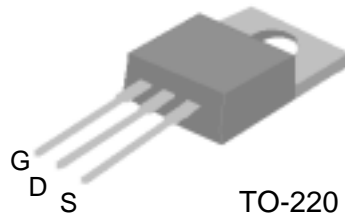


## N-CHANNEL ENHANCEMENT-MODE POWER MOSFET

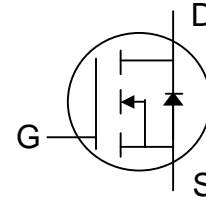
- Low gate charge
- Simple drive requirement
- Fast switching



$BV_{DSS}$	30V
$R_{DS(ON)}$	17m $\Omega$
$I_D$	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	$\pm 20$	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 <sup>1</sup>	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	$^\circ\text{C}/\text{W}$
Rthj-a	Thermal Resistance Junction-ambient Max.	62	$^\circ\text{C}/\text{W}$

**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	$\text{m}\Omega$
		$V_{GS}=4.5V, I_D=16A$	-	20	23	$\text{m}\Omega$
$V_{GS(th)}$	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	$\mu A$
	Drain-Source Leakage Current ( $T_j=150^\circ\text{C}$ )	$V_{DS}=24V, V_{GS}=0V$	-	-	25	$\mu A$
$I_{GSS}$	Gate-Source Leakage	$V_{GS}=\pm 20V$	-	-	$\pm 100$	nA
$Q_g$	Total Gate Charge <sup>2</sup>	$I_D=20A$	-	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 <sup>2</sup>	$V_{DS}=15V$	-	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
$C_{riss}$	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 ) <sup>1</sup>		-	-	169	A
$V_{SD}$	Forward On Voltage <sup>2</sup>	$T_j=25^\circ\text{C}, I_S=40A, V_{GS}=0V$	-	-	1.3	V

