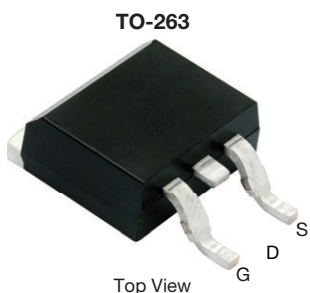
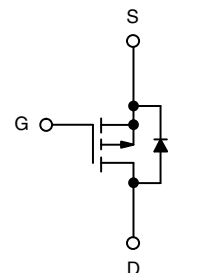


P-Channel 100-V (D-S) MOSFET



FEATURES

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


RoHS
COMPLIANT


P-Channel MOSFET

PRODUCT SUMMARY

V_{DS} (V)	-100
$R_{DS(on)}$ max. (Ω) at $V_{GS} = -10$ V	0.019
$R_{DS(on)}$ max. (Ω) 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}	± 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 ^{b, c}	
	$T_A = 125$ °C	-9.9 ^{b, c}	
Pulsed drain current	I_{DM}	-90	
Continuous source-drain diode current	$T_C = 25$ °C	-250	
	$T_A = 25$ °C	-9 ^{b, c}	
Avalanche Current	$L = 0.1$ mH	-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 ^{b, c}	
	$T_A = 125$ °C	4.5 ^{b, c}	
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 ^{b, d}	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
Static						
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}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$	-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	$V_{DS} = -100\text{ V}$, $V_{GS} = 0\text{ V}$	-	-	-1	μA
		$V_{DS} = -100\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 175\text{ }^{\circ}\text{C}$	-	-	-500	
On-state drain current ^a	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}$, $V_{GS} = -10\text{ V}$	-90	-	-	A
Drain-source on-state resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}$, $I_D = -20\text{ A}$	-	0.0156	0.019	Ω
		$V_{GS} = -4.5\text{ V}$, $I_D = -15\text{ A}$	-	0.0173	0.021	
Forward transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}$, $I_D = -20\text{ A}$	-	80	-	S
Dynamic ^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
Gate-source charge	Q_{gs}	$V_{DS} = -50\text{ V}$, $V_{GS} = -4.5\text{ V}$, $I_D = -90\text{ A}$	-	97	146	
Gate-drain charge	Q_{gd}		-	42	-	
Gate Resistance	R_g		-	51	-	
Turn-on delay time	$t_{d(on)}$	$f = 1\text{ MHz}$ $V_{DD} = -50\text{ V}$, $R_L = 0.56\text{ }\Omega$ $I_D \cong -90\text{ A}$, $V_{GEN} = -10\text{ V}$, $R_g = 1\text{ }\Omega$	-	3.5	-	W
Rise Time	t_r		-	20	30	ns
Turn-off delay time	$t_{d(off)}$		-	510	855	
Fall time	t_f		-	145	220	
			-	870	1300	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I_S	$T_C = 25\text{ }^{\circ}\text{C}$	-	-	-90	A
Pulse diode forward current ^a	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	-	

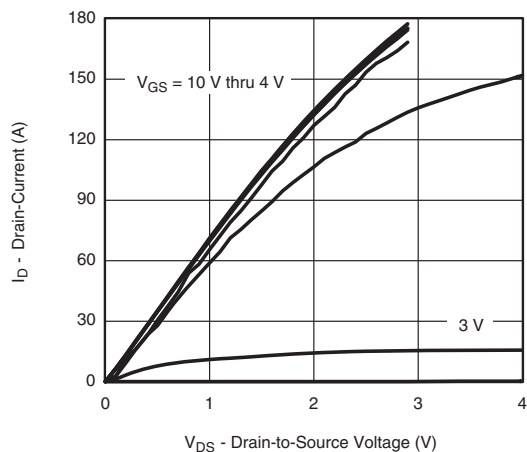
Notes

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

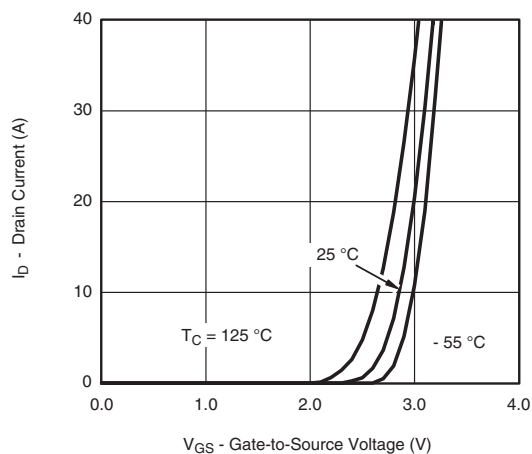
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



