

P-Channel 40-V (D-S) MOSFET

| PRODUCT SUMMARY | | |
|-----------------|-----------------------------|------------------------|
| V_{DS} (V) | $R_{DS(on)}$ (Ω) | I_D (A) ^b |
| - 40 | 0.082 at $V_{GS} = - 10$ V | - 3.0 |
| | 0.130 at $V_{GS} = - 4.5$ V | - 2.4 |

FEATURES

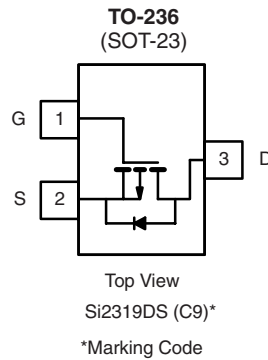
- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET[®] Power MOSFET

APPLICATIONS

- Load Switch



RoHS
COMPLIANT
HALOGEN
FREE
Available



Ordering Information: Si2319DS-T1-E3 (Lead (Pb)-free)
Si2319DS-T1-GE3 (Lead (Pb)-free and Halogen-free)

| ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted | | | | | |
|--|---------------|----------------|-------------|--------------|------|
| Parameter | | Symbol | 5 s | Steady State | Unit |
| Drain-Source Voltage | | V_{DS} | - 40 | | V |
| Gate-Source Voltage | | V_{GS} | ± 20 | | |
| Continuous Drain Current ($T_J = 150$ °C) ^b | $T_A = 25$ °C | I_D | - 3.0 | - 2.3 | A |
| | $T_A = 70$ °C | | - 2.4 | - 1.85 | |
| Pulsed Drain Current ^a | | I_{DM} | - 12 | | |
| Continuous Source Current (Diode Conduction) ^b | | I_S | - 1.0 | - 0.62 | |
| Power Dissipation ^b | $T_A = 25$ °C | P_D | 1.25 | 0.75 | W |
| | $T_A = 70$ °C | | 0.8 | 0.48 | |
| 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 | R_{thJA} | 75 | 100 | °C/W |
| Maximum Junction-to-Ambient ^c | | 120 | 166 | |
| Maximum Junction-to-Foot (Drain) | R_{thJF} | 40 | 50 | |

Notes:

- Pulse width limited by maximum junction temperature.
- Surface mounted on FR4 board, $t \leq 5$ s.
- Surface Mounted on FR4 board.

For Spice model information via the worldwide web: www.vishay.com/www/product/spice.htm.

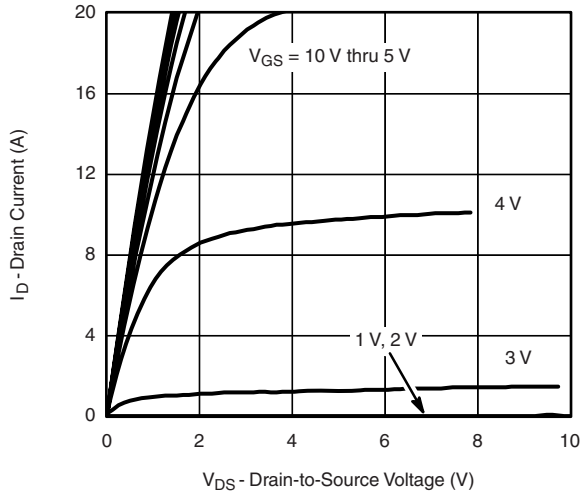
| SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted | | | | | | |
|--|--------------|--|--------|-------|-----------|---------------|
| Parameter | Symbol | Test Conditions | Limits | | | Unit |
| | | | Min. | Typ. | Max. | |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V_{DS} | $V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$ | - 40 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$ | - 1 | | - 3.0 | |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$ | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = -40\text{ V}, V_{GS} = 0\text{ V}$ | | | - 1 | μA |
| | | $V_{DS} = -40\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$ | | | - 10 | |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} \leq -5\text{ V}, V_{GS} = -10\text{ V}$ | - 6 | | | A |
| Drain-Source On-State Resistance ^a | $R_{DS(on)}$ | $V_{GS} = -10\text{ V}, I_D = -3.0\text{ A}$ | | 0.065 | 0.082 | Ω |
| | | $V_{GS} = -4.5\text{ V}, I_D = -2.4\text{ A}$ | | 0.100 | 0.130 | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = -5\text{ V}, I_D = -3.0\text{ A}$ | | 7.0 | | S |
| Diode Forward Voltage ^a | V_{SD} | $I_S = -1.25\text{ A}, V_{GS} = 0\text{ V}$ | | - 0.8 | - 1.2 | V |
| Dynamic^b | | | | | | |
| Total Gate Charge | Q_g | $V_{DS} = -20\text{ V}, V_{GS} = -10\text{ V}$ $I_D \cong -3\text{ A}$ | | 11.3 | 17 | nC |
| Gate-Source Charge | Q_{gs} | | | 1.7 | | |
| Gate-Drain Charge | Q_{gd} | | | 3.3 | | |
| Input Capacitance | C_{iss} | $V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ | | 470 | | pF |
| Output Capacitance | C_{oss} | | | 85 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 65 | | |
| Switching^c | | | | | | |
| Turn-On Time | $t_{d(on)}$ | $V_{DD} = -20\text{ V}, R_L = 20\text{ }\Omega$ $I_D \cong -1.0\text{ A}, V_{GEN} = -4.5\text{ V}$ $R_g = 6\text{ }\Omega$ | | 7 | 15 | ns |
| | t_r | | | 15 | 25 | |
| Turn-Off Time | $t_{d(off)}$ | | | 25 | 40 | |
| | t_f | | | 25 | 40 | |

