

## Dual N-Channel Enhancement Mode Power MOSFET

### DESCRIPTION

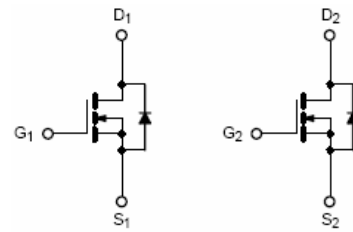
The HM9926 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

### GENERAL FEATURES

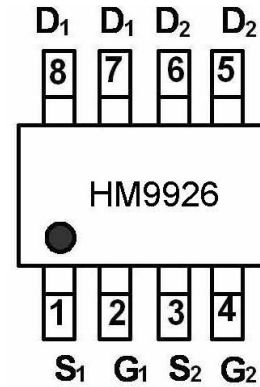
- $V_{DS} = 20V, I_D = 6A$   
 $R_{DS(ON)} < 30m\Omega @ V_{GS} = 4.5V$   
 $R_{DS(ON)} < 40m\Omega @ V_{GS} = 2.5V$
- High density cell design for ultra low Rdson
- Fully characterized Avalanche voltage and current

### Application

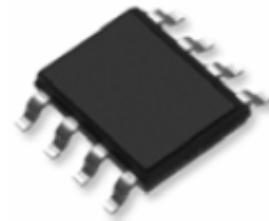
- Power switching application
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply



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   |
|----------------|--------|----------------|-----------|------------|------------|
| HM9926         | HM9926 | SOP-8          | Ø330mm    | 12mm       | 2500 units |

### Absolute Maximum Ratings (TA=25°C unless otherwise noted)

| Parameter  | Symbol             | Limit      | Unit |
|--|--------------------|------------|------|
| Drain-Source Voltage                             | $V_{DS}$           | 20         | V    |
| Gate-Source Voltage                              | $V_{GS}$           | ±12        | V    |
| Drain Current-Continuous                         | $I_D$              | 6          | A    |
| Drain Current-Continuous( $T_C=100^\circ C$ )    | $I_D(100^\circ C)$ | 3.8        | A    |
| Pulsed Drain Current                             | $I_{DM}$           | 25         | A    |
| Maximum Power Dissipation                        | $P_D$              | 1.25       | W    |
| Operating Junction and Storage Temperature Range | $T_J, T_{STG}$     | -55 To 150 | °C   |

### Thermal Characteristic

|   |                 |     |      |
|---|-----------------|-----|------|
| Thermal Resistance, Junction-to-Ambient(Note 2) | $R_{\theta JA}$ | 100 | °C/W |
|---|-----------------|-----|------|

