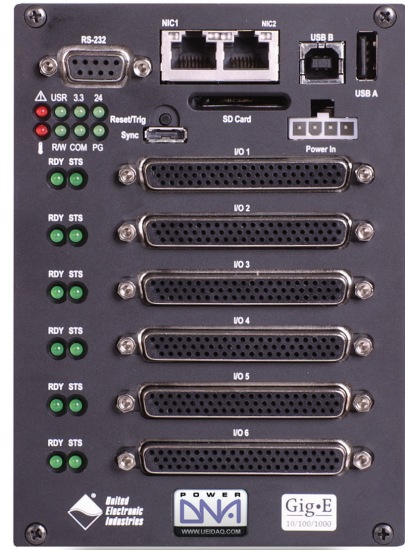


# DNA-PPCx-1G

## PowerDNA® Gigabit Ethernet I/O Cubes



- Flexible, over >80 different I/O boards available
- Two independent Gigabit (1000/100/10Base-T) Ethernet Interfaces
- One port for control, the second for diagnostics
- Sync via IEEE-1588 or Inter-Cube sync cable
- Rugged: 50 g shock, 3 g Vibration, -40 to +70 °C, 0 - 70,000 feet
- Compact
  - 4" x 4.1" x 2.7" provides 1 I/O slot (UEINet)
  - 4" x 4.1" x 4" provides 3 I/O slots (DNA-PPCx-1G)
  - 4" x 4.1" x 5.8" provides 6 I/O slots (DNA-PPC8-1G)
  - 4" x 4.1" x 6.6" provides 7 I/O slots (DNA-PPC9-1G)
- Real-time: 1000 I/O scans in < 1 millisecond
- Complete Windows, Linux, VxWorks, QNX, RTX support
- LabVIEW™, MATLAB®, support and more
- Standalone deployment as UEIPAC, UEISim or UEIModbus



### General Description:

The PowerDNA® (**D**istributed **N**etworked **A**utomation) Cube is a compact, rugged, Gigabit Ethernet-based DAQ interface. Its flexibility allows you to configure one or more cubes to match the specific I/O requirements of your application. The PowerDNA Cube is ideally suited for a wide variety of industrial, aerospace and laboratory data acquisition and control applications.

The heart of every PowerDNA system is the Cube. The PowerDNA Cubes are available in four sizes offering 1, 3, 6 or 7 I/O slots and are packed with power and flexibility. Each I/O Cube consists of two primary subsections: a Core Module and I/O slots or layers.

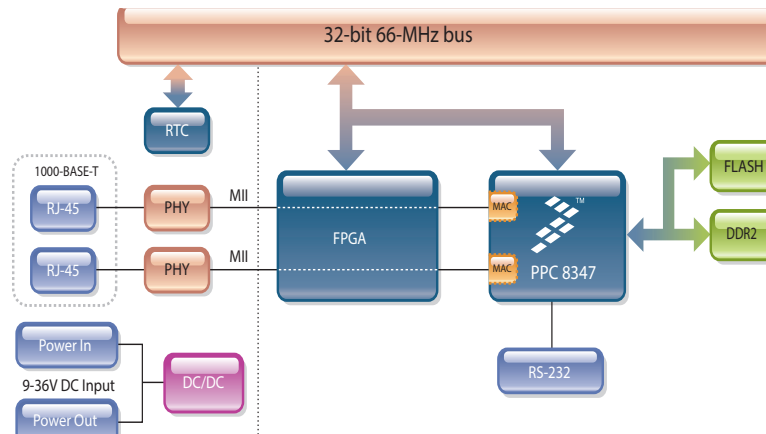
The Core Module occupies the top portion of the Cube and provides two independent Gigabit Ethernet Network Interface Controllers (NICs) with separate IP addresses. These are configured as a control port and a diagnostic port. The control port is the primary interface from the host PC to the Cube. The diagnostics port allows other computers (or a different thread on the host) to interrogate the I/O and system status of the Cube.

The core module also provides provides the 8347 series PowerPC CPU, indicator lights, timing/trigger interface, configuration ports and internal power supply. It's the brains of the Cube and controls the unit's operations including the interface with the host Controller (and other Cubes) and supervising the activity of the I/O Layers. The core module provides a wide variety of diagnostics including monitoring internal Cube temperature and power supply voltages. The core module also provides the IEEE-1588 and sync-bus interface allowing

multiple cubes to run synchronously.

