International Rectifier

Provisional Data Sheet No. PD-9.1388A

REPETITIVE AVALANCHE AND dv/dt RATED HEXFET® TRANSISTOR

IRFM260

N-CHANNEL

200Volt, 0.060Ω, HEXFET

HEXFET technology is the key to International Rectifier's advanced line of power MOSFET transistors. The efficient geometry design achieves very low on-state resistance combined with high transconductance.

HEXFET transistors also feature all of the well-established advantages of MOSFETs, such as voltage control, very fast switching, ease of paralleling and electrical parameter temperature stability. They are well-suited for applications such as switching power supplies, motor controls, inverters, choppers, audio amplifiers and high-energy pulse circuits, and virtually any application where high reliability is required.

HEXFET transistor's totally isolated package eliminates the need for additional isolating material between the device and the heatsink. This improves thermal efficiency and reduces drain capacitance.

Product Summary

Part Number	BV_{DSS}	$R_{DS(on)}$	I_D
IRFM260	200V	0.060Ω	35A*

Features:

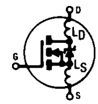
- Hermetically Sealed
- Electrically Isolated
- Simple Drive Requirements
- Ease of Paralleling
- Ceramic Eyelet

Absolute Maximum Ratings

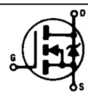
Pre-Radiation

	Parameter	IRFM260	Units
I_D @ V_{GS} = 10V, T_C = 25°C	Continuous Drain Current	35*	A
I_D @ V_{GS} = 10V, T_C = 100°C	Continuous Drain Current	28	
I_{DM}	Pulsed Drain Current ①	180	
P_D @ T_C = 25°C	Max. Power Dissipation	250	W
	Linear Derating Factor	2.0	W/K ⑤
V_{GS}	Gate-to-Source Voltage	±20	V
E_{AS}	Single Pulse Avalanche Energy ②	700	mJ
I_{AR}	Avalanche Current ①	35	A
E_{AR}	Repetitive Avalanche Energy ①	25	mJ
dv/dt	Peak Diode Recovery dv/dt ③	4.3	V/ns
T_J T_{STG}	Operating Junction Storage Temperature Range	-55 to 150	°C
	Lead Temperature	300(0.063 in.(1.6mm) from case for 10s)	
	Weight	9.3 (typical)	g

Electrical Characteristics @ Tj = 25°C (Unless Otherwise Specified)

	Parameter	Min	Typ	Max	Units	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	200	—	—	V	V_{GS} =0 V, I_D = 1.0mA
$\Delta BV_{DSS}/\Delta T_J$	Temperature Coefficient of Breakdown Voltage	—	0.24	—	V/°C	Reference to 25°C, I_D = 1.0mA
$R_{DS(on)}$	Static Drain-to-Source On-State Resistance	—	—	0.060	Ω	V_{GS} = 10V, I_D = 28A ④
		—	—	0.068		V_{GS} = 10V, I_D = 35A
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS} = V_{GS}, I_D = 250µA
g_{fs}	Forward Transconductance	22	—	—	S (℧)	V_{DS} > 15V, I_{DS} = 28A ④
I_{DSS}	Zero Gate Voltage Drain Current	—	—	25	µA	V_{DS}= 0.8 x Max Rating,V_{GS}=0V
		—	—	250		V_{DS} = 0.8 x Max Rating V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Leakage Forward	—	—	100	nA	V_{GS} = 20 V
I_{GSS}	Gate-to-Source Leakage Reverse	—	—	-100		V_{GS} = -20V
Q_g	Total Gate Charge	—	—	230	nC	V_{GS} = 10V, I_D = 35A V_{DS} = Max Rating x 0.5
Q_{gs}	Gate-to-Source Charge	—	—	40		
Q_{gd}	Gate-to-Drain ('Miller') Charge	—	—	110		
$t_{d(on)}$	Turn-On Delay Time	—	—	29	ns	V_{DD} = 100V, I_D = 35A, R_G = 2.35Ω
t_r	Rise Time	—	—	120		
$t_{d(off)}$	Turn-Off Delay Time	—	—	110		
t_f	Fall Time	—	—	92		
L_D	Internal Drain Inductance	—	8.7	—	nH	Measured from drain lead, 6mm (0.25 in) from package to center of die. / Modified MOSFET symbol showing the internal inductances. 
L_S	Internal Source Inductance	—	8.7	—		Measured from source lead, 6mm (0.25 in) from package to source bonding pad.
C_{iss}	Input Capacitance	—	5100	—	pF	V_{GS} = 0V, V_{DS} = 25 V f = 1.0MHz
C_{oss}	Output Capacitance	—	1100	—		
C_{rss}	Reverse Transfer Capacitance	—	280	—		

