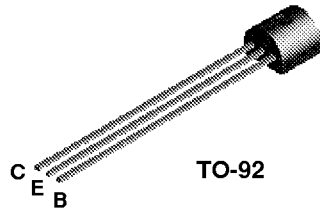
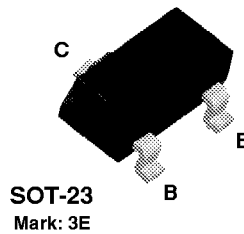


MPSH10



MMBTH10



NPN RF Transistor

This device is designed for use in low noise UHF/VHF amplifiers, with collector currents in the 100 μ 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 |
|------------------|---|--------|----------|-------|
| | | MPSH10 | *MMBTH10 | |
| P _D | Total Device Dissipation Derate above 25°C | 350 | 225 | mW |
| | | 2.8 | 1.8 | mW/°C |
| R _{θJC} | Thermal Resistance, Junction to Case | 125 | | °C/W |
| R _{θJA} | Thermal Resistance, Junction to Ambient | 357 | 556 | °C/W |

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

NPN RF Transistor

(continued)

MPSH10 / MMBTH10

Electrical Characteristics

TA = 25°C unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Max | Units |
|--------|-----------|-----------------|-----|-----|-------|
|--------|-----------|-----------------|-----|-----|-------|

