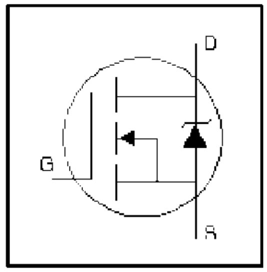
International
IOR Rectifier

PD - 95947

IRF737LCPbF

HEXFET® Power MOSFET

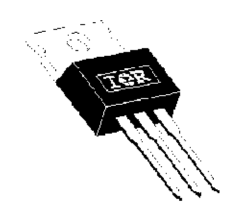
- Reduced Gate Drive Requirement
- Enhanced 30V V_{GS} Rating
- Reduced C_{ISS}, C_{OSS}, C_{RSS}
- Extremely High Frequency Operation
- Repetitive Avalanche Rated
- Lead-Free



V_{DSS} = 300V

$R_{DS(on)}$ = 0.75Ω

I_D = 6.1A



TO-220AB

Description

This new series of Low Charge HEXFETs achieve significantly lower gate charge over conventional MOSFETs. Utilizing the new LCDMOS technology, the device improvements are achieved without added product cost, allowing for reduced gate drive requirements and total system savings. In addition, reduced switching losses and improved efficiency are achievable in a variety of high frequency applications. Frequencies of a few MHz at high current are possible using the new Low Charge MOSFETs.

These device improvements combined with the proven ruggedness and reliability that are characteristics of HEXFETs offer the designer a new standard in power transistors for switching applications.

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	6.1	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	3.9	
I_{DM}	Pulsed Drain Current ①	24	
P_D @T_C = 25°C	Power Dissipation	74	W
	Linear Derating Factor	0.59	W/°C
V_{GS}	Gate-to-Source Voltage	±30	V
E_{AS}	Single Pulse Avalanche Energy ②	120	mJ
I_{AR}	Avalanche Current①	6.1	A
E_{AR}	Repetitive Avalanche Energy①	7.4	mJ
dv/dt	Peak Diode Recovery dv/dt ③	3.4	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 (1.1N•m)	

Thermal Resistance

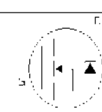
	Parameter	Min.	Typ.	Max.	Units
$R_{θJC}$	Junction-to-Case	——	——	1.7	°C/W
$R_{θCS}$	Case-to-Sink, Flat, Greased Surface	——	0.50	——	
$R_{θJA}$	Junction-to-Ambient	——	——	62	

12/20/04

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	300	—–	—–	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—–	0.391	—–	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—–	—–	0.75	Ω	V_{GS} = 10V, I_D = 3.7A ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—–	4.0	V	V_{DS} = V_{GS}, I_D = 250µA
g_{fs}	Forward Transconductance	2.7	—–	—–	S	V_{DS} = 50V, I_D = 3.7A
I_{DSS}	Drain-to-Source Leakage Current	—–	—–	25	µA	V_{DS} = 300V, V_{GS} = 0V
		—–	—–	250		V_{DS} = 240V, 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	—–	—–	17	nC	I_D = 6.1A
Q_{gs}	Gate-to-Source Charge	—–	—–	4.8		V_{DS} = 240V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—–	—–	7.6		V_{GS} = 10V, See Fig. 6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—–	6.6	—–	ns	V_{DD} = 150V
t_r	Rise Time	—–	21	—–		I_D = 6.1A
$t_{d(off)}$	Turn-Off Delay Time	—–	13	—–		R_G = 12Ω
t_f	Fall Time	—–	12	—–		R_D = 24Ω, See Fig. 10 ④
L_D	Internal Drain Inductance	—–	4.5	—–	nH	Between lead, 6mm (0.25in.) from package and center of die contact 
L_S	Internal Source Inductance	—–	7.5	—–		
C_{iss}	Input Capacitance	—–	430	—–	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—–	120	—–		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—–	9.2	—–		f = 1.0MHz, See Fig. 5

