

# MMBTA42LT1, MMBTA43LT1

MMBTA42LT1 is a Preferred Device

## High Voltage Transistors

### NPN Silicon

#### Features

- Pb-Free Package May be Available. The G-Suffix Denotes a Pb-Free Lead Finish

#### MAXIMUM RATINGS

| Rating                       | Symbol    | MMBTA42 | MMBTA43 | Unit |
|------------------------------|-----------|---------|---------|------|
| Collector-Emitter Voltage    | $V_{CEO}$ | 300     | 200     | Vdc  |
| Collector-Base Voltage       | $V_{CBO}$ | 300     | 200     | Vdc  |
| Emitter-Base Voltage         | $V_{EBO}$ | 6.0     | 6.0     | Vdc  |
| Collector Current-Continuous | $I_C$     | 500     |         | mAdc |

#### THERMAL CHARACTERISTICS

| Characteristic                                                                                                        | Symbol          | Max         | Unit                 |
|-----------------------------------------------------------------------------------------------------------------------|-----------------|-------------|----------------------|
| Total Device Dissipation FR-5 Board (Note 1)<br>$T_A = 25^\circ\text{C}$<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         | $^\circ\text{C/W}$   |
| Total Device Dissipation<br>Alumina Substrate (Note 2)<br>$T_A = 25^\circ\text{C}$<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         | $^\circ\text{C/W}$   |
| Junction and Storage Temperature                                                                                      | $T_J, T_{stg}$  | -55 to +150 | $^\circ\text{C}$     |

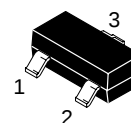
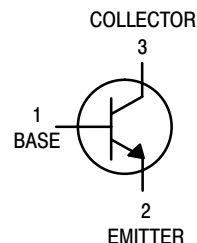
1. FR-5 = 1.0 x 0.75 x 0.062 in.

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



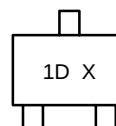
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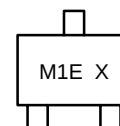


SOT-23 (TO-236)  
CASE 318  
STYLE 6

#### MARKING DIAGRAMS



MMBTA42LT1



MMBTA43LT1

1D, M1E = Specific Device Code  
X = Date Code

#### ORDERING INFORMATION

| Device      | Package | Shipping†         |
|-------------|---------|-------------------|
| MMBTA42LT1  | SOT-23  | 3000/Tape & Reel  |
| MMBTA42LT1G | SOT-23  | 3000/Tape & Reel  |
| MMBTA43LT1  | SOT-23  | 3000/Tape & Reel  |
| MMBTA43LT3  | SOT-23  | 10000/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.

