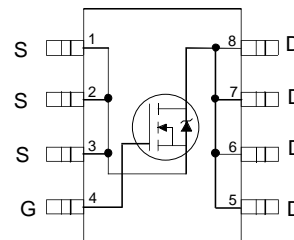


**Features**

- $V_{DS} (V) = 40V$
- $R_{DS(ON)} < 7.5m\Omega$  ( $V_{GS} = 10V$ )
- $R_{DS(ON)} < 9 m\Omega$  ( $V_{GS} = 4.5V$ )

**Applications**

- High Frequency DC-DC Converters with Synchronous Rectification
- Lead-Free



Top View

**Benefits**

- Ultra-Low Gate Impedance
- Very Low  $R_{DS(on)}$  at 4.5V  $V_{GS}$
- Fully Characterized Avalanche Voltage and Current

**Absolute Maximum Ratings**

| Symbol                   | Parameter                                | Max.         | Units         |
|--------------------------|--|--------------|---------------|
| $V_{DS}$                 | Drain-Source Voltage                     | 30           | V             |
| $V_{GS}$                 | Gate-to-Source Voltage                   | $\pm 12$     | V             |
| $I_D @ T_A = 25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 15           | A             |
| $I_D @ T_A = 70^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 12           |               |
| $I_{DM}$                 | Pulsed Drain Current <sup>①</sup>        | 120          |               |
| $P_D @ T_A = 25^\circ C$ | Maximum Power Dissipation <sup>③</sup>   | 2.5          | W             |
| $P_D @ T_A = 70^\circ C$ | Maximum Power Dissipation <sup>③</sup>   | 1.6          | W             |
|                          | Linear Derating Factor                   | 0.02         | W/ $^\circ C$ |
| $T_J, T_{STG}$           | Junction and Storage Temperature Range   | -55 to + 150 | $^\circ C$    |

**Thermal Resistance**

| Symbol          | Parameter                        | Typ. | Max. | Units        |
|-----------------|----------------------------------|------|------|--------------|
| $R_{\theta JA}$ | Junction-to-Ambient <sup>④</sup> |      | 50   | $^\circ C/W$ |

**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^\circ C$ ,  $L = 9.4mH$   
 $R_G = 25\Omega$ ,  $I_{AS} = 8.0A$ .
- ③ Pulse width  $\leq 400\mu s$ ; duty cycle  $\leq 2\%$ .
- ④ When mounted on 1 inch square copper board,  $t < 10$  sec

**Static @ 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/ΔT<sub>J</sub></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 |      | 6.0   | 7.5  | mΩ    | V <sub>GS</sub> = 10V, I <sub>D</sub> = 15A ④                       |
|                                      |                                      |      | 6.9   | 9    |       | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 12A ④                      |
|                                      |                                      |      | 10    | 2    |       | V <sub>GS</sub> = 2.8V, I <sub>D</sub> = 3.5A ④                     |
| V <sub>GS(th)</sub>                  | Gate Threshold Voltage               | 0.6  |       | 2.0  | V     | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA          |
| I <sub>DSS</sub>                     | Drain-to-Source Leakage Current      |      |       | 20   | μA    | V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V                         |
|                                      |                                      |      |       | 100  |       | V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C |
| I <sub>GSS</sub>                     | Gate-to-Source Forward Leakage       |      |       | 200  | nA    | V <sub>GS</sub> = 12V   |
|                                      | Gate-to-Source Reverse Leakage       |      |       | -200 |       | V <sub>GS</sub> = -12V  |

