SELECTION GUIDE

Part #	Description	Package	Status	Output Voltage vs. Power Supply	Bandwidth	Linearity	Max Common-Mode Voltage	Power Supply Current	Rise Time t_r
AD210ANATI ↙ 2500V ↘ DIP	Upgraded replacement for AD210AN	DIP	**In production**	Isolated	500kHz	±0.025%	2500V	30mA	1µs
AD210AN	-	DIP	**Stop production**	Isolated	20kHz	±0.025%	2500V	50mA	3µs
AD210BNATI ↙ 2500V ↘ DIP	Upgraded replacement for AD210BN	DIP	**In production**	Isolated	500kHz	±0.025%	2500V	30mA	1µs
AD210BN	-	DIP	**Stop production**	Isolated	20kHz	±0.012%	2500V	50mA	3µs
AD210JNATI ↙ 1500V ↘ DIP	Upgraded replacement for AD210JN	DIP	**In production**	Isolated	500kHz	±0.025%	1500V	30mA	1µs
AD210JN	-	DIP	**Stop production**	Isolated	20kHz	±0.025%	1500V	50mA	3µs



Figure 1. Photo of AD210ANATI



Figure 2. Photo of AD210BNATI

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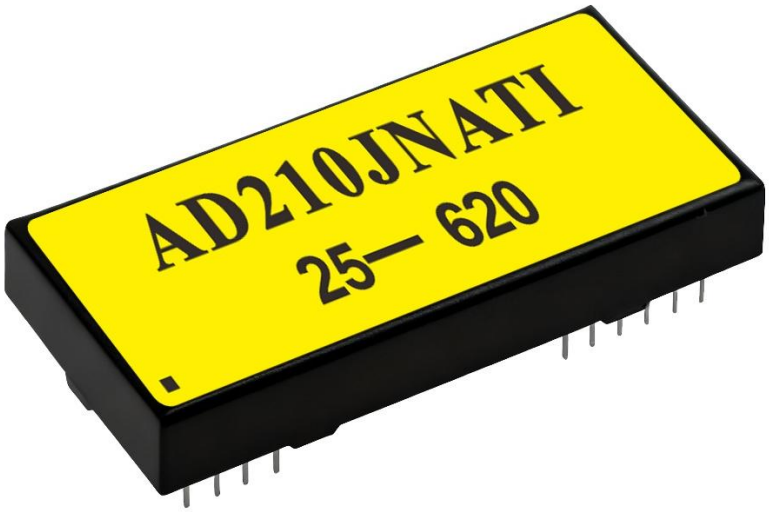


Figure 3. Photo of AD210JNATI

FEATURES

- High CMV Isolation: 2500V rms Continuous
  ±3500V Peak Continuous
- 3-Port Isolation: Input, Output, and Power
- Small Size: 1.00" × 2.10" × 0.350"
- Wide Bandwidth: 500kHz Full-Power (–3dB)
- Low Gain Drift: 625 ppm/°C Max
- High CMR: 120dB (Gain = 100V/V)
- High Accuracy: ±0.025% Max Nonlinearity
- Isolated Power: ±12.8V @ ±5mA
- Uncommitted Input Amplifier

APPLICATIONS

- Multichannel Data Acquisition
- High Voltage Instrumentation Amplifier
- Current Shunt Measurements
- Process Signal Isolation

Upgraded Drop-in Replacement for AD210

We guarantee production for ≥10 years.

DESCRIPTION

The AD210ATI is the latest addition to a new generation of affordable, high-performance isolation amplifiers. This three-port, wide-bandwidth amplifier is built using surface-mounted components in an automated assembly process. By combining advanced design expertise with cutting-edge manufacturing technology, the AD210ATI delivers a highly compact, cost-effective isolator with performance and user features that far exceed those of more expensive alternatives.

The AD210ATI provides complete isolation, with both signal and power isolation achieved through internal transformer coupling. Its fully integrated design, powered by a single +15V supply, eliminates the need for an external DC/DC converter, a common requirement for optically coupled isolation devices. The true three-port design allows the AD210ATI to function as both an input and output isolator, making it ideal for single or multi-channel applications. It maintains superior performance even under sustained common-mode stress.

Offering high accuracy and full galvanic isolation, the AD210ATI effectively breaks ground loops and leakage paths, while rejecting common-mode voltage and noise that could otherwise compromise measurement accuracy. Additionally, the AD210ATI provides robust protection against fault conditions that could potentially damage other components in a measurement system.

PRODUCT HIGHLIGHTS

The AD210ATI is a fully-featured isolator offering a wide range of user benefits, including:

High Common-Mode Performance: The AD210ATI provides 2500V rms (continuous) and ±3500V peak (continuous) isolation between any two ports. With a low input capacitance of 5pF, it achieves a 120dB Common-Mode Rejection (CMR) at a gain of 100, while maintaining a low leakage current (2µA rms max at 240V rms, 60Hz).

