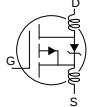
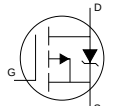


## Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

|                                 | Parameter                            | Min.  | Typ.   | Max.  | Units               | Conditions                                                                                                                      |
|---------------------------------|--------------------------------------|-------|--------|-------|---------------------|---------------------------------------------------------------------------------------------------------------------------------|
| $V_{(BR)DSS}$                   | Drain-to-Source Breakdown Voltage    | -20   | —      | —     | V                   | $V_{GS} = 0V$ , $I_D = -250\mu A$                                                                                               |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient  | —     | -0.012 | —     | V/ $^\circ\text{C}$ | Reference to $25^\circ\text{C}$ , $I_D = -1mA$                                                                                  |
| $R_{DS(ON)}$                    | Static Drain-to-Source On-Resistance | —     | —      | 0.090 | $\Omega$            | $V_{GS} = -4.5V$ , $I_D = -2.2A$ ③                                                                                              |
|                                 |                                      | —     | —      | 0.140 |                     | $V_{GS} = -2.7V$ , $I_D = -1.8A$ ③                                                                                              |
| $V_{GS(th)}$                    | Gate Threshold Voltage               | -0.70 | —      | —     | V                   | $V_{DS} = V_{GS}$ , $I_D = -250\mu A$                                                                                           |
| $g_{fs}$                        | Forward Transconductance             | 4.0   | —      | —     | S                   | $V_{DS} = -16V$ , $I_D = -2.2A$                                                                                                 |
| $I_{DSS}$                       | Drain-to-Source Leakage Current      | —     | —      | -1.0  | $\mu A$             | $V_{DS} = -16V$ , $V_{GS} = 0V$                                                                                                 |
|                                 |                                      | —     | —      | -25   |                     | $V_{DS} = -16V$ , $V_{GS} = 0V$ , $T_J = 125^\circ\text{C}$                                                                     |
| $I_{GSS}$                       | Gate-to-Source Forward Leakage       | —     | —      | -100  | nA                  | $V_{GS} = -12V$                                                                                                                 |
|                                 | Gate-to-Source Reverse Leakage       | —     | —      | 100   |                     | $V_{GS} = 12V$                                                                                                                  |
| $Q_g$                           | Total Gate Charge                    | —     | —      | 22    | nC                  | $I_D = -2.2A$                                                                                                                   |
| $Q_{gs}$                        | Gate-to-Source Charge                | —     | —      | 3.3   |                     | $V_{DS} = -16V$                                                                                                                 |
| $Q_{gd}$                        | Gate-to-Drain ("Miller") Charge      | —     | —      | 9.0   |                     | $V_{GS} = -4.5V$ , See Fig. 6 and 12 ③                                                                                          |
| $t_{d(on)}$                     | Turn-On Delay Time                   | —     | 8.4    | —     | ns                  | $V_{DD} = -10V$                                                                                                                 |
| $t_r$                           | Rise Time                            | —     | 26     | —     |                     | $I_D = -2.2A$                                                                                                                   |
| $t_{d(off)}$                    | Turn-Off Delay Time                  | —     | 51     | —     |                     | $R_G = 6.0\Omega$                                                                                                               |
| $t_f$                           | Fall Time                            | —     | 33     | —     |                     | $R_D = 4.5\Omega$ , See Fig. 10 ③                                                                                               |
| $L_D$                           | Internal Drain Inductance            | —     | 4.0    | —     | nH                  | Between lead tip and center of die contact  |
| $L_S$                           | Internal Source Inductance           | —     | 6.0    | —     |                     |                                                                                                                                 |
| $C_{iss}$                       | Input Capacitance                    | —     | 610    | —     | pF                  | $V_{GS} = 0V$                                                                                                                   |
| $C_{oss}$                       | Output Capacitance                   | —     | 310    | —     |                     | $V_{DS} = -15V$                                                                                                                 |
| $C_{rss}$                       | Reverse Transfer Capacitance         | —     | 170    | —     |                     | $f = 1.0MHz$ , See Fig. 5                                                                                                       |

