

P-Channel 30-V (D-S) MOSFET

| PRODUCT SUMMARY | | | |
|-----------------|-----------------------------|---------------------------|--------------|
| V_{DS} (V) | $R_{DS(on)}$ (Ω) | I_D (A) ^{a, e} | Q_g (Typ.) |
| - 30 | 0.045 at $V_{GS} = - 10$ V | - 5.9 | 7 nC |
| | 0.075 at $V_{GS} = - 4.5$ V | - 4.6 | |

FEATURES

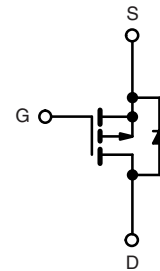
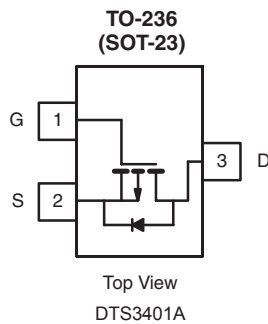
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Load Switch
- Notebook Adaptor Switch
- DC/DC Converter



Ordering Information: Si2343CDS-T1-GE3 (Lead (Pb)-free and Halogen-free)

P-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted | | | | |
|--|----------------|---------------|-----------------------|---|
| Parameter | Symbol | Limit | Unit | |
| Drain-Source Voltage | V_{DS} | - 30 | V | |
| Gate-Source Voltage | V_{GS} | ± 20 | | |
| Continuous Drain Current ($T_J = 150$ °C) | I_D | $T_C = 25$ °C | - 5.9 | A |
| | | $T_C = 70$ °C | - 4.7 | |
| | | $T_A = 25$ °C | - 4.2 ^{b, c} | |
| | | $T_A = 70$ °C | - 3.3 ^{b, c} | |
| Pulsed Drain Current | I_{DM} | - 25 | | |
| Continous Source-Drain Diode Current | I_S | $T_C = 25$ °C | - 2.1 | A |
| | | $T_A = 25$ °C | - 1 ^{b, c} | |
| Maximum Power Dissipation | P_D | $T_C = 25$ °C | 2.5 | W |
| | | $T_C = 70$ °C | 1.6 | |
| | | $T_A = 25$ °C | 1.25 ^{b, c} | |
| | | $T_A = 70$ °C | 0.8 ^{b, c} | |
| Operating Junction and Storage Temperature Range | T_J, T_{stg} | - 55 to 150 | °C | |

| THERMAL RESISTANCE RATINGS | | | | | |
|---|------------|---------|---------|------|--|
| Parameter | Symbol | Typical | Maximum | Unit | |
| Maximum Junction-to-Ambient ^{b, d} | R_{thJA} | 75 | 100 | °C/W | |
| Maximum Junction-to-Foot (Drain) | R_{thJF} | 40 | 50 | | |

Notes:

- Based on $T_C = 25$ °C.
- Surface Mounted on 1" x 1" FR4 board.
- $t = 5$ s.
- Maximum under Steady State conditions is 166 °C/W.
- Package Limited.

