P-Channel 1.8 V (G-S) MOSFET

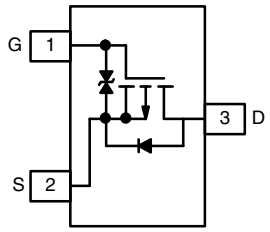
PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (mA)
- 20	1.2 at V_{GS} = - 4.5 V	- 350
	1.6 at V_{GS} = - 2.5 V	- 300
	2.7 at V_{GS} = - 1.8 V	- 150

FEATURES

- **Halogen-free According to IEC 61249-2-21 Definition**
- High-Side Switching
- Low On-Resistance: 1.2 Ω
- Low Threshold: 0.8 V (Typ.)
- Fast Switching Speed: 14 ns
- 1.8 V Operation
- TrenchFET® Power MOSFETs
- 2000 V ESD Protection
- Compliant to RoHS Directive 2002/95/EC

Pb-free
RoHS COMPLIANT
HALOGEN FREE

SC-75A or SC-89



Top View

SC-75A (SOT-416):
Si1013R - Marking Code D
SC-89 (SOT-490):
Si1013X - Marking Code B

Ordering Information:
Si1013R-T1-GE3 (SC-75A, Lead (Pb)-free and Halogen-free)
Si1013X-T1-GE3 (SC-89, Lead (Pb)-free and Halogen-free)

APPLICATIONS

- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories
- Battery Operated Systems
- Power Supply Converter Circuits
- Load/Power Switching Cell Phones, Pagers

BENEFITS

- Ease in Driving Switches
- Low Offset (Error) Voltage
- Low-Voltage Operation
- High-Speed Circuits
- Low Battery Voltage Operation

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}	± 6		
Continuous Drain Current (T_J = 150 °C)[b]	T_A = 25 °C	I_D	- 400	- 350	mA
	T_A = 85 °C		- 300	- 275	
Pulsed Drain Current[a]		I_{DM}	- 1000		
Continuous Source Current (Diode Conduction)[b]		I_S	- 275	- 250	
Maximum Power Dissipation[b] for SC-75	T_A = 25 °C	P_D	175	150	mW
	T_A = 85 °C		90	80	
Maximum Power Dissipation[b] for SC-89	T_A = 25 °C		275	250	
	T_A = 85 °C		160	140	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150		°C
Gate-Source ESD Rating (HBM, Method 3015)		ESD	2000		V

Notes:
a. Pulse width limited by maximum junction temperature.
b. Surface mounted on FR4 board.

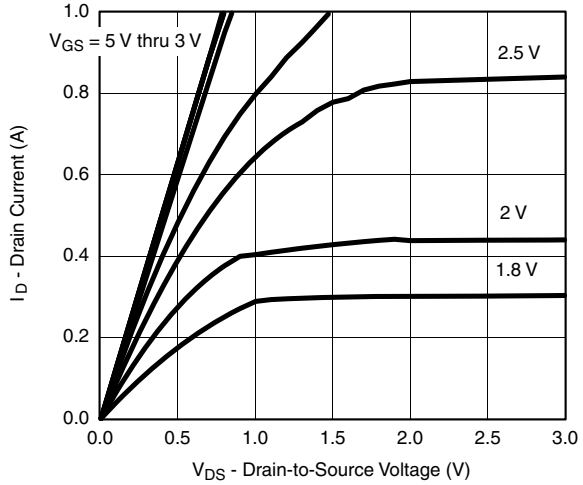
SPECIFICATIONS (T_A = 25 °C, unless otherwise noted)						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA	- 0.45			V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 4.5 V		± 1	± 2	µA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 16 V, V_{GS} = 0 V		- 0.3	- 100	nA
		V_{DS} = - 16 V, V_{GS} = 0 V, T_J = 85 °C			- 5	µA
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = - 5 V, V_{GS} = - 4.5 V	- 700			mA
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 4.5 V, I_D = - 350 mA		0.8	1.2	Ω
		V_{GS} = - 2.5 V, I_D = - 300 mA		1.2	1.6	
		V_{GS} = - 1.8 V, I_D = - 150 mA		1.8	2.7	
Forward Transconductance[a]	g_{fs}	V_{DS}= - 10 V, I_D = - 250 mA		0.4		S
Diode Forward Voltage[a]	V_{SD}	I_S = - 150 mA, V_{GS} = 0 V		- 0.8	- 1.2	V
Dynamic[b]						
Total Gate Charge	Q_g	V_{DS} = - 10 V, V_{GS} = - 4.5 V, I_D = - 250 mA		1500		pC
Gate-Source Charge	Q_{gs}			150		
Gate-Drain Charge	Q_{gd}			450		
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 10 V, R_L = 47 Ω $I_D \cong$ - 200 mA, V_{GEN} = - 4.5 V, R_g = 10 Ω		5		ns
Rise Time	t_r			9		
Turn-Off Delay Time	$t_{d(off)}$			35		
Fall Time	t_f			11		

Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

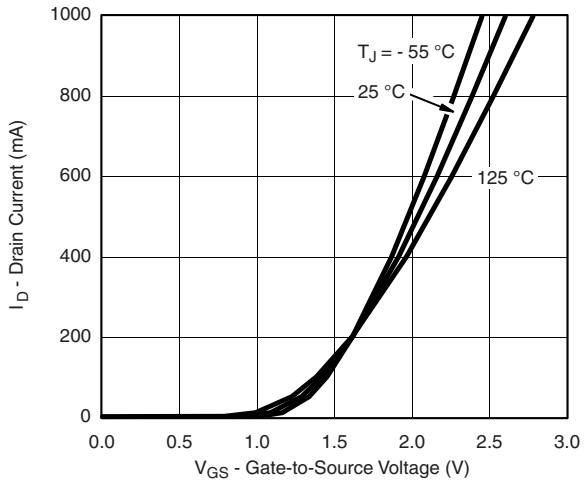
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)

For the following graphs, P-Channel negative polarities for all voltage and current values are represented as positive values.

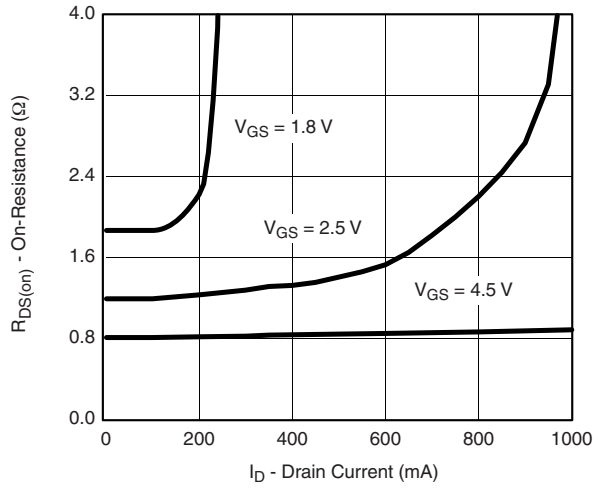


Output Characteristics

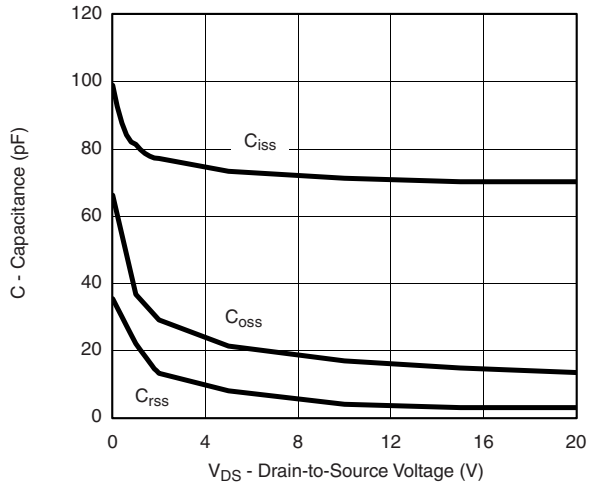


Transfer Characteristics

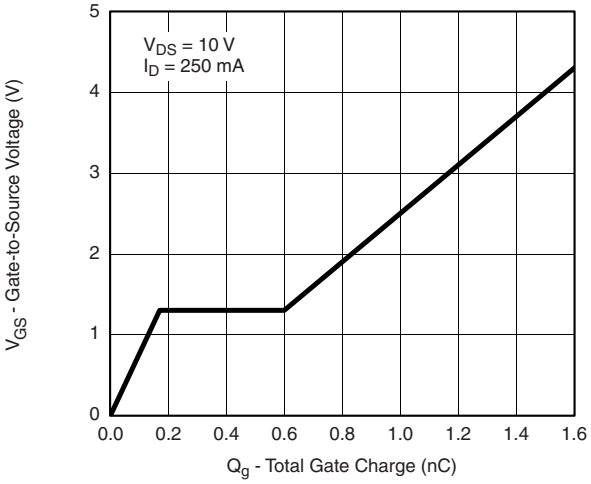
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



