

## Excellent Integrated System Limited

Stocking Distributor

Click to view price, real time Inventory, Delivery & Lifecycle Information:

[International Rectifier \(Infineon Technologies Americas Corp.\)  
SI4410DYTRPBF](#)

For any questions, you can email us directly:

[sales@integrated-circuit.com](mailto:sales@integrated-circuit.com)

International  
**IR** Rectifier

PD - 95168

**Si4410DYPbF**

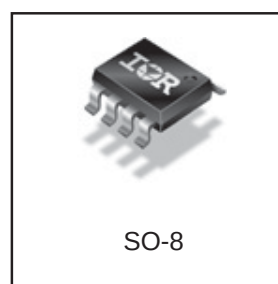
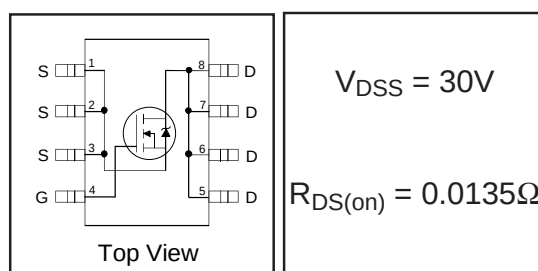
HEXFET® Power MOSFET

- N-Channel MOSFET
- Low On-Resistance
- Low Gate Charge
- Surface Mount
- Logic Level Drive
- Lead-Free

### Description

This N-channel HEXFET® Power MOSFET is produced using International Rectifier's advanced HEXFET power MOSFET technology. The low on-resistance and low gate charge inherent to this technology make this device ideal for low voltage or battery driven power conversion applications

The SO-8 package with copper leadframe offers enhanced thermal characteristics that allow power dissipation of greater than 800mW in typical board mount applications.



### Absolute Maximum Ratings

|                          | Parameter                                | Max.         | Units |
|--------------------------|------------------------------------------|--------------|-------|
| $V_{DS}$                 | Drain- Source Voltage                    | 30           | V     |
| $I_D @ T_A = 25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | $\pm 10$     | A     |
| $I_D @ T_A = 70^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | $\pm 8.0$    |       |
| $I_{DM}$                 | Pulsed Drain Current ①                   | $\pm 50$     |       |
| $P_D @ T_A = 25^\circ C$ | Power Dissipation ③                      | 2.5          | W     |
| $P_D @ T_A = 70^\circ C$ | Power Dissipation ③                      | 1.6          |       |
|                          | Linear Derating Factor                   | 0.02         | W/°C  |
| $dv/dt$                  | Peak Diode Recovery $dv/dt$ ⑤            | 5.0          | V/ns  |
| $E_{AS}$                 | Single Pulse Avalanche Energy④           | 400          | mJ    |
| $V_{GS}$                 | Gate-to-Source Voltage                   | $\pm 20$     | V     |
| $T_J, T_{STG}$           | Junction and Storage Temperature Range   | -55 to + 150 | °C    |

### Thermal Resistance

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

www.irf.com

1

09/22/04

# Si4410DYPbF

International  
**IR** Rectifier

## Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)