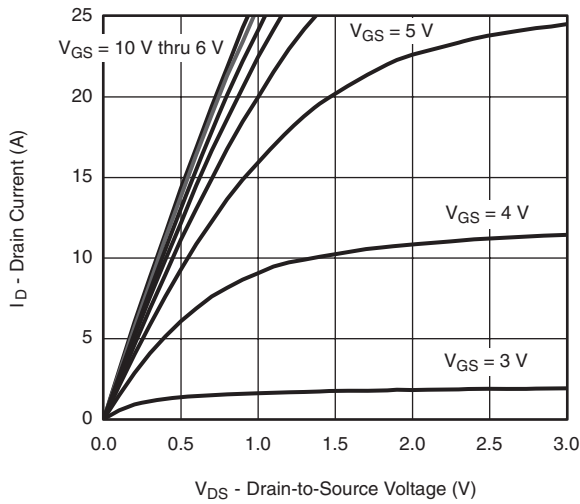
| SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted | | | | | | |
|--|-------------------------|---|------|-------|-----------|----------------------|
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V_{DS} | $V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$ | -30 | | | V |
| V_{DS} Temperature Coefficient | $\Delta V_{DS}/T_J$ | $I_D = -250\text{ }\mu\text{A}$ | | -19 | | mV/ $^\circ\text{C}$ |
| $V_{GS(th)}$ Temperature Coefficient | $\Delta V_{GS(th)}/T_J$ | | | 4.4 | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$ | -1.2 | | -2.5 | V |
| Gate-Source Leakage | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$ | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$ | | | -1 | μA |
| | | $V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$ | | | -5 | |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} \leq -5\text{ V}, V_{GS} = -10\text{ V}$ | -25 | | | A |
| Drain-Source On-State Resistance ^a | $R_{DS(on)}$ | $V_{GS} = -10\text{ V}, I_D = -4.2\text{ A}$ | | 0.037 | 0.045 | Ω |
| | | $V_{GS} = -4.5\text{ V}, I_D = -3.2\text{ A}$ | | 0.062 | 0.075 | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = -15\text{ V}, I_D = -4.2\text{ A}$ | | 10 | | S |
| Dynamic^b | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = -15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ | | 590 | | pF |
| Output Capacitance | C_{oss} | | | 115 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 93 | | |
| Total Gate Charge | Q_g | $V_{DS} = -15\text{ V}, V_{GS} = -10\text{ V}, I_D = -4.2\text{ A}$ | | 13.6 | 21 | nC |
| | | $V_{DS} = -15\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -4.2\text{ A}$ | | 7 | 11 | |
| Gate-Source Charge | Q_{gs} | $V_{DS} = -15\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -4.2\text{ A}$ | | 2.3 | | |
| Gate-Drain Charge | Q_{gd} | | | 3.2 | | |
| Gate Resistance | R_g | $f = 1\text{ MHz}$ | 1 | 5 | 10 | Ω |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD} = -15\text{ V}, R_L = 4.5\text{ }\Omega$ $I_D \cong -3.3\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$ | | 30 | 45 | ns |
| Rise Time | t_r | | | 25 | 38 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 16 | 24 | |
| Fall Time | t_f | | | 8 | 16 | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD} = -15\text{ V}, R_L = 4.5\text{ }\Omega$ $I_D \cong -3.3\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$ | | 8 | 16 | |
| Rise Time | t_r | | | 10 | 20 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 18 | 27 | |
| Fall Time | t_f | | | 8 | 16 | |
| Drain-Source Body Diode Characteristics | | | | | | |
| Continuous Source-Drain Diode Current | I_S | $T_C = 25\text{ }^\circ\text{C}$ | | | -4.2 | A |
| Pulse Diode Forward Current | I_{SM} | | | | -25 | |
| Body Diode Voltage | V_{SD} | $I_S = -3.3\text{ A}, V_{GS} = 0\text{ V}$ | | -0.8 | -1.2 | V |
| Body Diode Reverse Recovery Time | t_{rr} | $I_F = -3.3\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$ | | 17 | 26 | ns |
| Body Diode Reverse Recovery Charge | Q_{rr} | | | 9 | 18 | nC |
| Reverse Recovery Fall Time | t_a | | | 10 | | ns |
| Reverse Recovery Rise Time | t_b | | | 7 | | |

Notes:

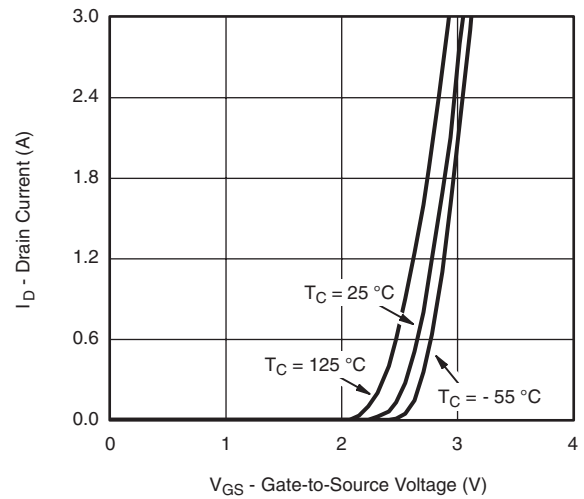
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

