

HEXFET® Power MOSFET for DC-DC Converters

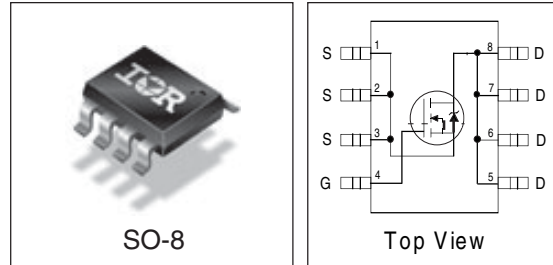
- N-Channel Application-Specific MOSFETs
- Ideal for CPU Core DC-DC Converters
- Low Conduction Losses
- Low Switching Losses

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 Cdv/dt -induced turn-on immunity. The IRF7828 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

IRF7828	
$R_{DS(on)}$	9.5mΩ
Q_G	9.2nC
Q_{sw}	3.7nC
Q_{oss}	6.1nC

Absolute Maximum Ratings

Parameter	Symbol	IRF7828	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±20	
Continuous Drain or Source Current ($V_{GS} \geq 4.5V$)	$T_A = 25^\circ C$	13.6	A
	$T_L = 70^\circ C$	11	
Pulsed Drain Current ^①	I_{DM}	100	
Power Dissipation	$T_A = 25^\circ C$	2.5	W
	$T_L = 70^\circ C$	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 Current ^①	I_{SM}	100	

Thermal Resistance

Parameter		Max.	Units
Maximum Junction-to-Ambient ^③	$R_{\theta JA}$	50	°C/W
Maximum Junction-to-Lead	$R_{\theta JL}$	20	°C/W

IRF7828

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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	$R_{DS(on)}$	-	9.5	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 $V_{GS} = 5.0V, I_F = 10A$.

