

IPB048N15N5LFATMA1-VB Datasheet

N-Channel 150 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω) MAX.	I_D (A)	Q_g (TYP.)
150	0.005at $V_{GS} = 10$ V	140	72nC

FEATURES

- SGT technology Power MOSFET
- 100 % R_g and UIS tested
- Maximum 175 °C junction temperature

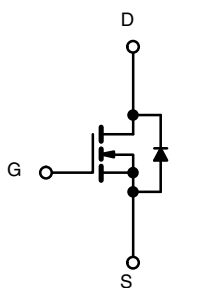


RoHS
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TO-263



Top View



N-Channel MOSFET

APPLICATIONS

- Power supplies:
 - Uninterruptible power supplies
 - AC/DC switch-mode power supplies
 - Lighting
- Synchronous rectification
- DC/DC converter
- Motor drive switch
- DC/AC inverter
- Solar micro inverter
- Class D audio amplifier

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150$ °C)	I_D	$T_C = 25$ °C	A
		$T_C = 70$ °C	
Pulsed Drain Current ($t = 100$ μ s)	I_{DM}	420	
Avalanche Current	I_{AS}	130	
Single Avalanche Energy ^a	E_{AS}	880	mJ
Maximum Power Dissipation ^a	P_D	$T_C = 25$ °C	W
		$T_C = 100$ °C	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +175	°C

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient (PCB Mount) ^c	R_{thJA}	40	°C/W
Junction-to-Case (Drain)	R_{thJC}	0.5	

Notes

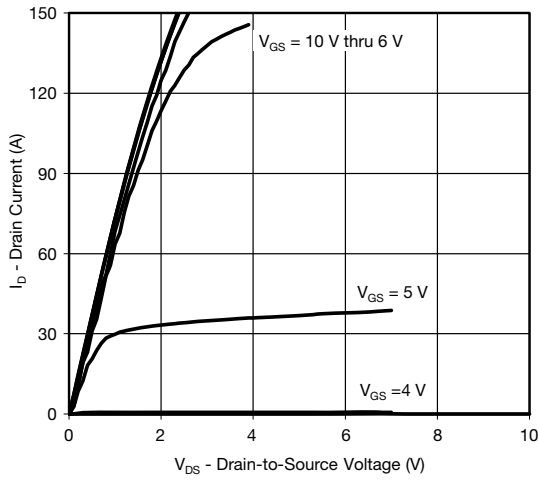
- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR4 material).

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	150	-	-	V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2.5	-	4.5	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V	-	-	± 250	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 150 V, V _{GS} = 0 V	-	-	1	μA
		V _{DS} = 150 V, V _{GS} = 0 V, T _J = 125 °C	-	-	150	
		V _{DS} = 150 V, V _{GS} = 0 V, T _J = 175 °C	-	-	5	mA
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 10 V, V _{GS} = 10 V	90	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 30 A	-	0.007	-	Ω
		V _{GS} = 7.5 V, I _D =30 A	-	0.015	-	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 30 A	-	75	-	S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 60 V, f = 1 MHz	-	9900	-	pF
Output Capacitance	C _{oss}		-	246	-	
Reverse Transfer Capacitance	C _{rss}		-	21	-	
Total Gate Charge ^c	Q _g	V _{DS} = 60 V, V _{GS} = 10 V, I _D = 60 A	-	90	96	nC
Gate-Source Charge ^c	Q _{gs}		-	16.7	-	
Gate-Drain Charge ^c	Q _{gd}		-	16.9	-	
Gate Resistance	R _g	f = 1 MHz	1.5	3	6	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 60 V, R _L = 1.66 Ω I _D ≅ 60 A, V _{GEN} = 10 V, R _g = 1 Ω	-	22	31	ns
Rise Time ^c	t _r		-	113	225	
Turn-Off Delay Time ^c	t _{d(off)}		-	35	75	
Fall Time ^c	t _f		-	93	134	
Drain-Source Body Diode Ratings and Characteristics ^b (T _C = 25 °C)						
Pulsed Current (t = 100 μs)	I _{SM}		-	-	420	A
Forward Voltage ^a	V _{SD}	I _F = 10 A, V _{GS} = 0 V	-	0.8	1.2	V
Reverse Recovery Time	t _{rr}	I _F = 30 A, di/dt = 100 A/μs	-	240	490	ns
Peak Reverse Recovery Charge	I _{RM(REC)}		-	11	20	A
Reverse Recovery Charge	Q _{rr}		-	0.9	1.8	μC

