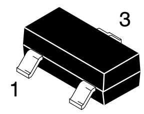
NPN RF Transistor

MMBT5179



1. Base 2. Emitter 3. Collector

SOT−23
CASE 318−08

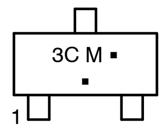
Description

This device is designed for use in low noise UHF/VHF amplifiers with collector currents in the 100 μA to 30 mA range in common emitter or common base mode of operation, and in low frequency drift, high ouput UHF oscillators. Sourced from Process 40.

Features

- This Devices is Pb−Free, Halogen Free/BFR Free and is RoHS Compliant

MARKING DIAGRAM



3C = Specific Device Code
M = Date Code*
▪ = Pb−Free Package
(Note: Microdot may be in either location)

*Date Code orientation and/or overbar may vary depending upon manufacturing location.

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{CEO}	Collector−Emitter Voltage	12	V
V_{CBO}	Collector−Base Voltage	20	V
V_{EBO}	Emitter−Base Voltage	2.5	V
I_C	Collector Current − Continuous	50	mA
T_J, T_{stg}	Operating and Storage Junction Temperature Range (Note 1)	−55 to + 150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

(T_A = 25°C unless otherwise noted) (Note 3)

Symbol	Characteristic	Max	Unit
P_D	Total Device Dissipation Derate above 25°C	225 1.8	MW mW/°C
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	556	°C/W

1. These ratings are based on a maximum junction temperature of 150°C.
2. These are steady−state limits. **onsemi** should be consulted on applications involving pulsed or low−duty cycle operations.
3. Device mounted on FR−4 PCB 1.6” × 1.6” × 0.06”.

ORDERING INFORMATION

Device	Package	Shipping†
MMBT5179	SOT−23 (Pb−Free)	3000 / Tape and Real

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

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

Symbol	Parameter	Test Conditions	Min	Max	Unit
$V_{CEO(sus)}$	Collector−Emitter Sustaining Voltage (Note 4)	I_C = 3.0 mA, I_B = 0	12		V
$V_{(BR)CBO}$	Collector−Base Breakdown Voltage	I_C = 1.0 μA, I_E = 0	20		V
$V_{(BR)EBO}$	Emitter−Base Breakdown Voltage	I_E = 10 μA, I_C = 0	2.5		V
I_{CBO}	Collector Cut−Off Current	V_{CB} = 15 V, I_E = 0		0.02	μA
		V_{CB} = 15 V, T_A = 150°C		1.0	μA
ON CHARACTERISTICS					
h_{FE}	DC Current Gain	I_C = 3.0 mA, V_{CE} = 1.0 V	25	250	
$V_{CE(sat)}$	Collector−Emitter Saturation Voltage	I_C = 10 mA, I_B = 1.0 mA		0.4	V
$V_{BE(sat)}$	Base−Emitter Saturation Voltage	I_C = 10 mA, I_B = 1.0 mA		1.0	V
SMALL SIGNAL CHARACTERISTICS					
f_T	Current Gain − Bandwidth Product	I_C = 5.0 mA, V_{CE} = 6.0 V, f = 100 MHz	900	2000	MHz
C_{cb}	Collector−Base Capacitance	V_{CB} = 10 V, I_E = 0, f = 0.1 to 1.0 MHz		1.0	pF
h_{fe}	Small−Signal Current Gain	I_C = 2.0 mA, V_{CE} = 6 V, f = 1.0 kHz	25	300	
$rb'C_c$	Collector Base Time Constant	I_C = 2.0 mA, V_{CB} = 6.0 V, f = 31.9 MHz	3.0	14	ps
NF	Noise Figure	I_C = 1.5 mA, V_{CE} = 6.0 V, R_S = 50 Ω, f = 200 MHz		5.0	dB
FUNCTIONAL TEST					
G_{pe}	Amplifier Power Gain	V_{CE} = 6.0 V, I_C = 5.0 mA, f = 200 MHz	15		dB
P_O	Power Output	V_{CB} = 10 V, I_E = 12 mA, f ≥ 500 MHz	20		mW

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

SPICE MODEL

NPN (Is=69.28E−18 Xti=3 Eg=1.11 Vaf=100 Bf=282.1 Ne=1.177 Ise=69.28E−18 Ikf=22.03m Xtb=1.5 Br=1.176 Nc=2 Isc=0 Ikr=0 Rc=4 Cjc=1.042p Mjc=.2468 Vjc=.75 Fc=.5 Cje=1.52p Mje=.3223 Vje=.75 Tr=1.588n Tf=135.6p Itf=.27 Vtf=10 Xtf=30 Rb=10)

