



TM563BA P-CHANNEL POWER MOSFET

General Description

The TM563BA uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

- Power switching application
- Hard switched and high frequency circuits
- DC-DC converter

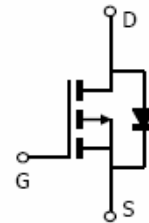
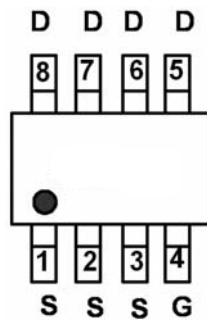
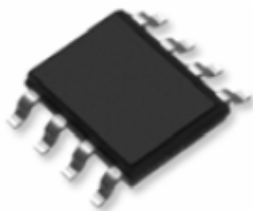
Product Summary

| | |
|----------------------------------|--------|
| V_{DS} | -40V |
| I_D (at $V_{GS}=-10V$) | -13A |
| $R_{DS(ON)}$ (at $V_{GS}=-10V$) | < 15mΩ |

100% UIS Tested
 100% R_g Tested



SOP-8 top view



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

| Parameter | Symbol | Limit | Unit |
|--|--------------------|------------|------------|
| Drain-Source Voltage | V_{DS} | -40 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Drain Current-Continuous | I_D | -13 | A |
| Drain Current-Continuous($T_C=100^\circ C$) | $I_D(100^\circ C)$ | -9 | A |
| Pulsed Drain Current | I_{DM} | 50 | A |
| Maximum Power Dissipation | P_D | 2.5 | W |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 150 | $^\circ C$ |

Thermal Characteristic

| | | | |
|---|-----------------|----|--------------|
| Thermal Resistance ,Junction-to-Ambient(Note 2) | $R_{\theta JA}$ | 50 | $^\circ C/W$ |
|---|-----------------|----|--------------|

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

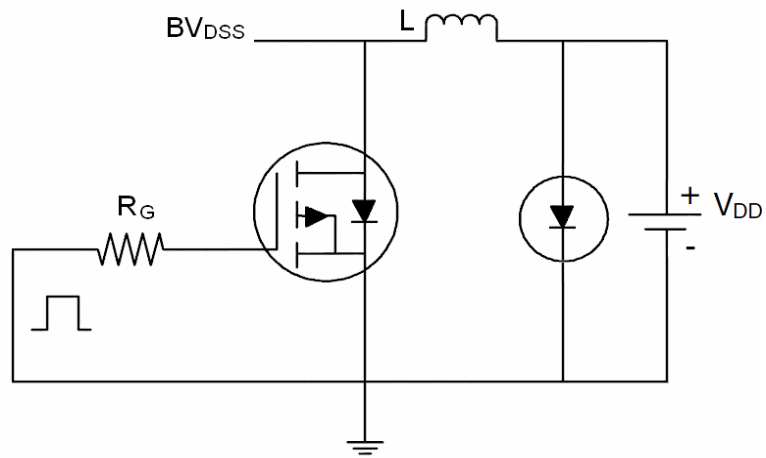
| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|--------------|--|------|------|-----------|------------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=-250\mu A$ | -40 | - | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=-40V, V_{GS}=0V$ | - | - | 1 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$ | -1.3 | -2 | -2.5 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=-10V, I_D=-12A$ | - | 12 | 15 | m Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=-15V, I_D=-10A$ | 35 | - | - | S |
| Dynamic Characteristics (Note 4) | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=-20V, V_{GS}=0V,$ $F=1.0\text{MHz}$ | - | 2800 | - | PF |
| Output Capacitance | C_{oss} | | - | 320 | - | PF |
| Reverse Transfer Capacitance | C_{rss} | | - | 220 | - | PF |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=-20V, R_L=2\Omega$ $V_{GS}=-10V, R_{GEN}=6\Omega$ | - | 11 | - | nS |
| Turn-on Rise Time | t_r | | - | 75 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 89 | - | nS |
| Turn-Off Fall Time | t_f | | - | 35 | - | nS |
| Total Gate Charge | Q_g | $V_{DS}=-20V, I_D=-12A,$ $V_{GS}=-10V$ | - | 40 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 6 | - | nC |
| Gate-Drain Charge | Q_{gd} | | - | 12 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 3) | V_{SD} | $V_{GS}=0V, I_S=-12A$ | - | - | 1.2 | V |
| Diode Forward Current (Note 2) | I_S | | - | - | -13 | A |

