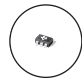


Voltage Output, High or Low Side Measurement, Bi-Directional Zerø-Drift Series CURRENT SHUNT MONITOR

FEATURES

- **WIDE COMMON-MODE RANGE: –0.3V to 26V**
- **OFFSET VOLTAGE: ±35µV (Max, INA210) (Enables shunt drops of 10mV full-scale)**
- **ACCURACY**
  - **±1% Gain Error (Max over temperature)**
  - **0.5µV/°C Offset Drift (Max)**
  - **10ppm/°C Gain Drift (Max)**
- **CHOICE OF GAINS:**
  - **INA210: 200V/V**
  - **INA211: 500V/V**
  - **INA212: 1000V/V**
  - **INA213: 50V/V**
  - **INA214: 100V/V**
- **QUIESCENT CURRENT: 100µA (max)**
- **SC70 PACKAGE**

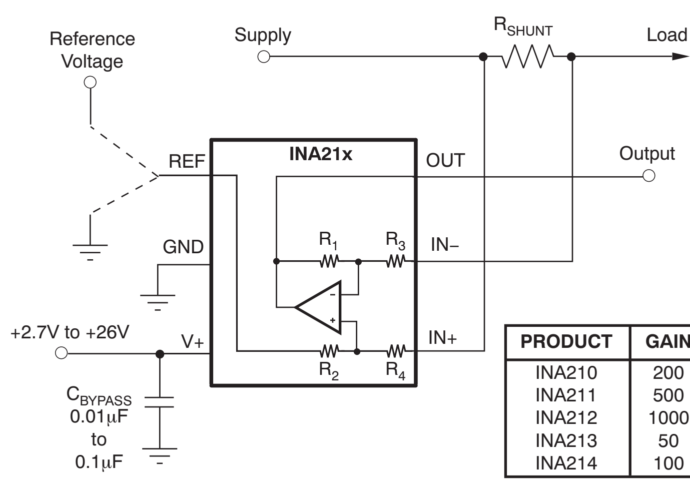
APPLICATIONS

- **NOTEBOOK COMPUTERS**
- **CELL PHONES**
- **TELECOM EQUIPMENT**
- **POWER MANAGEMENT**
- **BATTERY CHARGERS**
- **WELDING EQUIPMENT**

DESCRIPTION

The INA210, INA211, INA212, INA213, and INA214 are voltage output current shunt monitors that can sense drops across shunts at common-mode voltages from –0.3V to 26V, independent of the supply voltage. Five fixed gains are available: 50V/V, 100V/V, 200V/V, 500V/V, or 1000V/V. The low offset of the Zerø-Drift architecture enables current sensing with maximum drops across the shunt as low as 10mV full-scale.

These devices operate from a single +2.7V to +26V power supply, drawing a maximum of 100µA of supply current. All versions are specified over the extended operating temperature range (–40°C to +125°C), and offered in an SC70 package.



PRODUCT	GAIN	R_3 and R_4	R_1 and R_2
INA210	200	5kΩ	1MΩ
INA211	500	2kΩ	1MΩ
INA212	1000	1kΩ	1MΩ
INA213	50	20kΩ	1MΩ
INA214	100	10kΩ	1MΩ

This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

PACKAGE/ORDERING INFORMATION(1)

PRODUCT	GAIN	PACKAGE	PACKAGE DESIGNATOR	PACKAGE MARKING
INA210	200V/V	SC70-6	DCK	CET
INA211	500V/V	SC70-6	DCK	CEU
INA212	1000V/V	SC70-6	DCK	CEV
INA213	50V	SC70-6	DCK	CFT
INA214	100V/V	SC70-6	DCK	CFV

(1) For the most current package and ordering information, see the Package Option Addendum located at the end of this data sheet, or refer to our web site at www.ti.com.

ABSOLUTE MAXIMUM RATINGS(1)

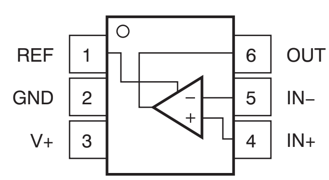
Over operating free-air temperature range, unless otherwise noted.

		INA210, INA211, INA212, INA213, INA214	UNIT
Supply Voltage		+26	V
Analog Inputs, V_{IN+}, V_{IN-} (2)	Differential (V_{IN+})–(V_{IN-})	–26 to +26	V
	Common-Mode (3)	GND–0.3 to +26	V
REF Input		GND–0.3 to (V+)+0.3	V
Output(3)		GND–0.3 to (V+)+0.3	V
Input Current into Any Pin(3)		5	mA
Operating Temperature		–55 to +150	°C
Storage Temperature		–65 to +150	°C
Junction Temperature		+150	°C
ESD Ratings:	Human Body Model (HBM)	4000	V
	Charged-Device Model (CDM)	1000	V
	Machine Model (MM)	200	V

(1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those specified is not implied.
(2) V_{IN+} and V_{IN-} are the voltages at the IN+ and IN– pins, respectively.
(3) Input Voltage at any pin may exceed the voltage shown if the current at that pin is limited to 5mA.

PIN CONFIGURATION

DCK PACKAGE
SC70-6
(TOP VIEW)



ELECTRICAL CHARACTERISTICS

Boldface limits apply over the specified temperature range, **T_A = –40°C to +125°C.**
At T_A = +25°C, $V_{SENSE} = V_{IN+} – V_{IN–}$.
INA210, INA213 and INA214: V_S = +5V, V_{IN+} = 12V, $V_{REF} = V_S/2$, unless otherwise noted.
INA211 and INA212: V_S = +12V, V_{IN+} = 12V, $V_{REF} = V_S/2$, unless otherwise noted.

