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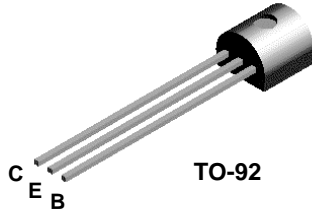
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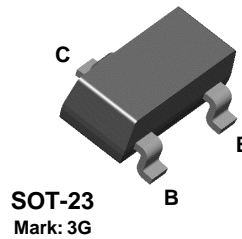
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MPSH11



MMBTH11



NPN RF Transistor

This device is designed for common-emitter low noise amplifier and mixer applications with collector currents in the 100 μ A to 10 mA range to 300 MHz, and low frequency drift common-base VHF oscillator applications with high output levels for driving FET mixers. Sourced from Process 47.

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 |
|------------------|---|--------|----------|-------|
| | | MPSH11 | *MMBTH11 | |
| P _D | Total Device Dissipation | 350 | 225 | mW |
| | Derate above 25°C | 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)

MPSH11 / MMBTH11

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 | $I_C = 100 \text{ } \mu\text{A}, I_E = 0$ | 30 | | V |
| $V_{(BR)EBO}$ | Emitter-Base Breakdown Voltage | $I_E = 10 \text{ } \mu\text{A}, I_C = 0$ | 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

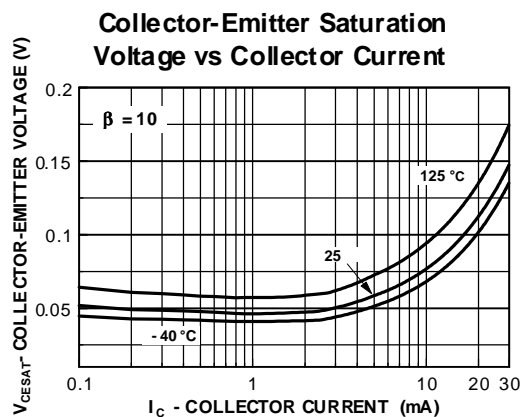
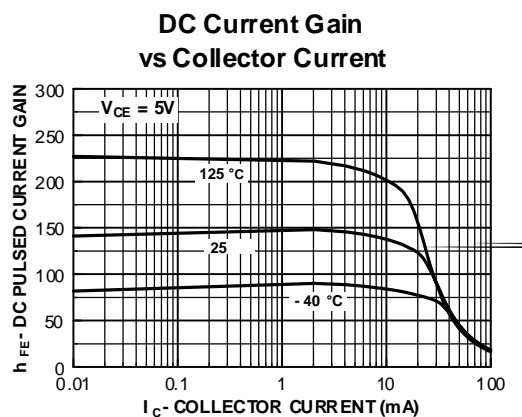
| | | | | | |
|---------------|--------------------------------------|---|----|------|---|
| h_{FE} | DC Current Gain | $I_C = 4.0 \text{ mA}, V_{CE} = 10 \text{ V}$ | 60 | | |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C = 4.0 \text{ mA}, I_B = 0.4 \text{ mA}$ | | 0.5 | V |
| $V_{BE(on)}$ | 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 | $V_{CB} = 10 \text{ V}, I_E = 0, f = 1.0 \text{ MHz}$ | 0.6 | 0.9 | pF |
| $r_{b\frac{1}{\beta}C}$ | Collector Base Time Constant | $I_C = 4.0 \text{ mA}, V_{CB} = 10 \text{ V}, f = 31.8 \text{ MHz}$ | | 9.0 | pS |

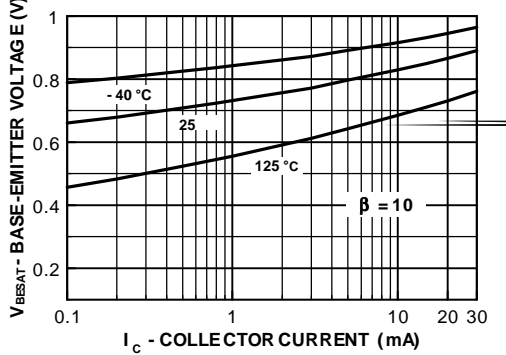
*Pulse Test: Pulse Width $\leq 300 \text{ } \mu\text{s}$, Duty Cycle $\leq 2.0\%$

