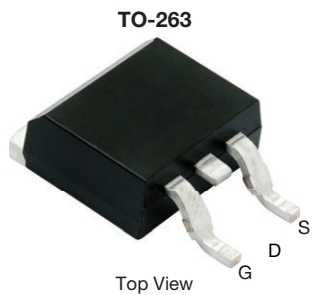
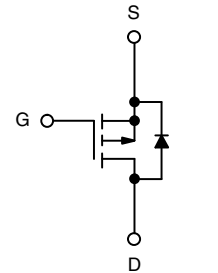


## P-Channel 100-V (D-S) MOSFET



### FEATURES

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


**RoHS**  
COMPLIANT


P-Channel MOSFET

PRODUCT SUMMARY	
$V_{DS}$ (V)	-100
$R_{DS(on)}$ max. ( $\Omega$ ) at $V_{GS} = -10$ V	0.019
$R_{DS(on)}$ max. ( $\Omega$ ) 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	$V_{GS}$	$\pm 20$		
Continuous drain current ( $T_J = 150$ °C)	$T_C = 25$ °C	-90	A	
	$T_C = 125$ °C	-52		
	$T_A = 25$ °C	-17.2 <sup>b, c</sup>		
	$T_A = 125$ °C	-9.9 <sup>b, c</sup>		
Pulsed drain current	$I_{DM}$	-90	A	
Continuous source-drain diode current	$T_C = 25$ °C	-250		
	$T_A = 25$ °C	-9 <sup>b, c</sup>		
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 <sup>b, c</sup>		
	$T_A = 125$ °C	4.5 <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>	$R_{thJA}$	8	11	°C/W	
Maximum junction-to-case (drain)	$R_{thJC}$	0.33	0.4		

### Notes

- Package limited
- Surface mounted on 1" x 1" FR4 board
- $t = 10$ s
- 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
<b>Static</b>						
Drain-source breakdown voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-100	-	-	V
$V_{DS}$ temperature coefficient	$\Delta V_{DS} / T_J$	$I_D = -250\text{ }\mu\text{A}$	-	-125	-	mV/ $^\circ\text{C}$
$V_{GS(th)}$ temperature coefficient	$\Delta V_{GS(th)} / T_J$		-	5.9	-	
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-1	-	-3	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	$I_{DSS}$	$V_{DS} = -100\text{ V}, V_{GS} = 0\text{ V}$	-	-	-1	$\mu\text{A}$
		$V_{DS} = -100\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$	-	-	-500	
On-state drain current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = -10\text{ V}$	-90	-	-	A
Drain-source on-state resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -20\text{ A}$	-	0.0156	0.019	$\Omega$
		$V_{GS} = -4.5\text{ V}, I_D = -15\text{ A}$	-	0.0173	0.021	
Forward transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -15\text{ V}, I_D = -20\text{ A}$	-	80	-	S
<b>Dynamic <sup>b</sup></b>						
Input capacitance	$C_{iss}$	$V_{DS} = -50\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	-	11100	-	pF
Output capacitance	$C_{oss}$		-	700	-	
Reverse transfer capacitance	$C_{rss}$		-	1690	-	
Total gate charge	$Q_g$	$V_{DS} = -50\text{ V}, V_{GS} = -10\text{ V}, I_D = -90\text{ A}$	-	217	326	nC
		$V_{DS} = -50\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -90\text{ A}$	-	97	146	
Gate-source charge	$Q_{gs}$		-	42	-	
Gate-drain charge	$Q_{gd}$		-	51	-	
Gate Resistance	$R_g$	$f = 1\text{ MHz}$	-	3.5	-	W
Turn-on delay time	$t_{d(on)}$	$V_{DD} = -50\text{ V}, R_L = 0.56\text{ }\Omega$ $I_D \cong -90\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$	-	20	30	ns
Rise Time	$t_r$		-	510	855	
Turn-off delay time	$t_{d(off)}$		-	145	220	
Fall time	$t_f$		-	870	1300	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous source-drain diode current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$	-	-	-90	A
Pulse diode forward current <sup>a</sup>	$I_{SM}$		-	-	-250	
Body diode voltage	$V_{SD}$	$I_S = -20\text{ A}$	-	-0.8	-1.5	V
Body diode reverse recovery time	$t_{rr}$	$I_F = -20\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$	-	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	-	

