

NCE N-Channel Enhancement Mode Power MOSFET

Description

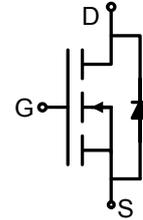
The NCE0202M uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

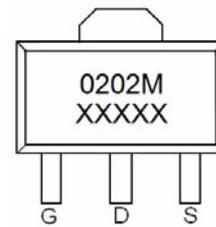
- $V_{DS} = 200V, I_D = 2A$
 $R_{DS(ON)} < 580m\Omega @ V_{GS}=10V$ (Typ:520m Ω)
 $R_{DS(ON)} < 600m\Omega @ V_{GS}=10V$ (Typ:540m Ω)
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Application

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



Schematic diagram



SOT-89 -3L top view

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|----------------|----------|----------------|-----------|------------|------------|
| 0202M | NCE0202M | SOT-89-3L | Ø330mm | 12mm | 2500 units |

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

| Parameter | Symbol | Limit | Unit |
|--|----------------|------------|------------|
| Drain-Source Voltage | V_{DS} | 200 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Drain Current-Continuous | I_D | 2 | A |
| Drain Current-Pulsed ^(Note 1) | I_{DM} | 8 | A |
| Maximum Power Dissipation | P_D | 1.5 | W |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 150 | $^\circ C$ |

Thermal Characteristic

| | | | |
|---|-----------------|------|--------------|
| Thermal Resistance, Junction-to-Ambient ^(Note 2) | $R_{\theta JA}$ | 83.3 | $^\circ C/W$ |
|---|-----------------|------|--------------|

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} | $V_{GS}=0V, I_D=250\mu A$ | 200 | - | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=200V, V_{GS}=0V$ | - | - | 1 | μA |

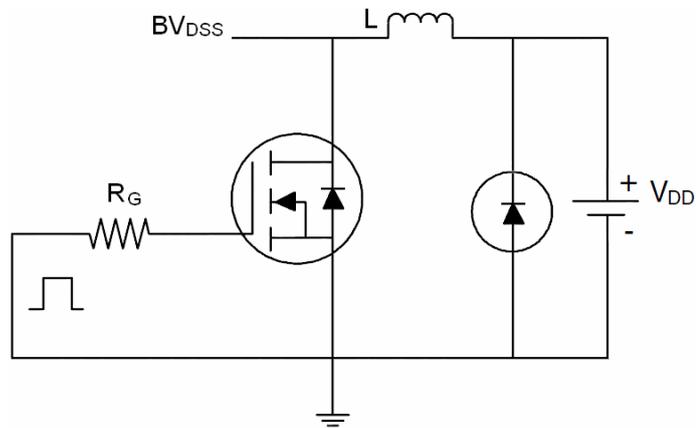
| | | | | | | |
|--|--------------|--|-----|-----|-----------|------------|
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA |
| On Characteristics ^(Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1.2 | 1.8 | 2.5 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=2A$ | - | 520 | 580 | m Ω |
| | $R_{DS(ON)}$ | $V_{GS}=4.5V, I_D=2A$ | - | 540 | 600 | m Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=15V, I_D=2A$ | - | 8 | - | S |
| Dynamic Characteristics ^(Note 4) | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=25V, V_{GS}=0V,$ $F=1.0MHz$ | - | 580 | - | PF |
| Output Capacitance | C_{oss} | | - | 90 | - | PF |
| Reverse Transfer Capacitance | C_{rss} | | - | 3 | - | PF |
| Switching Characteristics ^(Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=100V, R_L=15\Omega$ $V_{GS}=10V, R_G=2.5\Omega$ | - | 10 | - | nS |
| Turn-on Rise Time | t_r | | - | 12 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 15 | - | nS |
| Turn-Off Fall Time | t_f | | - | 15 | - | nS |
| Total Gate Charge | Q_g | $V_{DS}=100V, I_D=2A,$ $V_{GS}=10V$ | - | 12 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 2.5 | - | nC |
| Gate-Drain Charge | Q_{gd} | | - | 3.8 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage ^(Note 3) | V_{SD} | $V_{GS}=0V, I_S=2A$ | - | - | 1.2 | V |
| Diode Forward Current ^(Note 2) | I_S | | - | - | 2 | A |

