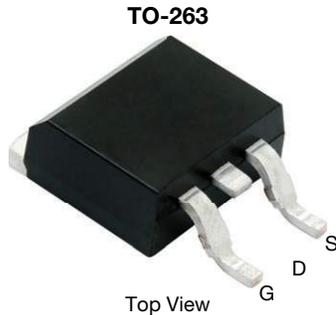


## N-Channel 100 V (D-S) MOSFET



### FEATURES

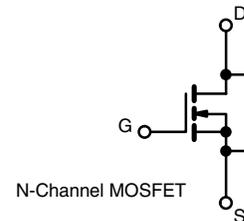
- TrenchFET® power MOSFETs
- 175 °C junction temperature
- 100 % R<sub>g</sub> and UIS tested
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

### APPLICATIONS

- Power supply
  - Secondary synchronous rectification
- Industrial
- Primary switch

PRODUCT SUMMARY	
V <sub>DS</sub> (V)	100
R <sub>DS(on)</sub> max. (Ω) at V <sub>GS</sub> = 10 V	0.0082
Q <sub>g</sub> typ. (nC)	97
I <sub>D</sub> (A)	90 <sup>d</sup>
Configuration	Single



ORDERING INFORMATION	
Package	TO-263
Lead (Pb)-free	SUM90N10-8m2P-E3

ABSOLUTE MAXIMUM RATINGS (T <sub>C</sub> = 25 °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V <sub>DS</sub>	100	V
Gate-source voltage		V <sub>GS</sub>	± 20	
Continuous drain current (T <sub>J</sub> = 175 °C)	T <sub>C</sub> = 25 °C	I <sub>D</sub>	90 <sup>d</sup>	A
	T <sub>C</sub> = 70 °C		90 <sup>d</sup>	
Pulsed drain current		I <sub>DM</sub>	240	
Avalanche current		I <sub>AS</sub>	60	
Single avalanche energy <sup>a</sup>	L = 0.1 mH	E <sub>AS</sub>	180	mJ
Maximum power dissipation <sup>a</sup>	T <sub>C</sub> = 25 °C	P <sub>D</sub>	300 <sup>b</sup>	W
	T <sub>A</sub> = 25 °C <sup>c</sup>		3.75	
Operating junction and storage temperature range		T <sub>J</sub> , T <sub>stg</sub>	-55 to +175	°C

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-ambient (PCB mount) <sup>c</sup>		R <sub>thJA</sub>	40	°C/W
Junction-to-case (drain)		R <sub>thJC</sub>	0.5	

#### Notes

- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR4 material).
- Package limited.



SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Drain-source breakdown voltage	V <sub>DS</sub>	V <sub>DS</sub> = 0 V, I <sub>D</sub> = 250 μA	100	-	-	V
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	2.5	-	4.5	
Gate-body leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V	-	-	± 250	nA
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V	-	-	1	μA
		V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C	-	-	50	
		V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 150 °C	-	-	250	
On-state drain current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 10 V, V <sub>GS</sub> = 10 V	70	-	-	A
Drain-source on-state resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A	-	0.0067	0.0082	Ω
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A, T <sub>J</sub> = 125 °C	-	0.0127	0.0170	
Forward transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 20 A	-	62	-	S
<b>Dynamic <sup>b</sup></b>						
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 50 V, f = 1 MHz	-	6290	-	pF
Output capacitance	C <sub>oss</sub>		-	535	-	
Reverse transfer capacitance	C <sub>rss</sub>		-	182	-	
Total gate charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 85 A	-	97	150	nC
Gate-source charge <sup>c</sup>	Q <sub>gs</sub>		-	32	-	
Gate-drain charge <sup>c</sup>	Q <sub>gd</sub>		-	25	-	
Gate resistance	R <sub>g</sub>	f = 1 MHz	0.28	1.4	2.8	W
Turn-on delay time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 50 V, R <sub>L</sub> = 0.588 Ω I <sub>D</sub> ≅ 85 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 1 Ω	-	23	35	ns
Rise time <sup>c</sup>	t <sub>r</sub>		-	17	26	
Turn-off delay time <sup>c</sup>	t <sub>d(off)</sub>		-	34	52	
Fall time <sup>c</sup>	t <sub>f</sub>		-	9	18	
<b>Source-Drain Diode Ratings and Characteristics (T<sub>C</sub> = 25 °C) <sup>b</sup></b>						
Continuous current	I <sub>S</sub>		-	-	85	A
Pulsed current	I <sub>SM</sub>		-	-	240	
Forward voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = 30 A, V <sub>GS</sub> = 0 V	-	0.85	1.5	V
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 75 A, di/dt = 100 A/μs	-	61	100	ns
Peak reverse recovery current	I <sub>RM(REC)</sub>		-	3	4.5	A
Reverse recovery charge	Q <sub>rr</sub>		-	91	130	nC

