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# PowerDAQ CompactPCI/PXI Family

## A/D Multifunction Board



### Features

- 16/64 single-ended or 8/32 differential A/D channels
- 150 kS/s–2.2 MS/s sampling rate
- 12-, 14-, 16-bit resolution
- Two 12-bit analog outputs; 32 digital I/O lines; three 16-bit counter/timers
- Simultaneous operation of all subsystems
- Stream-to-disk capability
- Calibration certificate included

### PowerDAQ Software Suite

for Windows 9x/NT/2000/Me supports application development in Visual C++, Visual Basic, Delphi and C++ Builder.

- PowerDAQ for Linux/RTLinux
- ProfessorDAQ Lite Excel Add-In
- PowerDAQ for QNX (optional purchase)

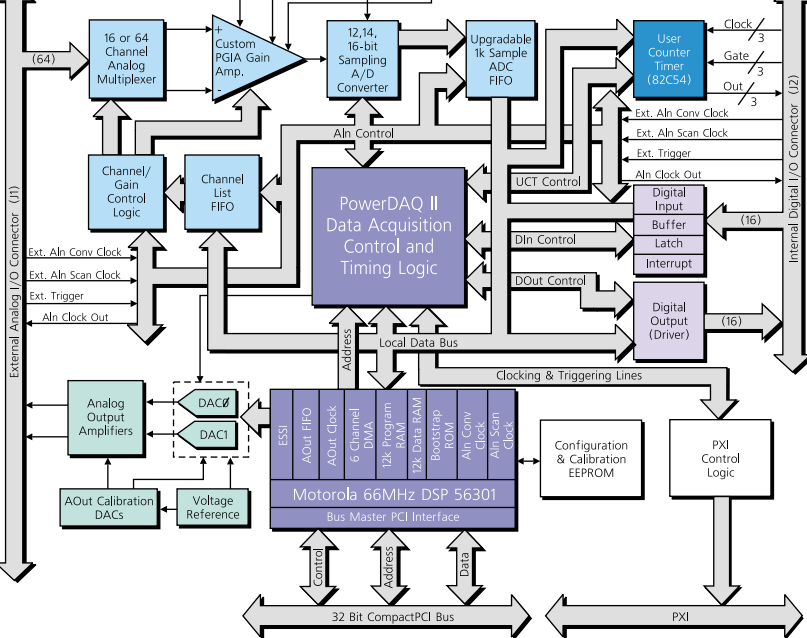
Also included at no cost are drivers for these applications: LabVIEW, Agilent VEE/VEE OneLAB, TestPoint, DASyLab, DIADem, MATLAB DAQ Toolbox

### General Description

When you know you'll be setting up a stimulus/response test, a closed-loop system or if you just want to be ready for any kind of testing situation, a multifunction board is the logical choice. Our PDXI-MF Series boards pack everything you'll likely need: as many as 64 single-ended/32 differential analog inputs running at speeds to 2.2 MS/s, dual analog outputs, 32 digital I/O lines plus three counter/timers available to users.

To allow all these I/O subsystems to run simultaneously without loading down the host CPU, MF Series cards run under the control of a Motorola DSP. Thus you can collect analog samples while generating waveforms yet have the resources to perform digital I/O and run the counter/timers – all at the same time. Operating in this fashion presents no constraints on setup parameters, either: a custom PGA (programmable-gain instrumentation amplifier) design runs any or all channels at different gains without the need to trade off peak throughput rate or accuracy.

We supply a complete set of drivers for all popular programming languages and third-party applications including LabVIEW and Agilent VEE – and at no additional charge! The support package also comes with example programs, complete with source code, that are so extensive that some of them might be enough to solve your problem straight out of the box.