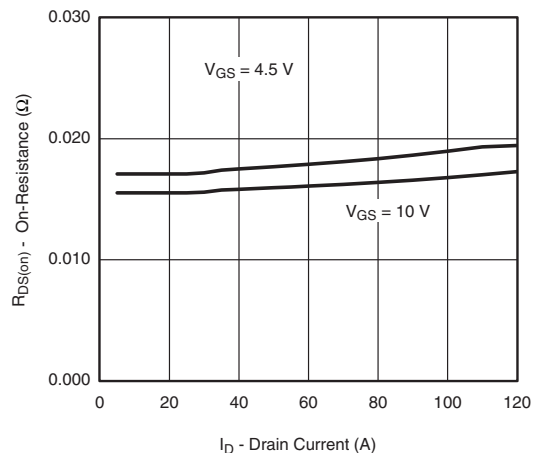
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



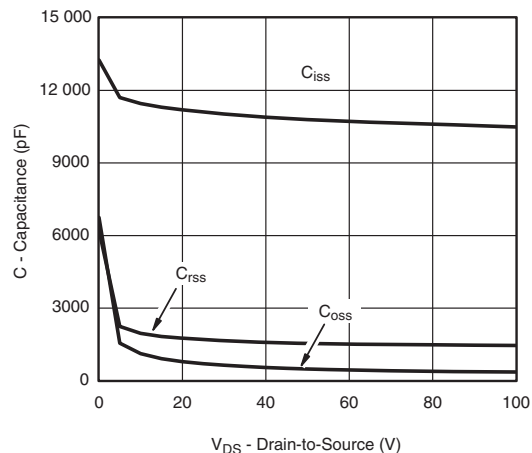
Output Characteristics



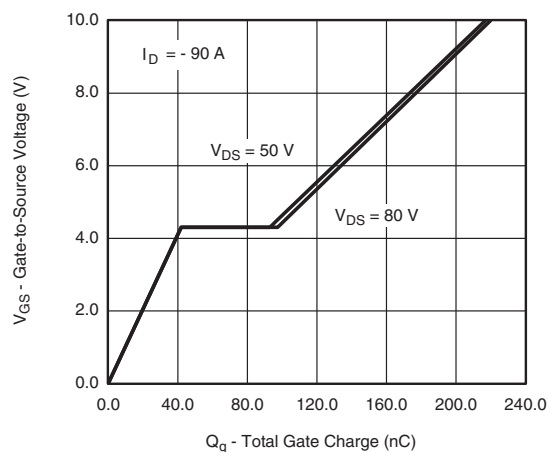
Transfer Characteristics



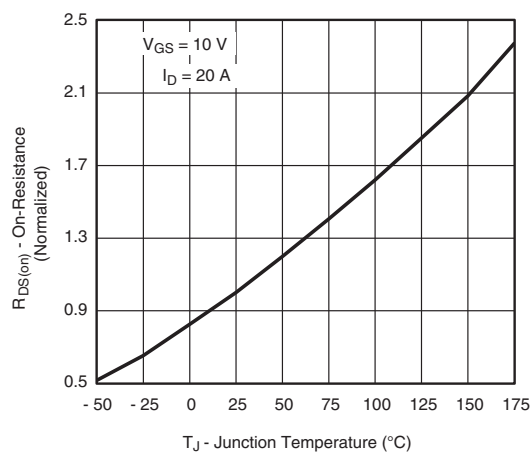
On-Resistance vs. Drain Current



Capacitance



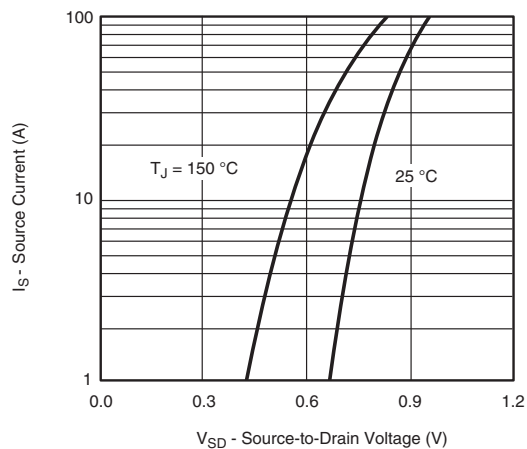
Gate Charge



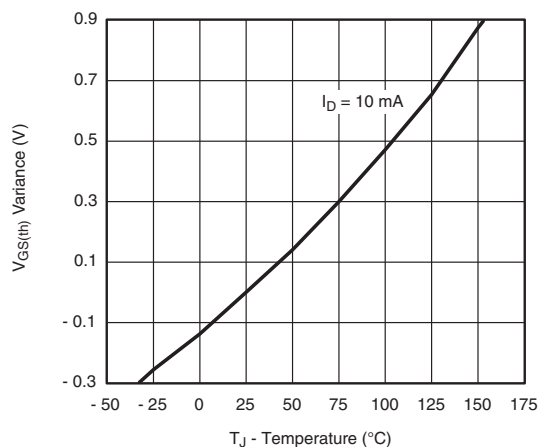
On-Resistance vs. Junction Temperature



