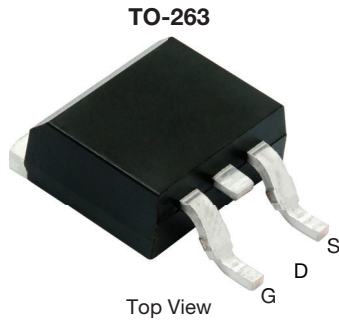


## N-Channel 100 V (D-S) MOSFET



### FEATURES

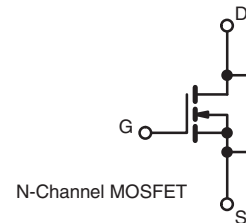
- TrenchFET® power MOSFETs
- 175 °C junction temperature
- 100 % R<sub>g</sub> and UIS tested
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

### APPLICATIONS

- Power supply
  - Secondary synchronous rectification
- Industrial
- Primary switch

PRODUCT SUMMARY	
V <sub>DS</sub> (V)	100
R <sub>DS(on)</sub> max. (Ω) at V <sub>GS</sub> = 10 V	0.0082
Q <sub>g</sub> typ. (nC)	97
I <sub>D</sub> (A)	90 <sup>d</sup>
Configuration	Single



ORDERING INFORMATION	
Package	TO-263
Lead (Pb)-free	SUM90N10-8m2P-E3

ABSOLUTE MAXIMUM RATINGS (T <sub>C</sub> = 25 °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V <sub>DS</sub>	100	V
Gate-source voltage		V <sub>GS</sub>	± 20	
Continuous drain current (T <sub>J</sub> = 175 °C)	T <sub>C</sub> = 25 °C	I <sub>D</sub>	90 <sup>d</sup>	A
	T <sub>C</sub> = 70 °C		90 <sup>d</sup>	
Pulsed drain current		I <sub>DM</sub>	240	
Avalanche current		I <sub>AS</sub>	60	
Single avalanche energy <sup>a</sup>	L = 0.1 mH	E <sub>AS</sub>	180	mJ
Maximum power dissipation <sup>a</sup>	T <sub>C</sub> = 25 °C	P <sub>D</sub>	300 <sup>b</sup>	W
	T <sub>A</sub> = 25 °C <sup>c</sup>		3.75	
Operating junction and storage temperature range		T <sub>J</sub> , T <sub>stg</sub>	-55 to +175	°C

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-ambient (PCB mount) <sup>c</sup>		R <sub>thJA</sub>	40	°C/W
Junction-to-case (drain)		R <sub>thJC</sub>	0.5	

#### Notes

- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR4 material).
- Package limited.



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	$V_{DS}$	$V_{DS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$	100	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	2.5	-	4.5	
Gate-body leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 20\text{ V}$	-	-	$\pm 250$	nA
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 100\text{ V}$ , $V_{GS} = 0\text{ V}$	-	-	1	$\mu\text{A}$
		$V_{DS} = 100\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 125\text{ }^\circ\text{C}$	-	-	50	
		$V_{DS} = 100\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 150\text{ }^\circ\text{C}$	-	-	250	
On-state drain current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}$ , $V_{GS} = 10\text{ V}$	70	-	-	A
Drain-source on-state resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$ , $I_D = 20\text{ A}$	-	0.0067	0.0082	$\Omega$
		$V_{GS} = 10\text{ V}$ , $I_D = 20\text{ A}$ , $T_J = 125\text{ }^\circ\text{C}$	-	0.0127	0.0170	
Forward transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}$ , $I_D = 20\text{ A}$	-	62	-	S
<b>Dynamic <sup>b</sup></b>						
Input capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}$ , $V_{DS} = 50\text{ V}$ , $f = 1\text{ MHz}$	-	6290	-	$\mu\text{F}$
Output capacitance	$C_{oss}$		-	535	-	
Reverse transfer capacitance	$C_{rss}$		-	182	-	
Total gate charge <sup>c</sup>	$Q_g$	$V_{DS} = 50\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 85\text{ A}$	-	97	150	nC
Gate-source charge <sup>c</sup>	$Q_{gs}$		-	32	-	
Gate-drain charge <sup>c</sup>	$Q_{gd}$		-	25	-	
Gate resistance	$R_g$	$f = 1\text{ MHz}$	0.28	1.4	2.8	W
Turn-on delay time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 50\text{ V}$ , $R_L = 0.588\text{ }\Omega$ $I_D \cong 85\text{ A}$ , $V_{GEN} = 10\text{ V}$ , $R_g = 1\text{ }\Omega$	-	23	35	ns
Rise time <sup>c</sup>	$t_r$		-	17	26	
Turn-off delay time <sup>c</sup>	$t_{d(off)}$		-	34	52	
Fall time <sup>c</sup>	$t_f$		-	9	18	
<b>Source-Drain Diode Ratings and Characteristics (<math>T_C = 25\text{ }^\circ\text{C}</math>) <sup>b</sup></b>						
Continuous current	$I_S$		-	-	85	A
Pulsed current	$I_{SM}$		-	-	240	
Forward voltage <sup>a</sup>	$V_{SD}$	$I_F = 30\text{ A}$ , $V_{GS} = 0\text{ V}$	-	0.85	1.5	V
Reverse recovery time	$t_{rr}$	$I_F = 75\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$	-	61	100	ns
Peak reverse recovery current	$I_{RM(REC)}$		-	3	4.5	A
Reverse recovery charge	$Q_{rr}$		-	91	130	nC

