

BBS3002-DL-E-VB Datasheet

P-Channel 60 V (D-S) MOSFET

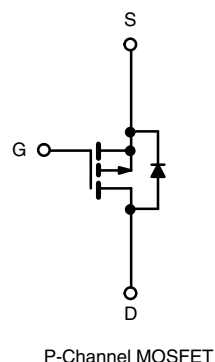
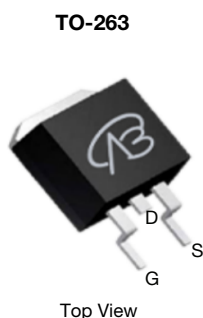
PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^d
-60	0.0030 at $V_{GS} = -10V$	-130
	0.0040 at $V_{GS} = -4.5V$	

FEATURES

- Trench power MOSFET
- Package with low thermal resistance



RoHS
COMPLIANT



ABSOLUTE MAXIMUM RATINGS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	-60	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ^d ($T_J = 175\text{ }^\circ\text{C}$)	$T_C = 25\text{ }^\circ\text{C}$	I_D	-130	A
	$T_C = 125\text{ }^\circ\text{C}$		-78	
Pulsed Drain Current		I_{DM}	-390	
Avalanche Current		I_{AS}	-65	
Single Pulse Avalanche Energy ^a		E_{AS}	281	mJ
Power Dissipation	$T_C = 25\text{ }^\circ\text{C}$ ^c	P_D	375	W
	$T_A = 25\text{ }^\circ\text{C}$ ^b		3.75	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to +175	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	TYPICAL	UNIT
Junction-to-Ambient	PCB mount ^b	R_{thJA}	40	$^\circ\text{C/W}$
Junction-to-Case		R_{thJC}	0.4	

Notes

- Duty cycle $\leq 1\%$.
- When mounted on 1" square PCB (FR4 material).
- See SOA curve for voltage derating.
- Limited by package.

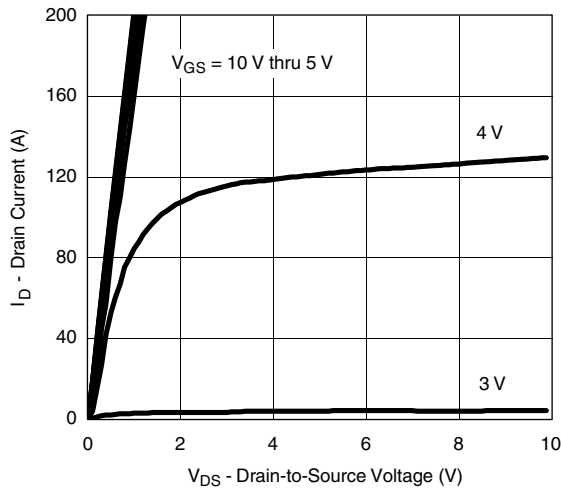
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = -250 μA	-60	-	-	V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250 μA	-	-3.5	-	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V	-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -60 V, V _{GS} = 0 V	-	-	-1	μA
		V _{DS} = -60 V, V _{GS} = 0 V, T _J = 125 °C	-	-	-50	
		V _{DS} = -60 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	-	0.0030	-	Ω
		V _{GS} = -10 V, I _D = -30 A, T _J = 125 °C	-	0.0040	-	
		V _{GS} = -10 V, I _D = -30 A, T _J = 175 °C	-	0.0060	-	
		V _{GS} = -4.5 V, I _D = -20 A	-	0.0040	-	
Forward Transconductance ^a	g _{fs}	V _{DS} = -15 V, I _D = -50 A	20	-	-	S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = -25 V, f = 1 MHz	-	18000	-	pF
Output Capacitance	C _{oss}		-	1200	-	
Reverse Transfer Capacitance	C _{rss}		-	900	-	
Total Gate Charge ^c	Q _g	V _{DS} = -30 V, V _{GS} = -10 V, I _D = -110 A	-	230	345	nC
Gate-Source Charge ^c	Q _{gs}		-	50	-	
Gate-Drain Charge ^c	Q _{gd}		-	60	-	
Gate Resistance	R _g	f = 1 MHz	-	3	-	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = -30 V, R _L = 0.27 Ω I _D ≅ -110 A, V _{GEN} = -10 V, R _g = 1 Ω	-	20	30	ns
Rise Time ^c	t _r		-	25	40	
Turn-Off Delay Time ^c	t _{d(off)}		-	110	200	
Fall Time ^c	t _f		-	50	100	
Drain-Source Body Diode Characteristics (T _C = 25 °C ^b)						
Continuous Current	I _S		-	-	-130	A
Pulsed Current	I _{SM}		-	-	-390	
Forward Voltage ^a	V _{SD}	I _F = -85 A, V _{GS} = 0 V	-	-1	-1.5	V
Reverse Recovery Time	t _{rr}	I _F = -85 A, dI/dt = 100 A/μs	-	91	137	ns
Peak Reverse Recovery Charge	I _{RM(REC)}		-	-6	-9	A
Reverse Recovery Charge	Q _{rr}		-	0.21	0.44	μC

