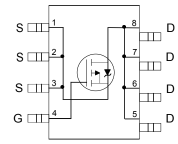
Features

- Advanced Process Technology
- Low On-Resistance
- Logic Level Gate Drive
- P Channel MOSFET
- Dynamic dv/dt Rating
- 150°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Lead-Free, RoHS Compliant
- Automotive Qualified *



Top View

V_{DSS}	-30V
$R_{DS(on)}$ max.	0.02Ω
I_D	-10A


SO-8
AUIRF7416Q

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	
AUIRF7416Q	SO-8	Tape and Reel	4000	AUIRF7416QTR

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	-10	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ -10V	-7.1	
I_{DM}	Pulsed Drain Current ①	-45	
P_D @T_A = 25°C	Maximum Power Dissipation	2.5	W
	Linear Derating Factor	0.02	mW°/C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy (Thermally Limited) ②	370	mJ
dv/dt	Peak Diode Recovery dv/dt ③	-5.0	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 ⑤	——	50	°C/W

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

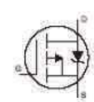
Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-30	—	—	V	V_{GS} = 0V, I_D = -250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	-0.024	—	V/°C	Reference to 25°C, I_D = -1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.020	Ω	V_{GS} = -10V, I_D = -5.6A ④
		—	—	0.035		V_{GS} = -4.5V, I_D = -2.8A ④
$V_{GS(th)}$	Gate Threshold Voltage	-1.0	—	-2.04	V	V_{DS} = V_{GS}, I_D = -250µA
gfs	Forward Trans conductance	5.6	—	—	S	V_{DS} = -10V, I_D = -2.8A
I_{DSS}	Drain-to-Source Leakage Current	—	—	-1.0	µA	V_{DS} = -24V, V_{GS} = 0V
		—	—	-25		V_{DS} = -24V,V_{GS} = 0V,T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	—	—	-100	nA	V_{GS} = -20V
	Gate-to-Source Reverse Leakage	—	—	100		V_{GS} = 20V

Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

Q_g	Total Gate Charge	—	61	92	nC	I_D = -5.6A
Q_{gs}	Gate-to-Source Charge	—	8.0	12		V_{DS} = -24V
Q_{gd}	Gate-to-Drain Charge	—	22	32		V_{GS} = -10V, See Fig.6 & 9 ④
$t_{d(on)}$	Turn-On Delay Time	—	18	—	ns	V_{DD} = -15V
t_r	Rise Time	—	49	—		I_D = -5.6A
$t_{d(off)}$	Turn-Off Delay Time	—	59	—		R_G = 6.2Ω
t_f	Fall Time	—	60	—		R_D = 2.7Ω , See Fig.10 ④
C_{iss}	Input Capacitance	—	1700	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	890	—		V_{DS} = -25V
C_{rss}	Reverse Transfer Capacitance	—	410	—		f = 1.0MHz, See Fig.5

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	-3.1	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	-45		
V_{SD}	Diode Forward Voltage	—	—	-1.0	V	T_J = 25°C,I_S = -5.6A,V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	56	85	ns	T_J = 25°C ,I_F = -5.6A,
Q_{rr}	Reverse Recovery Charge	—	99	150	nC	di/dt = 100A/µs ④

Notes:
① Repetitive rating; pulse width limited by max. junction temperature. (See Fig. 11)
② Starting T_J = 25°C, L = 25mH, R_G = 25Ω, I_{AS} = -5.6A. (See Fig. 12)
③ $I_{SD} \leq$ -5.6A, di/dt ≤ 100A/µs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 150°C.
④ Pulse width ≤ 300µs; duty cycle ≤ 2%.
⑤ Surface mounted on FR-4 board , t ≤ 10sec.

