

MMBTH10LT1, MMBTH10-4LT1

Preferred Devices

VHF/UHF Transistor

NPN Silicon

- Device Marking: 3EM

Features

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

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---------------------------|-----------|-------|------|
| Collector-Emitter Voltage | V_{CEO} | 25 | Vdc |
| Collector-Base Voltage | V_{CBO} | 30 | Vdc |
| Emitter-Base Voltage | V_{EBO} | 3.0 | Vdc |

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 (Note 1) | $R_{\theta JA}$ | 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 (Note 2) | $R_{\theta JA}$ | 417 | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature Range | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

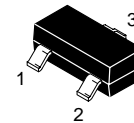
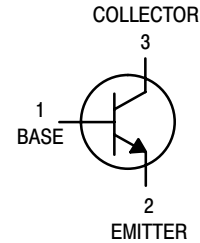
1. FR-5 = 1.0 x 0.75 x 0.062 in.

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



ON Semiconductor®

<http://onsemi.com>



CASE 318
SOT-23
STYLE 6

ORDERING INFORMATION

| Device | Package | Shipping [†] |
|--------------|---------------------|-----------------------|
| MMBTH10LT1 | SOT-23 | 3000/Tape & Reel |
| MMBTH10LT1G | SOT-23 (Pb-Free) | 3000/Tape & Reel |
| MMBTH10-4LT1 | SOT-23 | 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.

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

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

OFF CHARACTERISTICS

| | | | | | |
|--|---------------|-----|---|-----|------|
| Collector-Emitter Breakdown Voltage ($I_C = 1.0\text{ mA}$, $I_B = 0$) | $V_{(BR)CEO}$ | 25 | - | - | Vdc |
| Collector-Base Breakdown Voltage ($I_C = 100\ \mu\text{A}$, $I_E = 0$) | $V_{(BR)CBO}$ | 30 | - | - | Vdc |
| Emitter-Base Breakdown Voltage ($I_E = 10\ \mu\text{A}$, $I_C = 0$) | $V_{(BR)EBO}$ | 3.0 | - | - | Vdc |
| Collector Cutoff Current ($V_{CB} = 25\text{ Vdc}$, $I_E = 0$) | I_{CBO} | - | - | 100 | nAdc |
| Emitter Cutoff Current ($V_{EB} = 2.0\text{ Vdc}$, $I_C = 0$) | I_{EBO} | - | - | 100 | nAdc |

ON CHARACTERISTICS

| | | | | | | |
|---|----------------------------|---------------|-----------|--------|----------|-----|
| DC Current Gain ($I_C = 4.0\text{ mA}$, $V_{CE} = 10\text{ Vdc}$) | MMBTH10LT1 MMBTH10-4LT1 | h_{FE} | 60 120 | - - | - 240 | - |
| Collector-Emitter Saturation Voltage ($I_C = 4.0\text{ mA}$, $I_B = 0.4\text{ mA}$) | | $V_{CE(sat)}$ | - | - | 0.5 | Vdc |
| Base-Emitter On Voltage ($I_C = 4.0\text{ mA}$, $V_{CE} = 10\text{ Vdc}$) | | V_{BE} | - | - | 0.95 | Vdc |

SMALL-SIGNAL CHARACTERISTICS

| | | | | | | |
|---|----------------------------|-----------|------------|--------|--------|-----|
| Current-Gain – Bandwidth Product ($I_C = 4.0\text{ mA}$, $V_{CE} = 10\text{ Vdc}$, $f = 100\text{ MHz}$) | MMBTH10LT1 MMBTH10-4LT1 | f_T | 650 800 | - - | - - | MHz |
| Collector-Base Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$) | | C_{cb} | - | - | 0.7 | pF |
| Common-Base Feedback Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$) | | C_{rb} | - | - | 0.65 | pF |
| Collector Base Time Constant ($I_C = 4.0\text{ mA}$, $V_{CB} = 10\text{ Vdc}$, $f = 31.8\text{ MHz}$) | | $r_b'C_C$ | - | - | 9.0 | ps |

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TYPICAL CHARACTERISTICS

COMMON-BASE y PARAMETERS versus FREQUENCY

($V_{CB} = 10 \text{ Vdc}$, $I_C = 4.0 \text{ mAdc}$, $T_A = 25^\circ\text{C}$)

