

NTB5D0N15MC-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 150°C junction temperature

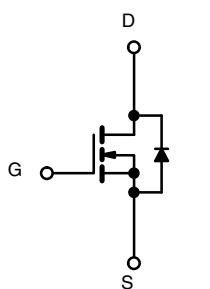


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TO-263



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	140	A
		110	
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	300 ^b	W
		150 ^b	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +150	°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

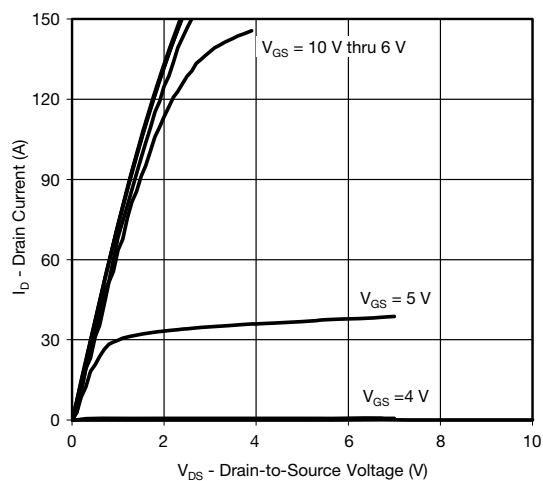
- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR4 material).

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 = 150 °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	-	0.005	-	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		-	20	35	
Turn-Off Delay Time ^c	t _{d(off)}		-	35	30	
Fall Time ^c	t _f		-	15	40	
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	-	25	-	ns
Peak Reverse Recovery Charge	I _{RM(REC)}		-	11	20	A
Reverse Recovery Charge	Q _{rr}		-	0.9	1.8	μC

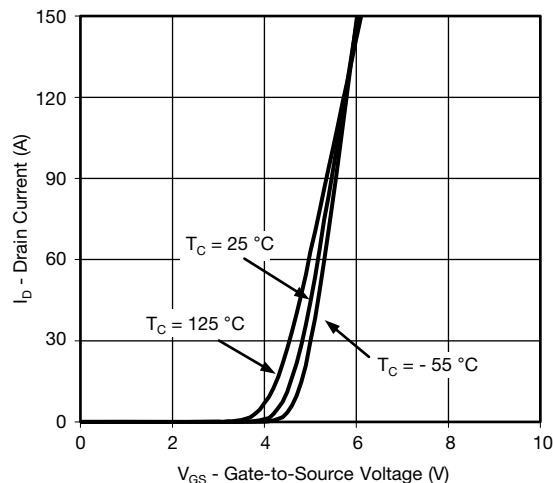
Notes

- 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.

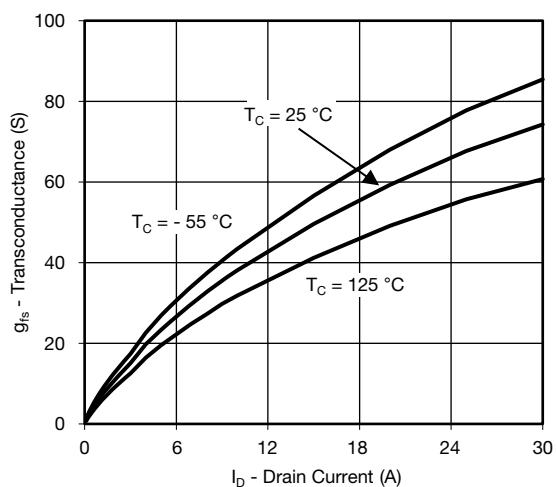
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



