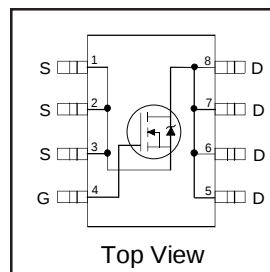


# Si4420DYPbF

HEXFET® Power MOSFET

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

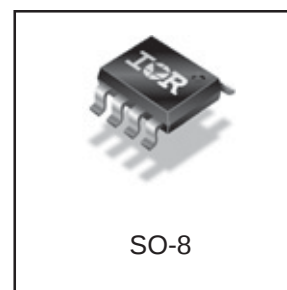


|                            |
|----------------------------|
| $V_{DSS} = 30V$            |
| $R_{DS(on)} = 0.009\Omega$ |

## 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, $V_{GS} @ 10V$ | $\pm 12.5$   | A     |
| $I_D @ T_A = 70^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | $\pm 10$     |       |
| $I_{DM}$                 | 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  |
| $E_{AS}$                 | 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    |

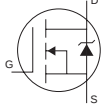
## Thermal Resistance

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

**Electrical Characteristics @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)**

|                                 | Parameter                            | Min. | Typ.  | Max.  | Units               | Conditions                                          |
|---------------------------------|--------------------------------------|------|-------|-------|---------------------|-----------------------------------------------------|
| $V_{(BR)DSS}$                   | Drain-to-Source Breakdown Voltage    | 30   | —     | —     | V                   | $V_{GS} = 0V, I_D = 250\mu A$                       |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient  | —    | 0.028 | —     | V/ $^\circ\text{C}$ | Reference to $25^\circ\text{C}$ , $I_D = 1mA$       |
| $R_{DS(on)}$                    | Static Drain-to-Source On-Resistance | —    | —     | 0.009 | $\Omega$            | $V_{GS} = 10V, I_D = 12.5A$ ②                       |
|                                 |                                      | —    | —     | 0.013 |                     | $V_{GS} = 4.5V, I_D = 10.5A$ ②                      |
| $V_{GS(th)}$                    | Gate Threshold Voltage               | 1.0  | —     | —     | V                   | $V_{DS} = V_{GS}, I_D = 250\mu A$                   |
| $g_{fs}$                        | Forward Transconductance             | —    | 29    | —     | S                   | $V_{DS} = 15V, I_D = 12.5A$                         |
| $I_{DSS}$                       | Drain-to-Source Leakage Current      | —    | —     | 1.0   | $\mu A$             | $V_{DS} = 30V, V_{GS} = 0V$                         |
|                                 |                                      | —    | —     | 5.0   |                     | $V_{DS} = 30V, V_{GS} = 0V, T_J = 55^\circ\text{C}$ |
| $I_{GSS}$                       | Gate-to-Source Forward Leakage       | —    | —     | -100  | nA                  | $V_{GS} = -20V$                                     |
|                                 | Gate-to-Source Reverse Leakage       | —    | —     | 100   |                     | $V_{GS} = 20V$                                      |
| $Q_g$                           | Total Gate Charge                    | —    | 52    | 78    | nC                  | $I_D = 12.5A$                                       |
| $Q_{gs}$                        | Gate-to-Source Charge                | —    | 8.7   | —     |                     | $V_{DS} = 15V$                                      |
| $Q_{gd}$                        | Gate-to-Drain ("Miller") Charge      | —    | 12    | —     |                     | $V_{GS} = 10V$ , See Fig. 6 ②                       |
| $t_{d(on)}$                     | Turn-On Delay Time                   | —    | 15    | —     | ns                  | $V_{DD} = 15V$                                      |
| $t_r$                           | Rise Time                            | —    | 10    | —     |                     | $I_D = 1.0A$                                        |
| $t_{d(off)}$                    | Turn-Off Delay Time                  | —    | 55    | —     |                     | $R_G = 6.0\Omega$                                   |
| $t_f$                           | Fall Time                            | —    | 47    | —     |                     | $R_D = 15\Omega$ , ②                                |
| $C_{iss}$                       | Input Capacitance                    | —    | 2240  | —     | pF                  | $V_{GS} = 0V$                                       |
| $C_{oss}$                       | Output Capacitance                   | —    | 1100  | —     |                     | $V_{DS} = 15V$                                      |
| $C_{rss}$                       | Reverse Transfer Capacitance         | —    | 150   | —     |                     | $f = 1.0MHz$ , See Fig. 5②                          |

