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» User Guide «

CP6105X

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1.0	Initial issue	12-May-2016

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Disclaimer

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This Kontron product is warranted against defects in material and workmanship for the warranty period from the date of shipment. During the warranty period, Kontron will at its discretion decide to repair or replace defective products.

Within the warranty period, the repair of products is free of charge as long as warranty conditions are observed.

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1 Introduction

1.1 Board Overview

CP6105X opens 6U CPCI platforms up for a wide variety of COTS available XMC and PMC modules, such as Graphics, Framegrabber, Digitizer, Ethernet, and Storage. And FPGA modules, providing for highest possible interface customizations. The carrier may be used either in addition to the CPU-based XMC/PMC option, or as an alternative for an optimized balance of system temperature.

The high speed backplane connector, assembled on the J4 position, enables highest data throughput within the system, based on the signalling according to PICMG 2.20. Data stream conversion from x8 PCI Express (XMC) to x8 or x4 PCI Express 3.0 (system) provides for maximum data bandwidth.

The PICMG2.20 based CompactPCI® line provides a high-speed J4 backplane connector for serial interconnects within the system. This makes CompactPCI /PICMG2.20 the ideal choice for communication or for computing nodes, when ordinary 19" Rackmount systems do not meet the required robustness and longevity.

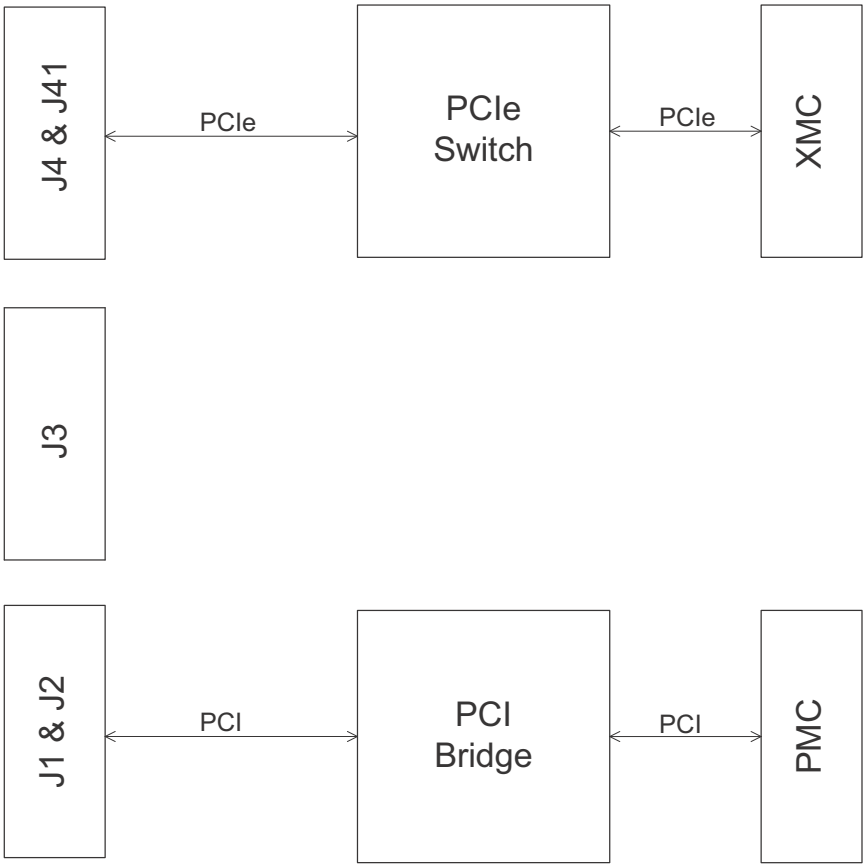
Where CompactPCI® has been already appreciated because of its openness, modularity, robustness, or longevity, the PICMG2.20 based CompactPCI® line is the choice whenever highest data throughput is required. The technology is open for PCI Express® 3.0, 10 or even 40 Gigabit Ethernet, and SATA 6Gb/s, depending on the capabilities of the selected CPU blades.

1.2 Board Diagrams

The following diagrams provide additional information concerning board functionality and component layout.

