Data Record System AD Specifications



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Data Record System AD Specifications

Definitions

Warranted specifications describe the performance of a model under stated operating conditions and are covered by the model warranty. Warranted specifications account for measurement uncertainties, temperature drift, and aging. Warranted specifications are ensured by design or verified during production and calibration.

Characteristics describe values that are relevant to the use of the model under stated operating conditions but are not covered by the model warranty.

- *Typical* specifications describe the performance met by a majority of models.
- *Nominal* specifications describe an attribute that is based on design, conformance testing, or supplemental testing.
- *Measured* specifications describe the measured performance of a representative model.

Specifications are *Warranted* unless otherwise noted.

Conditions

Refer to <u>ni.com/manuals</u> for detailed specifications on the specific instruments used within the Data Record System AD (Data Record System).

Specifications are valid for the system and all included instruments under the following conditions unless otherwise noted.

- Data Record System environmental characteristics are met
- Instrument-level conditions are met

Pinouts

Refer to the related links to review pinouts for each instrument. For a complete list of required hardware, refer to the *Hardware Components* topic.

Related information:

- <u>PXIe-1486 Pinout</u>
- PXIe-1487 Pinout
- PXIe-8521 Pinout
- PXIe-8522 Pinout
- PXIe-8523 Pinout

Physical Characteristics

Dimensions				
Width				
PXIe-1092DC	303.3 mm (11.94 in.)			
PXIe-1095DC	445.5 mm (17.54 in.	.)		
Depth				
PXIe-1092DC and PXIe-1095DC		463.6 mm (18.25 in.)		
Height				
PXIe-1092DC and PXIe-1095DC		177.1 mm (6.97 in.)		
Weight				
Empty PXIe-1092DC with power supply installed			11.7 kg (25.7 lb)	
Empty PXIe-1095DC with two power supplies installed 16.4 kg (36.2 lb)				

DC Power Supply Field Wiring Specifications

Notice Use only copper wire. For use in class 1 circuits only.



Note Refer to the *Data Record System AD User Manual* for the power supply connection requirements.

Gauge	2.5 mm ² to 16 mm ² (14 AW		G to 6 AWG) conductor	
Wire strip length	12 mm (0.47 in.)			
Temperature rating	60 °C minimum			
Wires per terminal	1			
Torque for screw terminals	1.7 N · m to 1.8 N · m (15 lb		• in. to 15.9 lb • in.)	
Single ferrule				
Barrel length			12 mm (0.47 in.)	
Maximum cross section of conductor plus ferrule			16 mm ² (6 AWG)	
Recommended crimping tool			Crimpfox 16 S crimping tool	
Connector securement				
Securement type		Screw lo	ocking	

Torque for screw flanges	0.3 N · m (2.7 lb · in.)

Protective Earthing

When using the product with hazardous voltage PXIe modules or I/O (>30 VAC, 42.4 V_{pk}, 60 VDC), connect the product to the protective earth terminal before connecting to DC power.



Notice The facility installation shall provide a means for connection to protective earth, and qualified personnel shall install a protective earthing conductor from the protective earthing terminal on the product to the protective earth wire in the facility.

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Notice Use only copper wire to connect the protective earthing terminal of your product to the protective earth wire in the facility.

Protective Earth Terminal Wiring

Grounding wire gauge	2.1 mm ² (14 AWG)
Ring lug	# 8
Protective earth terminal torque	1.13 N · m (10 lb · in.)

Power Requirements

Power Guidelines



Notice This product is for use only with the Data Record System AD 500W DC

Power Supply (NI part number 861354-01).

Power Specifications

Note Total available output power refers to the output power available for the controller and instruments in your chassis. This is the minimum specification guaranteed by design; the total available output power may be higher.

Input voltage rating (per power supply for the PXIe-1095DC) ¹	9 V at 68 A 30 V at 19 A
Operating voltage range	9 VDC to 30 VDC
PXIe-1092DC total available output power	283 W
PXIe-1095DC total available output power with dual power supplies	680 W
Maximum power consumption per PXI slot	58 W at 55 °C, 82 W at 40 °C
Over-current protection	Internal fuse in line
Main power disconnect	The installation must contain a suitable switch or circuit breaker for power disconnect. It must be suitably located and easily reached, and marked as the disconnect device for the equipment.

1. Do not exceed the current rating of the branch circuit providing power to the chassis.

Required power cord(s) 2.5 mm^2 to 16 mm^2 (14 AWG to 6 AWG) conductor(s)

Note Select the proper conductor size based on power source and cable routing. Ensure conductor insulation and cable construction are sufficient for the application and adhere to applicable electrical codes. Ensure none of the conductor is exposed.

