

# MMBTA42L, SMMBTA42L, MMBTA43L

## High Voltage Transistors

### NPN 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

Characteristic	Symbol	Value	Unit
Collector - Emitter Voltage MMBTA42, SMMBTA42 MMBTA43	$V_{CEO}$	300 200	Vdc
Collector - Base Voltage MMBTA42, SMMBTA42 MMBTA43	$V_{CBO}$	300 200	Vdc
Emitter - Base Voltage MMBTA42, SMMBTA42 MMBTA43	$V_{EBO}$	6.0 6.0	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	$^\circ\text{C}$

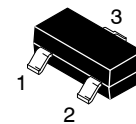
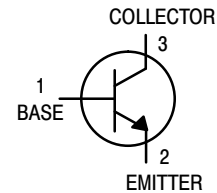
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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



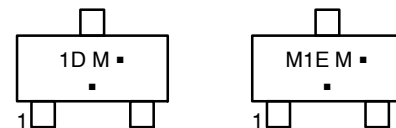
ON Semiconductor®

<http://onsemi.com>



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

#### MARKING DIAGRAMS



1D = MMBTA42LT, SMMBTA42L  
M1E = MMBTA43LT  
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.

# MMBTA42L, SMMBTA42L, MMBTA43L

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector – Emitter Breakdown Voltage (Note 3) (I <sub>C</sub> = 1.0 mA <sub>dc</sub> , I <sub>B</sub> = 0)	MMBTA42, SMMBTA42 MMBTA43	V <sub>(BR)CEO</sub>	300 200	– –	V <sub>dc</sub>
Collector – Base Breakdown Voltage (I <sub>C</sub> = 100 μA <sub>dc</sub> , I <sub>E</sub> = 0)	MMBTA42, SMMBTA42 MMBTA43	V <sub>(BR)CBO</sub>	300 200	– –	V <sub>dc</sub>
Emitter – Base Breakdown Voltage (I <sub>E</sub> = 100 μA <sub>dc</sub> , I <sub>C</sub> = 0)		V <sub>(BR)EBO</sub>	6.0	–	V <sub>dc</sub>
Collector Cutoff Current (V <sub>CB</sub> = 200 V <sub>dc</sub> , I <sub>E</sub> = 0) (V <sub>CB</sub> = 160 V <sub>dc</sub> , I <sub>E</sub> = 0)	MMBTA42, SMMBTA42 MMBTA43	I <sub>CBO</sub>	– –	0.1 0.1	μA <sub>dc</sub>
Emitter Cutoff Current (V <sub>EB</sub> = 6.0 V <sub>dc</sub> , I <sub>C</sub> = 0) (V <sub>EB</sub> = 4.0 V <sub>dc</sub> , I <sub>C</sub> = 0)	MMBTA42, SMMBTA42 MMBTA43	I <sub>EBO</sub>	– –	0.1 0.1	μA <sub>dc</sub>
<b>ON CHARACTERISTICS (Note 3)</b>					
DC Current Gain (I <sub>C</sub> = 1.0 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> ) (I <sub>C</sub> = 10 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> )  (I <sub>C</sub> = 30 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> )	Both Types Both Types MMBTA42, SMMBTA42 MMBTA43	h <sub>FE</sub>	25 40 40 40	– – – –	–
Collector – Emitter Saturation Voltage (I <sub>C</sub> = 20 mA <sub>dc</sub> , I <sub>B</sub> = 2.0 mA <sub>dc</sub> )	MMBTA42, SMMBTA42 MMBTA43	V <sub>CE(sat)</sub>	– –	0.5 0.5	V <sub>dc</sub>
Base – Emitter Saturation Voltage (I <sub>C</sub> = 20 mA <sub>dc</sub> , I <sub>B</sub> = 2.0 mA <sub>dc</sub> )		V <sub>BE(sat)</sub>	–	0.9	V <sub>dc</sub>
<b>SMALL-SIGNAL CHARACTERISTICS</b>					
Current – Gain – Bandwidth Product (I <sub>C</sub> = 10 mA <sub>dc</sub> , V <sub>CE</sub> = 20 V <sub>dc</sub> , f = 100 MHz)		f <sub>T</sub>	50	–	MHz
Collector – Base Capacitance (V <sub>CB</sub> = 20 V <sub>dc</sub> , I <sub>E</sub> = 0, f = 1.0 MHz)	MMBTA42, SMMBTA42 MMBTA43	C <sub>cb</sub>	– –	3.0 4.0	pF

