# CP387

## Single-width, 6U CompactPCI module

The CP387 is a single-width, 6U, CompactPCI module with up to 256 digital input/output channels.

Four mezzanine card sites can be populated with other forms of digital I/O including isolated input, isolated output, relay output, AC switch output or differential I/O.

## TYPICAL APPLICATIONS

Automotive test cells

Industrial monitoring and control

Automatic Test Equipment (ATE)

Monitoring and driving TTL-level signals

Driving relays, solenoids or lamps

KineticSystems' CP387 is a single-width, 6U, CompactPCI module with up to 256 digital input/output channels.

## FEATURES

- 256 channel Digital Input/Output Channels
- 128 Base card channels
- 4 mezzanine card sites for added I/O capability including:
    - TTL I/O
    - Differential I/O
    - Isolated Input
    - Isolated Output
    - Form "C" Relay Output
    - AC switch Output
- Change Of State Recognition
- Pattern Recognition
- Input and Output Strobes
- Programmable contact-bounce suppression on inputs

## GENERAL DESCRIPTION

The CP387 is a single-width, 6U, CompactPCI module with up to 256 digital input/output channels. The CP387 base board supports 128 channels of TTL I/O. Four mezzanine card sites can be populated with other forms of digital I/O including isolated input, isolated output, relay output, AC switch output or differential I/O. The mezzanine card concept allows multiple digital I/O types to be configured within a single module to match the application requirements.

Pattern Recognition and Change Of State detection are included. Both operations can be used on the base card as well as span to the mezzanine channels. Input and output strobes are provided for connection to external sources.

The digital inputs and outputs are available on 3 double stacked 68 position high density connectors.

## BASIC CIRCUIT OPERATION

The CP387 base-board provides 128 TTL level digital I/O channels. Expansion of up to 128 digital channels is provided by 4 mezzanine card sites. These sites can be populated with an assortment of I/O options to extend the capability of the CP387.

Data transfers to and from the CP387 are under programmed control and support 16 and 32 bit data words. Transfers to and from the base-board channels are executed directly. Transfers to the mezzanine card sites are translated by the base-board logic. The mezzanine card sites use an Industry Pack (IP) form factor and require the translation of PCI bus cycles to IP bus cycles.

Accessing digital output channels is accomplished by writing the selected data values to a register location. Reading digital input channels is also accomplished by simple register read operations.

The CP387 contains flash memory that can be used to restore basic digital input and output configuration parameters on power up. These parameters include the connection of either pull-up or pull-down resistors, the direction of digital I/O channels, and the initial power-up values of digital output channels.

Pattern recognition and change-of-state operations are supported by the CP387 base-board as well as by mezzanine plug on cards. The base-board performs these two operations by latching the digital input data from all sources and then performing a compare for the selected operation. If enabled, an interrupt can be generated at the conclusion of a pattern recognition or change-of-state operation.
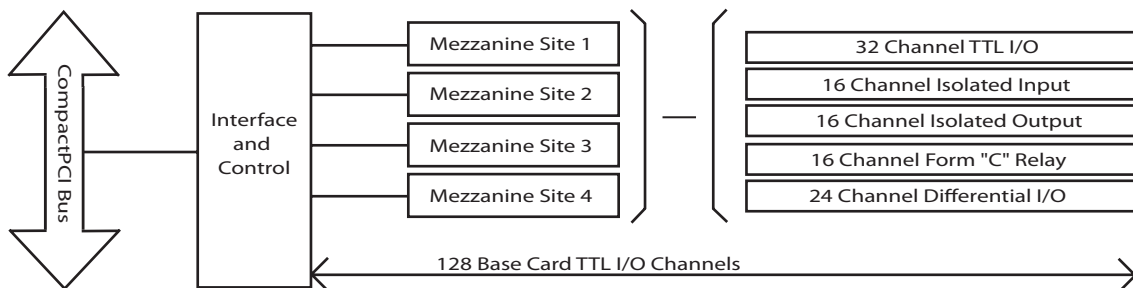
Digital input and output strobes are provided on both the base-board and the mezzanine cards. A strobe signal connected to any of the first 16 channels on the base board can be routed under software control to digital input channels. Programmable contact debounce suppression is provided to prevent false detection of digital input glitches.

## SOFTWARE

The CP387 comes with a Plug and Play driver for configuring and using the device and application examples to illustrate its basic functionality.

This and other tools, including their source code, are provided.

