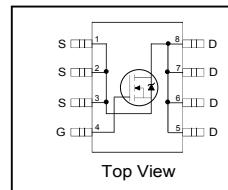


Features

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



V_{DSS}	60V
$R_{DS(on)}$ typ.	20mΩ
max.	
I_D	7.0A



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	
AUIRF7478Q	SO-8	Tape and Reel	4000	AUIRF7478QTR

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
V_{DS}	Drain-Source Voltage	60	V
I_D @ $T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	7.0	A
I_D @ $T_A = 70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	5.6	
I_{DM}	Pulsed Drain Current ①	56	
P_D @ $T_A = 25^\circ\text{C}$	Maximum Power Dissipation ④	2.5	W
	Linear Derating Factor	0.02	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy (Thermally Limited) ②	140	mJ
I_{AR}	Avalanche Current ①	4.2	A
dv/dt	Peak Diode Recovery dv/dt ⑥	3.7	V/ns
T_J	Operating Junction and	-55 to + 150	°C
T_{STG}	Storage Temperature Range		

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead	—	20	°C/W
$R_{\theta JA}$	Junction-to-Ambient ④	—	50	

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

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

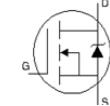
	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(\text{BR})\text{DSS}}$	Drain-to-Source Breakdown Voltage	60	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
$\Delta V_{(\text{BR})\text{DSS}}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.065	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = 1\text{mA}$
$R_{DS(\text{on})}$	Static Drain-to-Source On-Resistance	—	20	26	$\text{m}\Omega$	$V_{GS} = 10\text{V}, I_D = 4.2\text{A}$ ③
		—	23	30		$V_{GS} = 4.5\text{V}, I_D = 3.5\text{A}$ ③
$V_{GS(\text{th})}$	Gate Threshold Voltage	1.0	—	3.0	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
g_{fs}	Forward Trans conductance	17	—	—	S	$V_{DS} = 50\text{V}, I_D = 4.2\text{A}$
I_{DSS}	Drain-to-Source Leakage Current	—	—	20	μA	$V_{DS} = 48\text{V}, V_{GS} = 0\text{V}$
		—	—	100		$V_{DS} = 48\text{V}, V_{GS} = 0\text{V}, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20\text{V}$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20\text{V}$

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

Q_g	Total Gate Charge	—	21	31	nC	$I_D = 4.2\text{A}$ $V_{DS} = 48\text{V}$ $V_{GS} = 4.5\text{V}$
Q_{gs}	Gate-to-Source Charge	—	4.3	—		
Q_{qd}	Gate-to-Drain Charge	—	9.6	—		
$t_{d(on)}$	Turn-On Delay Time	—	7.7	—	ns	$V_{DD} = 30\text{V}$ $I_D = 4.2\text{A}$ $R_G = 6.2\Omega$ $V_{GS} = 10\text{V}$ ③
t_r	Rise Time	—	2.6	—		
$t_{d(off)}$	Turn-Off Delay Time	—	44	—		
t_f	Fall Time	—	13	—		
C_{iss}	Input Capacitance	—	1740	—	pF	$V_{GS} = 0\text{V}$ $V_{DS} = 25\text{V}$ $f = 1.0\text{MHz}$
C_{oss}	Output Capacitance	—	300	—		$V_{GS} = 0\text{V}, V_{DS} = 1.0\text{V}, f = 1.0\text{MHz}$
C_{rss}	Reverse Transfer Capacitance	—	37	—		$V_{GS} = 0\text{V}, V_{DS} = 48\text{V}, f = 1.0\text{MHz}$
C_{oss}	Output Capacitance	—	1590	—		$V_{GS} = 0\text{V}, V_{DS} = 0\text{V to } 48\text{V}$ ⑤
C_{oss}	Output Capacitance	—	220	—		
C_{oss}	Output Capacitance	—	410	—		

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_s	Continuous Source Current (Body Diode)	—	—	2.3	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{sM}	Pulsed Source Current (Body Diode) ①	—	—	56		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_s = 4.2\text{A}, V_{GS} = 0\text{V}$ ③
t_{rr}	Reverse Recovery Time	—	52	78	ns	$T_J = 25^\circ\text{C}, I_F = 4.2\text{A},$ $di/dt = 100\text{A}/\mu\text{s}$ ③
Q_{rr}	Reverse Recovery Charge	—	100	150	nC	


Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^\circ\text{C}$, $L = 16\text{mH}$, $R_G = 25\Omega$, $I_{AS} = 4.2\text{A}$.
- ③ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- ④ When mounted on 1" in square copper board.
- ⑤ C_{oss} eff. is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS} .
- ⑥ $I_{SD} \leq 4.2\text{A}$, $di/dt \leq 160\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(\text{BR})\text{DSS}}$, $T_J \leq 150^\circ\text{C}$.