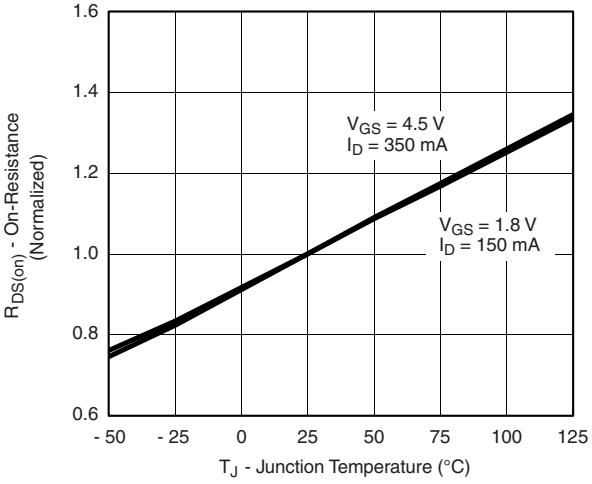
On-Resistance vs. Drain Current



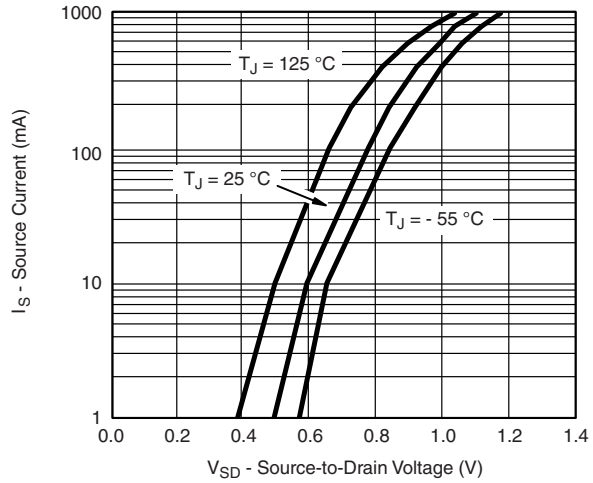
Capacitance



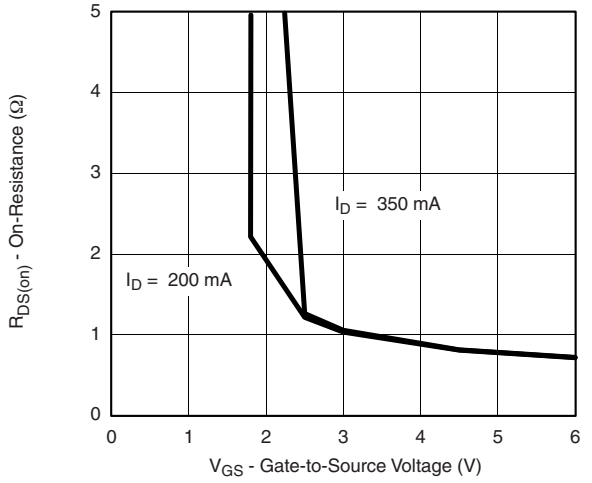
Gate Charge



On-Resistance vs. Junction Temperature

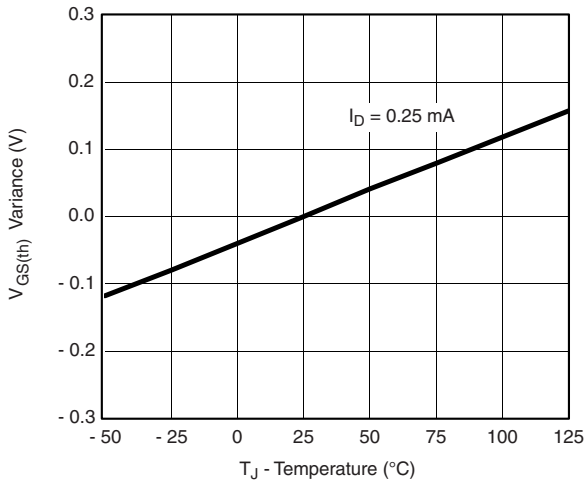