Notes:

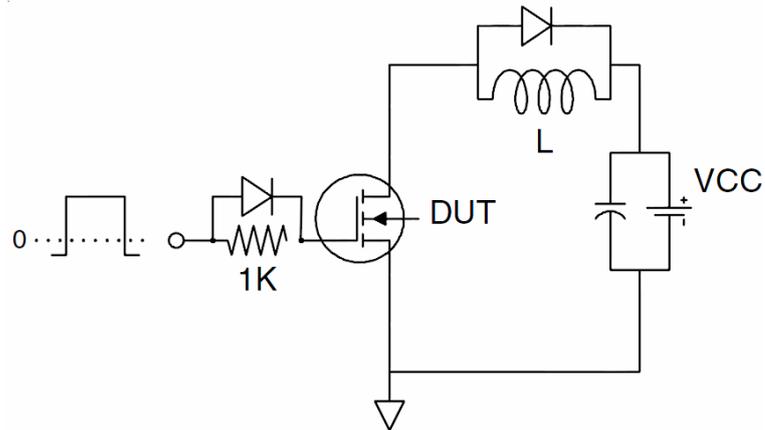
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Test Circuit

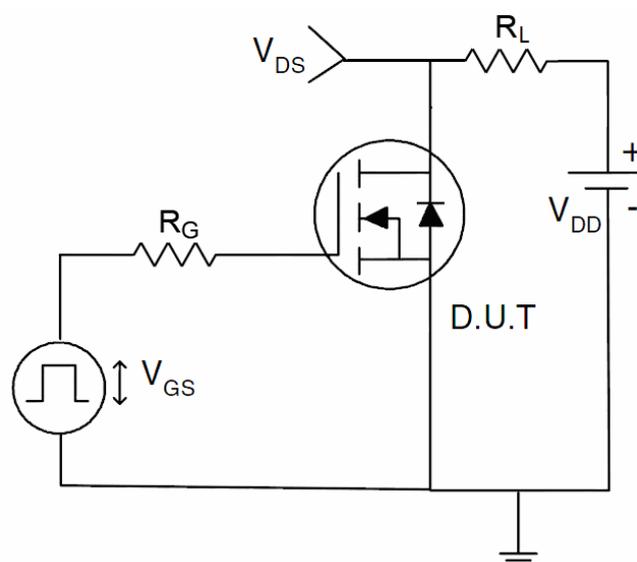
1) E_{AS} test circuit



2) Gate charge test circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

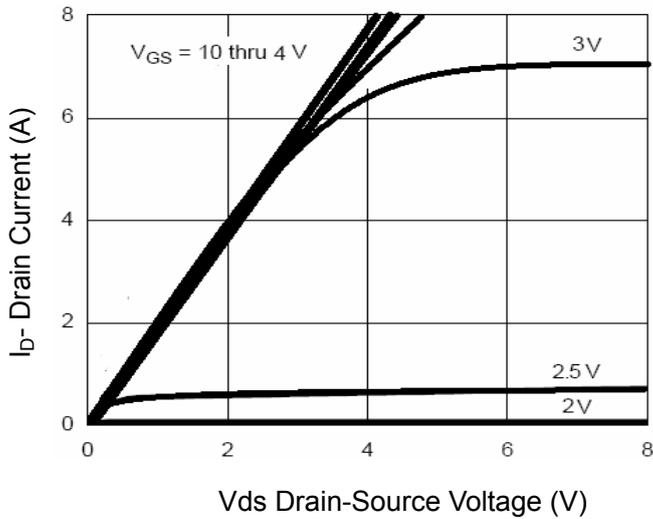


Figure 1 Output Characteristics

