

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

PRODUCT SUMMARY

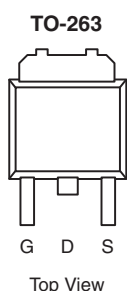
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
- 100	0.019 at $V_{GS} = - 10$ V	- 90	97 nC
	0.021 at $V_{GS} = - 4.5$ V	- 85	

FEATURES

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

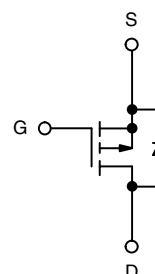


RoHS
COMPLIANT



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	mJ
Single-Pulse Avalanche Energy	E_{AS}	245	
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 V, I _D = - 250 μA	- 100			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		- 125		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			5.9		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1		- 3	V
Gate-Source 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 = 175 °C			- 500	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 10 V, V _{GS} = - 10 V	- 90			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 20 A		0.0156	0.019	Ω
		V _{GS} = - 4.5 V, I _D = - 15 A		0.0173	0.021	
Forward Transconductance ^a	g _{fs}	V _{DS} = - 15 V, I _D = - 20 A		80		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = - 50 V, V _{GS} = 0 V, f = 1 MHz		11100		pF
Output Capacitance	C _{oss}			700		
Reverse Transfer Capacitance	C _{rss}			1690		
Total Gate Charge	Q _g	V _{DS} = - 50 V, V _{GS} = - 10 V, I _D = - 90 A		217	326	nC
		V _{DS} = - 50 V, V _{GS} = - 4.5 V, I _D = - 90 A		97	146	
Gate-Source Charge	Q _{gs}			42		
Gate-Drain Charge	Q _{gd}			51		
Gate Resistance	R _g	f = 1 MHz		3.5		Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 50 V, R _L = 0.56 Ω I _D ≅ - 90 A, V _{GEN} = - 10 V, R _g = 1 Ω		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						
Continous Source-Drain Diode Current	I _S	T _C = 25 °C			- 90	A
Pulse Diode Forward Current ^a	I _{SM}				- 250	
Body Diode Voltage	V _{SD}	I _S = - 20 A		- 0.8	- 1.5	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = - 20 A, dI/dt = 100 A/μs, T _J = 25 °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		

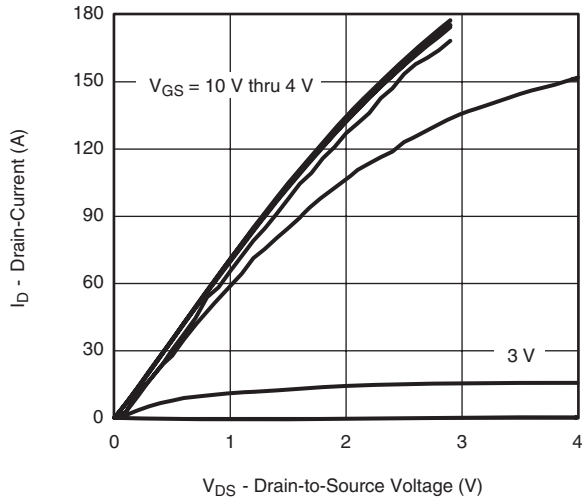
Notes

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

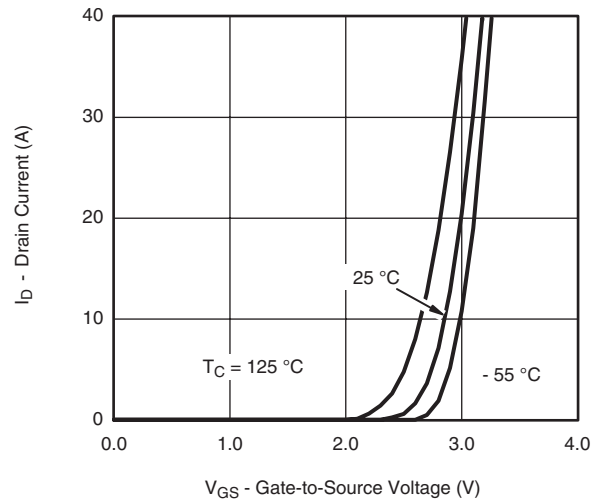
b. Guaranteed by design, not subject to production testing.

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.