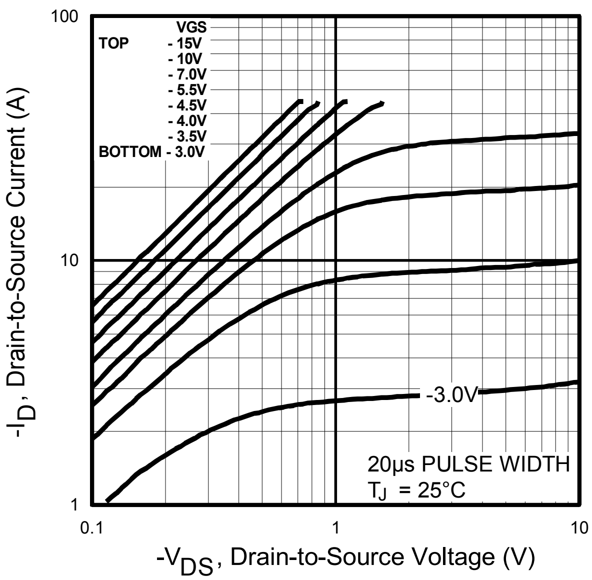


Fig. 1 Typical Output Characteristics

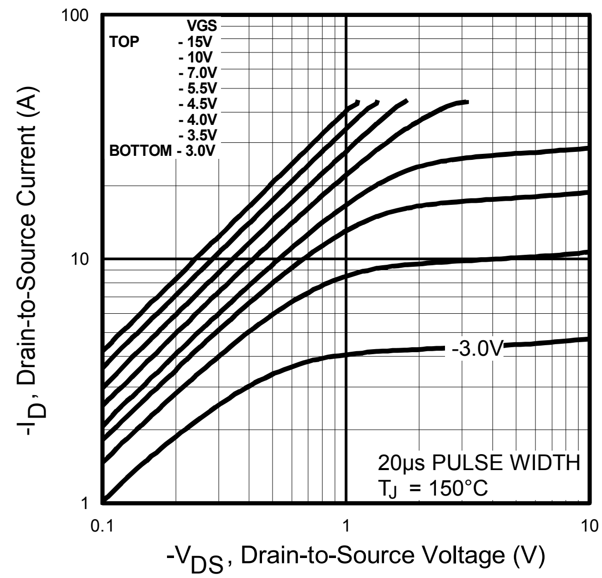


Fig. 2 Typical Output Characteristics

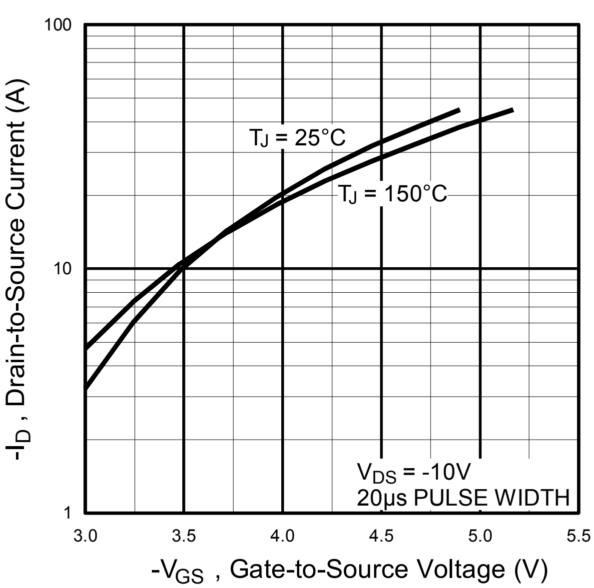


Fig. 3 Typical Transfer Characteristics

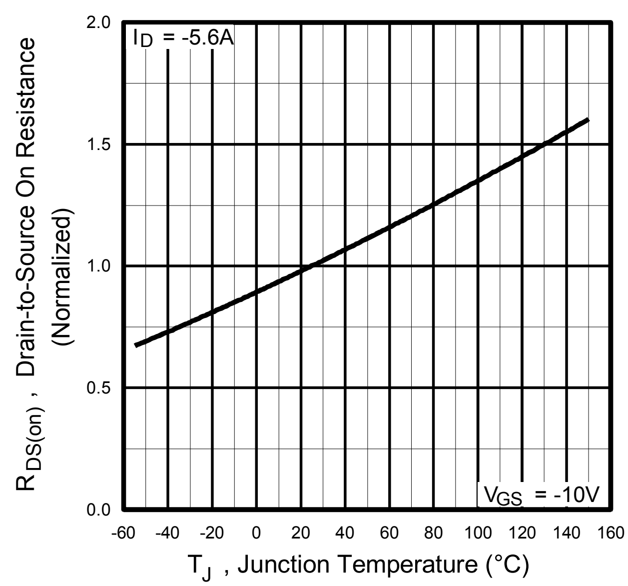


