



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



Complementary N- and P-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY				
	V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)	Q _g (TYP.)
N-Channel	20	0.396 at V _{GS} = 4.5 V	0.50	0.75 nC
		0.456 at V _{GS} = 2.5 V	0.20	
		0.546 at V _{GS} = 1.8 V	0.20	
		0.760 at V _{GS} = 1.5 V	0.05	
P-Channel	-20	0.756 at V _{GS} = -4.5 V	-0.35	1 nC
		1.038 at V _{GS} = -2.5 V	-0.35	
		1.440 at V _{GS} = -1.8 V	-0.10	
		2.400 at V _{GS} = -1.5 V	-0.05	

FEATURES

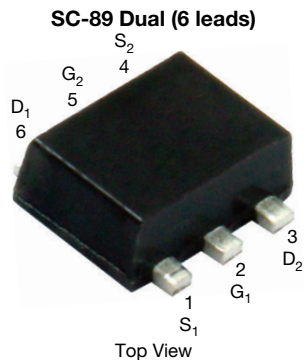
- TrenchFET® power MOSFETs
- High-side switching
- Ease in driving switches
- Low offset (error) voltage
- Low-voltage operation
- High-speed circuits
- Typical ESD protection:
n-channel 900 V, p-channel 900 V (HBM)
- 100 % R_g tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

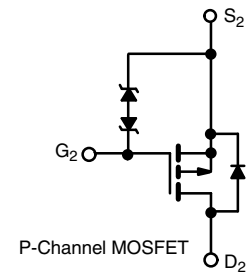
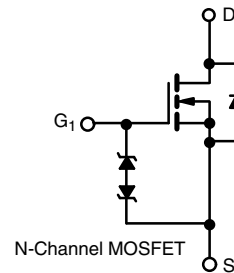
- Load switch, small signal switches and level-shift switches
 - Battery operated systems
 - Portable



Marking Code: 5

Ordering Information:

Si1016CX-T1-GE3 (Lead (Pb)-free and Halogen-free)



ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise noted)					
PARAMETER	SYMBOL	N-CHANNEL	P-CHANNEL	UNIT	
Drain-Source Voltage	V _{DS}	20	-20	V	
Gate-Source Voltage	V _{GS}	± 8			
Continuous Drain Current (T _J = 150 °C)	I _D	T _A = 25 °C	0.6 a, b	-0.6 a, b	
		T _A = 70 °C	0.49 a, b	-0.49 a, b	
Pulsed Drain Current (t = 300 μs)	I _{DM}	2	-1.5	A	
Source Drain Current Diode Current	I _S	0.18 a, b	-0.18 a, b	W	
Maximum Power Dissipation	P _D	T _A = 25 °C	0.22 a, b		0.22 a, b
		T _A = 70 °C	0.14 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	N-CHANNEL		P-CHANNEL		UNIT
		TYP.	MAX.	TYP.	MAX.	
Maximum Junction-to-Ambient a, c	t ≤ 5 s	470	565	470	565	°C/W
	Steady State	560	675	560	675	

Notes

- Surface mounted on 1" x 1" FR4 board.
- t = 5 s.
- Maximum under steady state conditions is 675 °C/W.



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	N-Ch	20	-	-	V
		V _{GS} = 0 V, I _D = -250 μA	P-Ch	-20	-	-	
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA	N-Ch	-	17	-	mV/°C
		I _D = -250 μA	P-Ch	-	-12	-	
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J	I _D = 250 μA	N-Ch	-	-1.8	-	mV/°C
		I _D = -250 μA	P-Ch	-	1.8	-	
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	N-Ch	0.4	-	1	V
		V _{DS} = V _{GS} , I _D = -250 μA	P-Ch	-0.4	-	-1	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 4.5 V	N-Ch	-	-	± 1	μA
			P-Ch	-	-	± 1	
		V _{DS} = 0 V, V _{GS} = ± 8 V	N-Ch	-	-	± 30	
			P-Ch	-	-	± 30	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V	N-Ch	-	-	1	μA
		V _{DS} = -20 V, V _{GS} = 0 V	P-Ch	-	-	-1	
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 55 °C	N-Ch	-	-	10	
		V _{DS} = -20 V, V _{GS} = 0 V, T _J = 55 °C	P-Ch	-	-	-10	
On-State Drain Current ^b	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 4.5 V	N-Ch	2	-	-	A
		V _{DS} ≤ -5 V, V _{GS} = -4.5 V	P-Ch	-1.5	-	-	
Drain-Source On-State Resistance ^b	R _{DS(on)}	V _{GS} = 4.5 V, I _D = 0.5 A	N-Ch	-	0.330	0.396	Ω
		V _{GS} = -4.5 V, I _D = -0.35 A	P-Ch	-	0.630	0.756	
		V _{GS} = 2.5 V, I _D = 0.2 A	N-Ch	-	0.380	0.456	
		V _{GS} = -2.5 V, I _D = -0.35 A	P-Ch	-	0.865	1.038	
		V _{GS} = 1.8 V, I _D = 0.2 A	N-Ch	-	0.420	0.546	
		V _{GS} = -1.8 V, I _D = -0.1 A	P-Ch	-	1.200	1.440	
		V _{GS} = 1.5 V, I _D = 0.05 A	N-Ch	-	0.505	0.760	
Forward Transconductance ^b	g _{fs}	V _{DS} = 10 V, I _D = 0.5 A	N-Ch	-	2	-	S
		V _{DS} = -10 V, I _D = -3.6 A	P-Ch	-	1	-	
Input Capacitance	C _{iss}	N-Channel V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	N-Ch	-	43	-	pF
Output Capacitance	C _{oss}		P-Ch	-	45	-	
			N-Ch	-	14	-	
Reverse Transfer Capacitance	C _{rss}		P-Channel V _{DS} = -10 V, V _{GS} = 0 V, f = 1 MHz	P-Ch	-	15	
		N-Ch	-	8	-		
Total Gate Charge	Q _g	V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 0.6 A	N-Ch	-	1.3	2	nC
		V _{DS} = -10 V, V _{GS} = -4.5 V, I _D = -0.4 A	P-Ch	-	1.65	2.50	
Gate-Source Charge	Q _{gs}	N-Channel V _{DS} = 10 V, V _{GS} = 2.5 V, I _D = 0.6 A	N-Ch	-	0.75	1.2	
			P-Ch	-	1	2	
Gate-Drain Charge	Q _{gd}	P-Channel V _{DS} = -10 V, V _{GS} = -2.5 V, I _D = -0.4 A	N-Ch	-	0.15	-	
			P-Ch	-	0.2	-	
Gate Resistance	R _g	f = 1 MHz	N-Ch	2.4	12.2	24.4	Ω
			P-Ch	2.4	12	24	
Dynamic ^a							



SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Dynamic ^a							
Turn-On Delay Time	t _{d(on)}	N-Channel V _{DD} = 10 V, R _L = 20 Ω I _D ≅ 0.5 A, V _{GEN} = 4.5 V, R _g = 1 Ω	N-Ch	-	11	20	ns
			P-Ch	-	9	18	
Rise Time	t _r	P-Channel V _{DD} = -10 V, R _L = 33.3 Ω I _D ≅ -0.3 A, V _{GEN} = -4.5 V, R _g = 1 Ω	N-Ch	-	16	24	
			P-Ch	-	10	20	
Turn-Off Delay Time	t _{d(off)}	N-Channel V _{DD} = 10 V, R _L = 20 Ω I _D ≅ 0.5 A, V _{GEN} = 8 V, R _g = 1 Ω	N-Ch	-	26	39	
			P-Ch	-	10	20	
Fall Time	t _f	P-Channel V _{DD} = -10 V, R _L = 33.3 Ω I _D ≅ -0.3 A, V _{GEN} = -8 V, R _g = 1 Ω	N-Ch	-	11	20	
			P-Ch	-	8	16	
Turn-On Delay Time	t _{d(on)}	N-Channel V _{DD} = 10 V, R _L = 20 Ω I _D ≅ 0.5 A, V _{GEN} = 8 V, R _g = 1 Ω	N-Ch	-	2	4	
			P-Ch	-	1	2	
Rise Time	t _r	P-Channel V _{DD} = -10 V, R _L = 33.3 Ω I _D ≅ -0.3 A, V _{GEN} = -8 V, R _g = 1 Ω	N-Ch	-	13	20	
			P-Ch	-	8	16	
Turn-Off Delay Time	t _{d(off)}	N-Channel V _{DD} = 10 V, R _L = 20 Ω I _D ≅ 0.5 A, V _{GEN} = 8 V, R _g = 1 Ω	N-Ch	-	7	14	
			P-Ch	-	9	18	
Fall Time	t _f	P-Channel V _{DD} = -10 V, R _L = 33.3 Ω I _D ≅ -0.3 A, V _{GEN} = -8 V, R _g = 1 Ω	N-Ch	-	5	10	
			P-Ch	-	5	10	
Drain-Source Body Diode Characteristics							
Pulse Diode Forward Current ^a	I _{SM}	I _S = 0.5 A, V _{GS} = 0 V	N-Ch	-	-	2	A
			P-Ch	-	-	-1.5	
Body Diode Voltage	V _{SD}	I _S = 0.5 A, V _{GS} = 0 V	N-Ch	-	0.85	1.2	V
		I _S = -0.3 A, V _{GS} = 0 V	P-Ch	-	-0.87	-1.2	
Body Diode Reverse Recovery Time	t _{rr}	N-Channel I _F = 0.5 A, di/dt = 100 A/μs, T _J = 25 °C	N-Ch	-	10	20	ns
			P-Ch	-	16	24	
Body Diode Reverse Recovery Charge	Q _{rr}	P-Channel I _F = -0.3 A, di/dt = -100 A/μs, T _J = 25 °C	N-Ch	-	2	4	nC
			P-Ch	-	8	20	
Reverse Recovery Fall Time	t _a	N-Channel I _F = 0.5 A, di/dt = 100 A/μs, T _J = 25 °C	N-Ch	-	5	-	ns
			P-Ch	-	11	-	
Reverse Recovery Rise Time	t _b	P-Channel I _F = -0.3 A, di/dt = -100 A/μs, T _J = 25 °C	N-Ch	-	5	-	
			P-Ch	-	5	-	

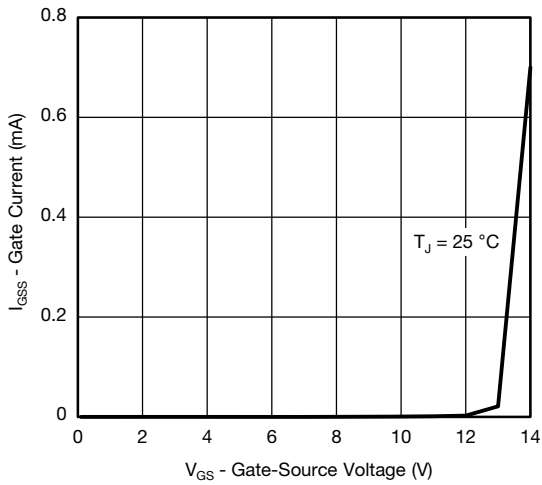
Notes

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

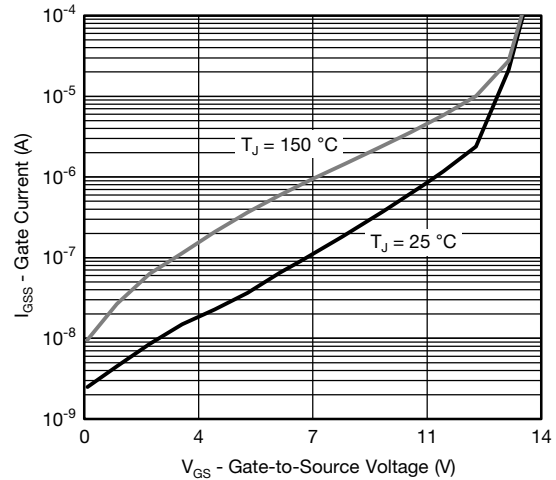
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



