

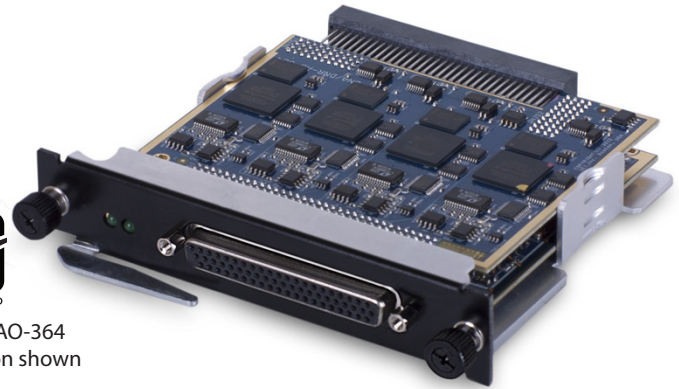
# DNA/DNR-AO-364

## 4-Channel Function generator/AWFG interface

- DNA-AO-364 for use with "Cube" I/O chassis
- DNR-AO-364 for use with RACKtangle™ I/O chassis
- 4 independently configurable channels
- Sine, Square, Triangle or AWFG output
- 1 mHz to 150kHz outputs
- 0.25 Hz output resolution
- Software selectable phase shifts between channels
- Real-time frequency slew/sweep



DNR-AO-364  
version shown



## General Description

The DNA/DNR-AO-364 are 4-channel function generator/Arbitrary Waveform Generator (AWFG) boards for use in UEI's popular Cube/RACKtangle chassis, respectively. Standard sine, square and triangle waveforms at up to 150 kHz are provided or the user may create a custom waveform with the boards' AWFG capabilities. Each channel's output may be set independently of the others or may be slaved to any other channel taking advantage of the programmable phase shift functionality.

The DNx-AO-364 provides high resolution in both frequency and voltage output. Output Frequency may be set from 1 mHz to 150 kHz with 0.25 Hz resolution and  $\pm 1.0$  Hz overall accuracy. Output voltages may be set from 0 to 8.48 Vrms with 16-bit resolution. Output DC offset may be set between  $\pm 12.0$  VDC, also with 16-bit resolution. Note that total output voltage selected including output voltage and offset may not exceed  $\pm 12.0$  VDC. The outputs may be enabled or disabled under software control with output impedances of  $< 1$  Ohm or  $> 150$  kOhm respectively.

Phase is programmable 0 to 360 degrees relative to any other channel on the board as well as relative to a "master" channel on another AO-364 series board. This phase shift may be set in increments of 0.1°. Square wave duty cycle is also programmable from 0 to 100% in 0.25% increments in Direct Digital Synthesis (DDS) mode.

Outputs may be swept over frequency and/or output voltage/offset. The sweep range takes advantage of the board's capability and so may be set into output sweep function mode, which can be created based on discrete 93 ns updates. Single Ramp (Freq A to Freq B and then hold at Freq B), Cycle Ramp (Freq A to Freq B to Freq A and hold at Freq A) or Continuous (Freq A to Freq B to Freq A to Freq B and so on). The sweep control may be set from the host PC at update rates up to 1 kHz.

The board also performs as a powerful Arbitrary Waveform Generator, with 60.6 ns updates. The 4096 sample AWFG memory allows the user to create a wide variety of output wave shapes. The AWFG generator outputs swing from  $+12.0$  to  $-12.0$  VDC.

All connections are made through standard DB-62 connectors, making it easy for OEMs to design custom cabling. For end-user applications or proof of concept OEM applications, UEI also provides the easy to use DNA-STP-62 screw terminal panel. The DNA-CBL-62 series cable connects the DNx-AO-364 to the DNA-STP-62 screw terminal board and is available in lengths of 1, 3, 5, 10 and 20 feet.

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

**Special note:** The DNx-AO-364 is one of the highest power dissipating boards in the DNx series. It should only be installed in Cube chassis that include cooling fans. If the board is to be used in a DNR rack with ambient temps of 60° or above, we recommend it be placed adjacent to a DNR-FAN-925 to ensure adequate cooling.