Notes

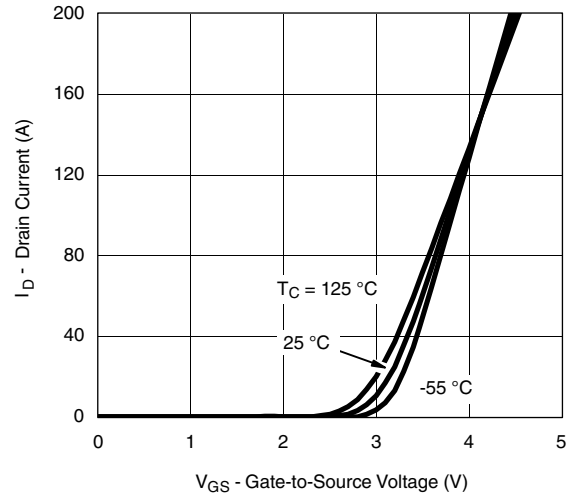
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.
 c. Independent of operating temperature.

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.

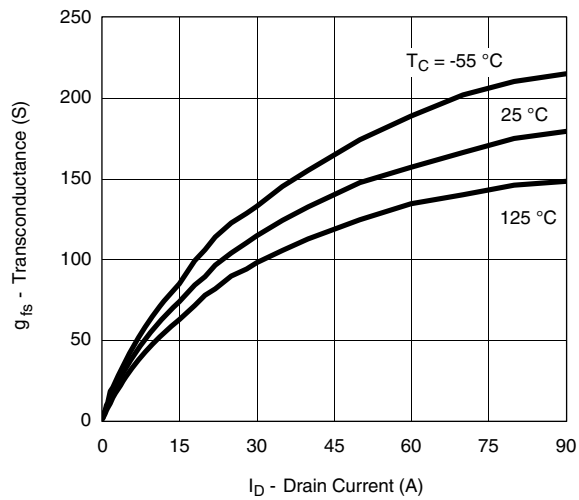
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