Typical Characteristics

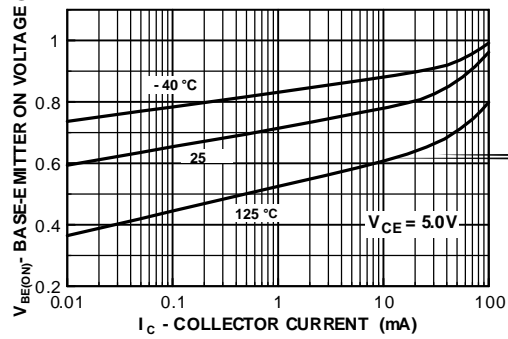


Typical Characteristics (continued)

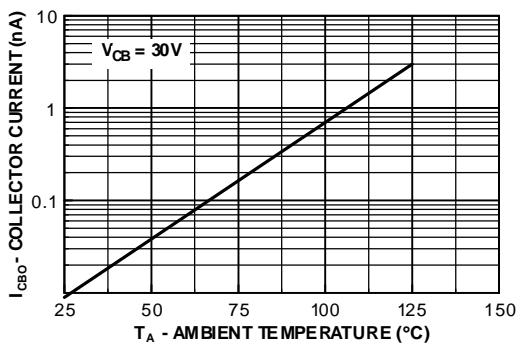
Base-Emitter Saturation Voltage vs Collector Current



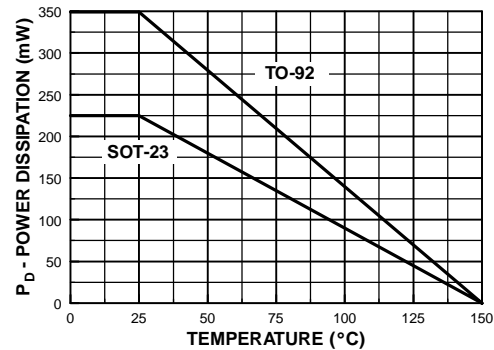
Base-Emitter ON Voltage vs Collector Current



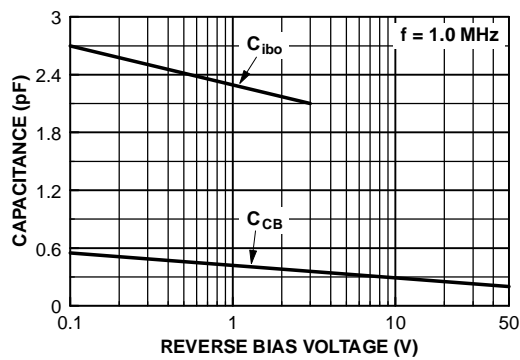
Collector Cut-Off Current vs Ambient Temperature



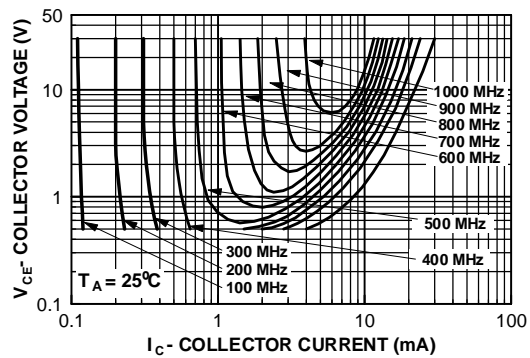
Power Dissipation vs Ambient Temperature



Capacitance vs Reverse Bias Voltage



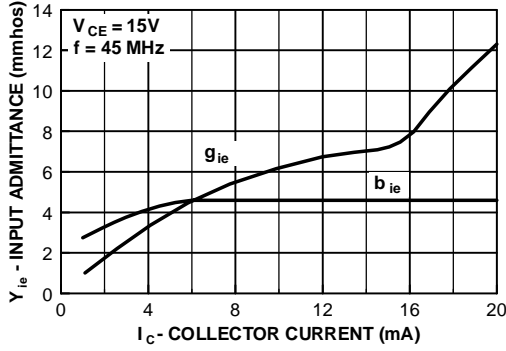
Contours of Constant Gain Bandwidth Product (f_T)