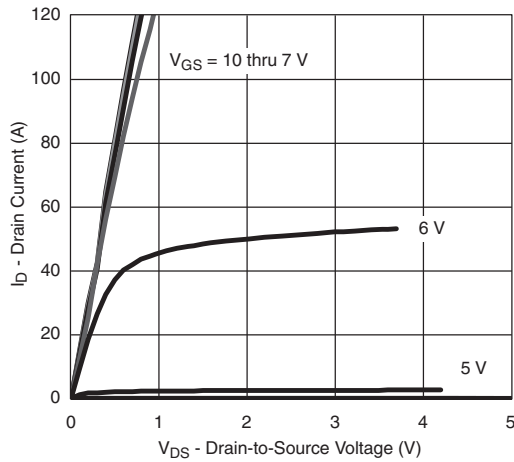
**Notes**

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

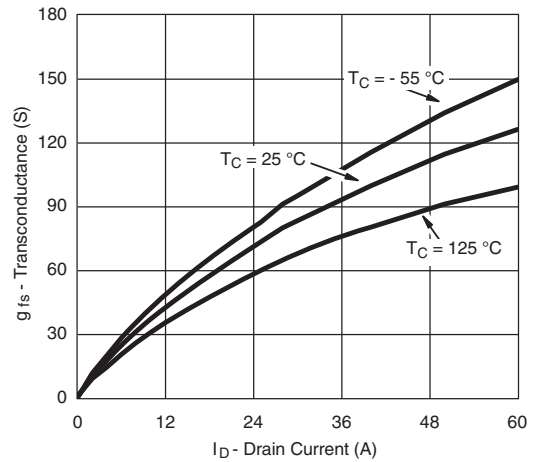
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



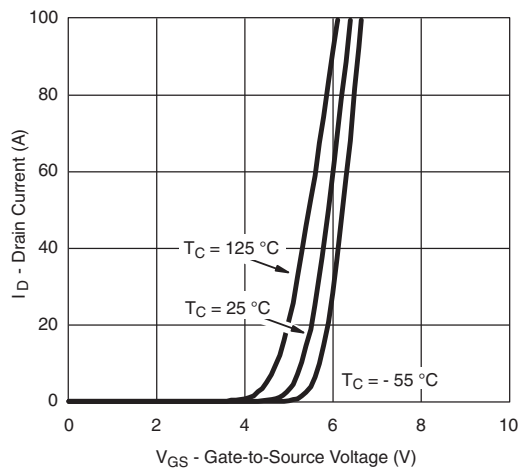
## TYPICAL CHARACTERISTICS (25 °C, UNLESS OTHERWISE NOTED)



