N-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω) Max.	I_D (A)	Q_g (Typ.)
20	0.420 at V_{GS} = 4.5 V	0.5	1 nC
	0.492 at V_{GS} = 2.5 V	0.2	
	0.597 at V_{GS} = 1.8 V	0.2	
	0.762 at V_{GS} = 1.5 V	0.05	

FEATURES

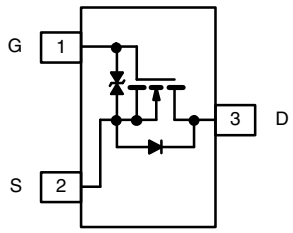
- TrenchFET® Power MOSFET
- Gate-Source ESD Protected: 1000 V
- Material categorization:
  For definitions of compliance please see www.vishay.com/doc?99912

Pb-free
RoHS COMPLIANT
HALOGEN FREE

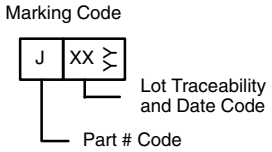
APPLICATIONS

- Load/Power Switching for Portable Devices
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories
- Battery Operated Systems
- Power Supply Converter Circuits

SC-89 (3-LEADS)



Top View



Ordering Information: Si1062X-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	± 8	
Continuous Drain Current (T_J = 150 °C)[a]	T_A = 25 °C	I_D	0.53[a, b]	A
	T_A = 70 °C		0.43[a, b]	
Pulsed Drain Current (t = 300 µs)		I_{DM}	2	
Continuous Source-Drain Diode Current	T_A = 25 °C	I_S	0.18[a, b]	A
Maximum Power Dissipation[a]	T_A = 25 °C	P_D	0.22[a, b]	W
	T_A = 70 °C		0.14[a, b]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS					
Parameter		**Symbol**	**Typ.**	**Max.**	**Unit**
Maximum Junction-to-Ambient[b]	t ≤ 5 s	R_{thJA}	440	530	°C/W
	Steady State		540	650	

Notes:
a. Surface mounted on 1" x 1" FR4 board.
b. t = 5 s.

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA		11		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 1.8		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	0.4		1	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 8 V			± 30	µA
		V_{DS} = 0 V, V_{GS} = ± 4.5 V			± 1	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V			1	
		V_{DS} = 20 V, V_{GS} = 0 V, T_J = 85 °C			10	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = ≥ 5 V, V_{GS} = 4.5 V	2			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 0.5 A		0.350	0.420	Ω
		V_{GS} = 2.5 V, I_D = 0.2 A		0.410	0.492	
		V_{GS} = 1.8 V, I_D = 0.2 A		0.459	0.597	
		V_{GS} = 1.5 V, I_D = 0.05 A		0.510	0.762	
Forward Transconductance	g_{fs}	V_{DS} = 10 V, I_D = 0.5 A		7.5		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz		43		pF
Output Capacitance	C_{oss}			14		
Reverse Transfer Capacitance	C_{rss}			8		
Total Gate Charge	Q_g	V_{DS} = 10 V, V_{GS} = 8 V, I_D = 0.5 A		1.8	2.7	nC
		V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = 0.5 A		1	2	
Gate-Source Charge	Q_{gs}			0.16		
Gate-Drain Charge	Q_{gd}			0.13		
Gate Resistance	R_g	f = 1 MHz		12.2		Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 10 V, R_L = 20 Ω I_D ≅ 0.4 A, V_{GEN} = 4.5 V, R_g = 1 Ω		2	4	ns
Rise Time	t_r			14	24	
Turn-Off Delay Time	$t_{d(off)}$			16	30	
Fall Time	t_f			11	20	
Drain-Source Body Diode Characteristics						
Pulse Diode Forward Current[a]	I_{SM}				2	A
Body Diode Voltage	V_{SD}	I_S = 0.4 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 0.4 A, dI/dt = 100 A/µs		10	15	ns
Body Diode Reverse Recovery Charge	Q_{rr}			2	4	nC
Reverse Recovery Fall Time	t_a			5		ns
Reverse Recovery Rise Time	t_b			5		

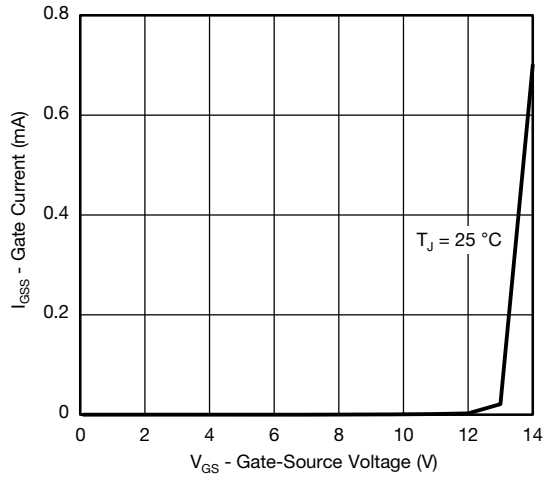
Notes:

