

MMBTH10M3T5G

NPN VHF/UHF Transistor

The MMBTH10M3T5G device is a spin-off of our popular SOT-23 three-leaded device. It is designed for general purpose VHF/UHF applications and is housed in the SOT-723 surface mount package. This device is ideal for low-power surface mount applications where board space is at a premium.

Features

- Reduces Board Space
- This is a Halide-Free Device
- This is a Pb-Free Device

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 | 265 2.1 | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 470 | $^\circ\text{C}/\text{W}$ |
| Total Device Dissipation Alumina Substrate, (Note 2) $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 640 5.1 | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 195 | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

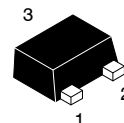
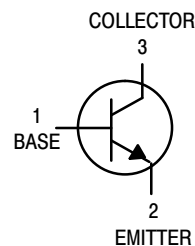
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR-5 = $1.0 \times 0.75 \times 0.062$ in.
2. Alumina = $0.4 \times 0.3 \times 0.024$ in. 99.5% alumina.



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AJ = Specific Device Code
M = Date Code

MARKING DIAGRAM

SOT-723
CASE 631AA
STYLE 1



ORDERING INFORMATION

| Device | Package | Shipping† |
|--------------|----------------------|------------------|
| MMBTH10M3T5G | SOT-723 (Pb-Free) | 8000/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.

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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 ($I_C = 1.0\text{ mAdc}$, $I_B = 0$) | $V_{(BR)CEO}$ | 25 | - | - | Vdc |
| Collector-Base Breakdown Voltage ($I_C = 100\ \mu\text{Adc}$, $I_E = 0$) | $V_{(BR)CBO}$ | 30 | - | - | Vdc |
| Emitter-Base Breakdown Voltage ($I_E = 10\ \mu\text{Adc}$, $I_C = 0$) | $V_{(BR)EBO}$ | 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 ($I_C = 4.0\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$) | h_{FE} | 60 | - | - | - |
| Collector-Emitter Saturation Voltage ($I_C = 4.0\text{ mAdc}$, $I_B = 0.4\text{ mAdc}$) | $V_{CE(sat)}$ | - | - | 0.5 | Vdc |
| Base-Emitter On Voltage ($I_C = 4.0\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$) | V_{BE} | - | - | 0.95 | Vdc |

SMALL-SIGNAL CHARACTERISTICS

| | | | | | |
|---|----------|-----|---|------|-----|
| Current-Gain – Bandwidth Product ($I_C = 4.0\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$, $f = 100\text{ MHz}$) | f_T | 650 | - | - | 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 ($I_C = 4.0\text{ mAdc}$, $V_{CB} = 10\text{ Vdc}$, $f = 31.8\text{ MHz}$) | $rb'C_c$ | - | - | 9.0 | ps |

