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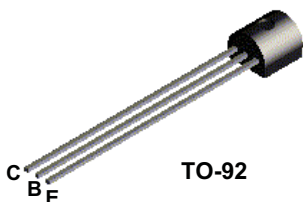
[Fairchild Semiconductor](#)  
[FPNH10](#)

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## FPNH10



### NPN RF Transistor

This device is designed for use in low noise UHF/VHF amplifiers, with collector currents in the 100  $\mu$ A to 20 mA range in common emitter or common base mode of operations, and in low frequency drift, high output UHF oscillators. Sourced from Process 42.

#### Absolute Maximum Ratings\* TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
$V_{CEO}$	Collector-Emitter Voltage	25	V
$V_{CBO}$	Collector-Base Voltage	30	V
$V_{EBO}$	Emitter-Base Voltage	3.0	V
$I_C$	Collector Current - Continuous	50	mA
$T_J, T_{stg}$	Operating and Storage Junction Temperature Range	-55 to +150	°C

\*These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

**NOTES:**

- 1) These ratings are based on a maximum junction temperature of 150 degrees C.
- 2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

#### Thermal Characteristics TA = 25°C unless otherwise noted

Symbol	Characteristic	Max	Units
		FPNH10	
$P_D$	Total Device Dissipation	350	mW
	Derate above 25°C	2.8	mW/°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case	125	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	357	°C/W

\*Device mounted on FR-4 PCB 1.6" X 1.6" X 0.06."

**NPN RF Transistor**  
(continued)

**Electrical Characteristics**

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
<b>OFF CHARACTERISTICS</b>					
$V_{(BR)CEO}$	Collector-Emitter Sustaining Voltage*	$I_C = 1.0 \text{ mA}, I_B = 0$	25		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 100 \mu\text{A}, I_E = 0$	30		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 10 \mu\text{A}, I_C = 0$	3.0		V
$I_{CBO}$	Collector Cutoff Current	$V_{CB} = 25 \text{ V}, I_E = 0$		100	nA
$I_{EBO}$	Emitter Cutoff Current	$V_{EB} = 2.0 \text{ V}, I_C = 0$		100	nA

**ON CHARACTERISTICS**

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

**SMALL SIGNAL CHARACTERISTICS**

$f_T$	Current Gain - Bandwidth Product	$I_C = 4.0 \text{ mA}, V_{CE} = 10 \text{ V}, f = 100 \text{ MHz}$	650		MHz
$C_{cb}$	Collector-Base Capacitance	$V_{CB} = 10 \text{ V}, I_E = 0, f = 1.0 \text{ MHz}$		0.720	pF
$C_{rb}$	Common-Base Feedback Capacitance	$V_{CB} = 10 \text{ V}, I_E = 0, f = 1.0 \text{ MHz}$	0.34	0.65	pF
$rb'C_c$	Collector Base Time Constant	$I_C = 4.0 \text{ mA}, V_{CB} = 10 \text{ V}, f = 31.8 \text{ MHz}$		9.0	ps

