

BBS3002-VB Datasheet

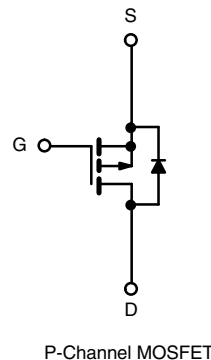
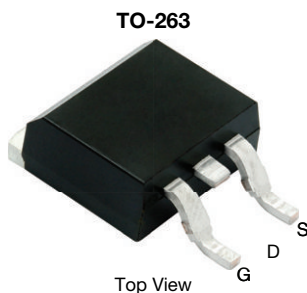
P-Channel 60 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^d
-60	0.0050 at $V_{GS} = -10$ V	-120
	0.0070 at $V_{GS} = -4.5$ V	

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	-120	A
	$T_C = 125\text{ }^\circ\text{C}$		-95	
Pulsed Drain Current		I_{DM}	-350	
Avalanche Current		I_{AS}	-75	
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.

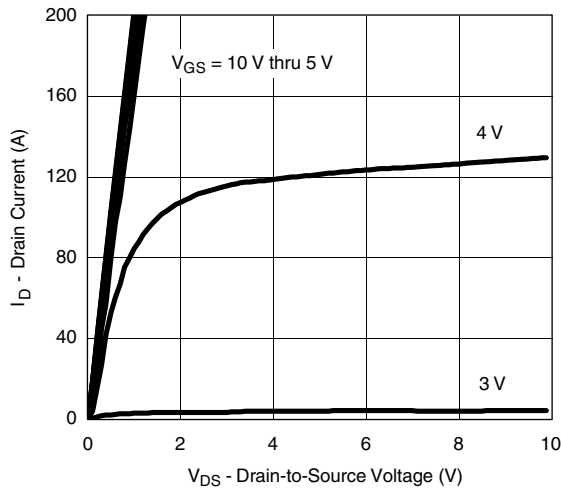
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = -250 μA	-60	-	-	V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250 μA	-1	-	-3	
Gate-Body Leakage	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	-	0.0050	-	Ω
		V _{GS} = -10 V, I _D = -30 A, T _J = 125 °C	-	0.0115	-	
		V _{GS} = -10 V, I _D = -30 A, T _J = 175 °C	-	0.0138	-	
		V _{GS} = -4.5 V, I _D = -20 A	-	0.0070	-	
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	-	11 400	-	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		-	-	-110	A
Pulsed Current	I _{SM}		-	-	-240	
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

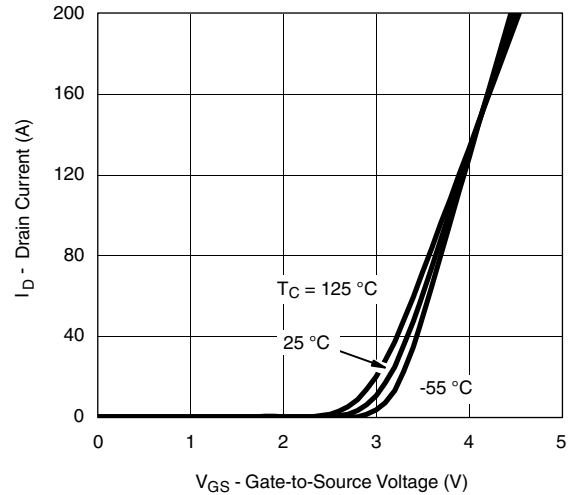
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.
 c. Independent of operating temperature.

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.

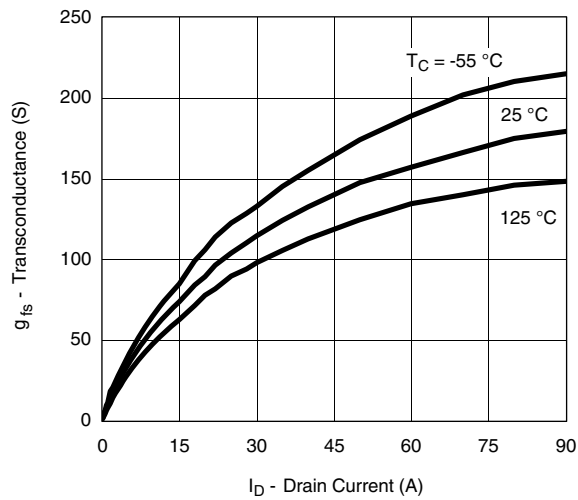
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



