

P-Channel 100-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
- 100	0.019 at $V_{GS} = - 10$ V	- 90	97 nC
	0.021 at $V_{GS} = - 4.5$ V	- 85	

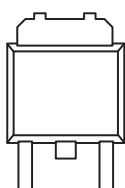
FEATURES

- TrenchFET® Power MOSFET
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT

TO-263

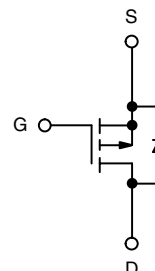


G D S

Top View

Drain Connected to Tab

Ordering Information: SUM90P10-19L-E3 (Lead (Pb)-free)



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	- 100	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150$ °C)	$T_C = 25$ °C	- 90	A
	$T_C = 125$ °C	- 52	
	$T_A = 25$ °C	- 17.2 ^{b, c}	
	$T_A = 125$ °C	- 9.9 ^{b, c}	
Pulsed Drain Current	I_{DM}	- 90	A
Continuous Source-Drain Diode Current	$T_C = 25$ °C	- 250	
	$T_A = 25$ °C	- 9 ^{b, c}	
Avalanche Current	I_{AS}	- 70	
Single-Pulse Avalanche Energy	E_{AS}	245	mJ
Maximum Power Dissipation	$T_C = 25$ °C	375	W
	$T_C = 125$ °C	125	
	$T_A = 25$ °C	13.6 ^{b, c}	
	$T_A = 125$ °C	4.5 ^{b, c}	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	R_{thJA}	8	11	°C/W
Maximum Junction-to-Case (Drain)	R_{thJC}	0.33	0.4	

Notes:

a. Package Limited.

b. Surface Mounted on 1" x 1" FR4 board.

c. $t = 10$ s.

d. Maximum under Steady State conditions is 40 °C/W.

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}	$V_{GS} = 0\text{ V}$, $I_D = -250\text{ }\mu\text{A}$	- 100			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		- 125		mV/ $^{\circ}\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			5.9		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250\text{ }\mu\text{A}$	- 1		- 3	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -100\text{ V}$, $V_{GS} = 0\text{ V}$			- 1	μA
		$V_{DS} = -100\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 175\text{ }^{\circ}\text{C}$			- 500	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}$, $V_{GS} = -10\text{ V}$	- 90			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}$, $I_D = -20\text{ A}$		0.0156	0.019	Ω
		$V_{GS} = -4.5\text{ V}$, $I_D = -15\text{ A}$		0.0173	0.021	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}$, $I_D = -20\text{ A}$		80		S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{DS} = -50\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		11100		pF
Output Capacitance	C_{oss}			700		
Reverse Transfer Capacitance	C_{rss}			1690		
Total Gate Charge	Q_g	$V_{DS} = -50\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -90\text{ A}$		217	326	nC
		$V_{DS} = -50\text{ V}$, $V_{GS} = -4.5\text{ V}$, $I_D = -90\text{ A}$		97	146	
Gate-Source Charge	Q_{gs}			42		
Gate-Drain Charge	Q_{gd}			51		
Gate Resistance	R_g	$f = 1\text{ MHz}$		3.5		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -50\text{ V}$, $R_L = 0.56\text{ }\Omega$ $I_D \cong -90\text{ A}$, $V_{GEN} = -10\text{ V}$, $R_g = 1\text{ }\Omega$		20	30	ns
Rise Time	t_r			510	855	
Turn-Off Delay Time	$t_{d(off)}$			145	220	
Fall Time	t_f			870	1300	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^{\circ}\text{C}$			- 90	A
Pulse Diode Forward Current ^a	I_{SM}				- 250	
Body Diode Voltage	V_{SD}	$I_S = -20\text{ A}$		- 0.8	- 1.5	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -20\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^{\circ}\text{C}$		80	120	ns
Body Diode Reverse Recovery Charge	Q_{rr}			220	330	nC
Reverse Recovery Fall Time	t_a			56		ns
Reverse Recovery Rise Time	t_b			24		

