

# MMBTA70LT1G

## General Purpose Transistor PNP Silicon

### Features

- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	-40	Vdc
Emitter-Base Voltage	$V_{EBO}$	-4.0	Vdc
Collector Current – Continuous	$I_C$	-100	mAdc

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board, (Note 1) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	225 1.8	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	556	$^\circ\text{C}/\text{W}$
Total Device Dissipation Alumina Substrate, (Note 2) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	300 2.4	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	417	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

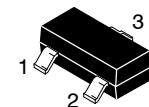
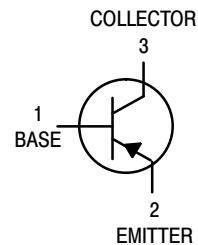
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR-5 = 1.0 x 0.75 x 0.062 in.
2. Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.



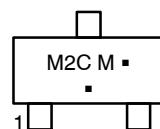
ON Semiconductor®

<http://onsemi.com>



SOT-23 (TO-236)  
CASE 318  
STYLE 6

### MARKING DIAGRAM



M2C = Specific Device Code

M = Date Code\*

▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation and/or overbar may vary depending upon manufacturing location.

### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
MMBTA70LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# MMBTA70LT1G

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Breakdown Voltage ( $I_C = -1.0 \text{ mA DC}, I_B = 0$ )	$V_{(\text{BR})\text{CEO}}$	-40	-	Vdc
Emitter-Base Breakdown Voltage ( $I_E = -100 \mu\text{A DC}, I_C = 0$ )	$V_{(\text{BR})\text{EBO}}$	-4.0	-	Vdc
Collector Cutoff Current ( $V_{CB} = -30 \text{ Vdc}, I_E = 0$ )	$I_{\text{CBO}}$	-	-100	nAdc
<b>ON CHARACTERISTICS</b>				
DC Current Gain ( $I_C = -5.0 \text{ mA DC}, V_{CE} = -10 \text{ Vdc}$ )	$h_{FE}$	40	400	-
Collector-Emitter Saturation Voltage ( $I_C = -10 \text{ mA DC}, I_B = -1.0 \text{ mA DC}$ )	$V_{CE(\text{sat})}$	-	-0.25	Vdc
<b>SMALL-SIGNAL CHARACTERISTICS</b>				
Current-Gain – Bandwidth Product ( $I_C = -5.0 \text{ mA DC}, V_{CE} = -10 \text{ Vdc}, f = 100 \text{ MHz}$ )	$f_T$	125	-	MHz
Output Capacitance ( $V_{CB} = -10 \text{ Vdc}, I_E = 0, f = 1.0 \text{ MHz}$ )	$C_{\text{obo}}$	-	4.0	pF

