## SELECTION GUIDE

| Part # | Description | Package | Serial # | Status | Output Voltage vs. Power Supply | Bandwidth | Linearity | Max Common-Mode Voltage | Power Supply Current | Rise Time $t_r$ | Pinout | Mechanical Outline | Datasheet | Buy Now |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AD202KNATI (2000V, DIP) | Pin out compatible with AD202KN, but output voltage is not isolated with power supply | DIP | ≤25156 | **Stop production** | Non-Isolated | 20kHz | ±0.02% | 2000V | 20mA | 18µs | Fig. 1.1 | Fig. 10.1 | | - |
| | Upgraded replacement for AD202KN | DIP | >25156 | **In production** | Isolated | 800kHz | ±0.02% | 2000V | 12mA | 0.5µs | | | | * * |
| AD202JNATI (1000V, DIP) | Upgraded replacement for AD202JN | DIP | - | **In production** | Isolated | 800kHz | ±0.02% | 1000V | 12mA | 0.5µs | Fig. 1.2 | Fig. 10.1 | | * * |
| AD202KYATI (2000V, SIP) | Pin out compatible with AD202KY, but output voltage is not isolated with power supply | SIP | ≤25290 | **Stop production** | Non-Isolated | 20kHz | ±0.02% | 2000V | 20mA | 18µs | Fig. 1.3 | Fig. 10.2 | | - |
| | Upgraded replacement for AD202KY | SIP | >25290 | **In production** | Isolated | 800kHz | ±0.02% | 2000V | 12mA | 0.5µs | | | | * * |
| AD202JYATI (1000V, SIP) | Upgraded replacement for AD202JY | SIP | - | **In production** | Isolated | 800kHz | ±0.02% | 1000V | 12mA | 0.5µs | Fig. 1.4 | Fig. 10.2 | | * * |
| AD202KN | Made by Analog Device | DIP | - | **Stop production** | Isolated | 2kHz | ±0.025% | 2000V | 5mA | 180µs | - | - | - | - |
| AD202JN | Made by Analog Device | DIP | - | **Stop production** | Isolated | 2kHz | ±0.05% | 1000V | 5mA | 180µs | - | - | - | - |
| AD202KY | Made by Analog Device | SIP | - | **Stop production** | Isolated | 2kHz | ±0.025% | 2000V | 5mA | 180µs | - | - | - | - |
| AD202JY | Made by Analog Device | SIP | - | **Stop production** | Isolated | 2kHz | ±0.05% | 1000V | 5mA | 180µs | - | - | - | - |
| ATIA202KN | Obsolete, identically replaced by AD202KNATI | DIP | - | **Stop production** | Isolated | 20kHz | ±0.01% | 2000V | 12mA | 18µs | - | - | | - |
| ATIA202KY | Obsolete, identically replaced by AD202KYATI | SIP | - | **Stop production** | Isolated | 20kHz | ±0.01% | 2000V | 12mA | 18µs | - | - | | - |



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Figure 1.1. Photo of AD202KNATI


Figure 1.3 Photo of AD202KYATI


Figure 1.2. Photo of AD202JNATI

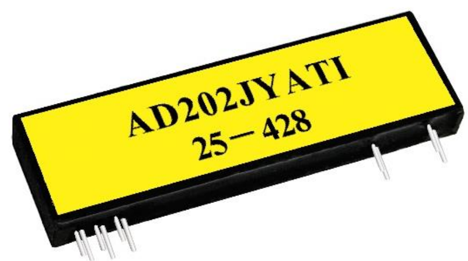


Figure 1.4 Photo of AD202JYATI

## FEATURES

- Isolated Power Outputs
- Small Size: 4 Channels/lnch Low
- Uncommitted Input Amplifier
- High CMR: 130dB (Gain = 100V/V)
- High Accuracy: ±0.02% Max Nonlinearity
- High CMV Isolation: ±1000V 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 AD202JN**

**We guarantee production for ≥10 years.**

The AD202JNATI 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 AD202JNATI 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 AD202JNATI 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 AD202JNATI

The AD202JNATI 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 3MHz, $15V_{P-P}$ square wave generated internally.