Source-Drain Diode Ratings and Characteristics

	Parameter	Min	Typ	Max	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	—	—	35*	A	Modified MOSFET symbol showing the integral reverse p-n junction rectifier. 
I_{SM}	Pulse Source Current (Body Diode) ①	—	—	180		
V_{SD}	Diode Forward Voltage	—	—	1.8	V	T_j = 25°C, I_S = 35A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	—	420	ns	T_j = 25°C, I_F = 35A, di/dt ≤ 100A/µs V_{DD} ≤ 50V ④
Q_{RR}	Reverse Recovery Charge	—	—	4.9	µC	
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible. Turn-on speed is substantially controlled by L_S + L_D.				

Thermal Resistance

	Parameter	Min	Typ	Max	Units	Test Conditions
R_{thJC}	Junction-to-Case	—	—	0.50	K/W ⑤	
R_{thCS}	Case-to-Sink	—	0.21	—		Mounting surface flat, smooth, and greased
R_{thJA}	Junction-to-Ambient	—	—	48		Typical socket mount

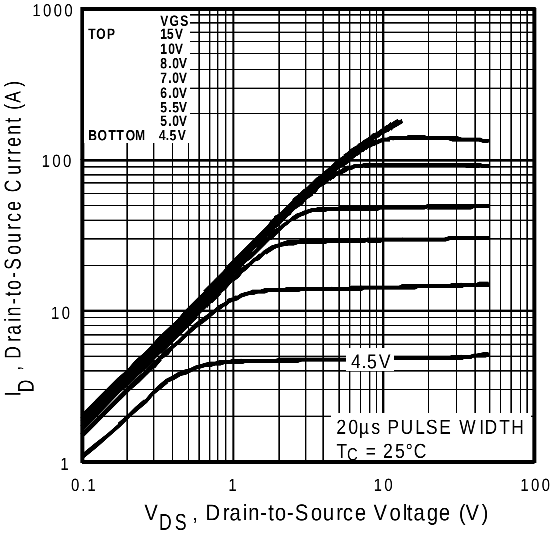


Fig 1. Typical Output Characteristics, $T_J = 25^oC$

