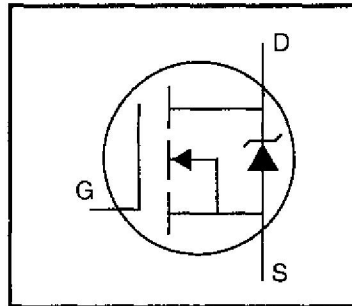


### HEXFET® Power MOSFET

- Isolated Package
- High Voltage Isolation= 2.5KVRMS ⑤
- Sink to Lead Creepage Dist.= 4.8mm
- Logic-Level Gate Drive
- $R_{DS(on)}$  Specified at  $V_{GS}=4V$  &  $5V$
- Fast Switching
- Ease of Paralleling



$$V_{DSS} = 60V$$

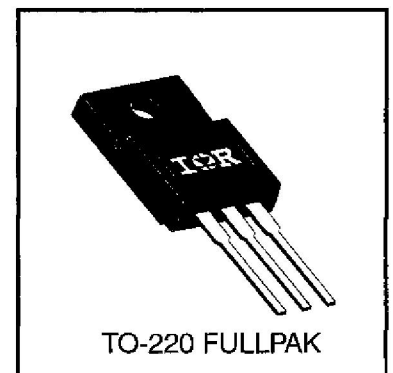
$$R_{DS(on)} = 0.20\Omega$$

$$I_D = 8.0A$$

### Description

Third Generation HEXFETs from International Rectifier provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-220 Fullpak eliminates the need for additional insulating hardware in commercial-industrial applications. The moulding compound used provides a high isolation capability and a low thermal resistance between the tab and external heatsink. This isolation is equivalent to using a 100 micron mica barrier with standard TO-220 product. The Fullpak is mounted to a heatsink using a single clip or by a single screw fixing.



DATA SHEETS

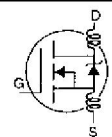
### Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D$ @ $T_C = 25^\circ C$	Continuous Drain Current, $V_{GS}$ @ 5.0 V	8.0	A
$I_D$ @ $T_C = 100^\circ C$	Continuous Drain Current, $V_{GS}$ @ 5.0 V	5.7	
$I_{DM}$	Pulsed Drain Current ①	32	
$P_D$ @ $T_C = 25^\circ C$	Power Dissipation	27	W
	Linear Derating Factor	0.18	W/°C
$V_{GS}$	Gate-to-Source Voltage	$\pm 10$	V
$E_{AS}$	Single Pulse Avalanche Energy ②	68	mJ
$dv/dt$	Peak Diode Recovery $dv/dt$ ③	4.5	V/ns
$T_J$ $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +175	°C
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	
	Mounting Torque, 6-32 or M3 screw	10 lbf•in (1.1 N•m)	

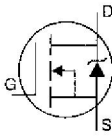
### Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	—	5.5	°C/W
$R_{\theta JA}$	Junction-to-Ambient	—	—	65	