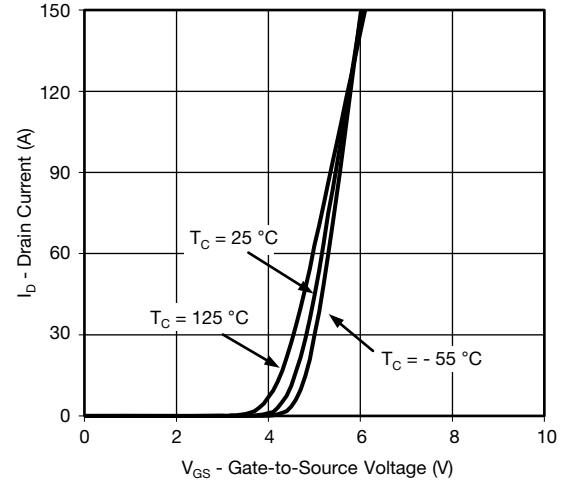
Notes

- 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.

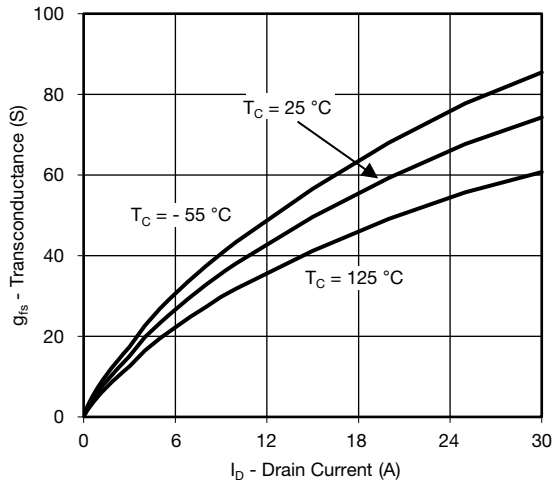
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



