

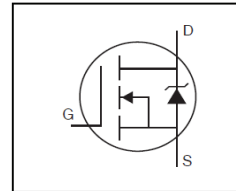
## Features

- Advanced Planar Technology
- Low On-Resistance
- Logic Level Gate Drive
- Dynamic dv/dt Rating
- 150°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Repetitive Avalanche Allowed up to Tjmax
- Lead-Free, RoHS Compliant
- Automotive Qualified \*

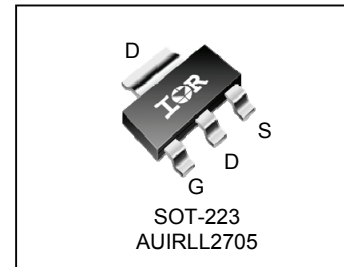
## Description

Specifically designed for Automotive applications, this cellular design of HEXFET® Power MOSFETs utilizes the latest processing techniques to achieve 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 Automotive and a wide variety of other applications.

HEXFET® Power MOSFET



$V_{DS}$	<b>55V</b>
$R_{DS(on)}$ max.	<b>0.04Ω</b>
$I_D$	<b>3.8A</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	
AUIRLL2705	SOT-223	Tape and Reel	2500	AUIRLL2705TR

## Absolute Maximum Ratings

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only; and functional operation of the device at these or any other condition beyond those indicated in the specifications is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions. Ambient temperature (TA) is 25°C, unless otherwise specified.

Symbol	Parameter	Max.	Units
$I_D$ @ $T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V ⑥	5.2	A
$I_D$ @ $T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V ⑤	3.8	
$I_D$ @ $T_A = 70^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V ⑤	3.0	
$I_{DM}$	Pulsed Drain Current ①	30	
$P_D$ @ $T_A = 25^\circ\text{C}$	Maximum Power Dissipation (PCB Mount) ⑥	2.1	W
$P_D$ @ $T_A = 25^\circ\text{C}$	Maximum Power Dissipation (PCB Mount) ⑤	1.0	
	Linear Derating Factor (PCB Mount) ⑤	8.3	mW/°C
$V_{GS}$	Gate-to-Source Voltage	± 16	V
$E_{AS}$	Single Pulse Avalanche Energy (Thermally Limited) ②	110	mJ
$I_{AR}$	Avalanche Current ①	3.8	A
$E_{AR}$	Repetitive Avalanche Energy ①⑤	0.10	mJ
dv/dt	Peak Diode Recovery dv/dt ③	7.5	V/ns
$T_J$	Operating Junction and	-55 to + 150	°C
$T_{STG}$	Storage Temperature Range		

## Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount, steady state) ⑤	93	120	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount, steady state) ⑥	48	60	

HEXFET® is a registered trademark of Infineon.

\*Qualification standards can be found at [www.infineon.com](http://www.infineon.com)

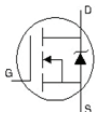
**Static @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)**

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	55	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.061	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}$ , $I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.040	$\Omega$	$V_{GS} = 10V, I_D = 3.8A$ ④
		—	—	0.051		$V_{GS} = 5.0V, I_D = 3.8A$ ④
		—	—	0.065		$V_{GS} = 4.0V, I_D = 1.9A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	1.0	—	2.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$g_{fs}$	Forward Trans conductance	5.1	—	—	S	$V_{DS} = 25V, I_D = 1.9A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	25	$\mu A$	$V_{DS} = 55V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 44V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 16V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -16V$