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

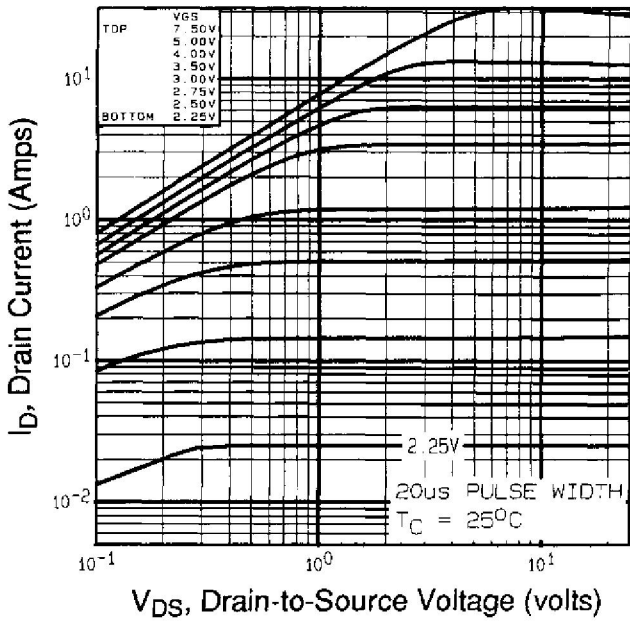
	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	60	---	---	V	$V_{GS}=0V, I_D=250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	---	0.070	---	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D=1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	---	---	0.20	$\Omega$	$V_{GS}=5.0V, I_D=4.8A$ ④
		---	---	0.28		$V_{GS}=4.0V, I_D=4.0A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	1.0	---	2.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
$g_{fs}$	Forward Transconductance	3.6	---	---	S	$V_{DS}=25V, I_D=4.8A$ ④
$I_{DSS}$	Drain-to-Source Leakage Current	---	---	25	$\mu A$	$V_{DS}=60V, V_{GS}=0V$
		---	---	250		$V_{DS}=48V, V_{GS}=0V, T_J=150^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	---	---	100	nA	$V_{GS}=10V$
	Gate-to-Source Reverse Leakage	---	---	-100		$V_{GS}=-10V$
$Q_g$	Total Gate Charge	---	---	8.4	nC	$I_D=10A$
$Q_{gs}$	Gate-to-Source Charge	---	---	3.5		$V_{DS}=48V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	---	---	6.0		$V_{GS}=5.0V$ See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	---	9.3	---	ns	$V_{DD}=30V$
$t_r$	Rise Time	---	110	---		$I_D=10A$
$t_{d(off)}$	Turn-Off Delay Time	---	17	---		$R_G=12\Omega$
$t_f$	Fall Time	---	26	---		$R_D=2.8\Omega$ See Figure 10 ④
$L_D$	Internal Drain Inductance	---	4.5	---	nH	Between lead, 6 mm (0.25in.) from package and center of die contact 
$L_S$	Internal Source Inductance	---	7.5	---		
$C_{iss}$	Input Capacitance	---	400	---	pF	$V_{GS}=0V$
$C_{oss}$	Output Capacitance	---	170	---		$V_{DS}=25V$
$C_{riss}$	Reverse Transfer Capacitance	---	42	---		$f=1.0\text{MHz}$ See Figure 5
$C$	Drain to Sink Capacitance	---	12	---		$f=1.0\text{MHz}$

## Source-Drain Ratings and Characteristics

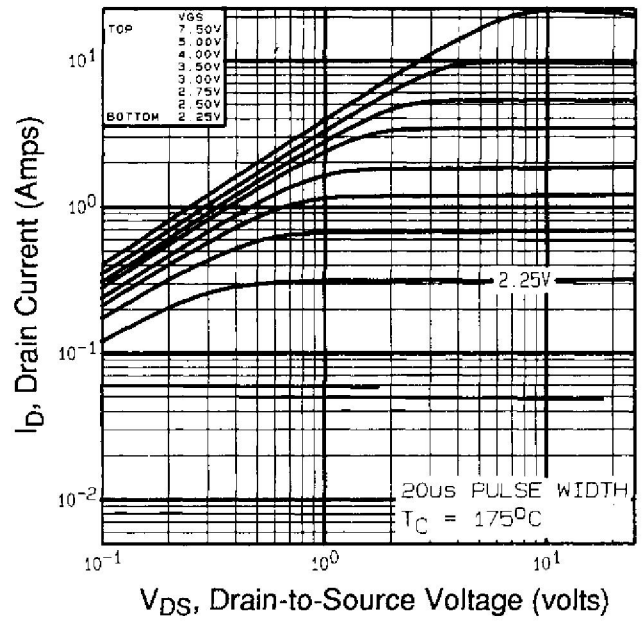
	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$I_S$	Continuous Source Current (Body Diode)	---	---	8.0	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①	---	---	32		
$V_{SD}$	Diode Forward Voltage	---	---	1.6	V	$T_J=25^\circ\text{C}, I_S=8.0A, V_{GS}=0V$ ④
$t_{rr}$	Reverse Recovery Time	---	65	130	ns	$T_J=25^\circ\text{C}, I_F=10A$
$Q_{rr}$	Reverse Recovery Charge	---	0.33	0.65	$\mu\text{C}$	$di/dt=100A/\mu\text{s}$ ④
$t_{on}$	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S+L_D$ )				

