



## Description

The HSTR2N2VH5 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

## General Features

$V_{DS} = 20V$   $I_D = 6A$

$R_{DS(ON)} < 27m\Omega$  @  $V_{GS}=4.5V$

## Application

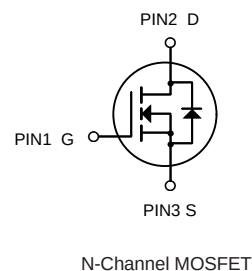
Battery protection

Load switch

Uninterruptible power supply



SOT-23



## Package Marking and Ordering Information

| Product ID | Pack  | Marking | Qty(PCS) |
|------------|-------|---------|----------|
| HSTR2N2VH5 | SOT23 | AE9T    | 3000     |

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

| Symbol          | Parameter                                        |                     | Limit      | Unit          |
|-----------------|--------------------------------------------------|---------------------|------------|---------------|
| $V_{DS}$        | Drain-Source Voltage                             |                     | 20         | V             |
| $V_{GS}$        | Gate-Source Voltage                              |                     | $\pm 12$   | V             |
| $I_D$           | Continuous Drain Current                         | $T_A = 25^{\circ}C$ | 6          | A             |
|                 |                                                  | $T_A = 70^{\circ}C$ | 3.6        |               |
| $I_{DM}$        | Drain Current-Pulsed (Note 1)                    |                     | 15         | A             |
| $P_D$           | Maximum Power Dissipation                        |                     | 1.25       | W             |
| $T_J, T_{STG}$  | Operating Junction and Storage Temperature Range |                     | -55 To 150 | $^{\circ}C$   |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient (Note 2) |                     | 100        | $^{\circ}C/W$ |



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

| Parameter                                 | Symbol              | Condition                                                                               | Min | Typ  | Max  | Unit |
|-------------------------------------------|---------------------|-----------------------------------------------------------------------------------------|-----|------|------|------|
| Drain-Source Breakdown Voltage            | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V I <sub>D</sub> =250μA                                               | 20  | 22.5 | -    | 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   |
| Gate Threshold Voltage                    | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                | 0.5 | 0.65 | 1.0  | V    |
| Drain-Source On-State Resistance          | R <sub>DS(on)</sub> | V <sub>GS</sub> =4.5V, I <sub>D</sub> =4.0 A                                            | -   | 22   | 27   | mΩ   |
|                                           |                     | V <sub>GS</sub> =2.5V, I <sub>D</sub> =4.5A                                             | -   | 28   | 40   | mΩ   |
| Forward Transconductance                  | g <sub>FS</sub>     | V <sub>DS</sub> =10V, I <sub>D</sub> =4A                                                | -   | 10   | -    | S    |
| Input Capacitance                         | C <sub>iss</sub>    | V <sub>DS</sub> =8V, V <sub>GS</sub> =0V,<br>F=1.0MHz                                   | -   | 500  | -    | PF   |
| Output Capacitance                        | C <sub>oss</sub>    |                                                                                         | -   | 295  | -    | PF   |
| Reverse Transfer Capacitance              | C <sub>rss</sub>    |                                                                                         | -   | 96   | -    | PF   |
| Turn-on Delay Time                        | t <sub>d(on)</sub>  | V <sub>DD</sub> =10V, I <sub>D</sub> =1A<br>V <sub>GS</sub> =4.5V, R <sub>GEN</sub> =6Ω | -   | 11   | -    | nS   |
| Turn-on Rise Time                         | t <sub>r</sub>      |                                                                                         | -   | 30   | -    | nS   |
| Turn-Off Delay Time                       | t <sub>d(off)</sub> |                                                                                         | -   | 35   | -    | nS   |
| Turn-Off Fall Time                        | t <sub>f</sub>      |                                                                                         | -   | 10   | -    | nS   |
| Total Gate Charge                         | Q <sub>g</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> =3A, V <sub>GS</sub> =4.5V                         | -   | 10   | 15   | nC   |
| Gate-Source Charge                        | Q <sub>gs</sub>     |                                                                                         | -   | 2.3  | -    | nC   |
| Gate-Drain Charge                         | Q <sub>gd</sub>     |                                                                                         | -   | 2.9  | -    | nC   |
| Diode Forward Voltage <sup>(Note 3)</sup> | V <sub>SD</sub>     | V <sub>GS</sub> =0V, I <sub>S</sub> =1A                                                 | -   | -    | 1.2  | V    |
| Diode Forward Current <sup>(Note 2)</sup> | I <sub>S</sub>      |                                                                                         | -   | -    | 4.5  | 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