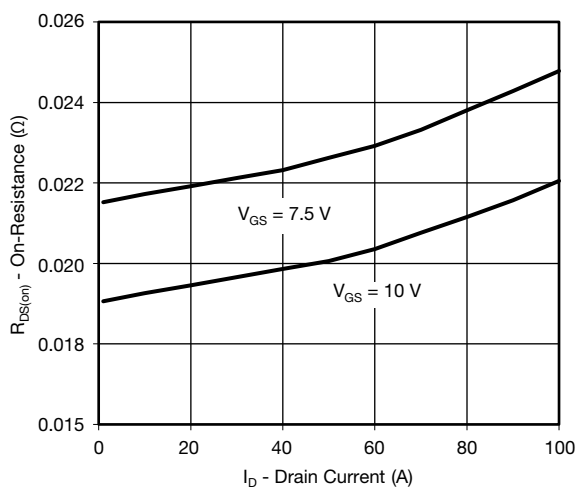
Output Characteristics



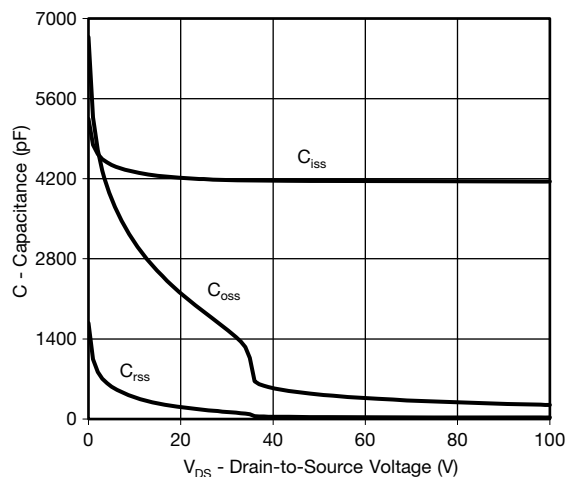
Transfer Characteristics



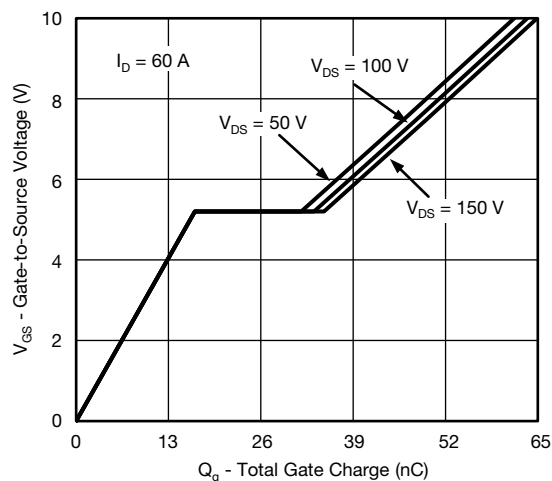
Transconductance



On-Resistance vs. Drain Current

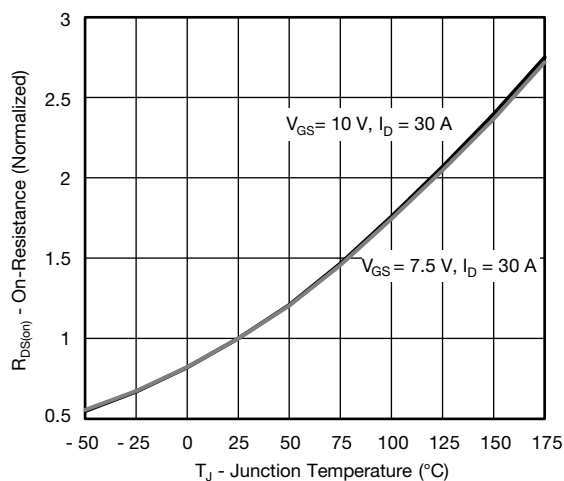


Capacitance

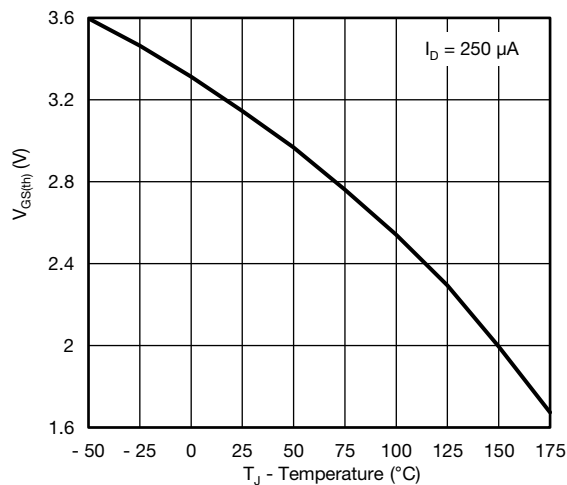


Gate Charge

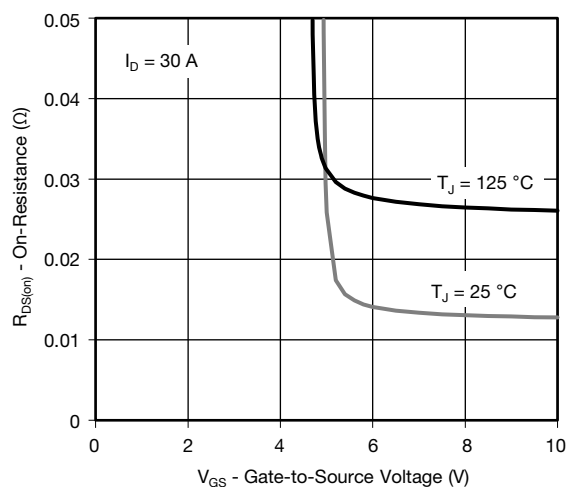
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



