

### Description

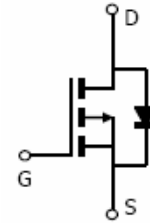
The PT11110 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

### General Features

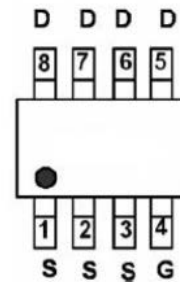
- $V_{DS} = -40V, I_D = -1A$   
 $R_{DS(ON)} < 15m\Omega @ V_{GS} = -10V$   
 $R_{DS(ON)} < 18m\Omega @ V_{GS} = -4.5V$
- High density cell design for ultra low  $R_{dson}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

### Application

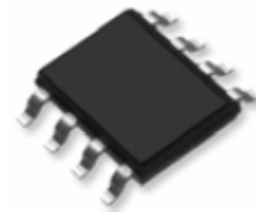
- Power switching application
- Hard switched and high frequency circuits
- DC-DC converter



Schematic diagram



Marking and pin assignment



SOP-8 top view

### Package Marking and Ordering Information

| Device Marking | Device  | Device Package | Reel Size | Tape width | Quantity   |
|----------------|---------|----------------|-----------|------------|------------|
| HM44850        | PT11110 | SOP-8          | Ø330mm    | 12mm       | 2500 units |

### 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                              | $V_{GS}$           | $\pm 20$   | V          |
| Drain Current-Continuous                         | $I_D$              | -1A        | A          |
| Drain Current-Continuous( $T_C = 100^\circ C$ )  | $I_D(100^\circ C)$ | -1         | A          |
| Pulsed Drain Current                             | $I_{DM}$           | HO         | 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)**

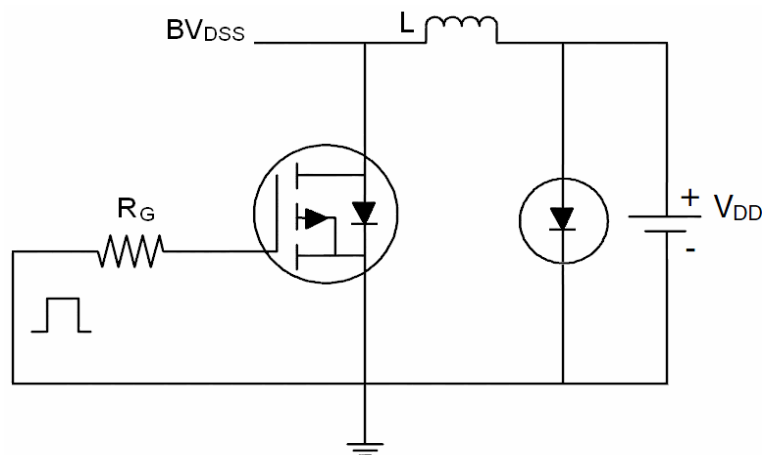
| Parameter                                 | Symbol       | Condition  | Min  | Typ  | Max           | Unit       |
|---|--------------|--|------|------|---------------|------------|
| <b>Off Characteristics</b>                |              |  |      |      |               |            |
| Drain-Source 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             | $\mu A$    |
| Gate-Body Leakage Current                 | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$                                  | -    | -    | $\pm 100$     | nA         |
| <b>On Characteristics (Note 3)</b>        |              |  |      |      |               |            |
| 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 $\Omega$ |
| Forward Transconductance                  | $g_{FS}$     | $V_{DS}=-15V, I_D=-10A$                                      | 35   | -    | -             | S          |
| <b>Dynamic Characteristics (Note 4)</b>   |              |  |      |      |               |            |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=-20V, V_{GS}=0V,$<br>$F=1.0\text{MHz}$               | -    | 2800 | -             | PF         |
| Output Capacitance                        | $C_{oss}$    |  | -    | 320  | -             | PF         |
| Reverse Transfer Capacitance              | $C_{rss}$    |  | -    | 220  | -             | PF         |
| <b>Switching Characteristics (Note 4)</b> |              |  |      |      |               |            |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DD}=-20V, R_L=2\Omega$<br>$V_{GS}=-10V, R_{GEN}=6\Omega$ | -    | 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                         | $Q_g$        | $V_{DS}=-20V, I_D=-12A,$<br>$V_{GS}=-10V$                    | -    | 40   | -             | nC         |
| Gate-Source Charge                        | $Q_{gs}$     |  | -    | 6    | -             | nC         |
| Gate-Drain Charge                         | $Q_{gd}$     |  | -    | 12   | -             | nC         |
| <b>Drain-Source Diode Characteristics</b> |              |  |      |      |               |            |
| Diode Forward Voltage (Note 3)            | $V_{SD}$     | $V_{GS}=0V, I_S=-12A$  | -    | -    | 1.2           | V          |
| Diode Forward Current (Note 2)            | $I_S$        |  | -    | -    | -1 $\epsilon$ | A          |

