



**ANALOG  
DEVICES**

# 100 kHz Bandwidth, Low Distortion, Internally Powered Isolation Amplifier

**AD206**

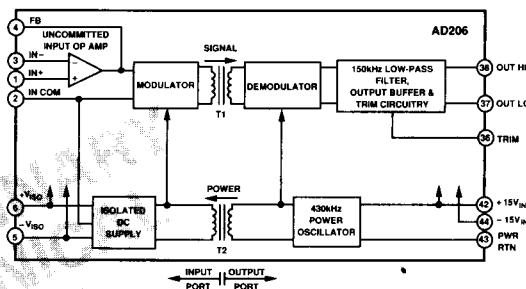
## FEATURES

**Wide Bandwidth:** 100 kHz, min (Full Power)  
**Rapid Slew Rate:** 6 V/ $\mu$ s  
**Fast Settling Time:** 9  $\mu$ s  
**Low Harmonic Distortion:** -80 dB @ 1 kHz  
**Low Nonlinearity:**  $\pm 0.005\%$   
**Wide Output Range:**  $\pm 10$  V, min  
**High Isolation:** 1.5 kV rms (B Grade)  
**Buffered Output**  
**Isolated Power:**  $\pm 15$  V dc @  $\pm 10$  mA  
**Performance Rated over** -40°C to +85°C

## APPLICATIONS INCLUDE

**High Speed Data Acquisition Systems**  
**Transient Monitoring**  
**Power Line Monitoring**  
**Power Supply Control**  
**Vibration Analysis**

## FUNCTIONAL BLOCK DIAGRAM



## GENERAL DESCRIPTION

The AD206 is a high speed, two-port, transformer-coupled isolation amplifier expressly designed for applications that require the amplification and isolation of wideband analog signals. The innovative circuit and transformer design of the AD206 ensures the wideband dynamic characteristics of the AD206 while preserving key dc performance specifications.

The AD206 provides total galvanic isolation between the input and output stages of the isolation amplifier, including the input and output power supplies, through the use of internal transformer coupling. The functionally complete design of the AD206, powered by a bipolar  $\pm 15$  V dc supply, eliminates the need for a user-supplied isolated dc/dc converter. This permits the designer to minimize the necessary circuit overhead and, consequently, reduce the overall system design and component costs.

The design of the AD206 emphasizes maximum flexibility and ease of use in a broad range of applications where fast analog signals must be measured and transmitted under high common-mode voltage (CMV) conditions. The AD206 has a  $\pm 10$  V input/output range, a specified gain range of 1 to 10, a buffered output and a front-end power supply of  $\pm 15$  V dc with  $\pm 10$  mA of current drive capability.

## PRODUCT HIGHLIGHTS

**High Speed Dynamic Characteristics:** The AD206 features a minimum full power bandwidth of 100 kHz, a typical rise time of 3  $\mu$ s, and settling time of 9  $\mu$ s. The high speed performance of the AD206 allows the amplification and isolation of dynamic signals.

**Flexible Input and Buffered Output Stages:** An uncommitted op amp is provided on the input stage of the AD206. This allows for input buffering and gain as needed. The AD206 also features a buffered output stage, allowing it to drive low impedance loads.

**High Accuracy:** Exhibiting a typical nonlinearity of  $\pm 0.005\%$  (B grade) of full-scale range and a total harmonic distortion of -80 dB (typical @ 1 kHz), the AD206 provides high isolation without loss of signal integrity and quality.

**Excellent Common-Mode Performance:** The AD206BY (AD206AY) provides 1.5 kV rms (0.75 kV rms) of common-mode protection. Both grades feature a low common-mode capacitance of 4.5 pF, inclusive of power isolation, resulting in a typical common-mode rejection specification of 105 dB (1 k $\Omega$  source impedance imbalance) as well as a low leakage current of 2.0  $\mu$ A rms (max @ 240 V rms, 60 Hz).

**Isolated Power:** An unregulated isolated  $\pm 15$  V dc power supply with  $\pm 10$  mA of current drive capability is available at the input port of the AD206. This permits the isolator to power up floating signal conditioners, front-end amplifiers or remote transducers at the input.

**Performance Rated over the -40°C to +85°C Temperature Range:** With an extended industrial temperature range rating, the AD206 is an ideal isolation amplifier for use in industrial environments.

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## AD206—SPECIFICATIONS (typical @ +25°C, $V_S = \pm 15$ V dc, 2 k $\Omega$ output load, unless otherwise noted)