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

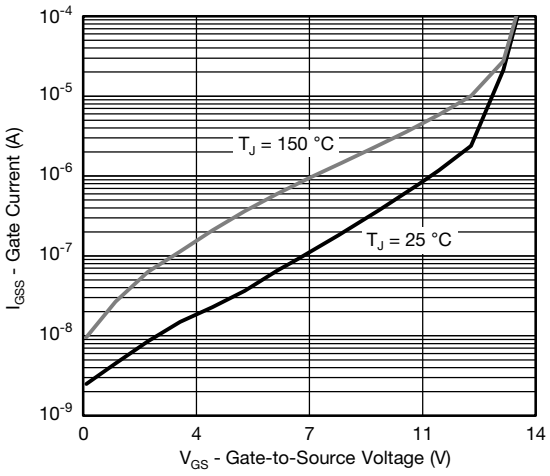
b. Guaranteed by design, not subject to production testing.

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.

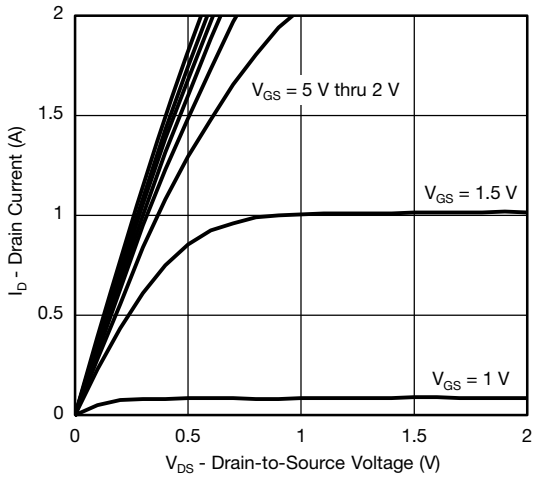
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