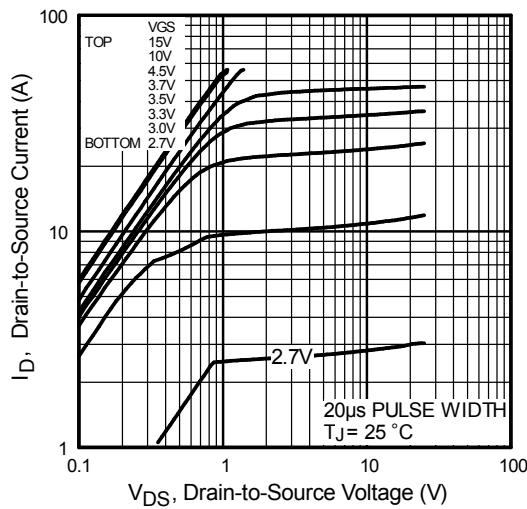


Fig. 1 Typical Output Characteristics

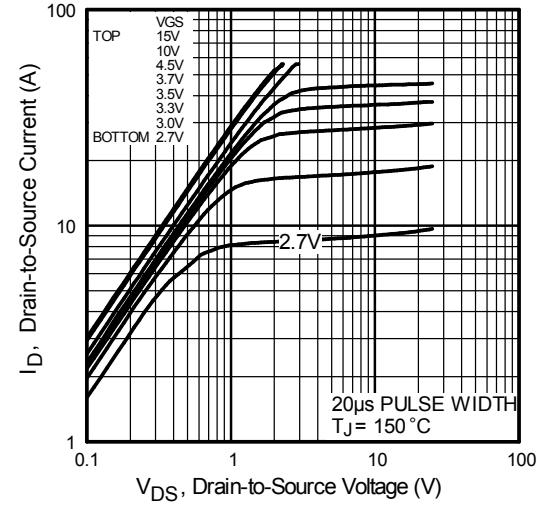


Fig. 2 Typical Output Characteristics

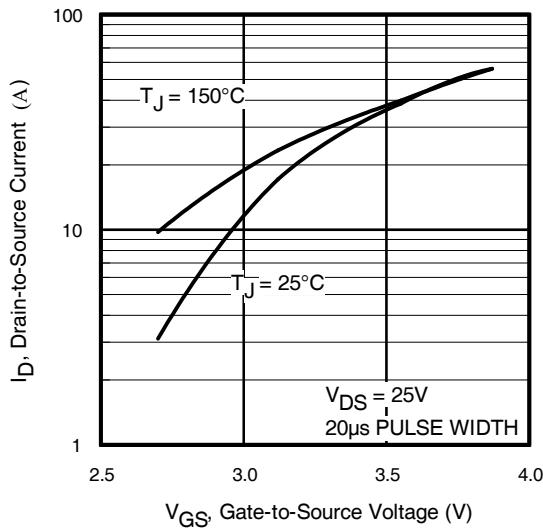


Fig. 3 Typical Transfer Characteristics

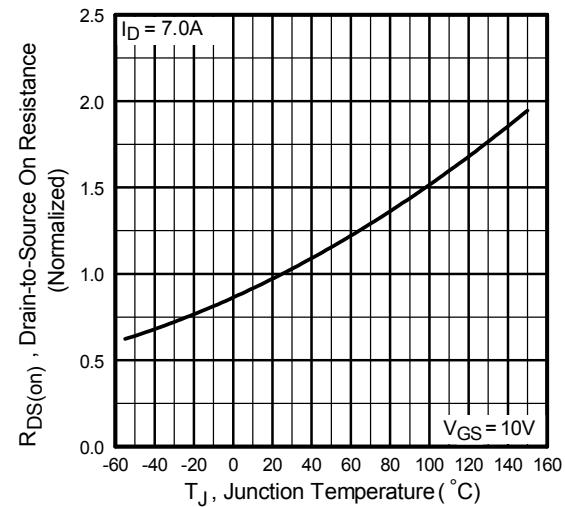


Fig. 4 Normalized On-Resistance vs. Temperature