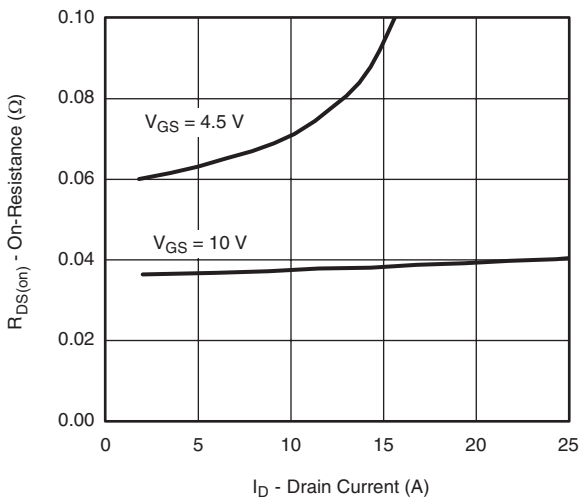
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



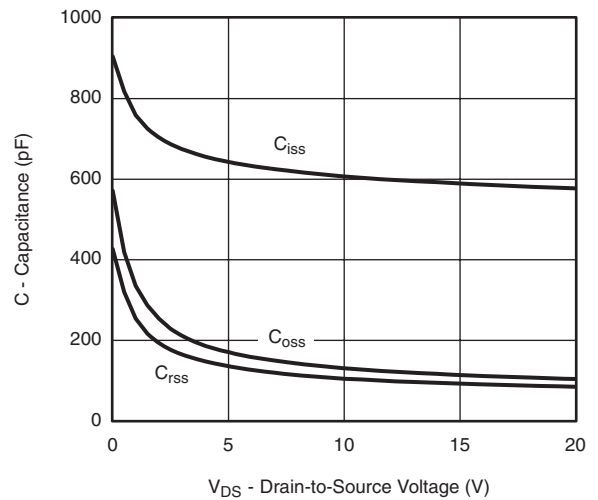
Output Characteristics



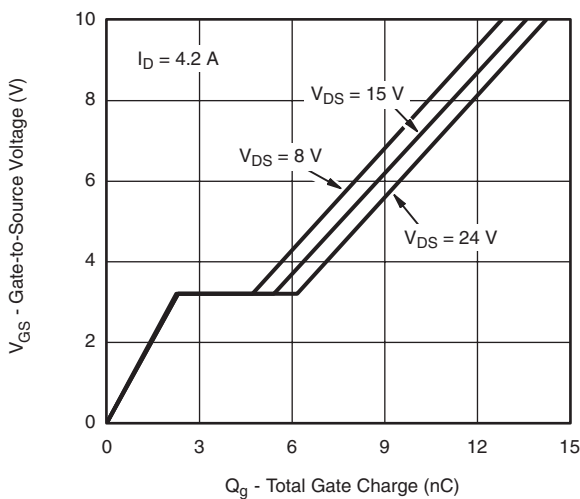
Transfer Characteristics



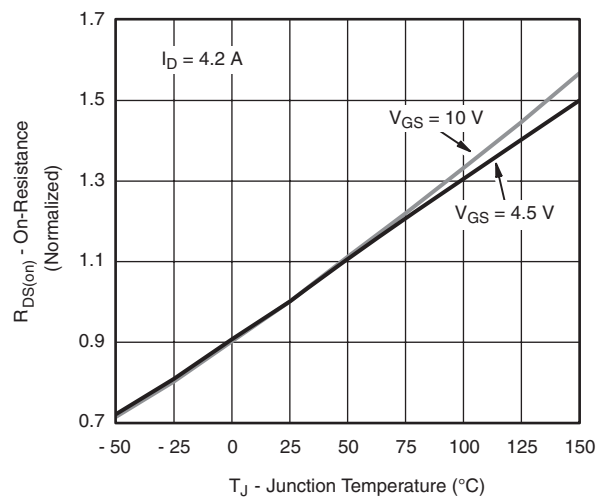
