

**Benefits**

- Advanced Process Technology
- Ultra Low On-Resistance
- Dynamic dv/dt Rating
- 175°C Operating Temperature
- Fast Switching
- Repetitive Avalanche Allowed up to Tjmax
- Lead-Free

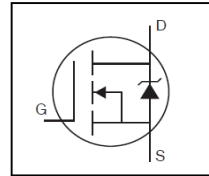
**Description**

Advanced HEXFET® Power MOSFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET power MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in a wide variety of applications.

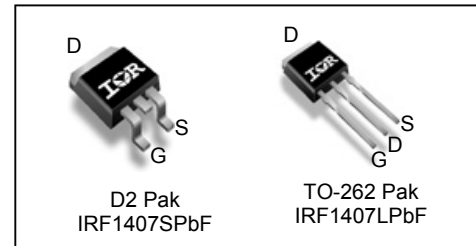
The D2Pak is a surface mount power package capable of accommodating die sizes up to HEX-4. It provides the highest power capability and the lowest possible on-resistance in any existing surface mount package. The D2Pak is suitable for high current applications because of its low internal connection resistance and can dissipate up to 2.0W in a typical surface mount application.

The through-hole version (IRF1407L) is available for low-profile applications.

HEXFET® Power MOSFET



<b>V<sub>DSS</sub></b>	<b>75V</b>
<b>R<sub>DS(on)</sub></b>	<b>0.0078Ω</b>
<b>I<sub>D</sub></b>	<b>100A<sup>Ⓔ</sup></b>



<b>G</b>	<b>D</b>	<b>S</b>
Gate	Drain	Source

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRF1407LPbF	TO-262	Tube	50	IRF1407LPbF (Obsolete)
IRF1407SPbF	D2-Pak	Tape and Reel Left	800	IRF1407STRLPbF

**Absolute Maximum Ratings**

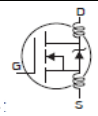
Symbol	Parameter	Max.	Units
I <sub>D</sub> @ T <sub>C</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>Ⓔ</sup>	100 <sup>Ⓔ</sup>	A
I <sub>D</sub> @ T <sub>C</sub> = 100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>Ⓔ</sup>	70 <sup>Ⓔ</sup>	
I <sub>DM</sub>	Pulsed Drain Current <sup>①</sup> <sup>Ⓔ</sup>	520	
P <sub>D</sub> @ T <sub>A</sub> = 25°C	Maximum Power Dissipation	3.8	W
P <sub>D</sub> @ T <sub>C</sub> = 25°C	Maximum Power Dissipation	200	W
	Linear Derating Factor	1.3	W/°C
V <sub>GS</sub>	Gate-to-Source Voltage	± 20	V
E <sub>AS</sub>	Single Pulse Avalanche Energy (Thermally Limited) <sup>②</sup> <sup>Ⓔ</sup>	390	mJ
I <sub>AR</sub>	Avalanche Current <sup>①</sup>	See Fig.15,16, 12a, 12b	A
E <sub>AR</sub>	Repetitive Avalanche Energy <sup>②</sup>		mJ
dv/dt	Peak Diode Recovery dv/dt <sup>③</sup> <sup>Ⓔ</sup>	4.6	V/ns
T <sub>J</sub>	Operating Junction and Storage Temperature Range	-55 to + 175	°C
T <sub>STG</sub>			
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	
	Mounting torque, 6-32 or M3 screw	10 lbf•in (1.1N•m)	

**Thermal Resistance**

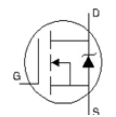
Symbol	Parameter	Typ.	Max.	Units
R <sub>θJC</sub>	Junction-to-Case	—	0.75	°C/W
R <sub>θJA</sub>	Junction-to-Ambient ( PCB Mount, steady state) <sup>⑨</sup>	—	40	