# MMBTA42LT1, MMBTA43LT1

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

| Characteristic                                                                                                                                                                               |                                                    | Symbol               | Min                      | Max                  | Unit |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|----------------------|--------------------------|----------------------|------|
| <b>OFF CHARACTERISTICS</b>                                                                                                                                                                   |                                                    |                      |                          |                      |      |
| Collector – Emitter Breakdown Voltage (Note 3)<br>(I <sub>C</sub> = 1.0 mAdc, I <sub>B</sub> = 0)                                                                                            | MMBTA42<br>MMBTA43                                 | V <sub>(BR)CEO</sub> | 300<br>200               | –<br>–               | Vdc  |
| Collector – Base Breakdown Voltage<br>(I <sub>C</sub> = 100 µAdc, I <sub>E</sub> = 0)                                                                                                        | MMBTA42<br>MMBTA43                                 | V <sub>(BR)CBO</sub> | 300<br>200               | –<br>–               | Vdc  |
| Emitter – Base Breakdown Voltage<br>(I <sub>E</sub> = 100 µAdc, I <sub>C</sub> = 0)                                                                                                          |                                                    | V <sub>(BR)EBO</sub> | 6.0                      | –                    | Vdc  |
| Collector Cutoff Current<br>(V <sub>CB</sub> = 200 Vdc, I <sub>E</sub> = 0)<br>(V <sub>CB</sub> = 160 Vdc, I <sub>E</sub> = 0)                                                               | MMBTA42<br>MMBTA43                                 | I <sub>CBO</sub>     | –<br>–                   | 0.1<br>0.1           | µAdc |
| Emitter Cutoff Current<br>(V <sub>EB</sub> = 6.0 Vdc, I <sub>C</sub> = 0)<br>(V <sub>EB</sub> = 4.0 Vdc, I <sub>C</sub> = 0)                                                                 | MMBTA42<br>MMBTA43                                 | I <sub>EBO</sub>     | –<br>–                   | 0.1<br>0.1           | µAdc |
| <b>ON CHARACTERISTICS (Note 3)</b>                                                                                                                                                           |                                                    |                      |                          |                      |      |
| DC Current Gain<br>(I <sub>C</sub> = 1.0 mAdc, V <sub>CE</sub> = 10 Vdc)<br>(I <sub>C</sub> = 10 mAdc, V <sub>CE</sub> = 10 Vdc)<br><br>(I <sub>C</sub> = 30 mAdc, V <sub>CE</sub> = 10 Vdc) | Both Types<br>Both Types<br><br>MMBTA42<br>MMBTA43 | h <sub>FE</sub>      | 25<br>40<br><br>40<br>40 | –<br>–<br><br>–<br>– | –    |
| Collector – Emitter Saturation Voltage<br>(I <sub>C</sub> = 20 mAdc, I <sub>B</sub> = 2.0 mAdc)                                                                                              | MMBTA42<br>MMBTA43                                 | V <sub>CE(sat)</sub> | –<br>–                   | 0.5<br>0.5           | Vdc  |
| Base – Emitter Saturation Voltage<br>(I <sub>C</sub> = 20 mAdc, I <sub>B</sub> = 2.0 mAdc)                                                                                                   |                                                    | V <sub>BE(sat)</sub> | –                        | 0.9                  | Vdc  |
| <b>SMALL – SIGNAL CHARACTERISTICS</b>                                                                                                                                                        |                                                    |                      |                          |                      |      |
| Current – Gain – Bandwidth Product<br>(I <sub>C</sub> = 10 mAdc, V <sub>CE</sub> = 20 Vdc, f = 100 MHz)                                                                                      |                                                    | f <sub>T</sub>       | 50                       | –                    | MHz  |
| Collector – Base Capacitance<br>(V <sub>CB</sub> = 20 Vdc, I <sub>E</sub> = 0, f = 1.0 MHz)                                                                                                  | MMBTA42<br>MMBTA43                                 | C <sub>cb</sub>      | –<br>–                   | 3.0<br>4.0           | pF   |

3. Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2.0%.

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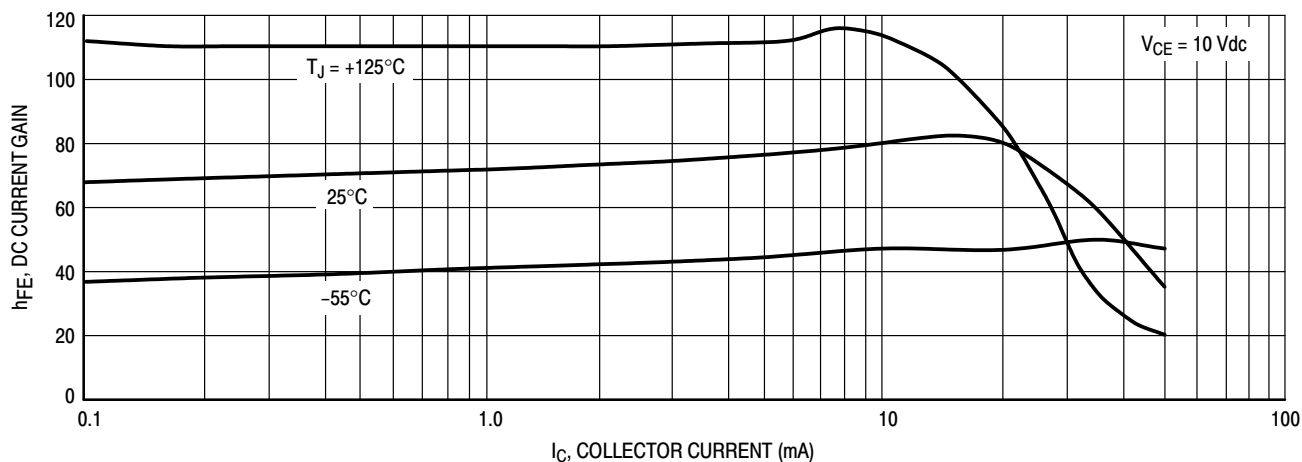


