MMBTA05L, MMBTA06L, SMMBTA06L

Driver Transistors

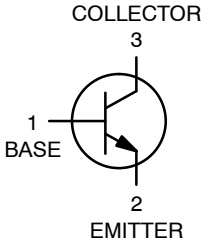
NPN Silicon

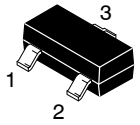
ON Semiconductor®

http://onsemi.com

Features

- S 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





SOT−23
CASE 318
STYLE 6

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector−Emitter Voltage MMBTA05LT1 MMBTA06LT1, SMMBTA06LT1	V_{CEO}	 60 80	Vdc
Collector−Base Voltage MMBTA05LT1 MMBTA06LT1, SMMBTA06LT1	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	

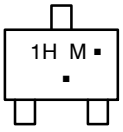
THERMAL CHARACTERISTICS

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

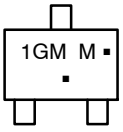
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

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.

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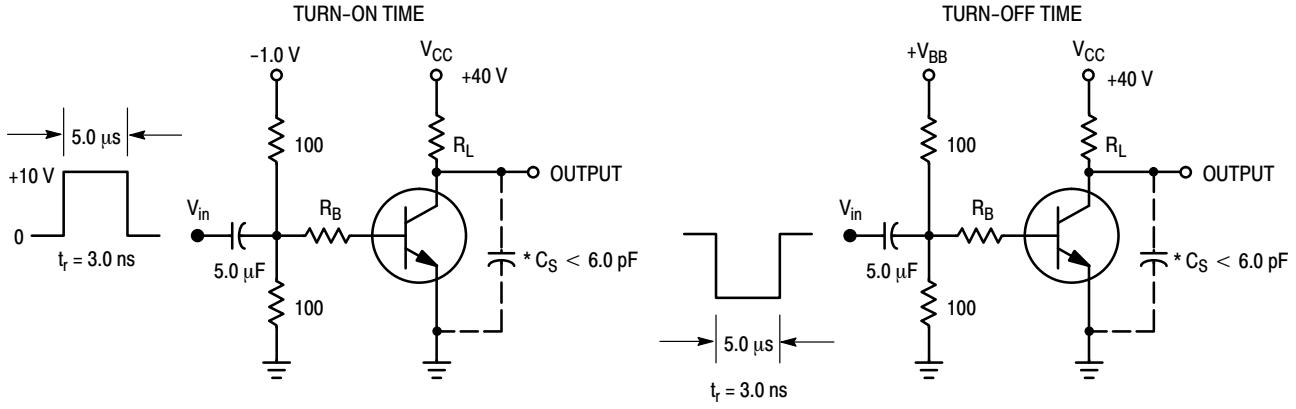
July, 2012 − Rev. 8

Publication Order Number:
MMBTA05LT1/D

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector−Emitter Breakdown Voltage (Note 3) (I_C = 1.0 mAdc, I_B = 0) MMBTA05 MMBTA06, SMMBTA06	$V_{(BR)CEO}$	 60 80	 – –	Vdc
Emitter−Base Breakdown Voltage (I_E = 100 μAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	–	Vdc
Collector Cutoff Current (V_{CE} = 60 Vdc, I_B = 0)	I_{CES}	–	0.1	μAdc
Collector Cutoff Current (V_{CB} = 60 Vdc, I_E = 0) MMBTA05 (V_{CB} = 80 Vdc, I_E = 0) MMBTA06, SMMBTA06	I_{CBO}	 – –	 0.1 0.1	μAdc
ON CHARACTERISTICS				
DC Current Gain (I_C = 10 mAdc, V_{CE} = 1.0 Vdc) (I_C = 100 mAdc, V_{CE} = 1.0 Vdc)	h_{FE}	 100 100	 – –	–
Collector−Emitter Saturation Voltage (I_C = 100 mAdc, I_B = 10 mAdc)	$V_{CE(sat)}$	–	0.25	Vdc
Base−Emitter On Voltage (I_C = 100 mAdc, V_{CE} = 1.0 Vdc)	$V_{BE(on)}$	–	1.2	Vdc
SMALL−SIGNAL CHARACTERISTICS				
Current−Gain − Bandwidth Product (Note 4) (I_C = 10 mA, V_{CE} = 2.0 V, f = 100 MHz)	f_T	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

