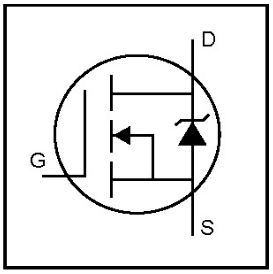
International
IOR Rectifier

PD - 95001

IRFP064NPbF

HEXFET® Power MOSFET

- Advanced Process Technology
- Ultra Low On-Resistance
- Dynamic dv/dt Rating
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Lead-Free



V_{DSS} = 55V

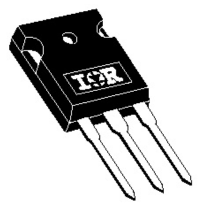
$R_{DS(on)}$ = 0.008Ω

I_D = 110A⑥

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 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.



TO-247AC

Absolute Maximum Ratings

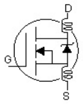
	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	110⑥	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	80⑥	
I_{DM}	Pulsed Drain Current ①⑤	390	
P_D @ T_C = 25°C	Power Dissipation	200	W
	Linear Derating Factor	1.3	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy②⑤	480	mJ
I_{AR}	Avalanche Current①	59	A
E_{AR}	Repetitive Avalanche Energy①	20	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)	
	Mounting torque, 6-32 or M3 srew	10 lbf•in (1.1N•m)	

Thermal Resistance

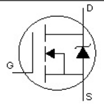
	Parameter	Typ.	Max.	Units
$R_{θJC}$	Junction-to-Case	–––	0.75	°C/W
$R_{θCS}$	Case-to-Sink, Flat, Greased Surface	0.24	–––	
$R_{θJA}$	Junction-to-Ambient	–––	40	

2/11/04

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	55	–––	–––	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	–––	0.057	–––	V/°C	Reference to 25°C, I_D = 1mA⑤
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	–––	–––	0.008	Ω	V_{GS} = 10V, I_D = 59A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	–––	4.0	V	V_{DS} = V_{GS}, I_D = 250µA
g_{fs}	Forward Transconductance	42	–––	–––	S	V_{DS} = 25V, I_D = 59A⑤
I_{DSS}	Drain-to-Source Leakage Current	–––	–––	25	µA	V_{DS} = 55V, V_{GS} = 0V
		–––	–––	250		V_{DS} = 44V, V_{GS} = 0V, T_J = 150°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	–––	–––	170	nC	I_D = 59A
Q_{gs}	Gate-to-Source Charge	–––	–––	32		V_{DS} = 44V
Q_{gd}	Gate-to-Drain ("Miller") Charge	–––	–––	74		V_{GS} = 10V, See Fig. 6 and 13 ④⑤
$t_{d(on)}$	Turn-On Delay Time	–––	14	–––	ns	V_{DD} = 28V
t_r	Rise Time	–––	100	–––		I_D = 59A
$t_{d(off)}$	Turn-Off Delay Time	–––	43	–––		R_G = 2.5Ω
t_f	Fall Time	–––	70	–––		R_D = 0.39Ω, See Fig. 10④⑤
L_D	Internal Drain Inductance	–––	5.0	–––	nH	Between lead, 6mm (0.25in.) from package and center of die contact 
L_S	Internal Source Inductance	–––	13	–––		
C_{iss}	Input Capacitance	–––	4000	–––	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	–––	1300	–––		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	–––	480	–––		ƒ = 1.0MHz, See Fig. 5⑤

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	–––	–––	110⑥		MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	–––	–––	390		
V_{SD}	Diode Forward Voltage	–––	–––	1.3	V	T_J = 25°C, I_S = 59A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	–––	110	170	ns	T_J = 25°C, I_F = 59A
Q_{rr}	Reverse Recovery Charge	–––	450	680	nC	di/dt = 100A/µs ④⑤

Notes:

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)

② V_{DD} = 25V, starting T_J = 25°C, L = 190µH R_G = 25Ω, I_{AS} = 59A. (See Figure 12)

③ $I_{SD} \leq$ 59A, di/dt ≤ 290A/µs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 175°C