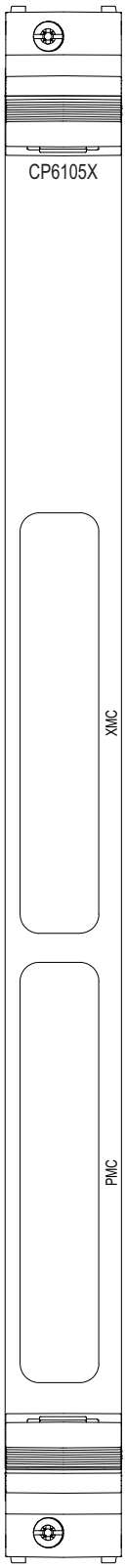
1.2.1 Functional Block Diagram

Figure 1: CP6105X Functional Block Diagram



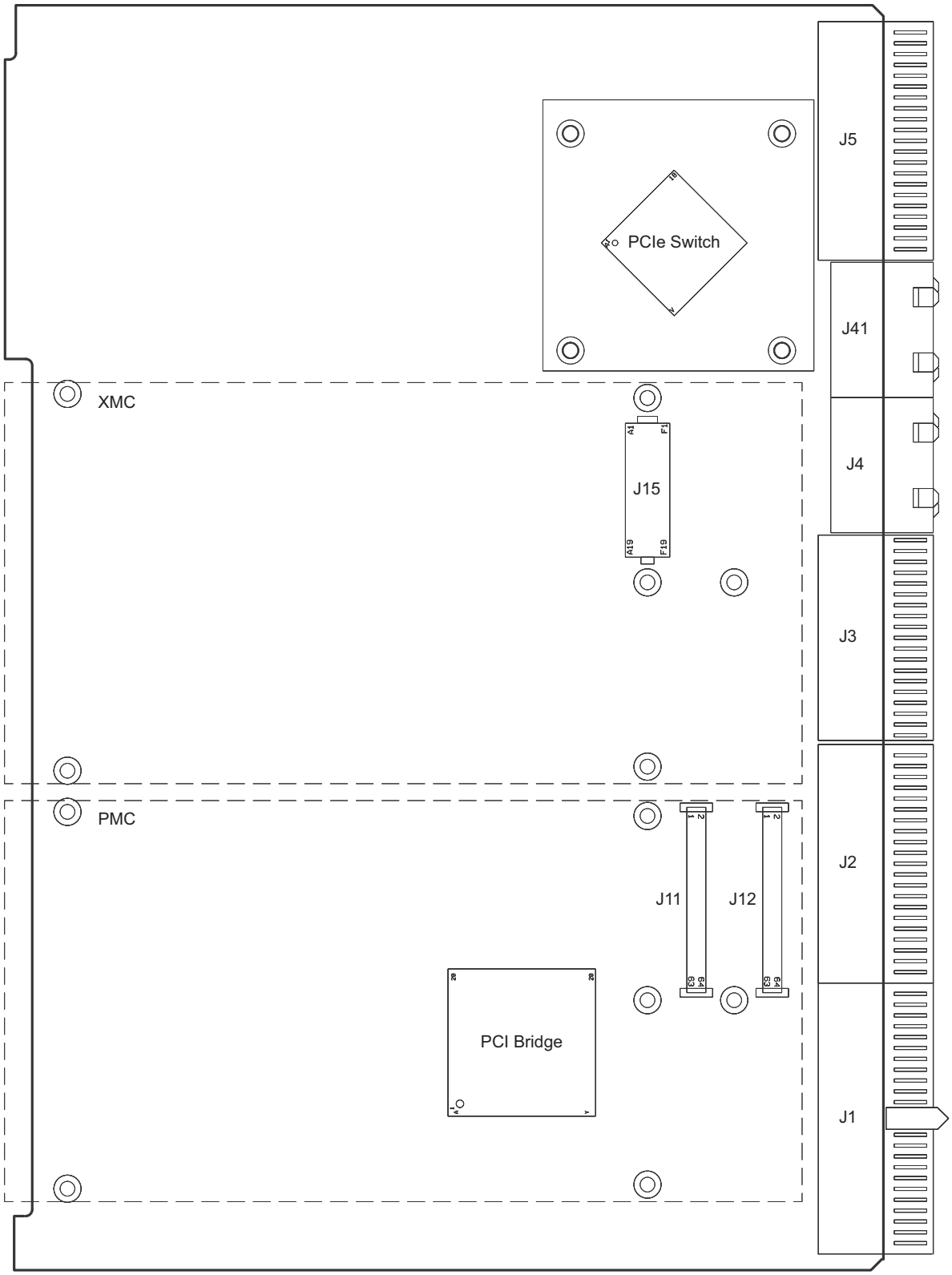
1.2.2 Front Panel

Figure 2: CP6105X Front Panel



1.2.3 Board Layout

Figure 3: CP6105X Board Layout (Top View)