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

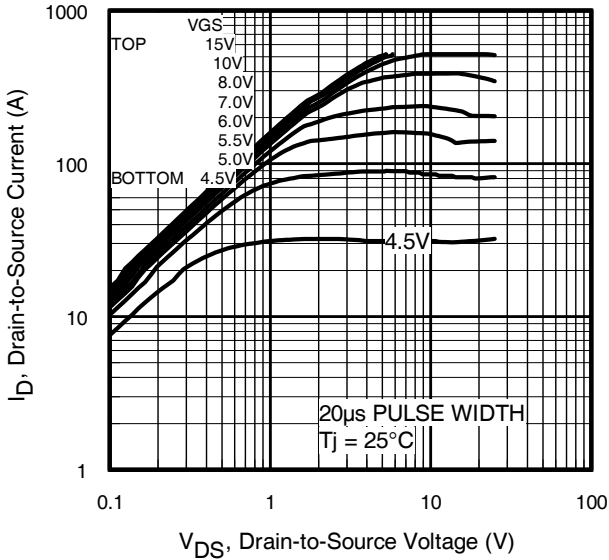
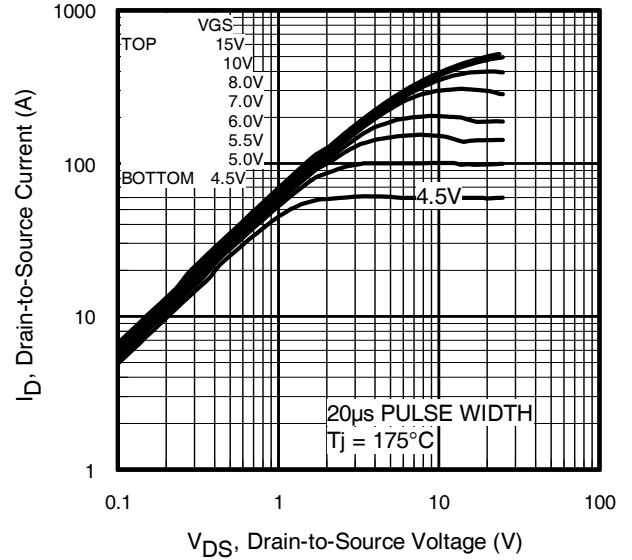
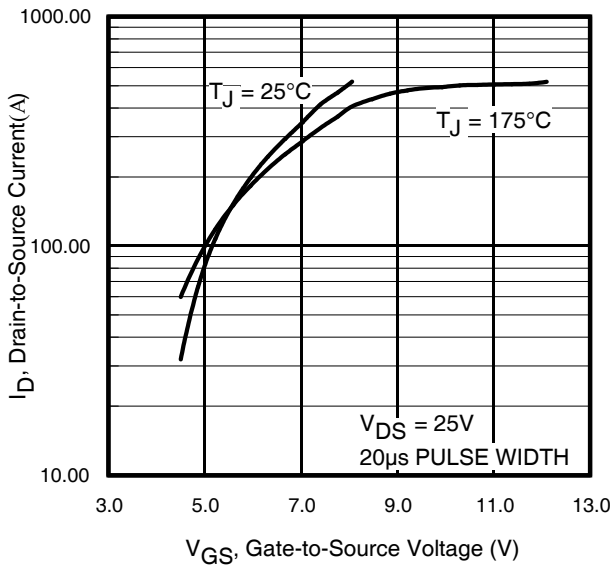
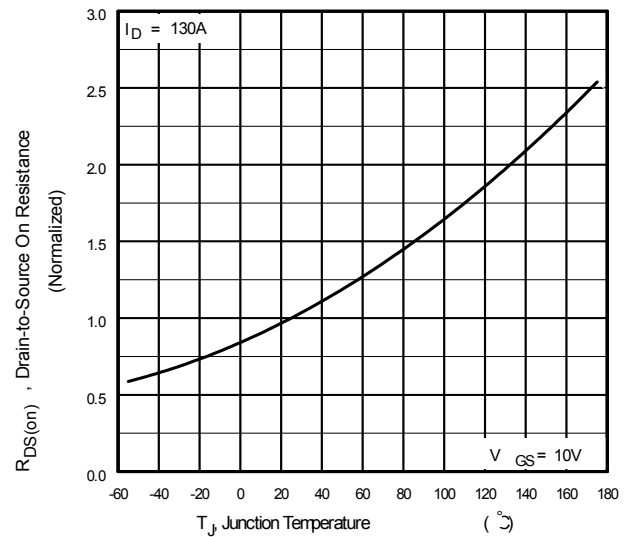
	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)DSS</sub>	Drain-to-Source Breakdown Voltage	75	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔV <sub>(BR)DSS/ΔT<sub>J</sub></sub>	Breakdown Voltage Temp. Coefficient	—	0.09	—	V/°C	Reference to 25°C, I <sub>D</sub> = 1mA ⑧
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	—	0.0078	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 78A ④
V <sub>GS(th)</sub>	Gate Threshold Voltage	2.0	—	4.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
g <sub>fs</sub>	Forward Trans conductance	74	—	—	S	V <sub>DS</sub> = 25V, I <sub>D</sub> = 78A⑧
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	20	μA	V <sub>DS</sub> = 75 V, V <sub>GS</sub> = 0V
		—	—	250		V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 150°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	—	—	200	nA	V <sub>GS</sub> = 20V
	Gate-to-Source Reverse Leakage	—	—	-200		V <sub>GS</sub> = -20V
Q <sub>g</sub>	Total Gate Charge	—	160	250	nC	I <sub>D</sub> = 78A
Q <sub>gs</sub>	Gate-to-Source Charge	—	35	52		V <sub>DS</sub> = 60V
Q <sub>gd</sub>	Gate-to-Drain Charge	—	54	81		V <sub>GS</sub> = 10V ④⑧
t <sub>d(on)</sub>	Turn-On Delay Time	—	11	—	ns	V <sub>DD</sub> = 38V
t <sub>r</sub>	Rise Time	—	150	—		I <sub>D</sub> = 78A
t <sub>d(off)</sub>	Turn-Off Delay Time	—	150	—		R <sub>G</sub> = 2.5Ω
t <sub>f</sub>	Fall Time	—	140	—		V <sub>GS</sub> = 10V ④⑧
L <sub>D</sub>	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact
L <sub>S</sub>	Internal Source Inductance	—	7.5	—		
C <sub>iss</sub>	Input Capacitance	—	5600	—	pF	V <sub>GS</sub> = 0V
C <sub>oss</sub>	Output Capacitance	—	890	—		V <sub>DS</sub> = 25V
C <sub>rss</sub>	Reverse Transfer Capacitance	—	190	—		f = 1.0kHz, See Fig. 5⑧
C <sub>oss</sub>	Output Capacitance	—	5800	—		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 1.0V f = 1.0kHz
C <sub>oss</sub>	Output Capacitance	—	560	—		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 60V f = 1.0kHz
C <sub>oss eff.</sub>	Effective Output Capacitance	—	1100	—		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V to 60V