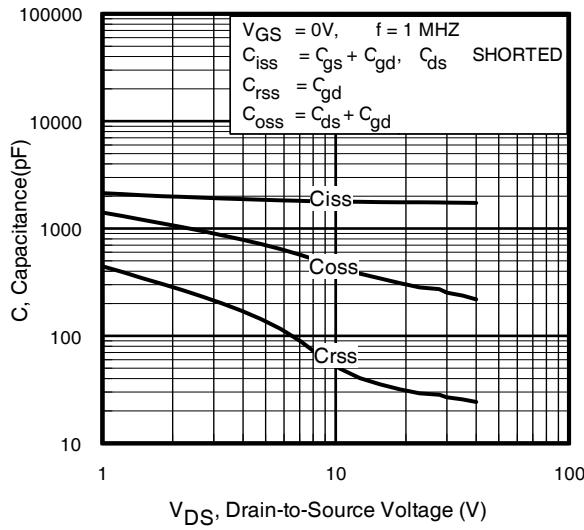


Fig 5. Typical Capacitance vs.
Drain-to-Source Voltage

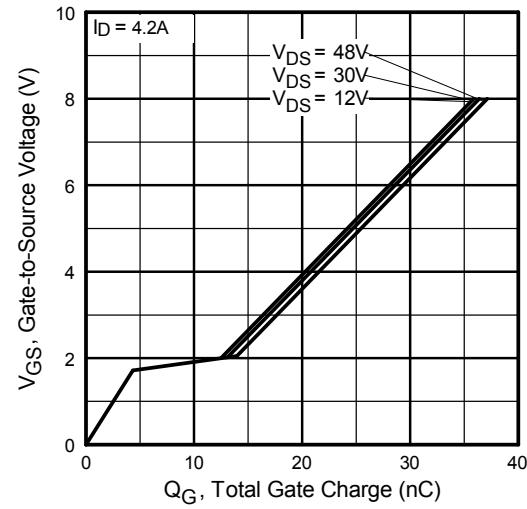


Fig 6. Typical Gate Charge vs.
Gate-to-Source Voltage

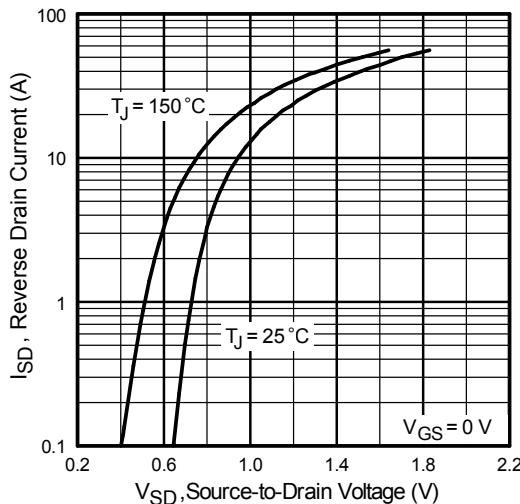


Fig. 7 Typical Source-to-Drain Diode
Forward Voltage

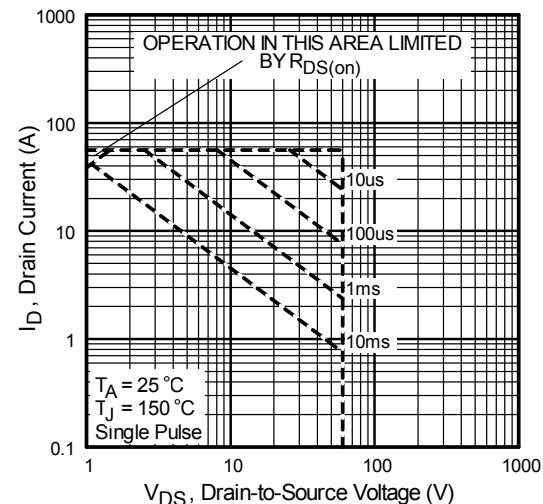


Fig 8. Maximum Safe Operating Area

