

## N-Channel 1.5 V (G-S) MOSFET

PRODUCT SUMMARY		
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (mA)
20	5 at V <sub>GS</sub> = 4.5 V	200
	7 at V <sub>GS</sub> = 2.5 V	175
	9 at V <sub>GS</sub> = 1.8 V	150
	10 at V <sub>GS</sub> = 1.5 V	50

### FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- Low-Side Switching
- Low On-Resistance: 5 Ω
- Low Threshold: 0.9 V (typ.)
- Fast Switching Speed: 35 ns
- TrenchFET® Power MOSFETs: 1.5 V Rated
- 2000 V ESD Protection
- Compliant to RoHS Directive 2002/95/EC



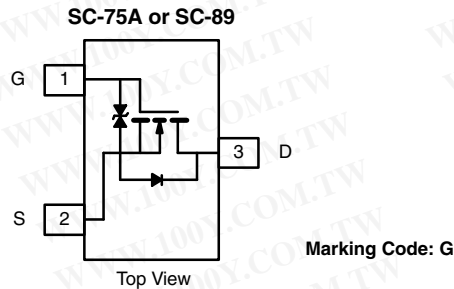
**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### BENEFITS

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

### APPLICATIONS

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



#### Ordering Information:

Si1032R-T1-GE3 (SC-75A, Lead (Pb)-free and Halogen-free)  
Si1032X-T1-GE3 (SC-89, Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C, unless otherwise noted)							
Parameter	Symbol	Si1032R		Si1032X		Unit	
		5 s	Steady State	5 s	Steady State		
Drain-Source Voltage	V <sub>DS</sub>	20				V	
Gate-Source Voltage	V <sub>GS</sub>	± 6					
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C	200	140	210	200	mA
		T <sub>A</sub> = 85 °C	110	100	150	140	
Pulsed Drain Current <sup>a</sup>	I <sub>DM</sub>	500		600			
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	250	200	300	240		
Maximum Power Dissipation <sup>a</sup> for SC-75	P <sub>D</sub>	T <sub>A</sub> = 25 °C	280	250	340	300	mW
		T <sub>A</sub> = 85 °C	145	130	170	150	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150				°C	
Gate-Source ESD Rating (HBM, Method 3015)	ESD	2000				V	

Notes:

a. Surface mounted on FR4 board.

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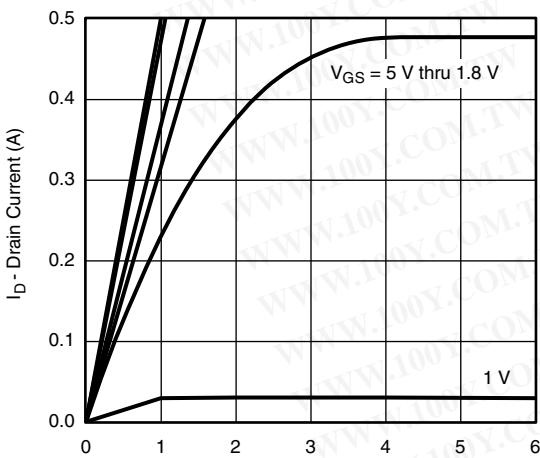
SPECIFICATIONS ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	0.40	0.7	1.2	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 2.8\text{ V}$		$\pm 0.5$	$\pm 1.0$	$\mu\text{A}$
		$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 4.5\text{ V}$		$\pm 1.0$	$\pm 3.0$	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 20\text{ V}$ , $V_{GS} = 0\text{ V}$			1	
		$V_{DS} = 20\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 55\text{ }^\circ\text{C}$			10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = 5\text{ V}$ , $V_{GS} = 4.5\text{ V}$	250			mA
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}$ , $I_D = 200\text{ mA}$			5	$\Omega$
		$V_{GS} = 2.5\text{ V}$ , $I_D = 175\text{ mA}$			7	
		$V_{GS} = 1.8\text{ V}$ , $I_D = 150\text{ mA}$			9	
		$V_{GS} = 1.5\text{ V}$ , $I_D = 40\text{ mA}$			10	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 10\text{ V}$ , $I_D = 200\text{ mA}$		0.5		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 150\text{ mA}$ , $V_{GS} = 0\text{ V}$			1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 10\text{ V}$ , $V_{GS} = 4.5\text{ V}$ , $I_D = 250\text{ mA}$		750		$\mu\text{C}$
Gate-Source Charge	$Q_{gs}$			75		
Gate-Drain Charge	$Q_{gd}$			225		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}$ , $R_L = 47\text{ }\Omega$ $I_D \cong 200\text{ mA}$ , $V_{GEN} = 4.5\text{ V}$ , $R_g = 10\text{ }\Omega$			50	ns
Rise Time	$t_r$				25	
Turn-Off Delay Time	$t_{d(off)}$				50	
Fall Time	$t_f$				25	

