# DNA/DNR-AO-308-353

## 16-bit, 8-Channel, ±40V, High-Voltage Analog Output Board

- DNA-AO-308-353 for use in "Cube" I/O chassis
- DNR-AO-308-353 for use in RACKTangle™ I/O chassis
- 8 independent DACs, 16-bit resolution
- 100kHz per channel max update rate
- ±40V output range, ±5 mA per channel
- Per-channel offset and gain calibration
- Simultaneous update across all channels
- **Requires external ±45V power source or in the "Cube" can be powered internally using the DNA-PC-913[1] power conversion layer.**

10 YEAR AVAILABILITY GUARANTEE

STANDARD WARRANTY 3 YEAR

100% TEST VERIFIED

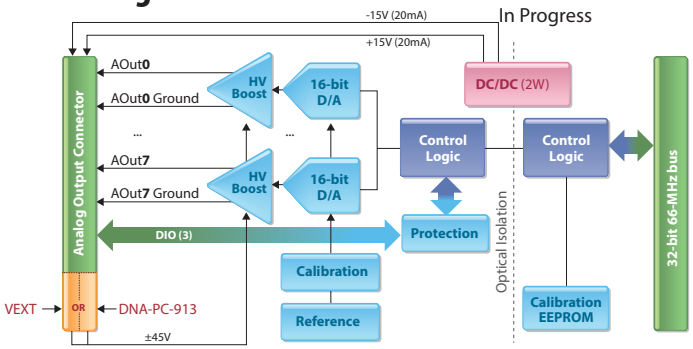
[1] When ordered with DNA-PC-913 power conversion layer, DNA-AO-308-353 comes factory-configured for internal powering.

## General Description:

The DNA-AO-308-353 and DNR-AO-308-353 are high-precision, high-voltage analog output boards compatible with UEI's "Cube" and RACKtangle I/O chassis respectively. The boards offer 16-bit, 8-channel high-voltage analog outputs with per-channel digital offset and gain calibration, buffered output, excellent linearity, and low output noise. The DNA/DNR-AO-308-353 is designed for the demanding high-voltage applications with ±40V analog output span and up to ±5mA of current per channel. This board requires external power supply (it can use DNA-PC-913 layer in "Cube" installations) to provide ±45V for the output buffers. This board is ideal for data acquisition and control applications requiring an output span greater than ±10V. Since the maximum power consumption may exceeds 4.5W, this DNA-AO-308-353 may require the rear-mount fan (DNA-FANx) option in "Cube" applications.

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.

## Block Diagram:



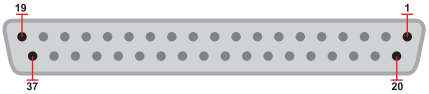

## Pinout Diagram:

DB-37 (female)

**37-pin connector:**

| | | | |
|---|---|---|---|
| AOUT0 GND | 37 | 19 | AGND |
| AGND | 36 | 18 | AOUT0 |
| AOUT1 | 35 | 17 | AOUT1 GND |
| AOUT2 GND | 34 | 16 | AGND |
| AGND | 33 | 15 | AOUT2 |
| AOUT3 | 32 | 14 | AOUT3 GND |
| AOUT4 GND | 31 | 13 | AGND |
| AGND | 30 | 12 | AOUT4 |
| AOUT5 | 29 | 11 | AOUT5 GND |
| AOUT6 GND | 28 | 10 | AGND |
| AGND | 27 | 9 | AOUT6 |
| AOUT7 | 26 | 8 | AOUT7 GND |
| **+VEXT** (140mA fused) | 25 | 7 | AGND |
| AGND | 24 | 6 | **–VEXT** (140mA fused) |
| AGND | 23 | 5 | AGND |
| DIO2 | 22 | 4 | DIO1 |
| AGND | 21 | 3 | DIO0 |
| –15V (20mA) OUT | 20 | 2 | +15V (20mA) OUT |
| | | 1 | AGND |

