

High Voltage Transistors

PNP Silicon

MMBTA92L, SMMBTA92L, MMBTA93L

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

Rating	Symbol	92	93	Unit
Collector – Emitter Voltage	V_{CEO}	-300	-200	Vdc
Collector – Base Voltage	V_{CBO}	-300	-200	Vdc
Emitter – Base Voltage	V_{EBO}	-5.0	-5.0	Vdc
Collector Current – Continuous	I_C	-500		mAdc

DEVICE MARKING

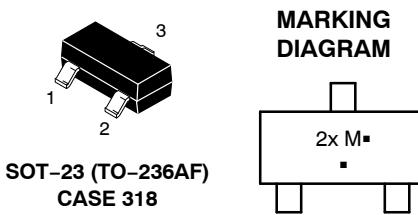
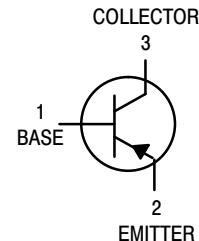
MMBTA92L, SMMBTA92L = 2D; MMBTA93LT1 = 2E

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 (Note 2) Alumina Substrate, ⁽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.



2x = 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

Device	Package	Shipping [†]
MMBTA92LT1G	SOT-23 (Pb-Free)	3000 / Tape & Reel
SMMBTA92LT1G	SOT-23 (Pb-Free)	3000 / Tape & Reel
MMBTA92LT3G	SOT-23 (Pb-Free)	10000 / Tape & Reel
SMMBTA92LT3G	SOT-23 (Pb-Free)	10000 / Tape & Reel
MMBTA93LT1G	SOT-23 (Pb-Free)	3000 / 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.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector – Emitter Breakdown Voltage (Note 3) ($I_C = -1.0 \text{ mA}_\text{dc}$, $I_B = 0$)	$V_{(\text{BR})\text{CEO}}$	-300 -200	–	Vdc
Collector – Base Breakdown Voltage ($I_C = -100 \mu\text{A}_\text{dc}$, $I_E = 0$)	$V_{(\text{BR})\text{CBO}}$	-300 -200	–	Vdc
Emitter – Base Breakdown Voltage ($I_E = -100 \mu\text{A}_\text{dc}$, $I_C = 0$)	$V_{(\text{BR})\text{EBO}}$	-5.0	–	Vdc
Collector Cutoff Current ($V_{CB} = -200 \text{ Vdc}$, $I_E = 0$) ($V_{CB} = -160 \text{ Vdc}$, $I_E = 0$)	I_{CBO}	– –	-0.25 -0.25	μA_dc
Emitter Cutoff Current ($V_{EB} = -3.0 \text{ Vdc}$, $I_C = 0$)	I_{EBO}	–	-0.1	μA_dc
ON CHARACTERISTICS (Note 3)				
DC Current Gain ($I_C = -1.0 \text{ mA}_\text{dc}$, $V_{CE} = -10 \text{ Vdc}$) ($I_C = -10 \text{ mA}_\text{dc}$, $V_{CE} = -10 \text{ Vdc}$)	h_{FE}	25 40	–	–
($I_C = -30 \text{ mA}_\text{dc}$, $V_{CE} = -10 \text{ Vdc}$)		25 25	– –	Vdc
Collector – Emitter Saturation Voltage ($I_C = -20 \text{ mA}_\text{dc}$, $I_B = -2.0 \text{ mA}_\text{dc}$)	$V_{CE(\text{sat})}$	– –	-0.5 -0.5	Vdc
Base – Emitter Saturation Voltage ($I_C = -20 \text{ mA}_\text{dc}$, $I_B = -2.0 \text{ mA}_\text{dc}$)	$V_{BE(\text{sat})}$	–	-0.9	Vdc
SMALL-SIGNAL CHARACTERISTICS				
Current – Gain — Bandwidth Product ($I_C = -10 \text{ mA}_\text{dc}$, $V_{CE} = -20 \text{ Vdc}$, $f = 100 \text{ MHz}$)	f_T	50	–	MHz
Collector – Base Capacitance ($V_{CB} = -20 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	C_{cb}	– –	6.0 8.0	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 $\leq 2.0\%$.

