WINSOURCE
ELECTRONICS

THE DATASHEET OF

IRL8114PBF

International
IOR Rectifier

IRL8114PbF

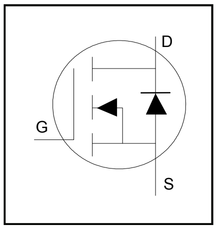
HEXFET® Power MOSFET

Application

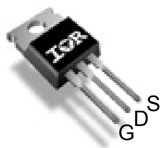
- Optimized for UPS/Inverter Applications
- Low Voltage Power Tools

Benefits

- Low RDS(on) at 4.5V V_{GS}
- Low Gate Charge
- Fully Characterized Capacitance and Avalanche SOA
- Lead-Free



V_{DSS}	**30V**
$R_{DS(on)}$ **typ.**	**3.5mΩ**
max	**4.5mΩ**
I_D **(Silicon Limited)**	**120A①**
I_D **(Package Limited)**	**90A**



TO-220AB
IRL8114PbF

G	D	S
Gate	Drain	Source

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRL8114PbF	TO-220	Tube	50	IRL8114PbF

Absolute Maximum Rating

Symbol	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V (Silicon Limited)	120 ①	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V (Silicon Limited)	85	
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V (Package Limited)	90	
I_{DM}	Pulsed Drain Current ②	440 ⑥	
P_D @T_C = 25°C	Maximum Power Dissipation	115	W
P_D @T_C = 100°C	Maximum Power Dissipation	58	
	Linear Derating Factor	0.77	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	
	Mounting Torque, 6-32 or M3 Screw④	10 lbf·in (1.1 N·m)	

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ⑤	——	1.3	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat Greased Surface	0.50	——	
$R_{\theta JA}$	Junction-to-Ambient	——	62	

Notes ① through ⑥ are on page 7

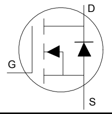
Static @ T_J = 25°C (unless otherwise specified)

Symbol	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	—	0.017	—	mV/°C	Reference to 25°C, I_D = 1mA ②
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	3.5	4.5	mΩ	V_{GS} = 10V, I_D = 40A ④
		—	4.6	5.8		V_{GS} = 4.5V, I_D = 32A ④
$V_{GS(th)}$	Gate Threshold Voltage	1.35	—	2.25	V	V_{DS} = V_{GS}, I_D = 250µA
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Temp. Coefficient	—	-6.7	—		
I_{DSS}	Drain-to-Source Leakage Current	—	—	1.0	µA	V_{DS} = 24V, V_{GS} = 0V
		—	—	150		V_{DS} = 24V,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
gfs	Forward Transconductance	173	—	—	S	V_{DS} = 15V, I_D = 32A
Q_g	Total Gate Charge	—	19	29	nC	V_{DS} = 15V V_{GS} = 4.5V④ I_D = 32A See Fig. 16
Q_{gs1}	Pre-Vth Gate-to-Source Charge	—	5.0	—		
Q_{gs2}	Post Vth Gate-to-Source Charge	—	3.0	—		
Q_{gd}	Gate-to-Drain Charge	—	6.7	—		
Q_{godr}	Gate Charge Overdrive	—	4.3	—		
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})	—	9.7	—		
Q_{oss}	Output Charge	—	15	—	nC	V_{DS} = 16V,V_{GS} = 0V
$t_{d(on)}$	Turn-On Delay Time	—	27	—	ns	V_{DD} = 15V I_D = 32A R_G= 10Ω V_{GS} = 4.5V ④
t_r	Rise Time	—	103	—		
$t_{d(off)}$	Turn-Off Delay Time	—	29	—		
t_f	Fall Time	—	45	—		
C_{iss}	Input Capacitance	—	2660	—	pF	V_{GS} = 0V V_{DS} = 15V f = 1.0MHz
C_{oss}	Output Capacitance	—	600	—		
C_{rss}	Reverse Transfer Capacitance	—	300	—		

Avalanche Characteristics

E_{AS} (Thermally limited)	Single Pulse Avalanche Energy ③	200	mJ
I_{AR}	Avalanche Current ②	32	A