High Accuracy: With a maximum nonlinearity of ±0.025% (B grade), a gain drift of ±25ppm/°C max, and input offset drift of (±10 ±30/G) µV/°C, the AD210ATI ensures signal

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integrity while providing superior isolation performance.

Wide Bandwidth: The AD210ATI offers a full-power bandwidth of 500kHz, making it ideal for wideband signals. It is especially useful in applications like control loops, where limited bandwidth could lead to instability.

Compact Size: Housed in a small 1.00" × 2.10" × 0.350" DIP package, the AD210ATI provides a complete isolation function in a space-saving form factor. Its low-profile design fits in 0.5" card racks and assemblies, with an optimized pinout to ease board layout while ensuring adequate isolation spacing between ports.

Three-Port Design: The AD210ATI's three-port structure ensures that the input, output, and power ports remain independent. This design enables the AD210ATI to function as either an input or output isolator and provides additional system protection in case of a power source fault.

Isolated Power: ±12.8V at 5mA is available at both the input and output sections, enabling the AD210ATI to power floating signal conditioners, front-end amplifiers, remote transducers, and other circuitry.

Flexible Input: The AD210ATI features an uncommitted operational amplifier at the input, providing buffering and gain as needed. This allows for flexibility in supporting a variety of input functions based on user requirements.

INSIDE THE AD210ATI

The basic block diagram of the AD210ATI is shown in Figure 1. A +15V supply is connected to the power port, while ±12.8V isolated power is provided to both the input and output ports via a 2.5MHz carrier frequency.

The uncommitted input amplifier can be used to provide gain or buffering for the input signals to the AD210. The full-wave modulator converts the signal to the carrier frequency, which is then applied to transformer T1. The synchronous demodulator in the output port reconstructs the input signal.

FUNCTIONAL BLOCK DIAGRAM

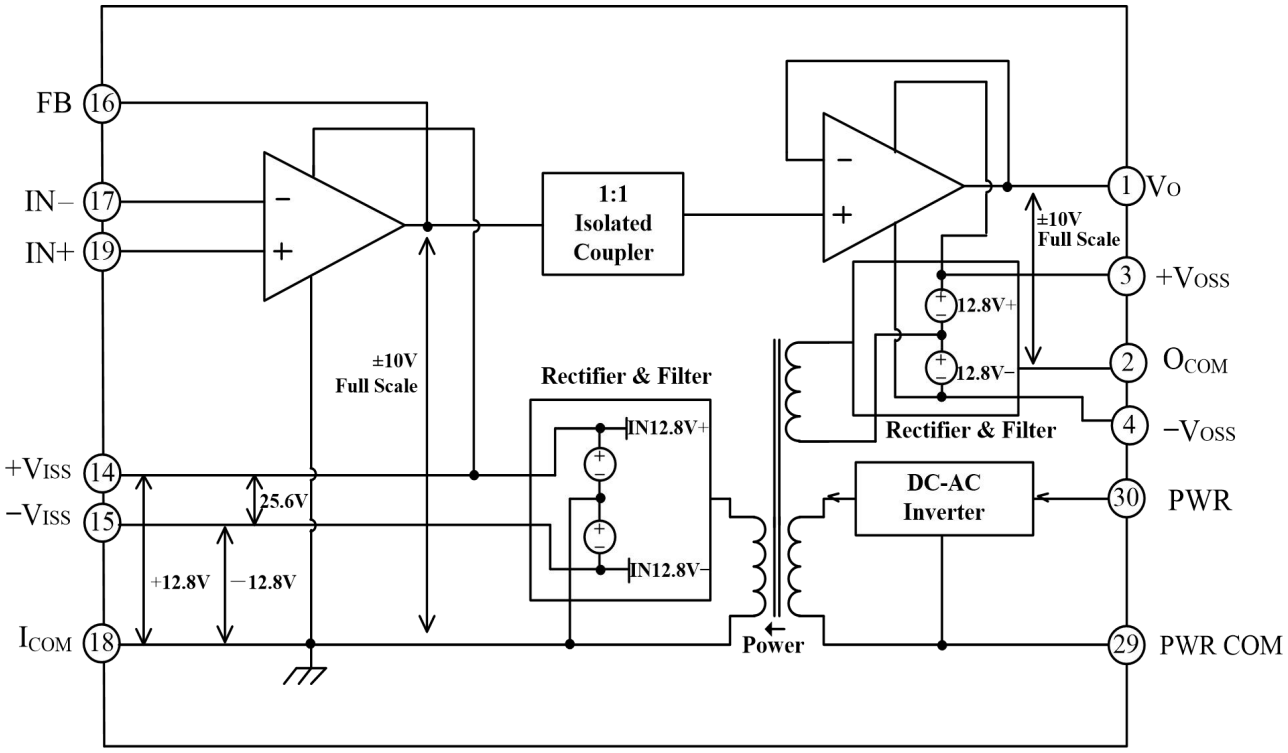


Figure 4. AD210ATI Functional Block Diagram

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PIN DESIGNATIONS

Pin #	Pin Name	Function Description
1	V_O	Output
2	O_{COM}	Output Common
3	$+V_{OSS}$	+Isolated Power @ Output
4	$-V_{OSS}$	−Isolated Power @ Output
14	$+V_{ISS}$	+Isolated Power @ Input
15	$-V_{ISS}$	−Isolated Power @ Input
16	FB	Input Feedback
17	−IN	−Input
18	I_{COM}	Input Common
19	+IN	+Input
29	Pwr Com	Power Common
30	Pwr	Power Input

