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PXIe-1491

DEVICE SPECIFICATIONS

NI PXIe-1491

This document lists specifications for the NI PXIe-1491 high-definition multimedia interface (HDMI) analyzer.

Specifications are warranted under the following conditions: you have installed software support for the NI PXIe-1491. Install one of the following software applications to automatically install software support: NI Picture Quality Analysis (PQA) 1.5 or later, NI Video Measurement Suite (VMS) 3.2 or later, or NI AudioMASTER 6.3 or later.



Note The features and functions of the NI PXIe-1491 depend on the software support you install.

Specifications describe the warranted, traceable product performance over ambient temperature ranges of 0 °C to 55 °C, unless otherwise noted.

Typical values describe useful product performance beyond specifications that are not covered by warranty and do not include guardbands for measurement uncertainty or drift. Typical values may not be verified on all units shipped from the factory. Unless otherwise noted, typical values cover the expected performance of units over ambient temperature ranges of 23 °C ± 5 °C with a 90% confidence level, based on measurements taken during development or production.

Nominal values (or supplemental information) describe additional information about the product that may be useful, including expected performance that is not covered under *Specifications* or *Typical* values. Nominal values are not covered by warranty.

Specifications are subject to change without notice. For the most recent NI PXIe-1491 specifications, visit ni.com/manuals.



Caution Refer to the *Read Me First: Safety and Electromagnetic Compatibility* document for important safety and electromagnetic compatibility information. To obtain a copy of this document online, visit ni.com/manuals and search for the document title.

To access documentation for the software applications that support the NI PXIe-1491, navigate to **Start»All Programs»National Instruments»<Application>»Documentation**, where **<Application>** stands for NI PQA 1.5 or later, NI VMS 3.2 or later, or NI AudioMASTER 6.3 or later, depending on which applications you have installed.



Caution To ensure the specified EMC performance, operate this product only with HDMI-compliant cables and accessories.

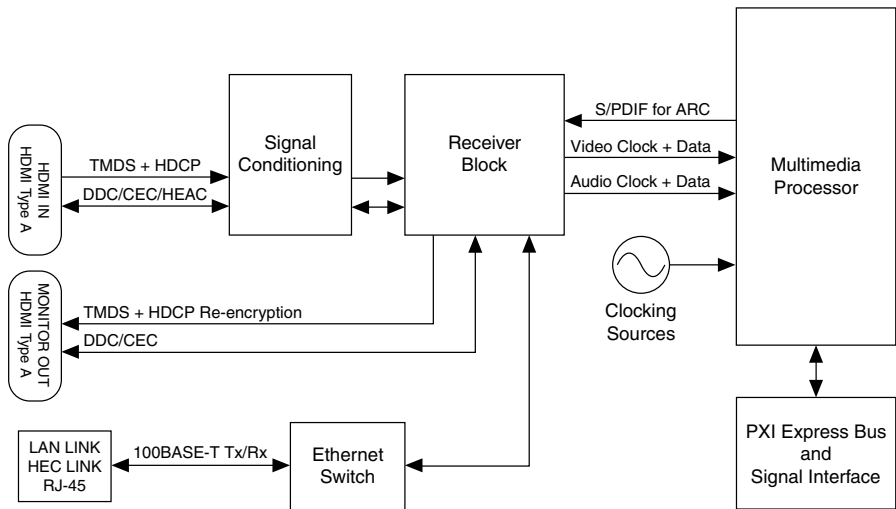
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Hardware Block Diagram

The following figure shows the hardware block diagram of the NI PXIe-1491.

