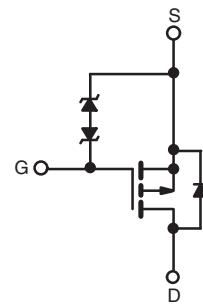
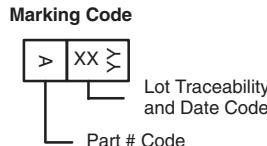
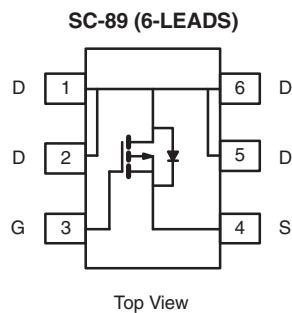


## P-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY			
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ ) 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](http://www.vishay.com/doc?99912)



**Ordering Information:** Si1077X-T1-GE3 (Lead (Pb)-free and Halogen-free)

P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25$ °C, unless otherwise noted)				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	$V_{DS}$	- 20	V	
Gate-Source Voltage	$V_{GS}$	$\pm 8$		
Continuous Drain Current ( $T_J = 150$ °C)	$I_D$	- 1.75 <sup>b, c</sup>	A	
$T_A = 70$ °C		- 1.4 <sup>b, c</sup>		
Pulsed Drain Current ( $t = 300$ $\mu$ s)	$I_{DM}$	- 8	A	
Continuous Source-Drain Diode Current	$I_S$	- 0.28 <sup>b, c</sup>		
Maximum Power Dissipation	$P_D$	0.33 <sup>b, c</sup>	W	
$T_A = 70$ °C		0.21 <sup>b, c</sup>		
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 <sup>a, b</sup>	$R_{thJA}$	300	375	°C/W
Steady State		360	450	

Notes:

- Maximum under steady state conditions is 450 °C/W.
- Surface mounted on 1" x 1" FR4 board.
- $t = 5$  s.

