

# International IOR Rectifier

## IRF7855PbF

HEXFET® Power MOSFET

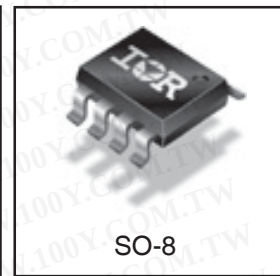
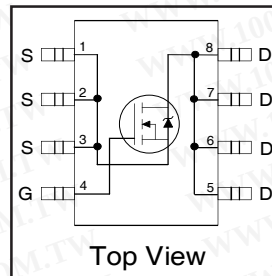
### Applications

- Primary Side Switch in Bridge Topology in Isolated DC-DC Converters
- Primary Side Switch in Push-Pull Topology for 18-36Vin Isolated DC-DC Converters
- Secondary Side Synchronous Rectification Switch for 15Vout
- Suitable for 48V Non-Isolated Synchronous Buck DC-DC Applications

### Benefits

- Low Gate to Drain Charge to Reduce Switching Losses
- Fully Characterized Capacitance Including Effective  $C_{OSS}$  to Simplify Design, (See App. Note AN1001)
- Fully Characterized Avalanche Voltage and Current

| $V_{DS}$ | $R_{DS(on)}$ max       | $I_D$ |
|----------|------------------------|-------|
| 60V      | 9.4mΩ @ $V_{GS} = 10V$ | 12A   |



### Absolute Maximum Ratings

|                            | Parameter                                | Max.         | Units |
|----------------------------|------------------------------------------|--------------|-------|
| $V_{DS}$                   | Drain-to-Source Voltage                  | 60           | V     |
| $V_{GS}$                   | Gate-to-Source Voltage                   | ± 20         |       |
| $I_D$ @ $T_A = 25^\circ C$ | Continuous Drain Current, $V_{GS}$ @ 10V | 12           | A     |
| $I_D$ @ $T_A = 70^\circ C$ | Continuous Drain Current, $V_{GS}$ @ 10V | 8.7          |       |
| $I_{DM}$                   | Pulsed Drain Current ①                   | 97           |       |
| $P_D$ @ $T_A = 25^\circ C$ | Maximum Power Dissipation ③              | 2.5          | W     |
|                            | Linear Derating Factor                   | 0.02         | W/°C  |
| dv/dt                      | Peak Diode Recovery dv/dt ⑥              | 9.9          | V/ns  |
| $T_J$                      | Operating Junction and                   | -55 to + 150 | °C    |
| $T_{STG}$                  | Storage Temperature Range                |              |       |

### Thermal Resistance

|                 | Parameter                           | Typ. | Max. | Units |
|-----------------|-------------------------------------|------|------|-------|
| $R_{\theta JL}$ | Junction-to-Drain Lead              | —    | 20   | °C/W  |
| $R_{\theta JA}$ | Junction-to-Ambient (PCB Mount) ③ ⑦ | —    | 50   |       |

Notes ① through ⑦ are on page 8

www.irf.com

# IRF7855PbF

International  
**IR** Rectifier

## Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

|                                 | Parameter                            | Min. | Typ. | Max. | Units      | Conditions                                           |
|---------------------------------|--------------------------------------|------|------|------|------------|------------------------------------------------------|
| $V_{(BR)DSS}$                   | Drain-to-Source Breakdown Voltage    | 60   | —    | —    | V          | $V_{GS} = 0V, I_D = 250\mu A$                        |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient  | —    | 72   | —    | mV/°C      | Reference to $25^\circ\text{C}, I_D = 1mA$           |
| $R_{DS(on)}$                    | Static Drain-to-Source On-Resistance | —    | 7.4  | 9.4  | m $\Omega$ | $V_{GS} = 10V, I_D = 12A$ ④                          |
| $V_{GS(th)}$                    | Gate Threshold Voltage               | 3.0  | —    | 4.9  | V          | $V_{DS} = V_{GS}, I_D = 100\mu A$                    |
| $I_{DSS}$                       | Drain-to-Source Leakage Current      | —    | —    | 20   | $\mu A$    | $V_{DS} = 60V, V_{GS} = 0V$                          |
|                                 |                                      | —    | —    | 250  |            | $V_{DS} = 60V, V_{GS} = 0V, T_J = 125^\circ\text{C}$ |
| $I_{GSS}$                       | Gate-to-Source Forward Leakage       | —    | —    | 100  | nA         | $V_{GS} = 20V$                                       |
|                                 | Gate-to-Source Reverse Leakage       | —    | —    | -100 |            | $V_{GS} = -20V$                                      |

