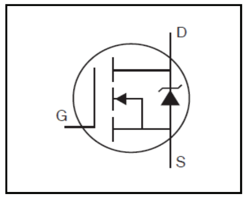
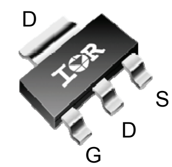
HEXFET® Power MOSFET

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 *



V_{DSS}	55V
$R_{DS(on)}$ max.	0.04Ω
I_D	3.8A



SOT-223
AUIRLL2705

G	D	S
Gate	Drain	Source

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.

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°C	Continuous Drain Current, V_{GS} @ 10V ⑥	5.2	A
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V ⑤	3.8	
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V ⑤	3.0	
I_{DM}	Pulsed Drain Current ①	30	
P_D @T_A = 25°C	Maximum Power Dissipation (PCB Mount) ⑥	2.1	W
P_D @T_A = 25°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 T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

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	

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*Qualification standards can be found at www.infineon.com

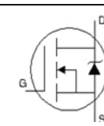
Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	55	—	—	V	V_{GS} = 0V, I_D = 250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.061	—	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.040	Ω	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 = 250μA
gfs	Forward Trans conductance	5.1	—	—	S	V_{DS} = 25V, I_D = 1.9A
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	V_{DS} = 55V, V_{GS} = 0V
		—	—	250		V_{DS} = 44V,V_{GS} = 0V,T_J = 150°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°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 = 6.2Ω
t_f	Fall Time	—	22	—		R_D = 7.1Ω, 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 = 1.0MHz, 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°C,I_S = 3.8A,V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	58	88	ns	T_J = 25°C ,I_F = 3.8A
Q_{rr}	Reverse Recovery Charge	—	140	210	nC	di/dt = 100A/μs 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°C, L = 15mH, R_G = 25Ω, I_{AS} = 3.8A. (See fig. 12)
③ $I_{SD} \le$ 3.8A, di/dt $\le$ 220A/μs, $V_{DD} \le V_{(BR)DSS}$, $T_J \le$ 150°C.
④ Pulse width $\le$ 300μs; duty cycle $\le$ 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.

