

**HEXFET® Power MOSFET for DC-DC Converters**

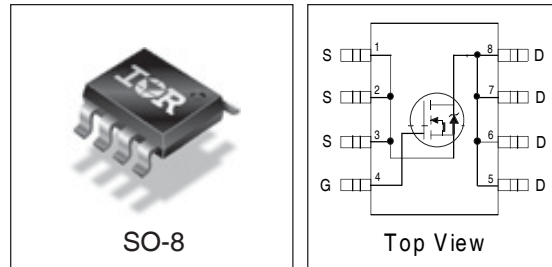
- N-Channel Application-Specific MOSFETs
- Ideal for CPU Core DC-DC Converters
- Low Conduction Losses
- Low Switching Losses
- Lead-Free

**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**

| <b>IRF7828PbF</b> |       |
|-------------------|-------|
| $R_{DS(on)}$      | 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  
**IR** Rectifier

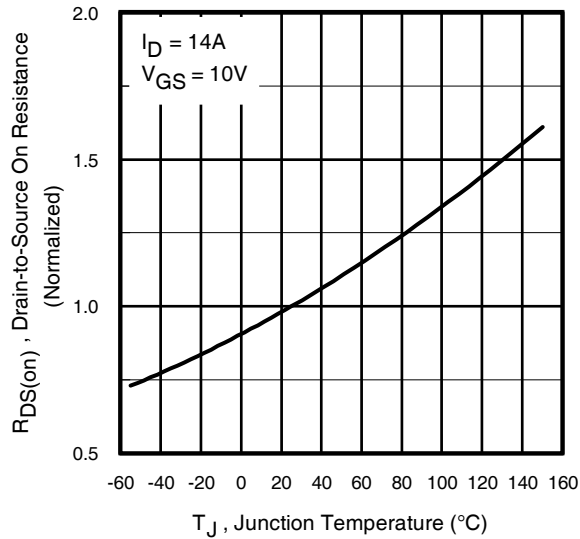
## Electrical Characteristics

| 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 $\Omega$ | $V_{GS} = 4.5V, I_D = 10A$ 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       | $\mu A$    | $V_{DS} = 24V, V_{GS} = 0$                                             |
|                                   |              | —   | —    | 150       |            | $V_{DS} = 24V, V_{GS} = 0,$<br>$T_j = 125^\circ C$                     |
| Gate-Source Leakage Current       | $I_{GSS}$    | —   | —    | $\pm 100$ | 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  | —         | $\Omega$   |                                                                        |
| Turn-on Delay Time                | $t_{d(on)}$  | —   | 6.3  | —         | ns         | $V_{DD} = 15V, I_D = 10A$<br>$V_{GS} = 4.5V$<br>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  | —         |            |                                                                        |

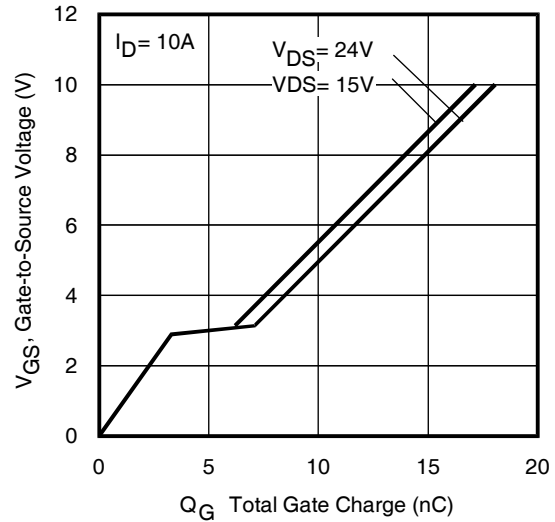
## Source-Drain Rating & Characteristics

| 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    | $di/dt \sim 700A/\mu s$<br>$V_{DS} = 16V, V_{GS} = 0V, I_S = 15A$                |
| Reverse Recovery Charge (with Parallel Schottky)④ | $Q_{rr(s)}$ | —   | 13  | —   | nC    | $di/dt = 700A/\mu s$<br>(with 10BQ040)<br>$V_{DS} = 16V, V_{GS} = 0V, I_S = 15A$ |

