

## SUB85N02-06-GE3-VB Datasheet

### N-Channel 20-V (D-S), 175°C MOSFET



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

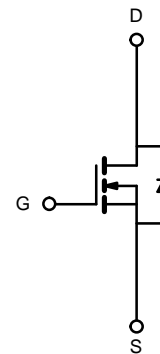
PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a</sup>
20	0.006 @ $V_{GS} = 4.5$ V	85
	0.009 @ $V_{GS} = 2.5$ V	85

#### FEATURES

- TrenchFET<sup>®</sup> Power MOSFET
- 100 %  $R_g$  and UIS Tested
- Compliant to RoHS Directive 2011/65/EU

#### APPLICATIONS

- OR-ing
- Server
- DC/DC



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	$V_{DS}$	20	V	
Gate-Source Voltage	$V_{GS}$	$\pm 12$		
Continuous Drain Current ( $T_J = 175^\circ\text{C}$ )	$I_D$	$T_C = 25^\circ\text{C}$	85 <sup>a</sup>	A
		$T_C = 100^\circ\text{C}$	75	
Pulsed Drain Current	$I_{DM}$	240		
Avalanche Current	$I_{AR}$	30		
Repetitive Avalanche Energy <sup>b</sup>	$E_{AR}$	45	mJ	
Power Dissipation	$P_D$	120 <sup>a</sup>	W	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 175	$^\circ\text{C}$	

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	Limit	Unit	
Junction-to-Ambient	$R_{thJA}$	PCB Mount (TO-263) <sup>c</sup>	40	$^\circ\text{C/W}$
		Free Air (TO-220AB)	62.5	
Junction-to-Case	$R_{thJC}$	1.25		

Notes:

- See SOA curve for voltage derating.
- Duty cycle  $\leq 1\%$ .
- When mounted on 1" square PCB (FR-4 material).

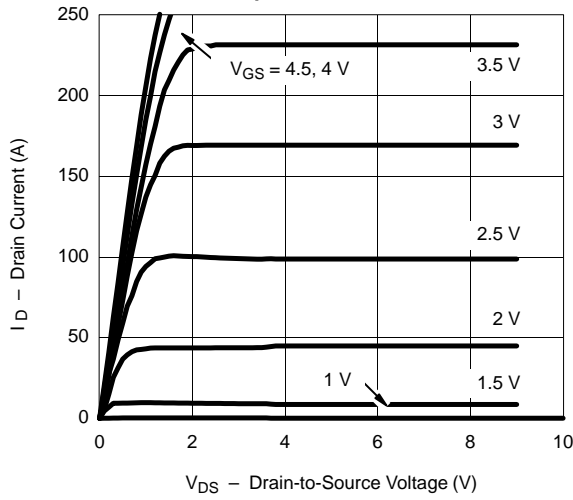
<b>MOSFET SPECIFICATIONS (T<sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)</b>						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	20			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>DS</sub> = 250 μA	0.6			
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 12 V			± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			50	
		V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 175 °C			150	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = 5 V, V <sub>GS</sub> = 4.5 V	120			A
Drain-Source On-State Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 30 A		0.006		Ω
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 30 A, T <sub>J</sub> = 125 °C		0.009		
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 30 A, T <sub>J</sub> = 175 °C		0.0111		
		V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 20 A		0.009		
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 30 A	20			S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 20 V, f = 1 MHz		6600		pF
Output Capacitance	C <sub>oss</sub>			1150		
Reversen Transfer Capacitance	C <sub>riss</sub>			600		
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 85 A		65	130	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>			13		
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			14		
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 10 V, R <sub>L</sub> = 0.12 Ω I <sub>D</sub> = 85 A, V <sub>GEN</sub> = 4.5 V, R <sub>G</sub> = 2.5 Ω		25	40	ns
Rise Time <sup>c</sup>	t <sub>r</sub>			120	180	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			80	120	
Fall Time <sup>c</sup>	t <sub>f</sub>			100	150	
<b>Source-Drain Diode Ratings and Characteristics (T<sub>C</sub> = 25 °C)<sup>b</sup></b>						
Pulsed Current	I <sub>SM</sub>				240	A
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = 100 A, V <sub>GS</sub> = 0 V		1.2	1.5	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 50 A, di/dt = 100 A/μs		45	100	ns

