SPICE MODEL: MMBTH10

MMBTH10

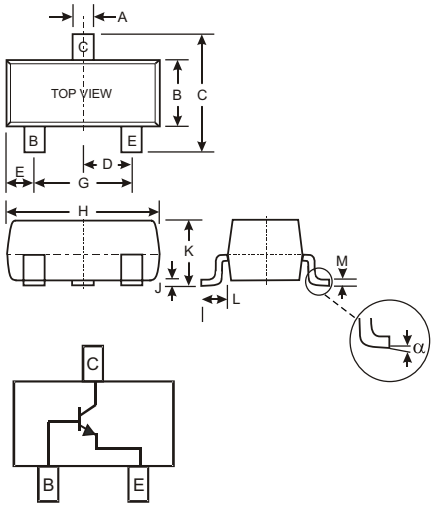
NPN SURFACE MOUNT VHF/UHF TRANSISTOR

Features

- Designed for VHF/UHF Amplifier Applications and High Output VHF Oscillators
- High Current Gain Bandwidth Product
- Ideal for Mixer and RF Amplifier Applications with collector currents in the 100μA - 30 mA Range
- Also Available in Lead Free Version

Mechanical Data

- Case: SOT-23, Molded Plastic
- Case material - UL Flammability Rating 94V-0
- Moisture sensitivity: Level 1 per J-STD-020A
- Terminals: Solderable per MIL-STD-202, Method 208
- Also Available in Lead Free Plating (Matte Tin Finish). Please see Ordering Information, Note 4, on Page 2
- Terminal Connections: See Diagram
- Marking (See Page 2): K3H, K3Y
- Ordering & Date Code Information: See Page 2
- Weight: 0.008 grams (approx.)



SOT-23		
Dim	**Min**	**Max**
A	0.37	0.51
B	1.20	1.40
C	2.30	2.50
D	0.89	1.03
E	0.45	0.60
G	1.78	2.05
H	2.80	3.00
J	0.013	0.10
K	0.903	1.10
L	0.45	0.61
M	0.085	0.180
α	0°	8°
All Dimensions in mm		

Maximum Ratings @ T_A = 25°C unless otherwise specified

Characteristic	Symbol	MMBTH10	Unit
Collector-Base Voltage	V_{CBO}	30	V
Collector-Emitter Voltage	V_{CEO}	25	V
Emitter-Base Voltage	V_{EBO}	3.0	V
Collector Current - Continuous (Note 1)	I_C	50	mA
Power Dissipation (Note 1)	P_d	300	mW
Thermal Resistance, Junction to Ambient (Note 1)	$R_{\theta JA}$	417	°C/W
Operating and Storage and Temperature Range	T_j, T_{STG}	-55 to +150	°C

Electrical Characteristics @ T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 2)					
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	25	—	V	I_C = 1mA I_B = 0
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	30	—	V	I_C = 100μA, I_E = 0
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	3.0	—	V	I_E = 10μA, I_C = 0
Collector Cutoff Current	I_{CBO}	—	100	nA	V_{CB} = 25V, I_E = 0
Emitter Cutoff Current	I_{EBO}	—	100	nA	V_{EB} = 2V, I_C = 0
ON CHARACTERISTICS (Note 2)					
DC Current Gain	h_{FE}	60	—	—	I_C = 4mA, V_{CE} = 10.0V
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	0.5	V	I_C = 4mA, I_B = 400μA
Base-Emitter On Voltage	$V_{BE(SAT)}$	—	0.95	V	I_C = 4mA, V_{CE} = 10.0V
SMALL SIGNAL CHARACTERISTICS					
Current-Gain-Bandwidth Product	f_T	650	—	MHz	V_{CE} = 10V, f = 100MHz, I_C = 4mA
Collector-Base Capacitance	C_{CB}	—	0.7	pF	V_{CB} = 10V, f = 1.0MHz, I_E = 0
Collector-Base Feedback Capacitance	C_{RB}	—	0.65	pF	V_{CB} = 10V, f = 1.0MHz, I_E = 0
Collector-Base Time Constant	Rb'Cc	—	9	ps	V_{CB} = 10V, f = 31.8MHz, I_C = 4mA

Note: 1. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.

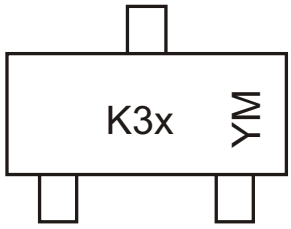
2. Short duration test pulse used to minimize self-heating effect.

Ordering Information (Note 3)

Device	Packaging	Shipping
MMBTH10-7	SOT-23	3000/Tape & Reel

Notes: 3. For Packaging Details, go to our website at http://www.diodes.com/datasheets/ap02007.pdf.
4. For Lead Free version (with Lead Free terminal finish) part number, please add "-F" suffix to part number above. Example: MMBTH10-7-F.