On-Resistance vs. Drain Current



Capacitance

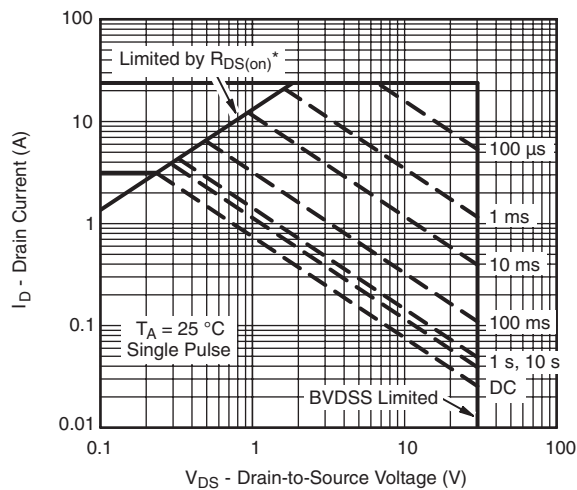
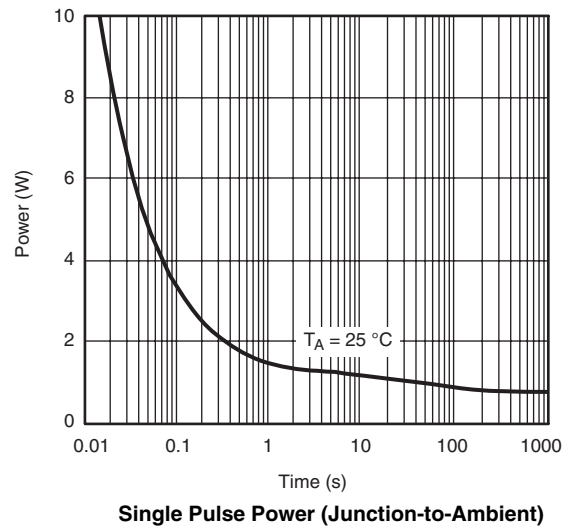
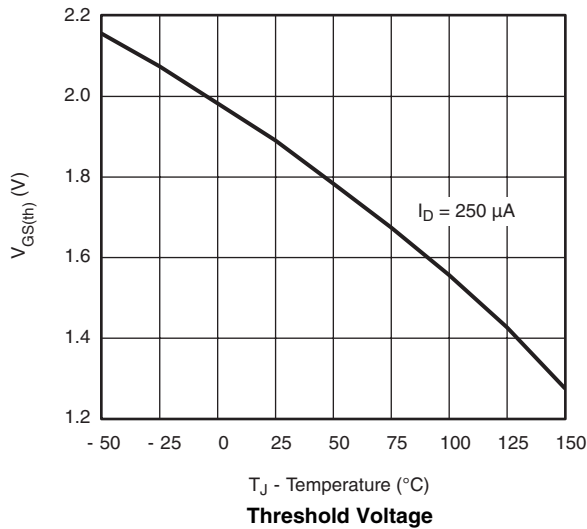
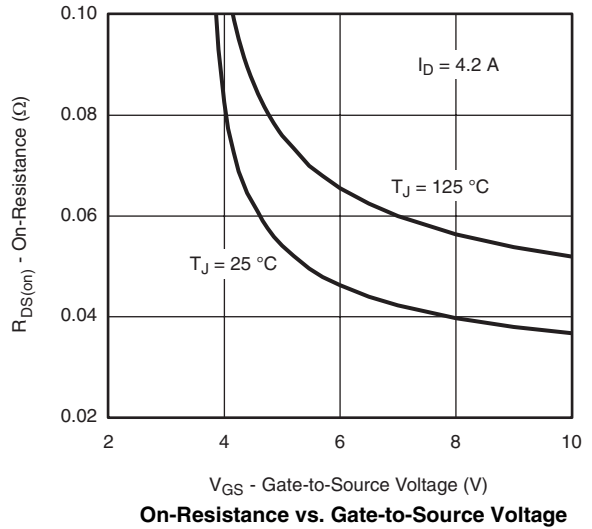
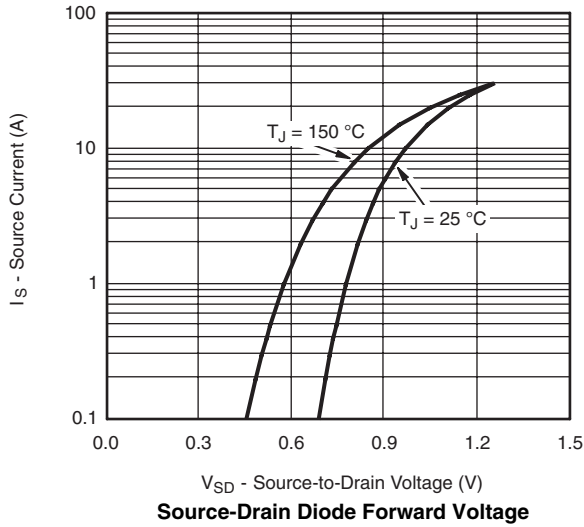


