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Detailed Specifications

For user manuals and dimensional drawings, visit the product page resources tab on ni.com.

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NI PXIe-4353

Data Acquisition with Integrated Signal Conditioning for Thermocouple Measurements





- 32 thermocouple input channels; 8 built-in CJC channels
- 0.30 °C typical accuracy for T-type thermocouple
- 90 S/s/ch sample rate in high-speed mode
- 24-bit resolution
- 300 Vrms CAT II channel-to-earth ground safety isolation
- Autozero channels for offset error compensation; open-thermocouple detection
- Multidevice triggering and synchronization via PXI Express
- Supported by NI-DAQmx driver software

Overview

The NI PXIe-4353 SC Express thermocouple input module provides data acquisition with integrated signal conditioning for temperature measurements. It features 32 channels with three 24-bit analog-to-digital converters and operates with high-speed (90 S/s per channel) and high-accuracy (1 S/s per channel) modes. It is designed to be highly accurate with 0.30 °C typical accuracy for the module and terminal block. The module has two autozero channels for offset compensation as well as open thermocouple detection to identify disconnected thermocouples. The NI PXIe-4353 is intended to be used with the NI TB-4353 front-mounting isothermal terminal block for screw terminal connectivity.

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Application and Technology

High-Accuracy Thermocouple Measurements

With the NI PXIe-4353 SC Express thermocouple module, you can measure temperatures with 0.30 °C typical accuracy and 24-bit resolution on 32 channels. The NI TB-4353 isothermal terminal block, which provides powerful cold-junction compensation (CJC), achieves high-accuracy levels. CJC improves your measurement accuracy by offering the temperature at the cold junctions and applying the appropriate correction. The isothermal terminal block minimizes error with a unique design that optimizes thermal conductivity, making it possible for the nearby CJC thermistors to accurately measure the temperature at the thermocouple junctions. The TB-4353 front-mounting terminal block includes eight CJC thermistors that are distributed on the terminal block to closely measure the cold junctions across the terminal block.

Integrated Signal Conditioning

By combining signal conditioning and analog-to-digital converters (ADCs) on the same device, the NI PXIe-4353 thermocouple input module delivers a smaller footprint and higher measurement performance. Integrated signal conditioning also provides simplified cable management and calibration due to fewer components, which drastically reduces the installation and maintenance cost of a high-channel-count measurement system.

PXI Express Dedicated Data Throughput

NI SC Express modules are built on the x1 PXI Express bus with dedicated bandwidth per device up to 250 MB/s. Because of the added bandwidth provided by PXI Express, SC Express modules offer simultaneous sampling options using the same channel counts and connectivity as multiplexed devices. Unlike multiplexed devices that reduce sampling rates, you can use simultaneous sampling devices to maintain sampling rates as you expand the number of channels.

PXI Platform Advanced Timing and Synchronization

PXI Express provides advanced timing and synchronization features, including a 100 MHz differential system clock, differential signaling, and differential star triggers. By using differential clocking and synchronization, PXI Express systems benefit from increased noise immunity for instrumentation clocks and the ability to transmit at higher-frequency rates. SC Express modules take advantage of PXI Express to deliver tight synchronization between modules in one chassis or multiple chassis.

Wide Variety of I/O on the PXI Platform

When combined with the more than 1,500 I/O types in the PXI platform, this module offers the flexibility needed to develop a measurement system that meets your application needs. PXI modules are compatible with the CompactPCI and CompactPCI Express industrial computer standards and offer additional features such as environmental specifications, standardized software, and built-in timing and synchronization.

Connectivity

The NI PXIe-4353 is designed to be used with the TB-4353 front-mounting isothermal terminal block. SC Express terminal blocks are hot-swappable and automatically recognized in software. This makes troubleshooting easier because you can connect and remove terminal blocks without powering down the PXI measurement system. Each terminal block also includes alignment fins that guide the connector onto the PXI Express module without bent pins.