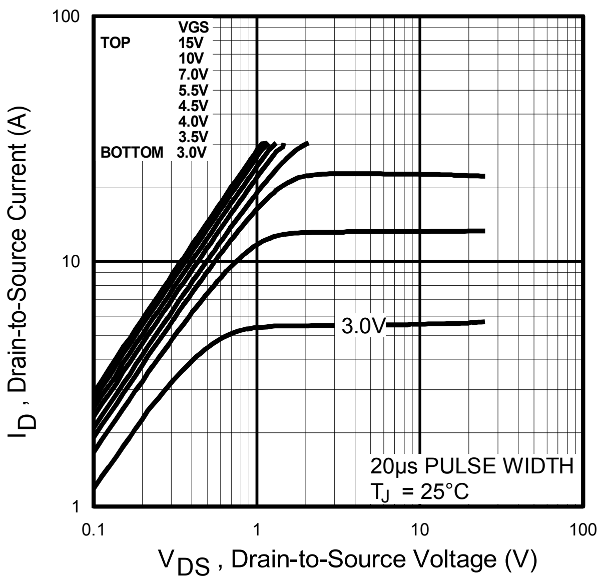


Fig. 1 Typical Output Characteristics

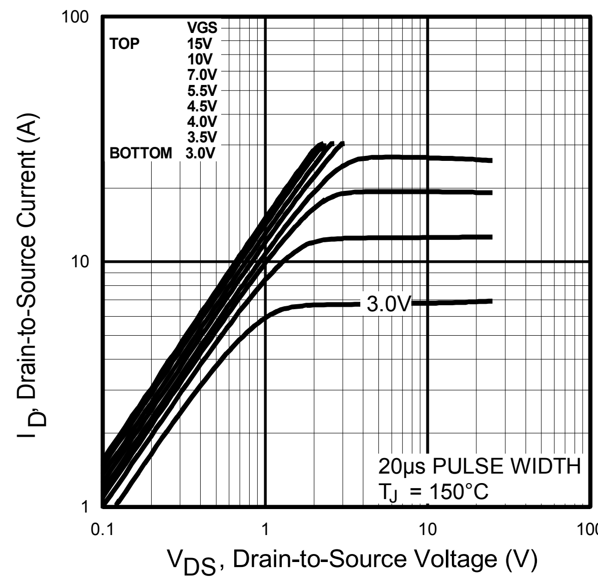


Fig. 2 Typical Output Characteristics

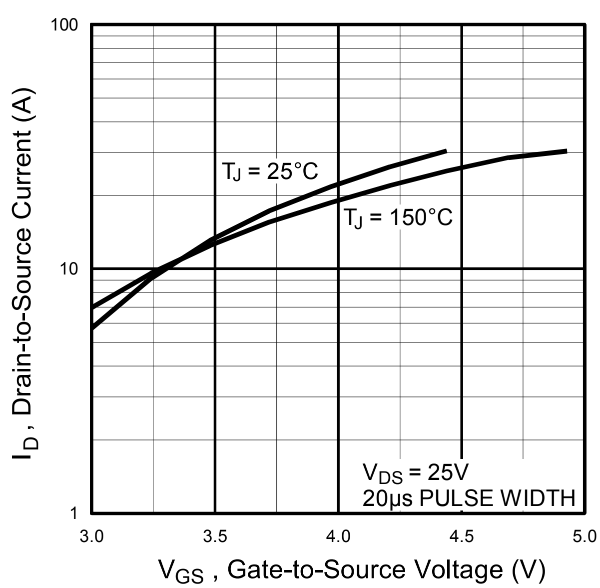


Fig. 3 Typical Transfer Characteristics

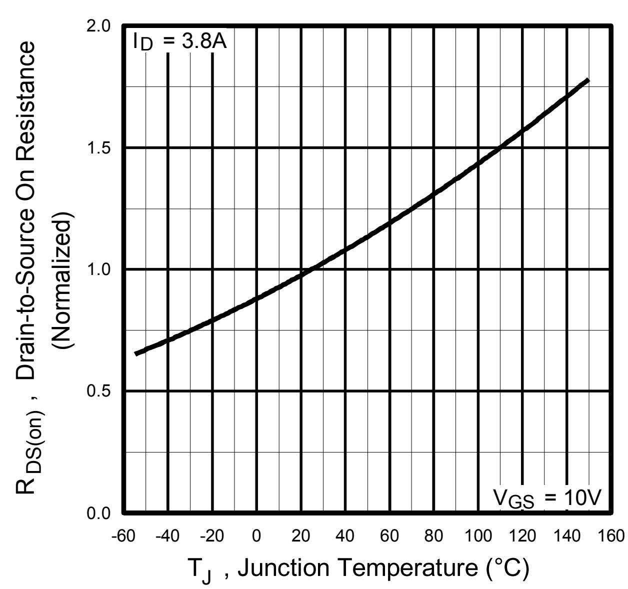


Fig. 4 Normalized On-Resistance vs. Temperature

