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### CERAMIC Miniature Disc

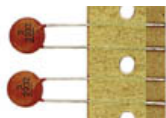
A large range of miniature disc ceramic capacitors offering a choice of dielectric stability & permittivity.

Temperature Compensated Range - Low K Dielectric NPO & N150. Low loss, close tolerance, high stability for use where a controlled change in capacitance with temperature is required.

Coupling & By-pass Range - Medium & High K Dielectric Y5P & Y5V. High permittivity capacitors for coupling and by-pass applications or frequency discriminating circuits where low losses and high stability are not of major importance.

#### Technical Specification

|                             |  |
|-----------------------------|--|
| Capacitance Range           | 1.0pF to 0.1µF   |
| Working Voltage             | 100V dc (0.047µF 50v, 0.1µF 50v)   |
| Capacitance Tolerance       | 1.0 - 4.7pF 0.25pF<br>5.6 - 8.2pF 0.5pF<br>10 - 82pF ±5%<br>100 - 4700pF ±10%<br>0.01 - 0.1µF -20/+80% |
| Operating Temperature Range | -25°C to +85°C   |
| Insulation Resistance       | ≥10,000MΩ (≥7,500MΩ C≥0.022µF)   |
| Dielectric Strength         | 250V (75V for 0.1µF)   |
| Body Colour                 | Brown  |
| Dielectric Tip Indicator    | NPO - Black, N150 - Orange   |



| Order Code              |                     | 1+   | 25+    | 50+    | 100+   | 500+   |
|-------------------------|---------------------|------|--------|--------|--------|--------|
| Low K Dielectric NPO    |                     |      |        |        |        |        |
| 872-001                 | 1.0pf 100V 5.0mmØ   | 0.05 | 0.0360 | 0.0240 | 0.0120 | 0.0096 |
| 872-003                 | 1.5pf 100V 5.0mmØ   | 0.05 | 0.0336 | 0.0224 | 0.0112 | 0.0090 |
| 872-004                 | 1.8pf 100V 5.0mmØ   | 0.05 | 0.0360 | 0.0240 | 0.0120 | 0.0096 |
| 872-005                 | 2.2pf 100V 5.0mmØ   | 0.05 | 0.0360 | 0.0240 | 0.0120 | 0.0096 |
| 872-006                 | 2.7pf 100V 5.0mmØ   | 0.05 | 0.0366 | 0.0244 | 0.0122 | 0.0098 |
| 872-007                 | 3.3pf 100V 5.0mmØ   | 0.05 | 0.0366 | 0.0244 | 0.0122 | 0.0098 |
| 872-008                 | 3.9pf 100V 5.0mmØ   | 0.05 | 0.0458 | 0.0366 | 0.0293 | 0.0256 |
| 872-009                 | 4.7pf 100V 5.0mmØ   | 0.05 | 0.0360 | 0.0240 | 0.0120 | 0.0096 |
| 872-010                 | 5.6pf 100V 5.0mmØ   | 0.05 | 0.0360 | 0.0240 | 0.0120 | 0.0096 |
| 872-011                 | 6.8pf 100V 5.0mmØ   | 0.05 | 0.0360 | 0.0240 | 0.0120 | 0.0096 |
| 872-012                 | 8.2pf 100V 5.0mmØ   | 0.05 | 0.0360 | 0.0240 | 0.0120 | 0.0096 |
| 872-013                 | 10pf 100V 5.0mmØ    | 0.07 | 0.0504 | 0.0336 | 0.0168 | 0.0134 |
| 872-014                 | 12pf 100V 5.0mmØ    | 0.05 | 0.0360 | 0.0240 | 0.0120 | 0.0096 |
| 872-015                 | 15pf 100V 5.0mmØ    | 0.05 | 0.0360 | 0.0240 | 0.0120 | 0.0096 |
| 872-016                 | 18pf 100V 5.0mmØ    | 0.05 | 0.0360 | 0.0240 | 0.0120 | 0.0096 |
| 872-017                 | 22pf 100V 5.0mmØ    | 0.05 | 0.0336 | 0.0224 | 0.0112 | 0.0090 |
| 872-018                 | 27pf 100V 5.0mmØ    | 0.05 | 0.0360 | 0.0240 | 0.0120 | 0.0096 |
| 872-019                 | 33pf 100V 5.0mmØ    | 0.05 | 0.0396 | 0.0264 | 0.0132 | 0.0106 |
| 872-020                 | 39pf 100V 5.0mmØ    | 0.05 | 0.0360 | 0.0240 | 0.0120 | 0.0096 |
| 872-021                 | 47pf 100V 5.0mmØ    | 0.05 | 0.0366 | 0.0244 | 0.0122 | 0.0098 |
| 872-022                 | 56pf 100V 6.0mmØ    | 0.07 | 0.0492 | 0.0328 | 0.0164 | 0.0131 |
| 872-023                 | 68pf 100V 6.0mmØ    | 0.07 | 0.0534 | 0.0356 | 0.0178 | 0.0142 |
| Low K Dielectric N150   |                     |      |        |        |        |        |
| 872-024                 | 82pf 100V 8.0mmØ    | 0.07 | 0.0534 | 0.0356 | 0.0178 | 0.0142 |
| Medium K Dielectric Y5P |                     |      |        |        |        |        |
| 872-025                 | 100pf 100V 5.0mmØ   | 0.04 | 0.0336 | 0.0224 | 0.0112 | 0.0090 |
| 872-026                 | 120pf 100V 5.0mmØ   | 0.05 | 0.0360 | 0.0240 | 0.0120 | 0.0096 |
| 872-027                 | 150pf 100V 5.0mmØ   | 0.04 | 0.0300 | 0.0200 | 0.0100 | 0.0080 |
| 872-028                 | 180pf 100V 5.0mmØ   | 0.05 | 0.0336 | 0.0224 | 0.0112 | 0.0090 |
| 872-029                 | 220pf 100V 5.0mmØ   | 0.05 | 0.0336 | 0.0224 | 0.0112 | 0.0090 |
| 872-030                 | 270pf 100V 5.0mmØ   | 0.04 | 0.0300 | 0.0200 | 0.0100 | 0.0080 |
| 872-031                 | 330pf 100V 5.0mmØ   | 0.05 | 0.0366 | 0.0244 | 0.0122 | 0.0098 |
| 872-032                 | 390pf 100V 5.0mmØ   | 0.05 | 0.0336 | 0.0224 | 0.0112 | 0.0090 |
| 872-033                 | 470pf 100V 5.0mmØ   | 0.05 | 0.0366 | 0.0244 | 0.0122 | 0.0098 |
| 872-034                 | 560pf 100V 5.0mmØ   | 0.05 | 0.0360 | 0.0240 | 0.0120 | 0.0096 |
| 872-035                 | 680pf 100V 5.0mmØ   | 0.04 | 0.0300 | 0.0200 | 0.0100 | 0.0080 |
| 872-036                 | 820pf 100V 5.0mmØ   | 0.05 | 0.0360 | 0.0240 | 0.0120 | 0.0096 |
| 872-037                 | 1000pf 100V 5.0mmØ  | 0.06 | 0.0504 | 0.0392 | 0.0280 | 0.0168 |
| 872-038                 | 1200pf 100V 5.0mmØ  | 0.05 | 0.0360 | 0.0240 | 0.0120 | 0.0096 |
| 872-039                 | 1500pf 100V 5.0mmØ  | 0.05 | 0.0336 | 0.0224 | 0.0112 | 0.0090 |
| 872-041                 | 2200pf 100V 6.0mmØ  | 0.05 | 0.0366 | 0.0244 | 0.0122 | 0.0098 |
| 872-042                 | 2700pf 100V 6.0mmØ  | 0.06 | 0.0420 | 0.0280 | 0.0140 | 0.0112 |
| 872-043                 | 3300pf 100V 7.0mmØ  | 0.08 | 0.0594 | 0.0396 | 0.0198 | 0.0158 |
| 872-044                 | 3900pf 100V 7.0mmØ  | 0.09 | 0.0672 | 0.0448 | 0.0224 | 0.0179 |
| 872-045                 | 4700pf 100V 8.0mmØ  | 0.08 | 0.0564 | 0.0376 | 0.0188 | 0.0150 |
| High K Dielectric Z5V   |                     |      |        |        |        |        |
| 872-049                 | 0.01µf 100V 6.0mmØ  | 0.05 | 0.0360 | 0.0240 | 0.0120 | 0.0096 |
| 872-053                 | 0.022µf 100V 8.5mmØ | 0.06 | 0.0480 | 0.0320 | 0.0160 | 0.0128 |
| 871-057                 | 0.047µf 50V 6.0mmØ  | 0.05 | 0.0416 | 0.0208 | 0.0166 | 0.0146 |
| 871-061                 | 0.1µf 50V 6.0mmØ    | 0.06 | 0.0420 | 0.0378 | 0.0336 | 0.0294 |

### High Voltage Ceramic Class Y3

Mains interference suppression capacitors, Y3 class radial lead. Suitable for across line (X2) applications. Flame retardant epoxy resin coated.

#### Technical Specification

|                             |                               |
|-----------------------------|-------------------------------|
| Capacitance Range           | 470pF to 3n3F                 |
| Capacitance Tolerance       | ±10% (Y5P), ±20% (Y5V)        |
| Temperature Coefficient     | ±10% (Y5P), +30 to -80% (Y5V) |
| Insulation Resistance       | ≥10,000MΩ                     |
| Voltage Rating              | 400Vac                        |
| Test Voltage                | 2600Vac                       |
| Operating Temperature Range | -25 to +85°C                  |



Lead Pitch 7.5mm (<2200pF)  
10mm (>3300pF)

| Order Code |                 | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|-----------------|------|--------|--------|--------|--------|
| 868-471    | 470pF Y5P 10mmØ | 0.12 | 0.0983 | 0.0786 | 0.0629 | 0.0550 |
| 868-102    | 1000pFY5V 10mmØ | 0.09 | 0.0773 | 0.0578 | 0.0462 | 0.0405 |
| 868-222    | 2200pFY5V 12mmØ | 0.09 | 0.0785 | 0.0628 | 0.0502 | 0.0440 |
| 868-332    | 3300pFY5V 15mmØ | 0.12 | 0.1033 | 0.0826 | 0.0661 | 0.0578 |

### Dipped Multilayer

A wide range of epoxy coated, multilayer ceramic capacitors, available in a choice of dielectrics.

**NPO (COG):** A Low K temperature compensation type. Extremely stable over wide variations of temperature, voltage, frequency and time. Very low dissipation factor. For use in precision timing, active & passive filtering, frequency setting and tuning circuits.

**X7R:** A Medium K semi-stable type offering greater volumetric efficiency. Suitable for by-pass, coupling and filtering in audio & video equipment, computers, telecommunications etc. i.e. where moderate capacitance variations are permissible and dissipation factor is not critical.

**Y5V/Z5U:** High K general purpose types for by-pass and decoupling applications where temperature stability is of no major importance. Offering the highest volumetric efficiency.

#### Technical Specification

|                             |  |
|-----------------------------|--|
| Capacitance Range           | 10pF to 1.0µF  |
| Working Voltage             | 100V dc  |
| Capacitance Tolerance       | NPO ±5% X7R ±10%<br>Y5U ±20% Z5V -20% +80%   |
| Operating Temperature Range | NPO, X7R -55°C to +125°C<br>Y5V, Z5U -25°C to +85°C  |
| Temperature Coefficient     | NPO ±30ppm/°C<br>X7R ±15% over -55°C to +125°C<br>Y5V +22%, -82% over -25°C to +85°C<br>Z5U +22%, -56% over +10°C to +85°C |
| Insulation Resistance       | NPO, X7R ≥100,000MΩ or 1000MΩ/µF<br>Y5V, Z5U ≥10,000MΩ or 100MΩ/µF   |
| Dissipation Factor          | whichever is less<br>NPO 0.1% max. at 1MHz, 1.2Vrms<br>X7R 2.5% max. at 1kHz, 0.2Vrms<br>Y5V, Z5U 4% max. at 1kHz, 0.1Vrms |
| Body Colour                 | Yellow   |



| Order Code                    |                       | 1+   | 25+    | 50+    | 100+   | 500+   |
|-------------------------------|-----------------------|------|--------|--------|--------|--------|
| 882-013                       | 10pF Low K NPO        | 0.07 | 0.0543 | 0.0362 | 0.0290 | 0.0253 |
| 882-017                       | 22pF Low K NPO        | 0.06 | 0.0474 | 0.0316 | 0.0284 | 0.0253 |
| 882-019                       | 33pF Low K NPO        | 0.08 | 0.0606 | 0.0404 | 0.0364 | 0.0323 |
| 882-020                       | 47pF Low K NPO        | 0.10 | 0.0840 | 0.0672 | 0.0538 | 0.0470 |
| 882-025                       | 100pF Low K NPO       | 0.08 | 0.0627 | 0.0418 | 0.0334 | 0.0293 |
| 882-029                       | 220pF Med K X7R       | 0.06 | 0.0480 | 0.0320 | 0.0256 | 0.0224 |
| 882-031                       | 330pF Med K X7R       | 0.08 | 0.0700 | 0.0560 | 0.0448 | 0.0392 |
| 882-033                       | 470pF Med K X7R       | 0.08 | 0.0700 | 0.0560 | 0.0448 | 0.0392 |
| 882-037                       | 1000pF Med K X7R      | 0.07 | 0.0543 | 0.0362 | 0.0290 | 0.0253 |
| 882-041                       | 2200pF Med K X7R      | 0.08 | 0.0675 | 0.0540 | 0.0432 | 0.0378 |
| 882-045                       | 4700pF Med K X7R      | 0.06 | 0.0478 | 0.0382 | 0.0306 | 0.0267 |
| 882-049                       | 0.01µF Med K X7R      | 0.06 | 0.0460 | 0.0368 | 0.0294 | 0.0258 |
| 882-053                       | 0.022µF High K Y5V    | 0.06 | 0.0468 | 0.0374 | 0.0299 | 0.0262 |
| 882-055                       | 0.033µF High K Y5V    | 0.06 | 0.0505 | 0.0404 | 0.0323 | 0.0283 |
| 882-057                       | 0.047µF High K Y5V    | 0.07 | 0.0575 | 0.0460 | 0.0368 | 0.0322 |
| 882-061                       | 0.10µF High K Y5V     | 0.05 | 0.0373 | 0.0298 | 0.0238 | 0.0209 |
| 882-065                       | 0.22µF High K Y5V     | 0.11 | 0.0878 | 0.0702 | 0.0562 | 0.0491 |
| 882-067                       | 0.33µF High K Z5U     | 0.21 | 0.1750 | 0.1400 | 0.1120 | 0.0980 |
| 882-069                       | 0.47µF High K Z5U     | 0.23 | 0.1910 | 0.1528 | 0.1222 | 0.1070 |
| 882-073                       | 1.0µF High K Z5U      | 0.37 | 0.2960 | 0.2664 | 0.2368 | 0.2072 |
| As above series but 5mm Pitch |                       |      |        |        |        |        |
| 883-049                       | 0.01µF Med K X7R 5mm  | 0.08 | 0.0560 | 0.0448 | 0.0358 | 0.0314 |
| 883-061                       | 0.10µF High K Y5V 5mm | 0.08 | 0.0591 | 0.0394 | 0.0315 | 0.0276 |

### CERAMIC

#### Axial Multilayer

A wide range of Axial Lead, epoxy coated, multilayer ceramic capacitors, available in a choice of dielectrics. See Dipped Multilayer ceramics for dielectric descriptions.

#### Technical Specification

|  |   |
|--|---|
| Capacitance Range                            | 10pF to 1.0μF   |
| Working Voltage                              | 100V dc   |
| Capacitance Tolerance                        | NPO ±5% X7R & Z5U ±10%  |
| Operating Temperature Range                  | NPO, X7R -55°C to +125°C<br>Z5U -25°C to +85°C<br>NPO ±30ppm/°C   |
| Temperature Coefficient                      | X7R ±15% over -55°C to +125°C<br>Z5U +22%, -56% over +10°C to +85°C<br>NPO, X7R ≥100,000MΩ or 1000MΩ/μF<br>Z5U ≥10,000MΩ or 100MΩ/μF<br>NPO 0.15% max. at 1MHz, 1Vrms<br>X7R 2.5% max. at 1KHz, 1Vrms<br>Z5U 5% max. at 1KHz, 0.5Vrms |
| Insulation Resistance<br>(whichever is less) |   |
| Dissipation Factor                           | Yellow  |
| Body Colour                                  |   |



Dims L x Dia.  
10pF-0.047μF 3.5 x 2.5mm  
0.1-1.0μF 5.0 x 3.0mm

| Order Code |                   | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|-------------------|------|--------|--------|--------|--------|
| 884-013    | 10pF Low K NPO    | 0.11 | 0.0722 | 0.0650 | 0.0578 | 0.0505 |
| 884-017    | 22pF Low K NPO    | 0.09 | 0.0510 | 0.0459 | 0.0408 | 0.0357 |
| 884-020    | 47pF Low K NPO    | 0.07 | 0.0400 | 0.0360 | 0.0320 | 0.0280 |
| 884-025    | 100pF Low K NPO   | 0.09 | 0.0524 | 0.0472 | 0.0419 | 0.0367 |
| 884-029    | 220pF Low K NPO   | 0.07 | 0.0565 | 0.0452 | 0.0407 | 0.0362 |
| 884-033    | 470pF Low K NPO   | 0.09 | 0.0500 | 0.0450 | 0.0400 | 0.0350 |
| 884-037    | 1000pF Med K X7R  | 0.07 | 0.0400 | 0.0360 | 0.0320 | 0.0280 |
| 884-041    | 2200pF Med K X7R  | 0.07 | 0.0400 | 0.0360 | 0.0320 | 0.0280 |
| 884-045    | 4700pF Med K X7R  | 0.07 | 0.0410 | 0.0369 | 0.0328 | 0.0287 |
| 884-049    | 0.01μF Med K X7R  | 0.08 | 0.0452 | 0.0407 | 0.0362 | 0.0316 |
| 884-053    | 0.022μF Med K X7R | 0.09 | 0.0520 | 0.0468 | 0.0416 | 0.0364 |
| 884-057    | 0.047μF Med K X7R | 0.14 | 0.0772 | 0.0695 | 0.0618 | 0.0540 |
| 884-061    | 0.10μF Med K X7R  | 0.14 | 0.0864 | 0.0576 | 0.0461 | 0.0403 |
| 884-069    | 0.47μF High K Z5U | 0.22 | 0.1240 | 0.1116 | 0.0992 | 0.0868 |
| 884-073    | 1.0μF High K Z5U  | 0.32 | 0.2160 | 0.1944 | 0.1728 | 0.1512 |

### POLYESTER FILM (MYLAR)

Low cost polyester film capacitors coated with epoxy resin to ensure excellent capacitance stability and protection against humidity. Solvent resistant. For general purpose use.

#### Technical Specification

|                             |                |
|-----------------------------|----------------|
| Capacitance Range           | 6.8F & 15nF    |
| Working Voltage             | 100Vdc (35Vac) |
| Capacitance Tolerance       | ±5%            |
| Operating Temperature Range | -40°C to +85°C |
| Insulation Resistance       | ≥30,000MΩ      |
| Dissipation Factor          | ≤1% at 1kHz    |
| Body Colour                 | Green          |



Value Pitch  
6.8nF 4.0mm  
15nF 4.5mm

| Order Code | W x H x D                 | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|---------------------------|------|--------|--------|--------|--------|
| 892-047    | 6800pF 6.5 x 11.5 x 4.0mm | 0.06 | 0.0360 | 0.0240 | 0.0192 | 0.0168 |
| 892-051    | 15nF 7.5 x 12 x 4.5mm     | 0.07 | 0.0405 | 0.0270 | 0.0216 | 0.0189 |

### PLASTIC FILM

Axial lead MKT plastic film "Audio Grade" capacitors suitable for use in high end loudspeaker crossover networks.

#### Technical Specification

|                       |                |
|-----------------------|----------------|
| Capacitance Range     | 0.22μF to 68μF |
| Working Voltage       | 250V           |
| Capacitance Tolerance | ±5%            |



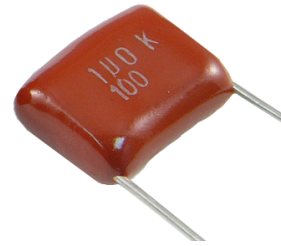
| Order Code | Pitch             | Order Code | 1+    | 10+    |
|------------|-------------------|------------|-------|--------|
| 850-224    | 0.22μF 250V 30mm  | 850-224    | 0.85  | 0.7462 |
| 850-334    | 0.33μF 250V 30mm  | 850-334    | 0.84  | 0.7336 |
| 850-474    | 0.47μF 250V 30mm  | 850-474    | 0.88  | 0.7699 |
| 850-684    | 0.68μF 250V 30mm  | 850-684    | 0.88  | 0.7700 |
| 850-105    | 1.0μF 250V 30mm   | 850-105    | 0.98  | 0.8540 |
| 850-155    | 1.5μF 250V 30mm   | 850-155    | 0.93  | 0.8120 |
| 850-225    | 2.2μF 250V 30mm   | 850-225    | 1.02  | 0.8940 |
| 850-335    | 3.3μF 250V 30mm   | 850-335    | 1.29  | 1.1259 |
| 850-475    | 4.7μF 250V 30mm   | 850-475    | 1.56  | 1.3608 |
| 850-685    | 6.8μF 250V 37.5mm | 850-685    | 2.03  | 1.7685 |
| 850-106    | 10μF 250V 37.5mm  | 850-106    | 2.51  | 2.1870 |
| 850-156    | 15μF 250V 37.5mm  | 850-156    | 3.44  | 3.3176 |
| 850-226    | 22μF 250V 42.5mm  | 850-226    | 5.03  | 4.6670 |
| 850-336    | 33μF 250V 42.5mm  | 850-336    | 7.31  | 6.7860 |
| 850-476    | 47μF 250V 52.5mm  | 850-476    | 9.53  | 8.8465 |
| 850-686    | 68μF 250V 52.5mm  | 850-686    | 13.62 | 10.220 |

**POLYESTER  
Dipped**

A range of dipped capacitors, industry compatible and suitable for general applications. Metallised polyester (PETP) film dielectric. Covered by a protective epoxy resin coating. Flame retardant, moisture repellent and solvent resistant. Leads are cropped and pre-formed to standard pitch spacing.

**Technical Specification**

|                             |  |
|-----------------------------|--|
| Capacitance Range           | 10nF to 2.2µF  |
| Working Voltage             | 100Vdc (63Vac)<br>250Vdc (160Vac)<br>400Vdc (220Vac)   |
| Capacitance Tolerance       | ±10%   |
| Operating Temperature Range | -40°C to +85°C   |
| Insulation Resistance or    | ≥7500MΩ (V>100Vdc)<br>≥3750MΩ (V=100Vdc)<br>≥2500 Sec. (V>100Vdc, C>330nF)<br>≥1250 Sec. (V=100Vdc, C>330nF) |
| Time Constant               |  |
| Dissipation Factor          | 1% at 1kHz   |
| Body Colour                 | Orange   |



| Order Code | Value | Voltage | Dimensions (mm) |      |      | Pitch (mm) |
|------------|-------|---------|-----------------|------|------|------------|
|            |       |         | W               | H    | D    |            |
| 846-065    | 220nF | 100V    | 13.0            | 13.0 | 5.5  | 10.0       |
| 846-069    | 470nF | 100V    | 18.0            | 14.5 | 6.0  | 15.0       |
| 846-073    | 1.0µF | 100V    | 18.0            | 17.0 | 7.5  | 15.0       |
| 846-077    | 2.2µF | 100V    | 26.0            | 20.0 | 8.0  | 22.5       |
| 847-057    | 47nF  | 250V    | 13.0            | 12.0 | 4.5  | 10.0       |
| 847-059    | 68nF  | 250V    | 13.0            | 12.5 | 5.0  | 10.0       |
| 847-061    | 100nF | 250V    | 13.0            | 13.0 | 5.0  | 10.0       |
| 847-065    | 220nF | 250V    | 18.0            | 15.0 | 6.0  | 15.0       |
| 847-067    | 330nF | 250V    | 18.0            | 16.0 | 7.0  | 15.0       |
| 847-069    | 470nF | 250V    | 26.0            | 17.5 | 5.5  | 22.5       |
| 847-071    | 680nF | 250V    | 26.0            | 18.5 | 6.5  | 22.5       |
| 847-073    | 1.0µF | 250V    | 26.0            | 19.5 | 7.5  | 22.5       |
| 847-077    | 2.2µF | 250V    | 30.0            | 22.5 | 10.5 | 27.5       |
| 848-049    | 10nF  | 400V    | 13.0            | 12.0 | 4.5  | 10.0       |
| 848-053    | 22nF  | 400V    | 13.0            | 12.0 | 4.5  | 10.0       |
| 848-055    | 33nF  | 400V    | 13.0            | 12.5 | 5.0  | 10.0       |
| 848-057    | 47nF  | 400V    | 18.0            | 14.0 | 5.0  | 15.0       |
| 848-059    | 68nF  | 400V    | 18.0            | 14.0 | 5.0  | 15.0       |
| 848-061    | 100nF | 400V    | 18.0            | 15.0 | 6.0  | 15.0       |
| 848-065    | 220nF | 400V    | 26.0            | 18.0 | 6.0  | 22.5       |
| 848-069    | 470nF | 400V    | 26.0            | 20.5 | 8.0  | 22.5       |
| 848-071    | 680nF | 400V    | 30.0            | 20.5 | 8.5  | 27.5       |

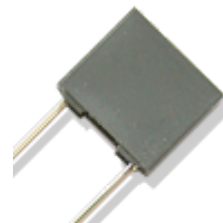
| Order Code |            | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------------|------|--------|--------|--------|--------|
| 846-065    | 220nF 100V | 0.26 | 0.2155 | 0.1724 | 0.1379 | 0.1207 |
| 846-069    | 470nF 100V | 0.19 | 0.1610 | 0.1288 | 0.1030 | 0.0902 |
| 846-073    | 1.0µF 100V | 0.28 | 0.2350 | 0.1880 | 0.1504 | 0.1316 |
| 846-077    | 2.2µF 100V | 0.57 | 0.4775 | 0.3820 | 0.3056 | 0.2674 |
| 847-057    | 47nF 250V  | 0.11 | 0.0923 | 0.0738 | 0.0590 | 0.0517 |
| 847-059    | 68nF 250V  | 0.12 | 0.0963 | 0.0770 | 0.0616 | 0.0539 |
| 847-061    | 100nF 250V | 0.11 | 0.0935 | 0.0748 | 0.0598 | 0.0524 |
| 847-065    | 220nF 250V | 0.23 | 0.1880 | 0.1504 | 0.1203 | 0.1053 |
| 847-067    | 330nF 250V | 0.15 | 0.1290 | 0.1032 | 0.0826 | 0.0722 |
| 847-069    | 470nF 250V | 0.18 | 0.1475 | 0.1180 | 0.0944 | 0.0826 |
| 847-071    | 680nF 250V | 0.22 | 0.1798 | 0.1438 | 0.1150 | 0.1007 |
| 847-073    | 1.0µF 250V | 0.26 | 0.2150 | 0.1720 | 0.1376 | 0.1204 |
| 847-077    | 2.2µF 250V | 0.55 | 0.4603 | 0.3682 | 0.2946 | 0.2577 |
| 848-049    | 10nF 400V  | 0.15 | 0.1228 | 0.0982 | 0.0786 | 0.0687 |
| 848-053    | 22nF 400V  | 0.11 | 0.0935 | 0.0748 | 0.0598 | 0.0524 |
| 848-055    | 33nF 400V  | 0.11 | 0.0928 | 0.0742 | 0.0594 | 0.0519 |
| 848-057    | 47nF 400V  | 0.13 | 0.1080 | 0.0864 | 0.0691 | 0.0605 |
| 848-059    | 68nF 400V  | 0.13 | 0.1075 | 0.0860 | 0.0688 | 0.0602 |
| 848-061    | 100nF 400V | 0.14 | 0.1125 | 0.0900 | 0.0720 | 0.0630 |
| 848-065    | 220nF 400V | 0.19 | 0.1600 | 0.1280 | 0.1024 | 0.0896 |
| 848-069    | 470nF 400V | 0.27 | 0.2278 | 0.1822 | 0.1458 | 0.1275 |
| 848-071    | 680nF 400V | 0.33 | 0.2728 | 0.2182 | 0.1746 | 0.1527 |

**Boxed**

A wide range of metallised polyester capacitors, epoxy resin encapsulated in flame retardant plastic cases with integral standoff feet. A broad voltage and capacitance range is offered.

**Technical Specification**

|                             |   |
|-----------------------------|---|
| Capacitance Range           | 1.0nF to 2.2µF  |
| Working Voltage             | 63Vdc (40Vac)<br>100Vdc (63Vac)<br>250Vdc (160Vac)<br>400Vdc (200Vac) |
| Capacitance Tolerance       | ±10%  |
| Operating Temperature Range | -55°C to +85°C  |
| Insulation Resistance       | ≥10,000MΩ Vdc≤100V<br>≥30,000MΩ Vdc≥250V                              |
| Dissipation Factor          | ≤1% at 1kHz   |
| Body Colour                 | Cream/Yellow/Grey/Red   |



| Order Code | Value | Voltage | Dimensions (mm) |      |      | Pitch (mm) |
|------------|-------|---------|-----------------|------|------|------------|
|            |       |         | W               | H    | D    |            |
| 861-061    | 100nF | 63V     | 7.2             | 6.5  | 2.5  | 5.0        |
| 861-063    | 150nF | 63V     | 7.2             | 6.5  | 2.5  | 5.0        |
| 861-065    | 220nF | 63V     | 7.2             | 6.5  | 2.5  | 5.0        |
| 861-067    | 330nF | 63V     | 7.2             | 7.5  | 3.5  | 5.0        |
| 861-069    | 470nF | 63V     | 7.2             | 7.5  | 3.5  | 5.0        |
| 861-071    | 680nF | 63V     | 7.2             | 10.0 | 5.0  | 5.0        |
| 861-073    | 1.0µF | 63V     | 7.5             | 8.0  | 5.0  | 5.0        |
| 861-077    | 2.2µF | 63V     | 18.0            | 12.0 | 6.0  | 15.0       |
| 862-037    | 1.0nF | 100V    | 7.5             | 6.5  | 2.5  | 5.0        |
| 862-039    | 1.5nF | 100V    | 7.2             | 6.5  | 2.5  | 5.0        |
| 862-041    | 2.2nF | 100V    | 7.2             | 6.5  | 2.5  | 5.0        |
| 862-043    | 3.3nF | 100V    | 7.2             | 6.5  | 2.5  | 5.0        |
| 862-045    | 4.7nF | 100V    | 7.2             | 6.5  | 2.5  | 5.0        |
| 862-047    | 6.8nF | 100V    | 7.2             | 6.5  | 2.5  | 5.0        |
| 862-049    | 10nF  | 100V    | 7.2             | 6.5  | 2.5  | 5.0        |
| 862-051    | 15nF  | 100V    | 7.2             | 6.5  | 2.5  | 5.0        |
| 862-055    | 33nF  | 100V    | 7.2             | 6.5  | 2.5  | 5.0        |
| 862-057    | 47nF  | 100V    | 7.2             | 6.5  | 2.5  | 5.0        |
| 862-059    | 68nF  | 100V    | 7.2             | 6.5  | 3.0  | 5.0        |
| 862-061    | 100nF | 100V    | 10.5            | 8.5  | 3.5  | 7.5        |
| 862-069    | 470nF | 100V    | 18.0            | 11.0 | 5.0  | 15.0       |
| 862-073    | 1.0µF | 100V    | 18.0            | 11.0 | 5.0  | 15.0       |
| 863-061    | 100nF | 250V    | 10.5            | 9.0  | 4.0  | 7.5        |
| 863-063    | 150nF | 250V    | 13.0            | 9.0  | 4.0  | 10.0       |
| 863-065    | 220nF | 250V    | 13.0            | 11.0 | 5.0  | 10.0       |
| 863-069    | 470nF | 250V    | 26.5            | 15.0 | 6.0  | 22.5       |
| 863-073    | 1.0µF | 250V    | 26.5            | 15.0 | 6.0  | 22.5       |
| 863-077    | 2.2µF | 250V    | 31.5            | 21.0 | 11.0 | 27.5       |
| 864-049    | 10nF  | 400V    | 10.0            | 7.0  | 2.5  | 7.5        |
| 864-053    | 22nF  | 400V    | 13.0            | 9.0  | 4.0  | 10.0       |
| 864-057    | 47nF  | 400V    | 18.0            | 11.0 | 5.0  | 15.0       |
| 864-061    | 100nF | 400V    | 18.0            | 12.5 | 6.0  | 15.0       |
| 864-065    | 220nF | 400V    | 26.5            | 15.0 | 6.0  | 22.5       |
| 864-073    | 1.0µF | 400V    | 32.0            | 17.0 | 9.0  | 27.5       |

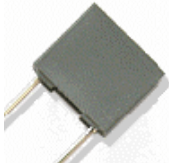
| Order Code |            | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------------|------|--------|--------|--------|--------|
| 861-061    | 100nF 63V  | 0.05 | 0.0393 | 0.0262 | 0.0210 | 0.0183 |
| 861-063    | 150nF 63V  | 0.14 | 0.1044 | 0.0696 | 0.0557 | 0.0487 |
| 861-065    | 220nF 63V  | 0.14 | 0.1193 | 0.0954 | 0.0763 | 0.0668 |
| 861-067    | 330nF 63V  | 0.18 | 0.1317 | 0.0878 | 0.0702 | 0.0615 |
| 861-069    | 470nF 63V  | 0.23 | 0.1804 | 0.1624 | 0.1443 | 0.1262 |
| 861-071    | 680nF 63V  | 0.39 | 0.3275 | 0.2620 | 0.2096 | 0.1834 |
| 861-073    | 1.0µF 63V  | 0.31 | 0.2500 | 0.2250 | 0.2000 | 0.1750 |
| 861-077    | 2.2µF 63V  | 0.64 | 0.5320 | 0.4280 | 0.3424 | 0.2996 |
| 862-037    | 1.0nF 100V | 0.09 | 0.0679 | 0.0466 | 0.0373 | 0.0326 |
| 862-039    | 1.5nF 100V | 0.11 | 0.0861 | 0.0574 | 0.0459 | 0.0402 |
| 862-041    | 2.2nF 100V | 0.11 | 0.0798 | 0.0532 | 0.0426 | 0.0372 |
| 862-043    | 3.3nF 100V | 0.11 | 0.0861 | 0.0574 | 0.0459 | 0.0402 |
| 862-045    | 4.7nF 100V | 0.07 | 0.0552 | 0.0368 | 0.0294 | 0.0258 |
| 862-047    | 6.8nF 100V | 0.11 | 0.0798 | 0.0532 | 0.0426 | 0.0372 |
| 862-049    | 10nF 100V  | 0.07 | 0.0513 | 0.0342 | 0.0274 | 0.0239 |
| 862-051    | 15nF 100V  | 0.11 | 0.0798 | 0.0532 | 0.0426 | 0.0372 |
| 862-055    | 33nF 100V  | 0.05 | 0.0381 | 0.0254 | 0.0203 | 0.0178 |
| 862-057    | 47nF 100V  | 0.08 | 0.0600 | 0.0400 | 0.0320 | 0.0280 |
| 862-059    | 68nF 100V  | 0.06 | 0.0429 | 0.0286 | 0.0229 | 0.0200 |
| 862-061    | 100nF 100V | 0.19 | 0.1395 | 0.0930 | 0.0744 | 0.0651 |
| 862-069    | 470nF 100V | 0.27 | 0.2225 | 0.1780 | 0.1424 | 0.1246 |
| 862-073    | 1.0µF 100V | 0.41 | 0.3403 | 0.2722 | 0.2178 | 0.1905 |
| 863-061    | 100nF 250V | 0.20 | 0.1470 | 0.0980 | 0.0784 | 0.0686 |
| 863-063    | 150nF 250V | 0.20 | 0.1491 | 0.0994 | 0.0795 | 0.0696 |
| 863-065    | 220nF 250V | 0.19 | 0.1610 | 0.1288 | 0.1030 | 0.0902 |
| 863-069    | 470nF 250V | 0.35 | 0.2883 | 0.2306 | 0.1845 | 0.1614 |
| 863-073    | 1.0µF 250V | 0.46 | 0.3800 | 0.3040 | 0.2432 | 0.2128 |
| 863-077    | 2.2µF 250V | 0.93 | 0.8370 | 0.7440 | 0.6510 | 0.5813 |
| 864-049    | 10nF 400V  | 0.16 | 0.1170 | 0.0780 | 0.0624 | 0.0546 |
| 864-053    | 22nF 400V  | 0.16 | 0.1293 | 0.1034 | 0.0827 | 0.0724 |
| 864-057    | 47nF 400V  | 0.30 | 0.2400 | 0.2160 | 0.1920 | 0.1680 |
| 864-061    | 100nF 400V | 0.23 | 0.1808 | 0.1627 | 0.1446 | 0.1266 |
| 864-065    | 220nF 400V | 0.27 | 0.2160 | 0.1944 | 0.1728 | 0.1512 |
| 864-073    | 1.0µF 400V | 0.80 | 0.6364 | 0.5728 | 0.5091 | 0.4455 |

**POLYESTER****Class X2 Mains Suppression**

Metallised polyester capacitors designed for mains interference suppression and are suitable for connection across the mains supply, Class X2. Epoxy resin encapsulated in flame retardant plastic cases. Specifications meets with extensive European and world-wide approvals.

**Technical Specification**

|                             |   |
|-----------------------------|---|
| Capacitance Range           | 10nF to 1.0 $\mu$ F                                   |
| Capacitance Tolerance       | $\pm 20\%$  |
| Insulation Resistance or    | $\geq 30,000\text{M}\Omega$ ( $C \leq 330\text{nF}$ ) |
| Time Constant               | $\geq 10,000$ Sec. ( $C > 330\text{nF}$ )             |
| Working Voltage             | 275Vac  |
| Test Voltage                | 1800Vdc   |
| Operating Temperature Range | -40°C to +100°C                                       |
| Body Colour                 | Grey  |



|            |                              |
|------------|------------------------------|
| Dims:      | 18 x 11 x 5mm (10 to 47nF)   |
|            | 18 x 12 x 6mm (100nF)        |
|            | 26.5 x 16 x 7mm (220nF)      |
|            | 26.5 x 18.5 x 10mm (470nF)   |
|            | 32 x 22 x 13mm (1.0 $\mu$ F) |
| Lead Pitch | 15mm (10 to 100nF)           |
|            | 22.5mm (220 & 470nF)         |
|            | 27.5mm (1.0 $\mu$ F)         |

| Order Code |                      | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|----------------------|------|--------|--------|--------|--------|
| 867-049    | 10nF Class X2        | 0.20 | 0.1467 | 0.0998 | 0.0798 | 0.0699 |
| 867-053    | 22nF Class X2        | 0.16 | 0.1293 | 0.1034 | 0.0827 | 0.0724 |
| 867-055    | 33nF Class X2        | 0.18 | 0.1329 | 0.0886 | 0.0709 | 0.0620 |
| 867-057    | 47nF Class X2        | 0.17 | 0.1269 | 0.0846 | 0.0677 | 0.0592 |
| 867-061    | 100nF Class X2       | 0.17 | 0.1248 | 0.0832 | 0.0666 | 0.0582 |
| 867-065    | 220nF Class X2       | 0.30 | 0.2589 | 0.1726 | 0.1381 | 0.1208 |
| 867-069    | 470nF Class X2       | 0.51 | 0.4368 | 0.2912 | 0.2330 | 0.2038 |
| 867-073    | 1.0 $\mu$ F Class X2 | 0.75 | 0.6426 | 0.4284 | 0.3427 | 0.2999 |

**POLYSTYRENE**

Axial lead polystyrene capacitors which offer good capacitance stability, high insulation resistance and a low dissipation factor. Suitable for use in tuned or timing circuits, filter networks etc.

**Technical Specification**

|                             |                              |
|-----------------------------|------------------------------|
| Capacitance Range           | 470 to 4700pF                |
| Working Voltage at 40°C     | 160Vdc (65Vac)               |
| Temperature Coefficient     | -250ppm/°C                   |
| Operating Temperature Range | -25°C to +70°C               |
| Insulation Resistance       | $\geq 100,000\text{M}\Omega$ |
| Self Inductance             | 10nH max.                    |
| Dissipation Factor          | 0.1% at 1kHz                 |
| Body Colour                 | Silver                       |



|              |      |     |
|--------------|------|-----|
| Range        | L    | Dia |
| 470 - 1000pF | 11.5 | 4.7 |
| 4700pF       | 11.5 | 5.8 |

| Order Code |             | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|-------------|------|--------|--------|--------|--------|
| 840-033    | 470pF 160V  | 0.12 | 0.1000 | 0.0800 | 0.0640 | 0.0560 |
| 840-037    | 1000pF 160V | 0.12 | 0.1000 | 0.0800 | 0.0640 | 0.0560 |
| 840-045    | 4700pF 160V | 0.12 | 0.1000 | 0.0800 | 0.0640 | 0.0560 |

**TANTALUM****Solid Bead**

Miniature resin dipped solid bead tantalum capacitors suitable for applications requiring high performance and reliability.

**Technical Specification**

|                             |   |
|-----------------------------|---|
| Capacitance Range           | 0.1 to 330 $\mu$ F                              |
| Capacitance Tolerance       | $\pm 20\%$                                      |
| Operating Temperature Range | -55°C to +85°C                                  |
| Dissipation Factor          | $\leq 4\%$ up to 1.5 $\mu$ F                    |
|                             | $\leq 6\%$ 2.2 to 6.8 $\mu$ F                   |
|                             | $\leq 8\%$ 10 to 47 $\mu$ F                     |
|                             | $\leq 10\%$ 100 $\mu$ F & above                 |
| Leakage Current             | $\leq 0.008\text{CV}$ or 0.5 $\mu$ A if greater |
| Body Colour                 | Gold  |



Pitch 2.5mm except...  
832-107 which is 5mm

| Value        | L x Dia    | Order Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|--------------|------------|------------|------|--------|--------|--------|--------|
| 6.3V Working |            |            |      |        |        |        |        |
| 6.8 $\mu$ F  | 7.0 x 4.5  | 830-083    | 0.11 | 0.0935 | 0.0748 | 0.0598 | 0.0524 |
| 10 $\mu$ F   | 7.0 x 4.5  | 830-106    | 0.18 | 0.1400 | 0.1260 | 0.1120 | 0.0980 |
| 47 $\mu$ F   | 10 x 6.0   | 830-476    | 0.23 | 0.1828 | 0.1645 | 0.1462 | 0.1280 |
| 10V Working  |            |            |      |        |        |        |        |
| 4.7 $\mu$ F  | 7.0 x 4.5  | 831-475    | 0.10 | 0.0760 | 0.0684 | 0.0608 | 0.0532 |
| 10 $\mu$ F   | 8.5 x 5.0  | 831-106    | 0.15 | 0.1160 | 0.1044 | 0.0928 | 0.0812 |
| 47 $\mu$ F   | 10 x 6.5   | 831-476    | 0.48 | 0.3800 | 0.3420 | 0.3040 | 0.2660 |
| 16V Working  |            |            |      |        |        |        |        |
| 2.2 $\mu$ F  | 7.0 x 4.5  | 832-225    | 0.10 | 0.0760 | 0.0684 | 0.0608 | 0.0532 |
| 4.7 $\mu$ F  | 7.5 x 4.5  | 832-475    | 0.14 | 0.1100 | 0.0990 | 0.0880 | 0.0770 |
| 6.8 $\mu$ F  | 8.5 x 5.0  | 832-083    | 0.25 | 0.2032 | 0.1829 | 0.1626 | 0.1422 |
| 10 $\mu$ F   | 9.0 x 5.5  | 832-106    | 0.24 | 0.2160 | 0.1920 | 0.1680 | 0.1500 |
| 15 $\mu$ F   | 9.0 x 5.5  | 832-086    | 0.25 | 0.2090 | 0.1672 | 0.1338 | 0.1170 |
| 22 $\mu$ F   | 10 x 6.0   | 832-226    | 0.38 | 0.3000 | 0.2700 | 0.2400 | 0.2100 |
| 33 $\mu$ F   | 10 x 6.0   | 832-336    | 0.27 | 0.2120 | 0.1908 | 0.1696 | 0.1484 |
| 47 $\mu$ F   | 12 x 8.0   | 832-476    | 0.44 | 0.3540 | 0.3186 | 0.2832 | 0.2478 |
| 25V Working  |            |            |      |        |        |        |        |
| 2.2 $\mu$ F  | 7.0 x 4.5  | 833-225    | 0.13 | 0.1170 | 0.1040 | 0.0910 | 0.0813 |
| 3.3 $\mu$ F  | 7.5 x 4.5  | 833-335    | 0.21 | 0.1700 | 0.1530 | 0.1360 | 0.1190 |
| 4.7 $\mu$ F  | 8.5 x 5.0  | 833-475    | 0.24 | 0.1900 | 0.1710 | 0.1520 | 0.1330 |
| 6.8 $\mu$ F  | 9.0 x 5.0  | 833-685    | 0.17 | 0.1380 | 0.1242 | 0.1104 | 0.0966 |
| 10 $\mu$ F   | 9.0 x 5.5  | 833-106    | 0.21 | 0.1680 | 0.1512 | 0.1344 | 0.1176 |
| 22 $\mu$ F   | 10.5 x 7.0 | 833-226    | 0.58 | 0.4620 | 0.4158 | 0.3696 | 0.3234 |
| 33 $\mu$ F   | 12 x 8.0   | 833-336    | 0.70 | 0.5560 | 0.5004 | 0.4448 | 0.3892 |
| 35V Working  |            |            |      |        |        |        |        |
| 0.1 $\mu$ F  | 7.0 x 4.5  | 834-104    | 0.09 | 0.0810 | 0.0720 | 0.0630 | 0.0563 |
| 0.22 $\mu$ F | 7.0 x 4.5  | 834-224    | 0.15 | 0.1200 | 0.1080 | 0.0960 | 0.0840 |
| 0.33 $\mu$ F | 7.0 x 4.5  | 834-334    | 0.15 | 0.1200 | 0.1080 | 0.0960 | 0.0840 |
| 0.47 $\mu$ F | 7.0 x 4.5  | 834-474    | 0.12 | 0.1000 | 0.0800 | 0.0720 | 0.0640 |
| 0.68 $\mu$ F | 7.0 x 4.5  | 834-071    | 0.12 | 0.0968 | 0.0774 | 0.0619 | 0.0542 |
| 1.0 $\mu$ F  | 7.0 x 4.5  | 834-105    | 0.10 | 0.0800 | 0.0720 | 0.0640 | 0.0560 |
| 2.2 $\mu$ F  | 7.0 x 4.5  | 834-225    | 0.12 | 0.0940 | 0.0846 | 0.0752 | 0.0658 |
| 3.3 $\mu$ F  | 8.5 x 5.0  | 834-079    | 0.20 | 0.1600 | 0.1440 | 0.1280 | 0.1120 |
| 4.7 $\mu$ F  | 8.5 x 5.5  | 834-475    | 0.21 | 0.1680 | 0.1512 | 0.1344 | 0.1170 |
| 10 $\mu$ F   | 10 x 6.0   | 834-106    | 0.50 | 0.4000 | 0.3600 | 0.3200 | 0.2800 |
| 50V Working  |            |            |      |        |        |        |        |
| 1.5 $\mu$ F  | 0.9 x 5.0  | 835-075    | 0.21 | 0.1384 | 0.1246 | 0.1107 | 0.0969 |
| 3.3 $\mu$ F  | 10 x 6.0   | 835-079    | 0.27 | 0.2182 | 0.1964 | 0.1746 | 0.1527 |



**RADIAL ELECTROLYTIC****Sub-miniature 85 °C**

Radial lead, sub-miniature aluminium electrolytic capacitors. With a low profile, only 7mm high, they are ideal for applications where space is limited.



| Value<br>µF | Voltage<br>Vdc | Surge | Ripple<br>mA | Dim.(mm)<br>L Dia | Pitch<br>(mm) |
|-------------|----------------|-------|--------------|-------------------|---------------|
| 22          | 10             | 13    | 35           | 7.0 5.0           | 2.0           |
| 47          | 10             | 13    | 60           | 7.0 6.3           | 2.5           |
| 100         | 10             | 13    | 105          | 7.0 6.3           | 2.5           |
| 10          | 16             | 20    | 25           | 7.0 4.0           | 1.5           |
| 22          | 16             | 20    | 40           | 7.0 5.0           | 2.0           |
| 47          | 16             | 20    | 70           | 7.0 6.3           | 2.5           |
| 100         | 16             | 20    | 120          | 7.0 6.3           | 2.5           |
| 10          | 25             | 32    | 25           | 7.0 5.0           | 1.5           |
| 22          | 25             | 32    | 40           | 7.0 6.3           | 2.0           |
| 33          | 25             | 32    | 70           | 7.0 6.3           | 2.5           |
| 4.7         | 35             | 44    | 20           | 7.0 4.0           | 1.5           |
| 10          | 35             | 44    | 30           | 7.0 5.0           | 2.0           |
| 22          | 35             | 44    | 55           | 7.0 6.3           | 2.5           |
| 0.1         | 63             | 79    | 5            | 7.0 4.0           | 1.5           |
| 0.22        | 63             | 79    | 8            | 7.0 4.0           | 1.5           |
| 0.33        | 63             | 79    | 10           | 7.0 4.0           | 1.5           |
| 0.47        | 63             | 79    | 10           | 7.0 4.0           | 1.5           |
| 1.0         | 63             | 79    | 15           | 7.0 4.0           | 1.5           |
| 2.2         | 63             | 79    | 20           | 7.0 4.0           | 1.5           |

**Standard 85 °C**

Radial lead aluminium electrolytic capacitors. Manufactured to high levels of quality and reliability, endurance is greater than 2000 Hours at 85°C.



| Value<br>µF | Voltage<br>Vdc | Surge | Ripple<br>mA | Dim.(mm)<br>L Dia | Pitch<br>(mm) |
|-------------|----------------|-------|--------------|-------------------|---------------|
| 10          | 16             | 20    | 60           | 11.0 5.0          | 2.0           |
| 22          | 16             | 20    | 55           | 11.0 5.0          | 2.0           |
| 33          | 16             | 20    | 70           | 11.0 5.0          | 2.0           |
| 47          | 16             | 20    | 80           | 11.0 5.0          | 2.0           |
| 100         | 16             | 20    | 140          | 11.0 6.3          | 2.5           |
| 220         | 16             | 20    | 240          | 11.5 8.0          | 3.5           |
| 330         | 16             | 20    | 300          | 11.5 8.0          | 3.5           |
| 470         | 16             | 20    | 420          | 12.5 10.0         | 5.0           |
| 1000        | 16             | 20    | 740          | 25.0 16.0         | 7.5           |
| 2200        | 16             | 20    | 1200         | 25.0 12.5         | 5.0           |
| 4700        | 16             | 20    | 2100         | 31.5 16.0         | 7.5           |
| 10          | 25             | 32    | 50           | 11.0 5.0          | 2.0           |
| 22          | 25             | 32    | 60           | 11.0 5.0          | 2.0           |
| 47          | 25             | 32    | 90           | 11.0 5.0          | 2.0           |
| 100         | 25             | 32    | 150          | 11.0 6.3          | 2.5           |
| 220         | 25             | 32    | 260          | 11.5 8.0          | 3.5           |
| 470         | 25             | 32    | 500          | 16.0 10.0         | 5.0           |
| 1000        | 25             | 32    | 910          | 20.0 12.5         | 5.0           |
| 2200        | 25             | 32    | 1500         | 25.0 16.0         | 7.5           |
| 3300        | 25             | 32    | 1900         | 31.5 16.0         | 7.5           |
| 4700        | 25             | 32    | 2450         | 35.5 18.0         | 7.5           |
| 4.7         | 40             | 50    | 30           | 11.0 5.0          | 2.0           |
| 10          | 40             | 50    | 45           | 11.0 5.0          | 2.0           |
| 22          | 40             | 50    | 60           | 11.0 5.0          | 2.0           |
| 33          | 40             | 50    | 90           | 11.0 5.0          | 2.0           |
| 47          | 40             | 50    | 100          | 11.0 6.3          | 2.5           |
| 100         | 40             | 50    | 200          | 11.5 8.0          | 3.5           |
| 220         | 40             | 50    | 360          | 12.5 10.0         | 5.0           |
| 330         | 40             | 50    | 500          | 16.0 10.0         | 5.0           |
| 470         | 40             | 50    | 620          | 20.0 10.0         | 5.0           |
| 1000        | 40             | 50    | 1040         | 25.0 12.5         | 5.0           |
| 2200        | 40             | 50    | 1900         | 31.5 16.0         | 7.5           |
| 0.1         | 63             | 79    | 5            | 11.0 5.0          | 2.0           |
| 0.47        | 63             | 79    | 10           | 11.0 5.0          | 2.0           |
| 1.0         | 63             | 79    | 15           | 11.0 5.0          | 2.0           |
| 2.2         | 63             | 79    | 20           | 11.0 5.0          | 2.0           |
| 4.7         | 63             | 79    | 35           | 11.0 5.0          | 2.0           |
| 10          | 63             | 79    | 50           | 11.0 5.0          | 2.0           |
| 22          | 63             | 79    | 85           | 11.0 6.3          | 2.5           |
| 47          | 63             | 79    | 150          | 11.5 8.0          | 3.5           |
| 100         | 63             | 79    | 260          | 12.5 10.0         | 5.0           |
| 220         | 63             | 79    | 460          | 20.0 10.0         | 5.0           |
| 470         | 63             | 79    | 850          | 25.0 12.5         | 5.0           |
| 1000        | 63             | 79    | 1550         | 31.5 16.0         | 7.5           |
| 1.0         | 100            | 125   | 15           | 11.0 5.0          | 2.0           |
| 4.7         | 100            | 125   | 35           | 11.0 5.0          | 2.0           |
| 10          | 100            | 125   | 60           | 11.0 6.3          | 2.5           |
| 22          | 100            | 125   | 110          | 11.5 8.0          | 3.5           |
| 47          | 100            | 125   | 210          | 16.0 10.0         | 5.0           |
| 100         | 100            | 125   | 380          | 20.0 12.5         | 5.0           |

**Technical Specification**

Capacitance Range  
Capacitance Tolerance  
Operating Temperature Range  
Dissipation Factor