## TYPICAL NOISE CHARACTERISTICS

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

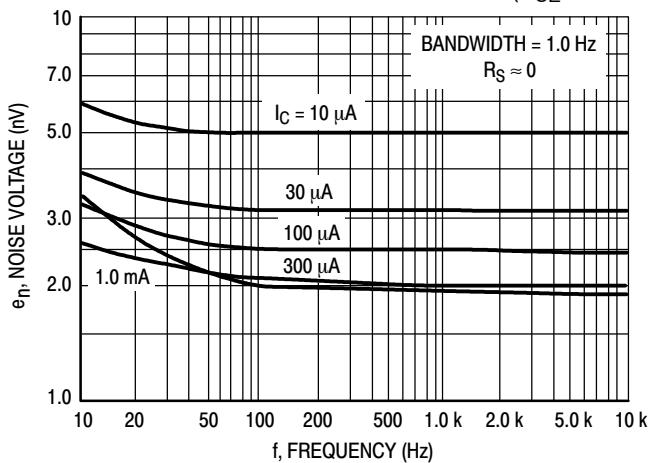


Figure 1. Noise Voltage

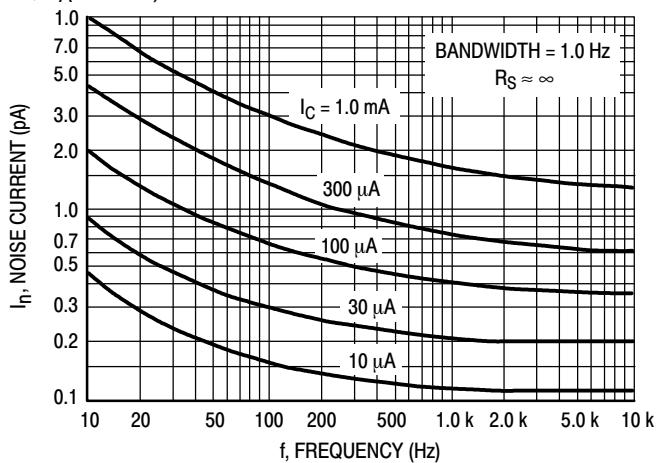


Figure 2. Noise Current

# MMBT A70LT1G

## NOISE FIGURE CONTOURS

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

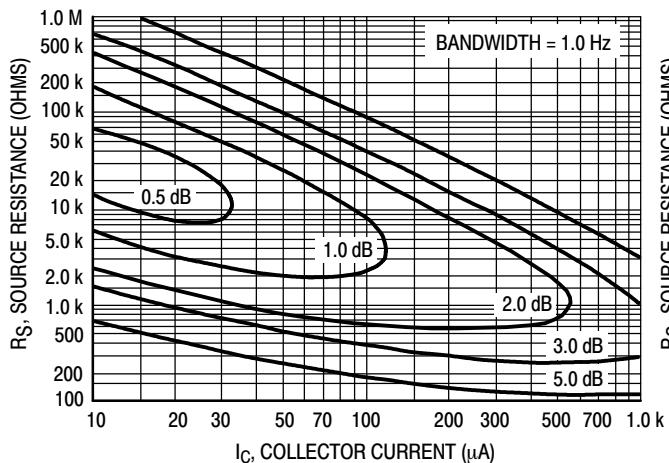


Figure 3. Narrow Band, 100 Hz

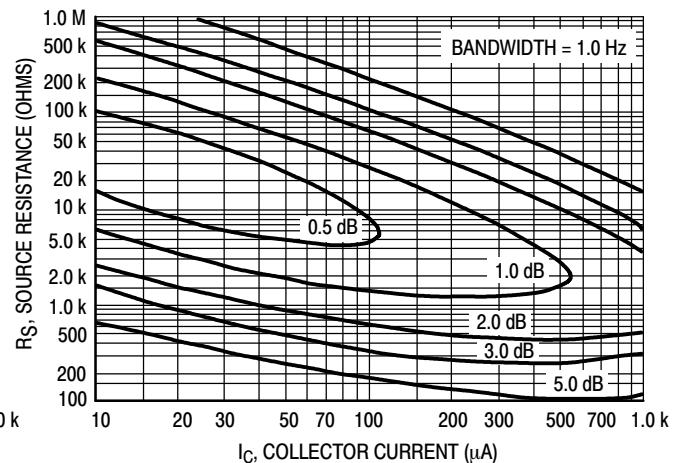


Figure 4. Narrow Band, 1.0 kHz

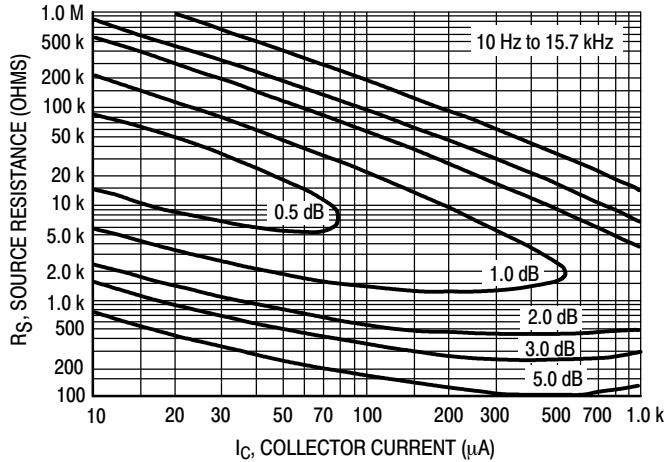


Figure 5. Wideband

Noise Figure is Defined as:

$$NF = 20 \log_{10} \left[ \frac{e_n^2 + 4KTR_S + I_n^2 R_S^2}{4KTR_S} \right]^{1/2}$$

$e_n$  = Noise Voltage of the Transistor referred to the input. (Figure 3)  
 $I_n$  = Noise Current of the Transistor referred to the input. (Figure 4)  
 $K$  = Boltzman's Constant ( $1.38 \times 10^{-23} \text{ J/K}$ )  
 $T$  = Temperature of the Source Resistance ( $^\circ\text{K}$ )  
 $R_S$  = Source Resistance (Ohms)

