PD - 97145

International
IOR Rectifier

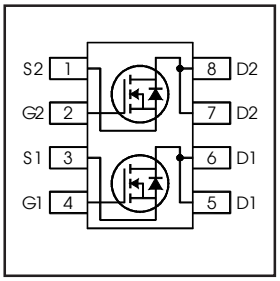
IRF8313PbF

HEXFET® Power MOSFET

V_{DSS}	$R_{DS(on)}$ max	Qg
30V	15.5mΩ@V_{GS} = 10V	6.0nC

Applications
- Load Switch
- DC/DC Conversion

Benefits
- Low Gate Charge and Low $R_{DS(on)}$
- Fully Characterized Avalanche Voltage and Current
- 20V V_{GS} Max. Gate Rating
- 100% Tested for R_G
- Lead-Free (Qualified to 260°C Reflow)
- RoHS Compliant (Halogen Free)



SO-8

Description

The IRF8313PbF incorporates the latest HEXFET Power MOSFET Silicon Technology into the industry standard SO-8 package. The IRF8313PbF has been optimized for parameters that are critical in synchronous buck operation including Rds(on) and gate charge to reduce both conduction and switching losses. The reduced total losses make this product ideal for high efficiency DC-DC converters that power the latest generation of processors for notebook and Netcom applications.

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	±20	
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	9.7	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	8.1	
I_{DM}	Pulsed Drain Current ①	81	
P_D @T_A = 25°C	Power Dissipation	2.0	W
P_D @T_A = 70°C	Power Dissipation	1.3	
	Linear Derating Factor	0.016	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead ⑤	—	42	°C/W
$R_{\theta JA}$	Junction-to-Ambient ④⑤	—	62.5	

Notes ① through ⑤ are on page 9

ORDERING INFORMATION:
See detailed ordering and shipping information on the last page of this data sheet.

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	30	—	—	V	V_{GS} = 0V, I_D = 250µA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.021	—	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	12.5	15.5	mΩ	V_{GS} = 10V, I_D = 9.7A ③
		—	18.6	21.6		V_{GS} = 4.5V, I_D = 8.0A ③
$V_{GS(th)}$	Gate Threshold Voltage	1.35	1.80	2.35	V	V_{DS} = V_{GS}, I_D = 25µA
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	—	-6.0	—	mV/°C	
I_{DSS}	Drain-to-Source Leakage Current	—	—	1.0	µA	V_{DS} = 24V, V_{GS} = 0V
		—	—	150		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
gfs	Forward Transconductance	23	—	—	S	V_{DS} = 15V, I_D = 8.0A
Q_g	Total Gate Charge	—	6.0	9.0	nC	V_{DS} = 15V V_{GS} = 4.5V I_D = 8.0A See Figs. 17a & 17b
Q_{gs1}	Pre-Vth Gate-to-Source Charge	—	1.5	—		
Q_{gs2}	Post-Vth Gate-to-Source Charge	—	0.9	—		
Q_{gd}	Gate-to-Drain Charge	—	2.2	—		
Q_{godr}	Gate Charge Overdrive	—	1.4	—		
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})	—	2.9	—		
Q_{oss}	Output Charge	—	3.8	—	nC	V_{DS} = 16V, V_{GS} = 0V
R_g	Gate Resistance	—	2.2	3.6	Ω	
$t_{d(on)}$	Turn-On Delay Time	—	8.3	—	ns	V_{DD} = 15V, V_{GS} = 4.5V I_D = 8.0A R_G = 1.8Ω See Fig. 15a & 15b
t_r	Rise Time	—	9.9	—		
$t_{d(off)}$	Turn-Off Delay Time	—	8.5	—		
t_f	Fall Time	—	4.2	—		
C_{iss}	Input Capacitance	—	760	—	pF	V_{GS} = 0V V_{DS} = 15V f = 1.0MHz
C_{oss}	Output Capacitance	—	172	—		
C_{rss}	Reverse Transfer Capacitance	—	87	—		

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	—	46	mJ
I_{AR}	Avalanche Current ①	—	8.0	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	—	—	82	A	
V_{SD}	Diode Forward Voltage	—	—	1.0	V	T_J = 25°C, I_S = 8.0A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	—	20	30	ns	T_J = 25°C, I_F = 8.0A, V_{DD} = 15V
Q_{rr}	Reverse Recovery Charge	—	10	15	nC	di/dt = 100A/µs ③
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