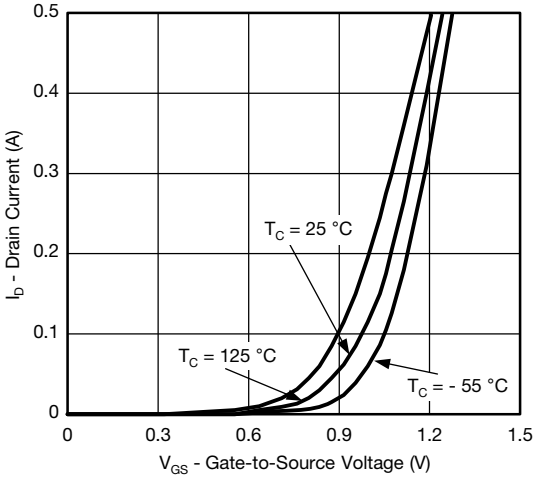
Gate Current vs. Gate-Source Voltage



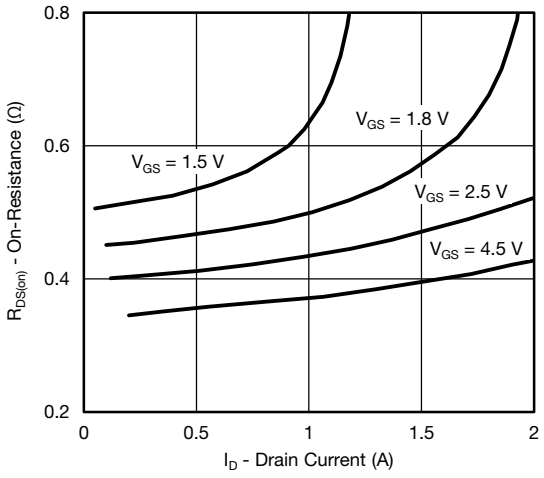
Gate Current vs. Gate-Source Voltage



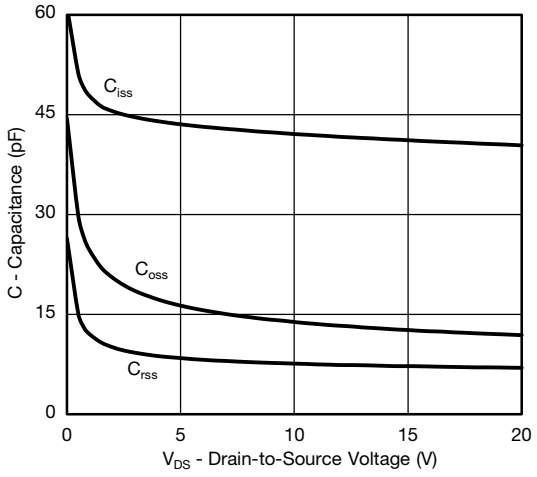
Output Characteristics



Transfer Characteristics

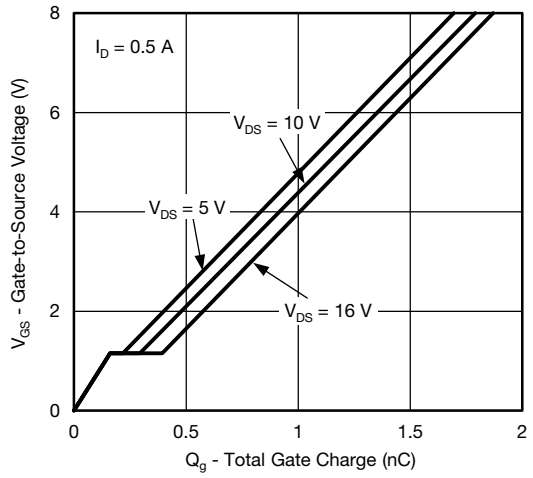


On-Resistance vs. Drain Current

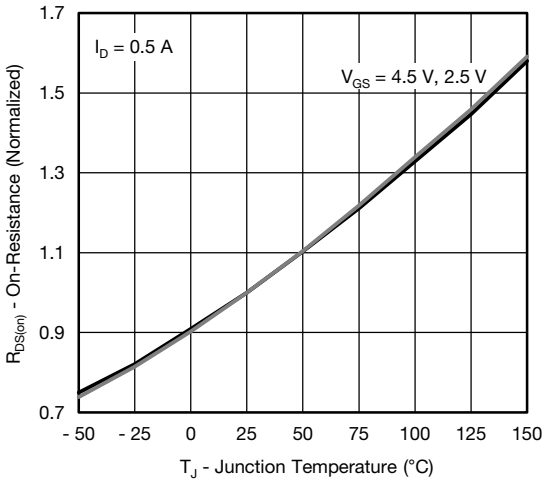


Capacitance

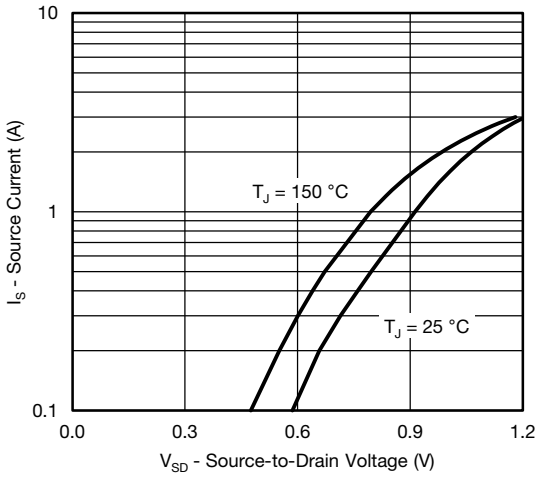
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



