

HEXFET® Power MOSFET for DC-DC Converters

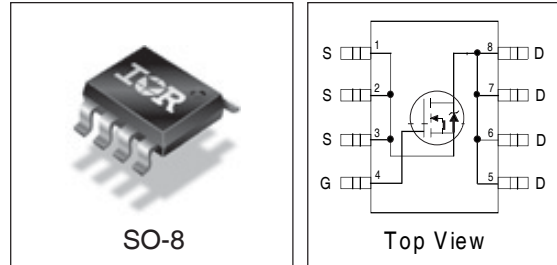
- N-Channel Application-Specific MOSFETs
- Ideal for CPU Core DC-DC Converters
- Low Conduction Losses
- Low Switching Losses
- Lead-Free

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 IRF7828 has been optimized for all parameters that are critical in synchronous buck converters including $R_{DS(on)}$, gate charge and C_{dv}/dt -induced turn-on immunity. The IRF7828 offers particularly low $R_{DS(on)}$ and high C_{dv}/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 CHARACTERISTICS⑤

IRF7828PbF	
$R_{DS(on)}$	9.5mΩ
Q_G	9.2nC
Q_{SW}	3.7nC
Q_{OSS}	6.1nC

Absolute Maximum Ratings

Parameter	Symbol	IRF7828PbF	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±20	
Continuous Drain or Source Current ($V_{GS} \geq 4.5V$)	I_D	13.6	A
		11	
Pulsed Drain Current①	I_{DM}	100	
Power Dissipation	P_D	2.5	W
		1.6	
Junction & Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C
Continuous Source Current (Body Diode)	I_S	3.1	A
Pulsed Source Current①	I_{SM}	100	

Thermal Resistance

Parameter		Max.	Units
Maximum Junction-to-Ambient③	$R_{\theta JA}$	50	°C/W
Maximum Junction-to-Lead	$R_{\theta JL}$	20	°C/W

IRF7828PbF

International
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Electrical Characteristics

Parameter		Min	Typ	Max	Units	Conditions
Drain-to-Source Breakdown Voltage	BV_{DS}	30	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
Static Drain-Source on Resistance	$R_{DS(on)}$	—	9.5	12.5	m Ω	$V_{GS} = 4.5V, I_D = 10A$ 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}	—	—	1.0	μA	$V_{DS} = 24V, V_{GS} = 0$
		—	—	150		$V_{DS} = 24V, V_{GS} = 0,$ $T_j = 125^\circ C$
Gate-Source Leakage Current	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20V$
Total Gate Chg Cont FET	Q_G	—	9.2	14	nC	$V_{GS} = 5.0V, I_D = 15A, V_{DS} = 16V$
Total Gate Chg Sync FET	Q_G	—	7.3	—		$V_{GS} = 5V, V_{DS} < 100mV$
Pre-Vth Gate-Source Charge	Q_{GS1}	—	2.5	—		$V_{DS} = 15V, I_D = 10A$
Post-Vth Gate-Source Charge	Q_{GS2}	—	0.8	—		
Gate to Drain Charge	Q_{GD}	—	2.9	—		
Switch Chg($Q_{GS2} + Q_{GD}$)	Q_{SW}	—	3.7	—		
Output Charge	Q_{OSS}	—	6.1	—		$V_{DS} = 10V, V_{GS} = 0$
Gate Resistance	R_G	—	2.3	—	Ω	
Turn-on Delay Time	$t_{d(on)}$	—	6.3	—	ns	$V_{DD} = 15V, I_D = 10A$ $V_{GS} = 4.5V$ Clamped Inductive Load
Rise Time	t_r	—	2.7	—		
Turn-off Delay Time	$t_{d(off)}$	—	9.7	—		
Fall Time	t_f	—	7.3	—		
Input Capacitance	C_{iss}	—	1010	—	pF	$V_{DS} = 15V, V_{GS} = 0$
Output Capacitance	C_{OSS}	—	360	—		
Reverse Transfer Capacitance	C_{rss}	—	110	—		

Source-Drain Rating & Characteristics

Parameter		Min	Typ	Max	Units	Conditions
Diode Forward Voltage*	V_{SD}	—	—	1.0	V	$I_S = 10A$ ②, $V_{GS} = 0V$
Reverse Recovery Charge④	Q_{rr}	—	13	—	nC	$di/dt \sim 700A/\mu s$ $V_{DS} = 16V, V_{GS} = 0V, I_S = 15A$
Reverse Recovery Charge (with Parallel Schottky)④	$Q_{rr(s)}$	—	13	—	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 $V_{GS} = 5.0V, I_F = 10A$.