## Typical Electrical and Thermal Characteristics

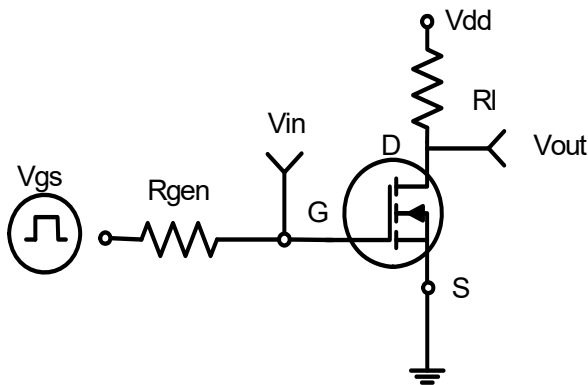


Figure 1: Switching Test Circuit

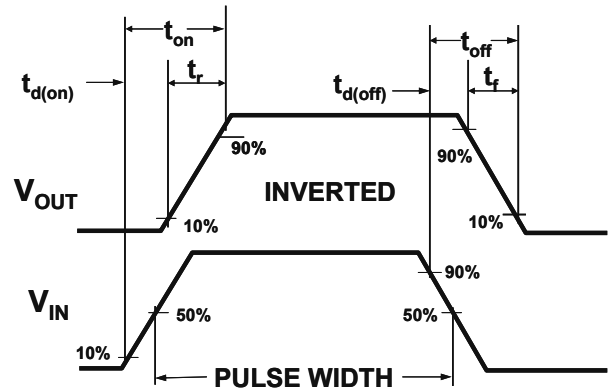


Figure 2: Switching Waveforms

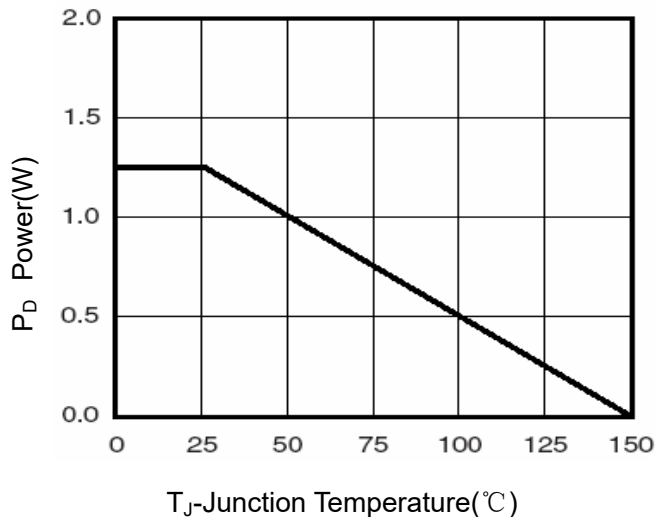


Figure 3 Power Dissipation

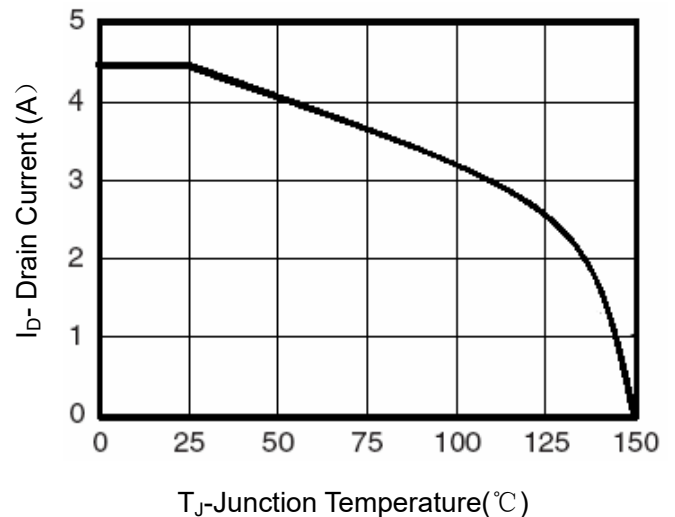


Figure 4 Drain Current

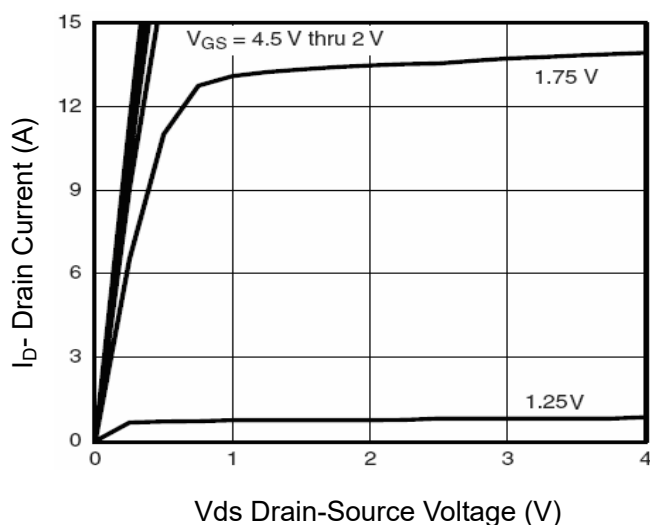


Figure 5 Output Characteristics

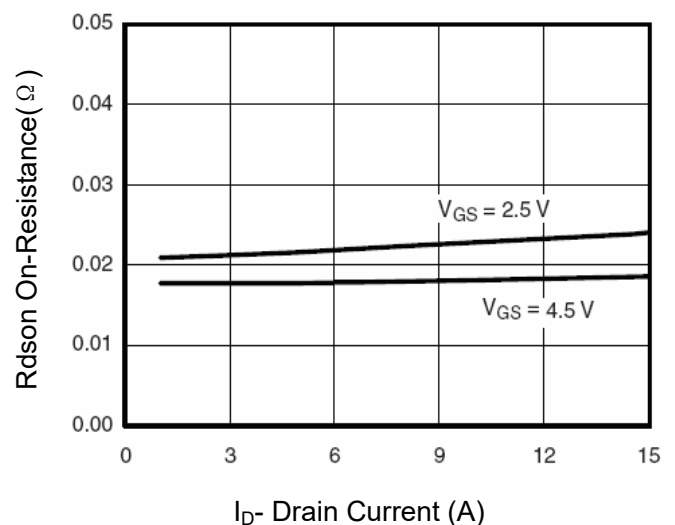


Figure 6 Drain-Source On-Resistance

