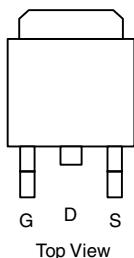


## N-Channel 30 V (D-S) MOSFET

PRODUCT SUMMARY			
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a, e</sup>	$Q_g$ (Typ.)
30	0.0022 at $V_{GS} = 10$ V	90	82 nC
	0.0027 at $V_{GS} = 4.5$ V	90	

### FEATURES

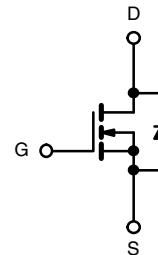
- TrenchFET® Power MOSFET
- 100 %  $R_g$  and UIS Tested
- Material categorization:  
For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**TO-263**


Top View

### APPLICATIONS

- OR-ing
- Server



N-Channel MOSFET

Ordering Information: SUM90N03-2m2P-E3 (Lead (Pb)-free)

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25$ °C, unless otherwise noted)				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	$V_{DS}$	30	V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$		
Continuous Drain Current ( $T_J = 175$ °C)	$T_C = 25$ °C	$I_D$	90 <sup>a, e</sup>	A
	$T_C = 70$ °C		90 <sup>e</sup>	
	$T_A = 25$ °C		33 <sup>b, c</sup>	
	$T_A = 70$ °C		29.8 <sup>b, c</sup>	
Pulsed Drain Current	$I_{DM}$	200		
Avalanche Current Pulse	$I_{AS}$	36		
Single Pulse Avalanche Energy	$E_{AS}$	64.8		
Continuous Source-Drain Diode Current	$T_C = 25$ °C	$I_S$	90 <sup>a, e</sup>	
	$T_A = 25$ °C		3.13 <sup>b, c</sup>	
Maximum Power Dissipation	$T_C = 25$ °C	$P_D$	250 <sup>a</sup>	W
	$T_C = 70$ °C		175	
	$T_A = 25$ °C		3.75 <sup>b, c</sup>	
	$T_A = 70$ °C		2.63 <sup>b, c</sup>	
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 <sup>b, d</sup>	$R_{thJA}$	32	40	°C/W
Maximum Junction-to-Case	Steady State	$R_{thJC}$	0.5	

Notes:

- a. Based on  $T_C = 25$  °C.
- b. Surface mounted on 1" x 1" FR4 board.
- c.  $t = 10$  s.
- d. Maximum under steady state conditions is 90 °C/W.
- e. Calculated based on maximum junction temperature. Package limitation current is 90 A.