	AD206A	AD206B
<b>GAIN</b> Range <sup>1</sup> Error @ Unity Gain vs. Temperature <sup>2</sup> 0 to +85°C -40°C to 0°C vs. Supply Voltage, ± (14.5 V to 16.5 V dc) vs. Isolated Supply Load <sup>3</sup> Nonlinearity, <sup>4</sup> ±10 V Output Swing, G = 1 V/V G = 10 V/V	1 V/V to 10 V/V ±2%, max  +15 ppm/°C +50 ppm/°C 100 ppm/V 20 ppm/mA ±0.01% (±0.025%, max) ±0.025%	* *  * * * * ±0.005%, (±0.015%, max) ±0.01%
<b>INPUT VOLTAGE RATINGS</b> Input Voltage Rating of the Uncommitted Input Op Amp, G = 1 V/V Max Safe Differential Range, IN+/IN- to IN COM Common Mode Rejection Ratio of Input Op Amp Max Isolation Voltage (Input to Output) <sup>5</sup> AC, 60 Hz  Isolation-Mode Rejection Ratio (IMRR) @ 60 Hz R <sub>S</sub> ≤ 100 Ω (HI & LO Inputs), G = 1 V/V R <sub>S</sub> ≤ 1 kΩ (Input, HI, LO or Both), G = 1 V/V Isolation-Mode Rejection Ratio (IMRR) @ 1 kHz R <sub>S</sub> ≤ 100 Ω (HI & LO Inputs), G = 1 V/V R <sub>S</sub> ≤ 1 kΩ (Input, HI, LO or Both), G = 1 V/V Isolation-Mode Rejection Ratio (IMRR) @ 10 kHz R <sub>S</sub> ≤ 100 Ω (HI & LO Inputs), G = 1 V/V R <sub>S</sub> ≤ 1 kΩ (Input, HI, LO or Both), G = 1 V/V Leakage Current, Input to Output, @ 240 V rms, 60 Hz	±10 V, min ±15 V 100 dB  750 V rms ±1000 V <sub>PEAK</sub>  120 dB 105 dB  100 dB 85 dB  80 dB 65 dB  2 μA rms, max	* * *  1500 V rms ±2000 V <sub>PEAK</sub> * *  * *  * *  *
<b>INPUT IMPEDANCE</b> Differential (G = 1 V/V) Common Mode	16 MΩ 2 GΩ  4.5 pF	* *
<b>INPUT OFFSET VOLTAGE</b> Initial @ +25°C vs. Temperature 0 to +85°C -40°C to 0°C	±400 μV (±2 mV, max)  ±2 μV/°C (±15 μV/°C, max) ±20 μV/°C	*  * *
<b>OUTPUT OFFSET VOLTAGE</b> Initial @ +25°C (Adjustable to Zero) <sup>6</sup> vs. Temperature 0 to +85°C -40°C to 0°C vs. Supply Voltage vs. Isolated Supply Load <sup>3</sup>	-45 mV (0 to -80 mV, max)  ±30 μV/°C ±80 μV/°C ±350 μV/V -35 μV/mA	*  * * * *
<b>INPUT BIAS CURRENT</b> Initial @ +25°C vs. Temperature -40°C to +85°C	300 nA (650 nA, max)  ±800 nA, max	*  *
<b>INPUT DIFFERENCE CURRENT</b> Initial @ +25°C vs. Temperature -40°C to +85°C	3 nA (±65 nA, max)  ±800 nA, max	*  *
<b>INPUT VOLTAGE NOISE</b> Frequency > 10 Hz	20 nV/√Hz	*

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	AD206A	AD206B
<b>DYNAMIC RESPONSE</b> (2 k $\Omega$ load) Full Signal Bandwidth (3 dB Corner, G = 1 V/V, 20 V pk-pk Signal)	110 kHz (100 kHz, min)	*
<b>DYNAMIC RESPONSE</b> Small Signal Bandwidth (3 dB Corner, G = 1 V/V, 100 mV pk-pk Signal)	115 kHz	*
Transport Delay	2.2 $\mu$ s <sup>6</sup>	*
Slew Rate	6 V/ $\mu$ s	*
Rise Time (10% to 90%)	3 $\mu$ s	*
Settling Time to $\pm 0.10\%$ on a 10 V Step	9 $\mu$ s	*
Overshoot	1%	*
Harmonic Distortion Components, @ 1 kHz	-80 dB	*
@ 10 kHz	-65 dB	*
Unity Gain Overload Recovery ( $\pm 15$ V Drive)	5 $\mu$ s	*
Output Overload Recovery Time (G > 5 V/V)	10 $\mu$ s	*
<b>RATED OUTPUT</b> Voltage (Out HI to Out LO)	$\pm 10$ V, min	*
Current	$\pm 5$ mA, min (into 2 k $\Omega$ Load)	*
Maximum Capacitive Load	1,000 pF	*
Output Resistance	1 $\Omega$ , max	*
Output Ripple and Noise, <sup>8</sup> 1 MHz Bandwidth	10 mV pk-pk	*
50 kHz Bandwidth	2.5 mV pk-pk	*
<b>ISOLATED POWER OUTPUT</b> <sup>9</sup> Voltage, No Load	$\pm 15$ V (-5%, +15%)	*
vs. Temperature, 0 to +85°C	+20 mV/°C	*
-40°C to 0°C	+25 mV/°C	*
Current with Rated Supply Voltage Range <sup>3, 10</sup>	$\pm 10$ mA	*
Regulation, No Load to Full Load	-90 mV/mA	*
Line Regulation	290 mV/V	*
Ripple, 1 MHz Bandwidth, No Load <sup>3</sup>	50 mV rms	*
Efficiency	75%	*
<b>POWER SUPPLY</b> Supply Voltage for Rated Performance	$\pm 14.5$ V dc to $\pm 16.5$ V dc	*
Voltage, Operating <sup>11</sup>	$\pm 14.25$ V dc to $\pm 17$ V dc	*
Current, Quiescent	+40 mA/-18 mA	*
<b>TEMPERATURE RANGE</b> Rated Performance	-40°C to +85°C	*
Storage	-40°C to +85°C	*
<b>PACKAGE DIMENSIONS</b> SIP Package	2.475" $\times$ 0.3250" $\times$ 0.840", max 62.9 mm $\times$ 8.3 mm $\times$ 21.3 mm, max	* *

## NOTES

<sup>1</sup>The gain range of the AD206 is specified from 1 to 10 V/V. The AD206 can also be used with gains of up to 100 V/V. With a gain of 100 V/V there is a 20% reduction in the 3 dB bandwidth specification, and the nonlinearity degrades to  $\pm 0.02\%$  (typ). Refer to Figure 12 for a description on how to implement a gain of 100 using the AD206.