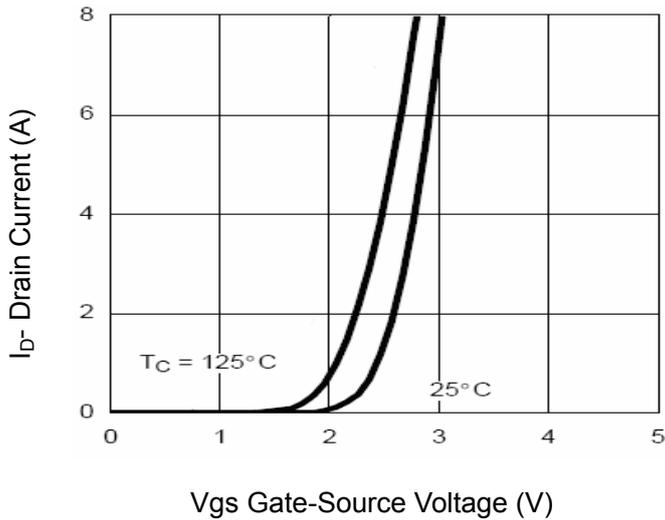


Figure 2 Transfer Characteristics

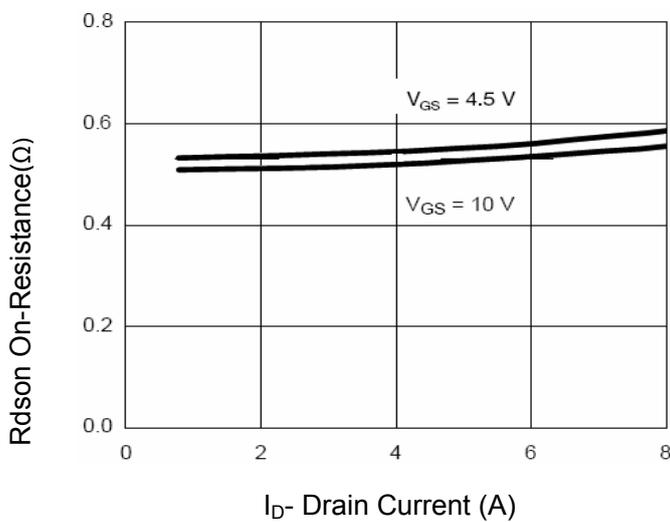


Figure 3 Rdson- Drain Current

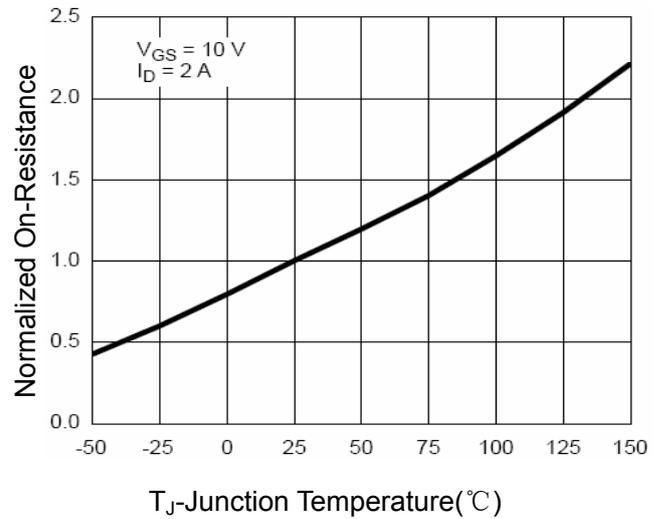


Figure 4 Rdson-Junction Temperature

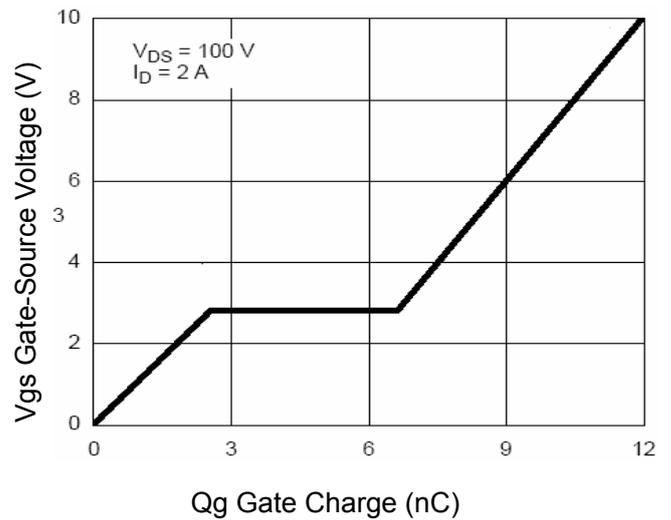


Figure 5 Gate Charge

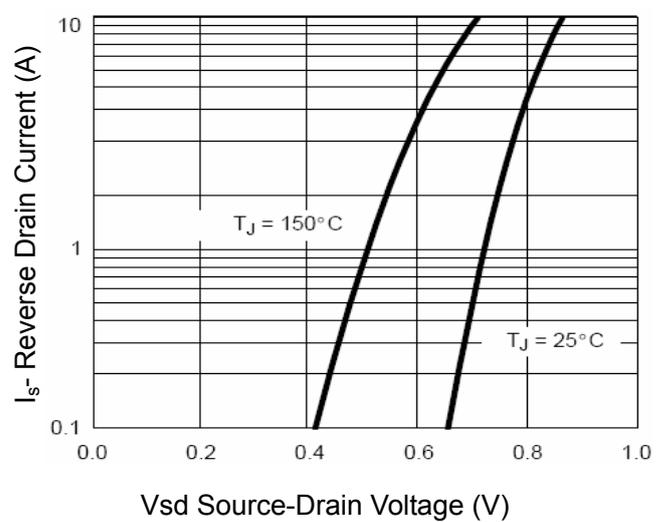


Figure 6 Source- Drain Diode Forward