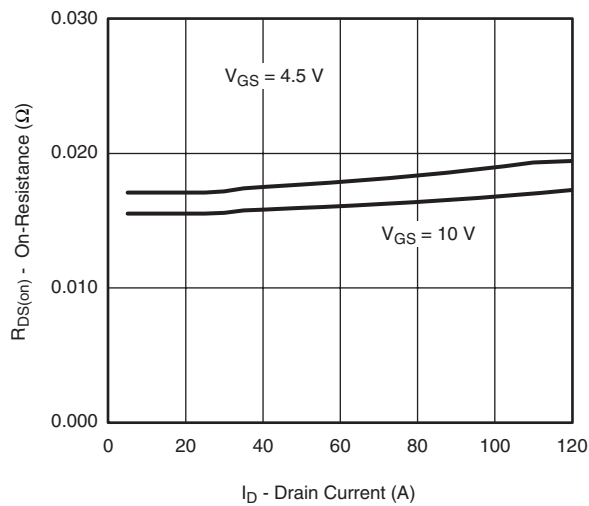
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



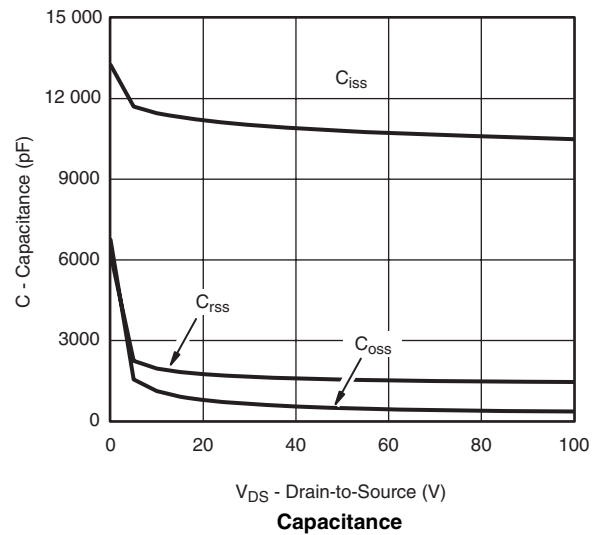
Output Characteristics



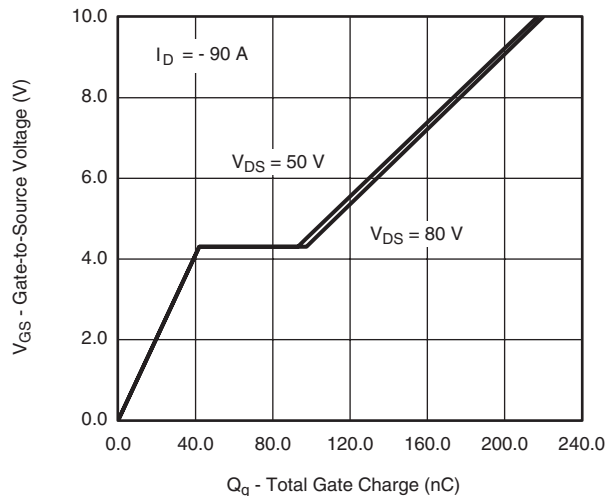
Transfer Characteristics



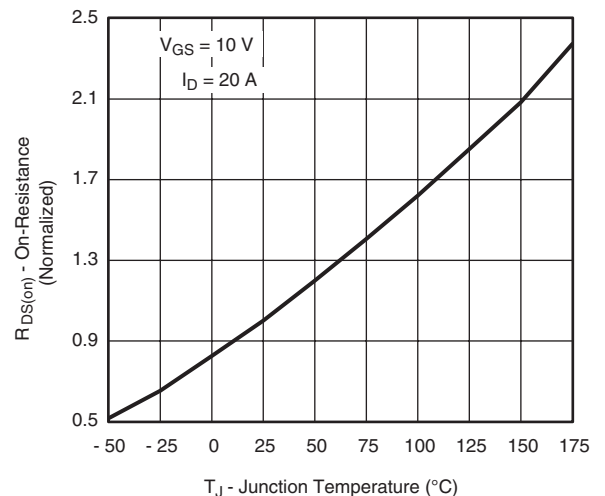
On-Resistance vs. Drain Current



Capacitance

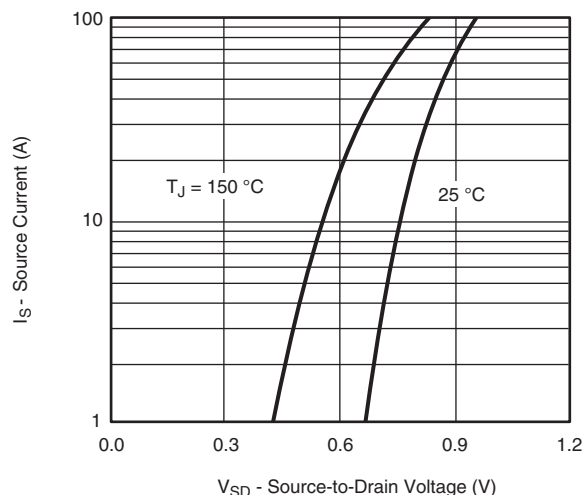


