# MMBTH10LT1, MMBTH10-4LT1

**Preferred Devices**

# VHF/UHF Transistor

## NPN Silicon

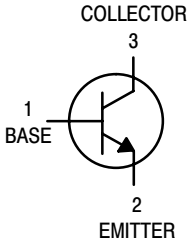
- Device Marking: 3EM

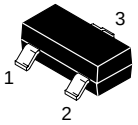
**ON Semiconductor®**

**http://onsemi.com**

### Features

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




**CASE 318**
**SOT−23**
**STYLE 6**

### 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 4) $T_A$ = 25°C Derate above 25°C | $P_D$ | 225 1.8 | mW mW/°C |
| Thermal Resistance, Junction to Ambient (Note 4) | $R_{\theta JA}$ | 556 | °C/W |
| Total Device Dissipation Alumina Substrate (Note 5) $T_A$ = 25°C Derate above 25°C | $P_D$ | 300 2.4 | mW mW/°C |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 417 | °C/W |
| Junction and Storage Temperature Range | $T_J$, $T_{stg}$ | −55 to +150 | °C |

4. FR−5 = 1.0 x 0.75 x 0.062 in.
5. Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina

### 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.

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted)

| Characteristic | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Collector−Emitter Breakdown Voltage ($I_C$ = 1.0 mAdc, $I_B$ = 0) | | $V_{(BR)CEO}$ | 25 | − | − | Vdc |
| Collector−Base Breakdown Voltage ($I_C$ = 100 μAdc, $I_E$ = 0) | | $V_{(BR)CBO}$ | 30 | − | − | Vdc |
| Emitter−Base Breakdown Voltage ($I_E$ = 10 μAdc, $I_C$ = 0) | | $V_{(BR)EBO}$ | 3.0 | − | − | Vdc |
| Collector Cutoff Current ($V_{CB}$ = 25 Vdc, $I_E$ = 0) | | $I_{CBO}$ | − | − | 100 | nAdc |
| Emitter Cutoff Current ($V_{EB}$ = 2.0 Vdc, $I_C$ = 0) | | $I_{EBO}$ | − | − | 100 | nAdc |
| **ON CHARACTERISTICS** | | | | | | |
| DC Current Gain ($I_C$ = 4.0 mAdc, $V_{CE}$ = 10 Vdc) | MMBTH10LT1<br>MMBTH10−4LT1 | $h_{FE}$ | <br>60<br>120 | <br>−<br>− | <br>−<br>240 | − |
| Collector−Emitter Saturation Voltage ($I_C$ = 4.0 mAdc, $I_B$ = 0.4 mAdc) | | $V_{CE(sat)}$ | − | − | 0.5 | Vdc |
| Base−Emitter On Voltage ($I_C$ = 4.0 mAdc, $V_{CE}$ = 10 Vdc) | | $V_{BE}$ | − | − | 0.95 | Vdc |
| **SMALL−SIGNAL CHARACTERISTICS** | | | | | | |
| Current−Gain − Bandwidth Product ($I_C$ = 4.0 mAdc, $V_{CE}$ = 10 Vdc, f = 100 MHz) | MMBTH10LT1<br>MMBTH10−4LT1 | $f_T$ | <br>650<br>800 | <br>−<br>− | <br>−<br>− | MHz |
| Collector−Base Capacitance ($V_{CB}$= 10 Vdc, $I_E$ = 0, f = 1.0 MHz) | | $C_{cb}$ | − | − | 0.7 | pF |
| Common−Base Feedback Capacitance ($V_{CB}$= 10 Vdc, $I_E$ = 0, f = 1.0 MHz) | | $C_{rb}$ | − | − | 0.65 | pF |
| Collector Base Time Constant ($I_C$= 4.0 mAdc, $V_{CB}$ = 10 Vdc, f = 31.8 MHz) | | $rb'C_c$ | − | − | 9.0 | ps |

