



## Description

The Si2323CDS-T1-GE3 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications. It is ESD protected.

## General Features

$V_{DS} = -20V, I_D = -5A$

$R_{DS(ON)} < 40m\Omega @ V_{GS} = -4.5V$

$R_{DS(ON)} < 60m\Omega @ V_{GS} = -2.5V$

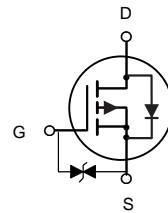
ESD Rating: 1500V HBM

## Application

PWM application  
Load switch



SOT-23



P-Channel MOSFET

## Package Marking and Ordering Information

| Product ID       | Pack   | Brand      | Qty(PCS) |
|------------------|--------|------------|----------|
| Si2323CDS-T1-GE3 | SOT-23 | HXY MOSFET | 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                              | $\pm 10$   | V            |
| $I_D$           | Drain Current-Continuous                         | -5         | A            |
| $I_{DM}$        | Drain Current-Pulsed (Note 1)                    | -30        | A            |
| $P_D$           | Maximum Power Dissipation                        | 1.4        | 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) | 89.3       | $^\circ C/W$ |



**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   |       | -        | V          |
| Zero Gate Voltage Drain Current           | $I_{DSS}$    | $V_{DS}=-20V, V_{GS}=0V$  | -     | -     | 1        | $\mu A$    |
| Gate-Body Leakage Current                 | $I_{GSS}$    | $V_{GS}=\pm 10V, V_{DS}=0V$                                     | -     | -     | $\pm 10$ | $\mu A$    |
| <b>On Characteristics (Note 3)</b>        |              |   |       |       |          |            |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$                                  | -0.35 | -0.55 | -0.9     | V          |
| Drain-Source On-State Resistance          | $R_{DS(on)}$ | $V_{GS}=-4.5V, I_D=-4A$   | -     | 30    | 40       | m $\Omega$ |
|   |              | $V_{GS}=-2.5V, I_D=-4A$   | -     | 44    | 60       | m $\Omega$ |
| Forward Transconductance                  | $g_{FS}$     | $V_{DS}=-5V, I_D=-4A$   | 8     | -     | -        | S          |
| <b>Dynamic Characteristics (Note4)</b>    |              |   |       |       |          |            |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=-10V, V_{GS}=0V,$<br>$F=1.0MHz$                         | -     | 950   | -        | PF         |
| Output Capacitance                        | $C_{oss}$    |   | -     | 165   | -        | PF         |
| Reverse Transfer Capacitance              | $C_{rss}$    |   | -     | 120   | -        | PF         |
| <b>Switching Characteristics (Note 4)</b> |              |   |       |       |          |            |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DD}=-10V, R_L=2.5\Omega$<br>$V_{GS}=-4.5V, R_{GEN}=3\Omega$ | -     | 12    |          | nS         |
| Turn-on Rise Time                         | $t_r$        |   | -     | 10    |          | nS         |
| Turn-Off Delay Time                       | $t_{d(off)}$ |   | -     | 19    |          | nS         |
| Turn-Off Fall Time                        | $t_f$        |   | -     | 25    |          | nS         |
| Total Gate Charge                         | $Q_g$        | $V_{DS}=-10V, I_D=-4A,$<br>$V_{GS}=-4.5V$                       | -     | 12    |          | nC         |
| Gate-Source Charge                        | $Q_{gs}$     |   | -     | 1.4   | -        | nC         |
| Gate-Drain Charge                         | $Q_{gd}$     |   | -     | 3.6   | -        | nC         |
| <b>Drain-Source Diode Characteristics</b> |              |   |       |       |          |            |
| Diode Forward Voltage (Note 3)            | $V_{SD}$     | $V_{GS}=0V, I_S=-4A$  | -     | -     | -1.2     | V          |
| Diode Forward Current (Note 2)            | $I_S$        |   | -     | -     | -4       | 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



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

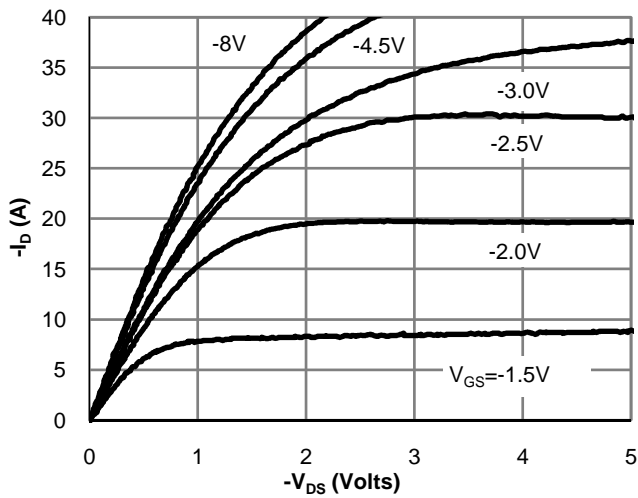


Fig 1: On-Region Characteristics (Note E)