**Electrical Characteristics (TA=25°C unless otherwise noted)**

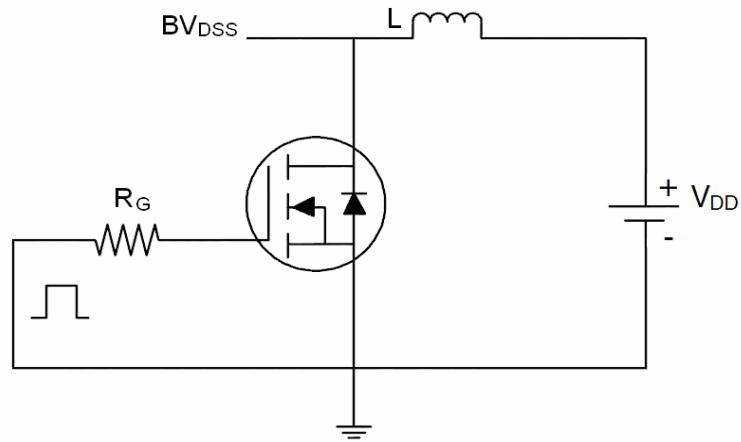
| Parameter                                 | Symbol       | Condition   | Min | Typ | Max       | Unit       |
|---|--------------|---|-----|-----|-----------|------------|
| <b>Off Characteristics</b>                |              |   |     |     |           |            |
| Drain-Source Breakdown Voltage            | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                           | 20  | 22  | -         | V          |
| Zero Gate Voltage Drain Current           | $I_{DSS}$    | $V_{DS}=20V, V_{GS}=0V$                             | -   | -   | 1         | $\mu A$    |
| Gate-Body Leakage Current                 | $I_{GSS}$    | $V_{GS}=\pm 12V, V_{DS}=0V$                         | -   | -   | $\pm 100$ | nA         |
| <b>On Characteristics (Note 3)</b>        |              |   |     |     |           |            |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                       | 0.6 |     | 1.2       | V          |
| Drain-Source On-State Resistance          | $R_{DS(ON)}$ | $V_{GS}=4.5V, I_D=6A$                               | -   | 26  | 30        | m $\Omega$ |
|   |              | $V_{GS}=2.5V, I_D=5A$                               | -   | 36  | 40        |            |
| Forward Transconductance                  | $g_{FS}$     | $V_{DS}=5V, I_D=6A$                                 | 20  | -   | -         | S          |
| <b>Dynamic Characteristics (Note4)</b>    |              |   |     |     |           |            |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=10V, V_{GS}=0V,$<br>$F=1.0MHz$              | -   | 640 | -         | PF         |
| Output Capacitance                        | $C_{oss}$    |   | -   | 140 | -         | PF         |
| Reverse Transfer Capacitance              | $C_{rss}$    |   | -   | 80  | -         | PF         |
| <b>Switching Characteristics (Note 4)</b> |              |   |     |     |           |            |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DD}=10V, I_D=1A$<br>$V_{GEN}=4.5V, R_G=6\Omega$ | -   | 8   | -         | nS         |
| Turn-on Rise Time                         | $t_r$        |   | -   | 9   | -         | nS         |
| Turn-Off Delay Time                       | $t_{d(off)}$ |   | -   | 15  | -         | nS         |
| Turn-Off Fall Time                        | $t_f$        |   | -   | 4   | -         | nS         |
| Total Gate Charge                         | $Q_g$        | $V_{DS}=10V, I_D=3A,$<br>$V_{GS}=4.5V$              | -   | 10  | -         | nC         |
| Gate-Source Charge                        | $Q_{gs}$     |   | -   | 1.5 | -         | nC         |
| Gate-Drain Charge                         | $Q_{gd}$     |   | -   | 1.6 | -         | nC         |
| <b>Drain-Source Diode Characteristics</b> |              |   |     |     |           |            |
| Diode Forward Voltage (Note 3)            | $V_{SD}$     | $V_{GS}=0V, I_S=1.7A$                               | -   | -   | 1.2       | V          |
| Diode Forward Current (Note 2)            | $I_S$        |   | -   | -   | 6         | A          |

**Notes:**

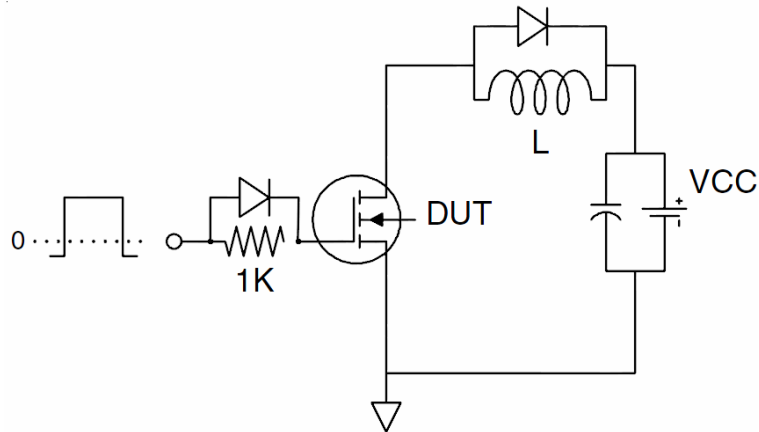
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