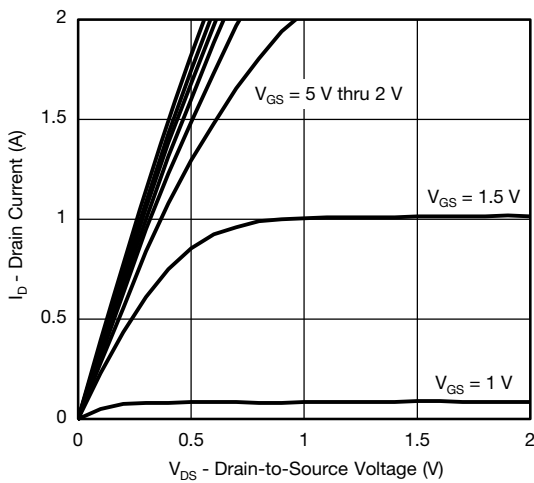
N-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



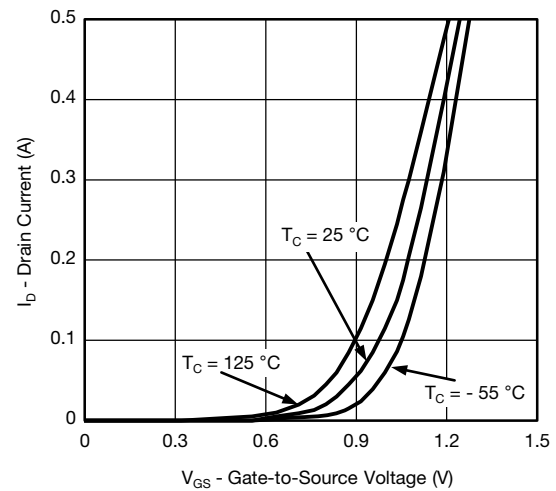
Gate Current vs. Gate-Source Voltage



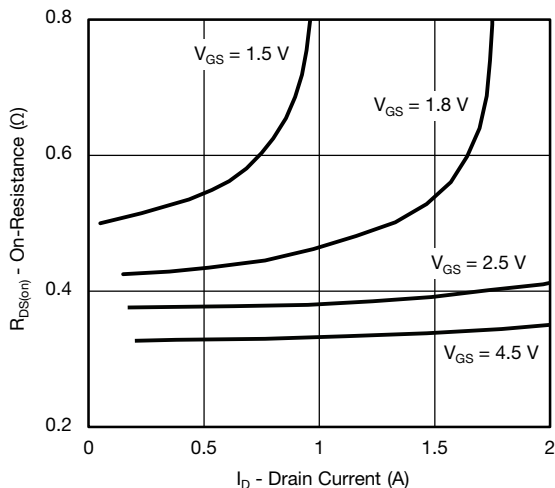
Gate Current vs. Gate-Source Voltage



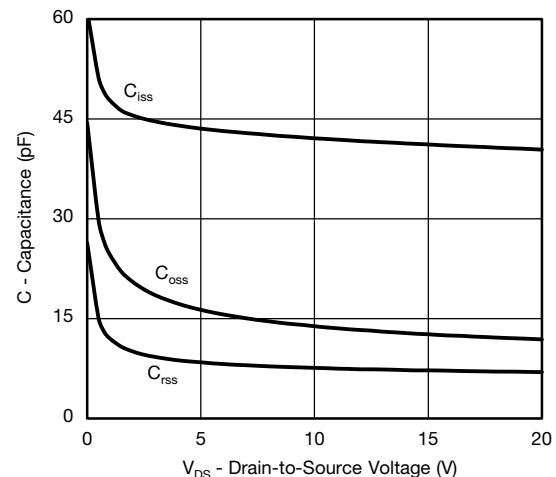
Output Characteristics



Transfer Characteristics



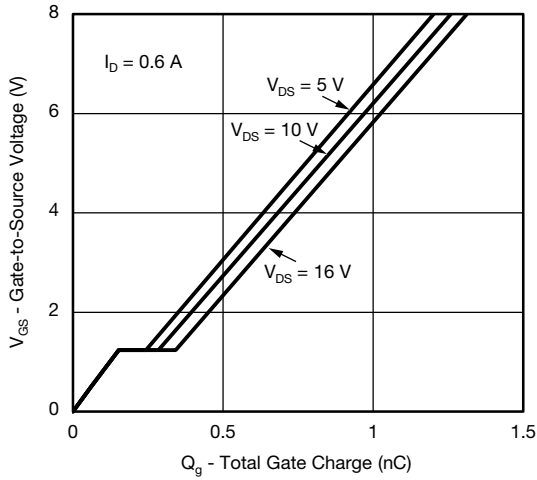