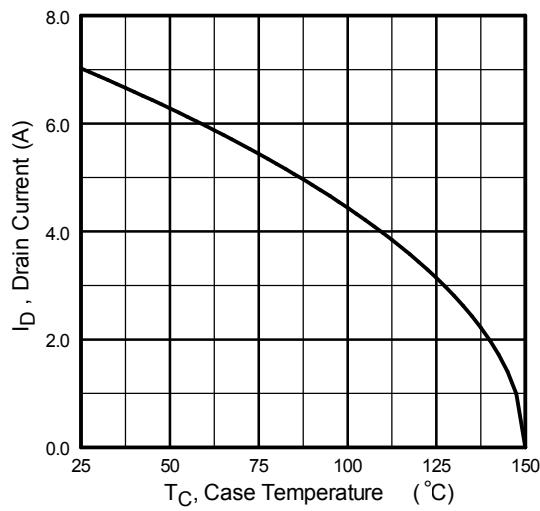


Fig 9. Maximum Drain Current vs. Case Temperature

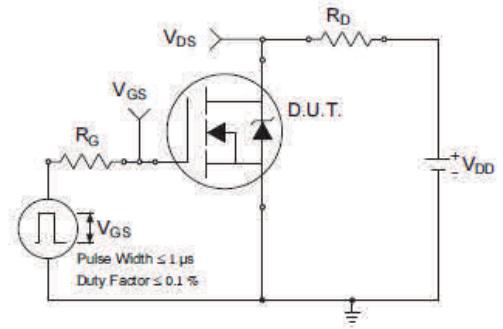


Fig 10a. Switching Time Test Circuit

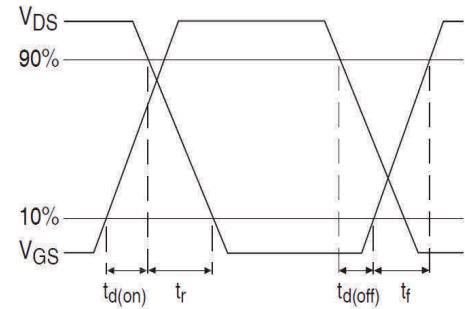


Fig 10b. Switching Time Waveforms

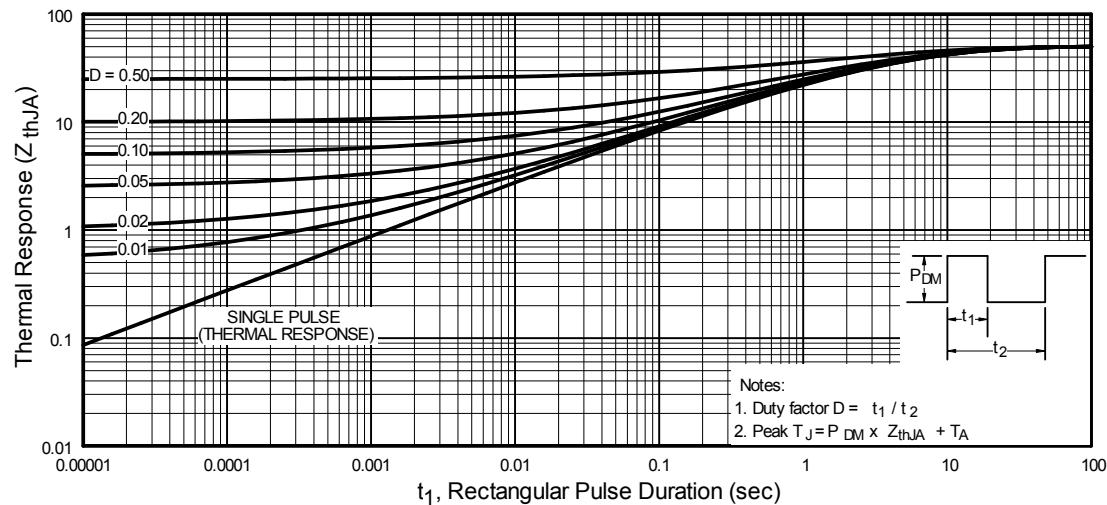


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

