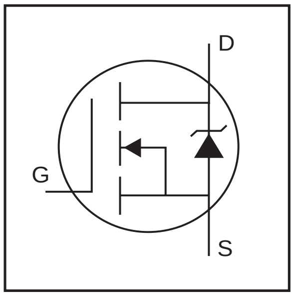
International
IOR Rectifier

PD - 91650A

FA57SA50LC

HEXFET® Power MOSFET

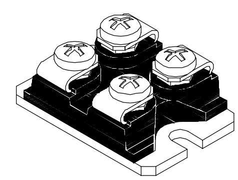
- Fully Isolated Package
- Easy to Use and Parallel
- Low On-Resistance
- Dynamic dv/dt Rating
- Fully Avalanche Rated
- Simple Drive Requirements
- Low Gate Charge Device
- Low Drain to Case Capacitance
- Low Internal Inductance



V_{DSS} = 500V

$R_{DS(on)}$ = 0.08Ω

I_D = 57A



SOT-227

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 SOT-227 package is universally preferred for all commercial-industrial applications at power dissipation levels to approximately 500 watts. The low thermal resistance of the SOT-227 contribute to its wide acceptance throughout the industry.

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	57	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	36	
I_{DM}	Pulsed Drain Current ①	228	
P_D @T_C = 25°C	Power Dissipation	625	W
	Linear Derating Factor	5.0	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy②	725	mJ
I_{AR}	Avalanche Current①	57	A
E_{AR}	Repetitive Avalanche Energy①	62.5	mJ
dv/dt	Peak Diode Recovery dv/dt ③	3.0	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C
V_{ISO}	Insulation Withstand Voltage (AC-RMS)	2.5	kV
	Mounting torque, M4 srew	1.3	N•m

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	——	0.20	
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.05	——	°C/W

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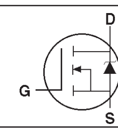
Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	500	——	——	V	V_{GS} = 0V, I_D = 1.0mA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.62	——	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	——	0.08	Ω	V_{GS} = 10V, I_D = 34A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	——	4.0	V	V_{DS} = V_{GS}, I_D = 250µA
g_{fs}	Forward Transconductance	43	——	——	S	V_{DS} = 50V, I_D = 34A
I_{DSS}	Drain-to-Source Leakage Current	——	——	50	µA	V_{DS} = 500V, V_{GS} = 0V
		——	——	500		V_{DS} = 400V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	200	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	——	——	-200		V_{GS} = -20V
Q_g	Total Gate Charge	——	225	338	nC	I_D = 57A
Q_{gs}	Gate-to-Source Charge	——	51	77		V_{DS} = 400V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	98	147		V_{GS} = 10V, See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	——	32	——	ns	V_{DD} = 250V
t_r	Rise Time	——	152	——		I_D = 57A
$t_{d(off)}$	Turn-Off Delay Time	——	108	——		R_G =2.0Ω (Internal)
t_f	Fall Time	——	118	——		R_D = 4.3Ω, See Fig. 10 ④
L_s	Internal Source Inductance	——	5.0	——	nH	Between lead, and center of die contact
C_{iss}	Input Capacitance	——	10000	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	1500	——		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	——	50	——		f = 1.0MHz, See Fig. 5

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	57	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	228		
V_{SD}	Diode Forward Voltage	——	——	1.3	V	T_J = 25°C, I_S = 57A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	——	901	1351	ns	T_J = 25°C, I_F = 57A
Q_{rr}	Reverse Recovery Charge	——	15	23	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 Starting T_J = 25°C, L = 446µH R_G = 25Ω, I_{AS} = 57A. (See Figure 12)

③ I_{SD} ≤ 57A, di/dt ≤ 200A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 150°C