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	120①	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	440⑥		
V_{SD}	Diode Forward Voltage	—	—	1.0	V	T_J = 25°C,I_S = 32A,V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	22	33	ns	T_J = 25°C, I_F = 32A , V_{DD} = 15V
Q_{rr}	Reverse Recovery Charge	—	13	20	nC	di/dt = 100A/µs ④

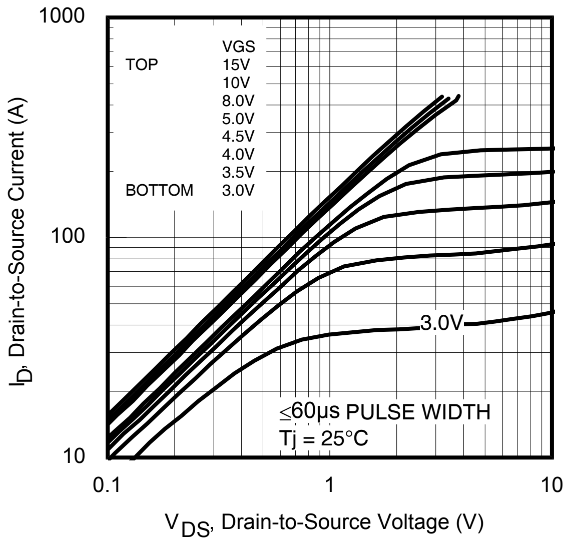


Fig 1. Typical Output Characteristics