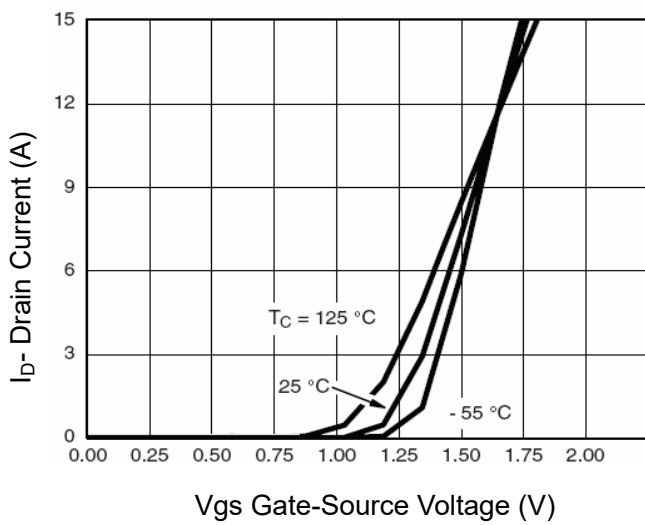


Figure 7 Transfer Characteristics

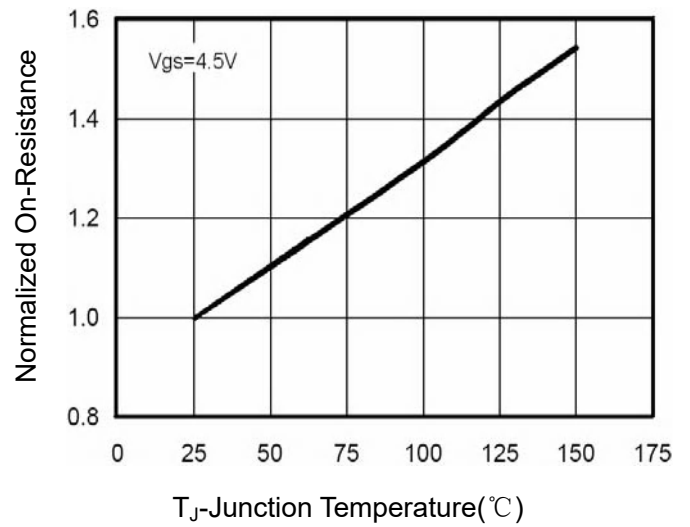


Figure 8 Drain-Source On-Resistance

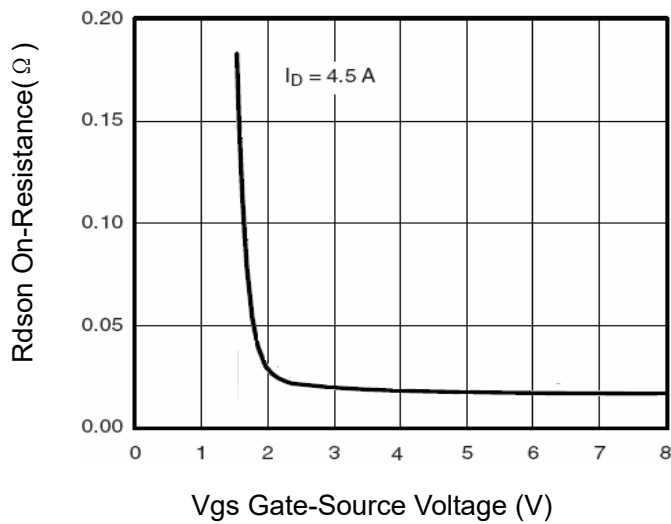


Figure 9 Rdson vs. Vgs

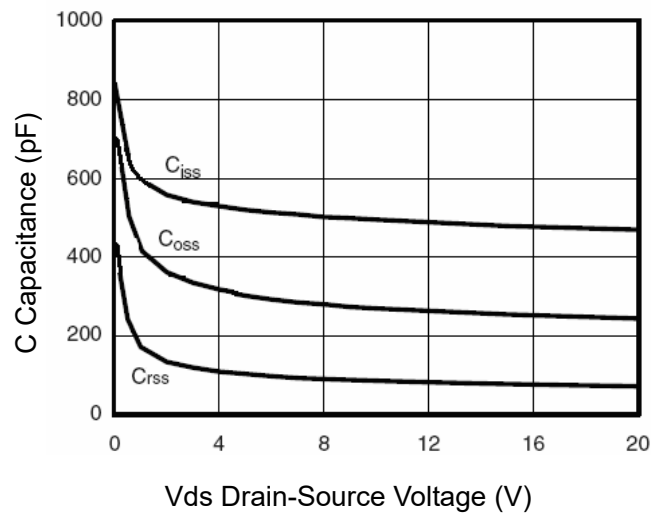


Figure 10 Capacitance vs Vds

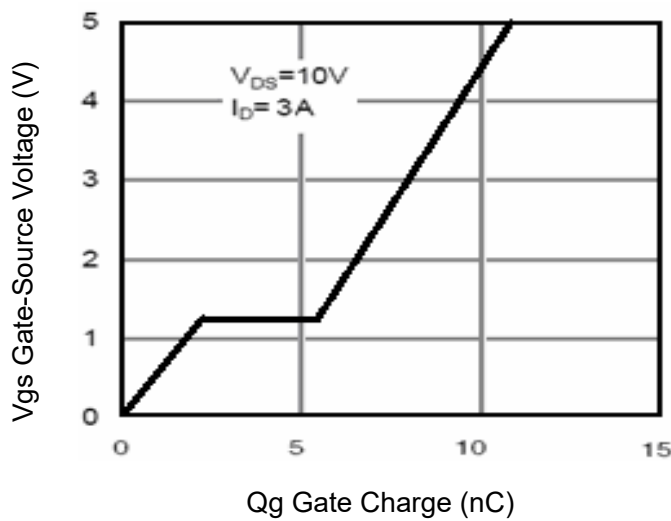


Figure 11 Gate Charge

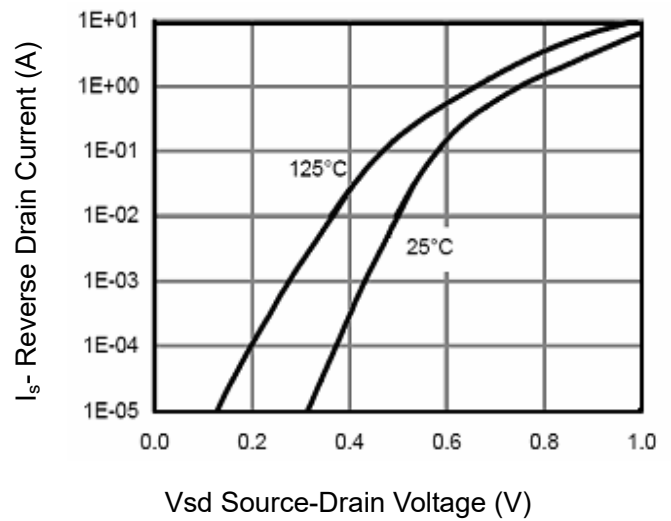


Figure 12 Source- Drain Diode Forward

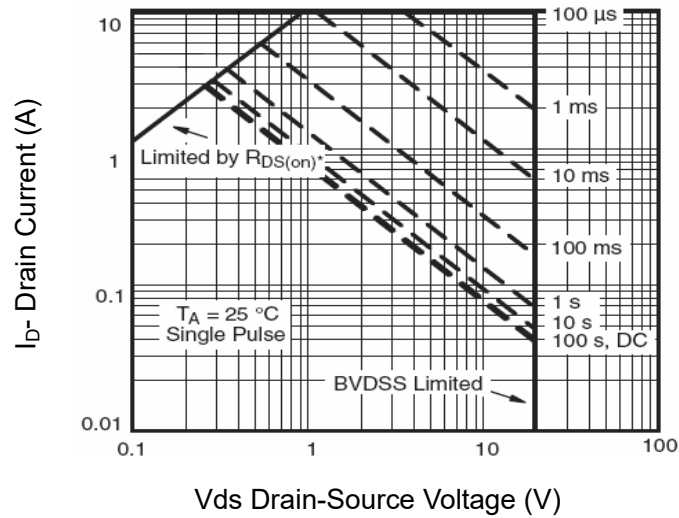