**Notes:**

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

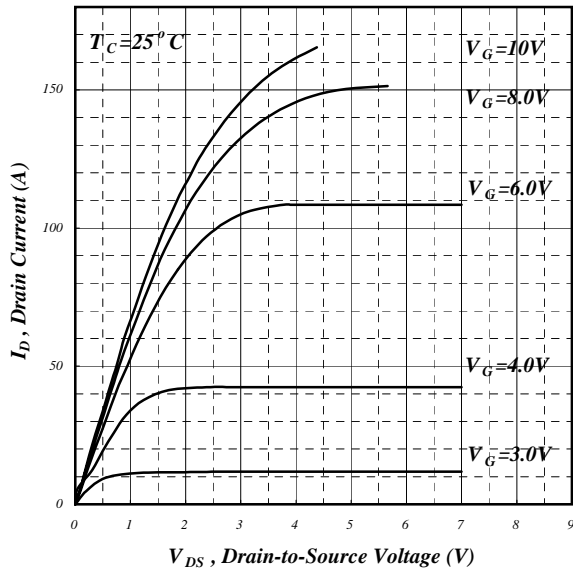


Fig 1. Typical Output Characteristics

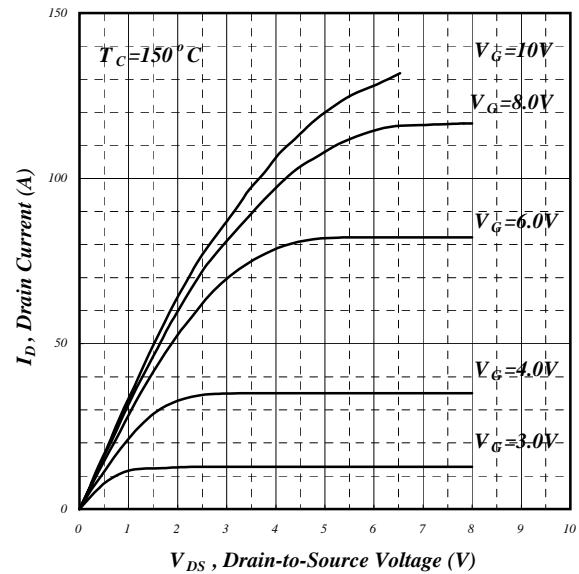


Fig 2. Typical Output Characteristics

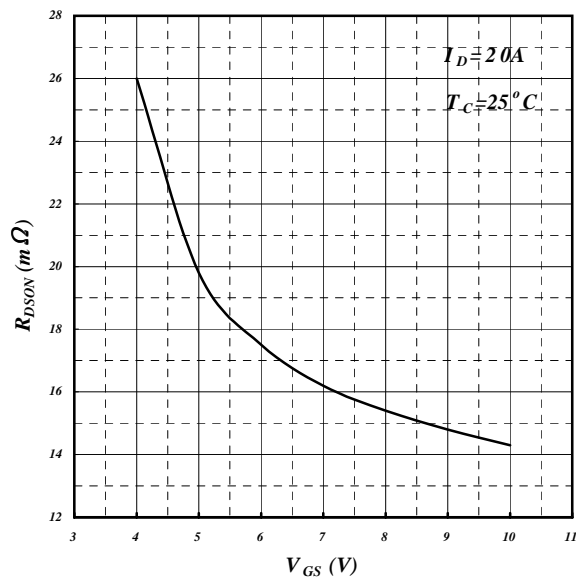


Fig 3. On-Resistance v.s. Gate Voltage

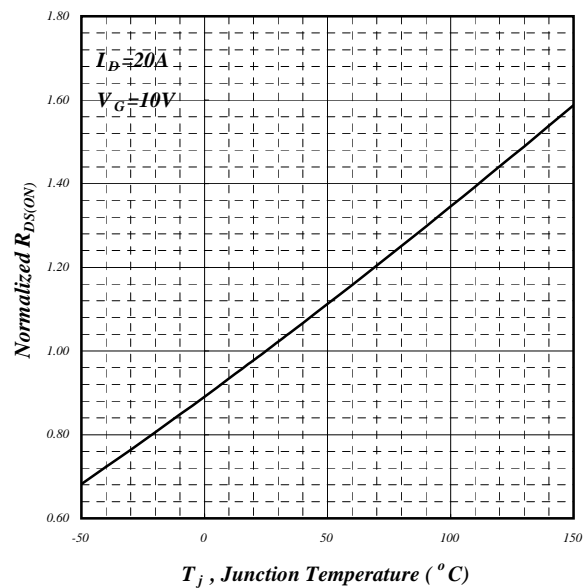


Fig 4. Normalized On-Resistance vs. Junction Temperature

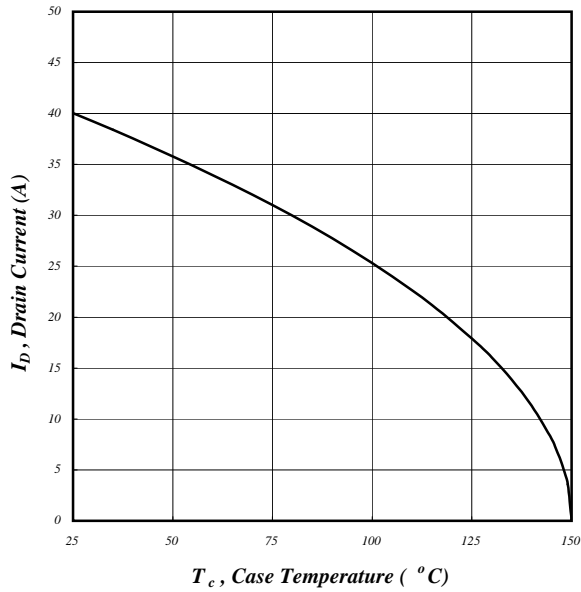


Fig 5. Maximum Drain Current vs. Case Temperature