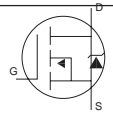
**Dynamic @ T<sub>J</sub> = 25°C (unless otherwise specified)**

| Symbol              | Parameter                       | Min. | Typ. | Max. | Units | Conditions                                  |
|---------------------|---------------------------------|------|------|------|-------|---|
| g <sub>fs</sub>     | Forward Transconductance        | 44   |      |      | S     | V <sub>DS</sub> = 10V, I <sub>D</sub> = 15A |
| Q <sub>g</sub>      | Total Gate Charge               |      | 37   | 56   | nC    | I <sub>D</sub> = 15A                        |
| Q <sub>gs</sub>     | Gate-to-Source Charge           |      | 8.9  | 13   |       | V <sub>DS</sub> = 24V                       |
| Q <sub>gd</sub>     | Gate-to-Drain ("Miller") Charge |      | 13   | 20   |       | V <sub>GS</sub> = 5.0V ③                    |
| Q <sub>oss</sub>    | Output Gate Charge              |      | 23   | 35   |       | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 16V |
| t <sub>d(on)</sub>  | Turn-On Delay Time              |      | 17   |      | ns    | V <sub>DD</sub> = 15V                       |
| t <sub>r</sub>      | Rise Time                       |      | 18   |      |       | I <sub>D</sub> = 1.0A                       |
| t <sub>d(off)</sub> | Turn-Off Delay Time             |      | 51   |      |       | R <sub>G</sub> = 6Ω                         |
| t <sub>f</sub>      | Fall Time                       |      | 44   |      |       | V <sub>GS</sub> = 4.5V ③                    |
| C <sub>iss</sub>    | Input Capacitance               |      | 3480 |      | pF    | V <sub>GS</sub> = 0V                        |
| C <sub>oss</sub>    | Output Capacitance              |      | 870  |      |       | V <sub>DS</sub> = 25V                       |
| C <sub>rss</sub>    | Reverse Transfer Capacitance    |      | 100  |      |       | f = 1.0MHz                                  |

**Avalanche Characteristics**

| Symbol          | Parameter                      | Typ. | Max. | Units |
|-----------------|--------------------------------|------|------|-------|
| E <sub>AS</sub> | Single Pulse Avalanche Energy② |      | 300  | mJ    |
| I <sub>AR</sub> | Avalanche Current②             |      | 15   | A     |

**Diode Characteristics**

| Symbol          | Parameter                              | Min. | Typ. | Max. | Units | Conditions   |
|-----------------|--|------|------|------|-------|--|
| I <sub>S</sub>  | Continuous Source Current (Body Diode) |      |      | 2.5  | A     | MOSFET symbol showing the integral reverse p-n junction diode.  |
| I <sub>SM</sub> | Pulsed Source Current (Body Diode) ①   |      |      | 120  |       |  |
| V <sub>SD</sub> | Diode Forward Voltage                  |      |      | 1.2  | V     | T <sub>J</sub> = 25°C, I <sub>S</sub> = 2.5A, V <sub>GS</sub> = 0V ③   |
| t <sub>rr</sub> | Reverse Recovery Time                  |      | 64   | 96   | ns    | T <sub>J</sub> = 25°C, I <sub>F</sub> = 2.5A, V <sub>R</sub> = 20V   |
| Q <sub>rr</sub> | Reverse Recovery Charge                |      | 99   | 150  | nC    |  |