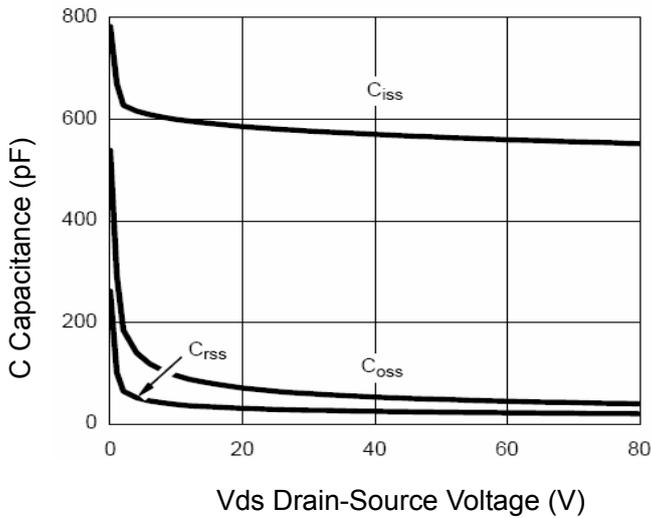


Figure 7 Capacitance vs Vds

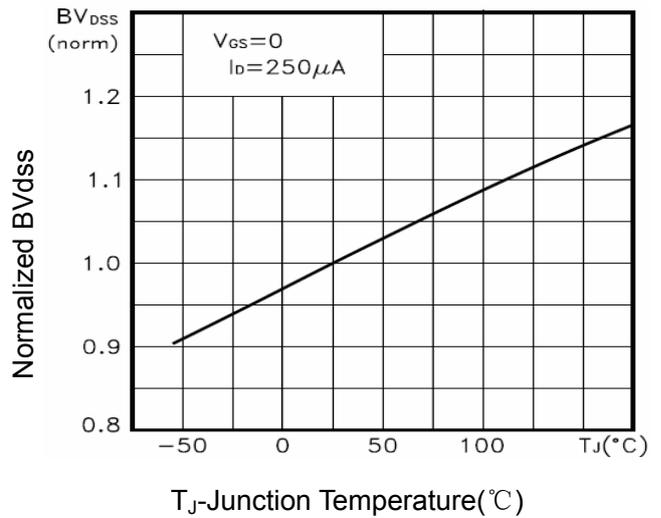


Figure 9 BV_{DSS} vs Junction Temperature

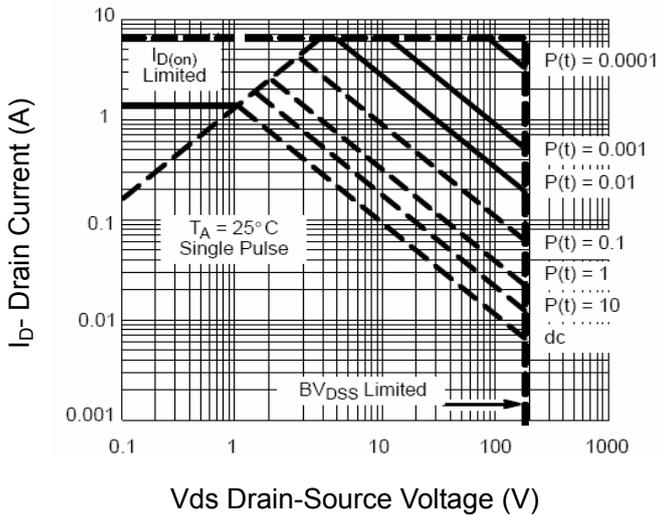


Figure 8 Safe Operation Area

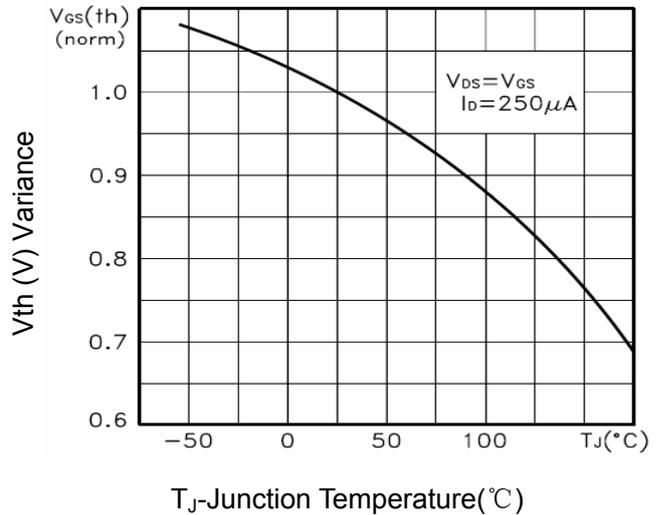


Figure 10 $V_{GS(th)}$ vs Junction Temperature

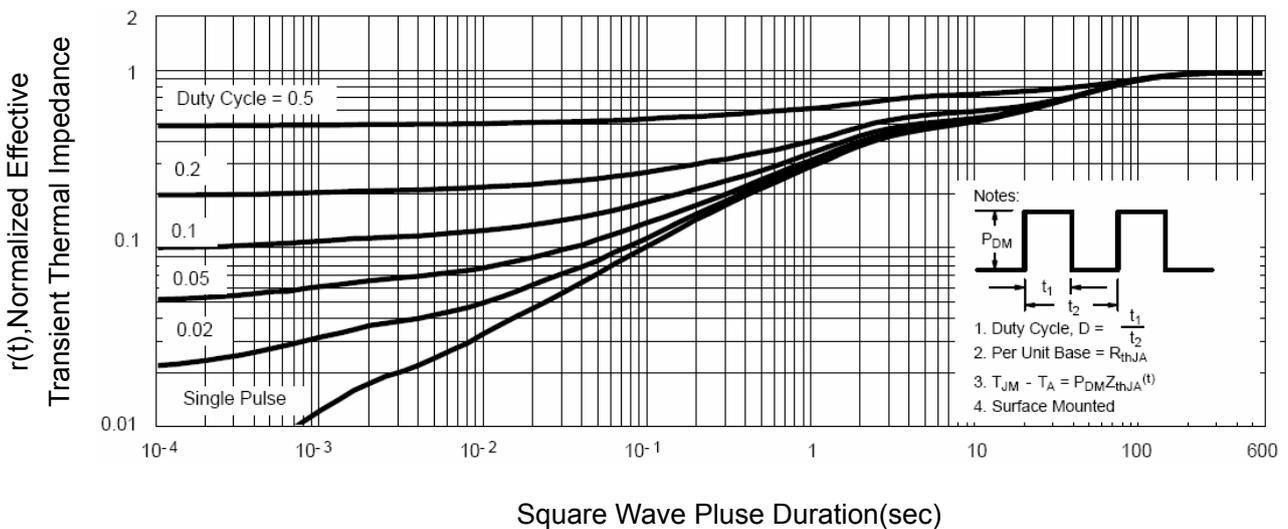