NI TB-4353 Front-Mounting Isothermal Terminal Block

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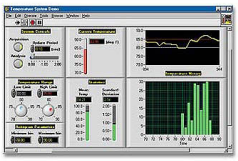
Software Recommendations

LabVIEW Professional Development System for Windows



- Advanced software tools for large project development
- Automatic code generation using DAQ Assistant and Instrument I/O Assistant
- Tight integration with a wide range of hardware
- Advanced measurement analysis and digital signal processing
- Open connectivity with DLLs, ActiveX, and .NET objects
- Capability to build DLLs, executables, and MSI installers

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Support and Services

System Assurance Programs

NI system assurance programs are designed to make it even easier for you to own an NI system. These programs include configuration and deployment services for your NI PXI, CompactRIO, or Compact FieldPoint system. The NI Basic System Assurance Program provides a simple integration test and ensures that your system is delivered completely assembled in one box. When you configure your system with the NI Standard System Assurance Program, you can select from available NI system driver sets and application development environments to create customized, reorderable software configurations. Your system arrives fully assembled and tested in one box with your software preinstalled. When you order your system with the standard program, you also receive system-specific documentation including a bill of materials, an integration test report, a recommended maintenance plan, and frequently asked question documents. Finally, the standard program reduces the total cost of owning an NI system by providing three years of warranty coverage and calibration service. Use the online product advisors at ni.com/advisor to find a system assurance program to meet your needs.

Calibration

NI measurement hardware is calibrated to ensure measurement accuracy and verify that the device meets its published specifications. To ensure the ongoing accuracy of your measurement hardware, NI offers basic or detailed recalibration service that provides ongoing ISO 9001 audit compliance and confidence in your measurements. To learn more about NI calibration services or to locate a qualified service center near you, contact your local sales office or visit ni.com/calibration.

Technical Support

Get answers to your technical questions using the following National Instruments resources.

- **Support** - Visit ni.com/support to access the NI KnowledgeBase, example programs, and tutorials or to contact our applications engineers who are located in NI sales offices around the world and speak the local language.
- **Discussion Forums** - Visit forums.ni.com for a diverse set of discussion boards on topics you care about.
- **Online Community** - Visit community.ni.com to find, contribute, or collaborate on customer-contributed technical content with users like you.

Repair

While you may never need your hardware repaired, NI understands that unexpected events may lead to necessary repairs. NI offers repair services performed by highly trained technicians who quickly return your device with the guarantee that it will perform to factory specifications. For more information, visit ni.com/repair.

Training and Certifications

The NI training and certification program delivers the fastest, most certain route to increased proficiency and productivity using NI software and hardware. Training builds the skills to more efficiently develop robust, maintainable applications, while certification validates your knowledge and ability.

- **Classroom training in cities worldwide** - the most comprehensive hands-on training taught by engineers.
- **On-site training at your facility** - an excellent option to train multiple employees at the same time.
- **Online instructor-led training** - lower-cost, remote training if classroom or on-site courses are not possible.
- **Course kits** - lowest-cost, self-paced training that you can use as reference guides.
- **Training memberships** and training credits - to buy now and schedule training later.

Visit ni.com/training for more information.

Extended Warranty

NI offers options for extending the standard product warranty to meet the life-cycle requirements of your project. In addition, because NI understands that your requirements may change, the extended warranty is flexible in length and easily renewed. For more information, visit ni.com/warranty.

OEM

NI offers design-in consulting and product integration assistance if you need NI products for OEM applications. For information about special pricing and services for OEM customers, visit ni.com/oem.

Alliance

Our Professional Services Team is comprised of NI applications engineers, NI Consulting Services, and a worldwide National Instruments Alliance Partner program of more than 700 independent consultants and integrators. Services range from start-up assistance to turnkey system integration. Visit ni.com/alliance.

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Detailed Specifications

This topic lists specifications for the NI PXIe-4353 module. These specifications are typical for the range of 0 to 55 °C unless otherwise stated. The system must be allowed to warm up for 15 minutes to achieve the rated accuracy. All specifications are subject to change without notice. Visit ni.com/manuals for the most current specifications and product documentation.

Note Keep the filler panels on all unused slots in your chassis to maintain forced air cooling.