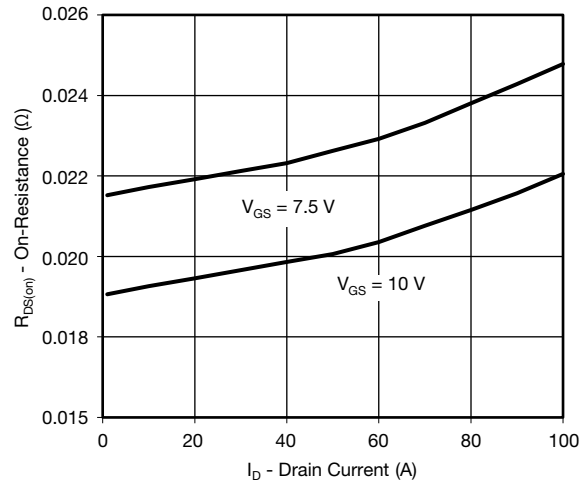
Output Characteristics



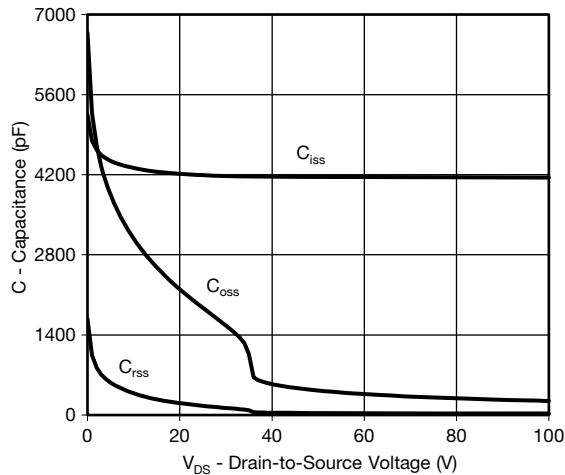
Transfer Characteristics



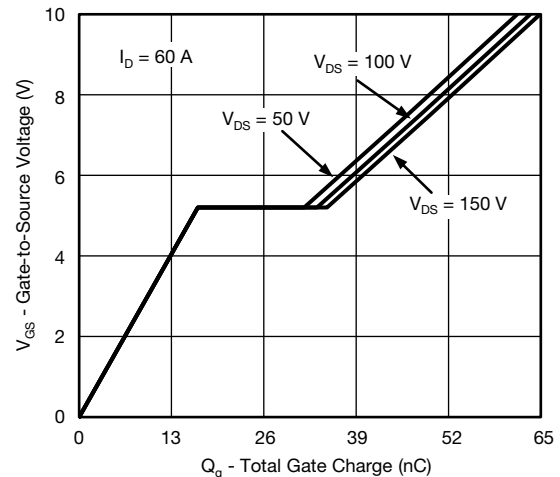
Transconductance



On-Resistance vs. Drain Current

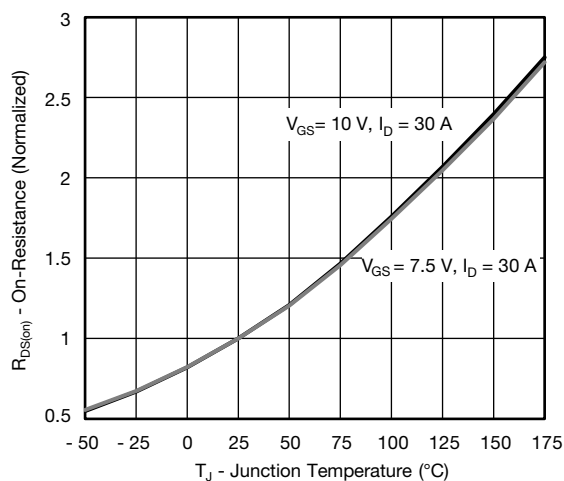


Capacitance

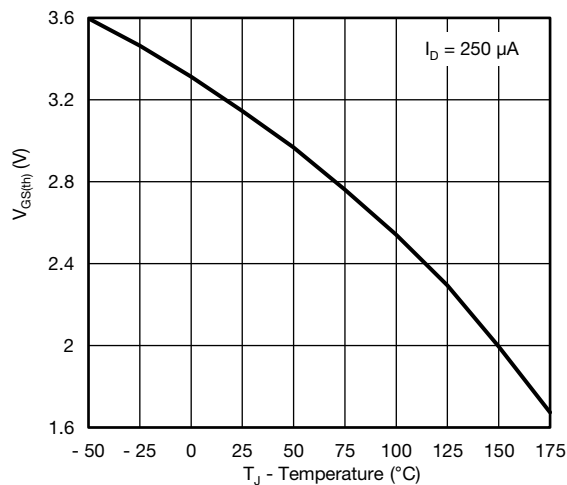


Gate Charge

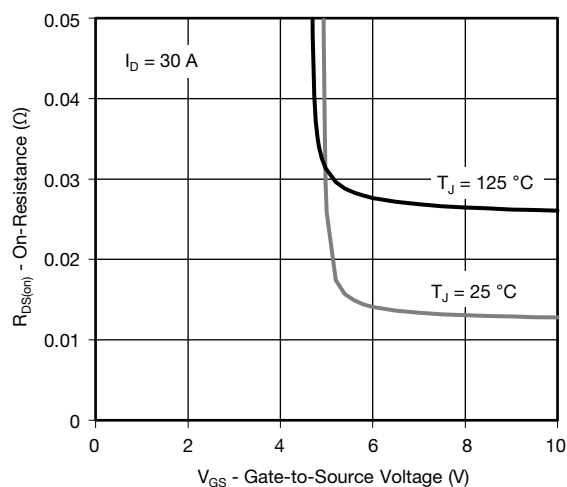
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