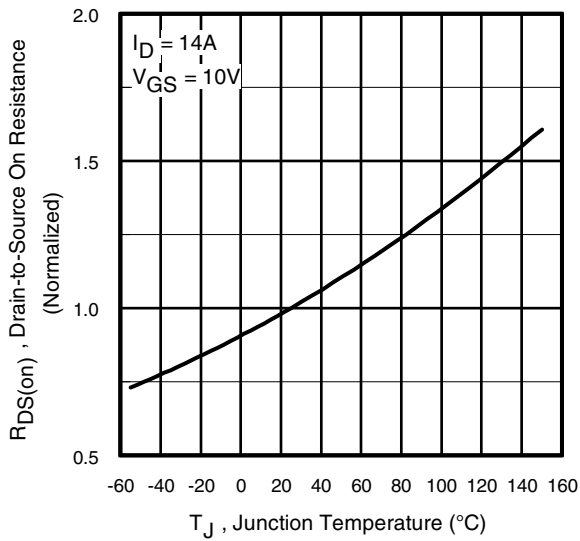


Fig 1. Normalized On-Resistance Vs. Temperature

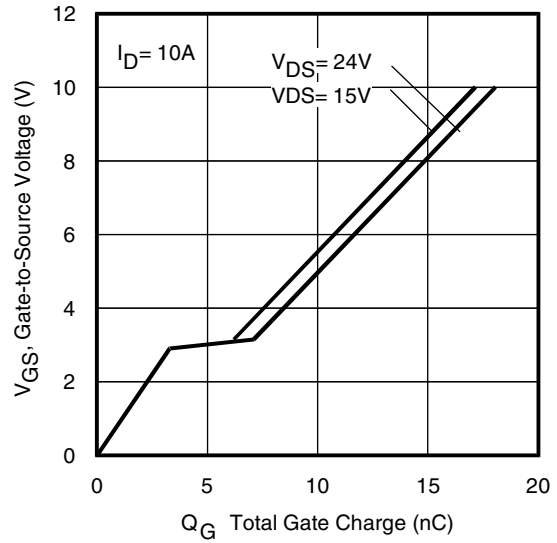


Fig 2. Typical Gate Charge Vs. Gate-to-Source Voltage

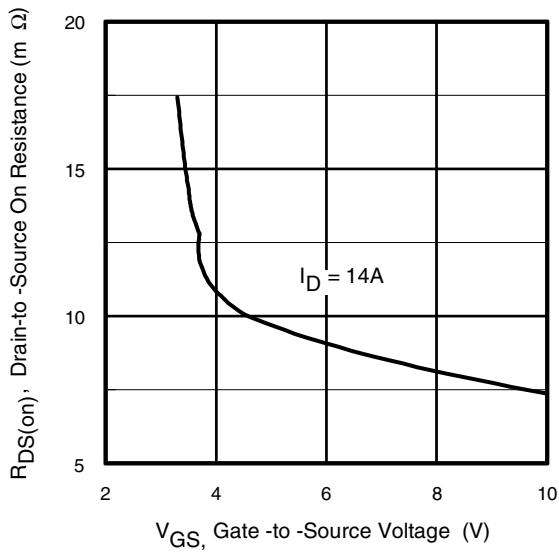


Fig 3. On-Resistance Vs. Gate Voltage

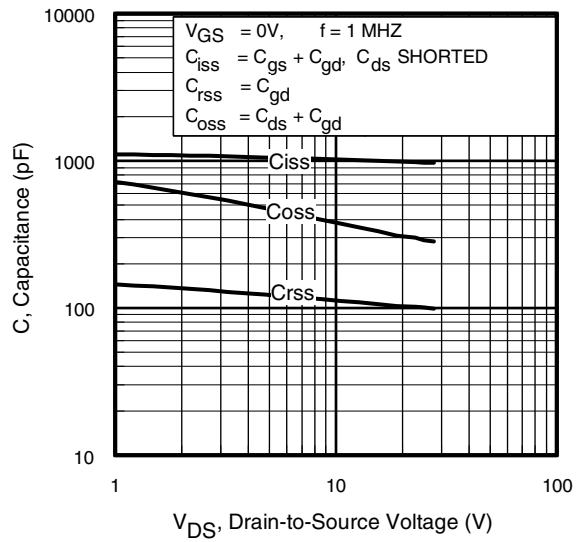
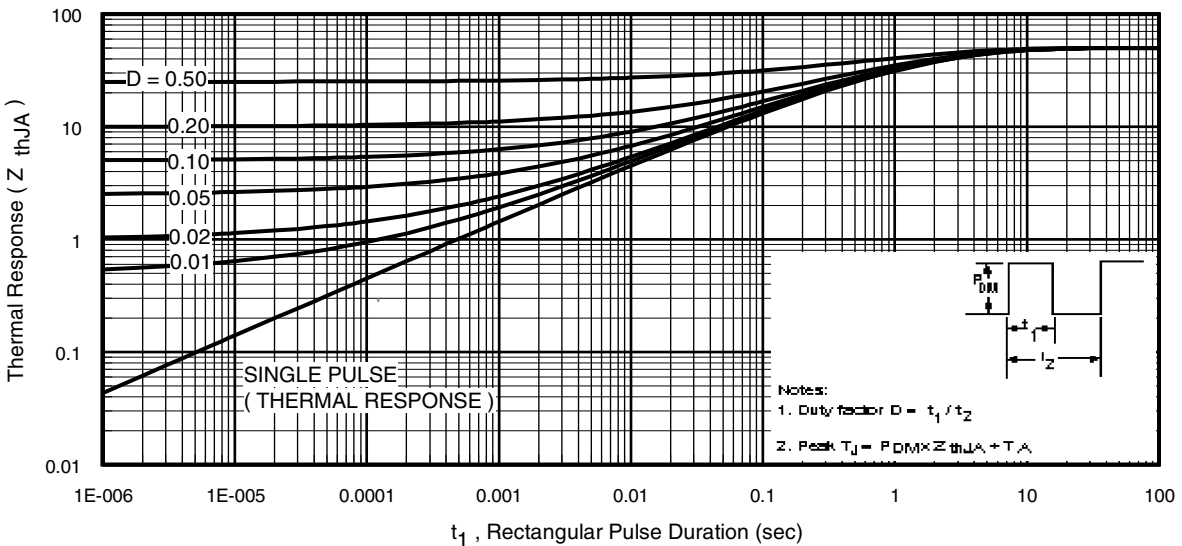
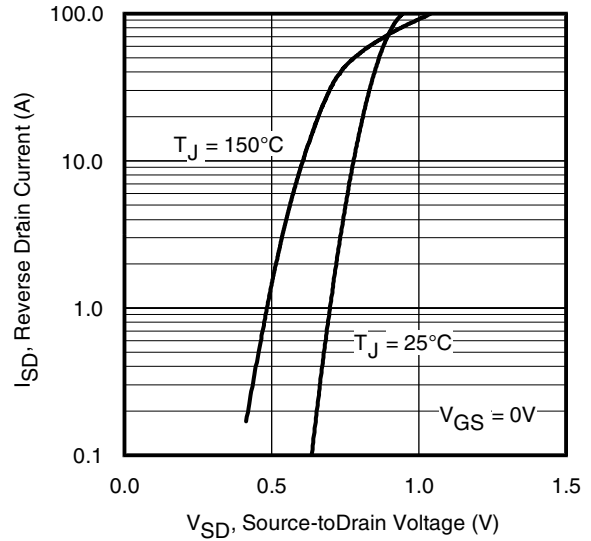
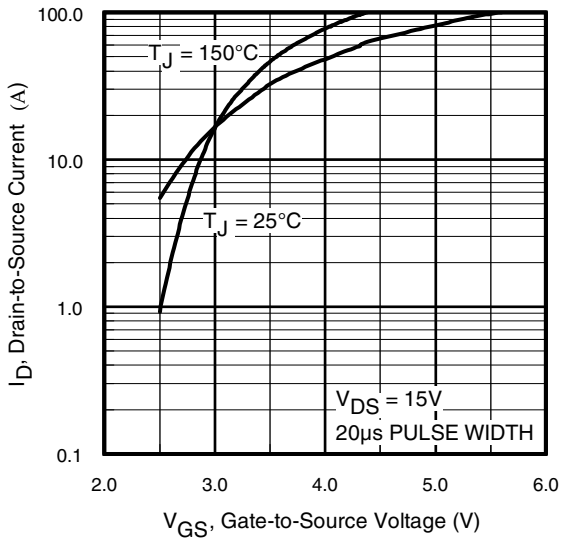
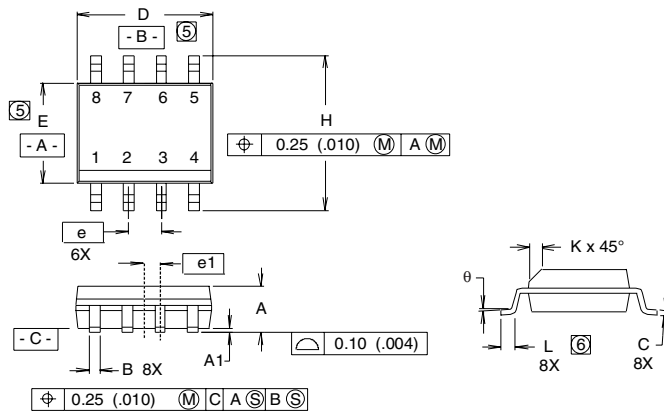


