

**KERSEMI ELECTRONIC CO.,LTD.**

## 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<sub>GS</sub>
- Ultra-Low Gate Impedance
- Fully Characterized Avalanche Voltage and Current
- Lead-Free
- RoHS compliant

D-Pak  
IRLR8729PbF



I-Pak  
IRLU8729PbF



V <sub>DSS</sub>	R <sub>DS(on)</sub> max	Qg
<b>30V</b>	<b>8.9mΩ</b>	<b>10nC</b>

## Absolute Maximum Ratings

	Parameter	Max.	Units
V <sub>DS</sub>	Drain-to-Source Voltage	30	V
V <sub>GS</sub>	Gate-to-Source Voltage	± 20	
I <sub>D</sub> @ T <sub>C</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	58④	A
I <sub>D</sub> @ T <sub>C</sub> = 100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	41④	
I <sub>DM</sub>	Pulsed Drain Current ①	260	
P <sub>D</sub> @ T <sub>C</sub> = 25°C	Maximum Power Dissipation ⑤	55	W
P <sub>D</sub> @ T <sub>C</sub> = 100°C	Maximum Power Dissipation ⑤	27	
	Linear Derating Factor	0.37	W/°C
T <sub>J</sub>	Operating Junction and	-55 to + 175	°C
T <sub>STG</sub>	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	

## Thermal Resistance

	Parameter	Typ.	Max.	Units
R <sub>θJC</sub>	Junction-to-Case	—	2.73	°C/W
R <sub>θJA</sub>	Junction-to-Ambient (PCB Mount) ⑥	—	50	
R <sub>θJA</sub>	Junction-to-Ambient	—	110	

**Static @ T<sub>J</sub> = 25°C (unless otherwise specified)**

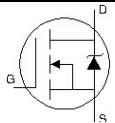
	Parameter	Min.	Typ.	Max.	Units	Conditions
BV <sub>DSS</sub>	Drain-to-Source Breakdown Voltage	30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	—	21	—	mV/°C	Reference to 25°C, I <sub>D</sub> = 1mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	6.0	8.9	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 25A ③
		—	8.9	11.9		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 20A ③
V <sub>GS(th)</sub>	Gate Threshold Voltage	1.35	1.8	2.35	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 25μA
ΔV <sub>GS(th)</sub> /ΔT <sub>J</sub>	Gate Threshold Voltage Coefficient	—	-6.2	—	mV/°C	
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	1.0	μA	V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V
		—	—	150		V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	—	—	100	nA	V <sub>GS</sub> = 20V
	Gate-to-Source Reverse Leakage	—	—	-100		V <sub>GS</sub> = -20V
g <sub>fs</sub>	Forward Transconductance	91	—	—	S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 20A
Q <sub>g</sub>	Total Gate Charge	—	10	16	nC	V <sub>DS</sub> = 15V V <sub>GS</sub> = 4.5V I <sub>D</sub> = 20A See Fig. 16
Q <sub>gs1</sub>	Pre-V <sub>th</sub> Gate-to-Source Charge	—	2.1	—		
Q <sub>gs2</sub>	Post-V <sub>th</sub> Gate-to-Source Charge	—	1.3	—		
Q <sub>gd</sub>	Gate-to-Drain Charge	—	4.0	—		
Q <sub>godr</sub>	Gate Charge Overdrive	—	2.6	—		
Q <sub>sw</sub>	Switch Charge (Q <sub>gs2</sub> + Q <sub>gd</sub> )	—	4.8	—	nC	V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V
Q <sub>oss</sub>	Output Charge	—	6.3	—		
R <sub>G</sub>	Gate Resistance	—	1.6	2.7	Ω	
t <sub>d(on)</sub>	Turn-On Delay Time	—	10	—	ns	V <sub>DD</sub> = 15V, V <sub>GS</sub> = 4.5V③ I <sub>D</sub> = 20A R <sub>G</sub> = 1.8Ω See Fig. 14
t <sub>r</sub>	Rise Time	—	47	—		
t <sub>d(off)</sub>	Turn-Off Delay Time	—	11	—		
t <sub>f</sub>	Fall Time	—	10	—		
C <sub>iss</sub>	Input Capacitance	—	1350	—	pF	V <sub>GS</sub> = 0V V <sub>DS</sub> = 15V f = 1.0MHz
C <sub>oss</sub>	Output Capacitance	—	280	—		
C <sub>rss</sub>	Reverse Transfer Capacitance	—	120	—		

