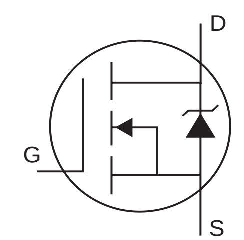
International Rectifier

PD - 91841C

IRLBA3803

HEXFET® Power MOSFET

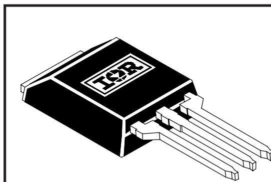
- Logic-Level Gate Drive
- Advanced Process Technology
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Purchase IRLBA3803/P for solder plated option.



V_{DSS} = 30V

$R_{DS(on)}$ = 0.005Ω

I_D = 179A⑥



Super - 220

Description

Fifth Generation HEXFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET Power MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in a wide variety of applications.

The Super-220 is a package that has been designed to have the same mechanical outline and pinout as the industry standard TO-220 but can house a considerably larger silicon die. It has increased current handling capability over both the TO-220 and the much larger TO-247 package. This makes it ideal to reduce component count in multiparalled TO-220 applications, reduce system power dissipation, upgrade existing designs or have TO-247 performance in a TO-220 outline.

This package has also been designed to meet automotive qualification standard Q101.

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	179 ⑥	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	126⑥	
I_{DM}	Pulsed Drain Current ①	720	
P_D @T_C = 25°C	Power Dissipation	270	W
	Linear Derating Factor	1.8	W/°C
V_{GS}	Gate-to-Source Voltage	±16	V
E_{AS}	Single Pulse Avalanche Energy②⑤	610	mJ
I_{AR}	Avalanche Current①⑤	71	A
E_{AR}	Repetitive Avalanche Energy①	27	mJ
dv/dt	Peak Diode Recovery dv/dt ③⑤	5.0	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)	
	Recommended clip force	20	N

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	–––	0.55	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.5	–––	
$R_{\theta JA}$	Junction-to-Ambient	–––	58	

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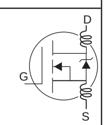
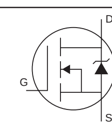
Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	30	——	——	V	V_{GS} = 0V, I_D = 250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.052	——	V/°C	Reference to 25°C, I_D = 1mA⑤
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	——	0.005	Ω	V_{GS} = 10V, I_D = 71A ④
		——	——	0.009		V_{GS} = 4.5V, I_D = 59A ④
$V_{GS(th)}$	Gate Threshold Voltage	1.0	——		V	V_{DS} = V_{GS}, I_D = 250μA
g_{fs}	Forward Transconductance	55	——	——	S	V_{DS} = 25V, I_D = 71A⑤
I_{DSS}	Drain-to-Source Leakage Current	——	——	25	μA	V_{DS} = 30V, V_{GS} = 0V
		——	——	250		V_{DS} = 24V, V_{GS} = 0V, T_J = 150°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	100	nA	V_{GS} = 16V
	Gate-to-Source Reverse Leakage	——	——	-100		V_{GS} = -16V
Q_g	Total Gate Charge	——	——	140	nC	I_D = 71A
Q_{gs}	Gate-to-Source Charge	——	——	41		V_{DS} = 24V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	——	78		V_{GS} = 4.5V, See Fig. 6 and 13 ④⑤
$t_{d(on)}$	Turn-On Delay Time	——	14	——		V_{DD} = 15V
t_r	Rise Time	——	230	——		I_D = 71A
$t_{d(off)}$	Turn-Off Delay Time	——	29	——		R_G = 1.3Ω
t_f	Fall Time		35			R_D = 0.20Ω, See Fig. 10 ④⑤
L_D	Internal Drain Inductance	——	2.0	——	nH	Between lead, 6mm (0.25in.) from package and center of die contact 
L_S	Internal Source Inductance	——	5.0	——		
C_{iss}	Input Capacitance	——	5000	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	1800	——		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	——	880	——		ƒ = 1.0MHz, See Fig. 5⑤

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	179⑥	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)①	——	——	720		
V_{SD}	Diode Forward Voltage	——	——	1.3	V	T_J = 25°C, I_S = 71A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	——	120	180	ns	T_J = 25°C, I_F = 71A
Q_{rr}	Reverse Recovery Charge	——	450	680	nC	di/dt = 100A/μs ④⑤
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} = 15V, starting T_J = 25°C, L = 180μH R_G = 25Ω, I_{AS} = 71A. (See Figure 12)

③ $I_{SD} \leq$ 71A, di/dt ≤ 130A/μs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 175°C

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

⑤ Uses IRL3803 data and test conditions.