Notes:

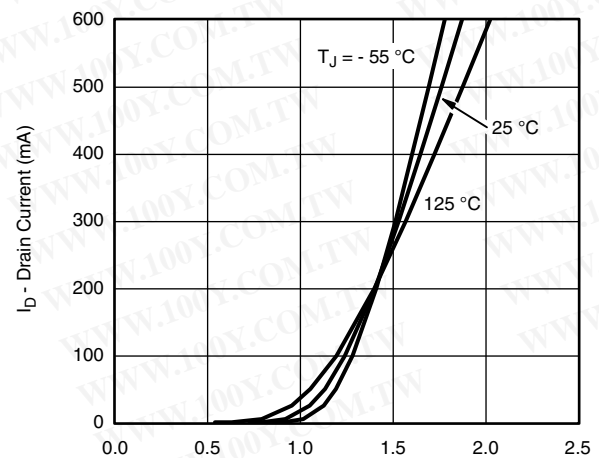
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
b. Guaranteed by design, not subject to production testing.

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



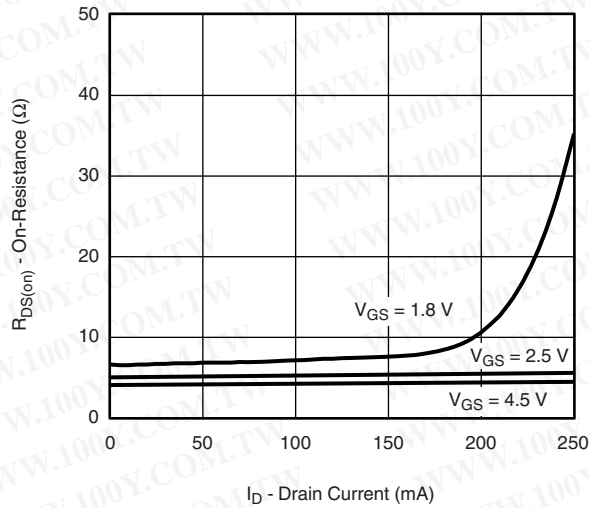
$V_{GS} = 5\text{ V thru } 1.8\text{ V}$   
**Output Characteristics**



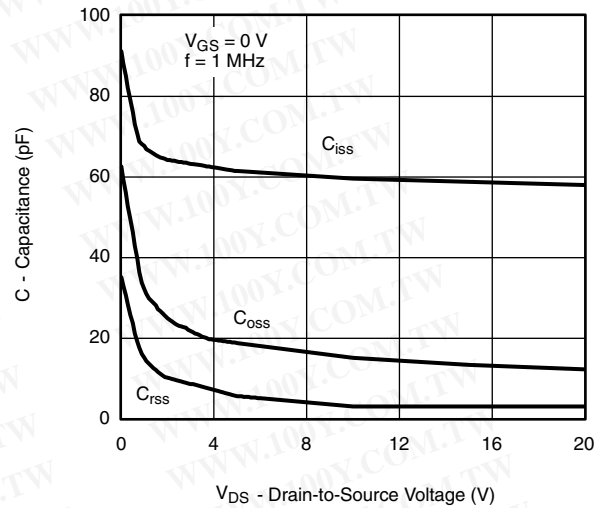
$T_J = -55\text{ }^\circ\text{C}$ ,  $25\text{ }^\circ\text{C}$ ,  $125\text{ }^\circ\text{C}$   
**Transfer Characteristics**