The remainder of the Cube is dedicated to I/O slots or layers. These slots are populated with the I/O modules that are selected to match your process or test application. With over 70 different I/O boards available we're sure to have just what your application requires. We currently offer: Analog input boards to measure voltage, current, strain gages, thermocouples and more, Analog output boards with outputs to ±40 V or ±50 mA, Digital I/O interfaces for logic and "real-world" signal levels, counters and timers, quadrature encoder inputs, and Communications interfaces for RS-232, RS-422/485, ARINC 429/453/708, AFDX, MIL-STD-1553 and the CAN bus.

### Block Diagram:



The host communicates with the cube in one of three ways. The first is simple, single point, programmed I/O. This mode is simple and is suitable for most systems where high speed or precise sample timing is not required. The second is the ACB (Advanced Circular Buffer). In ACB mode data is written to and from buffers on the I/O boards rather than directly to the Ethernet port.

ACB mode is preferred for high speed acquisition/control or where precise timing is required as the buffers are large enough to assure data is not lost due to Ethernet timing latencies. The third mode is DMAP. In DMAP mode cubes use our patented DAQBIOS Ethernet protocol to assure deterministic real-time performance and achieve sub-millisecond response times across more than 1000 I/O (analog and/or digital) points.

Software is included, providing a comprehensive, yet easy-to-use API that supports all popular operating systems, including Windows,

## General Description (continued):

Linux, and most real-time operating systems—such as QNX, Intime, VXworks, and more. Additionally, the UEIDAQ Framework—an even higher level Windows driver—supplies complete support for those creating applications in many popular Windows programming languages, as well as data acquisition software packages such as LabVIEW and MATLAB/Simulink.

The PowerDNA cubes offer a wide variety of mounting options. A flange kit is available allowing the cubes to be mounted to a wall or other flat surface. Rack kits and DIN Rail kits are available to allow mounting in 19" racks or on DIN rails respectively.

Whether your application requires a few I/O channels or a few thousand, the PowerDNA cube is an ideal solution. The Cubes' unique

## Technical Specifications:

Standard Interfaces	
Gigabit Ethernet	Two independent 1000/100/10Base-T interfaces, each with a unique IP address (connected via standard RJ-45 connectors)
Config/General	RS-232, 9-pin "D"
Sync	Custom cable to sync multiple cubes or via optional IEEE-1588 support
I/O Slots Available	
UEINet	1 slot (4.0" x 4.1" x 2.7" width x depth x height)
DNA-PPC5-1G	3 slots (4.0" x 5.0" x 4.0" including fan)
DNA-PPC8-1G	6 slots (4.0" x 5.0" x 5.8" including fan)
DNA-PPC9-1G	7 slots (4.0" x 4.0" x 6.6" including fan)
Host Communications	
Distance from host	100 meters max, CAT5+ cable
Ethernet data transfer rate	20 megabyte per second
Analog data transfer rate	>6 megasample per second. Capable of sustained transfer of any cube configuration
DMAP I/O mode	update 1000 I/O channels (analog and/or digital) in less than 1 millisecond, guaranteed
Processor	
CPU	Freescale 8347 series, 400 MHz, 32-bit (8347E optional)
Memory	128 MB (not including on-board Flash)
Status LEDs	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)	50 g, 3 ms half sine, 18 shocks at 6 orientations; 30 g, 11 ms half sine, 18 shocks at 6 orientations
Altitude	70,000 feet, maximum
MTBF	160,000 hours
Power Requirements	
Voltage	9 - 36 VDC (AC adaptor included)
Power Dissipation	8 W at 24 VDC (not including I/O boards)

## PowerDNA Advantages:

### Easy to configure and deploy

- Over >80 different I/O boards available
- Built-in signal conditioning
- Gigabit Ethernet based (100/10Base-T compatible)
- Flange kit for mounting to wall/flat surface
- DIN rail and Rack Mount kits
- Standard "Off-the-shelf" products and delivery

### True Real-time Performance

- 1 msec updates guaranteed with 1000 I/O
- Up to 6 million samples per second
- Use QNX, RTX, VxWorks

### Flexible Connectivity

- Dual 1000Base-T Gigabit Ethernet ports with independent IPs
- 10/100Base-FX Fiber interface available (see DNA-FPPC family)

### Compact Size:

- 5.0" x 4" x 6.6" Cube holds 7 I/O boards
- 5.0" x 4" x 5.8" Cube holds 6 I/O boards
- 5.0" x 4" x 4.0" Cube holds 3 I/O boards
- 4.1" x 4" x 2.7" Cube holds 1 I/O board
- up to 175 analog inputs per cube,
- up to 224 analog outputs per cube
- up to 336 digital I/O bits per cube

