

# 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 $25^\circ\text{C}$	$P_D$	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 $25^\circ\text{C}$	$P_D$	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	$^\circ\text{C}$

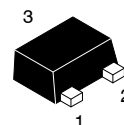
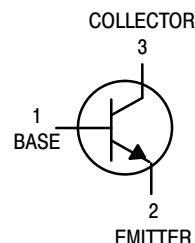
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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.

# MMBTH10M3T5G

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

Characteristic	Symbol	Min	Typ	Max	Unit
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### 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

# MMBTH10M3T5G

## 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

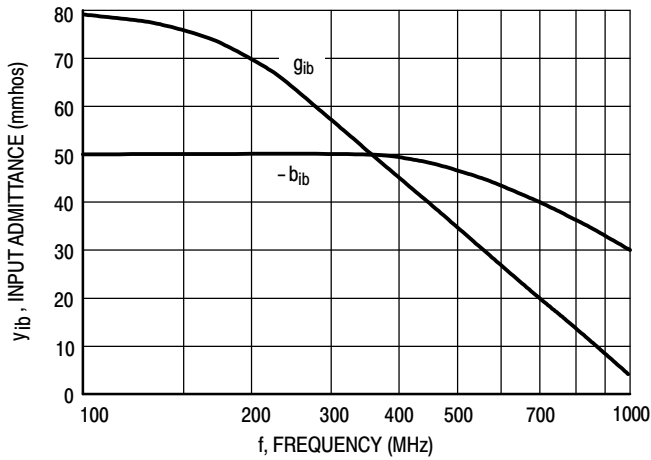


Figure 1. Rectangular Form

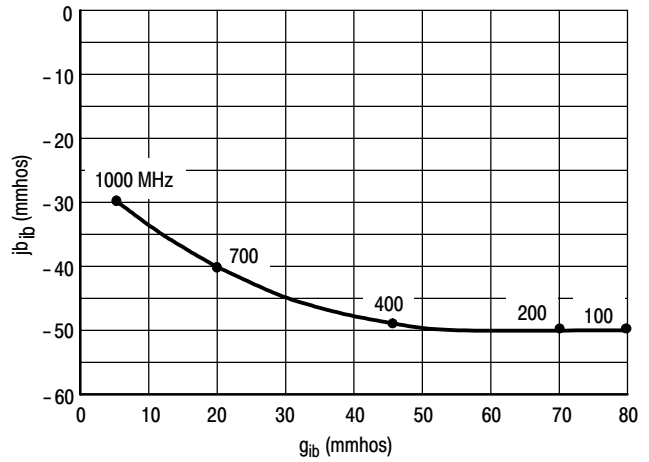


Figure 2. Polar Form

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

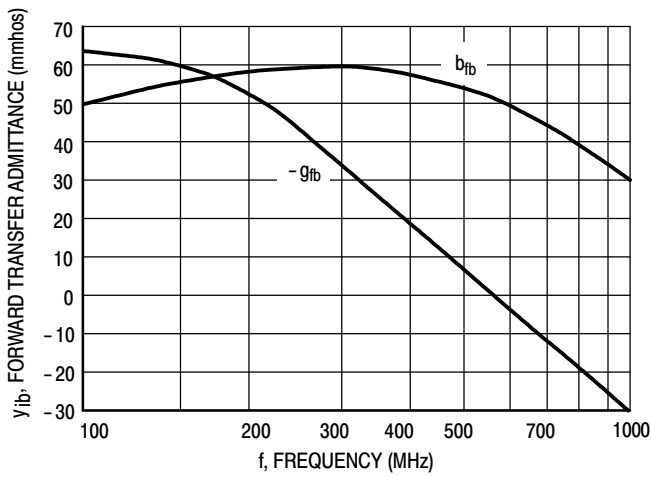


Figure 3. Rectangular Form

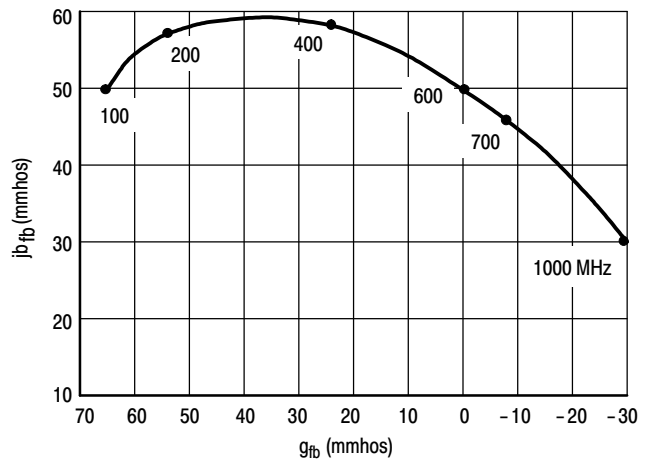


Figure 4. Polar Form

# MMBTH10M3T5G

## TYPICAL CHARACTERISTICS

### COMMON-BASE $y$ PARAMETERS versus FREQUENCY

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

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

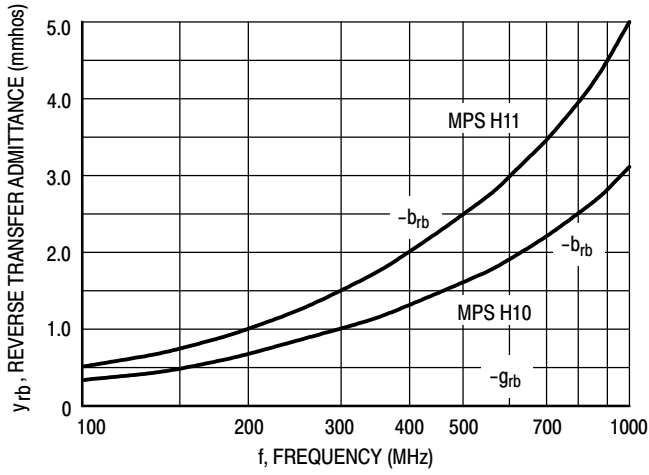


Figure 5. Rectangular Form

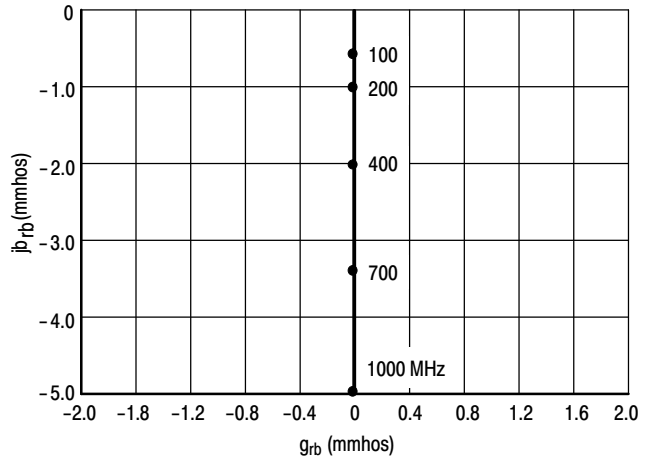


Figure 6. Polar Form