**Notes:**

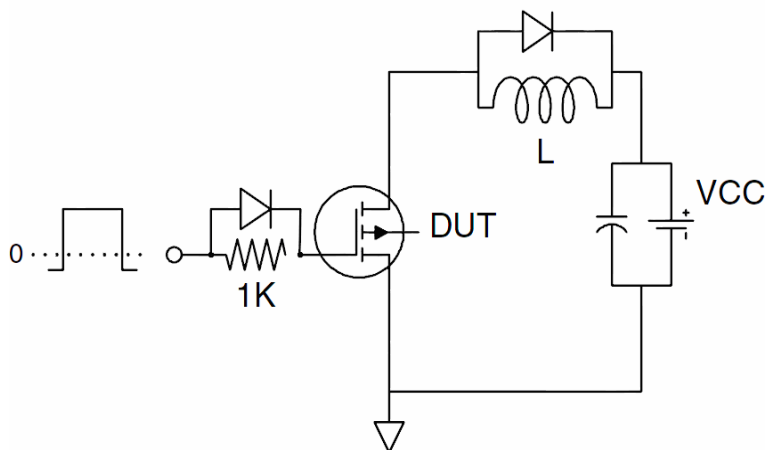
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

Test Circuit

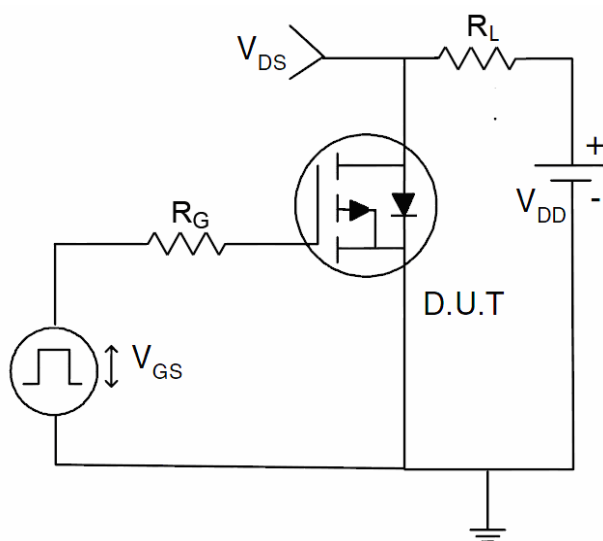
1)  $E_{AS}$  Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