Thermocouple Measurement Accuracy [1]

Type	–100 to 0 °C	0 to 300 °C	300 to 900 °C	900 to 1400 °C
J/N	0.44 °C	0.33 °C	0.45 °C	0.54 °C
K	0.42 °C	0.36 °C	0.56 °C	0.86 °C
T/E	0.45 °C	0.30 °C	0.47 °C	—
R/S	—	0.77 °C	0.59 °C	0.69 °C
B	—	—	0.97 °C	0.49 °C

Input Characteristics

Number of channels	32 thermocouple channels, 2 autozero channels, 8 cold-junction compensation channels
ADC resolution	24 bits
Type of ADC	Delta-Sigma
Sampling mode	Scanned
Maximum sample rate	90 S/s (Refer to *Timing* for more details.)
Voltage measurement range	±80 mV
Temperature measurement range	Full NIST temperature range (J, K, T, E, N, B, R, S thermocouple types)
50/60 Hz noise rejection (High resolution mode)	70 dB
Differential input impedance	20 MΩ
DC linearity	20 ppm typical, 60 ppm max
Open Thermocouple Detection (OTD)	
Selection	On/off, software selectable per module
Detection	Per channel
Input current	

OTD Enabled	17 nA
OTD Disabled	400 pA
Common Mode Voltage Range	
Channel-to-COM,	
Channel-to-channel	±10 V
COM-to-earth ground	±300 V
Common Mode Rejection Ratio (CMRR)	
Channel-to-COM at DC	100 dB
COM-to-earth ground at DC, 50/60 Hz	>170 dB

ADC Timing Modes [2]	CMRR (50/60 Hz) Channel-to-COM
1 (High Resolution)	110 dB
2	85 dB
3	75 dB
4	70 dB
5	70 dB
6	70 dB
7 (High Speed)	70 dB

Input Bandwidth (–3 dB)

ADC Timing Modes [2]	Input Bandwidth
1 (High Resolution)	14 Hz
2	17 Hz
3	32 Hz
4	57 Hz
5	61 Hz
6	67 Hz
7 (High Speed)	67 Hz

Overvoltage Protection

Between any CJC pin, TC input pin, and COM	±60 V
Between RSVD lines and COM	±24 V

Voltage Measurement Accuracy

ADC Timing Modes [2]	Offset Error with Open Thermocouple Detection Disabled [3]				Gain Error (% of Reading) 23 °C ±5 °C	
	Typical (23 °C ±5 °C)		Maximum (23 °C ±5 °C)			
	Autozero Enabled	Autozero Disabled	Autozero Enabled	Autozero Disabled	Typical	Maximum
1 (High Resolution)	1.0 µ V	3.5 µ V	2.0 µ V	9.5 µ V	0.03%	0.04%
2	1.0 µ V	3.5 µ V	2.0 µ V	9.5 µ V	0.03%	0.04%
3	1.0 µ V	3.5 µ V	2.0 µ V	9.5 µ V	0.03%	0.04%
4	2.0 µ V	4.5 µ V	3.0 µ V	10.5 µ V	0.03%	0.04%
5	3.0 µ V	7.0 µ V	5.0 µ V	13.0 µ V	0.04%	0.05%
6	4.5 µ V	8.5 µ V	6.5 µ V	14.5 µ V	0.04%	0.05%
7 (High Speed)	5.0 µ V	9.0 µ V	7.5 µ V	15.5 µ V	0.04%	0.05%

Input Noise

ADC Timing Modes [2]	Input Noise [4]	
1 (High Res.)	200 nV_{rms}	1.34 μV_{pk-pk}
2	200 nV_{rms}	1.34 μV_{pk-pk}

ADC Timing Modes [2]	Input Noise [4]	
3	280 nV_{rms}	1.84 μV_{pk-pk}
4	370 nV_{rms}	2.6 μV_{pk-pk}
5	750 nV_{rms}	6.3 μV_{pk-pk}
6	1.05 μV_{rms}	8.3 μV_{pk-pk}
7 (High Speed)	2.0 μV_{rms}	24 μV_{pk-pk}

Measurement Sensitivity [5]

ADC Timing Modes [2]	Type J, K, T, E	Type N	Type B	Type R, S
1 (High Res.)	≤ 0.01 °C	< 0.02 °C	< 0.10 °C	< 0.08 °C
2	≤ 0.01 °C	< 0.02 °C	< 0.10 °C	< 0.08 °C
3	< 0.02 °C	< 0.02 °C	≤ 0.13 °C	≤ 0.11 °C
4	< 0.02 °C	< 0.03 °C	< 0.18 °C	≤ 0.14 °C
5	< 0.04 °C	< 0.06 °C	< 0.35 °C	< 0.29 °C
6	< 0.06 °C	< 0.08 °C	< 0.49 °C	< 0.40 °C
7 (High Speed)	< 0.11 °C	< 0.14 °C	< 0.93 °C	< 0.77 °C

