

N-Channel Enhancement Mode Power MOSFET

Description

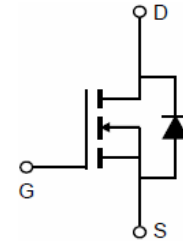
The RM0103 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

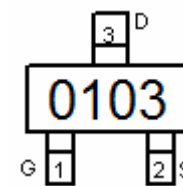
- $V_{DS} = 100V, I_D = 3A$
 $R_{DS(ON)} < 160m\Omega @ V_{GS}=10V$ (Typ:136m Ω)
 $R_{DS(ON)} < 170m\Omega @ V_{GS}=4.5V$ (Typ:140m Ω)
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Application

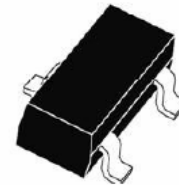
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply
- Halogen-free



Schematic diagram



Marking and pin assignment



SOT-23 top view

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|----------------|--------|----------------|-----------|------------|------------|
| 0103 | RM0103 | SOT-23 | Ø180mm | 8 mm | 3000 units |

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

| Parameter | Symbol | Limit | Unit |
|--|----------------|------------|------------|
| Drain-Source Voltage | V_{DS} | 100 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Drain Current-Continuous | I_D | 3 | A |
| Drain Current-Pulsed ^(Note 1) | I_{DM} | 20 | A |
| Maximum Power Dissipation | P_D | 1.5 | W |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 175 | $^\circ C$ |

Thermal Characteristic

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

Electrical Characteristics ($T_A=25^\circ C$ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---------------------------------|------------|---------------------------|-----|-----|-----|---------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 100 | - | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=100V, V_{GS}=0V$ | - | - | 1 | μA |

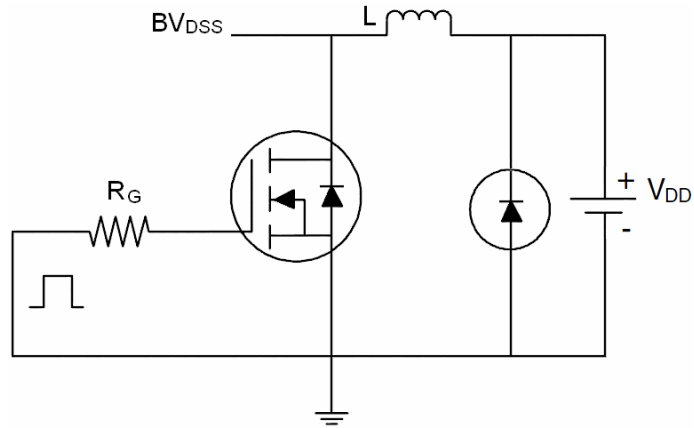
| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|--------------|---|-----|-----|-----------|------------|
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1.0 | 1.5 | 2.0 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=3A$ | - | 136 | 160 | m Ω |
| | | $V_{GS}=4.5V, I_D=3A$ | - | 140 | 170 | |
| Forward Transconductance | g_{FS} | $V_{DS}=5V, I_D=3A$ | - | 5 | - | S |
| Dynamic Characteristics (Note4) | | | | | | |
| Input Capacitance | C_{ISS} | $V_{DS}=50V, V_{GS}=0V,$ $F=1.0MHz$ | - | 650 | - | PF |
| Output Capacitance | C_{OSS} | | - | 24 | - | PF |
| Reverse Transfer Capacitance | C_{RSS} | | - | 20 | - | PF |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=50V, R_L=19\Omega$ $V_{GS}=10V, R_G=3\Omega$ | - | 6 | - | nS |
| Turn-on Rise Time | t_r | | - | 4 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 20 | - | nS |
| Turn-Off Fall Time | t_f | | - | 4 | - | nS |
| Total Gate Charge | Q_g | $V_{DS}=50V, I_D=3A,$ $V_{GS}=10V$ | - | 20 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 2.1 | - | nC |
| Gate-Drain Charge | Q_{gd} | | - | 3.3 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 3) | V_{SD} | $V_{GS}=0V, I_S=3A$ | - | - | 1.2 | V |
| Diode Forward Current (Note 2) | I_S | | - | - | 3 | A |

