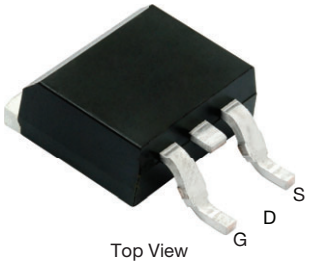
P-Channel 100-V (D-S) MOSFET

TO-263

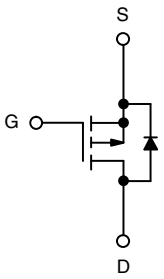


Top View

FEATURES

- TrenchFET® power MOSFET
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT



P-Channel MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	-100
$R_{DS(on)}$ max. (Ω) at V_{GS} = -10 V	0.019
$R_{DS(on)}$ max. (Ω) at V_{GS} = -4.5 V	0.021
Q_g typ. (nC)	97
I_D (A)	-90
Configuration	Single

ORDERING INFORMATION	
Package	TO-263
Lead (Pb)-free	SUM90P10-19L-E3

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	I_D	-90	A
	T_C = 125 °C		-52	
	T_A = 25 °C		-17.2 [b, c]	
	TA = 125 °C		-9.9 [b, c]	
Pulsed drain current		I_{DM}	-90	
Continuous source-drain diode current	T_C = 25 °C	I_S	-250	
	T_A = 25 °C		-9 [b, c]	
Avalanche Current	L = 0.1 mH	I_{AS}	-70	
Single-pulse avalanche energy		E_{AS}	245	mJ
Maximum power dissipation	T_C = 25 °C	P_D	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]	t ≤ 10 s	R_{thJA}	8	11	°C/W
Maximum junction-to-case (drain)	Steady state	R_{thJC}	0.33	0.4	

Notes

a. Package limited
b. Surface mounted on 1" x 1" FR4 board
c. t = 10s
d. Maximum under steady state conditions is 40 °C/W

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
V_{DS} temperature coefficient	$\Delta V_{DS} / T_J$	I_D = -250 µA	-	-125	-	mV/°C
$V_{GS(th)}$ temperature coefficient	$\Delta V_{GS(th)} / T_J$		-	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	-	W
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						
Continuous 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}		-	250	425	nC
Reverse recovery fall time	t_a		-	56	-	ns
Reverse recovery rise time	t_b		-	24	-	

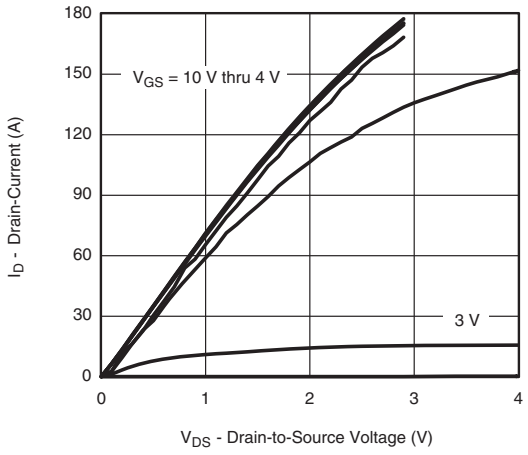
Notes

a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%

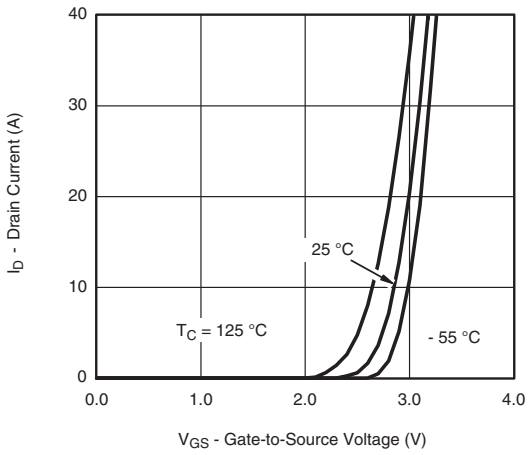
b. Guaranteed by design, not subject to production testing

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.

