

Features

- $V_{DS}=20V$
- $I_D=4.5A$
- $R_{DS(on)}@V_{GS}=4.5V < 25m\Omega$
- $R_{DS(on)}@V_{GS}=2.5V < 32m\Omega$
- Trench Power LV MOSFET technology
- High density cell design for low $R_{DS(on)}$
- High Speed switching

Applications

- Battery protection
- Load switch
- Power management

Mechanical Data

- Case: SOT-23
- Molding compound meets UL 94V-0 flammability rating, RoHS-compliant, halogen-free
- Terminals: Solder plated, solderable per MIL-STD-750, Method 2026

Maximum Ratings (Ta=25°C Unless otherwise specified)

| PARAMETER | SYMBOL | UNIT | VALUE | |
|---|------------------------|------|-----------|-----|
| Drain-source Voltage | V_{DS} | V | 20 | |
| Gate-source Voltage | V_{GS} | V | ± 10 | |
| Drain Current | I_D | A | Ta=25°C | 4.5 |
| | | | Ta=100°C | 2.8 |
| Pulsed Drain Current ⁽¹⁾ | I_{DM} | A | 30 | |
| Total Power Dissipation ⁽²⁾ | P_D | W | Ta=25°C | 1 |
| | | | Ta=100°C | 0.4 |
| Storage temperature | T_{stg} | °C | -55 ~+150 | |
| Junction temperature | T_j | °C | -55 ~+150 | |
| Thermal Resistance Junction-to-Ambient ⁽³⁾ | $R_{\theta J-A}^{(1)}$ | °C/W | 125 | |

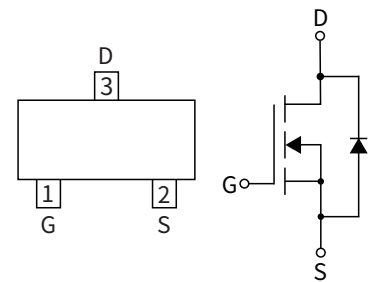
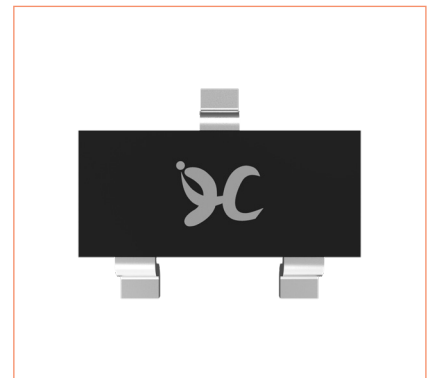
Note :

- (1) Repetitive rating; pulse width limited by max. junction temperature.
- (2) Pd is based on max. junction temperature, using junction-case thermal resistance.
- (3) The value of $R_{\theta J-A}$ is measured with the device mounted on the minimum recommend pad size, in the still air environment with TA = 25°C . The maximum allowed junction temperature of 150°C . The value in any given application depends on the user's specific board design.

Ordering Information

| PACKAGE | PACKAGE CODE | UNIT WEIGHT(g) | REEL(pcs) | BOX(pcs) | CARTON(pcs) | DELIVERY MODE |
|---------|--------------|----------------|-----------|----------|-------------|---------------|
| SOT-23 | R1 | 0.008 | 3000 | 30000 | 120000 | 7" |

SOT-23



Static Parameter Characteristics (Ta=25°C Unless otherwise specified)

