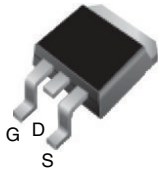
N-Channel 200-V (D-S) 175 °C MOSFET

D²PAK (TO-263)



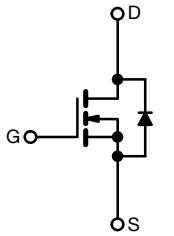
FEATURES

- TrenchFET® power MOSFET
- 175 °C junction temperature
- Low thermal resistance package
- 100 % R_g tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

APPLICATIONS

- Isolated DC/DC converters



N-Channel MOSFET

PRODUCT SUMMARY	
$V_{(BR)DSS}$ (V)	200
$R_{DS(on)}$ max. (Ω) at V_{GS} = 10 V	0.030
Q_g typ. (nC)	90
I_D (A) [a]	65
Configuration	Single

ORDERING INFORMATION	
Package	D²PAK (TO-263)
Lead (Pb)-free	SUM65N20-30-E3

ABSOLUTE MAXIMUM RATINGS T_C = 25 °C, unless otherwise noted

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V_{DS}	200	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current (T_J = 175 °C)	T_C = 25 °C	I_D	65 [a]	A
	T_C = 125 °C		37 [a]	
Pulsed drain current		I_{DM}	140	
Avalanche current	L = 0.1 mH	I_{AS}	35	
Single pulse avalanche energy [b]		E_{AS}	61	mJ
Maximum power dissipation [b]	T_C = 25 °C	P_D	375 [c]	W
	T_A = 25 °Cd		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	PCB mount (TO-263) [d]	R_{thJA}	40	°C/W
Junction-to-case (drain)		R_{thJC}	0.4	

Notes

a. Package limited
b. Duty cycle ≤ 1 %
c. See SOA curve for voltage derating
d. When mounted on 1" square PCB (FR-4 material)

SPECIFICATIONS T_J = 25 °C, unless otherwise noted						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 µA	200	-	-	V
Gate-threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	2	-	4	
Gate-body leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V	-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	V_{DS} = 200 V, V_{GS} = 0 V	-	-	1	µA
		V_{DS} = 200 V, V_{GS} = 0 V, T_J = 125 °C	-	-	50	
		V_{DS} = 200 V, V_{GS} = 0 V, T_J = 175 °C	-	-	250	
On-state drain current [a]	$I_{D(on)}$	V_{DS} ≥ 5 V, V_{GS} = 10 V	120	-	-	A
Drain-source on-state resistance [a]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 30 A	-	0.023	0.030	Ω
		V_{GS} = 10 V, I_D = 30 A, T_J = 125 °C	-	-	0.063	
		V_{GS} = 10 V, I_D = 30 A, T_J = 175 °C	-	-	0.084	
Forward transconductance [a]	g_{fs}	V_{DS} = 15 V, I_D = 30 A	25	-	-	S
Dynamic [b]						
Input capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	-	5100	-	pF
Output capacitance	C_{oss}		-	480	-	
Reverse transfer capacitance	C_{rss}		-	210	-	
Total gate charge [c]	Q_g	V_{DS} = 100 V, V_{GS} = 10 V, I_D = 85 A	-	90	130	nC
Gate-source charge [c]	Q_{gs}		-	23	-	
Gate-drain charge [c]	Q_{gd}		-	34	-	
Gate resistance	R_g		0.5	1.7	3.3	Ω
Turn-on delay time [c]	$t_{d(on)}$	V_{DD} = 100 V, R_L = 1.5 Ω I_D ≅ 65 A, V_{GEN} = 10 V, R_g = 2.5 Ω	-	24	35	ns
Rise time [c]	t_r		-	220	330	
Turn-off delay time [c]	$t_{d(off)}$		-	45	70	
Fall time [c]	t_f		-	200	300	
Source-Drain Diode Ratings and Characteristics T_C = 25 °C [b]						
Continuous current	I_S		-	-	65	A
Pulsed current	I_{SM}		-	-	140	
Forward voltage [a]	V_{SD}	I_F = 65 A, V_{GS} = 0 V	-	1.0	1.5	V
Reverse recovery time	t_{rr}	I_F = 50 A, di/dt = 100 A/µs	-	130	200	ns
Peak reverse recovery current	$I_{RM(REC)}$		-	8	12	A
Reverse recovery charge	Q_{rr}		-	0.52	1.2	µC

