

Applications

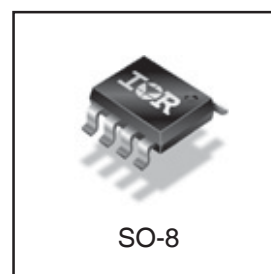
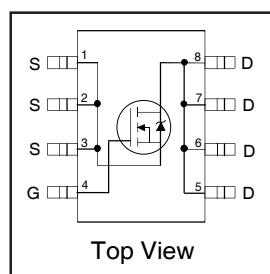
- Synchronous MOSFET for Notebook Processor Power
- Secondary Synchronous Rectification for Isolated DC-DC Converters
- Synchronous Fet for Non-Isolated DC-DC Converters
- Lead-Free

Benefits

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

HEXFET® Power MOSFET

V_{DSS}	$R_{DS(on)}$ max	Qg (typ.)
40V	5.0m Ω @ $V_{GS} = 10V$	33nC



Base Part Number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRF7842PbF	SO-8	Tube/Bulk	95	IRF7842PbF
		Tape and Reel	4000	IRF7842TRPbF

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	40	V
V_{GS}	Gate-to-Source Voltage	± 20	
I_D @ $T_A = 25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	18	A
I_D @ $T_A = 70^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	14	
I_{DM}	Pulsed Drain Current ①	140	
P_D @ $T_A = 25^\circ\text{C}$	Power Dissipation ④	2.5	W
P_D @ $T_A = 70^\circ\text{C}$	Power Dissipation ④	1.6	
	Linear Derating Factor	0.02	W/ $^\circ\text{C}$
T_J	Operating Junction and	-55 to + 150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range		

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead ⑤	—	20	$^\circ\text{C/W}$
$R_{\theta JA}$	Junction-to-Ambient ④⑤	—	50	

Notes ① through ⑤ are on page 10

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	40	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.037	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = 1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	4.0	5.0	m Ω	$V_{GS} = 10V, I_D = 17A$ ③
		—	4.7	5.9		$V_{GS} = 4.5V, I_D = 14A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	1.35	—	2.25	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	—	- 5.6	—	mV/ $^\circ\text{C}$	
I_{DSS}	Drain-to-Source Leakage Current	—	—	1.0	μA	$V_{DS} = 32V, V_{GS} = 0V$
		—	—	150		$V_{DS} = 32V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
g_{fs}	Forward Transconductance	81	—	—	S	$V_{DS} = 20V, I_D = 14A$
Q_g	Total Gate Charge	—	33	50	nC	$V_{DS} = 20V$ $V_{GS} = 4.5V$ $I_D = 14A$
Q_{gs1}	Pre-V _{th} Gate-to-Source Charge	—	9.6	—		
Q_{gs2}	Post-V _{th} Gate-to-Source Charge	—	2.8	—		
Q_{gd}	Gate-to-Drain Charge	—	10	—		
Q_{godr}	Gate Charge Overdrive	—	10.6	—		
Q_{sw}	Switch Charge ($Q_{gs2} + Q_{gd}$)	—	12.8	—		
Q_{oss}	Output Charge	—	18	—	nC	$V_{DS} = 16V, V_{GS} = 0V$
R_G	Gate Resistance	—	1.3	2.6	Ω	
$t_{d(on)}$	Turn-On Delay Time	—	14	—	ns	$V_{DD} = 20V, V_{GS} = 4.5V$ ③ $I_D = 14A$ Clamped Inductive Load
t_r	Rise Time	—	12	—		
$t_{d(off)}$	Turn-Off Delay Time	—	21	—		
t_f	Fall Time	—	5.0	—		
C_{iss}	Input Capacitance	—	4500	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	680	—		$V_{DS} = 20V$
C_{rss}	Reverse Transfer Capacitance	—	310	—		$f = 1.0MHz$

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	—	50	mJ
I_{AR}	Avalanche Current ①	—	14	A

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	—	—	140		
V_{SD}	Diode Forward Voltage	—	—	1.0	V	$T_J = 25^\circ\text{C}, I_S = 14A, V_{GS} = 0V$ ③
t_{rr}	Reverse Recovery Time	—	99	150	ns	$T_J = 25^\circ\text{C}, I_F = 14A, V_{DD} = 20V$
Q_{rr}	Reverse Recovery Charge	—	11	17	nC	$di/dt = 100A/\mu s$ ③



