

FPGA-based multifunction PCI I/O, counter and encoder board, optically isolated, with fully programmable real-time functions



Also for **CompactPCI™**
CPCI-1712, CPCI-1712

Also for
PCI EXPRESS®
PCIe-1712



Windows 11
64/32-bit drivers



On request

The APCI-1712 is a high-performance multifunction counter and digital I/O card for the PCI bus, designed for demanding industrial measurement and control applications. Based on an FPGA-driven architecture, the APCI-1712 provides four independently configurable function modules.

Each module can be programmed with a wide range of counter, measurement, and logic functions via the supplied software, allowing the board to be precisely adapted to application-specific requirements.

Contact us!

Features

- 32-bit data access
- Up to 40 MHz input frequency
- Signals in TTL or RS422 mode (APCI-1712), 24 V signals (APCI-1712-24V)
- 4 on board FPGAs
- Software reprogrammable FPGA 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.
- BiSS-C
- Counter/timer (82C54)
- Pulse acquisition
- Frequency measurement
- Pulse width modulation (PWM)
- Period duration measurement
- Velocity measurement
- Digital inputs and outputs
- Edge time measurement (ETM)
- **Customised functions**

Available channels for all four function modules

- 20 channels for digital inputs, optically isolated
- 8 channels, programmable either as digital inputs or outputs, optically isolated
- 4 digital power outputs, optically isolated

APCI-1712

Available functions:

Four programmable Altera Cyclone 10 FPGAs

Multifunction counter and I/O capabilities :

Incremental Counter, SSI, Counter, Timer, PWM, others on request (Sin/Cos, ENDAT ...)

Supports high-frequency input signals, suitable for fast encoder and pulse-based applications

Galvanic isolation of inputs

Input and Outputs: TTL, RS422, 24V

Software-configurable and upgradable

Available lines for each function module

8 lines are available for each function module

- Input lines:
 - 2 x TTL and RS422 (APCI-1712) or 2 x 24 V (APCI-1712-24V)
 - 3 x 24 V, optional 5 V for channels E, F, G
- Output lines:
 - 1 x 24 V, optional 5 V (power output)
- 2 channels, programmable either as digital inputs or outputs, optically isolated: 2 x TTL, RS422
- Galvanic Isolation (Inputs) 1000V

Applications

- Event and batch counting
- Position and speed acquisition
- Encoder feedback and motion control
- Conveyor tracking and synchronization
- Vision system triggering
- Production monitoring and quality control
- Frequency and pulse measurement

Software drivers

Standard drivers for:

- Linux
- 64 bits Windows 7 / 8 / 10 / 11
- On Request : RTX, Xenomai, VxWorks, QNX

Supported Drivers Languages :

- C/C++
- Python
- .NET
- Other on Request

On request:

Documentation and developer resources.

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

Service

- Integration in MSX-BOX DAQ IPC possible for ready to use solutions
- Long Term availability (20+)

Wide range of applications through free combination of function modules on FPGA

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 |
| 32-bit Incremental counter | 32-bit Incremental counter | Pulse counter | Counter/Timer |

| Configuration example 2 | | | |
|-------------------------|-------------------|----------------------------|-------------------|
| Function module 0 | Function module 1 | Function module 2 | Function module 3 |
| SSI | SSI | 32-bit Incremental counter | Digital I/O, 24 V |

Programmable onboard modules

The APCI-1712 is fully integrated into the ADDI-DATA Ecosystem and Software. Each onboard module can be configured with the required function using ConfigTools, the graphical configuration tool delivered as part of the ADDI-DATA software environment.

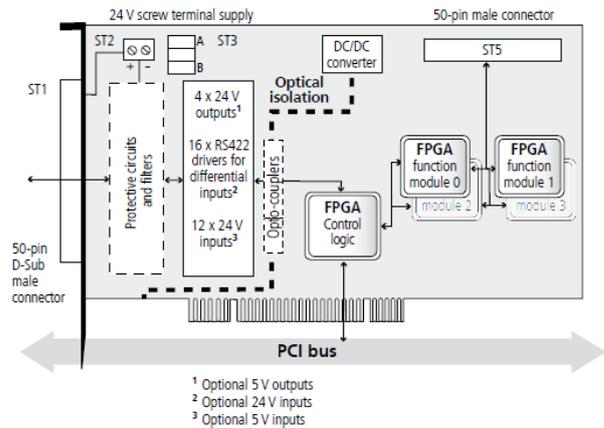
Up to four different functions can be operated simultaneously on a single board. Application changes are implemented quickly and easily by reconfiguring the modules via ConfigTools, without any hardware modification, ensuring flexibility throughout the product lifecycle.

