

DNA-MIL Cube

Four-Slot, Military-Grade I/O Chassis

- Military/Rugged 38999 connectivity (Keying optional)
- 100% COTS solution
- Supported by over 60 standard DNA-series I/O boards
- 5 g vibration, 100 g shock, sealed to IP66
- Dual GigE ports (control and diagnostic)
- Designed for MIL-STD-461/810/1275 compliance
- Extensive built-in system diagnostics
- PowerDNA, UEIPAC, UEISIM & UEIMODBUS configs.
- No rotary cooling devices
- Extensive software support including Windows, Linux, QNX, RTX and more
- VxWorks support available in embedded or hosted configurations.



The DNA-MIL provides 4 I/O slots and uses standard DNA-series I/O boards (e.g. DNA-AI-217). It is available in the standard PowerDNA configuration or as a UEIPAC or UEISIM.



General Description

The DNA-MIL is the latest deployment of UEI's popular Cube. Though the original Cubes are quite rugged, the DNA-MIL takes ruggedness to the extreme. Designed for use in the toughest environments, the new DNA-MIL is an ideal solution for military and aerospace deployments. The form factor is also ideal for a huge assortment of commercial applications including use on oil drilling platforms and refineries, heavy machinery, outdoor test stands and any other I/O application that will be exposed to the elements. All connectivity is through ROHS compliant 38999 connectors. Optional keying is available on the connectors.

Electronically, the DNA-MIL is identical to the standard DNA Series Cube except for hold-up and protection circuitry added to the power supply inputs. (This power supply conditioning is required in order to meet MIL-STD-1275.) This means the DNA-MIL uses our standard DNA Series board (e.g. DNA-AI-217 or DNA-1553-553). With over 70 unique I/O boards and 4 slots available there's sure to be a configuration perfectly matching your application.

The new DNA-MIL is designed to meet the most commonly required elements of MIL-STD-461 and -810 and is sealed to at least IP66/NEMA6 standards. All this is housed in a compact 6.2"x 7.1"x 8.7" chassis, weighing less than 11 pounds and typically consuming less than 25 Watts. In addition, no rotary cooling fans are used in the design which maximizes MTBF and mechanical reliability. All internal printed circuit boards are conformal coated to ensure the highest reliability.

The DNA-MIL chassis is available in four different deployment options. In PowerDNA, UEIPAC, UEISIM and UEIMODBUS.

PowerDNA: DNA-MIL

In PowerDNA mode, the DNA-MIL operates as a slave I/O device, running under the control of a host PC. All application code in this mode is created and run on the host. PowerDNA mode offers almost unprecedented software support including:

- All popular operating systems including Windows, Linux, VxWorks, QNX, RTX and InTime
- All popular programming languages including VB, VB.NET, C, C#, C++, JAVA
- All popular application packages including MATLAB, Simulink, LabVIEW, and more.

United Electronic Industries, Inc.
Tel: (508) 921-4600

UEIPAC 400-MIL

When deployed as a UEIPAC, the standard firmware running on a Cube is replaced by either a Linux or VxWorks operating system. The user then writes the Linux/VxWorks application that runs on the DNA-MIL. In this mode, the DNA-MIL can run fully stand-alone, or may be linked to a SCADA host via the Ethernet.

UEISIM 400-MIL

Simulink users will appreciate the ability to build models in Simulink, compile them in Embedded Coder and then deploy them on the UEISIM hardware. It's an ideal platform for testing models on actual hardware. Once the model is proven, it can be deployed using the exact same hardware.

UEIMODBUS 400-MIL

Users needing a compact, rugged Modbus TCP I/O slave will appreciate UEIMODBUS. The rugged, IP66/NEMA6 sealed DNR-MIL allows you to deploy your I/O system in the field, without any additional enclosure and protection.

The DNA-MIL platform is 100% COTS, made in the USA and supported by UEI's family of over 50 compatible analog, digital and interface I/O boards, including analog inputs up to 24-bits, thermocouples, RTDs, ICP/IEPE, ARINC-429/453/708, MIL-STD-1553, CAN, RVDT/LVDT, synchro/resolver, RS-232/422/485, strain gauge, quadrature encoder, high-voltage analog outputs (up to 115 VDC) with high drive analog output (up to 200 mA), function generator outputs and more.

Whether your application is on a ship or boat, in an aircraft, in a rocket, on an outdoor test cell, on an oil platform or simply going to be left outside and exposed to the elements, the MIL Cube is an ideal solution. Of course if you need more I/O, you should consider the 17.5" x 8.125" x 7" DNR-MIL, which offers many of the same features and options, but offers slots for up to 12 I/O boards in a much smaller chassis.



