



MODEL: T-73-13-03

5511, 5512

## 5510 Series 1MHz Bandwidth Analog Modulator/Demodulator

### Description

The Model 5511 and 5512 are precision, wide bandwidth V/F and F/V converters respectively, intended to be used as the modulator and demodulator for an analog fiber optic data link. The 5511 accepts a  $\pm 1V$  full scale analog input at a 1MHz bandwidth. An offset adjust pin is provided which can be used to bias the 5511 input to allow bipolar operation. The input voltage is converted into a TTL-compatible frequency output over the 8 to 10MHz range. This TTL output can then be used to modulate the optical transmitter in an existing digital fiber optic data link, or to implement a stand-alone analog data link.

The Model 5512 demodulator performs the reverse process, converting an 8 to 10MHz TTL frequency input into an analog output voltage over the range of  $\pm 1V$  full scale. Again, an offset pin is provided to allow the recovery of bipolar voltages. Analog linearity through the modulator/demodulator system is  $\pm 0.1\%$  FS for signals up to 1MHz in bandwidth.

The 5511 and 5512 are packaged in 2.0"x2.0"x0.4" plastic shells. Operating temperature range is 0°C to +70°C. Power dissipation is 1.5W for either the 5511 or 5512 on  $\pm 15V$  power supplies.

### Using the 5510 Series Analog Modulator/Demodulator General Considerations

As with any high precision conversion circuitry, the use of a ground plane is strongly recommended. The layout should be clean, with output pulses routed as far away as possible from the input analog signals. As shown in Figure 1, bypass capacitors should be mounted as close as possible to the power supply pins of the 5511 or 5512.

### Offset and Gain Calibration

The V/F OFFSET adjustment potentiometer should be a 20K $\Omega$ , 10-turn unit. With this pot in the circuit, initial offsets of up to  $\pm 10mV$  may be trimmed to zero.

The V/F GAIN adjustment potentiometer should be a 200 $\Omega$ , 10-turn unit with a recommended temperature coefficient of 100ppm/ $^{\circ}C$  or better. With this potentiometer in the circuit, initial gain errors of up to  $\pm 2\%$  may be trimmed to zero.

To calibrate the 5511, the offset is adjusted prior to adjusting the gain. With a voltage at the analog input of 0V signal at  $V_N$ , adjust the OFFSET pot until an output frequency of 9.000MHz is obtained at the pin. With a full scale voltage alternating between -1.0V and +1.0V at  $V_N$  of the V/F, adjust the gain pot for an equal deviation in output frequency between 10.000MHz and 8.000MHz respectively. Calibra-

### FEATURES

- ☐ Wide Analog Bandwidth  
dc to 1MHz
- ☐ Good Link Linearity  
0.1% End-to-End
- ☐ Course and Fine Offset  
Inputs  
Allows bipolar operation
- ☐ Convenient Interfacing  
TTL Compatible
- ☐ PC-Mounted Module  
2.0"x2.0"x0.4" Plastic Package

### APPLICATIONS

- ☐ Analog Transmission on  
Existing Digital Data  
Links
- ☐ Wide Bandwidth Analog  
Data Links
- ☐ Wide Bandwidth, Low  
Speed A/D Converters

## Specifications

T-73-13-03

All Specifications Guaranteed at 25°C Unless Otherwise Noted

**5511 MODULATOR****ANALOG INPUT**

Input Voltage

±1V

Input Overrange

5% minimum

Maximum Input Voltage

±V<sub>s</sub> without damage

Input Impedance

5kΩ nominal

**OFFSET VOLTAGE INPUT**

Input Voltage

9.0V ±0.25V

Offset Error

±5%, adjustable to zero

**TRANSFER CHARACTERISTICS**Full Scale Frequency Output (F<sub>out</sub>)

8-10MHz, +5% overrange

Transfer Function

 $F_{out} = [9M - (V_{IN} \cdot 1M)]Hz$ 

Non-Linearity

±0.05% FS typical,

±0.1% FS maximum

Gain Error

±5%, adjustable to zero

Full Scale Step Response

2 cycles of new frequency plus 2μs

Overload Recovery

12 cycles of new frequency

**FREQUENCY OUTPUT**

Output Pulse Width

50ns ±5ns

Logic Levels

Logic 1 ("Low")

