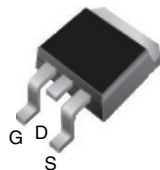


N-Channel 200-V (D-S) 175 °C MOSFET

D²PAK (TO-263)


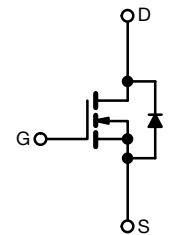
FEATURES

- 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	D ² PAK (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	V
Continuous drain current (T _J = 175 °C)	I _D	T _C = 25 °C	65 ^a
		T _C = 125 °C	37 ^a
Pulsed drain current	I _{DM}	140	A
Avalanche current	I _{AS}	35	A
Single pulse avalanche energy ^b	E _{AS}	61	mJ
Maximum power dissipation ^b	P _D	T _C = 25 °C	375 ^c
		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	R _{thJA}	40	°C/W
Junction-to-case (drain)	R _{thJC}	0.4	°C/W

Notes

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



SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	200	-	-	V
Gate-threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	2	-	4	
Gate-body leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$	-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 200\text{ V}$, $V_{GS} = 0\text{ V}$	-	-	1	μA
		$V_{DS} = 200\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 125\text{ }^{\circ}\text{C}$	-	-	50	
		$V_{DS} = 200\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 175\text{ }^{\circ}\text{C}$	-	-	250	
On-state drain current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}$, $V_{GS} = 10\text{ V}$	120	-	-	A
Drain-source on-state resistance ^a	$r_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 30\text{ A}$	-	0.023	0.030	Ω
		$V_{GS} = 10\text{ V}$, $I_D = 30\text{ A}$, $T_J = 125\text{ }^{\circ}\text{C}$	-	-	0.063	
		$V_{GS} = 10\text{ V}$, $I_D = 30\text{ A}$, $T_J = 175\text{ }^{\circ}\text{C}$	-	-	0.084	
Forward transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}$, $I_D = 30\text{ A}$	25	-	-	S
Dynamic ^b						
Input capacitance	C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$	-	5100	-	pF
Output capacitance	C_{oss}		-	480	-	
Reverse transfer capacitance	C_{rss}		-	210	-	
Total gate charge ^c	Q_g	$V_{DS} = 100\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 85\text{ A}$	-	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	$t_{d(on)}$	$V_{DD} = 100\text{ V}$, $R_L = 1.5\text{ }\Omega$ $I_D \cong 65\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 2.5\text{ }\Omega$	-	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 $T_C = 25\text{ }^{\circ}\text{C}$ ^b						
Continuous current	I_S		-	-	65	A
Pulsed current	I_{SM}		-	-	140	
Forward voltage ^a	V_{SD}	$I_F = 65\text{ A}$, $V_{GS} = 0\text{ V}$	-	1.0	1.5	V
Reverse recovery time	t_{rr}	$I_F = 50\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$	-	130	200	ns
Peak reverse recovery current	$I_{RM(REC)}$		-	8	12	A
Reverse recovery charge	Q_{rr}		-	0.52	1.2	μC

