

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

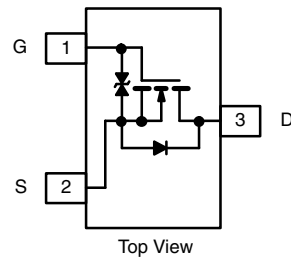


RoHS
COMPLIANT
HALOGEN
FREE

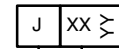
APPLICATIONS

- 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



Lot Traceability
and Date Code

Part # 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	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	R _{thJA}	t ≤ 5 s	440	530	°C/W
		Steady State	540	650	

Notes:

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

b. t = 5 s.

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

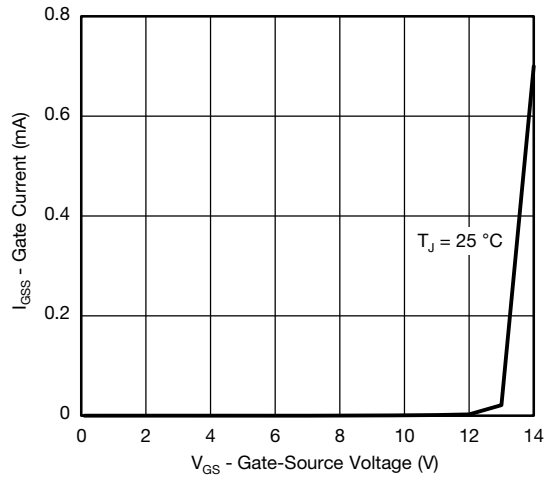
Notes:

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

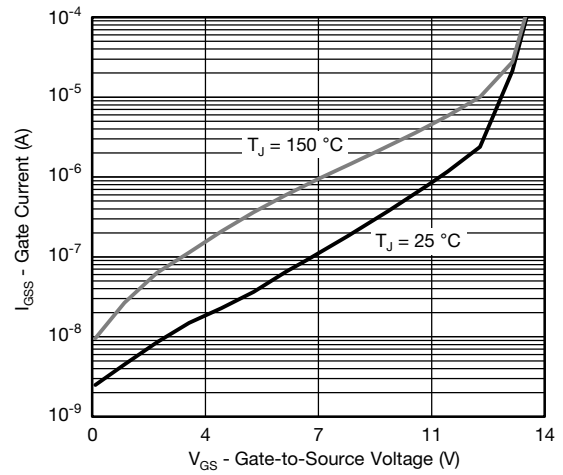
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



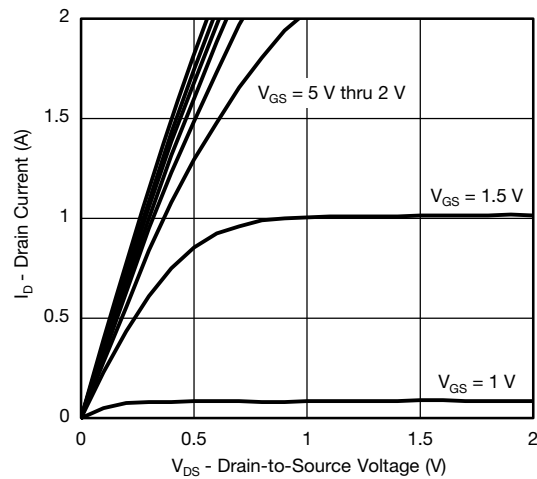
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



