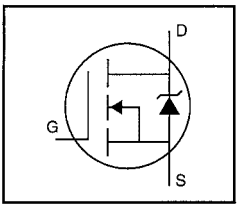
International IOR Rectifier

IRFPC48

HEXFET® Power MOSFET

- Dynamic dv/dt Rating
- Repetitive Avalanche Rated
- Isolated Central Mounting Hole
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements



V_{DSS} = 600V

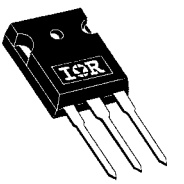
$R_{DS(on)}$ = 0.82Ω

I_D = 8.9A

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 TO-247 package is preferred for commercial–industrial applications where higher power levels preclude the use of TO-220 devices. The TO-247 is similar but superior to the earlier TO-218 package because of its isolated mounting hole. It also provides greater creepage distance between pins to meet the requirements of most safety specifications.



TO-247AC

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10 V	8.9	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10 V	5.6	
I_{DM}	Pulsed Drain Current ①	36	
P_D @ T_C = 25°C	Power Dissipation	170	W
	Linear Derating Factor	1.4	W/°C
V_{GS}	Gate-to-Source Voltage	±20	V
E_{AS}	Single Pulse Avalanche Energy ②	700	mJ
I_{AR}	Avalanche Current ①	8.9	A
E_{AR}	Repetitive Avalanche Energy ①	17	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
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	
	Mounting Torque, 6-32 or M3 screw	10 lbf•in (1.1 N•m)	

Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	—	0.73	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	—	0.24	—	
$R_{\theta JA}$	Junction-to-Ambient	—	—	40	

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

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	600	—	—	V	V_{GS}=0V, I_D= 250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.68	—	V/°C	Reference to 25°C, I_D= 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.82	Ω	V_{GS}=10V, I_D=5.3A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	V_{DS}=V_{GS}, I_D= 250μA
g_{fs}	Forward Transconductance	8.0	—	—	S	V_{DS}=50V, I_D=5.3A ④
I_{DSS}	Drain-to-Source Leakage Current	—	—	100	μA	V_{DS}=600V, V_{GS}=0V
		—	—	500		V_{DS}=480V, V_{GS}=0V, T_J=125°C
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V_{GS}=20V
	Gate-to-Source Reverse Leakage	—	—	-100		V_{GS}=-20V
Q_g	Total Gate Charge	—	—	110	nC	I_D=8.9A
Q_{gs}	Gate-to-Source Charge	—	—	17		V_{DS}=360V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	53		V_{GS}=10V ④
$t_{d(on)}$	Turn-On Delay Time	—	15	—	ns	V_{DD}=300V
t_r	Rise Time	—	32	—		I_D=8.9A
$t_{d(off)}$	Turn-Off Delay Time	—	73	—		R_G=7.8Ω
t_f	Fall Time	—	32	—		R_D=34Ω ④
L_D	Internal Drain Inductance	—	5.0	—	nH	Between lead, 6 mm (0.25in.) from package and center of die contact 
L_S	Internal Source Inductance	—	13	—		
C_{iss}	Input Capacitance	—	1800	—	pF	V_{GS}=0V
C_{oss}	Output Capacitance	—	230	—		V_{DS}= 25V
C_{rss}	Reverse Transfer Capacitance	—	50	—		f=1.0MHz

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	—	—	8.9	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	—	—	1.5	V	T_J=25°C, I_S=8.9A, V_{GS}=0V ④
t_{rr}	Reverse Recovery Time	—	600	900	ns	T_J=25°C, I_F=8.9A
Q_{rr}	Reverse Recovery Charge	—	3.7	5.6	μC	di/dt=100A/μs ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is neglegible (turn-on is dominated by L_S+L_D)				

Notes:

