Dual N-Channel 30 V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω) Max.	I_D (A)	Q_g (Typ.)
30	0.650 at V_{GS} = 10 V	0.48	0.5
	0.770 at V_{GS} = 4.5 V	0.45	

FEATURES

- TrenchFET® Power MOSFET
- ESD Protected: 550 V Typical HBM
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free
RoHS COMPLIANT
HALOGEN FREE

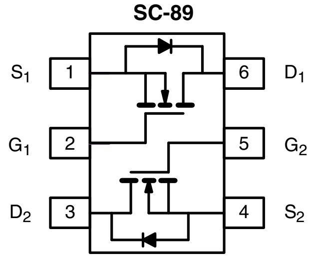
BENEFITS

- Low Offset Voltage
- Low-Voltage Operation
- High-Speed Circuits
- Small Board Area

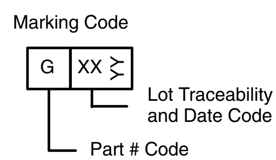
APPLICATIONS

- Load/Signal Switching for Portable Devices
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories
- Battery Operated Systems

SC-89



Top View



Ordering Information: Si1028X-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}	30	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150 °C)[a]	T_A = 25 °C	I_D	0.48[a, b]	A
	T_A = 70 °C		0.45[a, b]	
Pulsed Drain Current (t = 300 µs)		I_{DM}	1	
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}	470	565	°C/W
	Steady State		560	675	

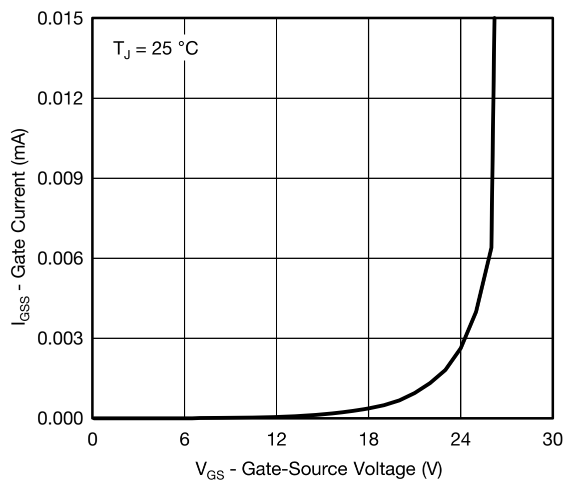
Notes:
a. Surface mounted on 1" x 1" FR4 board.
b. t = 5 s.

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	30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA		33		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 2.8		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 250 µA	1		2.5	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 20	µA
		V_{DS} = 0 V, V_{GS} = ± 4.5 V			± 1	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 30 V, V_{GS} = 0 V			1	
		V_{DS} = 30 V, V_{GS} = 0 V, T_J = 85 °C			10	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = ≥ 5 V, V_{GS} = 10 V	1			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 0.5 A		0.540	0.650	Ω
		V_{GS} = 4.5 V, I_D = 0.2 A		0.640	0.770	
Forward Transconductance	g_{fs}	V_{DS} = 10 V, I_D = 0.5 A		1		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz		16		pF
Output Capacitance	C_{oss}			8		
Reverse Transfer Capacitance	C_{rss}			4		
Total Gate Charge	Q_g	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 0.5 A		1	2	nC
		V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 0.5 A		0.5	1	
Gate-Source Charge	Q_{gs}			0.15		
Gate-Drain Charge	Q_{gd}			0.20		
Gate Resistance	R_g	f = 1 MHz		50		Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 37.5 Ω I_D = 0.38 A, V_{GEN} = 4.5 V, R_g = 1 Ω		8	16	ns
Rise Time	t_r			10	20	
Turn-Off Delay Time	$t_{d(off)}$			9	18	
Fall Time	t_f			8	16	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 37.5 Ω I_D = 0.38 A, V_{GEN} = 10 V, R_g = 1 Ω		2	4	
Rise Time	t_r			9	18	
Turn-Off Delay Time	$t_{d(off)}$			7	14	
Fall Time	t_f			8	16	
Drain-Source Body Diode Characteristics						
Pulse Diode Forward Current[a]	I_{SM}				1	A
Body Diode Voltage	V_{SD}	I_S = 0.38 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 0.38 A, dI/dt = 100 A/µs		9	18	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			4		

