cDAQ-9135 Specifications

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NI cDAQ-9135 Specifications

These specifications are for the NI cDAQ-9135 controller only. These specifications are typical at 23 °C ±5 °C unless otherwise noted. For the C Series module specifications, refer to the documentation for the C Series module you are using.

Processor

CPU	Intel Atom E3825
Number of cores	2
CPU frequency	1.33 GHz
On-die L2 cache	1 MB (shared)

Operating System

Supported operating systems	Windows Embedded Standard 7 (WES7), NI Linux Real-Time

Network/Ethernet Port

Number of ports	2
Network interface	10Base-T, 100Base-TX, and 1000Base-T Ethernet

Compatibility	IEEE 802.3
Communication rates	10 Mb/s, 100 Mb/s, 1,000 Mb/s auto-negotiated
Maximum cabling distance	100 m/segment

RS-232 Serial Port

Maximum baud rate	115,200 b/s
Data bits	5, 6, 7, 8
Stop bits	1, 2
Parity	Odd, even, mark, space
Flow control	RTS/CTS, XON/XOFF, DTR/DSR
RI wake maximum low level	0.8 V
RI wake minimum high level	2.4 V
RI overvoltage tolerance	±24 V

USB Ports

Number of ports	
Device ports	1 standard B connector
Host ports	2 standard A connectors

Note The USB device port is intended for use in device configuration, application deployment, debug, and maintenance.

USB interface	USB 2.0, Hi-Speed
Maximum data rate	480 Mb/s
Maximum current (USB host ports)	1 A (aggregate)

Mini DisplayPort

Maximum resolution	2560 × 1600 at 60 Hz

SD Card Slot

SD card support	SD and SDHC standards

Memory

Nonvolatile[1]	
SD removable (user supplied)	Up to 32 GB
SSD	32 GB
System memory	2 GB DDR3L

Note For information about the life span of the nonvolatile memory and about best practices for using nonvolatile memory, go to `ni.com/info` and enter Info Code `ssdbp`.

Data throughput	
System memory to SD removable storage[2],[3]	10 MB/s
Module slots to system memory	20 MB/s, application and system dependent

Internal Real-Time Clock

Accuracy	200 ppm; 40 ppm at 25 °C

CMOS Battery

Typical battery life with power applied to power connector	10 years

Typical battery life when stored at temperatures up to 25 °C	7.8 years
Typical battery life when stored at temperatures up to 85 °C	5.4 years

Analog Input

Input FIFO size	127 samples per slot
Maximum sample rate[4]	Determined by the C Series module or modules
Timing accuracy[5]	50 ppm of sample rate
Timing resolution[5]	12.5 ns
Number of channels supported	Determined by the C Series module or modules

Analog Output

Number of channels supported	
Hardware-timed task	
Onboard regeneration	16
Non-regeneration	Determined by the C Series module or modules

Non-hardware-timed task	Determined by the C Series module or modules
Maximum update rate	
Onboard regeneration	1.6 MS/s (multi-channel, aggregate)
Non-regeneration	Determined by the C Series module or modules
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 per slot
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 per slot

Serial modules	63 samples per slot
Waveform generation (DO) FIFO	
Parallel modules	
Slots 1 to 4	2,047 samples per slot
Slots 5 to 8	1,023 samples per slot
Serial modules	63 samples per slot

Note When parallel modules in a digital task are in slots 1 through 4, FIFO is 2,047 samples per slot for all slots. When any parallel module in a digital task is in slots 5 through 8, FIFO is 1,023 samples per slot for all eight slots.

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, controller 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 controller PFI or module PFI terminal

Module PFI Characteristics

Functionality	Static digital input, static digital output, timing input, and timing output
Timing output sources[6]	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

Controller PFI Characteristics

Maximum input or output frequency	1 MHz
Cable length	3 m (10 ft)
Cable impedance	50 Ω
PFI 0 connector	SMB
Power-on state	High impedance

Table 3. Input/Output Voltage Protection

Voltage	Minimum	Maximum
Input	-20 V	25 V
Output	-15 V	20 V

Maximum operating conditions[7]	
I_{OL} output low current	8 mA maximum

I_{OH} output high current	-8 mA maximum

Table 3. DC Input Characteristics

Voltage	Minimum	Maximum
Positive going threshold	1.43 V	2.28 V
Negative going threshold	0.86 V	1.53 V
Hysteresis	0.48 V	0.87 V

Table 3. DC Output Characteristics

Voltage	Conditions	Minimum	Maximum
High	—	—	5.25 V
	Sourcing 100 µA	4.65 V	—
	Sourcing 2 mA	3.60 V	—
	Sourcing 3.5 mA	3.44 V	—
Low	Sinking 100 µA	—	0.10 V
	Sinking 2 mA	—	0.64 V
	Sinking 3.5 mA	—	0.80 V

Digital Triggers

Source	Any controller PFI or 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 Data Interface

High-performance data streams	7
Data stream types available	Analog input, analog output, digital input, digital output, counter/timer input, counter/timer output, NI-XNET[8]

Module I/O States

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

Power Requirements

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

Note Sleep mode for C Series modules is not supported in the NI cDAQ-9135.