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 APCI-1712 | Max. number of signal generators or functions of each APCI-1712 | Page |
|---------------------|--|--|---|------|
| Incremental encoder | 1 (32-bit) or 2 (16-bit) | 4 | 4 or 8 | 3 |
| SSI | 3 | 4 | 12 | 3 |
| Chronos | 1 | 4 | 4 | 4 |
| Counter/Timer | 3 | 4 | 12 | 5 |
| TOR | 2 | 4 | 8 | 6 |
| Pulse counter | 4 | 4 | 16 | 7 |
| PWM | 2 | 4 | 8 | 7 |
| ETM | 2 | 4 | 8 | 8 |
| Digital I/O | 8 | 4 | 32 | 8 |
| TTL | 24 | 1 | 24 | - |



Simplified block diagram



Pin assignment

| Pin | Pin | Pin | Pin |
|----------|--------|-------|----------|
| 34 +UREF | 18 A2+ | 34 18 | 1 EXTGND |
| 35 HO* | 19 A2- | 35 2 | 2 A0+ |
| 36 H1* | 20 B2+ | 36 3 | 3 A0- |
| 37 H2* | 21 B2- | 37 4 | 4 B0+ |
| 38 H3* | 22 C2+ | 38 5 | 5 B0- |
| 39 E0* | 23 C2- | 39 6 | 6 C0+ |
| 40 E1* | 24 D2+ | 40 7 | 7 C0- |
| 41 E2* | 25 D2- | 41 8 | 8 D0+ |
| 42 E3* | 26 A3+ | 42 9 | 9 D0- |
| 43 F0* | 27 A3- | 43 10 | 10 A1+ |
| 44 F1* | 28 B3+ | 44 11 | 11 A1- |
| 45 F2* | 29 B3- | 45 12 | 12 B1+ |
| 46 F3* | 30 C3+ | 46 13 | 13 B1- |
| 47 G0* | 31 C3- | 47 14 | 14 C1+ |
| 48 G1* | 32 D3+ | 48 15 | 15 C1- |
| 49 G2* | 33 D3- | 49 16 | 16 D1+ |
| 50 G3* | | 50 17 | 17 D1- |

*Each number corresponds to the number of the function module

ConfigTools



Select the function you want to load.

Save when the configuration is complete.

Function Incremental encoder

Up to 2 **incremental encoders** can be connected to a module programmed with the function Incremental encoder. The applications are :

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

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 / external strobe, latch strobe synchronised with an internal clock pulse
- 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, interrupt and reference point logic

Used signals

| Signal name | Pin name | Signal type | Function |
|-------------|----------|---------------------------------|---|
| A_x | Ax +/- | Diff./TTL/24 V* | A signal of the incremental encoder (32-bit) resp. A signal of the incremental encoder 0 (16-bit) |
| B_x | Bx +/- | Diff./TTL/24 V* | B signal of the incremental encoder (32-bit) resp. B signal of the incremental encoder 0 (16-bit) |
| INDEX_x | Cx +/- | Diff./TTL/24 V* | Index signal of the incremental encoder (32-bit) |
| C_x | Cx +/- | Diff./TTL/24 V* | A signal of the incremental encoder 1 (2x16-bit) |
| UAS_x | Dx +/- | Diff./TTL/24 V* | Error signal input (32-bit) |
| D_x | Dx +/- | Diff./TTL/24 V* | B signal of the incremental encoder 1 (2x16-bit) |
| REF_x | Ex | 24 V / 5 V optional | Digital input (can also control the reference point logic) |
| ExtStrb_a_x | Fx | 24 V / 5 V optional Active High | Digital input (can be used for latch logic, respectively generate an interrupt) |
| ExtStrb_b_x | Gx | 24 V / 5 V optional Active High | Digital input (can be used for latch logic, respectively generate an interrupt) |
| DIG_OUT_x | Hx | 24 V / optional 5 V | Digital output |

x: Number of the function module (See pin assignment page 2)
* 24 V for the APCI-1712-24 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 allow an absolute position information through serial data transfer.

Typical application examples:

- Acquisition of displacement measurement systems
- Axis control (X, Y and Z)
- Tolerance measurement ...



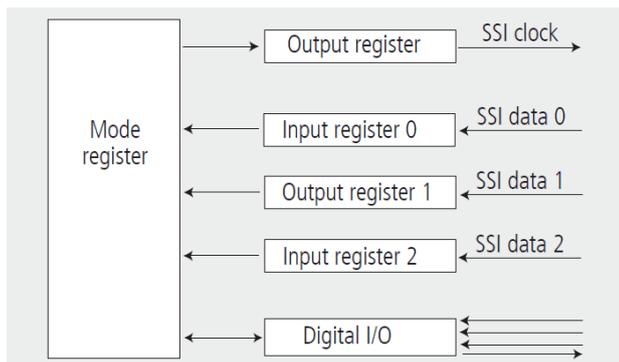
Properties

- 4 function modules for each board, up to 3 SSI encoders per function module (depends on encoder)
- Optical isolation of the inputs and outputs through opto-couplers to prevent ground loops
- Serial data transfer
- Common clock pulse for the 3 interfaces per function module
- Clock frequency and number of data bits are software-programmable
- GRAY to BINARY conversion possible
- For each function module there are 3 digital inputs and 1 digital output for an additional function (no effect on SSI function)

The interface includes:

- Three independent 32-bit SHIFT registers, which can be read through the data bus
- Clock and pulse generator
- Function and control logic

Block diagram SSI



Used signals

| Signal name | Pin name | Signal type | Function |
|-------------|----------|---------------------|--|
| Clock_x | Ax +/- | RS422 | Clock output signal for the SSI encoders |
| DATA1_x | Bx +/- | RS422/TTL | Data input 1 for the first encoder |
| DATA2_x | Cx +/- | RS422/TTL | Data input 2 for the second encoder |
| DATA3_x | Dx +/- | RS422/TTL | Data input 3 for the third encoder |
| Input1_x | Ex | 24 V / 5 V optional | Digital input 1 |
| Input2_x | Fx | 24 V / 5 V optional | Digital input 2 |
| Input3_x | Gx | 24 V / 5 V optional | Digital input 3 |
| Output_x | Hx | 24 V / 5 V optional | Digital output |

x: Number of the function module (See pin assignment page 2)
The SSI function cannot be programmed on the APCI-1712-24 V.