OFF CHARACTERISTICS

| | | | | | |
|---------------|---------------------------------------|-----------------------------------|-----|-----|----|
| $V_{(BR)CEO}$ | 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

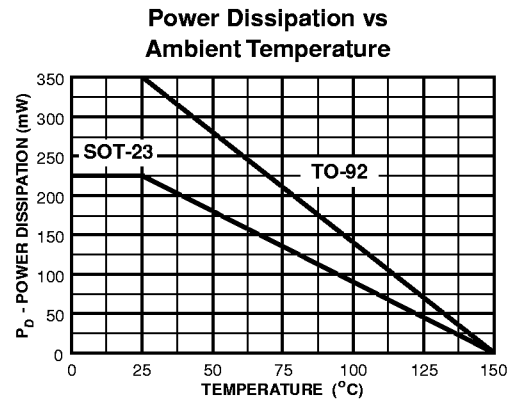
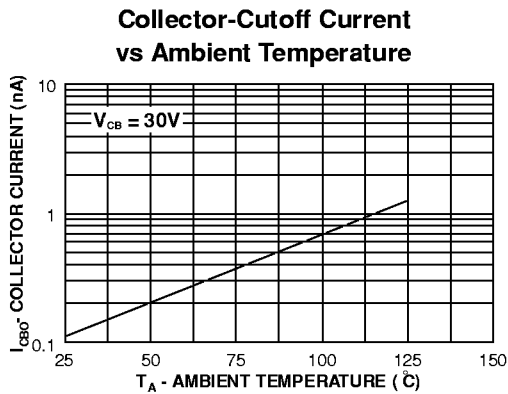
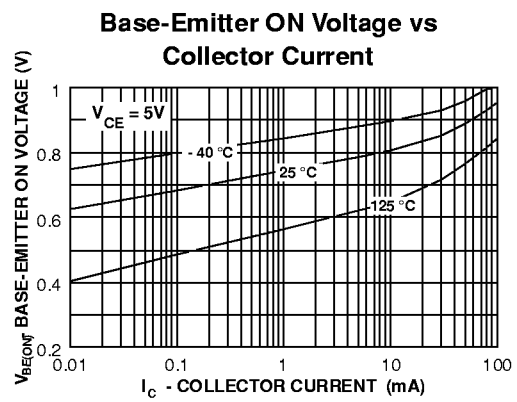
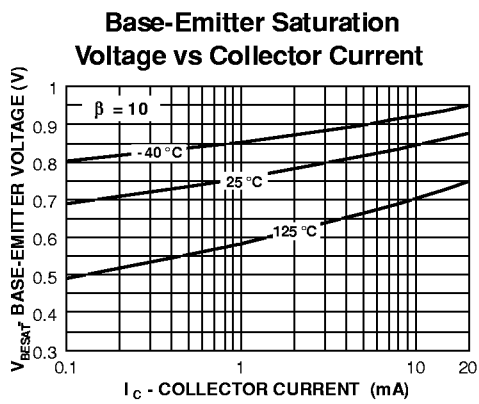
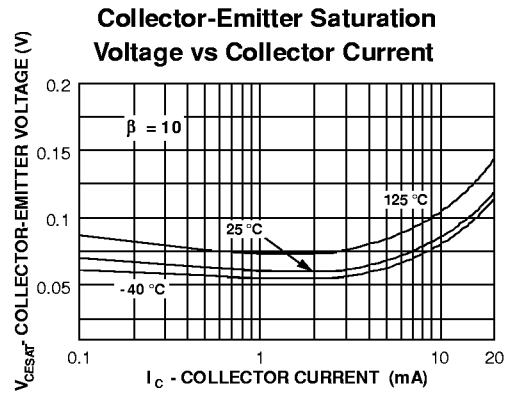
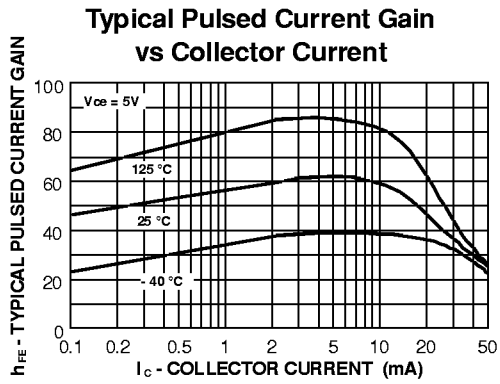
| | | | | | |
|----------|----------------------------------|--|------|------|-----|
| f_T | Current Gain - Bandwidth Product | $I_C = 4.0 \text{ mA}, V_{CE} = 10 \text{ V},$ $f = 100 \text{ MHz}$ | 650 | | MHz |
| C_{cb} | Collector-Base Capacitance | $V_{CB} = 10 \text{ V}, I_E = 0, f = 1.0 \text{ MHz}$ | | 0.7 | pF |
| C_{rb} | Common-Base Feedback Capacitance | $V_{CB} = 10 \text{ V}, I_E = 0, f = 1.0 \text{ MHz}$ | 0.35 | 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

