

## Dual N-Channel Enhancement Mode Power MOSFET

### DESCRIPTION

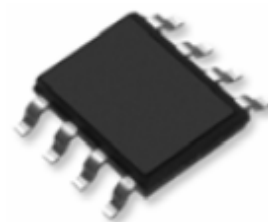
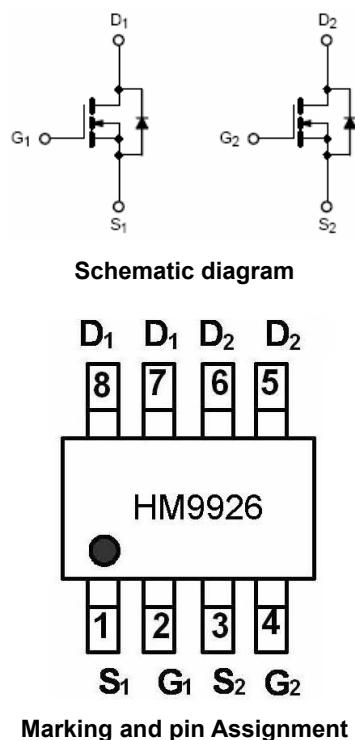
The HM9926 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

### 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  $R_{dson}$
- Fully characterized Avalanche voltage and current

### Application

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



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)**

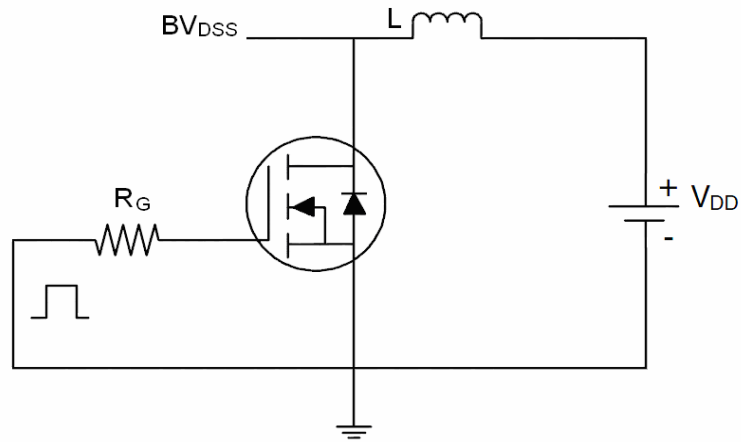
| Parameter                          | Symbol              | Condition                                                                            | Min | Typ | Max  | Unit |
|------------------------------------|---------------------|--------------------------------------------------------------------------------------|-----|-----|------|------|
| Off Characteristics                |                     |                                                                                      |     |     |      |      |
| Drain-Source Breakdown Voltage     | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V I <sub>D</sub> =250μA                                            | 20  | 22  | -    | V    |
| Zero Gate Voltage Drain Current    | I <sub>DSS</sub>    | V <sub>DS</sub> =20V,V <sub>GS</sub> =0V                                             | -   | -   | 1    | μA   |
| Gate-Body Leakage Current          | I <sub>GSS</sub>    | V <sub>GS</sub> =±12V,V <sub>DS</sub> =0V                                            | -   | -   | ±100 | nA   |
| On Characteristics (Note 3)        |                     |                                                                                      |     |     |      |      |
| Gate Threshold Voltage             | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> ,I <sub>D</sub> =250μA                              | 0.6 |     | 1.2  | V    |
| Drain-Source On-State Resistance   | R <sub>DS(ON)</sub> | V <sub>GS</sub> =4.5V, I <sub>D</sub> =6A                                            | -   | 26  | 30   | mΩ   |
|                                    |                     | V <sub>GS</sub> =2.5V, I <sub>D</sub> =5A                                            | -   | 36  | 40   |      |
| Forward Transconductance           | g <sub>FS</sub>     | V <sub>DS</sub> =5V,I <sub>D</sub> =6A                                               | 20  | -   | -    | S    |
| Dynamic Characteristics (Note4)    |                     |                                                                                      |     |     |      |      |
| Input Capacitance                  | C <sub>iss</sub>    | V <sub>DS</sub> =10V,V <sub>GS</sub> =0V,<br>F=1.0MHz                                | -   | 640 | -    | PF   |
| Output Capacitance                 | C <sub>oss</sub>    |                                                                                      | -   | 140 | -    | PF   |
| Reverse Transfer Capacitance       | C <sub>rss</sub>    |                                                                                      | -   | 80  | -    | PF   |
| Switching Characteristics (Note 4) |                     |                                                                                      |     |     |      |      |
| Turn-on Delay Time                 | t <sub>d(on)</sub>  | V <sub>DD</sub> =10V,I <sub>D</sub> =1A<br>V <sub>GEN</sub> =4.5V,R <sub>G</sub> =6Ω | -   | 8   | -    | nS   |
| Turn-on Rise Time                  | t <sub>r</sub>      |                                                                                      | -   | 9   | -    | nS   |
| Turn-Off Delay Time                | t <sub>d(off)</sub> |                                                                                      | -   | 15  | -    | nS   |
| Turn-Off Fall Time                 | t <sub>f</sub>      |                                                                                      | -   | 4   | -    | 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                    | -   | 10  | -    | nC   |
| Gate-Source Charge                 | Q <sub>gs</sub>     |                                                                                      | -   | 1.5 | -    | nC   |
| Gate-Drain Charge                  | Q <sub>gd</sub>     |                                                                                      | -   | 1.6 | -    | nC   |
| Drain-Source Diode Characteristics |                     |                                                                                      |     |     |      |      |
| Diode Forward Voltage (Note 3)     | V <sub>SD</sub>     | V <sub>GS</sub> =0V,I <sub>S</sub> =1.7A                                             | -   | -   | 1.2  | V    |
| Diode Forward Current (Note 2)     | I <sub>S</sub>      |                                                                                      | -   | -   | 6    | A    |