PowerDAQ PDXI-MF Block Diagram

To achieve optimum performance under Windows, we wrote the boards' 32-bit driver from scratch without relying on any legacy code. This advanced protocol-based driver works with shareable buffers in system RAM and makes obsolete traditional register-based drivers and double-buffering schemes. MF Series boards can stream data to disk continuously, gap-free, at the hardware's peak acquisition rates!

# PowerDAQ CompactPCI/PXI Family A/D Multifunction Board

## Technical Specifications

### Analog Inputs

Model: PDXI-MF-xx-	2M/14H	1M/12x	500/16x	400/14x	333/16x	150/16x
Resolution	14 bits	12 bits	16 bits	14 bits	16 bits	16 bits
Number of Channels Single-Ended Differential	16 or 64 8 or 32	16 or 64 8 or 32	16 or 64 8 or 32	16 or 64 8 or 32	16 or 64 8 or 32	16 8
Maximum Sampling Rate (single or multiple channel)	2.2 MS/s	1.25 MS/s	500 kS/s	400 kS/s	333 kS/s	150 kS/s
Onboard FIFO Size (upgradeable to 16k, 32k, 64k)	4k samples	4k samples	2k samples	1k samples	1k samples	1k samples
Channel-Gain List	256 entries	256 entries	256 entries	256 entries	256 entries	256 entries
Input Ranges	0–5V, ±5V, 0–8V, ±8V @ 10V ranges	0–5V, 0–10V ±5V, ±10V (software selectable)	0–5V, 0–10V ±5V, ±10V (software selectable)	0–5V, 0–10V ±5V, ±10V (software selectable)	0–5V, 0–10V ±5V, ±10V (software selectable)	0–5V, 0–10V ±5V, ±10V (software selectable)
Programmable Gains by channel	L=1,10,100,1000/ H=1, 2, 4, 8	L=1,10,100,1000/ H=1, 2, 4, 8	L=1,10,100,1000/ H=1, 2, 4, 8	L=1,10,100,1000/ H=1, 2, 4, 8	L=1,10,100,1000/ H=1, 2, 4, 8	L=1,10,100,1000/ H=1, 2, 4, 8
Drift Zero Gain	±30 µV/°C ±30 ppm/°C	±30 µV/°C ±30 ppm/°C	±30 µV/°C ±30 ppm/°C	±30 µV/°C ±30 ppm/°C	±30 µV/°C ±30 ppm/°C	±30 µV/°C ±30 ppm/°C
Input Impedance	10 MΩ	10 MΩ	10 MΩ	10 MΩ	10 MΩ	10 MΩ
Input Bias Current	±20 nA	±20 nA	±20 nA	±20 nA	±20 nA	±20 nA
Input Overvoltage	±20V,2000V ESD 10 mA max	±35V cont. 10 mA max	±35V cont. 10 mA max	±35V cont. 10 mA max	±35V cont. 10 mA max	±35V cont. 10 mA max
A/D Conversion Time	0.45 µs	0.8 µs	2 µs	2.5 µs	2.0 µs	20 µs
A/D Settling Time	0.37 µs	0.6 µs	1.2 µs	2.0 µs	1.2 µs	2.7 µs
<b>DC Accuracy</b>						
Nonlinearity	±2 LSB	±0.5 LSB	±1 LSB	±0.5 LSB	±1 LSB	±1 LSB
System Noise	1.2 LSB	0.3 LSB	1.3 LSB	0.8 LSB	1.3 LSB	1.2 LSB
<b>AC Accuracy</b>						
Effective Number of Bits	12.2	11.63	14.5	13.1	14.5	14.8
Total Harmonic Distortion+ Nonlinearity+Noise	76 dB	71.8 dB	88 dB	81 dB	89 dB	91 dB
Channel Crosstalk	-80 dB @ 1 kS/s	-80 dB @ 1 kS/s	-80 dB @ 1 kS/s	-80 dB @ 1 kS/s	-80 dB @ 1 kS/s	-80 dB @ 1 kS/s
<b>Clocking and Trigger Input</b>						
Maximum A/D Pacer Clock Aggregate Throughput @ 0.01% accuracy	2200 kS/s @ 1 ch 1950 kS/s @ all	1250 kS/s	500 kS/s	400 kS/s	333 kS/s	150 kS/s
External A/D Sample Clock Maximum Frequency	2.2 MHz	1.25 MHz	500 kHz	400 kHz	333 kHz	150 kHz
Minimum Pulse Width	20 ns	20 ns	20 ns	20 ns	20 ns	20 ns
External Digital (TTL)Trigger High-level Input Voltage Low-level Input Voltage Minimum Pulse Width	2.0V min 0.8V min 20 ns	2.0V min 0.8V min 20 ns	2.0V min 0.8V min 20 ns	2.0V min 0.8V min 20 ns	2.0V min 0.8V min 20 ns	2.0V min 0.8V min 20 ns

