



Figure 1. Photo of AD202KNATI

FEATURES

- Isolated Power Outputs
- Small Size: 4 Channels/Inch Low
- Uncommitted Input Amplifier
- High CMR: 130dB (Gain = 100V/V)
- High Accuracy: $\pm 0.2\%$ Max Nonlinearity
- High CMV Isolation: $\pm 2000\text{V}$ Continuous

APPLICATIONS

It can be applied for multichannel data acquisition, current shunt measurements motor controls, process signal isolation, high voltage instrumentation amplifier, etc.

DESCRIPTION

Upgraded Drop-in Replacement for AD202KN

We guarantee production for ≥ 10 years.

The AD202KNATI is a high voltage isolation amplifier designed for multiple applications where input signals are measured, processed, or transmitted without a galvanic connection. These isolation amplifiers in DIP package offer a signal and power isolation function.

With internal transformer-coupling, the AD202KNATI provides total galvanic isolation between the input and output stages of the isolation amplifier. These amplifiers eliminate the need for an external DC-DC converter, which allows the designer to minimize the necessary circuit overhead, thus reducing the overall design and component costs.

The AD202KNATI is powered directly from a 15V DC power supply, featuring small size, high accuracy, low power, wide bandwidth, excellent performance, flexible input, isolated power, etc.

INSIDE THE AD202KNATI

The AD202KNATI uses an amplitude modulation technique to permit transformer coupling of signals down to dc (Figure 2). It also contains an uncommitted input op amp and a power transformer that provides isolated power to the op amp, the modulator, and any external load. The power transformer primary is driven by a 20kHz, 15V_{P-P} square wave generated internally.

