

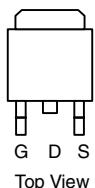
## P-Channel 60-V (D-S) 175 °C MOSFET

PRODUCT SUMMARY			
$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>d</sup>	$Q_g$ (Typ.)
- 60	0.019 at $V_{GS} = - 10$ V	- 55	76
	0.025 at $V_{GS} = - 4.5$ V	- 48	

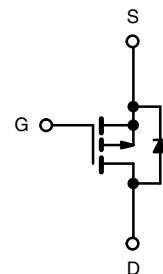
### FEATURES

- TrenchFET® Power MOSFET


**RoHS\***  
COMPLIANT

**TO-263**


Top View



**Ordering Information:** SUM55P06-19L  
SUM55P06-19L-E3 (Lead (Pb)-free)

P-Channel MOSFET

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	- 60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current <sup>d</sup> ( $T_J = 175$ °C)	$I_D$	- 55	A
		- 31	
Pulsed Drain Current	$I_{DM}$	- 150	A
Avalanche Current	$I_{AS}$	- 45	
Single Pulse Avalanche Energy <sup>a</sup>	$E_{AS}$	101	mJ
Power Dissipation	$P_D$	125 <sup>c</sup>	W
		3.75	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 175	°C

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient	$R_{thJA}$	40	°C/W
Junction-to-Case	$R_{thJC}$	1.2	

Notes:

- a. Duty cycle  $\leq 1\%$ .
- b. When Mounted on 1" square PCB (FR-4 material).
- c. See SOA curve for voltage derating.
- d. Limited by package.

\* Pb containing terminations are not RoHS compliant, exemptions may apply.

