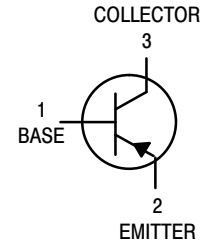


High Voltage Transistors

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

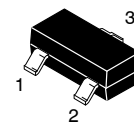
MMBTA92L, SMMBTA92L = 2D; MMBTA93LT1 = 2E

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 | 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 | $^\circ\text{C}$ |

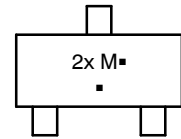
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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 $\leq 2.0\%$.

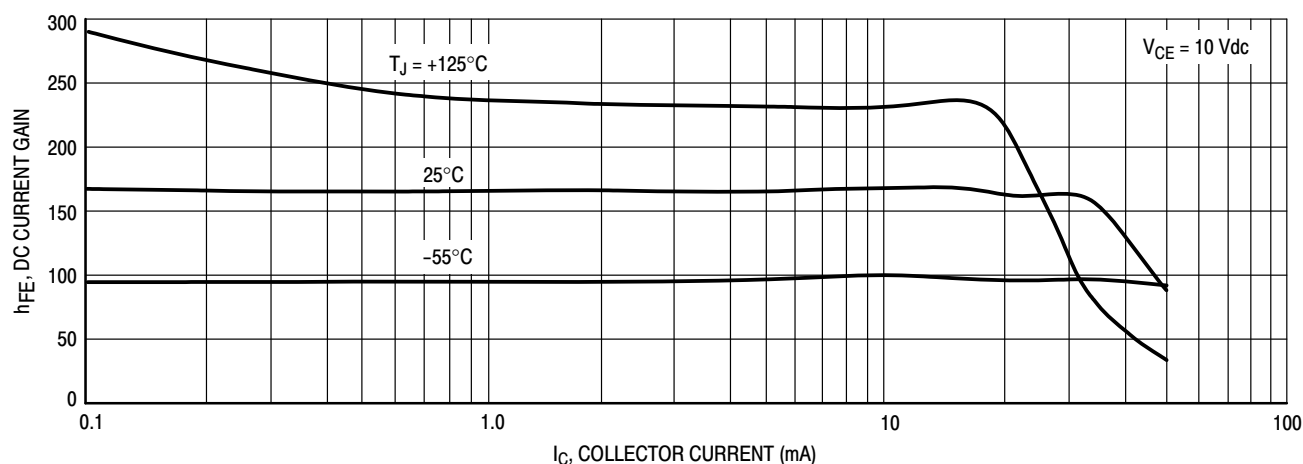


Figure 1. DC Current Gain

MMBTA92L, SMMBTA92L, MMBTA93L

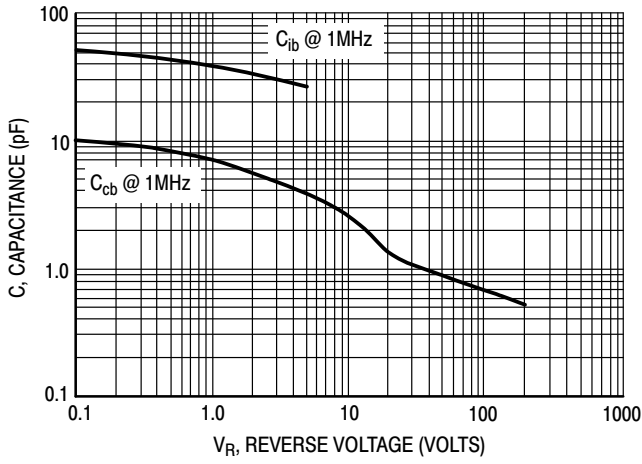


Figure 2. Capacitance

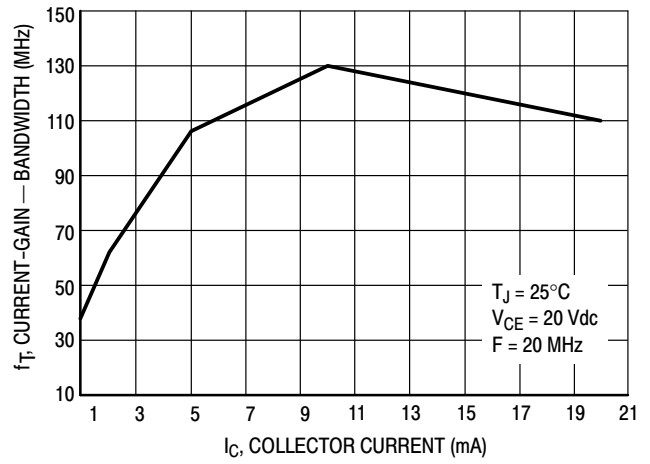


Figure 3. Current-Gain - Bandwidth

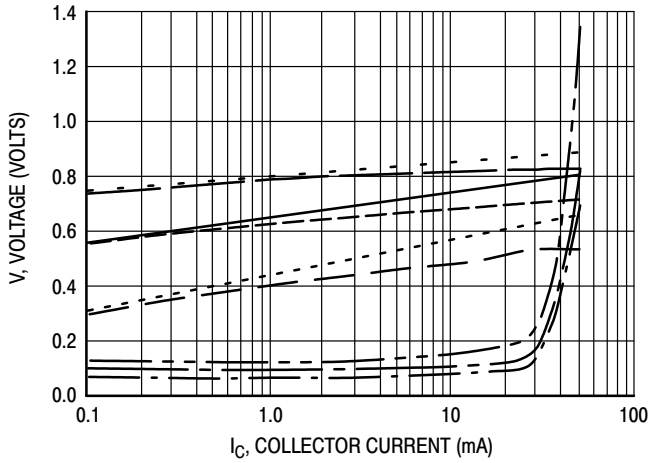


Figure 4. "ON" Voltages