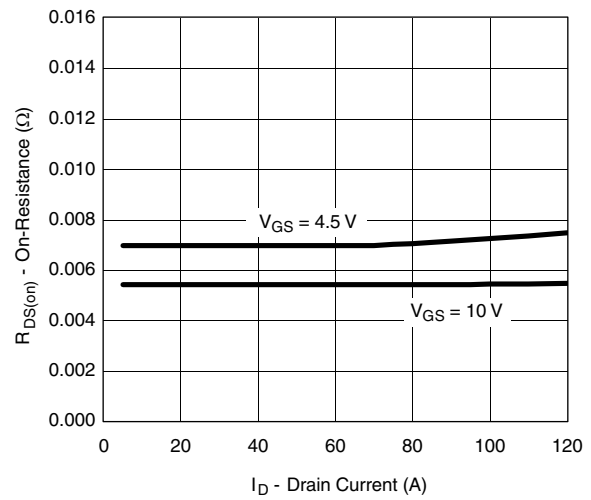
Output Characteristics



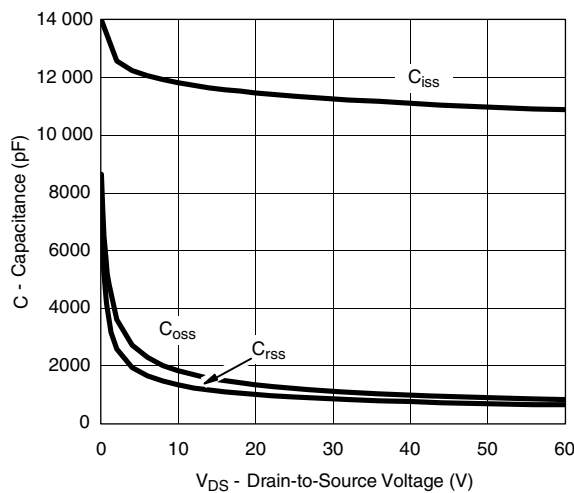
Transfer Characteristics



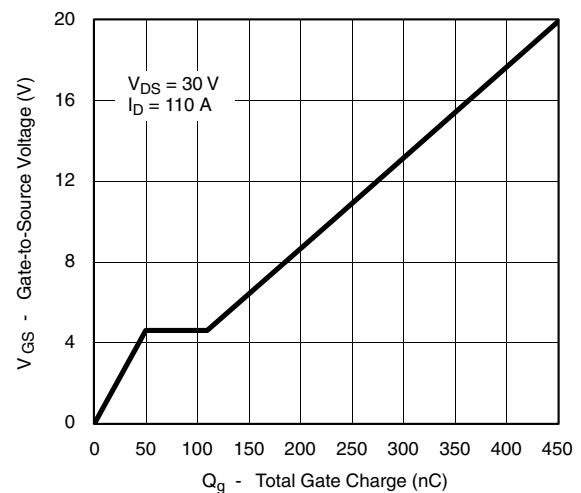
Transconductance



On-Resistance vs. Drain Current

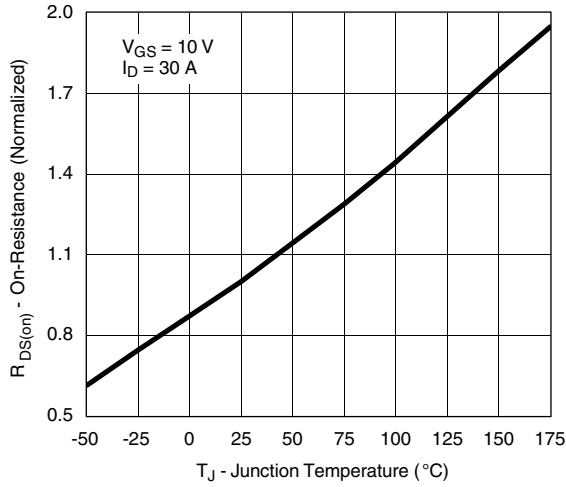


Capacitance

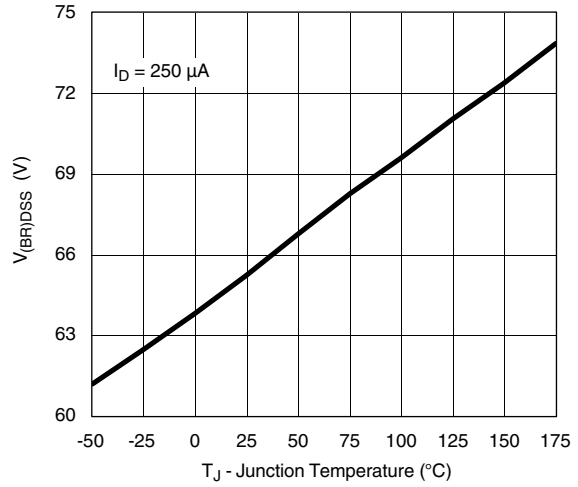


Gate Charge

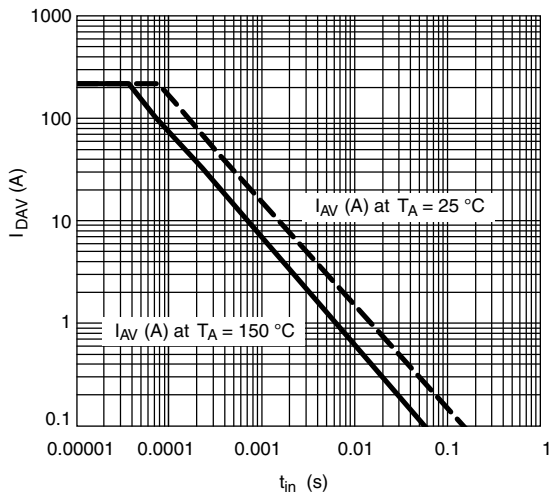
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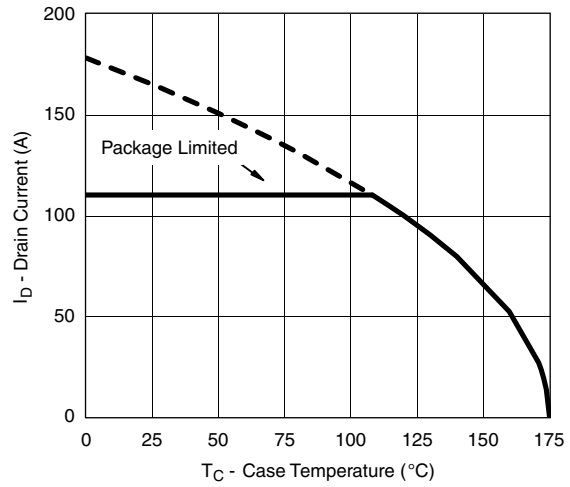
On-Resistance vs. Junction Temperature