|                                        | Parameter                            | Min. | Typ.  | Max.   | Units | Conditions                                                         |
|----------------------------------------|--------------------------------------|------|-------|--------|-------|--------------------------------------------------------------------|
| V <sub>(BR)DSS</sub>                   | Drain-to-Source Breakdown Voltage    | 30   | —     | —      | V     | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                       |
| ΔV <sub>(BR)DSS</sub> /ΔT <sub>J</sub> | Breakdown Voltage Temp. Coefficient  | —    | 0.029 | —      | V/°C  | Reference to 25°C, I <sub>D</sub> = 1mA                            |
| R <sub>DS(on)</sub>                    | Static Drain-to-Source On-Resistance | —    | 0.010 | 0.0135 | Ω     | V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A ②                      |
|                                        |                                      | —    | 0.015 | 0.020  |       | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 5.0A ②                    |
| V <sub>GS(th)</sub>                    | Gate Threshold Voltage               | 1.0  | —     | —      | V     | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA         |
| g <sub>fs</sub>                        | Forward Transconductance             | —    | 35    | —      | S     | V <sub>DS</sub> = 15V, I <sub>D</sub> = 10A                        |
| I <sub>DSS</sub>                       | Drain-to-Source Leakage Current      | —    | —     | 1.0    | μA    | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V                        |
|                                        |                                      | —    | —     | 25     |       | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 55°C |
| I <sub>GSS</sub>                       | Gate-to-Source Forward Leakage       | —    | —     | -100   | nA    | V <sub>GS</sub> = -20V                                             |
|                                        | Gate-to-Source Reverse Leakage       | —    | —     | 100    |       | V <sub>GS</sub> = 20V                                              |
| Q <sub>g</sub>                         | Total Gate Charge                    | —    | 30    | 45     | nC    | I <sub>D</sub> = 10A                                               |
| Q <sub>gs</sub>                        | Gate-to-Source Charge                | —    | 5.4   | —      |       | V <sub>DS</sub> = 15V                                              |
| Q <sub>gd</sub>                        | Gate-to-Drain ("Miller") Charge      | —    | 6.5   | —      |       | V <sub>GS</sub> = 10V, See Fig. 10 ②                               |
| t <sub>d(on)</sub>                     | Turn-On Delay Time                   | —    | 11    | —      | ns    | V <sub>DD</sub> = 25V                                              |
| t <sub>r</sub>                         | Rise Time                            | —    | 7.7   | —      |       | I <sub>D</sub> = 1.0A                                              |
| t <sub>d(off)</sub>                    | Turn-Off Delay Time                  | —    | 38    | —      |       | R <sub>G</sub> = 6.0Ω                                              |
| t <sub>f</sub>                         | Fall Time                            | —    | 44    | —      |       | R <sub>D</sub> = 25Ω, ②                                            |
| C <sub>iss</sub>                       | Input Capacitance                    | —    | 1585  | —      | pF    | V <sub>GS</sub> = 0V                                               |
| C <sub>oss</sub>                       | Output Capacitance                   | —    | 739   | —      |       | V <sub>DS</sub> = 15V                                              |
| C <sub>rss</sub>                       | Reverse Transfer Capacitance         | —    | 106   | —      |       | f = 1.0MHz, See Fig. 9                                             |

## Source-Drain Ratings and Characteristics

|                 | Parameter                                        | Min. | Typ. | Max. | Units | Conditions                                                              |
|-----------------|--------------------------------------------------|------|------|------|-------|-------------------------------------------------------------------------|
| I <sub>S</sub>  | Continuous Source Current<br>(Diode Conduction)③ | —    | —    | 2.3  | A     | MOSFET symbol<br>showing the<br>integral reverse<br>p-n junction diode. |
| I <sub>SM</sub> | Pulsed Source Current<br>(Body Diode) ①          | —    | —    | 50   |       |                                                                         |
| V <sub>SD</sub> | Diode Forward Voltage                            | —    | 0.7  | 1.1  | V     | T <sub>J</sub> = 25°C, I <sub>S</sub> = 2.3A, V <sub>GS</sub> = 0V ②    |
| t <sub>rr</sub> | Reverse Recovery Time                            | —    | 50   | 80   | ns    | T <sub>J</sub> = 25°C, I <sub>F</sub> = 2.3A                            |