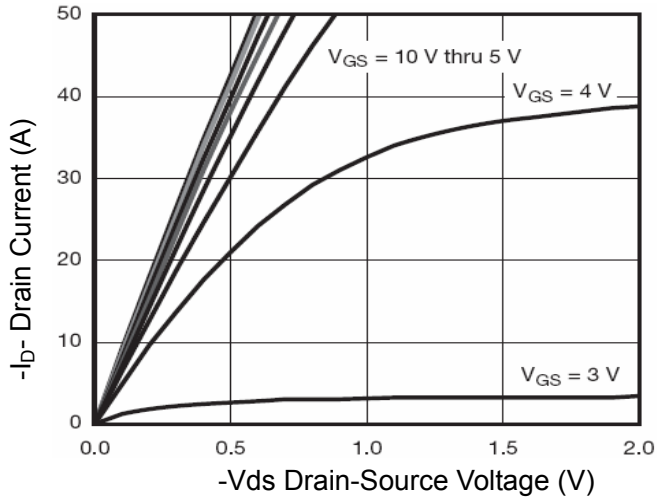


Figure 1 Output Characteristics

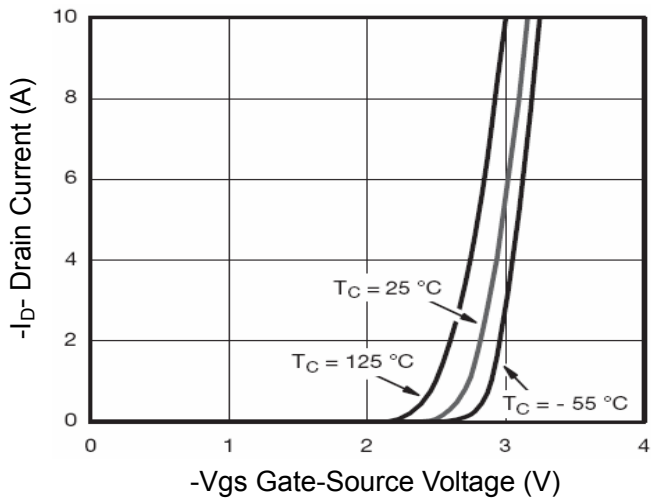


Figure 2 Transfer Characteristics

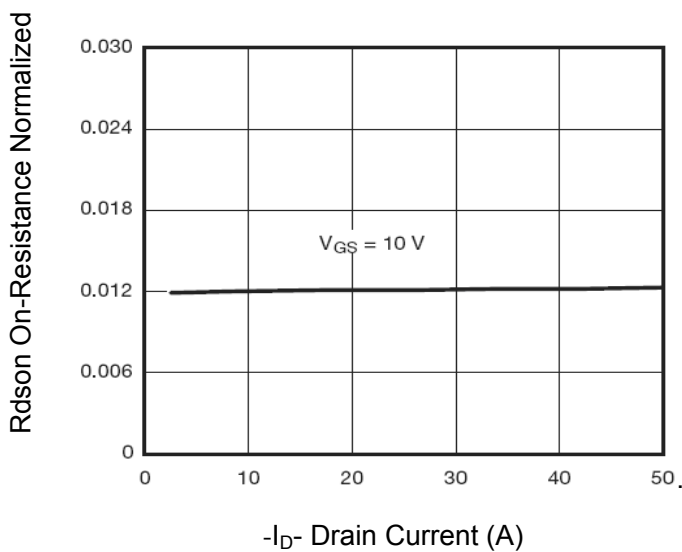


Figure 3 Rdson- Drain Current