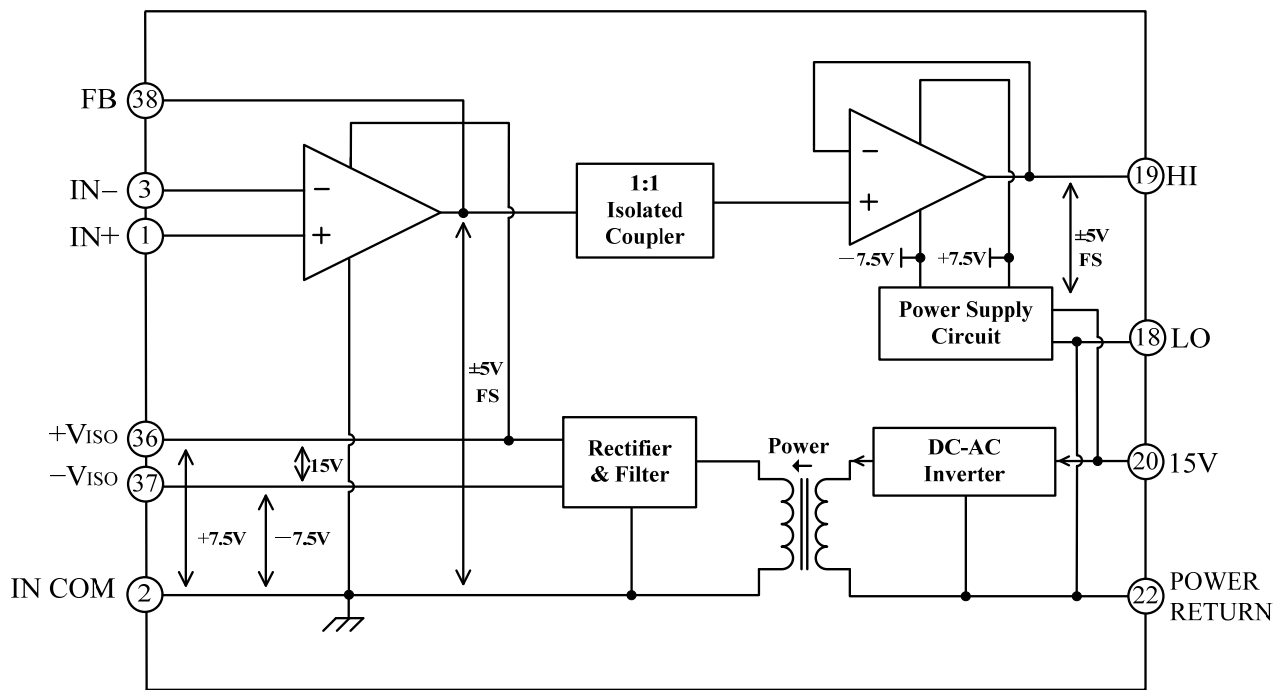


Figure 2. AD202KNATI Functional Block Diagram

SPECIFICATIONS

 Table 1. Electrical characteristics. (Typical @ 25°C and $V_S = 15V$ unless otherwise noted.)

| Model | AD202KNATI |
|---|-------------------------------|
| GAIN | |
| Range | 1V/V–100 V/V |
| Error | ±0.5% typ (±4% max) |
| vs. Temperature | ±20ppm/°C typ (±45ppm/°C max) |
| vs. Time | ±50 ppm/1000 Hours |
| vs. Supply Voltage | ±0.01%/V |
| Nonlinearity (G = 1V/V) | ±0.01 max |
| Nonlinearity vs. Isolated Supply Load | ±0.0015%/mA |
| INPUT VOLTAGE RATINGS | |
| Input Voltage Range | ±5V |
| Max Isolation Voltage (Input to Output) | |
| AC, 60Hz, Continuous | 1500Vrms |
| Continuous (AC and DC) | ±2000V Peak |
| CMRR (Common-Mode Rejection Ratio)* | –74dB |
| CMTC(Common-Mode Transfer Coefficient)* | –0.2×10 ³ |
| RS ≤ 100Ω (HI and LO Inputs) G = 1V/V | 105dB |
| G = 100V/V | 130dB |
| RS ≤ 1 kΩ (Input HI, LO, or Both) G = 1V/V | 100dB min |
| G = 100V/V | 110dB min |
| Leakage Current Input to Output @ 240Vrms, 60 Hz | 2μA rms max |
| INPUT IMPEDANCE | |
| Differential (G = 1V/V) | 10 ¹² Ω |
| Common-Mode | 2GΩ/4.5pF |
| INPUT BIAS CURRENT | |
| Initial, @ 25°C | ±30pA |
| vs. Temperature (0°C to 70°C) | ±10nA |
| INPUT DIFFERENCE CURRENT | |
| Initial, @ 25°C | ±5pA |
| vs. Temperature (0°C to 70°C) | ±2nA |
| INPUT NOISE | |
| Voltage, 0.1Hz to 10Hz | 1.8μV _{p-p} |
| f > 100Hz | 10.8nV/√Hz |
| FREQUENCY RESPONSE | |
| Bandwidth ($V_O \leq 10V_{p-p}$, G = 1V–50V/V) | 20kHz |
| Settling Time, to ±10mV (10V Step) | 1ms |
| OFFSET VOLTAGE (RTI) | |
| Initial, @ 25°C Adjustable to Zero | (±5 ± 5/G)mV max |
| vs. Temperature (0°C to 70°C) | [±10 ± $\frac{10}{G}$] μV/°C |
| RATED OUTPUT | |
| Voltage (Out HI to Out LO) | ±5V |
| Output Resistance | 7kΩ |
| Output Ripple, 100kHz Bandwidth | 10mV _{p-p} |
| 5kHz Bandwidth | 0.5mV rms |
| ISOLATED POWER OUTPUT | |
| Voltage, No Load | ±7.5V |
| Accuracy | ±10% |
| Current | 400μA Total |
| Regulation, No Load to Full Load | 5% |
| Ripple | 100mV _{p-p} |
| POWER SUPPLY | |
| Voltage, Rated Performance | 15V±5% |
| Voltage, Operating | 15V±10% |
| Current, No Load ($V_S = 15V$) | 10mA |
| TEMPERATURE RANGE | |
| Rated Performance | 0°C to 70°C |
| Operating | –40°C to +85°C |
| Storage | –40°C to +85°C |
| PACKAGE DIMENSIONS | |
| DIP Package (N) | 2.10"×0.700"×0.350" |

 *Test Schematic Figure 3 @ 100Hz Sine Wave @ $v_s(t) = 1000V$.