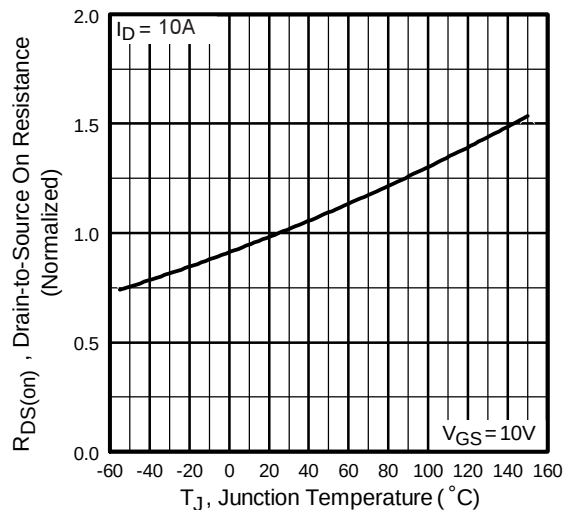
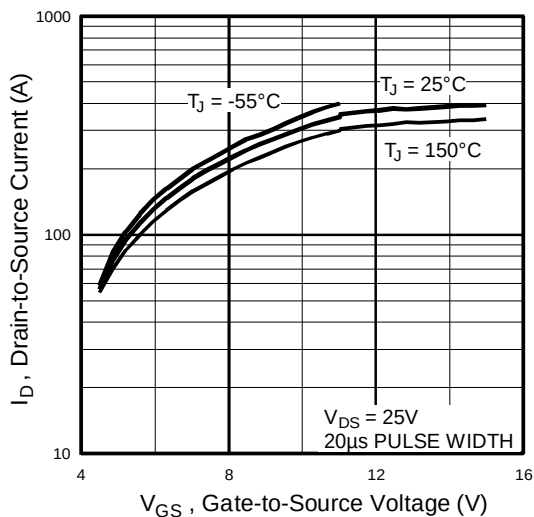
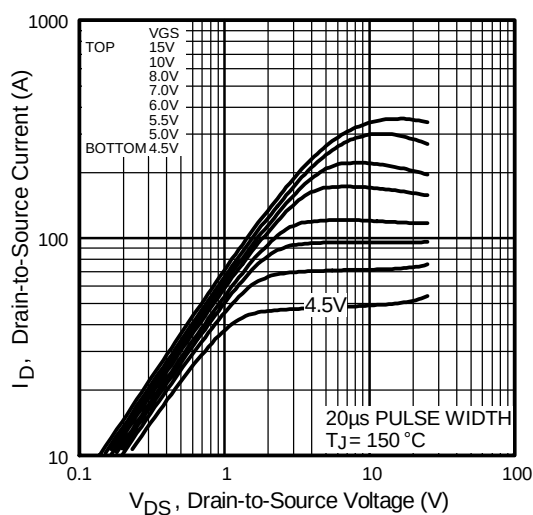
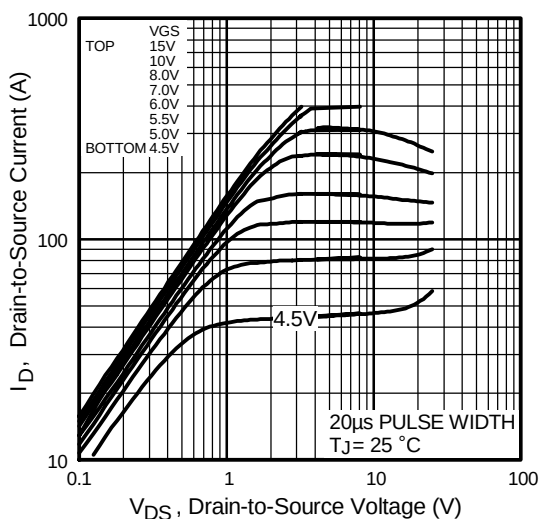
### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.  
② Pulse width ≤ 300μs; duty cycle ≤ 2%.  
③ When mounted on FR4 Board, t ≤ 10 sec

- ④ Starting T<sub>J</sub> = 25°C, L = 8.0mH  
R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 10A. (See Figure 15)  
⑤ I<sub>SD</sub> ≤ 2.3A, di/dt ≤ 130A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>,  
T<sub>J</sub> ≤ 150°C

