



**THE DATASHEET OF  
IRLR8259TRPBF**



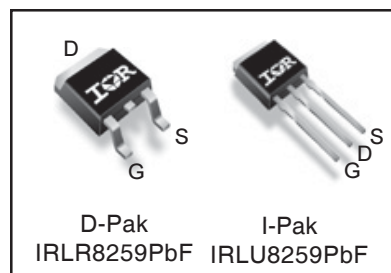
### Applications

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

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

### Benefits

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



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	
$I_D$ @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	57 <sup>④</sup>	A
$I_D$ @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	40 <sup>④</sup>	
$I_{DM}$	Pulsed Drain Current <sup>①</sup>	230	
$P_D$ @ $T_C = 25^\circ\text{C}$	Maximum Power Dissipation <sup>⑤</sup>	48	W
$P_D$ @ $T_C = 100^\circ\text{C}$	Maximum Power Dissipation <sup>⑤</sup>	24	
	Linear Derating Factor	0.32	W/°C
$T_J$	Operating Junction and	-55 to + 175	°C
$T_{STG}$	Storage Temperature Range		
	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) <sup>⑥</sup>	—	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 <sup>①</sup> through <sup>⑥</sup> are on page 11

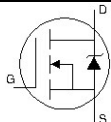
Static @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)

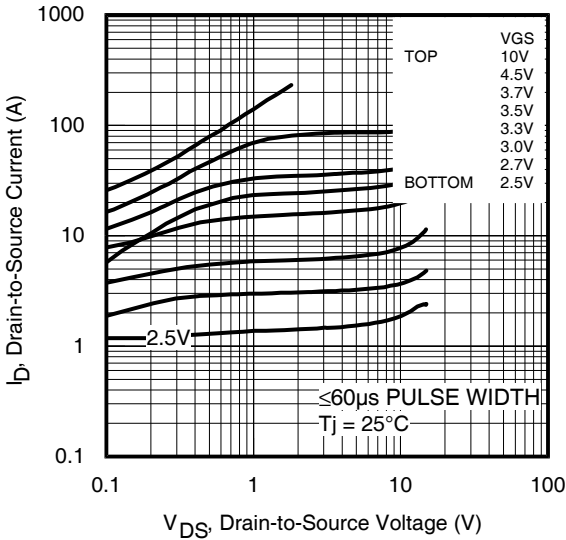
	Parameter	Min.	Typ.	Max.	Units	Conditions
$BV_{DSS}$	Drain-to-Source Breakdown Voltage	25	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	18	—	mV/°C	Reference to $25^\circ\text{C}, I_D = 1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	6.3	8.7	m $\Omega$	$V_{GS} = 10V, I_D = 21A$ 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	$V_{DS} = V_{GS}, I_D = 25\mu A$
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Coefficient	—	-7.1	—	mV/°C	
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	1.0	$\mu A$	$V_{DS} = 20V, V_{GS} = 0V$
		—	—	150		$V_{DS} = 20V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
$g_{fs}$	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-V <sub>th</sub> Gate-to-Source Charge	—	1.5	—		
$Q_{gs2}$	Post-V <sub>th</sub> 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	$\Omega$	
$t_{d(on)}$	Turn-On Delay Time	—	8.4	—	ns	$V_{DD} = 13V, V_{GS} = 4.5V$ ③ $I_D = 17A$ $R_G = 1.8\Omega$ 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	$V_{GS} = 0V$ $V_{DS} = 13V$ $f = 1.0MHz$
$C_{oss}$	Output Capacitance	—	300	—		
$C_{rss}$	Reverse Transfer Capacitance	—	110	—		