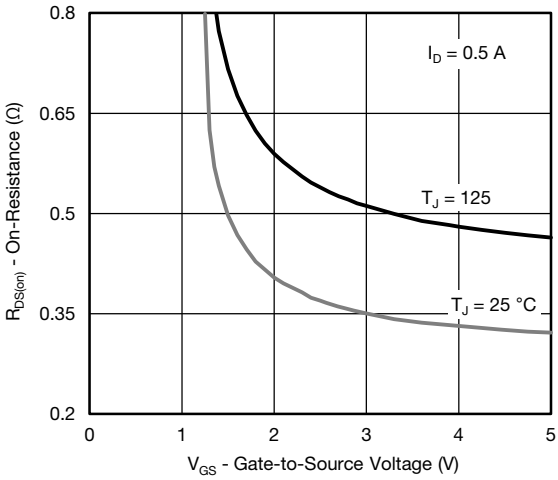
Gate Charge



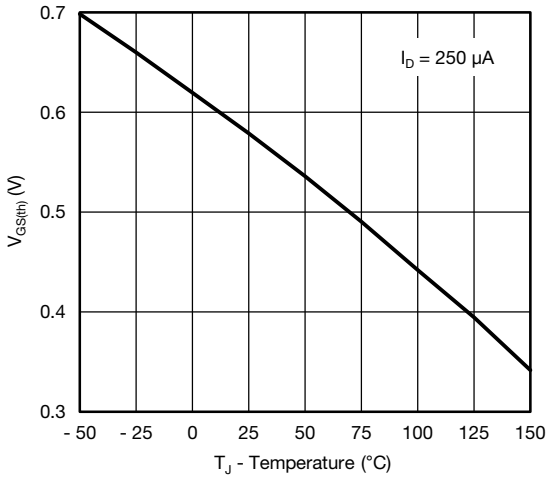
On-Resistance vs. Junction Temperature



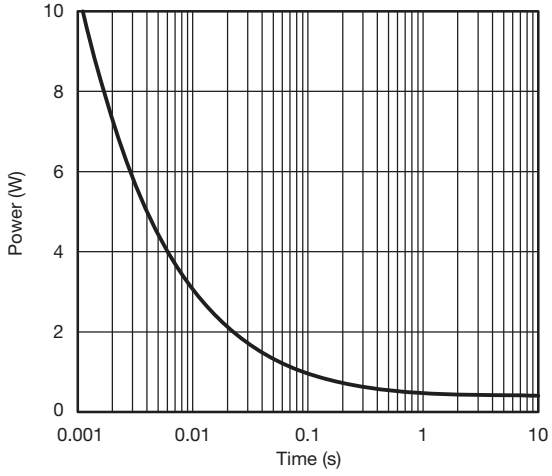
Soure-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

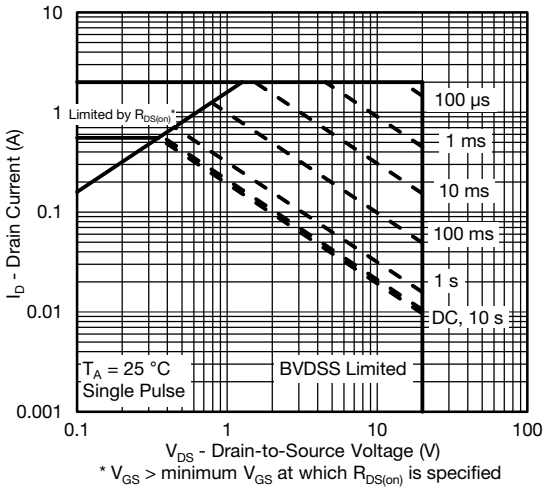


Single Pulse Power, Junction-to-Ambient

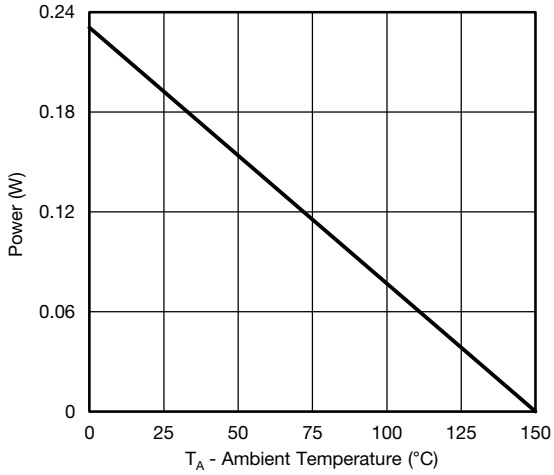
For technical questions, contact: pmostechsupport@vishay.com