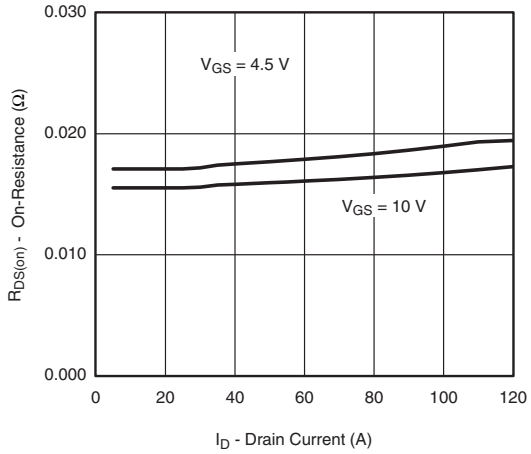
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



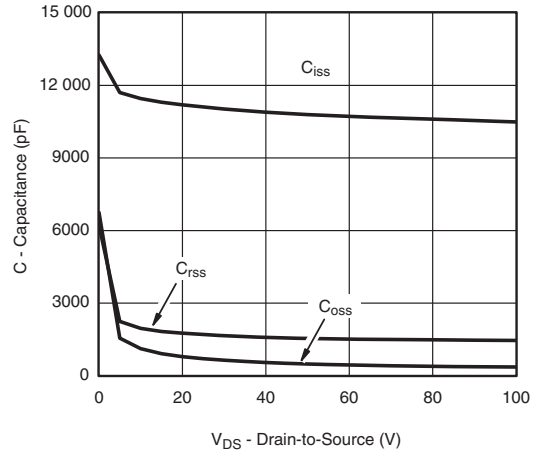
Output Characteristics



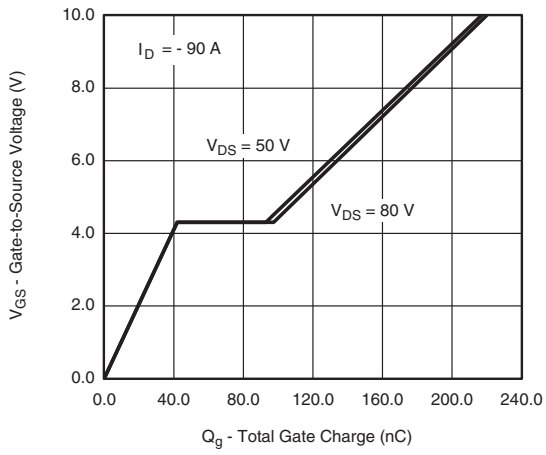
Transfer Characteristics



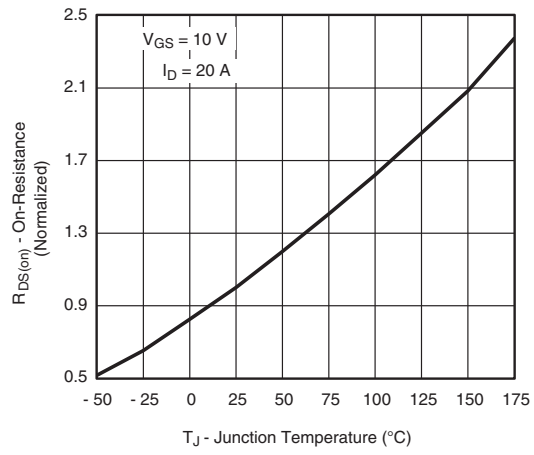
On-Resistance vs. Drain Current



Capacitance

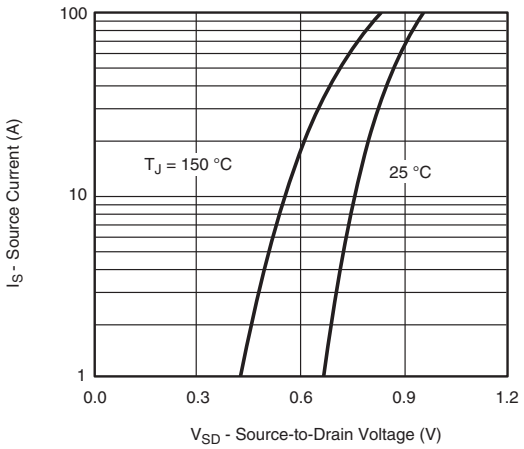


Gate Charge



On-Resistance vs. Junction Temperature

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Source-Drain Diode Forward Voltage

