MMBTA92L, SMMBTA92L, MMBTA93L

High Voltage Transistors

PNP Silicon

ON Semiconductor®

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) $T_A = 25°C$	P_D	225	mW
Derate above 25°C		1.8	mW/°C
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	556	°C/W
Total Device Dissipation (Note 2) Alumina Substrate,[2] $T_A = 25°C$	P_D	300	mW
Derate above 25°C		2.4	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 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.

COLLECTOR
3

1
BASE

2
EMITTER
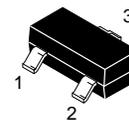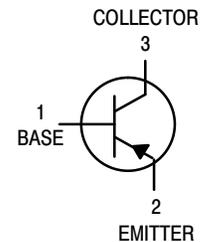
SOT−23 (TO−236AF)
CASE 318
STYLE 6

MARKING DIAGRAM

2x M■
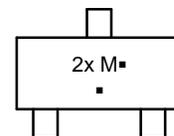
2x = Specific Device Code
M = Date Code*
■ = Pb−Free Package

(*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.

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) MMBTA92, SMMBTA92 MMBTA93		$V_{(BR)CEO}$	−300 −200	− −	Vdc
Collector–Base Breakdown Voltage (I_C = −100 μAdc, I_E = 0) MMBTA92, SMMBTA92 MMBTA93		$V_{(BR)CBO}$	−300 −200	− −	Vdc
Emitter–Base Breakdown Voltage (I_E = −100 μAdc, I_C = 0)		$V_{(BR)EBO}$	−5.0	−	Vdc
Collector Cutoff Current (V_{CB} = −200 Vdc, I_E = 0) MMBTA92, SMMBTA92 (V_{CB} = −160 Vdc, I_E = 0) MMBTA93		I_{CBO}	− −	−0.25 −0.25	μAdc
Emitter Cutoff Current (V_{EB} = −3.0 Vdc, I_C = 0)		I_{EBO}	−	−0.1	μAdc
ON CHARACTERISTICS (Note 3)					
DC Current Gain (I_C = −1.0 mAdc, V_{CE} = −10 Vdc) Both Types (I_C = −10 mAdc, V_{CE} = −10 Vdc) Both Types (I_C = −30 mAdc, V_{CE} = −10 Vdc) MMBTA92, SMMBTA92 MMBTA93		h_{FE}	25 40 25 25	− − − −	−
Collector–Emitter Saturation Voltage (I_C = −20 mAdc, I_B = −2.0 mAdc) MMBTA92, SMMBTA92 MMBTA93		$V_{CE(sat)}$	− −	−0.5 −0.5	Vdc
Base–Emitter Saturation Voltage (I_C = −20 mAdc, I_B = −2.0 mAdc)		$V_{BE(sat)}$	−	−0.9	Vdc
SMALL–SIGNAL CHARACTERISTICS					
Current–Gain — Bandwidth Product (I_C = −10 mAdc, V_{CE} = −20 Vdc, f = 100 MHz)		f_T	50	−	MHz
Collector–Base Capacitance (V_{CB} = −20 Vdc, I_E = 0, f = 1.0 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 ≤ 300 μs, Duty Cycle ≤ 2.0%.
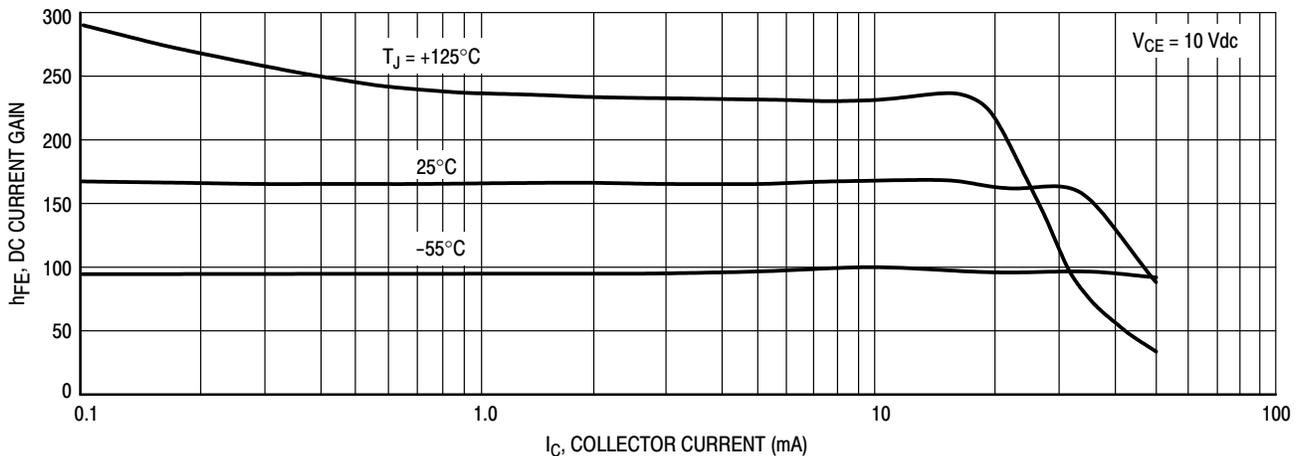
Figure 1. DC Current Gain