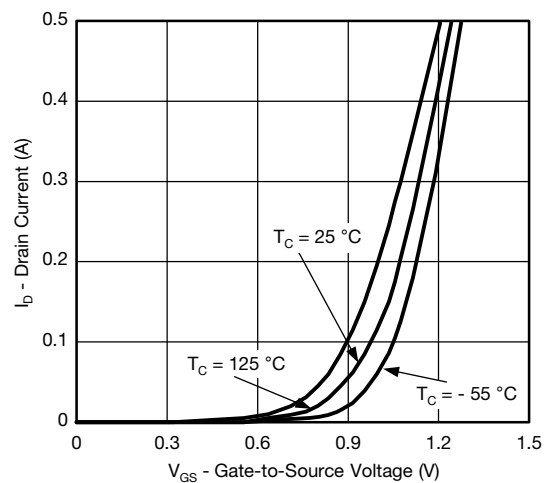
Gate Current vs. Gate-Source Voltage



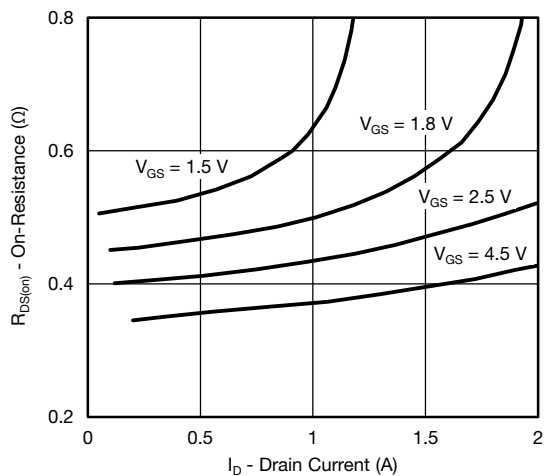
Gate Current vs. Gate-Source Voltage



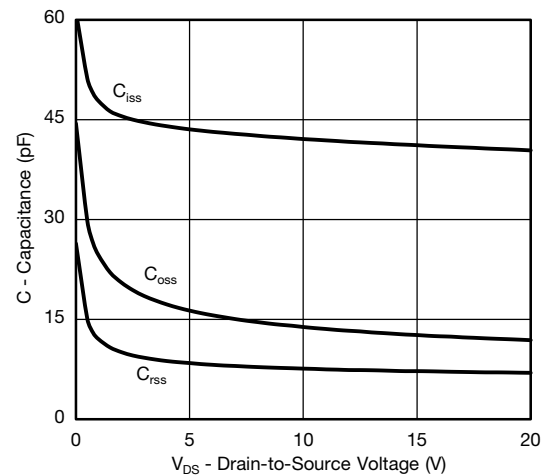
Output Characteristics



Transfer Characteristics