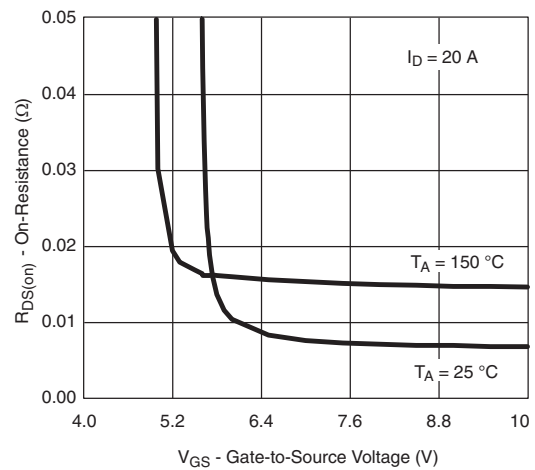
Output Characteristics



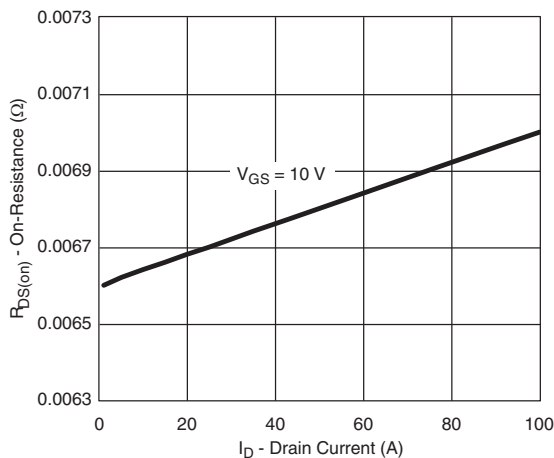
Transconductance



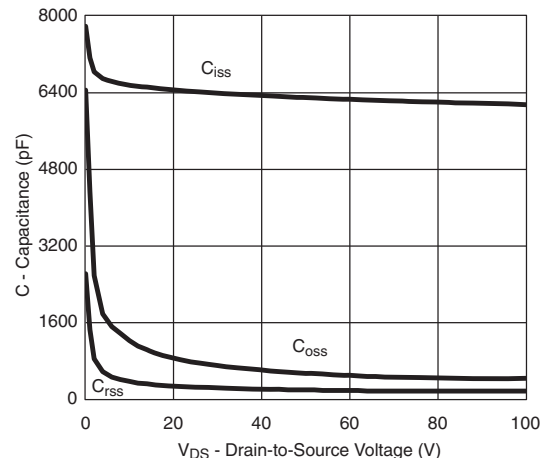
Transfer Characteristics



On-resistance vs. Gate-to-Source Voltage



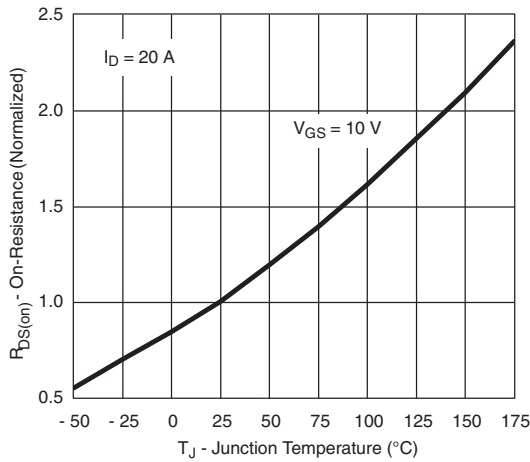
On-Resistance vs. Drain Current



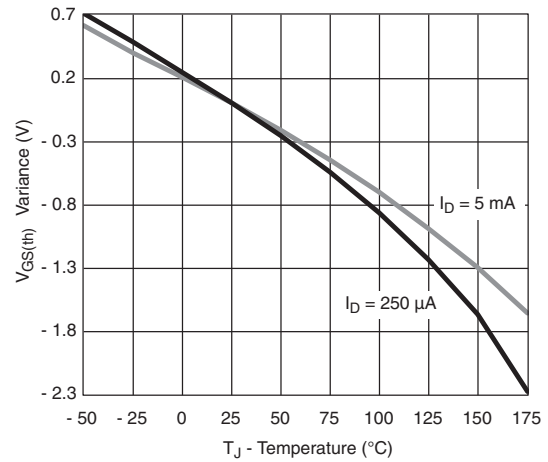
Capacitance



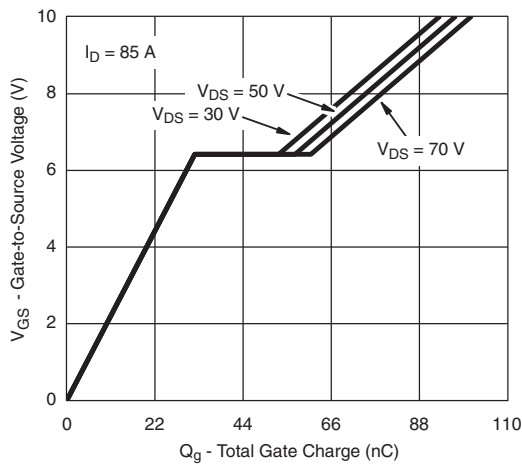
## TYPICAL CHARACTERISTICS (25 °C, UNLESS OTHERWISE NOTED)



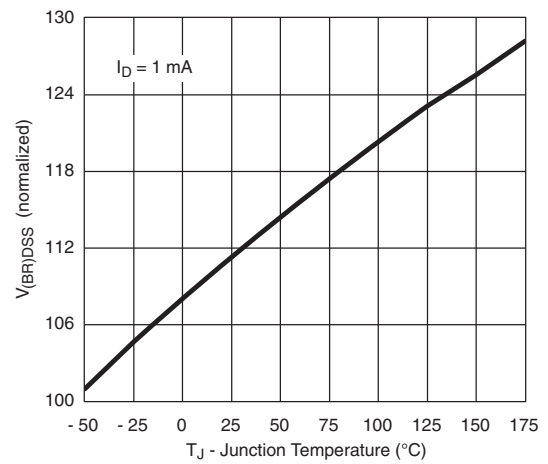
**On-Resistance vs. Junction Temperature**



