

# MMBTA92LT1, MMBTA93LT1

Preferred Device

## High Voltage Transistors

### PNP Silicon

#### Features

- Pb-Free Packages are Available

#### 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

MMBTA92LT1 = 2D; MMBTA93LT1 = 2E

#### THERMAL CHARACTERISTICS

| Characteristic   | Symbol          | Max         | Unit                      |
|--|-----------------|-------------|---------------------------|
| Total Device Dissipation FR-5 Board<br>(Note 1) $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$                        | $P_D$           | 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)<br>Alumina Substrate, <sup>(2)</sup> $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$           | 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 | $^\circ\text{C}$          |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

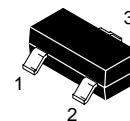
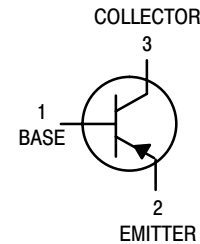
1. FR-5 = 1.0 x 0.75 x 0.062 in.

2. Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.



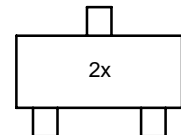
ON Semiconductor®

<http://onsemi.com>



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

#### MARKING DIAGRAM



2x = Specific Device Code

#### ORDERING INFORMATION

| Device      | Package             | Shipping†           |
|-------------|---------------------|---------------------|
| MMBTA92LT1  | SOT-23              | 3000 / Tape & Reel  |
| MMBTA92LT1G | SOT-23<br>(Pb-Free) | 3000 / Tape & Reel  |
| MMBTA92LT3  | SOT-23              | 10000 / Tape & Reel |
| MMBTA93LT1  | SOT-23              | 3000 / Tape & Reel  |
| MMBTA93LT1G | SOT-23<br>(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.

Preferred devices are recommended choices for future use and best overall value.

# MMBTA92LT1, MMBTA93LT1

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

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

### OFF CHARACTERISTICS

|  |                    |               |              |                |                 |
|--|--------------------|---------------|--------------|----------------|-----------------|
| Collector–Emitter Breakdown Voltage (Note 3)<br>( $I_C = -1.0\text{ mAdc}$ , $I_B = 0$ )                             | MMBTA92<br>MMBTA93 | $V_{(BR)CEO}$ | -300<br>-200 | -<br>-         | Vdc             |
| Collector–Base Breakdown Voltage<br>( $I_C = -100\ \mu\text{Adc}$ , $I_E = 0$ )                                      | MMBTA92<br>MMBTA93 | $V_{(BR)CBO}$ | -300<br>-200 | -<br>-         | Vdc             |
| Emitter–Base Breakdown Voltage<br>( $I_E = -100\ \mu\text{Adc}$ , $I_C = 0$ )  |                    | $V_{(BR)EBO}$ | -5.0         | -              | Vdc             |
| Collector Cutoff Current<br>( $V_{CB} = -200\text{ Vdc}$ , $I_E = 0$ )<br>( $V_{CB} = -160\text{ Vdc}$ , $I_E = 0$ ) | MMBTA92<br>MMBTA93 | $I_{CBO}$     | -<br>-       | -0.25<br>-0.25 | $\mu\text{Adc}$ |
| Emitter Cutoff Current<br>( $V_{EB} = -3.0\text{ Vdc}$ , $I_C = 0$ )   |                    | $I_{EBO}$     | -            | -0.1           | $\mu\text{Adc}$ |

### ON CHARACTERISTICS (Note 3)

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

### SMALL–SIGNAL CHARACTERISTICS

|  |                    |          |        |            |     |
|--|--------------------|----------|--------|------------|-----|
| Current–Gain — Bandwidth Product<br>( $I_C = -10\text{ mAdc}$ , $V_{CE} = -20\text{ Vdc}$ , $f = 100\text{ MHz}$ ) |                    | $f_T$    | 50     | -          | MHz |
| Collector–Base Capacitance<br>( $V_{CB} = -20\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )                     | MMBTA92<br>MMBTA93 | $C_{cb}$ | -<br>- | 6.0<br>8.0 | pF  |

