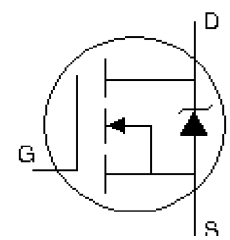
International Rectifier

PD - 9.1254

IRL630S

HEXFET® Power MOSFET

- Surface Mount
- Available in Tape & Reel
- Dynamic dv/dt Rating
- Repetitive Avalanche Rated
- Logic-Level Gate Drive
- $R_{DS(ON)}$ Specified at V_{GS} = 4V & 5V
- 150°C Operating Temperature



V_{DSS} = 200V

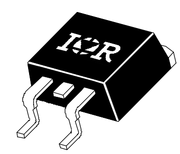
$R_{DS(on)}$ = 0.40Ω

I_D = 9.0A

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 SMD-220 is a surface mount power package capable of accommodating die sizes up to HEX-4. It provides the highest power capability and the lowest possible on-resistance in any existing surface mount package. The SMD-220 is suitable for high current applications because of its low internal connection resistance and can dissipate up to 2.0W in a typical surface mount application.



SMD-220

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 5.0V	9.0	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 5.0V	5.7	
I_{DM}	Pulsed Drain Current ①	36	
P_D @T_C = 25°C	Power Dissipation	74	W
P_D @T_C = 25°C	Power Dissipation (PCB Mount)**	3.1	
	Linear Derating Factor	0.59	W/°C
	Linear Derating Factor (PCB Mount)**	0.025	
V_{GS}	Gate-to-Source Voltage	±10	V
E_{AS}	Single Pulse Avalanche Energy ②	250	mJ
I_{AR}	Avalanche Current①	9.0	A
E_{AR}	Repetitive Avalanche Energy ①	7.4	mJ
dv/dt	Peak Diode Recovery dv/dt ③	5.0	V/ns
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	°C
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	

Thermal Resistance

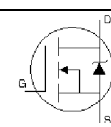
	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	——	——	1.7	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount)**	——	——	40	
$R_{\theta JA}$	Junction-to-Ambient	——	——	62	

** When mounted on 1" square PCB (FR-4 or G-10 Material).
For recommended footprint and soldering techniques refer to application note #AN-994.

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	200	——	——	V	V_{GS} = 0V, ID = 250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.27	——	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	——	——	0.40	Ω	V_{GS} = 5.0V, I_D = 5.4A ④
		——	——	0.50		V_{GS} = 4.0V, I_D = 4.5A ④
$V_{GS(th)}$	Gate Threshold Voltage	1.0	——	2.0	V	V_{DS} = V_{GS}, I_D = 250μA
g_{fs}	Forward Transconductance	4.8	——	——	S	V_{DS} = 50V, I_D = 5.4A
I_{DSS}	Drain-to-Source Leakage Current	——	——	25	μA	V_{DS} = 200V, V_{GS} = 0V
		——	——	250		V_{DS} = 160V, V_{GS} = 0V, T_J = 125°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	——	——	40	nC	I_D = 9.0A
Q_{gs}	Gate-to-Source Charge	——	——	5.5		V_{DS} = 160V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	——	24		V_{GS} = 10V, See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	——	8.0	——	ns	V_{DD} = 100V
t_r	Rise Time	——	57	——		I_D = 9.0A
$t_{d(off)}$	Turn-Off Delay Time	——	38	——		R_G = 6.0Ω
t_f	Fall Time	——	33	——		R_D = 11Ω, See Fig. 10 ④
L_D	Internal Drain Inductance	——	4.5	——	nH	Between lead, 6mm (0.25in.) from package and center of die contact 
L_S	Internal Source Inductance	——	7.5	——		
C_{iss}	Input Capacitance	——	1100	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	220	——		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	——	70	——		f = 1.0MHz, See Fig. 5

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	9.0	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	36		
V_{SD}	Diode Forward Voltage	——	——	2.0	V	T_J = 25°C, I_S = 9.0A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	——	230	350	ns	T_J = 25°C, I_F = 9.0A
Q_{rr}	Reverse RecoveryCharge	——	1.7	2.6	μC	di/dt = 100A/μs 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 fig. 11)

② V_{DD} = 25V, starting T_J = 25°C, L = 4.6mH R_G = 25Ω, I_{AS} = 9.0A. (See Figure 12)

③ $I_{SD} \leq$ 9.0A, di/dt ≤ 120A/μs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 150°C

④ Pulse width ≤ 300μs; duty cycle ≤ 2%.