Fig. 4 Normalized On-Resistance Vs. Temperature

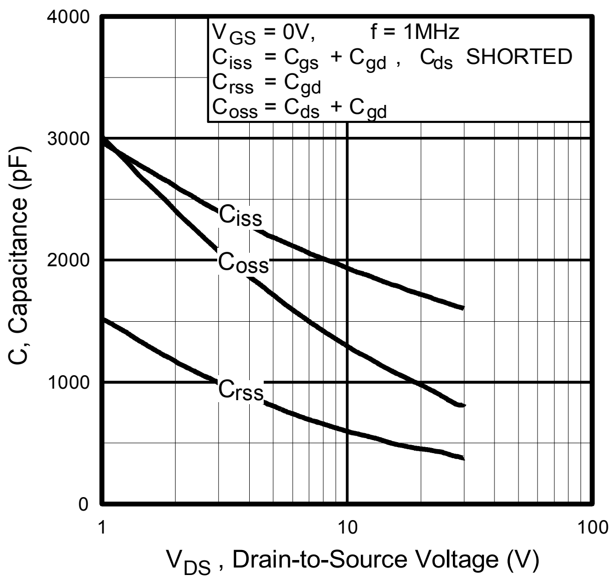


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

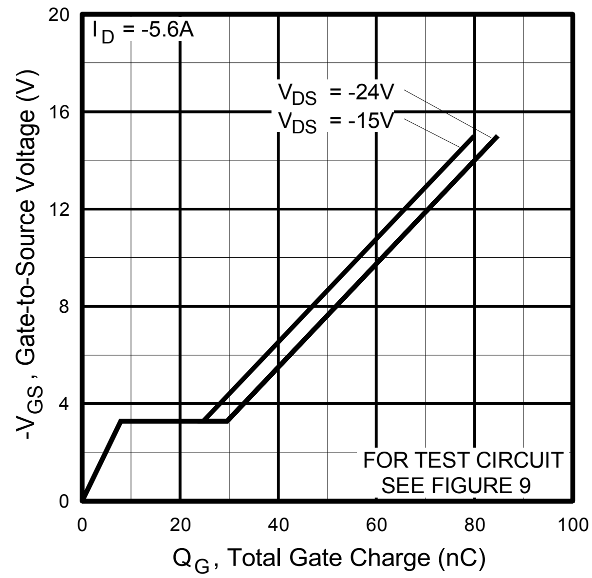


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

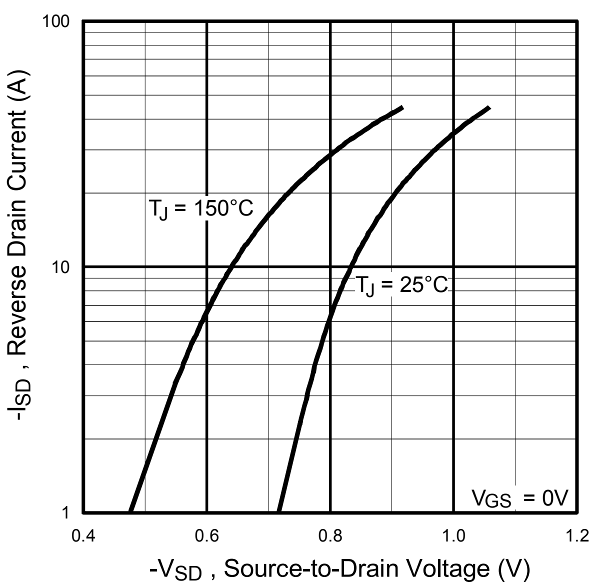


