Technical Information

CE4-PIANO

CompactPCI® SATA Controller

Up to 16 SATA Ports for Flexible System Design

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Contents

About this Manual

This manual is a short form description of the technical aspects of the CE4-PIANO, required for installation and system integration. It is intended for the advanced user only.

Edition History

EKF Document	Ed.	Contents/*Changes*	Author	Date
Text # 5234 ce4_tie.wpd	1	Technical Information CE4-PIANO English, Preliminary Edition	jj	21 August 2008

Related Documents

The CE4-PIANO can be operated in any CompactPCI environment. However, if combined with a CPU board from EKF, some properties of the CE4-PIANO may be configurable in addition via CPU BIOS setup. For a description of the particular EKF CPU card in use, please refer to the correspondent CPU user guide, available by download from http://www.ekf.com/c/ccpu/ccpu.html.

Nomenclature

Signal names used herein with an attached '#' designate active low lines.

Trade Marks

Some terms used herein are property of their respective owners, e.g.

- ExpressCard™: Trademark PCMCIA
- PCI Express®: ® PCI-SIG
- Intel, Pentium, Celeron, Pentium M, Core 2 Duo, iAMT: ® Intel
- ***CompactPCI®*** : ® PICMG
- Windows 2000, Windows XP, Windows Vista: ® Microsoft
- EKF, ekf system: ® EKF

EKF does not claim this list to be complete.

Legal Disclaimer - Liability Exclusion

This manual has been edited as carefully as possible. We apologize for any potential mistake. Information provided herein is designated exclusively to the proficient user (system integrator, engineer). EKF can accept no responsibility for any damage caused by the use of this manual.

Standards

Specifications/Standards	
CompactPCI	PICMG 2.0 (www.picmg.org)
PCI Local Bus	PCI 2.2/2.3/3.0 Standards (PC-SIG www.pcisig.com)
SATA eSATA	http://www.sata-io.org Serial ATA 2.5 Specification (released October 2005) Serial ATA 2.6 Specification (released February 2007)

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CE4-PIANO Features

Feature Summary	
Form Factor	▸ 3U Single size Eurocard (160x100mm^2) ▸ Front panel width 4HP (20.3mm)
CompactPCI	▸ 32-bit ▸ 33/66MHz ▸ Suitable for CPCI backplanes with +5V or +3.3V VIO (J1 w/o key)
Main Components	▸ PCI to SATA controller SiI3114, quad-port, 1.5G ▸ Up to 3 x SATA port multiplier SiI3726, one port to five-port expander each, 1.5G/3G
Front Panel SATA (eSATA)	▸ 3 x eSATA Receptacles available from front panel, derived from SATA port multiplier 1, individual F/P control LEDs green=link orange=activity
On-Board SATA	▸ Up to 5 SATA latching connectors maximum ▸ 2 channels from SATA port multiplier 1 ▸ 3 channels from SATA port multiplier 2 ▸ Option on-board 2.5-inch SATA drive (connector directly wired to SiI3114 SATA controller) ▸ Option mezzanine storage module C20-SATA (1 or 2 drives), requires SATA port multiplier 2
Rear I/O SATA	▸ Option 5 port J2 rear I/O SATA channels, requires SATA port multiplier 3 ▸ Additional rear I/O SATA port for satellite board configuration (slave mode, CE4-PIANO equipped with a disk drive only)
SATA RAID	▸ RAID Firmware as supplied from Silicon Image
Thermal Conditions Environmental Conditions	▸ Operating temperature: 0°C ... +70°C ▸ Storage temperature: -40°C ... +85°C, max. gradient 5°C/min ▸ Humidity 5% ... 95% RH non condensing ▸ Altitude -300m ... +3000m ▸ Shock 15g 0.33ms, 6g 6ms ▸ Vibration 1g 5-2000Hz
EC Regulations	▸ EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1) ▸ 2002/95/EC (RoHS)
MTBF	tbd

Short Description

Since SATA is todays most popular mass storage interface, the CE4-PIANO has been developed to satisfy the increasing demand for a sufficient number of additional SATA ports in any CompactPCI system.

The CE4-PIANO is available in different stuffing options. Bottom-of-the-range, the board is equipped with a PCI to SATA controller chip and an on-board SATA hard disk (or SATA silicon state drive). This combination is a straightforward mass storage solution - plug and play.

For maximum flexibility, the CE4-PIANO can be optionally populated with up to three SATA port multipliers in addition, five secondary ports each. The first multiplier is mainly used to control the front panel eSATA connectors, the second port multiplier is engaged in on-board SATA, and the third multiplier is exclusively dedicated to rear I/O SATA.

Option SATA port multiplier 1:
Three eSATA connectors are available from the front panel for external attachment of SATA devices. Another two latching SATA connectors are provided for in-system usage together with this option.