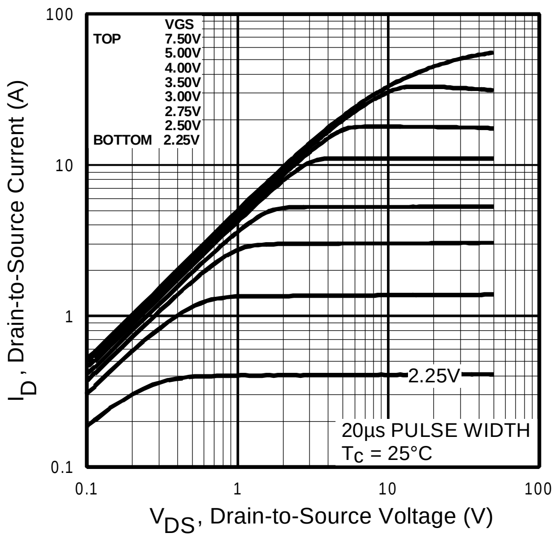


Fig 1. Typical Output Characteristics, $T_C = 25^oC$

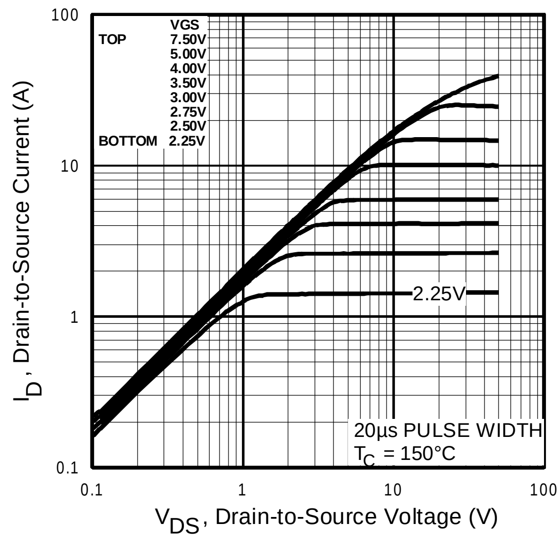


Fig 2. Typical Output Characteristics, $T_C = 150^oC$

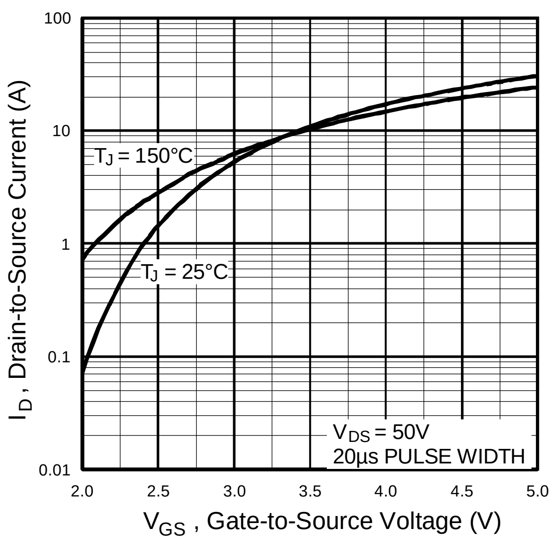


Fig 3. Typical Transfer Characteristics

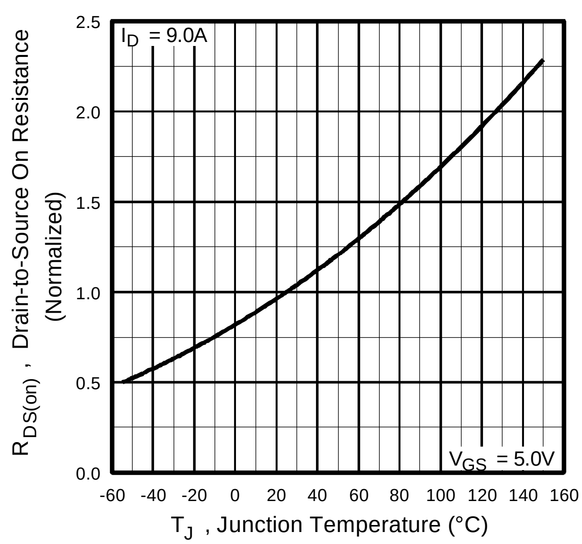


Fig 4. Normalized On-Resistance Vs. Temperature