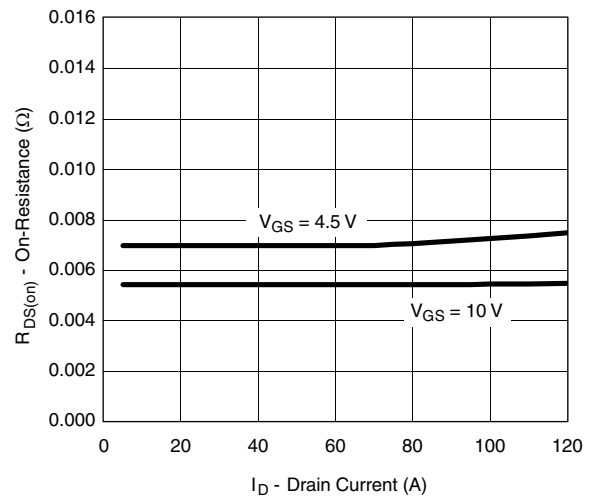
Output Characteristics



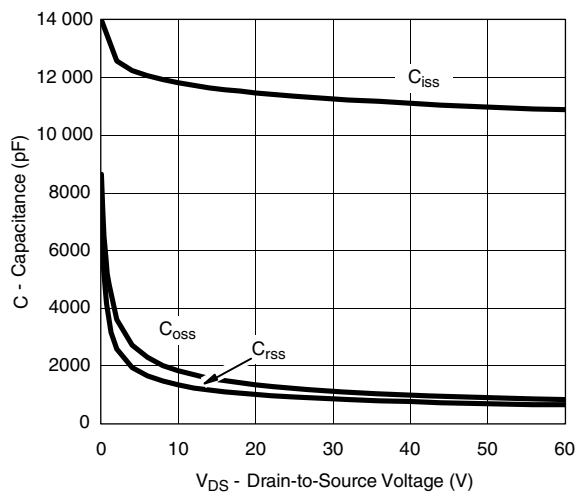
Transfer Characteristics



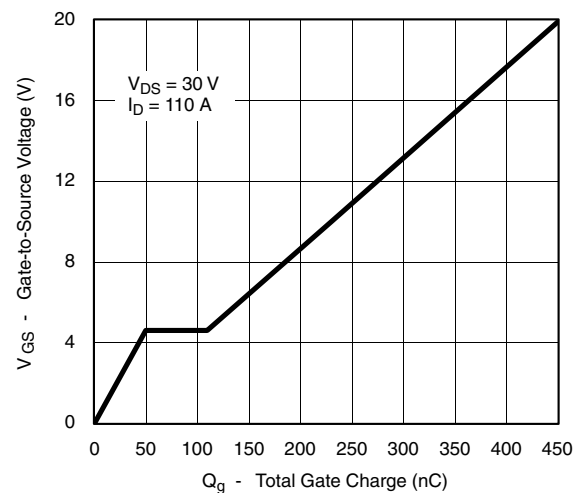
Transconductance



On-Resistance vs. Drain Current

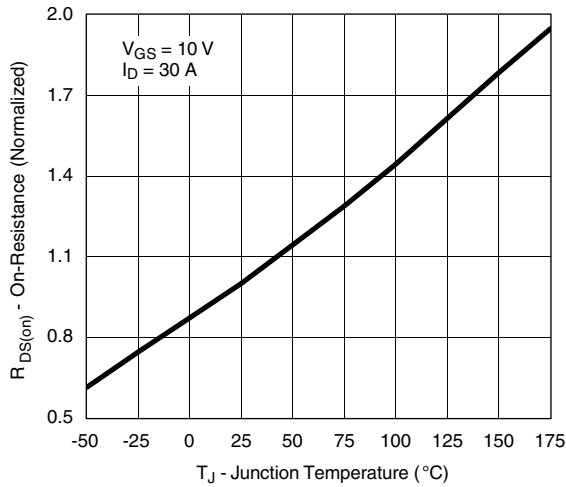


Capacitance