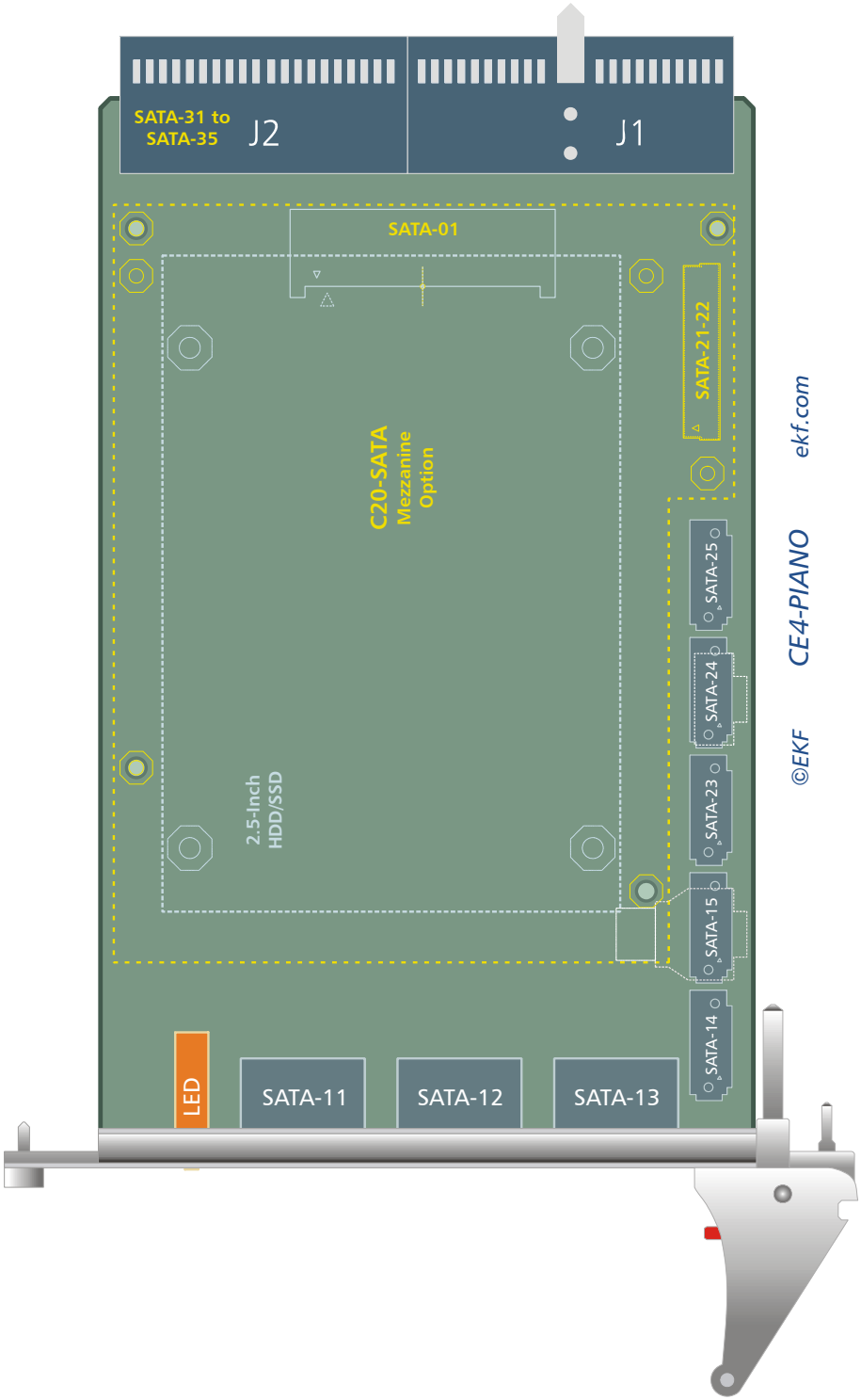
Option SATA port multiplier 2:
The CE4-PIANO can carry a mezzanine storage module (C20-SATA) with up to 2 SATA hard disk drives, which allows for a simple RAID configuration. Three more latching SATA connectors come with this option.

Option SATA port multiplier 3:
Suitable for all situations where rear I/O SATA across J2 is required, either for back panel connectors or system internal SATA connectors on a rear I/O transition module. Also useful in a scenario where one CE4-PIANO acts as a five port SATA master controller, with up to five bare CE4 cards as satellites (or slaves), equipped with a SATA drive only. An appropriate RIO strapping or backplane would be needed, with the CE4 master card working as SATA hub. The CE4 slave cards are then addressed via their sideband SATA channel (6th port on J2, see block diagram).

Most stuffing options mentioned are concurrently available. However, consider the maximum SATA data throughput, which is significantly limited by the CompactPCI backplane bandwidth, a well known bottleneck. Hence, the maximum number of 16 SATA ports on a CE4-PIANO is merely provided for system flexibility.

If your storage application requires high performance, EKF recommends a completely different approach, based on multi-lane PCI Express, realized either as CompactPCI Express card, or as a mezzanine module (side board) to any recent EKF CPU board.

In either case, discuss your individual needs with EKF (sales@ekf.de) in order to find out the perfect solution for your application.



