PD - 97360

International
IOR Rectifier

IRLR8259PbF
IRLU8259PbF

HEXFET® Power MOSFET

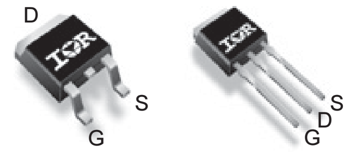
V_{DSS}	$R_{DS(on)}$ max	Qg
25V	**8.7mΩ**	**6.8nC**

Applications

- High Frequency Synchronous Buck Converters for Computer Processor Power
- High Frequency Isolated DC-DC Converters with Synchronous Rectification for Telecom and Industrial Use

Benefits

- Very Low RDS(on) at 4.5V V_{GS}
- Ultra-Low Gate Impedance
- Fully Characterized Avalanche Voltage and Current
- Lead-Free
- RoHS compliant



D-Pak
IRLR8259PbF

I-Pak
IRLU8259PbF

G	D	S
Gate	Drain	Source

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	25	V
V_{GS}	Gate-to-Source Voltage	± 20	
I_D @ $T_C = 25°C$	Continuous Drain Current, V_{GS} @ 10V	57④	A
I_D @ $T_C = 100°C$	Continuous Drain Current, V_{GS} @ 10V	40④	
I_{DM}	Pulsed Drain Current ①	230	
P_D @$T_C = 25°C$	Maximum Power Dissipation ⑤	48	W
P_D @$T_C = 100°C$	Maximum Power Dissipation ⑤	24	
	Linear Derating Factor	0.32	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	——	3.15	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount) ⑤	——	50	
$R_{\theta JA}$	Junction-to-Ambient	——	110	

ORDERING INFORMATION:
See detailed ordering and shipping information on the last page of this data sheet.

Notes ① through ⑤ are on page 11

12/16/08

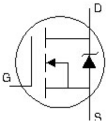
Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	25	——	——	V	V_{GS} = 0V, I_D = 250μA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	18	——	mV/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	6.3	8.7	mΩ	V_{GS} = 10V, I_D = 21A ③
		——	10.6	12.9		V_{GS} = 4.5V, I_D = 17A ③
$V_{GS(th)}$	Gate Threshold Voltage	1.35	1.90	2.35	V	$V_{DS} = V_{GS}$, I_D = 25μA
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Coefficient	——	-7.1	——	mV/°C	
I_{DSS}	Drain-to-Source Leakage Current	——	——	1.0	μA	V_{DS} = 20V, V_{GS} = 0V
		——	——	150		V_{DS} = 20V, 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	55	——	——	S	V_{DS} = 13V, I_D = 17A
Q_g	Total Gate Charge	——	6.8	10	nC	V_{DS} = 13V V_{GS} = 4.5V I_D = 17A See Fig. 16
Q_{gs1}	Pre-Vth Gate-to-Source Charge	——	1.5	——		
Q_{gs2}	Post-Vth Gate-to-Source Charge	——	1.1	——		
Q_{gd}	Gate-to-Drain Charge	——	2.4	——		
Q_{godr}	Gate Charge Overdrive	——	1.8	——		
Q_{sw}	Switch Charge ($Q_{gs2} + Q_{gd}$)	——	3.5	——		
Q_{oss}	Output Charge	——	5.9	——	nC	V_{DS} = 16V, V_{GS} = 0V
R_G	Gate Resistance	——	2.2	3.6	Ω	
$t_{d(on)}$	Turn-On Delay Time	——	8.4	——	ns	V_{DD} = 13V, V_{GS} = 4.5V③ I_D = 17A R_G = 1.8Ω See Fig. 14
t_r	Rise Time	——	38	——		
$t_{d(off)}$	Turn-Off Delay Time	——	9.1	——		
t_f	Fall Time	——	8.9	——		
C_{iss}	Input Capacitance	——	900	——	pF	V_{GS} = 0V V_{DS} = 13V ƒ = 1.0MHz
C_{oss}	Output Capacitance	——	300	——		
C_{rss}	Reverse Transfer Capacitance	——	110	——		

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	——	67	mJ
I_{AR}	Avalanche Current ①	——	17	A
E_{AR}	Repetitive Avalanche Energy ①	——	4.8	mJ

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	56④	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	230		
V_{SD}	Diode Forward Voltage	——	——	1.0	V	T_J = 25°C, I_S = 17A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	——	17	26	ns	T_J = 25°C, I_F = 17A, V_{DD} = 13V di/dt = 200A/μs ③
Q_{rr}	Reverse Recovery Charge	——	15	23	nC	
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

