

P-Channel 1.8 V (G-S) MOSFET

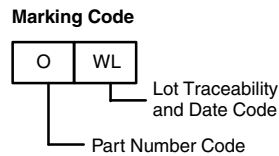
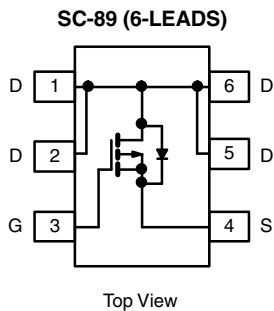
| PRODUCT SUMMARY | | |
|-----------------|-----------------------------|-----------|
| V_{DS} (V) | $R_{DS(on)}$ (Ω) | I_D (A) |
| - 12 | 0.165 at $V_{GS} = - 4.5$ V | - 0.95 |
| | 0.220 at $V_{GS} = - 2.5$ V | - 0.82 |
| | 0.280 at $V_{GS} = - 1.8$ V | - 0.67 |

FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- Low Threshold
- Smallest LITTLE FOOT[®] Package: 1.6 mm x 1.6 mm
- Low 0.6 mm Profile
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE



APPLICATIONS

- Cell Phones and Pagers
- Load Switch

Ordering Information: Si1039X-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} | - 12 | | V | |
| Gate-Source Voltage | V_{GS} | ± 8 | | | |
| Continuous Drain Current ($T_J = 150$ °C) ^a | I_D | $T_A = 25$ °C | - 0.95 | - 0.87 | A |
| | | $T_A = 70$ °C | - 0.76 | - 0.69 | |
| Pulsed Drain Current | I_{DM} | - 4 | | | |
| Continuous Diode Current (Diode Conduction) ^a | I_S | - 0.18 | - 0.14 | | |
| Maximum Power Dissipation ^a | P_D | $T_A = 25$ °C | 0.21 | 0.17 | W |
| | | $T_A = 70$ °C | 0.13 | 0.10 | |
| 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 ^a | R_{thJA} | $t \leq 5$ s | 500 | 600 | °C/W |
| | | Steady State | 600 | 720 | |

Notes:

a. Surface mounted on 1" x 1" FR4 board with minimum copper.



| SPECIFICATIONS (T _J = 25 °C, unless otherwise noted) | | | | | | |
|---|---------------------|--|---|--------|-------|------|
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
| Static | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = - 250 μA | - 0.45 | | | V |
| Gate-Body Leakage | I _{GSS} | V _{DS} = 0 V, V _{GS} = ± 8 V | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = - 12 V, V _{GS} = 0 V | | | - 1 | μA |
| | | V _{DS} = - 12 V, V _{GS} = 0 V, T _J = 70 °C | | | - 5 | |
| On-State Drain Current ^a | I _{D(on)} | V _{DS} = - 5 V, V _{GS} = - 4.5 V | - 4 | | | A |
| Drain-Source On-State Resistance ^a | R _{DS(on)} | V _{GS} = - 4.5 V, I _D = - 0.87 A | | 0.140 | 0.165 | Ω |
| | | V _{GS} = - 2.5 V, I _D = - 0.75 A | | 0.180 | 0.220 | |
| | | V _{GS} = - 1.8 V, I _D = - 0.2 A | | 0.230 | 0.280 | |
| Forward Transconductance ^a | g _{fs} | V _{DS} = - 10 V, I _D = - 0.87 A | | 3.5 | | S |
| Diode Forward Voltage ^a | V _{SD} | I _S = - 0.14 A, V _{GS} = 0 V | | - 0.78 | - 1.2 | V |
| Dynamic^b | | | | | | |
| Total Gate Charge | Q _g | V _{DS} = - 6 V, V _{GS} = - 4.5 V, I _D = - 0.87 A | | 3.8 | 6 | nC |
| Gate-Source Charge | Q _{gs} | | | 0.7 | | |
| Gate-Drain Charge | Q _{gd} | | | 0.8 | | |
| Turn-On Delay Time | t _{d(on)} | V _{DD} = - 6 V, R _L = 12 Ω I _D ≅ - 0.5 A, V _{GEN} = - 4.5 V, R _g = 6 Ω | | 15 | 30 | ns |
| Rise Time | t _r | | | 20 | 40 | |
| Turn-Off Delay Time | t _{d(off)} | | | 30 | 60 | |
| Fall Time | t _f | | | 16 | 30 | |
| Source-Drain Reverse Recovery Time | t _{rr} | | I _F = - 0.14 A, dI/dt = 100 A/μs | | 20 | |