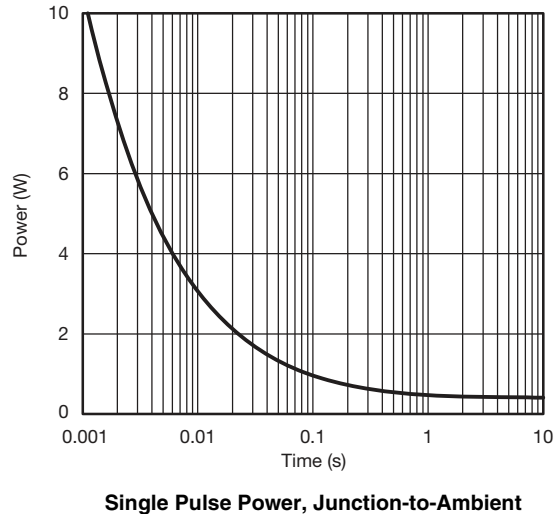
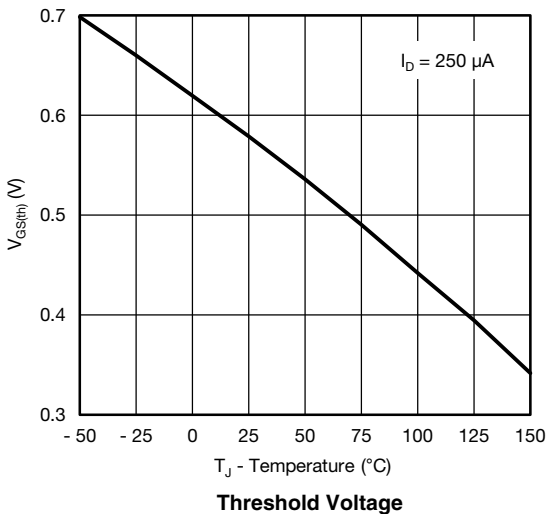
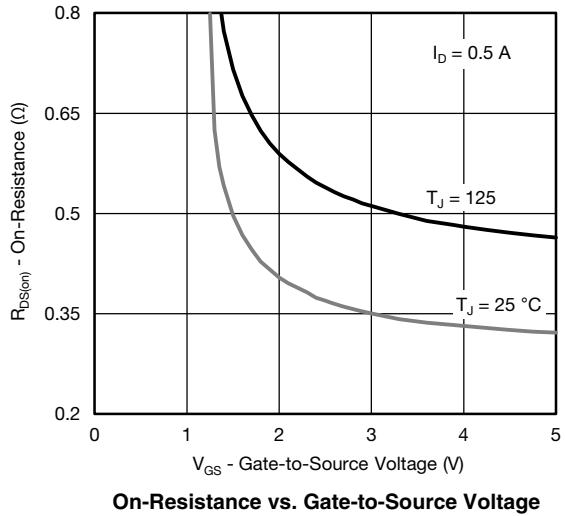
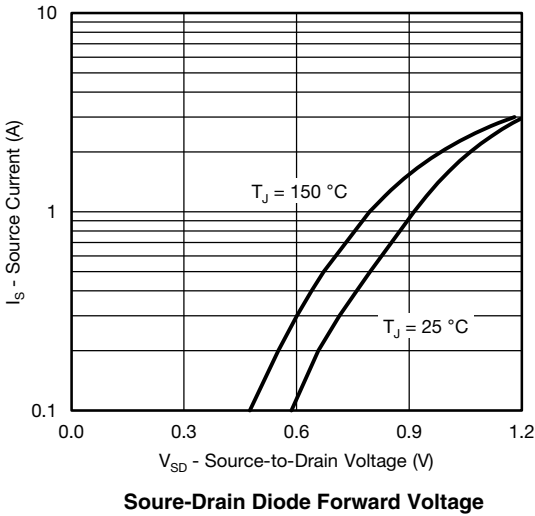
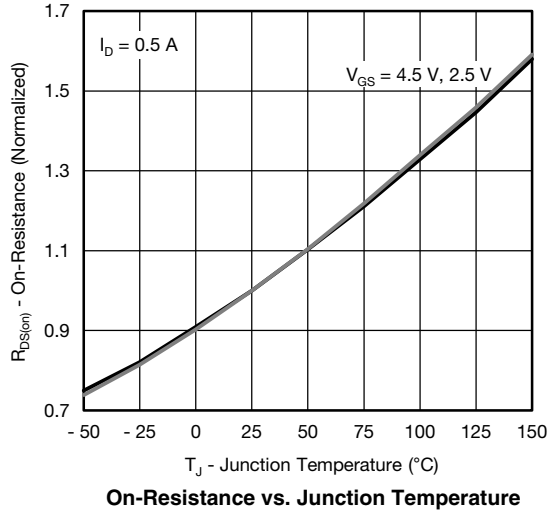
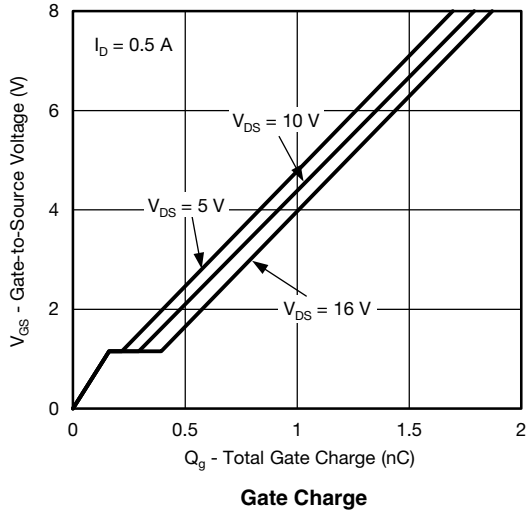