## Avalanche Characteristics

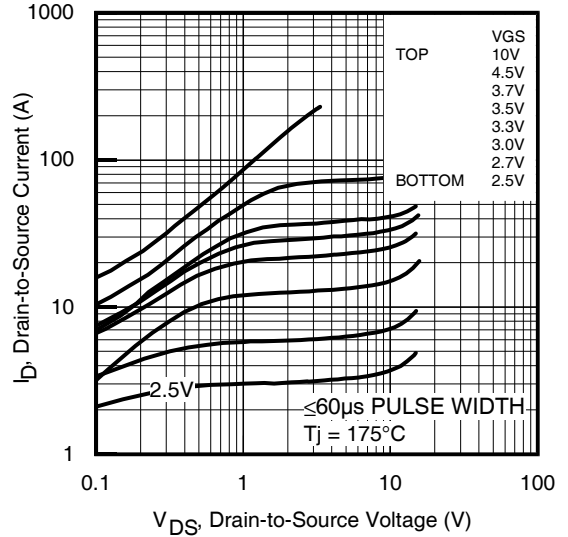
	Parameter	Typ.	Max.	Units
$E_{AS}$	Single Pulse Avalanche Energy ②	—	67	mJ
$I_{AR}$	Avalanche Current ①	—	17	A
$E_{AR}$	Repetitive Avalanche Energy ①	—	4.8	mJ

## Diode Characteristics

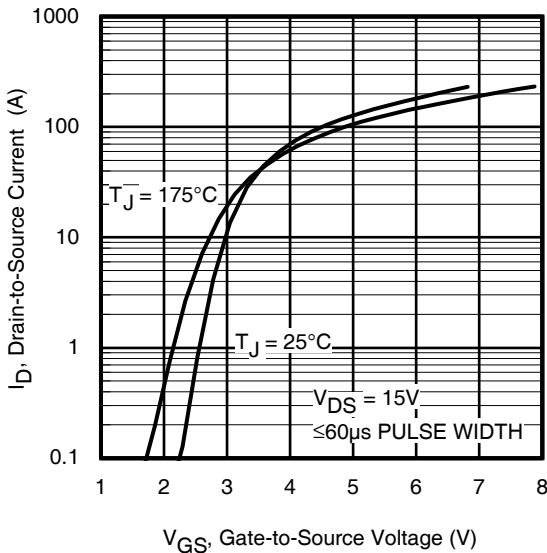
	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	56 ④	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	230		
$V_{SD}$	Diode Forward Voltage	—	—	1.0	V	$T_J = 25^\circ\text{C}, I_S = 17A, V_{GS} = 0V$ ③
$t_{rr}$	Reverse Recovery Time	—	17	26	ns	$T_J = 25^\circ\text{C}, I_F = 17A, V_{DD} = 13V$
$Q_{rr}$	Reverse Recovery Charge	—	15	23	nC	$di/dt = 200A/\mu s$ ③
$t_{on}$	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				



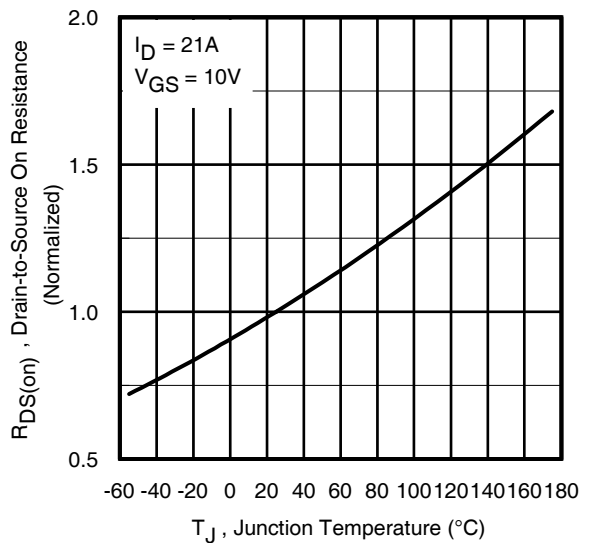
**Fig 1.** Typical Output Characteristics



