SYSTEM

Technical Information

C43-SATA

SATA/USB
Mezzanine Module

Document No. 5399 • Ed. 8 • 25 January 2013

Contents

About this Manual

This manual is a short form description of the technical aspects of the C43-SATA, required for installation and system integration. It is intended for the advanced user only.

Edition History

EKF Document	Ed.	Contents/*Changes*	Author	Date
Text # 5399 c43_tie.wpd	1	Technical Information C43-SATA English, Preliminary Edition	jj	11 February 2009
	2	Review	jj	16 February 2009
	3	Modified sectional drawing (SATA latching cable connector)	jj	20 March 2009
	4	Modified information regarding P-MEZ, with respect to USB2 (this USB channel is not in use on the C43-SATA)	jj	16 April 2009
	5	Added photos	jj	8 March 2010
	6	Added photo PC2-C43 exploded view, added table Alternate Products	jj	25 August 2011
	7	Added photo PC1-C43 exploded view	jj	30 March 2012
	8	Added photos PCS-C43	jj	25 January 2013

Related Documents

For a description of the CCM-BOOGIE or PC1-GROOVE CPU cards, which may act as carrier board with respect to the C43-SATA, please refer to the correspondent CPU user guide, available by download (change URL accordingly for other potential carrier cards).

Download CPU Card User Guides	
CCM-BOOGIE	www.ekf.com/c/ccpu/ccm/ccm_uge.pdf
PC1-GROOVE	www.ekf.com/p/pc1/pc1_uge.pdf
PC2-LIMBO	www.ekf.com/p/pc2/pc2_ug.pdf
SC1-ALLEGRO	www.ekf.com/s/sc1/sc1.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.

- Intel, Pentium, Celeron, Core 2 Duo, Core i7: ® Intel
- CompactPCI, CompactPCI PlusIO, CompactPCI Serial: ® PICMG
- Windows XP, WEPOS, POSReady, Windows 7: ® Microsoft
- EKF, ekf system: ® EKF

EKF does not claim this list to be complete.

Legal Disclaimer - Liability Exclusion

This document 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	
SATA	Serial ATA 2.5/2.6 Specification (www.sata-io.org)
USB	Universal Serial Bus Revision 2.0 specification (www.usb.org/developers)

C43-SATA on CCM-BOOGIE

Features

Feature Summary	
Form Factor	Proprietary size mezzanine module, fits basically into the 4HP (20.3mm) envelope of the CPU carrier board, typically delivered as a ready to use assembly unit (including the CCM-BOOGIE, PC1-GROOVE, SC1-ALLEGRO or successor CPU card), mounting position right (on top of CPU board)
Host I/F Connector (Bottom Mount to CPU Carrier)	▸ P-MEZ High Speed mezzanine connector suitable for CCM-BOOGIE and successor CPU carrier boards, nominal headroom 9mm between carrier board and C43-SATA ▸ up to 4 x SATA channels ▸ 3 x USB 2.0 ports
SATA Usage	▸ P-SATA1 horizontal mount latching connector (typically from the from ICH southbridge or PCH on a CPU carrier board) ▸ P-SATA2 and P-SATA3 horizontal mount latching connectors (derived from the CPU carrier board secondary SATA controller) ▸ P-SATA4 horizontal mount latching connector (from PCH southbridge on CPU carrier board, not functionable with CCM-BOOGIE carrier board), not available together with J-USB3
USB Usage	▸ Up to 2 x USB type A receptacles, horizontal mount (option only) ▸ Up to 1 x USB Solid State Drive (SSD), low profile, top mount
USB Solid State Drive	▸ Optional pin header for industrial grade USB Solid State Drive (SSD) ▸ Suitable for 2.0mm pitch low profile connector module
Top Mount Connectors	▸ P-SATA1 to P-SATA4 for attachment of system internal SATA drives (latching cable harness) ▸ Option J-USB3 for system internal attachment of USB devices - not available together with P-SATA4 ▸ Option J-USB4 for system internal attachment of USB devices - not available or at least not usable together with USB SSD ▸ Option P-UFD1 pin header for low profile USB SSD module (top mount)
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

Not all of the connectors may be present or functional on your actual C43-SATA board; assembly is highly custom specific. Options may be exclusive, i.e. not necessarily concurrently present. Discuss your needs with EKF before ordering.

C43-SATA on CompactPCI® Serial CPU Carrier Card

C43-SATA (Internal SATA Connectors Option)

Short Description

Available as a mezzanine add-on expansion board to the CCM-BOOGIE and successor CPU carrier cards, the main purpose of the C43-SATA is to provide SATA and USB connectors for system internal usage. In addition, the C43-SATA can accommodate an USB Flash drive module. Basically, the C43-SATA is designed to fit into the 4HP (20.32mm pitch) envelope of a CPCI CPU carrier board, so that another 4HP pitch mezzanine expansion board can be stacked above the CPU/C43 assembly in addition.

Up to four SATA connectors (latching headers) are optionally available on the C43-SATA, for attachment of system internal drives by ordinary latching SATA cable harnesses. Two of the SATA channels may be either operated in a low level RAID (0/1) mode, or as universal non-RAID SATA ports.

The C43-SATA can be optionally equipped with up to 2 horizontal mount USB type A host receptacles, for system internal use.