⑥ Calculated continuous current based on maximum allowable junction temperature;for recommended current-handling of the package refer to Design Tip # 93-4

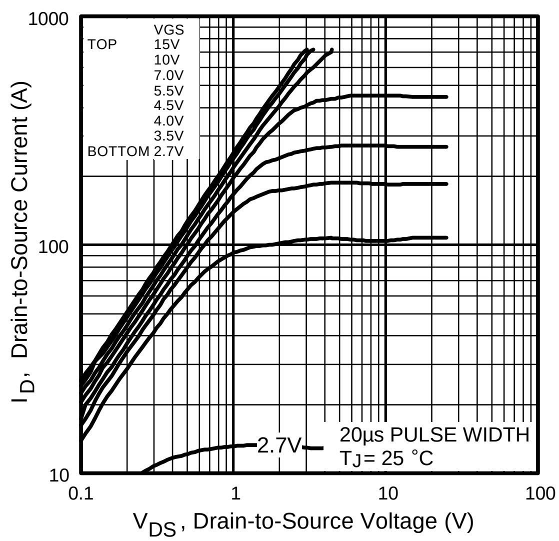


Fig 1. Typical Output Characteristics

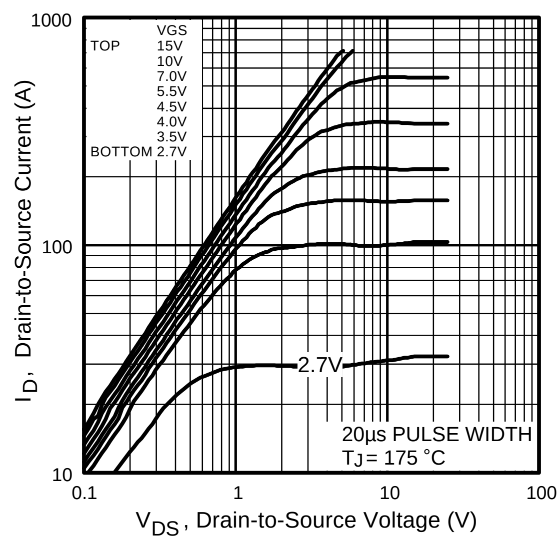


Fig 2. Typical Output Characteristics

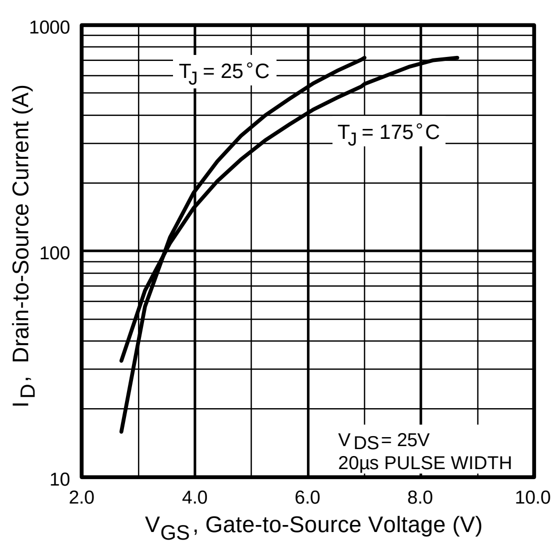


Fig 3. Typical Transfer Characteristics

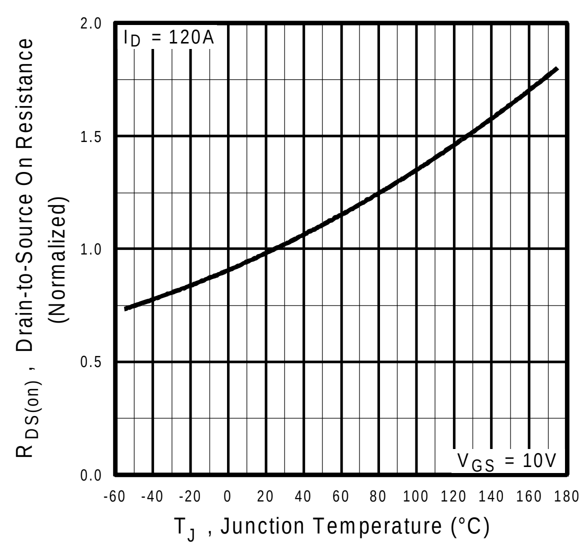