Table 1. DC Output

Voltage Rail	PXIe-1092DC Maximum Current	PXIe-1095DC Maximum Current (Dual Power Supplies)	Load Regulation	Maximum Ripple and Noise (20 MHz BW)
+5V_AUX	3 A	4.2 A	±5%	50 mVpp
+12 V	22.3 A	55 A	±5%	100 mVpp
+5 V	26.5 A	21.5 A	±5%	50 mVpp
+3.3 V	36 A	60 A	±5%	50 mVpp
-12 V	1.75 A	1.3 A	±5%	50 mVpp

Table 2. Backplane Slot Current Capacity

Slot	+5 V	V (I/O)	+3.3 V	+12 V	-12 V	5 V _{AUX}
System Controller Slot	15 A	-	15 A	30 A	-	3 A
System Timing Slot	-	-	9 A	6 A	-	1 A
PXI Express Peripheral Slot (PXIe-1095DC only)	-	-	9 A	6 A	-	1 A
Hybrid Peripheral Slot with PXI-5 Peripheral	-	-	9 A	6 A	-	1 A
Hybrid Peripheral Slot with PXI-1 Peripheral	6 A	5 A	6 A	1 A	1 A	-
Expansion Slot (PXIe-1092DC only)	-	-	9 A	6 A	_	1 A

Note Total System Controller Slot current should not exceed 45 A.

Note PCI V(I/O) pins in Hybrid Peripheral Slots are connected to +5 V.

Note The maximum power dissipated in a peripheral slot should not exceed 82 W.

Over-current protection	All outputs protected from short circuit and overload with automatic recovery
Over-voltage protection	+12 V, +5 V, and +3.3 V clamped at 20% to 30% above nominal output voltage

Chassis Cooling

Module cooling			
PXIe-1092DC	Forced air circulation (positive pressurization) through two 210 CFM fans		
PXIe-1095DC	Forced air circulation (positive pressurization) through three 210 CFM fans		
Module slot airflow direction		Bottom of module to top of module	
Module intake		Rear of chassis	
Module exhaust		Top of chassis	
Slot cooling capacity		82 W	

Secondary cooling	Forced air circulation (positive pressurization) through one 70 CFM fan			
Side intake	Right side of chassis			
Side exhaust	Left side of chassis			
Power supply cooling	Forced air circulation through two integrated fans			
Power supply intake	Rear of chassis			
Power supply exhaust	Top of chassis			
Timing and Synchronization upgrade intake	Right side of chassis			
Timing and Synchronization upgrade exhaust	Top of chassis			
Minimum chassis cooling clearances				
Top and sides	44.45 mm (1.75 in.)			
Back	101.60 mm (4.00 in.)			

Environmental Characteristics

Temperature

Operating	0 °C to 55 °C for ≤ 58 W module operation 0 °C to 40 °C for > 58 W module operation			
Storage	-40 °C to 71 °C			
Humidity				
Operating		10% to 90%, noncondensing		
Storage		5% to 95%, noncondensing		
Pollution Degree		2		
Maximum altitude		2,000 m		

Shock and Vibration

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

2. This product meets the requirements of the environmental standards for electrical equipment for measurement, control, and laboratory use.

Acoustic Emissions

Sound Pressure Level (at Operator Position)

Tested in accordance with ISO 7779. Meets MIL-PRF-28800F requirements.

58 W/82 W Profile	PXIe-1092DC	PXIe-1095DC
Auto Fan (up to 30 °C ambient)	51.6 dBA	54.5 dBA
High Fan	63.7 dBA	66.1 dBA

Sound Power Level

Tested in accordance with ISO 7779.

58 W/82 W Profile	PXIe-1092DC	PXIe-1095DC
Auto Fan (up to 30 °C ambient)	62.8 dBA	64.8 dBA
High Fan	74.1 dBA	77.7 dBA

Note The protection provided by the Data Record System can be impaired if it is used in a manner not described in this documentation.

Backplane System Synchronization Clocks

10 MHz System Reference Clock: PXI_CLK10

Maximum slot-to-slot skew	250 ps
Accuracy	±25 ppm maximum (guaranteed over the operating temperature range)

Maximum jitter	5 ps RMS phase-jitter (10 Hz to 1 MHz range)
Duty-factor	45% to 55%
Unloaded signal swing	3.3 V ±0.3 V

Note For other specifications, the Data Record System complies with the *PXI-1 Hardware Specification*.