**Notes:**

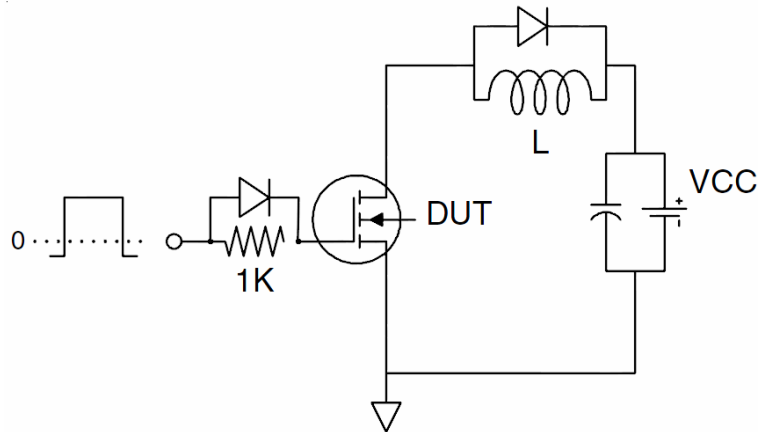
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

## Test circuit

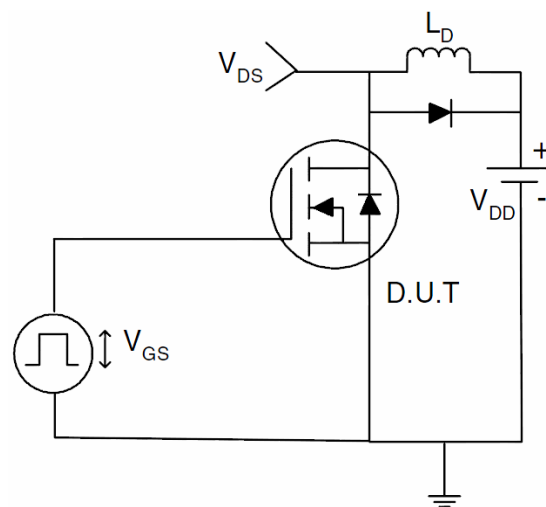
### 1) $E_{AS}$ test Circuits



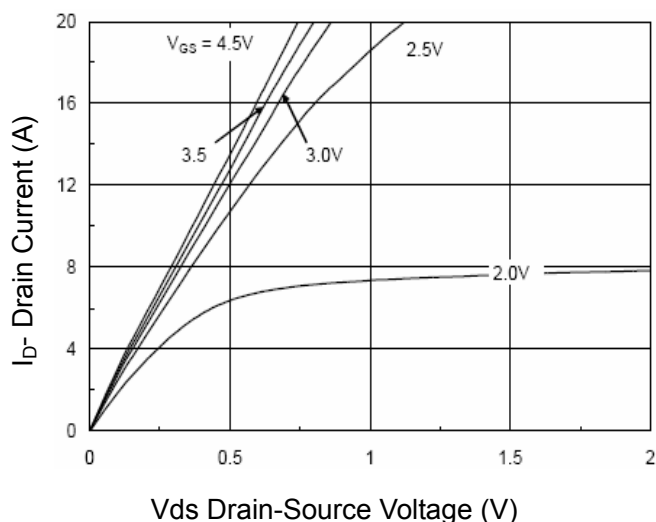
### 2) Gate charge test Circuit:



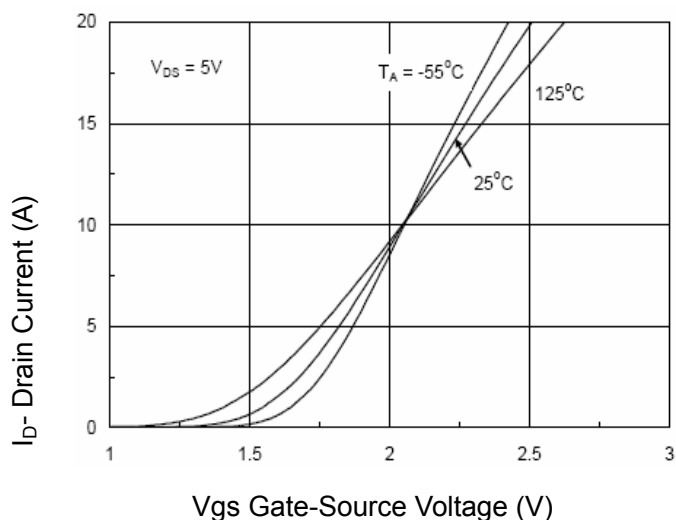
### 3) Switch Time Test Circuit:



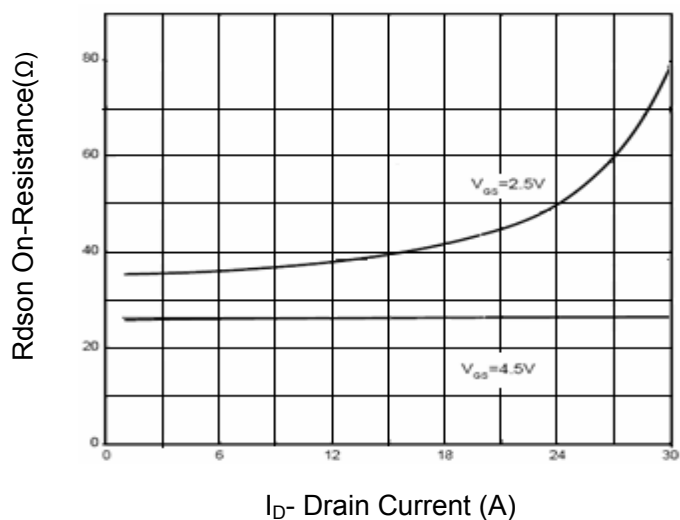
## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)



