EKF SYSTEM

Technical Information

C42-SATA

Micro SATA SSD
Solid State Drive Mezzanine Module

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Contents

About this Manual

This manual is a short form description of the technical aspects of the C42-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 # 5290 c42_tie.wpd	1	Technical Information C42-SATA English, Preliminary Edition	jj	14 October 2008
	2	Review	jj	4 December 2008
	3	Review	jj	10 February 2009
	4	Added Photos MicroSATA SSD Intel and other Brands	jj	2 March 2009
	5	General review	jj	16 April 2009
	6	C42-SATA illustrations updated	jj	18 May 2009
	7	Added sectional drawing	jj	5 June 2009
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	9	Added photos	jj	26 May 2010
	10	Added photos	jj	29 March 2012
	11	Added photos showing C42-SATA on PCS-BALLET	jj	17 April 2013

Related Documents

Related Documents CPU Cards	
CCM-BOOGIE	www.ekf.com/c/ccpu/ccm/ccm_e.html
PC1-GROOVE	www.ekf.com/p/pc1/pc1.html
PC2-LIMBO	www.ekf.com/p/pc2/pc2.html
SC1-ALLEGRO	www.ekf.com/s/sc1/sc1.html

Related Documents Mezzanine Modules and Side Cards	
C40 ... C47 Series Mezzanine Storage Modules	www.ekf.com/c/ccpu/c4x_mezz_ovw.pdf
Mezzanine Modules Overview	www.ekf.com/c/ccpu/mezz_ovw.pdf
The EKF Mezzanine Module Concept	www.ekf.com/c/ccpu/cpci_mezzanine_evolution.pdf

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 ® : ® PICMG, CompactPCI ® Serial : ® PICMG
▸ Windows XP, WEPOS/POSready, Windows 7, Windows 8: ® Microsoft
▸ EKF, ekf system: ® EKF

EKF does not claim this list to be complete.

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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	
Micro SATA	SFF-8144 Specification (ftp://ftp.seagate.com/sff)
SATA	Serial ATA 2.5/2.6 Specification (www.sata-io.org)

C42-SATA & SC1-ALLEGRO CPU Card

C42-SATA & SC1-ALLEGRO CPU Card Assembly

Features

Feature Summary	
Form Factor	▸ Proprietary size mezzanine module 66mm x 97.5mm x 1mm ▸ Fits into the 4HP (20.3mm) envelope of the CPU carrier board ▸ Typically delivered as a ready to use assembly unit (including the CCM-BOOGIE or successor CPU card) ▸ Mounting position right (on top of the CPU board)
Host I/F Connector (Bottom Mount to CPU Carrier)	▸ High speed mezzanine connector suitable for PC1-GROOVE, SC1-ALLEGRO and successor CPU carrier boards ▸ Up to 4 x SATA channels (SATA2 - SATA4 channels not in use on the C42-SATA) ▸ Up to 4 x USB ports (not in use on the C42-SATA)
SATA Usage	▸ SATA1 (typically from the PCH southbridge on a CPU carrier board), bound to the C42-SATA on-board Micro SATA solid state drive (SSD), 1.8-inch size ▸ SATA2 - SATA4 channels not in use on the C42-SATA
Solid State Drive	▸ Module suitable for 1.8-inch Micro SATA SSD (alternatively hard disk drive), dimensions according to SFF-8144 (54mm x 78.5mm x 5mm) ▸ All major operating systems supported (boot device) ▸ Variety of industrial grade Micro SATA SSD manufacturers, e.g. Intel, Micron, Toshiba, Samsung, SLC or MLC available ▸ Up to 800GB capacity as of current (Intel® Solid-State Drive DC S3500 Series) ▸ SSD can be provided by EKF or by customer
Top Mount Connectors	▸ P-SATA1 for on-board Micro SATA drive ▸ 7 pins signal section + 9 pins power section integrated docking connector
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

Available as a mezzanine add-on expansion board to EKF CPU carrier cards, the C42-SATA accommodates a Solid State Drive (SSD), as a rugged and fast mass storage media. The C42-SATA has been designed to fit into the 4HP (20.32mm) envelope of a CPCI CPU carrier board, so that another 4HP pitch mezzanine expansion board can be stacked above the CPU/C42 assembly in addition.