## Dynamic @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

|                 | Parameter                       | Min. | Typ. | Max. | Units | Conditions                                   |
|-----------------|---------------------------------|------|------|------|-------|----------------------------------------------|
| $g_{fs}$        | Forward Transconductance        | 14   | —    | —    | S     | $V_{DS} = 25V, I_D = 7.2A$                   |
| $Q_g$           | Total Gate Charge               | —    | 26   | 39   | nC    | $I_D = 7.2A$                                 |
| $Q_{gs}$        | Gate-to-Source Charge           | —    | 6.8  | —    |       | $V_{DS} = 30V$                               |
| $Q_{gd}$        | Gate-to-Drain ("Miller") Charge | —    | 9.6  | —    |       | $V_{GS} = 10V$ ④                             |
| $t_{d(on)}$     | Turn-On Delay Time              | —    | 8.7  | —    | ns    | $V_{DD} = 30V$                               |
| $t_r$           | Rise Time                       | —    | 13   | —    |       | $I_D = 7.2A$                                 |
| $t_{d(off)}$    | Turn-Off Delay Time             | —    | 16   | —    |       | $R_G = 6.2\Omega$                            |
| $t_f$           | Fall Time                       | —    | 12   | —    |       | $V_{GS} = 10V$ ④                             |
| $C_{iss}$       | Input Capacitance               | —    | 1560 | —    | pF    | $V_{GS} = 0V$                                |
| $C_{oss}$       | Output Capacitance              | —    | 440  | —    |       | $V_{DS} = 25V$                               |
| $C_{rss}$       | Reverse Transfer Capacitance    | —    | 120  | —    |       | $f = 1.0MHz$                                 |
| $C_{oss}$       | Output Capacitance              | —    | 1910 | —    |       | $V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0MHz$     |
| $C_{oss}$       | Output Capacitance              | —    | 320  | —    |       | $V_{GS} = 0V, V_{DS} = 48V, f = 1.0MHz$      |
| $C_{oss, eff.}$ | Effective Output Capacitance    | —    | 520  | —    |       | $V_{GS} = 0V, V_{DS} = 0V \text{ to } 48V$ ⑤ |

## Avalanche Characteristics

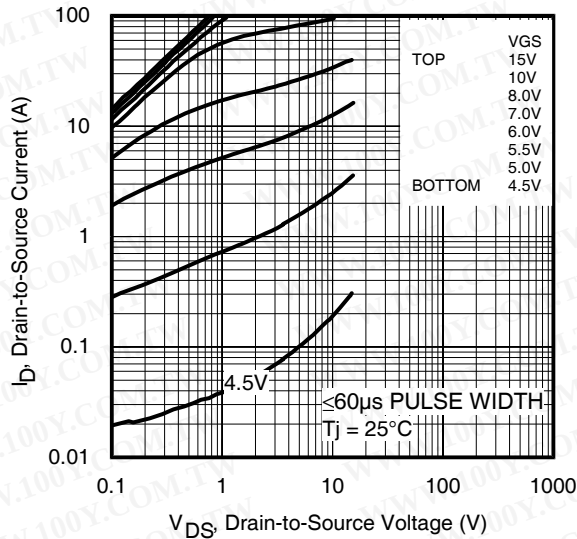
|          | Parameter                       | Typ. | Max. | Units |
|----------|---------------------------------|------|------|-------|
| $E_{AS}$ | Single Pulse Avalanche Energy ② | —    | 540  | mJ    |
| $I_{AR}$ | Avalanche Current ①             | —    | 7.2  | A     |

