

MMBTA92L, SMMBTA92L, MMBTA93L

High Voltage Transistors

PNP Silicon



ON Semiconductor®

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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

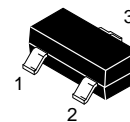
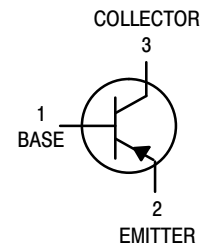
MMBTA92L, SMMBTA92L = 2D; MMBTA93LT1 = 2E

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	mW
		1.8	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	mW
		2.4	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	$^\circ\text{C}$

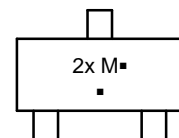
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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.



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

MARKING DIAGRAM



- 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.

MMBTA92L, SMMBTA92L, MMBTA93L

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

Characteristic	Symbol	Min	Max	Unit	
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage (Note 3) ($I_C = -1.0\text{ mA}$, $I_B = 0$)	MMBTA92, SMMBTA92 MMBTA93	$V_{(BR)CEO}$	-300 -200	-	Vdc
Collector–Base Breakdown Voltage ($I_C = -100\text{ }\mu\text{A}$, $I_E = 0$)	MMBTA92, SMMBTA92 MMBTA93	$V_{(BR)CBO}$	-300 -200	-	Vdc
Emitter–Base Breakdown Voltage ($I_E = -100\text{ }\mu\text{A}$, $I_C = 0$)		$V_{(BR)EBO}$	-5.0	-	Vdc
Collector Cutoff Current ($V_{CB} = -200\text{ Vdc}$, $I_E = 0$) ($V_{CB} = -160\text{ Vdc}$, $I_E = 0$)	MMBTA92, SMMBTA92 MMBTA93	I_{CBO}	-	-0.25 -0.25	μA
Emitter Cutoff Current ($V_{EB} = -3.0\text{ Vdc}$, $I_C = 0$)		I_{EBO}	-	-0.1	μA

ON CHARACTERISTICS (Note 3)

DC Current Gain ($I_C = -1.0\text{ mA}$, $V_{CE} = -10\text{ Vdc}$) ($I_C = -10\text{ mA}$, $V_{CE} = -10\text{ Vdc}$) ($I_C = -30\text{ mA}$, $V_{CE} = -10\text{ Vdc}$)	Both Types Both Types MMBTA92, SMMBTA92 MMBTA93	h_{FE}	25 40 25 25	- - - -	-
Collector–Emitter Saturation Voltage ($I_C = -20\text{ mA}$, $I_B = -2.0\text{ mA}$)	MMBTA92, SMMBTA92 MMBTA93	$V_{CE(sat)}$	- -	-0.5 -0.5	Vdc
Base–Emitter Saturation Voltage ($I_C = -20\text{ mA}$, $I_B = -2.0\text{ mA}$)		$V_{BE(sat)}$	-	-0.9	Vdc

SMALL–SIGNAL CHARACTERISTICS

Current–Gain — Bandwidth Product ($I_C = -10\text{ mA}$, $V_{CE} = -20\text{ Vdc}$, $f = 100\text{ MHz}$)		f_T	50	-	MHz
Collector–Base Capacitance ($V_{CB} = -20\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	MMBTA92, SMMBTA92 MMBTA93	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 $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2.0\%$.