# MMBT70LT1G

## TYPICAL STATIC CHARACTERISTICS

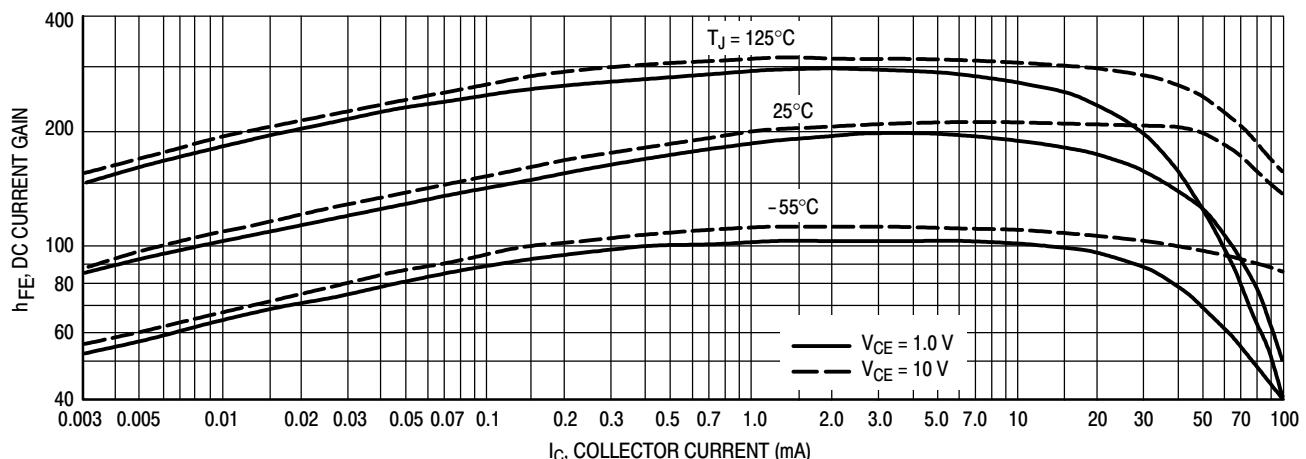


Figure 6. DC Current Gain

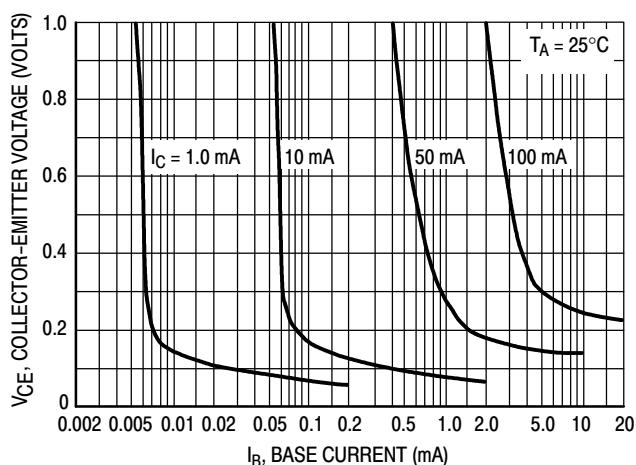


Figure 7. Collector Saturation Region

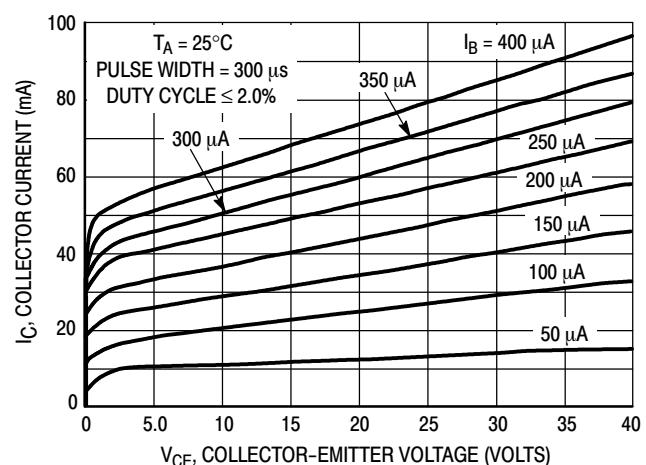


