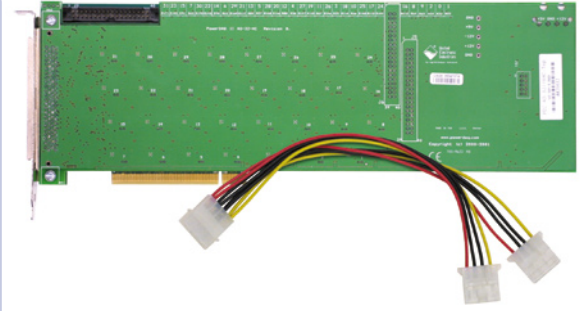


PD2-AO-32/16HS

32-Channel PCI Card for High-Speed Analog Output

- 32 analog outputs (16-bit resolution)
- 8 digital inputs; 8 digital outputs
- 100kS/s per channel max sampling rate; high-speed waveform generation
- 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
- 64k samples onboard buffer size



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:

The PD2-AO-32/16HS is designed for use as a high-speed waveform generator. This board has the ability to obtain 100 kS/s per channel on all channels simultaneously using the onboard DSP memory in recycle or one-shot mode. Synchronization of the board can be performed externally or internally. All channels can be updated simultaneously. PD2-AO-32/16HS includes the DSP memory upgrade to 64K samples.

To amplify analog outputs from $\pm 10V$ to $\pm 100V$ or $\pm 115V$ you can use 16-channel voltage amplifiers - PD-AO-AMP-100 or PD-AO-AMP-115. The settling time for the 200V full scale is 140 μs .

Technical Specifications:

Analog Outputs	
Number of channels	32
Resolution	16 bits
Update rate	100 kS/s per channel @ 16-bit; 200 kS/s per channel @ 12-bit; 600 kS/s aggregate in non-DMA mode; 1600 kS/s aggregate in DMA mode; 6.4 MS/s aggregate from DSP memory, regenerate waveform mode
DSP buffer size	2 or 64k samples (software selectable)
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 @ $\pm 9.8V$
Calibrated offset error	2mV typ, 4mV max @ 0.0V
Output range	$\pm 10V$
Output coupling	DC
Output impedance	0.15 Ω max
Current drive	± 30 mA min
Capacitive loads	180 pF min
Settling time	10 μs 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, $\pm 15V$
Power-on state	0.0000V $\pm 5mV$ (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	4.7k Ω 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	25 MS/s for external clock, 50 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, $\pm 30V$ 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
J1	PD-CBL-96	PD-AO-AMP-100	Amplifies 16 analog outputs to $\pm 100V$ per channel
J1	PD-CBL-96	PD-AO-AMP-115	Amplifies 16 analog outputs to $\pm 115V$ per channel

* PD-BNC-64 was initially designed for analog input subsystem of UEI's multifunction boards. Thus the analog output signals transferred 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 jumper configuration of the PD2-AO-STP-32 is required as well.