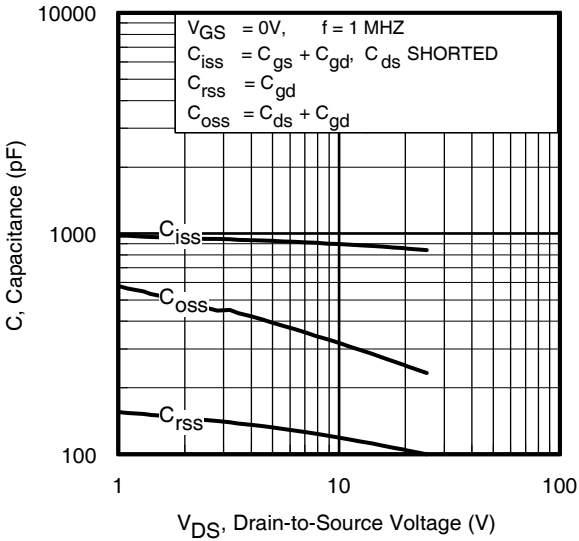
**Fig 2.** Typical Output Characteristics



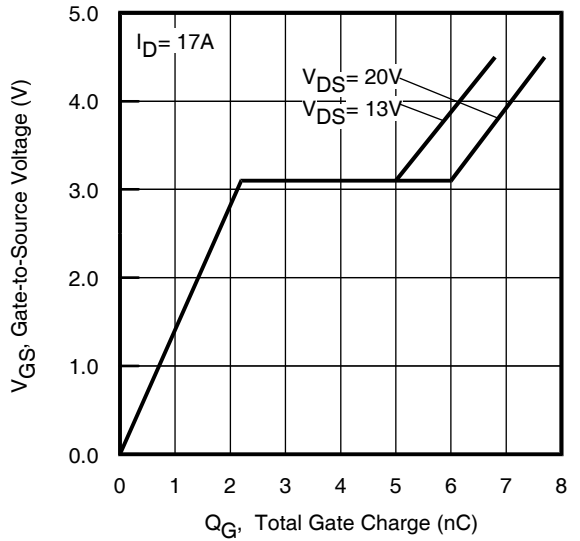
**Fig 3.** Typical Transfer Characteristics



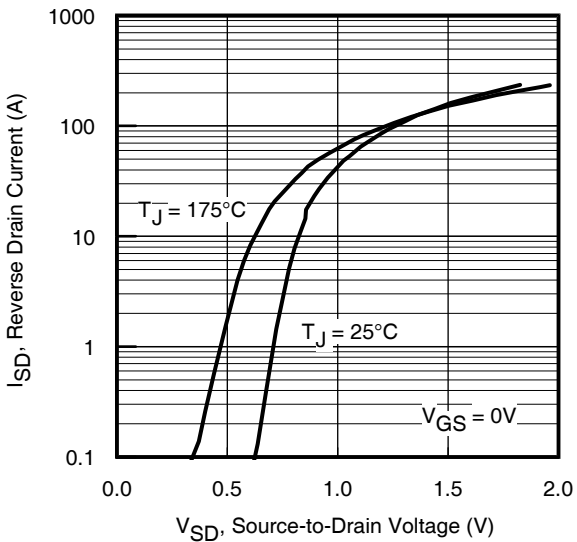
**Fig 4.** Normalized On-Resistance vs. Temperature



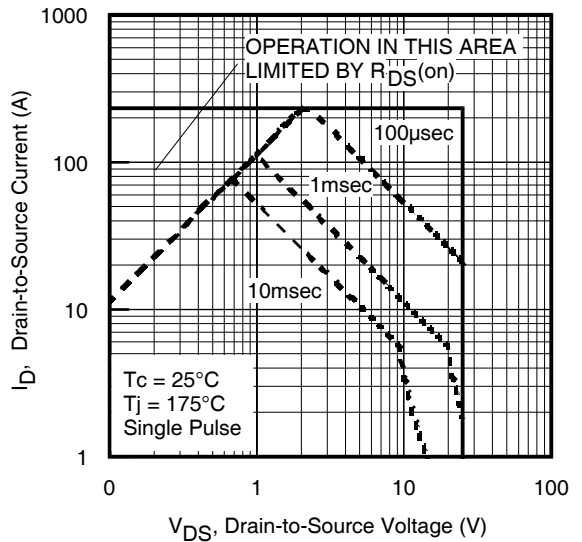
**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage