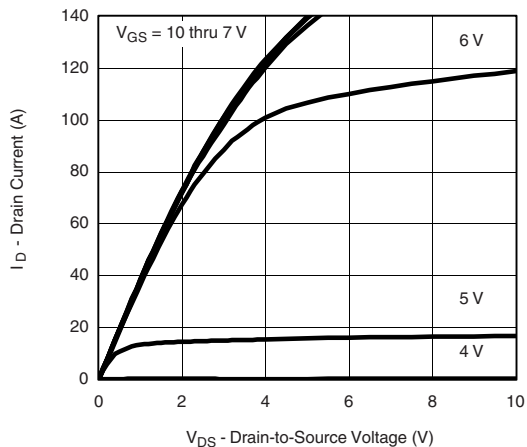
Notes

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

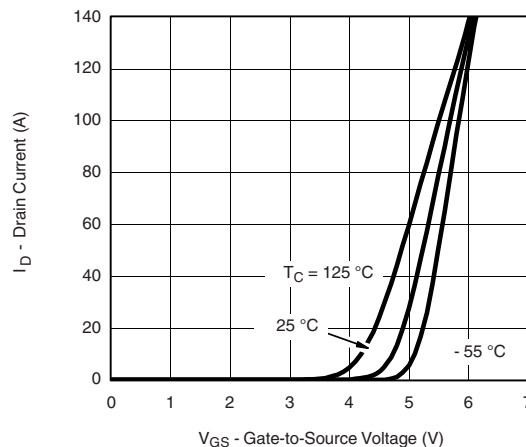
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



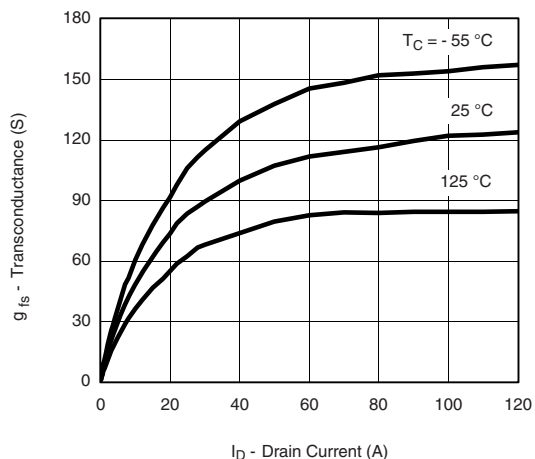
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