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

# MMBTA42L, SMMBTA42L, MMBTA43L

## TYPICAL CHARACTERISTICS

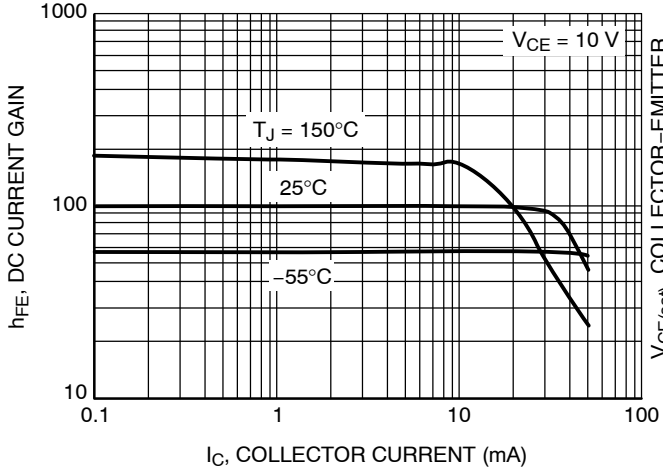


Figure 1. DC Current Gain

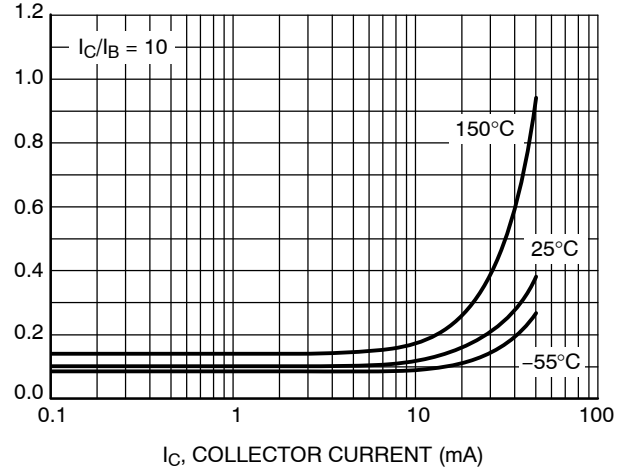


Figure 2. Collector-Emitter Saturation Voltage vs. Collector Current

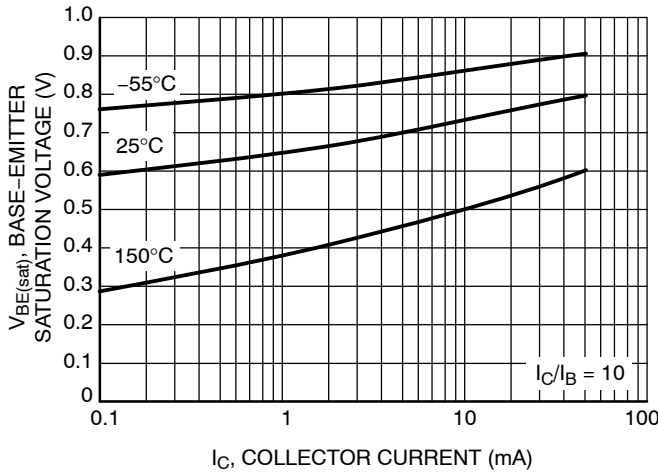


Figure 3. Base-Emitter Saturation Voltage vs. Collector Current

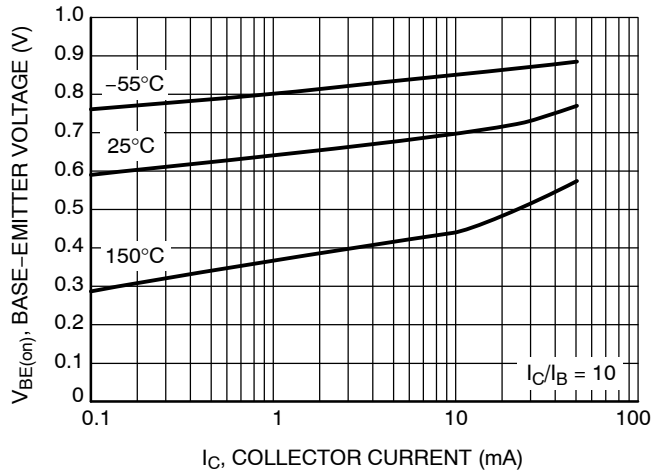


Figure 4. Base-Emitter On Voltage vs. Collector Current

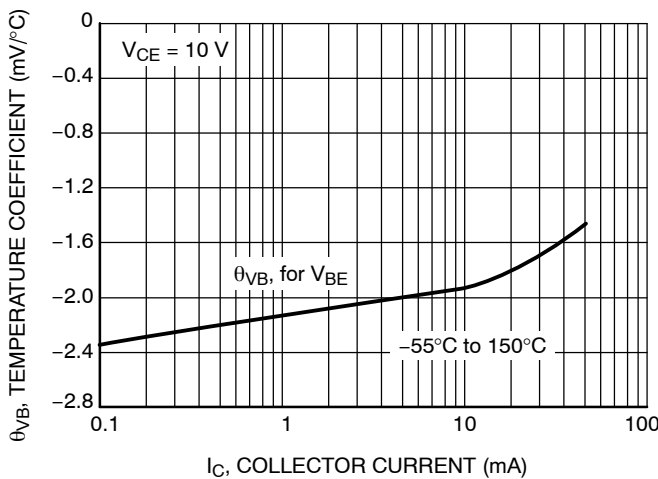


Figure 5. Base-Emitter Temperature Coefficient