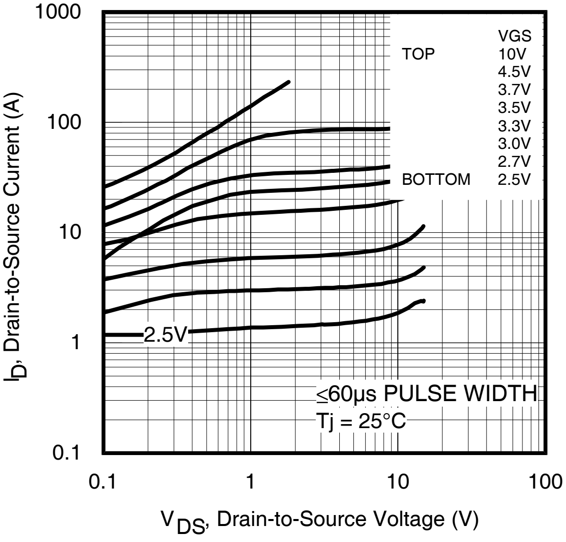


Fig 1. Typical Output Characteristics

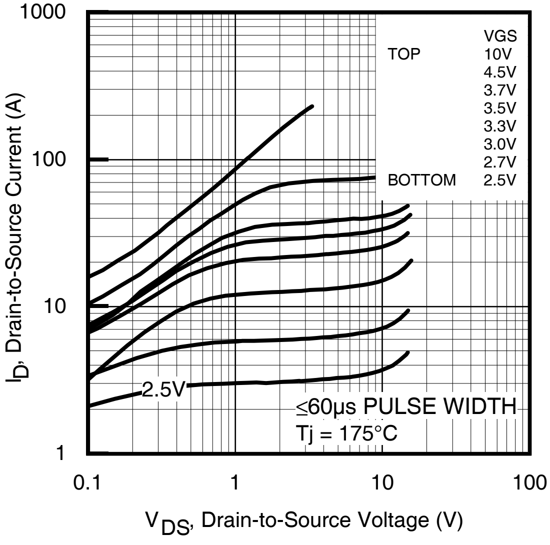


Fig 2. Typical Output Characteristics

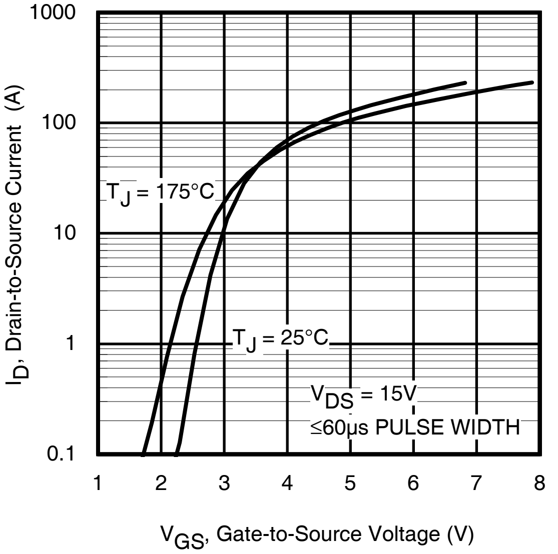


Fig 3. Typical Transfer Characteristics

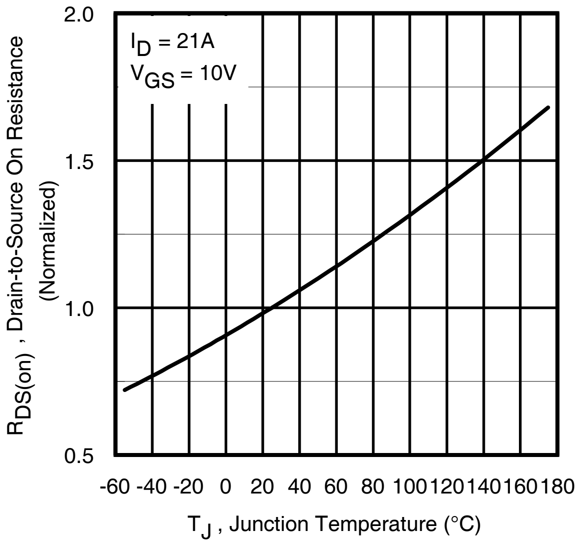


Fig 4. Normalized On-Resistance vs. Temperature