Gate Charge

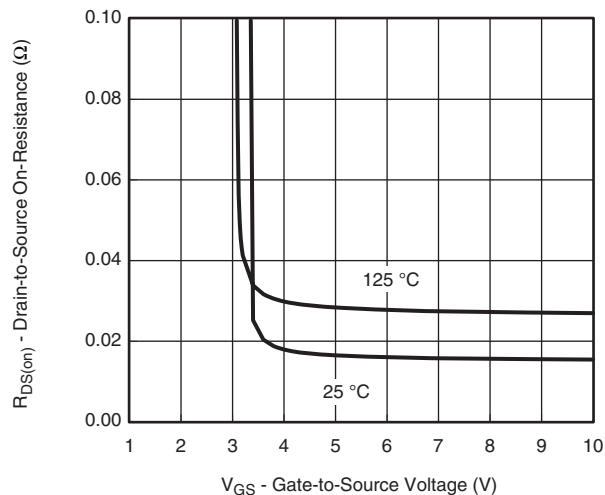


On-Resistance vs. Junction Temperature

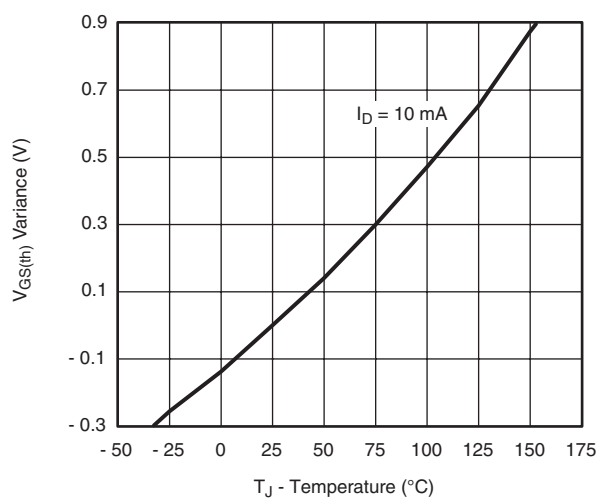
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



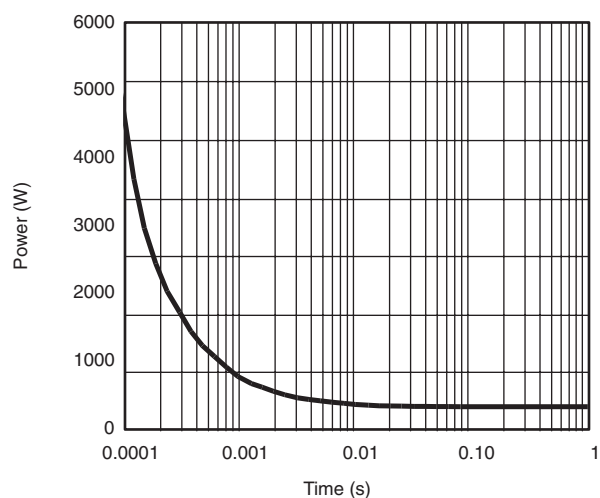
Source-Drain Diode Forward Voltage



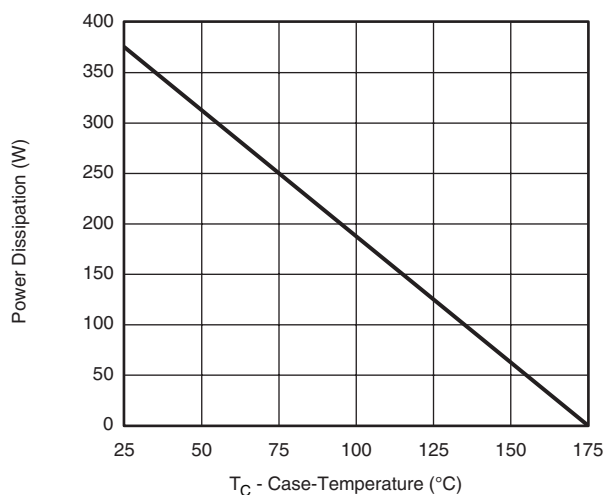
On-Resistance vs. Gate-to-Source Voltage