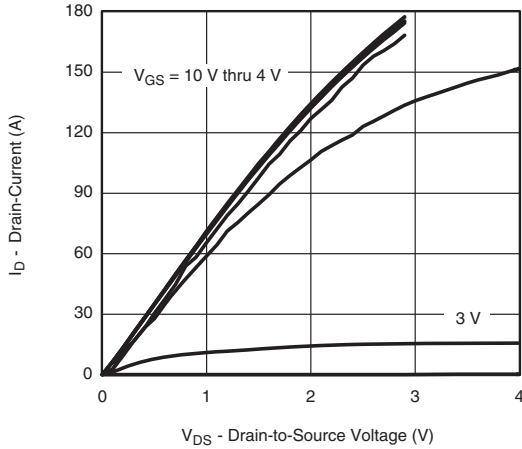
**Notes**

- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$   
b. Guaranteed by design, not subject to production testing

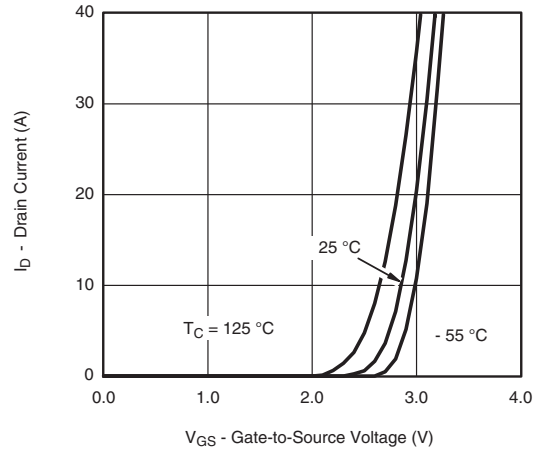
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



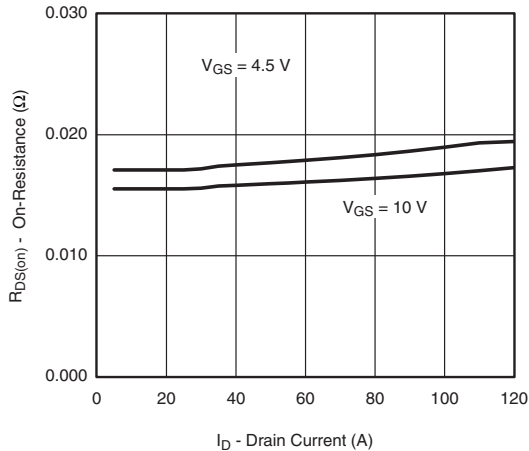
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