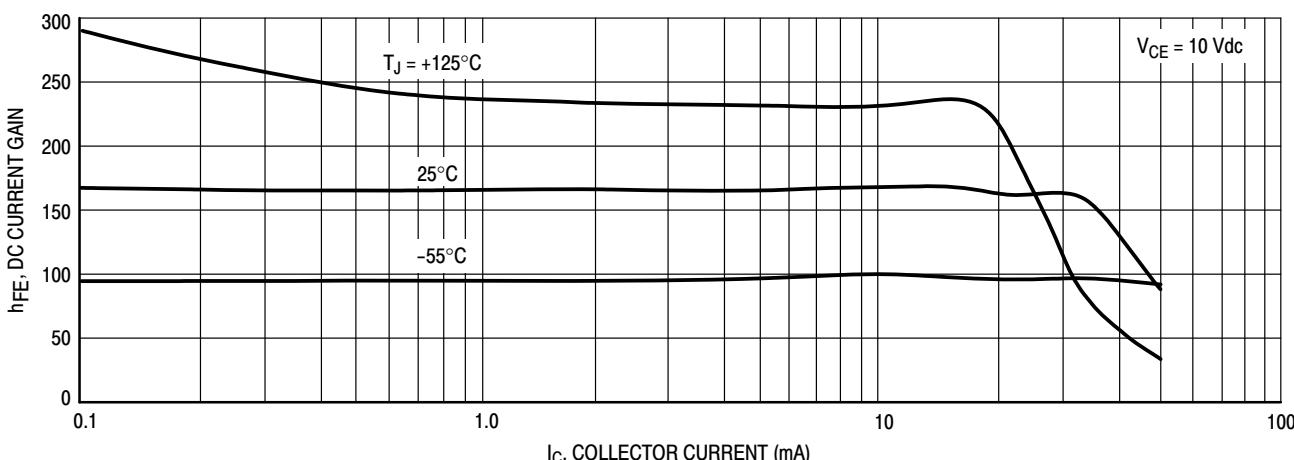


Figure 1. DC Current Gain

MMBTA92L, SMMBTA92L, MMBTA93L

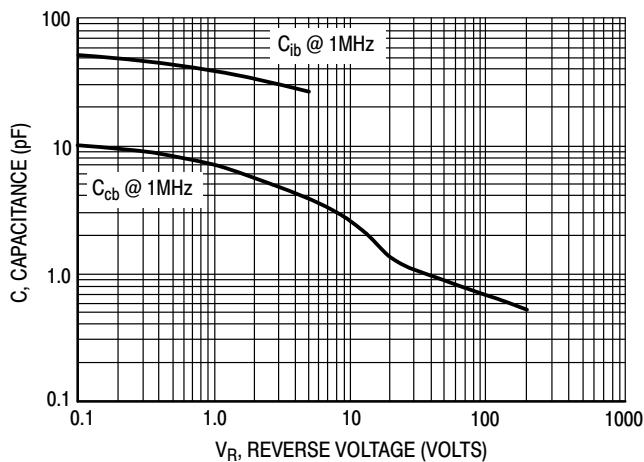


Figure 2. Capacitance

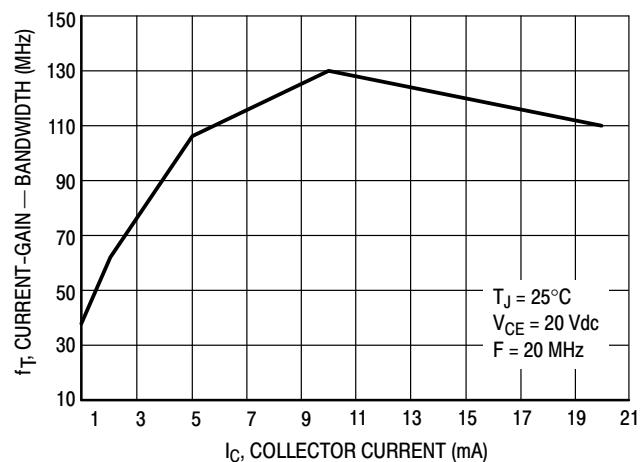


Figure 3. Current-Gain – Bandwidth

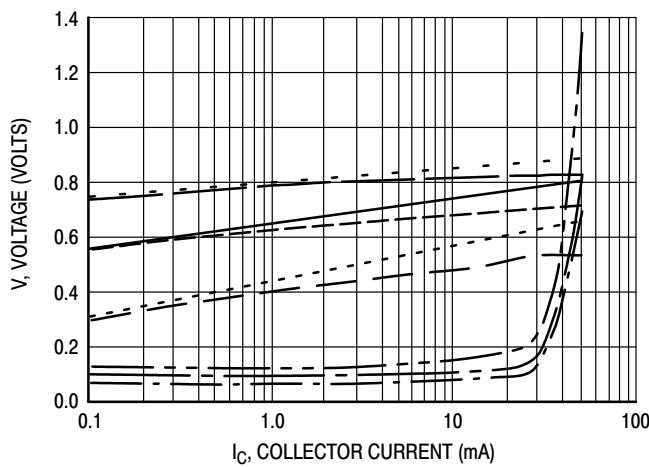


Figure 4. "ON" Voltages

— $V_{CE(sat)}$ @ 25°C , $I_C/I_B = 10$
 — $V_{CE(sat)}$ @ 125°C , $I_C/I_B = 10$
 — $V_{CE(sat)}$ @ -55°C , $I_C/I_B = 10$
 - - - $V_{BE(sat)}$ @ 25°C , $I_C/I_B = 10$
 - - - $V_{BE(sat)}$ @ 125°C , $I_C/I_B = 10$
 - - - $V_{BE(sat)}$ @ -55°C , $I_C/I_B = 10$
 - - - $V_{BE(on)}$ @ 25°C , $V_{CE} = 10$ V
 - - - $V_{BE(on)}$ @ 125°C , $V_{CE} = 10$ V
 - - - $V_{BE(on)}$ @ -55°C , $V_{CE} = 10$ V

