

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

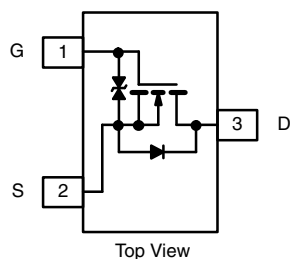


RoHS
COMPLIANT
HALOGEN
FREE

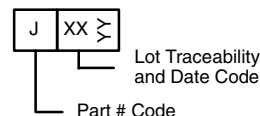
APPLICATIONS

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

SC-89 (3-LEADS)



Marking Code



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	A
	$T_A = 70$ °C	0.53 ^{a, b} 0.43 ^{a, b}	
Pulsed Drain Current ($t = 300$ μ s)	I_{DM}	2	
Continuous Source-Drain Diode Current	$T_A = 25$ °C	I_S	A
Maximum Power Dissipation ^a	$T_A = 25$ °C	P_D	W
	$T_A = 70$ °C	0.22 ^{a, b} 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	R_{thJA}	440	530	°C/W
		540	650	

Notes:

a. Surface mounted on 1" x 1" FR4 board.

b. $t = 5$ s.

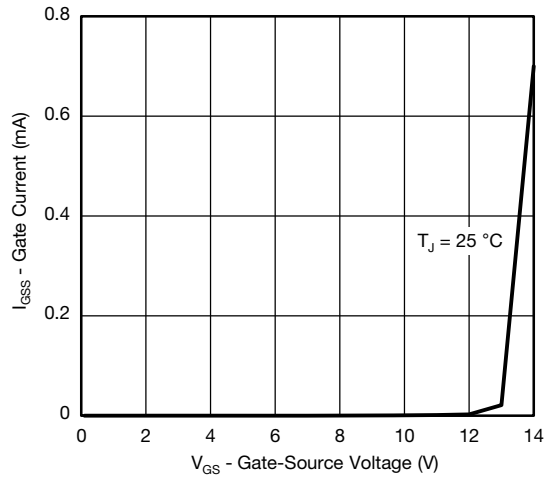
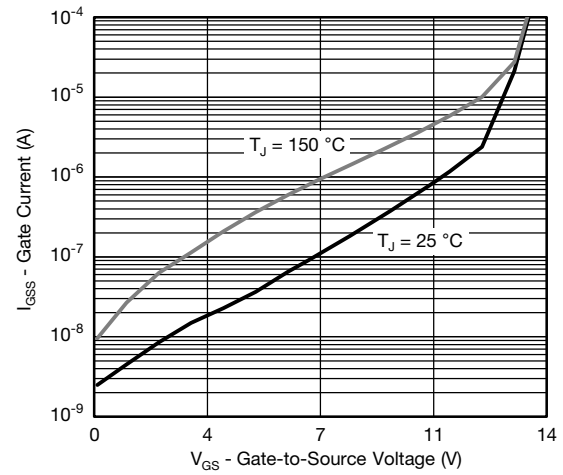
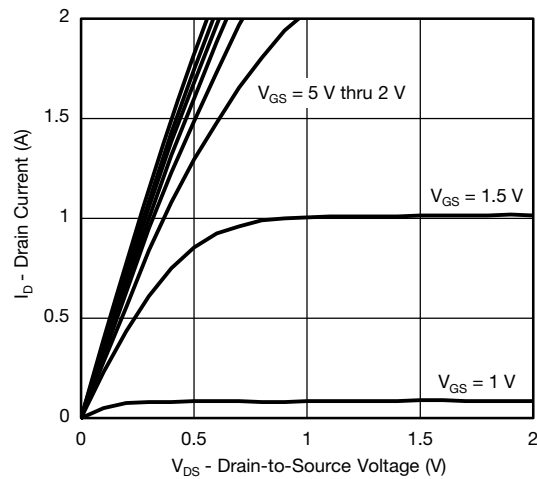
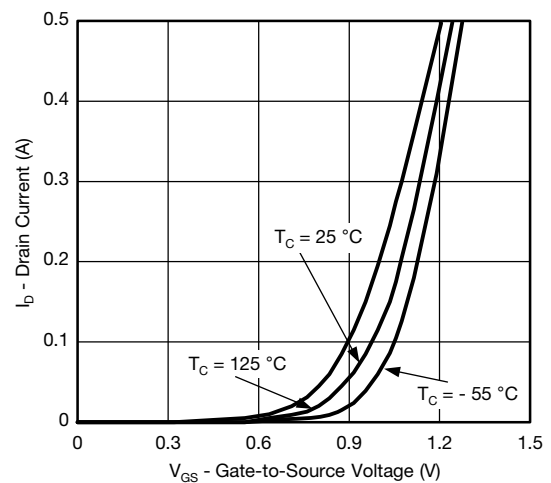
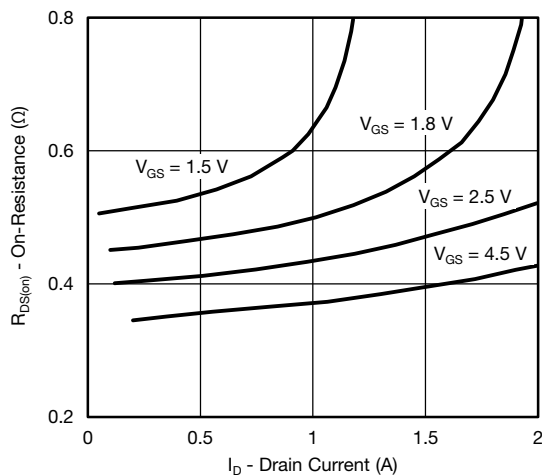
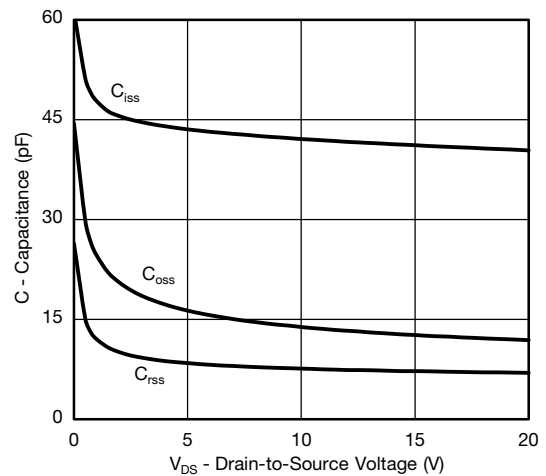
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	20			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		11		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{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	
Q _{gs}			0.16			
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		