**Dynamic Electrical Characteristics @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)**

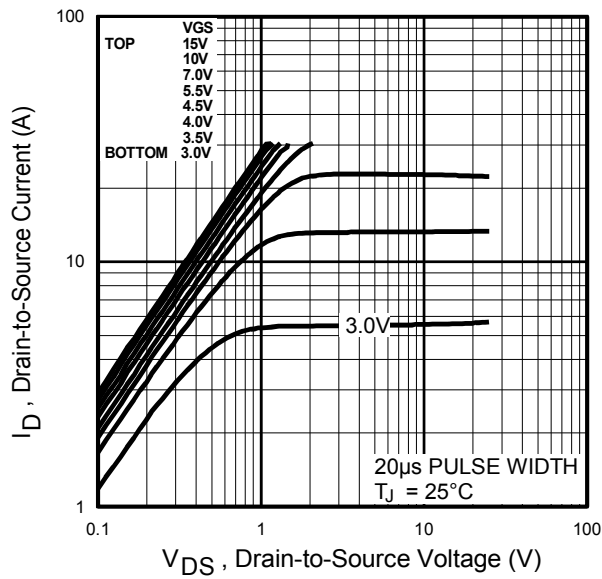
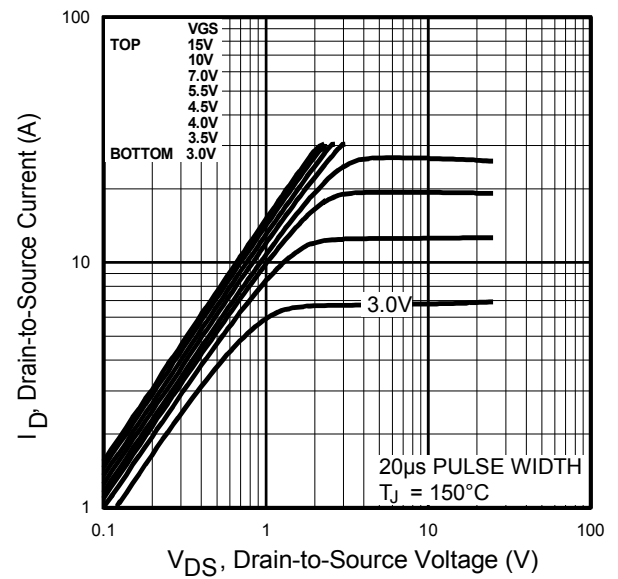
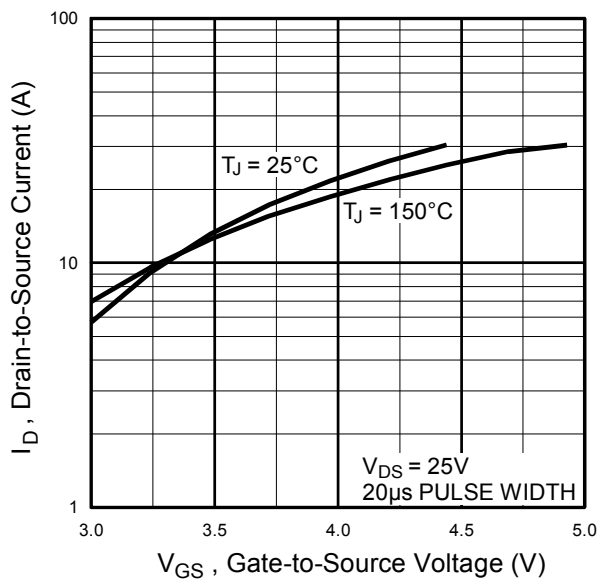
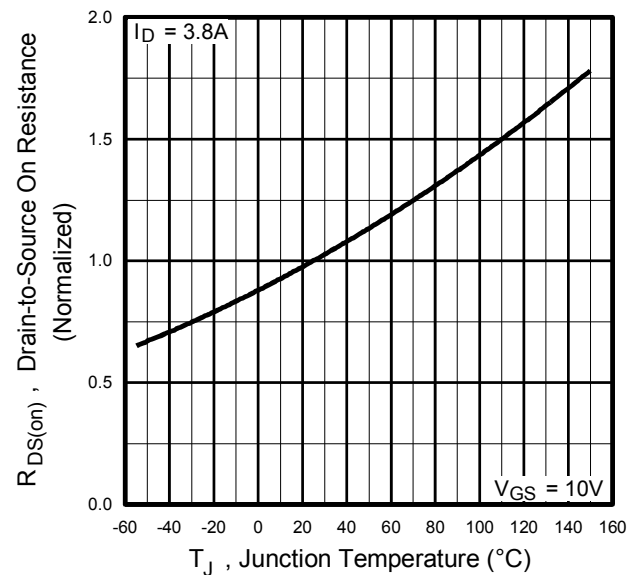
$Q_g$	Total Gate Charge	—	32	48	nC	$I_D = 3.8A$
$Q_{gs}$	Gate-to-Source Charge	—	3.5	5.3		$V_{DS} = 44V$
$Q_{gd}$	Gate-to-Drain Charge	—	9.7	14		$V_{GS} = 10V$ , See Fig 6 and 9 ④
$t_{d(on)}$	Turn-On Delay Time	—	6.2	—	ns	$V_{DD} = 28V$
$t_r$	Rise Time	—	12	—		$I_D = 3.8A$
$t_{d(off)}$	Turn-Off Delay Time	—	35	—		$R_G = 6.2\Omega$
$t_f$	Fall Time	—	22	—		$R_D = 7.1\Omega$ , See Fig. 10 ④
$C_{iss}$	Input Capacitance	—	870	—	pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	220	—		$V_{DS} = 25V$
$C_{rss}$	Reverse Transfer Capacitance	—	92	—		$f = 1.0\text{MHz}$ , See Fig.5