IRF7842PbF

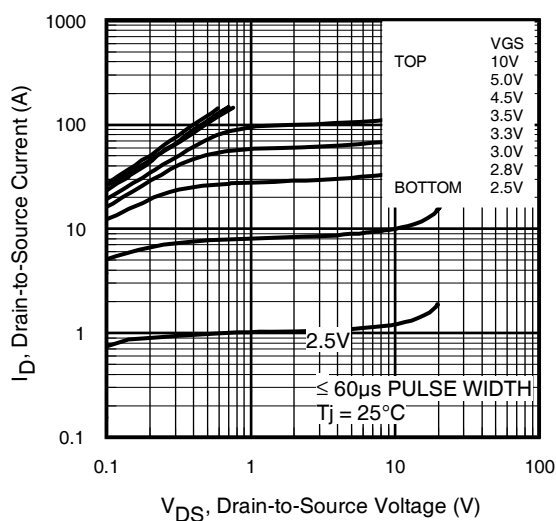


Fig 1. Typical Output Characteristics

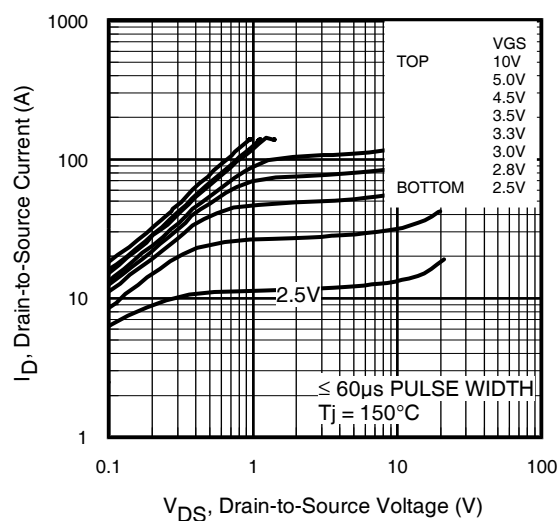


Fig 2. Typical Output Characteristics

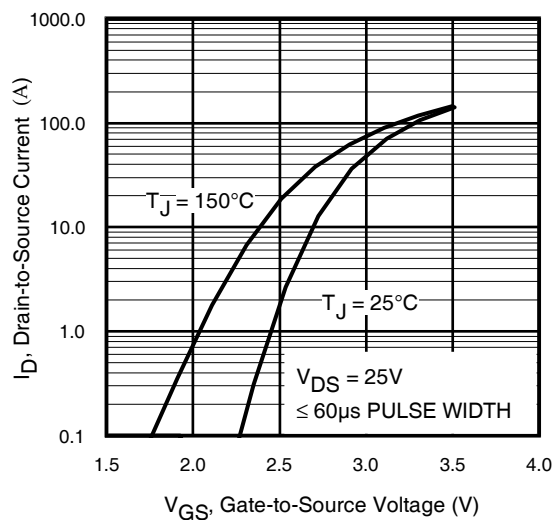


Fig 3. Typical Transfer Characteristics

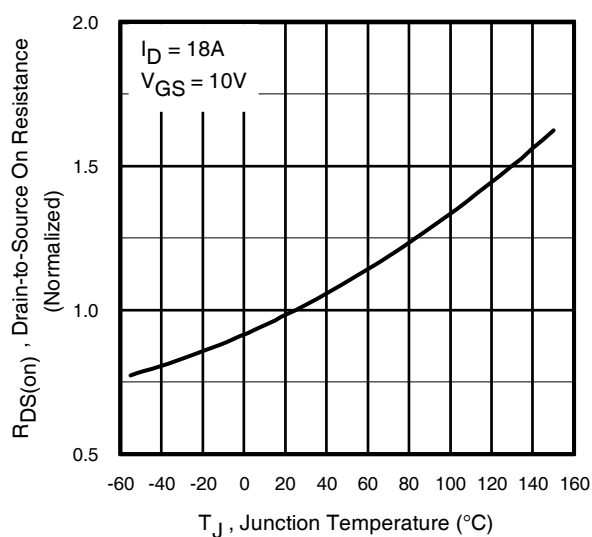