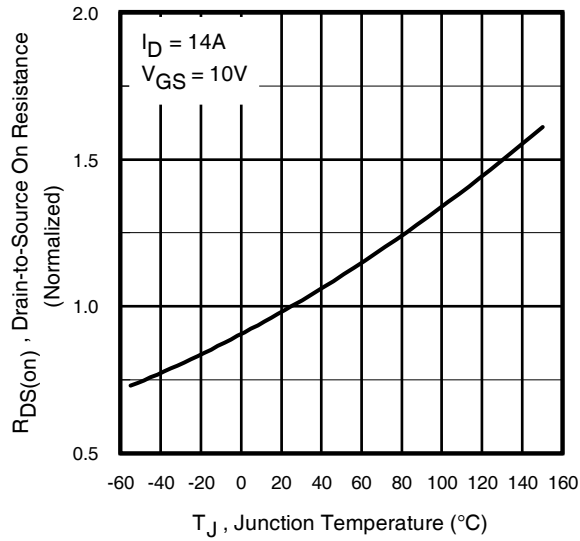


Fig 1. Normalized On-Resistance Vs. Temperature

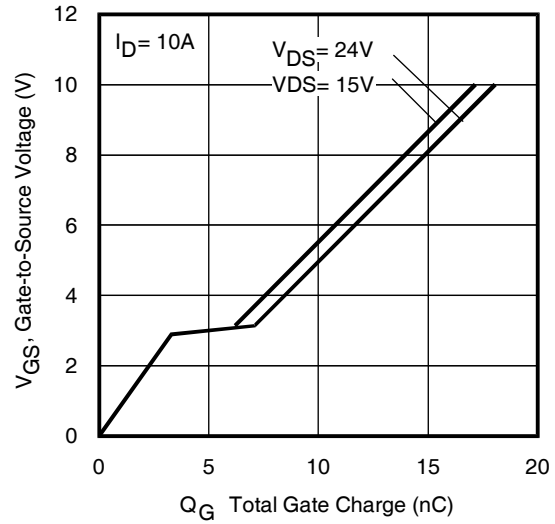


Fig 2. Typical Gate Charge Vs. Gate-to-Source Voltage

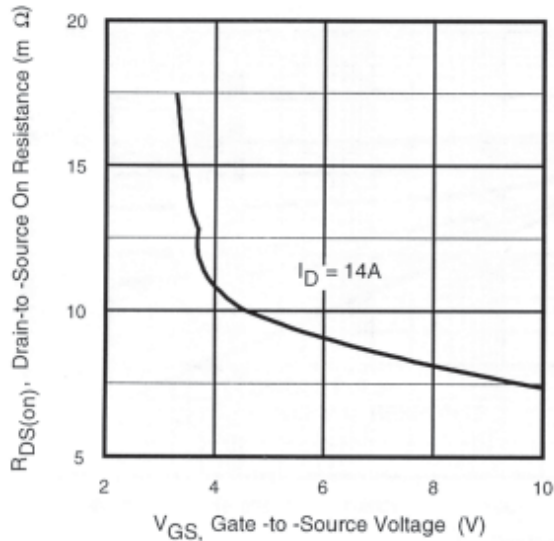