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

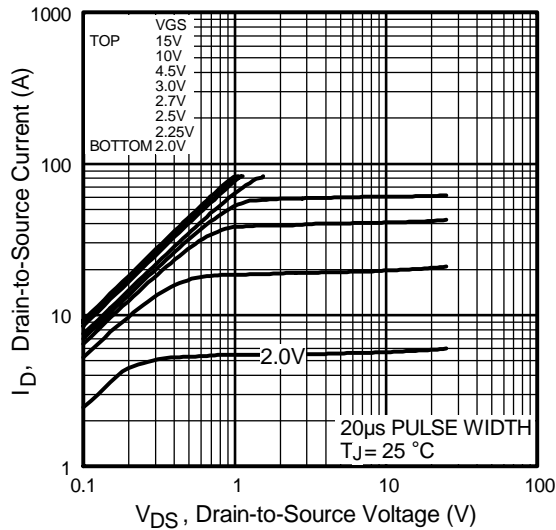


Fig 1. Typical Output Characteristics

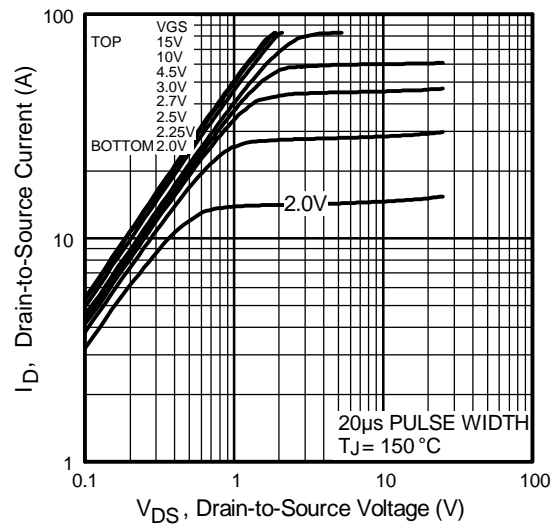


Fig 2. Typical Output Characteristics

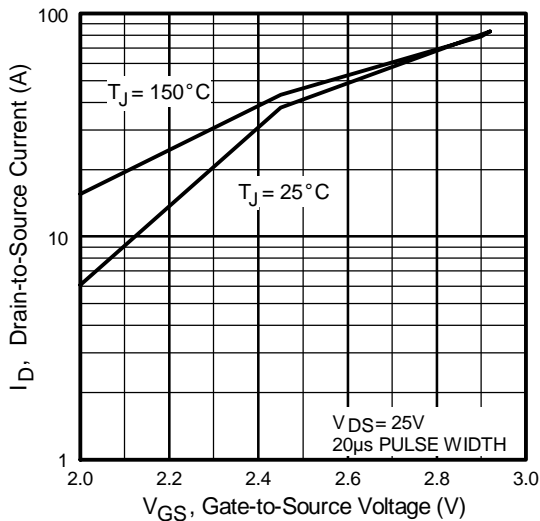


Fig 3. Typical Transfer Characteristics

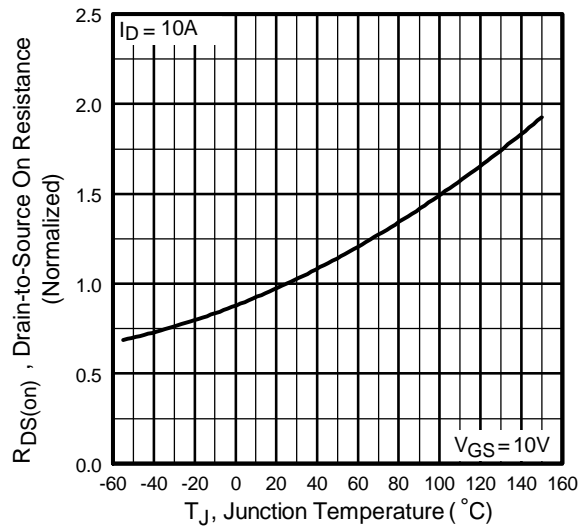
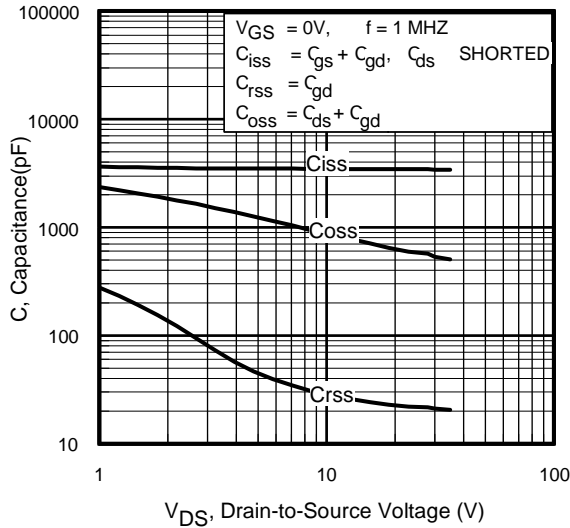
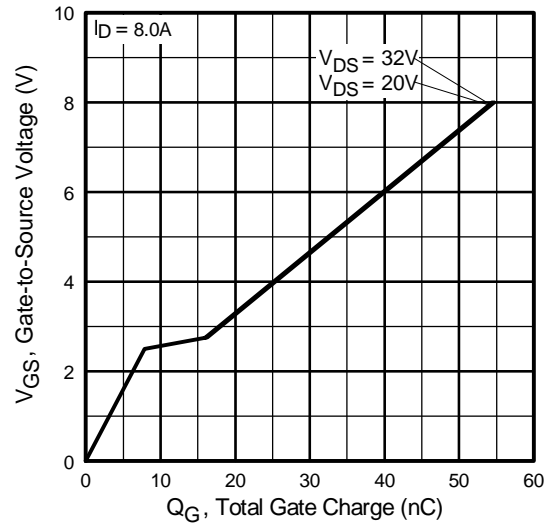


