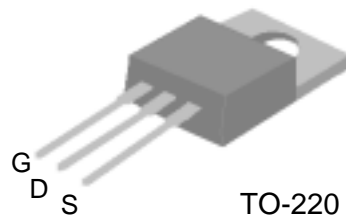


N-CHANNEL ENHANCEMENT-MODE POWER MOSFET

Low gate charge
Simple drive requirement
Fast switching



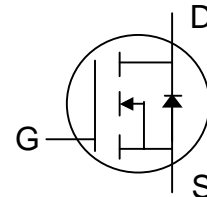
TO-220

BV_{DSS} 30V
 $R_{DS(ON)}$ 17m Ω
 I_D 40A

Description

Power MOSFETs from Silicon Standard provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-220 package is widely preferred for commercial and industrial applications and suited for low voltage applications such as DC/DC converters and high efficiency switching circuits.



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_C=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	40	A
$I_D @ T_C=100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	30	A
I_{DM}	Pulsed Drain Current ¹	169	A
$P_D @ T_C=25^\circ\text{C}$	Total Power Dissipation	50	W
	Linear Derating Factor	0.4	W/ $^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Value	Unit
Rthj-c	Thermal Resistance Junction-case Max.	2.5	$^\circ\text{C/W}$
Rthj-a	Thermal Resistance Junction-ambient Max.	62	$^\circ\text{C/W}$

Electrical Characteristics @ $T_j=25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to $25^\circ\text{C}, I_D=1\text{mA}$	-	0.037	-	V/ $^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=20A$	-	14	17	m Ω
		$V_{GS}=4.5V, I_D=16A$	-	20	23	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	-	3	V
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=20A$	-	26	-	S
I_{DSS}	Drain-Source Leakage Current ($T_j=25^\circ\text{C}$)	$V_{DS}=30V, V_{GS}=0V$	-	-	1	μA
	Drain-Source Leakage Current ($T_j=150^\circ\text{C}$)	$V_{DS}=24V, V_{GS}=0V$	-	-	25	μA
I_{GSS}	Gate-Source Leakage	$V_{GS}= \pm 20V$	-	-	± 100	nA
Q_g	Total Gate Charge ²	$I_D=20A$	-	17	-	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=24V$	-	3	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=5V$	-	10	-	nC
$t_{d(on)}$	Turn-on Delay Time ²	$V_{DS}=15V$	-	7.2	-	ns
t_r	Rise Time	$I_D=20A$	-	60	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega, V_{GS}=10V$	-	22.5	-	ns
t_f	Fall Time	$R_D=0.75\Omega$	-	10	-	ns
C_{iss}	Input Capacitance	$V_{GS}=0V$	-	800	-	pF
C_{oss}	Output Capacitance	$V_{DS}=25V$	-	380	-	pF
C_{rss}	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	133	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I_S	Continuous Source Current (Body Diode)	$V_D=V_G=0V, V_S=1.3V$	-	-	40	A
I_{SM}	Pulsed Source Current (Body Diode) ¹		-	-	169	A
V_{SD}	Forward On Voltage ²	$T_j=25^\circ\text{C}, I_S=40A, V_{GS}=0V$	-	-	1.3	V

Notes:

- 1.Pulse width limited by safe operating area.
- 2.Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