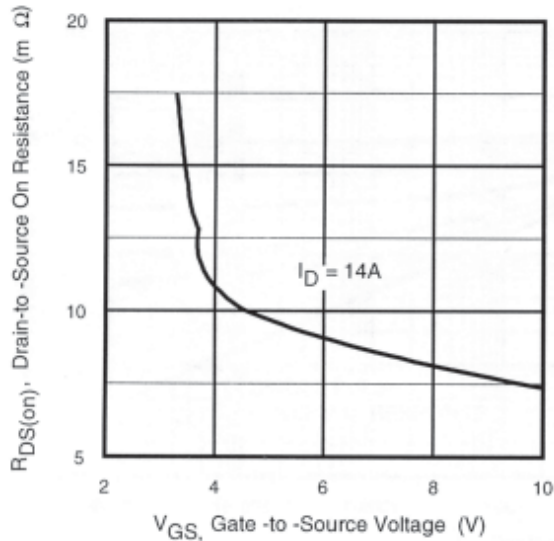
- Notes:**
- ① Repetitive rating; pulse width limited by max. junction temperature.
  - ② Pulse width  $\leq 400 \mu s$ ; duty cycle  $\leq 2\%$ .
  - ③ When mounted on 1 inch square copper board
  - ④ Typ = measured -  $Q_{oss}$
  - ⑤ Typical values of  $R_{DS(on)}$  measured at  $V_{GS} = 4.5V, Q_G, Q_{SW}$  and  $Q_{OSS}$  measured at  $V_{GS} = 5.0V, I_F = 10A$ .



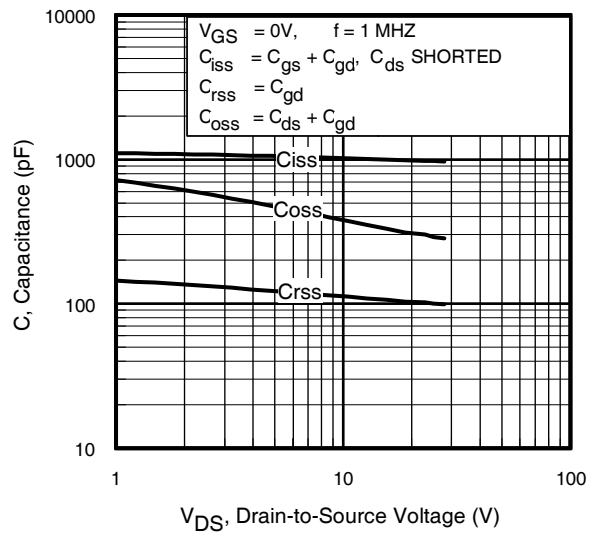
**Fig 1.** Normalized On-Resistance Vs. Temperature



