

Automotive N-Channel 150 V (D-S) 175 °C MOSFET

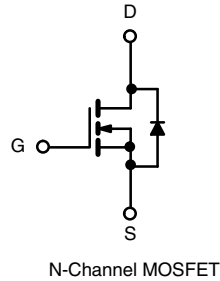
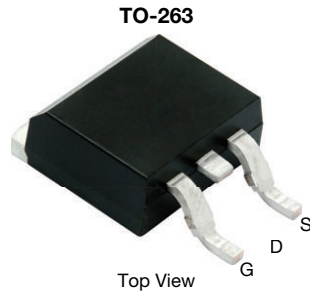


RoHS
COMPLIANT
HALOGEN
FREE

PRODUCT SUMMARY	
V_{DS} (V)	150
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.052
I_D (A)	25
Configuration	Single
Package	TO-263

FEATURES

- TrenchFET® power MOSFET
- Package with low thermal resistance
- 100 % R_g and UIS tested
- AEC-Q101 qualified ^d
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912



ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)				
PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-Source Voltage	V_{DS}	150	V	
Gate-Source Voltage	V_{GS}	± 20		
Continuous Drain Current	I_D	$T_C = 25$ °C	A	
		$T_C = 125$ °C		16
Continuous Source Current (Diode Conduction) ^a	I_S	50		
Pulsed Drain Current ^b	I_{DM}	65		
Single Pulse Avalanche Energy	$L = 0.1$ mH	I_{AS}		30
Single Pulse Avalanche Current		E_{AS}		45
Maximum Power Dissipation ^b	$T_C = 25$ °C	P_D	107	
			$T_C = 125$ °C	35
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 (Drain)			

Notes

- Package limited.
- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR4 material).
- Parametric verification ongoing.



SPECIFICATIONS (T _C = 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		150	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		2.5	3	4	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V	V _{DS} = 150 V	-	-	1	μA
		V _{GS} = 0 V	V _{DS} = 150 V, T _J = 125 °C	-	-	50	
		V _{GS} = 0 V	V _{DS} = 150 V, T _J = 175 °C	-	-	250	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = 10 V	V _{DS} ≥ 5 V	30	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V	I _D = 15 A	-	0.041	0.052	Ω
		V _{GS} = 10 V	I _D = 15 A, T _J = 125 °C	-	-	0.106	
		V _{GS} = 10 V	I _D = 15 A, T _J = 175 °C	-	-	0.138	
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 15 A		-	33	-	S
Dynamic ^b							
Input Capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 25 V, f = 1 MHz	-	1886	2360	pF
Output Capacitance	C _{oss}			-	215	270	
Reverse Transfer Capacitance	C _{rss}			-	97	125	
Total Gate Charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = 75 V, I _D = 25 A	-	34	51	nC
Gate-Source Charge ^c	Q _{gs}			-	14.5	-	
Gate-Drain Charge ^c	Q _{gd}			-	5.4	-	
Gate Resistance	R _g	f = 1 MHz		0.35	1.0	3.2	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 75 V, R _L = 3 Ω I _D ≅ 25 A, V _{GEN} = 10 V, R _g = 1 Ω		-	11	17	ns
Rise Time ^c	t _r			-	21	33	
Turn-Off Delay Time ^c	t _{d(off)}			-	20	30	
Fall Time ^c	t _f			-	12	20	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed Current ^a	I _{SM}			-	-	65	A
Forward Voltage	V _{SD}	I _F = 20 A, V _{GS} = 0 V		-	0.85	1.5	V