## Diode Characteristics

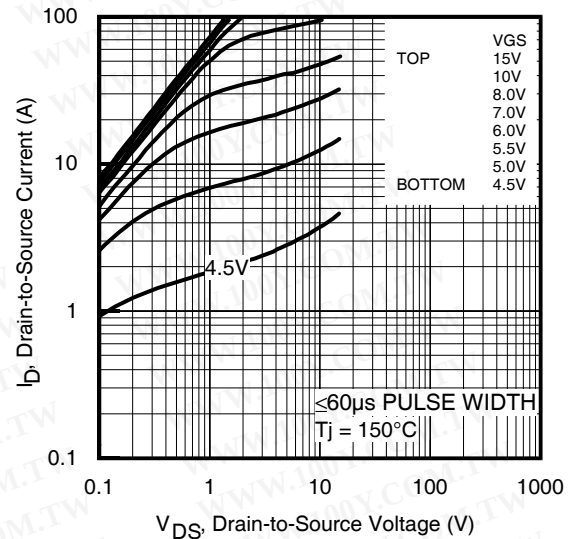
|          | Parameter                                 | Min.                                                                 | Typ. | Max. | Units | Conditions                                                              |
|----------|-------------------------------------------|----------------------------------------------------------------------|------|------|-------|-------------------------------------------------------------------------|
| $I_S$    | Continuous Source Current<br>(Body Diode) | —                                                                    | —    | 2.3  | A     | MOSFET symbol<br>showing the<br>integral reverse<br>p-n junction diode. |
| $I_{SM}$ | Pulsed Source Current<br>(Body Diode) ①   | —                                                                    | —    | 97   |       |                                                                         |
| $V_{SD}$ | Diode Forward Voltage                     | —                                                                    | —    | 1.3  | V     | $T_J = 25^\circ\text{C}, I_S = 7.2A, V_{GS} = 0V$ ④                     |
| $t_{rr}$ | Reverse Recovery Time                     | —                                                                    | 33   | 50   | ns    | $T_J = 25^\circ\text{C}, I_F = 7.2A, V_{DD} = 25V$                      |
| $Q_{rr}$ | Reverse Recovery Charge                   | —                                                                    | 38   | 57   | nC    | $di/dt = 100A/\mu s$ ④                                                  |
| $t_{on}$ | Forward Turn-On Time                      | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD) |      |      |       |                                                                         |