## Notes:

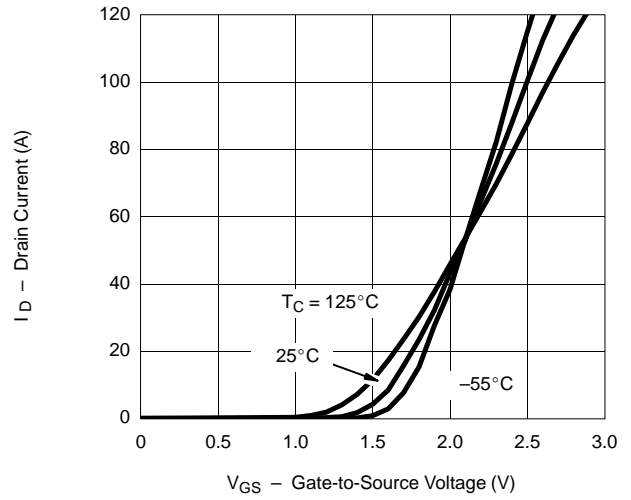
- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

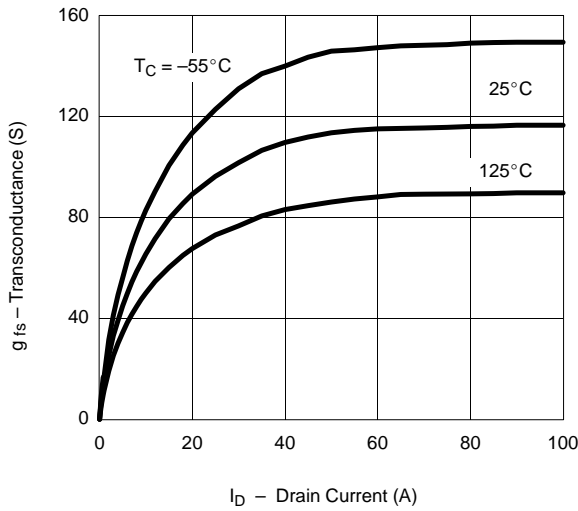
**Output Characteristics**



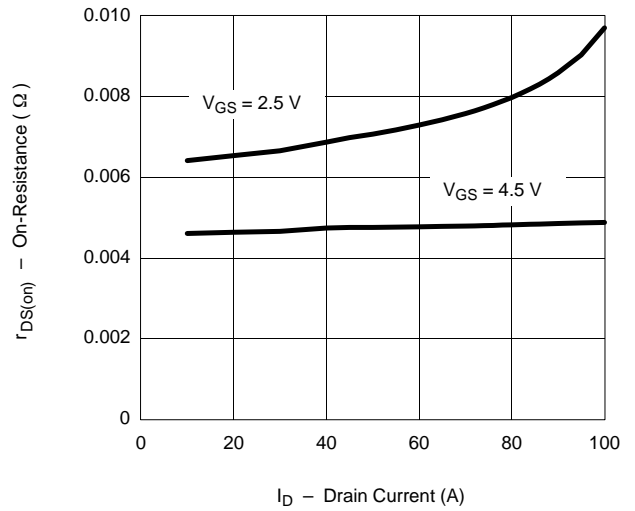
