

## N-Channel Enhancement Mode Power MOSFET

### Description

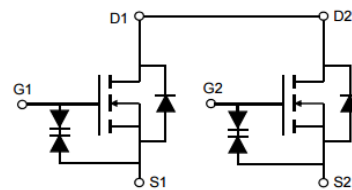
The ZLM0264BG uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

### General Features

- $V_{DS} = 20V, I_D = 7A$   
 $R_{DS(ON)} < 25m\Omega @ V_{GS}=2.5V$   
 $R_{DS(ON)} < 20m\Omega @ V_{GS}=4.5V$
- High power and current handling capability
- Lead free product is acquired
- Surface mount package
- ESD Protected

### Application

- Battery protection
- Load switch
- Power management
- model airplane



Schematic diagram



Marking and pin assignment



TSSOP-8 top view

### Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$ unless otherwise noted)

| Parameter                                        | Symbol         | Limit      | Unit             |
|--------------------------------------------------|----------------|------------|------------------|
| Drain-Source Voltage                             | $V_{DS}$       | 20         | V                |
| Gate-Source Voltage                              | $V_{GS}$       | $\pm 8$    | V                |
| Drain Current-Continuous                         | $I_D$          | 7          | A                |
| Drain Current-Pulsed <sup>(Note 1)</sup>         | $I_{DM}$       | 20         | A                |
| Maximum Power Dissipation                        | $P_D$          | 1.2        | W                |
| Operating Junction and Storage Temperature Range | $T_J, T_{STG}$ | -55 To 150 | $^\circ\text{C}$ |

### Thermal Characteristic

|                                                             |                 |    |                    |
|-------------------------------------------------------------|-----------------|----|--------------------|
| Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup> | $R_{\theta JA}$ | 62 | $^\circ\text{C/W}$ |
|-------------------------------------------------------------|-----------------|----|--------------------|

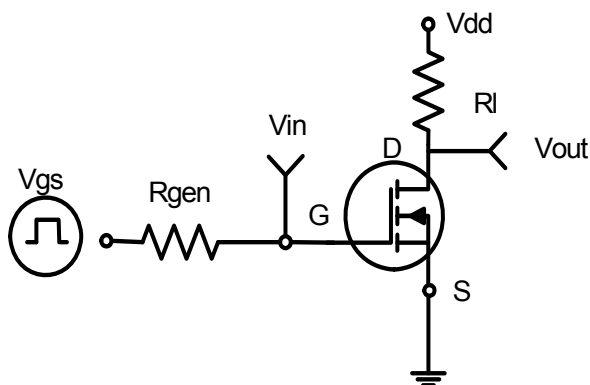
**Electrical Characteristics ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)**