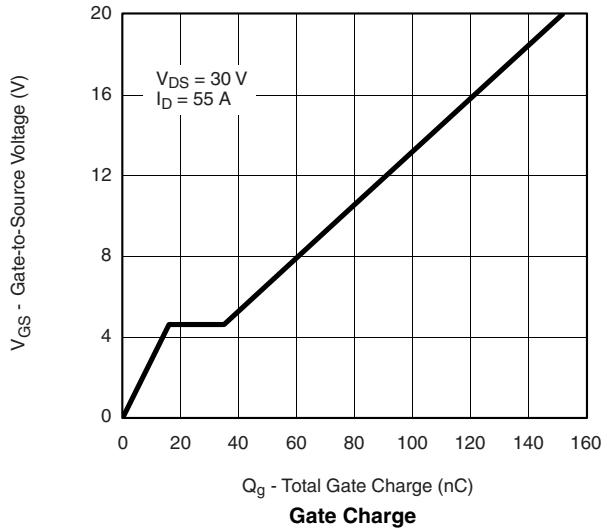
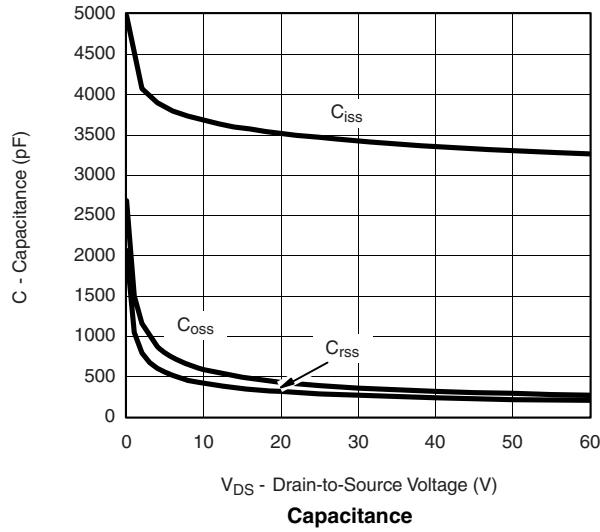
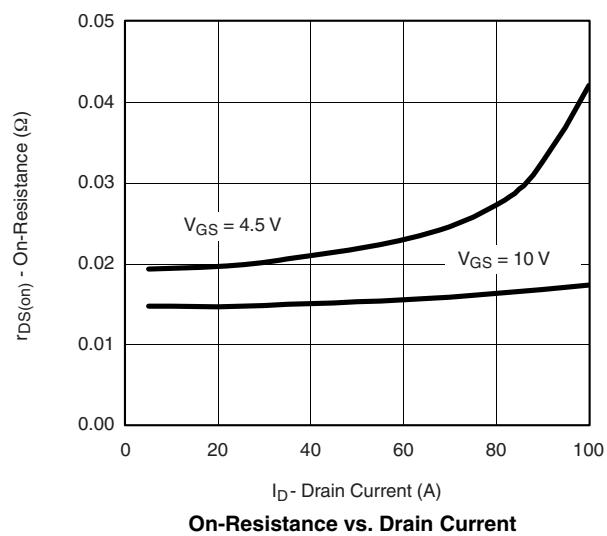
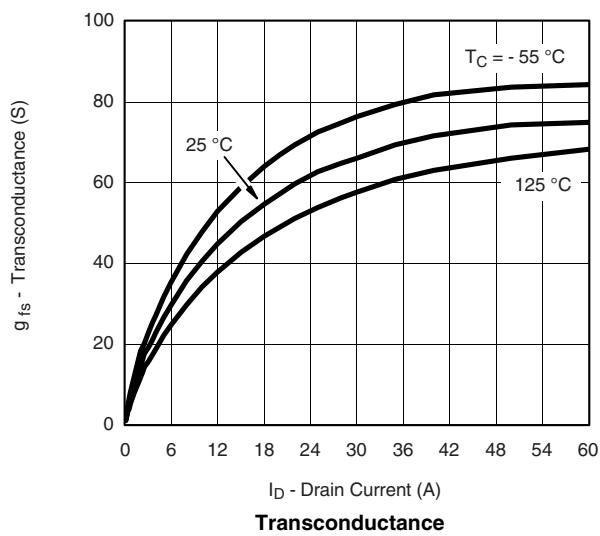
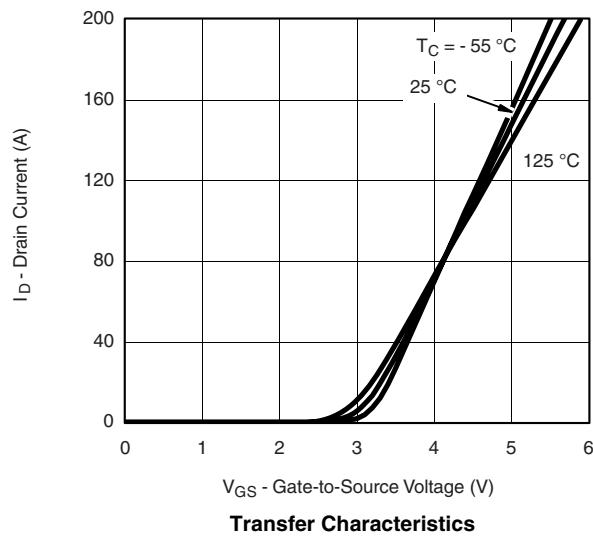
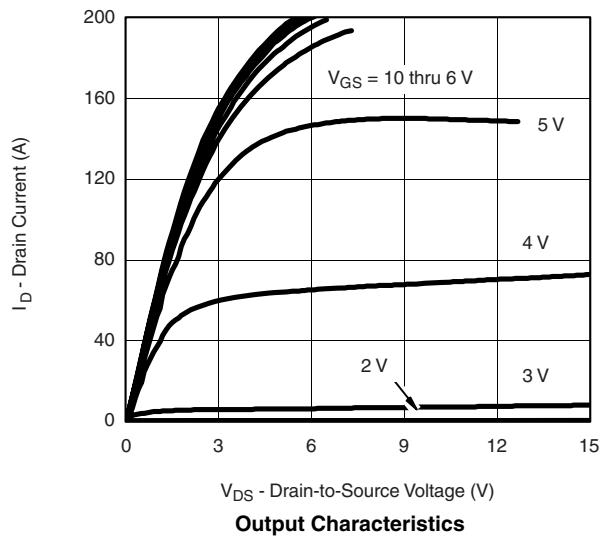
**SPECIFICATIONS**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