## Source-Drain Ratings and Characteristics

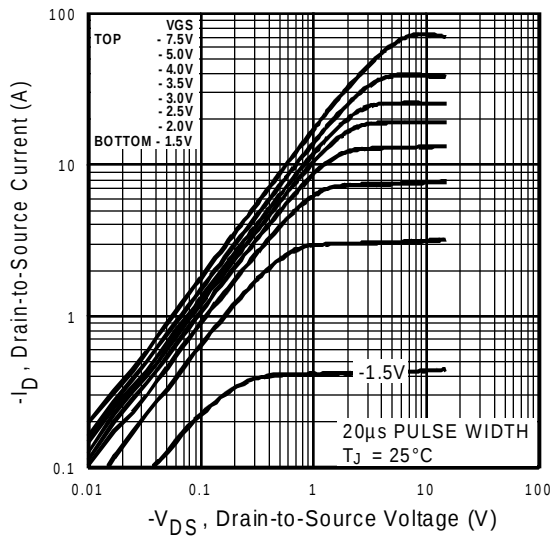
|          | Parameter                              | Min.                                                                        | Typ. | Max. | Units   | Conditions                                                                                                                                           |
|----------|----------------------------------------|-----------------------------------------------------------------------------|------|------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| $I_S$    | Continuous Source Current (Body Diode) | —                                                                           | —    | -2.5 | A       | MOSFET symbol showing the integral reverse p-n junction diode.  |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ①   | —                                                                           | —    | -17  |         |                                                                                                                                                      |
| $V_{SD}$ | Diode Forward Voltage                  | —                                                                           | —    | -1.0 | V       | $T_J = 25^\circ\text{C}$ , $I_S = -1.8A$ , $V_{GS} = 0V$ ③                                                                                           |
| $t_{rr}$ | Reverse Recovery Time                  | —                                                                           | 56   | 84   | ns      | $T_J = 25^\circ\text{C}$ , $I_F = -2.2A$                                                                                                             |
| $Q_{rr}$ | Reverse Recovery Charge                | —                                                                           | 71   | 110  | $\mu C$ | $di/dt = 100A/\mu s$ ③                                                                                                                               |
| $t_{on}$ | Forward Turn-On Time                   | Intrinsic turn-on time is negligible (turn-on is dominated by $L_S + L_D$ ) |      |      |         |                                                                                                                                                      |

### Notes:

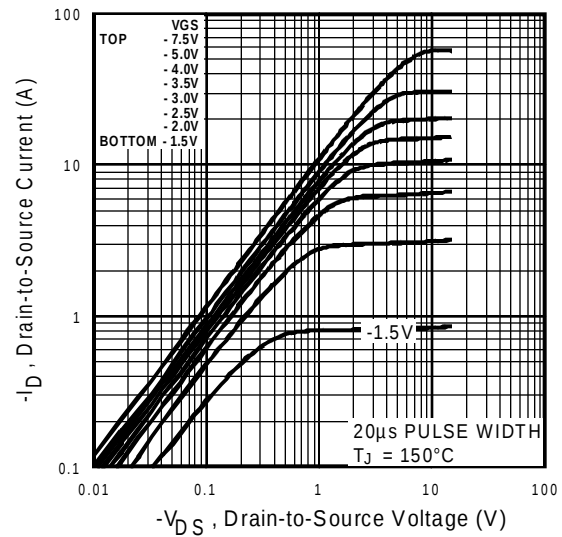
① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 11 )

③ Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .