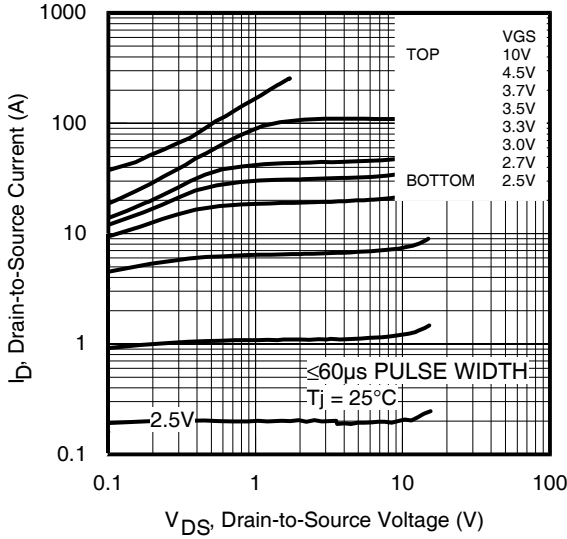
**Avalanche Characteristics**

	Parameter	Typ.	Max.	Units
E <sub>AS</sub>	Single Pulse Avalanche Energy②	—	74	mJ
I <sub>AR</sub>	Avalanche Current ①	—	20	A
E <sub>AR</sub>	Repetitive Avalanche Energy ①	—	5.5	mJ

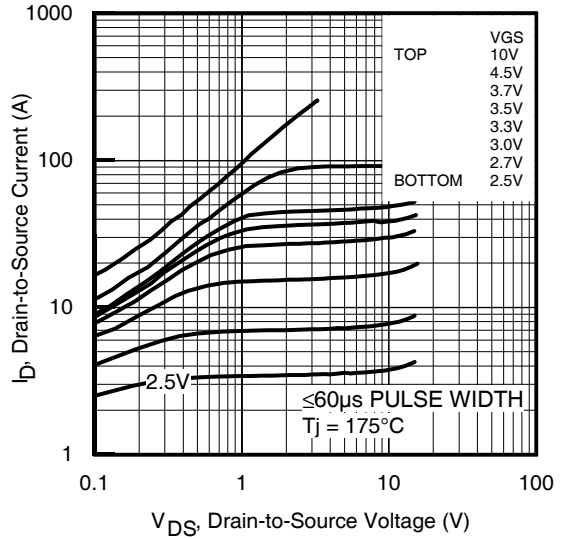
**Diode Characteristics**

	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	58④	A	MOSFET symbol showing the integral reverse p-n junction diode.
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	260		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.0	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 20A, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	Reverse Recovery Time	—	16	24	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 20A, V <sub>DD</sub> = 15V
Q <sub>rr</sub>	Reverse Recovery Charge	—	19	29	nC	di/dt = 300A/μs ③
t <sub>on</sub>	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