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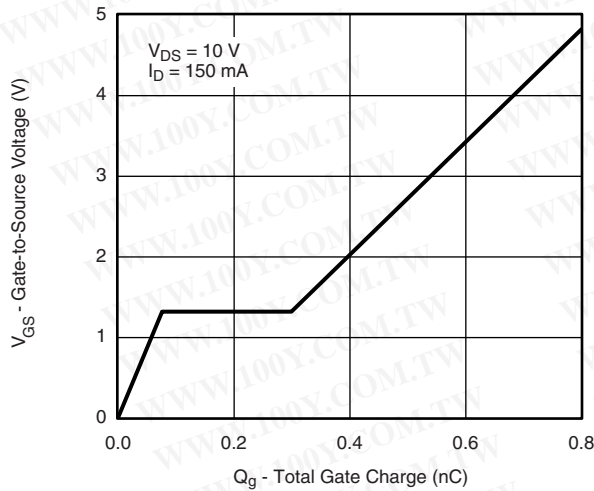
**TYPICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)



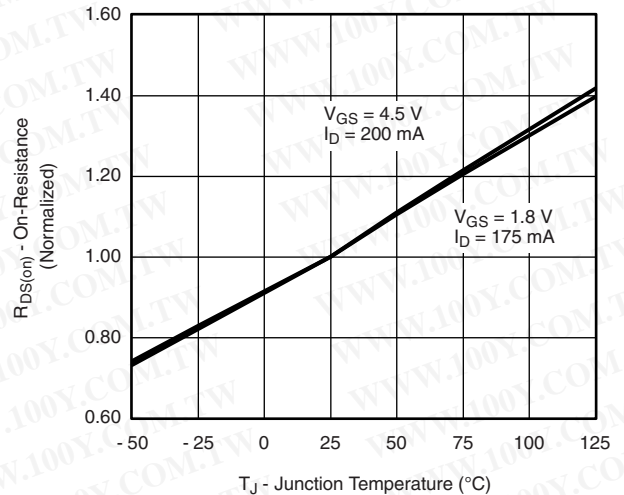
**On-Resistance vs. Drain Current**



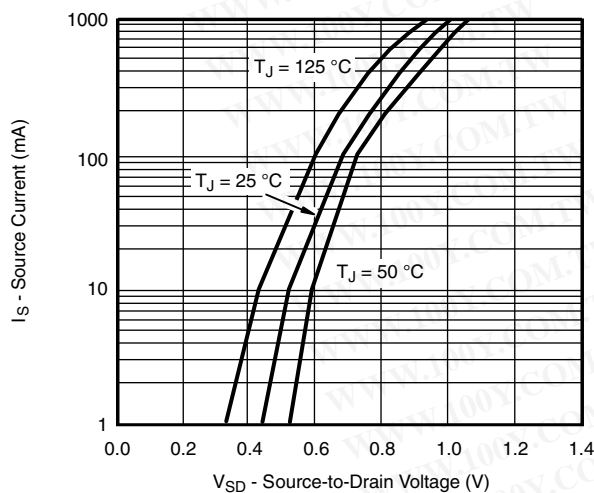
**Capacitance**



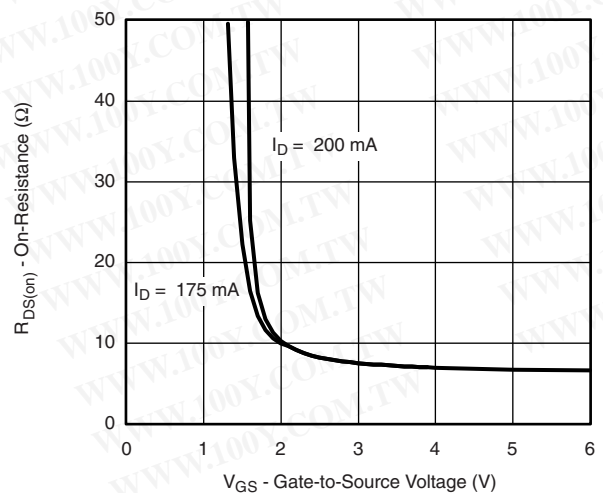