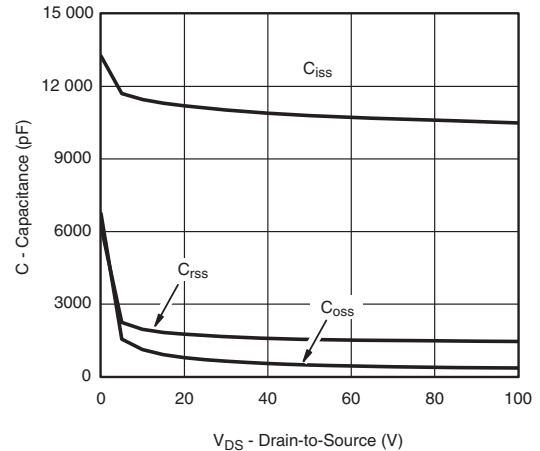
Output Characteristics



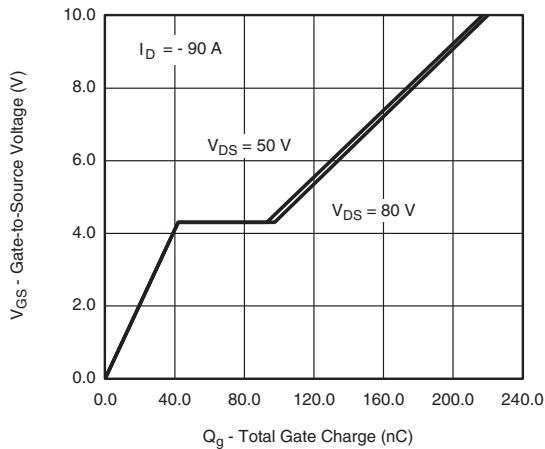
Transfer Characteristics



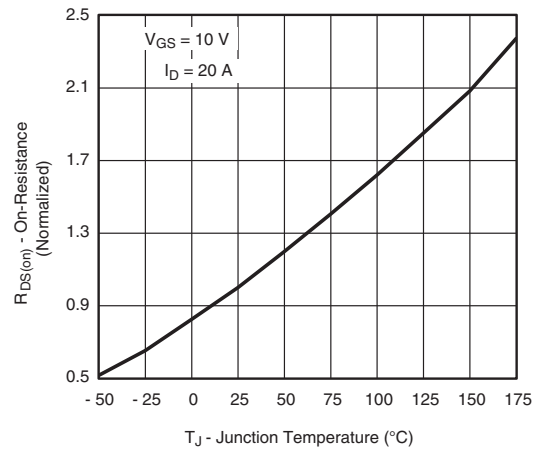
On-Resistance vs. Drain Current



Capacitance



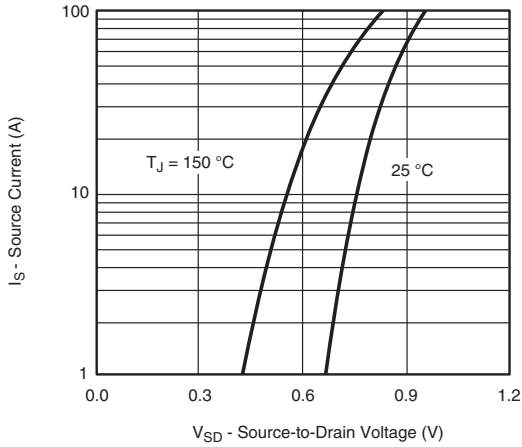
Gate Charge



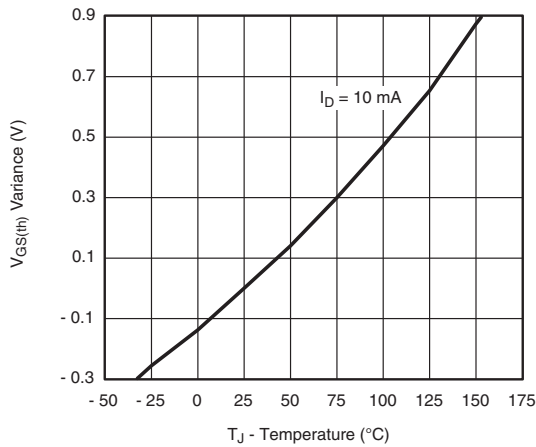
On-Resistance vs. Junction Temperature



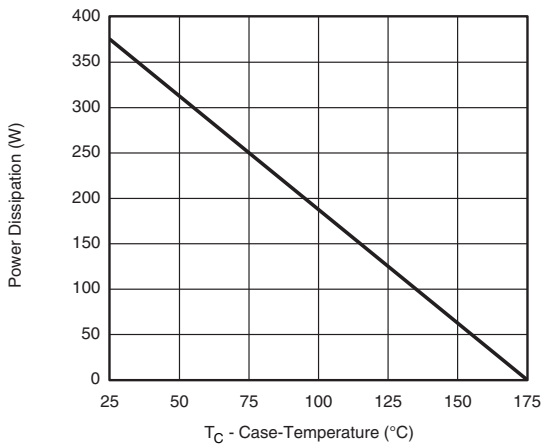
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