Notes:

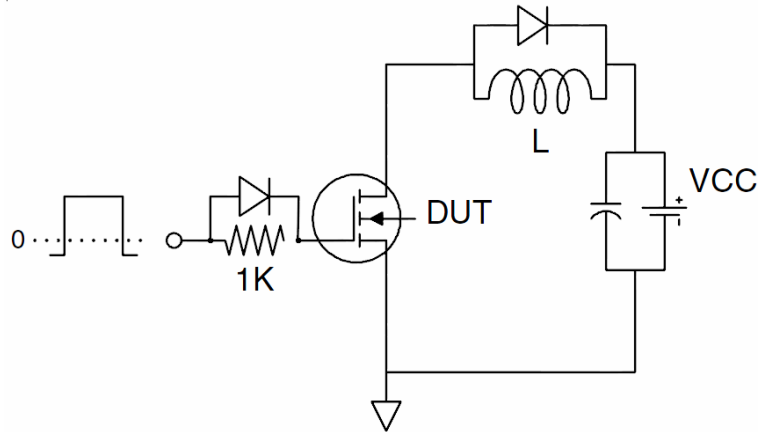
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to productio

Test Circuit

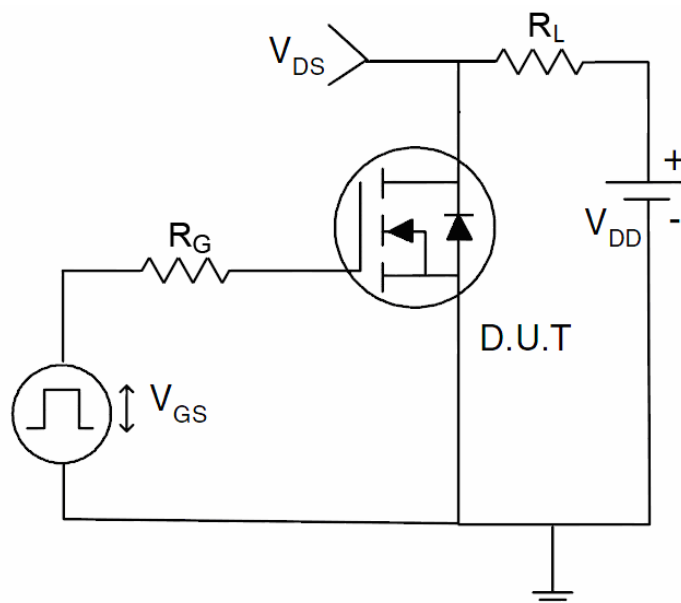
1) E_{AS} test circuit



2) Gate charge test circuit



3) Switch Time Test Circuit



RATING AND CHARACTERISTICS CURVES (RM0103)