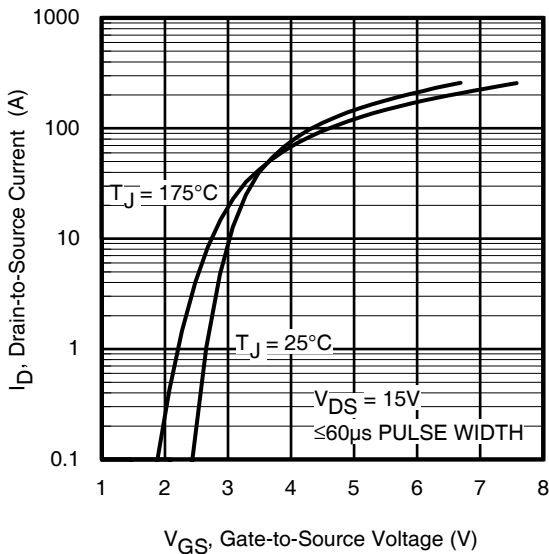




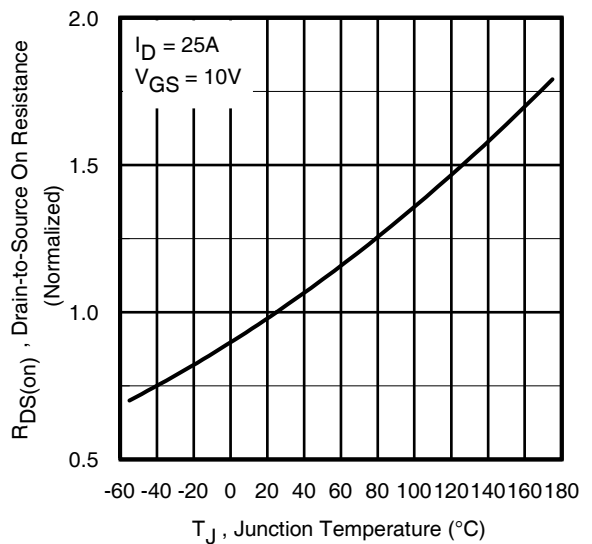
**Fig 1.** Typical Output Characteristics



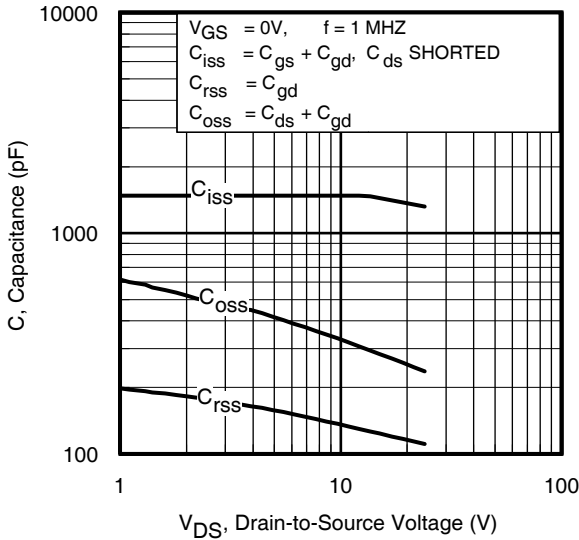
**Fig 2.** Typical Output Characteristics



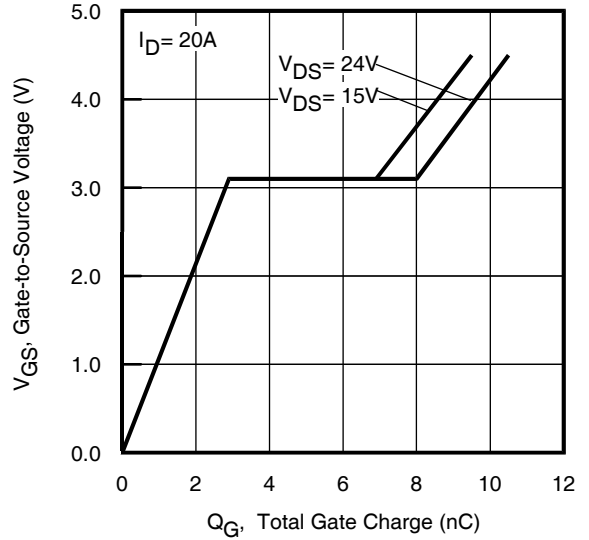
**Fig 3.** Typical Transfer Characteristics



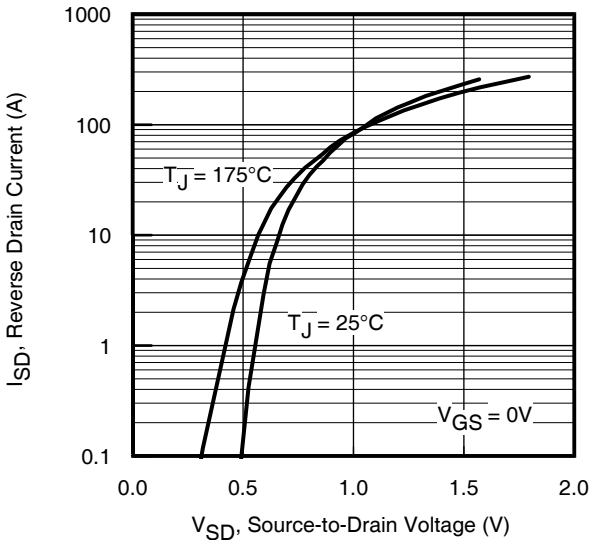
**Fig 4.** Normalized On-Resistance vs. Temperature