Notes

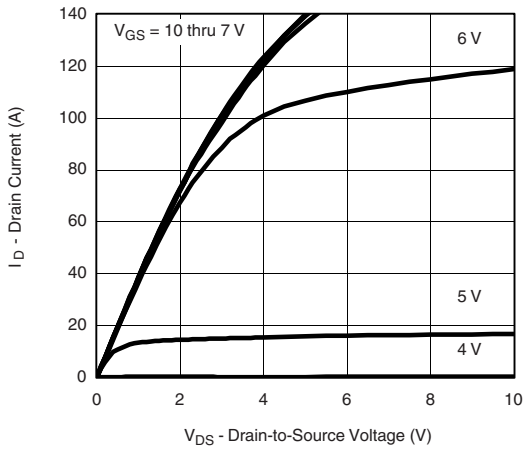
e. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %

f. Guaranteed by design, not subject to production testing

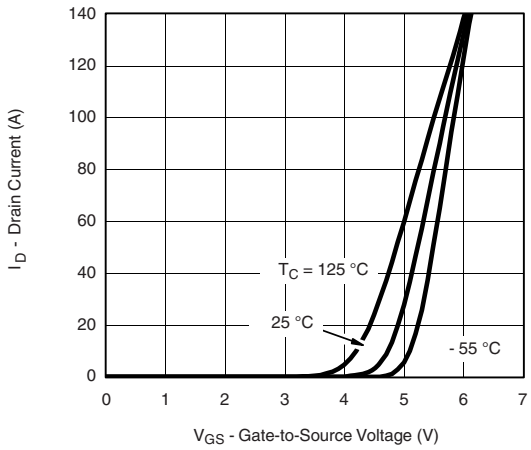
g. Independent of operating temperature

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.

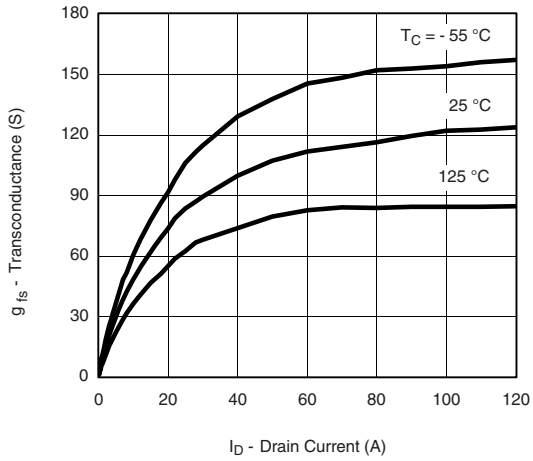
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