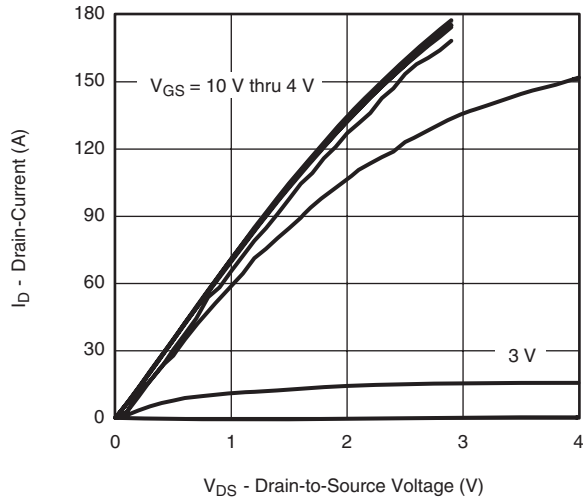
Notes

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

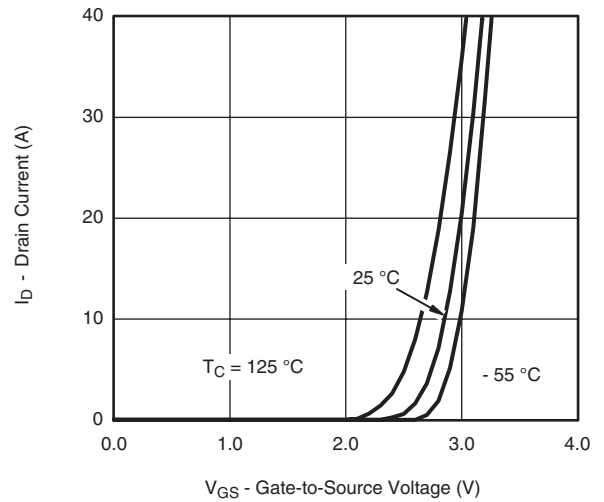
b. Guaranteed by design, not subject to production testing.

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.

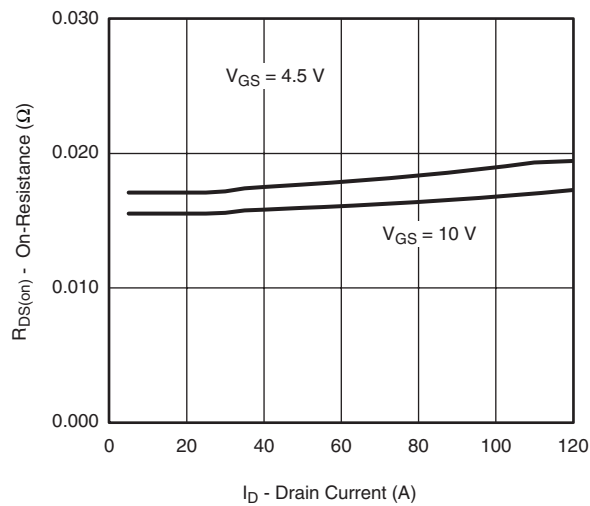
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