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TYPICAL CHARACTERISTICS

COMMON-BASE y PARAMETERS versus FREQUENCY

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

y_{ib} , INPUT ADMITTANCE

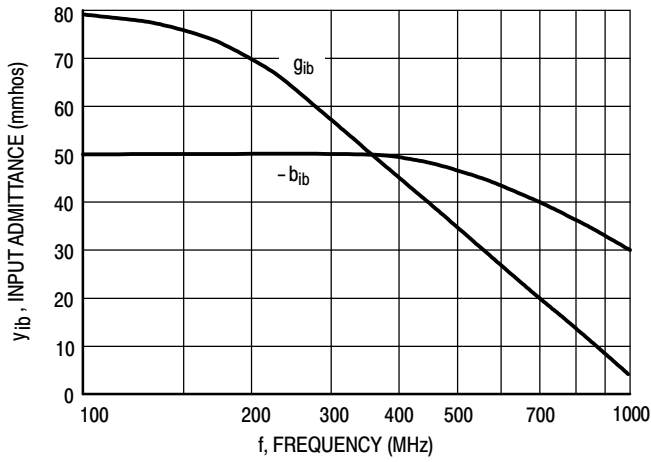


Figure 1. Rectangular Form

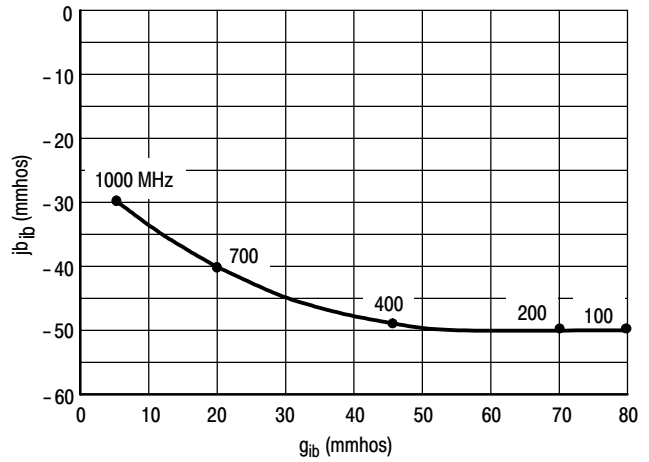


Figure 2. Polar Form

y_{fb} , FORWARD TRANSFER ADMITTANCE

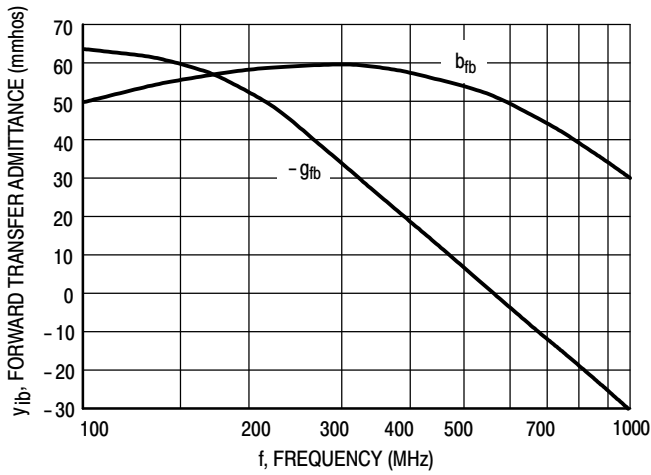


Figure 3. Rectangular Form

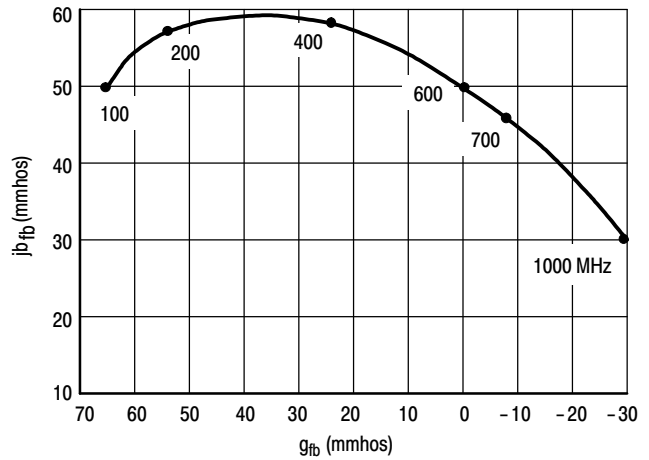


Figure 4. Polar Form

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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_{rb} , REVERSE TRANSFER ADMITTANCE