## CP387 Block Diagram

## CP387 Specifications  (Base-Board)

| Item | Specifications |
|---|---|
| Number of Channels | 128 Base-board Channels, and up to an additional 128 channels through expansion provided by the 4 mezzanine card sites. |
| I/O Type | Single-ended TTL |
| Direction Control | Yes, in Groups of 8 channels |
| Input Switching Threshold<br><br>"0" Level<br>"1" Level | <br><br>0.2 V maximum<br>2.2V minimum |
| Output Voltage Threshold<br><br>"0" Level<br>"1" Level | <br><br>0.4 V maximum (Iout = 2.5 mA)<br>2.7 V minimum (Iout = 2.5 mA) |
| Low Level Output Current | -24 mA, maximum |
| High Level Output Current | +24 mA, maximum |
| Input Current | ±20 μA |
| Input Strobes Supported | Yes, Maximum of 16 (shared with output strobe count) |
| Input Strobe Polarity | Programmable |
| Input Strobe Pulse Width | 200 nanoseconds minimum |
| Output Strobes Supported | Yes, Maximum of 16 (shared with input strobe count) |
| Output Strobe Polarity | Programmable |
| Output Strobe Delay | Programmable: 100 nanoseconds and 1 microsecond |
| Output Strobe Width | 200 nanoseconds |
| Debouncing Rates | Programmable: Disabled, 1 microsecond, 1 millisecond, 10 milliseconds and 100 milliseconds |
| Input/Output Connector Type | 3 Double-stacked 68 position High Density connectors |
| Power Requirements<br><br>+5 V<br><br>+3.3V<br><br>+12 V<br><br>-12 V | <br><br>500 mA*<br><br>300 mA<br><br>0 mA (Supplied to mezzanine sites)<br><br>0 mA (Supplied to mezzanine sites)<br><br>* The +5 V power requirement listed is for no-load. For each digital I/O channel sourcing current, add that amount to the no-load power to determine the total +5 volt requirement. |

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## IP380 Specifications 32 Channel TTL Bi-directional I/O Mezzanine Module

| Item | Specifications |
|---|---|
| Number of Channels | 32 |
| I/O Type | Single-ended TTL |
| Direction Control | Yes, in Groups of 8 channels |
| Input Switching Threshold<br><br>"0" Level<br>"1" Level | <br><br>0.2 V maximum<br>2.2V minimum |
| Output Voltage Threshold<br><br>"0" Level<br>"1" Level | <br><br>0.4 V maximum (Iout = 2.5 mA)<br>2.7 V minimum (Iout = 2.5 mA) |
| Low Level Output Current | -24 mA, maximum |
| High Level Output Current | +24 mA, maximum |
| Input Current | ±20 µA |
| Input Strobe Supported | Yes |
| Input Strobe Polarity | Programmable |
| Input Strobe Pulse Width | 200 nanoseconds minimum |
| Output Strobe Supported | Yes |
| Output Strobe Polarity | Programmable |
| Output Strobe Delay | Programmable: 100 nanoseconds and 1 microsecond |
| Output Strobe Width | 200 nanoseconds |
| Debouncing Rates | Programmable: Disabled, 1 microsecond, 1 millisecond, 10 milliseconds and 100 milliseconds |
| Input/Output Connector Type | 50 position Industry Pack Connector interface through the CP387 base board and routed to a 68 position high density connector. |
| Power Requirements<br><br>+5 V<br>+12V<br>-12 V | <br><br>120 mA<br>0 mA<br>0 mA |

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## IP381 Specifications 16 Channel Isolated Input Mezzanine Module

| Item | Specifications |
|---|---|
| Number of Channels | 16 |
| I/O Type | Isolated Input |
| Direction Control | Input Only |
| Voltage Levels Supported | 5V dc, 12V dc, 16V dc, 24V dc (Contact factory for additional voltage options) |
| Input Isolation | 500 V |
| Input Current | Greater than 5 mA, less than 15 mA |
| Switching Threshold | Nominally one-half of the rated input |
| Input Strobe Supported | Yes |
| Input Strobe Polarity | Programmable |
| Input Strobe Pulse Width | TBD nanoseconds minimum |
| Debouncing Rates | Programmable: Disabled, 1 microsecond, 1 millisecond, 10 milliseconds and 100 milliseconds |
| Input/Output Connector Type | 50 position Industry Pack Connector interface through the CP387 base board and routed to a 68 position high density connector. |
| Power Requirements | |
| +5 V | 270 mA |
| +12 V | 0 mA |
| -12 V | 0 mA |