Gate Charge



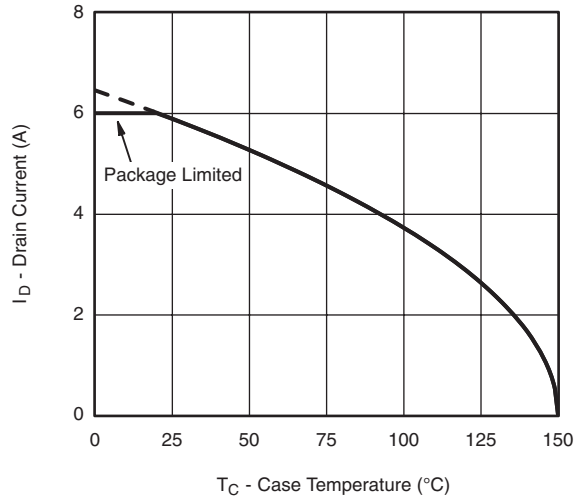
On-Resistance vs. Junction Temperature

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

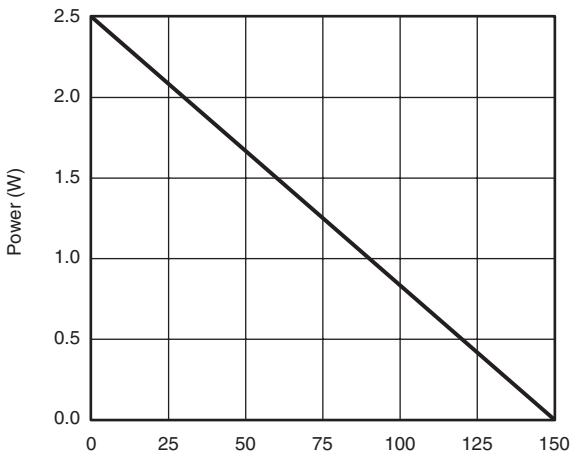


* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

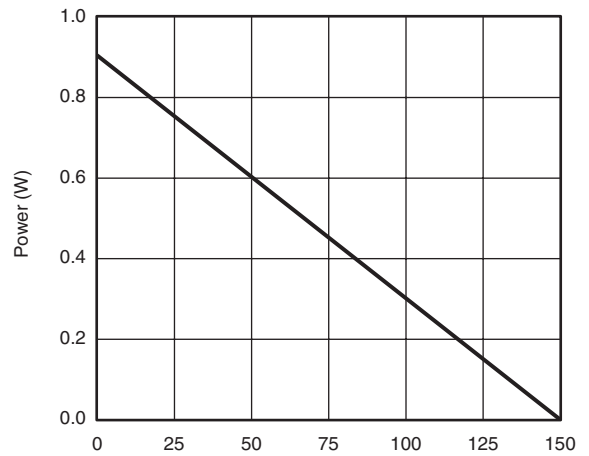
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*