Input Stability

	Typical	Max
Offset stability with autozero enabled	10 nV/°C	50 nV/°C
Offset stability with autozero disabled	0.3 µ V/°C	0.9 µ V/°C
Gain stability	4 ppm/°C	15 ppm/°C

Cold-Junction Compensation Accuracy

	Typical		Max	
	23 °C ±5 °C	0 to 55 °C	23 °C ±5 °C	0 to 55 °C
PXIe-4353 CJC channel accuracy	0.02 °C	0.03 °C	0.03 °C	0.05 °C
Total CJC accuracy using TB-4353 [6]	0.22 °C	0.38 °C	0.33 °C	0.50 °C

Temperature Measurement Accuracy

The following thermocouple measurement tables show the accuracy for each thermocouple type under the following conditions:

- The module is connected to a TB-4353.
- Autozero is enabled.
- Open thermocouple detection is disabled. [7]
- 0 V common mode voltage.

The tables include all measurement errors of the module and the terminal block. The tables do not include the accuracy of the thermocouple itself.

Thermocouple Type J/N Measurement Accuracy (°C)

		–100 °C	0 °C	100 °C	300 °C	500 °C	700 °C	900 °C	1100 °C	1400 °C
High Resolution	Typical 23 °C ±5 °C	0.44	0.33	0.29	0.32	0.36	0.40	0.45	0.54	—
	Max 23 °C ±5 °C	0.78	0.59	0.52	0.51	0.57	0.63	0.70	0.81	—
	Max 0–55 °C	1.25	0.94	0.78	0.84	0.99	1.09	1.27	1.51	—
High Speed	Typical 23 °C ±5 °C	0.77	0.59	0.51	0.51	0.55	0.62	0.70	0.80	—
	Max 23 °C ±5 °C	1.18	0.91	0.79	0.76	0.80	0.89	0.99	1.12	—
	Max 0–55 °C	1.66	1.26	1.06	1.07	1.18	1.35	1.55	1.80	—

Thermocouple Type K Measurement Accuracy (°C)

		–100 °C	0 °C	100 °C	300 °C	500 °C	700 °C	900 °C	1100 °C	1400 °C
High Resolution	Typical 23 °C ±5 °C	0.42	0.29	0.26	0.36	0.35	0.45	0.56	0.64	0.86
	Max 23 °C ±5 °C	0.70	0.49	0.46	0.58	0.59	0.70	0.85	0.97	1.26
	Max 0–55 °C	1.14	0.79	0.71	0.92	1.02	1.24	1.50	1.76	2.29
High Speed	Typical 23 °C ±5 °C	0.65	0.46	0.43	0.55	0.56	0.67	0.82	0.93	1.22

		–100 °C	0 °C	100 °C	300 °C	500 °C	700 °C	900 °C	1100 °C	1400 °C
	Max 23 °C ±5 °C	0.98	0.70	0.66	0.80	0.82	0.96	1.14	1.30	1.66
	Max 0–55 °C	1.43	1.00	0.91	1.14	1.25	1.49	1.80	2.09	2.68

Thermocouple Type T/E Measurement Accuracy (°C)

		–100 °C	0 °C	100 °C	300 °C	500 °C	700 °C	900 °C	1100 °C	1400 °C
High Resolution	Typical 23 °C ±5 °C	0.45	0.30	0.26	0.27	0.32	0.39	0.47	—	—
	Max 23 °C ±5 °C	0.75	0.51	0.44	0.43	0.48	0.58	0.69	—	—
	Max 0–55 °C	1.27	0.85	0.69	0.71	0.86	1.06	1.28	—	—
High Speed	Typical 23 °C ±5 °C	0.70	0.47	0.41	0.40	0.44	0.54	0.64	—	—
	Max 23 °C ±5 °C	1.05	0.73	0.62	0.59	0.63	0.75	0.88	—	—
	Max 0–55 °C	1.57	1.07	0.87	0.87	1.00	1.23	1.47	—	—

Thermocouple Type R/S Measurement Accuracy (°C)