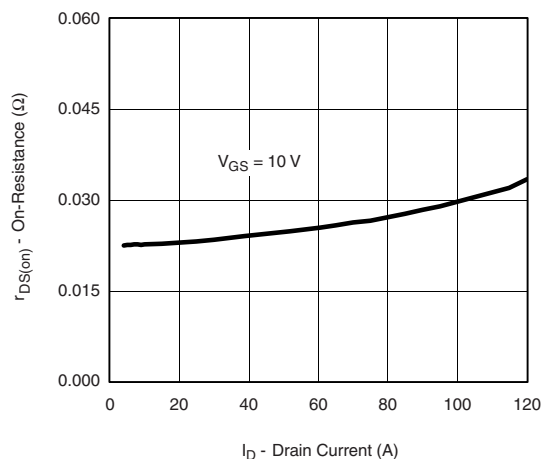
Output Characteristics



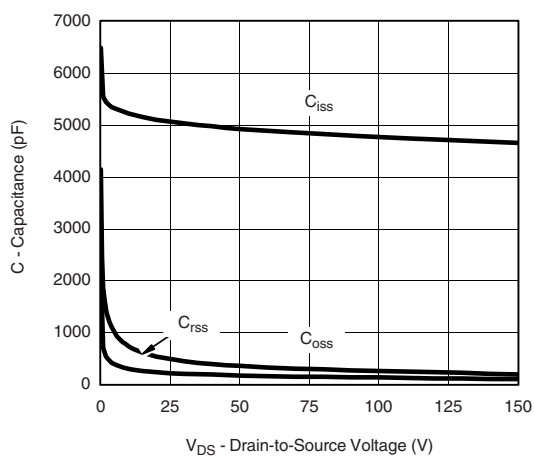
Transfer Characteristics



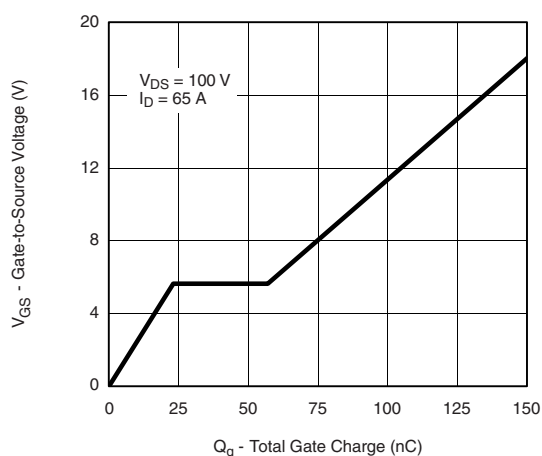
Transconductance



On-Resistance vs. Drain Current



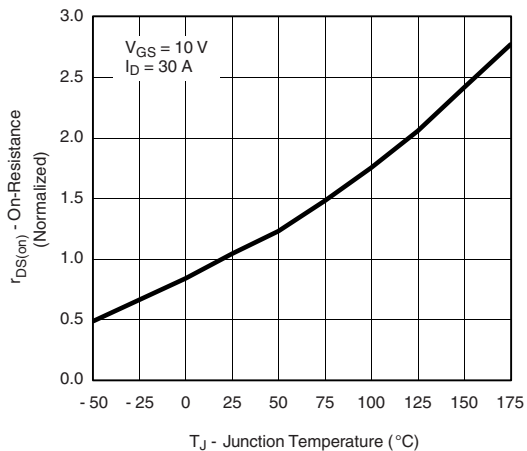
Capacitance



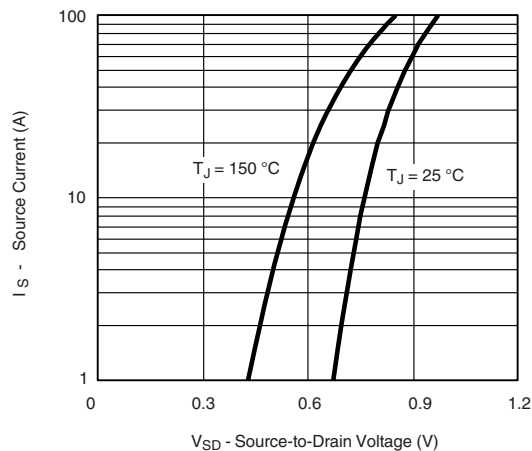
Gate Charge



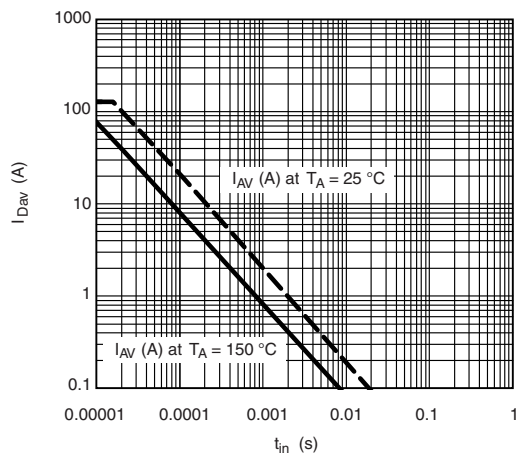
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



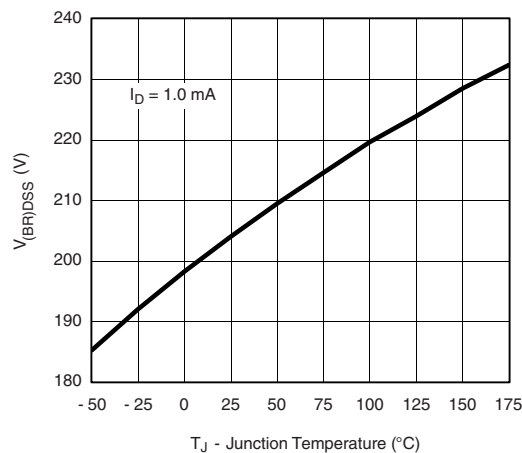
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage



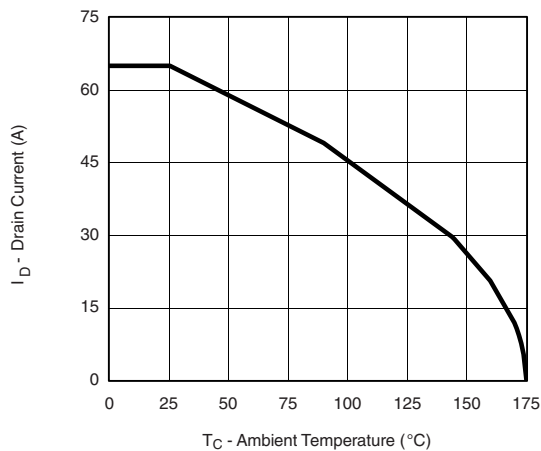
Avalanche Current vs. Time



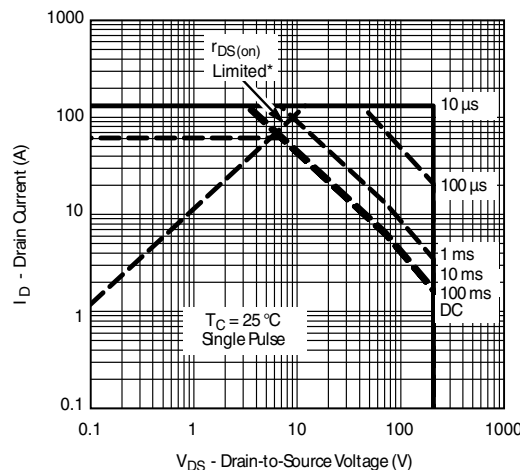
Drain Source Breakdown vs. Junction Temperature



THERMAL RATINGS



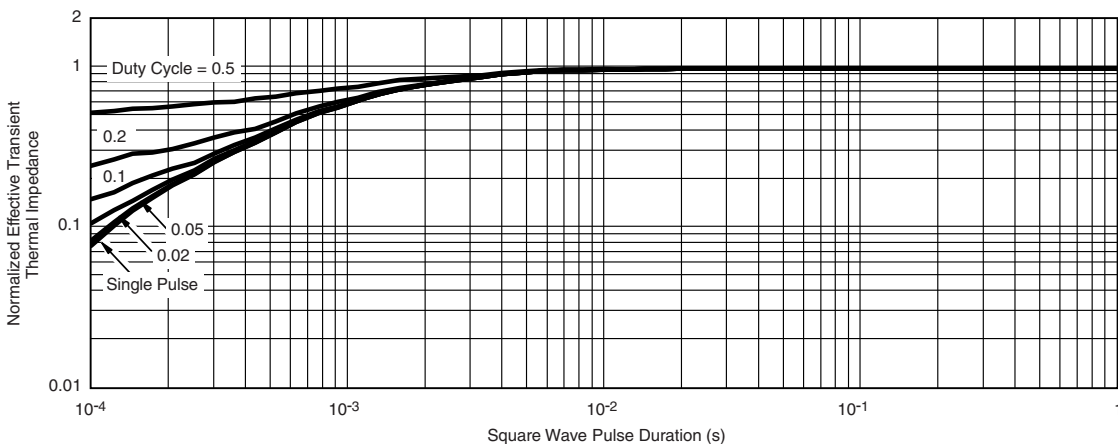
Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area

Note

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

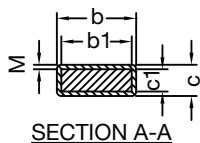
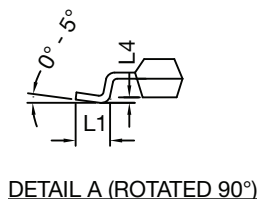
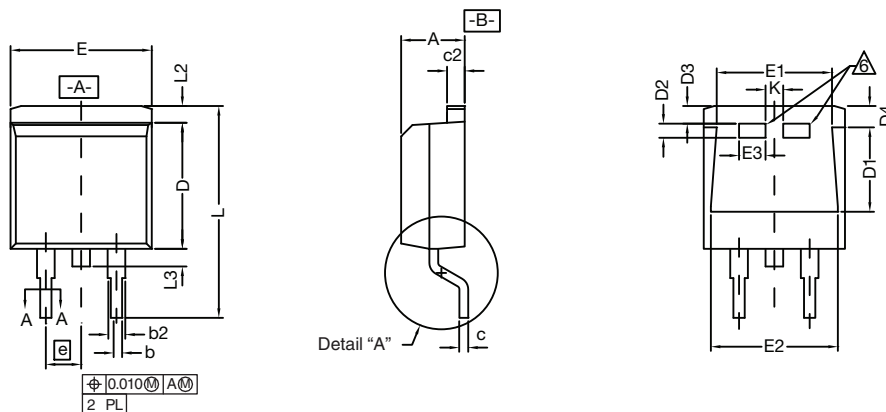


Normalized Thermal Transient Impedance, Junction-to-Case

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 <http://www.vishay.com/ppg?71702>.