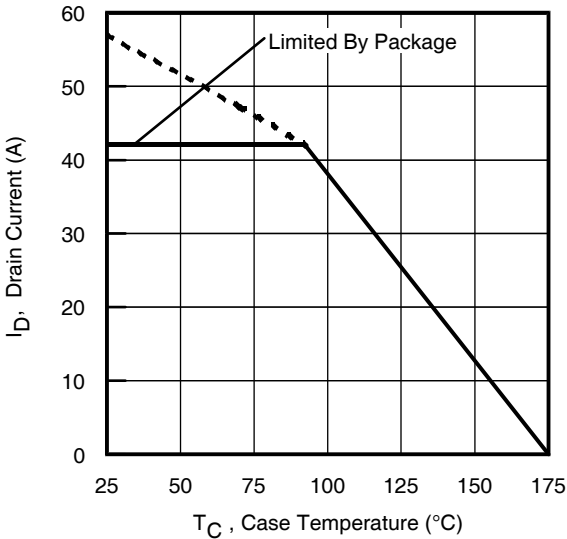
**Fig 6.** Typical Gate Charge vs. Gate-to-Source Voltage



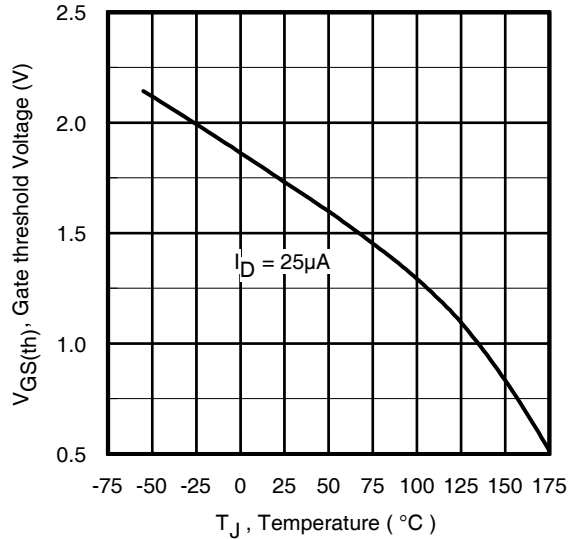
**Fig 7.** Typical Source-Drain Diode Forward Voltage



