# DNA-PPC9-1G
PowerDNA® Gigabit Ethernet I/O Cubes

- Flexible, over 60 different I/O boards available
- Two independent Gigabit (1000/100/10Base-T) Ethernet Interfaces
  One port for Control, the second for diagnostics
- Two USB 2.0 ports (one controller & one slave, (UEIPAC support only)
- Inter-Cube sync interface
- Rugged: 50 *g* shock, 3 *g* Vibration, -40 to +70 °C, 0 - 60,000 feet
- Compact
  4" x 4.1" x 6.6" provides 7 I/O slots
- Real-time: 1000 I/O scans in < 1 millisecond
- Complete Windows, Linux and RT OS support
- LabVIEW™, MATLAB®, DASYLab™ support and more
- Standalone deployment as UEIPAC, UEISim or UEIModbus

10-Year Availability Guarantee
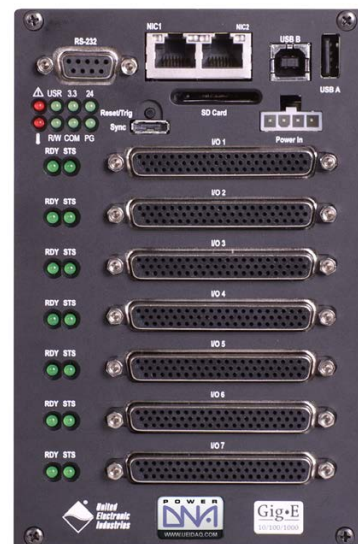
General Description:

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 PowerDNA Cubes are 4" x 4.1" x 4" (3 I/O slots), or 4" x 4.1" x 5.8" (6 I/O slots) or 4" x 4.1" x 6.6" (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.

Block Diagram:

The Core module also provides provides the 8347 series PowerPC CPU, two USB 2.0 controller ports, 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 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 30 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, MIL-STD-1553 and the CAN bus.

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

No system is complete without software. The PowerDNA Cube is supported by all the popular Windows, Linux and Real-time operating systems. Our UEIDAQ Framework provides a simple and universal API and supports all common programming languages. The Cube is also fully supported by an extensive array of application packages including LabVIEW, MATLAB, DASYLab and more.
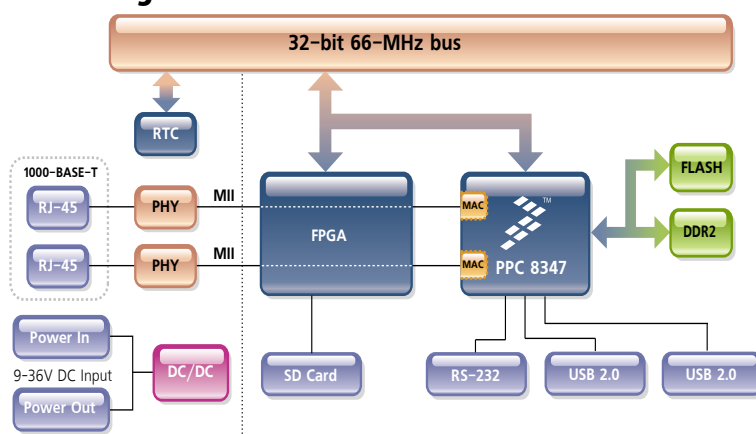
General Description (continued):

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 combination of flexibility, compact size, mechanical and electrical ruggedness and ease of use is unparalleled.

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)
USB 2.0	Two ports, one controller, one slave
Config/General	RS-232, 9-pin "D"
Sync	Custom cable to sync multiple cubes
I/O Slots Available	
DNA-PPC9-1G	7 slots
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
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 100 °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	16,000 feet, maximum
MTBF	300,000 hours
Physical Dimensions	
DNA-PPC9-1G	4.1" x 4.0" x 6.6"
Power Requirements	
Voltage	9 - 36 VDC (AC adaptor included)
Power Dissipation	13 W at 24 VDC (not including I/O boards)

PowerDNA Advantages:

Easy to configure and deploy
- Over 30 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
- Attach style carrying case available for portable deployments
- 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, RT Linux, RTAI Linux, LabVIEW RT

Flexible Connectivity
- Dual 1000Base-T Gigabit Ethernet ports with independent IPs
- Dual USB 2.0 controller ports
- 10/100Base-FX Fiber interface available (see DNA-FPPC family)
- Supports WIFI / GSM / Cell networks

Compact Size:
- 4.1" x 4" x 6.6 Cube holds 7 I/O boards
- 4.1" x 4" x 5.8 Cube holds 6 I/O boards
- 4.1" x 4" x 4" Cube holds 3 I/O boards
- 150 analog inputs per cube,
- 192 analog outputs per cube
- 288 digital I/O bits per cube.
- 48 counter/quadrature channels per cube
- 72 ARINC 429 ports per cube
- 24 Serial or CAN ports per cube

Low Power:
- Less than 13 watts per cube (not including I/O boards0
- AC, 9-36 VDC or battery powered.