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

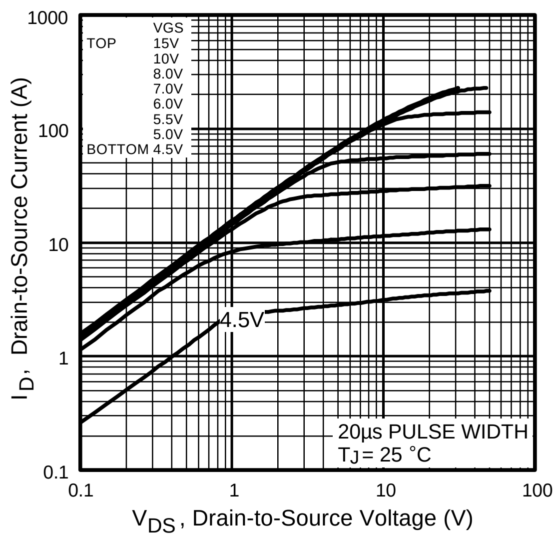


Fig 1. Typical Output Characteristics

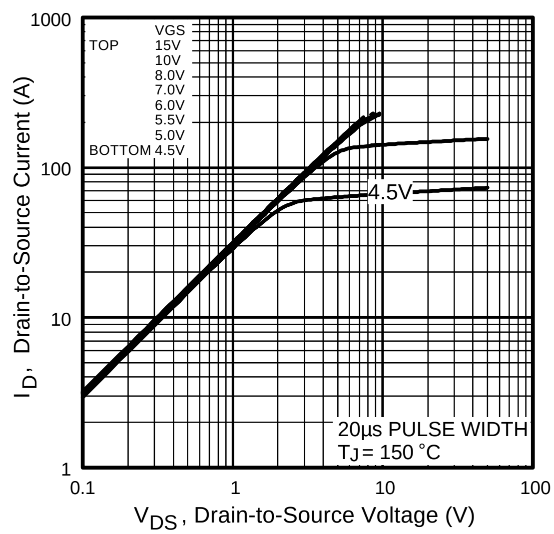


Fig 2. Typical Output Characteristics

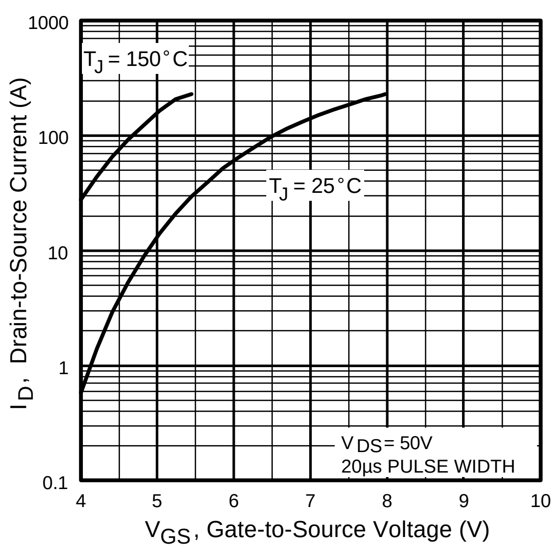


Fig 3. Typical Transfer Characteristics

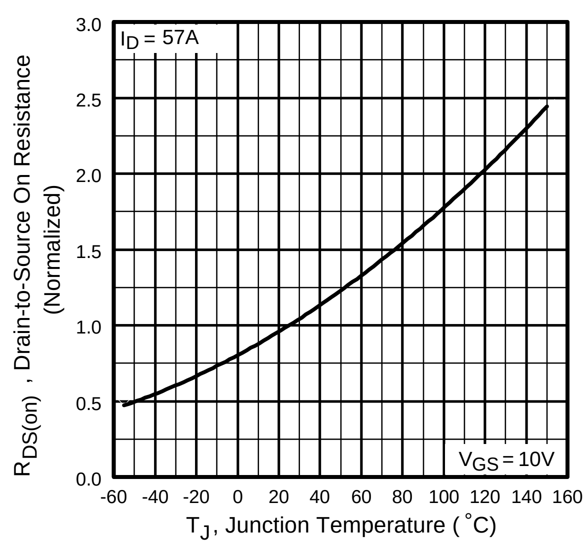


Fig 4. Normalized On-Resistance Vs. Temperature