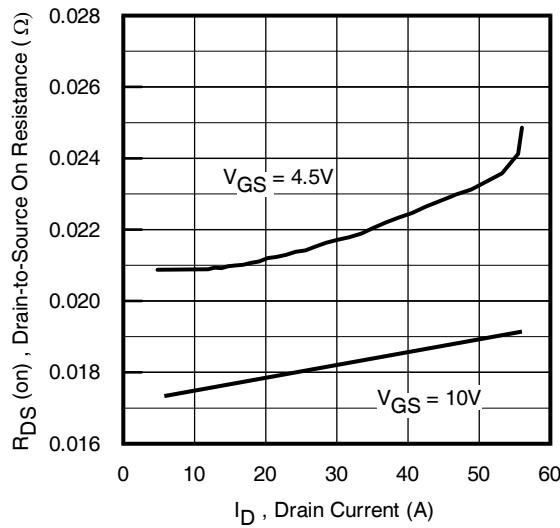


Fig 12. Typical On-Resistance Vs.
Drain Current

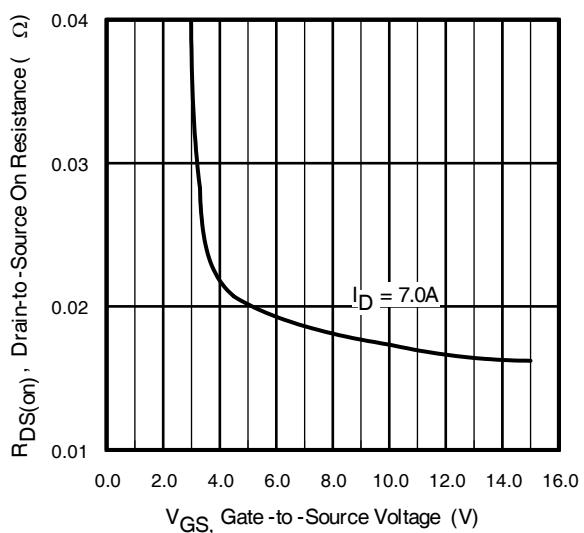


Fig 13. Typical On-Resistance Vs.
Gate Voltage

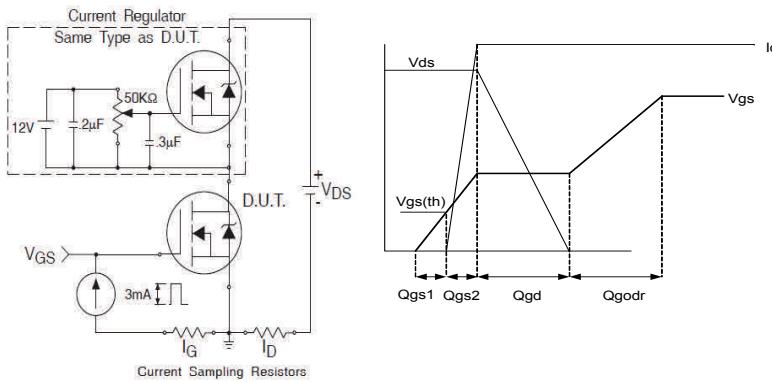


Fig 14a&b. Basic Gate Charge Test Circuit
and Waveform

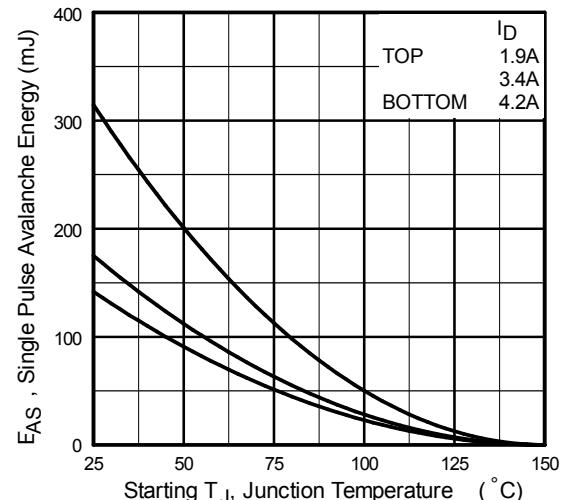


Fig 15c. Maximum Avalanche Energy