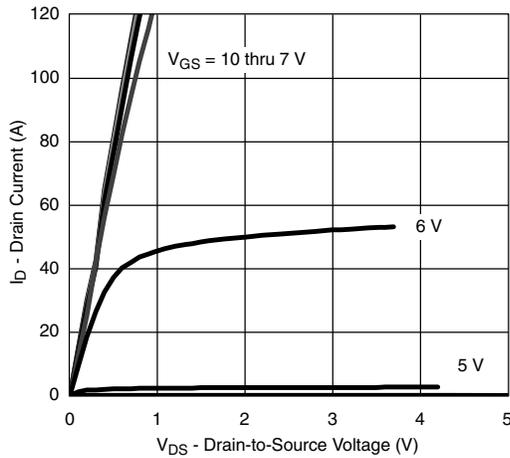
**Notes**

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

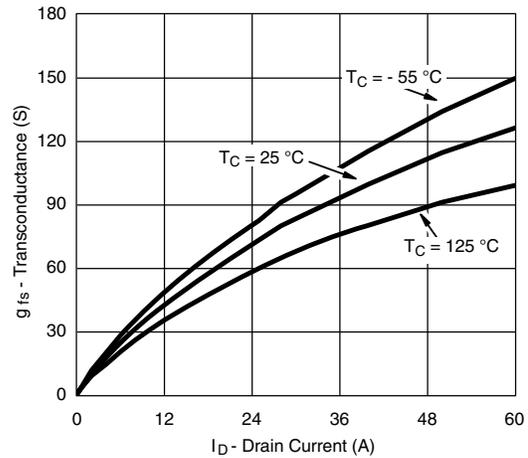
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



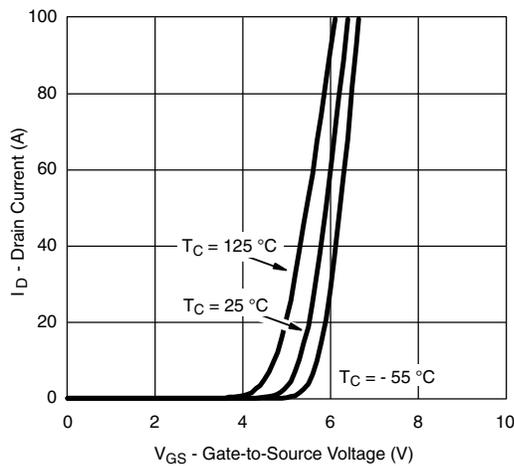
## TYPICAL CHARACTERISTICS (25 °C, UNLESS OTHERWISE NOTED)