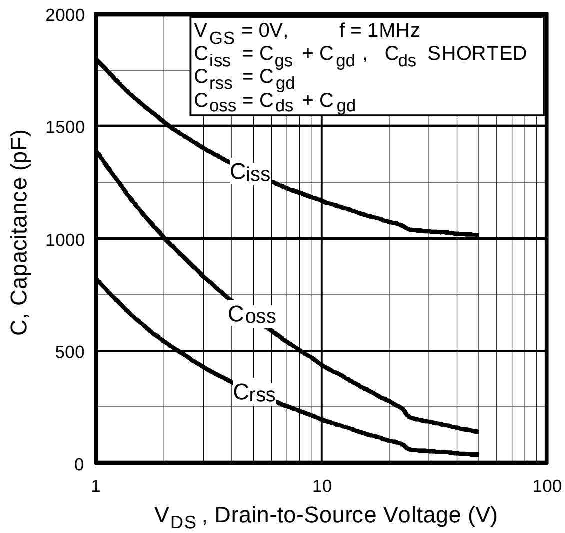


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

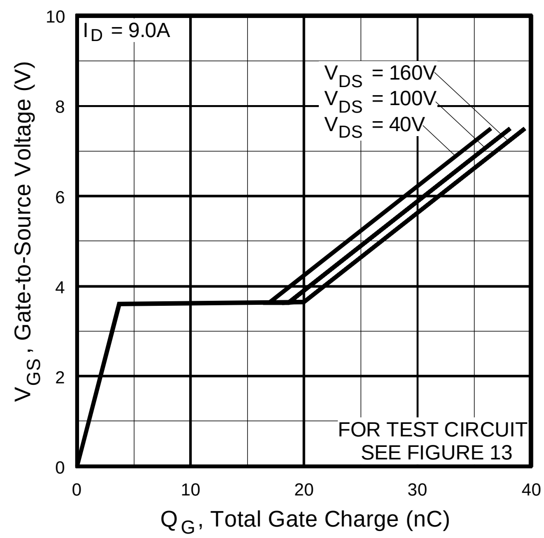


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

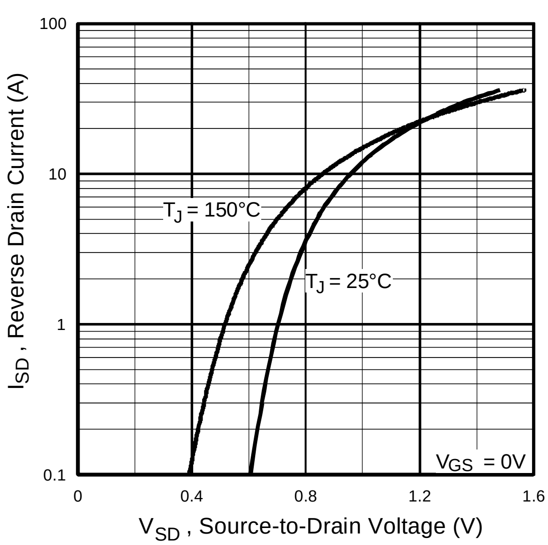


Fig 7. Typical Source-Drain Diode Forward Voltage

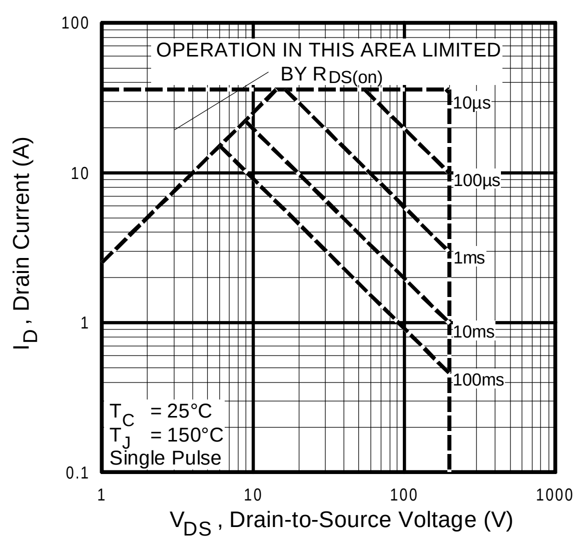


Fig 8. Maximum Safe Operating Area

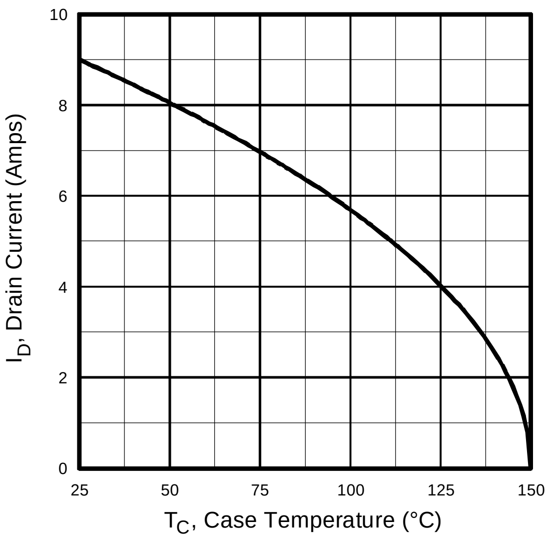