| PARAMETER | SYMBOL | Condition | UNIT | Min | Typ | Max |
|---------------------------------------|--------------|--|-----------|-----|-----|-----------|
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | V | 20 | — | — |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=20V, V_{GS}=0V$ | μA | — | — | 1 |
| | | $V_{GS}=0V, V_{DS}=20V, T_J=150^\circ C$ | | — | — | 100 |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 10V, V_{DS}=0V$ | nA | — | — | ± 100 |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | V | 0.4 | 0.6 | 1 |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}=4.5V, I_D=4.5A$ | $m\Omega$ | — | 20 | 25 |
| | | $V_{GS}=2.5V, I_D=3A$ | | — | 25 | 32 |
| | | $V_{GS}=1.8V, I_D=2.7A$ | | — | 33 | 46 |
| Diode Forward Voltage | V_{SD} | $I_S=4.5A, V_{GS}=0V$ | V | — | 0.9 | 1.2 |
| Gate resistance | R_G | f=1MHz, Open drain | Ω | — | 2.7 | — |
| Maximum Body-Diode Continuous Current | I_S | — | A | — | — | 4.5 |

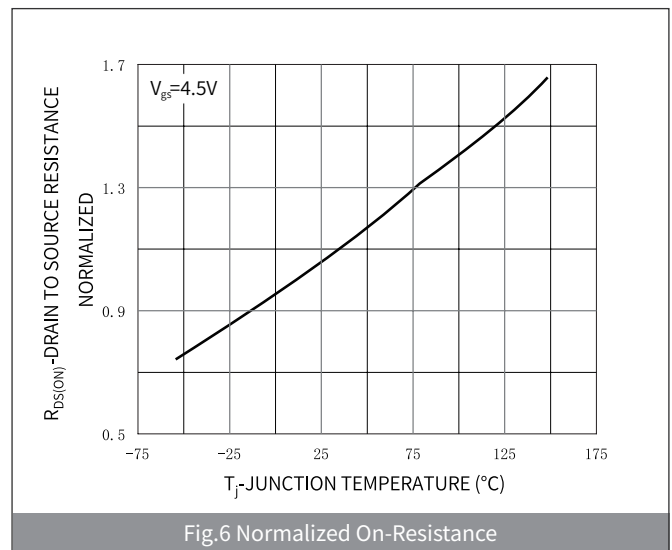
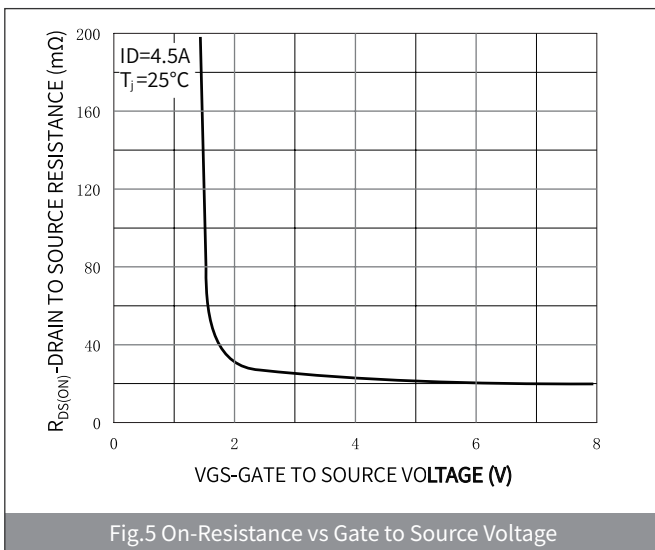
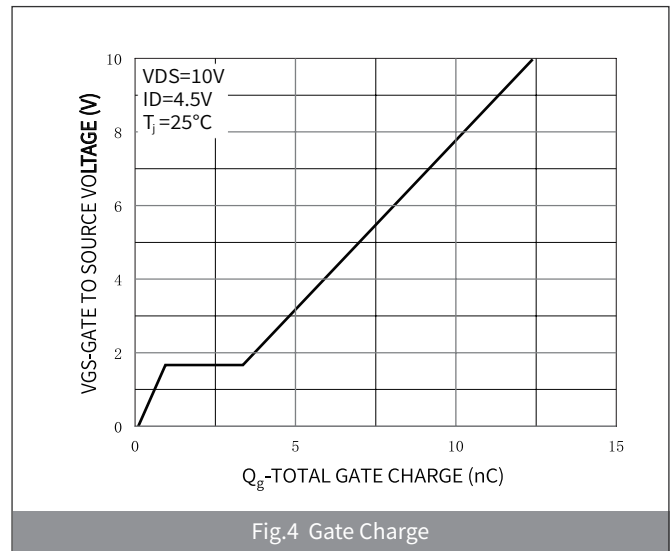
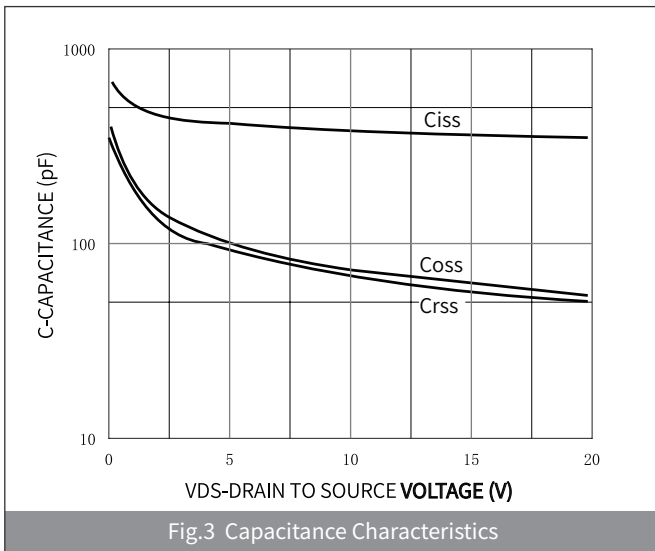
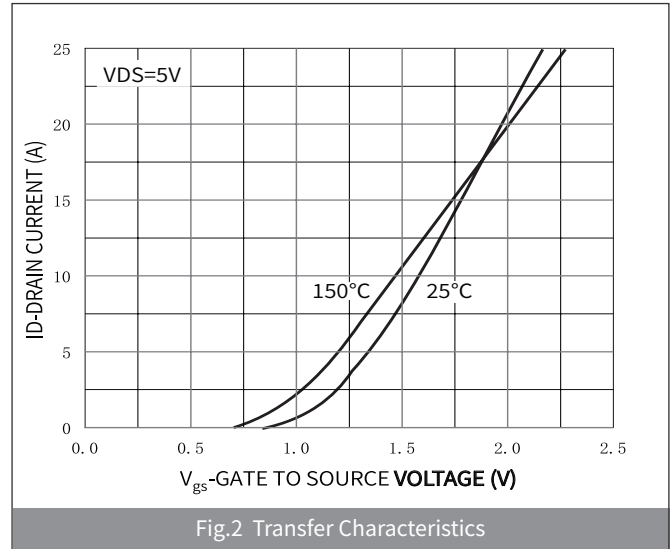
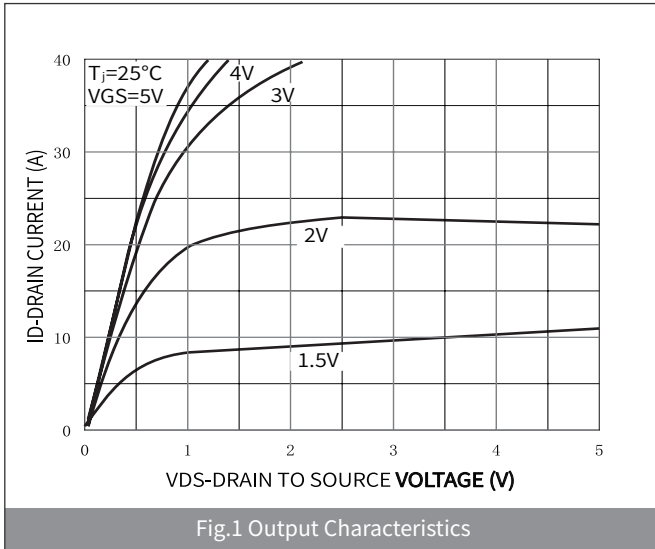
Dynamic Parameters (Ta=25°C Unless otherwise specified)

| PARAMETER | SYMBOL | Condition | UNIT | Min | Typ | Max |
|------------------------------|-----------|---------------------------------|------|-----|-----|-----|
| Input Capacitance | C_{iss} | $V_{DS}=10V, V_{GS}=0V, f=1MHz$ | pF | — | 418 | — |
| Output Capacitance | C_{oss} | | | — | 82 | — |
| Reverse Transfer Capacitance | C_{rss} | | | — | 70 | — |