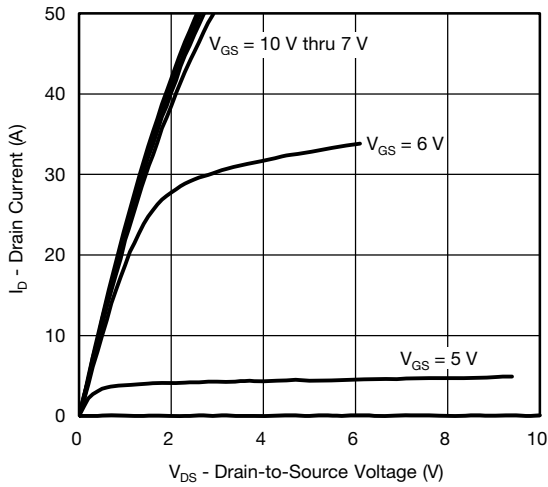
Notes

- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

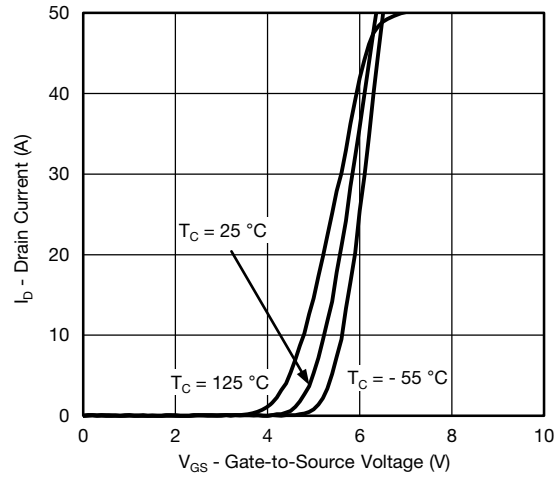
Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



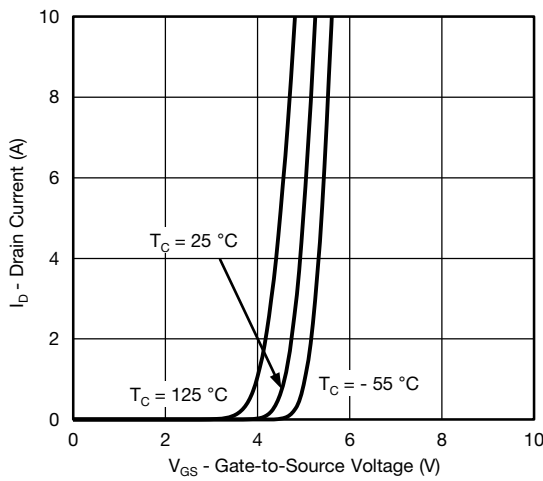
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