<sup>2</sup>The gain temperature coefficient for the AD206 is illustrated over the entire -40°C to +85°C rated performance temperature range in Figure 1.

<sup>3</sup>When the isolated supply load exceeds  $\pm 1$  mA, external filter capacitors are required in order to ensure that the gain, offset and nonlinearity specifications are preserved and to maintain the isolated supply full-load ripple below the specified 50 mV rms. A value of 6.8  $\mu$ F is recommended as shown in Figures 18 and 19b.

<sup>4</sup>Nonlinearity is specified as a percent (of full-scale range) deviation from a best straight line.

<sup>5</sup>The isolation rating of each AD206 is 100% tested in production. The A grade is Hi-Pot tested at 850 V rms for 1 minute. The B grade is tested using a 5 second partial discharge test at 1,800 V rms with a detection threshold of 150 pC.

<sup>6</sup>The AD206 should be allowed to warm-up for approximately 10 minutes before any gain and offset adjustments are made.

<sup>7</sup>Equivalent to a 0.8° phase shift at 1 kHz.

<sup>8</sup>With the  $\pm 15$  V dc power supply pins bypassed by 2.2  $\mu$ F capacitors at the AD206 pins, as shown in Figures 10 and 19a.

<sup>9</sup>**CAUTION:** The AD206 design does not provide short circuit protection of its isolated power supply. A current-limiting resistor may be placed in series with the isolated power terminals and the load in order to protect the supply against inadvertent shorts.

<sup>10</sup>With an input power supply voltage greater than or equal to  $\pm 15$  V dc the AD206 may supply up to  $\pm 15$  mA of current from the isolated power supplies.

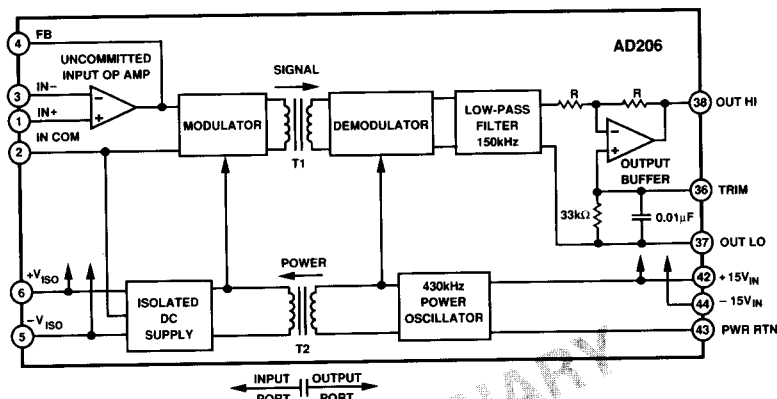
Exceeding these currents will increase the dependence of the gain and offset specifications of the AD206 on both the supply voltage and isolated load current.

<sup>11</sup>Voltages less than 14.25 V dc may cause the AD206 to cease operating properly. Voltages greater than 17.5 V dc may damage the internal components of the AD206 and consequently should not be used.

\*Specification is the same as that for the AD206A.

Specifications subject to change without notice.

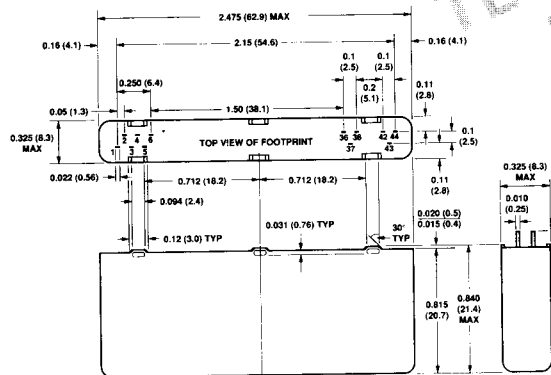
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Functional Block Diagram

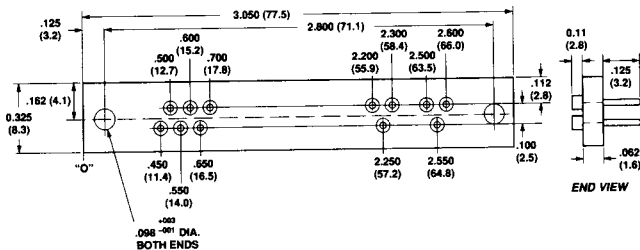
OUTLINE DIMENSIONS  
Dimensions shown in inches and (mm)

AD206 SIP PACKAGE



NOTE: PINS MEASURE 0.022 (0.56) - 0.010 (0.25) PRIOR TO TINNING.  
TINNING MAY ADD UP TO 3 mils (0.003") TO THESE DIMENSIONS.