Notes:

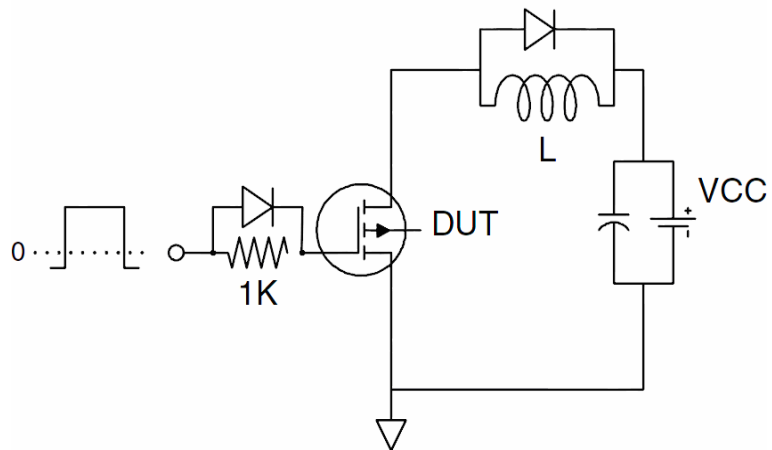
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Test Circuit

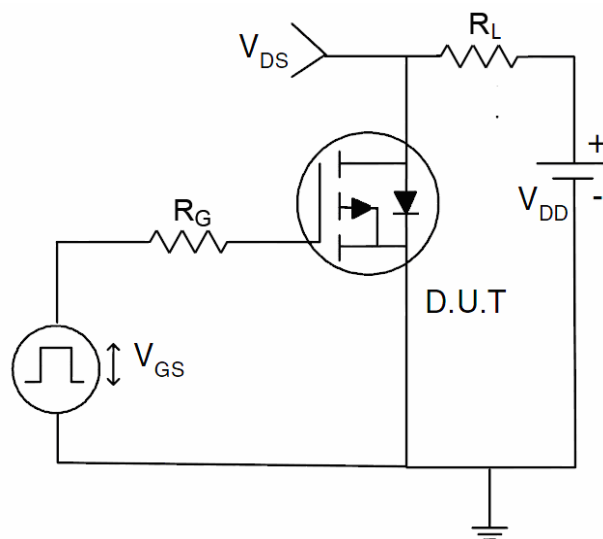
1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