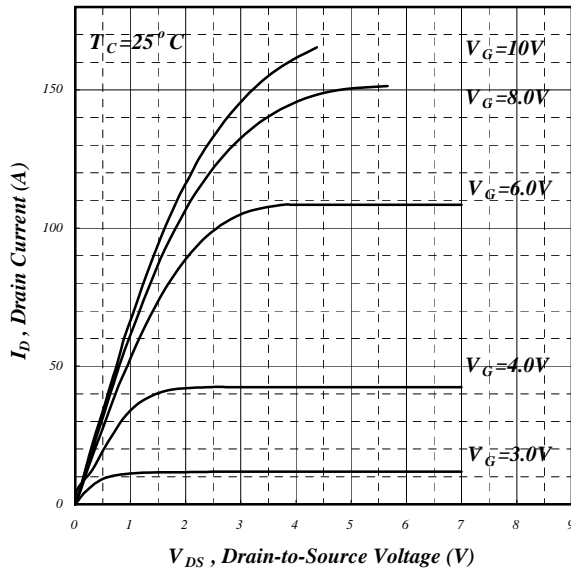


Fig 1. Typical Output Characteristics

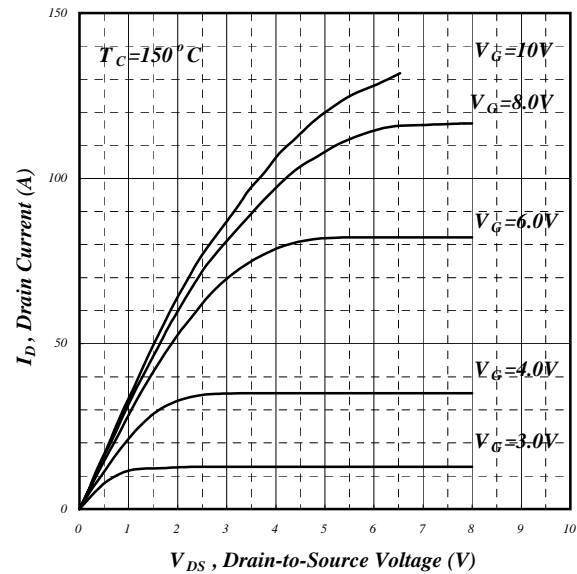


Fig 2. Typical Output Characteristics

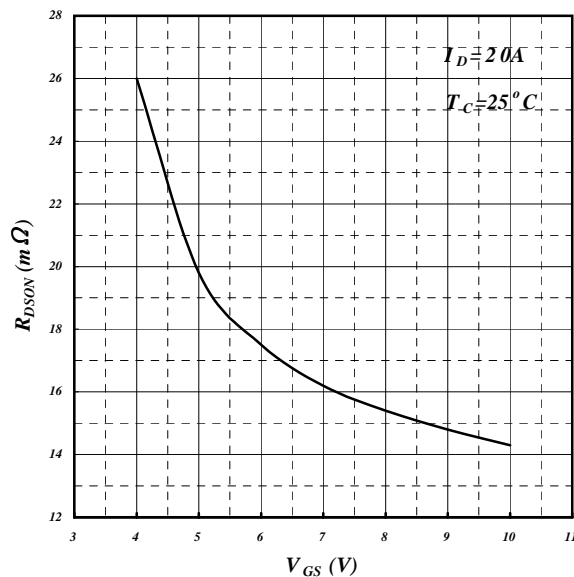
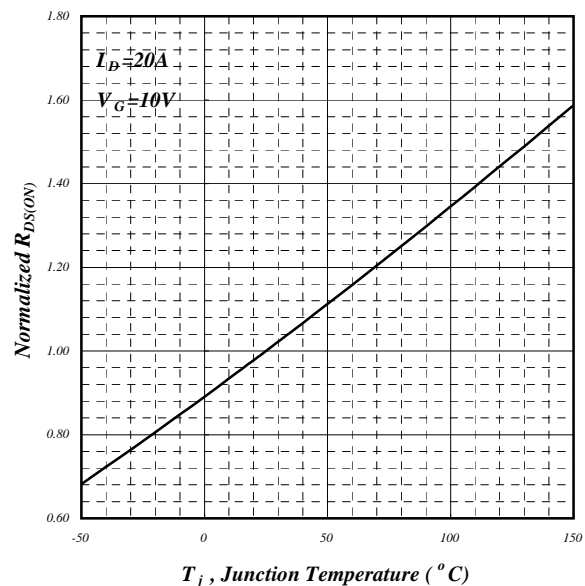


