SPECIFICATIONS

NI cDAQ™-9178

NI CompactDAQ Eight-Slot USB Chassis

These specifications are for the National Instruments CompactDAQ 9178 chassis only. These specifications are typical at 25 °C unless otherwise noted. For the C Series I/O module specifications, refer to the documentation for the C Series I/O module you are using.

Analog Input

Input FIFO size.....127 samples per slot

Maximum sample rate[1].....Determined by the C Series I/O module or modules

Timing accuracy[2].....50 ppm of sample rate

Timing resolution[3].....12.5 ns

Number of channels supported.....Determined by the C Series I/O module or modules

Analog Output

Number of channels supported

- Hardware-timed task
  - Onboard regeneration.....16
  - Non-regeneration.....Determined by the C Series I/O module or modules

[1] Performance dependent on type of installed C Series I/O module and number of channels in the task.

[2] Does not include group delay. For more information, refer to the documentation for each C Series I/O module.

[3] Does not include group delay. For more information, refer to the documentation for each C Series I/O module.

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Non-hardware-timed task.....Determined by the C Series I/O module or modules

Maximum update rate

Onboard regeneration.....1.6 MS/s (multi-channel, aggregate)

Non-regeneration.....Determined by the C Series I/O 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.....127 samples per slot

Waveform generation (DO) FIFO

Slots 1 to 4.....2,047 samples

Slots 5 to 8.....1,023 samples

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

Digital input sample clock frequency

Streaming to application.....System-dependent memory

Finite.....0 to 10 MHz

Digital output sample clock frequency

Streaming from application.....System-dependent memory

Regeneration from FIFO.....0 to 10 MHz

Finite.....0 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 to 20 MHz

Base clock accuracy.....50 ppm

Output frequency.....0 to 20 MHz

Inputs.....Gate, Source, HW_Arm, Aux, A, B, Z, Up_Down

Routing options for inputs.....Any module PFI, chassis PFI BNC, 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 chassis PFI BNC or module PFI terminal

Module PFI Characteristics

Functionality.....Static digital input, static digital output, timing input, and timing output

Timing output sources[4].....Many analog input, analog output, counter, digital input, and digital output timing signals

Timing input frequency.....0 to 20 MHz

Timing output frequency.....0 to 20 MHz

Chassis PFI Characteristics

Maximum input or output frequency.....1 MHz

Cable length.....3 m (10 ft)

Cable impedance.....50 Ω

TRIG 0 (PFI 0), TRIG 1 (PFI 1).....BNC

Power-on state.....High impedance

Table 1. Input/Output Voltage Protection

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

Maximum operating conditions[5]

I_{OL} output low current.....8 mA maximum

I_{OH} output high current.....-8 mA maximum

[4] Actual signals available dependent on type of installed C Series I/O module.

[5] Stresses beyond those listed under *Maximum operating conditions* may cause permanent damage to the chassis.

Table 2. 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 chassis PFI BNC 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 I/O States

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

Note The chassis may revert the input/output of the modules to their power-on state when the USB cable is removed.

Power Requirements

Caution You must use a National Electric Code (NEC) Class 2 power source with the NI cDAQ-9178 chassis.

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

Note Sleep mode for C Series I/O modules is not supported in the NI cDAQ-9178.

Input voltage range.....9 to 30 V

Maximum required input power[6].....15 W

Power input connector.....2 positions 3.5 mm pitch pluggable screw terminal with screw locks similar to Sauro CTMH020F8-0N001

Power input mating connector.....Sauro CTF020V8, Phoenix Contact 1714977, or equivalent

Power consumption from USB, 4.10 to 5.25 V.....500 µA maximum

[6] Includes maximum 1 W module load per slot across rated temperature and product variations.

Bus Interface

USB specification.....USB 2.0 Hi-Speed

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[7]

Note If you are connecting the NI cDAQ-9178 chassis to a USB hub, the hub must be externally powered.

Physical Characteristics

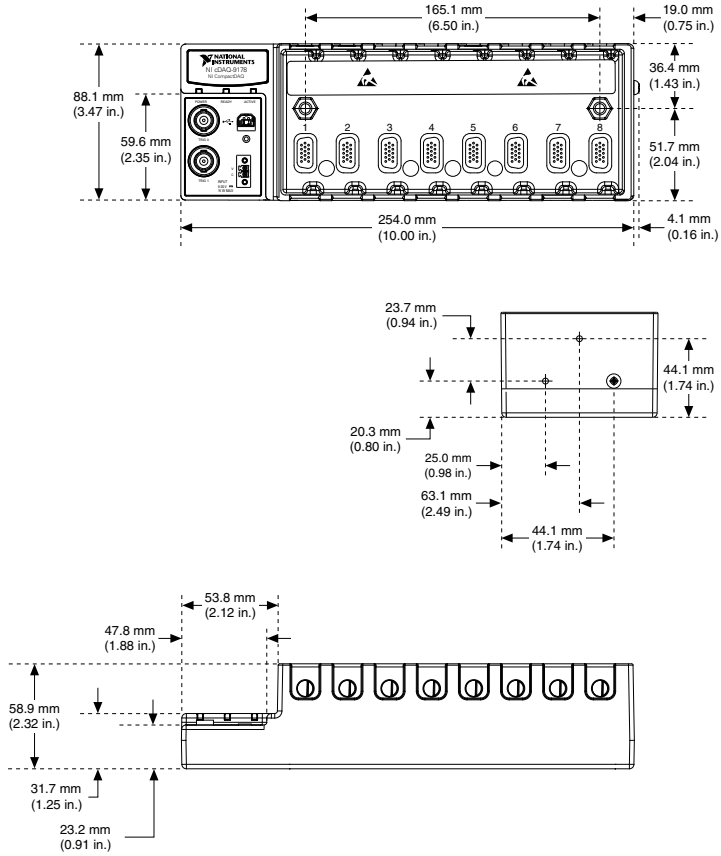
Weight (unloaded).....Approx. 878 g (31.0 oz)

Dimensions (unloaded).....254.0 mm × 88.1 mm × 58.9 mm (10 in. x 3.47 in. × 1.31 in.) Refer to the following figure.

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

[7] When a session is active, CAN or LIN (NI-XNET) C Series modules use a total of two data streams regardless of the number of NI-XNET modules in the chassis.

Figure 1. NI cDAQ-9178 Dimensions



Environmental

Operating temperature[8].....-20 °C to 55 °C (IEC-60068-2-1 and IEC-60068-2-2)

Storage temperature.....-40 °C to 85 °C (IEC-600068-2-1 and IEC-60068-2-2)

Ingress protection.....IP 30

[8] When operating the NI cDAQ-9178 in temperatures below 0 °C, you must use the PS-15 power supply or another power supply rated for below 0 °C.

Operating humidity.....10 to 90% RH, noncondensing (IEC-60068-2-56)

Storage humidity.....5 to 95% RH, noncondensing (IEC-60068-2-56)

Pollution Degree (IEC 60664).....2

Maximum altitude.....5,000 m

Indoor use only.

Shock and Vibration

To meet these specifications, you must panel mount the NI cDAQ-9178 system, use an NI locking USB cable, and affix ferrules to the ends of the terminal lines.

Operational shock.....30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC 60068-2-27. Test profile developed in accordance with MIL-PRF-28800F.)

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. Non-operating test profile exceeds the requirements of MIL PRF-28800F, Class 3.)

Safety

This product meets 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 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, 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 not only to the environment but also 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）

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.)

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