### Notes:

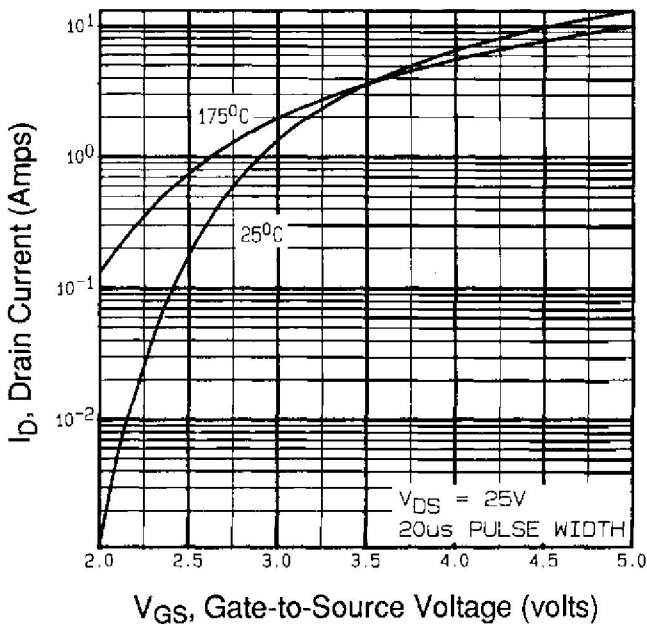
- ① Repetitive rating; pulse width limited by max. junction temperature (See Figure 11)
- ②  $V_{DD}=25V$ , starting  $T_J=25^\circ\text{C}$ ,  $L=1.2\text{mH}$ ,  $R_G=25\Omega$ ,  $I_{AS}=8.0A$  (See Figure 12)
- ③  $I_{SD}\leq 10A$ ,  $di/dt\leq 90A/\mu\text{s}$ ,  $V_{DD}\leq V_{(BR)DSS}$ ,  $T_J\leq 175^\circ\text{C}$
- ④ Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$
- ⑤  $t=60\text{s}$ ,  $f=60\text{Hz}$



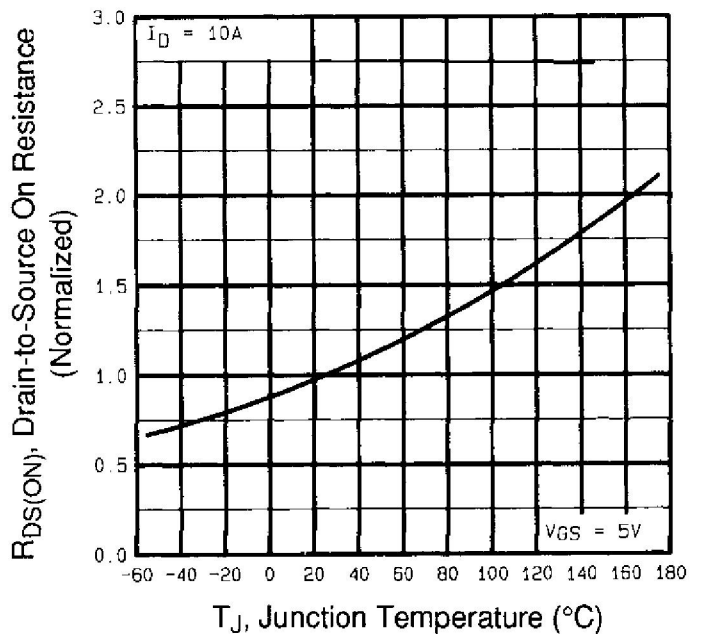
**Fig 1.** Typical Output Characteristics,  $T_C=25^\circ\text{C}$