Fig. 7 Typical Source-Drain Diode Forward Voltage

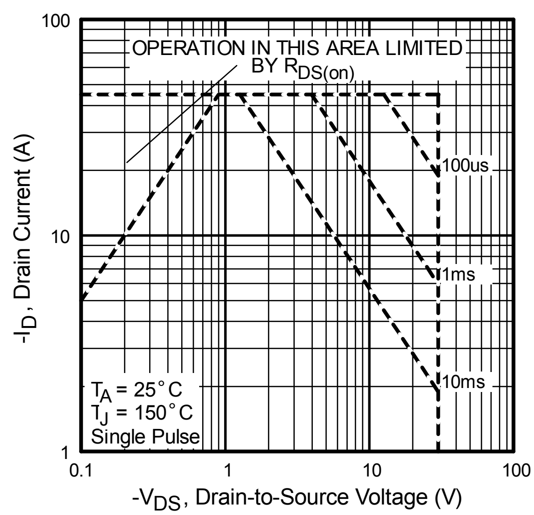


Fig 8. Maximum Safe Operating Area

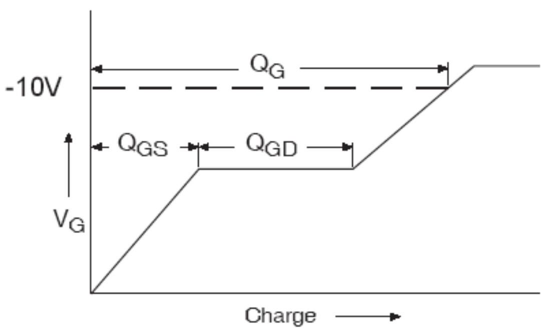


Fig 9a. Gate Charge Waveform

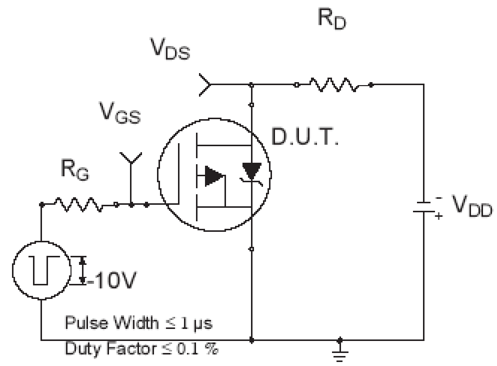


Fig 10a. Switching Time Test Circuit

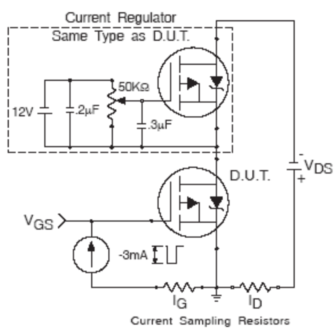


