

MMBTA42L, SMMBTA42L, MMBTA43L

High Voltage Transistors

NPN Silicon

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

| Characteristic | Symbol | Value | Unit |
|-------------------------------------------------------------|-----------|------------|------|
| Collector – Emitter Voltage MMBTA42, SMMBTA42 MMBTA43 | V_{CEO} | 300 200 | Vdc |
| Collector – Base Voltage MMBTA42, SMMBTA42 MMBTA43 | V_{CBO} | 300 200 | Vdc |
| Emitter – Base Voltage MMBTA42, SMMBTA42 MMBTA43 | V_{EBO} | 6.0 6.0 | Vdc |
| Collector Current – Continuous | I_C | 500 | mA |

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

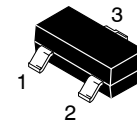
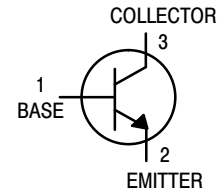
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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.



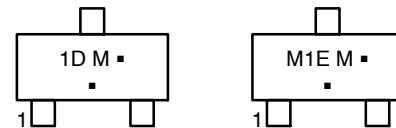
ON Semiconductor®

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

MARKING DIAGRAMS



1D = MMBTA42LT, SMMBTA42L
M1E = MMBTA43LT
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

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

MMBTA42L, SMMBTA42L, MMBTA43L

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 mA _{dc} , I _B = 0) | MMBTA42, SMMBTA42 MMBTA43 | V _{(BR)CEO} | 300 200 | – – | V _{dc} |
| Collector – Base Breakdown Voltage (I _C = 100 μA _{dc} , I _E = 0) | MMBTA42, SMMBTA42 MMBTA43 | V _{(BR)CBO} | 300 200 | – – | V _{dc} |
| Emitter – Base Breakdown Voltage (I _E = 100 μA _{dc} , I _C = 0) | | V _{(BR)EBO} | 6.0 | – | V _{dc} |
| Collector Cutoff Current (V _{CB} = 200 V _{dc} , I _E = 0) (V _{CB} = 160 V _{dc} , I _E = 0) | MMBTA42, SMMBTA42 MMBTA43 | I _{CBO} | – – | 0.1 0.1 | μA _{dc} |
| Emitter Cutoff Current (V _{EB} = 6.0 V _{dc} , I _C = 0) (V _{EB} = 4.0 V _{dc} , I _C = 0) | MMBTA42, SMMBTA42 MMBTA43 | I _{EBO} | – – | 0.1 0.1 | μA _{dc} |
| ON CHARACTERISTICS (Note 3) | | | | | |
| DC Current Gain (I _C = 1.0 mA _{dc} , V _{CE} = 10 V _{dc}) (I _C = 10 mA _{dc} , V _{CE} = 10 V _{dc}) (I _C = 30 mA _{dc} , V _{CE} = 10 V _{dc}) | Both Types Both Types MMBTA42, SMMBTA42 MMBTA43 | h _{FE} | 25 40 40 40 | – – – – | – |
| Collector – Emitter Saturation Voltage (I _C = 20 mA _{dc} , I _B = 2.0 mA _{dc}) | MMBTA42, SMMBTA42 MMBTA43 | V _{CE(sat)} | – – | 0.5 0.5 | V _{dc} |
| Base – Emitter Saturation Voltage (I _C = 20 mA _{dc} , I _B = 2.0 mA _{dc}) | | V _{BE(sat)} | – | 0.9 | V _{dc} |
| SMALL – SIGNAL CHARACTERISTICS | | | | | |
| Current – Gain – Bandwidth Product (I _C = 10 mA _{dc} , V _{CE} = 20 V _{dc} , f = 100 MHz) | | f _T | 50 | – | MHz |
| Collector – Base Capacitance (V _{CB} = 20 V _{dc} , I _E = 0, f = 1.0 MHz) | MMBTA42, SMMBTA42 MMBTA43 | C _{cb} | – – | 3.0 4.0 | 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%.