**Fig 2.** Typical Output Characteristics,  $T_C=175^\circ\text{C}$

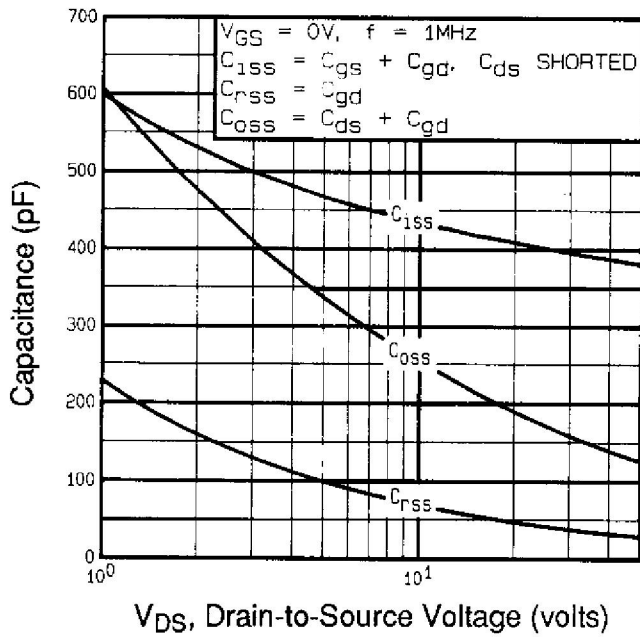


**Fig 3.** Typical Transfer Characteristics

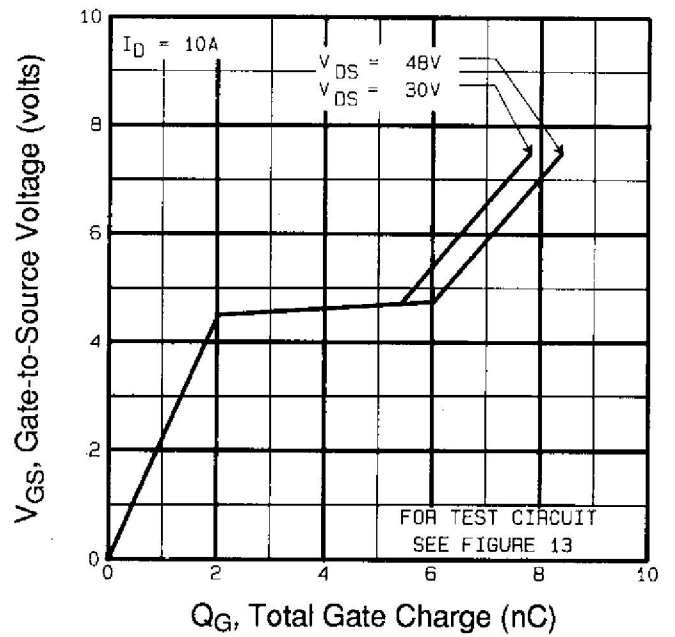


**Fig 4.** Normalized On-Resistance Vs. Temperature

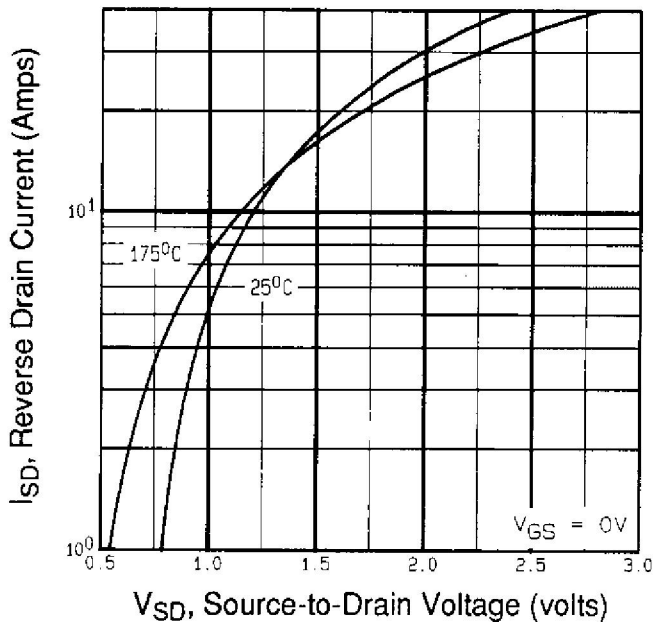
