

P-Channel 60-V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^d	Q_g (Typ.)
- 60	0.019 at $V_{GS} = - 10$ V	- 55	76
	0.025 at $V_{GS} = - 4.5$ V	- 48	

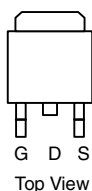
FEATURES

- TrenchFET[®] Power MOSFET

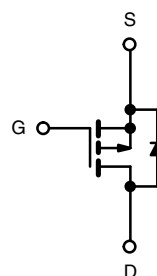


Available
RoHS*
COMPLIANT

TO-263



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}	± 20	
Continuous Drain Current ^d ($T_J = 175$ °C)	$T_C = 25$ °C	I_D - 55	A
	$T_C = 125$ °C	- 31	
Pulsed Drain Current	I_{DM}	- 150	
Avalanche Current	I_{AS}	- 45	
Single Pulse Avalanche Energy ^a	$L = 0.1$ mH	E_{AS} 101	mJ
Power Dissipation	$T_C = 25$ °C	P_D 125 ^c	W
	$T_A = 25$ °C ^b	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:

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

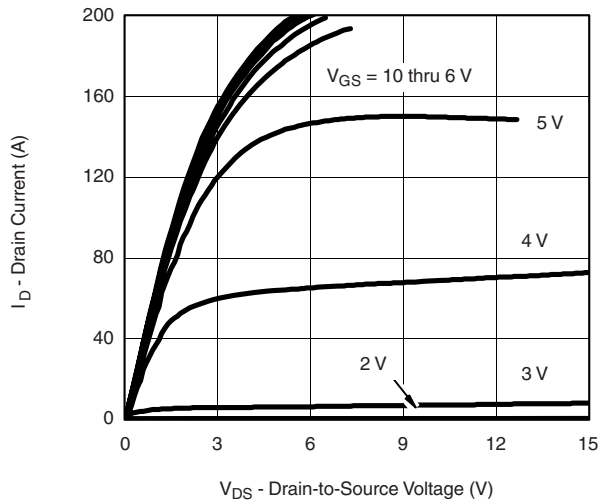
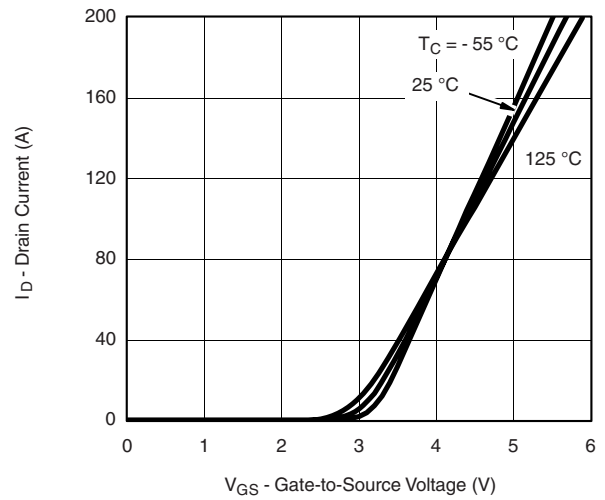
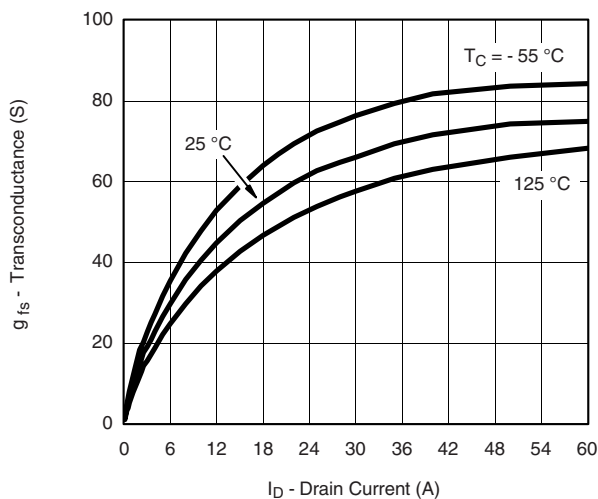
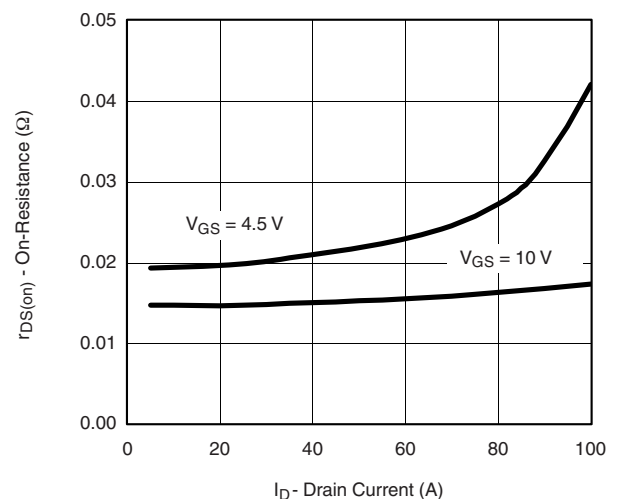
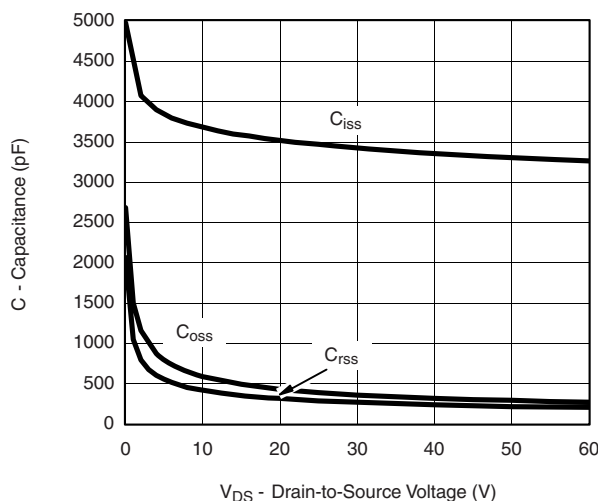
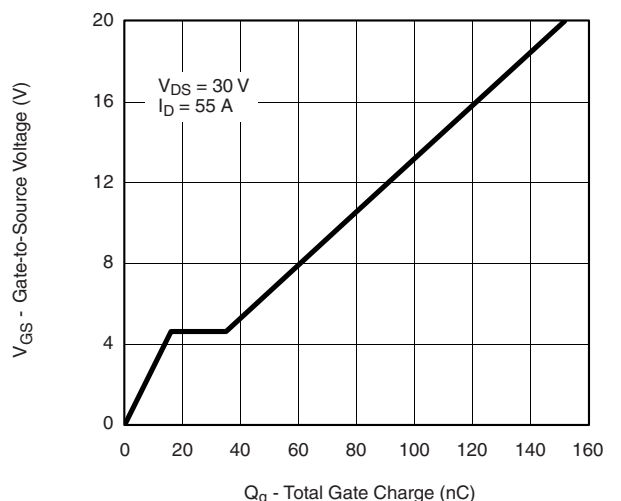
* Pb containing terminations are not RoHS compliant, exemptions may apply.