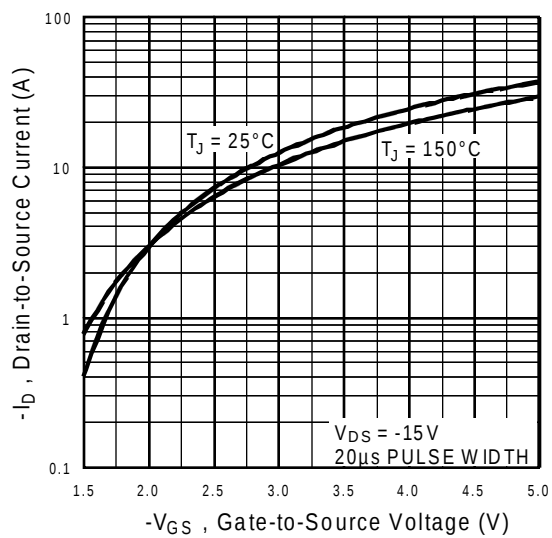
②  $I_{SD} \leq -2.2A$ ,  $di/dt \leq -50A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ\text{C}$



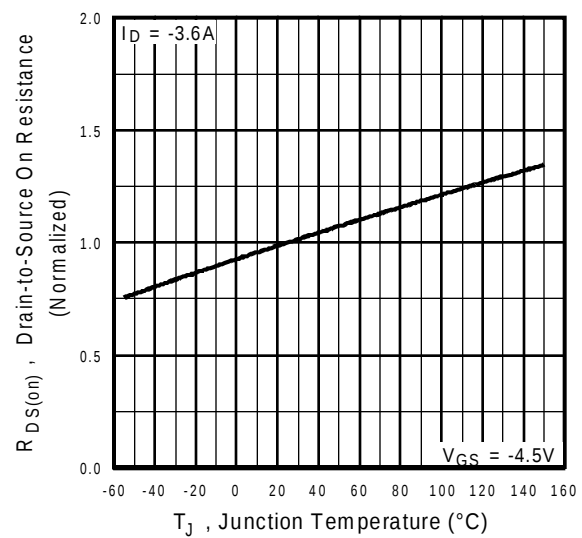
**Fig 1.** Typical Output Characteristics



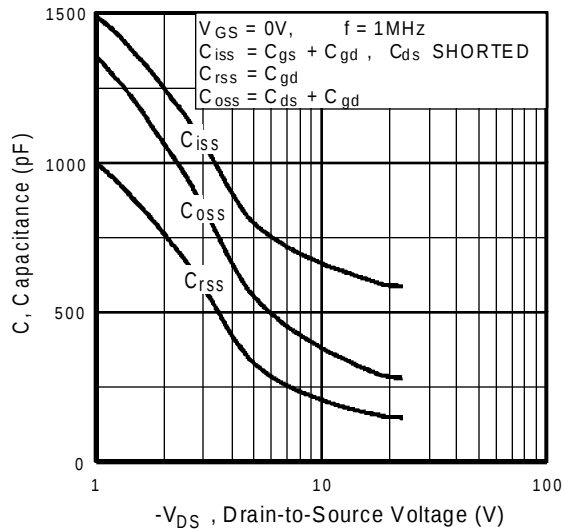
**Fig 2.** Typical Output Characteristics



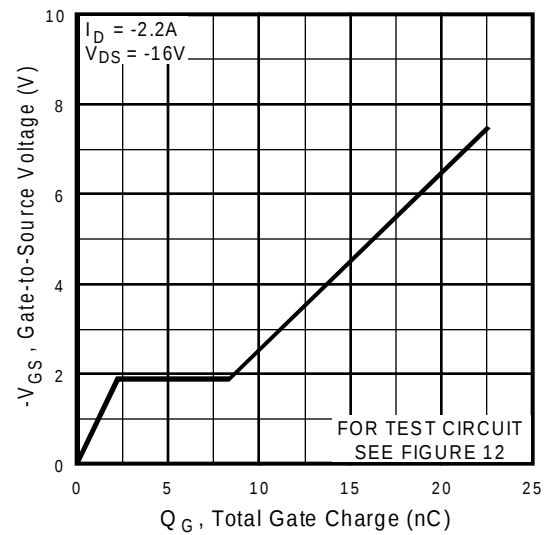
**Fig 3.** Typical Transfer Characteristics