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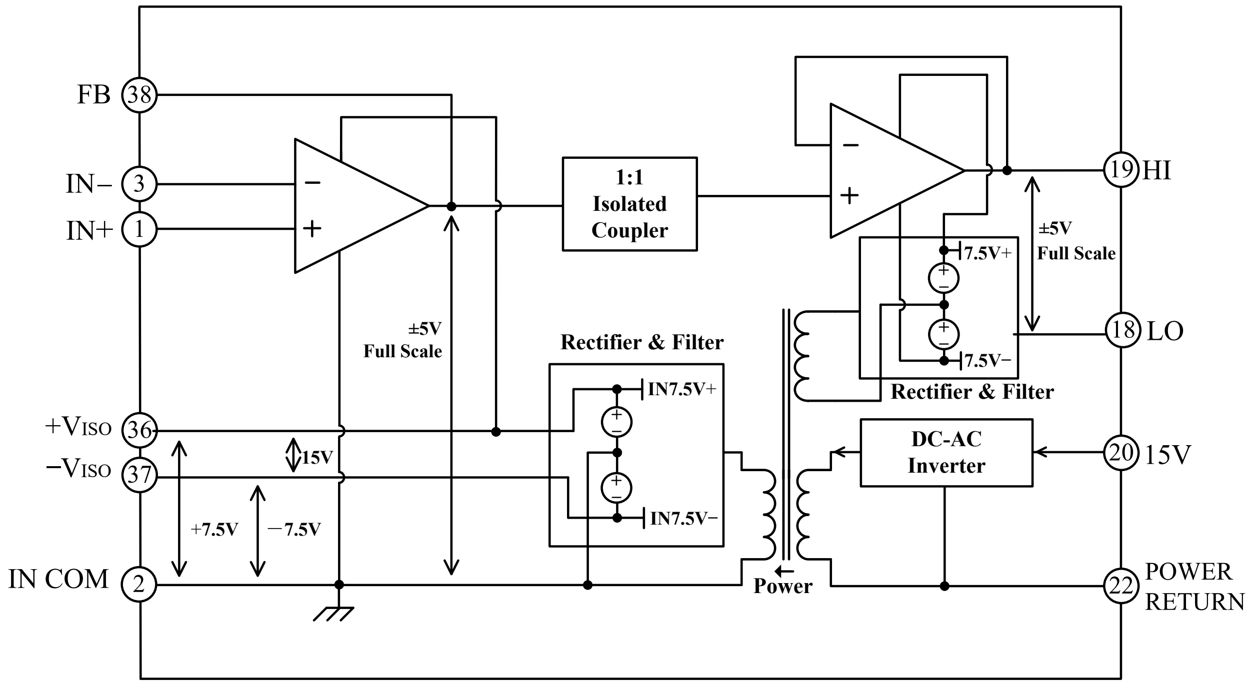


Figure 2. AD202JNATI Functional Block Diagram

## SPECIFICATIONS

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

| **Model** | **AD202JNATI** |
|---|---|
| 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 | 750Vrms |
| Continuous (AC and DC) | ±1000V Peak |
| CMRR (Common-Mode Rejection Ratio)* | −74dB |
| CMTC(Common-Mode Transfer Coefficient)* | $-0.2\times10^3$ |
| 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) | $10^{12}\Omega$ |
| 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 | 1.8μ$V_{P\text{-}P}$ |
| f > 100Hz | 10.8nV/$\sqrt{Hz}$ |



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| **Model** | **AD202JNATI** |
|---|---|
| FREQUENCY RESPONSE | |
| Bandwidth ($V_O \leq 10V_{P-P}$, G = 1V–50V/V) | 800kHz |
| 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) | $[\pm 10 \pm \frac{10}{G}]$ µV/°C |
| RATED OUTPUT | |
| Voltage (Out HI to Out LO) | ±5V |
| Output Resistance | 750Ω |
| 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) | 12mA |
| 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.