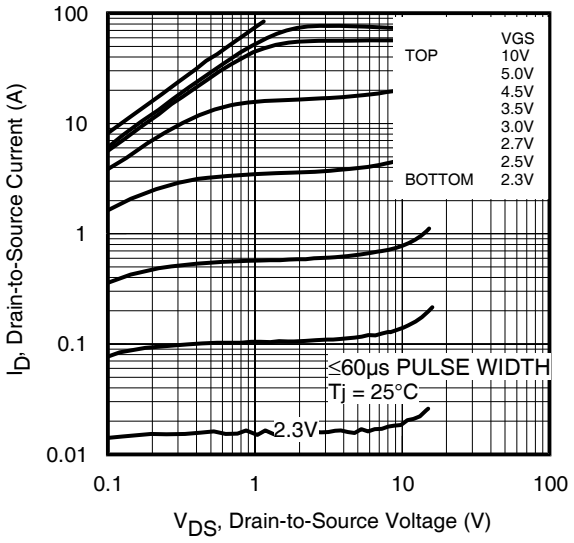


Fig 1. Typical Output Characteristics

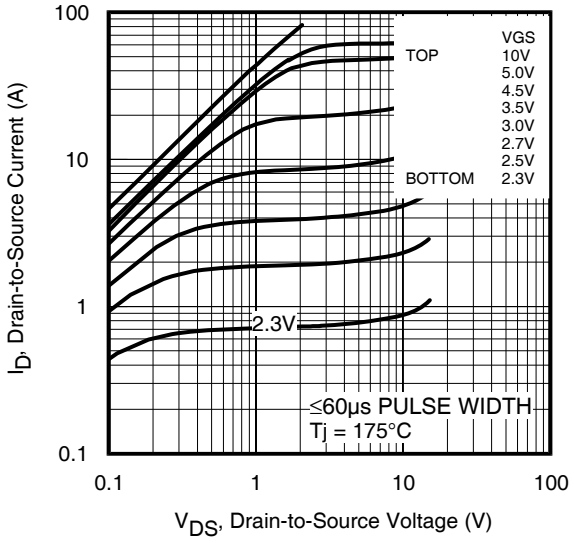


Fig 2. Typical Output Characteristics

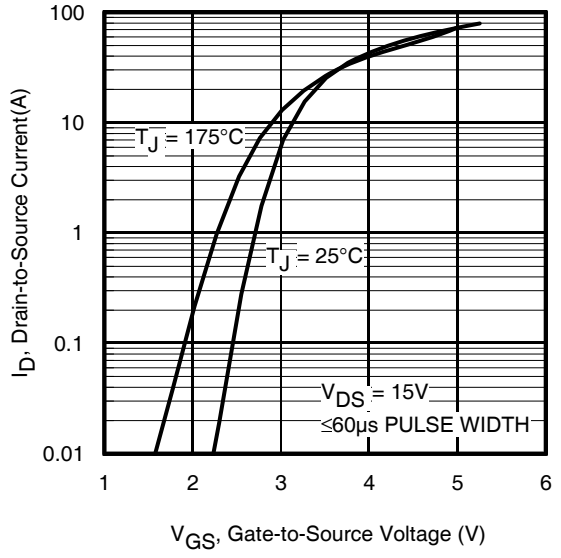


Fig 3. Typical Transfer Characteristics

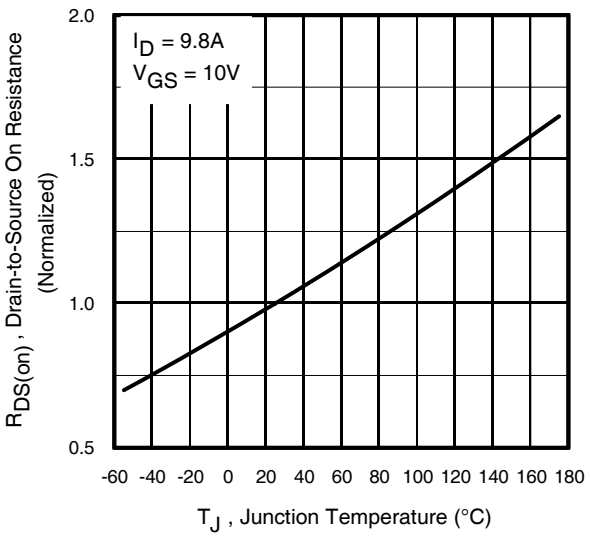