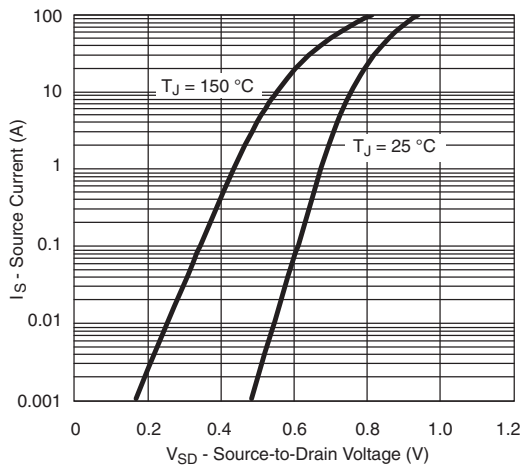
**Threshold Voltage**



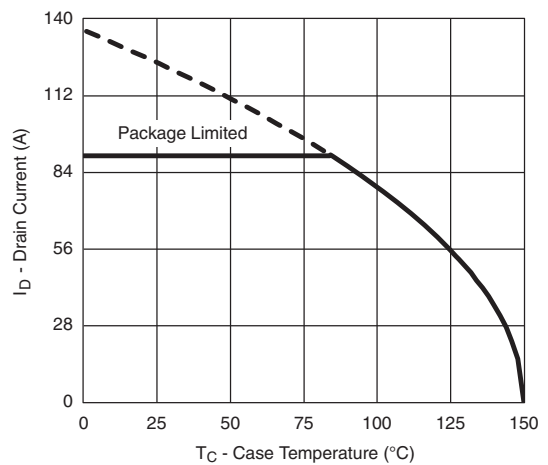
**Gate Charge**



**Drain Source Breakdown vs. Junction Temperature**



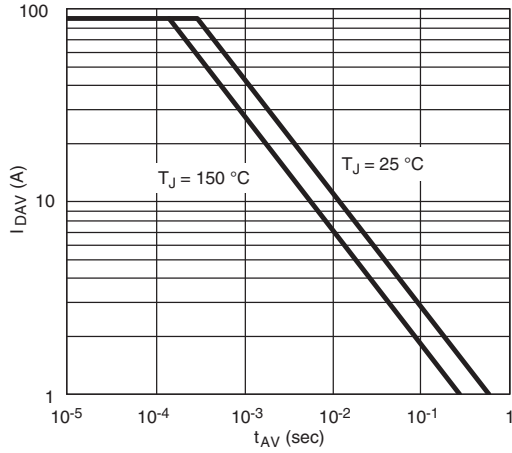
**Source-Drain Diode Forward Voltage**



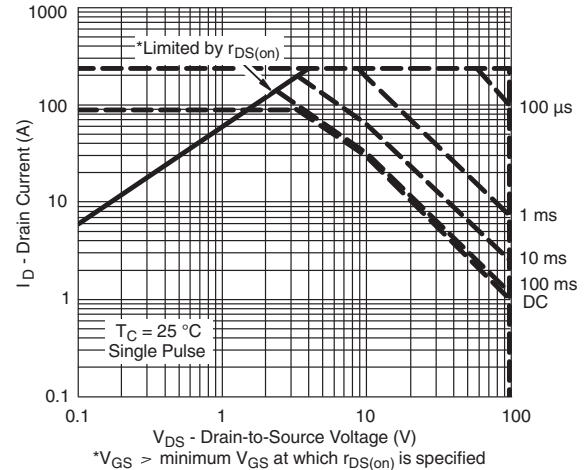