MMBTA42L, SMMBTA42L, MMBTA43L

TYPICAL CHARACTERISTICS

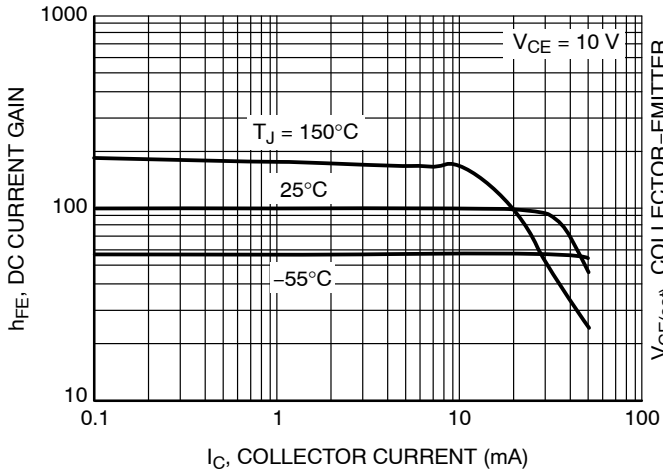


Figure 1. DC Current Gain

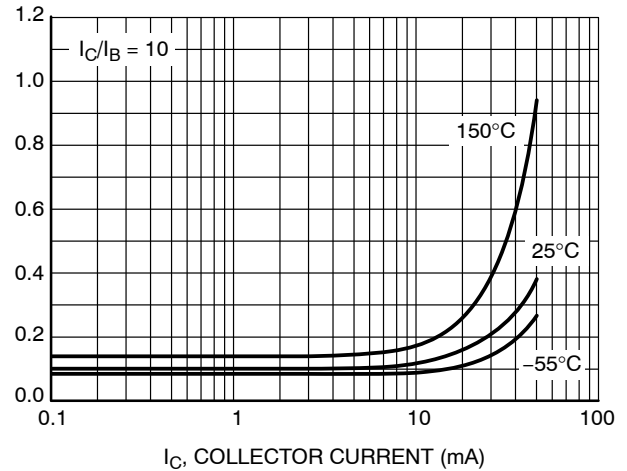


Figure 2. Collector-Emitter Saturation Voltage vs. Collector Current

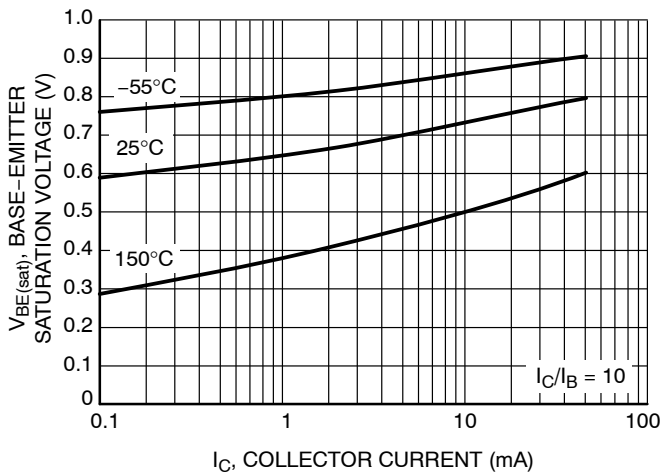


Figure 3. Base-Emitter Saturation Voltage vs. Collector Current

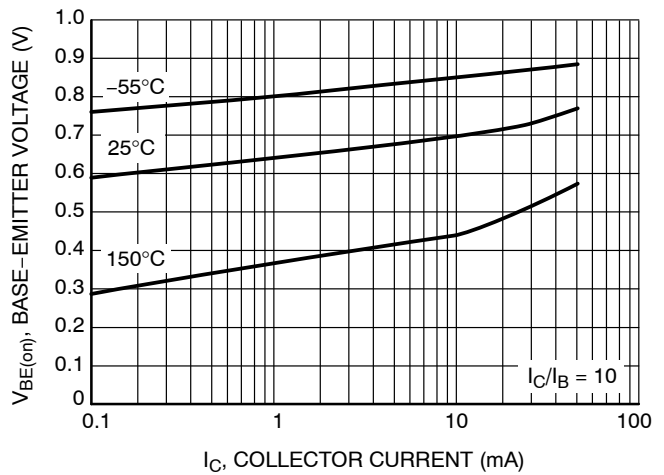


Figure 4. Base-Emitter On Voltage vs. Collector Current

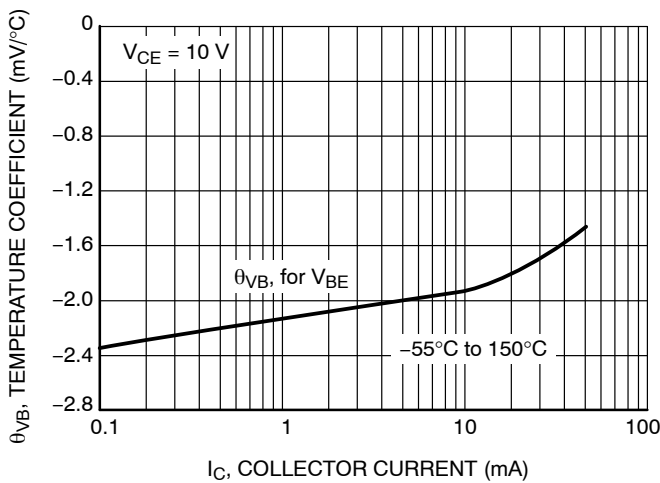


Figure 5. Base-Emitter Temperature Coefficient

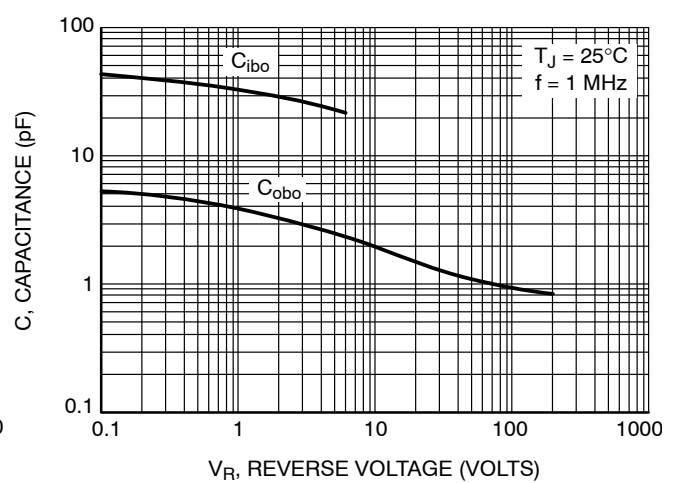


Figure 6. Capacitance

MMBTA42L, SMMBTA42L, MMBTA43L