International  
**IR** Rectifier

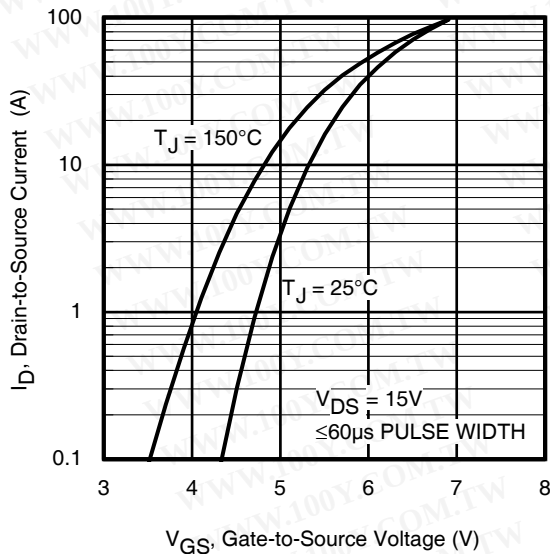
## IRF7855PbF



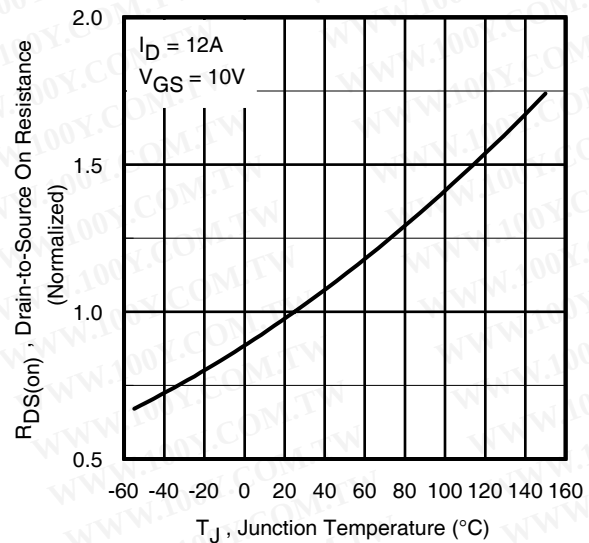
**Fig 1.** Typical Output Characteristics



**Fig 2.** Typical Output Characteristics



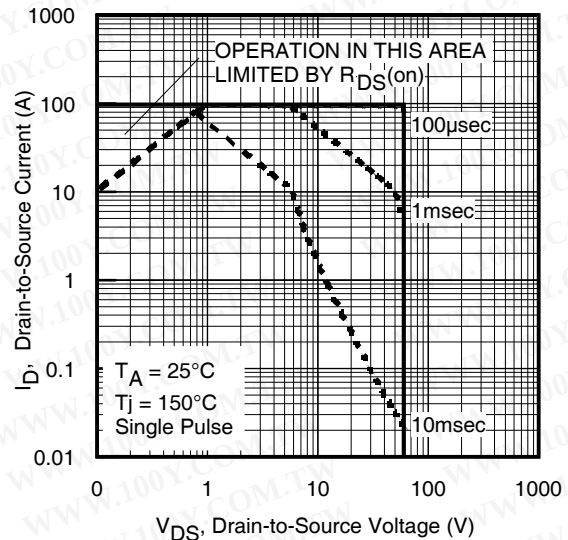
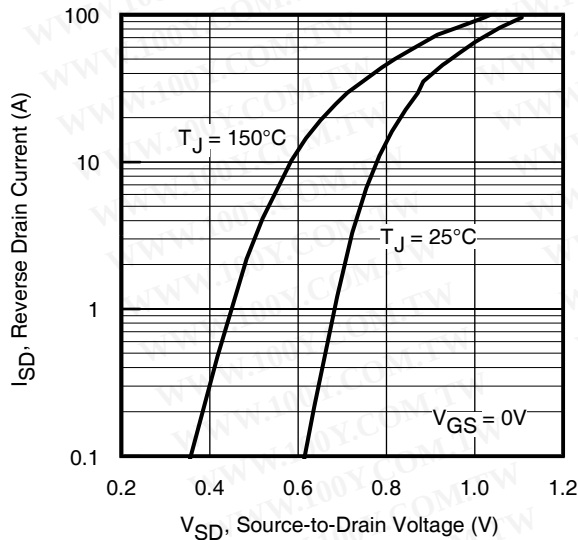
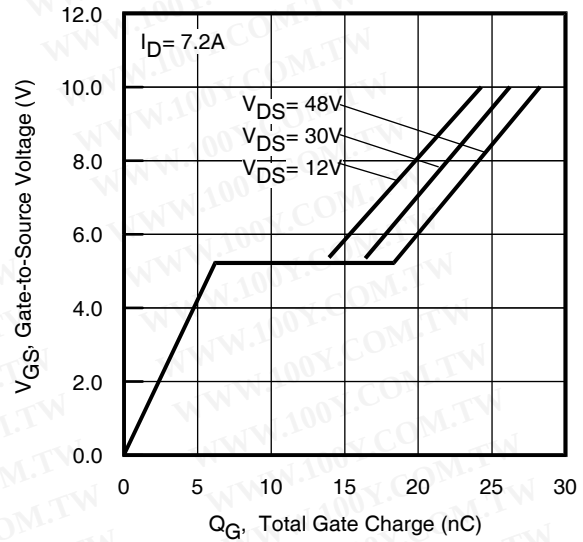
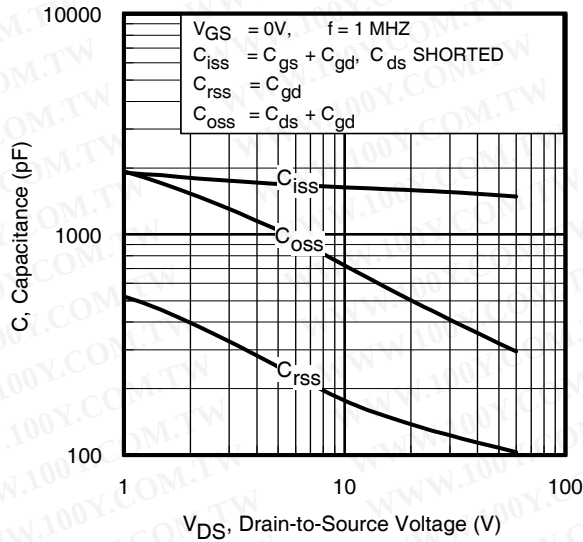
**Fig 3.** Typical Transfer Characteristics