| Parameter                                     | Symbol              | Condition                                                                                 | Min | Typ  | Max | Unit |
|-----------------------------------------------|---------------------|-------------------------------------------------------------------------------------------|-----|------|-----|------|
| Off Characteristics                           |                     |                                                                                           |     |      |     |      |
| Drain-Source Breakdown Voltage                | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V I <sub>D</sub> =250μA                                                 | 20  | -    | -   | V    |
| Zero Gate Voltage Drain Current               | I <sub>DSS</sub>    | V <sub>DS</sub> =16V, V <sub>GS</sub> =0V                                                 | -   | -    | 1   | μA   |
| Gate-Body Leakage Current                     | I <sub>GSS</sub>    | V <sub>GS</sub> =±8V V <sub>DS</sub> =0V                                                  | -   | -    | ±10 | μA   |
| On Characteristics <sup>(Note 3)</sup>        |                     |                                                                                           |     |      |     |      |
| Gate Threshold Voltage                        | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                  | 0.4 | 0.7  | 1.0 | V    |
| Drain-Source On-State Resistance              | R <sub>DS(ON)</sub> | V <sub>GS</sub> =4.5V, I <sub>D</sub> =2A                                                 | -   | 15   | 20  | mΩ   |
|                                               |                     | V <sub>GS</sub> =2.5V, I <sub>D</sub> =2A                                                 | -   | 19.5 | 25  | mΩ   |
| Forward Transconductance                      | g <sub>FS</sub>     | V <sub>DS</sub> =5V, I <sub>D</sub> =3A                                                   | -   | 10   | -   | S    |
| Dynamic Characteristics <sup>(Note4)</sup>    |                     |                                                                                           |     |      |     |      |
| Input Capacitance                             | C <sub>ISS</sub>    | V <sub>DS</sub> =10V, V <sub>GS</sub> =0V,<br>F=1.0MHz                                    | -   | 900  | -   | PF   |
| Output Capacitance                            | C <sub>OSS</sub>    |                                                                                           | -   | 220  | -   | PF   |
| Reverse Transfer Capacitance                  | C <sub>RSS</sub>    |                                                                                           | -   | 100  | -   | PF   |
| Switching Characteristics <sup>(Note 4)</sup> |                     |                                                                                           |     |      |     |      |
| Turn-on Delay Time                            | t <sub>d(on)</sub>  | V <sub>DD</sub> = 10V, I <sub>D</sub> =3A<br>V <sub>GS</sub> =4.5 V, R <sub>GEN</sub> =6Ω | -   | 10   | 20  | nS   |
| Turn-on Rise Time                             | t <sub>r</sub>      |                                                                                           | -   | 11   | 25  | nS   |
| Turn-Off Delay Time                           | t <sub>d(off)</sub> |                                                                                           | -   | 35   | 70  | nS   |
| Turn-Off Fall Time                            | t <sub>f</sub>      |                                                                                           | -   | 30   | 60  | nS   |
| Total Gate Charge                             | Q <sub>g</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> =3A,<br>V <sub>GS</sub> =4.5V                        | -   | 12   | 15  | nC   |
| Gate-Source Charge                            | Q <sub>GS</sub>     |                                                                                           | -   | 2.3  | -   | nC   |
| Gate-Drain Charge                             | Q <sub>gd</sub>     |                                                                                           | -   | 1    | -   | nC   |
| Drain-Source Diode Characteristics            |                     |                                                                                           |     |      |     |      |
| Diode Forward Voltage <sup>(Note 3)</sup>     | V <sub>SD</sub>     | V <sub>GS</sub> =0V, I <sub>S</sub> =1A                                                   | -   | -    | 1.2 | V    |
| Diode Forward Current <sup>(Note 2)</sup>     | I <sub>S</sub>      |                                                                                           | -   | -    | 6.5 | A    |

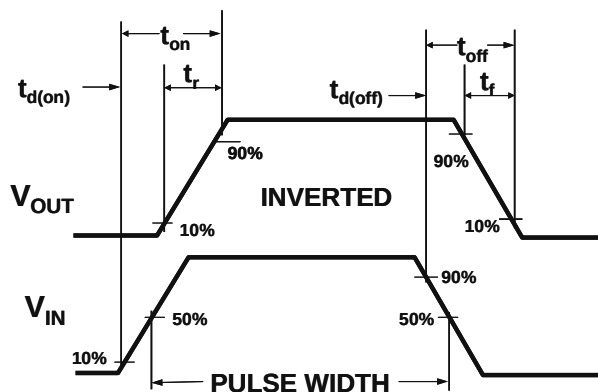
**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

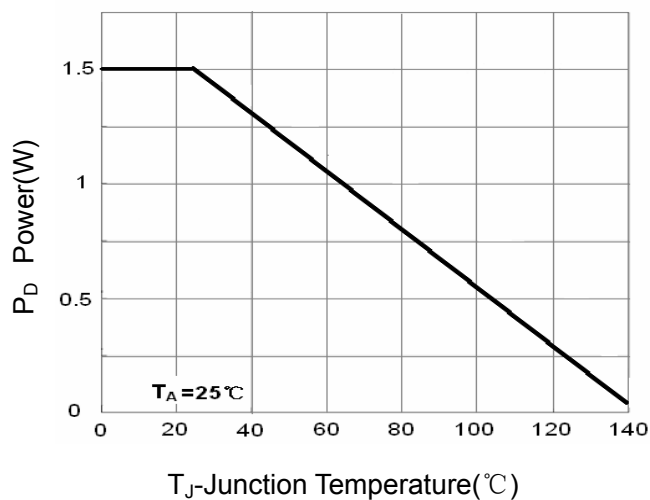
## Typical Electrical and Thermal Characteristics



