SYSTEM

Product Information

SC4-CONCERTO • CompactPCI® Serial CPU Card

Intel® Mobile Workstation Processor
6th Generation XEON® E3 v5 Family (Skylake)

Document No. 8250 • 28 September 2020

General

The SC4-CONCERTO is a rich featured high performance 4HP/3U CompactPCI® Serial CPU board, equipped with an Intel® Xeon® E3 familiy mobile workstation processor (Skylake Halo platform) for demanding applications. For scalability, the SC4-CONCERTO is also available with a 6th Generation Intel® Core™ Skylake processor.

The SC4-CONCERTO front panel is provided with two Gigabit Ethernet jacks, two USB 3.0 receptacles, and two DisplayPort connectors. In addition, up to two USB Type-C front panel receptacles are available as an option, one of them usable alternatively as (third) DisplayPort.

On-board mass-storage solutions are based on low profile mezzanine expansion cards, which accommodate up to two M.2 style SSD modules. One of the M.2 sockets is suitable for a fast NVMe (PCIe Gen3 x 4) module, and the other for a low cost SATA type M.2.

The SC4-CONCERTO is equipped with up to 32GB DDR4 RAM with ECC support. Up to 16GB memory-down are provided for rugged applications, and another 16GB are available via the DDR4 ECC SO-DIMM socket.

The powerful Xeon® E3-1500 v5 series processor is accompanied by the CM238 mobile PCH, for a maximum of high speed I/O resources (e.g. PCI Express®, SATA, USB). Thus, 22 PCIe lanes are available for backplane use, and up to 8 lanes for local mezzanine expansion.

The SC4-CONCERTO is provided with an on-board SATA hardware RAID controller, enabling high-capacity mass storage solutions across the CompactPCI® Serial backplane.

As an option, up to eight Gigabit Ethernet Ports are available via the backplane connector P6 (S80-P6 low profile mezzanine expansion card).

Feature Summary

General

- PICMG® CompactPCI® Serial (CPCI-S.0) CPU card
- Form factor single size Eurocard (board dimensions 100x160mm^2)
- Mounting height 3U
- Front panel width 4HP (8HP/12HP assembly with optional mezzanine side card)
- Front panel I/O connectors for typical system configuration (2 x USB3, 2 x DisplayPort, 2 x GbE)
- Backplane communication via PCI Express® Gen3, SATA 6G, USB 3.0, Gigabit Ethernet
- Local mezzanine expansion option, COTS and custom specific boards

Processor

- Intel® Skylake-H mobile platform with ECC (CM238 mobile workstation PCH)

- Intel® Xeon® processor E3 v5 family (mobile workstation)
- Xeon E3 1505M v5 ▪ 2.8/3.7GHz ▪ 8M ▪ 4C/8T ▪ DDR4 2133 ECC ▪ 45/35W ▪ GT2 ▪ vPRO™/AMT
- Xeon E3 1505L v5 ▪ 2.0/2.8GHz ▪ 8M ▪ 4C/8T ▪ DDR4 2133 ECC ▪ 25W ▪ GT2 ▪ vPRO™/AMT

- 6th Generation Intel® Core™ mobile processor
- i3 6100E ▪ 2.7GHz ▪ 3M ▪ 2C/4T ▪ DDR4 2133 ECC ▪ 35W ▪ GT2
- i3 6102E ▪ 1.9GHz ▪ 3M ▪ 2C/4T ▪ DDR4 2133 ECC ▪ 25W ▪ GT2
- G3900E ▪ tbd GHz ▪ 2M ▪ 2C/2T ▪ DDR4 2133 ECC ▪ 35W ▪ GT1
- G3902E ▪ tbd GHz ▪ 2M ▪ 2C/2T ▪ DDR4 2133 ECC ▪ 25W ▪ GT1

Firmware

- Phoenix® UEFI (Unified Extensible Firmware Interface) with CSM*
- Fully customizable by EKF
- Secure Boot and Measured Boot supported - meeting all demands as specified by Microsoft®
- Windows®, Linux and other (RT)OS' supported
- Intel® AMT supported for Intel® Xeon® E3 v5 (disabled by default, must be enabled via BIOS setup)

