



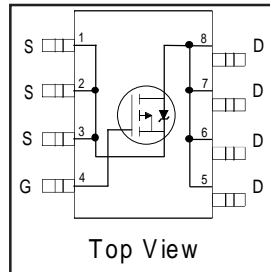
**THE DATASHEET OF
IRF7233**



IRF7233

HEXFET® Power MOSFET

- Ultra Low On-Resistance
- P-Channel MOSFET
- Surface Mount
- Available in Tape & Reel

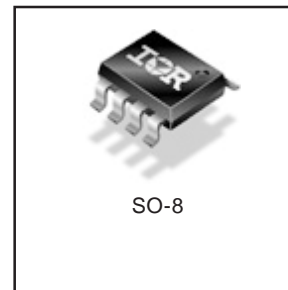


$V_{DSS} = -12V$
$R_{DS(on)} = 0.020\Omega$

Description

These P-Channel MOSFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit provides the designer with an extremely efficient device for use in battery and load management applications.

The SO-8 has been modified through a customized leadframe for enhanced thermal characteristics and multiple-die capability making it ideal in a variety of power applications. With these improvements, multiple devices can be used in an application with dramatically reduced board space. The package is designed for vapor phase, infrared, or wave soldering techniques.



Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain- Source Voltage	-12	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V$	± 9.5	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V$	± 6.0	
I_{DM}	Pulsed Drain Current ①	± 76	
$P_D @ T_A = 25^\circ C$	Power Dissipation	2.5	W
$P_D @ T_A = 70^\circ C$	Power Dissipation	1.6	
	Linear Derating Factor	0.02	
E_{AS}	Single Pulse Avalanche Energy④	60	mJ
V_{GS}	Gate-to-Source Voltage	± 12	V
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	$^\circ C$

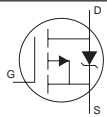
Thermal Resistance

	Parameter	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient③	50	$^\circ C/W$

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-14	—	—	V	$V_{GS} = 0V, I_D = -5.0mA$
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-12	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.001	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = -1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	0.013	0.020	Ω	$V_{GS} = -4.5V, I_D = -9.5A$ ②
		—	0.023	0.033		$V_{GS} = -2.5V, I_D = -6.0A$ ②
$V_{GS(th)}$	Gate Threshold Voltage	-0.6	—	—	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
g_{fs}	Forward Transconductance	3.3	—	—	S	$V_{DS} = -10V, I_D = -9.5A$
I_{DSS}	Drain-to-Source Leakage Current	—	—	-10	μA	$V_{DS} = -12V, V_{GS} = 0V$
		—	—	-1.0		$V_{DS} = -9.6V, V_{GS} = 0V$
		—	—	-100		$V_{DS} = -12V, V_{GS} = 0V, T_J = 70^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	-100	nA	$V_{GS} = -12V$
	Gate-to-Source Reverse Leakage	—	—	100		$V_{GS} = 12V$
Q_g	Total Gate Charge	—	49	74	nC	$I_D = -9.5A$
Q_{gs}	Gate-to-Source Charge	—	9.3	14		$V_{DS} = -10V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	22	32		$V_{GS} = -5.0V$ ②
$t_{d(on)}$	Turn-On Delay Time	—	26	—	ns	$V_{DD} = -10V$
t_r	Rise Time	—	540	—		$I_D = -9.5A$
$t_{d(off)}$	Turn-Off Delay Time	—	77	—		$R_D = 1.0\Omega$
t_f	Fall Time	—	370	—		$R_G = 6.2\Omega$ ②
C_{iss}	Input Capacitance	—	4530	6000	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	2400	—		$V_{DS} = -10V$
C_{rss}	Reverse Transfer Capacitance	—	2220	—		$f = 1.0kHz$

Source-Drain Ratings and Characteristics

	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	—	—	-76		
V_{SD}	Diode Forward Voltage	—	—	-1.2	V	$T_J = 25^\circ\text{C}, I_S = -2.5A, V_{GS} = 0V$ ②
t_{rr}	Reverse Recovery Time	—	43	65	ns	$T_J = 25^\circ\text{C}, I_F = -2.5A$
Q_{rr}	Reverse Recovery Charge	—	35	52	nC	$di/dt = 100A/\mu s$ ②

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
② Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

- ③ When mounted on 1 inch square copper board, $t < 10$ sec
④ Starting $T_J = 25^\circ\text{C}, L = 1.3mH$
 $R_G = 25\Omega, I_{AS} = 9.5A$.