### Rugged and Industrial:

- All Aluminum construction
- Operation tested from -40°C to 70°C
- Vibration tested to 3 g, (operating)
- Shock tested to 50 g (operating)
- All I/O isolated from Cube and host PC
- Operation to 70,000 feet
- Fans included

### Outstanding Software support

- Windows, Linux, RTX, VxWorks and QNX operating systems
- VB, VB .NET, C, C#, C++, Python
- MATLAB, LabVIEW, OPC, ActiveX support

## PowerDNA Cube Interface:

### A Network Connectors

Dual independent Gigabit (1000/100/10Base-T) Ethernet ports, each with a unique IP address.

### B USB Ports

The USB ports are accessible in the UEIPAC series of the Cubes.

### C SD Card Slot

The SD Card slot is not active in the standard DNA-PPCx-1G, PowerDNA mode of operation. However, the SD Card along with an internal solid-state disk drive are available for local storage on the UEIPAC series of the Cubes.

### D Serial Port

Using the supplied serial cable, you perform initial PowerDNA setup of the operating parameters 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.

### E I/O Board Slots

Cubes provide either 1, 3, 6, or 7 I/O slots. Boards installed in the I/O slots perform the various analog, digital and communications functions you need for your specific application. Your signals may be connected directly to the I/O boards via your custom cabling or take advantage of our wide variety of easy-to-use, external screw terminal panels. Boards ordered with your cube are factory installed. It is also a simple task to add boards or reconfigure a cube in the field

### F I/O Layer Status LEDs

These two green lights give a visual indication of the status of each I/O layer.

**RDY** - Ready • **STS** - Status

### G Sync Connector & Reset Button

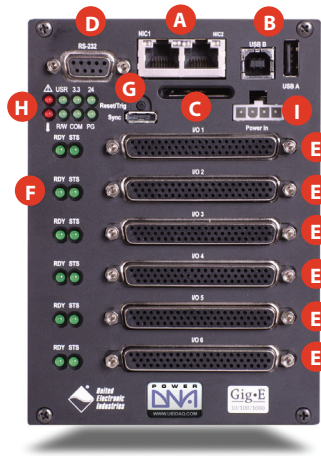
High-speed Cube-to-Cube synchronization connector allows multiple cubes to be synchronized. The reset button is Recessed to prevent accidental activation, this button resets the CPU layer for activities such as downloading and installing new firmware for the Cube.

### H Cube Status LEDs

These LEDs monitor power supplies, internal temperature, fan operation, CPU heartbeat and input current.

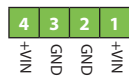
### I Power Connector

Power-In, 9-36V DC either from the DNA-PSU-24 (included with the Cube), or a user-supplied source.



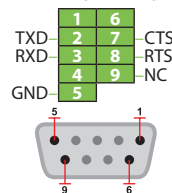
## Pinout Diagrams:

### Power In<sup>1</sup> (molex)

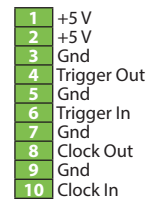


<sup>1</sup> Mating connector available from Digikey, Molex PN 39-01-4040

### Serial (RS-232)



### Synchronization



## Ordering Guide:

Part Number	Description
<b>Standard Gigabit Ethernet Cubes (includes universal AC power supply, serial and ethernet cables)</b>	
UEINET	1000Base-T I/O Cube, 1 I/O slots, 8347 CPU, sync interface
DNA-PPC5-1G	1000Base-T I/O Cube, 3 I/O slots, 8347 CPU, sync interface
DNA-PPC8-1G	1000Base-T I/O Cube, 6 I/O slots, 8347 CPU, sync interface
DNA-PPC9-1G	1000Base-T I/O Cube, 7 I/O slots, 8347 CPU, sync interface
<b>Accessories</b>	
DNA-FLANGE	Bottom-mount flange assembly allows cube to be mounted to any flat surface
UEINET-DR	DIN rail mount for the UEINET
DNA-DR5U	DIN rail mount for the DNA-PPC5-1G
DNA-DR8U	DIN rail mount for the DNA-PPC8-1G
DNA-DR9U	DIN rail mount for the DNA-PPC9-1G
DNA-ACCESSORY	PowerDNA accessories kit includes spare universal AC power supply and serial/ethernet cables
DNA-19RACKW	19" rackmount enclosure with DIN rail attached