PARAMETER		CONDITIONS	INA210, INA211, INA212, INA213, INA214			UNIT
			MIN	TYP	MAX	
INPUT						
Common-Mode Input Range	**V_{CM}**		**-0.3**		**26**	**V**
Common-Mode Rejection	**CMR**	**V_{IN+} = 0V to +26V, V_{SENSE} = 0mV**				
INA210, INA211, INA212, INA214			**105**	**140**		**dB**
INA213			**100**	**120**		**dB**
Offset Voltage, RTI(1)	V_{OS}	V_{SENSE} = 0mV				
INA210, INA211, INA212				±0.55	±35	μV
INA213				±5	±100	μV
INA214				±1	±60	μV
vs Temperature	**dV_{OS}/dT**			**0.1**	**0.5**	**μV/°C**
vs Power Supply	PSR	V_S = +2.7V to +18V, V_{IN+} = +18V, V_{SENSE} = 0mV		±0.1	±10	μV/V
Input Bias Current	I_B	V_{SENSE} = 0mV	15	28	35	μA
Input Offset Current	I_{OS}	V_{SENSE} = 0mV		±0.02		μA
OUTPUT						
Gain, INA210	G			200		V/V
INA211				500		VV
INA212				1000		V/V
INA213				50		V/V
INA214				100		V/V
Gain Error		**V_{SENSE} = –5mV to 5mV**		**±0.02**	**±1**	**%**
vs Temperature				**3**	**10**	**ppm/°C**
Nonlinearity Error		V_{SENSE} = –5mV to 5mV		±0.01		%
Maximum Capacitive Load		No sustained oscillation		1		nF
VOLTAGE OUTPUT(2)		**R_L = 10kΩ to GND**				
Swing to V+ Power Supply Rail				**(V+)-0.05**	**(V+)-0.2**	**V**
Swing to GND				**(V_{GND})+0.005**	**(V_{GND})+0.05**	**V**
FREQUENCY RESPONSE						
Bandwidth	GBW	C_{LOAD} = 10pF		14		kHz
Slew Rate	SR			0.4		V/μs
NOISE, RTI(1)						
Voltage Noise Density				25		nV/√Hz
POWER SUPPLY						
Operating Voltage Range	**V_S**		**+2.7**		**+26**	**V**
Quiescent Current	I_Q	V_{SENSE} = 0mV		65	100	μA
Over Temperature					**115**	**μA**
TEMPERATURE RANGE						
Specified Range			–40		+125	°C
Operating Range			–55		+150	°C
Thermal Resistance	θ_{JA}					
SC70				250		°C/W

(1) RTI = referred-to-input.
(2) See Typical Characteristic curve, Output Voltage Swing vs Output Current (Figure 10).

TYPICAL CHARACTERISTICS

The INA210 is used for typical characteristics at T_A = +25°C, V_S = +5V, V_{IN+} = 12V, and V_{REF} = V_S/2, unless otherwise noted.

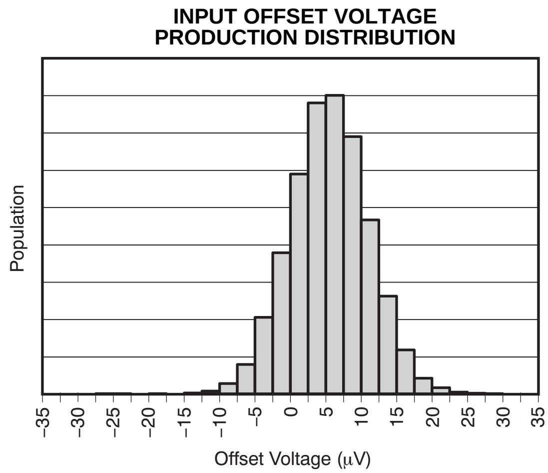


Figure 1.

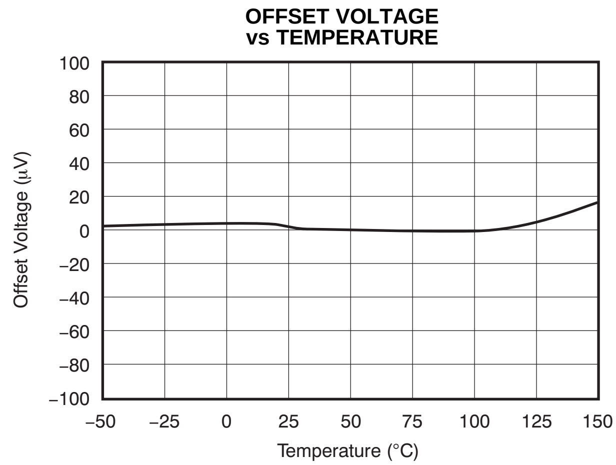


Figure 2.

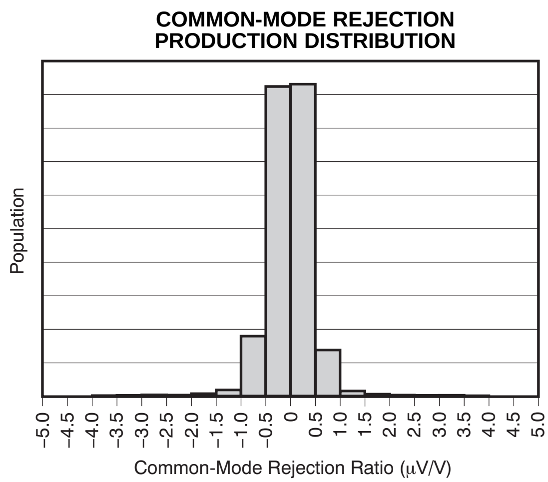


Figure 3.

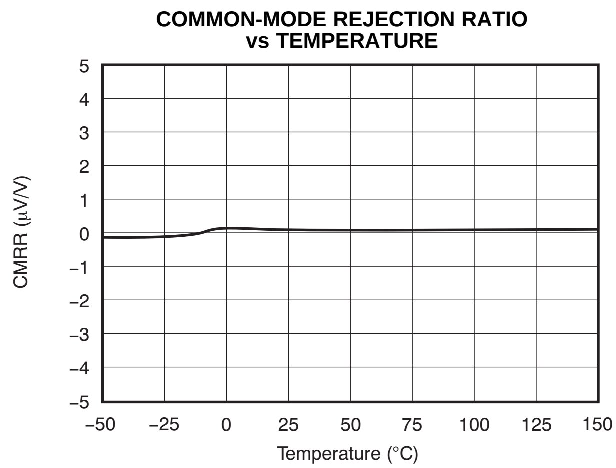


Figure 4.

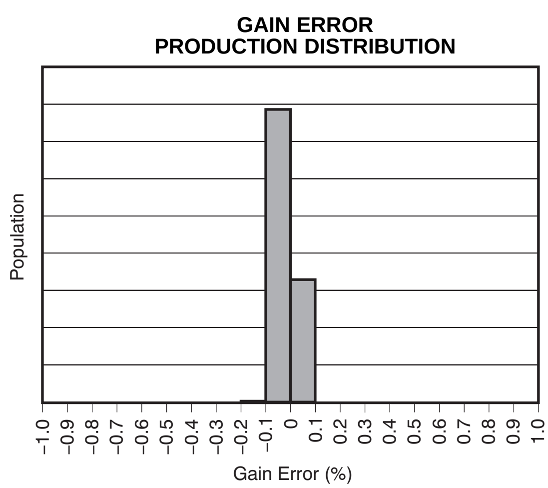


Figure 5.