Notes:

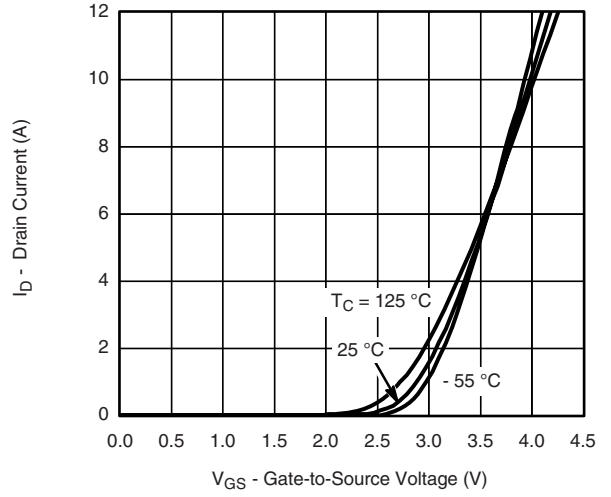
- a. Pulse test: $PW \leq 300\text{ }\mu\text{s}$ duty cycle $\leq 2\%$.
b. For design aid only, not subject to production testing.
c. Switching time is essentially independent of operating temperature.

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.

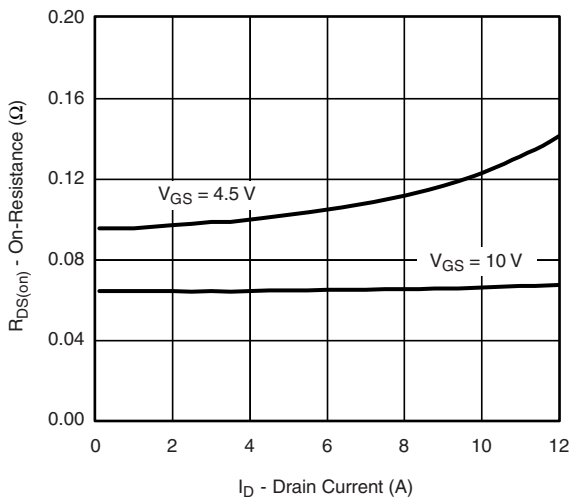
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



