

## NCE N-Channel Enhancement Mode Power MOSFET

### Description

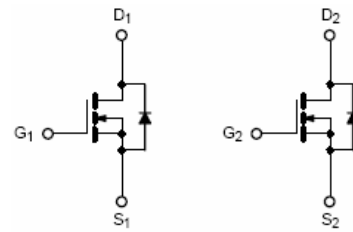
The NCE9926 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

### General Features

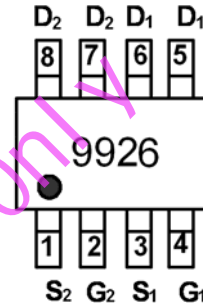
- $V_{DS} = 20V, I_D = 6A$   
 $R_{DS(ON)} < 28m\Omega @ V_{GS} = 4.5V$   
 $R_{DS(ON)} < 37m\Omega @ V_{GS} = 2.5V$
- High density cell design for ultra low  $R_{dson}$
- Fully characterized avalanche voltage and current

### Application

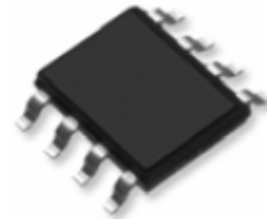
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply



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   |
|----------------|---------|----------------|-----------|------------|------------|
| 9926           | NCE9926 | SOP-8          | Ø330mm    | 12mm       | 2500 units |

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

| Parameter  | Symbol             | Limit      | Unit       |
|--|--------------------|------------|------------|
| Drain-Source Voltage                             | $V_{DS}$           | 20         | V          |
| Gate-Source Voltage                              | $V_{GS}$           | $\pm 10$   | 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 | $^\circ C$ |

### Thermal Characteristic

|   |                 |     |              |
|---|-----------------|-----|--------------|
| Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup> | $R_{\theta JA}$ | 100 | $^\circ C/W$ |
|---|-----------------|-----|--------------|

**Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)**

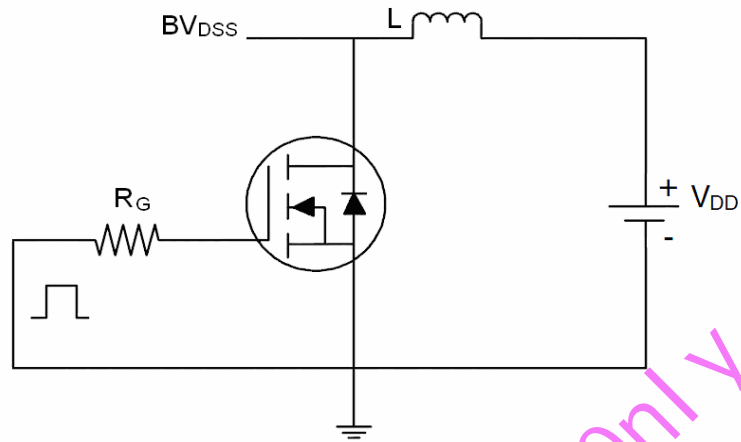
| Parameter                                 | Symbol              | Condition  | Min | Typ | Max  | Unit |
|---|---------------------|--|-----|-----|------|------|
| <b>Off Characteristics</b>                |                     |  |     |     |      |      |
| Drain-Source Breakdown Voltage            | 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> =±10V, V <sub>DS</sub> =0V   | -   | -   | ±100 | nA   |
| <b>On Characteristics (Note 3)</b>        |                     |  |     |     |      |      |
| Gate Threshold Voltage                    | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                               | 0.5 | 0.7 | 1.2  | V    |
| Drain-Source On-State Resistance          | R <sub>DS(ON)</sub> | V <sub>GS</sub> =4.5V, I <sub>D</sub> =6A  | -   | 20  | 28   | mΩ   |
|   |                     | V <sub>GS</sub> =2.5V, I <sub>D</sub> =5A  | -   | 26  | 37   |      |
| Forward Transconductance                  | g <sub>FS</sub>     | V <sub>DS</sub> =5V, I <sub>D</sub> =6A  | 20  | -   | -    | S    |
| <b>Dynamic Characteristics (Note4)</b>    |                     |  |     |     |      |      |
| 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   |
| <b>Switching Characteristics (Note 4)</b> |                     |  |     |     |      |      |
| Turn-on Delay Time                        | t <sub>d(on)</sub>  | V <sub>DD</sub> =10V, I <sub>D</sub> =1A<br>V <sub>OEN</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   |
| <b>Drain-Source Diode Characteristics</b> |                     |  |     |     |      |      |
| 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:**