Voltage input range	9 to 30 V (measured at the NI cDAQ-9135 power connector)

Maximum power consumption[9]	46 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 and USB devices consuming the maximum allowed power.

Typical standby power consumption	3.4 W at 24 VDC input
Recommended power supply	100 W, 24 VDC

Typical leakage current from secondary power input (V2) while system is powered from primary power input (V1)	
At 9 V	0.40 mA
At 30 V	1.93 mA

Caution Do not connect V2 to a DC MAINS supply or to any supply requiring a connecting cable longer than 3 m (10 ft). A DC MAINS supply is a local DC electricity supply network in the infrastructure of a site or building.

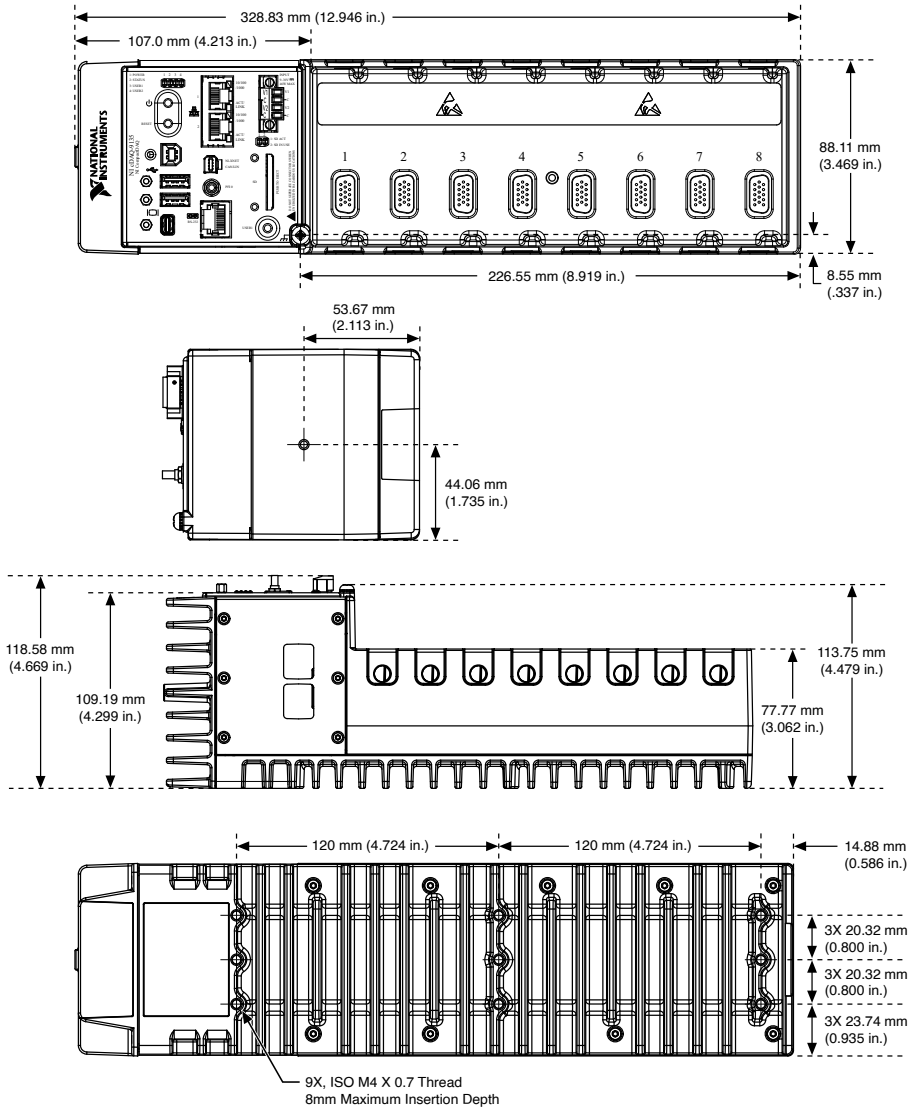
EMC ratings for inputs as described in IEC 61000	
V1	Short lines, long lines, and DC distributed networks
V2	Short lines only

Power input connector	4 position 3.5 mm pitch pluggable screw terminal with screw locks, Sauro CTF04BV8-AN000A

Physical Characteristics

Weight (unloaded)	2.5 kg (5 lb 8.2 oz)
Dimensions (unloaded)	328.8 mm × 88.1 mm × 118.6 mm (12.95 in. × 3.47 in. × 4.67 in.) Refer to the following figure.
Gauge	0.5 mm^2 to 2.1 mm^2 (20 AWG to 14 AWG) copper conductor wire
Wire strip length	6 mm (0.24 in.) of insulation stripped from the end
Temperature rating	85 °C
Torque for screw terminals	0.20 N · m to 0.25 N · m (1.8 lb · in. to 2.2 lb · in.)
Wires per screw terminal	One wire per screw terminal
Connector securement	
Securement type	Screw flanges provided
Torque for screw flanges	0.20 N · m to 0.25 N · m (1.8 lb · in. to 2.2 lb · in.)