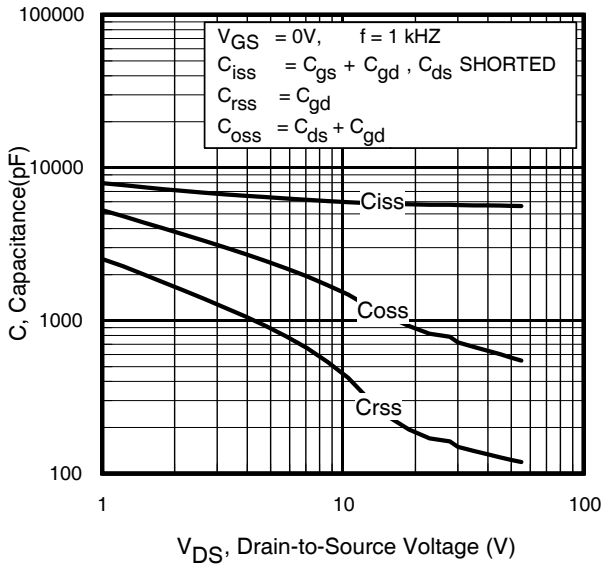

**Source-Drain Ratings and Characteristics**

	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	100⑥	A	MOSFET symbol showing the integral reverse p-n junction diode.
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	520		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.3	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 78A, V <sub>GS</sub> = 0V ④⑧
t <sub>rr</sub>	Reverse Recovery Time	—	110	170	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 78A
Q <sub>rr</sub>	Reverse Recovery Charge	—	390	590	nC	di/dt = 100A/μs ④⑧
t <sub>on</sub>	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L <sub>S</sub> +L <sub>D</sub> )				

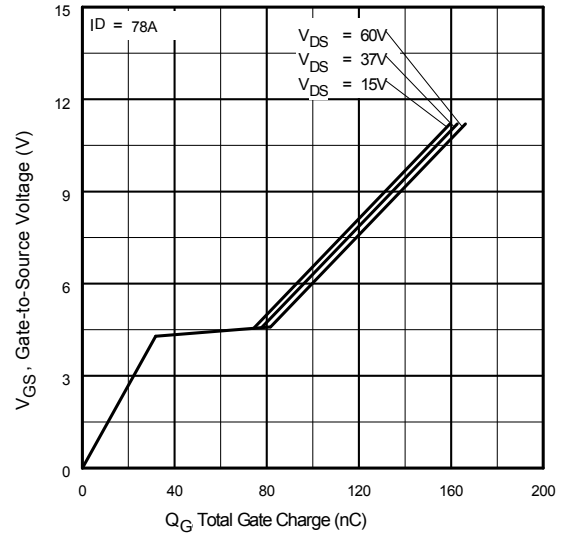

**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)
- ② starting T<sub>J</sub> = 25°C, L = 0.13mH, R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 78A, V<sub>GS</sub> = 10V. (See fig. 12)
- ③ I<sub>SD</sub> ≤ 78A, di/dt ≤ 320A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>J</sub> ≤ 175°C.
- ④ Pulse width ≤ 400μs; duty cycle ≤ 2%.
- ⑤ C<sub>oss eff.</sub> is a fixed capacitance that gives the same charging time as C<sub>oss</sub> while V<sub>DS</sub> is rising from 0 to 80% V<sub>DSS</sub>.
- ⑥ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.
- ⑦ Limited by T<sub>Jmax</sub>, see Fig.12a, 12b, 15, 16 for typical repetitive avalanche performance.
- ⑧ Uses IRF1407 data and test conditions.
- ⑨ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994

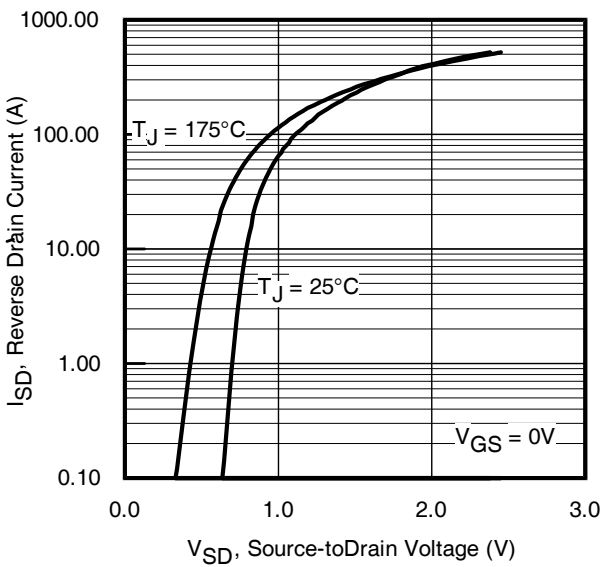

**Fig. 1** Typical Output Characteristics

**Fig. 2** Typical Output Characteristics

**Fig. 3** Typical Transfer Characteristics

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



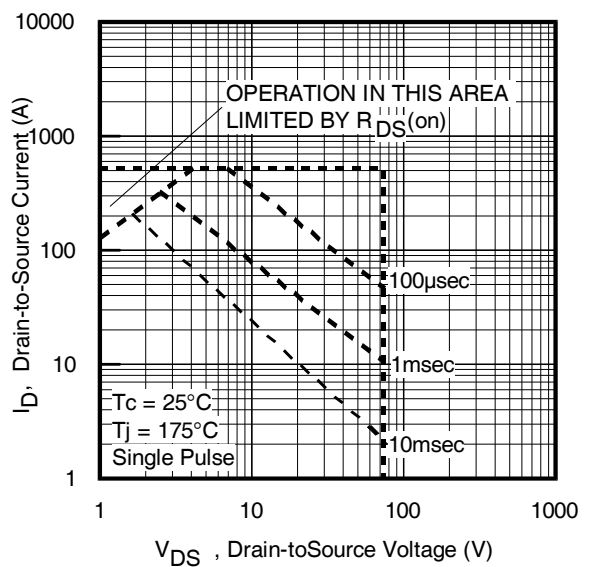
**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage



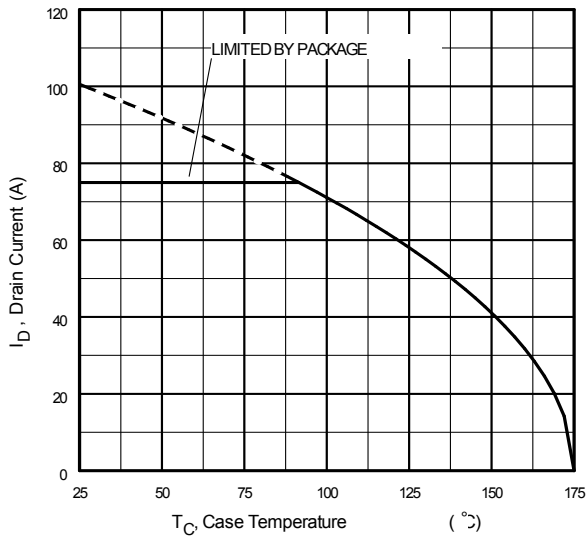
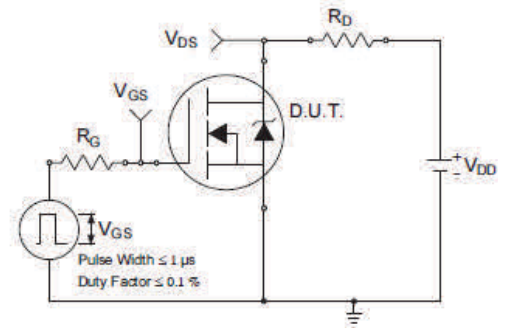
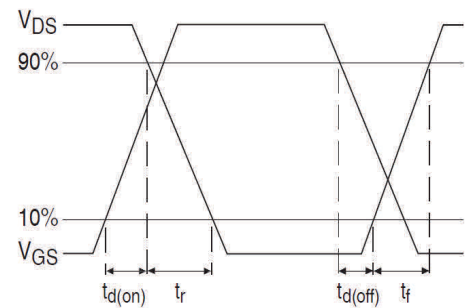
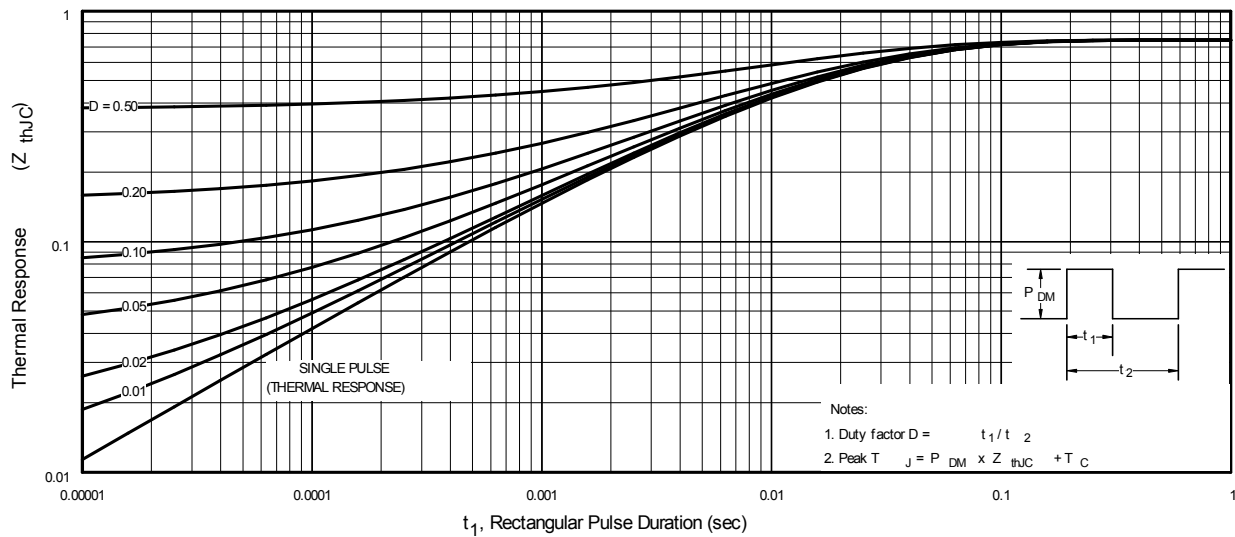
**Fig 6.** Typical Gate Charge vs. Gate-to-Source Voltage