Figure 1. DC Current Gain

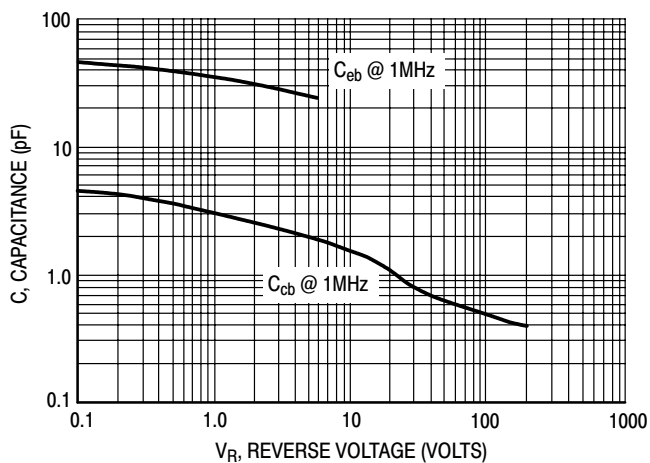


Figure 2. Capacitance

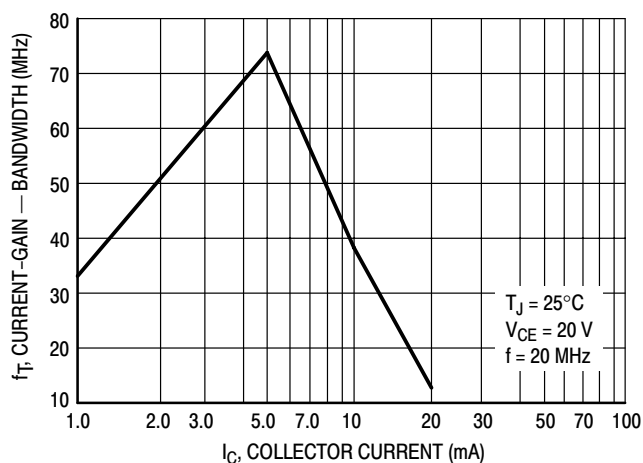


Figure 3. Current-Gain - Bandwidth

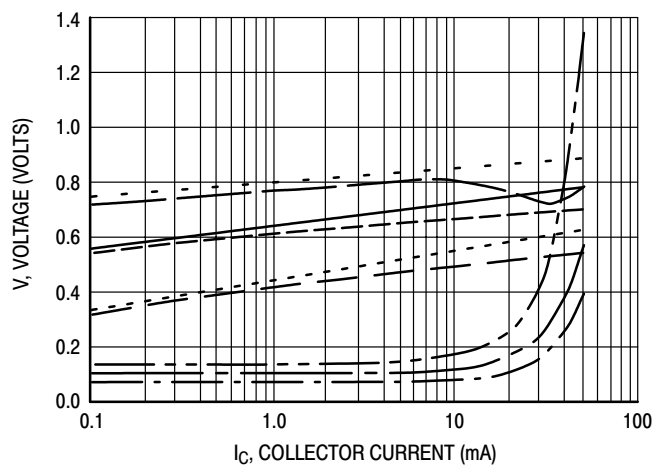


Figure 4. "ON" Voltages

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

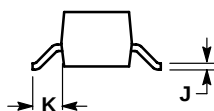
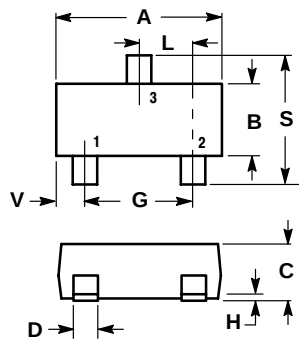
# MMBTA42LT1, MMBTA43LT1

## PACKAGE DIMENSIONS

### SOT-23 (TO-236)

CASE 318-08

ISSUE AH



#### 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. 318-03 AND -07 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:

1. BASE
2. EMITTER
3. COLLECTOR

### SOLDERING FOOTPRINT\*

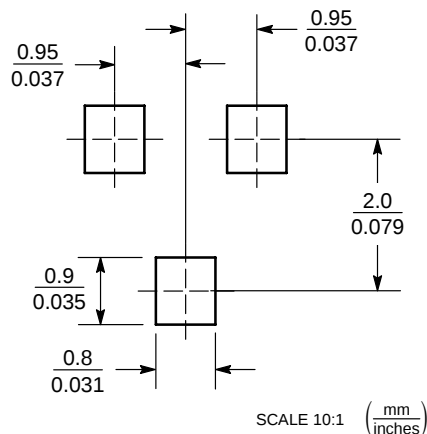


Figure 5. SOT-23

\*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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