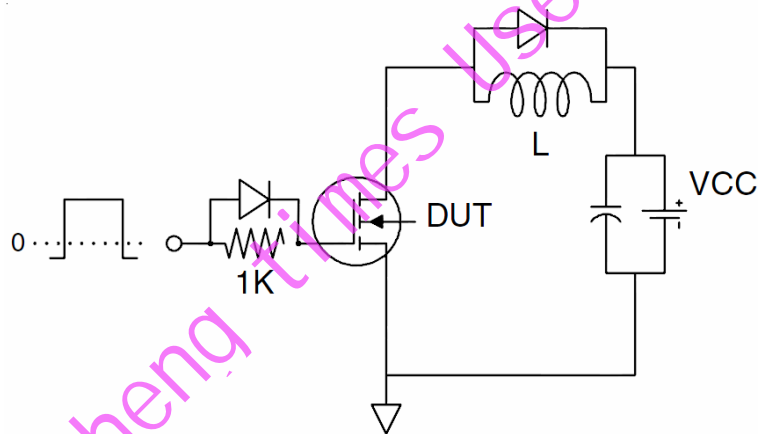
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

**Test Circuit**

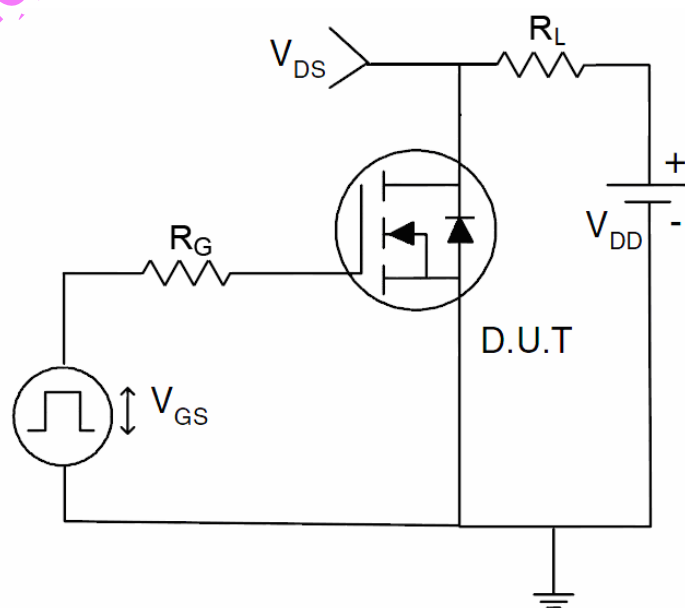
**1) E<sub>AS</sub> Test Circuits**



**2) Gate Charge Test Circuit:**



**3) Switch Time Test Circuit:**



Typical Electrical and Thermal Characteristics (Curves)

