

MMBT3906LT1

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector – Emitter Breakdown Voltage (I _C = -1.0 mA _{dc} , I _B = 0)	V _{(BR)CEO}	-40	-	V _{dc}
Collector – Base Breakdown Voltage (I _C = -10 μA _{dc} , I _E = 0)	V _{(BR)CBO}	-40	-	V _{dc}
Emitter – Base Breakdown Voltage (I _E = -10 μA _{dc} , I _C = 0)	V _{(BR)EBO}	-5.0	-	V _{dc}
Base Cutoff Current (V _{CE} = -30 V _{dc} , V _{EB} = -3.0 V _{dc})	I _{BL}	-	-50	nA _{dc}
Collector Cutoff Current (V _{CE} = -30 V _{dc} , V _{EB} = -3.0 V _{dc})	I _{CEX}	-	-50	nA _{dc}

ON CHARACTERISTICS (Note 4)

DC Current Gain (I _C = -0.1 mA _{dc} , V _{CE} = -1.0 V _{dc}) (I _C = -1.0 mA _{dc} , V _{CE} = -1.0 V _{dc}) (I _C = -10 mA _{dc} , V _{CE} = -1.0 V _{dc}) (I _C = -50 mA _{dc} , V _{CE} = -1.0 V _{dc}) (I _C = -100 mA _{dc} , V _{CE} = -1.0 V _{dc})	H _{FE}	60 80 100 60 30	- - 300 - -	-
Collector – Emitter Saturation Voltage (I _C = -10 mA _{dc} , I _B = -1.0 mA _{dc}) (I _C = -50 mA _{dc} , I _B = -5.0 mA _{dc})	V _{CE(sat)}	- -	-0.25 -0.4	V _{dc}
Base – Emitter Saturation Voltage (I _C = -10 mA _{dc} , I _B = -1.0 mA _{dc}) (I _C = -50 mA _{dc} , I _B = -5.0 mA _{dc})	V _{BE(sat)}	-0.65 -	-0.85 -0.95	V _{dc}

SMALL-SIGNAL CHARACTERISTICS

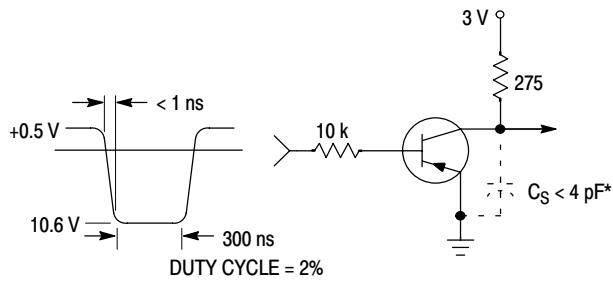
Current – Gain – Bandwidth Product (I _C = -10 mA _{dc} , V _{CE} = -20 V _{dc} , f = 100 MHz)	f _T	250	-	MHz
Output Capacitance (V _{CB} = -5.0 V _{dc} , I _E = 0, f = 1.0 MHz)	C _{obo}	-	4.5	pF
Input Capacitance (V _{EB} = -0.5 V _{dc} , I _C = 0, f = 1.0 MHz)	C _{ibo}	-	10	pF
Input Impedance (I _C = -1.0 mA _{dc} , V _{CE} = -10 V _{dc} , f = 1.0 kHz)	h _{ie}	2.0	12	kΩ
Voltage Feedback Ratio (I _C = -1.0 mA _{dc} , V _{CE} = -10 V _{dc} , f = 1.0 kHz)	h _{re}	0.1	10	X 10 ⁻⁴
Small – Signal Current Gain (I _C = -1.0 mA _{dc} , V _{CE} = -10 V _{dc} , f = 1.0 kHz)	h _{fe}	100	400	-
Output Admittance (I _C = -1.0 mA _{dc} , V _{CE} = -10 V _{dc} , f = 1.0 kHz)	h _{oe}	3.0	60	μmhos
Noise Figure (I _C = -100 μA _{dc} , V _{CE} = -5.0 V _{dc} , R _S = 1.0 kΩ, f = 1.0 kHz)	NF	-	4.0	dB