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

⑤ Uses IRF3205 data and test conditions

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

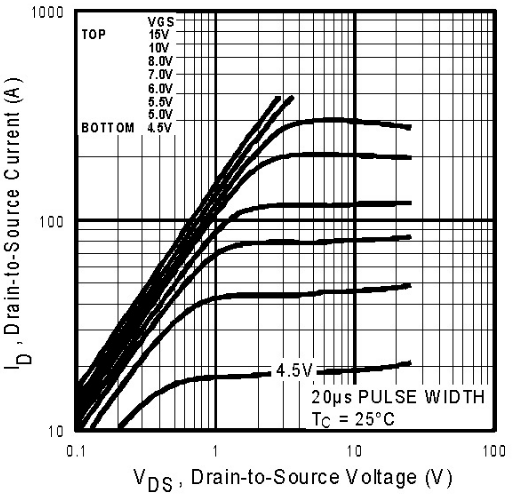


Fig 1. Typical Output Characteristics

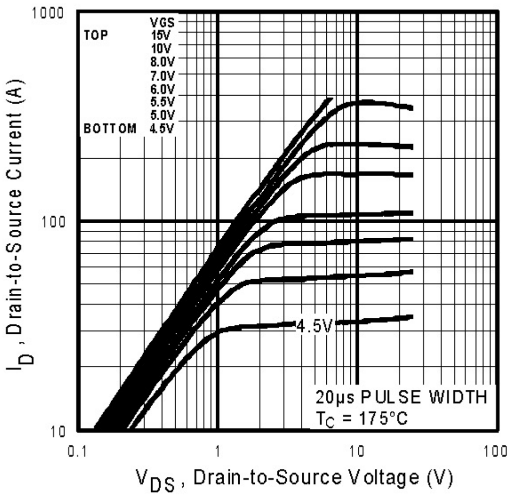


Fig 2. Typical Output Characteristics

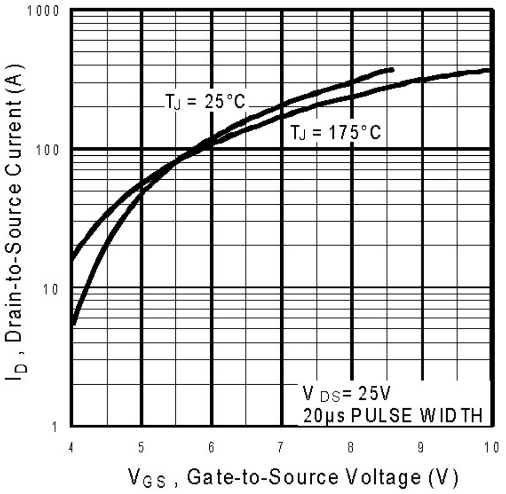


Fig 3. Typical Transfer Characteristics

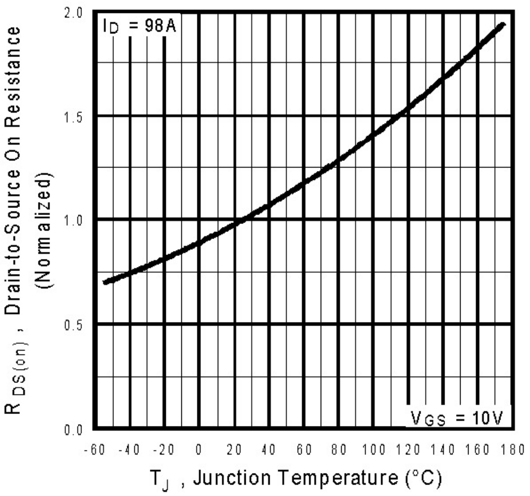


Fig 4. Normalized On-Resistance
Vs. Temperature

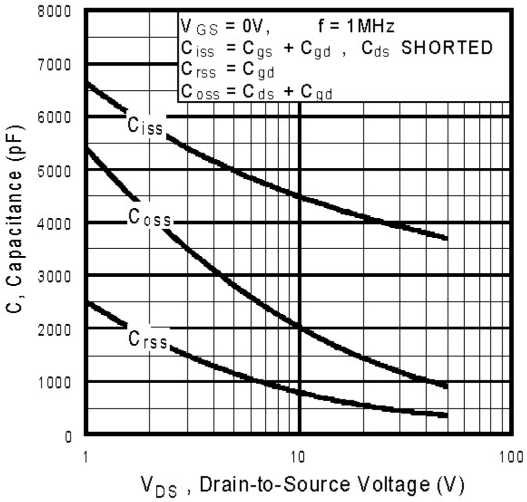


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

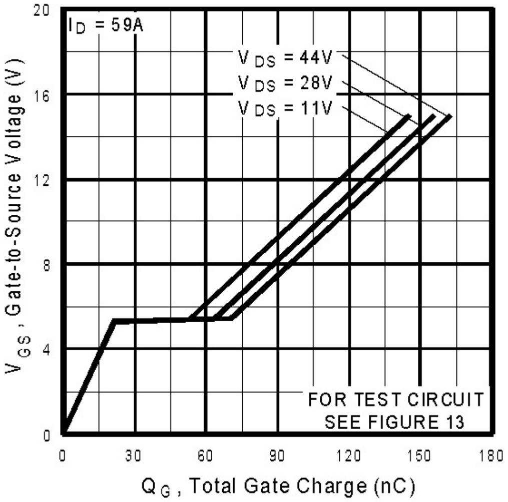