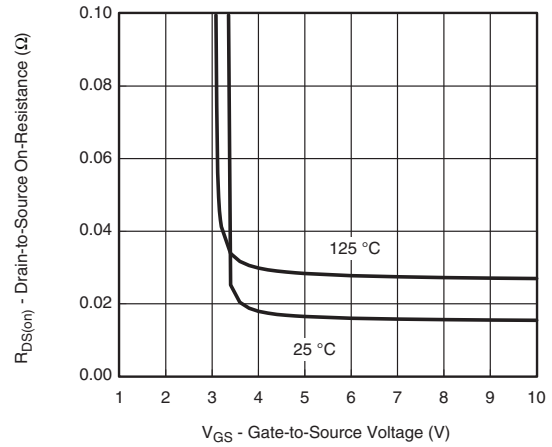
**Source-Drain Diode Forward Voltage**



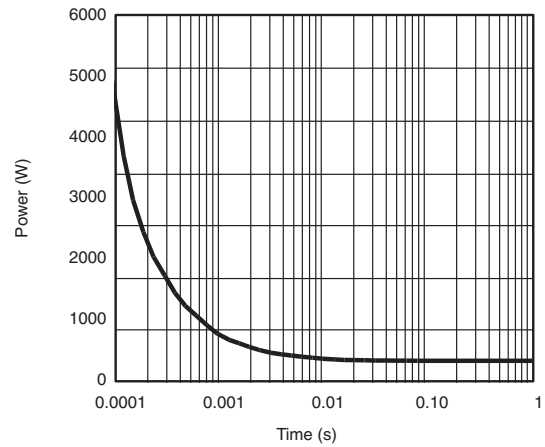
**Threshold Voltage**



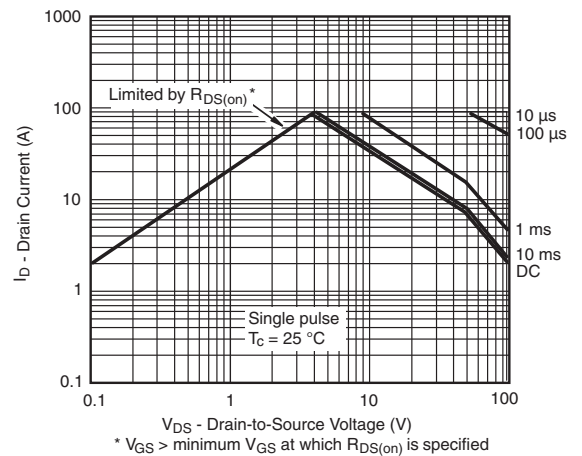
**Power Derating (Junction-to-Case)**



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



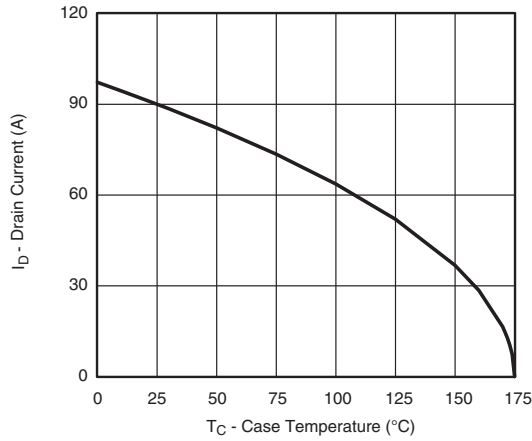
**Single Pulse, Junction-to-Case ( $T_C = 25\text{ }^\circ\text{C}$ )**