Leakage Current  
Body Colour

100nF to 100µF  
±20% at 120Hz, 25°C  
-40°C to +85°C  
Vdc 10 16 25 35 63  
Tanδ 0.20 0.16 0.14 0.12 0.08  
≤0.01CV or 3µA if greater  
Black

| Value<br>µF | Order<br>Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|-------------|---------------|------|--------|--------|--------|--------|
| 22          | 784-088       | 0.08 | 0.0570 | 0.0380 | 0.0304 | 0.0266 |
| 47          | 784-092       | 0.10 | 0.0741 | 0.0494 | 0.0395 | 0.0346 |
| 100         | 784-096       | 0.09 | 0.0690 | 0.0460 | 0.0368 | 0.0322 |
| 10          | 785-085       | 0.05 | 0.0360 | 0.0240 | 0.0192 | 0.0168 |
| 22          | 785-088       | 0.07 | 0.0531 | 0.0354 | 0.0283 | 0.0248 |
| 47          | 785-092       | 0.08 | 0.0570 | 0.0380 | 0.0304 | 0.0266 |
| 100         | 785-096       | 0.08 | 0.0636 | 0.0424 | 0.0339 | 0.0297 |
| 10          | 786-085       | 0.07 | 0.0540 | 0.0360 | 0.0288 | 0.0252 |
| 22          | 786-088       | 0.05 | 0.0408 | 0.0272 | 0.0218 | 0.0190 |
| 33          | 786-090       | 0.10 | 0.0720 | 0.0480 | 0.0384 | 0.0336 |
| 4.7         | 787-081       | 0.04 | 0.0315 | 0.0210 | 0.0168 | 0.0147 |
| 10          | 787-085       | 0.06 | 0.0471 | 0.0314 | 0.0251 | 0.0220 |
| 22          | 787-088       | 0.08 | 0.0630 | 0.0420 | 0.0336 | 0.0294 |
| 0.1         | 788-061       | 0.07 | 0.0540 | 0.0360 | 0.0288 | 0.0252 |
| 0.22        | 788-065       | 0.07 | 0.0534 | 0.0356 | 0.0285 | 0.0249 |
| 0.33        | 788-067       | 0.07 | 0.0510 | 0.0340 | 0.0272 | 0.0238 |
| 0.47        | 788-069       | 0.04 | 0.0315 | 0.0210 | 0.0168 | 0.0147 |
| 1.0         | 788-073       | 0.06 | 0.0423 | 0.0282 | 0.0226 | 0.0197 |
| 2.2         | 788-077       | 0.07 | 0.0540 | 0.0360 | 0.0288 | 0.0252 |

**Technical Specification**

Capacitance Range  
Capacitance Tolerance  
Operating Temperature Range  
Dissipation Factor

Leakage Current  
Body Colour

470nF to 4700µF  
±20% at 120Hz, 25°C  
-40°C to +85°C  
Vdc 16 25 40 63 100  
Tanδ 0.16 0.14 0.10 0.09 0.08  
≤0.01CV or 3µA if greater  
Black

| Value<br>µF | Order<br>Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|-------------|---------------|------|--------|--------|--------|--------|
| 10          | 805-085       | 0.05 | 0.0339 | 0.0226 | 0.0181 | 0.0158 |
| 22          | 805-088       | 0.04 | 0.0316 | 0.0198 | 0.0158 | 0.0142 |
| 33          | 805-090       | 0.04 | 0.0306 | 0.0204 | 0.0163 | 0.0143 |
| 47          | 805-092       | 0.06 | 0.0363 | 0.0290 | 0.0232 | 0.0203 |
| 100         | 805-096       | 0.06 | 0.0385 | 0.0308 | 0.0246 | 0.0216 |
| 220         | 805-100       | 0.08 | 0.0538 | 0.0430 | 0.0344 | 0.0301 |
| 330         | 805-102       | 0.08 | 0.0588 | 0.0470 | 0.0376 | 0.0329 |
| 470         | 805-104       | 0.13 | 0.0840 | 0.0756 | 0.0672 | 0.0588 |
| 1000        | 805-108       | 0.14 | 0.1168 | 0.0934 | 0.0747 | 0.0654 |
| 2200        | 805-112       | 0.31 | 0.2464 | 0.2218 | 0.1975 | 0.1725 |
| 4700        | 805-116       | 0.64 | 0.5118 | 0.4606 | 0.4094 | 0.3583 |
| 10          | 807-085       | 0.04 | 0.0316 | 0.0237 | 0.0158 | 0.0142 |
| 22          | 807-088       | 0.05 | 0.0390 | 0.0260 | 0.0208 | 0.0182 |
| 47          | 807-092       | 0.05 | 0.0354 | 0.0236 | 0.0189 | 0.0165 |
| 100         | 807-096       | 0.06 | 0.0462 | 0.0308 | 0.0246 | 0.0216 |
| 220         | 807-100       | 0.08 | 0.0628 | 0.0502 | 0.0402 | 0.0351 |
| 470         | 807-104       | 0.13 | 0.1115 | 0.0892 | 0.0714 | 0.0624 |
| 1000        | 807-108       | 0.18 | 0.1490 | 0.1192 | 0.0954 | 0.0834 |
| 2200        | 807-112       | 0.58 | 0.3868 | 0.3481 | 0.3094 | 0.2708 |
| 3300        | 807-114       | 1.02 | 0.8120 | 0.7308 | 0.6496 | 0.5684 |
| 4700        | 807-116       | 0.92 | 0.7655 | 0.6124 | 0.4899 | 0.4287 |
| 4.7         | 811-081       | 0.05 | 0.0381 | 0.0254 | 0.0203 | 0.0178 |
| 10          | 811-085       | 0.05 | 0.0318 | 0.0254 | 0.0203 | 0.0178 |
| 22          | 811-088       | 0.06 | 0.0420 | 0.0280 | 0.0224 | 0.0196 |
| 33          | 811-090       | 0.06 | 0.0420 | 0.0280 | 0.0224 | 0.0196 |
| 47          | 811-092       | 0.07 | 0.0455 | 0.0364 | 0.0291 | 0.0255 |
| 100         | 811-096       | 0.10 | 0.0715 | 0.0572 | 0.0458 | 0.0400 |
| 220         | 811-100       | 0.15 | 0.1050 | 0.0840 | 0.0672 | 0.0588 |
| 330         | 811-102       | 0.18 | 0.1530 | 0.1224 | 0.0979 | 0.0857 |
| 470         | 811-104       | 0.21 | 0.1763 | 0.1410 | 0.1128 | 0.0987 |
| 1000        | 811-108       | 0.30 | 0.2488 | 0.1990 | 0.1791 | 0.1592 |
| 2200        | 811-112       | 0.69 | 0.6241 | 0.5547 | 0.4854 | 0.4334 |
| 0.1         | 813-061       | 0.05 | 0.0318 | 0.0254 | 0.0203 | 0.0178 |
| 0.47        | 813-069       | 0.04 | 0.0228 | 0.0182 | 0.0146 | 0.0127 |
| 1.0         | 813-073       | 0.05 | 0.0290 | 0.0261 | 0.0232 | 0.0203 |
| 2.2         | 813-077       | 0.05 | 0.0283 | 0.0226 | 0.0181 | 0.0158 |
| 4.7         | 813-081       | 0.06 | 0.0363 | 0.0290 | 0.0232 | 0.0203 |
| 10          | 813-085       | 0.05 | 0.0378 | 0.0252 | 0.0202 | 0.0176 |
| 22          | 813-088       | 0.07 | 0.0552 | 0.0368 | 0.0294 | 0.0258 |
| 47          | 813-092       | 0.11 | 0.0700 | 0.0560 | 0.0448 | 0.0392 |
| 100         | 813-096       | 0.13 | 0.1152 | 0.0892 | 0.0714 | 0.0624 |
| 220         | 813-100       | 0.34 | 0.2453 | 0.1962 | 0.1570 | 0.1373 |
| 470         | 813-104       | 0.33 | 0.2988 | 0.2656 | 0.2324 | 0.2075 |
| 1000        | 813-108       | 0.80 | 0.6400 | 0.5760 | 0.5120 | 0.4480 |
| 1.0         | 815-073       | 0.05 | 0.0333 | 0.0266 | 0.0213 | 0.0186 |
| 4.7         | 815-081       | 0.06 | 0.0420 | 0.0280 | 0.0224 | 0.0196 |
| 10          | 815-085       | 0.09 | 0.0650 | 0.0520 | 0.0416 | 0.0364 |
| 22          | 815-088       | 0.12 | 0.0850 | 0.0680 | 0.0544 | 0.0476 |
| 47          | 815-092       | 0.19 | 0.1575 | 0.1260 | 0.1008 | 0.0882 |
| 100         | 815-096       | 0.19 | 0.1610 | 0.1288 | 0.1030 | 0.0902 |

### Low Leakage Radial

Radial lead, low leakage aluminium electrolytic capacitors. Suitable for timing and low signal coupling applications.



| Value<br>μF | Voltage<br>Vdc | Surge | Ripple<br>mA | Dim.(mm)<br>L Dia | Pitch<br>(mm) |
|-------------|----------------|-------|--------------|-------------------|---------------|
| 100         | 10             | 13    | 160          | 11.0 6.3          | 2.5           |
| 220         | 10             | 13    | 310          | 11.5 8.0          | 3.5           |
| 10          | 16             | 20    | 43           | 11.0 5.0          | 2.0           |
| 22          | 16             | 20    | 74           | 11.0 5.0          | 2.0           |
| 33          | 16             | 20    | 90           | 11.0 5.0          | 2.0           |
| 47          | 25             | 32    | 172          | 11.0 6.3          | 2.5           |
| 10          | 35             | 44    | 57           | 11.0 5.0          | 2.0           |
| 22          | 35             | 44    | 99           | 11.0 6.3          | 2.5           |
| 0.1         | 50             | 63    | 5            | 11.0 5.0          | 2.0           |
| 0.33        | 50             | 63    | 9            | 11.0 5.0          | 2.0           |
| 0.47        | 50             | 63    | 14           | 11.0 5.0          | 2.0           |
| 1.0         | 50             | 63    | 20           | 11.0 5.0          | 2.0           |
| 2.2         | 50             | 63    | 26           | 11.0 5.0          | 2.0           |
| 10          | 50             | 63    | 70           | 11.0 5.0          | 2.0           |

### Technical Specification

Capacitance Range  
Capacitance Tolerance  
Operating Temperature Range  
Dissipation Factor

100nF to 220μF  
±20% at 120Hz, 25°C  
-40°C to +85°C  
Vdc 10 16 25 35 50  
Tanδ 0.17 0.13 0.10 0.10 0.08  
Leakage Current  
Body Colour

≤0.002CV or 0.3μA if greater  
Orange

### 105°C Radial

Radial lead aluminium electrolytic capacitors designed to work at higher ambient temperatures. Suitable for applications requiring a greater upper temperature safety margin and thereby an improved reliability. Endurance is greater than 2000 Hours at 105°C.



| Value<br>μF | Voltage<br>Vdc | Surge | Ripple<br>mA | Dim.(mm)<br>L Dia | Pitch<br>(mm) |
|-------------|----------------|-------|--------------|-------------------|---------------|
| 47          | 16             | 20    | 130          | 11.0 5.0          | 2.0           |
| 100         | 16             | 20    | 220          | 11.0 6.3          | 2.5           |
| 220         | 16             | 20    | 290          | 11.5 8.0          | 3.5           |
| 330         | 16             | 20    | 315          | 12.5 10.0         | 5.0           |
| 470         | 16             | 20    | 500          | 16.0 10.0         | 5.0           |
| 1000        | 16             | 20    | 825          | 20.0 12.5         | 5.0           |
| 2200        | 16             | 20    | 1300         | 25.0 12.5         | 5.0           |
| 100         | 25             | 32    | 220          | 11.5 8.0          | 3.5           |
| 220         | 25             | 32    | 315          | 12.5 10.0         | 5.0           |
| 330         | 25             | 32    | 500          | 16.0 10.0         | 5.0           |
| 470         | 25             | 32    | 615          | 20.0 10.0         | 5.0           |
| 1000        | 25             | 32    | 1050         | 20.0 12.5         | 5.0           |
| 2200        | 25             | 32    | 1740         | 25.0 16.0         | 7.5           |
| 10          | 35             | 44    | 105          | 11.0 5.0          | 2.0           |
| 22          | 35             | 44    | 120          | 11.0 5.0          | 2.0           |
| 33          | 35             | 44    | 130          | 11.0 6.3          | 2.5           |
| 47          | 35             | 44    | 220          | 11.0 6.3          | 2.5           |
| 100         | 35             | 44    | 315          | 11.5 8.0          | 3.5           |
| 220         | 35             | 44    | 500          | 16.0 10.0         | 5.0           |
| 330         | 35             | 44    | 615          | 20.0 10.0         | 5.0           |
| 470         | 35             | 44    | 825          | 20.0 12.5         | 5.0           |
| 1000        | 35             | 44    | 1300         | 25.0 16.0         | 7.5           |
| 2200        | 35             | 44    | 2110         | 31.5 16.0         | 7.5           |
| 0.47        | 63             | 79    | 23           | 11.0 5.0          | 2.0           |
| 1.0         | 63             | 79    | 35           | 11.0 5.0          | 2.0           |
| 2.2         | 63             | 79    | 53           | 11.0 5.0          | 2.0           |
| 4.7         | 63             | 79    | 74           | 11.0 5.0          | 2.0           |
| 10          | 63             | 79    | 95           | 11.0 6.3          | 2.5           |
| 22          | 63             | 79    | 130          | 11.5 8.0          | 3.5           |
| 47          | 63             | 79    | 305          | 11.5 8.0          | 3.5           |
| 100         | 63             | 79    | 395          | 12.5 10.0         | 5.0           |
| 220         | 63             | 79    | 505          | 20.0 10.0         | 5.0           |
| 470         | 63             | 79    | 850          | 25.0 12.5         | 5.0           |

### Technical Specification

Capacitance Range  
Capacitance Tolerance  
Operating Temperature Range  
Dissipation Factor

470nF to 1000μF  
±20% at 120Hz, 25°C  
-40°C to +105°C  
Vdc 16 25 35 63  
Tanδ 0.16 0.14 0.12 0.08  
Leakage Current  
Body Colour

≤0.01CV +2μA after 2 min.  
Light Green

### NON POLARISED RADIAL ELECTROLYTIC

Radial lead, non polarised aluminium electrolytic capacitors. Suitable for applications where a reverse polarity may be applied, i.e. Loudspeaker crossover networks.



| Value<br>μF | Voltage<br>Vdc | Surge | Ripple<br>mA | Dim.(mm)<br>L Dia | Pitch<br>(mm) |
|-------------|----------------|-------|--------------|-------------------|---------------|
| 1.0         | 50             | 63    | 14           | 11.0 5.0          | 2.0           |
| 2.2         | 50             | 63    | 21           | 11.0 5.0          | 2.0           |
| 4.7         | 50             | 63    | 31           | 11.0 5.0          | 2.0           |
| 10          | 50             | 63    | 45           | 11.0 5.0          | 2.0           |
| 22          | 50             | 63    | 77           | 11.0 6.3          | 2.5           |
| 47          | 50             | 63    | 157          | 12.5 10.0         | 5.0           |
| 100         | 50             | 63    | 273          | 20.0 10.0         | 5.0           |

### Technical Specification

Capacitance Range  
Working Voltage  
Capacitance Tolerance  
Operating Temperature Range  
Leakage Current  
Dissipation Factor (Tan δ)  
Body Colour

1.0μF to 100μF  
50Vdc (Surge 63v)  
±20%  
-40°C to +85°C  
≤0.03CV +3μA max (after 5 min)  
0.12  
Red

**AXIAL ELECTROLYTIC**

Axial Lead aluminium electrolytic capacitors, manufactured to high levels of quality and reliability.



| Value<br>μF | Voltage<br>Vdc | Surge | Ripple<br>mA | Dim.(mm)<br>L Dia |
|-------------|----------------|-------|--------------|-------------------|
| 10          | 16             | 20    | 40           | 12.5 5.0          |
| 22          | 16             | 20    | 64           | 12.5 5.0          |
| 47          | 16             | 20    | 92           | 12.5 5.0          |
| 100         | 16             | 20    | 160          | 12.5 6.3          |
| 220         | 16             | 20    | 280          | 16.0 8.0          |
| 470         | 16             | 20    | 450          | 20.0 8.0          |
| 1000        | 16             | 20    | 760          | 25.0 13.0         |
| 2200        | 16             | 20    | 1200         | 26.0 13.0         |
| 4700        | 16             | 20    | 1900         | 34.0 16.0         |
| 22          | 25             | 32    | 70           | 12.5 5.0          |
| 47          | 25             | 32    | 100          | 12.5 6.3          |
| 100         | 25             | 32    | 180          | 16.0 6.3          |
| 220         | 25             | 32    | 300          | 16.0 8.0          |
| 470         | 25             | 32    | 500          | 20.0 10.0         |
| 1000        | 25             | 32    | 950          | 21.0 13.0         |
| 2200        | 25             | 32    | 1450         | 29.0 16.0         |
| 4700        | 25             | 32    | 2160         | 39.0 18.0         |
| 10          | 40             | 50    | 38           | 12.5 5.0          |
| 22          | 40             | 50    | 67           | 12.5 6.3          |
| 47          | 40             | 50    | 113          | 16.0 8.0          |
| 100         | 40             | 50    | 189          | 20.0 8.0          |
| 220         | 40             | 50    | 335          | 20.0 10.0         |
| 470         | 40             | 50    | 590          | 26.0 13.0         |
| 1000        | 40             | 50    | 1095         | 34.0 16.0         |
| 2200        | 40             | 50    | 1624         | 44.0 18.0         |
| 1.0         | 63             | 79    | 16           | 12.5 5.0          |
| 2.2         | 63             | 79    | 21           | 12.5 5.0          |
| 4.7         | 63             | 79    | 38           | 12.5 5.0          |
| 10          | 63             | 79    | 62           | 12.5 5.0          |
| 22          | 63             | 79    | 100          | 12.5 6.3          |
| 47          | 63             | 79    | 180          | 16.0 8.0          |
| 100         | 63             | 79    | 280          | 16.0 10.0         |
| 220         | 63             | 79    | 470          | 25.0 10.0         |
| 470         | 63             | 79    | 900          | 26.0 13.0         |
| 1000        | 63             | 79    | 1500         | 39.0 16.0         |
| 2200        | 63             | 79    | 2060         | 41.0 22.0         |
| 10          | 100            | 125   | 75           | 16.0 6.3          |
| 22          | 100            | 125   | 120          | 16.0 8.0          |
| 47          | 100            | 125   | 230          | 20.0 10.0         |
| 100         | 100            | 125   | 420          | 21.0 13.0         |
| 220         | 100            | 125   | 700          | 29.0 16.0         |
| 10          | 250            | 300   | 57           | 16.0 10.0         |
| 22          | 250            | 300   | 101          | 25.0 10.0         |
| 47          | 250            | 300   | 184          | 25.0 13.0         |
| 10          | 350            | 400   | 62           | 20.0 10.0         |
| 22          | 350            | 400   | 109          | 20.0 13.0         |
| 1.0         | 450            | 500   | 19           | 16.0 8.0          |
| 2.2         | 450            | 500   | 30           | 20.0 10.0         |
| 10          | 450            | 500   | 80           | 20.0 13.0         |
| 22          | 450            | 500   | 130          | 30.0 13.0         |
| 47          | 450            | 500   | 230          | 40.0 18.0         |
| 100         | 450            | 500   | 470          | 40.0 22.0         |

**Technical Specification**

Capacitance Range  
Capacitance Tolerance  
Operating Temperature Range  
Leakage Current  
Body Colour

1.0μF to 4700μF  
±20% at 120Hz, 25°C  
-40°C to +85°C  
≤0.01CV or 3μA if greater  
Black

| Value<br>μF | Order<br>Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|-------------|---------------|------|--------|--------|--------|--------|
| 10          | 804-085       | 0.17 | 0.1376 | 0.1236 | 0.1101 | 0.0963 |
| 22          | 804-088       | 0.16 | 0.1300 | 0.1170 | 0.1040 | 0.0910 |
| 47          | 804-092       | 0.17 | 0.1455 | 0.1164 | 0.0931 | 0.0815 |
| 100         | 804-096       | 0.20 | 0.1562 | 0.1406 | 0.1250 | 0.1093 |
| 220         | 804-100       | 0.22 | 0.1734 | 0.1561 | 0.1387 | 0.1214 |
| 470         | 804-104       | 0.24 | 0.2025 | 0.1620 | 0.1296 | 0.1134 |
| 1000        | 804-108       | 0.44 | 0.3690 | 0.2952 | 0.2362 | 0.2066 |
| 2200        | 804-112       | 0.53 | 0.4400 | 0.3520 | 0.2816 | 0.2464 |
| 4700        | 804-116       | 0.86 | 0.6878 | 0.6190 | 0.5502 | 0.4815 |
| 22          | 806-088       | 0.16 | 0.1280 | 0.1152 | 0.1024 | 0.0896 |
| 47          | 806-092       | 0.13 | 0.1118 | 0.0894 | 0.0805 | 0.0715 |
| 100         | 806-096       | 0.20 | 0.1678 | 0.1342 | 0.1208 | 0.1074 |
| 220         | 806-100       | 0.20 | 0.1643 | 0.1314 | 0.1051 | 0.0920 |
| 470         | 806-104       | 0.23 | 0.1890 | 0.1512 | 0.1361 | 0.1210 |
| 1000        | 806-108       | 0.50 | 0.4193 | 0.3354 | 0.2683 | 0.2348 |
| 2200        | 806-112       | 0.79 | 0.6318 | 0.5686 | 0.5054 | 0.4423 |
| 4700        | 806-116       | 1.12 | 0.8940 | 0.8046 | 0.7152 | 0.6258 |
| 10          | 810-085       | 0.12 | 0.1030 | 0.0824 | 0.0742 | 0.0659 |
| 22          | 810-088       | 0.15 | 0.1280 | 0.1024 | 0.0819 | 0.0717 |
| 47          | 810-092       | 0.16 | 0.1323 | 0.1058 | 0.0846 | 0.0741 |
| 100         | 810-096       | 0.20 | 0.1612 | 0.1451 | 0.1290 | 0.1128 |
| 220         | 810-100       | 0.21 | 0.1696 | 0.1526 | 0.1357 | 0.1187 |
| 470         | 810-104       | 0.34 | 0.2756 | 0.2480 | 0.2205 | 0.1929 |
| 1000        | 810-108       | 0.79 | 0.6332 | 0.5699 | 0.5066 | 0.4432 |
| 2200        | 810-112       | 1.18 | 0.9420 | 0.8478 | 0.7536 | 0.6594 |
| 1.0         | 812-073       | 0.14 | 0.1092 | 0.1004 | 0.0893 | 0.0781 |
| 2.2         | 812-077       | 0.15 | 0.1184 | 0.1066 | 0.0947 | 0.0829 |
| 4.7         | 812-081       | 0.20 | 0.1578 | 0.1420 | 0.1262 | 0.1105 |
| 10          | 812-085       | 0.13 | 0.1060 | 0.0848 | 0.0678 | 0.0594 |
| 22          | 812-088       | 0.19 | 0.1526 | 0.1373 | 0.1221 | 0.1068 |
| 47          | 812-092       | 0.25 | 0.2026 | 0.1823 | 0.1621 | 0.1418 |
| 100         | 812-096       | 0.37 | 0.2930 | 0.2637 | 0.2344 | 0.2051 |
| 220         | 812-100       | 0.39 | 0.3225 | 0.2580 | 0.2064 | 0.1806 |
| 470         | 812-104       | 0.45 | 0.3550 | 0.3195 | 0.2840 | 0.2485 |
| 1000        | 812-108       | 0.80 | 0.6362 | 0.5726 | 0.5090 | 0.4453 |
| 2200        | 812-112       | 1.55 | 1.3950 | 1.2400 | 1.0850 | 0.9688 |
| 10          | 814-085       | 0.17 | 0.1383 | 0.1106 | 0.0885 | 0.0774 |
| 22          | 814-088       | 0.21 | 0.1745 | 0.1396 | 0.1117 | 0.0977 |
| 47          | 814-092       | 0.32 | 0.2675 | 0.2140 | 0.1712 | 0.1498 |
| 100         | 814-096       | 0.43 | 0.3476 | 0.3128 | 0.2781 | 0.2433 |
| 220         | 814-100       | 0.60 | 0.4800 | 0.4320 | 0.3840 | 0.3360 |
| 10          | 818-085       | 0.40 | 0.3338 | 0.2670 | 0.2136 | 0.1869 |
| 22          | 818-088       | 0.53 | 0.4375 | 0.3500 | 0.2800 | 0.2450 |
| 47          | 818-092       | 0.54 | 0.4860 | 0.4320 | 0.3780 | 0.3375 |
| 10          | 820-085       | 0.44 | 0.3675 | 0.2940 | 0.2352 | 0.2058 |
| 22          | 820-088       | 0.86 | 0.6872 | 0.6185 | 0.5498 | 0.4810 |
| 1.0         | 822-073       | 0.27 | 0.2250 | 0.1800 | 0.1440 | 0.1260 |
| 2.2         | 822-077       | 0.42 | 0.3525 | 0.2820 | 0.2256 | 0.1974 |
| 10          | 822-085       | 0.65 | 0.5198 | 0.4678 | 0.4158 | 0.3639 |
| 22          | 822-088       | 1.12 | 0.9562 | 0.8606 | 0.7650 | 0.6693 |
| 47          | 822-476       | 1.65 | 1.4834 | 1.3186 | 1.1537 | 1.0301 |
| 100         | 822-107       | 2.37 | 2.2200 | 2.072  | 1.9240 | 1.8500 |

**NON POLARISED AXIAL ELECTROLYTIC**

Bipolar Axial Lead aluminium electrolytic capacitors, very low loss factor, high current rating with long-time value stability. Suitable for audio frequency applications, i.e. Crossover networks.



| Value<br>μF | Voltage<br>Vdc | Vac | Dim.(mm)<br>L Dia | Pitch |
|-------------|----------------|-----|-------------------|-------|
| 1.5         | 100            | 35  | 17.0 8.0          | 20.0  |
| 2.2         | 100            | 35  | 17.0 8.0          | 20.0  |
| 3.3         | 100            | 35  | 17.0 8.0          | 20.0  |
| 4.7         | 100            | 35  | 17.0 8.0          | 20.0  |
| 6.8         | 100            | 35  | 19.0 8.0          | 20.0  |
| 10          | 100            | 35  | 19.0 8.0          | 20.0  |
| 15          | 100            | 35  | 19.5 10.0         | 25.0  |
| 22          | 100            | 35  | 24.0 10.0         | 30.0  |
| 33          | 100            | 35  | 27.0 13.0         | 30.0  |
| 47          | 100            | 35  | 27.0 13.0         | 30.0  |
| 68          | 100            | 35  | 33.5 16.0         | 35.0  |
| 100         | 100            | 35  | 33.5 16.0         | 35.0  |
| 150         | 100            | 35  | 33.5 16.0         | 37.5  |
| 220         | 100            | 35  | 44.5 28.0         | 45.0  |

**Technical Specification**

Capacitance Range  
Capacitance Tolerance  
Voltage Stability

Body Colour

1.5μF to 300μF  
±10%  
100Vdc/35Vac  
150W@8Ω, 300W@4Ω  
Yellow

| Value<br>μF | Order<br>Code | 1+   | 10+    | 25+    | 50+    | 100+   |
|-------------|---------------|------|--------|--------|--------|--------|
| 1.5         | 776-115       | 0.39 | 0.3250 | 0.2600 | 0.2340 | 0.2080 |
| 2.2         | 776-225       | 0.39 | 0.3250 | 0.2600 | 0.2340 | 0.2080 |
| 3.3         | 776-335       | 0.36 | 0.2850 | 0.2565 | 0.2280 | 0.1995 |
| 4.7         | 776-475       | 0.38 | 0.3050 | 0.2745 | 0.2440 | 0.2135 |
| 6.8         | 776-685       | 0.41 | 0.3250 | 0.2925 | 0.2600 | 0.2275 |
| 10          | 776-106       | 0.42 | 0.3750 | 0.3375 | 0.3000 | 0.2625 |
| 15          | 776-156       | 0.50 | 0.4450 | 0.4005 | 0.3560 | 0.3115 |
| 22          | 776-226       | 0.64 | 0.5650 | 0.5085 | 0.4520 | 0.3955 |
| 33          | 776-336       | 0.76 | 0.7250 | 0.6525 | 0.5800 | 0.5075 |
| 47          | 776-476       | 0.89 | 0.7992 | 0.7104 | 0.6216 | 0.5531 |
| 68          | 776-686       | 1.35 | 1.2150 | 1.0800 | 0.9450 | 0.8438 |
| 100         | 776-107       | 1.88 | 1.6920 | 1.5040 | 1.3160 | 1.1750 |
| 150         | 776-157       | 2.47 | 2.2230 | 1.9760 | 1.7290 | 1.5438 |
| 220         | 776-227       | 3.95 | 3.6820 | 3.5505 | 3.4190 | 3.2875 |



## SNAP-IN PCB ELECTROLYTIC

Compact, low profile snap-in electrolytic capacitors for PCB mounting. Standard snap-in terminals on a 10mm pitch, 2mm Diameter.

### Technical Specification

|                             |                              |
|-----------------------------|------------------------------|
| Capacitance Range           | 100 $\mu$ F to 20000 $\mu$ F |
| Capacitance Tolerance       | $\pm$ 20% at 120Hz, 25°C     |
| Operating Temperature Range | -40°C to +85°C               |
| Body Colour                 | Black                        |



| Value $\mu$ F | Voltage Vdc | Surge | Ripple A | Dim.(mm) L | Dim.(mm) Dia |
|---------------|-------------|-------|----------|------------|--------------|
| 4700          | 16          | 20    | 2.2      | 25.0       | 22.0         |
| 10000         | 16          | 20    | 2.8      | 30.0       | 22.0         |
| 22000         | 16          | 20    | 4.4      | 40.0       | 25.0         |
| 3300          | 35          | 44    | 2.1      | 25.0       | 22.0         |
| 4700          | 35          | 44    | 2.4      | 25.0       | 25.0         |
| 6800          | 35          | 44    | 2.8      | 35.0       | 25.0         |
| 10000         | 35          | 44    | 3.5      | 45.0       | 25.0         |
| 2200          | 63          | 79    | 2.3      | 30.0       | 25.0         |
| 3300          | 63          | 79    | 2.6      | 40.0       | 25.0         |
| 4700          | 63          | 79    | 3.3      | 40.0       | 30.0         |
| 6800          | 63          | 79    | 4.9      | 50.0       | 30.0         |
| 10000         | 63          | 79    | 5.4      | 50.0       | 35.0         |
| 1000          | 100         | 125   | 2.1      | 30.0       | 22.0         |
| 4700          | 100         | 125   | 5.1      | 45.0       | 35.0         |
| 220           | 200         | 250   | 1.1      | 30.0       | 22.0         |
| 470           | 200         | 250   | 1.8      | 40.0       | 25.0         |
| 100           | 400         | 500   | 0.7      | 30.0       | 22.0         |
| 330           | 400         | 500   | 1.6      | 45.0       | 30.0         |
| 470           | 400         | 500   | 2.1      | 45.0       | 35.0         |

| Value $\mu$ F | Order Code | 1+   | 10+    | 25+    | 50+    | 100+   |
|---------------|------------|------|--------|--------|--------|--------|
| 4700          | 826-116    | 0.96 | 0.8626 | 0.7667 | 0.6709 | 0.5990 |
| 10000         | 826-120    | 1.50 | 1.3464 | 1.1968 | 1.0472 | 0.9350 |
| 22000         | 826-124    | 1.73 | 1.5559 | 1.3830 | 1.2102 | 1.0805 |
| 3300          | 827-114    | 0.96 | 0.8653 | 0.7691 | 0.6730 | 0.6009 |
| 4700          | 827-116    | 1.27 | 1.0140 | 0.9126 | 0.8112 | 0.7098 |
| 6800          | 827-118    | 1.73 | 1.5527 | 1.3802 | 1.2076 | 1.0783 |
| 10000         | 827-120    | 2.40 | 2.1564 | 1.9168 | 1.6772 | 1.4975 |
| 2200          | 828-112    | 1.40 | 1.2631 | 1.1227 | 0.9824 | 0.8771 |
| 3300          | 828-114    | 2.16 | 1.9408 | 1.7251 | 1.5095 | 1.3478 |
| 4700          | 828-116    | 2.49 | 2.2138 | 1.9924 | 1.7710 | 1.5497 |
| 6800          | 828-118    | 2.50 | 2.2218 | 1.9996 | 1.7774 | 1.5553 |
| 10000         | 828-120    | 6.76 | 6.0080 | 5.4072 | 4.8064 | 4.2056 |
| 1000          | 829-108    | 1.88 | 1.6920 | 1.5040 | 1.3160 | 1.1750 |
| 4700          | 829-116    | 4.44 | 3.9960 | 3.5520 | 3.1080 | 2.7755 |
| 220           | 829-200    | 1.74 | 1.5480 | 1.3932 | 1.2384 | 1.0836 |
| 470           | 829-204    | 1.97 | 1.5786 | 1.4207 | 1.2629 | 1.1050 |
| 100           | 829-396    | 2.05 | 1.8266 | 1.6439 | 1.4613 | 1.2786 |
| 330           | 829-402    | 4.69 | 4.2170 | 3.7485 | 3.2799 | 2.9285 |
| 470           | 829-404    | 6.63 | 5.9683 | 5.3051 | 4.6420 | 4.1446 |

## MINIATURE TRIMMER CAPACITORS

### Polypropylene

PCB 3 pin (894-0009 2 pin) mounting, single turn trimmers, with a polypropylene dielectric. Available in nine colour coded values.

### Technical Specification

|                             |                              |
|-----------------------------|------------------------------|
| Operating Temperature Range | -25°C to +70°C               |
| Voltage Rating              | 150Vdc                       |
| Body Colour                 | Red, Yellow, Green or Violet |



| ORDER CODE |                         | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|-------------------------|------|--------|--------|--------|--------|
| 894-009    | 2.0 - 10pF Yellow 5mm   | 0.49 | 0.4414 | 0.3923 | 0.3433 | 0.3065 |
| 894-010    | 2.0 - 10pF Yellow 8mm   | 0.35 | 0.3150 | 0.2800 | 0.2450 | 0.2188 |
| 894-015    | 2.0 - 22pF Green 8mm    | 0.80 | 0.7500 | 0.7000 | 0.6500 | 0.6250 |
| 894-016    | 4.0 - 20pF Green 8mm    | 0.93 | 0.8354 | 0.7426 | 0.6497 | 0.5801 |
| 894-017    | 3.3 - 33pF Green 8mm    | 0.83 | 0.7425 | 0.6600 | 0.5775 | 0.5156 |
| 894-018    | 5.5 - 40pF Grey 10mm    | 0.83 | 0.7425 | 0.6600 | 0.5775 | 0.5156 |
| 894-025    | 5.5 - 65pF Yellow 11mm  | 1.26 | 1.1340 | 1.0080 | 0.8820 | 0.7875 |
| 894-027    | 5.5 - 80pF Red 10mm     | 1.34 | 1.2067 | 1.0726 | 0.9386 | 0.8380 |
| 894-028    | 7.0 - 100pF Violet 10mm | 1.34 | 1.2067 | 1.0726 | 0.9386 | 0.8380 |

## Ceramic

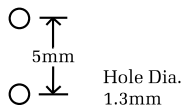
Low profile PCB mounting, single turn ceramic trimmers with plastic cases. Available in five colour coded values.

### Technical Specification

|                             |                                      |
|-----------------------------|--------------------------------------|
| Operating Temperature Range | -25°C to +85°C                       |
| Voltage Rating              | 100Vdc (50Vdc 6-50pF)                |
| Temperature Coefficient     | $\pm$ 300ppm/°C ( $\pm$ 200 1.5-5pF) |
| Q min @ 1MHz                | 500 (300 1.5-5, 6-50pF)              |
|                             | PCB Footprint                        |



Body  
5 x 6mm Dia



| ORDER CODE |                   | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|-------------------|------|--------|--------|--------|--------|
| 895-010    | 1.5 - 5.0pF Blue  | 0.30 | 0.2700 | 0.2400 | 0.2100 | 0.1875 |
| 895-020    | 3.0 - 11pF White  | 0.30 | 0.2700 | 0.2400 | 0.2100 | 0.1875 |
| 895-025    | 4.2 - 20pF Red    | 0.27 | 0.2430 | 0.2160 | 0.1890 | 0.1688 |
| 895-030    | 5.2 - 30pF Green  | 0.30 | 0.2700 | 0.2400 | 0.2100 | 0.1875 |
| 895-040    | 6.0 - 50pF Orange | 0.56 | 0.5040 | 0.4480 | 0.3920 | 0.3500 |

## MINIATURE TUNING CAPACITOR

A miniature tuning capacitor suitable for small radio circuits. Comprising of Oscillator & Antenna sections of with trimmers. Polyethylene film dielectric, Centre control shaft, 6mm Diameter with flat and M2.5 thread.

### Technical Specification

|                                 |                |
|---------------------------------|----------------|
| Capacitance, Antenna Section    | 3.0 - 142pF    |
| Capacitance, Oscillator Section | 4.0 - 60pF     |
| Voltage Rating                  | 100Vdc         |
| Control Rotation                | 180°           |
| Dimensions                      | 20 x 20 x 11mm |



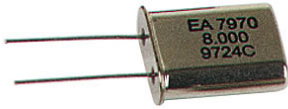
| ORDER CODE               | 1+   | 10+    | 25+    | 50+    | 100+   |
|--------------------------|------|--------|--------|--------|--------|
| 896-110 AM/FM Tuning Cap | 0.79 | 0.7115 | 0.6719 | 0.5929 | 0.5531 |

## QUARTZ CRYSTALS Standard Case

A wide range of popular frequencies typically used in microprocessor and general industrial applications. All are parallel resonant types. The 32.768kHz watch crystal is housed in a DT-38 can, all others in the popular HC-49/U case. Frequencies are fundamental.

### Technical Specification

|                             |                    |
|-----------------------------|--------------------|
| Frequency Range             | 32.768KHz to 20MHz |
| Tolerance                   | ±30ppm @ 25°C      |
| Operating Temperature Range | -10 to +60°C       |
| Temperature Stability       | ±50ppm             |



| Freq. MHz | Load Cap | Order Code | 1+   | 10+    | 25+    | 50+    | 100+   |
|-----------|----------|------------|------|--------|--------|--------|--------|
| 32.768kHz | 12.5pF   | 760-001    | 0.39 | 0.3300 | 0.2200 | 0.1760 | 0.1540 |
| 1.8432    | 30pF     | 760-018    | 1.08 | 0.8975 | 0.7180 | 0.5744 | 0.5026 |
| 2.0       | 30pF     | 760-020    | 1.46 | 1.1684 | 1.0516 | 0.9347 | 0.8179 |
| 2.4576    | 30pF     | 760-024    | 0.84 | 0.6985 | 0.5588 | 0.4470 | 0.3912 |
| 3.2768    | 12.5pF   | 760-032    | 0.32 | 0.2663 | 0.2130 | 0.1704 | 0.1491 |
| 3.579545  | 16pF     | 760-035    | 0.41 | 0.3430 | 0.2744 | 0.2195 | 0.1921 |
| 3.6864    | 30pF     | 760-036    | 0.41 | 0.3375 | 0.2700 | 0.2160 | 0.1890 |
| 4.0       | 30pF     | 760-040    | 0.45 | 0.3713 | 0.2960 | 0.2376 | 0.2079 |
| 4.194304  | 12.5pF   | 760-041    | 0.37 | 0.3073 | 0.2458 | 0.1966 | 0.1721 |
| 4.433619  | 20pF     | 760-044    | 0.41 | 0.3375 | 0.2700 | 0.2160 | 0.1890 |
| 4.9152    | 30pF     | 760-049    | 0.41 | 0.3430 | 0.2744 | 0.2195 | 0.1921 |
| 6.0       | 30pF     | 760-060    | 0.34 | 0.2868 | 0.2294 | 0.1835 | 0.1606 |
| 6.144     | 30pF     | 760-061    | 0.41 | 0.3375 | 0.2700 | 0.2160 | 0.1890 |
| 7.3728    | 30pF     | 760-073    | 0.41 | 0.3375 | 0.2700 | 0.2160 | 0.1890 |
| 8.0       | 30pF     | 760-080    | 0.41 | 0.3375 | 0.2700 | 0.2160 | 0.1890 |
| 8.867238  | 30pF     | 760-088    | 0.82 | 0.7385 | 0.6865 | 0.5744 | 0.5129 |
| 10.0      | 30pF     | 760-100    | 0.31 | 0.2623 | 0.2098 | 0.1678 | 0.1469 |
| 11.0      | 30pF     | 760-110    | 0.41 | 0.3375 | 0.2700 | 0.2160 | 0.1890 |
| 11.0592   | 30pF     | 760-111    | 0.41 | 0.3430 | 0.2744 | 0.2195 | 0.1921 |
| 12.0      | 30pF     | 760-120    | 0.41 | 0.3375 | 0.2700 | 0.2160 | 0.1890 |
| 14.7456   | 20pF     | 760-147    | 0.41 | 0.3375 | 0.2700 | 0.2160 | 0.1890 |
| 16.0      | 30pF     | 760-160    | 0.41 | 0.3375 | 0.2700 | 0.2160 | 0.1890 |
| 20.0      | 30pF     | 760-200    | 0.34 | 0.2868 | 0.2294 | 0.1835 | 0.1606 |

### Low Profile

AT-cut quartz crystals housed in the superior resistance weld HC-49/4U metal case compatible with HU-18 & HC-49/U footprint but offering a height of only 4mm. All type are parallel resonant, frequencies are fundamental.

### Technical Specification

|                             |                      |
|-----------------------------|----------------------|
| Frequency Range             | 3.579545MHz to 20MHz |
| Tolerance                   | ±30ppm @ 25°C        |
| Operating Temperature Range | -10 to +60°C         |
| Temperature Stability       | ±50ppm               |



| Freq. MHz | Load Cap | Order Code | 1+   | 10+    | 25+    | 50+    | 100+   |
|-----------|----------|------------|------|--------|--------|--------|--------|
| 3.579545  | 16pF     | 759-035    | 0.59 | 0.4875 | 0.3900 | 0.3120 | 0.2730 |
| 3.6864    | 30pF     | 759-036    | 0.53 | 0.4445 | 0.3556 | 0.2845 | 0.2489 |
| 4.0       | 30pF     | 759-040    | 0.59 | 0.4875 | 0.3900 | 0.3120 | 0.2730 |
| 4.9152    | 30pF     | 759-049    | 0.53 | 0.4445 | 0.3556 | 0.2845 | 0.2489 |
| 6.0       | 30pF     | 759-060    | 0.42 | 0.3495 | 0.2796 | 0.2516 | 0.2237 |
| 7.3728    | 30pF     | 759-073    | 0.53 | 0.4445 | 0.3556 | 0.2845 | 0.2489 |
| 8.0       | 30pF     | 759-080    | 0.59 | 0.4875 | 0.3900 | 0.3120 | 0.2730 |
| 11.0592   | 30pF     | 759-111    | 0.56 | 0.4700 | 0.3760 | 0.3008 | 0.2632 |
| 12.0      | 30pF     | 759-120    | 0.54 | 0.4525 | 0.3620 | 0.2896 | 0.2534 |
| 16.0      | 30pF     | 759-160    | 0.51 | 0.4288 | 0.3430 | 0.2744 | 0.2401 |
| 18.432    | 30pF     | 759-184    | 0.39 | 0.3245 | 0.2596 | 0.2077 | 0.1817 |
| 20.0      | 30pF     | 759-200    | 0.59 | 0.4875 | 0.3900 | 0.3120 | 0.2730 |

## CRYSTAL OSCILLATOR MODULES

DIL Format crystal oscillator modules. Housed in compact hermetically sealed 8 or 14 pin packages. TTL compatible outputs which can drive 10 TTL loads, will also drive CMOS loads when a 2k2 pull up resistor is used on the output.

|                       |                           |
|-----------------------|---------------------------|
| Frequency Range       | 2.4576 to 66.667MHz       |
| Temperature Stability | ±100ppm                   |
| Supply Current        | 30mA < 24MHz 40mA ≥ 24MHz |
| Output Drive Level    | 1 to 10 TTL Gates         |
| Output Levels         | 0=+0.4V Max. 1=+2.4V Min. |

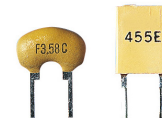


| Freq. MHz | DIL    | Order Code | 1+   | 10+    | 25+    | 50+    | 100+   |
|-----------|--------|------------|------|--------|--------|--------|--------|
| 2.4576    | 14 Pin | 761-215    | 2.40 | 2.1600 | 1.9200 | 1.6800 | 1.5000 |
| 3.2768    | 14 Pin | 761-220    | 2.20 | 1.9800 | 1.7600 | 1.5400 | 1.3750 |
| 10.0      | 14 Pin | 761-240    | 2.20 | 1.9800 | 1.7600 | 1.5400 | 1.3750 |
| 20.0      | 14 Pin | 761-245    | 2.20 | 1.9800 | 1.7600 | 1.5400 | 1.3750 |
| 24.0      | 14 Pin | 761-250    | 2.20 | 1.9800 | 1.7600 | 1.5400 | 1.3750 |
| 40.0      | 14 Pin | 761-260    | 2.20 | 1.9800 | 1.7600 | 1.5400 | 1.3750 |
| 50.0      | 8 Pin  | 761-165    | 1.90 | 1.7100 | 1.5200 | 1.3300 | 0.8125 |
| 64.0      | 14 Pin | 761-270    | 2.20 | 1.9800 | 1.7600 | 1.5400 | 1.3750 |
| 66.667    | 8 Pin  | 761-175    | 2.40 | 2.1600 | 1.9200 | 1.6800 | 1.5000 |

## CERAMIC RESONATORS

### 2 Pin

Miniature ceramic resonators housed in a boxed or dipped package. Suitable for oscillator circuits and may also be used as clock generators for MPU applications as they are optimised for MOS applications. Frequency Tolerance ±0.5%



| Freq. MHz | Case   | Order Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|-----------|--------|------------|------|--------|--------|--------|--------|
| 455kHz    | Boxed  | 762-110    | 0.33 | 0.2750 | 0.2200 | 0.1760 | 0.1540 |
| 500kHz    | Boxed  | 762-125    | 0.30 | 0.2500 | 0.2000 | 0.1600 | 0.1400 |
| 1.0       | Boxed  | 762-130    | 0.39 | 0.3288 | 0.2630 | 0.2104 | 0.1841 |
| 2.0       | Dipped | 762-210    | 0.36 | 0.3000 | 0.2400 | 0.1920 | 0.1680 |
| 3.27      | Dipped | 762-215    | 0.48 | 0.4000 | 0.3200 | 0.2560 | 0.2240 |
| 3.58      | Dipped | 762-220    | 0.32 | 0.2690 | 0.2152 | 0.1722 | 0.1506 |
| 3.69      | Dipped | 762-225    | 0.33 | 0.2750 | 0.2200 | 0.1760 | 0.1540 |
| 4.0       | Dipped | 762-230    | 0.25 | 0.2053 | 0.1642 | 0.1478 | 0.1314 |
| 4.19      | Dipped | 762-235    | 0.48 | 0.4000 | 0.3200 | 0.2560 | 0.2240 |
| 6.0       | Dipped | 762-245    | 0.33 | 0.2750 | 0.2200 | 0.1760 | 0.1540 |
| 8.0       | Dipped | 762-255    | 0.33 | 0.2750 | 0.2200 | 0.1760 | 0.1540 |
| 10.0      | Dipped | 762-265    | 0.33 | 0.2750 | 0.2200 | 0.1760 | 0.1540 |
| 12.0      | Dipped | 762-285    | 0.60 | 0.4000 | 0.3600 | 0.3200 | 0.2800 |

### 3 Pin, Integral Capacitors

Miniature 3 pin ceramic resonators housed in a dipped package with built-in load capacitors. Suitable for oscillator circuits and may also be used as clock generators for MPU applications as they are optimised for MOS applications. Frequency Tolerance ±0.5%



| Freq. MHz | Cap. | Order Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|-----------|------|------------|------|--------|--------|--------|--------|
| 3.58      | 30pF | 763-220    | 0.34 | 0.2246 | 0.2021 | 0.1791 | 0.1572 |
| 4.0       | 30pF | 763-230    | 0.16 | 0.1298 | 0.1038 | 0.0934 | 0.0830 |
| 4.19      | 30pF | 763-235    | 0.31 | 0.2042 | 0.1838 | 0.1634 | 0.1429 |
| 6.0       | 30pF | 763-245    | 0.30 | 0.1998 | 0.1798 | 0.1598 | 0.1399 |
| 8.0       | 30pF | 763-255    | 0.29 | 0.1900 | 0.1710 | 0.1520 | 0.1330 |
| 10.0      | 30pF | 763-265    | 0.18 | 0.1505 | 0.1204 | 0.1084 | 0.0963 |
| 12.0      | 30pF | 763-285    | 0.30 | 0.1998 | 0.1798 | 0.1598 | 0.1399 |
| 16.0      | 30pF | 763-295    | 0.25 | 0.1680 | 0.1512 | 0.1344 | 0.1176 |

## SUBMINIATURE LED'S 1.8mm Diffused Package

Diffused sub-miniature light emitting diodes of 1.8mm diameter, suited to through panel applications. Anode (+ve) identified by long lead.

### Technical Specifications

| Colour | I <sub>f</sub> | V <sub>f</sub> | V <sub>r</sub> | Int @ I <sub>f</sub> | View     | Wave   |       |
|--------|----------------|----------------|----------------|----------------------|----------|--------|-------|
|        | Max.           | Typ.           | Max.           | Max.                 | Angle    | Length |       |
| Red    | 25mA           | 2.0V           | 2.5V           | 5.0V                 | 3.2@10mA | 70°    | 700nm |
| Green  | 25mA           | 2.2V           | 2.5V           | 5.0V                 | 20@10mA  | 70°    | 565nm |
| Yellow | 30mA           | 2.1V           | 2.5V           | 5.0V                 | 20@10mA  | 70°    | 590nm |
| Orange | 30mA           | 2.0V           | 2.5V           | 5.0V                 | 32@10mA  | 70°    | 625nm |



| ORDER CODE |                  | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------------------|------|--------|--------|--------|--------|
| 710-110    | RED 1.8mm LED    | 0.15 | 0.1275 | 0.1020 | 0.0816 | 0.0714 |
| 711-110    | GREEN 1.8mm LED  | 0.14 | 0.1120 | 0.1008 | 0.0896 | 0.0784 |
| 712-110    | YELLOW 1.8mm LED | 0.11 | 0.0925 | 0.0740 | 0.0592 | 0.0518 |
| 713-110    | ORANGE 1.8mm LED | 0.15 | 0.1220 | 0.1098 | 0.0976 | 0.0854 |

## SUBMINIATURE LED'S 2.0mm Diffused Package

Diffused sub-miniature light emitting diodes of 2.0mm diameter, suited to through panel applications where a wide viewing angle is required. Anode (+ve) identified by long lead.

### Technical Specifications

| Colour | I <sub>f</sub> | V <sub>f</sub> | V <sub>r</sub> | Int @ I <sub>f</sub> | View      | Wave   |       |
|--------|----------------|----------------|----------------|----------------------|-----------|--------|-------|
|        | Max.           | Typ.           | Max.           | Max.                 | Angle     | Length |       |
| Red    | 25mA           | 2.0V           | 2.5V           | 5.0V                 | 2.0@10mA  | 70°    | 700nm |
| Green  | 25mA           | 2.2V           | 2.5V           | 5.0V                 | 12.5@10mA | 70°    | 565nm |
| Yellow | 30mA           | 2.1V           | 2.5V           | 5.0V                 | 12.5@10mA | 70°    | 590nm |



| ORDER CODE |                  | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------------------|------|--------|--------|--------|--------|
| 710-210    | RED 2.0mm LED    | 0.08 | 0.0600 | 0.0540 | 0.0480 | 0.0420 |
| 711-210    | GREEN 2.0mm LED  | 0.11 | 0.0900 | 0.0810 | 0.0720 | 0.0630 |
| 712-210    | YELLOW 2.0mm LED | 0.12 | 0.0960 | 0.0864 | 0.0768 | 0.0672 |

## MINIATURE LED'S 3.0mm Diffused Package

Standard diffused miniature light emitting diodes of 3.0mm diameter. Anode (+ve) identified by long lead.

### Technical Specifications

| Colour | I <sub>f</sub> | V <sub>f</sub> | V <sub>r</sub> | V <sub>r</sub> | Int @ I <sub>f</sub> | View  | Wave   |
|--------|----------------|----------------|----------------|----------------|----------------------|-------|--------|
|        | Max.           | Typ.           | Max.           | Max.           | mcd                  | Angle | Length |
| Red    | 15mA           | 1.7V           | 2.8V           | 5.0V           | 8.0@20mA             | 60°   | 660nm  |
| HE Red | 30mA           | 2.0V           | 2.5V           | 5.0V           | 50@10mA              | 60°   | 625nm  |
| Green  | 25mA           | 2.2V           | 2.5V           | 5.0V           | 32@10mA              | 60°   | 595nm  |
| Yellow | 30mA           | 2.1V           | 2.5V           | 5.0V           | 32@10mA              | 60°   | 590nm  |
| Orange | 30mA           | 2.0V           | 2.5V           | 5.0V           | 50@10mA              | 60°   | 625nm  |



| ORDER CODE |                  | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------------------|------|--------|--------|--------|--------|
| 710-310    | RED 3.0mm LED    | 0.06 | 0.0531 | 0.0354 | 0.0319 | 0.0283 |
| 710-330    | HE RED 3.0mm LED | 0.08 | 0.0500 | 0.0450 | 0.0400 | 0.0350 |
| 711-310    | GREEN 3.0mm LED  | 0.09 | 0.0580 | 0.0522 | 0.0464 | 0.0406 |
| 712-310    | YELLOW 3.0mm LED | 0.08 | 0.0520 | 0.0468 | 0.0416 | 0.0364 |
| 713-310    | ORANGE 3.0mm LED | 0.10 | 0.0640 | 0.0576 | 0.0512 | 0.0448 |

## 3mm White & Blue LED's

Miniature high efficiency light emitting diodes of 3.0mm diameter giving a white or blue light. The blue LED's have a wavelength of 430nm & are available in either clear or diffused bodies. The white LED has a dominant wavelength of 460nm.

### Technical Specifications

| Colour        | I <sub>f</sub> | V <sub>f</sub> | V <sub>r</sub> | Int @ I <sub>f</sub> | View  |
|---------------|----------------|----------------|----------------|----------------------|-------|
|               | Max.           | Typ.           | Max.           | Max.                 | Angle |
| White         | 30mA           | 4.3V           | 5.0V           | 600@20mA             | 70°   |
| White         | 30mA           | 3.1V           | 3.6V           | 1120@20mA            | 60°   |
| Blue Diffused | 30mA           | 4.5V           | 5.5V           | 40@20mA              | 60°   |
| Blue Clear    | 30mA           | 4.5V           | 5.5V           | 60@20mA              | 20°   |
| Blue Clear    | 30mA           | 3.7V           | 5.5V           | 1000@20mA            | 30°   |



| ORDER CODE |                    | 1+   | 10+    | 25+    | 50+     | 100+   |
|------------|--------------------|------|--------|--------|---------|--------|
| 709-340    | WHITE 3.0mm 600mcd | 0.64 | 0.5760 | 0.5440 | 0.5120  | 0.4800 |
| 709-350    | WHITE 3.0mm 1.12cd | 0.30 | 0.2500 | 0.2000 | 0.1800  | 0.1600 |
| 714-350    | BLUE 3.0mm Diff.   | 0.68 | 0.6120 | 0.5440 | 0.4760  | 0.4250 |
| 714-352    | BLUE 3.0mm Clear   | 0.68 | 0.6120 | 0.5440 | 0.4760  | 0.4250 |
| 714-362    | BLUE 3.0mm 1cd     | 0.30 | 0.2700 | 0.2400 | 0.21000 | 0.1875 |

## 3mm Water Clear Package

Miniature high efficiency light emitting diodes of 3.0mmØ in a water clear package. This range is intensity and colour matched.