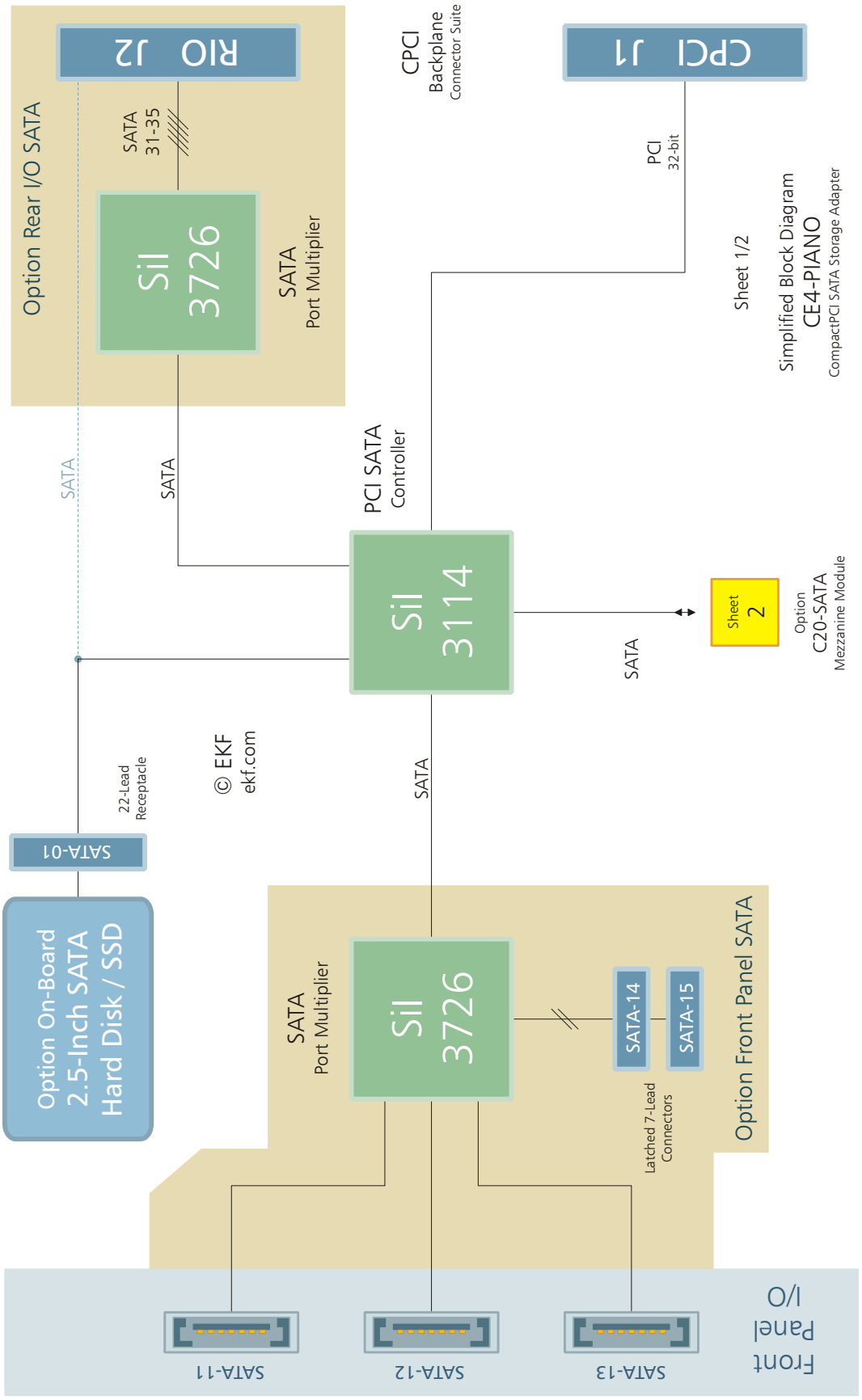
CE4-PIANO Concept Drawing

Front Panel Variations

The CE4-PIANO is available in different flavours, either with eSATA receptacles in the front panel, or without.

EKF offers in addition custom specific design, for board electronics and also for front panel layout, e.g. with a multi-lane SATA front panel connector according to SFF-8470.

Block Diagram CE4-PIANO



RIO J2
CPCI J1
Sheet 2/2
Simplified Block Diagram
CE4-PIANO
CompactPCI SATA Storage Adapter
C20-SATA
Single-/Dual- HDD/SSD
Mezzanine Module
High Speed
Mezzanine
Connector
SATA-21-22
SATA
Port Multiplier
SiI
3726
SATA
Sheet
1
Option Mezzanine SATA
SATA-25
SATA-24
SATA-23
Latched 7-Lead
Connectors
© EKF
ekf.com
Front
Panel
I/O
SATA-13
SATA-12
SATA-11

Top View Component Assembly CE4-PIANO

Theory of Operation

The main component on the CE4-PIANO is a SiI3114 PCI to quad-port SATA controller. Though offering SATA 1.5Gb/s channels only, whereas second generation SATA silicon is already available with 3.0Gb/s capability, the SiI3114 is further on a reasonable choice, since the typical CompactPCI backplane has a net bandwidth of less than 1Gb/s (@32bit/33MHz) and will therefore be the limiting element of the data chain.

Simple storage solutions based on the CE4-PIANO incorporate solely the SiI3114 SATA controller and a single 2.5-inch on-board SATA drive, either hard disk or rugged SSD (Flash) based. As an exception compared to other optional SATA connectors on the CE4-PIANO, the connector SATA-01 is directly attached to the SiI3114. A four-fold front panel LED signals activity on any of the quad SiI3114 SATA channels.