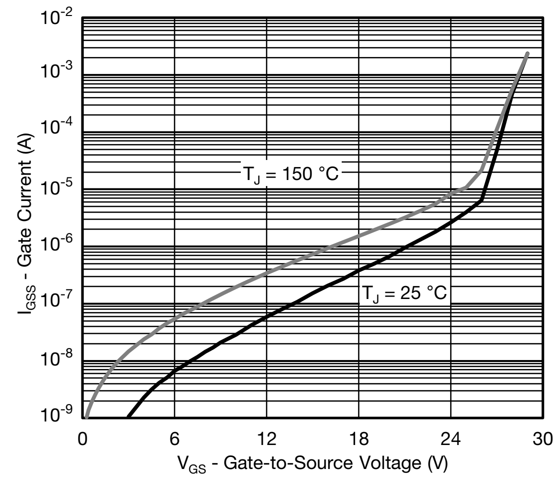
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

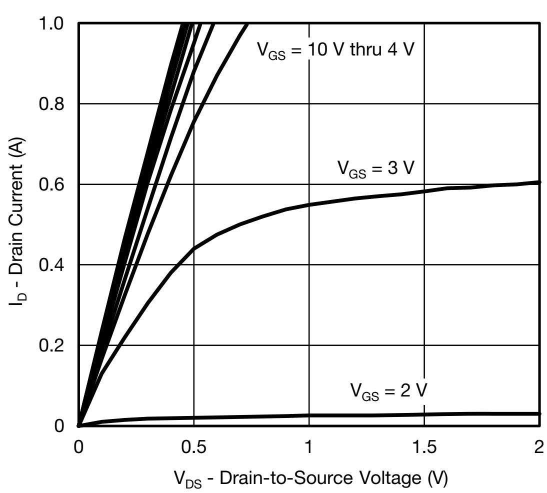
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