A top mount pin header can be provided for attachment of a low profile industrial grade USB solid state drive (SSD) module, available from several vendors with a capacity of up to 16GB as of current. However, the 4HP total stack height for the entire assembly comprised of carrier board CPU, C43-SATA and USB SSD will be exceeded by up to 1.8mm, depending on the profile of the USB module locking screw. This may be tolerable in many situations, but should be nevertheless considered.

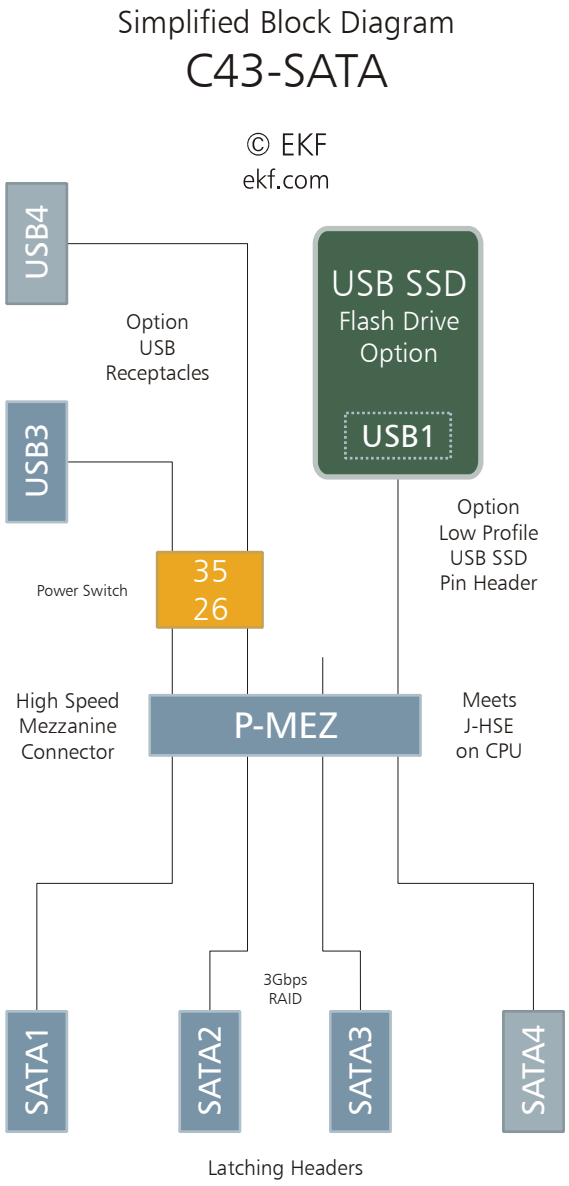
Some of the C43 stuffing options are exclusive to each other, due to space restrictions on the C43-SATA.

C43-SATA Stuffing Options		
P-SATA1 - P-SATA4 4HP Envelope Basically Maintained Exceeded with Latching Cable Connector	J-USB3 - J-USB4 4HP Envelope Slightly Exceeded (~1.3mm)	**P-UFD1** 4HP Envelope Exceeded with USB Module Locking Screw (~1.8mm)
P-SATA1 - P-SATA4	P-SATA1 - P-SATA3	P-SATA1 - P-SATA3
-	J-USB3 - J-USB4	J-USB3
-	-	P-UFD1

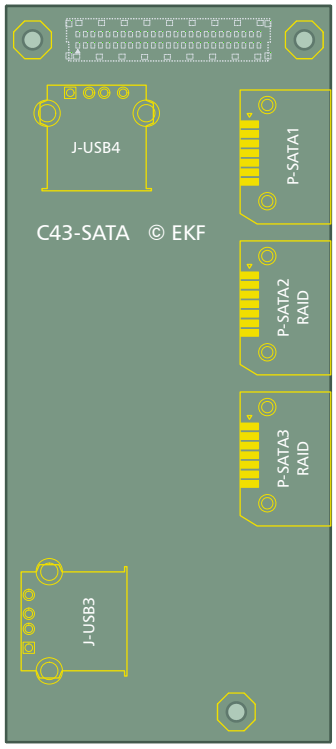
Some of the population options mentioned may exceed the 4HP total stack height for the CPU carrier board and C43-SATA assembly. Please read carefully the respective notes (subchapters 'J-USB3 - J-USB4', and 'P-UFD1 - P-UFD2'. For some EKF expansion boards slight violations of the 4HP envelope may be tolerable.

