DNF-4-1G

FLATRACK™ Ethernet I/O DAQ Platform

- Complete DAQ interface to any input/output/sensor type
- Standard rack-mountable 1U chassis: 7.8" x 1.75" x 16.75"
- Includes dual-channel NIC, CPU, dual USB 2.0 ports, and software
- Accommodates up to four front-loading I/O boards
- Compatible with >50 standard DNF-series I/O boards
- Two independent Gigabit (1000/100/10Base-T) Ethernet Interfaces
- Inter-RACK and multiple RACK sync Interface
- AC or DC powered versions
- Rugged: 3 g Vibration, 100 g Shock, -40 to +70°C
- Real-time: 1,000 I/O scans in <1 millisecond
- Complete Windows, Linux and RTOS support
- LabVIEW,™ MATLAB,® Simulink support and more

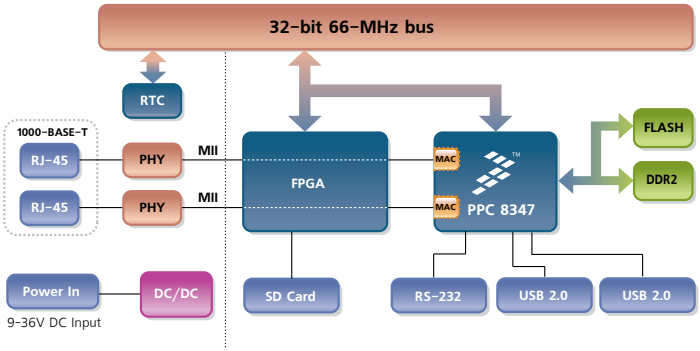
DNF-4-1G includes rack/chassis, dual channel NIC, CPU, dual USB 2.0 ports, and software. The DNF chassis is supported by all UEI I/O boards. To order a board for use in a DNF chassis, please use the DNF prefix (e.g. DNF-AI-217 or DNF-1553-553).

General Description:

The DNF-4-1G is a compact, rugged and highly integrated Ethernet I/O data acquisition platform. Its 1U FLATRACK form-factor provides a low-profile footprint for space-constrained applications that require up to four I/O boards per chassis. The platform is ideal for applications in which point-to-point signal conditioning and patch panel connections can be avoided. Its backplane electronics are identical to UEI's popular PowerDNR RACKtangle series. The DNF-4-1G series provides two Gigabit Ethernet (100/10 Base-T compatible) interfaces and front-loading slots for quick and easy implementation and configurability. These capabilities enhance usability, improve performance and simplify I/O reconfiguration. The backplane within the rack contains no active electronic components, ensuring that the platform delivers high availability (maximum MTBF and minimum MTTR) in mission-critical applications.

Like other UEI platforms, the DNF-4-1G provides an array of powerful diagnostics. Two independent Gigabit (1000/100/10Base-T) Ethernet ports allow one port to be configured as a controller, while the other serves as a real-time diagnostic interface. When used in conjunction with UEI's popular Guardian series I/O, its diagnostic capabilities are unrivaled.

Controller Block Diagram:



The DNF-4-1G houses an 8347 PowerPC CPU, two Ethernet Network Interfaces, a USB 2.0 controller port, a USB 2.0 slave port, indicator lights, timing/trigger interface, configuration ports, and power supply. I/O slots can be custom configured with over 50 I/O boards from which to choose, including analog input boards, analog output boards, digital I/O interfaces for logic and real-world signal levels, counters and timers, quadrature encoder inputs, and communications interfaces for ARINC-429, RS-232/422/485 and the CAN bus. To order I/O boards for the DNF-4-1G, simply use the DNF-prefix on the part number (e.g. DNF-AI-217).

A variety of Ethernet-based communications modes have been optimized for common application types to provide a reliable interface between the host PC and the FLATRACK. The first is simple, single point, programmed I/O. This mode is simple and suitable for systems where high speed or precision sample timing are not required. The second mode is the ACB (Advanced Circular Buffer), made to write data to and from memory buffers rather than directly to the Ethernet port. ACB mode is preferred for applications where high-speed acquisition/control and/or precise timing is required, as the buffers are large enough to ensure data is not lost due to Ethernet timing latencies. The third mode is DMAP. In DMAP mode, the FLATRACK uses UEI's patented DAQBIOS Ethernet protocol to ensure deterministic, real-time performance and achieve sub-millisecond response times across more than 1,000 I/O (analog and/or digital) points. Finally, there are two high-speed messaging modes that allow real-time performance when transferring data to and from any of the communications I/O boards (e.g. the ARINC-429 or CAN-bus interface).