Fig 9b. Gate Charge Test Circuit

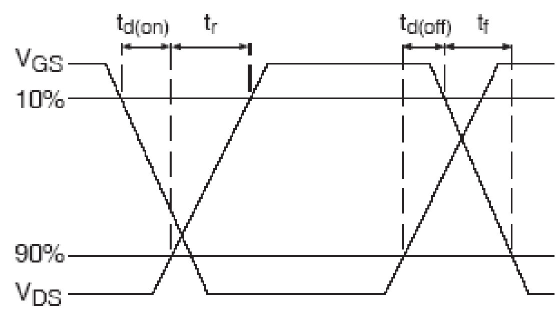


Fig 10b. Switching Time Waveforms

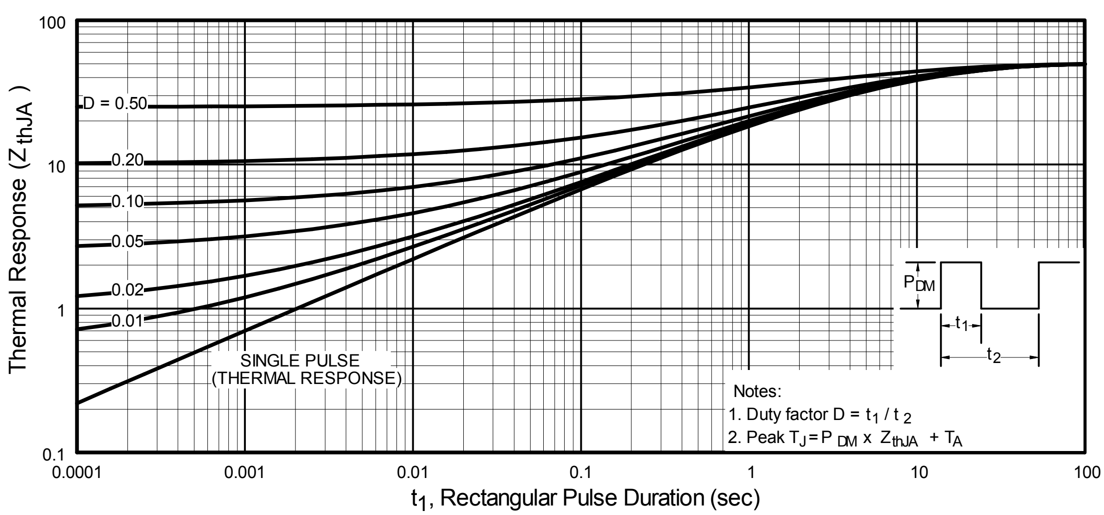


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

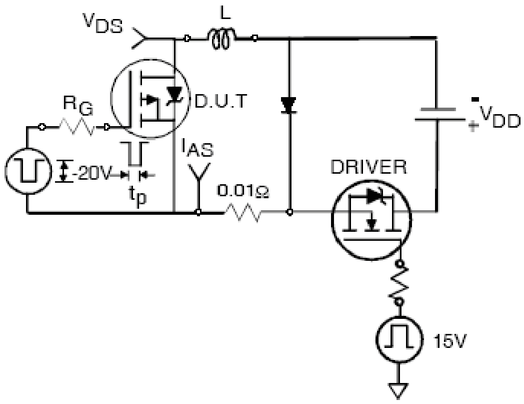


Fig 12a. Unclamped Inductive Test Circuit