Figure 8. Collector Characteristics

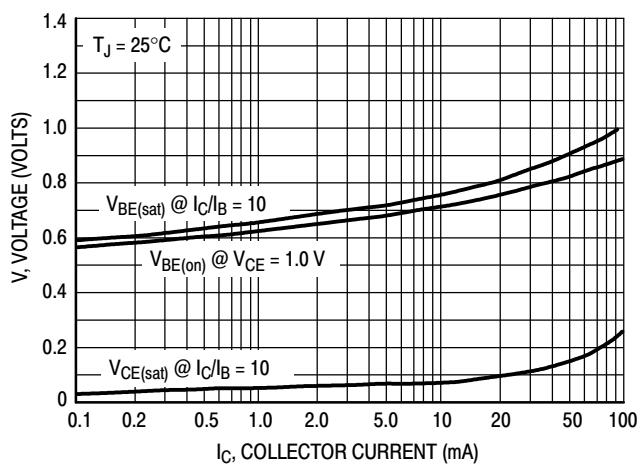


Figure 9. "On" Voltages

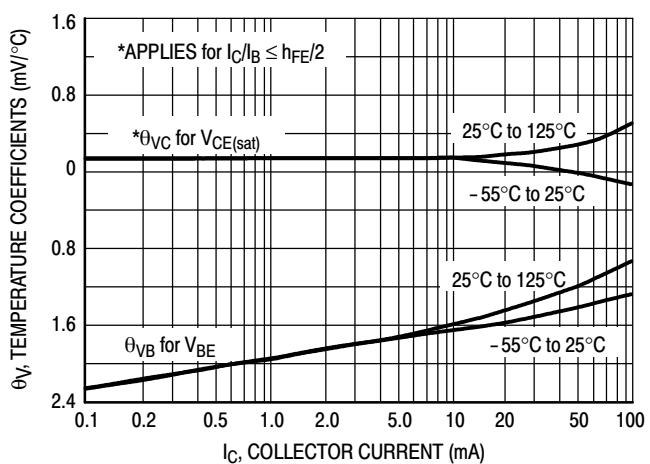
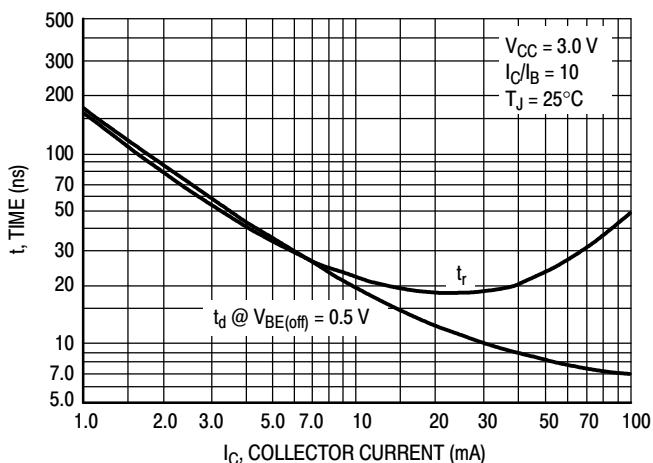
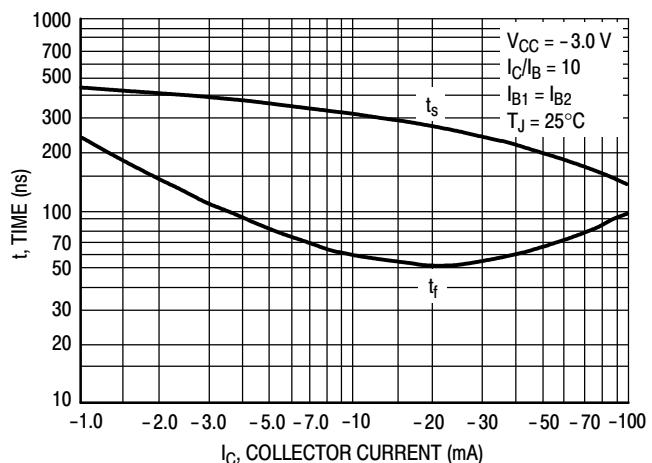


