

LINEAR INTEGRATED CIRCUITS

DESCRIPTION

The 510 is a dual high-frequency differential amplifier with associated constant current sources and biasing elements contained within a silicon monolithic epitaxial substrate. The large number of accessible internal points provide extreme flexibility of application. The 510 is intended for RF-IF amplifier service to beyond 100 MHz. Circuit layout provides for connection as either a high-gain, common-emitter, common-base, cascode amplifier or a common-collector, common-base, differential amplifier that is useful in critical limiter applications. Automatic gain control may be applied to either circuit.

The SE510Q and SE510A meet or exceed the mechanical and environmental requirements of MIL-S-19500 over the temperature range of -55°C to $+125^{\circ}\text{C}$.

The NE510A and NE510J are intended for industrial applications over the temperature range of 0°C to $+75^{\circ}\text{C}$.

FEATURES

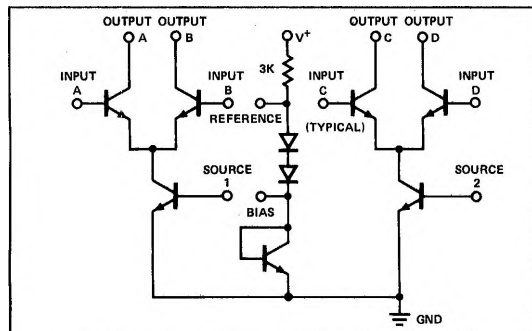
- LOW INPUT OFFSET VOLTAGE = $\pm 2\text{mV}$
- LOW INPUT OFFSET CURRENT = $\pm 3\mu\text{A}$
- SINGLE POWER SUPPLY
- AGC CAPABILITY
- HIGH FORWARD TRANSADMITTANCE
- LOW FEEDBACK CAPACITANCE

ABSOLUTE MAXIMUM RATINGS

| | |
|---------------------------|---|
| Applied Voltage (V^+) | 20V |
| Output Collector Voltage | 25V |
| Current (Pin K) | -25mA |
| Current (All Other Pins) | $\pm 15\text{mA}$ |
| Storage Temperature | -65°C to $+150^{\circ}\text{C}$ |
| Operating Temperature | |
| SE510J, SE510A | -55°C to $+125^{\circ}\text{C}$ |
| NE510A, NE510J | 0°C to $+75^{\circ}\text{C}$ |
| Junction Temperature | 150 $^{\circ}\text{C}$ |

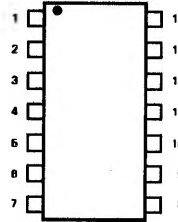
Maximum ratings are limiting values above which serviceability may be impaired.

BASIC CIRCUIT SCHEMATIC



PIN CONFIGURATIONS

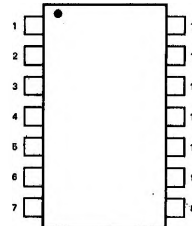
A PACKAGE (Top View)



1. Output B
2. Output A
3. Input A
4. Input B
5. Reference
6. Source 1
7. Ground
8. Source 2
9. Bias
10. Input D
11. Input C
12. Output C
13. Output D
14. V^+

ORDER PART NOS. SE510A/NE510A

Q PACKAGE



1. Input C
2. Output C
3. Input D
4. V^+
5. Output B
6. Output A
7. Input A
8. Input B
9. Reference
10. Source 1
11. Ground
12. Source 2
13. Bias
14. Input D

ORDER PART NOS. SE510Q/NE510Q

ELECTRICAL CHARACTERISTICS

| PARAMETERS | TEMPERATURE | TEST CONDITIONS | LIMITS | | | | | | UNITS | |
|--|--|-----------------|--------|-------------|-----------|-----------|-------------|-------------|-------------|----|
| | | | NE510 | | | SE510 | | | | |
| | | | MIN | TYP | MAX | MIN | TYP | MAX | | |
| Input Offset Voltage | +25°C 0°C to +70°C -55°C to +125°C | $V_{in} = 0$ | | 0.5 1.0 | 3 4 | | 0.5 1.5 | 2 3.5 | mV | |
| Input Offset Current | +25°C 0°C to +70°C -55°C to +125°C | | | 2.0 2.5 | 6 9 | | 2.0 2.5 | 3.5 7.5 | μA | |
| Input Bias Current | +25°C 0°C to +70°C -55°C to +125°C | | | 8.0 10.0 | 25 40 | | 8.0 16.0 | 20 40 | μA | |
| Differential Collector Current per Differential Pair | +25°C 0°C to +70°C -55°C to +125°C | | | 45 50 | 75 100 | | 45 50 | 62.5 100 | μA | |
| Differential Current in the Current Sources | +25°C 0°C to +70°C -55°C to +125°C | | | | 30 35 | 75 100 | | 30 35 | 62.5 100 | μA |
| Total Current | +25°C | | | | 11.0 | 15.0 | | 11.0 | 15.0 | mA |
| Common Mode Rejection Ratio | +25°C | | | 60 | 80 | | 60 | 80 | dB | |

ELECTRICAL CHARACTERISTICS ($V^+ = +12V$, $T = 25°C$ applicable from DC to 10 MHz, unless otherwise noted)

| PARAMETER | EMITTER COUPLED CONFIGURATION | CASCODE CONFIGURATION $V_{AGC} = 0V$ | UNITS |
|--------------------------------------|-------------------------------|---|-------|
| Input Conductance [$R_e(Y_{11})$] | 0.7 | 3.0 | mmho |
| Output Conductance [$R_e(Y_{22})$] | 0.01 | 0.01 | mmho |
| Input Capacitance | 4.5 | 10 | pF |
| Output Capacitance | 2.5 | 2.5 | pF |
| Reverse Transfer Capacitance | 0.05 | 0.05 | pF |
| Forward Transconductance | 25 | 90 | mmho |