		–100 °C	0 °C	100 °C	300 °C	500 °C	700 °C	900 °C	1100 °C	1400 °C
High Resolution	Typical 23 °C ±5 °C	—	0.77	0.57	0.51	0.53	0.56	0.59	0.61	0.69
	Max 23 °C ±5 °C	—	1.65	1.20	1.04	1.04	1.06	1.07	1.09	1.18
	Max 0–55 °C	—	2.29	1.64	1.48	1.53	1.62	1.69	1.77	1.99
High Speed	Typical 23 °C ±5 °C	—	2.01	1.46	1.25	1.23	1.24	1.24	1.25	1.34
	Max 23 °C ±5 °C	—	3.15	2.30	1.95	1.89	1.88	1.86	1.86	1.96
	Max 0–55 °C	—	3.80	2.73	2.38	2.39	2.44	2.48	2.54	2.77

Thermocouple Type B Measurement Accuracy (°C)

		–100 °C	0 °C	100 °C	300 °C	500 °C	700 °C	900 °C	1100 °C	1400 °C
High Resolution	Typical 23 °C ±5 °C	—	—	—	0.97	0.64	0.54	0.48	0.47	0.49
	Max 23 °C ±5 °C	—	—	—	2.31	1.47	1.16	1.01	0.94	0.92
	Max 0–55 °C	—	—	—	2.96	1.94	1.60	1.45	1.41	1.46
High Speed	Typical 23 °C ±5 °C	—	—	—	3.12	1.96	1.53	1.31	1.19	1.15
	Max 23 °C ±5 °C	—	—	—	4.93	3.08	2.38	2.01	1.82	1.72
	Max 0–55 °C	—	—	—	5.58	3.55	2.81	2.45	2.29	2.26

Additional Maximum Error When Open Thermocouple Detection Is Enabled (°C) [8]

	–100 °C	0 °C	100 °C	300 °C	500 °C	700 °C	900 °C	1100 °C	1400 °C
J/N	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.03	—
K	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03
T/E	0.03	0.02	0.02	0.02	0.01	0.01	0.01	—	—
R/S	—	0.18	0.13	0.10	0.10	0.09	0.08	0.08	0.08
B	—	—	—	0.31	0.19	0.14	0.11	0.10	0.08

Timing

Note To maintain the specified accuracy, the maximum allowable sample rate is 90 S/s.

ADC Timing Modes [2]	ADC Conversion Rate	Max Sample Rate [9] (32 Channels)
1 (High Resolution) [10]	17 Hz	1 S/s
2	34 Hz	2 S/s
3	68 Hz	4 S/s
4	136 Hz	8 S/s
5	272 Hz	16 S/s
6	544 Hz	32 S/s
7 (High Speed)	1530 Hz	90 S/s

Digital Triggers

PXI_TRIG <0..7>, PXI_STAR, PXIe_DSTAR <A..B>

Source	
Purpose	Start Trigger, Reference Trigger, Pause Trigger
Polarity	Software-selectable
Debounce filter settings	Disable, 90 ns, 5.12 µs, 2.56 ms, Custom interval

Clocking

Source	Onboard Clock, PXI_Trig <0..7>, PXI_STAR, PXIe_DSTAR <A..B>, PXIe_Clk100 (RefClk only)
Destination	Sample Clock, Sample Clock Timebase, Reference Clock
Polarity	Software-selectable (except Reference Clock)
Debounce filter settings (Sample clock only)	Disable, 90 ns, 5.12 µs, 2.56 ms, Custom interval

Reference clock locking frequencies

Reference Signal	Locking Input Frequency (MHz)		
	10	20	100
PXIe_DSTAR <A..B>			
PXI_STAR			—
PXIe_CLK100	—	—	
PXI_TRIG <0..7>			—

Note National Instruments does not recommend locking to non-selected frequencies.

Output Timing Signals

Source	Start Trigger, Reference Trigger, Pause Trigger, Sample Clock, Various derived timebases and clocks
Destination	PXI_Trig <0..7>, PXIe_DSTAR C
Polarity	Software-selectable

Bus Interface

Form factor	x1 PXI Express peripheral module, Specification v1.0 compliant
Slot compatibility	x1 and x4 PXI Express or PXI Express hybrid slots
DMA channels	1, analog input

Calibration

You can obtain the calibration certificate and information about calibration services for the NI PXIe-4353 at ni.com/calibration.