## Test circuit

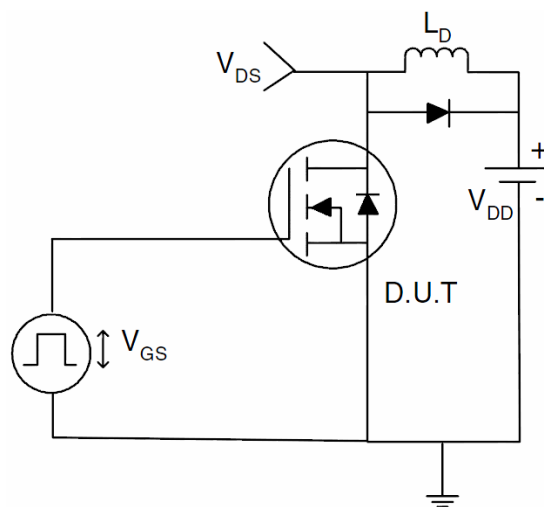
### 1) $E_{AS}$ test Circuits



### 2) Gate charge test Circuit:



### 3) Switch Time Test Circuit:



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

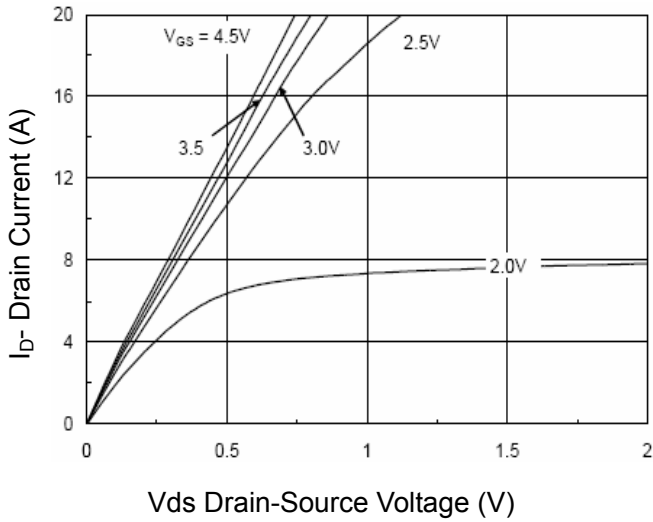


Figure 1 Output Characteristics

