

P-Channel 100 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω) Max.	I_D (A) ^c	Q_g (Typ.)
- 100	0.138 at $V_{GS} = - 10$ V	- 16.3	24 nC
	0.141 at $V_{GS} = - 7.5$ V	- 16.1	
	0.142 at $V_{GS} = - 6$ V	- 16.1	

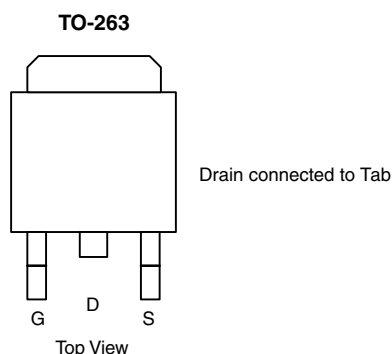
FEATURES

- TrenchFET® Power MOSFET
- 100 % R_g and UIS Tested
- Material categorization:
For definitions of compliance please see www.vishay.com/doc?99912

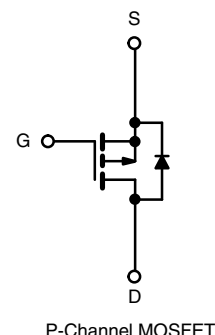

RoHS
COMPLIANT

APPLICATIONS

- DC/DC Converters
- Motor Control



Ordering Information:
SUM25P10-138-E3 (Lead (Pb)-free)



ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °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)	I_D	$T_C = 25$ °C	A
		$T_C = 125$ °C	
Pulsed Drain Current ($t = 100$ μ s)	I_{DM}	- 40	
Avalanche Current	I_{AS}	- 25	
Single Pulse Avalanche Energy ^a	E_{AS}	31.25	mJ
Power Dissipation	P_D	$T_C = 25$ °C	W
		$T_A = 25$ °C	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient Free Air	R_{thJA}	40	°C/W
Junction-to-Case	R_{thJC}	1.7	

Notes:

a. Duty cycle ≤ 1 %.

b. See SOA curve for voltage derating.