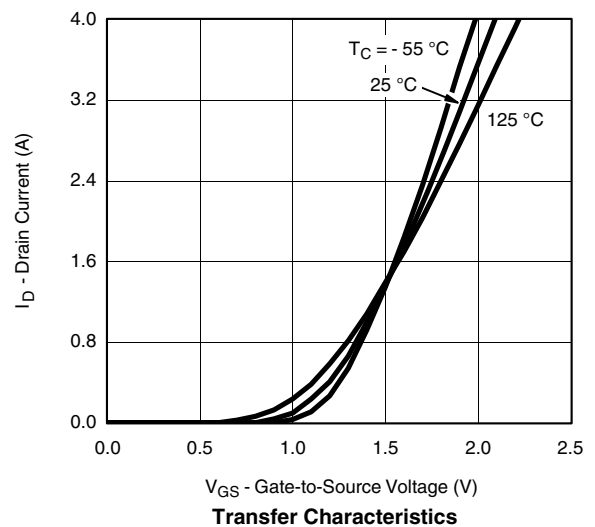
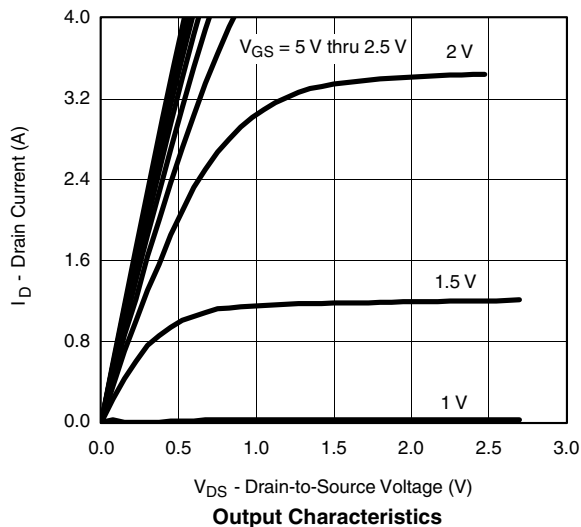
Notes:

a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.

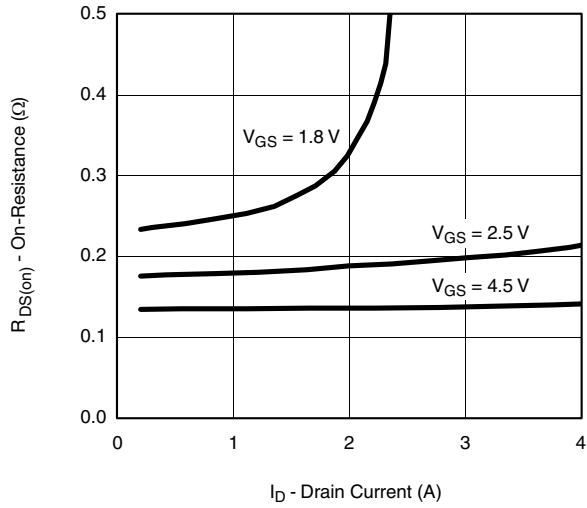
b. Guaranteed by design, not subject to production testing.

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.