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—–	—–	6.1	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—–	—–	24		
V_{SD}	Diode Forward Voltage	—–	—–	1.6	V	T_J = 25°C, I_S = 6.1A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—–	320	490	ns	T_J = 25°C, I_F = 6.1A
Q_{rr}	Reverse RecoveryCharge	—–	1.5	2.2	µC	di/dt = 100A/µs ④

Notes:

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

② V_{DD} = 25V, starting T_J = 25°C, L = 5.7mH R_G = 25Ω, I_{AS} = 6.1A. (See Figure 12)

③ $I_{SD} \leq$ 6.1A, di/dt $\leq$ 270A/µs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 150°C

④ Pulse width $\leq$ 300µs; duty cycle $\leq$ 2%.

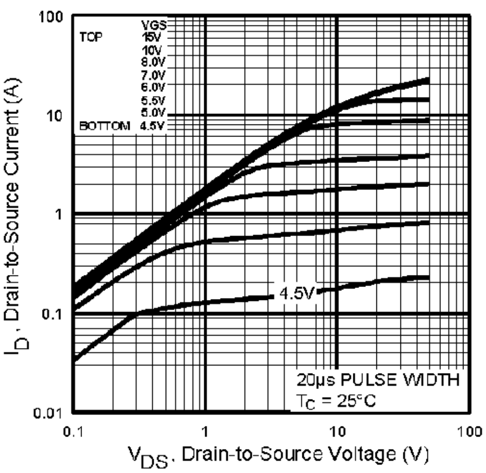


Fig 1. Typical Output Characteristics, $T_J = 25°C$

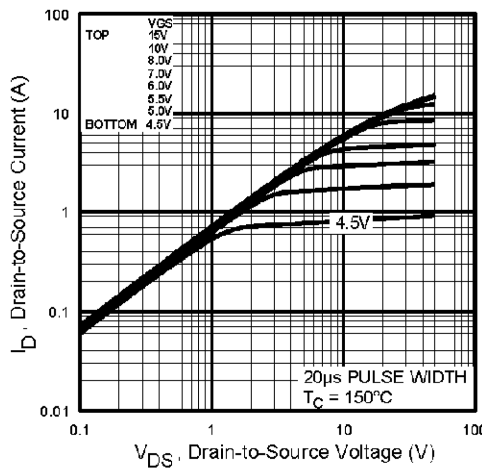


Fig 2. Typical Output Characteristics, $T_J = 150°C$

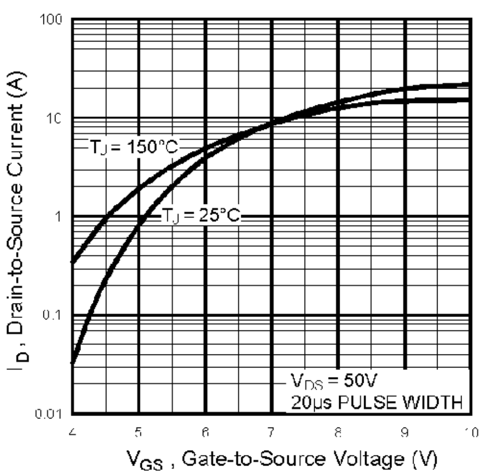


Fig 3. Typical Transfer Characteristics

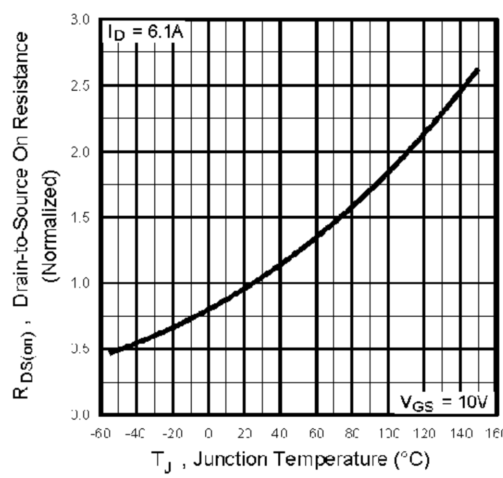


Fig 4. Normalized On-Resistance Vs. Temperature

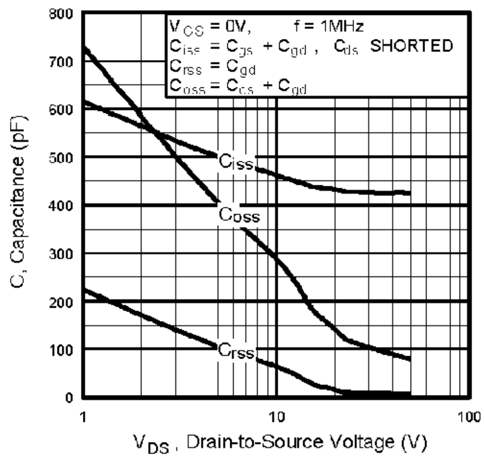


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