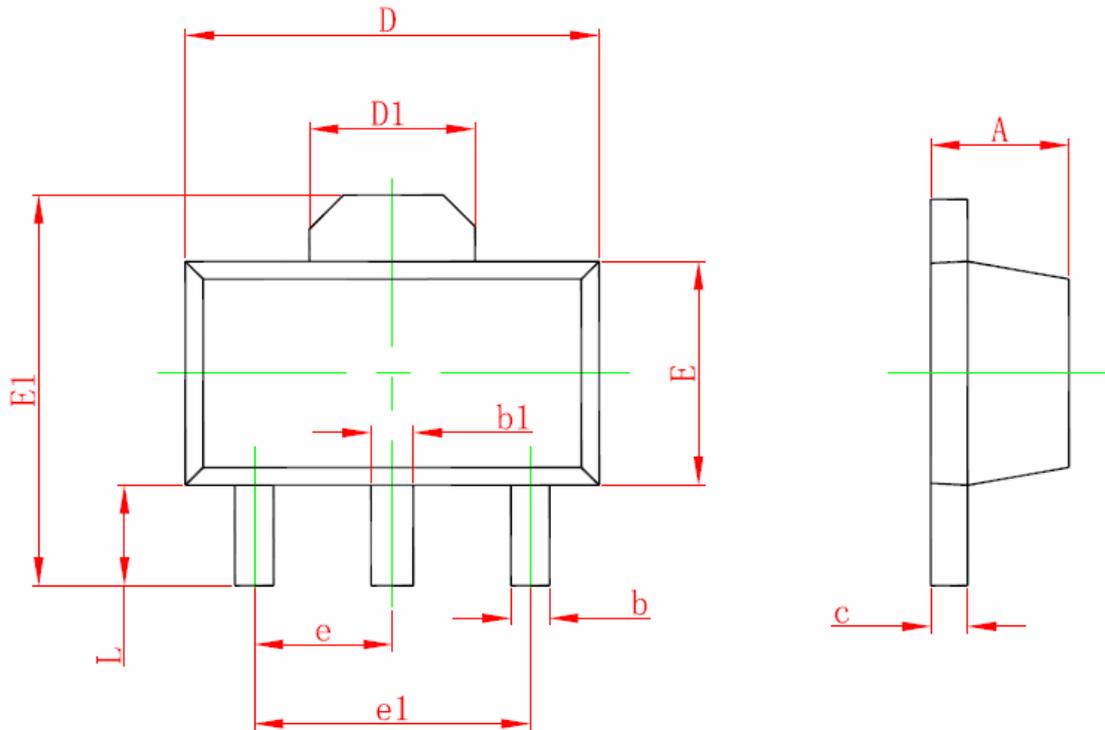


Figure 11 Normalized Maximum Transient Thermal Impedance

SOT-89-3L Package Information



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.400 | 1.600 | 0.055 | 0.063 |
| b | 0.320 | 0.520 | 0.013 | 0.020 |
| b1 | 0.400 | 0.580 | 0.016 | 0.023 |
| c | 0.350 | 0.440 | 0.014 | 0.017 |
| D | 4.400 | 4.600 | 0.173 | 0.181 |
| D1 | 1.550 REF. | | 0.061 REF. | |
| E | 2.300 | 2.600 | 0.091 | 0.102 |
| E1 | 3.940 | 4.250 | 0.155 | 0.167 |
| e | 1.500 TYP. | | 0.060 TYP. | |
| e1 | 3.000 TYP. | | 0.118 TYP. | |
| L | 0.900 | 1.200 | 0.035 | 0.047 |

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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