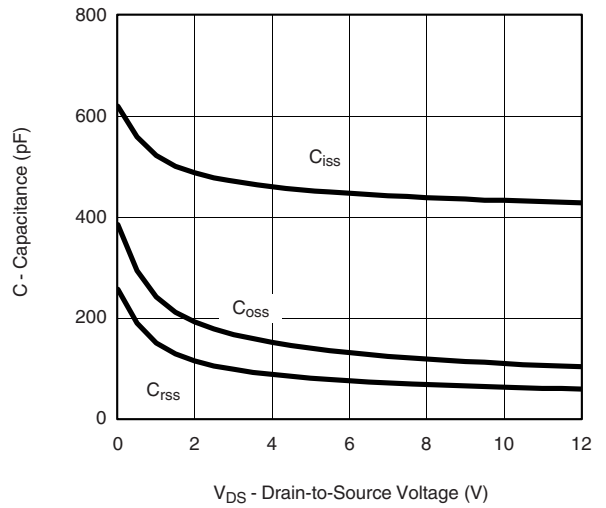
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



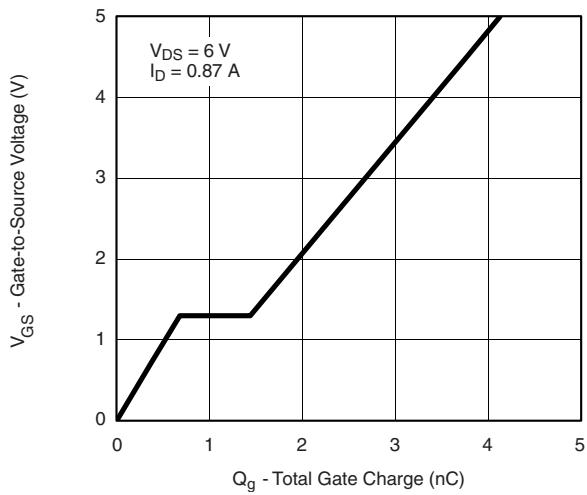
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