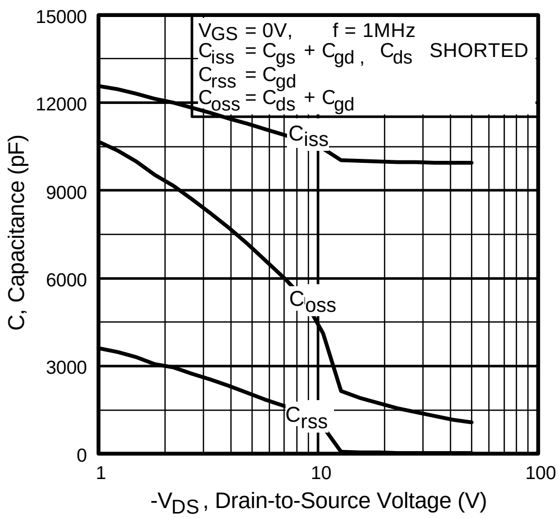


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

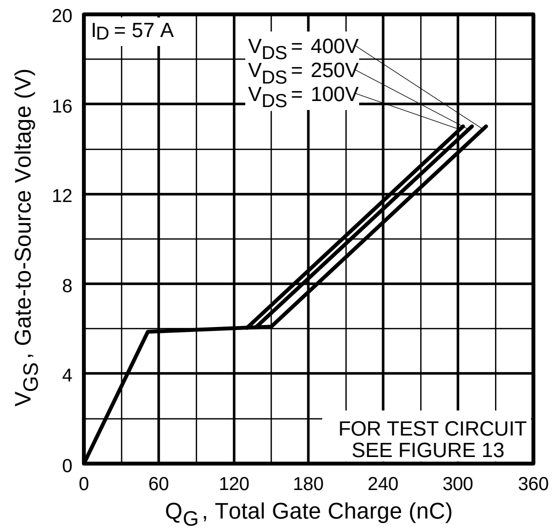


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

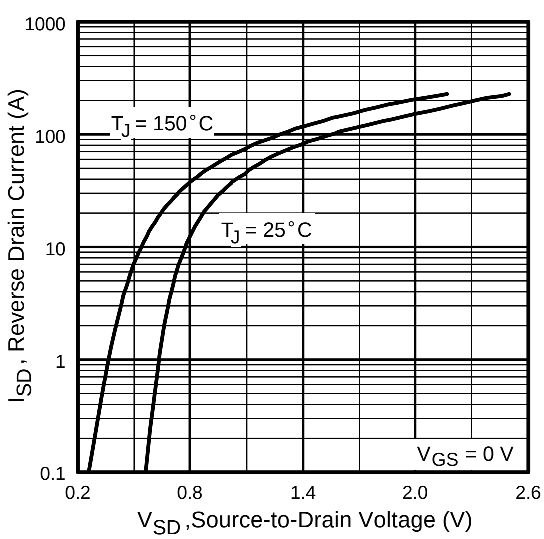


Fig 7. Typical Source-Drain Diode Forward Voltage

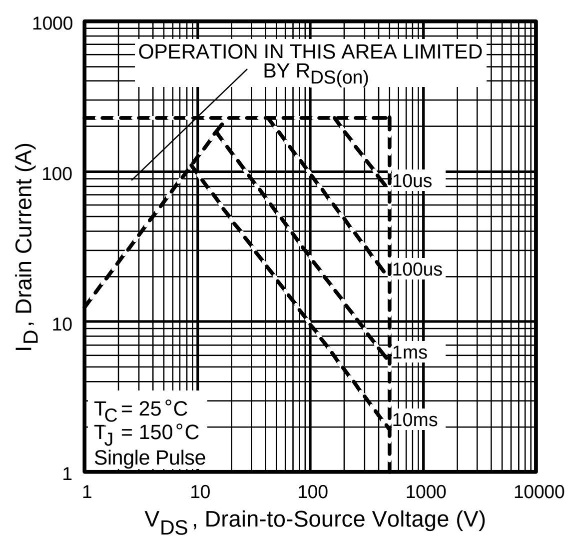


Fig 8. Maximum Safe Operating Area

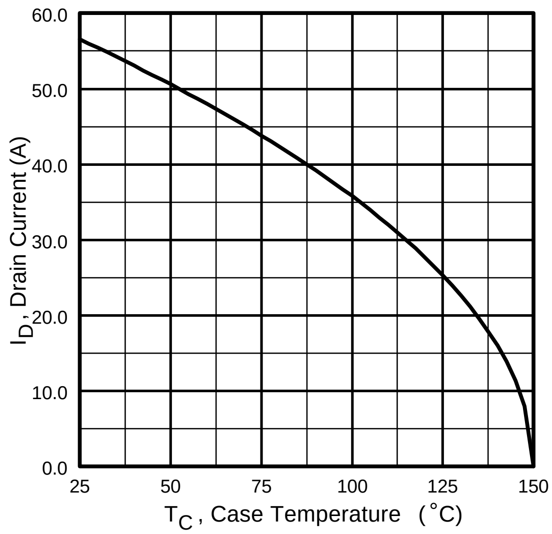