SWITCHING CHARACTERISTICS

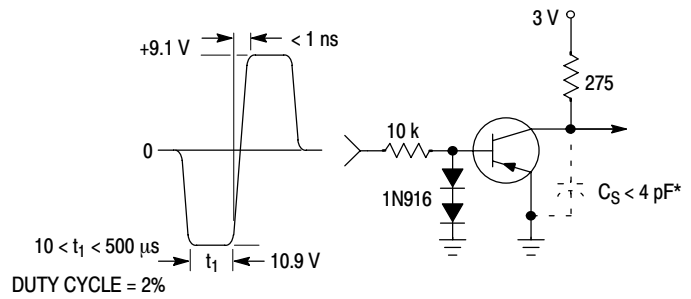
Delay Time	(V _{CC} = -3.0 V _{dc} , V _{BE} = 0.5 V _{dc} , I _C = -10 mA _{dc} , I _{B1} = -1.0 mA _{dc})	t _d	-	35	ns
Rise Time		t _r	-	35	
Storage Time	(V _{CC} = -3.0 V _{dc} , I _C = -10 mA _{dc} , I _{B1} = I _{B2} = -1.0 mA _{dc})	t _s	-	225	ns
Fall Time		t _f	-	75	

4. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

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**Figure 1. Delay and Rise Time
Equivalent Test Circuit**