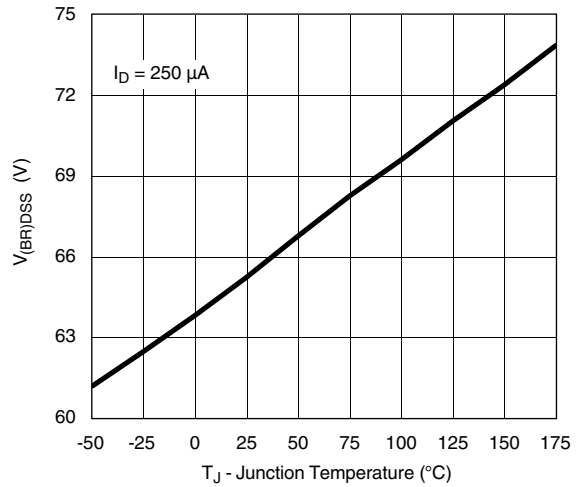


Gate Charge

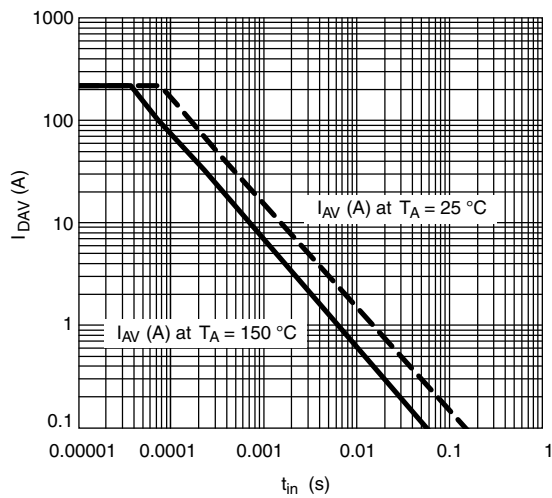
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



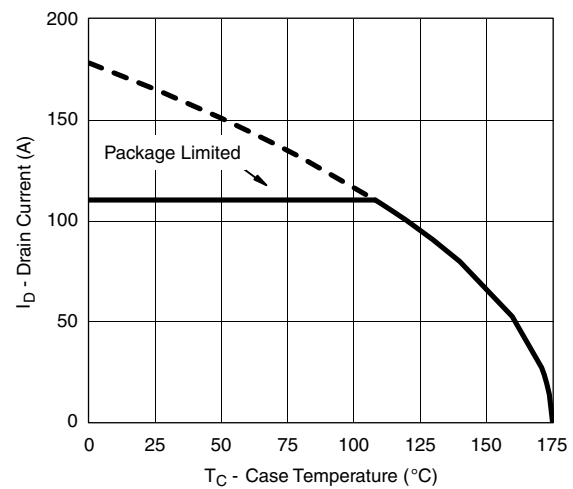
On-Resistance vs. Junction Temperature



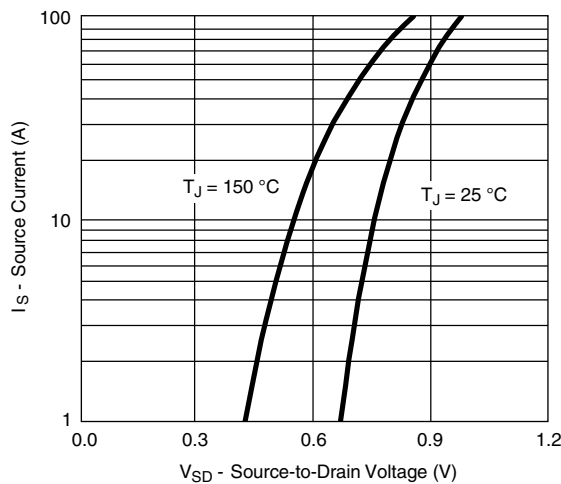
Drain Source Breakdown vs. Junction Temperature