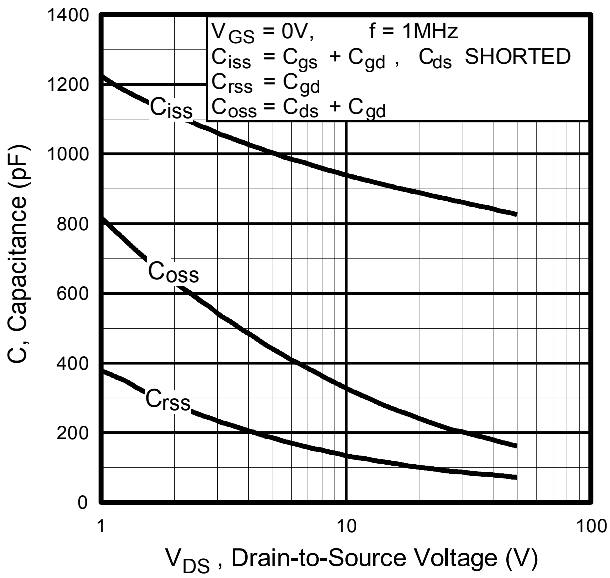


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

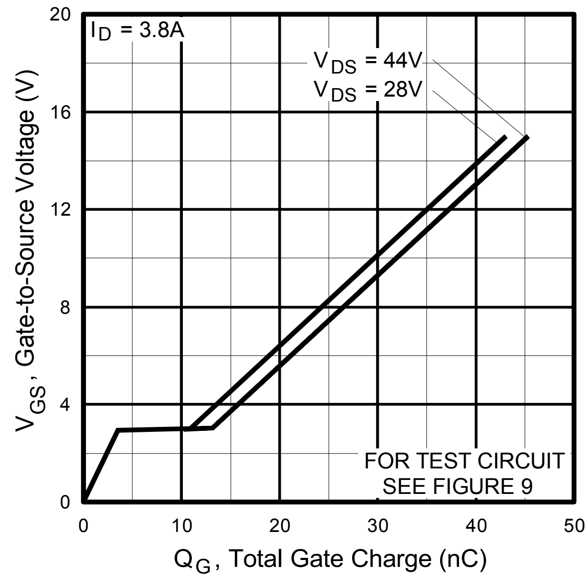


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

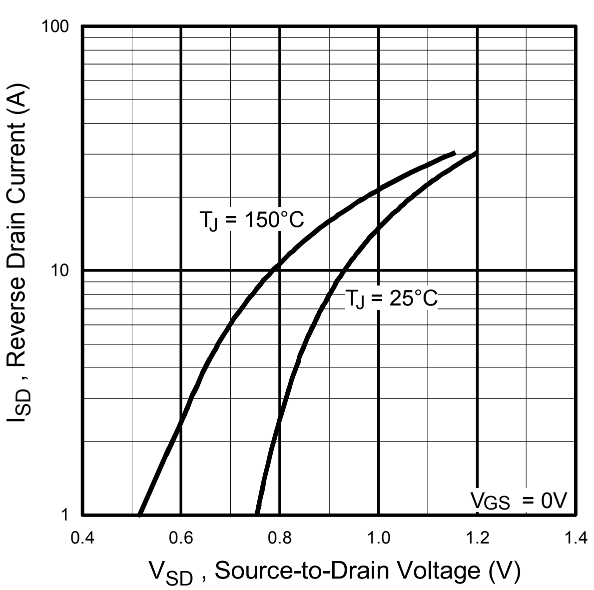


Fig. 7 Typical Source-to-Drain Diode Forward Voltage

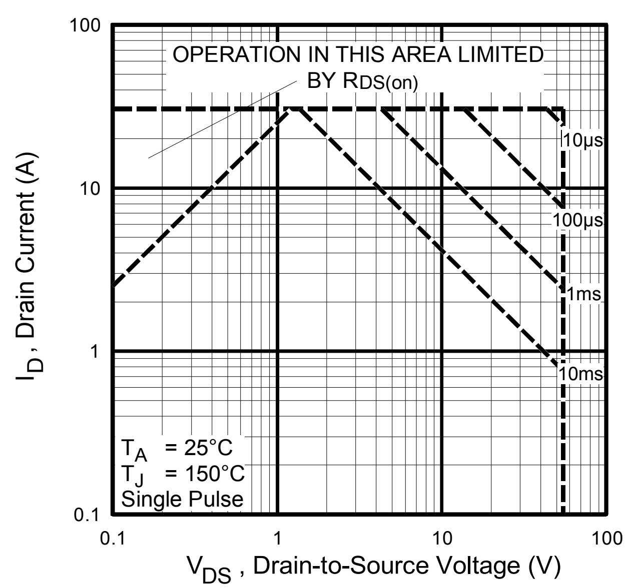


Fig 8. Maximum Safe Operating Area