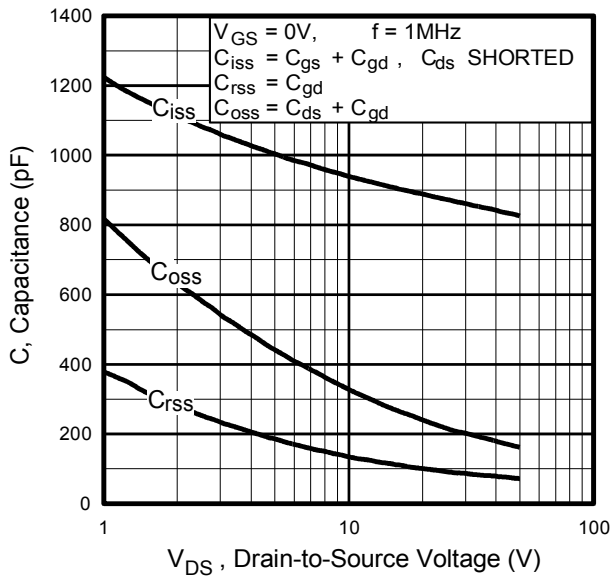
**Diode Characteristics**

	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	0.91	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	30		
$V_{SD}$	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_S = 3.8A, V_{GS} = 0V$ ④
$t_{rr}$	Reverse Recovery Time	—	58	88	ns	$T_J = 25^\circ\text{C}, I_F = 3.8A$
$Q_{rr}$	Reverse Recovery Charge	—	140	210	nC	$di/dt = 100A/\mu s$ ④
$t_{on}$	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

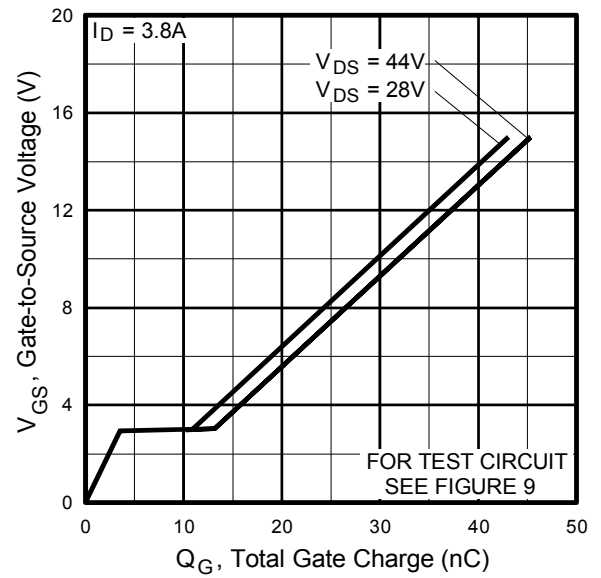
**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)
- ②  $V_{DD} = 25V$ , Starting  $T_J = 25^\circ\text{C}$ ,  $L = 15\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 3.8A$ . (See fig. 12)
- ③  $I_{SD} \leq 3.8A$ ,  $di/dt \leq 220A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ\text{C}$ .
- ④ Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .
- ⑤ When mounted on FR-4 board using minimum recommended footprint.
- ⑥ When mounted on 1 inch square copper board, for comparison with other SMD devices.