On-Resistance vs. Drain Current



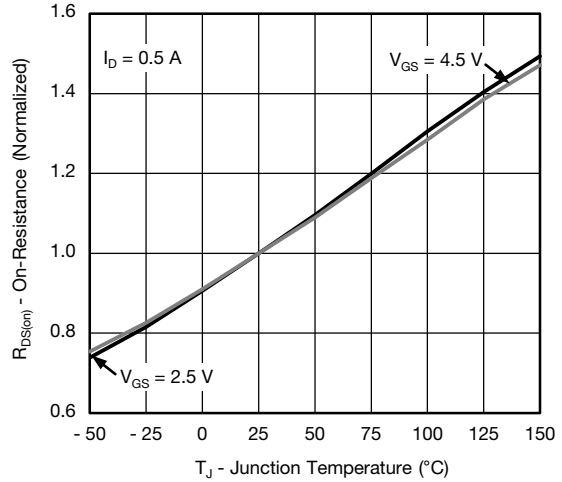
Capacitance



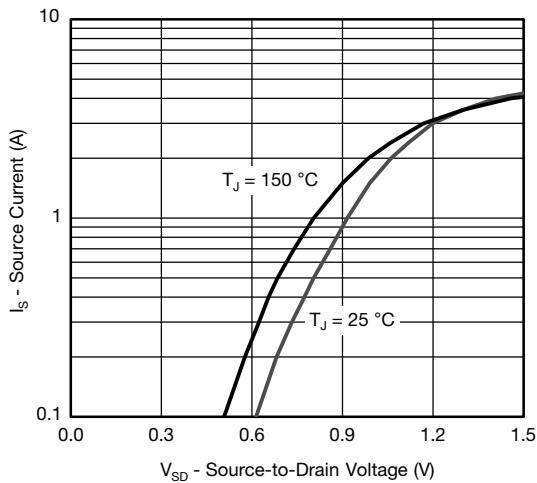
N-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



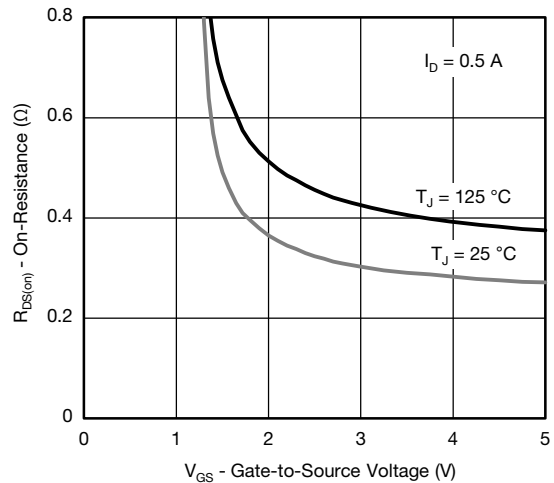
Gate Charge



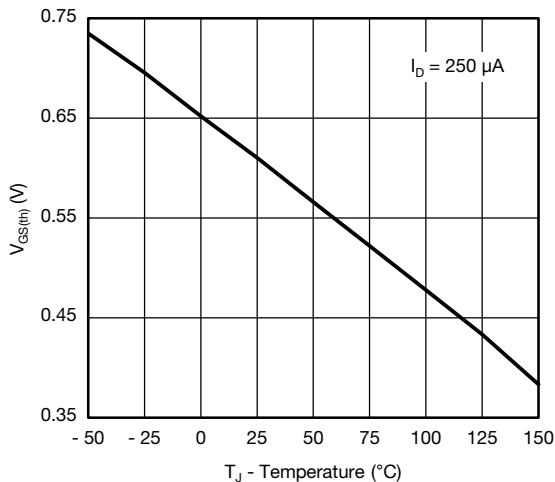
On-Resistance vs. Junction Temperature



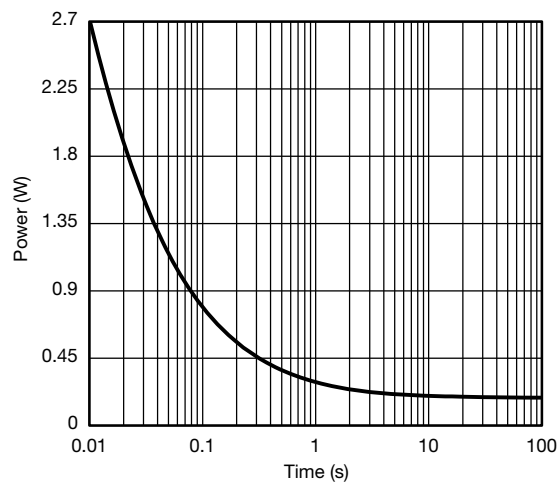
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