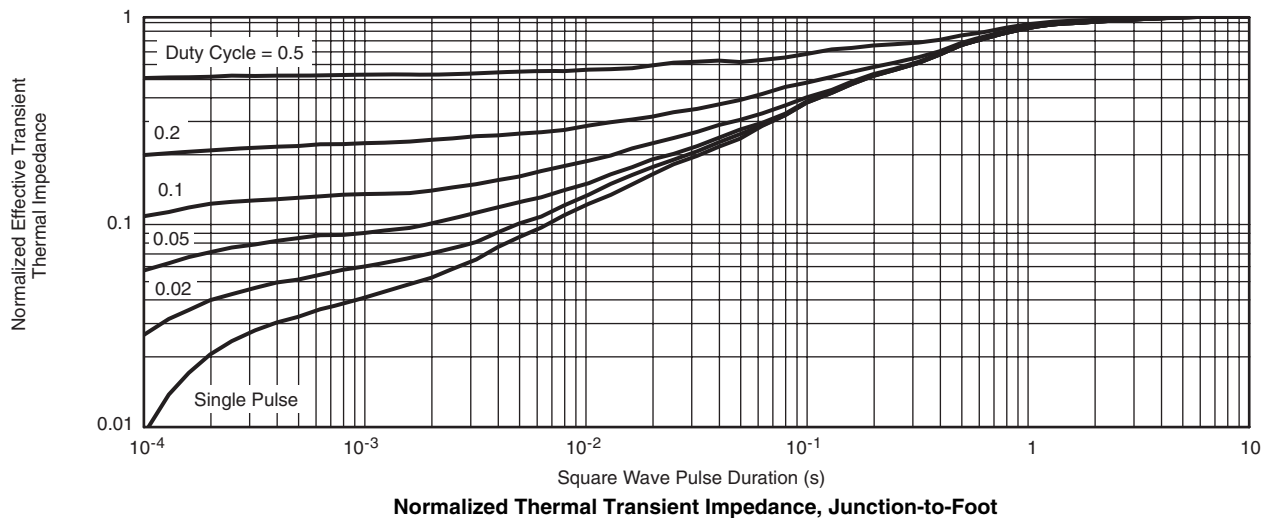
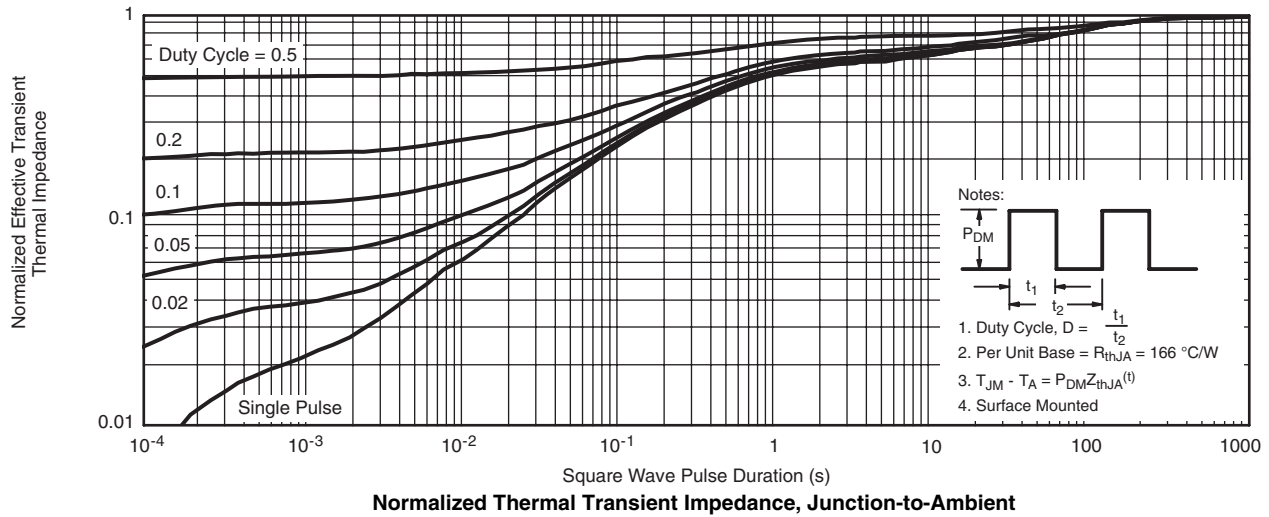
Power, Junction-to-Foot