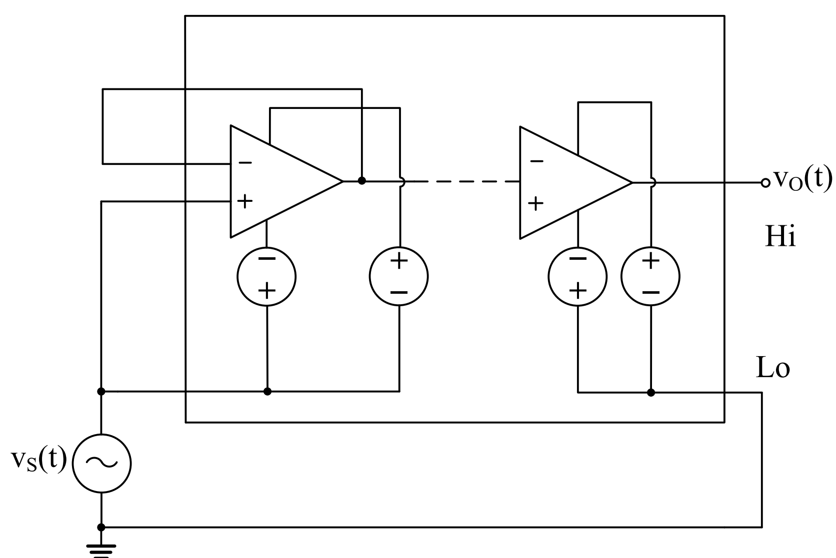


Figure 3. CMRR & CMTC Test Schematic



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## 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 output | Low Voltage Output |
| | 19 | HI | Analog output | High Voltage Output |
| | 20 | 15 V | Analog input | Positive 15V power supply input |
| | 22 | POWER RETURN | Analog input | Power supply return |

## RISE TIME

1. Connect pin FB and pin IN−. Provide a −2V ~ +2V voltage to pin IN+. The rise time = 500ns.

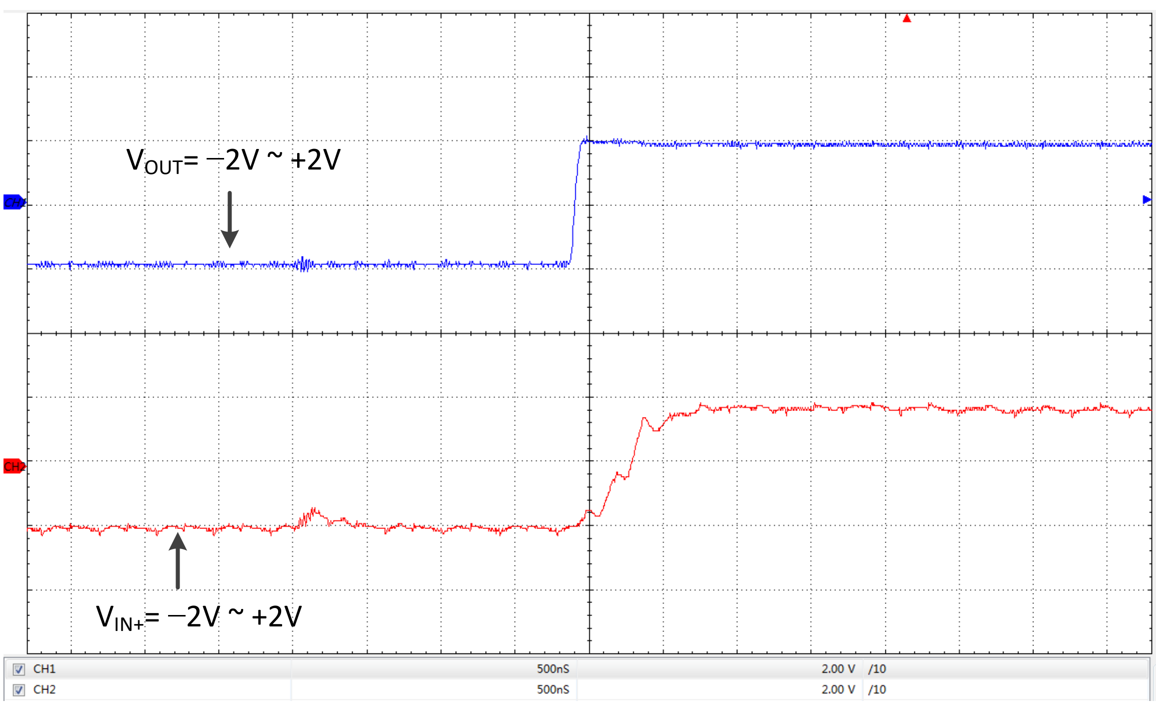


Figure 4. Rise time @ $V_{IN+}$ = −2V ~ +2V



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2. Connect pin FB and pin IN−. Provide a −5V ~ +5V voltage to pin IN+. The rise time = 1μs.