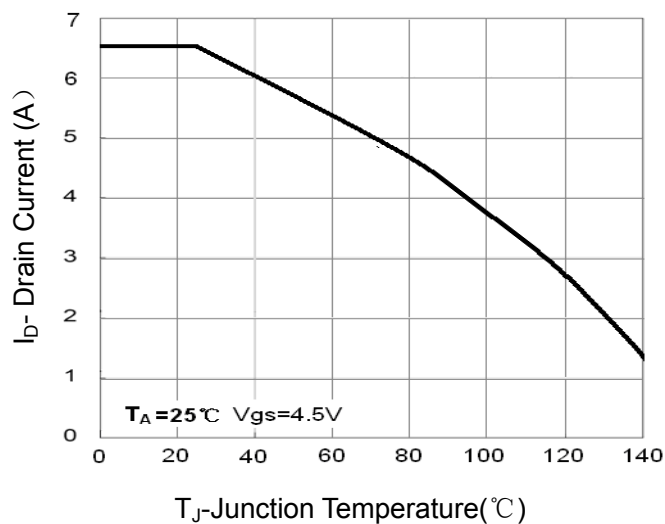
**Figure 1: Switching Test Circuit**



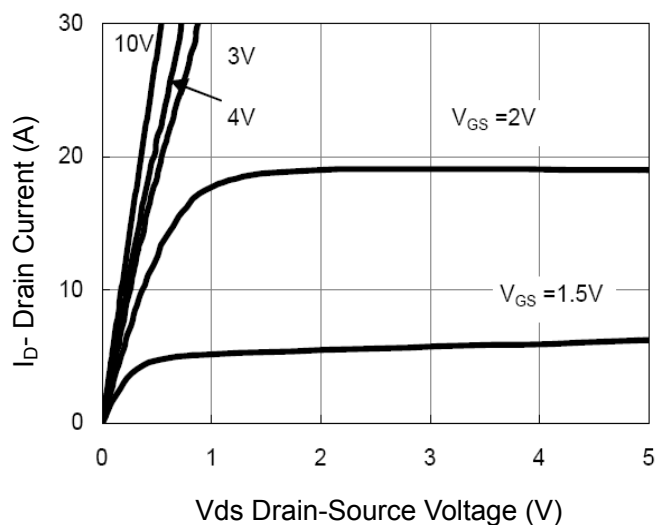
**Figure 2: Switching Waveforms**



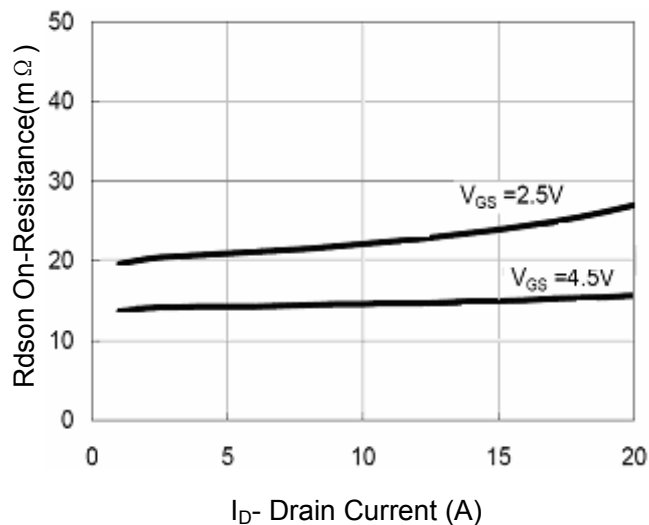
**Figure 3 Power Dissipation**



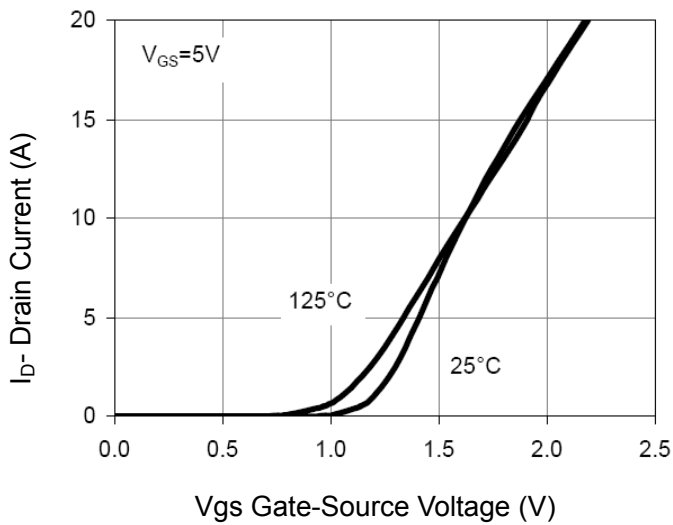
**Figure 4 Drain Current**



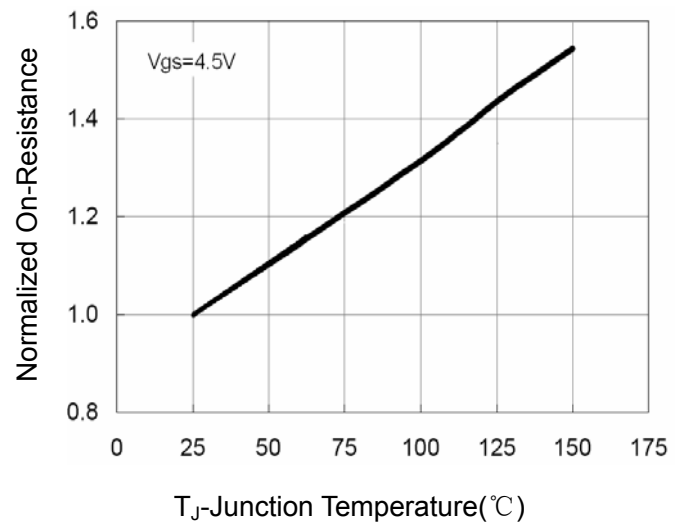
**Figure 5 Output Characteristics**



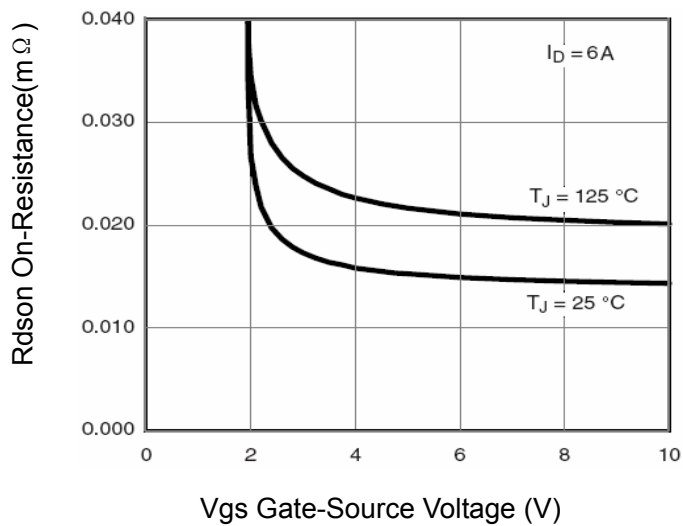
**Figure 6 Drain-Source On-Resistance**



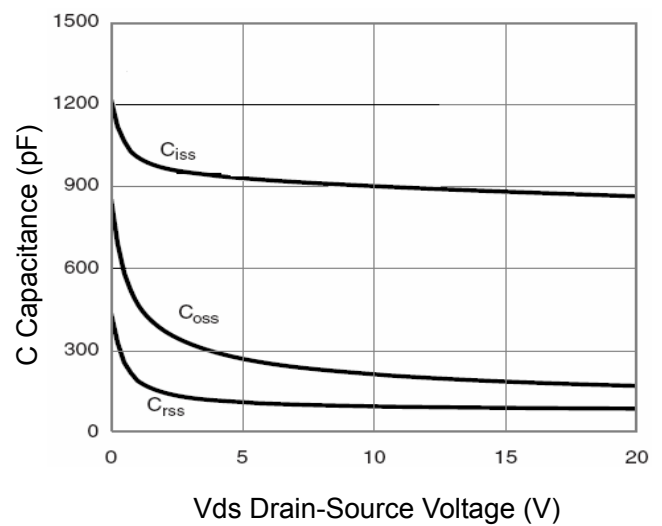