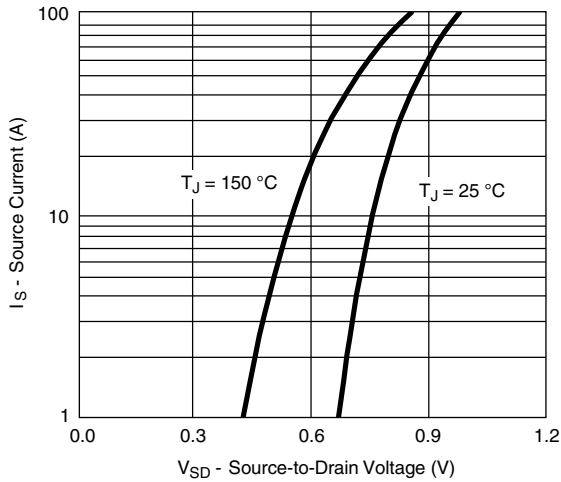
Drain Source Breakdown vs. Junction Temperature



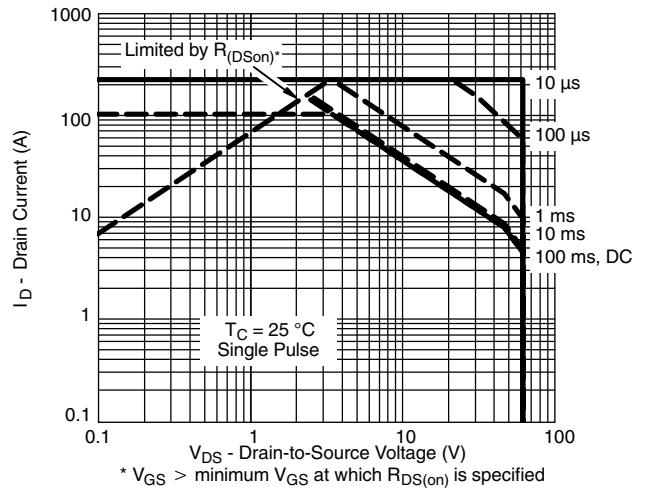
Avalanche Current vs. Time



Maximum Avalanche and Drain Current vs. Case Temperature

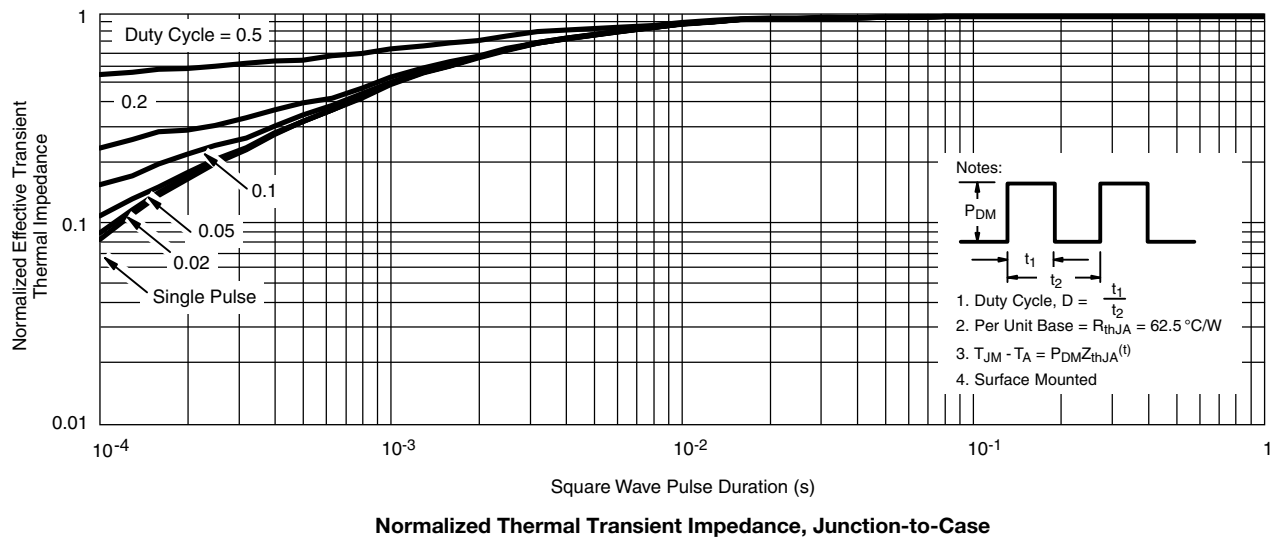


Source-Drain Diode Forward Voltage

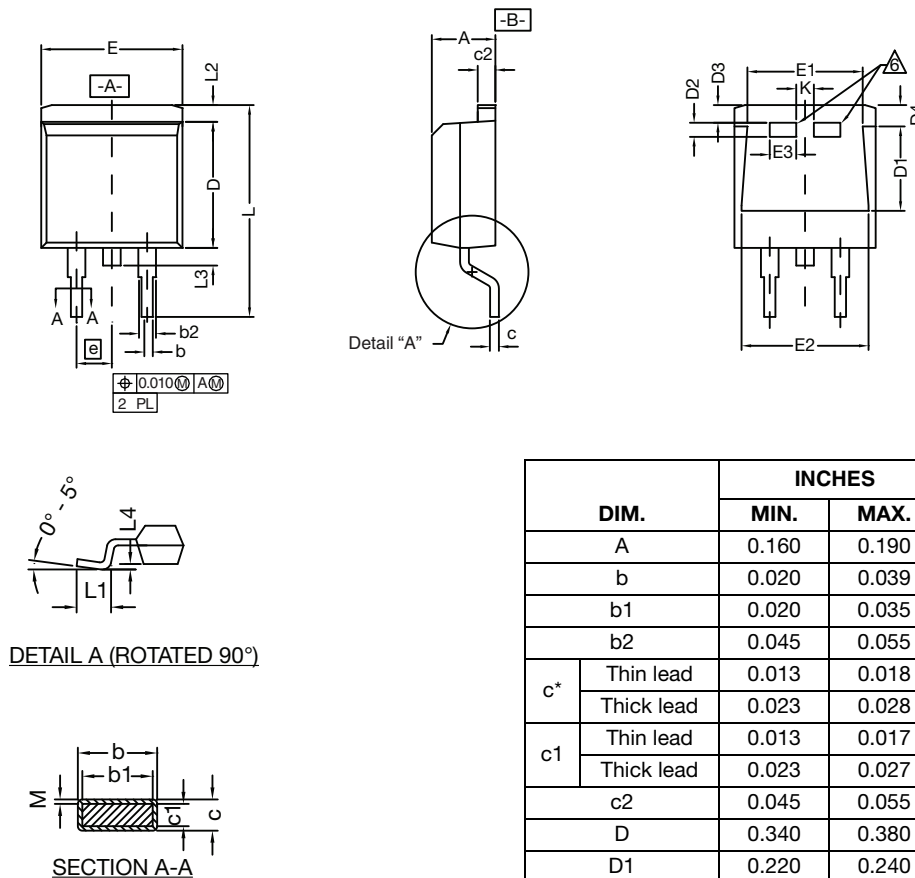


Safe Operating Area