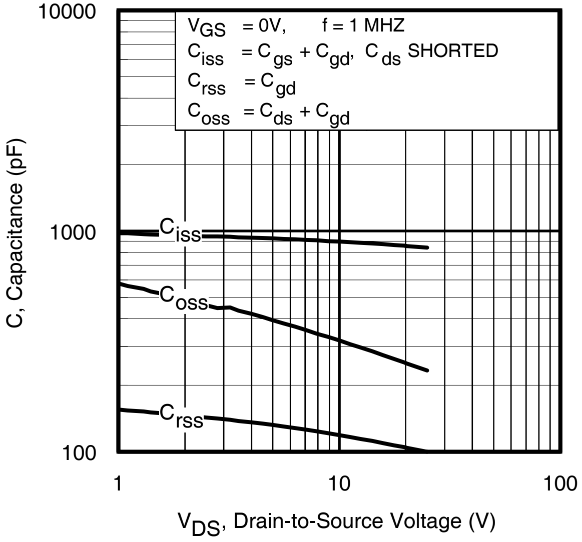


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

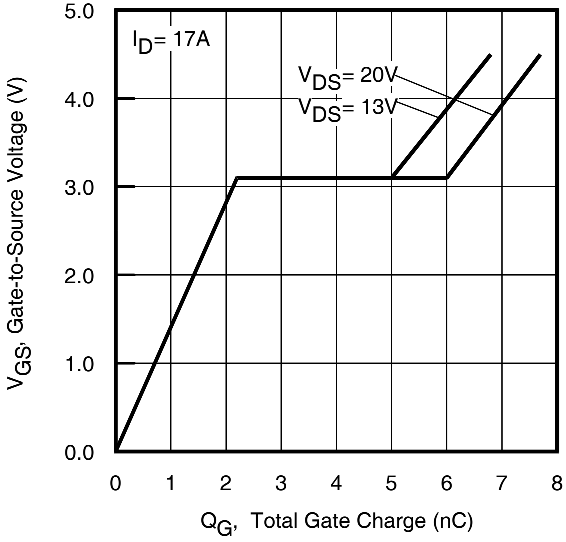


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

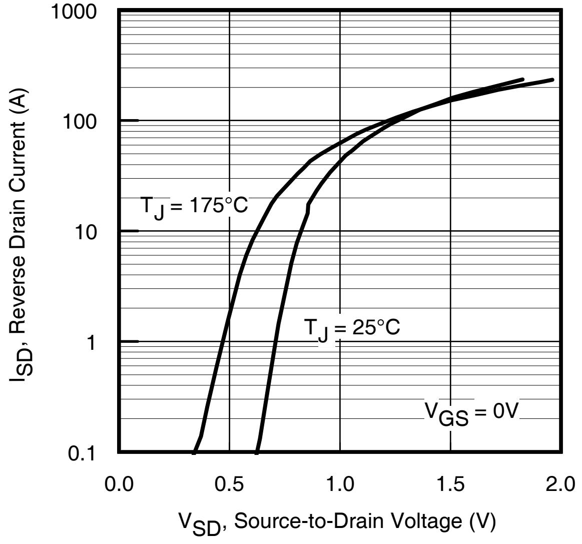


Fig 7. Typical Source-Drain Diode Forward Voltage

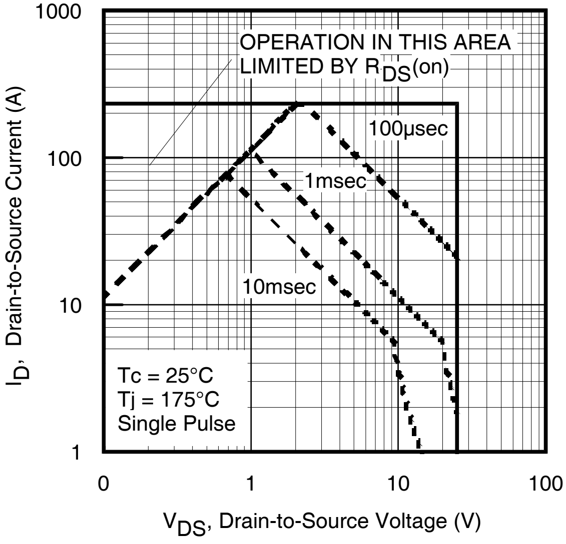