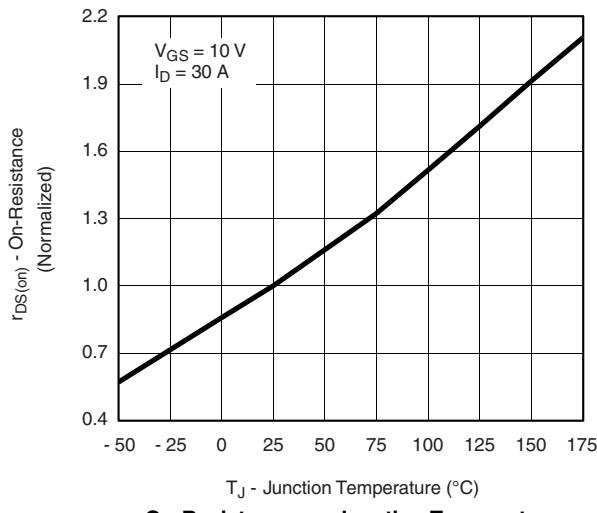
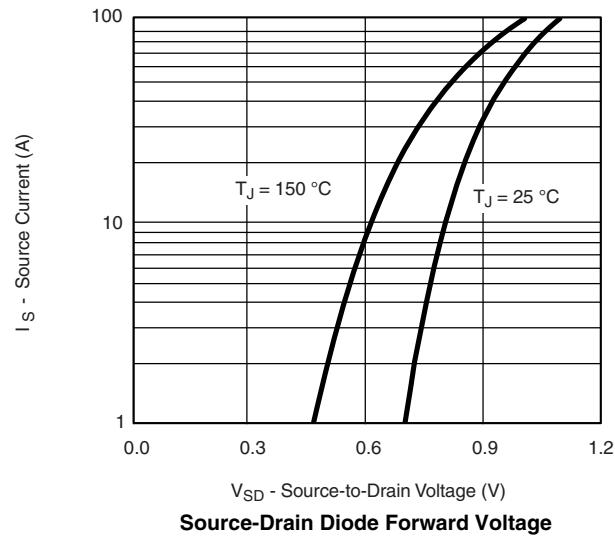
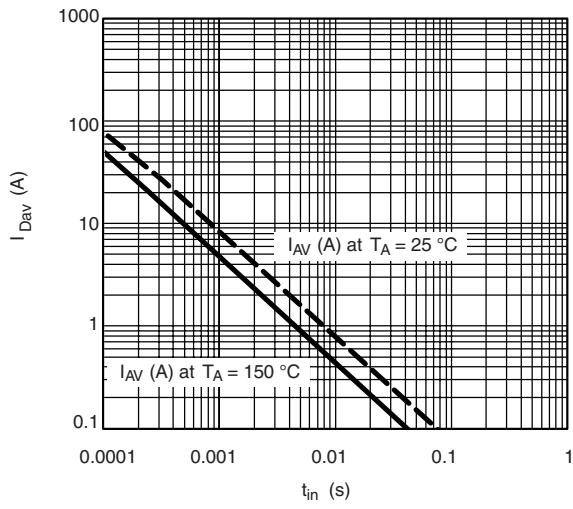
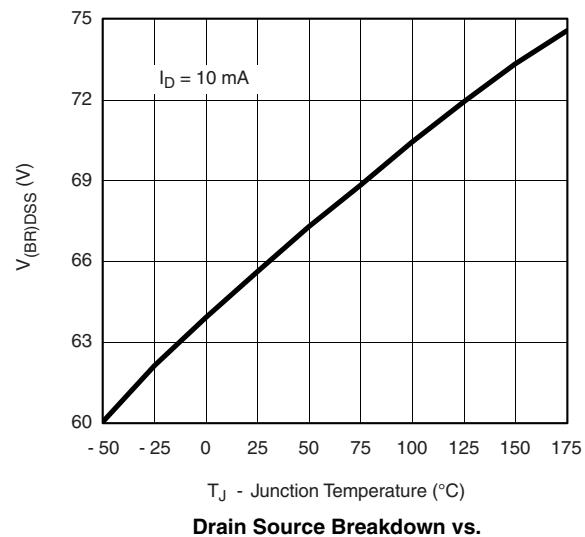
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0 \text{ V}, I_D = -250 \mu\text{A}$	- 60			V
Gate-Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}, I_D = -250 \mu\text{A}$	- 1		- 3	
Gate-Body Leakage	$I_{\text{GSS}}$	$V_{\text{DS}} = 0 \text{ V}, V_{\text{GS}} = \pm 20 \text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{\text{DSS}}$	$V_{\text{DS}} = -60 \text{ V}, V_{\text{GS}} = 0 \text{ V}$			- 1	$\mu\text{A}$
		$V_{\text{DS}} = -60 \text{ V}, V_{\text{GS}} = 0 \text{ V}, T_J = 125^\circ\text{C}$			- 50	
		$V_{\text{DS}} = -60 \text{ V}, V_{\text{GS}} = 0 \text{ V}, T_J = 175^\circ\text{C}$			- 250	
On-State Drain Current <sup>a</sup>	$I_{\text{D}(\text{on})}$	$V_{\text{DS}} = -5 \text{ V}, V_{\text{GS}} = -10 \text{ V}$	- 120			A
Drain-Source On-State Resistance <sup>a</sup>	$r_{\text{DS}(\text{on})}$	$V_{\text{GS}} = -10 \text{ V}, I_D = -30 \text{ A}$		0.015	0.019	$\Omega$
		$V_{\text{GS}} = -10 \text{ V}, I_D = -30 \text{ A}, T_J = 125^\circ\text{C}$			0.033	
		$V_{\text{GS}} = -10 \text{ V}, I_D = -30 \text{ A}, T_J = 175^\circ\text{C}$			0.041	
		$V_{\text{GS}} = -4.5 \text{ V}, I_D = -20 \text{ A}$		0.020	0.025	