Stand alone and Data Logger Modes
- DNA-PPC-G series Cubes can be upgraded with UEI-LOGGER series capabilities
- DNA-PPC-G series Cubes can be upgraded to the Linux based UEIPAC Programmable Automation Controller

Rugged and Industrial:
- All Aluminum construction
- Operation tested from -40°C to 85°C
- Vibration tested to 5 g, (operating)
- Shock tested to 50 g (operating)
- All I/O isolated from Cube and host PC.
- Operation to 70,000 feet

Outstanding Software support
- Windows, Linux, RT Linux, Windows RT, RTX, VXworks and QNX operating systems
- VB, VB .NET, C, C#, C++, J#
- MATLAB, LabVIEW, DASYLab, 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

Two USB 2.0 controller ports. Controller port suitable for connection to external peripheral devices. Slave port suitable for connecting the cube to a host computer. (Photo with dual USB ports not available at this time.).

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 UEILogger series. It is also stores both data and linux embedded programs deployed on the cube using the soon to be released embedded toolkit. Supports FAT12, FAT16 and FAT32 filesystems.

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.
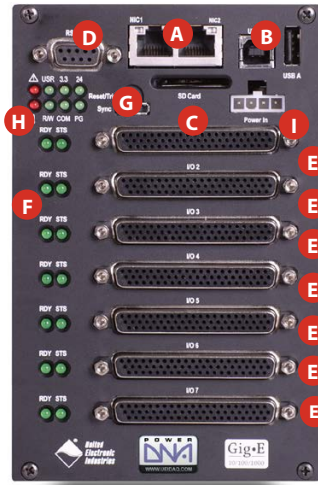
E ### I/O Board Slots

Cubes provide either 3 or 6 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 sychrnonized. 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

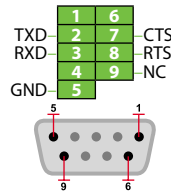Power-In, 9-36V DC either from the DNA-PSU-24 (included with the Cube), or a user-supplied source.

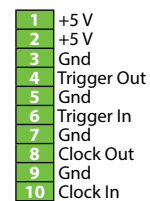
Pinout Diagrams:

Power In[1] (molex)

4	3	2	1
+VIN	GND	GND	+VIN

[1] *Mating connector available from Digikey, Molex PN 39-01-4040*

Serial (RS-232)

	1	6	
TXD	2	7	CTS
RXD	3	8	RTS
	4	9	NC
GND	5		

Synchronization

1	+5 V
2	+5 V
3	Gnd
4	Trigger Out
5	Gnd
6	Trigger In
7	Gnd
8	Clock Out
9	Gnd
10	Clock In

Ordering Guide:

Part Number	Description
Gigabit Ethernet Cubes (includes universal AC power supply, serial and ethernet cables)	
DNA-PPC5-1G	1000Base-T I/O Cube, 3 I/O slots, 8343 CPU, sync interface,
DNA-PPC8-1G	1000Base-T I/O Cube, 6 I/O slots, 8343 CPU, sync interface,
DNA-PPC9-1G	1000Base-T I/O Cube, 7 I/O slots, 8343 CPU, sync interface,
DNA-PPC9-1GNSD	1000Base-T I/O Cube, 7 I/O slots, 8343 CPU, sync interface, No slot for the SD card
Accessories	
DNA-GPS	High performance WAAS capable GPS interface 1 PPS synchronization pulse accurate to UTC ±1 μS
DNA-FLANGE	Bottom-mount flange assembly allows cube to be mounted to any flat surface
DNA-CASE	Light-weight plastic carrying case for PowerDNA Cube
DNA-ACCESSORY	PowerDNA accessories kit includes spare universal AC power supply and serial/ethernet cabels
DNA-19RACKW	19" rackmount enclosure with DIN rail attached