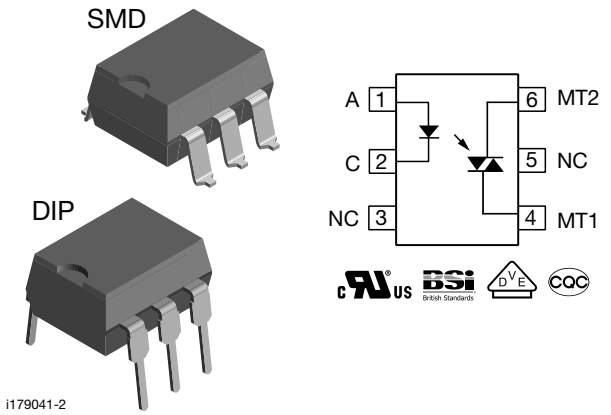
# Optocoupler, Phototriac Output, Non-Zero Crossing, 400 $V_{DRM}$




## FEATURES

- 400 V blocking voltage
- Isolation test voltage, 5300 $V_{RMS}$, t = 1 s
- Isolation materials per UL94
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

## APPLICATIONS

- High current triac driver
- Solid state relay
- Switch small AC loads

## AGENCY APPROVALS

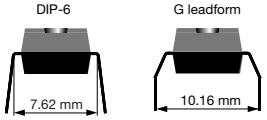
- UL1577, file no. E52744 system code H
- CSA notice 5A compliant, cUL tested
- DIN EN 60747-5-5 (VDE0884)
- BSI IEC 60950; IEC 60065
- CQC: GB8898-2001

## DESCRIPTION

The K3020P, K3020PG series consists of a phototriac optically coupled to a gallium arsenide infrared-emitting diode in a 6-lead plastic dual inline package

## ORDERING INFORMATION

| K | 3 | 0 | 2 | 0 | P | # | X | 0 | # | # | T |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PART NUMBER | | | | | | TRIGGER CURRENT BIN | PACKAGE OPTION | | | | TAPE AND REEL |




| AGENCY CERTIFIED/PACKAGE | TRIGGER CURRENT, $I_{FT}$ | | | | |
|---|---|---|---|---|---|
| **VDE, cUL, BSI** | **3.6 mA** | **5 mA** | **10 mA** | **15 mA** | **30 mA** |
| DIP-6 | K3036P | K3023P | K3022P | K3021P | K3020P |
| DIP-6, 400 mil | K3036PG | K3023PG | K3022PG | K3021PG | K3020PG |

**Note**

- G = leadform 10.16 mm; G is not marked on the body.

## ABSOLUTE MAXIMUM RATINGS ($T_{amb}$ = 25 °C, unless otherwise specified)

| PARAMETER | TEST CONDITION | PART | SYMBOL | VALUE | UNIT |
|---|---|---|---|---|---|
| **INPUT** | | | | | |
| Reverse voltage | | | $V_R$ | 5 | V |
| Forward current | | | $I_F$ | 80 | mA |
| Surge current | P.W. < 10 µs | | $I_{FSM}$ | 3 | A |
| Power dissipation | | | $P_{diss}$ | 100 | mW |
| Junction temperature | | | $T_j$ | 100 | °C |
| **OUTPUT** | | | | | |
| Peak off-state voltage | | | $V_{DRM}$ | 400 | V |
| On-state RMS current | | | $I_{D(RMS)}$ | 100 | mA |
| Peak surge current | $t_p \leq 10$ ms | | $I_{FSM}$ | 1.5 | A |
| Power dissipation | | | $P_{diss}$ | 300 | mW |
| Junction temperature | | | $T_j$ | 100 | °C |

| **ABSOLUTE MAXIMUM RATINGS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | |
|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **PART** | **SYMBOL** | **VALUE** | **UNIT** |
| **COUPLER** | | | | | |
| Isolation voltage | t = 1 s | | $V_{ISO}$ | 5300 | $V_{RMS}$ |
| Total power dissipation | | | $P_{tot}$ | 350 | mW |
| Storage temperature range | | | $T_{stg}$ | - 55 to + 150 | °C |
| Ambient temperature | | | $T_{amb}$ | - 55 to + 100 | °C |
| Junction temperature | | | $T_j$ | 100 | °C |
| Lead soldering temperature (1) | 2 mm from case, t < 10 s | | $T_{sld}$ | 260 | °C |

**Notes**

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.

(1) Refer to wave profile for soldering conditions for through hole devices (DIP) “Assembly Instructions” (www.vishay.com/doc?80054)

| **ELECTRICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **PART** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| **INPUT** | | | | | | | |
| Forward voltage | $I_F$ = 50 mA | | $V_F$ | | 1.3 | 1.6 | V |
| Reverse voltage | $I_R$ = 10 µA | | $V_R$ | 5 | | | V |
| Junction capacitance | $V_R$ = 0 V, f = 1 MHz | | $C_j$ | | 50 | | pF |
| **OUTPUT** | | | | | | | |
| Forward peak off-state voltage (repetitive) | $I_{DRM}$ = 100 nA | | $V_{DRM}$ (1) | 400 | | | V |
| Peak on-state voltage | $I_{TM}$ = 100 mA | | $V_{TM}$ | | 1.5 | 3 | V |
| Critical rate of rise of off-state voltage | $I_F$ = 0 A, $V_D$ = 0.67 $V_{DRM}$ | | $dV/dt_{cr}$ | | 10 | | V/µs |
| Critical rate of rise of on-state current commutation | $V_D$ = 30 $V_{RMS}$, $I_D$ = 15 $mA_{RMS}$ | | $dV/dt_{crq}$ | 0.1 | 0.15 | | V/µs |
| **COUPLER (2)** | | | | | | | |
| Emitting diode trigger current | $V_S$ = 3 V, $R_L$ = 150 Ω | K3020P | $I_{FT}$ | | 15 | 30 | mA |
| | | K3020PG | $I_{FT}$ | | 15 | 30 | mA |
| | | K3021P | $I_{FT}$ | | 8 | 15 | mA |
| | | K3021PG | $I_{FT}$ | | 8 | 15 | mA |
| | | K3022P | $I_{FT}$ | | 5 | 10 | mA |
| | | K3022PG | $I_{FT}$ | | 5 | 10 | mA |
| | | K3023P | $I_{FT}$ | | 3 | 5 | mA |
| | | K3023PG | $I_{FT}$ | | 3 | 5 | mA |
| | | K3036P | $I_{FT}$ | | 2 | 3.6 | mA |
| | | K3036PG | $I_{FT}$ | | 2 | 3.6 | mA |
| Holding current | $I_F$ = 10 mA, $V_S \geq$ 3 V | | $I_H$ | | 200 | | µA |