SPECIFICATIONS

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

Model	AD210ANATI	AD210BNATI	AD210JNATI
GAIN			*
Range	1V/V–100 V/V	*	*
Error	±2% max	±1% max	*
vs. Temperature (0°C to +70°C)	±25ppm/°C max	*	*
(–25°C to +85°C)	±50ppm/°C max	*	*
vs. Supply Voltage	±0.002%/V	*	*
Nonlinearity	±0.025% max	*	*
INPUT VOLTAGE RATINGS			
Linear Differential Range	±10V	*	*
Maximum Safe Differential Input	±12.8V	*	*
Max. CMV Input-to-Output	*		
AC, 60Hz, Continuous	2500Vrms	*	1500Vrms
DC Continuous	±3500V Peak	*	±2000V Peak
CMRR (Common-Mode Rejection	*		
Ratio)	*		
60 Hz, G = 100 V/V,	−120dB	*	*
RS ≤ 500 Ω Impedance Imbalance			
Leakage Current Input to Output	*		
@ 240Vrms, 60 Hz	2µA rms max	*	*
INPUT IMPEDANCE			
Differential	$10^{12}\Omega$	*	*
Common-Mode	5GΩ‖5pF	*	*
INPUT BIAS CURRENT			
Initial, @ 25°C	30pA typ (400pA max)	*	*
vs. Temperature (0°C to 70°C)	10nA max	*	*
(–25°C to +85°C)	30nA max	*	*
INPUT DIFFERENCE CURRENT			
Initial, @ 25°C	5pA (200pA max)	*	*
vs. Temperature (0°C to 70°C)	2nA max	*	*
(–25°C to +85°C)	10nA max	*	*

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Model	AD210ANATI	AD210BNATI	AD210JNATI
INPUT NOISE			
Voltage (1kHz)	18nV/√Hz	*	*
(1kHz to 10kHz)	4µV rms	*	*
Current (1kHz)	0.01pA/√Hz	*	*
FREQUENCY RESPONSE			
Bandwidth (–3dB)			
G = 1V/V	500kHz	*	*
G = 100V/V	300kHz	*	*
Settling Time, to ±10mV (200V Step)			
G = 1V/V	10µs	*	*
G = 100V/V	35µs	*	*
Slew Rate (G = 1V/V)	10V/µs	*	*
OFFSET VOLTAGE (RTI)			
Initial, @ 25°C	(±5 ±45/G) mV max	(±5 ±15/G) mV max	*
vs. Temperature (0°C to 70°C)	(±10 ±30G) µV/°C	*	*
(–25°C to +85°C)	(±10 ±50G) µV/°C	*	*
RATED OUTPUT			
Voltage, 2 kΩ Load	±10V min	*	*
Impedance	1Ω max	*	*
Output Ripple, 100kHz Bandwidth	$10mV_{P-P}$ max	*	*
ISOLATED POWER OUTPUT			
Voltage, No Load	±11.5V	*	*
Accuracy	±10%	*	*
Current	±5mA	*	*
Regulation, No Load to Full Load	See Text	*	*
Ripple	See Text	*	*
POWER SUPPLY			
Voltage, Rated Performance	15V±5%	*	*
Voltage, Operating	15V±10%	*	*
Current, Quiescent	30mA	*	*
Current, Full Load – Full Signal	80mA	*	*
TEMPERATURE RANGE			
Rated Performance	−25°C to +85°C	*	*
Operating	−40°C to +85°C	*	*
Storage	−40°C to +85°C	*	*
PACKAGE DIMENSIONS			
Inches	1.00 × 2.10 × 0.350	*	*
Millimeters	25.4 × 53.3 × 8.9	*	*