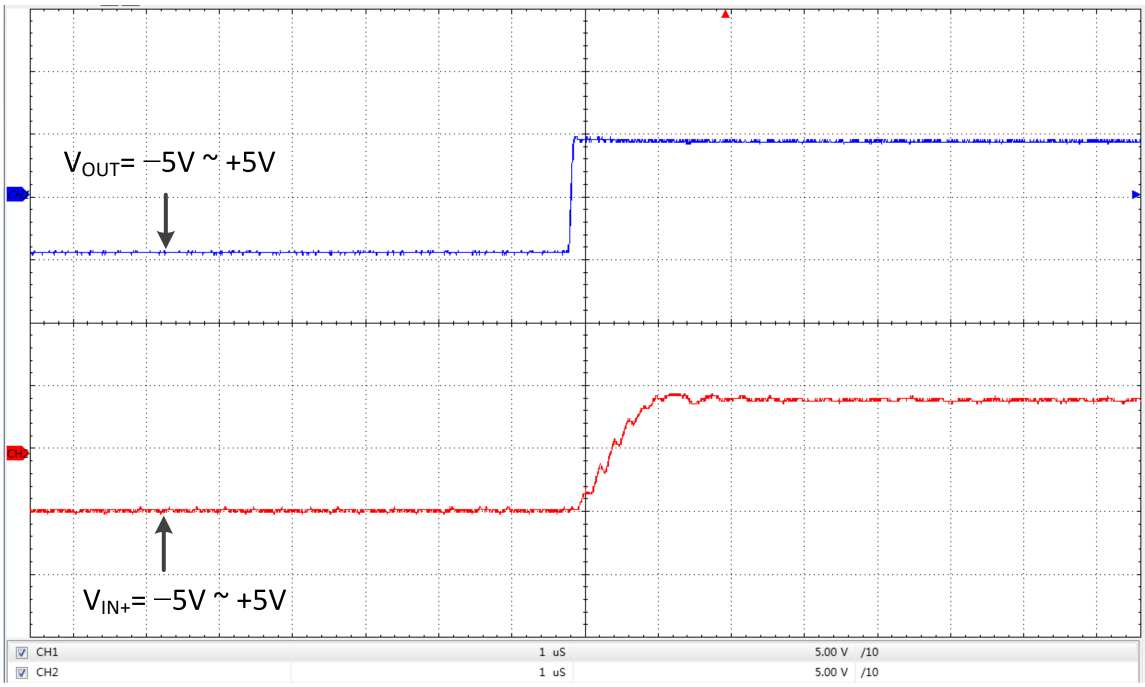


Figure 5. Rise time @ $V_{IN+}$ = −5V ~ +5V

3. Connect pin FB and pin IN−. Provide a −5V ~ +5V voltage to pin IN+. The Frequency f = 500kHz.

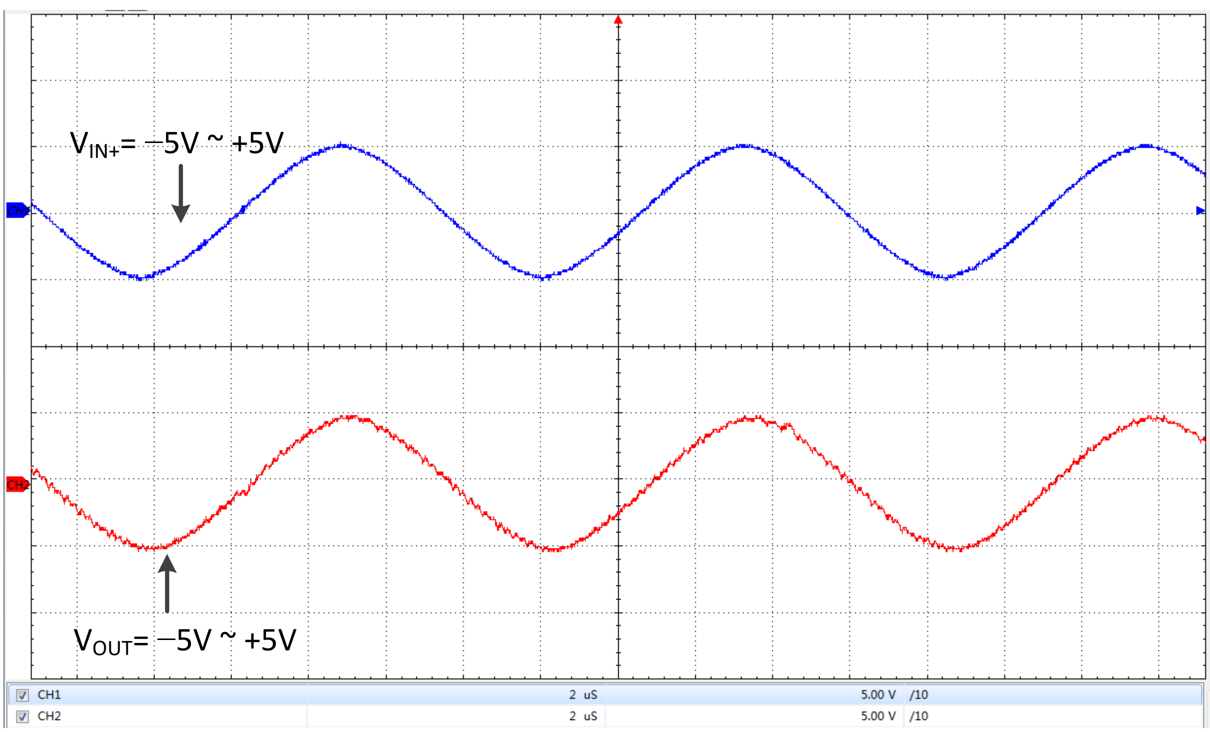


Figure 6. Frequency @ $V_{IN+}$ = −5V ~ +5V



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4. Connect pin FB and pin IN−. Provide a −5V ~ +5V voltage to pin IN+. The Frequency f = 50Hz.