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

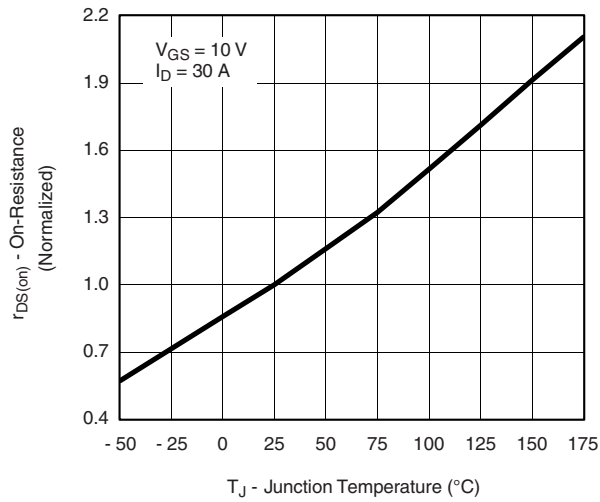
Notes:

- 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.

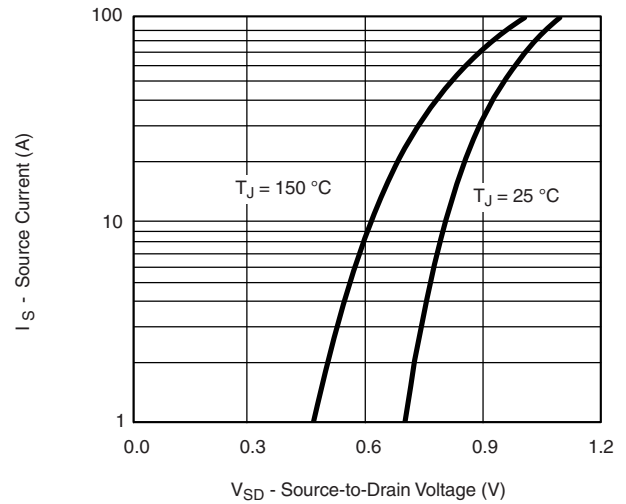
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Output Characteristics

Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

Gate Charge

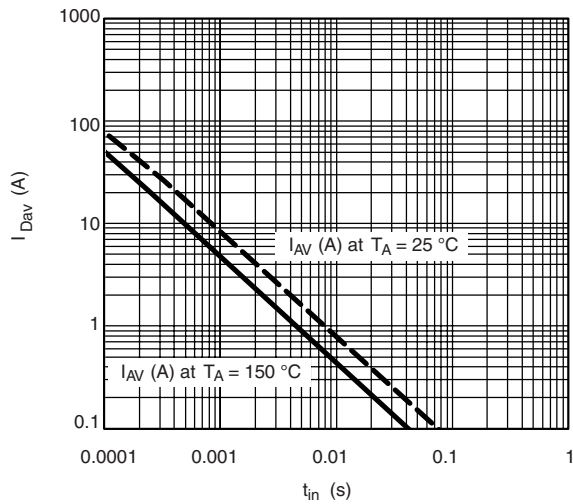
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



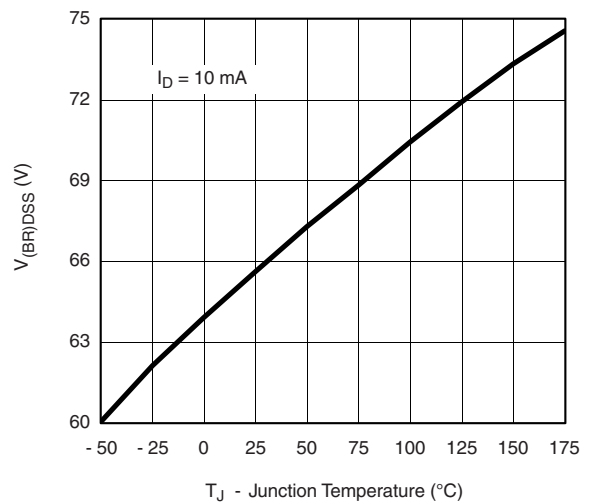
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage



