

6 Decade, High Accuracy Log Ratio Amplifiers

Models 757N, 757P

FEATURES

- 6 Decade Operation – 1 nA to 1 mA
- 1/2% Log Conformity – 10 nA to 100 μ A
- Symmetrical FET Inputs
- Voltage or Current Operation
- Temperature Compensated

APPLICATIONS

- Absorbance Measurements
- Log Ratios of Voltages or Currents
- Data Compression
- Transducer Linearization

GENERAL DESCRIPTION

Model 757 is a complete, temperature compensated, dc-coupled log ratio amplifier. It is comprised of two input channels for processing signals spanning up to 6 decades in dynamic range (1nA to 1mA). By virtue of its symmetrical FET input stages, the 757 can accommodate this 6 decade signal range at either channel. Log conformity is maintained to within 1/2% over 4 decades of input (10nA to 100 μ A) and to within 1% over the full input range. Unlike other log ratio designs, model 757 does not restrict the relative magnitude of the two signal inputs to achieve rated performance. Either input can be operated within the specified range regardless of the signal level at the other channel.

The model 757 log-ratio amplifier design makes available both input amplifier summing junctions. As a result, it can directly interface with photo diodes operating in the short-circuit current mode without the need of additional input circuitry.

The excellent performance of model 757 can be further improved by means of external scale factor and output offset adjustments. A significant feature of model 757 not found on competing devices is that, when the offset adjustment is used to establish a fixed bias at the output, the output offset level does not vary as a function of input signal magnitude. On other designs, the sensitivity of output offset to input levels results in output effects resembling log conformity errors.

Model 757 can operate with either current or voltage inputs.

Its excellent performance makes it ideally suited for log ratio applications such as blood analysis, chromatography, chemical analysis of liquids and absorbance measurements.

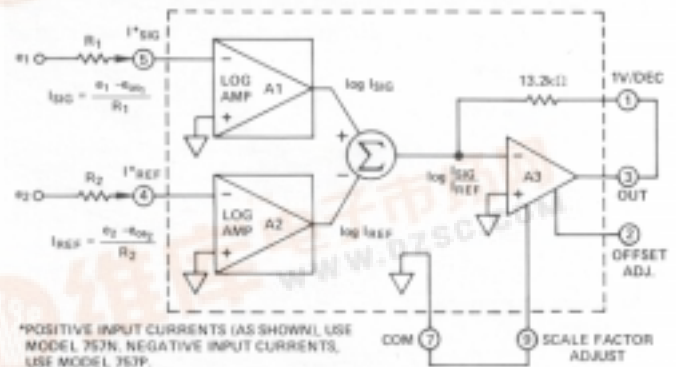


Figure 1. Functional Block Diagram of Model 757

CURRENT LOG RATIO

Current log ratio is accomplished by model 757 when two currents, I_{SIG} and I_{REF} , are applied directly to the input terminals (see Figure 1). The two log amps process these signals providing voltages which are proportional to the log of their respective inputs. These voltages are then subtracted and applied to an output amplifier. The scale factor, when connected as shown, is 1V/dec. However, higher scale factors may be achieved by connecting external scale factor adjusting resistors.

