



-100V 40mΩ P-Ch Power MOSFET

Features

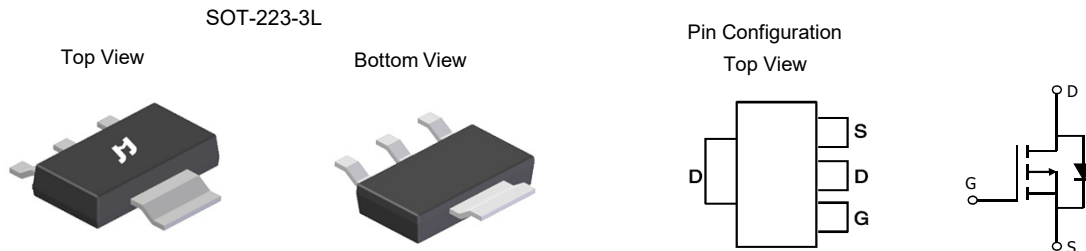
- Low On-Resistance
- Excellent Gate Charge x $R_{DS(ON)}$ Product (FOM)
- Pb-Free Lead Plating
- RoHS and Halogen-Free Compliant
- 100% UIS Tested, 100% R_g Tested

Product Summary

| Parameter | Value | Unit |
|---|-------|------|
| V_{DS} | -100 | V |
| $V_{GS(th_Typ)}$ | -2.0 | V |
| I_D (@ $V_{GS} = -10V$) ⁽¹⁾ | -10 | A |
| $R_{DS(ON_Typ)}$ (@ $V_{GS} = -10V$) | 40 | mΩ |
| $R_{DS(ON_Typ)}$ (@ $V_{GS} = -4.5V$) | 53 | mΩ |

Applications

- Battery Management
- DC/DC in Telecoms and Industrial
- Hard Switching and High Speed Circuit

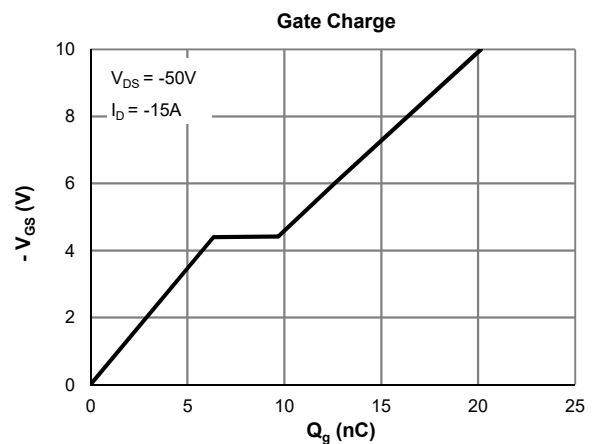
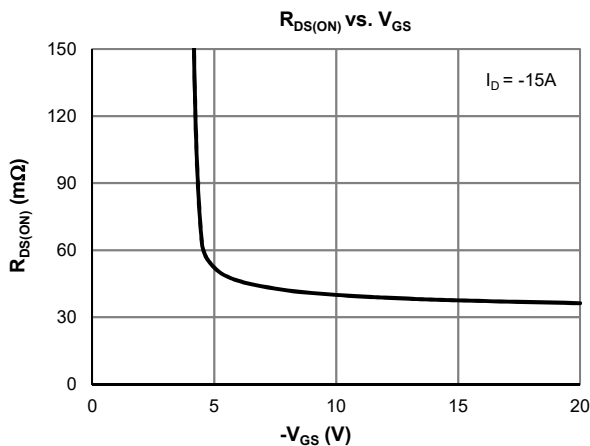


Ordering Information

| Device | Package | # of Pins | Marking | MSL | T_J (°C) | Media | Quantity (pcs) |
|---------------|------------|-----------|---------|-----|------------|--------------|----------------|
| JMPL1050AY-13 | SOT-223-3L | 3 | PL1050A | 1 | -55 to 150 | 13-inch Reel | 4000 |

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

| Parameter | Symbol | Value | Unit |
|---|---------------------|------------|------|
| Drain-to-Source Voltage | V_{DS} | -100 | V |
| Gate-to-Source Voltage | V_{GS} | ±20 | V |
| Continuous Drain Current ⁽¹⁾ | $T_C = 25^\circ C$ | -9.7 | A |
| | $T_C = 100^\circ C$ | -6.2 | |
| Pulsed Drain Current ⁽²⁾ | I_{DM} | -22 | A |
| Avalanche Current ⁽³⁾ | I_{AS} | -27 | A |
| Avalanche Energy ⁽³⁾ | E_{AS} | 109 | mJ |
| Power Dissipation ⁽⁴⁾ | $T_C = 25^\circ C$ | 10.4 | W |
| | $T_C = 100^\circ C$ | 4.2 | |
| Junction & Storage Temperature Range | T_J, T_{STG} | -55 to 150 | °C |