**SPECIFICATIONS** ( $T_J = 25^\circ\text{C}$ , unless otherwise noted)

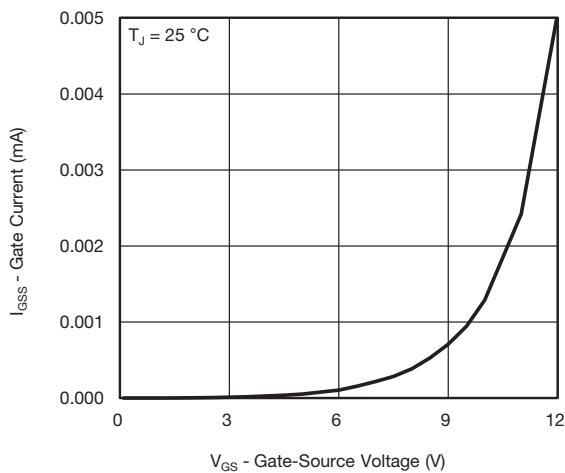
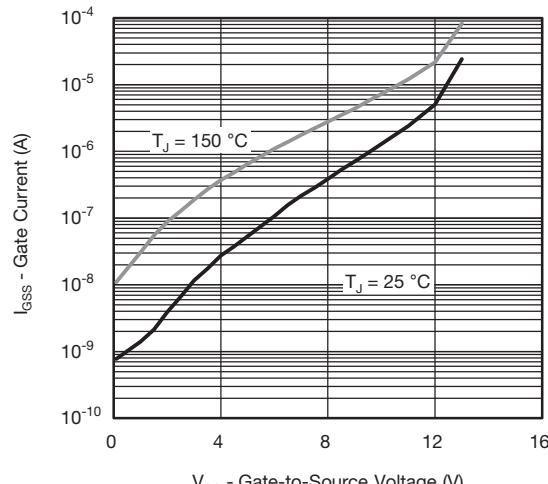
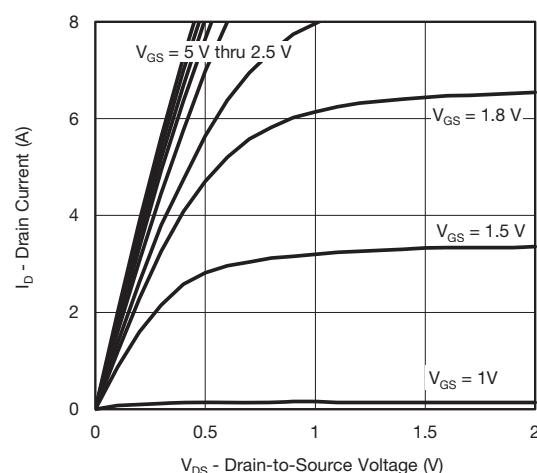
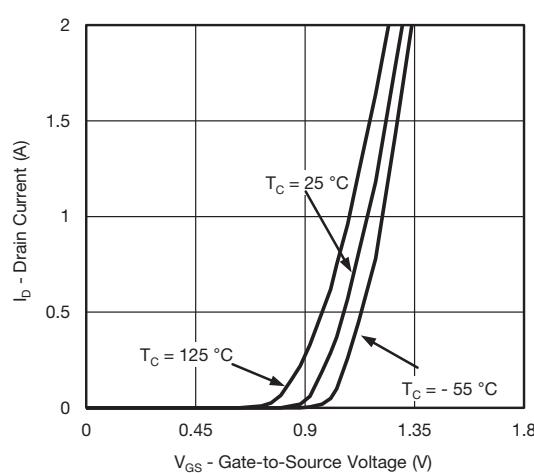
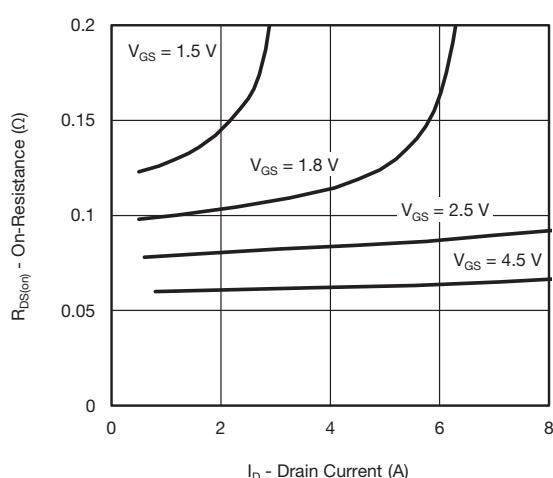
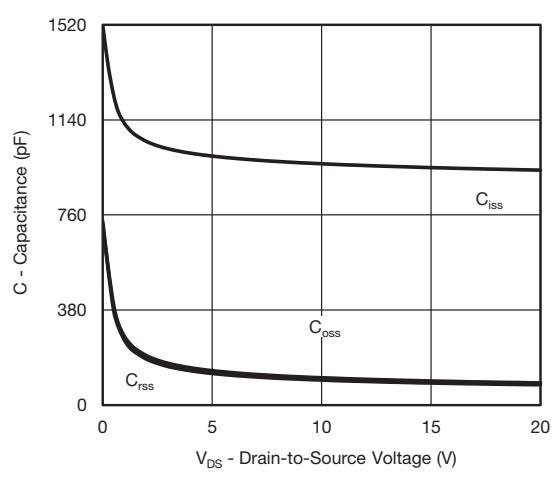
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
<b>Static</b>							
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0 \text{ V}$ , $I_D = -250 \mu\text{A}$	-20			V	
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250 \mu\text{A}$		-11		mV/°C	
$V_{GS(\text{th})}$ Temperature Coefficient	$\Delta V_{GS(\text{th})}/T_J$			2.4			
Gate-Source Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$ , $I_D = -250 \mu\text{A}$	-0.4		-1	V	
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0 \text{ V}$ , $V_{GS} = \pm 8 \text{ V}$			$\pm 10$	μA	
		$V_{DS} = 0 \text{ V}$ , $V_{GS} = \pm 4.5 \text{ V}$			$\pm 1$		
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -20 \text{ V}$ , $V_{GS} = 0 \text{ V}$			-1		
		$V_{DS} = -20 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $T_J = 85^\circ\text{C}$			-10		
On-State Drain Current <sup>a</sup>	$I_{D(\text{on})}$	$V_{DS} = \geq -5 \text{ V}$ , $V_{GS} = -4.5 \text{ V}$	-8			A	
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(\text{on})}$	$V_{GS} = -4.5 \text{ V}$ , $I_D = -1.8 \text{ A}$		0.065	0.078	Ω	
		$V_{GS} = -2.5 \text{ V}$ , $I_D = -1 \text{ A}$		0.081	0.098		
		$V_{GS} = -1.8 \text{ V}$ , $I_D = -1 \text{ A}$		0.100	0.130		