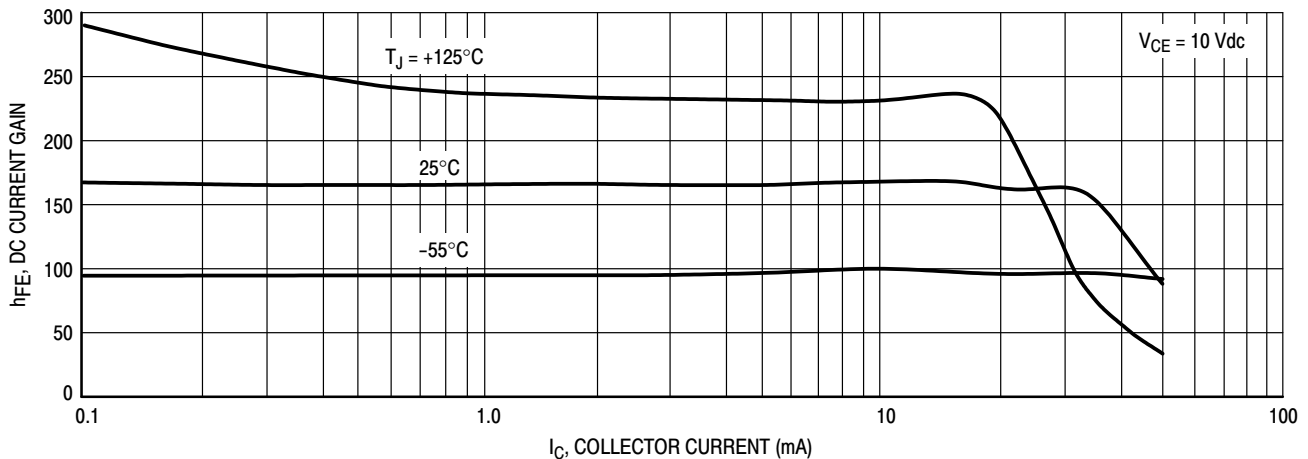


Figure 1. DC Current Gain

MMBTA92L, SMMBTA92L, MMBTA93L

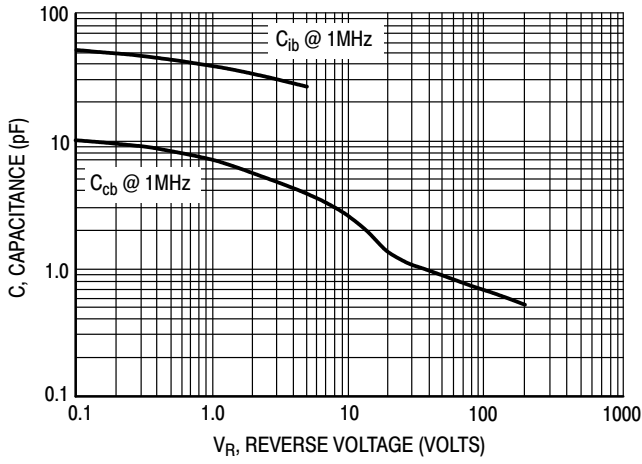


Figure 2. Capacitance

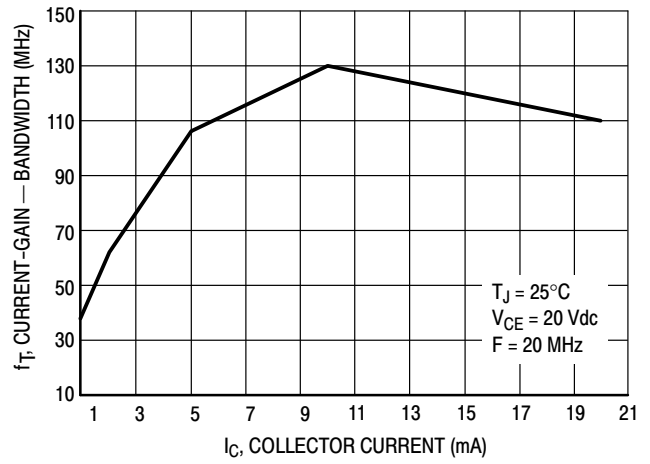


Figure 3. Current-Gain - Bandwidth

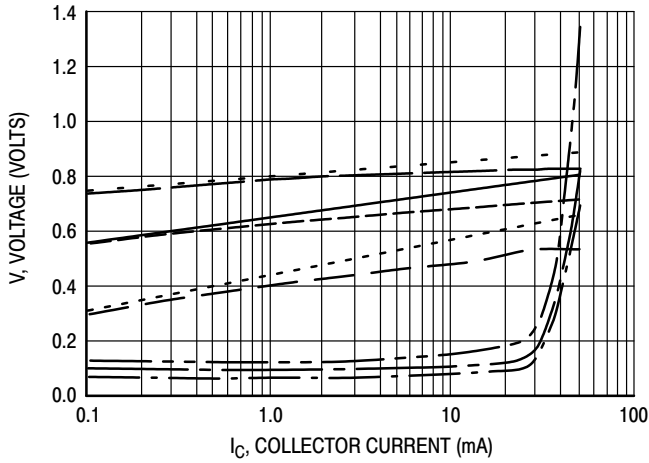


Figure 4. "ON" Voltages

- $V_{CE(sat)}$ @ 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 , $V_{CE} = 10\text{ V}$
- $V_{BE(on)}$ @ 125°C , $V_{CE} = 10\text{ V}$
- $V_{BE(on)}$ @ -55°C , $V_{CE} = 10\text{ V}$

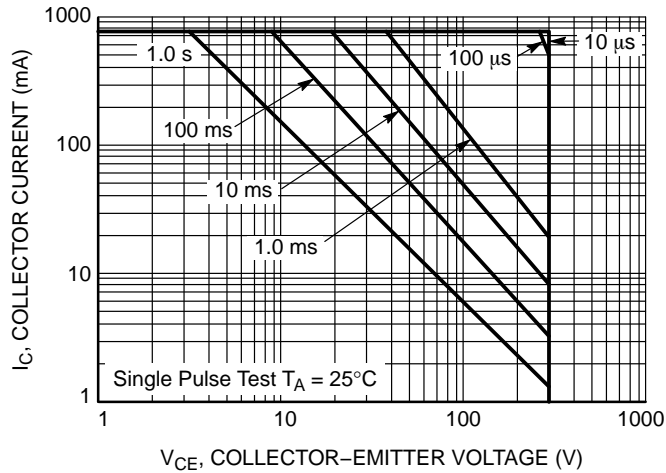
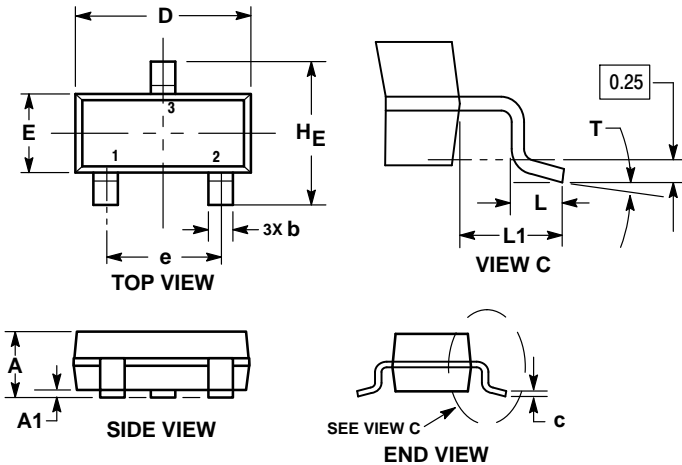


Figure 5. Safe Operating Area

MMBTA92L, SMMBTA92L, MMBTA93L

PACKAGE DIMENSIONS

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

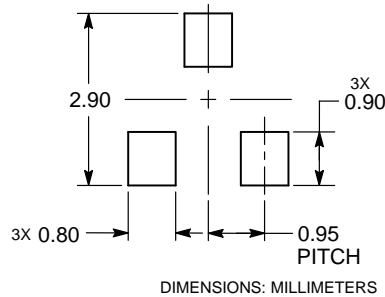


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETERS.
 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
 4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

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
HE	2.10	2.40	2.64	0.083	0.094	0.104
T	0°	---	10°	0°	---	10°

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

RECOMMENDED 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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