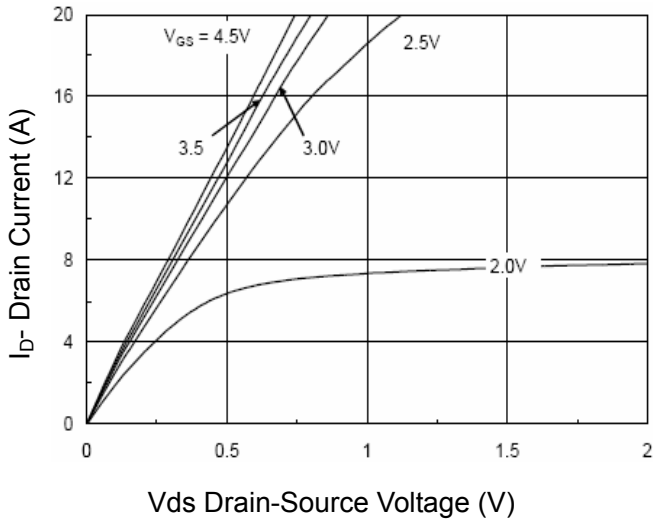


Figure 1 Output Characteristics

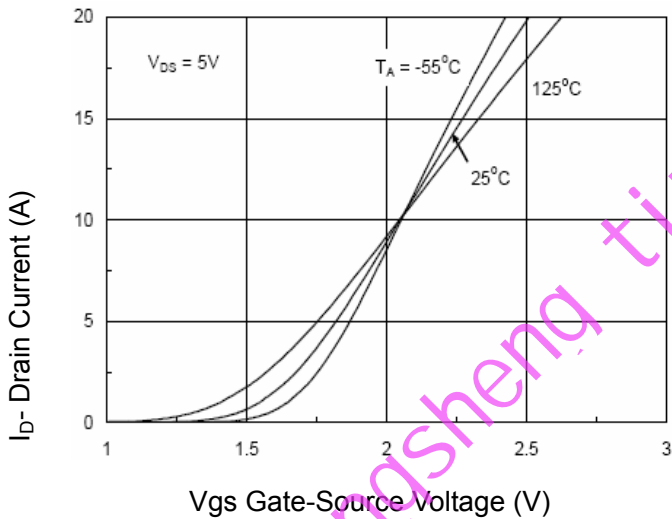


Figure 2 Transfer Characteristics

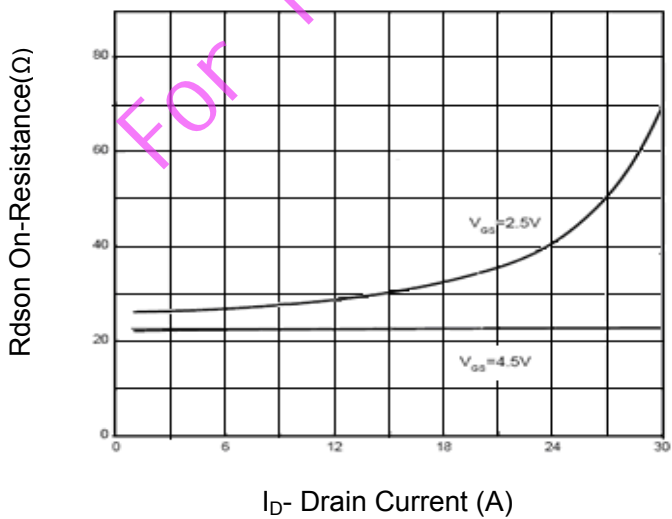


Figure 3 Rdson- Drain Current

