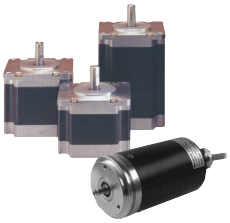
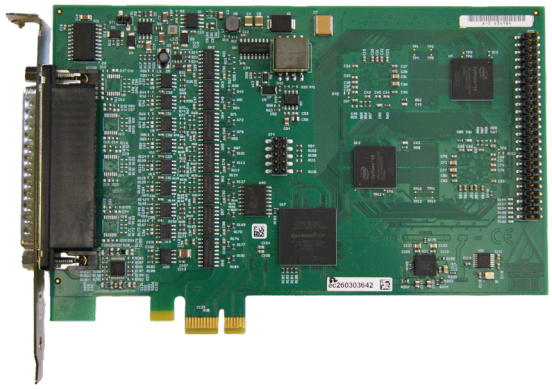
Multifunction counter board, optically isolated, fast counter inputs – programmable functions, for PCI Express





APCIe-1712

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, EnDat 2.2 ...

Function selection through software

Optical isolation

Inputs and outputs: RS422, TTL, 24 V

Customised functions

RoHS 2011/65/EU

Also for PCI
see APCI-1712

Also for CompactPCI™
see CPCI-1712

Also for CompactPCI™ Serial
see CPCIs-1712

Windows 11
64-bit drivers

The board APCIe-1712 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 in harsh industrial environment. 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
- RS422 driver with 20 MHz max.
- With RS422/TTL input/output signals (APCIe-1712) or 24 V input signals (APCIe-1712-24V)
- Four onboard programmable function modules
- 50-pin D-Sub connector with the same pin assignment as the APCI-1710: existing ST370-16 cables and PX8001 terminal panels can be reused
- Migration from APCI-1710: 24 V outputs 90 mA instead of 500 mA; Opt. 5V = 3.3 V outputs instead of 5 V; location of the 24 V supply

Functions

- Incremental counter for the acquisition of incremental encoders (90° phase-shifted signals)
- BiSS-Master (B and C mode)
- SSI Synchronous Serial Interface. The SSI function is an interface for systems which allow an absolute position information via serial data transfer.
- Counter/timer (82C54)
- Pulse acquisition
- Frequency measurement
- Pulse width modulation (PWM)
- Period duration measurement
- Velocity measurement
- Digital inputs and outputs
- Edge time measurement (ETM)
- Parallel interface
- EnDat 2.2
- Customised functions

Available channels on one function module

- 4 channels, programmable either as digital inputs or outputs, optically isolated, RS422
- 3 channels, digital inputs, optically isolated, 24 V
- 1 digital power output, optically isolated, 24 V

Additional channels

- 26 TTL I/O, without optical isolation

Versions

	RS422/ TTL-I/O	24 V inputs	5 V inputs	24 V outputs	TTL I/O
APCIe-1712	16	12	–	4	26
APCIe-1712-24V	–	28	–	4	26
APCIe-1712-5V-I	16	–	12	4	26

Safety features

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

Applications

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

Software

Standard drivers for:

- Linux
- Signed 64-bit drivers for Windows
- Real-time use with Linux and Windows on request

Drivers and samples for the following compilers and software packages:

- Microsoft VC++

On request:

Further operating systems, compilers and samples.

Driver download: www.addi-data.com/drivers

Phone: +49 7229 1847-0 info@addi-data.com
Fax: +49 7229 1847-222 www.addi-data.com

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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	Counter/Timer

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

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.

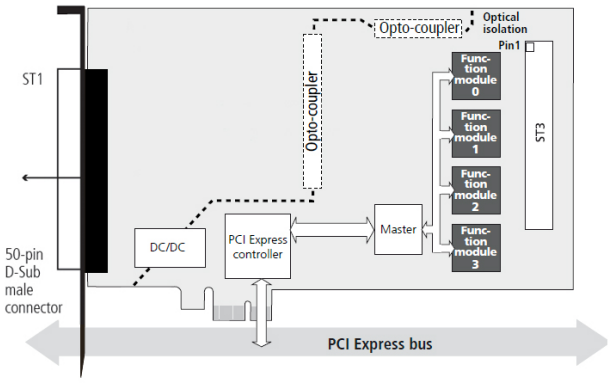
Overview of signal generators resp. functions

Application	Max. number of signal generators or functions for each function module	Max. number of function modules for each APCIe-1712	Max. number of signal generators or functions of each APCIe-1712	Page
Incremental counter	1 (32-bit) or 2 (16-bit)	4	4 or 8	–
SSI	3	4	12	–
Chronos	1	4	4	–
BiSS-Master	6	4	24	120
Counter/Timer	3	4	12	–
TOR	2	4	8	–
Pulse acquisition	4	4	16	–
PWM	2	4	8	–
ETM	2	4	8	–
Digital I/O	8	4	32	–
TTL	26	1	26	–
Parallel Interface	1	4	1	120
EnDat 2.2	2	4	8	121