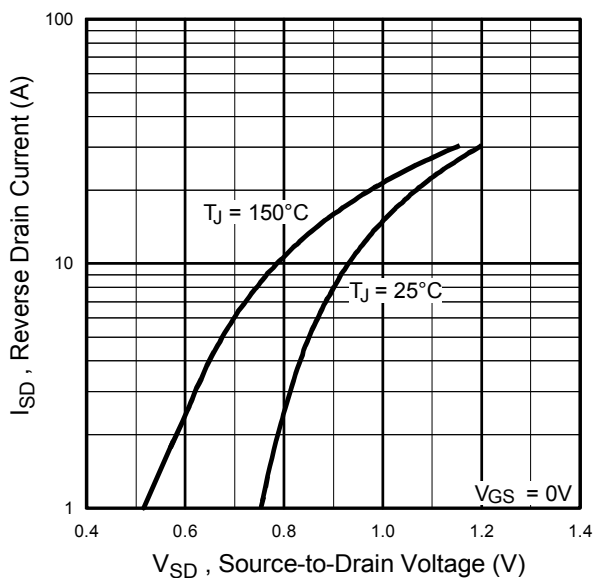

**Fig. 1** Typical Output Characteristics

**Fig. 2** Typical Output Characteristics

**Fig. 3** Typical Transfer Characteristics

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



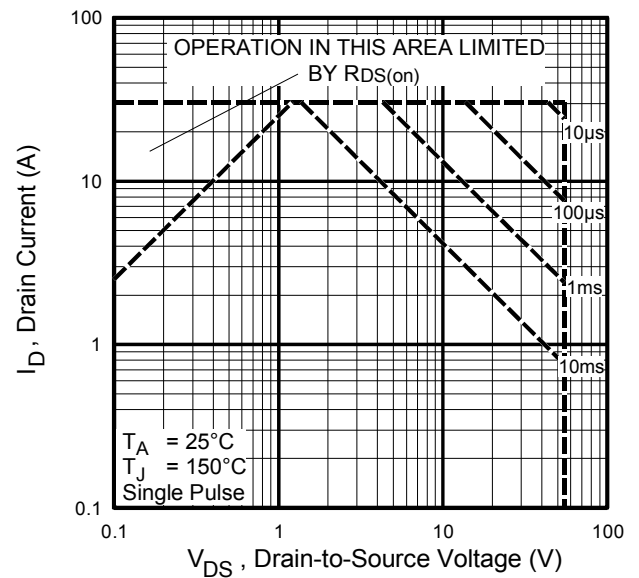
**Fig 5.** Typical Capacitance vs.  
Drain-to-Source Voltage