Logic 0 ("High")

&lt;0.4V @ 16mA sink

&gt;3.5V

Fanout

10 TTL loads

**STABILITY**

(Exclusive of external components)

Gain - Tempco

±100ppm/°C FS maximum

Gain - Power Supply Sensitivity

100ppm/% change in supply voltage

Offset - Tempco

±50μV/°C maximum

Offset - Power Supply Sensitivity

20μV/% change in supply voltage

**POWER REQUIREMENTS**

+15V, ±3%

-15V, ±3%

+5V, ±5%

35mA

5mA

60mA

Absolute Power Supply Limits

±15V, ±3%; +7V

**ENVIRONMENTAL AND MECHANICAL**

Operating Temperature Range (Rated Performance)

0°C to +70°C

Storage Temperature

-55°C to +125°C

Dimensions

2.0"x2.0"x0.4"

Plastic module

**5502 DEMODULATOR****FREQUENCY INPUT**

Input Pulse Width

45ns maximum; negative

Logic Levels

Logic 1 ("Low")

Logic 0 ("High")

&lt;0.4V @ 16mA sink

&gt;3.5V

Input Load

1TTL load

**TRANSFER CHARACTERISTICS**Full Scale Frequency Input (F<sub>IN</sub>)

8 to 10MHz, +5% overrange

Transfer Function

 $[(9MHz - F_{IN}/1MHz)] \cdot V$ 

Non-Linearity

±0.05% FS typical;

±0.1% FS maximum

Gain Error

±5%, adjustable to zero

Full Scale Step Response

2 cycles of new frequency plus 2μs

Overload Recovery

12 cycles of new frequency

**ANALOG OUTPUT**

Output Voltage

±1V

Output Overrange

5% minimum

Ripple Voltage

±500mV typical at carrier frequency;

assumes no low pass filter present on

output

## Specifications (continued)

T-73-13-03

All Specifications Guaranteed at 25°C Unless Otherwise Noted

查询 5512 供应商

**OFFSET VOLTAGE INPUT****Input Voltage**9.0V  $\pm 0.25$ V**Offset Error** $\pm 5\%$ , adjustable to zero**STABILITY**

(Exclusive of external components)

**Gain - Tempco** $\pm 100$ ppm/°C FS maximum**Gain - Power Supply Sensitivity**

100ppm/% change in supply voltage

**Offset - Tempco** $\pm 50$  $\mu$ V/°C maximum**Offset - Power Supply Sensitivity**20 $\mu$ V/% change in supply voltage**POWER REQUIREMENTS****+15V,  $\pm 3\%$**     **-15V,  $\pm 3\%$**     **+5V,  $\pm 5\%$** 

35mA    5mA    60mA

**Absolute Power Supply Limits** $\pm 15$ V,  $\pm 3\%$ ; +7V**ENVIRONMENTAL AND MECHANICAL****Operating Temperature Range (Rated Performance)**

0°C to +70°C

**Storage Temperature**

-55°C to +125°C

**Dimensions**

2.0"x2.0"x0.4"

Plastic module

**Using the 5510 Series Analog Modulator/Demodulator**

tion is now completed.

To calibrate the 5512, the offset is adjusted prior to adjusting the gain. With a TTL frequency at the input to the 5512 of 9.000MHz, adjust the OFFSET pot until an output voltage of 0.000V is present

on the output pin. With a TTL frequency of 10.000MHz on the input, adjust the GAIN pot until the output voltage equals -1.000V. Please refer to the section entitled "Low-Pass Filtering Output Ripple" for additional information.

