cDAQ-9191 Specifications

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Definitions

Warranted specifications describe the performance of a model under stated operating conditions and are covered by the model warranty.

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.

Specifications are ***Typical*** unless otherwise noted.

Conditions

Specifications are valid at 25 °C unless otherwise noted.

Analog Input

Input FIFO size	127 samples
Maximum sample rate[1]	Determined by the C Series module
Timing accuracy[2]	50 ppm of sample rate

Timing resolution[2]	12.5 ns
Number of channels supported	Determined by the C Series module

Analog Output

Number of channels supported	
Hardware-timed task	
Onboard regeneration	16
Non-regeneration	Determined by the C Series module
Non-hardware-timed task	Determined by the C Series module
Maximum update rate	
Onboard regeneration	1.6 MS/s (multi-channel, aggregate)
Non-regeneration	Determined by the C Series module
Timing accuracy	50 ppm of sample rate
Timing resolution	12.5 ns
Output FIFO size	
Onboard regeneration	8,191 samples shared among channels used

Non-regeneration	127 samples
AO waveform modes	Non-periodic waveform, periodic waveform regeneration mode from onboard memory, periodic waveform regeneration from host buffer including dynamic update

Digital Waveform Characteristics

Waveform acquisition (DI) FIFO	
Parallel modules	511 samples
Serial modules	63 samples
Waveform generation (DO) FIFO	
Parallel modules	2,047 samples
Serial modules	63 samples
Digital input sample clock frequency	
Streaming to application memory	System-dependent
Finite	0 MHz to 10 MHz
Digital output sample clock frequency	
Streaming from application memory	System-dependent

Regeneration from FIFO	0 MHz to 10 MHz
Finite	0 MHz to 10 MHz
Timing accuracy	50 ppm

General-Purpose Counters/Timers

Number of counters/ timers	4
Resolution	32 bits
Counter measurements	Edge counting, pulse, semi-period, period, two-edge separation, pulse width
Position measurements	X1, X2, X4 quadrature encoding with Channel Z reloading; two-pulse encoding
Output applications	Pulse, pulse train with dynamic updates, frequency division, equivalent time sampling
Internal base clocks	80 MHz, 20 MHz, 100 kHz
External base clock frequency	0 MHz to 20 MHz

Base clock accuracy	50 ppm
Output frequency	0 MHz to 20 MHz
Inputs	Gate, Source, HW_Arm, Aux, A, B, Z, Up_Down
Routing options for inputs	Any module PFI,analog trigger, many internal signals
FIFO	Dedicated 127-sample FIFO

Frequency Generator

Number of channels	1
Base clocks	20 MHz, 10 MHz, 100 kHz
Divisors	1 to 16 (integers)
Base clock accuracy	50 ppm
Output	Any module PFI terminal

Module PFI Characteristics

Functionality	Static digital input, static digital output, timing input, and timing output
Timing output sources[3]	Many analog input, analog output, counter, digital input, and digital output timing signals
Timing input frequency	0 MHz to 20 MHz
Timing output frequency	0 MHz to 20 MHz

Digital Triggers

Source	Any module PFI terminal
Polarity	Software-selectable for most signals
Analog input function	Start Trigger, Reference Trigger,Pause Trigger,Sample Clock,Sample Clock Timebase
Analog output function	Start Trigger, Pause Trigger,Sample Clock,Sample Clock Timebase
Counter/timer function	Gate, Source, HW_Arm, Aux, A, B, Z, Up_Down

Module I/O States

At power-on	Module-dependent. Refer to the documentation for each C Series module.

Network Interface

Network protocols	TCP/IP, UDP
Network ports used	HTTP:80 (configuration only), TCP:3580; UDP:5353 (configuration only), TCP:5353 (configuration only); TCP:31415; UDP:7865 (configuration only), UDP:8473 (configuration only)
Network IP configuration	DHCP + Link-Local, DHCP, Static, Link-Local
High-performance data streams	6
Data stream types available	Analog input, analog output, digital input, digital output, counter/timer input, counter/timer output, NI-XNET[4]
Default MTU size	1500 bytes

Ethernet

Network interface	100 Base-TX, full-duplex; 100 Base-TX,half-duplex;10 Base-T,full-duplex;10 Base-T,half-duplex
Communication rates	10/100 Mbps, auto-negotiated
Maximum cabling distance	100 m/segment

Wireless

Radio mode	IEEE 802.11b, 802.11g
Wireless mode	Infrastructure and Ad-Hoc
Infrastructure	
Security types	Open, WEP-40, WEP-104, WPA, WPA2, WPA2-Enterprise
Enterprise security EAP types	EAP-TLS, EAP-TTLS/MS-CHAPv2, PEAPv0/MS-CHAPv2
Ad-Hoc security types	WEP-40, WEP-104
Channel[5]	1 to 14
Center frequency	

11b	2412 MHz to 2484 MHz
11g	2412 MHz to 2472 MHz
Channel interval	
11b	5 MHz
11g	5 MHz
Modulation type	
11b	DSSS (CCK, DQPSK, DBPSK)
11g	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)

Table 1. Transmission Power

Specification	Channel(s)	Maximum Radio Output
11b	1 to 14	16 dBm
11g	1	12 dBm
	2	16 dBm
	3, 4	15.5 dBm
	5 to 7	15 dBm
	8 to 10	14.5 dBm
	11 to 13	14 dBm

Note Transmission power levels in the EU have been lowered to 10 dBm to comply with ETSI EN 300 328 v1.8.1 beginning in firmware version 1.7. The

> lower transmission power is in effect on any cDAQ-9191 units that have been configured in NI Measurement & Automation Explorer (MAX) for countries affected by EN 300 328.