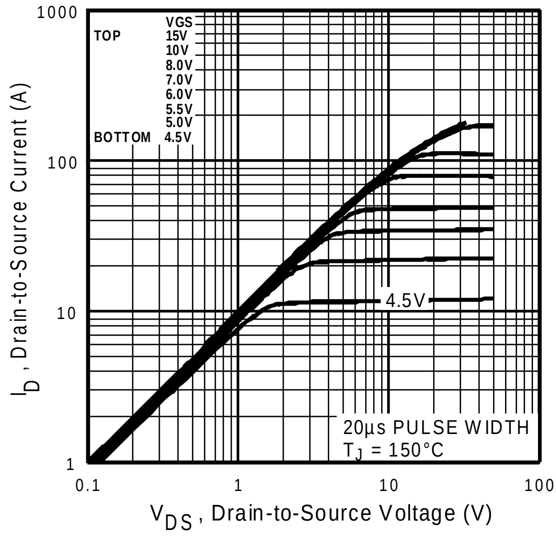


Fig 2. Typical Output Characteristics, $T_J = 150^oC$

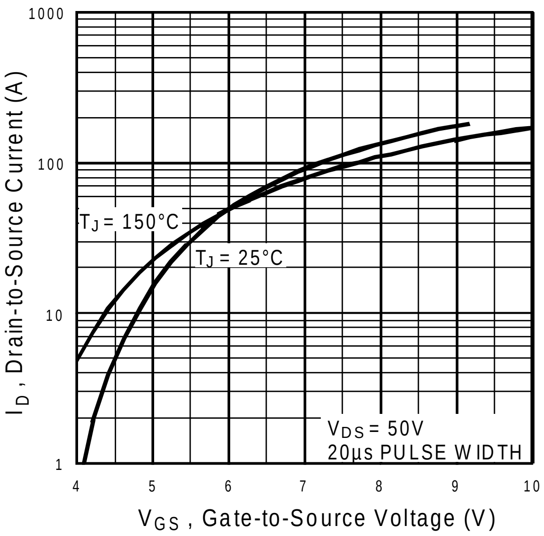


Fig 3. Typical Transfer Characteristics

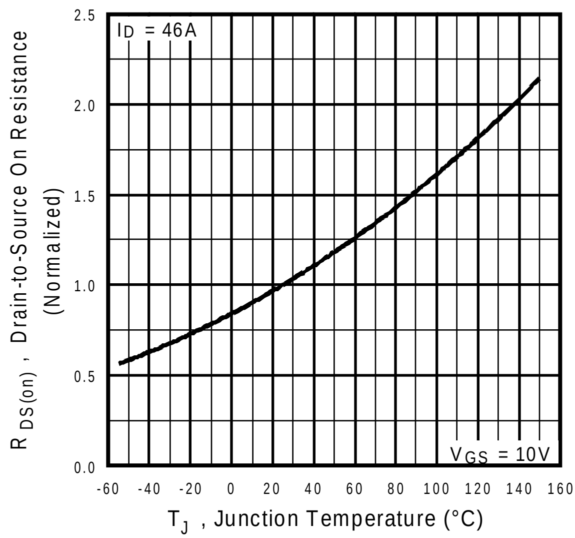


Fig 4. Normalized On-Resistance Vs. Temperature

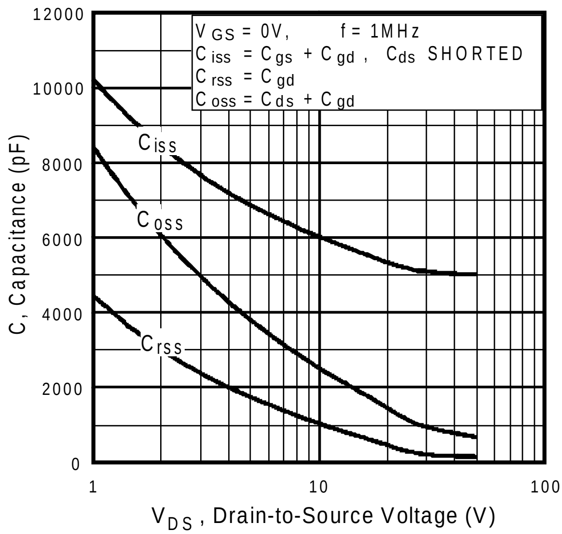


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

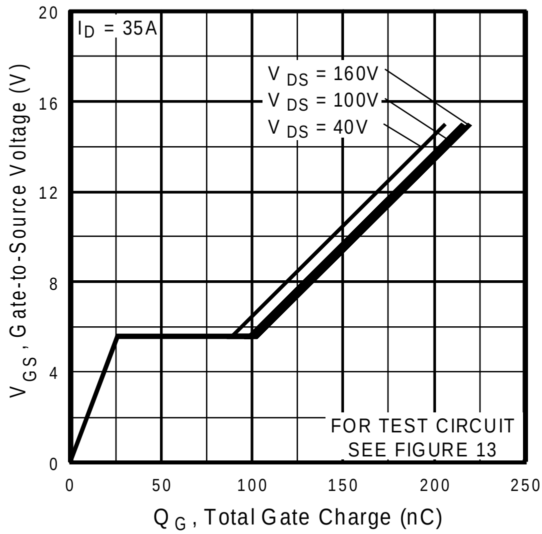


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

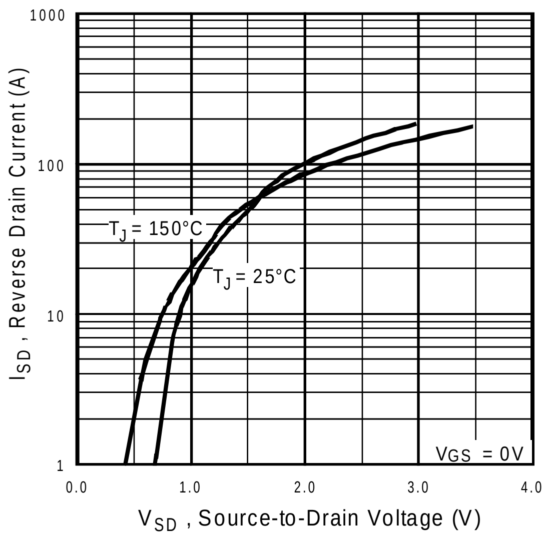