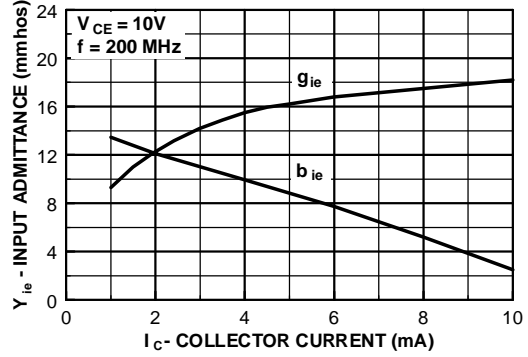
NPN RF Transistor
(continued)

Common Emitter Y Parameters

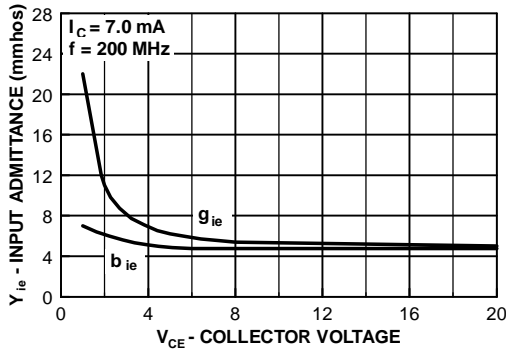
Input Admittance vs Collector Current



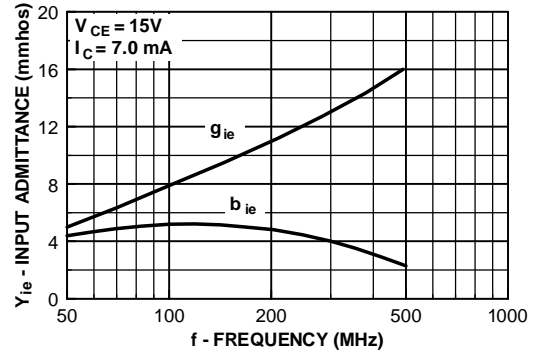
Input Admittance vs Collector Current



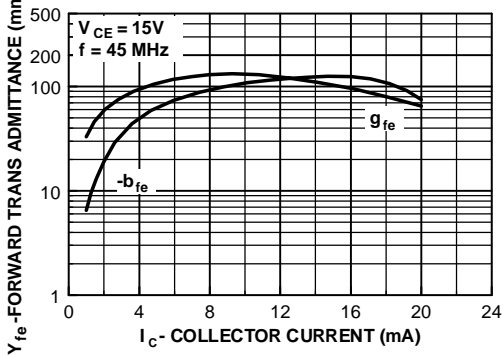
Input Admittance vs Collector Voltage



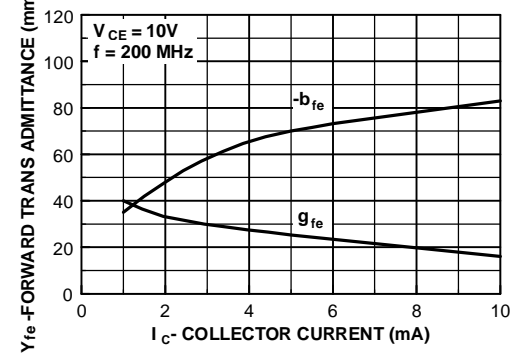
Input Admittance vs Frequency



Forward Transfer Admittance vs Collector Current

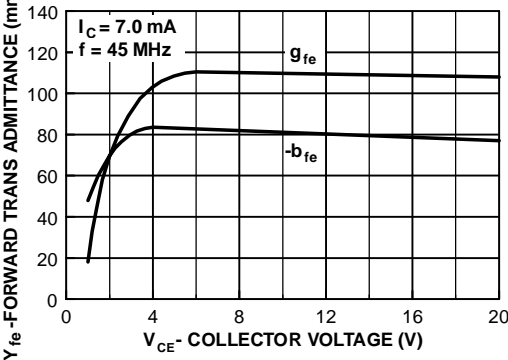


Forward Transfer Admittance vs Collector Current

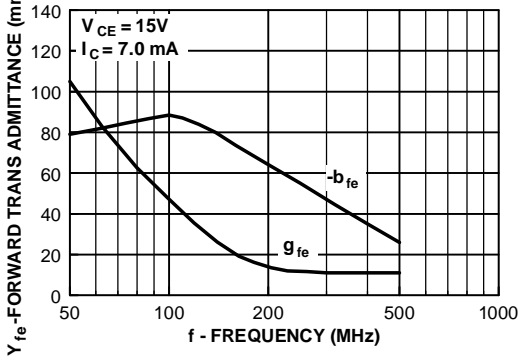


Common Emitter Y Parameters (continued)