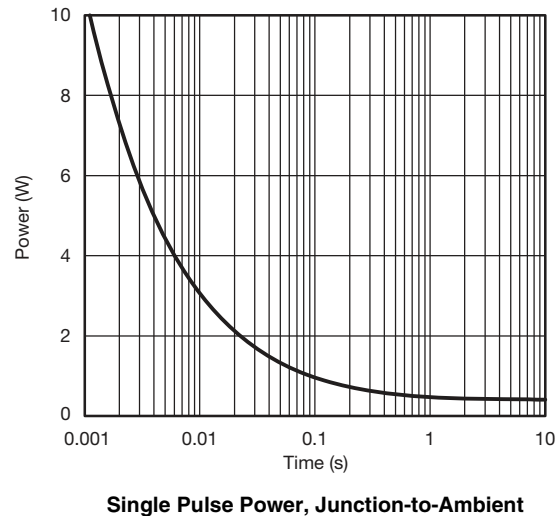
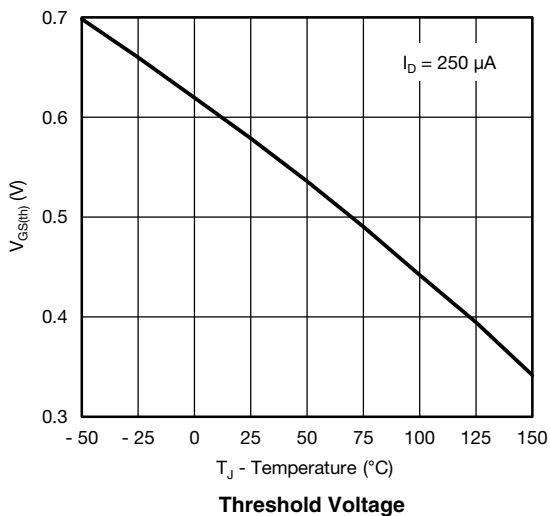
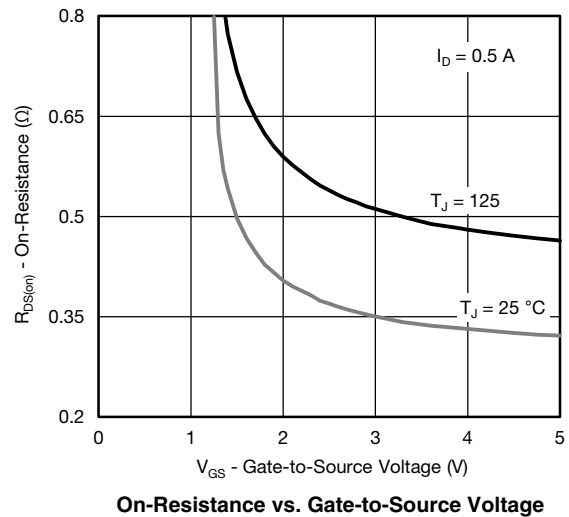
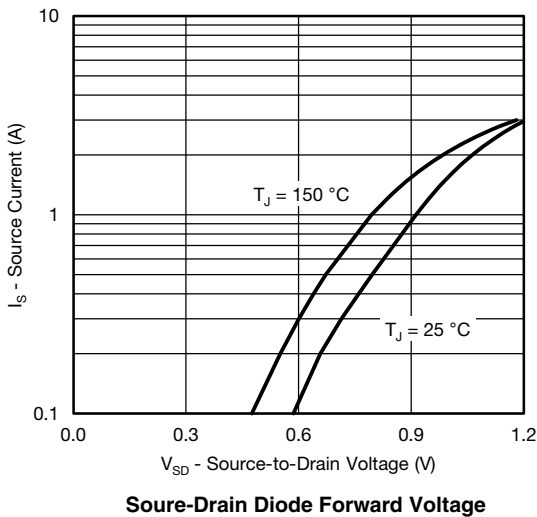
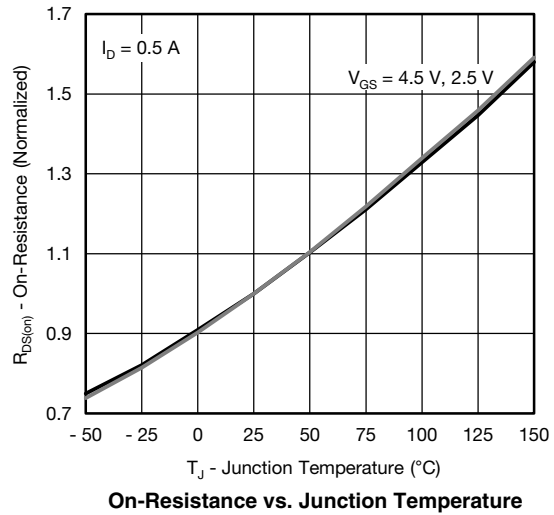
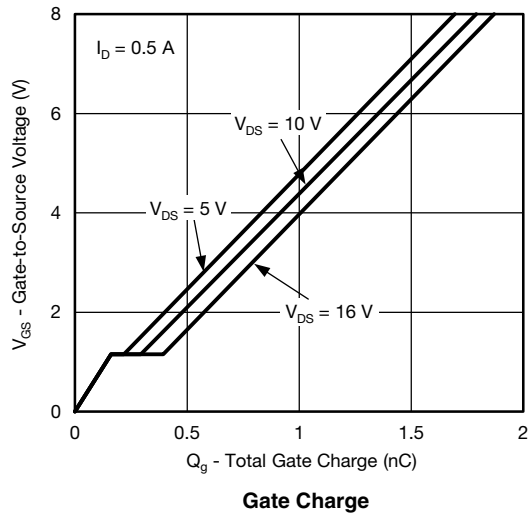
Notes:

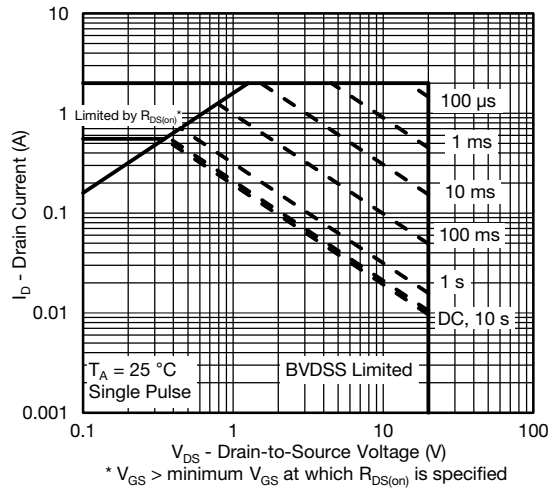
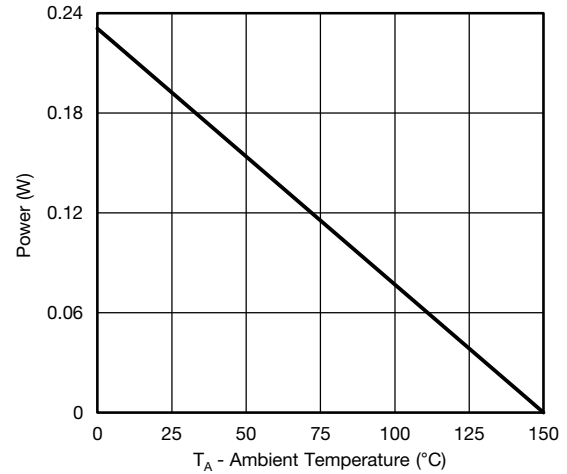
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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