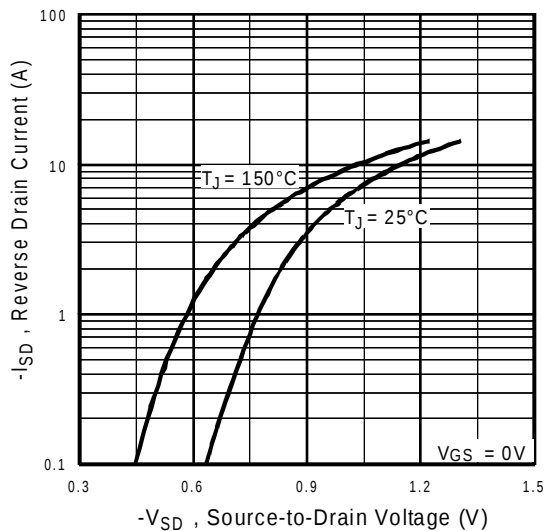
**Fig 4.** Normalized On-Resistance  
Vs. Temperature



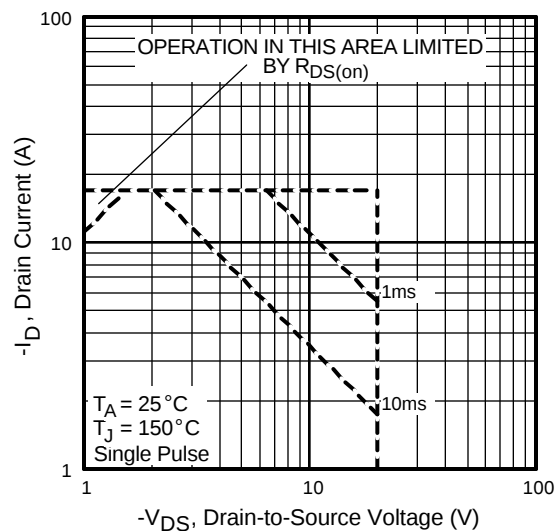
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



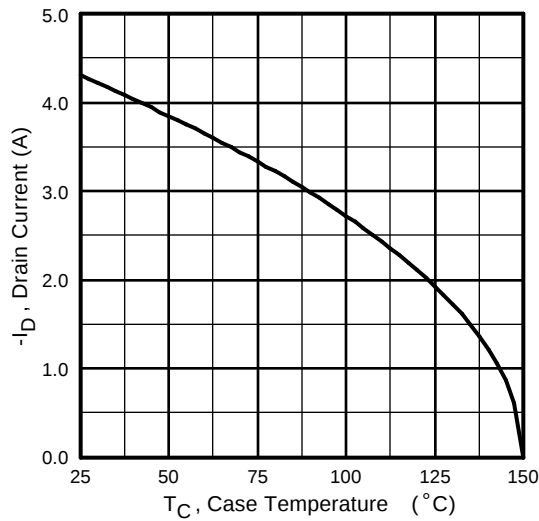
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



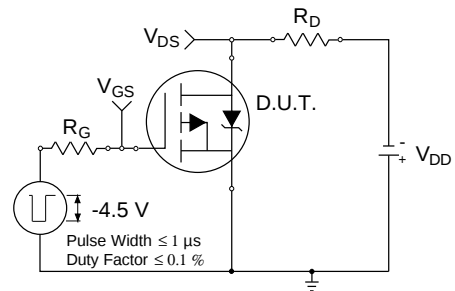
**Fig 7.** Typical Source-Drain Diode Forward Voltage