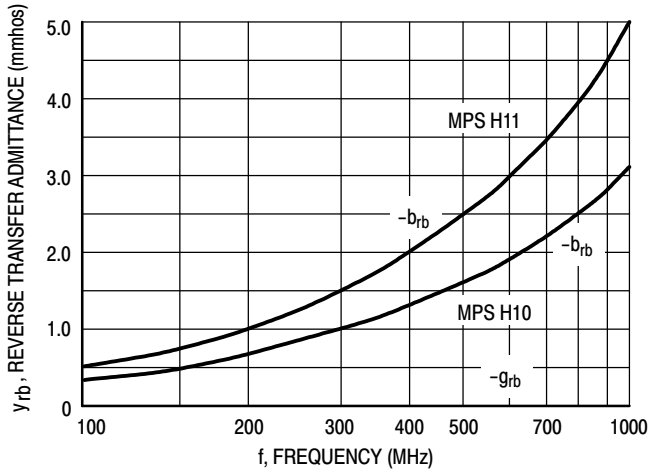


Figure 5. Rectangular Form

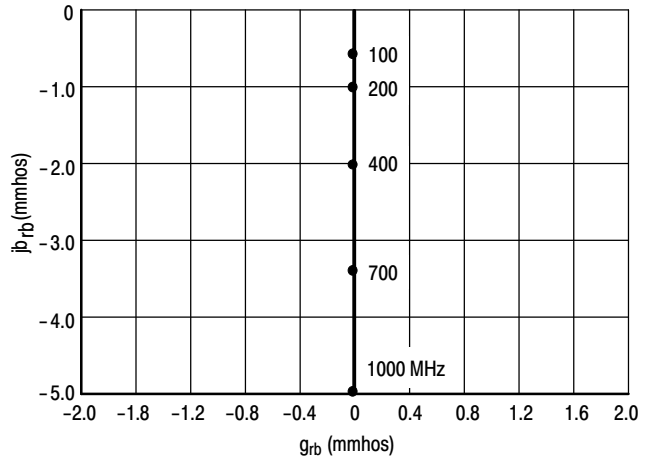


Figure 6. Polar Form

y_{ob} , OUTPUT ADMITTANCE

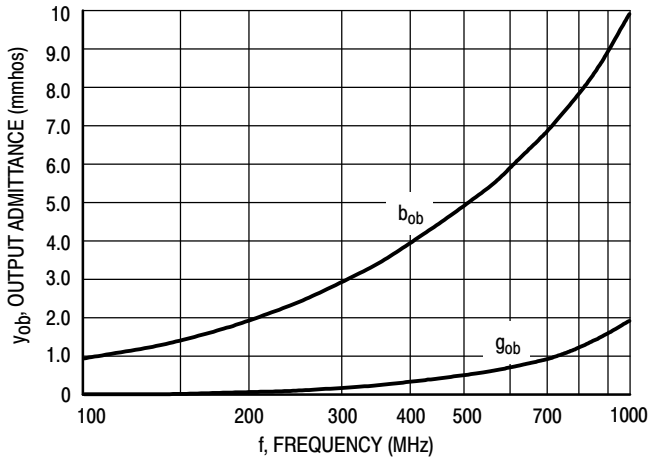


Figure 7. Rectangular Form

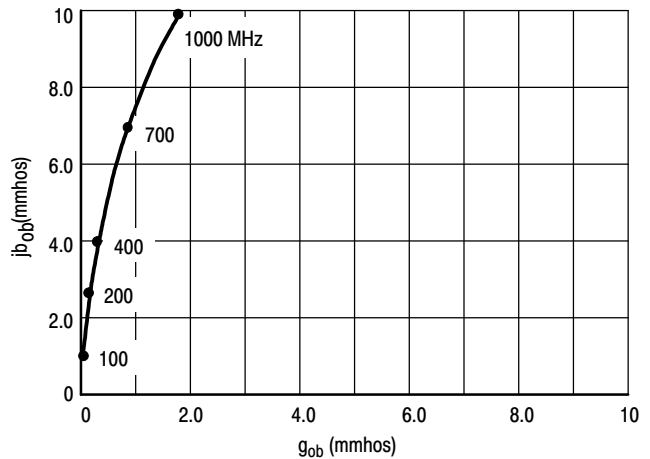
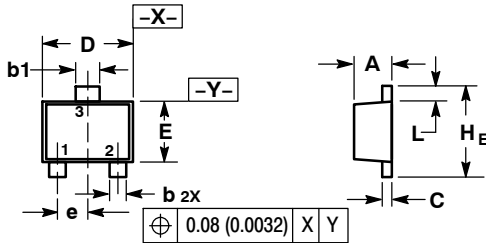


Figure 8. Polar Form

MMBTH10M3T5G

PACKAGE DIMENSIONS

SOT-723
CASE 631AA-01
ISSUE C



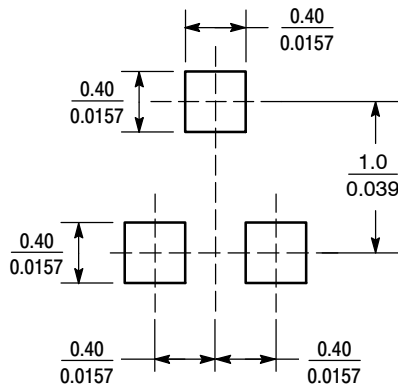
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF 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 | 0.45 | 0.50 | 0.55 | 0.018 | 0.020 | 0.022 |
| b | 0.15 | 0.21 | 0.27 | 0.0059 | 0.0083 | 0.0106 |
| b1 | 0.25 | 0.31 | 0.37 | 0.010 | 0.012 | 0.015 |
| C | 0.07 | 0.12 | 0.17 | 0.0028 | 0.0047 | 0.0067 |
| D | 1.15 | 1.20 | 1.25 | 0.045 | 0.047 | 0.049 |
| E | 0.75 | 0.80 | 0.85 | 0.03 | 0.032 | 0.034 |
| e | 0.40 BSC | | | 0.016 BSC | | |
| H e | 1.15 | 1.20 | 1.25 | 0.045 | 0.047 | 0.049 |
| L | 0.15 | 0.20 | 0.25 | 0.0059 | 0.0079 | 0.0098 |

STYLE 1:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

SOLDERING FOOTPRINT*



SCALE 20:1 (mm/inches)

*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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