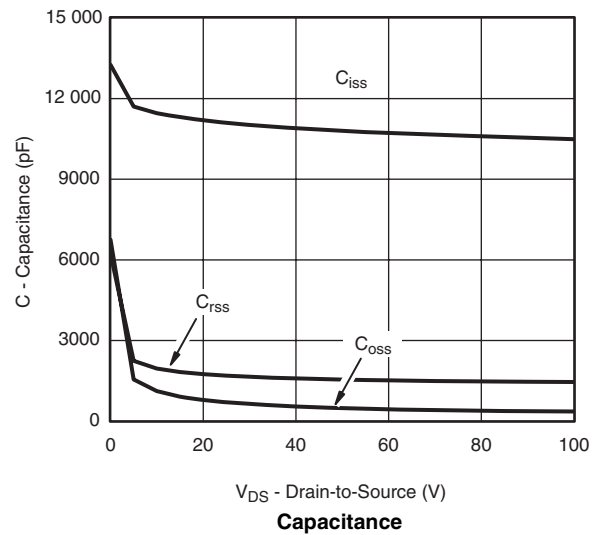
Output Characteristics



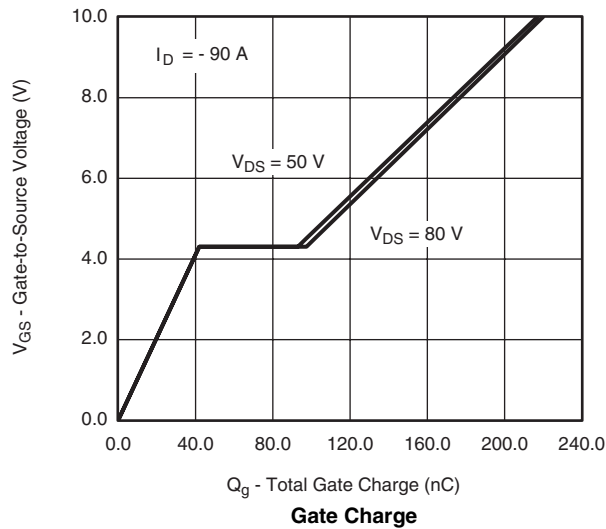
Transfer Characteristics



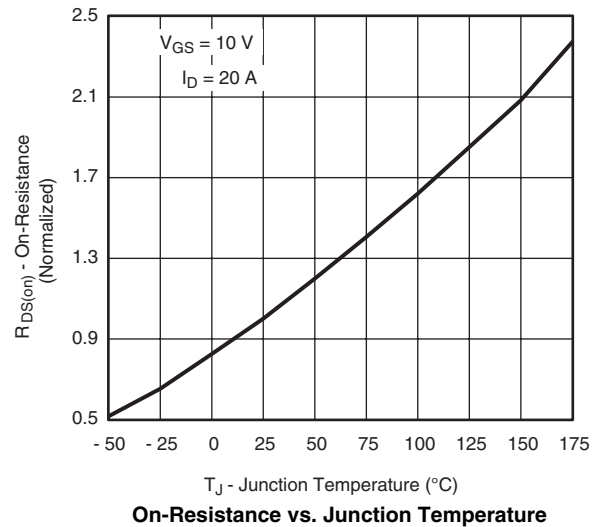
On-Resistance vs. Drain Current



Capacitance

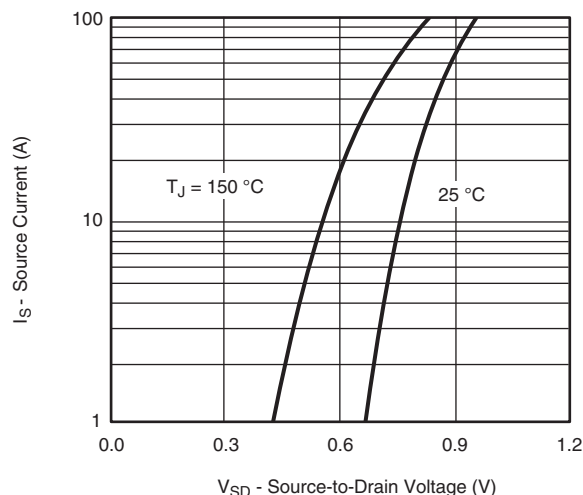


Gate Charge

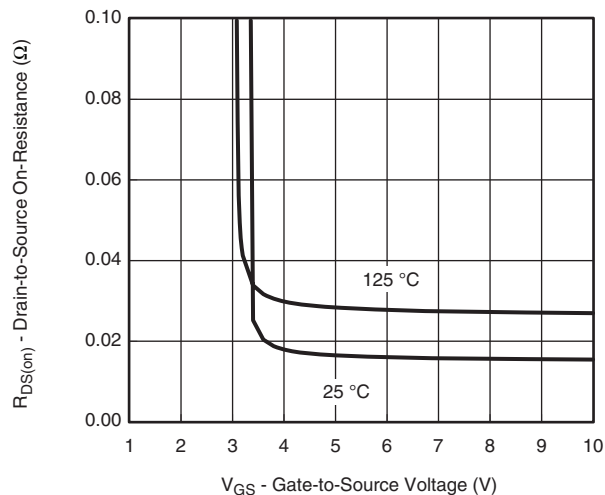


On-Resistance vs. Junction Temperature

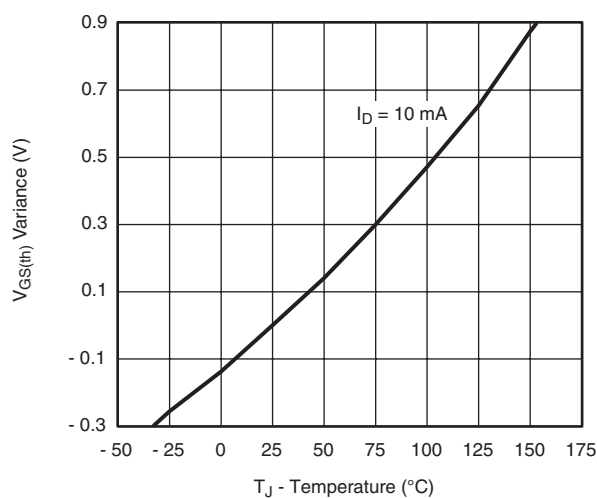
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



