2930

DESCRIPTION:

The 2930 bipolar Logarithmic Amplifier is the newest addition to the OEI series of high speed wide Dynamic Range logarithmic amplifiers. The 2900 series of logarithmic amplifiers are useful from DC to video frequencies. These characteristics make them applicable for use in the audio, ultrasonic, sonor and video systems. The 2930's parameters make it particularly useful for video applications such as compression or enhancement systems.

The primary advantage of the 2930 over the 2910 and 2920 is its excellent dynamic range, as with most currently available logarithmic amplifiers the dynamic range decreases with increasing frequencies. For example, the 2910 and the 2920 have a dynamic range of 80dB in the audio and ultrasonic range, this figure decreases to 40dB at 3MHz. The 2930 however, will be capable of 70dB at video rates. If some noise can be tolerated greater than 80dB can be expected at video rates with a signal to noise ratio of approximately 6dB.

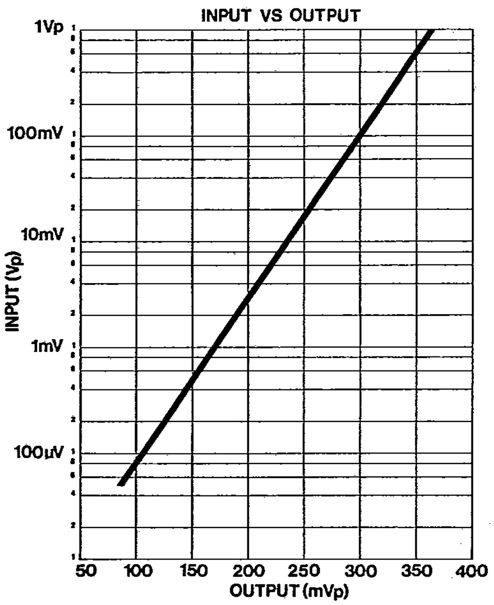
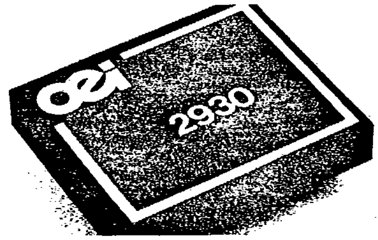


FIGURE 1 (graph) is the typical input output transfer characteristics of the 2930. The 2930 will accept input voltage levels from 50µVp to 500MVp. The output is 335MVp with a 500MVp input which decreases to 95MVp at an input of 50µVp the output can vary as much as (±5MVp) which corresponds to an 1.5% percent of full scale error the output coefficient is approximately 60MV/decade (±5MV).

WIDEBAND LOG AMPLIFIER



Features

Wide Bandwidth: Small - 20MHz TYP.
Full Power - 5MHz TYP.
Wide Dynamic Range: 84dB @ 5MHz TYP.
Bipolar Operation
Voltage Range: ±60µV to ±1V

Applications

Video Log
Data Compression
Log Ratios of Voltages
Audio Compression

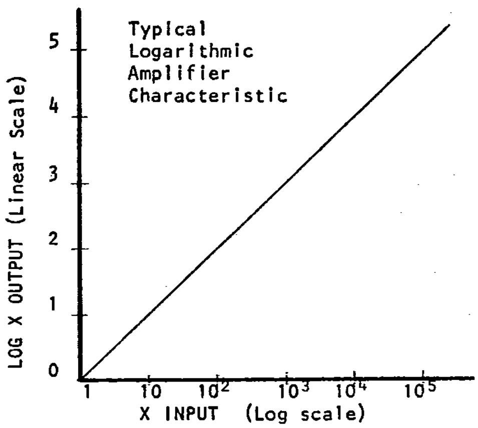
SPECIFYING LOGARITHMIC AMPLIFIERS

A discussion relating system requirements to specifications.

System requirements can be classified into two categories. (1) Voltage levels at input and output and (2) A mathematical statement of the transfer function.

The first category is by far the most common and rightly so, because a statement of voltage levels defines a log amplifier completely and in the terms familiar and compatible with other system components.

The second category is most often encountered in simulation of mechanical or physical phenomena. If an equation exists to specify the log amplifier, a conversion into voltage levels is always required.



The curve above shows a typical transfer function on an arbitrary scale. The output scale is based on a $\log_{10}$ but we will see that this can be easily changed.

The above curve can be expressed as....

$$E_o = \text{Log}_{10} X$$

The curve can be thought of as representing an amplifier having a 1 volt/decade output gain and the input units could be Volts (10^5 volts full scale), millivolts (100 volts full scale), microvolts (0.1 volt full scale). Since we are centering our discussion around a five decade device, the bottom scale inputs would be (1 volt for volt units), (1 millivolt for millivolt units), (1 microvolt for microvolt units). The last two are quite practical. T-73-43

Assume our dynamic range is actually 40 microvolts to 4 volts input range. Then the equation changes as.....

$$E_o = \text{Log}_{10} X/40 \text{ where X is in microvolts}$$

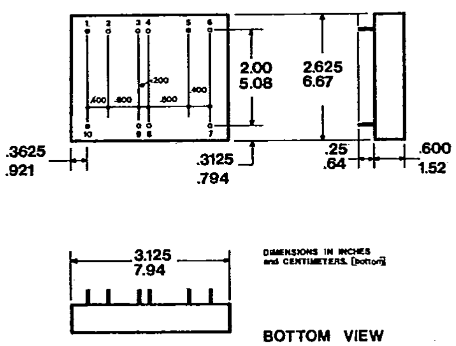
If we required a one volt full scale, the equation is....$E_o = 0.2 \text{ Log}_{10} X/40$ where X is in microvolts.

If the requirement needs to be or is expressed in Natural Logarithms, remember the conversion equation....

$$B \text{ Log}_e CX = \frac{B}{0.4343} \text{ Log}_{10} CX$$

When changing the base of a logarithm, we are essentially just changing the coefficient of the logarithm.

The definition of a logarithmic amplifier (A Logarithm) is that the output changes in linear increments for a given factor change in the input. If the input changes by a factor of 3....0.3X, X, 3X, 10X....0.25X, X, 4X, 16X....for a factor of 4, the output will change by a constant amount.



PIN CONNECTIONS
1 COURSE OFFSET ADJ.
2 " " "
3 Vin
4 Vin
5 FINE OFFSET ADJ.
6 " " "
7 -Vcc
8 Vout
9 Vout
10 +Vcc

PRELIMINARY SPECIFICATIONS

	Typ	Max	Units
INPUT			
Voltage	$\pm 50 \times 10^{-6}$min	$\pm 800 \times 10^{-3}$max	VOLTS
ERROR			
80dB Dynamic Range	±1.5typ		% of full scale
OUTPUT			
Voltage Coefficient	±90min 60 typ	±340max	MV MV/decade
POWER SUPPLY			
Rate Voltage	±15		Volts