Figure 10. Temperature Coefficients

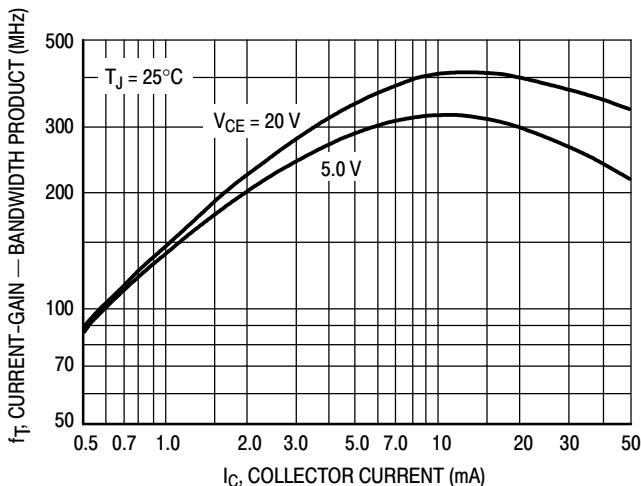
**TYPICAL DYNAMIC CHARACTERISTICS**



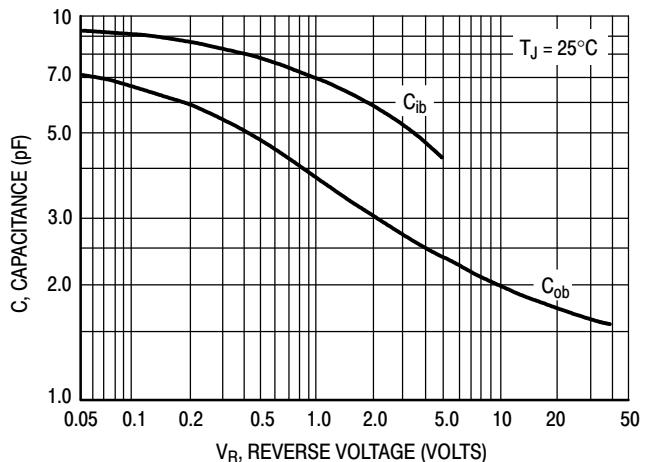
**Figure 11. Turn-On Time**



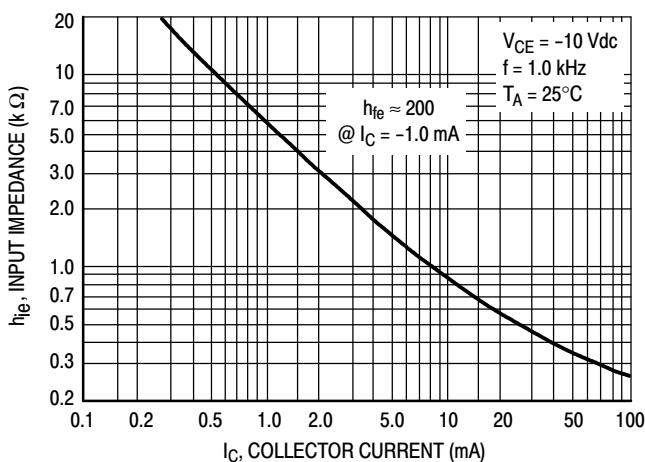
**Figure 12. Turn-Off Time**



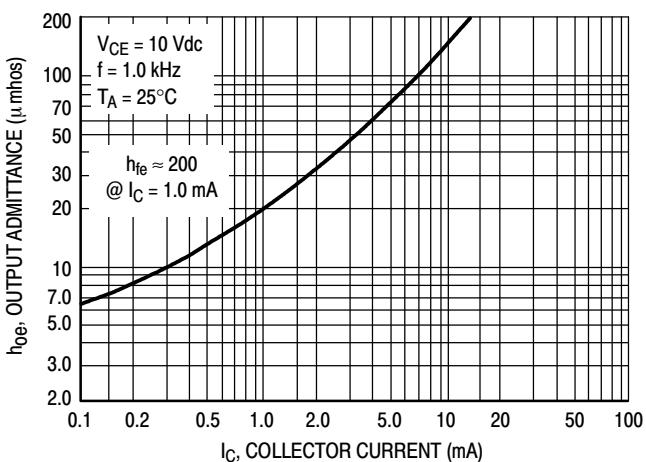
**Figure 13. Current-Gain — Bandwidth Product**