**Electrical Characteristics** (@ $T_J = 25^\circ\text{C}$ unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|-----------------------------------|---------------|--|------|------|--------------|------------------|
| STATIC PARAMETERS | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $I_D = -250\mu\text{A}, V_{GS} = 0\text{V}$ | -100 | | | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = -80\text{V}, V_{GS} = 0\text{V}$ $T_J = 55^\circ\text{C}$ | | | -1.0 -5.0 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$ | | | ± 100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\mu\text{A}$ | -1.0 | -2.0 | -3.0 | V |
| Static Drain-Source ON-Resistance | $R_{DS(on)}$ | $V_{GS} = -10\text{V}, I_D = -15\text{A}$ | | 40 | 52 | $\text{m}\Omega$ |
| | | $V_{GS} = -4.5\text{V}, I_D = -10\text{A}$ | | 53 | 68 | $\text{m}\Omega$ |
| Forward Transconductance | g_{FS} | $V_{DS} = -5\text{V}, I_D = -15\text{A}$ | | 30 | | S |
| Diode Forward Voltage | V_{SD} | $I_S = -1\text{A}, V_{GS} = 0\text{V}$ | | -0.7 | -1.0 | V |
| Diode Continuous Current | I_S | $T_C = 25^\circ\text{C}$ | | | -10 | A |

DYNAMIC PARAMETERS ⁽⁵⁾

| | | | | | | |
|------------------------------|-----------|---|--|------|--|----------|
| Input Capacitance | C_{iss} | $V_{GS} = 0\text{V}, V_{DS} = -50\text{V}, f = 1\text{MHz}$ | | 1412 | | pF |
| Output Capacitance | C_{oss} | | | 222 | | pF |
| Reverse Transfer Capacitance | C_{rss} | | | 2.6 | | pF |
| Gate Resistance | R_g | $V_{GS} = 0\text{V}, V_{DS} = 0\text{V}, f = 1\text{MHz}$ | | 10.2 | | Ω |