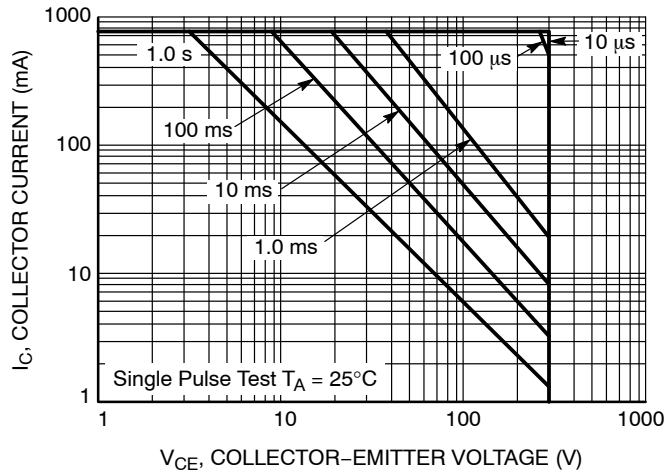


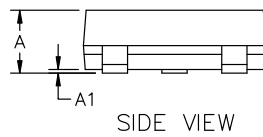
Figure 5. Safe Operating Area



SCALE 4:1

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

DATE 14 AUG 2024



| 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° |

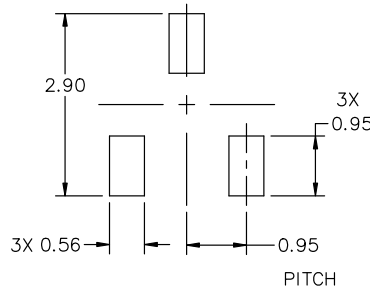
NOTES:

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.

GENERIC MARKING DIAGRAM*



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



* For additional information on our Pb-Free strategy and soldering details, please download the onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

*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.

STYLES ON PAGE 2

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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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