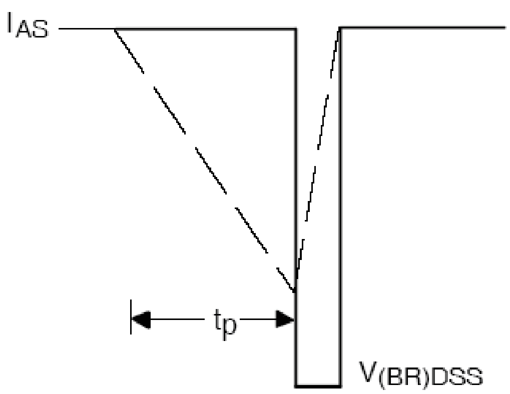


Fig 12b. Unclamped Inductive Waveforms

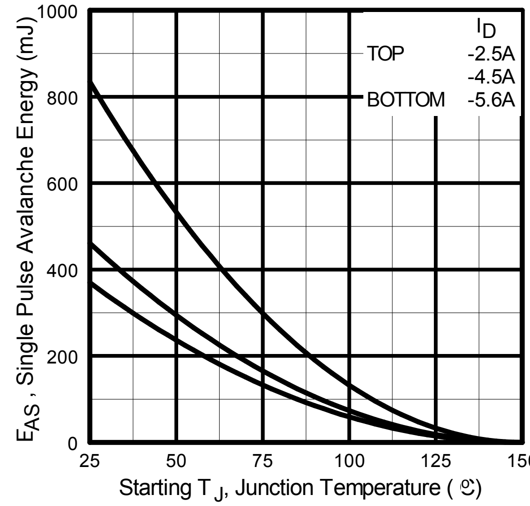


Fig 12c. Maximum Avalanche Energy vs. Drain Current

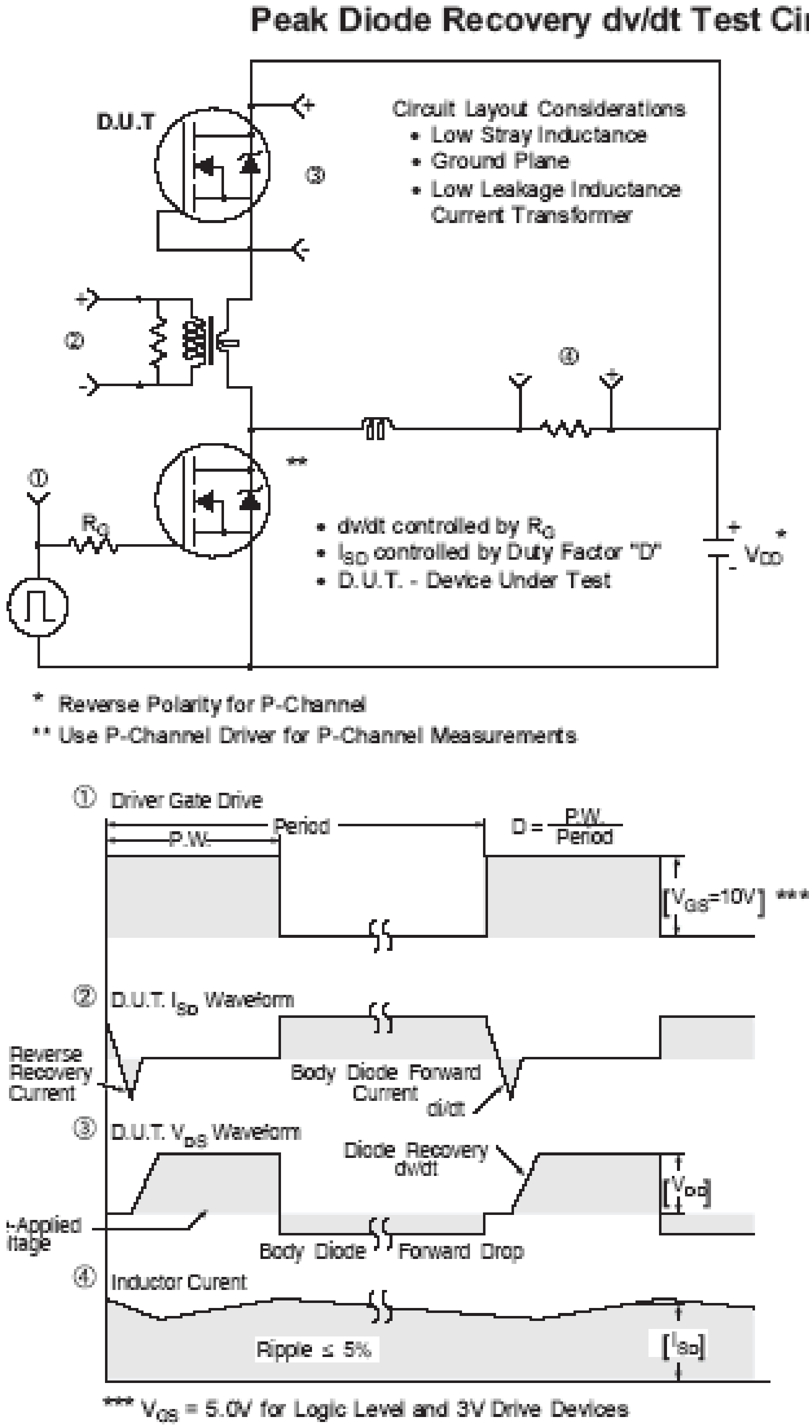
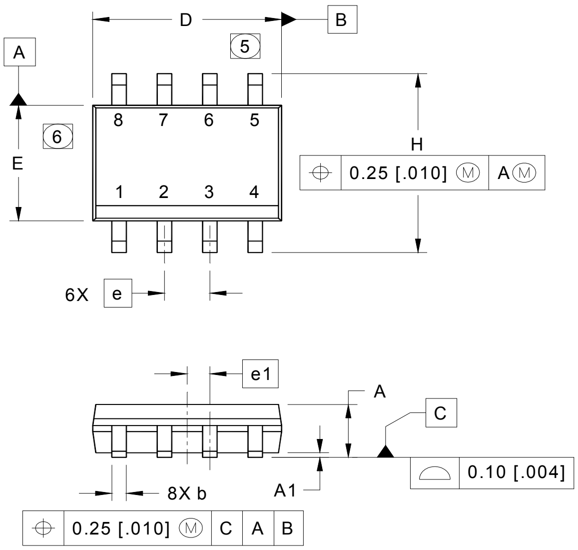
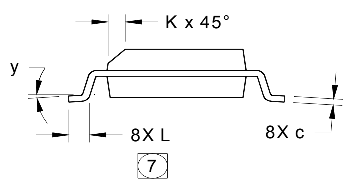