Fig 8. Maximum Safe Operating Area

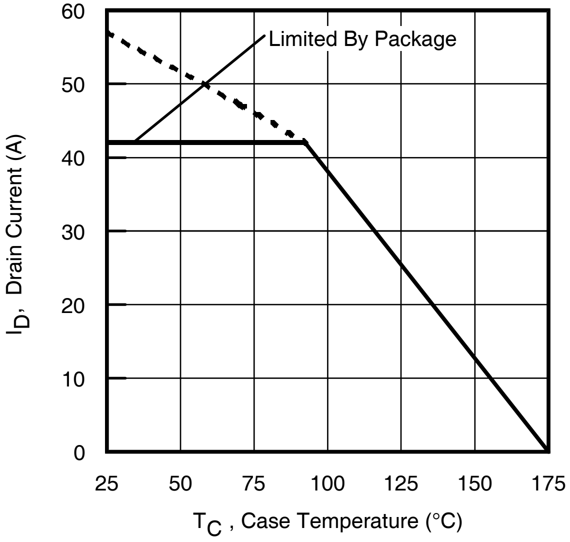


Fig 9. Maximum Drain Current vs. Case Temperature

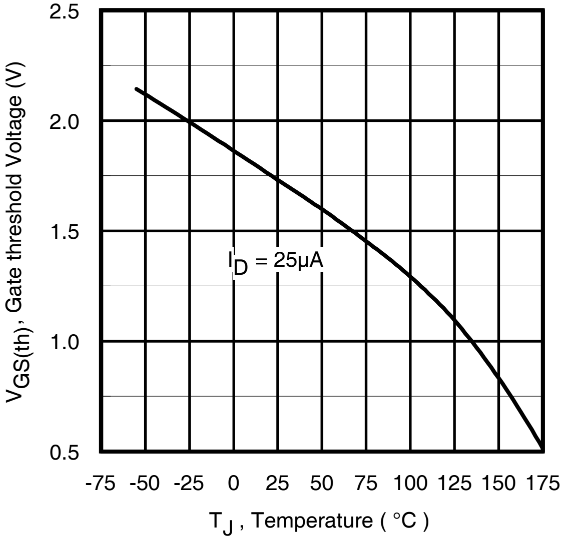
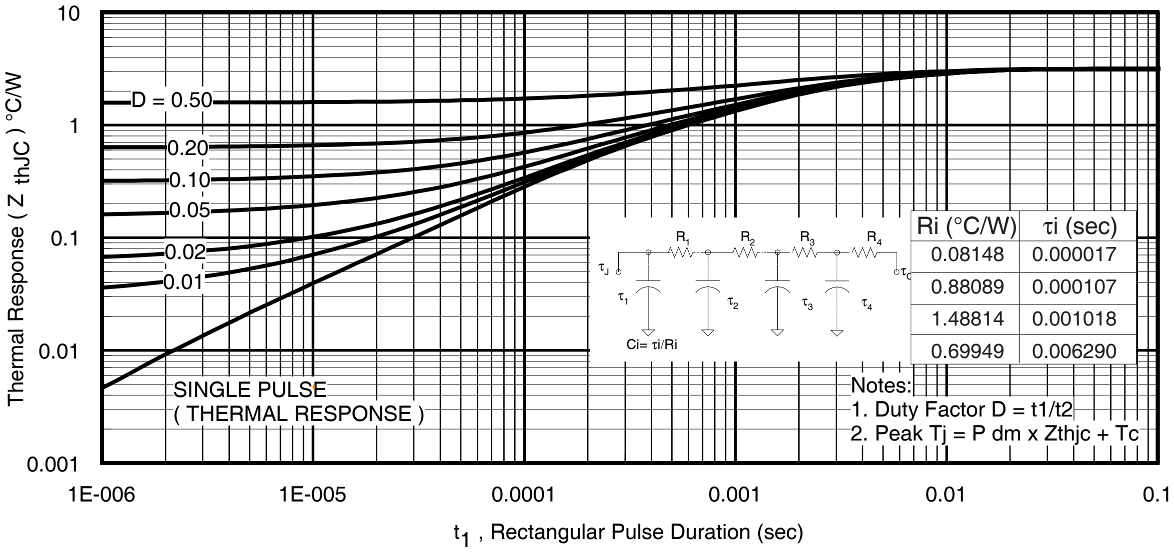


Fig 10. Threshold Voltage vs. Temperature



Ri (°C/W)	τi (sec)
0.08148	0.000017
0.88089	0.000107
1.48814	0.001018
0.69949	0.006290