1.3 Technical Specification

Table 1: CP6105X Main Specifications

FEATURES		SPECIFICATIONS
Switch	PCI Express Switch	ExpressLane™ PEX 8724 PCI Express 3.0 switch from PLX Technology used to provide maximum performance to an MXM module: » One x8 PCI Express Gen3 upstream port » One x8 PCI Express Gen3 downstream port
Connectors	High-Speed Serial I/O Interconnection	The following interface is provided to the backplane via two high-speed serial ZDplus connectors, J4 and J41: » One x8 PCI Express 3.0 interface operating at 8 GT/s as end point (non-transparent bridge)
	CompactPCI	CompactPCI interface: » Compliant with CompactPCI Specification PICMG 2.0 R 3.0: » Peripheral slot functionality » 3.3V or 5V signaling levels (universal signaling support) » No hot swap support » CompactPCI connectors J1, J2, J3 and J5
General	Mechanical	6U, 4 HP, CompactPCI-compliant form factor
	Power Consumption	approx. 8 W
	Power Supply	3.3V and 5V DC in accordance with the CompactPCI® specification
	Temperature Range	Operational: 0°C to +60°C Standard -40°C to +70°C Extended (with sufficient cooling for the PCI Express switch) Storage: -40°C to +85°C
	Cooling	Depending on the integrated module, an appropriate heat sink for the module and the PCI Express switch as well as sufficient airflow must be provided to ensure optimal operation and long-term reliability of the CP6105X. For further information, please contact Kontron.
	Climatic Humidity	93% RH at 40 °C, non-condensing (acc. to IEC 60068-2-78)
	Dimensions	233.35 mm x 160 mm
	Board Weight	360 grams (without XMC and PMC modules and without cooling solution)

1.4 Standards

This product complies with the requirements of the following standards.

Table 2: Standards

TYPE	ASPECT	STANDARD	REMARKS
CE	Emission	EN 55022 Class B, IEC 61000-6-3	--
	Immunity	EN 55024, IEC 61000-6-2	--
	Electrical Safety	EN 60950-1	--
Mechanical	Mechanical Dimensions	IEEE 1101.10	--
Environmental	Climatic Humidity	IEC 60068-2-78 (see note below)	--
	WEEE	Directive 2002/96/EC Waste electrical and electronic equipment	--
	RoHS 2	Directive 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment	--
	Operating Vibration (Sinusoidal)	IEC 60068-2-6	Ruggedized version test parameters: 10-300 (Hz) frequency range 5 (g) acceleration 1 (oct/min) sweep rate 10 cycles/axis 3 axes
	Operating Shocks	IEC 60068-2-27	Ruggedized version test parameters: 30 (g) acceleration 9 (ms) shock duration half sine 3 number of shocks per direction (total: 18) 6 directions 5 (s) recovery time
	Operating Bumps	IEC 60068-2-27	Ruggedized version test parameters: 15 (g) acceleration 11 (ms) shock duration half sine 500 number of shocks per direction 6 directions 1 (s) recovery time

Note: Customers desiring to perform further environmental testing of the CP6105X must contact Kontron for assistance prior to performing any such testing.

Boards **without conformal coating** must not be exposed to a change of temperature which can lead to condensation, as this may cause irreversible damage especially when the board is powered up again.

Kontron does not accept any responsibility for damage to products resulting from destructive environmental testing.

1.5 Related Publications

The following publications contain information relating to this product.

Table 3: Related Publications

PRODUCT	PUBLICATION
CompactPCI Systems	PICMG 2.0, Rev. 3.0 CompactPCI Specification PICMG 2.20, Rev. 1.0 CompactPCI Packet Serial Mesh Backplane Specification
	Kontron CompactPCI Backplane Manual, ID 24229
PCI Express	PCI Express Base Specification Revision 3.0
All Kontron products	Product Safety and Implementation Guide, ID 1021-9142

2 Functional Description

2.1 Board Interfaces

2.1.1 PMC Interface

The CP6105X provides one 3.3 V standard PMC interface with a dedicated 32-bit/66 MHz PCI Express-to-PCI bridge. The PMC interface is compliant with the IEEE 1386.1-2001 specification, which defines a PCI electrical interface for the CMC (Common Mezzanine Card) form factor.