**Note:** If powering externally, connect ±45V power supply to pins **+VEXT** (25) and **-VEXT** (6).




## Technical Specifications:

| | |
|---|---|
| Number of Channels | 8 |
| Resolution | 16 bits |
| Max Update Rate: @ 16-bit resolution | 100 kHz/chan (500kHz max aggregate) |
| Buffer Size | 1K samples |
| Type of D/A | double-buffered |
| INL (no load) | ±1 LSB (0.003%) |
| DNL (no load) | ±1 LSB (0.003%) |
| Monotonicity Over Temperature | 16 bits |
| Gain Linearity Error | 0.002% |
| Gain Calibration Error | ±1 mV |
| Offset Calibration Error | ±1 mV |
| Offset Drift | 5ppm/°C |
| Gain Drift | 5ppm/°C |
| Output Range | ±40V |
| Output Coupling | DC |
| Output Impedance | 0.1Ω max |
| Current Drive | ±5mA/channel |
| Capacitive Loads | 500 pF |
| Settling Time | 10 µs to 16 bits |
| Slew Rate | 10 V/µs |
| Isolation | 350Vrms |
| Power Consumption[2] | 1.8W - 5W |
| Physical Dimensions | 3.875" x 3.875" (98 x 98 mm) |
| Operating Temp. (tested) | -40°C to +85°C |
| Operating Humidity | 0 -95%, non-condensing |
| Vibration *IEC 60068-2-6*<br>*IEC 60068-2-64* | 5 g, 10-500 Hz, sinusoidal<br>5 g (rms), 10-500Hz, broadband random |
| Shock *IEC 60068-2-27* | 100 g, 3 ms half sine, 18 shocks @ 6 orientations<br>30 g, 11 ms half sine, 18 shocks @ 6 orientations |
| Altitude | 120,000 ft |
| MTBF | 480,000 hours |

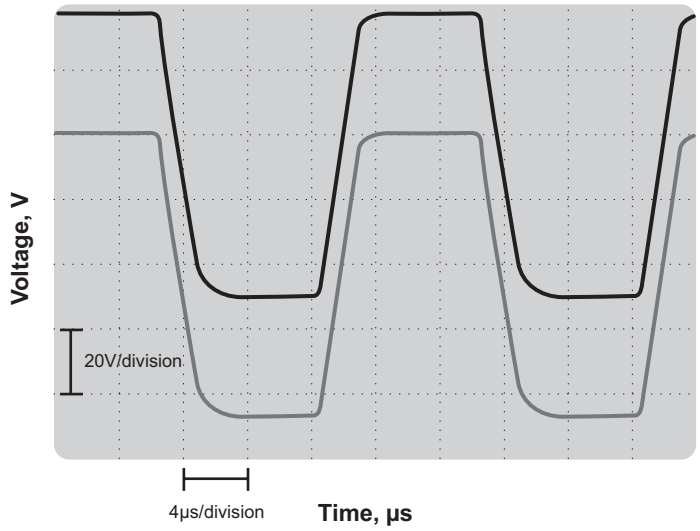
[2] If the total power consumption of the layer is over the 4.5W, the DNA-FANx rear-mount cooling fan is required. Refer to the Typical Performance Characteristics for more details.

## Connection Options:

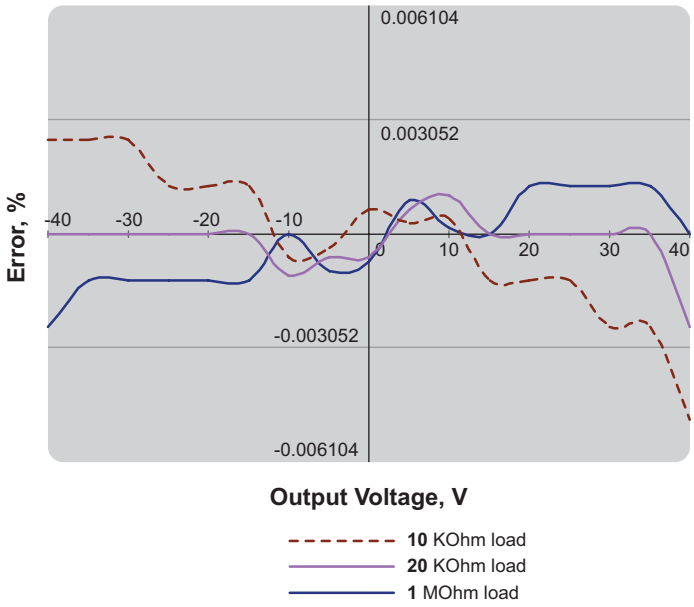
| Terminal Panel | Cable | Description |
|---|---|---|
| DNA-STP-37 | DNA-CBL-37S | DNA-CBL-37S shielded cable connects the DNA/DNR-AO-308 to the 37-way DNA-STP-37 screw terminal panel |
| DNA-STP-37 | DNA-CBL-37 | DNA-CBL-37 ribbon cable connects the DNA/DNR-AO-308 to the 37-way DNA-STP-37 screw terminal panel |