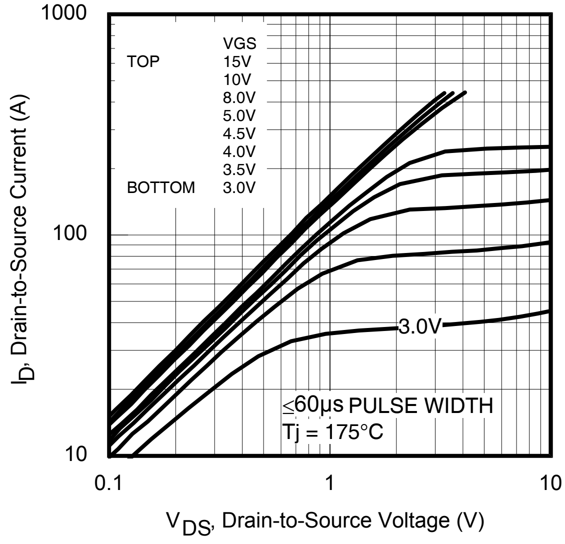


Fig 2. Typical Output Characteristics

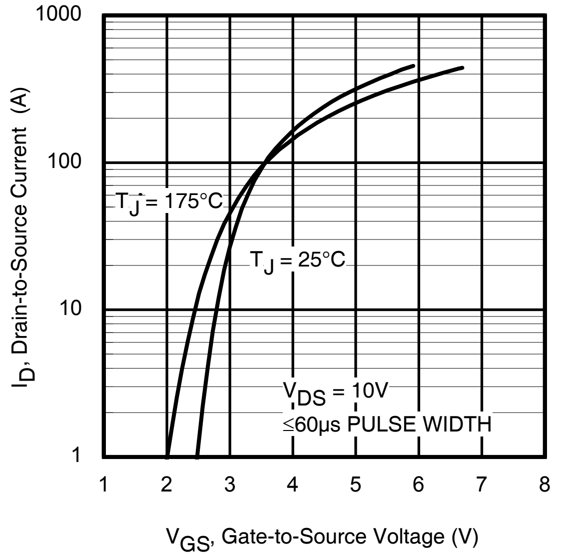


Fig 3. Typical Transfer Characteristics

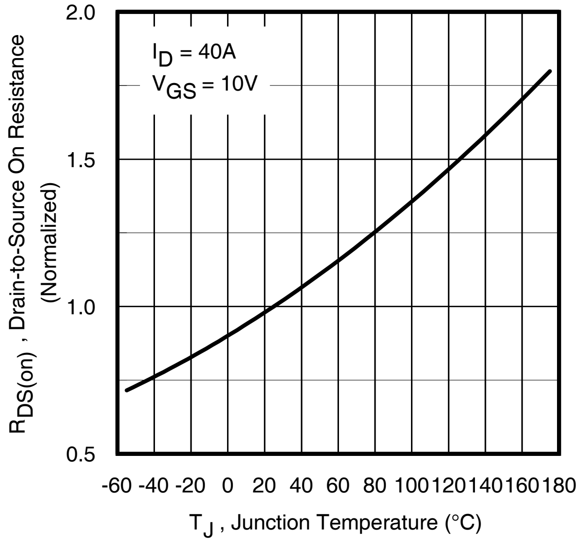


Fig 4. Normalized On-Resistance vs. Temperature

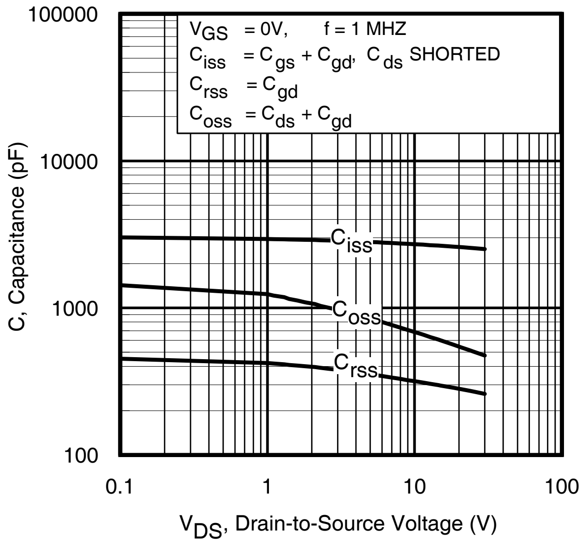


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

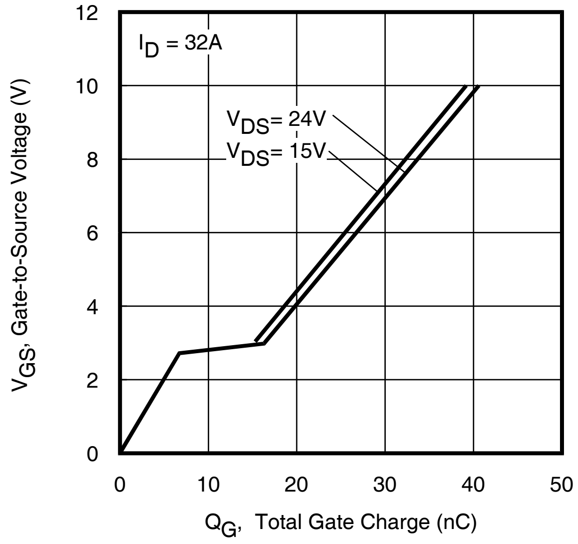


