

MMBTA42L, SMMBTA42L, MMBTA43L

High Voltage Transistors

NPN Silicon

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

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	mA

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board (Note 1) $T_A = 25^\circ\text{C}$ Derate above 25°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°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	$^\circ\text{C}$

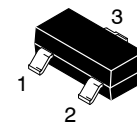
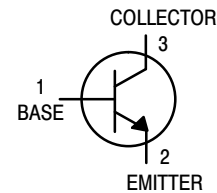
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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



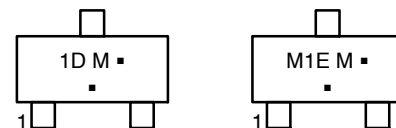
ON Semiconductor®

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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 4 of this data sheet.

MMBTA42L, SMMBTA42L, MMBTA43L

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector – Emitter Breakdown Voltage (Note 3) ($I_C = 1.0 \text{ mAdc}$, $I_B = 0$)	MMBTA42, SMMBTA42 MMBTA43	$V_{(BR)CEO}$	300 200	– –	Vdc
Collector – Base Breakdown Voltage ($I_C = 100 \mu\text{Adc}$, $I_E = 0$)	MMBTA42, SMMBTA42 MMBTA43	$V_{(BR)CBO}$	300 200	– –	Vdc
Emitter – Base Breakdown Voltage ($I_E = 100 \mu\text{Adc}$, $I_C = 0$)		$V_{(BR)EBO}$	6.0	–	Vdc
Collector Cutoff Current ($V_{CB} = 200 \text{ Vdc}$, $I_E = 0$) ($V_{CB} = 160 \text{ Vdc}$, $I_E = 0$)	MMBTA42, SMMBTA42 MMBTA43	I_{CBO}	– –	0.1 0.1	μAdc
Emitter Cutoff Current ($V_{EB} = 6.0 \text{ Vdc}$, $I_C = 0$) ($V_{EB} = 4.0 \text{ Vdc}$, $I_C = 0$)	MMBTA42, SMMBTA42 MMBTA43	I_{EBO}	– –	0.1 0.1	μAdc
ON CHARACTERISTICS (Note 3)					
DC Current Gain ($I_C = 1.0 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$) ($I_C = 10 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$) ($I_C = 30 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$)	Both Types Both Types MMBTA42, SMMBTA42 MMBTA43	h_{FE}	25 40 40 40	– – – –	–
Collector – Emitter Saturation Voltage ($I_C = 20 \text{ mAdc}$, $I_B = 2.0 \text{ mAdc}$)	MMBTA42, SMMBTA42 MMBTA43	$V_{CE(sat)}$	– –	0.5 0.5	Vdc
Base – Emitter Saturation Voltage ($I_C = 20 \text{ mAdc}$, $I_B = 2.0 \text{ mAdc}$)		$V_{BE(sat)}$	–	0.9	Vdc
SMALL – SIGNAL CHARACTERISTICS					
Current – Gain – Bandwidth Product ($I_C = 10 \text{ mAdc}$, $V_{CE} = 20 \text{ Vdc}$, $f = 100 \text{ MHz}$)		f_T	50	–	MHz
Collector – Base Capacitance ($V_{CB} = 20 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	MMBTA42, SMMBTA42 MMBTA43	C_{cb}	– –	3.0 4.0	pF