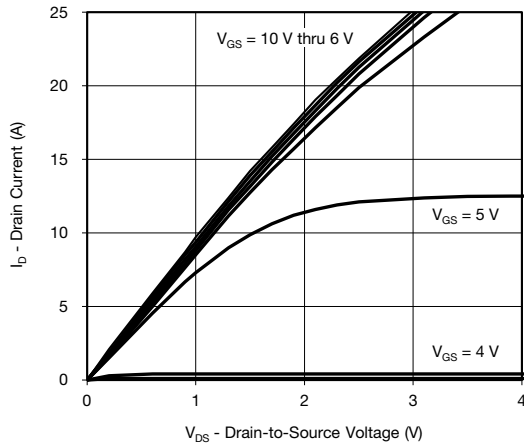
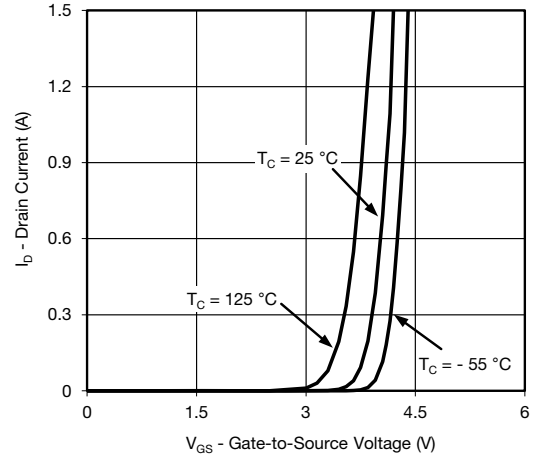
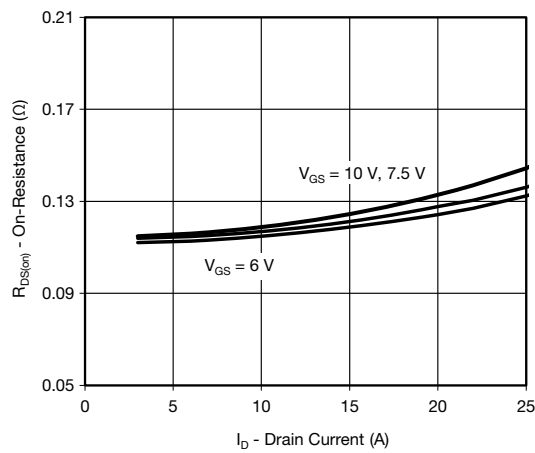
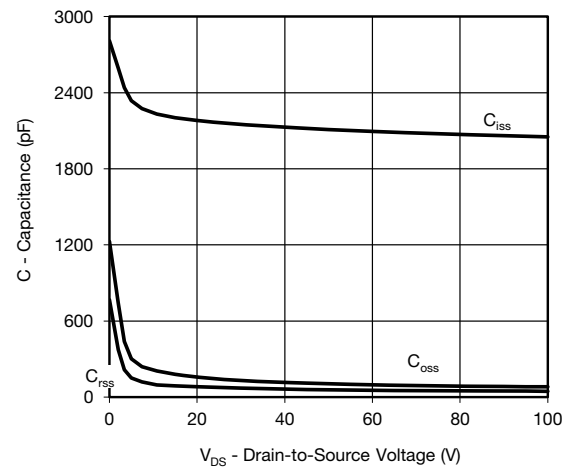
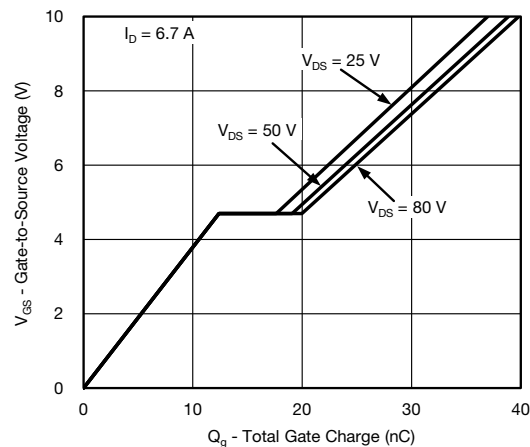
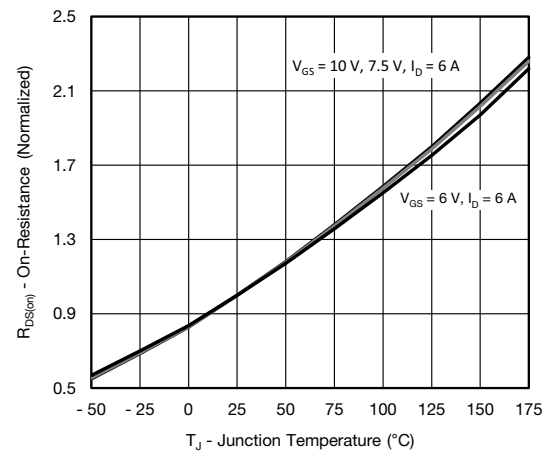
c. $T_C = 25$ °C

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	- 100			V
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 2		- 4	
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		- 105		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J	I _D = - 250 μA		6.6		
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 100 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 100 V, V _{GS} = 0 V, T _J = 125 °C			- 50	
		V _{DS} = - 100 V, V _{GS} = 0 V, T _J = 150 °C			- 200	
On-State Drain Current ^a	I _{D(on)}	V _{DS} = - 5 V, V _{GS} = - 10 V	- 20			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 6 A		0.115	0.138	Ω
		V _{GS} = - 7.5 V, I _D = - 6 A		0.117	0.141	
		V _{GS} = - 6 V, I _D = - 6 A		0.118	0.142	
Forward Transconductance ^a	g _{fs}	V _{DS} = - 15 V, I _D = - 6 A		18		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = - 50 V, f = 1 MHz		2110		pF
Output Capacitance	C _{oss}			105		
Reverse Transfer Capacitance	C _{rss}			58		
Total Gate Charge ^c	Q _g	V _{DS} = - 50 V, V _{GS} = - 10 V, I _D = - 6.7 A		40	60	nC
		V _{DS} = - 50 V, V _{GS} = - 6 V, I _D = - 6.7 A		24	36	
Gate-Source Charge ^c	Q _{gs}			12.5		
Gate-Drain Charge ^c	Q _{gd}			6.7		
Gate Resistance	R _g	f = 1 MHz	2	8	16	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = - 50 V, R _L = 10 Ω I _D ≅ - 5 A, V _{GEN} = - 10 V, R _g = 1 Ω		7	14	ns
Rise Time ^c	t _r			12	20	
Turn-Off Delay Time ^c	t _{d(off)}			46	70	
Fall Time ^c	t _f			40	60	
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = - 50 V, R _L = 10 Ω I _D ≅ - 5 A, V _{GEN} = - 4.5 V, R _g = 1 Ω		12	20	
Rise Time ^c	t _r			105	160	
Turn-Off Delay Time ^c	t _{d(off)}			36	54	
Fall Time ^c	t _f			34	51	
Source-Drain Diode Ratings and Characteristics T _C = 25 °C ^b						
Continuous Current	I _S				- 16.3	A
Pulsed Current (t = 100 μs)	I _{SM}				- 40	
Forward Voltage ^a	V _{SD}	I _F = - 5 A, V _{GS} = 0 V		- 0.85	- 1.5	V
Reverse Recovery Time	t _{rr}	I _F = - 5 A, dI/dt = 100 A/μs		70	105	ns
Peak Reverse Recovery Current	I _{RM(REC)}			- 7	- 14	A
Reverse Recovery Charge	Q _{rr}			220	330	nC

