USB/PCIe/PXIe-6301 Series

24 bits Temperature Input Module for Resistance Temperature Detector

Overview

JYTEK USB/PCIe/PXIe-6301 is a high-resolution and high-speed temperature measurement module designed for PT100 RTD sensor. This module provides up to 32 channels of analog temperature measurement and supports 2-wire, 3-wire and 4-wire resistance temperature detector (RTD) measurements.

The PCIe/PXIe-6301 supports a variety of acquisition trigger modes such as software and external, and can generate trigger signals such as start and window. All trigger signals are routed through PFI or PXI chassis backplane.

USB-6301 Series only supports USB 3.0 bus protocol or above.

Please download JYTEK <JYPEDIA>, you can quickly inquire the product prices, the key features and available accessories.

Main Features

- 32 channels (3-wire mode), 20 channels (4-wire mode)
- 24 bits ADC resolution
- -200 °C ~ +850 °C measurement range (using PT100)
- 0 ~ 400 Ω range
- The balance line resistance compensation is provided under the 3-wire RTD measurements
- 128M sample onboard FIFO buffer for analog input
- DMA for analog input
- Provide resistance or temperature measurement value
- Digital/Software Trigger

Hardware Specifications

Analog Input Specifications

Number of channels	32ch (2-wire/3-wire)
	20ch (2-wire/3-wire/4-wire)
Synchronous acquisition	No
Sensor support	RTD PT100
ADC resolution	24 bits
ADC type	Δ-Σ
Input isolation	Yes
Sampling rate	800 Sample/s MAX (4 channels)
	160 Sample/s (2-wire/3-wire/4-wire, 20ch fully used)
	100 Sample/s (2-wire/3-wire, 32ch fully used)
Clock	Onboard (25 MHz) PX I_CLK100 Clock in (PCIe /TX I Only)
Storage depth	128M Samples
Measuring range	0 Ω ~ 400 Ω / -200 °C ~ +850 °C(for PT100)
Terminal type	2-wire/3-wire/4-wire
Excitation current	1000 μA (4-wire)
	500 μA (2-wire/3-wire)
Overvoltage protection	±30 V
Trigger type	Digital/Software
Analog trigger range	0 Ω ~ 400 Ω / -200 °C ~ +850 °C (for PT100)
Trigger mode	StartTrigger，ReferenceTrigger，ReTrigger
Digital trigger sourse	PX I_TRIG <0..7> PX I_STAR PFI<0..7>

PFI

Number of channels	8 (4 of them have hardware pull-ups)
External digital trigger interface	Trigger voltage：5 V TTL
	Trigger edge：Rising /Falling
Initial state	Input*
**6301's PFI is only used for external digital triggering, cannot be configured as output*	

Digital Trigger

Trigger source:	PX I_TRIG <0..7>, PX I_STAR, PFI <0..7>
Trigger mode:	Start Trigger, Reference Trigger
Trigger polarity:	Software-selectable

Analog Trigger

Trigger source:	AI CH<0..31>
Trigger mode:	Start Trigger, Reference Trigger
Trigger polarity:	Software-selectable

Clock

Clock source:	On Board
Clock Destination:	Sample Clock

Physical and Environment

Bus

PXIe standard:	x4 PXI Express module, specification rev 1.0 compliant
Slot supported:	x1 and x4 PXI Express or PXI Express hybrid slots

Size

External physical size:	3U PXIE
Weight:	190 g

Operating Environment

Ambient temperature range	0 °C to 50 °C
Relative humidity range	20% to 80%, noncondensing

Storage Environment

Ambient temperature range	-20°C to 80°C
Relative humidity range	10% to 90%, noncondensing

Power

3.3 V:	2.0 A
12 V:	0.04 A

Performance Test

Temperature measurement accuracy

24H Temperature Measurement Accuracy （4-Wire）				
RTD Type	Temperature Range (℃)	Sample Rate (S/s)		
		40.0	400.0	800.0
PT 100	-200 to 850	0.23	0.23	0.25

90Days Temperature Measurement Accuracy （4-Wire）				
RTD Type	Temperature Range (℃)	Sample Rate (S/s)		
		40.0	400.0	800.0
PT 100	-200 to 850	0.29	0.31	0.40

RDC (Resistance-digital conversion) accuracy

JY6301 Accuracy = ±(Gain Error % of Reading + Offset Error mΩ) ,4-Wire										
Sample Rate (Sample/s)	Range (Ω)	24 Hour Tcal ±1C°	90 Days Tcal ± 5°	24 Hr Accuracy @100Ω	90 Days Accuracy @100Ω	24 Hr Full Scale Accuracy @400Ω	90 Days Full Scale Accuracy @400Ω	24 Hr Full Scale Accuracy @400Ω (%)	90 Days Full Scale Accuracy @400Ω (%)	2,3-wire Offset Adjustment
40	400	0.012 + 0.005	0.014 + 0.007	32 mΩ	42 mΩ	68 mΩ	84 mΩ	0.017	0.021	1 mΩ
400	400	0.012 + 0.005	0.014 + 0.009	32 mΩ	50 mΩ	68 mΩ	92 mΩ	0.017	0.023	2 mΩ
800	400	0.012 + 0.006	0.015 + 0.014	36 mΩ	71 mΩ	72 mΩ	120 mΩ	0.018	0.030	12 mΩ

Resistance measurement noise

Timing mode	single conversion rate	Single A/D conversion time	Noise(2-wire/3-wire)(RMS)	Noise(4-wire) (RMS)
Level 0	2.3 Hz	434.7826 ms	0.35 mΩ	0.18 mΩ
Level 1	5.1 H z	196 .0784 ms	0.45 mΩ	0.24 mΩ
Level 2	26.5 Hz	37.7358 ms	0.65 mΩ	0.5 mΩ
Level 3	41 Hz	24.3902 ms	0.68 mΩ	0.6 mΩ
Level 4	410 Hz	2.4390 ms	2.1 mΩ	1.8 mΩ
Level 5	830 Hz	1.1205 ms	10.5 mΩ	6.6 mΩ

Special Operating Instructions

When using the JY6301 module, it is crucial to avoid grounding the sensor, as doing so may significantly affect the measurement results. Grounding the sensor can introduce unwanted noise and errors into the system, leading to inaccurate temperature readings. To ensure the highest accuracy and reliability of your measurements, always follow these guidelines:

Isolate the Sensor: Keep the sensor electrically isolated from the ground. This means that the leads from the RTD sensor should only be connected to the designated terminals on the JY6301 module and should not be connected to any ground or reference point on the system.

Avoid Ground Loops: A ground loop occurs when there are multiple paths to ground in a system, which can cause interference. Make sure that the sensor and the measurement system are referenced to a common ground point to prevent ground loops.

Order Information

- PXIe-6301 (PN: JY2016301-01)
  32-ch 24-Bit PXIe Temperature input card for RTD
- PCIe-6301 (PN: JY2116301-01)
  32-ch 24-bit PCIe Temperature input card for RTD
- USB-6301 (PN: JY2116301-02)
  32-ch 24-bit USB Temperature input module for RTD

Accessories

- TB-68 (PN: JY2000068-03)
  68-Pin SCSI Shielded I/O Connector Block
- DIN-68S-01 (PN: JA9114029-01)
  SCSI 68-pin Terminal board w/o cable
- ACL-2016868-1 (PN: JY2016868-01)
  1M 68pin VHDCI68M-SCSI68M 100Ω shielded cable
- ACL-2016868-2 (PN: JY2016868-02)
  2M 68pin VHDCI68M-SCSI68M 100Ω shielded cable

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