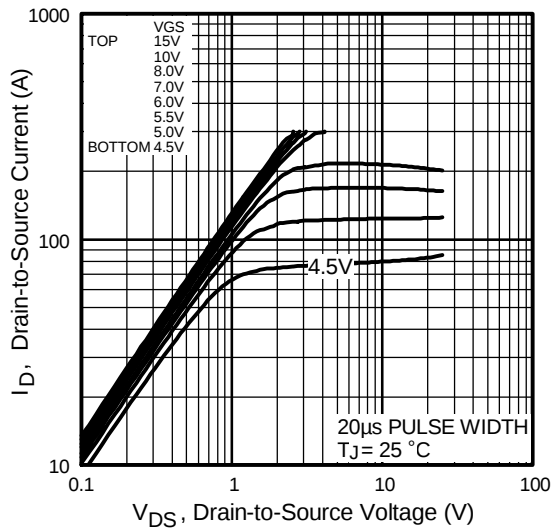
**Source-Drain Ratings and Characteristics**

|          | Parameter                                       | Min. | Typ. | Max. | Units | Conditions                                                                                                                                                       |
|----------|-------------------------------------------------|------|------|------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $I_S$    | Continuous Source Current<br>(Diode Conduction) | —    | —    | 2.3  | A     | MOSFET symbol<br>showing the<br>integral reverse<br>p-n junction diode.<br> |
| $I_{SM}$ | Pulsed Source Current<br>(Body Diode) ①         | —    | —    | 50   |       |                                                                                                                                                                  |
| $V_{SD}$ | Diode Forward Voltage                           | —    | —    | 1.1  | V     | $T_J = 25^\circ\text{C}$ , $I_S = 2.3A$ , $V_{GS} = 0V$ ②                                                                                                        |
| $t_{rr}$ | Reverse Recovery Time                           | —    | 52   | 78   | ns    | $T_J = 25^\circ\text{C}$ , $I_F = 2.3A$                                                                                                                          |

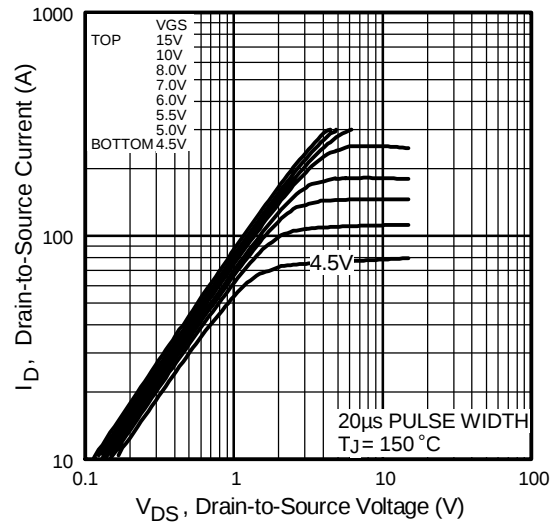
**Notes:**

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

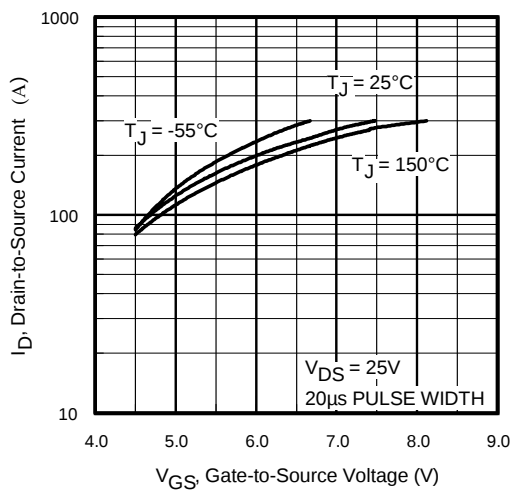
- ④ Starting  $T_J = 25^\circ\text{C}$ ,  $L = 13mH$   
 $R_G = 25\Omega$ ,  $I_{AS} = 8.9A$ . (See Figure 15)



