

# High Voltage Transistor

## PNP Silicon

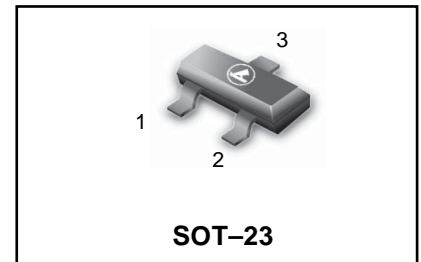
### FEATURE

- High voltage.
- For Telephony or Professional communication equipment applications.
- We declare that the material of product compliance with RoHS requirements.
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

**LMBTA92LT1G**  
**LMBTA93LT1G**  
**S-LMBTA92LT1G**  
**S-LMBTA93LT1G**

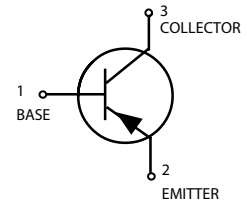
### DEVICE MARKING AND ORDERING INFORMATION

| Device          | Marking | Shipping        |
|-----------------|---------|-----------------|
| (S-)LMBTA92LT1G | 2D      | 3000/Tape&Reel  |
| (S-)LMBTA92LT3G | 2D      | 10000/Tape&Reel |
| (S-)LMBTA93LT1G | 2E      | 3000/Tape&Reel  |
| (S-)LMBTA93LT3G | 2E      | 10000/Tape&Reel |



### MAXIMUM RATINGS

| Rating                         | Symbol    | Value   |         | Unit |
|--------------------------------|-----------|---------|---------|------|
|                                |           | LMBTA92 | LMBTA93 |      |
| Collector-Emitter Voltage      | $V_{CEO}$ | -300    | -200    | Vdc  |
| Collector-Base Voltage         | $V_{CBO}$ | -300    | -200    | Vdc  |
| Emitter-Base Voltage           | $V_{EBO}$ | -5.0    |         | Vdc  |
| Collector Current — Continuous | $I_C$     | -500    |         | mAdc |



### THERMAL CHARACTERISTICS

| Characteristic  | Symbol          | Max         | Unit                      |
|---|-----------------|-------------|---------------------------|
| Total Device Dissipation FR-5 Board, (1)<br>$T_A = 25^\circ\text{C}$        | $P_D$           | 225         | mW                        |
| Derate above $25^\circ\text{C}$   |                 | 1.8         | mW/ $^\circ\text{C}$      |
| Thermal Resistance, Junction to Ambient                                     | $R_{\theta JA}$ | 556         | $^\circ\text{C}/\text{W}$ |
| Total Device Dissipation<br>Alumina Substrate, (2) $T_A = 25^\circ\text{C}$ | $P_D$           | 300         | mW                        |
| Derate above $25^\circ\text{C}$   |                 | 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 | $^\circ\text{C}$          |

- FR-5 = 1.0 x 0.75 x 0.062 in.
- Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.
- Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

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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(3)<br>( $I_C = -1.0\text{ mA}$ , $I_B = 0$ )                                   | LMBTA92<br>LMBTA93 | $V_{(BR)CEO}$ | -300<br>-200 | —<br>—        | Vdc           |
| Collector–Emitter Breakdown Voltage<br>( $I_C = -100\ \mu\text{A}$ , $I_E = 0$ )                                   | LMBTA92<br>LMBTA93 | $V_{(BR)CBO}$ | -300<br>-200 | —<br>—        | Vdc           |
| Emitter–Base Breakdown Voltage<br>( $I_E = -100\ \mu\text{A}$ , $I_C = 0$ )  |                    | $V_{(BR)EBO}$ | -5.0         | —             | Vdc           |
| Collector Cutoff Current<br>( $V_{CB} = -200\text{Vdc}$ , $I_E = 0$ )<br>( $V_{CB} = -300\text{Vdc}$ , $I_E = 0$ ) |                    | $I_{CBO}$     | —<br>—       | -0.1<br>-100  | $\mu\text{A}$ |
| Collector Cutoff Current<br>( $V_{EB} = -6.0\text{Vdc}$ , $I_C = 0$ )<br>( $V_{EB} = -5.0\text{Vdc}$ , $I_C = 0$ ) |                    | $I_{EBO}$     | —<br>—       | -0.05<br>-100 | $\mu\text{A}$ |

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

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

**ON CHARACTERISTICS (3)**

|  |  |               |                      |                  |     |
|--|--|---------------|----------------------|------------------|-----|
| DC Current Gain<br>( $I_C = -1.0\text{ mA}$ , $V_{CE} = -10\text{ Vdc}$ )<br>( $I_C = -10\text{ mA}$ , $V_{CE} = -10\text{Vdc}$ )<br>( $I_C = -30\text{ mA}$ , $V_{CE} = -10\text{ Vdc}$ ) | Both Types<br>Both Types<br>LMBTA92<br>LMBTA93 | $h_{FE}$      | 25<br>40<br>25<br>25 | —<br>—<br>—<br>— | —   |
| Collector–Emitter Saturation Voltage<br>( $I_C = -20\text{ mA}$ , $I_B = -2.0\text{ mA}$ )   | LMBTA92<br>LMBTA93                             | $V_{CE(sat)}$ | —<br>—               | -0.5<br>-0.5     | Vdc |
| Base–Emitter Saturation Voltage<br>( $I_C = -20\text{ mA}$ , $I_B = -2.0\text{ mA}$ )  |  | $V_{BE(sat)}$ | —                    | -0.9             | Vdc |