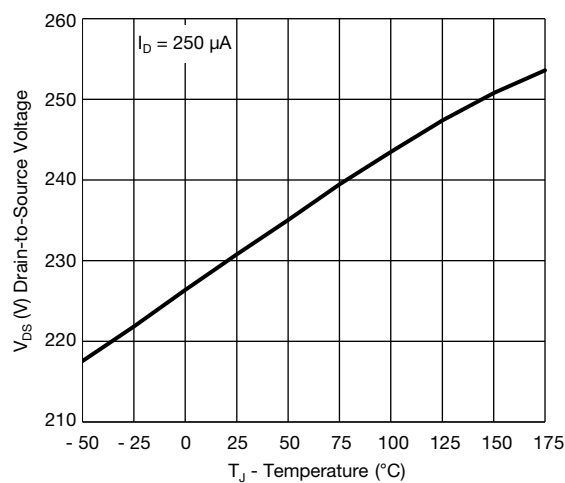
On-Resistance vs. Junction Temperature



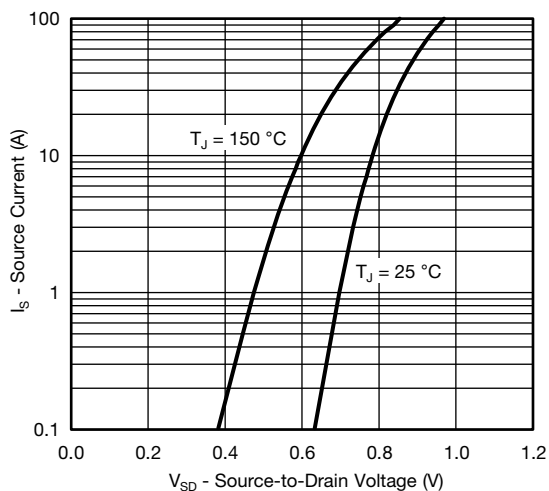
Threshold Voltage



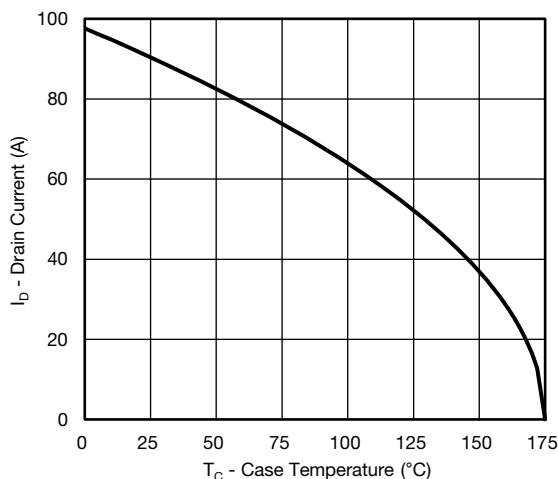
On-Resistance vs. Gate-to-Source Voltage