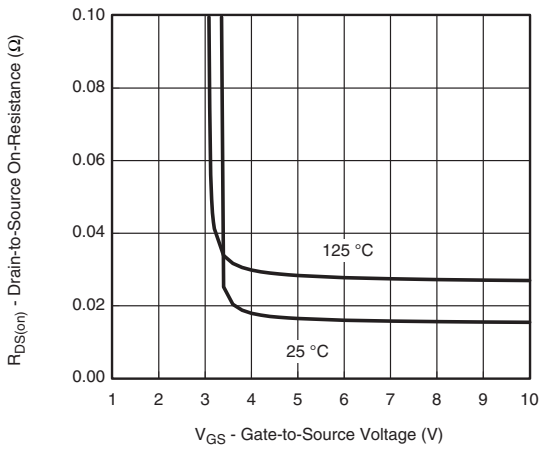
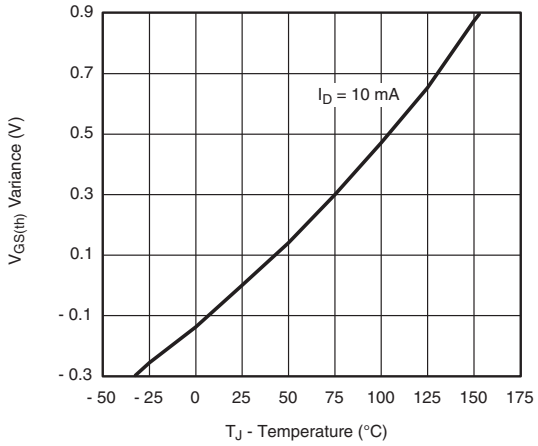
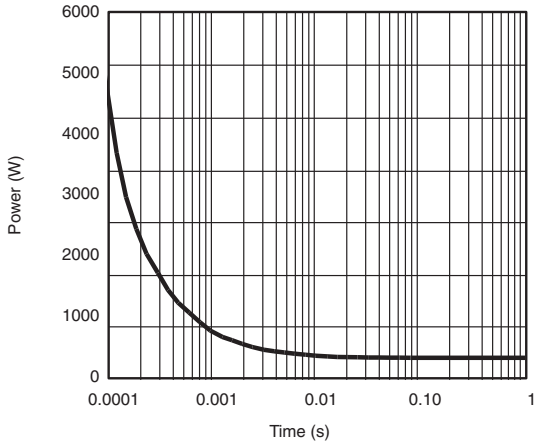


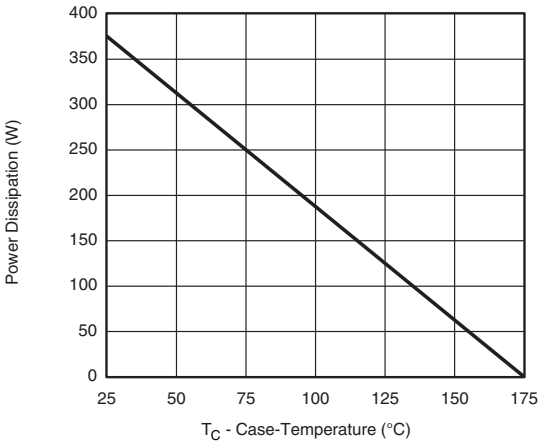
Fig. 1 - On-Resistance vs. Gate-to-Source Voltage



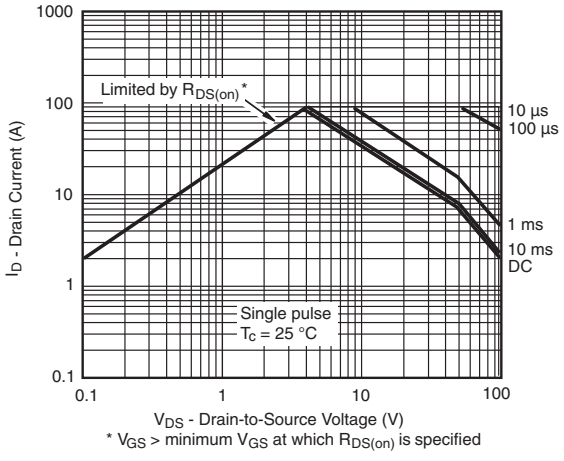
Threshold Voltage



Single Pulse, Junction-to-Case (T_C = 25 °C)

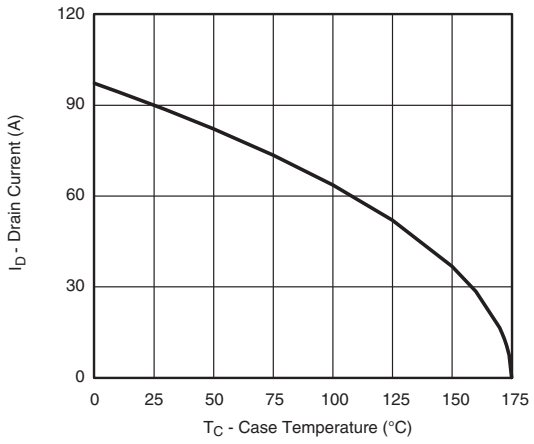


Power Derating (Junction-to-Case)