AC1063 MATING SOCKET



AD206 PIN DESIGNATIONS

Pin	Designation	Function
1	IN+	Input Op Amp: Noninverting Input
2	IN COM	Input Common
3	IN-	Input Op Amp: Inverting Input
4	FB	Input Feedback
5	-V <sub>ISO</sub> OUT	Isolated Power: -DC
6	+V <sub>ISO</sub> OUT	Isolated Power: +DC
36	TRIM	Output Offset Trim Adjustment
37	OUT LO	Output Low
38	OUT HI	Output High
42	+15 V IN	DC Power Supply Input: +15 V
43	PWR RTN	DC Power Supply Input Common
44	-15 V IN	DC Power Supply Input: -15 V

ORDERING GUIDE

Model	Temperature Range
AD206AY	-40°C to +85°C
AD206BY	-40°C to +85°C

CAUTION

ESD (electrostatic discharge) sensitive device. Permanent damage may occur on unconnected devices subject to high energy electrostatic fields. Unused devices must be stored in conductive foam or shunts. The protective foam should be discharged to the destination socket before devices are removed.



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### INSIDE THE AD206

The functional block diagram of the AD206 has been shown. The AD206 employs a double balanced amplitude modulation technique to implement transformer coupling of signals down to dc. The 430 kHz square wave carrier used by the AD206 is generated by an internal oscillator located on the output side of the isolator. This oscillator is powered by the bipolar 15 V dc supply.

The input port of the AD206 contains an uncommitted input op amp, a modulator and an isolated power supply. The uncommitted input amplifier may be used to supply gain or to buffer the

input signals. The primary windings of the power transformer T2 are driven by the 430 kHz square wave while the secondary, in conjunction with a rectifier network, supply isolated power to the modulator, input op amp and any external load.

A full-wave modulator translates the input signal to the carrier frequency which is then transmitted across the signal transformer T1. The synchronous demodulator on the output port extracts the input signal from the carrier. This signal is then passed through a Bessel response low-pass filter to an output buffer and is then made available at the output signal terminals.

### PERFORMANCE CHARACTERISTICS

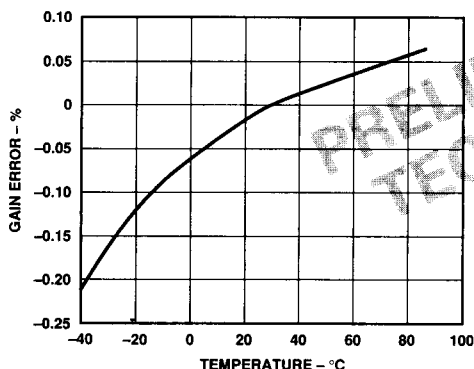


Figure 1. Gain Error vs. Temperature

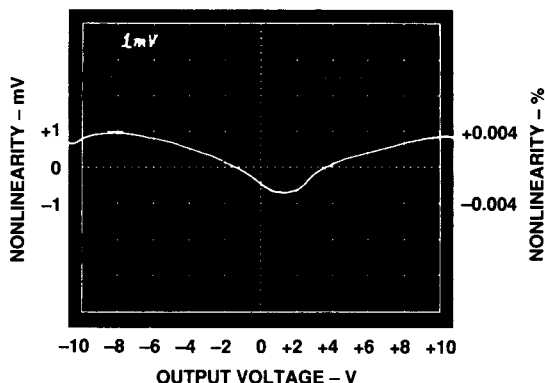


Figure 2. Gain Nonlinearity Error (% of Output Span and mV) vs. Output Voltage Swing for a Gain of 1

Nonlinearity does not change with temperature over the  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  range and is not dependent on the gain setting for gains in the rated 1 V/V to 10 V/V range.

Note: The gain and offset and offset errors will increase when the isolated power supply load exceeds  $\pm 10$  mA.

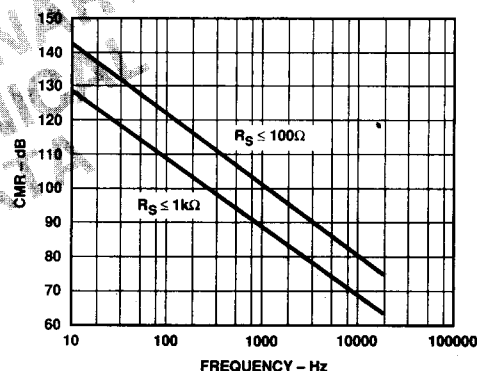


Figure 3. Typical Common-Mode Rejection (dB) vs. Common-Mode Signal Frequency (Hz) and Source Impedance Imbalance ( $\Omega$ ) for the 10 Hz to 20 kHz Frequency Range and with a Gain of 1

To achieve the optimal common-mode rejection of unwanted signals, it is strongly recommended that the source impedance imbalance be kept as low as possible and that the input circuitry be carefully laid out so as to avoid adding excessive stray capacitances at the isolator's input terminals.

