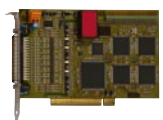
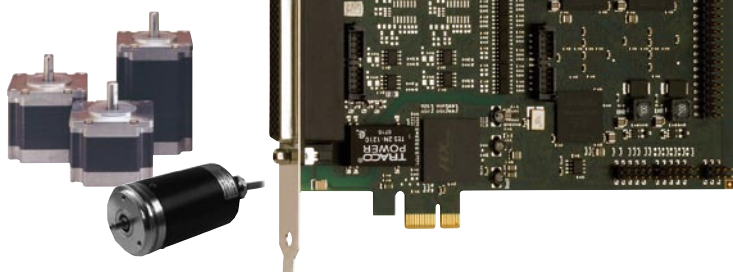


# Multifunction counter board, optically isolated, fast counter inputs – programmable, for PCI Express

**New!\***

PCI EXPRESS®



Also for **PCI**  
See page 70



Also for **CompactPCI™**  
See page 126



The board APCL-1710 is a fast multifunction and multi-channel counter board for the PCI Express bus. The strengths of this board are its wide range of applications and high precision and reliability for tough industrial applications.

With this board you can realise many different applications on the same hardware base. The board is supplied with a pool of functions which provides the user with maximum efficiency yet minimum space and parts requirement. The functions are individually configured for each channel through the supplied software. The flexible programming facilities on this board allow many different user applications to be quickly and easily developed and reconfigured as further requirements arise. Thanks to the FPGA board structure, further counting applications can be realised through software adaptation. Contact us!

## Features

- 32-bit data access
- Up to 5 MHz input frequency
- Signals in TTL or RS422 mode (APCL-1711), 24 V signals (APCL-1711-24 V)
- Four onboard function modules
- Programmable functions

## Functions

- Incremental counter for the acquisition of incremental encoders (90° phase-shifted signals)
- SSI synchronous serial interface. The SSI function is an interface for systems which allow an absolute position information via serial data transfer.
- Customized functions
- Counter/timer (82x54)
- pulse acquisition
- Frequency measurement
- Pulse width modulation (PWM)
- Period duration measurement
- Velocity measurement
- BiSS-Master
- Digital inputs and outputs
- Edge time measurement (ETM)

## Available channels for all four function modules

- 12 channels for digital inputs, optically isolated
- 16 channels, programmable either as digital inputs or outputs, optically isolated
- 4 digital power outputs, optically isolated

## APCL-1711

Available functions:

incremental counter, SSI synchronous serial interface, counter/timer, pulse acquisition, frequency, pulse width, period duration, velocity measurement, PWM, BiSS-Master, digital inputs and outputs, ...

Function selection through software

Optical isolation

TTL, RS422, 24 V

Customized functions

## Available lines for each function module

8 lines are available for each function module.

The multifunction counter board APCL-1711 is available in different versions:

- APCL-1711** 16 x RS422/TTL inputs and outputs, 12 x 24 V inputs, 4 x 24 V outputs
- APCL-1711-24V** 28 x 24 V inputs, 4 x 24 V outputs
- APCL-1711-5V-I** 16 x RS422/TTL inputs and outputs, 12 x TTL-inputs, 4 x 24 V outputs

## Safety features

- Creeping distance IEC 61010-1
- Optical isolation 1000 V
- Noise neutralization of the PC supply

## Applications

- Event counting
- Position acquisition
- Motion control
- Batch counting
- ...

## Software drivers

A CD-ROM with the following software and programming examples is supplied with the board.

### Standard drivers for:

Linux, Windows Vista™ (32-bit)/XP/2000  
Real-time drivers for Windows Vista™ (32-bit)/XP/2000.

### On request: RTX drivers

### Samples for the following compilers:

Depending on the function, the samples are not always available for each compiler. You will find a detailed list on the web.

- Microsoft VC++ 5.0
- Borland C++ 5.01
- Visual Basic 5.0 • Delphi 4

### Drivers for the following software packages:

LabVIEW 5.01 (depending on the function)

### On request: DasyLab 6/7 • Diadem 6

Current driver list on the web: [www.addi-data.com](http://www.addi-data.com)

The software functions can be adapted to your application on request. The board can also be implemented for other application softwares.

\* Preliminary product information

# Multifunction counter board, optically isolated, fast counter inputs – programmable, for PCI Express

Wide range of applications through the free combination of functions

4 function modules quickly and easily programmable with numerous functions

Each of the four modules is programmed with one function. You can program 4 times the same function or freely combine 4 different functions.