# PowerDAQ CompactPCI/PXI Family

## A/D Multifunction Board

### Analog Outputs

	PDXI-MF—all models
Number of Channels	2
Resolution	12 bits
Update Rate	200 kS/s each
Onboard FIFO Size	2k samples (on DSP)
Analog Output Range	±10V
<b>Error</b>	
Gain	±1 LSB
Zero	Calibrated to 0
Current Output	±20 mA max
Output Impedance	0.3Ω typ
Capacitive Drive Capability	1000 pF
Nonlinearity	±1 LSB
Protection	Short circuit to analog ground
Power-on Voltage	0V ±10 mV
Setting Time to 0.01% of FSR	10 μs, 20V step 1 μs, 100 mV step
Slew Rate	30 V/μs

### Counter/Timer

	PDXI-MF—all models
Number of Counters	3 available to user (Intel 82C54)
Resolution	16 bits on each counter
Clock Inputs	
Software configurable	Internal 1 MS/s, External ≤ 10 MS/s
High-level Input voltage	2.0V min
Low-level Input voltage	0.8V max
High-level Input current	20 μA
Low-level Input current	-20 μA
Gate Inputs	
Maximum Pulse Width	100 ns (high) 100 ns (low)
Counter Outputs	Inverted
Output Driver High Voltage	2.5V min (I <sub>OH</sub> = 24 mA)
Output Driver Low Voltage	0.55V max (I <sub>OH</sub> = 48 mA)

### Digital I/O

	PDXI-MF—all models
Input Bits (8 can generate IRQ)	16
Output Bits	16
Inputs	
High-level Input Voltage	2.0V min
Low-level Input Voltage	0.8V max
High-level Input Current	20 μA
Low-level Input Current	-20 μA
Outputs	
Output Driver High Voltage	2.5V min, 3.0V typ (I <sub>OH</sub> = -32 mA)
Output Driver Low voltage:	0.55V max (I <sub>OL</sub> = 64 mA)
Current Sink	-32/64 mA max, 250 mA per port
Pulse Width	20 ns min, interrupt bit latched on rising, falling or either edge
Power-on Voltage	Logic Zero

### General Specifications and Connectors

	PDXI-MF-All Models
Power Requirements	5V
Physical Dimensions	10.5" x 3.8" (262 mm x 98 mm)
Environmental	
Operating Temperature range	0°C to 70°C
Storage Temperature range	-25°C to 85°C
Relative Humidity	To 95%, noncondensing
Connector J1	96-pin high-density Fujitsu connector (male) (Fujitsu PN#FCN-245P096-G/U)
Connector J2	80-pin header connector (male) ???