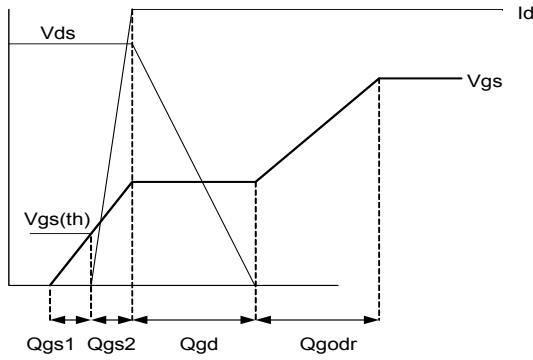
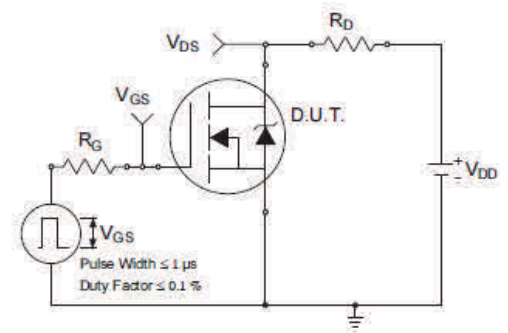
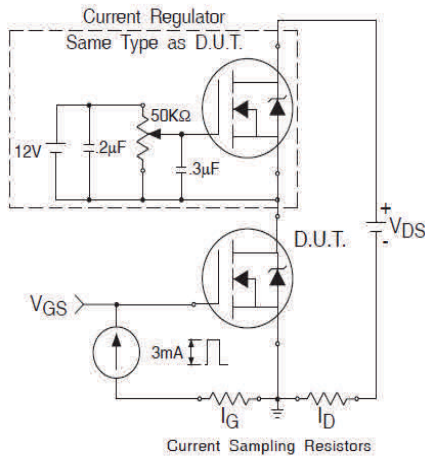
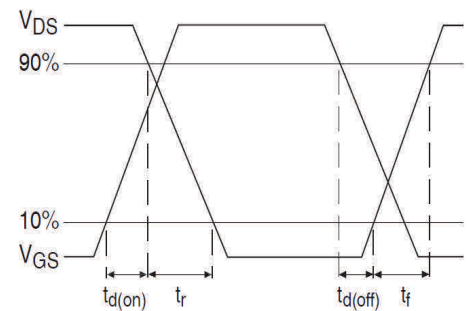
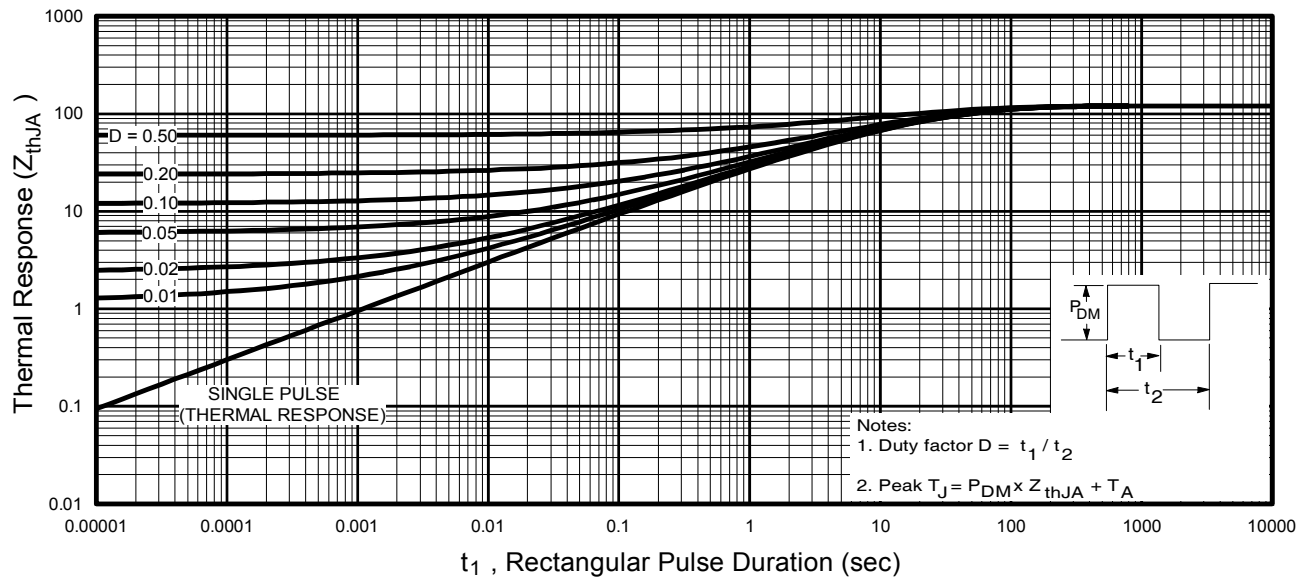
**Fig 6.** Typical Gate Charge vs.  
Gate-to-Source Voltage