100 MHz System Reference Clock: PXIe_CLK100 and PXIe_SYNC100

Maximum slot-to-slot skew	100 ps
Accuracy	±25 ppm maximum (guaranteed over the operating temperature range)
Maximum jitter	3 ps RMS phase-jitter (10 Hz to 12 kHz range), 2 ps RMS phase-jitter (12 kHz to 20 MHz range)
Duty-factor for PXIe_CLK100	45% to 55%
Absolute differential voltage (When terminated with a 50 Ω load to 1.30 V or Thévenin equivalent)	400 mV to 1000 mV



Note For other specifications, the Data Record System complies with the

PXI-5 PXI Express Hardware Specification.

External 10 MHz Reference Out (Timing and Synchronization Option, Rear Panel SMA)

Accuracy	±80 ppb maximum within 1 year of calibration adjustment within 0 °C to 55 °C operating temperature range (after 24 hours of operation); ±50 ppb/year long-term stability (after 72 hours of operation)
Maximum jitter	5 ps RMS phase-jitter (10 Hz to 1 MHz range)
Output amplitude	1 Vpp ±20% square-wave into 50 Ω, 2 Vpp unloaded
Output impedance	50 Ω ±5 Ω

External Clock Source

Frequency	10 MHz ±25 ppm
Input amplitude	
External 10 MHz Reference IN (Timing and Synchronization option, rear panel SMA)	100 mVpp to 5 Vpp square-wave or sine-wave
System timing slot PXI_CLK10_IN	5 V or 3.3 V TTL signal

Maximum jitter introduced by backplane	1 ps RMS phase-jitter (10 Hz to 1 MHz range)
Rear panel SMA input impedance (Timing and Synchronization option)	50 Ω ±5 Ω

PXI Star Trigger

Maximum slot-to-slot skew	250 ps
Backplane characteristic impedance	$65\Omega\pm10\%$

For other specifications, the Data Record System complies with the **PXI-1 Hardware Specification**.

PXI Differential Star Triggers: PXIe-DSTARA, PXIe-DSTARB, and PXIe-DSTARC

Maximum slot-to-slot skew	150 ps
Maximum differential skew	25 ps
Backplane differential impedance	100 Ω ±10%

For other specifications, the Data Record System complies with the **PXI-5 PXI Express Hardware Specification**.

Remote Inhibit and Chassis Monitoring Connector (Timing and Synchronization Option)

Inhibit input signal	
Input voltage range	-0.5 V minimum to 5.5 V maximum
V _{IH}	2.0 V
V _{IL}	0.8 V
Input impedance	High-Z (>10 kΩ typical)



Note Internal 10 k Ω pull-up to an internal +3.3V_AUX rail.

Fault output signal					
Output voltage range	0 V to 3.3 V typical				
V _{OH}	2.4 V minimum (I _{OH} < 8 mA)				
V _{OL}	0.4 V maximum (I _{OL} < 8 mA)				
Output impedance	65 Ω typical				
PFI lines					
Input voltage range -0.	-0.5 V minimum to 4.6 V maximum				

V _{IH}	2.0 V
VIL	0.8 V
Input impedance	High-Z (>10 kΩ typical)
Output voltage range	0 V to 3.3 V typical
V _{OH}	2.4 V minimum (I _{OH} < 8 mA)
V _{OL}	0.4 V maximum (I _{OL} < 8 mA)
Output impedance	65 Ω typical

Hardware Components

The following components are used within the Data Record System.



Note Detailed specifications for hardware components are available online at <u>ni.com/manuals</u>.

Table 3. Required Hardware Components

Component Type	Part	Description	
Chassis (select one)	PXIe-1092DC	10-slot (7 hybrid slots) 3U PXI Express Chassis	
	PXIe-1095DC	18-slot (5 hybrid slots) 3U PXI Express Chassis	
PXI Controller	<u>PXIe-8861</u>	2.8 GHz quad-core Intel Xeon PXI	

Component Type	Part	Description
(select one)		controller
	<u>PXIe-8880</u>	2.3 GHz eight-core Intel Xeon PXI controller
	<u>PXIe-8881</u> ³	3.9 GHz eight-core Intel Xeon PXI controller
Customer- Provided Peripheral Components	Keyboard and mouse	USB keyboard and optical USB mouse
	Monitor	Computer monitor

The Data Record System includes the Timing and Synchronization chassis upgrade, but your system must contain at least one of the following instruments in order to enable this functionality:

- PXIe-1486
- PXIe-1487
- PXIe-8523
- PXIe-8522
- PXIe-8521
- PXIe-8510
- PXI-6683H



Note The maximum quantities listed in the following table are based on power budgeting constraints as well as chassis slot capacity.