TYPICAL CHARACTERISTICS

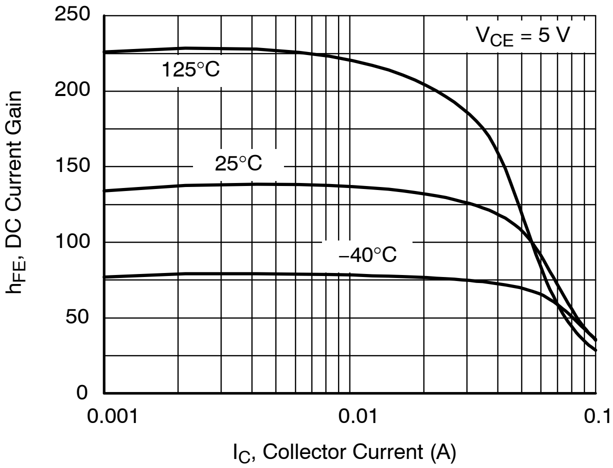


Figure 1. DC Current Gain vs. Collector Current

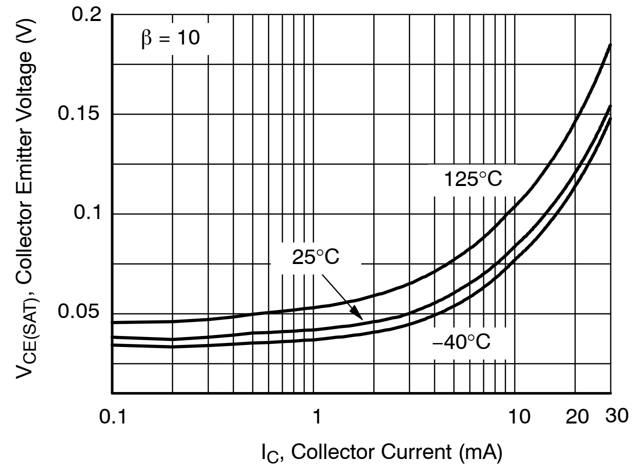


Figure 2. Collector− Emitter Saturation Voltage vs. Collector Current

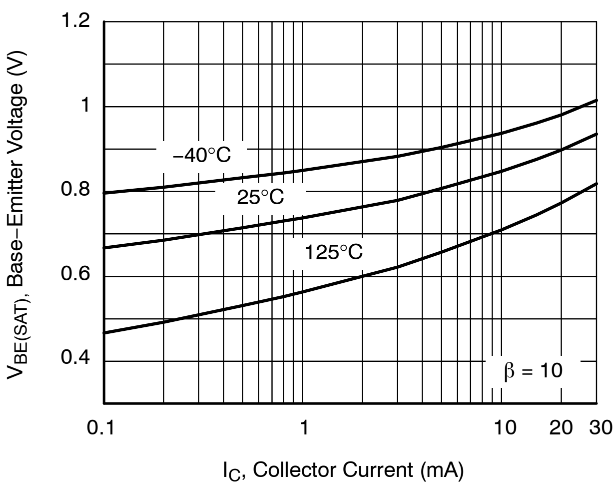


Figure 3. Base−Emitter Saturation Voltage vs. Collector Current

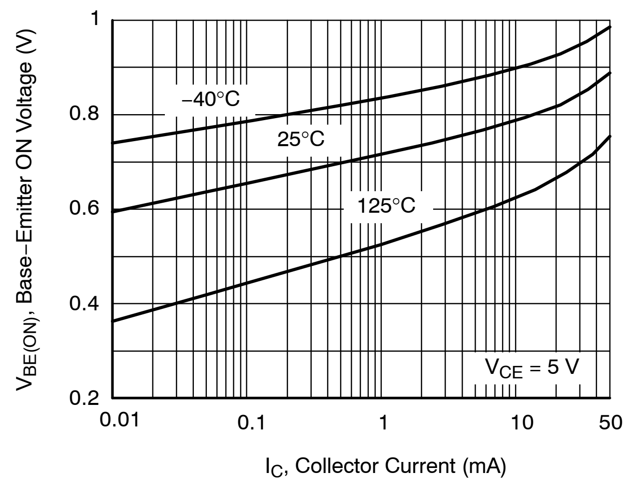


Figure 4. Base−Emitter ON Voltage vs. Collector Current