Switching Parameters (Ta=25°C Unless otherwise specified)

| PARAMETER | SYMBOL | Condition | UNIT | Min | Typ | Max |
|-------------------------|--------------|--|------|-----|------|-----|
| Total Gate Charge | Q_g | $V_{GS}=4.5V, V_{DS}=10V, I_D=4.5A$ | nC | — | 6.06 | — |
| Gate-Source Charge | Q_{gs} | | | — | 1.07 | — |
| Gate-Drain Charge | Q_{gd} | | | — | 1.95 | — |
| Reverse Recovery Charge | Q_{rr} | $I_F=4.5A, di/dt=150A/\mu s$ | nC | — | 1.38 | — |
| Reverse Recovery Time | t_{rr} | | ns | — | 17.9 | — |
| Turn-on Delay Time | $t_{D(on)}$ | $V_{GS}=4.5V, V_{DS}=10V, I_D=4.5A$ $R_{GEN}=3\Omega$ | ns | — | 4.2 | — |
| Turn-on Rise Time | t_r | | | — | 19.8 | — |
| Turn-off Delay Time | $t_{D(off)}$ | | | — | 22.6 | — |
| Turn-off fall Time | t_f | | | — | 23.2 | — |

► Ratings And Characteristics Curves (Ta=25°C Unless otherwise specified)



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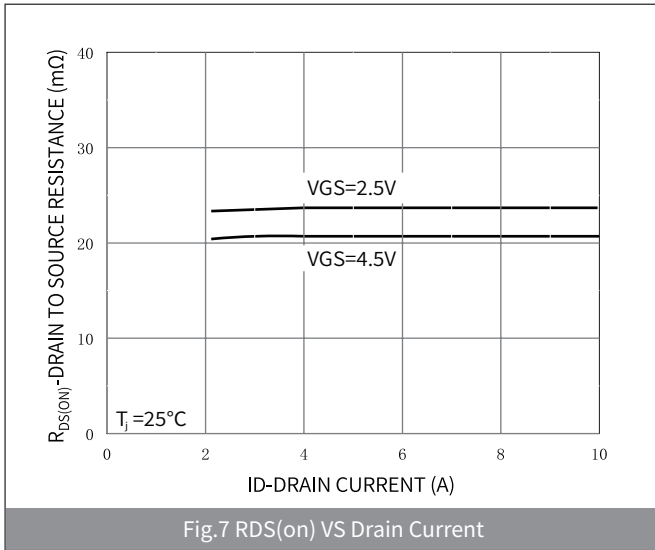