As of current, Micro SATA solid state drives are available with up to 800GB capacity as of current, delivering sufficient space for installation of any popular operating system.

The 1.8-inch Micro SATA SSD will be fastened by means of a screw locked retainer, for optimum reliability. A Flash technology based SATA drive provides significant advantages compared to rotating memory solutions (aka hard disk), e.g. less power consumption, faster data I/O transfers, lower latency time, industrial temperature grade and superior immunity against shock and vibration.
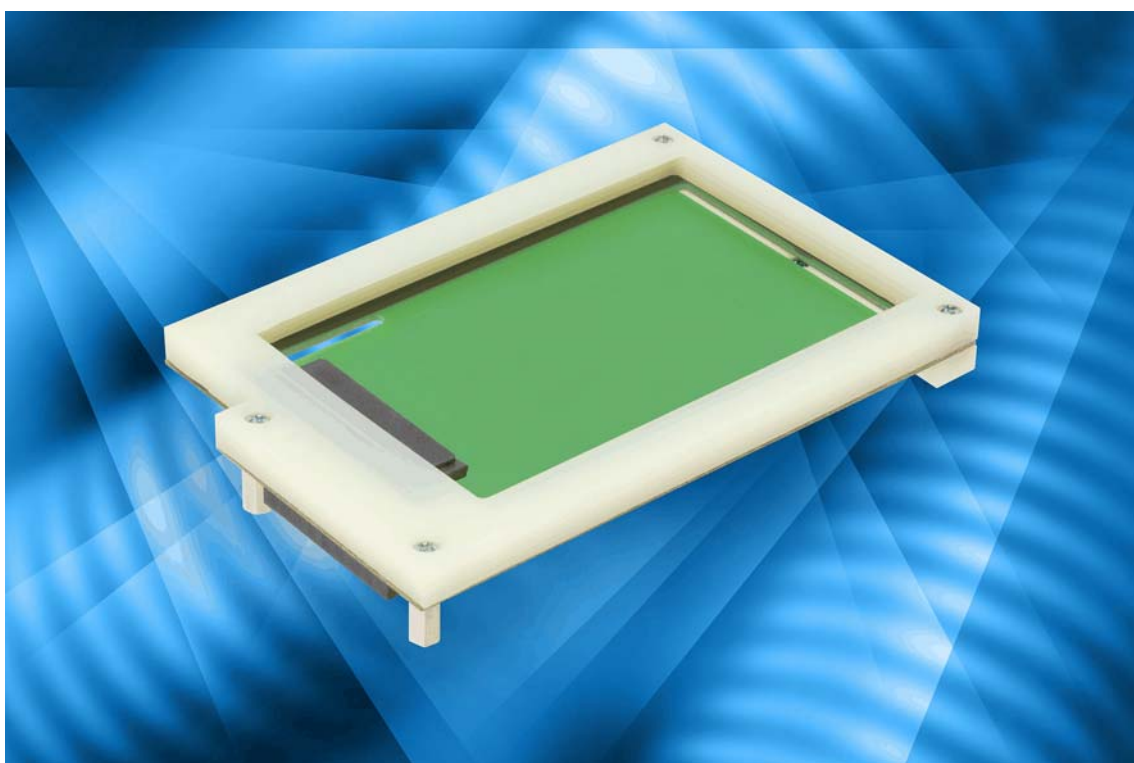
SSDs of different vendors may differ significantly in read/write access times. Contact EKF for choosing an optimum solution.