No system is complete without software. The DNF-4-1G FLATRACK is supported by all popular Windows, Linux, Vista, and real-time operating systems (RTOS). The UEIDAQ Framework (included with the rack) provides a simple and universal API layer to support all common programming languages. The DNF-4-1G is also fully supported by an array of application packages including LabVIEW, MATLAB, Simulink and more.

A variety of mounting options are possible. A bracket kit (included) allows the FLATRACK to be mounted to a wall, under workstation surfaces or in datacenter environments. Brackets are also included to allow the FLATRACK to be mounted in any standard 19" rack.

There are AC and DC powered versions of the DNF-4-1G. The DC version requires a DC power source between 9 and 36 Volts. The AC unit operates from 100 to 240 VAC, from 50 to 60 Hz.

Like all DNx-series products, the DNF-4-1G is supported by UEI's **10-Year Availability Guarantee**, and is fully CE and RoHS compliant.

United Electronic Industries, Inc.
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http://www.ueidaq.com
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DNF Series Advantages

Easy to Configure and Deploy

- Gigabit Ethernet based (100/10Base-T compatible)
- Bracket kit for mounting to wall or in 19" racks
- Industrial quality rubber feet for solid table-top mounting
- Passive backplane ensures extremely low MTTR
- Standard "Off-the-shelf" products and delivery
- 10 year availability guarantee

True Real-time Performance

- 1 msec updates guaranteed with 1,000 I/O
- Up to 6 million samples per second
- Use QNX, RTX, Linux, VxWorks, InTIme and more

Flexible Connectivity

- 1000Base-T with Cat-5/5e cable
- Dual IP addresses (one control, one diagnostic)
- Built-in USB 2.0 slave and controller ports

Compact Size:

- 7.2" x 1.75" x 16.75" (including optional AC power module)
- 100 analog inputs per rack
- 128 analog outputs per rack
- 192 digital I/O bits per rack
- 32 counter/quadrature channels per rack
- 48 ARINC-429 channels per rack
- 32 RS-232/422/485 ports per rack

Low Power:

- Less than 8 watts per chassis (not including I/O)
- Universal AC, 9-36 VDC or battery powered.

Stand alone Modes

- Upgradeable to UEISIM 400R
- Upgradeable to UEIPAC 400R
- Upgradeable to UEIModbus 400R
- Upgradeable to UEIOPCUA 400R

Rugged and Industrial:

- Solid Aluminium construction
- 130,000 hour MTBF
- Operation tested from -40°C to +70°C
- Vibration tested to 3 g, (operating)
- Shock tested to 100 g (operating)
- All I/O isolated from rack and host PC.

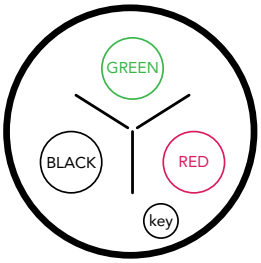
Outstanding Software Support

- Windows, Linux, RTX, InTime, VXworks and QNX operating systems
- VB, VB .NET, C, C#, C++, J#
- MATLAB, LabVIEW, DASYLab, OPC, ActiveX support

Technical Specifications:

Standard Interfaces	
To Host Computer	Two independent 1000Base-T Gigabit Ethernet ports (100/10Base-T compatible)
Distance from host	100 meters, max
Other Interfaces	One USB 2.0 controller, One USB 2.0 slave port.
Config/General	RS-232, 9-pin "D"
Sync	Custom cable to sync multiple racks
I/O Slots Available	
DNF-4-1G	4 slots
Allowable I/O configs	Any DNF-series I/O boards may be installed in any of the four slots.
Data transfer and communications rates	
Ethernet data transfer rate	20 megabytes per second
Analog data transfer rate	up to 6 megasample per sec (16-bit samples)
DMAP I/O mode	update 1000 I/O channels (analog and/or digital) in less than 1 millisecond, guaranteed
Processor	
CPU	Freescale 8347, 400 MHz, 32-bit
Memory	128 MB (not including on-board Flash)
Status LEDs	Power supplies within spec, One second system heart-beat, Attention, Read/Write, Power, Communications Active
Environmental	
Temp (operating)	Tested to -40 °C to 70 °C
Temp (storage)	-40 °C to 85 °C
Humidity	0 to 95%, non-condensing
Vibration	
(IEC 60068-2-64)	10–500 Hz, 3 g (rms), Broad-band random
(IEC 60068-2-6)	10–500 Hz, 3 g, Sinusoidal
Shock	
(IEC 60068-2-27)	100 g, 3 ms half sine, 18 shocks at 6 orientations; 30 g, 11 ms half sine, 18 shocks at 6 orientations
RoHS	All DNF series products are fully RoHS compliant
EMC testing	Fully CE/CSA/FCC tested and certified
MTBF	130,000 hours
Physical Dimensions	
Size	7.2" x 1.75" x 16.75" (AC or DC model)
Weight *(not including I/O boards)*	DNF-4-1G-DC: 3.5 Lbs (1.6 kg) DNF-4-1G-AC: 4.0 Lbs (1.8 kg)
Power Requirements	
Voltage	9 - 36 VDC, 100 - 240 VAC (50-60 Hz)
Power Dissipation	8 W (not including I/O boards)
Power Monitoring	
Internal power supplies	All internal power supplies monitored to ±1% accuracy. All internal PS voltages may be read by host. LED annunciators indicate out of range
Input current	Monitored by host, LED indicates over-current
Input voltage	Monitored by host, LED indicates out of range

DNF-4-1G-DC Power Connections



- **Green connects to the chassis**
- **Red is VCC**
- **Black is ground**

DC power mating/cable connector is: Conxall's 6380-3SG-311. Diagram shown is looking into the connector on the DNF-4-1G-DC chassis.

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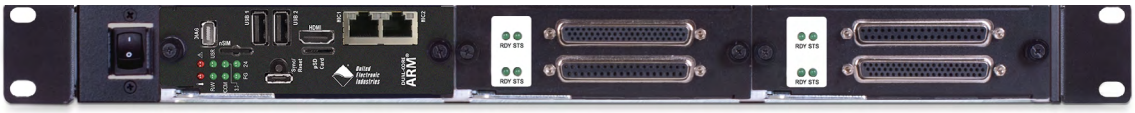
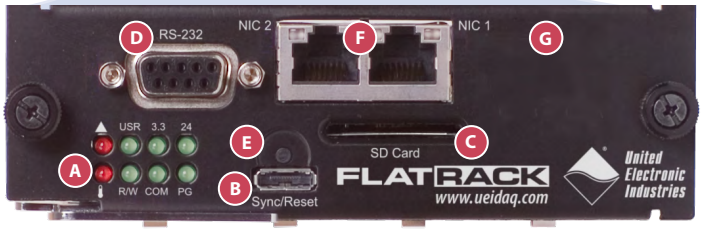
CPU and NIC Interface



CPU and NIC Interface



A. Status LEDs

These LED indicators display the status of a variety of internally monitored parameters, including: Internal temperature, system self-test status, bus activity, SD card activity as well as providing indication that required CPU/NIC power supply voltages are within specifications. A user controllable USR LED can be controlled by a service technician via the application to confirm that s/he is working on the correct rack in multiple rack installations.

B. Sync Connector

High-speed RACK-to-RACK synchronization connector. This connector allows triggers or clocks to be shared among racks. Two racks may be connected together directly or larger systems may take advantage of the DNA-SYNC interface to share timing signals among many racks.

C. SD Card Slot

Secure Digital (SD) Card slot for onboard data storage. The SD Card is used as the data storage media in the UEIPAC series. It also stores both data and Linux embedded programs deployed on the rack when using the UEIPAC or UEISIM options. Supports FAT12, FAT16 and FAT32 file systems.

D. Serial Port

The serial port is used primarily for system setup and configuration. The rack may be configured from any serial terminal running at 57,600 baud/8 data bits/no parity/1 stop bit. From a terminal program you can, for instance, change the IP address from the default, if necessary. You also download updated firmware through the serial port. The serial port is usable for RS-232 communications. For users without a convenient serial port, a USB to serial converter provides a simple and inexpensive interface.