C43-SATA Mounted on CPU Carrier Card

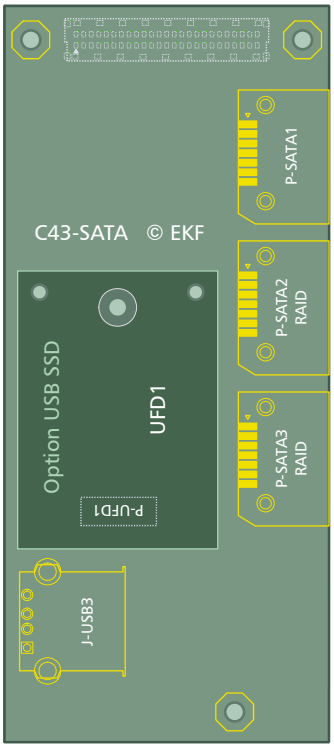
Block Diagram C43-SATA



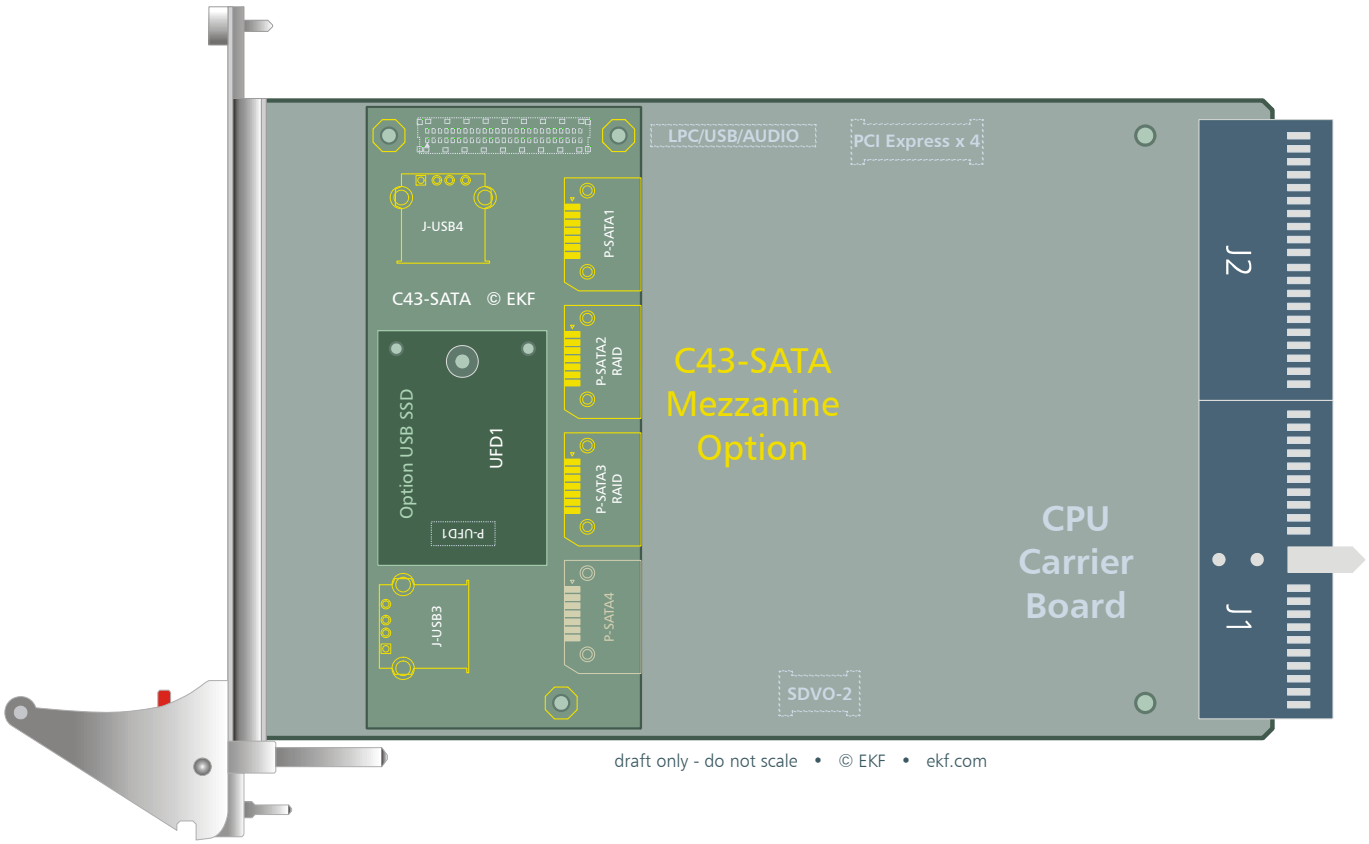
Top View Component Assembly C43-SATA



Stuffing Option SATA/USB Receptacles



Stuffing Option USB SSD Module(s)



draft only - do not scale • © EKF • ekf.com

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 Assembly

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 onboard 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 Assembly

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 onboard 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

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 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)

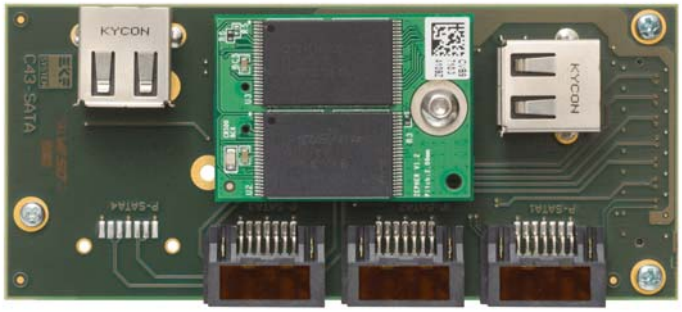
Technical Reference - Connectors

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 C43-SATA mezzanine module may be equipped with several connectors for system internal usage. Not all of these connectors may be present on a particular board. Be sure to specify your individual needs when ordering the C43-SATA board. Characteristic features and the pin assignments of each connector are described on the following pages.



