P-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω) Max.	I_D (A)	Q_g (Typ.)
- 20	0.078 at V_{GS} = - 4.5 V	- 1.4	12.1 nC
	0.098 at V_{GS} = - 2.5 V	- 1	
	0.130 at V_{GS} = - 1.8 V	- 1	
	0.188 at V_{GS} = - 1.5 V	- 0.3	

FEATURES

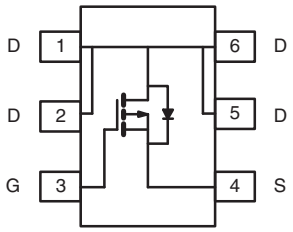
- TrenchFET® Power MOSFET
- Typical ESD Performance 2500 V
- 100 % R_g Tested
- Material categorization:
  For definitions of compliance please see
  www.vishay.com/doc?99912

Pb-free
RoHS COMPLIANT
HALOGEN FREE

APPLICATIONS

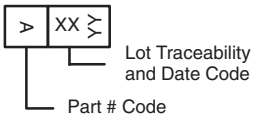
- Load Switch for Portable Devices
- Power Management

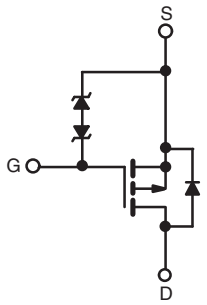
SC-89 (6-LEADS)



Top View

Marking Code





P-Channel MOSFET

Ordering Information: Si1077X-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)	T_A = 25 °C	I_D	- 1.75[b, c]	A
	T_A = 70 °C		- 1.4[b, c]	
Pulsed Drain Current (t = 300 µs)		I_{DM}	- 8	
Continuous Source-Drain Diode Current	T_A = 25 °C	I_S	- 0.28[b, c]	
Maximum Power Dissipation	T_A = 25 °C	P_D	0.33[b, c]	W
	T_A = 70 °C		0.21[b, c]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS					
Parameter		**Symbol**	**Typical**	**Maximum**	**Unit**
Maximum Junction-to-Ambient[a, b]	t ≤ 5 s	R_{thJA}	300	375	°C/W
	Steady State		360	450	

Notes:
a. Maximum under steady state conditions is 450 °C/W.
b. Surface mounted on 1" x 1" FR4 board.
c. t = 5 s.

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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	$\Delta V_{GS(th)}/T_J$			2.4		
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			± 10	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	- 8			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 4.5 V, I_D = - 1.8 A		0.065	0.078	Ω
		V_{GS} = - 2.5 V, I_D = - 1 A		0.081	0.098	
		V_{GS} = - 1.8 V, I_D = - 1 A		0.100	0.130	
		V_{GS} = - 1.5 V, I_D = - 0.3 A		0.125	0.188	
Forward Transconductance	g_{fs}	V_{DS} = - 10 V, I_D = - 1.8 A		10		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = - 10 V, V_{GS} = 0 V, f = 1 MHz		965		pF
Output Capacitance	C_{oss}			110		
Reverse Transfer Capacitance	C_{rss}			101		
Total Gate Charge	Q_g	V_{DS} = - 10 V, V_{GS} = - 8 V, I_D = - 1.75 A		20.7	31.1	nC
		V_{DS} = - 10 V, V_{GS} = - 4.5 V, I_D = - 1.75 A		12.1	18.2	
Gate-Source Charge	Q_{gs}			1.85		
Gate-Drain Charge	Q_{gd}			2.21		
Gate Resistance	R_g	f = 1 MHz	3.6	18	36	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 10 V, R_L = 7.1 Ω I_D ≅ - 1.4 A, V_{GEN} = - 4.5 V, R_g = 1 Ω		24	36	ns
Rise Time	t_r			17	26	
Turn-Off Delay Time	$t_{d(off)}$			95	145	
Fall Time	t_f			28	42	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 10 V, R_L = 7.1 Ω I_D = - 1.4 A, V_{GEN} = - 8 V, R_g = 1 Ω		5	10	ns
Rise Time	t_r			8	16	
Turn-Off Delay Time	$t_{d(off)}$			115	173	
Fall Time	t_f			26	39	
Drain-Source Body Diode Characteristics						
Pulse Diode Forward Current[a]	I_{SM}				- 8	A
Body Diode Voltage	V_{SD}	I_S = - 1.4 A		- 0.75	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = - 1.4 A, dI/dt = 100 A/µs		16	24	ns
Body Diode Reverse Recovery Charge	Q_{rr}			7	14	nC
Reverse Recovery Fall Time	t_a			9		ns
Reverse Recovery Rise Time	t_b			7		