Figure 1. NI PXIe-1491 Hardware Block Diagram



HDMI Input (HDMI IN connector)

HDMI functions ¹	Video, audio, CEC, ARC, HEC, HPD
TMDS clock rate ²	25 MHz to 225 MHz
Video clock rate.....	25 MHz to 165 MHz
HDMI version.....	1.4b
Maximum resolution ³	
60 Hz (HDTV).....	1080p
30 Hz (3D HDTV).....	1080p
60 Hz UXGA graphics.....	1600 × 1200
Color depth.....	8 bits to 12 bits per color channel ⁴
Chroma formats	
RGB.....	4:4:4
YCbCr.....	4:4:4 or 4:2:2
Audio channels ⁵	8-channel LPCM or encoded audio
Audio sample rate.....	32 kHz to 192 kHz
ARC channels.....	2
ARC sample rates.....	32, 44.1, or 48 kHz
ARC sample rate accuracy, typical.....	35 ppm
HDCP version.....	1.4
HEC data rate, nominal.....	100 Mbps



Note To modify the capabilities of the NI PXIe-1491 as presented to the HDMI source, use the NI EDID Update Utility. For example, you might want to do so in order to match the HDMI capabilities of the NI PXIe-1491 to those of a device under test.

¹ This feature depends on the software support you install for the NI PXIe-1491.
² The TMDS clock rate is higher than the video clock rate for deep color video formats.
³ The actual resolution in 3D depends on the 3D mode. Higher frame rates are possible for lower spatial resolutions.
⁴ Deep color video is 10 bits or 12 bits per channel.
⁵ Depending on software support, you can program this feature.

Monitor Output (MONITOR OUT connector)

Function ⁶	Repeater
Source.....	HDMI IN connector
HDMI functions.....	Video, audio

Video Triggers

Trigger type.....	Start
Sources.....	Immediate, PXI_TRIG<0..7>
Detection.....	Immediate, PXI_TRIG<0..7>
Detection start.....	Edge (rising or falling)
Minimum detectable pulse width.....	64 ns
Destinations ⁷	PXI_TRIG<0...7>

Audio Triggers

Trigger type.....	Start
Sources.....	Immediate, PXI_TRIG<0..7>, or Audio channel <0..7>
Detection ⁸	
Audio channel.....	Level crossing
PXI_TRIG<0..7>.....	Edge (rising or falling)
Minimum detectable pulse width.....	64 ns
Destinations ⁹	PXI_TRIG<0...7>

⁶ The HDMI monitor output provides the content from the HDMI IN connector. The video format and frame rate for the monitor output are the same as for the input.

⁷ 200 ns pulse width, typical.

⁸ This feature depends on the software support you install for the NI PXIe-1491. Depending on support, you can program the level and hysteresis.

⁹ 200 ns pulse width, typical.

Software

Driver software.....	The NI PXIe-1491 is supported through application software. When you install the software support, you are prompted to install any drivers required by the software.
Application software.....	Install one of the following software applications to automatically install software support for the NI PXIe-1491: NI Picture Quality Analysis (PQA) 1.5 or later, NI Video Measurement Suite (VMS) 3.2 or later, or NI AudioMASTER 6.3 or later.
Application development environments.....	Controlling the NI PXIe-1491 is supported in LabVIEW via NI PQA or NI VMS. NI CEC, NI EDID, and NI HPD provide additional functionality.
Testing sequence environment.....	NI AudioMASTER, NI PQA, and NI VMS support controlling the NI PXIe-1491 through NI TestStand.



Note Refer to the *NI PXIe-1491 Getting Started Guide* for more information about software support for the environments in which you can program the NI PXIe-1491.

Power

+3.3 VDC.....	2.3 A
+12 VDC.....	2.4 A
+5 V _{aux}	None
Total power.....	30 W

Dimensions and Weight

Dimensions.....	3U, One Slot, PXI Express Module 21.6 × 2.0 × 13.0 cm (8.5 × 0.8 × 5.1 in.)
Weight.....	208 g (7.3 oz)

Front Panel Connectors and Indicators

This section describes the connectors and LED indicators on the NI PXIe-1491.