Table 2. Receiver Sensitivity

Specification	Rate	Sensitivity
11b, FER<8%	11 Mbps	-82 dB/minimum
	5.5 Mbps	-84 dB/minimum
	2 Mbps	-86 dB/minimum
	1 Mbps	-88 dB/minimum
11g, PER<10%	54 Mbps	-68 dB/minimum
	48 Mbps	-68 dB/minimum
	36 Mbps	-75 dB/minimum
	24 Mbps	-79 dB/minimum
	18 Mbps	-82 dB/minimum
	12 Mbps	-84 dB/minimum
	9 Mbps	-87 dB/minimum
	6 Mbps	-88 dB/minimum

Antenna

Connector	Bulkhead RP-SMA connector
Electrical performance	
VSWR	Maximum 2.0 (2.4 GHz to 2.5 GHz)
Impedance	50 Ω nominal

Directivity	Omni
Maximum gain	2.0 dBi (2.4 GHz to 2.5 GHz)

Power Requirements

Note Some C Series modules have additional power requirements. For more information about C Series module power requirements, refer to the documentation for each C Series module.

Note Sleep mode for C Series modules is not supported in the cDAQ-9191.

Voltage input range	9 V to 30 V
Maximum power consumption[6]	6 W

Note The maximum power consumption specification is based on a fully populated system running a high-stress application at elevated ambient temperature and with all C Series modules consuming the maximum allowed power.

Power input connector	2 positions 3.5 mm pitch mini-combicon screw terminal with screw flanges, Phoenix Contact 1727566
Power input mating connector	Sauro CTF020V8, Phoenix Contact 1714977, or equivalent

Physical Characteristics

Weight (unloaded)	
Without antenna	481 g (16.9 oz)
With antenna	491 g (17.3 oz)
Dimensions (unloaded)	
Without antenna	202.7 mm × 88.7 mm × 33.6 mm (7.98 in. × 3.49 in. × 1.32 in.)
Antenna, attached and fully extended	109.9 mm (4.33 in.)

If you need to clean the chassis, wipe it with a dry towel.

Figure 1. cDAQ-9191 Dimensions

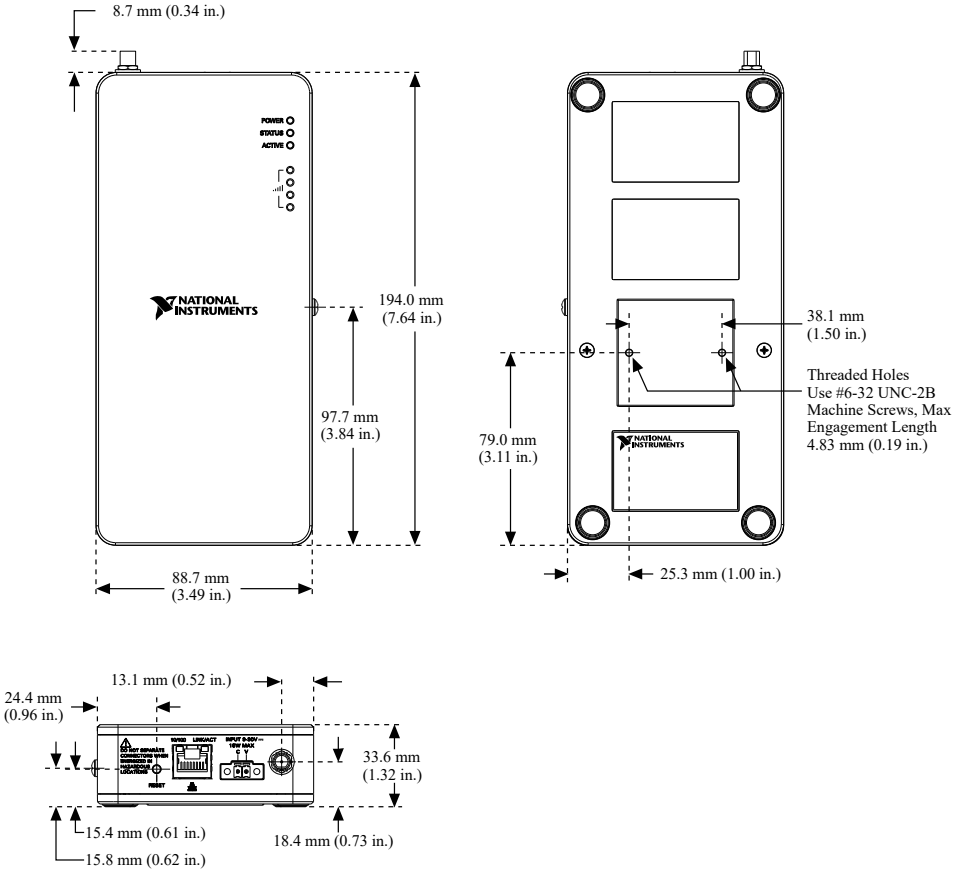
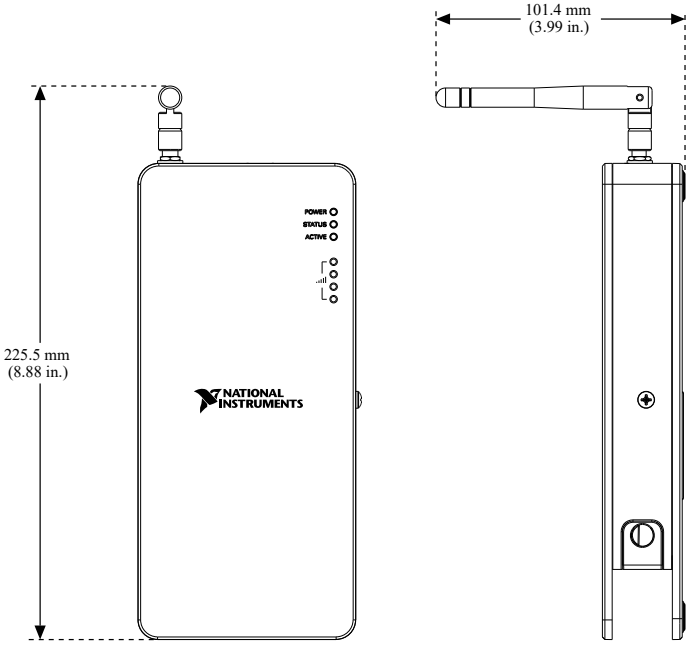