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

② V_{DD}=50V, starting T_J=25°C, L=16mH R_G=25Ω, I_{AS}=8.9A

③ I_{SD}≤8.9A, di/dt≤90A/μs, V_{DD}≤$V_{(BR)DSS}$, T_J≤150°C

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

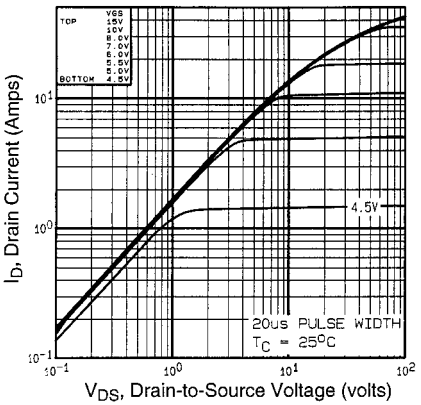


Fig 1. Typical Output Characteristics, T_C=25°C

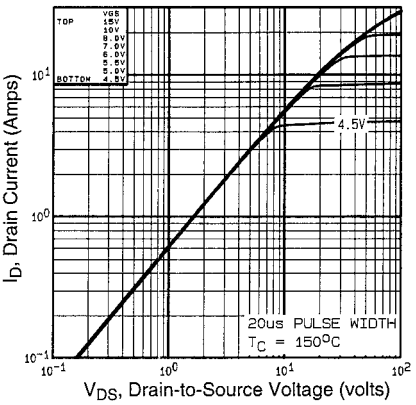


Fig 2. Typical Output Characteristics, T_C=150°C

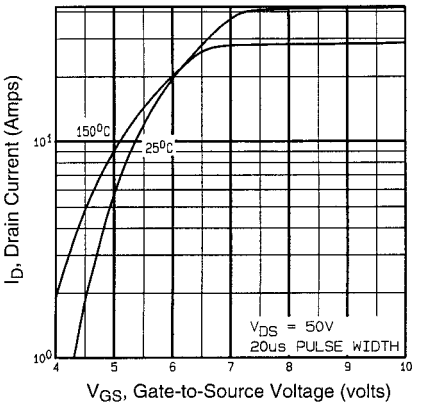


Fig 3. Typical Transfer Characteristics

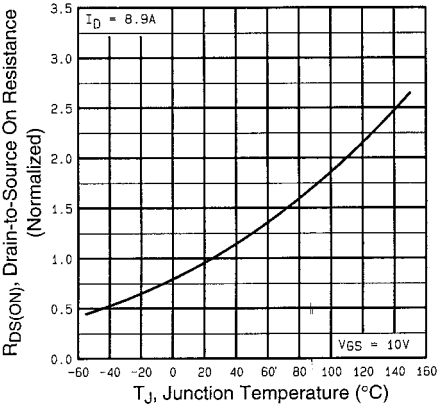


Fig 4. Normalized On-Resistance Vs. Temperature

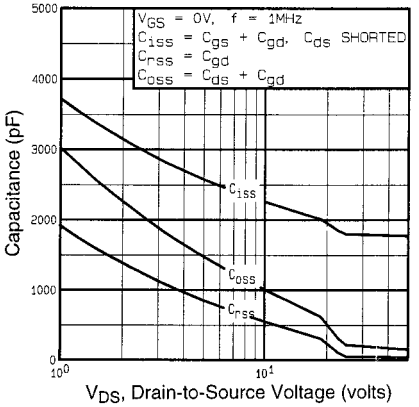


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

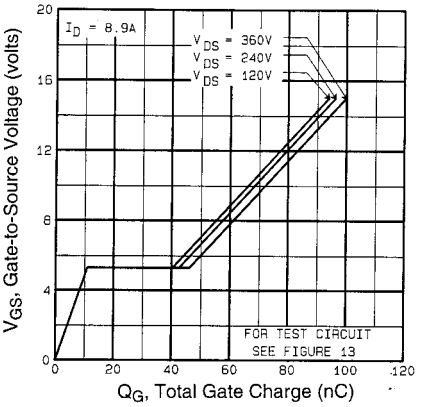


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