Fig 9. Maximum Drain Current Vs. Case Temperature

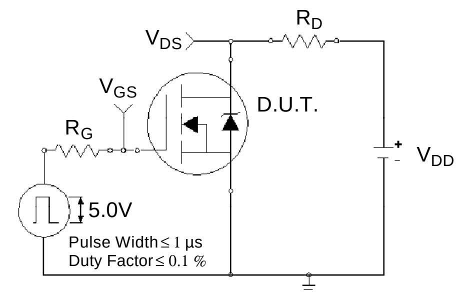


Fig 10a. Switching Time Test Circuit

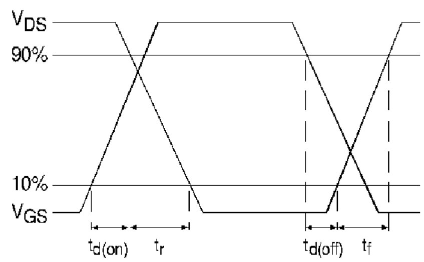


Fig 10b. Switching Time Waveforms

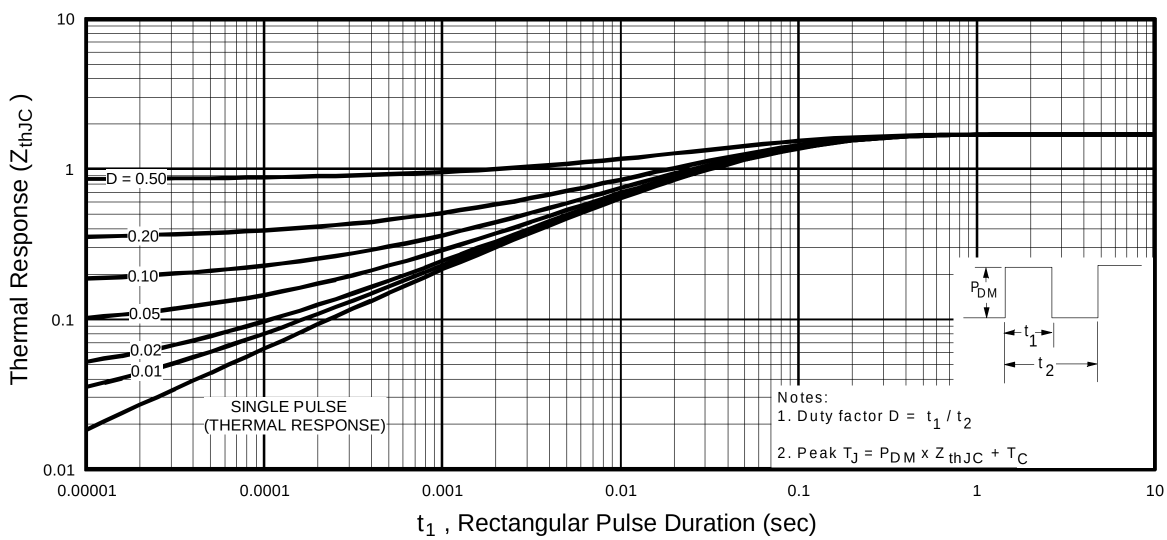


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

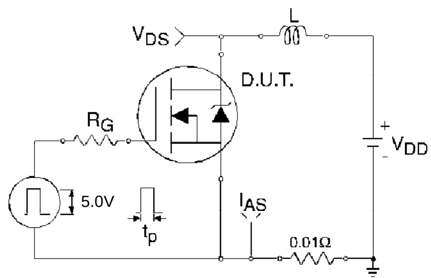


Fig 12a. Unclamped Inductive Test Circuit