Surge-Drain Diode Forward Voltage

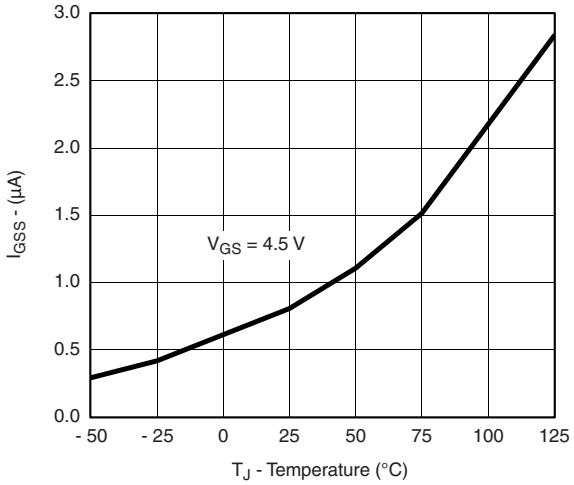


On-Resistance vs. Gate-to-Source Voltage

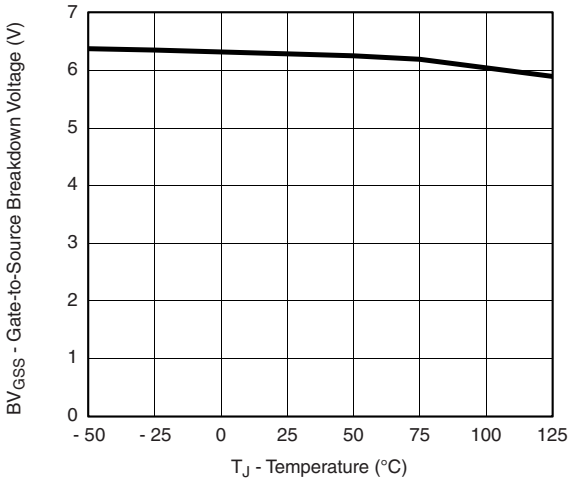
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



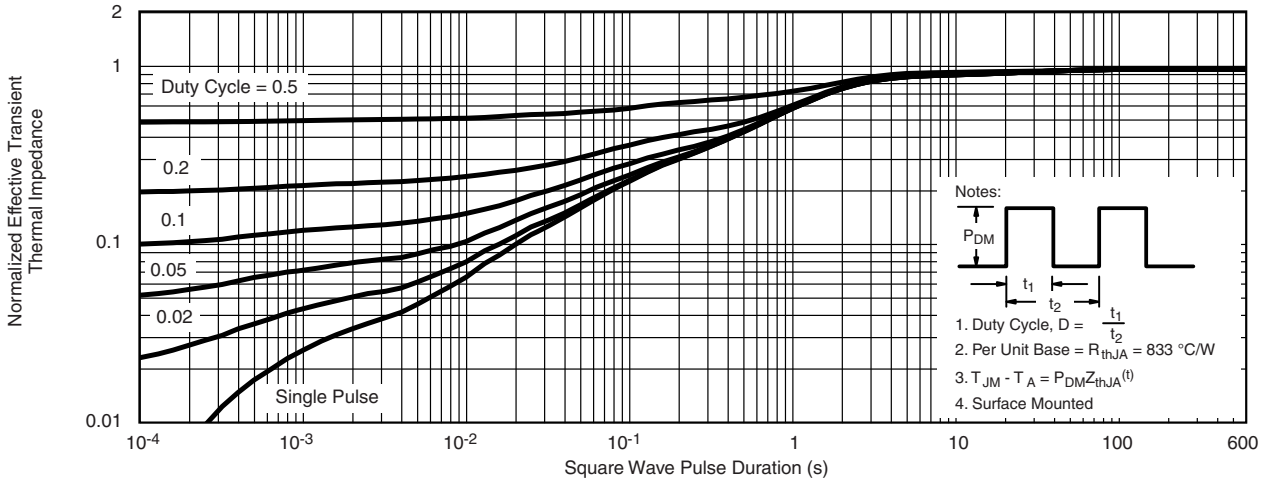
Threshold Voltage Variance vs. Temperature