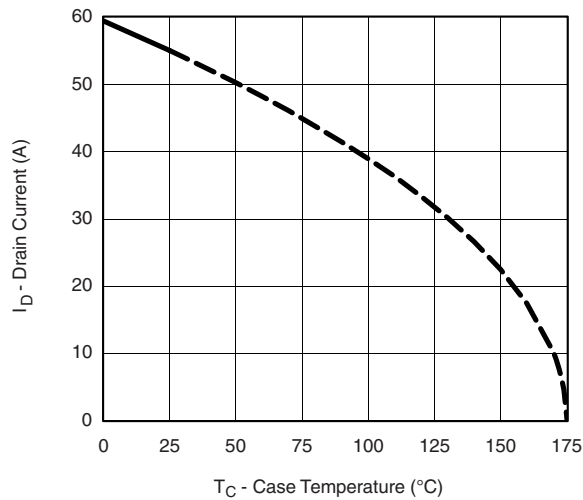
Avalanche Current vs. Time



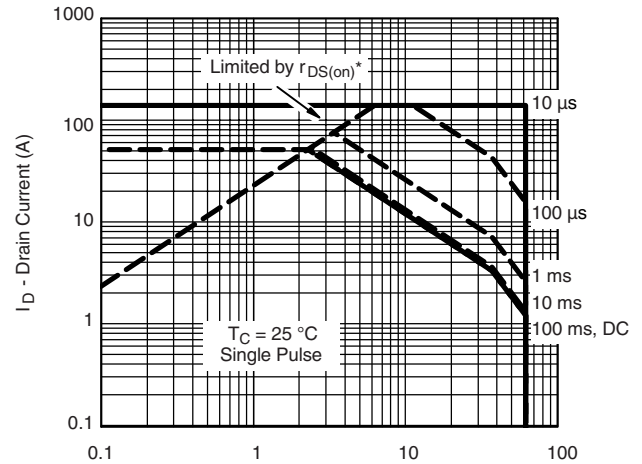
Drain Source Breakdown vs. Junction Temperature