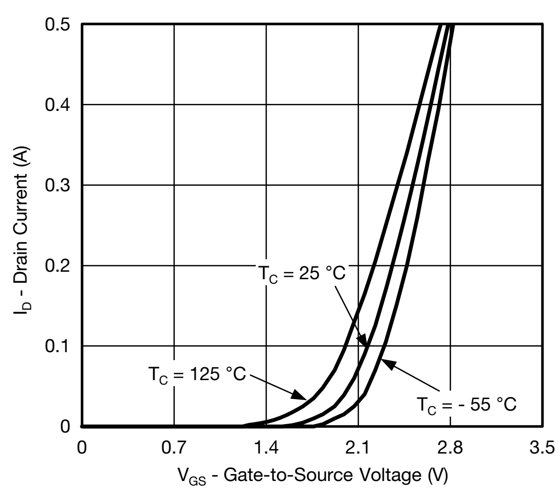
Gate Current vs. Gate-Source Voltage



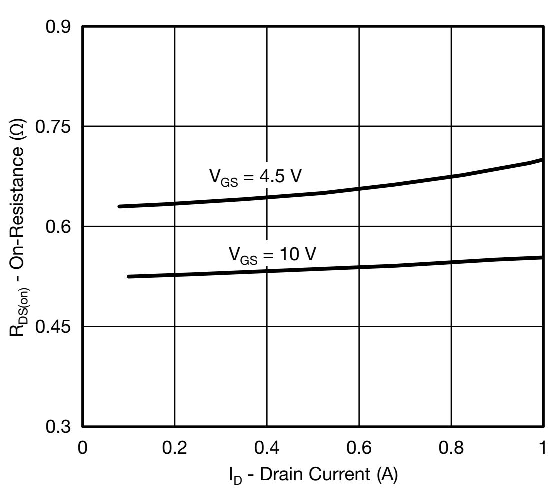
Gate Current vs. Gate-Source Voltage



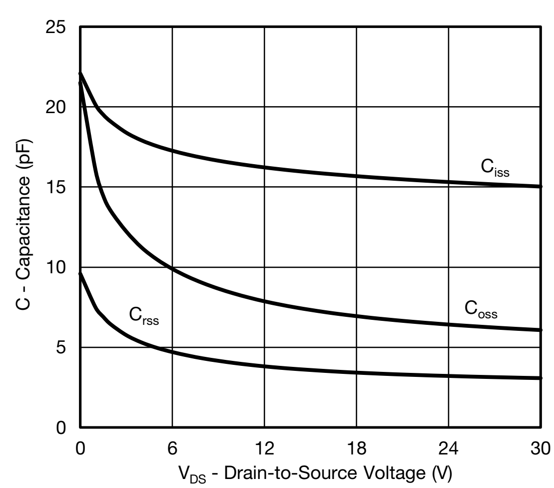
Output Characteristics



Transfer Characteristics

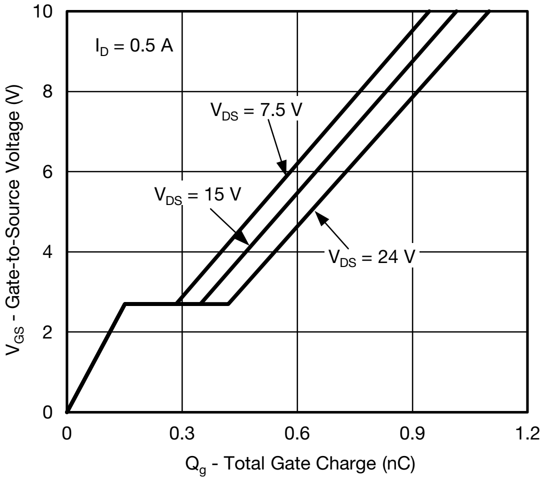


On-Resistance vs. Drain Current

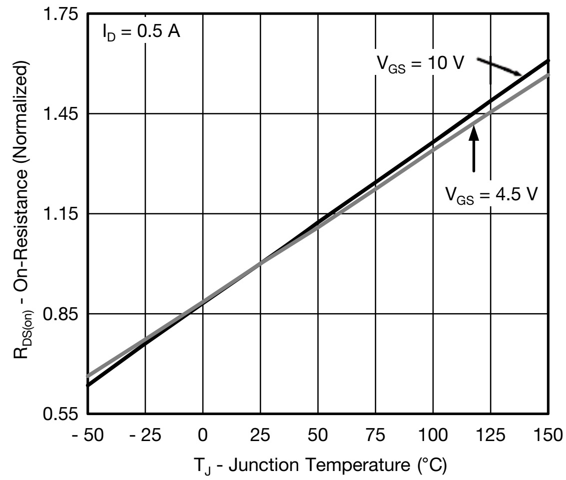


Capacitance

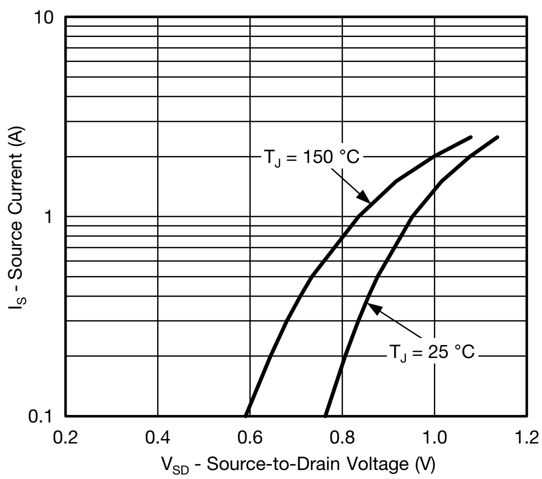
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