Fig 3. On-Resistance Vs. Gate Voltage

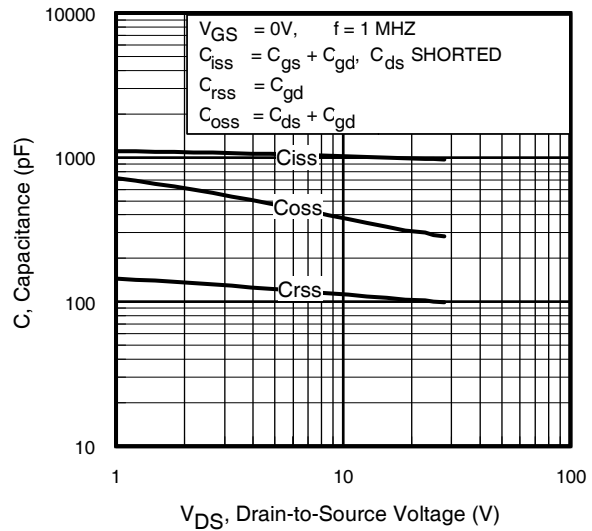
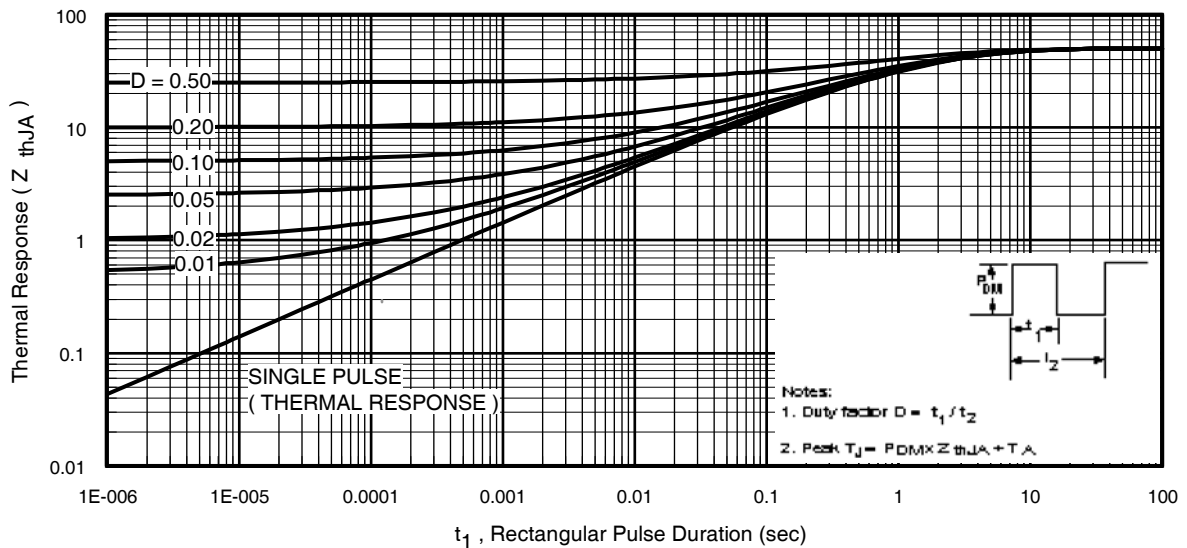
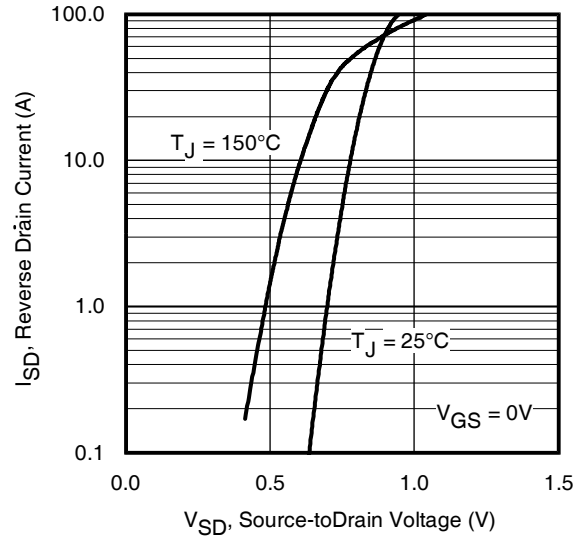
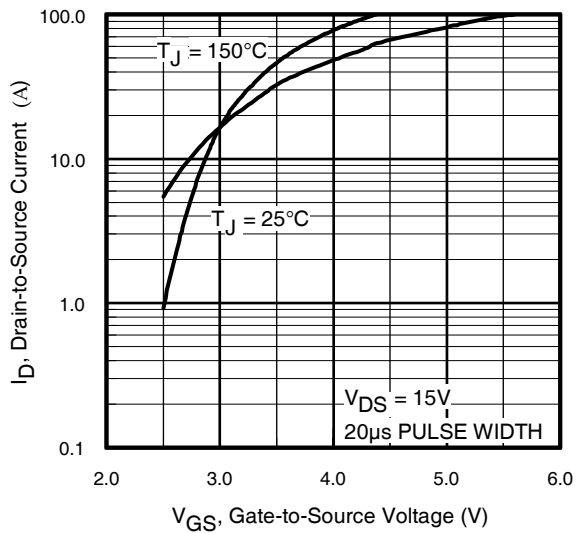