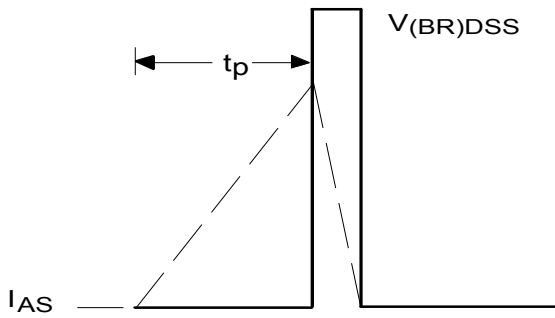
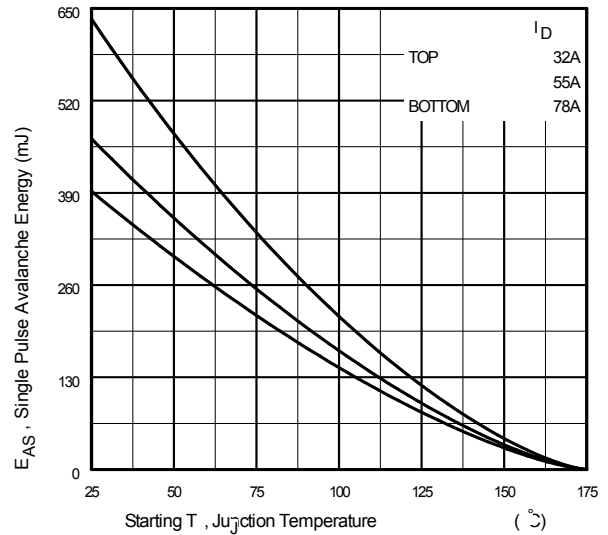
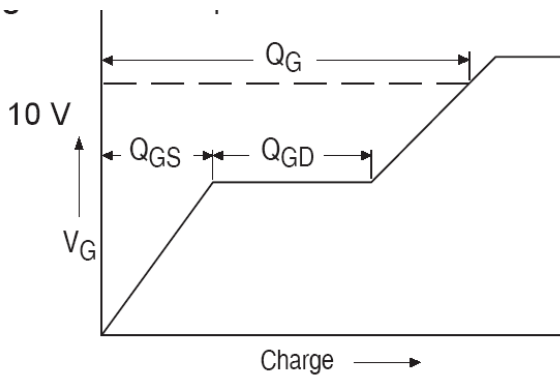
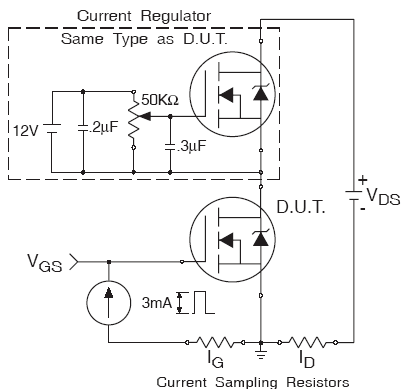
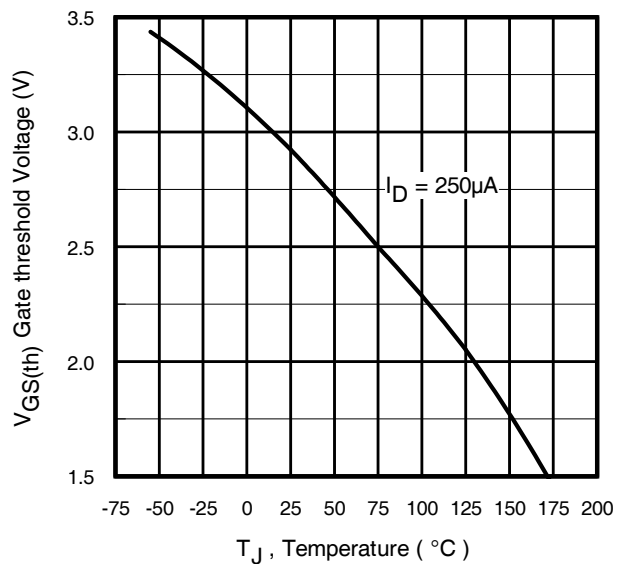


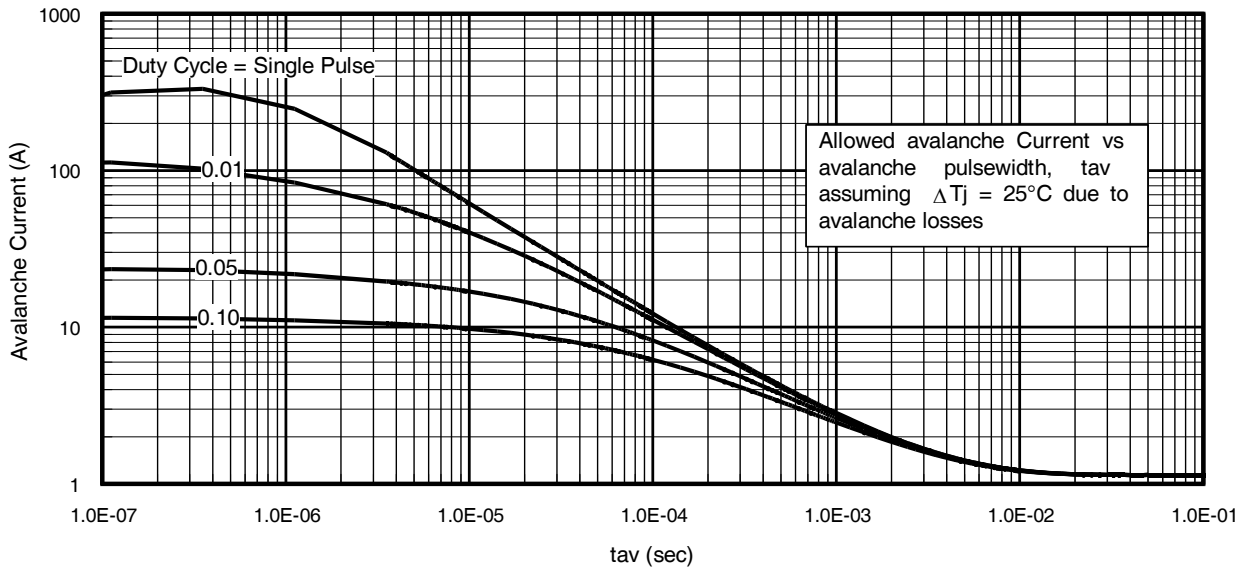
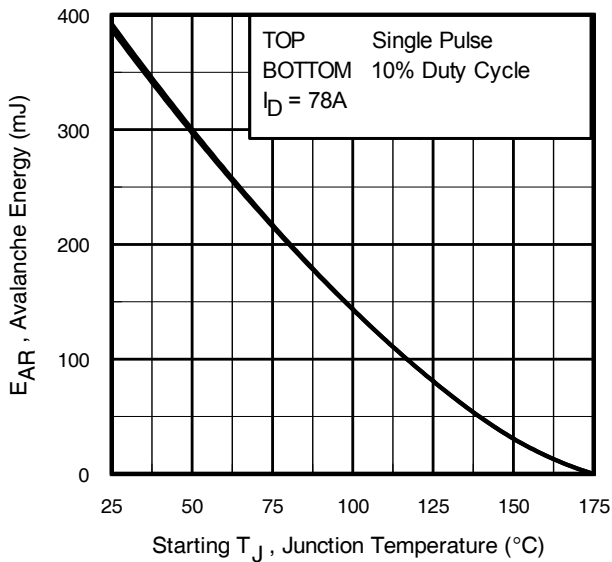
**Fig 7.** Typical Source-to-Drain Diode Forward Current