Notes:
1. Duty Factor D = t1/t2
2. Peak Tj = P dm x Zthjc + Tc

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

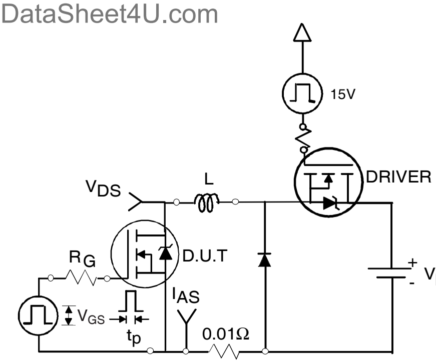


Fig 12a. Unclamped Inductive Test Circuit

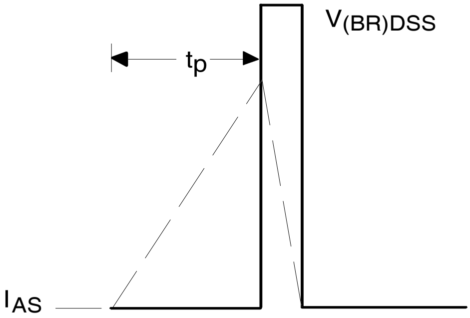


Fig 12b. Unclamped Inductive Waveforms

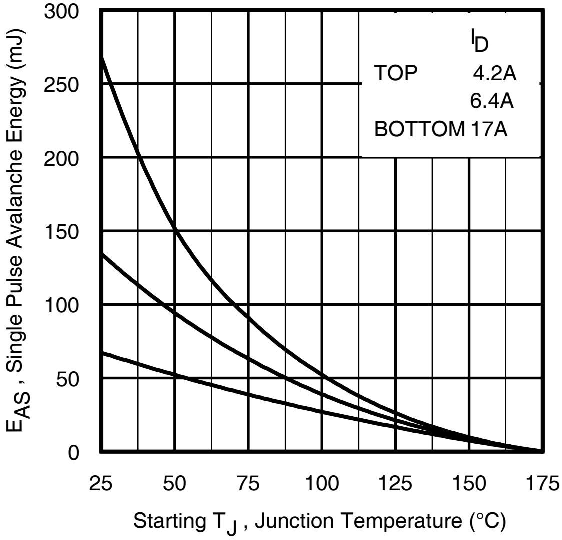


Fig 12c. Maximum Avalanche Energy vs. Drain Current

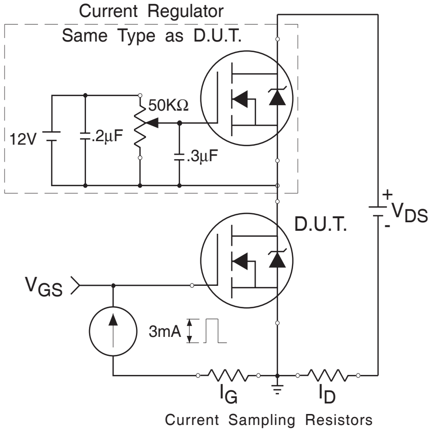


Fig 13. Gate Charge Test Circuit

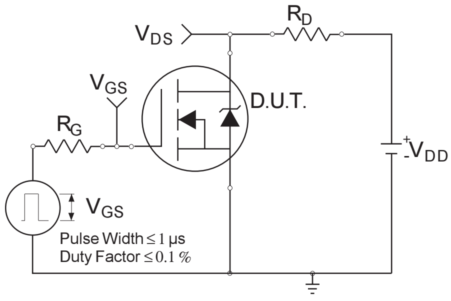


Fig 14a. Switching Time Test Circuit

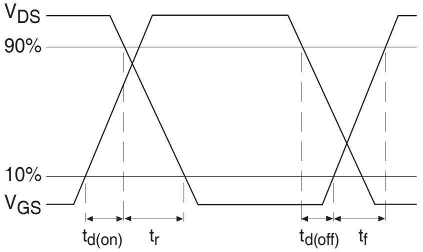
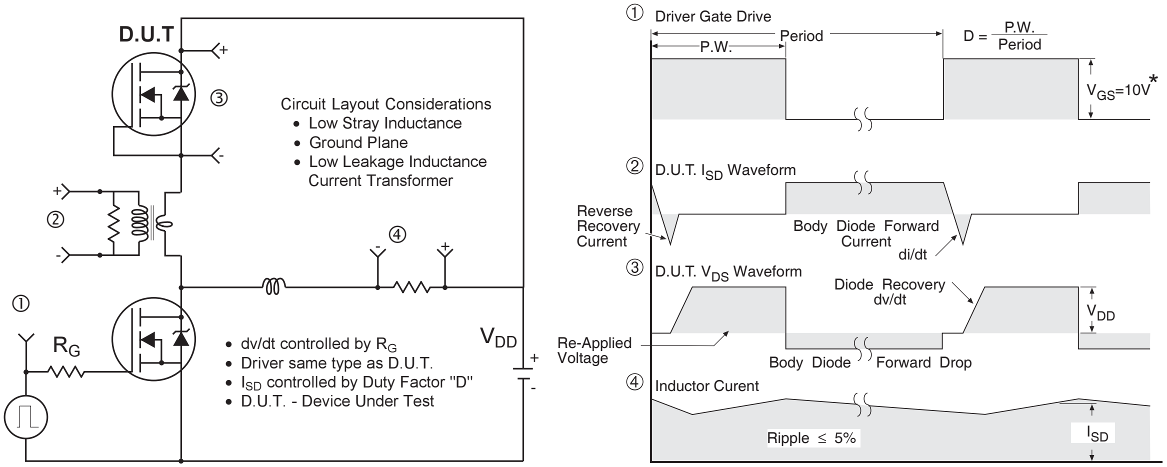