** CSM (Compatibility Support Module) emulates a legacy BIOS environment, which allows to boot a legacy operating system such as DOS, 32-bit Windows and some RTOS'*

Main Memory

- Integrated memory controller up to 32GB DDR4 2133 +ECC
- DDR4 +ECC soldered memory up to 16GB
- DDR4 +ECC SO-DIMM memory module socket up to 16GB

Feature Summary

Performance Rating

- tbd

Graphics

- Integrated graphics engine, 3 symmetric independent displays
- 3D HW acceleration DirectX12, OpenCL 2.x, OpenGL 4.3/4.4, ES 2.0
- HW video decode/encode HEVC, VP9, JPEG
- HDR (High Dynamic Range) Rec. 709
- Content protection
- Front panel options: Dual DisplayPort (DP) connectors
- 3rd DisplayPort optional via Type-C connector on low profile mezzanine card
- Max resolution 4096 x 2304 @60Hz (any DisplayPort, concurrent operation)
- DisplayPort™ 1.2 Multi-Stream Transport (MST) - display daisy chaining
- MST max resolution via single DP connector 2880x1800@60Hz (2 displays), 2304x1440@60Hz (3 displays)
- Integrated audio (3 independent audio streams)

Networking

- Up to 10 networking interfaces in total - 2 x front RJ45 GbE, option 8 x backplane or 4 x M12-X front
- 1000BASE-T, 100BASE-TX, 10BASE-T connections
- Front port 1 - I219LM with Intel® AMT support
- Front port 2 - Intel® I210-IT -40°C to +85°C operating temperature GbE NIC w. integrated PHY
- IPv4/IPv6 checksum offload, 9.5KB Jumbo Frame support, EEE Energy Efficient Ethernet
- IEEE 802.1Qav Audio-Video-Bridging (AVB) enhancements for time-sensivitive streams
- IEEE 1588 and 802.1AS packets hardware-based time stamping for high-precision time synchronization
- Backplane Gigabit Ethernet option w. S80-P6 mezzanine module - I210-IT NIC & Marvell Peridot switch
- Option front panel M12 X-coded GbE ports with SCL-RHYTHM side card (8HP front panel width)

Chipset

- Intel® CM238 Mobile Workstation Platform Controller Hub (PCH)
- PCIe Gen3 8GT/s
- SATA 6G
- USB3
- GbE
- LPC, Audio, Legacy

Feature Summary

On-Board Building Blocks

- Additional on-board devices, PCIe® based
- 1 x Gigabit Ethernet controller Intel® I210IT
- 1 x Gigabit Ethernet PHY Intel® I219LM
- IEEE 1588-2008 Precision Time Protocol including PPS and PPM signals supported
- SATA 6G RAID controller Marvell® 88SE9230, ARM powered subsystem for host CPU offload

Security

- Trusted Platform Module
- TPM 2.0 for highest level of certified platform protection
- Infineon Optiga™ SLB 9665 cryptographic processor
- Conforming to TCG 2.0 specification
- AES hardware acceleration support (Intel® AES-NI)

Front Panel I/O (4HP)

- 2 x Gigabit Ethernet RJ45 (1 = PCH & I219LM - Intel® AMT support, 2 = I210IT)
- 2 x DisplayPort (from processor integrated HD graphics engine, standard DP latching receptacles)
- 2 x USB 3.0
- Option 2 x Type-C USB 3.1 Gen1 (requires low profile mezzanine expansion card w. front panel I/O)
- Support for Type-C locking plugs (dual screw) according to the 'Locking Connector Spec. Rev. 1.0'
- Option DisplayPort Alt Mode on lower Type-C connector (3rd video monitor output)