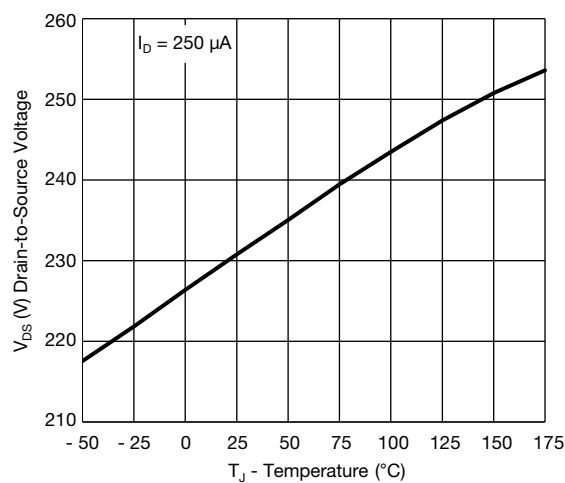
On-Resistance vs. Junction Temperature



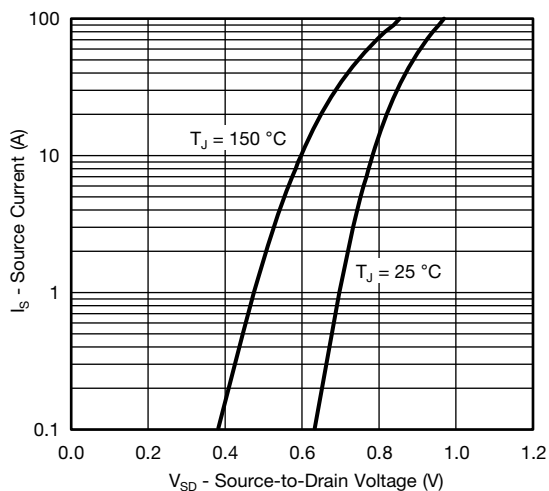
Threshold Voltage



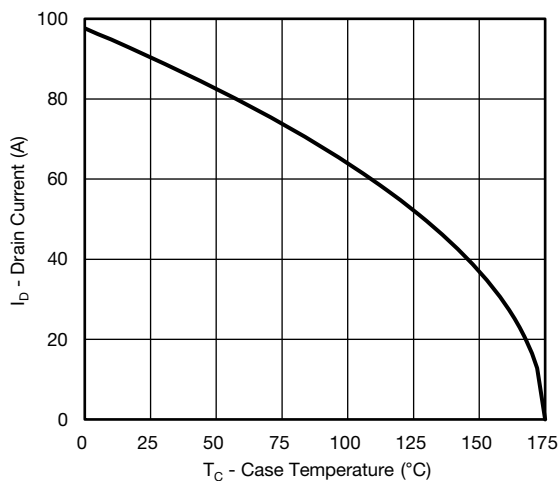
On-Resistance vs. Gate-to-Source Voltage