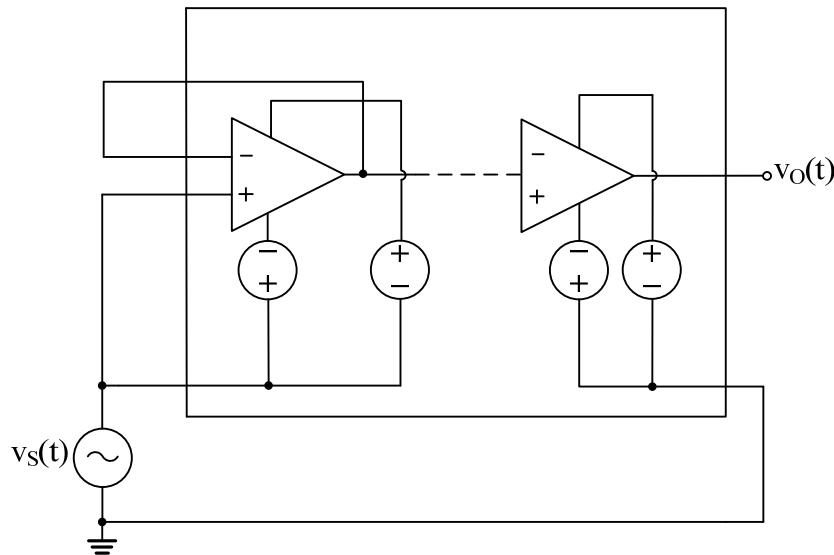


Figure 3. CMRR & CMTC Test Schematic

PIN DESIGNATIONS

| Block | Pin # | Pin Name | Type | Function Description |
|----------------|-------|--------------|------------------------|--|
| Isolated Block | 1 | IN+ | Isolated analog input | Isolated positive (Non-inverting) input |
| | 2 | IN COM | Isolated analog ground | Isolated ground |
| | 3 | IN- | Isolated analog input | Isolated negative (inverting) input |
| | 36 | +VISO OUT | Isolated power output | Isolated positive power supply output, +7.5V, referenced to pin 2 IN COM |
| | 37 | -VISO OUT | Isolated power output | Isolated negative power supply output, approximately -7.0V, referenced to pin 2 IN COM |
| | 38 | FB | Isolated analog output | Isolated op amp output as a feedback signal |
| Local Block | 18 | LO | Analog ground | Output voltage ground reference, internally connected to pin 22 POWER RETURN |
| | 19 | HI | Analog output | Op amp output, equals to the voltage difference between FB and IN COM |
| | 20 | 15 V | Analog input | Positive 15V power supply input |
| | 22 | POWER RETURN | Analog input | Power supply return, internally connected to pin 18 GND |