Fig 4. Typical Capacitance Vs. Drain-to-Source Voltage

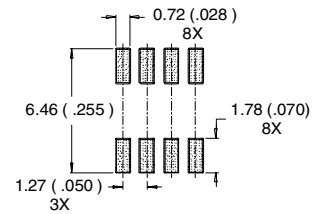


SO-8 Package Details



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

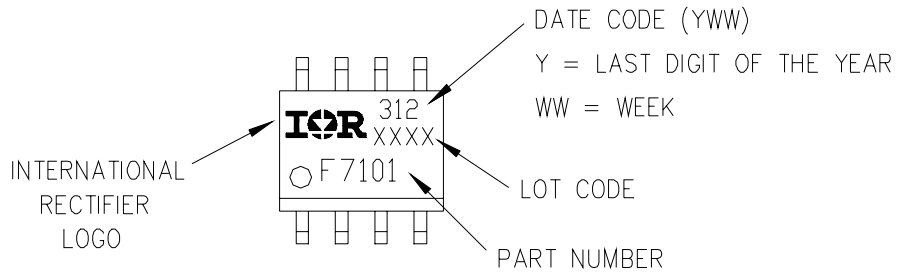


NOTES:

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..

SO-8 Part Marking

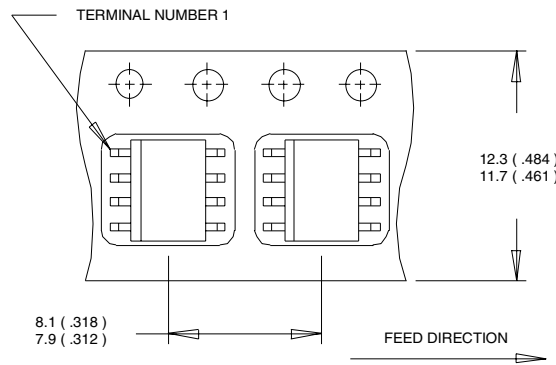
EXAMPLE: THIS IS AN IRF7101



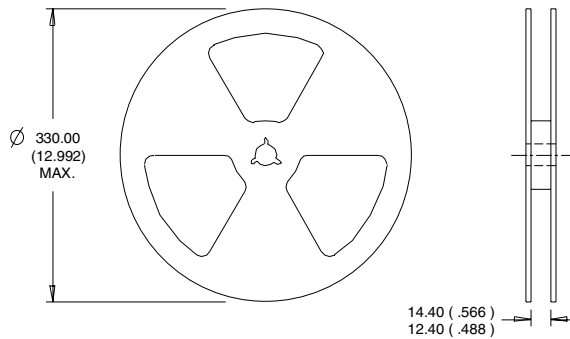
IRF7828

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SO-8 Tape and Reel



- 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 Industrial market.
Qualification Standards can be found on IR's Web site.

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