Fig 6. Typical Gate Charge vs. Drain-to-Source Voltage

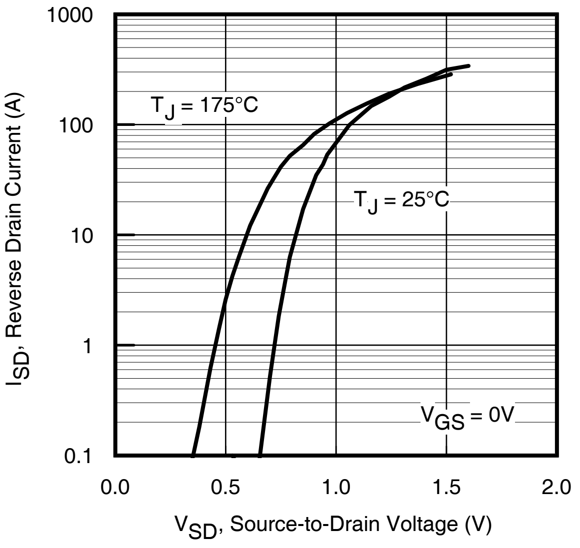


Fig 7. Typical Source-Drain Diode Forward Voltage

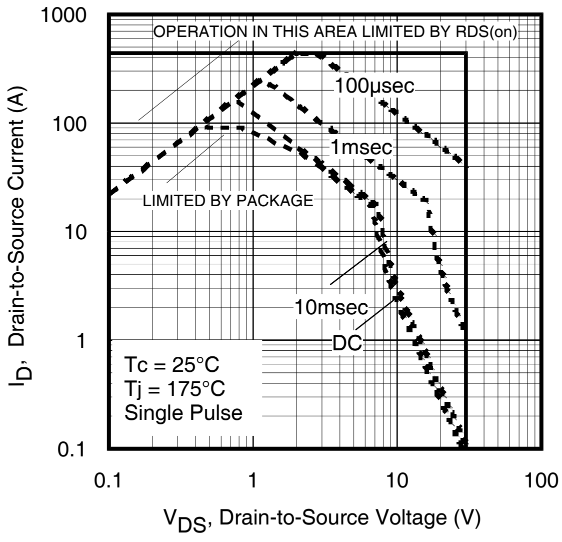


Fig 8. Maximum Safe Operating Area

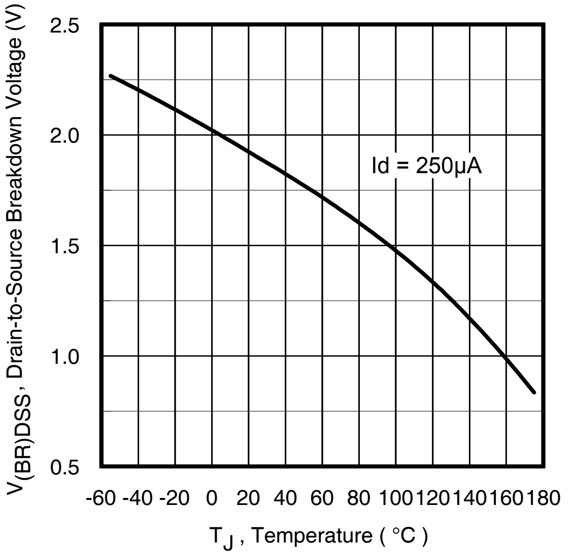


Fig 9. Threshold Voltage vs. Temperature

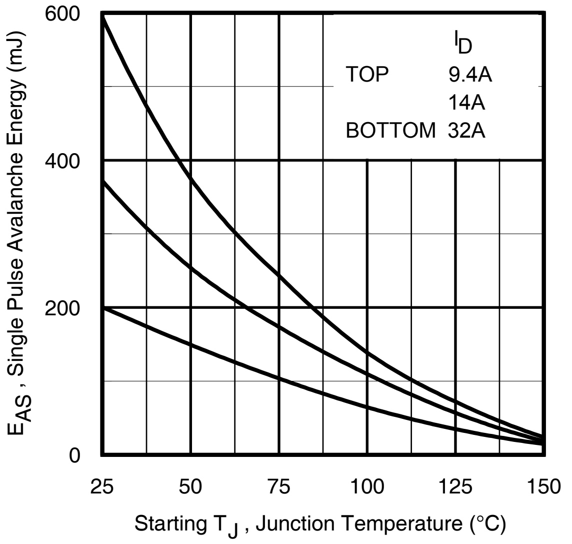


Fig 10. Maximum Avalanche Energy Charge vs. Drain Current