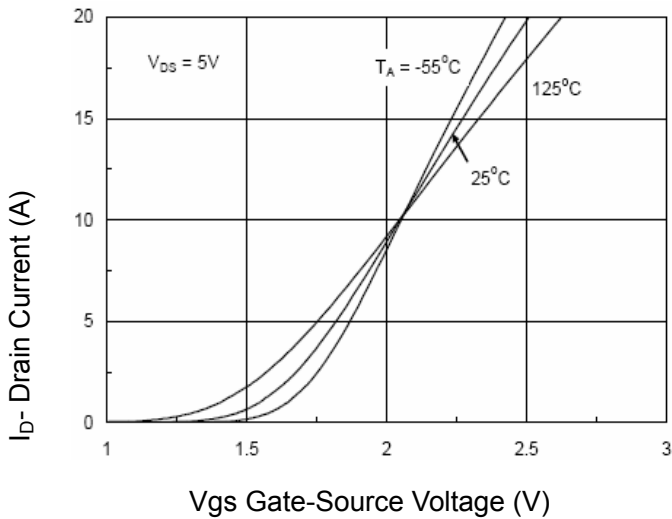


Figure 2 Transfer Characteristics

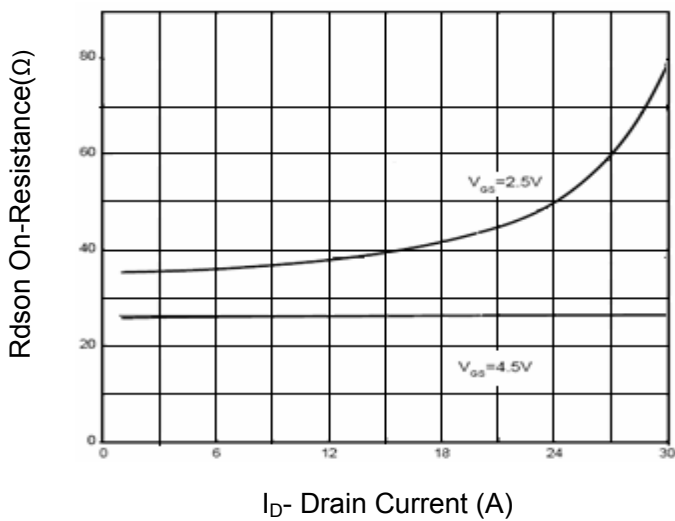


Figure 3 Rdson- Drain Current

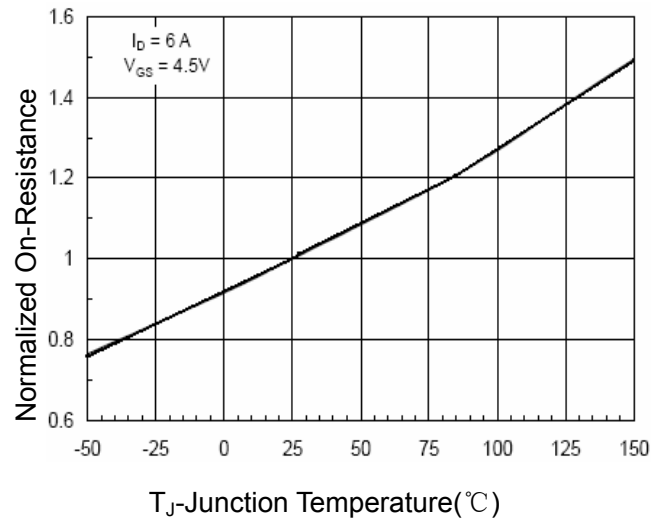


Figure 4 Rdson-Junction Temperature

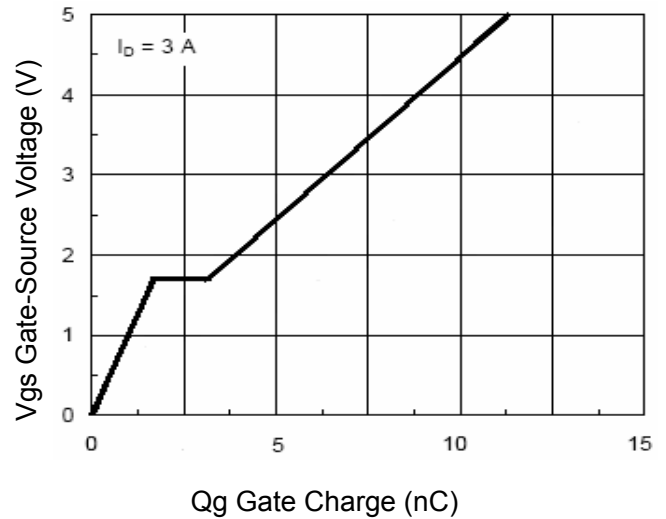


Figure 5 Gate Charge

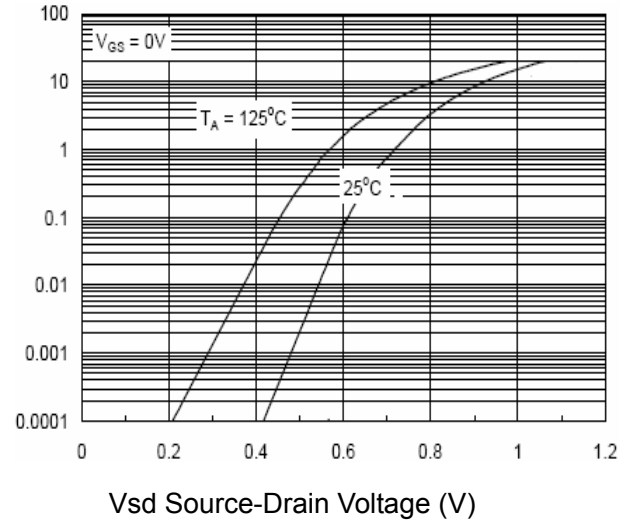