Figure 2. cDAQ-9191 Antenna Dimensions



Safety Voltages

Connect only voltages that are within these limits.

V terminal to C terminal	30 V maximum, Measurement Category I

RF Safety

This equipment complies with FCC radiation exposure limits set for uncontrolled equipment and meets the FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET65. This product generates and radiates radio frequency energy. To comply with the radio frequency radiation exposure guidelines in an uncontrolled environment, this equipment should be installed and operated with at least 20 cm and more between the radiator and the person's body.

Environmental

Operating temperature (IEC 60068-2-1 and IEC 60068-2-2)	0 °C to 55 °C

Caution To maintain product performance and accuracy specifications when the ambient temperature is between 45 and 55 °C, you must mount the chassis horizontally to a metal panel or surface using the screw holes or the panel mount kit. Measure the ambient temperature at each side of the CompactDAQ system 63.5 mm (2.5 in.) from the side and 25.4 mm (1.0 in.) from the rear cover of the system. For further information about mounting configurations, go to `ni.com/info` and enter the Info Code `cdaqmounting`.

Storage temperature (IEC 60068-2-1 and IEC 60068-2-2)	-10 °C to 70 °C

Ingress protection	IP 30
Operating humidity (IEC 60068-2-56)	10% to 90% RH, noncondensing
Storage humidity (IEC 60068-2-56)	5% to 95% RH, noncondensing
Pollution Degree	2
Maximum altitude	5,000 m

Indoor use only.

Hazardous Locations

U.S. (UL)	; ,
Canada (C-UL)	;
Europe (ATEX) and International (IECEx)	DEMKO ATEX IECEx

Shock and Vibration

To meet these specifications, you must direct mount the cDAQ-9191 system and affix ferrules to the ends of the terminal lines.

Operational shock	30 g peak, half-sine, 11 ms pulse
Random vibration	
Operating	5 Hz to 500 Hz,0.3 g_{rms}
Non-operating	5 Hz to 500 Hz,2.4 g_{rms}

Safety and Hazardous Locations Standards

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 C22.2 No. 61010-1
- EN 60079-0:2012, EN 60079-15:2010
- IEC 60079-0: Ed 6, IEC 60079-15; Ed 4
- UL 60079-0; Ed 6, UL 60079-15; Ed 4
- CSA C22.2 No. 60079-0, CSA C22.2 No. 60079-15

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; for radio equipment; and for telecommunication terminal equipment:

- 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 and certifications, and additional information, refer to the Online Product Certification section.

CE Compliance CE

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

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)
- 2014/34/EU; Potentially Explosive Atmospheres (ATEX)
- 2014/53/EU; Radio Equipment Directive (RED)

Product Certifications and Declarations

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for NI products, visit ni.com/product-certifications, search by model number, and click the appropriate link.

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 ***Engineering a Healthy Planet*** 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.

EU and UK Customers

- **Waste Electrical and Electronic Equipment (WEEE)**—At the end of the product life cycle, all NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit ni.com/environment/weee.

电子信息产品污染控制管理办法（中国RoHS）

- **中国RoHS**— NI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NI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`.)