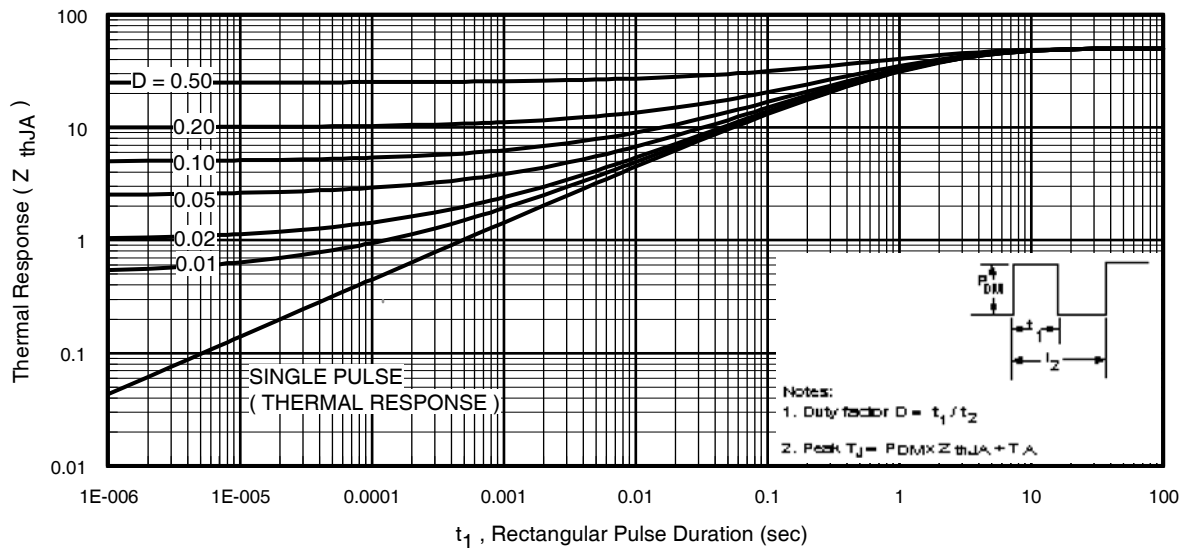
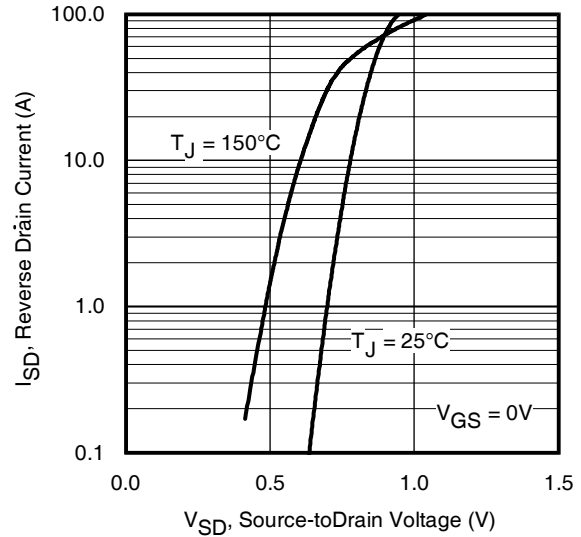
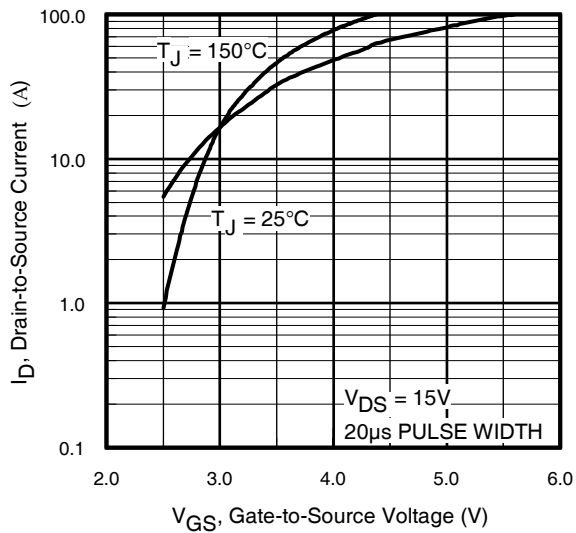
**Fig 2.** Typical Gate Charge Vs. Gate-to-Source Voltage



**Fig 3.** On-Resistance Vs. Gate Voltage



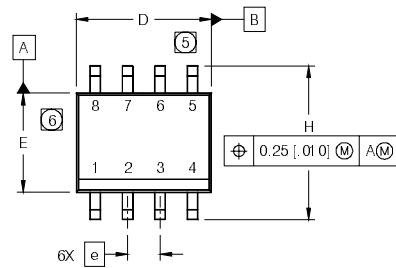
**Fig 4.** Typical Capacitance Vs. Drain-to-Source Voltage