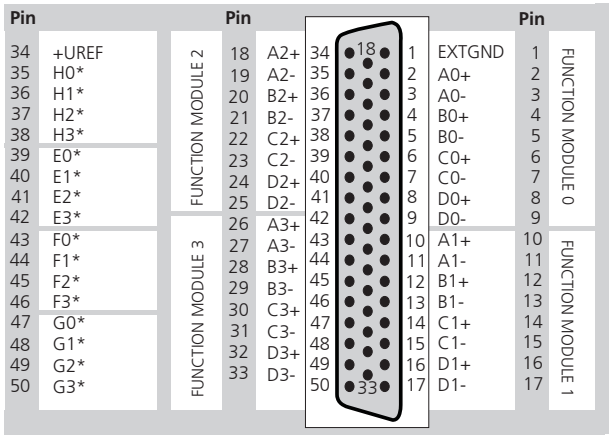


Customer-tailored modifications, designed to suit your needs.
Hardware and software, firmware, PLDs, ...
Contact us!

Simplified block diagram

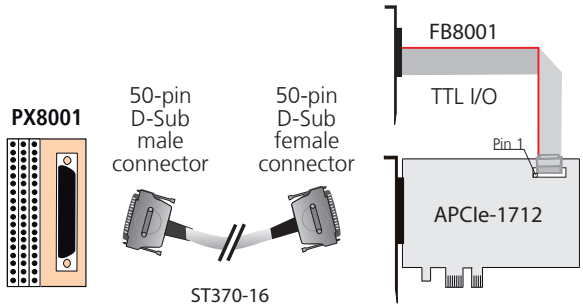


Pin assignment



*Each number corresponds to the number of the function module

ADDI-DATA connection



Function Parallel Interface

On request

With the Parallel Interface function, the digital inputs of the APCIe-1712 are acquired in parallel. Up to 28 digital inputs, 24 V, can be acquired with the APCIe-1712-24 V. Up to 16 RS422 and 12 digital 24 V inputs can be acquired with the APCIe-1712.

There are different methods for the acquisition of the inputs:
- Timer controlled (max. resolution 1 µs = 1 MHz)
- Digital input (by masking the digital inputs, rising or falling edge)
- Software

This function can be loaded up to 4 times for each APCIe-1712, i.e. it is possible to acquire 8-bit (7 inputs), 16-bit (14 inputs), 24-bit (21 inputs) or 32-bit (28 inputs) in parallel. If an external trigger signal is used (maskable, rising or falling edge), there is no need to use one of the inputs for triggering.

The data is transferred directly via DMA into the RAM of the PC.
If the Parallel Interface function is loaded on all function modules up to 28 digital inputs (RS422 / 24 V) are available.

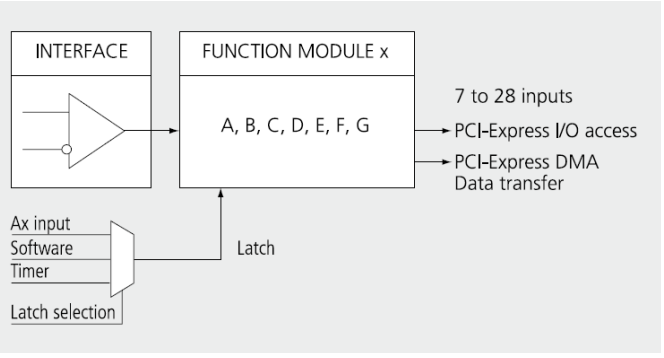
Used signals

Pin name	Signal type	Function
Ax +/-	24 V*/ RS422	Digital input
Bx +/-	24 V*/ RS422	Digital input
Cx +/-	24 V*/ RS422	Digital input
Dx +/-	24 V*/ RS422	Digital input
Ex	24 V	Digital input
Fx	24 V	Digital input
Gx	24 V	Digital input

The 24 V switching level can be adjusted optionally down to 1 V

x: Number of the function module (See pin assignment page 119)
* 24 V for the APCIe-1712-24 V

Block diagram Parallel Interface



Function BiSS-Master

The BiSS-Master function is a bidirectional sensor interface for the communication with up to 6 sensors. BiSS B and C are supported.

