

Applications

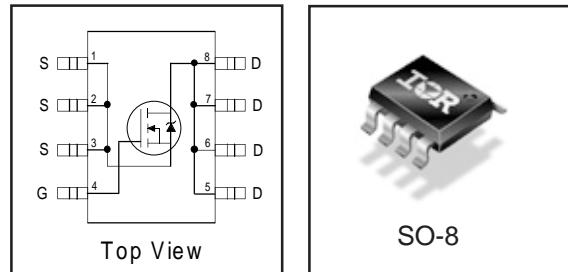
- High Frequency DC-DC Isolated Converters with Synchronous Rectification for Telecom and Industrial use
- High Frequency Buck Converters for Computer Processor Power

HEXFET® Power MOSFET

V_{DSS}	R_{DS(on)} max	I_D
20V	9.0mΩ	12A

Benefits

- Ultra-Low Gate Impedance
- Very Low R_{DS(on)} at 4.5V V_{GS}
- Fully Characterized Avalanche Voltage and Current



Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
V _{DS}	Drain-Source Voltage	20	V
V _{GS}	Gate-to-Source Voltage	± 12	V
I _D @ T _A = 25°C	Continuous Drain Current, V _{GS} @ 10V	12	A
I _D @ T _A = 70°C	Continuous Drain Current, V _{GS} @ 10V	10	
I _{DM}	Pulsed Drain Current①	100	
P _D @ T _A = 25°C	Maximum Power Dissipation③	2.5	W
P _D @ T _A = 70°C	Maximum Power Dissipation③	1.6	W
	Linear Derating Factor	0.02	W/°C
T _J , T _{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
R _{θJL}	Junction-to-Drain Lead	—	20	°C/W
R _{θJA}	Junction-to-Ambient ⑥	—	50	

Notes ① through ④ are on page 8
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IRF7459

International
Rectifier

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	20	—	—	V	$V_{GS} = 0V, I_D = 250\mu\text{A}$
$\Delta V_{(\text{BR})\text{DSS}/\Delta T_J}$	Breakdown Voltage Temp. Coefficient	—	0.024	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(\text{on})}$	Static Drain-to-Source On-Resistance	—	6.7	9.0	$\text{m}\Omega$	$V_{GS} = 10V, I_D = 12\text{A}$ ③
		—	8.0	11		$V_{GS} = 4.5V, I_D = 9.6\text{A}$ ③
		—	11	22		$V_{GS} = 2.8V, I_D = 6.0\text{A}$ ③
$V_{GS(\text{th})}$	Gate Threshold Voltage	0.6	—	2.0	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
I_{DSS}	Drain-to-Source Leakage Current	—	—	20	μA	$V_{DS} = 16V, V_{GS} = 0V$
		—	—	100		$V_{DS} = 16V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	200	nA	$V_{GS} = 12V$
	Gate-to-Source Reverse Leakage	—	—	-200		$V_{GS} = -12V$

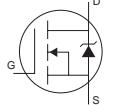
Dynamic @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g_{fs}	Forward Transconductance	32	—	—	S	$V_{DS} = 16V, I_D = 9.6\text{A}$
Q_g	Total Gate Charge	—	23	35	nC	$I_D = 9.6\text{A}$
Q_{gs}	Gate-to-Source Charge	—	6.6	10	nC	$V_{DS} = 10V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	6.3	9.5	nC	$V_{GS} = 4.5V$ ③
Q_{oss}	Output Gate Charge	—	17	26	nC	$V_{GS} = 0V, V_{DS} = 10V$
$t_{d(on)}$	Turn-On Delay Time	—	10	—	ns	$V_{DD} = 10V, I_D = 9.6\text{A}$
t_r	Rise Time	—	4.5	—		$R_G = 1.8\Omega$
$t_{d(off)}$	Turn-Off Delay Time	—	20	—		$V_{GS} = 4.5V$ ③
t_f	Fall Time	—	5.0	—		
C_{iss}	Input Capacitance	—	2480	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	1030	—		$V_{DS} = 10V$
C_{rss}	Reverse Transfer Capacitance	—	130	—		$f = 1.0\text{MHz}$

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	—	290	mJ
I_{AR}	Avalanche Current①	—	12	A