Fig 4. Normalized On-Resistance vs. Temperature

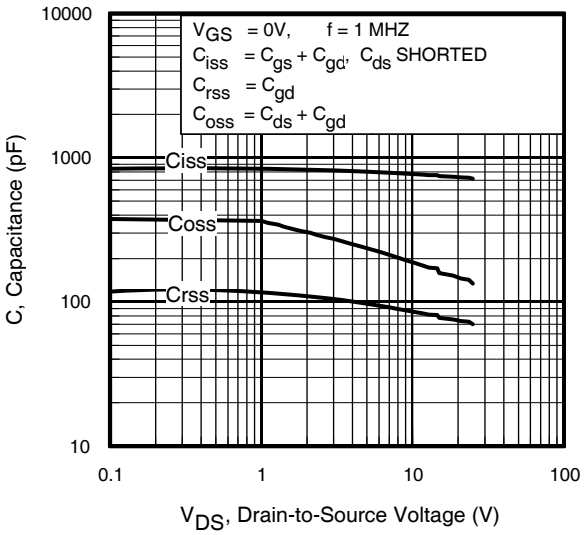


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

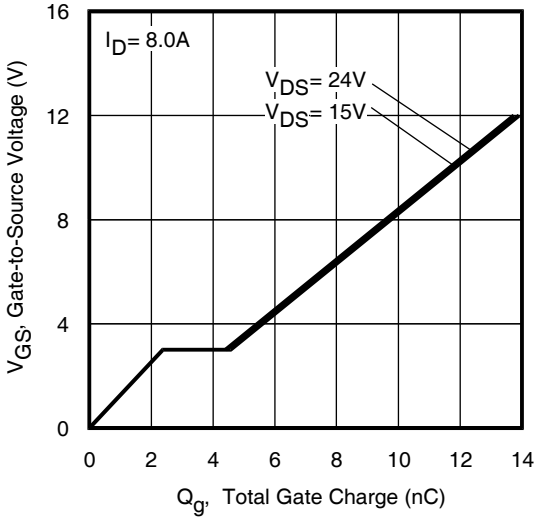


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

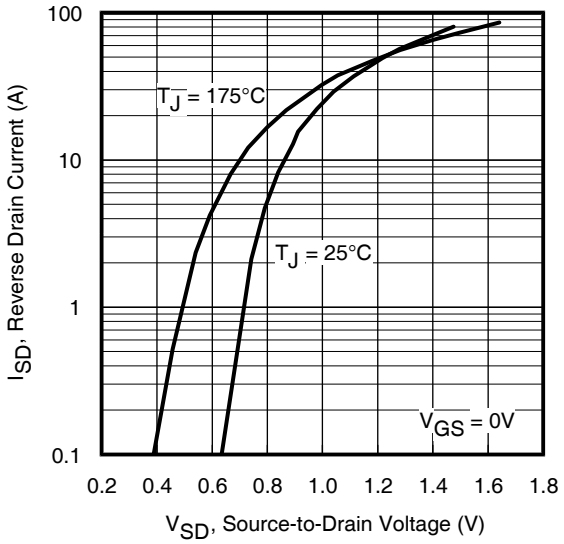