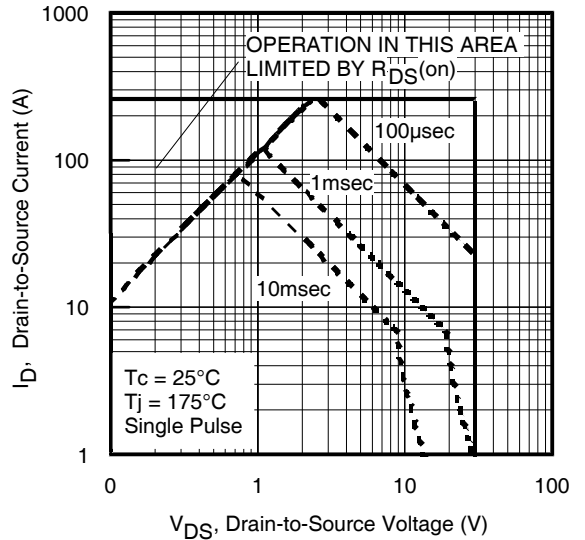
**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage



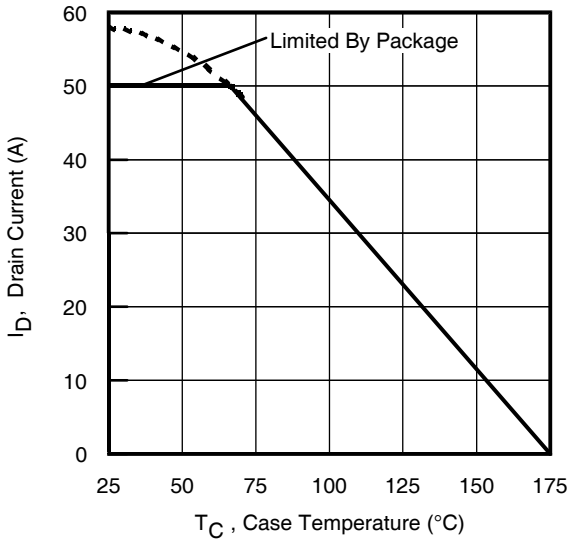
**Fig 6.** Typical Gate Charge vs. Gate-to-Source Voltage



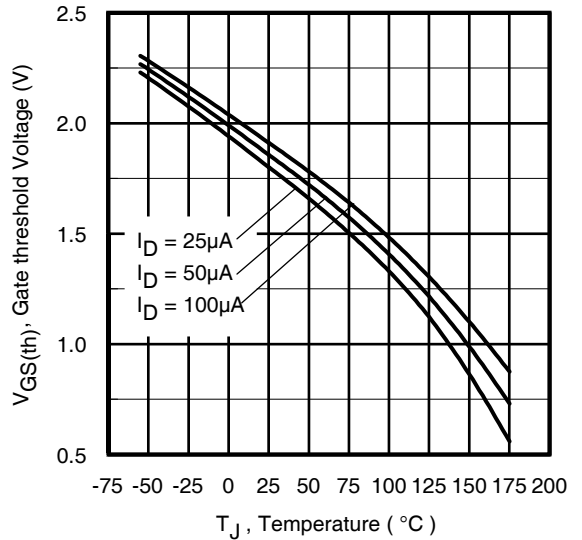
**Fig 7.** Typical Source-Drain Diode Forward Voltage