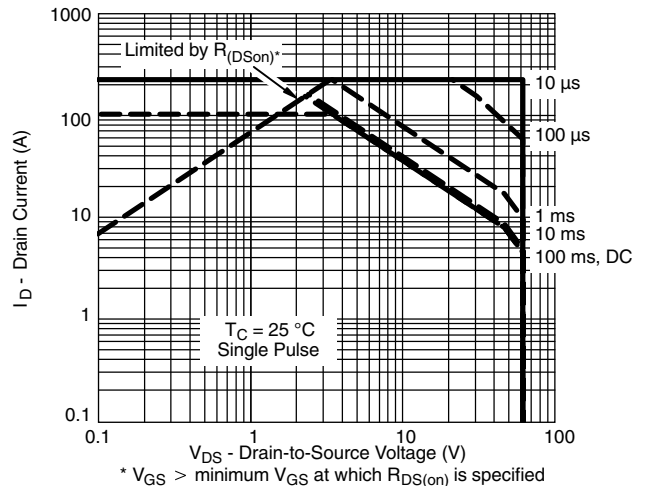
Avalanche Current vs. Time



Maximum Avalanche and Drain Current vs. Case Temperature

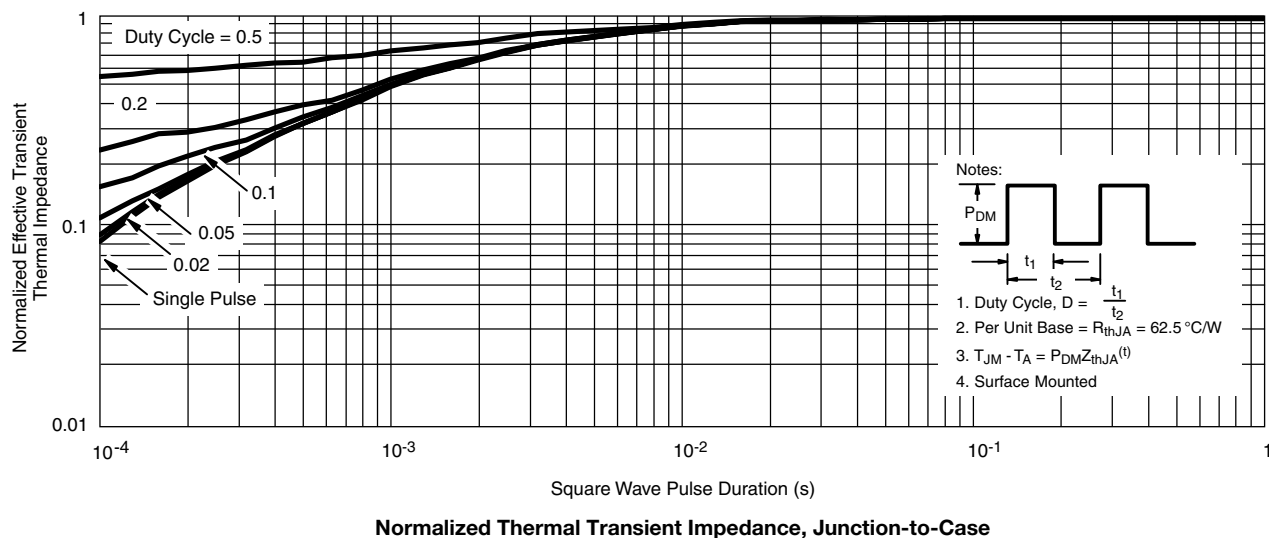


Source-Drain Diode Forward Voltage

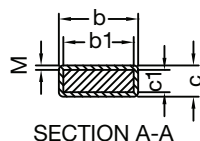
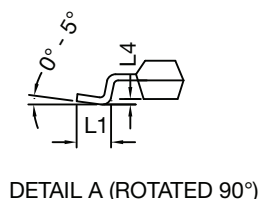
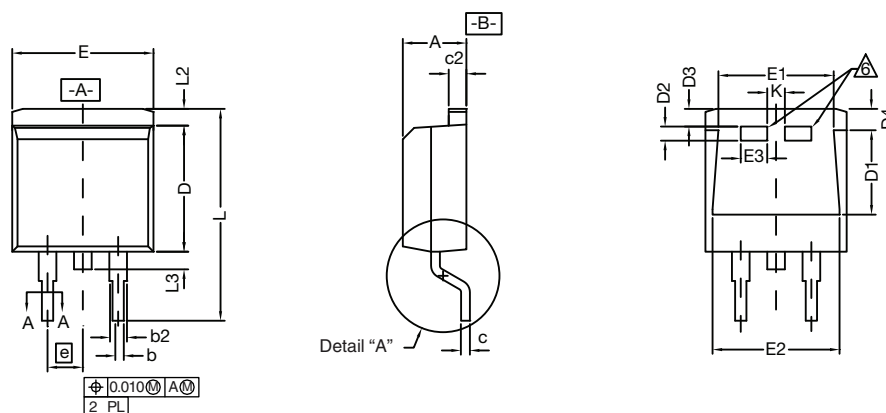


Safe Operating Area

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)