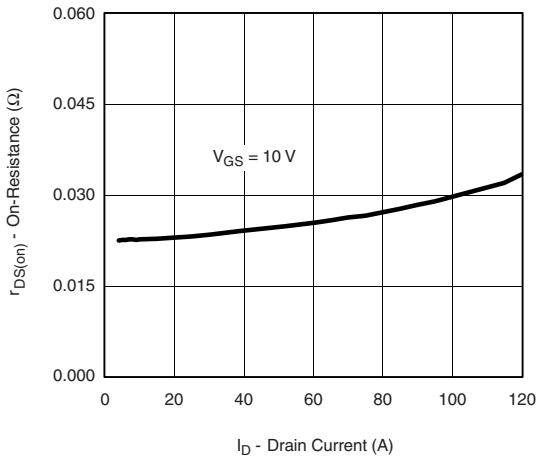
Output Characteristics



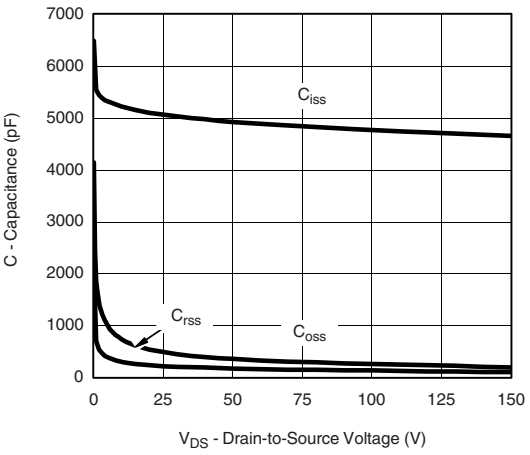
Transfer Characteristics



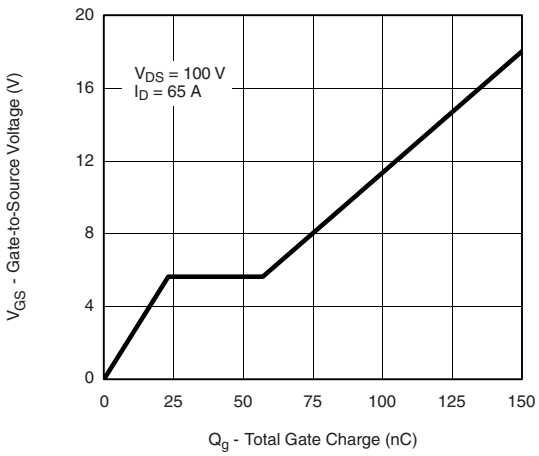
Transconductance



On-Resistance vs. Drain Current

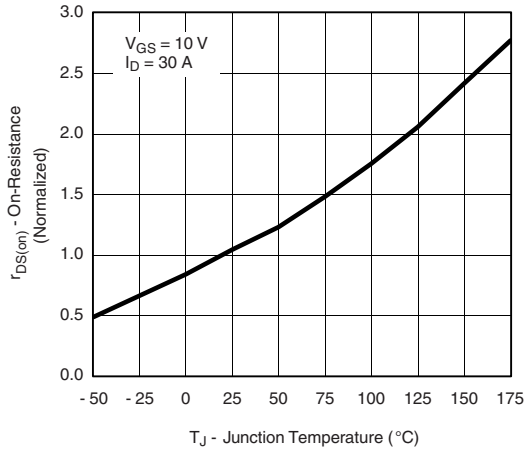


Capacitance

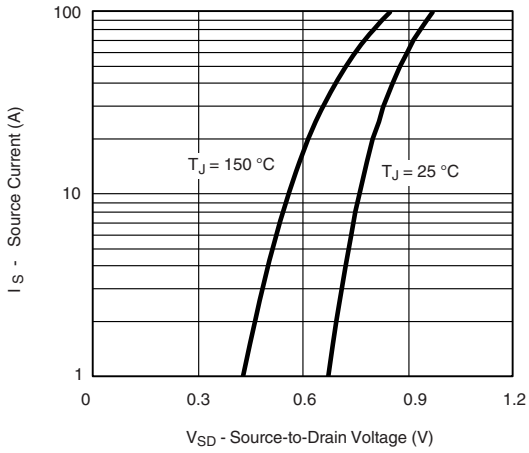


Gate Charge

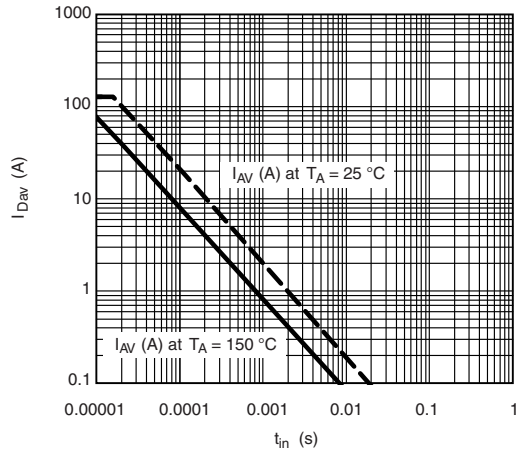
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



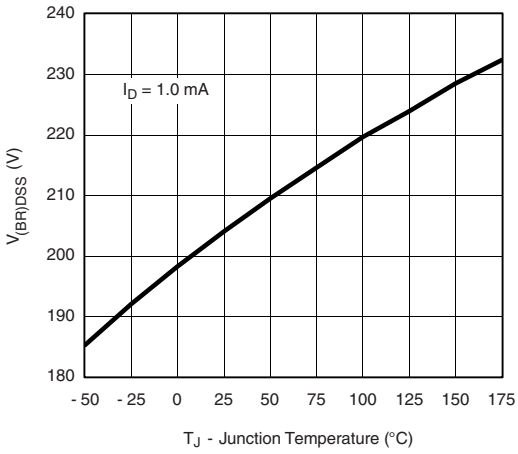
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

