MMBTA05L, MMBTA06L

Driver Transistors

NPN Silicon

Features

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

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector−Emitter Voltage MMBTA05L MMBTA06L	V_{CEO}	 60 80	Vdc
Collector−Base Voltage MMBTA05L MMBTA06L	V_{CBO}	 60 80	Vdc
Emitter−Base Voltage	V_{EBO}	4.0	Vdc
Collector Current − Continuous	I_C	500	mAdc
Electrostatic Discharge	ESD	HBM Class 3B MM Class C CDM Class IV	

THERMAL CHARACTERISTICS

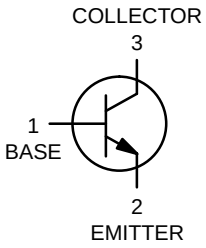
Characteristic	Symbol	Max	Unit
Total Device Dissipation FR−5 Board (Note 1) T_A = 25°C Derate above 25°C	P_D	225 1.8	mW mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	556	°C/W
Total Device Dissipation Alumina Substrate, (Note 2) T_A = 25°C Derate above 25°C	P_D	300 2.4	mW mW/°C
Thermal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

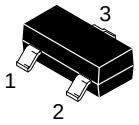
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

ON Semiconductor®

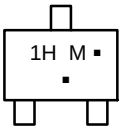
http://onsemi.com



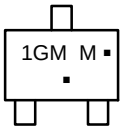


SOT−23
CASE 318
STYLE 6

MARKING DIAGRAMS



MMBTA05LT1



MMBTA06LT1,
SMMBTA06L

1H, 1GM = 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.

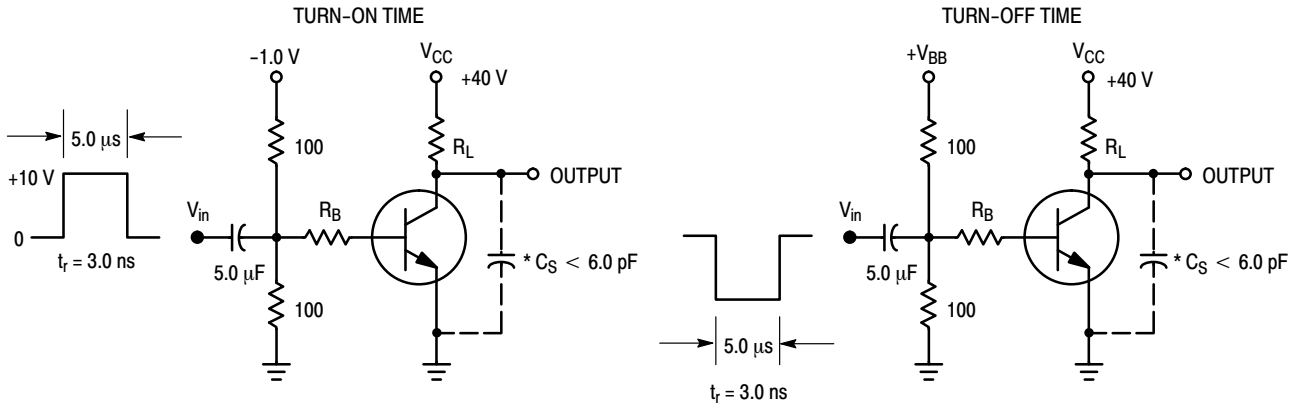
ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector−Emitter Breakdown Voltage (Note 3)		$V_{(BR)CEO}$			Vdc
(I_C = 1.0 mAdc, I_B = 0)	MMBTA05L		60	−	
	MMBTA06L		80	−	
Emitter−Base Breakdown Voltage		$V_{(BR)EBO}$	4.0	−	Vdc
(I_E = 100 μAdc, I_C = 0)					
Collector Cutoff Current		I_{CES}	−	0.1	μAdc
(V_{CE} = 60 Vdc, I_B = 0)					
Collector Cutoff Current		I_{CBO}			μAdc
(V_{CB} = 60 Vdc, I_E = 0)	MMBTA05L		−	0.1	
(V_{CB} = 80 Vdc, I_E = 0)	MMBTA06L		−	0.1	
ON CHARACTERISTICS					
DC Current Gain		h_{FE}			−
(I_C = 10 mAdc, V_{CE} = 1.0 Vdc)			100	−	
(I_C = 100 mAdc, V_{CE} = 1.0 Vdc)			100	−	
Collector−Emitter Saturation Voltage		$V_{CE(sat)}$	−	0.25	Vdc
(I_C = 100 mAdc, I_B = 10 mAdc)					
Base−Emitter On Voltage		$V_{BE(on)}$	−	1.2	Vdc
(I_C = 100 mAdc, V_{CE} = 1.0 Vdc)					
SMALL−SIGNAL CHARACTERISTICS					
Current−Gain − Bandwidth Product (Note 4)		f_T	100	−	MHz
(I_C = 10 mA, V_{CE} = 2.0 V, f = 100 MHz)					