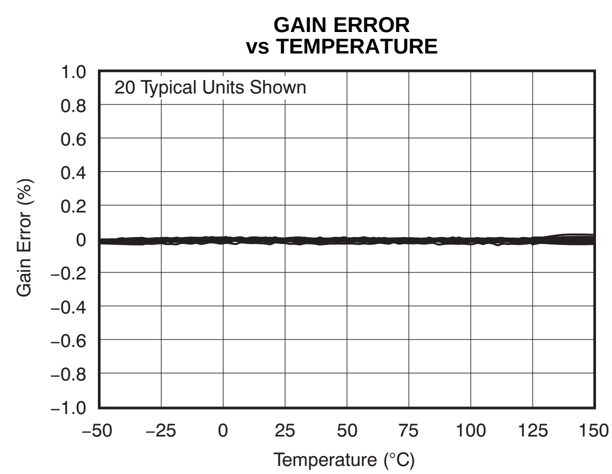


Figure 6.

TYPICAL CHARACTERISTICS (continued)

The INA210 is used for typical characteristics at T_A = +25°C, V_S = +5V, V_{IN+} = 12V, and V_{REF} = V_S/2, unless otherwise noted.

GAIN vs FREQUENCY

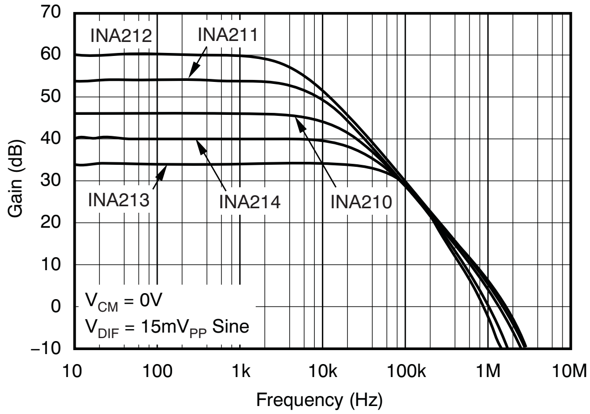


Figure 7.

POWER-SUPPLY REJECTION RATIO vs FREQUENCY

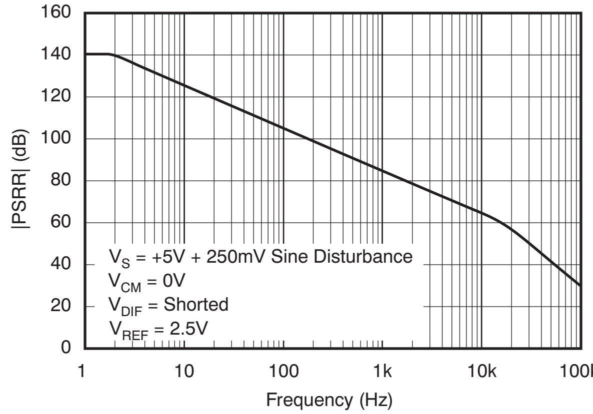


Figure 8.

COMMON-MODE REJECTION RATIO vs FREQUENCY

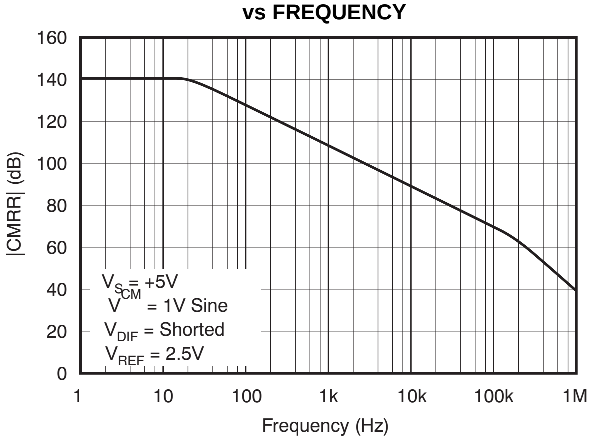


Figure 9.

OUTPUT VOLTAGE SWING vs OUTPUT CURRENT

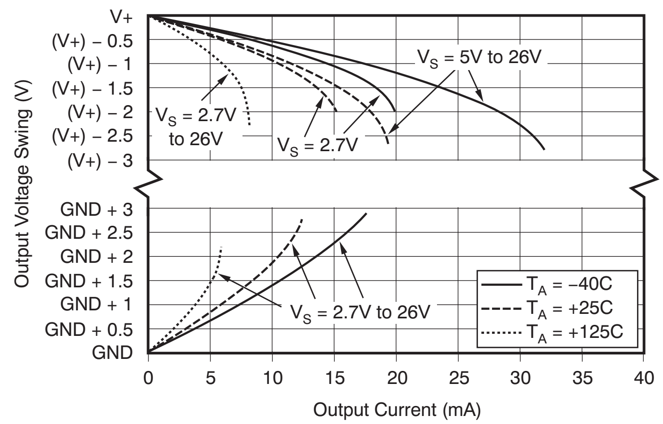


Figure 10.

INPUT BIAS CURRENT vs COMMON-MODE VOLTAGE with SUPPLY VOLTAGE = +5V

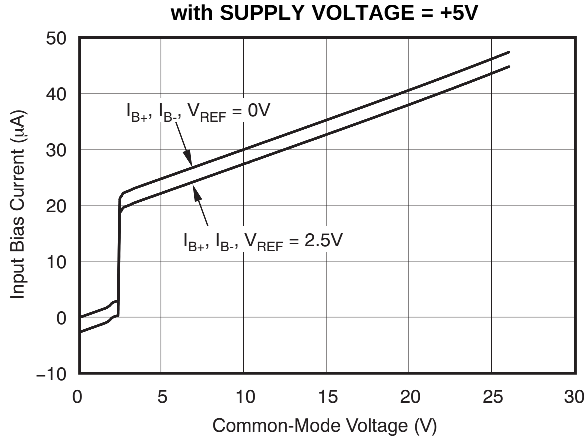


Figure 11.

INPUT BIAS CURRENT vs COMMON-MODE VOLTAGE with SUPPLY VOLTAGE = 0V (Shutdown)

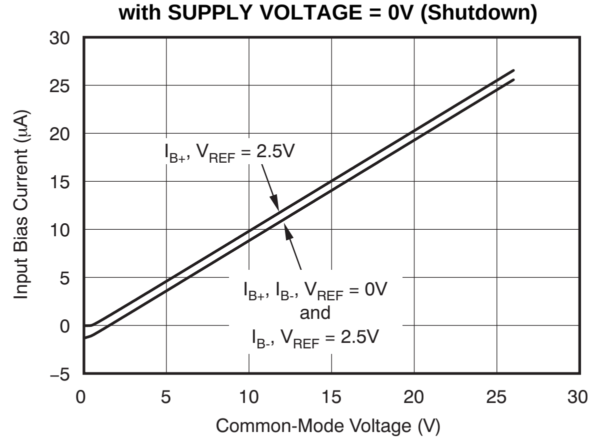


Figure 12.