<http://www.ueidaq.com>
Fax: (508) 668-2350

The DNA-MIL includes a flange mounting kit that simplifies the installation of the Cube onto almost any flat surface.



Technical Specifications

DNA-MIL (Power DNA mode)

Computer Interface	PPCx-1G series GigE RACKtangles
Primary Ethernet Port	10/100/1000Base-T, 38999 connector
Diagnostic Port	10/100/1000Base-T, 38999 connector
Config/Serial Port	RS-232, 38999 connector
Sync	1. DNA-SYNC-1G series cables and boards provide both clock and trigger sync signals. 2. DNA-IRIG-650 board provides IRIG and GPS time synchronization
I/O Board Support	
Series supported	All DNA-series boards
Processor/system	
CPU	Freescall 8347, 400 MHz, 32-bit
Memory (RAM)	256 MB
Memory (Flash)	32 MB
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 in any RACKtangle configuration
DMAP I/O mode	update >1,000 I/O channels at 4 kHz, guaranteed
Physical Dimensions / Weight	
4 I/O slots	6.2" x 7.1" x 8.7", 11 lbs.
Environmental*	
Electrical Isolation	350 Vrms
Temp (operating)	-40 °C to 70 °C
Temp (storage)	-40 °C to 85 °C
Humidity	0 to 95%, non-condensing
Vibration	
(IEC 60068-2-64)	MIL-STD-810G plus the IEC specs below 10-500 Hz, 5 g (rms), Broad-band random
(IEC 60068-2-6)	10-500 Hz, 5 g, Sinusoidal
Shock	
(IEC 60068-2-27)	MIL-STD-810G plus the IEC stds below 100 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
EMI / RFI	Designed to meet MIL-STD-461
Power Requirements	
Voltage	9 - 36 VDC (115/220 VAC adaptor available)
Power	8 Watts (not including I/O boards)
Power Quality requirement	Designed to meet MIL-STD-1275
Reliability	
MTBF	>130,000 hours

**Also available in the
UEIMODBUS and UEIOPC-UA
Configurations!**

UEIPAC 400-MIL

Computer Interface	PPCx-1G series GigE RACKtangles
Primary Ethernet Port	10/100/1000Base-T, 38999 connector
Diagnostic Port*	10/100/1000Base-T, 38999 connector *Alternatively can be teamed/bonded with primary port.
Config/Serial Port	RS-232, 38999 connector
USB Port	USB 2.0 fully supported
Synchronization Options	1. DNA-SYNC-1G series cables and boards provide both clock and trigger sync signals. 2. DNA-IRIG-650 board provides IRIG and GPS time synchronization 3. PTP client provides software implementation of IEEE-1588
I/O Board Support	
Series supported	All DNA-series boards
Software / Operating System	
Embedded OS	Linux, kernel 2.6.x (VxWorks Available)
Real-time support	Xenomai RTOS support
Dev Language	C/C++, Eclipse IDE support,
Dev Environment	Linux PC or Cygwin Windows environment
EPICS CAS interface	Yes
SNMP Library	Yes
OS royalties	none
Processor/system	
CPU	Freescall 8347, 400 MHz, 32-bit
Memory	256 MB (128 MB avail for application SW)
FLASH memory	32 MB (16 MB available for user apps)
SD card interface	SD cards up to 32 GB
USB drive interface	Standard USB 2.0 port
Physical Dimensions	
4 I/O slots	6.2" x 7.1" x 8.7", 11 lbs.
Environmental	
Electrical Isolation	350 Vrms
Temp (operating)	-40 °C to 70 °C
Temp (storage)	-40 °C to 85 °C
Humidity	0 to 95%, non-condensing
Vibration	
(IEC 60068-2-64)	MIL-STD-810G plus the IEC specs below 10-500 Hz, 5g (rms), Broad-band random
(IEC 60068-2-6)	10-500 Hz, 5 g, Sinusoidal
Shock	
(IEC 60068-2-27)	MIL-STD-810G plus the IEC stds below 100 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
EMI / RFI	Designed to meet MIL-STD-461
Power Requirements	
Voltage	9 - 36 VDC (115/220 VAC adaptor available)
Power	8 Watts (not including I/O boards)
Power Quality requirement	Designed to meet MIL-STD-1275
Reliability	
MTBF	>130,000 hours