Fig 14b. Switching Time Waveforms



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

Fig 15. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

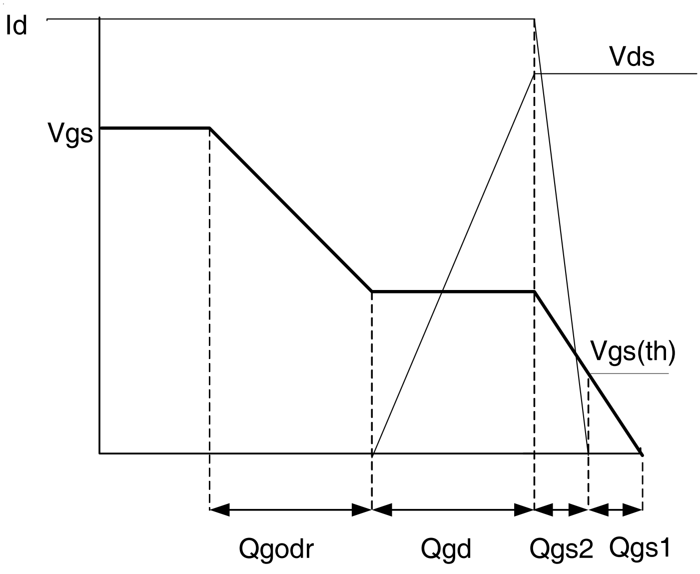
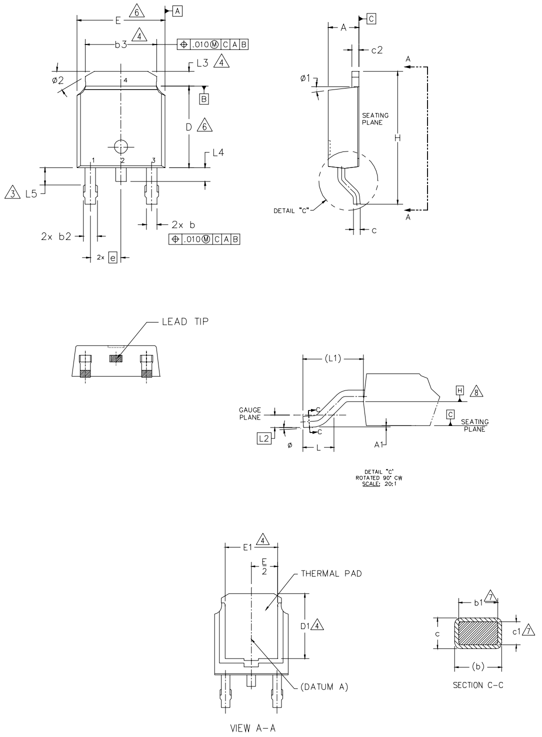


Fig 16. Gate Charge Waveform

D-Pak (TO-252AA) Package Outline

Dimensions are shown in millimeters (inches)



NOTES:

1.– DIMENSIONING AND TOLERANCING PER ASME Y14.5M–1994

2.– DIMENSION ARE SHOWN IN INCHES [MILLIMETERS].

3.– LEAD DIMENSION UNCONTROLLED IN L5.

4.– DIMENSION D1, E1, L3 & b3 ESTABLISH A MINIMUM MOUNTING SURFACE FOR THERMAL PAD.

5.– SECTION C–C DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN .005 AND 0.10 [0.13 AND 0.25] FROM THE LEAD TIP.

6.– DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005 [0.13] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.

7.– DIMENSION b1 & c1 APPLIED TO BASE METAL ONLY.

8.– DATUM A & B TO BE DETERMINED AT DATUM PLANE H.

9.– OUTLINE CONFORMS TO JEDEC OUTLINE TO–252AA.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	2.18	2.39	.086	.094	
A1	–	0.13	–	.005	
b	0.64	0.89	.025	.035	
b1	0.65	0.79	.025	.031	7
b2	0.76	1.14	.030	.045	
b3	4.95	5.46	.195	.215	4
c	0.46	0.61	.018	.024	
c1	0.41	0.56	.016	.022	7
c2	0.46	0.89	.018	.035	
D	5.97	6.22	.235	.245	6
D1	5.21	–	.205	–	4
E	6.35	6.73	.250	.265	6
E1	4.32	–	.170	–	4
e	2.29 BSC		.090 BSC		
H	9.40	10.41	.370	.410	
L	1.40	1.78	.055	.070	
L1	2.74 BSC		.108 REF.		
L2	0.51 BSC		.020 BSC		
L3	0.89	1.27	.035	.050	4
L4	–	1.02	–	.040	
L5	1.14	1.52	.045	.060	3
ø	0°	10°	0°	10°	
ø1	0°	15°	0°	15°	
ø2	25°	35°	25°	35°	