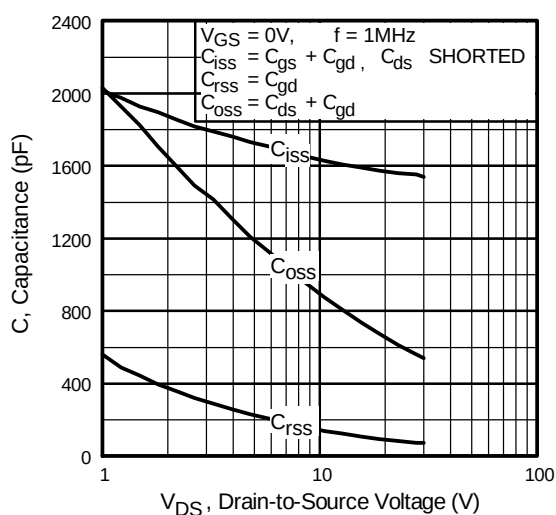
International  
**IR** Rectifier

**Si4410DYPbF**

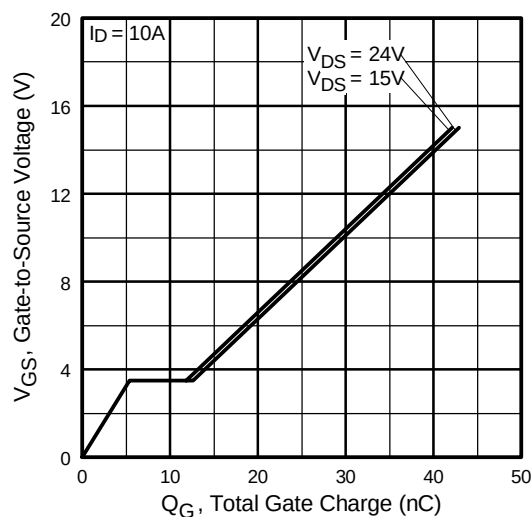


## Si4410DYPbF

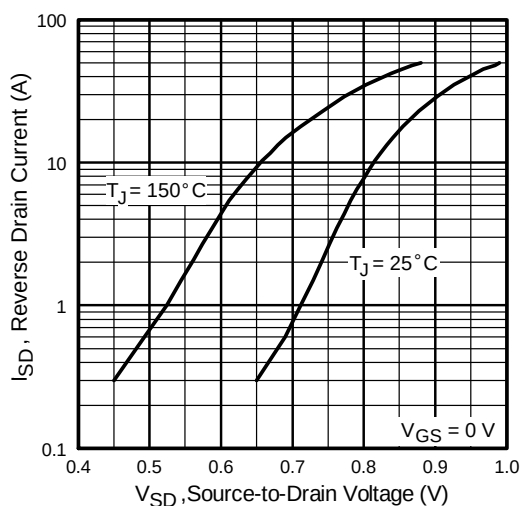
International  
**IR** Rectifier



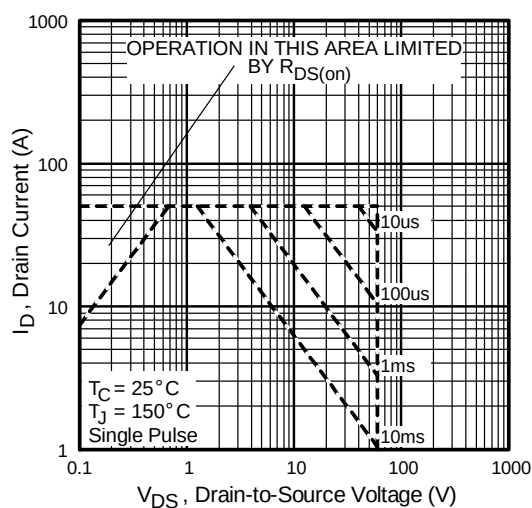
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



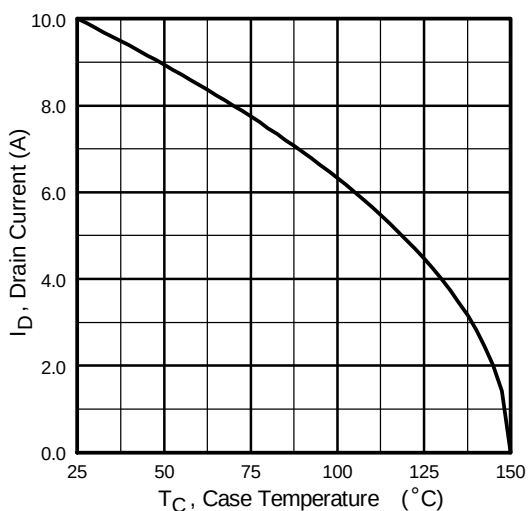
**Fig 7.** Typical Source-Drain Diode Forward Voltage