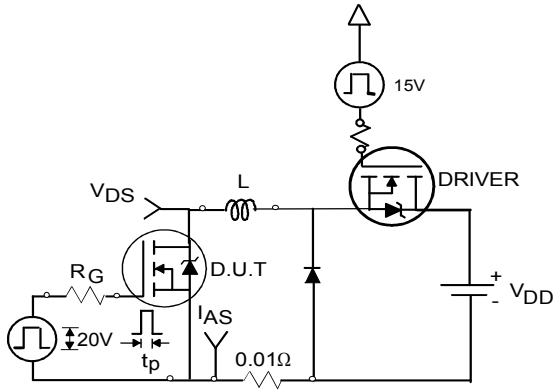


**Fig. 7** Typical Source-to-Drain Diode  
Forward Voltage

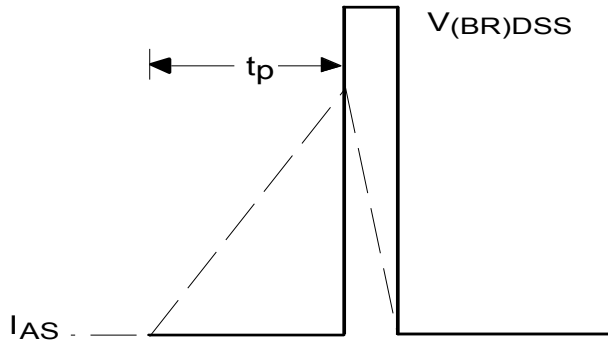


**Fig 8.** Maximum Safe Operating Area

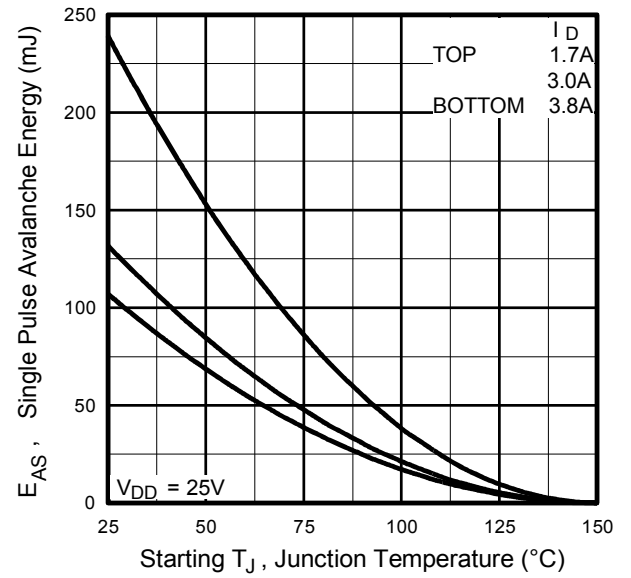

**Fig 9a. Basic Gate Charge Waveform**

**Fig 10a. Switching Time Test Circuit**

**Fig 9b. Gate Charge Test Circuit**

**Fig 10b. Switching Time Waveforms**

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



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

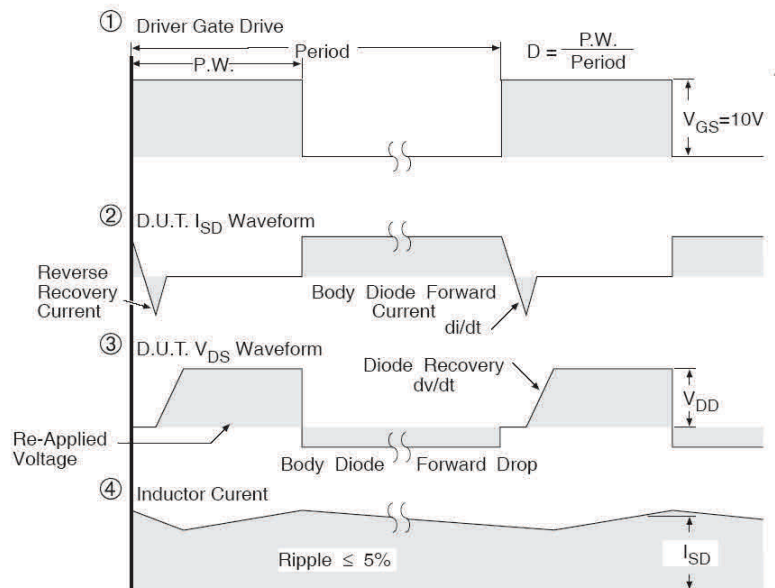
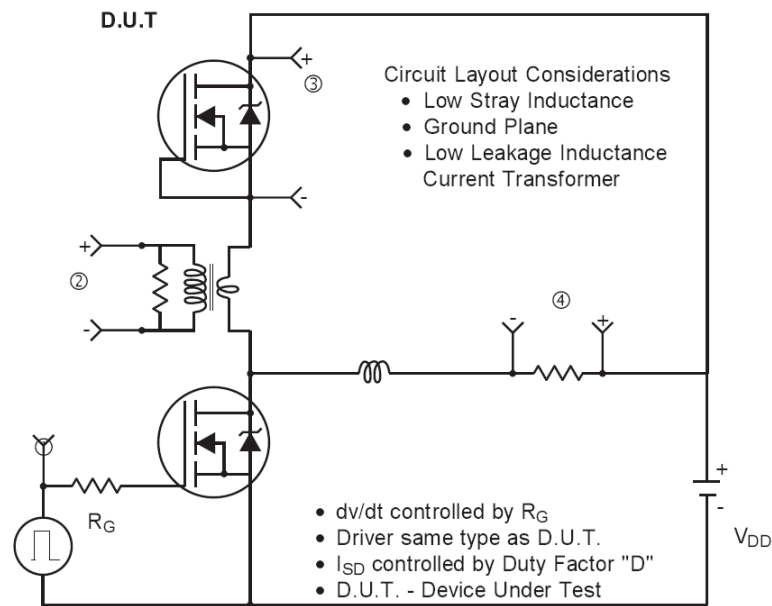