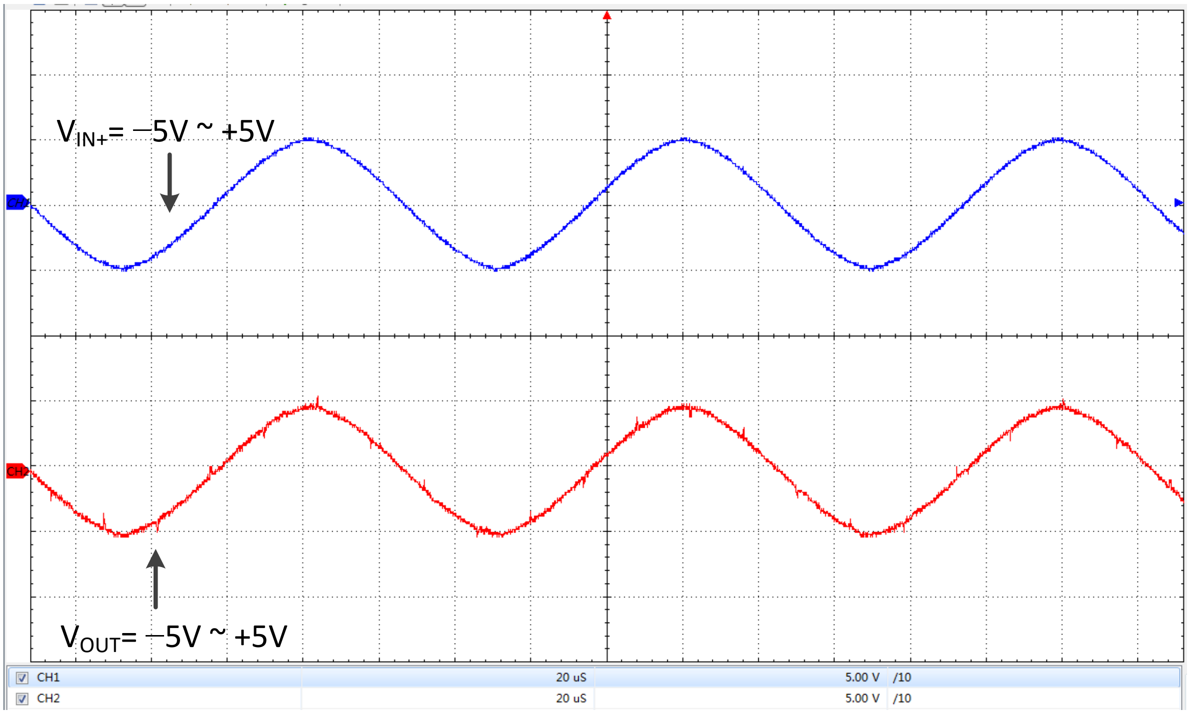


Figure 7. Frequency @ $V_{IN+}$ = −5V ~ +5V

5. Connect pin FB and pin IN−. Provide a −5V ~ +5V voltage to pin IN+. The Frequency f = 100Hz.

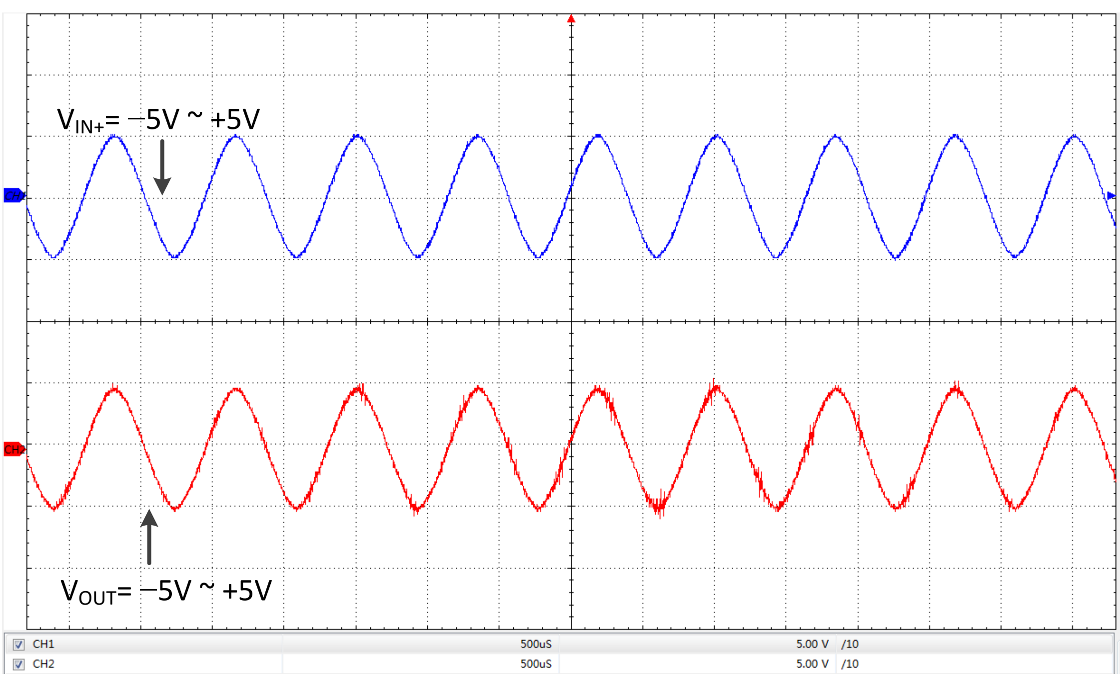


Figure 8. Frequency @ $V_{IN+}$ = −5V ~ +5V



