PD - 93917

International
IOR Rectifier

SMPS MOSFET

IRFP3703

HEXFET® Power MOSFET

V_{DSS}	$R_{DS(on)}$ max	I_D
30V	0.0028Ω	210A⑥

Applications

- Synchronous Rectification
- Active ORing

Benefits

- Ultra Low On-Resistance
- Low Gate Impedance to Reduce Switching Losses
- Fully Avalanche Rated

TO-247AC

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	210 ⑥	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	100 ⑥	
I_{DM}	Pulsed Drain Current ①	1000	
P_D @T_C = 25°C	Power Dissipation	230	W
P_D @T_A = 25°C	Power Dissipation	3.8	
	Linear Derating Factor	1.5	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
dv/dt	Peak Diode Recovery dv/dt ③	5.0	V/ns
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 175	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	——	0.65	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.24	——	
$R_{\theta JA}$	Junction-to-Ambient	——	40	

Typical SMPS Topologies

- Forward and Bridge Converters with Synchronous Rectification for Telecom and Industrial Applications
- Offline High Power AC/DC Convertors using Synchronous Rectification

Notes ① through ⑥ are on page 8

Static @ 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	—	0.028	—	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	2.3	2.8	mΩ	V_{GS} = 10V, I_D = 76A ④
		—	2.8	3.9		V_{GS} = 7.0V, I_D = 76A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS} = V_{GS}, I_D = 250µA
I_{DSS}	Drain-to-Source Leakage Current	—	—	20	µA	V_{DS} = 24V, V_{GS} = 0V
		—	—	250		V_{DS} = 24V, V_{GS} = 0V, T_J = 150°C
I_{GSS}	Gate-to-Source Forward Leakage	—	—	200	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	—	—	-200		V_{GS} = -20V

Dynamic @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
g_{fs}	Forward Transconductance	150	—	—	S	V_{DS} = 24V, I_D = 76A
Q_g	Total Gate Charge	—	209	—	nC	I_D = 76A
Q_{gs}	Gate-to-Source Charge	—	62	—		V_{DS} = 24V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	42	—		V_{GS} = 10V, ④
$t_{d(on)}$	Turn-On Delay Time	—	18	—	ns	V_{DD} = 15V, V_{GS} = 10V
t_r	Rise Time	—	123	—		I_D = 76A
$t_{d(off)}$	Turn-Off Delay Time	—	53	—		R_G = 1.8Ω
t_f	Fall Time	—	24	—		V_{GS} = 10V ④
C_{iss}	Input Capacitance	—	8250	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	3000	—		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—	290	—		f = 1.0MHz
C_{oss}	Output Capacitance	—	10360	—		V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0MHz
C_{oss}	Output Capacitance	—	3060	—		V_{GS} = 0V, V_{DS} = 24V, f = 1.0MHz
C_{oss} eff.	Effective Output Capacitance	—	2590	—		V_{GS} = 0V, V_{DS} = 0V to 24V ⑤

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	—	1700	mJ
I_{AR}	Avalanche Current①	—	76	A
E_{AR}	Repetitive Avalanche Energy①	—	23	mJ

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	210⑥	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	1000		
V_{SD}	Diode Forward Voltage	—	0.8	1.3	V	T_J = 25°C, I_S = 76A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	80	120	ns	T_J = 25°C, I_F = 76A, V_{DS} = 16V
Q_{rr}	Reverse RecoveryCharge	—	185	275	nC	di/dt = 100A/µs ④