Fig 4. Normalized On-Resistance Vs. Temperature

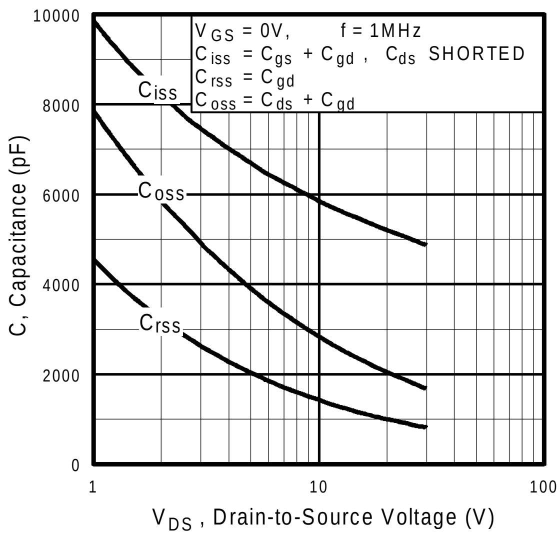


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

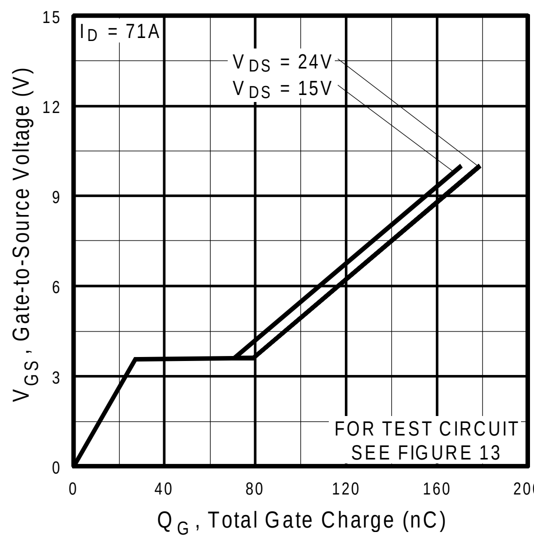


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

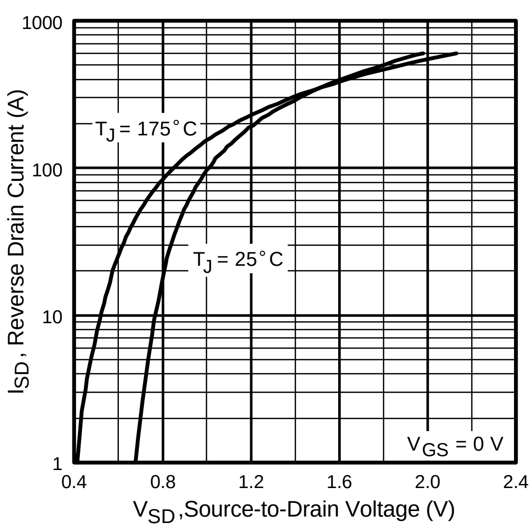


Fig 7. Typical Source-Drain Diode Forward Voltage

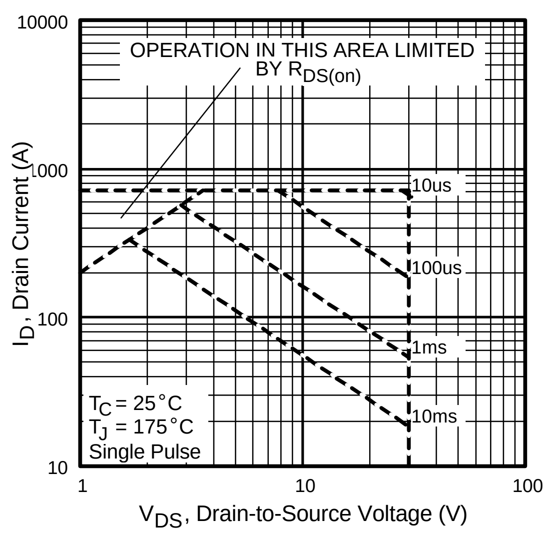


Fig 8. Maximum Safe Operating Area