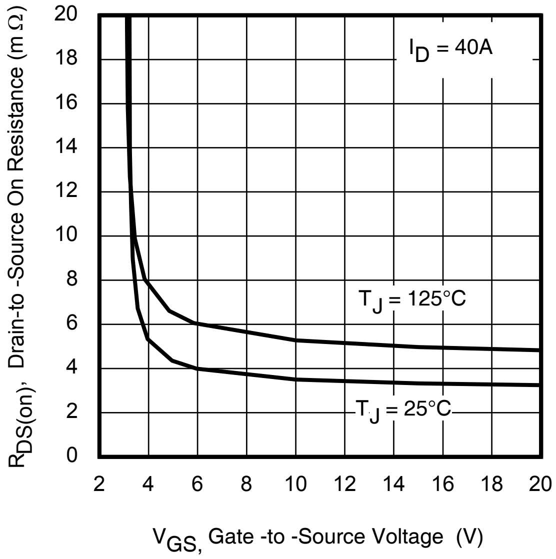


Fig 11. Typical On-Resistance vs. Gate Voltage

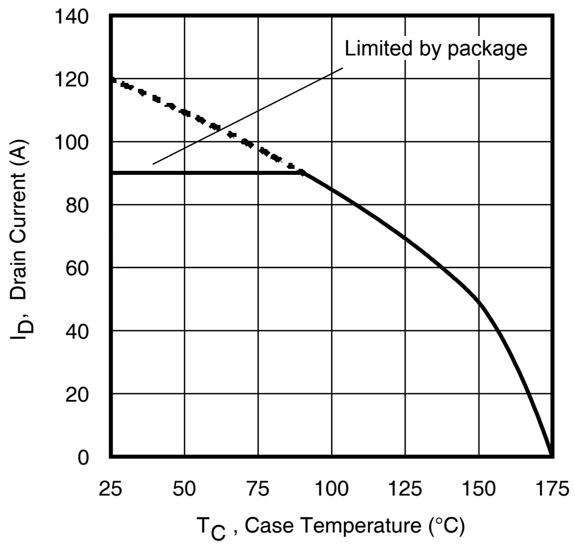


Fig 12. Maximum Drain Current vs. Case Temperature

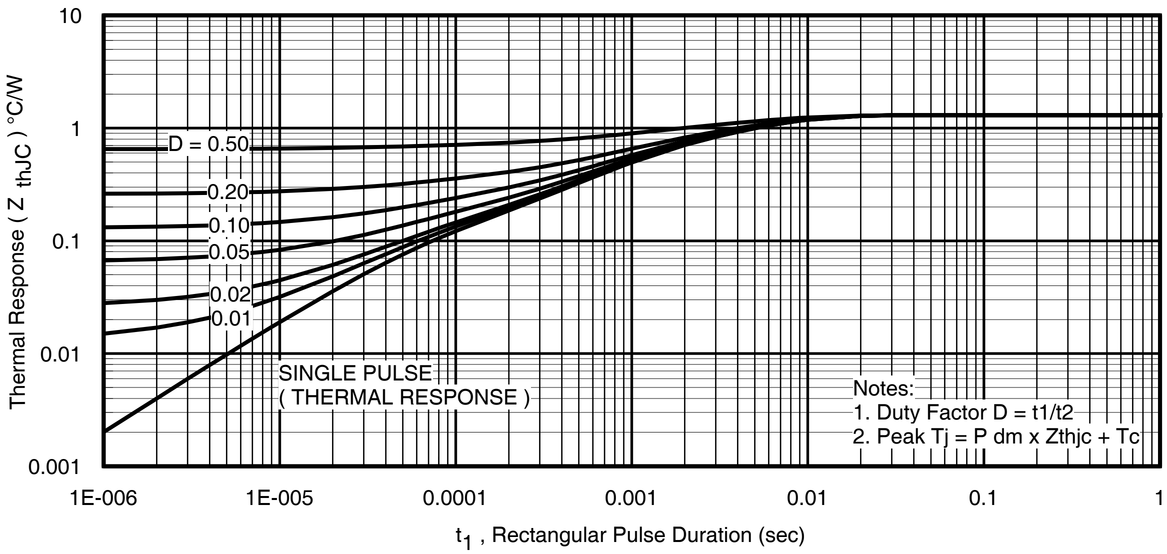


Fig 13. Maximum Effective Transient Thermal Impedance, Junction-to-Case

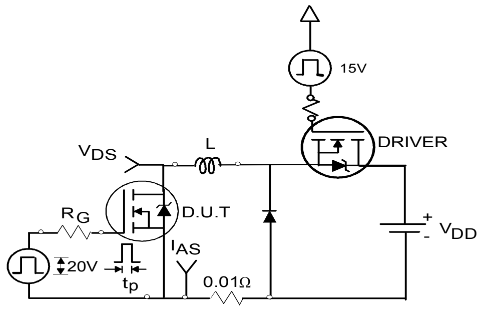


Fig 14a. Unclamped Inductive Test Circuit