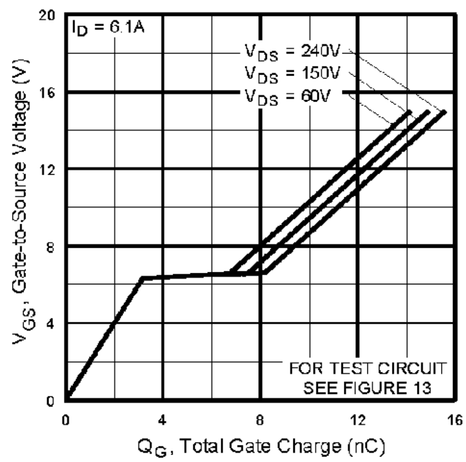


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

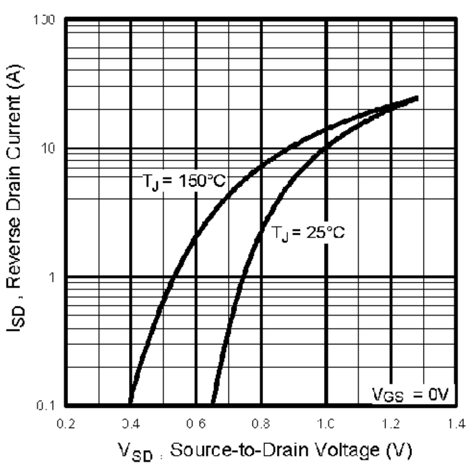


Fig 7. Typical Source-Drain Diode Forward Voltage

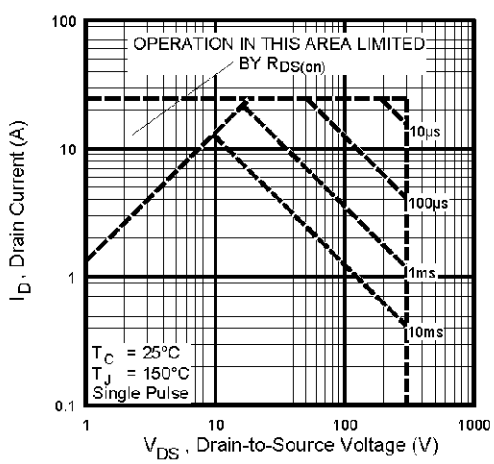


Fig 8. Maximum Safe Operating Area

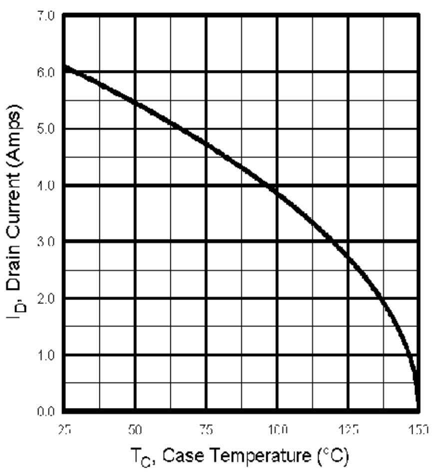


Fig 9. Maximum Drain Current Vs. Case Temperature

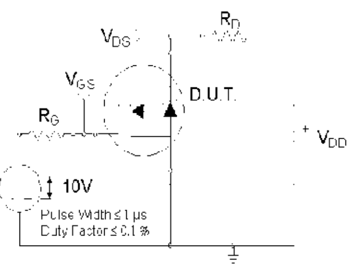


Fig 10a. Switching Time Test Circuit

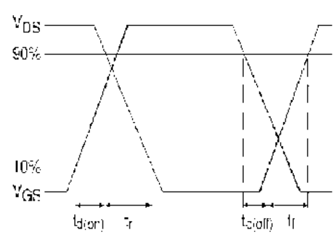


Fig 10b. Switching Time Waveforms