The remaining 3 SATA channels of the SiI3114 are assigned to three optionally available SiI3726 SATA port multipliers. A port multiplier can be thought of as a SATA signal switch, or simply as an expander with five secondary SATA ports each. Hence 15 SATA channels can be derived from the three port multipliers, plus one port from the SATA controller, for a theoretical maximum of 16 SATA ports on the CE4-PIANO. Firmware is available which allows RAID level 0/1/10 operation over a particular port multiplier.

Each SiI3726 port multiplier on the CE4-PIANO focusses a particular application. The SAM1 (SATA Multiplier 1) addresses front panel eSATA I/O, while SAM2 is responsible for several on-board SATA connectors (e.g. the C20-SATA mezzanine module), and SAM3 will be stuffed only if rear I/O SATA is an issue. Any combination of SAM1 - SAM3 is concurrently available as stuffing option at the customers choice (observe limitations in achievable total data throughput as imposed by the CompactPCI backplane bandwidth).

The front panel SATA connectors are eSATA compliant, for attachment of up to 2m shielded cable assemblies. The SAM1 PHY transceiver amplitude for the eSATA connectors will be 100mV larger than normal setting. Other settings for up to 4m external cable can be discussed with EKF. The remaining two SATA ports of SAM1 are available on-board for system internal usage, via vertical latching headers. Sufficient mounting space to the right of the CE4-PIANO would be needed for cable attachment, dependent of the type of SATA plug (R/A or straight).

On-Board SATA is provided as an option by the SATA port multiplier 2 (SAM2). A high speed mezzanine connector is available, for attachment of the optional C20-SATA mass storage module, equipped with a single or dual 2.5-inch drive. The remaining three SATA channels from SAM2 are wired to vertical latching headers, for system internal usage.

Rear I/O SATA will be enabled through the optional port multiplier 3 (SAM3). All five channels are wired to the J2 Rear I/O connector, either for system internal usage, or back panel eSATA connectors. EKF offers custom specific design for a suitable rear I/O transition module. Since the CE4-PIANO can be configured optionally as passive hard disk carrier board, without any active components, up to five CE4-PIANO satellite cards can be controlled by a single CE4-PIANO master board, across the J2 rear I/O connectors. A custom specific J2 backplane would be required, in order to distribute the 5 rear I/O SATA channels provided by the CE4-PIANO master board to the slave cards.

Front Panel Connectors

SATA-11 SATA-12 SATA-13	External SATA (eSATA) connectors, 7-position, for shielded external SATA cable assemblies up to 2m length, SATA port multiplier 1 (SAM1)

On-Board Connectors

SATA-01	SATA Header for a 2.5-inch on-board drive, 7 + 15 position, controlled normally by the on-board SiI3114 SATA controller, configurable (stuffing option) for rear I/O SATA (satellite slave board)
SATA-14 SATA-15	Vertical latching SATA headers for system internal usage via latching or non-latching cable assemblies, 7-position, SATA port multiplier 1 (SAM1)
SATA-21-22	Hig speed mezzanine connector suitable for attachment of the optional available C20-SATA storage module, two SATA channels, 50-position connector, SATA port multiplier 2 (SAM2)
SATA-23 SATA-24 SATA-25	Vertical latching SATA headers for system internal usage via latching or non-latching cable assemblies, 7-position, SATA port multiplier 2 (SAM2)

CompactPCI & Rear I/O Connectors

J1	2.00mm unkeyed Hard Metric female connector, according to CompactPCI standards, 32-Bit 33/66MHz
J2	2.00mm Hard Metric female connector, option for rear I/O SATA, 5 + 1 SATA channels, for a proprietary rear I/O transition module, or SATA over a proprietary backplane, in addition GPIO signals, SATA port multiplier 3 (SAM3)

Please note:

Not all of the connectors or other elements listed above may be present or functional on your actual CE4-PIANO board. Assembly of these connectors is highly custom specific. Discuss your needs (target application) with EKF before ordering, for an optimum board configuration.

Installing and Replacing Components

Before You Begin

Warnings

The procedures in this chapter assume familiarity with the general terminology associated with industrial electronics and with safety practices and regulatory compliance required for using and modifying electronic equipment. Disconnect the system from its power source and from any telecommunication links, networks or modems before performing any of the procedures described in this chapter. Failure to disconnect power, or telecommunication links before you open the system or perform any procedures can result in personal injury or equipment damage. Some parts of the system can continue to operate even though the power switch is in its off state.

Caution

Electrostatic discharge (ESD) can damage components. Perform the procedures described in this chapter only at an ESD workstation. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis or board front panel. Store the board only in its original ESD protected packaging. Retain the original packaging (antistatic bag and antistatic box) in case of returning the board to EKF for repair.

Installing the Board

Warning

This procedure should be done only by qualified technical personnel. Disconnect the system from its power source before doing the procedures described here. Failure to disconnect power, or telecommunication links before you open the system or perform any procedures can result in personal injury or equipment damage.

