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A 16-bit ADC scans each channel at a scan rate chosen by the user. The number of channels scanned and scan rate are software selectable.

APPLICATIONS

Temperature measurements
General-purpose data acquisition
Powertrain/engine testing
Automatic Test Equipment (ATE)

CP213

32/64/128-Channel, 16-bit CompactPCI/PXI ADC



FEATURES

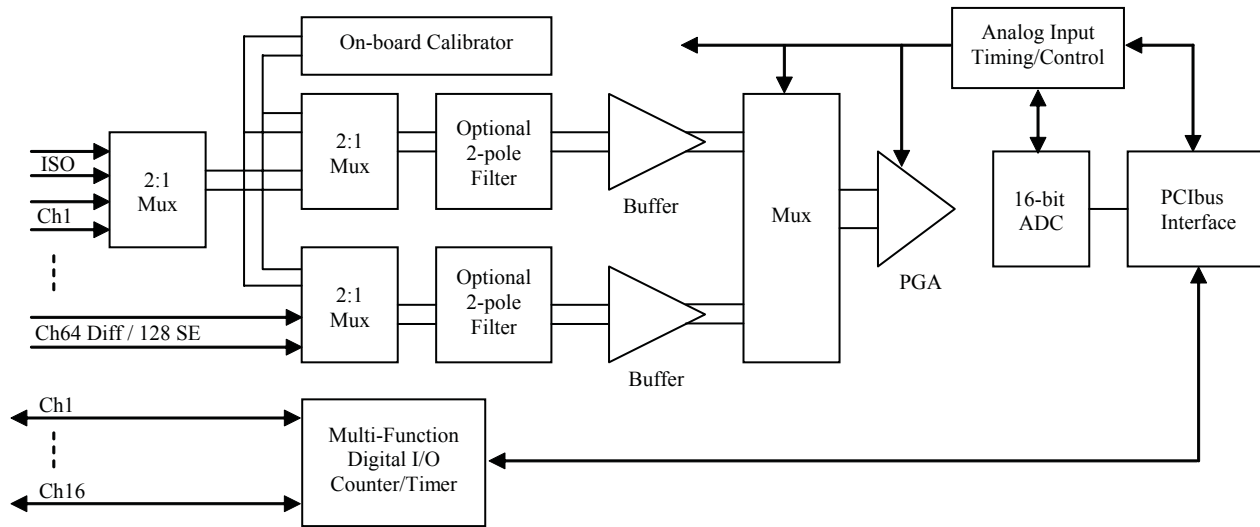
- 32, 64 or 128 channels of analog input
- 16 multi-function digital I/O (TTL) channels that may be configured as digital in, digital out, or selectively attached to 2 frequency in, 2 counter in, and/or 2 timer out channels
- 16-bit resolution
- Programmable gain per channel
- Programmable scan rates of <1 S/s through 100 kS/s
- Optional 10 Hz to 1 kHz low pass filters
- Precision on-board reference for end-to-end calibration

GENERAL DESCRIPTION

The CP213 is a single-width, 6U, CompactPCI/PXI module with either 32 or 64 differential analog input channels that can alternately be configured under software control as 64 or 128 single-ended analog input channels. A 16-bit ADC scans each channel at a scan rate chosen by the user. The number of channels scanned and scan rate are software selectable. Scans may be triggered from either the internal clock, one of eight PXI backplane triggers, the PXI star trigger bus or an external SMB connector on the module front panel. Single and continuous scan operations are supported. If single scan operation is chosen, an interrupt may be generated at the end of the scan.

The CP213 has programmable gain that can be set on a channel-by-channel basis. Gains of 1, 2, 5, 10, 20, 50, 100, 200, 500 and 1000 are available. On-board calibration is available on each channel for end-to-end calibration. Optional fixed, 2-pole, passive filters are available in a 1, 2, 5 progression from 10 Hz to 1 kHz. Under software control, channels 1 and 33 may be configured as isothermal reference channels for temperature measurement applications.