**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. Gate Charge Waveform**

**Fig 13b. Gate Charge Test Circuit**

**Fig 14. Threshold Voltage vs. Temperature**


**Fig 15.** Typical Avalanche Current vs. Pulse width

**Fig 16.** Maximum Avalanche Energy vs. Temperature

**Notes on Repetitive Avalanche Curves , Figures 15, 16:  
(For further info, see AN-1005 at www.infineon.com)**

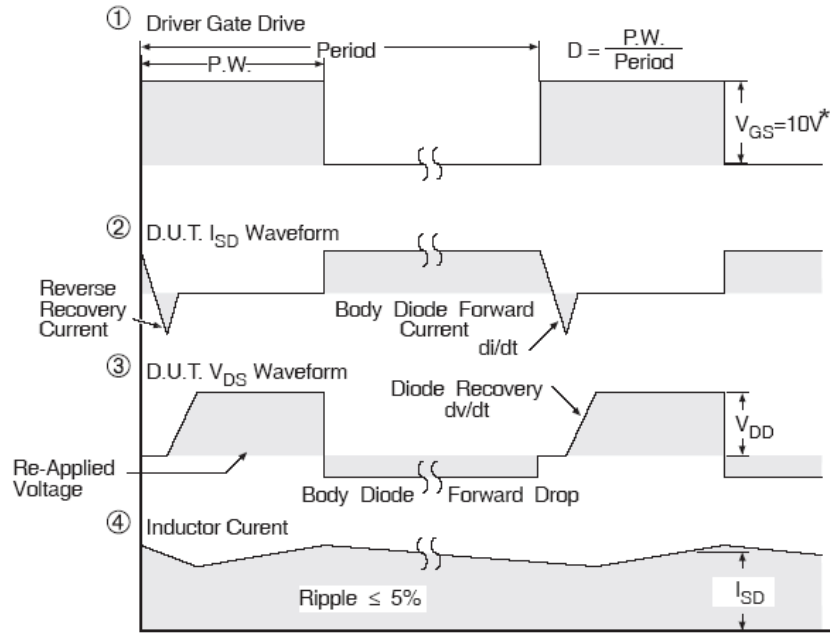
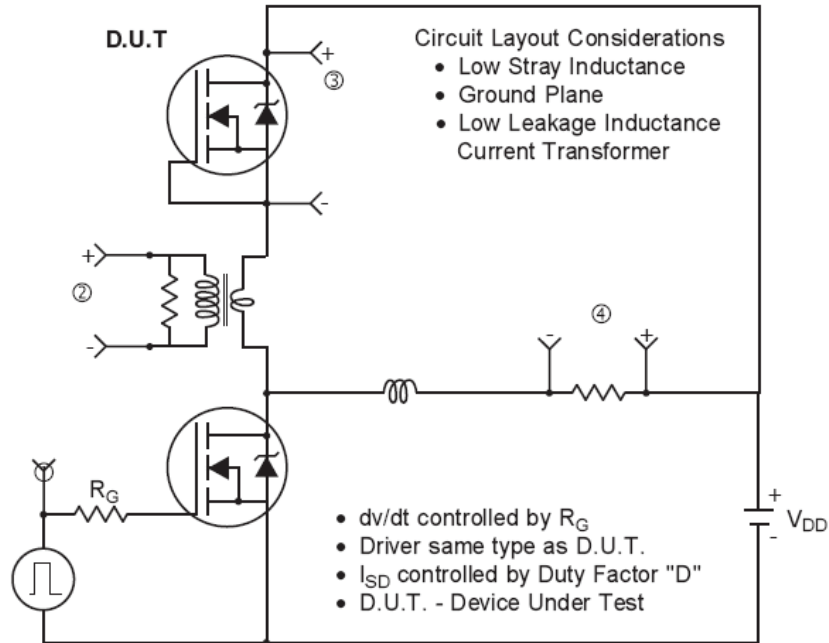
1. Avalanche failures assumption:  
Purely a thermal phenomenon and failure occurs at a temperature far in excess of  $T_{jmax}$ . This is validated for every part type.
2. Safe operation in Avalanche is allowed as long as  $T_{jmax}$  is not exceeded.
3. Equation below based on circuit and waveforms shown in Figures 12a, 12b.
4.  $P_{D(ave)}$  = Average power dissipation per single avalanche pulse.
5.  $BV$  = Rated breakdown voltage (1.3 factor accounts for voltage increase during avalanche).
6.  $I_{av}$  = Allowable avalanche current.
7.  $\Delta T$  = Allowable rise in junction temperature, not to exceed  $T_{jmax}$  (assumed as 25°C in Figure 15, 16).  
 $t_{av}$  = Average time in avalanche.  
 $D$  = Duty cycle in avalanche =  $t_{av} \cdot f$   
 $Z_{thJC}(D, t_{av})$  = Transient thermal resistance, see Figures 13)

$$P_{D(ave)} = 1/2 ( 1.3 \cdot BV \cdot I_{av} ) = \Delta T / Z_{thJC}$$

$$I_{av} = 2\Delta T / [ 1.3 \cdot BV \cdot Z_{thJC} ]$$

$$E_{AS(AR)} = P_{D(ave)} \cdot t_{av}$$

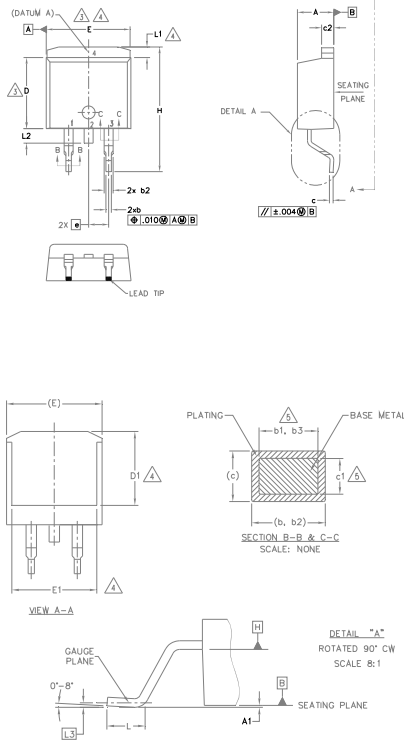
### Peak Diode Recovery dv/dt Test Circuit