C42-SATA and PC1-GROOVE CPU Card Assembly
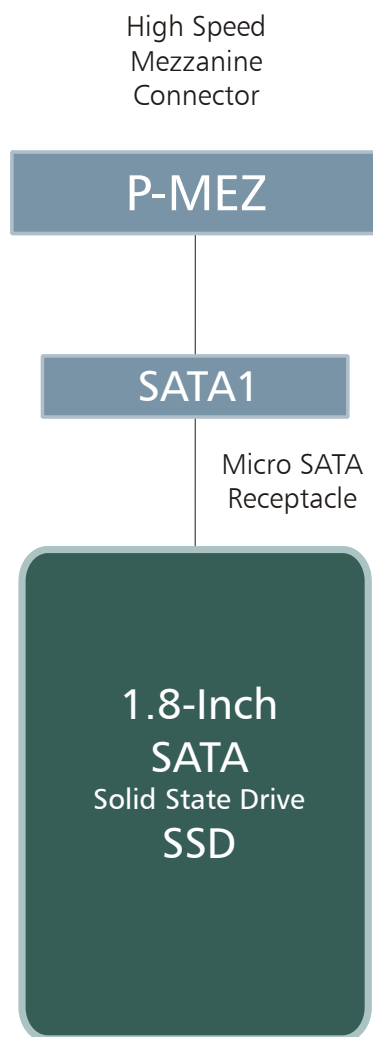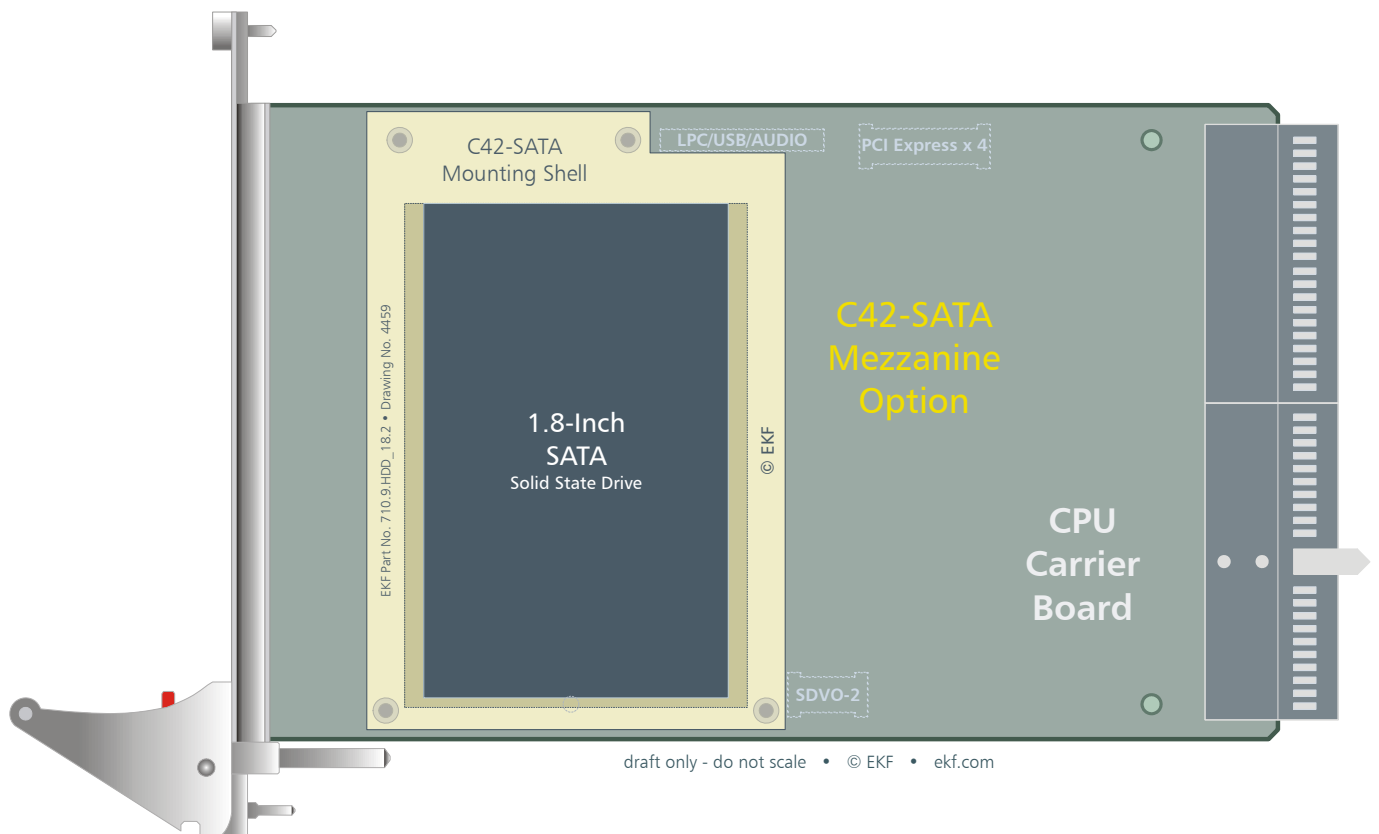
Intel® MicroSATA SSD