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

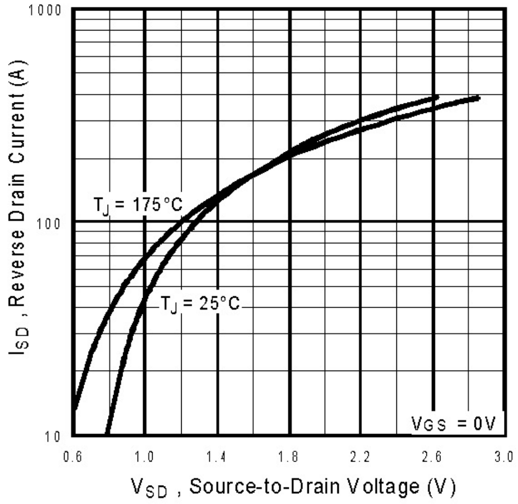


Fig 7. Typical Source-Drain Diode Forward Voltage

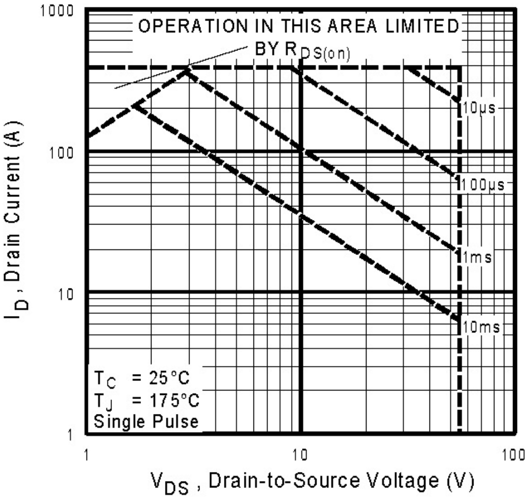


Fig 8. Maximum Safe Operating Area

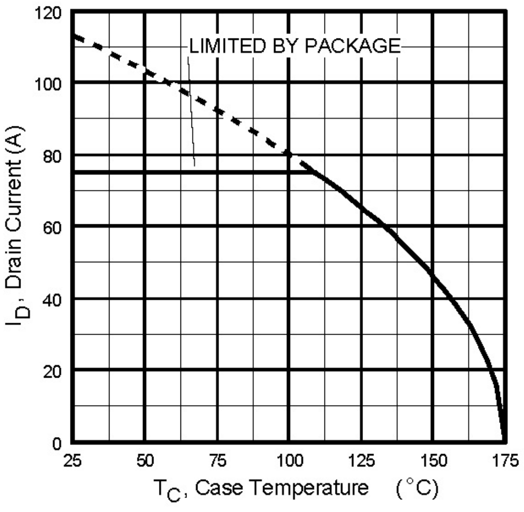


Fig 9. Maximum Drain Current Vs. Case Temperature

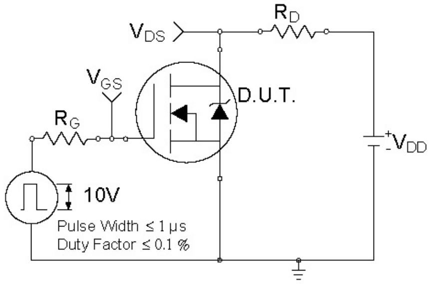


Fig 10a. Switching Time Test Circuit

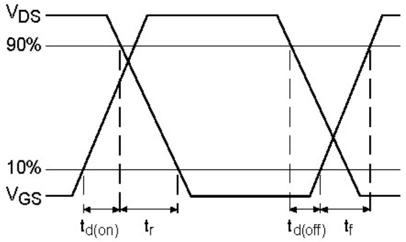


Fig 10b. Switching Time Waveforms

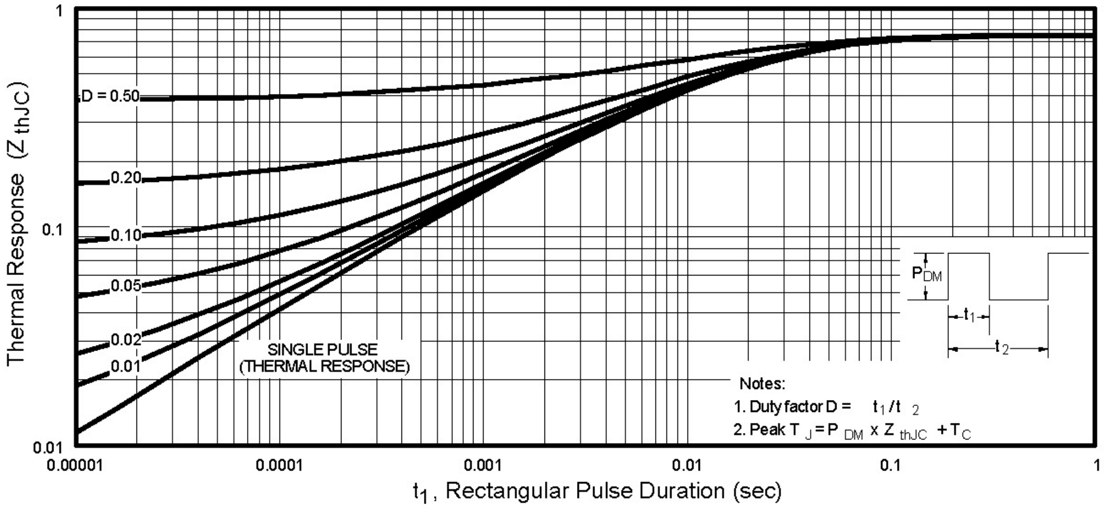


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

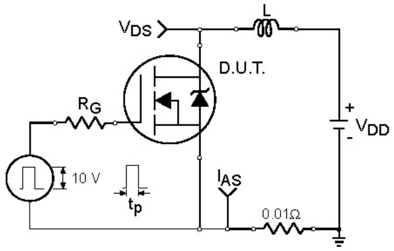


Fig 12a. Unclamped Inductive Test Circuit