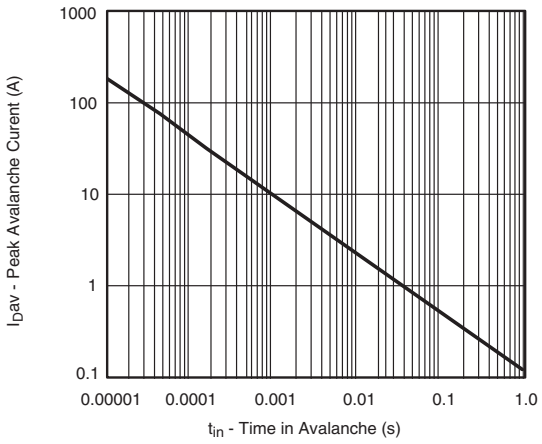


Safe Operating Area

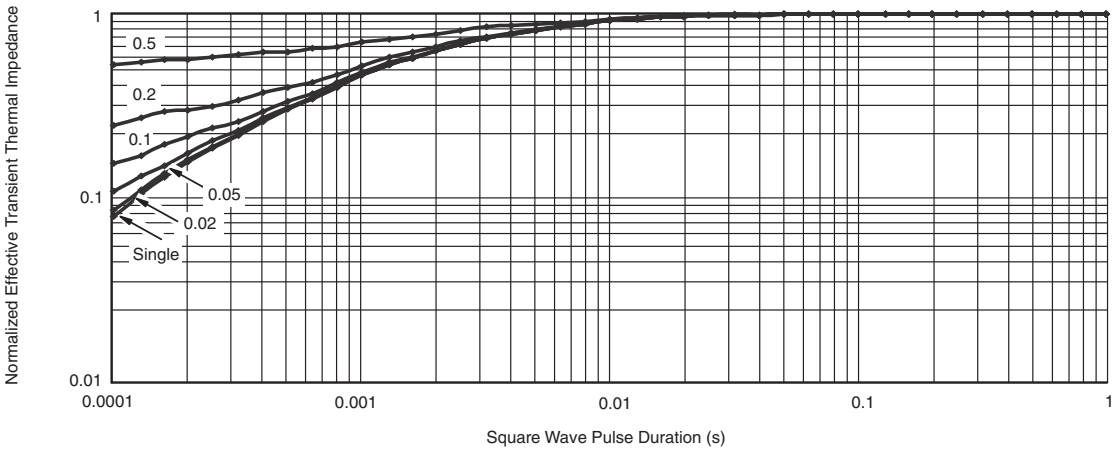
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Max Avalanche and Drain Current vs. Case Temperature



Avalanche Current vs. Time

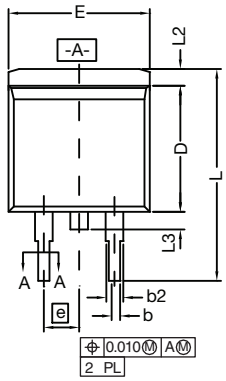


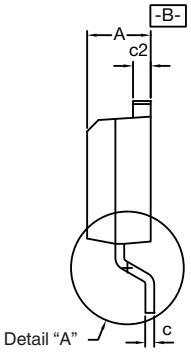
Normalized Thermal Transient Impedance, Junction-to-Case

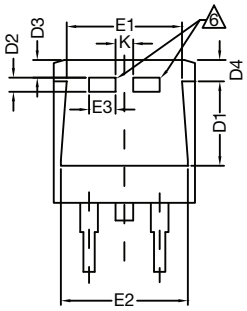
Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package / tape drawings, part marking, and reliability data, see www.vishay.com/ppg?73474.