Fig 7. Typical Source-Drain Diode Forward Voltage

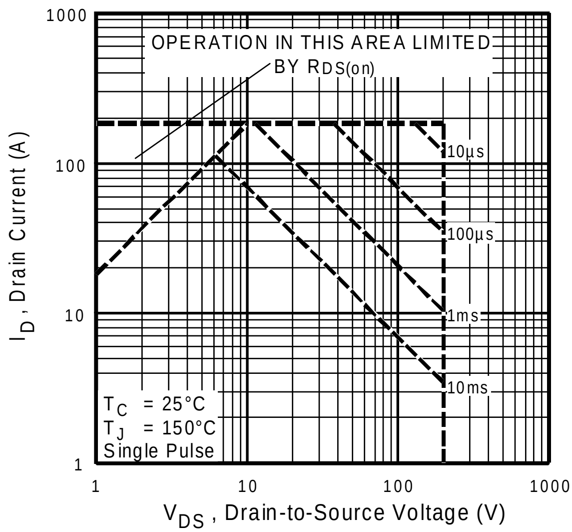


Fig 8. Maximum Safe Operating Area

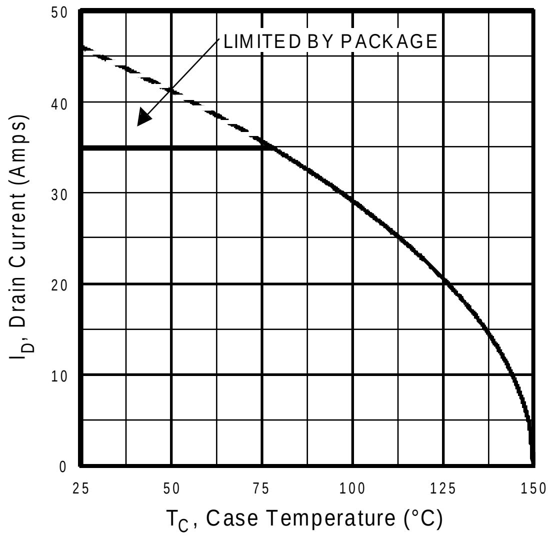


Fig 9. Maximum Drain Current Vs. Case Temperature

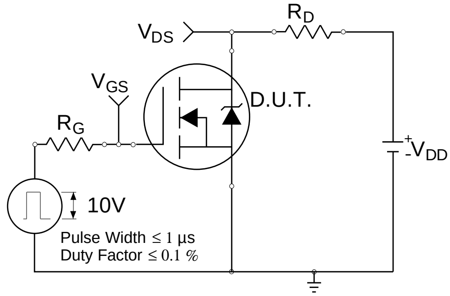


Fig 10a. Switching Time Test Circuit

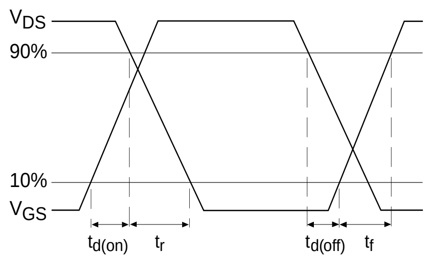


Fig 10b. Switching Time Waveforms

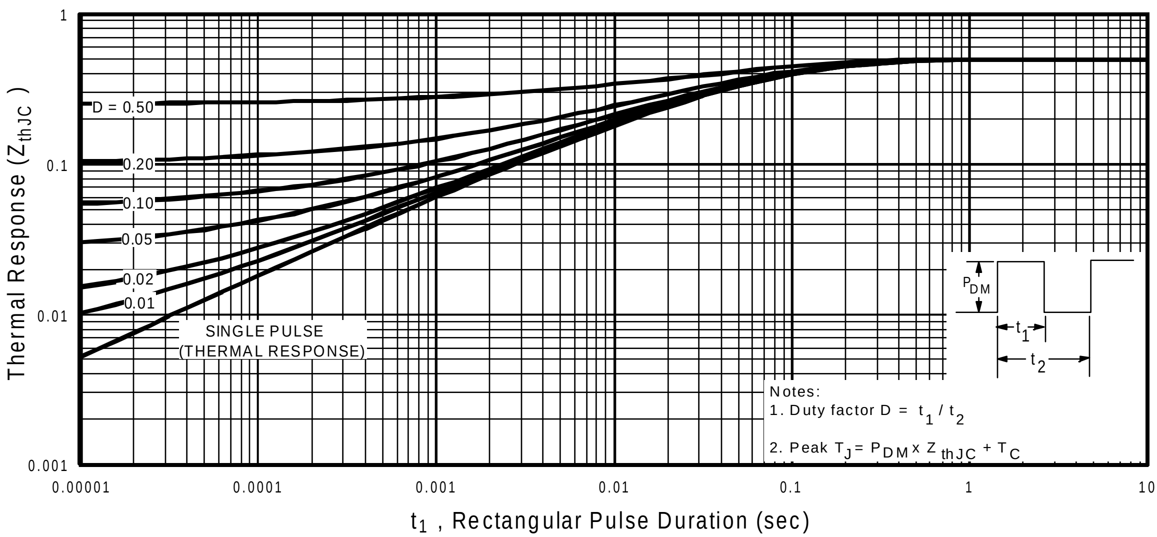


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