Typically you will perform the following steps:

- Switch off the system, remove the AC power cord
- Attach your antistatic wrist strap to a metallic part of the system

- Remove the board packaging, be sure to touch the board only at the front panel
- Identify the related CompactPCI slot (peripheral slot for I/O boards, system slot for CPU boards, with the system slot typically most right or most left to the backplane)
- Insert card carefully (be sure not to damage components mounted on the bottom side of the board by scratching neighboured front panels)
- A card with on-board connectors requires attachment of associated cabling now
- Lock the ejector lever, fix screws at the front panel (top/bottom)
- Retain original packaging in case of return

Removing the Board

Warning

This procedure should be done only by qualified technical personnel. Disconnect the system from its power source before doing the procedures described here. Failure to disconnect power, or telecommunication links before you open the system or perform any procedures can result in personal injury or equipment damage.

Typically you will perform the following steps:

- Switch off the system, remove the AC power cord
- Attach your antistatic wrist strap to a metallic part of the system

- Identify the board, be sure to touch the board only at the front panel
- Unfasten both front panel screws (top/bottom), unlock the ejector lever
- Remove any on-board cabling assembly
- Activate the ejector lever
- Remove the card carefully (be sure not to damage components mounted on the bottom side of the board by scratching neighboured front panels)
- Store board in the original packaging, do not touch any components, hold the board at the front panel only

Warning

Do not expose the card to fire. Battery cells and other components could explode and cause personal injury.

EMC Recommendations

CE

In order to comply with the CE regulations for EMC, it is mandatory to observe the following rules:

- The chassis or rack including other boards in use must comply entirely with CE
- Close all board slots not in use with a blind front panel
- Front panels must be fastened to the enclosure by built-in screws
- Cover any unused front panel mounted connector with a shielding cap
- External communications cable assemblies must be shielded (shield connected only at one end of the cable)
- Use ferrite beads for cabling wherever appropriate
- Some connectors may require additional isolating parts

Reccomended Accessories

Blind CPCI Front Panels	EKF Elektronik	Widths currently available (1HP=5.08mm): with handle 4HP/8HP without handle 2HP/4HP/8HP/10HP/12HP
Ferrit Bead Filters	ARP Datacom, 63115 Dietzenbach	Ordering No. 102 820 (cable diameter 6.5mm) 102 821 (cable diameter 10.0mm) 102 822 (cable diameter 13.0mm)
Metal Shielding Caps	Conec-Polytronic, 59557 Lippstadt	Ordering No. CDFA 09 165 X 13129 X (DB9) CDSFA 15 165 X 12979 X (DB15) CDSFA 25 165 X 12989 X (DB25)

Technical Reference - Connectors

Caution

Some of the connectors may provide operating voltage (e.g. +12V, +5V and +3.3V) to devices inside the system chassis, such as internal peripherals. Not all of these connectors are overcurrent protected. Do not use these connectors for powering devices external to the computer chassis. A fault in the load presented by the external devices could cause damage to the board, the interconnecting cable and the external devices themselves.

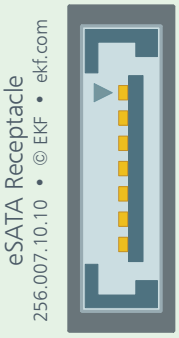
Please Note

The CE4-PIANO mezzanine module may be equipped with several front panel - , on-board - and rear I/O connectors for system internal and/or external usage. Not all of these connectors may be present on a particular board. Be sure to specify your individual needs when ordering the CE4-PIANO board. Characteristic features and the pin assignments of each connector are described on the following pages (connector designation in alphabetical order within the groups 'front panel connectors', 'on-board connectors', and 'rear I/O connectors').

Front Panel Connectors

SATA-11/12/13 eSATA Connectors

The CE4-PIANO can be optionally equipped with 3 front panel eSATA signal headers. TX/RX designation of signals are shown with respect to the SATA port multiplier 1 (SAM1). Shielded external SATA cable assemblies are recommended for reliable industrial usage. A dual LED is associated to each eSATA receptacle - green signals an established link between the CE4-PIANO and the attached device, and orange will indicate activity on a particular port.

3 x F/P eSATA #256.007.10.10 Receptacles		
	1	GND
	2	SATA_TX+
	3	SATA_TX-
	4	GND
	5	SATA_RX-
	6	SATA_RX+
	7	GND

The typical external cable length should not exceed 2m. For special applications the SAM1 SATA PHYs can be individually adjusted to compensate for signal distortions over up to 4m cable length (stuffing option, has to be specified when ordering).

Remember that SATA is a high speed data link. Chose the minimum distance possible for locating the external SATA device, and use high quality cable assemblies for reliable industrial operation, such as the Molex 68782 series (EKF part no. 256.007.82.10 and 256.007.82.20). Compared to internal SATA cabling, the CE4-PIANO eSATA front panel connectors offer superior shielding and provide EMI protection. eSATA connectors and cable harnesses used or supplied by EKF adhere to the design specifications recommended by the Serial ATA International Organization (SATA-IO).

For experimental purposes, there are also adapter cable assemblies available from eSATA to SATA (EKF part no. 256.007.81.10).