Fig 7. Typical Source-Drain Diode Forward Voltage

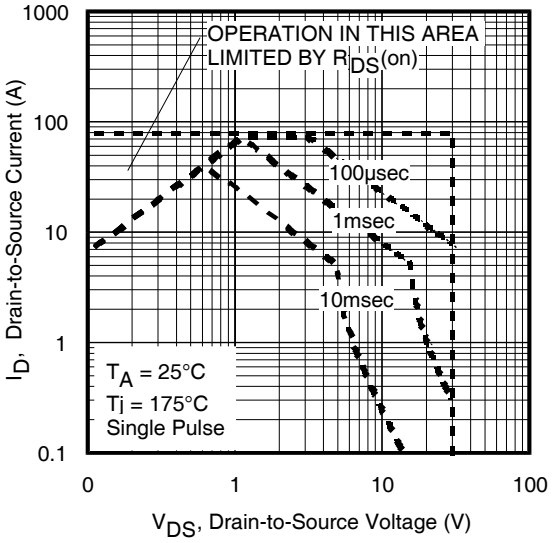


Fig 8. Maximum Safe Operating Area

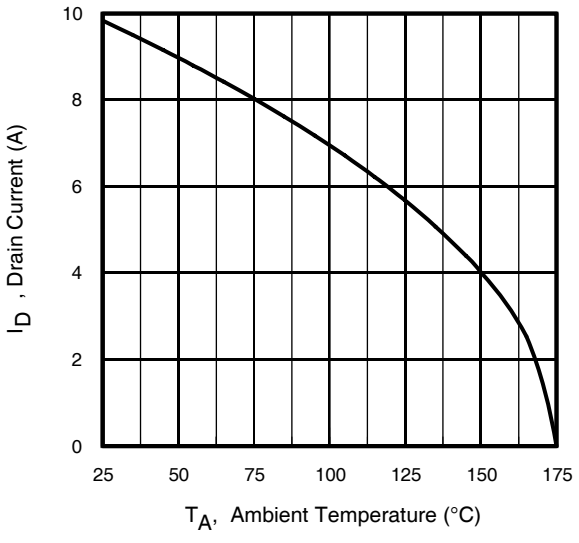


Fig 9. Maximum Drain Current vs. Ambient Temperature

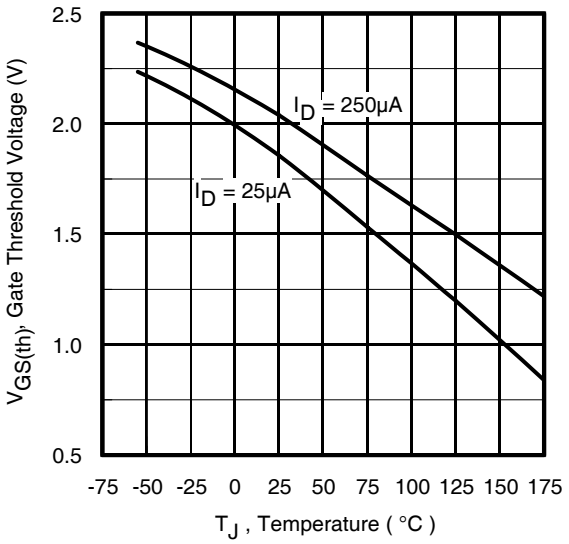
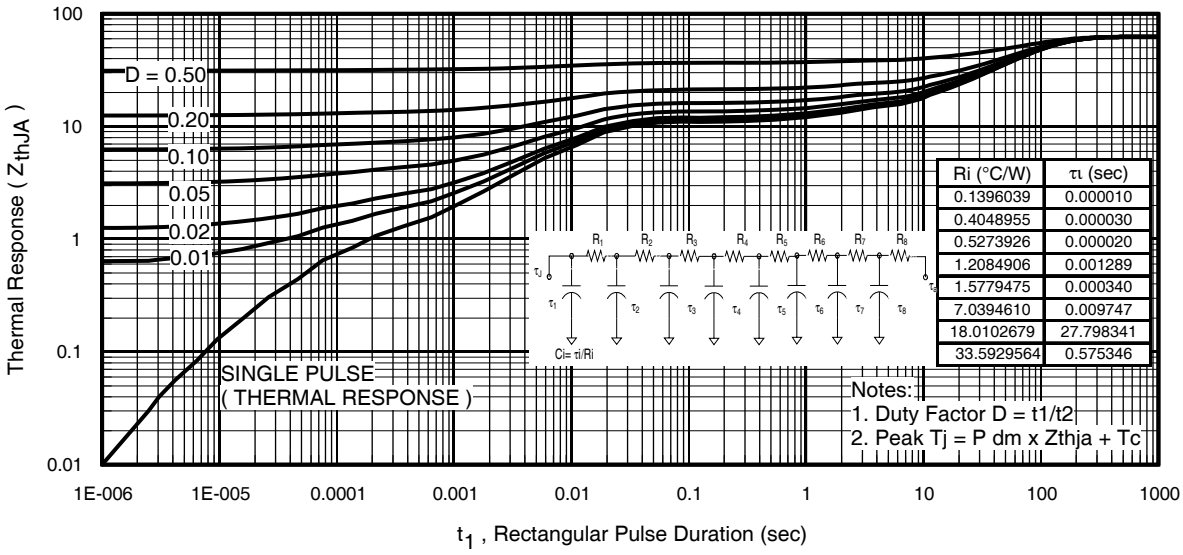