Fig 13. Peak Diode Recovery dv/dt Test Circuit for P-Channel HEXFET® Power MOSFETs

SO-8 Package Outline (Dimensions are shown in millimeters (inches))

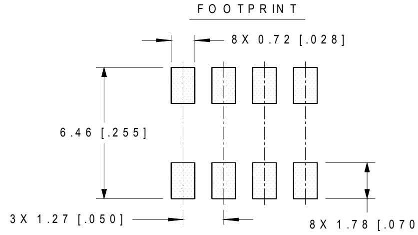


DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e 1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40	1.27
y	0°	8°	0°	8°

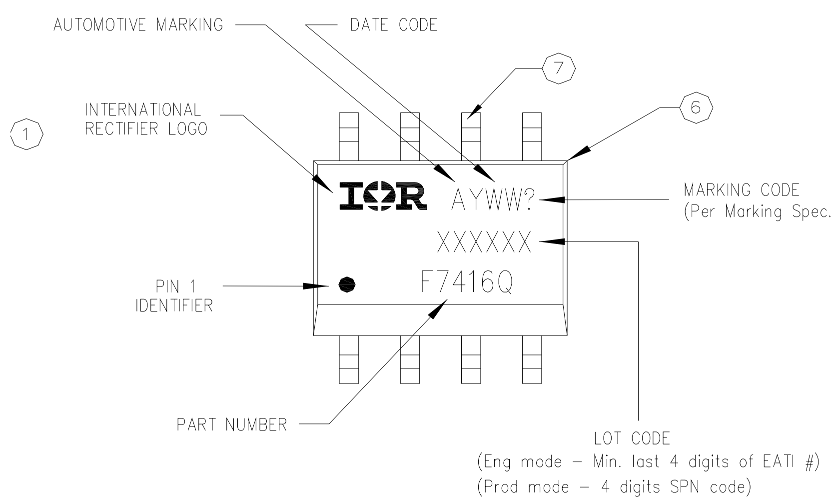


NOTES:
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [.006].
6. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [.010].
7. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