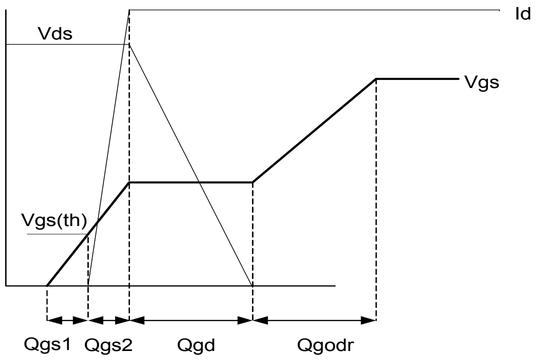


Fig 9a. Basic Gate Charge Waveform

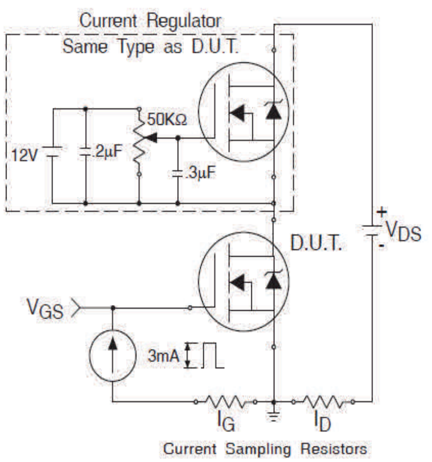


Fig 9b. Gate Charge Test Circuit

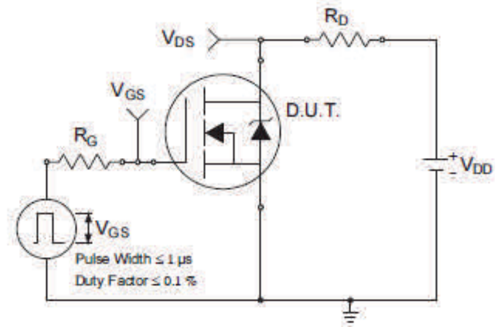


Fig 10a. Switching Time Test Circuit

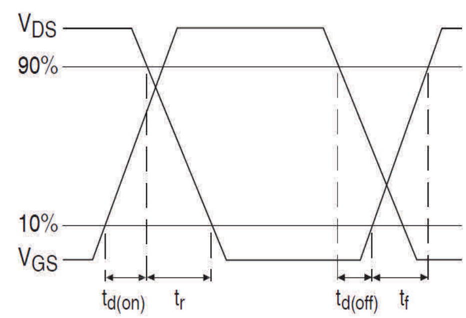


Fig 10b. Switching Time Waveforms

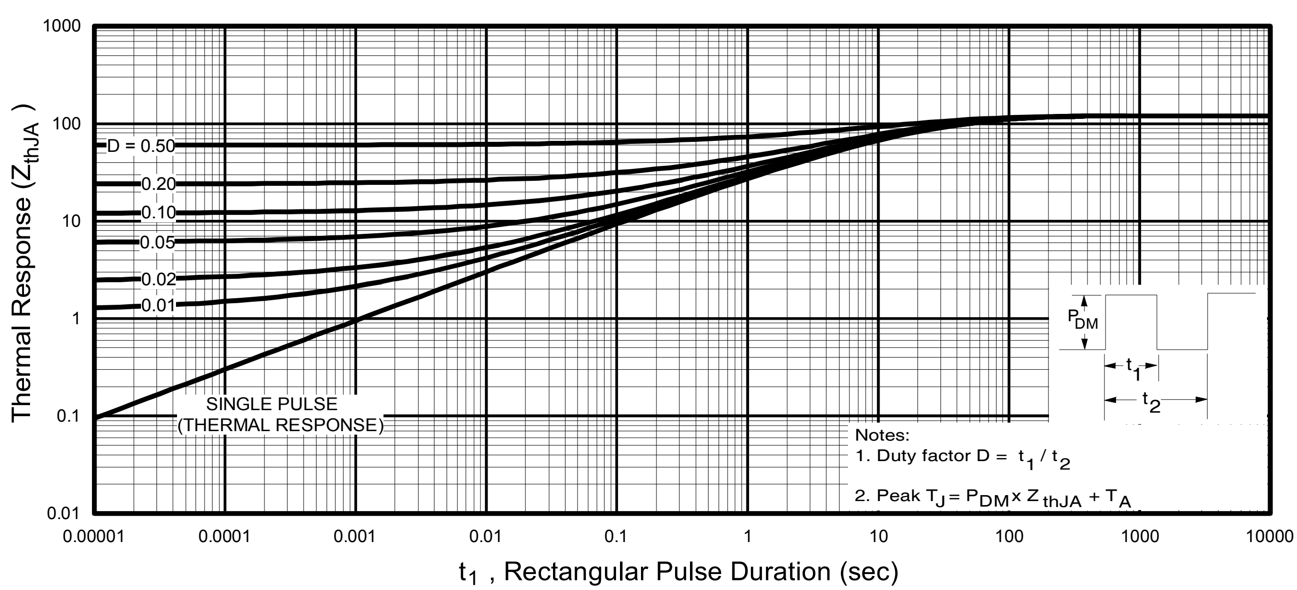