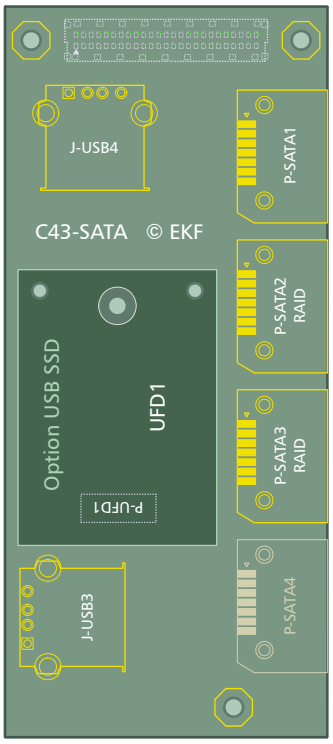
C43-SATA Top View

C43-SATA Bottom View

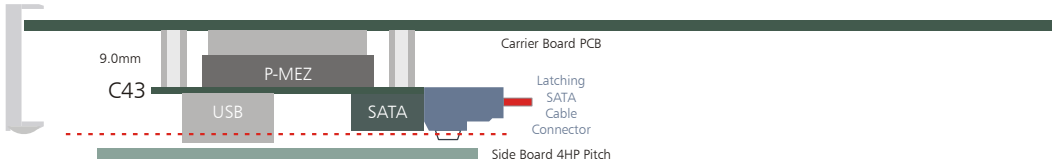
I/O Connectors

The C43-SATA can be equipped with several I/O connectors. Some of these connectors are available as an option only or exclusive to each other, and therefore may not be functional or even present on your actual board.

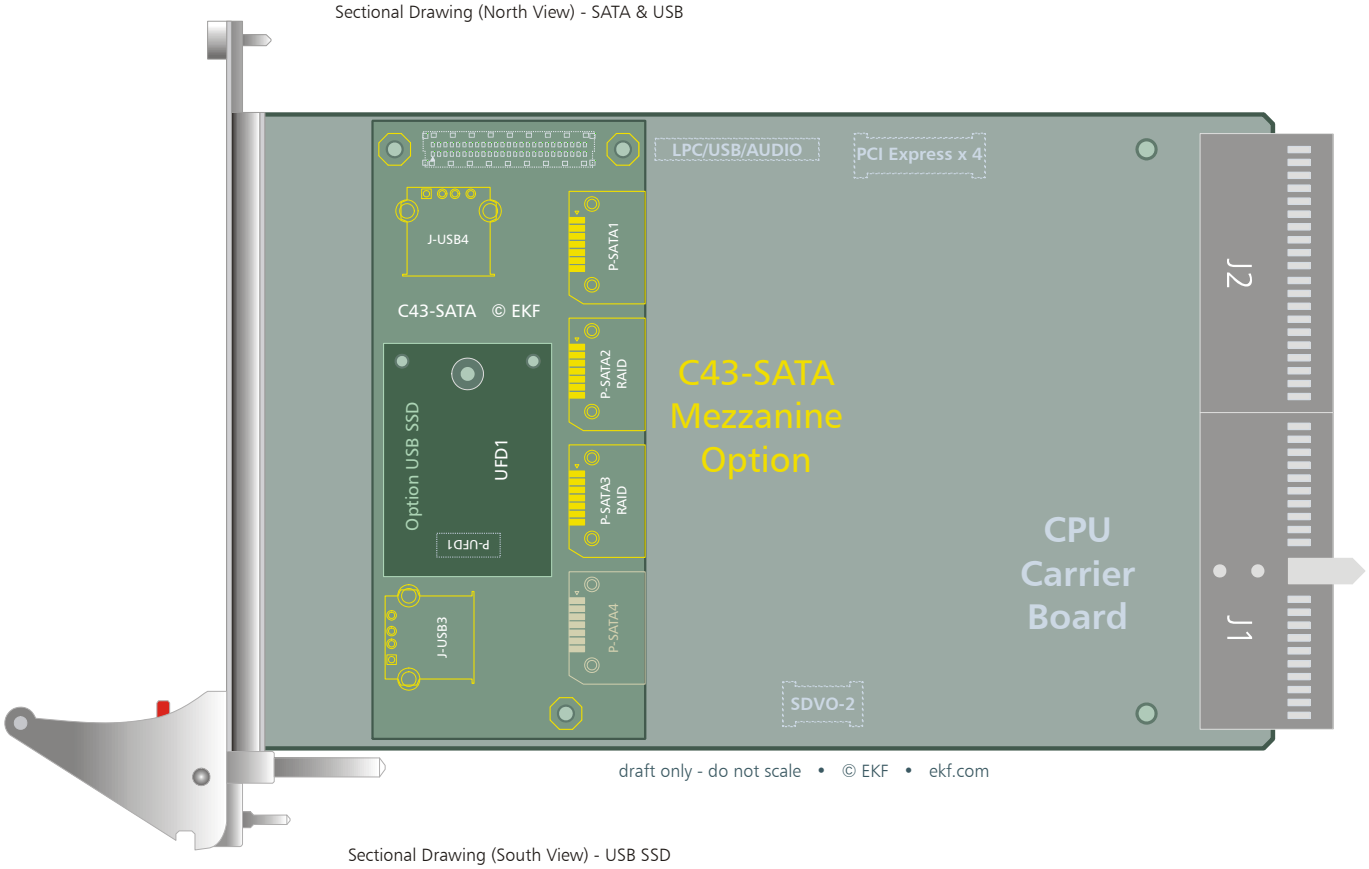
Assembly of these connectors is highly custom specific. Discuss your needs with EKF before ordering, so that the optimum board configuration for your application will be chosen.