Function Chronos

The function **Chronos** is a timer interface which allows to measure the time between two "events" like a chronometer.

3 functions are available:

- a 32-bit timer to create a time reference,
- a 32-bit measuring timer to determinate and measure the time between start and stop pulse.
- 3 digital inputs and 3 digital outputs

Properties

- Optical isolation of the inputs and outputs through opto-couplers to prevent ground loops
- Interrupt status at the end of the measuring time
- Timer readable
- Input and output channels can be inverted through software, Software GATE possible

Function description

The pulse signals from Timer 0 are counted between the start pulse signal and the stop pulse signal. The number of pulses is then stored in the measuring timer and can be read through I/O read commands. The timer 0 is used as a time reference generator. The divider factor is written in timer 0 and determines the output frequency.

The input frequency is set according to the PCI clock pulse or to the 10 MHz onboard clock generator. Timer 0 is synchronised with the start event or with the 40 MHz quartz of the board. Timer 0 can be read at any time. The Chronos function can be used in 8 different modes.

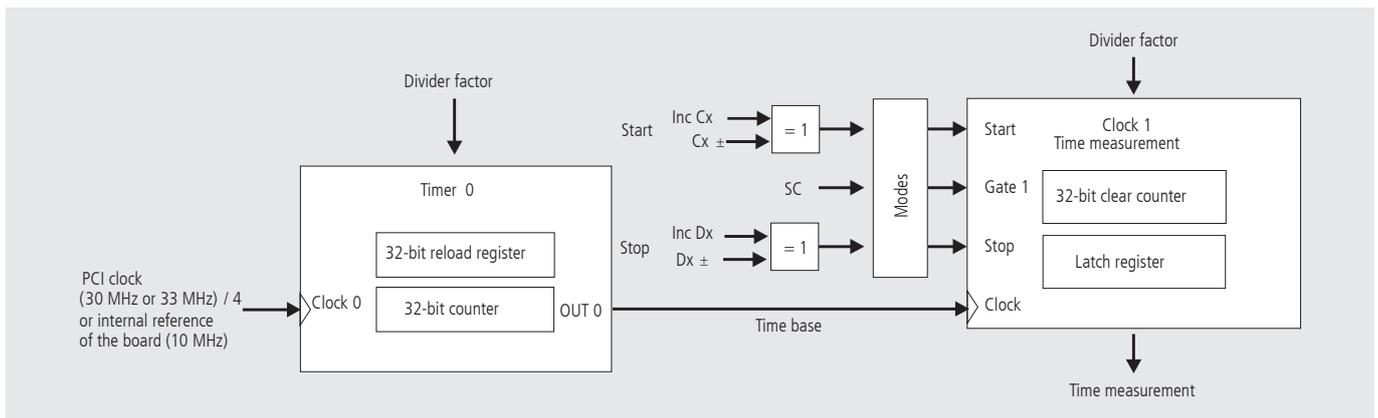
Used signals

| Pin name | Signal type | Function |
|----------|---------------------|--|
| Ax +/- | Diff./TTL, 24 V* | Digital output 1; set to "0" after reset |
| Bx +/- | Diff./TTL, 24 V* | Digital output 2; set to "0" after reset |
| Cx +/- | Diff./TTL/24 V* | Start pulse for measuring |
| Dx +/- | Diff./TTL/24 V* | Stop pulse for measuring |
| Ex | 24 V / 5 V optional | Digital input 0, inverting |
| Fx | 24 V / 5 V optional | Digital input 1, inverting |
| Gx | 24 V / 5 V optional | Digital input 2, inverting |
| Hx | 24 V / 5 V optional | Digital output 0; set to "0" after reset |

x: Number of the function module (See pin assignment page 2)

*24 V for the APCI-1712-24V

Block diagram Chronos



Function Counter/Timer

Function equivalent to Intel 82C54

The module **Counter/Timer** can be used as a programmable interval counter/timer (similar to Intel 82C54) with 3 x 32-bit per module.

It generates time delays through software control. Instead of setting up timing loops in software, the user programs the module for the desired delays. After this delay, the module will interrupt the PC.

- Optical isolation of the inputs and outputs through opto-couplers to prevent ground loops
- 3 x 32-bit counters/timers, binary counting only
- 6 programmable modes
- Status readback and latch command
- Inputs and outputs can be inverted through software
- Hardware and software gate possible, readable
- Simple interface: no multiple assignment of the addresses
- Interrupt enabled with an individual release bit per counter/timer and interrupt status register

Typical applications:

- Event counter
- Programmable rate generator
- Binary rate multiplier
- Square-wave generator
- Complex motor controller / signal generator

Programmable modes

For each counter/timer (3 x 32-bit) there are 6 modes available: mode 0 to mode 5, which can be programmed independently.