Fig 4. Normalized On-Resistance Vs. Temperature

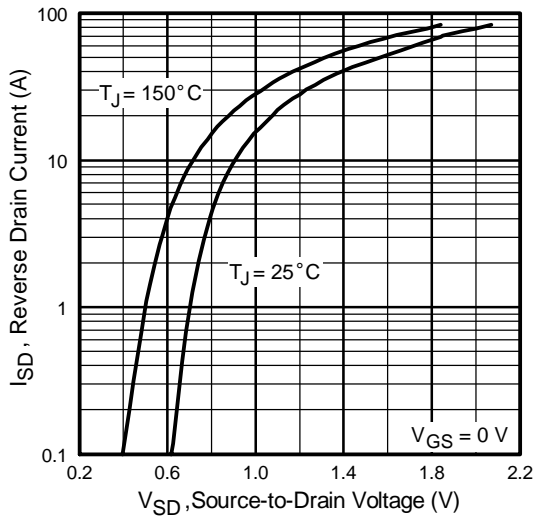
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



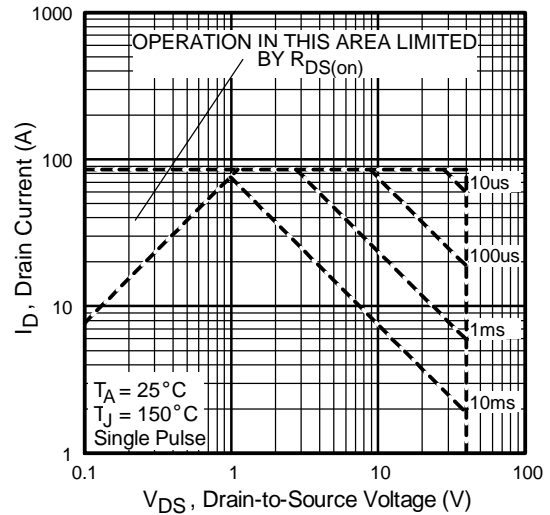
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