DATA SHEETS



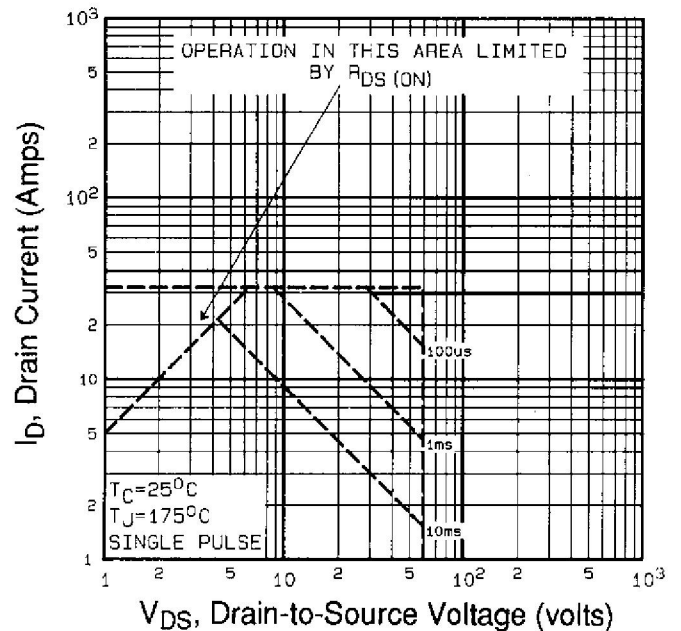
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



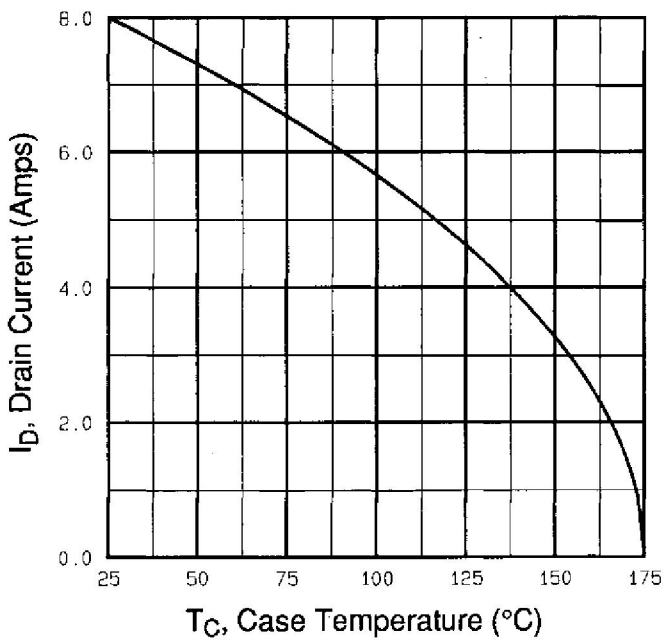
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



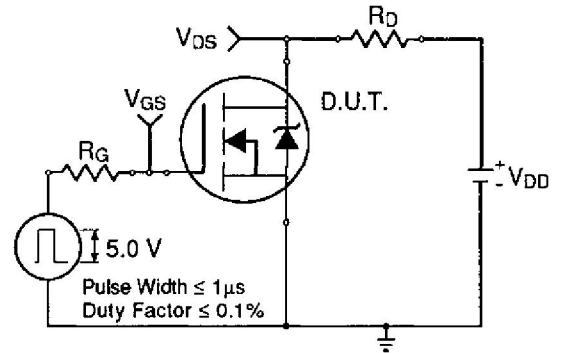
**Fig 7.** Typical Source-Drain Diode Forward Voltage