NOTES

***Specifications same as AD210ANATI.**

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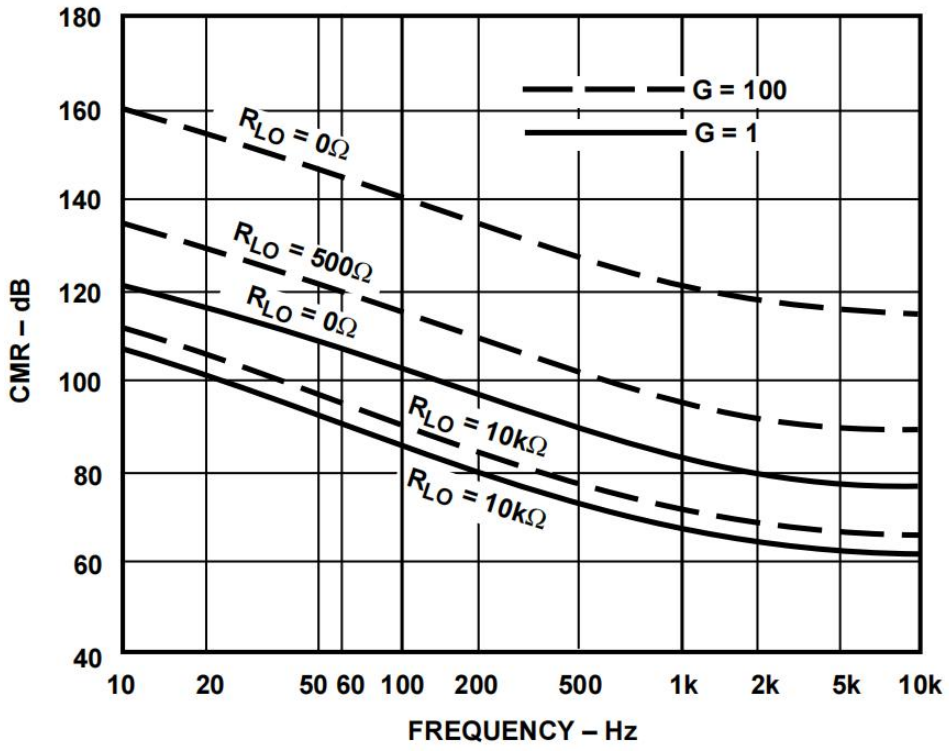