Mode 0: Interrupt on terminal count

Mode 0 is particularly suitable for event counting. The output is initially set to "Low" and remains "Low" until the counter reaches 0. The output then goes "High" and holds this state until a new count or a new counter value is written into the counter.

Mode 1: Hardware retriggerable one-shot

This mode is identical to mode 0 except for the GATE input. The GATE input is not used to activate or deactivate the timer, but to trigger it.

Mode 2: Pulse generator

In this mode the counter is dividing the choosed input clock through the start value "ul_ReloadValue". Mode 2 is used for generating a real-time clock interrupt. After initialization the output is set to "High". When the initial count has decremented to 1, the output goes "Low". For only one clock pulse the output is set to "Low" then it goes back to "High". The counter reloads the start value ("ul_ReloadValue") and the counter sequence is repeated. The number of sequences is unlimited. An interrupt can be generated at the end of the cycle. Calculation of time: $(ul_ReloadValue + 2) \times \text{input clock}$

Mode 3: Square wave mode

Mode 3 is used for baud rate generation. It is similar to mode 2 except for the duty cycle of the output. The output is initially set to "High". When half the initial count has expired, the output is set to "Low" for the remainder of the count. Mode 3 is periodic; the same sequence is repeated indefinitely. Calculation of time: $(ul_ReloadValue + 2) \times \text{input clock}$

Mode 4: Software-triggered strobe

The output is initially set to "High". When the initial count expires, the output goes "Low" for one clock pulse and then goes "High" again. The counting sequence is triggered by writing the initial count.

If a new count is written during counting, it will be loaded on the next clock pulse and counting will continue from the new count.

Mode 5: Hardware-triggered strobe (retriggerable)

This mode is identical to mode 4 except for the GATE input. The GATE input is not used to activate or deactivate the timer, but to trigger it.

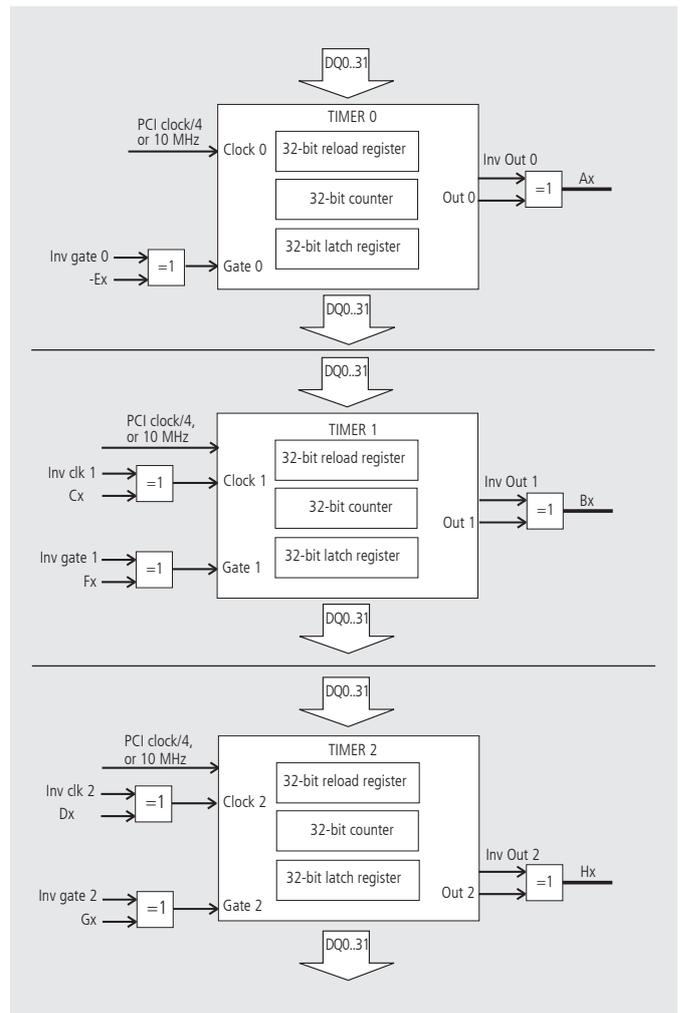
Used signals

| Signal name | Pin name | Signal type | Function |
|-------------|----------|-----------------------|--|
| OUT1_x | Ax +/- | Diff./TTL | Output of counter/timer 0 |
| OUT2_x | Bx +/- | Diff./TTL | Output of counter/timer 1 |
| OUT3_x | Hx | 24 V / 5 V opt. | Output of counter/timer 2 |
| GATE1_x | Ex | 24 V / 5 V opt. | GATE Input of counter/timer 0 |
| GATE2_x | Fx | 24 V / 5 V opt. | GATE Input of counter/timer 1 |
| GATE3_x | Gx | 24 V / 5 V opt. | GATE Input of counter/timer 2 |
| CLK1_x | - | - | Internal clock |
| CLK2_x | Cx +/- | Diff./TTL/ 24 V opt. | Clock counter input of counter/timer 1 |
| CLK3_x | Dx +/- | Diff./ TTL/ 24 V opt. | Clock counter input of counter/timer 2 |

The Counter/Timer function cannot be programmed on the APCI-1712-24 V.

x: Number of the function module (See pin assignment page 2)

Block diagram Counter/Timer



Function TOR

The **TOR** function is a counter interface which allows counting input signals in a defined time interval.