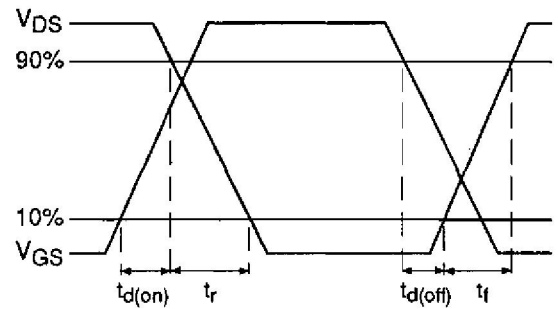
**Fig 8.** Maximum Safe Operating Area



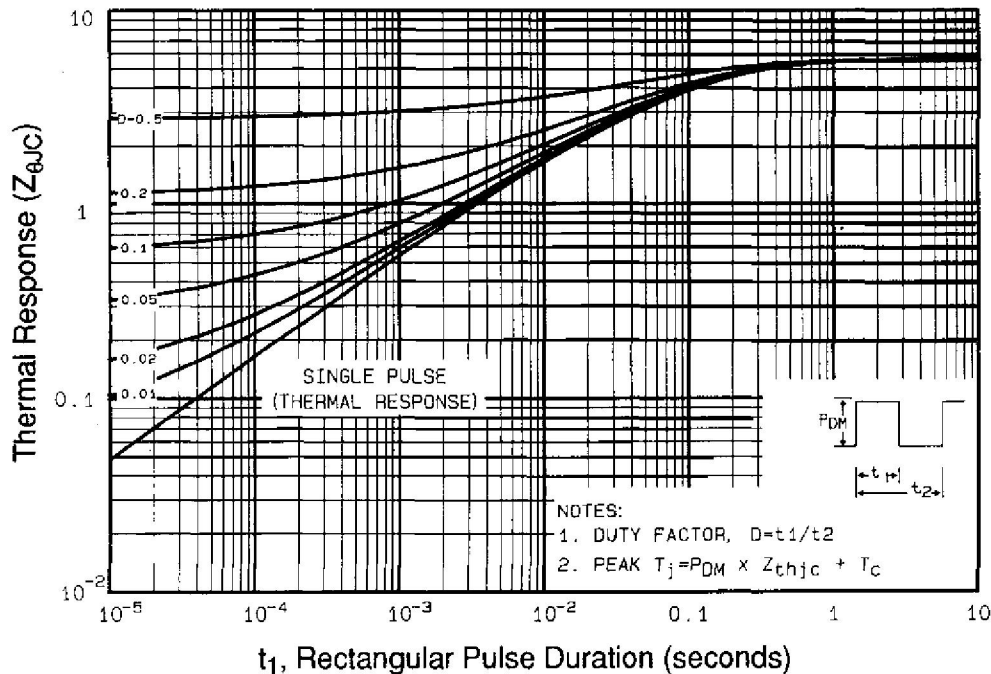
**Fig 9.** Maximum Drain Current Vs. Case Temperature