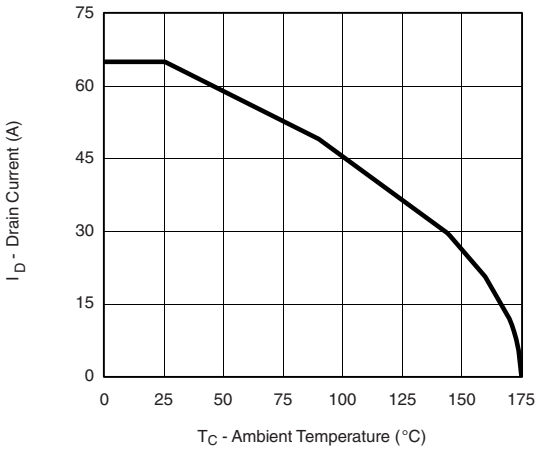


Avalanche Current vs. Time

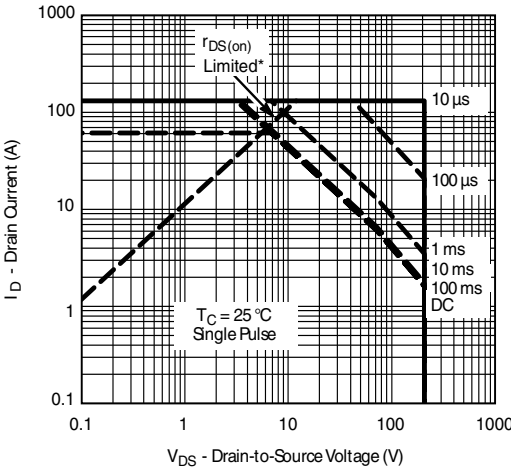


Drain Source Breakdown vs. Junction Temperature

THERMAL RATINGS



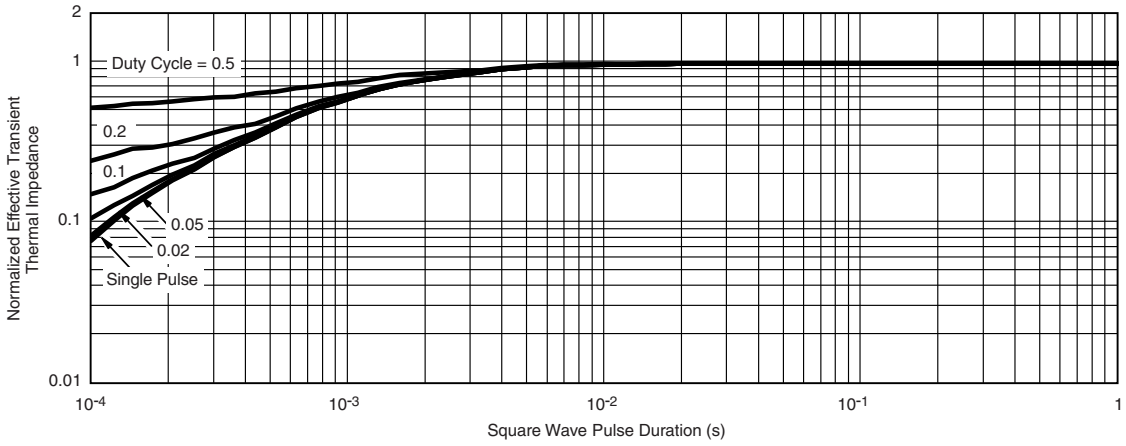
Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area

Note

a. V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified



Normalized Thermal Transient Impedance, Junction-to-Case

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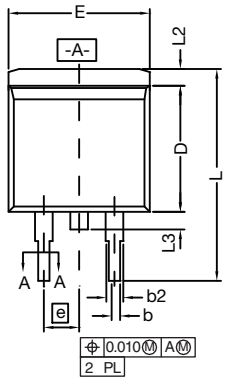
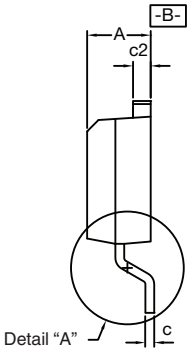
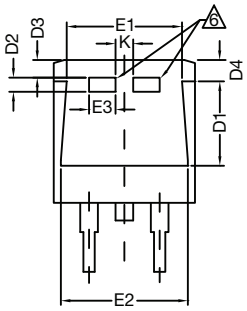
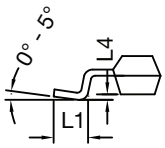
TO-263 (D²PAK): 3-LEAD