3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 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

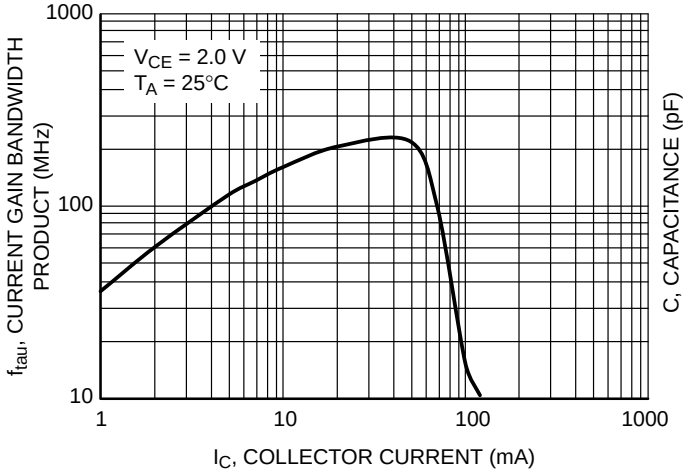


Figure 2. Current Gain Bandwidth Product vs. Collector Current

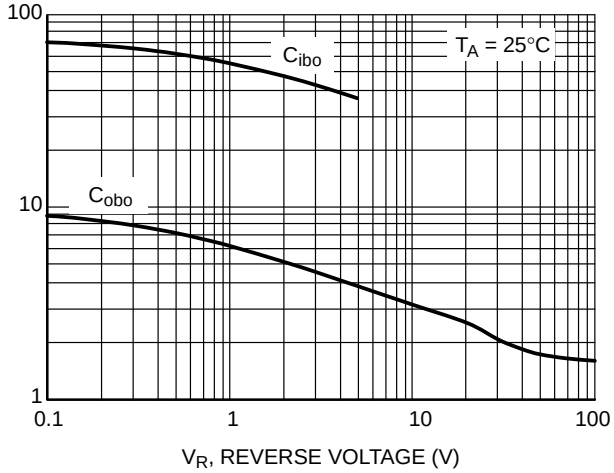


Figure 3. Capacitance

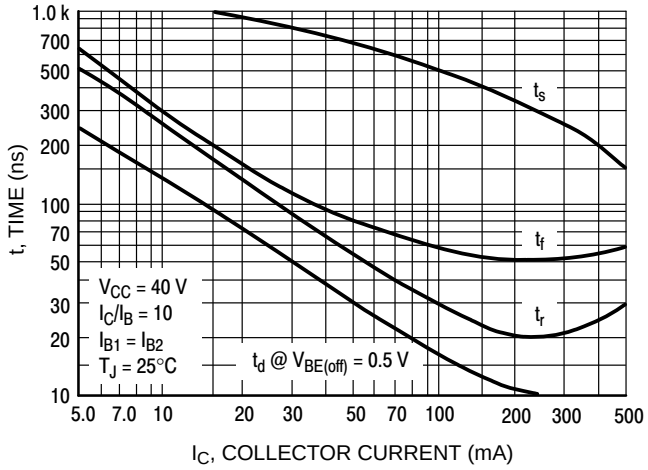


Figure 4. Switching Time

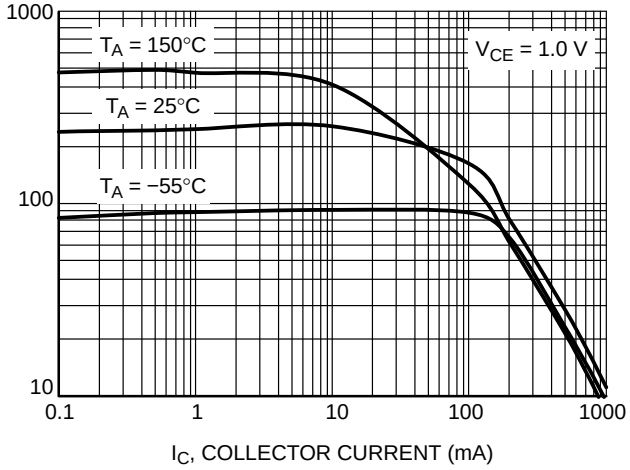


Figure 5. DC Current Gain vs. Collector Current

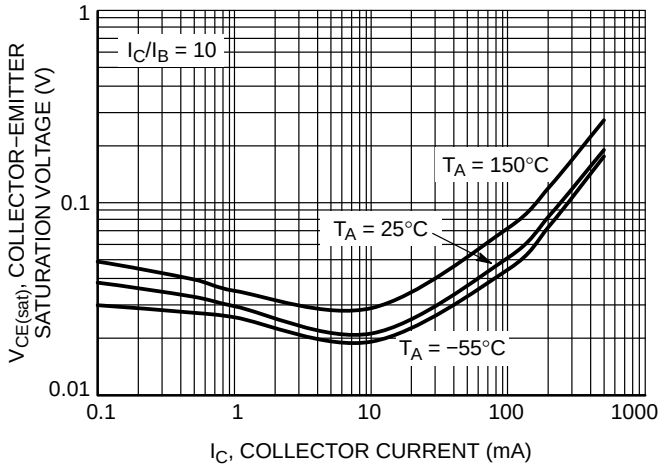