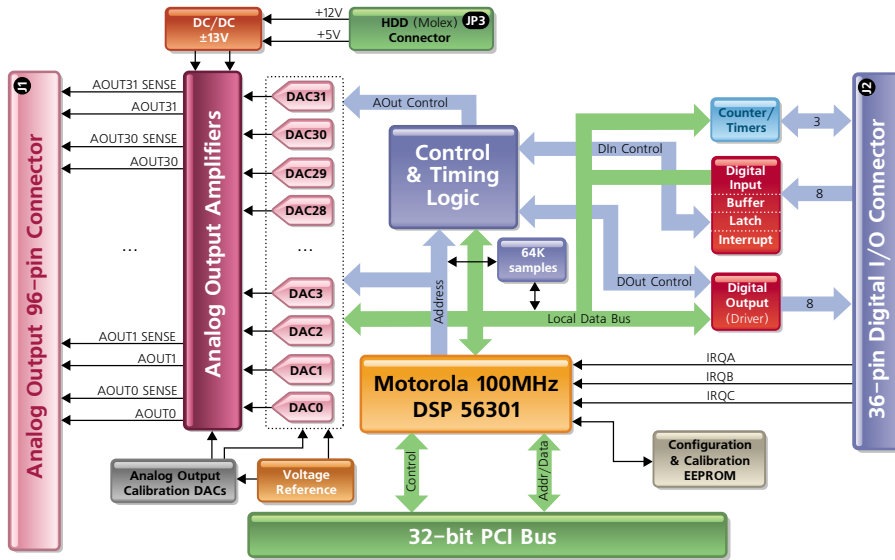
		PD2-AO-32/16HS		PD2-AO-STP-32	
		Jumper Position (W1 - W32) ¹	Signals	Jumper Position (JP1 - JP3) ³	Signals
Sensing	Local		AOUTX ² and AOUTX SENSE ² carry the same signal. No compensation for the voltage drop across the cable (PD-CBL-96).		OUTX ³ carries actual analog output signal; SNSX ³ carries analog ground
	Remote on STP		AOUTX 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		AOUTX 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.		OUTX ³ carries actual analog output signal; SNSX ³ carries actual analog output sense signal; OUTX ³ and SNSX ³ should be tied together at the load

¹ As designated on the PD2-AO-32/16HS board

² As designated in pinout diagram for the J1 connector (PD2-AO-32/16HS)

³ As designated on the PD2-AO-STP-32 terminal panel

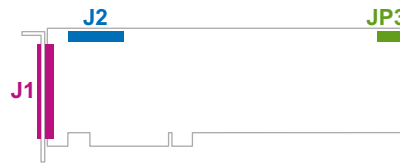
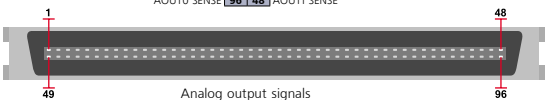
Block Diagram:



Pinout Diagrams:

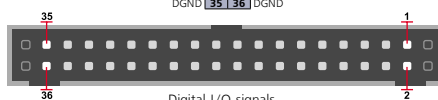
J1 – pinless SCSI 96-pin connector:

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
AOUT22	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
78	30	NC	
AOUT31 SENSE	79	31	AOUT30 SENSE
AOUT29 SENSE	80	32	AOUT28 SENSE
AGND	81	33	AOUT27 SENSE
AOUT26 SENSE	82	34	AOUT25 SENSE
AOUT24 SENSE	83	35	AOUT23 SENSE
AOUT22 SENSE	84	36	AGND
AOUT21 SENSE	85	37	AOUT20 SENSE
AOUT19 SENSE	86	38	AOUT18 SENSE
AOUT17 SENSE	87	39	AOUT16 SENSE
AOUT15 SENSE	88	40	AGND
AOUT14 SENSE	89	41	AOUT13 SENSE
AOUT12 SENSE	90	42	AOUT11 SENSE
AOUT10 SENSE	91	43	AOUT9 SENSE
AGND	92	44	AOUT8 SENSE
AOUT7 SENSE	93	45	AOUT6 SENSE
AOUT5 SENSE	94	46	AOUT4 SENSE
AOUT3 SENSE	95	47	AGND
AOUT2 SENSE	96	48	AOUT1 SENSE

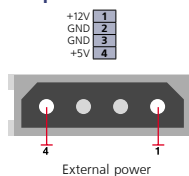


J2 – IDC-36 (male) 36-pin header:

DGND	1	DGND	
TMRO	3	4	TMR2
DGND	5	6	DGND
DGND	7	8	DGND
TMR1	9	10	+5V 200mA max
DIN0	11	12	DGND
DIN1	13	14	DOU0
DIN2	15	16	DOU1
DIN3	17	18	DOU2
DIN4	19	20	DOU3
DIN5	21	22	DOU4
DIN6	23	24	DOU5
DIN7	25	26	DOU6
IRQA	27	28	DOU7
IROB	29	30	DGND
IROC	31	32	DGND
DGND	33	34	DGND
DGND	35	36	DGND



JP3* – Molex (male) 4-pin connector:



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