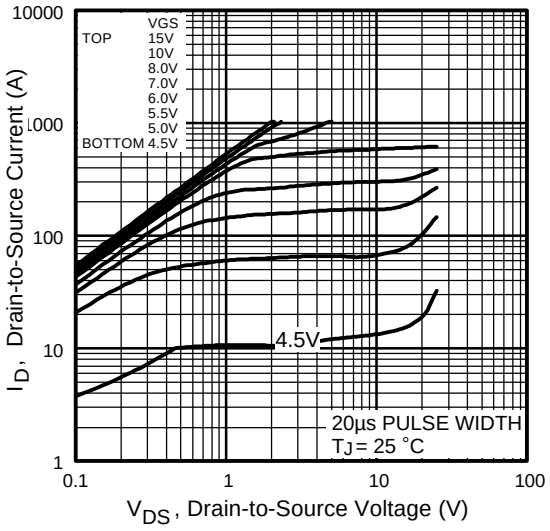


Fig 1. Typical Output Characteristics

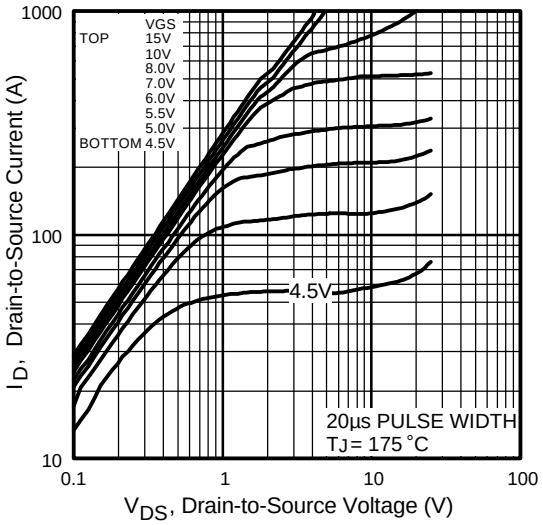


Fig 2. Typical Output Characteristics

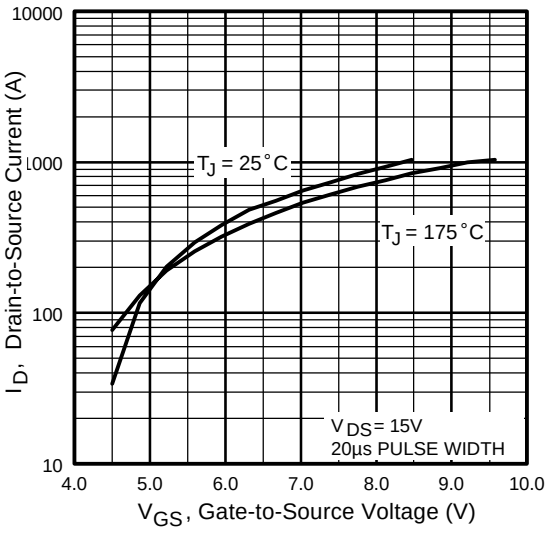


Fig 3. Typical Transfer Characteristics

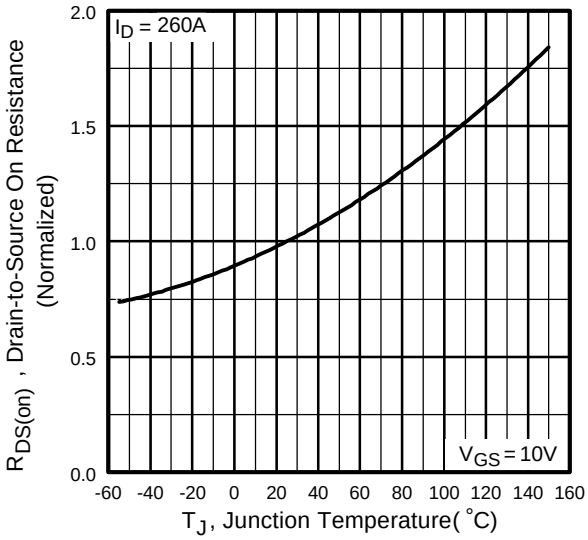


Fig 4. Normalized On-Resistance
Vs. Temperature

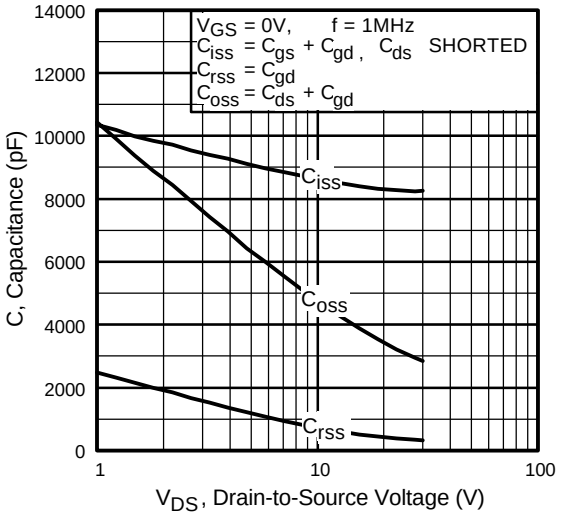


