



Communication Circuits

LM171/LM271 LM371 integrated rf/if amplifier

general description

The LM171/LM271/LM371 is a monolithic RF-IF amplifier capable of emitter-coupled or cascode operation from dc to 250 MHz. The device features:

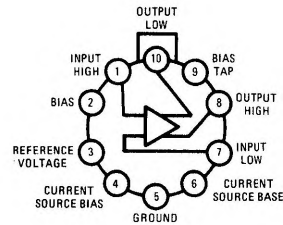
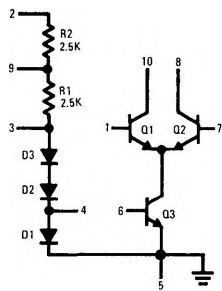
- Low internal feedback, allowing high stability-limited gain
- Versatility through user-connected configurations
- As emitter coupled amplifier, symmetrical, non-saturated limiting
- As cascode, wide AGC range with constant input admittance

- As differential DC amplifier, low input offset voltage and wide dynamic range
- As video amplifier, externally selected gain, and high gain-bandwidth product
- 100 MHz tuned power gain

| | |
|-------------------|---------|
| (emitter coupled) | 24.6 dB |
| (cascode) | 27.5 dB |

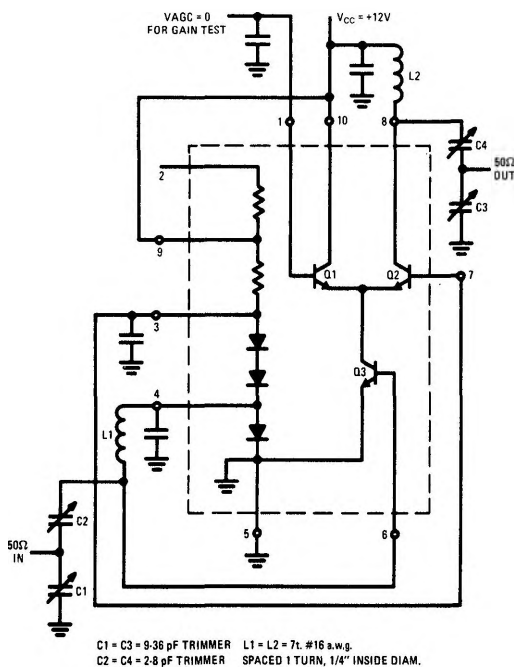
In addition to amplifier service, the circuit is useful in mixer, oscillator, detector, modulator, and numerous other applications. The LM271 is a plug-in replacement for the 911C type.

schematic and connection diagrams

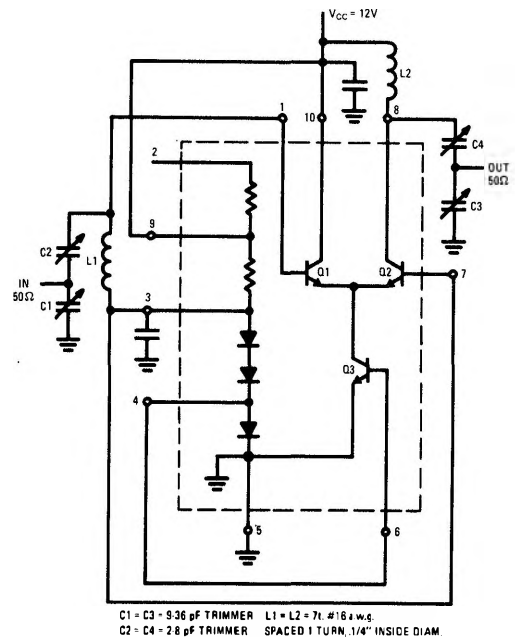


test circuits

100 MHz Cascode Test Circuit



100 MHz Emitter Coupled Test Circuit



Note: All unmarked bypass capacitors 1000 pF.

absolute maximum ratings

| | | |
|-----------------------|-------|-----------------|
| Storage Temperature | | -65°C to +150°C |
| Operating Temperature | LM171 | -55°C to +125°C |
| | LM271 | -20°C to +100°C |
| | LM371 | 0°C to +70°C |
| Power Dissipation | | 230 mW |

electrical characteristics (Note 1)

| PARAMETER | SYMBOL | CONDITIONS | LM171 | | | LM271 | | | LM371 | | | UNITS |
|-----------------------------------|------------|------------------------------------|-------|-----|------|-------|-----|------|-------|-----|------|-------|
| | | | MIN | TYP | MAX | MIN | TYP | MAX | MIN | TYP | MAX | |
| DC CHARACTERISTICS | | | | | | | | | | | | |
| Input Offset Voltage | V_{OS} | $I_B = I_{10} = 500 \mu A$ | | | 3 | | | 3 | | | 10 | mV |
| Input Bias Current | I_{BIAS} | | 1.30 | | 2.65 | 1.3 | | 2.65 | 1.3 | | 2.65 | mA |
| Ratio of R1/R2 | | | .895 | | 1.12 | .895 | | 1.12 | .895 | | .895 | |
| Voltage at Pin 3 | V_3 | $V_2 = +12V$ | 2.0 | | | 2.0 | | | 2.0 | | | V |
| Current Through Current Source Q3 | I_C | $I_C = I_B + I_{10}$ | 2.45 | | 5.70 | 2.45 | | 5.70 | 2.45 | | 5.70 | mA |
| Current Gain | B | | 40 | | | 40 | | | 40 | | | |
| Power Supply Current Drain | I_{PS} | $I_{PS} = I_{BIAS} + I_B + I_{10}$ | | | 9.0 | | | 9.0 | | | 10.5 | mA |

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
|------------------------------------------------------------|------------|---------------------------------------|------|------|-----|-------|
| EMITTER COUPLED CHARACTERISTICS (Input Signal < 10 mV rms) | | | | | | |
| Input Conductance | G_{11} | 455 kHz | | .30 | .40 | mmhos |
| Output Conductance | G_{22} | 455 kHz | | .01 | .04 | mmhos |
| Magnitude of Forward Transadmittance | $ Y_{21} $ | 455 kHz | 17.0 | 27.0 | | mmhos |
| Magnitude of Reverse Transadmittance | $ Y_{12} $ | 200 MHz | | 0.1 | | mmhos |
| Tuned Power Gain | A_P | 10.7 MHz BW = 470 kHz | | 24.6 | | dB |
| Tuned Power Gain | A_P | 100 MHz BW = 5 MHz | | 22.7 | | dB |
| CASCODE CHARACTERISTICS (Input Signal < 10 mV rms) | | | | | | |
| Input Conductance | G_{11} | 455 kHz | | 1.1 | 2.5 | mmhos |
| Output Conductance | G_{22} | 455 kHz Connect pin 1 to 7 | | .01 | .04 | mmhos |
| Magnitude of Forward Transadmittance | $ Y_{21} $ | 455 kHz Pin 1 ground | 25.0 | 50.0 | | mmhos |
| Magnitude of Reverse Transadmittance | $ Y_{12} $ | 200 MHz | | .001 | | mmhos |
| Tuned Power Gain | A_P | 100 MHz Pin 1 ground BW = 5 MHz | | 27.5 | | dB |
| Tuned Power Gain | A_P | 200 MHz Pin 1 ground BW = 6 MHz | | 25.0 | | dB |

Note 1: These specifications apply for $V^+ = +12V$ and $T_A = 25^\circ C$