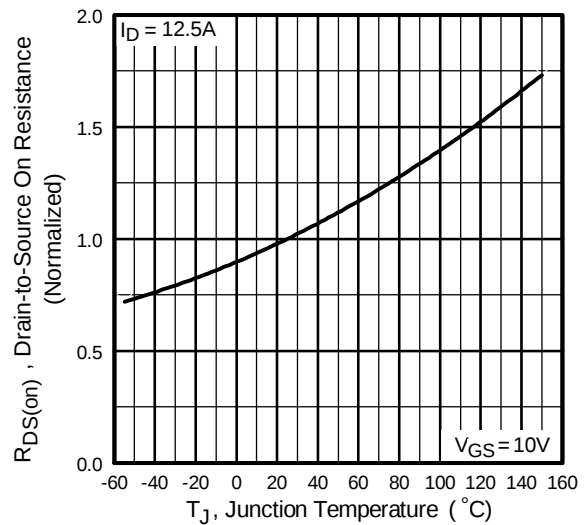
**Fig 1.** Typical Output Characteristics



**Fig 2.** Typical Output Characteristics



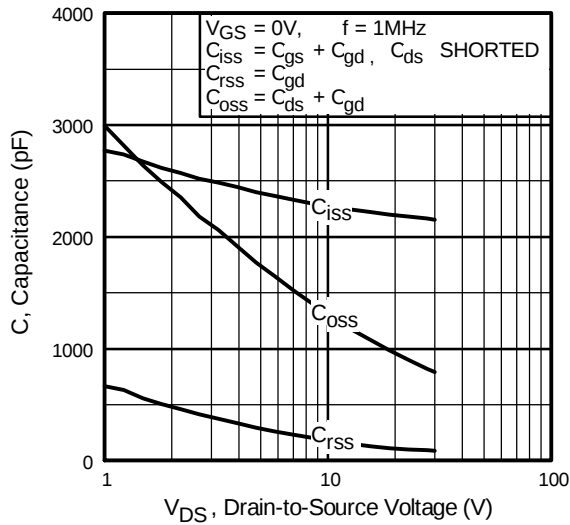
**Fig 3.** Typical Transfer Characteristics



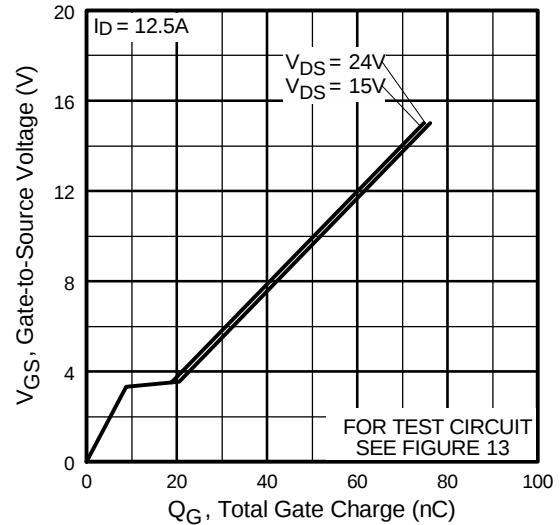
**Fig 4.** Normalized On-Resistance Vs. Temperature

# Si4420DYPbF

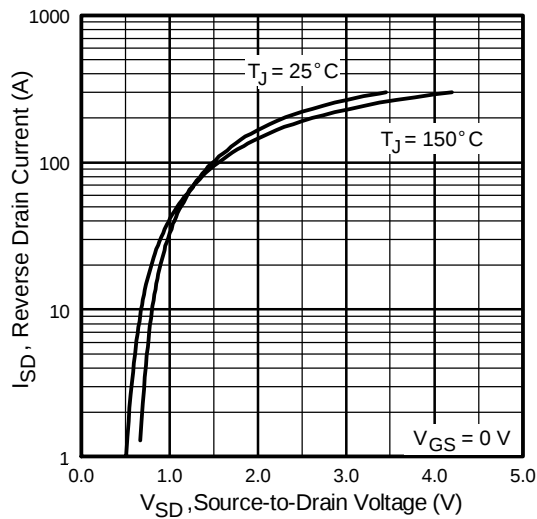
International  
**IR** Rectifier



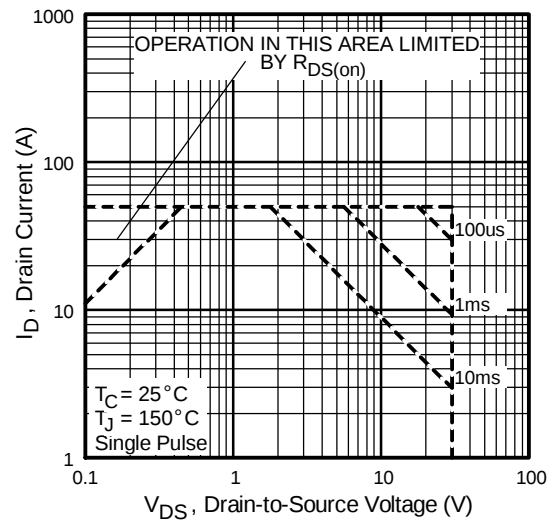
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