## TYPICAL CHARACTERISTICS

**COMMON−BASE y PARAMETERS versus FREQUENCY**
($V_{CB}$ = 10 Vdc, $I_C$ = 4.0 mAdc, $T_A$ = 25°C)

**$y_{ib}$, INPUT ADMITTANCE**

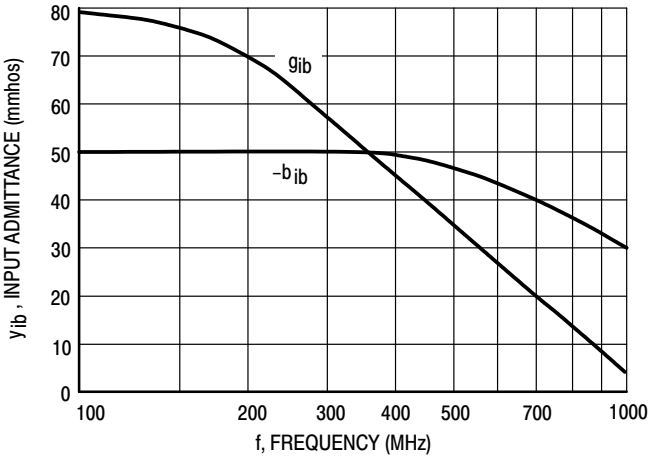



**Figure 1. Rectangular Form**

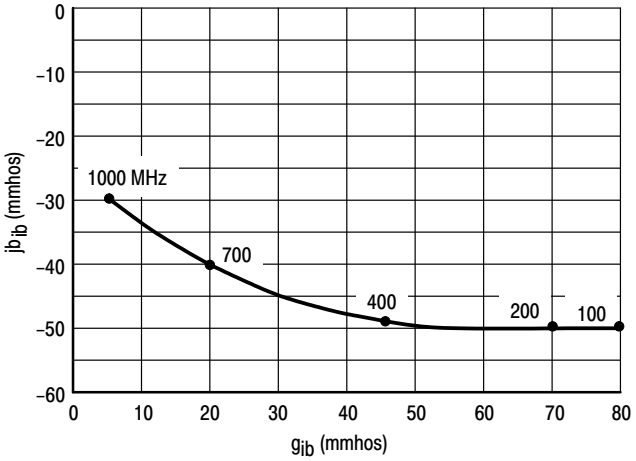



**Figure 2. Polar Form**

**$y_{fb}$, FORWARD TRANSFER ADMITTANCE**

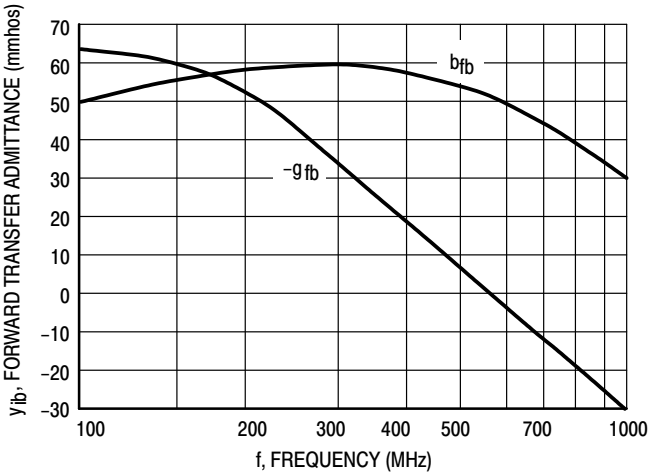



**Figure 3. Rectangular Form**

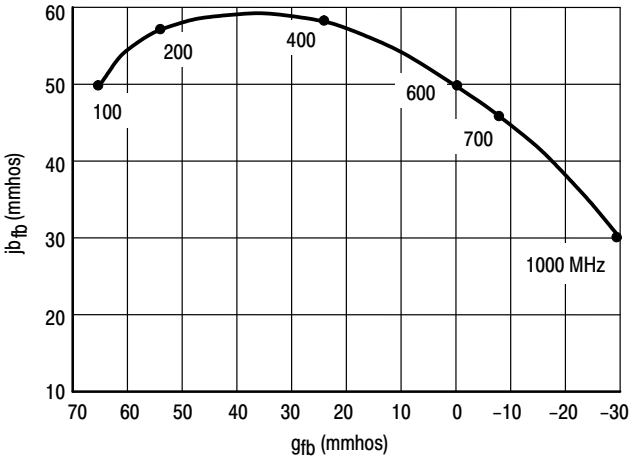