Fig 4. Normalized On-Resistance Vs. Temperature

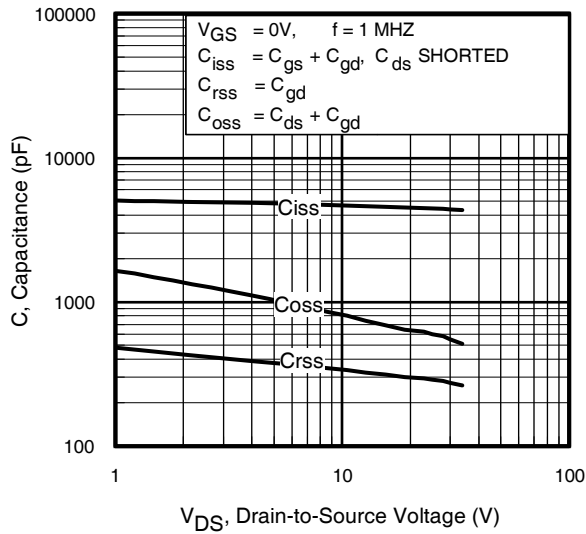


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

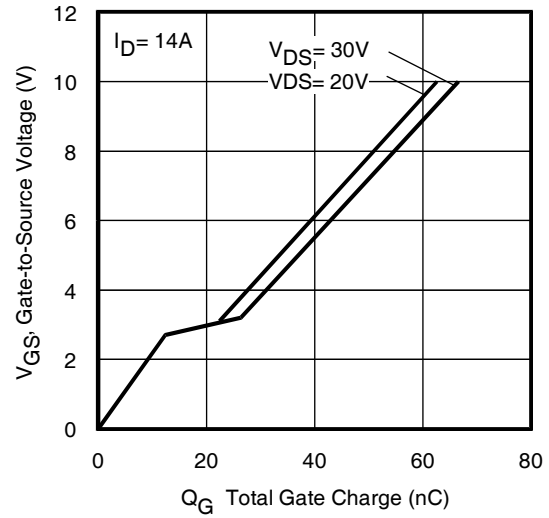


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

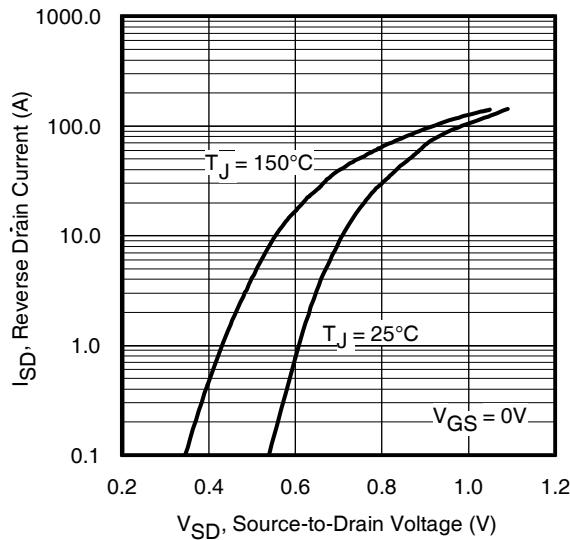