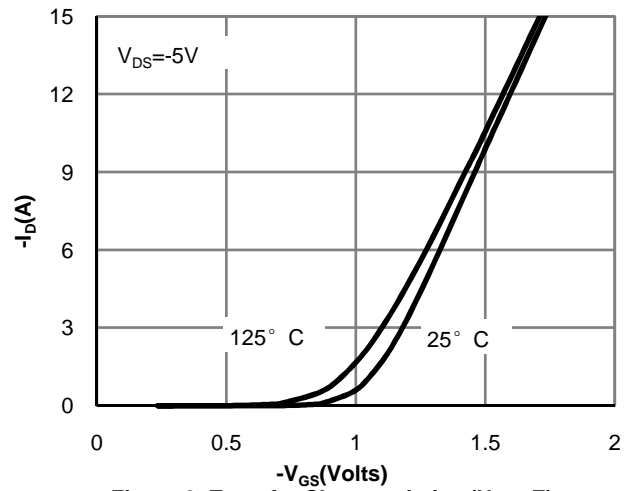


Figure 2: Transfer Characteristics (Note E)

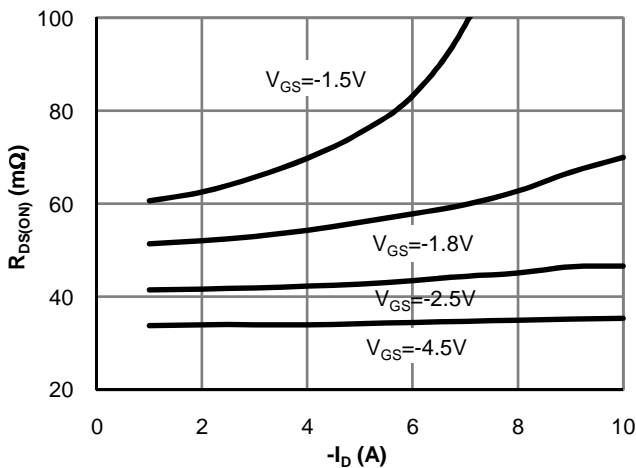


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

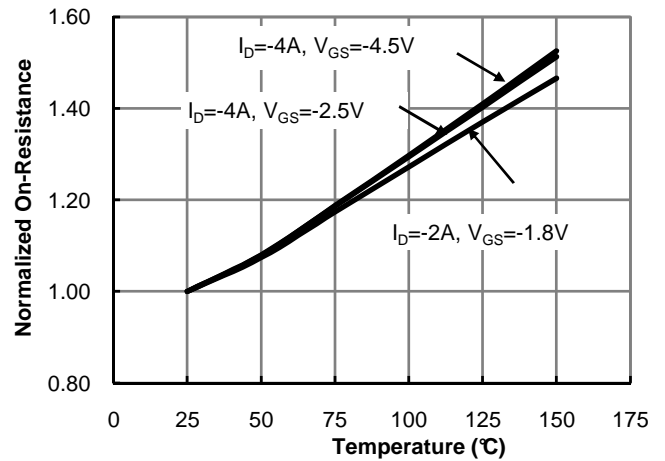


Figure 4: On-Resistance vs. Junction Temperature (Note E)