**Fig 4.** Normalized On-Resistance vs. Temperature

# IRF7855PbF

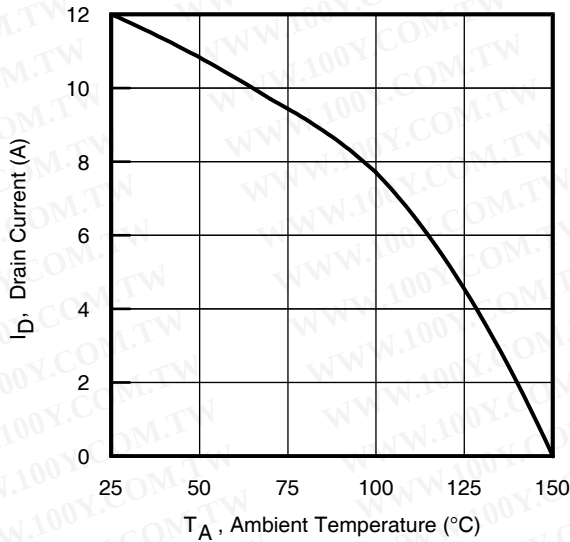
International  
**IR** Rectifier



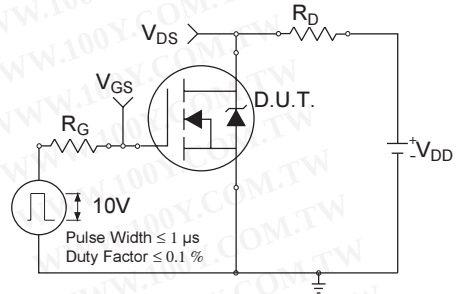


International  
**IOR** Rectifier

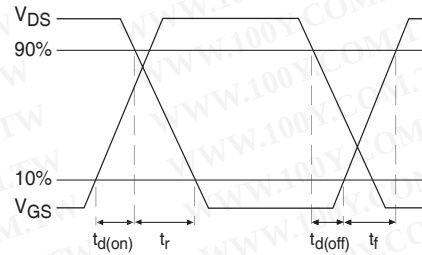
**IRF7855PbF**



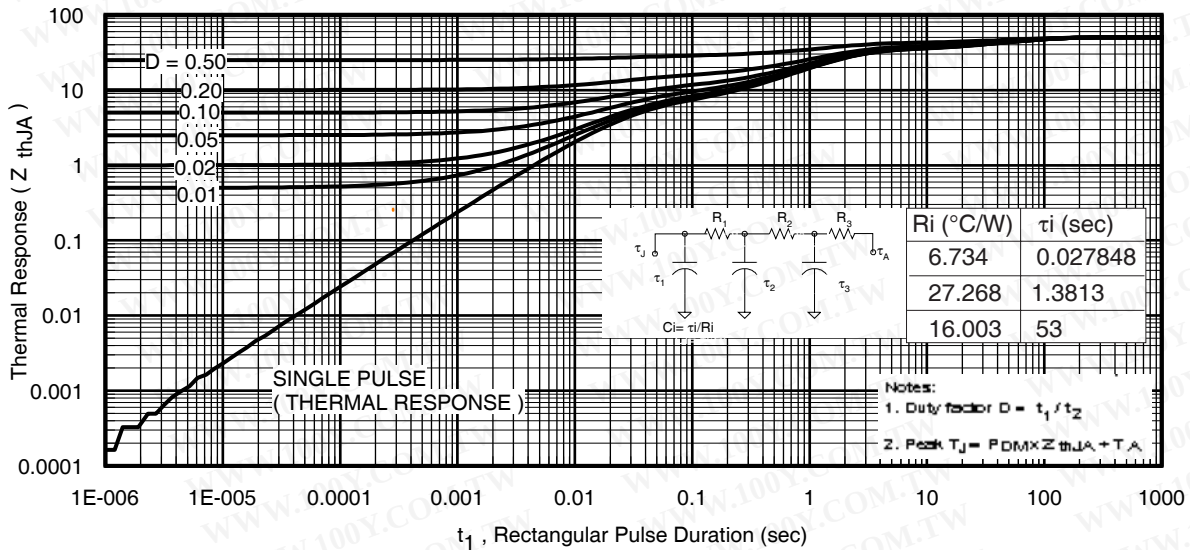