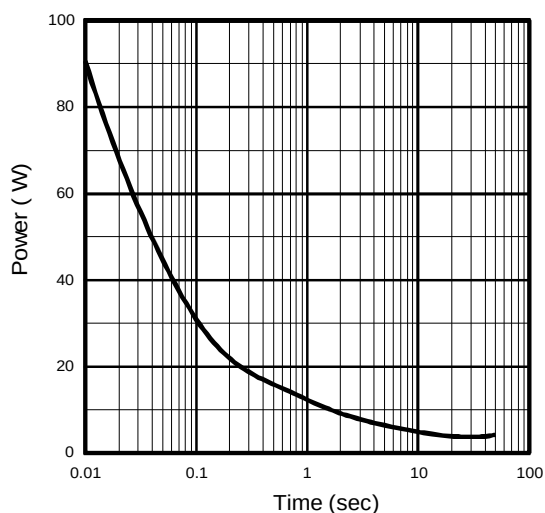
**Fig 8.** Maximum Safe Operating Area

International  
**IR** Rectifier

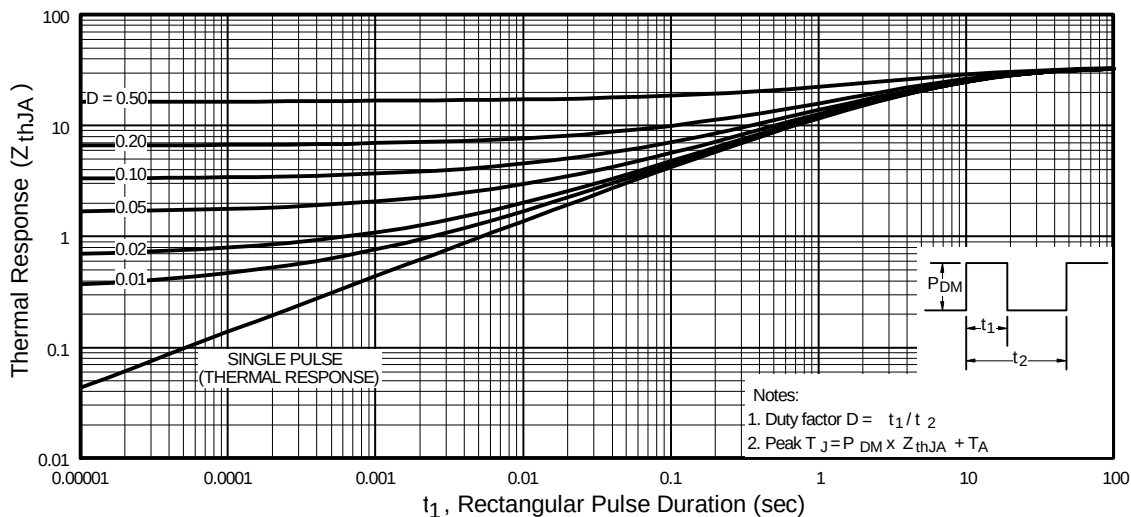
**Si4410DYPbF**



**Fig 9.** Maximum Drain Current Vs. Case Temperature



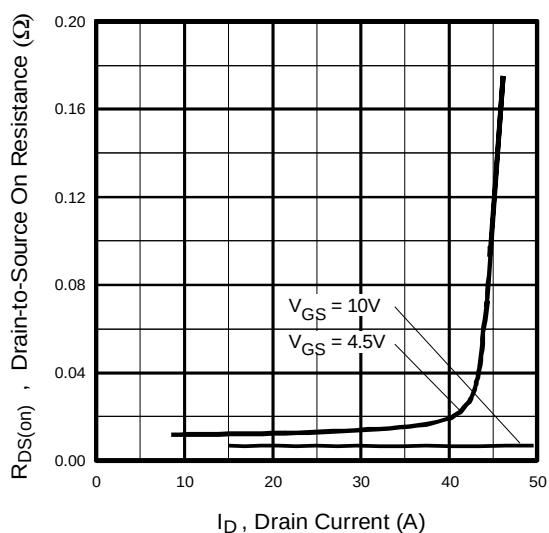
**Fig 10.** Typical Power Vs. Time



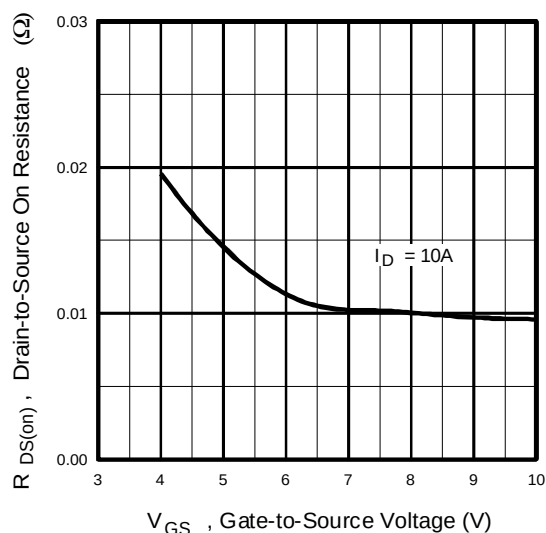
**Fig 11.