Fig.7 RDS(on) VS Drain Current

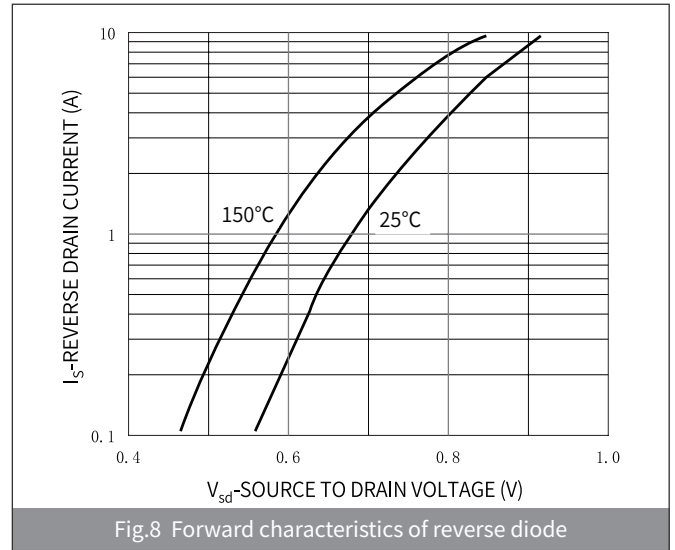


Fig.8 Forward characteristics of reverse diode

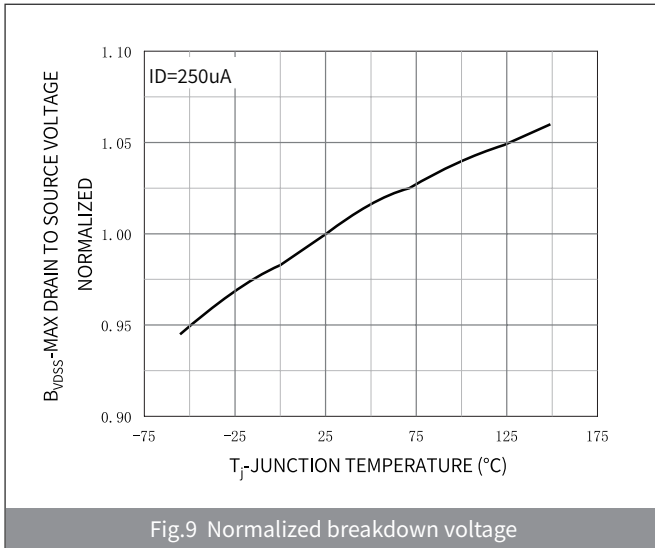


Fig.9 Normalized breakdown voltage

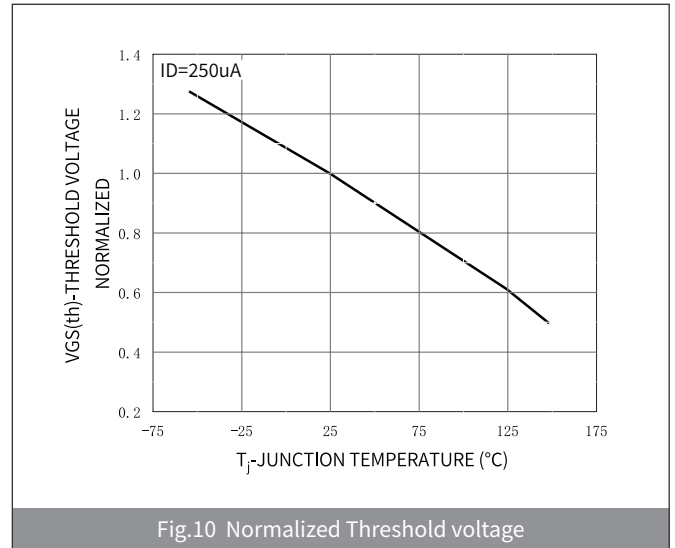