The SATA-11/12/13 front panel connectors are assigned to the SATA port multiplier 1 (SAM1). Another two SATA channels for system internal usage are associated to SAM1 - refer to the SATA-14 and SATA-15 description.

On-Board Connectors

The CE4-PIANO can be equipped with several on-board connectors. These connectors are available as an option only, or even exclusive to each other, and therefore may not be functional or even present on your actual board.

Assembly of these connectors is highly custom specific. Discuss your needs with EKF before ordering, so that the optimum board configuration for your application will be chosen.

SATA-01 Docking Header

As an option, the CE4-PIANO can be equipped with an on-board 2.5-inch SATA drive, either hard disk (HDD), or silicon state (SSD). The 22-position SATA docking header SATA-01 allows for direct attachment of any drive, without a cable assembly.

Signal designations RX/TX with respect to the SATA host controller. Data signals can be derived either from the on-board controller chip SiI3114, which situation is referred to as 'master' configuration, or optionally from the rear I/O connector J2, which is referred to as 'slave' configuration.

SATA-01 • SATA Docking Connector 15+7 • 256.022.10.01

S1	GND
S2	TX+ SATA01
S3	TX- SATA01
S4	GND
S5	RX- SATA01
S6	RX+ SATA01
S7	GND
P1	+3.3V
P2	+3.3V
P3	+3.3V
P4	GND
P5	GND
P6	GND
P7	+5V
P8	+5V
P9	+5V
P10	GND
P11	*RSVD*
P12	GND
P13	*+12V*
P14	*+12V*
P15	*+12V*

Typically, SATA devices are powered from a single +5V rail, hence +12V are not supplied by default. On the CE4-PIANO, +3.3V and +5V at the connector SATA-01 are fused by 1.5A PolySwitches each.

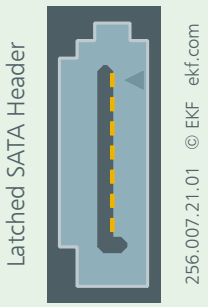
The on-board SATA device attached to SATA-01 is a reasonable priced single drive solution. However, if two drives on a CE4-PIANO are required e.g. for RAID operation, the C20-SATA mezzanine module should be chosen. Due to space restrictions imposed by the 4HP total assembly height, the C20-SATA dual drive mezzanine module would not be available together with the SATA-01 connector. However, if the neighboured card slot in a CompactPCI system is empty, a raised C20-SATA mezzanine module would be optionally available for a total of three SATA drives mounted on a single CE4-PIANO.

The CE4-PIANO is also available in a special passive 'slave' version. This is just a drive, attached to SATA-01, which in turn is wired to the J2 rear I/O connector as a stuffing option, rather than to the SiI3114 controller. A single 'master' CE4-PIANO with rear I/O option can be used to control up to 5 satellite 'slave' boards, by means of a suitable J2 backplane, for a JBOD or RAID configuration.

For 'master' CE4-PIANO boards, a front panel LED indicates data transfer activity over the SATA-01 connector (left position of the 4-fold LED, captured as '0').

SATA-14/15/23/24/25 Cable Headers

The CE4-PIANO can be optionally stuffed with up to 5 vertical latching SATA signal headers for attachment of system internal SATA devices. TX/RX designation of signals are shown with respect to the SATA port multiplier 1 (SATA-14 & SATA-15) and SATA port multiplier 2 (SATA-23 SATA-24 SATA-25). Latching cable assemblies are recommended for reliable industrial usage, e.g. the Molex 68561 series.

Up to 5 x SATA #256.007.21.01 Latched Headers		
	1	GND
	2	SATA_TX+
	3	SATA_TX-
	4	GND
	5	SATA_RX-
	6	SATA_RX+
	7	GND

Due to limited component space on the CE4-PIANO PCB, all connectors are vertical mount receptacles. Together with a straight plug, the 4HP envelope of a CompactPCI slot would be exceeded, resulting in a loss of the neighboured card slot. Hence, right angled plugs are recommended to overcome this issue. However, when the C20-SATA mezzanine module is simultaneously in use, there will occur an obstruction of R/A plugs with respect to SATA-15/23/24/25.

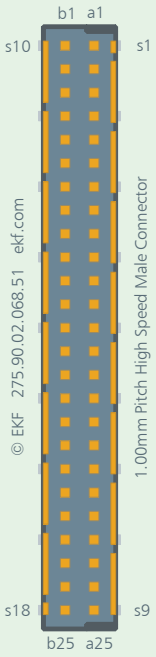
SATA-21/22 Mezzanine Connector

The CCE-PIANO can be provided with a high speed mezzanine connector for attachment of the C20-SATA hard disk drive module. TX/RX designation of signals is with respect to the CE4-PIANO SATA port multiplier 2 (SAM2).

The C20-SATA can be equipped with up to two drives (top and bottom mount), and hence is suitable for RAID Level 0/1 operation. For a 4HP CompactPCI envelope, the C20-SATA mezzanine storgae module is not available together with the on-board docking connector SATA-01. A special 8HP solution (raised profile mezzanine connectors) would be available to overcome this restriction for a maximum of three drives in total, mounted on a single CE4-PIANO carrier board.