TYPICAL CHARACTERISTICS

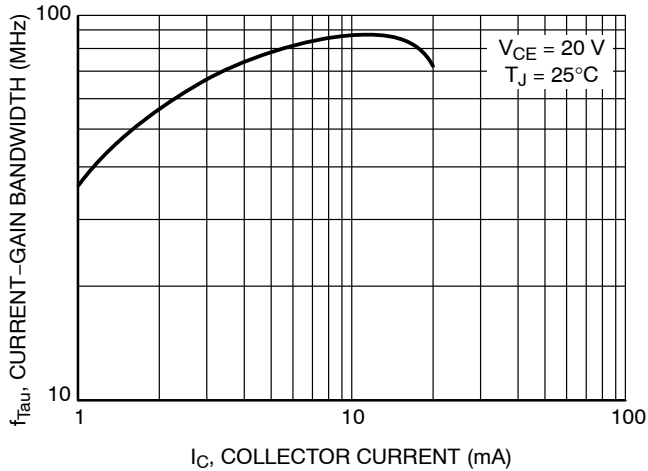


Figure 7. Current-Gain — Bandwidth Product

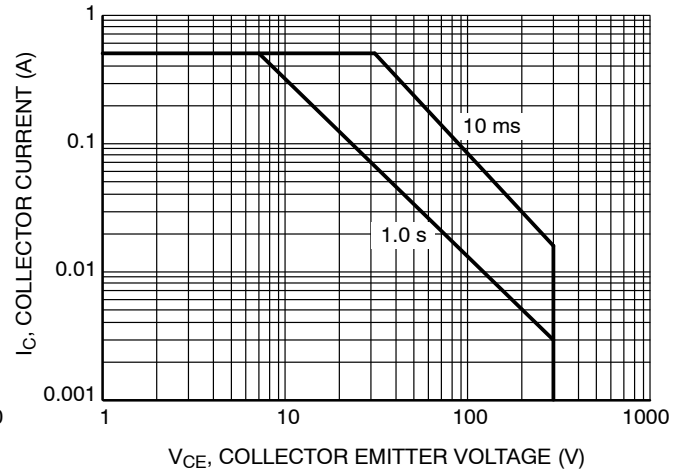


Figure 8. Safe Operating Area

ORDERING INFORMATION

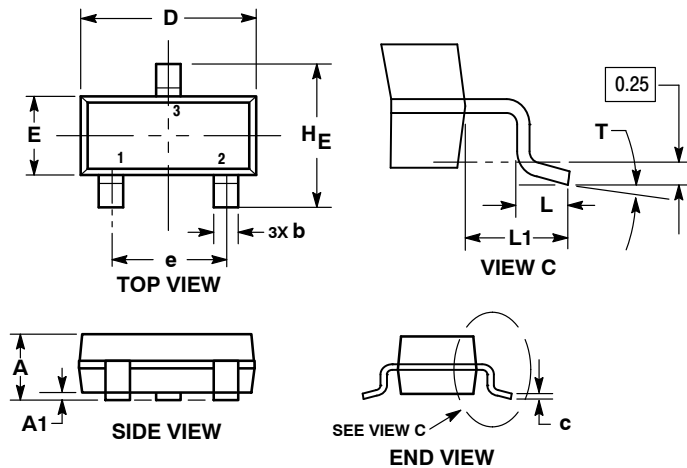
| Device Order Number | Package Type | Shipping [†] |
|---------------------|---------------------|-----------------------|
| MMBTA42LT1G | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| SMMBTA42LT1G | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| MMBTA42LT3G | SOT-23 (Pb-Free) | 10,000 / Tape & Reel |
| SMMBTA42LT3G | SOT-23 (Pb-Free) | 10,000 / Tape & Reel |
| MMBTA43LT1G | SOT-23 (Pb-Free) | 3,000 / 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.

MMBTA42L, SMMBTA42L, MMBTA43L

PACKAGE DIMENSIONS

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



NOTES:

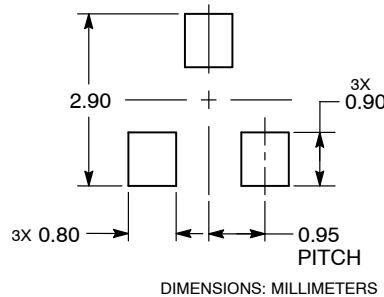
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| 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 |
| HE | 2.10 | 2.40 | 2.64 | 0.083 | 0.094 | 0.104 |
| T | 0° | --- | 10° | 0° | --- | 10° |

STYLE 6:

1. BASE
2. EMITTER
3. COLLECTOR

RECOMMENDED 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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