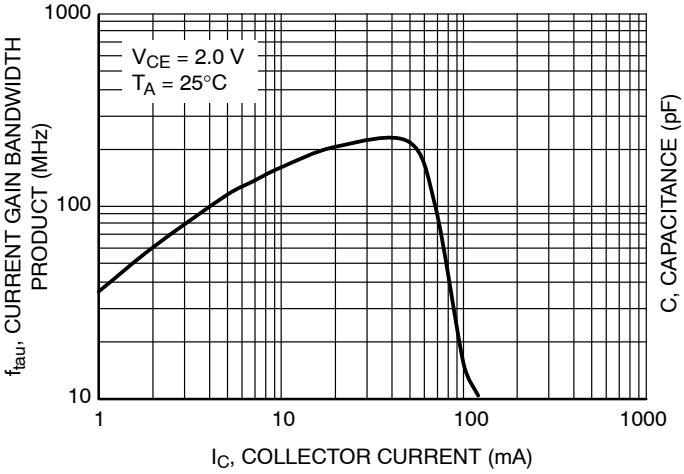


Figure 2. Current Gain Bandwidth Product vs. Collector Current

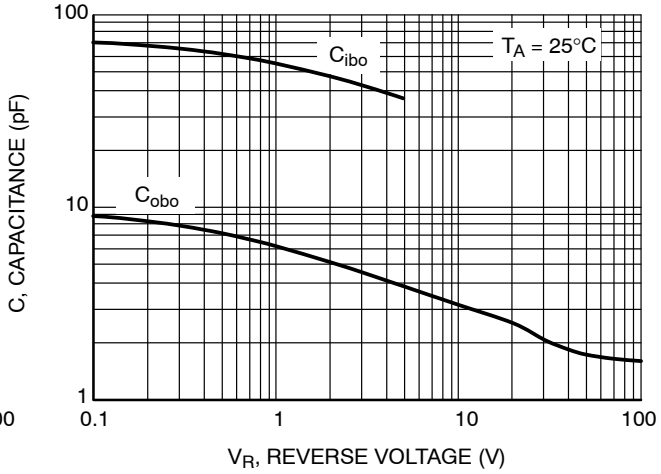


Figure 3. Capacitance

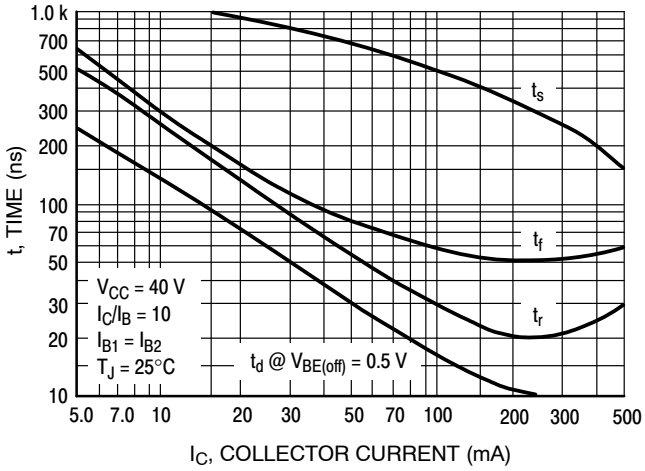


Figure 4. Switching Time

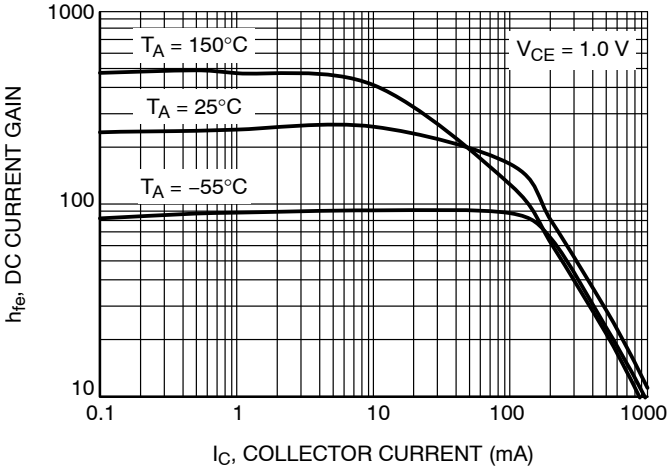


Figure 5. DC Current Gain vs. Collector Current

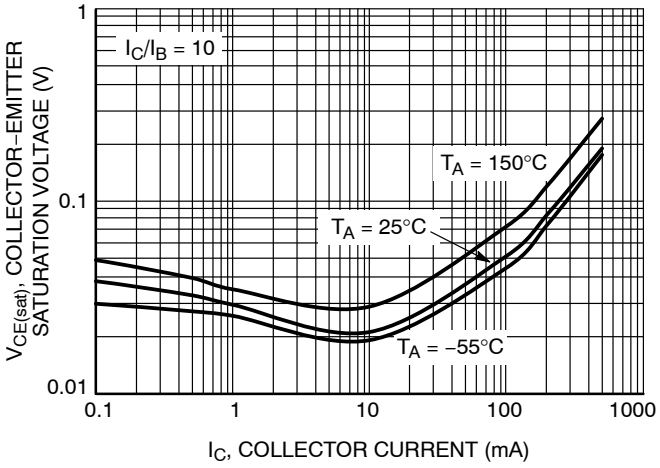


Figure 6. Collector Emitter Saturation Voltage vs. Collector Current

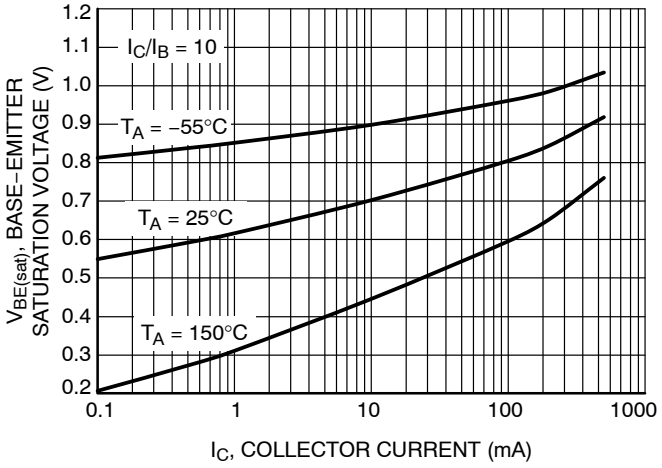