Fig 7. Typical Source-Drain Diode Forward Voltage

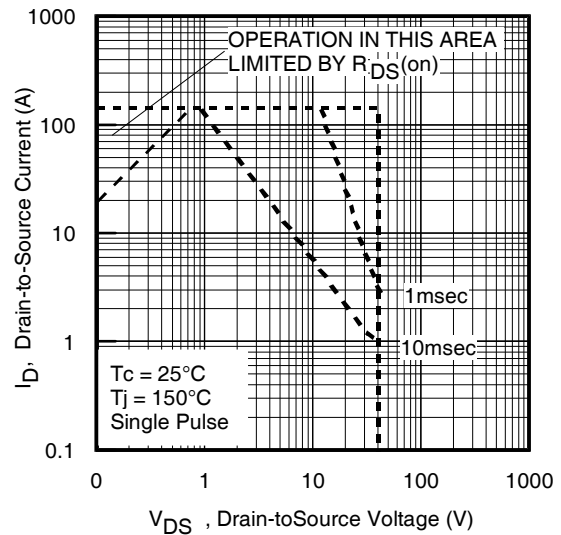


Fig 8. Maximum Safe Operating Area



IRF7842PbF

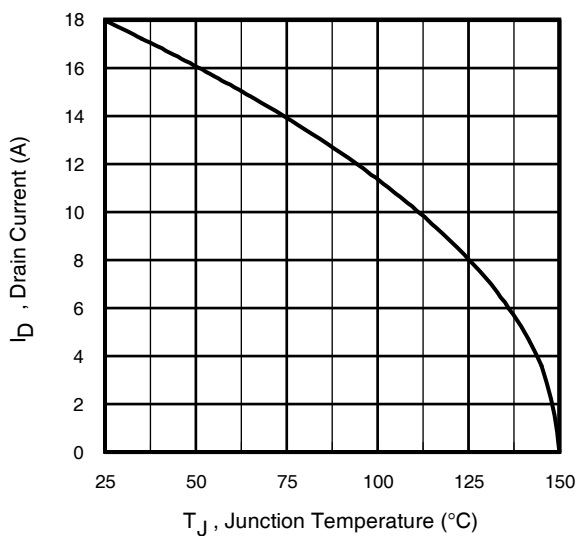


Fig 9. Maximum Drain Current Vs. Case Temperature

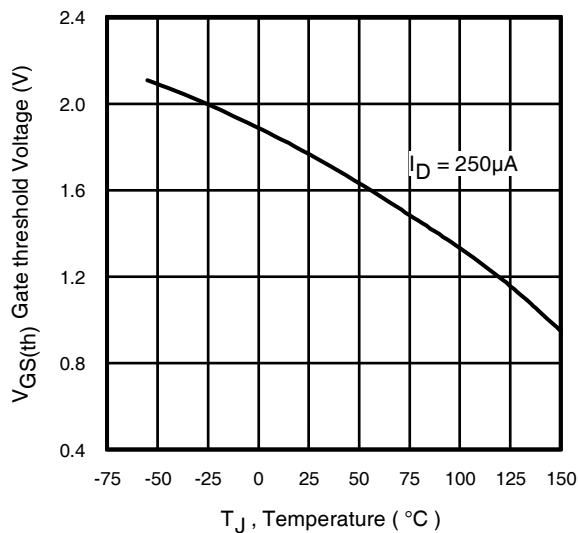


Fig 10. Threshold Voltage Vs. Temperature