2 TOR counters are available on each function module. Each TOR counter includes 2 x 32-bit timers.

The TOR function is a scaled-down version of the Counter/Timer

function. The pulse signal of Timer 1 gives the start and stop pulse signal to Timer 0. Timer 0 counts the input signals. After the stop signal from Timer 0 the number of pulses is stored and can be read through I/O read commands.

The timer 1 is used as a time reference generator.

The divider factor is written in timer 1 and determines the output frequency. The input frequency is set according to the PCI clock pulse or the 40 MHz on-board quartz clock. Timer 0 is synchronised with the start event.

Pulse measurement

As soon as a start signal occurs from Timer 1, the Timer 0 is reset.

It counts the pulse signals of the channel Ax(Bx).

During the process the status bit "Counter in Progress" is set.

As soon as a stop signal occurs from Timer 1, the Timer 0 is stopped and the status bit "Counter in Progress" is reset.

An interrupt can also be generated. The value can then be read. The latest measured value is read in the counter measurement register.

Properties

- Optical isolation of the inputs and outputs through opto-couplers to prevent ground loops
- Interrupt status at the end of the measuring period
- Inputs and output can be inverted through software
- Software GATE

The function TOR occupies 4 inputs (A to D) of the corresponding function module of the APCI-1712.

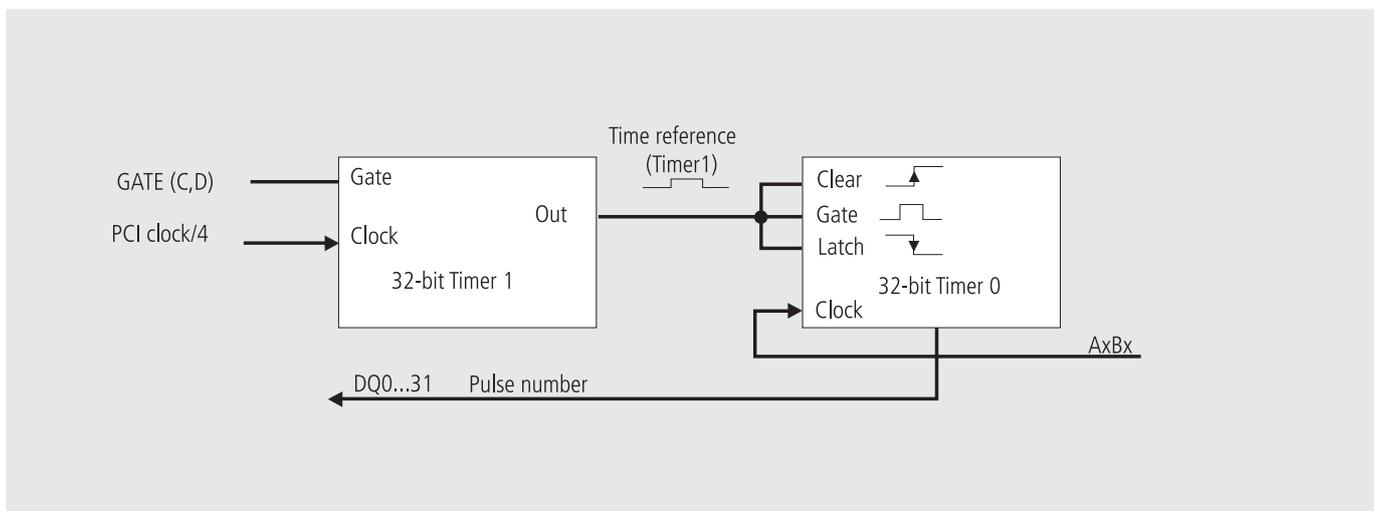
Used signals

| Pin name | Signal type | Function |
|----------|-----------------|------------------------|
| Ax +/- | Diff./TTL/24 V* | Digital input 1 (TOR1) |
| Bx +/- | Diff./TTL/24 V* | Digital input 2 (TOR2) |
| Cx +/- | Diff./TTL/24 V* | External Gate (TOR1) |
| Dx +/- | Diff./TTL/24 V* | External Gate (TOR2) |

x: Number of the function module (see pin assignment page 2)

*24 V for the APCI-1712-24V

Block diagram TOR



Function Pulse counter

The **Pulse counter** is an interface for the acquisition of external digital pulses. Each rising or falling edge on the counter input starts decrementing from the initially set counter value. An interrupt is generated at logical "0", i.e. the digital output is set or reset.

- 4 x 32-bit downward counters
- Optical isolation of the inputs and outputs through opto-couplers to prevent ground loops
- Each counter can be loaded with a predefined counter value
- Interrupt at overflow
- Output can be set or reset at overflow
- Polarity of the inputs selectable through software

The interface includes:

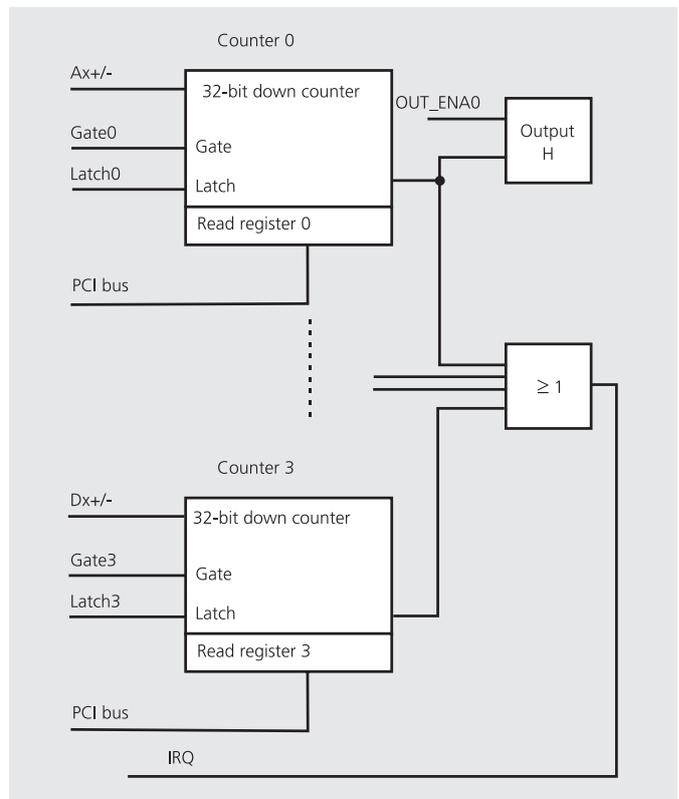
- 4 x 32-bit counters
- 4 independent 32-bit registers, readable through the data bus
- a function and control logic.

Used signals

| Pin name | Signal type | Function |
|----------|-------------------|--------------------------------------|
| Ax +/- | Diff./TTL/24 V* | Input of the 1st counter |
| Bx +/- | Diff./TTL/24 V* | Input of the 2nd counter |
| Cx +/- | Diff./TTL/24 V* | Input of the 3rd counter |
| Dx +/- | Diff./TTL/24 V* | Input of the 4th counter |
| H | 24 V/5 V optional | Common digital output of the counter |

x: Number of the function module (see pin assignment page 2)
 * 24 V for the APCI-1712-24V

Block diagram Pulse counter



Function PWM (Pulse width modulation)

The PWM function provides a pulse-width modulation generator. It generates a configurable frequency and defines the duration (pulse width) of the Low and High levels.

PWM generator

The "Low/High" time-divider factors are written in the timer and determines the output frequency. The input frequency is set according to the PCI clock or the 40 MHz quartz of the board.

The function includes:

- a 32-bit frequency generator for setting the "Low" and "High" levels
- 2 digital inputs as start or stop trigger
- 2 digital frequency outputs

Properties

- Optical isolation of the inputs and outputs through opto-couplers to prevent ground loops
- Interrupt status at the end of a period
- Selection of the start level
- Selection of the stop level
- Hardware gate
- Software gate

Typical applications

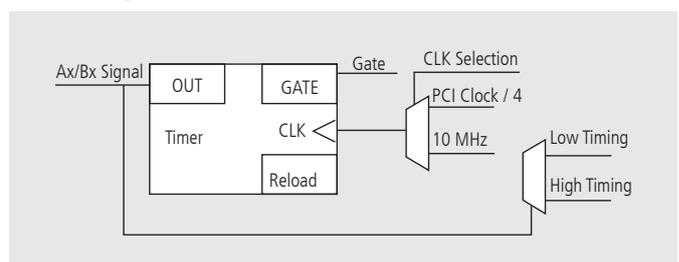
- Frequency generation
- Pulse width modulation
- Drive technology

Used signals

| Signal name | Pin name | Signal type | Function |
|---------------|----------|------------------|---|
| PWM_OUT_Ch0_x | Ax +/- | Diff./TTL output | digital output PWM 0 |
| PWM_OUT_Ch1_x | Bx +/- | Diff./TTL output | digital output PWM 1 |
| GATE_Ch0_x | Cx +/- | Diff./TTL input | Gate input PWM 0 |
| GATE_Ch1_x | Dx +/- | Diff./TTL input | Gate input PWM 1 |
| DIG_IN_E_x | Ex | 24 V input | digital input |
| DIG_IN_F_x | Fx | 24 V input | digital input |
| DIG_IN_G_x | Gx | 24 V input | digital input |
| DIG_OUT_H_x | Hx | 24 V output | digital output PWM 0 or freely controllable |

x: Number of the function module (See pin assignment page 2)
 The PWM function only can be used restricted to the 24 V version. Only PWM0 is available for the DIG_OUT_H_x 24 V output.

Block diagram PWM



Function ETM (Edge Time Measurement)

The **ETM** function is a timer interface which allows measuring the duration of a period, and simultaneously, the “High” or “Low” level time of this period. A function module with the ETM function has

- 1 timer to create a time base
- 2 counters to measure the period duration
- 2 counters to measure the “High” or “Low” level time
- 2 gate inputs