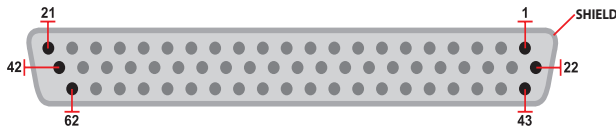
## Connection Options:

Cable/STP	Description
DNA-STP-62	Break-out panel that breaks each serial port out to screw terminals
DNA-CBL-62	62 conductor cable connects directly to OEM equipment or to the DNA-STP-62 screw terminal panel

## Technical Specifications:

General Specifications	
Number of channels	4, independently configurable
Output type	Sine, Square/Pulse, Triangle/Trapezoid, DC, AWFG
Output Harmonic Distortion	72 dB at 150 kHz; 84 dB at less than 10 kHz
Output range	0 to 8.48 Vrms ( $\pm 12.0$ VDC)
Output drive	10 mA, min
Output resolution	16-bit
Output slew rate	$\pm 10$ Volt / microsecond
Output DC offset	$\pm 12$ VDC (note: max output including Vout and offset is $\pm 12$ . VDC)
DC offset resolution	18-bit
Output states (impedance)	Enabled ( $< 1$ Ohm) Disabled ( $> 150$ kOhm)
Frequency Specifications	
Output Range	1mHz to 150 kHz
Output Freq Resolution	0.25 Hz (approximately 19 bits)
Output Freq Accuracy	$\pm 1$ Hz or better
Phase shift control	
Configuration	Slaved relative to any channel. May be slaved to channels on other DNx-AO-364 boards
Phase shift range/resolution	0..360° / $< 0.1^\circ$
Duty cycle control	
Duty cycle range	0 to 100%
Duty cycle resolution	0.25% in DDS mode
Sweep Control	
Sweep update rate	1 ms max (from host PC)
Sweep Frequency Range	Full scale (1mHz to 150 kHz) any timing possible within 50 ns sample update rate
Amplitude/offset rang	Full scale ( $\pm 12$ VDC)
Sweep modes	Single Ramp, Cycle Ramp, Continuous Ramp
AWFG specifications	
Output timing resolution	60.6 ns
Output waveform size	4096 samples per channel
General Specifications	
Isolation	350 V channel to channel and channel to chassis
ESD protection	15 kV
Power Consumption	10.5 W (should not be placed in adjacent slots)
Operating Temperature	-40 to 85 deg C
Operating Humidity	0 - 95%, non-condensing
Vibration IEC 60068-2-6 IEC 60068-2-64	5 g, 10-500 Hz, sinusoidal 5 g (rms), 10-500 Hz, broad-band random
Shock IEC 60068-2-27	100 g, 3 ms half sine, 18 shocks @ 6 orientations 30 g, 11 ms half sine, 18 shocks @ 6 orientations
Altitude	120,000 ft
MTBF	290,000 hours

## Connection Diagram:



Pin	Signal	Pin	Signal	Pin	Signal
1	NC	22	NC	43	GND 0
2	NC	23	GND 0	44	CLK 0*
3	NC	24	TRIG 0**	45	GND 0
4	AGND 0	25	AOUT 0	46	GND 0
5	GND 0	26	RSVD	47	NC
6	NC	27	NC	48	NC
7	CLK 1*	28	GND 1	49	TRIG 1**
8	NC	29	GND 1	50	NC
9	AGND 1	30	AOUT 1	51	GND 1
10	GND 1	31	RSVD	52	GND 1
11	NC	32	NC	53	GND 2
12	NC	33	GND 2	54	CLK 2*
13	NC	34	TRIG 2**	55	GND 2
14	AGND 2	35	AOUT 2	56	GND 2
15	GND 2	36	RSVD	57	NC
16	NC	37	NC	58	NC
17	CLK 3*	38	GND 3	59	TRIG 3**
18	NC	39	GND 3	60	NC
19	GND 3	40	GND 3	61	AGND 3
20	GND 3	41	RSVD	62	AOUT 3
21	NC	42	NC		

### Notes:

\* CLK n can be used as a general purpose DIO 0 signal if not used as CLK.

\*\* TRIG n can be used as a general purpose DIO 1 signal if not used as TRIG.

RSVD pins are for internal use. Please do not connect to these pins.

## Block Diagram