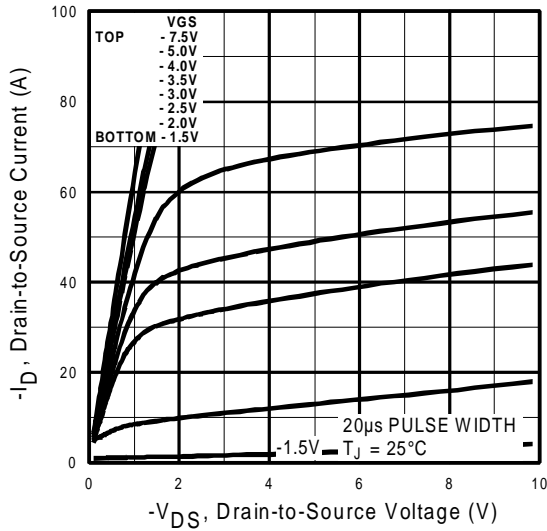


Fig 1. Typical Output Characteristics

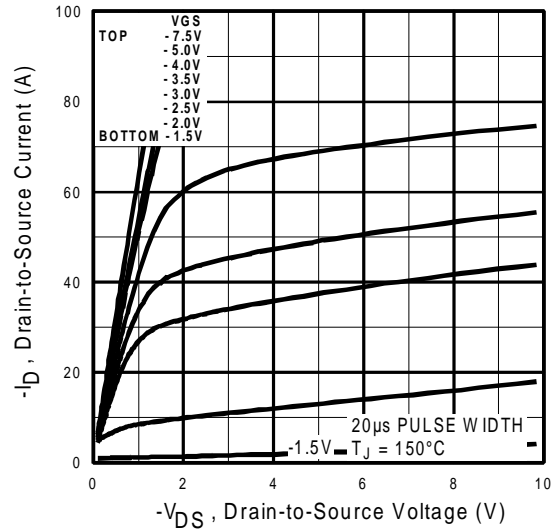


Fig 2. Typical Output Characteristics

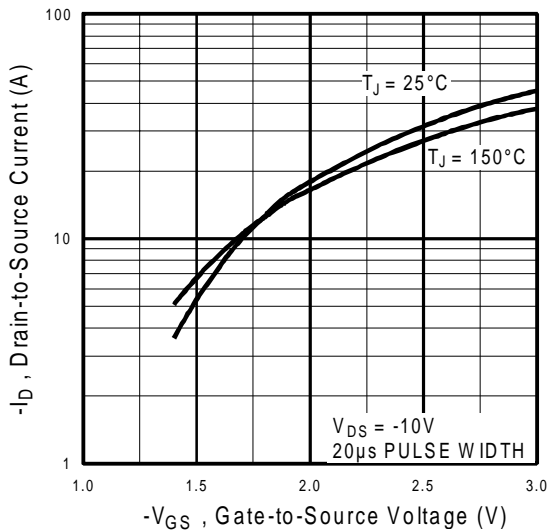


Fig 3. Typical Transfer Characteristics

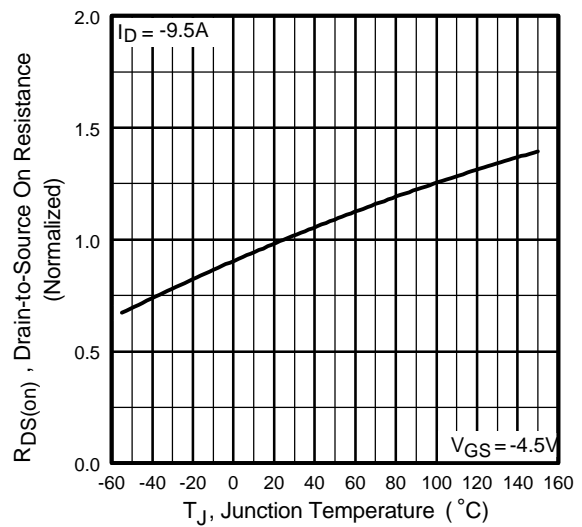


Fig 4. Normalized On-Resistance Vs. Temperature