RISE TIME

1. Connect pin FB and pin IN⁻. Provide a -4V ~ +4V voltage to pin IN⁺. The rise time = 3μs.

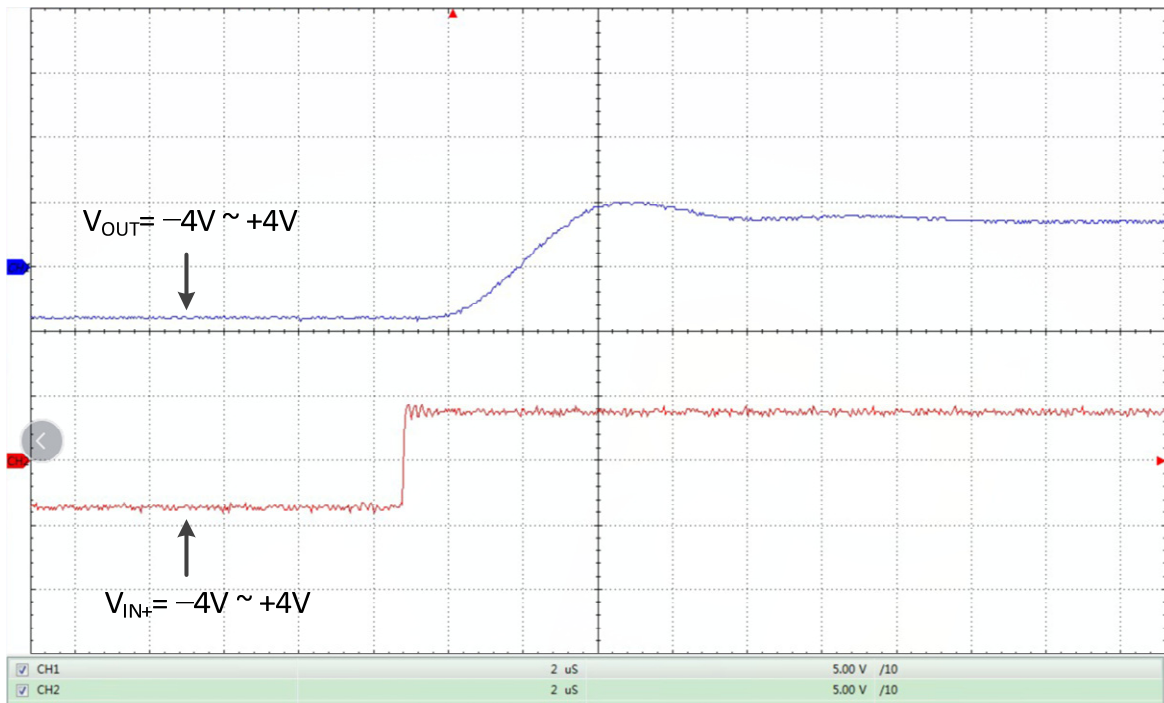


Figure 4. Rise time @ $V_{IN+} = -4V \sim +4V$

2. Connect pin FB and pin IN⁻. Provide a -2V ~ +2V voltage to pin IN⁺. The rise time = 3μs.

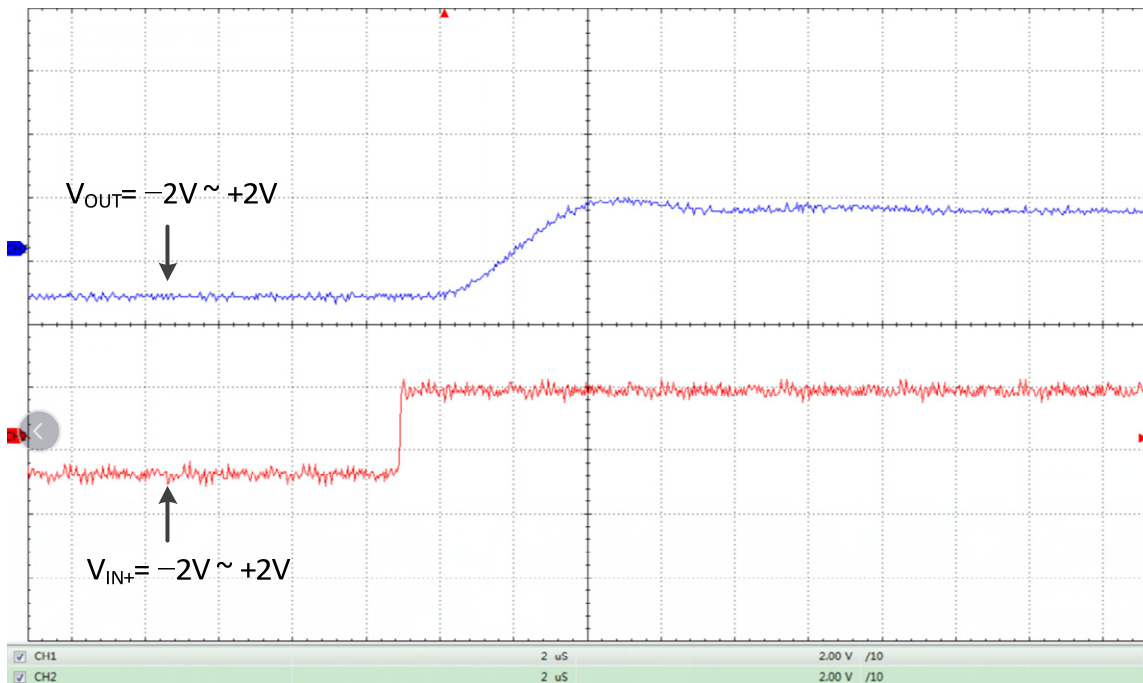