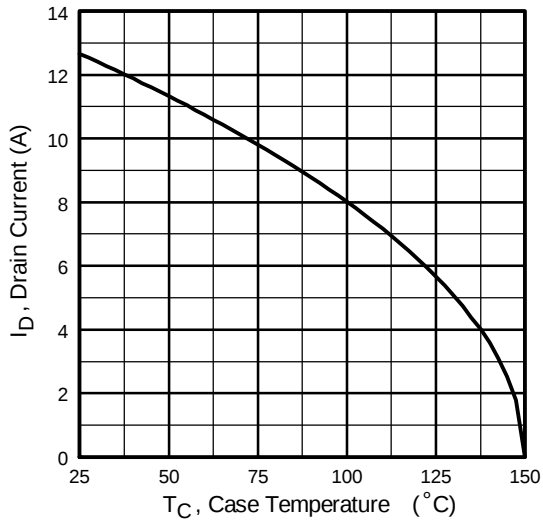
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



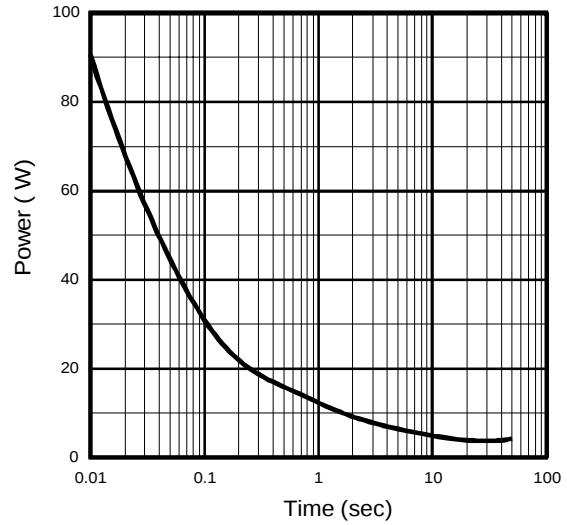
**Fig 7.** Typical Source-Drain Diode Forward Voltage