**Transfer Characteristics**



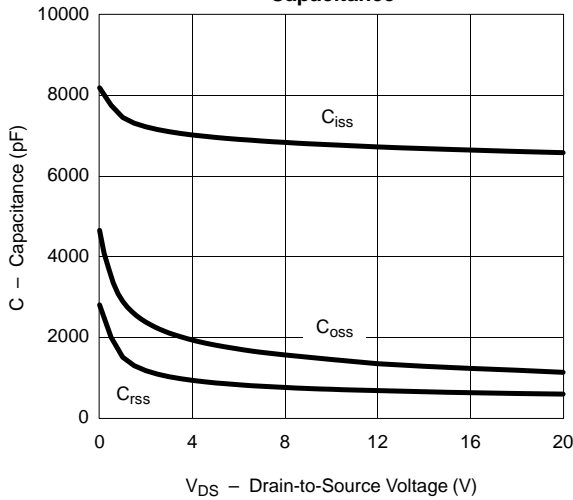
**Transconductance**



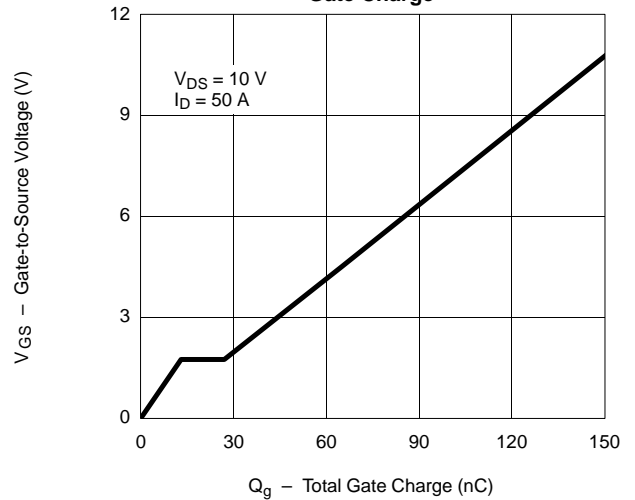
**On-Resistance vs. Drain Current**



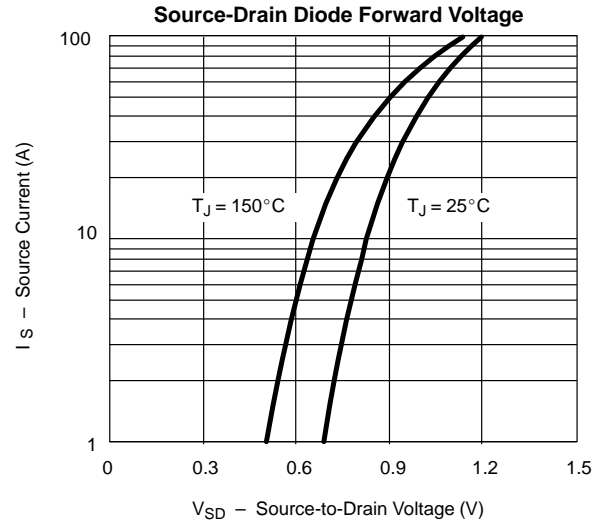
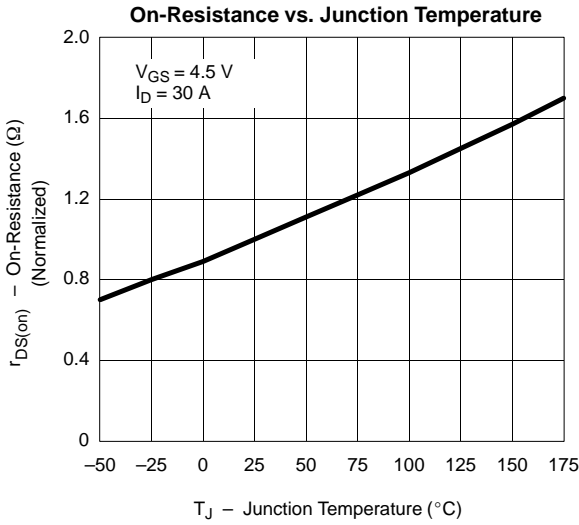
**Capacitance**