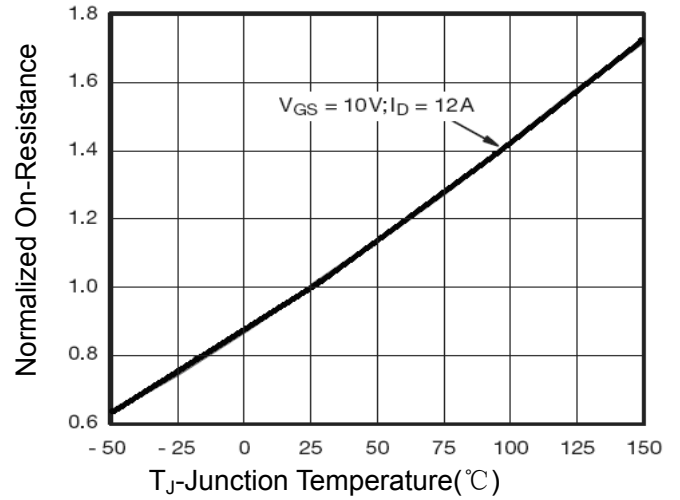


Figure 4 Rdson-Junction Temperature

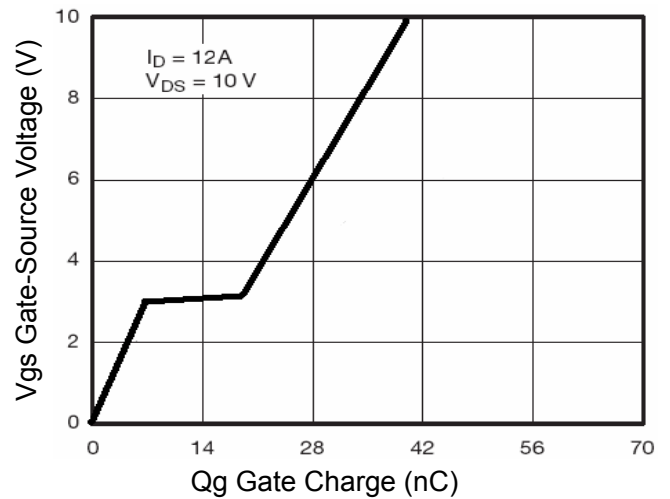


Figure 5 Gate Charge

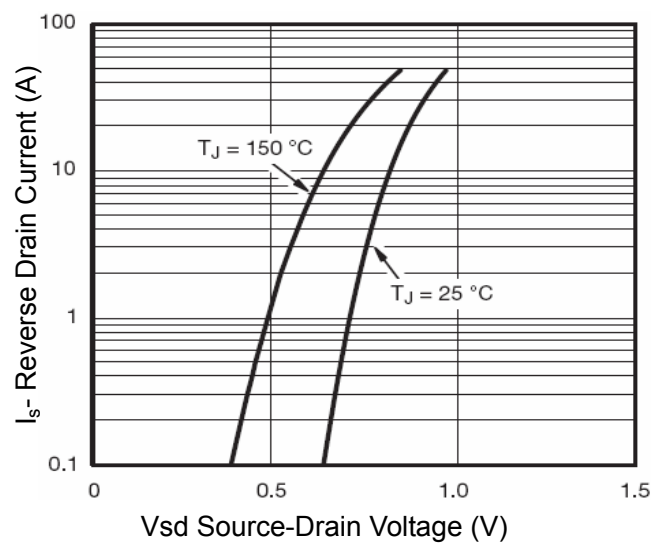


Figure 6 Source- Drain Diode Forward

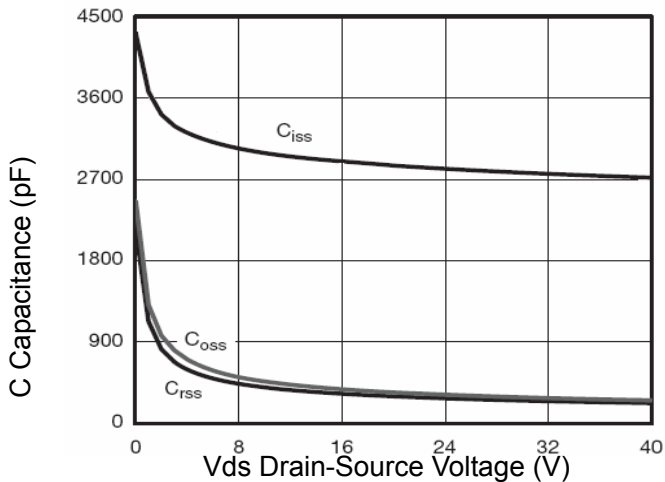