TYPICAL CHARACTERISTICS (continued)

The INA210 is used for typical characteristics at T_A = +25°C, V_S = +5V, V_{IN+} = 12V, and V_{REF} = V_S/2, unless otherwise noted.

INPUT BIAS CURRENT vs TEMPERATURE

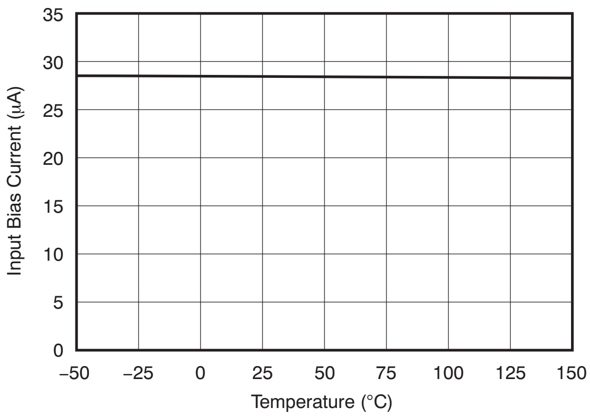


Figure 13.

QUIESCENT CURRENT vs TEMPERATURE

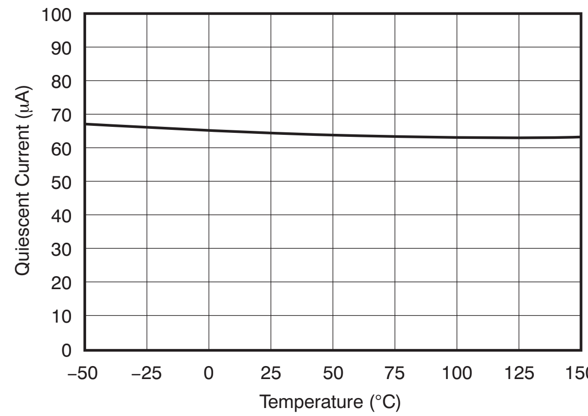


Figure 14.

INPUT-REFERRED VOLTAGE NOISE vs FREQUENCY

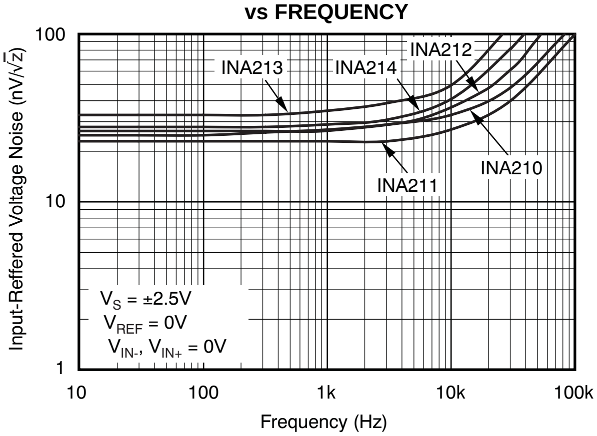


Figure 15.

0.1Hz to 10Hz VOLTAGE NOISE (Referred-to-Input)

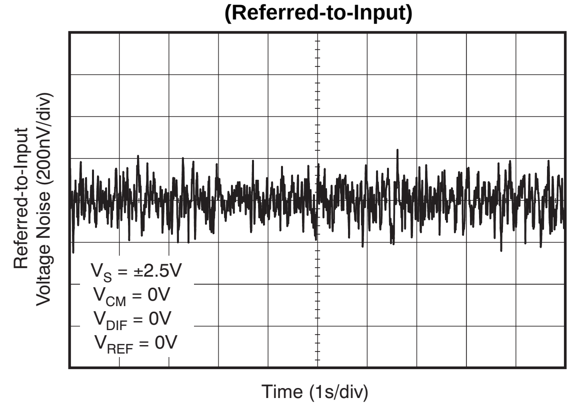


Figure 16.

STEP RESPONSE ($10mV_{PP}$ Input Step)

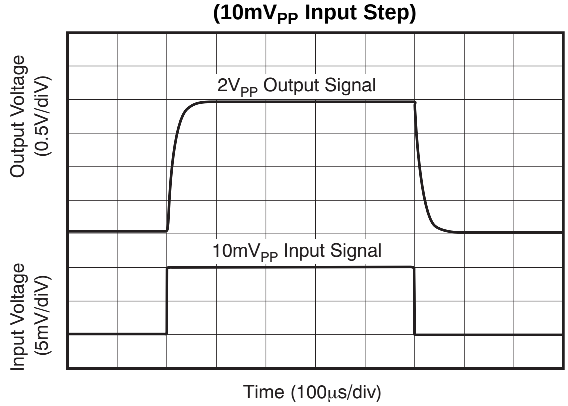


Figure 17.

COMMON-MODE VOLTAGE TRANSIENT RESPONSE

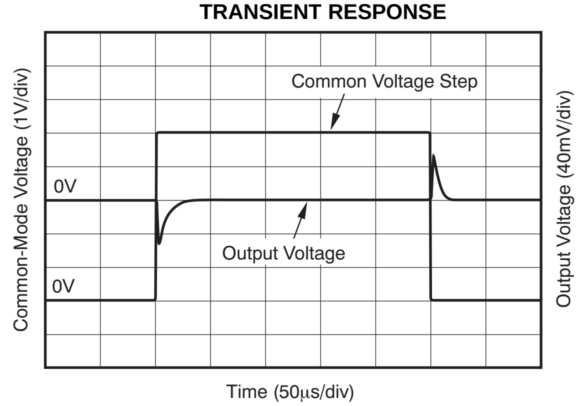


Figure 18.

TYPICAL CHARACTERISTICS (continued)

The INA210 is used for typical characteristics at T_A = +25°C, V_S = +5V, V_{IN+} = 12V, and V_{REF} = V_S/2, unless otherwise noted.

INVERTING DIFFERENTIAL INPUT OVERLOAD

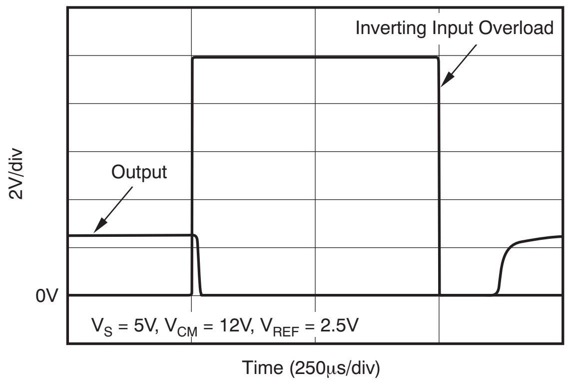


Figure 19.