Table 4. Optional Hardware Components

Component Type	Part	Description	Maximum Quantity in PXIe-1092DC	Maximum Quantity in PXIe-1095DC	Cable Connection Type
Camera Interface	<u>PXIe-1486</u>	2-slot FPD- LINK III interface instrument, 8	2	5	FPD-Link III with power over coax cable

3. The PXIe-8881 controller is functionally supported, but its high power consumption levels must be taken into account during power budgeting.

Component Type	Part	Description	Maximum Quantity in PXIe-1092DC	Maximum Quantity in PXIe-1095DC	Cable Connection Type
		input deserializers option or 4 input deserializers and 4 output serializers option			
	<u>PXIe-1487</u>	2-slot GMSL interface instrument, 8 input deserializers option or 4 input deserializers and 4 output serializers option	2	5	GMSL2 with power over coax cable
	<u>PXIe-7976</u>	2 GB DRAM PXI FPGA instrument for FlexRIO, K410T FPGA, 3.2 GB/s	5	12	Adapter module
	<u>PXIe-8245</u>	1 Gigabit Ethernet instrument, 4 port	8	17	Ethernet cable
	<u>PXIe-8246</u>	Power over Ethernet, 1 Gigabit Ethernet instrument, 4 port	8	17	Ethernet cable
Automotive Bus Interface	<u>PXIe-8523</u>	100/ 1000BASE-T1	5	17	Automotive Ethernet

Component Type	Part	Description	Maximum Quantity in PXIe-1092DC	Maximum Quantity in PXIe-1095DC	Cable Connection Type
		automotive Ethernet interface instrument, 4 port			
	<u>PXIe-8522</u>	1000BASE-T1 automotive Ethernet interface instrument, 4 port	5	17	Automotive Ethernet
	<u>PXIe-8521</u>	100BASE-T1 automotive Ethernet interface instrument, 4 port	8	17	Automotive Ethernet
	<u>PXI-8517</u>	FlexRay interface, 2 port	7	5	9-pin D-SUB serial connector, SMB coax cable
	<u>PXIe-8510</u>	CAN/LIN through NI- XNET interface (vehicle networks), 2 port or 6 port	8	17	XNET to CAN/ LIN transceiver
	<u>PXIe-8240</u>	40 Gigabit Ethernet instrument, 2 port	6	17	Ethernet cable
	<u>PXIe-8238</u>	10 Gigabit	8	17	Ethernet cable

Component Type	Part	Description	Maximum Quantity in PXIe-1092DC	Maximum Quantity in PXIe-1095DC	Cable Connection Type
		Ethernet instrument, 2 port			
	<u>PXIe-8245</u>	1 Gigabit Ethernet instrument, 4 port	8	17	Ethernet cable
	<u>PXIe-8246</u>	Power over Ethernet, 1 Gigabit Ethernet instrument, 4 port	8	17	Ethernet cable
	<u>PXIe-8623</u>	100/ 1000BASE-T Ethernet interface instrument, 4 port, with 802.1AS timestamping	5	17	Ethernet cable
	<u>PXIe-6592R</u>	High-speed serial instrument (10 Gbps) with SFP+ adapter	3	12	Ethernet cable, SMB coax cable
	<u>NI-9962</u>	3-pin push-in spring terminal (4 count) for automotive Ethernet	5	17	Automotive Ethernet
Timing and Synchronization	<u>PXI-6683H</u>	TCXO (GPS, IRIG-B, IEEE 1588)	7	5	SMB coax cable,

Component Type	Part	Description	Maximum Quantity in PXIe-1092DC	Maximum Quantity in PXIe-1095DC	Cable Connection Type
					Ethernet cable
Data Storage	<u>PXIe-8267</u> ⁴	15 TB SSD, data storage instrument (5 GB/s), 1 slot	3	12	N/A
	<u>PXIe-8394</u>	x8 Gen 3 MXI- Express daisy chain interface	5	17	MXI-Express cable
Slot Filler	PXI Filler Panel	1-slot PXI filler panel	9	17	N/A

 Documentation for the 4 TB variant of the PXIe-8267 applies to the 15 TB variant with the exception of the storage specifications, power consumption, and slot cooling capacity requirements. Refer to *PXIe-8267 Safety, Environmental, and Regulatory Information* for requirements specific to the 15 TB variant.