### Technical Specifications

| Polymatrix Specifications |                |                |                |                |                      |       |        |
|---------------------------|----------------|----------------|----------------|----------------|----------------------|-------|--------|
| Colour                    | I <sub>f</sub> | V <sub>f</sub> | V <sub>r</sub> | V <sub>r</sub> | Int @ I <sub>f</sub> | View  | Wave   |
|                           | Max.           | Typ.           | Max.           | Max.           | mcd                  | Angle | Length |
| Red                       | 25mA           | 2.0V           | 2.5V           | 5.0V           | 125@10mA             | 50°   | 625nm  |
| Green                     | 25mA           | 2.2V           | 2.5V           | 5.0V           | 80@10mA              | 50°   | 565nm  |
| Yellow                    | 30mA           | 2.1V           | 2.5V           | 5.0V           | 50@10mA              | 50°   | 590nm  |



| ORDER CODE |                    | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|--------------------|------|--------|--------|--------|--------|
| 710-340    | RED 3.0mm Clear    | 0.08 | 0.0600 | 0.0540 | 0.0480 | 0.0420 |
| 711-340    | GREEN 3.0mm Clear  | 0.07 | 0.0580 | 0.0522 | 0.0464 | 0.0406 |
| 712-340    | YELLOW 3.0mm Clear | 0.08 | 0.0600 | 0.0540 | 0.0480 | 0.0420 |

## 3mm Extra Bright

Miniature light emitting diodes of 3.0mmØ with very high luminous intensity, employing a GaAlAs dice. Available in diffused or clear packages. Wave Length 660nm.

### Technical Specifications

| Colour          | I <sub>f</sub> | V <sub>f</sub> | V <sub>r</sub> | Int @ I <sub>f</sub> | View     |     |
|-----------------|----------------|----------------|----------------|----------------------|----------|-----|
|                 | Max.           | Typ.           | Max.           | Max.                 | Angle    |     |
| Red Diffused100 | 30mA           | 1.85V          | 2.5V           | 5.0V                 | 100@20mA | 60° |
| Red Diffused200 | 30mA           | 1.85V          | 2.5V           | 5.0V                 | 200@20mA | 60° |
| Red Clear 500   | 30mA           | 1.85V          | 2.5V           | 5.0V                 | 500@20mA | 50° |
| Red Clear 700   | 30mA           | 1.85V          | 2.5V           | 5.0V                 | 700@20mA | 50° |



| ORDER CODE |                     | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|---------------------|------|--------|--------|--------|--------|
| 710-350    | RED 100 3.0mm Diff. | 0.11 | 0.0840 | 0.0760 | 0.0672 | 0.0588 |
| 710-352    | RED 200 3.0mm Diff. | 0.11 | 0.0860 | 0.0774 | 0.0688 | 0.0602 |
| 710-360    | RED 500 3.0mm Clear | 0.11 | 0.0840 | 0.0760 | 0.0672 | 0.0588 |
| 710-362    | RED 700 3.0mm Clear | 0.09 | 0.0740 | 0.0666 | 0.0592 | 0.0518 |

## 3mm Low Current Diffused Package

Miniature high efficiency low current light emitting diodes of 3.0mmØ. Luminous intensity remains consistent down to 2Ma.

### Technical Specifications

| Colour | I <sub>f</sub> | V <sub>f</sub> | V <sub>r</sub> | Int @ I <sub>f</sub> | View    | Wave   |       |
|--------|----------------|----------------|----------------|----------------------|---------|--------|-------|
|        | Max.           | Typ.           | Max.           | Max.                 | Angle   | Length |       |
| Red    | 30mA           | 1.7V           | 2.0V           | 5.0V                 | 5@2mA   | 60°    | 625nm |
| Green  | 25mA           | 1.9V           | 2.2V           | 5.0V                 | 3.2@2mA | 60°    | 565nm |
| Yellow | 30mA           | 1.8V           | 2.1V           | 5.0V                 | 3.2@2mA | 60°    | 590nm |



| ORDER CODE |                    | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|--------------------|------|--------|--------|--------|--------|
| 710-370    | RED Low Current    | 0.09 | 0.0740 | 0.0666 | 0.0592 | 0.0518 |
| 711-370    | GREEN Low Current  | 0.09 | 0.0720 | 0.0648 | 0.0576 | 0.0504 |
| 712-370    | YELLOW Low Current | 0.11 | 0.0880 | 0.0792 | 0.0704 | 0.0616 |

**MINIATURE LED'S****3mm Bi-Colour, Tri-Colour Diffused Package**

Miniature light emitting diodes of 3.0mm diameter in a milky white package. Bi-Colour, 2 lead, Red or Green by reversing connections. Tri-Colour, 3 lead, Red, Green or Yellow(both on) common cathode.

**Technical Specifications**

| Type                          | IF<br>Max. | VF<br>Typ. | VF<br>Max. | VR<br>Max. | Int @ IF<br>mcd | View Angle |
|-------------------------------|------------|------------|------------|------------|-----------------|------------|
| Bi-colour                     | 30mA       | 2.0(2.2)V  | 2.5V       | 5.0V       | 40(20)20mA      | 60°        |
| Tri-colour<br>(for Green LED) | 30mA       | 2.0(2.2)V  | 2.5V       | 5.0V       | 50@20mA         | 60°        |



| ORDER CODE                   | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------------------------|------|--------|--------|--------|--------|
| 715-130 Bi-Colour 3.0mm LED  | 0.14 | 0.1120 | 0.1008 | 0.0876 | 0.0784 |
| 715-230 Tri-Colour 3.0mm LED | 0.21 | 0.1700 | 0.1530 | 0.1360 | 0.1190 |

**STANDARD LED'S****5.0mm Diffused Package**

Standard diffused light emitting diodes of 5.0mm diameter. Anode (+ve) identified by long lead.

**Technical Specifications**

| Colour       | IF<br>Max. | VF<br>Typ. | VF<br>Max. | VR<br>Max. | Int @ IF<br>mcd | View Angle | Wave Length |
|--------------|------------|------------|------------|------------|-----------------|------------|-------------|
| Red 15mA     |            | 2.8V       |            |            | 10@20mA         | 60°        | 700nm       |
| Red 100 30mA |            | 2.6V       |            |            | 100@20mA        | 60°        | 643nm       |
| Green 30mA   |            | 2.8V       |            |            | 30@20mA         | 60°        | 570nm       |
| Yellow 15mA  |            | 2.8V       |            |            | 50@20mA         | 60°        | 570nm       |
| Orange 30mA  | 2.0V       | 2.5V       | 5.0V       |            | 80@10mA         | 60°        | 625nm       |



| ORDER CODE                | 1+   | 25+    | 50+    | 100+   | 500+   |
|---------------------------|------|--------|--------|--------|--------|
| 710-510 RED 5.0mm LED     | 0.06 | 0.0510 | 0.0340 | 0.0306 | 0.0272 |
| 710-530 RED 100 5.0mm LED | 0.08 | 0.0600 | 0.0400 | 0.0360 | 0.0320 |
| 711-510 GREEN 5.0mm LED   | 0.07 | 0.0540 | 0.0360 | 0.0324 | 0.0288 |
| 712-510 YELLOW 5.0mm LED  | 0.07 | 0.0540 | 0.0360 | 0.0324 | 0.0288 |
| 713-510 ORANGE 5.0mm LED  | 0.09 | 0.0600 | 0.0540 | 0.0480 | 0.0420 |

**5mm White High Intensity**

Miniature high efficiency light emitting diodes of 5.0mm diameter giving a white light. The white LED has a dominant wavelength of 460nm. Anode (+ve) identified by long lead.

**Technical Specifications**

| Colour     | IF<br>Max. | VF<br>Max. | VR<br>Max. | Int @ IF<br>mcd | View Angle |
|------------|------------|------------|------------|-----------------|------------|
| White 300  | 30mA       | 4.0V       | 5.0V       | 300@20mA        | 16°        |
| White 1100 | 30mA       | 4.0V       | 5.0V       | 1100@30mA       | 50°        |
| White 3000 |            | 4.2V       | 5.0V       | 3000@20mA       | 15°        |
| White 3200 |            | 4.0V       | 5.0V       | 3200@20mA       | 20°        |



| ORDER CODE                 | 1+   | 10+    | 25+    | 50+    | 100+   |
|----------------------------|------|--------|--------|--------|--------|
| 709-550 WHITE 5.0mm 300mcd | 0.69 | 0.6192 | 0.5848 | 0.5504 | 0.5160 |
| 709-552 WHITE 5.0mm 1.1cd  | 1.60 | 1.4400 | 1.2800 | 1.1200 | 1.0000 |
| 709-554 WHITE 5.0mm 3.0cd  | 0.56 | 0.5040 | 0.4480 | 0.3920 | 0.3500 |
| 709-556 WHITE 5.0mm 3.2cd  | 0.94 | 0.8460 | 0.7520 | 0.6580 | 0.5875 |

**5mm Blue High Intensity**

Miniature high efficiency light emitting diodes of 5.0mm diameter giving a blue light, available in either clear or diffused bodies. Anode (+ve) identified by long lead.

**Technical Specifications**

| Colour        | IF<br>Max. | VF<br>Max. | VR<br>Max. | Int @ IF<br>mcd | View Angle | Wave Length |
|---------------|------------|------------|------------|-----------------|------------|-------------|
| Blue Diffused | 30mA       | 5.5V       | 5.0V       | 60@20mA         | 50°        | 430nm       |
| Blue Clear    | 30mA       | 5.5V       | 5.0V       | 100@20mA        | 16°        | 430nm       |
| Blue Light    | 30mA       | 5.5V       | 5.0V       | 100@20mA        | 16°        | 430nm       |
| Blue Diffused | 30mA       | 4.0V       | 5.0V       | 450@20mA        | 20°        | 468nm       |
| Blue Clear    | 30mA       | 4.0V       | 5.0V       | 1000@20mA       | 16°        | 465nm       |
| Blue Clear    | 30mA       | 4.1V       |            | 1400@20mA       | 30°        | 465nm       |
| Blue Clear    | 30mA       | 4.0V       |            | 2200@20mA       | 15°        | 470nm       |



| ORDER CODE                | 1+   | 10+    | 25+    | 50+    | 100+   |
|---------------------------|------|--------|--------|--------|--------|
| 714-550 BLUE 5.0mm 60mcd  | 0.68 | 0.6120 | 0.5440 | 0.4760 | 0.4250 |
| 714-552 BLUE 5.0mm Clear  | 0.78 | 0.7020 | 0.6240 | 0.5460 | 0.4875 |
| 714-554 BLUE 5.0mm Light  | 0.78 | 0.7020 | 0.6240 | 0.5460 | 0.4875 |
| 714-560 BLUE 5.0mm 450mcd | 1.12 | 1.0080 | 0.8960 | 0.7840 | 0.7000 |
| 714-562 BLUE 5.0mm 1.0cd  | 0.96 | 0.8640 | 0.7680 | 0.6720 | 0.6000 |
| 714-566 BLUE 5.0mm 1.4cd  | 1.02 | 0.9180 | 0.8160 | 0.7140 | 0.6375 |
| 714-568 BLUE 5.0mm 2.2cd  | 0.90 | 0.8100 | 0.7200 | 0.6300 | 0.5625 |

**5mm Water Clear Package**

High efficiency light emitting diodes of 5.0mm diameter in a water clear package. Anode (+ve) identified by long lead. This range is intensity and colour matched.

**Technical Specifications**

| Colour      | IF<br>Max. | VF<br>Typ. | VF<br>Max. | VR<br>Max. | Int @ IF<br>mcd | View Angle | Wave Length |
|-------------|------------|------------|------------|------------|-----------------|------------|-------------|
| Red 30mA    | 2.0V       | 2.5V       | 5.0V       |            | 200@10mA        | 30°        | 625nm       |
| Green 30mA  | 2.2V       | 2.5V       | 5.0V       |            | 150@10mA        | 30°        | 565nm       |
| Yellow 30mA | 2.1V       | 2.5V       | 5.0V       |            | 80@10mA         | 30°        | 590nm       |



| ORDER CODE               | 1+   | 25+    | 50+    | 100+   | 500+   |
|--------------------------|------|--------|--------|--------|--------|
| 710-540 RED 5.0mm LED    | 0.10 | 0.0800 | 0.0720 | 0.0640 | 0.0560 |
| 711-540 GREEN 5.0mm LED  | 0.09 | 0.0720 | 0.0648 | 0.0576 | 0.0504 |
| 712-540 YELLOW 5.0mm LED | 0.10 | 0.0800 | 0.0720 | 0.0640 | 0.0560 |

**5mm Extra Bright Water Clear Package**

A range of light emitting diodes of 5.0mm diameter with very high luminous intensity, employing a GaAlAs dice. Anode (+ve) identified by long lead. Viewing angle 30°

**Technical Specifications**

| Colour      | IF<br>Max. | VF<br>Typ. | VF<br>Max. | VR<br>Max. | Int @ IF<br>mcd | Wave Length |
|-------------|------------|------------|------------|------------|-----------------|-------------|
| Red 1000    | 30mA       | 1.85V      | 2.5V       | 5.0V       | 1000@20mA       | 660nm       |
| Red 1600    | 30mA       | 1.85V      | 2.5V       | 5.0V       | 1600@20mA       | 660nm       |
| Red 2000    | 30mA       | 1.85V      | 2.5V       | 5.0V       | 2000@20mA       | 660nm       |
| Red 3500    | 30mA       | 1.85V      | 2.5V       | 5.0V       | 3500@20mA       | 660nm       |
| Green 300   | 25mA       | 2.2V       | 2.5V       | 5.0V       | 300@20mA        | 565nm       |
| Yellow 1200 | 30mA       | 2.2V       | 2.5V       | 5.0V       | 1200@20mA       | 589nm       |



| ORDER CODE                  | 1+   | 25+    | 50+    | 100+   | 500+   |
|-----------------------------|------|--------|--------|--------|--------|
| 710-550 RED 1000 5.0mm LED  | 0.11 | 0.0840 | 0.0756 | 0.0672 | 0.0588 |
| 710-552 RED 1600 5.0mm LED  | 0.10 | 0.0780 | 0.0702 | 0.0624 | 0.0546 |
| 710-554 RED 2000 5.0mm LED  | 0.25 | 0.2000 | 0.1800 | 0.1600 | 0.1400 |
| 710-556 RED 3500 5.0mm LED  | 0.20 | 0.1800 | 0.1620 | 0.1440 | 0.1260 |
| 711-550 GREEN 300 5.0mm LED | 0.08 | 0.0625 | 0.0500 | 0.0450 | 0.0400 |
| 712-556 YELLOW 1200 5.0mm   | 0.15 | 0.1160 | 0.1044 | 0.0928 | 0.0812 |



## 5mm Low Current Diffused Package

High efficiency low current light emitting diodes of 5.0mm diameter. Luminous intensity remains consistent down to 2mA.

### Technical Specifications

| Colour | IF   | VF   | VF   | VR   | Int @ IF | View  | Wave   |
|--------|------|------|------|------|----------|-------|--------|
|        | Max. | Typ. | Max. | Max. | mcd      | Angle | Length |
| Red    | 30mA | 1.7V | 2.0V | 5.0V | 5@2mA    | 60°   | 625nm  |
| Green  | 25mA | 1.9V | 2.2V | 5.0V | 3.2@2mA  | 60°   | 565nm  |
| Yellow | 30mA | 1.8V | 2.1V | 5.0V | 3.2@2mA  | 60°   | 590nm  |



| ORDER CODE |        |           | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|--------|-----------|------|--------|--------|--------|--------|
| 710-570    | RED    | 5.0mm LED | 0.09 | 0.0740 | 0.0666 | 0.0592 | 0.0518 |
| 711-570    | GREEN  | 5.0mm LED | 0.08 | 0.0660 | 0.0594 | 0.0528 | 0.0462 |
| 712-570    | YELLOW | 5.0mm LED | 0.09 | 0.0740 | 0.0666 | 0.0592 | 0.0518 |

## 5mm 12V Diffused Package

Light emitting diodes of 5.0mm diameter with inbuilt limiting resistor enabling direct connection to a 12V supply.

### Technical Specifications

| Colour | IF    | VF   | VR   | PTOT  | Int @ IF | View  | Wave   |
|--------|-------|------|------|-------|----------|-------|--------|
|        | Max.  | Typ. | Max. | Max.  | mcd      | Angle | Length |
| Red    | 150mA | 15V  | 5.0V | 310mW | 32@10mA  | 60°   | 630nm  |
| Green  | 150mA | 15V  | 5.0V | 310mW | 80@10mA  | 60°   | 565nm  |
| Yellow | 150mA | 15V  | 5.0V | 310mW | 32@10mA  | 60°   | 590nm  |



| ORDER CODE |        |           | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|--------|-----------|------|--------|--------|--------|--------|
| 710-585    | RED    | 5.0mm LED | 0.21 | 0.1640 | 0.1476 | 0.1312 | 0.1148 |
| 711-585    | GREEN  | 5.0mm LED | 0.20 | 0.1600 | 0.1440 | 0.1280 | 0.1120 |
| 712-585    | YELLOW | 5.0mm LED | 0.20 | 0.1600 | 0.1440 | 0.1280 | 0.1120 |

## STANDARD LED'S

### 5mm Bi-Colour, Tri-Colour Diffused Package

Light emitting diodes of 5.0mm diameter in a milky white package. Bi-Colour, 2 lead, Red or Green by reversing connections. Tri-Colour, 3 lead, Red, Green or Yellow(both on) common cathode.

### Technical Specifications

| Type       | IF   | VF        | VF   | VR   | Int @ IF    | View  | Wave   |
|------------|------|-----------|------|------|-------------|-------|--------|
|            | Max. | Typ.      | Max. | Max. | mcd         | Angle | Length |
| Bi-colour  | 30mA | 2.0(2.2)V | 2.5V | 5.0V | 40(20)@20mA | 60°   |        |
| Tri-colour | 30mA | 2.0(2.2)V | 2.5V | 5.0V | 90(70)@20mA | 60°   |        |

(For Green LED)



| ORDER CODE |            |           | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------------|-----------|------|--------|--------|--------|--------|
| 715-150    | Bi-Colour  | 5.0mm LED | 0.13 | 0.1000 | 0.0900 | 0.0800 | 0.0700 |
| 715-250    | Tri-Colour | 5.0mm LED | 0.13 | 0.1060 | 0.0954 | 0.0848 | 0.0742 |

## 5mm Flashing Diffused Package

Light emitting diodes of 5.0mm diameter with an inbuilt circuit to flash continuously at 3Hz. Supply voltage 9 to 12Vdc.

### Technical Specifications

| Colour | IF   | VF    | VF    | VR   | Int @ VF | View  | Wave   |
|--------|------|-------|-------|------|----------|-------|--------|
|        | Max. | Typ.  | Max.  | Max. | mcd      | Angle | Length |
| Red    | 56mA | 9-12V | 13.5V | 0.5V | 8@9V     | 60°   | 700nm  |
| HE Red | 56mA | 9-12V | 13.5V | 0.5V | 80@9V    | 60°   | 625nm  |
| Green  | 56mA | 9-12V | 13.5V | 0.5V | 32@9V    | 60°   | 565nm  |
| Yellow | 56mA | 9-12V | 13.5V | 0.5V | 32@9V    | 60°   | 590nm  |



| ORDER CODE |        |           | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|--------|-----------|------|--------|--------|--------|--------|
| 715-550    | RED    | 5.0mm LED | 0.37 | 0.2960 | 0.2664 | 0.2368 | 0.2072 |
| 715-551    | HE RED | 5.0mm LED | 0.44 | 0.3700 | 0.2960 | 0.2664 | 0.2368 |
| 715-552    | GREEN  | 5.0mm LED | 0.37 | 0.2960 | 0.2664 | 0.2368 | 0.2072 |
| 715-554    | YELLOW | 5.0mm LED | 0.30 | 0.2400 | 0.2160 | 0.1920 | 0.1680 |

## FLAT TOP LED'S

### Round Diffused Package

Light emitting diodes of 5.0mm diameter with a flat top.

### Technical Specifications

| Colour | IF   | VF   | VF   | VR   | Int @ IF  | View  | Wave   |
|--------|------|------|------|------|-----------|-------|--------|
|        | Max. | Typ. | Max. | Max. | mcd       | Angle | Length |
| Red    | 25mA | 2.0V | 2.5V | 5.0V | 3.2@10mA  | 100°  | 700nm  |
| Green  | 25mA | 2.2V | 2.5V | 5.0V | 8.0@10mA  | 100°  | 565nm  |
| Yellow | 30mA | 2.1V | 2.5V | 5.0V | 8.0@10mA  | 100°  | 590nm  |
| Orange | 30mA | 2.0V | 2.5V | 5.0V | 12.5@10mA | 100°  | 625nm  |



| ORDER CODE |        |                | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|--------|----------------|------|--------|--------|--------|--------|
| 710-590    | RED    | Round Flat Top | 0.09 | 0.0740 | 0.0666 | 0.0592 | 0.0518 |
| 711-590    | GREEN  | Round Flat Top | 0.11 | 0.0880 | 0.0792 | 0.0704 | 0.0616 |
| 712-590    | YELLOW | Round Flat Top | 0.13 | 0.1040 | 0.0936 | 0.0832 | 0.0728 |
| 713-590    | ORANGE | Round Flat Top | 0.13 | 0.1040 | 0.0936 | 0.0832 | 0.0728 |

## Square Diffused Package

Light emitting diodes 5.0mm Square with a flat top.

### Technical Specifications

| Colour | IF   | VF   | VF   | VR   | Int @ IF  | View  | Wave   |
|--------|------|------|------|------|-----------|-------|--------|
|        | Max. | Typ. | Max. | Max. | mcd       | Angle | Length |
| Red    | 25mA | 2.0V | 2.5V | 5.0V | 2.0@10mA  | 110°  | 700nm  |
| Green  | 25mA | 2.2V | 2.5V | 5.0V | 8.0@10mA  | 110°  | 565nm  |
| Yellow | 30mA | 2.1V | 2.5V | 5.0V | 8.0@10mA  | 110°  | 590nm  |
| Orange | 30mA | 2.0V | 2.5V | 5.0V | 12.5@10mA | 110°  | 625nm  |



| ORDER CODE |        |            | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|--------|------------|------|--------|--------|--------|--------|
| 710-591    | RED    | Square LED | 0.07 | 0.0560 | 0.0504 | 0.0448 | 0.0392 |
| 711-591    | GREEN  | Square LED | 0.07 | 0.0560 | 0.0504 | 0.0448 | 0.0392 |
| 712-591    | YELLOW | Square LED | 0.08 | 0.0660 | 0.0594 | 0.0528 | 0.0462 |
| 713-591    | ORANGE | Square LED | 0.08 | 0.0660 | 0.0594 | 0.0528 | 0.0462 |

## Rectangular Diffused Package

Light emitting diodes 5.0 x 2.5mm Rectangular with a flat top.

### Technical Specifications

| Colour | IF   | VF   | VF   | VR   | Int @ IF  | View  | Wave   |
|--------|------|------|------|------|-----------|-------|--------|
|        | Max. | Typ. | Max. | Max. | mcd       | Angle | Length |
| Red    | 30mA | 2.0V | 2.5V | 5.0V | 1.3@10mA  | 110°  | 625nm  |
| Green  | 25mA | 2.2V | 2.5V | 5.0V | 8.0@10mA  | 110°  | 565nm  |
| Yellow | 30mA | 2.1V | 2.5V | 5.0V | 8.0@10mA  | 110°  | 590nm  |
| Orange | 30mA | 2.0V | 2.5V | 5.0V | 12.5@10mA | 110°  | 625nm  |



| ORDER CODE |        |           | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|--------|-----------|------|--------|--------|--------|--------|
| 710-592    | RED    | Rect. LED | 0.08 | 0.0660 | 0.0594 | 0.0528 | 0.0462 |
| 711-592    | GREEN  | Rect. LED | 0.08 | 0.0660 | 0.0594 | 0.0528 | 0.0462 |
| 712-592    | YELLOW | Rect. LED | 0.08 | 0.0660 | 0.0594 | 0.0528 | 0.0462 |
| 713-592    | ORANGE | Rect. LED | 0.09 | 0.0720 | 0.0648 | 0.0576 | 0.0504 |

## Triangular Diffused Package

Light emitting diodes 4.8 x 4.8 x 3.5mm Triangular with a flat top.

### Technical Specifications

| Colour | IF   | VF   | VF   | VR   | Int @ IF | View  | Wave   |
|--------|------|------|------|------|----------|-------|--------|
|        | Max. | Typ. | Max. | Max. | mcd      | Angle | Length |
| Red    | 20mA | 2.0V | 2.5V | 5.0V | 1.6@10mA | 100°  | 660nm  |
| Green  | 30mA | 2.2V | 2.5V | 5.0V | 1.2@10mA | 100°  | 565nm  |
| Yellow | 30mA | 2.1V | 2.5V | 5.0V | 1.8@10mA | 100°  | 590nm  |



| ORDER CODE |        |              | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|--------|--------------|------|--------|--------|--------|--------|
| 710-593    | RED    | Triangle LED | 0.11 | 0.0880 | 0.0792 | 0.0704 | 0.0616 |
| 711-593    | GREEN  | Triangle LED | 0.12 | 0.0960 | 0.0864 | 0.0768 | 0.0672 |
| 712-593    | YELLOW | Triangle LED | 0.14 | 0.1080 | 0.0972 | 0.0864 | 0.0756 |

## LARGE 8MM LED'S



## 8mm Diffused Package

High intensity light emitting diodes of 8mm diameter in a diffused package. 2 lead devices. Anode (+ve) identified by long lead.

## Technical Specifications

| Colour | IF   | VF   | VF   | VR   | Int @ IF | View  | Wave   |
|--------|------|------|------|------|----------|-------|--------|
|        | Max. | Typ. | Max. | Max. | mcd      | Angle | Length |
| Red    | 30mA | 2.0V | 2.8V | 5.0V | 150@20mA | 50°   | 625nm  |
| Green  | 25mA | 2.2V | 2.8V | 5.0V | 70@20mA  | 50°   | 565nm  |
| Yellow | 30mA | 2.1V | 2.8V | 5.0V | 70@20mA  | 50°   | 590nm  |

| ORDER CODE |                | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|----------------|------|--------|--------|--------|--------|
| 710-730    | RED 8mm LED    | 0.13 | 0.1000 | 0.0900 | 0.0800 | 0.0700 |
| 711-730    | GREEN 8mm LED  | 0.13 | 0.1000 | 0.0900 | 0.0800 | 0.0700 |
| 712-730    | YELLOW 8mm LED | 0.13 | 0.1000 | 0.0900 | 0.0800 | 0.0700 |

## 8mm Extra Bright

A range of light emitting diodes of 8mm dia. with very high luminous intensity in diffused or clear packages. Wave length 660nm.

## Technical Specifications

| Colour       | IF        | VF    | VF   | VR   | Int @ IF  | View  |
|--------------|-----------|-------|------|------|-----------|-------|
|              | Max.      | Typ.  | Max. | Max. | mcd       | Angle |
| Red Diffused | 350 30mA  | 1.85V | 2.5V | 5.0V | 350@20mA  | 60°   |
| Red Diffused | 450 30mA  | 1.85V | 2.5V | 5.0V | 450@20mA  | 60°   |
| Red Clear    | 1600 30mA | 1.85V | 2.5V | 5.0V | 1600@20mA | 40°   |
| Red Clear    | 2000 30mA | 1.85V | 2.5V | 5.0V | 2000@20mA | 40°   |

| ORDER CODE |                  | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------------------|------|--------|--------|--------|--------|
| 710-750    | RED 350 8mm LED  | 0.15 | 0.1220 | 0.1098 | 0.0976 | 0.0854 |
| 710-752    | RED 450 8mm LED  | 0.16 | 0.1300 | 0.1170 | 0.1040 | 0.0910 |
| 710-760    | RED 1600 8mm LED | 0.15 | 0.1220 | 0.1098 | 0.0976 | 0.0854 |
| 710-762    | RED 2000 8mm LED | 0.33 | 0.2970 | 0.2640 | 0.2310 | 0.2063 |

## LARGE 10MM LED'S



## 10mm Diffused Package

High intensity light emitting diodes of 10mm diameter in a diffused package. 2 lead devices. Anode (+ve) identified by long lead.

## Technical Specifications

| Colour | IF   | VF   | VF   | VR   | Int @ IF | View  | Wave   |
|--------|------|------|------|------|----------|-------|--------|
|        | Max. | Typ. | Max. | Max. | mcd      | Angle | Length |
| Red    | 30mA | 2.0V | 2.5V | 5.0V | 150@20mA | 50°   | 625nm  |
| Green  | 25mA | 2.2V | 2.5V | 5.0V | 70@20mA  | 50°   | 565nm  |
| Yellow | 30mA | 2.1V | 2.5V | 5.0V | 70@20mA  | 50°   | 590nm  |
| Orange | 30mA | 2.0V | 2.5V | 5.0V | 150@20mA | 50°   | 625nm  |

| ORDER CODE |                 | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|-----------------|------|--------|--------|--------|--------|
| 710-830    | RED 10mm LED    | 0.10 | 0.0800 | 0.0720 | 0.0640 | 0.0560 |
| 711-830    | GREEN 10mm LED  | 0.10 | 0.0800 | 0.0720 | 0.0640 | 0.0560 |
| 712-830    | YELLOW 10mm LED | 0.10 | 0.0800 | 0.0720 | 0.0640 | 0.0560 |
| 713-830    | ORANGE 10mm LED | 0.10 | 0.0800 | 0.0720 | 0.0640 | 0.0560 |

## 10mm Extra Bright

A range of light emitting diodes of 10mm dia. with very high luminous intensity in diffused or clear packages. Wave length 660nm.

## Technical Specifications

| Colour       | IF        | VF    | VF   | VR   | Int @ IF  | View  |
|--------------|-----------|-------|------|------|-----------|-------|
|              | Max.      | Typ.  | Max. | Max. | mcd       | Angle |
| Red Diffused | 350 30mA  | 1.85V | 2.5V | 5.0V | 350@20mA  | 60°   |
| Red Diffused | 550 30mA  | 1.85V | 2.5V | 5.0V | 550@20mA  | 60°   |
| Red Clear    | 1600 30mA | 1.85V | 2.5V | 5.0V | 1600@20mA | 20°   |
| Red Clear    | 2000 30mA | 1.85V | 2.5V | 5.0V | 2000@20mA | 20°   |
| Red Clear    | 3000 30mA | 1.85V | 2.5V | 5.0V | 3000@20mA | 20°   |

| ORDER CODE |                   | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|-------------------|------|--------|--------|--------|--------|
| 710-850    | RED 350 10mm LED  | 0.15 | 0.1220 | 0.1098 | 0.0976 | 0.0854 |
| 710-852    | RED 550 10mm LED  | 0.17 | 0.1380 | 0.1242 | 0.1104 | 0.0966 |
| 710-860    | RED 1600 10mm LED | 0.13 | 0.1060 | 0.0954 | 0.0848 | 0.0742 |
| 710-862    | RED 2000 10mm LED | 0.32 | 0.2844 | 0.2528 | 0.2212 | 0.1975 |
| 710-864    | RED 3000 10mm LED | 0.33 | 0.2970 | 0.2640 | 0.2310 | 0.2063 |

## HIGH POWER 1W LED'S



## SMT LED Mounted on Hexagonal Heatsink

Super high-flux output and high luminance, very long operating life

## Technical Specifications

| Colour  | IF    | VF   | Power       | Luminous | View  | Wave   |
|---------|-------|------|-------------|----------|-------|--------|
|         | Max.  | Typ. | Dissipation | flux     | Angle | Length |
| White   | 350mA | 3.2V |             | 55lm     | 90°   |        |
| P.White | 350mA | 3.2V | 1.6W        | 60lm     | 90°   |        |
| Red     | 350mA | 3.2V | 0.9W        | 36lm     | 90°   | 625nm  |
| Green   | 350mA | 3.2V | 1.6W        | 70lm     | 90°   | 520nm  |
| Yellow  | 350mA | 3.2V | 0.9W        | 10lm     | 90°   | 625nm  |
| Blue    | 350mA | 3.2V | 1.6W        | 10lm     | 90°   | 570nm  |

| ORDER CODE |                   | 1+   | 10+  | 25+  |
|------------|-------------------|------|------|------|
| 709-910    | WHITE 1W LED      | 2.00 | 1.80 | 1.60 |
| 709-912    | PURE WHITE 1W LED | 3.51 | 3.35 | 3.25 |
| 710-910    | RED 1W LED        | 2.84 | 2.73 | 2.63 |
| 711-910    | GREEN 1W LED      | 4.13 | 3.98 | 3.83 |
| 712-910    | YELLOW 1W LED     | 2.50 | 2.41 | 2.31 |
| 714-910    | BLUE 1W LED       | 3.27 | 3.75 | 3.03 |

## HIGH POWER 3W LED'S



## SMT LED Mounted on Hexagonal Heatsink

Super high-flux output and high luminance, very long operating life. RGB (Red/Green/Blue) also available.

## Technical Specifications

| Colour  | IF    | VF                 | Power       | Luminous   | View  | Wave   |
|---------|-------|--------------------|-------------|------------|-------|--------|
|         | Max.  | Typ.               | Dissipation | flux       | Angle | Length |
| White   | 0.7A  | 4.0V               |             | 100lm      |       |        |
| P.White | 1A    | 3.5V               | 4.8W        | 170lm      | 110°  |        |
| Red     | 1A    | 2.2V               | 4.8W        | 36lm       | 90°   | 625nm  |
| Green   | 1A    | 3.5V               | 4.8W        | 170lm      | 140°  | 520nm  |
| Yellow  | 1A    | 2.2V               | 4.8W        | 36lm       | 90°   | 590nm  |
| Blue    | 1A    | 3.5V               | 4.8W        | 36lm       | 110°  | 465nm  |
| RGB     | 150mA | 2.2V(R), 3.3V(G+B) |             | 36/60/12lm | 140°  |        |

| ORDER CODE |                   | 1+   | 10+  | 25+  |
|------------|-------------------|------|------|------|
| 709-930    | WHITE 3W LED      | 3.44 | 3.22 | 3.19 |
| 709-932    | PURE WHITE 3W LED | 5.66 | 5.45 | 5.24 |
| 710-930    | RED 3W LED        | 4.25 | 4.10 | 3.94 |
| 711-930    | GREEN 3W LED      | 9.57 | 9.22 | 8.86 |
| 712-930    | YELLOW 3W LED     | 4.43 | 4.26 | 4.10 |
| 714-930    | BLUE 3W LED       | 5.72 | 5.51 | 5.30 |
| 715-933    | RGB 3W LED        | 7.87 | 7.58 | 7.29 |

## LED PANEL CLIPS

## Standard Single Part

Low cost black plastic panel clip suitable for most makes of 3mm and 5mm LED's.



| ORDER CODE |                       | 1+   | 50+    | 100+   | 500+   | 1000+  |
|------------|-----------------------|------|--------|--------|--------|--------|
| 719-310    | 3mm One part LED clip | 0.05 | 0.0350 | 0.0315 | 0.0280 | 0.0245 |
| 719-510    | 5mm One part LED clip | 0.07 | 0.0588 | 0.0529 | 0.0470 | 0.0412 |

## Single Part Bezel Panel Clips

Black plastic single part LED clips giving an attractive finish. Matching Protruding range for 5, 8 and 10mm LED's. Recessed type also available for 5mm LED's.



| ORDER CODE |                       | 1+   | 50+    | 100+   | 500+   | 1000+  |
|------------|-----------------------|------|--------|--------|--------|--------|
| 719-515    | 5mm Recessed Bezel    | 0.13 | 0.1078 | 0.0970 | 0.0862 | 0.0755 |
| 719-520    | 5mm Protruding Bezel  | 0.13 | 0.1078 | 0.0970 | 0.0862 | 0.0755 |
| 719-710    | 8mm Protruding Bezel  | 0.16 | 0.1440 | 0.1280 | 0.1120 | 0.1000 |
| 719-810    | 10mm Protruding Bezel | 0.21 | 0.1890 | 0.1680 | 0.1470 | 0.1313 |

## Chrome Bezel LED Holders

Chrome plated brass recessed LED panel holders suitable for use with most makes of 3mm and 5mm LED's. A push fit retaining mount holds the LED into the bezel and the holder is secured to the panel by a nut and washer supplied.



| ORDER CODE |                  | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------------------|------|--------|--------|--------|--------|
| 719-330    | 3mm Chrome Bezel | 0.47 | 0.4266 | 0.3792 | 0.3318 | 0.2963 |
| 719-530    | 5mm Chrome Bezel | 0.43 | 0.3800 | 0.3420 | 0.3040 | 0.2660 |

## LED LENS / PANEL CLIP

A combined lens and LED panel clip for use 5mm LED. Available coloured or as a clear lens. Available as a protruding lens or a low profile lens. Protruding type for panels 1.6 to 3.2mm thick. The low profile type for panels 0.8 to 6.35mm thick, a retaining ring is available for use with the low profile lens when a panels less than 4.8mm thick.



| ORDER CODE |                    | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|--------------------|------|--------|--------|--------|--------|
| 719-550    | RED Low Profile    | 0.19 | 0.1710 | 0.1520 | 0.1330 | 0.1188 |
| 719-551    | GREEN Low Profile  | 0.19 | 0.1710 | 0.1520 | 0.1330 | 0.1188 |
| 719-552    | YELLOW Low Profile | 0.19 | 0.1710 | 0.1520 | 0.1330 | 0.1188 |
| 719-553    | ORANGE Low Profile | 0.19 | 0.1710 | 0.1520 | 0.1330 | 0.1188 |
| 719-555    | CLEAR Low Profile  | 0.19 | 0.1710 | 0.1520 | 0.1330 | 0.1188 |
| 719-556    | Low Profile Ring   | 0.07 | 0.0601 | 0.0534 | 0.0468 | 0.0418 |
| 719-560    | RED Protruding     | 0.19 | 0.1728 | 0.1536 | 0.1344 | 0.1200 |
| 719-561    | GREEN Protruding   | 0.19 | 0.1728 | 0.1536 | 0.1344 | 0.1200 |
| 719-562    | YELLOW Protruding  | 0.19 | 0.1728 | 0.1536 | 0.1344 | 0.1200 |
| 719-563    | ORANGE Protruding  | 0.22 | 0.1980 | 0.1760 | 0.1640 | 0.1375 |
| 719-565    | CLEAR Protruding   | 0.19 | 0.1728 | 0.1536 | 0.1344 | 0.1200 |

## LED ARRAYS

### 5 Segment Horizontal Bar

A 5 segment LED bar which can be stackable end to end. The LED's are laid out horizontally lengthways forming a single line. Ten pin Single In Line package. Anode (+ve) identified by long lead.

#### Technical Specifications

| Colour | I <sub>f</sub> | V <sub>f</sub> | V <sub>r</sub> | Int @ I <sub>f</sub> | View Angle | Wave Length |
|--------|----------------|----------------|----------------|----------------------|------------|-------------|
|        | Max.           | Typ.           | Max.           | Max.                 | mcd        |             |
| Red    | 25mA           | 2.0V           | 2.5V           | 5.0V                 | 1@10mA     | 660nm       |
| Green  | 25mA           | 2.2V           | 2.5V           | 5.0V                 | 3@10mA     | 565nm       |
| Yellow | 30mA           | 2.1V           | 2.5V           | 5.0V                 | 3@10mA     | 590nm       |



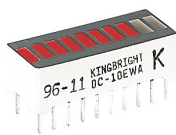
| ORDER CODE |                     | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|---------------------|------|--------|--------|--------|--------|
| 716-550    | RED 5 Seg. Array    | 0.58 | 0.5200 | 0.4640 | 0.4060 | 0.3625 |
| 716-650    | GREEN 5 Seg. Array  | 0.60 | 0.5400 | 0.4800 | 0.4200 | 0.3750 |
| 716-750    | YELLOW 5 Seg. Array | 0.62 | 0.5580 | 0.4960 | 0.4340 | 0.3875 |

### 10 Segment Vertical Bargraph

A 10 segment LED bar which can be stackable end to end. The LED's are laid out vertically side by side. 20 Pin Dual In Line package. Individually packaged LED's eliminating light leakage between adjacent cells. Anodes (+ve) along one side (pins 1-10).

#### Technical Specifications

| Colour | I <sub>f</sub> | V <sub>f</sub> | V <sub>r</sub> | Int @ I <sub>f</sub> | View Angle | Wave Length |
|--------|----------------|----------------|----------------|----------------------|------------|-------------|
|        | Max.           | Typ.           | Max.           | Max.                 | mcd        |             |
| Red    | 30mA           | 2.0V           | 2.5V           | 5.0V                 | 5.6@10mA   | 50° 625nm   |
| Green  | 25mA           | 2.2V           | 2.5V           | 5.0V                 | 5.6@10mA   | 50° 565nm   |
| Yellow | 30mA           | 2.1V           | 2.5V           | 5.0V                 | 5.6@10mA   | 50° 590nm   |



| ORDER CODE |                      | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|----------------------|------|--------|--------|--------|--------|
| 716-500    | RED 10 Seg. Array    | 0.98 | 0.7800 | 0.7020 | 0.6240 | 0.5460 |
| 716-600    | GREEN 10 Seg. Array  | 0.98 | 0.7800 | 0.7020 | 0.6240 | 0.5460 |
| 716-700    | YELLOW 10 Seg. Array | 0.98 | 0.7800 | 0.7020 | 0.6240 | 0.5460 |

## 7 SEGMENT DISPLAYS 0.3" 7.5mm DIL Displays

7 segment displays with a character height of 7.5mm which can be directly mounted on a PCB or into DIL sockets. White diffused segments, grey display surface, RH decimal point.

#### Technical Specifications

| Colour | I <sub>f</sub> | V <sub>f</sub> | V <sub>r</sub> | Int @ I <sub>f</sub> | View Angle | Wave Length |
|--------|----------------|----------------|----------------|----------------------|------------|-------------|
|        | Max.           | Typ.           | Max.           | Max.                 | mcd        |             |
| Red    | 25mA           | 2.0V           | 2.5V           | 5.0V                 | 1.4@10mA   | 50° 700nm   |



| ORDER CODE |                  | 1+   | 10+  | 25+    | 50+    | 100+   |
|------------|------------------|------|------|--------|--------|--------|
| 716-001    | RED 0.3" C.Anode | 0.65 | 0.52 | 0.4680 | 0.4160 | 0.3640 |
| 716-002    | RED 0.3" C.Cath. | 0.65 | 0.52 | 0.4680 | 0.4160 | 0.3640 |

## 0.56" 14.2mm Displays

7 segment displays with a character height of 14.2mm which can be directly mounted on a PCB or across 0.6" pitch DIL sockets. White diffused segments, grey display surface, RH decimal point.

#### Technical Specifications

| Colour | I <sub>f</sub> | V <sub>f</sub> | V <sub>r</sub> | Int @ I <sub>f</sub> | View Angle | Wave Length |
|--------|----------------|----------------|----------------|----------------------|------------|-------------|
|        | Max.           | Typ.           | Max.           | Max.                 | mcd        |             |
| Red    | 25mA           | 2.0V           | 2.5V           | 5.0V                 | 1.4@10mA   | 50° 700nm   |



| ORDER CODE |                   | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|-------------------|------|--------|--------|--------|--------|
| 716-021    | RED 0.56" C.Anode | 0.45 | 0.3660 | 0.3240 | 0.2880 | 0.2520 |
| 716-022    | RED 0.56" C.Cath. | 0.60 | 0.4800 | 0.4320 | 0.3840 | 0.3360 |

## 0.56" 14.2mm Dual Displays

Dual 7 segment displays with a character height of 14.2mm which can be directly mounted on a PCB or across 0.6" pitch DIL sockets. White diffused segments, grey display surface, RH decimal points.

#### Technical Specifications

| Colour | I <sub>f</sub> | V <sub>f</sub> | V <sub>r</sub> | Int @ I <sub>f</sub> | View Angle | Wave Length |
|--------|----------------|----------------|----------------|----------------------|------------|-------------|
|        | Max.           | Typ.           | Max.           | Max.                 | mcd        |             |
| Red    | 20mA           | 2.0V           | 2.5V           | 5.0V                 | 5.6@10mA   | 50° 625nm   |



| ORDER CODE |                     | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|---------------------|------|--------|--------|--------|--------|
| 716-027    | RED 0.56" C.A. Dual | 1.05 | 0.8400 | 0.7560 | 0.6720 | 0.5880 |
| 716-028    | RED 0.56" C.C. Dual | 1.05 | 0.8400 | 0.7560 | 0.6720 | 0.5880 |

## 1.0" 25.0mm Displays

7 segment displays with a character height of 25mm. Two LED's per segment. White diffused segments, grey display surface, RH decimal points.

#### Technical Specifications

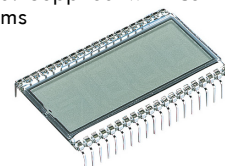
| Colour | I <sub>f</sub> | V <sub>f</sub> | V <sub>r</sub> | Int @ I <sub>f</sub> | View Angle | Wave Length |
|--------|----------------|----------------|----------------|----------------------|------------|-------------|
|        | Max.           | Typ.           | Max.           | Max.                 | mcd        |             |
| Red    | 25mA           | 4.0V           | 5.0V           | 10.0V                | 2.2@10mA   | 50° 700nm   |



| ORDER CODE |                  | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|------------------|------|--------|--------|--------|--------|
| 716-041    | RED 1.0" C.Anode | 1.43 | 1.1400 | 1.0260 | 0.9120 | 0.7980 |
| 716-042    | RED 1.0" C.Cath. | 1.43 | 1.1400 | 1.0260 | 0.9120 | 0.7980 |

## LIQUID CRYSTAL DISPLAYS (LCD)

Standard seven segment format with a decimal point between digits and a colon between alternative digits. The transmissive display gives black segments on a silvered background which can be back lit if required. Supplied with connectors on 0.1" pitch. Supply voltage 3-12Vrms



| ORDER CODE |                 | 1+   | 5+   | 10+  | 25+  | 50+  |
|------------|-----------------|------|------|------|------|------|
| 717-035    | 3 1/2 Digit LCD | 4.40 | 3.96 | 3.52 | 3.08 | 2.75 |
| 717-040    | 4 Digit LCD     | 4.00 | 3.75 | 3.50 | 3.25 | 3.13 |



**INFRARED DEVICES****3mm Standard**

A pair of Infrared devices housed in a 3mm LED package. An emitter diode and photo transistor which can be used together and easily interfaced with logic devices. Anode (+ve) identified by long lead.

**Technical Specification****Emitter Diode**

|                 |               |
|-----------------|---------------|
| VF Max.         | 1.6V @ 20mA   |
| Rise Time       | 600ns         |
| Radiant Power   | 3.6mW Typical |
| Peak Wavelength | 940nm         |

**Photo Transistor**

|                        |                            |
|------------------------|----------------------------|
| VCEO Max.              | 30V                        |
| VCE Max.               | 5V                         |
| Power Dissipation Max. | 100mW @ 25°C               |
| Light Current          | 7mA @ 20mW/cm <sup>2</sup> |
| Dark Current           | 100nA @ VCE=10V            |
| Rise Time              | 8µs                        |
| Fall Time              | 6µs                        |



| ORDER CODE |                         | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|-------------------------|------|--------|--------|--------|--------|
| 720-310    | 3mm IR Emitter Diode    | 0.15 | 0.1160 | 0.1044 | 0.0928 | 0.0812 |
| 721-310    | 3mm IR Photo Transistor | 0.15 | 0.1160 | 0.1044 | 0.0928 | 0.0812 |

**3mm Matched Pairs**

A pair of spectrally matched GaAs Infrared emitters and filtered narrow acceptance angle (24°) photo transistors housed in a 3mm LED package. Anode (+ve) identified by long lead.

**Technical Specification****Emitter Diode**

|                   |              |
|-------------------|--------------|
| VF Max.           | 1.3V @ 100mA |
| VR Max.           | 5V           |
| Surge Current     | 3A           |
| Radiant Power     | 15mW @ 100mA |
| Power Dissipation | 165mW        |
| Peak Wavelength   | 950nm        |

**Photo Transistor**

|                        |       |
|------------------------|-------|
| VCEO Max.              | 35V   |
| VCE Max.               | 5V    |
| Power Dissipation Max. | 165mW |
| Photo Current          | 3.2mA |
| Dark Current           | 200nA |
| Rise/Fall Time         | 70µs  |
| Peak Wavelength        | 900nm |



| ORDER CODE |                         | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|-------------------------|------|--------|--------|--------|--------|
| 720-330    | 3mm IR Emitter Diode    | 0.42 | 0.3780 | 0.3360 | 0.2940 | 0.2625 |
| 721-330    | 3mm IR Photo Transistor | 0.42 | 0.3780 | 0.3360 | 0.2940 | 0.2625 |

**5mm Standard**

A pair of high power Infrared devices. The emitter is housed in a 5mm clear LED package and the PIN photo diode is housed in a square black epoxy moulding. Anode (+ve) identified by long lead.

**Technical Specification****Emitter Diode**

|                   |              |
|-------------------|--------------|
| VF Max.           | 1.7V         |
| IF Max.           | 100mA        |
| Radiant Power     | 20mW Typical |
| Power Dissipation | 120mW        |
| Peak Wavelength   | 880nm        |

**Photo Diode**

|                       |                     |
|-----------------------|---------------------|
| Breakdown (IR=100µA)  | <b>BPW41/TIL100</b> |
| Dark Current (VR=10V) | 32V (Min.)          |
| Light Current (VR=5V) | 2nA (Typ.)          |
|                       | 45µA (Typ.)         |



| ORDER CODE |                        | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------------------------|------|--------|--------|--------|--------|
| 720-510    | 5mm IR Emitter Diode   | 0.20 | 0.1800 | 0.1600 | 0.1400 | 0.1250 |
| 721-592    | 5mm IR PIN Photo Diode | 0.58 | 0.5220 | 0.4640 | 0.4060 | 0.3625 |

**5mm Matched Pairs**

A range of spectrally matched GaAs & GaAlAs Infrared emitters and receivers. A choice of narrow or medium beam infrared emitters and a Photo transistor or PIN Photo Diode receiver. All devices housed in a 5mm LED package. Anode (+ve) identified by long lead.

**Technical Specification****Emitter Diode**

|                              |       |
|------------------------------|-------|
| VF Max. (IF=100mA)           | 1.5V  |
| VR Max.                      | 5V    |
| Surge Current (t=10µs)       | 3A    |
| Min Radiant Power (IF=100mA) | 80mW  |
| Power Dissipation            | 165mW |
| Peak Wavelength              | 950nm |
| Beam Angle                   | 40°   |

**PIN Photo Diode**

|                   |       |
|-------------------|-------|
| VR Max.           | 50V   |
| Power Dissipation | 100mW |
| Dark Current      | 5nA   |
| Rise/Fall Time    | 5ns   |
| Peak Wavelength   | 850nm |
| Acceptance Angle  | 40°   |



| ORDER CODE |                     | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|---------------------|------|--------|--------|--------|--------|
| 720-530    | 5mm M Beam Emitter  | 0.34 | 0.3060 | 0.2720 | 0.2380 | 0.2125 |
| 720-532    | 5mm N Beam Emitter  | 0.56 | 0.5040 | 0.4480 | 0.3920 | 0.3500 |
| 721-512    | 5mm PIN Photo Diode | 0.76 | 0.6840 | 0.6080 | 0.5320 | 0.4750 |

**TRANSISTOR OUTPUT OPTO COUPLERS**  
**Industrial Standard**

A range of popular opto couplers widely used throughout industry. Gallium Arsenide infrared emitting diode and an NPN silicon photo transistor housed in a standard 6 Pin DIL package.

**Technical Specification**

| Part No | Isolation | CTR | IF Max. | VCEO |
|---------|-----------|-----|---------|------|
| 4N25    | 2500V     | 20% | 80mA    | 30V  |
| 4N26    | 1500V     | 20% | 80mA    | 30V  |



| Order Code |                   | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|-------------------|------|--------|--------|--------|--------|
| 722-110    | 4N25 Opto Coupler | 0.25 | 0.2000 | 0.1800 | 0.1600 | 0.1400 |
| 722-115    | 4N26 Opto Coupler | 0.30 | 0.2400 | 0.2160 | 0.1920 | 0.1680 |

**High Isolation CNY17 Series**

The CNY17 series feature a high isolation voltage and consist of an Gallium Arsenide infrared emitting diode and a NPN silicon photo transistor mounted in a standard 6 Pin DIL package.

**Technical Specification**

| Part No | Isolation | CTR      | IF Max. | Vr   |
|---------|-----------|----------|---------|------|
| CNY17-1 | 7500V     | 40-80%   | 90mA    | 1.3V |
| CNY17-2 | 7500V     | 63-125%  | 90mA    | 1.3V |
| CNY17-3 | 5000V     | 100-200% | 90mA    | 1.2V |



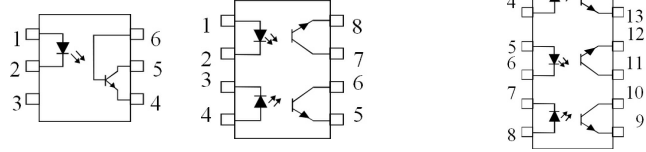
| Order Code |                      | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|----------------------|------|--------|--------|--------|--------|
| 722-130    | CNY17-1 Opto Coupler | 0.38 | 0.3420 | 0.3040 | 0.2660 | 0.2375 |
| 722-135    | CNY17-2 Opto Coupler | 0.35 | 0.2334 | 0.2101 | 0.1867 | 0.1411 |
| 722-140    | CNY17-3 Opto Coupler | 0.48 | 0.4320 | 0.3840 | 0.3360 | 0.3000 |

## Single, Dual & Quad Couplers

A range of single, dual and quad opto couplers, each channel has matched characteristics. Consisting of a Gallium Arsenide infrared emitting diode and NPN silicon photo transistor.

### Technical Specifications

| Isolation | CTR                           | V <sub>ceo</sub> | Rise / Fall Time                                |
|-----------|-------------------------------|------------------|---|
| 1500V     | I <sub>f</sub> =10mA<br>12.5% | 20V              | T <sub>r</sub><br>6μs<br>T <sub>f</sub><br>25μs |



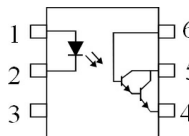
| Order Code                  | 1+   | 25+    | 50+    | 100+   | 500+   |
|-----------------------------|------|--------|--------|--------|--------|
| 722-150 IS-74 Opto Coupler  | 0.40 | 0.3600 | 0.3200 | 0.2800 | 0.2500 |
| 722-155 ISD-74 Opto Coupler | 1.02 | 0.9180 | 0.8160 | 0.7140 | 0.6375 |
| 722-160 ISQ-74 Opto Coupler | 1.41 | 1.2672 | 1.1968 | 1.0560 | 1.8304 |

## DARLINGTON OUTPUT OPTO COUPLERS

An industrial standard opto coupler comprising of a darlington photo transistor output and a Gallium Arsenide infrared emitting diode. Housed in a standard 6 Pin DIL package.