**Fig 10a.** Switching Time Test Circuit

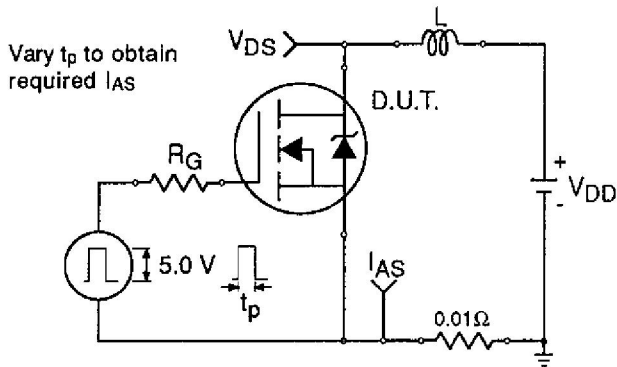


**Fig 10b.** Switching Time Waveforms

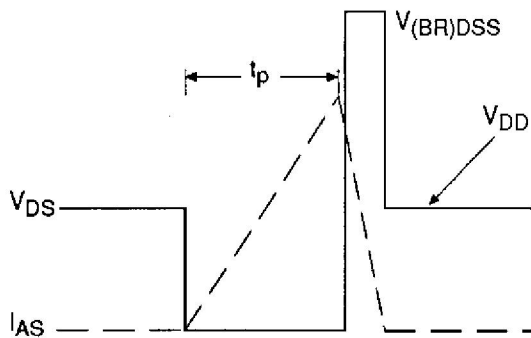


**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case

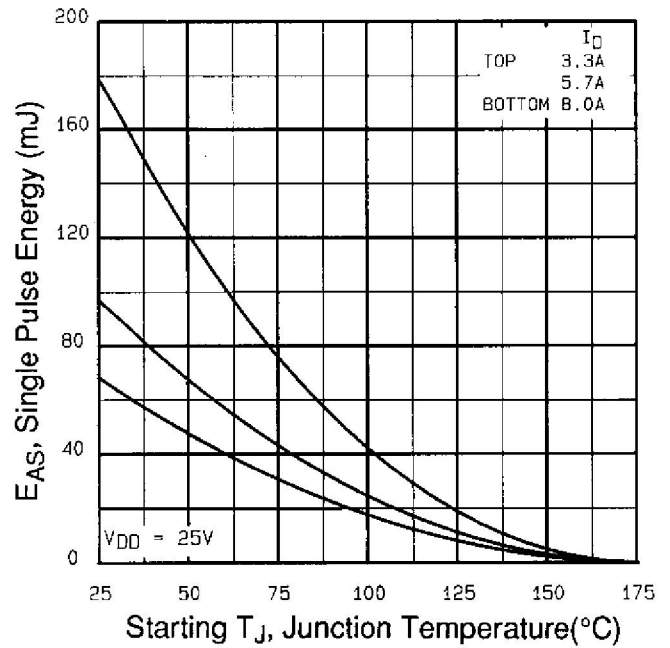
DATA SHEETS



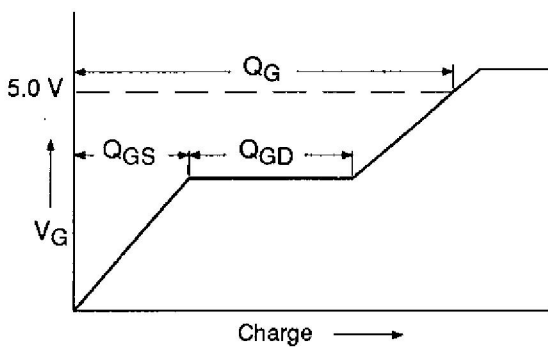
**Fig 12a.** Unclamped Inductive Test Circuit



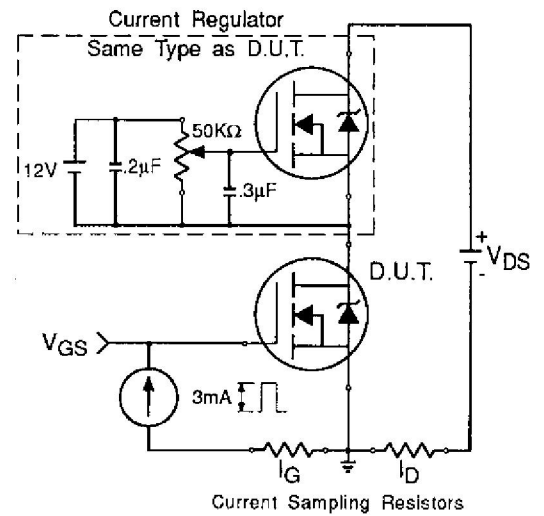
**Fig 12b.** Unclamped Inductive Waveforms



**Fig 12c.** Maximum Avalanche Energy Vs. Drain Current



**Fig 13a.** Basic Gate Charge Waveform



**Fig 13b.** Gate Charge Test Circuit

**Appendix A:** Figure 14, Peak Diode Recovery  $dv/dt$  Test Circuit – See page 1505

**Appendix B:** Package Outline Mechanical Drawing – See page 1510

**Appendix C:** Part Marking Information – See page 1517