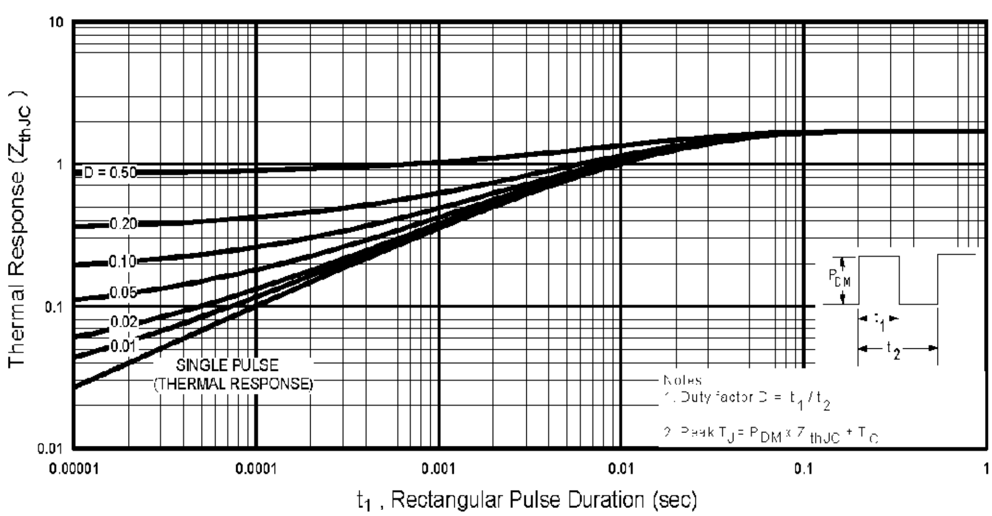


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

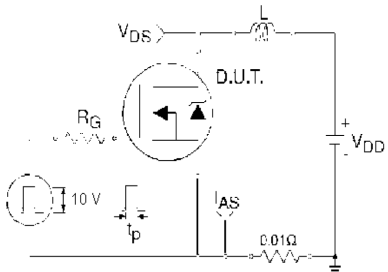


Fig 12a. Unclamped Inductive Test Circuit

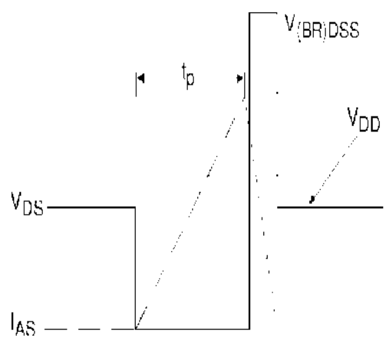


Fig 12b. Unclamped Inductive Waveforms

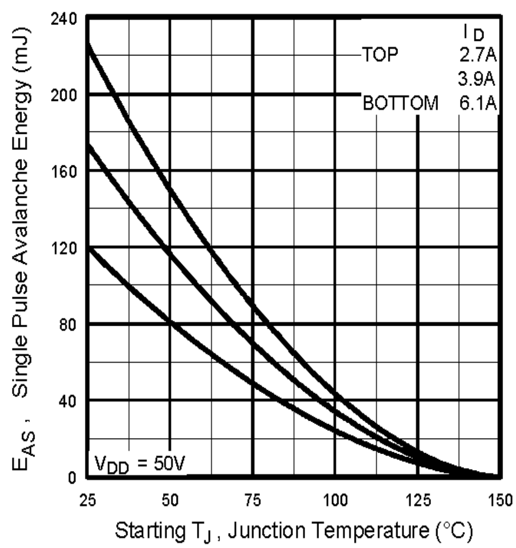


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

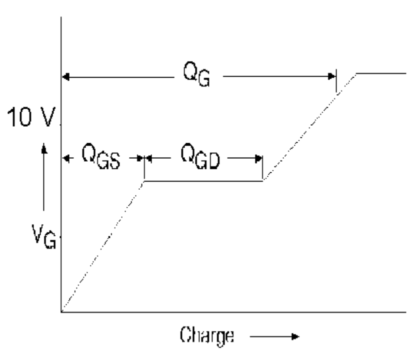


Fig 13a. Basic Gate Charge Waveform

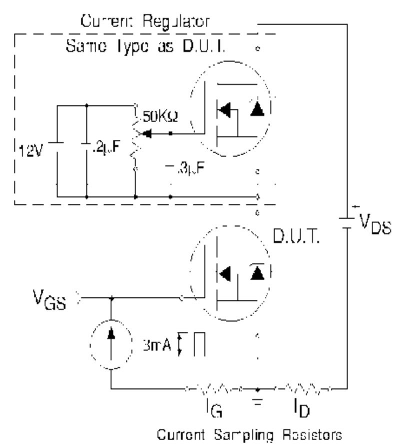
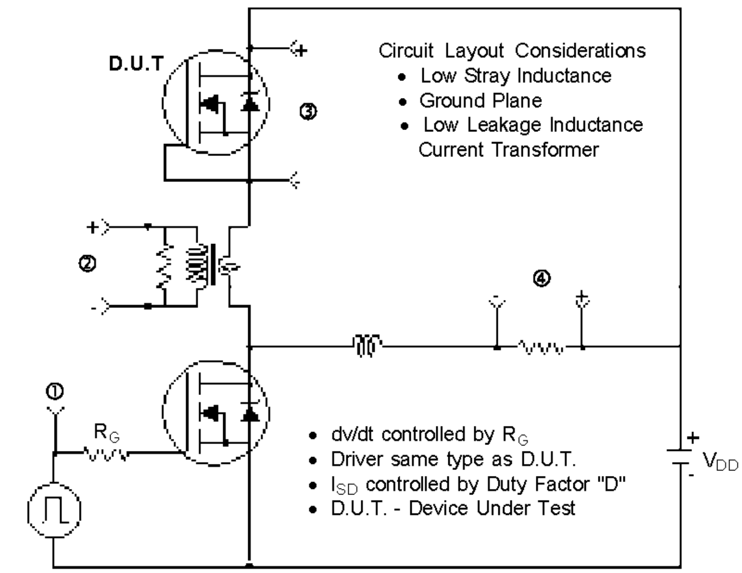
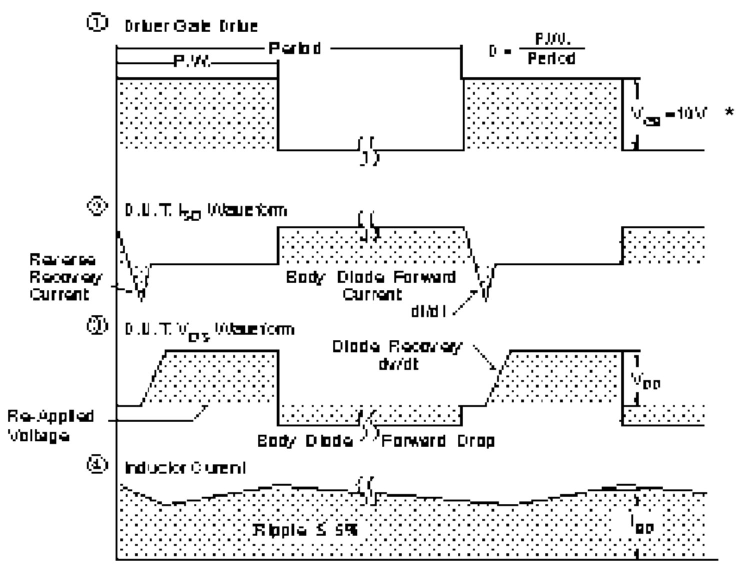