Figure 5. Common-Mode Rejection vs. Frequency

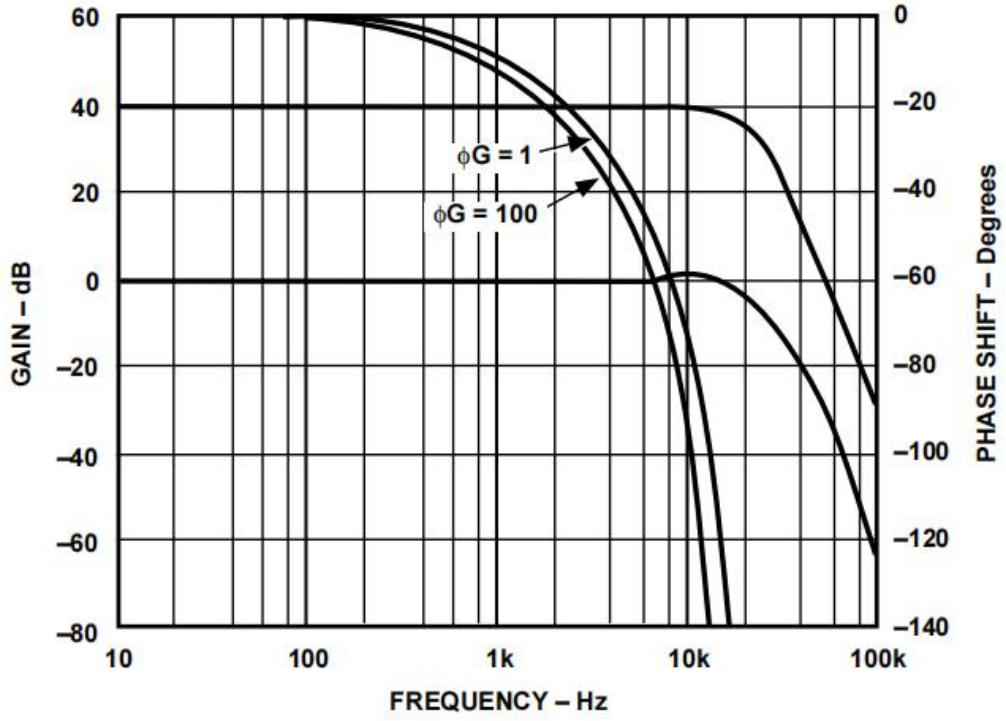


Figure 6. Phase Shift and Gain vs. Frequency

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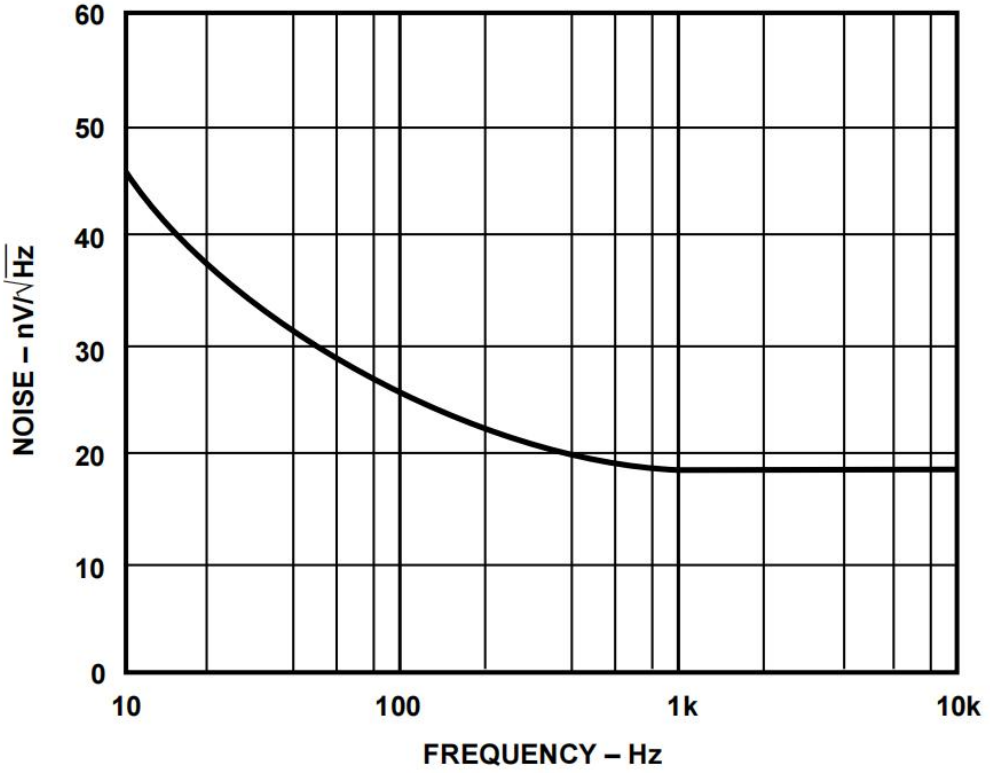