By default, only a single supply voltage (+5V_SATA) is wired to SATA-21-22, since popular 2.5-inch SATA hard disk drives do not require +3.3V and/or +12V, as of current. However, these voltages can be supplied as a stuffing option (some CompactPCI systems do not provide +12V). Self resettable fuses are provided on the CE4-PIANO on each of the three voltage rails.

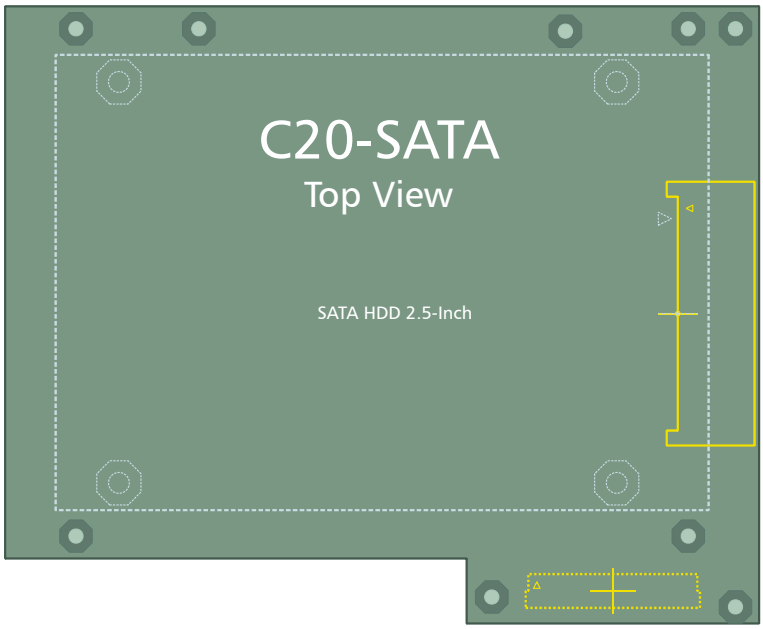
SATA-21-22 SATA Expansion Interface
1.00mm Pitch Male Connector 2mm Height (275.90.02.068.51)



GND	b1	a1	GND
	b2	a2	SATA0_TXP
	b3	a3	SATA0_TXN
GND	b4	a4	GND
	b5	a5	SATA0_RXN
	b6	a6	SATA0_RXP
GND	b7	a7	GND
	b8	a8	SATA1_TXP
	b9	a9	SATA1_TXN
GND	b10	a10	GND
	b11	a11	SATA1_RXN
	b12	a12	SATA1_RXP
GND	b13	a13	GND
	b14	a14	
	b15	a15	
GND	b16	a16	GND
	b17	a17	
	b18	a18	
	b19	a19	
	b20	a20	
	b21	a21	
+5V_SATA	b22	a22	*+3.3V_SATA*
+5V_SATA	b23	a23	*+3.3V_SATA*
	b24	a24	
	b25	a25	*+12V_SATA*

Notes:

- +3.3V_SATA is not connected by default - stuffing option together with 1.5A PolySwitch resettable fuse
- +5V_SATA across 1.5A PolySwitch resettable fuse
- +12V_SATA is not connected by default - stuffing option together with 0.5A PolySwitch resettable fuse
- All sx pins (shield) are tied to GND
- All TX/RX designations with respect to SiI3726 SATA port multiplier 2 (TX controller = RX drive, RX controller = TX drive)

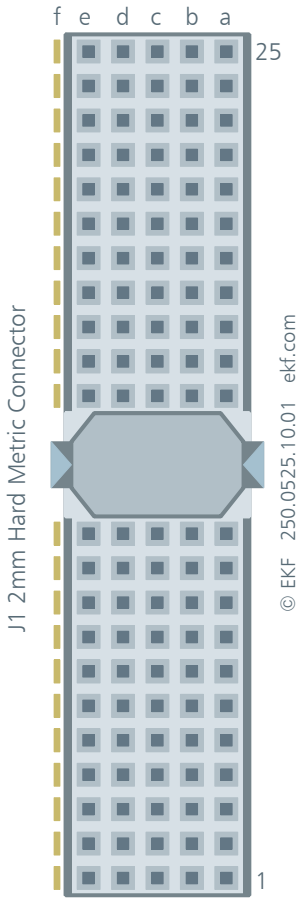


C20-SATA Photo Soon Here

CompactPCI Connector Suite

J1 CPCI Backplane

J1 is provided as the CompactPCI backplane connector, suitable for 32-bit 33/66MHz operation of the CE4-PIANO. For satellite 'slave' cards (i.e. a CE4-PIANO with an on-board drive only, no electronics), J1 is normally not required.