# Typical Performance Characteristics

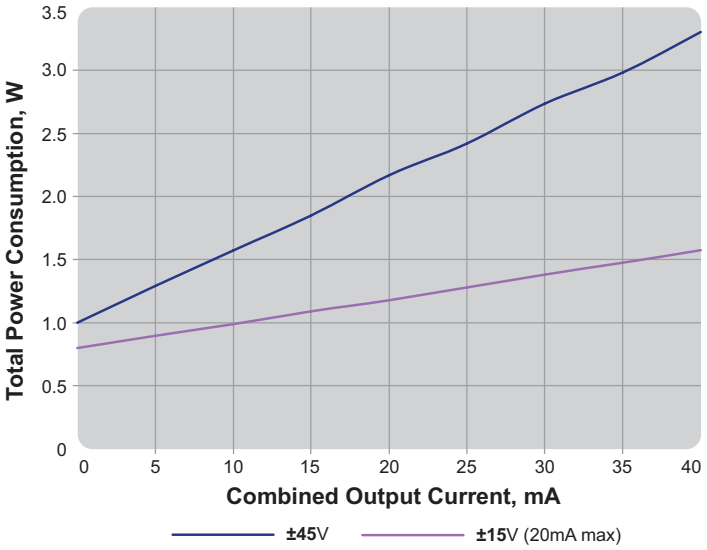
### Full Scale (±40V) Output at 100kHz Per Channel
(800kHz aggregate rate)




### Output Voltage Error vs. Voltage vs. Load
(±40V output range)



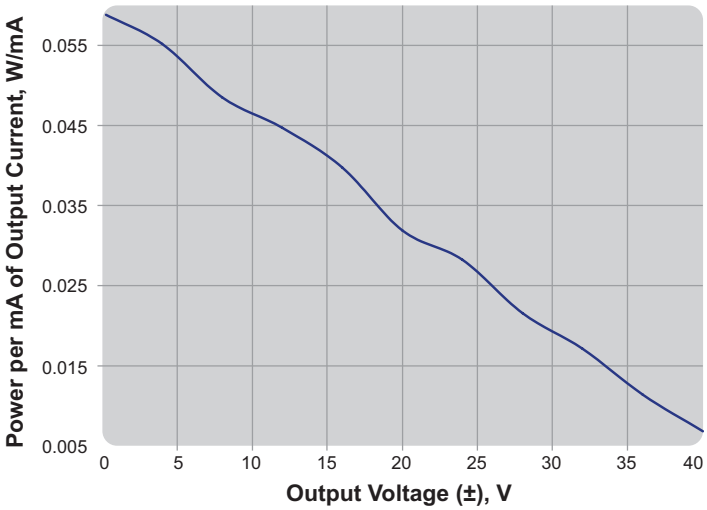

### Power Consumption vs. Output Current




### Conversion Factors

| Resolution | | |
|---|---|---|
| **bits** | **%** | **mV** |
| 14 | 0.006104 | 4.883 |
| 15 | 0.003052 | 2.441 |
| 16 | 0.001526 | 1.221 |

### Internal Power Dissipation vs. Output Voltage




**Note:** Total internal power consumption = 1.5W + (Total output current x Power/mA at given voltage)