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HEXFET® Power MOSFET for DC-DC Converters

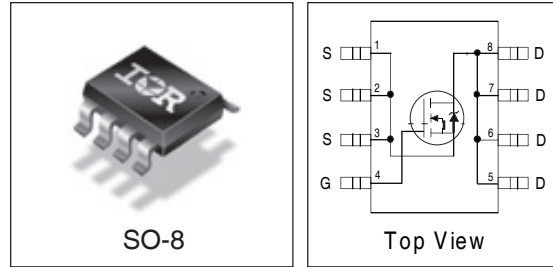
- N-Channel Application-Specific MOSFETs
- Ideal for CPU Core DC-DC Converters
- Low Conduction Losses
- Low Switching Losses
- 100% Tested for Rg
- Lead-Free

Description

This new device employs advanced HEXFET Power MOSFET technology to achieve an unprecedented balance of on-resistance and gate charge. The reduced conduction and switching losses make it ideal for high efficiency DC-DC converters that power the latest generation of microprocessors.

The IRF7811WPbF has been optimized for all parameters that are critical in synchronous buck converters including $R_{DS(on)}$, gate charge and Cdv/dt-induced turn-on immunity. The IRF7811WPbF offers particularly low $R_{DS(on)}$ and high Cdv/dt immunity for synchronous FET applications.

The package is designed for vapor phase, infra-red, convection, or wave soldering techniques. Power dissipation of greater than 3W is possible in a typical PCB mount application.



DEVICE CHARACTERISTICS^⑤

IRF7811WPbF	
$R_{DS(on)}$	9.0mΩ
Q_G	22nC
Q_{sw}	10.1nC
Q_{oss}	12nC

Absolute Maximum Ratings

Parameter	Symbol	IRF7811WPbF	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±12	
Continuous Drain or Source Current ($V_{GS} \geq 4.5V$)	$T_A = 25^\circ C$	14	A
	$T_L = 90^\circ C$	13	
Pulsed Drain Current ^①	I_{DM}	109	
Power Dissipation	$T_A = 25^\circ C$	3.1	W
	$T_L = 90^\circ C$	3.0	
Junction & Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C
Continuous Source Current (Body Diode)	I_S	3.8	A
Pulsed Source Current ^①	I_{SM}	109	

Thermal Resistance

Parameter		Max.	Units
Maximum Junction-to-Ambient ^③	$R_{\theta JA}$	40	°C/W
Maximum Junction-to-Lead	$R_{\theta JL}$	20	°C/W

IRF7811WPbF

Electrical Characteristics

Parameter		Min	Typ	Max	Units	Conditions
Drain-to-Source Breakdown Voltage	BV_{DSS}	30	-	-	V	$V_{GS} = 0V, I_D = 250\mu A$
Static Drain-Source on Resistance	$R_{DS(on)}$		9.0	12	m Ω	$V_{GS} = 4.5V, I_D = 15A$ ②
Gate Threshold Voltage	$V_{GS(th)}$	1.0			V	$V_{DS} = V_{GS}, I_D = 250\mu A$
Drain-Source Leakage Current	I_{DSS}			30	μA	$V_{DS} = 24V, V_{GS} = 0$
				150		$V_{DS} = 24V, V_{GS} = 0,$ $T_j = 100^\circ C$
Gate-Source Leakage Current	I_{GSS}			± 100	nA	$V_{GS} = \pm 12V$
Total Gate Chg Cont FET	Q_G		22	33	nC	$V_{GS}=5.0V, I_D=15A, V_{DS}=16V$
Total Gate Chg Sync FET	Q_G		16.3			$V_{GS} = 5V, V_{DS} < 100mV$
Pre-Vth Gate-Source Charge	Q_{GS1}		3.5			$V_{DS} = 16V, I_D = 15A, V_{GS} = 5.0V$
Post-Vth Gate-Source Charge	Q_{GS2}		1.2			
Gate to Drain Charge	Q_{GD}		8.8			
Switch Chg($Q_{GS2} + Q_{gd}$)	Q_{sw}		10.1			
Output Charge	Q_{OSS}		12			$V_{DS} = 16V, V_{GS} = 0$
Gate Resistance	R_G		2.0	4.0	Ω	
Turn-on Delay Time	$t_{d(on)}$		11		ns	$V_{DD} = 16V, I_D = 15A$ $V_{GS} = 5.0V$ Clamped Inductive Load
Rise Time	t_r		11			
Turn-off Delay Time	$t_{d(off)}$		29			
Fall Time	t_f		9.9			
Input Capacitance	C_{iss}	-	2335	-	pF	$V_{DS} = 16V, V_{GS} = 0$
Output Capacitance	C_{oss}	-	400	-		
Reverse Transfer Capacitance	C_{rss}	-	119	-		