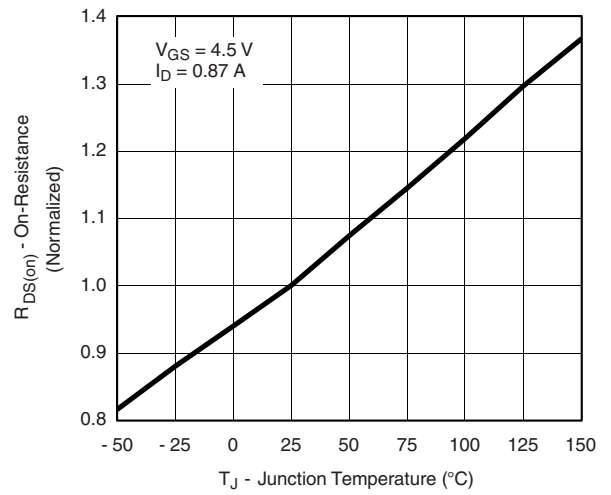
On-Resistance vs. Drain Current



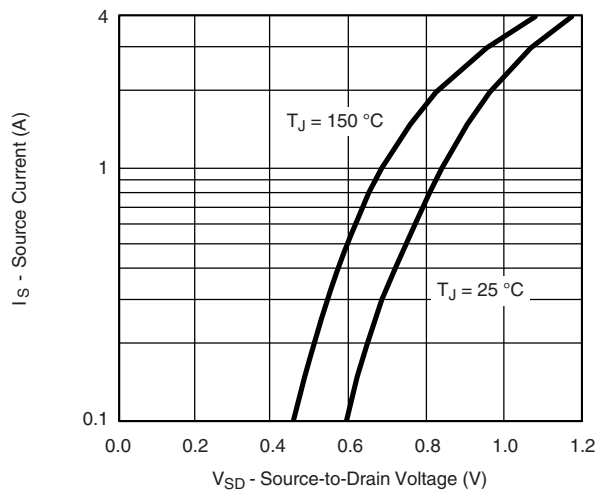
Capacitance



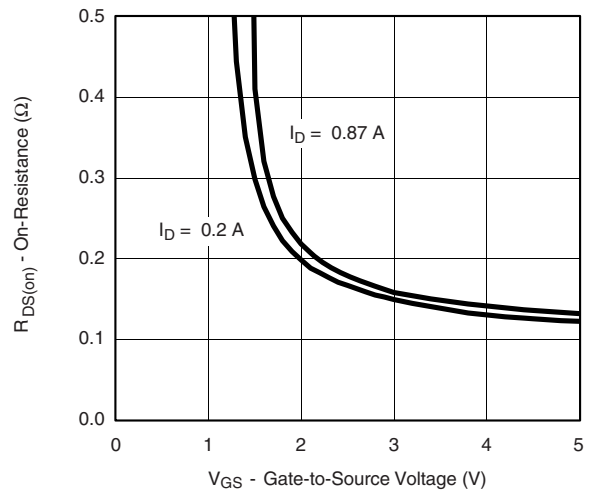
Gate Charge



On-Resistance vs. Junction Temperature

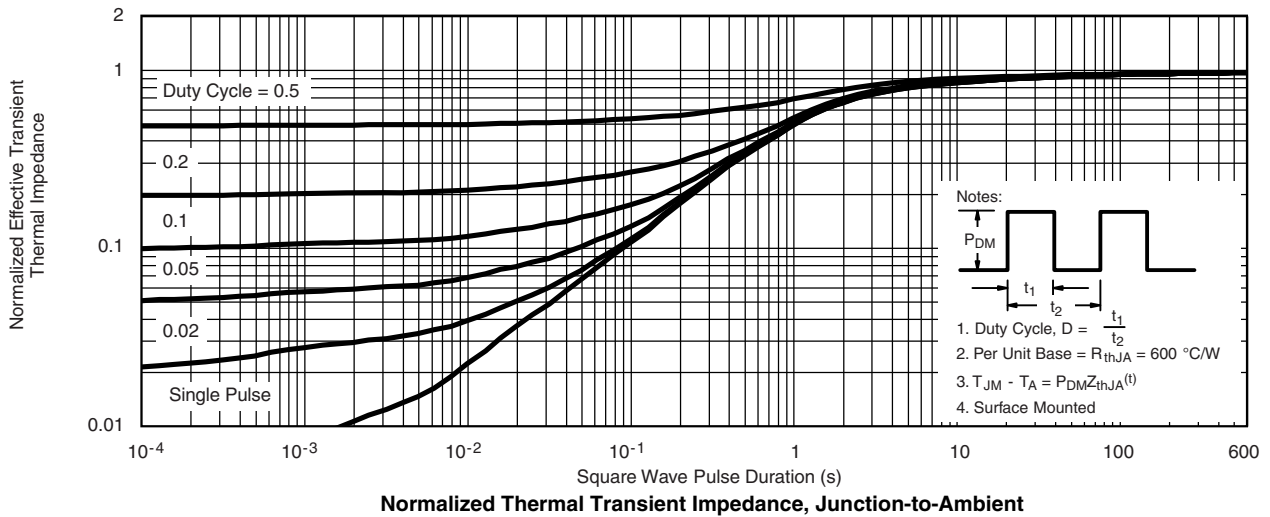
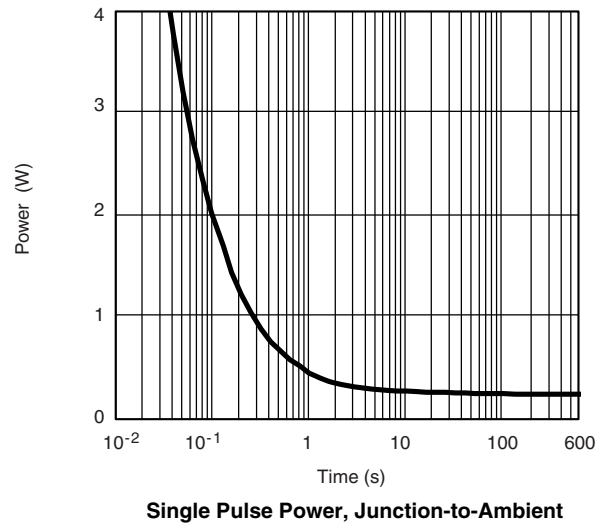
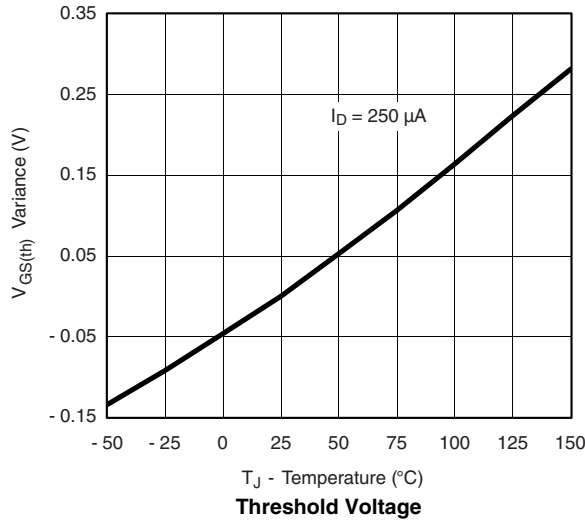