C42-SATA (w/o Drive)

Block Diagram

Simplified Block Diagram
C42-SATA
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High Speed
Mezzanine
Connector

P-MEZ

SATA1

Micro SATA
Receptacle

1.8-Inch
SATA
Solid State Drive
SSD

Component Assembly

C42-SATA
Mounting Shell

EKF Part No. 710.9.HDD_18.2 • Drawing No. 4459

1.8-Inch
SATA
Solid State Drive

© EKF

C42-SATA
Mounting Shell

LPC/USB/AUDIO

PCI Express x 4

EKF Part No. 710.9.HDD_18.2 • Drawing No. 4459

C42-SATA
Mezzanine
Option

1.8-Inch
SATA
Solid State Drive

© EKF

CPU
Carrier
Board

SDVO-2
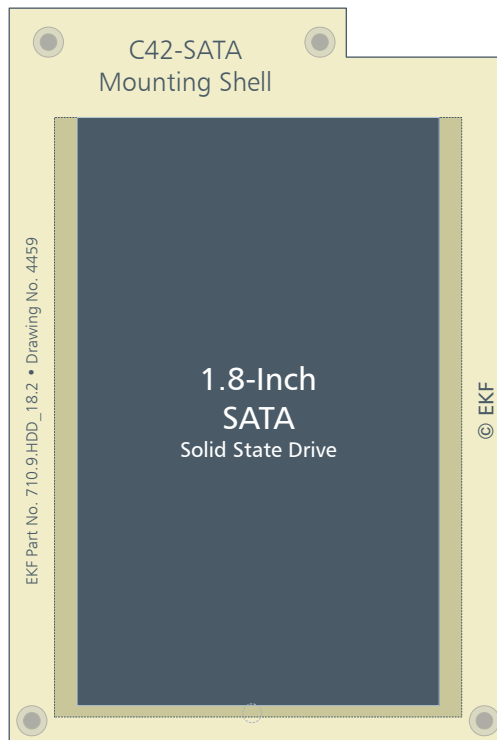
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C42-SATA Top View

C42-SATA Bottom View

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 any telecommunication links, networks or procedures described in this chapter. Failure links before you open the system or perform or equipment damage. Some parts of the the power switch is in its off state. the system from its power source and from modems before performing any of the to disconnect power, or telecommunication any procedures can result in personal injury system can continue to operate even though

Caution

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

C42-SATA over the PC1-GROOVE CPU Carier Card

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

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 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

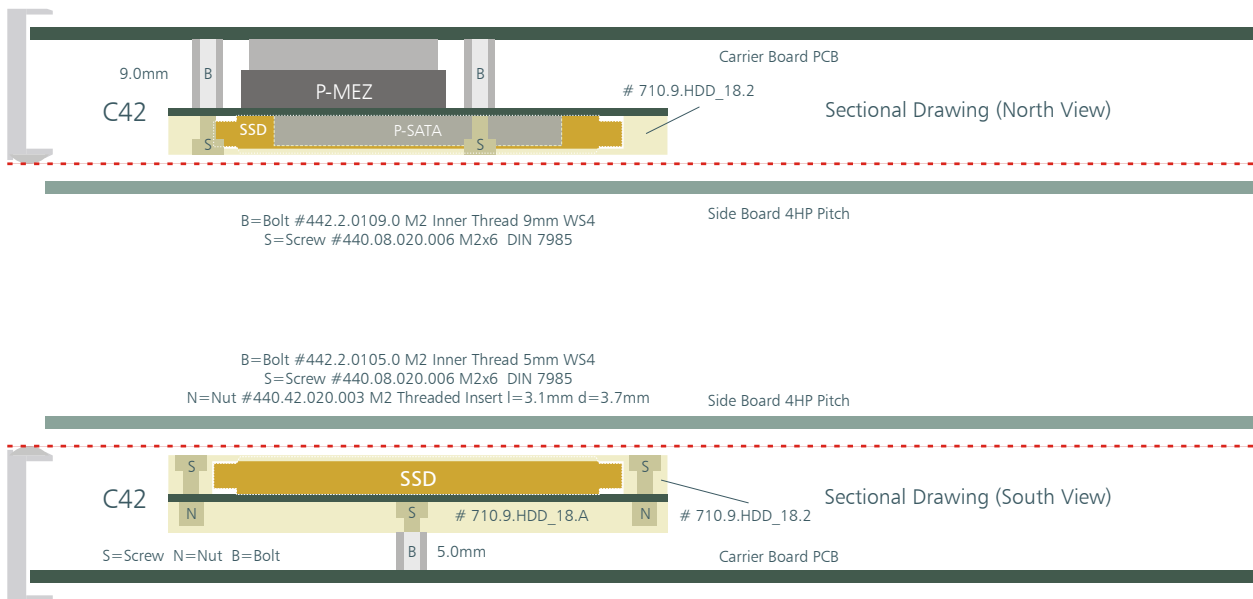- Some connectors may require additional isolating parts