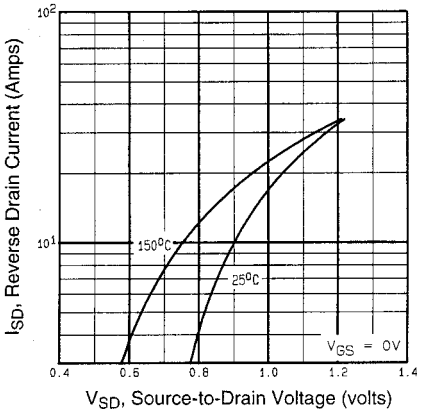


Fig 7. Typical Source-Drain Diode Forward Voltage

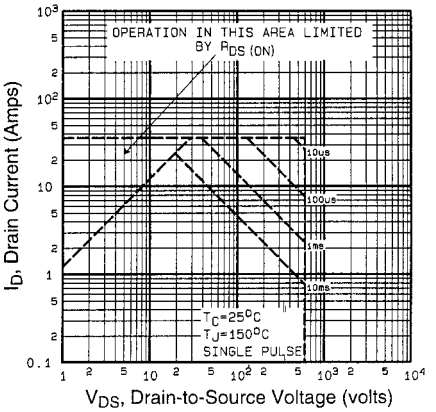


Fig 8. Maximum Safe Operating Area

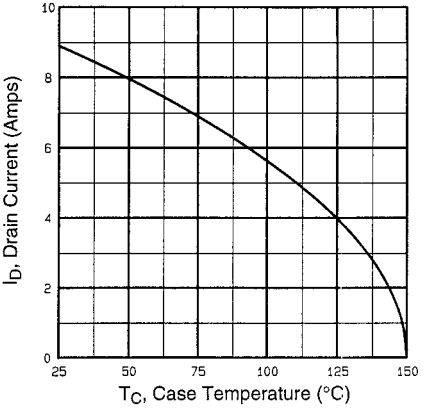


Fig 9. Maximum Drain Current Vs. Case Temperature

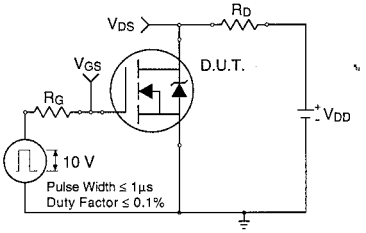


Fig 10a. Switching Time Test Circuit

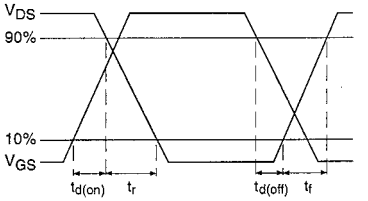


Fig 10b. Switching Time Waveforms

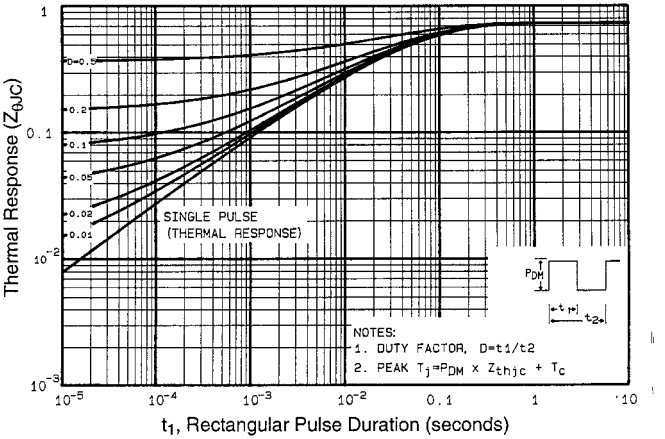


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

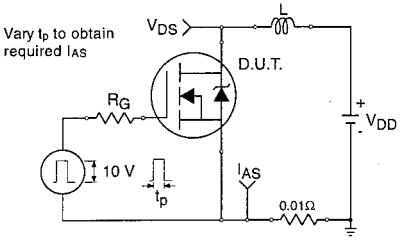


Fig 12a. Unclamped Inductive Test Circuit

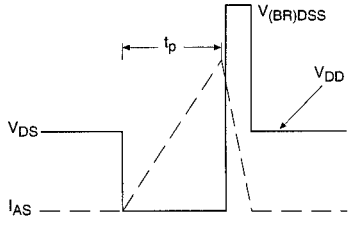


Fig 12b. Unclamped Inductive Waveforms

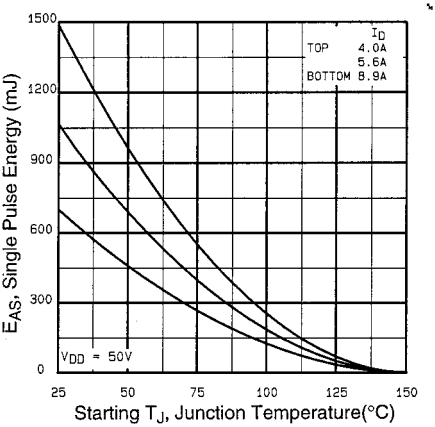


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