Technical Specifications

UEISIM 400-MIL

Computer Interface	
Primary Ethernet Port	10/100/1000Base-T, 38999 connector
Diagnostic Port	10/100/1000Base-T, 38999 connector
Daisy chain output	n/a
Optional Interface	n/a
Config/Serial Port	RS-232, 38999 connector
USB Port	USB 2.0 fully supported
Sync	DNA-SYNC-1G series cables and boards provide both clock and trigger sync signals
I/O Board Support	
Series supported	All DNA-series boards
Software Requirements	
MATLAB	Version 2007b or greater
Simulink	Version 7.0 or greater
Real-Time Workshop	Version 7.0 or greater
Software / Operating System	
Embedded OS	Linux, kernel 2.6.x, Xenomai RTOS support
Dev Language	C
Dev Environments	Simulink / RTW with Cygwin environment on a Windows PC
Processor/system	
CPU	Freescall 8347, 400 MHz, 32-bit
Memory	256 MB (128 MB available for application SW)
SD card interface	SD cards up to 32 GB
USB drive interface	Standard USB 2.0 port
Physical Dimensions	
4 I/O slots	6.2" x 7.1" x 8.7", 11 lbs.
Environmental	
Electrical Isolation	350 Vrms
Temp (operating)	-40 °C to 70 °C
Temp (storage)	-40 °C to 85 °C
Humidity	0 to 95%, non-condensing
Vibration	
(IEC 60068-2-64)	MIL-STD-810G plus the IEC specs below
(IEC 60068-2-6)	10–500 Hz, 5 g (rms), Broad-band random
	10–500 Hz, 5 g, Sinusoidal
Shock	
(IEC 60068-2-27)	MIL-STD-810G plus the IEC stds below
	100 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
EMI / RFI	Designed to meet MIL-STD-461
Power Requirements	
Voltage	9 - 36 VDC (115/220 VAC adaptor available)
Power	8 Watts (not including I/O boards)
Power Quality requirement	Designed to meet MIL-STD-1275
Reliability	
MTBF	>130,000 hours

Cables, Connectors & screw-terminal panels

Connectors

All connections to the DNA-MIL are made through standard, COTS, nickel plated 38999 connectors. I/O board connections are made through 128-pin connectors where each I/O board utilizes up to 62 of the 128 pins. The Ethernet, USB, diagnostic Serial, Sync, and hardware reset connections are via 37-pin connectors. Power supply and an auxiliary synch bus connections are through a 13-pin connector. Optional keying is available on the 128 pin, I/O connectors. For keying order:

DNA-38999-KEY Clocked/keyed I/O connectors (N, A keys)

Cables

Though most customers will design custom cables for their deployed systems, customers working on prototypes and/or those building "one of" systems may desire the ability to connect to the DNA-MIL using more traditional, commercial connections (e.g. RJ-45 for the Ethernet ports).

For these customers UEI offers a complete array of cables and screw terminal panels that will provide direct access to all signals routed in and out of the chassis.

LAN/Power Cables

DNA-CBL-LAN-06 Communications cable

6 foot cable connecting the 37-pin LAN/COM/USB port connector to standard commercial connectors. Ethernet ports come out to RJ-45, the serial port to a DB-9 and the USB ports to standard USB jacks.

DNA-CBL-1315-03 Power supply cable

Connects the 13-pin power/sync connector to a standard female DB-15 connector.

I/O board cables

Each 128 pin I/O 38999 connector provides the I/O connectivity for two I/O slots within the DNA-MIL. UEI I/O boards utilize either 37- or 62-pin D connectors and these connectors are mapped as follows.

The top and third I/O slots map to pins 1-62 on the upper and lower 128 pin 38999 respectively. The second and fourth I/O slots map to pins 65-126 on the 38999s. Note that the 37-pin based boards simply do not use pins 38-62. For this reason, most applications can standardize on 62-pin cables and screw terminal panels and simply ignore "no connection" pins. The exception to this is the STP boards that have been specifically designed for use with 37-pin boards (e.g. DNA-STP-207TC). For these boards 37-pin are also available. Also, as some I/O slots may not be utilized in a given application, cables with a single 37-pin or 62-pin D connector are also available.

The following cables provide the same I/O connectivity as the standard, commercial DNA-CBL-37S and DNA-CBL-62 series cables.

DNA-CBL-12862-05: 5 ft male 128-pin 38999 to 2x DB-62M

DNA-CBL-12837-05: 5 ft male 128-pin 38999 to 2x DB-37F

DNA-CBL-6237M-05: 5 ft male RoHS 128-pin 38999 to 1x DB-37F and 1x DB-62M

DNA-CBL-62M-03: 3 ft male 128-pin 38999 to 1x DB-62M

DNA-CBL-37M-03: 3 ft male 128-pin 38999 to 1x DB-37F

Screw Terminal Panels

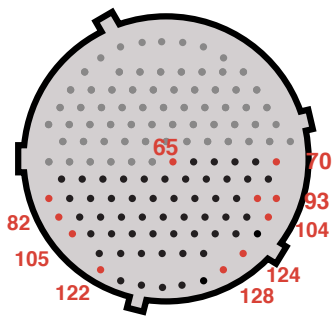
DNA-STP-37 Standard 37-pin screw terminal panel, suitable for use with all 37-pin I/O boards and cables.