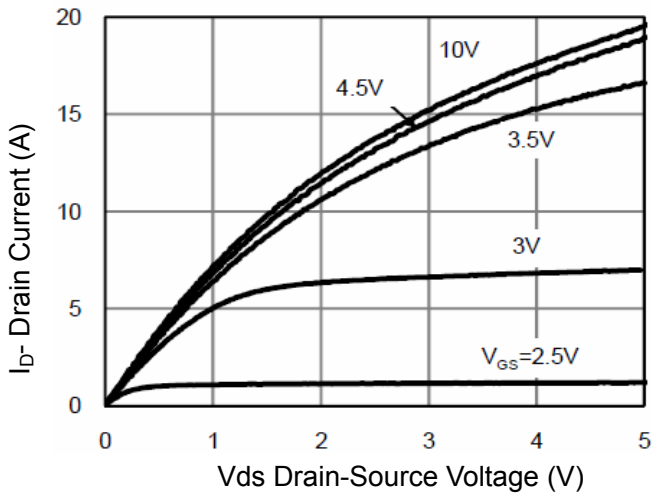


Figure 1 Output Characteristics

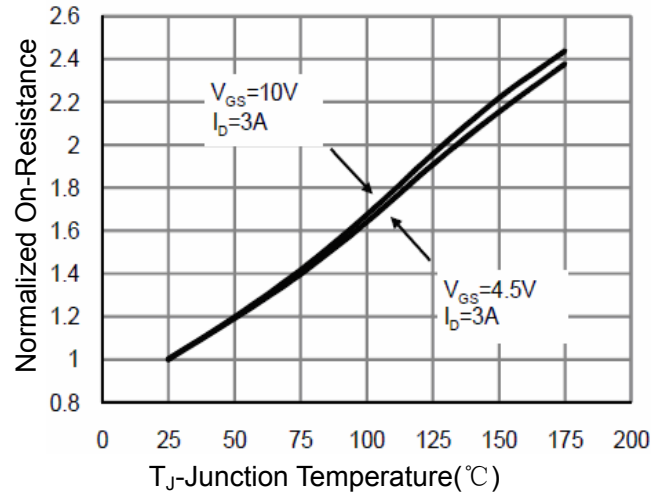


Figure 4 R_{dson} -Junction Temperature

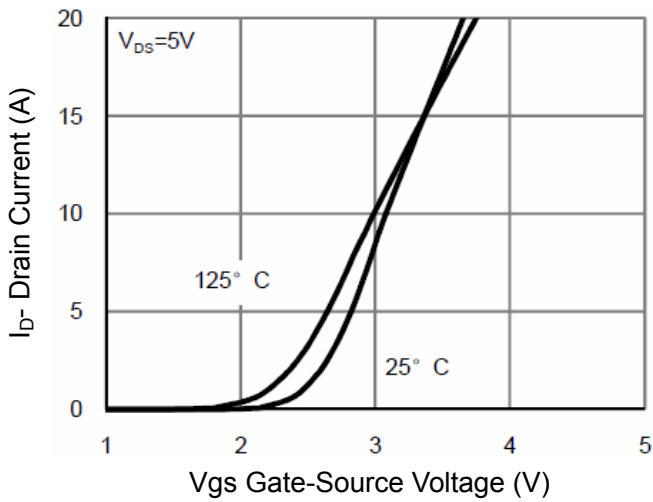


Figure 2 Transfer Characteristics