Forward Transconductance <sup>a</sup>	$g_{\text{fs}}$	$V_{\text{DS}} = -15 \text{ V}, I_D = -50 \text{ A}$	20			S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{\text{iss}}$	$V_{\text{GS}} = 0 \text{ V}, V_{\text{DS}} = -25 \text{ V}, f = 1 \text{ MHz}$		3500		$\text{pF}$
Output Capacitance	$C_{\text{oss}}$			390		
Reverse Transfer Capacitance	$C_{\text{rss}}$			290		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{\text{DS}} = -30 \text{ V}, V_{\text{GS}} = -10 \text{ V}, I_D = -55 \text{ A}$		76	115	$\text{nC}$
Gate-Source Charge <sup>c</sup>	$Q_{\text{gs}}$			16		
Gate-Drain Charge <sup>c</sup>	$Q_{\text{gd}}$			19		
Gate Resistance	$R_g$	$f = 1.0 \text{ MHz}$		5.2		$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{\text{d}(\text{on})}$	$V_{\text{DD}} = -30 \text{ V}, R_L = 0.54 \Omega$ $I_D \equiv -55 \text{ A}, V_{\text{GEN}} = -10 \text{ V}, R_g = 2.5 \Omega$		12	20	$\text{ns}$
Rise Time <sup>c</sup>	$t_r$			15	25	
Turn-Off Delay Time <sup>c</sup>	$t_{\text{d}(\text{off})}$			80	120	
Fall Time <sup>c</sup>	$t_f$			230	350	
<b>Source-Drain Diode Ratings and Characteristics</b> $T_C = 25^\circ\text{C}$						
Continuous Current	$I_S$				- 110	$\text{A}$
Pulsed Current	$I_{\text{SM}}$				- 240	
Forward Voltage <sup>a</sup>	$V_{\text{SD}}$	$I_F = -50 \text{ A}, V_{\text{GS}} = 0 \text{ V}$		- 1.0	- 1.5	V
Reverse Recovery Time	$t_{\text{rr}}$	$I_F = -50 \text{ A}, \text{di/dt} = 100 \text{ A}/\mu\text{s}$		45	68	ns
Peak Reverse Recovery Current	$I_{\text{RM}(\text{REC})}$			- 2.6	4.0	A
Reverse Recovery Charge	$Q_{\text{rr}}$			0.059	0.136	$\mu\text{C}$