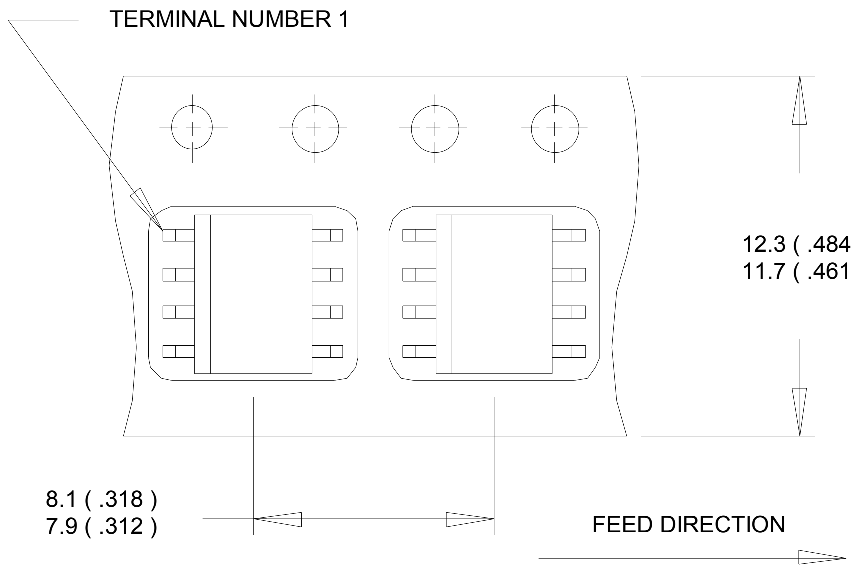
FOOTPRINT



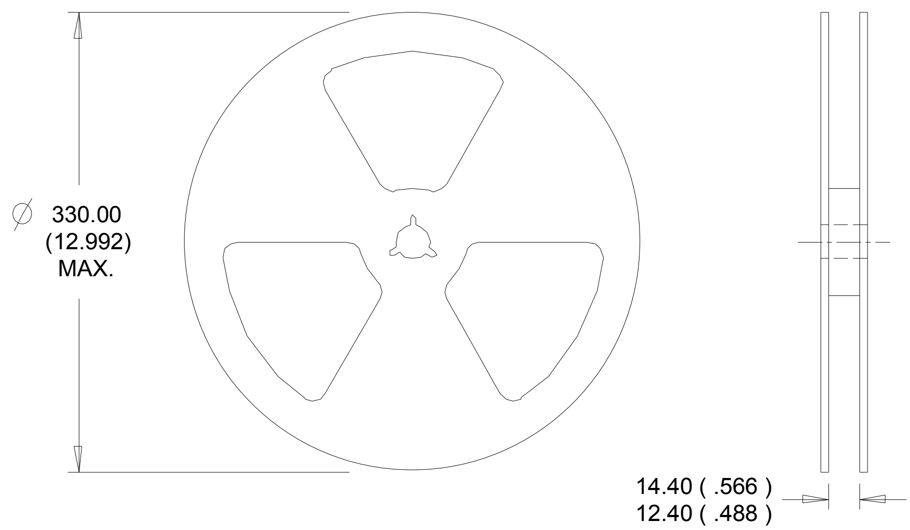
SO-8 Part Marking Information



SO-8 Tape and Reel (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. CONTROLLING DIMENSION : MILLIMETER.
2. OUTLINE CONFORMS TO EIA-481 & EIA-541.

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		SO-8	MSL1
ESD	Machine Model	Class M4 (+/- 425V)† AEC-Q101-002	
	Human Body Model	Class H1B (+/- 1000V)† AEC-Q101-001	
	Charged Device Model	Class C5 (+/- 1125V)† AEC-Q101-005	
RoHS Compliant		Yes	

† Highest passing voltage.

Revision History

Date	Comments
3/27/2014	• Added "Logic Level Gate Drive" bullet in the features section on page 1 • Updated part marking on page 6. • Updated data sheet with new IR corporate template
9/30/2015	• Updated datasheet with corporate template • Corrected ordering table on page 1.

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