TO-263 (D²PAK): 3-LEAD

VERSION 1: FACILITY CODE = T



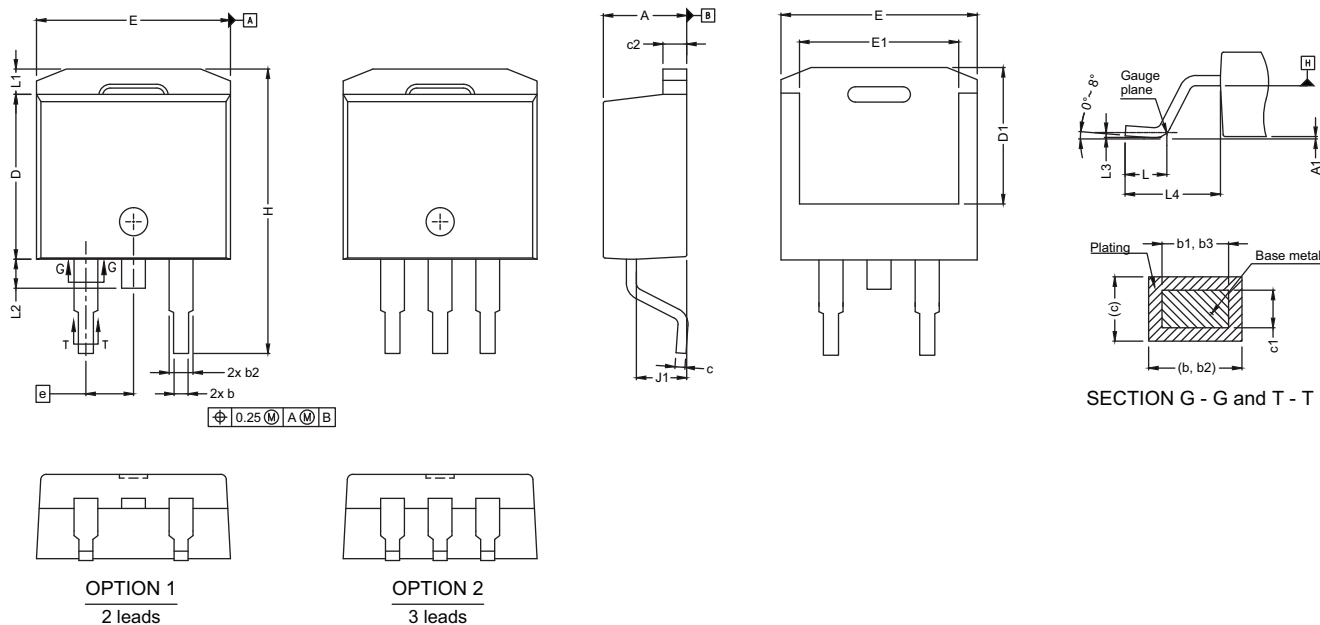
DIM.		INCHES		MILLIMETERS	
		MIN.	MAX.	MIN.	MAX.
A		0.160	0.190	4.064	4.826
b		0.020	0.039	0.508	0.990
b1		0.020	0.035	0.508	0.889
b2		0.045	0.055	1.143	1.397
c*	Thin lead	0.013	0.018	0.330	0.457
	Thick lead	0.023	0.028	0.584	0.711
c1	Thin lead	0.013	0.017	0.330	0.431
	Thick lead	0.023	0.027	0.584	0.685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