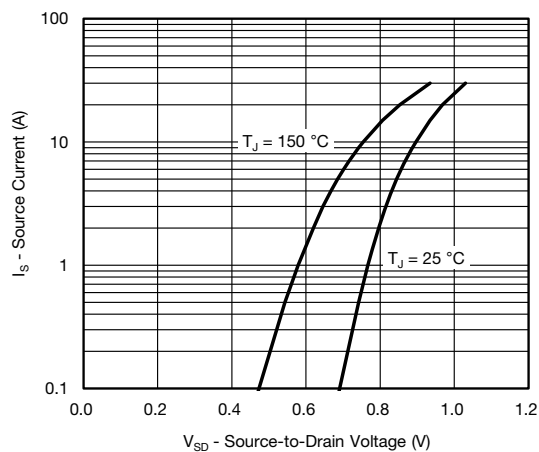
Notes:

- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

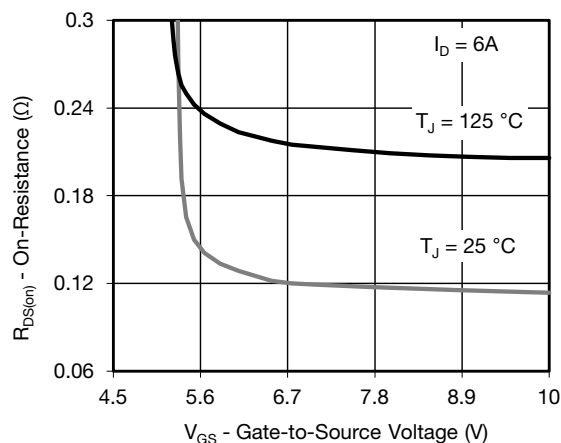
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current and Gate Voltage

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature

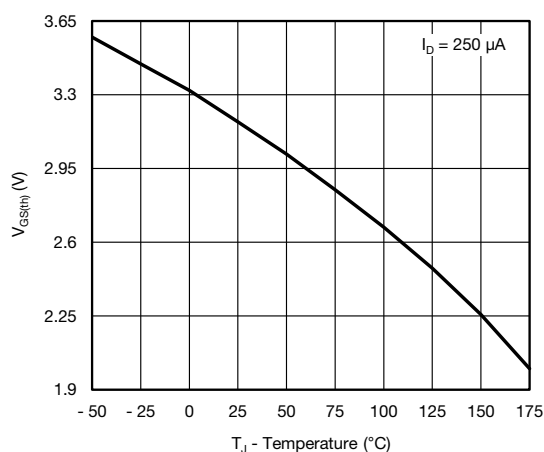
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