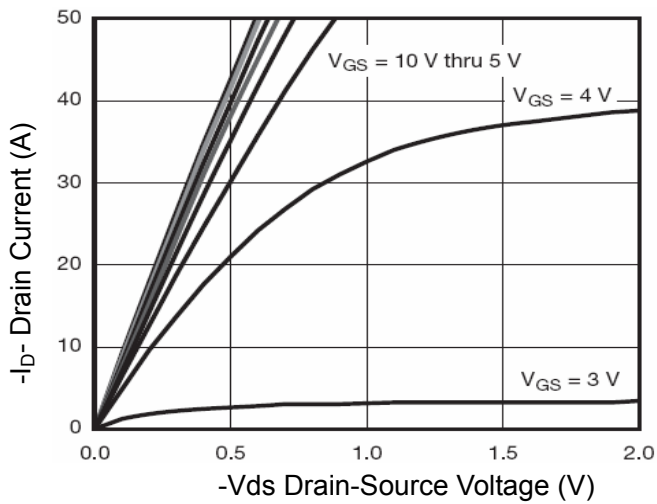


Figure 1 Output Characteristics

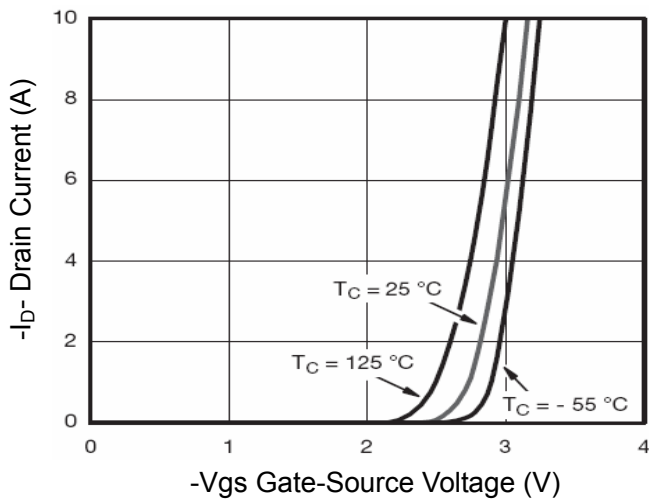


Figure 2 Transfer Characteristics

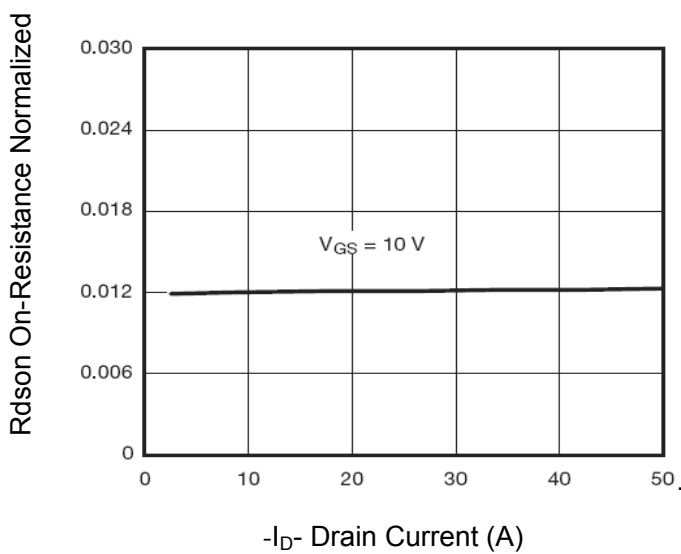


Figure 3 $R_{DS(on)}$ - Drain Current