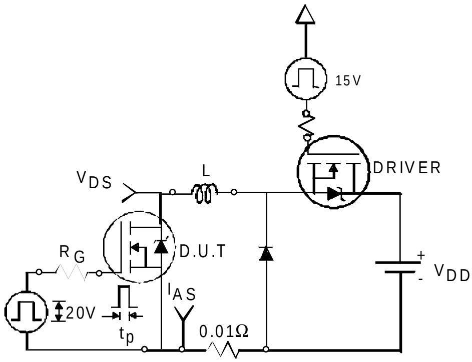


Fig 12a. Unclamped Inductive Test Circuit

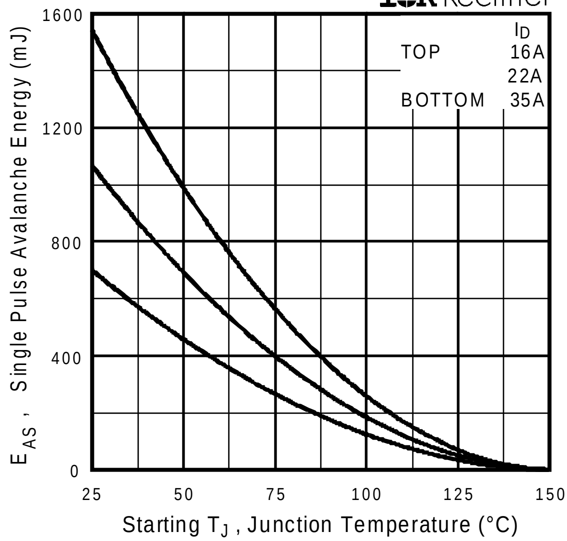


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

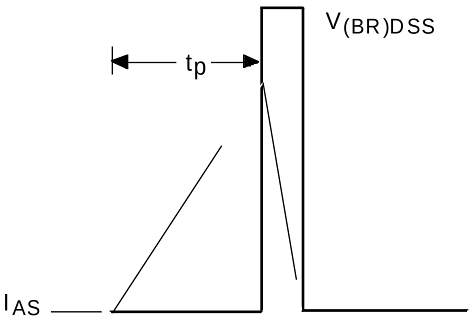


Fig 12b. Unclamped Inductive Waveforms

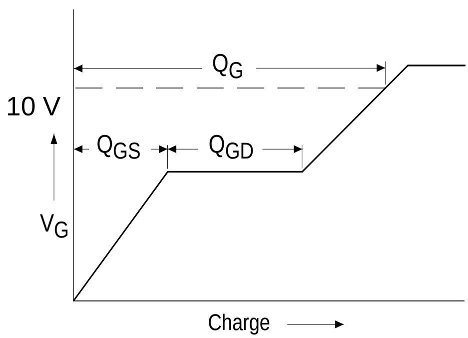


Fig 13a. Basic Gate Charge Waveform

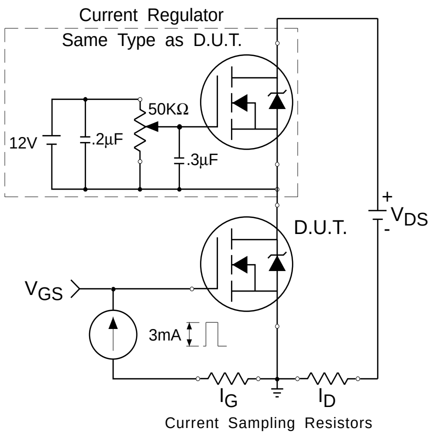
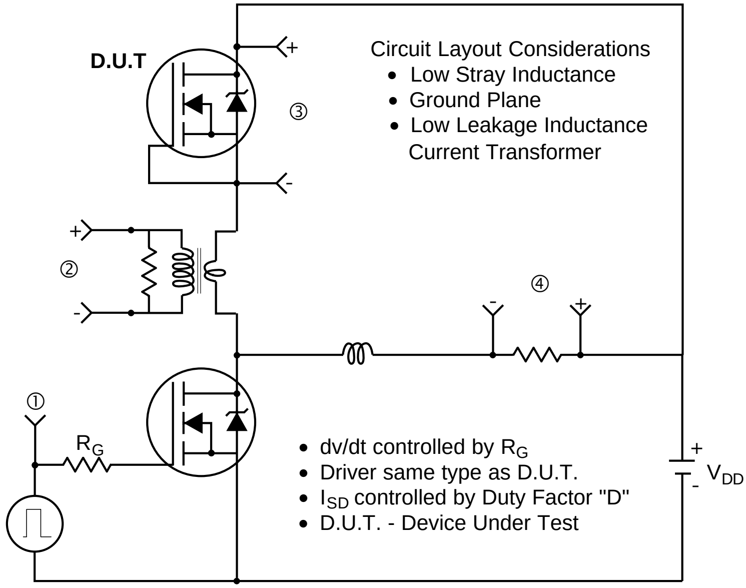
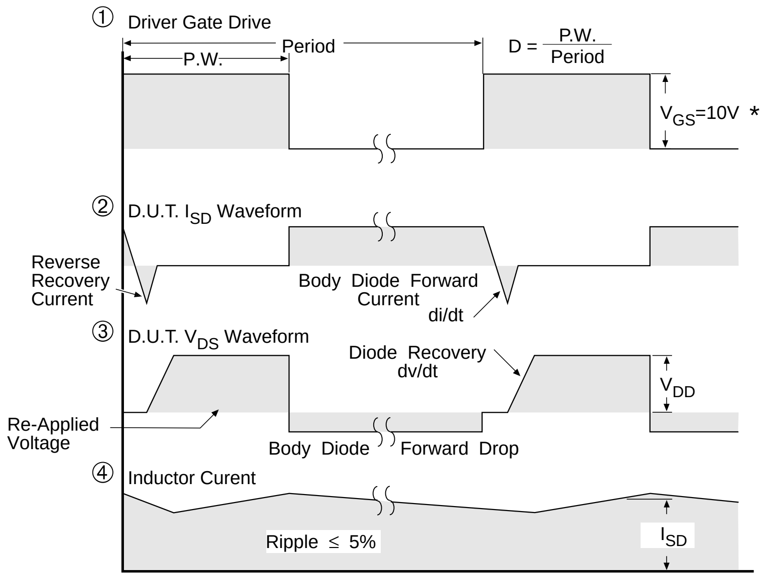