NONINVERTING DIFFERENTIAL INPUT OVERLOAD

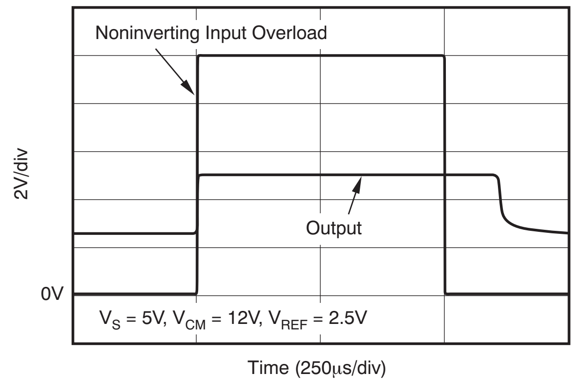


Figure 20.

START-UP RESPONSE

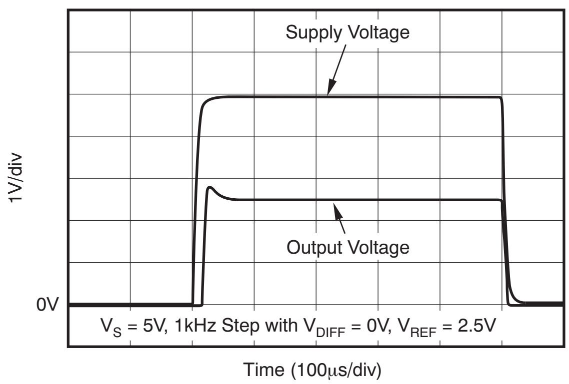


Figure 21.

BROWNOUT RECOVERY

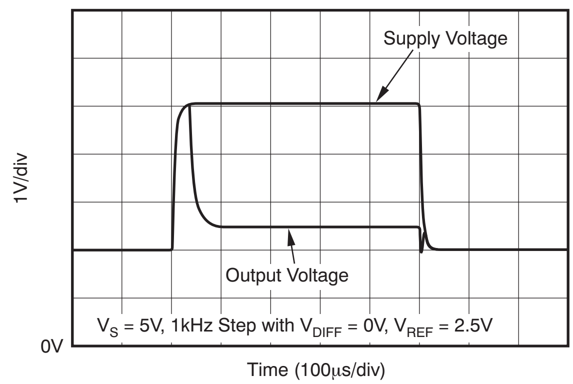


Figure 22.

APPLICATION INFORMATION

BASIC CONNECTIONS

Figure 23 shows the basic connections of the INA210-INA214. The input pins, IN+ and IN–, should be connected as closely as possible to the shunt resistor to minimize any resistance in series with the shunt resistance.

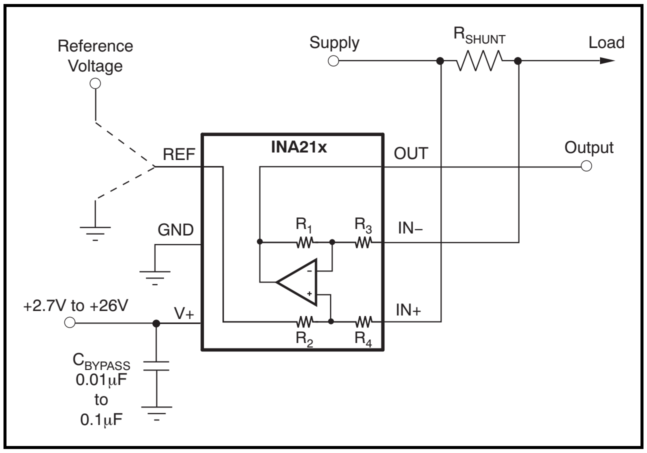


Figure 23. Typical Application

Power-supply bypass capacitors are required for stability. Applications with noisy or high impedance power supplies may require additional decoupling capacitors to reject power-supply noise. Connect bypass capacitors close to the device pins.

POWER SUPPLY

The input circuitry of the INA210-INA214 can accurately measure beyond its power-supply voltage, V+. For example, the V+ power supply can be 5V, whereas the load power supply voltage can be as high as +26V. However, the output voltage range of the OUT terminal is limited by the voltages on the power-supply pin. Note also that the INA210-INA214 can withstand the full –0.3V to +26V in the input pins, regardless of whether the device has power applied or not.

SELECTING R_S

The zero-drift offset performance of the INA210-INA214 offers several benefits. Most often, the primary advantage of the low offset characteristic enables lower full-scale drops across the shunt. For example, non-zero-drift current shunt monitors typically require a full-scale range of 100mV.

The INA210-INA214 series gives equivalent accuracy at a full-scale range on the order of 10mV. This accuracy reduces shunt dissipation by an order of magnitude with many additional benefits.

Alternatively, there are applications that must measure current over a wide dynamic range that can take advantage of the low offset on the low end of the measurement. Most often, these applications can use the lower gain INA213 or INA214 to accommodate larger shunt drops on the upper end of the scale. For instance, an INA213 operating on a 3.3V supply could easily handle a full-scale shunt drop of 60mV, with only 60μV of offset.

UNIDIRECTIONAL OPERATION

Unidirectional operation allows the INA210-INA214 to measure currents through a resistive shunt in one direction. The most frequent case of unidirectional operation sets the output at ground by connecting the REF pin to ground. In unidirectional applications where the highest possible accuracy is desirable at very low inputs, bias the REF pin to a convenient value above 50mV to get the device output swing into the linear range for zero inputs.

A less frequent case of unipolar output biasing is to bias the output by connecting the REF pin to the supply; in this case, the quiescent output for zero input is at quiescent supply. This configuration would only respond to negative currents (inverted voltage polarity at the device input).

BIDIRECTIONAL OPERATION

Bidirectional operation allows the INA210-INA214 to measure currents through a resistive shunt in two directions. In this case, the output can be set anywhere within the limits of what the reference inputs allow (that is, between 0V to V+). Typically, it is set at half-scale for equal range in both directions. In some cases, however, it is set at a voltage other than half-scale when the bidirectional current is nonsymmetrical.

The quiescent output voltage is set by applying voltage to the reference input. Under zero differential input conditions the output assumes the same voltage as is applied to the reference input.

INPUT FILTERING

An obvious and straightforward location for filtering is at the output of the INA210-INA214; however, this location negates the advantage of the low output impedance of the internal buffer. The only other option for filtering is at the input pins of the INA210-INA214; this location requires consideration of the ±30% tolerance of the input impedance. Figure 24 shows a filter placed at the input pins.