Figure 7. Input Noise vs. Frequency

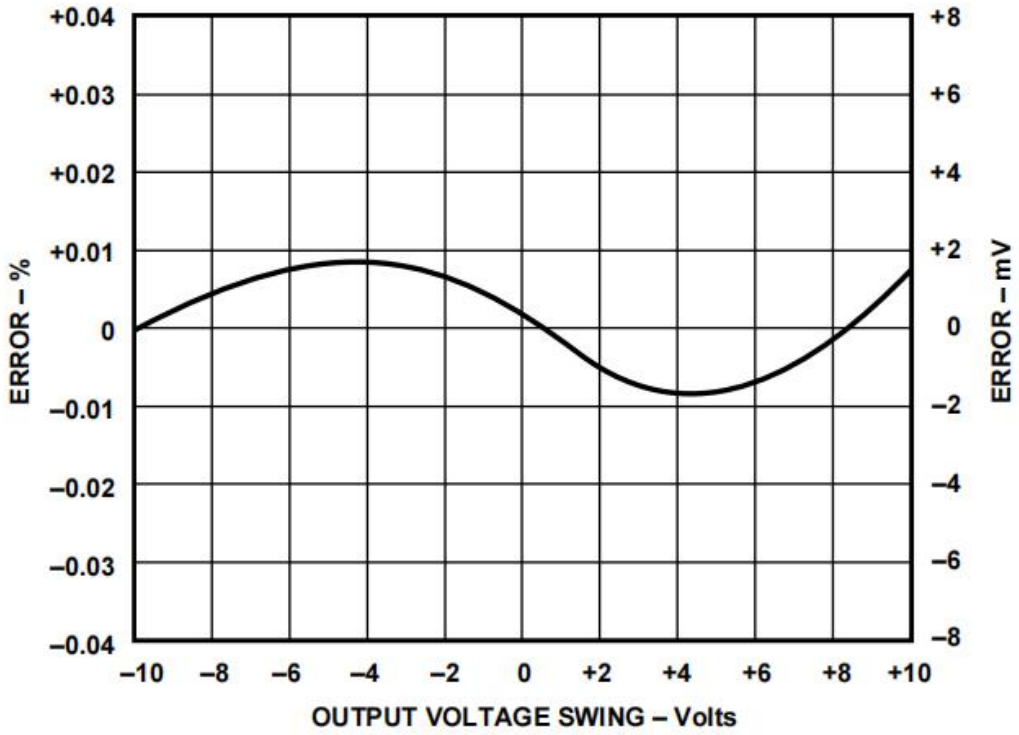


Figure 8. Gain Nonlinearity Error vs. Output

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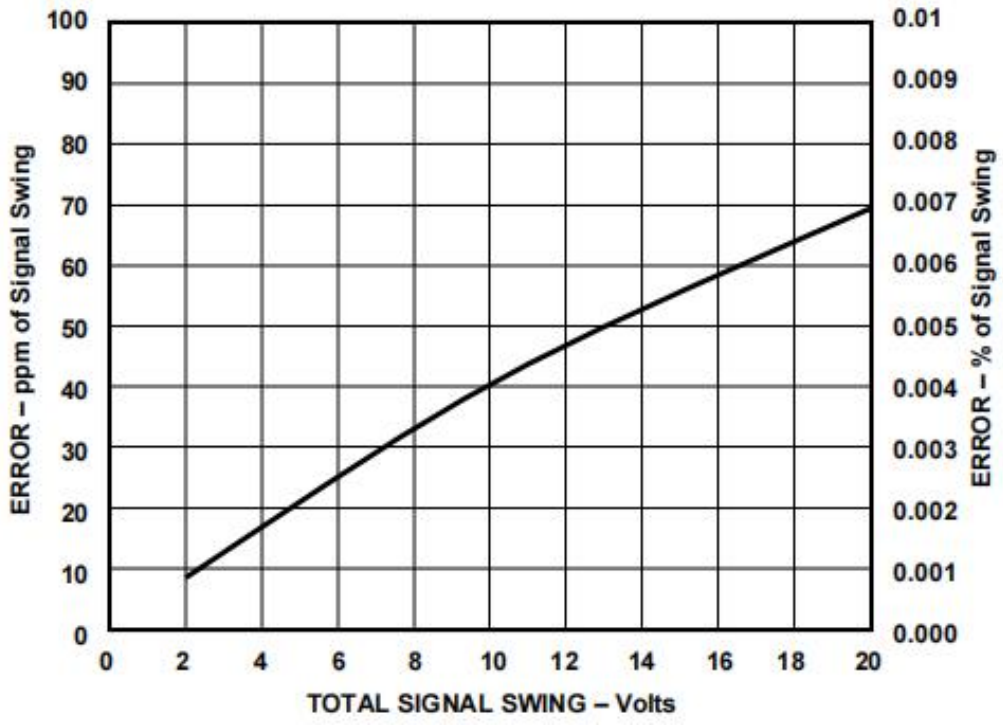