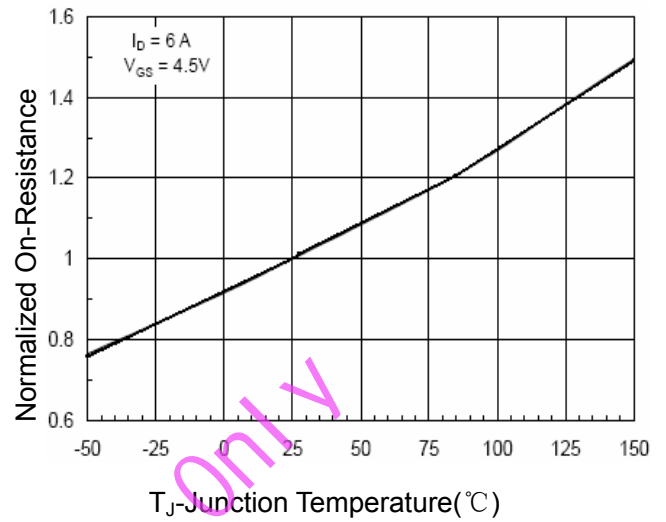


Figure 4 Rdson-Junction Temperature

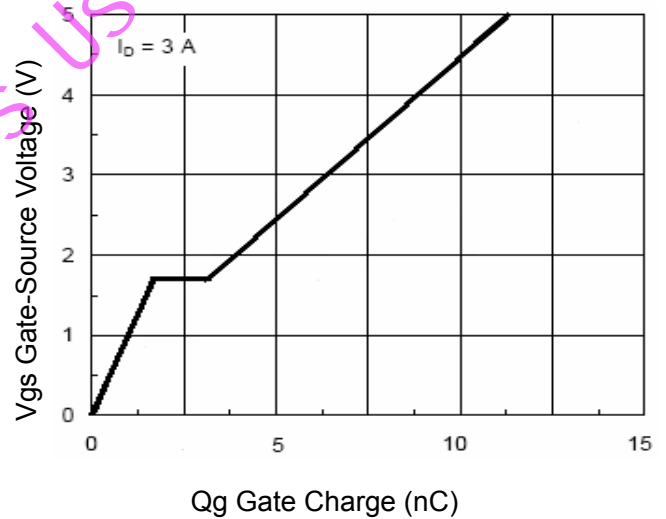


Figure 5 Gate Charge

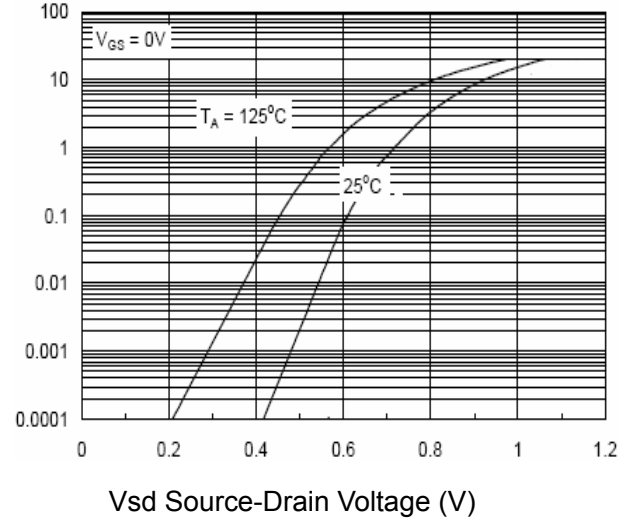
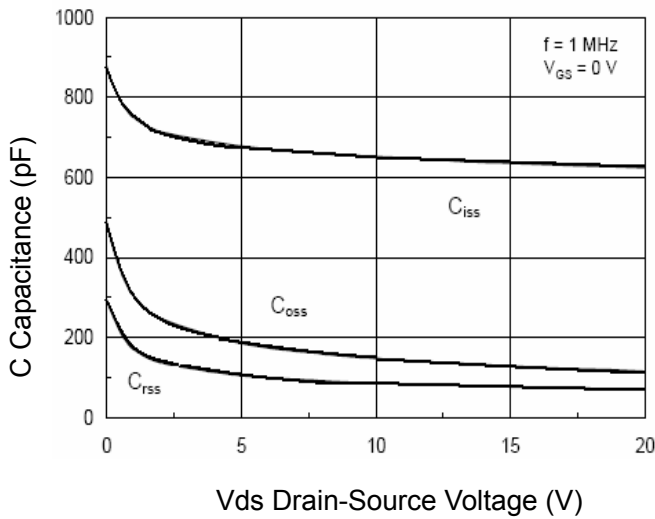
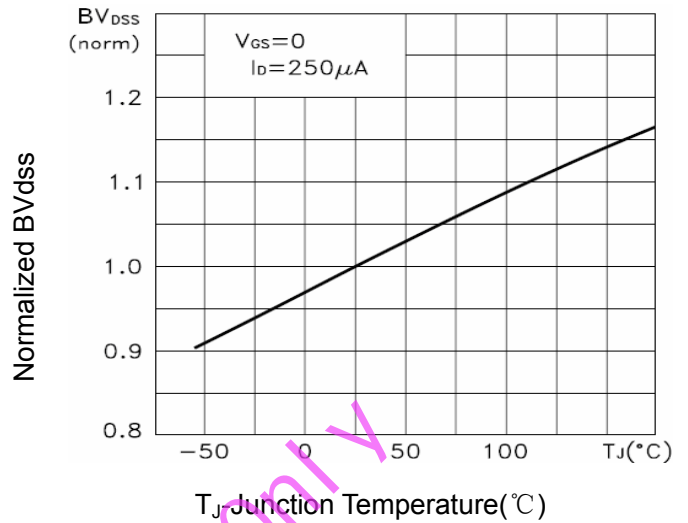