MMBTA92L, SMMBTA92L, MMBTA93L
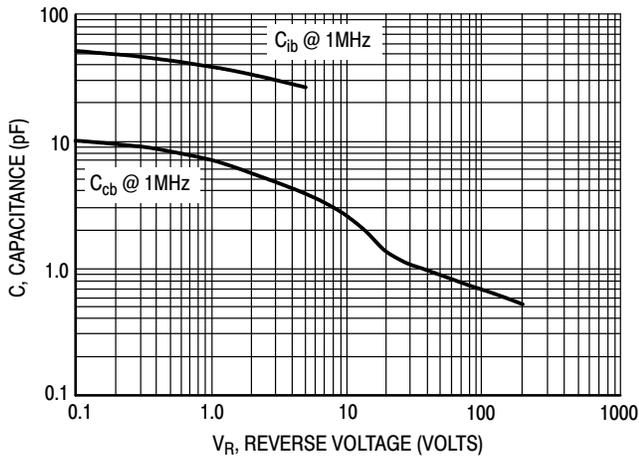
Figure 2. Capacitance
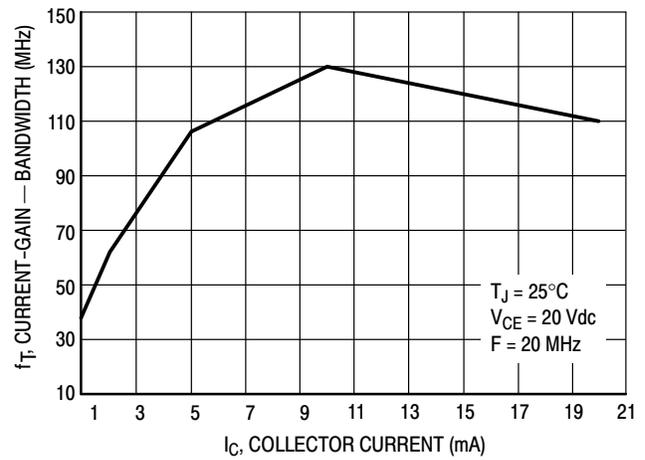
Figure 3. Current−Gain − Bandwidth