Source-Drain Rating & Characteristics

Parameter		Min	Typ	Max	Units	Conditions
Diode Forward Voltage*	V_{SD}			1.25	V	$I_S = 15A$ ②, $V_{GS} = 0V$
Reverse Recovery Charge④	Q_{rr}		45		nC	$di/dt \sim 700A/\mu s$ $V_{DS} = 16V, V_{GS} = 0V, I_S = 15A$
Reverse Recovery Charge (with Parallel Schottky)④	$Q_{rr(s)}$		41		nC	$di/dt = 700A/\mu s$ (with 10BQ040) $V_{DS} = 16V, V_{GS} = 0V, I_S = 15A$

- Notes:**
- ① Repetitive rating; pulse width limited by max. junction temperature.
 - ② Pulse width $\leq 400 \mu s$; duty cycle $\leq 2\%$.
 - ③ When mounted on 1 inch square copper board
 - ④ Typ = measured - Q_{oss}
 - ⑤ Typical values of $R_{DS(on)}$ measured at $V_{GS} = 4.5V$, Q_G , Q_{sw} and Q_{OSS} measured at $V_{GS} = 5.0V, I_F = 15A$.

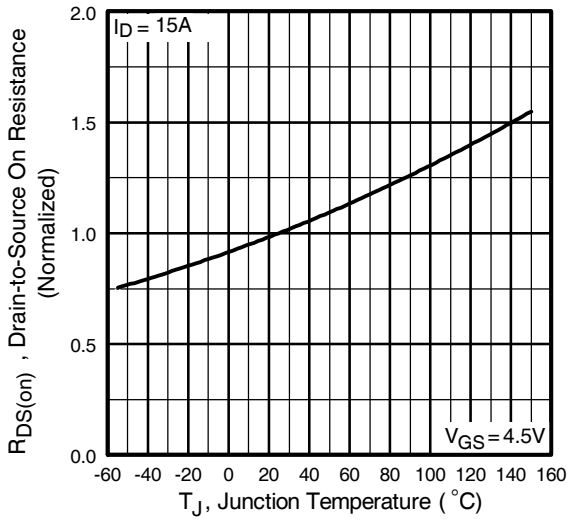


Fig 1. Normalized On-Resistance Vs. Temperature

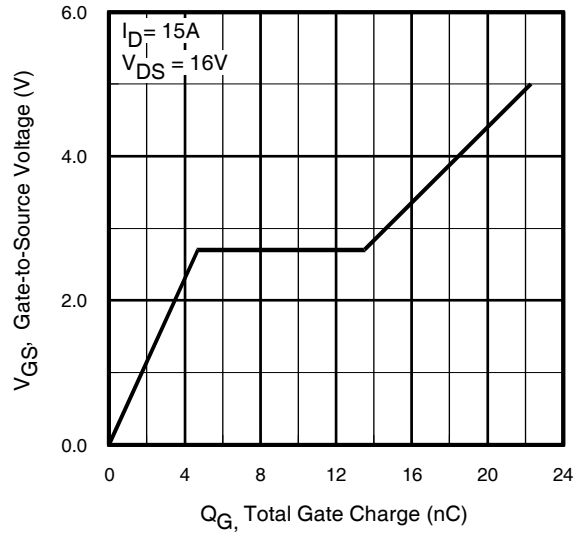


Fig 2. Typical Gate Charge Vs. Gate-to-Source Voltage

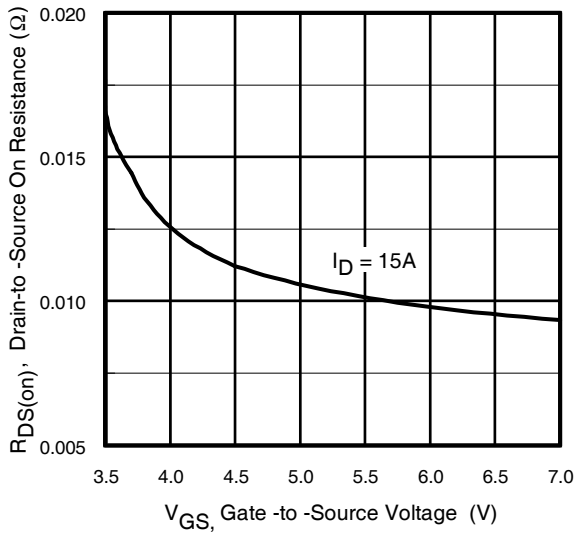


Fig 3. On-Resistance Vs. Gate Voltage

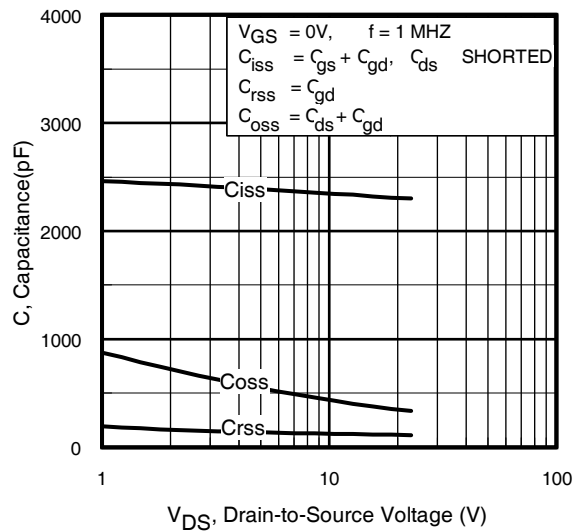


Fig 4. Typical Capacitance Vs. Drain-to-Source Voltage

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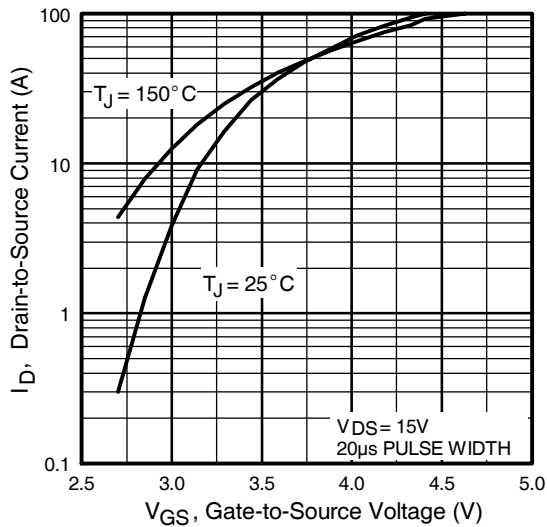