Fig 10. Threshold Voltage vs. Temperature



Ri (°C/W)	τι (sec)
0.1396039	0.000010
0.4048955	0.000030
0.5273926	0.000020
1.2084906	0.001289
1.5779475	0.000340
7.0394610	0.009747
18.0102679	27.798341
33.5929564	0.575346

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

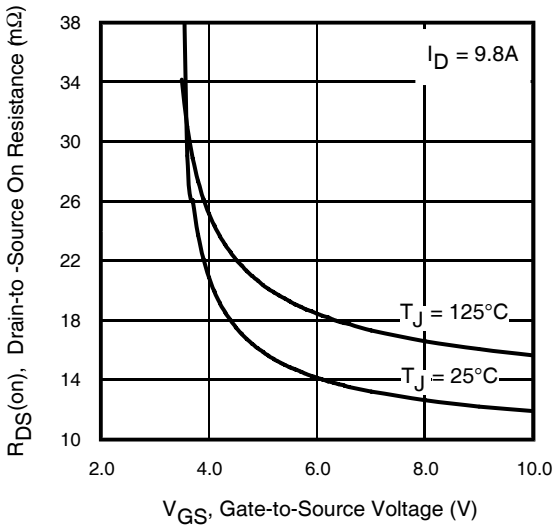


Fig 12. On-Resistance vs. Gate Voltage

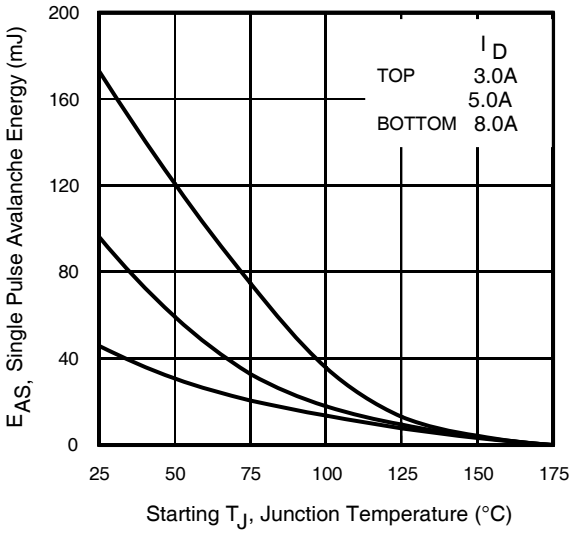


Fig 13. Maximum Avalanche Energy vs. Drain Current

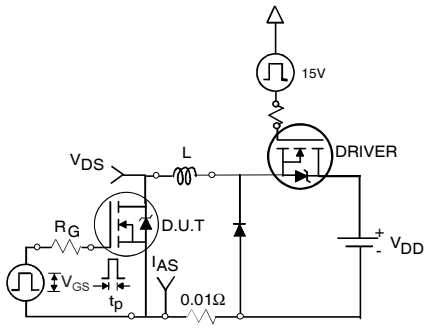


Fig 14a. Unclamped Inductive Test Circuit

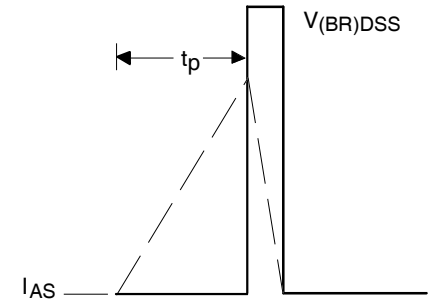


Fig 14b. Unclamped Inductive Waveforms