Recommended warm-up time	15 minutes
Calibration interval	1 year

Power Requirements

+3.3 V	570 mA
+12 V	200 mA

Physical Requirements

Dimensions	Standard 3U PXIe, 16 × 10 cm (6.3 × 3.9 in.)
Weight	139 g (4.9 oz)
I/O connector	96-pin male DIN 41612/IEC 60603-2 connector

Environmental Specifications

Maximum altitude	2,000 m (800 mbar)
Pollution Degree	2

Indoor use only	
Operating Environment	
Ambient temperature range	0 to 55 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2. Meets MIL-PRF-28800F Class 3 low temperature limit and MIL-PRF-28800F Class 2 high temperature limit.)
Relative humidity range	10% to 90%, noncondensing (Tested in accordance with IEC-60068-2-56.)
Storage Environment	
Ambient temperature range	–40 to 71°C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2. Meets MIL-PRF-28800F Class 3 limits.)
Relative humidity range	5% to 95%, noncondensing (Tested in accordance with IEC-60068-2-56.)

Shock and Vibration

Operating shock	30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC-60068-2-27. Meets MIL-PRF-28800F Class 2 limits.)
Random vibration	
Operating	5 to 500 Hz, 0.3 g_{rms}
Non-operating	5 to 500 Hz, 2.4 g_{rms} (Tested in accordance with IEC-60068-2-64. Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

Safety Voltages

Connect only voltages that are within the following limits.	
Between any TC+ and TC–	±80 mV
Between any TC terminal and COM	±10 V
Between CJC+ and CJC–	±1.024 V
Isolation	
Channel-to-channel	None
Channel-to-earth ground	
Continuous	300 V_{rms}, Measurement Category II
Withstand	2,300 V_{rms}, verified by a 5 s dielectric withstand test

Measurement Category II is for measurements performed on circuits directly connected to the electrical distribution system.

This category refers to local-level electrical distribution, such as that provided by a standard wall outlet, for example, 115 V for U.S. or 230 V for Europe.

Caution Do *not* connect the NI PXIe-4353 to signals or use for measurements within Measurement Categories III or IV.

Safety Standards

This product is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1

Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

Note For the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.

Note For EMC compliance, operate this device with shielded cables.

CE Compliance CE

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

- 2006/95/EC; Low-Voltage Directive (safety)

- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit ni.com/certification, search by module number or product line, and click the appropriate link in the Certification column.

Environmental Management

National Instruments is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial not only to the environment but also to NI customers.

For additional environmental information, refer to the *NI and the Environment* Web page at ni.com/environment. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers At the end of the product life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste Electrical and Electronic Equipment, visit ni.com/environment/weee.htm.

电子信息产品污染控制管理办法 （中国 RoHS）

中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。
关于 National Instruments 中国 RoHS 合规性信息，请登录 ni.com/environment/rohs_china。
(For information about China RoHS compliance, go to ni.com/environment/rohs_china.)

[1] The values in this table are typical for 23 °C ±5 °C when using the module in the High Resolution ADC timing mode. For detailed accuracy tables, including maximum specifications, refer to the *Temperature Measurement Accuracy* section.

[2] Refer to the *NI PXIe-4353 User Manual* for more information about ADC timing modes..

[3] If open thermocouple detection is enabled, there is additional offset due to input current. To determine the additional offset, refer to the *Input Current* specification and multiply by the lead-wire resistance, which is the sum of the resistance of both thermocouple leads. All offsets assume the lead-wire resistance is ≤ 50 Ω when open thermocouple detection is disabled.

[4] Multiply noise by $\sqrt{2}$ if using the autozero channel for each sample.

[5] Measurement sensitivity represents the smallest change in temperature that the module can detect. It is a function of input noise. The values assume the full measurement range of the standard thermocouple sensor according to NIST Monograph 175.

[6] Includes thermistor and isothermal errors and assumes that the module and terminal block are maintained at a stable ambient temperature. Refer to the *SC Express 4353 Installation and Terminal Block Specifications* document for proper set up instructions.

[7] For more information, refer to the *Additional Maximum Error When Open Thermocouple Detection Is Enabled (°C)* table.

[8] Per 50 Ω of lead-wire resistance, which is the sum of the resistance of both thermocouple leads. Add the values in the table to the accuracy numbers shown in the *Thermocouple Measurement Accuracy* tables to get the total error when open thermocouple detection is enabled.

[9] With autozero enabled.

[10] ADC Timing Mode 1 is the default setting for the On Demand timing mode when sample rate is not explicitly selected.

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