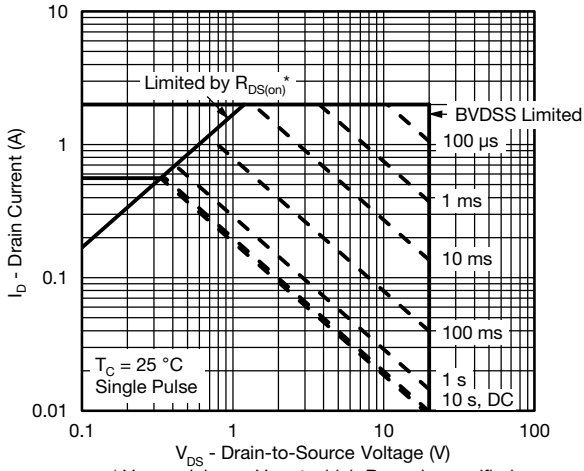
Threshold Voltage



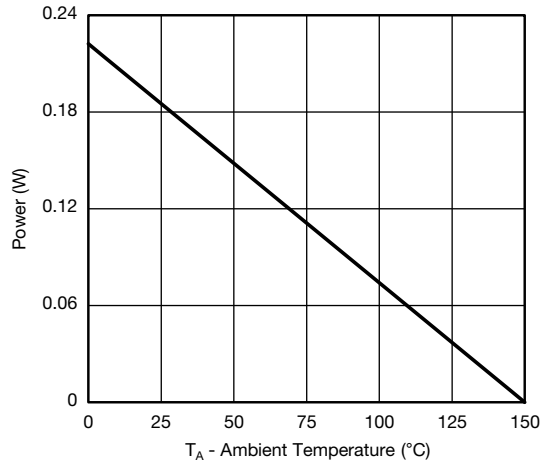
Single Pulse Power, Junction-to-Ambient



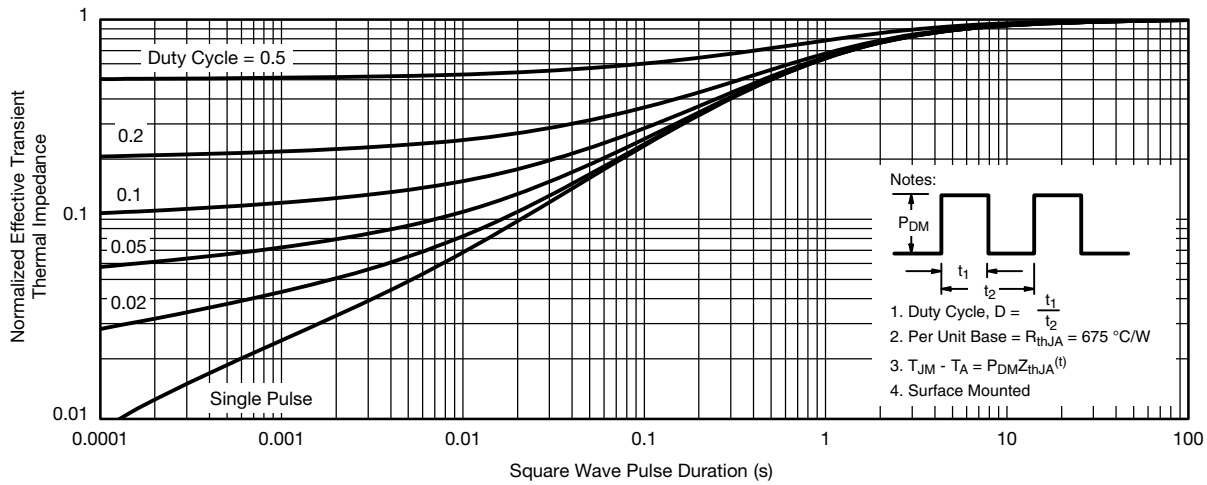
N-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Safe Operating Area, Junction-to-Ambient



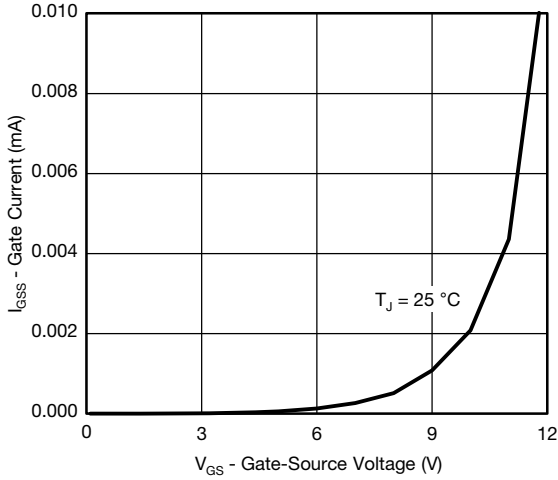
Power Derating, Junction-to-Ambient



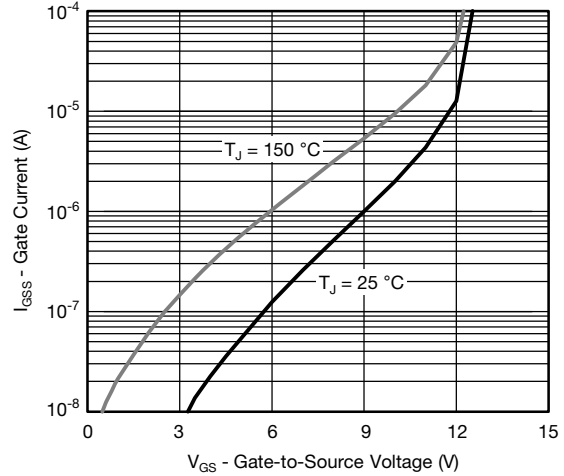
Normalized Thermal Transient Impedance, Junction-to-Ambient



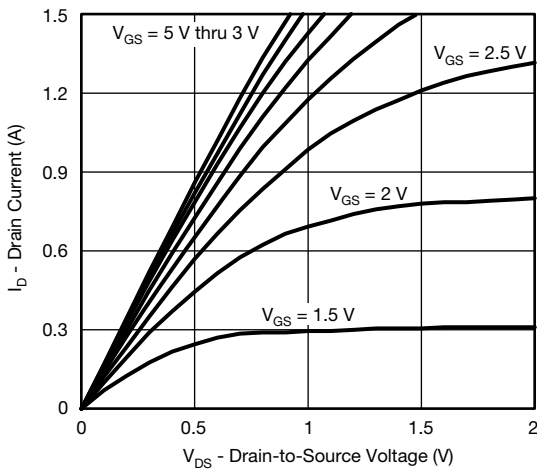
P-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