** Typical Effective Transient Thermal Impedance, Junction-to-Ambient

## Si4410DYPbF

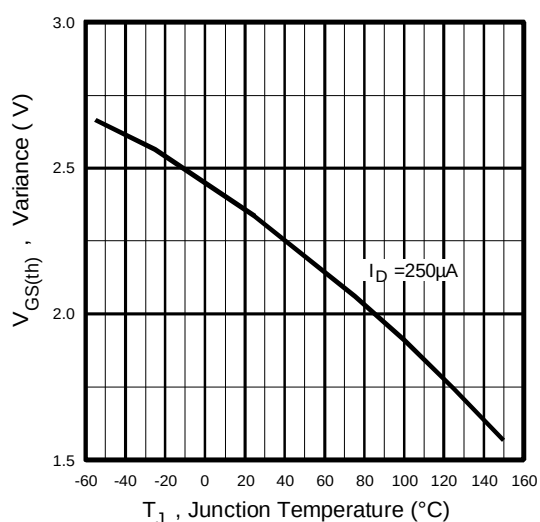
International  
**IR** Rectifier



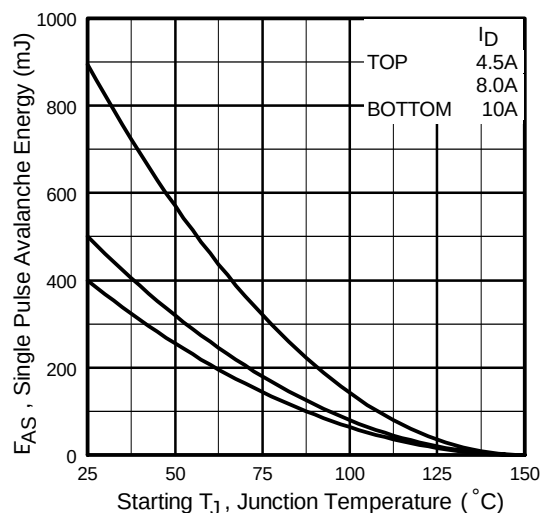
**Fig 12.** Typical On-Resistance Vs. Drain Current



**Fig 13.** Typical On-Resistance Vs. Gate Voltage



**Fig 14.** Typical Threshold Voltage Vs. Temperature



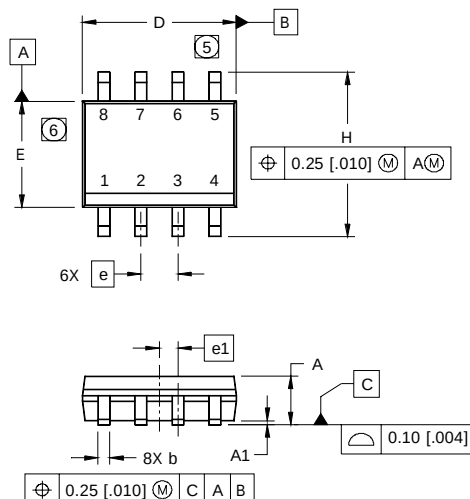
**Fig 15.** Maximum Avalanche Energy Vs. Drain Current

