cRIO-9033 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 for -40 °C to 70 °C unless otherwise noted.

Processor

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

Operating System

Note For minimum software support information, visit ni.com/r/SWsupport.

Supported operating system	NI Linux Real-Time (64-bit)
Application software requirements	
LabVIEW	LabVIEW 2014 or later, LabVIEW Real-Time Module 2014 or later, LabVIEW FPGA Module 2014 or later

Note LabVIEW FPGA Module is not required when using Scan Interface mode. To program the user-accessible FPGA on the cRIO-9033, LabVIEW FPGA Module is required.

Note C/C++ Development Tools for NI Linux Real-Time is an optional interface for C/C++ programming of the cRIO-9033 processor. Visit ni.com/r/RIOCdev for more information about the C/C++ Development Tools for NI Linux Real-Time. For information on setting up a C/C++ based toolchain, visit ni.com/r/NILRTCrossCompile.

Driver software requirements	NI CompactRIO and Drivers August 2014 or later

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

RS-485/422 (DTE) 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	XON/XOFF
Wire mode	4-wire, 2-wire, 2-wire auto
Isolation voltage	60 V DC continuous, port to earth ground

Note The RS-485 serial port ground and shield are not connected to chassis ground. This isolation is intended to prevent ground loops and does not meet UL ratings for safety isolation.

Cable requirement	Unshielded, 30 m maximum length (limited by EMC/surge)

Note RS-485 is capable of 1.2 km (4,000 ft) length without surge limitation.

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, debugging, and maintenance.

USB interface	USB 2.0, Hi-Speed
Maximum data rate	480 Mb/s per port
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]

1. 1 MB is equal to 1 million bytes. 1 GB is equal to 1 billion bytes. The actual formatted capacity might be less.

SD removable (user supplied)	Up to 32 GB
Solid-state drive	8 GB

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

Volatile		
Processor memory		
Density		2 GB
Type		DDR3L
Maximum theoretical data rate		8.533 GB/s
Data throughput		
System memory to SD removable storage[2]	10 MB/s	
Module slots to system memory	20 MB/s, application- and system-dependent	

Reconfigurable FPGA

FPGA type	Xilinx Kintex-7 7K160T

2. Consult the manufacturer specifications of your SD removable storage.

Number of flip-flops	202,800
Number of 6-input LUTs	101,400
Number of DSP slices (18 × 25 multipliers)	600
Available block RAM	11,700 kbits
Number of DMA channels	16
Number of logical interrupts	32

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

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.

Voltage input range (measured at the cRIO-9033 power connector)	
V1	9 V to 30 V
V2	9 V to 30 V
Maximum power consumption	40 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 V DC input
Recommended power supply	100 W, 24 V DC
Typical leakage current from secondary power input (V2) while system is powered from primary power input (V1)	
At 9 V	0.4 mA
At 30 V	1.93 mA

Notice Do not connect V2 to a DC mains supply or to any supply that requires 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

Tip For two-dimensional drawings and three-dimensional models of the cRIO-9033, visit ni.com/dimensions and search by module number.

Weight (unloaded)	1,800 g (3 lb 15 oz)
Dimensions (unloaded)	219.5 mm × 88.1 mm × 109.2 mm (8.64 in. × 3.47 in. × 4.30 in.)
Screw-terminal wiring	
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.)

Safety Voltages

Connect only voltages that are below these limits.

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

Measurement Category

Caution Do not connect the product to signals or use for measurements within Measurement Categories II, III, or IV.

Attention Ne pas connecter le produit à des signaux dans les catégories de

mesure II, III ou IV et ne pas l'utiliser pour effectuer des mesures dans ces catégories.

Warning Do not connect the product to signals or use for measurements within Measurement Categories II, III, or IV, or for measurements on MAINs circuits or on circuits derived from Overvoltage Category II, III, or IV which may have transient overvoltages above what the product can withstand. The product must not be connected to circuits that have a maximum voltage above the continuous working voltage, relative to earth or to other channels, or this could damage and defeat the insulation. The product can only withstand transients up to the transient overvoltage rating without breakdown or damage to the insulation. An analysis of the working voltages, loop impedances, temporary overvoltages, and transient overvoltages in the system must be conducted prior to making measurements.

Mise en garde Ne pas connecter le produit à des signaux dans les catégories de mesure II, III ou IV et ne pas l'utiliser pour des mesures dans ces catégories, ou des mesures sur secteur ou sur des circuits dérivés de surtensions de catégorie II, III ou IV pouvant présenter des surtensions transitoires supérieures à ce que le produit peut supporter. Le produit ne doit pas être raccordé à des circuits ayant une tension maximale supérieure à la tension de fonctionnement continu, par rapport à la terre ou à d'autres voies, sous peine d'endommager et de compromettre l'isolation. Le produit peut tomber en panne et son isolation risque d'être endommagée si les tensions transitoires dépassent la surtension transitoire nominale. Une analyse des tensions de fonctionnement, des impédances de boucle, des surtensions temporaires et des surtensions transitoires dans le système doit être effectuée avant de procéder à des mesures.

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.

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 Characteristics

Temperature	
Operating	-40 °C to 70 °C
Storage	-40 °C to 85 °C
Humidity	
Operating	10% RH to 90% RH, noncondensing
Storage	5% RH to 95% RH, noncondensing
Ingress protection	IP20
Pollution Degree	2
Maximum altitude	5,000 m
Shock and Vibration	
Operating vibration	
Random	5 g RMS, 10 Hz to 500 Hz

Sinusoidal	5 g pk-pk, 10 Hz to 500 Hz
Operating shock	30 g, 11 ms half sine; 50 g, 3 ms half sine; 18 shocks at 6 orientations

To meet the shock and vibration specifications, you must mount the cRIO-9033 system directly on a flat, rigid surface as described in the user manual, affix ferrules to the ends of the terminal wires, install an SD card cover (SD Door Kit, 783660-01), and use retention accessories for the USB host ports (NI Industrial USB Extender Cable, 152166-xx), USB device port (NI Locking USB Cable, 157788-01), and mini DisplayPort connector (NI Retention Accessory for Mini DisplayPort, 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.