**SMALL–SIGNAL CHARACTERISTICS**

|  |                    |          |        |            |     |
|--|--------------------|----------|--------|------------|-----|
| Current–Gain — Bandwidth Product(3),(4)<br>( $I_C = -10\text{ mA}$ , $V_{CE} = -20\text{Vdc}$ , $f = 100\text{ MHz}$ ) |                    | $f_T$    | 50     | —          | MHz |
| Collector – Base Capacitance<br>( $V_{CB} = -20\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )                       | LMBTA92<br>LMBTA93 | $C_{cb}$ | —<br>— | 6.0<br>8.0 | pF  |

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

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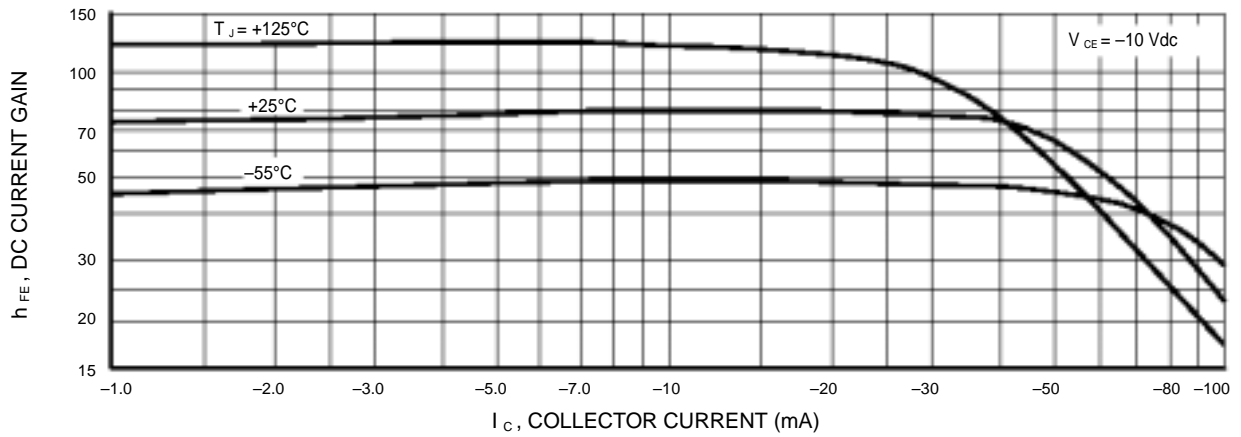


Figure 1. DC Current Gain

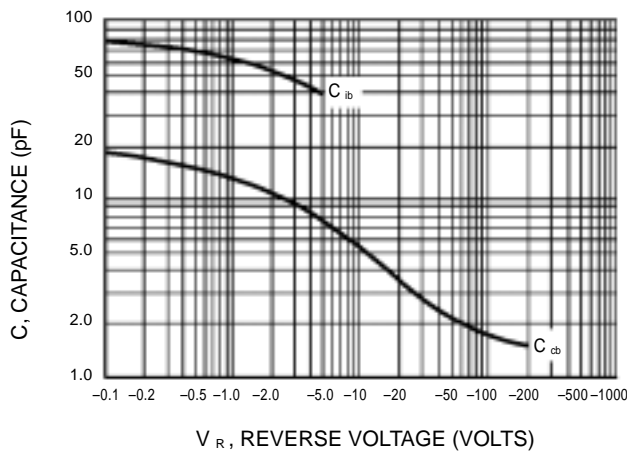


Figure 2. Capacitances

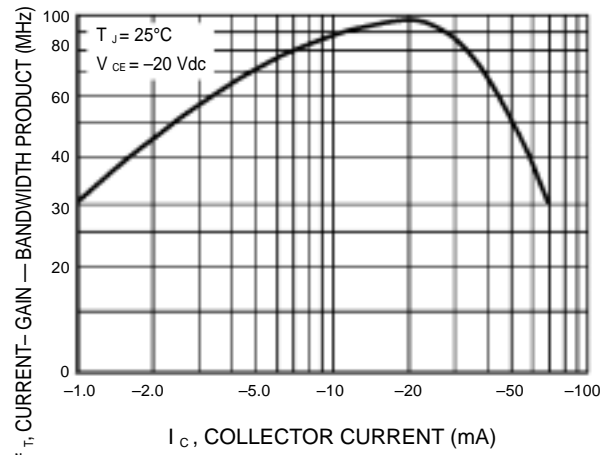


Figure 3. Current-Gain — Bandwidth Product

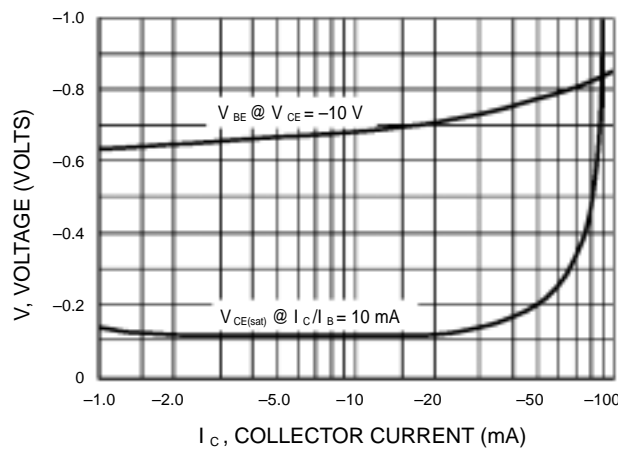
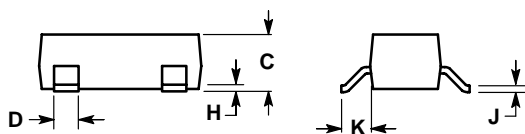
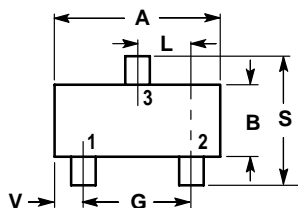


Figure 4. "On" Voltages

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**SOT-23**



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| 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  |

