

# MMBTA55L Series, MMBTA56L Series, SMMBTA56L Series

## Driver Transistors

### PNP Silicon

#### Features

- AEC-Q101 Qualified and PPAP Capable
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant\*

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector - Emitter Voltage MMBTA55 MMBTA56, SMMBTA56	$V_{CEO}$	-60 -80	Vdc
Collector - Base Voltage MMBTA55 MMBTA56, SMMBTA56	$V_{CBO}$	-60 -80	Vdc
Emitter - Base Voltage	$V_{EBO}$	-4.0	Vdc
Collector Current - Continuous	$I_C$	-500	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.

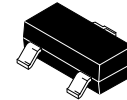
1. FR-5 =  $1.0 \times 0.75 \times 0.062$  in.
2. Alumina =  $0.4 \times 0.3 \times 0.024$  in. 99.5% alumina.

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

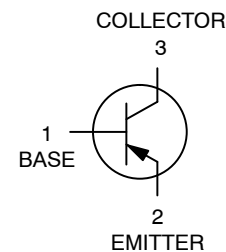


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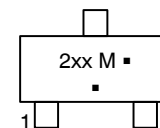
<http://onsemi.com>



SOT-23  
CASE 318  
STYLE 6



#### MARKING DIAGRAM



2xx = Device Code  
x = H for MMBTA55LT1G  
xx = GM for MMBTA56LT1G,  
SMMBTA56LT1G

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

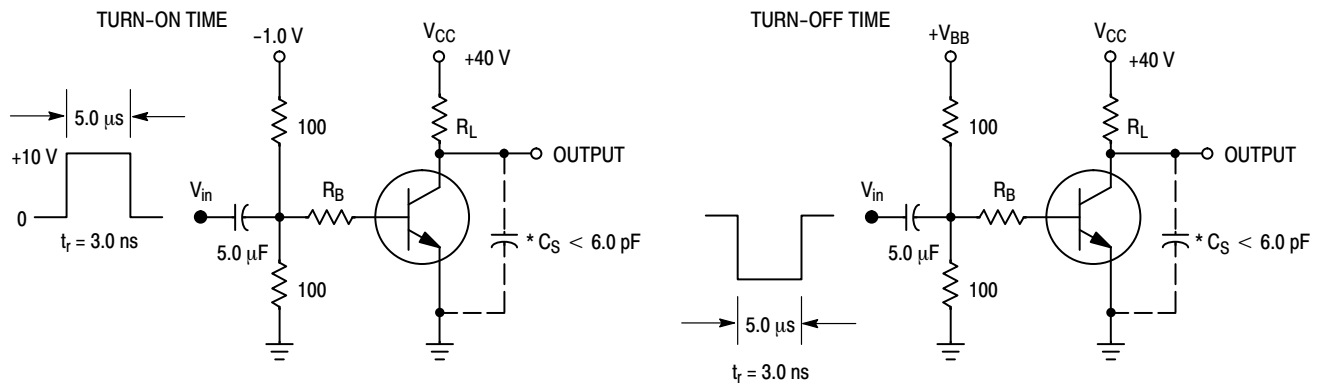
See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

# MMBTA55L Series, MMBTA56L Series, SMMBTA56L Series

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector - Emitter Breakdown Voltage (Note 3) ( $I_C = -1.0\text{ mA}$ , $I_B = 0$ ) MMBTA55 MMBTA56, SMMBTA56	$V_{(BR)CEO}$	-60 -80	-	Vdc
Emitter - Base Breakdown Voltage ( $I_E = -100\text{ }\mu\text{A}$ , $I_C = 0$ )	$V_{(BR)EBO}$	-4.0	-	Vdc
Collector Cutoff Current ( $V_{CE} = -60\text{ Vdc}$ , $I_B = 0$ )	$I_{CES}$	-	-0.1	$\mu\text{A}$
Collector Cutoff Current ( $V_{CB} = -60\text{ Vdc}$ , $I_E = 0$ ) MMBTA55 ( $V_{CB} = -80\text{ Vdc}$ , $I_E = 0$ ) MMBTA56, SMMBTA56	$I_{CBO}$	-	-0.1	$\mu\text{A}$
<b>ON CHARACTERISTICS</b>				
DC Current Gain ( $I_C = -10\text{ mA}$ , $V_{CE} = -1.0\text{ Vdc}$ ) ( $I_C = -100\text{ mA}$ , $V_{CE} = -1.0\text{ Vdc}$ )	$h_{FE}$	100 100	- -	-
Collector - Emitter Saturation Voltage ( $I_C = -100\text{ mA}$ , $I_B = -10\text{ mA}$ )	$V_{CE(sat)}$	-	-0.25	Vdc
Base - Emitter On Voltage ( $I_C = -100\text{ mA}$ , $V_{CE} = -1.0\text{ Vdc}$ )	$V_{BE(on)}$	-	-1.2	Vdc
<b>SMALL-SIGNAL CHARACTERISTICS</b>				
Current - Gain - Bandwidth Product (Note 4) ( $I_C = -100\text{ mA}$ , $V_{CE} = -1.0\text{ Vdc}$ , $f = 100\text{ MHz}$ )	$f_T$	50	-	MHz

3. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .  
 4.  $f_T$  is defined as the frequency at which  $|h_{fe}|$  extrapolates to unity.