**Fig 9.** Maximum Drain Current vs. Ambient Temperature



**Fig 10a.** Switching Time Test Circuit



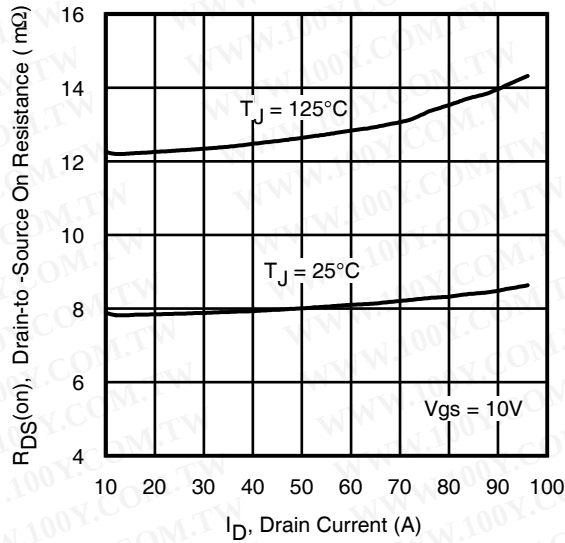
**Fig 10b.** Switching Time Waveforms



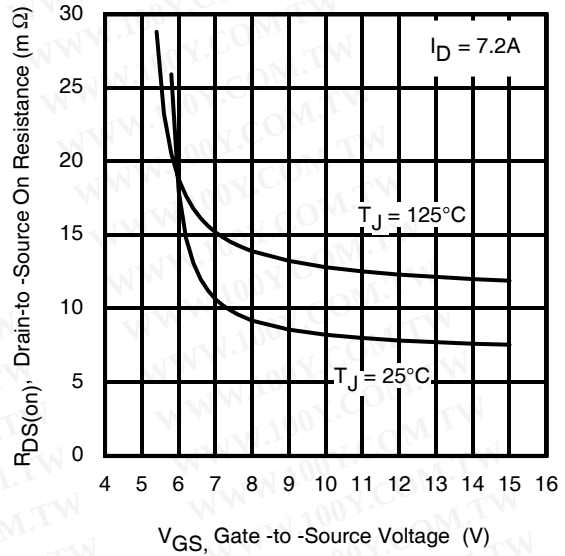
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