Figure 2. NI PXIe-1491 Front Panel

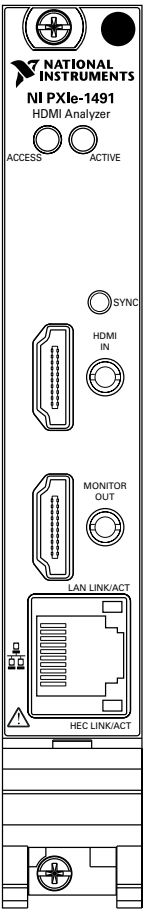


Table 1. NI PXIe-1491 Front Panel Connectors

Connector	Function(s)	Connector Type
HDMI IN	HDMI-compliant input. Depending on software support, supports audio return channel (ARC) and Ethernet over HDMI (HEC).	HDMI type A
MONITOR OUT	HDMI-compliant repeater output from the HDMI IN connector.	HDMI type A
HEC/LAN	Provides 100BASE-T access to HEC from HDMI IN connector path. Does not serve as an end-point adapter.	RJ-45

Table 2. NI PXIe-1491 Front Panel LEDs

LED	Indications
ACCESS	<p>Indicates the following basic hardware statuses of the module:</p> <ul style="list-style-type: none"> • OFF—The module is not yet initialized or detected a problem with a power rail. • AMBER—The module is being accessed. <i>Accessed</i> means that the device setup registers are being written to in order to control the device. • GREEN—The device is ready to be programmed. • RED—The device exceeded approved operating temperature and thermal shutdown occurred.
ACTIVE	<p>Indicates the following active states:</p> <ul style="list-style-type: none"> • OFF—The device is not armed, triggered, or acquiring a waveform. • AMBER—The device is armed and waiting for a trigger. • GREEN—The device received a Reference trigger. A green LED also indicates that the device is acquiring a waveform. • RED—The device detected an error. You must use the application software to access the device to determine the cause of the error. The LED remains red until the error condition is removed.
SYNC	<p>Indicates the following states for the selected input:</p> <ul style="list-style-type: none"> • OFF—No valid input signal from the source is detected, or the device is not yet in an operational state. • GREEN—The device detected a valid input signal from the source.

Table 2. NI PXIe-1491 Front Panel LEDs (Continued)

LED	Indications
LAN LINK/ACT	Indicates the following states for the selected input: <ul style="list-style-type: none">GREEN—There is a link over the Ethernet cable, but there is no active communication.BLINKING GREEN—There is active communication over the Ethernet cable.
HEC LINK/ACT	Indicates the following states for the selected input: <ul style="list-style-type: none">YELLOW—The device is not yet functional, or there is a link over the HDMI cable, but there is no active communication.BLINKING YELLOW—There is active communication over the HDMI cable.

Environment

Maximum altitude.....2,000 m (800 mbar) (at 25 °C ambient temperature)

Pollution Degree.....2

Indoor use only.

Operating Environment

Ambient temperature range.....0 °C to 55 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)

Relative humidity range.....10% to 90%, noncondensing (Tested in accordance with IEC-60068-2-56.)

Storage Environment

Ambient temperature range.....-40 °C 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 Hz to 500 Hz, 0.3 g _{rms}
Nonoperating.....	5 Hz 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.)

Compliance and Certifications

Safety

This product is designed to meet the requirements of the following electrical equipment safety standards 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
- EN 55022 (CISPR 22): Class A emissions
- EN 55024 (CISPR 24): Immunity
- AS/NZS CISPR 11: Group 1, Class A emissions
- AS/NZS CISPR 22: Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions



Note In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia, and New Zealand (per CISPR 11), Class A equipment is intended for use only in heavy-industrial locations.



Note Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.



Note For EMC declarations, certifications, and additional information, refer to the *Online Product Certification* section.

CE Compliance

This product meets the essential requirements of applicable European Directives, as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

To obtain product certifications and the DoC for this product, visit ni.com/certification, search by model number or product line, and click the appropriate link in the Certification column.

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the *Minimize Our Environmental Impact* 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.

电子信息产品污染控制管理办法（中国 RoHS）



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