\*Total Shunt Capacitance of Test Jig and Connectors For PNP Test Circuits, Reverse All Voltage Polarities

Figure 1. Switching Time Test Circuits

# MMBTA55L Series, MMBTA56L Series, SMMBTA56L Series

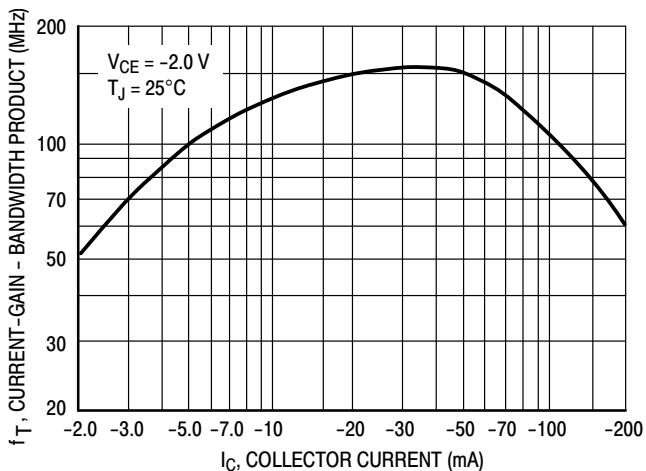


Figure 2. Current-Gain — Bandwidth Product

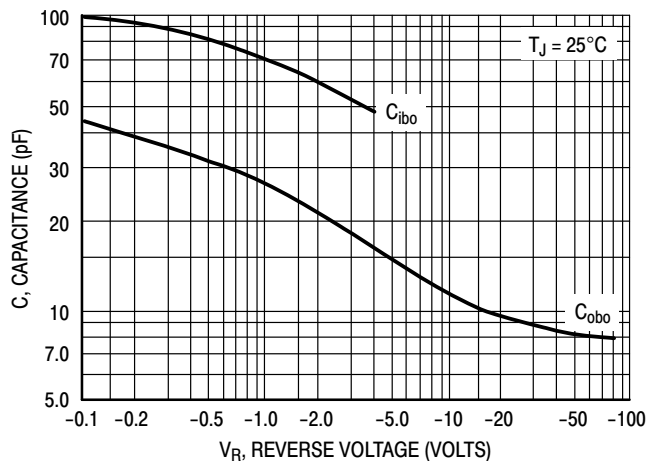


Figure 3. Capacitance