**Figure 4. Polar Form**

## TYPICAL CHARACTERISTICS

**COMMON−BASE y PARAMETERS versus FREQUENCY**
($V_{CB}$ = 10 Vdc, $I_C$ = 4.0 mAdc, $T_A$ = 25°C)

**$y_{rb}$, REVERSE TRANSFER ADMITTANCE**

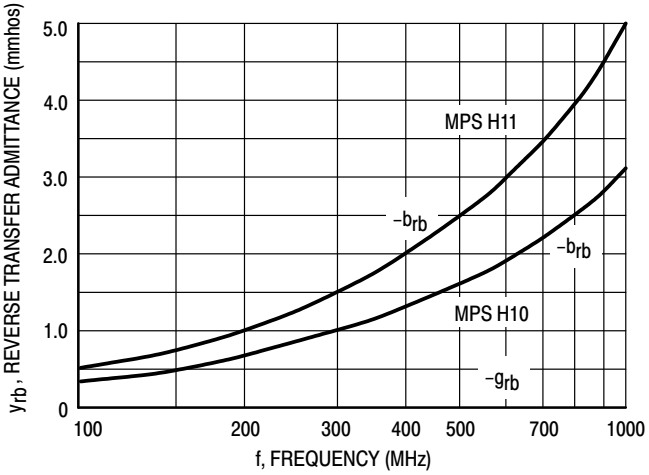



**Figure 5. Rectangular Form**

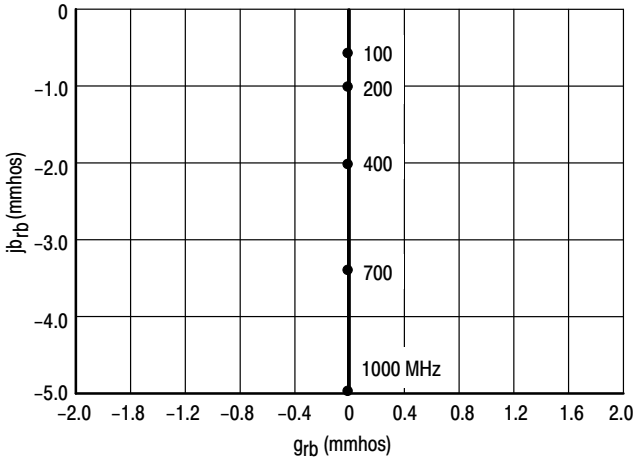



**Figure 6. Polar Form**

**$y_{ob}$, OUTPUT ADMITTANCE**

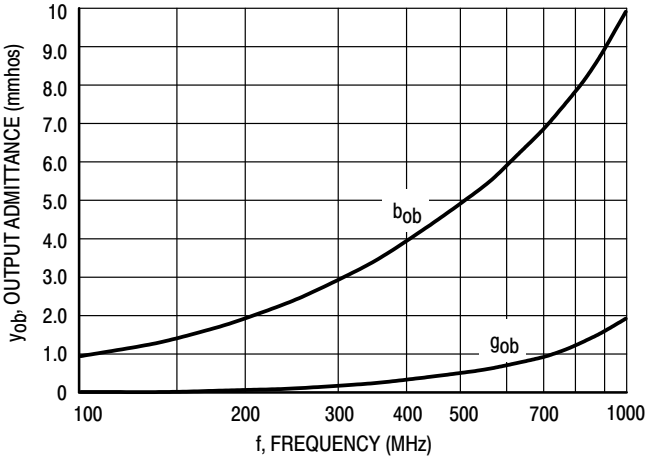



**Figure 7. Rectangular Form**

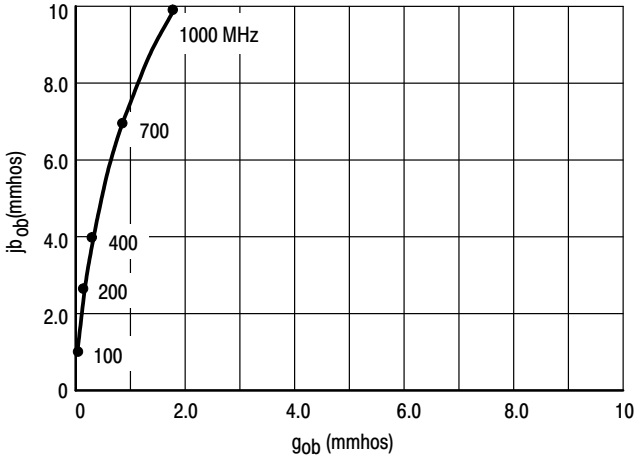



**Figure 8. Polar Form**