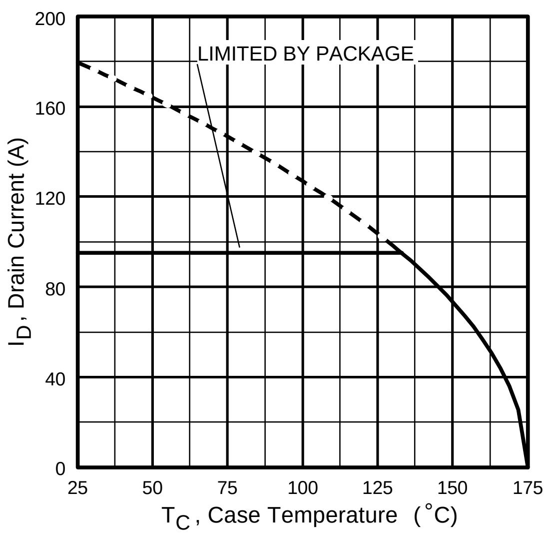


Fig 9. Maximum Drain Current Vs. Case Temperature

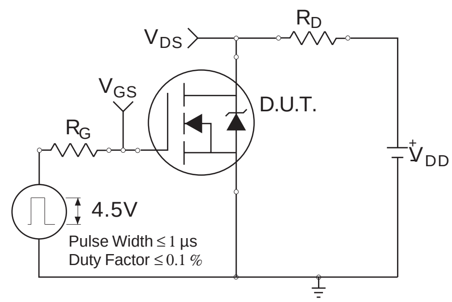


Fig 10a. Switching Time Test Circuit

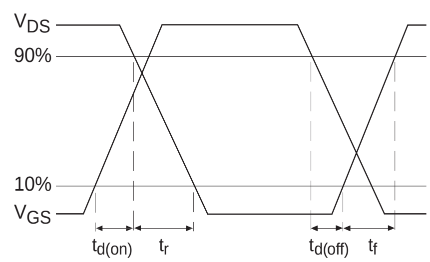


Fig 10b. Switching Time Waveforms

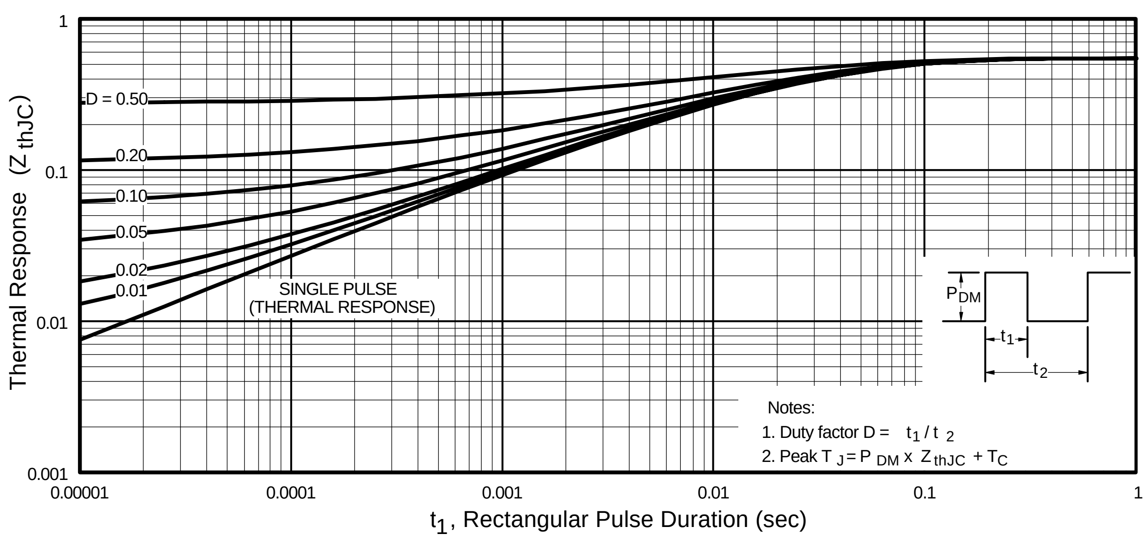


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

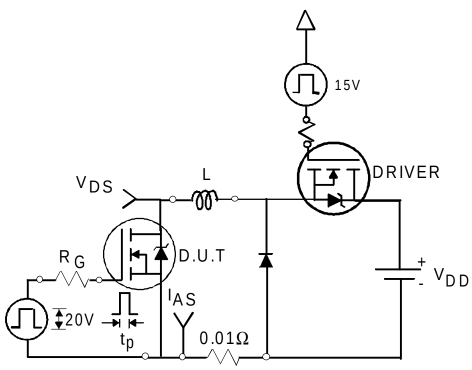


Fig 12a. Unclamped Inductive Test Circuit