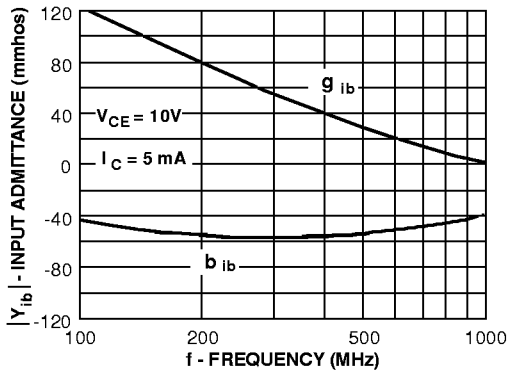
NPN (Is=69.28E-18 Xti=3 Eg=1.11 Vaf=100 Bf=308.6 Ne=1.197 Ise=69.28E-18 Ikf=22.83m Xtb=1.5 Br=1.11 Nc=2 Isc=0 Ikr=0 Rc=4 Cjc=1.042p Mjc=.2468 Vjc=.75 Fc=.5 Cje=1.52p Mje=.3223 Vje=.75 Tr=1.558n Tf=135.8p Itf=.27 Vtf=10 Xtf=30 Rb=10)

Typical Characteristics

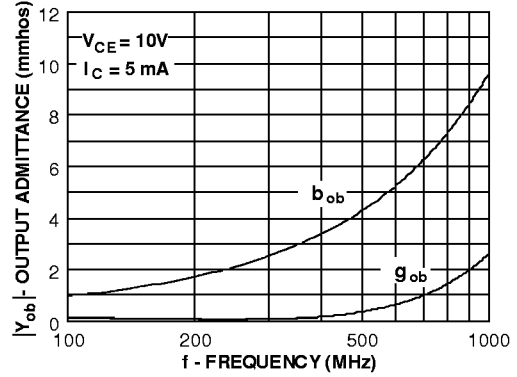


Common Base Y Parameters vs. Frequency

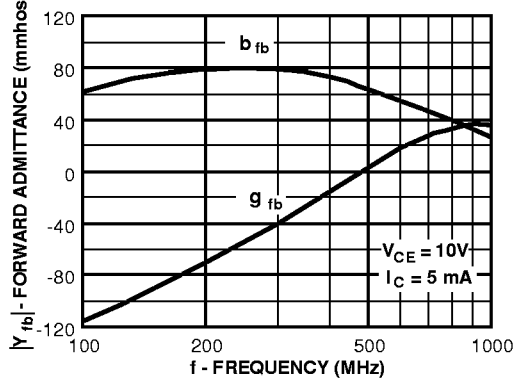
Input Admittance



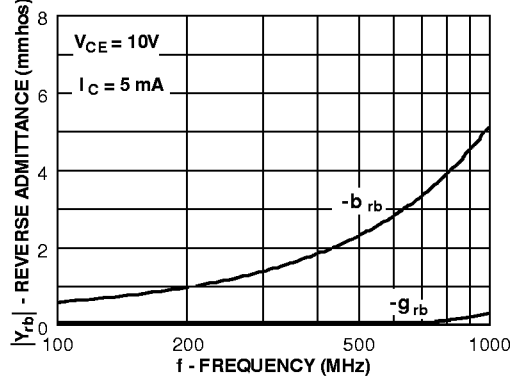
Output Admittance



Forward Transfer Admittance