Figure 7 Capacitance vs Vds

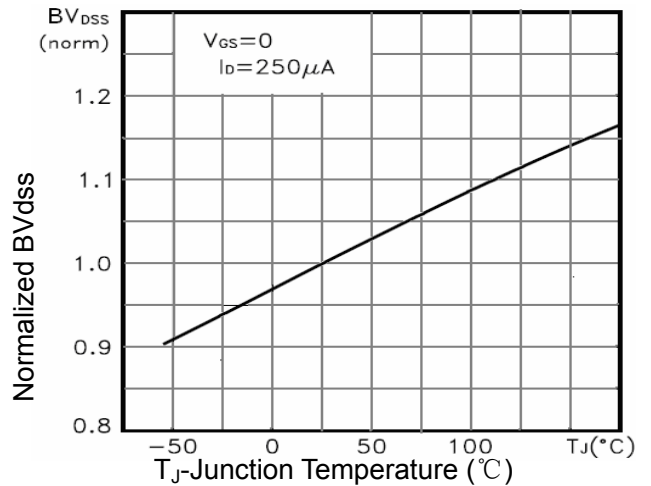


Figure 9  $BV_{DSS}$  vs Junction Temperature

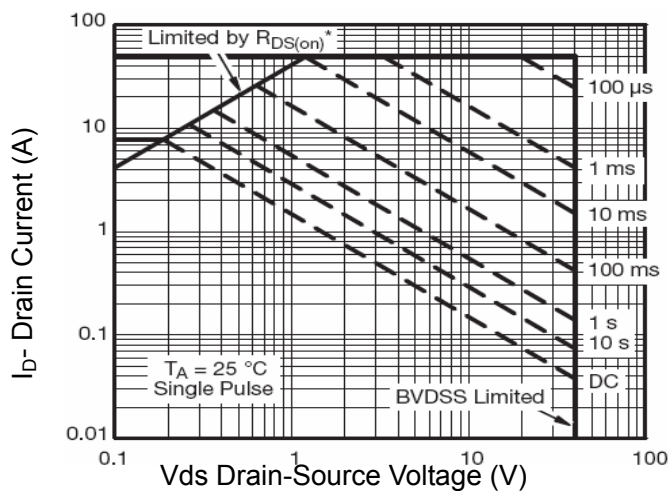


Figure 8 Safe Operation Area

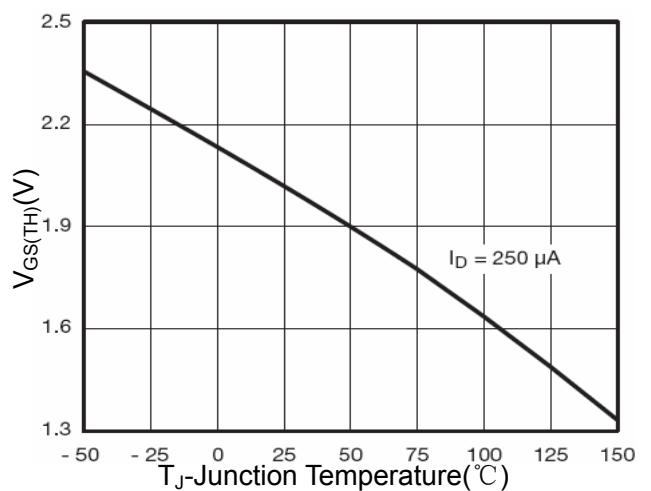