Drain Source Breakdown vs. Junction Temperature

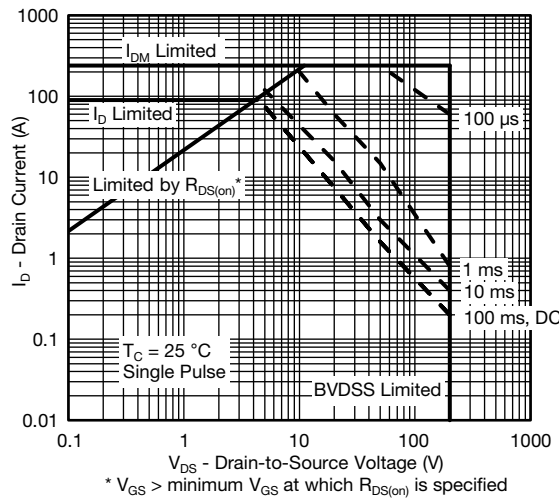


Source Drain Diode Forward Voltage

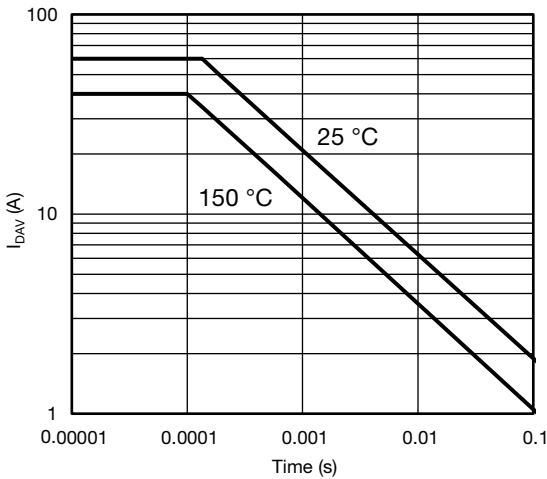


Current De-rating

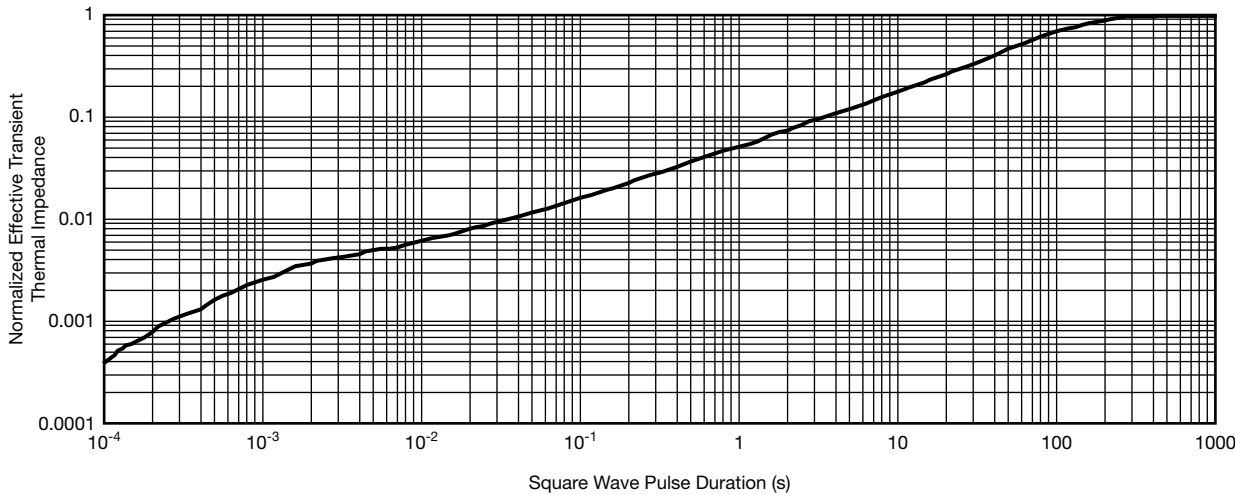
THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



Safe Operating Area

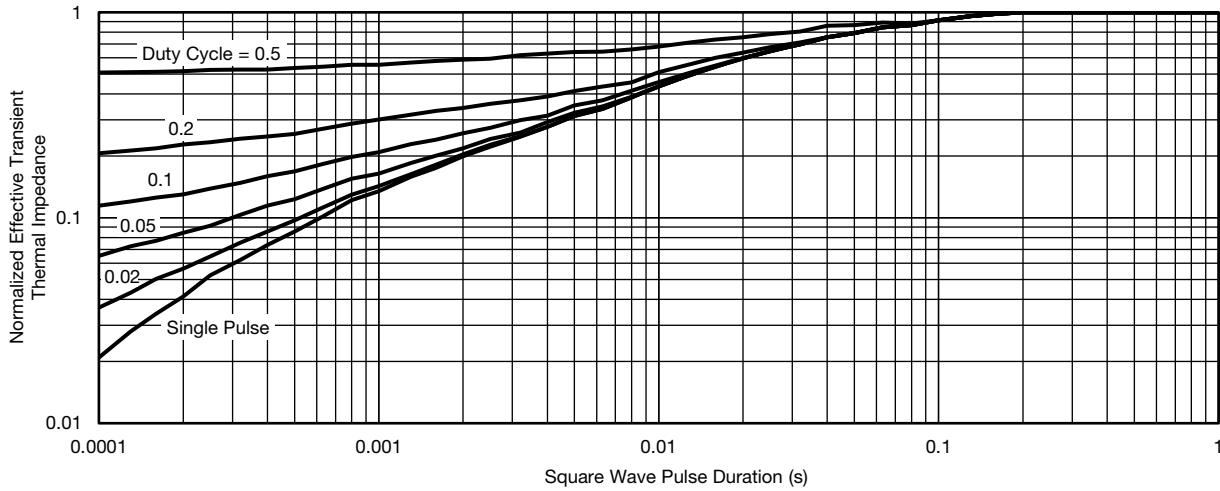


Single Pulse Avalanche Current Capability vs. Time



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 annotations.