SWITCHING PARAMETERS ⁽⁵⁾

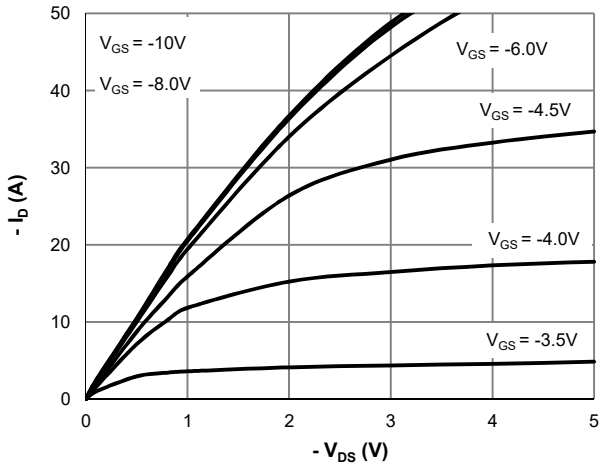
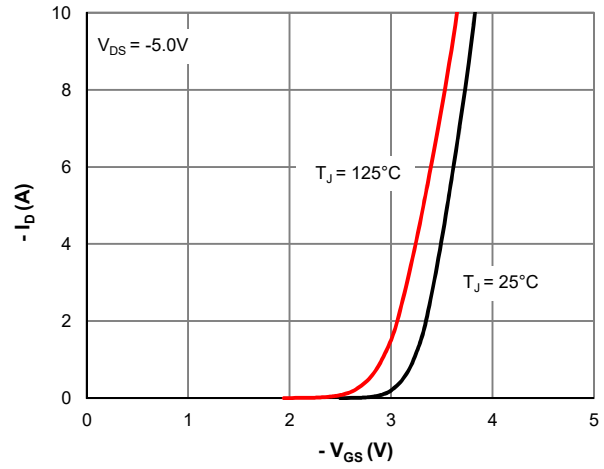
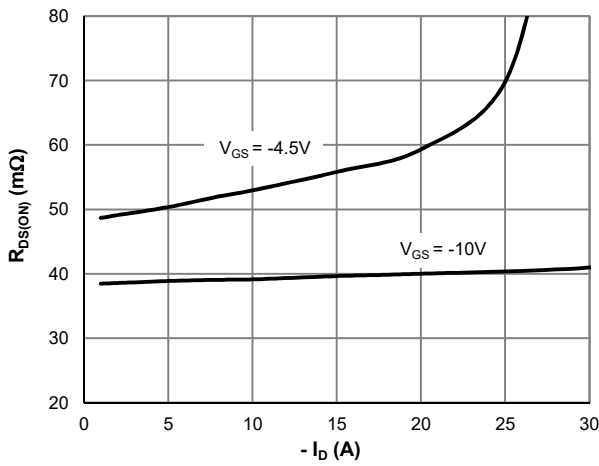
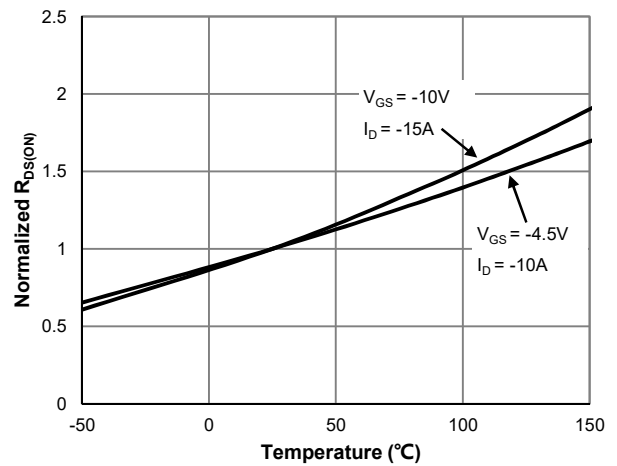
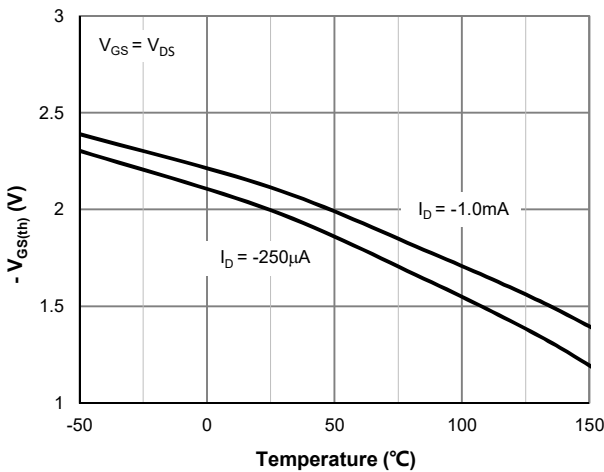
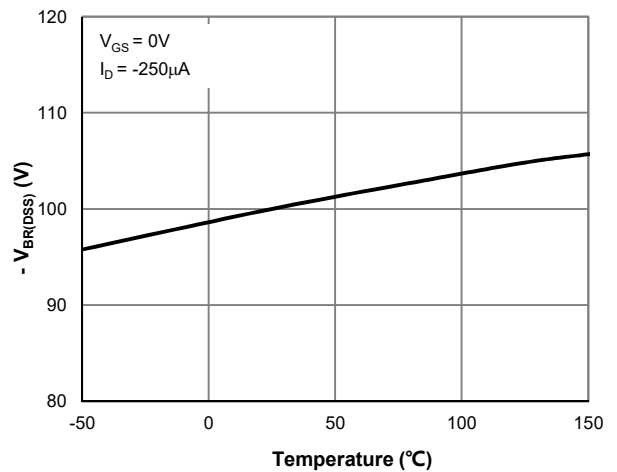
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|--|--------------|--|---|------|----|----|
| Total Gate Charge (@ $V_{GS} = -10\text{V}$) | Q_g | $V_{GS} = 0 \text{ to } -10\text{V}$ $V_{DS} = -50\text{V}, I_D = -15\text{A}$ | | 20 | | nC |
| Total Gate Charge (@ $V_{GS} = -6.0\text{V}$) | Q_g | | | 12.6 | | nC |
| Gate Source Charge | Q_{gs} | | | 6.4 | | nC |
| Gate Drain Charge | Q_{gd} | | | 3.3 | | nC |
| Turn-On DelayTime | $t_{D(on)}$ | $V_{GS} = -10\text{V}, V_{DS} = -50\text{V}$ $R_L = 3.3\Omega, R_{GEN} = 6\Omega$ | | 10.7 | | ns |
| Turn-On Rise Time | t_r | | | 56 | | ns |
| Turn-Off DelayTime | $t_{D(off)}$ | | | 45 | | ns |
| Turn-Off Fall Time | t_f | | | 81 | | ns |
| Body Diode Reverse Recovery Time | t_{rr} | | $I_F = -15\text{A}, dI_F/dt = -100\text{A}/\mu\text{s}$ | | 51 | |
| Body Diode Reverse Recovery Charge | Q_{rr} | $I_F = -15\text{A}, dI_F/dt = -100\text{A}/\mu\text{s}$ | | 130 | | nC |