### Technical Specification

| Part No | Isolation | CTR  | I <sub>f</sub> Max. | V <sub>ceo</sub> |
|---------|-----------|------|---------------------|------------------|
| 4N32    | 2500V     | 500% | 60mA                | 30V              |



| Order Code                | 1+   | 25+    | 50+    | 100+   | 500+   |
|---------------------------|------|--------|--------|--------|--------|
| 722-210 4N32 Opto Coupler | 0.36 | 0.3240 | 0.2880 | 0.2520 | 0.2250 |

## HIGH PERFORMANCE OPTO COUPLERS

### High Speed

Popular opto couplers, featuring a separate connection for the photo diode bias resulting in a faster operation over that of conventional opto couplers. Housed in a standard 8 Pin DIL package.



### Technical Specification

| Part  | Isolation | CTR | Data Rate | Propagation | Delay |
|-------|-----------|-----|-----------|-------------|-------|
| 6N135 | 3000V     | 7%  | 1Mbit/s   | 1.5μs       | 1.5μs |
| 6N136 | 3000V     | 19% | 1Mbit/s   | 0.8μs       | 0.8μs |

| Order Code                 | 1+   | 25+    | 50+    | 100+   | 500+   |
|----------------------------|------|--------|--------|--------|--------|
| 722-310 6N135 Opto Coupler | 0.96 | 0.8640 | 0.7680 | 0.6720 | 0.6000 |
| 722-315 6N136 Opto Coupler | 0.85 | 0.6800 | 0.6120 | 0.5440 | 0.4760 |

## High Speed High Gain

Industrial standard opto couplers featuring very high gain, 500V/μs common mode transient immunity and extremely high current transfer ratio. Separate connections for photo diode and output stage giving TTL compatible saturation voltages and high speed operation.



### Technical Specification

| Part  | Isolation | CTR   | Data Rate | Propagation | Delay |
|-------|-----------|-------|-----------|-------------|-------|
| 6N138 | 2500V     | 1600% | 300kbit/s | 10μs        | 35μs  |
| 6N139 | 2500V     | 2000% | 300kbit/s | 10μs        | 35μs  |

| Order Code                 | 1+   | 25+    | 50+    | 100+   | 500+   |
|----------------------------|------|--------|--------|--------|--------|
| 722-330 6N138 Opto Coupler | 0.84 | 0.7560 | 0.6720 | 0.5880 | 0.5250 |
| 722-335 6N139 Opto Coupler | 0.90 | 0.7200 | 0.6480 | 0.5760 | 0.5040 |

## Ultra High Speed

A GaAsP emitting diode and an integrated detector which features a high gain amplifier that drives a schottky clamped open collector output transistor. Housed in a standard 8 Pin DIL case.



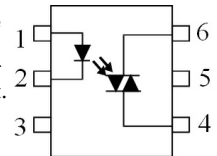
### Technical Specification

| Part  | Isolation | CTR  | Data Rate                        | Propagation                  | Delay Time                    |
|-------|-----------|------|----------------------------------|------------------------------|-------------------------------|
| 6N137 | 3000V     | 700% | R <sub>i</sub> =350Ω<br>10Mbit/s | C <sub>i</sub> =15pF<br>75ns | I <sub>f</sub> =7.5mA<br>75ns |

| Order Code                 | 1+   | 25+    | 50+    | 100+   | 500+   |
|----------------------------|------|--------|--------|--------|--------|
| 722-340 6N137 Opto Coupler | 0.85 | 0.6760 | 0.6084 | 0.5408 | 0.4732 |

## OPTO COUPLED TRIAC

A Gallium Arsenide infrared emitting diode and light activated triac suitable for switching 240Vac (400V Max.) supplies at 100mA. Input Trigger current - 15mA Typ. 30mA Max. Housed in a standard 6 Pin DIL package.



### Technical Specifications

| Part    | Isolation | I <sub>f</sub> Max. | V <sub>r</sub> Max. | V <sub>f</sub> Max.         |
|---------|-----------|---------------------|---------------------|-----------------------------|
| MOC3020 | 7500V     | 30mA                | 3V                  | 1.5V @ I <sub>f</sub> =10mA |

| Order Code                   | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------------------------|------|--------|--------|--------|--------|
| 722-410 MOC3020 Opto coupler | 0.39 | 0.3148 | 0.2833 | 0.2518 | 0.2204 |

## Zero Crossing Triac

A Gallium Arsenide infrared emitting diode coupled to a monolithic silicon detector which operates as a zero crossing bilateral triac. Housed in a standard 6 Pin DIL package.



### Technical Specification

|                                   |                                      |   |                   |                        |  |
|-----------------------------------|--------------------------------------|---|-------------------|------------------------|--|
| <b>Input</b>                      |                                      |   |                   |                        |  |
| <b>I<sub>F</sub></b>              | <b>V<sub>R</sub></b>                 | <b>V<sub>F</sub> (I<sub>F</sub>=30mA)</b> |                   |                        |  |
| 50mA                              | 6V                                   | 1.5V                                      |                   |                        |  |
| <b>Output</b>                     |                                      |   |                   |                        |  |
| <b>V<sub>DRM</sub></b>            | <b>I<sub>r</sub> RMS</b>             | <b>I<sub>TSM</sub> Peak</b>               | <b>ZC Inhibit</b> | <b>Leakage Current</b> |  |
| 400V                              | 100mA                                | 1.2A                                      | 40V Max.          | 300μA Max.(Inhibited)  |  |
| <b>Coupled Characteristics</b>    |                                      |   |                   |                        |  |
| <b>LED Trigger I<sub>FT</sub></b> | <b>Holding Current I<sub>H</sub></b> | <b>Isolation Voltage</b>                  |                   |                        |  |
| 15mA Max.                         | 200μA                                | 2500V Peak                                |                   |                        |  |

| Order Code                   | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------------------------|------|--------|--------|--------|--------|
| 722-415 MOC3041 Opto coupler | 0.63 | 0.5042 | 0.4538 | 0.4034 | 0.3529 |

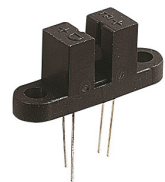
## OPTO SWITCHES

### Slotted

A slotted opto coupler with mounting flanges for counting / sensing applications. The aperture is 3 x 6mm with a sensitive zone of 1mm<sup>2</sup>. Housed in a black polycarbonate body with integral mounting flanges. Darlington Transistor output.

### Technical Specification

| I <sub>c</sub> Max | I <sub>f</sub> Max | T <sub>ON</sub> | T <sub>OFF</sub> | V <sub>CE</sub> Max |
|--------------------|--------------------|-----------------|------------------|---------------------|
| 40mA               | 50mA               | 90μs            | 80μs             | 35V                 |



| Order Code                  | 1+   | 10+    | 25+    | 50+    | 100+   |
|-----------------------------|------|--------|--------|--------|--------|
| 724-110 Slotted Opto Switch | 0.55 | 0.4400 | 0.3960 | 0.3520 | 0.3080 |

## LIGHT DEPENDENT RESISTOR

Light dependent resistor. Cadmium sulphide cells with characteristics such that as light intensity increases the resistance reduces. Available as a miniature open style or a sealed window type.

### Technical Specification

| Dark Res. @10Frc | @100Frc  | V Max | Power Dissipation |
|------------------|----------|-------|-------------------|
| 1MΩ              | -        | 400Ω  | 320Vdc 250mW      |
| 20MΩ             | 50-160kΩ | -     | 150Vdc 100mW      |



| Order Code                    | 1+   | 10+    | 25+    | 50+    | 100+   |
|-------------------------------|------|--------|--------|--------|--------|
| 723-010 ORP12 LDR - sealed    | 1.10 | 0.9900 | 0.8800 | 0.7700 | 0.6875 |
| Order Code                    | 1+   | 25+    | 50+    | 100+   | 500+   |
| 723-015 Mini Light LDR - open | 0.60 | 0.4776 | 0.4298 | 0.3821 | 0.3343 |

**0.125W 5% CARBON FILM**

Sub miniature high stability fixed value carbon film resistors for industrial and consumer applications. The sub miniature size (3.2 x 1.7mmØ) enables high PCB packing densities to be achieved. Light brown body with four band colour code.

**Technical Specification**

|                         |                       |
|-------------------------|-----------------------|
| Resistance Range        | 10Ω to 1MΩ E12 Series |
| Resistance Tolerance    | ±5%                   |
| Power Dissipation       | 0.125W @ 70°C         |
| Temperature Coefficient | -100 to -700ppm/°C    |
| Working Voltage         | 200V                  |
| Overload Voltage        | 400V max.             |
| Insulation Resistance   | 1000M                 |

| Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code |
|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|
| 10R   | 900-010    | 100R  | 900-110    | 1k0   | 900-210    | 10k   | 900-310    | 100k  | 900-410    | 1M0   | 900-510    |
| 15R   | 900-015    | 120R  | 900-112    | 1k2   | 900-212    | 12k   | 900-312    | 120k  | 900-412    |       |            |
| 22R   | 900-022    | 150R  | 900-115    | 1k5   | 900-215    | 15k   | 900-315    | 150k  | 900-415    |       |            |
| 27R   | 900-027    | 180R  | 900-118    | 1k8   | 900-218    | 18k   | 900-318    | 180k  | 900-418    |       |            |
| 33R   | 900-033    | 220R  | 900-122    | 2k2   | 900-222    | 22k   | 900-322    | 220k  | 900-422    |       |            |
| 47R   | 900-047    | 330R  | 900-133    | 2k7   | 900-227    | 27k   | 900-327    | 270k  | 900-427    |       |            |
| 68R   | 900-068    | 390R  | 900-139    | 3k3   | 900-233    | 33k   | 900-333    | 330k  | 900-433    |       |            |
|       |            | 470R  | 900-147    | 3k9   | 900-239    | 39k   | 900-339    | 390k  | 900-439    |       |            |
|       |            | 560R  | 900-156    | 4k7   | 900-247    | 47k   | 900-347    | 470k  | 900-447    |       |            |
|       |            | 680R  | 900-168    | 5k6   | 900-256    | 56k   | 900-356    |       |            |       |            |
|       |            |       |            | 6k8   | 900-268    | 68k   | 900-368    | 680k  | 900-468    |       |            |
|       |            |       |            |       |            | 82k   | 900-382    | 820k  | 900-482    |       |            |

**Pricing Information**

All values of these resistors are priced at the same price.

**Mixed Quantity Pricing Applies to per 100 & per 1000 pricing.**

i.e. Purchase a total of 1000 resistors or more with a minimum of 100 of each value, and pay the 10+ price per 100.  
or Purchase a total of 10,000 resistors or more with a minimum of 1000 of each value, and pay the 10+ price per 1000.

**Order Code****Per Individual Resistor**

As above 0.125W 5% Carbon Film

**Per 100 of one value**

As above 0.125W 5% Carbon Film

**Per 1000 of one value**

As above 0.125W 5% Carbon Film

**1+**

Each

0.02

per 100

0.80

per 1000

5.40

**10+**

Each

0.02

per 100

0.65

per 1000

3.78

**0.25W 5% CARBON FILM**

Miniature high stability fixed value carbon film resistors. This range forms the industry standard and is suitable for general, industrial and consumer applications. A "Zero" ohm resistor is also included in the range as an alternative to wire links and it can also be used in automated cropping and bending machines. Light brown body, with four band colour code.

**Technical Specification**

|                             |                       |
|-----------------------------|-----------------------|
| Resistance Range            | 0Ω to 10MΩ E12 Series |
| Resistance Tolerance        | ±5%                   |
| Power Dissipation           | 0.25W @ 70°C          |
| Temperature Coefficient     | ±700ppm/°C            |
| Working Voltage             | 300V                  |
| Overload Voltage            | 500V max.             |
| Operating Temperature Range | -25 to +70°C          |

| Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code |
|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|
| 0R0   | 906-700    | 10R   | 906-010    | 100R  | 906-110    | 1k0   | 906-210    | 10k   | 906-310    | 100k  | 906-410    | 1M0   | 906-510    |
| 1R0   | 906-910    | 12R   | 906-012    | 120R  | 906-112    | 1k2   | 906-212    | 12k   | 906-312    | 120k  | 906-412    | 1M2   | 906-512    |
| 1R2   | 906-912    | 15R   | 906-015    | 150R  | 906-115    | 1k5   | 906-215    | 15k   | 906-315    | 150k  | 906-415    | 1M5   | 906-515    |
| 1R5   | 906-915    | 18R   | 906-018    | 180R  | 906-118    | 1k8   | 906-218    | 18k   | 906-318    | 180k  | 906-418    | 1M8   | 906-518    |
| 2R7   | 906-927    | 22R   | 906-022    | 220R  | 906-122    | 2k2   | 906-222    | 22k   | 906-322    | 220k  | 906-422    | 2M2   | 906-522    |
| 3R3   | 906-933    | 27R   | 906-027    | 270R  | 906-127    | 2k7   | 906-227    | 27k   | 906-327    | 270k  | 906-427    | 2M7   | 906-527    |
| 3R9   | 906-939    | 33R   | 906-033    | 330R  | 906-133    | 3k3   | 906-233    | 33k   | 906-333    | 330k  | 906-433    | 3M3   | 906-533    |
| 4R7   | 906-947    | 39R   | 906-039    | 390R  | 906-139    | 3k9   | 906-239    | 39k   | 906-339    | 390k  | 906-439    | 3M9   | 906-539    |
| 5R6   | 906-956    | 47R   | 906-047    | 470R  | 906-147    | 4k7   | 906-247    | 47k   | 906-347    | 470k  | 906-447    | 4M7   | 906-547    |
| 6R8   | 906-968    | 56R   | 906-056    | 560R  | 906-156    | 5k6   | 906-256    | 56k   | 906-356    | 560k  | 906-456    | 5M6   | 906-556    |
| 8R2   | 906-982    | 68R   | 906-068    | 680R  | 906-168    | 6k8   | 906-268    | 68k   | 906-368    | 680k  | 906-468    | 6M8   | 906-568    |
|       |            | 82R   | 906-082    | 820R  | 906-182    | 8k2   | 906-282    | 82k   | 906-382    | 820k  | 906-482    | 8M2   | 906-582    |
|       |            |       |            |       |            |       |            |       |            |       |            | 10M   | 906-610    |

**Pricing Information**

All values of these resistors are priced at the same price.

**Mixed Quantity Pricing Applies to per 100 & per 1000 pricing.**

i.e. Purchase a total of 1000 resistors or more with a minimum of 100 of each value, and pay the 10+ price per 100.  
or Purchase a total of 10,000 resistors or more with a minimum of 1000 of each value, and pay the 10+ price per 1000.

**Order Code****Per Individual Resistor**

As above 0.25W 5% Carbon Film

**Per 100 of one value**

As above 0.25W 5% Carbon Film

**Per 1000 of one value**

As above 0.25W 5% Carbon Film

**1+**

Each

0.02

per 100

0.60

per 1000

3.80

**10+**

Each

0.02

per 100

0.43

per 1000

2.66

**RESISTOR DATA****4 Band Colour Coded**

The 1st & 2nd (not 3rd) Significant figures, the multiplier and the tolerance are used to establish the value of the resistor.

e.g. Red, Violet, Red, Gold = 2700Ω 5% = 2.7k (2k7)

**5 Band Colour Coded**

The 1st, 2nd & 3rd Significant figures, the multiplier and the tolerance are used to establish the value of the resistor.

e.g. White, Brown, Black, Gold, Brown = 91Ω 1%

**Total Resistance Combinations**

Series  $R_t = R_1 + R_2 + R_3 \dots$  etc

Parallel  $1/R_t = 1/R_1 + 1/R_2 + 1/R_3 \dots$  etc

**Preferred Values**

E12 10 12 15 16 18 22 24 27 30 33 36 39 43 47 51 56 62 68 75 82  
E24 10 11 12 13 15 16 18 20 22 24 27 30 33 36 39 43 47 51 56 62 68 75 82 91

Just seeing shades of grey? Check out our catalogue online at [www.esr.co.uk](http://www.esr.co.uk)

**Resistor Colour code for 4 & 5 Band Resistors**

| Colour | 1st | 2nd | 3rd | Multiplier  | Tolerance |
|--------|-----|-----|-----|-------------|-----------|
| Silver |     |     |     | +100        | 10%       |
| Gold   |     |     |     | +10         | 5%        |
| Black  | 0   | 0   | 0   | x1          |           |
| Brown  | 1   | 1   | 1   | x10         | 1%        |
| Red    | 2   | 2   | 2   | x100        | 2%        |
| Orange | 3   | 3   | 3   | x1,000      |           |
| Yellow | 4   | 4   | 4   | x10,000     |           |
| Green  | 5   | 5   | 5   | x100,000    |           |
| Blue   | 6   | 6   | 6   | x1,000,000  |           |
| Violet | 7   | 7   | 7   | x10,000,000 |           |
| Grey   | 8   | 8   | 8   |             |           |
| White  | 9   | 9   | 9   |             |           |

# RESISTORS

## Carbon Film - 0.5W, 1W, 2W

### 0.5W 5% CARBON FILM

Miniature high stability fixed value carbon film resistors. This range is suitable for general, industrial and consumer applications. Light brown body with four band colour code.



#### Technical Specification

|                             |                       |
|-----------------------------|-----------------------|
| Resistance Range            | 10Ω to 10M E12 Series |
| Resistance Tolerance        | ±5%                   |
| Power Dissipation           | 0.5W @ 70°C           |
| Temperature Coefficient     | ±400ppm/°C            |
| Working Voltage             | 350V                  |
| Overload Voltage            | 700V max.             |
| Operating Temperature Range | -25 to + 70°C         |

| Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code |
|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|
| 1R0   | 910-910    | 10R   | 910-010    | 100R  | 910-110    | 1k0   | 910-210    | 10k   | 910-310    | 100k  | 910-410    | 1M0   | 910-510    |
|       |            | 12R   | 910-012    | 120R  | 910-112    | 1k2   | 910-212    | 12k   | 910-312    | 120k  | 910-412    | 1M2   | 910-512    |
|       |            | 15R   | 910-015    | 150R  | 910-115    | 1k5   | 910-215    | 15k   | 910-315    | 150k  | 910-415    | 1M5   | 910-515    |
|       |            | 18R   | 910-018    | 180R  | 910-118    | 1k8   | 910-218    | 18k   | 910-318    | 180k  | 910-418    | 1M8   | 910-518    |
| 2R2   | 910-922    | 22R   | 910-022    | 220R  | 910-122    | 2k2   | 910-222    | 22k   | 910-322    | 220k  | 910-422    | 2M2   | 910-522    |
|       |            | 27R   | 910-027    | 270R  | 910-127    | 2k7   | 910-227    | 27k   | 910-327    | 270k  | 910-427    | 2M7   | 910-527    |
|       |            | 33R   | 910-033    | 330R  | 910-133    | 3k3   | 910-233    | 33k   | 910-333    | 330k  | 910-433    | 3M3   | 910-533    |
| 3R9   | 910-939    | 39R   | 910-039    | 390R  | 910-139    | 3k9   | 910-239    | 39k   | 910-339    | 390k  | 910-439    | 3M9   | 910-539    |
| 4R7   | 910-947    | 47R   | 910-047    | 470R  | 910-147    | 4k7   | 910-247    | 47k   | 910-347    | 470k  | 910-447    | 4M7   | 910-547    |
| 5R6   | 910-956    | 56R   | 910-056    | 560R  | 910-156    | 5k6   | 910-256    | 56k   | 910-356    | 560k  | 910-456    | 5M6   | 910-556    |
| 6R8   | 910-968    | 68R   | 910-068    | 680R  | 910-168    | 6k8   | 910-268    | 68k   | 910-368    | 680k  | 910-468    |       |            |
| 8R2   | 910-982    | 82R   | 910-082    | 820R  | 910-182    | 8k2   | 910-282    | 82k   | 910-382    |       |            |       |            |

10M 910-610

#### Pricing Information

All values of these resistors are priced at the same price.

**Mixed Quantity Pricing Applies to per 100 & per 1000 pricing.**

i.e. Purchase a total of 1000 resistors or more with a minimum of 100 of each value, and pay the 10+ price per 100.  
or Purchase a total of 10,000 resistors or more with a minimum of 1000 of each value, and pay the 10+ price per 1000.

#### Order Code

**Per Individual Resistor**

As above 0.5W 5% Carbon Film

**Per 100 of one value**

As above 0.5W 5% Carbon Film

**Per 1000 of one value**

As above 0.5W 5% Carbon Film

**1+**

Each

0.02

per 100

0.95

per 1000

5.12

**10+**

Each

0.02

per 100

0.56

per 1000

4.44

### 1W 5% CARBON FILM

High power fixed value carbon film resistors suitable for consumer and industrial applications. Light brown body, four band colour code.



#### Technical Specification

|                             |                          |
|-----------------------------|--------------------------|
| Resistance Range            | 10Ω to 8M2 E12 Series    |
| Resistance Tolerance        | ±5%                      |
| Power Dissipation           | 1W @ 70°C (Zero @ 155°C) |
| Temperature Coefficient     | 0 to -1000ppm/°C         |
| Working Voltage             | 500V                     |
| Overload Voltage            | 1000V max.               |
| Operating Temperature Range | -55 to + 155°C           |

| Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code |
|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|
| 1R0   | 912-910    | 33R   | 912-033    | 270R  | 912-127    | 1k2   | 912-212    | 6k8   | 912-268    | 47k   | 912-347    | 270k  | 912-427    |
| 5R6   | 912-956    | 47R   | 912-047    | 330R  | 912-133    | 1k5   | 912-215    | 10k   | 912-310    | 56k   | 912-356    | 470k  | 912-447    |
| 10R   | 912-010    | 68R   | 912-068    | 390R  | 912-139    | 1k8   | 912-218    | 15k   | 912-315    | 68k   | 912-368    | 820k  | 912-482    |
| 22R   | 912-022    | 100R  | 912-110    | 470R  | 912-147    | 2k2   | 912-222    | 18k   | 912-318    | 82k   | 912-382    | 1M8   | 912-518    |
| 27R   | 912-027    | 150R  | 912-115    | 560R  | 912-156    | 2k7   | 912-227    | 22k   | 912-322    | 100k  | 912-410    | 2M2   | 912-522    |
|       |            | 180R  | 912-118    | 680R  | 912-168    | 3k3   | 912-233    | 27k   | 912-327    | 120k  | 912-412    | 3M9   | 912-539    |
|       |            | 220R  | 912-122    | 820R  | 912-182    | 3k9   | 912-239    | 33k   | 912-333    | 150k  | 912-415    | 5M6   | 912-556    |
|       |            |       |            | 1k0   | 912-210    | 4k7   | 912-247    | 39k   | 912-339    | 220k  | 912-422    | 8M2   | 912-582    |

#### Pricing Information

All values of these resistors are priced at the same price.

**Mixed Quantity Pricing Applies to per 100 pricing.**

i.e. Purchase a total of 1000 resistors or more with a minimum of 100 of each value, and pay the 10+ price per 100.

#### Order Code

**Per Individual Resistor**

As above 1W 5% Carbon Film

**Per 100 of one value**

As above 1W 5% Carbon Film

**1+**

Each

0.06

per 100

3.90

**10+**

Each

0.04

per 100

3.12

### 2W 5% CARBON FILM

High power fixed value carbon film resistors suitable for consumer and industrial applications. Light brown body, four band colour code.



#### Technical Specification

|                             |                          |
|-----------------------------|--------------------------|
| Resistance Range            | 10Ω to 10M E12 Series    |
| Resistance Tolerance        | ±5%                      |
| Power Dissipation           | 2W @ 70°C (Zero @ 155°C) |
| Temperature Coefficient     | 0 to -1000ppm/°C         |
| Working Voltage             | 500V                     |
| Overload Voltage            | 1000V max.               |
| Operating Temperature Range | -55 to + 155°C           |

| Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code |
|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|
| 10R   | 914-010    | 68R   | 914-068    | 470R  | 914-147    | 2k7   | 914-227    | 18k   | 914-318    | 56k   | 914-356    | 2M7   | 914-527    |
| 22R   | 914-022    | 100R  | 914-110    | 820R  | 914-182    | 10k   | 914-310    | 22k   | 914-322    | 100k  | 914-410    | 3M3   | 914-533    |
| 33R   | 914-033    | 150R  | 914-115    | 1k0   | 914-210    | 12k   | 914-312    | 27k   | 914-327    | 1M5   | 914-515    | 6M8   | 914-568    |
| 47R   | 914-047    | 220R  | 914-122    | 2k2   | 914-222    | 15k   | 914-315    | 33k   | 914-333    | 1M8   | 914-518    | 8M2   | 914-582    |

#### Pricing Information

All values of these resistors are priced at the same price.

**Mixed Quantity Pricing Applies to per 100 pricing.**

i.e. Purchase a total of 1000 resistors or more with a minimum of 100 of each value, and pay the 10+ price per 100.

#### Order Code

**Per Individual Resistor**

As above 2W 5% Carbon Film

**Per 100 of one value**

As above 2W 5% Carbon Film

**1+**

Each

0.12

per 100

5.99

**10+**

Each

0.08

per 100

4.80

**0.25W 1% METAL FILM**

Miniature high stability fixed value metal film resistors suited to industrial applications or where a low noise, 1% resistor is required. Light blue body with five band colour code.

**Technical Specification**

Resistance Range  
Resistance Tolerance  
Power Dissipation  
Temperature Coefficient  
Working Voltage  
Overload Voltage  
Operating Temperature Range

10Ω to 1MΩ E24 Series  
±1%  
0.25W @ 70°C  
±50ppm/°C  
300V  
600V max.  
-25 to + 70°C

| Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code | Value | Order Code |
|-------|------------|-------|------------|-------|------------|-------|------------|-------|------------|
| 10R   | 907-010    | 100R  | 907-110    | 1k0   | 907-210    | 10k   | 907-310    | 100k  | 907-410    |
|       |            | 110R  | 907-111    | 1k1   | 907-211    | 11k   | 907-311    | 110k  | 907-411    |
| 12R   | 907-012    | 120R  | 907-112    | 1k2   | 907-212    | 12k   | 907-312    | 120k  | 907-412    |
| 13R   | 907-013    | 130R  | 907-113    | 1k3   | 907-213    | 13k   | 907-313    | 130k  | 907-413    |
| 15R   | 907-015    | 150R  | 907-115    | 1k5   | 907-215    | 15k   | 907-315    | 150k  | 907-415    |
|       |            | 160R  | 907-116    | 1k6   | 907-216    | 16k   | 907-316    | 160k  | 907-416    |
| 18R   | 907-018    | 180R  | 907-118    | 1k8   | 907-218    | 18k   | 907-318    | 180k  | 907-418    |
| 20R   | 907-020    | 200R  | 907-120    | 2k0   | 907-220    | 20k   | 907-320    | 200k  | 907-420    |
| 22R   | 907-022    | 220R  | 907-122    | 2k2   | 907-222    | 22k   | 907-322    | 220k  | 907-422    |
| 24R   | 907-024    | 240R  | 907-124    | 2k4   | 907-224    | 24k   | 907-324    | 240k  | 907-424    |
| 27R   | 907-027    | 270R  | 907-127    | 2k7   | 907-227    | 27k   | 907-327    | 270k  | 907-427    |
| 30R   | 907-030    | 300R  | 907-130    | 3k0   | 907-230    | 30k   | 907-330    | 300k  | 907-430    |
| 33R   | 907-033    | 330R  | 907-133    | 3k3   | 907-233    | 33k   | 907-333    | 330k  | 907-433    |
| 36R   | 907-036    | 360R  | 907-136    | 3k6   | 907-236    | 36k   | 907-336    | 360k  | 907-436    |
| 39R   | 907-039    | 390R  | 907-139    | 3k9   | 907-239    | 39k   | 907-339    | 390k  | 907-439    |
|       |            | 430R  | 907-143    | 4k3   | 907-243    | 43k   | 907-343    | 430k  | 907-443    |
| 47R   | 907-047    | 470R  | 907-147    | 4k7   | 907-247    | 47k   | 907-347    | 470k  | 907-447    |
| 51R   | 907-051    | 510R  | 907-151    | 5k1   | 907-251    | 51k   | 907-351    | 510k  | 907-451    |
| 56R   | 907-056    | 560R  | 907-156    | 5k6   | 907-256    | 56k   | 907-356    | 560k  | 907-456    |
| 62R   | 907-062    | 620R  | 907-162    | 6k2   | 907-262    | 62k   | 907-362    | 620k  | 907-462    |
| 68R   | 907-068    | 680R  | 907-168    | 6k8   | 907-268    | 68k   | 907-368    | 680k  | 907-468    |
| 75R   | 907-075    | 750R  | 907-175    | 7k5   | 907-275    | 75k   | 907-375    | 750k  | 907-475    |
| 82R   | 907-082    | 820R  | 907-182    | 8k2   | 907-282    | 82k   | 907-382    | 820k  | 907-482    |
| 91R   | 907-091    | 910R  | 907-191    | 9k1   | 907-291    | 91k   | 907-391    | 910k  | 907-491    |
|       |            |       |            |       |            |       |            | 1M0   | 907-510    |

**Pricing Information**

All values of these resistors are priced at the same price.

**Mixed Quantity Pricing Applies to per 100 & per 1000 pricing.**

i.e. Purchase a total of 1000 resistors or more with a minimum of 100 of each value, and pay the 10+ price per 100.

or Purchase a total of 10,000 resistors or more with a minimum of 1000 of each value, and pay the 10+ price per 1000.

**Order Code****Per Individual Resistor**

As above 0.25W 1% Metal Film

**Per 100 of one value**

As above 0.25W 1% Metal Film

**Per 1000 of one value**

As above 0.25W 1% Metal Film

**1+**

Each

0.04

per 100

1.29

per 1000

8.60

**10+**

Each

0.04

per 100

1.29

per 1000

6.00

**2.5W 5% SILICON**

Flame retardant silicon coated high power wirewound resistors.

**Technical Specification**

Resistance Range 10Ω to 270Ω E12 Series  
Resistance Tolerance ±5%  
Power Dissipation 2.5W @ 70°C 3W @ 40°C  
(Zero @ 275°C)  
Temperature Coefficient ±300ppm/°C (R≥22Ω)  
±400ppm/°C (R<22Ω)  
Operating Temperature Range -40 to + 200°C



| Value | Code    | Value | Code    | Value | Code    | Value | Code    |
|-------|---------|-------|---------|-------|---------|-------|---------|
| 0R1   | 916-810 | 2R2   | 916-922 | 15R   | 916-015 | 82R   | 916-082 |
| 0R15  | 916-815 | 3R3   | 916-933 | 18R   | 916-018 | 100R  | 916-110 |
| 0R22  | 916-822 | 3R9   | 916-939 | 22R   | 916-022 | 120R  | 916-112 |
| 0R33  | 916-833 | 4R7   | 916-947 | 27R   | 916-027 | 150R  | 916-115 |
| 0R47  | 916-847 | 5R6   | 916-956 | 33R   | 916-033 | 180R  | 916-118 |
| 1R0   | 916-910 | 8R2   | 916-982 | 39R   | 916-039 | 220R  | 916-122 |
| 1R5   | 916-915 | 10R   | 916-010 | 47R   | 916-047 | 270R  | 916-127 |
| 1R8   | 916-918 | 12R   | 916-012 | 56R   | 916-056 |       |         |

**Order Code**

As above 2.5W Wirewound

**1+**

0.18

**25+**

0.1530

**50+**

0.1224

**100+**

0.0979

**500+**

0.0857

**5, 10 & 20W 5% CERAMIC**

A wide range of high power wirewound resistors in ceramic flame proof bodies.

**Technical Specification**

Resistance Range 5W 0.10Ω to 47kΩ  
10W 0.10Ω to 22kΩ  
20W 1Ω to 100Ω  
Resistance Tolerance ±5%  
Dimensions 5W 23 x 10 x 10mm  
10W 48 x 10 x 10mm  
20W 60 x 14 x 14mm

**5W Ceramic**

| Value | Code    | Value | Code    | Value | Code    |
|-------|---------|-------|---------|-------|---------|
| 0R10  | 924-810 | 10R   | 924-010 | 1k0   | 924-210 |
| 0R12  | 924-812 | 12R   | 924-012 | 1k2   | 924-212 |
| 0R15  | 924-815 | 15R   | 924-015 | 1k5   | 924-215 |
| 0R18  | 924-818 | 18R   | 924-018 | 1k8   | 924-218 |
| 0R22  | 924-822 | 22R   | 924-022 | 2k2   | 924-222 |
| 0R27  | 924-827 | 27R   | 924-027 | 2k7   | 924-227 |
| 0R33  | 924-833 | 33R   | 924-033 | 3k3   | 924-233 |
| 0R39  | 924-839 | 39R   | 924-039 | 3k9   | 924-239 |
| 0R47  | 924-847 | 47R   | 924-047 | 4k7   | 924-247 |
| 0R56  | 924-856 | 56R   | 924-056 | 5k6   | 924-256 |
| 0R68  | 924-868 | 68R   | 924-068 | 6k8   | 924-268 |
| 0R82  | 924-868 | 82R   | 924-082 | 8k2   | 924-282 |

| Value | Code    | Value | Code    | Value | Code    |
|-------|---------|-------|---------|-------|---------|
| 1R0   | 924-910 | 100R  | 924-110 | 10k   | 924-310 |
| 1R2   | 924-912 | 120R  | 924-112 | 12k   | 924-312 |
| 1R5   | 924-915 | 150R  | 924-115 | 15k   | 924-315 |
| 1R8   | 924-918 | 180R  | 924-118 | 18k   | 924-318 |
| 2R2   | 924-922 | 220R  | 924-122 | 22k   | 924-322 |
| 2R7   | 924-927 | 270R  | 924-127 | 33k   | 924-333 |
| 3R9   | 924-939 | 330R  | 924-133 | 47k   | 924-347 |
| 4R7   | 924-947 | 390R  | 924-139 |       |         |
| 5R6   | 924-956 | 470R  | 924-147 |       |         |
| 6R8   | 924-968 | 560R  | 924-156 |       |         |
| 8R2   | 924-982 | 680R  | 924-168 |       |         |
|       |         | 820R  | 924-182 |       |         |

**Order Code**

As above 5W 5% Ceramic

**1+**

0.30

**10+**

0.2500

**25+**

0.2000

**50+**

0.1800

**100+**

0.1600



## CERAMIC - Continued



## 10W Ceramic

| Value | Code    | Value | Code    | Value | Code    |
|-------|---------|-------|---------|-------|---------|
| 0R10  | 926-810 | 10R   | 926-010 | 1k0   | 926-210 |
| 0R12  | 926-812 | 12R   | 926-012 | 1k2   | 926-212 |
| 0R15  | 926-815 | 15R   | 926-015 | 1k5   | 926-215 |
| 0R18  | 926-818 | 18R   | 926-018 | 1k8   | 926-218 |
| 0R22  | 926-822 | 22R   | 926-022 | 2k2   | 926-222 |
| 0R27  | 926-827 | 27R   | 926-027 | 2k7   | 926-227 |
| 0R33  | 926-833 | 33R   | 926-033 | 3k3   | 926-233 |
| 0R39  | 926-839 | 39R   | 926-039 | 3k9   | 926-239 |
| 0R47  | 926-847 | 47R   | 926-047 | 4k7   | 926-247 |
| 0R56  | 926-856 | 56R   | 926-056 | 5k6   | 926-256 |
| 0R68  | 926-868 | 68R   | 926-068 | 6k8   | 926-268 |
| 0R82  | 926-882 | 82R   | 926-082 | 8k2   | 926-282 |
|       |         |       |         |       |         |
| 1R0   | 926-910 | 100R  | 926-110 | 10k   | 926-310 |
| 1R2   | 926-912 | 120R  | 926-112 | 12k   | 926-312 |
| 1R5   | 926-915 | 150R  | 926-115 | 15k   | 926-315 |
| 1R8   | 926-918 | 180R  | 926-118 | 18k   | 926-318 |
| 2R2   | 926-922 | 220R  | 926-122 | 22k   | 926-322 |
| 2R7   | 926-927 | 270R  | 926-127 |       |         |
| 3R3   | 926-933 | 330R  | 926-133 |       |         |
| 3R9   | 926-939 | 390R  | 926-139 |       |         |
| 4R7   | 926-947 | 470R  | 926-147 |       |         |
| 5R6   | 926-956 | 560R  | 926-156 |       |         |
| 6R8   | 926-968 | 680R  | 926-168 |       |         |
| 8R2   | 926-982 | 820R  | 926-182 |       |         |

## 20W Ceramic

| Value | Code    | Value | Code    | Value | Code    |
|-------|---------|-------|---------|-------|---------|
| 1R0   | 927-910 | 3R9   | 927-939 | 15R   | 927-015 |
| 1R2   | 927-912 | 4R7   | 927-947 | 18R   | 927-018 |
| 1R5   | 927-915 | 5R6   | 927-956 | 22R   | 927-022 |
| 1R8   | 927-918 | 6R8   | 927-968 | 27R   | 927-027 |
| 2R2   | 927-922 | 8R2   | 927-982 | 33R   | 927-033 |
| 2R7   | 927-927 | 10R   | 927-010 | 39R   | 927-039 |
| 3R3   | 927-933 | 12R   | 927-012 | 47R   | 927-047 |
|       |         |       |         | 68R   | 927-068 |

## Order Code

As above 20W 5% Ceramic

1+

1.12

10+

1.0080

25+

0.8960

50+

0.7840

100+

0.7000

## Order Code

As above 10W 5% Ceramic

1+

0.40

10+

0.3200

25+

0.2880

50+

0.2560

100+

0.2240

## 25 &amp; 50W 5% ALUMINIUM

Wirewound resistors housed in an aluminium case which ensures high dissipation at a relatively low surface temperature. Full rating can only be dissipated when mounted on a heatsink.

## Technical Specification

Resistance Range

25W 0Ω1 to 82k  
50W 0Ω05 to 82k

Resistance Tolerance

±5%

Dimensions

25W 29 x 28 x 15mm  
50W 51 x 30 x 17mm

## 25W Aluminium

| Value | Code    | Value | Code    | Value | Code    |
|-------|---------|-------|---------|-------|---------|
| 0R10  | 942-810 | 10R   | 942-010 | 1k0   | 942-210 |
| 0R12  | 942-812 | 12R   | 942-012 | 1k2   | 942-212 |
| 0R15  | 942-815 | 15R   | 942-015 | 1k5   | 942-215 |
| 0R18  | 942-818 | 18R   | 942-018 | 1k8   | 942-218 |
| 0R22  | 942-822 | 22R   | 942-022 | 2k2   | 942-222 |
| 0R27  | 942-827 | 27R   | 942-027 | 2k7   | 942-227 |
| 0R33  | 942-833 | 33R   | 942-033 | 3k3   | 942-233 |
| 0R39  | 942-839 | 39R   | 942-039 | 3k9   | 942-239 |
| 0R47  | 942-847 | 47R   | 942-047 | 4k7   | 942-247 |
| 0R56  | 942-856 | 56R   | 942-056 | 5k6   | 942-256 |
| 0R68  | 942-868 | 68R   | 942-068 | 6k8   | 942-268 |
| 0R82  | 942-882 | 82R   | 942-082 | 8k2   | 942-282 |
|       |         |       |         |       |         |
| 1R0   | 942-910 | 100R  | 942-110 | 10k   | 942-310 |
| 1R2   | 942-912 | 120R  | 942-112 | 12k   | 942-312 |
| 1R5   | 942-915 | 150R  | 942-115 | 15k   | 942-315 |
| 1R8   | 942-918 | 180R  | 942-118 | 18k   | 942-318 |
| 2R2   | 942-922 | 220R  | 942-122 | 22k   | 942-322 |
| 2R7   | 942-927 | 270R  | 942-127 | 27k   | 942-327 |
| 3R3   | 942-933 | 330R  | 942-133 | 33k   | 942-333 |
| 3R9   | 942-939 | 390R  | 942-139 | 39k   | 942-339 |
| 4R7   | 942-947 | 470R  | 942-147 | 47k   | 942-347 |
| 5R6   | 942-956 | 560R  | 942-156 | 56k   | 942-356 |
| 6R8   | 942-968 | 680R  | 942-168 | 68k   | 942-368 |
| 8R2   | 942-982 | 820R  | 942-182 | 82k   | 942-382 |

## 50W Aluminium

| Value | Code    | Value | Code    | Value | Code    |
|-------|---------|-------|---------|-------|---------|
| 0R05  | 943-750 |       |         |       |         |
| 0R10  | 943-810 | 10R   | 943-010 | 1k0   | 943-210 |
| 0R12  | 943-812 | 12R   | 943-012 | 1k2   | 943-212 |
| 0R15  | 943-815 | 15R   | 943-015 | 1k5   | 943-215 |
| 0R18  | 943-818 | 18R   | 943-018 | 1k8   | 943-218 |
| 0R22  | 943-822 | 22R   | 943-022 | 2k2   | 943-222 |
| 0R27  | 943-827 | 27R   | 943-027 | 2k7   | 943-227 |
| 0R33  | 943-833 | 33R   | 943-033 | 3k3   | 943-233 |
| 0R39  | 943-839 | 39R   | 943-039 | 3k9   | 943-239 |
| 0R47  | 943-847 | 47R   | 943-047 | 4k7   | 943-247 |
| 0R56  | 943-856 | 56R   | 943-056 | 5k6   | 943-256 |
| 0R68  | 943-868 | 68R   | 943-068 | 6k8   | 943-268 |
| 0R82  | 943-882 | 82R   | 943-082 | 8k2   | 943-282 |
|       |         |       |         |       |         |
| 1R0   | 943-910 | 100R  | 943-110 | 10k   | 943-310 |
| 1R2   | 943-912 | 120R  | 943-112 | 12k   | 943-312 |
| 1R5   | 943-915 | 150R  | 943-115 | 15k   | 943-315 |
| 1R8   | 943-918 | 180R  | 943-118 | 18k   | 943-318 |
| 2R2   | 943-922 | 220R  | 943-122 | 22k   | 943-322 |
| 2R7   | 943-927 | 270R  | 943-127 | 27k   | 943-327 |
| 3R3   | 943-933 | 330R  | 943-133 | 33k   | 943-333 |
| 3R9   | 943-939 | 390R  | 943-139 | 39k   | 943-339 |
| 4R7   | 943-947 | 470R  | 943-147 | 47k   | 943-347 |
| 5R6   | 943-956 | 560R  | 943-156 | 56k   | 943-356 |
| 6R8   | 943-968 | 680R  | 943-168 | 68k   | 943-368 |
| 8R2   | 943-982 | 820R  | 943-182 | 82k   | 943-382 |

## Order Code

| Order Code | Value                          | 1+   | 10+    | 25+    | 50+    |
|------------|--------------------------------|------|--------|--------|--------|
| 942-910    | 0R1 25W 5% Aluminium Resistor  | 1.36 | 1.2240 | 1.0880 | 0.9520 |
| 942-822    | 2R2 25W 5% Aluminium Resistor  | 1.36 | 1.2240 | 1.0880 | 0.9520 |
| 942-847    | 4R7 25W 5% Aluminium Resistor  | 1.36 | 1.2240 | 1.0880 | 0.9520 |
| 942-922    | 2R2 25W 5% Aluminium Resistor  | 1.36 | 1.2240 | 1.0880 | 0.9520 |
| 942-947    | 4R7 25W 5% Aluminium Resistor  | 1.36 | 1.2240 | 1.0880 | 0.9520 |
| 942-010    | 10R 25W 5% Aluminium Resistor  | 1.36 | 1.2240 | 1.0880 | 0.9520 |
| 942-022    | 22R 25W 5% Aluminium Resistor  | 1.36 | 1.2240 | 1.0880 | 0.9520 |
| 942-033    | 33R 25W 5% Aluminium Resistor  | 1.36 | 1.2240 | 1.0880 | 0.9520 |
| 942-047    | 47R 25W 5% Aluminium Resistor  | 1.36 | 1.2240 | 1.0880 | 0.9520 |
| 942-068    | 68R 25W 5% Aluminium Resistor  | 1.36 | 1.2240 | 1.0880 | 0.9520 |
| 942-110    | 100R 25W 5% Aluminium Resistor | 1.36 | 1.2240 | 1.0880 | 0.9520 |
| 942-122    | 220R 25W 5% Aluminium Resistor | 1.36 | 1.2240 | 1.0880 | 0.9520 |
| 942-147    | 470R 25W 5% Aluminium Resistor | 1.36 | 1.2240 | 1.0880 | 0.9520 |
| 942-210    | 1k0 25W 5% Aluminium Resistor  | 1.36 | 1.2240 | 1.0880 | 0.9520 |
| 942-247    | 4k7 25W 5% Aluminium Resistor  | 1.36 | 1.2240 | 1.0880 | 0.9520 |

All other values, 25W 5% Aluminium Resistor 2.00 1.8000 1.7000 1.5000

## Order Code

| Order Code                                  | Value                          | 1+   | 10+    | 25+    | 50+    |
|---|--------------------------------|------|--------|--------|--------|
| 943-750                                     | 0R05 50W 5% Aluminium Resistor | 1.58 | 1.4220 | 1.3430 | 1.1850 |
| 943-810                                     | 1R0 50W 5% Aluminium Resistor  | 1.58 | 1.4220 | 1.3430 | 1.1850 |
| 943-847                                     | 0R47 50W 5% Aluminium Resistor | 1.58 | 1.4220 | 1.3430 | 1.1850 |
| 943-868                                     | 0R68 50W 5% Aluminium Resistor | 1.58 | 1.4220 | 1.3430 | 1.1850 |
| 943-910                                     | 1R0 50W 5% Aluminium Resistor  | 1.58 | 1.4220 | 1.3430 | 1.1850 |
| 943-922                                     | 2R2 50W 5% Aluminium Resistor  | 1.58 | 1.4220 | 1.3430 | 1.1850 |
| 943-933                                     | 3R3 50W 5% Aluminium Resistor  | 1.58 | 1.4220 | 1.3430 | 1.1850 |
| 943-947                                     | 4R7 50W 5% Aluminium Resistor  | 1.58 | 1.4220 | 1.3430 | 1.1850 |
| 943-968                                     | 6R8 50W 5% Aluminium Resistor  | 1.58 | 1.4220 | 1.3430 | 1.1850 |
| 943-010                                     | 10R 50W 5% Aluminium Resistor  | 1.58 | 1.4220 | 1.3430 | 1.1850 |
| 943-015                                     | 15R 50W 5% Aluminium Resistor  | 1.58 | 1.4220 | 1.3430 | 1.1850 |
| 943-022                                     | 22R 50W 5% Aluminium Resistor  | 1.58 | 1.4220 | 1.3430 | 1.1850 |
| 943-033                                     | 33R 50W 5% Aluminium Resistor  | 1.58 | 1.4220 | 1.3430 | 1.1850 |
| 943-047                                     | 47R 50W 5% Aluminium Resistor  | 1.58 | 1.4220 | 1.3430 | 1.1850 |
| 943-068                                     | 68R 50W 5% Aluminium Resistor  | 1.58 | 1.4220 | 1.3430 | 1.1850 |
| 943-110                                     | 100R 50W 5% Aluminium Resistor | 1.58 | 1.4220 | 1.3430 | 1.1850 |
| 943-122                                     | 220R 50W 5% Aluminium Resistor | 1.58 | 1.4220 | 1.3430 | 1.1850 |
| 943-210                                     | 1k0 50W 5% Aluminium Resistor  | 1.58 | 1.4220 | 1.3430 | 1.1850 |
| All other values, 50W 5% Aluminium Resistor |                                | 2.48 | 2.2316 | 2.1076 | 1.8596 |

## THERMISTORS

Miniature NTC (Negative Temperature Coefficient) disc thermistors for general purpose applications including temperature measurement and compensation.

### Technical Specification

| Res @ 25°C | Res @ 100°C | Max. Current @ 25°C | B Constant | Time Constant | Max. Power |
|------------|-------------|---------------------|------------|---------------|------------|
| 300R       | 30R         | 125mA               | 3000°K     | 15s           | 500mW      |
| 1k0        | 70R         | 80mA                | 3700°K     | 17s           | 500mW      |
| 5k0        | 300R        | 45mA                | 4100°K     | 15s           | 500mW      |
| 20k        | 1k0         | 25mA                | 4200°K     | 18s           | 500mW      |
| 100k       | 4k0         | 15mA                | 4400°K     | 16s           | 500mW      |



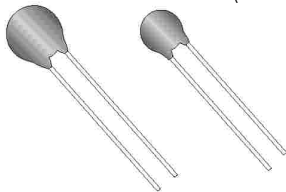
| Order Code |      |                | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|------|----------------|------|--------|--------|--------|--------|
| 928-130    | 300R | NTC Thermistor | 0.36 | 0.2700 | 0.1800 | 0.1440 | 0.1260 |
| 928-210    | 1k0  | NTC Thermistor | 0.36 | 0.2700 | 0.1800 | 0.1440 | 0.1260 |
| 928-250    | 5k0  | NTC Thermistor | 0.36 | 0.2700 | 0.1800 | 0.1440 | 0.1260 |
| 928-320    | 20k  | NTC Thermistor | 0.36 | 0.2700 | 0.1800 | 0.1440 | 0.1260 |
| 928-410    | 100k | NTC Thermistor | 0.36 | 0.2700 | 0.1800 | 0.1440 | 0.1260 |

## NTC INRUSH THERMISTORS

Negative temperature coefficient thermistors designed to limit the initial current flow to a circuit. Typically used in power supplies, lighting, motor and other applications requiring a Soft Start supply.

### Technical Specification

| Steady State Current        | Resistance Cold     | Resistance Hot | Thermal Dissipation | Thermal Time | Dims  |
|-----------------------------|---------------------|----------------|---------------------|--------------|-------|
| 1A                          | 120Ω                | 2.29Ω          | 14mW/°C             | 35s          | 10mmØ |
| 2A                          | 8Ω                  | 0.2Ω           | 11mW/°C             | 35s          | 8mmØ  |
| 2A                          | 20Ω                 | 0.604Ω         | 16mW/°C             | 45s          | 10mmØ |
| 3A                          | 10Ω                 | 0.29Ω          | 13mW/°C             | 50s          | 10mmØ |
| 5A                          | 2.5Ω                | 0.1Ω           | 13mW/°C             | 35s          | 10mmØ |
| 5A                          | 5Ω                  | 0.12Ω          | 13mW/°C             | 68s          | 13mmØ |
| Operating Temperature Range | -40 to +170°C       |                |                     |              |       |
| Lead Pitch                  | 5.0mm (7.5mm 13mmØ) |                |                     |              |       |



| Order Code |                     | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|---------------------|------|--------|--------|--------|--------|
| 929-110    | 1A 120Ω NTC Limiter | 1.06 | 0.9500 | 0.8480 | 0.7420 | 0.6625 |
| 929-120    | 2A 8Ω NTC Limiter   | 1.05 | 0.8400 | 0.7560 | 0.6720 | 0.5880 |
| 929-122    | 2A 20Ω NTC Limiter  | 1.05 | 0.8400 | 0.7560 | 0.6720 | 0.5880 |
| 929-130    | 3A 10Ω NTC Limiter  | 1.05 | 0.8400 | 0.7560 | 0.6720 | 0.5880 |
| 929-150    | 5A 2.5Ω NTC Limiter | 1.05 | 0.8400 | 0.7560 | 0.6720 | 0.5880 |
| 929-152    | 5A 5Ω NTC Limiter   | 1.60 | 1.2800 | 1.1520 | 1.0240 | 0.8960 |

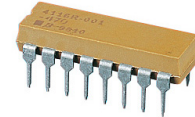
## RESISTOR NETWORKS

### DIL - Dual In Line

Thick film resistor networks housed in a DIL, low profile, ceramic package. Cermet elements on a high quality alumina substrate. Each package contains eight isolated resistors.

### Technical Specification

|                             |                      |
|-----------------------------|----------------------|
| Resistance Range            | 47Ω to 100k          |
| Resistance Tolerance        | 2%                   |
| Power Dissipation           | 2W @ 70°C (commoned) |
| Temperature Coefficient     | ±100ppm/°C (R≥100Ω)  |
|                             | ±250ppm/°C (R<100Ω)  |
| Working Voltage             | 100V                 |
| Insulation Resistance       | >10,000M             |
| Operating Temperature Range | -55 to +125°C        |



| Value | Order Code | Value | Order Code | Value | Order Code |
|-------|------------|-------|------------|-------|------------|
| 47R   | 936-047    | 1k0   | 936-210    | 10k   | 936-310    |
| 100R  | 936-110    | 2k2   | 936-222    | 22k   | 936-322    |
| 220R  | 936-122    |       |            |       |            |
| 330R  | 936-133    | 4k7   | 936-247    | 47k   | 936-347    |
| 470R  | 936-147    |       |            | 100k  | 936-410    |

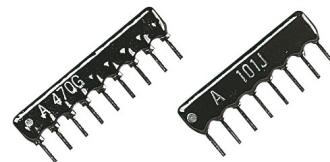
| Order Code |                        | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------------------------|------|--------|--------|--------|--------|
| As above   | 8 Isolated DIL network | 0.35 | 0.3150 | 0.2800 | 0.2450 | 0.2188 |

### SIL - Single in Line

Thick film resistor networks housed in a SIL, low profile epoxy coated package. High quality metal glaze elements on a ceramic substrate. A choice of isolated or commoned styles. Offering a space saving and greater reliability than standard resistors.

### Technical Specification

|                             |                          |
|-----------------------------|--------------------------|
| Resistance Range            | 47Ω to 100k              |
| Resistance Tolerance        | ±2%                      |
| Power Dissipation           | 0.125W @ 70°C (commoned) |
|                             | 0.2W @ 70°C (isolated)   |
| Temperature Coefficient     | ±100ppm/°C               |
| Working Voltage             | 100V                     |
| Insulation Resistance       | >10,000M                 |
| Operating Temperature Range | -55 to +125°C            |



| 4 Isolated Value | Order Code | 7 Commoned Value | Order Code | 8 Commoned Value | Order Code |
|------------------|------------|------------------|------------|------------------|------------|
| 47R              | 930-047    | 47R              | 932-047    | 47R              | 933-047    |
| 100R             | 930-110    | 100R             | 932-110    | 100R             | 933-110    |
| 220R             | 930-122    | 220R             | 932-122    | 220R             | 933-122    |
| 330R             | 930-133    | 330R             | 932-133    | 330R             | 933-133    |
| 470R             | 930-147    | 470R             | 932-147    | 470R             | 933-147    |
| 1k0              | 930-210    | 1k0              | 932-210    | 1k0              | 933-210    |
| 2k2              | 930-222    | 2k2              | 932-222    | 2k2              | 933-222    |
| 3k3              | 930-233    | 3k3              | 932-233    | 3k3              | 933-233    |
| 4k7              | 930-247    | 4k7              | 932-247    | 4k7              | 933-247    |
| 10k              | 930-310    | 10k              | 932-310    | 10k              | 933-310    |
| 22k              | 930-322    | 22k              | 932-322    | 22k              | 933-322    |
| 33k              | 930-333    | 33k              | 932-333    | 33k              | 933-333    |
| 47k              | 930-347    | 47k              | 932-347    | 47k              | 933-347    |
| 100k             | 930-410    | 100k             | 932-410    | 100k             | 933-410    |

| Order Code |                    | 1+   | 50+    | 100+   | 500+   | 1000+  |
|------------|--------------------|------|--------|--------|--------|--------|
| As above   | 4 Isolated Network | 0.10 | 0.0910 | 0.0650 | 0.0520 | 0.0468 |
| As above   | 7 Commoned Network | 0.11 | 0.0900 | 0.0750 | 0.0600 | 0.0480 |
| As above   | 8 Commoned Network | 0.12 | 0.1020 | 0.0850 | 0.0680 | 0.0544 |



### SINGLE TURN CARBON PRESETS

#### Sub-miniature enclosed

Fully enclosed single turn carbon track preset potentiometers. Sub-miniature Horizontal style only 6mm square and with a height of 5mm above the PCB.