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

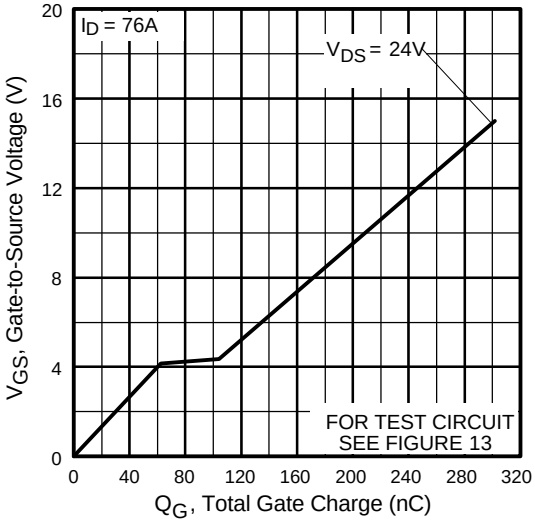


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

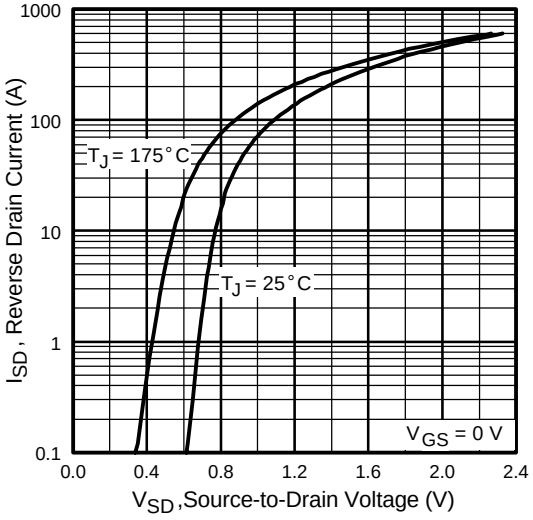


Fig 7. Typical Source-Drain Diode Forward Voltage

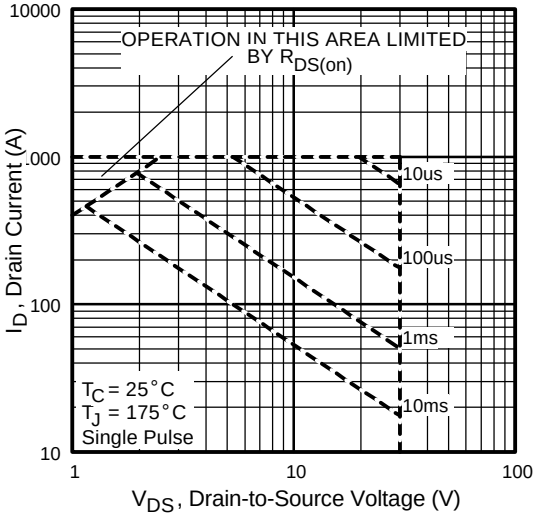


Fig 8. Maximum Safe Operating Area

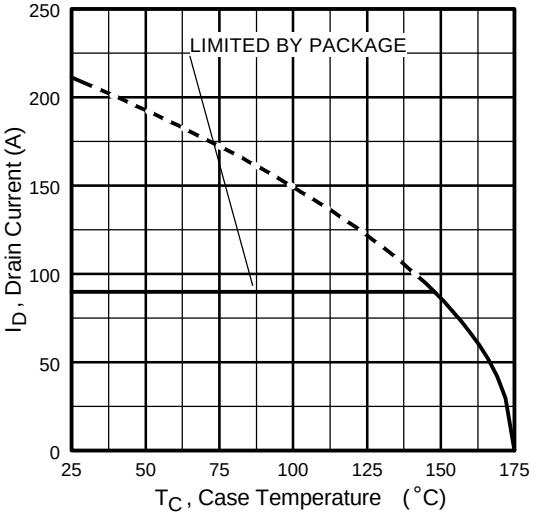