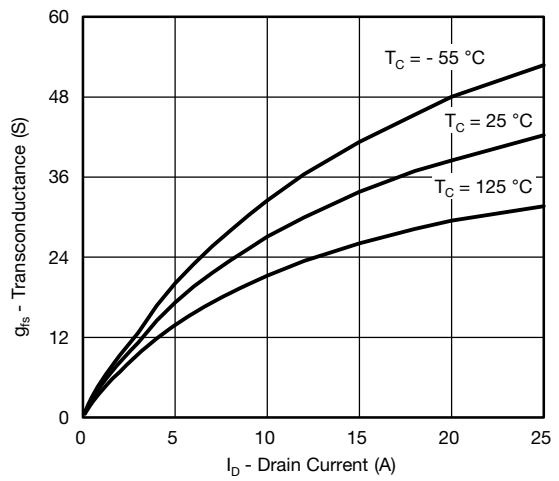
Output Characteristics



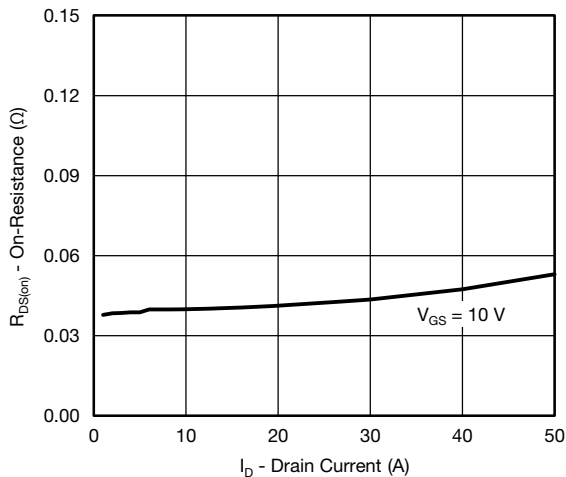
Transfer Characteristics



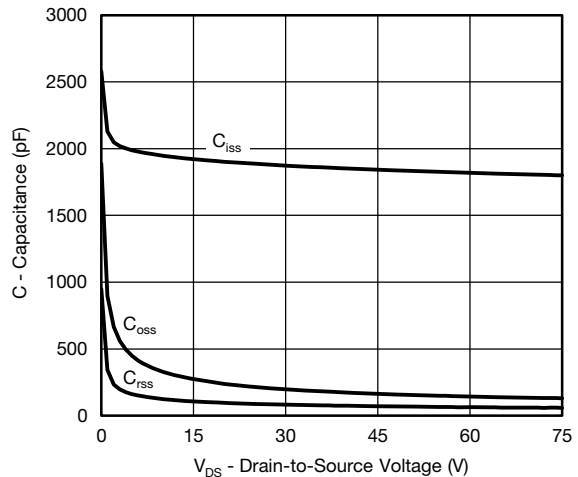
Transfer Characteristics



Transconductance



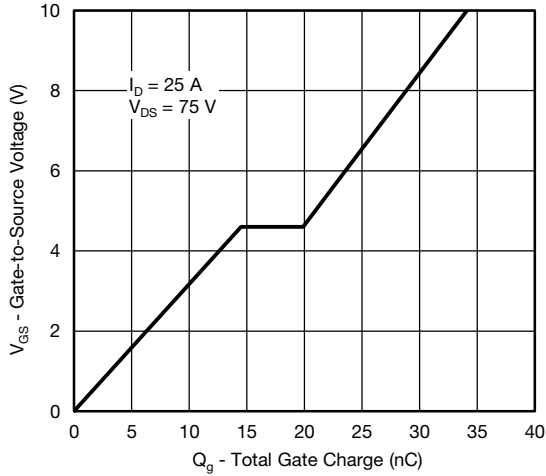
On-Resistance vs. Drain Current



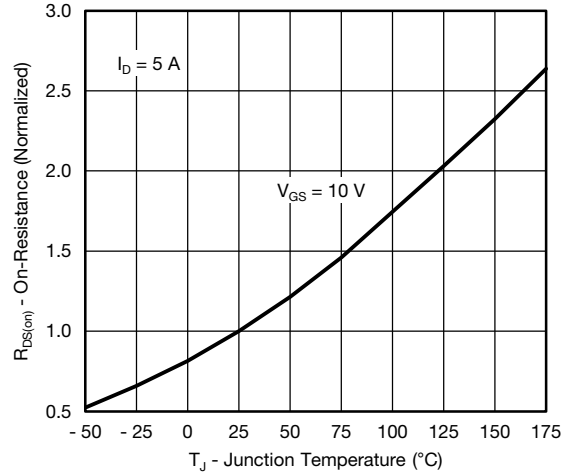
Capacitance



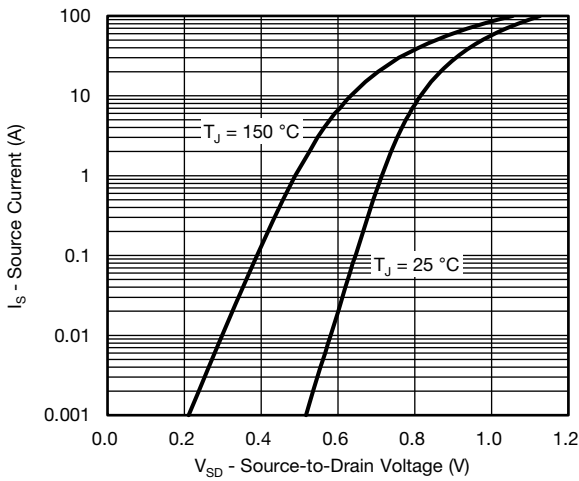
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