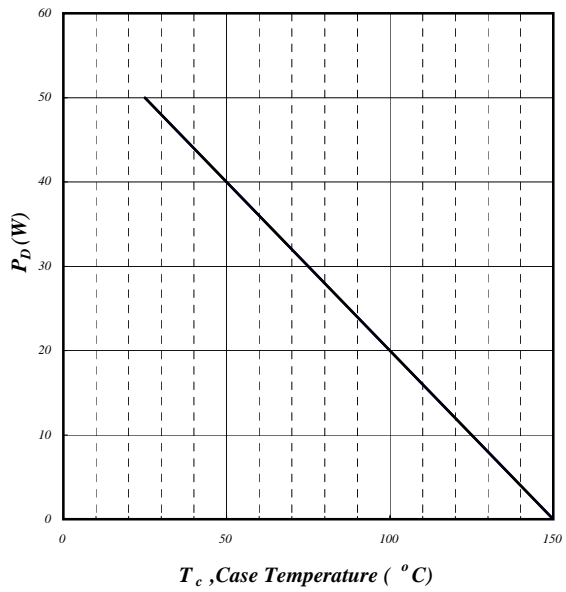


Fig 6. Typical Power Dissipation

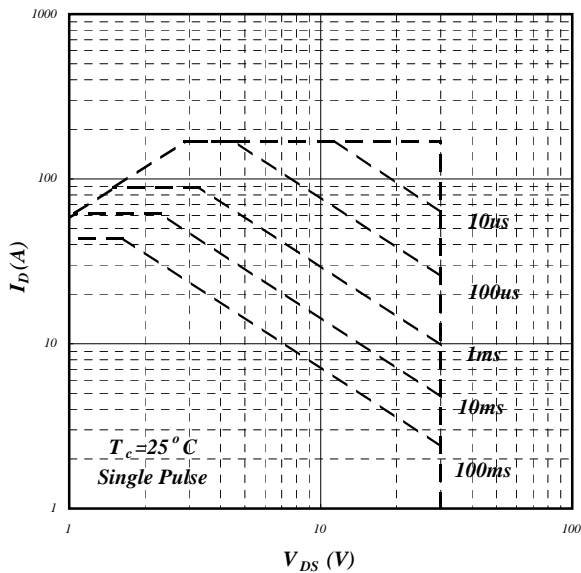


Fig 7. Maximum Safe Operating Area

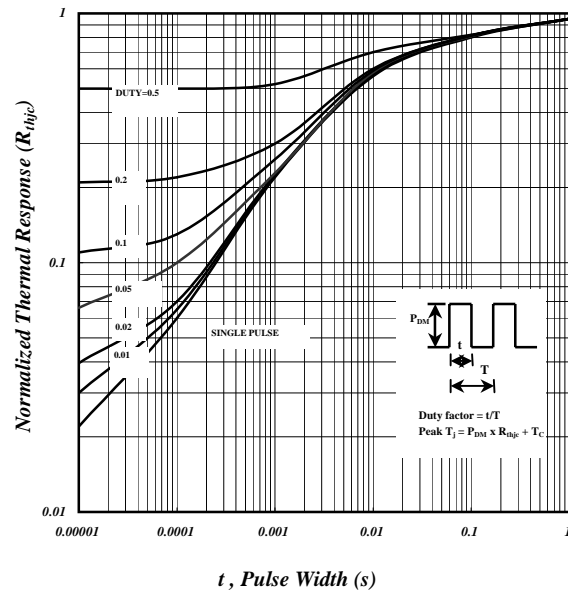


Fig 8. Effective Transient Thermal Impedance

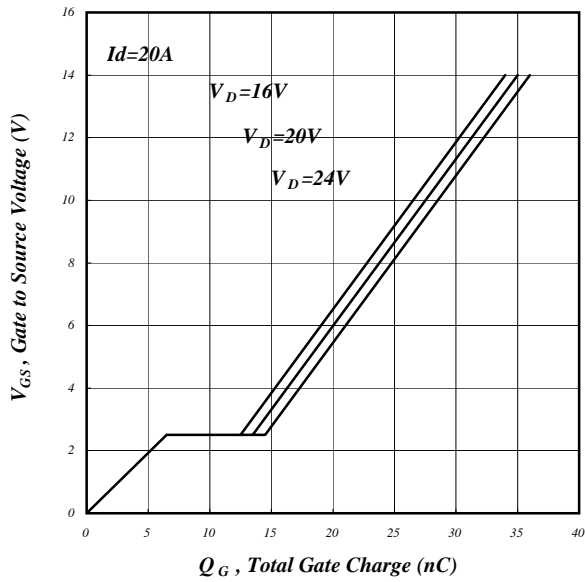


Fig 9. Gate Charge Characteristics

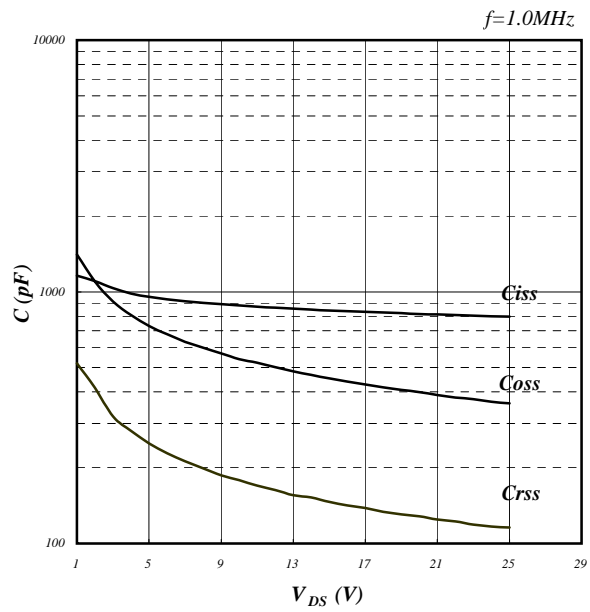


Fig 10. Typical Capacitance Characteristics

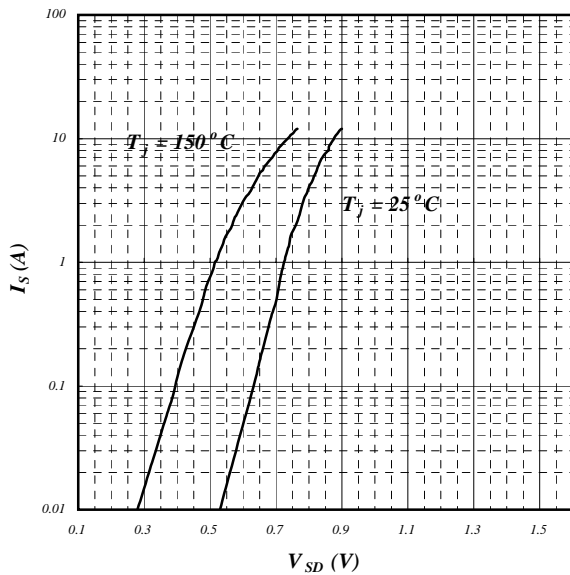