CompactPCI® Serial Backplane Resources

- PICMG® CPCI-S.0 CPU card & system slot controller
- 16 x PCIe Gen3 8GT/s (2 links x 8 for two fat pipe slots, derived directly from the Xeon® or Core™ CPU)
- 6 x PCIe Gen3 8GT/s (6 links x 1 for peripheral slots, derived from CM238 PCH)
- 2 x SATA 6G (from CM238 PCH)
- 4 x SATA 6G (Marvell hardware RAID controller)
- 5 x USB2, 3 x USB3 (from CM238 PCH)
- Option 8 x Gigabit Ethernet (Marvell 88E6390 GbE switch, requires low profile mezzanine expansion card)

Feature Summary

Local Expansion & Mezzanine Mass Storage Options

- Mezzanine side card connectors for optional local expansion
- Low profile mezzanine modules available (4HP front panel) and also side cards (8HP F/P assembly)
- P-EXP - Legacy interface (from PCH)
- P-HSE1 - configurable as 4 x SATA 6G or 4 x PCIe (from CM238 PCH), 1 x USB3
- P-HSE2 - 4 x PCIe (from CM238 PCH) & 3rd DisplayPort (from CPU)

- 4HP Low profile mezzanine module preferred options:
- C47-MSATA Mezzanine module - 2 x mSATA SSD sockets
- C48-M2 Mezzanine module - 2 x M.2 2280 SATA SSD sockets
- S20-NVME Mezzanine module - 1 x M.2 2280 NVME SSD socket, 1 x Type-C USB F/P connector
- S40-NVME Mezzanine module - 1 x M.2 2280 NVME SSD socket, 1 x M.2 2280 SATA SSD socket, 2 x Type-C USB F/P Connector (1 connector enabled for DisplayPort alternate mode)
- S80-P6 Mezzanine module - 1 x M.2 2280 NVMe SSD socket, 8 x Gigabit Ethernet via P6 backplane connector (TSN/AVB switch based solution)
- Custom specific storage & I/O module design

- 8HP/12HP Mezzanine side card options:
- SCL-RHYTHM Quad port GbE NIC, front panel M12 X-coded receptacles, dual M.2 (NVMe/SATA) SSD
- SCZ-NVM Dual M.2 NVMe SSD, quad UART
- Custom specific side card design - I/O and storage