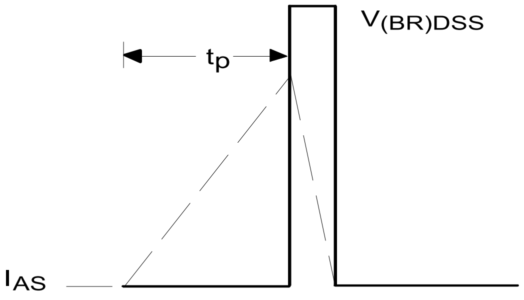


Fig 14b. Unclamped Inductive Waveforms

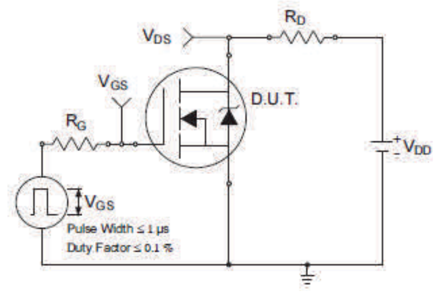


Fig 15a. Switching Time Test Circuit

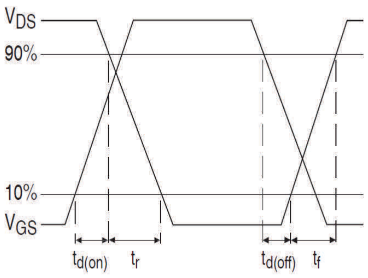


Fig 15b. Switching Time Waveforms

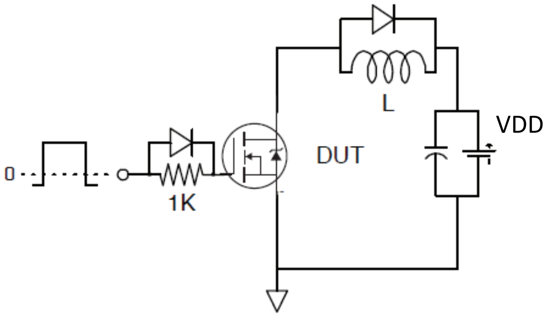


Fig 16a. Gate Charge Test Circuit

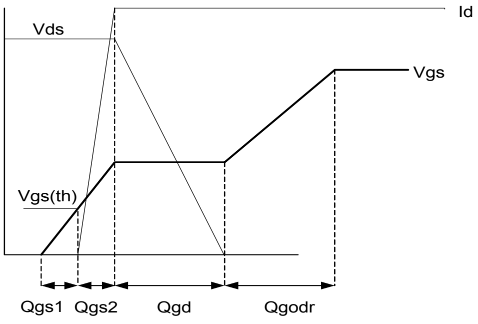
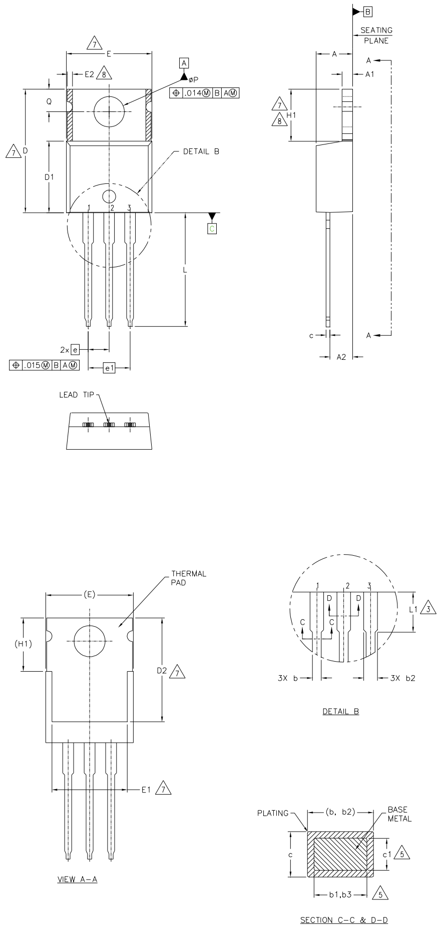