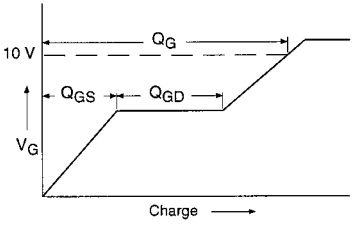


Fig 13a. Basic Gate Charge Waveform

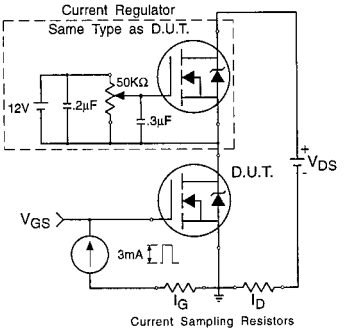


Fig 13b. Gate Charge Test Circuit

Appendix A: Figure 14, Peak Diode Recovery dv/dt Test Circuit

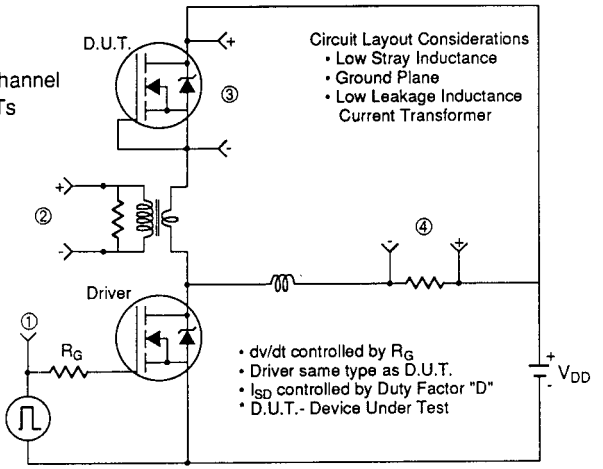
Appendix B: Package Outline Mechanical Drawing

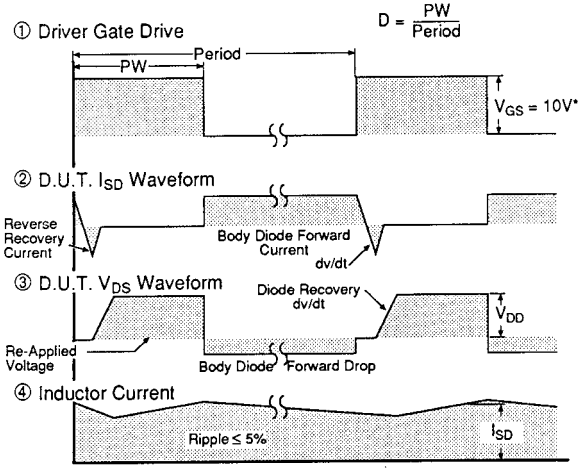
Appendix C: Part Marking Information

Appendix A

Peak Diode Recovery dv/dt Test Circuit

Fig 14. For N-Channel HEXFETs





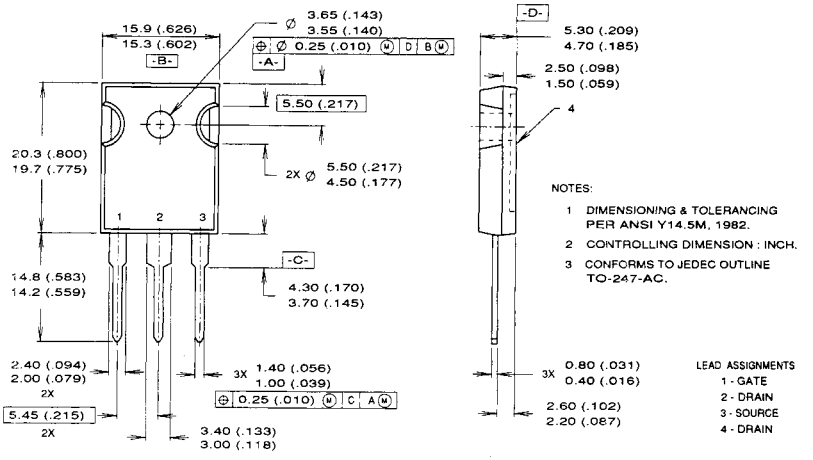
* V_{GS} = 5V for Logic Level Devices

Package Outline

Appendix B

TO-247AC Outline

Dimensions are shown in millimeters (inches)



Part Marking Information

Appendix C

TO-247AC

EXAMPLE: THIS IS AN IRFPE30 WITH ASSEMBLY LOT CODE 3A1Q