		$V_{GS} = -1.5 \text{ V}$ , $I_D = -0.3 \text{ A}$		0.125	0.188		
Forward Transconductance	$g_{fs}$	$V_{DS} = -10 \text{ V}$ , $I_D = -1.8 \text{ A}$		10		S	
<b>Dynamic<sup>b</sup></b>							
Input Capacitance	$C_{iss}$	$V_{DS} = -10 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 1 \text{ MHz}$		965		pF	
Output Capacitance	$C_{oss}$			110			
Reverse Transfer Capacitance	$C_{rss}$			101			
Total Gate Charge	$Q_g$	$V_{DS} = -10 \text{ V}$ , $V_{GS} = -8 \text{ V}$ , $I_D = -1.75 \text{ A}$		20.7	31.1	nC	
Gate-Source Charge	$Q_{gs}$	$V_{DS} = -10 \text{ V}$ , $V_{GS} = -4.5 \text{ V}$ , $I_D = -1.75 \text{ A}$		12.1	18.2		
Gate-Drain Charge	$Q_{gd}$			1.85			
Gate Resistance	$R_g$			2.21			
Turn-On Delay Time	$t_{d(\text{on})}$	$V_{DD} = -10 \text{ V}$ , $R_L = 7.1 \Omega$ $I_D \equiv -1.4 \text{ A}$ , $V_{GEN} = -4.5 \text{ V}$ , $R_g = 1 \Omega$		3.6	18	36	Ω
Rise Time	$t_r$			24	36	ns	
Turn-Off Delay Time	$t_{d(\text{off})}$			17	26		
Fall Time	$t_f$			95	145		
Turn-On Delay Time	$t_{d(\text{on})}$			28	42	ns	
Rise Time	$t_r$			5	10		
Turn-Off Delay Time	$t_{d(\text{off})}$			8	16		
Fall Time	$t_f$			115	173		
				26	39		
<b>Drain-Source Body Diode Characteristics</b>							
Pulse Diode Forward Current <sup>a</sup>	$I_{SM}$				-8	A	
Body Diode Voltage	$V_{SD}$	$I_S = -1.4 \text{ A}$		-0.75	-1.2	V	
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = -1.4 \text{ A}$ , $dI/dt = 100 \text{ A}/\mu\text{s}$		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			