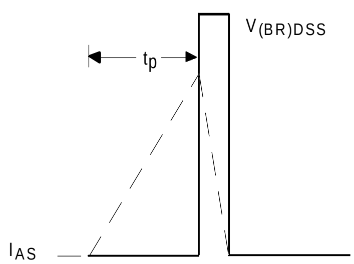


Fig 12b. Unclamped Inductive Waveforms

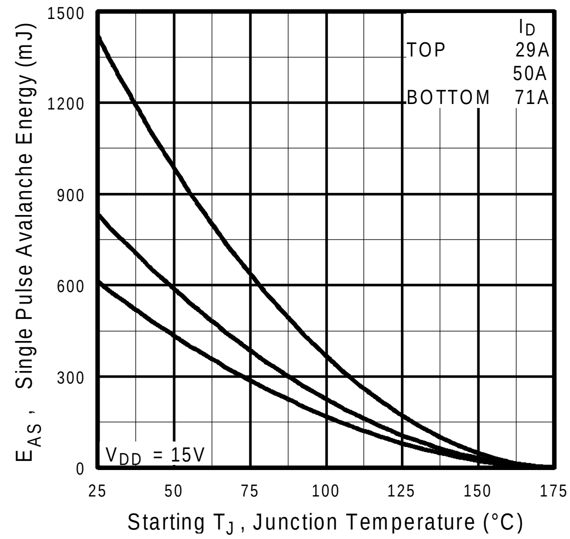


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

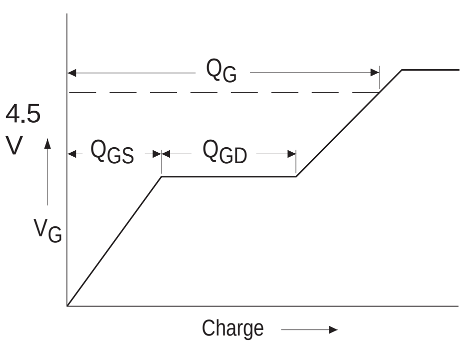


Fig 13a. Basic Gate Charge Waveform

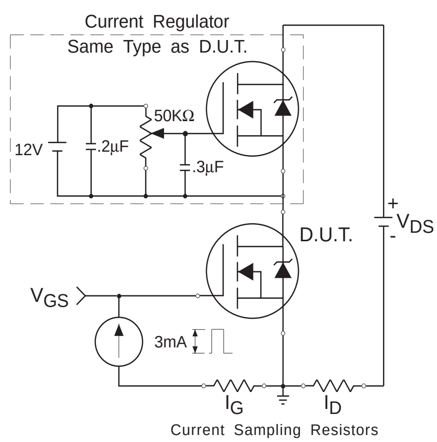
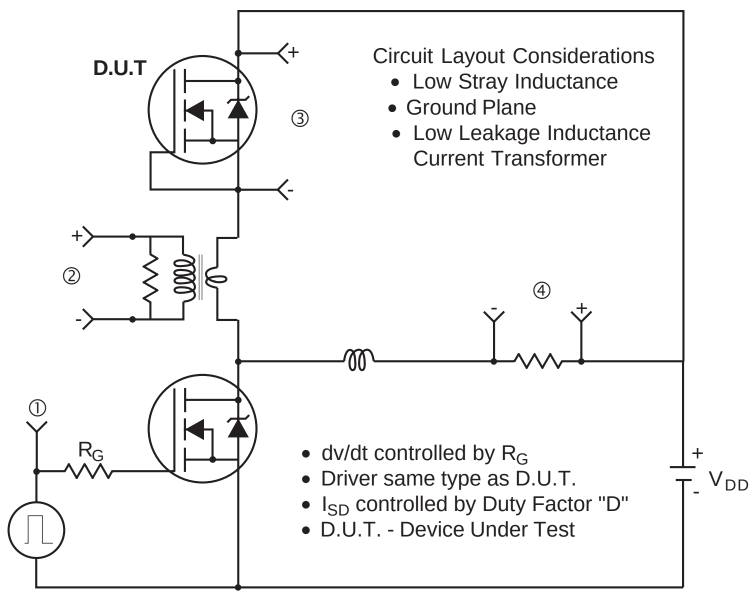
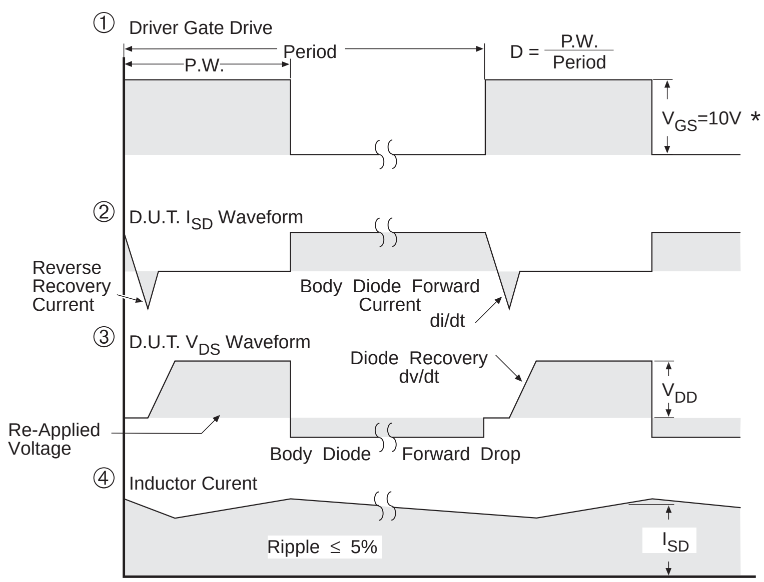


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit

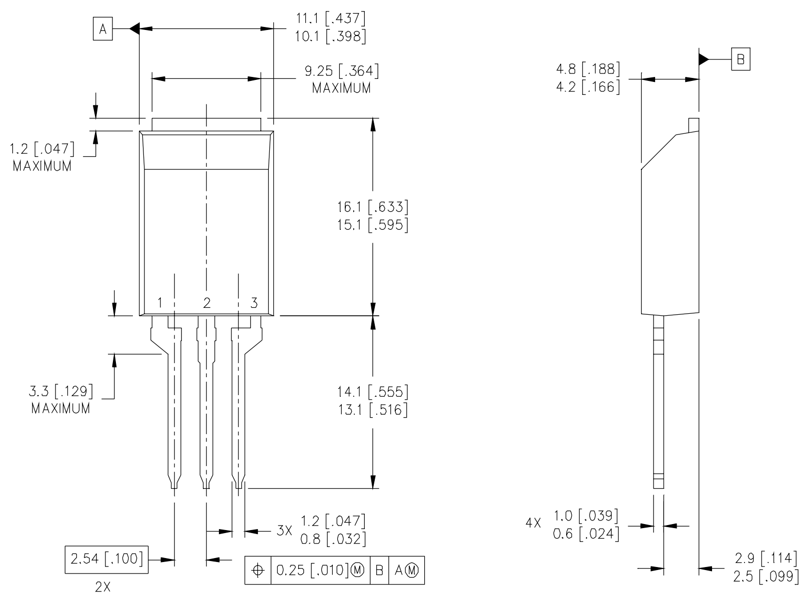




* V_{GS} = 5V for Logic Level Devices

Fig 14. For N-Channel HEXFETS

Super-220 Package Outline



Super-220 package is not recommended for Surface Mount Application.

Data and specifications subject to change without notice.
This product has been designed and qualified for the Consumer market.
Qualification Standards can be found on IR's Web site.

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