Features of the BiSS-Master function:
- 1 function module with a maximum amount of 6 sensors (3 per channel) for cascading the sensors it is necessary that each sensor has a data input and data output
- Read sensor data
- Read/write register data

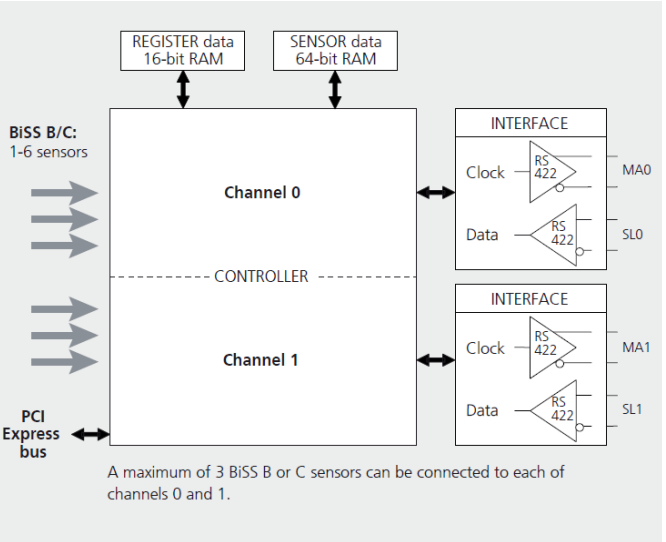
Get more information about the function range of the BiSS interface at www.biss-interface.com.

Used signals

Signal name	Pin name	Signal type	Function
Output_Ch0_x+/-	Ax +/-	Differential	Channel 0: digital output (clock line from master to slave)
Input_Ch0_x+/-	Bx +/-	Differential	Channel 0: digital input (data line from slave to master)
Output_Ch1_x+/-	Cx +/-	Differential	Channel 1: digital output (clock line from master to slave)
Input_Ch1_x+/-	Dx +/-	Differential	Channel 1: digital input (data line from slave to master)

x: Number of the function module (0-3)

Block diagram BiSS-Master



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Function EnDat 2.2

EnDat 2.2 is a bidirectional synchronous-serial interface for position measurement devices. This interface allows the reading out of absolute position values and parameters, the writing of status and initialisation registers and the transfer of additional information about the position value. Furthermore, the EnDat 2.2 function modules support the analysis of diagnostic values and access to the OEM memory. Data transfer is effected serially.

On one board you can use up to 8 EnDat 2.2 sensors (2 sensors per function module). Each function module has its own clock pulse line (B or D) and data line (A or C).

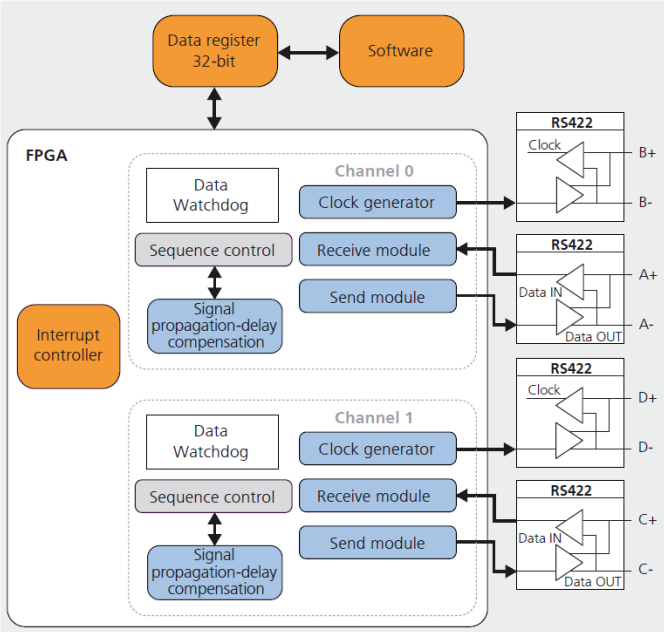
The function EnDat 2.2 is only available for the APCIe-1712!
(not for the APCIe-1712-24V and APCIe-1712-5V-I)

Used signals

Channel	Signal name	I/O	Pin name	Function
0	DATA_0+_x	I/O	Ax +	Data line
0	DATA_0-_x	I/O	Ax -	Data line
0	CLK_0+_x	O	Bx +	Clock line
0	CLK_0-_x	O	Bx -	Clock line
1	DATA_1+_x	I/O	Cx +	Data line
1	DATA_1-_x	I/O	Cx -	Data line
1	CLK_1+_x	O	Dx +	Clock line
1	CLK_1-_x	O	Dx -	Clock line
Dig. I/O	DigIn0_x	I (24 V)	Ex	Digital inputs for free use
Dig. I/O	DigIn1_x	I (24 V)	Fx	Digital inputs for free use
Dig. I/O	DigIn2_x	I (24 V)	Gx	Digital inputs for free use
Dig. I/O	DigOut_x	O (24 V)	Hx	Digital output for free use

x: Number of the function module (0-3)

Block diagram EnDat 2.2



Up to 8 EnDat 2.2 sensors can be connected (2 per function module)!