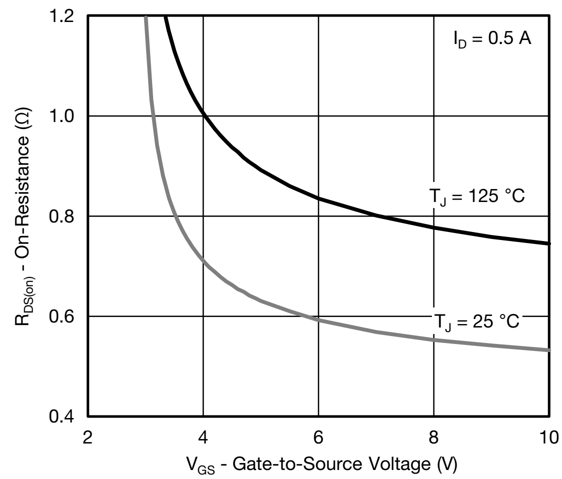
Gate Charge



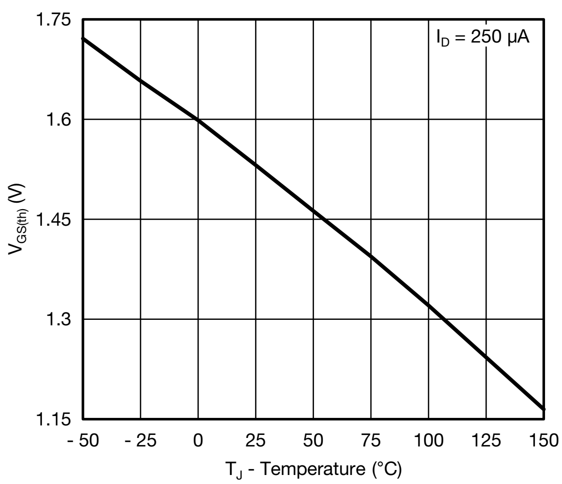
On-Resistance vs. Junction Temperature



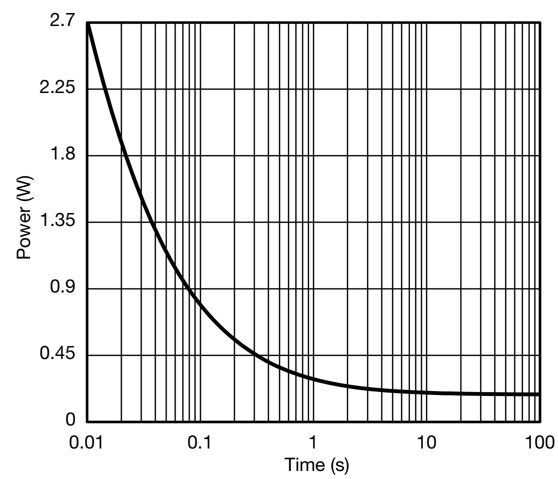
Soure-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