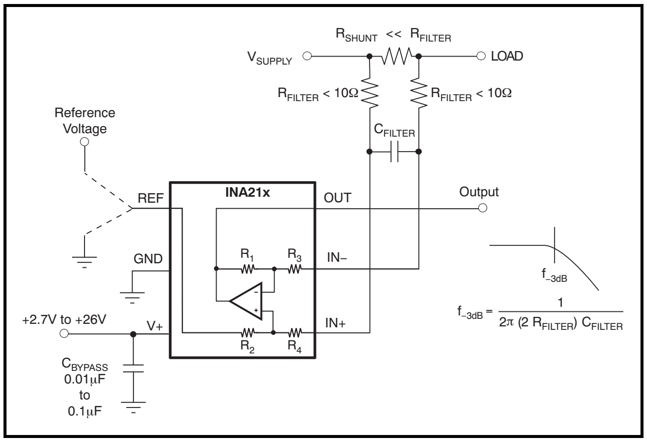


Figure 24. Input Filter

Using the lowest possible resistor values minimizes both the initial shift in gain and effects of tolerance. The effect on initial gain is given by Equation 1:

$$\text{GainError\%} = 100 - [100 \times \{R/(R + R_{FILT})\}] \quad (1)$$

Where R is the value for R_3 or R_4 from Table 1 for the model is in question.

Table 1.

PRODUCT	GAIN	R_3 AND R_4
INA210	200	5kΩ
INA211	500	2kΩ
INA212	1000	1kΩ
INA213	50	20kΩ
INA214	100	10kΩ

Using an INA212, for example, the total effect on gain error can be calculated by replacing the R with 1kΩ− 30%, (or 700Ω) or 1kΩ+ 30% (or 1.3kΩ). The tolerance extremes of R_{FILT} can also be inserted into the equation. If a pair of 100Ω, 1% resistors are used on the inputs, the initial gain error is approximately 2%.

SHUTTING DOWN THE INA210-INA214 SERIES

While the INA210-INA214 series does not have a shutdown pin, its low power consumption allows powering from the output of a logic gate or transistor switch that can turn on and turn off the INA210-INA214 power-supply quiescent current.

However, in current shunt monitoring applications. there is also a concern for how much current is drained from the shunt circuit in shutdown conditions. Evaluating this current drain involves considering the simplified schematic of the INA210-INA214 in shutdown mode shown in Figure 25.

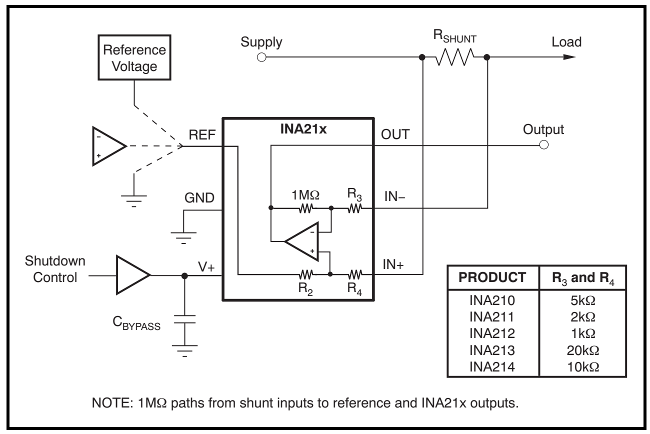


Figure 25. Basic Circuit for Shutting Down INA210-INA214 with Grounded Reference

Note that there is typically slightly more than 1MΩ impedance (from the combination of 1MΩ feedback and 5kΩ input resistors) from each input of the INA210-INA214 to the OUT pin and to the REF pin. The amount of current flowing through these pins depends on the respective ultimate connection. For example, if the REF pin is grounded, the calculation of the effect of the 1MΩ impedance from the shunt to ground is straightforward. However, if the reference or op amp is powered while the INA210-INA214 is shut down, the calculation is direct; instead of assuming 1MΩ to ground, however, assume 1MΩ to the reference voltage. If the reference or op amp is also shut down, some knowledge of the reference or op amp output impedance under shutdown conditions is required. For instance, if the reference source behaves as an open circuit when it is unpowered, little or no current flows through the 1MΩ path.

Regarding the 1MΩ path to the output pin, the output stage of a disabled INA210-INA214 does constitute a good path to ground; consequently, this current is directly proportional to a shunt common-mode voltage impressed across a 1MΩ resistor.

As a final note, when the device is powered up, there is an additional, nearly constant, and well-matched 25µA that flows in each of the inputs as long as the shunt common-mode voltage is 3V or higher. Below 2V common-mode, the only current effects are the result of the 1MΩ resistors.

REF INPUT IMPEDANCE EFFECTS

As with any difference amplifier, the INA210-INA214 series common-mode rejection ratio is affected by any impedance present at the REF input. This concern is not a problem when the REF pin is connected directly to most references or power supplies. When using resistive dividers from the power supply or a reference voltage, the REF pin should be buffered by an op amp.

In systems where the INA210-INA214 output can be sensed differentially, such as by a differential input analog-to-digital converter (ADC) or by using two separate ADC inputs, the effects of external impedance on the REF input can be cancelled. Figure 26 depicts a method of taking the output from the INA210-INA214 by using the REF pin as a reference.

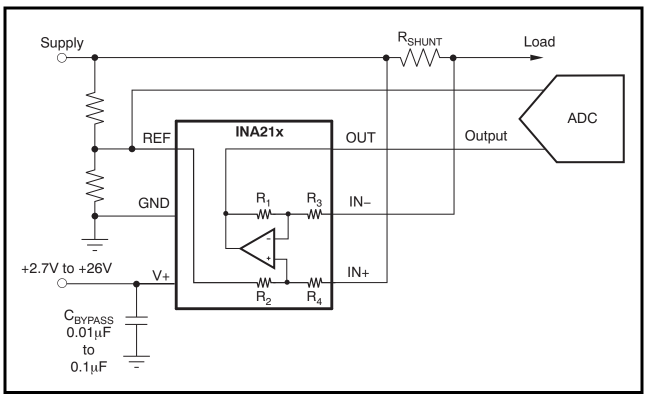


Figure 26. Sensing INA210-INA214 to Cancel Effects of Impedance on the REF Input

USING THE INA210 WITH COMMON-MODE TRANSIENTS ABOVE 26V

With a small amount of additional circuitry, the INA210-INA214 series can be used in circuits subject to transients higher than 26V, such as automotive applications. Use only zener diode or zener-type transient absorbers (sometimes referred to as *Transzorbs*)— any other type of transient absorber has an unacceptable time delay. Start by adding a pair of resistors as shown in Figure 27 as a working impedance for the zener. It is desirable to keep these resistors as small as possible, most often around 10Ω. Larger values can be used with an effect on gain that is discussed in the section on input filtering. Because this circuit is limiting only short-term transients, many applications are satisfied with a 10Ω resistor along with conventional zener diodes of the lowest power rating that can be found. This combination uses the least amount of board space. These diodes can be found in packages as small as SOT-523 or SOD-523.