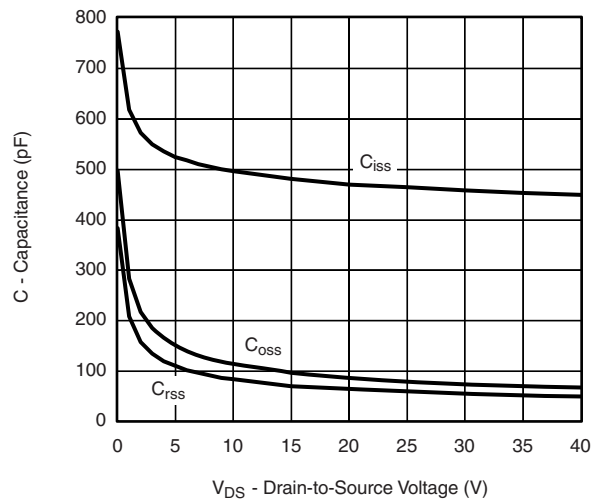
Output Characteristics



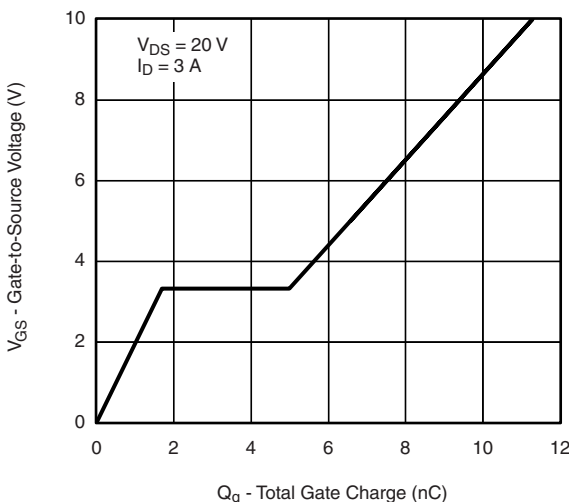
Transfer Characteristics



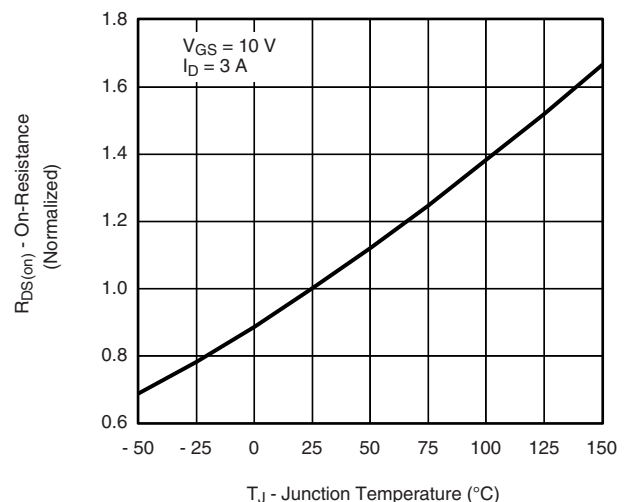
On-Resistance vs. Drain Current



Capacitance

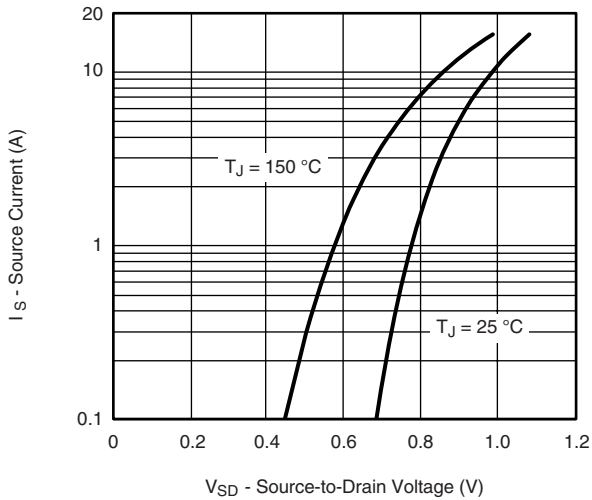


Gate Charge

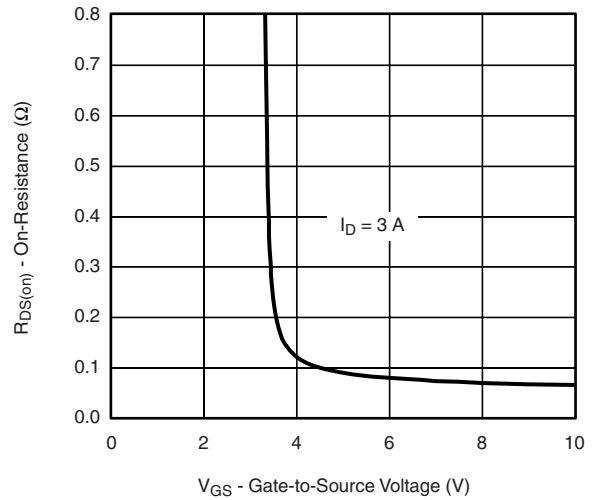


On-Resistance vs. Junction Temperature

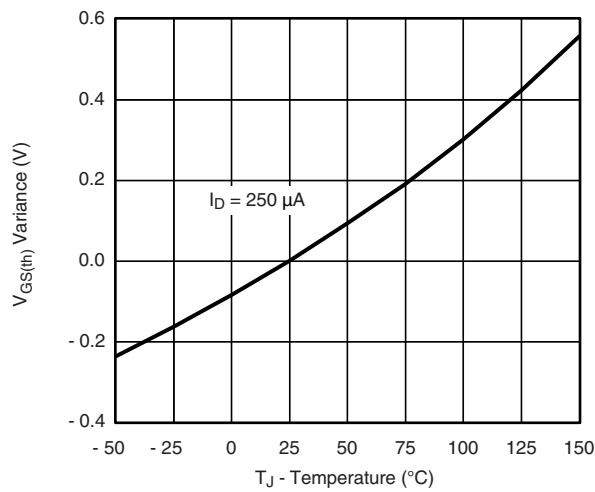
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