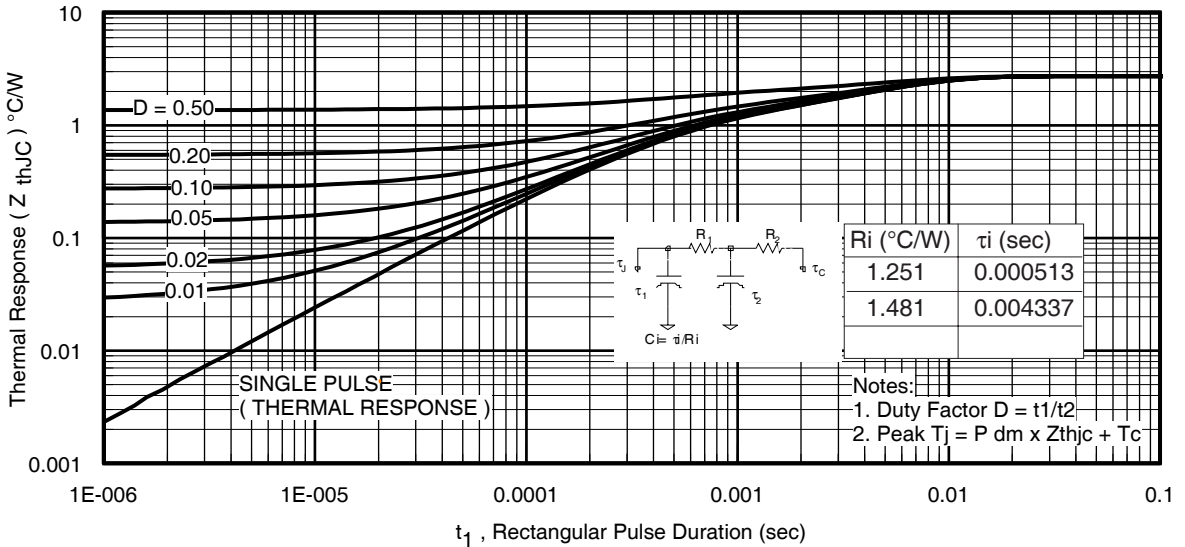
**Fig 8.** Maximum Safe Operating Area



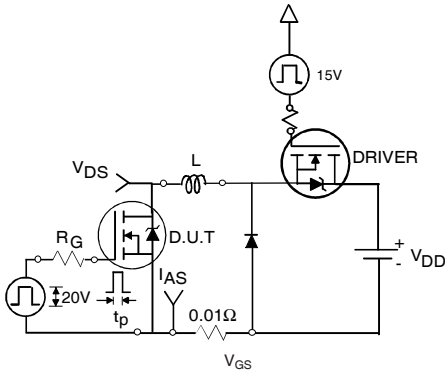
**Fig 9.** Maximum Drain Current vs. Case Temperature



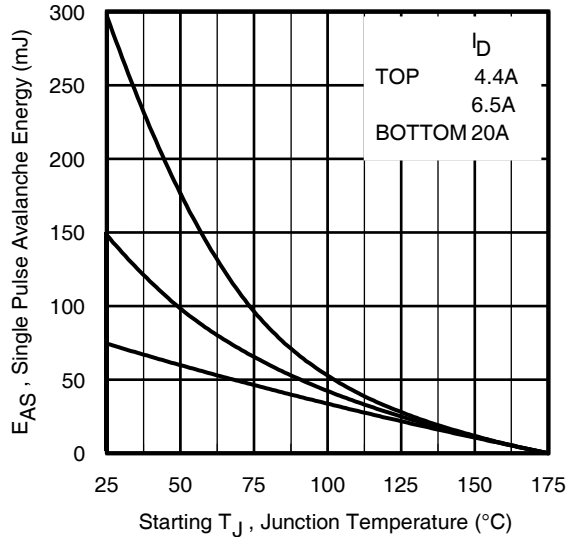
**Fig 10.** Threshold Voltage vs. Temperature



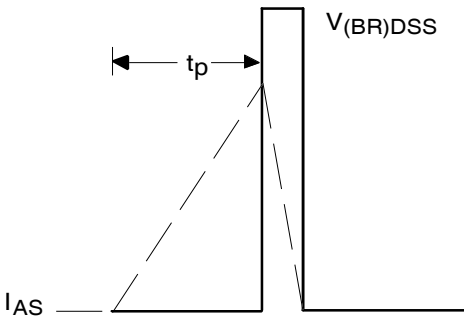
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case



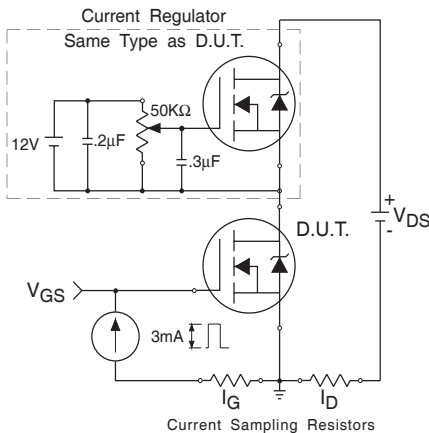
**Fig 12a.** Unclamped Inductive Test Circuit