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.

Sectional Drawing (North View)

B=Bolt #442.2.0109.0 M2 Inner Thread 9mm WS4
S=Screw #440.08.020.006 M2x6 DIN 7985

B=Bolt #442.2.0105.0 M2 Inner Thread 5mm WS4
S=Screw #440.08.020.006 M2x6 DIN 7985
N=Nut #440.42.020.003 M2 Threaded Insert l=3.1mm d=3.7mm

Sectional Drawing (South View)

P-SATA1 (Micro SATA Receptacle)

The C42-SATA can accommodate any 1.8-inch SATA standard form factor drive according to the SFF-8144 specification, which results in a 5.0 mm maximum height, and 78.5mm x 54.0mm dimensions. The Micro SATA connector in use is defined in Serial ATA Rev. 2.6. Devices with 8.0mm height (probably only hard disk) could be used on the C42-SATA, but require additional headroom (4HP envelope for the assembly not maintained in this case).

A mounting frame is used to hold the drive in its position, for extremely rugged applications.

P-SATA1 • Micro SATA Docking Connector 7+9 • 256.016.10.01	
S1	GND
S2	TX+ SATA1
S3	TX- SATA1
S4	GND
S5	RX- SATA1
S6	RX+ SATA1
S7	GND
P1	+3.3V
P2	+3.3V
P3	GND
P4	GND
P5	+5V
P6	+5V
P7	DAS (R to GND)
P8	NC
P9	NC

Signal designations RX/TX assigned with respect to the SATA host controller (ICH Southbridge). Typical Micro SATA SSD devices are powered from a single +3.3V rail. Power is supplied (and switched on/off according to Sx state) from the CPU carrier board, across the C42-SATA mezzanine connector P-MEZ.

Note: Do not confuse the Micro SATA connector specified by Serial ATA Rev. 2.6 with the proprietary 'Special SATA' connector as defined by Samsung (refer to *Samsung 1.8" Form Factor Proposal*).

P-MEZ

The C42-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 C42-SATA and establishes the data path and power link to the carrier board CPU. Since the C42-SATA comes typically mounted as a unit together with the CCM-BOOGIE, 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 C42-SATA.

The connector P-MEZ is a 1mm height shielded male pin header. Its counterpart on the CPU carrier board is a 8mm height receptacle, 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	b2	a2	SATA1_TXP
	SATA3_TXN	b3	a3	SATA1_TXN
	GND	b4	a4	GND
	SATA3_RXN	b5	a5	SATA1_RXN
	SATA3_RXP	b6	a6	SATA1_RXP
	GND	b7	a7	GND
	SATA4_TXP	b8	a8	SATA2_TXP
	SATA4_TXN	b9	a9	SATA2_TXN
	GND	b10	a10	GND
	SATA4_RXN	b11	a11	SATA2_RXN
	SATA4_RXP	b12	a12	SATA2_RXP
	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
	USB4_N	b18	a18	USB2_N
	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
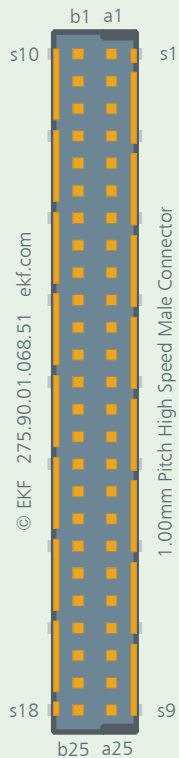
1) 2)   Switched voltages from carrier board, according to CPU sleep state S0