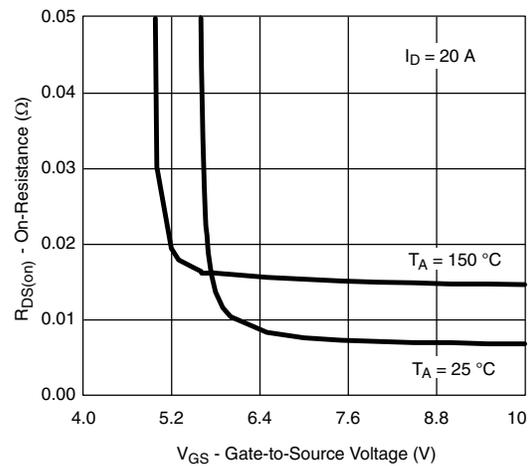
Output Characteristics



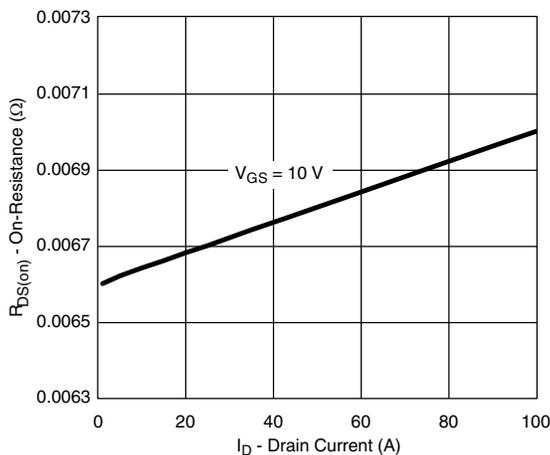
Transconductance



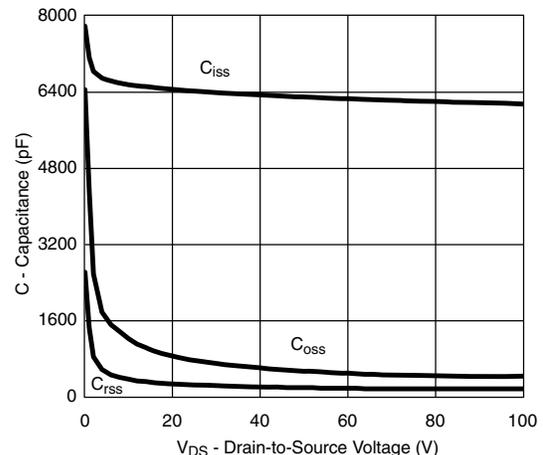
Transfer Characteristics



On-resistance vs. Gate-to-Source Voltage



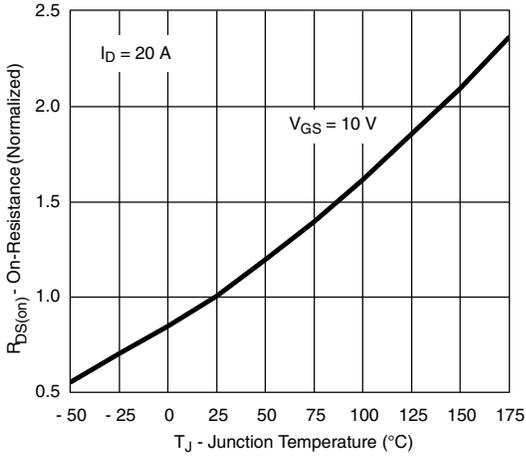
On-Resistance vs. Drain Current



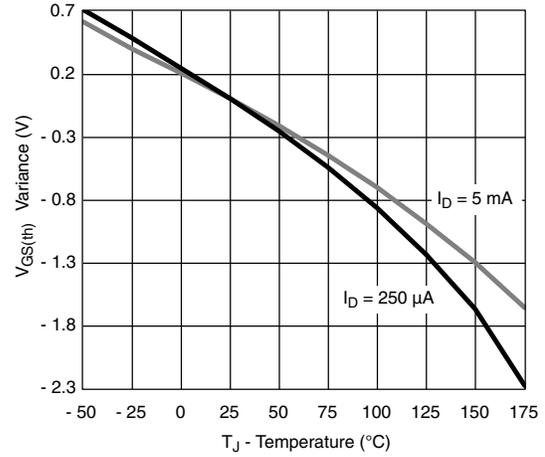
Capacitance



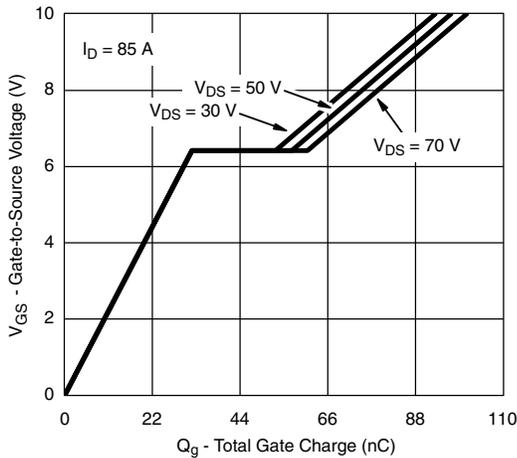
## TYPICAL CHARACTERISTICS (25 °C, UNLESS OTHERWISE NOTED)



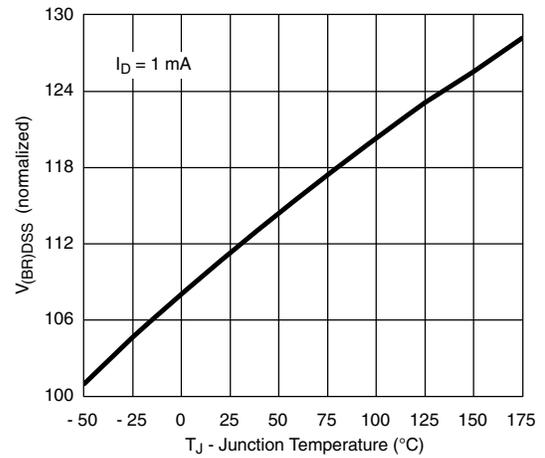
**On-Resistance vs. Junction Temperature**