Vs. Drain Current

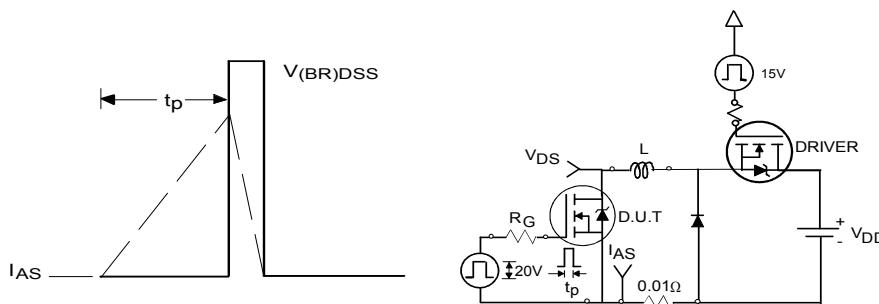
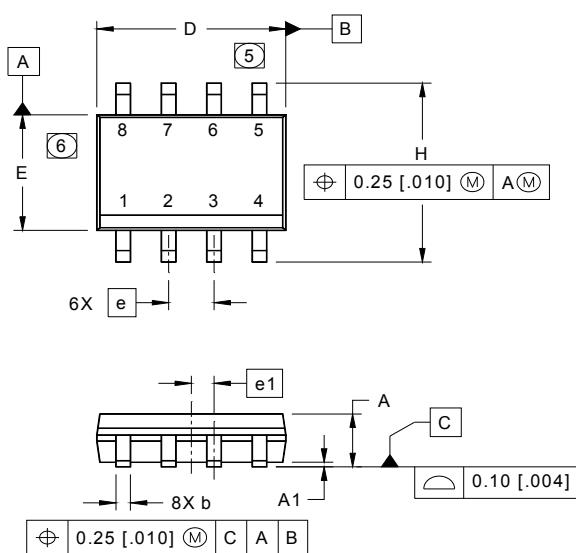
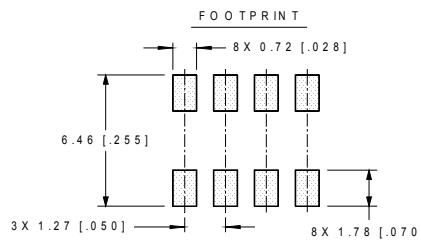
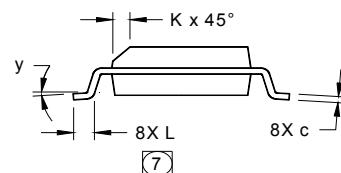


Fig 15a&b. Unclamped Inductive Test circuit
and Waveforms

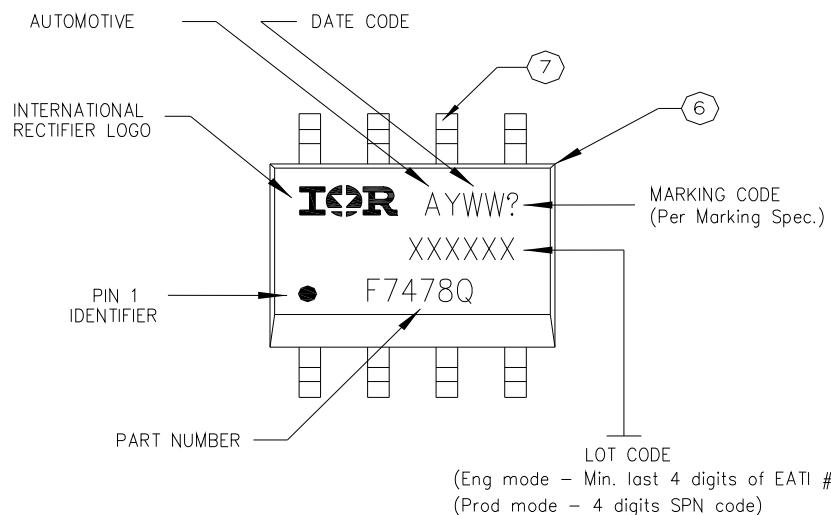
SO-8 Package Outline (Dimensions are shown in millimeters (inches))