**Gate Charge**



**On-Resistance vs. Junction Temperature**

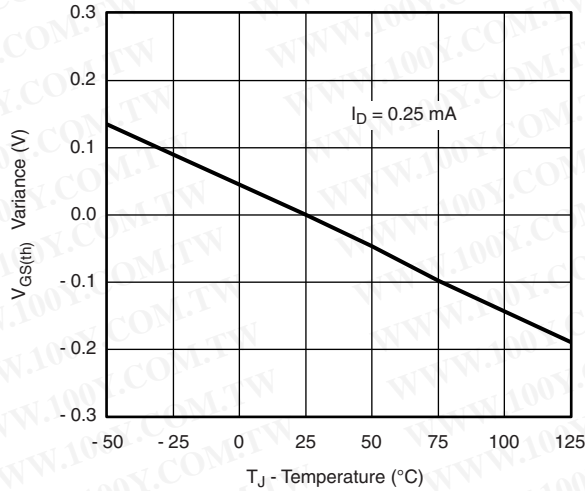


**Surge-Drain Diode Forward Voltage**

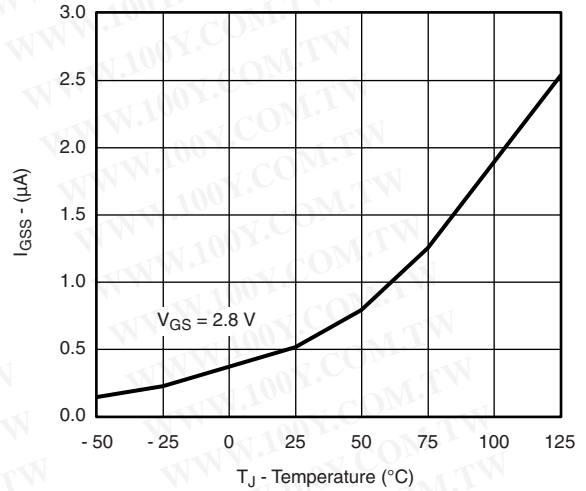


**On-Resistance vs. Gate-to-Source Voltage**

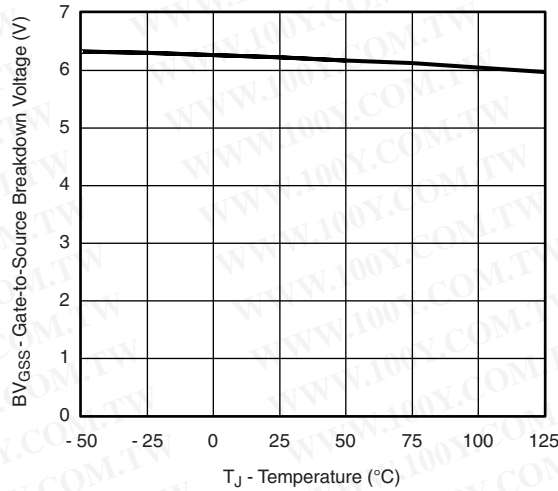
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