Application example

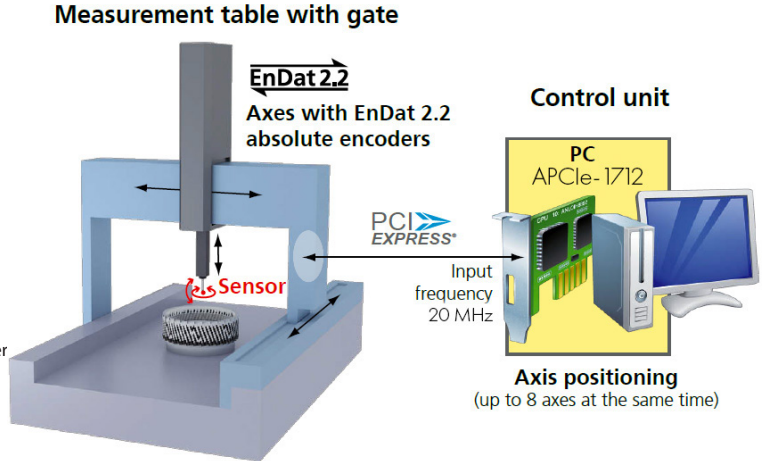
Exact positioning of axes for the regulation of surface measurement devices for rotationally symmetric parts (e.g. gear wheels)

Challenge

For the measurement of the surfaces of rotationally symmetric parts, numerous axes must be positioned. Furthermore, the signals must be fastly transferred in order to detect the position as exactly as possible. To save time, absolute encoders are used because they do not need any reference runs when started.

Solution

The measurement device consists of a measurement table with a gate. The rotationally symmetric parts are fixed on the measurement table and their surface is tested with a sensor connected to the gate. To move the sensor around the parts, the gate has several axes equipped with EnDat 2.2 absolute encoders. The precision of the axis position is assured by the PCI Express counter board APCIe-1712. Thanks to its high input speed of 20 MHz and its resistance to interferences, the board is able to move the axes precisely even at high speed.





Specifications

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 82C54)
- 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 (B and C mode)
- ETM (Timer interface for period duration measurement, edge time, ...)
- TTL (TTL I/O without isolation)
- Parallel Interface
- EnDat 2.2
- Customised functions

Signals

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

Inputs

Differential inputs or outputs (A, B, C, D)		
Differential inputs, RS422:	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 kΩ	
Terminal resistor:	120 Ω (not supplied)	
Max. input frequency:	20 MHz (at nominal voltage)	
Mass-related inputs, 24 V (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:	20 MHz (diff. outputs)
Max. number of outputs:	16 (if they are not used as diff. inputs)
Digital outputs, 24 V (H)	
Output type:	High-side (load to ground)
Number of outputs:	4
Nominal voltage:	24 VDC
Supply voltage range:	5 V to 35 VDC (via 24 V ext. pin)
Maximum current:	90 mA per output / 270 mA for all outputs (PTC)
Overtemperature:	165 °C (all outputs switch off)

Technical data APCIe-1712-24V version

	24 V inputs (channels A to G). 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 :	Unominal:	24 V
(Standard)	UH max.:	30 V
	UH min.:	18 V
	UL max.:	16 V
	UL min.:	0 V

Functions

On the board APCIe-1712-24V Ax, Bx, Cx and Dx are only available as 24 V inputs and not as outputs. Therefore not any function can be used on any version of the board.

Please find more detailed information in the respective function manual.

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 1.0a)
Space required:	1-/4-/8-/16-lane PCI Express slot
Operating voltage:	+ 3.3 V / + 12 V from the PC +24 V ext.
Front connector:	50-pin D-Sub male connector
Additional connector:	Male connector for the TTL I/O function
Temperature range:	0 to 60 °C (with forced cooling)

Ordering information

APCIe-1712

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

APCIe-1712:	Isolated counter board with programmable functionality
APCIe-1712-24V:	24 V instead of RS422 (A, B, C, D)
APCIe-1712-5V-I:	5 V inputs instead of 24 V (E, F, G)

Option

Opt. 5V:	3.3 V outputs instead of 24 V (H0, H1, H2, H3)

Accessories

PX8001:	3-row screw terminal panel with housing for DIN rail
ST370-16:	Standard round cable, shielded, twisted pairs, 2 m
FB8001:	Ribbon cable