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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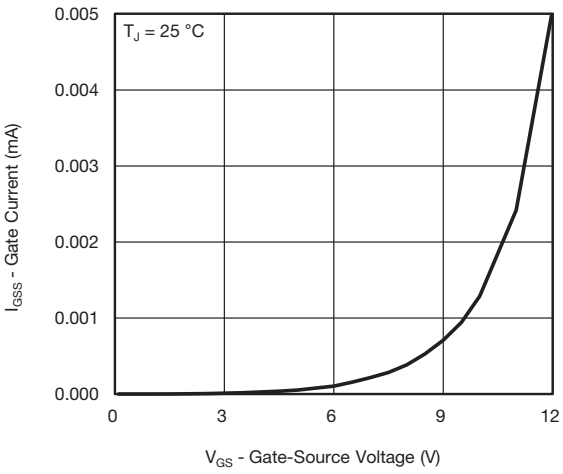
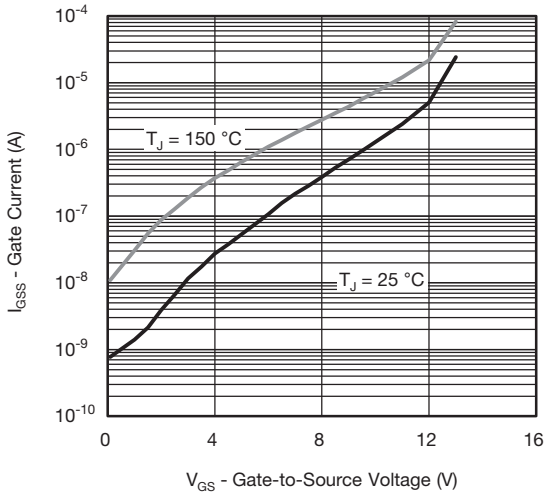
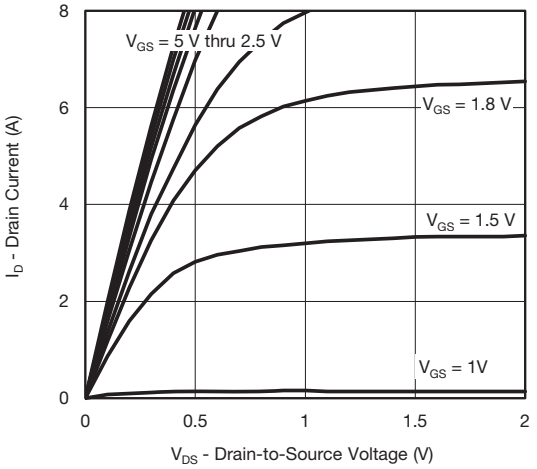