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	2.5	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	100		
V_{SD}	Diode Forward Voltage	—	0.84	1.3	V	$T_J = 25^\circ\text{C}, I_S = 9.6\text{A}, V_{GS} = 0V$ ③
		—	0.69	—		$T_J = 125^\circ\text{C}, I_S = 9.6\text{A}, V_{GS} = 0V$
t_{rr}	Reverse Recovery Time	—	70	105	ns	$T_J = 25^\circ\text{C}, I_F = 9.6\text{A}, V_R = 15V$
Q_{rr}	Reverse Recovery Charge	—	70	105		$di/dt = 100\text{A}/\mu\text{s}$ ③
t_{rf}	Reverse Recovery Time	—	70	105	ns	$T_J = 125^\circ\text{C}, I_F = 9.6\text{A}, V_R = 15V$
Q_{rf}	Reverse Recovery Charge	—	75	113		$di/dt = 100\text{A}/\mu\text{s}$ ③

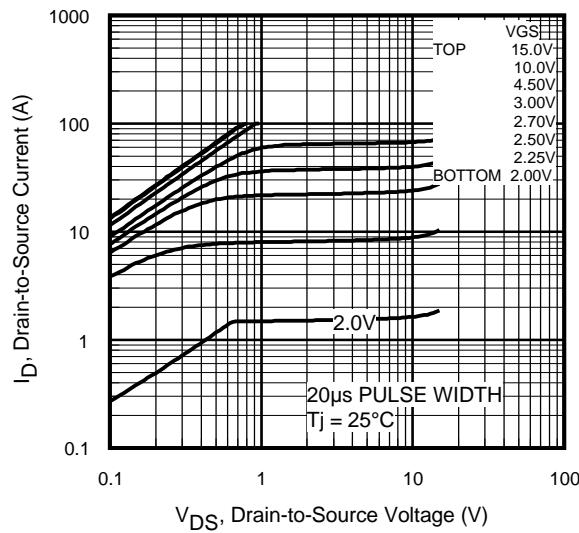


Fig 1. Typical Output Characteristics

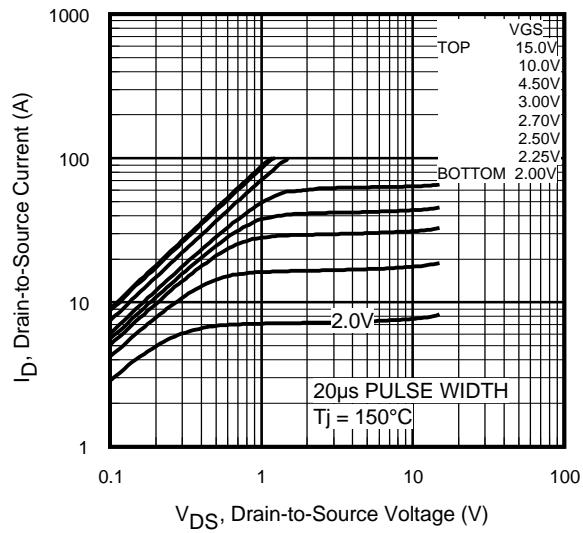


Fig 2. Typical Output Characteristics

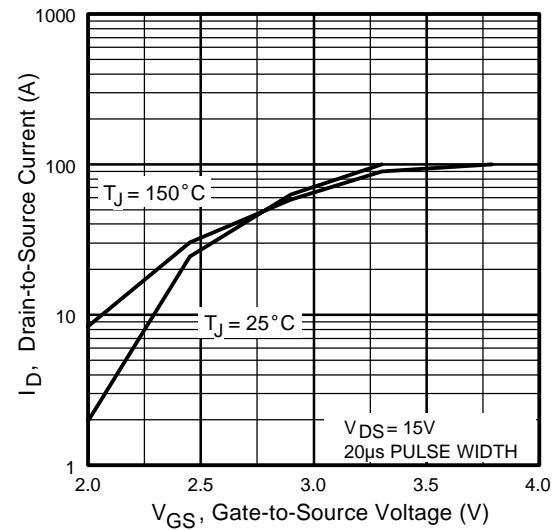


Fig 3. Typical Transfer Characteristics

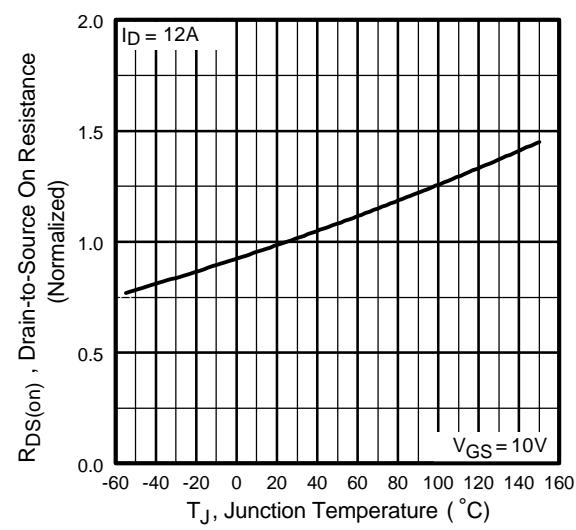


Fig 4. Normalized On-Resistance
Vs. Temperature

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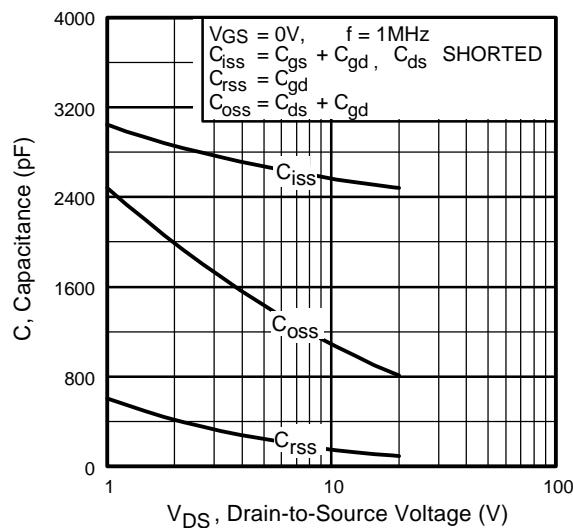