Figure 5. Rise time @ $V_{IN+} = -2V \sim +2V$

NONLINEARITY

Connect pin FB and pin IN-. Provide a -5V ~ +5V voltage to pin IN+. The output voltage is as follows.

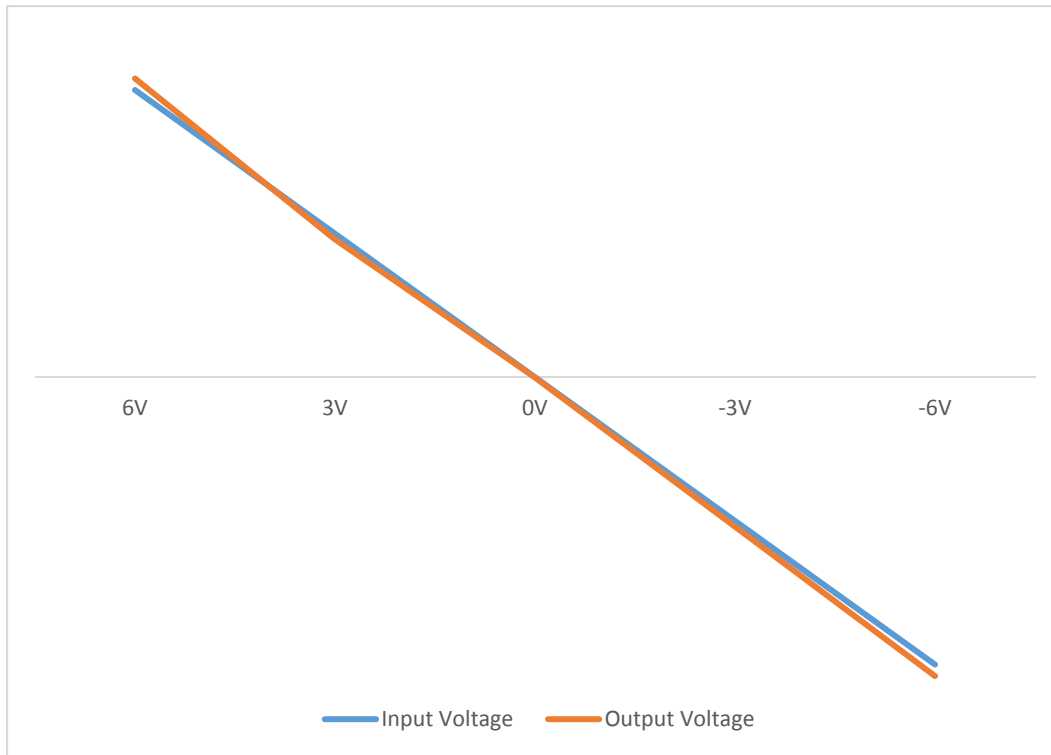


Figure 6. Nonlinearity

MECHANICAL DIMENSIONS

The dimensions of AD202KNATI in DIP package are shown in Figure 7.