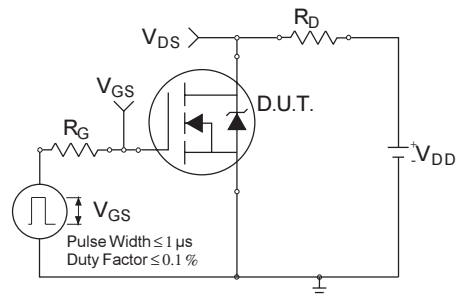
**Fig 12c.** Maximum Avalanche Energy vs. Drain Current



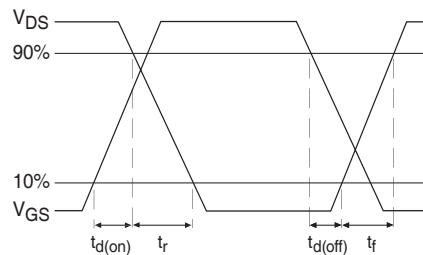
**Fig 12b.** Unclamped Inductive Waveforms



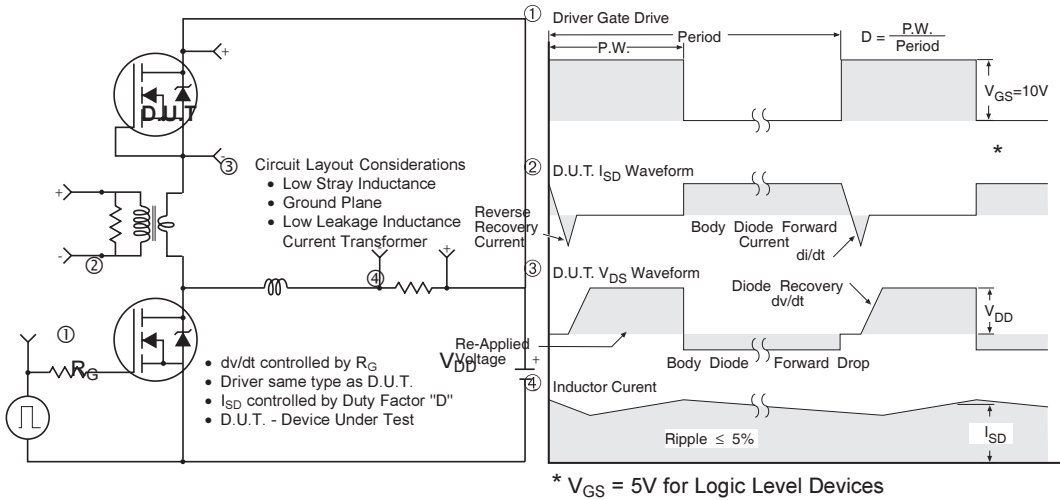
**Fig 13.** Gate Charge Test Circuit



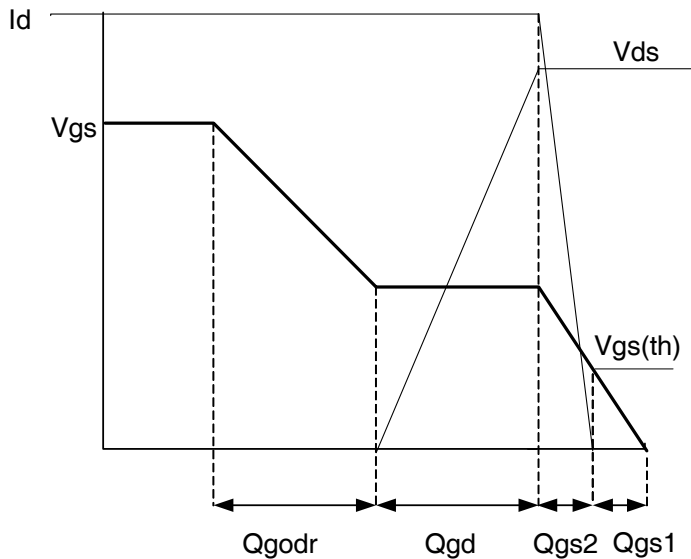
**Fig 14a.** Switching Time Test Circuit