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## NONLINEARITY

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

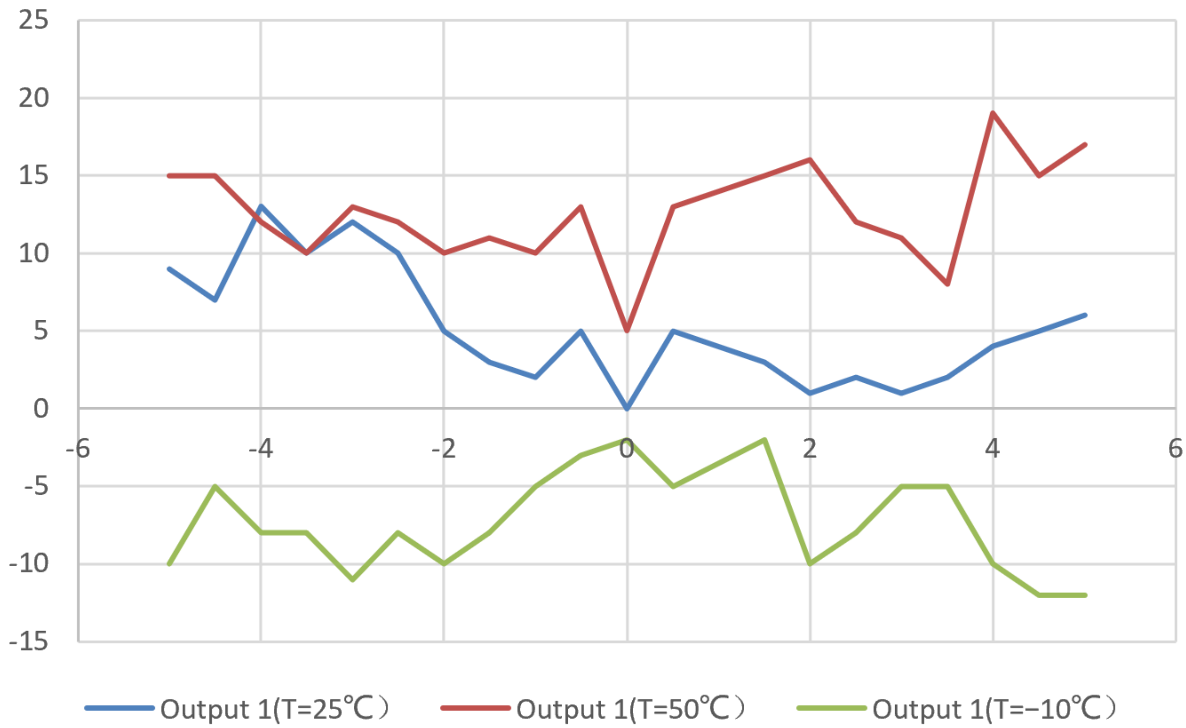


Figure 9. Nonlinearity



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## MECHANICAL DIMENSIONS

The dimensions of AD202JNATI in DIP package are shown in Figure 10.1.