A PMC module can be connected to the CP6105X via the standard PMC connectors J11 and J12.

Table 4: PMC PCI Frequency Configuration

FREQUENCY	M66EN Signal J21 (Jn2)	DIP SWITCH SW2 SWITCH 3
33 MHz	Low	OFF
33 MHz	--	ON
66 MHz	High	OFF

2.1.2 XMC Interface

For easy and flexible configuration a standard XMC connector, J15, is available. The board uses one x8 PCI Express 3.0 interface operating at 8.0 GT/s and compliant with the ANSI/VITA 42.0 and ANSI/VITA 42.3 specifications.

2.1.3 CompactPCI and ZDplus Connectors

The CP6105X provides four standard CompactPCI connectors (2mm hard metric) designated as J1, J2, J3, and J5, and two high-speed serial ZDplus connectors, J4 and J41, for back-plane interconnection.

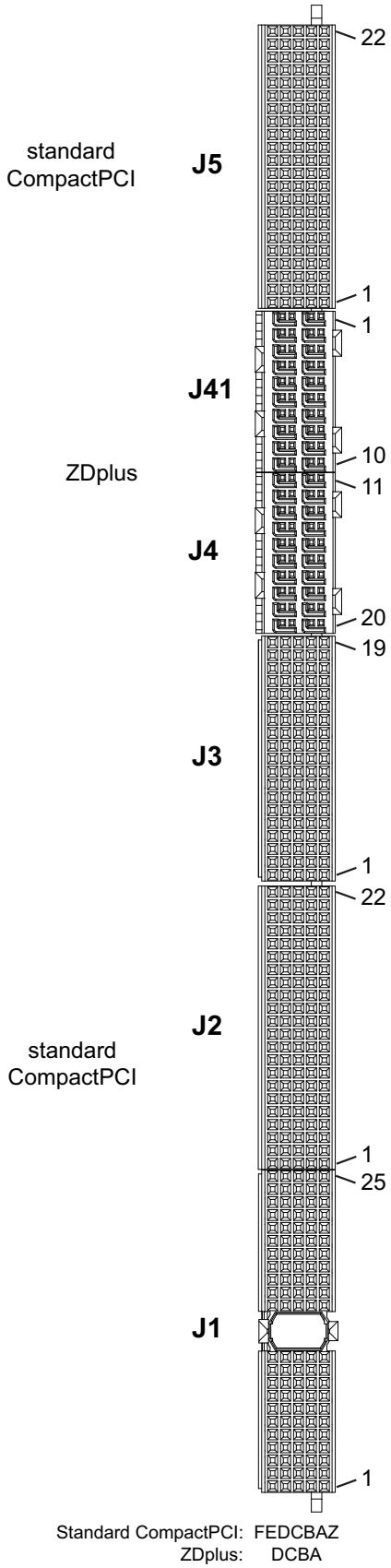
Their functions are as follows:

- J1, J2, and J3: CompactPCI interface with power and PCIe clock signals
- J4 and J41 for high-speed serial I/O interconnection

2.1.3.1 CompactPCI Connector Keying

The CompactPCI connector J1 supports guide lugs to ensure a correct polarized mating. The CP6105X supports universal PCI VI/O signaling voltages.

Figure 4: CompactPCI and ZDplus Connectors



2.1.3.2 CompactPCI Connectors J1 and J2 Pinout

The CP6105X is provided with two 2 mm x 2 mm pitch female CompactPCI connectors, J1 and J2.