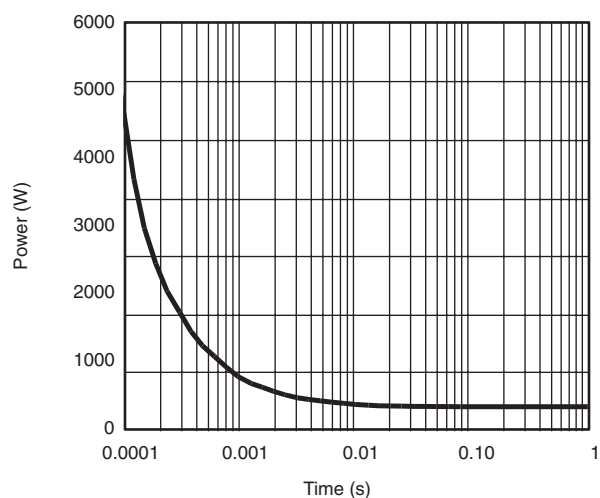
Source-Drain Diode Forward Voltage



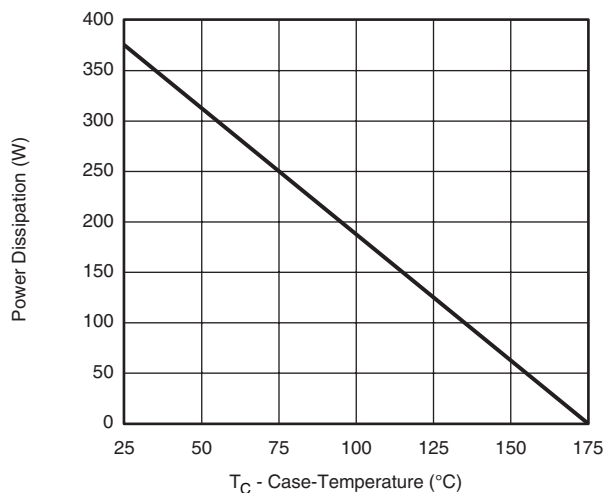
On-Resistance vs. Gate-to-Source Voltage



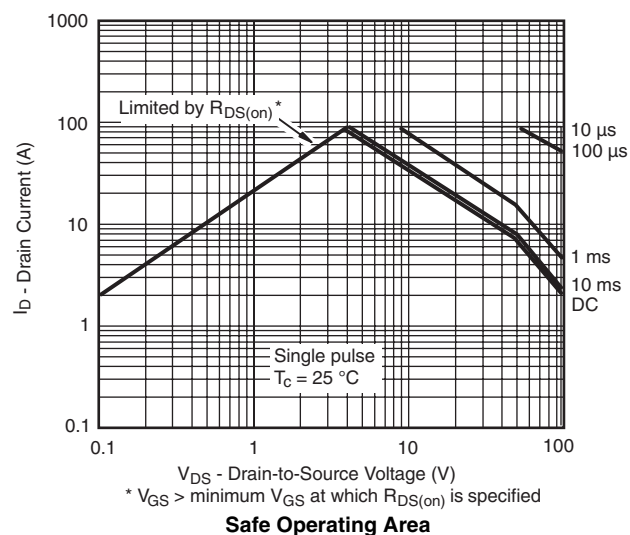
Threshold Voltage



Single Pulse, Junction-to-Case ($T_C = 25\text{ }^{\circ}\text{C}$)

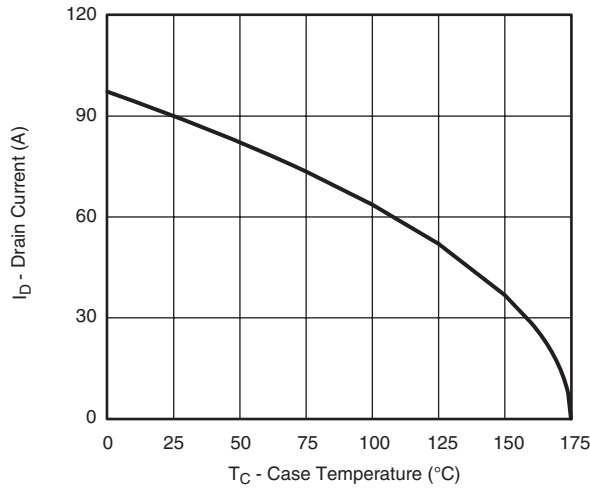


Power Derating (Junction-to-Case)