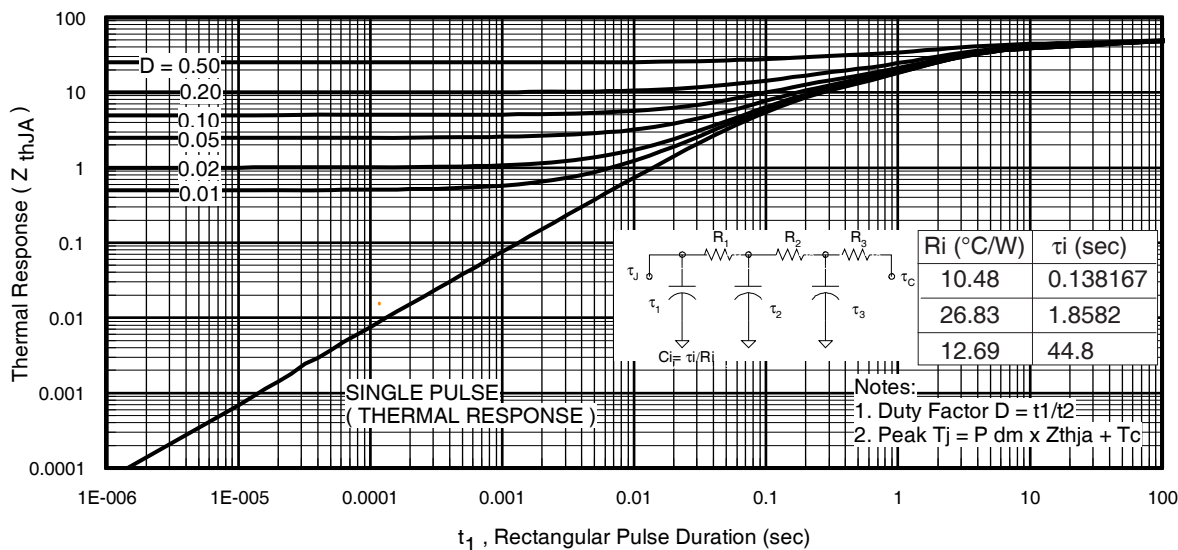
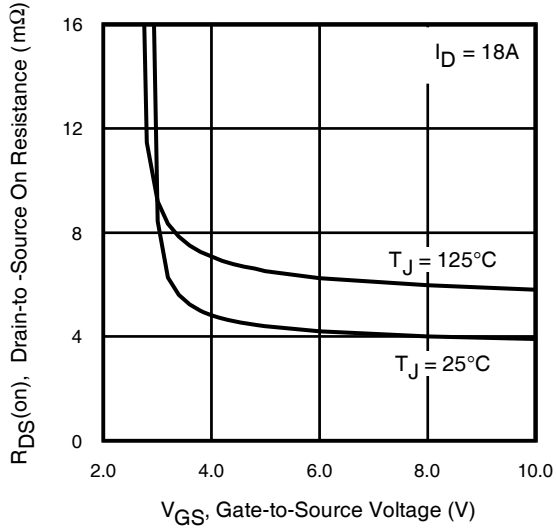
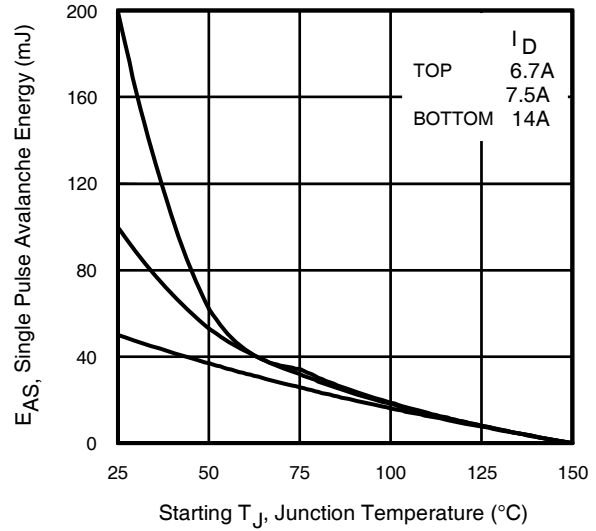
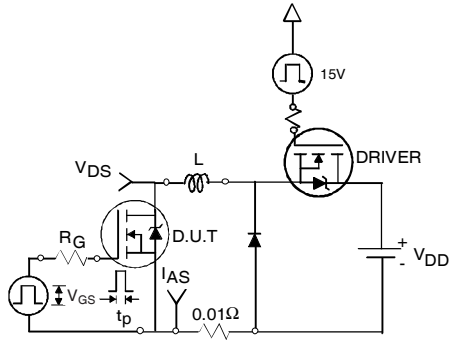
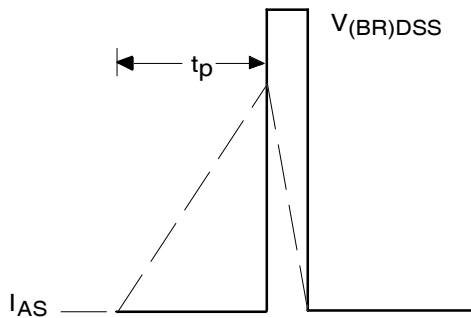
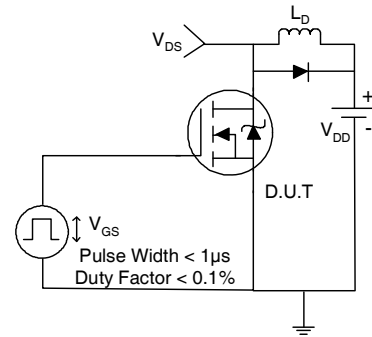
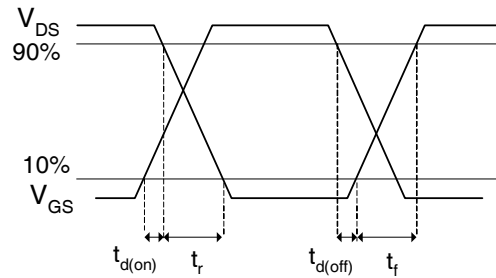