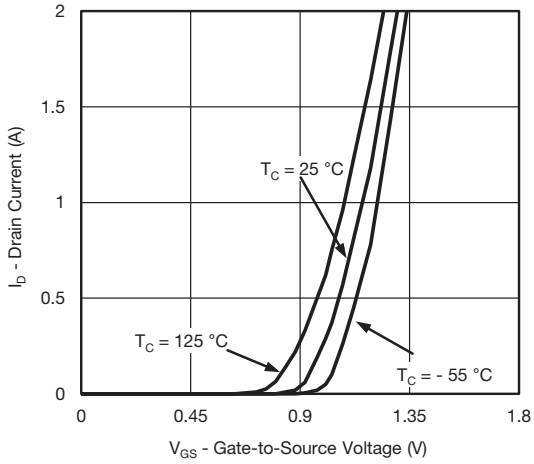
Gate Current vs. Gate-Source Voltage



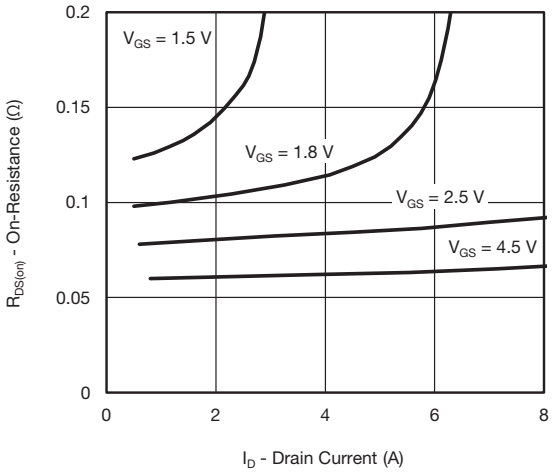
Gate Current vs. Gate-to-Source Voltage



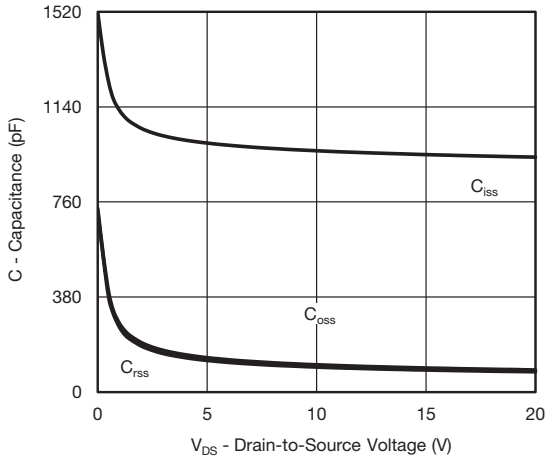
Output Characteristics



Transfer Characteristics Curves vs. Temperature



On-Resistance vs. Drain Current



Capacitance

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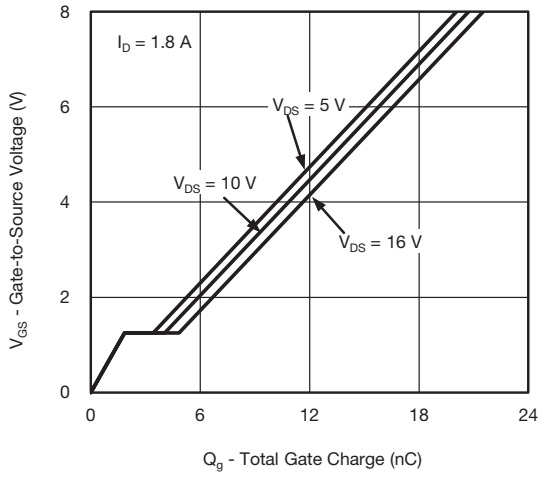
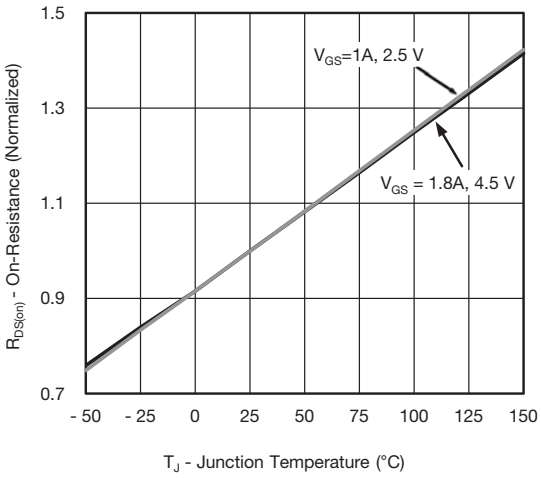
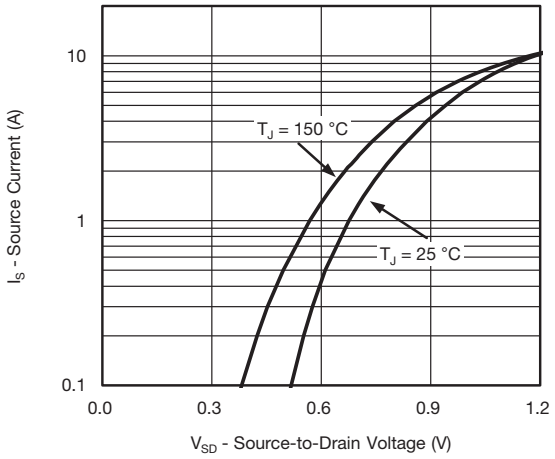