**Fig 12b.** Unclamped Inductive Waveforms



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

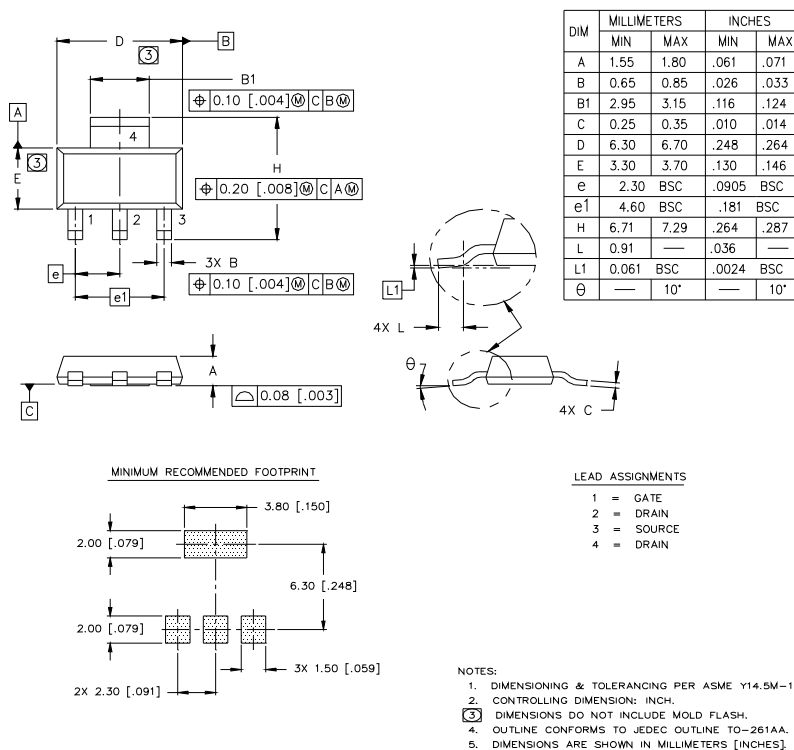
# Peak Diode Recovery dv/dt Test Circuit



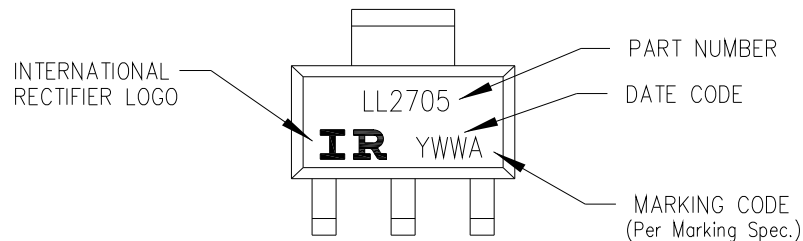
\*  $V_{GS} = 5V$  for Logic Level Devices

**Fig 13.** Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

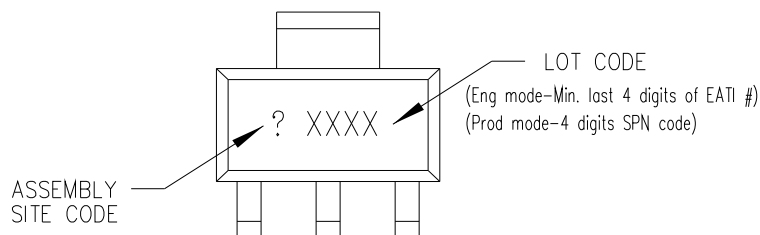
# SOT-223 (TO-261AA) Package Outline (Dimensions are shown in millimeters (inches))