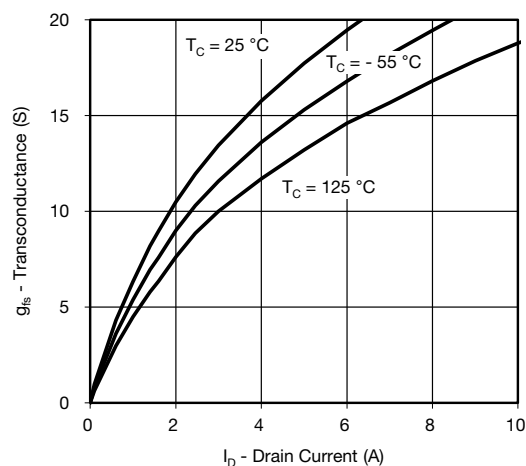
Source-Drain Diode Forward Voltage



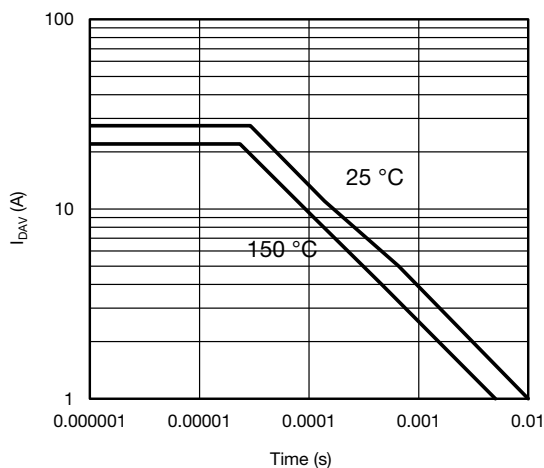
On-Resistance vs. Gate-to-Source Voltage