Figure 7. Base Emitter Saturation Voltage vs. Collector Current

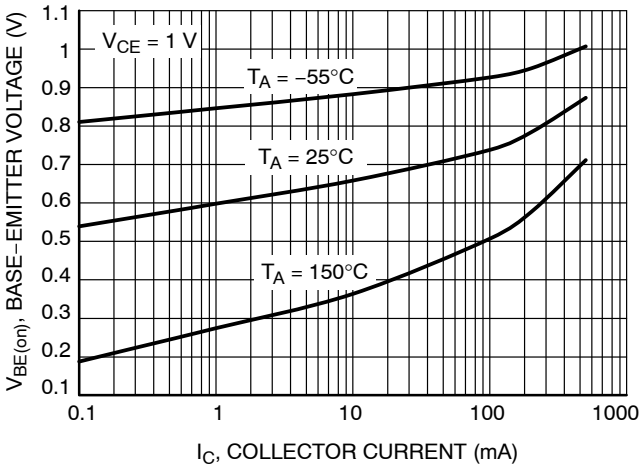


Figure 8. Base Emitter Turn−ON Voltage vs. Collector Current

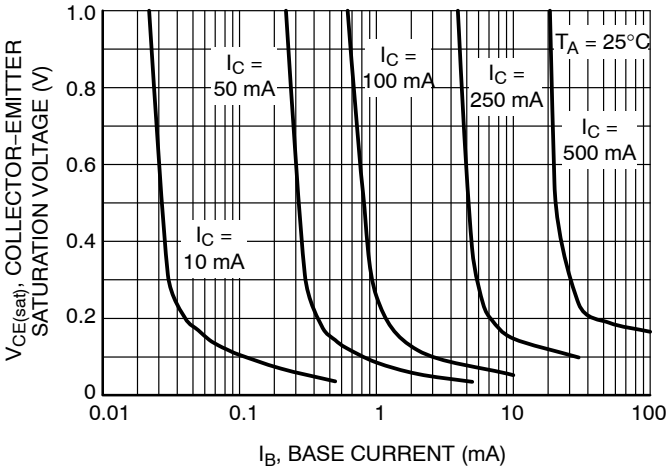


Figure 9. Saturation Region

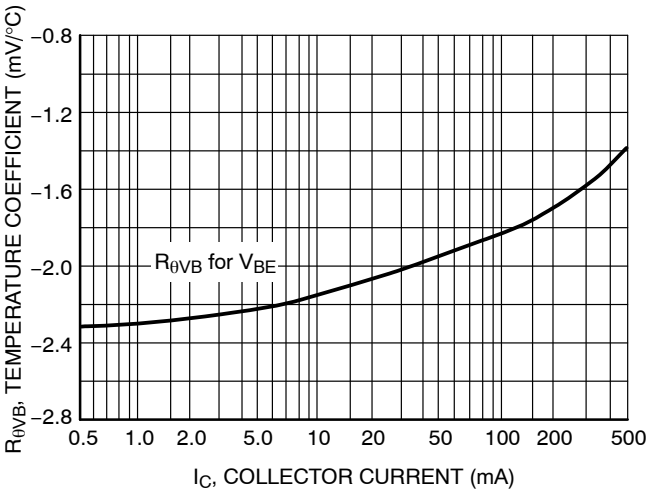


Figure 10. Base−Emitter Temperature Coefficient

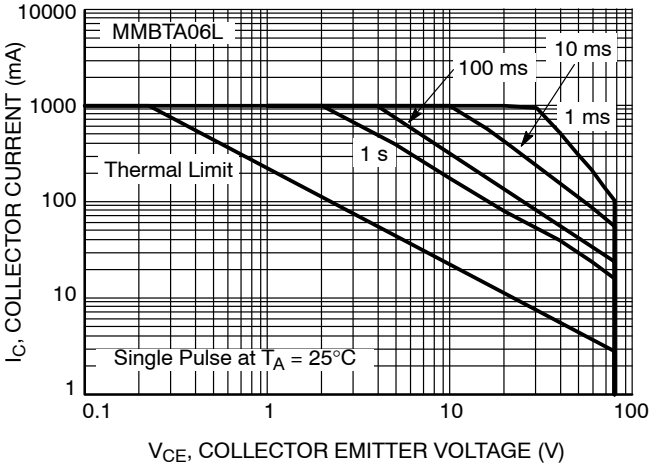


Figure 11. Safe Operating Area

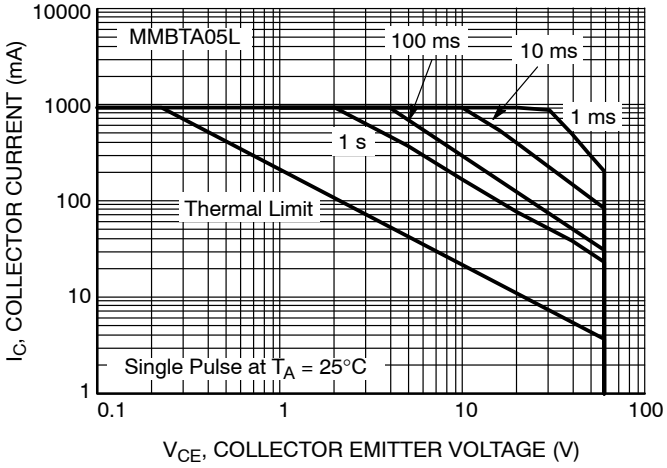