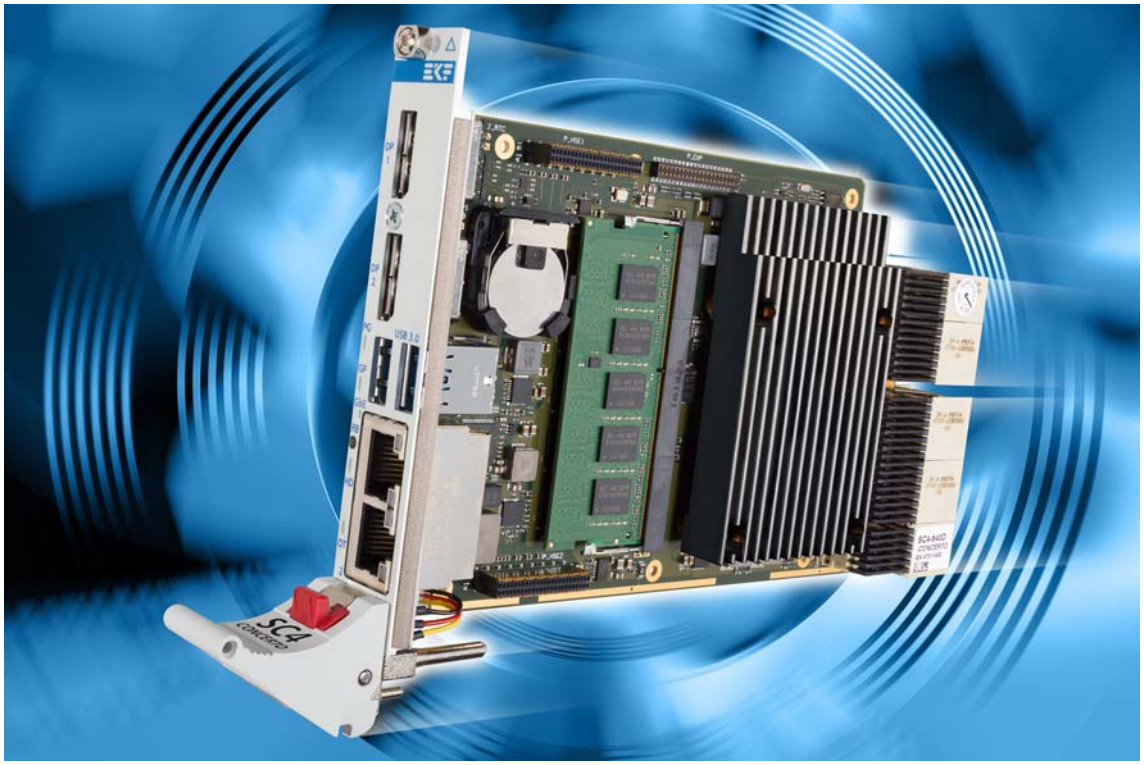
Environmental & Regulatory

- Suitable e.g. for industrial, transportation & instrumentation applications
- Designed & manufactured in Germany
- ISO 9001 certified quality management
- Long term availability
- Rugged solution
- Coating, sealing, underfilling on request
- Lifetime application support
- RoHS compliant
- Operating temperature 0°C to +70°C
- Operating temperature -40°C to +85°C (industrial temperature range) on request
- Storage temperature -40°C to +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
- MTBF 21.2 years
- EC Regulatory EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1)

Feature Summary

RT OS Board Support Packages & Driver

- LynxOS - on request
- On Time RTOS-32 - on request
- OS-9 - on request
- QNX 4.x, 6.x - on request
- Real-Time Linux (RT Patch) - on request
- RTX - on request
- VxWorks 5.5 & 6.9 - on request
- VxWorks 7.0 - on request
- Others - on request