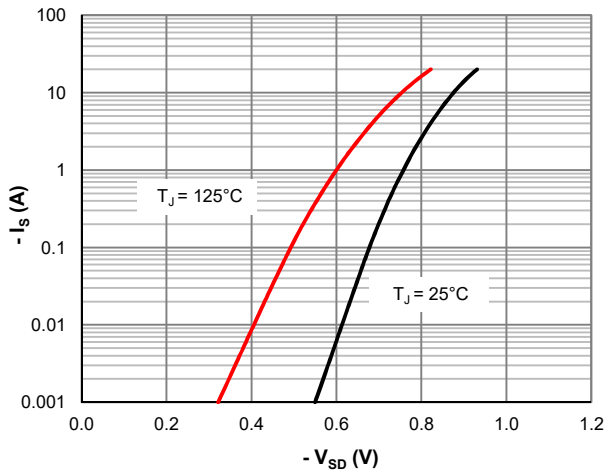
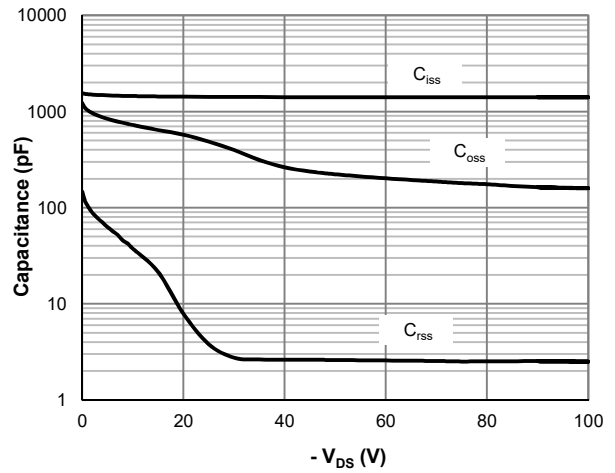
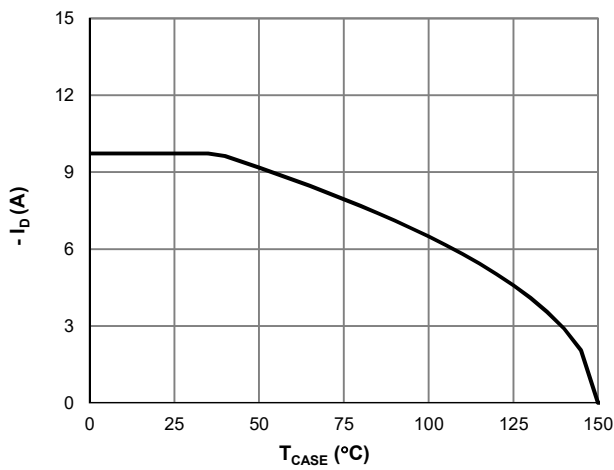
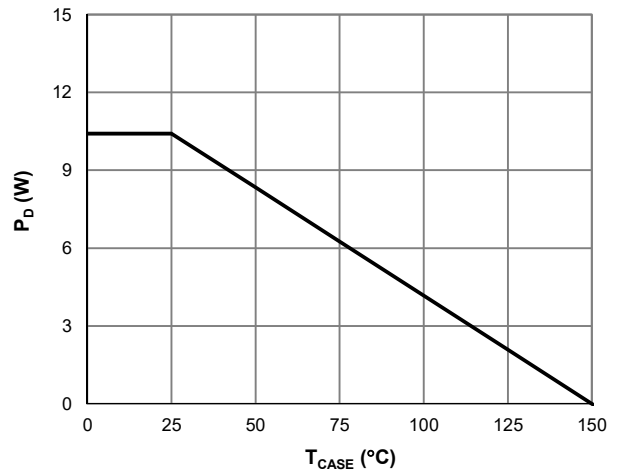
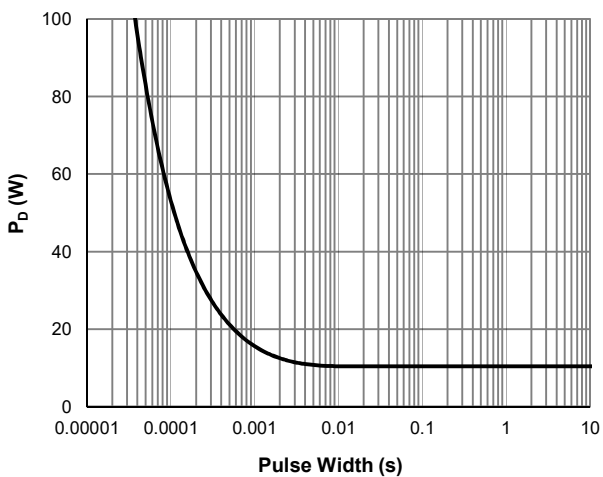
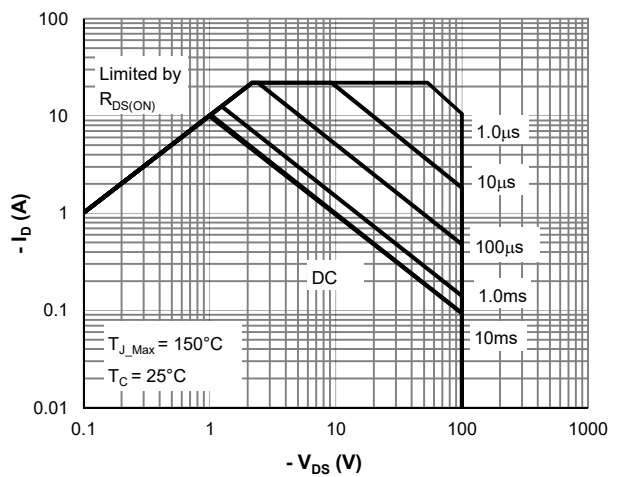
Thermal Performance