International  
**IR** Rectifier

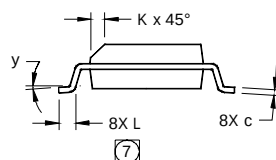
**Si4410DYPbF**

## SO-8 Package Outline

Dimensions are shown in millimeters (inches)



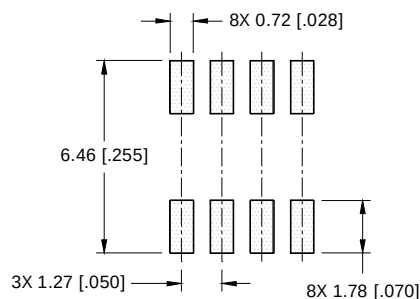
| DIM | INCHES     |       | MILLIMETERS |      |
|-----|------------|-------|-------------|------|
|     | MIN        | MAX   | MIN         | MAX  |
| A   | .0532      | .0688 | 1.35        | 1.75 |
| A1  | .0040      | .0098 | 0.10        | 0.25 |
| b   | .013       | .020  | 0.33        | 0.51 |
|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

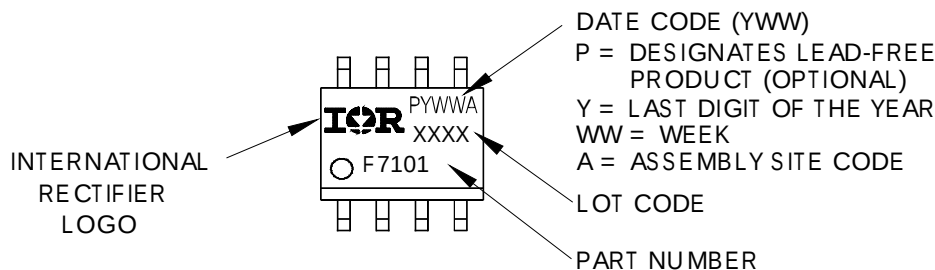
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
6. DIMENSION DOES NOT INCLUDE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



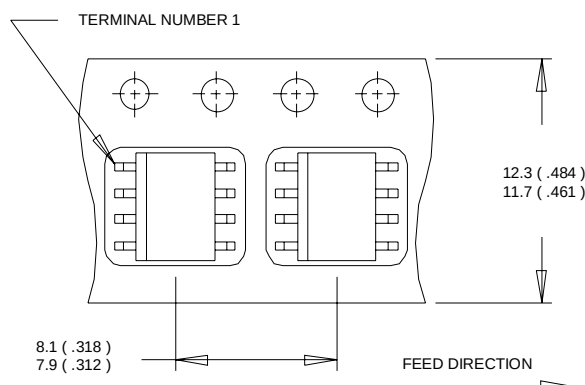


# Si4410DYPbF

International  
**IR** Rectifier

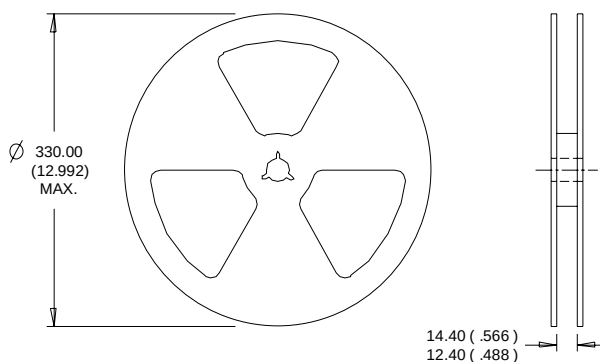
## SO-8 Tape and Reel

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.

Data and specifications subject to change without notice.  
This product has been designed and qualified for the Consumer market.  
Qualifications 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.09/04

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