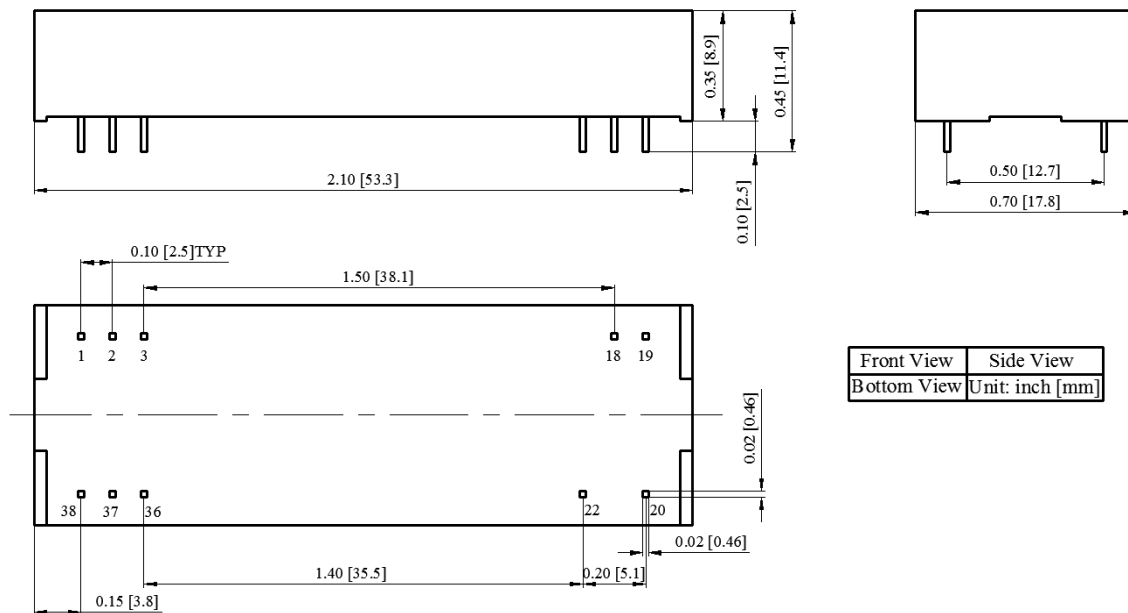


Figure 7. Dimensions of AD202KNATI DIP Package

NOTICE

1. ATI warrants performance of its products for one year to the specifications applicable at the time of sale, except for those damaged by excessive abuse. Products found not meeting the specifications within one year from the date of sale can be exchanged free of charge.
2. ATI reserves the right to make changes to its products or to discontinue any product or service without notice and advise customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current and complete.
3. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgment, including those pertaining to warranty, patent infringement, and limitation of liability. Testing and other quality control techniques are utilized to the extent ATI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.
4. Customers are responsible for their applications using ATI products. In order to minimize risks associated with the customers' applications, adequate design and operating safeguards must be provided by the customers to minimize inherent or procedural hazards. ATI assumes no liability for applications assistance or customer product design.
5. ATI does not warrant or represent that any license, either expressed or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of ATI covering or relating to any combination, machine, or process in which such products or services might be or are used. ATI's publication of information regarding any third party's products or services does not constitute ATI's approval, warranty or endorsement thereof.
6. IP (Intellectual Property) Ownership: ATI retains the ownership of full rights for special technologies and/or techniques embedded in its products, the designs for mechanics, optics, plus all modifications, improvements, and inventions made by ATI for its products and/or projects.