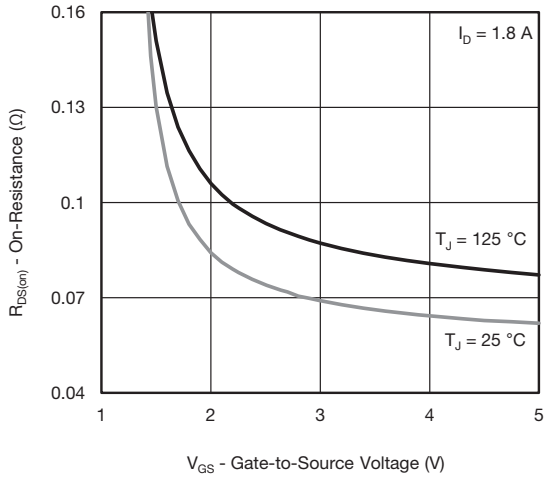
Gate Charge



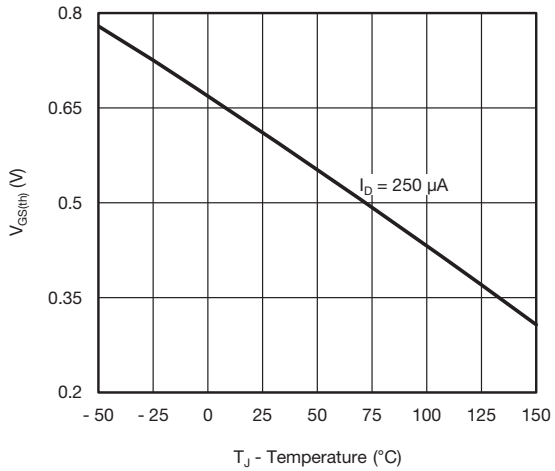
On-Resistance vs. Junction Temperature



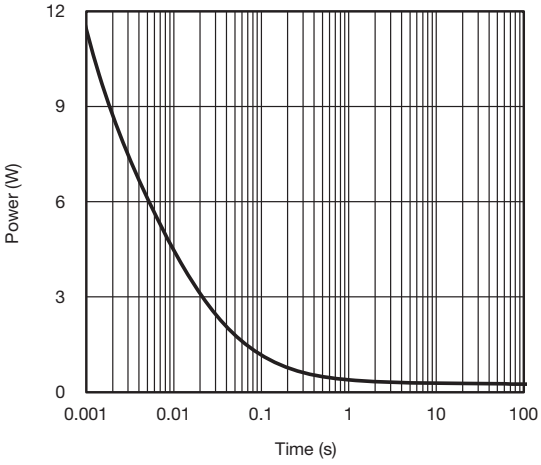
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient