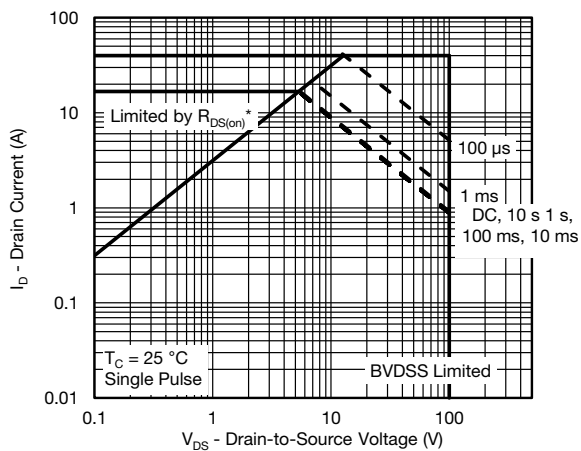
Threshold Voltage



Transconductance

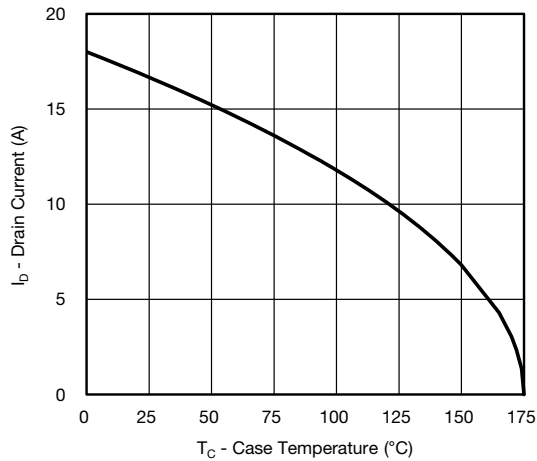


Single Pulse Avalanche Capability

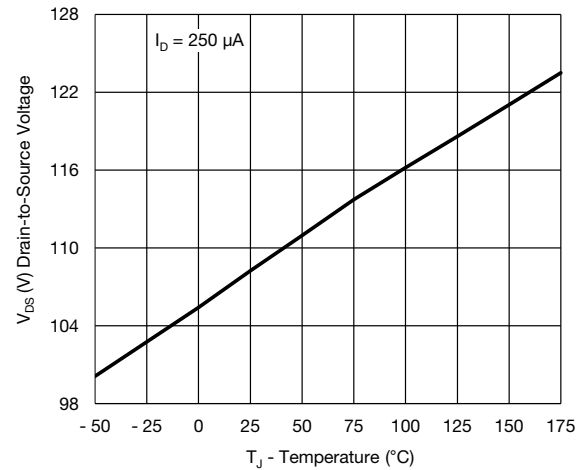


Safe Operating Area, Junction-to-Case

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

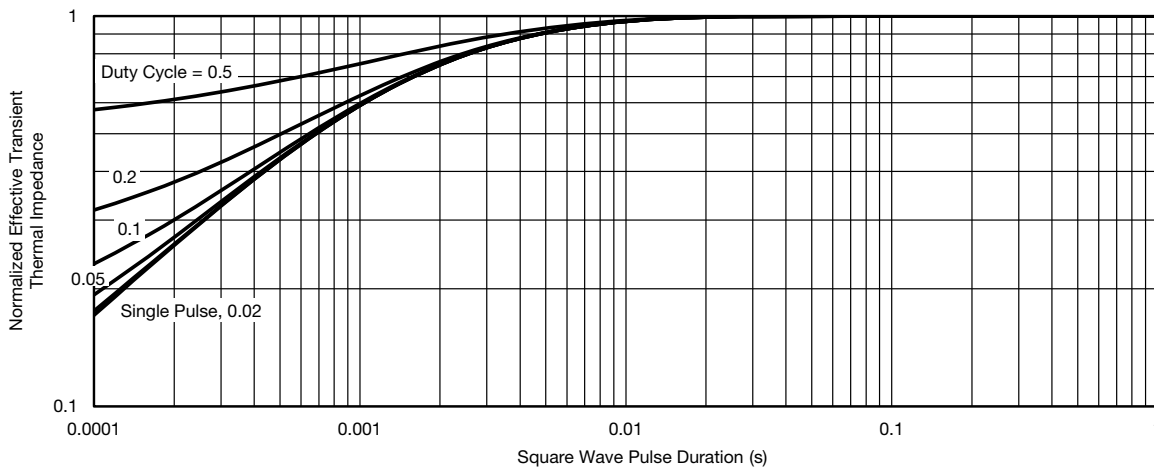


Current Derating*



Drain Source Breakdown vs. Junction Temperature

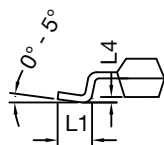
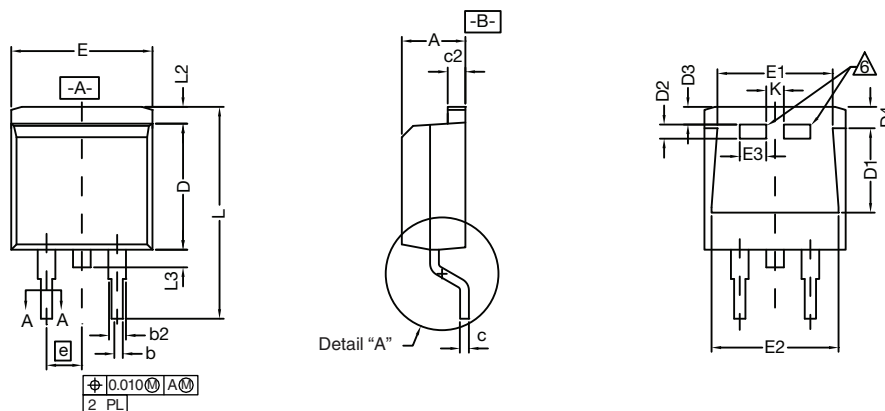
* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



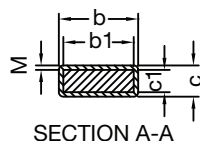
Normalized Thermal Transient Impedance, Junction-to-Case

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?62886.

TO-263 (D²PAK): 3-LEAD



DETAIL A (ROTATED 90°)



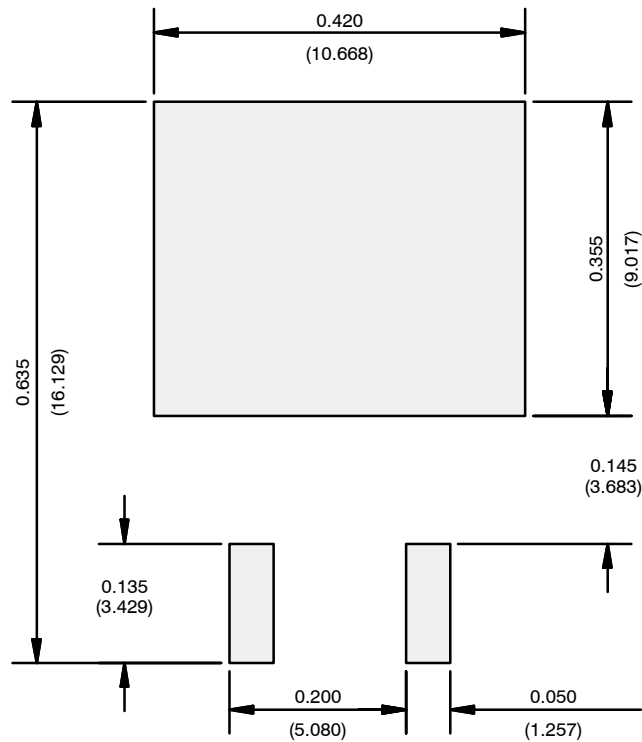
SECTION A-A

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
		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					

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.

Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.