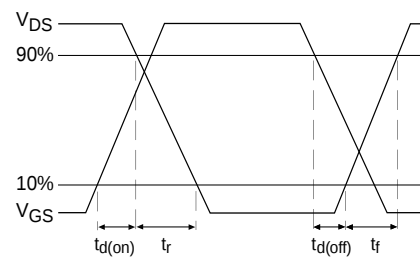
**Fig 8.** Maximum Safe Operating Area



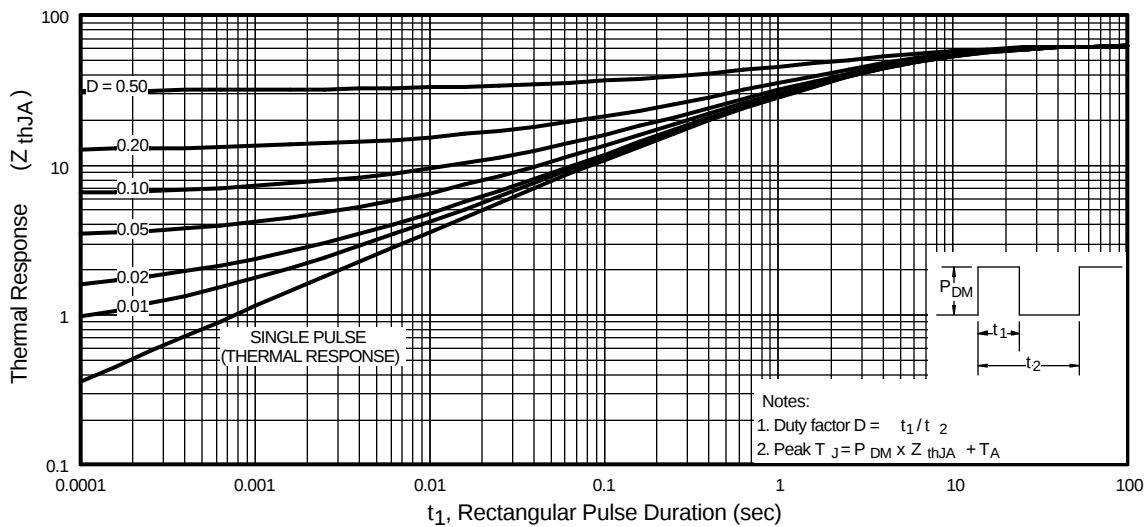
**Fig 9.** Maximum Drain Current Vs. Ambient Temperature



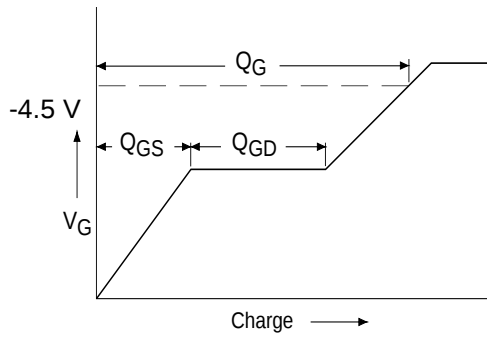
**Fig 10a.** Switching Time Test Circuit