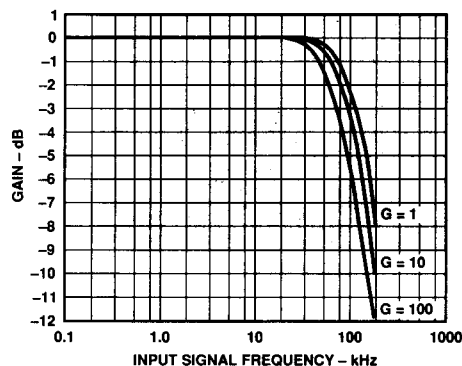


Figure 4. Normalized Gain (dB) as a Function of Input Signal Frequencies (kHz) in the 100 Hz to 150 kHz Range

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# AD206

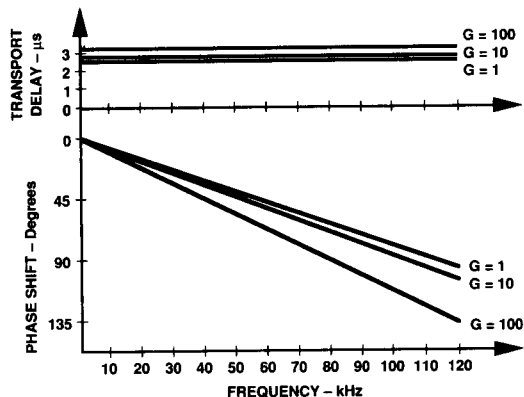


Figure 5. Phase Shift ( $^{\circ}$ ) and Transport Delay ( $\mu\text{s}$ ) vs. Input Signal Frequencies (kHz) in the 10 Hz to 120 kHz Range

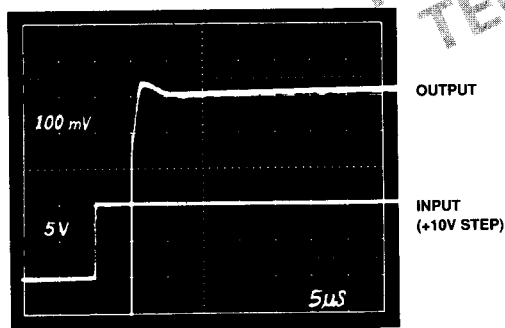
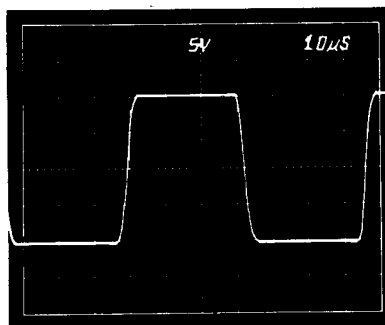


Figure 6. Overshoot/Undershoot Characteristics of the AD206 to a Full-Scale Step at the Isolator's Input and with a Gain of 1 ( $R_L = 2 \text{ k}\Omega$ )



$\pm 10\text{V}$ , 15kHz STEP INPUT RESPONSE ( $G=1$ )

Figure 7. Output Response of the AD206 to a + and - Full-Scale Step at the Isolator's Input, with a Gain of 1 ( $R_L = 2 \text{ k}\Omega$ )

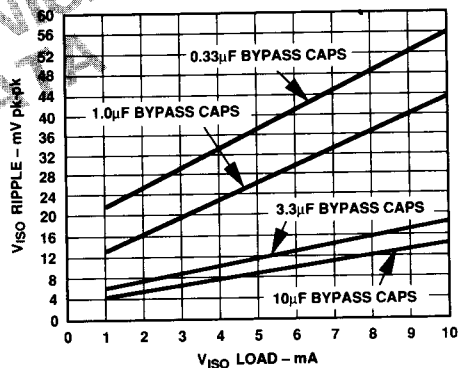


Figure 8. Isolated Power Supply Ripple (mV pk-pk) vs. Load (mA) and Bypass Capacitance ( $\mu\text{F}$ )

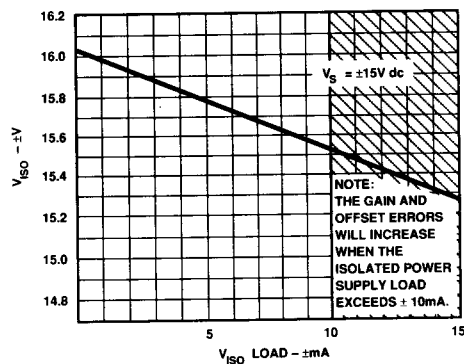


Figure 9. Isolated Power Supply Voltage (V dc) vs. Isolated Power Supply Load (mA)

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## POWERING THE AD206

The AD206 is powered by a bipolar  $\pm 15$  V dc power supply connected as shown in Figure 10. External bypass capacitors should be provided in bused applications. Note that a small signal-related current ( $50 \mu\text{A}/V_{\text{OUTPUT}}$ ) will flow out of the OUT LO pin (Pin 37). Therefore, the OUT LO terminals should be bused together and referenced at a single "Analog Star Ground" to the  $\pm 15$  V dc supply common as illustrated in Figure 10.

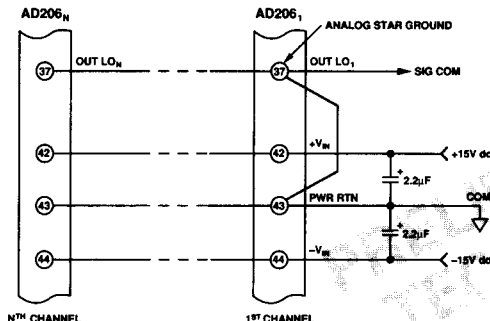


Figure 10. Powering the AD206

**Power Supply Voltage Considerations.** The rated performance of the AD206 remains unaffected for power supply voltages in the  $\pm 14.5$  V dc to  $\pm 16.5$  V dc range. Voltages below  $\pm 14.25$  V dc may cause the AD206 to cease operating properly.