Fig 9. Maximum Drain Current Vs. Case Temperature

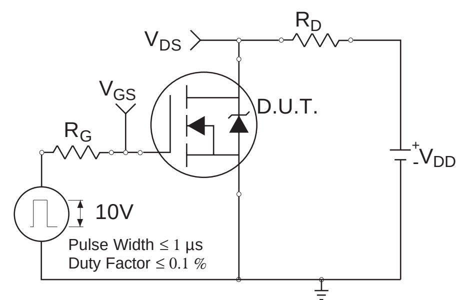


Fig 10a. Switching Time Test Circuit

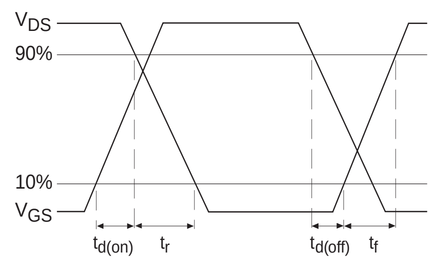


Fig 10b. Switching Time Waveforms

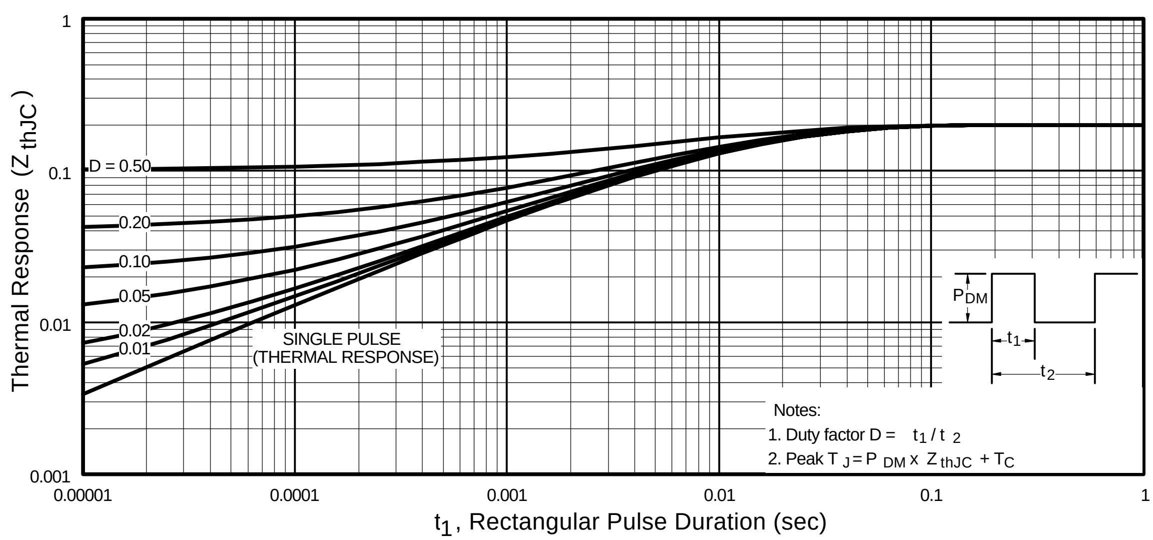


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

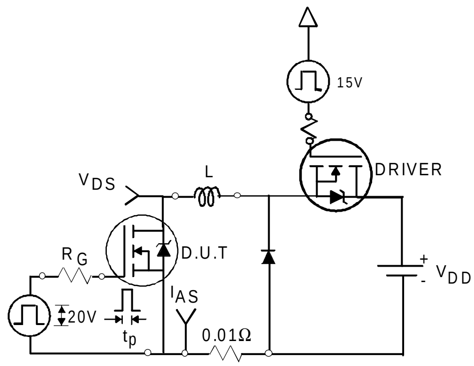


Fig 12a. Unclamped Inductive Test Circuit