Table 5: CompactPCI Connector J1 Pinout

PIN	Z	A	B	C	D	E	F
25	NC	5V	NC	NC	3.3V	5V	GND
24	NC	NC	5V	V(I/O)	NC	NC	GND
23	NC	3.3V	NC	NC	5V	NC	GND
22	NC	NC	GND	3.3V	NC	NC	GND
21	NC	3.3V	NC	NC	NC	NC	GND
20	NC	NC	GND	V(I/O)	NC	NC	GND
19	NC	3.3V	NC	NC	GND	NC	GND
18	NC	NC	GND	3.3V	NC	NC	GND
17	NC	3.3V	Res.	Res.	GND	NC	GND
16	NC	NC	GND	V(I/O)	NC	NC	GND
15	NC	3.3V	NC	NC	NC	NC	GND
14-12	Key Area						
11	NC	NC	NC	NC	GND	NC	GND
10	NC	NC	GND	3.3V	NC	NC	GND
9	NC	NC	NC	NC	GND	NC	GND
8	NC	NC	GND	V(I/O)	NC	NC	GND
7	NC	NC	NC	NC	GND	NC	GND
6	NC	NC	GND	3.3V	NC	NC	GND
5	NC	NC	NC	CPCI_RST#	GND	NC	GND
4	NC	NC	NC	V(I/O)	NC	NC	GND
3	NC	NC	NC	NC	5V	NC	GND
2	NC	NC	5V	NC	NC	NC	GND
1	NC	5V	-12V	NC	+12V	5V	GND

Table 6: 64-bit CompactPCI Connector J2 Pinout

PIN	Z	A	B	C	D	E	F
22	NC	NC	NC	NC	NC	NC	GND
21	NC	NC	NC	NC	NC	NC	GND
20	NC	NC	NC	NC	GND	NC	GND
19	NC	NC	NC	NC	NC	NC	GND
18	NC	NC	NC	NC	GND	NC	GND
17	NC	NC	GND	NC	NC	NC	GND
16	NC	NC	NC	NC	GND	NC	GND
15	NC	NC	GND	NC	NC	NC	GND
14	NC	NC	NC	NC	GND	NC	GND
13	NC	NC	GND	V(I/O)	NC	NC	GND
12	NC	NC	NC	NC	GND	NC	GND
11	NC	NC	GND	V(I/O)	NC	NC	GND
10	NC	NC	NC	NC	GND	NC	GND
9	NC	NC	GND	V(I/O)	NC	NC	GND
8	NC	NC	NC	NC	GND	NC	GND
7	NC	NC	GND	V(I/O)	NC	NC	GND
6	NC	NC	NC	NC	GND	NC	GND
5	NC	NC	GND	V(I/O)	NC	NC	GND
4	NC	V(I/O)	NC	NC	GND	NC	GND
3	NC	NC	GND	NC	NC	NC	GND
2	NC	NC	NC	NC	NC	NC	GND
1	NC	NC	GND	NC	NC	NC	GND

2.1.3.3 CompactPCI Rear I/O Connectors J3 and J5 Pinout

Table 7: CompactPCI Rear I/O Connector J3 Pinout

PIN	Z	A	B	C	D	E	F
19	NC	5V	5V	NC	NC	NC	GND
18	NC	NC	NC	NC	NC	NC	GND
17	NC	NC	NC	NC	NC	NC	GND
16	NC	NC	NC	NC	NC	NC	GND
15	NC	NC	NC	NC	NC	NC	GND
14	NC	NC	NC	NC	NC	NC	GND
13	NC	NC	NC	NC	NC	NC	GND
12	NC	NC	NC	NC	NC	NC	GND
11	NC	NC	NC	NC	NC	NC	GND
10	NC	NC	NC	NC	NC	NC	GND
9	NC	NC	NC	NC	NC	NC	GND
8	NC	NC	NC	NC	NC	NC	GND
7	NC	NC	NC	NC	NC	NC	GND
6	NC	NC	NC	NC	NC	NC	GND
5	NC	NC	NC	NC	NC	NC	GND
4	NC	NC	NC	NC	NC	NC	GND
3	NC	NC	NC	NC	NC	NC	GND
2	NC	NC	NC	NC	NC	NC	GND
1	NC	NC	NC	NC	NC	NC	GND