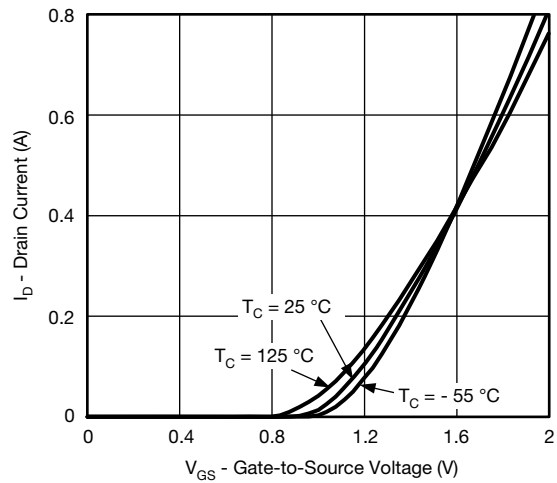
Gate Current vs. Gate-Source Voltage



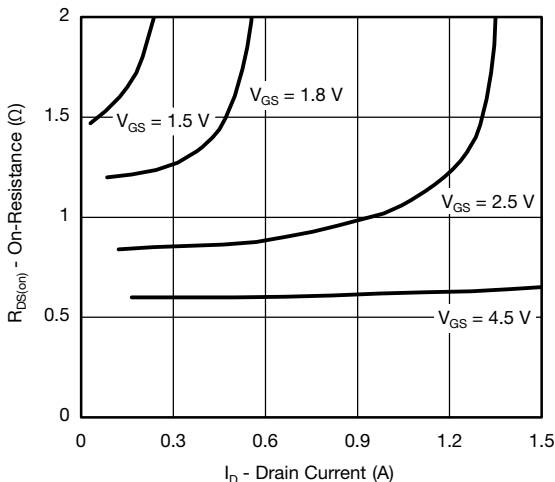
Gate Current vs. Gate-Source Voltage



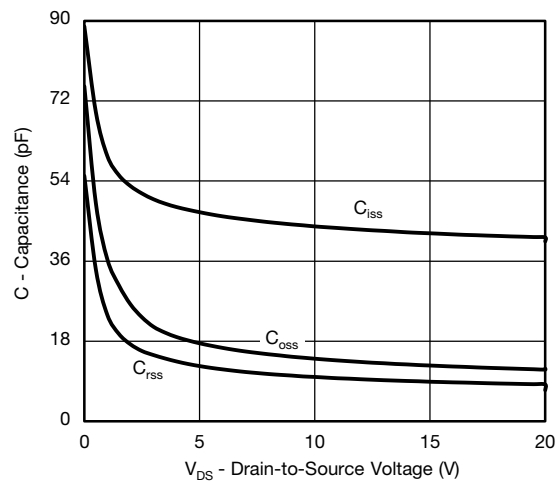
Output Characteristics



Transfer Characteristics



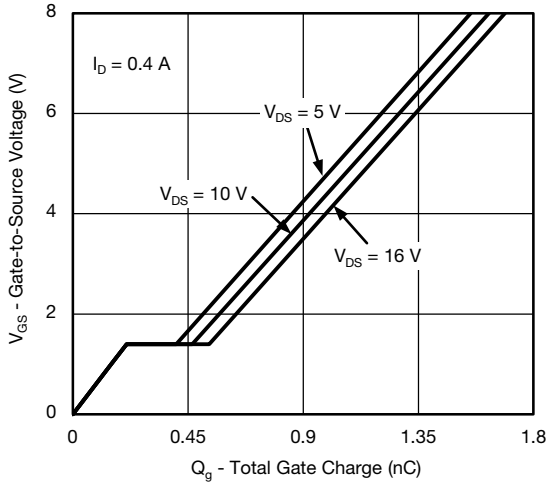
On-Resistance vs. Drain Current



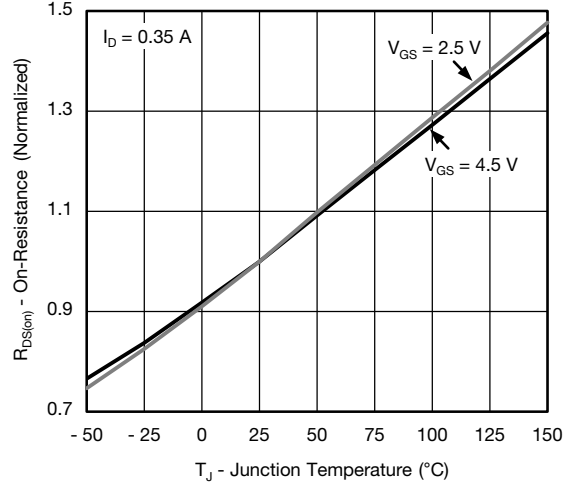
Capacitance



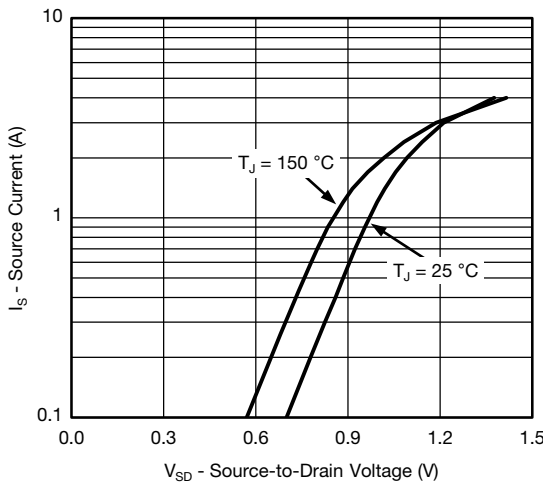
P-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