I_{GSS} vs. Temperature

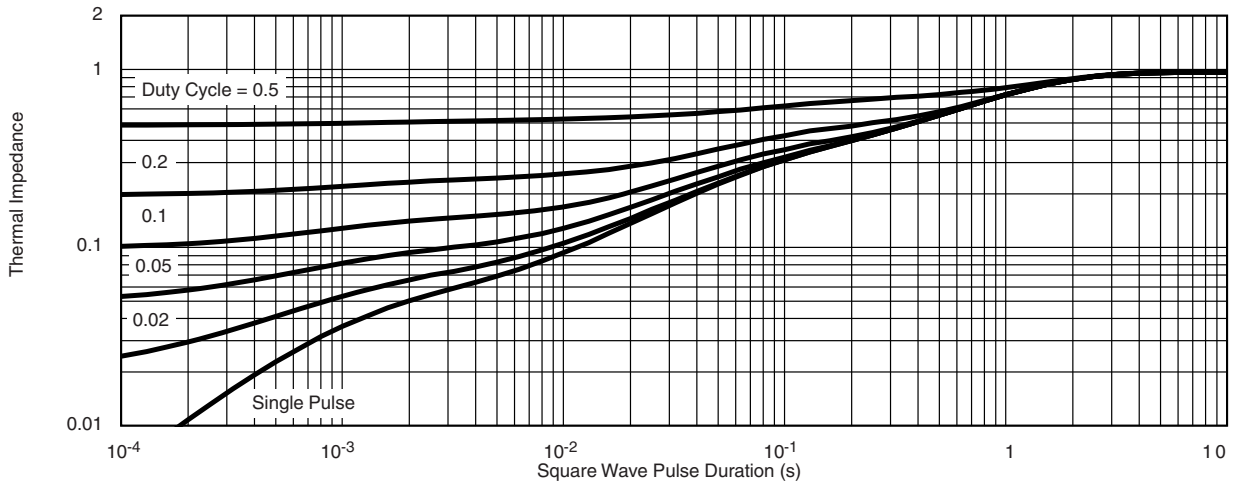


BV_{GSS} vs. Temperature



Normalized Thermal Transient Impedance, Junction-to-Ambient (SC-75A)

TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Foot

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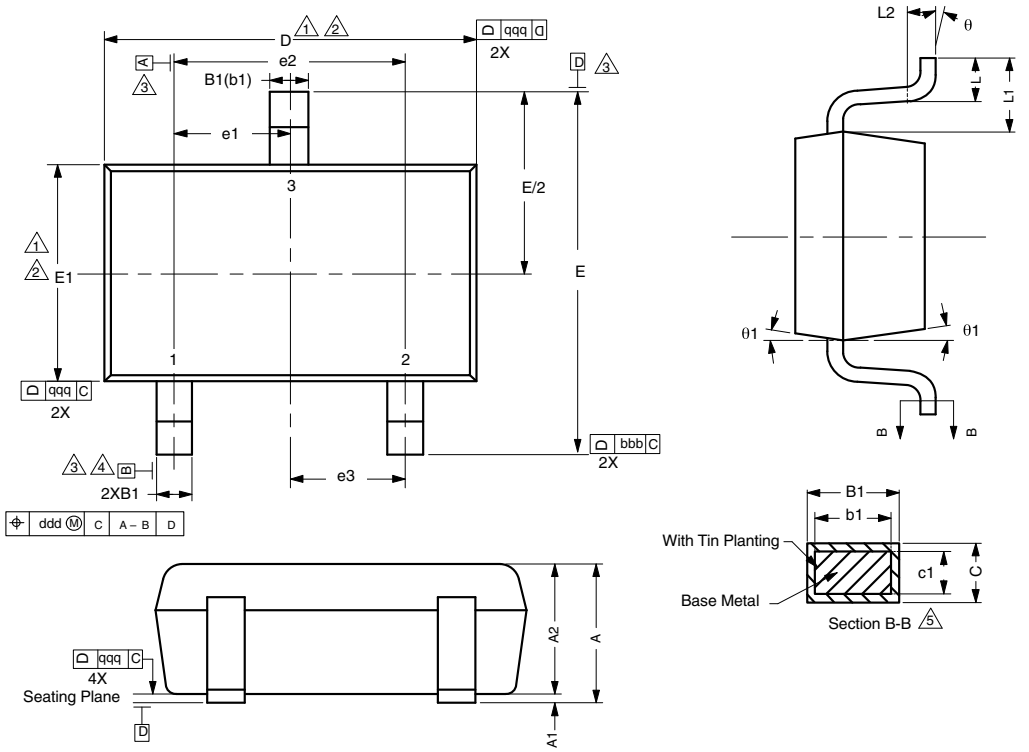
SC-75A: 3 Leads