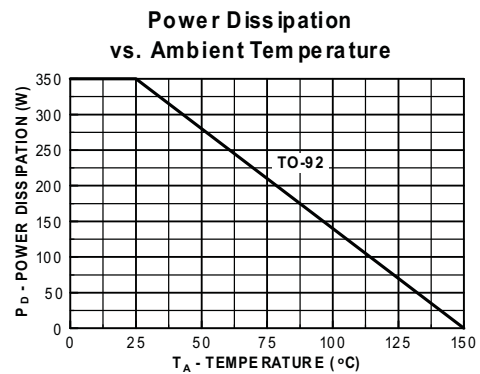
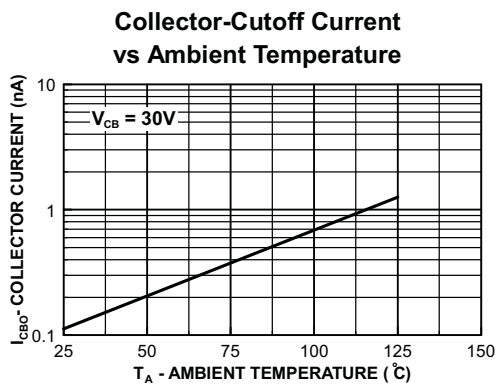
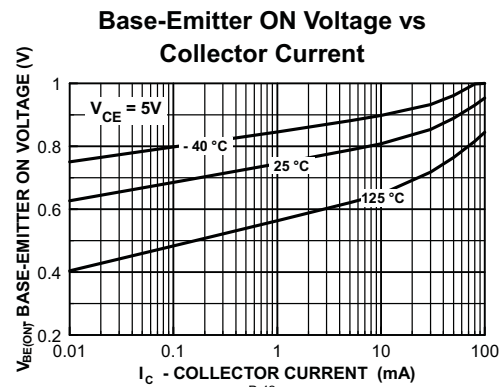
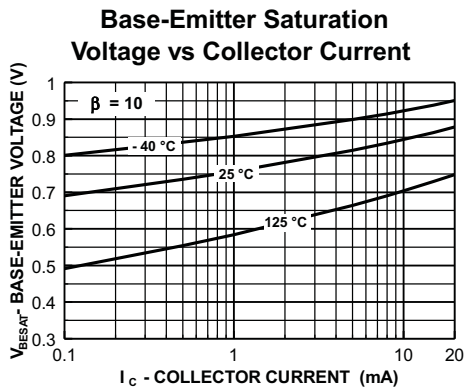
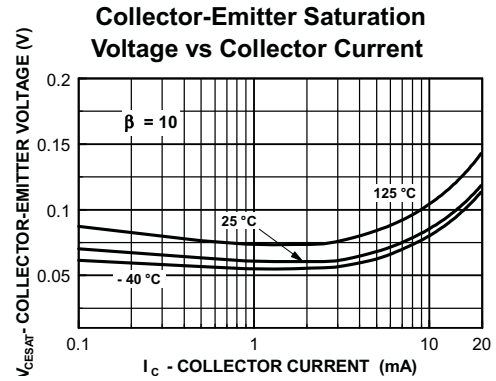
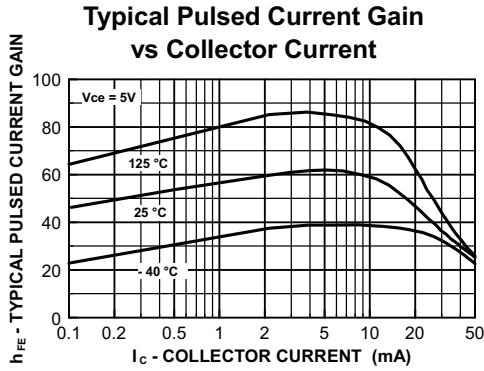
\*Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

**Spice Model**

NPN (Is=69.28E-18 Xti=3 Eg=1.11 Vaf=100 Bf=308.6 Ne=1.197 Ise=69.28E-18 Ikf=22.83m Xtb=1.5 Br=1.11 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=1.558n Tf=135.8p Itf=.27 Vtf=10 Xtf=30 Rb=10)

**NPN RF Transistor**  
(continued)

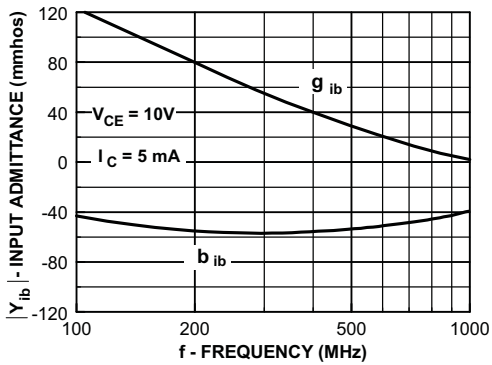
**Typical Characteristics**



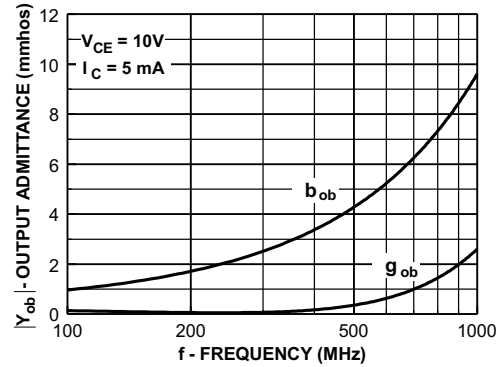
**NPN RF Transistor**  
(continued)