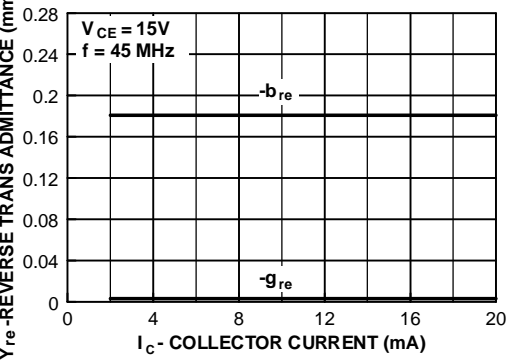
Forward Transfer Admittance vs Collector Voltage



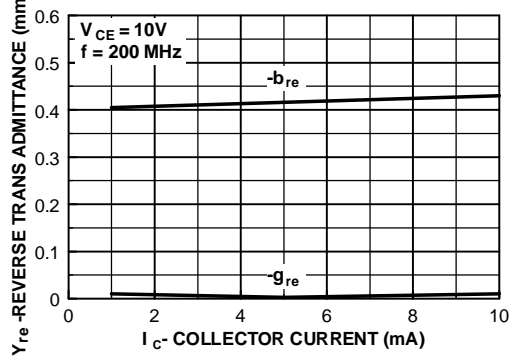
Forward Transfer Admittance vs Frequency



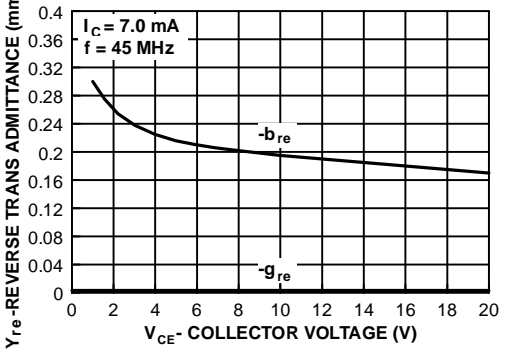
Reverse Transfer Admittance vs Collector Current



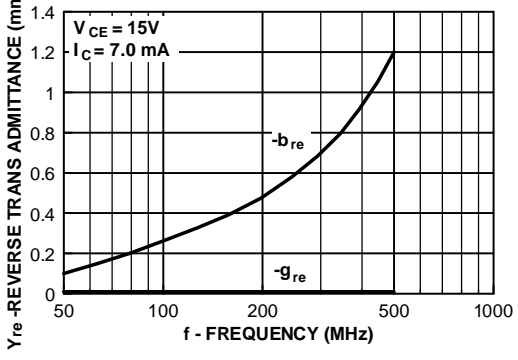
Reverse Transfer Admittance vs Collector Current



Reverse Transfer Admittance vs Collector Voltage

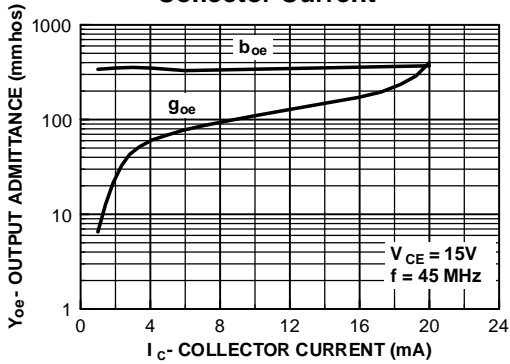


Reverse Transfer Admittance vs Frequency

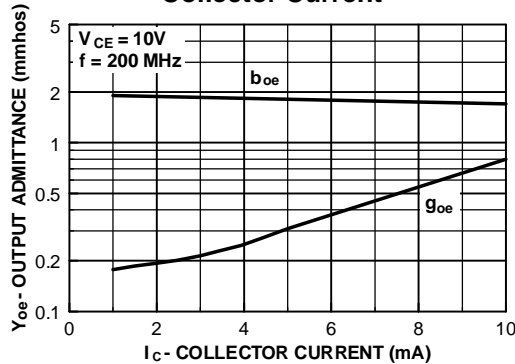


Common Emitter Y Parameters (continued)