Document Number: 62661
S12-2732-Rev. B, 12-Nov-12

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

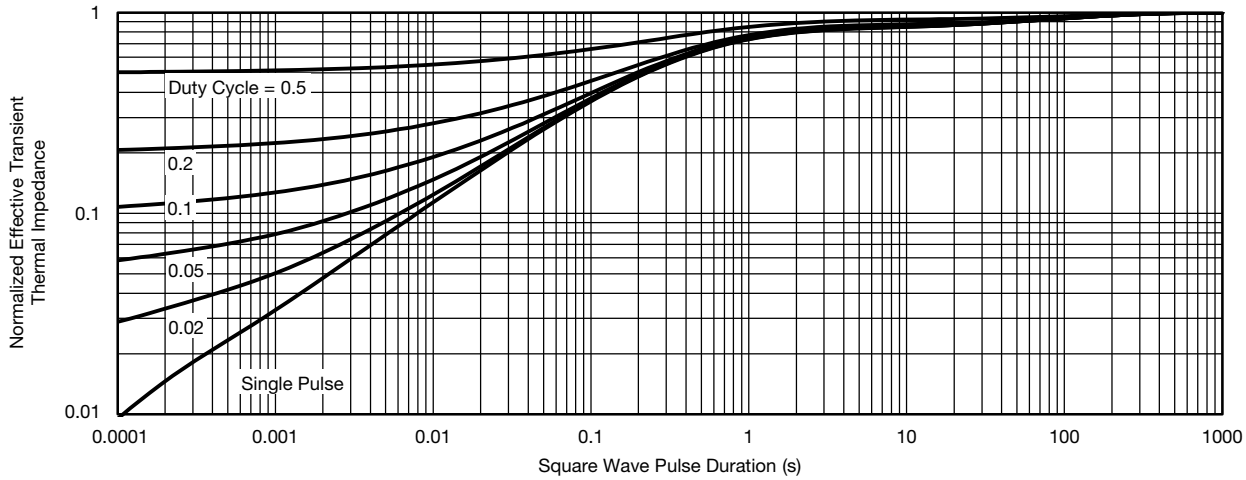


Safe Operating Area, Junction-to-Ambient



Power Derating, Junction-to-Ambient

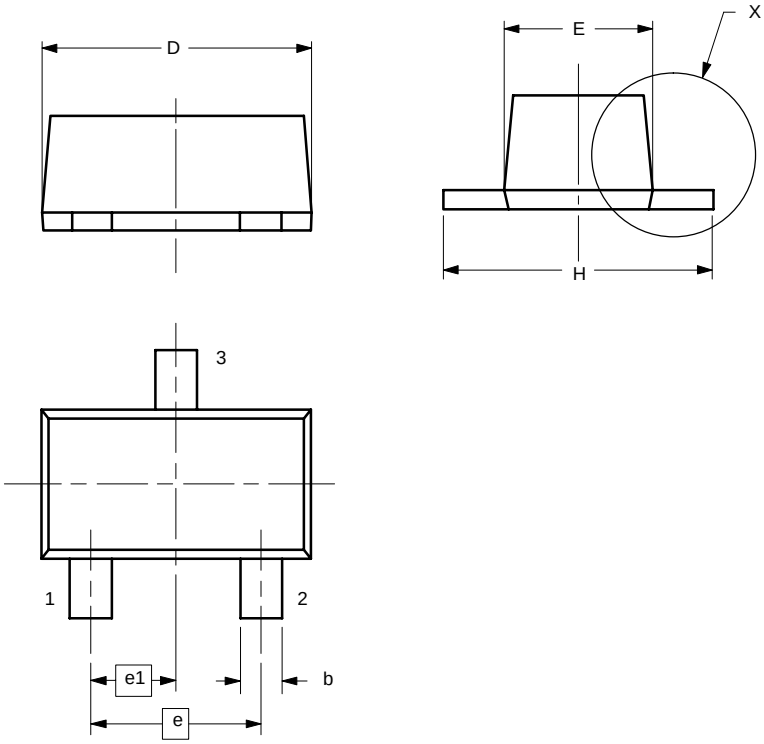
* The power dissipation P_D is based on $T_{J(max)}$ = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



Normalized Thermal Transient Impedance, Junction-to-Ambient

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?62661.

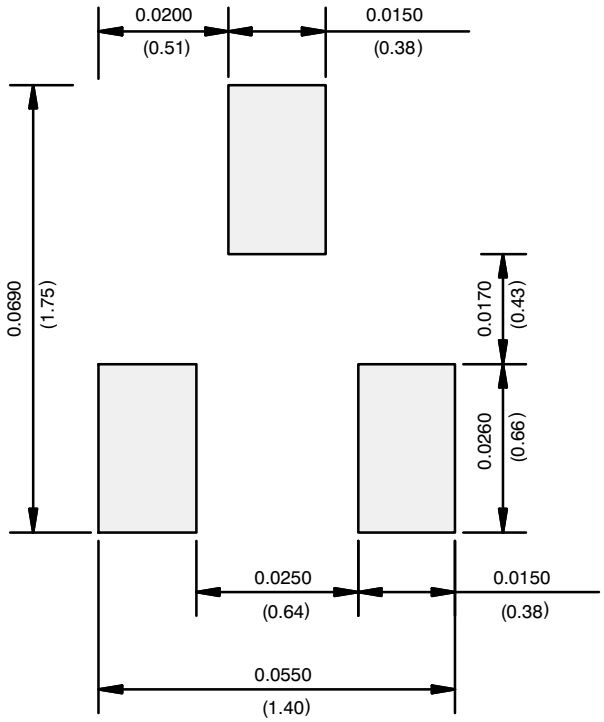
SC89-3



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_1	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

RECOMMENDED MINIMUM PADS FOR SC-89: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

Return to Index

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay’s knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer’s responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer’s technical experts. Product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.