Fig 16b. Gate Charge Waveform

TO-220AB Package Outline (Dimensions are shown in millimeters (inches))



NOTES:

1.– DIMENSIONING AND TOLERANCING AS PER ASME Y14.5 M– 1994.
2.– DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].
3.– LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
4.– DIMENSION D, D1 & 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, b3 & 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.
9.– OUTLINE CONFORMS TO JEDEC TO–220, EXCEPT A2 (max.) AND D2 (min.) WHERE DIMENSIONS ARE DERIVED FROM THE ACTUAL PACKAGE OUTLINE.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	3.56	4.83	.140	.190	
A1	1.14	1.40	.045	.055	
A2	2.03	2.92	.080	.115	
b	0.38	1.01	.015	.040	
b1	0.38	0.97	.015	.038	5
b2	1.14	1.78	.045	.070	
b3	1.14	1.73	.045	.068	5
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	11.68	12.88	.460	.507	7
E	9.65	10.67	.380	.420	4,7
E1	6.86	8.89	.270	.350	7
E2	–	0.76	–	.030	8
e	2.54 BSC		.100 BSC		
e1	5.08 BSC		.200 BSC		
H1	5.84	6.86	.230	.270	7,8
L	12.70	14.73	.500	.580	
L1	3.56	4.06	.140	.160	3
ØP	3.54	4.08	.139	.161	
Q	2.54	3.42	.100	.135	

LEAD ASSIGNMENTS

HEXFET

1.– GATE
2.– DRAIN
3.– SOURCE

IGBTs, CoPACK

1.– GATE
2.– COLLECTOR
3.– EMITTER

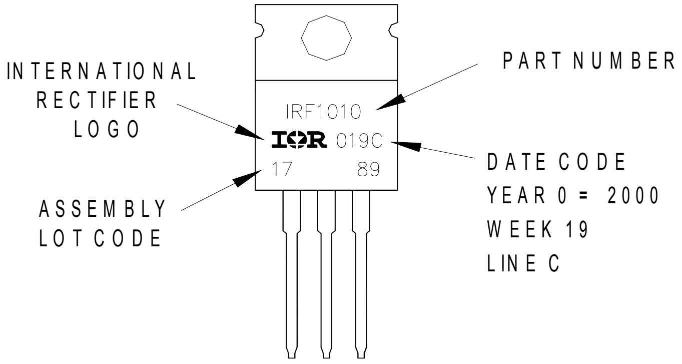
DIODES

1.– ANODE
2.– CATHODE
3.– ANODE

TO-220AB Part Marking Information

EXAMPLE: THIS IS AN IRF1010
LOT CODE 1789
ASSEMBLED ON WW 19, 2000
IN THE ASSEMBLY LINE "C"

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



TO-220AB packages are not recommended for Surface Mount Application.

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

Qualification Information[†]

Qualification Level	Industrial (per JEDEC JESD47F) [††]	
Moisture Sensitivity Level	TO-220	N/A
RoHS Compliant	Yes	

† Qualification standards can be found at International Rectifier's web site: http://www.irf.com/product-info/reliability/

†† Applicable version of JEDEC standard at the time of product release.

Notes:

① Calculated continuous current based on maximum allowable junction temperature. Bond wire current limit is 90A. Note that current limitation arising from heating the device leads may occur with some lead mounting arrangements. (Refer to AN-1140)

② Repetitive rating; pulse width limited by max. junction temperature.

③ Limited by T_{JMAX}, starting T_J = 25°C, L = 0.39mH, R_G = 50Ω, I_{AS} = 32A, V_{GS} =10V.

④ Pulse width ≤ 400μs; duty cycle ≤ 2%.

⑤ R_θ is measured at T_J approximately 90°C.

⑥ Pulse drain current is limited at 360A by source bond technology.

International
IOR Rectifier

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To contact International Rectifier, please visit http://www.irf.com/whoto-call/

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