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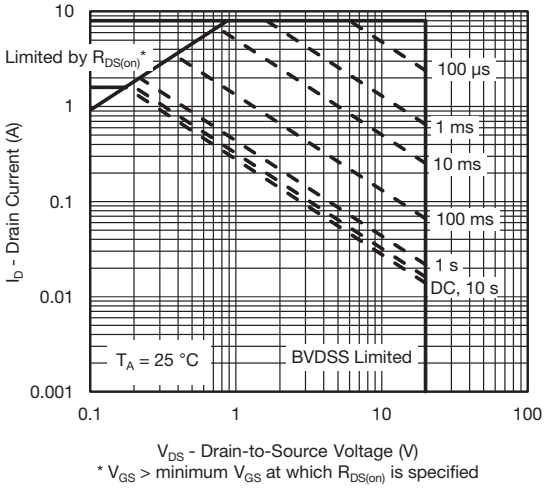
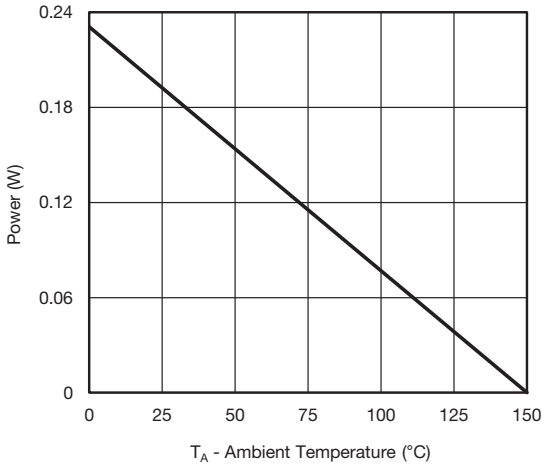
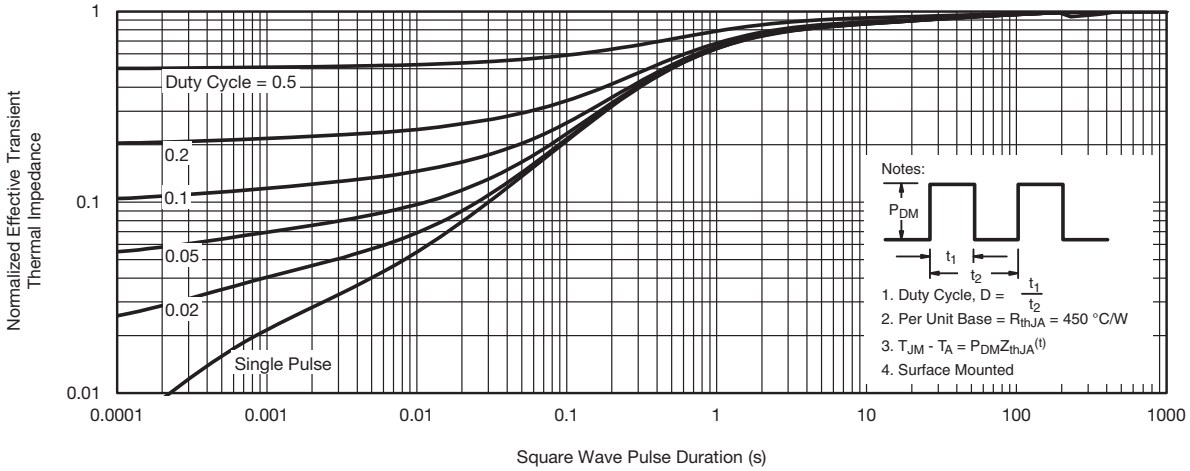