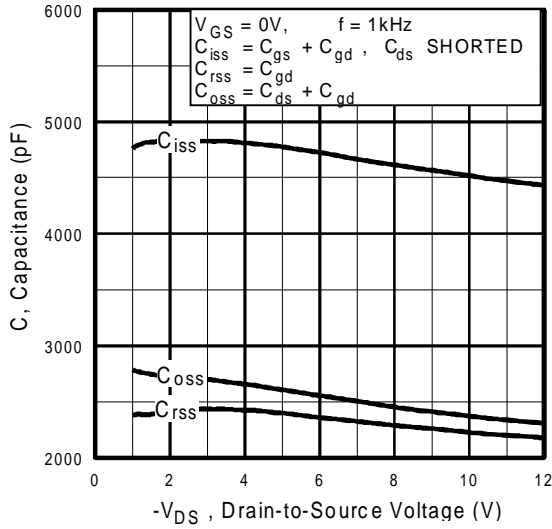


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

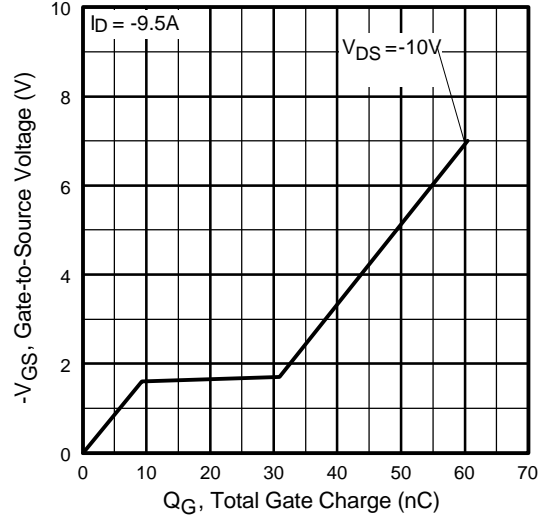


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

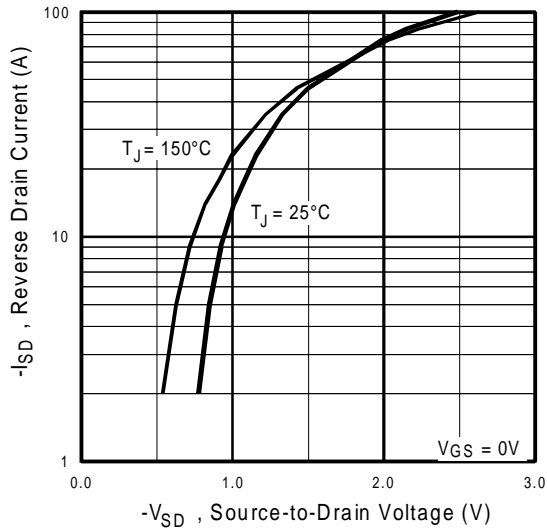


Fig 7. Typical Source-Drain Diode Forward Voltage

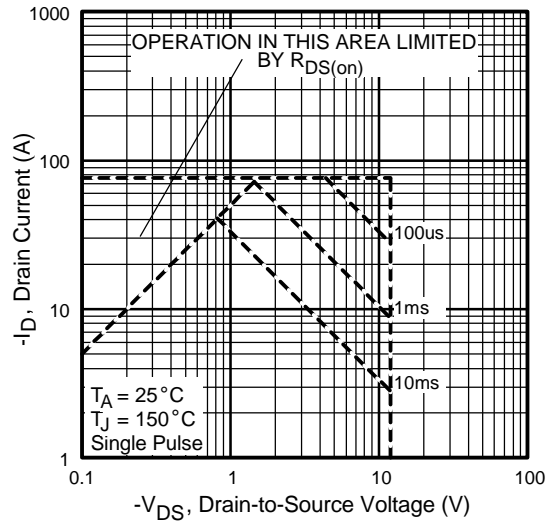