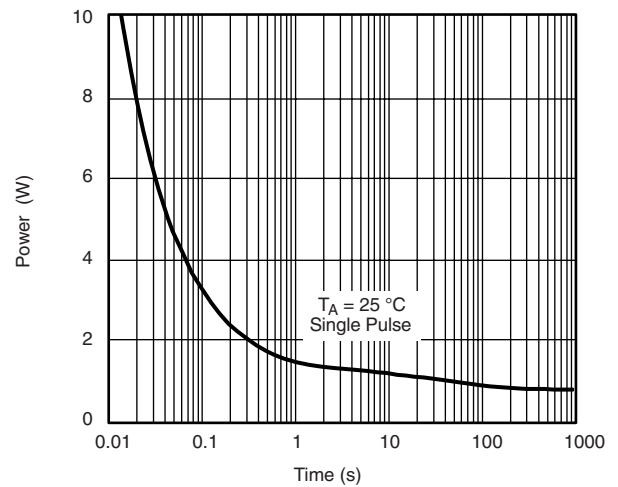
Source-Drain Diode Forward Voltage



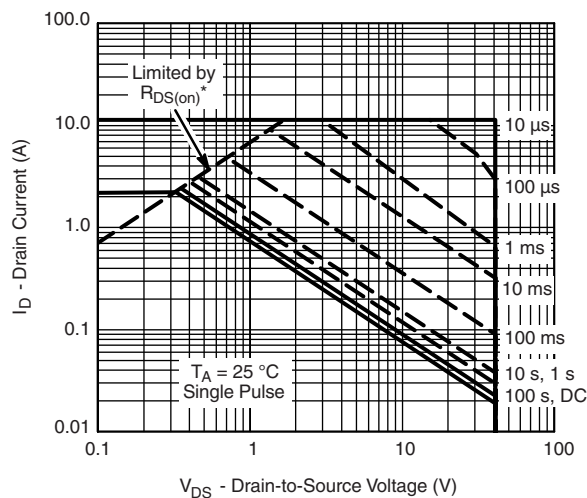
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