Figure 6. Collector Emitter Saturation Voltage vs. Collector Current

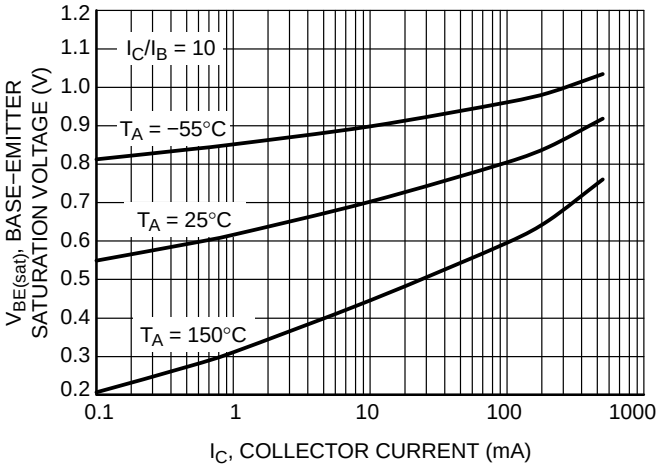


Figure 7. Base Emitter Saturation Voltage vs. Collector Current

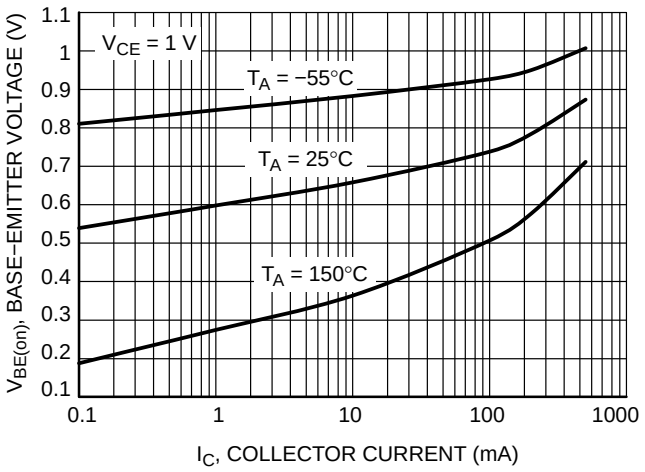


Figure 8. Base Emitter Turn−ON Voltage vs. Collector Current

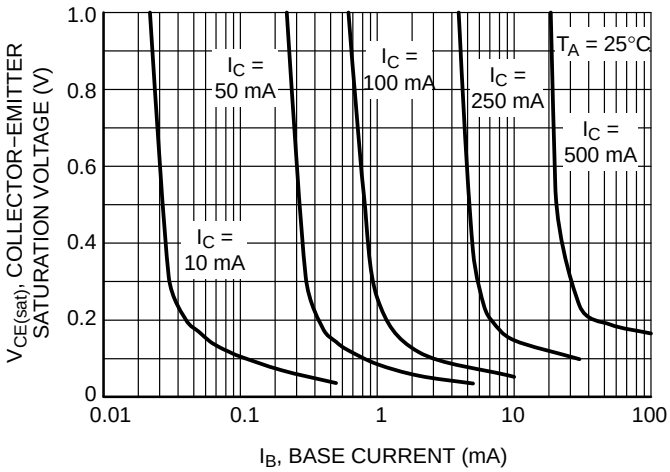


Figure 9. Saturation Region

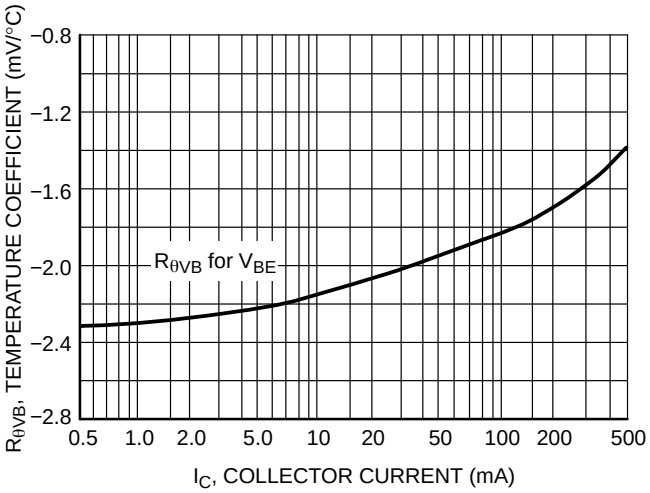


Figure 10. Base−Emitter Temperature Coefficient

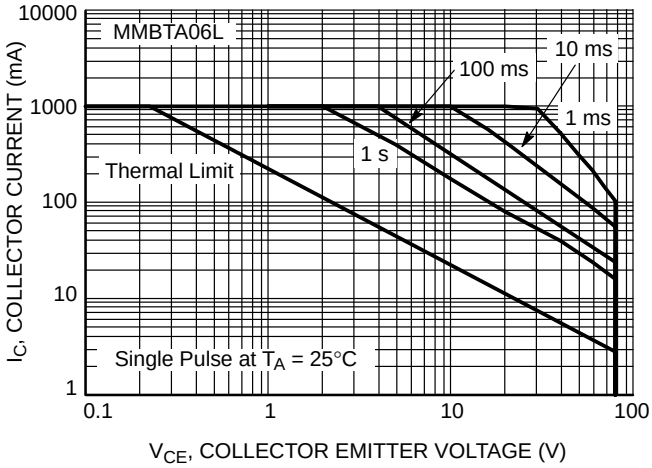


Figure 11. Safe Operating Area

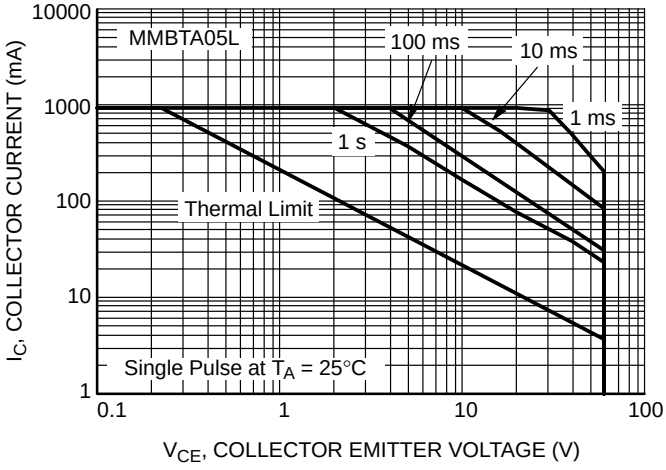