Fig 3. On-Resistance v.s. Gate Voltage


 Fig 4. Normalized On-Resistance
 vs. Junction Temperature

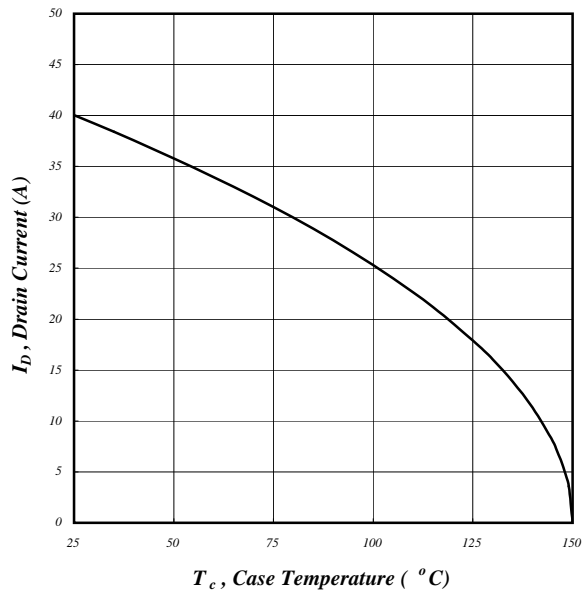


Fig 5. Maximum Drain Current vs. Case Temperature

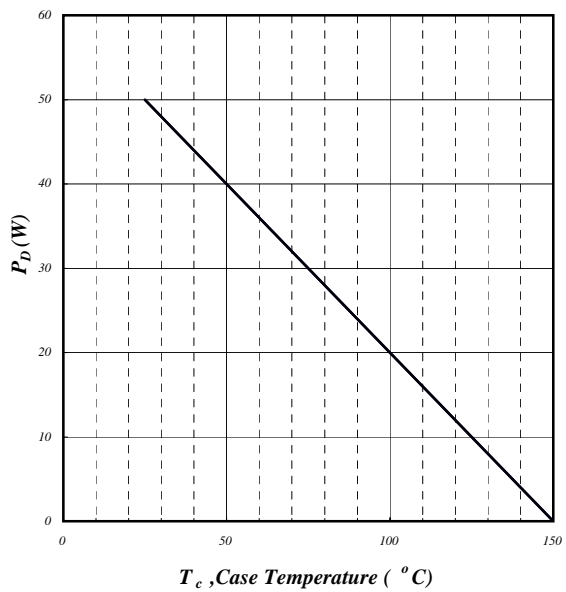


Fig 6. Typical Power Dissipation