**Figure 7 Transfer Characteristics**



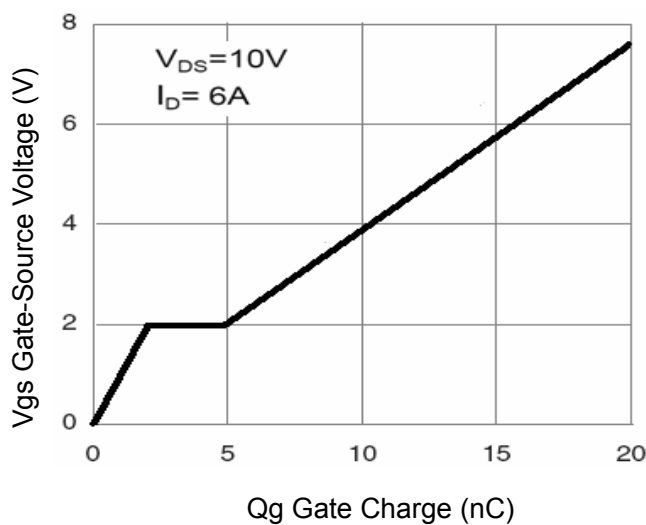
**Figure 8 Drain-Source On-Resistance**



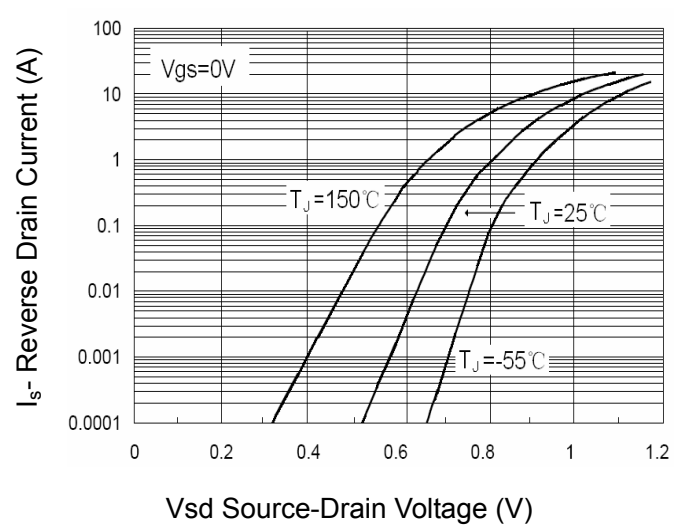
**Figure 9 Rdson vs Vgs**



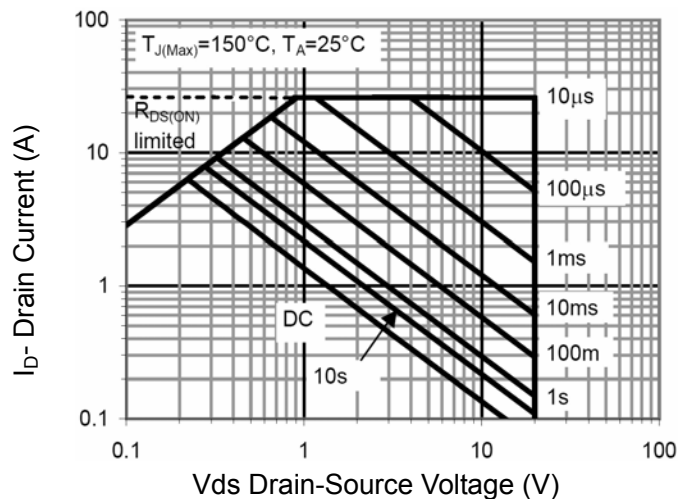
**Figure 10 Capacitance vs Vds**



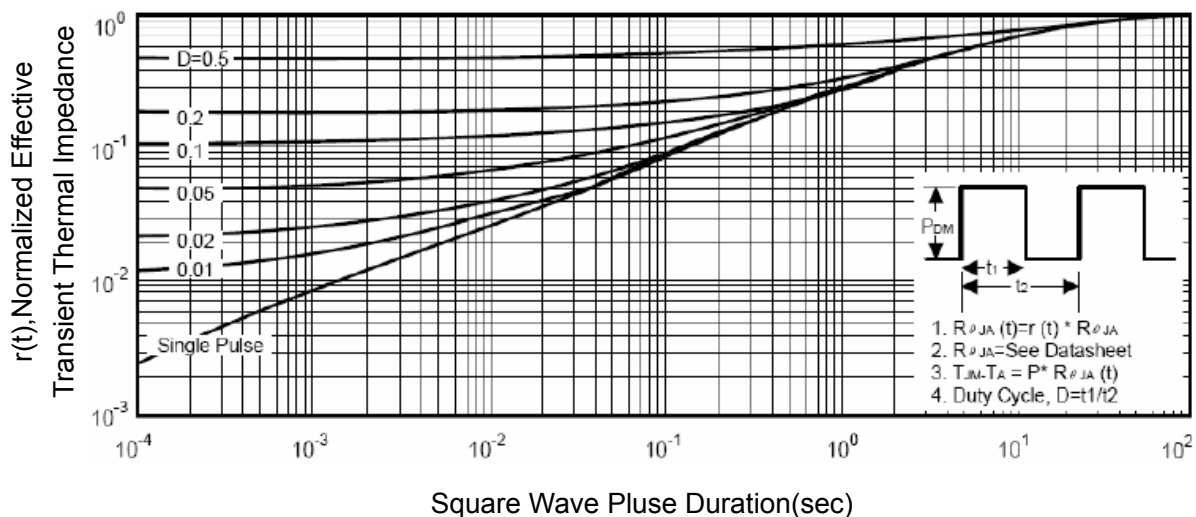
**Figure 11 Gate Charge**



**Figure 12 Source- Drain Diode Forward**



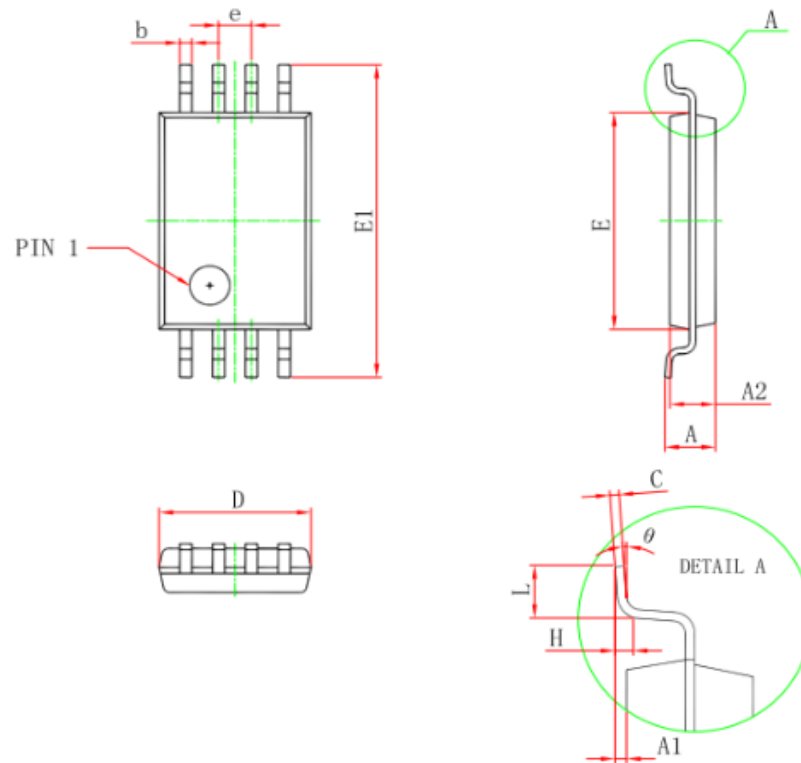
**Figure 13 Safe Operation Area**



**Figure 14 Normalized Maximum Transient Thermal Impedance**

**Package Information**

**TSSOP8**



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| D      | 2.900                     | 3.100 | 0.114                | 0.122 |
| E      | 4.300                     | 4.500 | 0.169                | 0.177 |
| b      | 0.190                     | 0.300 | 0.007                | 0.012 |
| e      | 0.090                     | 0.200 | 0.004                | 0.008 |
| E1     | 6.250                     | 6.550 | 0.246                | 0.258 |
| A      |                           | 1.200 |                      | 0.047 |
| A2     | 0.800                     | 1.000 | 0.031                | 0.039 |
| A1     | 0.050                     | 0.150 | 0.002                | 0.006 |
| e      | 0.65 (BSC)                |       | 0.026 (BSC)          |       |
| L      | 0.500                     | 0.700 | 0.020                | 0.028 |
| H      | 0.25(TYP)                 |       | 0.01(TYP)            |       |
| θ      | 1°                        | 7°    | 1°                   | 7°    |