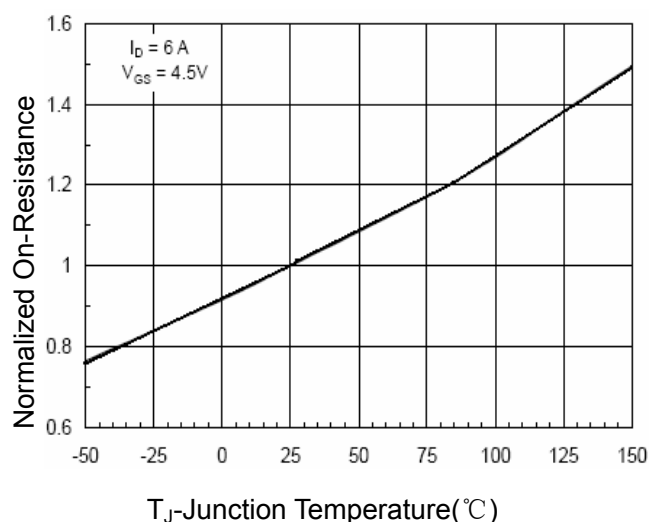
**Figure 1 Output Characteristics**



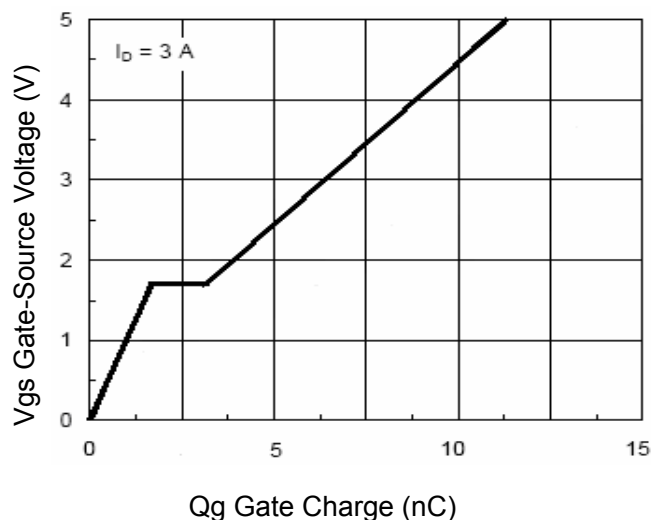
**Figure 2 Transfer Characteristics**



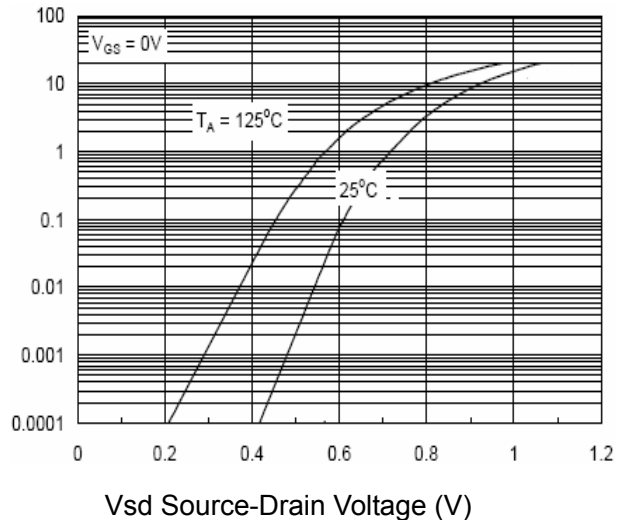
**Figure 3 Rdson- Drain Current**



**Figure 4 Rdson-Junction Temperature**



**Figure 5 Gate Charge**



**Figure 6 