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

**Fig 17.** Peak Diode Recovery  $dv/dt$  Test Circuit for N-Channel HEXFET® Power MOSFETs



**D2-Pak (TO-263AB) Package Outline (Dimensions are shown in millimeters (inches))**

**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [0.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY AT DATUM H.
4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.
5. DIMENSION b1, b3 AND c1 APPLY TO BASE METAL ONLY.
6. DATUM A & B TO BE DETERMINED AT DATUM PLANE H.
7. CONTROLLING DIMENSION: INCH.
8. OUTLINE CONFORMS TO JEDEC OUTLINE TO-263AB.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	
A1	0.00	0.254	.000	.010	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	5
b2	1.14	1.78	.045	.070	
b3	1.14	1.73	.045	.068	5
c	0.38	0.74	.015	.029	
c1	0.38	0.58	.015	.023	5
c2	1.14	1.65	.045	.065	
D	8.38	9.65	.330	.380	3
D1	6.86	—	.270	—	4
E	9.65	10.67	.380	.420	3,4
E1	6.22	—	.245	—	4
e	2.54 BSC		.100 BSC		
H	14.61	15.88	.575	.625	
L	1.78	2.79	.070	.110	
L1	—	1.68	—	.066	4
L2	—	1.78	—	.070	
L3	0.25 BSC		.010 BSC		

**LEAD ASSIGNMENTS**
**DIODES**

- 1.- ANODE (TWO DIE) / OPEN (ONE DIE)
- 2, 4.- CATHODE
- 3.- ANODE

**HEXFET**

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

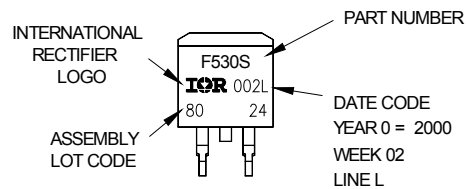
**IGBTs, CoPACK**

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

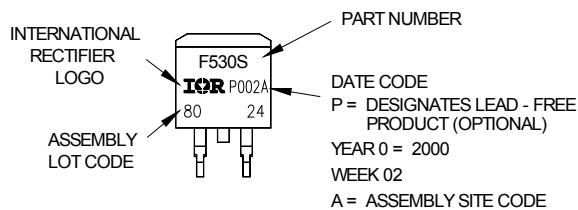
**D2-Pak (TO-263AB) Part Marking Information**

EXAMPLE: THIS IS AN IRF530S WITH  
LOT CODE 8024  
ASSEMBLED ON WW 02, 2000  
IN THE ASSEMBLY LINE "L"

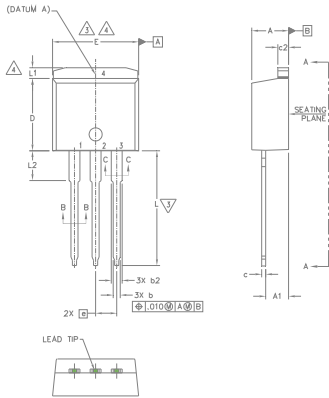
Note: "P" in assembly line position  
indicates "Lead - Free"



OR



Note: For the most current drawing please refer to Infineon's web site [www.infineon.com](http://www.infineon.com)

**TO-262 Package Outline (Dimensions are shown in millimeters (inches))**


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
  2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
  3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
  4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.
  5. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
  6. CONTROLLING DIMENSION: INCH.
  7. OUTLINE CONFORM TO JEDEC TO-262 EXCEPT A1(max.), b(min.) AND D1(min.) WHERE DIMENSIONS DERIVED THE ACTUAL PACKAGE OUTLINE.

**LEAD ASSIGNMENTS**
**IGBTs, CoPACK**

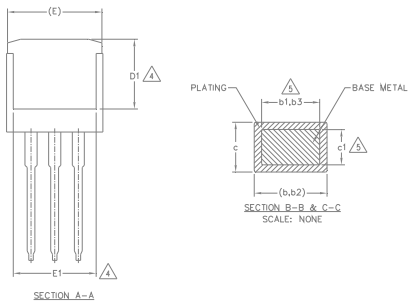
- 1.- GATE
- 2.- COLLECTOR
- 3.- EMITTER
- 4.- COLLECTOR

**HEXFET**

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

**DIODES**

- 1.- ANODE (TWO DIE) / OPEN (ONE DIE)
- 2.- CATHODE
- 3.- ANODE

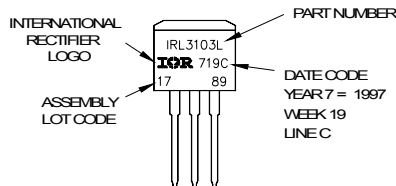


SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	
A1	2.03	3.02	.080	.119	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	5
b2	1.14	1.78	.045	.070	
b3	1.14	1.73	.045	.068	5
c	0.38	0.74	.015	.029	
c1	0.38	0.58	.015	.023	5
c2	1.14	1.65	.045	.065	
D	8.38	9.65	.330	.380	3
D1	6.86	-	.270	-	4
E	9.65	10.67	.380	.420	3,4
E1	6.22	-	.245	-	4
e	2.54 BSC		.100 BSC		
L	13.46	14.10	.530	.555	
L1	-	1.65	-	.065	4
L2	3.56	3.71	.140	.146	