**Notes**

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.

(1) Test voltage must be applied within dV/dt ratings.

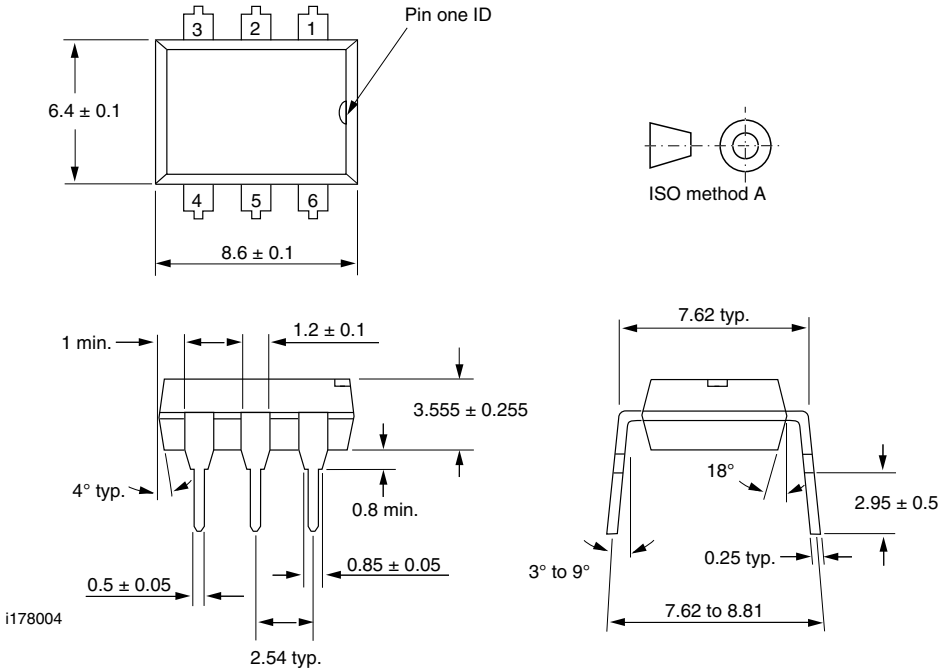
(2) $I_{FT}$ is defined as a minimum trigger current.

| SAFETY AND INSULATION RATINGS | | | | | |
|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Climatic classification (according to IEC 68 part 1) | | | 55/100/21 | | |
| Pollution degree (DIN VDE 0109) | | | 2 | | |
| Comparative tracking index | CTI | 175 | | | |
| Peak transient overvoltage | $V_{IOTM}$ | | | 8000 | $V_{peak}$ |
| Peak working insulation voltage | $V_{IORM}$ | | | 890 | $V_{peak}$ |
| Partial discharge test voltage (method a, $V_{pd} = V_{IORM} \times 1.875$) | $V_{pd}$ | | | 1669 | $V_{peak}$ |
| Isolation resistance at $T_{amb}$ = 100 °C, $V_{DC}$ = 500 V | $R_{IO}$ | $10^{11}$ | | | Ω |
| Isolation resistance at $T_{amb}$ = 25 °C, $V_{DC}$ = 500 V | $R_{IO}$ | $10^{12}$ | | | Ω |
| Safety rating - power | $P_{SO}$ | | | 265 | mW |
| Safety rating - input current | $I_{SI}$ | | | 130 | mA |
| Safety rating - temperature | $T_{SI}$ | | | 150 | °C |
| Clearance distance (Standard DIP-6) | | 7 | | | mm |
| Creepage distance (Standard DIP-6) | | 7 | | | mm |
| Clearance distance (400 mil DIP-6) | | 8 | | | mm |
| Creepage distance (400 mil DIP-6) | | 8 | | | mm |

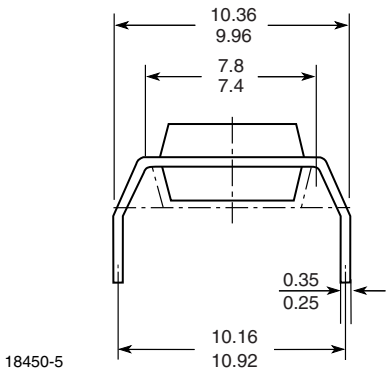
**Note**

- According to DIN EN60747-5-5 (see figure 4). This optocoupler is suitable for safe electrical isolation only within the safety ratings. Compliance with the safety ratings shall be ensured by means of suitable protective circuits.

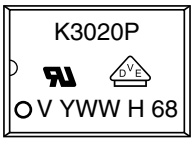
**PACKAGE DIMENSIONS** millimeters




**G Series**




**PACKAGE MARKING** (example)




**Notes**

- The “G” of the G leadform type is not marked on the body.
- The VDE logo is only marked on option1 parts.

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