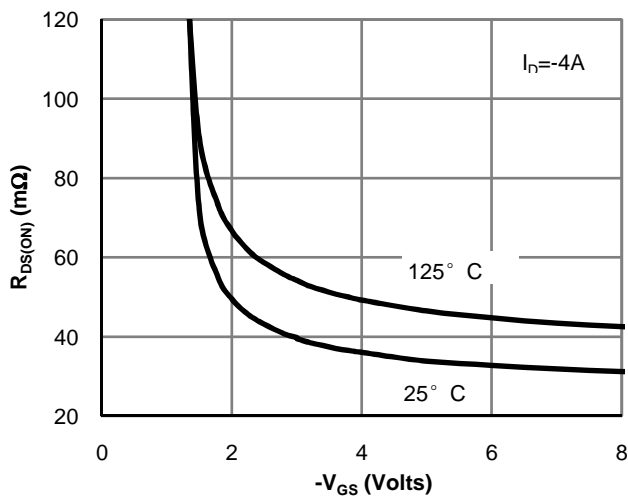


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

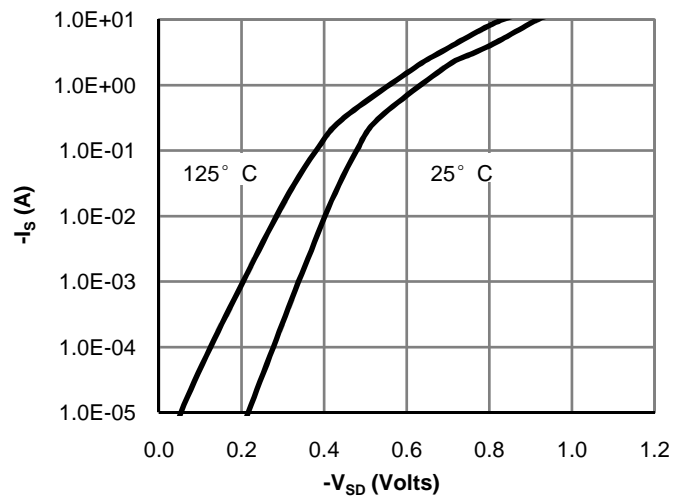


Figure 6: Body-Diode Characteristics (Note E)