Table 8: CompactPCI Rear I/O Connector J5 Pinout

PIN	Z	A	B	C	D	E	F
22	NC	NC	NC	NC	NC	NC	GND
21	NC	NC	NC	NC	NC	NC	GND
20	NC	NC	NC	NC	NC	NC	GND
19	NC	NC	NC	NC	NC	NC	GND
18	NC	NC	NC	NC	NC	NC	GND
17	NC	NC	NC	NC	NC	NC	GND
16	NC	NC	NC	NC	NC	NC	GND
15	NC	NC	NC	NC	NC	NC	GND
14	NC	NC	NC	NC	NC	NC	GND
13	NC	NC	NC	NC	NC	NC	GND
12	NC	NC	NC	NC	NC	NC	GND
11	NC	NC	NC	NC	NC	NC	GND
10	NC	NC	NC	NC	NC	NC	GND
9	NC	NC	NC	NC	NC	NC	GND
8	NC	NC	NC	NC	NC	NC	GND
7	NC	NC	NC	NC	NC	NC	GND
6	NC	NC	NC	NC	NC	NC	GND
5	NC	NC	NC	NC	NC	NC	GND
4	NC	NC	NC	NC	NC	NC	GND
3	NC	NC	NC	NC	NC	NC	GND
2	NC	NC	NC	NC	NC	NC	GND
1	NC	NC	NC	NC	NC	NC	GND

2.1.3.4 High-Speed Serial ZDplus Connectors J41 and J4 Pinout

The CP6105X provides backplane connectivity via two high-speed serial ZDplus connectors, J4 and J41, and supports the x8 PCI Express 3.0 interface operating at 8 GT/s as an end point (non transparent bridge).

The CP6105X is compatible with all Kontron 6U CompactPCI passive backplanes that are compliant with the PICMG 2.20 specification.

Table 9: High-Speed Serial ZDplus Connector J41 Pinout

POS	A	B	C	D
1	PE_RST#	Res.	Res.	Res.
2	NC	NC	NC	NC
3	NC	NC	NC	NC
4	NC	NC	NC	NC
5	NC	NC	NC	NC
6	NC	NC	NC	NC
7	NC	NC	NC	NC
8	NC	NC	NC	NC
9	NC	NC	NC	NC
10	NC	NC	NC	NC

Table 10: High-Speed Serial ZDplus Connector J4 Pinout

POS	A	B	C	D
11	NC	NC	NC	NC
12	PE_TX7+	PE_TX7-	PE_RX7-	PE_RX7+
13	PE_TX6+	PE_TX6-	PE_RX6-	PE_RX6+
14	PE_TX5+	PE_TX5-	PE_RX5-	PE_RX5+
15	PE_TX4+	PE_TX4-	PE_RX4-	PE_RX4+
16	PE_TX3+	PE_TX3-	PE_RX3-	PE_RX3+
17	PE_TX2+	PE_TX2-	PE_RX2-	PE_RX2+
18	PE_TX1+	PE_TX1-	PE_RX1-	PE_RX1+
19	PE_TX0+	PE_TX0-	PE_RX0-	PE_RX0+
20	PE_CLK+	PE_CLK-	NC	NC

Table 11: High-Speed Serial ZDplus Connectors J41 and J4 Signal Description

SIGNAL	DESCRIPTION
PE_TX/RX	PCI Express reference transmit/receive signals
PE_CLK	PCI Express reference clock signals

3 Power Considerations

3.1 CP6105X Voltage Ranges

The CP6105X has been designed for optimal power input and distribution. Still it is necessary to observe certain criteria essential for application stability and reliability.

The system power supply must comply with the CompactPCI® specification.

The following table specifies the ranges for the input power voltage within which the board is functional.

Table 12: DC Operational Input Voltage Range

INPUT SUPPLY VOLTAGE	ABSOLUTE RANGE
+3.3 V	3.13 V min. to 3.47 V max.
+5 V	4.75 V min. to 5.25 V max.
+12 V	11.4 V min. to 12.6 V max.
-12 V	-11.4 V min. to -12.6 V max.

Note: Failure to comply with the instructions above may result in damage to the board or improper operation.

3.1.1 Start-Up Requirement

Power supplies must comply with the following guidelines, in order to be used with the CP6105X:

- Beginning at 10% of the nominal output voltage, the voltage must rise within > 0.1 ms to < 20 ms to the specified regulation range of the voltage. Typically: > 5 ms to < 15 ms.
- There must be a smooth and continuous ramp of each DC output voltage from 10% to 90% of the regulation band.
- The slope of the turn-on waveform shall be a positive, almost linear voltage increase and have a value from 0 V to nominal Vout.

3.1.2 Power-Up Sequence

The +5 VDC output level must always be equal to or higher than the +3.3 VDC output during power-up and normal operation.

Both voltages must reach their minimum in-regulation level not later than 20 ms after the output power ramp start.

3.1.3 Regulation

The power supply shall be unconditionally stable under line, load, unload and transient load conditions including capacitive loads. The operation of the power supply must be consistent even without the minimum load on all output lines.