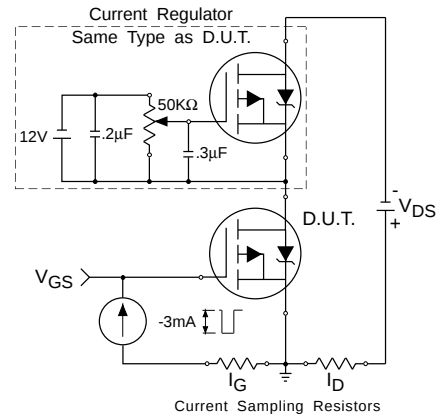
**Fig 10b.** Switching Time Waveforms



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

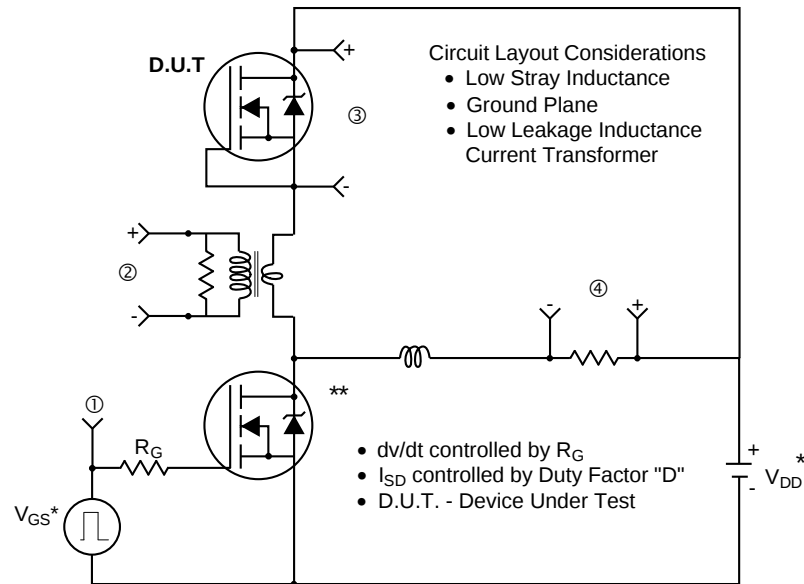


**Fig 12a.** Basic Gate Charge Waveform



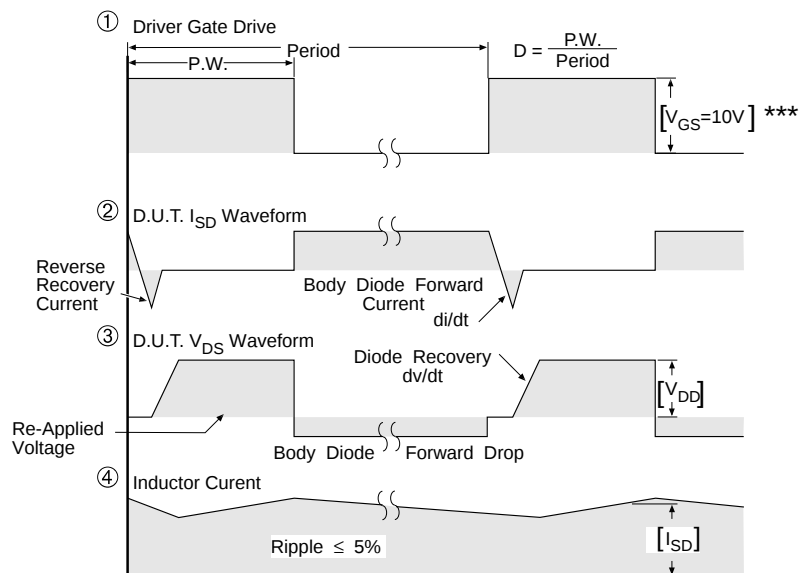
