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[Vishay/Siliconix](#)  
[SI1011X-T1-GE3](#)

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**Si1011X**  
 Vishay Siliconix

## P-Channel 12 V (D-S) MOSFET

PRODUCT SUMMARY			
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω) Max.	I <sub>D</sub> (A)	Q <sub>g</sub> (Typ.)
- 12	0.640 at V <sub>GS</sub> = - 4.5 V	- 0.48	1.15 nC
	0.880 at V <sub>GS</sub> = - 2.5 V	- 0.41	
	1.200 at V <sub>GS</sub> = - 1.8 V	- 0.35	
	1.443 at V <sub>GS</sub> = - 1.5 V	- 0.10	
	2.475 at V <sub>GS</sub> = - 1.2 V	- 0.05	

### FEATURES

- TrenchFET<sup>®</sup> Power MOSFET
- Typical ESD protection: 700 V (HBM)
- Fast Switching Speed
- Material categorization:  
 For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

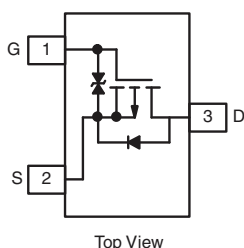


**RoHS**  
 COMPLIANT  
 HALOGEN  
**FREE**

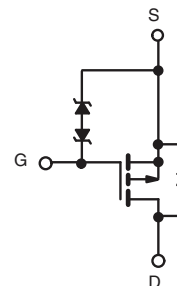
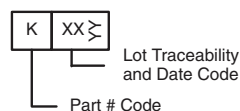
### APPLICATIONS

- Portable Devices such as Smart Phones, Tablet PCs and Mobile Computing
  - Load Switch for Low Voltage Gate Drive
  - Load Switch for 1.2 V Power Line

SC-89 (3-LEADS)



Marking Code



Ordering Information: SI1011X-T1-GE3 (Lead (Pb)-free and Halogen-free)

P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C, unless otherwise noted)			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V <sub>DS</sub>	- 12	V
Gate-Source Voltage	V <sub>GS</sub>	± 5	
Continuous Drain Current (T <sub>J</sub> = 150 °C)	I <sub>D</sub>	T <sub>A</sub> = 25 °C	- 0.48 <sup>b, c</sup>
		T <sub>A</sub> = 70 °C	- 0.38 <sup>b, c</sup>
Pulsed Drain Current (t = 300 μs)	I <sub>DM</sub>	- 1.5	A
Continuous Source-Drain Diode Current	I <sub>S</sub>	- 0.16 <sup>b, c</sup>	W
Maximum Power Dissipation	P <sub>D</sub>	T <sub>A</sub> = 25 °C	
		T <sub>A</sub> = 70 °C	0.12 <sup>b, c</sup>
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150	°C

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a, b</sup>	R <sub>thJA</sub>	t ≤ 5 s	440	530
		Steady State	540	650

Notes:

- Maximum under steady state conditions is 650 °C/W.
- Surface mounted on 1" x 1" FR4 board.
- t = 5 s.