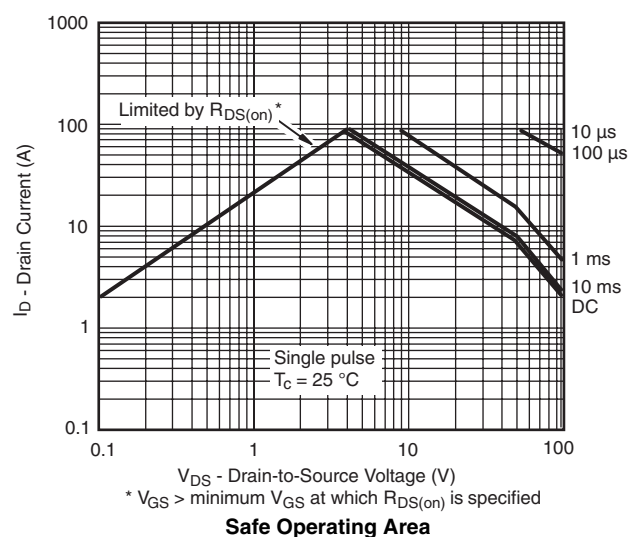
Threshold Voltage



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

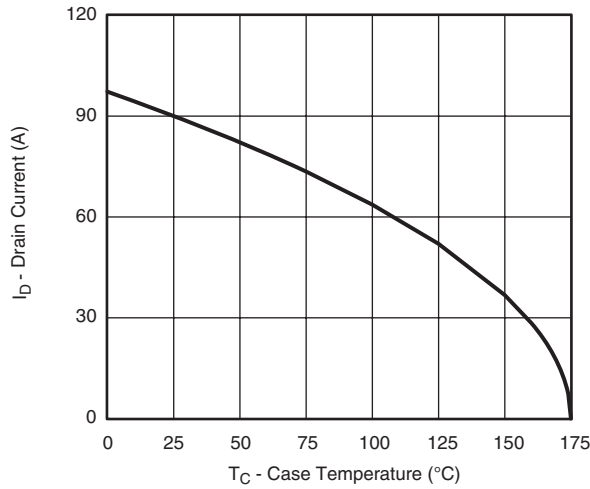


Power Derating (Junction-to-Case)