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

MMBTA42L, SMMBTA42L, MMBTA43L

TYPICAL CHARACTERISTICS

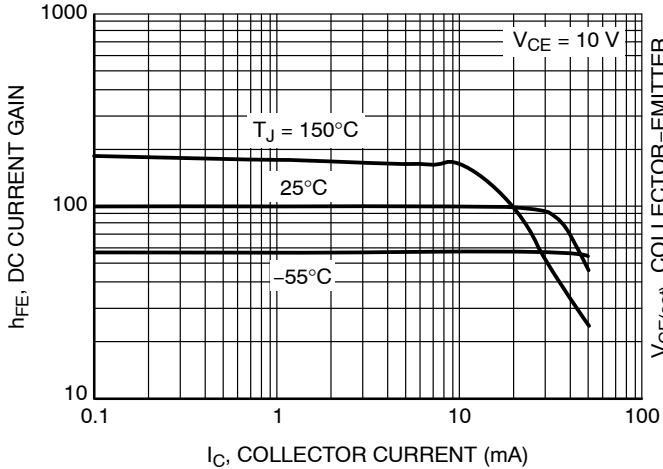


Figure 1. DC Current Gain

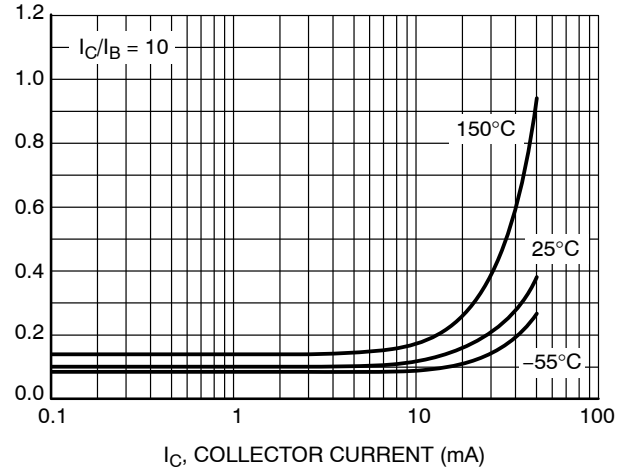


Figure 2. Collector-Emitter Saturation Voltage vs. Collector Current

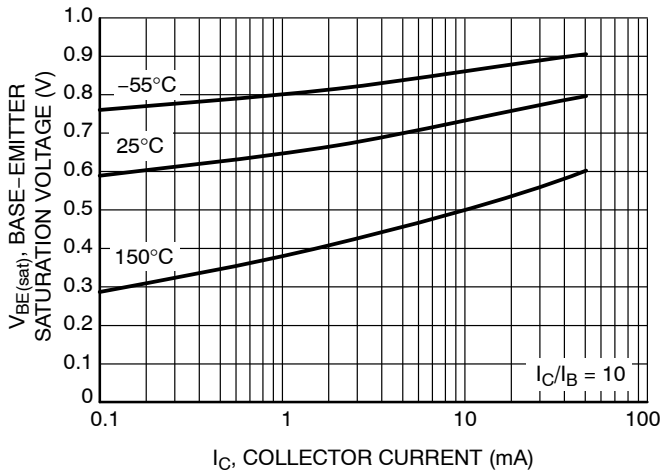


Figure 3. Base-Emitter Saturation Voltage vs. Collector Current

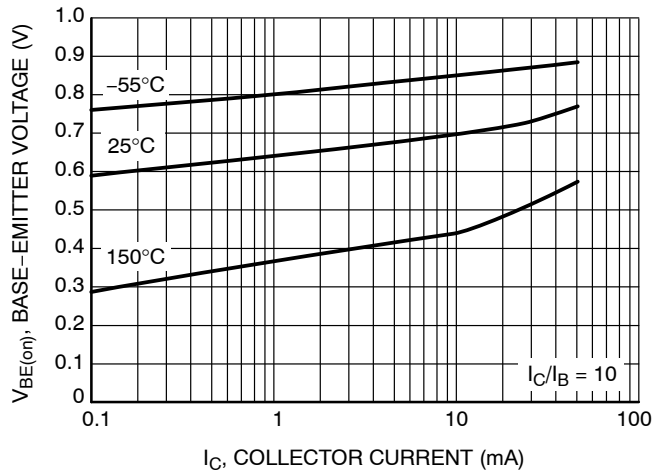


Figure 4. Base-Emitter On Voltage vs. Collector Current

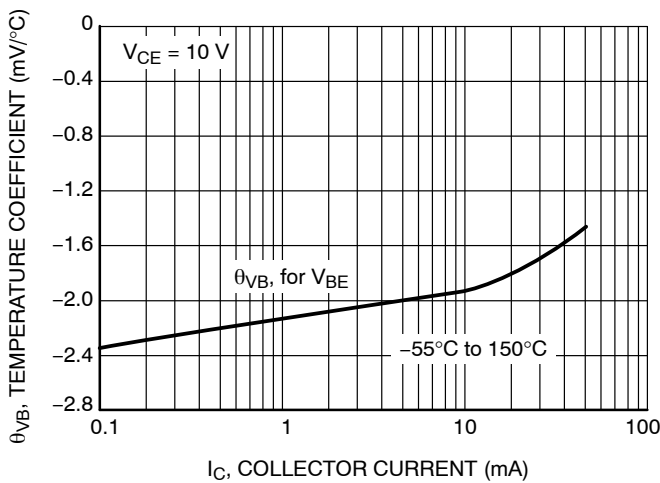


Figure 5. Base-Emitter Temperature Coefficient

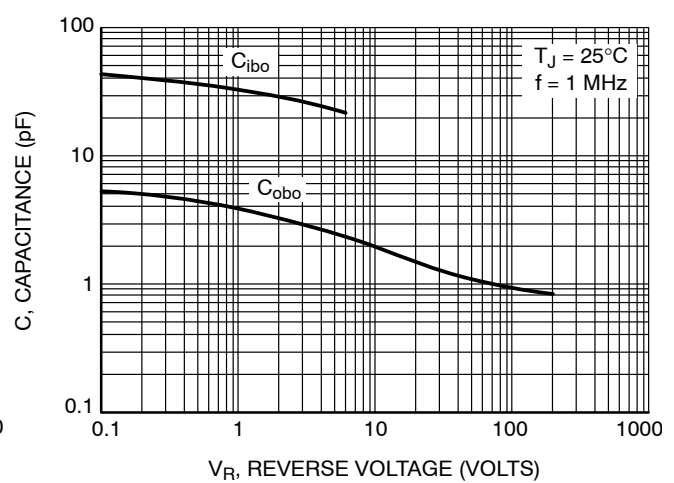


Figure 6. Capacitance

MMBTA42L, SMMBTA42L, MMBTA43L

TYPICAL CHARACTERISTICS

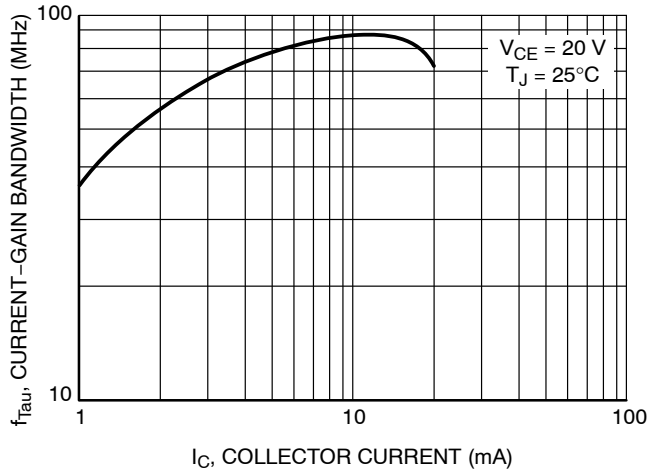


Figure 7. Current-Gain — Bandwidth Product

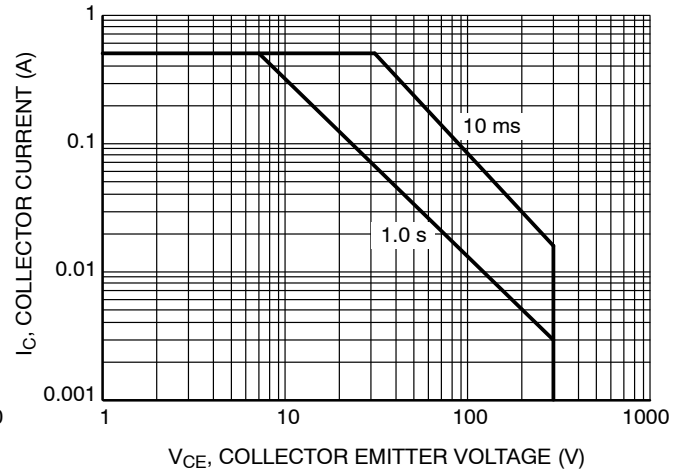


Figure 8. Safe Operating Area

ORDERING INFORMATION

Device Order Number	Package Type	Shipping [†]
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

[†]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.

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SOT-23 (TO-236)
CASE 318
ISSUE AT

DATE 01 MAR 2023

SCALE 4:1



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M,1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE 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	0.039	0.044
A1	0.01	0.06	0.10	0.000	0.002	0.004
b	0.37	0.44	0.50	0.015	0.017	0.020
c	0.08	0.14	0.20	0.003	0.006	0.008
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	0.080
L	0.30	0.43	0.55	0.012	0.017	0.022
L1	0.35	0.54	0.69	0.014	0.021	0.027
H _E	2.10	2.40	2.64	0.083	0.094	0.104