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

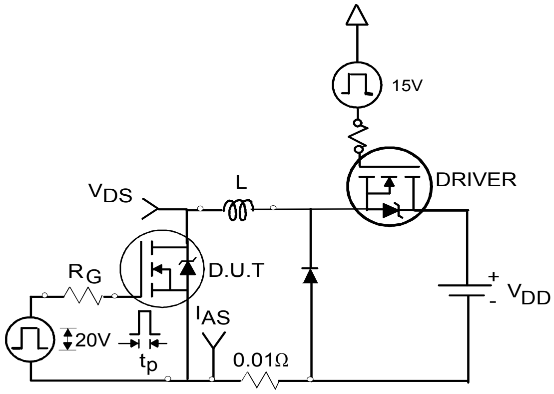


Fig 12a. Unclamped Inductive Test Circuit

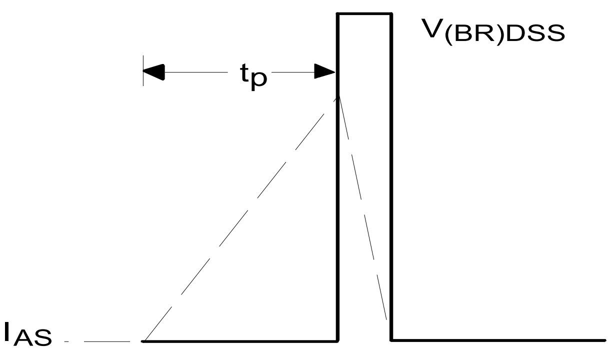


Fig 12b. Unclamped Inductive Waveforms

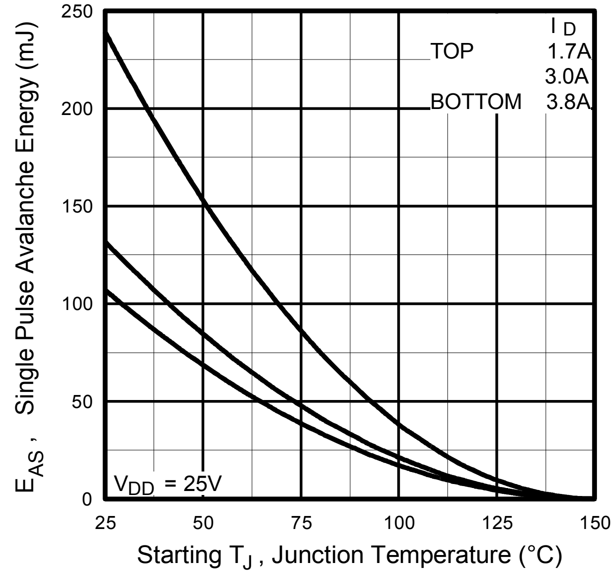
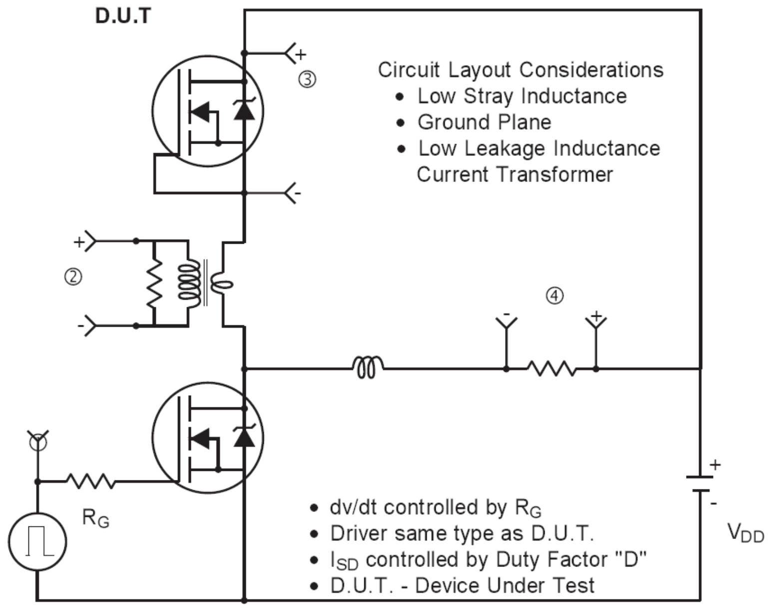
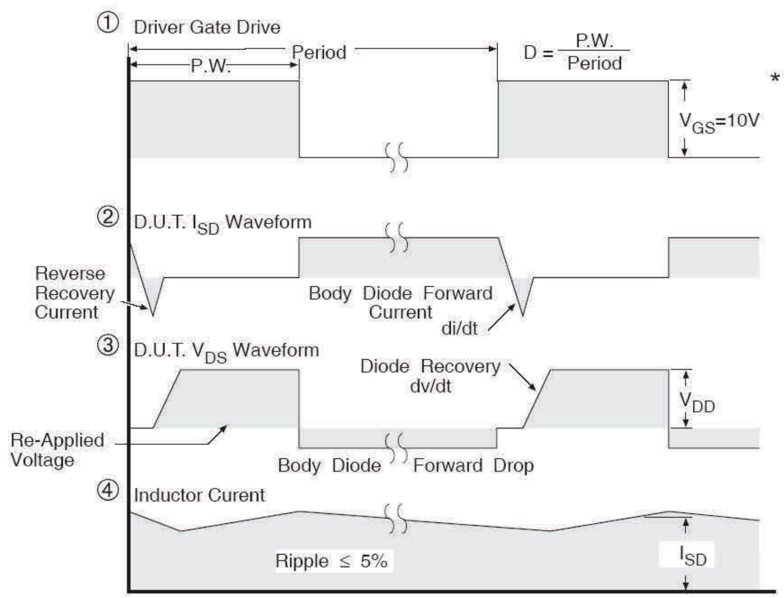