#### Technical Specification

|                             |              |
|-----------------------------|--------------|
| Resistance Range            | 100Ω to 1MΩ  |
| Resistance Tolerance        | ±25%         |
| Power Dissipation           | 0.1W @ 70°C  |
| Working Voltage             | 50Vdc        |
| Rotation Angle              | 260° ±20%    |
| Operating Temperature Range | -30 to +70°C |



| Value | Order Code | Value | Order Code |
|-------|------------|-------|------------|
| 200R  | 992-120    | 20k   | 992-320    |
| 500R  | 992-150    | 50k   | 992-350    |
| 1kΩ   | 992-210    | 100k  | 992-410    |
| 2kΩ   | 992-220    | 200k  | 992-420    |
| 5kΩ   | 992-250    | 500k  | 992-450    |
| 10k   | 992-310    | 1MΩ   | 992-510    |

| Order Code |                       | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|-----------------------|------|--------|--------|--------|--------|
| As above   | Subminiature Enclosed | 0.14 | 0.1200 | 0.1080 | 0.0960 | 0.0840 |

#### Miniature Enclosed

Fully enclosed miniature single turn carbon preset potentiometers. Available in Horizontal & Vertical styles, adjustable from both sides.

#### Technical Specification

|                             |              |
|-----------------------------|--------------|
| Resistance Range            | 100Ω to 1MΩ  |
| Resistance Tolerance        | ±20%         |
| Power Dissipation           | 0.15W @ 40°C |
| Working Voltage             | 200Vdc       |
| Rotation Angle              | 295° ±20%    |
| End Resistance              | 2Ω           |
| Operating Temperature Range | -25 to +70°C |



#### Horizontal Mounting Preset

| Value | Order Code | Value | Order Code |
|-------|------------|-------|------------|
| 100R  | 998-110    | 100R  | 999-110    |
| 220R  | 998-122    | 220R  | 999-122    |
| 470R  | 998-147    | 470R  | 999-147    |
| 1kΩ   | 998-210    | 1kΩ   | 999-210    |
| 2kΩ   | 998-222    | 2kΩ   | 999-222    |
| 4k7   | 998-247    | 4k7   | 999-247    |
| 10k   | 998-310    | 10k   | 999-310    |
| 22k   | 998-322    | 22k   | 999-322    |
| 47k   | 998-347    | 47k   | 999-347    |
| 100k  | 998-410    | 100k  | 999-410    |
| 220k  | 998-422    | 220k  | 999-422    |
| 470k  | 998-447    | 470k  | 999-447    |
| 1MΩ   | 998-510    | 1MΩ   | 999-510    |

#### Vertical Mounting Preset

| Value | Order Code | Value | Order Code |
|-------|------------|-------|------------|
| 100R  | 999-110    | 100R  | 999-110    |
| 220R  | 999-122    | 220R  | 999-122    |
| 470R  | 999-147    | 470R  | 999-147    |
| 1kΩ   | 999-210    | 1kΩ   | 999-210    |
| 2kΩ   | 999-222    | 2kΩ   | 999-222    |
| 4k7   | 999-247    | 4k7   | 999-247    |
| 10k   | 999-310    | 10k   | 999-310    |
| 22k   | 999-322    | 22k   | 999-322    |
| 47k   | 999-347    | 47k   | 999-347    |
| 100k  | 999-410    | 100k  | 999-410    |
| 220k  | 999-422    | 220k  | 999-422    |
| 470k  | 999-447    | 470k  | 999-447    |
| 1MΩ   | 999-510    | 1MΩ   | 999-510    |

| Order Code |                    | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|--------------------|------|--------|--------|--------|--------|
| As above   | Miniature Enclosed | 0.12 | 0.0960 | 0.0864 | 0.0768 | 0.0672 |

#### Miniature Open

Horizontal Open skeleton single turn preset potentiometers. Linear carbon track.

#### Technical Specification

|                             |              |
|-----------------------------|--------------|
| Resistance Range            | 100Ω to 1MΩ  |
| Resistance Tolerance        | ±30%         |
| Power Dissipation           | 0.1W @ 40°C  |
| Working Voltage             | 200Vdc       |
| Rotation Angle              | 220° ±10%    |
| End Resistance              | 2%           |
| Operating Temperature Range | -20 to +70°C |



| Value | Order Code | Value | Order Code |
|-------|------------|-------|------------|
| 100R  | 996-110    | 10k   | 996-310    |
| 220R  | 996-122    | 22k   | 996-322    |
| 470R  | 996-147    | 100k  | 996-410    |
| 1kΩ   | 996-210    | 220k  | 996-422    |
| 2kΩ   | 996-222    | 470k  | 996-447    |
| 4k7   | 996-247    | 1MΩ   | 996-510    |

| Order Code                         | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------------------------------|------|--------|--------|--------|--------|
| As above    Open Horizontal Preset | 0.09 | 0.0680 | 0.0612 | 0.0544 | 0.0476 |

### Spindle / Thumbwheel Presets

Fully enclosed carbon film single turn preset. Adjustment made by either a thumbwheel or spindle, supplied separately. The spindle is available in four sizes and can accept a control knob designed for 6.35mm shafts.

#### Technical Specification

|                             |              |
|-----------------------------|--------------|
| Resistance Range            | 100Ω to 10M  |
| Resistance Tolerance        | ±20%         |
| Power Dissipation           | 0.25W @ 40°C |
| Operating Temperature Range | -25 to +70°C |



#### Horizontal Mounting Preset

| Value | Order Code |
|-------|------------|
| 100R  | 994-110    |
| 220R  | 994-122    |
| 470R  | 994-147    |
| 1kΩ   | 994-210    |
| 2kΩ   | 994-222    |
| 4k7   | 994-247    |
| 10k   | 994-310    |
| 22k   | 994-322    |
| 47k   | 994-347    |
| 100k  | 994-410    |
| 220k  | 994-422    |
| 470k  | 994-447    |
| 1MΩ   | 994-510    |
| 2MΩ   | 994-522    |
| 4M7   | 994-547    |

#### Vertical Mounting Preset

| Value | Order Code |
|-------|------------|
| 100R  | 995-110    |
| 220R  | 995-122    |
| 470R  | 995-147    |
| 1kΩ   | 995-210    |
| 2kΩ   | 995-222    |
| 4k7   | 995-247    |
| 10k   | 995-310    |
| 22k   | 995-322    |
| 47k   | 995-347    |
| 100k  | 995-410    |
| 220k  | 995-422    |
| 470k  | 995-447    |
| 1MΩ   | 995-510    |
| 2MΩ   | 995-522    |
| 4M7   | 995-547    |
| 10M   | 995-610    |

| Order Code |                       | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|-----------------------|------|--------|--------|--------|--------|
| As above   | Horizontal Preset     | 0.29 | 0.2300 | 0.2070 | 0.1840 | 0.1610 |
| As above   | Vertical Preset       | 0.29 | 0.2300 | 0.2070 | 0.1840 | 0.1610 |
| 987-010    | 16mm Dia. Thumbwheel  | 0.11 | 0.0860 | 0.0774 | 0.0688 | 0.0602 |
| 987-015    | 9.5mm Plastic Spindle | 0.11 | 0.0860 | 0.0774 | 0.0688 | 0.0602 |
| 987-020    | 15mm Plastic Spindle* | 0.13 | 0.1003 | 0.0878 | 0.0815 | 0.0784 |
| 987-030    | 19mm Plastic Spindle  | 0.10 | 0.0800 | 0.0720 | 0.0640 | 0.0560 |
| 987-040    | 39mm Plastic Spindle  | 0.15 | 0.1190 | 0.1071 | 0.0952 | 0.0833 |

### MULTITURN CERMET PRESETS

#### 1/4" Square - Top Adjust

Miniature multiturn cermet presets housed in a sealed moulded case. Precious metal multi-finger contact for reliable and stable performance. Top adjustment screw.

#### Technical Specification

|                             |               |
|-----------------------------|---------------|
| Resistance Range            | 100Ω to 100k  |
| Resistance Tolerance        | ±10%          |
| Power Dissipation           | 0.25W @ 85°C  |
| Working Voltage             | 200Vdc        |
| Electrical Travel           | 15 Turns      |
| End Resistance              | 2Ω Max.       |
| Operating Temperature Range | -55 to +125°C |



| Value | Order Code | Value | Order Code |
|-------|------------|-------|------------|
| 100R  | 971-110    | 5kΩ   | 971-250    |
| 200R  | 971-120    | 10k   | 971-310    |
| 500R  | 971-150    | 20k   | 971-320    |
| 1kΩ   | 971-210    | 50k   | 971-350    |
| 2kΩ   | 971-220    | 100k  | 971-410    |

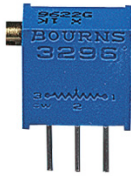
| Order Code                         | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------------------------------|------|--------|--------|--------|--------|
| As above 1/4" Multiturn - Top Adj. | 1.11 | 0.8900 | 0.8010 | 0.7120 | 0.6230 |

**3/8" Square - Top or Side Adjust**

Multiturn cermet presets housed in a sealed moulded case. Precious metal multi-finger contact for reliable and stable performance. Top or side adjustment screw.

**Technical Specification**

|                             |               |
|-----------------------------|---------------|
| Resistance Range            | 100Ω to 1MΩ   |
| Resistance Tolerance        | ±10%          |
| Power Dissipation           | 0.5W @ 85°C   |
| Working Voltage             | 200Vdc        |
| Electrical Travel           | 20 Turns      |
| End Resistance              | 2Ω Max.       |
| Operating Temperature Range | -55 to +125°C |

**Top Adjust (973-XXX)****Side Adjust (972-XXX)****Top Adjust**

| Value | Order Code |
|-------|------------|
| 100R  | 973-110    |
| 200R  | 973-120    |
| 500R  | 973-150    |
| 1kΩ   | 973-210    |
| 2kΩ   | 973-220    |
| 5kΩ   | 973-250    |
| 10k   | 973-310    |
| 20k   | 973-320    |
| 50k   | 973-350    |
| 100k  | 973-410    |
| 200k  | 973-420    |
| 500k  | 973-450    |
| 1MΩ   | 973-510    |

**Side Adjust**

| Value | Order Code |
|-------|------------|
| 200R  | 972-120    |
| 500R  | 972-150    |
| 1kΩ   | 972-210    |
| 2kΩ   | 972-220    |
| 5kΩ   | 972-250    |
| 10k   | 972-310    |
| 20k   | 972-320    |
| 50k   | 972-350    |
| 100k  | 972-410    |
| 1MΩ   | 972-510    |

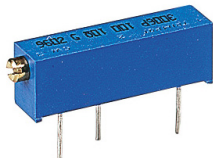
| Order Code |                           | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|---------------------------|------|--------|--------|--------|--------|
| 973-XXX    | 3/8" Multiturn - Top Adj  | 0.89 | 0.7100 | 0.6200 | 0.4950 | 0.4728 |
| 972-XXX    | 3/8" Multiturn - Side Adj | 0.98 | 0.7800 | 0.7020 | 0.6240 | 0.5460 |

**3/4" Rectangular - End Adjust**

Multiturn cermet presets housed in a sealed moulded case. Precious metal multi-finger contact for reliable and stable performance. End adjustment screw.

**Technical Specification**

|                             |               |
|-----------------------------|---------------|
| Resistance Range            | 50Ω to 1MΩ    |
| Resistance Tolerance        | ±10%          |
| Power Dissipation           | 0.75W @ 85°C  |
| Working Voltage             | 200Vdc        |
| Electrical Travel           | 20 Turns      |
| End Resistance              | 2Ω Max.       |
| Operating Temperature Range | -55 to +125°C |



| Order Code |      |                | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------|----------------|------|--------|--------|--------|--------|
| 974-050    | 50Ω  | 3/4" Multiturn | 0.59 | 0.4878 | 0.3902 | 0.3122 | 0.2731 |
| 974-110    | 100Ω | 3/4" Multiturn | 0.62 | 0.5145 | 0.4116 | 0.3293 | 0.2881 |
| 974-120    | 200Ω | 3/4" Multiturn | 0.55 | 0.4575 | 0.3660 | 0.2928 | 0.2562 |
| 974-150    | 500Ω | 3/4" Multiturn | 0.57 | 0.4560 | 0.4104 | 0.3648 | 0.3192 |
| 974-210    | 1kΩ  | 3/4" Multiturn | 0.55 | 0.4543 | 0.3634 | 0.2907 | 0.2544 |
| 974-220    | 2kΩ  | 3/4" Multiturn | 0.55 | 0.4543 | 0.3634 | 0.2907 | 0.2544 |
| 974-250    | 5kΩ  | 3/4" Multiturn | 0.60 | 0.4804 | 0.4324 | 0.3843 | 0.3363 |
| 974-310    | 10k  | 3/4" Multiturn | 0.67 | 0.5350 | 0.4815 | 0.4280 | 0.3745 |
| 974-320    | 20k  | 3/4" Multiturn | 0.55 | 0.4575 | 0.3660 | 0.2928 | 0.2562 |
| 974-350    | 50k  | 3/4" Multiturn | 0.60 | 0.4983 | 0.3986 | 0.3189 | 0.2790 |
| 974-410    | 100k | 3/4" Multiturn | 0.70 | 0.5628 | 0.5065 | 0.4502 | 0.3940 |
| 974-420    | 200k | 3/4" Multiturn | 0.62 | 0.4926 | 0.4433 | 0.3941 | 0.3448 |
| 974-450    | 500k | 3/4" Multiturn | 0.59 | 0.4878 | 0.3902 | 0.3122 | 0.2731 |
| 974-510    | 1MΩ  | 3/4" Multiturn | 0.55 | 0.4575 | 0.3660 | 0.2928 | 0.2562 |

**24MM CARBON**

Low cost carbon track single gang potentiometers. Solder tag connections, 6mm plastic shaft.



| Value    | Order Code | Value    | Order Code | Value    | Order Code |
|----------|------------|----------|------------|----------|------------|
| 470R Lin | 951-147    | 100k Lin | 951-410    | 4k7 Log  | 950-247    |
| 1kΩ Lin  | 951-210    | 220k Lin | 951-422    | 10k Log  | 950-310    |
| 4k7 Lin  | 951-247    | 470k Lin | 951-447    | 47k Log  | 950-347    |
| 10k Lin  | 951-310    | 1MΩ Lin  | 951-510    | 100k Log | 950-410    |
| 22k Lin  | 951-322    | 2M2 Lin  | 951-522    | 1MΩ Log  | 950-510    |
| 47k Lin  | 951-347    |          |            | 2M2 Log  | 950-522    |

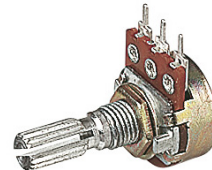
| ORDER CODE |                    | 1+   | 10+  | 25+    | 50+    | 100+   |
|------------|--------------------|------|------|--------|--------|--------|
| As above   | 24mm Standard Pots | 0.56 | 0.45 | 0.4050 | 0.3600 | 0.3150 |

**16MM PCB CARBON**

16mm Diameter single & dual gang carbon track potentiometers suitable for PCB or panel mounting. Supplied with an aluminium serrated shaft, 6mmØ, 18 teeth.

**Technical Specification**

|                             |  |
|-----------------------------|--|
| Resistance Range            | 470Ω to 1MΩ Single<br>10k to 500k Dual |
| Resistance Tolerance        | ±20%                                   |
| Power Dissipation           | 0.2W Lin, 0.1W Log                     |
| Working Voltage             | 200V Lin, 150V Log                     |
| Electrical Travel           | 300° ±5°                               |
| Operating Temperature Range | -25 to +70°C                           |

**Single Gang**

| ORDER CODE |                     | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|---------------------|------|--------|--------|--------|--------|
| 947-110    | 100R Linear PCB Pot | 1.07 | 0.9990 | 0.9324 | 0.8658 | 0.8325 |
| 947-147    | 470R Linear PCB Pot | 0.40 | 0.3750 | 0.3500 | 0.3250 | 0.3125 |
| 947-210    | 1kΩ Linear PCB Pot  | 0.40 | 0.3750 | 0.3500 | 0.3250 | 0.3125 |
| 947-247    | 4k7 Linear PCB Pot  | 0.40 | 0.3750 | 0.3500 | 0.3250 | 0.3125 |
| 947-310    | 10k Linear PCB Pot  | 0.40 | 0.3750 | 0.3500 | 0.3250 | 0.3125 |
| 947-320    | 20k Linear PCB Pot  | 1.07 | 0.9990 | 0.9324 | 0.8658 | 0.8325 |
| 947-347    | 47k Linear PCB Pot  | 0.40 | 0.3750 | 0.3500 | 0.3250 | 0.3125 |
| 947-410    | 100k Linear PCB Pot | 0.40 | 0.3750 | 0.3500 | 0.3250 | 0.3125 |
| 947-420    | 200k Linear PCB Pot | 1.07 | 0.9990 | 0.9324 | 0.8658 | 0.8325 |
| 947-447    | 470k Linear PCB Pot | 0.40 | 0.3750 | 0.3500 | 0.3250 | 0.3125 |
| 947-510    | 1MΩ Linear PCB Pot  | 0.40 | 0.3750 | 0.3500 | 0.3250 | 0.3125 |
| 946-210    | 1kΩ Log PCB Pot     | 1.07 | 0.9990 | 0.9324 | 0.8658 | 0.8325 |
| 946-247    | 4k7 Log PCB Pot     | 0.40 | 0.3750 | 0.3500 | 0.3250 | 0.3125 |
| 946-310    | 10k Log PCB Pot     | 1.07 | 0.9990 | 0.9324 | 0.8658 | 0.8325 |
| 946-320    | 20k Log PCB Pot     | 1.07 | 0.9990 | 0.9324 | 0.8658 | 0.8320 |
| 946-350    | 50k Log PCB Pot     | 1.07 | 0.9990 | 0.9324 | 0.8658 | 0.8325 |
| 946-410    | 100k Log PCB Pot    | 1.07 | 0.9990 | 0.9324 | 0.8658 | 0.8325 |
| 946-420    | 200k Log PCB Pot    | 1.07 | 0.9990 | 0.9324 | 0.8658 | 0.8325 |
| 946-450    | 500k Log PCB Pot    | 1.07 | 0.9990 | 0.9324 | 0.8658 | 0.8325 |
| 946-510    | 1MΩ Log PCB Pot     | 0.40 | 0.3750 | 0.3500 | 0.3250 | 0.3125 |

**Dual Gang**

| Value    | Order Code | Value    | Order Code |
|----------|------------|----------|------------|
| 10k Lin  | 949-310    | 10k Log  | 948-310    |
| 50k Lin  | 949-350    | 50k Log  | 948-350    |
| 100k Lin | 949-410    | 100k Log | 948-410    |
| 500k Lin | 949-450    | 500k Log | 948-450    |

| ORDER CODE |                      | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|----------------------|------|--------|--------|--------|--------|
| As above   | Linear PCB Dual Pots | 1.69 | 1.6031 | 1.5188 | 1.4344 | 1.4063 |
| As above   | Log PCB Dual Pots    | 1.69 | 1.6031 | 1.5188 | 1.4344 | 1.4063 |

## POSITIVE POSITION PCB CARBON

A range of high quality pots featuring positive position "Click" rotation. Available with a Centre click or 41 click positions, single & dual gang carbon track for PCB or panel mounting.

### Technical Specification

|                       |               |
|-----------------------|---------------|
| Resistance Range      | 10k to 100k   |
| Insulation Resistance | <100M/500V    |
| Tracking Error        | ±3dB, 0/-40dB |
| Power Dissipation     | 0.2W          |
| Test Voltage          | 500V~/1 min   |
| Electrical Travel     | 300° ±5°      |

### Single Gang - Centre Click



| ORDER CODE |                       | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|-----------------------|------|--------|--------|--------|--------|
| 944-310    | 10k Lin Centre click  | 1.19 | 1.1354 | 1.0757 | 1.0159 | 0.9338 |
| 944-320    | 20k Lin Centre click  | 1.19 | 1.1354 | 1.0757 | 1.0159 | 0.9338 |
| 944-350    | 50k Lin Centre click  | 1.19 | 1.1354 | 1.0757 | 1.0159 | 0.9338 |
| 944-410    | 100k Lin Centre click | 1.19 | 1.1354 | 1.0757 | 1.0159 | 0.9338 |

### Dual Gang - Centre Click



| ORDER CODE |                         | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|-------------------------|------|--------|--------|--------|--------|
| 944-312    | 10k Dual Lin Cnt click  | 2.13 | 2.0246 | 1.9181 | 1.8115 | 1.6650 |
| 944-352    | 50k Dual Lin Cnt click  | 2.13 | 2.0246 | 1.9181 | 1.8115 | 1.6650 |
| 944-412    | 100k Dual Lin cnt click | 2.13 | 2.0246 | 1.9181 | 1.8115 | 1.6650 |

### Single Gang - 41 Click



| ORDER CODE |                       | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|-----------------------|------|--------|--------|--------|--------|
| 945-312    | 10k Lin 41 Click Pot  | 1.80 | 1.7100 | 1.6200 | 1.5300 | 1.4063 |
| 945-350    | 50k Lin 41 Click Pot  | 1.80 | 1.7100 | 1.6200 | 1.5300 | 1.4063 |
| 945-410    | 100k Lin 41 Click Pot | 1.80 | 1.7100 | 1.6200 | 1.5300 | 1.4063 |
| 945-311    | 10k Log 41 Click Pot  | 1.80 | 1.7100 | 1.6200 | 1.5300 | 1.4063 |
| 945-351    | 50k Log 41 Click Pot  | 1.80 | 1.7100 | 1.6200 | 1.5300 | 1.4063 |

### Dual Gang - 41 Click



| ORDER CODE |                       | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|-----------------------|------|--------|--------|--------|--------|
| 945-312    | 10k Lin 41 Click Pot  | 2.66 | 2.5308 | 2.3976 | 2.2644 | 2.0813 |
| 945-352    | 50k Lin 41 Click Pot  | 2.66 | 2.5308 | 2.3976 | 2.2644 | 2.0813 |
| 945-412    | 100k Lin 41 Click Pot | 2.66 | 2.5308 | 2.3976 | 2.2644 | 2.0813 |
| 945-313    | 10k Log 41 Click Pot  | 2.66 | 2.5308 | 2.3976 | 2.2644 | 2.0813 |
| 945-353    | 50k Log 41 Click Pot  | 2.66 | 2.5308 | 2.3976 | 2.2644 | 2.0813 |
| 945-413    | 100K Log 41 Click Pot | 2.66 | 2.5308 | 2.3976 | 2.2644 | 2.0813 |

## HIGH QUALITY Dual Gang

High quality dual conductive plastic track potentiometers. PCB pin connection, plastic spindle.



| Value    | Order Code | Value    | Order Code |
|----------|------------|----------|------------|
| 1k0 Lin  | 955-210    | 10k Log  | 954-310    |
| 10k Lin  | 955-310    | 47k Log  | 954-347    |
| 22k Lin  | 955-322    | 100k Log | 954-410    |
| 47k Lin  | 955-347    |          |            |
| 100k Lin | 955-410    |          |            |

| ORDER CODE |                      | 1+   | 10+    | 25+    | 50+    |
|------------|----------------------|------|--------|--------|--------|
| As above   | Dual Gang Pots - Lin | 1.95 | 1.7550 | 1.6575 | 1.4625 |
| As above   | Dual Gang Pots - Log | 1.80 | 1.6200 | 1.5300 | 1.3500 |

## HIGH QUALITY Switched Single Gang

High quality conductive plastic track potentiometers incorporating a SPST switch. PCB connection, plastic spindle.



|                      |           |           |
|----------------------|-----------|-----------|
| Dims. (WxHxD)        | Pin Pitch | 5mm       |
| 17 x 19.2 x 17mm     | Spindle   | 6Ø x 49mm |
| Panel Cutout 10.2mmØ | Switch    | 4A 250Vac |

| Value   | Order Code | Value    | Order Code | Value   | Order Code |
|---------|------------|----------|------------|---------|------------|
| 1k0 Lin | 953-210    | 100k Lin | 953-410    | 4k7 Log | 952-247    |
| 4k7 Lin | 953-247    | 220k Lin | 953-422    | 10k Log | 952-310    |
| 10k Lin | 953-310    | 470k Lin | 953-447    | 47k Log | 952-347    |
| 22k Lin | 953-322    | 1M0 Lin  | 953-510    |         |            |
| 47k Lin | 953-347    | 2M2 Lin  | 953-522    |         |            |

| ORDER CODE |                    | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|--------------------|------|--------|--------|--------|--------|
| As above   | 16mm Switched Pots | 1.92 | 1.7280 | 1.6320 | 1.4400 | 1.3125 |

### Also available.....

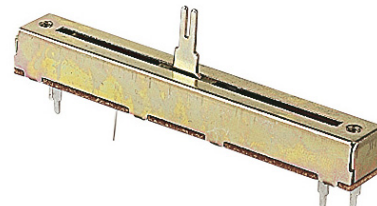
We now stock replacement crossfaders for disco mixers. These are supplied complete with control knob, PCB, mounting screws and most come with a metal plate. Contact our sales dept for a data sheet.

## SLIDER POTENTIOMETERS

High quality slider potentiometers with a travel of 60mm. Very smooth single track pot suitable for audio equipment or similar applications. PCB Mounting but may be panel mounting via integral M3 nuts on 80mm centres.

### Technical Specification

|                             |                       |
|-----------------------------|-----------------------|
| Resistance Range            | 10k to 500K           |
| Power Dissipation           | 0.5W Lin 0.25W Log    |
| Working Voltage             | 500Vdc Lin 250Vdc Log |
| Slider Travel               | 60mm                  |
| End Resistance              | 1% nominal            |
| Operating Temperature Range | -25 to +70°C          |



| ORDER CODE |                       | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|-----------------------|------|--------|--------|--------|--------|
| 960-310    | 10k Slider Pot - Lin  | 0.92 | 0.8200 | 0.7380 | 0.6560 | 0.5740 |
| 960-410    | 100k Slider Pot- Lin  | 0.92 | 0.8200 | 0.7380 | 0.6560 | 0.5740 |
| 960-450    | 500K Slider Pot - Lin | 0.92 | 0.8200 | 0.7380 | 0.6560 | 0.5740 |
| 961-310    | 10k Slider Pot - Log  | 0.92 | 0.8200 | 0.7380 | 0.6560 | 0.5740 |

**SIGNAL DIODES**

A range of small signal diodes for general purpose applications. Axial lead germanium, silicon epitaxial and silicon schottky types.

**Technical Specification**

| Device | Type         | V <sub>RRM</sub> | I <sub>F</sub> Max | Package | Applications          |
|--------|--------------|------------------|--------------------|---------|-----------------------|
| 1N914  | Si Epitaxial | 100V             | 75mA               | DO-35   | Fast logic            |
| 1N4148 | Si Epitaxial | 100V             | 150mA              | DO-35   | Fast logic            |
| 1N4149 | Si Epitaxial | 100V             | 75mA               | DO-35   | High speed fast logic |
| BAT41  | Si Schottky  | 100V             | 100mA              | DO-35   | General purpose       |
| BAT42  | Si Schottky  | 30V              | 200mA              | DO-35   | General purpose       |
| BAT46  | Si Schottky  | 100V             | 150mA              | DO-35   | General purpose       |
| BAT85  | Si Schottky  | 30V              | 200mA              | DO-35   | High speed            |
| BAV21  | Si Epitaxial | 250V             | 250mA              | DO-35   | Switching             |
| BAW62  | Si Epitaxial | 75V              | 100mA              | DO-35   | High speed            |
| BAX16  | Si Epitaxial | 150V             | 200mA              | DO-35   | General purpose       |
| OA200  | Si Epitaxial | 50V              | 160mA              | DO-7    | General purpose       |

| Order Code |              | 1+   | 50+    | 100+   | 500+   | 1000+  |
|------------|--------------|------|--------|--------|--------|--------|
| 1N914      | Si Epitaxial | 0.05 | 0.0347 | 0.0154 | 0.0123 | 0.0108 |
| 1N4148     | Si Epitaxial | 0.03 | 0.0210 | 0.0084 | 0.0076 | 0.0067 |
| 1N4149     | Si Epitaxial | 0.07 | 0.0540 | 0.0486 | 0.0432 | 0.0378 |
| BAT41      | Si Schottky  | 0.12 | 0.0864 | 0.0720 | 0.0760 | 0.0461 |
| BAT42      | Si Schottky  | 0.07 | 0.0546 | 0.0364 | 0.0328 | 0.0291 |
| BAT46      | Si Schottky  | 0.12 | 0.0980 | 0.0784 | 0.0588 | 0.0392 |
| BAT85      | Si Schottky  | 0.09 | 0.0639 | 0.0426 | 0.0383 | 0.0341 |
| BAV21      | Si Epitaxial | 0.07 | 0.0420 | 0.0252 | 0.0168 | 0.0134 |
| BAW62      | Si Epitaxial | 0.08 | 0.0600 | 0.0360 | 0.0240 | 0.0192 |
| BAX16      | Si Epitaxial | 0.05 | 0.0358 | 0.0322 | 0.0286 | 0.0251 |
| OA200      | Si Epitaxial | 0.56 | 0.5040 | 0.4480 | 0.3920 | 0.3640 |

**ZENER DIODES**

Axial lead, glass encapsulated zener diodes available in 500mW or 1.3W power ratings and a wide voltage range. 5% Tolerance.

**500mW BZX55 Series DO-35 Package**

| Order Code |           | Order Code |           |
|------------|-----------|------------|-----------|
| 725-024    | 2V4 500mW | 725-150    | 15V 500mW |
| 725-027    | 2V7 500mW | 725-160    | 16V 500mW |
| 725-030    | 3V0 500mW | 725-180    | 18V 500mW |
| 725-033    | 3V3 500mW | 725-200    | 20V 500mW |
| 725-036    | 3V6 500mW | 725-220    | 22V 500mW |
| 725-039    | 3V9 500mW | 725-240    | 24V 500mW |
| 725-043    | 4V3 500mW | 725-270    | 27V 500mW |
| 725-047    | 4V7 500mW | 725-300    | 30V 500mW |
| 725-051    | 5V1 500mW | 725-330    | 33V 500mW |
| 725-056    | 5V6 500mW | 725-360    | 36V 500mW |
| 725-062    | 6V2 500mW | 725-390    | 39V 500mW |
| 725-068    | 6V8 500mW | 725-430    | 43V 500mW |
| 725-075    | 7V5 500mW | 725-470    | 47V 500mW |
| 725-082    | 8V2 500mW | 725-510    | 51V 500mW |
| 725-091    | 9V1 500mW | 725-560    | 56V 500mW |
| 725-100    | 10V 500mW | 725-620    | 62V 500mW |
| 725-110    | 11V 500mW | 725-680    | 68V 500mW |
| 725-120    | 12V 500mW | 725-750    | 75V 500mW |
| 725-130    | 13V 500mW |            |           |

| Order Code |                    | 1+   | 50+    | 100+   | 500+   | 1000+  |
|------------|--------------------|------|--------|--------|--------|--------|
| See Above  | 500mW Zener Diodes | 0.06 | 0.0297 | 0.0198 | 0.0158 | 0.0139 |

**1.3W BZX85 Series DO-41 Package**

| Order Code |          | Order Code |          |
|------------|----------|------------|----------|
| 726-027    | 2V7 1.3W | 726-150    | 15V 1.3W |
| 726-030    | 3V0 1.3W | 726-160    | 16V 1.3W |
| 726-033    | 3V3 1.3W | 726-180    | 18V 1.3W |
| 726-036    | 3V6 1.3W | 726-200    | 20V 1.3W |
| 726-039    | 3V9 1.3W | 726-220    | 22V 1.3W |
| 726-043    | 4V3 1.3W | 726-240    | 24V 1.3W |
| 726-047    | 4V7 1.3W | 726-270    | 27V 1.3W |
| 726-051    | 5V1 1.3W | 726-300    | 30V 1.3W |
| 726-056    | 5V6 1.3W | 726-330    | 33V 1.3W |
| 726-062    | 6V2 1.3W | 726-360    | 36V 1.3W |
| 726-068    | 6V8 1.3W | 726-390    | 39V 1.3W |
| 726-075    | 7V5 1.3W | 726-430    | 43V 1.3W |
| 726-082    | 8V2 1.3W | 726-470    | 47V 1.3W |
| 726-091    | 9V1 1.3W | 726-510    | 51V 1.3W |
| 726-100    | 10V 1.3W | 726-560    | 56V 1.3W |
| 726-110    | 11V 1.3W | 726-620    | 62V 1.3W |
| 726-120    | 12V 1.3W | 726-680    | 68V 1.3W |
| 726-130    | 13V 1.3W | 726-750    | 75V 1.3W |

| Order Code |                   | 1+   | 50+    | 100+   | 500+   | 1000+  |
|------------|-------------------|------|--------|--------|--------|--------|
| See Above  | 1.3W Zener Diodes | 0.10 | 0.0600 | 0.0400 | 0.0320 | 0.0280 |

**SPEAKER L PAD**

We also carry in stock a range of potentiometers suitable for speaker attenuation, as the load impedance to the amplifier is always maintained. Available in single & dual gang at different power ratings.

For more details see our web site  
[www.theelectronicsshop.co.uk](http://www.theelectronicsshop.co.uk)





### RECTIFIER DIODES

A comprehensive range of axial lead silicon rectifier diodes. Available in a range of Current and Voltage ratings. UL94V-0 plastic encapsulated.



#### 1A High Voltage DO-41 Package

| Order Code |       |    | 1+   | 50+    | 100+   | 500+   | 1000+  |
|------------|-------|----|------|--------|--------|--------|--------|
| BY127      | 1250V | 1A | 0.18 | 0.1620 | 0.1440 | 0.1260 | 0.1170 |
| BY133      | 1300V | 1A | 0.10 | 0.0741 | 0.0494 | 0.0395 | 0.0346 |

#### 1A Fast Recovery DO-41 Package

| Order Code |       |    | 1+   | 50+    | 100+   | 500+   | 1000+  |
|------------|-------|----|------|--------|--------|--------|--------|
| BA157      | 400V  | 1A | 0.07 | 0.0536 | 0.0402 | 0.0268 | 0.0214 |
| BA159      | 1000V | 1A | 0.13 | 0.0960 | 0.0640 | 0.0512 | 0.0448 |

#### 1A Standard 1N4000 Series DO-41 Package

| Order Code |       |    | 1+   | 50+    | 100+   | 500+   | 1000+  |
|------------|-------|----|------|--------|--------|--------|--------|
| 1N4001     | 50V   | 1A | 0.04 | 0.0270 | 0.0135 | 0.0090 | 0.0081 |
| 1N4002     | 100V  | 1A | 0.05 | 0.0360 | 0.0180 | 0.0120 | 0.0096 |
| 1N4003     | 200V  | 1A | 0.03 | 0.0240 | 0.0120 | 0.0080 | 0.0064 |
| 1N4004     | 400V  | 1A | 0.05 | 0.0366 | 0.0183 | 0.0122 | 0.0098 |
| 1N4005     | 600V  | 1A | 0.05 | 0.0396 | 0.0198 | 0.0132 | 0.0106 |
| 1N4006     | 800V  | 1A | 0.05 | 0.0396 | 0.0198 | 0.0132 | 0.0106 |
| 1N4007     | 1000V | 1A | 0.03 | 0.0240 | 0.0120 | 0.0080 | 0.0064 |

#### 1A Ultrafast UF4000 Series DO-41 Package

| Order Code |       |    | 1+   | 50+    | 100+   | 500+   | 1000+  |
|------------|-------|----|------|--------|--------|--------|--------|
| UF4001     | 50V   | 1A | 0.08 | 0.0660 | 0.0550 | 0.0440 | 0.0352 |
| UF4002     | 100V  | 1A | 0.08 | 0.0718 | 0.0615 | 0.0513 | 0.0410 |
| UF4003     | 200V  | 1A | 0.09 | 0.0805 | 0.0690 | 0.0575 | 0.0460 |
| UF4004     | 400V  | 1A | 0.08 | 0.0718 | 0.0615 | 0.0513 | 0.0410 |
| UF4005     | 600V  | 1A | 0.10 | 0.0840 | 0.0720 | 0.0600 | 0.0480 |
| UF4006     | 800V  | 1A | 0.10 | 0.0840 | 0.0720 | 0.0600 | 0.0480 |
| UF4007     | 1000V | 1A | 0.14 | 0.1185 | 0.0948 | 0.0853 | 0.0758 |

#### 3A Standard 1N5400 Series DO-27 Package

| Order Code |       |    | 1+   | 50+    | 100+   | 500+   | 1000+  |
|------------|-------|----|------|--------|--------|--------|--------|
| 1N5401     | 100V  | 3A | 0.08 | 0.0471 | 0.0314 | 0.0251 | 0.0220 |
| 1N5402     | 200V  | 3A | 0.08 | 0.0495 | 0.0330 | 0.0264 | 0.0231 |
| 1N5404     | 400V  | 3A | 0.09 | 0.0540 | 0.0360 | 0.0288 | 0.0252 |
| 1N5406     | 600V  | 3A | 0.10 | 0.0700 | 0.0560 | 0.0488 | 0.0392 |
| 1N5407     | 800V  | 3A | 0.09 | 0.0699 | 0.0466 | 0.0373 | 0.0326 |
| 1N5408     | 1000V | 3A | 0.10 | 0.0615 | 0.0410 | 0.0328 | 0.0287 |

#### 6A Standard R-6 Package

| Order Code |       |    | 1+   | 50+    | 100+   | 500+   | 1000+  |
|------------|-------|----|------|--------|--------|--------|--------|
| 6A05       | 50V   | 6A | 0.27 | 0.1780 | 0.1602 | 0.1424 | 0.1246 |
| 6A1        | 100V  | 6A | 0.30 | 0.1980 | 0.1782 | 0.1584 | 0.1386 |
| 6A2        | 200V  | 6A | 0.27 | 0.1820 | 0.1638 | 0.1456 | 0.1274 |
| 6A4        | 400V  | 6A | 0.28 | 0.1860 | 0.1674 | 0.1488 | 0.1302 |
| 6A6        | 600V  | 6A | 0.32 | 0.2100 | 0.1890 | 0.1680 | 0.1470 |
| 6A8        | 800V  | 6A | 0.30 | 0.1980 | 0.1782 | 0.1584 | 0.1386 |
| 6A10       | 1000V | 6A | 0.35 | 0.2360 | 0.2124 | 0.1888 | 0.1652 |

### BRIDGE RECTIFIERS

A wide range of silicon bridge rectifiers available in a choice of current and voltage ratings.

#### 1A PCB Mounting - DIL Package

UL94V-0 Plastic encapsulated. Standard 4 pin dual in-line package. Equivalent to DB1, DF..M, DM, DI, VM, 1DM, 1B & PBD10 series.

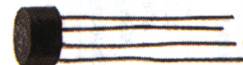


Dims: 6.4 x 9.2mm  
Height: 3.3mm  
Pins: 5.1 x 7.6mm Pitch

| Order Code |      |    | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------|----|------|--------|--------|--------|--------|
| 700-100    | 50V  | 1A | 0.32 | 0.2700 | 0.2160 | 0.1728 | 0.1512 |
| 700-101    | 100V | 1A | 0.36 | 0.2860 | 0.2574 | 0.2288 | 0.2002 |
| 700-102    | 200V | 1A | 0.39 | 0.3100 | 0.2790 | 0.2480 | 0.2170 |
| 700-104    | 400V | 1A | 0.39 | 0.3100 | 0.2790 | 0.2480 | 0.2170 |
| 700-106    | 600V | 1A | 0.40 | 0.3325 | 0.2660 | 0.2394 | 0.2128 |
| 700-108    | 800V | 1A | 0.43 | 0.3550 | 0.2840 | 0.2556 | 0.2272 |

#### 1.5A PCB Mounting - Round Package

UL94V-0 Plastic encapsulated. Low profile 4 pin round package. Dims. 5.5 x 8mmØ Equivalent to W0..M, RD15, B..C., 1KAB., VE., PF.. & PB15..M series.

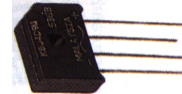


Dims: 9.1mmØmm  
Height: 5.5mm  
Pins: 5.1mm Square Pitch

| Order Code |       |      | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|-------|------|------|--------|--------|--------|--------|
| 700-150    | 50V   | 1.5A | 0.24 | 0.1833 | 0.1222 | 0.1100 | 0.0978 |
| 700-151    | 100V  | 1.5A | 0.11 | 0.0880 | 0.0792 | 0.0704 | 0.0616 |
| 700-152    | 200V  | 1.5A | 0.19 | 0.1540 | 0.1386 | 0.1232 | 0.1078 |
| 700-154    | 400V  | 1.5A | 0.20 | 0.1685 | 0.1348 | 0.1213 | 0.1078 |
| 700-156    | 600V  | 1.5A | 0.24 | 0.1900 | 0.1710 | 0.1520 | 0.1330 |
| 700-158    | 800V  | 1.5A | 0.26 | 0.2080 | 0.1872 | 0.1664 | 0.1456 |
| 700-159    | 1000V | 1.5A | 0.18 | 0.1380 | 0.0920 | 0.0828 | 0.0736 |

#### 2A PCB Mounting - In-line Package

UL94V-0 Plastic encapsulated. Compact 4 pin In-line package. Equivalent to KBP, FBP, 2KBB..R, 2KBP..M, KBP2, BR8..D, RS2., 2FBP. & PBP20. series.

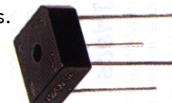


Dims: 5.0 x 17.5mm  
Height: 14.5mm  
Pins: 3.8mm Pitch

| Order Code |       |    | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|-------|----|------|--------|--------|--------|--------|
| 700-251    | 100V  | 2A | 0.34 | 0.2680 | 0.2412 | 0.2144 | 0.1876 |
| 700-252    | 200V  | 2A | 0.34 | 0.2740 | 0.2466 | 0.2196 | 0.1918 |
| 700-254    | 400V  | 2A | 0.35 | 0.2800 | 0.2520 | 0.2240 | 0.1960 |
| 700-258    | 800V  | 2A | 0.36 | 0.2860 | 0.2574 | 0.2288 | 0.2002 |
| 700-259    | 1000V | 2A | 0.45 | 0.3620 | 0.3258 | 0.2896 | 0.2534 |

#### 3A PCB/Panel Mounting - Square Package

UL94V-0 Plastic encapsulated. Miniature 4 pin square package with centre fixing hole. Equivalent to KBPC1., BR3., KBPC3, SO...., PBPC30., & GBPC1.. series.



Dims: 15.5mm Square  
Height: 6.8mm  
Pins: 10.8mm Square Pitch

| Order Code |       |    | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|-------|----|------|--------|--------|--------|--------|
| 700-302    | 200V  | 3A | 0.34 | 0.3024 | 0.2688 | 0.2352 | 0.2100 |
| 700-304    | 400V  | 3A | 0.40 | 0.3582 | 0.3184 | 0.2786 | 0.2488 |
| 700-306    | 600V  | 3A | 0.33 | 0.3674 | 0.2672 | 0.2338 | 0.2088 |
| 700-308    | 800V  | 3A | 0.42 | 0.3744 | 0.3328 | 0.2912 | 0.2600 |
| 700-309    | 1000V | 3A | 0.33 | 0.2948 | 0.2621 | 0.2293 | 0.2048 |

#### 4A PCB Mounting - In-line Package

UL94V-0 Plastic encapsulated. Miniature 4 pin In-line package with fixing hole. Equivalent to KBU4., GBU5., FBU4., BPU4., RS4., PE4... MDA4... & KBL.. series.



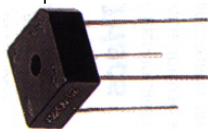
Dims: 7.1 x 23.0mm  
Height: 19.0mm  
Pins: 5.1mm Pitch

| Order Code |       |    | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|-------|----|------|--------|--------|--------|--------|
| 700-451    | 100V  | 4A | 0.78 | 0.6984 | 0.6208 | 0.5432 | 0.4850 |
| 700-452    | 200V  | 4A | 0.81 | 0.7188 | 0.6469 | 0.5750 | 0.5032 |
| 700-454    | 400V  | 4A | 0.86 | 0.7704 | 0.6848 | 0.5992 | 0.5350 |
| 700-456    | 600V  | 4A | 0.90 | 0.8064 | 0.7168 | 0.6272 | 0.5600 |
| 700-458    | 800V  | 4A | 1.01 | 0.7587 | 0.5058 | 0.4552 | 0.3541 |
| 700-459    | 1000V | 4A | 1.21 | 1.0847 | 0.9642 | 0.8436 | 0.7533 |

## 6A PCB/Panel Mounting - Square Package

UL94V-0 Plastic encapsulated. Miniature 4 pin square package with centre fixing hole. Equivalent to KBU6., GBU6., RS6., & PBU60. series.

Dims: 15.5mm Square  
Height: 6.8mm  
Pins: 10.8mm Square Pitch

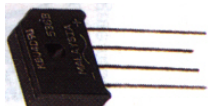


| Order Code |      |    | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------|----|------|--------|--------|--------|--------|
| 700-601    | 100V | 6A | 0.49 | 0.4428 | 0.3936 | 0.3444 | 0.3075 |
| 700-602    | 200V | 6A | 0.64 | 0.5080 | 0.4572 | 0.4064 | 0.3556 |
| 700-604    | 400V | 6A | 0.53 | 0.4806 | 0.4272 | 0.3738 | 0.3338 |
| 700-606    | 600V | 6A | 0.67 | 0.6048 | 0.5376 | 0.4704 | 0.4200 |
| 700-608    | 800V | 6A | 0.37 | 0.2996 | 0.2696 | 0.2397 | 0.2097 |

## 8A PCB Mounting - In-line Package

UL94V-0 Plastic encapsulated. Miniature 4 pin in-line package with fixing hole. Equivalent to KBU8., GBU8., RS8., & PBU80. series.

Dims: 7.1 x 23.0mm Square  
Height: 19.0mm  
Pins: 5.1mm Pitch

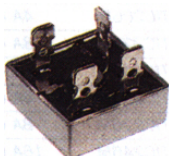


| Order Code |       |    | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|-------|----|------|--------|--------|--------|--------|
| 700-851    | 100V  | 8A | 0.98 | 0.8802 | 0.7824 | 0.6846 | 0.6113 |
| 700-852    | 200V  | 8A | 1.00 | 0.9000 | 0.8000 | 0.7000 | 0.6250 |
| 700-854    | 400V  | 8A | 1.20 | 1.0800 | 0.9600 | 0.8400 | 0.7500 |
| 700-856    | 600V  | 8A | 1.33 | 1.1180 | 1.0620 | 0.9440 | 0.8260 |
| 700-858    | 800V  | 8A | 1.56 | 1.4044 | 1.2483 | 1.0923 | 0.9753 |
| 700-859    | 1000V | 8A | 1.05 | 0.8386 | 0.8302 | 0.6709 | 0.5870 |

## 25A Chassis Mounting - Square Package

Metal clad bodies fitted with 1/4" fast-on tags. 4 terminal square package with centre fixing hole. Equivalent to KBPC25., MDA25..., 26MB, SDA1029..., SCBA..., & GBPC25.. series.

Dims: 28.5mm Square  
Height: 11.5mm  
Pins: 6.3 x 0.8mm Fast-on

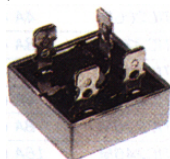


| Order Code |       |     | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|-------|-----|------|--------|--------|--------|--------|
| 701-251    | 100V  | 25A | 1.47 | 1.3266 | 1.1792 | 1.0318 | 0.9213 |
| 701-252    | 200V  | 25A | 1.54 | 1.3860 | 1.2320 | 1.0780 | 0.9625 |
| 701-254    | 400V  | 25A | 1.98 | 1.7820 | 1.5840 | 1.3860 | 1.2375 |
| 701-256    | 600V  | 25A | 1.82 | 1.6380 | 1.4560 | 1.2740 | 1.1375 |
| 701-258    | 800V  | 25A | 1.86 | 1.6740 | 1.4880 | 1.3020 | 1.1625 |
| 701-259    | 1000V | 25A | 1.88 | 1.6920 | 1.5040 | 1.3160 | 1.1750 |

## 35A Chassis Mounting - Square Package

Metal clad bodies fitted with 1/4" fast-on tags. 4 terminal square package with centre fixing hole. Equivalent to KBPC35., MD35..., 36MB, SDA909..., VK..., & GBPC35.. series.

Dims: 28.5mm Square  
Height: 11.5mm  
Pins: 6.3 x 0.8mm Fast-on



| Order Code |       |     | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|-------|-----|------|--------|--------|--------|--------|
| 701-351    | 100V  | 35A | 1.57 | 1.4130 | 1.2560 | 1.0990 | 0.9813 |
| 701-352    | 200V  | 35A | 1.80 | 1.6200 | 1.4400 | 1.2600 | 1.1250 |
| 701-356    | 600V  | 35A | 1.60 | 1.4371 | 1.2774 | 1.1178 | 0.9898 |
| 701-359    | 1000V | 35A | 2.32 | 2.0880 | 1.8560 | 1.6240 | 1.4875 |

## DIAC

Silicon bi-directional trigger diode suitable for use in triac firing applications. DO-14 package. Equivalent to BR100, DB3, ST2 & ST4.



| Order Code |                | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|----------------|------|--------|--------|--------|--------|
| 693-005    | 32V 150mW Diac | 0.08 | 0.0624 | 0.0468 | 0.0312 | 0.0250 |

## THYRISTORS

A wide range of Miniature & Standard thyristors. Available in a choice of current and voltage ratings.

### Technical Specification

| Order Code | Device     | Ir   | V <sub>ORM</sub> | V <sub>GT</sub> | I <sub>GT</sub> | Pi-out |           |
|------------|------------|------|------------------|-----------------|-----------------|--------|-----------|
| 692-110    | 2N5060     | 0.8A | 30V              | 0.8V            | 200μA           | 7N     | Miniature |
| 692-120    | 2N5061     | 0.8A | 60V              | 0.8V            | 200μA           | 7N     | Miniature |
| 692-111    | P0102AA    | 0.8A | 100V             | 0.8V            | 200μA           | 7N     | Miniature |
| 692-214    | C106D      | 4.0A | 400V             | 1.5V            | 200μA           | 14E    | Standard  |
| 692-514    | TIC116D    | 8.0A | 400V             | 1.5V            | 20mA            | 17E    | Standard  |
| 692-714    | TIC126D    | 12A  | 400V             | 1.5V            | 20mA            | 17E    | Standard  |
| 692-715    | BT151-500R | 12A  | 500V             | 1.5V            | 15mA            | 17E    | Standard  |

| Order Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------|--------|--------|--------|--------|
| 692-110    | 0.19 | 0.1520 | 0.1368 | 0.1216 | 0.1064 |
| 692-120    | 0.19 | 0.1544 | 0.1390 | 0.1235 | 0.1081 |
| 692-111    | 0.32 | 0.2160 | 0.1944 | 0.1728 | 0.1512 |
| 692-214    | 0.34 | 0.3029 | 0.2693 | 0.2356 | 0.2104 |
| 692-514    | 0.66 | 0.5904 | 0.5248 | 0.4592 | 0.4100 |
| 692-714    | 1.06 | 0.7976 | 0.7090 | 0.5672 | 0.4963 |
| 692-715    | 0.65 | 0.5375 | 0.4300 | 0.3440 | 0.3010 |

## TRIACS

A wide range of Miniature, Standard and Isolated Tab triacs. Available in a choice of current and voltage ratings. The isolated versions have the metal tab electrically isolated to 2500VRMS and therefore do not require insulating hardware. The snubber-less devices have an inbuilt suppression circuit and so do not require a snubber network to be added.

### Technical Specification

| Order Code | Device       | Ir   | V <sub>ORM</sub> | V <sub>GT</sub> | I <sub>GT</sub> | Pin-out |                    |
|------------|--------------|------|------------------|-----------------|-----------------|---------|--------------------|
| 693-314    | TIC206D      | 4.0A | 400V             | 2.0V            | 5mA             | 17J     | Standard           |
| 693-315    | BT136-500    | 4.0A | 500V             | 1.5V            | 35mA            | 17J     | Standard           |
| 693-316    | BT136-600    | 4.0A | 600V             | 1.5V            | 35mA            | 17J     | Standard           |
| 693-326    | TIC206M      | 4.0A | 600V             | 2.0V            | 5mA             | 17J     | Standard           |
| 693-514    | TIC226D      | 8.0A | 400V             | 2.0V            | 50mA            | 17J     | Standard           |
| 693-516    | BT137-600    | 8.0A | 600V             | 1.5V            | 35mA            | 17J     | Standard           |
| 693-526    | TIC226M      | 8.0A | 600V             | 2.0V            | 50mA            | 17J     | Standard           |
| 693-536    | BTA08-600C   | 8.0A | 600V             | 1.75V           | 25mA            | 17L     | Isolated Tab       |
| 693-556    | BTA08-600B   | 8.0A | 600V             | 1.75V           | 50mA            | 17L     | Isolated Tab       |
| 693-566    | BTA08-600BW  | 8.0A | 600V             | 1.65V           | 50mA            | 17L     | Snubber-less & Iso |
| 693-596    | BTA08-600SW  | 8.0A | 600V             | 1.75V           | 10mA            | 17L     | Logic, Snub & Iso  |
| 693-586    | BTA08-600TW  | 8.0A | 600V             | 1.5V            | 5mA             | 17L     | Logic, Snub & Iso  |
| 693-714    | TIC236D      | 12A  | 400V             | 2.0V            | 50mA            | 17J     | Standard           |
| 693-766    | BTA12A-600BW | 12A  | 600V             | 1.5V            | 50mA            | 17L     | Snubber-less & Iso |
| 693-814    | TIC246D      | 16A  | 400V             | 2.0V            | 50mA            | 17J     | Standard           |
| 693-815    | BT139-500    | 16A  | 500V             | 1.5V            | 35mA            | 17J     | Standard           |
| 693-816    | BT139-600    | 16A  | 600V             | 1.5V            | 35mA            | 17J     | Standard           |
| 693-826    | TIC246M      | 16A  | 600V             | 2.0V            | 50mA            | 17J     | Standard           |
| 693-856    | BTA16-600B   | 16A  | 600V             | 1.5V            | 50mA            | 17L     | Isolated Tab       |
| 693-866    | BTA16-600CW  | 16A  | 600V             | 1.5V            | 35mA            | 17L     | Snubber-less & Iso |
| 693-956    | BTA26-600B   | 26A  | 600V             | 1.5V            | 50mA            | 18L     | Isolated Tab       |

| Order Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------|--------|--------|--------|--------|
| 693-314    | 0.84 | 0.6758 | 0.6082 | 0.5406 | 0.4731 |
| 693-315    | 0.58 | 0.4600 | 0.4140 | 0.3680 | 0.3220 |
| 693-316    | 0.50 | 0.4000 | 0.3600 | 0.3200 | 0.2800 |
| 693-326    | 0.75 | 0.6000 | 0.5400 | 0.4800 | 0.4200 |
| 693-514    | 0.80 | 0.7200 | 0.6400 | 0.5600 | 0.5000 |
| 693-516    | 0.58 | 0.4600 | 0.4140 | 0.3680 | 0.3220 |
| 693-526    | 1.00 | 0.9000 | 0.8000 | 0.7000 | 0.6250 |
| 693-536    | 0.96 | 0.7674 | 0.6907 | 0.6169 | 0.5372 |
| 693-556    | 0.84 | 0.7030 | 0.5624 | 0.4499 | 0.3937 |
| 693-566    | 0.76 | 0.6300 | 0.5040 | 0.4032 | 0.3528 |
| 693-596    | 0.93 | 0.7735 | 0.6188 | 0.4950 | 0.4332 |
| 693-586    | 0.93 | 0.7414 | 0.6673 | 0.5931 | 0.5190 |
| 693-714    | 1.12 | 1.0080 | 0.8960 | 0.7840 | 0.7000 |
| 693-766    | 0.92 | 0.7668 | 0.6134 | 0.4907 | 0.4294 |
| 693-814    | 1.00 | 0.8000 | 0.7200 | 0.6400 | 0.5600 |
| 693-815    | 1.00 | 0.9000 | 0.8000 | 0.7000 | 0.6250 |
| 693-816    | 1.20 | 0.9600 | 0.8640 | 0.7680 | 0.6720 |
| 693-826    | 1.00 | 0.8020 | 0.7218 | 0.6416 | 0.5614 |
| 693-856    | 1.28 | 1.0680 | 0.8544 | 0.6835 | 0.5981 |
| 693-866    | 1.45 | 1.1600 | 1.0440 | 0.9280 | 0.8120 |
| 693-956    | 2.78 | 2.2208 | 2.9987 | 1.7766 | 1.5546 |

## VOLTAGE REGULATORS

### Fixed Voltage

A range of fixed voltage regulators with internal overload, thermal and short circuit protection.