T	0°	---	10°	0°	---	10°

GENERIC MARKING DIAGRAM*



- XXX = Specific Device Code
- M = Date Code
- = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.



RECOMMENDED MOUNTING 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.

STYLES ON PAGE 2

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**MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS**



**SOT-23 (TO-236)
CASE 318
ISSUE AT**

DATE 01 MAR 2023

STYLE 1 THRU 5:
CANCELLED

STYLE 6:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

STYLE 7:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

STYLE 8:
PIN 1. ANODE
2. NO CONNECTION
3. CATHODE

STYLE 9:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 10:
PIN 1. DRAIN
2. SOURCE
3. GATE

STYLE 11:
PIN 1. ANODE
2. CATHODE
3. CATHODE-ANODE

STYLE 12:
PIN 1. CATHODE
2. CATHODE
3. ANODE

STYLE 13:
PIN 1. SOURCE
2. DRAIN
3. GATE

STYLE 14:
PIN 1. CATHODE
2. GATE
3. ANODE

STYLE 15:
PIN 1. GATE
2. CATHODE
3. ANODE

STYLE 16:
PIN 1. ANODE
2. CATHODE
3. CATHODE

STYLE 17:
PIN 1. NO CONNECTION
2. ANODE
3. CATHODE

STYLE 18:
PIN 1. NO CONNECTION
2. CATHODE
3. ANODE

STYLE 19:
PIN 1. CATHODE
2. ANODE
3. CATHODE-ANODE

STYLE 20:
PIN 1. CATHODE
2. ANODE
3. GATE

STYLE 21:
PIN 1. GATE
2. SOURCE
3. DRAIN

STYLE 22:
PIN 1. RETURN
2. OUTPUT
3. INPUT

STYLE 23:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 24:
PIN 1. GATE
2. DRAIN
3. SOURCE

STYLE 25:
PIN 1. ANODE
2. CATHODE
3. GATE

STYLE 26:
PIN 1. CATHODE
2. ANODE
3. NO CONNECTION

STYLE 27:
PIN 1. CATHODE
2. CATHODE
3. CATHODE

STYLE 28:
PIN 1. ANODE
2. ANODE
3. ANODE

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