y_{ib} , INPUT ADMITTANCE

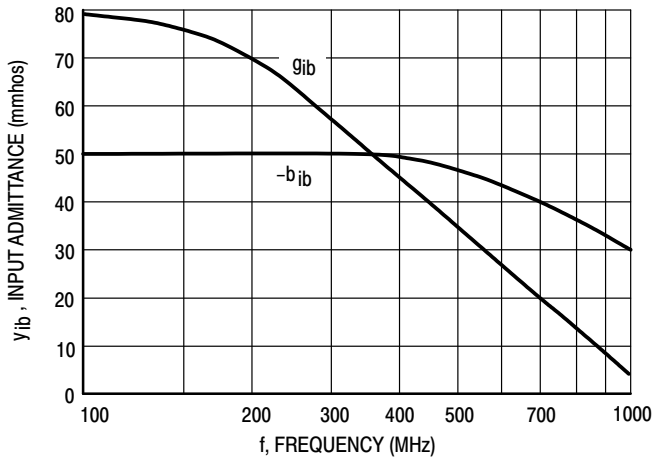


Figure 1. Rectangular Form

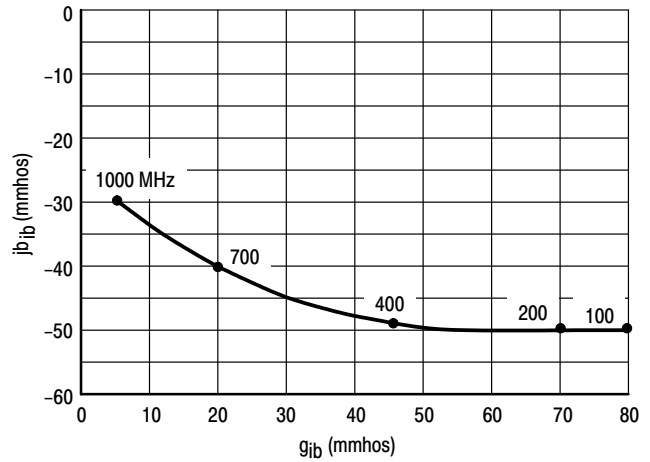


Figure 2. Polar Form

y_{fb} , FORWARD TRANSFER ADMITTANCE

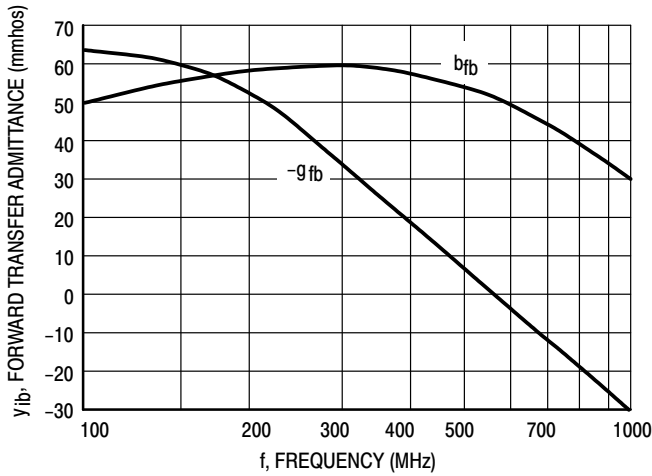


Figure 3. Rectangular Form

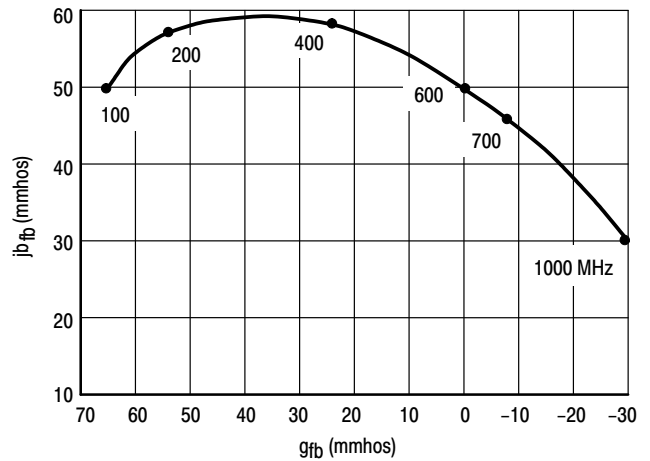


Figure 4. Polar Form

MMBTH10LT1, MMBTH10-4LT1

TYPICAL CHARACTERISTICS

COMMON-BASE y PARAMETERS versus FREQUENCY

($V_{CB} = 10 \text{ Vdc}$, $I_C = 4.0 \text{ mAdc}$, $T_A = 25^\circ\text{C}$)