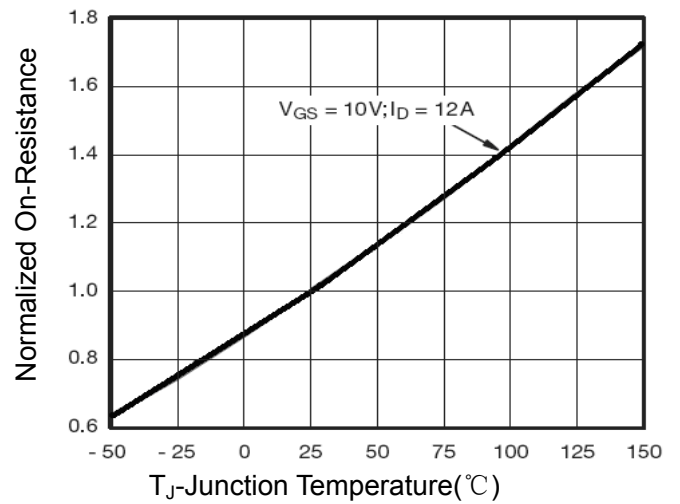


Figure 4 $R_{DS(on)}$ -Junction Temperature

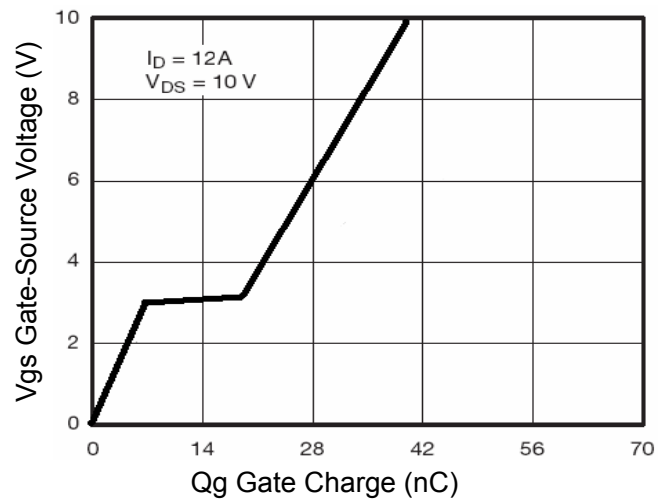


Figure 5 Gate Charge

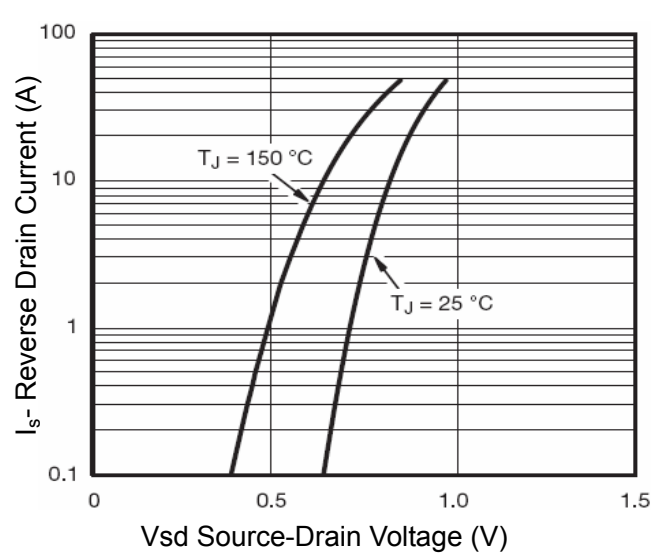


Figure 6 Source- Drain Diode Forward

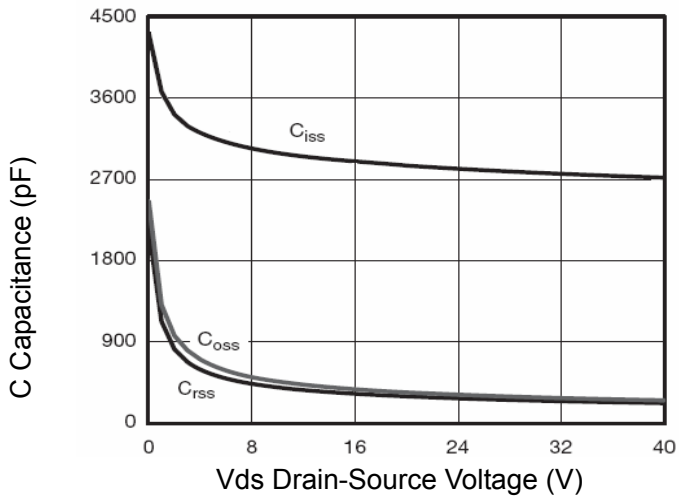