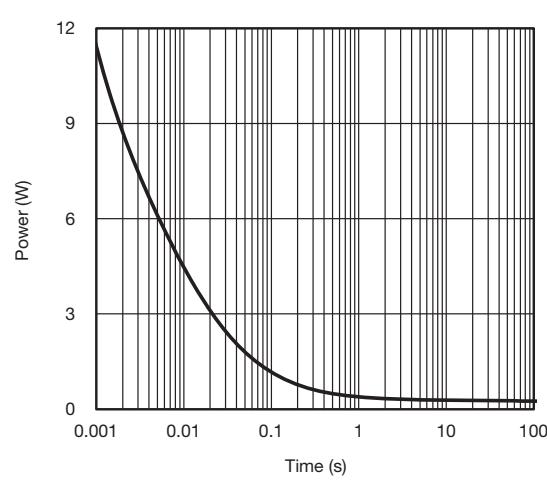
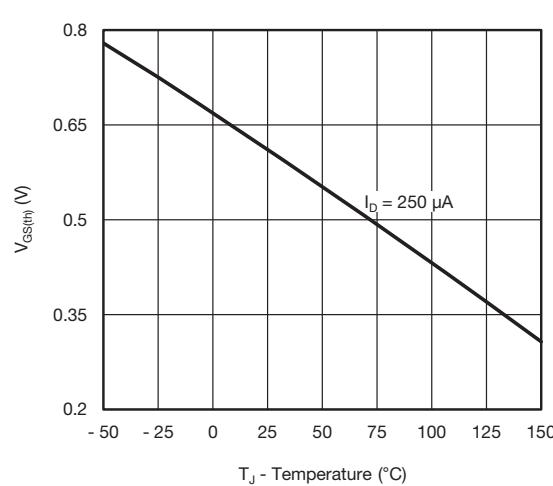
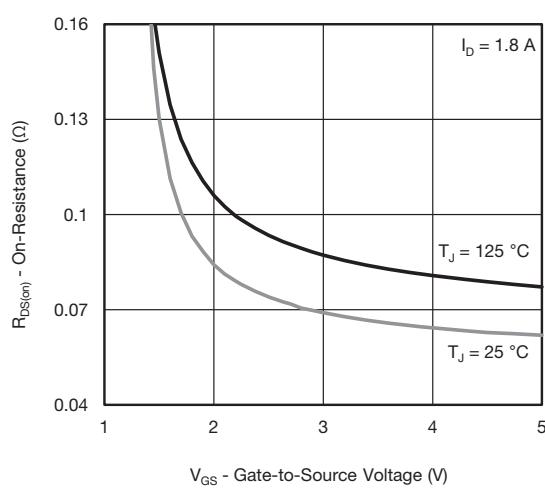
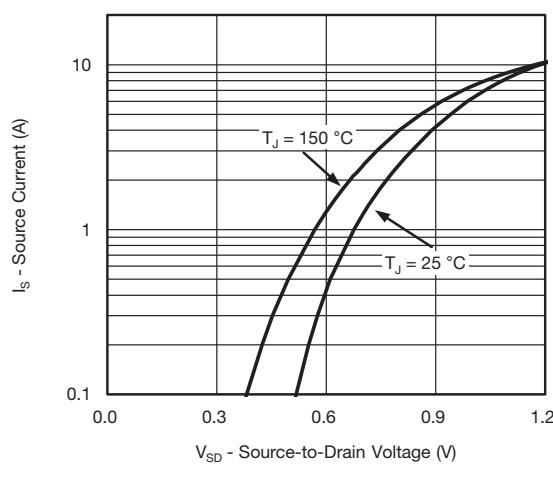
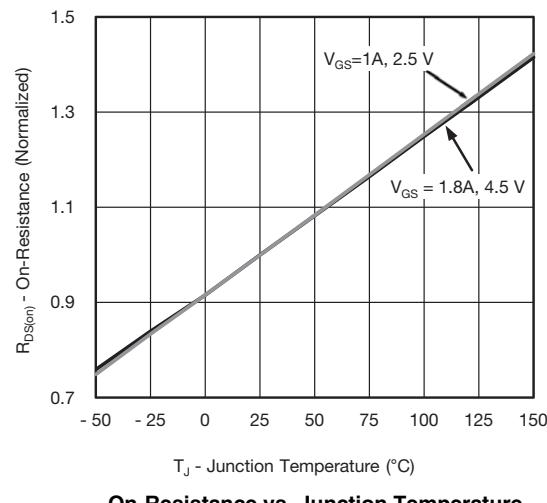
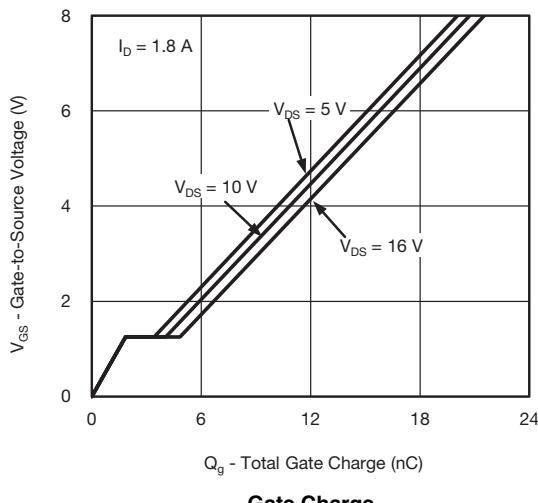
Notes:

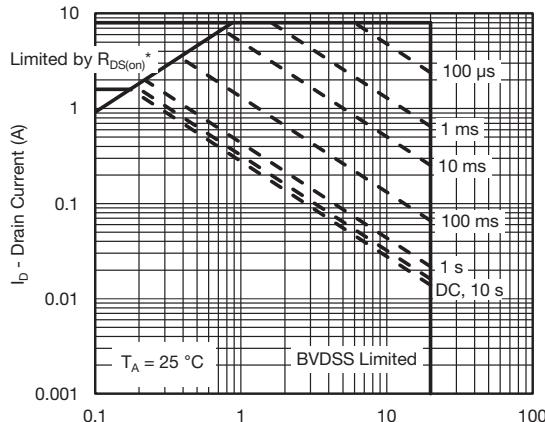
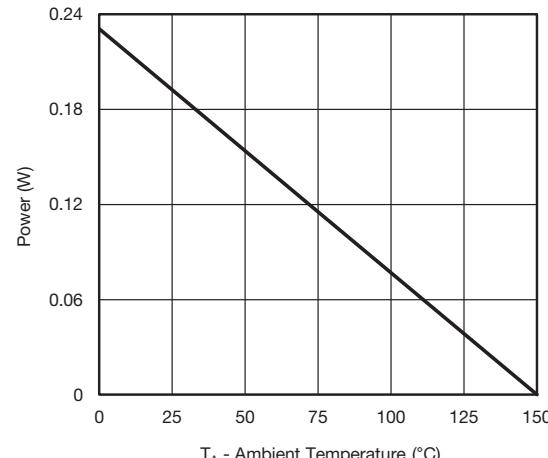
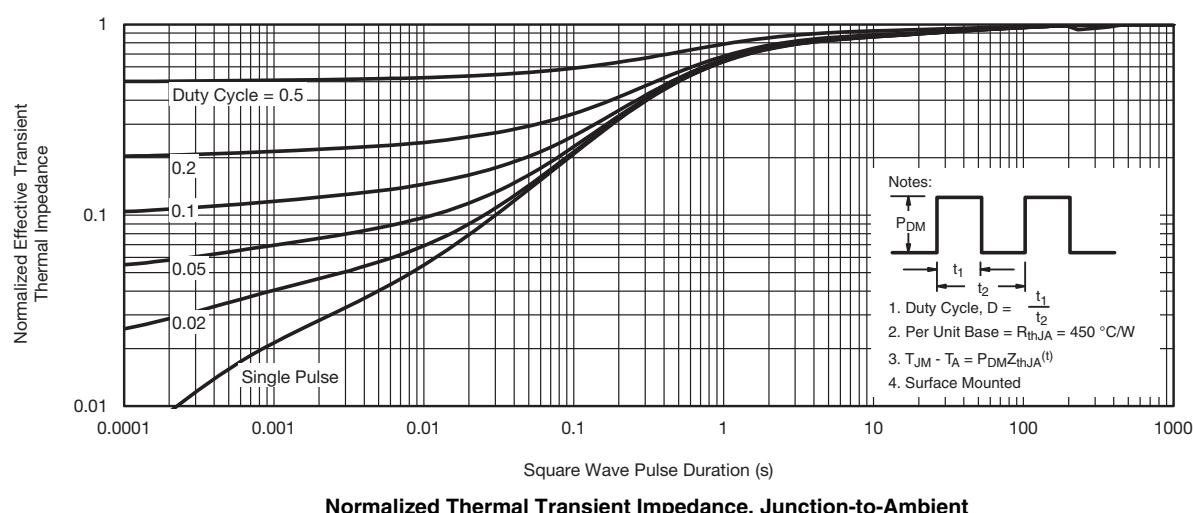
a. Pulse test; pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .

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.

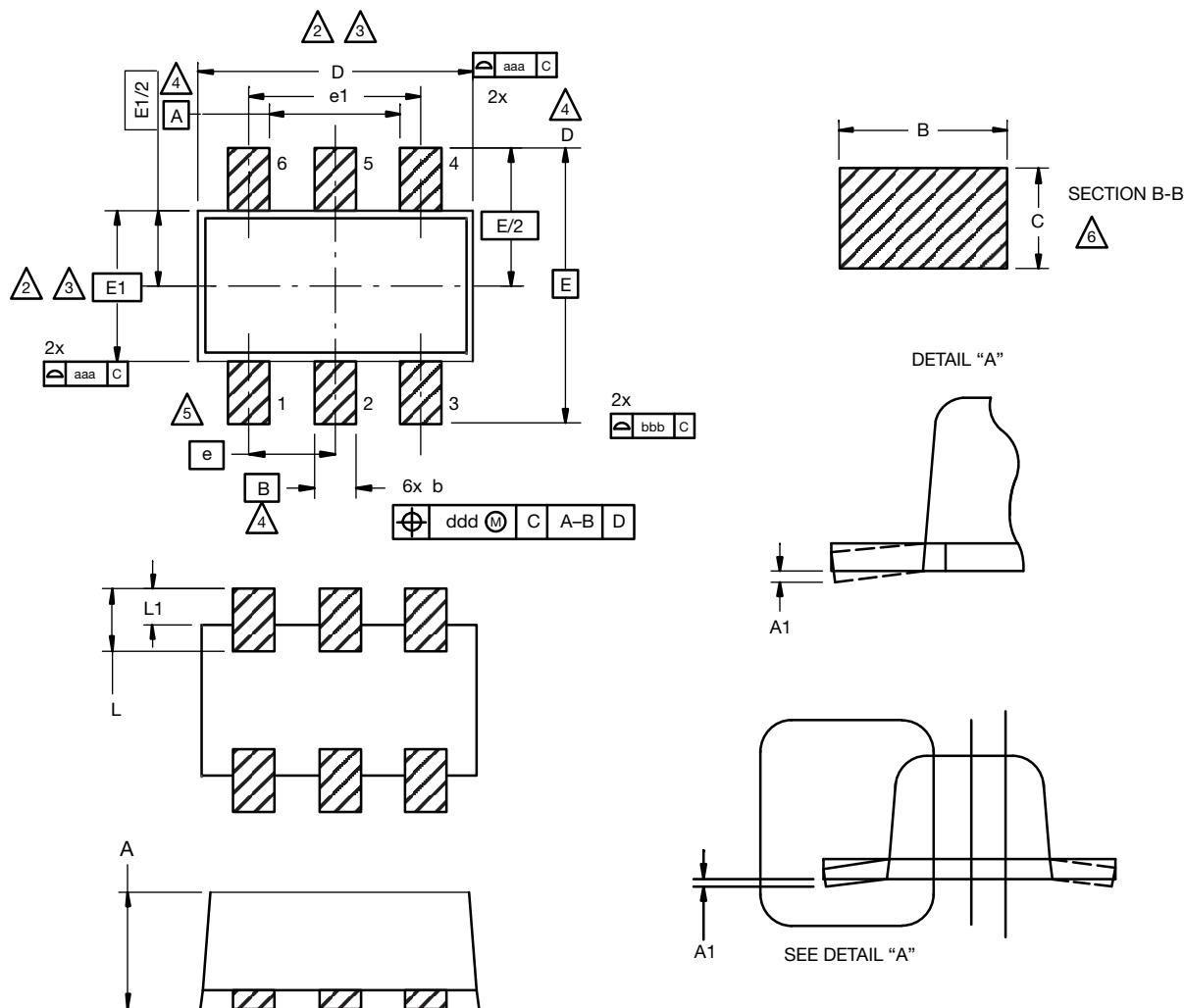
**TYPICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)

**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**

**TYPICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)


**TYPICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)

**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.

**⚠** 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.

**⚠** 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.

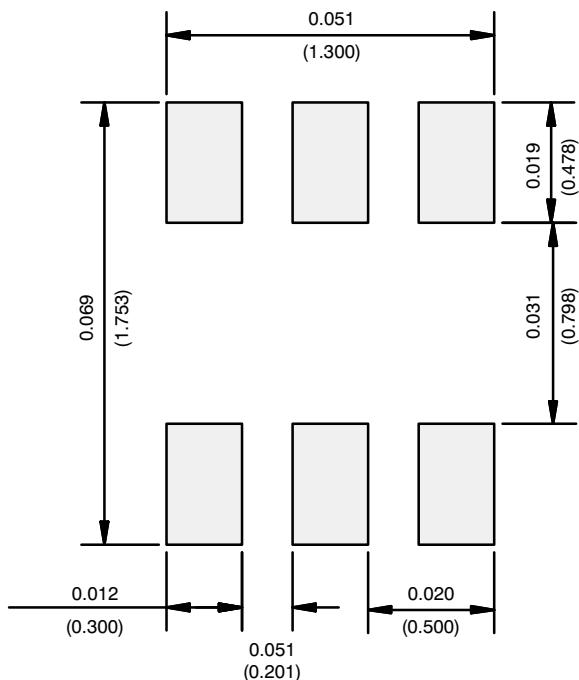
**⚠** Datums A, B and D to be determined 0.10 mm from the lead tip.

**⚠** Terminal numbers are shown for reference only.

**⚠** 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

**RECOMMENDED MINIMUM PADS FOR SC-89: 6-Lead**[Return to Index](#)

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