Marking Information



K3x = Product Type Marking Code, e.g. K3H
YM = Date Code Marking
Y = Year ex: N = 2002
M = Month ex: 9 = September

Date Code Key

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Code	J	K	L	M	N	P	R	S	T	U	V	W

Month	Jan	Feb	March	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

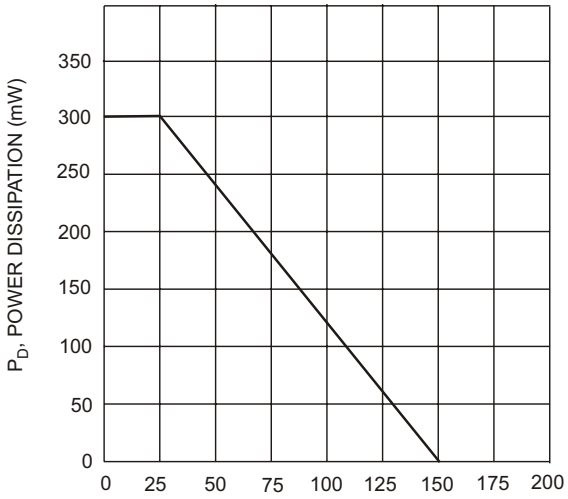


Fig. 1, Max Power Dissipation vs Ambient Temperature

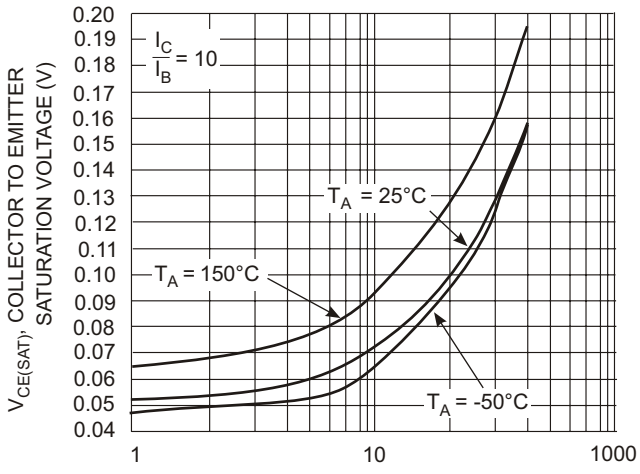


Fig. 2 Collector Emitter Saturation Voltage vs. Collector Current

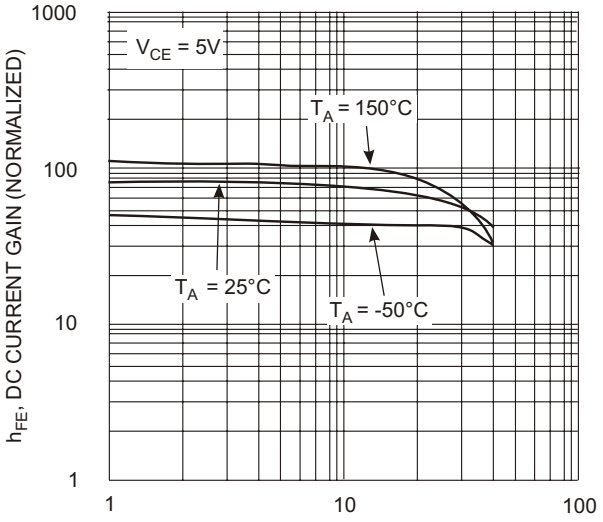


Fig. 3, DC Current Gain vs. Collector Current

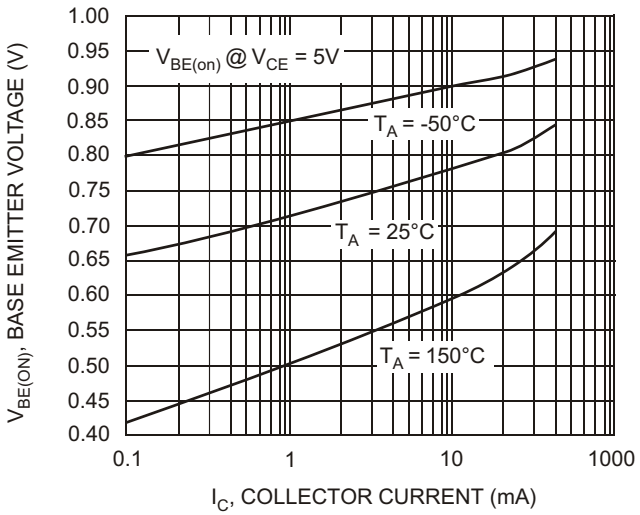


Fig. 4 Base Emitter Voltage vs. Collector Current

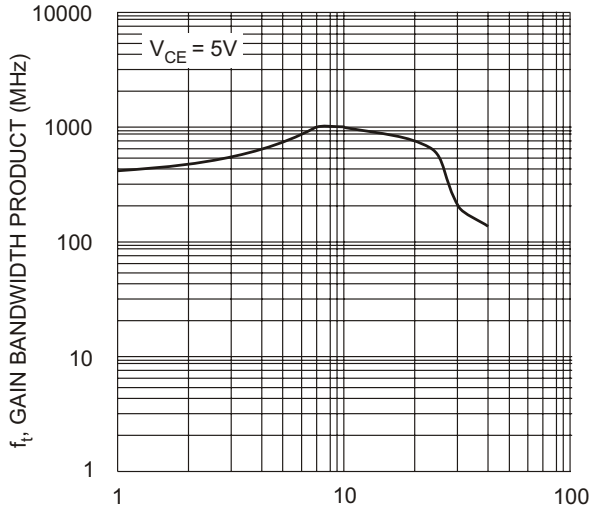


Fig. 5, Gain Bandwidth Product vs Collector Current