# SUM90N03-2m2P

Vishay Siliconix



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

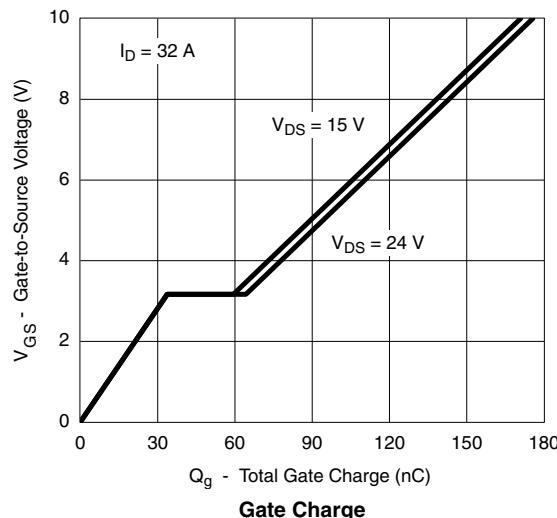
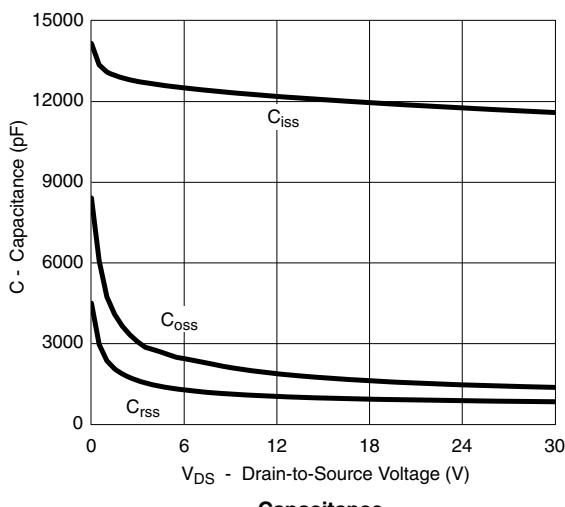
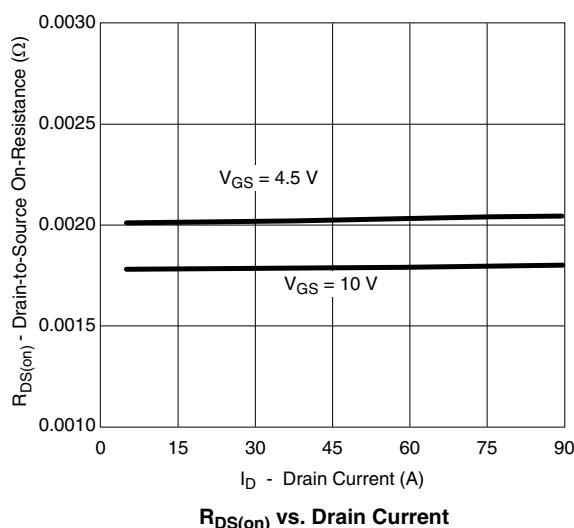
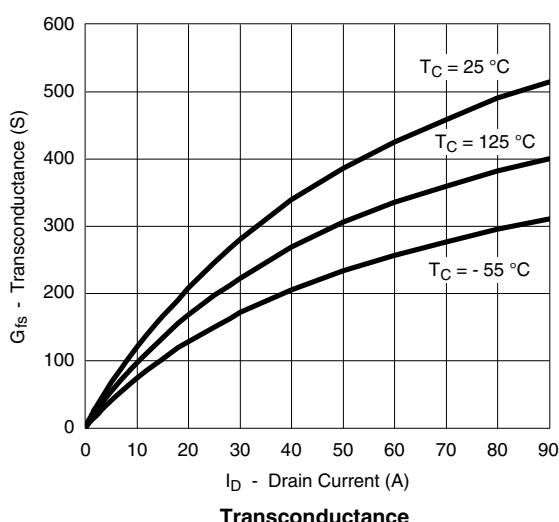
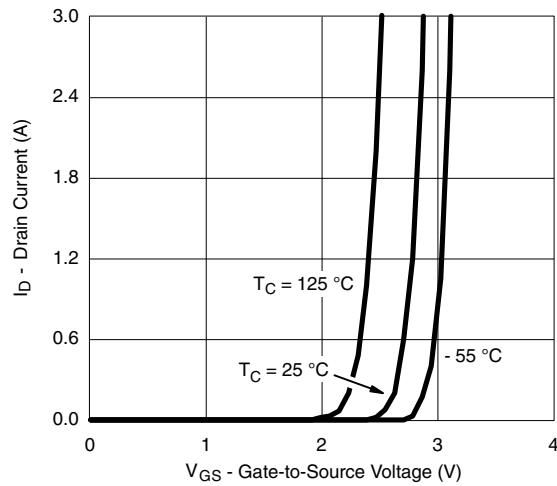
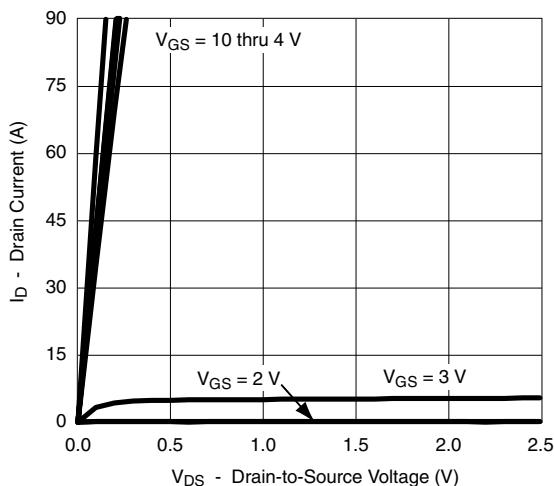
Parameter	Symbol	Test Conditions	Min .	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$	30			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250 \mu\text{A}$		35		$\text{mV}/^\circ\text{C}$
$V_{GS(\text{th})}$ Temperature Coefficient	$\Delta V_{GS(\text{th})}/T_J$			- 7.5		
Gate-Source Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{A}$	1.5		2.5	V
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0 \text{ V}$ , $V_{GS} = \pm 20 \text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 30 \text{ V}$ , $V_{GS} = 0 \text{ V}$		1		$\mu\text{A}$
		$V_{DS} = 30 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $T_J = 55^\circ\text{C}$			10	
On-State Drain Current <sup>a</sup>	$I_{D(\text{on})}$	$V_{DS} \geq 5 \text{ V}$ , $V_{GS} = 10 \text{ V}$	90			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(\text{on})}$	$V_{GS} = 10 \text{ V}$ , $I_D = 32 \text{ A}$		0.0018	0.0022	$\Omega$
		$V_{GS} = 4.5 \text{ V}$ , $I_D = 29 \text{ A}$		0.0022	0.0027	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15 \text{ V}$ , $I_D = 32 \text{ A}$		160		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 15 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 1 \text{ MHz}$		12065		$\text{pF}$
