

PowerDAQ II PCI Multifunction Boards



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
- Gains 1,10,100,1000 or 1,2,4,8
- Two 12-bit analog outputs;
32 digital I/O lines;
three 16-bit counter/timers
- Simultaneous operation of all subsystems
- Stream-to-disk capability
- Multiple boards operate in one PC
- Full PCI-bus implementation

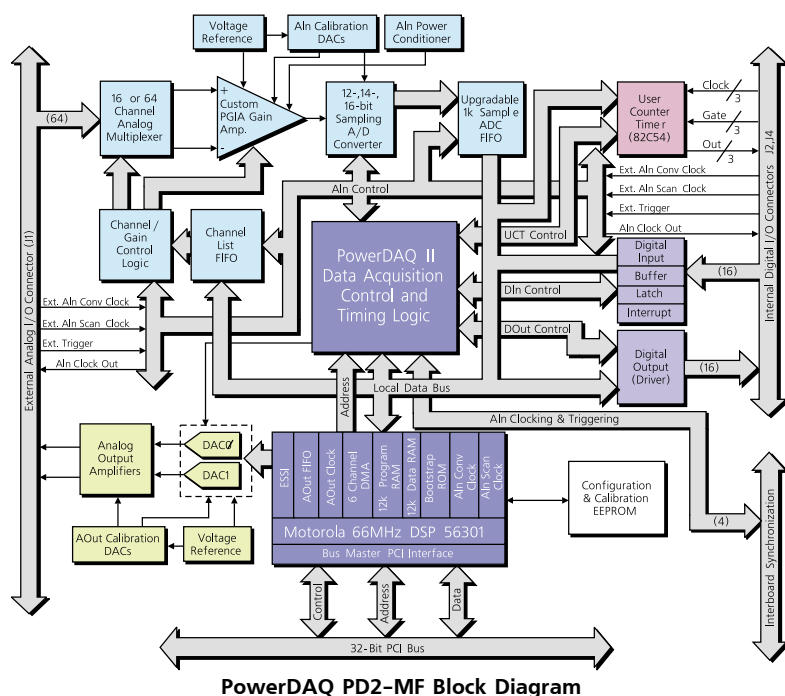
FREE Software Included:

- PowerDAQ Software Suite
- PowerDAQ for Linux/RTLinux
- ProfessorDAQ Lite Excel Add-In
- Drivers for:
Windows/Linux, QNX* (optional)
LabVIEW, VEE/VEE OneLab,
TestPoint, DasyLab, DIAdem,
MATLAB/xPC Target

General Description

When you know you'll be setting up a stimulus/response test, when you know you'll be implementing 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 PD2-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 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 PGIA (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.

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!

Technical Specifications

Analog Inputs

Model: PD2-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 8
Maximum Sampling Rate	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					
Input Ranges	0–5V, $\pm 5V$, 0–8V, $\pm 8V$ @ 10V ranges			0–5V, 0–10V $\pm 5V$, $\pm 10V$ (software selectable)		
Programmable Gains by channel	H=1, 2, 4, 8			L=1,10,100,1000 H=1, 2, 4, 8		
Drift Zero Gain				$\pm 30 \mu V/^{\circ}C$ $\pm 30 \text{ ppm}/^{\circ}C$		
Input Impedance				10 M Ω		
Input Bias Current				$\pm 20 \text{ nA}$		
Input Overvoltage	$\pm 20V$, 2000V ESD 10 mA max			$\pm 35V$ cont.		
A/D Conversion Time	0.45 μs	0.8 μs	2 μs	2.5 μs	2.0 μs	6 μs
A/D Settling Time	0.37 μs	0.6 μs	1.2 μs	2.0 μs	1.2 μs	5 μs
DC Accuracy						
Nonlinearity	$\pm 2 \text{ LSB}$	$\pm 0.5 \text{ LSB}$	$\pm 1 \text{ LSB}$	$\pm 0.5 \text{ LSB}$	$\pm 1 \text{ LSB}$	$\pm 1 \text{ LSB}$
System Noise	1.2 LSB	0.3 LSB	1.3 LSB	0.8 LSB	1.3 LSB	1.2 LSB
AC Accuracy						
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		
Clocking and Trigger Input						
Maximum A/D Pacer Clock Aggregate Throughput @ 0.01% Accuracy	2200 kS/s @ 1 ch 1800 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	2200 kS/s @ 1 ch 1800 kS/s @ all	1250 kS/s	500 kS/s	400 kS/s	333 kS/s	150 kS/s
Minimum Pulse Width				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		