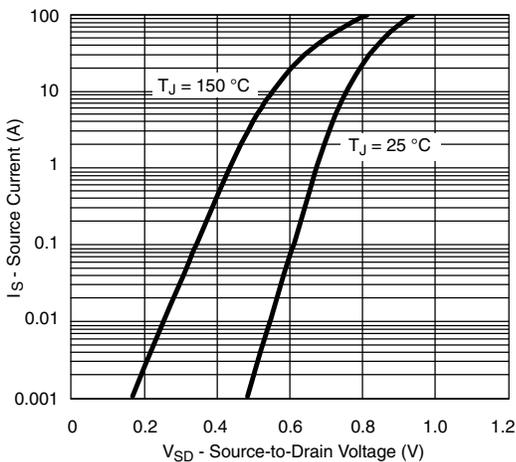
**Threshold Voltage**



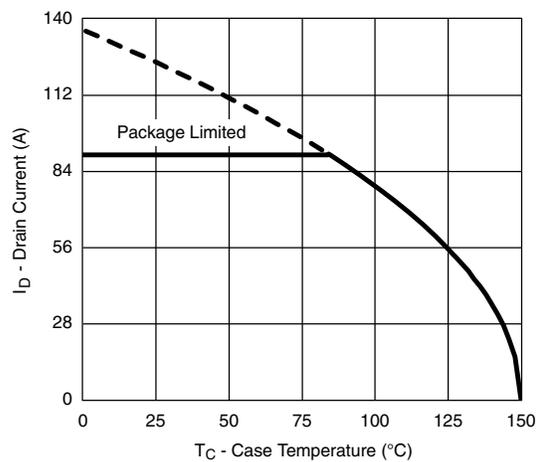
**Gate Charge**



**Drain Source Breakdown vs. Junction Temperature**



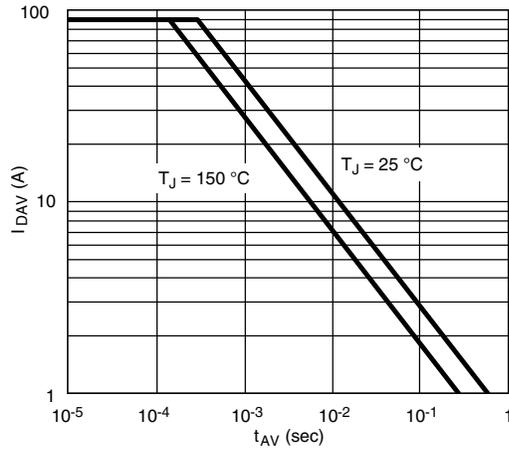
**Source-Drain Diode Forward Voltage**



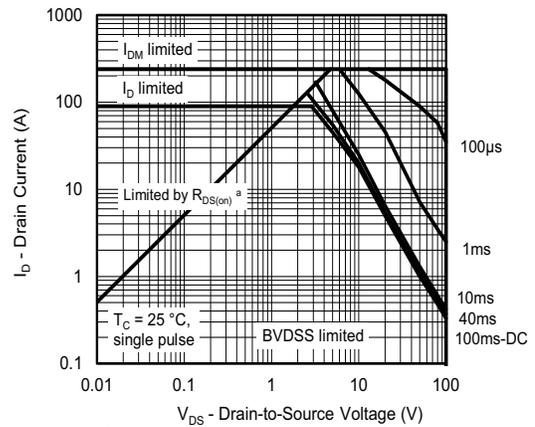
**Maximum Drain Current vs. Case Temperature**



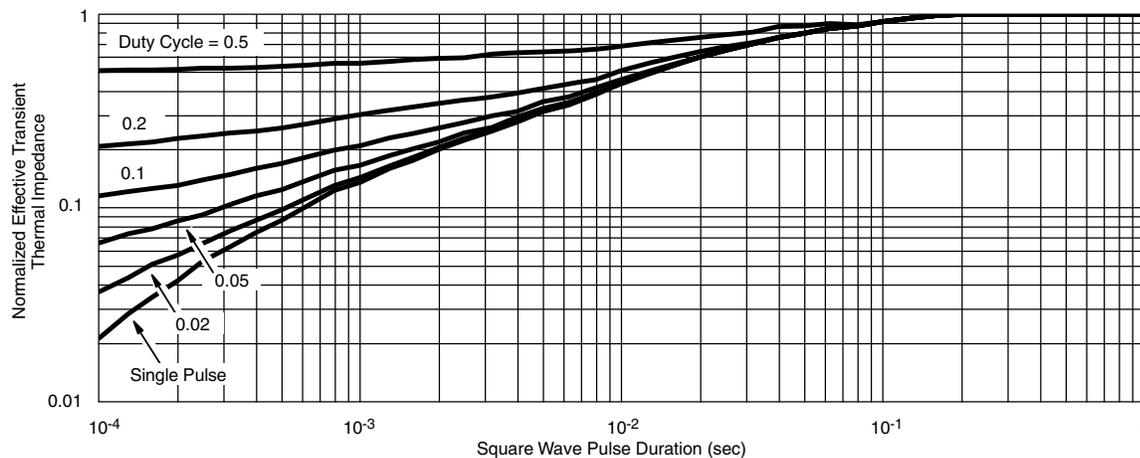
## TYPICAL CHARACTERISTICS (25 °C, UNLESS OTHERWISE NOTED)