Fig 9. Maximum Drain Current Vs. Case Temperature

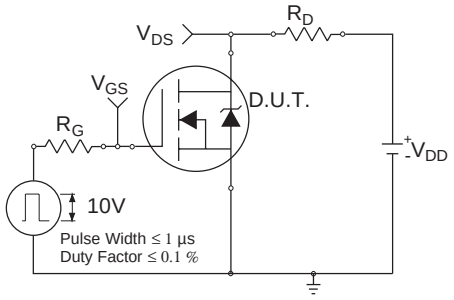


Fig 10a. Switching Time Test Circuit

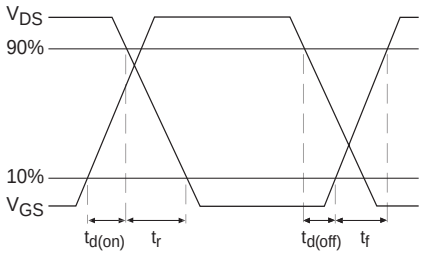


Fig 10b. Switching Time Waveforms

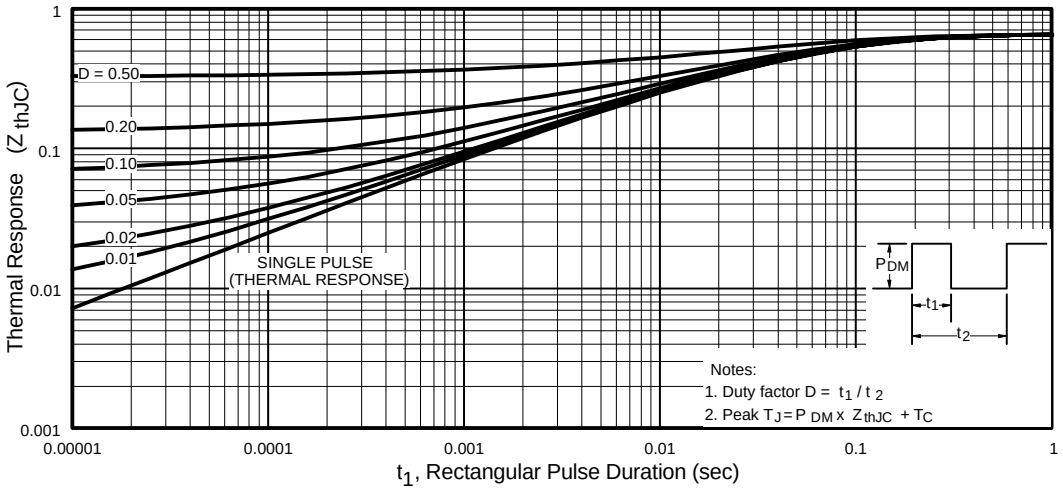


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

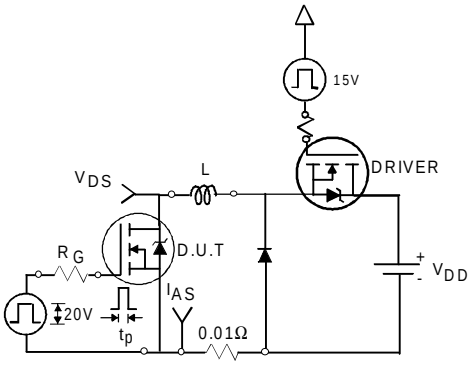


Fig 12a. Unclamped Inductive Test Circuit