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)

C42-SATA on the PCS-BALLET Side Card

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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C42-SATA as an Option on the SP2-LUTE Wireless Card
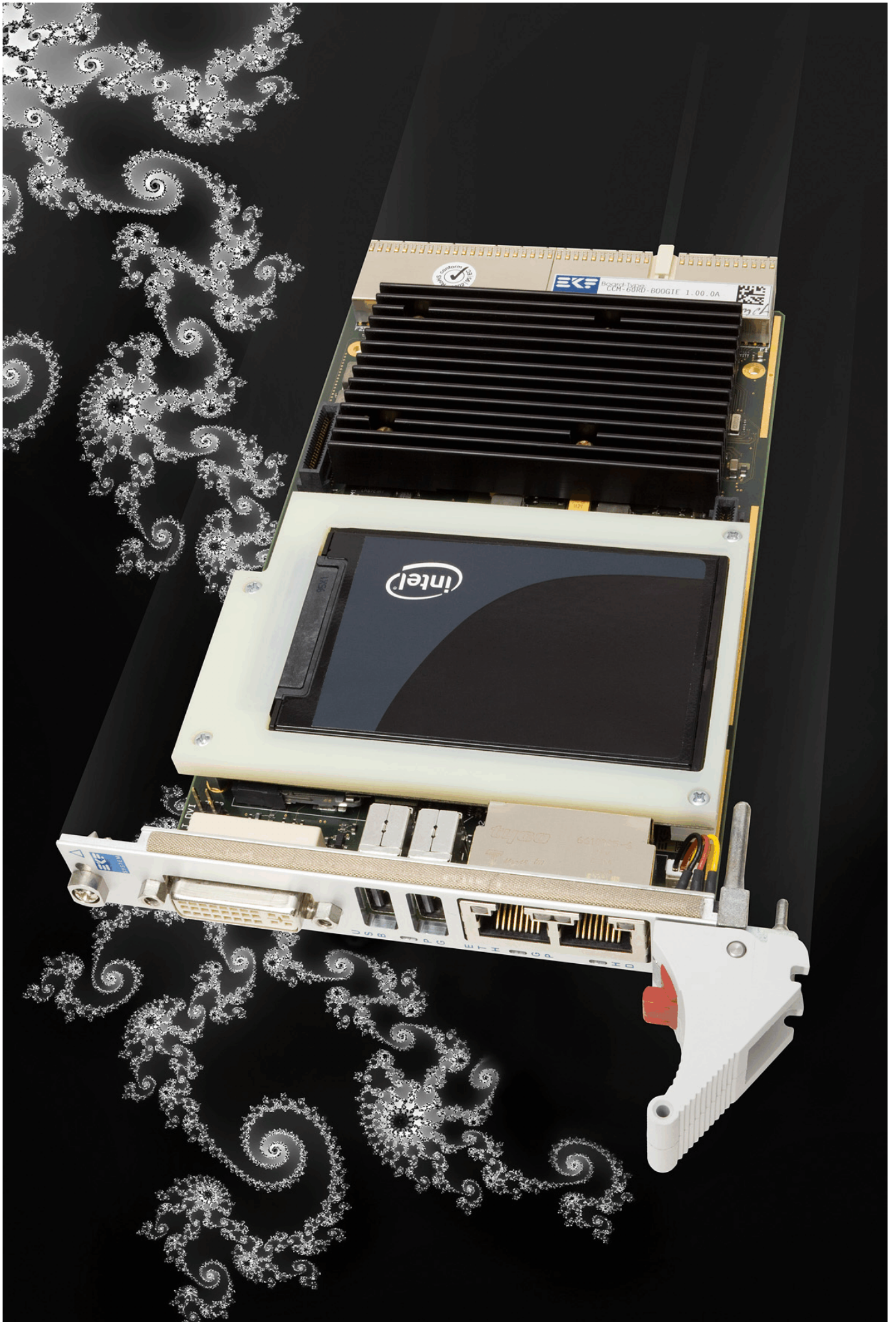
Industrial Computers Made in Germany
boards.   systems.   solutions.