**Maximum Drain Current vs. Case Temperature**



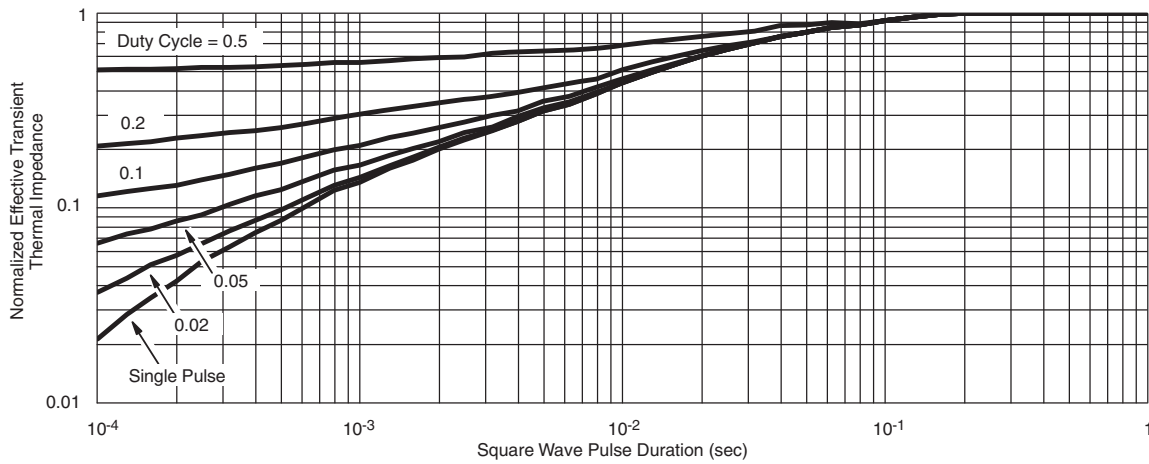
TYPICAL CHARACTERISTICS (25 °C, UNLESS OTHERWISE NOTED)



Single Pulse Avalanche Current Capability vs. Time



Safe Operating Area

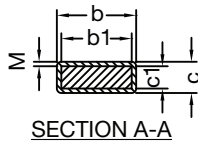
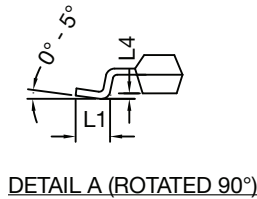
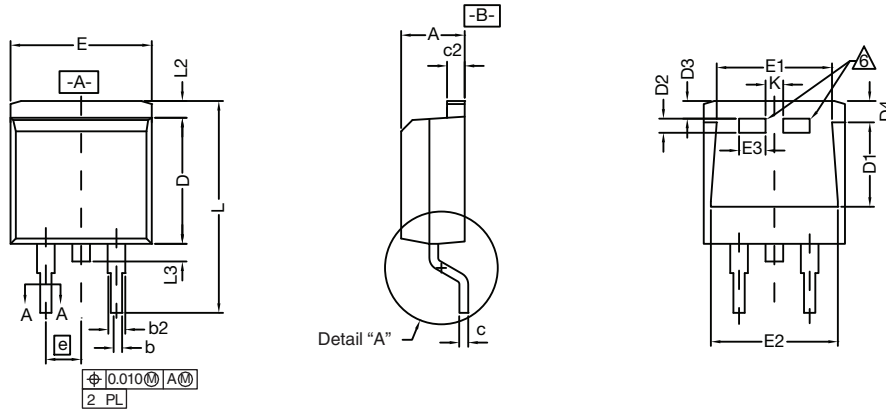