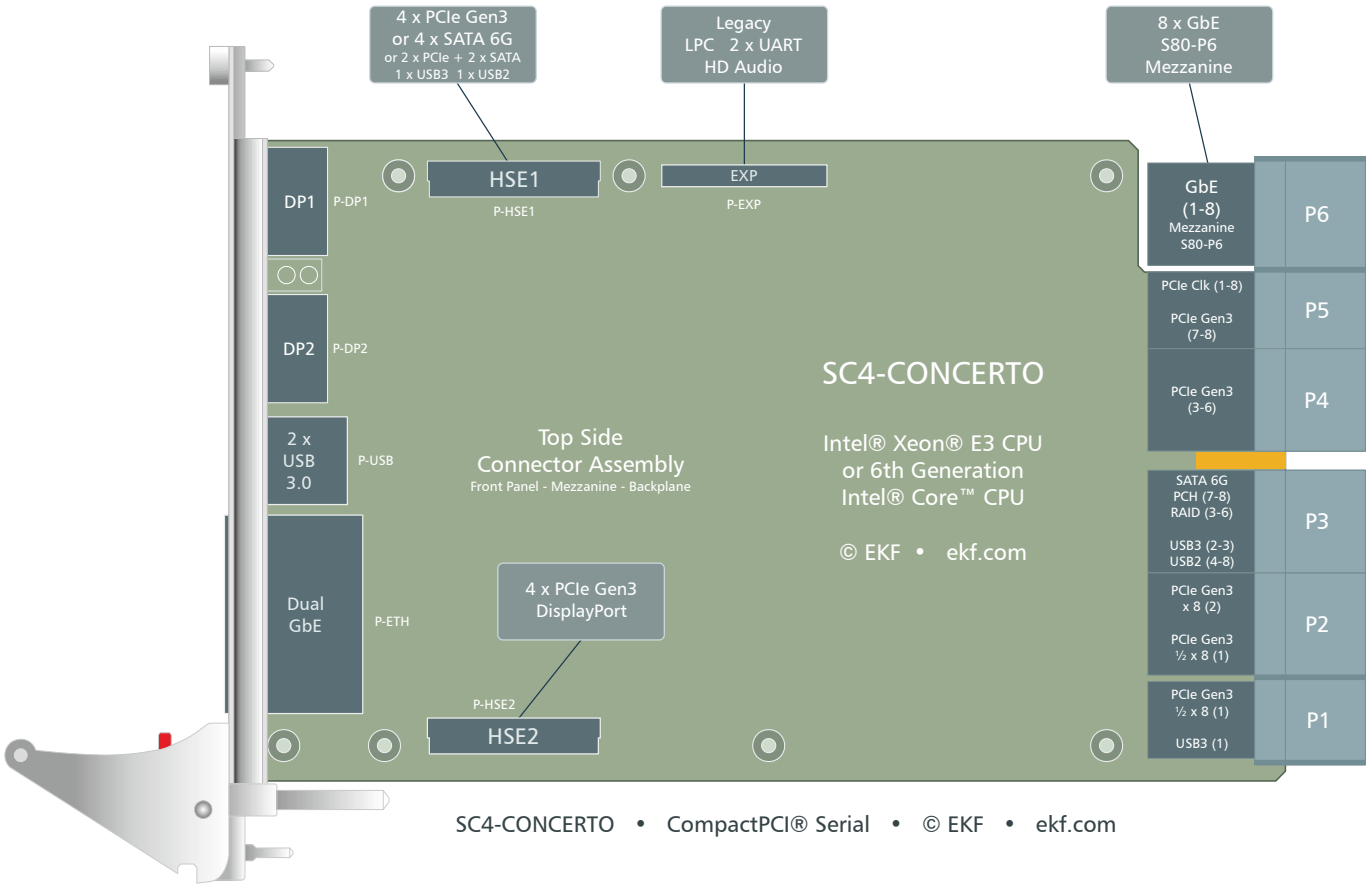


CompactPCI® Serial

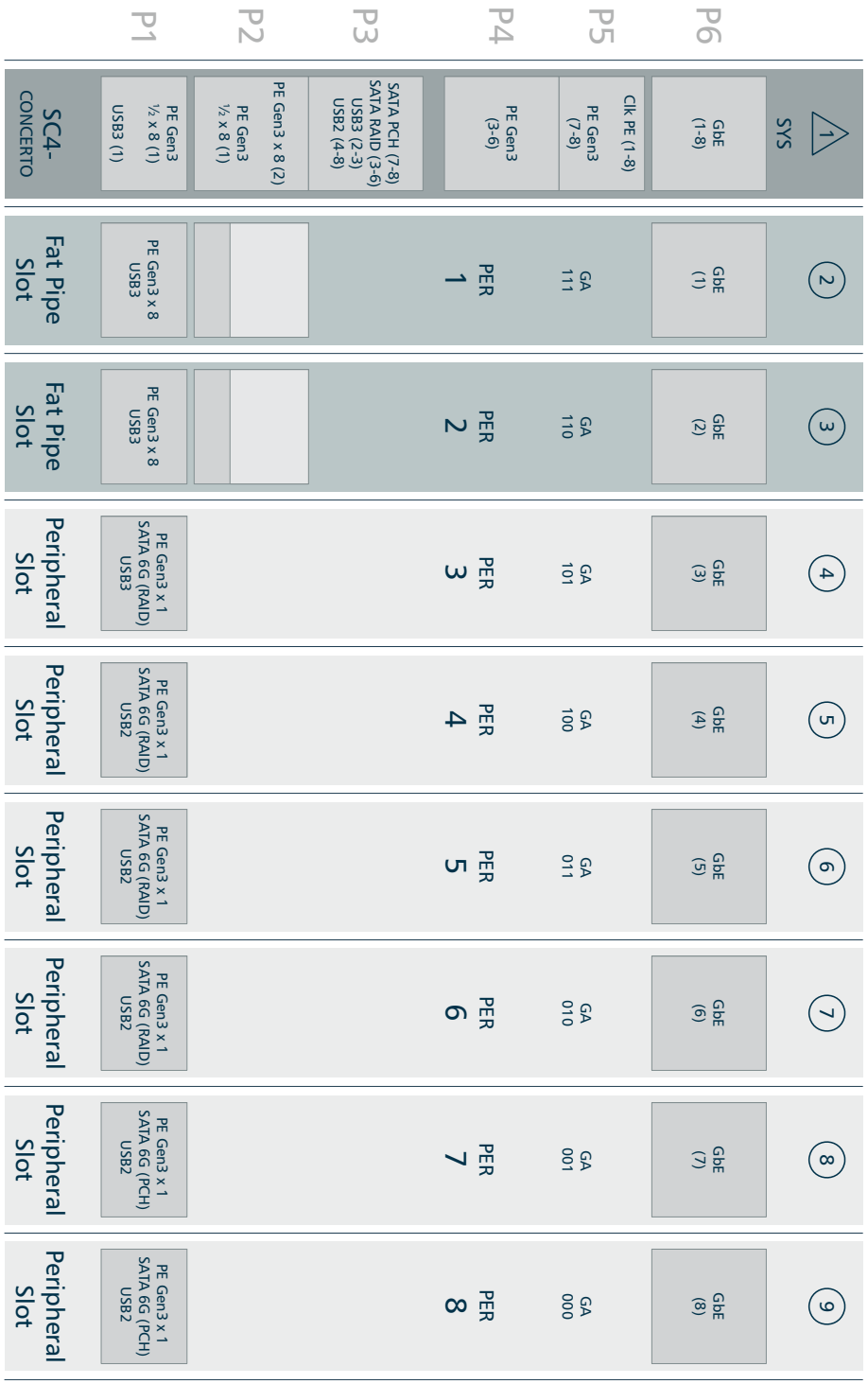
While mechanically compliant to CompactPCI® Classic, CompactPCI® Serial (PICMG® CPCIS.0) defines a completely new card slot, based on PCI Express®, SATA, Gigabit Ethernet and USB serial data lines. Up to 6 high-speed backplane connectors P1 - P6 are provided on a system slot controller such as the SC4-CONCERTO, which can be considered as a root hub with respect to most signal lines. A passive backplane is used for distribution of a defined subset of I/O channels from the system slot to each of up to eight peripheral slots in a CompactPCI® Serial system.

Most CompactPCI® Serial peripheral slot cards require only the backplane connector P1, which comprises PCIe, SATA and USB signals, resulting in a concise and inexpensive peripheral board design. More powerful peripheral cards profit from two so called Fat Pipe slots (PCIe x 8).

The SC4-CONCERTO is a native CompactPCI® Serial CPU card, suitable for usage in a pure CPCI Serial environment. Due to its generous backplane capabilities (22 x PCI Express® Gen3, 8 x USB, 6 x SATA/RAID 6G, 8 x GbE), very powerful industrial systems can be built.