Fig 5. Typical Capacitance Vs.
Drain-to-Source Voltage

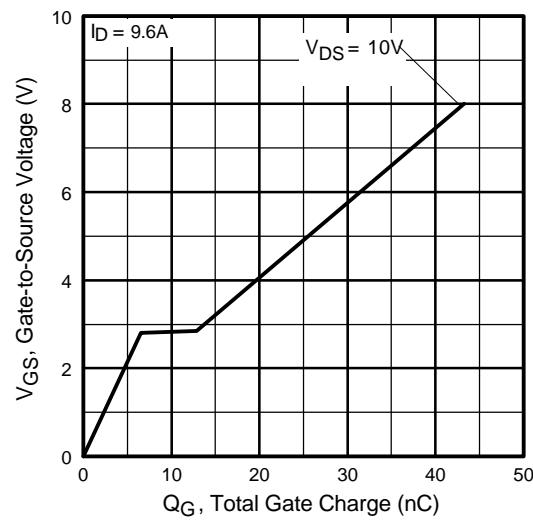


Fig 6. Typical Gate Charge Vs.
Gate-to-Source Voltage

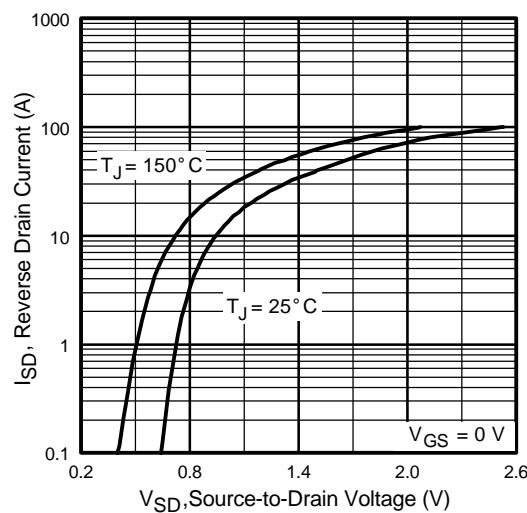


Fig 7. Typical Source-Drain Diode
Forward Voltage

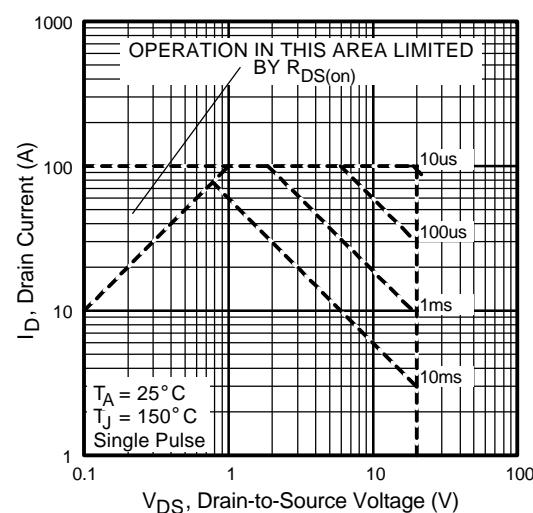