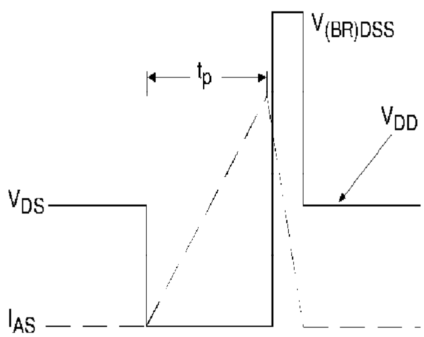


Fig 12b. Unclamped Inductive Waveforms

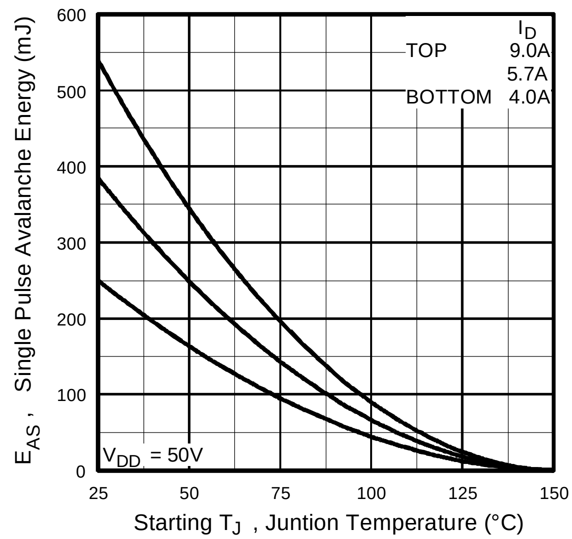


Fig 12c. Maximum Avalanche Energy
Vs. Drain Current

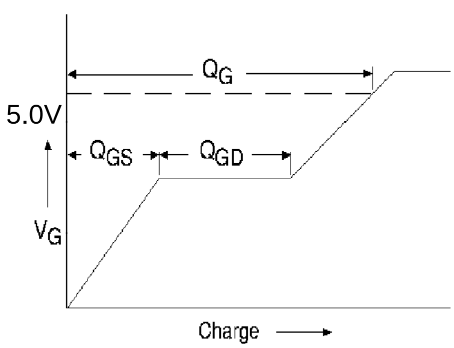


Fig 13a. Basic Gate Charge Waveform

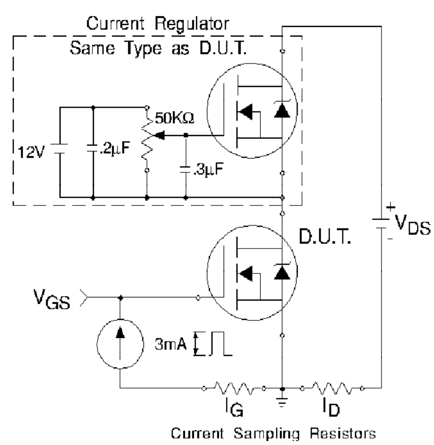
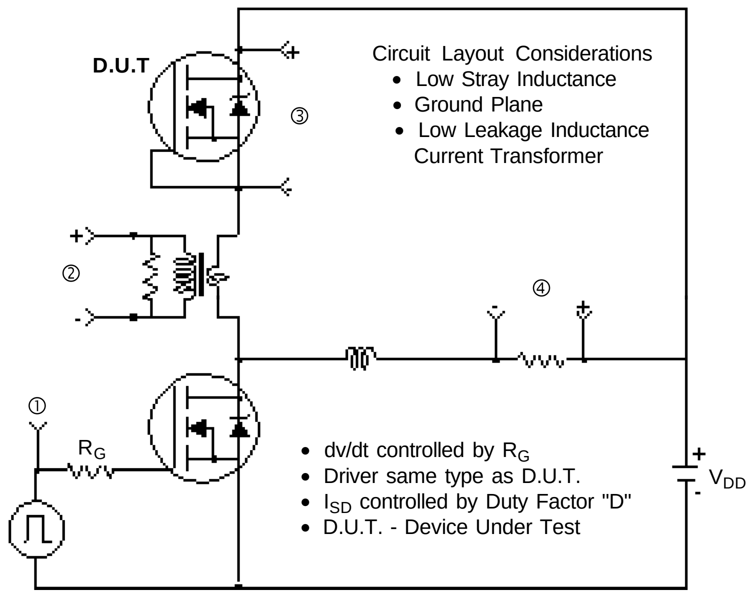
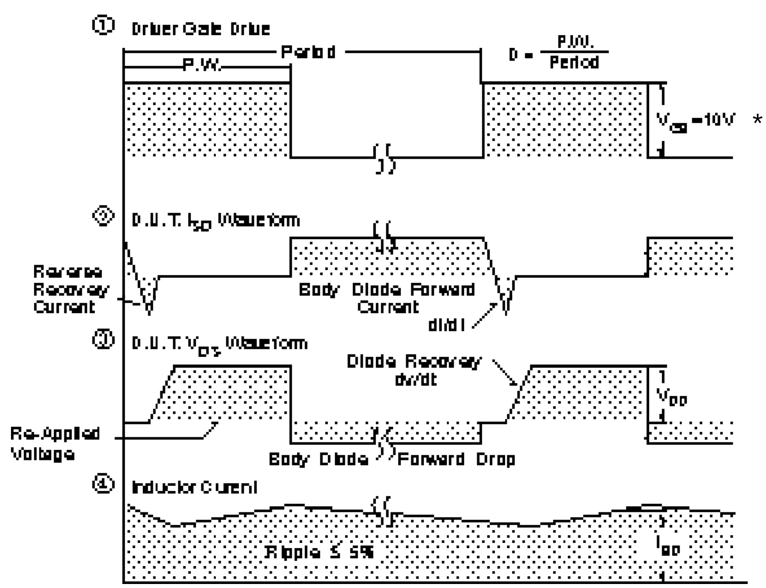