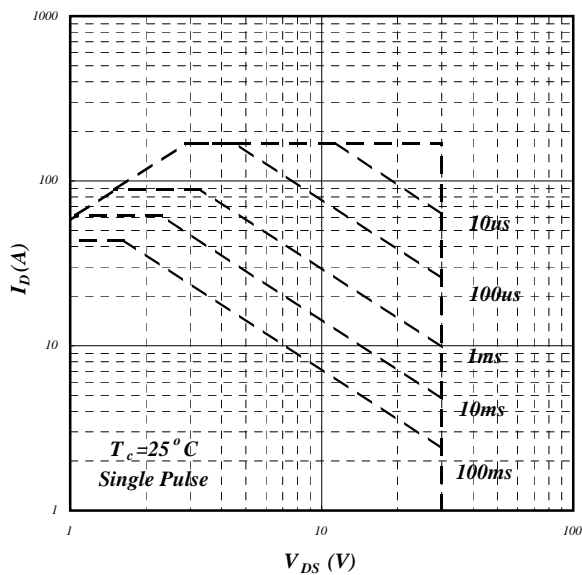


Fig 7. Maximum Safe Operating Area

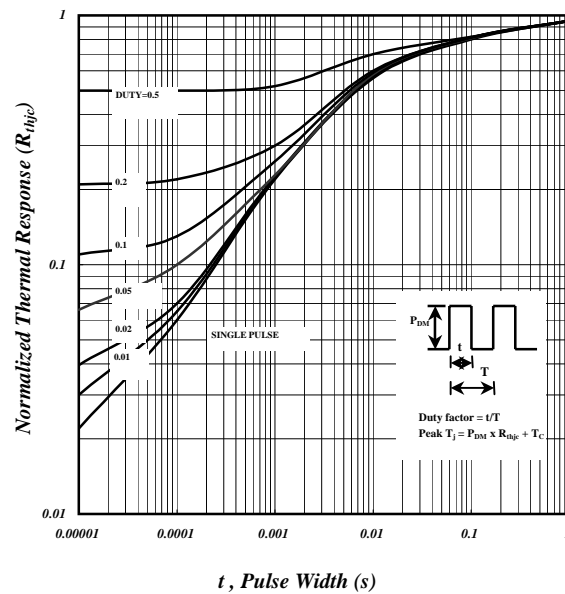
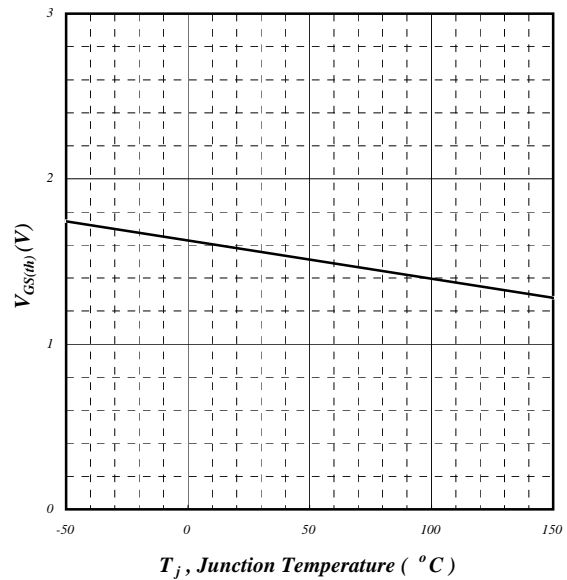
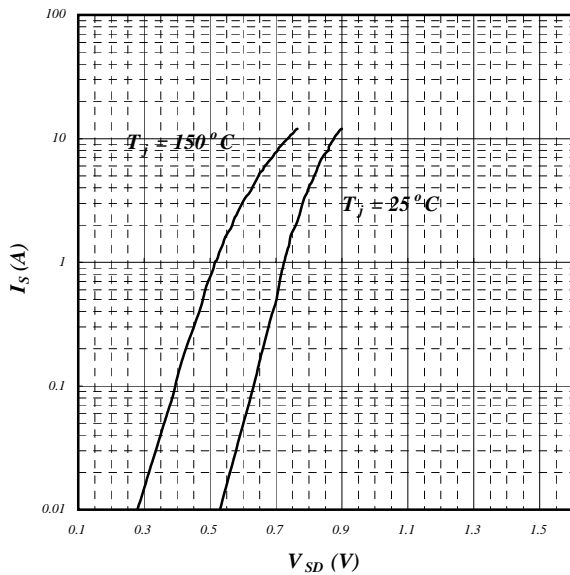
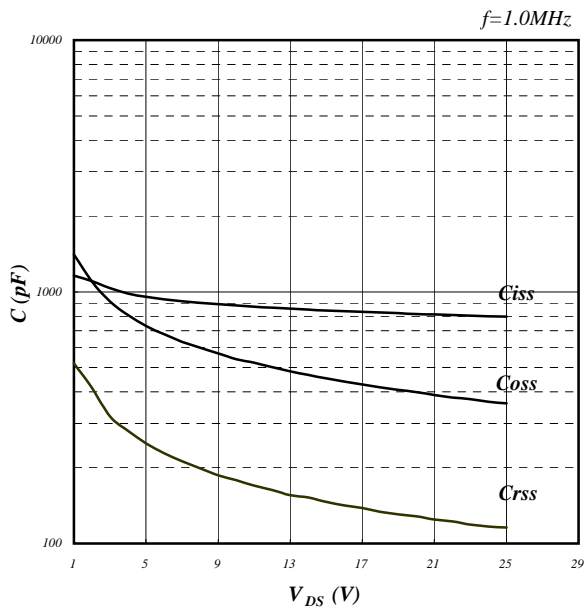
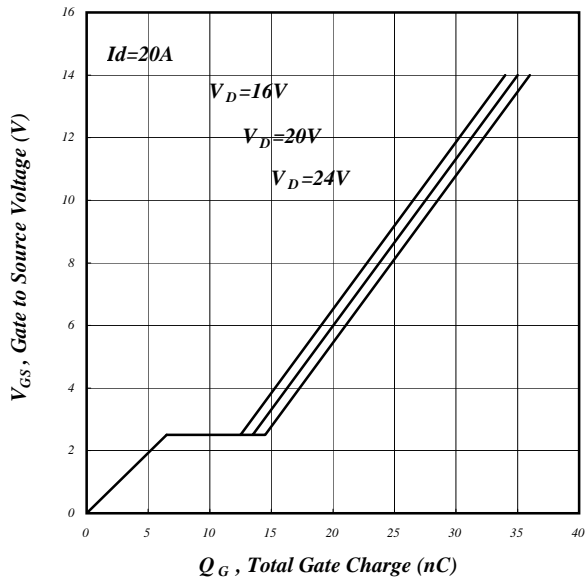