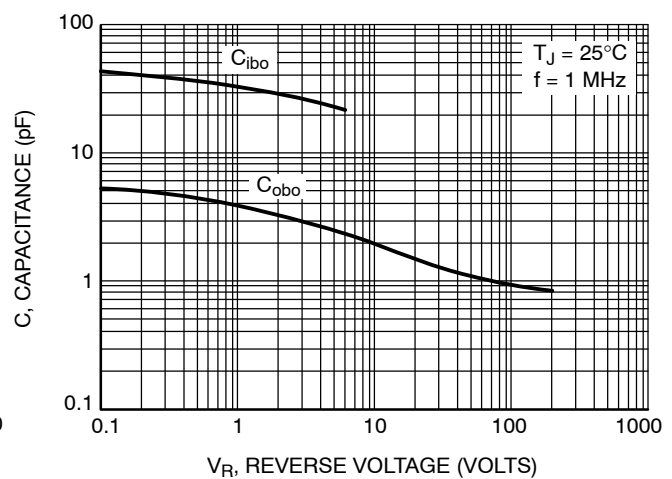


Figure 6. Capacitance

# MMBTA42L, SMMBTA42L, MMBTA43L

## TYPICAL CHARACTERISTICS

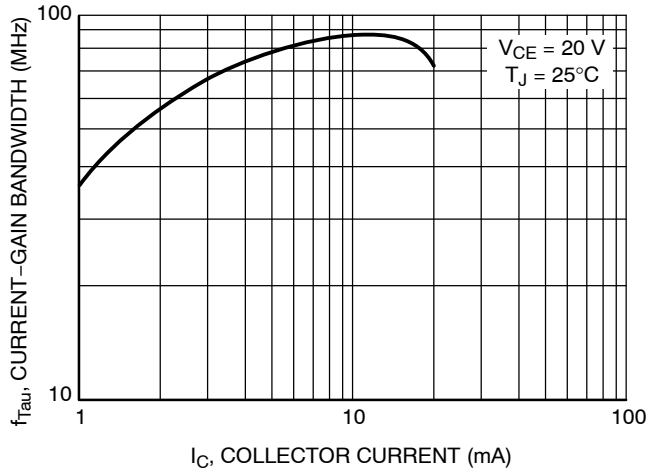


Figure 7. Current-Gain — Bandwidth Product

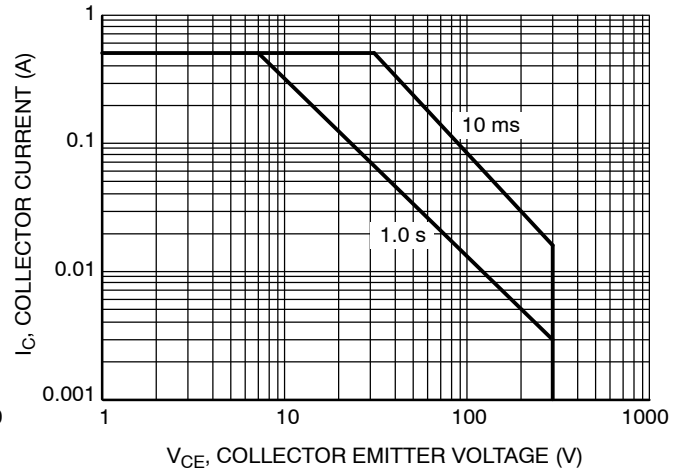


Figure 8. Safe Operating Area

# MMBTA42L, SMMBTA42L, MMBTA43L

## ORDERING INFORMATION

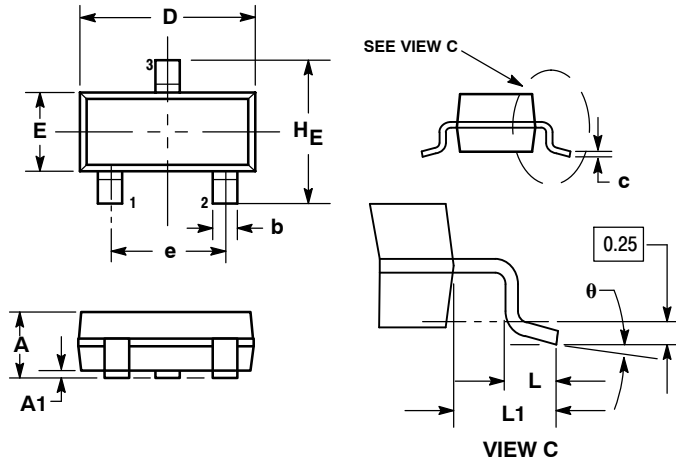
Device Order Number	Package Type	Shipping <sup>†</sup>
MMBTA42LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
SMMBTA42LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
MMBTA42LT3G	SOT-23 (Pb-Free)	10,000 / Tape & Reel
SMMBTA42LT3G	SOT-23 (Pb-Free)	10,000 / Tape & Reel
MMBTA43LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel

<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.

# MMBTA42L, SMMBTA42L, MMBTA43L

## PACKAGE DIMENSIONS

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



NOTES:

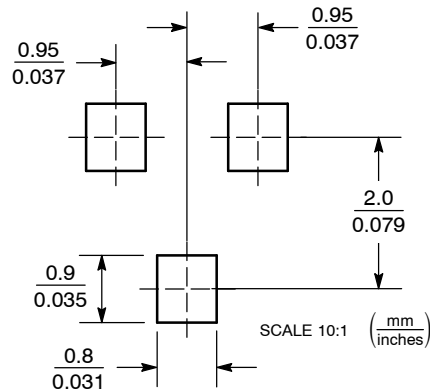
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

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\*



\*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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