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



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



**Fig 8.** Maximum Safe Operating Area

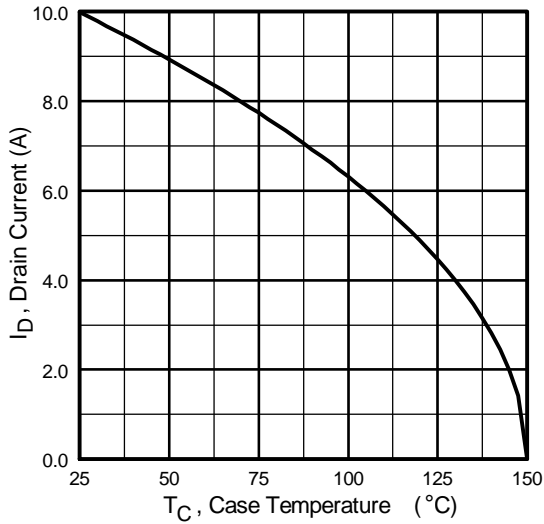


Fig 6. On-Resistance Vs. Drain Current

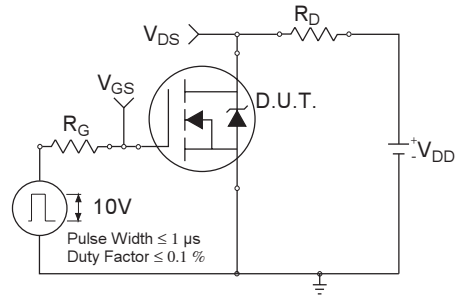


Fig 10a. Switching Time Test Circuit

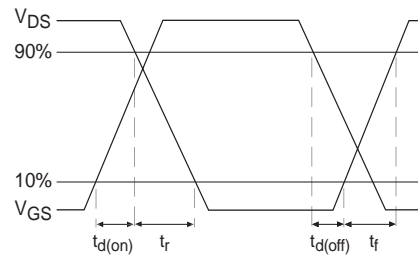


Fig 10b. Switching Time Waveforms

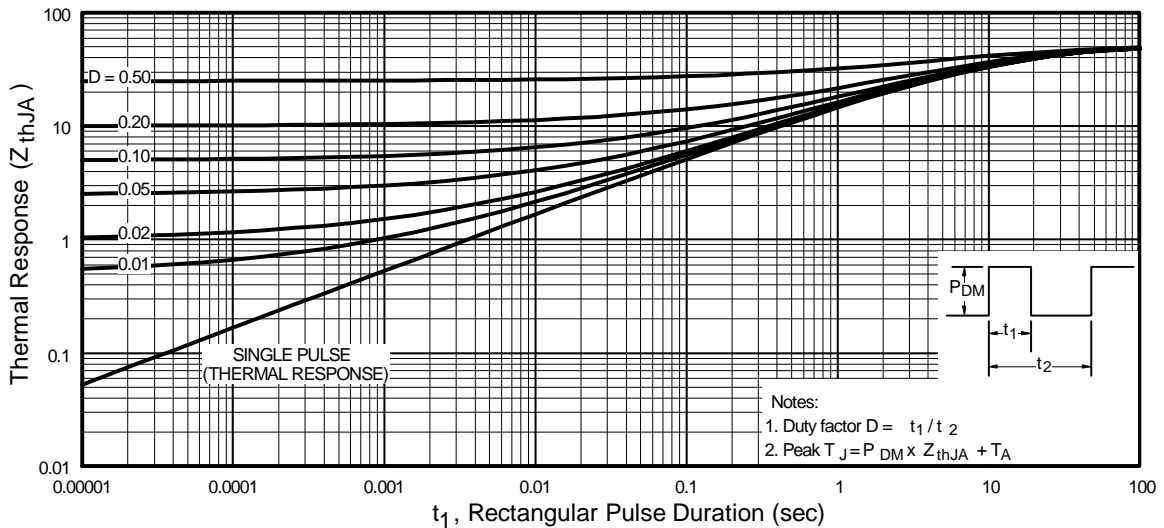


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

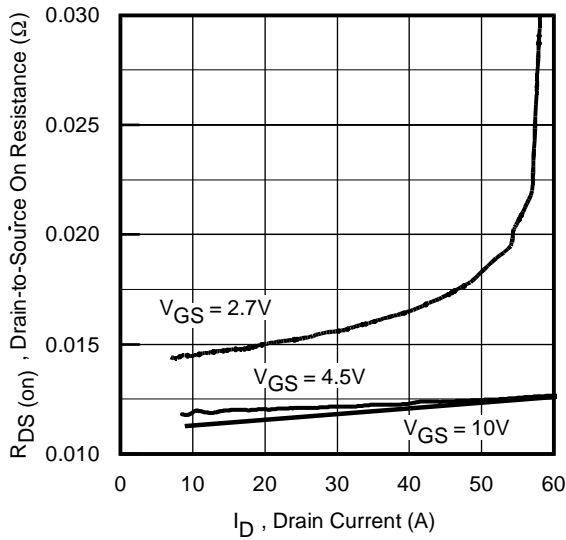


Fig 12. On-Resistance Vs. Drain Current

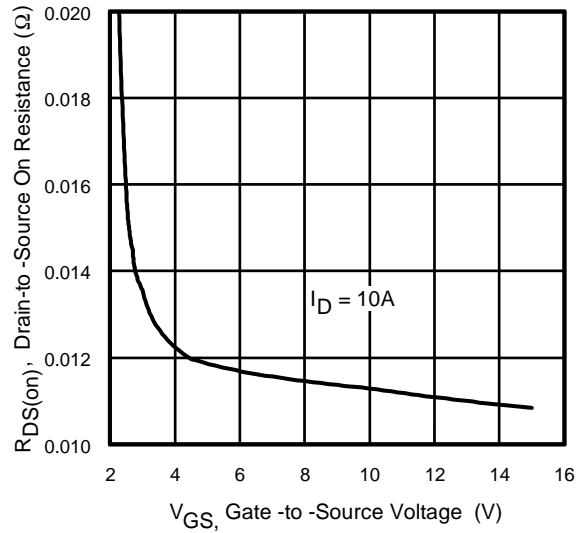


Fig 13. On-Resistance Vs. Gate Voltage

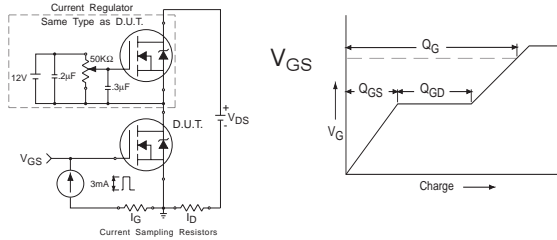