I/O Connectors	
J-USB3	Type A USB receptacle (4HP envelope slightly violated, not together with P-SATA4)
J-USB4	Type A USB receptacle (4HP envelope slightly violated, not together with P-UFD1)
P-SATA1	Horizontal mount latching SATA header - ICH/PCH Southbridge
P-SATA2	Horizontal mount latching SATA header - JMB362 controller (RAID or non-RAID driver)
P-SATA3	Horizontal mount latching SATA header - JMB362 controller (RAID or non-RAID driver)
P-SATA4	Horizontal mount latching SATA header - PCH Southbridge (not with CCM-BOOGIE)
P-UFD1	Pin Header for top mount USB SSD module (4HP envelope exceeded)

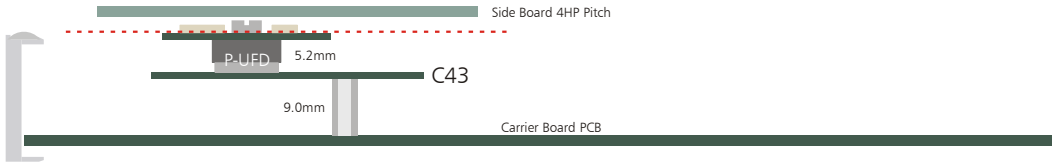


Sectional Drawing (North View) - SATA & USB



draft only - do not scale • © EKF • ekf.com

Sectional Drawing (South View) - USB SSD

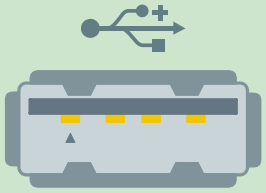


J-USB3 - J-USB4

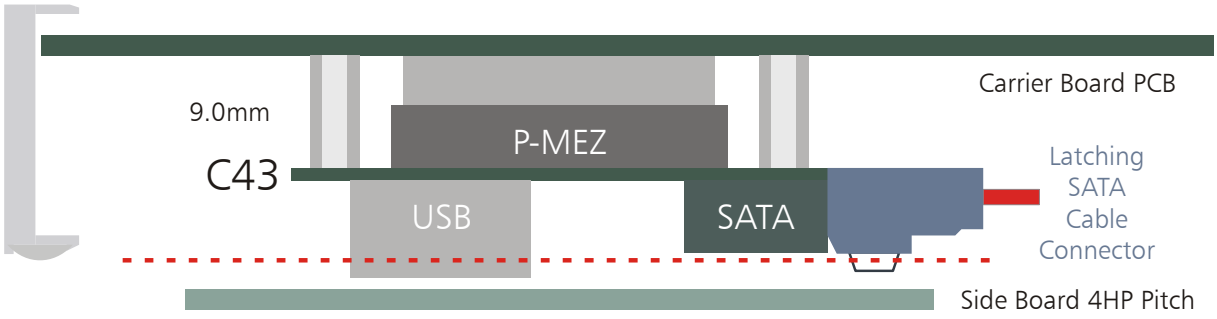
As a custom specific option, the C43-SATA can be provided with up to two horizontal mount USB receptacles. Due to the USB connector dimensions, the total stack height of the CPU carrier board and the C43-SATA mezzanine module assembly will exceed the 4HP envelope about ~1.3mm. This may be tolerable in some situations, but should be nevertheless considered. USB cable assemblies with slim and short plugs are required - not any USB harness matches with the C43-SATA due to space restrictions. The same issue must be strictly observed if direct attachment of an USB stick (e.g. Flash Drive) is intended - only very short, low profile sticks (with an overall length of less than ~50mm) would be suitable.

The J-USB3 receptacle cannot be populated together with the P-SATA4 connector (USB cable assembly in conflict with SATA receptacle). For similar reasons, the J-USB4 jack cannot be stuffed together with P-UFD1 (USB SSD memory module). Be sure to discuss your needs with sales@ekf.de before ordering.

The C43-SATA USB ports are derived from the ICH/PCH southbridge on the CPU carrier board. A dual electronic switch is provided on the C43-SATA for short-circuit and overcurrent control regarding the J-USBx receptacles (0.5A).