y_{rb} , REVERSE TRANSFER ADMITTANCE

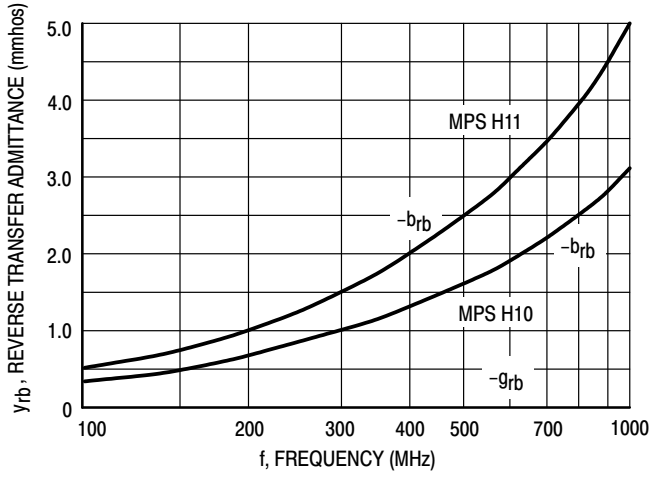


Figure 5. Rectangular Form

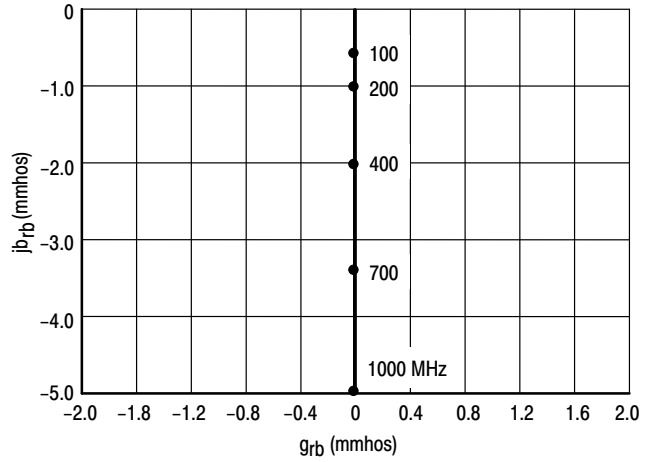


Figure 6. Polar Form

y_{ob} , OUTPUT ADMITTANCE

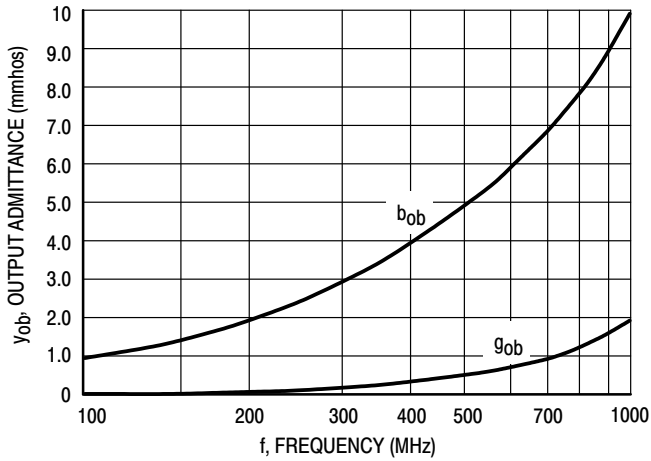


Figure 7. Rectangular Form

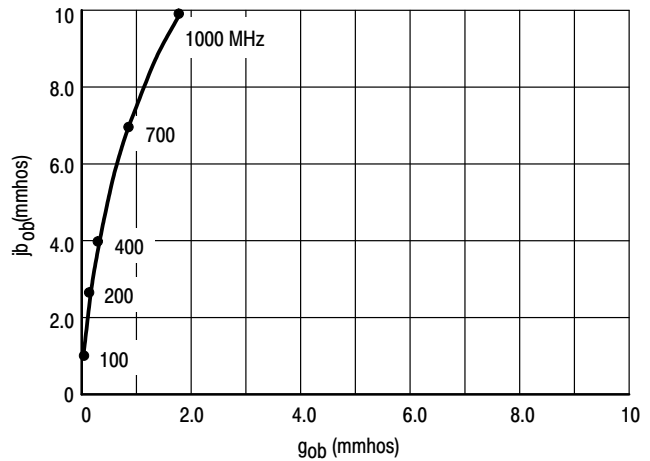
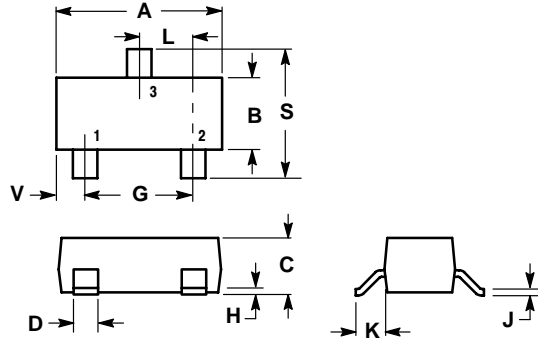


Figure 8. Polar Form

MMBTH10LT1, MMBTH10-4LT1

PACKAGE DIMENSIONS

SOT-23
(TO-236AB)
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:

- PIN 1. BASE
2. EMITTER
3. COLLECTOR

SOLDERING FOOTPRINT*

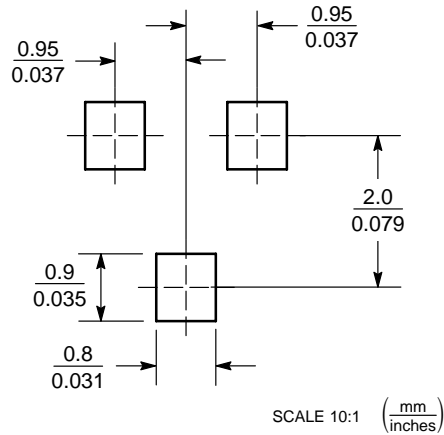



Figure 9. SOT-23

*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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