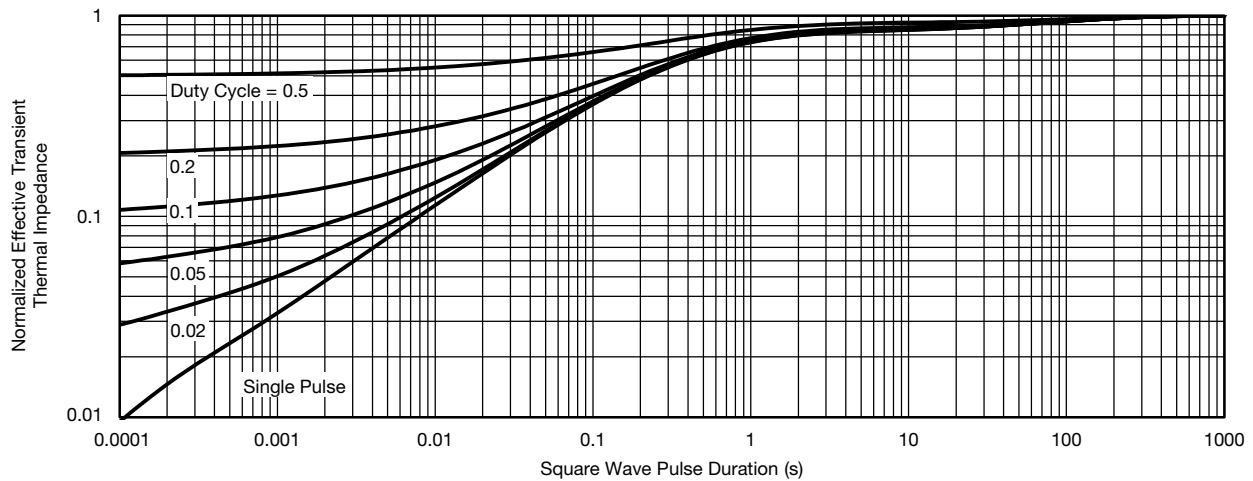
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

**TYPICAL CHARACTERISTICS** (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)

**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)**Safe Operating Area, Junction-to-Ambient****Power Derating, Junction-to-Ambient**