**Fig 14b.** Switching Time Waveforms



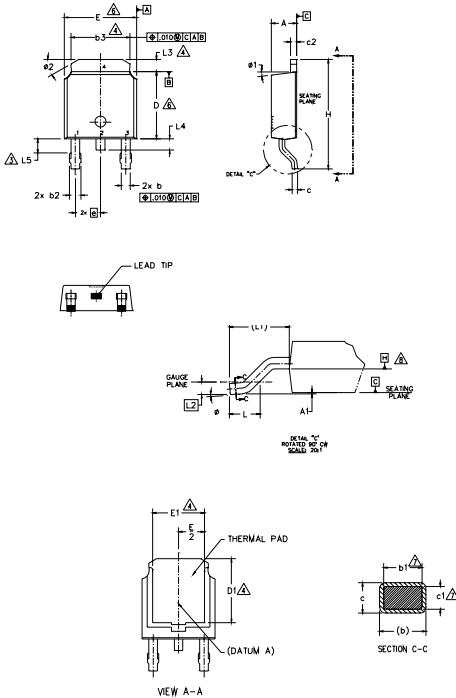
**Fig 15. Peak Diode Recovery  $dv/dt$  Test Circuit for N-Channel HEXFET<sup>®</sup> Power MOSFETs**



**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	0.51	.018	.024	7
c1	0.41	0.56	.016	.022	4
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

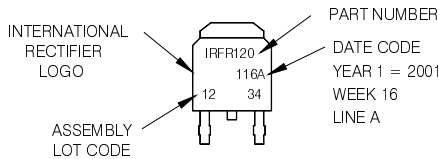
EXAMPLE: THIS IS AN IRFR120  
WITH ASSEMBLY  
LOT CODE 1234  
ASSEMBLED ON WW 16, 2001  
IN THE ASSEMBLY LINE 'A'

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

'P̄' in assembly line position indicates  
'Lead-Free' qualification to the consumer-level

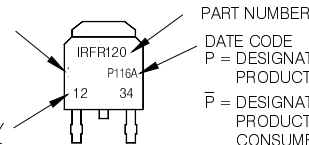
OR

INTERNATIONAL  
RECTIFIER  
LOGO



INTERNATIONAL  
RECTIFIER  
LOGO

ASSEMBLY  
LOT CODE

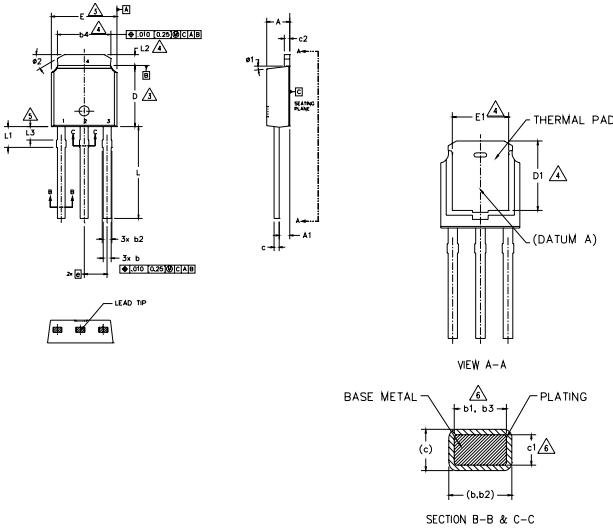


PART NUMBER  
DATE CODE  
P = DESIGNATES LEAD-FREE  
PRODUCT (OPTIONAL)  
P̄ = DESIGNATES LEAD-FREE  
PRODUCT QUALIFIED TO THE  
CONSUMER LEVEL (OPTIONAL)  
YEAR 1 = 2001  
WEEK 16  
A = ASSEMBLY SITE CODE



## 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]
  - △ 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.
  - △- THERMAL PAD CONTOUR OPTION WITHIN DIMENSION b4, L2, E1 & D1.
  - △- LEAD DIMENSION UNCONTROLLED IN L3.
  - △- DIMENSION b1, b3 & c1 APPLY TO BASE METAL ONLY.
  - 7.- OUTLINE CONFORMS TO JEDEC OUTLINE TO-251AA (Date 06/02).
- B.- 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	
L3	1.14	1.52	.045	.060	5
ø1	0"	15"	0"	15"	
ø2	25"	35"	25"	35"	