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

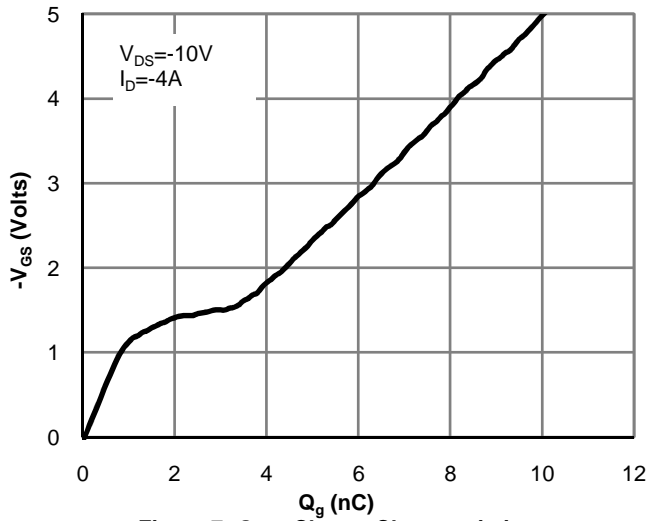


Figure 7: Gate-Charge Characteristics

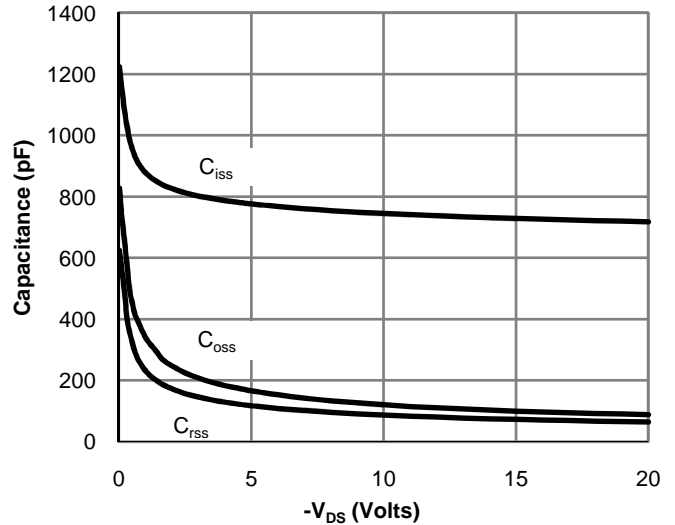


Figure 8: Capacitance Characteristics

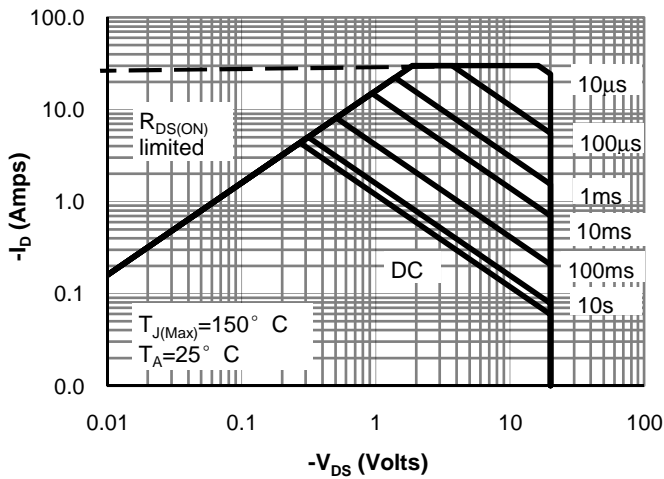


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

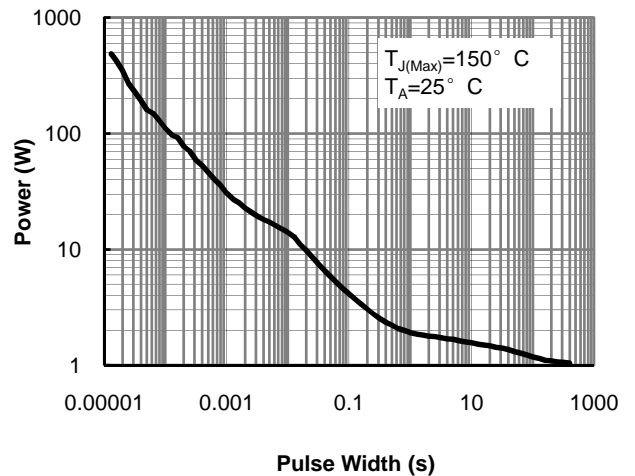


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

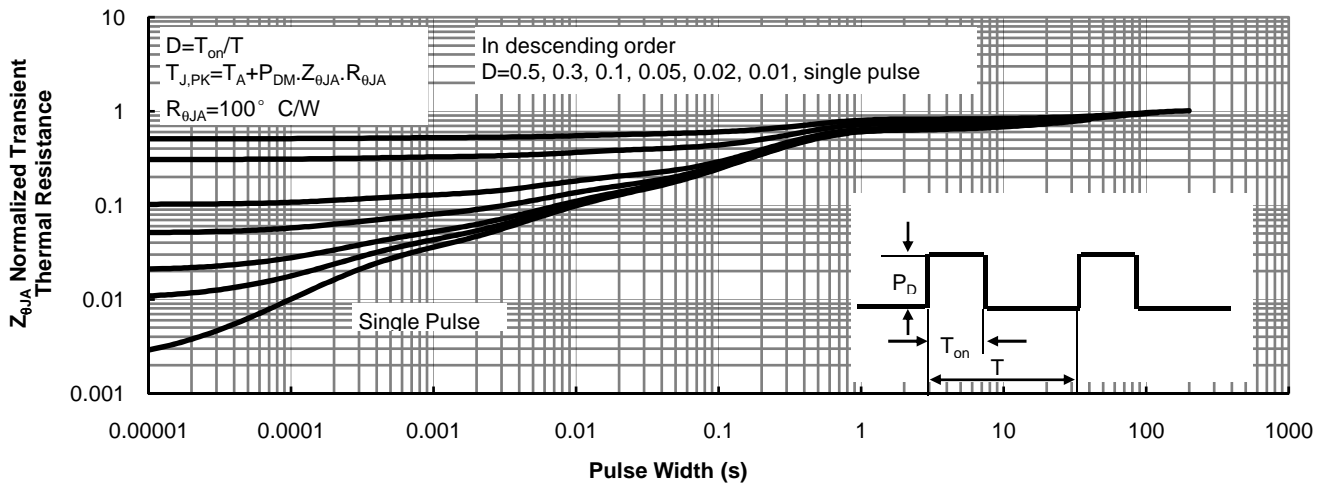
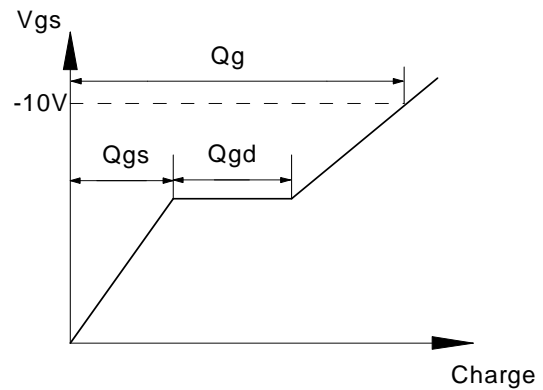
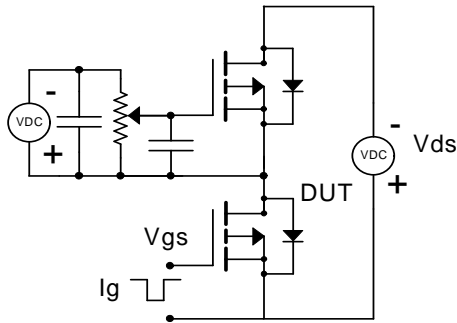