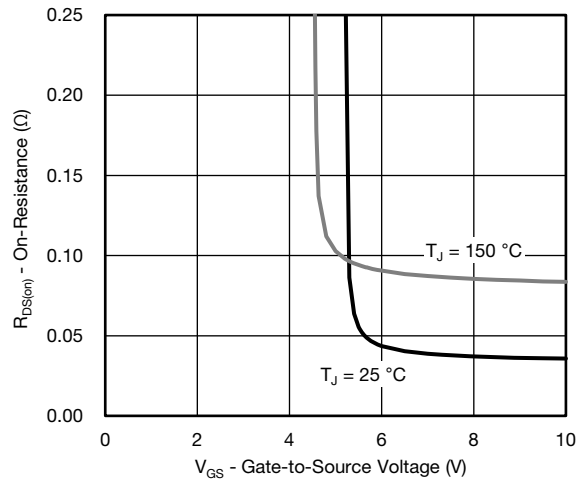
Gate Charge



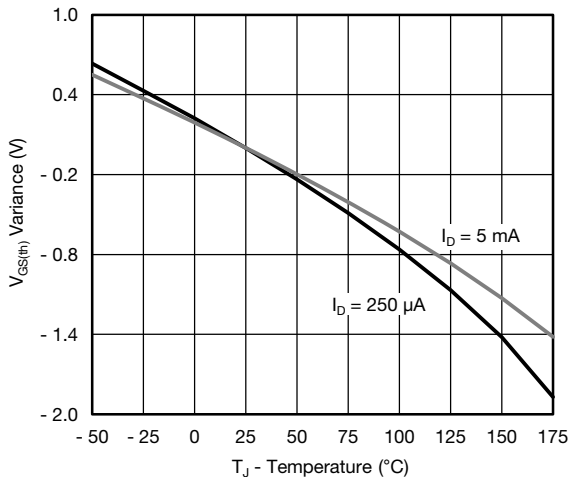
On-Resistance vs. Junction Temperature



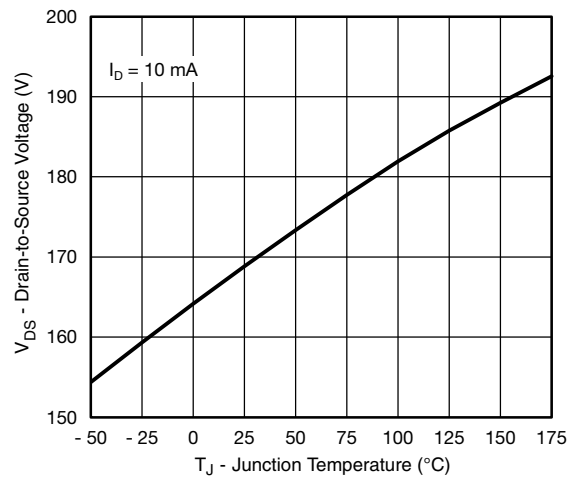
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



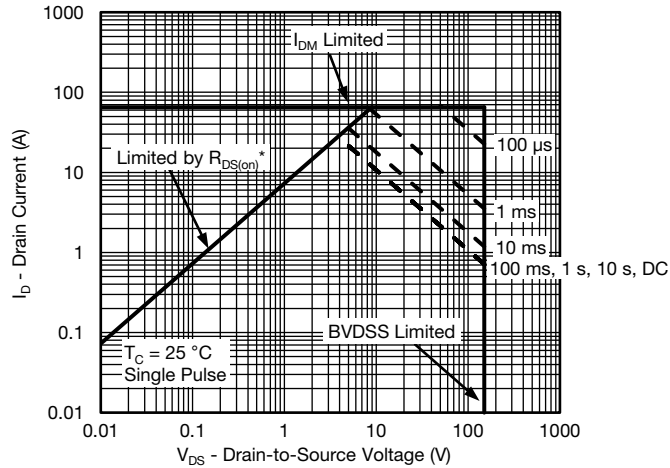
Threshold Voltage



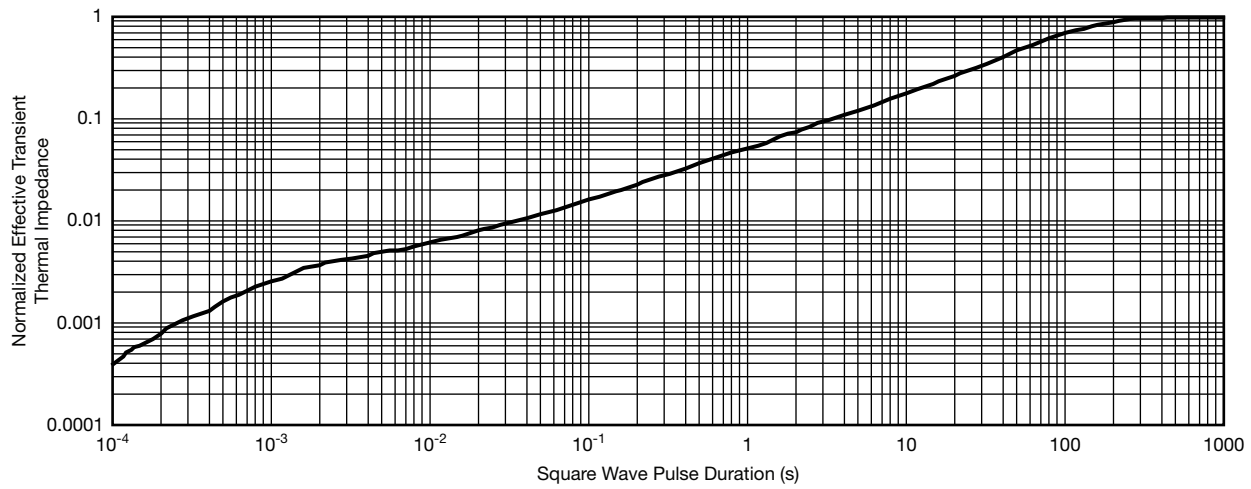
Drain Source Breakdown vs. Junction Temperature



THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



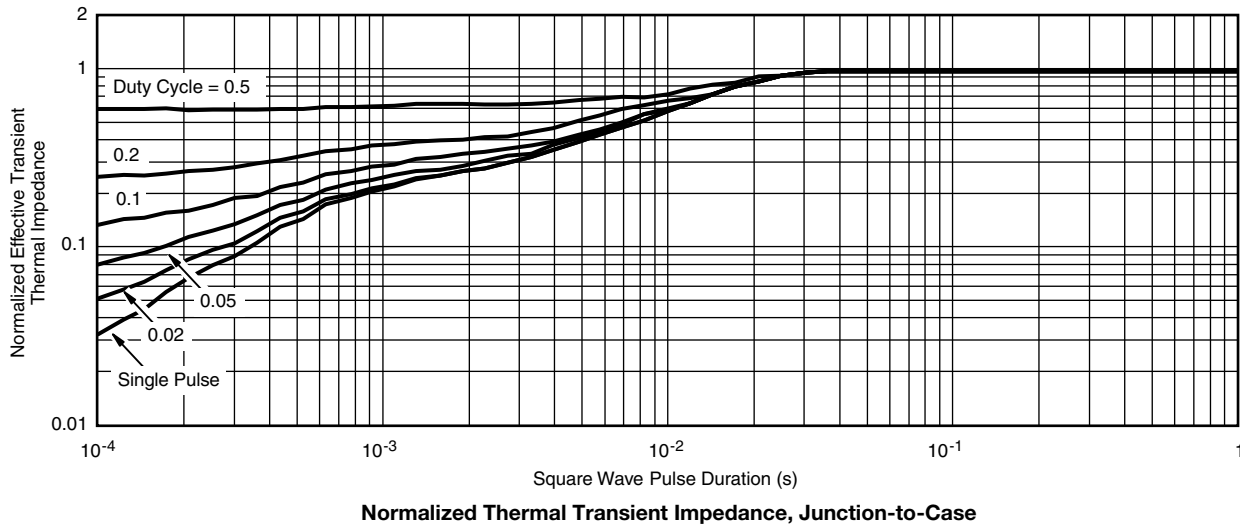
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction to Ambient ($25\text{ }^\circ\text{C}$)
 - Normalized Transient Thermal Impedance Junction to Case ($25\text{ }^\circ\text{C}$)
 are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

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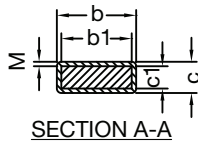
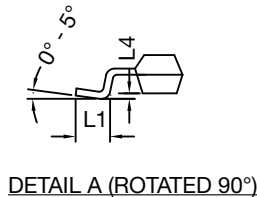
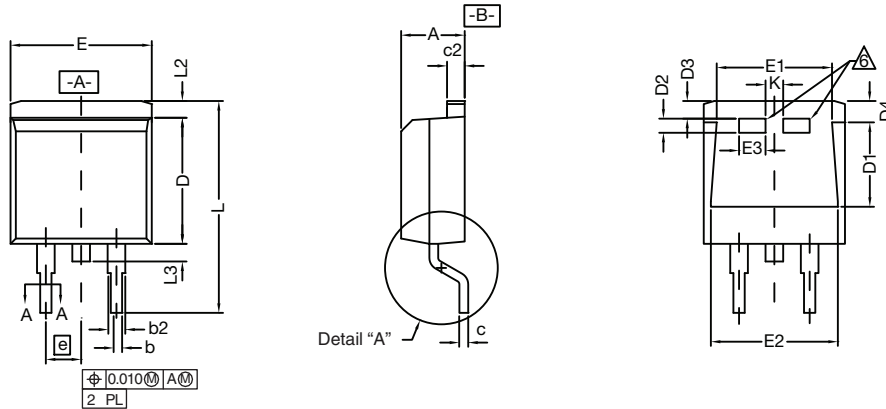
REVISION HISTORY ^a		
REVISION	DATE	DESCRIPTION OF CHANGE
D	08-Aug-15	• R_g , C_{RSS} , t_r and t_f changed