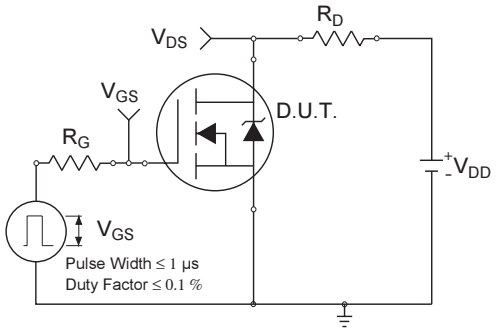


Fig 15a. Switching Time Test Circuit

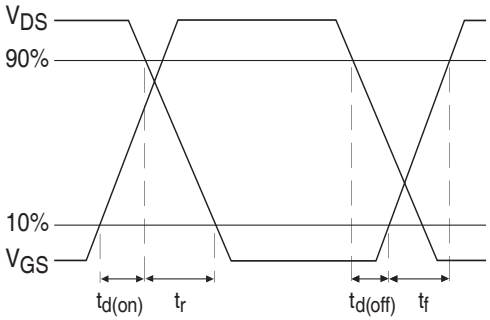


Fig 15b. Switching Time Waveforms

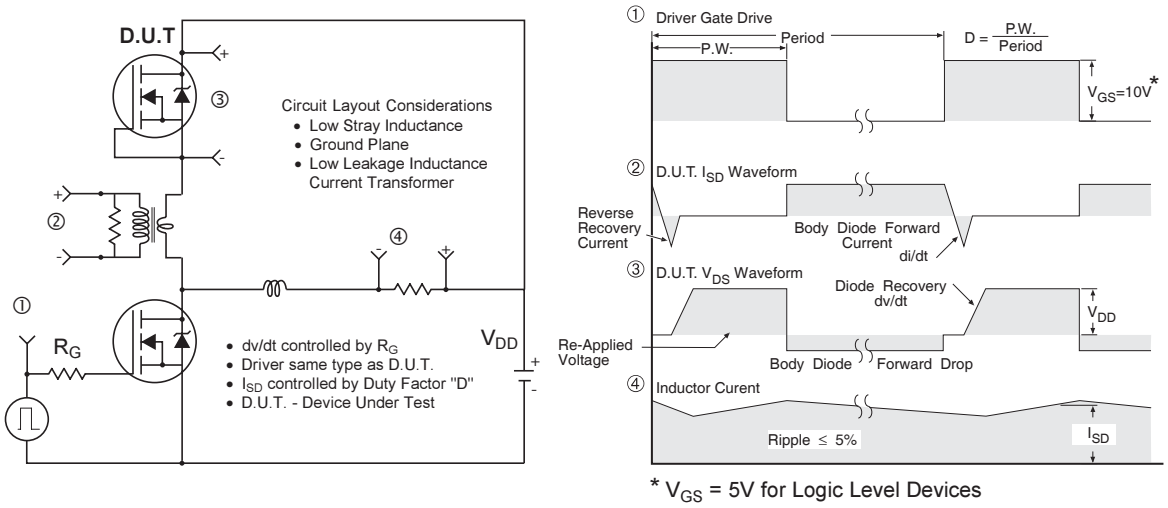


Fig 16. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

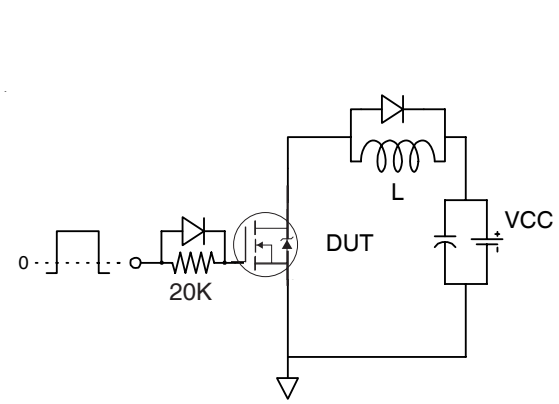


Fig 17a. Gate Charge Test Circuit

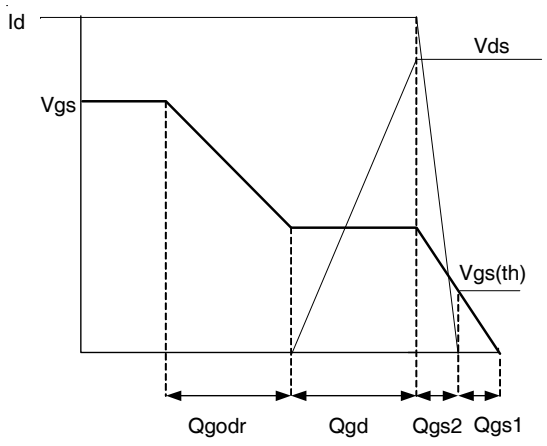


Fig 17b. Gate Charge Waveform

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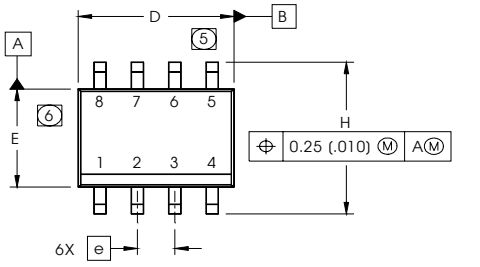
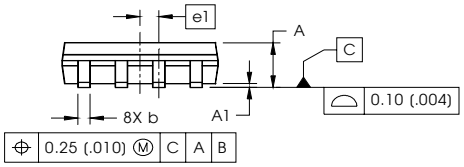
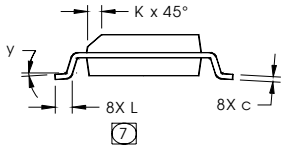
SO-8 Package Outline