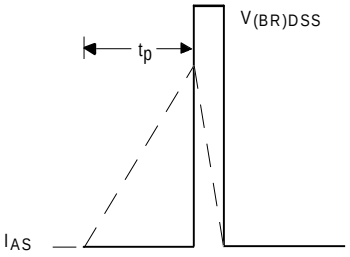


Fig 12b. Unclamped Inductive Waveforms

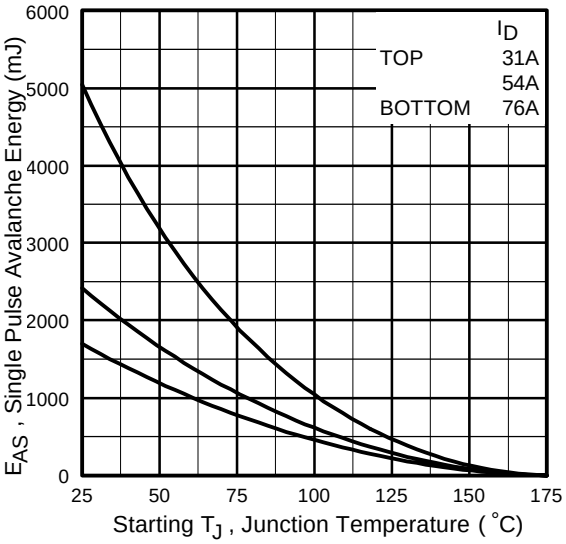


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

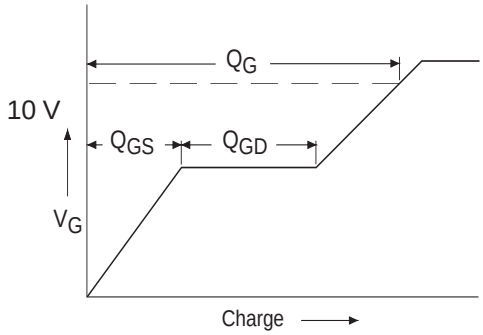


Fig 13a. Basic Gate Charge Waveform

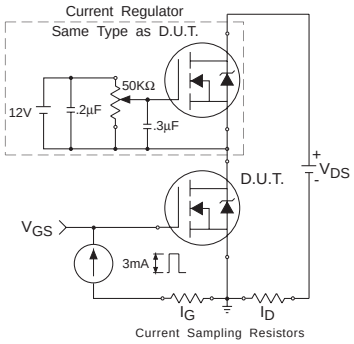
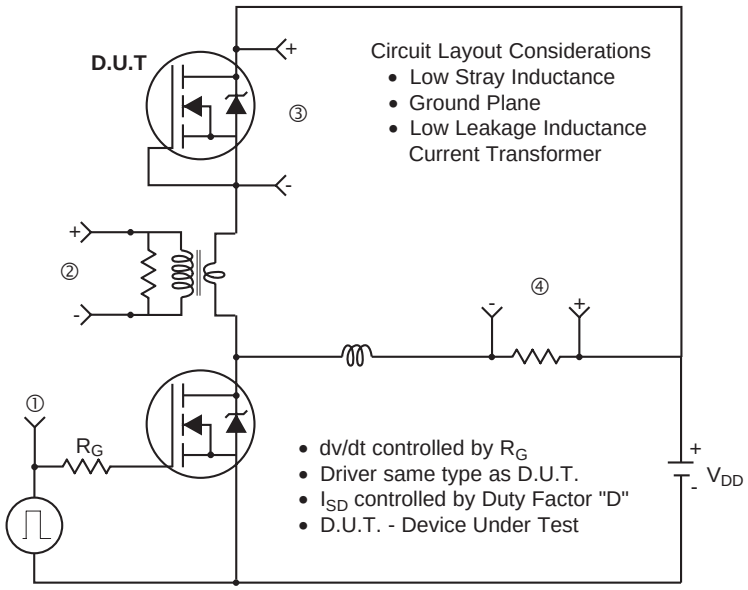
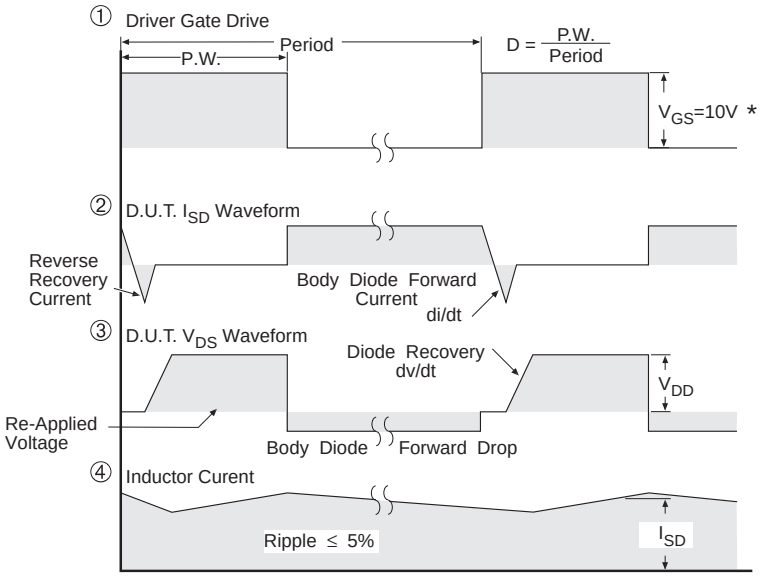