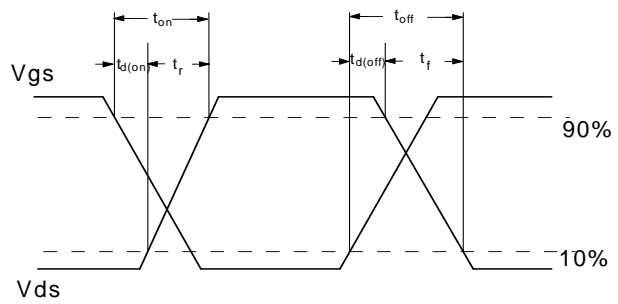
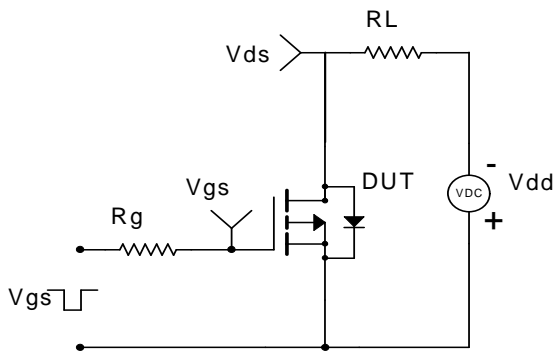
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)



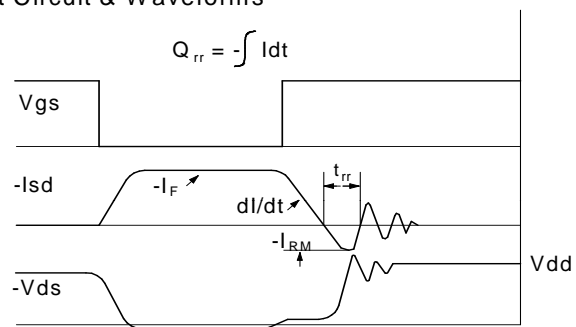
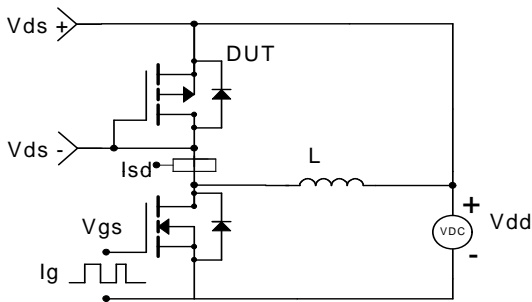
### Gate Charge Test Circuit & Waveform



### Resistive Switching Test Circuit & Waveforms

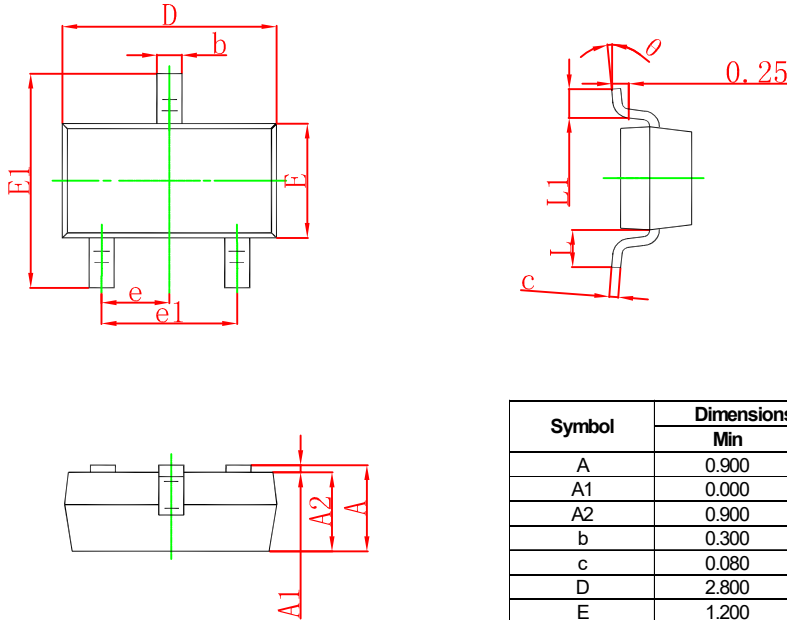


### Diode Recovery Test Circuit & Waveforms



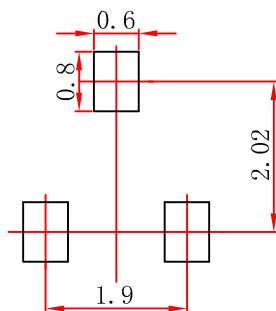


### SOT-23 Package Outline Dimensions



| 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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