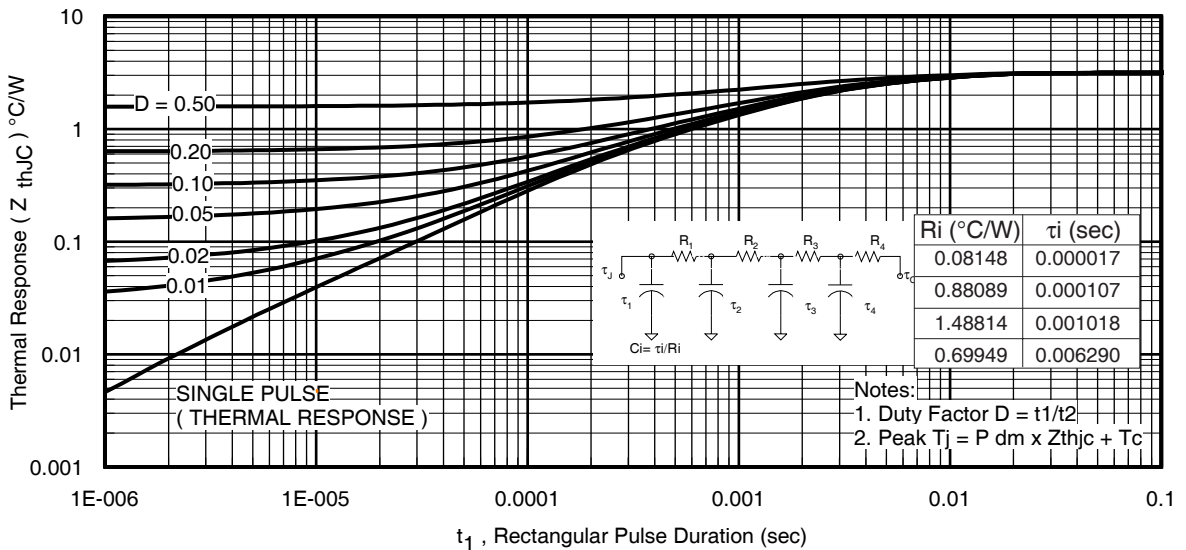
**Fig 8.** Maximum Safe Operating Area



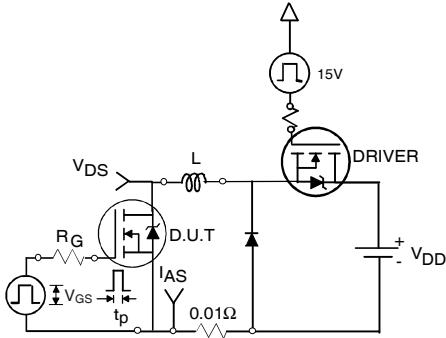
**Fig 9.** Maximum Drain Current vs. Case Temperature



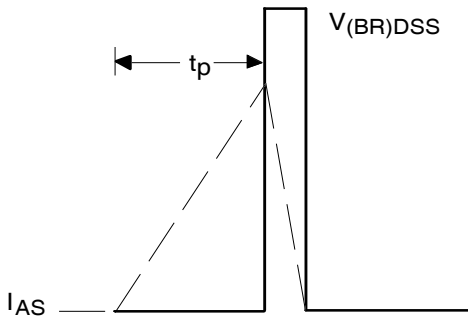
**Fig 10.** Threshold Voltage vs. Temperature



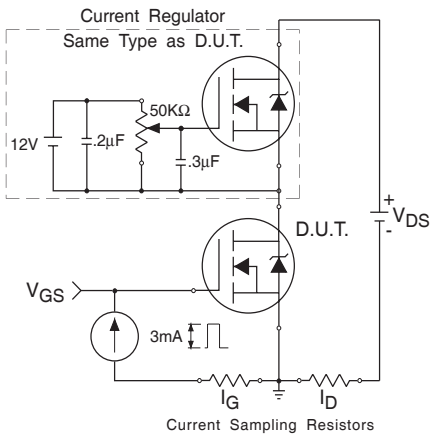
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case



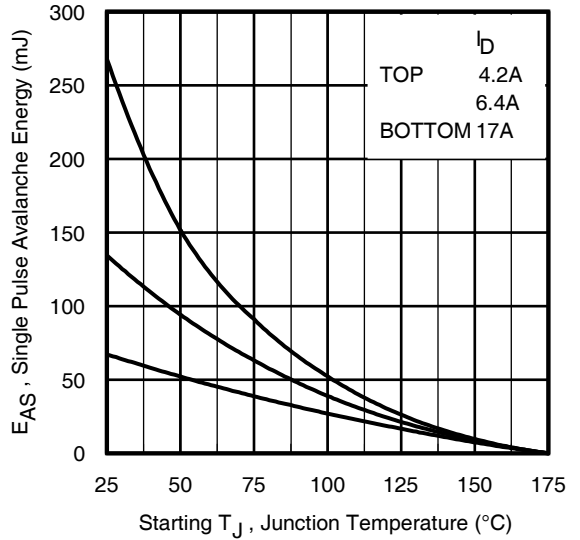
**Fig 12a.** Unclamped Inductive Test Circuit



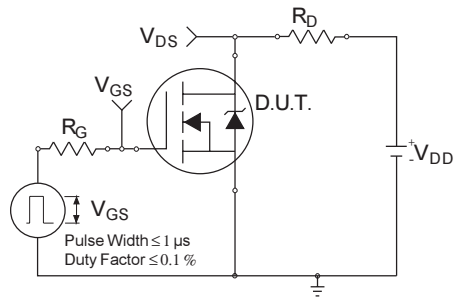
**Fig 12b.** Unclamped Inductive Waveforms