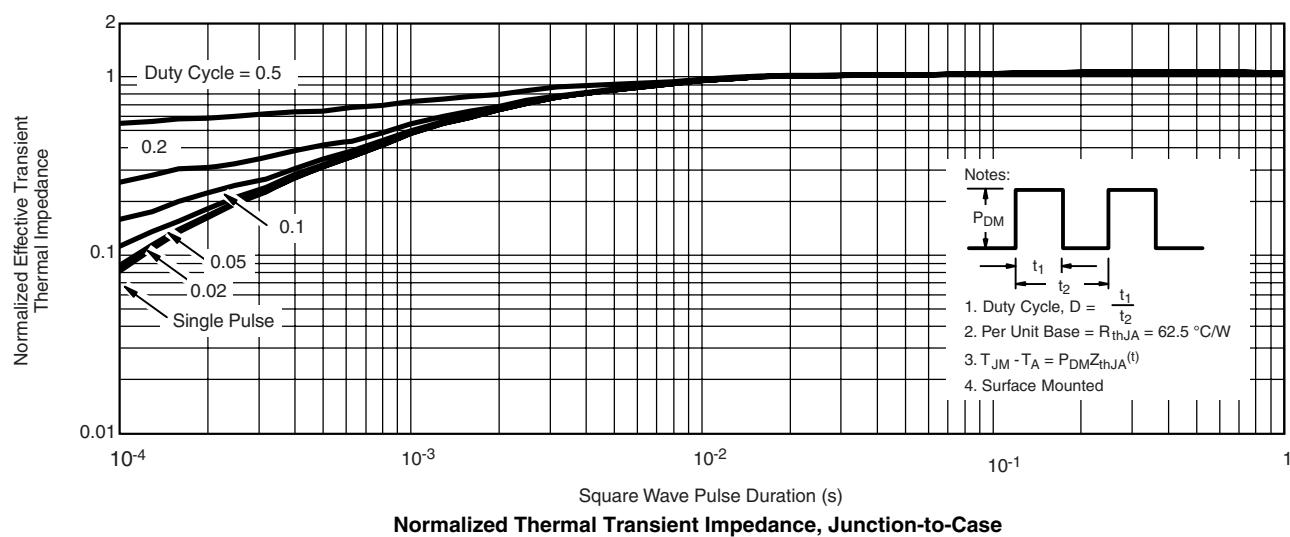
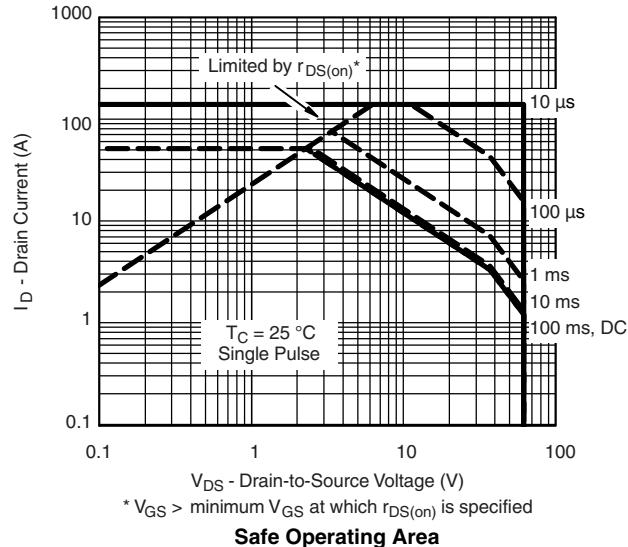
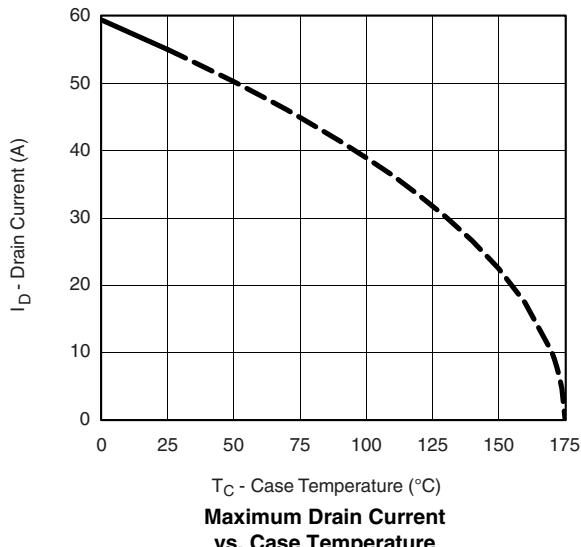
## Notes:

- a. Pulse test; pulse width  $\leq 300 \mu\text{s}$ , 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.

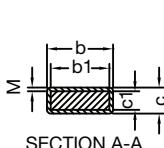
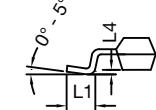
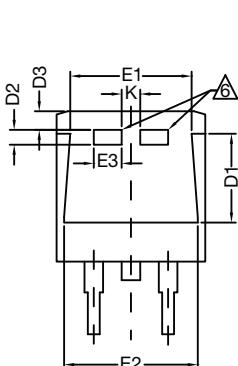
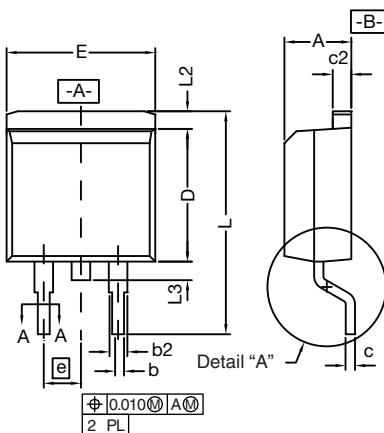
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted


**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted**On-Resistance vs. Junction Temperature****Source-Drain Diode Forward Voltage****Avalanche Current vs. Time****Drain Source Breakdown vs. Junction Temperature**

**THERMAL RATINGS**


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 <http://www.vishay.com/ppg?73059>.

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



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
	Thick lead	0.023	0.028	0.584
c1	Thin lead	0.013	0.017	0.330
	Thick lead	0.023	0.027	0.584
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
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

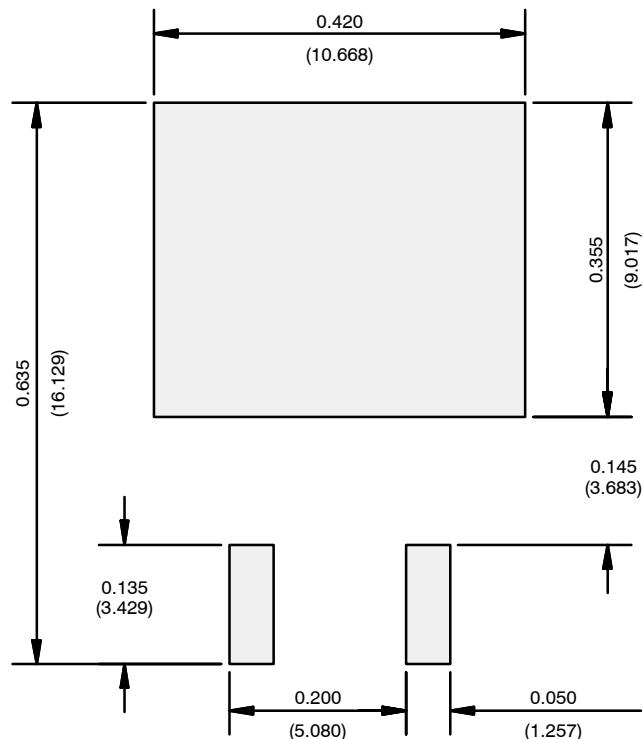
ECN: T10-0738-Rev. J, 03-Jan-11

DWG: 5843

#### 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.

 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.

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.**