USB Receptacles J-USB3 - J-USB4 • 270.20.04.0		
 USB Receptacle © EKF • 270.20.04.0 • ekf.com	1	+5V_USB 0.5A 1)
	2	DATA-
	3	DATA+
	4	GND

1) Dual Channel Electronic Switch Protection

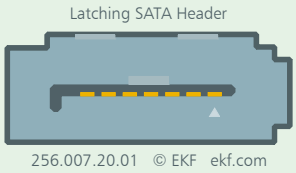


Sectional Drawing (North View) - SATA & USB

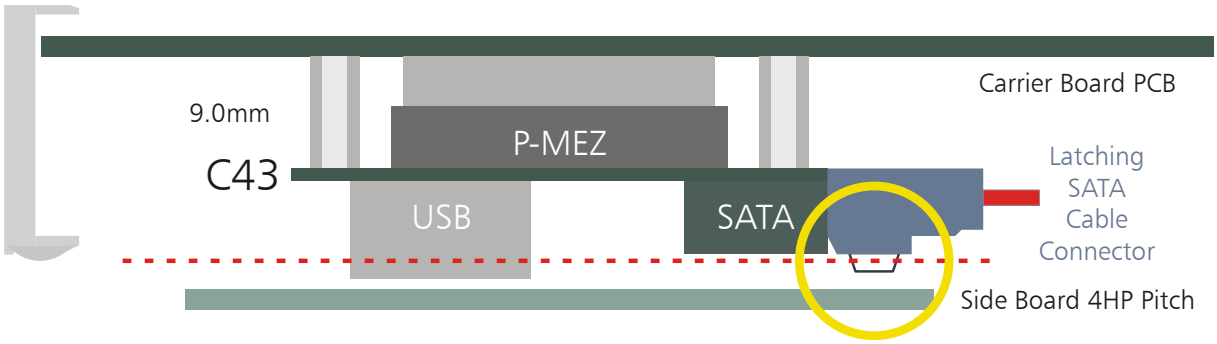
P-SATA1 - P-SATA4

The C43-SATA can be optionally populated with up to four horizontal mount latching SATA signal headers , for system internal attachment of SATA drives. TX/RX designation of signals are shown with respect to the additional SATA controller located on the carrier board. P-SATA1 and P-SATA4 are tied to the ICH/PCH southbridge of the CPU carrier board (P-SATA4 not available with CCM-BOOGIE). P-SATA2 corresponds to the SATA channel 0 of the JMB362 controller on the carrier board, and P-SATA3 is wired to the JMB362 SATA channel 1. The SATA ports P-SATA2 and P-SATA3 can be used individually or as RAID 0/1 (different drivers).

Straight SATA cable assemblies are recommended for reliable industrial usage.

P-SATA1 P-SATA2 P-SATA3 #256.007.20.01 Latched Headers		
	1	GND
	2	SATA_TX+
	3	SATA_TX-
	4	GND
	5	SATA_RX-
	6	SATA_RX+
	7	GND

P-SATA4 is provided for future CPU boards based on a new Intel Platform Controller Hub generation with additional SATA channels. P-SATA4 is not available concurrent to J-USB3 (space restrictions).



Sectional Drawing (North View) - SATA & USB

When latching SATA cable assemblies are in use, the unlocking clip of the SATA cable connector will exceed the 4HP profile of the carrier board and C43-SATA mezzanine card assembly. Although this may be tolerable in some situations - be aware of a potential **short-circuit** condition on bottom of the neighboured side board, possibly caused by the metallic clip surface!

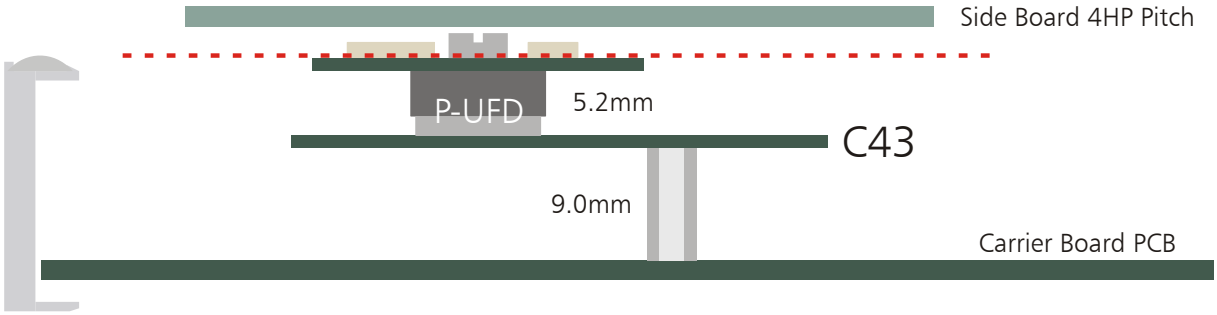
P-UFD1

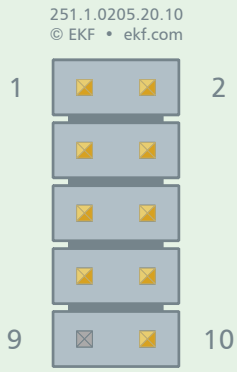
As a custom specific option, the C43-SATA can be provided with an USB SSD (Solid State Drive) low profile mezzanine modules. However, the total stack height of the CPU carrier board and the C43-SATA mezzanine module assembly would then exceed the 4HP envelope up to ~ 1.8mm. This may be tolerable under the condition that there is no 4HP pitch expansion side board mounted, or the locking screw for the USB Flash module is omitted, or the adjacent side board has no bottom mount components opposed to the USB SSD.

The P-UFD1 Flash module cannot be populated or used together with the J-USB3 receptacle, since both component areas (with USB cable connector landing zone in mind) would overlap each other.