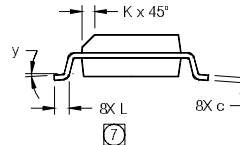
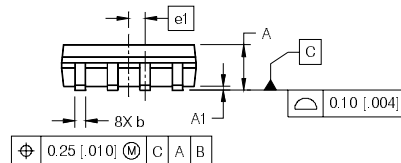
## SO-8 Package Outline

Dimensions are shown in millimeters (inches)

# IRF7828PbF



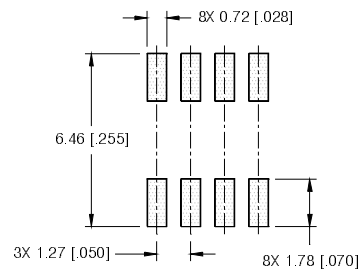
| DIM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | .0532  | .0688 | 1.35        | 1.75  |
| A1  | .0040  | .0098 | 0.10        | 0.25  |
| b   | .013   | .020  | 0.33        | 0.51  |
| c   | .0075  | .0098 | 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:

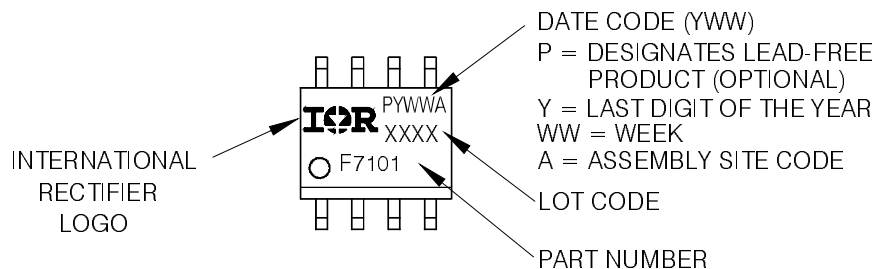
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
6. DIMENSION DOES NOT INCLUDE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

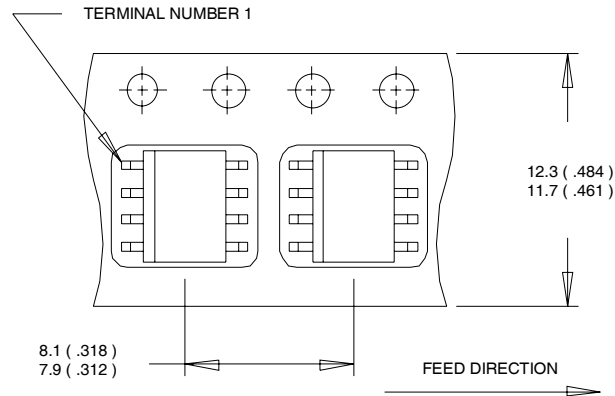


# IRF7828PbF

## SO-8 Tape and Reel

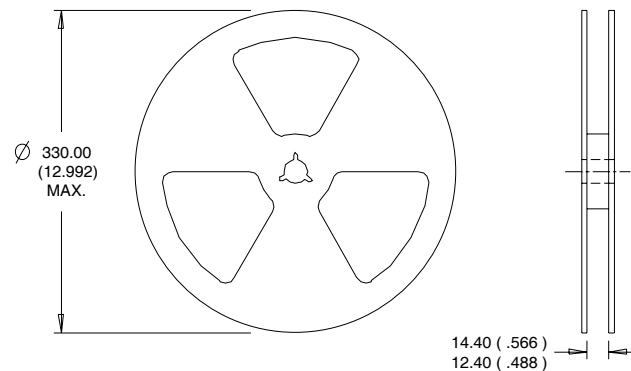
International  
**IR** Rectifier

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.

International  
**IR** Rectifier

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