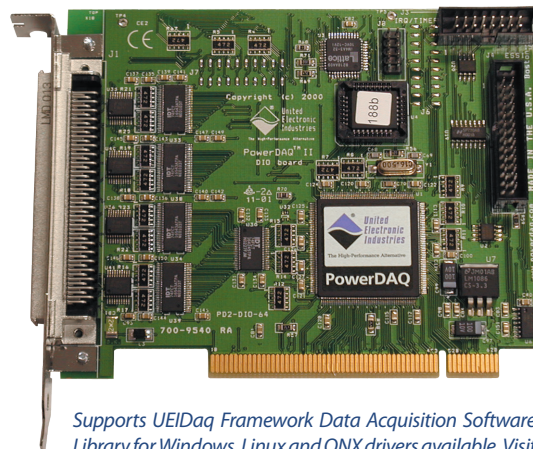# PD2-DIO

PowerDAQ 2 PCI Digital I/O Boards

- 64 or 128 lines (5V/TTL) of I/O in 16-bit ports
- Generate interrupts on any line
- Four separate high-speed IRQ lines (100 ns)
- Custom logic chip replaces obsolete 8255 and equivalents
- Ideal for solid-state relays
- User-defined power-up state in 16-bit groups (High, Low, Tri-stated)
- Two Enhanced Synchronous Serial Interfaces (ESSIs) for high-speed devices such as codecs
- Onboard 16-bit FIFO: 2k samples
- Three 24-bit counter/timers
- Port-scan list
- High-speed pattern generation and digital streaming
- High-speed event counts streaming (2 Mwords/s)
- Start/stop external trigger line

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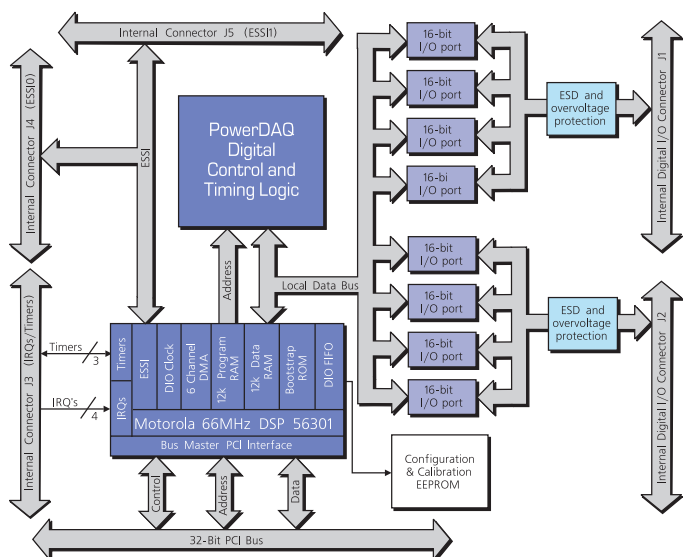
General Description

For applications that involve a high number of digital I/O lines, UEI offers four models in the PD2-DIO family with either 64 or 128 I/O lines. Instead of following the industry trend of implementing discrete I/O with cumbersome and limiting 8255-type devices, we work with 16-bit line drivers under control of a DSP and custom logic.

As a result, you no longer need to create external circuitry to guarantee power-on startup states; our software allows you to configure startup states in groups of 16-bit ports. You no longer need to design separate interrupt circuitry; our hardware comes with four high-speed interrupts waiting for you to use. The digital I/O lines are protected against electrostatic discharge and automatically detect shorts on power up.

Besides digital I/O, the board features three 24-bit counter/timers as well as two high-speed ESSI (Enhanced Synchronous Serial Interface) ports. The onboard DSP and optimized PCI-bus interface also allow the card to optionally stream digital data to or from disk at rates as high as 2 Mbytes/s and count events up to 16.5 MHz

Distribution panels make all the board's I/O capabilities available for field connection. Further, an optional accessory (PD2-DIO-CONN64-4) distributes 64 of the digital I/O points into four sets of 16 lines through industry-standard 50-pin IDC connectors. They, in turn, attach directly to relay panels available from UEI and many other sources.

Block Diagram:

Technical Specifications:

DC Electrical Characteristics Over Operating Range

Input High Level	Guaranteed logic High level	2.0V min
Input Low Level	Guaranteed logic Low level	0.8V max
Input High Current	V_I = 5V	±1 µA max
Input Low Current	V_I = Gnd	±1 µA max
3-State Output Current	V_O = 2.7V	±1 µA max
3-State Output Current	V_O = 0.5V	±1 µA max
Short-Circuit Current	V_O = Gnd (momentary)	-80 mA min -140 mA typ -250 mA max
Input Hysteresis		100 mV typ

Output Drive Characteristics

Output Drive Current	V_O = 2.5 V	-32 mA per pin -180 mA per port
Output High Voltage	I_{OH} = -3 mA	3.5V typ, 4.8V max
Output High Voltage	I_{OH} = -15 mA	3.5V typ, 4.7V max
Output High Voltage	I_{OH} = -32 mA	2.4V min, 3.0V typ
Output High Voltage	I_{OL} = 64 mA	0.2V typ, 0.55V max
I/O Power Off Leakage	$V_{I/O}$ ≤ 4.5V	±1 µA max

Counter /Timer

Prescaler	1 (21-bit)
Number of Channels	3
Resolution	24 bits
Maximum Frequency	16.5M S/s for external clock and 33M S/s for internal DSP clock
Minimum Frequency	0.0000002 S/s for internal clock, no low limit for external clock
Minimum Pulse Width	20 ns
Output High Level	2.0V min @ -4 mA
Output Low Level	0.5V max @ 4 mA
Input High range	from 11V to level of input supply voltage
Protection	7 kV ESD, ±30V overshoot/undershoot
Input Low Voltage	0.0-0.8V
Input High Voltage	2.0-5.0V

ESSI Characteristics

The Motorola 56301 DSP contains two fast Enhanced Synchronous Serial Interfaces. The PowerDAQ DIO board allows access to both. Each ESSI port contains three transmitters and one receiver and has a maximum operational speed of 15M bits/sec.