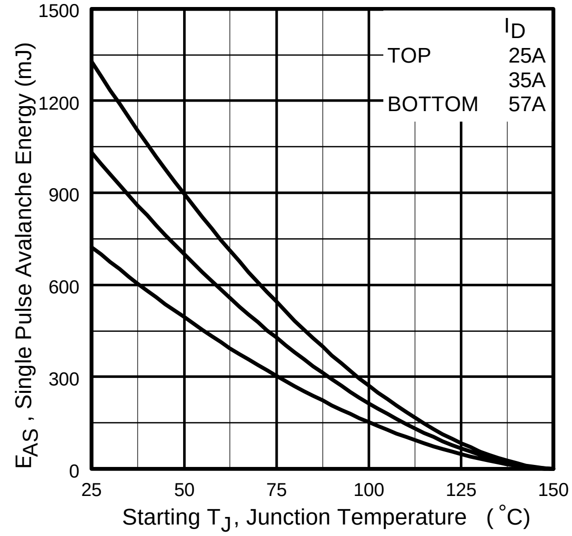


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

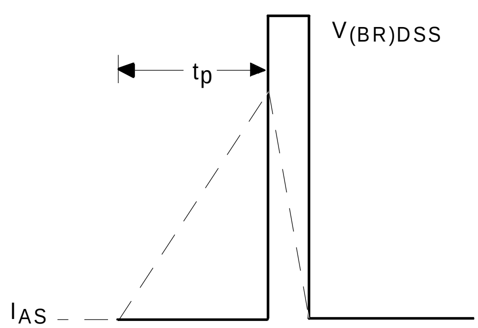


Fig 12b. Unclamped Inductive Waveforms

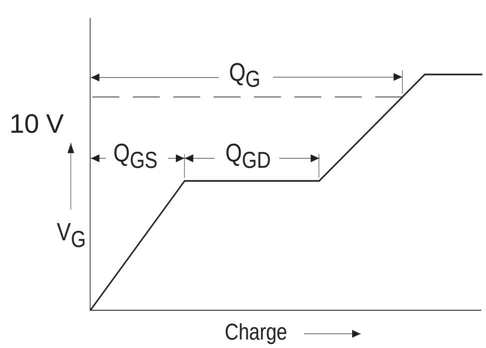


Fig 13a. Basic Gate Charge Waveform

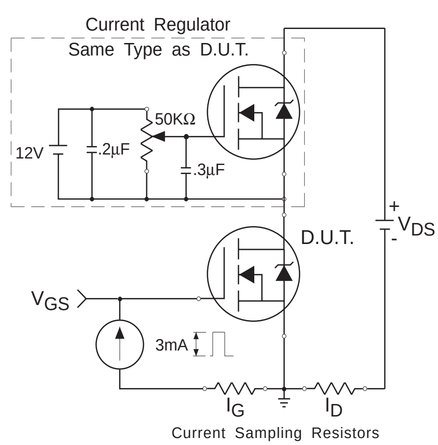
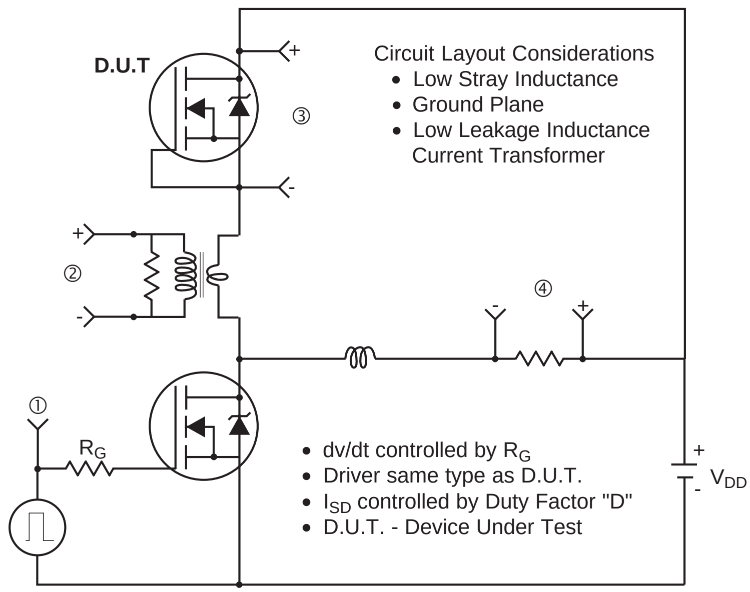
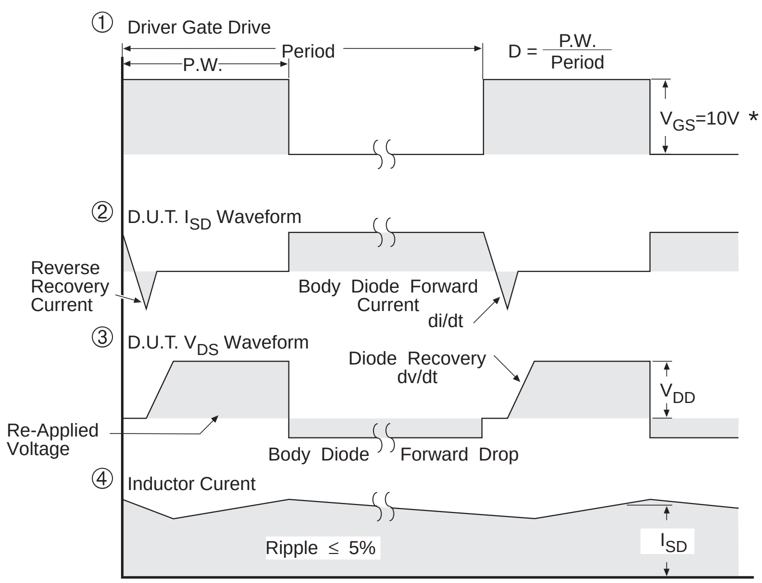