**Fig 12b.** Gate Charge Test Circuit

### Peak Diode Recovery dv/dt Test Circuit



\* Reverse Polarity for P-Channel

\*\* Use P-Channel Driver for P-Channel Measurements

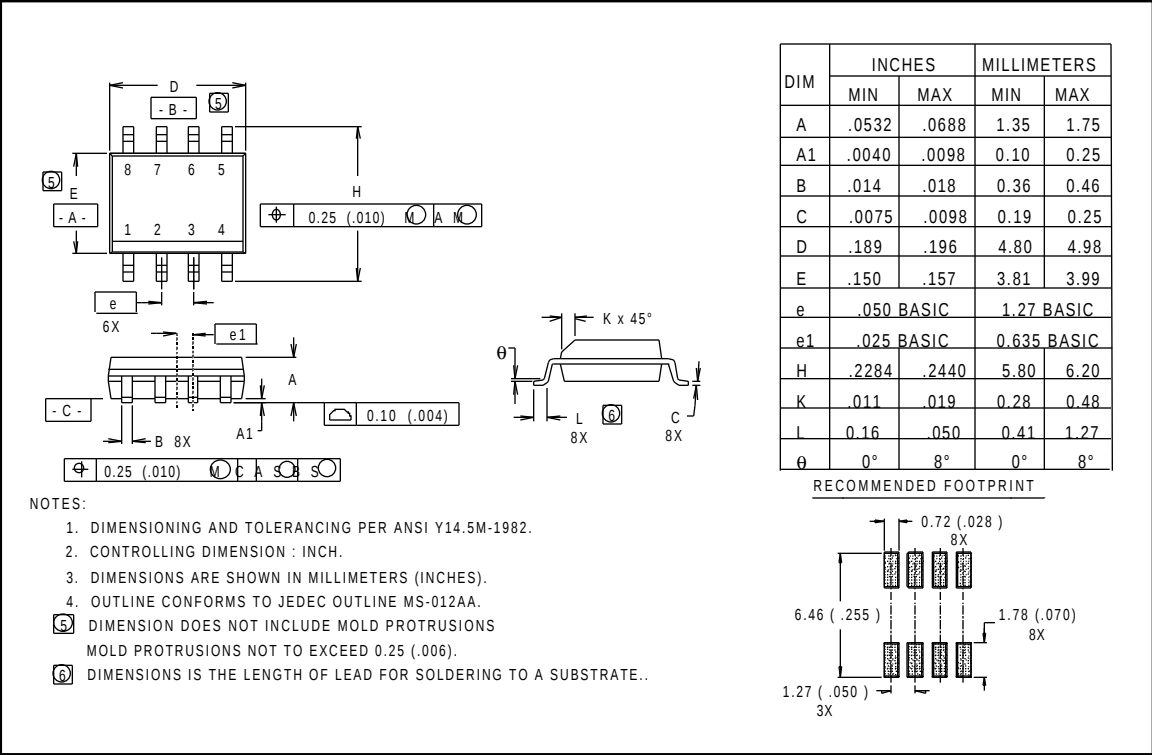


\*\*\*  $V_{GS} = 5.0V$  for Logic Level and 3V Drive Devices

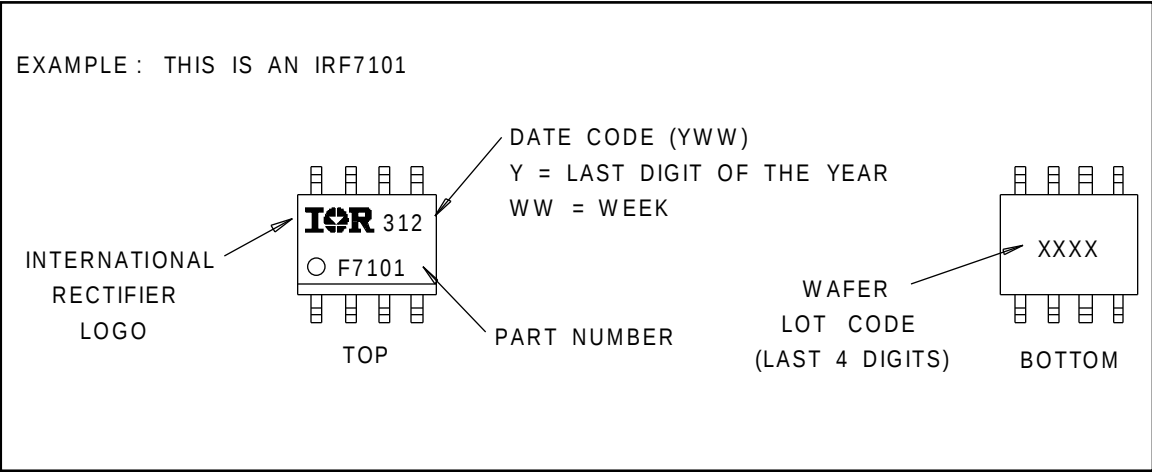