Fig 8. Maximum Safe Operating Area

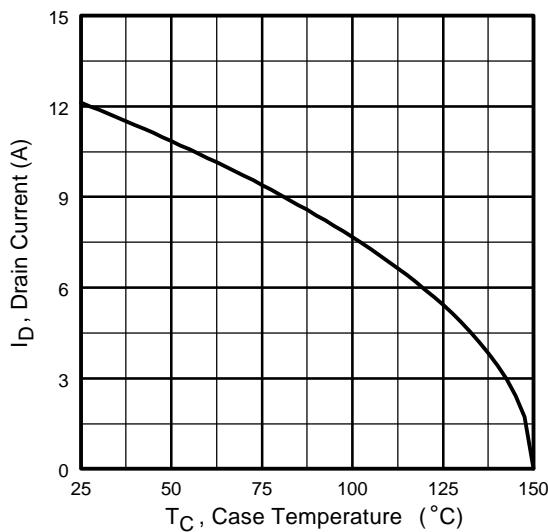


Fig 9. Maximum Drain Current Vs.
Case Temperature

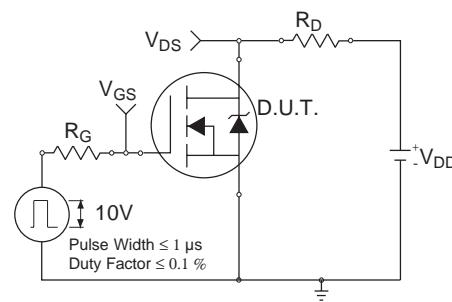


Fig 10a. Switching Time Test Circuit

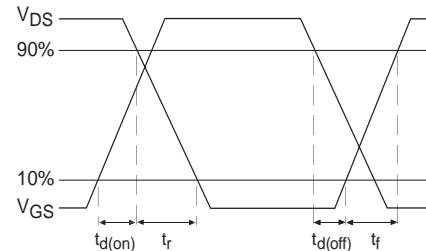