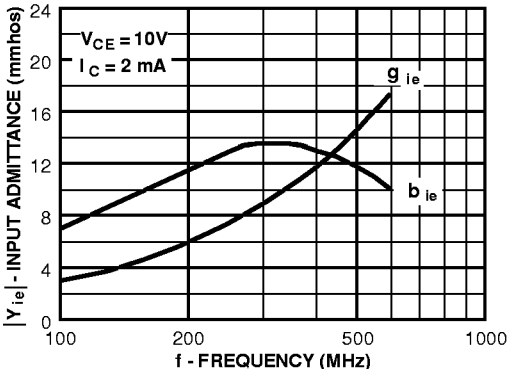


Reverse Transfer Admittance

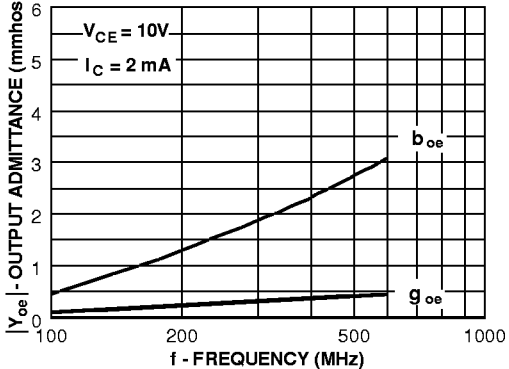


Common Emitter Y Parameters vs. Frequency

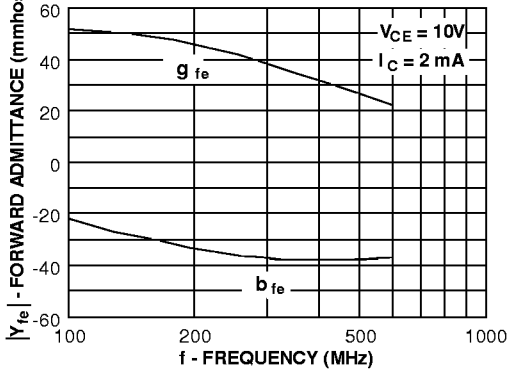
Input Admittance



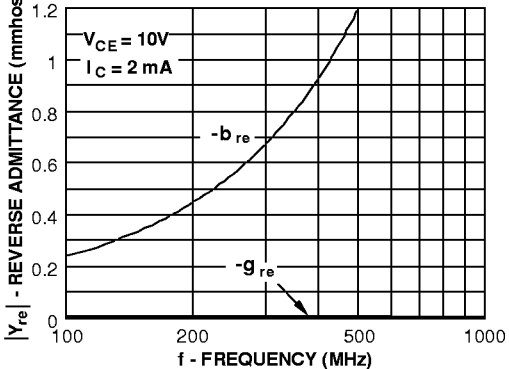
Output Admittance



Forward Transfer Admittance



Reverse Transfer Admittance



Test Circuits

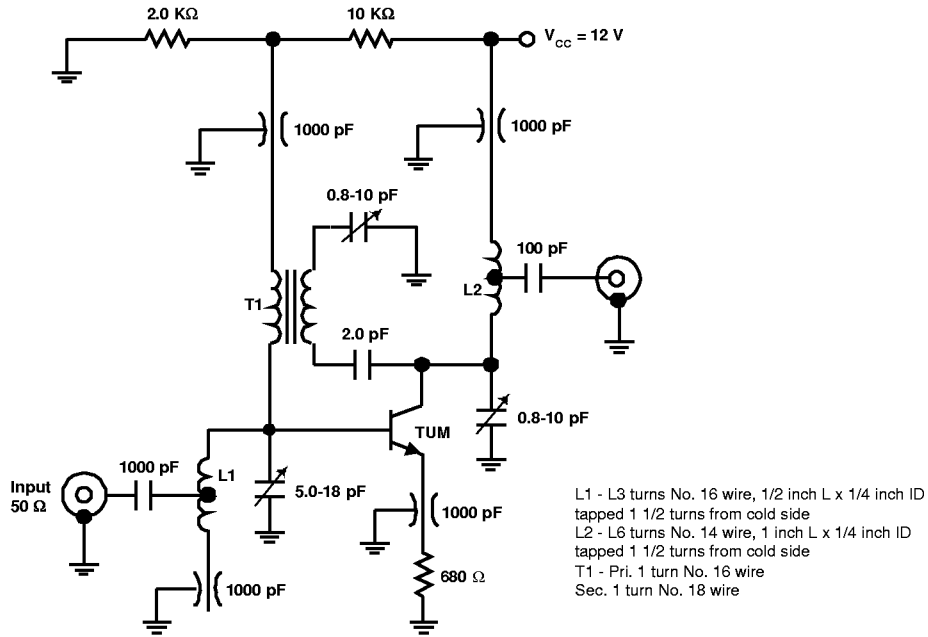


FIGURE 1: Neutralized 200 MHz pF and NF Circuit

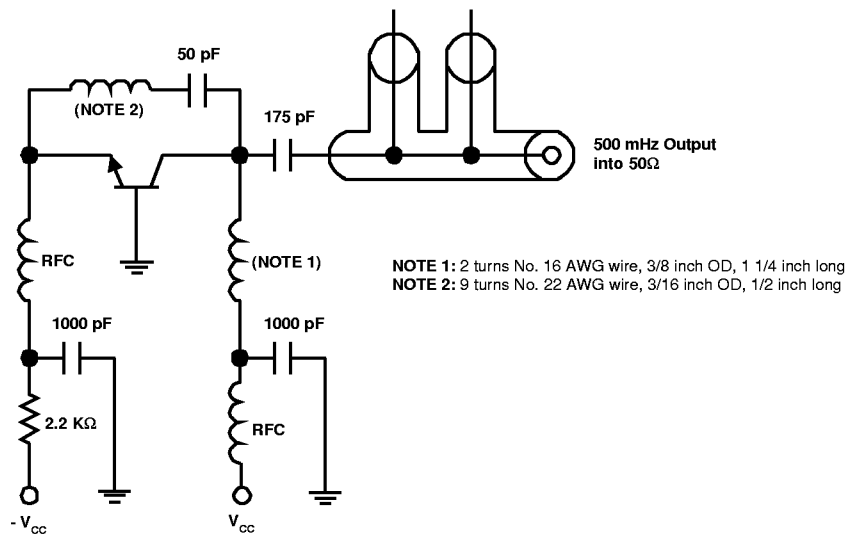


FIGURE 2: 500 MHz Oscillator Circuit