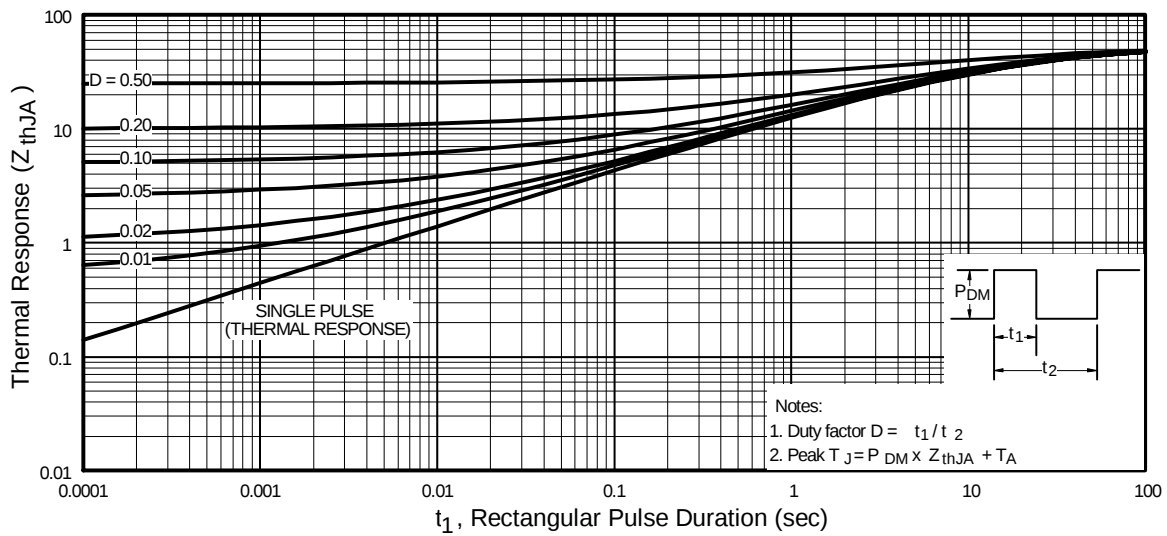
**Fig 8.** Maximum Safe Operating Area



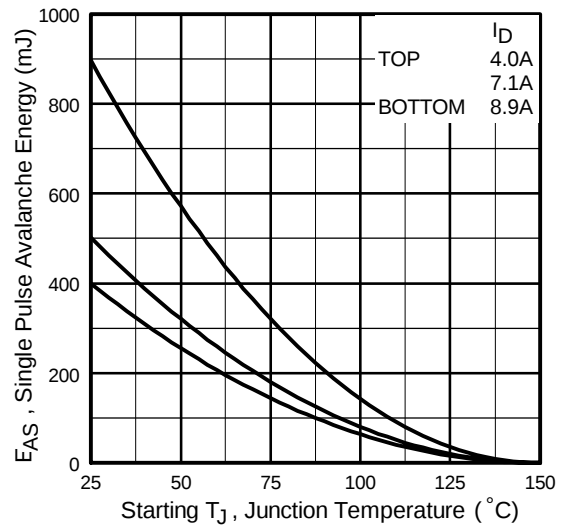
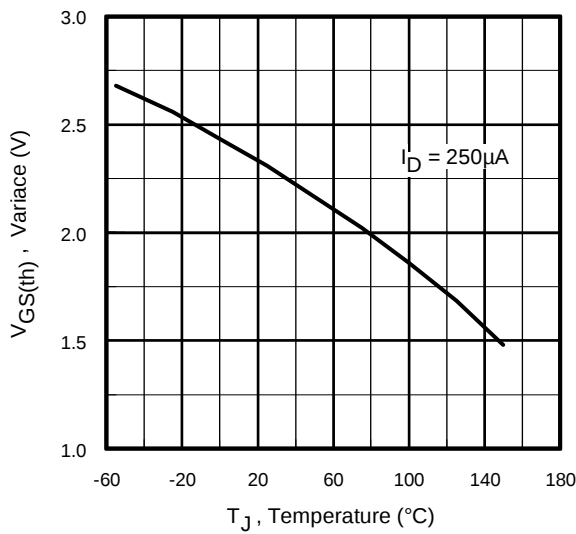
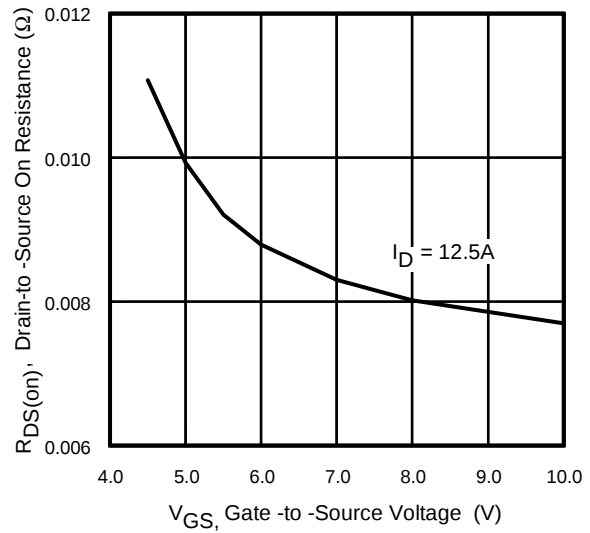
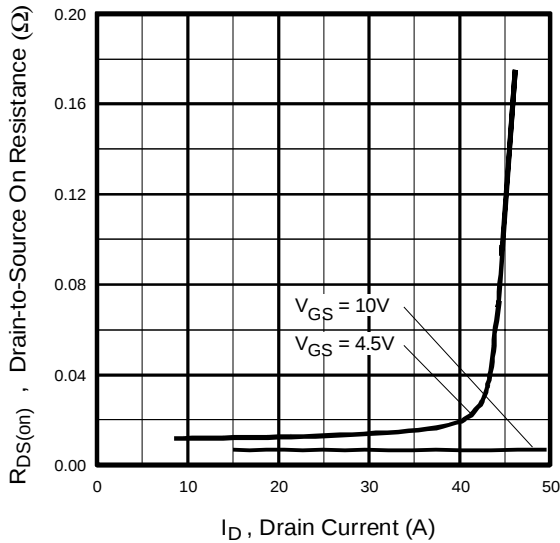
**Fig 9.** Maximum Drain Current Vs. Case Temperature