Fig 8. Maximum Safe Operating Area

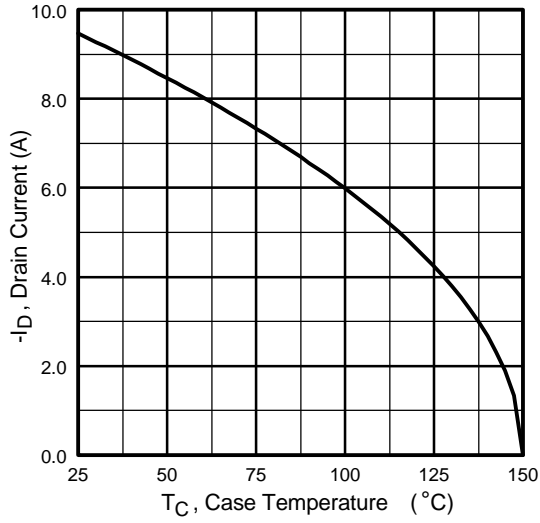


Fig 9. Maximum Drain Current Vs. Case Temperature

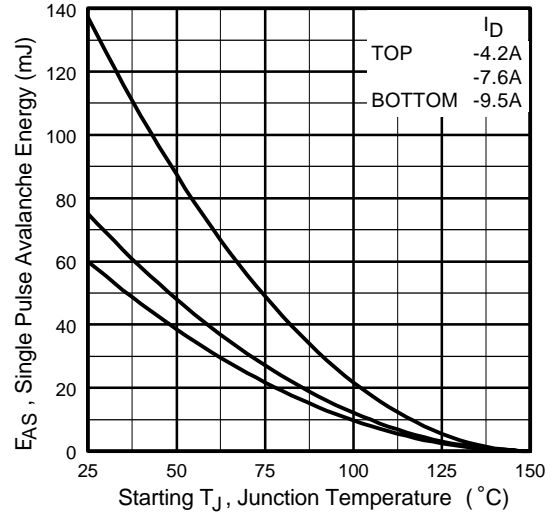


Fig 10. Maximum Avalanche Energy Vs. Drain Current

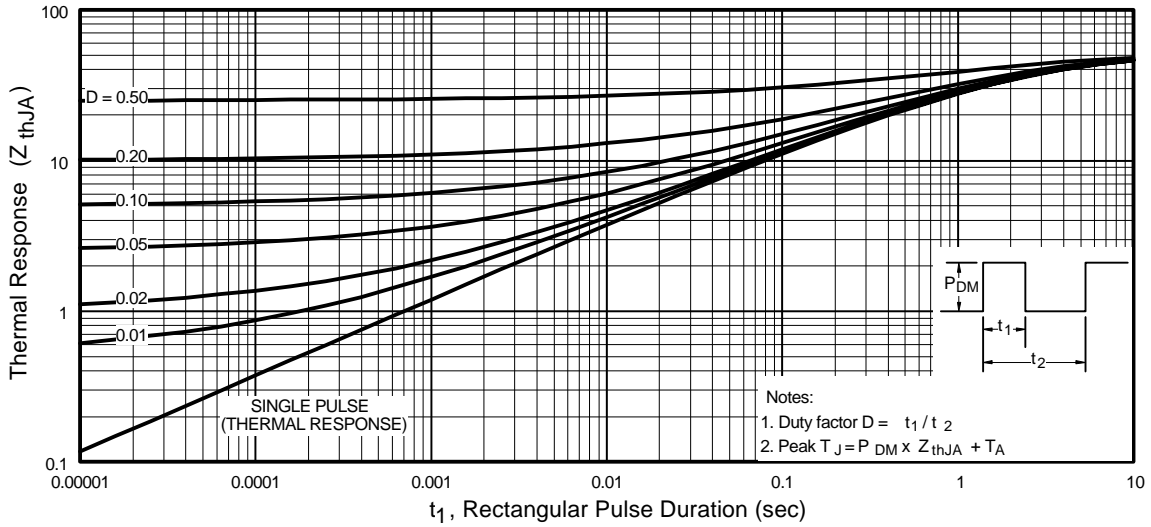
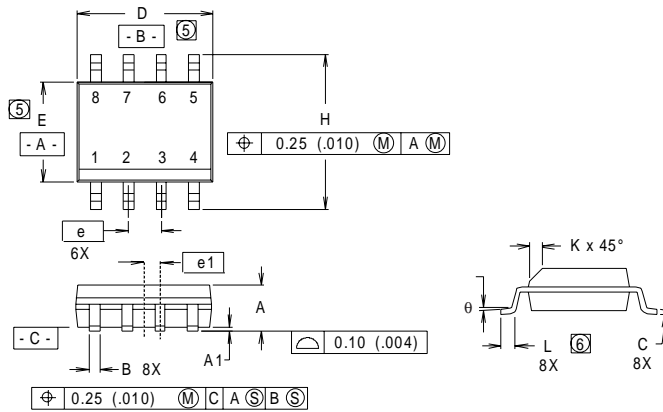