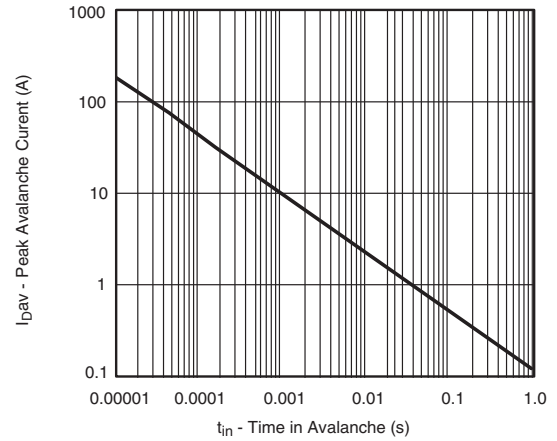
**Safe Operating Area**



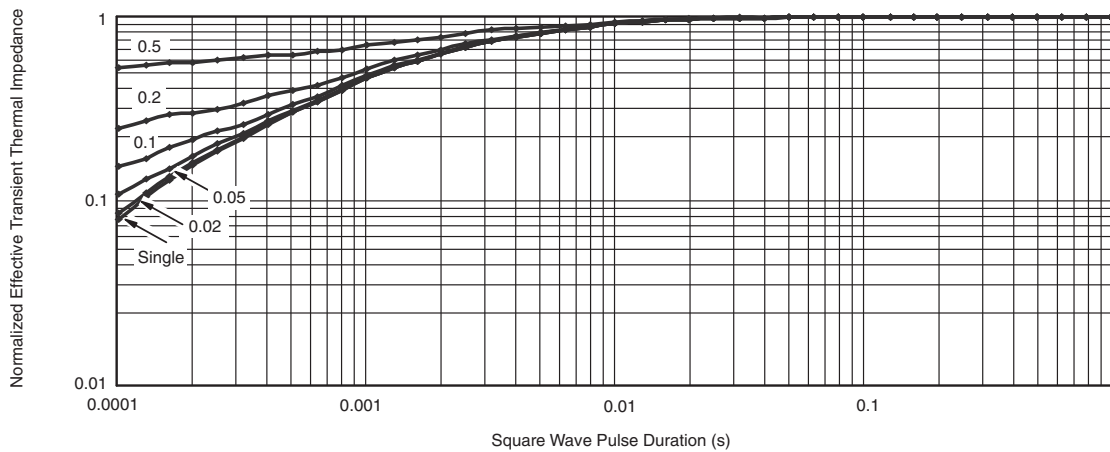
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Max Avalanche and Drain Current vs. Case Temperature



Avalanche Current vs. Time



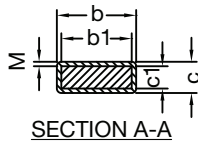
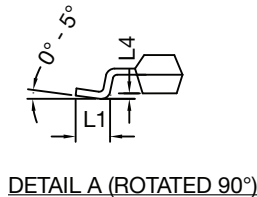
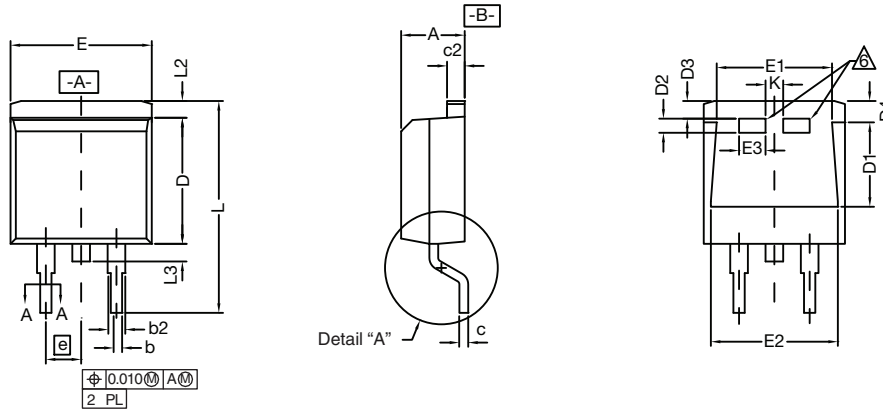
Normalized Thermal Transient Impedance, Junction-to-Case