Fig.10 Normalized Threshold voltage

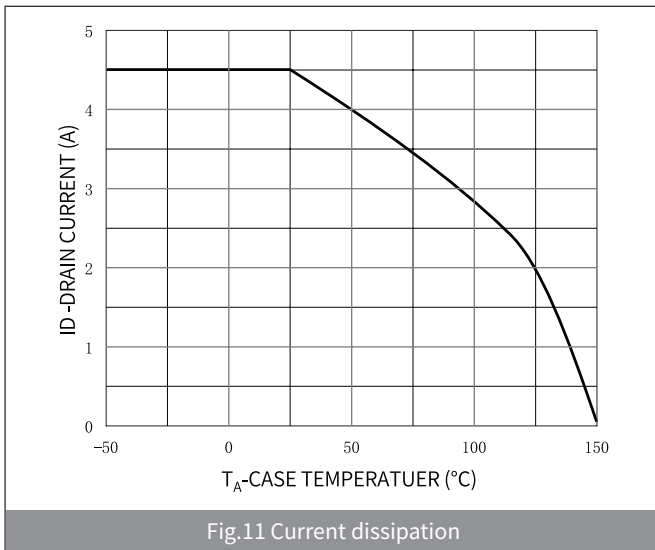


Fig.11 Current dissipation

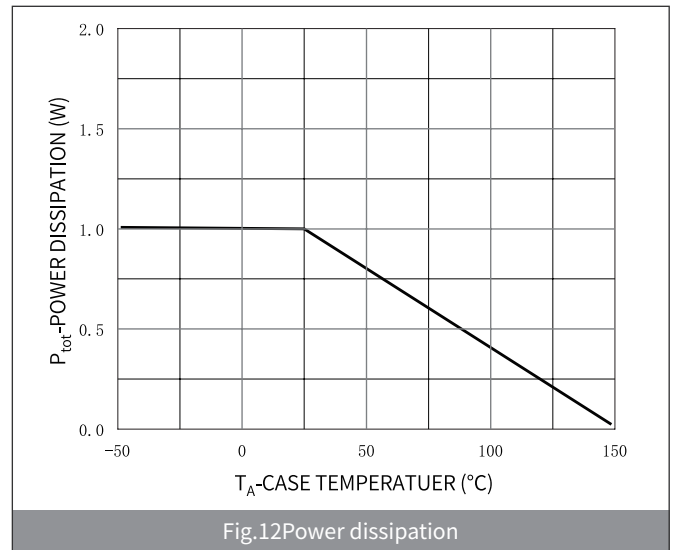
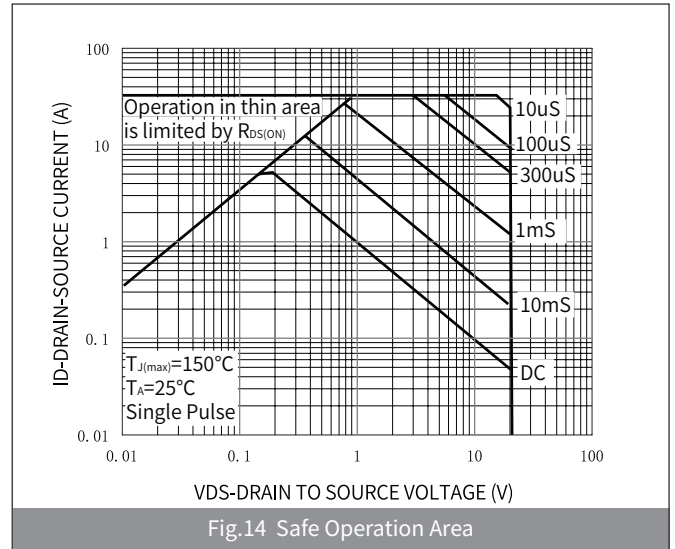
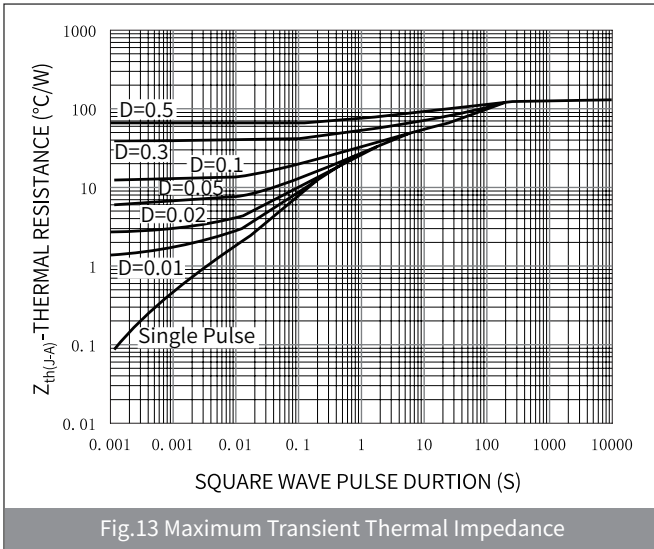
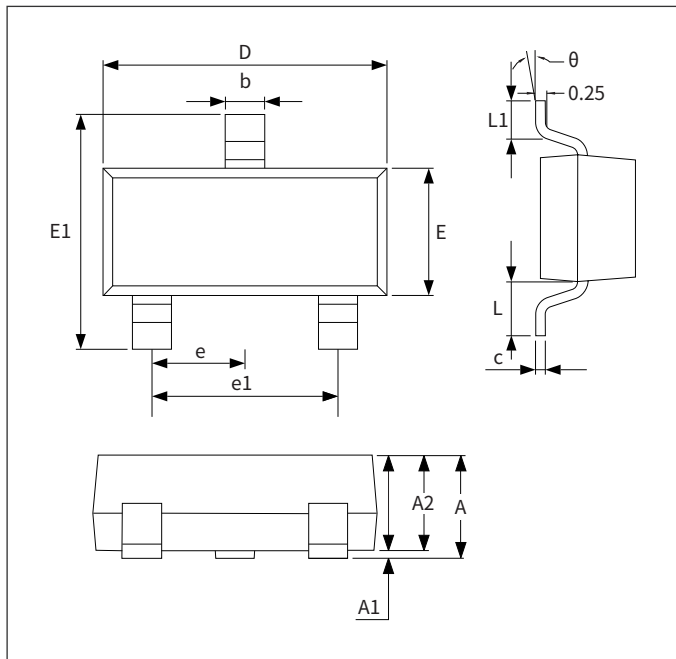