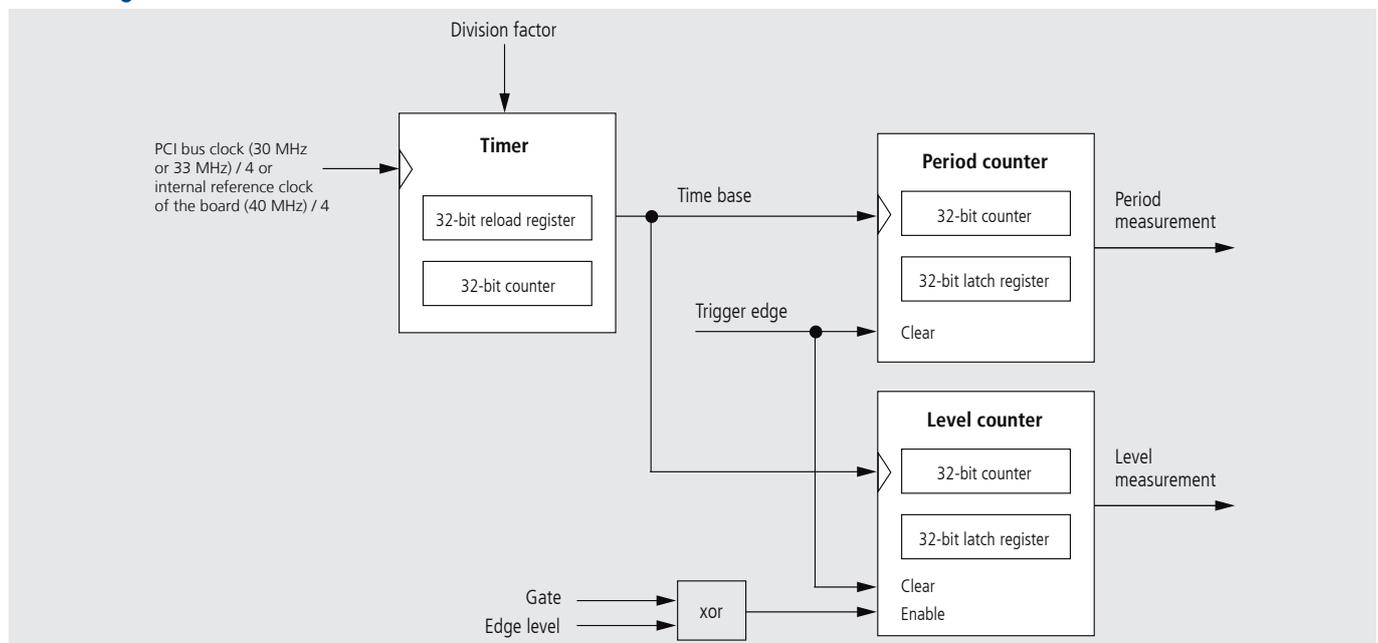
The ETM function uses 4 inputs (A to D) with each function module of the APCI-1712 or CPCI-1712. Up to 8 ETM (2 per module) can be operated on one board.

Properties

- Optical isolation of the inputs and outputs through opto-couplers to prevent ground loops
- Interrupt status at the end of a period
- Timer can be read back
- Inputs and outputs can be inverted through software
- Software gate

Typical applications

Block diagram ETM



- Period duration measurement
- Level duration measurement

Used signals

| Signal name | Pin name | Signal type | Function |
|-------------|----------|----------------------|-----------------------------|
| Gate0_x | Ax +/- | Diff./TTL/opt. 24 V* | Gate input of ETM counter 0 |
| Input0_x | Bx +/- | Diff./TTL/opt. 24 V* | Input of ETM counter 0 |
| Gate1_x | Cx +/- | Diff./TTL/opt. 24 V* | Gate input of ETM counter 1 |
| Input1_x | Dx +/- | Diff./TTL/opt. 24 V* | Input of ETM counter 1 |

x: Number of the function module (see pin assignment page 2)
*24 V for the APCI-1712-24V

Function Digital input and output

The **Digital input and output** function allows an easy access to the digital I/O available on the function modules. The I/O level of the input and output channels are read and set or reset through read/write commands. The digital I/O have no logical connection to each other. The connection can only be made through software. The complete isolation through opto-couplers avoids earth circuits. The complete galvanic isolation using opto-couplers prevents ground loops between isolated circuits.

Available channels

- 3 x 24 V mass-related input channels, optional 5 V
- 2 x differential input channels (RS422/485), can also be used as TTL input channels
- 1 digital output, 24 V, load to ground (10 to 36 V / 500mA)
- 2 differential inputs or outputs (RS485), can also be used as TTL input or output channels. Software configuration.

When the digital I/O function is programmed on all function modules, up to 28 digital input and 12 digital output channels are available

Used signals

| Pin name | Signal type | Function |
|----------|---------------------------|---|
| Ax +/- | Diff./TTL/24 V* | Dig. input and output (with 24 V* only input) |
| Bx +/- | Diff./TTL/24 V* | Dig. input and output (with 24 V* only input) |
| Cx +/- | Diff./TTL/24 V* | Digital input |
| Dx +/- | Diff./TTL/24 V* | Digital input |
| Ex | 24 V / 5 V optional | Digital input |
| Fx | 24 V / 5 V optional | Digital input |
| Gx | 24 V / 5 V optional | Digital input |
| Hx | 24 V / 500 mA (10 – 36 V) | Digital output |

x: Number of the function module (see pin assignment page 2)
*with the APCI-1712-24V

Specifications

Counter components

| | |
|---------------------|-------------|
| Counting depth: | 32-bit |
| Counting frequency: | Up to 5 MHz |