**Threshold Voltage Variance vs. Temperature**

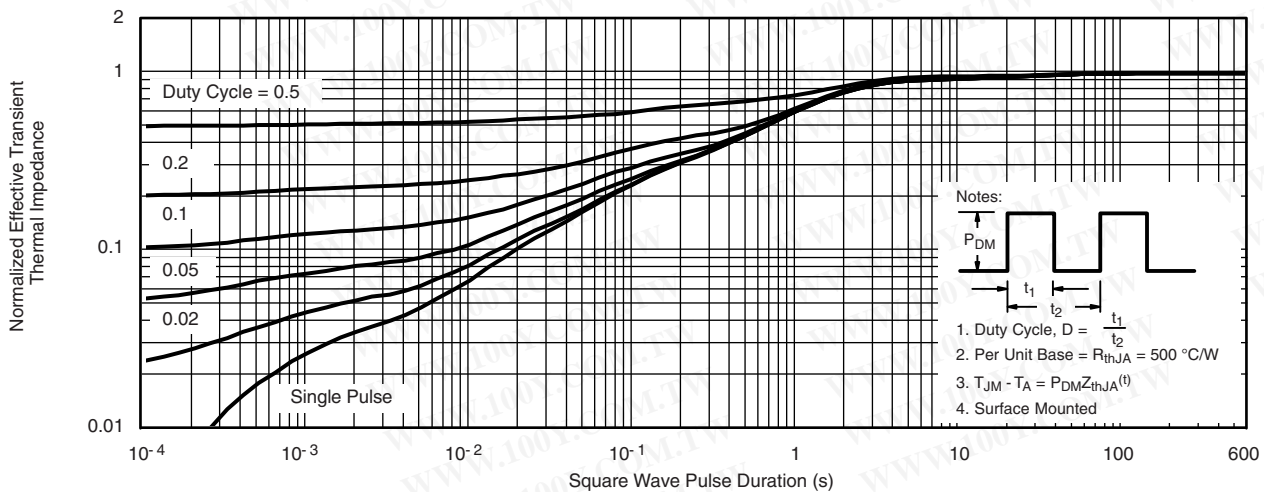


**I<sub>GSS</sub> vs. Temperature**



**BV<sub>GSS</sub> vs. Temperature**

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**Normalized Thermal Transient Impedance, Junction-to-Ambient (SC-75A, Si1032R Only)**

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?71172](http://www.vishay.com/ppg?71172).



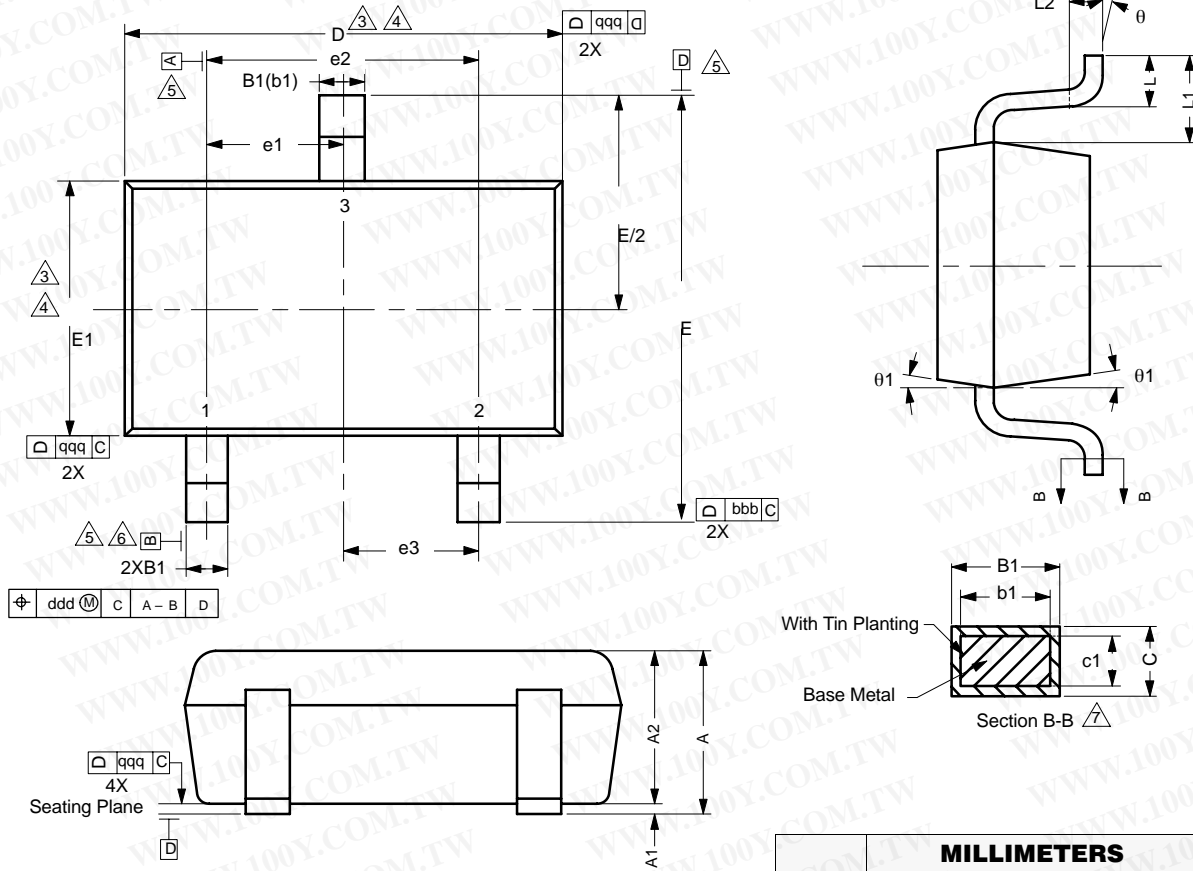


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# Package Information

## Vishay Siliconix

### SC-75A: 3-LEADS



**NOTES:**

Dimensions in Millimeters.