Figure 12. Safe Operating Area

ORDERING INFORMATION

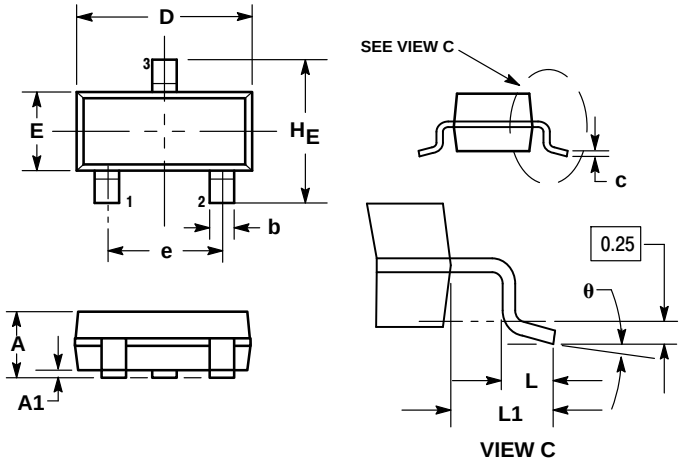
Device	Package	Shipping†
MMBTA05LT1G	SOT−23 (Pb−Free)	3000 / Tape & Reel
NSVMMBTA05LT1G*	SOT−23 (Pb−Free)	3000 / Tape & Reel
MMBTA05LT3G	SOT−23 (Pb−Free)	10,000 / Tape & Reel
MMBTA06LT1G	SOT−23 (Pb−Free)	3000 / Tape & Reel
SMMBTA06LT1G*	SOT−23 (Pb−Free)	3000 / Tape & Reel
MMBTA06LT3G	SOT−23 (Pb−Free)	10,000 / Tape & Reel
SMMBTA06LT3G*	SOT−23 (Pb−Free)	10,000 / Tape & Reel

†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.

*S and NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable.

PACKAGE DIMENSIONS

SOT−23 (TO−236)
CASE 318−08
ISSUE AP

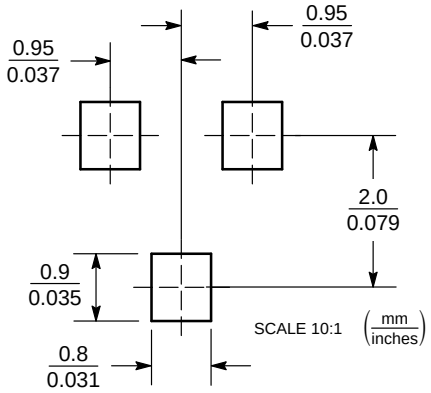


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

	MILLIMETERS			INCHES		
DIM	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
θ	0°	−−−	10°	0°	−−−	10°

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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
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