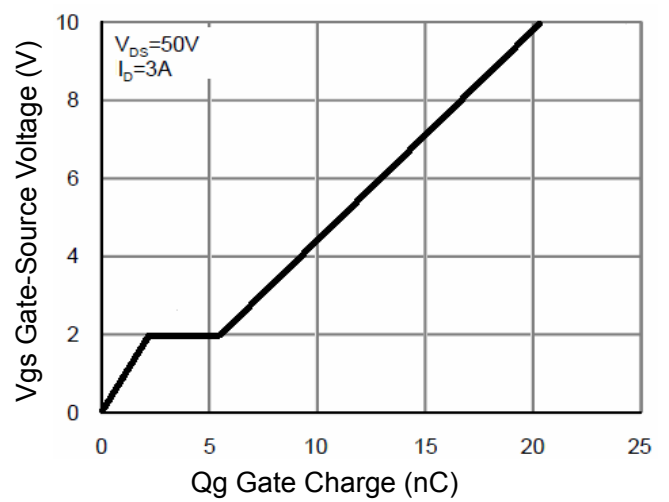


Figure 5 Gate Charge

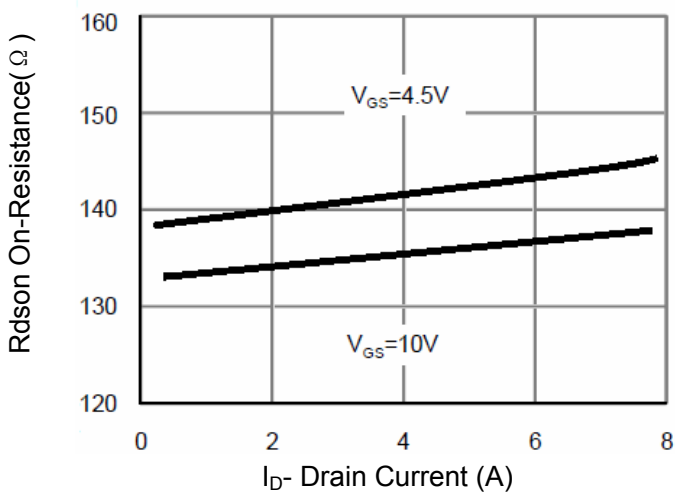


Figure 3 R_{dson} - Drain Current

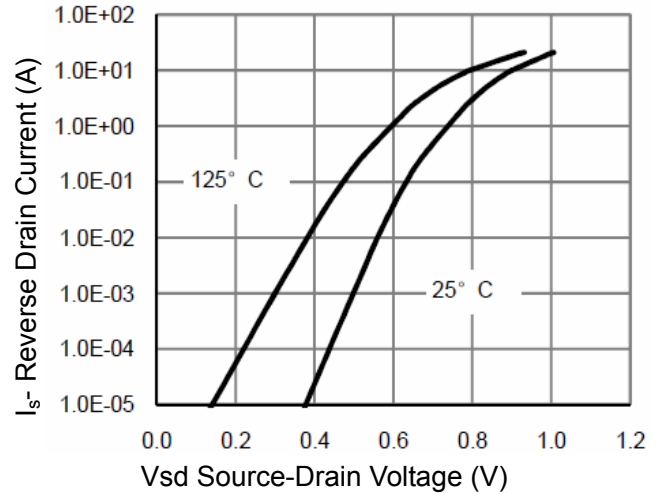


Figure 6 Source- Drain Diode Forward

RATING AND CHARACTERISTICS CURVES (RM0103)