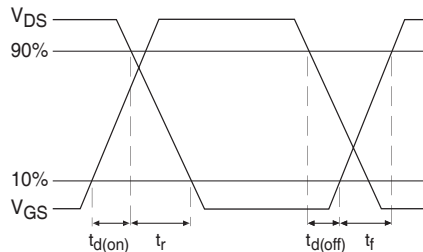
**Fig 13.** Gate Charge Test Circuit



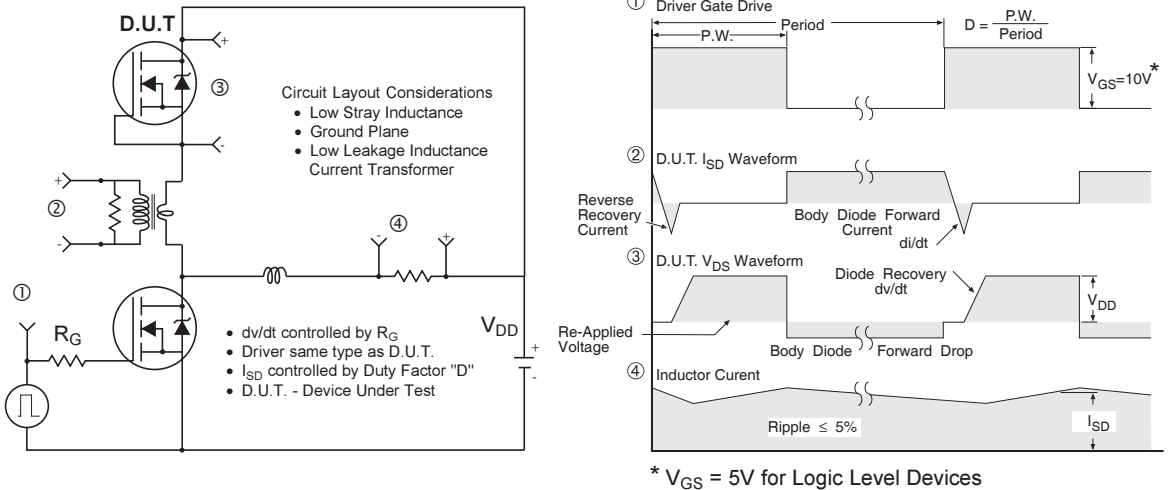
**Fig 12c.** Maximum Avalanche Energy vs. Drain Current



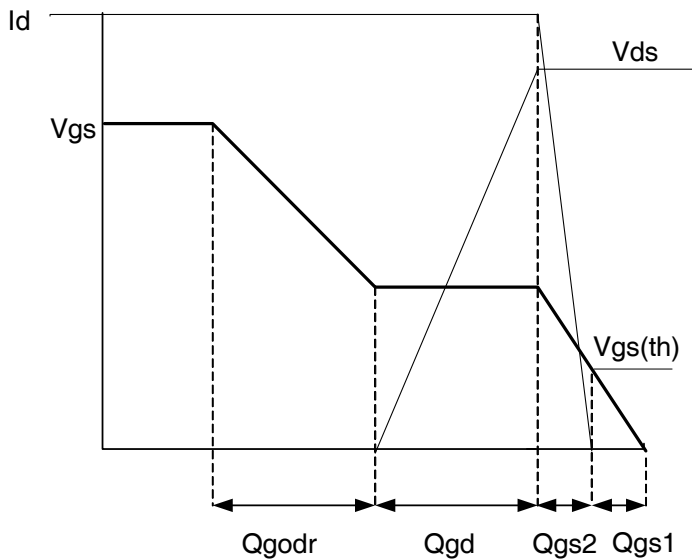
**Fig 14a.** Switching Time Test Circuit