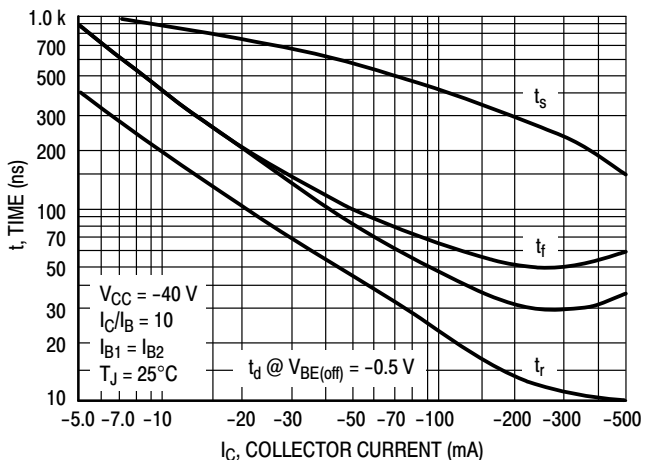


Figure 4. Switching Time

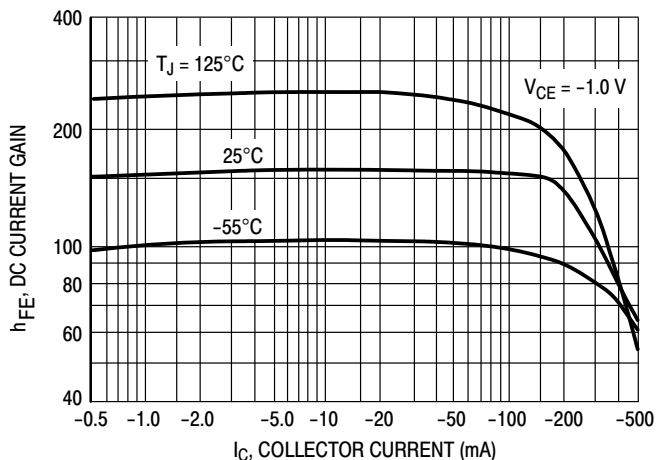


Figure 5. DC Current Gain

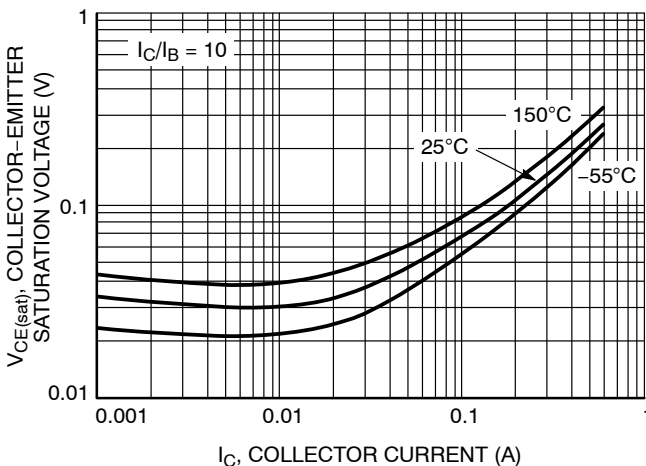


Figure 6. Collector Emitter Saturation Voltage vs. Collector Current

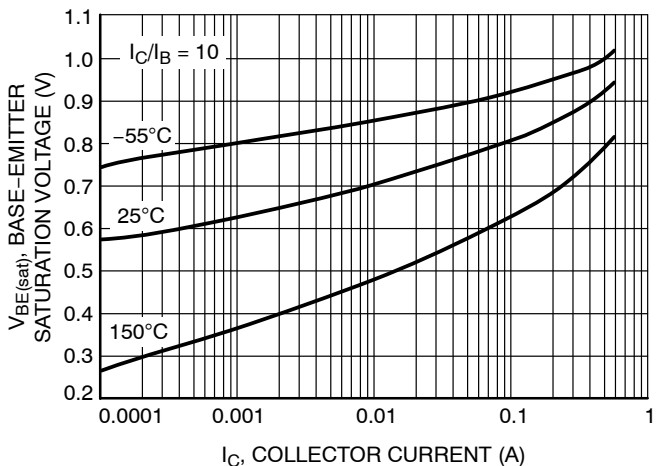
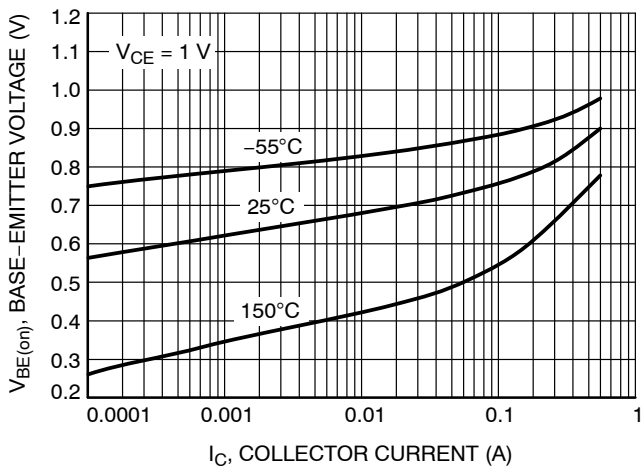
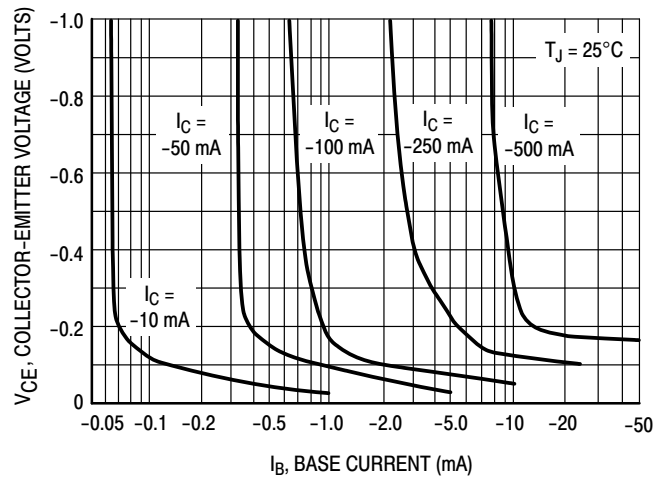


