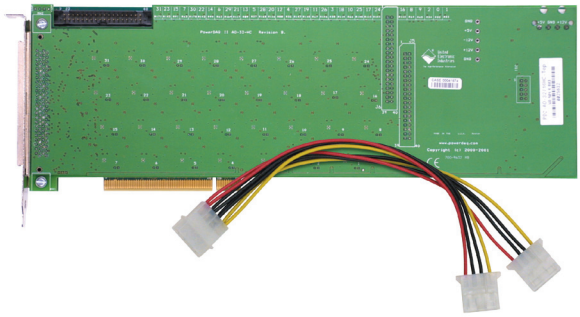
PD2-AO-32/16HC

32-Channel PCI Card for High-Current Analog Output

- 32 analog outputs (16-bit resolution)
- 8 digital inputs; 8 digital outputs
- Output current up to ±90 mA continuous, per channel
- Maximum peak current - 100 mA per channel
- Three 24-bit counters/timers; three clock/interrupt lines
- Channel list (64 locations)
- Independent waveform on each channel
- Simultaneous channel update; update on external event
- 2k samples onboard buffer size (upgradable to 64k samples)



Board comes with a "Y"-split power cable (with molex-type connectors) and a set of jumpers for sensing configuration (refer to the table below for more details).

Supports **UEIDaq Framework** Data Acquisition Software Library for Windows. Linux and QNX drivers available. Visit our website for more details.

General Description:

Most analog output cards for the PCI bus generate voltages in the range of 10V and currents peaking at 20 mA. Thus, when test engineers find that their applications need more "oomph", they almost always turn to external I/O modules on a rack, which adds cost and inconvenience. Thanks to United Electronic Industries that extra rack is no longer necessary. UEI has developed two special versions of its popular 32-channel PD2-AO-32/16 analog-output card. The PD2-AO-32/16HC is a high-current version that supplies 90 mA per channel continuously on each of its output lines.

In more detail, the PD2-AO-32/16HC can source or sink 90 mA continuously per channel with the peak output of 100 mA/channel for no longer than 1 min. Further, the maximum aggregate output current is 1.725A at 10V or 1.625A at -10V. Note that adequate cooling is needed if the board sinks more than 1.25A total, but simply adding a fan in the chassis is generally sufficient.

Technical Specifications:

Analog Outputs	
Number of channels	32
Resolution	16 bits
Update rate	100 kS/s per channel; 450kS/s aggregate in non-DMA mode; up to 1100 kS/s aggregate in DMA mode
DSP buffer size	2k samples (2 buffers x 1k sample)
Type of D/A	double-buffered
Data transfer modes	DMA, interrupt, software
Accuracy	±3 LSB max
DNL	±3 LSB max
Monotonicity over temp.	15 bits, -40 to 85°C
Calibrated gain error	3mV typ, 6mV max @ ±9.8V
Calibrated offset error	2mV typ, 4mV max @ 0.0V
Output range	±10V
Output coupling	DC
Output impedance	0.15Ω max
Output current	±90 mA; 100 mA max (per channel)
Gain error vs load	±0.05% @ 0-20 mA, ±0.1% @ 21-60 mA
Aggregate output current	1.725A @ 10V and 1.625A @ -10V
Capacitive loads	180 pF min
Settling time	10µs to 0.003%
Slew rate	10V/µs
Gain bandwidth	1 MHz
Noise	less than 2 LSB RMS, 0-10000 Hz
Output protection	short to ground, ±15V
Power-on state	0.0000V ±5mV (default), user programmable
Gain drift	25 ppm/°C

Digital I/O	
Number of channels	8 inputs, 8 outputs
Compatibility	CMOS/TTL, 2kV ESD protected
Power-on state	logic zero (default), user programmable
Data transfer modes	DMA, interrupt, software
Input termination	4.7kΩ pull-up to 5V
Output high level	3.0V typ @ -32mA, 3.4V typ @ -16mA, 4.2V @ -2mA
Output low level	0.55V max @ 64mA
Input low voltage	0.0 - 0.8V
Input high voltage	2.0 - 5.0V
Counter/Timer	
Number of channels	3
Resolution	24 bits
Max frequency	16.5 MS/s for external clock, 33 MS/s for internal DSP clock
Min frequency	0.00002 Hz for internal clock, no low limit for external clock
Min pulse width	20 ns
Output high level	2.9V typ @ -4 mA
Output low level	0.5V min @ 4 mA
Protection	7 kV ESD, ±30V over/undershoot
Input low voltage	0.0 - 0.8V
Input high voltage	2.0 - 5.0V