## IP382 Specifications 16 Channel Isolated Output Mezzanine Module

| Item | Specifications |
|---|---|
| Number of Channels | 16 |
| I/O Type | Optically Isolated Input |
| Direction Control | Output Only |
| Maximum Open Circuit Voltage | 30 V |
| Maximum ON Current | 10 mA |
| ON Voltage Drop | 1V maximum |
| Off Current | 1 µA maximum |
| Output Strobe Supported | Yes |
| Output Strobe Polarity | Programmable |
| Output Strobe Pulse Width | 500 nanoseconds minimum |
| Input/Output Connector Type | 50 position Industry Pack Connector interface through the CP387 base board and routed to a 68 position high density connector. |
| Power Requirements | |
| +5 V | 370 mA |
| +12 V | 0 mA |
| -12 V | 0 mA |

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**IP384 Specifications  16 Channel Form "C" Relay Output**

| Item | Specifications |
|---|---|
| Number of Channels | 16 |
| I/O Type | Relay |
| Direction Control | Output Only |
| Output Configuration | 1 Form "C" Relay |
| Maximum Open Circuit Voltage | 100 V |
| Maximum Current | 300 mA |
| Maximum Switched Load | 10 VA |
| Life Expectancy | $50 \times 10^6$ operations (with proper contact protection) |
| Contact Resistance | 200 mΩ, maximum |
| Operate Time | 3 mS, maximum |
| Release Time | 3 mS, maximum |
| Insulation Resistance | 1,000 MΩ, minimum |
| Contact Bounce | <3 mS |
| Output Strobe Supported | No |
| Input/Output Connector Type | 50 position Industry Pack Connector interface through the CP387 base board and routed to a 68 position high density connector. |
| Power Requirements | |
| +5 V | 480 mA |
| +12 V | 0 mA |
| -12 V | 0 mA |

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### IP385 Specifications  24 Channel Differential Bi-directional I/O Mezzanine Module

| Item | Specifications |
|---|---|
| Number of Channels | 24 |
| I/O Type | Differential I/O conforming to RS-422 signal levels |
| Direction Control | Yes, in Groups of 8 Channels |
| Driver Termination | 50 Ω in series with each leg |
| Receiver Termination | 100 Ω across the differential path |
| Maximum Input Voltage | ± 7 V |
| Input Resistance | 6 kΩ |
| Differential Input Sensitivity | +2 V maximum, -2V minimum |
| Driver Output Voltage<br><br>        "0" Level<br><br>        "1" Level | <br><br>+0.5 V maximum,<br><br>+2.5 V minimum |
| Driver short Circuit Current | -150 mA maximum, -30 mA minimum |
| Input Strobe Supported | Yes |
| Input Strobe Polarity | Programmable |
| Input Strobe Pulse Width | 200 nanoseconds minimum |
| Output Strobe Supported | Yes |
| Output Strobe Polarity | Programmable |
| Output Strobe Delay | Programmable: 100 nanoseconds and 1 microsecond |
| Output Strobe Width | 200 nanoseconds |
| Debouncing Rates | Programmable: Disabled, 1 microsecond, 1 millisecond, 10 milliseconds and 100 milliseconds |
| Input/Output Connector Type | 50 position Industry Pack Connector interface through the CP387 base board and routed to a 68 position high density connector. |
| Power Requirements<br><br>    +5 V<br><br>    +12 V<br><br>    -12 V | <br><br>375 mA<br><br>0 mA<br><br>0 mA |

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**ORDERING INFORMATION**

| | |
|---|---|
| CP387-ZA11 | 256 Channel Digital I/O Base Board |
| IP380-AA11 | 32 Channel TTL Bi-directional I/O Mezzanine Module |
| IP381-AA11 | 24 Channel Isolated Input Mezzanine Module, 5V dc |
| IP381-AA21 | 24 Channel Isolated Input Mezzanine Module, 12V dc |
| IP381-AA31 | 24 Channel Isolated Input Mezzanine Module, 16V dc |
| IP381-AA41 | 24 Channel Isolated Input Mezzanine Module, 24V dc |
| IP381-AA51 | 24 Channel Isolated Input Mezzanine Module, 28V dc |
| IP382-AA11 | 16 Channel Isolated Output Mezzanine Module |
| IP384-AA11 | 16 Channel Form "C" Relay Output Mezzanine Module |
| IP385-AA11 | 24 Channel Differential Bi-directional I/O Mezzanine Module |
| IP386-AA11 | 16 Channel AC Switch Output Mezzanine Module |
| V765-ZA11 | Rackmount Termination Panel |
| 5868-Sxyz | Cable, 68 Socket VHDCI to Unterminated |
| 5868-Txyz | Cable, 68 Plug VHDCI to 68 Socket SCSI (V765) |

* Consult Factory for other options

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