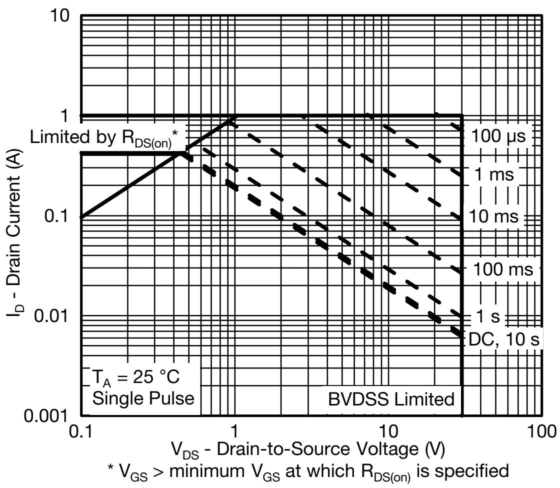


Threshold Voltage

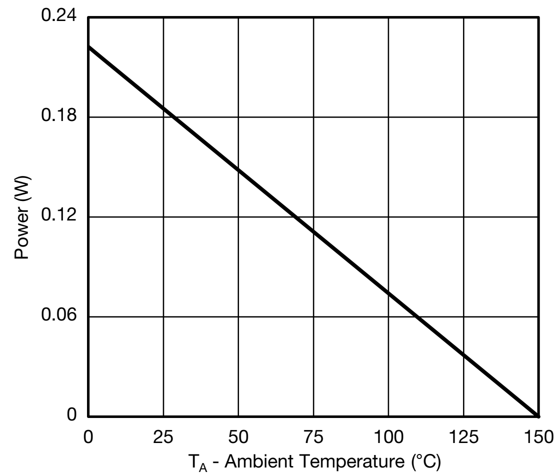


Single Pulse Power, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

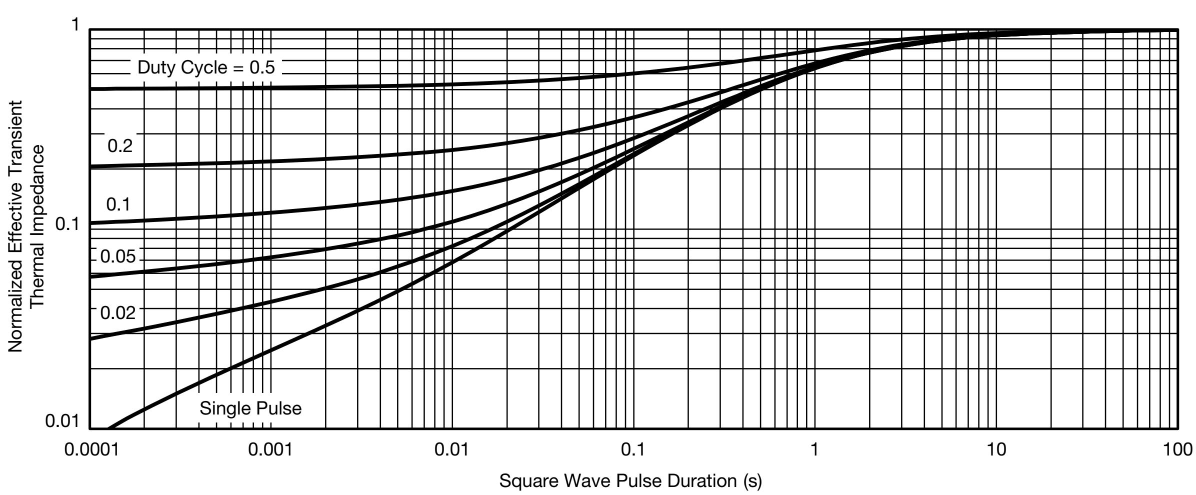


Safe Operating Area, Junction-to-Ambient



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

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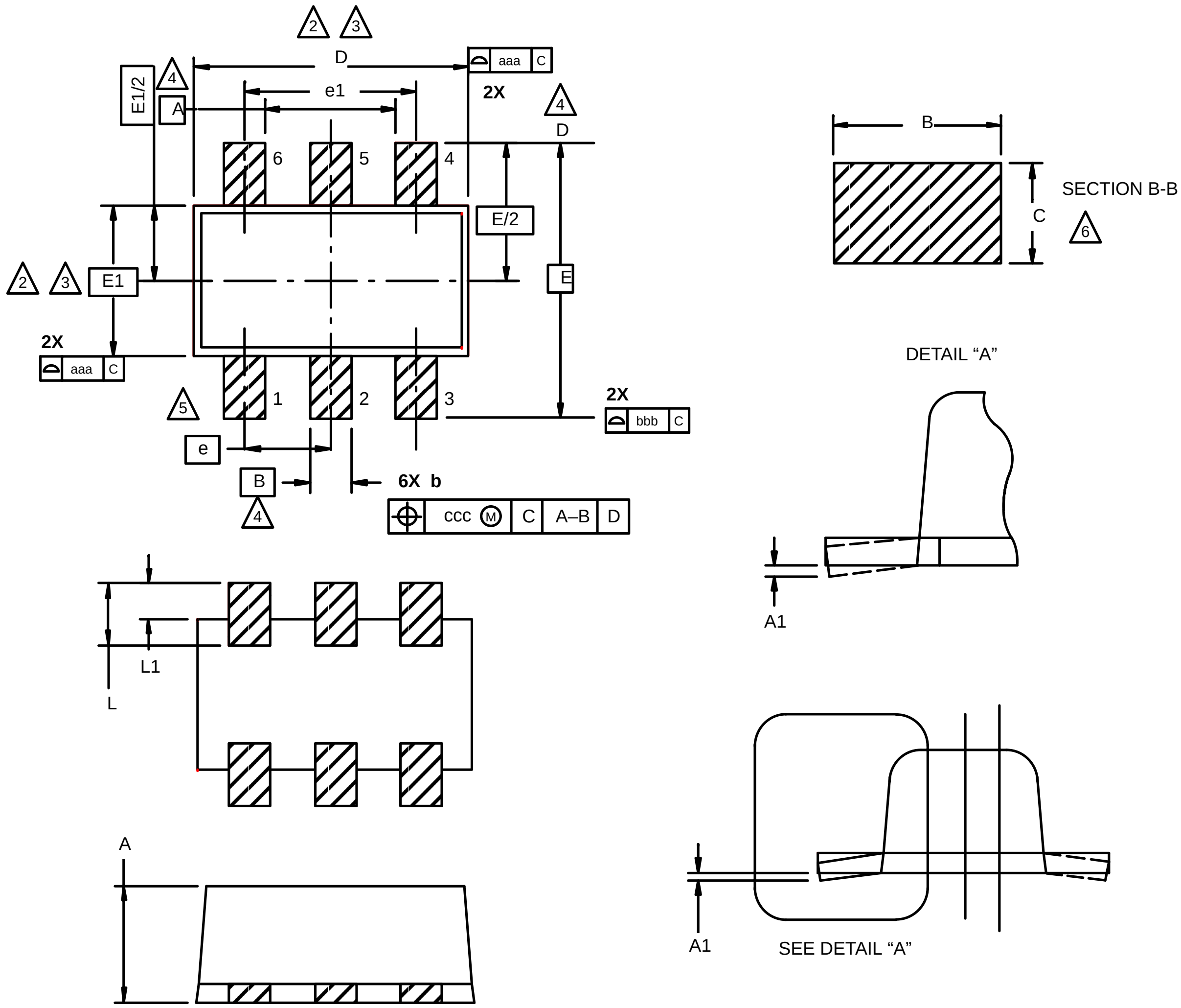
SC89: 6- LEADS (SOT-563F)