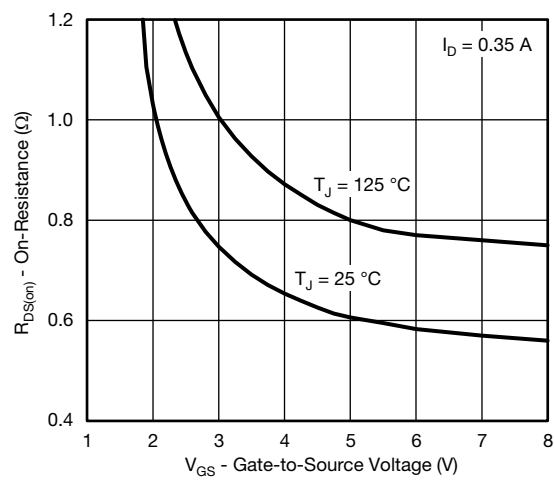
Gate Charge



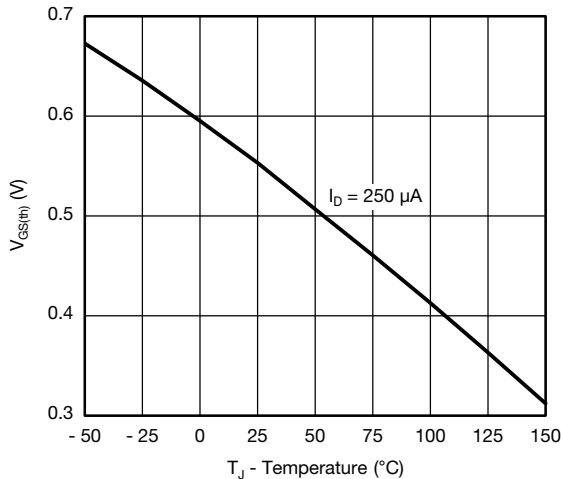
On-Resistance vs. Junction Temperature



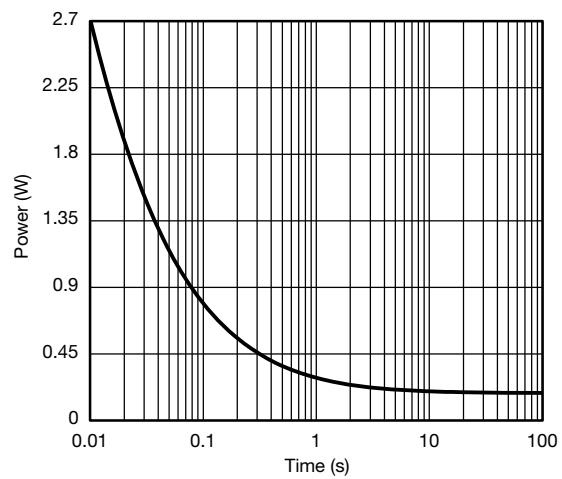
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



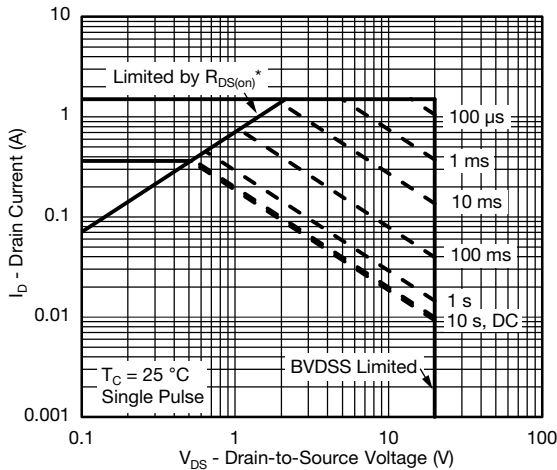
Threshold Voltage



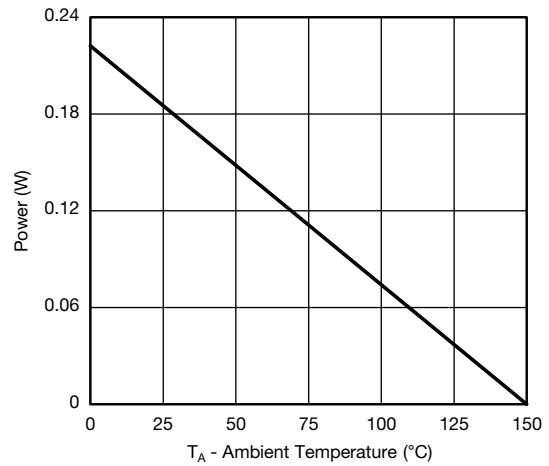
Single Pulse Power, Junction-to-Ambient



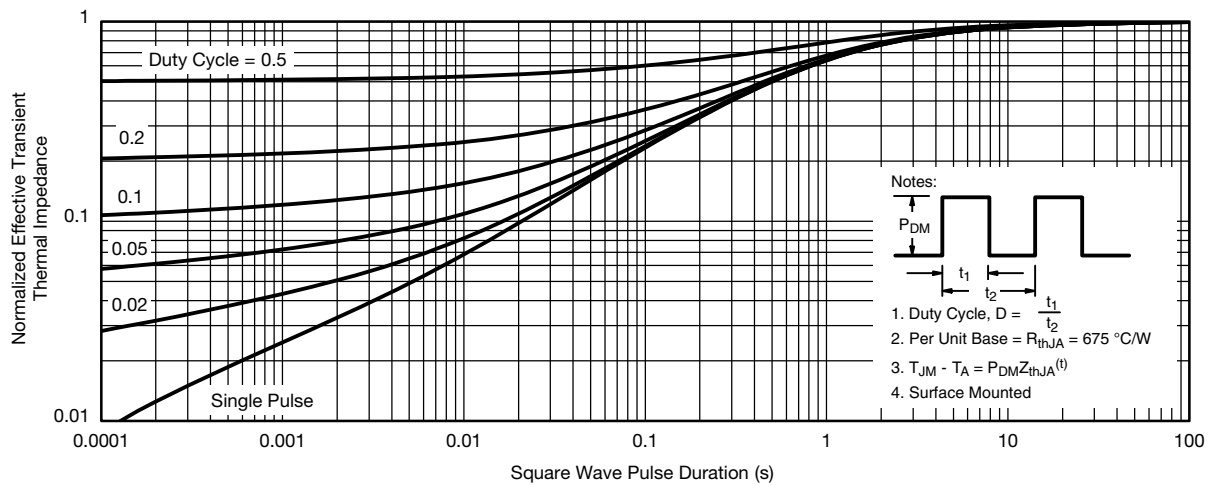
P-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified
Safe Operating Area, Junction-to-Ambient