**Fig 13. For P-Channel HEXFETS**

# IRF7304

## Package Outline SO8 Outline



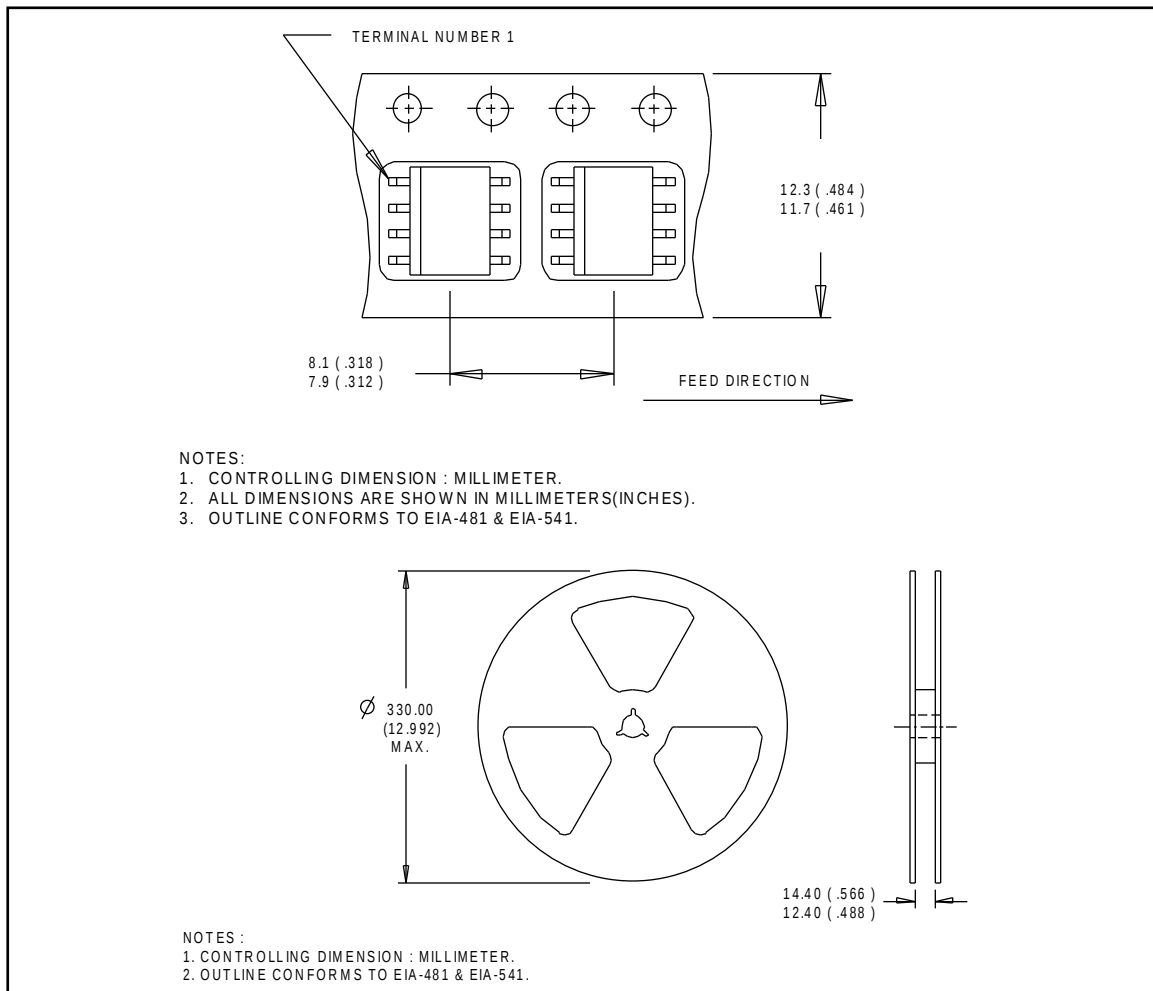
## Part Marking Information SO8



## Tape & Reel Information

### SO8

Dimensions are shown in millimeters (inches)



International  
**IR** Rectifier

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