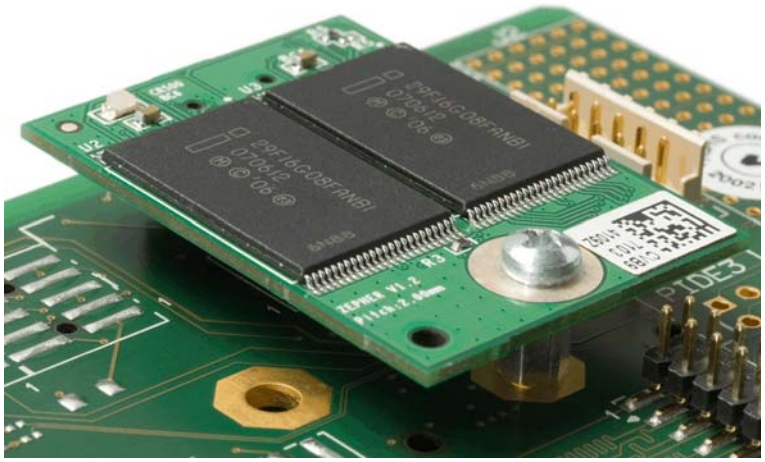
The C43-SATA USB ports are derived from the ICH/PCH southbridge on the CPU carrier board. A self resettable fuse is provided on the C43-SATA for short-circuit and overcurrent control regarding the P-UFD1 pin header.

Sectional Drawing (South View) - USB SSD



P-UFD1 • 2.00mm Modified Pin Header 2x5 (251.1.0205.20.10) USB Solid-State Drive (Low Profile) 562.20.0004.00 (4GB) Sandisk uSSD 5000 • STec SLUFDM • Smart (Intel) Z-U130				
	+5V 1)	1	2	NC
	USB_D-	3	4	NC
	USB_D+	5	6	NC
	GND	7	8	NC
	Mech. Key	9	10	NC

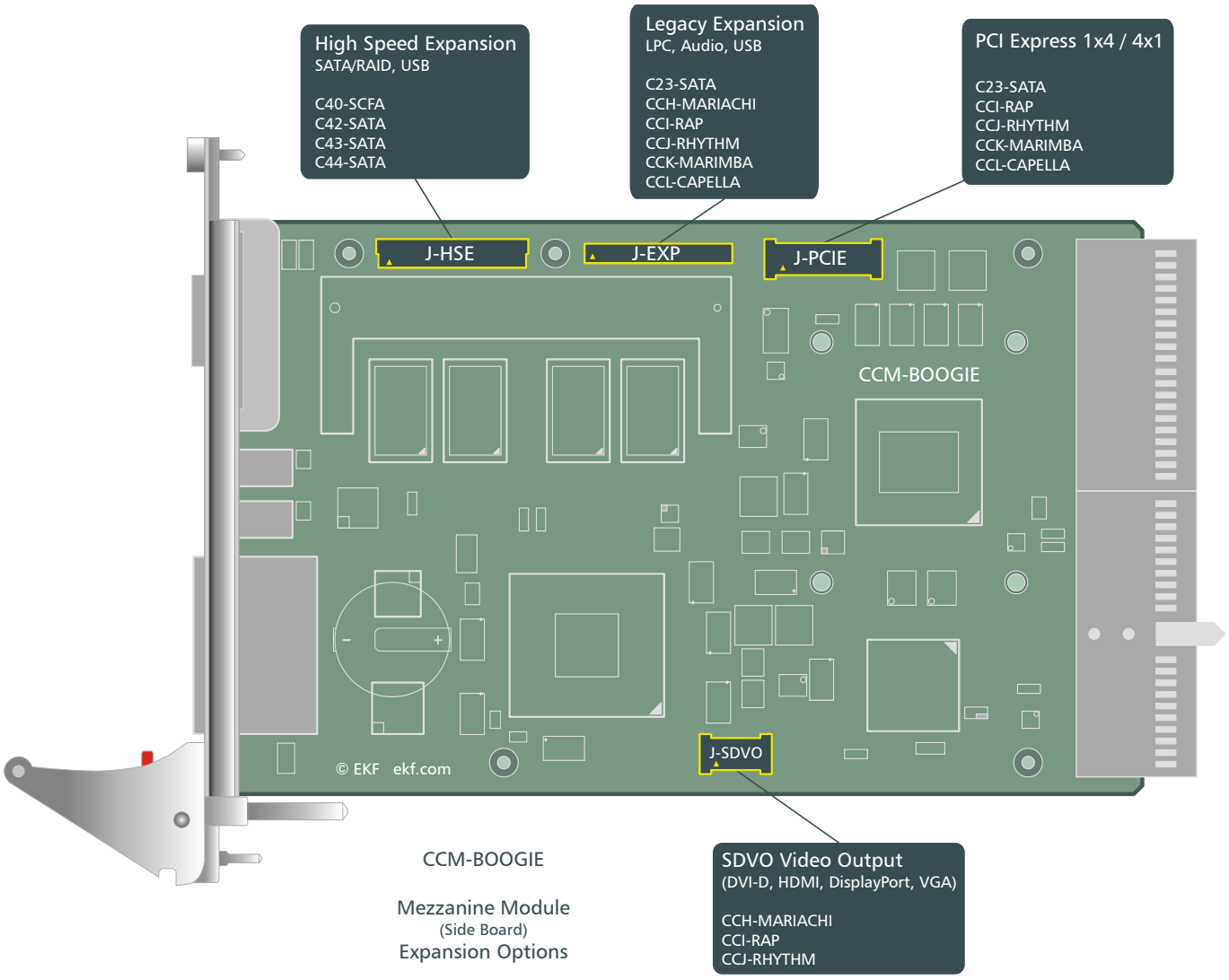
1) Self resetting fuse 0.5A, power switched according to CPU carrier board sleep state