#J1	A	B	C	D	E
25	+5V	*REQ64#*	*ENUM#*	+3.3V	+5V
24	AD1	+5V	VI/O	AD0	*ACK64#*
23	+3.3V	AD4	AD3	+5V	AD2
22	AD7	GND	+3.3V	AD6	AD5
21	+3.3V	AD9	AD8	M66EN	C/BE0#
20	AD12	GND	VI/O	AD11	AD10
19	+3.3V	AD15	AD14	GND	AD13
18	SERR#	GND	+3.3V	PAR	C/BE1#
17	+3.3V	*IPMB SCL*	*IPMB SDA*	GND	PERR#
16	DEVSEL#	GND	VI/O	STOP#	LOCK#
15	+3.3V	FRAME#	IRDY#	*BD_SEL#*	TRDY#
14					
13			Not Keyed		
12					
11	AD18	AD17	AD16	GND	C/BE2#
10	AD21	GND	+3.3V	AD20	AD19
9	C/BE3#	IDSEL	AD23	GND	AD22
8	AD26	GND	VI/O	AD25	AD24
7	AD30	AD29	AD28	GND	AD27
6	REQ#	GND	+3.3V	CLK	AD31
5	*BRSVP1A5*	*BRSVP1B5*	RST#	GND	GNT#
4	*IPMB PWR*	*HEALTHY#*	VI/O	*INTP*	*INTS*
3	INTA#	*INTB#*	*INTC#*	+5V	*INTD#*
2	*TCK*	+5V	*TMS*	TDO [1]	TDI [1]
1	+5V	-12V [2]	*TRST#*	+12V [3]	+5V

[1] TDO - TDI internally connected

[2] -12V not in use

[3] +12V typically not used

J2 SATA Rear I/O

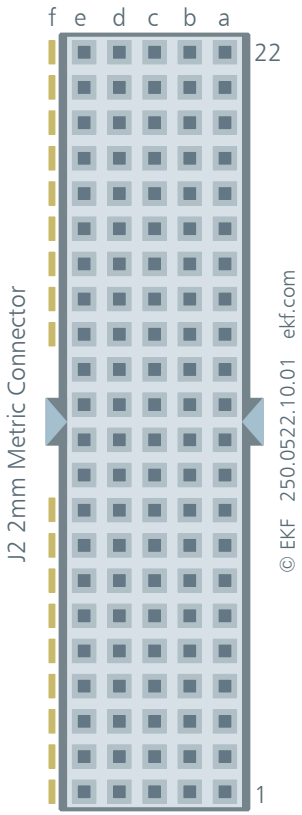
As an option, the CE4-PIANO can be configured for rear I/O SATA across the connector J2. All five SATA channels from the SATA port multiplier 3 (SAM3) are routed to J2, either for usage together with a custom specific rear I/O transition module, or a custom specific SATA backplane. As a matter of course, the rear I/O option is not suitable together with a 64-bit CompactPCI backplane, due to signal interference.

A rear I/O transition module could be designed for system internal and/or back panel external usage of the SATA channels.

A proprietary SATA backplane would distribute the SATA channels from a 'master' CE4-PIANO slot (acting as a controller hub) to a maximum of 5 'slave' card slots, equipped with just a drive each.

Also a combined SATA backplane and transition module solution can be designed.

In addition to the SATA channels, the connector J2 provides a lot of GPIO signals, derived from SAM3 (3.3V compliant).



#J2	A	B	C	D	E
22	*GA4*	*GA3*	*GA2*	*GA1*	*GA0*
21	SATA_TX31-	SATA_TX31+	GND	SATA_RX31-	SATA_RX31+
20	ACTLED31#	GND	+5V	GND	LNKLED31#
19	SATA_TX32-	SATA_TX32+	GND	SATA_RX32-	SATA_RX32+
18	ACTLED32#	GND	GND	GND	LNKLED32#
17	SATA_TX33-	SATA_TX33+	GND	SATA_RX33-	SATA_RX33+
16	ACTLED33#	GND	+5V	GND	LNKLED33#
15	SATA_TX34-	SATA_TX34+	GND	SATA_RX34-	SATA_RX34+
14	ACTLED34#	GND	GND	GND	LNKLED34#
13	SATA_TX35-	SATA_TX35+	GND	SATA_RX35-	SATA_RX35+
12	ACTLED35#	GND	+5V	GND	LNKLED35#
11	RSVD	RSVD	GND	RSVD	RSVD
10	GND	GND	GND	GND	GND
9	SLAVE_SATA_TX-	SLAVE_SATA_TX+	GND	SLAVE_SATA_RX-	SLAVE_SATA_RX+
8	SLAVE_ACTLED#	GND	+5V	GND	SLAVE_LNKLED#
7	GPI0	GPI1	GND	GPI13	GPI26
6	GPI28	GPI29	GND	GPI31	RSVD
5	GPO0	GPO1	GND	GPO10	GPO11
4	GPO12	GPO13	GND	GPO14	GPO15
3	GPO16	GPO17	GND	GPO18	GPO19
2	GPO20	GPO21	GND	GPO30	GPO31
1	+3.3V	+3.3V	+3.3V	+5V	+5V

gray: NC
red: SATA channel for slave boards only

Notes

- SATA 31-35 RX/TX designations with respect to the controller (SATA port multiplier 3)
- LED outputs already provided with 330 Ohm series resistors, tie LED anodes directly to +3.3V
- GPIO ports derived from SAM3 (SATA port multiplier 3)

Schematics

Complete circuit diagrams for this product are available for customers on request. Signing of a non-disclosure agreement would be needed. Please contact sales@ekf.de for details.

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