LEAD ASSIGNMENTS

HEXFET

1.– GATE
2.– DRAIN
3.– SOURCE
4.– DRAIN

IGBT & CoPAK

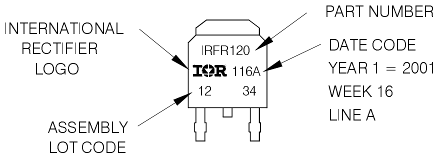
1.– GATE
2.– COLLECTOR
3.– EMITTER
4.– COLLECTOR

D-Pak (TO-252AA) Part Marking Information

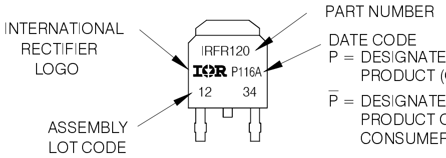
EXAMPLE: THIS IS AN IRFR120
WITH ASSEMBLY
LOT CODE 1234
ASSEMBLED ON WW 16, 2001
IN THE ASSEMBLY LINE "A"

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

"$\overline{\text{P}}$" in assembly line position indicates
"Lead-Free" qualification to the consumer-level



OR

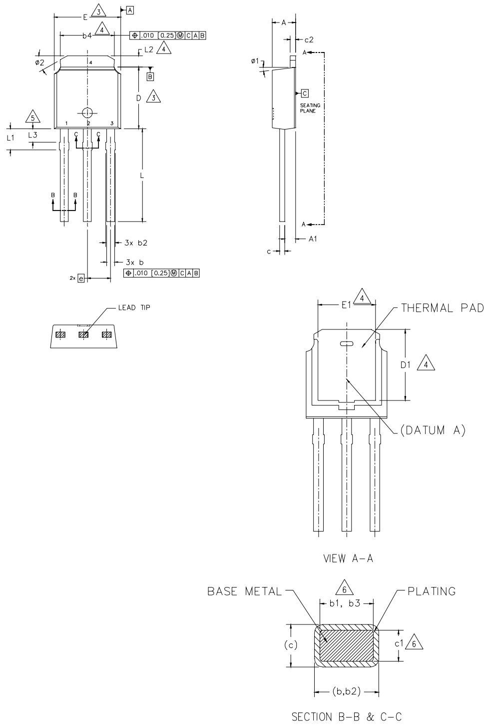


DATE CODE
P = DESIGNATES LEAD-FREE
PRODUCT (OPTIONAL)
$\overline{\text{P}}$ = DESIGNATES LEAD-FREE
PRODUCT QUALIFIED TO THE
CONSUMER LEVEL (OPTIONAL)
YEAR 1 = 2001
WEEK 16
A = ASSEMBLY SITE CODE

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

I-Pak (TO-251AA) Package Outline

Dimensions are shown in millimeters (inches)



NOTES:

1.– DIMENSIONING AND TOLERANCING PER ASME Y14.5M–1994

2.– DIMENSION ARE SHOWN IN INCHES [MILLIMETERS].

3.– DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005 [0.13] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.

4.– THERMAL PAD CONTOUR OPTION WITHIN DIMENSION b4, L2, E1 & D1.

5.– LEAD DIMENSION UNCONTROLLED IN L3.

6.– DIMENSION b1, b3 & c1 APPLY TO BASE METAL ONLY.

7.– OUTLINE CONFORMS TO JEDEC OUTLINE TO–251AA (Date 06/02).

8.– CONTROLLING DIMENSION : INCHES.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	2.18	2.39	.086	.094	
A1	0.89	1.14	.035	.045	
b	0.64	0.89	.025	.035	
b1	0.65	0.79	.025	.031	6
b2	0.76	1.14	.030	.045	
b3	0.76	1.04	.030	.041	6
b4	4.95	5.46	.195	.215	4
c	0.46	0.61	.018	.024	
c1	0.41	0.56	.016	.022	6
c2	0.46	0.89	.018	.035	
D	5.97	6.22	.235	.245	3
D1	5.21	–	.205	–	4
E	6.35	6.73	.250	.265	3
E1	4.32	–	.170	–	4
e	2.29 BSC		.090 BSC		
L	8.89	9.65	.350	.380	
L1	1.91	2.29	.045	.090	
L2	0.89	1.27	.035	.050	4
L3	1.14	1.52	.045	.060	5
ø1	0°	15°	0°	15°	
ø2	25°	35°	25°	35°	