On-Resistance vs. Drain Current



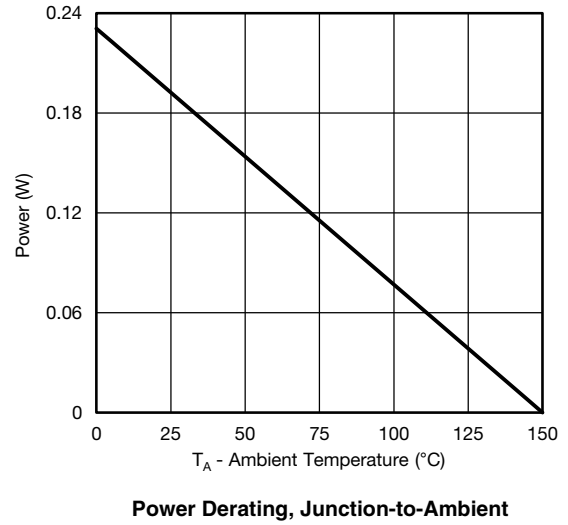
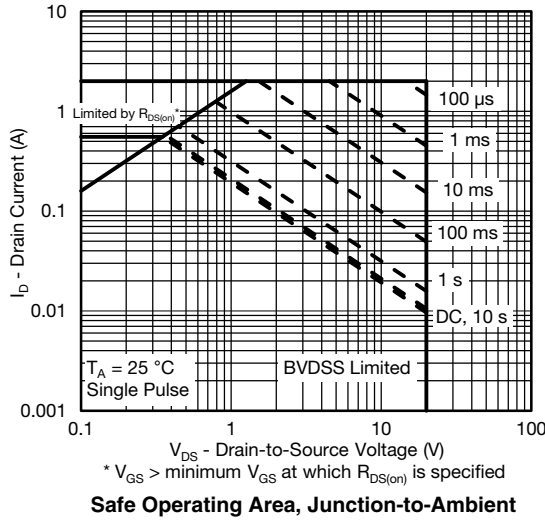
Capacitance