DNA-STP-62 Standard 62-pin screw terminal panel, suitable for use with all 62-pin I/O boards and cables.

DNA-STP-3762 Standard 37-pin screw terminal panel, providing both 37- and 62-pin connectors and suitable for use with any combination of I/O board.

38999 Connector Pinouts

128-pin I/O — mating connector required: D38999/26FJ35PN



Pin #	I/O slot	Board Pin
1	1	1
2	1	2
3	1	3
4	1	4
5	1	5
6	1	6
7	1	7
8	1	8
9	1	9
10	1	10
11	1	11
12	1	12
13	1	13
14	1	14
15	1	15
16	1	16
17	1	17
18	1	18
19	1	19
20	1	20
21	1	21
22	1	22
23	1	23

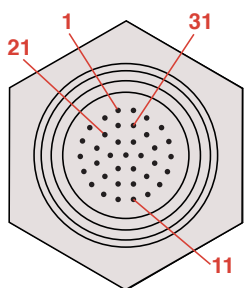
Pin #	I/O slot	Board Pin
24	1	24
25	1	25
26	1	26
27	1	27
28	1	28
29	1	29
30	1	30
31	1	31
32	1	32
33	1	33
34	1	34
35	1	35
36	1	36
37	1	37
38*	1	38
39	1	39
40	1	40
41	1	41
42	1	42
43	1	43
44	1	44
45	1	45
46	1	46

Pin #	I/O slot	Board Pin
47	1	47
48	1	48
49	1	49
50	1	50
51	1	51
52	1	52
53	1	53
54	1	54
55	1	55
56	1	56
57	1	57
58	1	58
59	1	59
60	1	60
61	1	61
62	1	62
63	n/a	n/a
64	n/a	n/a
65	2	1
66	2	2
67	2	3
68	2	4
69	2	5
70	2	6
71	2	7
72	2	8
73	2	9
74	2	10
75	2	11
76	2	12
77	2	13
78	2	14
79	2	15
80	2	16
81	2	17
82	2	18
83	2	19
84	2	20
85	2	21
86	2	22
87	2	23

Pin #	I/O slot	Board Pin
88	2	24
89	2	25
90	2	26
91	2	27
92	2	28
93	2	29
94	2	30
95	2	31
96	2	32
97	2	33
98	2	34
99	2	35
100	2	36
101	2	37
102	2	38
103	2	39
104	2	40
105	2	41
106	2	42
107	2	43
108	2	44
109	2	45
110	2	46
111	2	47
112	2	48
113	2	49
114	2	50
115	2	51
116	2	52
117	2	53
118	2	54
119	2	55
120	2	56
121	2	57
122	2	58
123	2	59
124	2	60
125	2	61
126	2	62
127	2	n/a
128	2	n/a

*Pins 38-62 are not applicable if I/O slot 1 contains a 37-pin board

37-pin LAN / COM port — mating connector required: D38999/26WD35PN

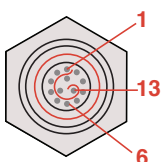


Pin number	Pin designation
1	LAN0 TX+ / DA+
2	LAN0 RX+ / DB+
3	LAN0 nc / DC-
4	LAN0 nc / DD+
5	Shield
6	Lan1 TX+ / DA+
7	LAN1 RX+ / DB+
8	LAN1 nc / DC-
9	LAN1 nc / DD+
10	Shield
11	Misc In
12	USB1 P+
13	USB1 D+

Pin number	Pin designation
14	USB2 P+
15	USB2 P-
16	USB2 D+
17	USB2 D-
18	LAN0 TX- / DA-
19	LAN0 nc / DC+
20	LAN0 RX- / DB-
21	LAN0 nc / DD-
22	LAN1 TX- / DA-
23	LAN1 nc / DC+
24	LAN1 RX- / DB-
25	LAN1 nc / DD-
26	Misc Out

Pin number	Pin designation
27	USB1 P-
28	USB1 D-
29	Sync Clock Out
30	Sync Trig Out
31	RS232 TX
32	RS232 RX
33	RS232 GND
34	Sync Clock In
35	Sync Trig In
36	Sync +5V
37	Sync Gnd

13-pin power connector — mating connector required: D38999/26FB35PN



Pin #	Pin Designation
1	GND
2	GND
3	GND
4	Vcc (9-36 VDC)
5	Vcc (9-36 VDC)
6	Vcc (9-36 VDC)
7	Sync In2 / reset
8	Sync In0
9	Sync In1
10	Sync Gnd
11	Sync Out1
12	Sync +5V
13	Sync Out0