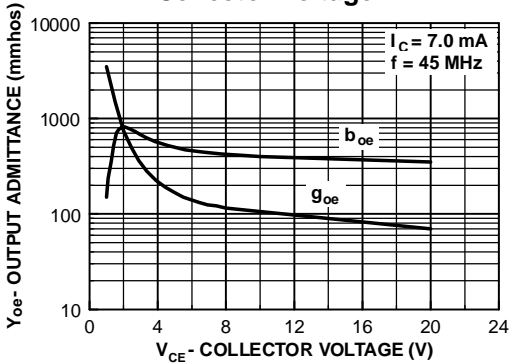
Output Admittance vs Collector Current



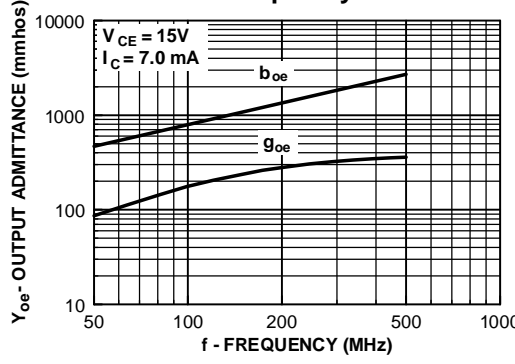
Output Admittance vs Collector Current



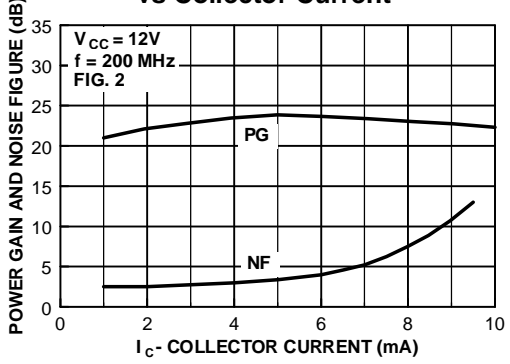
Output Admittance vs Collector Voltage



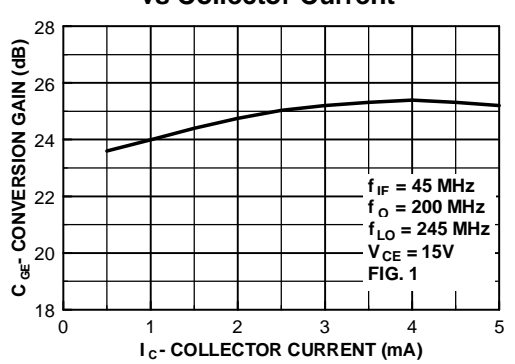
Output Admittance vs Frequency



Power Gain and Noise Figure vs Collector Current