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

# MMBTA92LT1, MMBTA93LT1

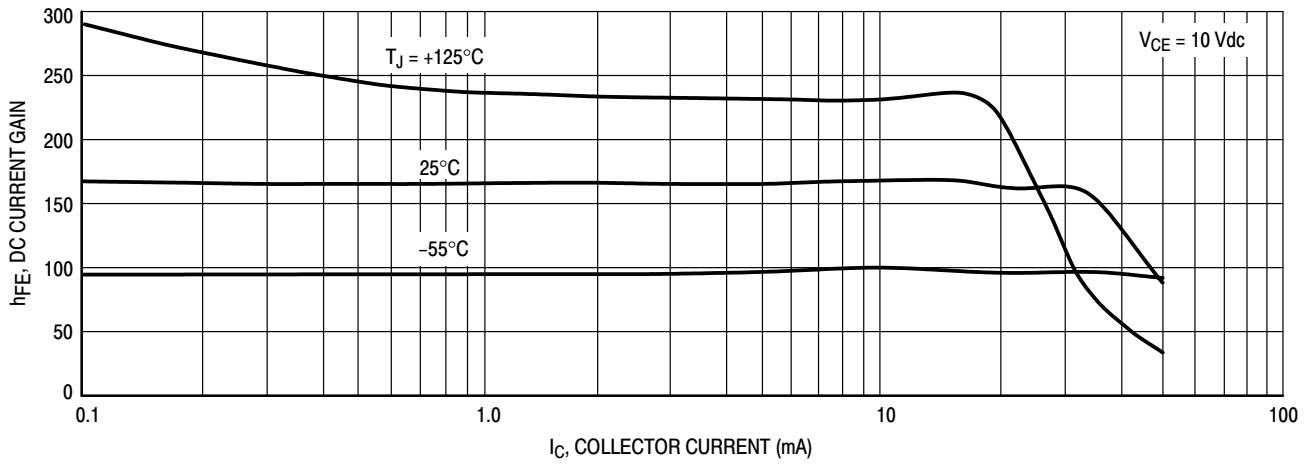


Figure 1. DC Current Gain

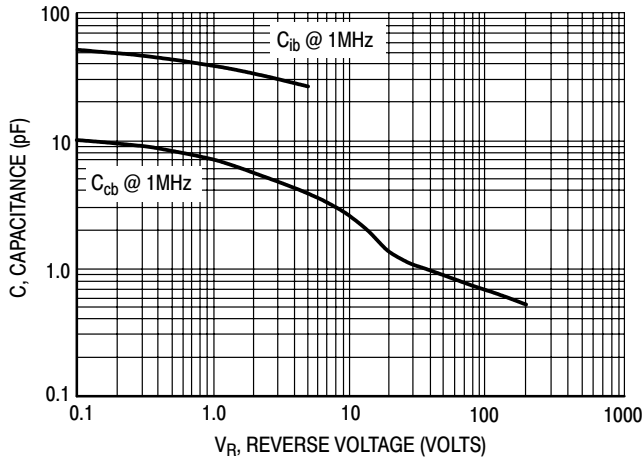


Figure 2. Capacitance

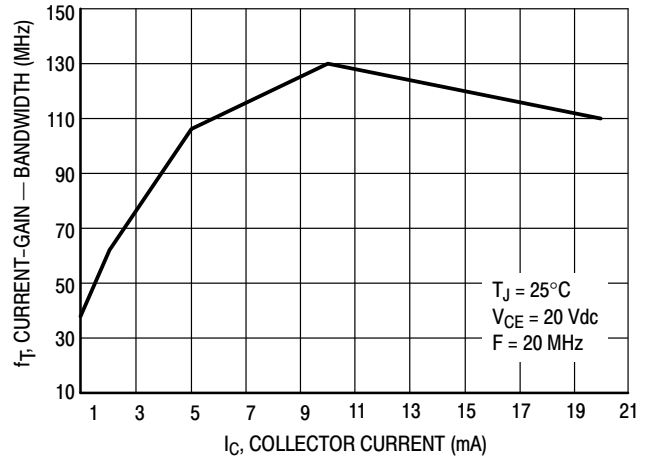


Figure 3. Current-Gain - Bandwidth

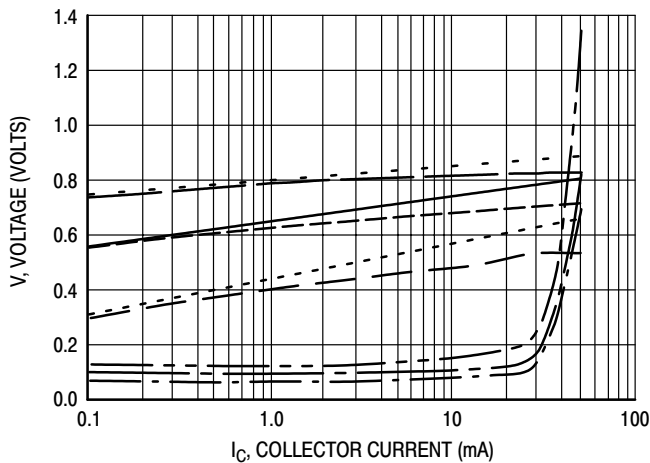


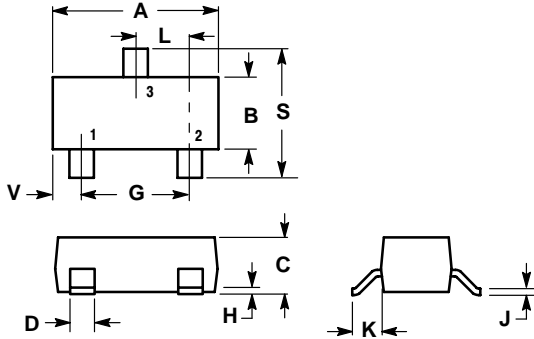
Figure 4. "ON" Voltages

- $V_{CE(sat)}$  @  $25^\circ\text{C}$ ,  $I_C/I_B = 10$
- $V_{CE(sat)}$  @  $125^\circ\text{C}$ ,  $I_C/I_B = 10$
- $V_{CE(sat)}$  @  $-55^\circ\text{C}$ ,  $I_C/I_B = 10$
- $V_{BE(sat)}$  @  $25^\circ\text{C}$ ,  $I_C/I_B = 10$
- $V_{BE(sat)}$  @  $125^\circ\text{C}$ ,  $I_C/I_B = 10$
- $V_{BE(sat)}$  @  $-55^\circ\text{C}$ ,  $I_C/I_B = 10$
- $V_{BE(on)}$  @  $25^\circ\text{C}$ ,  $V_{CE} = 10 \text{ V}$
- $V_{BE(on)}$  @  $125^\circ\text{C}$ ,  $V_{CE} = 10 \text{ V}$
- $V_{BE(on)}$  @  $-55^\circ\text{C}$ ,  $V_{CE} = 10 \text{ V}$

# MMBTA92LT1, MMBTA93LT1

## PACKAGE DIMENSIONS

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