# PowerDAQ CompactPCI/PXI Family A/D Multifunction Board

AGND	1	49	AGND
AGND	2	50	AQOUT0
AGND	3	51	AGND
AGND	4	52	AQOUT1
DGND	5	53	AGND
AGND	6	54	AGND
AIN55	7	55	AIN54
AIN53	8	56	AIN52
AIN51	9	57	AIN50
AIN49	10	58	AIN48
AGND	11	59	AIN39
AIN38	12	60	AIN37
AIN36	13	61	AIN35
AIN34	14	62	AGND
AIN33	15	63	AIN32
AIN23	16	64	AIN22
AIN21	17	65	AIN20
AGND	18	66	AIN19
AIN18	19	67	AIN17
AIN16	20	68	AIN7
AIN6	21	69	AGND
AIN5	22	70	AIN4
AIN3	23	71	AIN2
AIN1	24	72	AIN0
AGND	25	73	AGND
DSP Trigger Input/AO External Clock	26	74	+5V (100 mA max)
ADC Conversion Start Out/ Pacer Clock Out	27	75	ADC Conversion Start Input / Pacer Clock
N/C	28	76	AGND
AGND	29	77	N/C
ADC Channel List Start Input / Burst Clock	30	78	AIN63
AIN62	31	79	AIN61
AIN60	32	80	AGND
AIN59	33	81	AIN58
AIN57	34	82	AIN56
AIN47	35	83	AIN46
AGND	36	84	AIN45
AIN44	37	85	AIN43
AIN42	38	86	AIN41
AIN40	39	87	AIN31
AGND	40	88	AIN30
AIN29	41	89	AIN28
AIN27	42	90	AIN26
AIN25	43	91	AGND
AIN24	44	92	AIN15
AIN14	45	93	AIN13
AIN12	46	94	AIN11
AGND	47	95	AIN10
AIN9	48	96	AIN8

**PowerDAQ II MF  
Analog Connector (J1)**

DOUT11	1	2	DIN12
DIN13	3	4	DOU10
DOU12	5	6	DIN11
DIN14	7	8	DOU19
DOU13	9	10	DIN10
DIN15	11	12	DOU18
DOU14	13	14	DIN9
DOU15	15	16	DGND
DGND	17	18	DIN8
DGND	19	20	+5VP12
DGND	21	22	DGND
DGND	23	24	CL_DONE_OUT
DGND	25	26	CL_START_OUT_BACK
DGND	27	28	DGND
DGND	29	30	DGND
DGND	31	32	CL_START_OUT
DGND	33	34	CL_START_IN_BACK
DGND	35	36	DGND
DGND	37	38	TRIG_IN_BACK
DGND	39	40	DOU7
DGND	41	42	CL_START_IN_BACK
DGND	43	44	DOU16
DGND	45	46	DIN7
DGND	47	48	DOU15
DGND	49	50	DIN6
DGND	51	52	DOU14
DGND	53	54	DIN5
DGND	55	56	DOU13
DGND	57	58	DIN4
DGND	59	60	DOU12
DGND	61	62	DIN3
DGND	63	64	DOU11
DGND	65	66	DIN2
UCT0_CLK_IN	67	68	DOU10
UCT2_CLK_IN	69	70	DIN1
UCT0_OUT	71	72	DGND
UCT2_OUT	73	74	DIN0
UCT0_GATE	75	76	+5VP12
UCT2_GATE	77	78	UCT1_OUT
UCT1_CLK_IN	79	80	UCT1_GATE