# IRF7855PbF

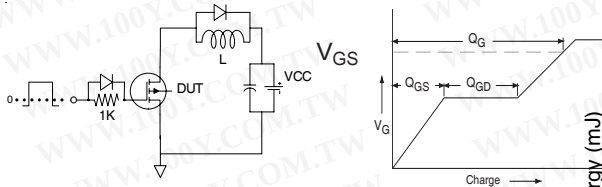
International  
**IR** Rectifier



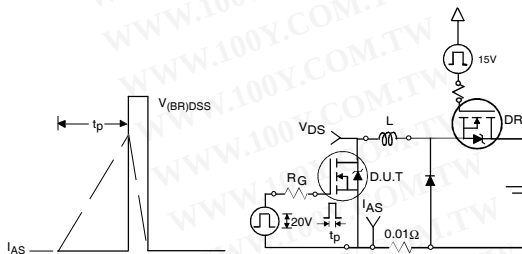
**Fig 12.** On-Resistance vs. Drain Current



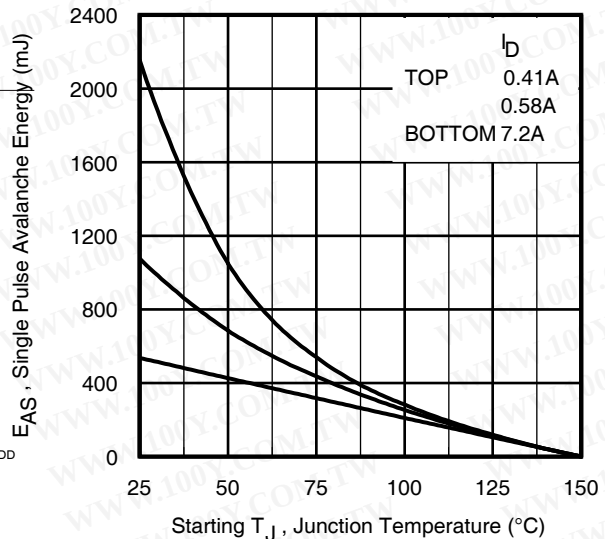
**Fig 13.** On-Resistance vs. Gate Voltage



**Fig 14a&b.** Basic Gate Charge Test Circuit and Waveform



**Fig 15a&b.** Unclamped Inductive Test circuit and Waveforms

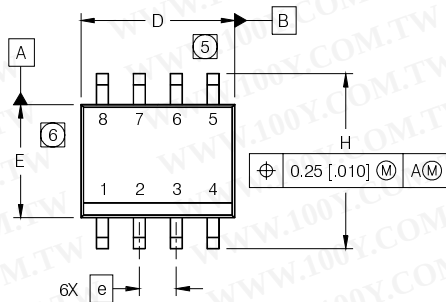


**Fig 15c.** Maximum Avalanche Energy vs. Drain Current

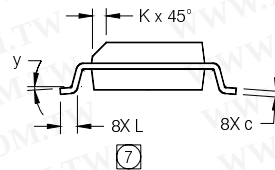
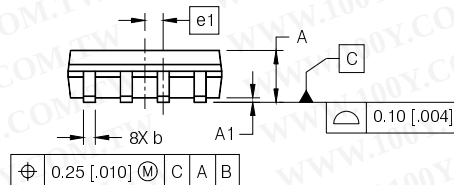
International  
**IR** Rectifier