Fig 8. Effective Transient Thermal Impedance



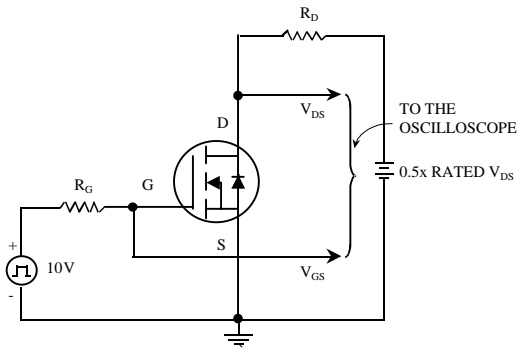


Fig 13. Switching Time Circuit

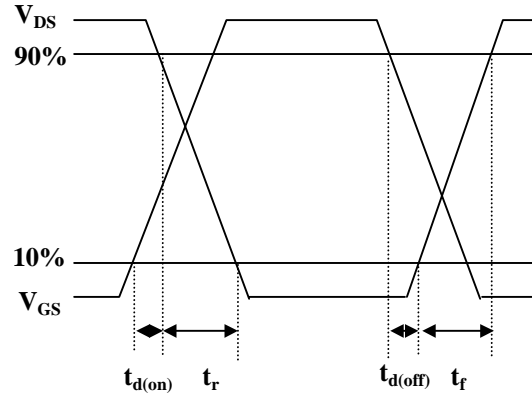


Fig 14. Switching Time Waveform

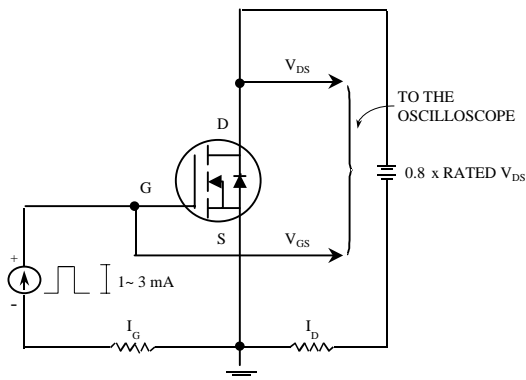


Fig 15. Gate Charge Circuit

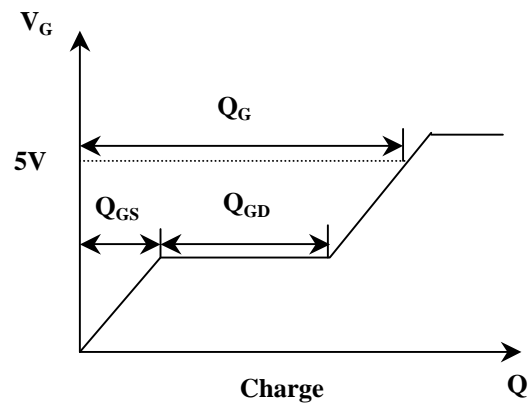


Fig 16. Gate Charge Waveform

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