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
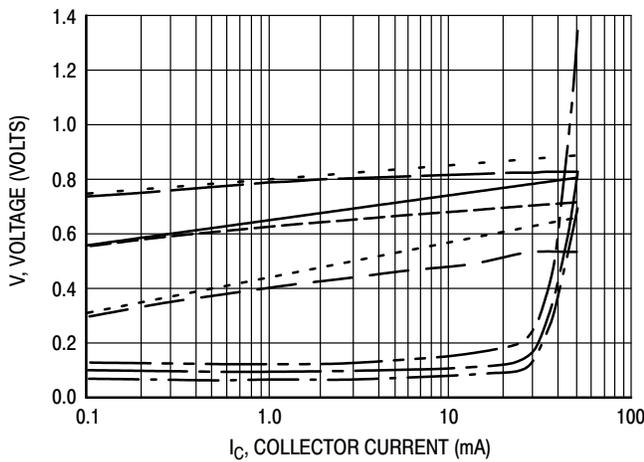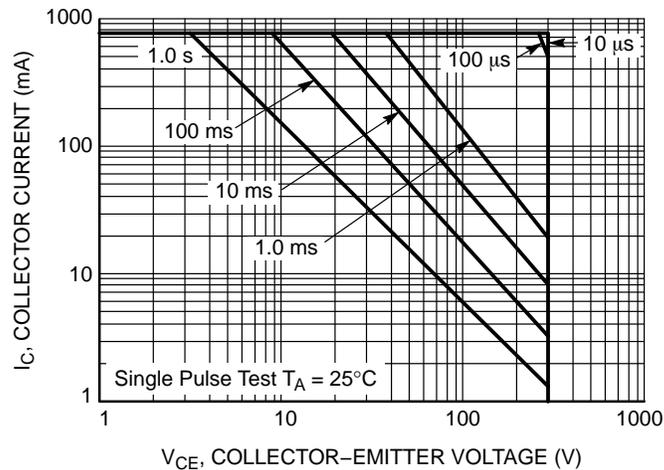
Figure 5. Safe Operating Area
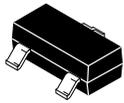
SOT−23 (TO−236)
CASE 318
ISSUE AT

DATE 01 MAR 2023

SCALE 4:1

TOP VIEW

DETAIL A

SIDE VIEW

DETAIL A

END VIEW
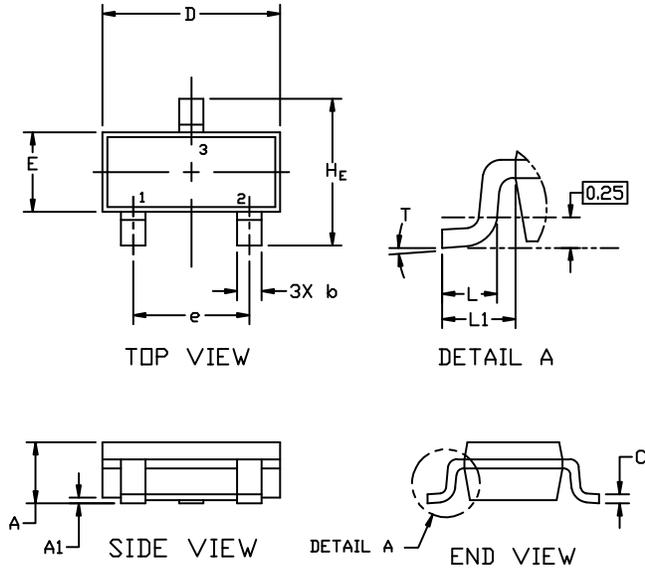
NOTES:

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***

XXXM▪

1
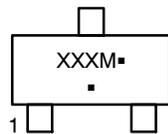
XXX = Specific Device Code
M   = Date Code
▪   = Pb−Free Package

*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.

2.90

3X
0.95

3X 0.56

0.95

PITCH
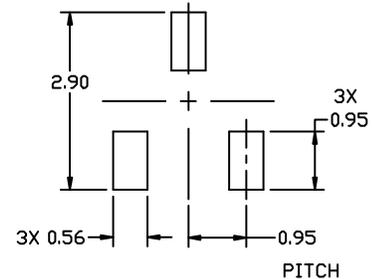
**RECOMMENDED
MOUNTING FOOTPRINT**

✴ 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

DOCUMENT NUMBER:	98ASB42226B	
DESCRIPTION:	SOT−23 (TO−236)	PAGE 1 OF 2

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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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PUBLICATION ORDERING INFORMATION

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