Figure 1. NI cDAQ-9135 Dimensions



Safety Voltages

Connect only voltages that are below these limits.

V1 terminal to C terminal	30 VDC maximum, Measurement Category I
V2 terminal to C terminal	30 VDC maximum, Measurement Category I
Chassis ground to C terminal	30 VDC maximum, Measurement Category I

Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as MAINS voltage. MAINS is a hazardous live electrical supply system that powers equipment. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.

Caution Do not connect the NI cDAQ-9135 to signals or use for measurements within Measurement Categories II, III, or IV.

Attention FR translation TBD.

Note Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are for other circuits not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

Environmental

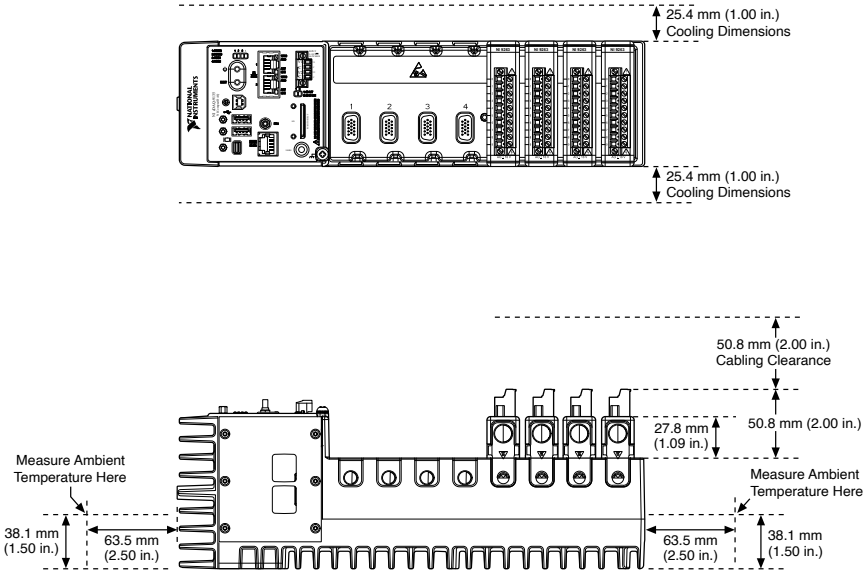
Temperature (IEC 60068-2-1 and IEC 60068-2-2)	
Operating	-40 to 70 °C
Storage	-40 to 85 °C

Caution Failure to follow the mounting instructions in the ***NI cDAQ-9132/9133/9134/9135/9136/9137 User Manual*** can cause temperature derating. For more information about mounting configurations and temperature derating, go to `ni.com/info` and enter Info Code `cdaqmounting`.

Caution To maintain product performance and accuracy specifications

> when the ambient temperature is -40 to 70 °C, you must mount the controller 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 38.1 mm(1.50 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`.

Figure 1. NI cDAQ-9135 Temperature, Cooling, and Cabling Dimensions



Humidity (IEC 60068-2-56)	
Operating	10 to 90% RH, noncondensing
Storage	5 to 95% RH, noncondensing

Ingress protection	IP 30
Pollution Degree (IEC 60664)	2

Maximum altitude	5,000 m

Indoor use only.

Hazardous Locations

U.S. (UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, AEx nA IIC T4
Canada (C-UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, Ex nA IIC T4
Europe (DEMKO)	Ex nA IIC T4 Gc

Shock and Vibration

To meet these specifications, you must mount the NI cDAQ-9135 system directly on a flat, rigid surface as described in the ***NI cDAQ-9132/9133/9134/9135/9136/9137 User Manual***, affix ferrules to the ends of the terminal wires, install an SD card cover (SD Door Kit, NI part number 783660-01), and use retention accessories for the USB host ports (NI Industrial USB Extender Cable, NI part number 152166-***xx***), USB device port (NI Locking USB Cable, NI part number 157788-01), and mini DisplayPort connector (NI Retention Accessory for Mini DisplayPort, NI part number 156866-01). All cabling should be strain relieved near input connectors. Take care to not directionally bias cable connectors within input connectors when applying strain relief.

Operating vibration	
Random	5 g RMS, 10 Hz to 500 Hz
Sinusoidal	5 g, 10 Hz to 500 Hz

Operating shock	30 g, 11 ms half sine, 50 g, 3 ms half sine, 18 shocks at 6 orientations

Safety Compliance 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, EN 60079-7
- IEC 60079-0, IEC 60079-7
- UL 60079-0, UL 60079-7
- CSA C22.2 No. 60079-0, CSA C22.2 No. 60079-7

Note For safety certifications, refer to the product label or the Product Certifications and Declarations section.

Electromagnetic Compatibility

CE Compliance CE

- 2014/34/EU; Potentially Explosive Atmospheres (ATEX)

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.

Battery Replacement and Disposal

- **Battery Directive**—This product contains a long-life coin cell battery. If you need to replace it, use the Return Material Authorization (RMA) process or contact an authorized NI service representative. For more information about compliance with the EU Battery Directive 2006/66/EC about Batteries and Accumulators and Waste Batteries and Accumulators, visit ni.com/environment/batterydirective.

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`.)