Dimensions are shown in milimeters (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:

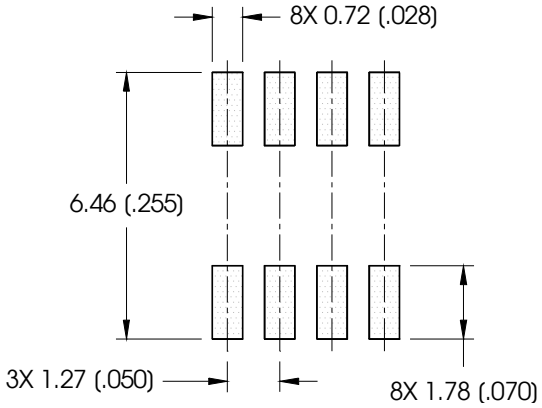
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.

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).

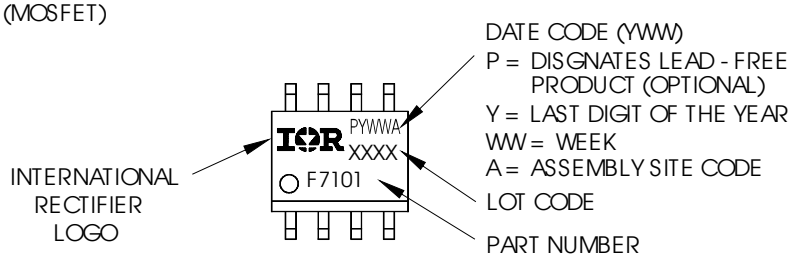
7 DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

FOOTPRINT



SO-8 Part Marking Information

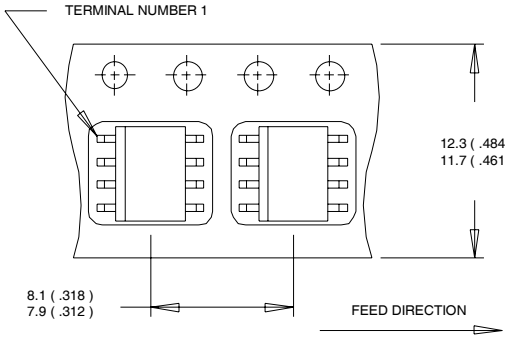
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



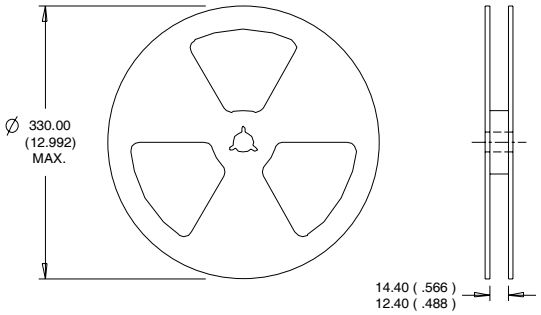
Note: For the most current drawing please refer to IR website at http://www.irf.com/package/

SO-8 Tape and Reel

Dimensions are shown in milimeters (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.

Notes:

① Repetitive rating; pulse width limited by max. junction temperature.

② Starting T_J = 25°C, L = 1.43mH, R_G = 25Ω, I_{AS} = 8.0A.

③ Pulse width ≤ 400µs; duty cycle ≤ 2%.

④ When mounted on 1 inch square copper board.

⑤ R_θ is measured at T_J of approximately 90°C.

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

Orderable Part number	Package Type	Standard Pack		Note
		Form	Quantity	
IRF8313PbF	SO-8	Tube/Bulk	95	
IRF8313TRPbF	SO-8	Tape and Reel	4000	

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/

†† Higher qualification ratings may be available should the user have such requirements. Please contact your International Rectifier sales representative for further information: http//www.irf.com/whoto-call/salesrep/

††† Applicable version of JEDEC standard at the time of product release.

Data and specifications subject to change without notice.

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