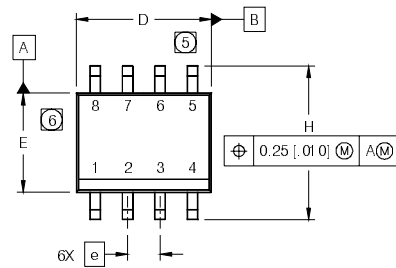
Fig 4. Typical Capacitance Vs. Drain-to-Source Voltage



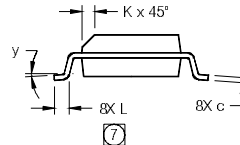
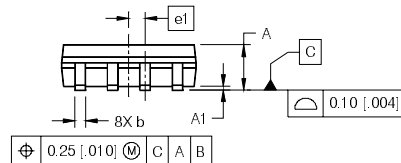
SO-8 Package Outline

Dimensions are shown in millimeters (inches)

IRF7828PbF



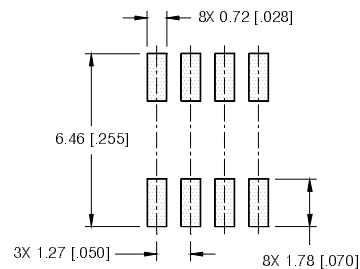
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40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



NOTES:

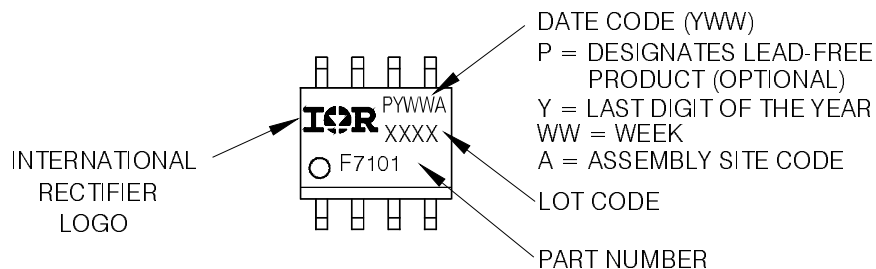
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
6. DIMENSION DOES NOT INCLUDE 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 (Lead-Free)

EXAMPLE: THIS IS AN IRF7101 (MOSFET)

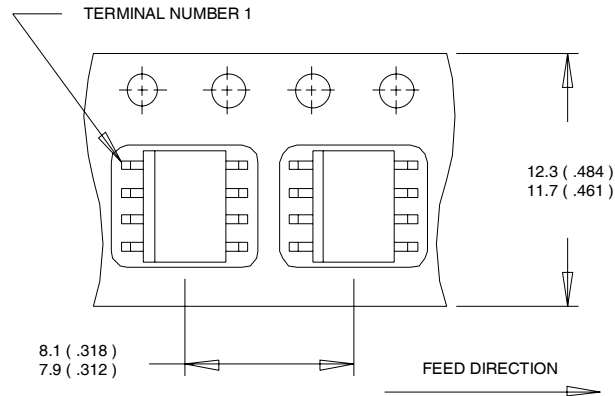


IRF7828PbF

SO-8 Tape and Reel

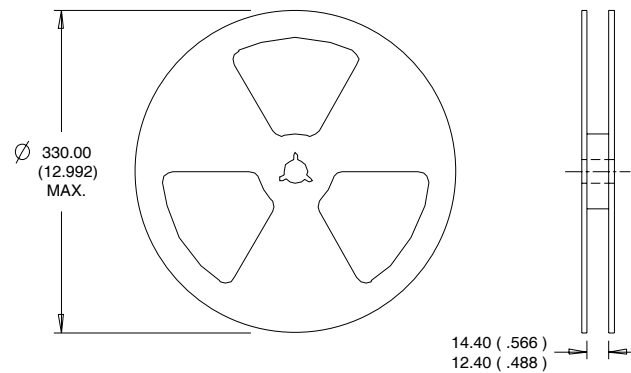
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IR Rectifier

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.

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.

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