Configuration example 1			
Function module 0	Function module 1	Function module 2	Function module 3
Incremental counter	Incremental counter	Pulse acquisition	Timer/counter

Configuration example 2			
Function module 0	Function module 1	Function module 2	Function module 3
SSI	SSI	Incremental counter	Digital I/O

**Available functions**

- Acquisition of incremental encoders (1 x 32-bit or 2 x 16-bit)
- SSI (max. 3 encoders per module)
- Counter/Timer (3 counters similar to 82 C 54)
- Pulse counter (4 x 32-bit counter per module)
- Chronos (chronometer)
- TOR (pulse counter with time slices)
- Digital I/O (8 I/O, 24 V, TTL, RS422)
- PWM (pulse width modulation, 2 x per module)
- BiSS-Master (fast sensor interface)
- ETM (Timer interface for period duration measurement, edge time, ...)
- TTL (TTL-I/O, without isolation)
- Customized functions

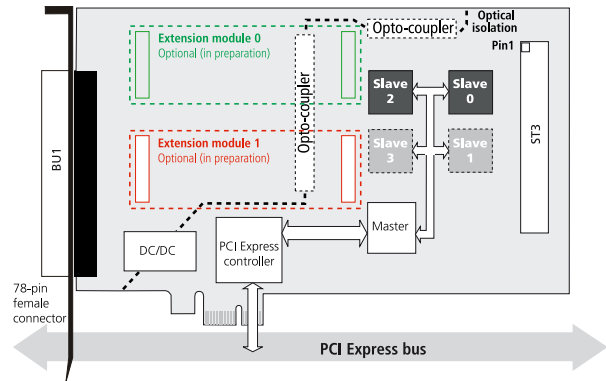
**Programmable onboard modules**

Each module can be programmed with the function of your choice. You can operate simultaneously up to 4 different functions on one board. If your application must be modified, you can load a new function quickly and easily.

**Customer-tailored modifications,** designed to suit your needs.  
Hardware and software, firmware, PLDs, ...  
Contact us!

APCLe-1711

**Simplified block diagram**

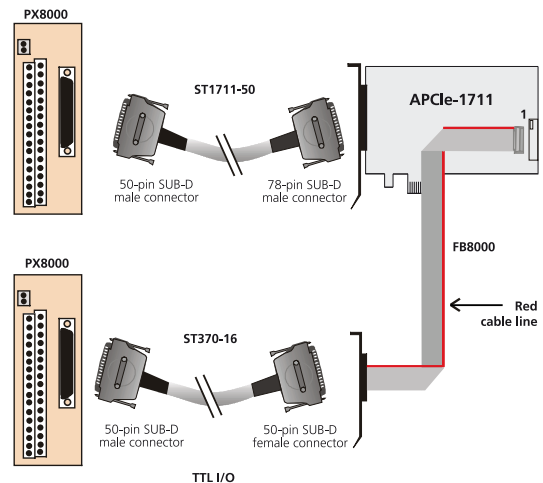


**Pin assignment – 78-pin SUB-D female connector**

Pin	Pin	Pin	Pin
78 EM0	59 EM0	EM0	39 EM0
77 EM0	58 EM0	EM0	38 EM0
76 EM0	57 EM0	EM0	37 EM1
75 EM1	56 EM0	EM1	36 EM1
74 EM1	55 EM1	EM1	35 EM1
73 EM1	54 EM1	EM1	34 EM1
72 +24V supply	52 Uref/24Vsupply	GND	33 E3
71 H3	51 G3	F3	32 A3-
70 D3-	50 C3-	B3-	31 A3+
69 D3+	49 C3+	B3+	30 A2-
68 H2	48 G2	F2	28 A2+
67 D2-	47 C2-	B2-	27 A2+
66 D2+	46 C2+	F1	26 E1
65 H1	45 G1	B1-	25 A1-
64 D1-	44 C1-	B1+	24 A1+
63 D1+	43 C1+	F0	23 E0
62 H0	42 G0	B0-	22 A0-
61 D0-	41 C0-	B0+	21 A0+
60 D0+	40 C0+		GND

EM = Extension module

**ADDI-DATA connection**



TTL I/O

\* Preliminary product information

# Multifunction counter board, optically isolated, fast counter inputs – programmable, for PCI Express

**New!\***

## Function incremental encoder

1 to 2 incremental encoders can be connected to the module programmed with this function.