Available functions

| |
|--|
| 32-bit or 16-bit acquisition of incremental encoders |
| Acquisition of absolute encoders/SSI |
| Counter/timer |
| Chronos/TOR for frequency measurement |
| Pulse acquisition |
| Chronos for pulse width modulation |
| Chronos for period duration measurement |
| TOR for velocity measurement |
| Digital I/O, 24 V, TTL, RS422 |
| PWM |
| ETM |
| Custom functions |

Signals

Digital I/O signals, TTL or RS422

Inputs

| | |
|-------------------|----|
| Number of inputs: | 20 |
|-------------------|----|

Differential inputs or outputs

| | |
|---------------------------|---|
| 5 V inputs: | 8/16 (8 can be used as inputs or outputs) |
| Nominal voltage: | 5 VDC |
| Common mode range: | +13 / -8 V |
| Max. differential voltage | ±12 V |
| Input sensitivity: | 105 mV |
| Input hysteresis: | 10 mV |
| Input impedance: | High Impedance |
| Terminal resistor: | Not connected |
| Signal delay: | 25 nS (at nominal voltage) |
| Max. input frequency: | 2.5 MHz (at nominal voltage) |

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

| | |
|---------------------|---|
| Number of inputs: | 12 |
| Nominal voltage: | 24 VDC |
| Input current: | 35 µA (OPA buffered) |
| Logic input levels: | Unominal: 24 V UH max.: 30 V UH min.: 19 V UL max.: 17 V UL min.: 0 V |

| | |
|--------------------------|------------------------------|
| Signal delay: | 1.3 µs (at nominal voltage) |
| Maximal input frequency: | 2.5 MHz (at nominal voltage) |
| Galvanic Isolation: | 1000V |

Outputs

| | |
|---------------------------|--|
| Nominal voltage: | 3.3V |
| Maximum output frequency: | 2.5 MHz (diff. outputs) |
| Max. number of outputs: | 8 (if they are not used as diff. inputs) |

Digital outputs, 24 V:

| | |
|--|---|
| Output type: | High-side (load to ground) |
| Number of outputs: | 4 |
| Nominal voltage: | 24 VDC |
| Range of the supply voltage: | 5V to 35V (via 24 V ext. pin) |
| Maximum current for 4 outputs: | 1.4 A typ. (limited to the voltage supply) |
| Maximum output current: | 500 mA short-circuit current/ output at 24 V, $R_{load} < 0.1 \Omega$: 1.5 A max. (output switches off) |
| ON-resistance of the output (RDS ON resistance): | 0.4 Ω max. |

| | |
|--|--|
| Overtemperature: | 165 °C (all outputs switch off) |
| Overtemperature protection (24 V outputs) | |
| Activated: | From approx. 150-165 °C (chip temperature) |
| Deactivated (automatically): | Always activated |
| Outputs (at overtemperature): | Outputs switch off |

Switching characteristics of the 24 V outputs

| | |
|---|--------|
| (V ext. = 24 V, T=25 °C, ohmic load: 500 mA): | |
| Switch ON time: | 200 µs |
| Switch OFF time: | 15 µs |

Digital outputs, 5 V (option):

| | |
|--------------------|-------|
| Output type: | TTL |
| Number of outputs: | 4 |
| Nominal voltage: | 5 VDC |

Switching characteristics of the 5 V outputs (T=25 °C, TTL load):

| | |
|------------------|---------|
| Switch ON time: | 0.06 µs |
| Switch OFF time: | 0.02 µs |

Technical data for the APCI-1712-24 V board version

24 V inputs (channels A to G). This board version is exclusively used for connecting 24 V encoders. Only 24 V signals can be connected to the input channels.

| | |
|-----------------------|--|
| Nominal voltage: | 24 VDC / 35 µA |
| Max. input frequency: | 1 Mhz |
| Logic input levels: | U nominal: 24 V UH max.: 30 V UH min.: 19 V UL max.: 17 V UL min.: 0 V |

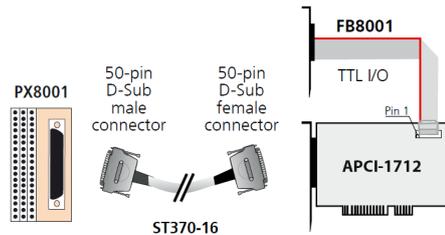
EMC – Electromagnetic compatibility

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.

Physical and environmental conditions

| | |
|-----------------------|---|
| Dimensions: | 168 x 98 mm |
| System bus: | PCI 32-bit 5 V acc. to specification 2.1 (PCISIG) |
| Space required: | 1 slot |
| Operating voltage: | +5 V, ± 5 % from the PC +24 V ext. /10 mA |
| Current consumption: | APCI-1712-x: 1.15 A typ. ± 10 % |
| 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) |

ADDI-DATA connection



Ordering information

APCI-1712

FPGA-based multifunction PCI I/O, counter and encoder board, optically isolated, with fully programmable real-time functions.

APCI-1712: Multifunction counter board, optically isolated.

APCI-1712-24V: 24 V for differential input signals (A and B for counter, I (Index) and UAS (error) signals).

APCI-1712-5V-I: 5 V inputs (E, F, G) instead of 24 V

Option

Opt. 5V: 5 V outputs (H1, H2, H3, H4) instead of 24 V

Accessories

ST370-16: Shielded round cable, 2 m

PX8001: 3-row terminal panel for DIN rail

FB8001: Ribbon cable for connecting the TTL I/O function