Safe Operating Area, Junction-to-Ambient



Power Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Ambient

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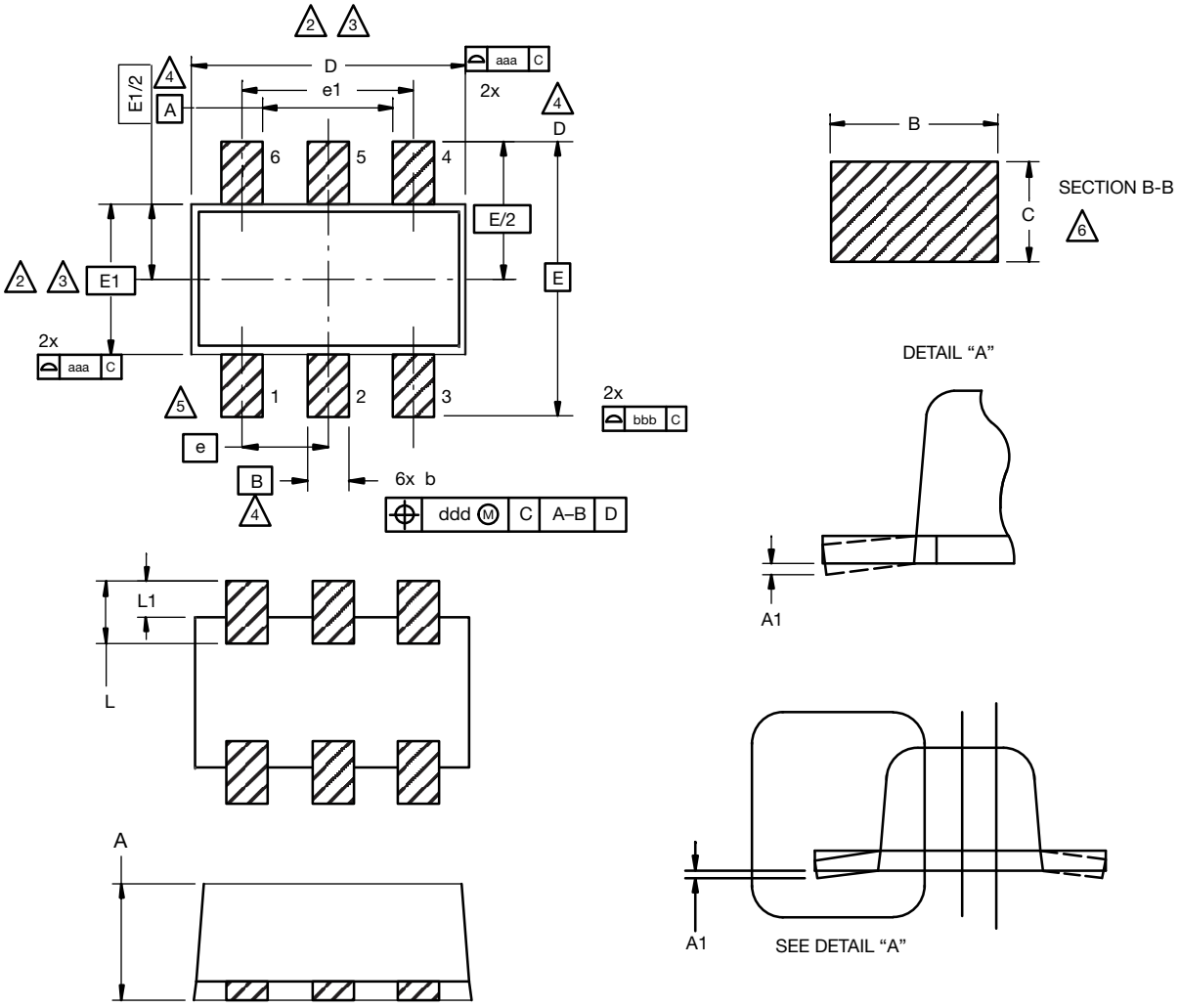
SC-89 6-Leads (SOT-563F)



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.	NOM.	MAX.
A	0.56	0.58	0.60
A1	0	0.02	0.10
b	0.15	0.22	0.30
c	0.10	0.14	0.18
D	1.50	1.60	1.70
E	1.50	1.60	1.70
E1	1.15	1.20	1.25
e	0.45	0.50	0.55
e1	0.95	1.00	1.05
L	0.25	0.35	0.50
L1	0.10	0.20	0.30
C14-0439-Rev. C, 11-Aug-14 DWG: 5880			

For technical questions, contact: analogswitchtechsupport@vishay.com

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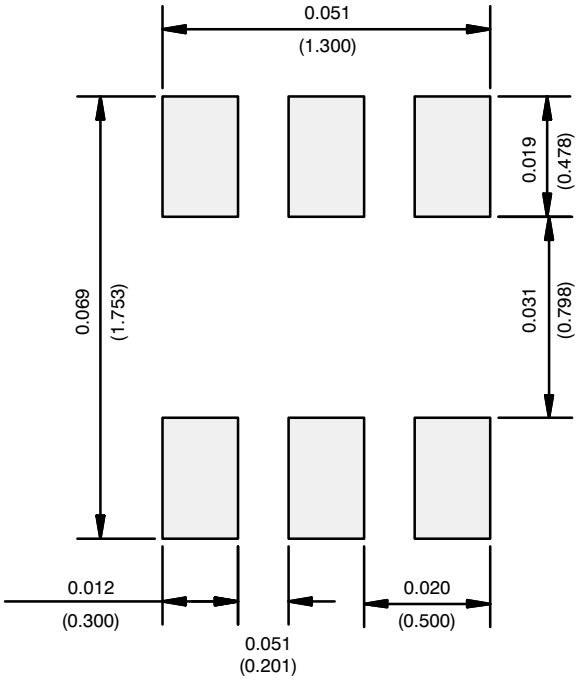
RECOMMENDED MINIMUM PADS FOR SC-89: 6-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

Return to Index

APPLICATION NOTE

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