- 90° phase-shifted input signals (displacement measurement systems)
- Motion control
- Pulse width and frequency measurement
- Incremental encoder acquisition
- Tolerance measurement
- Velocity measurement
- Rotation measurement

### Possible configurations:

- 1 counter channel with a 32-bit counting depth, for TTL or differential incremental encoders (option 24 V: APCLe-1711-24 V)
- 2 counter channels with a 16-bit counting depth for TTL or differential incremental encoders (option 24 V: APCLe-1711-24 V)
- 1 input for reference point logic
- 1 input which can be used as error input
- 1 input as usual dig. input or for reference point logic
- 2 inputs to latch the counter value
- Fast counting

### Function range of the counter component

- Simple, double, quadruple analysis of 2 phase-shifted clock pulses (A, B)
- Direction recognition for upwards or downwards counting
- Hysteresis circuit for the absorption of the first pulse after a change in rotation; switchable
- 2 x 32-bit data latches, indiv. programmable for internal or ext. strobe
- The operating mode is defined by an internal mode register, loadable and readable through the data bus.
- Strobe inputs, which can be triggered either through 2 external pins (24 V input) or by writing in a register

- Interrupt indication triggered through the external strobe inputs
- Compare logic

### Used signals

On connector	Polarity	Function
Ax +/-	Diff./TTL/24 V*	A signal of the 1st incremental encoder
Bx +/-	Diff./TTL/24 V*	B signal of the 1st incremental encoder
Cx +/-	Diff./TTL/24 V*	INDEX signal of the incremental encoder in 32-bit mode
Cx +/-	Diff./TTL/24 V*	A signal of the 2nd incremental encoder in 16-bit mode.
Dx +/-	Diff./TTL/24 V*	Error signal input in 32-bit mode.
Dx +/-	Diff./TTL/24 V*	B signal of the 2nd incremental encoder in 16-bit mode
Ex	24 V/5 V optional	Usual digital input, readable through register, can control the reference point logic
Fx	24 V/5 V optional	Digital input, which latches the counter 16/32-bit in the first latch register. Can also generate an interrupt.
Gx	24 V/5 V optional	Digital input, which latches the counter 16/32-bit in the second latch register. Can also generate an interrupt.

x: Number of the function module (See pin assignment page 43)

\* 24 V with the APCLe-1711-24 V

## Function synchronous serial interface (SSI)

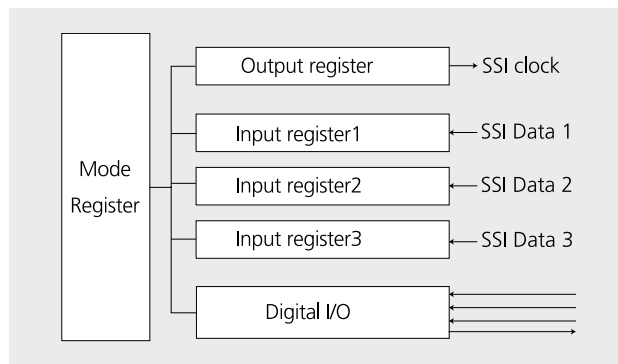
The function module is programmed as a synchronous serial interface. The SSI function is an interface for systems which allows an absolute position information through serial data transfer.

### Typical application examples:

- Acquisition of displacement measurement systems
- Axis control
- Tolerance measurement ...



### Block diagramm of the SSI



\* Preliminary product information

### Connection of 1 up to 3 SSI encoders per function module:

- Common clock pulse for the 3 interfaces (depending on the clock frequency, line length and input drivers of the sensors)
- The clock frequency is software programmable
- The number of data bits is programmable, which allows a flexible resolution.
- GRAY to BINARY conversion possible

### The interface includes:

- Three independent SHIFT registers, which can be read through the data bus
- Clock and pulse generator
- Function and control logic

### Used signals

On connector	Polarity	Function
Ax +/-	Diff.	Clock output signal for the SSI encoders
Bx +/-	Diff./TTL/24 V*	DATA input 1 for the first encoder
Cx +/-	Diff./TTL/24 V*	DATA input 2 for the second encoder
Dx +/-	Diff./TTL/24 V*	DATA input 3 for the third encoder
Ex	24 V/5 V optional	Digital input 1
Fx	24 V/5 V optional	Digital input 2
Gx	24 V/5 V optional	Digital input 3
Hx	24 V/5 V optional	Digital output

x: Number of the function module (See pin assignment page 43)