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SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0, I <sub>D</sub> = - 250 μA	- 12			V
V <sub>DS</sub> Temperature Coefficient	ΔV <sub>DS</sub> /T <sub>J</sub>	I <sub>D</sub> = - 250 μA		- 7		mV/°C
V <sub>GS(th)</sub> Temperature Coefficient	ΔV <sub>GS(th)</sub> /T <sub>J</sub>			1.7		
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = - 250 μA	- 0.35		- 0.8	V
Gate-Source Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 5 V			± 10	μA
		V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 4.5 V			± 1	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = - 12 V, V <sub>GS</sub> = 0 V			- 1	
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	- 1.5			A
		V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 0.4 A		0.530	0.640	Ω
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = - 2.5 V, I <sub>D</sub> = - 0.2 A		0.730	0.880	
		V <sub>GS</sub> = - 1.8 V, I <sub>D</sub> = - 0.1 A		0.920	1.200	
		V <sub>GS</sub> = - 1.5 V, I <sub>D</sub> = - 0.05 A		1.100	1.443	
		V <sub>GS</sub> = - 1.2 V, I <sub>D</sub> = - 0.05 A		1.650	2.475	
		V <sub>DS</sub> = - 6 V, I <sub>D</sub> = - 0.4 A				
Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> = - 6 V, I <sub>D</sub> = - 0.4 A		1		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = - 6 V, V <sub>GS</sub> = 0 V, f = 1 MHz		62		pF
Output Capacitance	C <sub>oss</sub>			26		
Reverse Transfer Capacitance	C <sub>rss</sub>			20		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = - 6 V, V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 0.4 A		2	4	nC
		V <sub>DS</sub> = - 6 V, V <sub>GS</sub> = - 2.5 V, I <sub>D</sub> = - 0.4 A		1.15	2	
Gate-Source Charge	Q <sub>gs</sub>	V <sub>DS</sub> = - 6 V, V <sub>GS</sub> = - 2.5 V, I <sub>D</sub> = - 0.4 A		0.37		
Gate-Drain Charge	Q <sub>gd</sub>			0.43		
Gate Resistance	R <sub>g</sub>	f = 1 MHz		12		Ω
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = - 6 V, R <sub>L</sub> = 20 Ω I <sub>D</sub> ≅ - 0.3 A, V <sub>GEN</sub> = - 5 V, R <sub>g</sub> = 1 Ω		4	8	ns
Rise Time	t <sub>r</sub>			11	20	
Turn-Off Delay Time	t <sub>d(off)</sub>			9	18	
Fall Time	t <sub>f</sub>			9	18	
<b>Drain-Source Body Diode Characteristics</b>						
Pulse Diode Forward Current <sup>a</sup>	I <sub>SM</sub>				- 1.5	A
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = - 0.3 A		- 0.8	- 1.2	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = - 0.3 A, di/dt = 100 A/μs		12	20	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			5	10	nC
Reverse Recovery Fall Time	t <sub>a</sub>			7		ns
Reverse Recovery Rise Time	t <sub>b</sub>			5		

Notes:

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

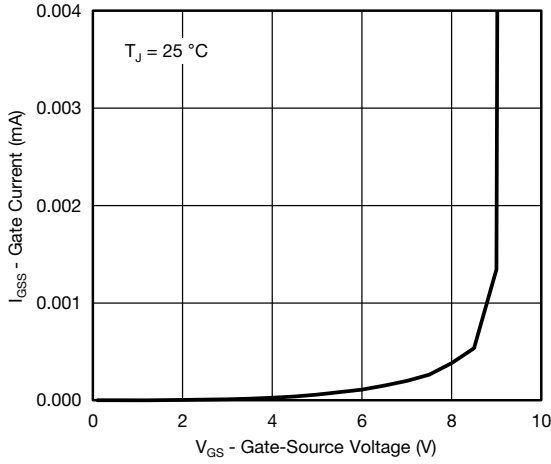
b. Guaranteed by design, not subject to production testing.

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.