### Technical Specification

| Order Code   | Voltage | Current | Input Range   | Pinout |                              |
|--------------|---------|---------|---------------|--------|------------------------------|
| 78L05        | +5.0V   | 100mA   | +7 to +30V    | 7B     | Micro-power 75μA 380mV       |
| LP2950CZ-5.0 | +5.0V   | 160mA   | -0.3 to +30V  | 7B     |                              |
| 7805         | +5.0V   | 1A      | +7 to +25V    | 17B    |                              |
| LM2940CT5    | +5.0V   | 1A      | +5.5 to +26V  | 17B    | Low dropout voltage (0.5V)   |
| 78S05        | +5.0V   | 2A      | +8 to +35V    | 17B    |                              |
| LM323K       | +5V     | 3A      |               | 23A    | High current version of 7805 |
| 78L06        | +6.0V   | 100mA   | +8 to +30V    | 7B     |                              |
| 7806         | +6.0V   | 1A      | +8 to +25V    | 17B    |                              |
| 78L08        | +8.0V   | 100mA   | +10.5 to +30V | 7B     |                              |
| 7808         | +8.0V   | 1A      | +10.5 to +25V | 17B    |                              |
| 78L12        | +12V    | 100mA   | +14.5 to +35V | 7B     | High current version of 7812 |
| 7812         | +12V    | 1A      | +14.5 to +30V | 17B    |                              |
| 78S12        | +12V    | 2A      | +15 to +35V   | 17B    |                              |
| 78L15        | +15V    | 100mA   | +17.5 to +35V | 7B     | High current version of 7815 |
| 7815         | +15V    | 1A      | +17.5 to +30V | 17B    |                              |
| 78S15        | +15V    | 2A      | +18 to +35V   | 17B    |                              |
| 78L24        | +24V    | 100mA   | +26 to +40V   | 7B     |                              |
| 79L05        | -5.0V   | 100mA   | -7 to -25V    | 7A     |                              |
| 7905         | -5.0V   | 1A      | -7 to -25V    | 17C    |                              |
| 79L12        | -12V    | 100mA   | -14.5 to -35V | 7A     |                              |
| 7912         | -12V    | 1A      | -14.5 to -30V | 17C    |                              |
| 79L15        | -15V    | 100mA   | -17.5 to -35V | 7A     |                              |
| 7915         | -15V    | 1A      | -17.5 to -30V | 17C    |                              |
| 79L24        | -24V    | 100mA   | -26 to 40V    | 7A     |                              |
| 7924         | -24V    | 1A      | -26 to +40V   | 17C    |                              |

| Order Code   | 1+   | 25+    | 50+    | 100+   | 500+   |
|--------------|------|--------|--------|--------|--------|
| 78L05        | 0.20 | 0.1460 | 0.1168 | 0.1051 | 0.0934 |
| LP2950CZ-5.0 | 0.72 | 0.6150 | 0.4100 | 0.3280 | 0.2870 |
| 7805         | 0.31 | 0.2615 | 0.2090 | 0.1883 | 0.1674 |
| LM2940CT5    | 1.08 | 0.9720 | 0.8640 | 0.7560 | 0.6750 |
| 78S05        | 0.57 | 0.3800 | 0.3420 | 0.3040 | 0.2660 |
| LM323K       | 2.40 | 2.1600 | 2.0400 | 1.8000 | 1.6800 |
| 78L06        | 0.32 | 0.2880 | 0.2560 | 0.2240 | 0.2000 |
| 7806         | 0.27 | 0.2233 | 0.1786 | 0.1607 | 0.1429 |
| 78L08        | 0.22 | 0.1575 | 0.1260 | 0.1134 | 0.1008 |
| 7808         | 0.29 | 0.2296 | 0.2066 | 0.1837 | 0.1607 |
| 78L12        | 0.16 | 0.1128 | 0.0902 | 0.0812 | 0.0722 |
| 7812         | 0.31 | 0.2613 | 0.2090 | 0.1881 | 0.1672 |
| 78S12        | 0.58 | 0.4793 | 0.3834 | 0.3451 | 0.3067 |
| 78L15        | 0.26 | 0.2100 | 0.1890 | 0.1680 | 0.1470 |
| 7815         | 0.23 | 0.1915 | 0.1532 | 0.1379 | 0.1226 |
| 78S15        | 0.55 | 0.4400 | 0.3960 | 0.3520 | 0.3080 |
| 78L24        | 0.39 | 0.3510 | 0.3120 | 0.2730 | 0.2438 |
| 79L05        | 0.23 | 0.1524 | 0.1372 | 0.1219 | 0.1067 |
| 7905         | 0.25 | 0.2100 | 0.1680 | 0.1344 | 0.1176 |
| 79L12        | 0.23 | 0.2070 | 0.1840 | 0.1610 | 0.1438 |
| 7912         | 0.29 | 0.2296 | 0.2066 | 0.1837 | 0.1607 |
| 79L15        | 0.28 | 0.2520 | 0.2240 | 0.1960 | 0.1750 |
| 7915         | 0.31 | 0.2458 | 0.2212 | 0.1966 | 0.1721 |
| 79L24        | 0.30 | 0.2700 | 0.2400 | 0.2100 | 0.1875 |
| 7924         | 0.38 | 0.3000 | 0.2700 | 0.2400 | 0.2100 |

### Variable Voltage

A range of variable output voltage regulators many with current limiting, thermal overload protection and input overload protection.

### Technical Specification

| Order Code | Current | Voltage      | Pin-out        |                                |
|------------|---------|--------------|----------------|--------------------------------|
| ADM666     | 40mA    | +1.3 to 16V  | (8DIL)         | Micropower 6μA, plus +5V Fixed |
| LM317LZ    | 100mA   | +1.2 to 37V  | 7O             |                                |
| TL431CZ    | 100mA   | +1.2 to 37V  | 7P             |                                |
| LM723      | 150mA   | +2 to 37V    | (14DIL)        | Overcurrent protection         |
| LM317T     | 1.5A    | +1.2 to 37V  | 17L            |                                |
| LM317K     | 1.5A    | +1.2 to 37V  | 23K            |                                |
| LM337T     | 1.5A    | -1.2 to 37V  | 17N            |                                |
| L200CV     | 2A      | +2.85 to 36V | (TO-220/5)     | Adjustable current limit       |
| L296       | 4A      | +5.1 to 40V  | (15/Multiwatt) |                                |
| L4960      | 2.5A    | +5.1 to 40V  | (7/Heptawatt)  | Power switching regulator      |
| LM338T     | 5A      | +1.2 to 37V  | 17L            |                                |
| LM338K     | 5A      | +1.2 to 37V  | 23K            |                                |

| Order Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------|--------|--------|--------|--------|
| ADM666     |      |        |        |        |        |
| LM317LZ    | 0.29 | 0.2390 | 0.1912 | 0.1530 | 0.1338 |
| TL431CZ    | 0.14 | 0.1130 | 0.0904 | 0.0814 | 0.0723 |
| LM723      | 0.40 | 0.3190 | 0.2871 | 0.2552 | 0.2233 |
| LM317T     | 0.44 | 0.3630 | 0.2904 | 0.2323 | 0.2003 |
| LM317K     | 2.28 | 1.8200 | 1.6380 | 1.4560 | 1.2740 |
| LM337T     | 0.64 | 0.5724 | 0.5152 | 0.4579 | 0.4007 |
| L200CV     | 1.67 | 1.3374 | 1.2037 | 1.0699 | 0.9362 |
| L296       | 4.42 | 3.9805 | 3.5382 | 3.0960 | 2.7643 |
| L4960      | 2.81 | 2.5270 | 2.2462 | 1.9655 | 1.7549 |
| LM338T     | 1.38 | 1.2420 | 1.1040 | 0.9660 | 0.8625 |
| LM338K     | 5.31 | 4.7763 | 4.2456 | 3.7149 | 3.3169 |



## TRANSISTORS

A comprehensive range of transistors covering a wide range of types, ratings and applications.

## Germanium

## Technical Specification

| Device | Type | V <sub>CB</sub><br>V <sub>MAX</sub> | I <sub>C</sub><br>mA <sub>MAX</sub> | P <sub>TOT</sub><br>mW <sub>MAX</sub> | h <sub>FE</sub> MIN<br>@ I <sub>C</sub> mA <sub>MAX</sub> | f <sub>T</sub><br>MHz | Pin-out           |
|--------|------|-------------------------------------|-------------------------------------|---------------------------------------|---|-----------------------|-------------------|
| AC187  | NPN  | 25                                  | 1.0A                                | 1W                                    |   |                       | 2A                |
| ACY17  | PNP  | 70                                  | 500                                 | 260                                   |   |                       | 2A                |
| AD162  | PNP  | 32                                  | 1.0A                                | 6.0W                                  | 80@500  | 1.0                   | 22A Comp to AD161 |

| Order Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------|--------|--------|--------|--------|
| AC187      | 0.68 | 0.6120 | 0.5440 | 0.4760 | 0.4420 |
| ACY17      | 4.84 | 4.3560 | 3.8720 | 3.3880 | 3.0250 |
| AD162      | 0.95 | 0.7600 | 0.6840 | 0.6080 | 0.5320 |

## Silicon

| Device | Type | V <sub>CB</sub><br>V <sub>MAX</sub> | I <sub>C</sub><br>mA <sub>MAX</sub> | P <sub>TOT</sub><br>mW <sub>MAX</sub> | h <sub>FE</sub> MIN<br>@ I <sub>C</sub> mA <sub>MAX</sub> | f <sub>T</sub><br>MHz | Pin-out |
|--------|------|-------------------------------------|-------------------------------------|---------------------------------------|---|-----------------------|---------|
|--------|------|-------------------------------------|-------------------------------------|---------------------------------------|---|-----------------------|---------|

## Technical Specification

| Device   | Type | V <sub>CB</sub><br>V <sub>MAX</sub> | I <sub>C</sub><br>mA <sub>MAX</sub> | P <sub>TOT</sub><br>mW <sub>MAX</sub> | h <sub>FE</sub> MIN<br>@ I <sub>C</sub> mA <sub>MAX</sub> | f <sub>T</sub><br>MHz | Pin-out             |
|----------|------|-------------------------------------|-------------------------------------|---------------------------------------|---|-----------------------|---------------------|
| BC107    | NPN  | 50                                  | 100                                 | 300                                   | 125@2   | 300                   | 2A                  |
| BC107B   | NPN  | 50                                  | 100                                 | 300                                   | 330@2   | 300                   | 2A                  |
| BC108    | NPN  | 30                                  | 100                                 | 300                                   | 125@2   | 300                   | 2A                  |
| BC108B   | NPN  | 30                                  | 100                                 | 300                                   | 330@2   | 300                   | 2A                  |
| BC108C   | NPN  | 30                                  | 100                                 | 300                                   | 600@2   | 300                   | 2A                  |
| BC109    | NPN  | 30                                  | 100                                 | 300                                   | 180@2   | 150                   | 2A Low noise        |
| BC109C   | NPN  | 30                                  | 100                                 | 300                                   | 420@2   | 150                   | 2A Low noise        |
| BC114    | NPN  | 30                                  | 50                                  | 200                                   | 200@1   | 100                   | 8A                  |
| BC115    | NPN  | 40                                  | 200                                 | 300                                   | 80@10   | 80                    | 8A                  |
| BC118    | NPN  | 45                                  | 100                                 | 200                                   | 50@5  | 200                   | 8A                  |
| BC132    | NPN  | 30                                  | 50                                  | 400                                   | 60@10   | 40                    | 8A                  |
| BC134    | NPN  | 45                                  | 200                                 | 200                                   | 150@10  | 400                   | 8A                  |
| BC135    | NPN  | 45                                  | 200                                 | 200                                   | 50@10   | 200                   | 8A                  |
| BC142    | NPN  | 80                                  | 1.0A                                | 800                                   | 20@200  | 50                    | 2A                  |
| BC159    | PNP  | 25                                  | 100                                 | 300                                   | 120@2   | 130                   | 11A Low noise       |
| BC170B   | NPN  | 20                                  | 100                                 | 300                                   | 80@1  | 100                   | 7A                  |
| BC177    | PNP  | 45                                  | 100                                 | 300                                   | 70@2  | 120                   | 2A                  |
| BC178    | PNP  | 20                                  | 100                                 | 300                                   | 240@2   | 200                   | 2A                  |
| BC179    | PNP  | 20                                  | 200                                 | 300                                   | 500@2   | 150                   | 2A                  |
| BC182B   | NPN  | 60                                  | 200                                 | 300                                   | 500@2   | 150                   | 7A                  |
| BC182L   | NPN  | 60                                  | 200                                 | 300                                   | 500@2   | 150                   | 7C                  |
| BC183L   | NPN  | 45                                  | 200                                 | 300                                   | 900@2   | 150                   | 7C                  |
| BC184    | NPN  | 45                                  | 200                                 | 300                                   | 900@2   | 150                   | 7A Low noise audio  |
| BC184L   | NPN  | 45                                  | 200                                 | 300                                   | 900@2   | 150                   | 7C Low noise audio  |
| BC206B   | PNP  | 50                                  | 100                                 | 200                                   | 240@2   | 200                   | 8A                  |
| BC208    | NPN  | 25                                  | 100                                 | 200                                   | 75/900@2  | 300                   | 8A                  |
| BC209A   | NPN  | 25                                  | 100                                 | 200                                   | 125@2   | 300                   | 8A Low noise audio  |
| BC212L   | PNP  | 60                                  | 200                                 | 300                                   | 100@2   | 200                   | 7C                  |
| BC214    | PNP  | 45                                  | 200                                 | 300                                   | 140@2   | 200                   | 7A                  |
| BC214L   | PNP  | 45                                  | 200                                 | 300                                   | 140@2   | 200                   | 7C                  |
| BC225    | PNP  | 40                                  | 100                                 | 200                                   | 90@10   | 70                    | 8A                  |
| BC237B   | NPN  | 50                                  | 100                                 | 350                                   | 120@2   | 200                   | 7A                  |
| BC238B   | NPN  | 30                                  | 100                                 | 350                                   | 120@2   | 240                   | 7A                  |
| BC250A   | PNP  | 20                                  | 100                                 | 300                                   | 35@1  | 180                   | 7A                  |
| BC261B   | PNP  | 50                                  | 100                                 | 300                                   | 240@2   | 130                   | 2A                  |
| BC262B   | PNP  | 30                                  | 100                                 | 300                                   | 240@2   | 130                   | 2A                  |
| BC267B   | NPN  | 50                                  | 500                                 | 375                                   | 240@2   | 200                   | 2A                  |
| BC327    | PNP  | 50                                  | 800                                 | 500                                   | 63@100  | 100                   | 7A Comp: BC337      |
| BC327-25 | PNP  | 50                                  | 500                                 | 625                                   | 160@100   | 100                   | 7A Comp: BC327-25   |
| BC328    | PNP  | 30                                  | 500                                 | 625                                   | 100@100   | 60                    | 7A Comp: BC328      |
| BC337-16 | NPN  | 50                                  | 800                                 | 360                                   | 100@100   | 60                    | 7A Comp: BC327-16   |
| BC337-25 | NPN  | 50                                  | 800                                 | 360                                   | 160@100   | 60                    | 7A Comp: BC327-25   |
| BC348B   | NPN  | 40                                  | 100                                 | 300                                   | 200@2   | 125                   | 7E                  |
| BC357    | PNP  | 25                                  | 100                                 | 310                                   | 100@10  | 200                   | 7E                  |
| BC463    | NPN  | 35                                  | 1.5A                                | 880                                   | 50/280@500  | 100                   | 11A                 |
| BC477    | PNP  | 80                                  | 150                                 | 360                                   | 125@2   | 150                   | 2A                  |
| BC479    | PNP  | 40                                  | 150                                 | 360                                   | 200@2   | 100                   | 2A                  |
| BC516    | PNP  | 40                                  | 400                                 | 625                                   | 350@2   | 200                   | 7A Darlington audio |
| BC546B   | NPN  | 80                                  | 100                                 | 500                                   | 200@2   | 300                   | 7A Comp: BC556B     |
| BC546C   | NPN  | 80                                  | 100                                 | 500                                   | 420@2   | 300                   | 7A Comp: BC556C     |
| BC547A   | NPN  | 50                                  | 100                                 | 500                                   | 110@2   | 300                   | 7A Comp: BC557A     |
| BC547B   | NPN  | 50                                  | 100                                 | 500                                   | 200@2   | 300                   | 7A Comp: BC557B     |
| BC547C   | NPN  | 50                                  | 100                                 | 500                                   | 420@2   | 300                   | 7A Comp: BC557C     |
| BC548A   | NPN  | 30                                  | 100                                 | 500                                   | 110@2   | 300                   | 7A Comp: BC558A     |
| BC548B   | NPN  | 30                                  | 100                                 | 500                                   | 200@2   | 300                   | 7A Comp: BC558B     |
| BC548C   | NPN  | 30                                  | 100                                 | 500                                   | 420@2   | 300                   | 7A Comp: BC558C     |
| BC549B   | NPN  | 30                                  | 100                                 | 500                                   | 200@2   | 300                   | 7A Comp: BC559B     |
| BC549C   | NPN  | 30                                  | 100                                 | 500                                   | 420@2   | 300                   | 7A Comp: BC559C     |
| BC550C   | NPN  | 50                                  | 100                                 | 500                                   | 420@2   | 300                   | 7A Comp: BC560C     |
| BC556A   | PNP  | 80                                  | 100                                 | 500                                   | 125@2   | 300                   | 7A Comp: BC546A     |
| BC556B   | PNP  | 80                                  | 100                                 | 500                                   | 220@2   | 300                   | 7A Comp: BC546B     |
| BC557A   | PNP  | 50                                  | 100                                 | 500                                   | 125@2   | 300                   | 7A Comp: BC547A     |
| BC557B   | PNP  | 50                                  | 100                                 | 500                                   | 220@2   | 300                   | 7A Comp: BC547B     |
| BC557C   | PNP  | 50                                  | 100                                 | 500                                   | 420@2   | 300                   | 7A Comp: BC547C     |
| BC558A   | PNP  | 30                                  | 100                                 | 500                                   | 125@2   | 300                   | 7A Comp: BC548A     |
| BC558B   | PNP  | 30                                  | 100                                 | 500                                   | 220@2   | 300                   | 7A Comp: BC548B     |
| BC560A   | PNP  | 50                                  | 100                                 | 500                                   | 125@2   | 300                   | 7A Comp: BC550A     |
| BC635    | NPN  | 45                                  | 1A                                  | 1W                                    | 40@150  | 130                   | 7C L-Frequency amp  |
| BC636    | PNP  | 45                                  | 1A                                  | 1W                                    | 40@150  | 130                   | 7C L-Frequency amp  |
| BC638    | PNP  | 60                                  | 500                                 | 800                                   | 25@5  | 50                    | 7C Comp: BC637      |
| BC639    | NPN  | 80                                  | 500                                 | 800                                   | 25@5  | 130                   | 7C Comp: BC640      |
| BC640    | PNP  | 80                                  | 500                                 | 800                                   | 25@5  | 50                    | 7C Comp: BC639      |
| BCX38B   | NPN  | 80                                  | 800                                 | 1W                                    | 2k@100  |                       | 40E M-Power darl.   |
| BCY72    | PNP  | 25                                  | 200                                 | 350                                   | 50@10   | 200                   | 2A                  |
| BD124P   | NPN  | 70                                  | 2A                                  | 15W                                   | 35@500  | 60                    | 22A                 |
| BD135    | NPN  | 45                                  | 1A                                  | 12W                                   | 40@150  | 50                    | 14H                 |
| BD136    | PNP  | 45                                  | 1A                                  | 12W                                   | 40@150  | 50                    | 14H                 |
| BD137    | NPN  | 60                                  | 1A                                  | 12W                                   | 40/160@150  | 50                    | 14H                 |
| BD138    | PNP  | 60                                  | 1A                                  | 12W                                   | 40/180@150  | 50                    | 14H                 |
| BD139    | NPN  | 80                                  | 1A                                  | 12W                                   | 40@150  | 50                    | 14H                 |
| BD140    | PNP  | 80                                  | 1A                                  | 12W                                   | 40@150  | 50                    | 14H                 |
| BD150C   | NPN  | 200                                 | 500                                 | 1W                                    | 20@80   | 80                    | 2A                  |
| BD201    | NPN  | 60                                  | 8A                                  | 55W                                   | 30@3A   | 3                     | 17J                 |
| BD202    | PNP  | 60                                  | 8A                                  | 55W                                   | 30@3A   | 3                     | 17J                 |

| Order Code | 1+ | 25+ | 50+ | 100+ | 500+ |
|------------|----|-----|-----|------|------|
|------------|----|-----|-----|------|------|

| Order Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------|--------|--------|--------|--------|
| BC107      | 0.15 | 0.1314 | 0.1168 | 0.1022 | 0.0913 |
| BC107B     | 0.14 | 0.1242 | 0.1104 | 0.0966 | 0.0863 |
| BC108      | 0.18 | 0.1620 | 0.1440 | 0.1260 | 0.1125 |
| BC108B     | 0.14 | 0.1260 | 0.1120 | 0.0980 | 0.0875 |
| BC108C     | 0.18 | 0.1620 | 0.1440 | 0.1260 | 0.1125 |
| BC109      | 0.24 | 0.2160 | 0.1920 | 0.1680 | 0.1500 |
| BC109C     | 0.16 | 0.1520 | 0.1440 | 0.1360 | 0.1280 |
| BC114      | 0.19 | 0.1550 | 0.1240 | 0.0992 | 0.0868 |
| BC115      | 0.41 | 0.3672 | 0.3264 | 0.2856 | 0.2550 |
| BC118      | 0.41 | 0.3672 | 0.3264 | 0.2856 | 0.2550 |
| BC132      | 0.36 | 0.3222 | 0.2864 | 0.2506 | 0.2238 |
| BC134      | 0.36 | 0.3222 | 0.2864 | 0.2506 | 0.2238 |
| BC135      | 0.36 | 0.3222 | 0.2864 | 0.2506 | 0.2238 |
| BC142      | 0.50 | 0.4500 | 0.4000 | 0.3500 | 0.3125 |
| BC159      | 0.17 | 0.1548 | 0.1376 | 0.1204 | 0.1075 |
| BC170B     | 0.16 | 0.1280 | 0.1152 | 0.1024 | 0.0896 |
| BC177      | 0.25 | 0.2050 | 0.1640 | 0.1476 | 0.1312 |
| BC178      | 0.18 | 0.1620 | 0.1440 | 0.1260 | 0.1125 |
| BC179      | 0.27 | 0.2400 | 0.2160 | 0.1920 | 0.1680 |
| BC182B     | 0.09 | 0.0696 | 0.0348 | 0.0311 | 0.0278 |
| BC182L     | 0.11 | 0.0852 | 0.0426 | 0.0383 | 0.0341 |
| BC183L     | 0.08 | 0.0600 | 0.0400 | 0.0320 | 0.0280 |
| BC184      | 0.09 | 0.0660 | 0.0396 | 0.0264 | 0.0211 |
| BC184L     | 0.13 | 0.0750 | 0.0500 | 0.0400 | 0.0350 |
| BC206B     | 0.72 | 0.6498 | 0.5776 | 0.5054 | 0.4513 |
| BC208      | 0.72 | 0.6498 | 0.5776 | 0.5054 | 0.4513 |
| BC209A     | 0.72 | 0.6498 | 0.5776 | 0.5054 | 0.4513 |
| BC212L     | 0.09 | 0.0675 | 0.0450 | 0.0360 | 0.0315 |
| BC214      | 0.11 | 0.0789 | 0.0526 | 0.0421 | 0.0368 |
| BC214L     | 0.09 | 0.0801 | 0.0534 | 0.0427 | 0.0374 |
| BC225      | 0.15 | 0.1260 | 0.1120 | 0.0980 | 0.0875 |
| BC237B     | 0.11 | 0.0651 | 0.0434 | 0.0347 | 0.0304 |
| BC238B     | 0.11 | 0.0660 | 0.0440 | 0.0352 | 0.0308 |
| BC250A     | 0.15 | 0.1404 | 0.1248 | 0.1092 | 0.0975 |
| BC261B     | 0.30 | 0.2700 | 0.2400 | 0.2100 | 0.1875 |
| BC262B     | 0.24 | 0.2160 | 0.1920 | 0.1680 | 0.1500 |
| BC267B     | 0.36 | 0.3120 | 0.2600 | 0.2080 | 0.1664 |
| BC327      | 0.08 | 0.0492 | 0.0328 | 0.0295 | 0.0262 |
| BC327-25   | 0.08 | 0.0492 | 0.0328 | 0.0295 | 0.0262 |
| BC328      | 0.09 | 0.0546 | 0.0364 | 0.0291 | 0.0255 |
| BC337-16   | 0.10 | 0.0570 | 0.0380 | 0.0304 | 0.0266 |
| BC337-25   | 0.08 | 0.0480 | 0.0320 | 0.0288 | 0.0256 |
| BC348B     | 0.14 | 0.1260 | 0.1120 | 0.0980 | 0.0875 |
| BC357      | 0.25 | 0.2300 | 0.2070 | 0.1840 | 0.1610 |
| BC463      | 0.29 | 0.2592 | 0.2304 | 0.2016 | 0.1800 |
| BC477      | 0.52 | 0.4680 | 0.4160 | 0.3640 | 0.3250 |
| BC479      | 0.32 | 0.2880 | 0.2560 | 0.2240 | 0.2000 |
| BC516      | 0.21 | 0.1750 | 0.1400 | 0.1120 | 0.0980 |
| BC546B     | 0.06 | 0.0512 | 0.0384 | 0.0256 | 0.0205 |
| BC546C     | 0.08 | 0.0632 | 0.0474 | 0.0316 | 0.0253 |
| BC547A     | 0.11 | 0.0943 | 0.0754 | 0.0603 | 0.0528 |
| BC547B     | 0.09 | 0.0660 | 0.0396 | 0.0264 | 0.0211 |
| BC547C     | 0.10 | 0.0570 | 0.0429 | 0.0286 | 0.0229 |
| BC548A     | 0.12 | 0.1015 | 0.0812 | 0.0650 | 0.0568 |
| BC548B     | 0.09 | 0.0615 | 0.0369 | 0.0246 | 0.0197 |
| BC548C     | 0.09 | 0.0630 | 0.0378 | 0.0252 | 0.0202 |
| BC549B     | 0.11 | 0.0775 | 0.0465 | 0.0310 | 0.0248 |
| BC549C     | 0.09 | 0.0670 | 0.0402 | 0.0268 | 0.0214 |
| BC550C     | 0.11 | 0.0720 | 0.0450 | 0.0360 | 0.0288 |
| BC556A     | 0.09 | 0.0675 | 0.0405 | 0.0270 | 0.0216 |
| BC556B     | 0.10 | 0.0800 | 0.0480 | 0.0320 | 0.0256 |
| BC557A     | 0.09 | 0.0615 | 0.0369 | 0.0246 | 0.0197 |
| BC557B     | 0.09 | 0.0675 | 0.0405 | 0.0270 | 0.0216 |
| BC557C     | 0.09 | 0.0625 | 0.0375 | 0.0250 | 0.0200 |
| BC558A     | 0.08 | 0.0585 | 0.0351 | 0.0234 | 0.0187 |
| BC558B     | 0.14 | 0.1160 | 0.0928 | 0.0742 | 0.0650 |
| BC560A     | 0.09 | 0.0660 | 0.0440 | 0.0352 | 0.0308 |
| BC635      |      |        |        |        |        |
| BC636      | 0.10 | 0.0750 | 0.0500 | 0.0400 | 0.0350 |
| BC638      | 0.21 | 0.1680 | 0.1512 | 0.1344 | 0.1176 |
| BC639      | 0.11 | 0.0750 | 0.0675 | 0.0600 | 0.0525 |
| BC640      | 0.12 | 0.0900 | 0.0600 | 0.0480 | 0.0420 |
| BCX38B     |      |        |        |        |        |
| BCY72      | 0.20 | 0.1160 | 0.1044 | 0.0928 | 0.0812 |
| BD124P     | 6.86 | 6.1776 | 5.8310 | 5.1450 | 4.8020 |
| BD135      | 0.22 | 0.1833 | 0.1466 | 0.1319 | 0.1173 |
| BD136      | 0.21 | 0.1890 | 0.1680 | 0.1470 | 0.1313 |
| BD137      | 0.23 | 0.2070 | 0.1840 | 0.1610 | 0.1438 |
| BD138      | 0.19 | 0.1550 | 0.1395 | 0.1240 | 0.1085 |
| BD139      | 0.19 | 0.1590 | 0.1272 | 0.1018 | 0.0890 |
| BD140      | 0.14 | 0.1198 | 0.0958 | 0.0862 | 0.0766 |
| BD150C     | 0.82 | 0.7362 | 0.6544 | 0.5726 | 0.5113 |
| BD201      | 0.40 | 0.3618 | 0.3216 | 0.2814 | 0.2513 |
| BD202      | 0.70 | 0.6300 | 0.5600 | 0.4900 | 0.4375 |

| Device  | Type | V <sub>CB</sub><br>V <sub>MAX</sub> | I <sub>C</sub><br>mA <sub>MAX</sub> | P <sub>ROT</sub><br>mW <sub>MAX</sub> | h <sub>FE</sub> MIN<br>@ I <sub>C</sub> mA <sub>MAX</sub> | f <sub>T</sub><br>MHz | Pin-out               | Order Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|---------|------|-------------------------------------|-------------------------------------|---------------------------------------|---|-----------------------|-----------------------|------------|------|--------|--------|--------|--------|
| BD232   | NPN  | 500                                 | 250                                 | 11W                                   | 25/150@50   | 10                    | 14H                   | BD232      | 0.50 | 0.4536 | 0.4032 | 0.3528 | 0.3150 |
| BD237   | NPN  | 100                                 | 2A                                  | 25W                                   | 25@1A   | 3                     | 14H                   | BD237      | 0.32 | 0.2880 | 0.2560 | 0.2240 | 0.2000 |
| BD238   | PNP  | 100                                 | 2A                                  | 25W                                   | 25@1A   | 3                     | 14H                   | BD238      | 0.44 | 0.3960 | 0.3520 | 0.3080 | 0.2750 |
| BD240C  | PNP  | 115                                 | 2A                                  | 30W                                   | 15@1A   | 3                     | 17J                   | BD240C     | 0.37 | 0.3330 | 0.2960 | 0.2590 | 0.2313 |
| BD245C  | NPN  | 115                                 | 15A                                 | 80W                                   | 40@1A   | 18J                   |                       | BD245C     | 1.18 | 1.0620 | 0.9440 | 0.8260 | 0.7375 |
| BC246C  | PNP  | 115                                 | 15A                                 | 80W                                   | 40@1A   | 18J                   |                       | BD246C     | 1.10 | 0.9900 | 0.8800 | 0.7700 | 0.6875 |
| BD283   | NPN  | 32                                  | 4A                                  | 36W                                   | 85/350@500  | 3                     | 14H                   | BD283      | 0.61 | 0.5508 | 0.4896 | 0.4284 | 0.3825 |
| BD284   | PNP  | 32                                  | 4A                                  | 36W                                   | 85/350@500  | 3                     | 14H                   | BD284      | 0.61 | 0.5508 | 0.4896 | 0.4284 | 0.3825 |
| BD400   | NPN  | 170                                 | 1A                                  | 15W                                   | 40@500  | 500k                  | 14H                   | BD400      | 0.79 | 0.7128 | 0.6336 | 0.5572 | 0.2475 |
| BD437   | NPN  | 45                                  | 4A                                  | 36W                                   | 40@2A   | 7                     | 14H Comp: BD438       | BD437      | 0.17 | 0.1384 | 0.1038 | 0.0692 | 0.0623 |
| BD438   | PNP  | 45                                  | 4A                                  | 36W                                   | 40@2A   | 7                     | 14H Comp: BD437       | BD438      | 0.22 | 0.1850 | 0.1444 | 0.1300 | 0.1155 |
| BD442   | PNP  | 80                                  | 4A                                  | 36W                                   | 15@2A   | 3                     | 14H                   | BD442      | 0.37 | 0.3330 | 0.2960 | 0.2590 | 0.2313 |
| BD534   | PNP  | 45                                  | 4A                                  | 40W                                   | 40@500  | 3                     | 17J                   | BD534      | 0.47 | 0.4194 | 0.3728 | 0.3262 | 0.2913 |
| BD535   | NPN  | 60                                  | 4A                                  | 40W                                   | 40@500  | 3                     | 17J                   | BD535      | 0.50 | 0.4500 | 0.4000 | 0.3500 | 0.3125 |
| BD646   | PNP  | 60                                  | 10A                                 | 70W                                   | 750@4A  | 1                     | 17J                   | BD646      | 0.52 | 0.4680 | 0.4160 | 0.3640 | 0.3250 |
| BD648   | PNP  | 80                                  | 10A                                 | 70W                                   | 750@4A  | 1                     | 17J                   | BD648      | 0.52 | 0.4680 | 0.4160 | 0.3640 | 0.3250 |
| BD679   | NPN  | 100                                 | 6A                                  | 40W                                   | 2k2@500   | 1                     | 14H Power darlington  | BD679      |      |        |        |        |        |
| BD680   | PNP  | 100                                 | 6A                                  | 40W                                   | 2k2@500   | 1                     | 14H Power darlington  | BD680      |      |        |        |        |        |
| BDW93C  | NPN  | 100                                 | 12A                                 | 80W                                   | 75/20k@5A   | 20                    | 17J Power darlington  | BDW93C     |      |        |        |        |        |
| BDW94C  | PNP  | 100                                 | 12A                                 | 80W                                   | 75/20k@5A   | 20                    | 17J Power darlington  | BDW94C     |      |        |        |        |        |
| BDX32   | NPN  | 1700                                | 4A                                  | 40W                                   | 2@3.5A  | 23A                   |                       | BDX32      | 1.78 | 1.5984 | 1.4208 | 1.2432 | 1.1100 |
| BDX53C  | NPN  | 100                                 | 8A                                  | 60W                                   | 750@3A  | 20                    | 17J                   | BDX53C     | 0.53 | 0.4378 | 0.3502 | 0.3152 | 0.2802 |
| BDX54C  | PNP  | 100                                 | 8A                                  | 60W                                   | 750@3A  | 20                    | 17J                   | BDX54C     | 0.50 | 0.4536 | 0.4032 | 0.3528 | 0.3150 |
| BF180   | NPN  | 30                                  | 20                                  | 150                                   | 13@2  | 335                   | 5G                    | BF180      | 0.31 | 0.2790 | 0.2480 | 0.2170 | 0.1938 |
| BF182   | NPN  | 25                                  | 15                                  | 150                                   | 10@2  | 325                   | 5G                    | BF182      | 0.31 | 0.2790 | 0.2480 | 0.2170 | 0.1938 |
| BF257   | NPN  | 160                                 | 100                                 | 500                                   | 25@30   | 55                    | 2A                    | BF257      | 0.33 | 0.2950 | 0.2624 | 0.2296 | 0.2050 |
| BF259   | NPN  | 300                                 | 100                                 | 500                                   | 25@30   | 90                    | 2A High voltage       | BF259      | 0.33 | 0.2952 | 0.2624 | 0.2296 | 0.2050 |
| BF337   | NPN  | 300                                 | 100                                 | 800                                   | 20@30   | 80                    | 2A                    | BF337      | 0.40 | 0.3600 | 0.3200 | 0.2800 | 0.2500 |
| BF422   | NPN  | 250                                 | 50                                  | 830                                   | 50@25   | 100                   | 7C Comp: BF423        | BF422      | 0.15 | 0.1225 | 0.0980 | 0.0882 | 0.0784 |
| BF423   | PNP  | 250                                 | 50                                  | 830                                   | 50@25   | 80                    | 7C Comp: BF422        | BF423      | 0.15 | 0.1225 | 0.0980 | 0.0882 | 0.0784 |
| BF459   | NPN  | 300                                 | 100                                 | 6W                                    | 26@30   | 40                    | 14H                   | BF459      | 0.33 | 0.2952 | 0.2624 | 0.2296 | 0.2050 |
| BF469   | NPN  | 250                                 | 30                                  | 2W                                    | 50@25   | 60                    | 14H                   | BF469      | 0.36 | 0.3276 | 0.2912 | 0.2548 | 0.2275 |
| BFX29   | PNP  | 60                                  | 600                                 | 600                                   | 50@10   | 100                   | 2A                    | BFX29      | 0.29 | 0.2592 | 0.2304 | 0.2016 | 0.1800 |
| BFX85   | NPN  | 100                                 | 1A                                  | 800                                   | 70@150  | 50                    | 2A Audio high voltage | BFX85      | 0.48 | 0.3800 | 0.3420 | 0.3040 | 0.2660 |
| BFX88   | PNP  | 40                                  | 600                                 | 600                                   | 40@10   | 100                   | 2A                    | BFX88      | 0.27 | 0.2120 | 0.1908 | 0.1696 | 0.1484 |
| BFY50   | NPN  | 80                                  | 1A                                  | 800                                   | 30@150  | 60                    | 2A                    | BFY50      | 0.30 | 0.2700 | 0.2400 | 0.2100 | 0.1875 |
| BFY51   | NPN  | 60                                  | 1A                                  | 800                                   | 40@150  | 50                    | 2A                    | BFY51      | 0.38 | 0.3420 | 0.3040 | 0.2660 | 0.2375 |
| BFY52   | NPN  | 40                                  | 1A                                  | 800                                   | 60@150  | 50                    | 2A                    | BFY52      | 0.24 | 0.2200 | 0.1980 | 0.1760 | 0.1540 |
| BU326A  | NPN  | 900                                 | 6A                                  | 60W                                   | 30@600  | 4                     | 23A                   | BU326A     | 1.38 | 1.2420 | 1.1040 | 0.9660 | 0.8625 |
| BU407   | NPN  | 330                                 | 7A                                  | 60W                                   | 10@5A   | 10                    | 17J                   | BU407      |      |        |        |        |        |
| BU508A  | NPN  | 1500                                | 8A                                  | 125W                                  |   | 18J                   |                       | BU508A     | 1.40 | 1.2600 | 1.1200 | 0.9800 | 0.9100 |
| BU508AF | NPN  | 1500                                | 8A                                  | 34W                                   |   | 18C Isolated BU508A   |                       | BU508AF    |      |        |        |        |        |
| BU508D  | NPN  | 1500                                | 8A                                  | 125W                                  |   | 18J                   |                       | BU508D     | 0.98 | 0.8820 | 0.7840 | 0.6860 | 0.6125 |
| BU508DF | NPN  | 1500                                | 8A                                  | 34W                                   |   | 18C BU508AF+diode     |                       | BU508DF    |      |        |        |        |        |
| BU806   | NPN  | 400                                 | 8A                                  | 60W                                   | 100@5A  | 17J                   |                       | BU806      | 1.06 | 0.9504 | 0.8448 | 0.7392 | 0.6600 |
| BUT11AF | NPN  | 1000                                | 5A                                  | 100W                                  | 30@300  | 17C                   |                       | BUT11AF    | 1.14 | 1.0260 | 0.9120 | 0.7980 | 0.7125 |
| BUX84   | NPN  | 800                                 | 2A                                  | 40W                                   | 5@1A  | 17C                   |                       | BUX84      | 0.78 | 0.7020 | 0.6240 | 0.5460 | 0.4875 |
| MJ2501  | PNP  | 80                                  | 10A                                 | 150W                                  | 100@5A  | 23A                   | H-Power darl.         | MJ2501     | 1.60 | 1.4400 | 1.2800 | 1.1200 | 1.0000 |
| MJ2955  | PNP  | 100                                 | 15A                                 | 150W                                  | 5@10A   | 4                     | 23A                   | MJ2955     | 0.90 | 0.8100 | 0.7200 | 0.6300 | 0.5625 |
| MJ11015 | PNP  | 120                                 | 30A                                 | 200W                                  | 1k@20A  | 23A                   |                       | MJ11015    | 2.45 | 2.2032 | 2.0808 | 1.8360 | 1.7136 |
| MJ11016 | NPN  | 120                                 | 30A                                 | 200W                                  | 1k@20A  | 23A                   |                       | MJ11016    | 2.78 | 2.5020 | 2.2240 | 1.9460 | 1.7375 |
| MJE340  | NPN  | 300                                 | 500                                 | 20W                                   | 30@50   | 10                    | 14H Comp: MJE350      | MJE340     | 0.32 | 0.2598 | 0.2338 | 0.2078 | 0.1819 |
| MJE350  | PNP  | 300                                 | 500                                 | 20W                                   | 30@50   | 10                    | 14H Comp: MJE340      | MJE350     | 0.48 | 0.4320 | 0.3840 | 0.3360 | 0.3000 |
| MP5A05  | NPN  | 60                                  | 500                                 | 625                                   | 50@100  | 175                   | 7E Comp: MP5A55       | MP5A05     | 0.14 | 0.0900 | 0.0810 | 0.0720 | 0.0630 |
| MP5A13  | NPN  | 30                                  | 500                                 | 625                                   | 5k@10   | 125                   | 7E Darlington switch  | MP5A13     | 0.09 | 0.0770 | 0.0616 | 0.0493 | 0.0431 |
| MP5A42  | NPN  | 300                                 | 500                                 | 625                                   | 40@30   | 50                    | 7E Comp: MP5A92       | MP5A42     | 0.14 | 0.0858 | 0.0572 | 0.0458 | 0.0400 |
| MP5A55  | PNP  | 60                                  | 500                                 | 625                                   | 100@100   | 50                    | 7E Comp: MP5A05       | MP5A55     | 0.13 | 0.1000 | 0.0750 | 0.0500 | 0.0400 |
| MP5A92  | PNP  | 300                                 | 500                                 | 625                                   | 40@30   | 50                    | 7E Comp: MP5A42       | MP5A92     | 0.15 | 0.0900 | 0.0600 | 0.0480 | 0.0420 |
| TIP29A  | NPN  | 60                                  | 1A                                  | 30W                                   | 40@200  | 3                     | 17J                   | TIP29A     | 0.32 | 0.2520 | 0.2268 | 0.2016 | 0.1764 |
| TIP29C  | NPN  | 100                                 | 1A                                  | 30W                                   | 40@200  | 3                     | 17J                   | TIP29C     | 0.30 | 0.2736 | 0.2432 | 0.2128 | 0.1900 |
| TIP30A  | PNP  | 60                                  | 1A                                  | 30W                                   | 40@200  | 3                     | 17J                   | TIP30A     | 0.47 | 0.3794 | 0.3415 | 0.3035 | 0.2656 |
| TIP30C  | PNP  | 100                                 | 1A                                  | 30W                                   | 40@200  | 3                     | 17J                   | TIP30C     | 0.27 | 0.2278 | 0.1822 | 0.1640 | 0.1458 |
| TIP31A  | NPN  | 60                                  | 3A                                  | 40W                                   | 20@1A   | 3                     | 17J Comp: TIP32A      | TIP31A     | 0.23 | 0.1822 | 0.1640 | 0.1458 | 0.1275 |
| TIP31C  | NPN  | 100                                 | 3A                                  | 40W                                   | 20@1A   | 3                     | 17J Comp: TIP32C      | TIP31C     | 0.35 | 0.2800 | 0.2520 | 0.2240 | 0.1960 |
| TIP32A  | PNP  | 60                                  | 3A                                  | 40W                                   | 20@1A   | 3                     | 17J Comp: TIP31A      | TIP32A     | 0.29 | 0.2344 | 0.2110 | 0.1875 | 0.1641 |
| TIP32C  | PNP  | 100                                 | 3A                                  | 40W                                   | 20@1A   | 3                     | 17J Comp: TIP31C      | TIP32C     | 0.30 | 0.2500 | 0.2000 | 0.1800 | 0.1600 |
| TIP41A  | NPN  | 60                                  | 6A                                  | 65W                                   | 15@3A   | 3                     | 17J Comp: TIP42A      | TIP41A     | 0.32 | 0.2566 | 0.2309 | 0.2053 | 0.1796 |
| TIP41C  | NPN  | 100                                 | 6A                                  | 65W                                   | 15@3A   | 3                     | 17J Comp: TIP42C      | TIP41C     | 0.32 | 0.2560 | 0.2304 | 0.2048 | 0.1792 |
| TIP42A  | PNP  | 60                                  | 6A                                  | 65W                                   | 15@3A   | 3                     | 17J Comp: TIP41A      | TIP42A     | 0.40 | 0.3226 | 0.2903 | 0.2581 | 0.2258 |
| TIP42C  | PNP  | 100                                 | 6A                                  | 65W                                   | 15@3A   | 3                     | 17J Comp: TIP41C      | TIP42C     | 0.47 | 0.3925 | 0.3140 | 0.2512 | 0.2198 |
| TIP50   | NPN  | 400                                 | 1A                                  | 40W                                   | 30/150@150  | 17J                   |                       | TIP50      | 0.28 | 0.2208 | 0.1987 | 0.1766 | 0.1546 |
| TIP110  | NPN  | 60                                  | 2A                                  | 50W                                   | 1k@1A   | 17J                   |                       | TIP110     | 0.28 | 0.2276 | 0.2048 | 0.1821 | 0.1593 |
| TIP120  | NPN  | 60                                  | 5A                                  | 60W                                   | 1k@3A   | 17J                   | Comp: TIP125          | TIP120     | 0.30 | 0.2438 | 0.2194 | 0.1950 | 0.1707 |
| TIP121  | NPN  | 80                                  | 5A                                  | 60W                                   | 1k@3A   | 17J                   | Comp: TIP126          | TIP121     | 0.32 | 0.2592 | 0.2333 | 0.2074 | 0.1814 |
| TIP122  | NPN  | 100                                 | 5A                                  | 60W                                   | 1k@3A   | 17J                   | Comp: TIP127          | TIP122     | 0.37 | 0.3080 | 0.2464 | 0.2218 | 0.1971 |
| TIP125  | PNP  | 60                                  | 5A                                  | 60W                                   | 1k@3A   | 17J                   | Comp: TIP120          | TIP125     | 0.31 | 0.2500 | 0.2250 | 0.2000 | 0.1750 |
| TIP126  | PNP  | 80                                  | 5A                                  | 60W                                   | 1k@3A   | 17J                   | Comp: TIP121          | TIP126     | 0.31 | 0.2500 | 0.2250 | 0.2000 | 0.1750 |
| TIP127  | PNP  | 100                                 | 5A                                  | 60W                                   | 1k@3A   | 17J                   | Comp: TIP122          | TIP127     | 0.37 | 0.3080 | 0.2464 | 0.2218 | 0.1971 |
| TIP132  | NPN  | 100                                 | 12A                                 | 70W                                   | 1k@4A   | 17J                   |                       | TIP132     | 0.50 | 0.4014 | 0.3613 | 0.3211 | 0.2810 |
| TIP137  | PNP  | 100                                 | 12A                                 | 70W                                   | 1k@4A   | 17J                   |                       | TIP137     | 0.64 | 0.5126 | 0.4613 | 0.4101 | 0.3588 |
| TIP141  | NPN  | 80                                  | 10A                                 | 125W                                  | 1k@5A   | 18J                   | Darlington audio      | TIP141     | 0.93 | 0.7450 | 0.6705 | 0.5960 | 0.5215 |
| TIP142  | NPN  | 100                                 | 10A                                 | 125W                                  | 1k@5A   | 18J                   | Darlington audio      | TIP142     | 0.98 | 0.7816 | 0.7034 | 0.6253 | 0.5471 |
| TIP147  | PNP  | 100                                 | 10A                                 | 125W                                  | 1k@5A   | 18J                   | Darlington audio      | TIP147     | 1.07 | 0.8536 | 0.7682 | 0.6829 | 0.5975 |
| TIP2955 | PNP  | 100                                 | 15A                                 | 90W                                   | 20@4A   | 3                     | 18J Comp: TIP3055     | TIP2955    | 0.46 | 0.3714 | 0.3343 | 0.2971 | 0.2600 |
| TIP3055 | NPN  | 100                                 | 15A                                 | 90W                                   | 20@4A   | 3                     | 18J Comp: TIP2955     | TIP3055    | 0.58 | 0.4644 | 0.4180 | 0.3715 | 0.3251 |
| ZTX450  | NPN  | 60                                  | 150                                 | 1W                                    | 100@150   | 150                   | 40E Comp: ZTX451      | ZTX450     | 0.19 | 0.1744 | 0.1550 | 0.1357 | 0.1211 |
| ZTX451  | NPN  | 80                                  | 1A                                  | 1W                                    | 150@150   | 150                   | 40E Comp: ZTX551      | ZTX451     | 0.19 | 0.1710 | 0.1520 | 0.1330 | 0.1188 |
| ZTX453  | NPN  | 120                                 | 150                                 | 2W                                    | 40@150  | 150                   | 40E                   | ZTX453     | 0.26 | 0.2340 | 0.2080 | 0.1820 | 0.1625 |
| ZTX550  | PNP  | 60                                  | 150                                 | 1W                                    | 100@150   | 150                   | 40E Comp: ZTX450      | ZTX550     | 0.22 | 0.1980 | 0.1760 | 0.1540 | 0.1375 |
| ZTX551  | PNP  | 80                                  | 1A                                  | 1W                                    | 150@150   | 150                   | 40E Comp: ZTX451      | ZTX551     | 0.33 | 0.2600 | 0.2340 | 0.2080 | 0.1820 |
| ZTX600  | NPN  | 160                                 | 1A                                  | 1W                                    | 300@500   | 150                   | 40E M-Power darl.     | ZTX600     | 0.33 | 0.2950 | 0.2622 | 0.2295 | 0.2049 |
| ZTX600B | NPN  | 160                                 | 1A                                  | 1W                                    | 10k@500   | 150                   | 40E M-Power darl.     | ZTX600B    | 0.35 | 0.3150 | 0.2800 | 0.2450 | 0.2188 |
| ZTX605  | NPN  | 140                                 | 1A                                  | 1W                                    | 5k@500  | 150                   | 40E M-Power darl.     | ZTX605     | 0.37 |        |        |        |        |

| Device   | Type | V <sub>CB</sub><br>V <sub>MAX</sub> | I <sub>C</sub><br>mA <sub>MAX</sub> | P <sub>tot</sub><br>mW <sub>MAX</sub> | h <sub>FE</sub> MIN<br>@ I <sub>C</sub> mA <sub>MAX</sub> | f <sub>r</sub><br>MHz | Pin-out            |
|----------|------|-------------------------------------|-------------------------------------|---------------------------------------|---|-----------------------|--------------------|
| ZTX1053A | NPN  | 150                                 | 3A                                  | 1W                                    | 450@1A  | 440                   | 40E H-Gain M-Power |
| 2N2222A  | NPN  | 75                                  | 800                                 | 500                                   | 100@150   | 250                   | 2A                 |
| 2N2904A  | PNP  | 60                                  | 600                                 | 800                                   | 40/120@150  | 200                   | 2A                 |
| 2N2905   | PNP  | 60                                  | 600                                 | 600                                   | 100@120   | 200                   | 2A                 |
| 2N2905A  | PNP  | 60                                  | 600                                 | 600                                   | 100@120   | 200                   | 2A                 |
| 2N2906A  | PNP  | 60                                  | 600                                 | 400                                   | 40@10   | 200                   | 2A                 |
| 2N2907A  | PNP  | 60                                  | 600                                 | 400                                   | 100@150   | 200                   | 2A                 |
| 2N3053   | NPN  | 60                                  | 700                                 | 1W                                    | 50@150  | 100                   | 2A                 |
| 2N3054   | NPN  | 90                                  | 4A                                  | 25W                                   | 20/70@4A  | 0.8                   | 22A                |
| 2N3055   | NPN  | 100                                 | 15A                                 | 115W                                  | 20/70@4A  | 0.8                   | 23A Exptaxial      |
| 2N3055H  | NPN  | 100                                 | 15A                                 | 115W                                  | 20/70@4A  | 0.8                   | 23A Homotaxial     |
| 2N3439   | NPN  | 350                                 | 1A                                  | 1W                                    | 40/160@40   | 140                   | 2A                 |
| 2N3440   | NPN  | 250                                 | 1A                                  | 1W                                    | 40/160@40   | 15                    | 2A                 |
| 2N3702   | PNP  | 40                                  | 200                                 | 360                                   | 60@50   | 100                   | 7C                 |
| 2N3703   | PNP  | 50                                  | 200                                 | 360                                   | 30@50   | 100                   | 7C                 |
| 2N3704   | NPN  | 50                                  | 800                                 | 360                                   | 300@50  | 100                   | 7C                 |
| 2N3705   | NPN  | 50                                  | 800                                 | 625                                   | 150@50  | 100                   | 7C                 |
| 2N3772   | NPN  | 100                                 | 20A                                 | 150W                                  | 15/60@10A   | 0.2                   | 23A                |
| 2N3773   | NPN  | 120                                 | 16A                                 | 150W                                  | 15/60@8A  | 0.2                   | 23A                |
| 2N3903   | NPN  | 60                                  | 200                                 | 625                                   | 200@1   | 250                   | 7E Comp: 2N3905    |
| 2N3904   | NPN  | 60                                  | 200                                 | 310                                   | 100@10  | 250                   | 7E Comp: 2N3906    |
| 2N3905   | PNP  | 40                                  | 200                                 | 625                                   | 50/150@10   | 200                   | 7E Comp: 2N3903    |
| 2N3906   | PNP  | 60                                  | 200                                 | 310                                   | 100@10  | 250                   | 7E Comp: 2N3904    |
| 2N4123   | NPN  | 40                                  | 200                                 | 625                                   | 50@2  | 250                   | 7E Comp: 2N4125    |
| 2N4126   | PNP  | 25                                  | 200                                 | 625                                   | 120@2   | 250                   | 7E Comp: 2N4124    |
| 2N4401   | NPN  | 40                                  | 600                                 | 625                                   | 255@150   | 250                   | 7E Comp: 2N4403    |
| 2N4402   | PNP  | 40                                  | 600                                 | 625                                   | 30@1  | 150                   | 7E Comp: 2N4400    |
| 2N4403   | PNP  | 40                                  | 600                                 | 625                                   | 100@150   | 200                   | 7E Comp: 2N4401    |
| 2N5296   | NPN  | 60                                  | 4A                                  | 36W                                   | 30/120@1A   | 0.8                   | 17J                |
| 2N5401   | PNP  | 160                                 | 600                                 | 625                                   | 40@1  | 300                   | 7E Comp: 2N5551    |
| 2N5550   | NPN  | 160                                 | 600                                 | 625                                   | 60@10   | 300                   | 7E Comp: 2N5400    |
| 2N5551   | NPN  | 180                                 | 600                                 | 625                                   | 80/250@10   | 100                   | 7E Comp: 2N5401    |
| 2N6491   | PNP  | 90                                  | 15A                                 | 75W                                   | 20/150@5A   | 5                     | 17J                |
| 2SB548   | PNP  | 100                                 | 800                                 | 10W                                   | 40/320@200  | 80                    | 14H                |

| Order Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------|--------|--------|--------|--------|
| ZTX1053A   | 0.45 | 0.4086 | 0.3632 | 0.3178 | 0.2838 |
| 2N2222A    | 0.23 | 0.2070 | 0.1840 | 0.1610 | 0.1438 |
| 2N2904A    | 0.35 | 0.2800 | 0.2520 | 0.2240 | 0.1960 |
| 2N2905     |      |        |        |        |        |
| 2N2905A    | 0.30 | 0.2700 | 0.2400 | 0.2100 | 0.1875 |
| 2N2906A    |      |        |        |        |        |
| 2N2907A    | 0.28 | 0.2200 | 0.1980 | 0.1760 | 0.1540 |
| 2N3053     | 0.34 | 0.3060 | 0.2720 | 0.2380 | 0.2125 |
| 2N3054     | 0.86 | 0.7668 | 0.6816 | 0.5964 | 0.5325 |
| 2N3055     | 0.82 | 0.7380 | 0.6560 | 0.5740 | 0.5125 |
| 2N3055H    |      |        |        |        |        |
| 2N3439     | 0.62 | 0.5580 | 0.4960 | 0.4340 | 0.3875 |
| 2N3440     | 0.50 | 0.4464 | 0.3968 | 0.3472 | 0.3100 |
| 2N3702     | 0.11 | 0.0750 | 0.0600 | 0.0480 | 0.0420 |
| 2N3703     | 0.10 | 0.0800 | 0.0720 | 0.0640 | 0.0560 |
| 2N3704     | 0.11 | 0.0753 | 0.0602 | 0.0482 | 0.0421 |
| 2N3705     | 0.08 | 0.0602 | 0.0542 | 0.0482 | 0.0421 |
| 2N3772     | 1.72 | 1.5516 | 1.3792 | 1.2068 | 1.0775 |
| 2N3773     | 2.30 | 2.0700 | 1.8400 | 1.6100 | 1.4375 |
| 2N3903     | 0.11 | 0.0875 | 0.0700 | 0.0560 | 0.0490 |
| 2N3904     | 0.05 | 0.0405 | 0.0270 | 0.0216 | 0.0189 |
| 2N3905     | 0.10 | 0.0750 | 0.0500 | 0.0400 | 0.0350 |
| 2N3906     | 0.08 | 0.0600 | 0.0400 | 0.0320 | 0.0280 |
| 2N4123     |      |        |        |        |        |
| 2N4126     |      |        |        |        |        |
| 2N4401     | 0.08 | 0.0665 | 0.0570 | 0.0475 | 0.0380 |
| 2N4402     |      |        |        |        |        |
| 2N4403     | 0.09 | 0.0756 | 0.0540 | 0.0432 | 0.0346 |
| 2N5296     | 0.57 | 0.5112 | 0.4544 | 0.3976 | 0.3550 |
| 2N5401     | 0.12 | 0.0100 | 0.0800 | 0.0640 | 0.0560 |
| 2N5550     |      |        |        |        |        |
| 2N5551     | 0.07 | 0.0454 | 0.0409 | 0.0363 | 0.0318 |
| 2N6491     | 1.58 | 1.4220 | 1.2640 | 1.1060 | 0.9875 |
| 2SB548     | 0.30 | 0.2682 | 0.2384 | 0.2086 | 0.1863 |