Power, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

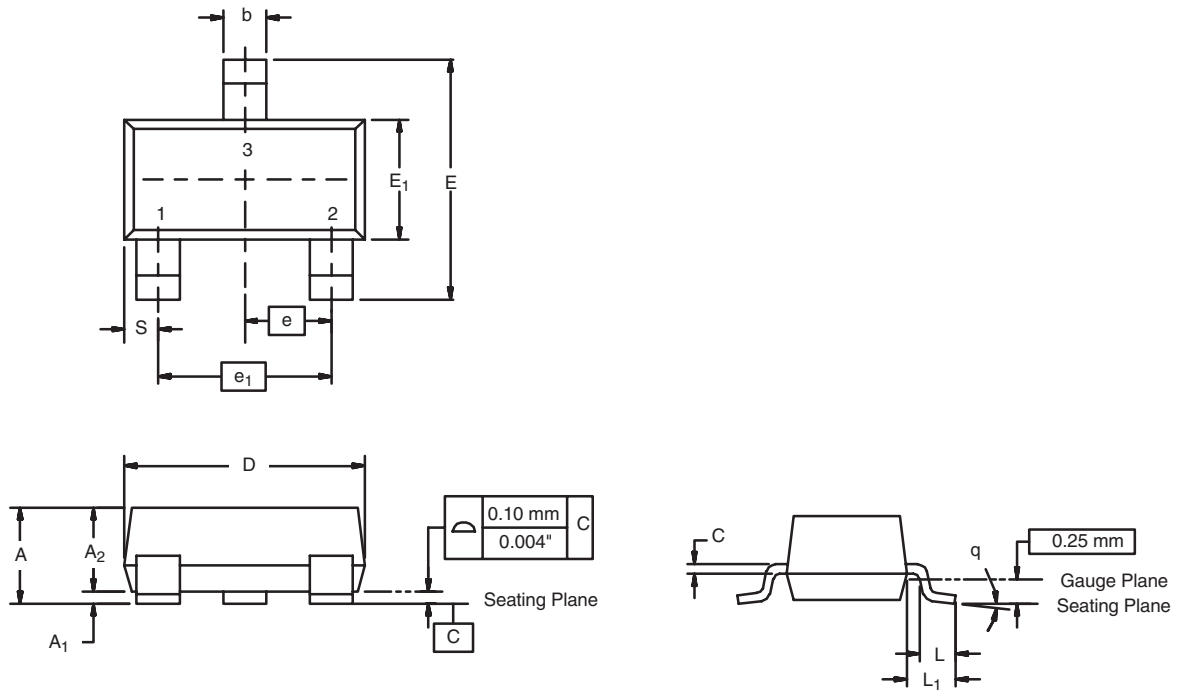
THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient ($25\text{ }^\circ\text{C}$)
 - Normalized Transient Thermal Impedance Junction-to-Foot ($25\text{ }^\circ\text{C}$)
 are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

SOT-23 (TO-236): 3-LEAD



| Dim | MILLIMETERS | | INCHES | |
|----------------|-------------|------|------------|-------|
| | Min | Max | Min | Max |
| A | 0.89 | 1.12 | 0.035 | 0.044 |
| A ₁ | 0.01 | 0.10 | 0.0004 | 0.004 |
| A ₂ | 0.88 | 1.02 | 0.0346 | 0.040 |
| b | 0.35 | 0.50 | 0.014 | 0.020 |
| c | 0.085 | 0.18 | 0.003 | 0.007 |
| D | 2.80 | 3.04 | 0.110 | 0.120 |
| E | 2.10 | 2.64 | 0.083 | 0.104 |
| E ₁ | 1.20 | 1.40 | 0.047 | 0.055 |
| e | 0.95 BSC | | 0.0374 Ref | |
| e ₁ | 1.90 BSC | | 0.0748 Ref | |
| L | 0.40 | 0.60 | 0.016 | 0.024 |
| L ₁ | 0.64 Ref | | 0.025 Ref | |
| S | 0.50 Ref | | 0.020 Ref | |
| q | 3° | 8° | 3° | 8° |

ECN: S-03946-Rev. K, 09-Jul-01
 DWG: 5479

RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads
Dimensions in Inches/(mm)

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