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

Peak Diode Recovery dv/dt Test Circuit

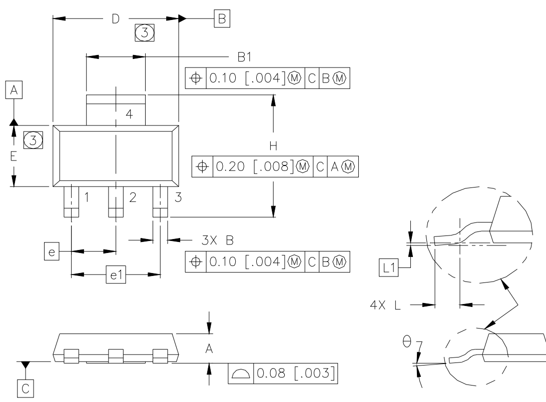




* V_{GS} = 5V for Logic Level Devices

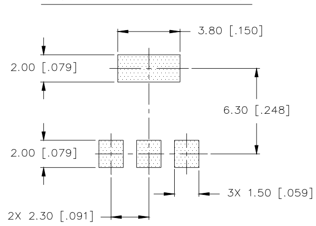
Fig 13. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

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



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.55	1.80	.061	.071
B	0.65	0.85	.026	.033
B1	2.95	3.15	.116	.124
C	0.25	0.35	.010	.014
D	6.30	6.70	.248	.264
E	3.30	3.70	.130	.146
e	2.30	BSC	.0905	BSC
e1	4.60	BSC	.181	BSC
H	6.71	7.29	.264	.287
L	0.91	—	.036	—
L1	0.061	BSC	.0024	BSC
θ	—	10°	—	10°

MINIMUM RECOMMENDED FOOTPRINT



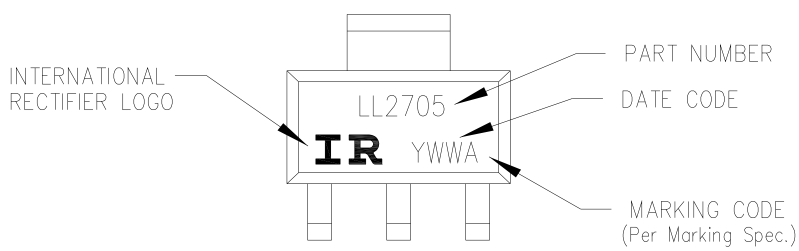
LEAD ASSIGNMENTS

1 = GATE
2 = DRAIN
3 = SOURCE
4 = DRAIN

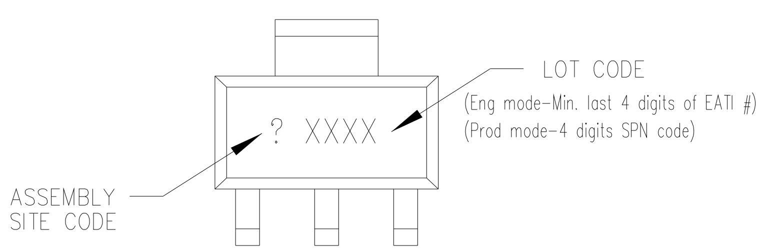
NOTES:

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS DO NOT INCLUDE MOLD FLASH.
4. OUTLINE CONFORMS TO JEDEC OUTLINE TO-261AA.
5. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].