**Figure 2. Storage and Fall Time
Equivalent Test Circuit**

* Total shunt capacitance of test jig and connectors

TYPICAL TRANSIENT CHARACTERISTICS

— $T_J = 25^\circ\text{C}$
 - - $T_J = 125^\circ\text{C}$

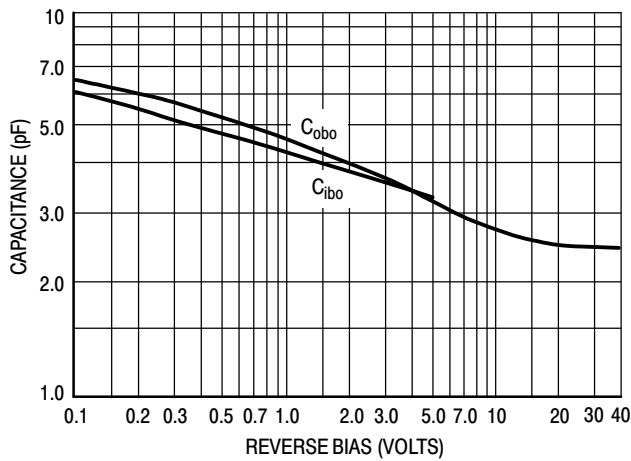


Figure 3. Capacitance

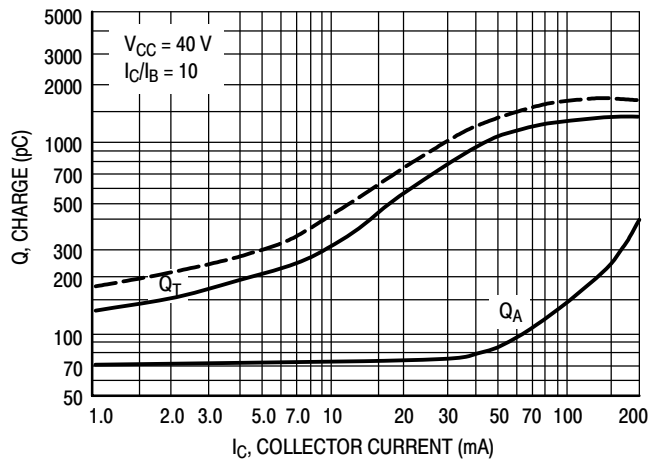


Figure 4. Charge Data

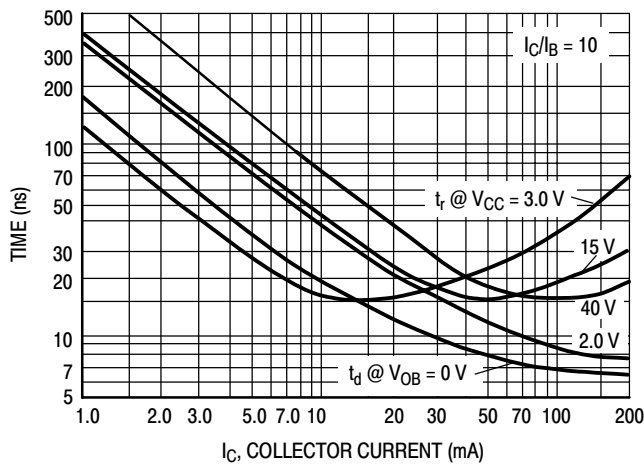


Figure 5. Turn-On Time

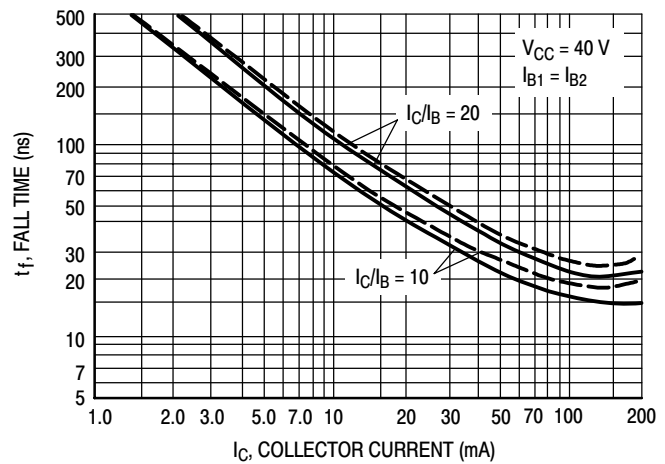


Figure 6. Fall Time

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TYPICAL AUDIO SMALL-SIGNAL CHARACTERISTICS NOISE FIGURE VARIATIONS

($V_{CE} = -5.0$ Vdc, $T_A = 25^\circ\text{C}$, Bandwidth = 1.0 Hz)

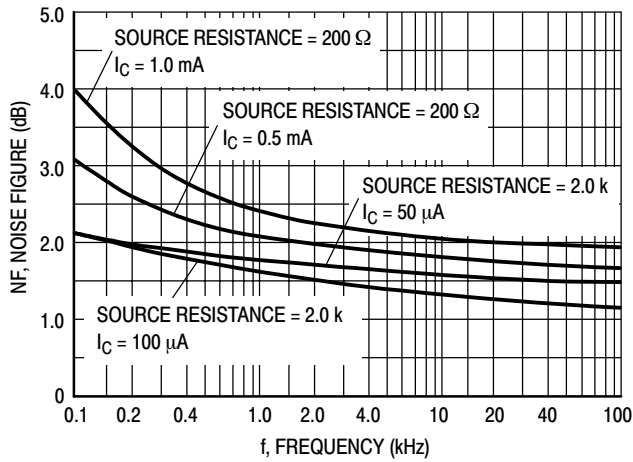


Figure 7.

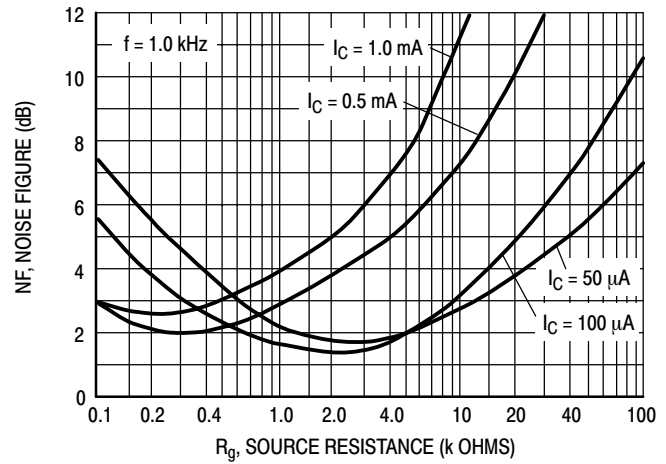


Figure 8.

h PARAMETERS

($V_{CE} = -10$ Vdc, $f = 1.0$ kHz, $T_A = 25^\circ\text{C}$)