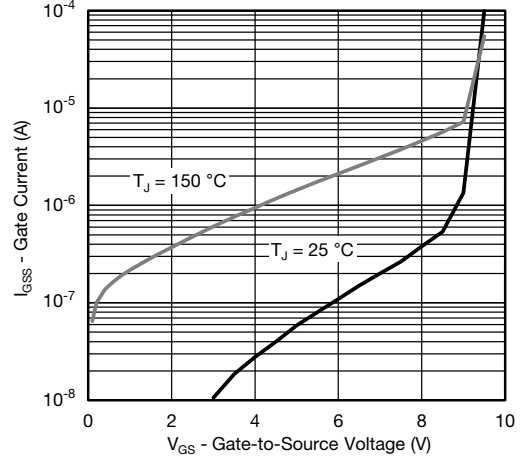


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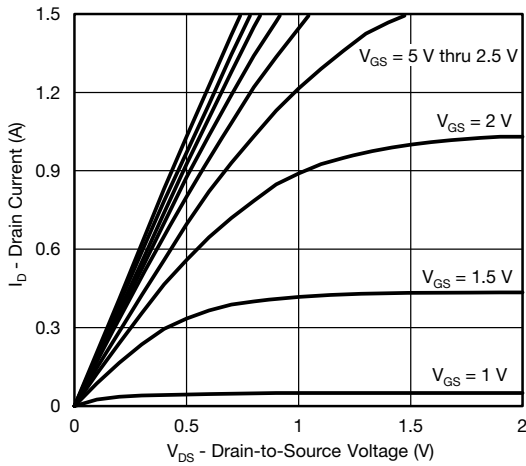
**P-CHANNEL TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



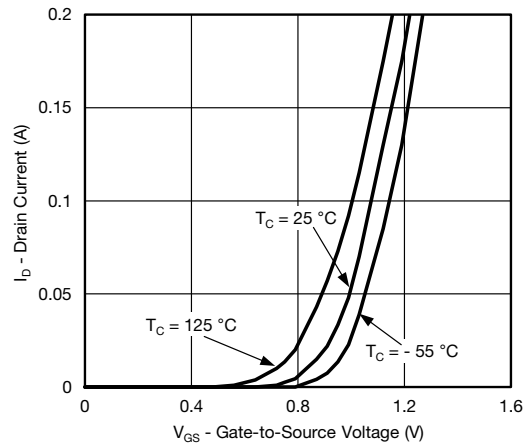
**Gate Current vs. Gate-Source Voltage**



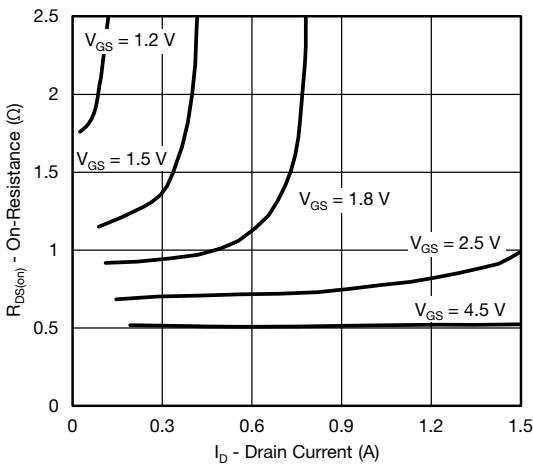
**Gate Current vs. Gate-Source Voltage**