Source-Drain Diode Forward Voltage



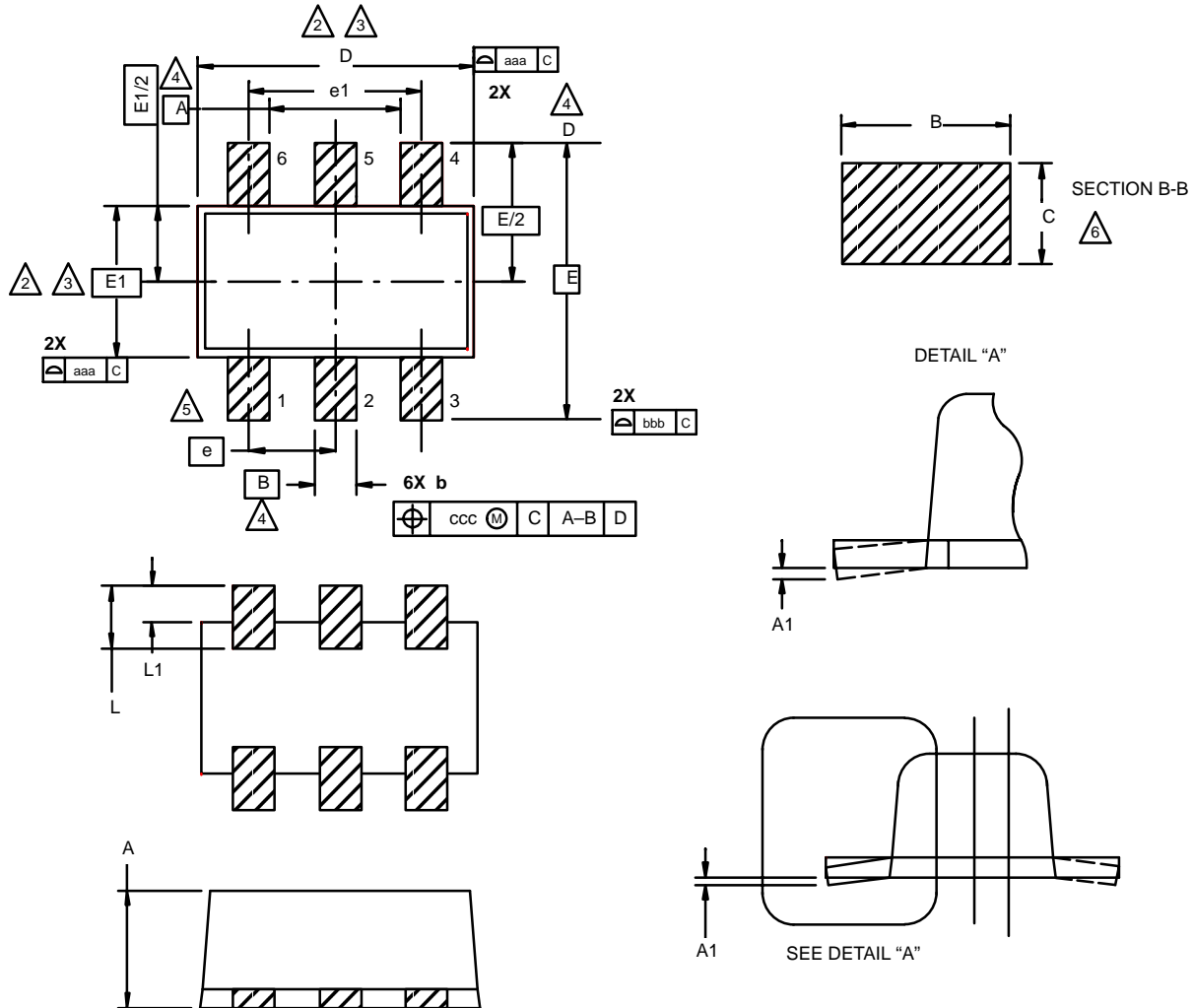
On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