Output Capacitance	$C_{oss}$			1725		
Reverse Transfer Capacitance	$C_{rss}$			970		
Total Gate Charge	$Q_g$	$V_{DS} = 15 \text{ V}$ , $V_{GS} = 10 \text{ V}$ , $I_D = 32 \text{ A}$		171	257	$\text{nC}$
Gate-Source Charge	$Q_{gs}$	$V_{DS} = 15 \text{ V}$ , $V_{GS} = 4.5 \text{ V}$ , $I_D = 29 \text{ A}$		81.5	123	
Gate-Drain Charge	$Q_{gd}$			34		
Gate Resistance	$R_g$			29		
Turn-On Delay Time	$t_{d(\text{on})}$	$V_{DD} = 15 \text{ V}$ , $R_L = 0.555 \Omega$ $I_D \geq 27 \text{ A}$ , $V_{GEN} = 10 \text{ V}$ , $R_g = 1 \Omega$		1.4	2.1	$\Omega$
Rise Time	$t_r$			18	27	$\text{ns}$
Turn-Off Delay Time	$t_{d(\text{off})}$			11	17	
Fall Time	$t_f$			70	105	
Turn-On Delay Time	$t_{d(\text{on})}$			10	15	
Rise Time	$t_r$			55	83	
Turn-Off Delay Time	$t_{d(\text{off})}$			180	270	
Fall Time	$t_f$			55	83	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25^\circ\text{C}$			90	$\text{A}$
Pulse Diode Forward Current <sup>a</sup>	$I_{SM}$				200	
Body Diode Voltage	$V_{SD}$	$I_S = 22 \text{ A}$		0.8	1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 20 \text{ A}$ , $\text{di}/\text{dt} = 100 \text{ A}/\mu\text{s}$ , $T_J = 25^\circ\text{C}$		52	78	$\text{ns}$
Body Diode Reverse Recovery Charge	$Q_{rr}$			70.2	105	$\text{nC}$
Reverse Recovery Fall Time	$t_a$			27		$\text{ns}$
Reverse Recovery Rise Time	$t_b$			25		