Figure 7 Capacitance vs Vds

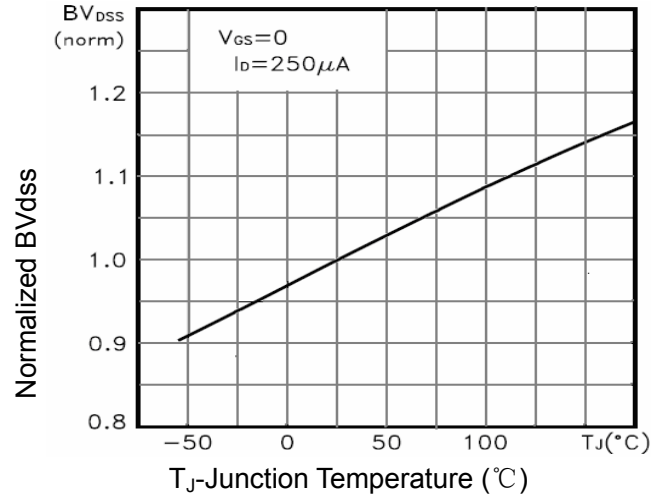


Figure 9 BV_{DSS} vs Junction Temperature

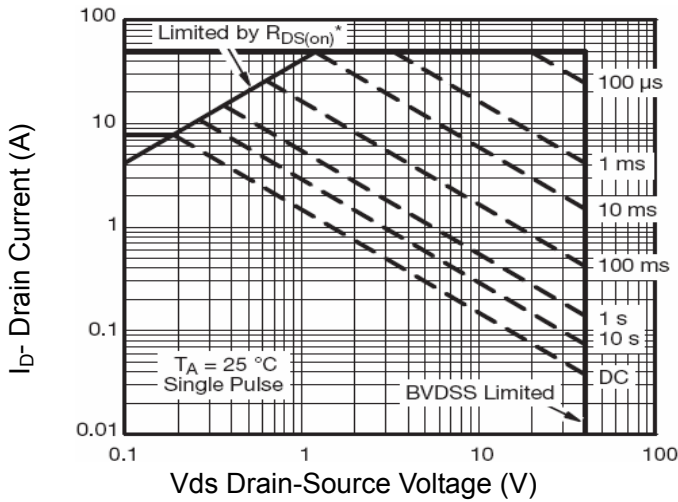


Figure 8 Safe Operation Area

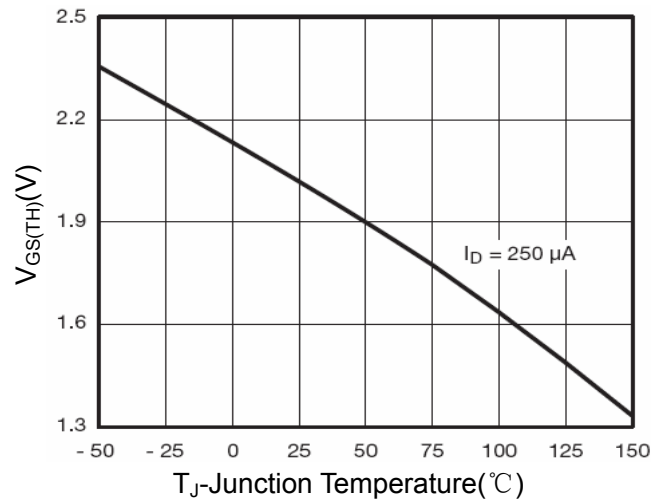