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit

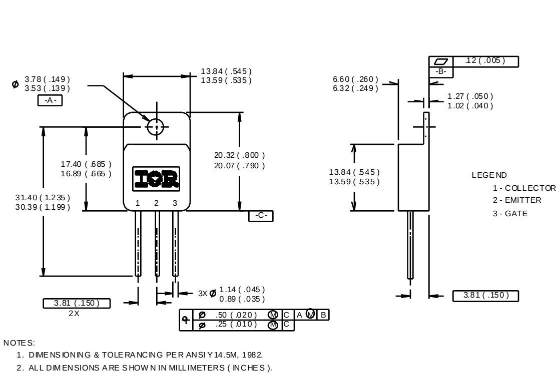


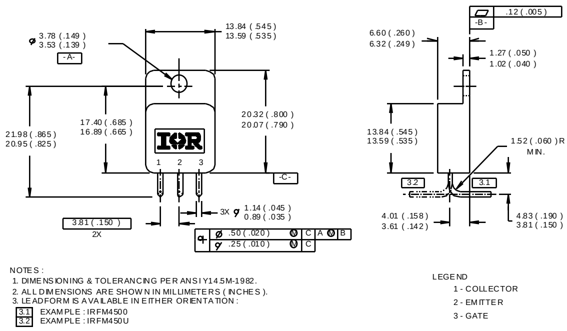


* V_{GS} = 5V for Logic Level Devices

Fig 14. For N-Channel HEXFETS

Case Outline and Dimensions — TO-254AA





Conforms to JEDEC Outline TO-254AA
Dimensions in Millimeters and (Inches)

CAUTION

BERYLLIA WARNING PER MIL-PRF-19500

Packages containing beryllia shall not be ground, sandblasted, machined, or have other operations perfomed on them which will produce beryllia or beryllium dust. Furthermore, beryllium oxide packages shall not be placed in acids that will produce fumes containing beryllium.

Notes:

① Repetitive Rating; Pulse width limited by maximum junction temperature.
Refer to current HEXFET reliability report.

② @ V_{DD} = 50 V, Starting T_J = 25°C,
E_{AS} = [0.5 * L * (I_L^2)]
Peak I_L = 35A, V_{GS} =10 V, 25 ≤ R_G ≤ 200Ω

③ I_{SD} ≤ 35A, di/dt ≤ 130 A/µs,
V_{DD} ≤ BV_{DSS}, T_J ≤ 150°C
Suggested R_G = 2.35Ω

④ Pulse width ≤ 300 µs; Duty Cycle ≤ 2%

⑤ K/W = °C/W

* I_D current limited by pin diamete (Die Current = 46A)

International
IOR Rectifier

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