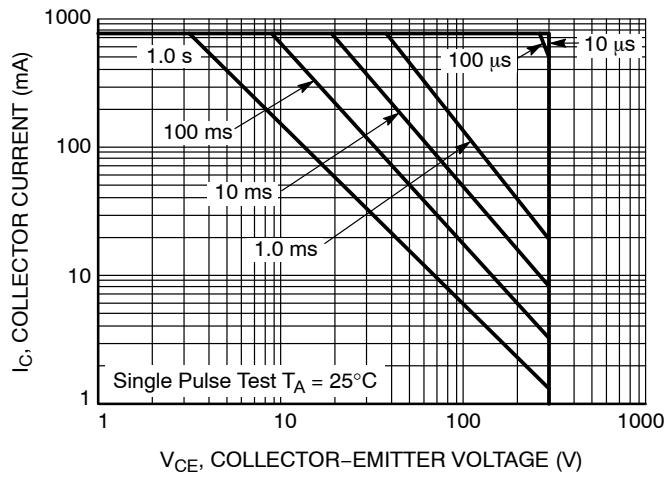


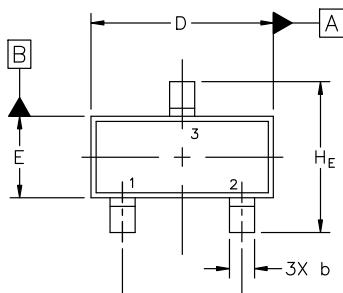
Figure 5. Safe Operating Area



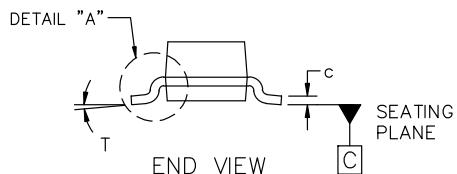
SCALE 4:1

SOT-23 (TO-236) 2.90x1.30x1.00 1.90P
CASE 318
ISSUE AU

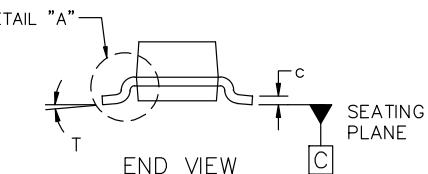
DATE 14 AUG 2024



TOP VIEW



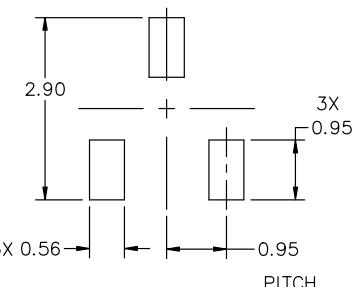
SIDE VIEW

DETAIL "A"
Scale 3:1

MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.89	1.00	1.11
A1	0.01	0.06	0.10
b	0.37	0.44	0.50
c	0.08	0.14	0.20
D	2.80	2.90	3.04
E	1.20	1.30	1.40
e	1.78	1.90	2.04
L	0.30	0.43	0.55
L1	0.35	0.54	0.69
HE	2.10	2.40	2.64
T	0°	---	10°

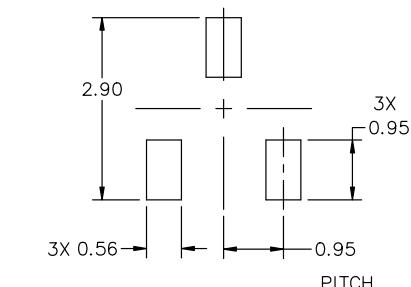
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSIONS: 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.

GENERAL
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 onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

STYLES ON PAGE 2

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STYLE 1 THRU 5:
CANCELLEDSTYLE 6:
PIN 1. BASE
2. Emitter
3. CollectorSTYLE 7:
PIN 1. Emitter
2. Base
3. CollectorSTYLE 8:
PIN 1. Anode
2. No Connection
3. CathodeSTYLE 9:
PIN 1. Anode
2. Anode
3. CathodeSTYLE 10:
PIN 1. Drain
2. Source
3. GateSTYLE 11:
PIN 1. Anode
2. Cathode
3. Cathode-AnodeSTYLE 12:
PIN 1. Cathode
2. Cathode
3. AnodeSTYLE 13:
PIN 1. Source
2. Drain
3. GateSTYLE 14:
PIN 1. Cathode
2. Gate
3. AnodeSTYLE 15:
PIN 1. Gate
2. Cathode
3. AnodeSTYLE 16:
PIN 1. Anode
2. Cathode
3. CathodeSTYLE 17:
PIN 1. No Connection
2. Anode
3. CathodeSTYLE 18:
PIN 1. No Connection
2. Cathode
3. AnodeSTYLE 19:
PIN 1. Cathode
2. Anode
3. Cathode-AnodeSTYLE 20:
PIN 1. Cathode
2. Anode
3. GateSTYLE 21:
PIN 1. Gate
2. Source
3. DrainSTYLE 22:
PIN 1. Return
2. Output
3. InputSTYLE 23:
PIN 1. Anode
2. Anode
3. CathodeSTYLE 24:
PIN 1. Gate
2. Drain
3. SourceSTYLE 25:
PIN 1. Anode
2. Cathode
3. GateSTYLE 26:
PIN 1. Cathode
2. Anode
3. No ConnectionSTYLE 27:
PIN 1. Cathode
2. Cathode
3. CathodeSTYLE 28:
PIN 1. Anode
2. Anode
3. Anode

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