- 3. 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.
- 4. 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.
- 5. Datums A, B and D to be determined 0.10 mm from the lead tip.
- 6. Terminal positions are shown for reference only.
- 7. These dimensions apply to the flat section of the lead between 0.08 mm and 0.15 mm from the lead tip.

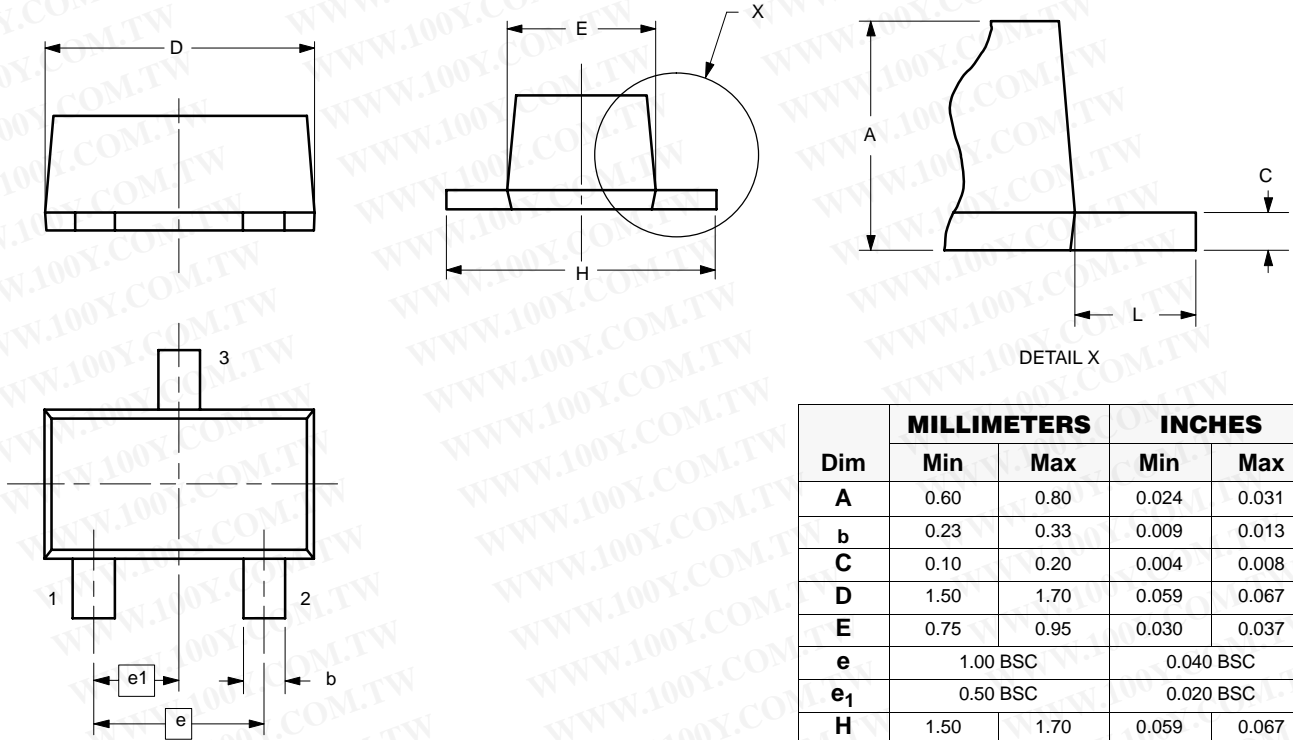
Dim	Tolerances
aaa	0.10
bbb	0.10
ccc	0.10
ddd	0.10

