

SL1001A MODULATOR/DEMODULATOR

The SL1001A is a bipolar monolithic integrated circuit double balanced modulator, designed primarily for use in telephone transmission equipment, but equally suitable for any application where the modulation function is required.

The device employs conventional 'tree' configuration multiplier circuits. Careful design of the circuit layout results in low carrier and signal leak levels, with high dynamic range and good linearity. Internal bias is provided, allowing direct balanced transformer input, or single-ended capacitor drive.

A two-stage common collector output structure is used to provide a low output impedance.

A pair of diodes is included to provide optional carrier input limiting.

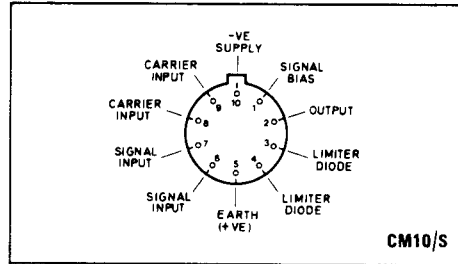


Fig.1 Pin connections (bottom)

FEATURES

- High Carrier and Signal Suppression: 50dB
- Unity Conversion Gain
- Low Noise Level: -112dBmp
- High Intermodulation Suppression: 58dB
- Low Supply Current: 6mA
- Diodes Included for Limiting

APPLICATIONS

- Telephone Transmission Equipment
- Suppressed Carrier and Amplitude Modulation
- Synchronous Detection
- FM Detection
- Phase Detection

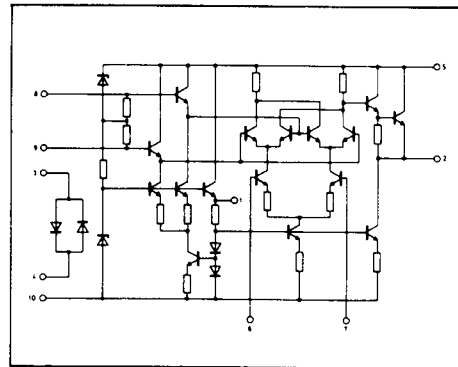


Fig.2 Circuit diagram

QUICK REFERENCE DATA

- | | |
|--------------------------|---|
| ■ Supply Voltage | -15V |
| ■ Supply Current SL1001A | 6mA |
| ■ Carrier Level | 125mVrms (Min.) |
| ■ Signal Level | Up to 600mVrms |
| ■ Output Current SL1001A | 3.5mA peak (Typ.) |
| ■ Temperature Range | -25°C to $+125^{\circ}\text{C}$ |

ELECTRICAL CHARACTERISTICS

Test conditions (unless otherwise stated):

$T_{amb} 22^{\circ}\text{C} \pm 2^{\circ}\text{C}$

Circuit ref: Figs.3 and 4

| Characteristic | Value | | | Units | Conditions |
|------------------------------|-------|------|------|------------|---|
| | Min. | Typ. | Max. | | |
| Conversion gain | -1 | 0 | +1 | dB | Pins 6 & 7 Pins 8 & 9 Pins 8 & 5 or 9 & 5 Pin 2 Signal 170mV, Carrier 500mV For $\pm 3\text{dB}$ on 500mV Supply line resistance=500 Ω Weighted speech band Signals 2 X 170mV $+5^{\circ}\text{C}$ to $+55^{\circ}\text{C}$ $\pm 10\%$ supply See Fig.5 |
| Signal input impedance | | 150 | | k Ω | |
| Carrier input impedance | 7 | 10 | 13 | k Ω | |
| | 3.3 | 5 | 6.7 | k Ω | |
| Output impedance | | 12 | | Ω | |
| Signal suppression | 20 | 50 | | dB | |
| Carrier suppression | 20 | 40 | | dB | |
| 2nd harmonic suppression | | 40 | | dB | |
| Carrier compression | | | 0.1 | dB | |
| Supply line suppression | | 50 | | dB | |
| Sig. and carrier band width | 200 | | | kHz | |
| Carrier level | 125 | | | mVrms | |
| Signal level | | | 600 | mVrms | |
| Output current | | 3.5 | | mApk | |
| Noise level | | -112 | -105 | dBmp | |
| Intermod. products | | -58 | | dB | |
| Gain stability | | 0.12 | | dB | |
| | | 0 | | dB | |
| Adjusted carrier suppression | | 70 | | dB | |

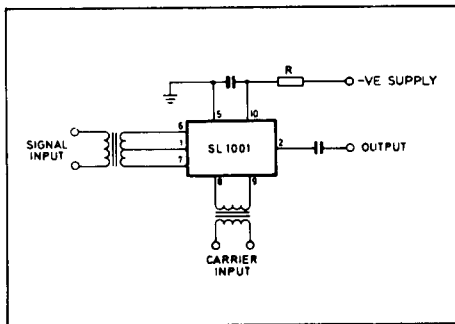


Fig. 3 Transformer input

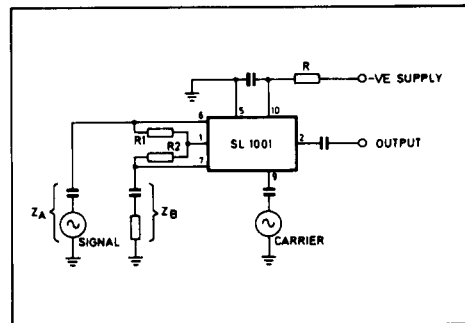


Fig. 4 Unbalanced input

OPERATING NOTES

1. A resistance in series with the supply (Pin 10) is usually advisable, to improve the supply rejection and reduce the circuit voltage.
2. For good carrier suppression, the signal input bias resistors should be equal and have a value less than $5k\Omega$.
3. For improved intermodulation suppression, Pin 1 may be decoupled, preferably with a 100Ω resistor in series with Pin 1.
4. Low leakage input capacitors are advisable for the input connections to avoid inducing carrier or signal leakage.
5. Carrier suppression may be improved by using the circuit of Fig.5, and adjusting for minimum leakage.
6. This device is also available with tin-dipped leads, order as SL1001AM.

OPERATING CONDITIONS (see Figs.3 and 4)

| Parameter | Value | Units | Condition |
|--------------------------|-------------|--------------|--------------|
| Supply voltage | -15 | V | Pin 10 |
| Supply current | 6 | mA | |
| Input bias current | 5 | μ A | Pins 6 & 7 |
| Dynamic resistance | 8 | $k\Omega$ | Pins 5 to 10 |
| Output quiescent voltage | -3 | V | Pins 2 to 5 |
| Temperature range | -25 to +125 | $^{\circ}$ C | |

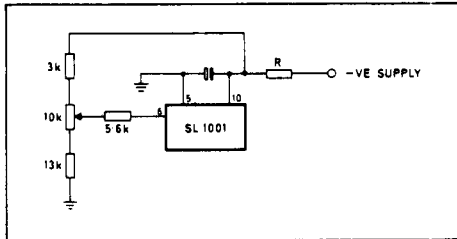


Fig.5 Carrier suppression adjustment

ABSOLUTE MAXIMUM RATINGS

| | |
|-----------------------------------|---------------------------------------|
| Supply voltage (via 820Ω) | -30V |
| Storage temp. range | -55 $^{\circ}$ C to +175 $^{\circ}$ C |
| Free air operating temp. range | -40 $^{\circ}$ C to +150 $^{\circ}$ C |