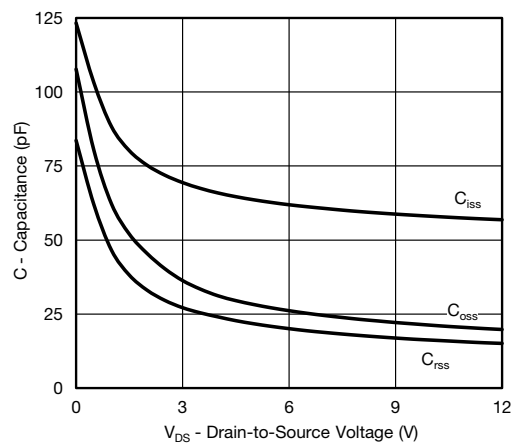
**Output Characteristics**



**Transfer Characteristics**



**On-Resistance vs. Drain Current**



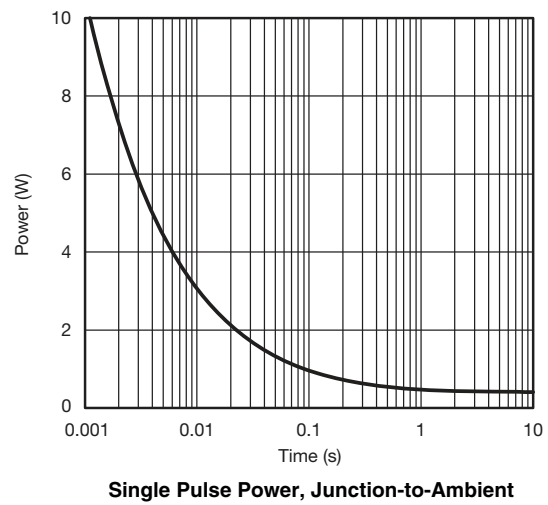
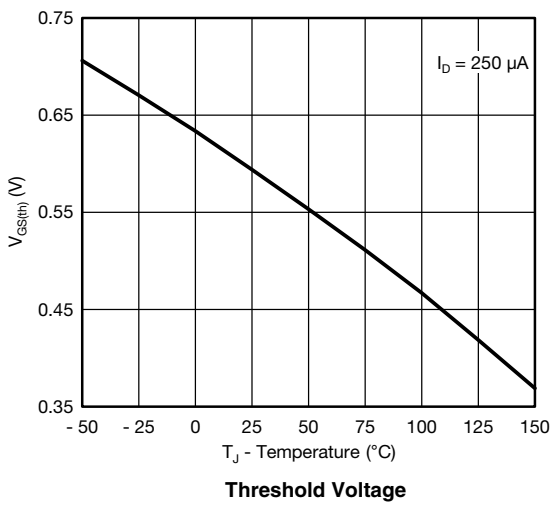
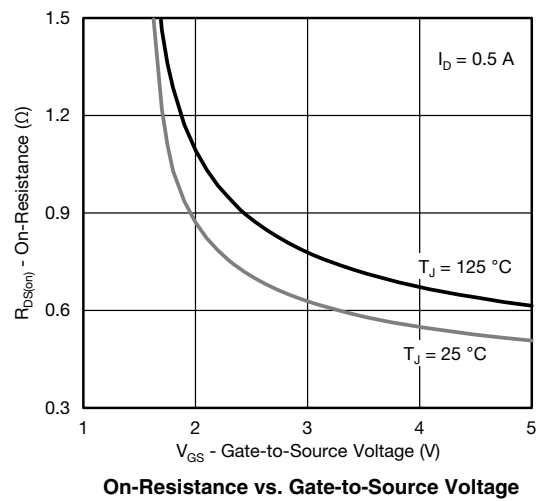
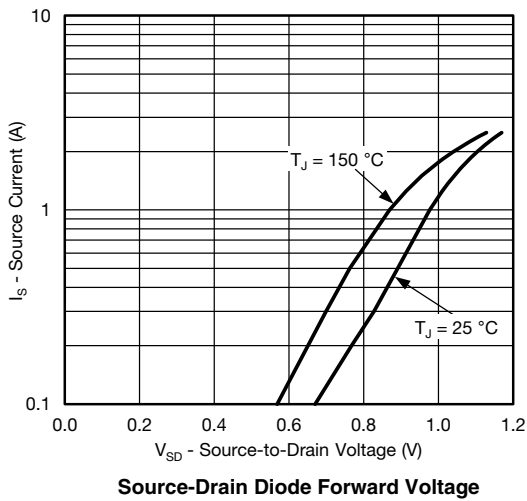
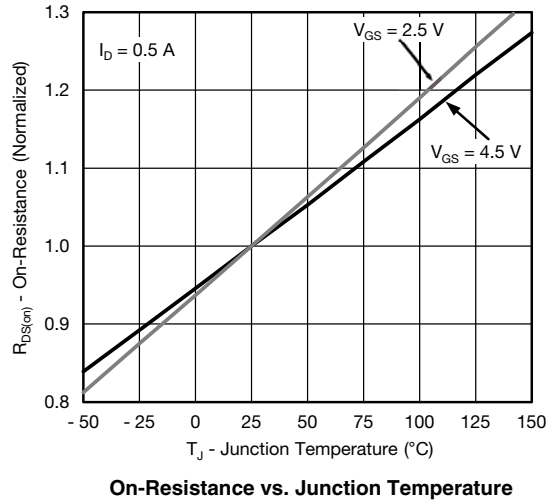
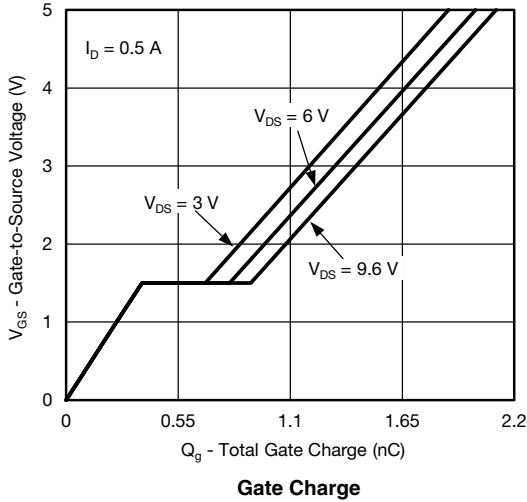
**Capacitance**