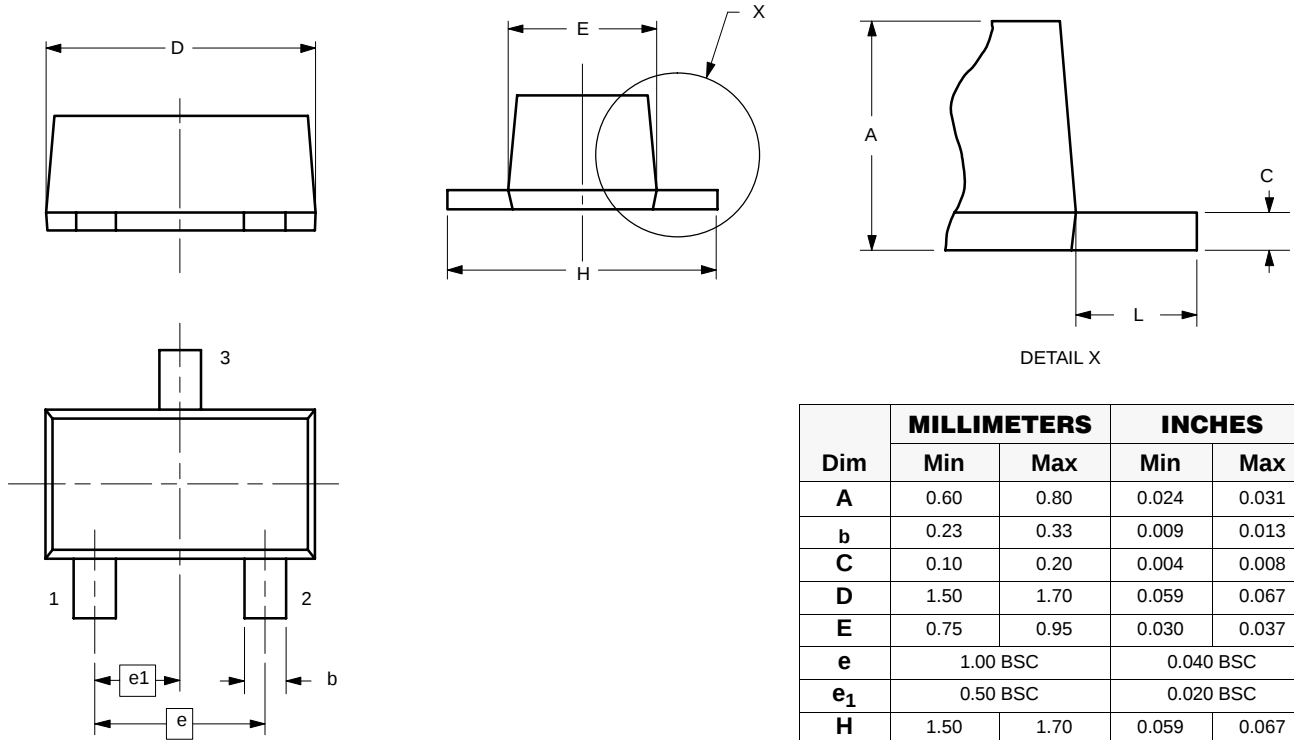
* The power dissipation P_D is based on $T_{J(max)} = 150^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the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

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

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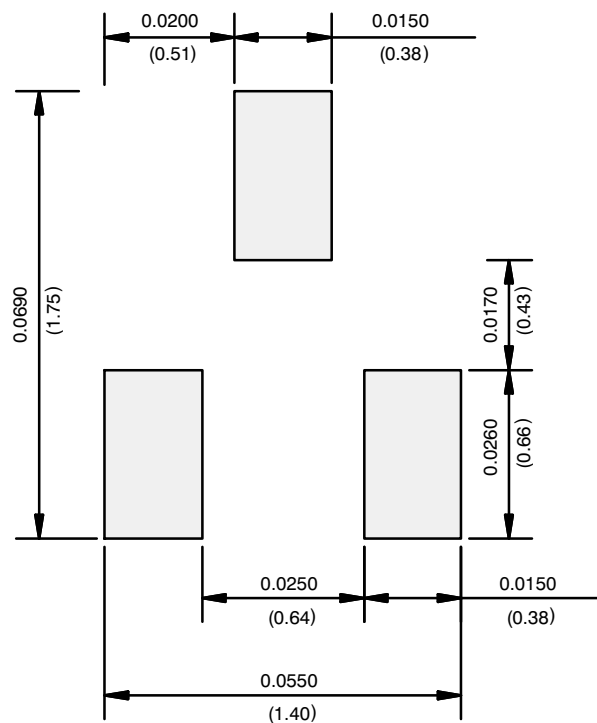
SC89-3



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)

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