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)




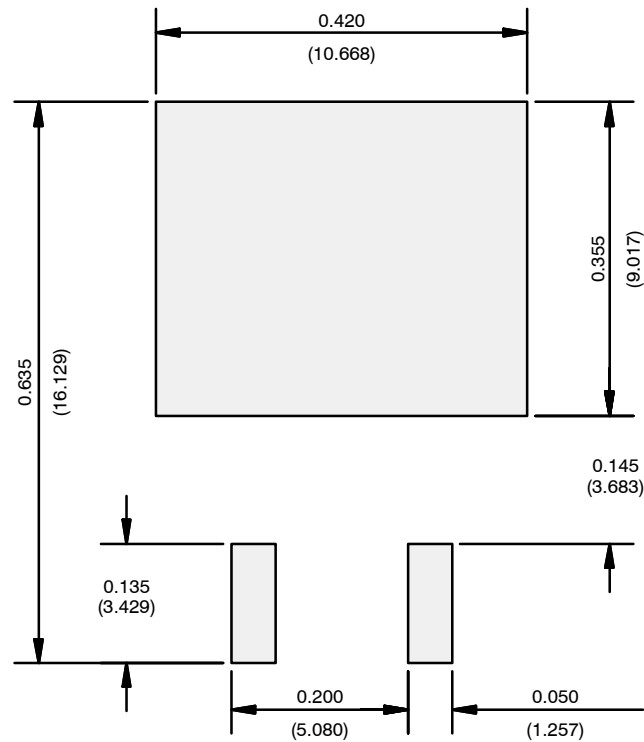
TO-263 (D²PAK): 3-LEAD



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.

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead

Recommended Minimum Pads
Dimensions in Inches/(mm)

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