**Note:** Power supply voltages greater than 17.5 V dc may damage the internal components of the AD206 and consequently should not be used.

## USING THE AD206

**Unity Gain Input Configuration.** The basic unity gain configuration for input signals of up to  $\pm 10$  V is shown in Figure 11.

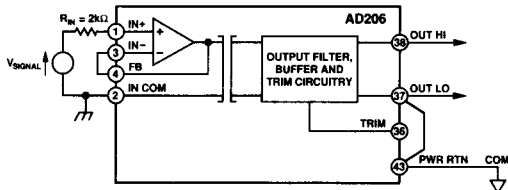


Figure 11. Basic Unity Gain Configuration

**Noninverting Input Configuration for a Gain Greater Than One ( $G > 1$ ).** When input signal levels must be amplified and isolated, Figure 12 shows how to achieve a gain greater than one while continuing to preserve a very high input impedance.

In this circuit, the gain equation is written as follows:

$$V_O = (1 + R_F/R_G) \times V_{SIG}$$

where:

- $V_O$  = Output Voltage (V),
- $V_{SIG}$  = Input Signal Voltage (V),
- $R_F$  = Feedback Resistor Value ( $\Omega$ ),
- $R_G$  = Gain Resistor Value ( $\Omega$ ).

The values for the resistors  $R_F$  and  $R_G$  are subject to the following constraints:

- The total impedance of the gain network should be less than 10 k $\Omega$ .
- The current drawn in the feedback resistor ( $R_F$ ) is less than 1 mA at  $\pm 10$  V. Note that for each mA drawn by the feedback resistor, the isolated power supply drive capability decreases by 1 mA.
- The feedback ( $R_F$ ) and gain resistor ( $R_G$ ) result in the desired amplifier gain.

Greater than One

It is recommended that the feedback resistor ( $R_F$ ) is bypassed with a 47 pF capacitor ( $C_F$ ).

**Note on the input resistor ( $R_{IN}$ ):** The 2 k $\Omega$  resistor placed in series with the input signal source and the IN+ terminal, designated as  $R_{IN}$  in Figures 11 and 12, is recommended so as to limit the current seen at the input terminals of the AD206 to 5.0 mA when the AD206 is not powered.

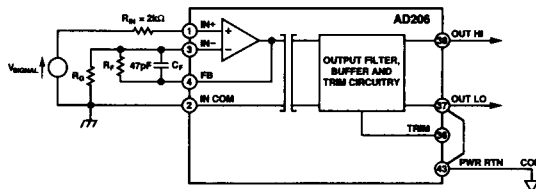


Figure 12. Noninverting Input Configuration for a Gain

**Compensating the Uncommitted Input Op Amp.** The open-loop gain and phase versus frequency for the uncommitted input op amp are given in Figure 13. These curves can be used to determine the appropriate values for the feedback resistor and compensation capacitor in order to ensure frequency stability when reactive or nonlinear components are used in conjunction with the uncommitted input op amp.

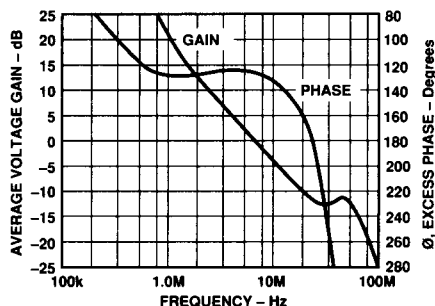


Figure 13. Open-Loop Gain and Phase Response for the Uncommitted Input Op Amp of the AD206

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## AD206

**Inverting, Summing or Current Input Configuration.** Figure 14 shows how the AD206 can measure currents or sum currents or voltages.

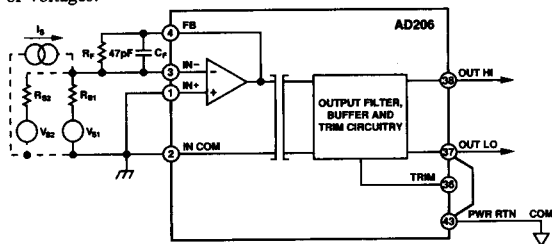


Figure 14. Summing or Current Input Configuration Non-inverting Mode of Operation

For this circuit, the output voltage equation is written as follows:

$$V_O = -R_F \times (I_S + V_{S1}/R_{S1} + V_{S2}/R_{S2} + \dots)$$

where:

$V$  = Output Voltage (V),

$V_{S1}$  = Voltage of Input Signal 1 (V),

$V_{S2}$  = Voltage of input Signal 2 (V),

$I_S$  = Input Current Source (A),

$R_F$  = Feedback Resistor Value ( $\Omega$ ) (10 k $\Omega$ , typ)

$R_{S1}$  = Source Resistance Associated with Input Signal 1 ( $\Omega$ ),

$R_{S2}$  = Source Resistance Associated with Input Signal 2 ( $\Omega$ ).