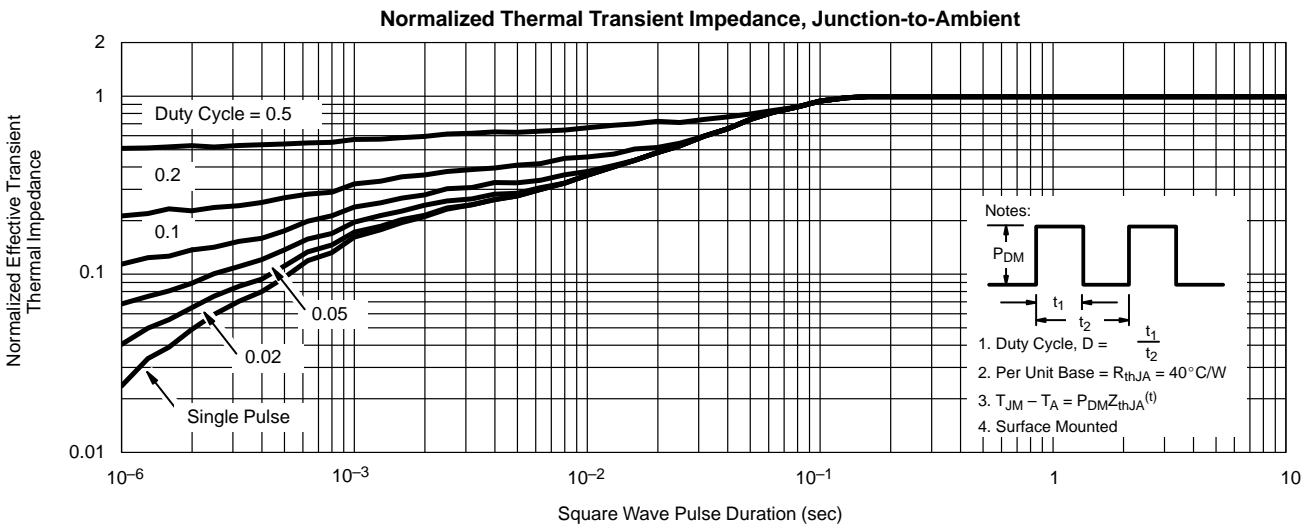
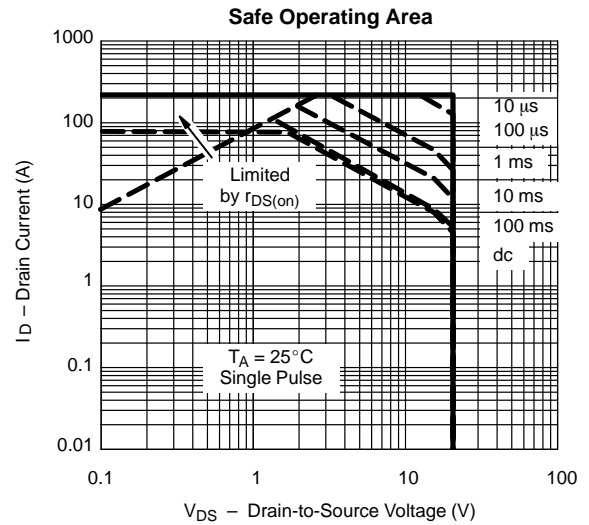
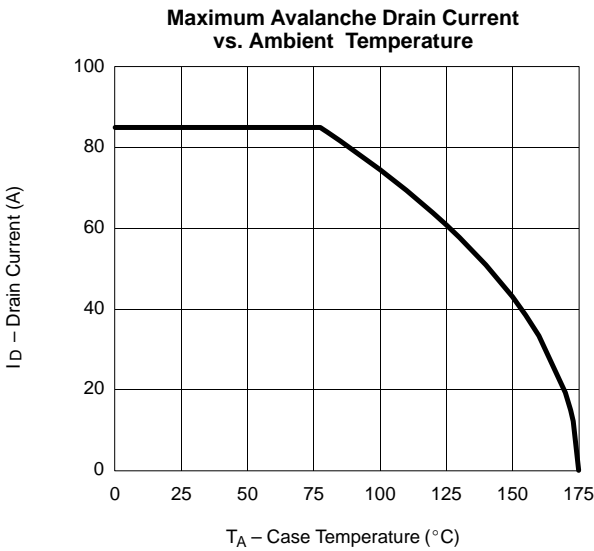
**Gate Charge**



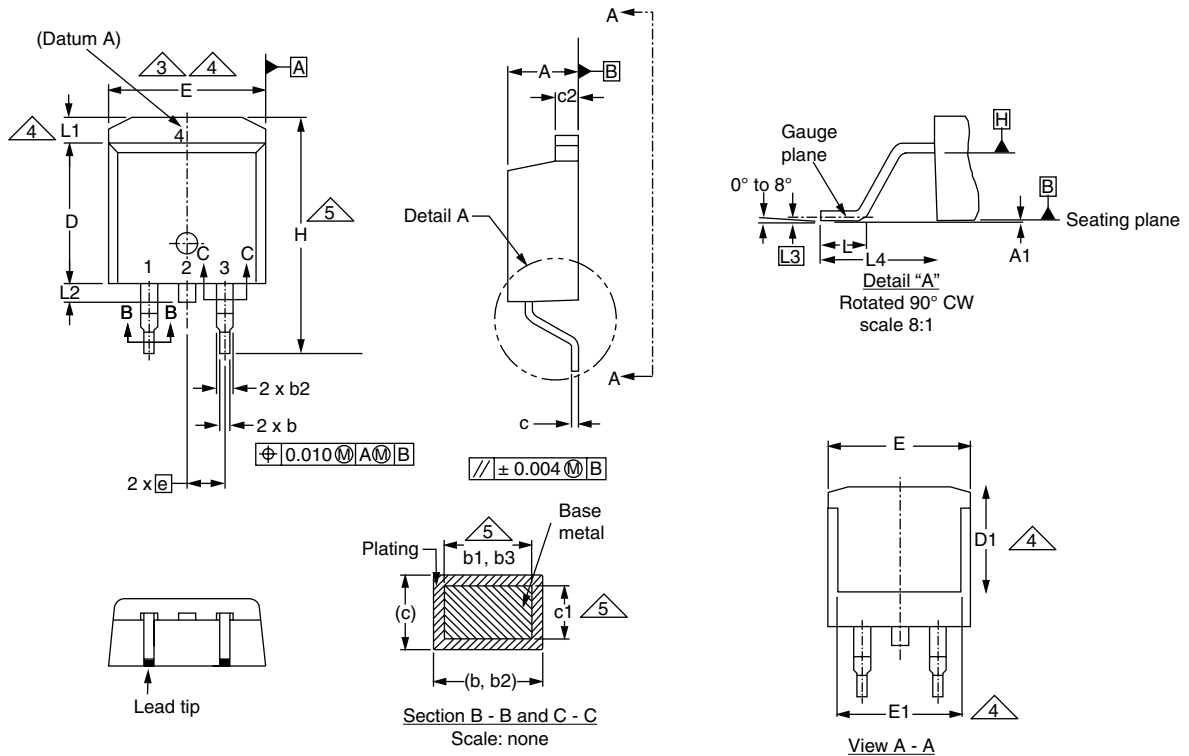
**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**