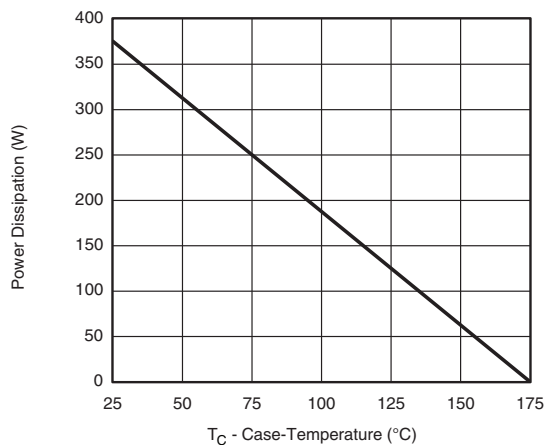
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Source-Drain Diode Forward Voltage



Threshold Voltage



Power Derating (Junction-to-Case)

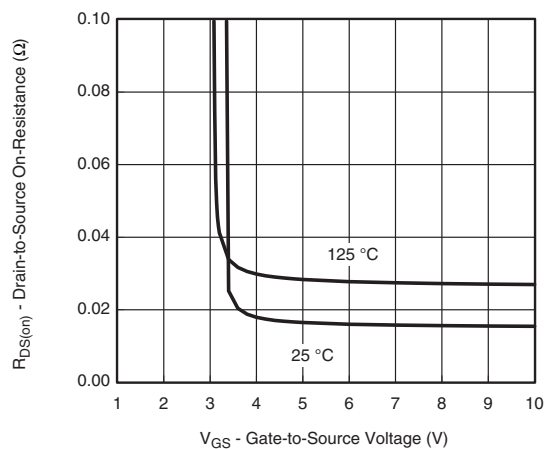
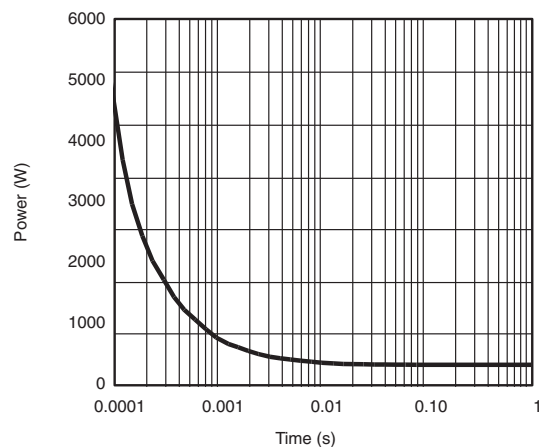
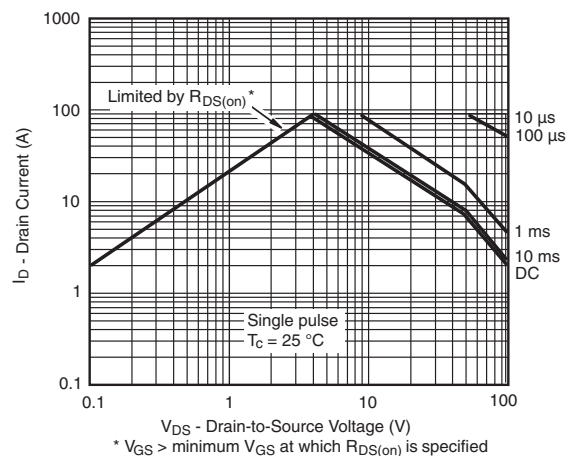


Fig. 1 - On-Resistance vs. Gate-to-Source Voltage



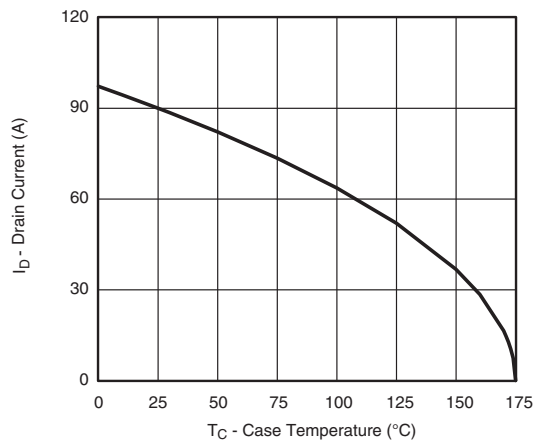
Single Pulse, Junction-to-Case ($T_C = 25\text{ }^{\circ}\text{C}$)