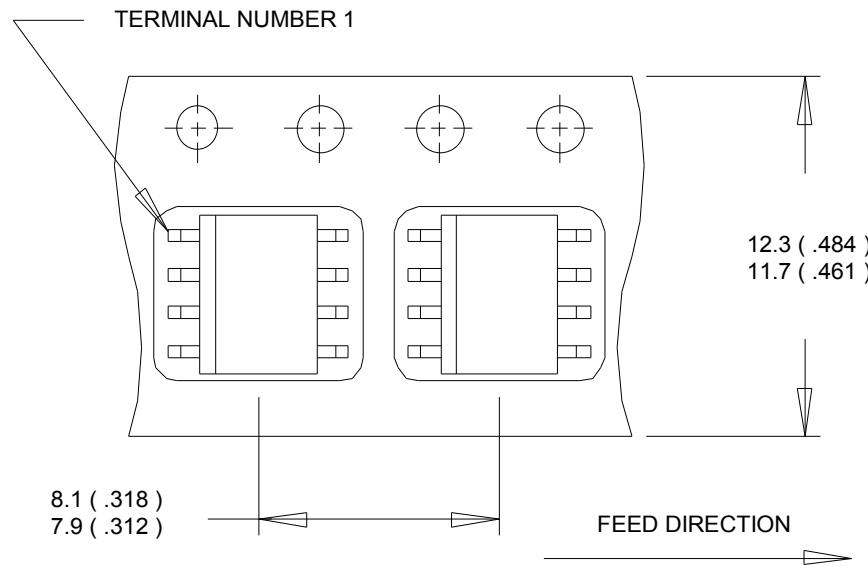
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050	BASIC	1.27	BASIC
e 1	.025	BASIC	0.635	BASIC
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40	1.27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



SO-8 Part Marking Information

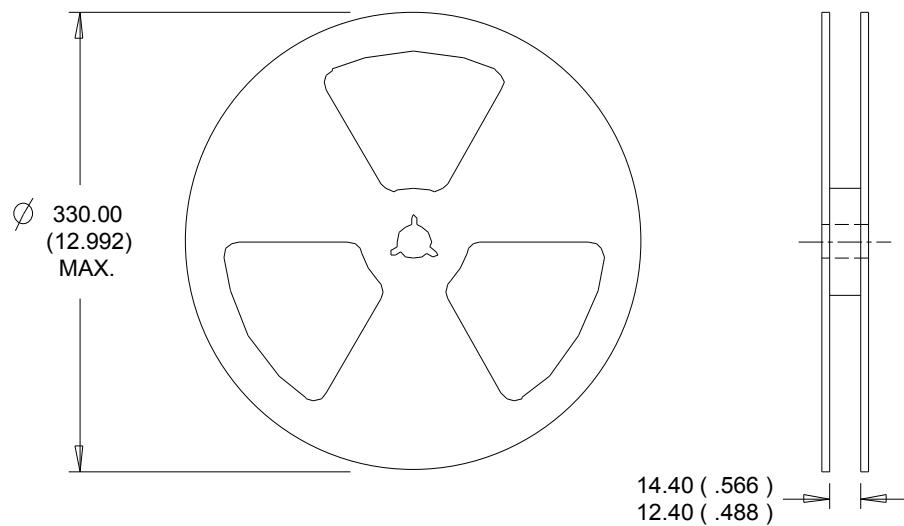


SO-8 Tape and Reel (Dimensions are shown in millimeters (inches))



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 M3 (+/- 300V) [†] AEC-Q101-002	
	Human Body Model	Class H1C (+/- 2000V) [†] AEC-Q101-001	
	Charged Device Model	Class C5 (+/- 2000V) [†] AEC-Q101-005	
RoHS Compliant		Yes	

† Highest passing voltage.

Revision History

Date	Comments
3/11/2014	<ul style="list-style-type: none"> Added "Logic Level Gate Drive" bullet in the features section on page 1 Updated data sheet with new IR corporate template
9/30/2015	<ul style="list-style-type: none"> Updated datasheet with corporate template Corrected ordering table on page 1.

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