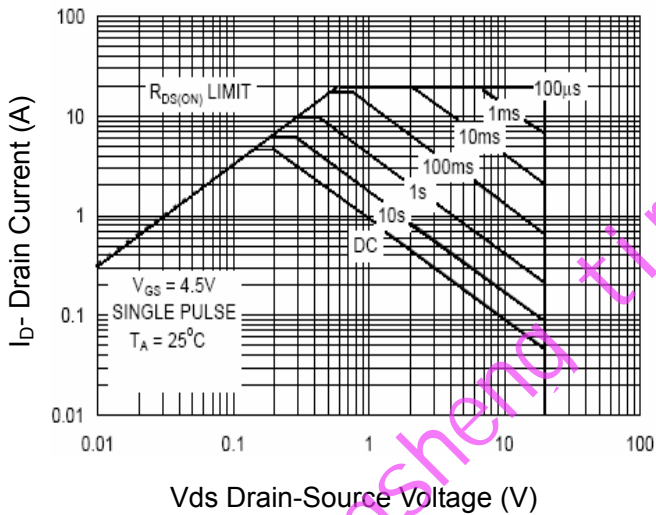
Figure 6 Source- Drain Diode Forward



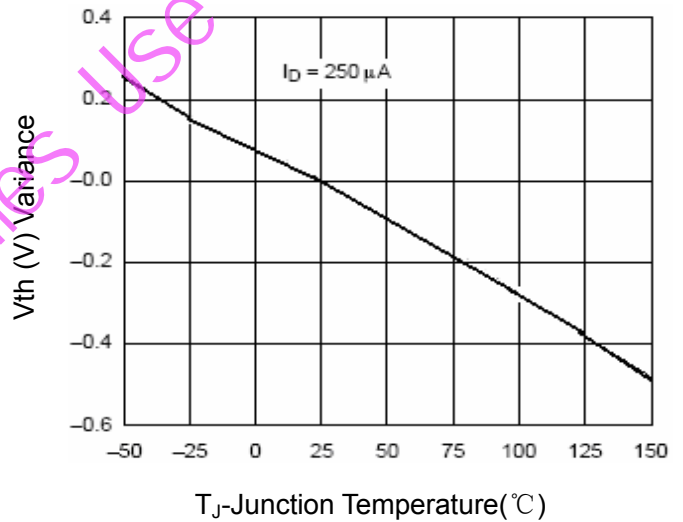
Vds Drain-Source Voltage (V)  
**Figure 7 Capacitance vs Vds**



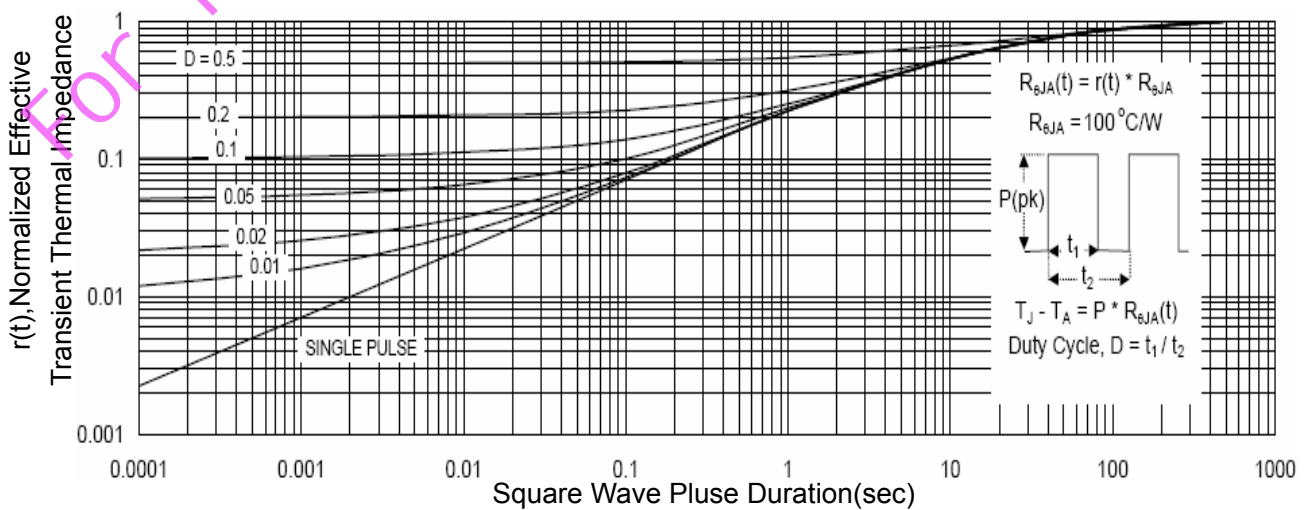
T<sub>J</sub>-Junction Temperature(°C)  
**Figure 9 BV<sub>DSS</sub> vs Junction Temperature**