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

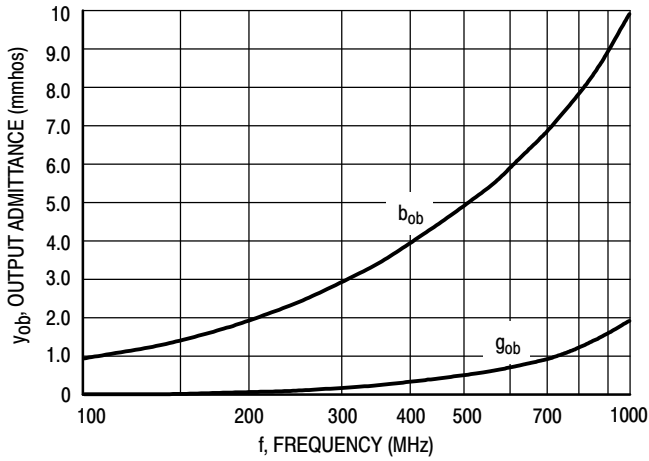


Figure 7. Rectangular Form

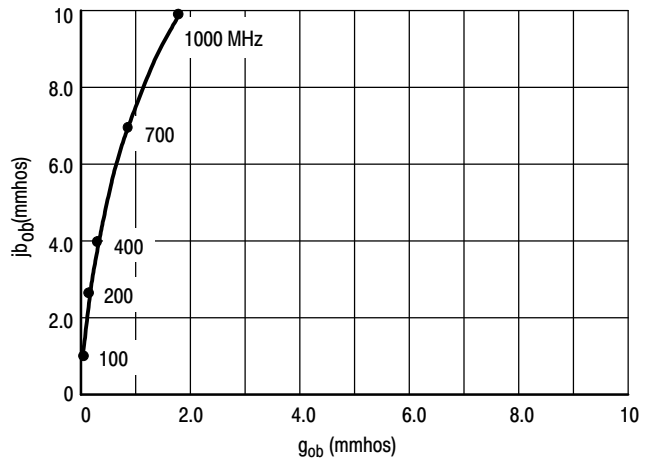


Figure 8. Polar Form

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

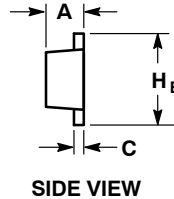
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SCALE 4:1

**SOT-723**  
CASE 631AA-01  
ISSUE D

DATE 10 AUG 2009

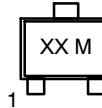


**NOTES:**

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 BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.45	0.50	0.55
b	0.15	0.21	0.27
b1	0.25	0.31	0.37
C	0.07	0.12	0.17
D	1.15	1.20	1.25
E	0.75	0.80	0.85
e	0.40 BSC		
H E	1.15	1.20	1.25
L	0.29 REF		
L2	0.15	0.20	0.25

**GENERIC MARKING DIAGRAM\***



XX = Specific Device Code  
M = Date Code

- |   |  |  |  |  |
|---|--|--|--|--|
| STYLE 1:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR | STYLE 2:<br>PIN 1. ANODE<br>2. N/C<br>3. CATHODE | STYLE 3:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE | STYLE 4:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. ANODE | STYLE 5:<br>PIN 1. GATE<br>2. SOURCE<br>3. DRAIN |
|---|--|--|--|--|

**RECOMMENDED SOLDERING FOOTPRINT\***



\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G", may or not be present.

\*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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