

## P-Channel 1.8 V (G-S) MOSFET

PRODUCT SUMMARY		
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
- 20	0.195 at $V_{GS} = - 4.5$ V	- 0.84
	0.260 at $V_{GS} = - 2.5$ V	- 0.73
	0.350 at $V_{GS} = - 1.8$ V	- 0.64

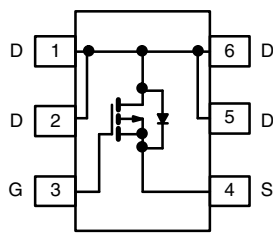
### FEATURES

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



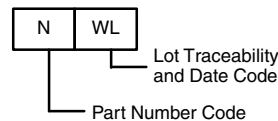
**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

SC-89 (6-LEADS)



Top View

Marking Code



Ordering Information: Si1037X-T1-GE3 (Lead (Pb)-free and Halogen-free)

### APPLICATIONS

- Cell Phones and Pagers
- Load Switch
- Battery Operated Systems

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25$ °C, unless otherwise noted)					
Parameter	Symbol	5 s	Steady State	Unit	
Drain-Source Voltage	$V_{DS}$	- 20		V	
Gate-Source Voltage	$V_{GS}$	$\pm 8$			
Continuous Drain Current ( $T_J = 150$ °C) <sup>a</sup>	$I_D$	$T_A = 25$ °C	- 0.84	- 0.77	A
		$T_A = 70$ °C	- 0.68	- 0.62	
Pulsed Drain Current	$I_{DM}$	- 4			
Continuous Diode Current (Diode Conduction) <sup>a</sup>	$I_S$	- 0.18	- 0.14		
Maximum Power Dissipation <sup>a</sup>	$P_D$	$T_A = 25$ °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 <sup>a</sup>	$R_{thJA}$	500	600	°C/W
		Steady State	600	

Notes:

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

SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = - 250 μA	- 0.45			V
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 8 V			± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = - 20 V, V <sub>GS</sub> = 0 V			- 1	μA
		V <sub>DS</sub> = - 20 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 70 °C			- 5	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = - 5 V, V <sub>GS</sub> = - 4.5 V	- 4			A
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 0.77 A		0.160	0.195	Ω
		V <sub>GS</sub> = - 2.5 V, I <sub>D</sub> = - 0.67 A		0.212	0.260	
		V <sub>GS</sub> = - 1.8 V, I <sub>D</sub> = - 0.2 A		0.290	0.350	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = - 10 V, I <sub>D</sub> = - 0.77 A		3.1		S
Diode Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>S</sub> = - 0.14 A, V <sub>GS</sub> = 0 V		- 0.78	- 1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = - 10 V, V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 0.77 A		3.5	5.5	nC
Gate-Source Charge	Q <sub>gs</sub>			0.65		
Gate-Drain Charge	Q <sub>gd</sub>			0.60		
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = - 10 V, R <sub>L</sub> = 20 Ω I <sub>D</sub> ≅ - 0.5 A, V <sub>GEN</sub> = - 4.5 V, R <sub>G</sub> = 6 Ω		10	20	ns
Rise Time	t <sub>r</sub>			15	30	
Turn-Off Delay Time	t <sub>d(off)</sub>			30	60	
Fall Time	t <sub>f</sub>			10	20	
Source-Drain Reverse Recovery Time	t <sub>rr</sub>		I <sub>F</sub> = - 0.14 A, di/dt = 100 A/μs		20	

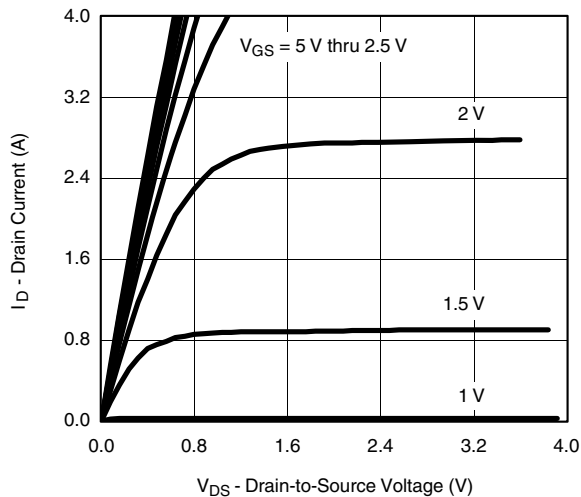
Notes:

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

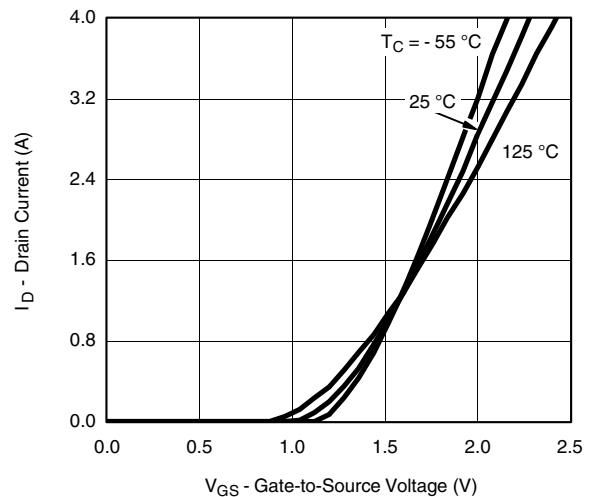
b. Guaranteed by design, not subject to production testing.

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** (T<sub>A</sub> = 25 °C, unless otherwise noted)

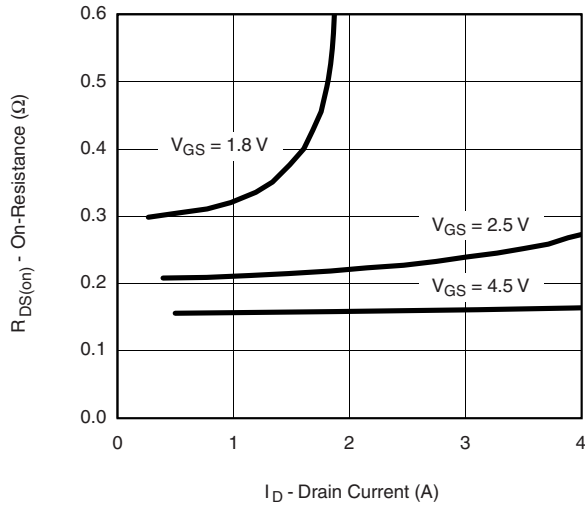


**Output Characteristics**

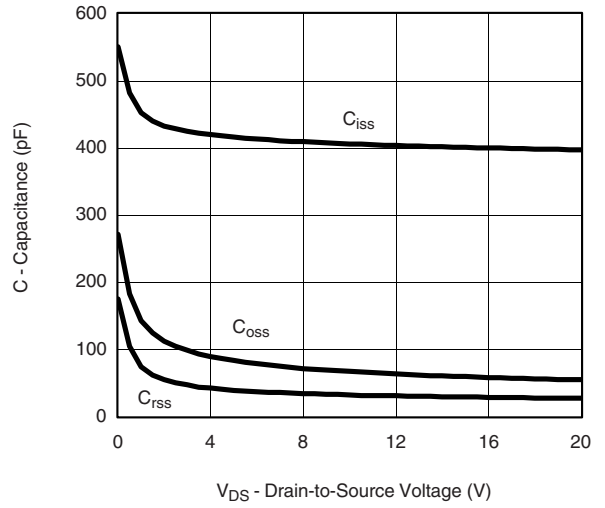


**Transfer Characteristics**

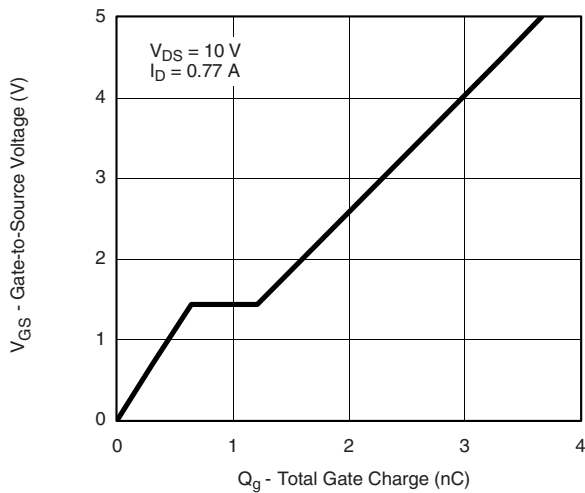
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