**LEAD ASSIGNMENTS**

**HEXFET**

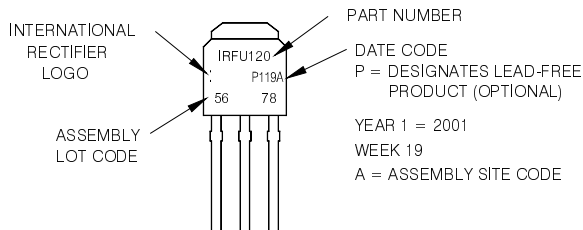
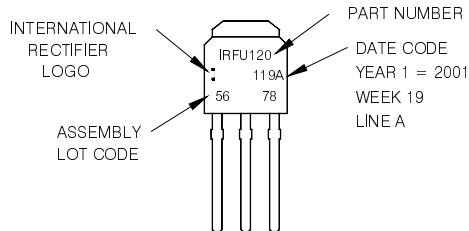
- 1.- GATE
- 2.- DRAIN
- 3.- SOURCE
- 4.- DRAIN

## 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'

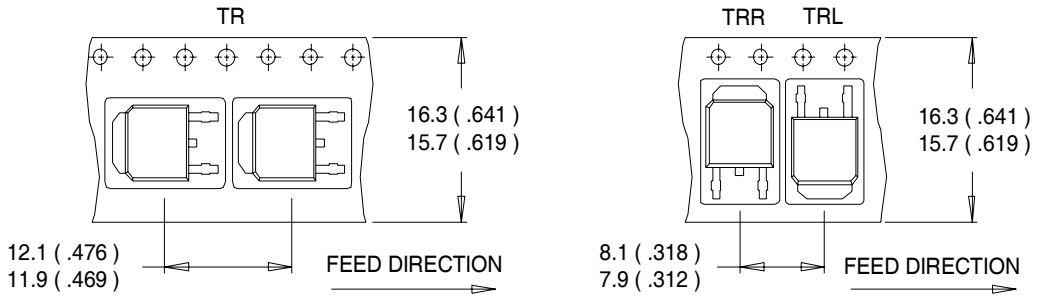
Note: 'P' in assembly line position  
indicates Lead-Free'

OR



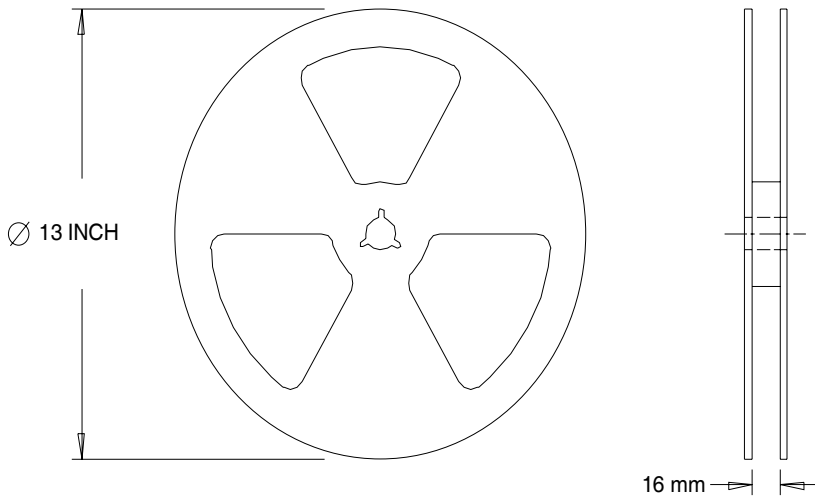
## D-Pak (TO-252AA) Tape & Reel Information

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.



# IRLR/U8729PBF

Orderable part number	Package Type	Standard Pack		Note
		Form	Quantity	
IRLR8729PBF	D-PAK	Tube/Bulk	75	
IRLR8729TRPBF	D-PAK	Tape and Reel	2000	
IRLU8729PBF	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	MSL 1  (per JEDEC J-STD-020D†††)
	I-PAK	Not applicable
RoHS compliant	Yes	