TO-263 (D²PAK): 3-LEAD

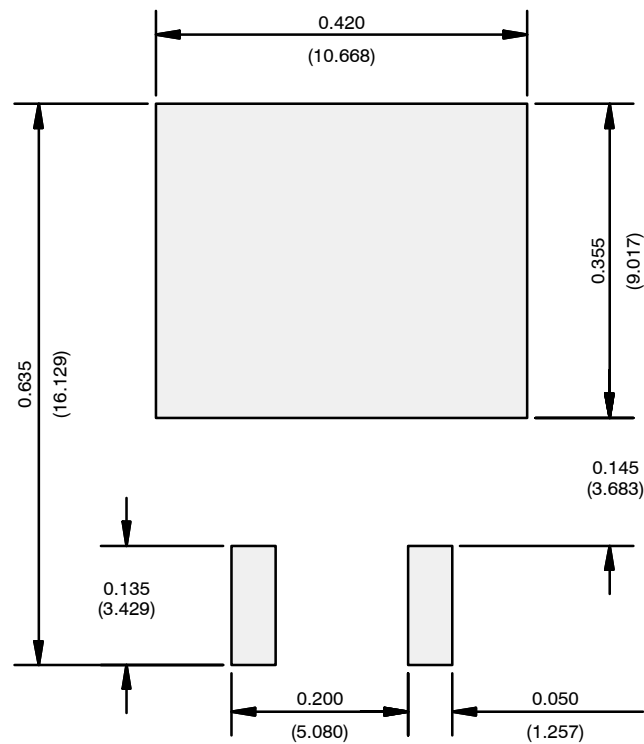


DIM.		INCHES		MILLIMETERS	
		MIN.	MAX.	MIN.	MAX.
A		0.160	0.190	4.064	4.826
b		0.020	0.039	0.508	0.990
b1		0.020	0.035	0.508	0.889
b2		0.045	0.055	1.143	1.397
c*	Thin lead	0.013	0.018	0.330	0.457
	Thick lead	0.023	0.028	0.584	0.711
c1	Thin lead	0.013	0.017	0.330	0.431
	Thick lead	0.023	0.027	0.584	0.685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

ECN: T13-0707-Rev. K, 30-Sep-13
DWG: 5843

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)

Disclaimer

All products due to improve reliability, function or design or for other reasons, product specifications and data are subject to change without notice.

Taiwan VBsemi Electronics Co., Ltd., branches, agents, employees, and all persons acting on its or their representatives (collectively, the "Taiwan VBsemi"), assumes no responsibility for any errors, inaccuracies or incomplete data contained in the table or any other any disclosure of any information related to the product.(www.VBsemi.com)

Taiwan VBsemi makes no guarantee, representation or warranty on the product for any particular purpose of any goods or continuous production. To the maximum extent permitted by applicable law on Taiwan VBsemi relinquished: (1) any application and all liability arising out of or use of any products; (2) any and all liability, including but not limited to special, consequential damages or incidental ; (3) any and all implied warranties, including a particular purpose, non-infringement and merchantability guarantee.

Statement on certain types of applications are based on knowledge of the product is often used in a typical application of the general product VBsemi Taiwan demand that the Taiwan VBsemi of. Statement on whether the product is suitable for a particular application is non-binding. It is the customer's responsibility to verify specific product features in the products described in the specification is appropriate for use in a particular application. Parameter data sheets and technical specifications can be provided may vary depending on the application and performance over time. All operating parameters, including typical parameters must be made by customer's technical experts validated for each customer application. Product specifications do not expand or modify Taiwan VBsemi purchasing terms and conditions, including but not limited to warranty herein.

Unless expressly stated in writing, Taiwan VBsemi products are not intended for use in medical, life saving, or life sustaining applications or any other application. Wherein VBsemi product failure could lead to personal injury or death, use or sale of products used in Taiwan VBsemi such applications using client did not express their own risk. Contact your authorized Taiwan VBsemi people who are related to product design applications and other terms and conditions in writing.

The information provided in this document and the company's products without a license, express or implied, by estoppel or otherwise, to any intellectual property rights granted to the VBsemi act or document. Product names and trademarks referred to herein are trademarks of their respective representatives will be all.

Material Category Policy

Taiwan VBsemi Electronics Co., Ltd., hereby certify that all of the products are determined to be oHS compliant and meets the definition of restrictions under Directive of the European Parliament 2011/65 / EU, 2011 Nian. 6. 8 Ri Yue restrict the use of certain hazardous substances in electrical and electronic equipment (EEE) - modification, unless otherwise specified as inconsistent.(www.VBsemi.com)

Please note that some documents may still refer to Taiwan VBsemi RoHS Directive 2002/95 / EC. We confirm that all products identified as consistent with the Directive 2002/95 / EC European Directive 2011/65 /.

Taiwan VBsemi Electronics Co., Ltd. hereby certify that all of its products comply identified as halogen-free halogen-free standards required by the JEDEC JS709A. Please note that some Taiwanese VBsemi documents still refer to the definition of IEC 61249-2-21, and we are sure that all products conform to confirm compliance with IEC 61249-2-21 standard level JS709A.