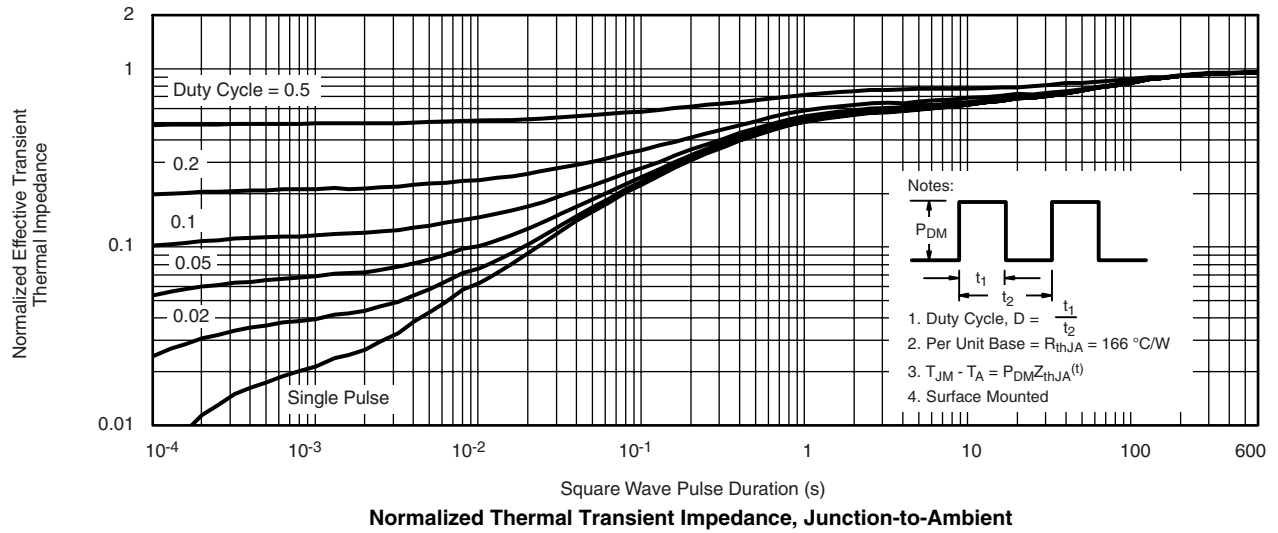
Single Pulse Power



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

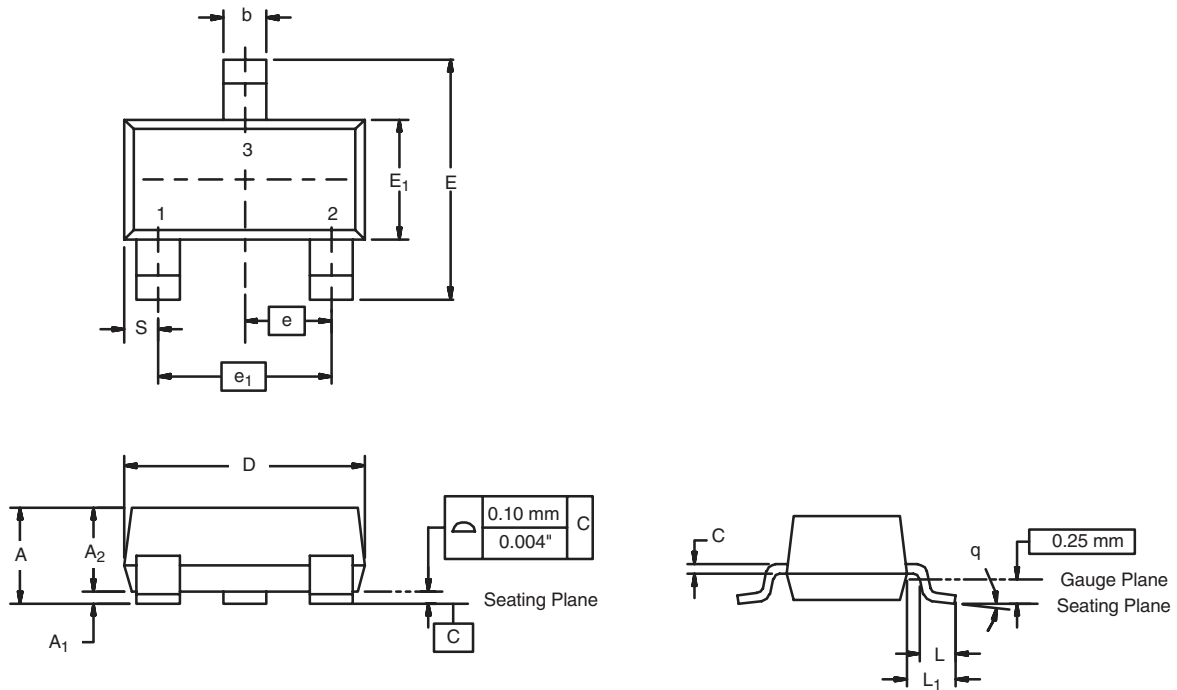
Safe Operating Area, Junction-to-Case

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see www.vishay.com/ppg?72315.

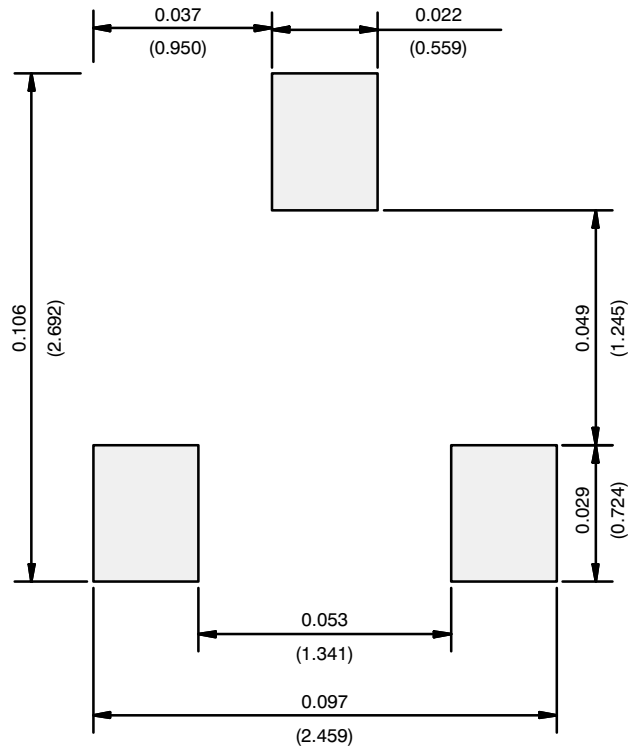
SOT-23 (TO-236): 3-LEAD



| 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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