Figure 6 Source- Drain Diode Forward

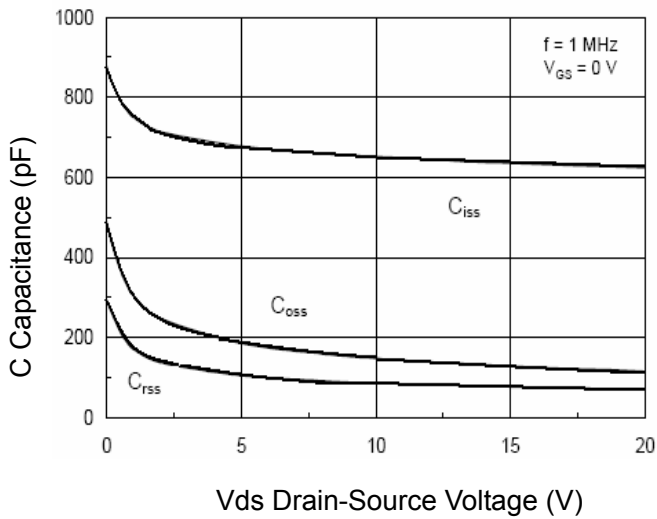


Figure 7 Capacitance vs Vds

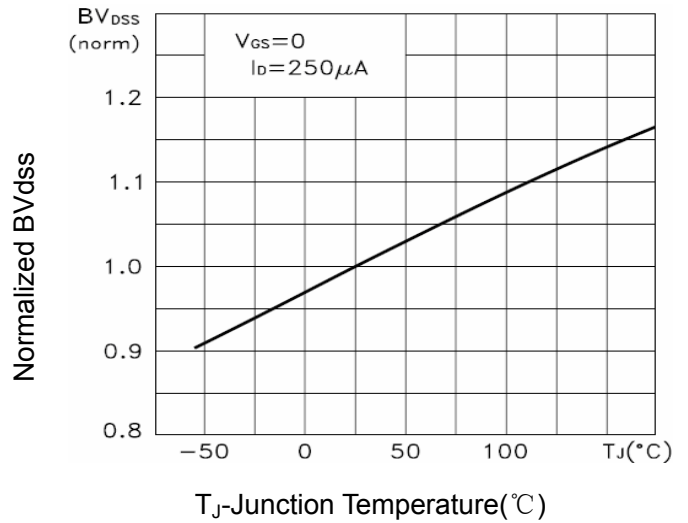


Figure 9  $BV_{DSS}$  vs Junction Temperature

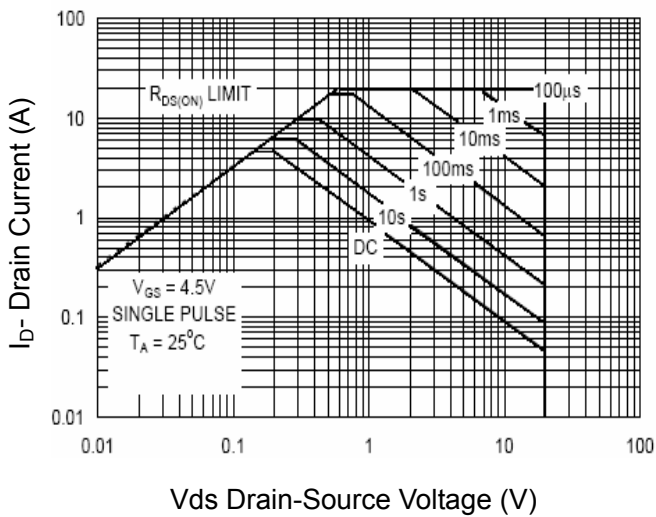


Figure 8 Safe Operation Area