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SC89: 6- LEADS (SOT-563F)



NOTES:

1. Dimensions in millimeters.

2 Dimension D does not include mold flash, protrusions or gate burrs. Mold flash, protrusions or gate burrs shall not exceed 0.15 mm per dimension E1 does not include interlead flash or protrusion, interlead flash or protrusion shall not exceed 0.15 mm per side.

3 Dimensions D and E1 are determined at the outmost extremes of the plastic body exclusive of mold flash, the bar burrs, gate burrs and interlead flash, but including any mismatch between the top and the bottom of the plastic body.

4 Datums A, B and D to be determined 0.10 mm from the lead tip.

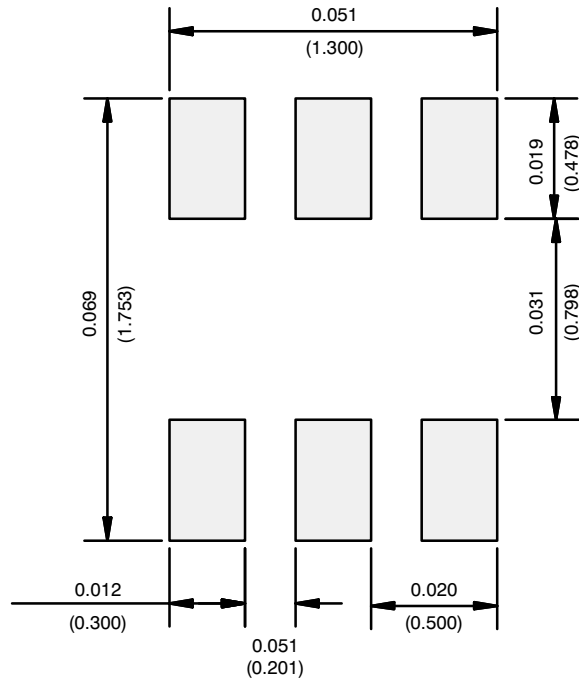
5 Terminal numbers are shown for reference only.

6 These dimensions apply to the flat section of the lead between 0.08 mm and 0.15 mm from the lead tip.

| Dim | MILLIMETERS | | Note | Symbol | Tolerances Of Form And Position |
|-----|-------------|------|------|--------|---------------------------------|
| | Min | Max | | | |
| A | 0.56 | 0.60 | | aaa | 0.10 |
| A1 | 0.00 | 0.10 | | bbb | 0.10 |
| b | 0.15 | 0.30 | | ccc | 0.10 |
| c | 0.10 | 0.18 | | | |
| D | 1.50 | 1.70 | 2, 3 | | |
| E | 1.55 | 1.70 | | | |
| E1 | 1.20 BSC | | 2, 3 | | |
| e | 0.50 BSC | | | | |
| e1 | 1.00 BSC | | | | |
| L | 0.35 BSC | | | | |
| L1 | 0.20 BSC | | | | |

ECN: E-00499—Rev. B, 02-Jul-01
DWG: 5880

RECOMMENDED MINIMUM PADS FOR SC-89: 6-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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