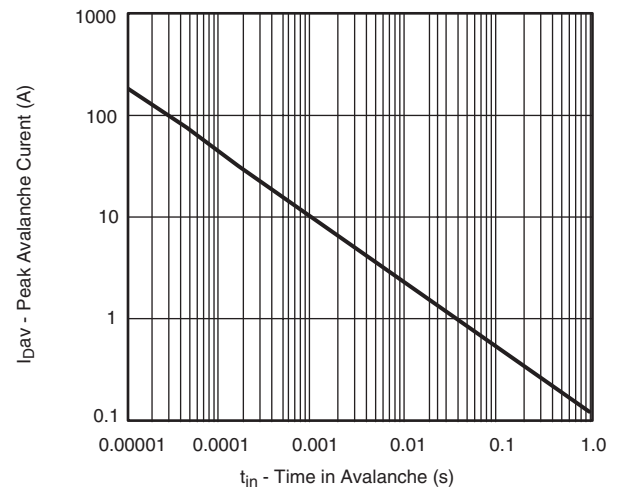


Safe Operating Area

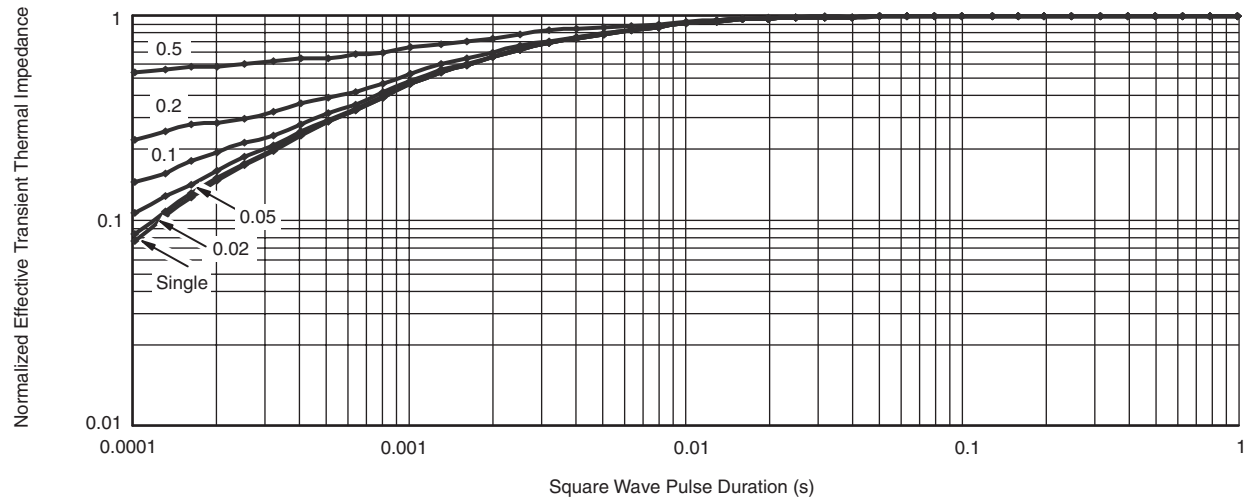
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Max Avalanche and Drain Current vs. Case Temperature



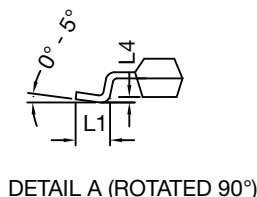
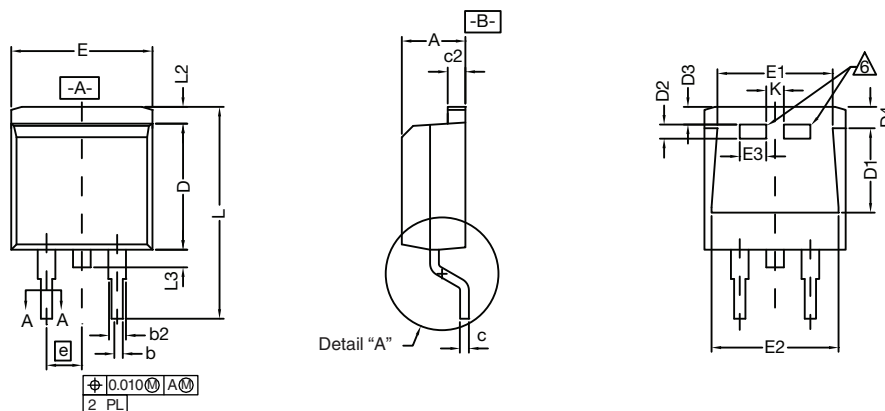
Avalanche Current vs. Time