## SOT-223(TO-261AA) Part Marking Information



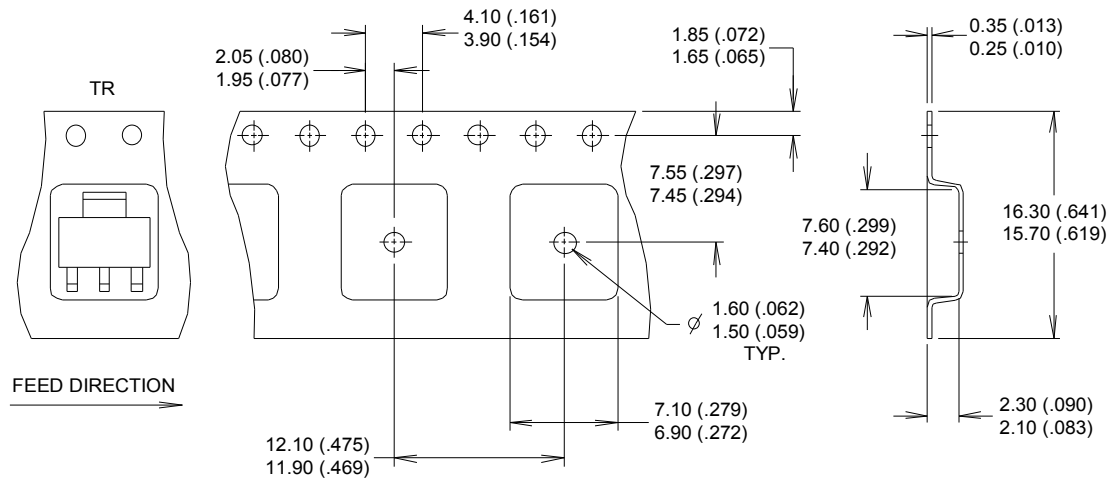
TOP MARKING



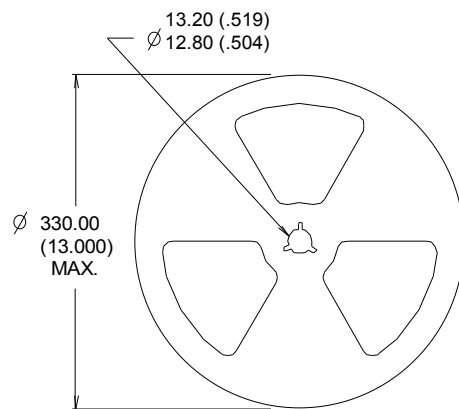
BOTTOM MARKING

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

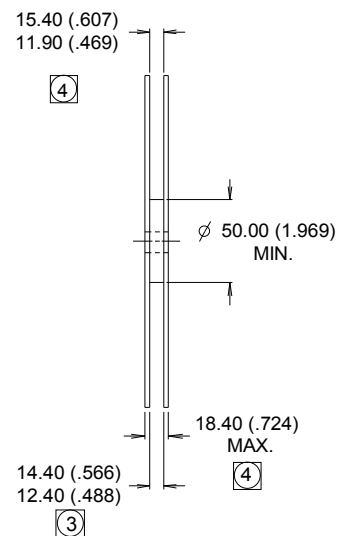


**SOT-223(TO-261AA) Tape and Reel** (Dimensions are shown in millimeters (inches))

**NOTES :**

1. CONTROLLING DIMENSION: MILLIMETER.
2. OUTLINE CONFORMS TO EIA-481 & EIA-541.
3. EACH  $\phi$ 330.00 (13.00) REEL CONTAINS 2,500 DEVICES.


**NOTES :**

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



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

**Qualification Information**

<b>Qualification Level</b>		Automotive (per AEC-Q101)	
		Comments: This part number(s) passed Automotive qualification. Infineon's Industrial and Consumer qualification level is granted by extension of the higher Automotive level.	
<b>Moisture Sensitivity Level</b>		SOT-223	MSL1
<b>ESD</b>	Machine Model	Class M2 (+/- 200V) <sup>†</sup> AEC-Q101-002	
	Human Body Model	Class H1B (+/- 750V) <sup>†</sup> AEC-Q101-001	
	Charged Device Model	Class C5 (+/- 1125V) <sup>†</sup> AEC-Q101-005	
<b>RoHS Compliant</b>		Yes	

† Highest passing voltage.

**Revision History**

Date	Comments
3/26/2014	<ul style="list-style-type: none"> <li>Added "Logic Level Gate Drive" bullet in the features section on page 1</li> <li>Updated part marking on page 8</li> <li>Updated data sheet with new IR corporate template</li> </ul>
10/29/2015	<ul style="list-style-type: none"> <li>Updated datasheet with corporate template</li> <li>Corrected ordering table on page 1.</li> </ul>

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