**Grounding**

The Analog and Digital grounds are internally connected within the 5511/5512 circuitry. The use of a ground plane is recommended. If a ground plane is not

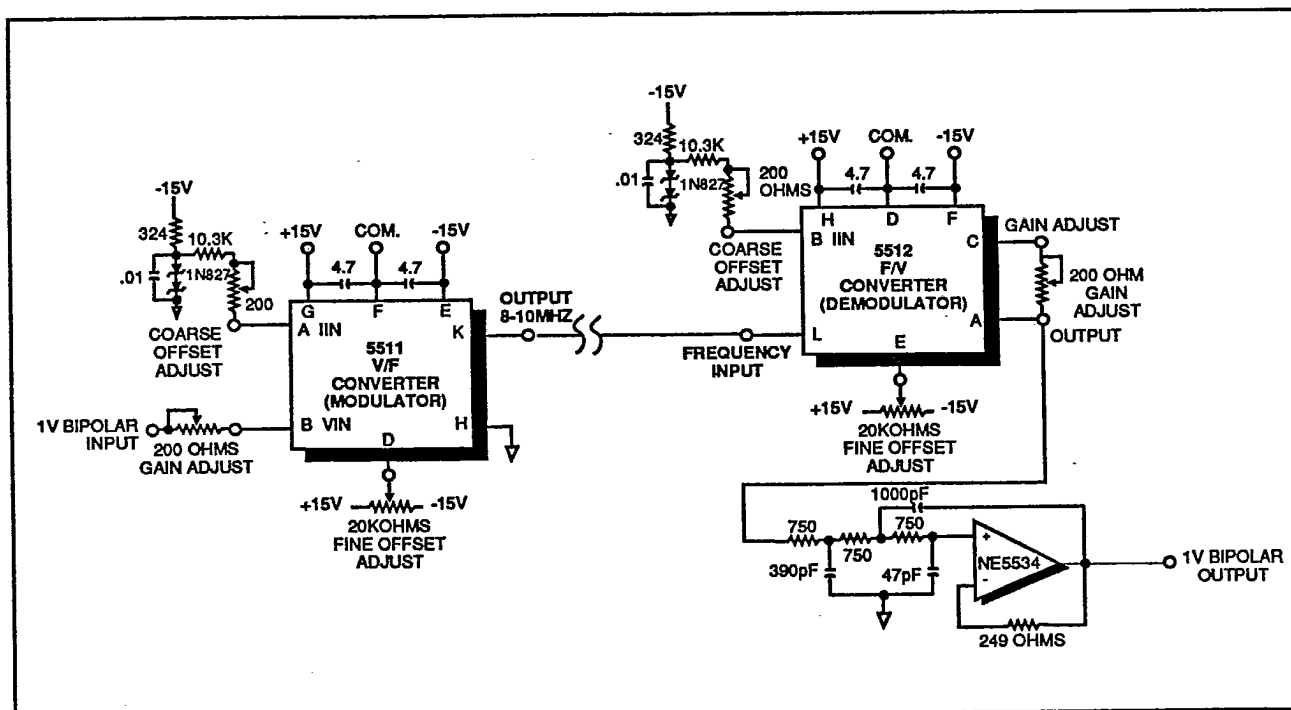


Figure 1. 5511/5512 Interconnection

## Using the 5510 Series Analog Modulator/Demodulator

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feasible, then a single-point ground ("star" ground) must be used. Significant performance degradation will result if these grounding schemes are not utilized.