VERSION 1: FACILITY CODE = T

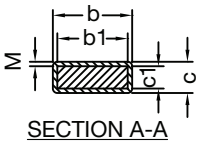








DETAIL A (ROTATED 90°)



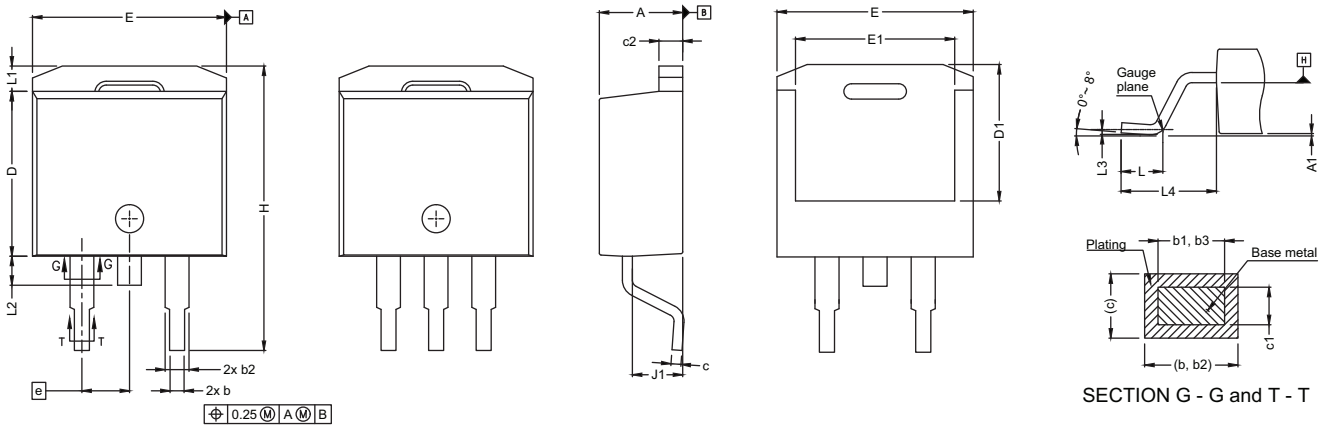
SECTION A-A

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

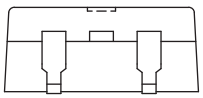
Notes

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.

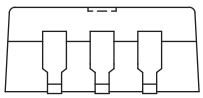
VERSION 2: FACILITY CODE = N



SECTION G - G and T - T



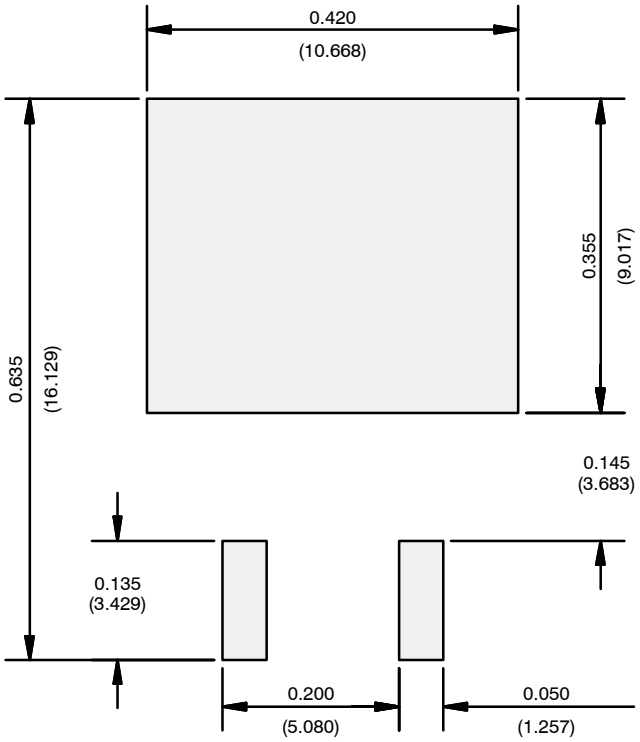
OPTION 1
2 leads



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)

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