Pinout Diagrams:

PowerDAQ PD2-DIO Digital I/O Connectors (J1, J2)

	Pin	Pin				Pin	Pin	
DIO57	1	51	DIO56		DIO121	1	51	DIO120
DGND	2	52	DIO55		DGND	2	52	DIO119
DIO58	3	53	DIO54		DIO122	3	53	DIO118
DIO59	4	54	DIO53		DIO123	4	54	DIO117
DIO60	5	55	DIO52		DIO124	5	55	DIO116
DGND	6	56	DIO51		DGND	6	56	DIO115
DIO61	7	57	DIO50		DIO125	7	57	DIO114
DIO62	8	58	DIO49		DIO126	8	58	DIO113
DIO63	9	59	DIO48		DIO127	9	59	DIO112
DGND	10	60	DIO47		DGND	10	60	DIO111
DGND	11	61	DIO46		DGND	11	61	DIO110
+5VPJ	12	62	DIO45		+5VPJ	12	62	DIO109
+5VPJ	13	63	DIO44		+5VPJ	13	63	DIO108
DGND	14	64	DIO43		DGND	14	64	DIO107
DGND	15	65	DIO42		DGND	15	65	DIO106
LIn0	16	66	DIO41		LIn1	16	66	DIO105
DGND	17	67	DIO40		DGND	17	67	DIO104
PROP0	18	68	DIO39		PROP1	18	68	DIO103
DGND	19	69	DIO38		DGND	19	69	DIO102
DGND	20	70	DIO37		DGND	20	70	DIO101
DGND	21	71	DIO36		DGND	21	71	DIO100
DGND	22	72	DIO35		DGND	22	72	DIO99
DGND	23	73	DIO34		DGND	23	73	DIO98
DGND	24	74	DIO33		DGND	24	74	DIO97
DGND	25	75	DIO32		DGND	25	75	DIO96
DGND	26	76	DIO31		DGND	26	76	DIO95
DGND	27	77	DIO30		DGND	27	77	DIO94
DGND	28	78	DIO29		DGND	28	78	DIO93
DGND	29	79	DIO28		DGND	29	79	DIO92
DGND	30	80	DIO27		DGND	30	80	DIO91
DGND	31	81	DIO26		DGND	31	81	DIO90
DGND	32	82	DIO25		DGND	32	82	DIO89
DGND	33	83	DIO24		DGND	33	83	DIO88
DGND	34	84	DIO23		DGND	34	84	DIO87
DGND	35	85	DIO22		DGND	35	85	DIO86
DGND	36	86	DIO21		DGND	36	86	DIO85
DGND	37	87	DIO20		DGND	37	87	DIO84
DGND	38	88	DIO19		DGND	38	88	DIO83
DGND	39	89	DIO18		DGND	39	89	DIO82
DGND	40	90	DIO17		DGND	40	90	DIO81
DGND	41	91	DIO16		DGND	41	91	DIO80
DIO0	42	92	DIO15		DIO64	42	92	DIO79
DIO1	43	93	DIO14		DIO65	43	93	DIO78
DIO2	44	94	DIO13		DIO66	44	94	DIO77
DGND	45	95	DIO12		DGND	45	95	DIO76
DIO3	46	96	DIO11		DIO67	46	96	DIO75
DIO4	47	97	DIO10		DIO68	47	97	DIO74
DIO5	48	98	DIO9		DIO69	48	98	DIO73
DGND	49	99	DIO8		DGND	49	99	DIO72
DIO6	50	100	DIO7		DIO70	50	100	DIO71

PowerDAQ PD2-DIO Counter/Timers/IRQ Lines Male Connector (J3)

	Pin	Pin	
CTM0	1	2	DGND
CTM1	3	4	DGND
CTM2	5	6	DGND
IRQ_A	7	8	DGND
IRQ_B	9	10	DGND
IRQ_C	11	12	DGND
IRQ_D	13	14	DGND

PowerDAQ PD2-DIO ESSI Male Connector (J4)

	Pin	Pin	
STD1	1	2	DGND
SRD1	3	4	DGND
SCK1	5	6	DGND
SC10	7	8	DGND
SC11	9	10	DGND
SC12	11	12	DGND

PowerDAQ PD2-DIO ESSI Male Connector (J5)

	Pin	Pin	
STD0	1	2	DGND
SRD0	3	4	DGND
SCK0	5	6	DGND
SC00	7	8	DGND
SC01	9	10	DGND
SC02	11	12	DGND

Ordering Information:

Part Number	Description
PD2-DIO-64	64 digital I/O channels, 3 counter/timers, 2 ESSI ports, 4 high-speed IRQ lines (100 ns)
PD2-DIO-128	128 digital I/O channels, 3 counter/timers, 2 ESSI ports, 4 high-speed IRQ lines (100 ns)