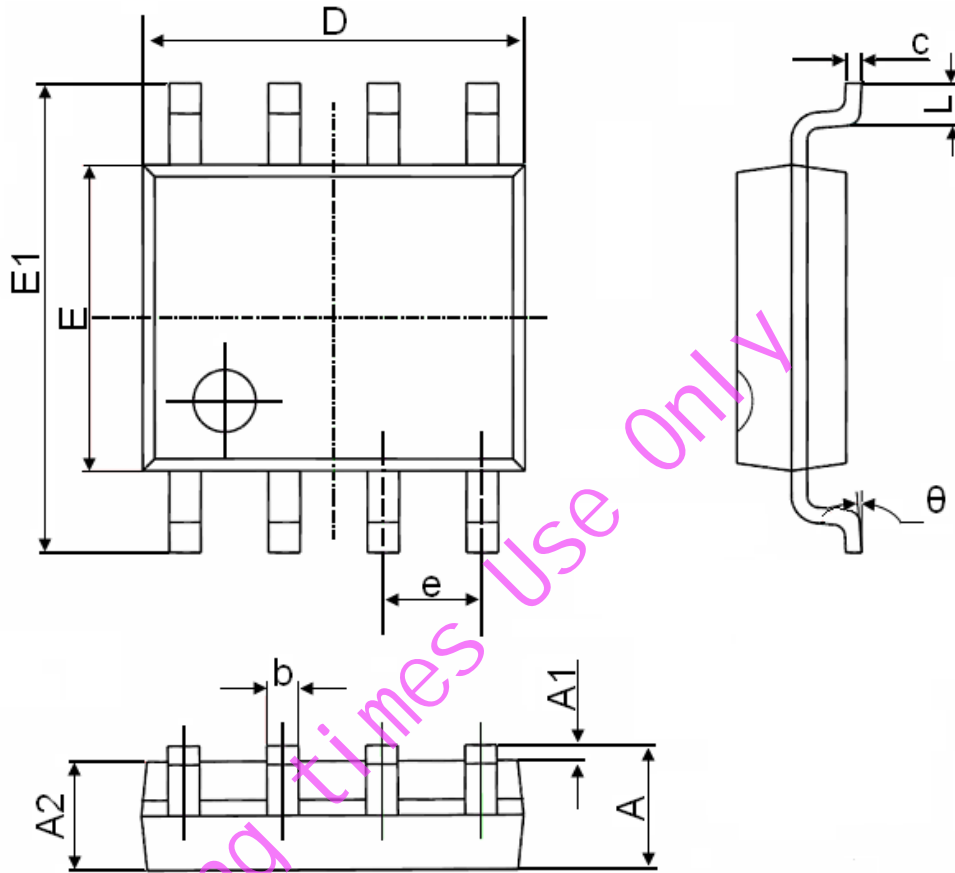
Vds Drain-Source Voltage (V)  
**Figure 8 Safe Operation Area**



T<sub>J</sub>-Junction Temperature(°C)  
**Figure 10 V<sub>GS(th)</sub> 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°    |

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