Fig 10b. Switching Time Waveforms

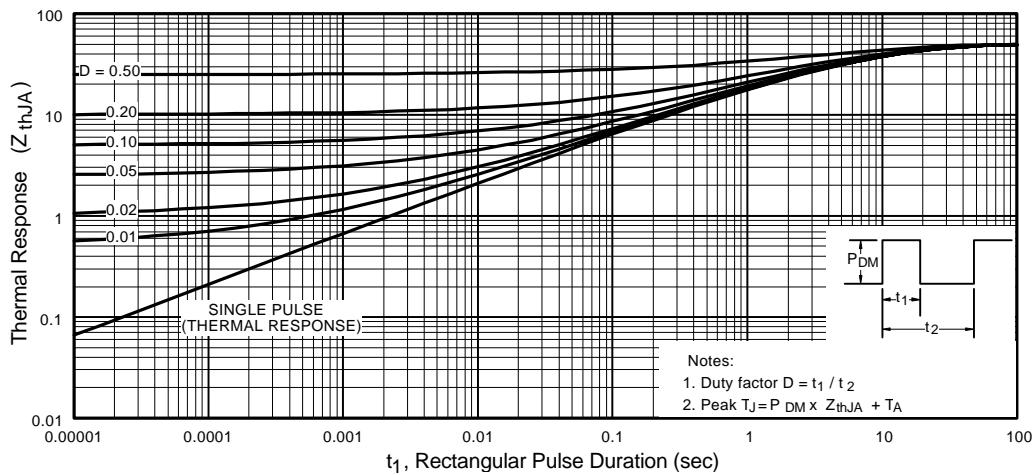
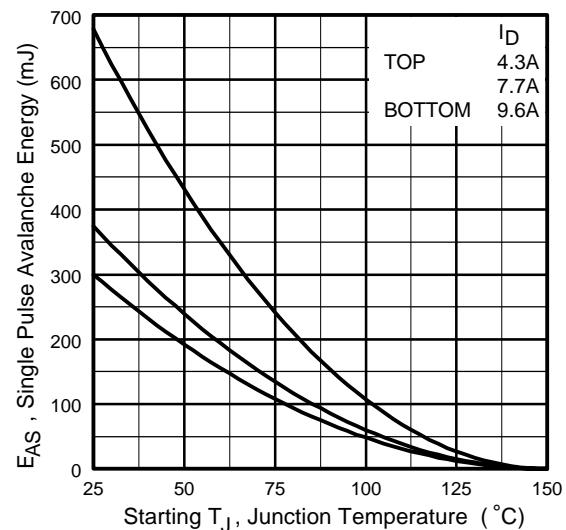
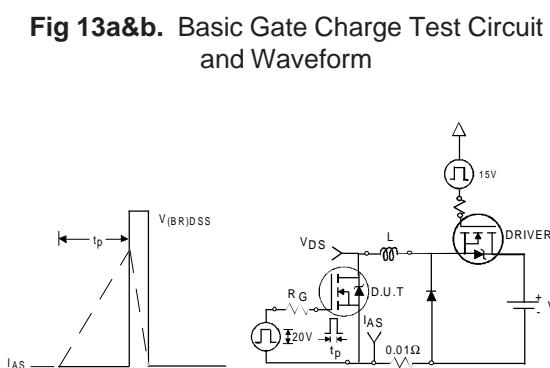
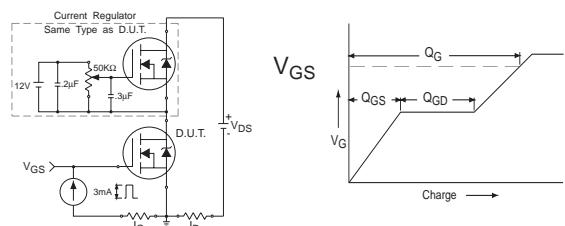
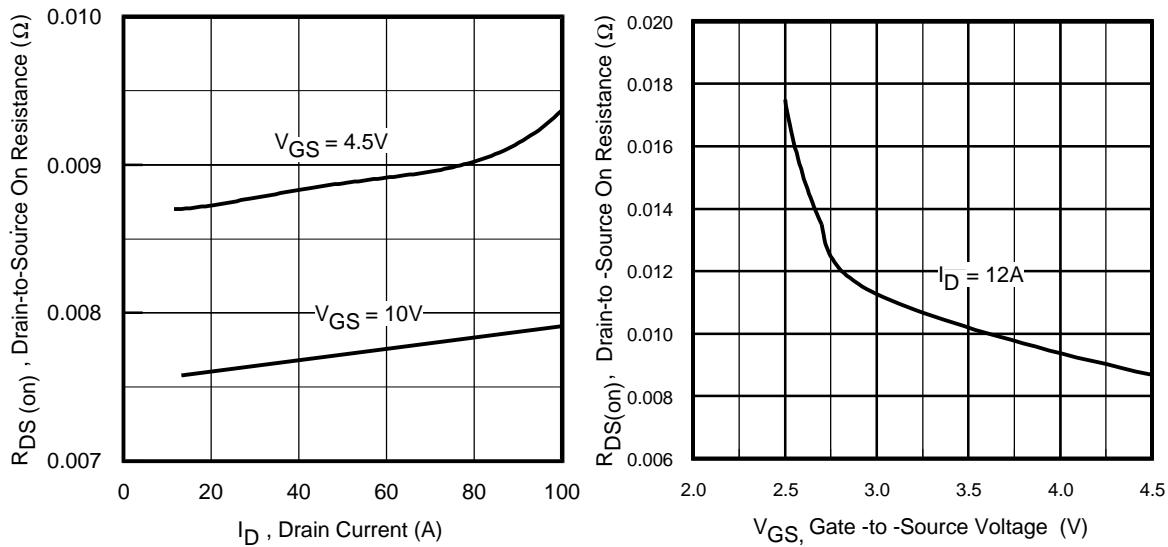
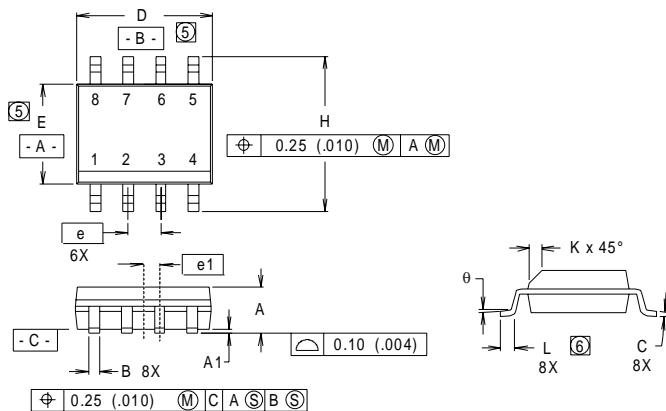