Dim	MILLIMETERS			Note
	Min	Nom	Max	
A	-	-	0.80	
A <sub>1</sub>	0.00	-	0.10	
A <sub>2</sub>	0.65	0.70	0.80	
B <sub>1</sub>	0.19	-	0.24	7
b <sub>1</sub>	0.17	-	0.21	
c	0.13	-	0.15	7
c <sub>1</sub>	0.10	-	0.12	7
D	1.55	1.575	1.60	3,4
E	1.50	1.60	1.70	
E <sub>1</sub>	0.73	0.76	0.80	3,4
e <sub>1</sub>	0.50 BSC			
e <sub>2</sub>	1.00 BSC			
e <sub>3</sub>	0.50 BSC			
L	0.15	0.205	0.30	
L <sub>1</sub>	0.40 REF			
L <sub>2</sub>	0.15 BSC			
$\theta$	0°	-	8°	
$\theta_1$	4°	-	10°	

ECN: S-03946-Rev. B, 09-Jul-01  
 DWG: 5868



SC89-3

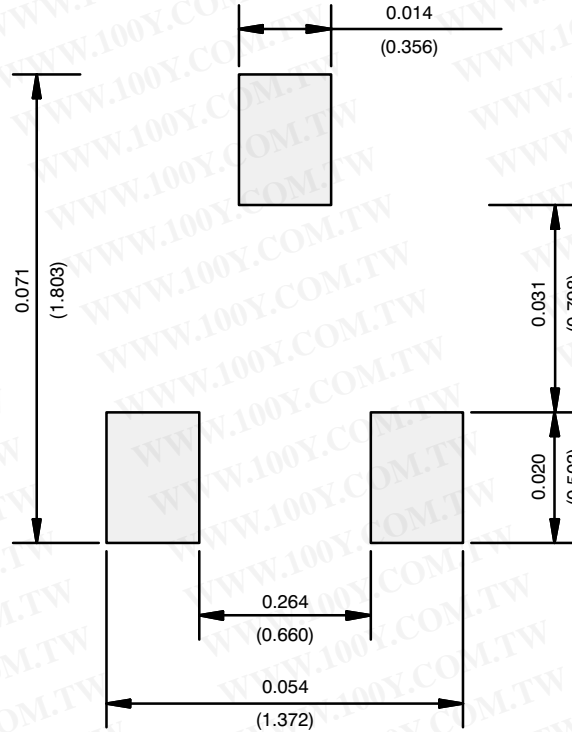


Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	0.60	0.80	0.024	0.031
b	0.23	0.33	0.009	0.013
C	0.10	0.20	0.004	0.008
D	1.50	1.70	0.059	0.067
E	0.75	0.95	0.030	0.037
e	1.00 BSC		0.040 BSC	
e <sub>1</sub>	0.50 BSC		0.020 BSC	
H	1.50	1.70	0.059	0.067
L	0.30	0.50	0.012	0.020

ECN: S-03946—Rev. B, 09-Jul-01  
DWG: 5869

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

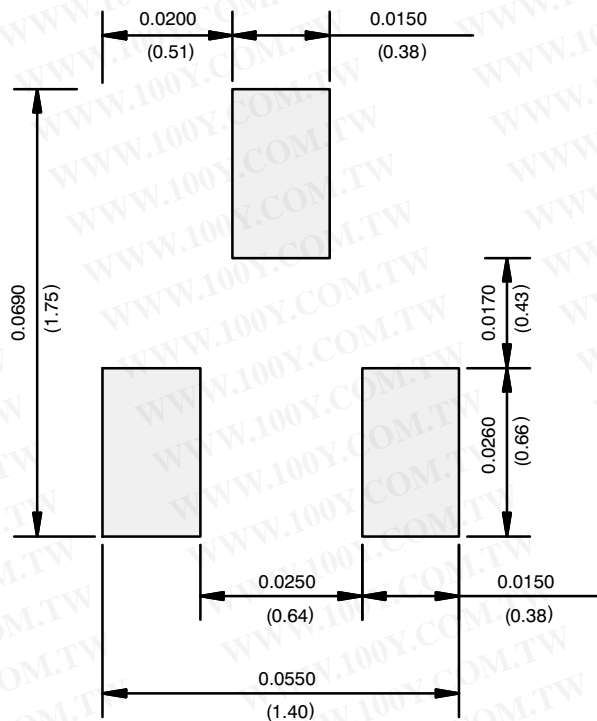


Recommended Minimum Pads  
Dimensions in Inches/(mm)

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## RECOMMENDED MINIMUM PADS FOR SC-89: 3-Lead



Recommended Minimum Pads  
Dimensions in Inches(mm)

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APPLICATION NOTE

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