**Fig 14b.** Switching Time Waveforms



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

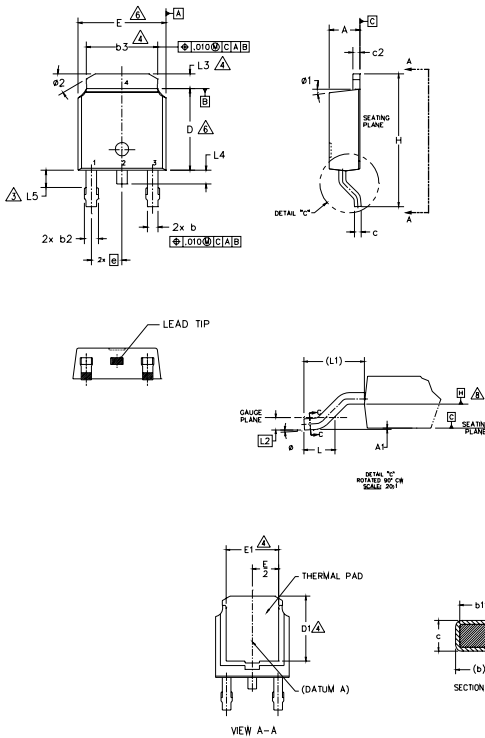


**Fig 16. Gate Charge Waveform**

# IRLR/U8259PbF

## 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**

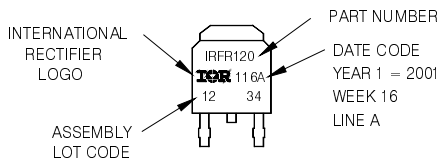
- 1.- GATE
- 2.- COLLECTOR
- 3.- EMITTER
- 4.- COLLECTOR

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

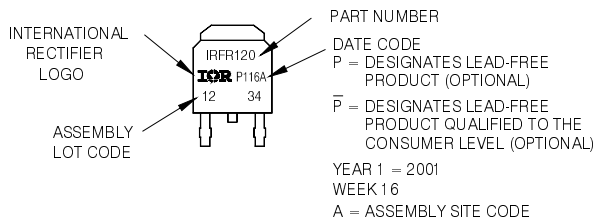
EXAMPLE: THIS IS AN IRFR120  
WITH ASSEMBLY  
LOT CODE 1234  
ASSEMBLED ON WW 16, 2001  
IN THE ASSEMBLY LINE 'A'

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

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



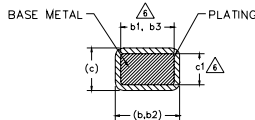
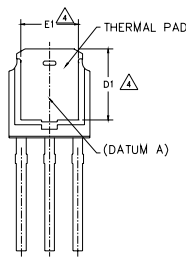
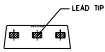
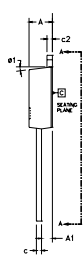
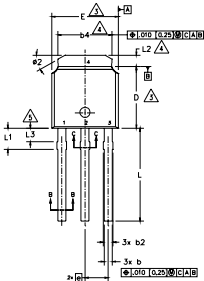
OR



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

## I-Pak (TO-251AA) Package Outline

Dimensions are shown in millimeters (inches)



SECTION B-B & C-C

**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	6	
A1	0.89	1.14	.035	.045		
b	0.64	0.89	.025	.035		
b1	0.65	0.79	.025	.031		
b2	0.76	1.14	.030	.045		
b3	0.76	1.04	.030	.041		
b4	4.95	5.46	.195	.215		4
c	0.46	0.61	.018	.024		6
c1	0.41	0.56	.016	.022		
c2	0.46	0.89	.018	.035		3
D	5.97	6.22	.235	.245		
D1	5.21	-	.205	-		4
E	6.35	6.73	.250	.265		3
E1	4.32	-	.170	-		4
e	2.29	BSC	.090	BSC		LEAD ASSIGNMENTS
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"	HEXFEET	
ø2	25"	35"	25"	35"		