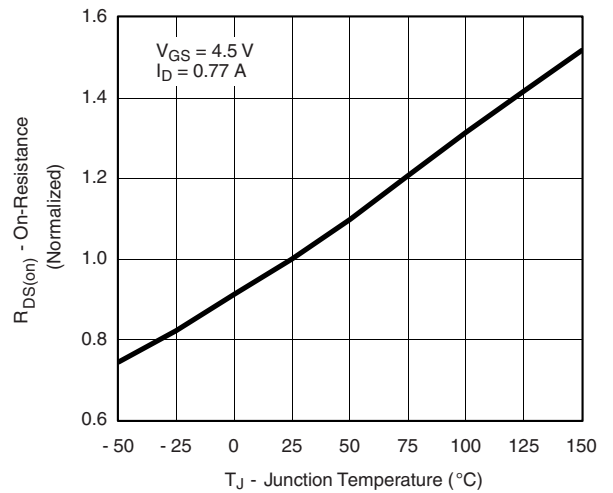
**On-Resistance vs. Drain Current**



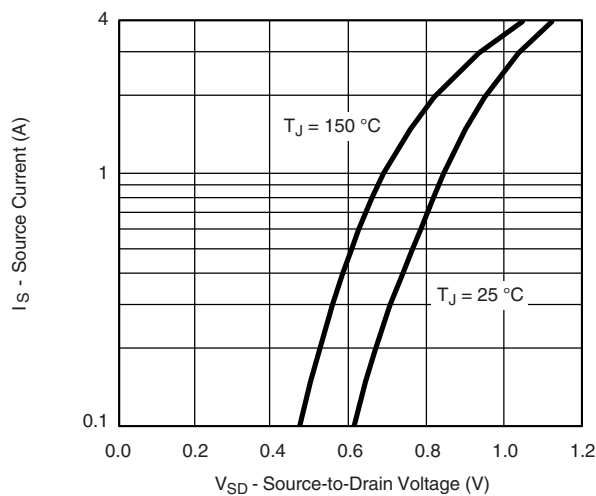
**Capacitance**



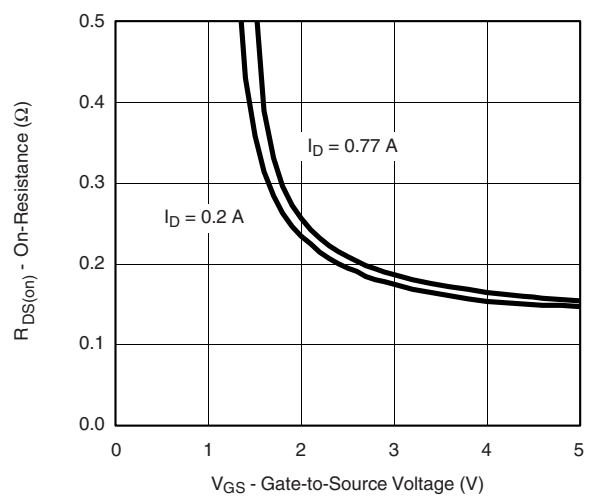
