

# PCIe/PXIe-6301 Series

## 24 bits Temperature Input Module for Resistance Temperature Detector



### Overview

JYTEK 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.

🔗 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  $\Omega$  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                | $\Delta\Sigma$                                                                            |
| 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 $\Omega$ ~ 400 $\Omega$ / -200 $^{\circ}\text{C}$ ~ +850 $^{\circ}\text{C}$ (for PT100) |
| Terminal type           | 2-wire/3-wire/4-wire                                                                      |
| Excitation current      | 1000 $\mu\text{A}$ (4-wire)                                                               |
|                         | 500 $\mu\text{A}$ (2-wire/3-wire)                                                         |
| Overvoltage protection  | $\pm 30\text{ V}$                                                                         |
| Trigger type            | Digital/Software                                                                          |
| Analog trigger range    | 0 $\Omega$ ~ 400 $\Omega$ / -200 $^{\circ}\text{C}$ ~ +850 $^{\circ}\text{C}$ (for PT100) |
| Trigger mode            | StartTrigger, ReferenceTrigger, ReTrigger                                                 |
| Digital trigger source  | 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

|                 |                                                        |
|-----------------|--------------------------------------------------------|
| PXle 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

| Temperature Accuracy         |                                |                        |                        |                        |                      |
|------------------------------|--------------------------------|------------------------|------------------------|------------------------|----------------------|
| Levels                       | Maximum Total Sample Rate(S/s) | (-200°C,2,3-wires)(°C) | (-200° c,4-wires) (°C) | (850°C,2,3-wires) (°C) | (850°C,4-wires) (°C) |
| Level 0                      | 2.2                            | 0.06                   | 0.06                   | 0.12                   | 0.12                 |
| Level 1                      | 5                              | 0.07                   | 0.06                   | 0.12                   | 0.12                 |
| Level 2                      | 25                             | 0.07                   | 0.07                   | 0.13                   | 0.13                 |
| Level 3                      | 40                             | 0.07                   | 0.07                   | 0.13                   | 0.13                 |
| Level 4                      | 400                            | 0.09                   | 0.08                   | 0.16                   | 0.15                 |
| Level 5                      | 800                            | 0.21                   | 0.15                   | 0.33                   | 0.25                 |
| Wiring resistance negligible |                                |                        |                        |                        |                      |
| Operating temperature =25    |                                |                        |                        |                        |                      |

### RDC (Resistance-digital conversion) accuracy

| JY6301 Accuracy = ±(Gain Error % + Offset Error mΩ) |           |                              |            |   |      |         |   |      |                                                 |                                               |
|-----------------------------------------------------|-----------|------------------------------|------------|---|------|---------|---|------|-------------------------------------------------|-----------------------------------------------|
| Temperature                                         | ADC Level | Internal<br>ADC Rate<br>(Hz) | 2, 3-wires |   |      | 4-wires |   |      | Full Scale<br>Accuracy<br>@ 100Ω<br>(2,3-wires) | Full Scale<br>Accuracy @<br>100Ω(4-<br>wires) |
| Tcal±5 °C                                           | Level 0   | 2.3                          | 0.0462     | + | 25.9 | 0.0462  | + | 25.3 | 30.5 mΩ                                         | 30.0 mΩ                                       |
| Tcal±5 °C                                           | Level 1   | 5.1                          | 0.0462     | + | 26.2 | 0.0462  | + | 25.5 | 30.8 mΩ                                         | 30.1 mΩ                                       |
| Tcal±5 °C                                           | Level 2   | 26.5                         | 0.0462     | + | 26.8 | 0.0462  | + | 26.3 | 31.4 mΩ                                         | 30.9 mΩ                                       |
| Tcal±5 °C                                           | Level 3   | 41.0                         | 0.0462     | + | 26.8 | 0.0462  | + | 26.6 | 31.5 mΩ                                         | 31.2 mΩ                                       |
| Tcal±5 °C                                           | Level 4   | 410.0                        | 0.0462     | + | 31.1 | 0.0462  | + | 30.2 | 35.7 mΩ                                         | 34.8 mΩ                                       |
| Tcal±5 °C                                           | Level 5   | 830.0                        | 0.0462     | + | 56.3 | 0.0462  | + | 44.6 | 60.9 mΩ                                         | 49.2 mΩ                                       |

Tcal=25°C typical.  
Add 0.0160% to the gain, 20mΩ to the offset for temperatures outside Tcal±5 °C  
Offset error contains 3σ,σ is the noise error.

### 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 m $\Omega$           | 0.18 m $\Omega$    |
| Level 1     | 5.1 H z                | 196 .0784 ms               | 0.45 m $\Omega$           | 0.24 m $\Omega$    |
| Level 2     | 26.5 Hz                | 37.7358 ms                 | 0.65 m $\Omega$           | 0.5 m $\Omega$     |
| Level 3     | 41 Hz                  | 24.3902 ms                 | 0.68 m $\Omega$           | 0.6 m $\Omega$     |
| Level 4     | 410 Hz                 | 2.4390 ms                  | 2.1 m $\Omega$            | 1.8 m $\Omega$     |
| Level 5     | 830 Hz                 | 1.1205 ms                  | 10.5 m $\Omega$           | 6.6 m $\Omega$     |

## 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

## 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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