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



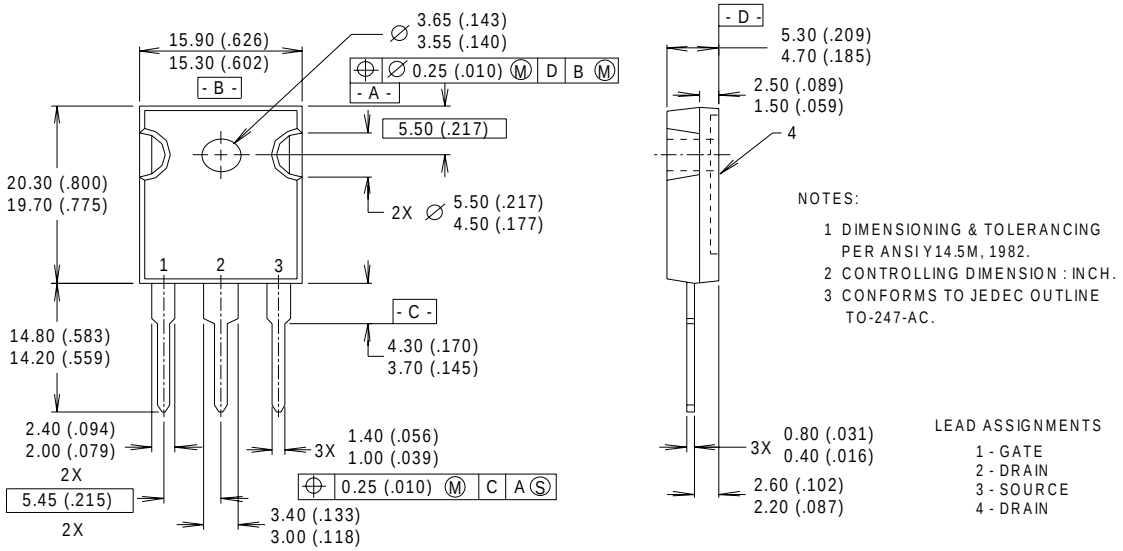


* V_{GS} = 5V for Logic Level Devices

Fig 14. For N-Channel HEXFET® Power MOSFET

TO - 247 Package Outline

Dimensions are shown in millimeters (inches)



Notes:

① Repetitive rating; pulse width limited by max. junction temperature.

② Starting T_J = 25°C, L = 0.6mH R_G = 25Ω, I_{AS} = 76A.

③ $I_{SD} \leq$ 76A, di/dt ≤ 100A/µs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 175°C

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

⑤ C_{oss} eff. is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS}

⑥ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 90A

International
IOR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
IR EUROPEAN REGIONAL CENTRE: 439/445 Godstone Rd, Whyteleafe, Surrey CR3 OBL, UK Tel: ++ 44 (0)20 8645 8000
IR CANADA: 15 Lincoln Court, Brampton, Ontario L6T3Z2, Tel: (905) 453 2200
IR GERMANY: Saalburgstrasse 157, 61350 Bad Homburg Tel: ++ 49 (0) 6172 96590
IR ITALY: Via Liguria 49, 10071 Borgaro, Torino Tel: ++ 39 011 451 0111
IR JAPAN: K&H Bldg., 2F, 30-4 Nishi-Ikebukuro 3-Chome, Toshima-Ku, Tokyo 171 Tel: 81 (0)3 3983 0086
IR SOUTHEAST ASIA: 1 Kim Seng Promenade, Great World City West Tower, 13-11, Singapore 237994 Tel: ++ 65 (0)838 4630
IR TAIWAN:16 Fl. Suite D. 207, Sec. 2, Tun Haw South Road, Taipei, 10673 Tel: 886-(0)2 2377 9936
Data and specifications subject to change without notice. 6/00