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

## VERSION 1: FACILITY CODE = T



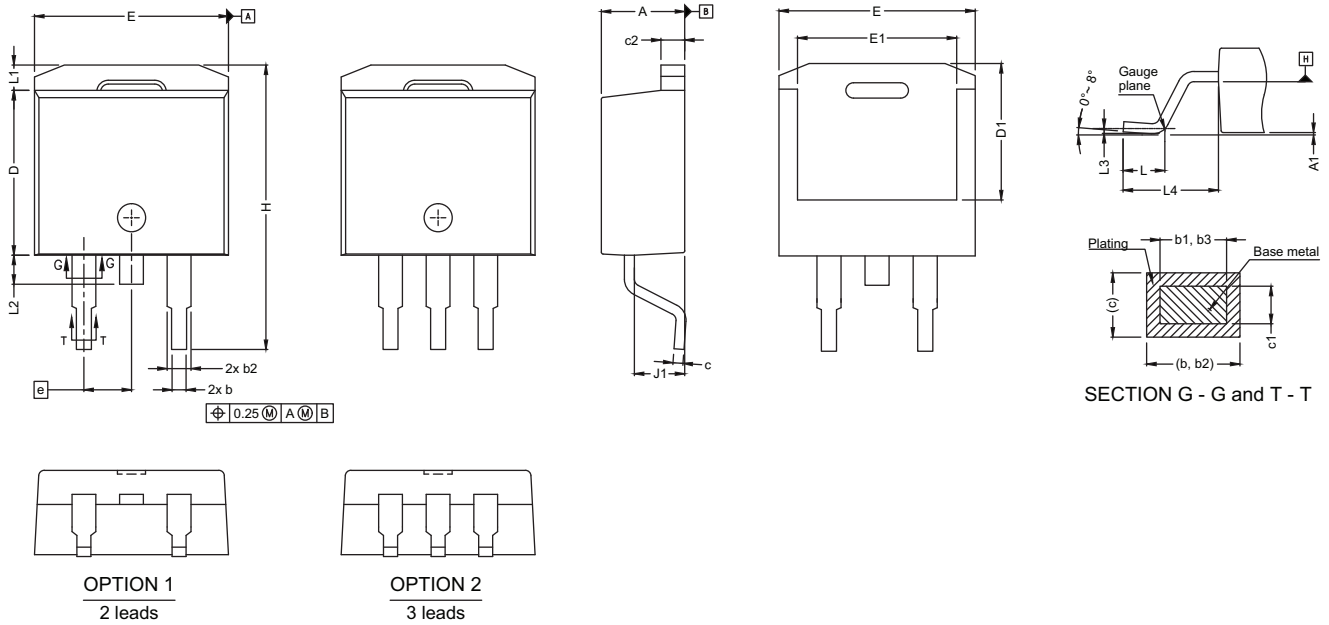
DIM.	INCHES		MILLIMETERS		
	MIN.	MAX.	MIN.	MAX.	
A	0.160	0.190	4.064	4.826	
b	0.020	0.039	0.508	0.990	
b1	0.020	0.035	0.508	0.889	
b2	0.045	0.055	1.143	1.397	
c*	Thin lead	0.013	0.018	0.330	0.457
	Thick lead	0.023	0.028	0.584	0.711
c1	Thin lead	0.013	0.017	0.330	0.431
	Thick lead	0.023	0.027	0.584	0.685
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	-	
<b>E2</b>	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**



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 D<sup>2</sup>PAK: 3-Lead**



Recommended Minimum Pads  
Dimensions in Inches/(mm)

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