

FPNH₁₀



NPN RF Transistor

This device is designed for use in low noise UHF/VHF amplifiers, with collector currents in the 100 μA 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
Ic	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.

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."

9.0

ps

(continued)

Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
OFF CHA	RACTERISTICS				
$V_{(BR)CEO}$	Collector-Emitter Sustaining Voltage*	$I_C = 1.0 \text{ mA}, I_B = 0$	25		V
V _{(BR)CBO}	Collector-Base Breakdown Voltage	$I_C = 100 \mu A, I_E = 0$	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
h _{FE}	DC Current Gain	$I_C = 4.0 \text{ mA}, V_{CE} = 10 \text{ V}$	60		
	RACTERISTICS 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 S	IGNAL CHARACTERISTICS	-			
f⊤	Current Gain - Bandwidth Product	$I_C = 4.0 \text{ mA}, V_{CE} = 10 \text{ V},$ f = 100 MHz	650		MHz
C _{cb}	Collector-Base Capacitance	V _{CB} = 10 V, I _E = 0, f = 1.0 MHz		0.720	pF
C _{rb}	Common-Base Feedback Capacitance	V _{CB} = 10 V, I _E = 0, f = 1.0 MHz	0.34	0.65	pF
-1-10	Callagian Daga Tima Canatant	1 40 1 1/ 40 1/		0.0	

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

Collector Base Time Constant

Spice Model

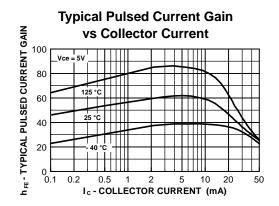
rb'Cc

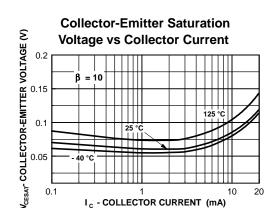
NPN (Is=69.28E-18 Xti=3 Eg=1.11 Vaf=100 Bf=308.6 Ne=1.197 Ise=69.28E-18 Ikf=22.83m Xtb=1.5 Br=1.11 Nc=2 Isc=0 Ikr=0 Rc=4 Cjc=1.042p Mjc=.2468 Vjc=.75 Fc=.5 Cje=1.52p Mje=.3223 Vje=.75 Tr=1.558n Tf=135.8p Itf=.27 Vtf=10 Xtf=30 Rb=10)

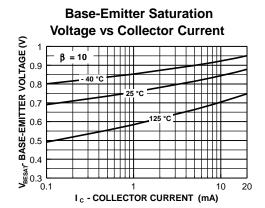
 $I_C = 4.0 \text{ mA}, V_{CB} = 10 \text{ V},$ f = 31.8 MHz

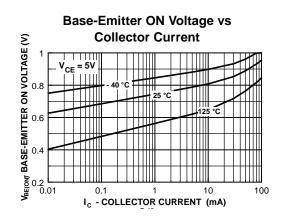
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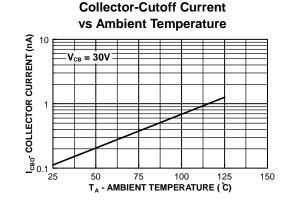
Typical Characteristics

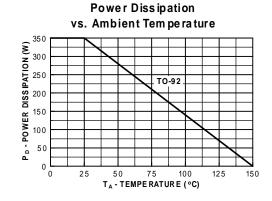






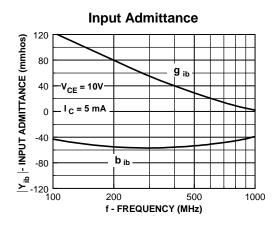


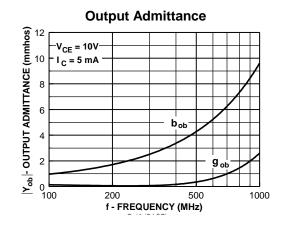


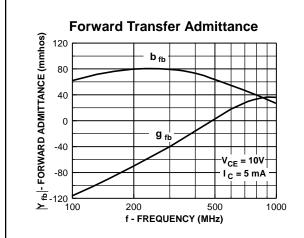


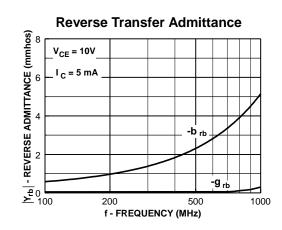
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Common Base Y Parameters vs. Frequency



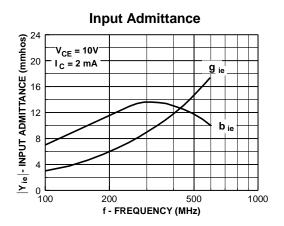


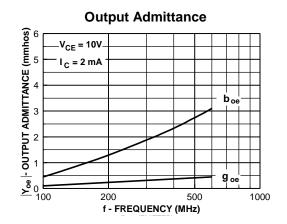


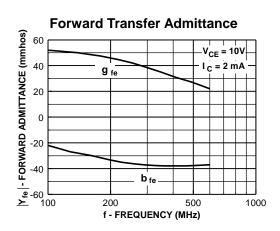


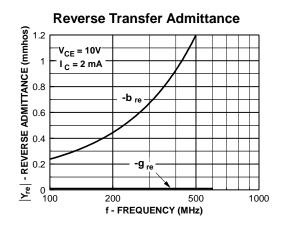
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Common Emitter Y Parameters vs. Frequency









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Test Circuits

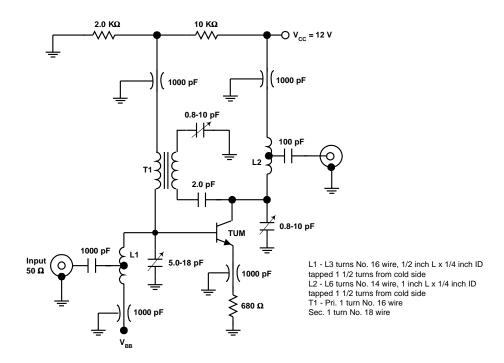


FIGURE 1: Neutralized 200 MHz pF and NF Circuit

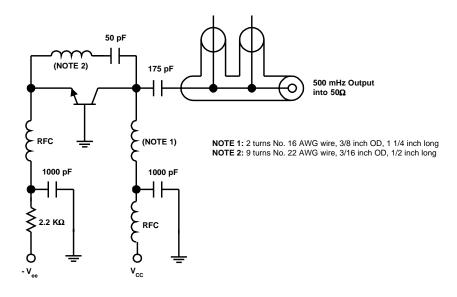


FIGURE 2: 500 MHz Oscillator Circuit

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