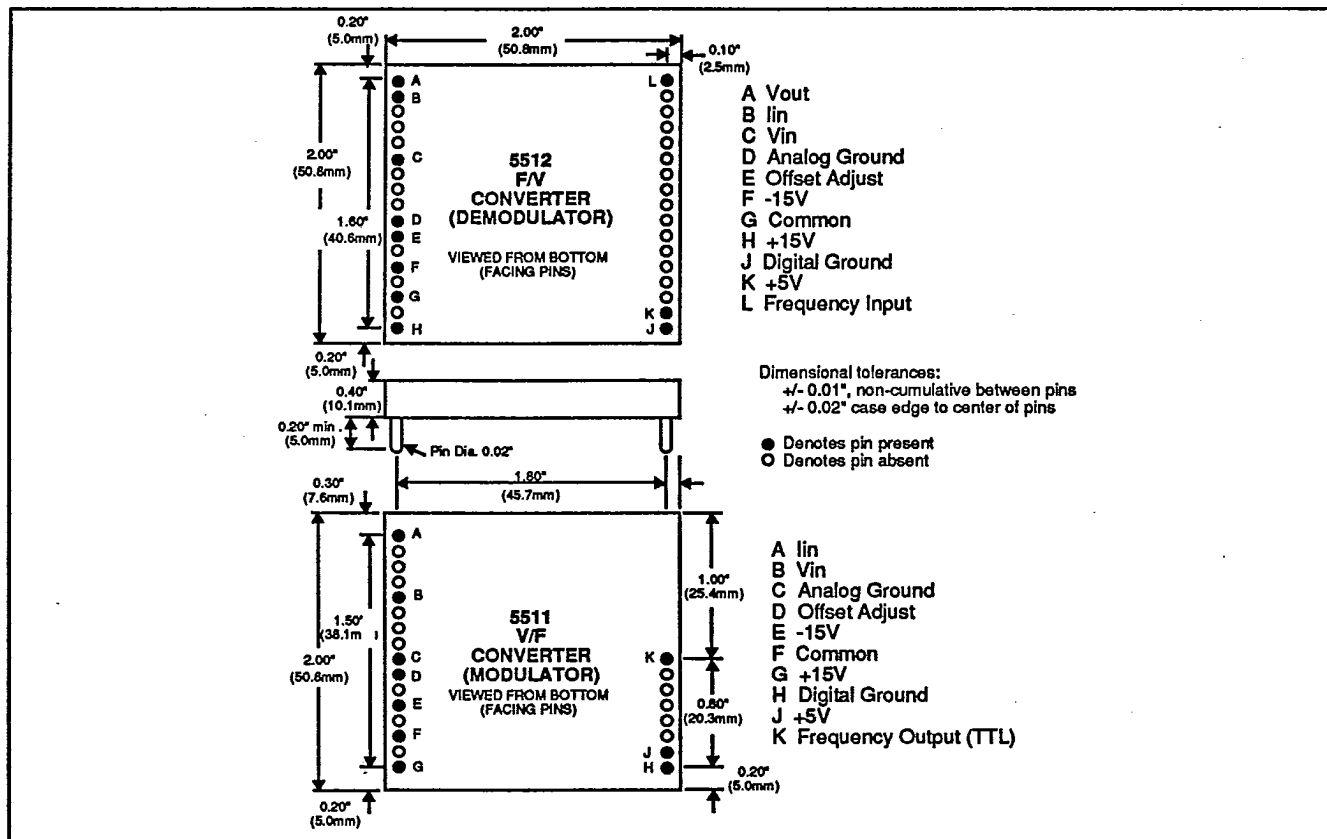
### Low-Pass Filtering of 5502 Output Ripple

The 5512 analog output has an

ac component that is composed of the carrier frequency. Unfiltered, this ripple voltage can be as large as 500V. To filter this ripple voltage and maintain the overall link analog bandwidth for the intended application, a capacitor is connected between the OUTPUT and OFFSET ADJUST pins of the F/V converter.

The value of this feedback capacitor is dependent on the bandwidth to be preserved and the required settling time of the receiver circuit. Representative values are given in Figure 1.

## Mechanical/Pinout



## ORDERING INFORMATION

1MHz Bandwidth,  $\pm 0.1\%$  Linearity  
 Analog Modulator  
 Analog Demodulator

Order Model:  
 5511  
 5512



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