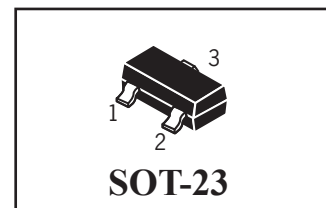
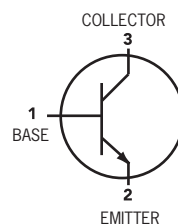


### NPN Silicon VHF/UHF Transistor

**(Pb)** Lead(Pb)-Free



### MAXIMUM RATINGS (Ta=25 °C)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V <sub>CEO</sub>	25	V <sub>dc</sub>
Collector-Base Voltage	V <sub>CBO</sub>	30	V <sub>dc</sub>
Emitter-Base Voltage	V <sub>EBO</sub>	3.0	V <sub>dc</sub>
Collector Current - Continuous	I <sub>C</sub>	50	mA <sub>dc</sub>

### THERMAL CHARACTERISTICS

Characteristics	Symbol	Value	Unit
Total Device Dissipation FR-5 Board <sup>(1)</sup> T <sub>A</sub> = 25 °C	P <sub>D</sub>	225	mW
Derate above 25 °C		1.8	mW/°C
Thermal Resistance, Junction Ambient	R <sub>θJA</sub>	556	°C/W
Junction and Storage, Temperature	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C

### Device Marking

MMBTH10=3EM

### ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min	Max	Unit
Collector-Emitter Breakdown Voltage (I <sub>C</sub> = 1.0 mA <sub>dc</sub> , I <sub>B</sub> =0)	V <sub>(BR)CEO</sub>	25	-	V <sub>dc</sub>
Collector-Base Breakdown Voltage (I <sub>C</sub> = 100 uA <sub>dc</sub> , I <sub>E</sub> =0)	V <sub>(BR)CBO</sub>	30	-	V <sub>dc</sub>
Emitter-Base Breakdown Voltage (I <sub>E</sub> = 10 uA <sub>dc</sub> , I <sub>C</sub> =0)	V <sub>(BR)EBO</sub>	3.0	-	V <sub>dc</sub>
Collector Cutoff Current (V <sub>CB</sub> = 25V <sub>dc</sub> , I <sub>E</sub> =0)	I <sub>CBO</sub>	-	100	nA <sub>dc</sub>
Emitter Cutoff Current (V <sub>EB</sub> = 2.0 V <sub>dc</sub> , I <sub>C</sub> =0)	I <sub>EBO</sub>	-	100	nA <sub>dc</sub>

1. FR-5=1.0 × 0.75 × 0.062 in

# MMBTH10



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

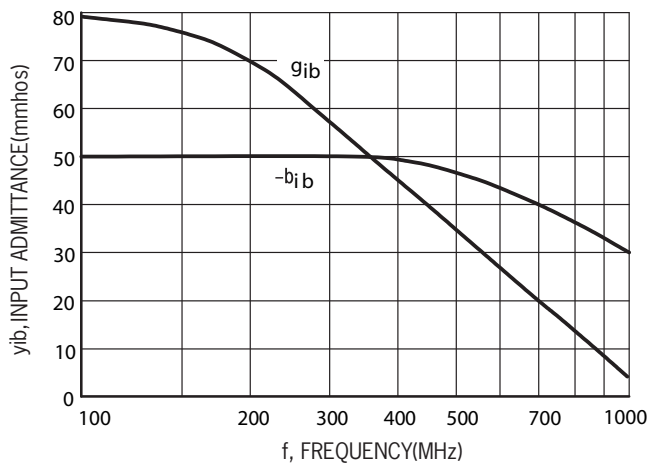
Characteristics	Symbol	Min	Typ	Max	Unit
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### ON CHARACTERISTICS

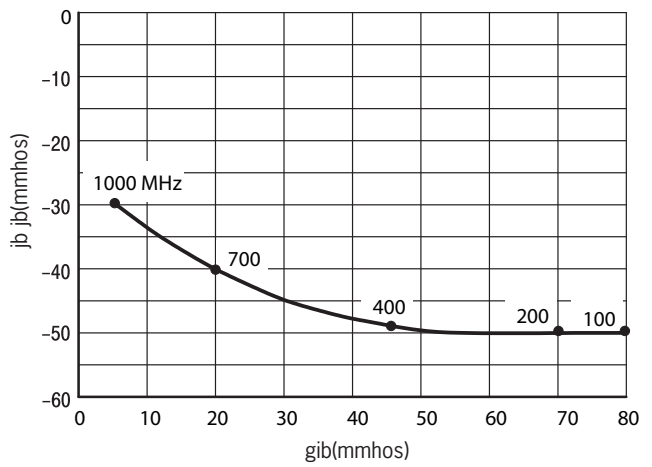
DC Current Gain ( $I_C=4.0\text{ mA}$ , $V_{CE}=10\text{ V}$ )	$h_{FE}$	60	-	-	-
Collector-Emitter Saturation Voltage ( $I_C=4.0\text{ mA}$ , $I_B=0.4\text{ mA}$ )	$V_{CE(sat)}$	-	-	0.5	Vdc
Base-Emitter On Voltage ( $I_C=4.0\text{ mA}$ , $V_{CE}=10\text{ V}$ )	$V_{BE(on)}$	-	-	0.95	Vdc