\* 24 V with the APCLe-1711-24 V

# Multifunction counter board, optically isolated, fast counter inputs – programmable, for PCI Express

**New!\***

## Free programming of the functions

- Acquisition of incremental encoders (1 x 32-bit or 2 x 16-bit)
- SSI (max. 3 encoders per module)
- Counter/timer (3 counters similar to 82 C 54)
- Pulse counter (4 x 32-bit counters per module)
- Chronos (chronometer)
- TOR (pulse counter with time slices, ...)
- Digital I/O (8 I/O, 24 V, TTL, RS422)
- PWM (pulse width modulation, 2 x per module)
- BiSS-Master (fast sensor interface)
- ETM (Timer interface for period duration measurement, edge time, ...)
- TTL (TTL I/O without isolation)
- Customized functions

## Signals

Digital I/O signals, TTL or RS422, 24 V

## Inputs

### Differential inputs or outputs (A, B, C, D)

Differential inputs, 5 V/3.3 V:	16 (can be used as inputs or outputs)
Nominal voltage:	3.3 VDC
Common mode range:	+12 / -7 V
Input sensitivity:	200 mV
Input hysteresis:	50 mV
Input impedance:	12 k $\Omega$
Terminal resistor:	120 $\Omega$ (not supplied)
Max. input frequency:	5 MHz (at nominal voltage) depending on the function

### Mass-related inputs, 24 V (channels E, F, G):

Number of inputs:	12
Nominal voltage:	24 VDC
Logic input levels:	Unominal: 24 V UH max.: 30 V UH min.: 19 V UL max.: 14 V UL min.: 0 V

Maximal input frequency: 1 MHz (at nominal voltage) depending on the function

## Outputs

Nominal voltage:	3.3 VDC
Maximum output frequency:	5 MHz (diff. outputs) depending on the function
Max. number of outputs:	16 (if they are not used as diff. inputs)

### Digital outputs, 24 V:

Output type:	High-side (load at ground)
Number of outputs:	4
Nominal voltage:	24 VDC
Supply voltage range:	17 V to 30 VDC (via 24 V ext. pin)
Maximum current	90 mA per output /
for 4 outputs:	270 mA for all outputs (PTC)
Overtemperature:	165 °C (all outputs switch off)

Overtemperature protection  
(24 V outputs)

## Technical data

### Version APCI-1710-24 V

24 V inputs (channels A to D).  
This board version is intended for the connection of 24 V encoders.  
Only 24 V signals can be connected to the inputs.

Nominal voltage:	24 VDC
Max. input frequency:	1 MHz (at nominal voltage) depending on the function
Logic input levels : (Standard)	Unominal: 24 V UH max.: 30 V UH min.: 19 V UL max.: 14 V UL min.: 0 V

All functionalities with port A, B, C, D cannot be used as outputs.  
See the manuals of the functions!

## Safety

Optical isolation: 1000 V

## EMC – Electromagnetic compatibility

The product complies with the European EMC directive. The tests were carried out by a certified EMC laboratory in accordance with the norm from the EN 61326 series (IEC 61326). The limit values as set out by the European EMC directive for an industrial environment are complied with. The respective EMC test report is available on request.

## PC system requirements and environmental conditions

Dimensions:	168 x 98 mm
System bus:	Acc. to PCI Express base specification, Revision 1.0a (PCI Express r1.0a)
Space required:	1-/4-lane PCI Express slots
Operating voltage:	+ 3.3 V / + 12 V from the PC +24 V ext.
Current consumption APCIe-1711:	3.3 V / 340 mA 12 V / 80 mA typ.
Front connector:	78-pin SUB-D female connector
Additional connector:	50-pin SUB-D male connector
Temperature range:	0 to 60 °C (with forced cooling)

## Ordering information

### APCIe-1711

Multifunction counter board, optically isolated, fast counter inputs – programmable, for PCI Express  
Incl. technical description and software drivers.

**APCIe-1711:** Isolated counter board with programmable functions

**APCIe-1711-24V:** 24 V instead of differential input signals (A, B, C, D).

**APCIe-1711-5V-I:** 5 V inputs (E, F, G) instead of 24 V

### Accessories

**PX 8000:** Screw terminal panel with housing for DIN rail

**ST1711-50:** Standard round cable, shielded, twisted pairs, 2 m, 78-pin male connector to 50-pin male connector

### For the TTL I/O function

**ST370-16:** Standard round cable, shielded, twisted pairs, 2 m

**FB8000:** Ribbon cable

\* Preliminary product information