## FIELD EFFECT TRANSISTORS (FET)

## Technical Specification

| Device | Type      | V <sub>DS</sub> | V <sub>GS</sub> | V <sub>P</sub> | I <sub>D</sub> | I <sub>SS</sub> | P <sub>tot</sub> | Pin-out |
|--------|-----------|-----------------|-----------------|----------------|----------------|-----------------|------------------|---------|
| BF245B | N-Channel | 30V             | 30V             | 0.5-8V         | 10mA           | 6-15mA          | 350mW            | 7F      |
| 2N3819 | N-Channel | 25V             | 25V             | 8V             | 10mA           | 2-20mA          | 360mW            | 7E      |

| Order Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------|--------|--------|--------|--------|
| BF245B     | 0.40 | 0.3200 | 0.2880 | 0.2560 | 0.2240 |
| 2N3819     | 0.22 | 0.1650 | 0.1375 | 0.1100 | 0.0880 |

## METAL-OXIDE SEMICONDUCTOR FIELD EFFECT TRANSISTORS (MOSFET)

### Technical Specification

| Device       | Type      | V <sub>DS</sub><br>V | R <sub>DS</sub><br>(on) $\Omega$ | I <sub>D</sub> (cont)<br>@25°C<br>250mA | I <sub>DM</sub><br>(pulsed)<br>500mA | P <sub>D</sub><br>@25°C<br>350mW | Pin-out            |
|--------------|-----------|----------------------|----------------------------------|---|--------------------------------------|----------------------------------|--------------------|
| BS107        | N-Channel | 200                  | 28.0                             | 250mA                                   | 500mA                                | 350mW                            | 7A low Power       |
| BS170        | N-Channel | 60                   | 5.0                              | 500mA                                   | 1.2A                                 | 830mW                            | 7A low Power       |
| BUK456-800B  | N-Channel | 800                  | 4.0                              | 3.5A                                    | 14A                                  | 125W                             | 17C high power     |
| BUZ71        | N-Channel | 50                   | 0.1                              | 18A                                     | 72A                                  | 85W                              | 17C med power      |
| BUZ72A       | N-Channel | 100                  | 0.25                             | 11A                                     | 44A                                  | 40W                              | 17C high power     |
| BUZ900       | N-Channel | 160                  | 1.5                              | 7.0A                                    | -                                    | 125W                             | 23E audio FET      |
| BUZ900P      | N-Channel | 160                  | 1.5                              | 8.0A                                    | -                                    | 125W                             | 18D audio FET      |
| BUZ905       | P-Channel | 160                  | 1.5                              | 7.0A                                    | -                                    | 125W                             | 23E audio FET      |
| BUZ905P      | P-Channel | 160                  | 1.5                              | 8.0A                                    | -                                    | 125W                             | 18D audio FET      |
| IRF520       | N-Channel | 100                  | 0.2                              | 9.2A                                    | 37A                                  | 45W                              | 17C high power     |
| IRF530       | N-Channel | 100                  | 0.11                             | 14A                                     | 56A                                  | 55W                              | 17C high power     |
| IRF540       | N-Channel | 100                  | 0.052                            | 28A                                     | 110A                                 | 107W                             | 17C high power     |
| IRF630       | N-Channel | 200                  | 0.4                              | 10A                                     | 40A                                  | 100W                             | 17C high power     |
| IRF640       | N-Channel | 200                  | 0.18                             | 18A                                     | 72A                                  | 139W                             | 17C high power     |
| IRF730       | N-Channel | 400                  | 1.0                              | 5.5A                                    | 22A                                  | 73W                              | 17C high power     |
| IRF740       | N-Channel | 400                  | 0.55                             | 10A                                     | 40A                                  | 134W                             | 17C high power     |
| IRF830       | N-Channel | 500                  | 1.5                              | 4.5A                                    | 18A                                  | 73W                              | 17C high power     |
| IRF840       | N-Channel | 500                  | 0.85                             | 8.0A                                    | 32A                                  | 134W                             | 17C high power     |
| IRF9520      | P-Channel | 100                  | 0.6                              | 6.0A                                    | 24A                                  | 40W                              | 17C high power     |
| IRF9630      | P-Channel | 200                  | 0.8                              | 6.5A                                    | 26A                                  | 75W                              | 17C high power     |
| IRFZ14       | N-Channel | 60                   | 0.7                              | 10A                                     | 40A                                  | 30W                              | 17C med power      |
| IRFZ24       | N-Channel | 60                   | 0.07                             | 17A                                     | 68A                                  | 44W                              | 17C med power      |
| MTP3055E     | N-Channel | 60                   | 0.15                             | 14A                                     | 56A                                  | 70W                              | 17C med power      |
| PHP45N03LT   | N-Channel | 30                   | 0.024                            | 45A                                     | 180A                                 | 86W                              | 17C 5V logic level |
| STP14NF10    | N-Channel | 100                  | 0.13                             | 15A                                     | 60A                                  | 60W                              | 17C switching appl |
| STW80NE06-10 | N-Channel | 60                   | 0.01                             | 80A                                     | -                                    | 180W                             | 18C med powewr     |
| ZVN2106A     | N-Channel | 60                   | 2.0                              | 450mA                                   | 8.0A                                 | 700mW                            | 40E low Power      |
| ZVN3306A     | N-Channel | 60                   | 5.0                              | 270mA                                   | 3.0A                                 | 625mW                            | 40E low Power      |
| ZVN4206A     | N-Channel | 60                   | 1.5                              | 600mA                                   | 8.0A                                 | 700mW                            | 40E 5V logic level |
| ZVN4210A     | N-Channel | 100                  | 1.8                              | 450mA                                   | 6.0A                                 | 700mW                            | 40E low Power      |
| ZVN4306A     | N-Channel | 60                   | 0.45                             | 1.1A                                    | 15A                                  | 850mW                            | 40E 5V logic level |
| ZVN4310A     | N-Channel | 100                  | 0.65                             | 900mA                                   | 12A                                  | 850mW                            | 40E 5V logic level |
| ZVP2106A     | P-Channel | 60                   | 5.0                              | 280mA                                   | 4.0A                                 | 700mW                            | 40E low Power      |
| ZVP2110A     | P-Channel | 100                  | 8.0                              | 230mA                                   | 3.0A                                 | 700mW                            | 40E low Power      |
| ZVP3306A     | P-Channel | 60                   | 14.0                             | 160mA                                   | 1.6A                                 | 625mW                            | 40E low Power      |
| 2N7000       | N-Channel | 60                   | 5.0                              | 200mA                                   | 0.5A                                 | 400mW                            | 7E low Power       |

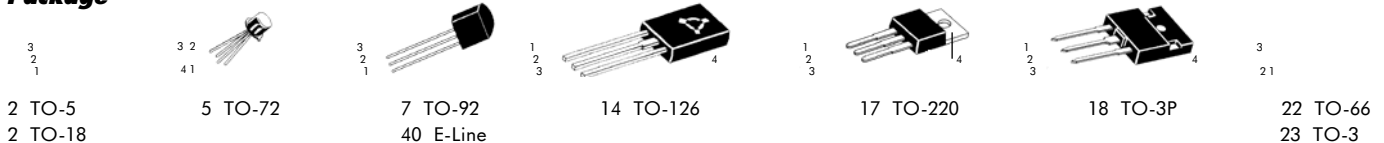
| Order Code   | 1+   | 25+    | 50+    | 100+   | 500+   |
|--------------|------|--------|--------|--------|--------|
| BS107        | 0.21 | 0.1890 | 0.1680 | 0.1470 | 0.1313 |
| BS170        | 0.15 | 0.1000 | 0.0900 | 0.0800 | 0.0700 |
| BUK456-800B  |      |        |        |        |        |
| BUZ71        |      |        |        |        |        |
| BUZ72A       |      |        |        |        |        |
| BUZ900       | 7.68 | 7.2000 | 6.7200 | 6.2400 | 6.0000 |
| BUZ900P      | 5.60 | 5.2500 | 4.9000 | 4.5500 | 4.3750 |
| BUZ905       | 7.68 | 7.2000 | 6.7200 | 6.2400 | 6.0000 |
| BUZ905P      | 5.55 | 5.1800 | 4.8100 | 4.6250 |        |
| IRF520       |      |        |        |        |        |
| IRF530       | 0.53 | 0.4232 | 0.3809 | 0.3386 | 0.2962 |
| IRF540       | 0.80 | 0.7200 | 0.6400 | 0.5600 | 0.5000 |
| IRF630       | 0.42 | 0.3326 | 0.2993 | 0.2691 | 0.2328 |
| IRF640       | 0.81 | 0.7200 | 0.6480 | 0.4320 | 0.3780 |
| IRF730       | 0.66 | 0.5473 | 0.4378 | 0.3502 | 0.3065 |
| IRF740       | 0.91 | 0.7593 | 0.6074 | 0.4859 | 0.4252 |
| IRF830       | 0.53 | 0.4200 | 0.3780 | 0.3360 | 0.2940 |
| IRF840       | 0.78 | 0.6254 | 0.5629 | 0.5003 | 0.4378 |
| IRF9520      |      |        |        |        |        |
| IRF9630      |      |        |        |        |        |
| IRFZ14       |      |        |        |        |        |
| IRFZ24       |      |        |        |        |        |
| MTP3055E     |      |        |        |        |        |
| PHP45N03LT   |      |        |        |        |        |
| STP14NF10    | 0.61 | 0.4918 | 0.4426 | 0.3934 | 0.3443 |
| STW80NE06-10 | 3.80 | 3.4173 | 3.0376 | 2.6579 | 2.3731 |
| ZVN2106A     | 0.40 | 0.3600 | 0.3200 | 0.2800 | 0.2500 |
| ZVN3306A     | 0.28 | 0.2240 | 0.2016 | 0.1792 | 0.1568 |
| ZVN4206A     | 0.52 | 0.4680 | 0.4160 | 0.3640 | 0.3250 |
| ZVN4210A     | 0.56 | 0.5040 | 0.4480 | 0.3920 | 0.3500 |
| ZVN4306A     | 0.86 | 0.7740 | 0.6880 | 0.6020 | 0.5375 |
| ZVN4310A     | 0.88 | 0.7920 | 0.7040 | 0.6160 | 0.5500 |
| ZVP2106A     | 0.42 | 0.3780 | 0.3360 | 0.2940 | 0.2625 |
| ZVP2110A     | 0.46 | 0.4140 | 0.3680 | 0.3220 | 0.2875 |
| ZVP3306A     | 0.32 | 0.2580 | 0.2322 | 0.2064 | 0.1806 |
| 2N7000       | 0.19 | 0.1700 | 0.1530 | 0.1360 | 0.1190 |

### PIN-OUTS

#### Semiconductors - Discrete

Pin connections for our range of Thyristors, Triacs, Voltage Regulators and Transistors on the previous pages. All connections are PIN view, i.e. Looking at the package with the pins towards you, any identifying shape or marking at the bottom or bottom left. The number from the pin-out column indicates the package, the letter indicated the pin configuration.

#### Package



#### Pin Configuration

| Transistors |   |   |   |      | FET & MOSFETs |    |    |    |    | Thyristors & Triacs |    |    |    |    | Voltage Regulators |     |     |     |     |
|-------------|---|---|---|------|---------------|----|----|----|----|---------------------|----|----|----|----|--------------------|-----|-----|-----|-----|
| Pin         | 1 | 2 | 3 | 4    | Pin           | 1  | 2  | 3  | 4  | Pin                 | 1  | 2  | 3  | 4  | Pin                | 1   | 2   | 3   | 4   |
| A           | E | B | C |      | A             | S  | G  | D  | D  | E                   | K  | A  | G  | A  | A                  | Out | In  | Gnd | Gnd |
| C           | B | C | E |      | C             | G  | D  | S  | D  | J                   | A1 | A2 | G  | A2 | B                  | In  | Gnd | Out | Gnd |
| D           | B | E | C |      | D             | G  | S  | D  |    | L                   | A1 | A2 | G  |    | C                  | Gnd | In  | Out | In  |
| E           | C | B | E |      | E             | D  | G  | S  |    | N                   | A  | G  | K  |    | E                  | In  | Out | Gnd |     |
| G           | E | B | C | Case | F             | D  | S  | G  |    | P                   | A2 | G  | A1 |    | K                  | Gnd | Adj | Out |     |
| H           | E | C | B | C    | UJT & PUTs    |    |    |    |    |                     |    |    |    |    | L                  | Adj | Out | In  |     |
| J           | B | C | E | C    | A             | B1 |    | B2 | E  |                     |    |    |    |    | N                  | Adj | In  | Out |     |
|             |   |   |   |      | E             | E  | B1 |    | B2 |                     |    |    |    |    | O                  | In  | Out | Adj |     |
|             |   |   |   |      |               |    |    |    |    |                     |    |    |    |    | P                  | K   | A   | Ref |     |



## Base No.

| Base No. | Device    | Function Description                  | Pins/Package | Order Code | 1+   | 10+    | 25+    | 50+    | 100+   |
|----------|-----------|---------------------------------------|--------------|------------|------|--------|--------|--------|--------|
| 1        | REF01CP   | 10V Precision Voltage Reference       | 8DIL         | REF01CP    | 2.31 | 2.0808 | 1.8496 | 1.7680 | 1.7000 |
| 27       | OP27GP    | Low Noise Operational Amplifier       | 8DIL         | OP27GP     | 2.33 | 2.0550 | 1.9180 | 1.7810 | 1.7125 |
| 34       | M34-1     | LED Flasher IC - 1Hz                  | TJ92         | M34-1      | 0.30 | 0.2400 | 0.2160 | 0.1920 | 0.1680 |
| 34       | M34-2     | LED Flasher IC - 2Hz                  | TJ92         | M34-2      | 0.30 | 0.2400 | 0.2160 | 0.1920 | 0.1680 |
| 35       | LM35DZ    | Temperature Sensor (0 to 100°C ±0.9%) | T092         | LM35DZ     | 1.37 | 1.0960 | 0.9864 | 0.8768 | 0.7672 |
| 61       | TL061CN   | Single Low Power Op-Amp               | 8DIL         | TL061CN    | 0.29 | 0.2083 | 0.1666 | 0.1499 | 0.1333 |
| 62       | TL062CP   | Dual Low Power Op-Amp                 | 8DIL         | TL062CP    | 0.21 | 0.1773 | 0.1478 | 0.1182 | 0.0946 |
| 64       | TL064CN   | Quad Low Power Op-Amp                 | 14DIL        | TL064CN    | 0.29 | 0.2502 | 0.2085 | 0.1668 | 0.1334 |
| 71       | TL071CN   | Single Low noise operational amp      | 8DIL         | TL071CN    | 0.29 | 0.2083 | 0.1666 | 0.1499 | 0.1333 |
| 72       | TL072CN   | Dual Low noise operational amp        | 8DIL         | TL072CN    | 0.40 | 0.3429 | 0.2858 | 0.2286 | 0.2057 |
| 74       | TL074CN   | Quad Low noise operational amp        | 14DIL        | TL074CN    | 0.25 | 0.1911 | 0.1593 | 0.1274 | 0.1147 |
| 81       | TL081CN   | Single Low noise operational amp      | 8DIL         | TL081CN    | 0.26 | 0.2195 | 0.1756 | 0.1580 | 0.1405 |
| 82       | TL082CN   | Dual Low noise operational amp        | 8DIL         | TL082CN    | 0.32 | 0.2100 | 0.1890 | 0.1680 | 0.1470 |
| 84       | TL084CN   | Quad Low noise operational amp        | 8DIL         | TL084CN    | 0.37 | 0.3147 | 0.2623 | 0.2098 | 0.1678 |
| 90       | OP90GP    | Single Low Voltage Micropower Op-Amp  | 8DIL         | OP90GP     | 2.91 | 2.6208 | 2.4752 | 1.9890 | 1.9000 |
| 97       | OP97FP    | Low Power Operational Amplifier       | 8DIL         | OP97FP     | 1.84 | 1.6560 | 1.5640 | 1.2880 | 1.1960 |
| 120      | TBA120S   | Linear IC                             | 14DIL        | TBA120S    | 1.04 | 0.9360 | 0.8320 | 0.7280 | 0.6500 |
| 165      | L165V     | High Power Operational Amplifier      | T0220        | L165V      | 2.36 | 2.1614 | 1.9453 | 1.7291 | 1.5130 |
| 177      | OP177GP   | Ultra Precision Operational Amplifier | 8DIL         | OP177GP    | 2.18 | 1.9620 | 1.7440 | 1.5260 | 1.3625 |
| 202      | MAX202CPE | 5v RS-232 Transceiver                 | 16 DIL       | MAX202CPE  | 2.00 | 1.8000 | 1.6000 | 1.4000 | 1.2500 |
| 232      | MAX232CPE | (ST232CN) Dual RS232 Driver/Receiver  | 16 DIL       | MAX232CPE  | 1.30 | 1.0800 | 0.8640 | 0.6912 | 0.6048 |
| 271      | TLC271CP  | Single Programmable Operational Amp.  | 8DIL         | TLC271CP   | 0.63 | 0.5000 | 0.4500 | 0.4000 | 0.3500 |
| 272      | L272M     | Dual Power Operational Amplifier      | 8DIL         | L272M      | 1.21 | 1.0897 | 0.9686 | 0.8476 | 0.7568 |
| 272      | TS272CN   | Dual Programmable Operational Amp.    | 8DIL         | TS272CN    | 0.57 | 0.4763 | 0.3810 | 0.3048 | 0.2667 |
| 274      | TS274CN   | Quad High Speed Operational Amp.      | 14DIL        | TS274CN    | 0.50 | 0.4471 | 0.3974 | 0.3478 | 0.3105 |
| 290      | OP290GP   | Single end Dual OP Amp                | 8DIL         | OP290GP    | 4.28 | 3.7100 | 3.5775 | 2.5740 | 2.1875 |
| 293      | L293E     | Stepper Motor Controller              | 20DIL        | L293E      | 4.20 | 3.7800 | 3.3600 | 2.9400 | 2.6250 |
| 297      | L297      | Stepper Motor Controller              | 20DIL        | L297       | 5.12 | 4.6080 | 4.3520 | 3.8400 | 3.5840 |
| 297      | OP297GP   | Dual Precision Operational Amplifier  | 8DIL         | OP297GP    | 4.64 | 4.0600 | 3.9150 | 2.7690 | 2.5875 |
| 298      | LM318N    | Dual Full Bridge Motor Driver         | 15SIL        | L298N      | 3.80 | 3.4200 | 3.0400 | 2.6600 | 2.3750 |
| 311      | LM311N    | High Speed voltage comparator         | 8DIL         | LM311N     | 0.17 | 0.1449 | 0.0966 | 0.0869 | 0.0773 |
| 311      | LP311N    | Low Power Voltage Comparator          | 8DIL         | LP311N     | 0.72 | 0.6480 | 0.5760 | 0.5040 | 0.4500 |
| 319      | LM319N    | Dual High Speed Comparator            | 14DIL        | LM319N     | 0.90 | 0.8100 | 0.7200 | 0.6300 | 0.5850 |
| 324      | LM324N    | Quad Operational Amplifier            | 14DIL        | LM324N     | 0.29 | 0.2538 | 0.1813 | 0.1450 | 0.1305 |
| 324      | LP324N    | μPower Quad Operational Amplifier     | 14DIL        | LP324N     | 0.75 | 0.6000 | 0.5400 | 0.4800 | 0.4200 |
| 334      | LM334Z    | 3 Terminal Adjustable Current Source  | T092         | LM334Z     | 0.97 | 0.8588 | 0.7729 | 0.6870 | 0.6012 |
| 335      | LM335Z    | Temperature Sensor (-10 to 100°C ±1%) | T092         | LM335Z     | 1.12 | 0.8968 | 0.8071 | 0.7174 | 0.6278 |
| 339      | LM339N    | Quad Comparator                       | 14DIL        | LM339N     | 0.18 | 0.1500 | 0.1200 | 0.0960 | 0.0840 |
| 339      | LP339N    | μPower Quad Comparator                | 14DIL        | LP339N     | 0.59 | 0.5310 | 0.4720 | 0.4130 | 0      |



### Analogue ICs - Cont.

| Base No. | Device      | Function Description                               | Pins/Package |
|----------|-------------|--|--------------|
| 5534     | NE5534N     | Low Noise Operational Amplifier                    | 8DIL         |
| 7106     | ICL7106CPL  | CMOS 3 Digit Driver/ A to D Converter              | 40DIL        |
| 7107     | ICL7107CPL  | 3½ Digit LED Driver/ A to D Converter              | 40DIL        |
| 7555     | ICM7555IPA  | Single Low Power Timer                             | 8DIL         |
| 7556     | ICM7556     | Dual Low Power Timer                               | 14DIL        |
| 7611     | ICL7611DCPA | CMOS Operational Amplifier                         | 8DIL         |
| 7621     | ICL7621DCPA | Dual CMOS Operational Amplifier                    | 8DIL         |
| 7660     | ICL7660SCPA | CMOS Voltage Converter                             | 8DIL         |
| 7705     | TL7705ACP   | µProcessor Voltage Supervisor                      | 8DIL         |
| 13700    | LM13700     | Dual Transconductance Amplifier (replaces LM13600) | 16DIL        |

| Order Code  | 1+   | 10+    | 25+    | 50+    | 100+   |
|-------------|------|--------|--------|--------|--------|
| NE5534N     | 0.54 | 0.4334 | 0.3901 | 0.3467 | 0.3034 |
| ICL7106CPL  | 2.21 | 1.9872 | 1.8768 | 1.7664 | 1.6560 |
| ICL7107CPL  | 2.72 | 2.4480 | 2.3120 | 2.0400 | 1.9040 |
| ICM7555IPA  | 0.41 | 0.3654 | 0.3248 | 0.2842 | 0.2639 |
| ICM7556     | 1.04 | 0.9360 | 0.8320 | 0.7280 | 0.6760 |
| ICL7611DCPA | 1.00 | 0.8000 | 0.7200 | 0.6400 | 0.5600 |
| ICL7621DCPA | 0.84 | 0.7560 | 0.6720 | 0.5880 | 0.5460 |
| ICL7660SCPA | 0.80 | 0.7200 | 0.6400 | 0.5600 | 0.5000 |
| TL7705ACP   | 0.82 | 0.7344 | 0.6936 | 0.5850 | 0.5125 |
| LM13700     | 1.28 | 1.1152 | 1.0880 | 1.0240 | 0.8960 |

### Digital ICs

| Base No. | Device     | Function Description    | Pins/Package |
|----------|------------|-------------------------|--------------|
| 800      | DAC0800LCN | 8-Bit D to A Converter  | 16DIL        |
| 7109     | ICL7109CPL | 12-Bit D to A Converter | 40DIL        |

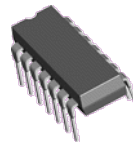
| Order Code | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|------|--------|--------|--------|--------|
| DAC0800LCN | 1.36 | 1.2240 | 1.1560 | 1.0880 | 1.0625 |
| ICL7109CPL | 5.76 | 5.1840 | 4.6080 | 4.0320 | 3.6000 |



TO-92



TO-220



14DIL



8DIL

## DIGITAL

### 74 Series - Standard TTL Devices

Supply Voltage 4.75-5.25Vdc Power Dissipation (@100kHz) 10mW/gate Propagation Delay 10nS(typ)  
Max Clock Freq. 35Mhz Min Output Current 16mA Fan-outs (TTL Loads) 40

| Device | Function Description | Pins/Package | Order Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|--------|----------------------|--------------|------------|------|--------|--------|--------|--------|
| 7407   | Hex Buffer / Driver  | 14DIL        | 7407       | 0.47 | 0.4323 | 0.3760 | 0.3290 | 0.2938 |

### 74LS Series - Low Power Schottky TTL Devices

Supply Voltage 4.75-5.25Vdc Power Dissipation (@100kHz) 2mW/gate Propagation Delay 10nS(typ)  
Max Clock Freq. 40Mhz Min Output Current 8mA Fan-outs (TTL Loads) 20

| Device  | Function Description                               | Pins/Package | Order Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|---------|--|--------------|------------|------|--------|--------|--------|--------|
| 74LS00  | Quad 2-Input NAND Gate                             | 14DIL        | 74LS00     | 0.28 | 0.2240 | 0.2016 | 0.1792 | 0.1568 |
| 74LS01  | Quad 2-Input NAND Gate                             | 14DIL        | 74LS01     | 0.14 | 0.1224 | 0.1088 | 0.0952 | 0.0884 |
| 74LS02  | Quad 2-Input NOR Gate                              | 14DIL        | 74LS02     | 0.38 | 0.3000 | 0.2700 | 0.2400 | 0.2100 |
| 74LS03  | Quad 2-Input NAND Gate                             | 14DIL        | 74LS03     | 0.29 | 0.2610 | 0.2320 | 0.2030 | 0.1885 |
| 74LS04  | Hex Inverter                                       | 14DIL        | 74LS04     | 0.30 | 0.2400 | 0.2160 | 0.1920 | 0.1680 |
| 74LS05  | Hex Inverter                                       | 14DIL        | 74LS05     | 0.14 | 0.1224 | 0.1088 | 0.0952 | 0.0884 |
| 74LS08  | Quad 2-Input AND Gate                              | 14DIL        | 74LS08     | 0.19 | 0.1520 | 0.1368 | 0.1216 | 0.1064 |
| 74LS09  | Quad 2-Input AND Gate                              | 14DIL        | 74LS09     | 0.15 | 0.1200 | 0.1080 | 0.0960 | 0.0840 |
| 74LS10  | Triple 3-Input NAND Gate                           | 14DIL        | 74LS10     | 0.27 | 0.2120 | 0.1908 | 0.1696 | 0.1484 |
| 74LS107 | Dual J-K Flip Flop with clear                      | 14DIL        | 74LS107    | 0.30 | 0.2700 | 0.2400 | 0.2100 | 0.1875 |
| 74LS11  | Triple 3-Input AND Gate                            | 14DIL        | 74LS11     | 0.17 | 0.1530 | 0.1360 | 0.1190 | 0.1105 |
| 74LS112 | Dual J-K Flip Flop with clear                      | 16DIL        | 74LS112    | 0.24 | 0.2160 | 0.1920 | 0.1680 | 0.1560 |
| 74LS113 | Dual J-K Flip Flop with clear                      | 14DIL        | 74LS113    | 0.23 | 0.1800 | 0.1620 | 0.1440 | 0.1260 |
| 74LS114 | Dual J-K Flip Flop with clear                      | 14DIL        | 74LS114    | 0.36 | 0.3240 | 0.2880 | 0.2520 | 0.2340 |
| 74LS12  | Hex Schmitt Trigger Inverter                       | 14DIL        | 74LS12     | 0.25 | 0.2000 | 0.1800 | 0.1600 | 0.1400 |
| 74LS122 | Retriggerable Monostable                           | 14DIL        | 74LS122    | 0.31 | 0.2772 | 0.2464 | 0.2156 | 0.2002 |
| 74LS123 | Dual Retriggerable Monostable                      | 16DIL        | 74LS123    | 0.31 | 0.2500 | 0.2250 | 0.2000 | 0.1750 |
| 74LS126 | Quad Bus Buffer, Tri state                         | 14DIL        | 74LS126    | 0.25 | 0.2286 | 0.2032 | 0.1778 | 0.1651 |
| 74LS132 | Quad 2-Input NAND Schmitt Trigger                  | 14DIL        | 74LS132    | 0.47 | 0.4200 | 0.3780 | 0.3360 | 0.2940 |
| 74LS133 | 13-Input NAND Gate                                 | 16DIL        | 74LS133    | 0.36 | 0.3240 | 0.2880 | 0.2520 | 0.2340 |
| 74LS136 | Quad 2-Input EOR Gate                              | 14DIL        | 74LS136    | 0.23 | 0.1800 | 0.1620 | 0.1440 | 0.1260 |
| 74LS138 | 3 to 8 Line Decoder / Demultiplexer                | 14DIL        | 74LS138    | 0.33 | 0.2200 | 0.1980 | 0.1760 | 0.1540 |
| 74LS14  | Hex Schmitt Trigger Inverter                       | 14DIL        | 74LS14     | 0.33 | 0.2600 | 0.2340 | 0.2080 | 0.1820 |
| 74LS145 | BCD to Decimal Decoder / Driver                    | 16DIL        | 74LS145    | 0.56 | 0.5040 | 0.4480 | 0.3920 | 0.3640 |
| 74LS148 | 8 to 3 Line Priority Encoder                       | 16DIL        | 74LS148    | 0.64 | 0.5760 | 0.5120 | 0.4480 | 0.4160 |
| 74LS15  | Triple 3-Input AND Gate                            | 14DIL        | 74LS15     | 0.24 | 0.1600 | 0.1440 | 0.1280 | 0.1120 |
| 74LS156 | Dual 2 to 4 Line Decoder / Demultiplexer           | 16DIL        | 74LS156    | 0.36 | 0.3240 | 0.2880 | 0.2520 | 0.2340 |
| 74LS157 | Quad 2 to 1 Line Data Selector / Multiplexer       | 16DIL        | 74LS157    | 0.23 | 0.2034 | 0.1808 | 0.1582 | 0.1469 |
| 74LS158 | Quad 2 to 1 Line Data Selector / Multiplexer       | 16DIL        | 74LS158    | 0.21 | 0.1854 | 0.1648 | 0.1442 | 0.1339 |
| 74LS160 | Synchronous Decade Counter                         | 16DIL        | 74LS160    | 0.48 | 0.4320 | 0.3840 | 0.3360 | 0.3120 |
| 74LS161 | Synchronous 4-Bit Binary Counter                   | 16DIL        | 74LS161    | 0.32 | 0.2898 | 0.2576 | 0.2254 | 0.2093 |
| 74LS162 | Synchronous Decade Counter                         | 16DIL        | 74LS162    | 0.44 | 0.3960 | 0.3520 | 0.3080 | 0.2860 |
| 74LS163 | Synchronous 4-Bit Binary Counter                   | 16DIL        | 74LS163    | 0.44 | 0.3960 | 0.3520 | 0.3080 | 0.2860 |
| 74LS164 | 8-Bit Shift Register S-In S/P-Out                  | 14DIL        | 74LS164    | 0.43 | 0.3400 | 0.3060 | 0.2720 | 0.2380 |
| 74LS165 | 8-Bit Shift Register S/P-In S-Out                  | 16DIL        | 74LS165    | 0.48 | 0.4284 | 0.3808 | 0.3332 | 0.3094 |
| 74LS173 | 4-Bit D-Type Register                              | 16DIL        | 74LS173    | 0.24 | 0.2196 | 0.1952 | 0.1708 | 0.1573 |
| 74LS175 | 4-Bit D-Type Register with clear                   | 16DIL        | 74LS175    | 0.30 | 0.2400 | 0.2160 | 0.1920 | 0.1680 |
| 74LS191 | Synchronous Up/Down 4-Bit Binary Counter           | 16DIL        | 74LS191    | 0.27 | 0.2250 | 0.1800 | 0.1440 | 0.1260 |
| 74LS193 | Synchronous Up/Down 4-Bit Binary Counter           | 16DIL        | 74LS193    | 0.43 | 0.3400 | 0.3060 | 0.2720 | 0.2380 |
| 74LS195 | 4-Bit Parallel Access Shift Register               | 16DIL        | 74LS195    | 0.24 | 0.2160 | 0.1920 | 0.1680 | 0.1560 |
| 74LS20  | Dual 4-Input NAND Gate                             | 14DIL        | 74LS20     | 0.27 | 0.2430 | 0.2160 | 0.1890 | 0.1688 |
| 74LS240 | Octal Inverting Buffer / Line Driver, Tri state    | 20DIL        | 74LS240    | 0.32 | 0.2844 | 0.2528 | 0.2212 | 0.2054 |
| 74LS241 | Octal Buffer / Line Driver, Tri state              | 20DIL        | 74LS241    | 0.32 | 0.2844 | 0.2528 | 0.2212 | 0.2054 |
| 74LS243 | Quad Bus Transceiver, Tri state                    | 14DIL        | 74LS243    | 0.30 | 0.2000 | 0.1800 | 0.1600 | 0.1400 |
| 74LS244 | Octal Buffer / Line Driver, Tri state              | 20DIL        | 74LS244    | 0.41 | 0.3600 | 0.3240 | 0.2880 | 0.2520 |
| 74LS245 | Octal Bus Transceiver, Tri state                   | 20DIL        | 74LS245    | 0.45 | 0.3600 | 0.3240 | 0.2880 | 0.2520 |
| 74LS247 | BCD to 7-Segment Decoder / Driver                  | 16DIL        | 74LS247    | 0.60 | 0.4800 | 0.4320 | 0.3840 | 0.3360 |
| 74LS251 | 1 of 8 Data Selector / Multiplexer, Tri state      | 16DIL        | 74LS251    | 0.24 | 0.2196 | 0.1952 | 0.1708 | 0.1586 |
| 74LS257 | Quad 2 of 1 Data Selector / Multiplexer, Tri state | 16DIL        | 74LS257    | 0.24 | 0.2196 | 0.1952 | 0.1708 | 0.1586 |
| 74LS258 | Quad 2 of 1 Data Selector / Multiplexer, Tri state | 16DIL        | 74LS258    | 0.24 | 0.2196 | 0.1952 | 0.1708 | 0.1586 |
| 74LS26  | Quad 2-Input NAND Gate                             | 14DIL        | 74LS26     | 0.17 | 0.1360 | 0.1088 | 0.0952 | 0.0884 |
| 74LS266 | Quad 2-Input EOR Gate                              | 14DIL        | 74LS266    | 0.14 | 0.1224 | 0.1088 | 0.0952 | 0.0884 |
| 74LS27  | Triple 3-Input NOR Gate                            | 14DIL        | 74LS27     | 0.25 | 0.2000 | 0.1800 | 0.1600 | 0.1400 |
| 74LS273 | 8-Bit D-Type Register with clear                   | 20DIL        | 74LS273    | 0.42 | 0.3780 | 0.3360 | 0.2940 | 0.2625 |
| 74LS279 | Quad R-S Latch                                     | 16DIL        | 74LS279    | 0.24 | 0.2160 | 0.1920 | 0.1680 | 0.1560 |
| 74LS283 | 4-Bit Full Adder                                   | 16DIL        | 74LS283    | 0.47 | 0.3670 | 0.3384 | 0.3008 | 0.2632 |
| 74LS30  | 8-Input NAND Gate                                  | 14DIL        | 74LS30     | 0.20 | 0.1800 | 0.1600 | 0.1400 | 0.1300 |
| 74LS32  | Quad 2-Input OR Gate                               | 14DIL        | 74LS32     | 0.23 | 0.1800 | 0.1620 | 0.1440 | 0.1260 |
| 74LS365 | Hex Bus Buffer with enable, Tri state              | 16DIL        | 74LS365    | 0.21 | 0.1872 | 0.1664 | 0.1456 | 0.1352 |
| 74LS367 | Hex Bus Driver with enable, Tri state              | 16DIL        | 74LS367    | 0.21 | 0.1872 | 0.1664 | 0.1456 | 0.1352 |
| 74LS368 | Hex Inverting Bus Buffer with enable, Tri state    | 16DIL        | 74LS368    | 0.21 | 0.1872 | 0.1664 | 0.1456 | 0.1352 |
| 74LS37  | Quad 2-Input NAND Buffer                           | 14DIL        | 74LS37     | 0.31 | 0.2500 | 0.2250 | 0.2000 | 0.1750 |
| 74LS373 | Octal D-Type Latch with enable, Tri state          | 20DIL        | 74LS373    | 0.43 | 0.3800 | 0.3420 | 0.3040 | 0.2660 |
| 74LS374 | Octal D-Type Flip Flop, Tri state                  | 20DIL        | 74LS374    | 0.38 | 0.3000 | 0.2700 | 0.2400 | 0.2100 |
| 74LS378 | Hex D-Type Flip Flop with clock enable             | 16DIL        | 74LS378    | 0.62 | 0.5580 | 0.4960 | 0.4340 | 0.4030 |
| 74LS38  | Quad 2-Input NAND Buffer                           | 14DIL        | 74LS38     | 0.18 | 0.1620 | 0.1440 | 0.1260 | 0.1170 |
| 74LS390 | Dual Decade Counter                                | 16DIL        | 74LS390    | 0.76 | 0.6840 | 0.6080 | 0.5320 | 0.4750 |
| 74LS393 | Dual 4-Bit Binary Counter                          | 14DIL        | 74LS393    | 0.33 | 0.2970 | 0.2640 | 0.2310 | 0.2145 |
| 74LS395 | 4-Bit Cascadable Register                          | 16DIL        | 74LS395    | 0.26 | 0.2304 | 0.2048 | 0.1792 | 0.1664 |
| 74LS40  | Dual 4-Input NAND Buffer                           | 14DIL        | 74LS40     | 0.14 | 0.1224 | 0.1088 | 0.0952 | 0.0884 |
| 74LS51  | Dual AND-OR-Invert Gate                            | 14DIL        | 74LS51     | 0.24 | 0.2160 | 0.1920 | 0.1680 | 0.1560 |
| 74LS83  | 4-Bit Full Adder                                   | 16DIL        | 74LS83     | 0.38 | 0.3420 | 0.3040 | 0.2660 | 0.2470 |
| 74LS92  | Divide by 12 Counter                               | 14DIL        | 74LS92     | 0.45 | 0.4050 | 0.3600 | 0.3150 | 0.2925 |
| 74LS93  | 4-Bit Binary Counter                               | 14DIL        | 74LS93     | 0.44 | 0.3500 | 0.3150 | 0.2800 | 0.2450 |

### 74HC Series - High Speed CMOS TTL Devices (CMOS Compatible inputs)

Supply Voltage  
Max Clock Freq.

4.5-5.5Vdc  
40Mhz

Power Dissipation (@100kHz)  
Min Output Current

negligible  
4mA

Propagation Delay  
Fan-outs (TTL Loads)

10nS(typ)  
10

| Device   | Function Description                                    | Pins/Package | Order Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|----------|---|--------------|------------|------|--------|--------|--------|--------|
| 74HC00   | Quad 2-Input NAND Gate                                  | 14DIL        | 74HC00     | 0.16 | 0.1295 | 0.1036 | 0.0829 | 0.0725 |
| 74HC02   | Quad 2-Input NOR Gate (OC)                              | 14DIL        | 74HC02     | 0.19 | 0.1578 | 0.1262 | 0.1010 | 0.0883 |
| 74HC03   | Quad 2-Input NAND Gate (OC)                             | 14DIL        | 74HC03     | 0.21 | 0.1908 | 0.1696 | 0.1484 | 0.1378 |
| 74HC04   | Hex Inverter  | 14DIL        | 74HC04     | 0.17 | 0.1410 | 0.1128 | 0.0902 | 0.0790 |
| 74HC08   | Quad 2-Input AND Gate                                   | 14DIL        | 74HC08     | 0.23 | 0.1923 | 0.1538 | 0.1230 | 0.1077 |
| 74HC10   | Triple 3-Input NAND Gate                                | 14DIL        | 74HC10     | 0.21 | 0.1400 | 0.1260 | 0.1120 | 0.0980 |
| 74HC107  | Dual J-K Flip Flop with clear                           | 14DIL        | 74HC107    | 0.40 | 0.3600 | 0.3200 | 0.2800 | 0.2600 |
| 74HC11   | Triple 3-Input AND Gate                                 | 14DIL        | 74HC11     | 0.21 | 0.1400 | 0.1260 | 0.1120 | 0.0980 |
| 74HC123  | Dual Retriggerable Monostable with clear                | 16DIL        | 74HC123    | 0.33 | 0.2970 | 0.2640 | 0.2310 | 0.2145 |
| 74HC125  | Quad Bus Buffer, Tri state                              | 14DIL        | 74HC125    | 0.26 | 0.2304 | 0.2048 | 0.1792 | 0.1664 |
| 74HC126  | Quad Bus Buffer, Tri state                              | 14DIL        | 74HC126    | 0.46 | 0.4140 | 0.3680 | 0.3220 | 0.2990 |
| 74HC132  | Quad 2-Input NAND Schmitt Trigger                       | 14DIL        | 74HC132    | 0.26 | 0.2200 | 0.1760 | 0.1408 | 0.1232 |
| 74HC133  | 13-Input NAND Gate                                      | 16DIL        | 74HC133    | 0.34 | 0.2740 | 0.2466 | 0.2192 | 0.1918 |
| 74HC137  | 3 to 8 Line Decoder / Demultiplexer                     | 16DIL        | 74HC137    | 0.30 | 0.1976 | 0.1778 | 0.1581 | 0.1383 |
| 74HC138  | 3 to 8 Line Decoder / Demultiplexer                     | 16DIL        | 74HC138    | 0.26 | 0.2168 | 0.1734 | 0.1561 | 0.1387 |
| 74HC139  | Dual 3 to 8 Line Decoder / Demultiplexer                | 16DIL        | 74HC139    | 0.31 | 0.2808 | 0.2496 | 0.2184 | 0.2028 |
| 74HC14   | Hex Schmitt Trigger Inverter                            | 14DIL        | 74HC14     | 0.18 | 0.1174 | 0.1057 | 0.0939 | 0.0822 |
| 74HC151  | 1 of 8 Data Selector / Demultiplexer                    | 16DIL        | 74HC151    | 0.33 | 0.2952 | 0.2624 | 0.2296 | 0.2132 |
| 74HC153  | Dual 4 to 1 Line Data Selector / Demultiplexer          | 16DIL        | 74HC153    | 0.30 | 0.1976 | 0.1581 | 0.1383 | 0.1284 |
| 74HC154  | 4 to 16 Line Decoder / Demultiplexer                    | 24DIL        | 74HC154    | 0.94 | 0.7548 | 0.6793 | 0.6038 | 0.5284 |
| 74HC157  | Quad 2 to 1 Line Data Selector / Demultiplexer          | 16DIL        | 74HC157    | 0.22 | 0.1860 | 0.1488 | 0.1339 | 0.1190 |
| 74HC158  | Quad 2 to 1 Line Data Selector / Demultiplexer          | 16DIL        | 74HC158    | 0.23 | 0.2070 | 0.1840 | 0.1610 | 0.1495 |
| 74HC161  | Synchronous 4-Bit Binary Counter                        | 16DIL        | 74HC161    | 0.27 | 0.2134 | 0.1921 | 0.1707 | 0.1494 |
| 74HC162  | Synchronous Decade Counter                              | 16DIL        | 74HC162    | 0.46 | 0.4122 | 0.3664 | 0.3206 | 0.2977 |
| 74HC163  | Synchronous 4-Bit Binary Counter                        | 16DIL        | 74HC163    | 0.26 | 0.2338 | 0.2078 | 0.1819 | 0.1689 |
| 74HC164  | 8-Bit Shift Register, S/P In S/P Out                    | 14DIL        | 74HC164    | 0.23 | 0.1885 | 0.1508 | 0.1056 | 0.0980 |
| 74HC165  | 8-Bit Shift Register, S/P In S/P Out                    | 16DIL        | 74HC165    | 0.26 | 0.1944 | 0.1296 | 0.1166 | 0.1037 |
| 74HC173  | 4-Bit D Type Register, Tri state                        | 16DIL        | 74HC173    | 0.38 | 0.3402 | 0.3024 | 0.2646 | 0.2457 |
| 74HC174  | 6-Bit D Type Register with clear                        | 16DIL        | 74HC174    | 0.27 | 0.2394 | 0.2128 | 0.1862 | 0.1729 |
| 74HC175  | 4-Bit D Type Register with clear                        | 16DIL        | 74HC175    | 0.35 | 0.3150 | 0.2800 | 0.2450 | 0.2275 |
| 74HC193  | Synchronous Up/Down 4-Bit Binary Counter                | 16DIL        | 74HC193    | 0.39 | 0.3080 | 0.2772 | 0.2464 | 0.2156 |
| 74HC194  | 4-Bit Bidirectional Shift Register, S/P In/Out          | 16DIL        | 74HC194    | 0.33 | 0.2970 | 0.2640 | 0.2310 | 0.2145 |
| 74HC195  | 4-Bit Parallel Access Shift Register                    | 16DIL        | 74HC195    | 0.32 | 0.2880 | 0.2560 | 0.2240 | 0.2080 |
| 74HC20   | Dual 4-Input NAND Gate                                  | 14DIL        | 74HC20     | 0.28 | 0.2520 | 0.2240 | 0.1960 | 0.1820 |
| 74HC240  | Octal Inverting Buffer / Line Driver, Tri state         | 20DIL        | 74HC240    | 0.32 | 0.2668 | 0.2134 | 0.1707 | 0.1494 |
| 74HC241  | Octal Buffer / Line Driver, Tri state                   | 20DIL        | 74HC241    | 0.36 | 0.3276 | 0.2912 | 0.2548 | 0.2366 |
| 74HC244  | Octal Buffer / Line Driver, Tri state                   | 20DIL        | 74HC244    | 0.40 | 0.3300 | 0.2640 | 0.2112 | 0.1848 |
| 74HC245  | Octal Bus Transceiver, Tri state                        | 20DIL        | 74HC245    | 0.34 | 0.2423 | 0.1938 | 0.1550 | 0.1357 |
| 74HC251  | 1 of 8 Data Selector / Multiplexer, Tri state           | 16DIL        | 74HC251    | 0.30 | 0.2700 | 0.2400 | 0.2100 | 0.1950 |
| 74HC253  | Dual 1 of 4 Data Selector / Multiplexer, Tri state      | 16DIL        | 74HC253    | 0.25 | 0.2250 | 0.2000 | 0.1750 | 0.1625 |
| 74HC257  | Quad 2 to 1 Line Data Selector / Multiplexer, Tri state | 16DIL        | 74HC257    | 0.25 | 0.2250 | 0.2000 | 0.1750 | 0.1625 |
| 74HC259  | 8-Bit Addressable Latch                                 | 16DIL        | 74HC259    | 0.29 | 0.2211 | 0.1474 | 0.1327 | 0.1179 |
| 74HC27   | Triple 3-Input NOR Gate                                 | 14DIL        | 74HC27     | 0.16 | 0.1440 | 0.1280 | 0.1120 | 0.1040 |
| 74HC273  | 8-Bit D Type Register with clear                        | 20DIL        | 74HC273    | 0.27 | 0.2162 | 0.1946 | 0.1730 | 0.1513 |
| 74HC299  | 8-Bit Universal Shift Register, Tri state               | 20DIL        | 74HC299    | 0.61 | 0.4046 | 0.3641 | 0.3237 | 0.2832 |
| 74HC30   | 8-Input NAND Gate                                       | 14DIL        | 74HC30     | 0.22 | 0.1980 | 0.1760 | 0.1540 | 0.1430 |
| 74HC32   | Quad 2-Input OR Gate                                    | 14DIL        | 74HC32     | 0.14 | 0.1180 | 0.0944 | 0.0755 | 0.0661 |
| 74HC365  | Hex Buffer with enable, Tri state                       | 16DIL        | 74HC365    | 0.28 | 0.2335 | 0.1868 | 0.1494 | 0.1308 |
| 74HC367  | Hex Bus Driver with enable, Tri state                   | 16DIL        | 74HC367    | 0.38 | 0.3150 | 0.2520 | 0.2268 | 0.2016 |
| 74HC368  | Hex Inverting Bus Driver with enable, Tri state         | 16DIL        | 74HC368    | 0.29 | 0.2390 | 0.1912 | 0.1530 | 0.1338 |
| 74HC373  | Octal D Type Latch with enable, Tri state               | 20DIL        | 74HC373    | 0.31 | 0.2565 | 0.2052 | 0.1847 | 0.1436 |
| 74HC374  | Octal D Type Edge Triggered Flip Flop, Tri state        | 20DIL        | 74HC374    | 0.34 | 0.2423 | 0.1938 | 0.1550 | 0.1357 |
| 74HC390  | Dual Decade Counter                                     | 16DIL        | 74HC390    | 0.37 | 0.3058 | 0.2446 | 0.2201 | 0.1957 |
| 74HC393  | Dual 4-Bit Binary Counter                               | 14DIL        | 74HC393    | 0.36 | 0.2988 | 0.2390 | 0.1912 | 0.1673 |
| 74HC4002 | Dual 4-Input NOR Gate                                   | 14DIL        | 74HC4002   | 0.31 | 0.2790 | 0.2480 | 0.2170 | 0.2015 |
| 74HC4017 | Decade Counter, 10 decoded outputs                      | 16DIL        | 74HC4017   | 0.36 | 0.3035 | 0.2428 | 0.1942 | 0.1700 |
| 74HC4020 | 14-Stage Binary Counter (+16384)                        | 16DIL        | 74HC4020   | 0.36 | 0.3240 | 0.2880 | 0.2520 | 0.2340 |
| 74HC4040 | 12-Stage Binary Counter (+4096)                         | 16DIL        | 74HC4040   | 0.29 | 0.2435 | 0.1948 | 0.1558 | 0.1364 |
| 74HC4049 | Hex Inverting Buffer & TTL Driver                       | 16DIL        | 74HC4049   | 0.31 | 0.2790 | 0.2480 | 0.2170 | 0.2015 |
| 74HC4051 | 8-Channel Analogue Multiplexer                          | 16DIL        | 74HC4051   | 0.50 | 0.3960 | 0.3564 | 0.3168 | 0.2772 |
| 74HC4052 | Dual 4-Channel Analogue Multiplexer                     | 16DIL        | 74HC4052   | 0.34 | 0.2453 | 0.1962 | 0.1766 | 0.1570 |
| 74HC4053 | Triple 2-Channel Analogue Multiplexer                   | 16DIL        | 74HC4053   | 0.22 | 0.1454 | 0.1309 | 0.1163 | 0.1018 |
| 74HC4060 | 14-Stage Binary Counter (+16384) with osc.              | 16DIL        | 74HC4060   | 0.23 | 0.1930 | 0.1544 | 0.1235 | 0.1081 |
| 74HC4075 | Triple 3-Input OR Gate                                  | 14DIL        | 74HC4075   | 0.27 | 0.2466 | 0.2192 | 0.1918 | 0.1781 |
| 74HC4078 | 8-Input NOR Gate  | 14DIL        | 74HC4078   | 0.32 | 0.2880 | 0.2560 | 0.2240 | 0.2080 |
| 74HC42   | BCD to Decimal Decoder                                  | 16DIL        | 74HC42     | 0.36 | 0.3240 | 0.2880 | 0.2520 | 0.2340 |
| 74HC4511 | 7-Segment Latch / Decoder / Driver                      | 16DIL        | 74HC4511   | 0.64 | 0.5760 | 0.5120 | 0.4480 | 0.4160 |
| 74HC4514 | 4-Bit Latch / 4 to 16 line Decoder, high                | 24DIL        | 74HC4514   | 0.84 | 0.7560 | 0.6720 | 0.5880 | 0.5460 |
| 74HC4538 | Dual Retriggerable Monostable Multivibrator             | 16DIL        | 74HC4538   | 0.41 | 0.3690 | 0.3280 | 0.2870 | 0.2665 |
| 74HC4543 | BCD to 7-Segment Latch / Decoder / Driver               | 16DIL        | 74HC4543   | 0.90 | 0.8100 | 0.7200 | 0.6300 | 0.5850 |
| 74HC563  | Octal Inverting D Type Latch, Tri state                 | 20DIL        | 74HC563    | 0.56 | 0.5040 | 0.4480 | 0.3920 | 0.3640 |
| 74HC573  | Octal Type Latch, Tri state                             | 20DIL        | 74HC573    | 0.29 | 0.2385 | 0.1908 | 0.1526 | 0.1336 |
| 74HC574  | Octal D Type Latch, Tri state                           | 20DIL        | 74HC574    | 0.30 | 0.2108 | 0.1686 | 0.1517 | 0.1349 |
| 74HC595  | 8-Stage Shift Register with latch                       | 16DIL        | 74HC595    | 0.27 | 0.2255 | 0.1804 | 0.1443 | 0.1263 |
| 74HC597  | 8-Bit PIPO Shift Register with latch                    | 16DIL        | 74HC597    | 0.22 | 0.1818 | 0.1454 | 0.1163 | 0.1018 |
| 74HC688  | 8-Bit Comparator with enable                            | 20DIL        | 74HC688    | 0.46 | 0.3040 | 0.2736 | 0.2432 | 0.2128 |
| 74HC73   | Dual J-K Flip Flop with clear                           | 14DIL        | 74HC73     | 0.40 | 0.3600 | 0.3200 | 0.2800 | 0.2600 |
| 74HC75   | 4-Bit D-Type Latch with enable                          | 14DIL        | 74HC75     | 0.31 | 0.2563 | 0.2050 | 0.1845 | 0.1640 |
| 74HC85   | 4-Bit Comparator  | 16DIL        | 74HC85     | 0.23 | 0.1938 | 0.1550 | 0.1395 | 0.1240 |
| 74HC86   | Quad 2-Input EOR Gate                                   | 14DIL        | 74HC86     | 0.21 | 0.1755 | 0.1404 | 0.1123 | 0.0983 |