### SMALL-SIGNAL CHARACTERISTICS

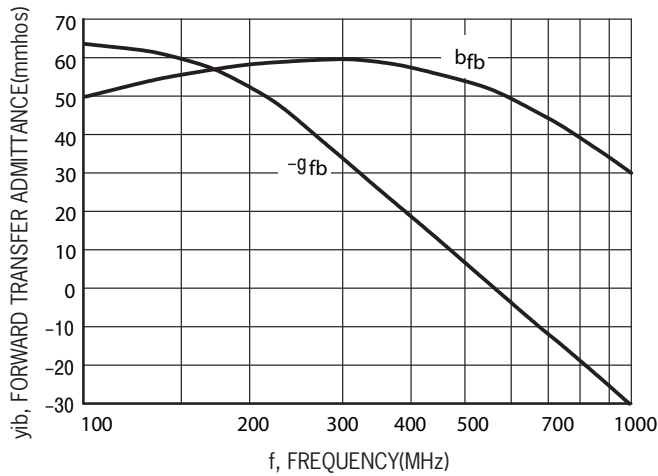
Current-Gain-Bandwidth Product ( $I_C=4.0\text{ mA}$ , $V_{CE}=10\text{ V}$ , $f=100\text{ MHz}$ )	$f_T$	650	-	-	MHz
Collector-Base Capacitance ( $V_{CB}=10\text{ V}$ , $I_E=0$ , $f=1.0\text{ MHz}$ )	$C_{cb}$	-	-	0.7	pF
Common-Base Feedback Capacitance ( $V_{CB}=10\text{ V}$ , $I_E=0$ , $f=1.0\text{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