DWG: 5868

Notes

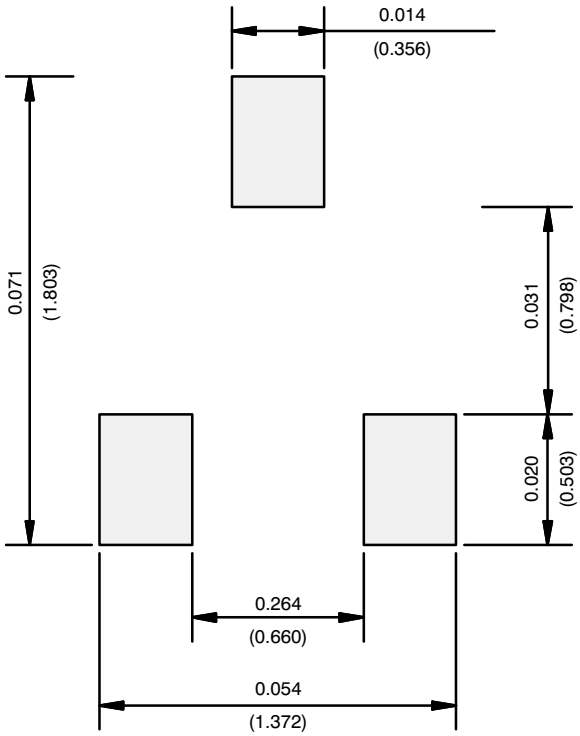
Dimensions in millimeters will govern.

1. Dimension D does not include mold flash, protrusions or gate burrs. Mold flash protrusions or gate burrs shall not exceed 0.10 mm per end. Dimension E1 does not include Interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.10 mm per side.
2. Dimensions D and E1 are determined at the outmost extremes of the plastic body exclusive of mold flash, tie bar burrs, gate burrs and interlead flash, but including any mismatch between the top and bottom of the plastic body.
3. Datums A, B and D to be determined 0.10 mm from the lead tip.
4. Terminal positions are shown for reference only.
5. These dimensions apply to the flat section of the lead between 0.08 mm and 0.15 mm from the lead tip.

DIMENSIONS	TOLERANCES
aaa	0.10
bbb	0.10
ccc	0.10
ddd	0.10

DIM.	MILLIMETERS			NOTE
	MIN.	NOM.	MAX.	
A	-	-	0.80	
A1	0.00	-	0.10	
A2	0.65	0.70	0.80	
B1	0.19	-	0.24	5
b1	0.17	-	0.21	
c	0.13	-	0.15	5
c1	0.10	-	0.12	5
D	1.48	1.575	1.68	1, 2
E	1.50	1.60	1.70	
E1	0.66	0.76	0.86	1, 2
e1	0.50 BSC			
e2	1.00 BSC			
e3	0.50 BSC			
L	0.15	0.205	0.30	
L1	0.40 ref.			
L2	0.15 BSC			
q	0°	-	8°	
q1	4°	-	10°	

RECOMMENDED MINIMUM PADS FOR SC-75A: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

Return to Index

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