**Gate Charge**



**On-Resistance vs. Junction Temperature**

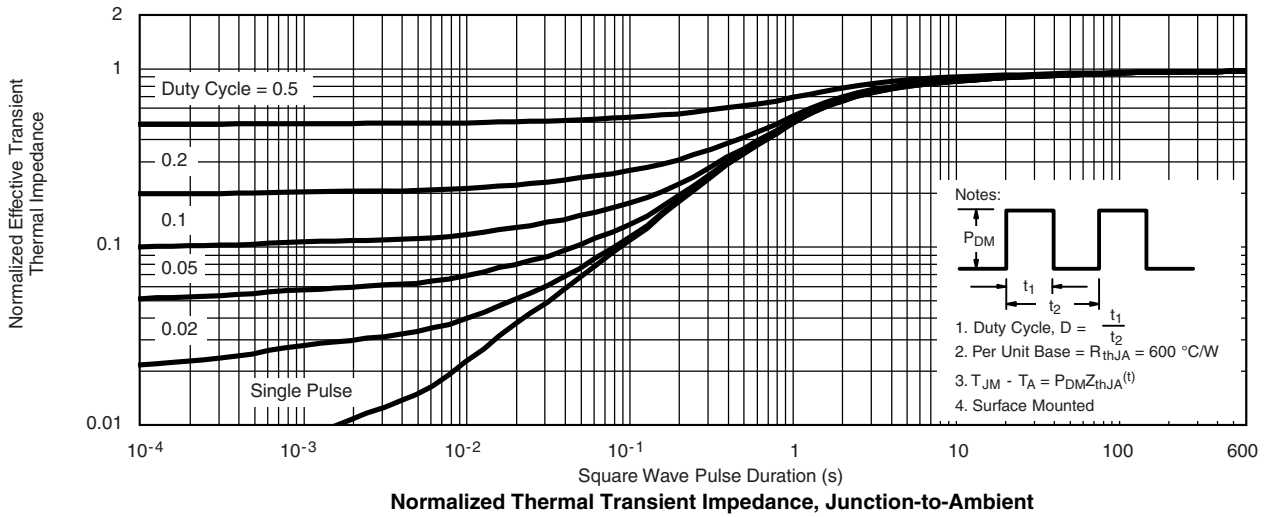
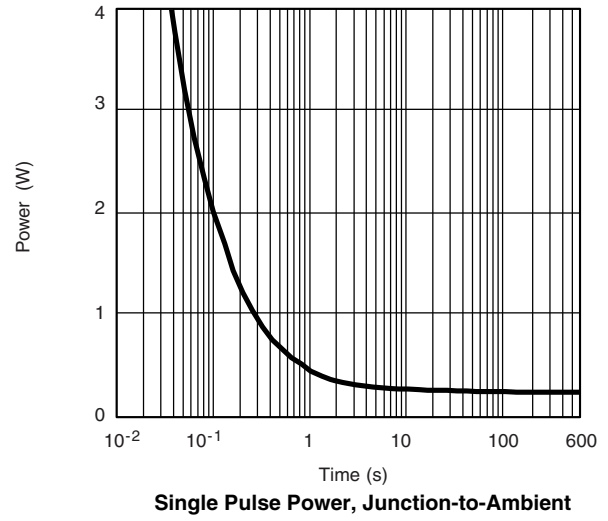
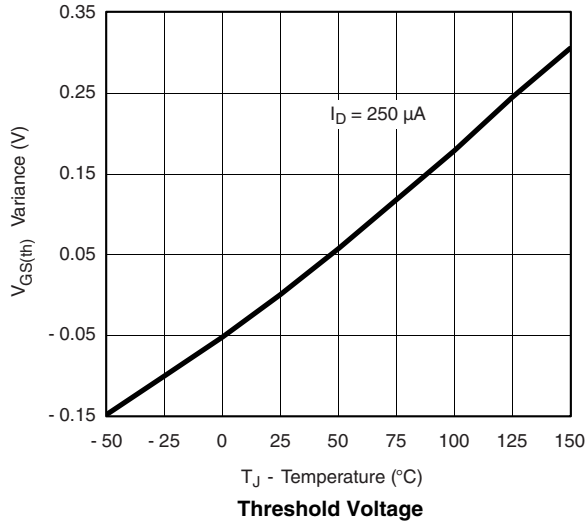