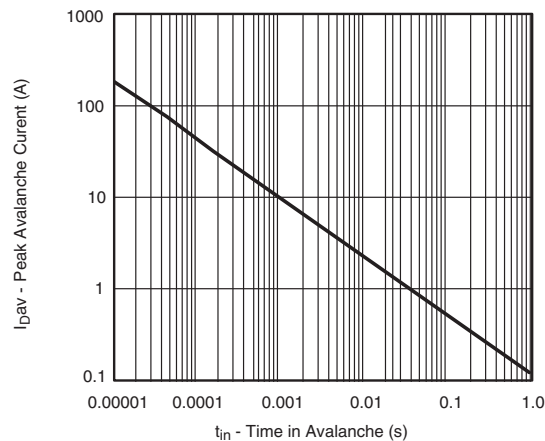
Safe Operating Area



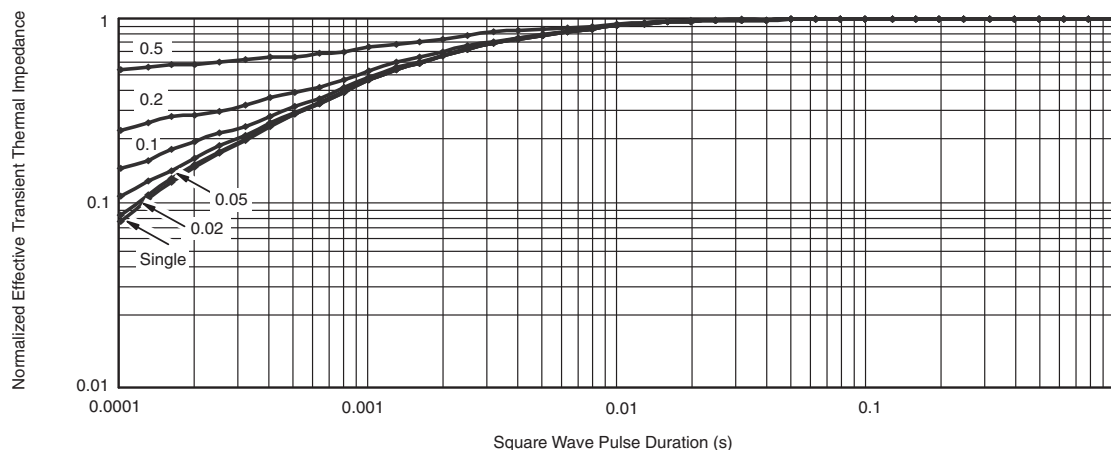
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Max Avalanche and Drain Current vs. Case Temperature



Avalanche Current vs. Time

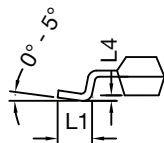
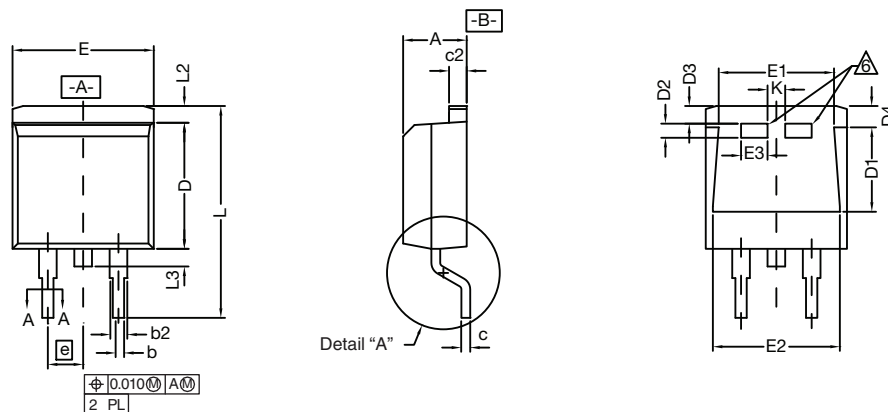


Normalized Thermal Transient Impedance, Junction-to-Case

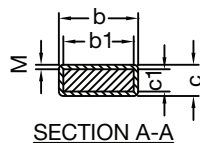
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TO-263 (D²PAK): 3-LEAD

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

- 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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