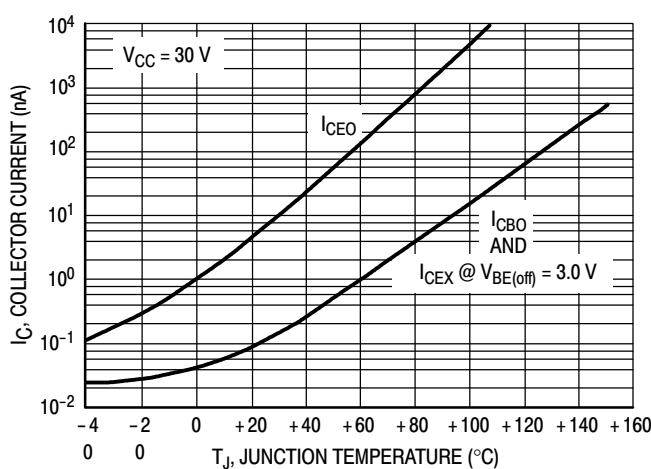
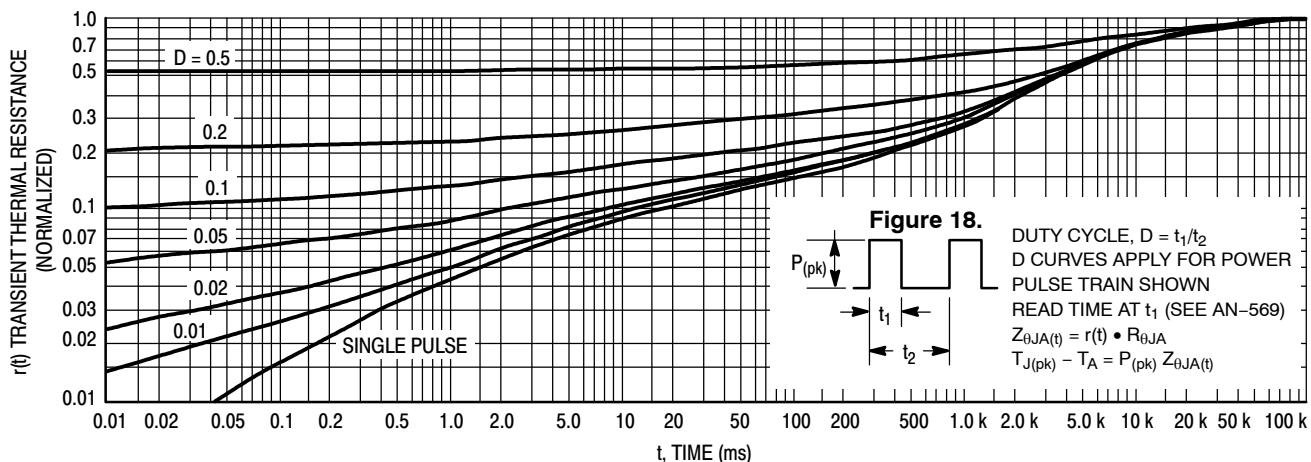
**Figure 14. Capacitance**



**Figure 15. Input Impedance**



**Figure 16. Output Admittance**



**Figure 19. Typical Collector Leakage Current**

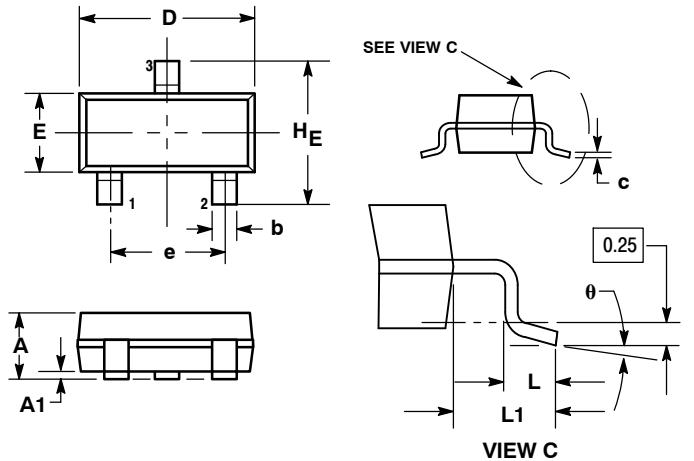
# MMBTA70LT1G

## PACKAGE DIMENSIONS

### SOT-23 (TO-236)

CASE 318-08

ISSUE AN



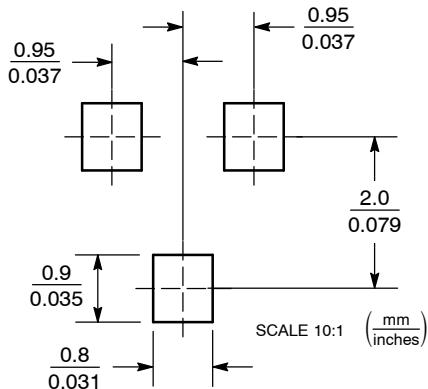
#### NOTES:

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
H_E	2.10	2.40	2.64	0.083	0.094	0.104

STYLE 6:  
 PIN 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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