Drain Source Breakdown vs. Junction Temperature

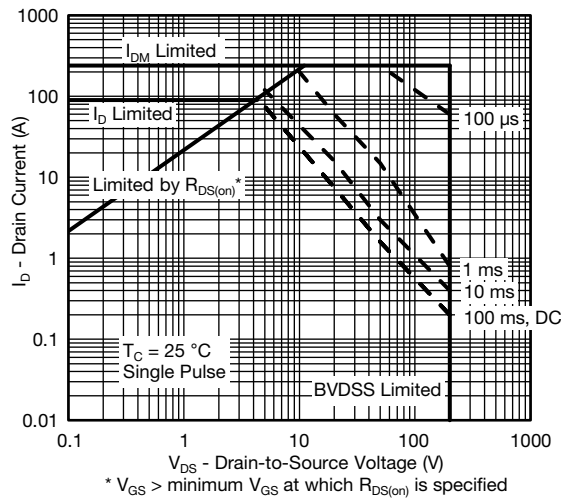


Source Drain Diode Forward Voltage

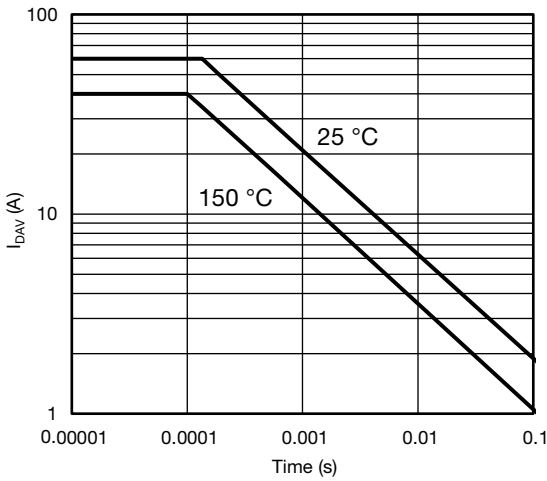


Current De-rating

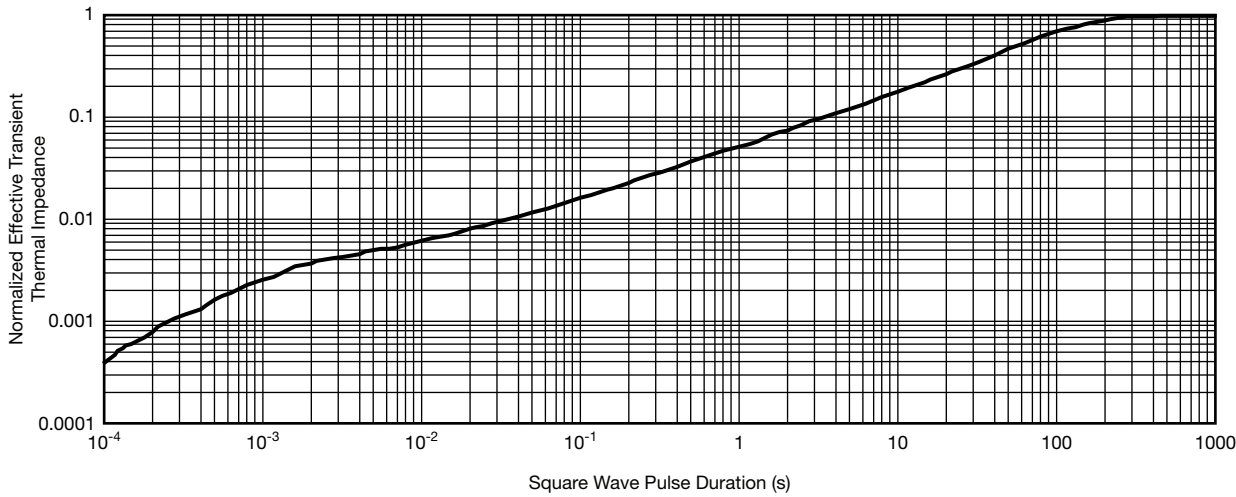
THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