**PowerDAQ II MF Digital Connector (J2)**

## Ordering Information

PDXI-MF-16-2M/14H	.....	2.2 MS/s, 14-bit, 16SE/8DI A/D, gains: 1,2,4,8; two 12-bit D/As; 3 counter/timers; 32 digital I/O
PDXI-MF-64-2M/14H	.....	2.2 MS/s, 14-bit, 64SE/32DI A/D, gains: 1,2,4,8; two 12-bit D/As; 3 counter/timers; 32 digital I/O
PDXI-MF-16-1M/12L	.....	1.25 MS/s, 12-bit, 16SE/8DI A/D, gains: 1,10,100,1000; two 12-bit D/As; 3 counter/timers; 32 digital I/O
PDXI-MF-16-1M/12H	.....	1.25 MS/s, 12-bit, 16SE/8DI A/D, gains: 1,2,4,8; two 12-bit D/As; 3 counter/timers; 32 Digital I/O
PDXI-MF-64-1M/12L	.....	1.25 MS/s, 12-bit, 64SE/32DI A/D, gains: 1,10,100,1000; two 12-bit D/As; 3 counter/timers; 32 digital I/O
PDXI-MF-64-1M/12H	.....	1.25 MS/s, 12-bit, 64SE/32DI A/D, gains: 1,2,4,8; two 12-bit D/As; 3 counter/timers; 32 digital I/O
PDXI-MF-16-500/16L	.....	500 kS/s, 16-bit, 16SE/8DI A/D, gains: 1,10,100,1000; two 12-bit D/As; 3 counter/timers; 32 digital I/O
PDXI-MF-16-500/16H	.....	500 kS/s, 16-bit, 16SE/8DI A/D, gains: 1,2,4,8; two 12-bit D/As; 3 counter/timers; 32 digital I/O
PDXI-MF-64-500/16L	.....	500 kS/s, 16-bit, 64SE/32DI A/D, gains: 1,10,100,1000; two 12-bit D/As; 3 counter/timers; 32 digital I/O
PDXI-MF-64-500/16H	.....	500 kS/s, 16-bit, 64SE/32DI A/D, gains: 1,2,4,8; two 12-bit D/As; 3 counter/timers; 32 digital I/O
PDXI-MF-16-400/14L	.....	400 kS/s, 14-bit, 16SE/8DI A/D, gains: 1,10,100,1000; two 12-bit D/As; 3 counter/timers; 32 digital I/O
PDXI-MF-16-400/14H	.....	400 kS/s, 14-bit, 16SE/8DI A/D, gains: 1,2,4,8; two 12-bit D/As; 3 counter/timers; 32 digital I/O
PDXI-MF-64-400/14L	.....	400 kS/s, 14-bit, 64SE/32DI A/D, gains: 1,10,100,1000; two 12-bit D/As; 3 counter/timers; 32 digital I/O
PDXI-MF-64-400/14H	.....	400 kS/s, 14-bit, 64SE/32DI A/D, gains: 1,2,4,8; two 12-bit D/As; 3 counter/timers; 32 digital I/O
PDXI-MF-16-333/16L	.....	333 kS/s, 16-bit, 16SE/8DI A/D, gains: 1,10,100,1000; two 12-bit D/As; 3 counter/timers; 32 digital I/O
PDXI-MF-16-333/16H	.....	333 kS/s, 16-bit, 16SE/8DI A/D, gains: 1,2,4,8; two 12-bit D/As; 3 counter/timers; 32 digital I/O
PDXI-MF-64-333/16L	.....	333 kS/s, 16-bit, 64SE/32DI A/D, gains: 1,10,100,1000; two 12-bit D/As; 3 counter/timers; 32 digital I/O
PDXI-MF-64-333/16H	.....	333 kS/s, 16-bit, 64SE/32DI A/D, gains: 1,2,4,8; two 12-bit D/As; 3 counter/timers; 32 digital I/O
PDXI-MF-16-50/16L	.....	150 kS/s, 16-bit, 16SE/8DI A/D, gains: 1,10,100,1000; two 12-bit D/As; 3 counter/timers; 32 digital I/O
PDXI-MF-16-50/16H	.....	150 kS/s, 16-bit, 16SE/8DI A/D, gains: 1,2,4,8; two 12-bit D/As; 3 counter/timers; 32 digital I/O

### Upgrade FIFO

PDXI-16KFIFO	.....	Upgrade 1K FIFO to 16K FIFO
PDXI-32KFIFO	.....	Upgrade 1K FIFO to 32K FIFO
PDXI-64KFIFO	.....	Upgrade 1K FIFO to 64K FIFO



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