**THERMAL RATINGS**



**TO-263AB (HIGH VOLTAGE)**



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.06	4.83	0.160	0.190
A1	0.00	0.25	0.000	0.010
b	0.51	0.99	0.020	0.039
b1	0.51	0.89	0.020	0.035
b2	1.14	1.78	0.045	0.070
b3	1.14	1.73	0.045	0.068
c	0.38	0.74	0.015	0.029
c1	0.38	0.58	0.015	0.023
c2	1.14	1.65	0.045	0.065
D	8.38	9.65	0.330	0.380

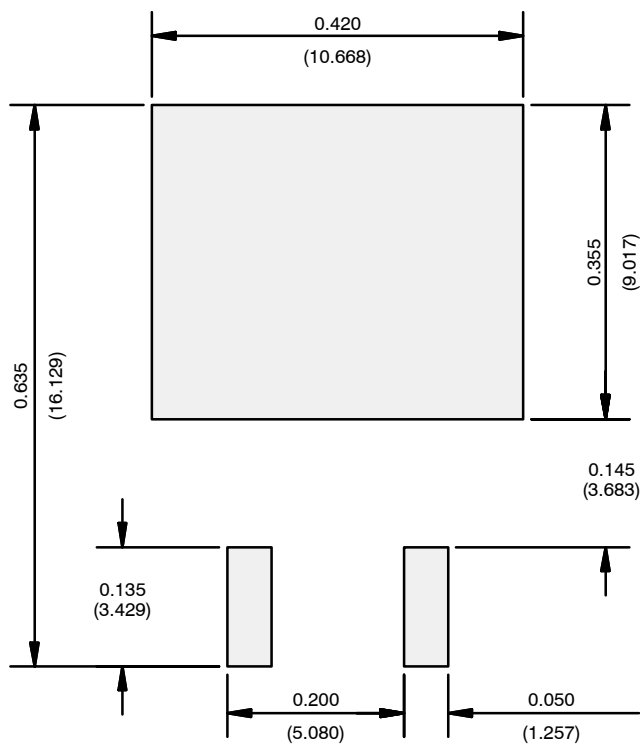
DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
D1	6.86	-	0.270	-
E	9.65	10.67	0.380	0.420
E1	6.22	-	0.245	-
e	2.54 BSC		0.100 BSC	
H	14.61	15.88	0.575	0.625
L	1.78	2.79	0.070	0.110
L1	-	1.65	-	0.066
L2	-	1.78	-	0.070
L3	0.25 BSC		0.010 BSC	
L4	4.78	5.28	0.188	0.208

ECN: S-82110-Rev. A, 15-Sep-08  
DWG: 5970

**Notes**

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Dimensions are shown in millimeters (inches).
3. Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body at datum A.
4. Thermal PAD contour optional within dimension E, L1, D1 and E1.
5. Dimension b1 and c1 apply to base metal only.
6. Datum A and B to be determined at datum plane H.
7. Outline conforms to JEDEC outline to TO-263AB.

**RECOMMENDED MINIMUM PADS FOR D<sup>2</sup>PAK: 3-Lead**



Recommended Minimum Pads  
Dimensions in Inches/(mm)

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