Fig 5. Typical Transfer Characteristics

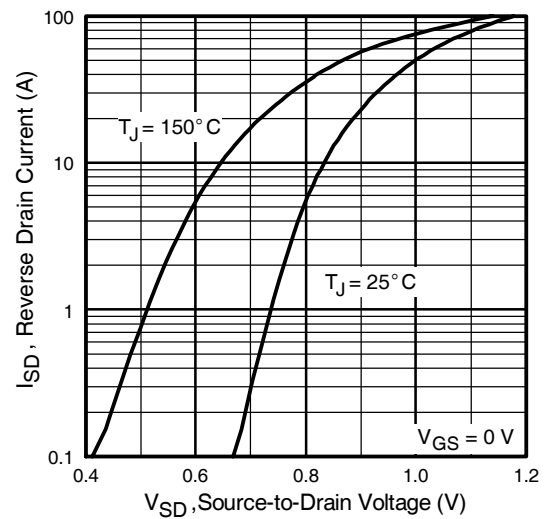


Fig 6. Typical Source-Drain Diode Forward Voltage

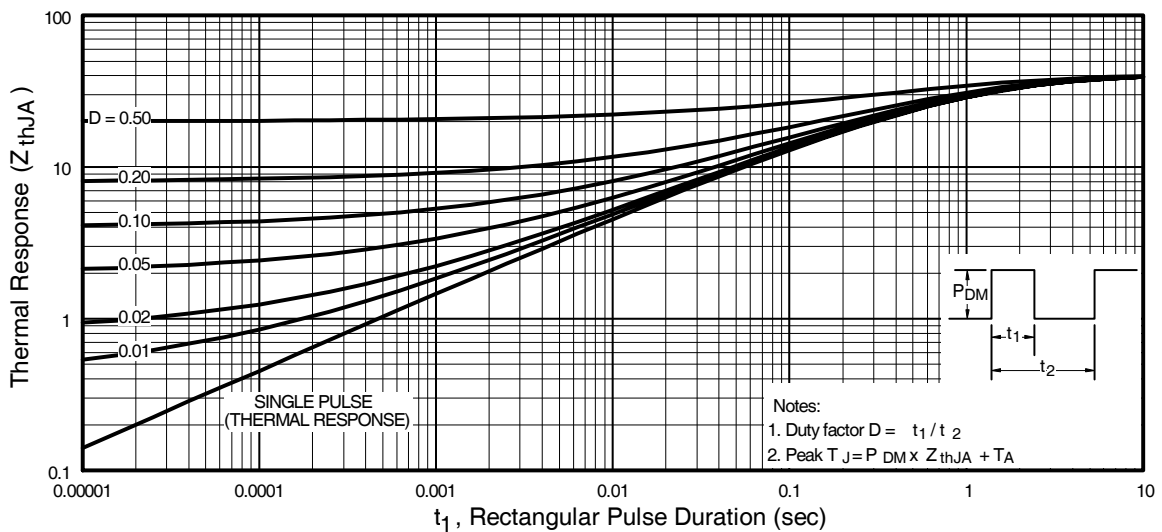
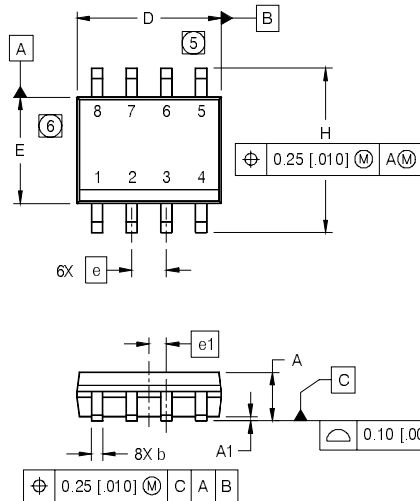


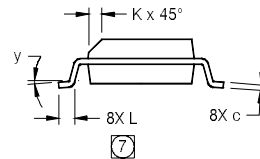
Figure 7. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

SO-8 Package Outline (Mofset & Fetky)

Dimensions are shown in millimeters (inches)



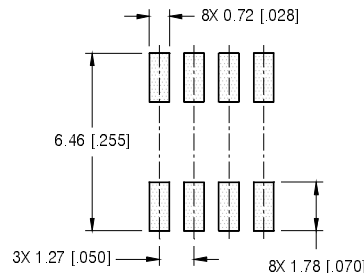
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40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



NOTES:

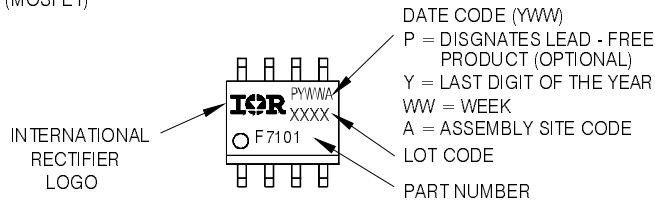
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-01 2AA.
- ⑤ DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
- ⑥ DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [0.010].
- ⑦ DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

FOOTPRINT



SO-8 Part Marking Information

EXAMPLE: THIS IS AN IRF7101 (MOSFET)



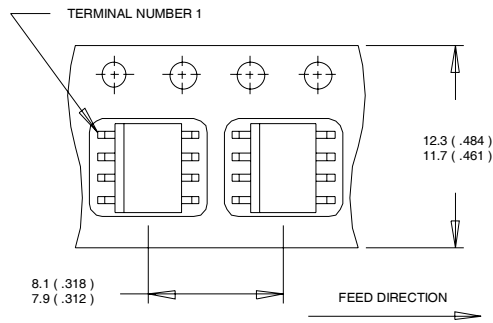
Note: For the most current drawing please refer to IR website at: <http://www.irf.com/package/>
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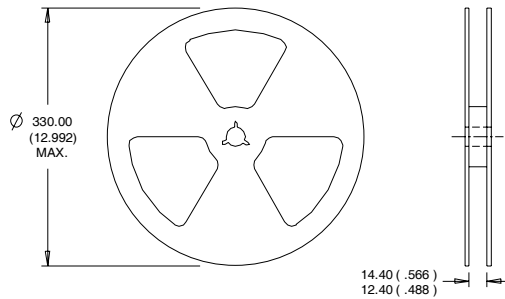
SO-8 Tape and Reel

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/>

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

International
IR Rectifier

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