Conversion Gain vs Collector Current



Test Circuits

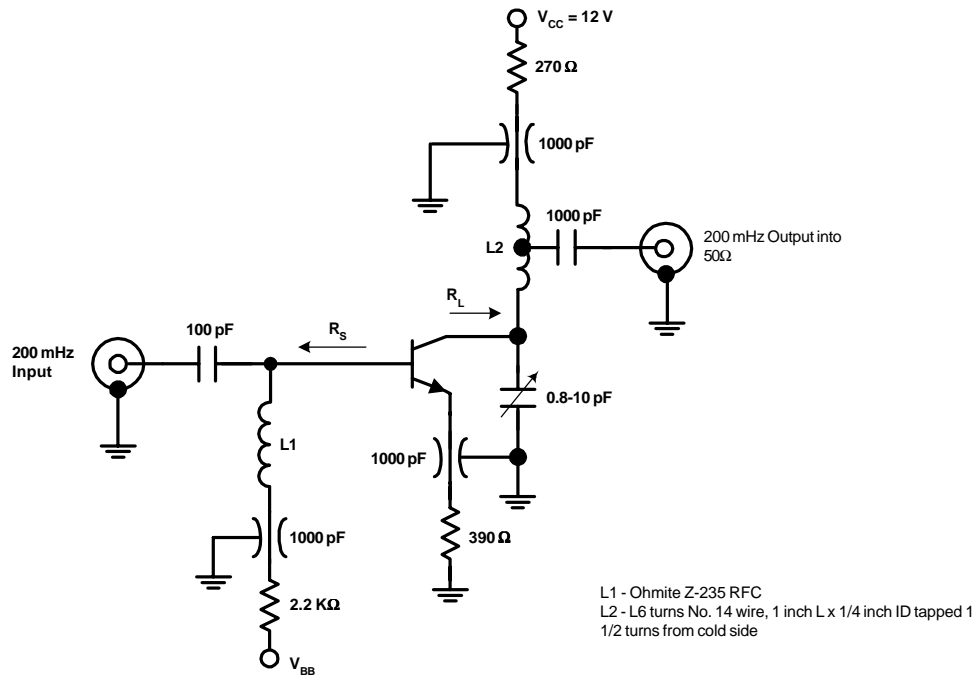


FIGURE 1: Unneutralized 200 MHz PG and NF Test Circuit

Test Circuits (continued)

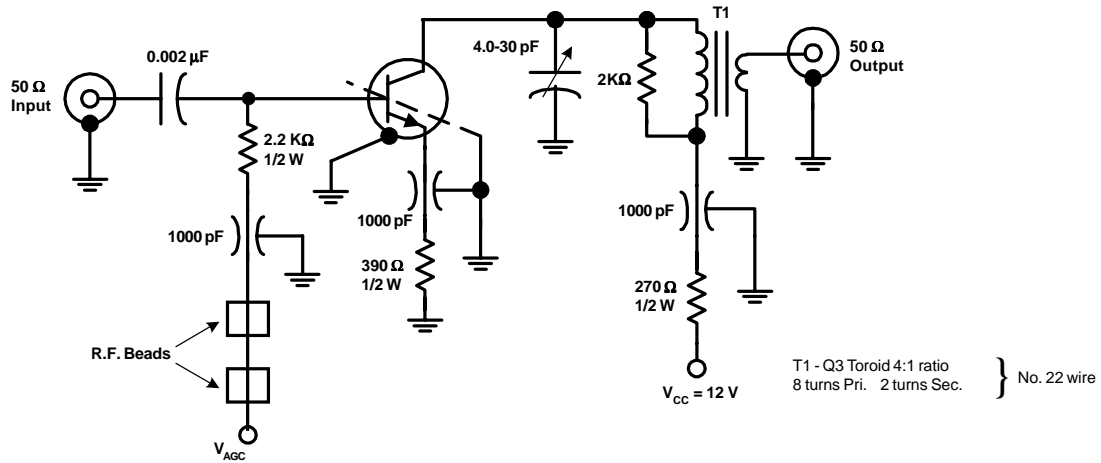


FIGURE 2: 45 MHz Power Gain Circuit

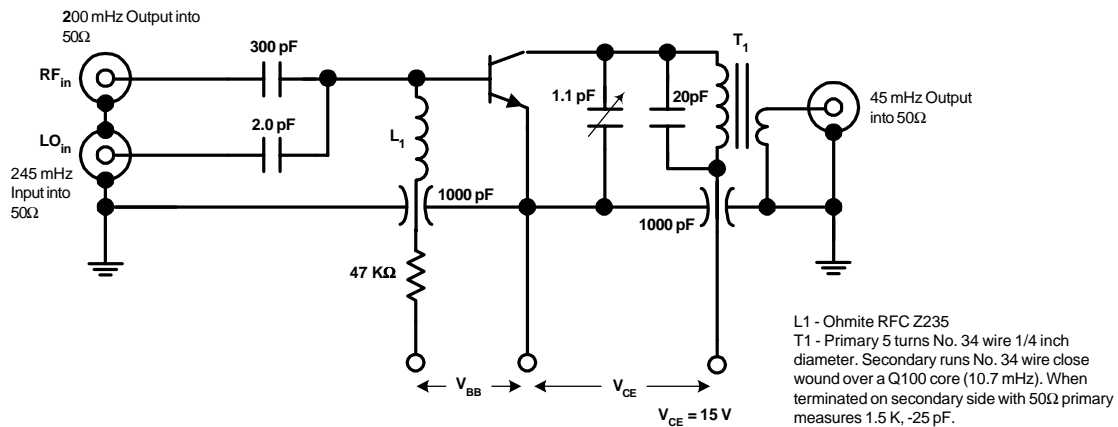


FIGURE 3: 200 MHz Conversion Gain Test Circuit

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