C43-SATA over CCM-BOOGIE CPU Carrier Card

Inter-Board Connector

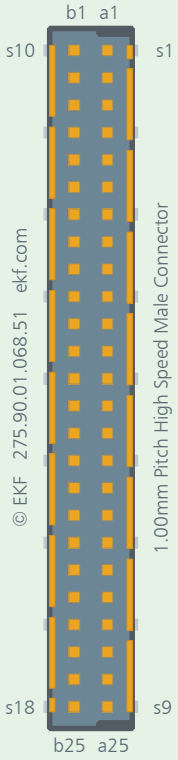
The C43-SATA is equipped with a high speed mezzanine connector P-MEZ, mating with the CCM-BOOGIE CPU carrier board and its successors. The inter-board connector is situated at the bottom of the C43-SATA and establishes the data path and power link to the carrier board CPU J-HSE. Since the C43-SATA comes typically mounted as a unit together with the CCG-RUMBA, there is normally no need for the user to get access to the inter-board connector. It is described here as a reference only and for better understanding of the C43-SATA



P-MEZ

The connector P-MEZ is a 1mm nominal height shielded male pin header. Its counterpart on the CPU carrier board is a 8mm height receptacle (J-HSE), for a nominal headroom of 9mm between the boards.

P-MEZ SATA & USB Mezzanine Interface
1.00mm Pitch Male Connector 1mm Height (275.90.01.068.51)



GND	b1	a1	GND
SATA3_TXP 4)	b2	a2	SATA1_TXP 3)
SATA3_TXN 4)	b3	a3	SATA1_TXN 3)
GND	b4	a4	GND
SATA3_RXN 4)	b5	a5	SATA1_RXN 3)
SATA3_RXP 4)	b6	a6	SATA1_RXP 3)
GND	b7	a7	GND
SATA4_TXP 3)	b8	a8	SATA2_TXP 4)
SATA4_TXN 3)	b9	a9	SATA2_TXN 4)
GND	b10	a10	GND
SATA4_RXN 3)	b11	a11	SATA2_RXN 4)
SATA4_RXP 3)	b12	a12	SATA2_RXP 4)
GND	b13	a13	GND
USB3_P	b14	a14	USB1_P
USB3_N	b15	a15	USB1_N
GND	b16	a16	GND
USB4_P	b17	a17	*USB2_P 5)*
USB4_N	b18	a18	*USB2_N 5)*
GND	b19	a19	GND
USB3_OC#	b20	a20	USB1_OC#
USB4_OC#	b21	a21	USB2_OC#
+5VS 2)	b22	a22	+3.3VS 1)
+5VS 2)	b23	a23	+3.3VS 1)
+5V	b24	a24	*+3.3V*
RSVD	b25	a25	*+12V*

1) 2) Switched voltages from carrier board, according to CPU sleep state S0
3) This SATA channel has been derived from ICH/PCH southbridge
4) These SATA channels are derived from the additional secondary PCIe SATA controller, RAID 0/1/10 capable
5) USB2 not in use

Notes:
- All s# connector pins (shield) are tied to GND
- All TX/RX designations with respect to SATA controller (TX controller = RX drive, RX controller = TX drive)

C43-SATA over PC1-GROOVE CPU Carrier Card

C43-SATA over PC2-LIMBO CPU Carrier Card

C43-SATA on PCS-BALLET Mezzanine Side Card (8HP Assembly w. CPU Carrier)

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.

EKF reserves the right to refuse distribution of confidential information material for any reason that EKF may consider substantial.

Ordering Information

Ordering Information
For popular C43-SATA SKUs please refer to www.ekf.com/liste/liste_20.html#C43

Alternate Products

Low Profile CPU Card Mezzanine Storage Modules		
C40-SCFA	CompactFlash®	www.ekf.com/c/ccpu/c40/c40_tie.pdf
C41-CFAST	CFast™	www.ekf.com/c/ccpu/c41/c41_tie.pdf
C42-SATA	Micro SATA	www.ekf.com/c/ccpu/c42/c42_tie.pdf
C47-MSATA	Dual mSATA	www.ekf.com/c/ccpu/c47/c47.html
Overview	J-HSE/P-MEZ Based Modules	www.ekf.com/c/ccpu/c4x_mezz_ovw.pdf

Industrial Computers Made in Germany

boards. systems. solutions.

EKF Elektronik GmbH
Philipp-Reis-Str. 4
59065 Hamm
Germany

Phone +49 (0)2381/6890-0
Fax +49 (0)2381/6890-90
Internet www.ekf.com
E-Mail info@ekf.com