NOTES:

1. Dimensions in millimeters.

2. Dimension D does not include mold flash, protrusions or gate burrs. Mold flush, protrusions or gate burrs shall not exceed 0.15 mm per dimension E1 does not include interlead flash or protrusion, interlead flash or protrusion shall not exceed 0.15 mm per side.

3. Dimensions D and E1 are determined at the outmost extremes of the plastic body exclusive of mold flash, the bar burrs, gate burrs and interlead flash, but including any mismatch between the top and the bottom of the plastic body.

4. Datums A, B and D to be determined 0.10 mm from the lead tip.

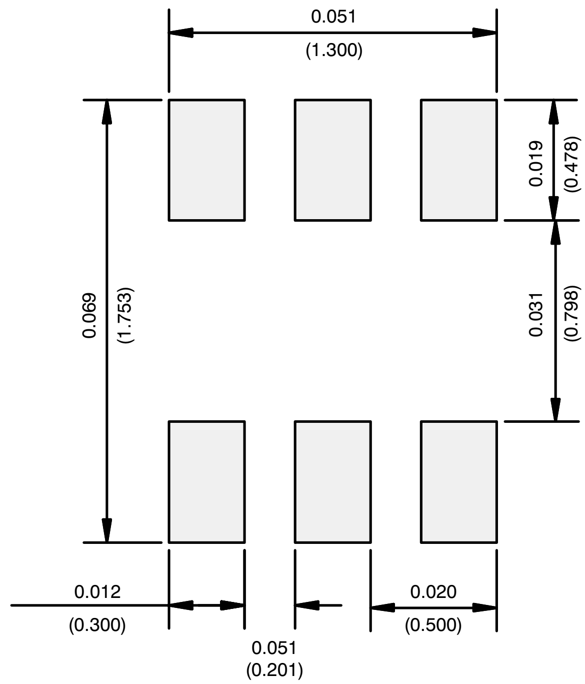
5. Terminal numbers are shown for reference only.

6. These dimensions apply to the flat section of the lead between 0.08 mm and 0.15 mm from the lead tip.

Dim	MILLIMETERS Min	Max	Note	Symbol	Tolerances Of Form And Position
A	0.56	0.60		aaa	0.10
A1	0.00	0.10		bbb	0.10
b	0.15	0.30		ccc	0.10
c	0.10	0.18			
D	1.50	1.70	2, 3		
E	1.55	1.70			
E1	1.20 BSC		2, 3		
e	0.50 BSC				
e1	1.00 BSC				
L	0.35 BSC				
L1	0.20 BSC				

ECN: E-00499—Rev. B, 02-Jul-01
DWG: 5880

RECOMMENDED MINIMUM PADS FOR SC-89: 6-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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