PowerDAQ II PCI Multifunction Boards

Analog Outputs

	PD2-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
Error	
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

	PD2-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_{OH} = 24 mA)
Output Driver Low Voltage	0.55V max (I_{OH} = 48 mA)

Digital I/O

	PD2-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_{OH} = -32 mA)
Output Driver Low voltage:	0.55V max (I_{OL} = 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

	PD2-MF-all models
Power Requirements	5V
Physical Dimensions	10.5 x 3.8" (262 x 98 mm)
Environmental	
Operating Temperature Range	0 to 70°C
Storage Temperature Range	-25 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	36-pin header connector (male) (Thomas and Betts PN#609-3627)
Connector J4	36-pin header connector (male) (Thomas and Betts PN#609-3627)
Connector J6	8-pin male connector (Adam-Tech PN#PH2-SMT-8-SGA)

PowerDAQ II PCI Multifunction Boards

AGND	1	49	AGND
AGND	2	50	AOUT0
AGND	3	51	AGND
AGND	4	52	AOUT1
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 PD2-MF
Analog Connector (J1)**

CTR0-IN	1	2	CTR2-IN
CTR0-OUT	3	4	CTR2-OUT
CTR0-GATE	5	6	CTR2-GATE
CTR1-IN	7	8	CTR1-GATE
CTR1-OUT	9	10	+5V (100 mA max)
DIN0	11	12	DGND
DIN0	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
Burst Clock / ADC Channel List Start Input	27	28	DOUT7
DSP Trigger Input /AO External Clock	29	30	DGND
Pacer Clock / ADC Conversion Start Input	31	32	ADC Conversion Start Output / Pacer Clock Output
DGND	33	34	DGND
Burst Clock /ADC Channel List Start Output	35	36	Channel List Done Output

PowerDAQ PD2-MF Digital Male Connector (J2)

DGND	1	2	DGND
DGND	3	4	DGND
DGND	5	6	DGND
DGND	7	8	DGND
DGND	9	10	+5V (100 mA max)
DIN8	11	12	DGND
DIN9	13	14	DOUT8
DIN10	15	16	DOUT9
DIN11	17	18	DOUT10
DIN12	19	20	DOUT11
DIN13	21	22	DOUT12
DIN14	23	24	DOUT13
DIN15	25	26	DOUT14
DGND	27	28	DOUT15
DGND	29	30	DGND
DGND	31	32	DGND
DGND	33	34	DGND
DGND	35	36	DGND

**PowerDAQ PD2-MF
Digital Male Connector (J4)**

CV_START_OUT	1	2	DGND
CL_START_OUT	3	4	DGND
CV_START_IN	5	6	DGND
CL_START_IN	7	8	DGND

**PowerDAQ PD2-MF
Synchronization Male
Connector (J6)**

Ordering Information

PD2-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
PD2-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
PD2-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
PD2-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
PD2-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
PD2-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
PD2-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
PD2-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
PD2-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
PD2-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
PD2-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
PD2-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
PD2-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
PD2-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
PD2-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
PD2-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
PD2-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
PD2-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
PD2-MF-16-150/16L	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
PD2-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

PD-16KFIFO	Upgrade 1K FIFO to 16K FIFO
PD-32KFIFO	Upgrade 1K FIFO to 32K FIFO
PD-64KFIFO	Upgrade 1K FIFO to 64K FIFO