**IRF7855PbF**

## SO-8 Package Details



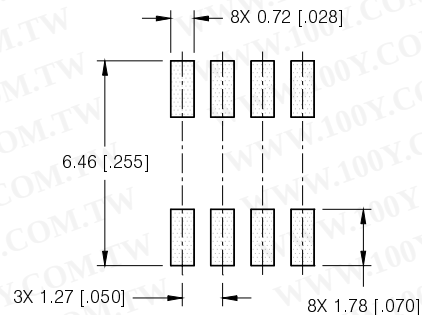
| DIM | INCHES     |       | MILLIMETERS |      |
|-----|------------|-------|-------------|------|
|     | MIN        | MAX   | MIN         | MAX  |
| A   | .0532      | .0688 | 1.35        | 1.75 |
| A1  | .0040      | .0098 | 0.10        | 0.25 |
| b   | .013       | .020  | 0.33        | 0.51 |
|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

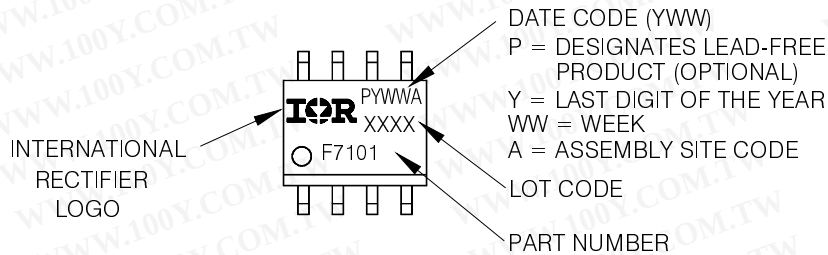
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
6. DIMENSION DOES NOT INCLUDE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

EXAMPLE: THIS IS AN IRF7101 (MOSFET)

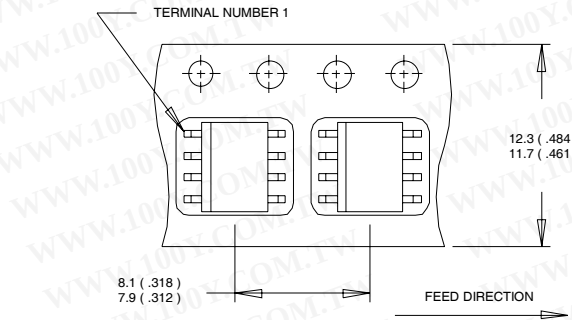


勝特力材料 886-3-5753170  
 勝特力电子(上海) 86-21-54151736  
 勝特力电子(深圳) 86-755-83298787  
[Http://www.100y.com.tw](http://www.100y.com.tw)

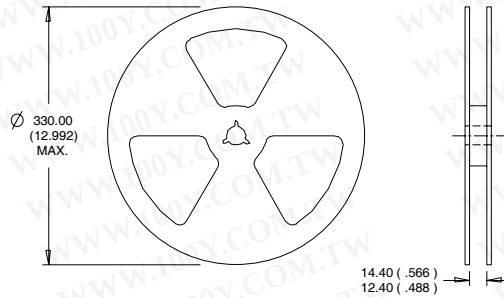
# IRF7855PbF

International  
**IR** Rectifier

## 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.

### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 21\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 7.2\text{A}$ .
- ③ When mounted on 1 inch square copper board,  $t \leq 10$  sec.
- ④ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ⑤  $C_{OSS}$  eff. is a fixed capacitance that gives the same charging time as  $C_{OSS}$  while  $V_{DS}$  is rising from 0 to 80%  $V_{DSS}$ .
- ⑥  $I_{SD} \leq 7.2\text{A}$ ,  $di/dt \leq 650\text{A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ\text{C}$ .
- ⑦  $R_{\theta}$  is measured at  $T_J$  of approximately  $90^\circ\text{C}$ .

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.

International  
**IR** Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105

TAC Fax: (310) 252-7903

Visit us at [www.irf.com](http://www.irf.com) for sales contact information.05/06

[www.irf.com](http://www.irf.com)