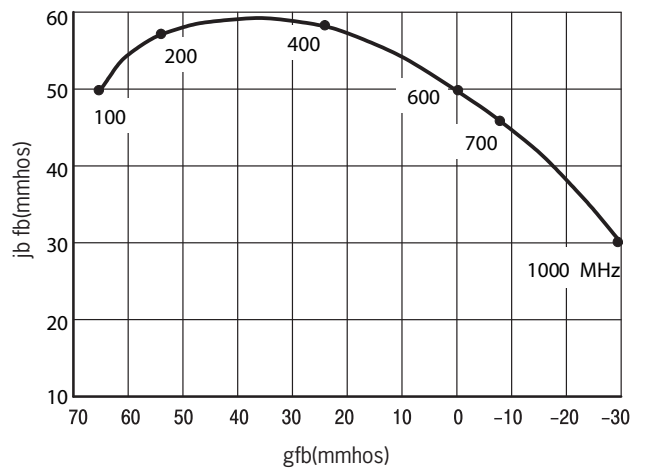
**FIG.1 Rectangular Form**



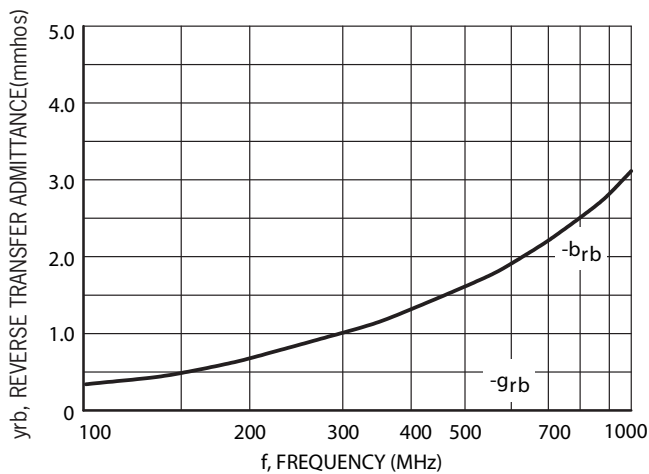
**FIG.2 Polar Form**



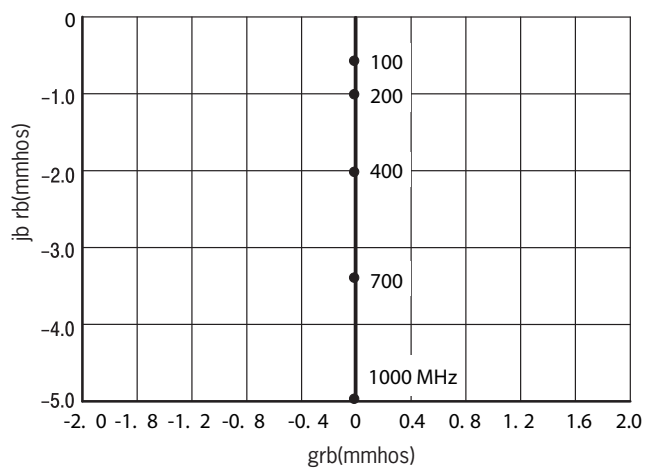
**FIG.3 Rectangular Form**



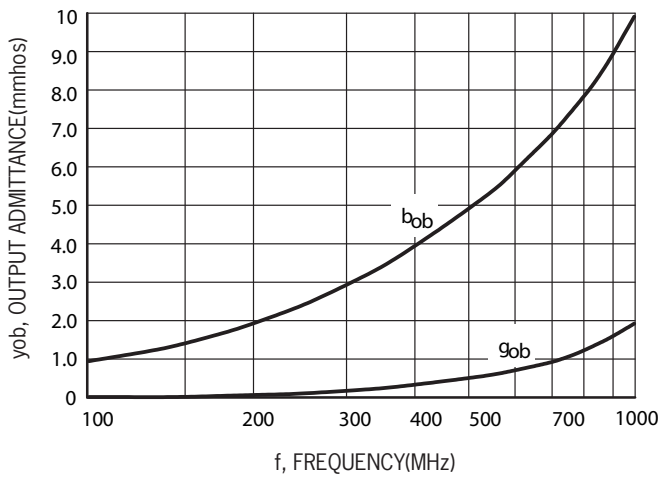
**FIG.4 Polar Form**



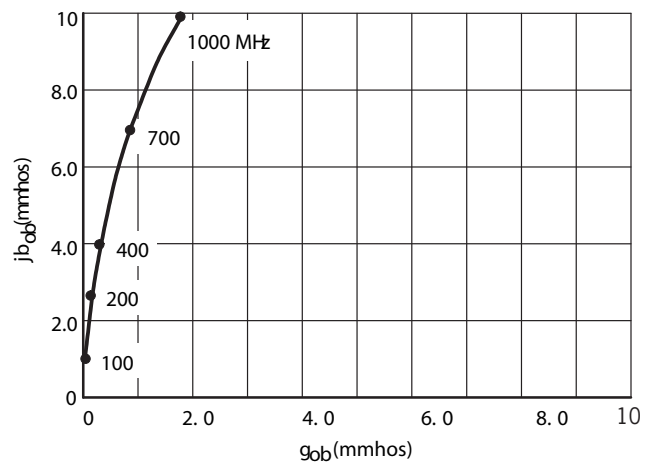
**FIG.5 Rectangular Form**



**FIG.6 Polar Form**



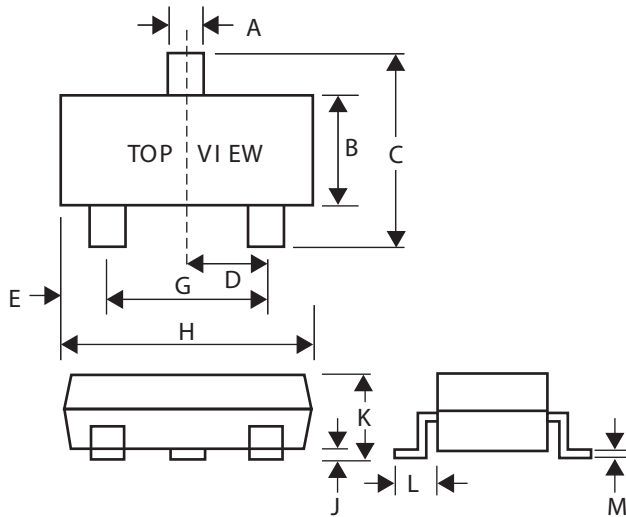
**FIG. 7 Rectangular Form**



**FIG. 8 Polar Form**

## SOT-23 Package Outline Dimensions

Unit:mm



Dim	Min	Max
A	0.35	0.51
B	1.19	1.40
C	2.10	3.00
D	0.85	1.05
E	0.46	1.00
G	1.70	2.10
H	2.70	3.10
J	0.01	0.13
K	0.89	1.10
L	0.30	0.61
M	0.076	0.25