Figure 12. Safe Operating Area

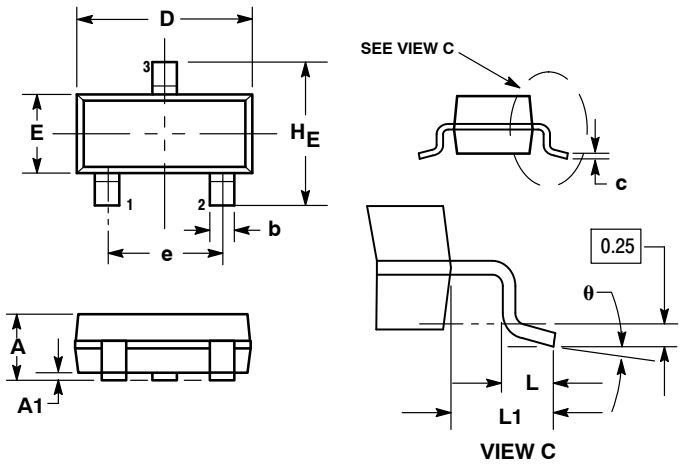
ORDERING INFORMATION

Device	Package	Shipping†
MMBTA05LT1G	SOT−23 (Pb−Free)	3000 / Tape & Reel
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.

PACKAGE DIMENSIONS

SOT−23 (TO−236)
CASE 318−08
ISSUE AP

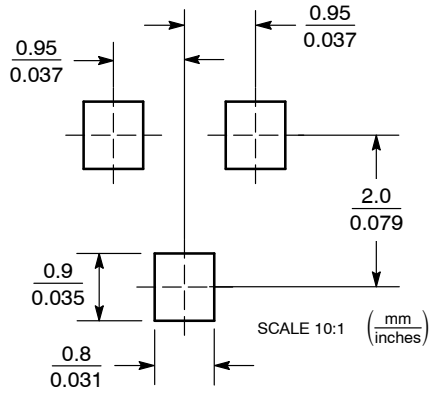


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

	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.

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