**Common Base Y Parameters vs. Frequency**

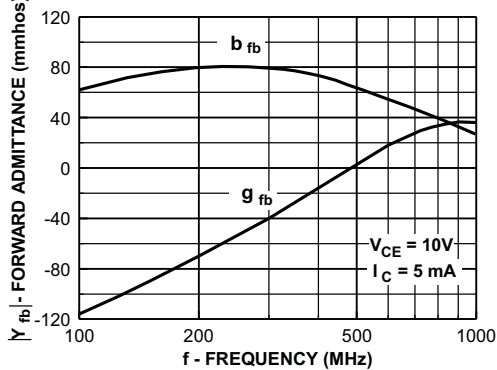
**Input Admittance**



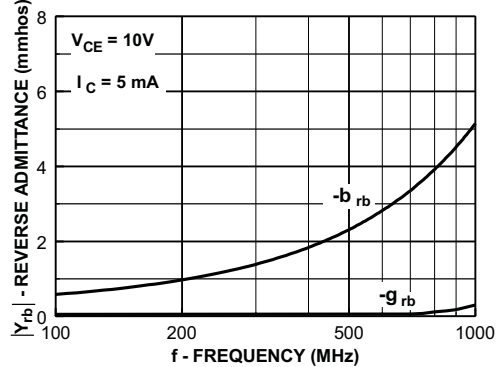
**Output Admittance**



**Forward Transfer Admittance**



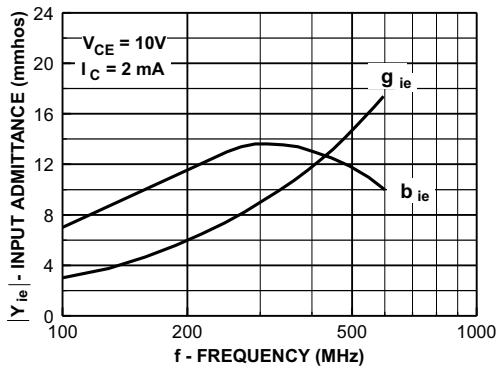
**Reverse Transfer Admittance**



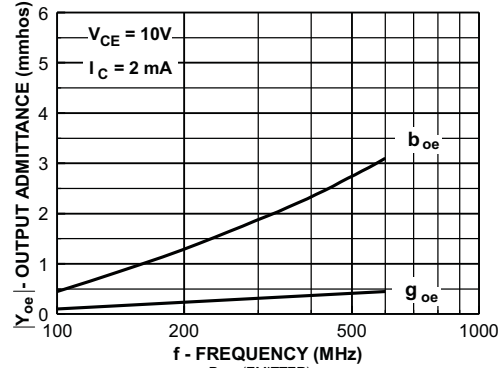
**NPN RF Transistor**  
(continued)