| Parameter | Symbol | Typ. | Max. | Unit |
|---|-----------------|------|------|---------------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 58 | 70 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 9.2 | 12.0 | $^\circ\text{C}/\text{W}$ |

Notes:

1. Computed continuous current assumes the condition of T_{J_Max} while the actual continuous current depends on the thermal & electro-mechanical application board design.
2. This single-pulse measurement was taken under $T_{J_Max} = 150^\circ\text{C}$.
3. This single-pulse measurement was taken under the following condition [$L = 300\mu\text{H}, V_{GS} = -10\text{V}, V_{DD} = -50\text{V}$] while its value is limited by $T_{J_Max} = 150^\circ\text{C}$.
4. The power dissipation P_D is based on $T_{J_Max} = 150^\circ\text{C}$.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Electrical & Thermal Characteristics

Figure 1: Saturation Characteristics

Figure 2: Transfer Characteristics

Figure 3: $R_{DS(ON)}$ vs. Drain Current

Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

Figure 5: $V_{GS(th)}$ vs. Junction Temperature

Figure 6: $V_{BR(DSS)}$ vs. Junction Temperature

Typical Electrical & Thermal Characteristics

Figure 7: Body-Diode Characteristics

Figure 8: Capacitance Characteristics

Figure 9: Current De-rating

Figure 10: Power De-rating

Figure 11: Single Pulse Power Rating, Junction-to-Case

Figure 12: Maximum Safe Operating Area



Typical Electrical & Thermal Characteristics

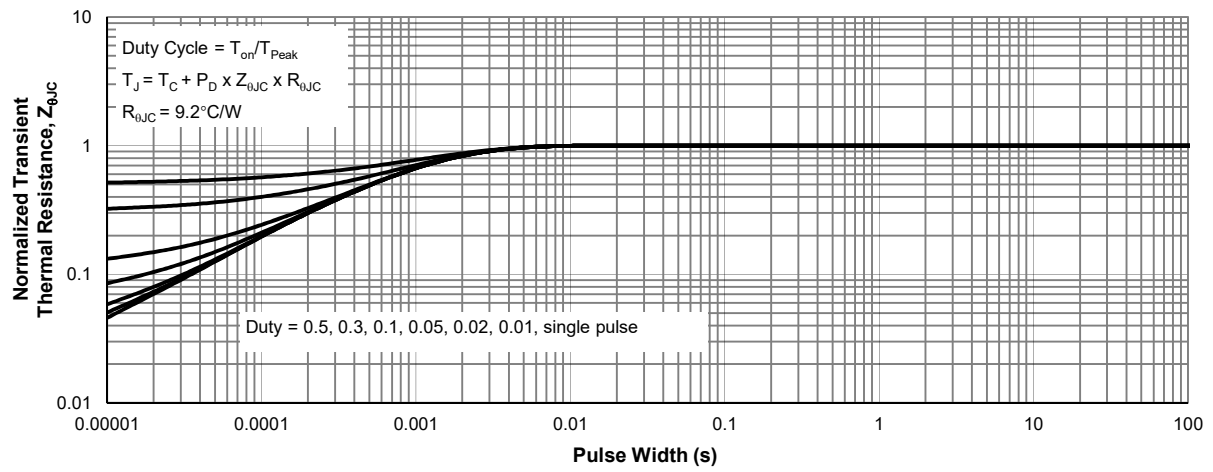
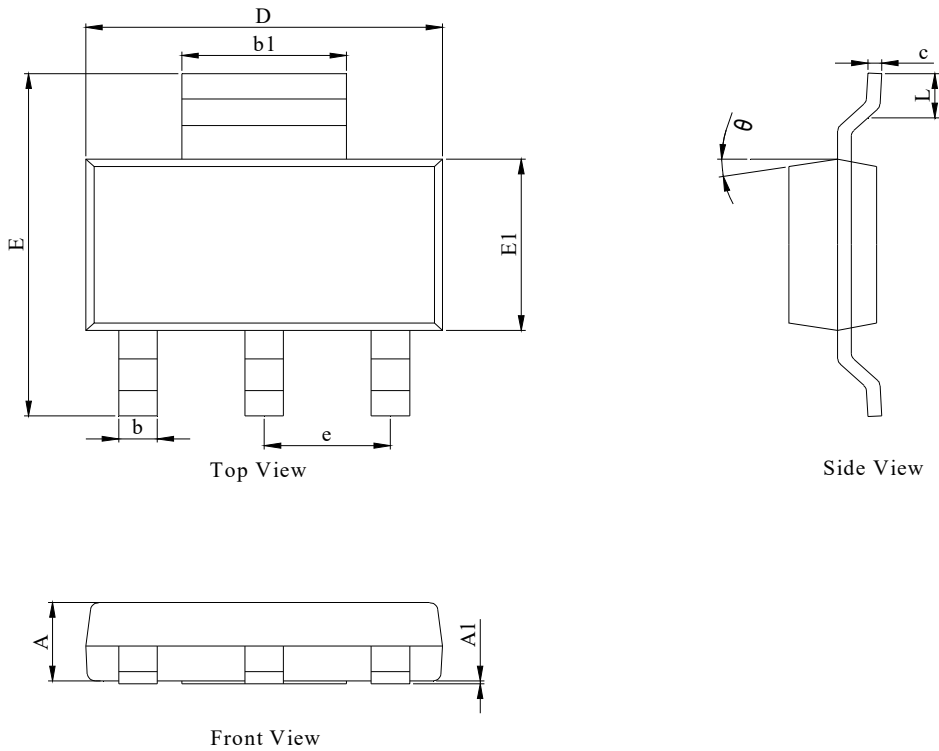


Figure 13: Normalized Maximum Transient Thermal Impedance

SOT-223-3L Package Information
Package Outline


| DIM. | MILLIMETER | | |
|----------|------------|------|------|
| | MIN. | NOM. | MAX. |
| A | 1.50 | 1.60 | 1.80 |
| A1 | 0.01 | 0.06 | 0.10 |
| b | 0.60 | 0.70 | 0.80 |
| b1 | 2.90 | 3.00 | 3.10 |
| D | 6.30 | 6.50 | 6.70 |
| E | 6.70 | 7.00 | 7.30 |
| E1 | 3.30 | 3.50 | 3.70 |
| c | 0.22 | 0.26 | 0.32 |
| L | 0.70 | 0.90 | 1.10 |
| e | 2.30 BSC | | |
| θ | - | - | 10° |

Recommended Soldering Footprint