**Source-Drain Diode Forward Voltage**



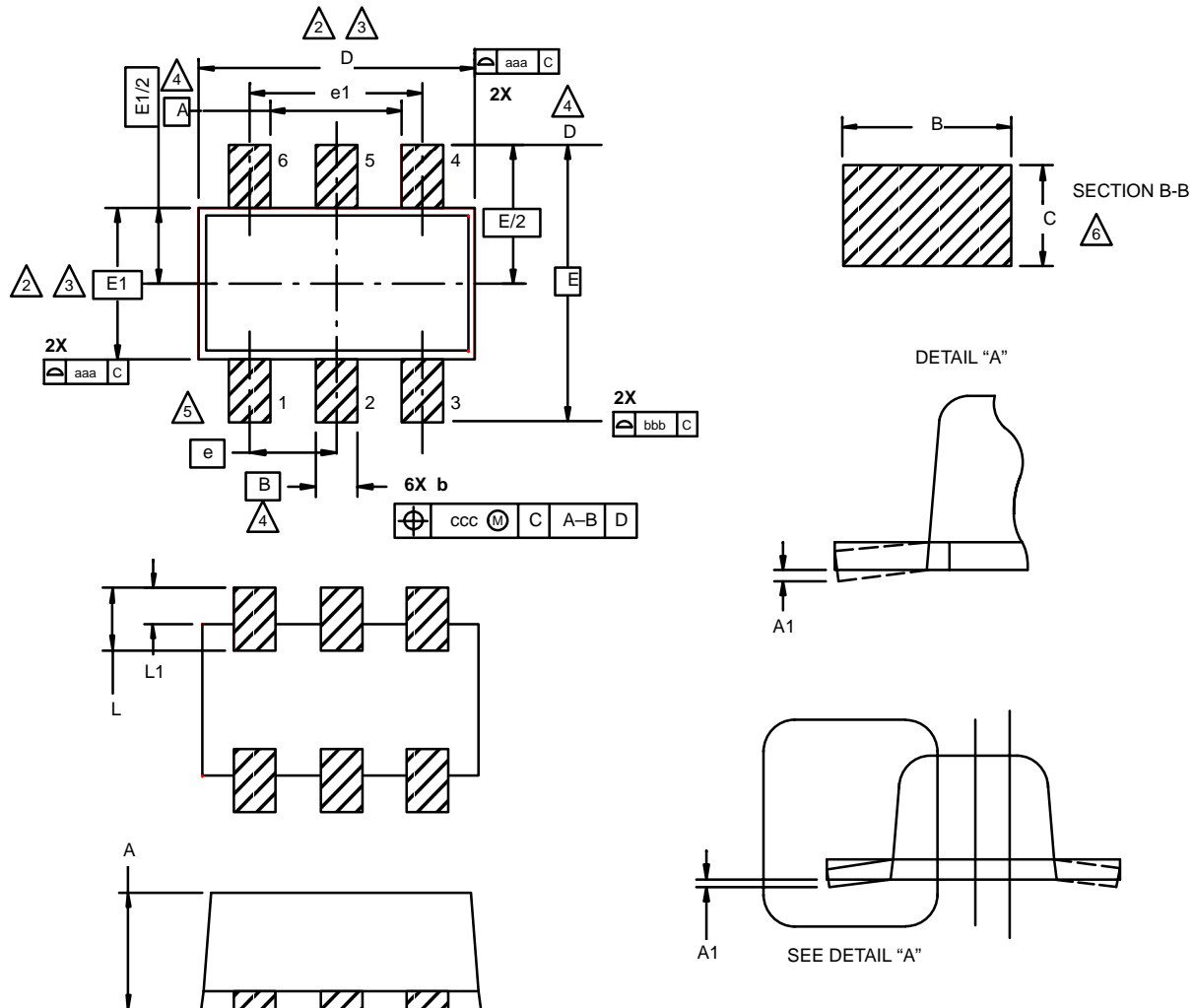
**On-Resistance vs. Gate-to-Source Voltage**

**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , 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.

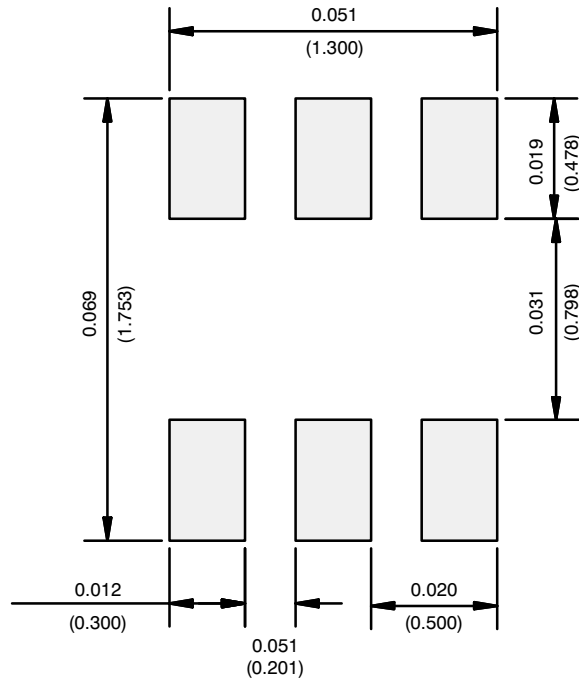
**4** Datums A, B and D to be determined 0.10 mm from the lead tip.

**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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