LEAD ASSIGNMENTS

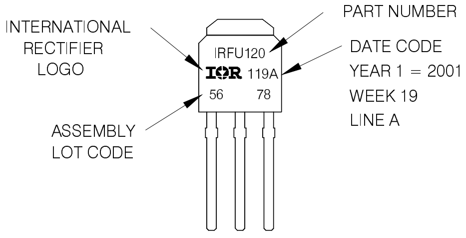
HEXFET

1.– GATE
2.– DRAIN
3.– SOURCE
4.– DRAIN

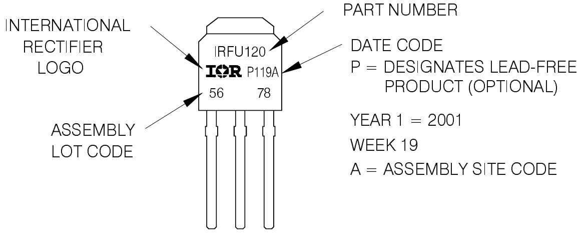
I-Pak (TO-251AA) Part Marking Information

EXAMPLE: THIS IS AN IRFU120
WITH ASSEMBLY
LOT CODE 5678
ASSEMBLED ON WW 19, 2001
IN THE ASSEMBLY LINE "A"

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



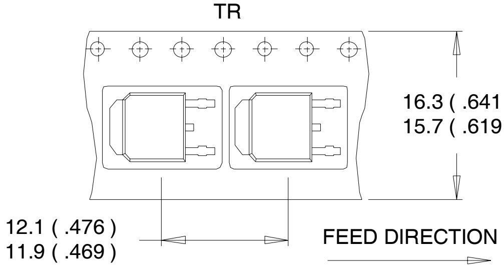
OR

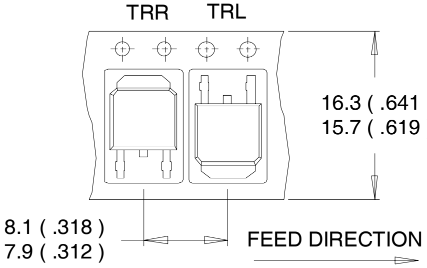


Note: For the most current drawing please refer to IR website at http://www.ir

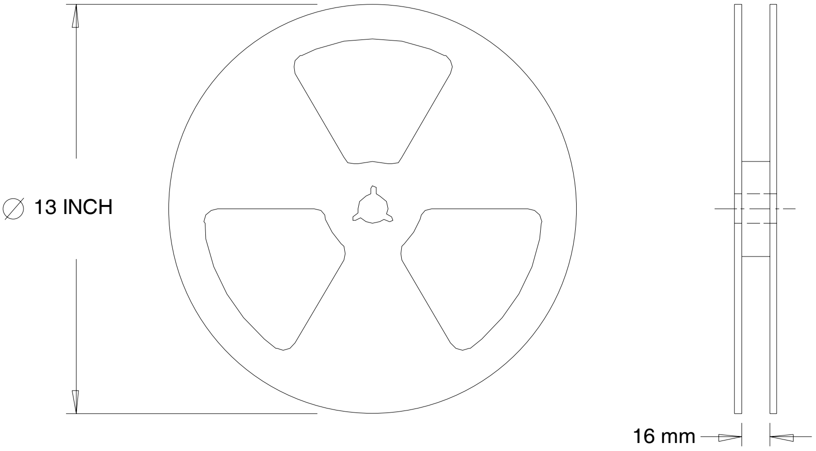
D-Pak (TO-252AA) Tape & Reel Information

Dimensions are shown in millimeters (inches)





NOTES :
1. CONTROLLING DIMENSION : MILLIMETER.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
3. OUTLINE CONFORMS TO EIA-481 & EIA-541.



NOTES :
1. OUTLINE CONFORMS TO EIA-481.

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

Orderable part number	Package Type	Standard Pack		Note
		Form	Quantity	
IRLR8259PBF	D-PAK	Tube/Bulk	75	
IRLR8259TRPBF	D-PAK	Tape and Reel	2000	
IRLU8259PBF	I-PAK	Tube/Bulk	75	

Qualification information†		
Qualification level	Industrial†† (per JEDEC JESD47F††† guidelines)	
	Comments: This family of products has passed JEDEC's Industrial qualification. IR's Consumer qualification level is granted by extension of the higher Industrial level.	
Moisture Sensitivity Level	D-PAK	MSL1 (per JEDEC J-STD-020D†††)
	I-PAK	Not applicable
RoHS compliant	Yes	

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

†† Higher qualification ratings may be available should the user have such requirements. Please contact your International Rectifier sales representative for further information: http://www.irf.com/whoto-call/salesrep/

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

Notes:

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

② Starting T_J = 25°C, L = 0.48mH, R_G = 25Ω, I_{AS} = 17A.

③ Pulse width ≤ 400μs; duty cycle ≤ 2%.

④ Calculated continuous current based on maximum allowable junction temperature.
Package limitation current is 42A.

⑤ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994.

Data and specifications subject to change without notice.

International
IOR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-790
Visit us at www.irf.com for sales c