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



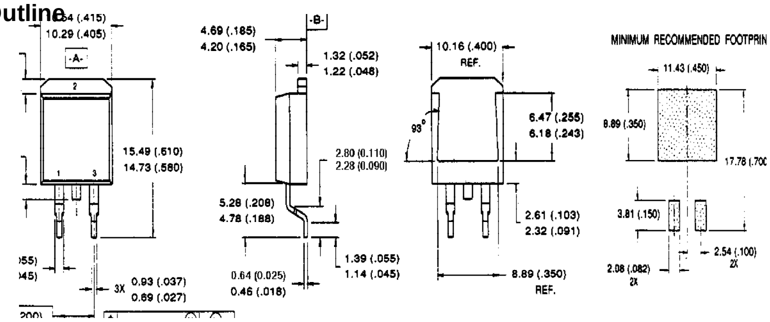


* VGS = 5V for Logic Level Devices

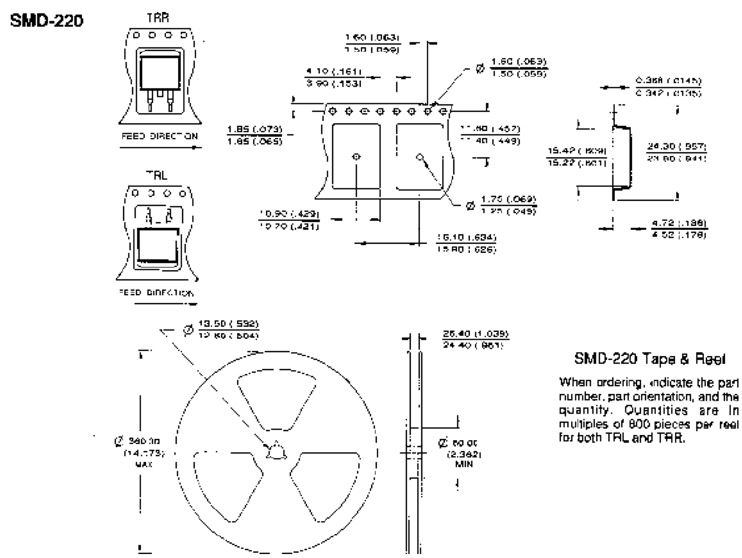
Fig 14. For N-Channel HEXFETS

Package Outline

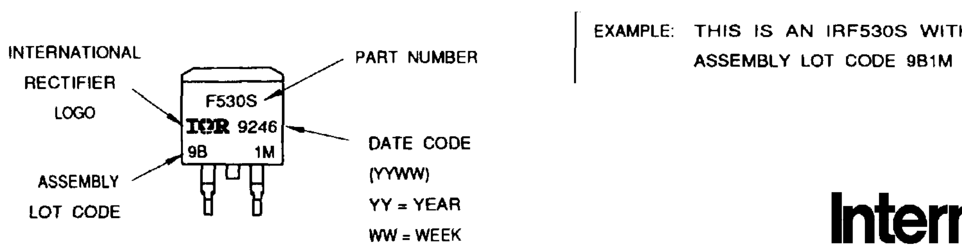
SMD-220 Outline



Tape and Reel Information



Part Marking Information



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