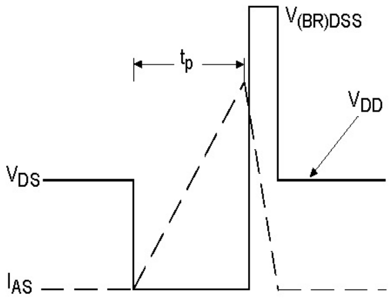


Fig 12b. Unclamped Inductive Waveforms

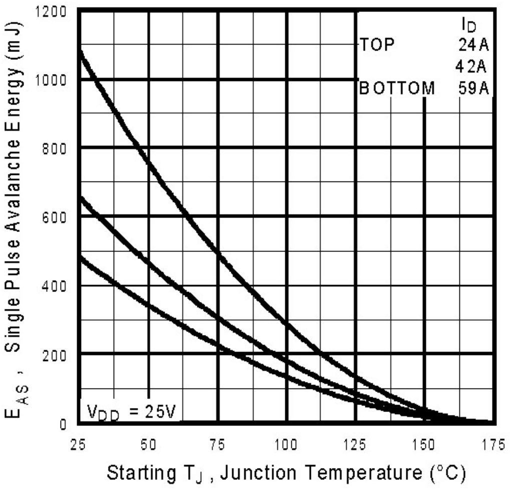


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

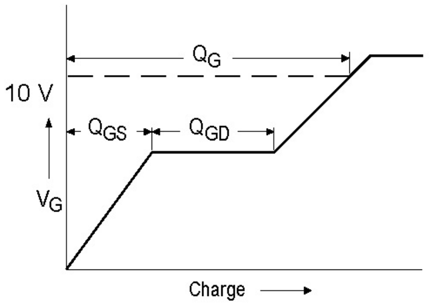


Fig 13a. Basic Gate Charge Waveform

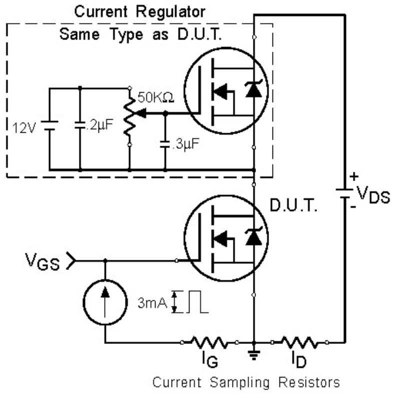
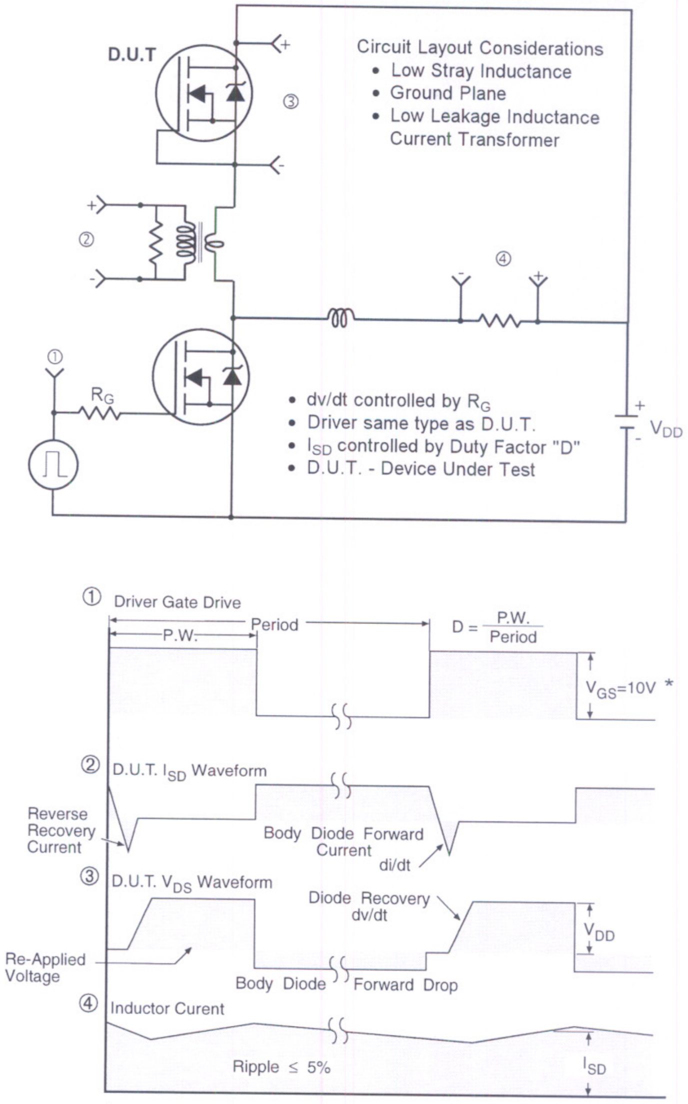


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit

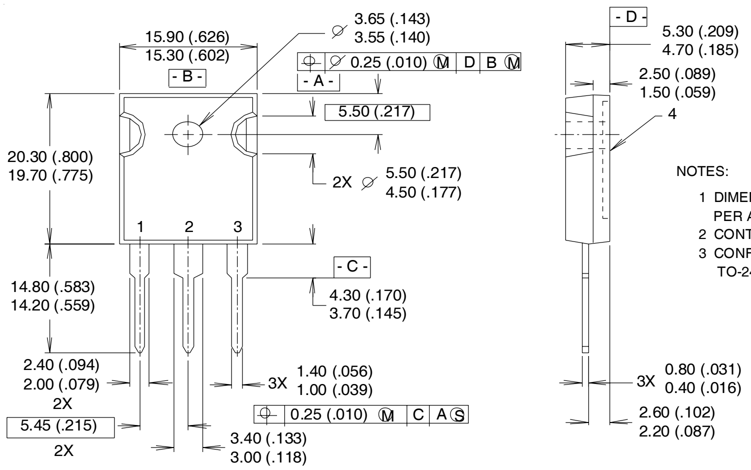


* V_{GS} = 5V for Logic Level Devices

Fig 14. For N-Channel HEXFETS

TO-247AC Package Outline

Dimensions are shown in millimeters (inches)



NOTES:

1 DIMENSIONING & TOLERANCING PER ANSI Y14.5M, 1982.
2 CONTROLLING DIMENSION : INCH.
3 CONFORMS TO JEDEC OUTLINE TO-247-AC.

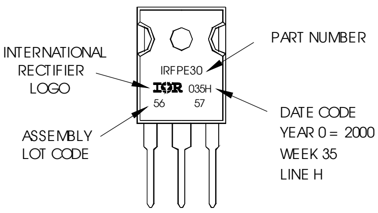
LEAD ASSIGNMENTS

Hexfet	IGBT
1 - Gate	1 - Gate
2 - Drain	2 - Collector
3 - Source	3 - Emitter
4 - Drain	4 - Collector

TO-247AC Part Marking Information

EXAMPLE: THIS IS AN IRFPE30
WITH ASSEMBLY
LOT CODE 5657
ASSEMBLED ON WW 35, 2000
IN THE ASSEMBLY LINE "H"

Note: "P" in assembly line position indicates "Lead-Free"



Data and specifications subject to change without notice.

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Note: For the most current drawings please refer to the IR website at:
http://www.irf.com/package/