**LEAD ASSIGNMENTS**

**HEXFEET**

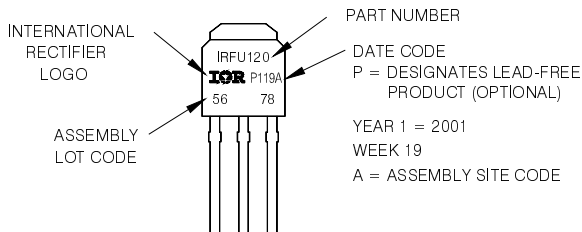
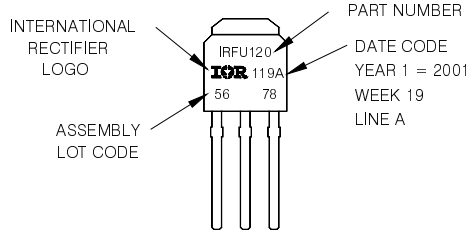
- 1.- GATE
- 2.- DRAIN
- 3.- SOURCE
- 4.- DRAIN

## 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

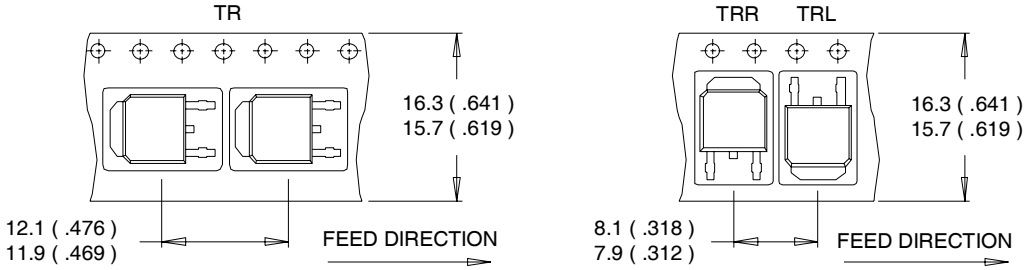
OR



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

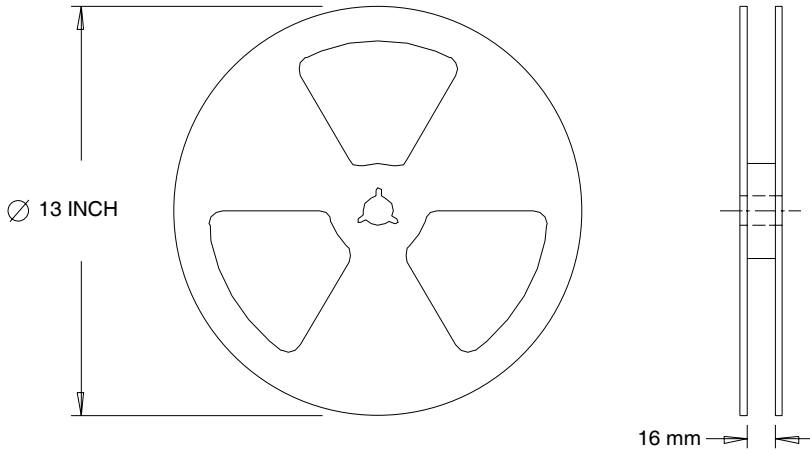
## D-Pak (TO-252AA) Tape & Reel Information

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	MSL 1 (per JEDEC J-ST D-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  $T_J = 25^\circ\text{C}$ ,  $L = 0.48\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 17\text{A}$ .
- ③ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- 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  
**IR** 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](http://www.irf.com) for sales contact information.12/08

## **IMPORTANT NOTICE**

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffheitsgarantie").

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office ([www.infineon.com](http://www.infineon.com)).

## **WARNINGS**

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.

## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

- ⊖ [View IRLR8259TRPBF on WIN SOURCE](#)
- ⊖ [Infineon Technologies](#) Information

## Optimize Your Supply Chain with WIN SOURCE Solutions

- ✓ Global Sourcing Solution
- ✓ Obsolete Management
- ✓ Cost Control Management
- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management