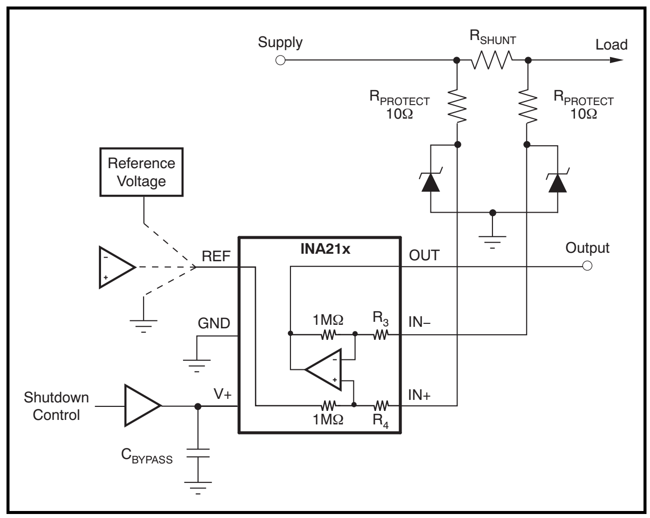


Figure 27. INA210-INA214 Transient Protection Using Dual Zener Diodes

In the event that low-power zeners do not have sufficient transient absorption capability and a higher power transzorb must be used, the most package-efficient solution then involves using a single transzorb and back-to-back diodes between the device inputs. The most space-efficient solutions are dual series-connected diodes in a single SOT-523 or SOD-523 package. This method is shown in Figure 28. In either of these examples, the total board area required by the INA210-INA214 with all protective components is less than that of an SO-8 package, and only slightly greater than that of an MSOP-8 package.

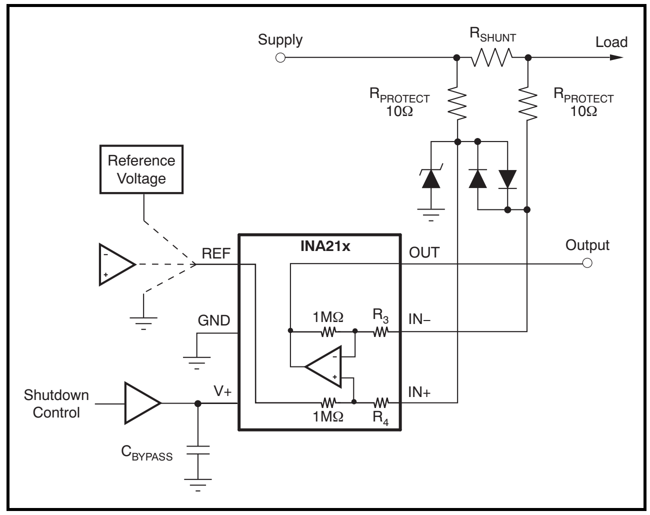


Figure 28. INA210-INA214 Transient Protection Using a Single Transzorb and Input Clamps

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
INA210AIDCKR	ACTIVE	SC70	DCK	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
INA210AIDCKRG4	ACTIVE	SC70	DCK	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
INA210AIDCKT	ACTIVE	SC70	DCK	6	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
INA210AIDCKTG4	ACTIVE	SC70	DCK	6	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
INA211AIDCKR	ACTIVE	SC70	DCK	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
INA211AIDCKT	ACTIVE	SC70	DCK	6	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
INA212AIDCKR	ACTIVE	SC70	DCK	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
INA212AIDCKT	ACTIVE	SC70	DCK	6	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
INA213AIDCKR	ACTIVE	SC70	DCK	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
INA213AIDCKRG4	ACTIVE	SC70	DCK	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
INA213AIDCKT	ACTIVE	SC70	DCK	6	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
INA213AIDCKTG4	ACTIVE	SC70	DCK	6	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
INA214AIDCKR	ACTIVE	SC70	DCK	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
INA214AIDCKRG4	ACTIVE	SC70	DCK	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
INA214AIDCKT	ACTIVE	SC70	DCK	6	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
INA214AIDCKTG4	ACTIVE	SC70	DCK	6	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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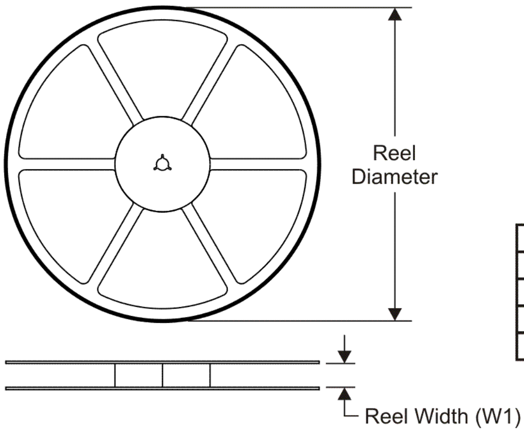
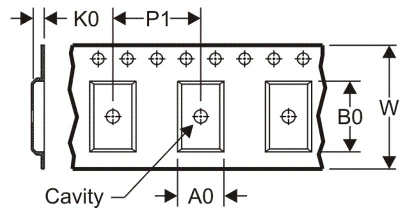
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