Connection Schemes:

Connector On The Board	Cable Required	Target Panel	Description
J1	PD-CBL-96	PD2-AO-STP-32	Carries analog output lines to 32-channel terminal panel
J2	PD-CBL-37	PD2-AO-STP-32	Carries 8 digital input and 8 digital output lines to 32-channel terminal panel
J1	PD-CBL-96	PD-BNC-64*	Carries analog output lines to 64-channel BNC terminal panel
J2	PD-CBL-37	PD-BNC-64	Carries 8 digital input and 8 digital output lines to 64-channel BNC terminal panel
J2	PD-CBL-3650-8/8	PD2-DIO-BPLANE16	Carries digital lines to digital isolation panel for adding relays to the DIO lines

* PD-BNC-64 was initially designed for analog input subsytem of UEI's multifunction boards. Thus the analog output signals transfered via PD-CBL-96 will not match the signal designations on PD-BNC-64's J1 connector. See PowerDAQ Analog Output Manual for more details and remapping diagram.

Sensing Configuration:

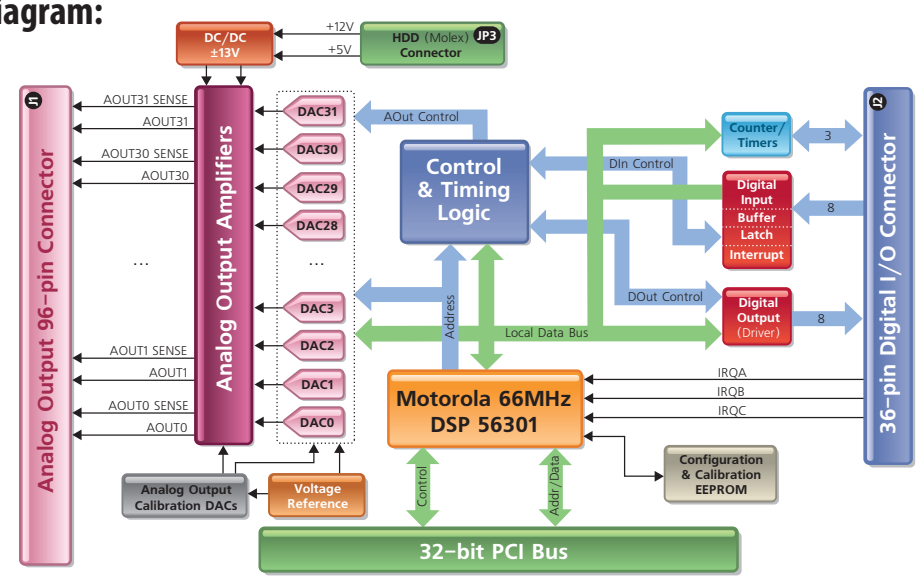
Partial disassembly of the board is required for setting jumpers to the required position. An appropriate jumpers configuration of the PD2-AO-STP-32 is required as well.

		PD2-AO-32/16HC		PD2-AO-STP-32	
		Jumper Position (W1 - W32)[1]	Signals	Jumper Position (JP1 - JP32)[3]	Signals
Sensing	Local		AOUT**X**[2] and AOUT**X** SENSE[2] carry the same signal. No compensation for the voltage drop across the cable (PD-CBL-96).		OUT**X**[3] carries actual analog output signal; SNS**X**[3] carries analog ground
	Remote on STP		AOUT**X** SENSE[2] line is used to sense and compensate for the voltage drop across the cable (PD-CBL-96). Voltage drop across the load wiring is not compensated.		
	Remote at load	(default)	AOUT**X** SENSE[2] line is used to sense and compensate for the voltage drop across the cable (PD-CBL-96). Voltage drop across the load wiring is compensated.		OUT**X**[3] carries actual analog output signal; SNS**X**[3] carries actual analog output sense signal; OUT**X**[3] and SNS**X**[3] should be tied together at the load

factory default

[1] As designated on the PD2-AO-32/16HC board; [2] As designated in pinout diagram for the J1 connector (PD2-AO-32/16HC); [3] As designated on the PD2-AO-STP-32 terminal panel