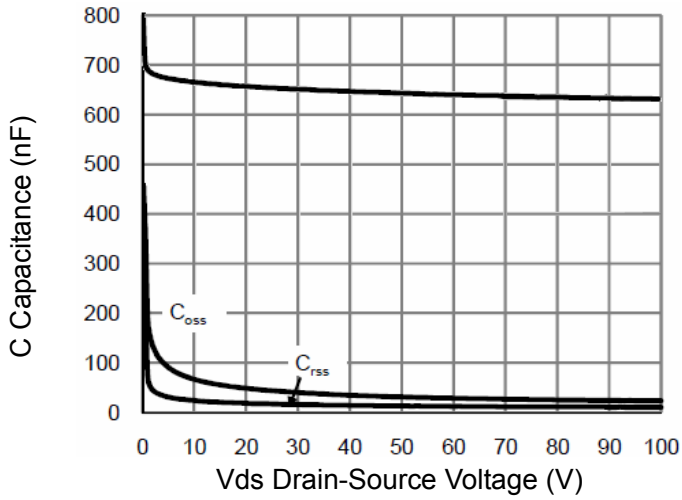


Figure 7 Capacitance vs Vds

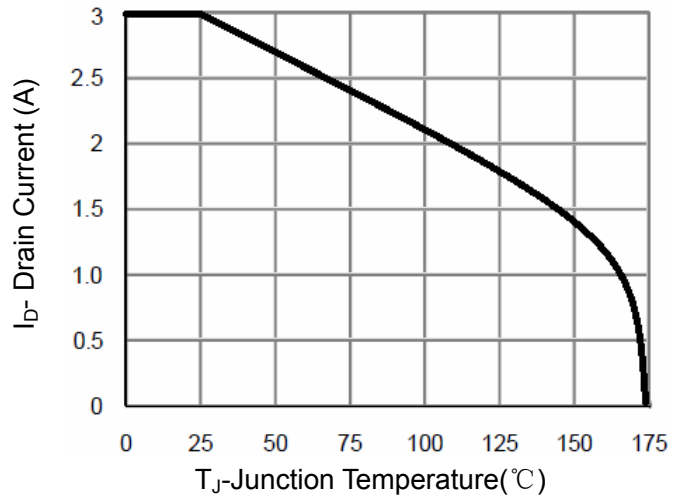


Figure 9 BV_{DSS} vs Junction Temperature

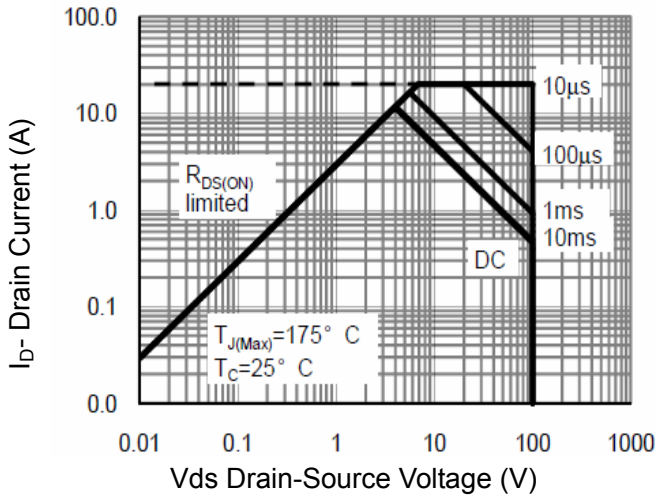


Figure 8 Safe Operation Area

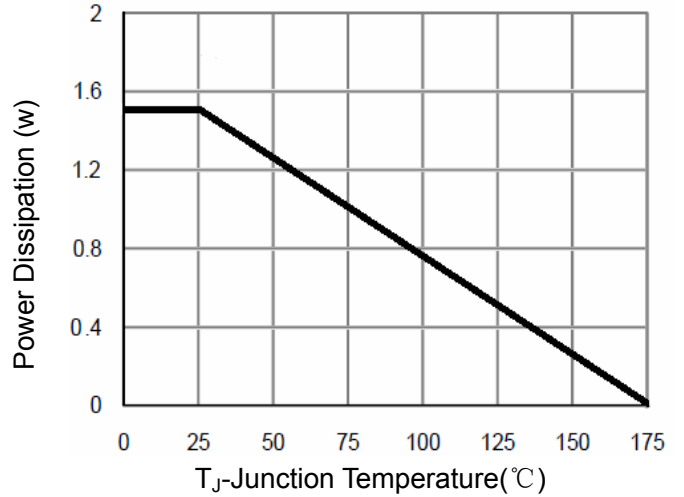


Figure 10 Power De-rating

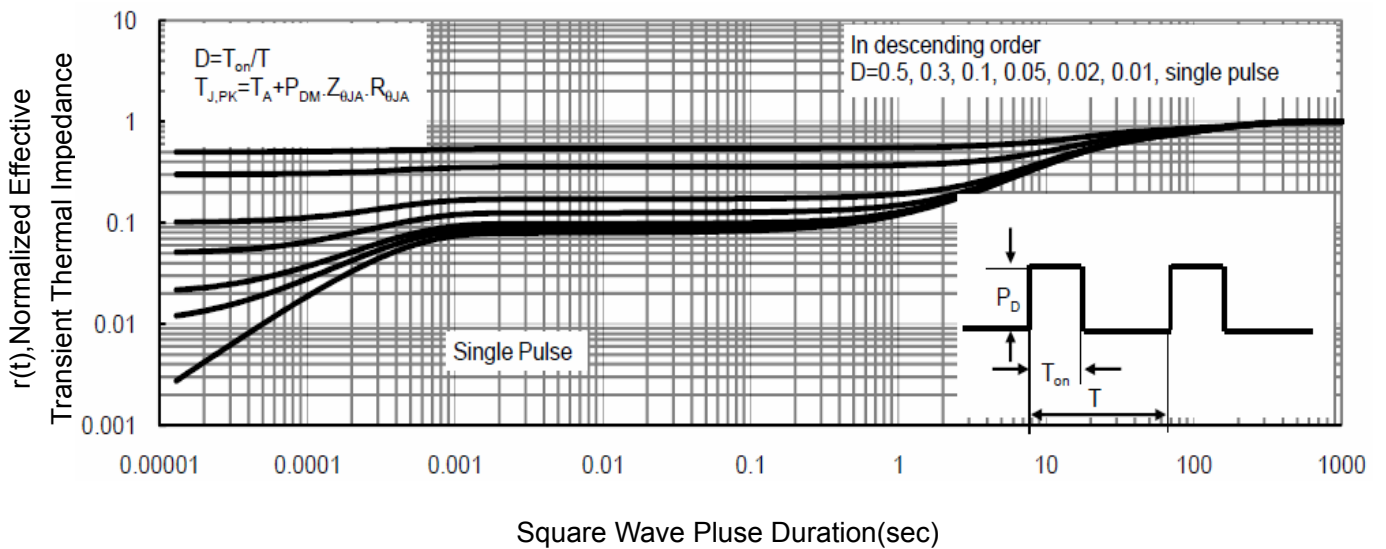
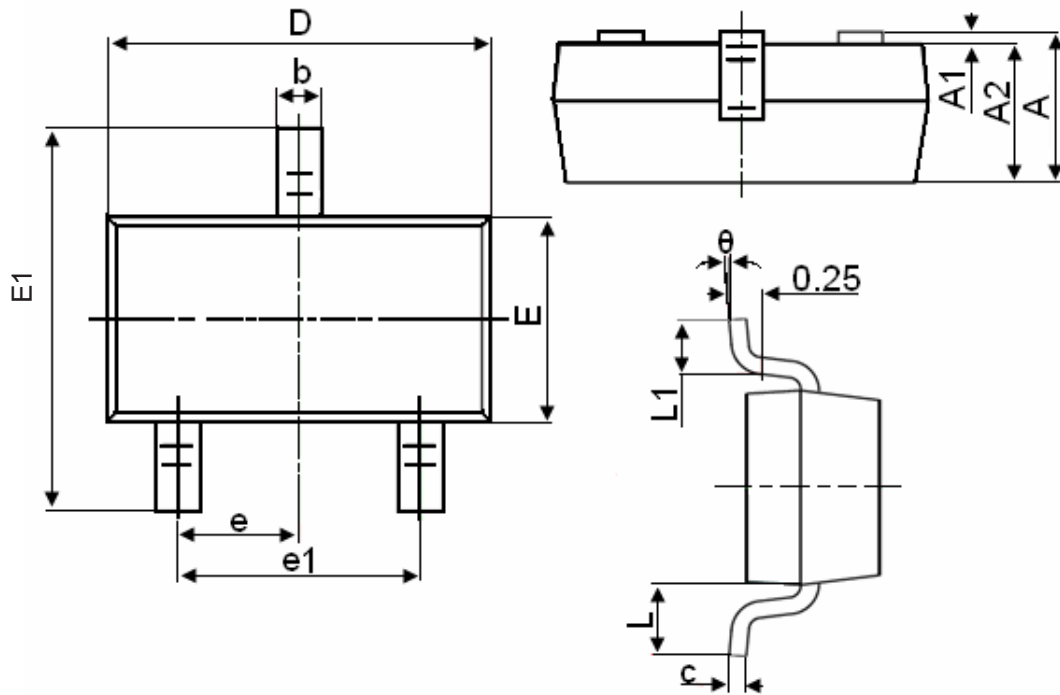


Figure 11 Normalized Maximum Transient Thermal Impedance

SOT-23 Package Information



| Symbol | Dimensions in Millimeters | |
|----------|---------------------------|-------|
| | MIN. | MAX. |
| A | 0.900 | 1.150 |
| A1 | 0.000 | 0.100 |
| A2 | 0.900 | 1.050 |
| b | 0.300 | 0.500 |
| c | 0.080 | 0.150 |
| D | 2.800 | 3.000 |
| E | 1.200 | 1.400 |
| E1 | 2.250 | 2.550 |
| e | 0.950TYP | |
| e1 | 1.800 | 2.000 |
| L | 0.550REF | |
| L1 | 0.300 | 0.500 |
| θ | 0° | 8° |

Notes

1. All dimensions are in millimeters.
2. Tolerance $\pm 0.10\text{mm}$ (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

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