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



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

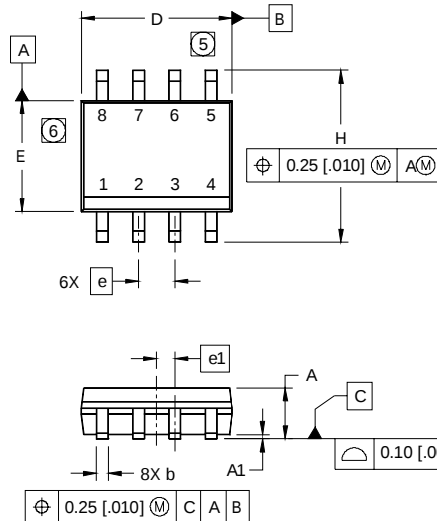


**Fig 14.** Typical Threshold Voltage Vs. Temperature

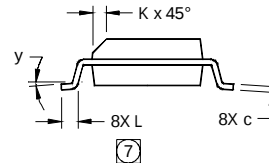
**Fig 15.** Maximum Avalanche Energy Vs. Drain Current

## SO-8 Package Outline

Dimensions are shown in millimeters (inches)



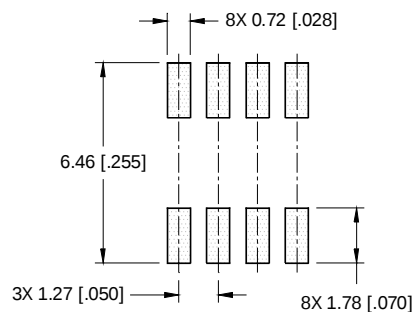
| DIM | INCHES     |       | MILLIMETERS |      |
|-----|------------|-------|-------------|------|
|     | MIN        | MAX   | MIN         | MAX  |
| A   | .0532      | .0688 | 1.35        | 1.75 |
| A1  | .0040      | .0098 | 0.10        | 0.25 |
| b   | .013       | .020  | 0.33        | 0.51 |
|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

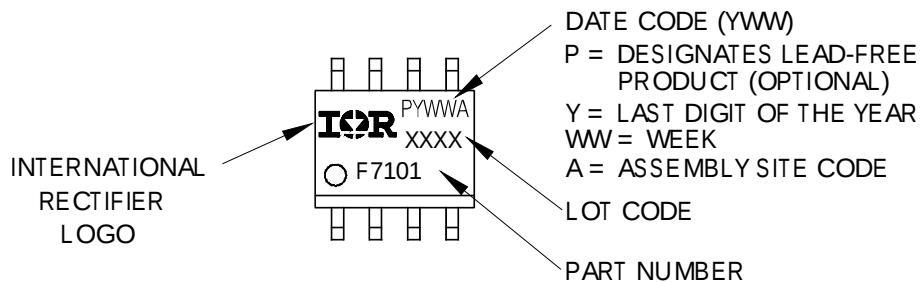
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
6. DIMENSION DOES NOT INCLUDE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

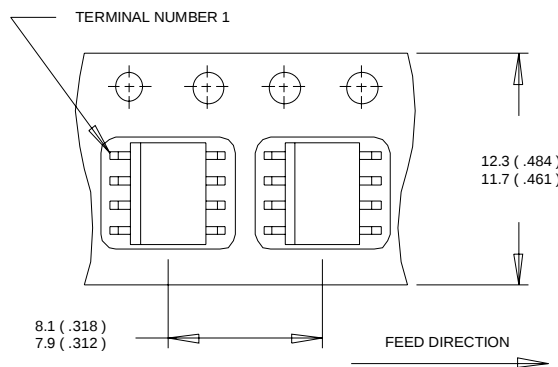


# Si4420DYPbF

International  
**IR** Rectifier

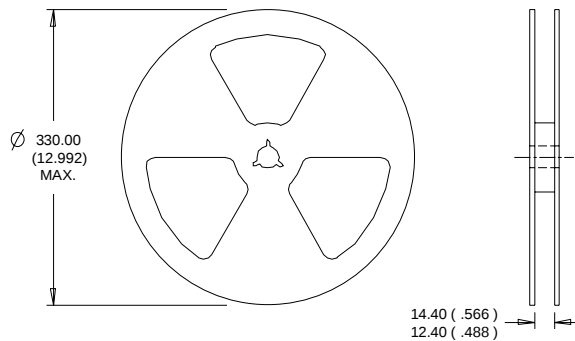
## SO-8 Tape and Reel

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

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