Normalized Thermal Transient Impedance, Junction-to-Case

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

**VERSION 1: FACILITY CODE = T**



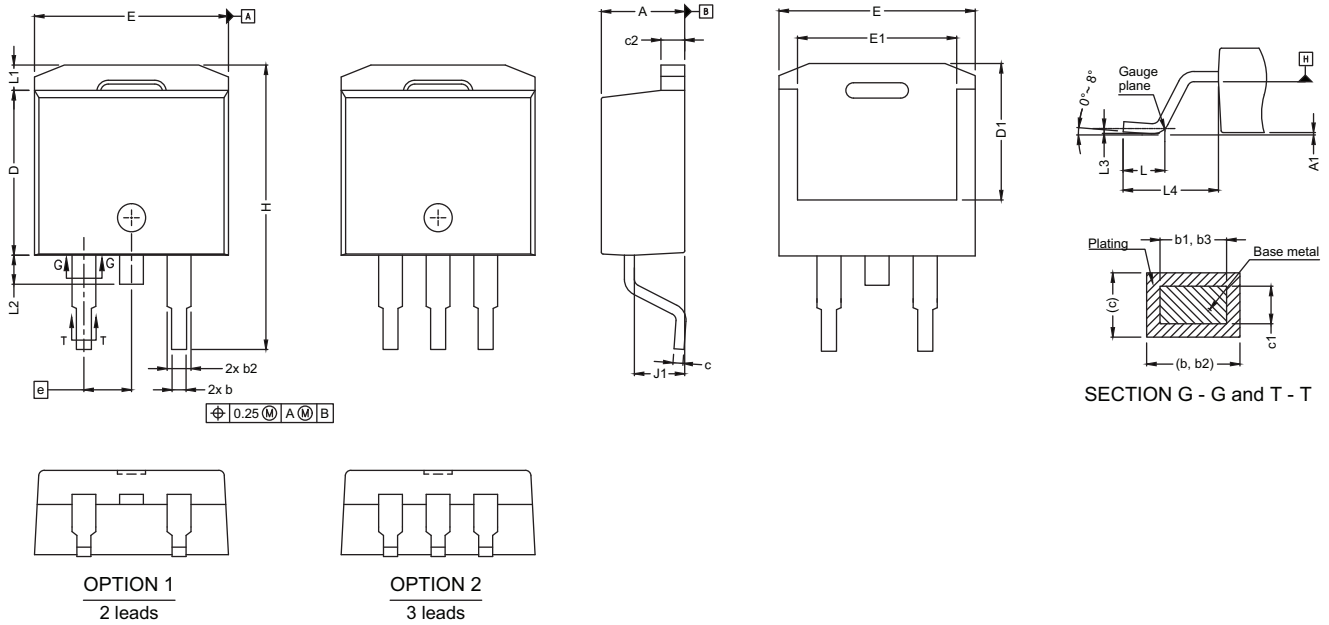
DIM.	INCHES		MILLIMETERS		
	MIN.	MAX.	MIN.	MAX.	
A	0.160	0.190	4.064	4.826	
b	0.020	0.039	0.508	0.990	
b1	0.020	0.035	0.508	0.889	
b2	0.045	0.055	1.143	1.397	
c*	Thin lead	0.013	0.018	0.330	0.457
	Thick lead	0.023	0.028	0.584	0.711
c1	Thin lead	0.013	0.017	0.330	0.431
	Thick lead	0.023	0.027	0.584	0.685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

- 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.



**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)

[Return to Index](#)





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