In addition to the analog input channels, 16 multi-function digital I/O (TTL) channels are provided. Any of these channels may be configured as digital in, digital out, or selectively attached to 2 frequency in, 2 counter in, and/or 2 timer out channels.



BASIC CIRCUIT OPERATION

The CP213 analog input channels are multiplexed to a high-speed programmable gain amplifier (PGA) that provides full-scale input ranges of ± 10 volts at a gain of 1 down to ± 10 millivolts at a gain of 1000. The PGA supports scan rates up to 100 kHz at all gain settings. The analog input channels may be configured as single-ended or differential inputs via software control. The number of channels scanned and the scan rate are also software programmable. A 16-bit Successive Approximation Register (SAR) ADC samples the output of the PGA. Converted data from the ADC is stored in a 32, 64 or 128 word memory, allowing "present value monitoring". DMA capability allows converted data to be stored on host memory at the required data rates.

The CP213 also provides 16 multi-function digital I/O channels. Any of these channels may be configured as digital in, digital out, or selectively attached to 2 frequency in, 2 counter in, and/or 2 timer out channels. Two channels each of frequency in, counter in and timer out are provided. These channels operate at standard TTL levels.

SOFTWARE

The CP213 comes with a *Plug and Play* driver for configuring and using the device and application examples to illustrate its basic functionality.

APPLICATION EXAMPLE

This and other tools, including their source code, are provided.



ANALOG INPUT CHANNELS

Number of analog input channels:	32 differential / 64 single-ended or 64 differential / 128 single-ended (depending on option)	
Input:		
Common Mode Input range:	±10 V	
Differential Mode Input range:	±10 V	
Input protection:	±25 V continuous	
Input impedance:	Channel + to ground = 1MΩ Channel - to ground = 1MΩ	
Input coupling:	DC	
Resolution:	16-bits	
Gain ranges:	1, 2, 5, 10, 20, 50, 100, 200, 500 and 1000	
Scan Rate (Per Channel):		
Internal frequency choices:	0.0000232 Hz to 100 kHz (in 4,294,967,296 steps)	
External sources:	Front-panel SMB, TTL to 100 kHz	
Duty cycle:	50%	
Backplane source:	1 of 8 PXI backplane triggers or the PXI star trigger bus	
ADC Rate (Aggregate):	100 kHz (software programmable to 20 kHz or 2 kHz for lower noise)	
Trigger Sources:		
External:	Front panel SMB, negative-going TTL signal	
Backplane:	1 of 8 PXI backplane triggers or the PXI star trigger bus	
Transfer Characteristics:		
Integral Non-linearity (INL):	0.014% FSR maximum @ gain = 1-500 0.04% FSR maximum @ gain = 1000	
Differential non-linearity (DNL):	No missing codes	
Initial accuracy, RTI (Referred to input):	After automatic calibration	
	Absolute Accuracy	
	<u>Differential</u>	<u>Single-Ended</u>
Gain = 1	±2.2 mV	±2.2mV
Gain = 10	±220 µV	±250 µV
Gain = 100	±28 µV	±65 µV
Gain = 1000	±15 µV	±55 µV
Offset stability, RTI:	±12 µV/°C maximum @ gain = 1000	
Gain stability:	±18 ppm/°C maximum @ gain < 100 ±60 ppm/°C maximum @ gain 100-500 ±150 ppm/°C maximum @ gain = 1000	
Common mode rejection:	75 dB minimum	
Noise, RTI:	5 µV rms @ gain = 1000, ADC rate = 2 kHz	

Channel-to-channel crosstalk:

14 µV rms @ gain = 1000, ADC rate = 20 kHz
-90 dB

Analog input connector type(s):

1(2)- 68P High Density, 2-pin LEMO (for external calibration input)