Figure 9. Gain Nonlinearity vs. Output Swing

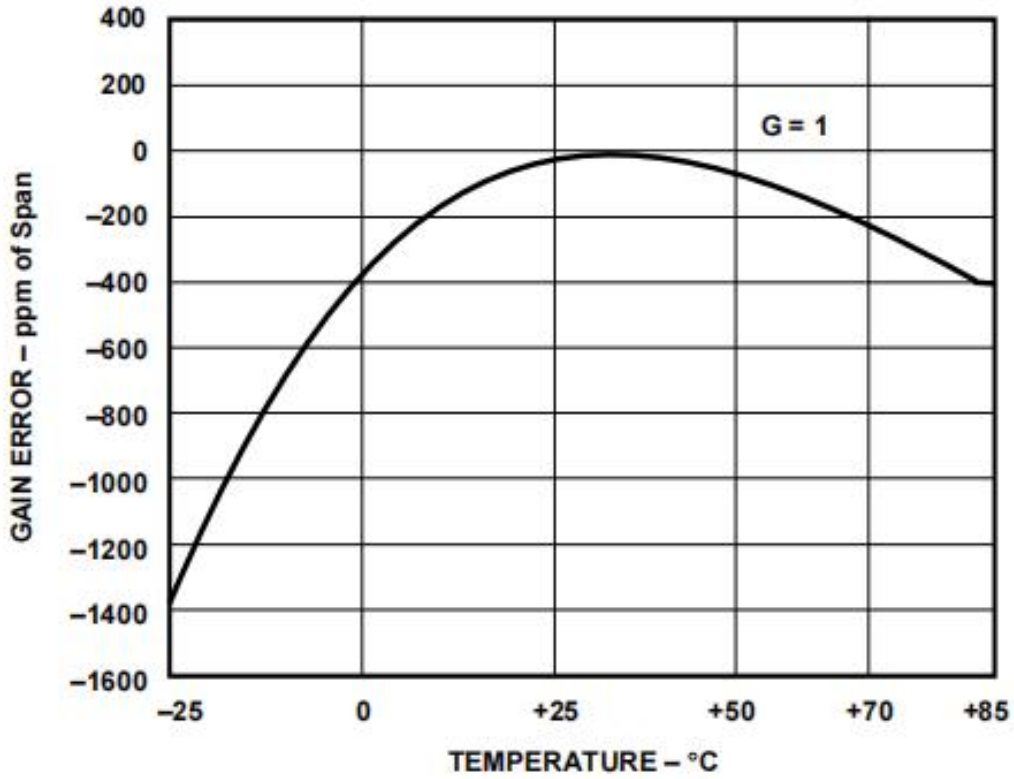


Figure 10. Gain vs. Temperature

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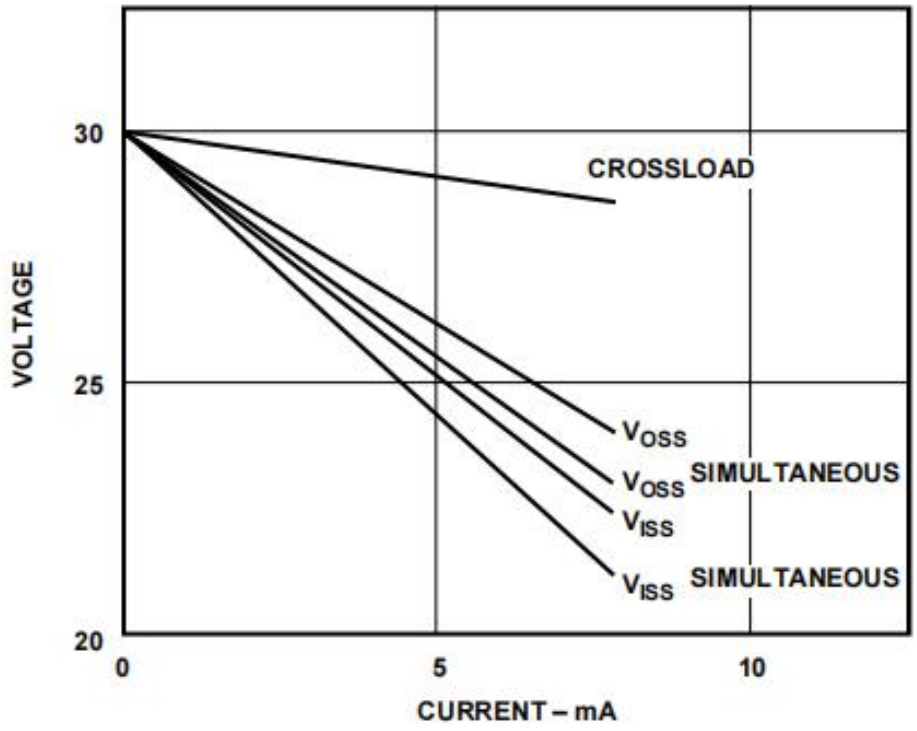


Figure 11. Isolated Power Supplies vs. Load

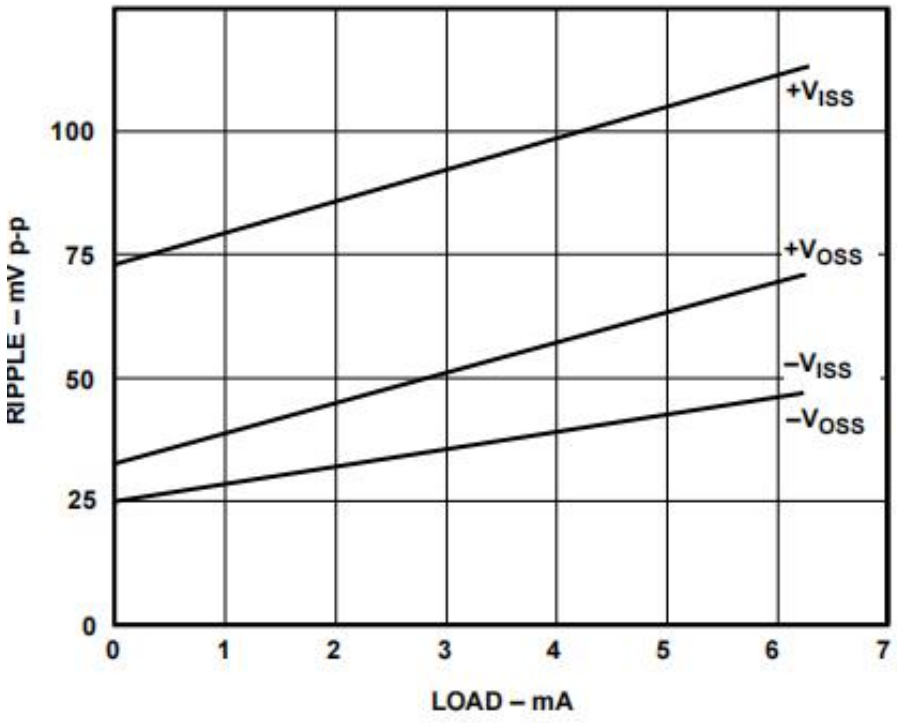


Figure 12a. Isolated Supply Ripple vs. Load

(External 4.7µF Bypass)