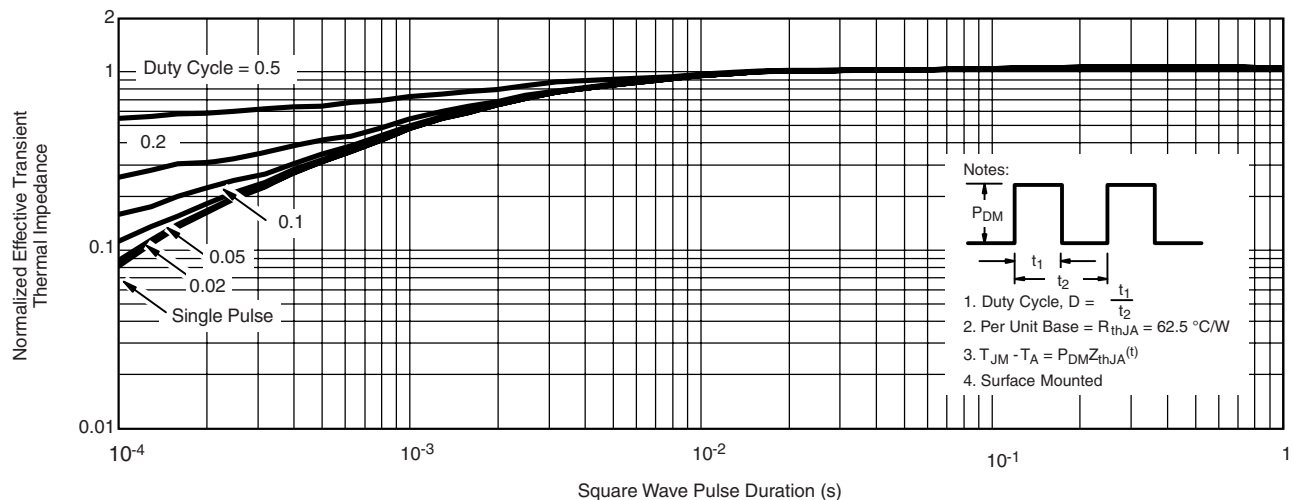
THERMAL RATINGS



Maximum Drain Current
vs. Case Temperature



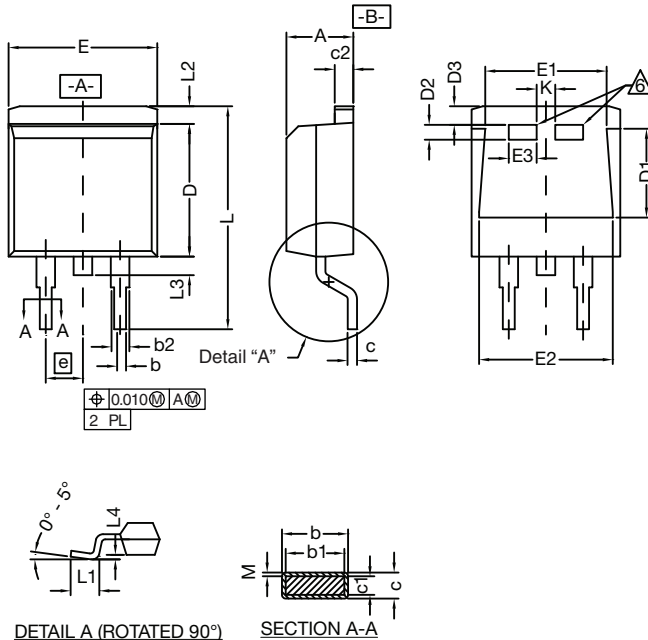
* V_{GS} > minimum V_{GS} at which $r_{DS(on)}$ is specified
Safe Operating Area



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

TO-263 (D²PAK): 3-LEAD

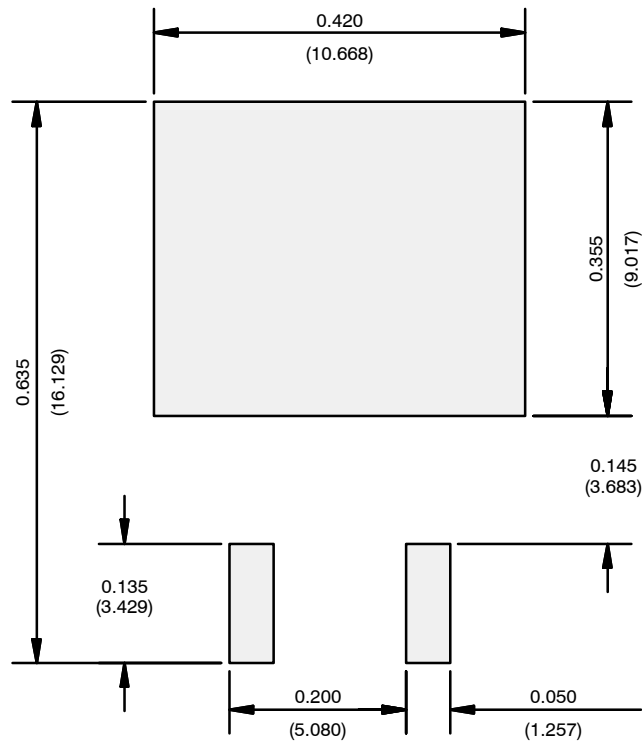


DIM.		INCHES		MILLIMETERS	
		MIN.	MAX.	MIN.	MAX.
A		0.160	0.190	4.064	4.826
b		0.020	0.039	0.508	0.990
b1		0.020	0.035	0.508	0.889
b2		0.045	0.055	1.143	1.397
c*	Thin lead	0.013	0.018	0.330	0.457
	Thick lead	0.023	0.028	0.584	0.711
c1	Thin lead	0.013	0.017	0.330	0.431
	Thick lead	0.023	0.027	0.584	0.685
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
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.
6. This feature is for thick lead.

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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