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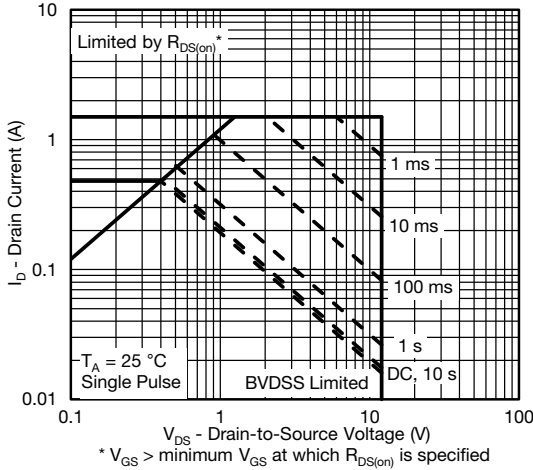
## P-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



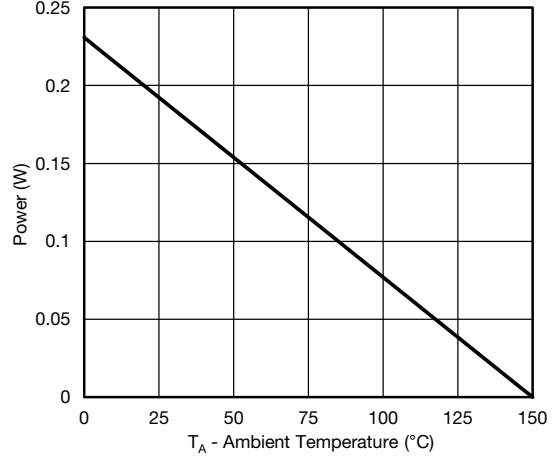


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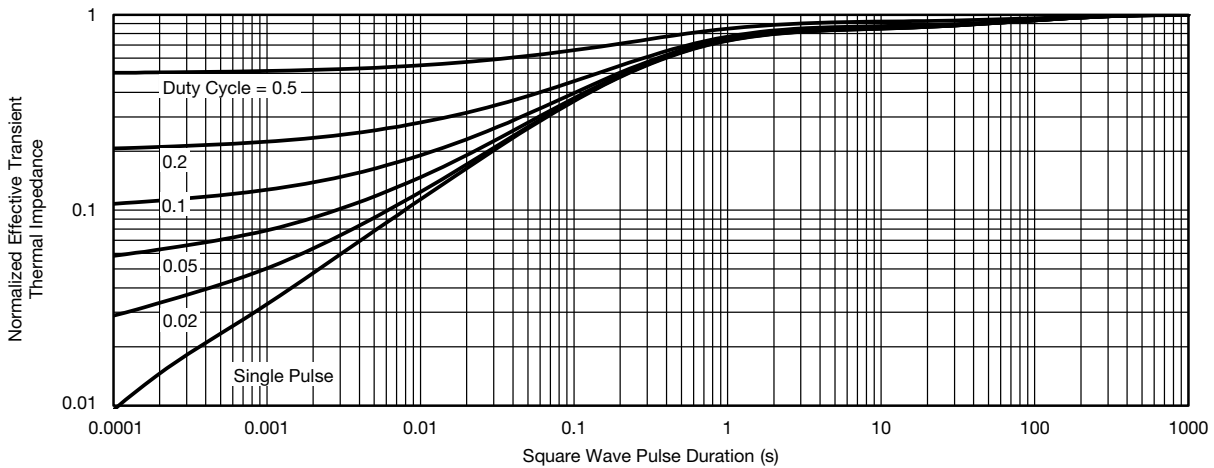
**P-CHANNEL TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