Source- Drain Diode Forward**

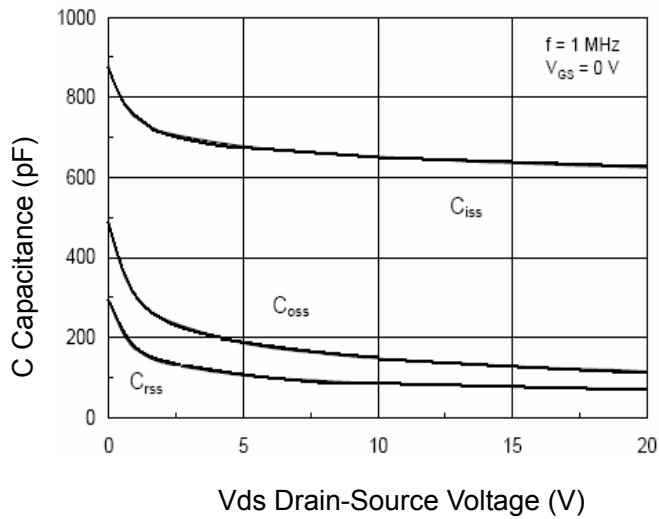


Figure 7 Capacitance vs  $V_{DS}$

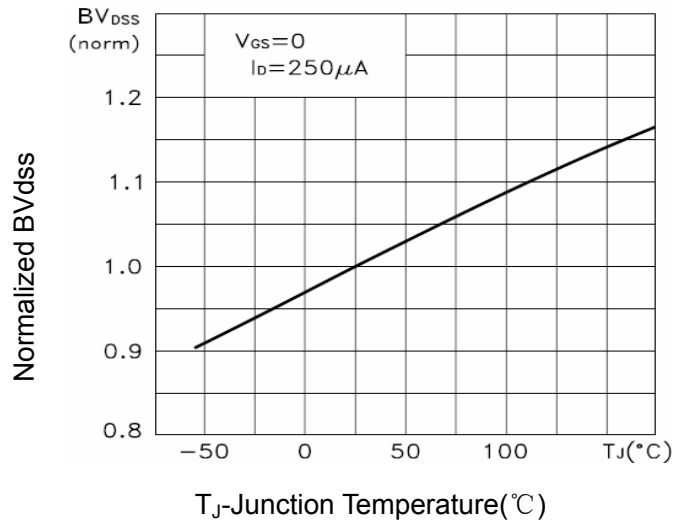


Figure 9  $BV_{DSS}$  vs Junction Temperature

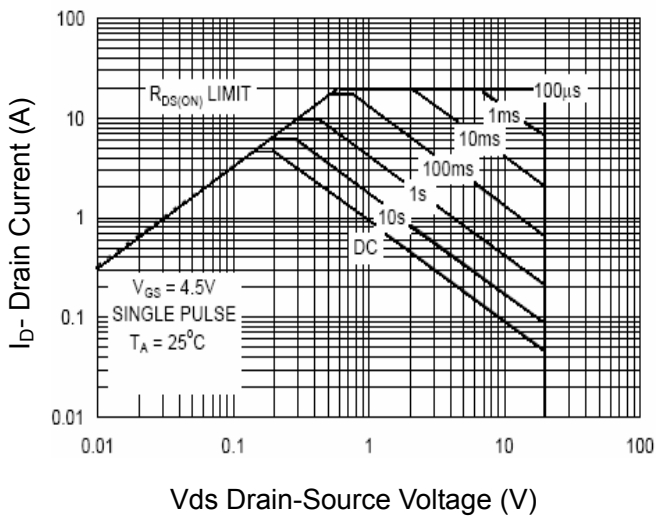


Figure 8 Safe Operation Area

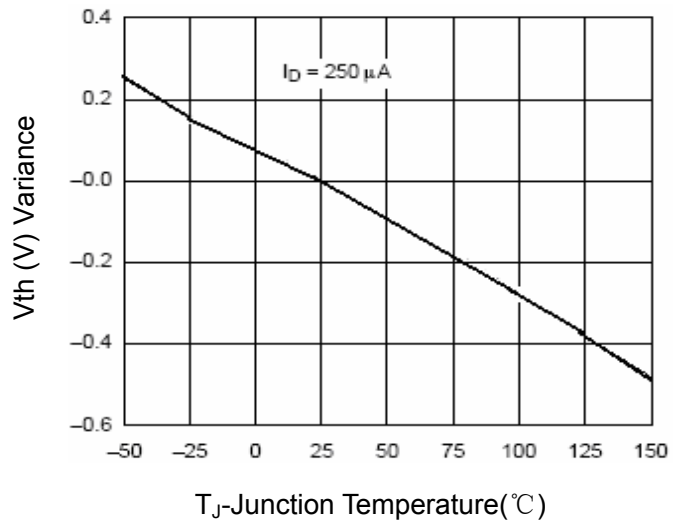