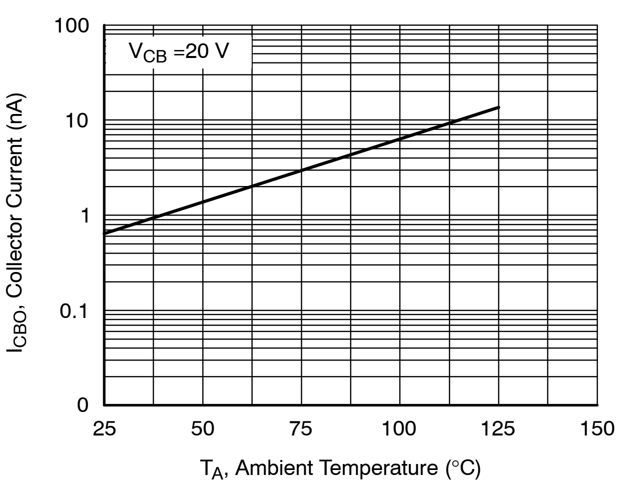


Figure 5. Collector Cut−Off Current vs. Ambient Temperature

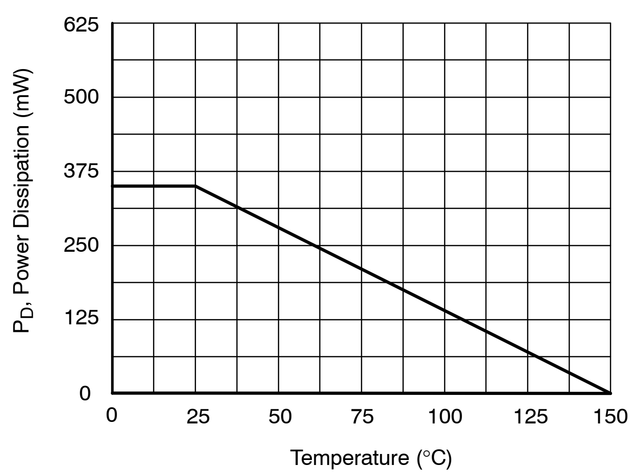


Figure 6. Power Dissipation vs. Ambient Temperature

TEST CIRCUIT

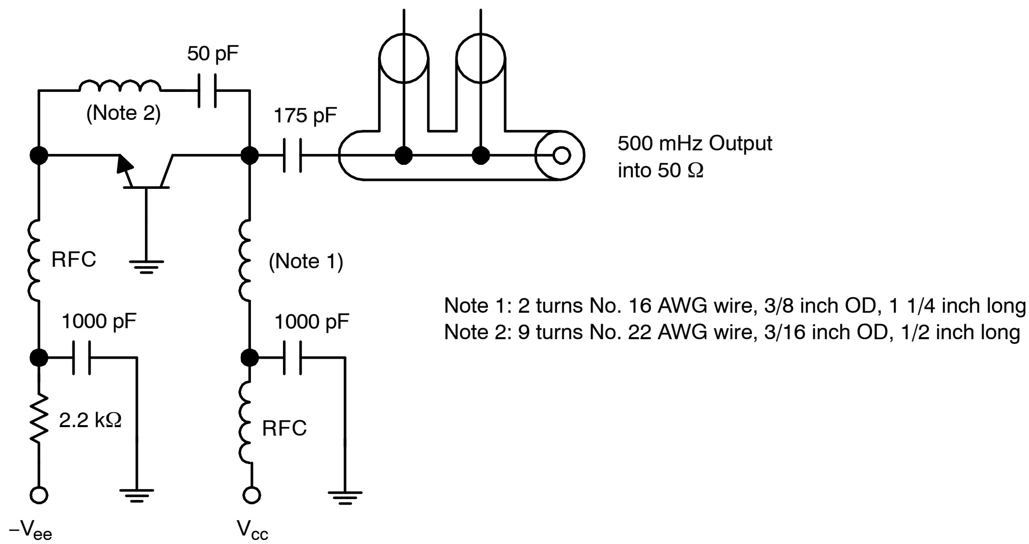


Figure 7. 500 MHz Oscillator Circuit

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales

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