Single Pulse Avalanche Current Capability vs. Time



Safe Operating Area, Junction-to-Case



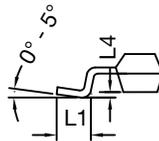
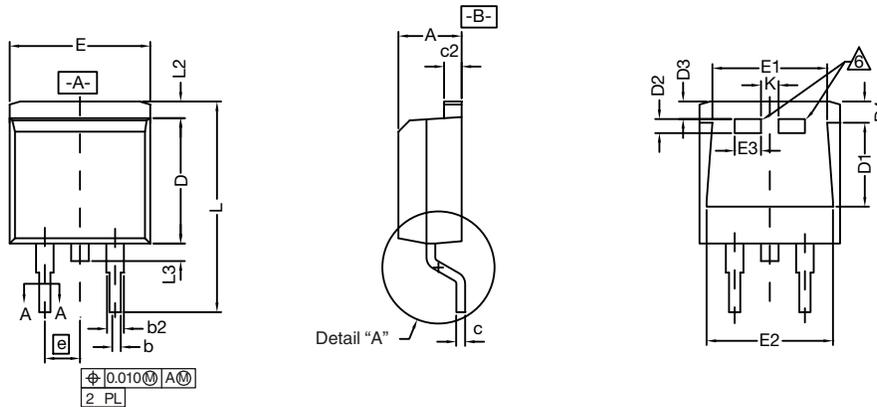
Normalized Thermal Transient Impedance, Junction-to-Case

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?74643](http://www.vishay.com/ppg?74643).

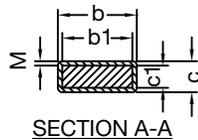


# TO-263 (D<sup>2</sup>PAK): 3-LEAD

VERSION 1: FACILITY CODE = T



DETAIL A (ROTATED 90°)



SECTION A-A

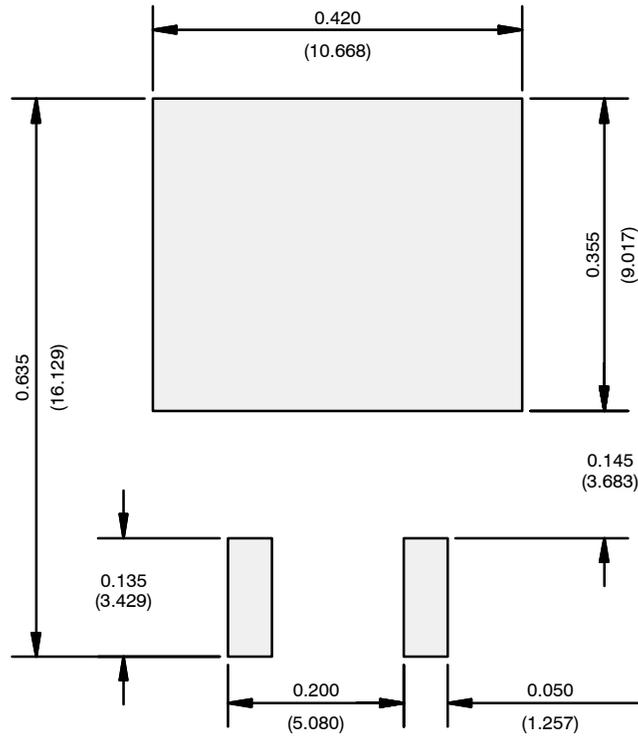
DIM.	INCHES		MILLIMETERS		
	MIN.	MAX.	MIN.	MAX.	
A	0.160	0.190	4.064	4.826	
b	0.020	0.039	0.508	0.990	
b1	0.020	0.035	0.508	0.889	
b2	0.045	0.055	1.143	1.397	
c*	Thin lead	0.013	0.018	0.330	0.457
	Thick lead	0.023	0.028	0.584	0.711
c1	Thin lead	0.013	0.017	0.330	0.431
	Thick lead	0.023	0.027	0.584	0.685
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	-	
<b>E2</b>	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	

**Notes**

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



**RECOMMENDED MINIMUM PADS FOR D<sup>2</sup>PAK: 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.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. 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.