MULTI-FUNCTION DIGITAL I/O CHANNELS

Number of multi-function digital I/O channels:	16 digital I/O channels (channels may be configured as digital in, digital out or selectively attached to 2 frequency in, 2 counter in, and/or 2 timer out channels)	
I/O type:	Single-ended TTL	
Direction control:	Yes	
Input termination:	Pulled-up	
Input switching threshold:		
"0" Level:	0.8 V maximum	
"1" Level:	2 V minimum	
Output voltage level:		
"0" Level:	0.4 V maximum (I _{out} = 2.5 mA)	
"1" Level:	2.7 V minimum (I _{out} = 2.5 mA)	
Low level output current:	24 mA, maximum	
High level output current:	-24 mA, maximum	
Input current:	±20 µA	
Frequency channels (2):		
Frequency range:	0.06 Hz to 1 MHz	
Window period:	1 mS	
Counter channels (2):		
Counter size:	32-bits	
Timer channels (2):		
Timer size:	32-bits	
Digital I/O connector type:	1- 26P Subminiature D connector	

POWER

Power Requirements:	<u>With Filters</u>	<u>Without Filters</u>
+5 V:	3740 mA*	1850 mA*
+3.3 V:	350 mA	350 mA
+12 V:	800 µA	800 µA
-12 V:	800 µA	800 µA

* The +5 V power requirement listed is for no-load. For each digital I/O channel sourcing current, add that amount to the no-load power to determine the total +5 volt requirement.

ENVIRONMENTAL AND MECHANICAL

Temperature range:	
Operational:	0°C to +50°C
Storage:	-25°C to +75°C
Relative humidity:	0 to 85%, non-condensing to 40°C
Cooling requirements:	10 CFM
Dimensions:	233.35 mm x 160 mm (6U CompactPCI/PXI module)
Front-panel potential:	Chassis ground

Technical specifications contained within this publication are subject to change without notice.



RELATED PRODUCTS

Model 5868-B001	Shorting Connector for CP213
Model 5868-Bxyz	Cable: 68S High Density to Unterminated
Model 5868-Dxyz	Cable: 68S High Density to 68P High Density
Model 5868-Exyz	Cable: 68S High Density to 68S High Density
Model 5857-Cxyz	Cable: 2-contact LEMO to Unterminated
Model 5857-Dxyz	Cable: 2-contact LEMO to 2-contact LEMO
Model 5857-Gxyz	Cable: 2-contact LEMO to BNC; shielded
Model 5826-Bxyz	Cable: 26S Subminiature D to Unterminated
Model T910-Axyz	Cable: SMB to SMB; shielded
Model T910-Bxyz	Cable: SMB to BNC; shielded
Model T910-Cxyz	Cable: SMB to Unterminated
Model 5926-Z1A	26S Subminiature D Mating Connector; sok change
Model V765-ZA11	Rack-mount Termination Panel
Model V792-ZA11	Rack-mount Isothermal Termination Panel

ORDERING INFORMATION

Model CP213-AA11 16-bit Scanning ADC, No Filters, Programmable 32-ch Differential/64-ch Single-Ended

Model CP213-ABB1 16-bit Scanning ADC, 10Hz Filters, 32-ch Differential

Model CP213-AEB1 16-bit Scanning ADC, 100Hz Filters, 32-ch Differential

Model CP213-AHB1 16-bit Scanning ADC, 1kHz Filters, 32-ch Differential

Model CP213-ABC1 16-bit Scanning ADC, 10Hz Filters, 64-ch Single-Ended

Model CP213-AEC1 16-bit Scanning ADC, 100Hz Filters, 64-ch Single-Ended

Model CP213-AHC1 16-bit Scanning ADC, 1kHz Filters, 64-ch Single-Ended

Model CP213-BA11 16-bit Scanning ADC, No Filters, Programmable 64-ch Differential/128-ch Single-Ended

Model CP213-BBB1 16-bit Scanning ADC, 10Hz Filters, 64-ch Differential

Model CP213-BEB1 16-bit Scanning ADC, 100Hz Filters, 64-ch Differential

Model CP213-BHB1 16-bit Scanning ADC, 1kHz Filters, 64-ch Differential

Model CP213-BBC1 16-bit Scanning ADC, 10Hz Filters, 128-ch Single-Ended

Model CP213-BEC1 16-bit Scanning ADC, 100Hz Filters, 128-ch Single-Ended

Model CP213-BHC1 16-bit Scanning ADC, 1kHz Filters, 128-ch Single-Ended

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