

FEATURES

High CMV Isolation: 2500 V rms Continuous
 ± 3500 V Peak Continuous
Small Size: 1.00" \times 2.10" \times 0.350"
Three-Port Isolation: Input, Output, and Power
Low Nonlinearity: $\pm 0.012\%$ max
Wide Bandwidth: 20 kHz Full-Power (-3 dB)
Low Gain Drift: ± 25 ppm/ $^{\circ}$ C max
High CMR: 120 dB ($G = 100$ V/V)
Isolated Power: ± 15 V @ ± 5 mA
Uncommitted Input Amplifier

APPLICATIONS

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

GENERAL DESCRIPTION

The AD210 is the latest member of a new generation of low cost, high performance isolation amplifiers. This three-port, wide bandwidth isolation amplifier is manufactured with surface-mounted components in an automated assembly process. The AD210 combines design expertise with state-of-the-art manufacturing technology to produce an extremely compact and economical isolator whose performance and abundant user features far exceed those offered in more expensive devices.

The AD210 provides a complete isolation function with both signal and power isolation supplied via transformer coupling internal to the module. The AD210's functionally complete design, powered by a single $+15$ V supply, eliminates the need for an external DC/DC converter, unlike optically coupled isolation devices. The true three-port design structure permits the AD210 to be applied as an input or output isolator, in single or multichannel applications. The AD210 will maintain its high performance under sustained common-mode stress.

Providing high accuracy and complete galvanic isolation, the AD210 interrupts ground loops and leakage paths, and rejects common-mode voltage and noise that may otherwise degrade measurement accuracy. In addition, the AD210 provides protection from fault conditions that may cause damage to other sections of a measurement system.

PRODUCT HIGHLIGHTS

The AD210 is a full-featured isolator providing numerous user benefits including:

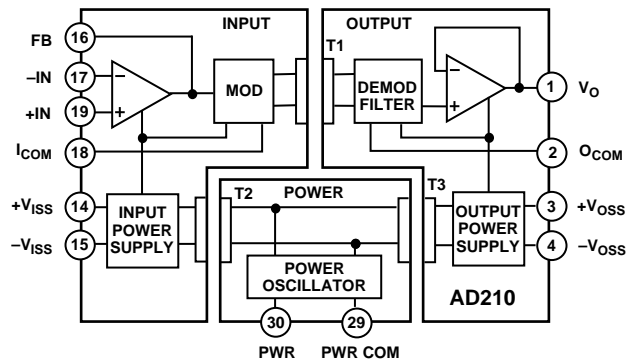
High Common-Mode Performance: The AD210 provides 2500 V rms (Continuous) and ± 3500 V peak (Continuous) common-

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REV. A

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FUNCTIONAL BLOCK DIAGRAM



mode voltage isolation between any two ports. Low input capacitance of 5 pF results in a 120 dB CMR at a gain of 100, and a low leakage current (2 μ A rms max @ 240 V rms, 60 Hz).

High Accuracy: With maximum nonlinearity of $\pm 0.012\%$ (B Grade), gain drift of ± 25 ppm/ $^{\circ}$ C max and input offset drift of ($\pm 10 \pm 30/G$) μ V/ $^{\circ}$ C, the AD210 assures signal integrity while providing high level isolation.

Wide Bandwidth: The AD210's full-power bandwidth of 20 kHz makes it useful for wideband signals. It is also effective in applications like control loops, where limited bandwidth could result in instability.

Small Size: The AD210 provides a complete isolation function in a small DIP package just 1.00" \times 2.10" \times 0.350". The low profile DIP package allows application in 0.5" card racks and assemblies. The pinout is optimized to facilitate board layout while maintaining isolation spacing between ports.

Three-Port Design: The AD210's three-port design structure allows each port (Input, Output, and Power) to remain independent. This three-port design permits the AD210 to be used as an input or output isolator. It also provides additional system protection should a fault occur in the power source.

Isolated Power: ± 15 V @ 5 mA is available at the input and output sections of the isolator. This feature permits the AD210 to excite floating signal conditioners, front-end amplifiers and remote transducers at the input as well as other circuitry at the output.

Flexible Input: An uncommitted operational amplifier is provided at the input. This amplifier provides buffering and gain as required and facilitates many alternative input functions as required by the user.