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit

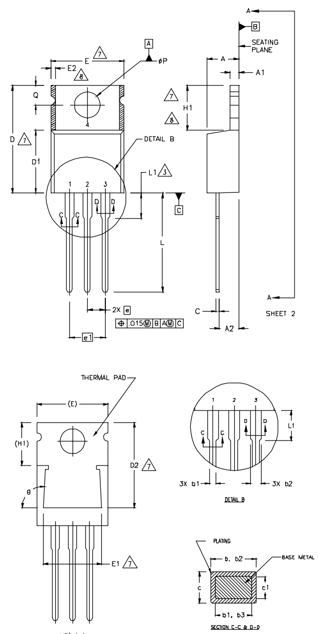




* V_{GS} = 5V for Logic Level Devices

Fig 14. For N-Channel HEXFETS

TO-220AB Package Outline



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5 M- 1994.
2. DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].
3. LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
4. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
5. DIMENSION b1 & c1 APPLY TO BASE METAL ONLY.
6. CONTROLLING DIMENSION : INCHES.
7. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS E,H1,D2 & E1
8. DIMENSION E2 X H1 DEFINE A ZONE WHERE STAMPING AND SINGULATION IRREGULARITIES ARE ALLOWED.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	3.56	4.82	.140	.190	
A1	0.51	1.40	.020	.055	
A2	2.04	2.92	.080	.115	
b	0.38	1.01	.015	.040	
b1	0.38	0.96	.015	.038	5
b2	1.15	1.77	.045	.070	
b3	1.15	1.73	.045	.068	
c	0.36	0.61	.014	.024	
c1	0.36	0.56	.014	.022	5
D	14.22	16.51	.560	.650	4
D1	8.38	9.02	.330	.355	
D2	12.19	12.88	.480	.507	7
E	9.66	10.66	.380	.420	4,7
E1	8.38	8.89	.330	.350	7
e	2.54 BSC		.100 BSC		
e1	5.08		.200 BSC		
H1	5.85	6.55	.230	.270	7,8
L	12.70	14.73	.500	.580	
L1	–	6.35	–	.250	3
øP	3.54	4.08	.139	.161	
Q	2.54	3.42	.100	.135	
ø	90°–93°		90°–93°		

LEAD ASSIGNMENTS

HEXFET

1.- GATE
2.- DRAIN
3.- SOURCE

IGBTs, CoPACK

1.- GATE
2.- COLLECTOR
3.- EMITTER

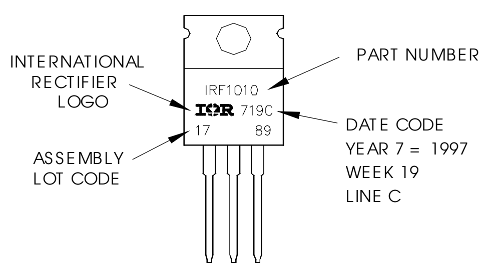
DIODES

1.- ANODE/OPEN
2.- CATHODE
3.- ANODE

TO-220AB Part Marking Information

EXAMPLE: THIS IS AN IRF1010
LOT CODE 1789
ASSEMBLED ON WW 19, 1997
IN THE ASSEMBLY LINE "C"

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



Data and specifications subject to change without notice.

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IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7903
12/04

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