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient


Fig 12. On-Resistance Vs. Gate Voltage

Fig 13c. Maximum Avalanche Energy Vs. Drain Current

Fig 13a. Unclamped Inductive Test Circuit

Fig 13b. Unclamped Inductive Waveforms

Fig 14a. Switching Time Test Circuit

Fig 14b. Switching Time Waveforms



IRF7842PbF

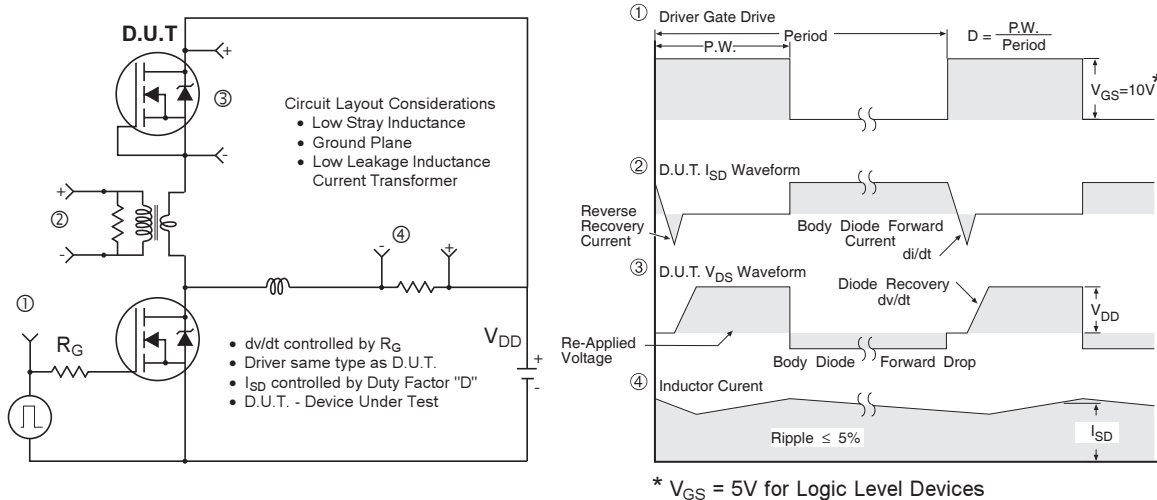


Fig 15. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

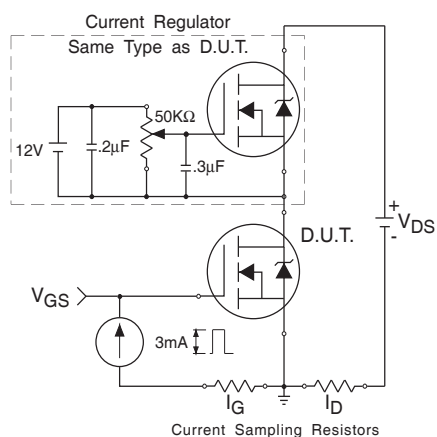


Fig 16. Gate Charge Test Circuit

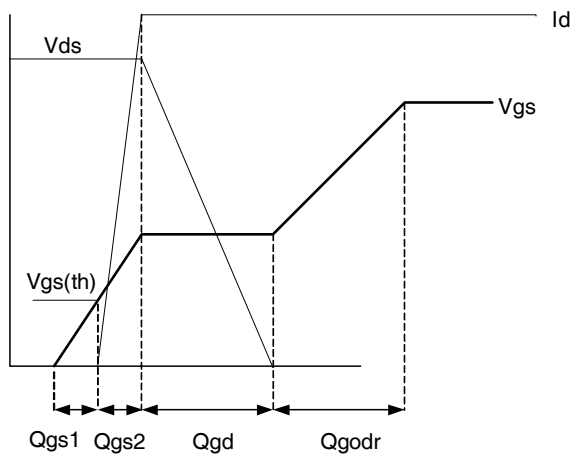
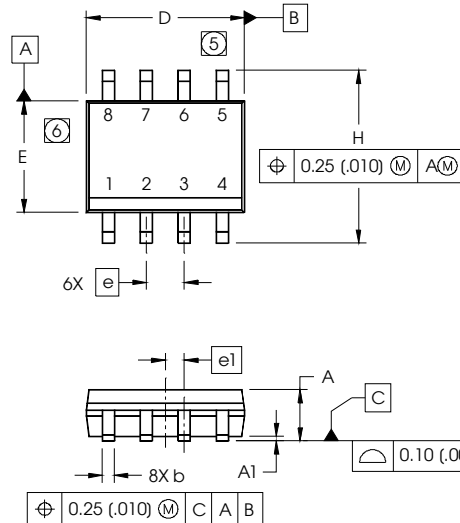