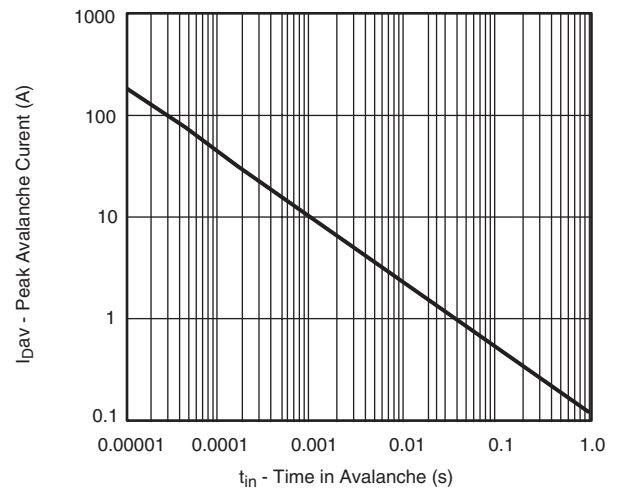


Safe Operating Area

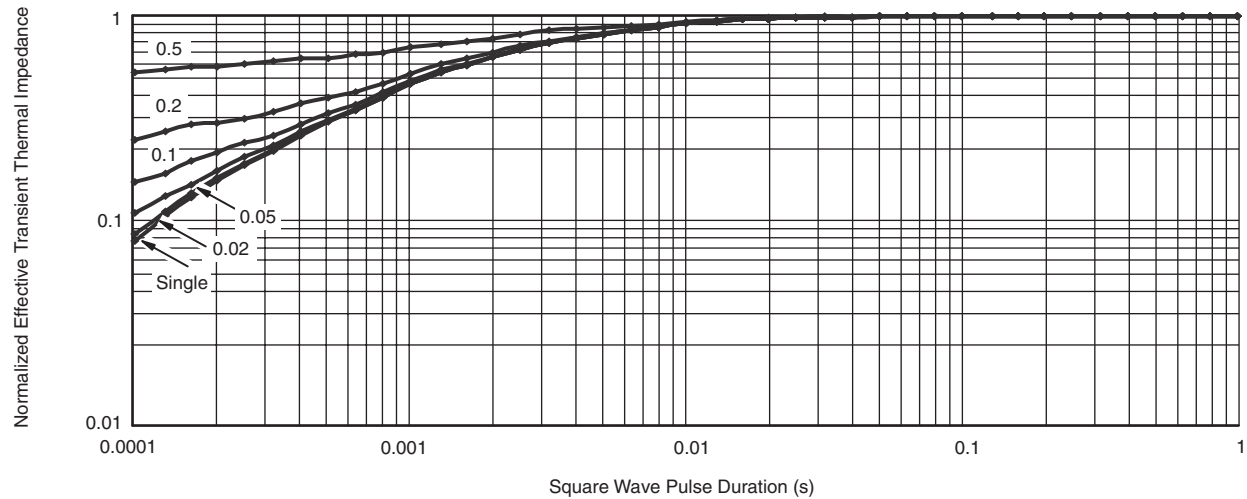
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Max Avalanche and Drain Current vs. Case Temperature



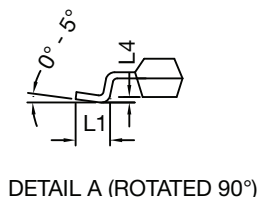
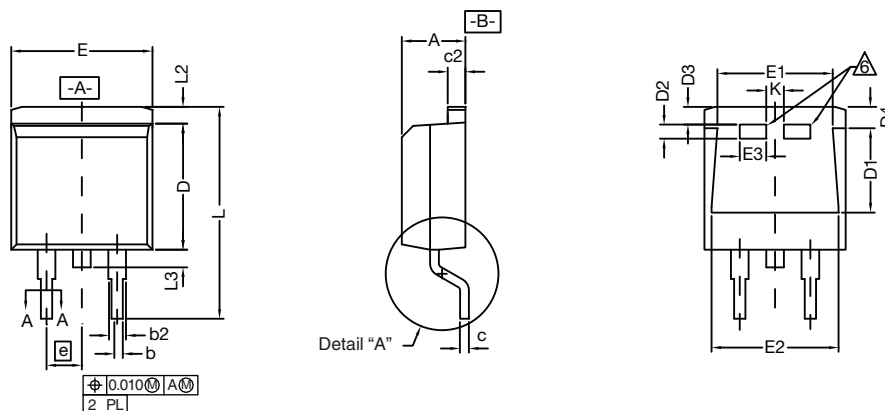
Avalanche Current vs. Time



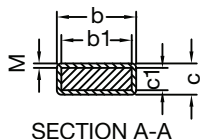
Normalized Thermal Transient Impedance, Junction-to-Case

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TO-263 (D²PAK): 3-LEAD



DETAIL A (ROTATED 90°)



SECTION A-A

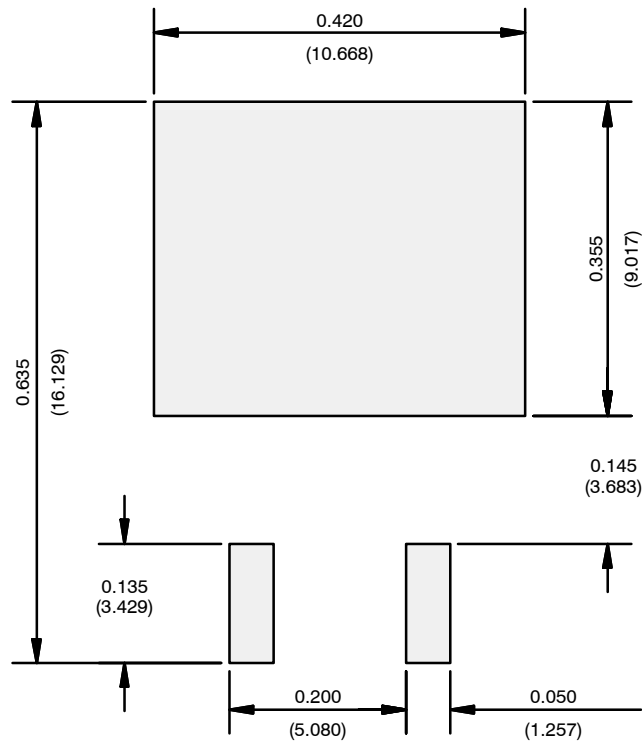
Notes

- 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)

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