Notes:

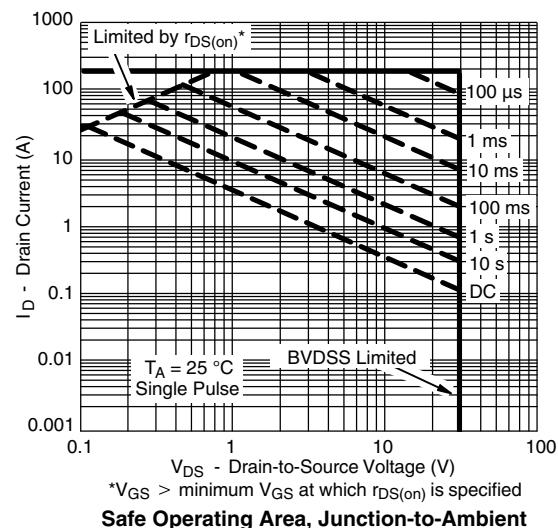
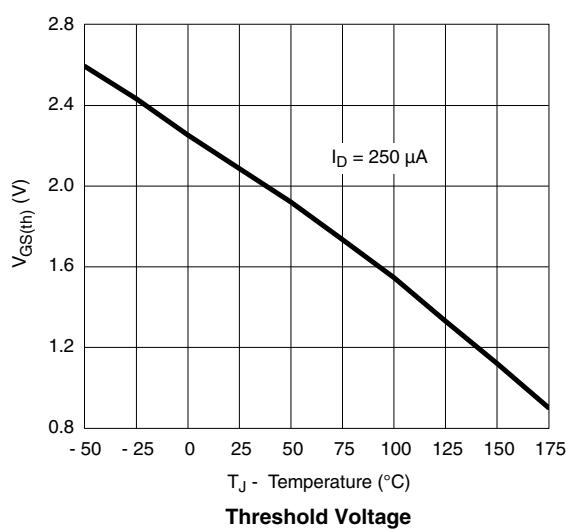
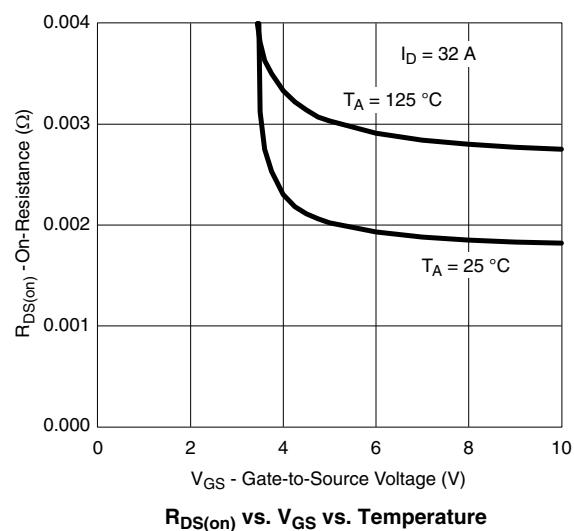
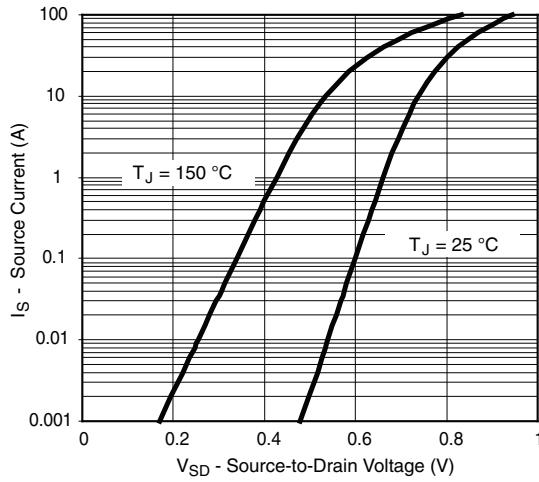
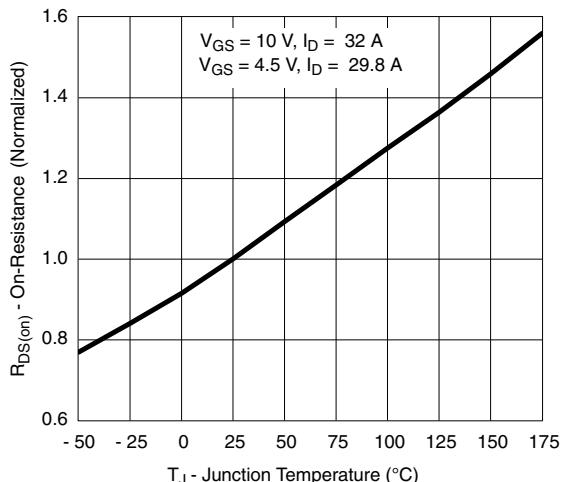
a. Pulse test; pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .

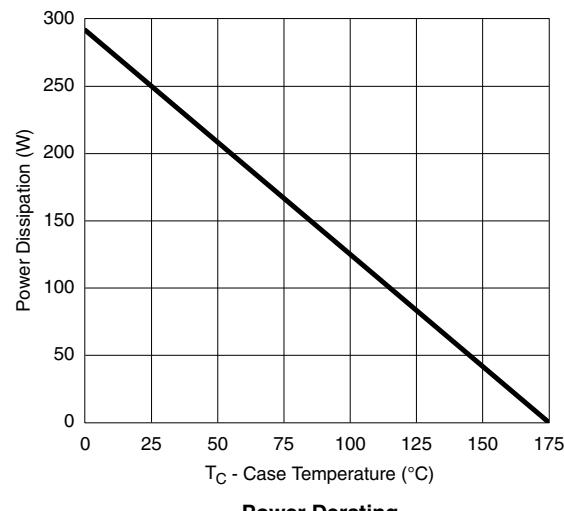
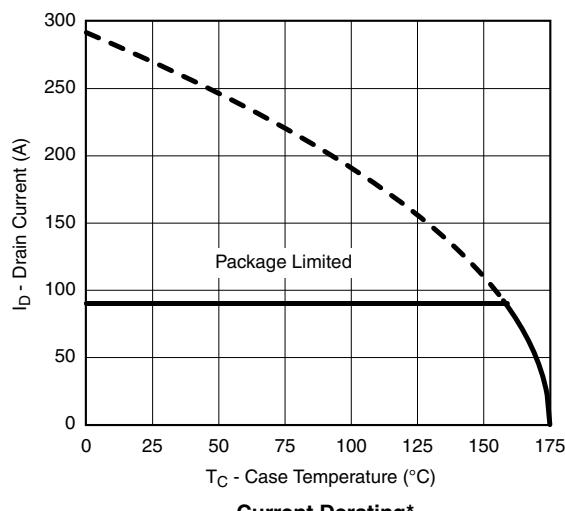
b. Guaranteed by design, not subject to production testing.

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.

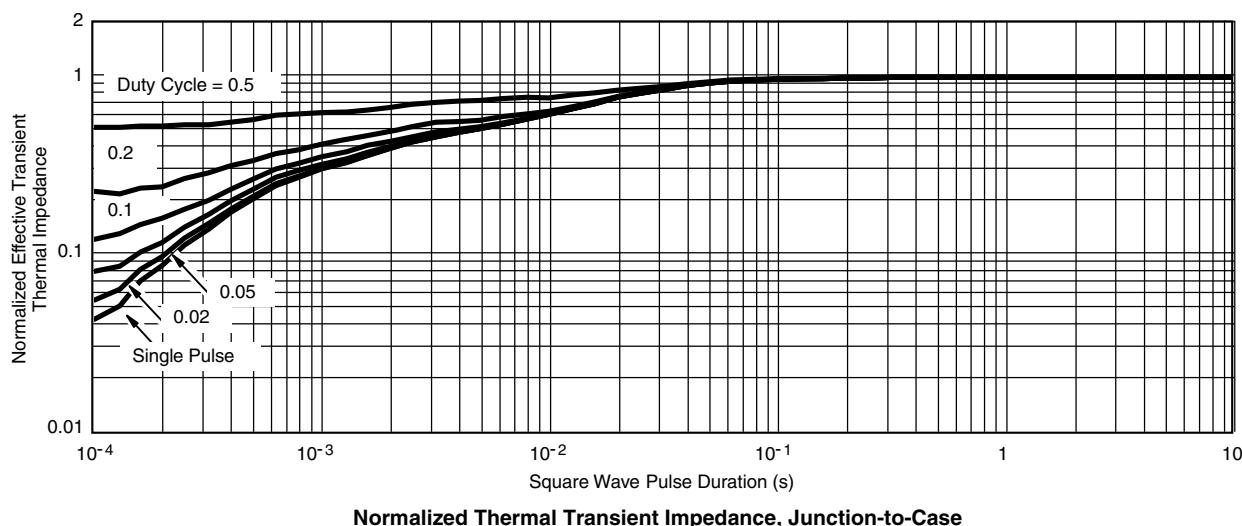
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)


### TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



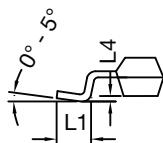
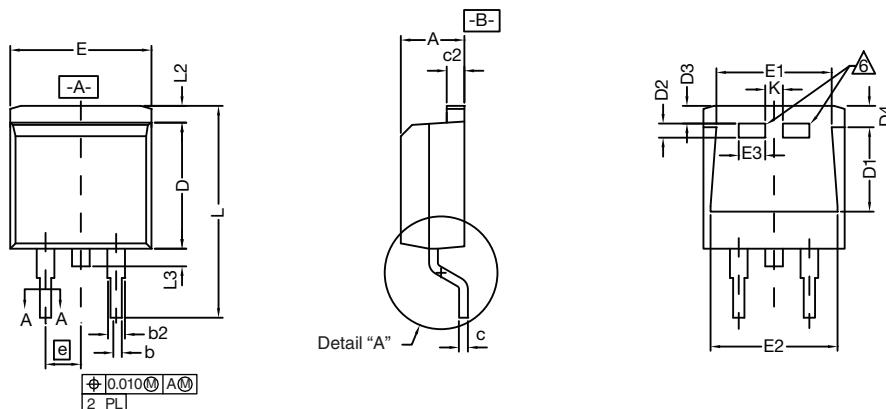
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)


\* The power dissipation  $P_D$  is based on  $T_{J(max)} = 175$  °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.

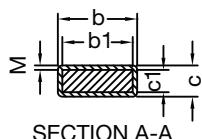


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### TO-263 (D<sup>2</sup>PAK): 3-LEAD



DETAIL A (ROTATED 90°)



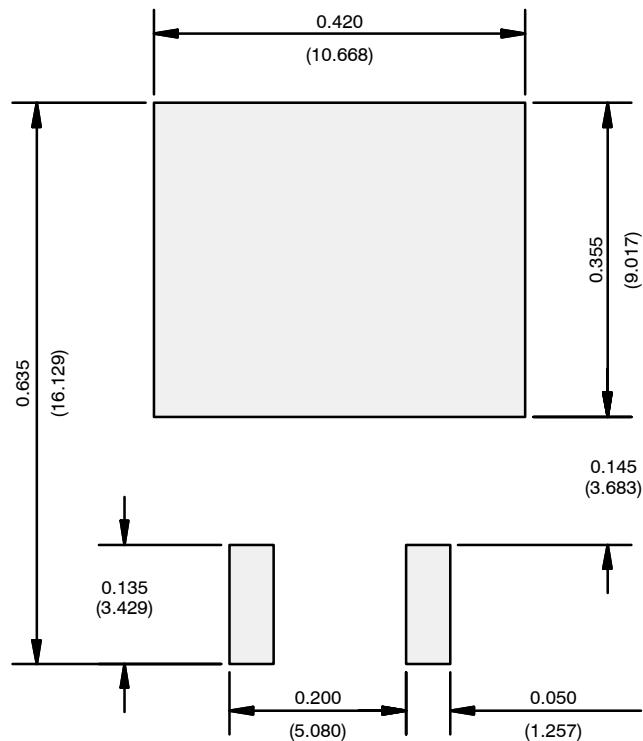
SECTION A-A

#### 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.

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					

**RECOMMENDED MINIMUM PADS FOR D<sup>2</sup>PAK: 3-Lead**

Recommended Minimum Pads  
Dimensions in Inches/(mm)

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