Note: All of the input voltages must be functionally coupled to each other so that if one input voltage fails, all other input voltages must be regulated proportionately to the failed voltage. For example, if the +5V begins to decrease, all other input voltages must decrease accordingly. This is required in order to preclude cross currents within the CP6105X.
Failure to comply with above may result in damage to the board or improper system operation.

Note: If the main power input is switched off, the supply voltages will not go to 0V instantly. It will take a couple of seconds until the capacitors are discharged. If the voltage rises again before it has gone below a certain level, the circuits may enter a latch-up state where even a hard RESET will not help any more. The system must be switched off for at least 10 seconds before it may be switched on again. If problems still occur, turn off the main power for 30 seconds before turning it on again.

3.2 Power Consumption

The power consumption of the CP6105X is approximately 10 W.

The power consumption measurement was carried out using the following testing parameters:

- CP6105X installed in a peripheral slot
- Front panel ports not connected
- MXM module not installed
- +3.3 V and 5 V main supply voltage
- 2 m/s airflow
- Ambient temperature: 25°C

4 Installation

This chapter is oriented towards an application environment. Some aspects may, however, be applicable to a development environment.

4.1 Safety

To ensure personnel safety and correct operation of this product, the following safety precautions must be observed:

- All operations involving the CP6105X require that personnel be familiar with system equipment, safety requirements and the CP6105X.
- This product contains electrostatically sensitive components which can be seriously damaged by electrical static discharge (ESD). Therefore, proper handling must be ensured at all times.
- Whenever possible, unpack or pack this product only at EOS/ESD safe work stations. Where a safe work station is not guaranteed, it is important for the user to be electrically discharged before touching the product with his/her hands or tools. This is most easily done by touching a metal part of your system housing.
- Do not handle this product out of its protective enclosure while it is not used for operational purposes unless it is otherwise protected.
- Do not touch components, connector-pins or traces.

Kontron assumes no liability for any damage resulting from failure to comply with these requirements.

4.2 General Instructions on Usage

In order to maintain Kontron's product warranty, this product must not be altered or modified in any way. Changes or modifications to the device, which are not explicitly approved by Kontron and described in this manual or received from Kontron's Technical Support as a special handling instruction, will void your warranty.

This device should only be installed in or connected to systems that fulfill all necessary technical and specific environmental requirements. This applies also to the operational temperature range of the specific board version, which must not be exceeded. If batteries are present, their temperature restrictions must be taken into account.

4.3 Board Installation

The CP6105X is designed for use in a peripheral slot.

4.3.1 Board Insertion

Prior to following the steps below, ensure that the safety requirements are met.

Note: The CP6105X is not hot swap capable.

To insert the CP6105X in a system, proceed as follows:

1. Ensure that no power is applied to the system before proceeding.
2. Ensure that the board ejection handles are open.
3. Insert the board into the slot designated until it makes contact with the backplane connectors.
4. Using the ejector handles, engage the board with the backplane. When the ejector handles are closed, the board is engaged.
5. Fasten the front panel retaining screws.
6. Connect all external interfacing cables to the board as required.

4.3.2 Board Removal

Prior to following the steps below, ensure that the safety requirements are met. When removing a board from the system, particular attention must be paid to the components that may be hot, such as heat sink, etc.

Note: The CP6105X is not hot swap capable.

To remove the CP6105X from a system, proceed as follows:

1. Ensure that no power is applied to the system before proceeding.
2. Unlock the board ejection handles by pressing their release buttons.
3. Disconnect any interfacing cables that may be connected to the board.
4. Unscrew the front panel retaining screws.
5. Using the ejector handles, disengage the board from the backplane and remove it from the system.
6. Dispose of the board as required.

4.4 Installation of Peripheral Devices

The CP6105X is designed to accommodate one PMC module and one XMC module. Prior to installation of a peripheral device, ensure that the safety requirements are met. Special attention must be paid to avoid touching any components that may be hot, such as heat sink, etc.

4.4.1 PMC Module Installation

The CP6105X supports the installation of a PMC module via the J11 to J12 connectors. For information on the installation of the PMC module, refer to the documentation provided with the module.

4.4.2 XMC Module Installation

The CP6105X supports the installation of an XMC module via the J15 connector. For information on the installation of the XMC module, refer to the documentation provided with the module.

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