E. Reset Button

Recessed to prevent accidental activation, this button resets the CPU layer for activities such as downloading and installing new firmware for the DNF rack.

F. Network Connectors

Each NIC interface includes two independent Gigabit Ethernet ports. The 1000/100/10Base-T interface allows the rack to be installed up to 100 Meters from your host PC.

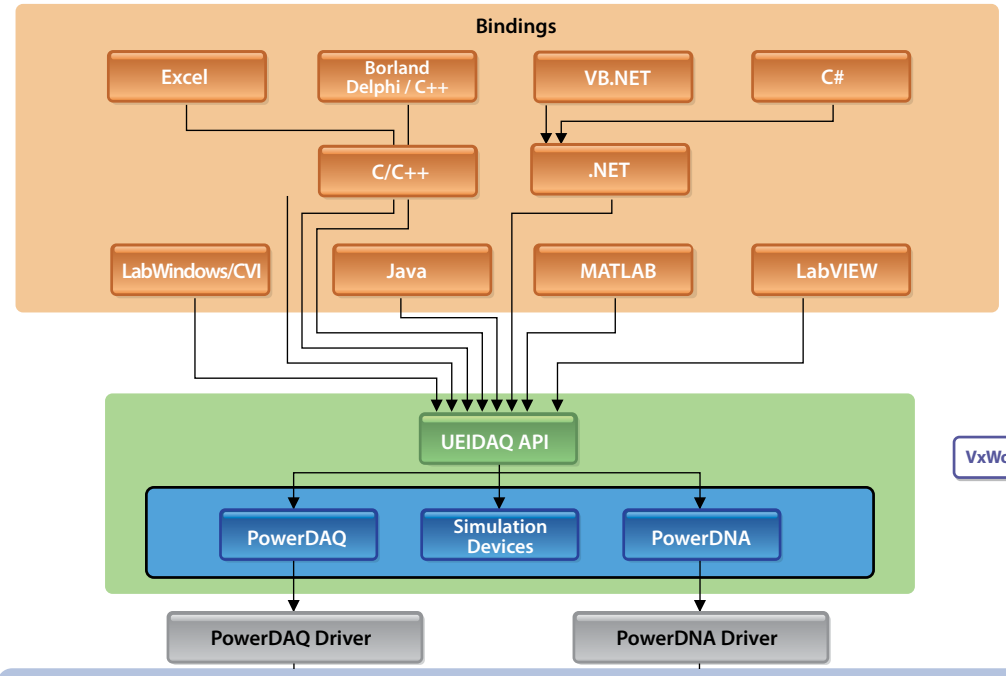
G. USB 2.0

The DNF-4-1G provides two high speed USB 2.0 interfaces. One of the USB ports is configured as a controller while the other is configured as a slave port.

Software Support

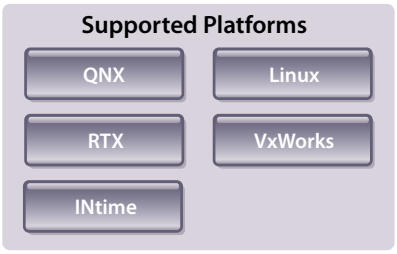
WINDOWS: 32/64-bit XP, Vista, 7, 8, 10 [Hosted Systems]

UEIDAQ Framework Library Architecture

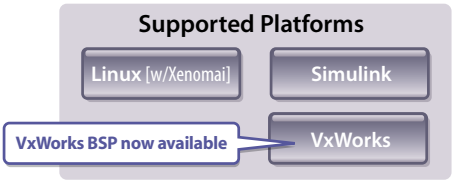


LINUX & REALTIME

Operating Systems/Extensions



RealTime Embedded Systems



Ordering Guide:

Part Number	Description
DNF Racks (includes UEIDAQ Framework software, serial and Ethernet cables)	
DNF-4-1G-AC	4 slot, 1U, 1000Base-T based DNR series Gigabit Ethernet-based DAQ and Control rack, 100-240 VAC powered
DNF-4-1G-DC	4 slot, 1U, 1000Base-T based DNR series Gigabit Ethernet-based DAQ and Control rack, 9-36 VDC powered
Extended Warranty	Option to purchase UEI's extended 3-5 year warranty is available

Specifications subject to change without notice

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