The circuit of Figure 14 can also be used when the input signal is larger than the  $\pm 10$  V input range of the isolator. For example, suppose that in Figure 14, only  $V_{S1}$ ,  $R_{S1}$  and  $R_F$  are connected to the feedback, input and common terminals as shown by the solid lines in Figure 14. Now, a  $V_{S1}$  with a  $\pm 50$  V span can be accommodated with  $R_F = 10$  k $\Omega$  and a total  $R_{S1} = 50$  k $\Omega$ .

### GAIN AND OFFSET ADJUSTMENTS

**General Comments.** The AD206 features a TRIM pin on the output stage of the isolator. This pin should be used with user-supplied external circuitry to adjust the output offset of the AD206. When gain and offset adjustments are required, the actual compensation circuit ultimately used depends on the following:

- The input configuration mode of the isolation amplifier (i.e., noninverting or inverting).
- The placement of the adjusting potentiometer (i.e., on the isolator's input or output side).

As a general rule:

- Gain Adjustments are most easily accomplished as part of the gain-setting resistor network at the isolator's input side.
- To ensure the highest degree of stability in the gain adjustment, the adjusting potentiometers should be located as close as possible to the isolator's front end and its impedance should be kept low. Adjustment ranges should also be kept to a minimum since their resolution and stability is dependent on the actual trim potentiometers used.

- Output side adjustments may be necessary under the conditions where adjusting potentiometers placed on the input side would present a hazard to the user due to the presence of high common-mode voltages during the adjustment procedure.
- It is recommended that the offset is adjusted prior to the gain adjustment.
- The AD206 should be allowed to warm-up for approximately 10 minutes before any gain and/or offset adjustments are performed.

**Input Gain Adjustments for the Noninverting Mode of Operation.** Figure 15 shows the suggested gain adjustment circuit. Note that the gain adjustment potentiometer  $R_P$  is incorporated into the gain-setting resistor network at the isolator's input.

For a  $\pm 1\%$  trim range ( $R_P \approx 1$  k $\Omega$ ), let  $R_C \approx 0.02 \frac{R_G \times R_F}{R_G + R_F}$ .

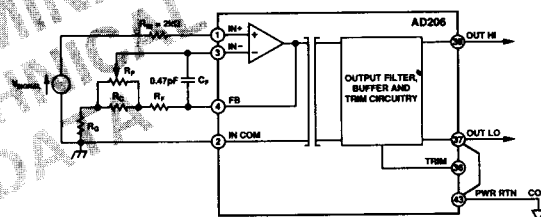


Figure 15. Input Gain Adjustment Circuit for the

**Input Gain Adjustments for the Inverting Mode of Operation.** Figure 16 shows the suggested gain adjustment circuit. In this circuit, the gain adjustment is made in the feedback loop using potentiometer  $R_P$ . The adjustments are effective for all gains in the 1 to 10 range.

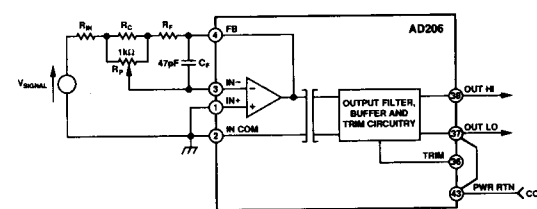


Figure 16. Input Gain Adjustment Circuit for the Inverting Mode of Operation

For an approximate  $\pm 1\%$  gain trim range, let

$$R_X = \frac{R_{IN} \times R_F}{R_{IN} + R_F}$$

and select

$$R_C = 0.02 \times R_{IN}$$

while

$$R_F \leq 10 \text{ k}\Omega$$

$$C_F = 47 \text{ pF}$$

$R_F$  and  $R_{IN}$  are selected for a good temperature coefficient match.

This information applies to a product under development. Its characteristics and specifications are subject to change without notice. Analog Devices assumes no obligation regarding future manufacture unless otherwise agreed to in writing.



**Output Offset Adjustments.** Figure 17 illustrates one method of adjusting the output offset voltage. Since the AD206 exhibits a nominal output offset of  $-35$  mV, the circuit shown in Figure 17 was chosen to yield an offset correction of  $0$  to  $+73$  mV for a total output offset range of approximately  $-35$  mV to  $+38$  mV.

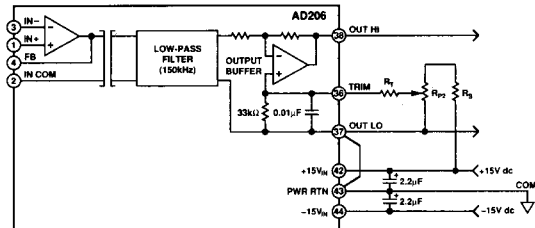


Figure 17. Output Offset Adjustment Circuit

**Output Gain Adjustments.** Since the output amplifier stage of the AD206 is fixed at unity, any desired output gain adjustments can be made only in a subsequent stage.

### USING ISOLATED POWER

The AD206 provides  $\pm 15$  V dc @  $\pm 10$  mA power outputs referred to the input common. These may be used to power various accessory circuits which must operate at the input common-mode level including input adjustment circuits, references, op amps, signal conditioners or remote transducers. Figure 18 shows the recommended connections from the isolated power supplies.