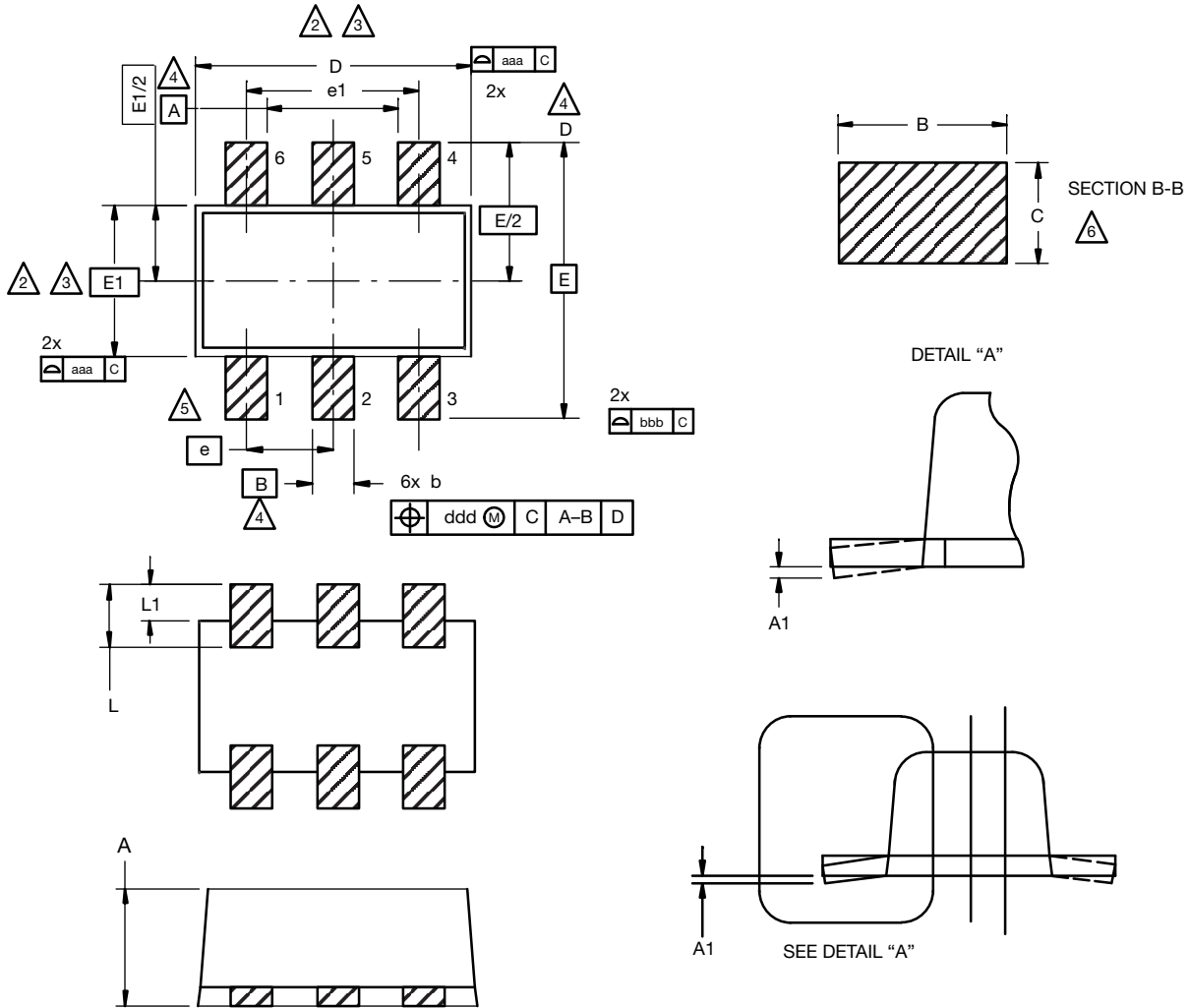
Power Derating, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Ambient

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see www.vishay.com/ppg267535.

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



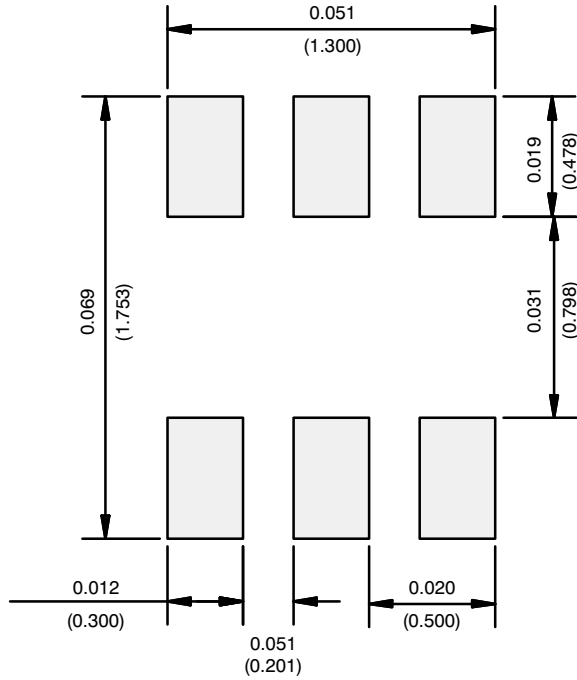
Notes

1. Dimensions in millimeters.
- ⚠ Dimension D does not include mold flash, protrusions or gate burrs. Mold flash, 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



Recommended Minimum Pads
Dimensions in Inches/(mm)

[Return to Index](#)



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.