Figure 13 Safe Operation Area

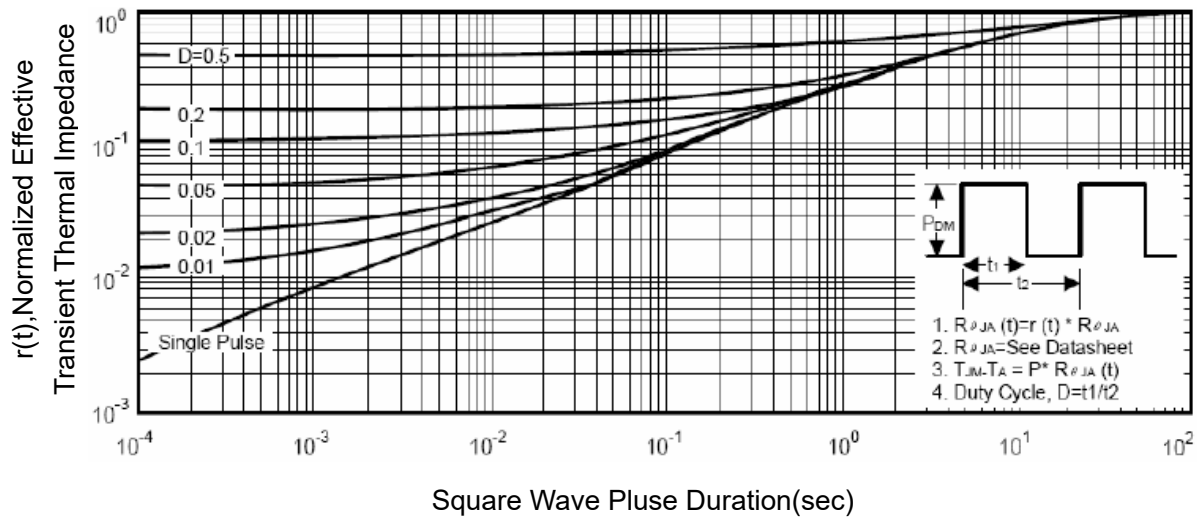
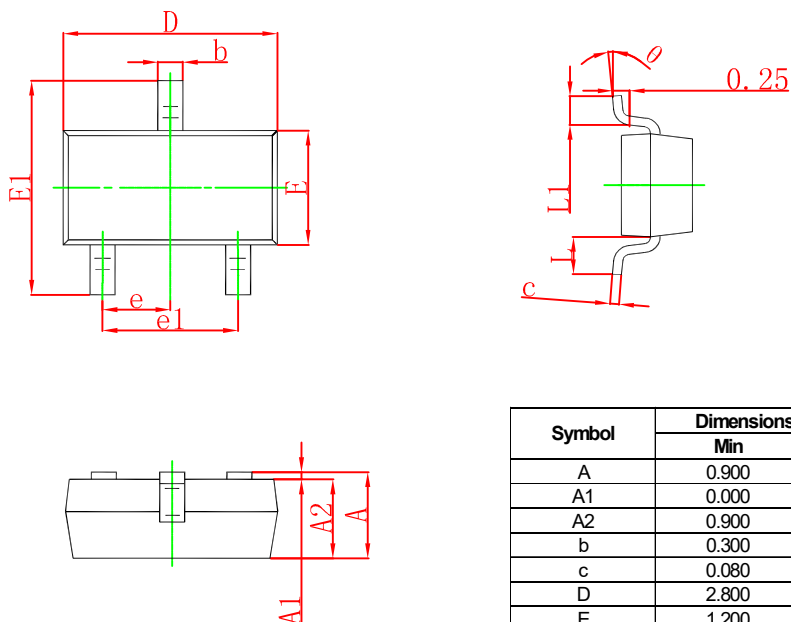


Figure 14 Normalized Maximum Transient Thermal Impedance

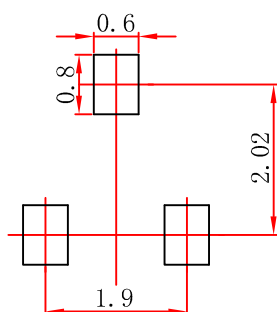


## SOT-23 Package Outline Dimensions



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 0.900                     | 1.150 | 0.035                | 0.045 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 0.900                     | 1.050 | 0.035                | 0.041 |
| b      | 0.300                     | 0.500 | 0.012                | 0.020 |
| c      | 0.080                     | 0.150 | 0.003                | 0.006 |
| D      | 2.800                     | 3.000 | 0.110                | 0.118 |
| E      | 1.200                     | 1.400 | 0.047                | 0.055 |
| E1     | 2.250                     | 2.550 | 0.089                | 0.100 |
| e      | 0.950 TYP                 |       | 0.037 TYP            |       |
| e1     | 1.800                     | 2.000 | 0.071                | 0.079 |
| L      | 0.550 REF                 |       | 0.022 REF            |       |
| L1     | 0.300                     | 0.500 | 0.012                | 0.020 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |

## SOT-23 Suggested Pad Layout



Note:  
1. Controlling dimension: in millimeters.  
2. General tolerance:  $\pm 0.05\text{mm}$ .  
3. The pad layout is for reference purposes only.



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