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

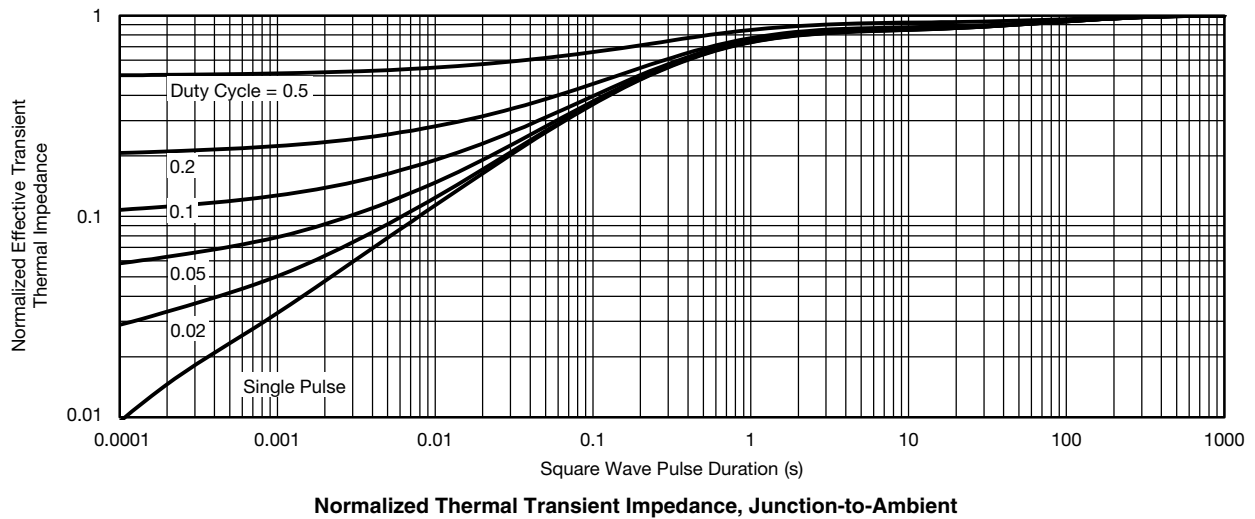




TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



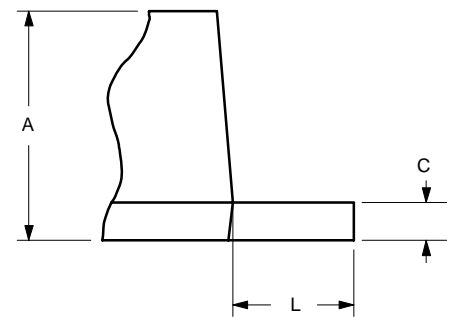
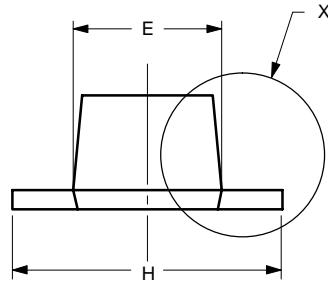
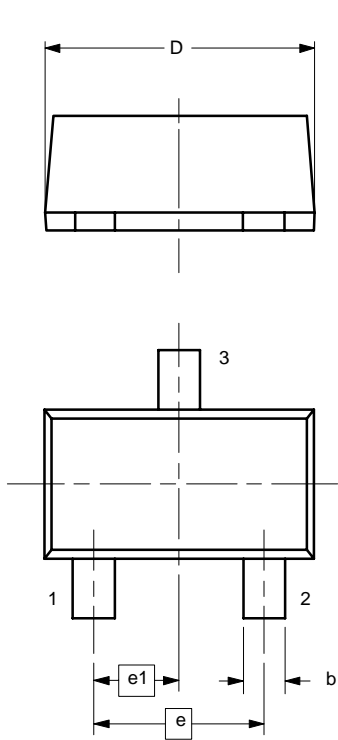
* The power dissipation P_D is based on $T_{J(max)} = 150^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the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



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SC89-3

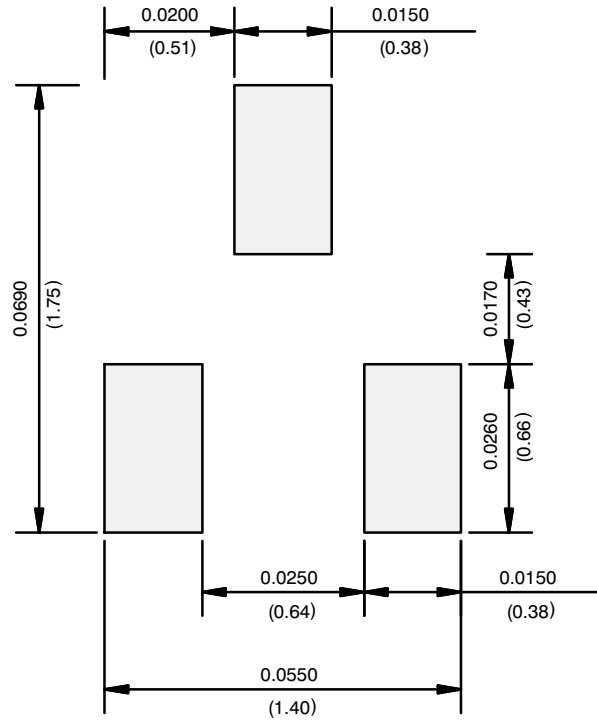


DETAIL X

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	
e₁	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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