Safe Operating Area

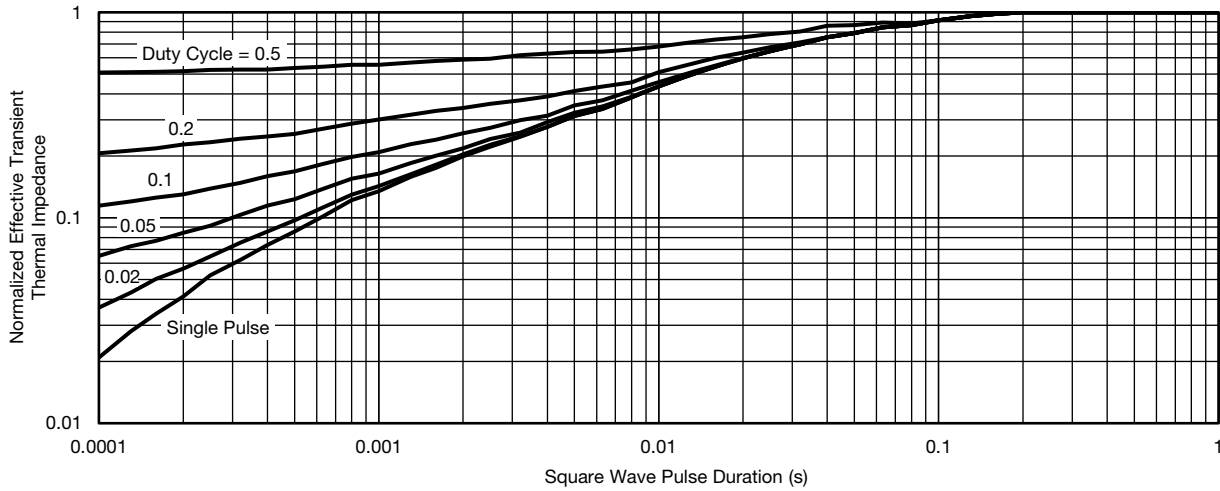


Single Pulse Avalanche Current Capability vs. Time



Normalized Thermal Transient Impedance, Junction-to-Ambient

THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Case

Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction to Ambient ($25\text{ }^{\circ}\text{C}$)
 - Normalized Transient Thermal Impedance Junction to Case ($25\text{ }^{\circ}\text{C}$)
- are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

Technical drawing of a mechanical part, likely a probe or stylus, showing multiple views and features.

Main View (Left): Shows the front view of the part. Key features include:

- Lead tip:** Indicated by an arrow pointing to the bottom center.
- Dimensions:** E (total width), D (total height), $L1$ (height from datum A to the top of the main body), $L2$ (height from datum A to the bottom of the main body), H (height from datum A to the top of the probe body), $2 \times b2$ (width of the probe body), and $2 \times b$ (width of the base).
- Feature Callouts:** 1, 2, 3, 4, 5 (feature numbers), A (Datum A), B (feature B), C (feature C), and $2 \times e$ (width of the base).
- Surface Finish:** $\sqrt{0.010} \text{ (A)} \text{ (B)}$ and $\sqrt{\pm 0.004} \text{ (B)}$.

Detail A (Right): A circular detail view of the lead tip area, showing a curved profile. Key features include:

- Dimensions:** A (width), $c2$ (width of the lead tip), and c (width of the base).
- Feature Callouts:** A (Datum A), B (feature B), and C (feature C).

Section B - B and C - C (Bottom Center): A cross-sectional view showing the internal structure. Key features include:

- Dimensions:** $b1, b3$ (widths), $c1$ (height), and $(b, b2)$ (width).
- Feature Callouts:** 5 (feature 5), Base metal, and Plating.

View A - A (Right): A side view of the part. Key features include:

- Dimensions:** E (total width), $D1$ (height), $L4$ (width), and $A1$ (width).
- Feature Callouts:** H (feature H), B (feature B), A1 (feature A1), and 4 (feature 4).
- Surface Finish:** $0^\circ \text{ to } 8^\circ$ (angle), $L3$ (width), and $L4$ (width).
- Text:** "Detail 'A' Rotated 90° CW scale 8:1".

	MILLIMETERS		INCHES	
DIM.	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

	MILLIMETERS		INCHES	
DIM.	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

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.

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