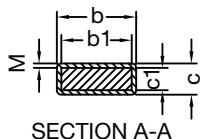
Normalized Thermal Transient Impedance, Junction-to-Case

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/ppg?73474.

TO-263 (D²PAK): 3-LEAD



DETAIL A (ROTATED 90°)



SECTION A-A

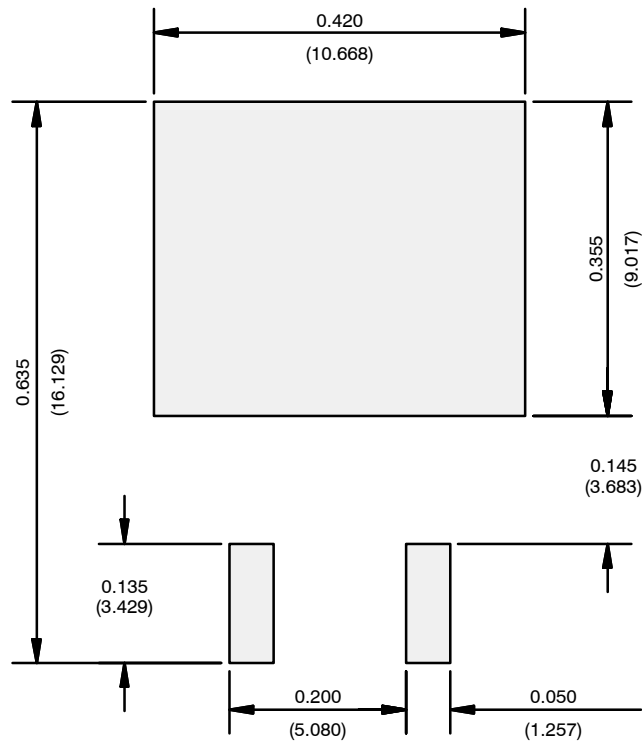
Notes

- Plane B includes maximum features of heat sink tab and plastic.
- No more than 25 % of L1 can fall above seating plane by max. 8 mils.
- Pin-to-pin coplanarity max. 4 mils.
- *: Thin lead is for SUB, SYB.
Thick lead is for SUM, SYM, SQM.
- Use inches as the primary measurement.
- This feature is for thick lead.

DIM.		INCHES		MILLIMETERS	
		MIN.	MAX.	MIN.	MAX.
A		0.160	0.190	4.064	4.826
b		0.020	0.039	0.508	0.990
b1		0.020	0.035	0.508	0.889
b2		0.045	0.055	1.143	1.397
c*	Thin lead	0.013	0.018	0.330	0.457
	Thick lead	0.023	0.028	0.584	0.711
c1	Thin lead	0.013	0.017	0.330	0.431
	Thick lead	0.023	0.027	0.584	0.685
c2		0.045	0.055	1.143	1.397
D		0.340	0.380	8.636	9.652
D1		0.220	0.240	5.588	6.096
D2		0.038	0.042	0.965	1.067
D3		0.045	0.055	1.143	1.397
D4		0.044	0.052	1.118	1.321
E		0.380	0.410	9.652	10.414
E1		0.245	-	6.223	-
E2		0.355	0.375	9.017	9.525
E3		0.072	0.078	1.829	1.981
e		0.100 BSC		2.54 BSC	
K		0.045	0.055	1.143	1.397
L		0.575	0.625	14.605	15.875
L1		0.090	0.110	2.286	2.794
L2		0.040	0.055	1.016	1.397
L3		0.050	0.070	1.270	1.778
L4		0.010 BSC		0.254 BSC	
M		-	0.002	-	0.050
ECN: T13-0707-Rev. K, 30-Sep-13					
DWG: 5843					

ECN: T13-0707-Rev. K, 30-Sep-13
DWG: 5843

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-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.