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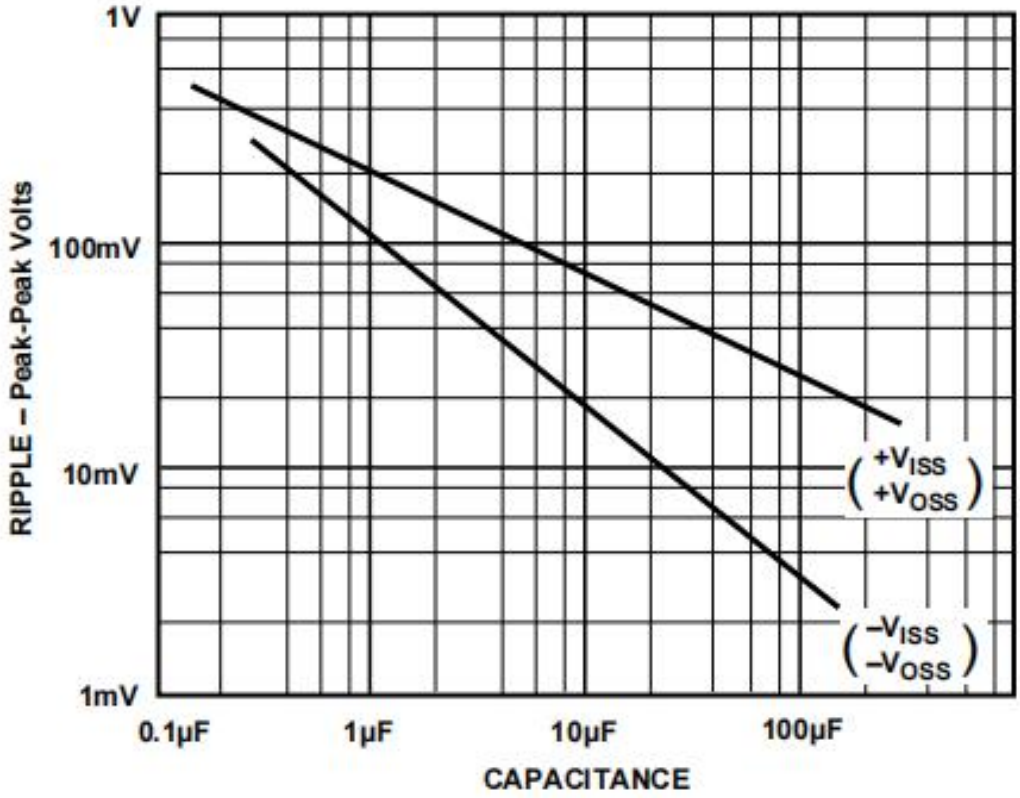


Figure 12b. Isolated Power Supply Ripple vs. Bypass

Capacitance (Volts p-p, 1MHz Bandwidth, 5mA Load)

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MECHANICAL DIMENSIONS

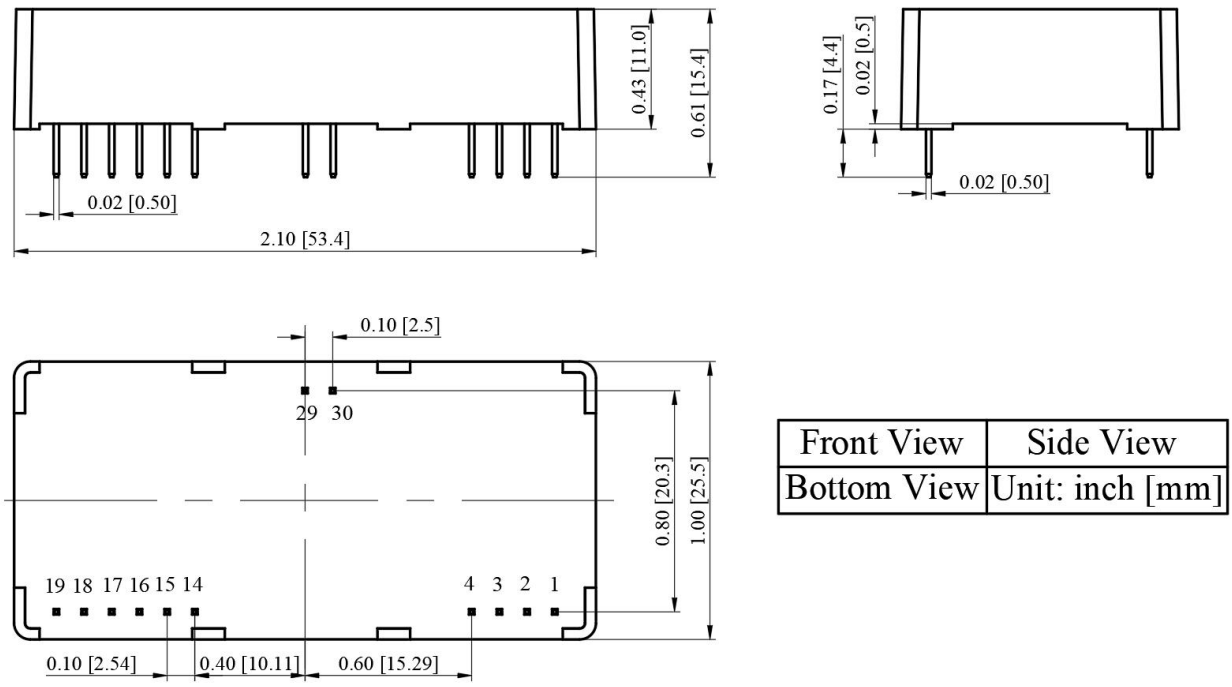


Figure 13. Dimensions of AD210ATI

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