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit

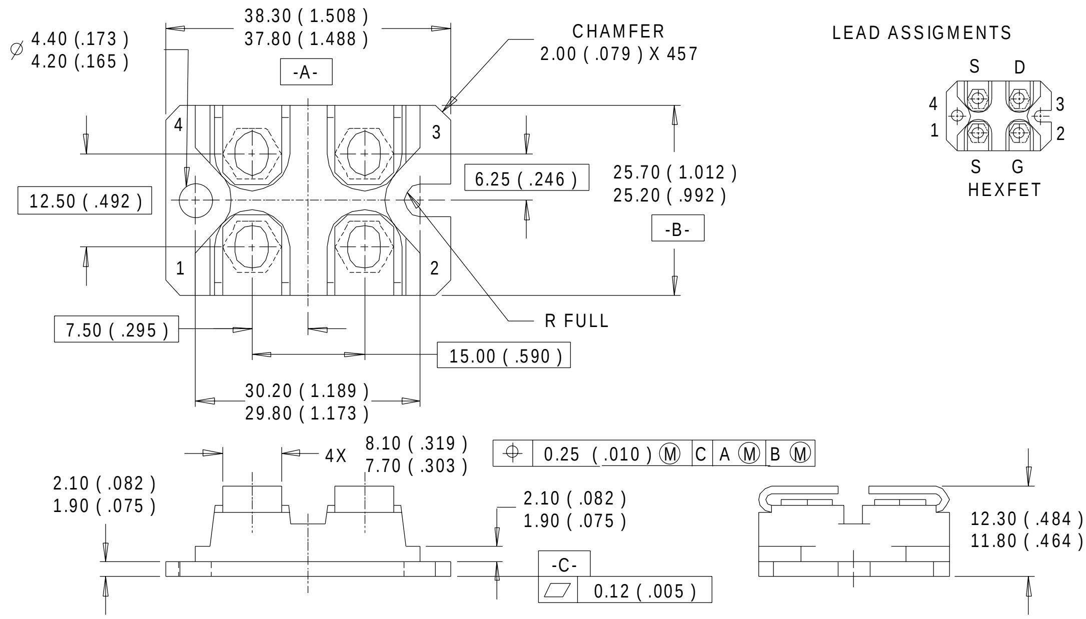




* V_{GS} = 5V for Logic Level Devices

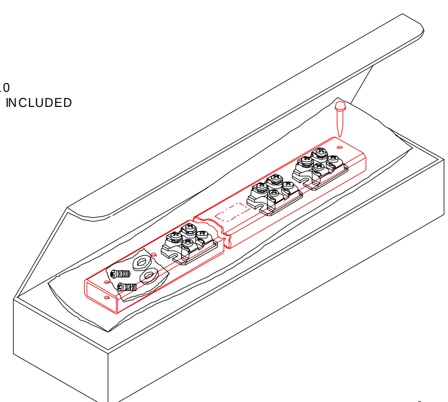
Fig 14. For N-Channel HEXFETS

SOT-227 Package Details



Tube

QUANTITY PER TUBE IS 10
M4 SREW AND WASHER INCLUDED



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