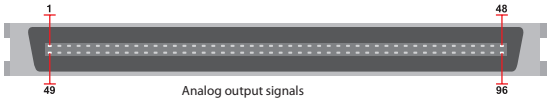
Block Diagram:



Pinout Diagrams:

J1 — pinless SCSI (male)
96-pin connector:

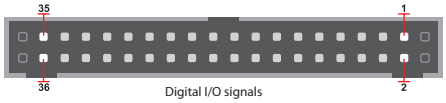
AGND	49	1	AGND
NC	50	2	AGND
AGND	51	3	AGND
NC	52	4	AGND
AGND	53	5	NC
AGND	54	6	AGND
AOUT30	55	7	AOUT31
AOUT28	56	8	AOUT29
AOUT26	57	9	AOUT27
AOUT24	58	10	AOUT25
AOUT23	59	11	AGND
AOUT21	60	12	AOUT22
AOUT19	61	13	AOUT20
AGND	62	14	AOUT18
AOUT16	63	15	AOUT17
AOUT14	64	16	AOUT15
AOUT12	65	17	AOUT13
AOUT11	66	18	AGND
AOUT9	67	19	AOUT10
AOUT7	68	20	AOUT8
AGND	69	21	AOUT6
AOUT4	70	22	AOUT5
AOUT2	71	23	AOUT3
AOUT0	72	24	AOUT1
AGND	73	25	AGND
NC	74	26	NC
NC	75	27	NC
AGND	76	28	NC
NC	77	29	AGND
AOUT31 SENSE	78	30	NC
AOUT29 SENSE	79	31	AOUT30 SENSE
AGND	80	32	AOUT28 SENSE
AOUT26 SENSE	81	33	AOUT27 SENSE
AOUT24 SENSE	82	34	AOUT25 SENSE
AOUT22 SENSE	83	35	AOUT23 SENSE
AOUT21 SENSE	84	36	AGND
AOUT19 SENSE	85	37	AOUT20 SENSE
AOUT17 SENSE	86	38	AOUT18 SENSE
AOUT15 SENSE	87	39	AOUT16 SENSE
AOUT14 SENSE	88	40	AGND
AOUT12 SENSE	89	41	AOUT13 SENSE
AOUT10 SENSE	90	42	AOUT11 SENSE
AGND	91	43	AOUT9 SENSE
AOUT7 SENSE	92	44	AOUT8 SENSE
AOUT5 SENSE	93	45	AOUT6 SENSE
AOUT3 SENSE	94	46	AOUT4 SENSE
AOUT2 SENSE	95	47	AGND
AOUT0 SENSE	96	48	AOUT1 SENSE



Analog output signals

J2 — IDC-36 (male)
36-pin header:

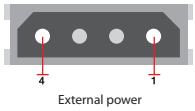
DGND	1	2	DGND
TMR0	3	4	TMR2
DGND	5	6	DGND
DGND	7	8	DGND
TMR1	9	10	+5V 200mA max
DIN0	11	12	DGND
DIN1	13	14	DOUT0
DIN2	15	16	DOUT1
DIN3	17	18	DOUT2
DIN4	19	20	DOUT3
DIN5	21	22	DOUT4
DIN6	23	24	DOUT5
DIN7	25	26	DOUT6
IRQA	27	28	DOUT7
IRQB	29	30	DGND
IRQC	31	32	DGND
DGND	33	34	DGND
DGND	35	36	DGND



Digital I/O signals

JP3* — Molex (male)
4-pin connector:

+12V	1
GND	2
GND	3
+5V	4



External power

Note: *Board will not operate if not powered via PC's internal HDD power connector directly or using supplied Y-split power cable.*