Fig 13a&b. Basic Gate Charge Test Circuit and Waveform

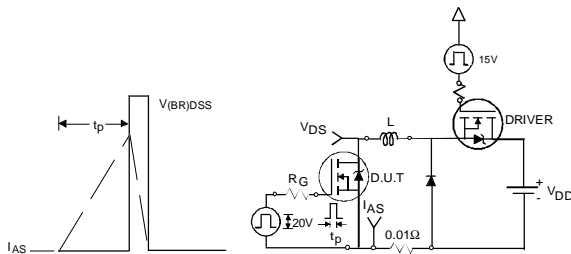


Fig 14a&b. Unclamped Inductive Test circuit and Waveforms

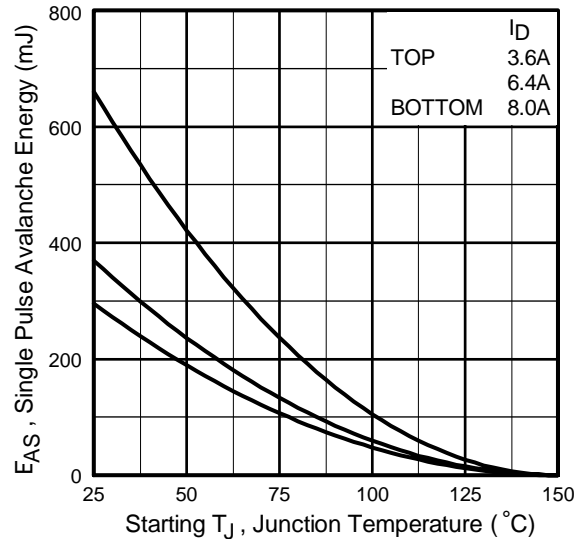
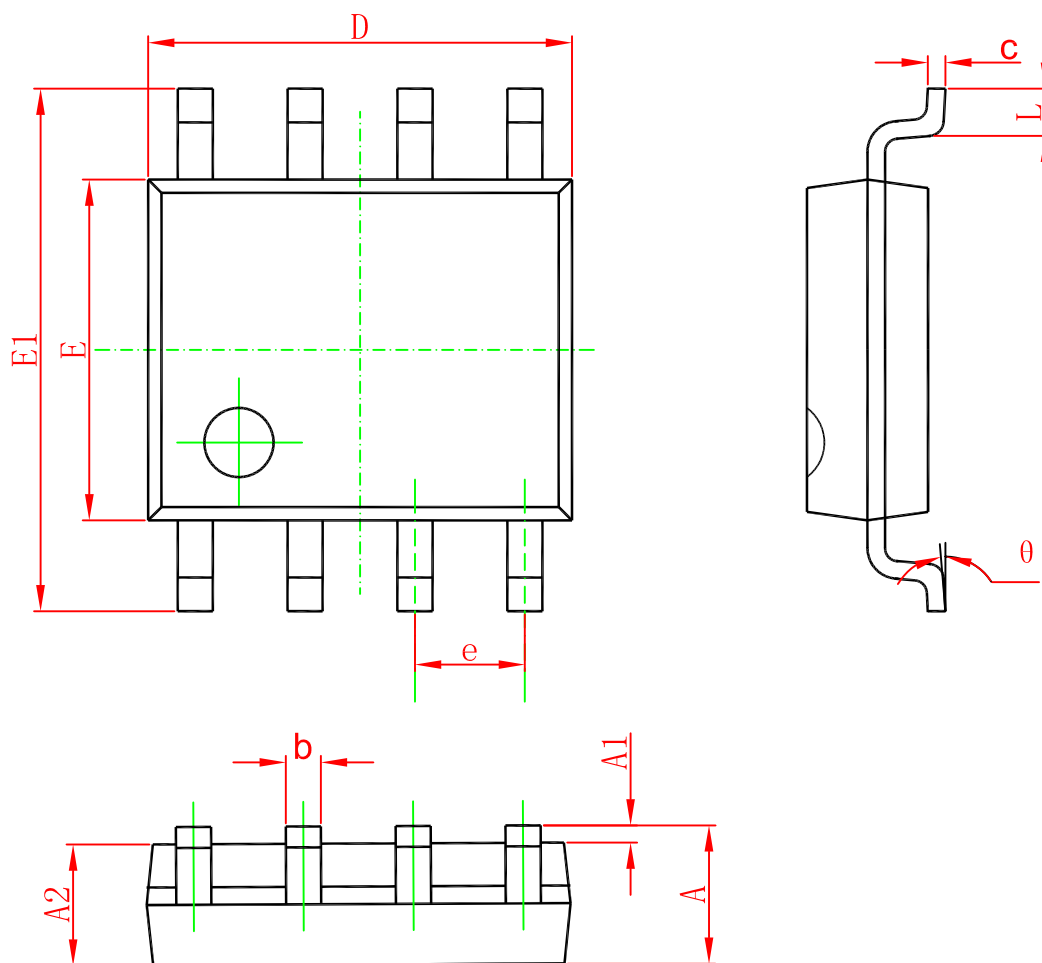


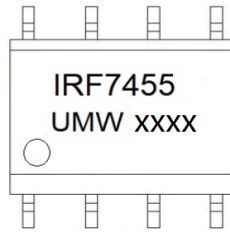
Fig 14c. Maximum Avalanche Energy Vs. Drain Current

SOP-8



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.350                     | 1.750 | 0.053                | 0.069 |
| A1     | 0.100                     | 0.250 | 0.004                | 0.010 |
| A2     | 1.350                     | 1.550 | 0.053                | 0.061 |
| b      | 0.330                     | 0.510 | 0.013                | 0.020 |
| c      | 0.170                     | 0.250 | 0.006                | 0.010 |
| D      | 4.700                     | 5.100 | 0.185                | 0.200 |
| E      | 3.800                     | 4.000 | 0.150                | 0.157 |
| E1     | 5.800                     | 6.200 | 0.228                | 0.244 |
| e      | 1.270(BSC)                |       | 0.050(BSC)           |       |
| L      | 0.400                     | 1.270 | 0.016                | 0.050 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |

**Marking**



**Ordering information**

| Order code    | Package | Baseqty | Deliverymode  |
|---------------|---------|---------|---------------|
| UMW IRF7455TR | SOP-8   | 3000    | Tape and reel |



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