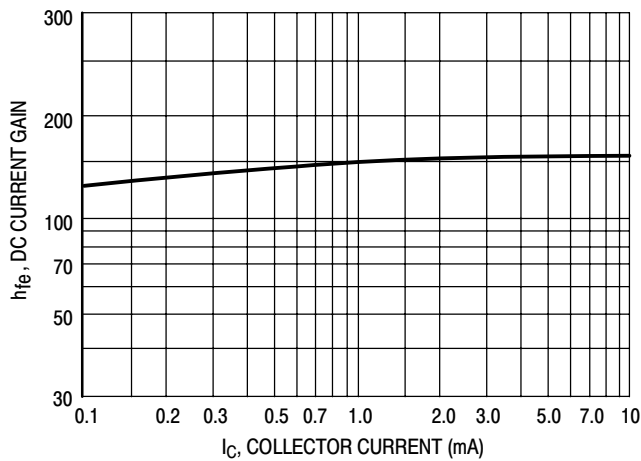


Figure 9. Current Gain

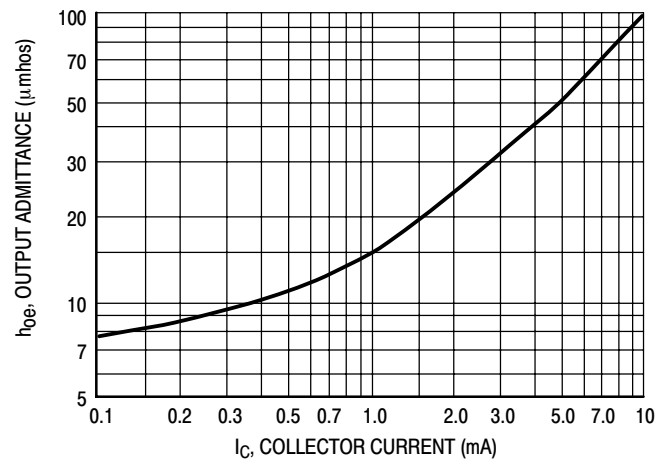


Figure 10. Output Admittance

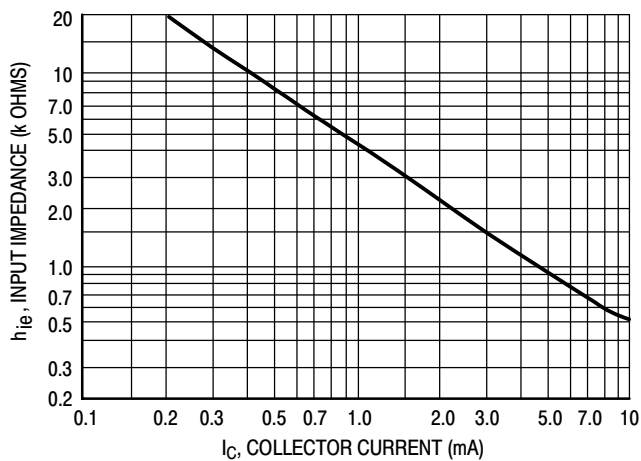


Figure 11. Input Impedance

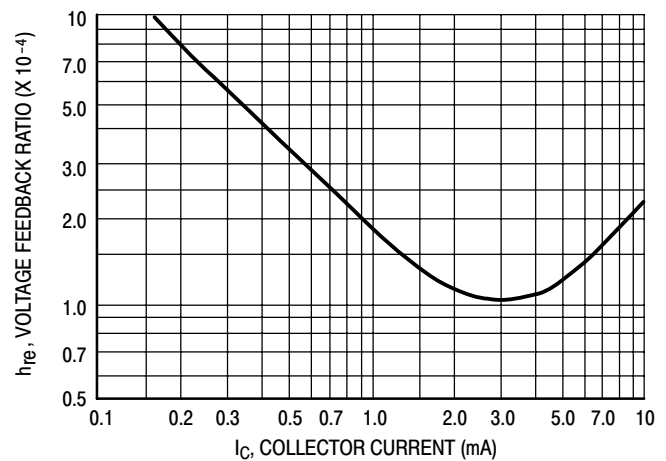


Figure 12. Voltage Feedback Ratio

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TYPICAL STATIC CHARACTERISTICS