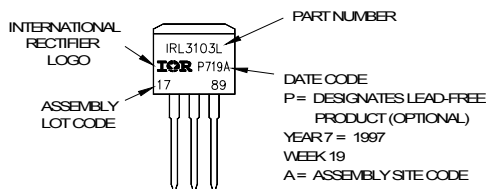
**TO-262 Part Marking Information**

EXAMPLE: THIS IS AN IRL3103L  
 LOT CODE 1789  
 ASSEMBLED ON WW19, 1997  
 IN THE ASSEMBLY LINE "C"

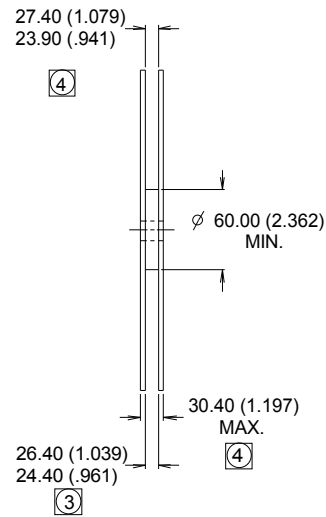
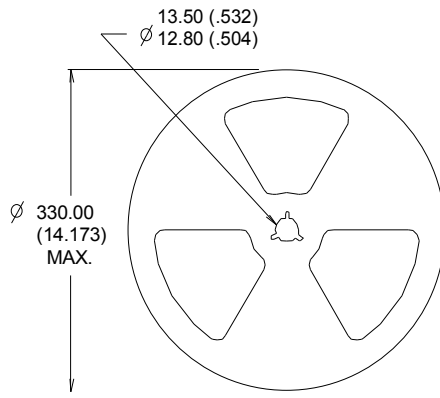
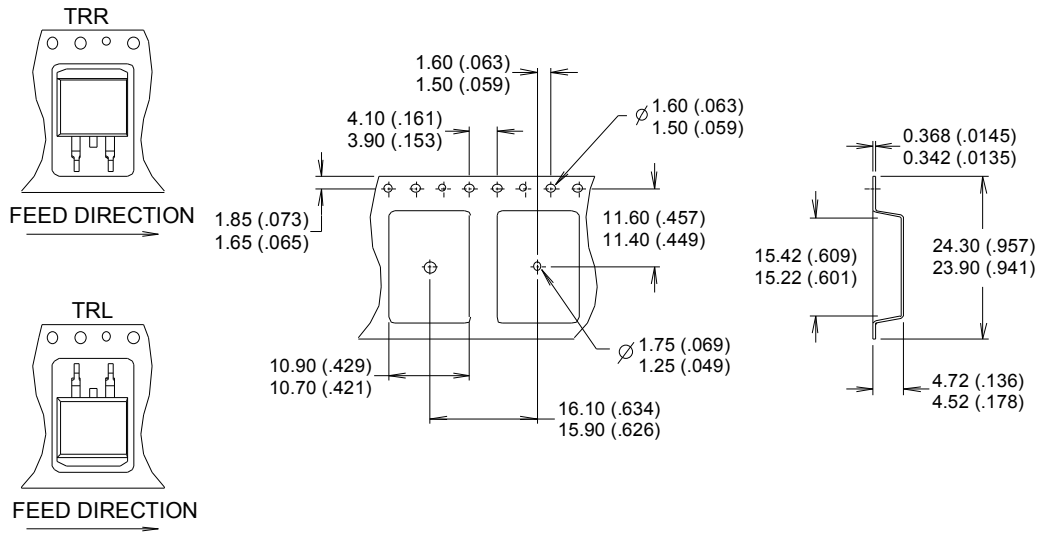
Note: "P" in assembly line position indicates "Lead - Free"



OR



Note: For the most current drawing please refer to Infineon's web site [www.infineon.com](http://www.infineon.com)

**D2-Pak (TO-263AB) Tape & Reel Information (Dimensions are shown in millimeters (inches))**

**NOTES :**

1. CONFORMS TO EIA-418.
2. CONTROLLING DIMENSION: MILLIMETER.
- ③ DIMENSION MEASURED @ HUB.
- ④ INCLUDES FLANGE DISTORTION @ OUTER EDGE.

Note: For the most current drawing please refer to Infineon's web site [www.infineon.com](http://www.infineon.com)

**Qualification Information<sup>†</sup>**

<b>Qualification Level</b>	Industrial (per JEDEC JESD47F) <sup>††</sup>	
<b>Moisture Sensitivity Level</b>	D2-Pak	MSL1 (per JEDEC J-STD-020D) <sup>††</sup>
	TO-262	N/A
<b>RoHS Compliant</b>	Yes	

† Qualification standards can be found at Infineon's web site [www.infineon.com](http://www.infineon.com)

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

**Revision History**

Date	Comments
4/20/2016	<ul style="list-style-type: none"> <li>Updated datasheet with corporate template.</li> <li>Corrected typo on Fig. 3 from <math>V_{DS} = 15V</math> to <math>V_{DS} = 25V</math> on page 3.</li> <li>Corrected typo on Fig. 5 from <math>f = 1MHz</math> to <math>1kHz</math> on page 4.</li> <li>Updated Package outline on pages 9,10.</li> </ul>
5/26/2016	<ul style="list-style-type: none"> <li>Added disclaimer on last page.</li> <li>TO-262 package was removed from ordering information since it is EOL on page 1.</li> </ul>

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**Document reference**

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