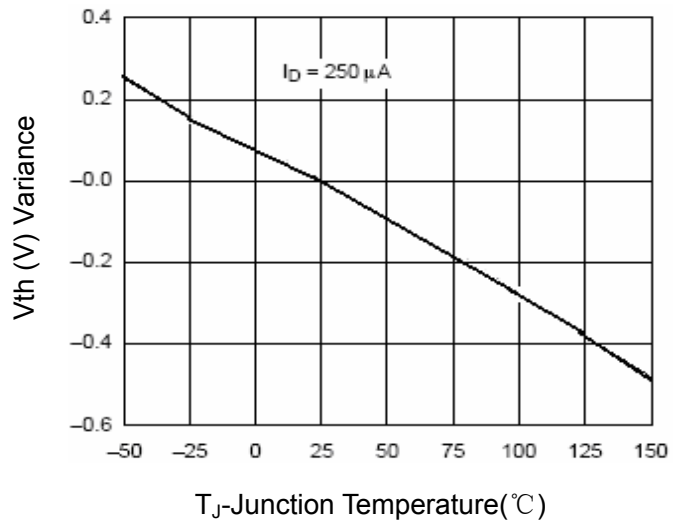


Figure 10  $V_{GS(th)}$  vs Junction Temperature

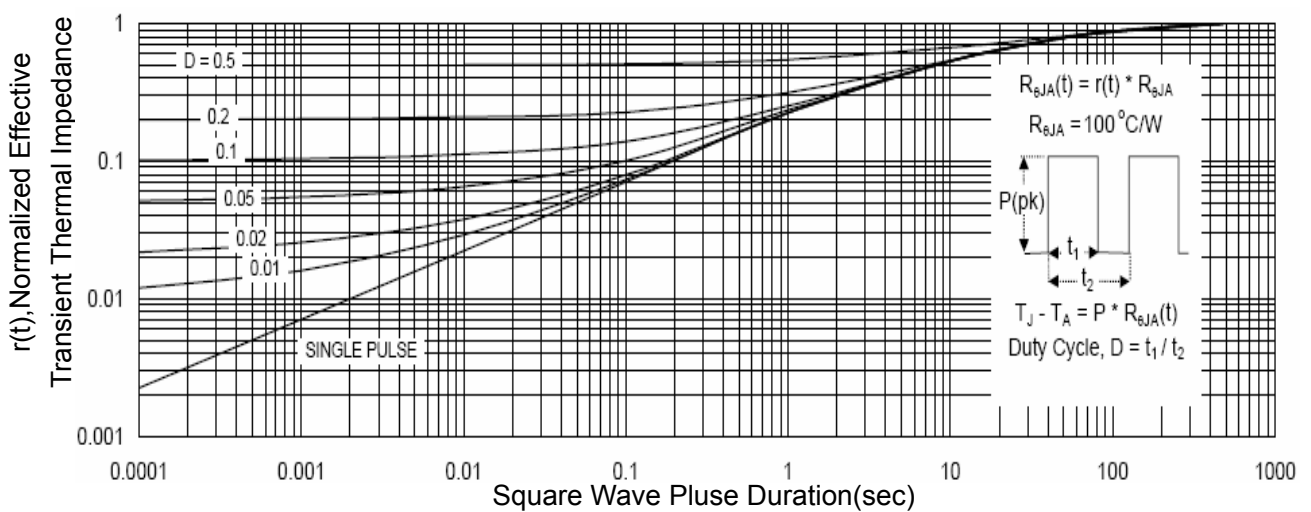
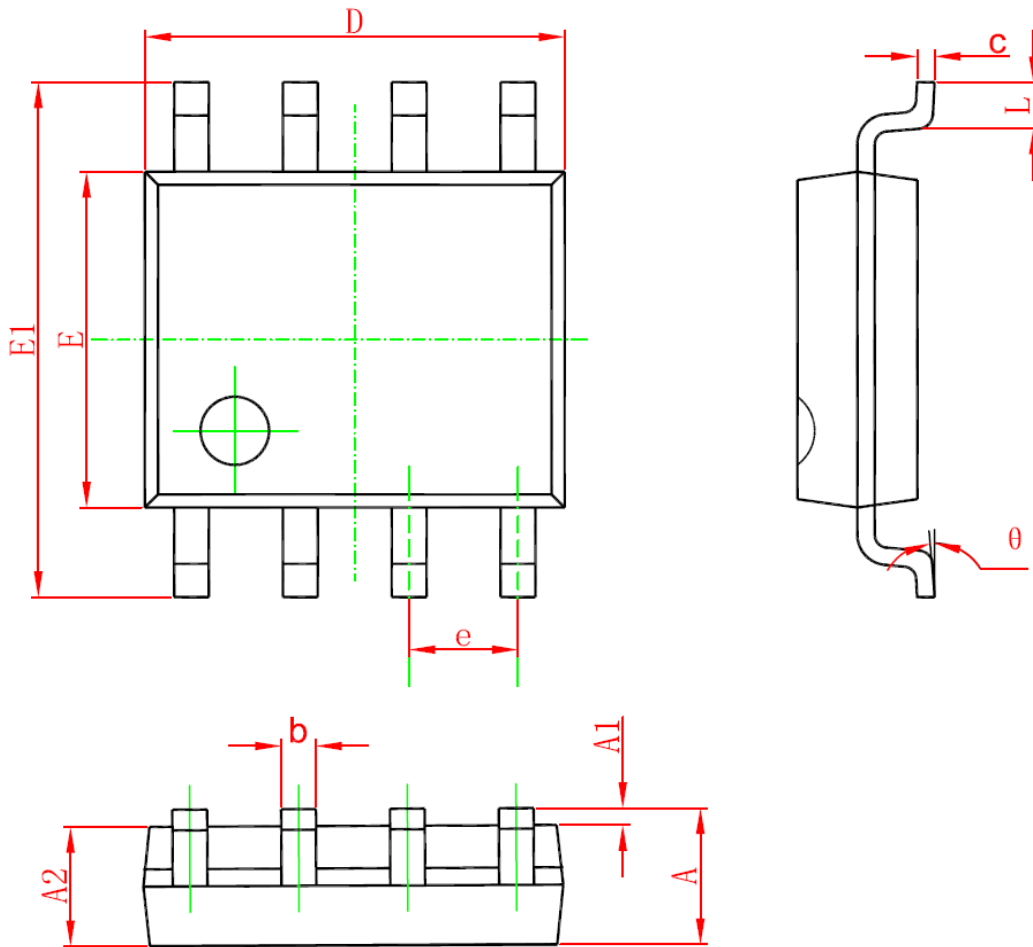


Figure 11 Normalized Maximum Transient Thermal Impedance

## SOP-8 PACKAGE IN FORMATION



| 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°    |