Figure 10  $V_{GS(th)}$  vs Junction Temperature

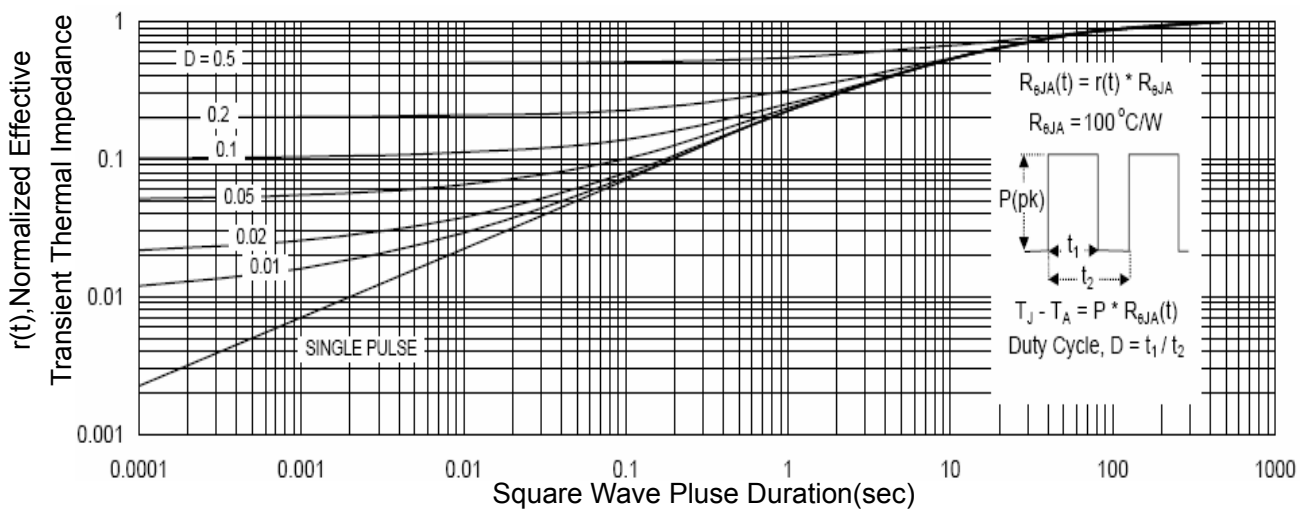
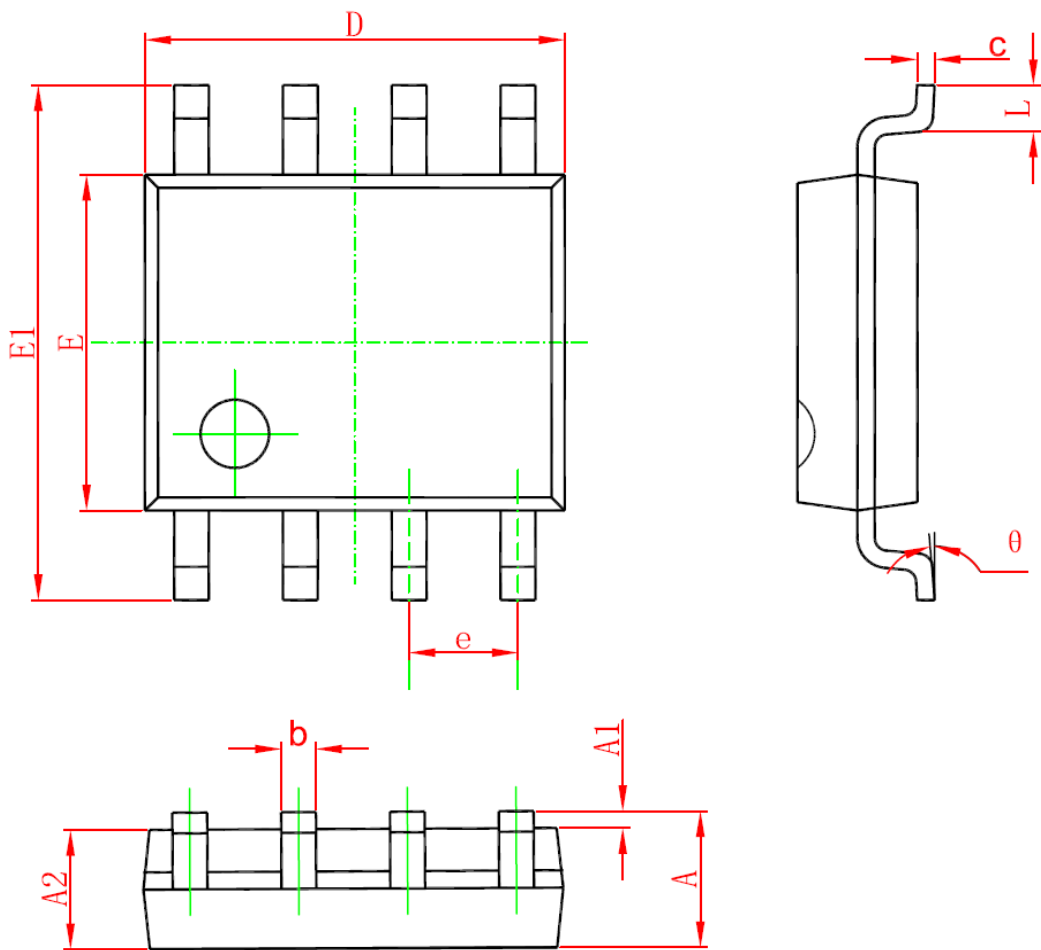


Figure 11 Normalized Maximum Transient Thermal Impedance

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 |
| $\theta$ | 0°                        | 8°    | 0°                   | 8°    |