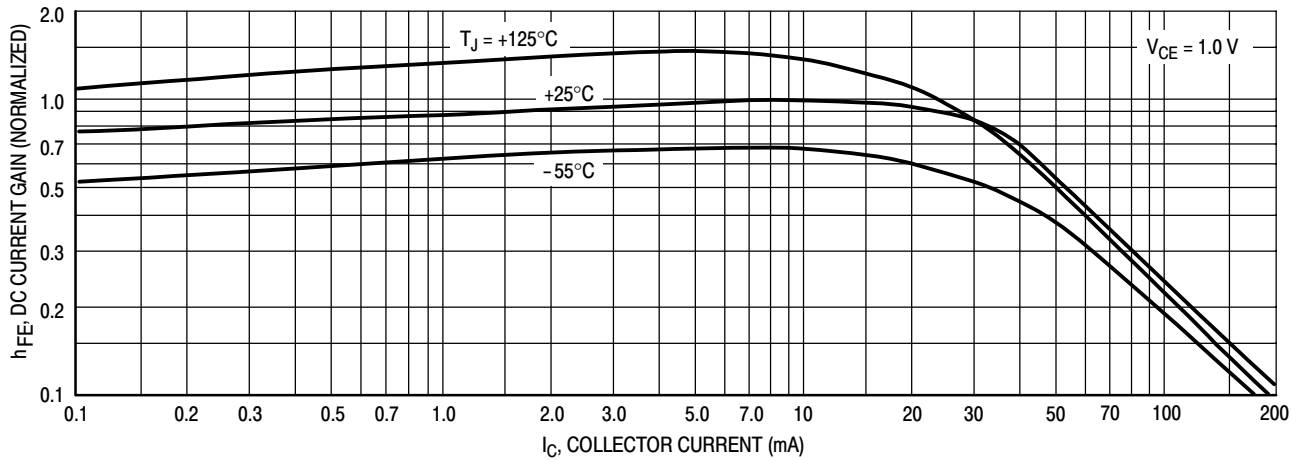


Figure 13. DC Current Gain

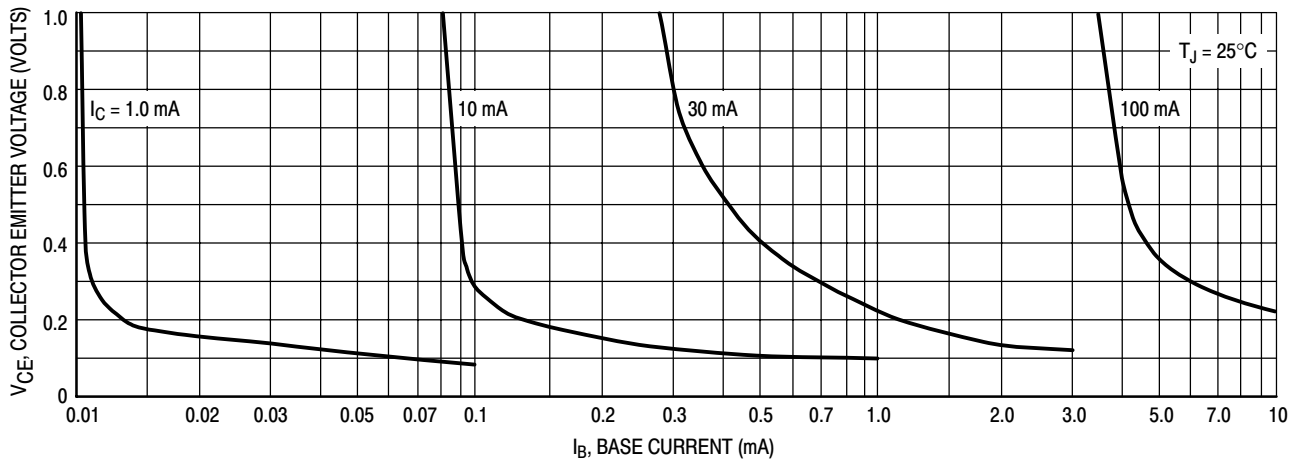


Figure 14. Collector Saturation Region

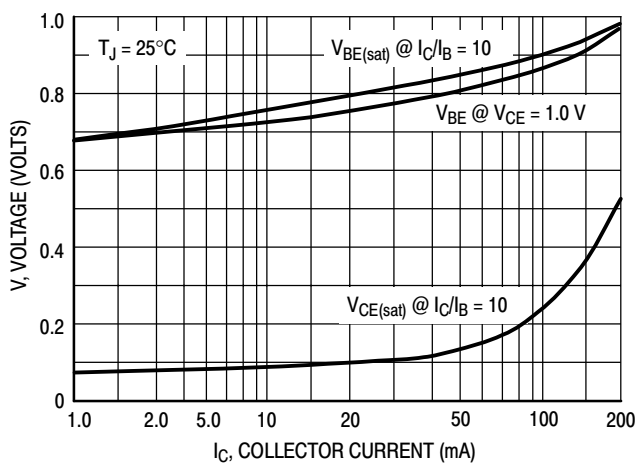


Figure 15. "ON" Voltages

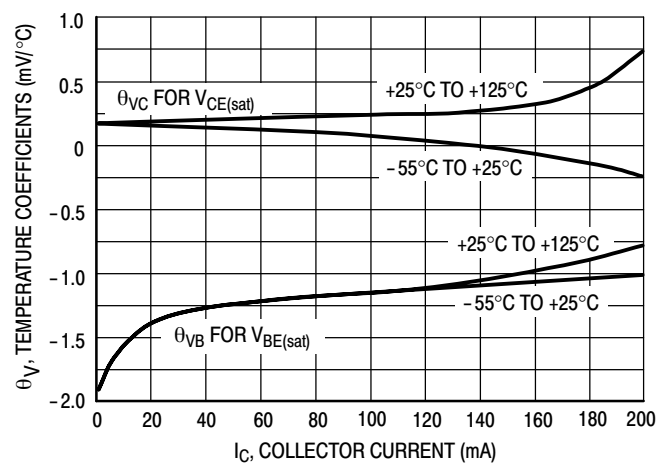


Figure 16. Temperature Coefficients

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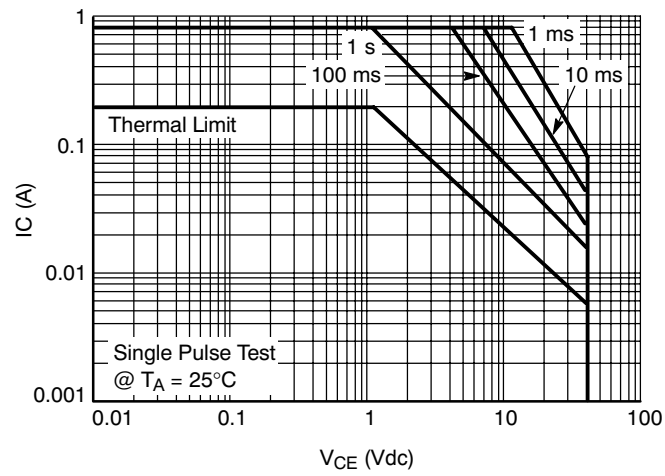
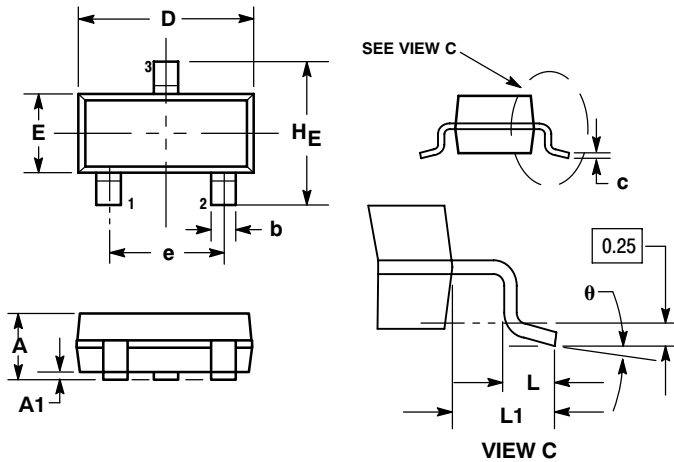


Figure 17. Safe Operating Area

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PACKAGE DIMENSIONS

SOT-23 (TO-236) CASE 318-08 ISSUE AN



NOTES:

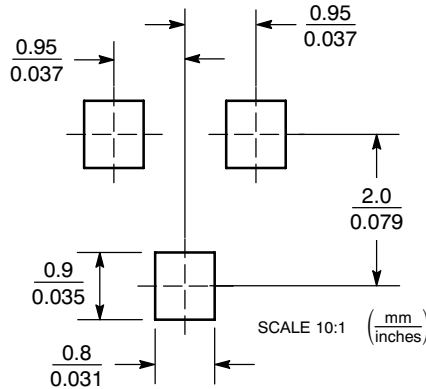
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318-01 THRU -07 AND -09 OBSOLETE, NEW STANDARD 318-08.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.040	0.044
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.37	0.44	0.50	0.015	0.018	0.020
c	0.09	0.13	0.18	0.003	0.005	0.007
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.081
L	0.10	0.20	0.30	0.004	0.008	0.012
L1	0.35	0.54	0.69	0.014	0.021	0.029
HE	2.10	2.40	2.64	0.083	0.094	0.104

STYLE 6:

1. BASE
2. EMITTER
3. COLLECTOR

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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