**Safe Operating Area, Junction-to-Ambient**



**Power Derating, Junction-to-Ambient**



**Normalized Thermal Transient Impedance, Junction-to-Ambient**

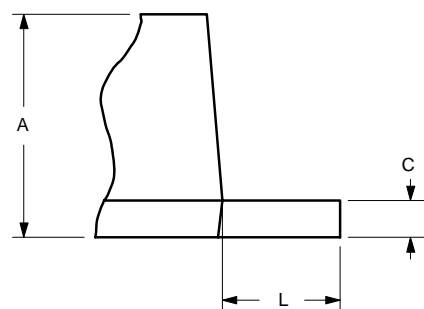
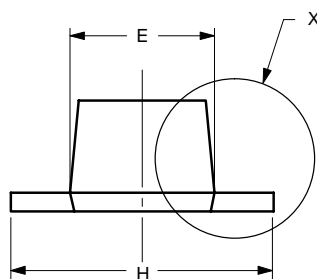
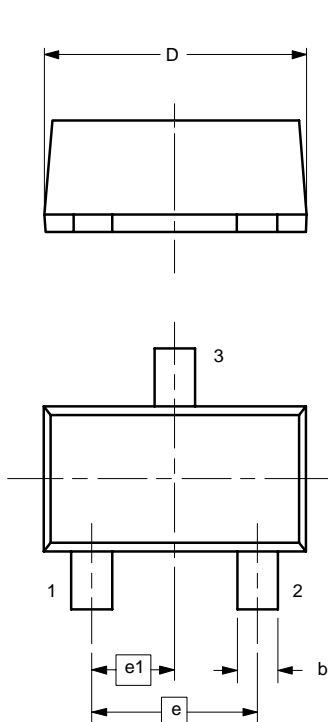
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## Package Information

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#### SC89-3



DETAIL X

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

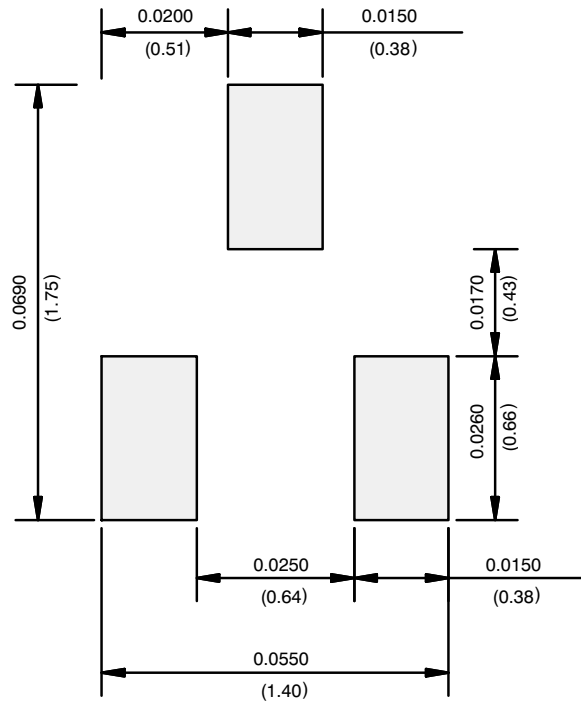
ECN: S-03946—Rev. B, 09-Jul-01  
DWG: 5869

# Application Note 826

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



Recommended Minimum Pads  
Dimensions in Inches/(mm)

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