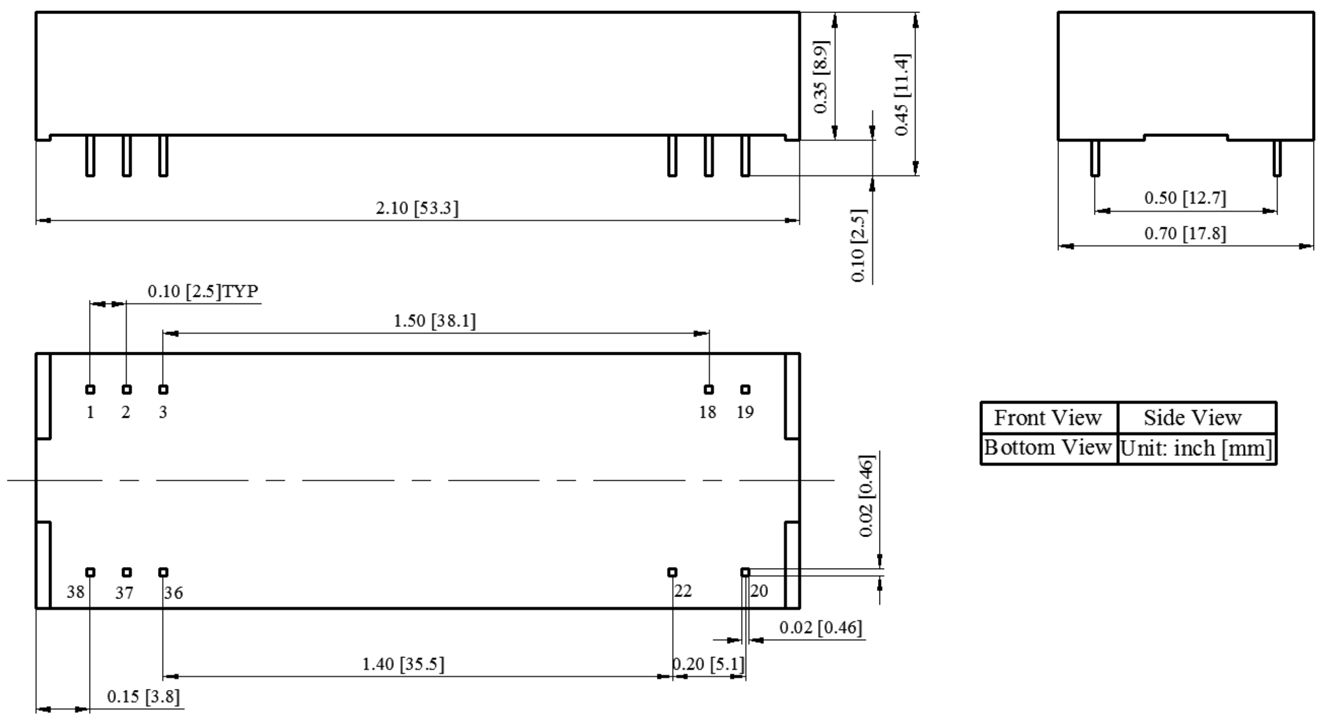


Figure 10.1. Dimensions of AD202JNATI & AD202KNATI DIP Package

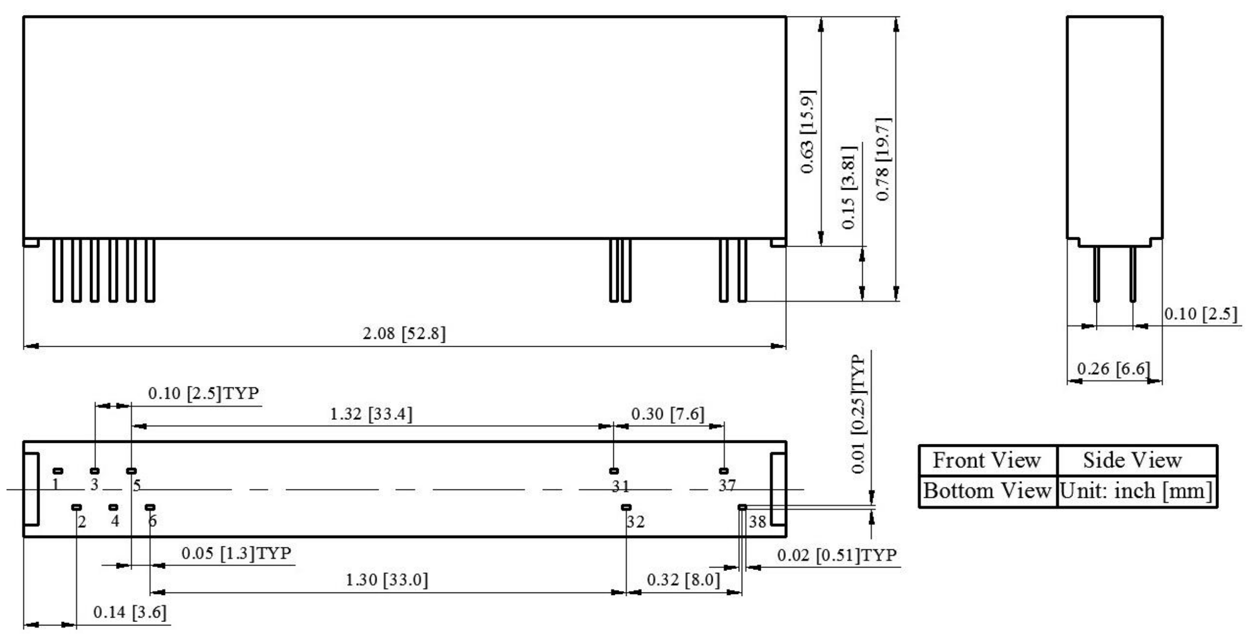


Figure 10.2. Dimensions of AD202JYATI & AD202KYATI SIP Package



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