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



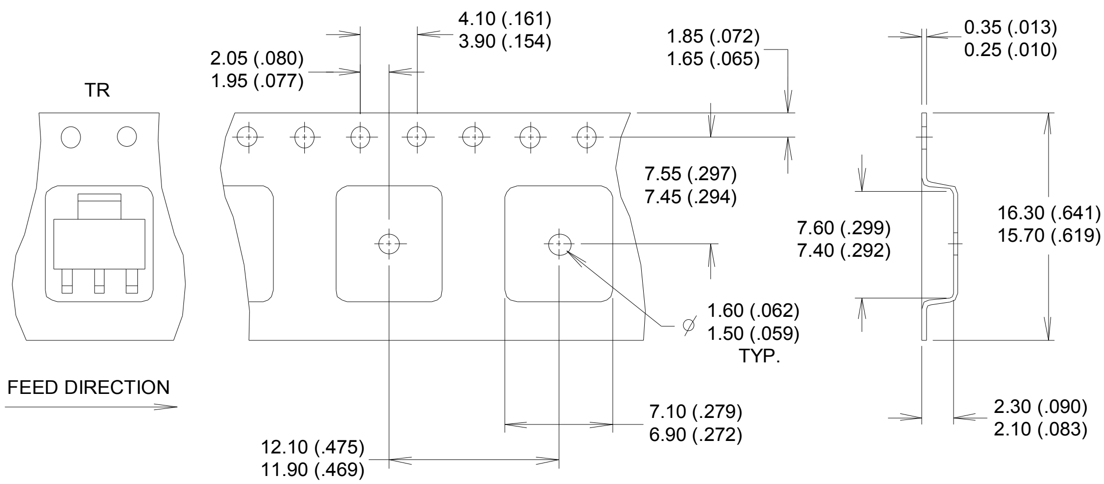
TOP MARKING



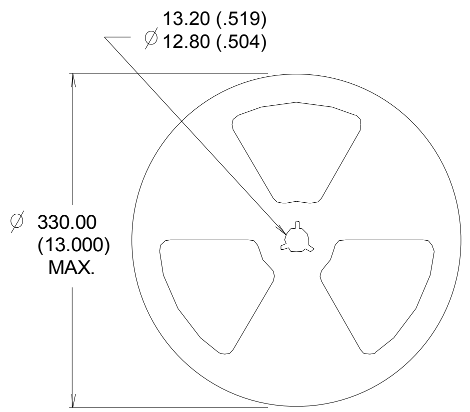
BOTTOM MARKING

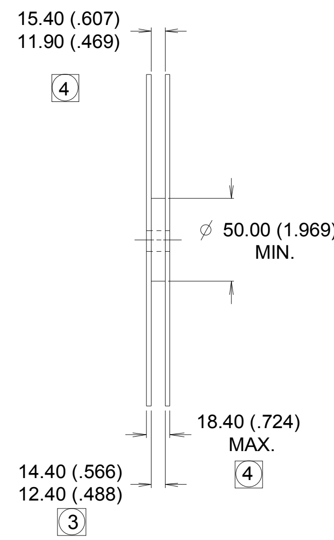
Note: For the most current drawing please refer to IR website at http://www.irf.com/package/

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 Ø330.00 (13.00) REEL CONTAINS 2,500 DEVICES.





NOTES :
1. OUTLINE CONFORMS 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

Qualification Level		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.	
Moisture Sensitivity Level		SOT-223	MSL1
ESD	Machine Model	Class M2 (+/- 200V)† AEC-Q101-002	
	Human Body Model	Class H1B (+/- 750V)† AEC-Q101-001	
	Charged Device Model	Class C5 (+/- 1125V)† AEC-Q101-005	
RoHS Compliant		Yes	

† Highest passing voltage.

Revision History

Date	Comments
3/26/2014	• Added "Logic Level Gate Drive" bullet in the features section on page 1 • Updated part marking on page 8 • Updated data sheet with new IR corporate template
10/29/2015	• Updated datasheet with corporate template • Corrected ordering table on page 1.

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