## 4000 Series - High Speed CMOS

Supply Voltage 3.0-18Vdc Power Dissipation (@100kHz) negligible Propagation Delay 25ns(typ)  
Max Clock Freq. 40Mhz Min Output Current 3mA Fan-outs (TTL Loads) 7

| Device | Function Description                          | Pins/Package | Order Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|--------|---|--------------|------------|------|--------|--------|--------|--------|
| 4000B  | Dual 3-Input NOR Gate plus inverter           | 14DIL        | 4000B      | 0.27 | 0.2319 | 0.1933 | 0.1546 | 0.1391 |
| 4001B  | Quad 2-Input NOR Gate                         | 14DIL        | 4001B      | 0.16 | 0.1313 | 0.1050 | 0.0945 | 0.0840 |
| 4002B  | Dual 4-Input NOR Gate                         | 14DIL        | 4002B      | 0.19 | 0.1286 | 0.1157 | 0.1029 | 0.0900 |
| 4006B  | 18-Bit Static Shift Register                  | 14DIL        | 4006B      | 0.65 | 0.5188 | 0.4669 | 0.4150 | 0.3632 |
| 40106B | Hex Schmitt Trigger, inverting                | 14DIL        | 40106B     | 0.19 | 0.1565 | 0.1252 | 0.1127 | 0.1002 |
| 40109B | Quad Non-inverting Level Converter, Tri State | 16DIL        | 40109B     | 0.59 | 0.5292 | 0.4704 | 0.4116 | 0.3822 |
| 4010B  | Hex Non-Inverting Buffer                      | 16DIL        | 4010B      | 0.21 | 0.1400 | 0.1260 | 0.1120 | 0.0980 |
| 4011B  | Quad 2-Input NAND Gate                        | 14DIL        | 4011B      | 0.16 | 0.1373 | 0.1098 | 0.0878 | 0.0769 |
| 4012B  | Dual 4-Input NAND Gate                        | 14DIL        | 4012B      | 0.20 | 0.1320 | 0.1188 | 0.1056 | 0.0924 |
| 4013B  | Dual D-Type Flip Flop                         | 14DIL        | 4013B      | 0.24 | 0.2023 | 0.1618 | 0.1456 | 0.1294 |
| 4014B  | 8-Stage Shift Register P/S-in P/S-out         | 16DIL        | 4014B      | 0.30 | 0.2700 | 0.2400 | 0.2100 | 0.1950 |
| 4015B  | Dual 4-Stage Shift Register, S-in P-out       | 16DIL        | 4015B      | 0.27 | 0.2168 | 0.1951 | 0.1734 | 0.1518 |
| 4016B  | Quad Analogue Switch                          | 14DIL        | 4016B      | 0.20 | 0.1690 | 0.1352 | 0.1082 | 0.0946 |
| 40174B | 6-Bit D Type Register with reset              | 16DIL        | 40174B     | 0.46 | 0.4122 | 0.3664 | 0.3206 | 0.2977 |
| 40175B | 4-Bit D Type Register, complement outputs     | 16DIL        | 40175B     | 0.41 | 0.3280 | 0.2952 | 0.2624 | 0.2296 |
| 4017B  | Decade Counter, 10 decoded outputs            | 16DIL        | 4017B      | 0.32 | 0.2757 | 0.2298 | 0.1613 | 0.1654 |
| 4018B  | Programmable Counter/Divider n=2..10          | 16DIL        | 4018B      | 0.29 | 0.1916 | 0.1724 | 0.1533 | 0.1341 |
| 4019B  | 4-Bit AND/OR Selector                         | 16DIL        | 4019B      | 0.25 | 0.1650 | 0.1485 | 0.1320 | 0.1155 |
| 4020B  | 14-Stage Binary Counter (+16384)              | 16DIL        | 4020B      | 0.31 | 0.2620 | 0.2096 | 0.1677 | 0.1467 |
| 4021B  | 8-Stage Shift Register, P/S-in S-out          | 16DIL        | 4021B      | 0.22 | 0.1855 | 0.1484 | 0.1336 | 0.1187 |
| 4022B  | Octal Counter with 8 decoded outputs          | 16DIL        | 4022B      | 0.32 | 0.2862 | 0.2544 | 0.2226 | 0.2067 |
| 4023B  | Triple 3-Input NAND Gate                      | 14DIL        | 4023B      | 0.23 | 0.1500 | 0.1350 | 0.1200 | 0.1050 |
| 4024B  | 7-Stage Binary Counter (+128)                 | 14DIL        | 4024B      | 0.22 | 0.1850 | 0.1480 | 0.1184 | 0.1036 |
| 4025B  | Triple 3-Input NOR Gate                       | 14DIL        | 4025B      | 0.20 | 0.1326 | 0.1193 | 0.1061 | 0.0928 |
| 4026B  | Decade Counter with 7 Segment outputs         | 16DIL        | 4026B      | 0.67 | 0.5588 | 0.4470 | 0.4023 | 0.3576 |
| 4027B  | Dual J-K Flip Flop                            | 16DIL        | 4027B      | 0.21 | 0.1768 | 0.1414 | 0.1131 | 0.0990 |
| 4028B  | BCD to Decimal Decoder, 1 of 10               | 16DIL        | 4028B      | 0.35 | 0.2780 | 0.2502 | 0.2224 | 0.1946 |
| 4029B  | Presetable Up/Down Counter, binary or decade  | 16DIL        | 4029B      | 0.38 | 0.3163 | 0.2530 | 0.2024 | 0.1771 |
| 4030B  | Quad 2-Input EOR Gate                         | 14DIL        | 4030B      | 0.15 | 0.1000 | 0.0900 | 0.0800 | 0.0700 |
| 4035B  | 4-Stage Shift Register, P-in P-out            | 16DIL        | 4035B      | 0.31 | 0.2754 | 0.2448 | 0.2142 | 0.1989 |
| 4040B  | 12-Stage Binary Counter (+4096)               | 16DIL        | 4040B      | 0.30 | 0.2520 | 0.2016 | 0.1613 | 0.1411 |
| 4042B  | Quad Clocked D-Latch                          | 16DIL        | 4042B      | 0.19 | 0.1668 | 0.1112 | 0.1001 | 0.0890 |
| 4043B  | Quad R/S Flip Flop, NOR Logic, Tri State      | 16DIL        | 4043B      | 0.35 | 0.2800 | 0.2520 | 0.2240 | 0.1960 |
| 4046B  | Phase Locked Loop                             | 16DIL        | 4046B      | 0.42 | 0.3340 | 0.3006 | 0.2672 | 0.2338 |
| 4047B  | Monostable / Astable Multivibrator            | 14DIL        | 4047B      | 0.25 | 0.2184 | 0.1820 | 0.1456 | 0.1310 |
| 4048B  | 8-Input Multifunction Gate                    | 16DIL        | 4048B      | 0.34 | 0.2274 | 0.2047 | 0.1819 | 0.1592 |
| 4049B  | Hex Inverting Buffer & TTL Driver             | 16DIL        | 4049B      | 0.29 | 0.2350 | 0.2115 | 0.1880 | 0.1645 |
| 4049UB | Hex Inverting Buffer & TTL Driver             | 16DIL        | 4049UB     | 0.17 | 0.1390 | 0.1112 | 0.1001 | 0.0980 |
| 4050B  | Hex Non-Inverting Buffer & TTL Driver         | 16DIL        | 4050B      | 0.20 | 0.1625 | 0.1300 | 0.1170 | 0.1040 |
| 4051B  | 8-Channel Analogue Multiplexer                | 16DIL        | 4051B      | 0.23 | 0.1928 | 0.1542 | 0.1234 | 0.1079 |
| 4052B  | Dual 4-Channel Analogue Multiplexer           | 16DIL        | 4052B      | 0.32 | 0.2880 | 0.2560 | 0.2240 | 0.2080 |
| 4053B  | Triple 2-Channel Analogue Multiplexer         | 16DIL        | 4053B      | 0.22 | 0.1800 | 0.1440 | 0.1152 | 0.1008 |
| 4054B  | 4-Segment LCD Driver                          | 16DIL        | 4054B      | 0.56 | 0.5040 | 0.4480 | 0.3920 | 0.3640 |
| 4055B  | BCD to 7-Segment LCD Decoder/Driver           | 16DIL        | 4055B      | 0.34 | 0.3078 | 0.2736 | 0.2394 | 0.2233 |
| 4060B  | 14-Stage Binary Counter (+16384) with osc.    | 16DIL        | 4060B      | 0.16 | 0.1343 | 0.1074 | 0.0967 | 0.0859 |
| 4063B  | 4-Bit Magnitude Comparator                    | 16DIL        | 4063B      | 0.41 | 0.3262 | 0.2936 | 0.2610 | 0.2283 |
| 4066B  | Quad Analogue Switch                          | 14DIL        | 4066B      | 0.22 | 0.1825 | 0.1460 | 0.1168 | 0.1022 |
| 4068B  | 8-Input NAND Gate                             | 14DIL        | 4068B      | 0.19 | 0.1668 | 0.1390 | 0.1112 | 0.1001 |
| 4069UB | Hex Inverter                                  | 14DIL        | 4069UB     | 0.18 | 0.1554 | 0.1036 | 0.0829 | 0.0725 |
| 4070B  | Quad 2-Input EOR Gate                         | 14DIL        | 4070B      | 0.20 | 0.1578 | 0.1420 | 0.1262 | 0.1105 |
| 4071B  | Quad 2-Input OR Gate                          | 14DIL        | 4071B      | 0.25 | 0.2000 | 0.1800 | 0.1600 | 0.1400 |
| 4072B  | Dual 4-Input OR Gate                          | 14DIL        | 4072B      | 0.18 | 0.1458 | 0.1312 | 0.1166 | 0.1021 |
| 4073B  | Triple 3-Input AND Gate                       | 14DIL        | 4073B      | 0.19 | 0.1500 | 0.1350 | 0.1200 | 0.1050 |
| 4075B  | Triple 3-Input OR Gate                        | 14DIL        | 4075B      | 0.15 | 0.1280 | 0.1024 | 0.0922 | 0.0666 |
| 4076B  | Quad D-Type Register, Tri State               | 16DIL        | 4076B      | 0.31 | 0.2754 | 0.2448 | 0.2142 | 0.1989 |
| 4077B  | Quad 2-Input Ex-NOR Gate                      | 14DIL        | 4077B      | 0.28 | 0.2520 | 0.2240 | 0.1960 | 0.1820 |
| 4078B  | 8-Input NOR Gate                              | 14DIL        | 4078B      | 0.30 | 0.2500 | 0.2000 | 0.1800 | 0.1600 |
| 4081B  | Quad 2-Input AND Gate                         | 14DIL        | 4081B      | 0.23 | 0.1913 | 0.1530 | 0.1224 | 0.1071 |
| 4082B  | Dual 4-Input AND Gate                         | 14DIL        | 4082B      | 0.22 | 0.1768 | 0.1591 | 0.1414 | 0.1238 |
| 4085B  | Dual AND-OR-Invert Gate                       | 14DIL        | 4085B      | 0.28 | 0.1892 | 0.1703 | 0.1514 | 0.1324 |
| 4086B  | 4 x 2 AND-OR-Invert Gate                      | 14DIL        | 4086B      | 0.33 | 0.2600 | 0.2340 | 0.2080 | 0.1820 |
| 4093B  | Quad 2-Input NAND Schmitt Trigger             | 14DIL        | 4093B      | 0.21 | 0.1765 | 0.1412 | 0.1130 | 0.0988 |
| 4094B  | 8-Stage Shift Register with Tri state buffer  | 16DIL        | 4094B      | 0.29 | 0.2312 | 0.2081 | 0.1850 | 0.1618 |
| 4098B  | Dual Retriggerable Monostable                 | 16DIL        | 4098B      | 0.40 | 0.3350 | 0.2680 | 0.2144 | 0.1876 |
| 4099B  | Addressable 8-Bit Latch                       | 16DIL        | 4099B      | 0.35 | 0.2885 | 0.2308 | 0.2077 | 0.1846 |
| 4502B  | Hex Inverter / Driver, Tri state              | 16DIL        | 4502B      | 0.32 | 0.2580 | 0.2322 | 0.2064 | 0.1806 |
| 4503B  | Hex Non-Inverter / Driver, Tri state          | 16DIL        | 4503B      | 0.40 | 0.3600 | 0.3200 | 0.2800 | 0.2600 |
| 4508B  | Dual 4-Bit Latch, Tri state                   | 24DIL        | 4508B      | 1.40 | 1.2600 | 1.1200 | 0.9800 | 0.9100 |
| 4511B  | 7-Segment LED Latch / Decoder / Driver        | 16DIL        | 4511B      | 0.48 | 0.4000 | 0.3200 | 0.2880 | 0.2560 |
| 4512B  | 8-Channel Data Selector, Tri state            | 16DIL        | 4512B      | 0.27 | 0.2188 | 0.1969 | 0.1750 | 0.1532 |
| 4515B  | 4-Bit Latch / 4 to 16 line Decoder, low       | 24DIL        | 4515B      | 1.00 | 0.9000 | 0.8000 | 0.7000 | 0.6500 |
| 4516B  | 4-Bit Binary Up/Down Counter                  | 16DIL        | 4516B      | 0.44 | 0.3645 | 0.2916 | 0.2333 | 0.2041 |
| 4518B  | Dual Synchronous Decade Counter               | 16DIL        | 4518B      | 0.42 | 0.3600 | 0.2400 | 0.2160 | 0.1920 |
| 4520B  | Dual Synchronous 4-Bit Binary Counter         | 16DIL        | 4520B      | 0.34 | 0.2825 | 0.2260 | 0.1808 | 0.1582 |
| 4521B  | 24-Stage Binary Counter                       | 16DIL        | 4521B      | 0.62 | 0.5580 | 0.4960 | 0.4340 | 0.4030 |
| 4526B  | Presetable 4-Bit Binary Down Counter          | 16DIL        | 4526B      | 0.47 | 0.3740 | 0.3366 | 0.2992 | 0.2618 |
| 4527B  | Decimal Rate Multiplier                       | 16DIL        | 4527B      | 0.40 | 0.3600 | 0.3200 | 0.2800 | 0.2600 |
| 4529B  | Dual Analogue Multiplexer                     | 16DIL        | 4529B      | 0.44 | 0.3960 | 0.3520 | 0.3080 | 0.2860 |
| 4532B  | 8-Bit Priority Encoder                        | 16DIL        | 4532B      | 0.24 | 0.2035 | 0.1628 | 0.1302 | 0.1140 |
| 4536B  | Programmable Timer                            | 16DIL        | 4536B      | 1.00 | 0.9000 | 0.8000 | 0.7000 | 0.6500 |
| 4538B  | Dual Retriggerable Monostable Multivibrator   | 16DIL        | 4538B      | 0.40 | 0.3350 | 0.2680 | 0.2144 | 0.1876 |
| 4541B  | Programmable Timer                            | 14DIL        | 4541B      | 0.33 | 0.2934 | 0.2608 | 0.2282 | 0.2119 |
| 4555B  | Dual 1 of 4 Decoder / Demultiplexer, high     | 16DIL        | 4555B      | 0.32 | 0.2880 | 0.2560 | 0.2240 | 0.2080 |
| 4556B  | Dual 1 of 4 Decoder / Demultiplexer, low      | 16DIL        | 4556B      | 0.40 | 0.3600 | 0.3200 | 0.2800 | 0.2600 |
| 4584B  | Hex Schmitt Trigger, inverting                | 14DIL        | 4584B      | 0.27 | 0.2126 | 0.1913 | 0.1701 | 0.1488 |
| 4585B  | 4-Bit Magnitude Comparator                    | 16DIL        | 4585B      | 0.48 | 0.4302 | 0.3824 | 0.3346 | 0.3107 |
| 4724B  | 8 Bit Addressable Latch                       | 16DIL        | 4724B      | 0.94 | 0.8460 | 0.7520 | 0.6580 | 0.6300 |



### EPROMS - UV Erasable

Electrically Programmable Read Only Memory, featuring a transparent window to permit erasure by Ultra Violet light.

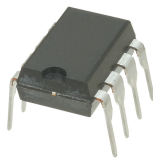
#### Technical Specification

| Device  | Size | Configuration | V <sub>s</sub> | V <sub>p</sub> | Package  |       |
|---------|------|---------------|----------------|----------------|----------|-------|
| 27C64   | 64k  | 8k x 8        | 150ns          | 5Vdc           | 12.75Vdc | 28DIL |
| 27C256  | 256k | 32k x 8       | 150ns          | 5Vdc           | 12.75Vdc | 28DIL |
| 27C1001 | 1M   | 128k x 8      | 120ns          | 5Vdc           | 12.75Vdc | 32DIL |
| 27C2001 | 2M   | 256k x 8      | 150ns          | 5Vdc           | 12.75Vdc | 32DIL |
| 27C4001 | 4M   | 512k x 8      | 100ns          | 5Vdc           | 12.75Vdc | 32DIL |

| Order Code                   | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------------------------|------|--------|--------|--------|--------|
| 27C64A-15F1 64K CMOS EPROM   | 3.99 | 3.6155 | 3.2138 | 2.8120 | 2.5108 |
| 27C256B-15F1 256k CMOS EPROM | 2.42 | 2.1812 | 1.9389 | 1.6965 | 1.5148 |
| 27C1001-12F1 1M CMOS EPROM   | 3.17 | 2.8505 | 2.5338 | 2.2170 | 1.9795 |
| 27C2001-15F1 2M CMOS EPROM   | 4.41 | 3.9717 | 3.5304 | 3.0891 | 2.7581 |
| 27C4001-10F1 4M CMOS EPROM   | 5.98 | 5.3820 | 4.7840 | 4.1860 | 3.7375 |

### E<sup>2</sup>PROM - 8 Bit

Serial electrically erasable programmable read only memories. Supply voltage between 2.5 and 5.5Vdc, speed 400kHz (@5Vdc). Package 8 DIL.



| Order Code                             | 1+   | 10+     | 25+    | 50+    | 100+   |
|--|------|---------|--------|--------|--------|
| 24LC08BP 8k 1k x 8 E <sup>2</sup> PROM | 0.73 | 0.58000 | 0.5220 | 0.4640 | 0.4060 |

### E<sup>2</sup>PROM - 16 Bit

| Order Code                            | 1+   | 10+    | 25+    | 50+    | 100+   |
|---------------------------------------|------|--------|--------|--------|--------|
| 93C46N 1k 64 x 16 E <sup>2</sup> PROM | 0.33 | 0.2750 | 0.2200 | 0.1760 | 0.1540 |

### MICROCONTROLLERS

#### Atmel - 89C Series Microcontrollers

An industry standard range of microcontrollers with Flash ROM.

#### Technical Specifications

|                        |      |                        |       |
|------------------------|------|------------------------|-------|
| Flash ROM              | 2k   | Analogue comparator    | Yes   |
| RAM                    | 128b | Max Osc. Speed         | 24MHz |
| I/O Pins               | 15   | Vcc                    | 2.7V  |
| 16-Bit Timers/Counters | 2    | I/O sink current/pin   | 20mA  |
| Interrupt sources      | 6    | Total I/O sink current | 80mA  |
| UART(full duplex)      | Yes  | Package                | 20DIL |



| Order Code                 | 1+   | 10+    | 25+    | 50+    | 100+   |
|----------------------------|------|--------|--------|--------|--------|
| AT89C2051-24PC μcontroller | 6.38 | 5.5300 | 5.3325 | 4.2900 | 4.1250 |

### Microchip - PIC12C Series

A general purpose microcontroller series featuring: In-Circuit Serial Programming, 400ns Instruction Execution, 33/35 Instruction Set, 8-Bit Timer/counter, Watchdog Timer, 6 I/O Pins, Internal/Crystal Resonator/Resistor-Capacitor Oscillator Support. OTP (One Time Programmable) EPROM (Windowed) type available.

#### Technical Specification

|                      |          |          |
|----------------------|----------|----------|
| PROM (bytes)         | 508A-04P | 509A-04P |
| RAM (bytes)          | 512      | 1024     |
| Max Osc. Speed       | 25       | 41       |
| VCC                  | 4MHz     | 4MHz     |
| I/O Sink Current/pin | 3-5.5V   | 3-5.5V   |
| Package              | 25mA     | 25mA     |
|                      | 8DIL     | 8DIL     |

### MICROCHIP



| Order Code                 | 1+   | 10+    | 25+    | 50+    | 100+   |
|----------------------------|------|--------|--------|--------|--------|
| PIC12C508A-04P μcontroller | 0.78 | 0.7056 | 0.6664 | 0.5880 | 0.5488 |
| PIC12C509A-04P μcontroller | 0.83 | 0.7488 | 0.7072 | 0.6240 | 0.5824 |

### Microchip - PIC16C5 Series

An advanced microcontroller series featuring: 200ns Instruction Execution, 33 Instruction Set, 8-Bit Timer/counter, Watchdog Timer, Internal/Crystal Resonator/Resistor-Capacitor Oscillator Support. OTP (One Time Programmable) or EPROM (Windowed)

#### Technical Specification

|               | PROM (bytes) | RAM (bytes) | I/O Pins | Max Osc. Speed | Package |
|---------------|--------------|-------------|----------|----------------|---------|
| PIC16C54C-04P | 512 OTP      | 25          | 12       | 4Mhz           | 18DIL   |
| PIC16C54BJW   | 512 EPROM    | 25          | 12       | 20Mhz          | 18DIL   |
| PIC16C56A-04P | 1024 OTP     | 25          | 12       | 4Mhz           | 18DIL   |



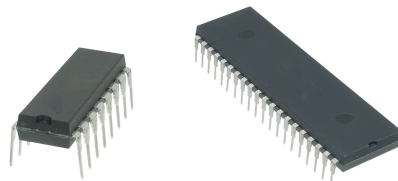
| Order Code                | 1+   | 10+    | 25+    | 50+    | 100+   |
|---------------------------|------|--------|--------|--------|--------|
| PIC16C54C-04P μcontroller | 1.49 | 1.3392 | 1.2648 | 1.1160 | 1.0416 |
| PIC16C54BJW μcontroller   | 7.60 | 6.8400 | 6.4600 | 5.7000 | 5.3200 |
| PIC16C56A-04P μcontroller | 1.58 | 1.4220 | 1.2640 | 1.1060 | 0.9875 |

### Microchip - PIC16F Series

Flash EEPROM microcontroller series.

#### Technical Specification

|                 | Memory<br>PROM | RAM       | I/O<br>Pins | Max Osc.<br>Speed | Package |
|-----------------|----------------|-----------|-------------|-------------------|---------|
| PIC16F84-04P    | 1024 Flash     | 68+64     | 13          | 4Mhz              | 18DIL   |
| PIC16F84-10P    | 1024 Flash     | 68+64     | 13          | 10Mhz             | 18DIL   |
| PIC16F627-04P   | 1024 Flash     | 224+12815 |             | 4Mhz              | 18DIL   |
| PIC16F627-20/IP | 1024 Flash     | 224+12815 |             | 20Mhz             | 18DIL   |
| PIC16F876-04SP  | 8192 Flash     | 368+25622 |             | 4Mhz              | 28DIL   |
| PIC16F877-20P   | 9192 Flash     | 368+25633 |             | 20Mhz             | 40DIL   |



| Order Code                  | 1+   | 10+    | 25+    | 50+    | 100+   |
|-----------------------------|------|--------|--------|--------|--------|
| PIC16F84-04P μcontroller    | 3.14 | 2.8224 | 2.6656 | 2.3520 | 2.1952 |
| PIC16F84-10P μcontroller    | 4.16 | 3.9000 | 3.6400 | 3.3800 | 3.2500 |
| PIC16F627-04P μcontroller   | 2.15 | 2.0378 | 1.9305 | 1.8233 | 1.7160 |
| PIC16F627-20/IP μcontroller | 2.10 | 1.9950 | 1.8900 | 1.7850 | 1.6800 |
| PIC16F876-04SP μcontroller  | 5.10 | 4.8450 | 4.5900 | 4.3350 | 4.0800 |
| PIC16F877-20P μcontroller   | 4.80 | 4.3200 | 4.0800 | 3.6000 | 3.3600 |

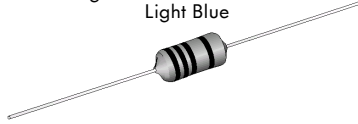
## INDUCTORS

### Sub-miniature

A range of sub-miniature RF inductors with axial leads. Ferrite drum cored with flame retardant epoxy bodies. Sub-miniature size (7.5 x 3.0mmØ) Light blue body with three (±20%) or four (±10%) band colour code. The 4th colour band indicating tolerance is not used on devices with a ±20% tolerance.

#### Technical Specification

|                              |                                |
|------------------------------|--------------------------------|
| Inductance Range             | 0.1 to 1000µH                  |
| Dielectric withstand voltage | 250Vrms                        |
| Inductance Tolerance         | ≤0.68µH ±20%    >0.68µH ±10%   |
| Q Factor                     | ≤47µH 45 Min.    >47µH 50 Min. |
| Operating Temperature Range  | -20 to +80°C                   |
| Body Colour                  | Light Blue                     |



| Order Code | Value  | I <sub>dc</sub> max. | R <sub>dc</sub> | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|--------|----------------------|-----------------|------|--------|--------|--------|--------|
| 770-810    | 0.1µH  | 1.4A                 | 0.06Ω           | 0.14 | 0.1050 | 0.0750 | 0.0600 | 0.0480 |
| 770-822    | 0.22µH | 1.15A                | 0.08Ω           | 0.15 | 0.1092 | 0.0728 | 0.0582 | 0.0510 |
| 770-847    | 0.47µH | 1.0A                 | 0.15Ω           | 0.15 | 0.1092 | 0.0728 | 0.0582 | 0.0510 |
| 770-910    | 1.0µH  | 815mA                | 0.25Ω           | 0.14 | 0.1050 | 0.0750 | 0.0600 | 0.0480 |
| 770-915    | 1.5µH  | 700mA                | 0.3Ω            | 0.14 | 0.1071 | 0.0765 | 0.0612 | 0.0490 |
| 770-922    | 2.2µH  | 630mA                | 0.4Ω            | 0.15 | 0.1092 | 0.0728 | 0.0582 | 0.0510 |
| 770-933    | 3.3µH  | 575mA                | 0.5Ω            | 0.14 | 0.1050 | 0.0750 | 0.0600 | 0.0480 |
| 770-947    | 4.7µH  | 530mA                | 0.6Ω            | 0.14 | 0.1050 | 0.0750 | 0.0600 | 0.0480 |
| 770-968    | 6.8µH  | 470mA                | 0.7Ω            | 0.15 | 0.1093 | 0.0874 | 0.0699 | 0.0612 |
| 770-010    | 10µH   | 370mA                | 0.85Ω           | 0.14 | 0.1050 | 0.0750 | 0.0600 | 0.0480 |
| 770-022    | 22µH   | 335mA                | 1.0Ω            | 0.12 | 0.0918 | 0.0612 | 0.0490 | 0.0428 |
| 770-047    | 47µH   | 255mA                | 2.1Ω            | 0.14 | 0.1050 | 0.0750 | 0.0600 | 0.0480 |
| 770-068    | 68µH   | 205mA                | 2.6Ω            | 0.14 | 0.1050 | 0.0750 | 0.0600 | 0.0480 |
| 770-110    | 100µH  | 165mA                | 4.2Ω            | 0.12 | 0.0918 | 0.0612 | 0.0490 | 0.0428 |
| 770-122    | 220µH  | 150mA                | 5.0Ω            | 0.15 | 0.1092 | 0.0728 | 0.0582 | 0.0510 |
| 770-147    | 470µH  | 90mA                 | 13Ω             | 0.15 | 0.1092 | 0.0728 | 0.0582 | 0.0510 |
| 770-210    | 1000µH | 60mA                 | 26Ω             | 0.17 | 0.1311 | 0.0874 | 0.0699 | 0.0612 |

## NTC INRUSH THERMISTORS

Negative temperature coefficient thermistors designed to limit the initial current flow to a circuit. Typically used in power supplies, lighting, motor and other applications requiring a Soft Start supply.

#### Technical Specification

| Steady State Current        | Resistance Cold | Hot    | Thermal Dissipation | Thermal Time | Dims  |
|-----------------------------|-----------------|--------|---------------------|--------------|-------|
| 1A                          | 120Ω            | 2.29Ω  | 14mW/°C             | 35s          | 10mmØ |
| 2A                          | 8Ω              | 0.2Ω   | 11mW/°C             | 35s          | 8mmØ  |
| 2A                          | 20Ω             | 0.604Ω | 16mW/°C             | 45s          | 10mmØ |
| 3A                          | 10Ω             | 0.29Ω  | 13mW/°C             | 50s          | 10mmØ |
| 5A                          | 2.5Ω            | 0.1Ω   | 13mW/°C             | 35s          | 10mmØ |
| 5A                          | 5Ω              | 0.12Ω  | 13mW/°C             | 68s          | 13mmØ |
| Operating Temperature Range |                 |        | -40 to +170°C       |              |       |
| Lead Pitch                  |                 |        | 5.0mm (7.5mm 13mmØ) |              |       |



| Order Code |                     | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|---------------------|------|--------|--------|--------|--------|
| 929-110    | 1A 120Ω NTC Limiter | 1.05 | 0.8400 | 0.7560 | 0.6720 | 0.5880 |
| 929-120    | 2A 8Ω NTC Limiter   | 1.05 | 0.8400 | 0.7560 | 0.6720 | 0.5850 |
| 929-122    | 2A 20Ω NTC Limiter  | 1.05 | 0.8400 | 0.7560 | 0.6720 | 0.5880 |
| 929-130    | 3A 10Ω NTC Limiter  | 1.05 | 0.8400 | 0.7560 | 0.6720 | 0.5880 |
| 929-150    | 5A 2.5Ω NTC Limiter | 1.05 | 0.8400 | 0.7560 | 0.6720 | 0.5880 |
| 929-152    | 5A 5Ω NTC Limiter   | 1.60 | 1.2800 | 1.1520 | 1.0240 | 0.8960 |

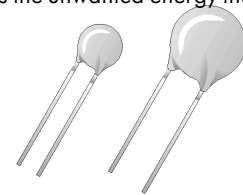
## METAL OXIDE VARISTORS

These devices are designed to protect equipment against transient voltage spikes. Connected directly across the supply rails, they offer a simple solution to transient suppression. A varistor remains high impedance during normal use, when a spike is encountered the impedance drops to a very low level, clamping the transient voltage to an acceptable level. The varistor absorbs the unwanted energy thereby protecting the equipment.

#### Technical Specification

|                             |  |
|-----------------------------|--|
| Response Time               | <50ns  |
| Voltage Coefficient         | -0.05%/°C  |
| Insulation Resistance       | ≥1000MΩ @ 500V   |
| Insulation Voltage          | 1000Vrms (varistor rating ≤330V)<br>1500Vrms (varistor rating >330V) |
| Operating Temperature Range | -40 to +85°C   |

| Op. Voltage<br>Vrms | Voltage<br>Vdc | Varistor<br>Nom | Voltage<br>Min/Max | Clamp Voltage<br>V max. @ A | Surge Current<br>1 Surge | 2 Surges | Power<br>W | Energy J<br>10/1000µs | Dia.<br>mmØ |      |
|---------------------|----------------|-----------------|--------------------|-----------------------------|--------------------------|----------|------------|-----------------------|-------------|------|
| 11                  | 14             | 18              | 16/20              | 36                          | 2.5                      | 250      | 125        | 0.02                  | 0.9         | 7.0  |
| 14                  | 18             | 22              | 20/24              | 43                          | 2.5                      | 250      | 125        | 0.02                  | 1.1         | 7.0  |
| 17                  | 22             | 27              | 24/30              | 53                          | 2.5                      | 250      | 125        | 0.02                  | 1.4         | 7.0  |
| 20                  | 26             | 33              | 30/36              | 65                          | 2.5                      | 250      | 125        | 0.02                  | 1.7         | 7.0  |
| 30                  | 38             | 47              | 42/52              | 93                          | 2.5                      | 250      | 125        | 0.02                  | 2.5         | 7.0  |
| 50                  | 65             | 82              | 74/90              | 135                         | 10                       | 1200     | 600        | 0.25                  | 5.5         | 7.0  |
| 60                  | 85             | 100             | 90/110             | 165                         | 10                       | 1200     | 600        | 0.25                  | 6.5         | 7.0  |
| 75                  | 100            | 120             | 108/132            | 200                         | 10                       | 1200     | 600        | 0.25                  | 7.8         | 7.0  |
| 130                 | 170            | 200             | 185/225            | 340                         | 10                       | 1200     | 600        | 0.25                  | 13          | 7.0  |
| 130                 | 170            | 200             | 185/225            | 340                         | 50                       | 4500     | 2500       | 0.6                   | 57          | 14.0 |
| 150                 | 200            | 240             | 216/264            | 395                         | 10                       | 1200     | 600        | 0.25                  | 15          | 7.0  |
| 150                 | 200            | 240             | 216/264            | 395                         | 25                       | 2500     | 1250       | 0.4                   | 35          | 10.0 |
| 150                 | 200            | 240             | 216/264            | 395                         | 100                      | 6500     | 4000       | 1                     | 108         | 20.0 |
| 175                 | 225            | 270             | 247/303            | 455                         | 10                       | 1200     | 600        | 0.25                  | 18          | 7.0  |
| 250                 | 320            | 390             | 351/429            | 650                         | 10                       | 1200     | 600        | 0.25                  | 25          | 7.0  |
| 250                 | 320            | 390             | 351/429            | 650                         | 25                       | 2500     | 1250       | 0.4                   | 60          | 10.0 |
| 250                 | 320            | 390             | 351/429            | 650                         | 50                       | 4500     | 2500       | 0.6                   | 100         | 14.0 |
| 275                 | 350            | 430             | 387/473            | 710                         | 10                       | 1200     | 600        | 0.25                  | 28          | 7.0  |
| 275                 | 350            | 430             | 387/473            | 710                         | 25                       | 2500     | 1250       | 0.4                   | 65          | 10.0 |
| 275                 | 350            | 430             | 387/473            | 710                         | 50                       | 4500     | 2500       | 0.6                   | 115         | 14.0 |
| 275                 | 350            | 430             | 387/473            | 710                         | 100                      | 6500     | 4000       | 1                     | 190         | 20.0 |
| 300                 | 385            | 470             | 423/517            | 775                         | 10                       | 1200     | 600        | 0.25                  | 30          | 7.0  |



| Order Code | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------|--------|--------|--------|--------|
| 741-180    | 0.22 | 0.1835 | 0.1468 | 0.1174 | 0.1028 |
| 741-220    | 0.13 | 0.1124 | 0.0963 | 0.0642 | 0.0578 |
| 741-270    | 0.13 | 0.1124 | 0.0963 | 0.0642 | 0.0578 |
| 741-330    | 0.13 | 0.1124 | 0.0963 | 0.0642 | 0.0578 |
| 741-470    | 0.13 | 0.1124 | 0.0963 | 0.0642 | 0.0578 |
| 741-820    | 0.08 | 0.0735 | 0.0630 | 0.0420 | 0.0378 |
| 741-101    | 0.10 | 0.0840 | 0.0720 | 0.0480 | 0.0432 |
| 741-121    | 0.08 | 0.0735 | 0.0630 | 0.0420 | 0.0378 |
| 741-201    | 0.08 | 0.0735 | 0.0630 | 0.0420 | 0.0378 |
| 743-201    | 0.20 | 0.1729 | 0.1482 | 0.0988 | 0.0889 |
| 741-241    | 0.08 | 0.0714 | 0.0612 | 0.0408 | 0.0367 |
| 742-241    | 0.12 | 0.1082 | 0.0927 | 0.0618 | 0.0556 |
| 744-241    | 0.43 | 0.3805 | 0.3261 | 0.2174 | 0.1957 |
| 741-271    | 0.08 | 0.0714 | 0.0612 | 0.0408 | 0.0367 |
| 741-391    | 0.08 | 0.0679 | 0.0582 | 0.0388 | 0.0349 |
| 742-391    | 0.13 | 0.1124 | 0.0963 | 0.0642 | 0.0578 |
| 743-391    | 0.20 | 0.1729 | 0.1482 | 0.0988 | 0.0889 |
| 741-431    | 0.09 | 0.0756 | 0.0648 | 0.0432 | 0.0389 |
| 742-431    | 0.14 | 0.1190 | 0.1020 | 0.0680 | 0.0612 |
| 743-431    | 0.20 | 0.1584 | 0.1188 | 0.0792 | 0.0713 |
| 744-431    | 0.50 | 0.4344 | 0.3720 | 0.2480 | 0.2232 |
| 741-471    | 0.09 | 0.0816 | 0.0699 | 0.0466 | 0.0419 |

## CAPACITORS

### High Voltage Ceramic Class Y3

Mains interference suppression capacitors, Y3 class radial lead. Suitable for across line (X2) applications. Flame retardant epoxy resin coated.

#### Technical Specification

|                             |                               |
|-----------------------------|-------------------------------|
| Capacitance Range           | 470pF to 4n7F                 |
| Capacitance Tolerance       | ±10% (Y5P), ±20% (Y5V)        |
| Temperature Coefficient     | ±10% (Y5P), +30 to -80% (Y5V) |
| Insulation Resistance       | ≥10,000MΩ                     |
| Voltage Rating              | 400Vac                        |
| Test Voltage                | 2600Vac                       |
| Operating Temperature Range | -25 to +85°C                  |



Lead Pitch 7.5mm (<2200pF)  
10mm (>3300pF)

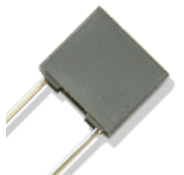
| Order Code |                  | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------------------|------|--------|--------|--------|--------|
| 868-471    | 470pF Y5P 10mmØ  | 0.12 | 0.0983 | 0.0786 | 0.0629 | 0.0550 |
| 868-102    | 1000pF Y5V 10mmØ | 0.09 | 0.0723 | 0.0578 | 0.0462 | 0.0405 |
| 868-222    | 2200pF Y5V 12mmØ | 0.09 | 0.0785 | 0.0628 | 0.0502 | 0.0440 |
| 868-332    | 3300pF Y5V 15mmØ | 0.12 | 0.1033 | 0.0826 | 0.0661 | 0.0578 |
| 868-472    | 4700pF Y5V 16mmØ | 0.11 | 0.0880 | 0.0704 | 0.0563 | 0.0493 |

### Class X2 Polyester

Metallised polyester capacitors designed for mains interference suppression and are suitable for connection across the mains supply, Class X2. Epoxy resin encapsulated in flame retardant plastic cases. Specifications meets with extensive European and world-wide approvals.

#### Technical Specification

|  |   |
|--|---|
| Capacitance Range                      | 10nF to 1.0μF                                 |
| Capacitance Tolerance                  | ±20%  |
| Insulation Resistance or Time Constant | ≥30,000MΩ (C≤330nF)<br>≥10,000 Sec. (C>330nF) |
| Working Voltage                        | 275Vac  |
| Test Voltage                           | 1800Vdc                                       |
| Operating Temperature Range            | -40°C to +100°C                               |
| Body Colour                            | Grey  |



Dims: 18 x 11 x 5mm (10 to 47nF)  
18 x 12 x 6mm (100nF)  
26.5 x 16 x 7mm (220nF)  
26.5 x 18.5 x 10mm (470nF)  
32 x 22 x 13mm (1.0μF)  
Lead Pitch 15mm (10 to 100nF)  
22.5mm (220 & 470nF)  
27.5mm (1.0μF)

| Order Code |                | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|----------------|------|--------|--------|--------|--------|
| 867-049    | 10nF Class X2  | 0.18 | 0.1329 | 0.0886 | 0.0709 | 0.0620 |
| 867-053    | 22nF Class X2  | 0.16 | 0.1293 | 0.1034 | 0.0827 | 0.0724 |
| 867-055    | 33nF Class X2  | 0.18 | 0.1329 | 0.0886 | 0.0709 | 0.0620 |
| 867-057    | 47nF Class X2  | 0.18 | 0.1329 | 0.0886 | 0.0709 | 0.0620 |
| 867-061    | 100nF Class X2 | 0.17 | 0.1248 | 0.0832 | 0.0666 | 0.0582 |
| 867-065    | 220nF Class X2 | 0.30 | 0.2589 | 0.1726 | 0.1381 | 0.1208 |
| 867-069    | 470nF Class X2 | 0.51 | 0.4368 | 0.2912 | 0.2330 | 0.2038 |
| 867-073    | 1.0μF Class X2 | 0.80 | 0.6840 | 0.4560 | 0.3648 | 0.3192 |

### Three Terminal Filter Capacitors

Compact, high performance disc EMI suppression filters. The three terminal construction enhances high frequency performance and offers lower inductance than two terminal capacitors. Available without and with integral ferrite beads (to minimise resonance with surrounding circuits).

#### Technical Specification

|                             |  |
|-----------------------------|--|
| Capacitance Range           | 22pF to 22nF   |
| Capacitance Tolerance       | ±20% (Y5S)<br>±30% (FZ 100V)<br>-20/+80% (F, FZ 50V, Y5U)                            |
| Temperature Coefficient     | ±22% (Y5S)<br>-55/+20% (Y5U)<br>-85/+30% (FZ)<br>-80/+30% (F)                        |
| Current Rating              | 6A   |
| Operating Temperature Range | -25 to +85°C   |
| Working Voltage             | 16V (with ferrite beads)<br>50V (without ferrite beads)<br>100V (with ferrite beads) |



Dims: 7mmØ (no ferrite)  
8 x 7mm (ferrite)  
Lead Pitch 2.5mm

| Order Code |                        | 1+   | 25+    | 50+    | 100+   | 500+   |
|------------|------------------------|------|--------|--------|--------|--------|
| 767-223    | 22nF 16V F Filter      | 0.23 | 0.1995 | 0.1663 | 0.1330 | 0.1064 |
| 767-101    | 100pF 50V Y5S Filter   | 0.18 | 0.1575 | 0.1313 | 0.1050 | 0.0840 |
| 767-102    | 1000pF 50V Y5S Filter  | 0.18 | 0.1530 | 0.1275 | 0.1020 | 0.0816 |
| 767-103    | 10nF 50V FZ Filter     | 0.18 | 0.1530 | 0.1275 | 0.1020 | 0.0816 |
| 768-220    | 22pF 100V Y5S Filter   | 0.26 | 0.2223 | 0.1853 | 0.1482 | 0.1186 |
| 768-470    | 47pF 100V Y5S Filter   | 0.29 | 0.2460 | 0.2050 | 0.1640 | 0.1312 |
| 768-101    | 100pF 100V Y5S Filter  | 0.23 | 0.1995 | 0.1663 | 0.1330 | 0.1064 |
| 768-221    | 220pF 100V Y5S Filter  | 0.19 | 0.1588 | 0.1270 | 0.1143 | 0.1016 |
| 768-471    | 470pF 100V Y5S Filter  | 0.23 | 0.1995 | 0.1663 | 0.1330 | 0.1064 |
| 768-102    | 1000pF 100V Y5S Filter | 0.23 | 0.1995 | 0.1663 | 0.1330 | 0.1064 |
| 768-222    | 2200pF 100V Y5U Filter | 0.23 | 0.1995 | 0.1663 | 0.1330 | 0.1064 |
| 768-103    | 10nF 100V FZ Filter    | 0.23 | 0.1995 | 0.1663 | 0.1330 | 0.1064 |

### Delta Capacitor

Three paper capacitors in a delta configuration, housed in a moulded case with flying leads. Features one 0.1μF (Class X1) & two 4700pF (Class Y2) capacitors, rated at 250Vac. Designed for suppression of small motors etc.



Dims. 35 x 14mmØ  
Lead Length 150mm

| Order Code |                 | 1+   | 10+    | 25+    | 50+    | 100+   |
|------------|-----------------|------|--------|--------|--------|--------|
| 869-100    | Delta Capacitor | 1.19 | 0.9950 | 0.7960 | 0.6368 | 0.5572 |





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Station Road, Cullercoats,  
Tyne & Wear. NE30 4PQ

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E-mail: [sales@esr.co.uk](mailto:sales@esr.co.uk)

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*All modules assembled & tested.*
**Digital Echo Chamber Kit**

A compact sound effects kit, with built-in mic or line in, line out or speaker (500mW). 4 Adjustment controls  
 Power: 9Vdc 150mA


**MK182 Velleman kit £11.43**
**3rd Brake Light Flasher Kit**

Works with any incandescent or LED rear centre brake light. Flashes at 7Hz for 5 or 10 times, adjustable re-triggering.  
 Power: 12Vdc max load 4A


**MK178 Velleman kit £6.30**
**Digital Clock Mini Kit**

Red 7 Segment display in attractive enclosure, automatic time base selection, battery back-up, 12 or 24Hr modes.  
 Power: 9Vac or dc


**MK151 Velleman kit £15.09**
**Proximity Card Reader Kit**

A simple security kit with many applications. RFID technology activates a relay, either on/off or timed. Supplied with 2 cards, can be used with up to 25 cards. Power: 9Vac or dc


**MK179 Velleman kit £14.25**
**Running Microbug Kit**

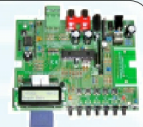
Powered by two subminiature motors, this robot will run towards any light source. Novel shape PCB with LED eyes.  
 Power: 2 x AAA Batteries


**MK127 Velleman kit £9.02**
**200W Power Amplifier**

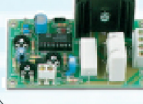
A high quality audio power amp. 200w music power @ 4Ω 3-200kHz. Available as a kit without heatsink or module including heatsink.  
**K8060 Velleman kit £12.85**  
**Heatsink for kit £9.95**  
**VM100 Module £38.54**


**MP3 Player Kit**

Plays MP3 files from an SD card, supports ID3 tag which can be displayed on optional LCD. Line & headphone output. Remote control add-on. Power: 12Vdc 100mA


**K8095 Velleman kit £39.99**
**DC to Pulse width Modulator**

A handy kit to accurately control DC motors etc. Overload & short circuit protection. Input voltage 2.5-35Vdc, Max output 6.5A.  
 Power: 8-35Vdc


**K8004 Velleman kit £9.95**
**Audio Analyser Kit**

A small spectrum analyser with LCD. Suitable for use on 2, 4 or 8Ω systems. 300mW to 1200W(20) 20-20kHz Panel mounting, back-lit display. Power: 12Vdc 75mA


**K8098 Velleman kit £31.65**
**USB**
**USB DMX Interface**

512 DMX Channels controlled by PC via USB. Software & case included. Available as a kit or ready assembled module.


**K8062 Velleman kit £47.90**  
**VM116 Module £67.15**
**USB Interface Board**

Featuring 5 in, 8 digital outputs, 2 in & 2 analogue outputs. Supplied with software. Available as a kit or ready assembled module.


**K8055 Velleman kit £24.80**  
**VM110 Module £34.90**
**8 Channel USB Relay Board**

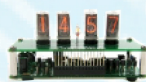
PC Controlled 16A relays with toggle, momentary or timed action. Test buttons included, available in a kit or assembled.


**K8090 Velleman kit £39.95**  
**VM8090 Module £58.40**
**Multifunction Up/Down Counter**

An up or down counter via on-board button or ext input. Time display feature. Alarm count output. 0-9999 display.  
 Power: 9-12Vdc 150mA


**K8035 Velleman kit £17.85**
**Nixie Clock Kit**

Gas filled nixie tubes with their distinctive orange glow. HH-MM display, automatic power sync 50/60Hz.  
 Power: 9-12Vac 300mA


**K8099 Velleman kit £64.96**
**Mini USB Interface Board**

New from Velleman this little interface module with 15 inputs/outputs inc digital & analogue in, PWM outputs. USB Powered 50mA, Software supplied


**VM167 Module £26.80**
**Thermostat Mini Kit**

General purpose low cost thermostat kit. +5 to +30°C Easily modified temperature range/min/max/hysteresis 3A Relay.  
 Power: 12Vdc 100mA


**MK138 Velleman Kit £4.55**
**Velleman Function Generator**

PC Based USB controlled function generator. 0.01Hz to 2Mhz Pre-defined & waveform editor. Software supplied. See web site for full feature list.


**PCGU1000 Velleman £118.38**
**Velleman PC Scope**

PC Based USB controlled 2 channel 60Mhz oscilloscope with spectrum analyser & Transient recorder. 2 Scope probes & software included. See web site for full feature list.


**PCSU1000 Velleman £249.00**
**Velleman PC Scope/Generator**

PC Based USB controlled 2 channel oscilloscope AND Function generator. Software included. See web site for full feature list.


**PCSGU250 Velleman £113.67**
**RF Remote Control Transmitter**

Single channel RF keyfob transmitter with over 13,122 combinations. Certified radio frequency 433.92MHz. Power: 12Vdc 2mA (inc) For use with TL-1,2,3,4 receivers.


**TL-5 Cebek Module £14.64**
**RF Remote Control Receiver**

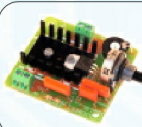
Single channel RF receiver with relay output. Auto or manual code setup. Momentary output, 3A relay.  
 Power: 12Vdc 60mA For use with TL-5 or TL-6 transmitters.


**TL-1 Cebek Module £28.25**
**Keypad Access Control**

An electronic lock with up to ten 4 digit codes. Momentary or timed (1-60sec/1-60min) output. Relay 5A.  
 Power: 12Vdc 100mA Keypad included.


**DA-03 Cebek Module £54.26**
**AC Motor Controller**

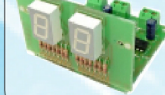
A 230Vac 375W motor speed control unit giving 33 to 98% of full power.  
 Power: 230Vac


**R-8 Cebek Module £12.14**
**Digital Record/Player**

Non volatile flash memory, Single 20 sec recording via integral mic, 2W output to 8Ω speaker.  
 Power: 5Vdc 100mA


**C-9701 Cebek Module £7.89**
**2 Digital Counter**

Standard counter, 0 to 99 from input pulses or external signal. With reset input, 13.5mm Displays.  
 Power: 12Vdc 90mA.


**CD-9 Cebek Module £12.99**
**1.8W Mono Amplifier**

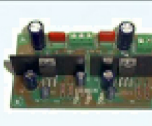
Compact mono 1.8W RMS 4Ω power stage, short circuit & reverse polarity protection. 30-18kHz, Power: 4-14Vdc 150mA


**E-1 Cebek Module £5.87**
**20W 2 Channel Amplifier**

Mono amplifier with 2 channels (Low & High frequency), 20W RMS 4Ω per channel, adjustable high level, 22-22kHz, short circuit & reverse polarity protection.  
 Power: 8-18Vdc 2A


**E-14 Cebek Module £22.11**
**5W Stereo Amplifier**

Stereo power stage with 5W RMS 4Ω, 30-18kHz, short circuit & reverse polarity protection.  
 Power: 6-15Vdc 500mA


**ES-2 Cebek Module £21.54**
**12Vdc Power Supply**

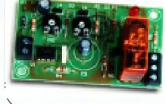
Single rail regulated power supply complete with transformer, 130mA max, low ripple, 12Vdc with adjustment.


**FE-103 Cebek Module £13.16**
**1-180 Second Timer**

Universal timer with relay output. Time start upon power up or push button. LED indication. 5A Relay.  
 Power: 12Vdc 60mA


**I-1 Cebek Module £12.92**
**Cyclic Timer**

Universal timer with relay output. Time start upon power up or push button. On & Off times 0.3-60 Seconds, LED indication. 5A Relay.  
 Power: 12Vdc 80mA


**I-10 Cebek Module £14.12**
**Light Detector**

Adjustable light sensor operating a relay. Remote sensor & terminals for remote adjustment pot. 5A Relay.  
 Power: 12Vdc 60mA


**I-4 Cebek Module £13.98**
**Liquid Level Detector**

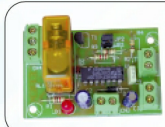
A liquid level operated relay. Remote sensor operates relay when in contact with a liquid. 5A Relay.  
 Power: 12Vdc 60mA


**I-6 Cebek Module £13.08**
**Thermostat**

A temperature controlled relay. Adjustable between -10 to 60°C Sensor on remote PCB. Connector for external adjustment pot. 5A Relay.  
 Power: 12Vdc 60mA


**I-8 Cebek Module £12.80**
**Start / Stop Relay**

Simple push button control of a relay. Either 1 or 2 button operation 5A Relay.  
 Power: 12Vdc 60mA


**I-9 Cebek Module £12.83**
**Components**
**Hardware**
**Soldering**
**Switches**
**Test Equipment**
**Transformers**
**Motors**
**PCB Equipment**
**Connectors**
**Power Supplies**
**Enclosures**
**Relays**