Fig.12 Power dissipation

▶ Ratings And Characteristics Curves (Ta=25°C Unless otherwise specified)

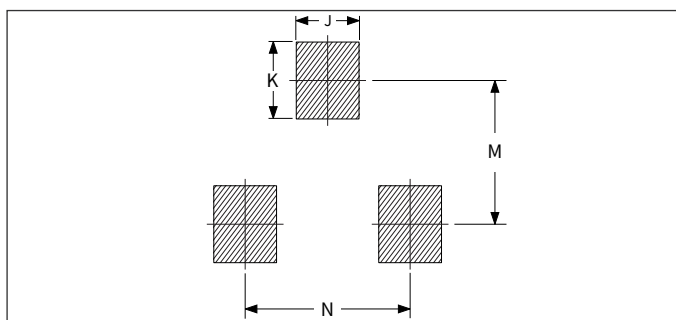


▶ Package Outline Dimensions (SOT-23)



| Symbol | Dimensions | | | |
|--------|-------------|------|----------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 0.90 | 1.15 | 0.035 | 0.045 |
| A1 | - | 0.10 | - | 0.004 |
| A2 | 0.90 | 1.05 | 0.035 | 0.041 |
| b | 0.30 | 0.50 | 0.012 | 0.020 |
| c | 0.10 | 0.20 | 0.004 | 0.008 |
| D | 2.80 | 3.00 | 0.110 | 0.118 |
| E | 1.20 | 1.40 | 0.047 | 0.055 |
| E1 | 2.25 | 2.55 | 0.089 | 0.100 |
| e | 0.950TYP | | 0.037TYP | |
| e1 | 1.80 | 2.00 | 0.071 | 0.079 |
| L | 0.550REF | | 0.022REF | |
| L1 | 0.30 | 0.50 | 0.012 | 0.020 |
| θ | - | 8° | - | 8° |

▶ Suggested Pad Layout



| Symbol | Dimensions | | | |
|--------|-------------|------|--------|-------|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| J | 0.80 | - | 0.031 | - |
| K | - | 0.90 | - | 0.035 |
| M | 2.00 | - | 0.078 | - |
| N | - | 1.90 | - | 0.074 |