**Common Emitter Y Parameters vs. Frequency**

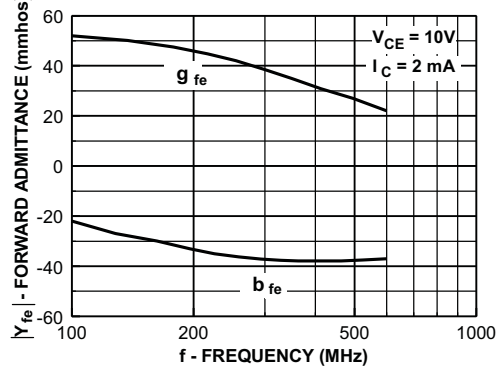
**Input Admittance**



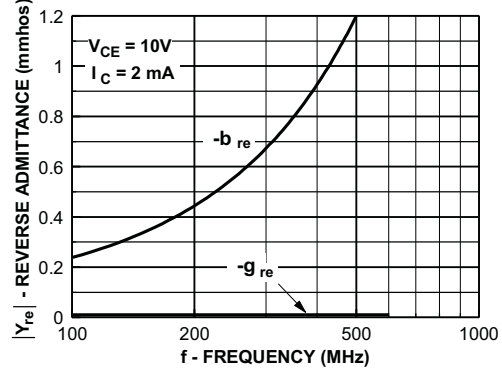
**Output Admittance**



**Forward Transfer Admittance**

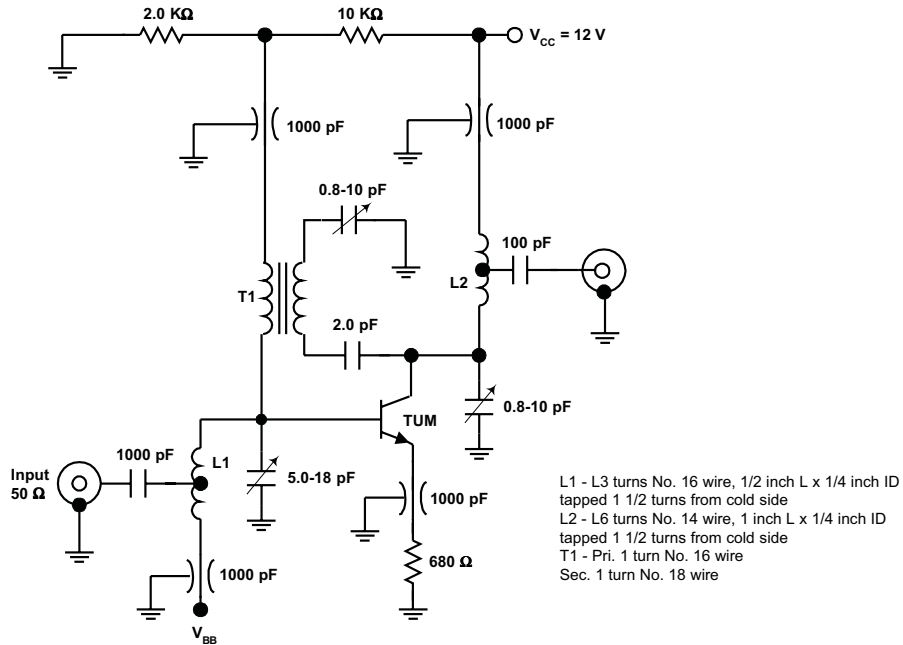


**Reverse Transfer Admittance**

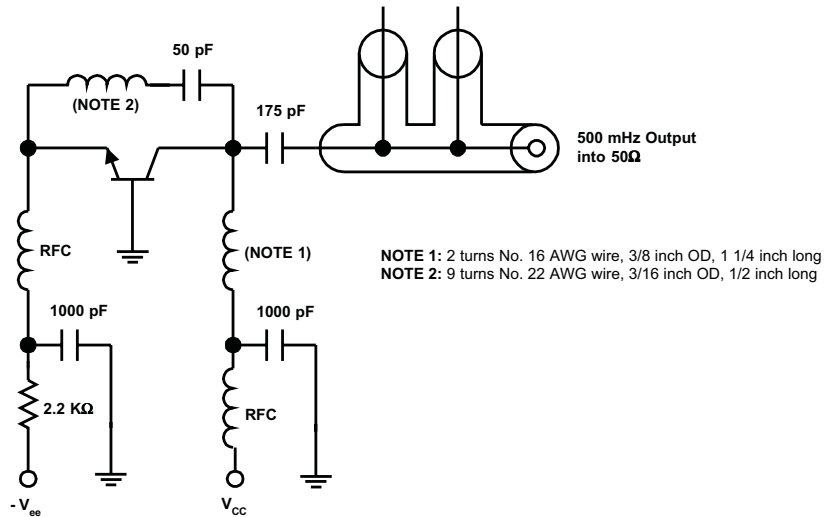


**NPN RF Transistor**  
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**Test Circuits**



**FIGURE 1: Neutralized 200 MHz pF and NF Circuit**



**FIGURE 2: 500 MHz Oscillator Circuit**

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