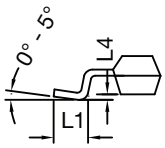
TO-263 (D²PAK): 3-LEAD

VERSION 1: FACILITY CODE = T

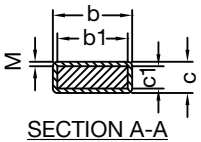








DETAIL A (ROTATED 90°)



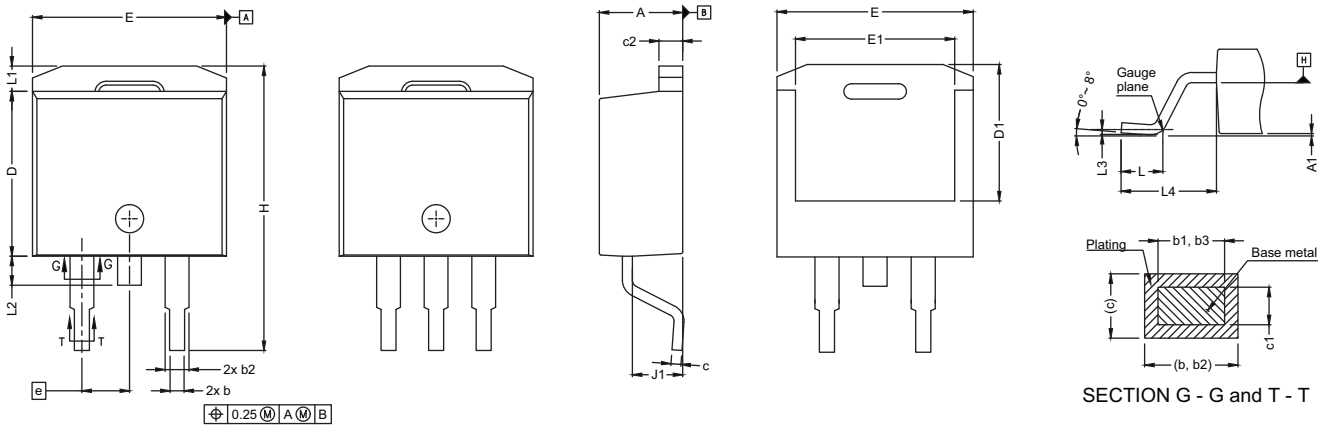
SECTION A-A

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	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

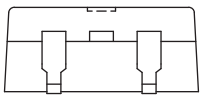
Notes

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.

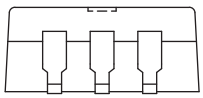
VERSION 2: FACILITY CODE = N



SECTION G - G and T - T



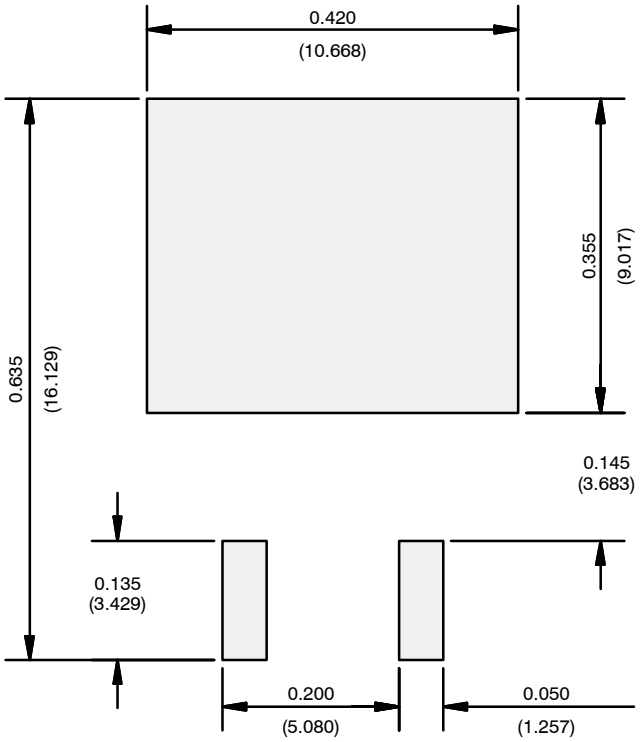
OPTION 1
2 leads



OPTION 2
3 leads

DIM.	MIN.	MAX.
A	4.36	4.56
A1	0	0.25
b	0.70	0.90
b1	0.51	0.89
b2	1.20	1.46
b3	1.17	1.37
c	0.38	0.694
c1	0.38	0.534
c2	1.19	1.34
D	8.60	9.00
D1	6.9	7.5
E	10.15	10.55
E1	8.1	8.7
e	2.54 BSC	
H	15.0	15.6
L	1.9	2.5
L1	-	1.65
L2	-	1.78
L3	0.25 typ.	
L4	4.78	5.28
J1	2.56	2.96
ECN: S24-1080-Rev. L, 28-Oct-2024 DWG: 5843		

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

Return to Index

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