Figure 10  $V_{GS(th)}$  vs Junction Temperature

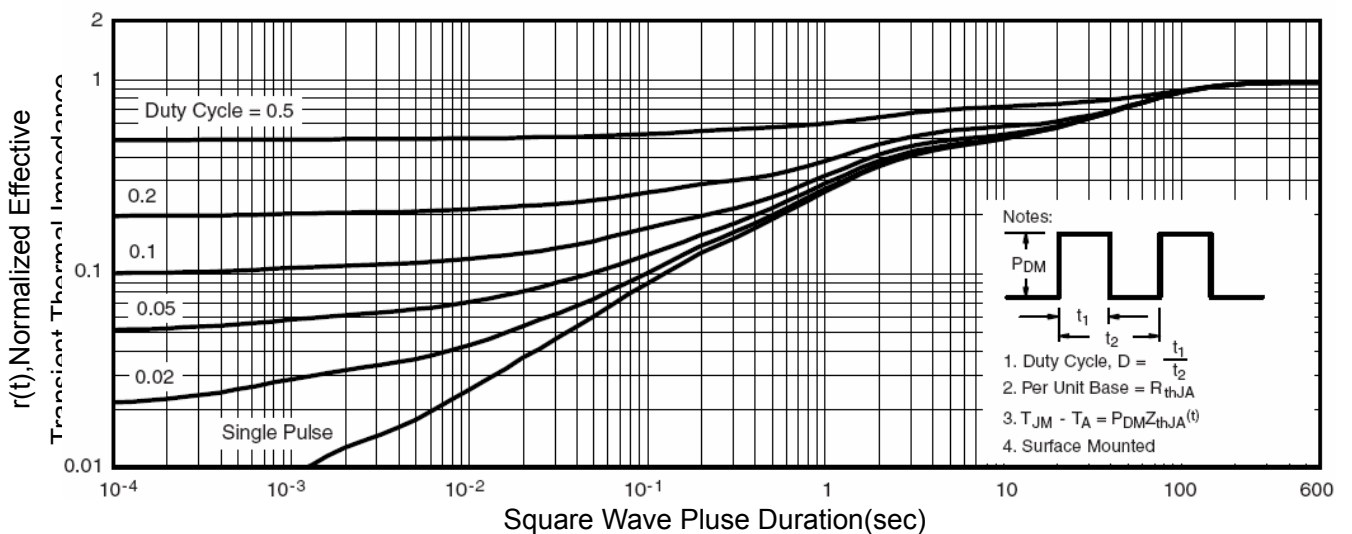
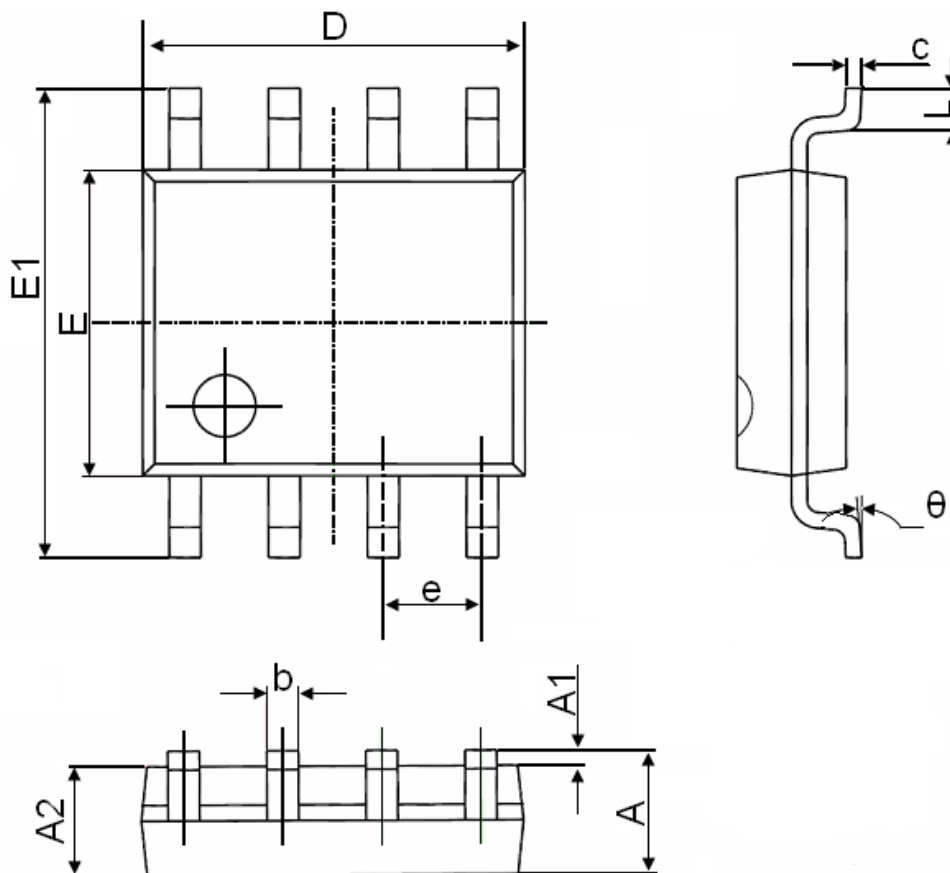


Figure 11 Normalized Maximum Transient Thermal Impedance

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°    |