Figure 7. Base Emitter Saturation Voltage vs. Collector Current

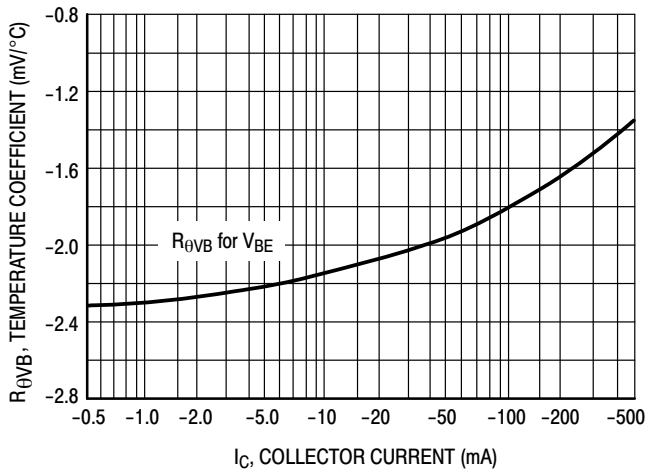
# MMBTA55L Series, MMBTA56L Series, SMMBTA56L Series



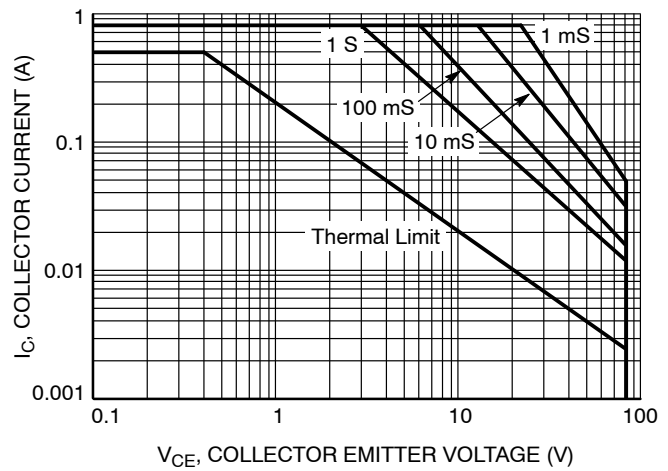
**Figure 8. Base Emitter Voltage vs. Collector Current**



**Figure 9. Collector Saturation Region**



**Figure 10. Base-Emitter Temperature Coefficient**



**Figure 11. Safe Operating Area**

## ORDERING INFORMATION

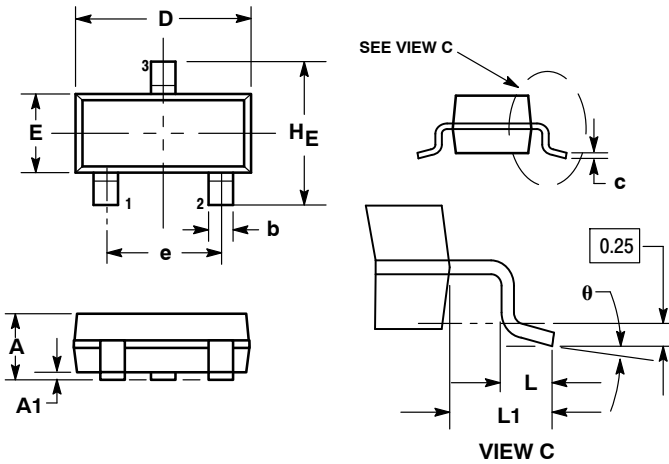
Device Order Number	Package Type	Shipping <sup>†</sup>
MMBTA55LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
MMBTA55LT3G	SOT-23 (Pb-Free)	10,000 / Tape & Reel
MMBTA56LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
SMMBTA56LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
MMBTA56LT3G	SOT-23 (Pb-Free)	10,000 / Tape & Reel
SMMBTA56LT3G	SOT-23 (Pb-Free)	10,000 / 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.

# MMBTA55L Series, MMBTA56L Series, SMMBTA56L Series

## PACKAGE DIMENSIONS

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



NOTES:

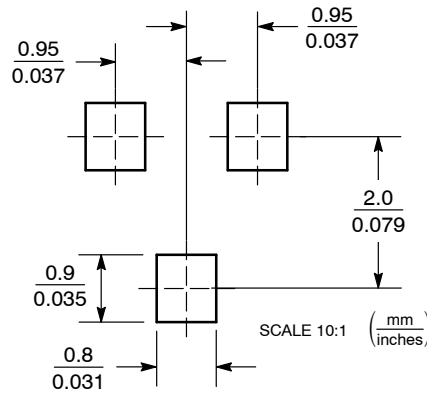
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

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
θ	0°	---	10°	0°	---	10°

STYLE 6:

1. BASE
2. EMITTER
3. COLLECTOR

### SOLDERING FOOTPRINT



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