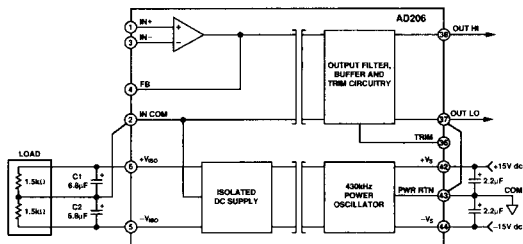


Figure 18. Using the Isolated Power Supplies

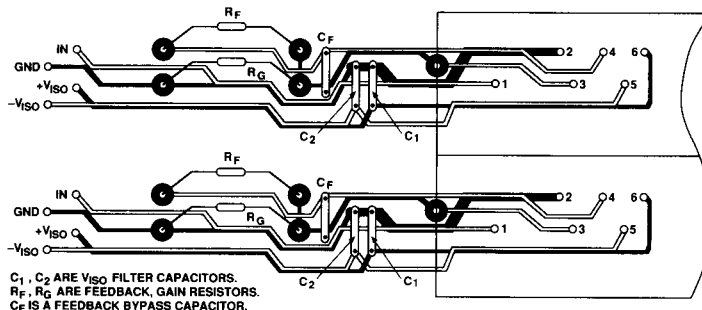


Figure 19b. PCB Layout for Multichannel with Gain Is Required on the AD206s

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### PCB LAYOUT FOR MULTICHANNEL APPLICATIONS

The pinout of the AD206 has been designed to facilitate multichannel applications. Figure 19a shows the recommended printed circuit board (PCB) layout for the simple unity gain configuration. When gain setting resistors are present, 0.325" channel centers can still be achieved as shown in Figure 19b.

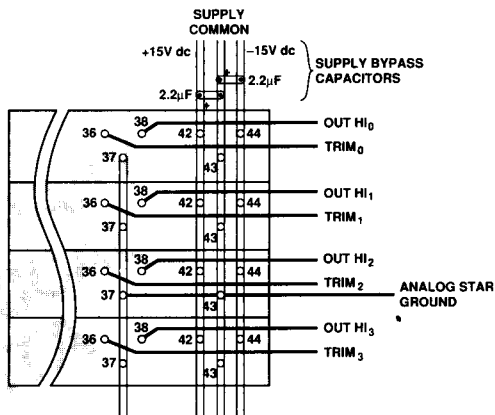


Figure 19a. PCB Layout for Multichannel, Unity Gain Applications

**CAUTION:** The AD206 design does not provide short-circuit protection of its isolated power supply. A current limiting resistor may be placed in series with the isolated power terminals and the load in order to protect the supply against inadvertent shorts.

# AD206

## APPLICATION EXAMPLES

**Motor Control.** Figure 20 shows an AD206 used in a dc motor controller application. The excellent phase characteristics and

wide bandwidth of the AD206 are ideal for this type of application.

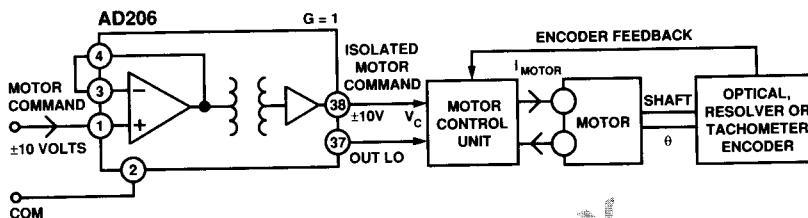


Figure 20. Using the AD206 in a Motor Control Application

## Multichannel Data Acquisition

Figure 21 shows the AD206 in a multiplexed, multichannel data acquisition application. The rapid slew rate and settling time performance of the AD206 are ideal in satisfying the demanding signal processing requirements imposed by the sampling nature of the multiplexer output. These specifications ensure that the AD206 is capable of accurately acquiring an analog signal in a limited time period, with minimal signal attenuation and distortion, before the multiplexer switches to the next signal channel.

The current drive capabilities of the AD206's bipolar  $\pm 15$  V dc isolated power supplies are more than adequate to meet the modest  $\pm 800$   $\mu$ A supply current requirements for the AD7502 multiplexer. Digital isolation techniques should be employed to isolate the Enable (EN), A0 and A1 logic control signals.

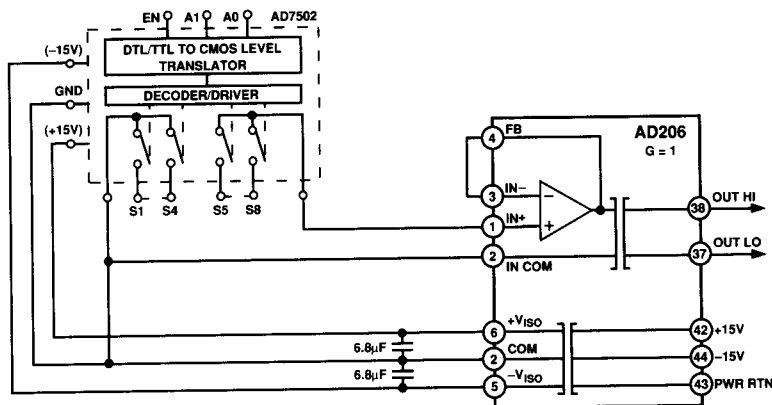


Figure 21. Using the AD206 in Multichannel Data Acquisition Applications

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