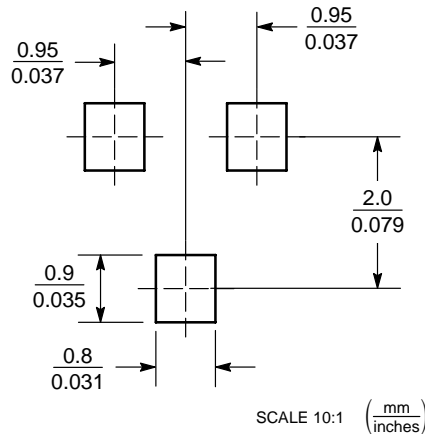


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
  4. 318-01 THRU -07 AND -09 OBSOLETE, NEW STANDARD 318-08.

| DIM | INCHES |        | MILLIMETERS |       |
|-----|--------|--------|-------------|-------|
|     | MIN    | MAX    | MIN         | MAX   |
| A   | 0.1102 | 0.1197 | 2.80        | 3.04  |
| B   | 0.0472 | 0.0551 | 1.20        | 1.40  |
| C   | 0.0350 | 0.0440 | 0.89        | 1.11  |
| D   | 0.0150 | 0.0200 | 0.37        | 0.50  |
| G   | 0.0701 | 0.0807 | 1.78        | 2.04  |
| H   | 0.0005 | 0.0040 | 0.013       | 0.100 |
| J   | 0.0034 | 0.0070 | 0.085       | 0.177 |
| K   | 0.0140 | 0.0285 | 0.35        | 0.69  |
| L   | 0.0350 | 0.0401 | 0.89        | 1.02  |
| S   | 0.0830 | 0.1039 | 2.10        | 2.64  |
| V   | 0.0177 | 0.0236 | 0.45        | 0.60  |

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

### 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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