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

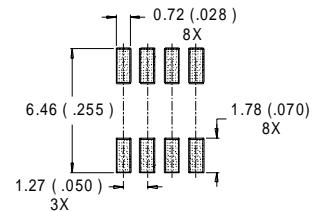


SO-8 Package Details



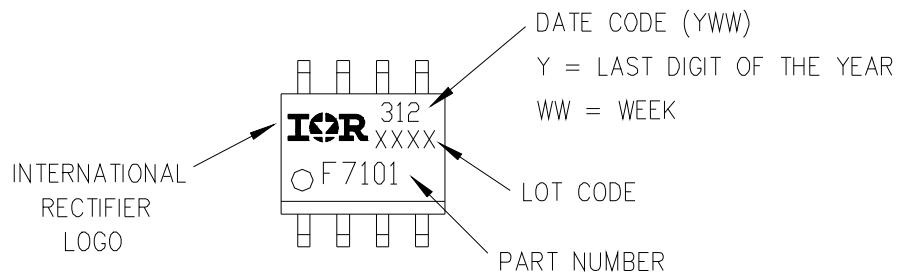
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
B	.014	.018	0.36	0.46
C	.0075	.0098	0.19	0.25
D	.189	.196	4.80	4.98
E	.150	.157	3.81	3.99
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.011	.019	0.28	0.48
L	.016	.050	0.41	1.27
θ	0°	8°	0°	8°

RECOMMENDED FOOTPRINT



SO-8 Part Marking

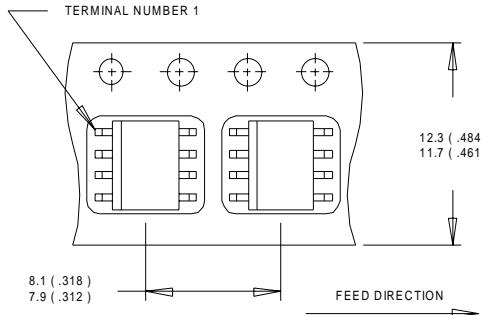
EXAMPLE: THIS IS AN IRF7101



IRF7459

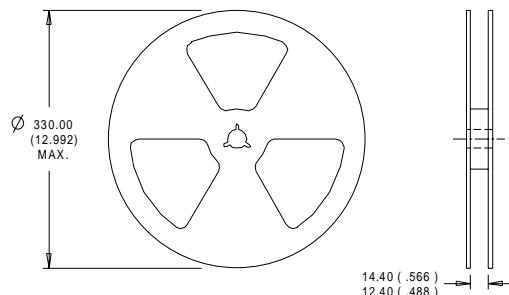
International
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SO-8 Tape and Reel



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.

Notes:

- | | |
|---|--|
| ① Repetitive rating; pulse width limited by max. junction temperature. | ③ Pulse width \leq 300 μ s; duty cycle \leq 2%. |
| ② Starting $T_J = 25^\circ\text{C}$, $L = 6.3\text{mH}$
$R_G = 25\Omega$, $I_{AS} = 9.6\text{A}$. | ④ When mounted on 1 inch square copper board, $t < 10$ sec |

Data and specifications subject to change without notice.
This product has been designed and qualified for the Industrial market.
Qualification Standards can be found on IR's Web site.

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IR Rectifier

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