Views:

- Top View:** Shows dimensions E , D , $L1$, $L2$, $L3$, $L4$, $L5$, $L6$, $L7$, $L8$, $L9$, $L10$, $L11$, $L12$, $L13$, $L14$, $L15$, $L16$, $L17$, $L18$, $L19$, $L20$, $L21$, $L22$, $L23$, $L24$, $L25$, $L26$, $L27$, $L28$, $L29$, $L30$, $L31$, $L32$, $L33$, $L34$, $L35$, $L36$, $L37$, $L38$, $L39$, $L40$, $L41$, $L42$, $L43$, $L44$, $L45$, $L46$, $L47$, $L48$, $L49$, $L50$, $L51$, $L52$, $L53$, $L54$, $L55$, $L56$, $L57$, $L58$, $L59$, $L60$, $L61$, $L62$, $L63$, $L64$, $L65$, $L66$, $L67$, $L68$, $L69$, $L70$, $L71$, $L72$, $L73$, $L74$, $L75$, $L76$, $L77$, $L78$, $L79$, $L80$, $L81$, $L82$, $L83$, $L84$, $L85$, $L86$, $L87$, $L88$, $L89$, $L90$, $L91$, $L92$, $L93$, $L94$, $L95$, $L96$, $L97$, $L98$, $L99$, $L100$. It includes feature control frames for surface texture (Ra), circular runout (ϕ), and position ($\square$).
- Front View:** Shows dimensions A , B , C , D , E , F , G , H , I , J , K , L , M , N , O , P , Q , R , S , T , U , V , W , X , Y , Z . It includes a detail view of the tip.
- Side View:** Shows dimensions A , B , C , D , E , F , G , H , I , J , K , L , M , N , O , P , Q , R , S , T , U , V , W , X , Y , Z . It includes a detail view of the tip.
- Section B-B and C-C:** Shows the internal structure of the part, including the base metal and plating. Dimensions $b1$, $b2$, $b3$, $c1$, $c2$, $c3$, $c4$, $c5$, $c6$, $c7$, $c8$, $c9$, $c10$, $c11$, $c12$, $c13$, $c14$, $c15$, $c16$, $c17$, $c18$, $c19$, $c20$, $c21$, $c22$, $c23$, $c24$, $c25$, $c26$, $c27$, $c28$, $c29$, $c30$, $c31$, $c32$, $c33$, $c34$, $c35$, $c36$, $c37$, $c38$, $c39$, $c40$, $c41$, $c42$, $c43$, $c44$, $c45$, $c46$, $c47$, $c48$, $c49$, $c50$, $c51$, $c52$, $c53$, $c54$, $c55$, $c56$, $c57$, $c58$, $c59$, $c60$, $c61$, $c62$, $c63$, $c64$, $c65$, $c66$, $c67$, $c68$, $c69$, $c70$, $c71$, $c72$, $c73$, $c74$, $c75$, $c76$, $c77$, $c78$, $c79$, $c80$, $c81$, $c82$, $c83$, $c84$, $c85$, $c86$, $c87$, $c88$, $c89$, $c90$, $c91$, $c92$, $c93$, $c94$, $c95$, $c96$, $c97$, $c98$, $c99$, $c100$ are shown.
- View A-A:** Shows the part from a different perspective, including dimensions A , B , C , D , E , F , G , H , I , J , K , L , M , N , O , P , Q , R , S , T , U , V , W , X , Y , Z .

Annotations:

- (Datum A):** Indicated by a triangle and the letter A.
- Detail A:** A circular detail view of the tip.
- Seating plane:** Indicated by a horizontal line and the letter A.
- Lead tip:** Indicated by an arrow pointing to the tip.
- Base metal:** Indicated by a hatched area in the section view.
- Plating:** Indicated by a hatched area in the section view.
- Surface texture:** Indicated by a triangle and the letter A.
- Circular runout:** Indicated by a circle and the letter A.
- Position:** Indicated by a square and the letter A.

	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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