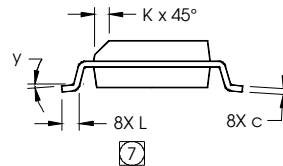
Fig 17. Gate Charge Waveform

SO-8 Package Outline

Dimensions are shown in millimeters (inches)



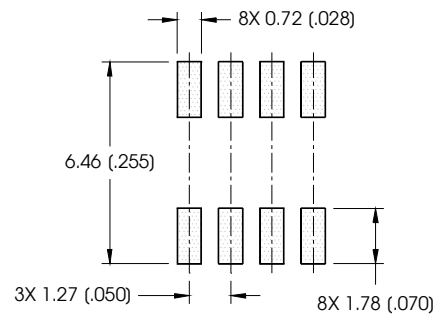
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40	1.27
y	0°	8°	0°	8°



NOTES:

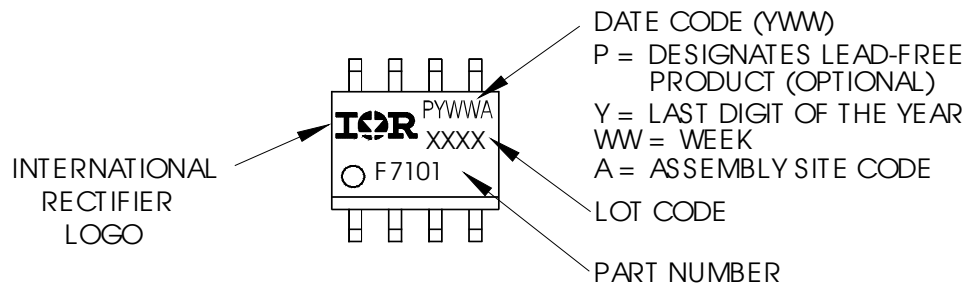
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
- ⑤ DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 (.006).
- ⑥ DIMENSION DOES NOT 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

EXAMPLE: THIS IS AN IRF7101 (MOSFET)



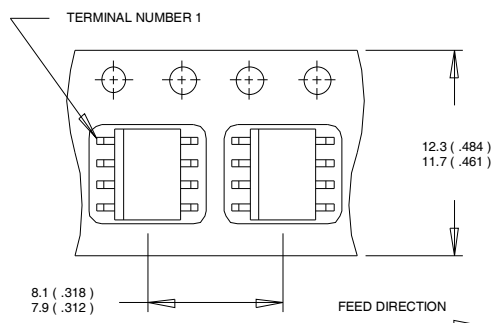
Note: For the most current drawing please refer to IR website at: <http://www.irf.com/package/>



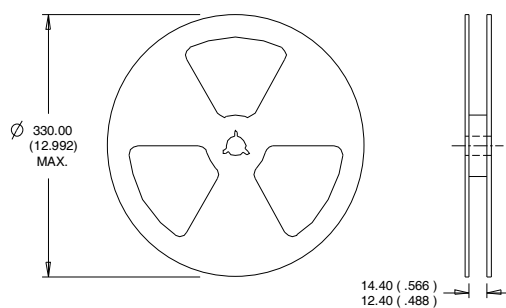
IRF7842PbF

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.

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

Qualification information[†]

Qualification level	Consumer (per JEDEC JESD47F ^{††} guidelines)	
Moisture Sensitivity Level	SO-8	MSL1 (per JEDEC J-STD-020D ^{††})
RoHS compliant	Yes	

[†] Qualification standards can be found at International Rectifier's web site: <http://www.irf.com/product-info/reliability>

^{††} Applicable version of JEDEC standard at the time of product release

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^{\circ}\text{C}$, $L = 0.5\text{mH}$
 $R_G = 25\Omega$, $I_{AS} = 14\text{A}$.
- ③ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- ④ When mounted on 1 inch square copper board
- ⑤ R_{θ} is measured at T_J approximately 90°C

Revision History

Date	Comment
7/8/2014	- Updated data sheet based on corporate template. - Added Qual level on page10. - Added ordering information on page1 - Updated Max R_G from "TBD" to "2.6Ohm" on page2.

International
 Rectifier

IR WORLD HEADQUARTERS: 101 N. Sepulveda Blvd., El Segundo, California 90245, USA

To contact International Rectifier, please visit <http://www.irf.com/whoto-call/>

IMPORTANT NOTICE

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenhheitsgarantie").

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office (www.infineon.com).

WARNINGS

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.