

FEATURES

- 2 independent channels optimized for photodiode interfacing**
- 6-decade input dynamic range**
- Law conformance 0.3 dB from 3 nA to 3 mA**
- Temperature-stable logarithmic outputs**
- Nominal slope 10 mV/dB (200 mV/dec), externally scalable**
- Intercepts may be independently set by external resistors**
- User-configurable output buffer amplifiers**
- Single-supply or dual-supply operation**
- Space efficient, 24-lead 4 mm × 4 mm LFCSP**
- Low power: <10 mA quiescent current**

APPLICATIONS

- Gain and absorbance measurements**
- Multichannel power monitoring**
- General-purpose baseband log compression**

GENERAL DESCRIPTION

The ADL5310¹ low cost, dual logarithmic amplifier converts input current over a wide dynamic range to a linear-in-dB output voltage. It is optimized to determine the optical power in wide-ranging optical communication system applications, including control circuitry for lasers, optical switches, attenuators, and amplifiers, as well as system monitoring. The device is equivalent to a dual AD8305 with enhanced dynamic range (120 dB). While the ADL5310 contains two independent signal channels with individually configurable transfer function constants (slope and intercept), internal bias circuitry is shared between channels for improved power consumption and channel matching. Dual converters in a single, compact LFCSP package yield space-efficient solutions for measuring gain or attenuation across optical elements. Only a single supply is required; optional dual-supply operation offers added flexibility.

The ADL5310 employs an optimized translinear structure that use the accurate logarithmic relationship between a bipolar transistor's base emitter voltage and collector current, with appropriate scaling by precision currents to compensate for the inherent temperature dependence. Input and reference current pins sink current ranging from 3 nA to 3 mA (limited to ± 60 dB between input and reference) into a fixed voltage defined by the

FUNCTIONAL BLOCK DIAGRAM

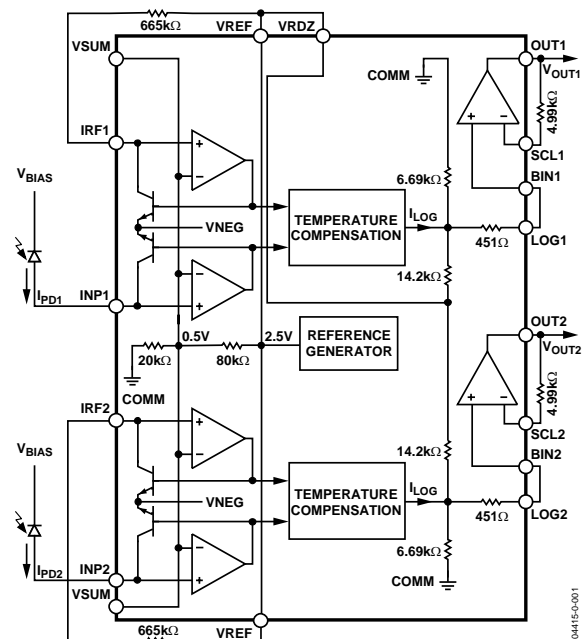


Figure 1.

VSUM potential. The VSUM potential is internally set to 500 mV but may be externally grounded for dual-supply operation, and for additional applications requiring voltage inputs.

The logarithmic slope is set to 10 mV/dB (200 mV/decade) nominal and can be modified using external resistors and the independent buffer amplifiers. The logarithmic intercepts for each channel are defined by the individual reference currents, which are set to 3 μ A nominal for maximum input range by connecting 665 k Ω resistors between the 2.5 V VREF pins and the IRF1 and IRF2 inputs. Tying VRDZ to VREF effectively sets the x-intercept four decades below the reference current, which is typically 300 pA for a 3 μ A reference.

The use of individually optimized reference currents may be valuable when using the ADL5310 for gain or absorbance measurements where each channel input has a different current range requirement. The reference current inputs are also fully functional dynamic inputs, allowing log ratio operation with the reference input current as the denominator. The ADL5310 is specified for operation from -40°C to $+85^{\circ}\text{C}$.

¹ Protected by US Patents 4,604,532, and 5,519,308. Other patents pending.

Rev. B

Document Feedback

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REVISION HISTORY

4/2018—Rev. A to Rev. B

Changes to Figure 2 and Table 3.....	5
Changes to Figure 40.....	18
Updated Outline Dimensions	20
Changes to Ordering Guide	20

9/2004—Rev. 0 to Rev. A

Changes to Ordering Guide	20
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11/2003—Revision 0: Initial Version