AD210—SPECIFICATIONS (typical @ +25°C, and $V_S = +15$ V unless otherwise noted)

Model	AD210AN	AD210BN	AD210JN
GAIN			
Range	1 V/V – 100 V/V	*	*
Error	±2% max	±1% max	*
vs. Temperature(0°C to +70°C)	+25 ppm/°C max	*	*
(–25°C to +85°C)	±50 ppm/°C max	*	*
vs. Supply Voltage	±0.002%/V	*	*
Nonlinearity ¹	±0.025% max	±0.012% max	*
INPUT VOLTAGE RATINGS			
Linear Differential Range	±10 V	*	*
Maximum Safe Differential Input	±15 V	*	*
Max. CMV Input-to-Output	*	*	*
ac, 60 Hz, Continuous	2500 V rms	*	1500 V rms
dc, Continuous	±3500 V peak	*	±2000 V peak
Common-Mode Rejection	*	*	*
60 Hz, G = 100 V/V	*	*	*
$R_S \leq 500 \Omega$ Impedance Imbalance	120 dB	*	*
Leakage Current Input-to-Output	*	*	*
@ 240 V rms, 60 Hz	2 μ A rms max	*	*
INPUT IMPEDANCE			
Differential	$10^{12} \Omega$	*	*
Common Mode	5 G Ω 5 pF	*	*
INPUT BIAS CURRENT			
Initial, @ +25°C	30 pA typ (400 pA max)	*	*
vs. Temperature (0°C to +70°C)	10 nA max	*	*
(–25°C to +85°C)	30 nA max	*	*
INPUT DIFFERENCE CURRENT			
Initial, @ +25°C	5 pA typ (200 pA max)	*	*
vs. Temperature (0°C to +70°C)	2 nA max	*	*
(–25°C to +85°C)	10 nA max	*	*
INPUT NOISE			
Voltage (1 kHz)	18 nV/ $\sqrt{\text{Hz}}$	*	*
(10 Hz to 10 kHz)	4 μ V rms	*	*
Current (1 kHz)	0.01 pA/ $\sqrt{\text{Hz}}$	*	*
FREQUENCY RESPONSE			
Bandwidth (–3 dB)	*	*	*
G = 1 V/V	20 kHz	*	*
G = 100 V/V	15 kHz	*	*
Settling Time (± 10 mV, 20 V Step)	*	*	*
G = 1 V/V	150 μ s	*	*
G = 100 V/V	500 μ s	*	*
Slew Rate (G = 1 V/V)	1 V/ μ s	*	*
OFFSET VOLTAGE (RTI)²			
Initial, @ +25°C	±15 ± 45/G) mV max	(±5 ± 15/G) mV max	*
vs. Temperature (0°C to +70°C)	(±10 ± 30/G) μ V/°C	*	*
(–25°C to +85°C)	(±10 ± 50/G) μ V/°C	*	*
RATED OUTPUT³			
Voltage, 2 k Ω Load	±10 V min	*	*
Impedance	1 Ω max	*	*
Ripple (Bandwidth = 100 kHz)	10 mV p-p max	*	*
ISOLATED POWER OUTPUTS⁴			
Voltage, No Load	±15 V	*	*
Accuracy	±10%	*	*
Current	±5 mA	*	*
Regulation, No Load to Full Load	See Text	*	*
Ripple	See Text	*	*
POWER SUPPLY			
Voltage, Rated Performance	+15 V dc ± 5%	*	*
Voltage, Operating	+15 V dc ± 10%	*	*
Current, Quiescent	50 mA	*	*
Current, Full Load – Full Signal	80 mA	*	*
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 AD210AN.

¹Nonlinearity is specified as a % deviation from a best straight line..

²RTI – Referred to Input.

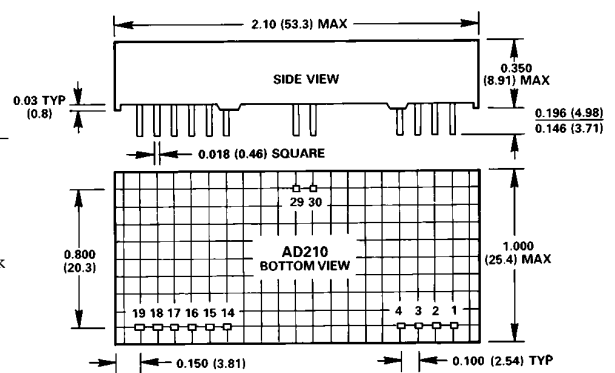
³A reduced signal swing is recommended when both $\pm V_{ISS}$ and $\pm V_{OSS}$ supplies are fully loaded, due to supply voltage reduction.

⁴See text for detailed information.

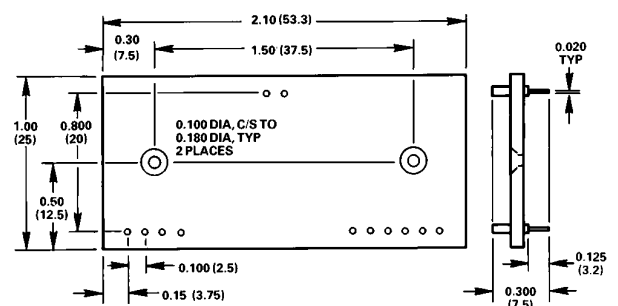
Specifications subject to change without notice.

OUTLINE DIMENSIONS

Dimensions shown in inches and (mm).



AC1059 MATING SOCKET



AD210 PIN DESIGNATIONS

Pin	Designation	Function
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



CAUTION

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Although the AD210 features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.