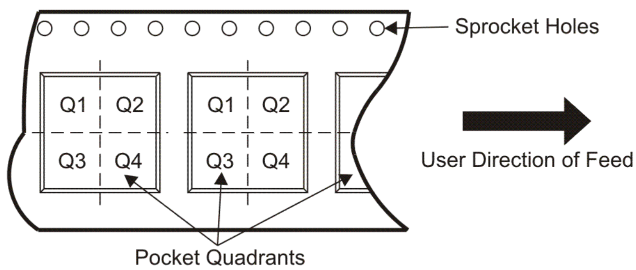


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

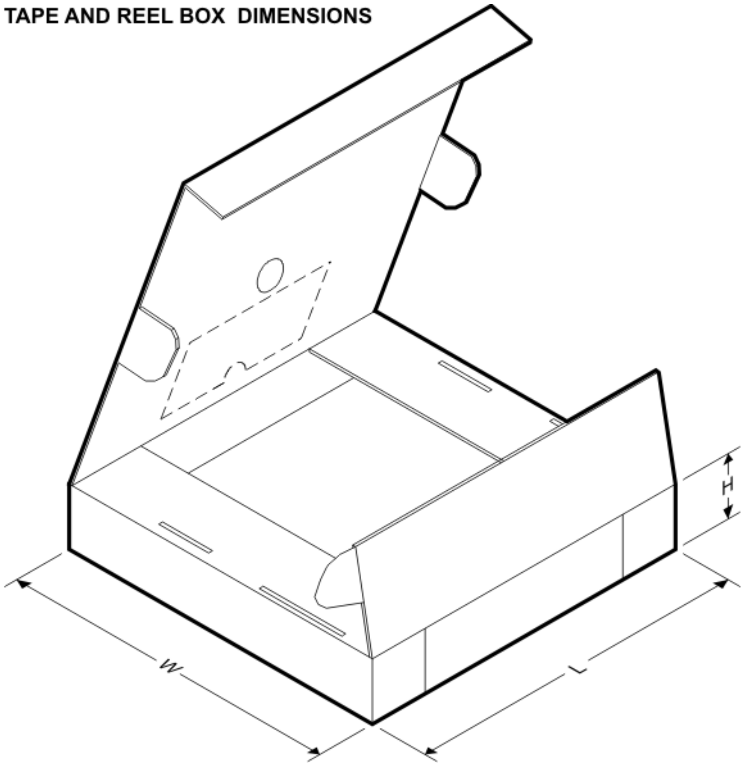
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
INA210AIDCKT	SC70	DCK	6	250	180.0	9.2	4.0	2.24	2.34	4.0	8.0	Q3
INA211AIDCKR	SC70	DCK	6	3000	180.0	9.2	2.55	2.34	1.22	4.0	8.0	Q3
INA211AIDCKT	SC70	DCK	6	250	180.0	9.2	2.55	2.34	1.22	4.0	8.0	Q3
INA212AIDCKR	SC70	DCK	6	3000	180.0	9.2	2.55	2.34	1.22	4.0	8.0	Q3
INA212AIDCKT	SC70	DCK	6	250	180.0	9.2	2.55	2.34	1.22	4.0	8.0	Q3
INA213AIDCKT	SC70	DCK	6	250	180.0	9.2	4.0	2.24	2.34	4.0	8.0	Q3
INA214AIDCKR	SC70	DCK	6	3000	180.0	9.2	4.0	2.24	2.34	4.0	8.0	Q3
INA214AIDCKT	SC70	DCK	6	250	180.0	9.2	4.0	2.24	2.34	4.0	8.0	Q3

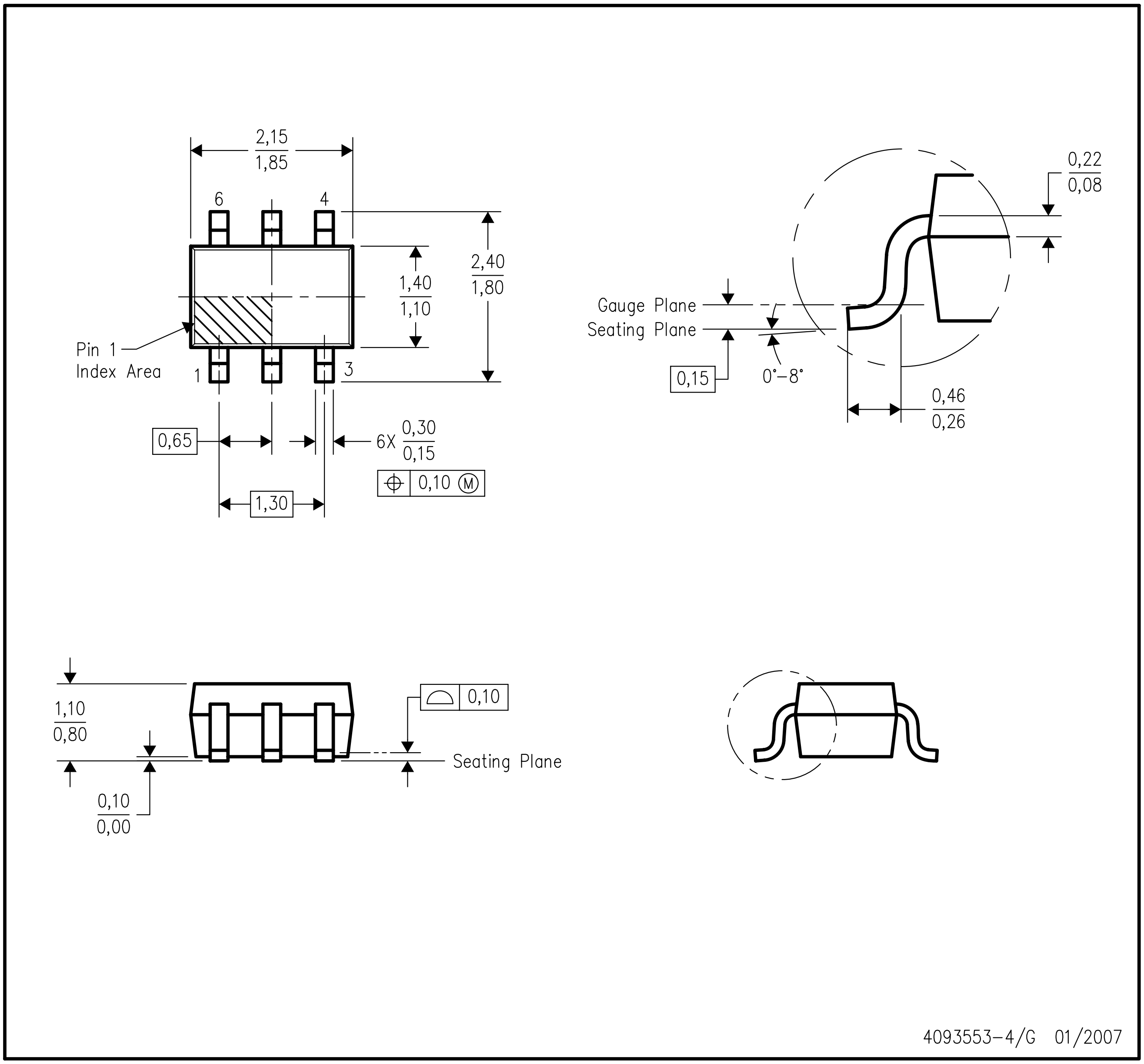
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
INA210AIDCKT	SC70	DCK	6	250	202.0	201.0	28.0
INA211AIDCKR	SC70	DCK	6	3000	202.0	201.0	28.0
INA211AIDCKT	SC70	DCK	6	250	202.0	201.0	28.0
INA212AIDCKR	SC70	DCK	6	3000	202.0	201.0	28.0
INA212AIDCKT	SC70	DCK	6	250	202.0	201.0	28.0
INA213AIDCKT	SC70	DCK	6	250	202.0	201.0	28.0
INA214AIDCKR	SC70	DCK	6	3000	202.0	201.0	28.0
INA214AIDCKT	SC70	DCK	6	250	202.0	201.0	28.0

DCK (R–PDSO–G6) PLASTIC SMALL–OUTLINE PACKAGE



NOTES:
- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
- D. Falls within JEDEC MO–203 variation AB.