Note

a. As of April 2014

TO-263 (D²PAK): 3-LEAD

VERSION 1: FACILITY CODE = T



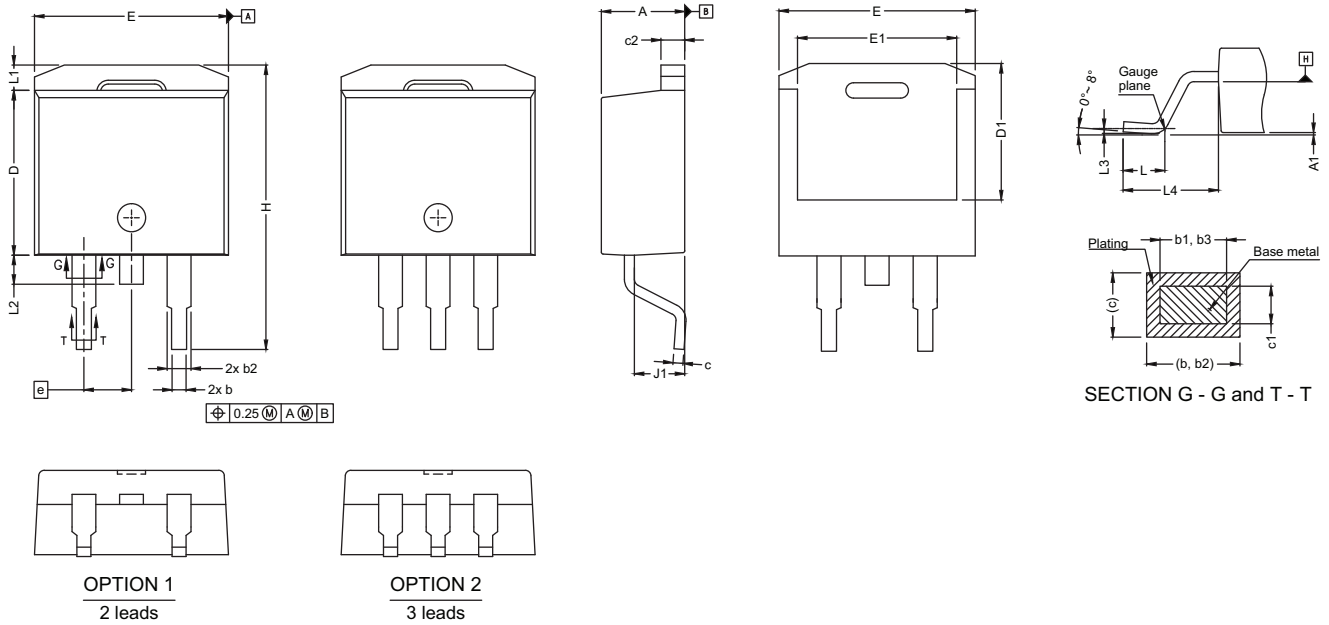
DIM.	INCHES		MILLIMETERS		
	MIN.	MAX.	MIN.	MAX.	
A	0.160	0.190	4.064	4.826	
b	0.020	0.039	0.508	0.990	
b1	0.020	0.035	0.508	0.889	
b2	0.045	0.055	1.143	1.397	
c*	Thin lead	0.013	0.018	0.330	0.457
	Thick lead	0.023	0.028	0.584	0.711
c1	Thin lead	0.013	0.017	0.330	0.431
	Thick lead	0.023	0.027	0.584	0.685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

- 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 D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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