Fig 11. Forward Characteristic of Reverse Diode

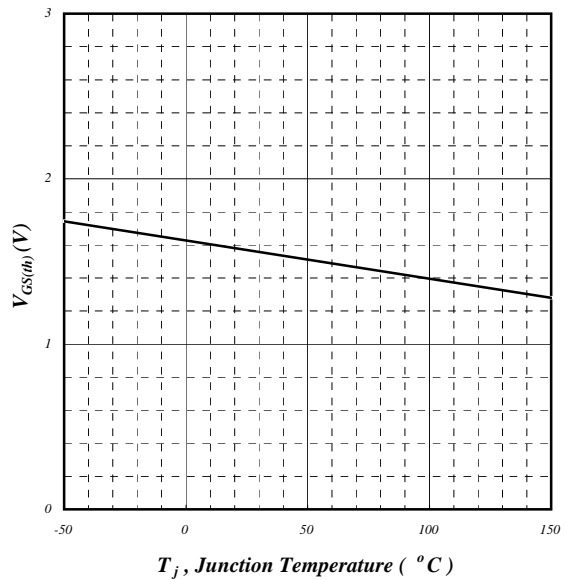
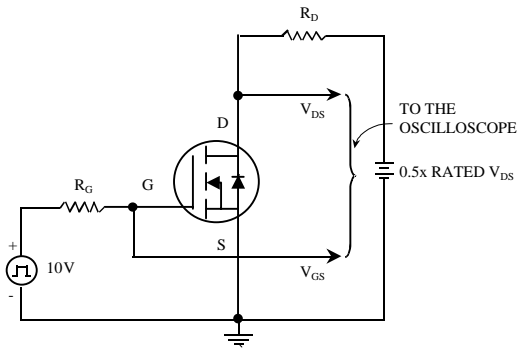
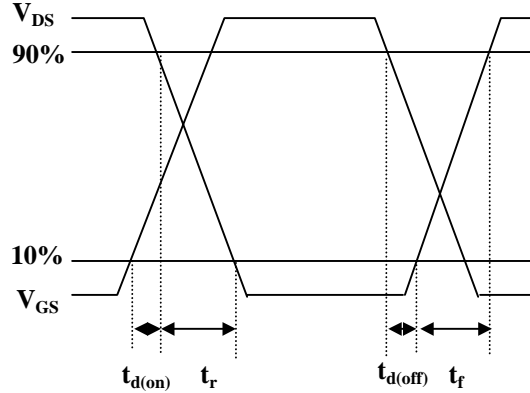
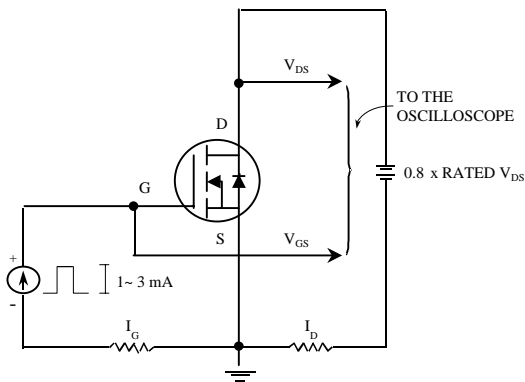
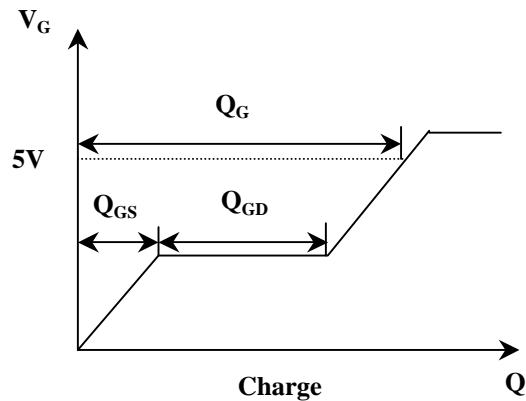


Fig 12. Gate Threshold Voltage vs. Junction Temperature


**Fig 13. Switching Time Circuit**

**Fig 14. Switching Time Waveform**

**Fig 15. Gate Charge Circuit**

**Fig 16. Gate Charge Waveform**

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