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

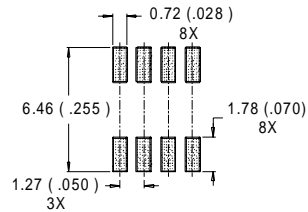
IRF7233

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	0.16	.050	0.41	1.27
θ	0°	8°	0°	8°

RECOMMENDED FOOTPRINT

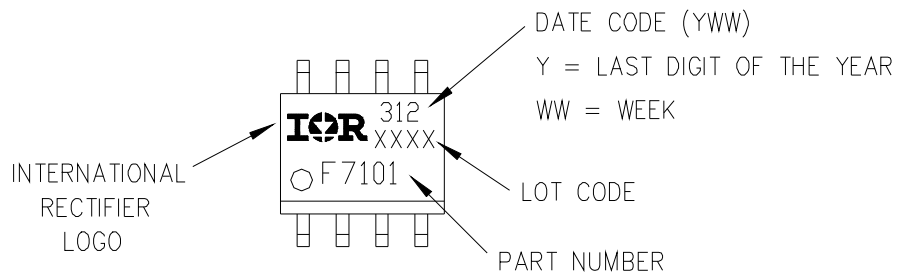


NOTES:

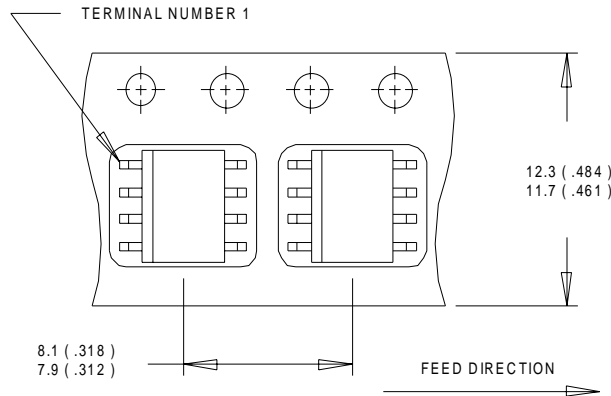
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1982.
2. CONTROLLING DIMENSION : INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
- ⑤ DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS
MOLD PROTRUSIONS NOT TO EXCEED 0.25 (.006).
- ⑥ DIMENSIONS IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE..

Part Marking

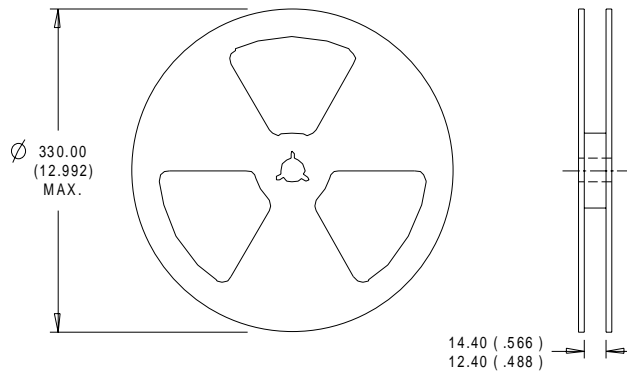
EXAMPLE: THIS IS AN IRF7101



Tape and Reel SO-8



- 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.

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<http://www.irf.com/> Data and specifications subject to change without notice. 7/99

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