Figure 10 $V_{GS(th)}$ vs Junction Temperature

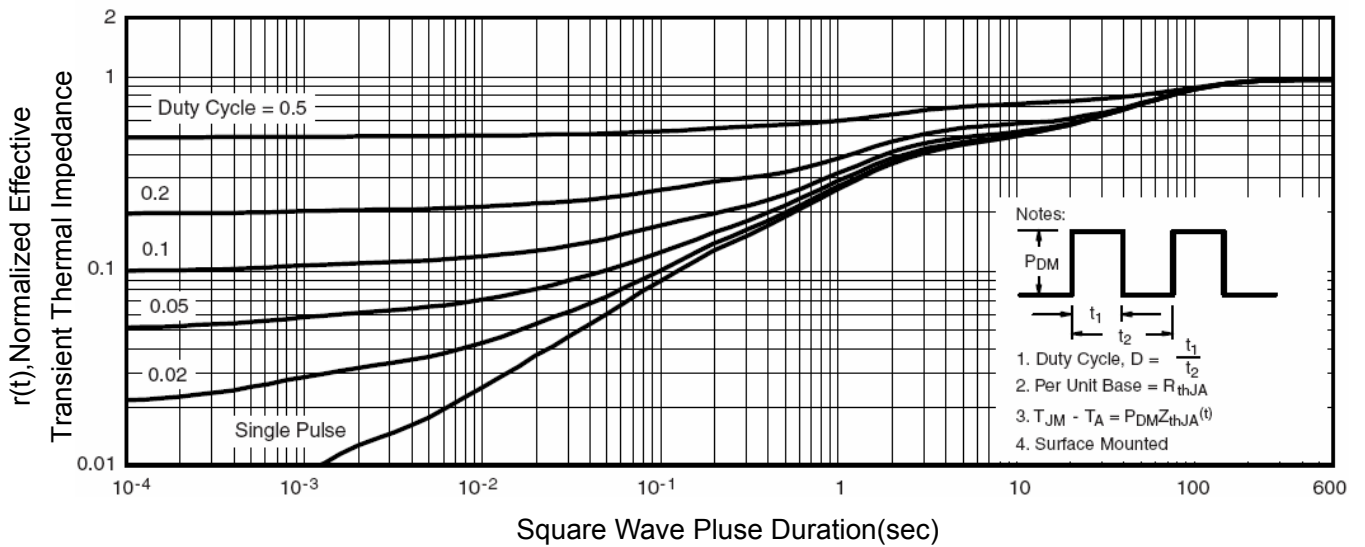
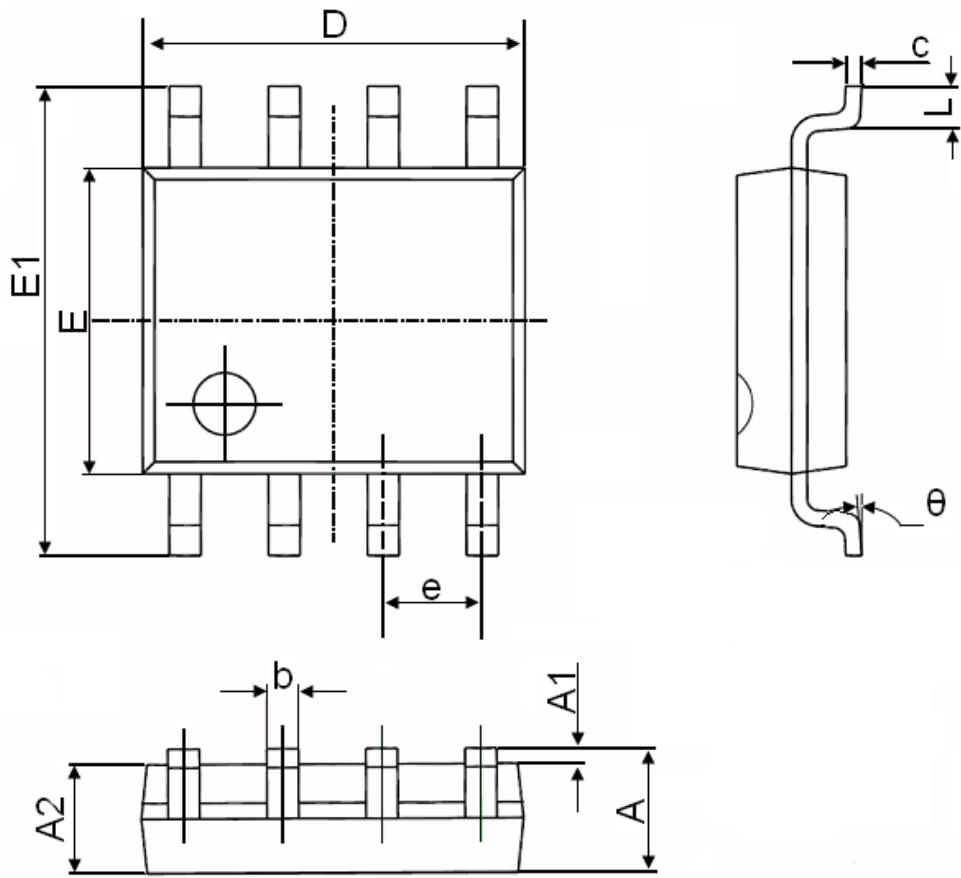


Figure 11 Normalized Maximum Transient Thermal Impedance

SOP-8 Package Information



| 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° |