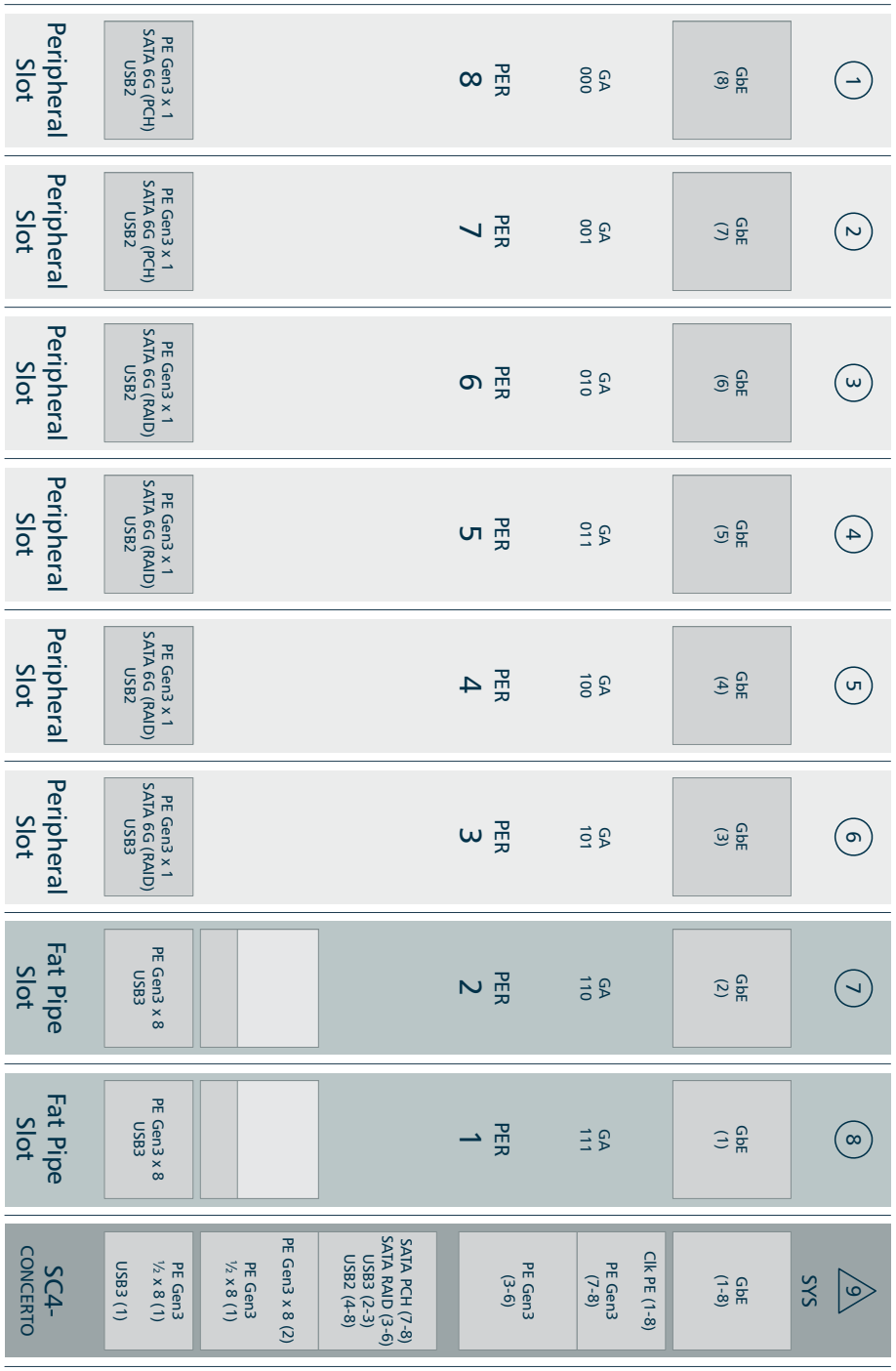
SC4-CONCERTO Connector Suite



Backplane Resources SC4-CONCERTO (System Slot Right Aligned)

www.ekf.com/s/sc4/img/sc4_backplane.pdf

For backplanes with a lower number of peripheral card slots (PER#), resources shown above get lost on missing slots. Not so however regarding SATA - these channels move towards the SC4-CONCERTO system slot. A backplane with six peripheral slots e.g. would provide SATA (RAID) on both fat pipe peripheral slots.



Backplane Resources SC4-CONCERTO (System Slot Left Aligned)

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Local Expansion

The SC4-CONCERTO is equipped with a set of high-speed local expansion interface connectors, which can be optionally used to attach either a low profile mezzanine module (fits into the 4HP front panel envelope) or a side board for an 8HP or even 12HP assembly in total.

The connectors HSE1 and HSE2 are high speed connectors, as required for PCI Express® Gen3 and SATA 6G. The socket EXP is used as a legacy interface (e.g. HD Audio, LPC) and not required for many mezzanine modules. All connectors allow board-to-board heights of 9.5mm (C4* series), 10.0mm (S20, S40), 10.8mm (S60, S80), and 18.7mm (SC* side cards 8HP assembly).

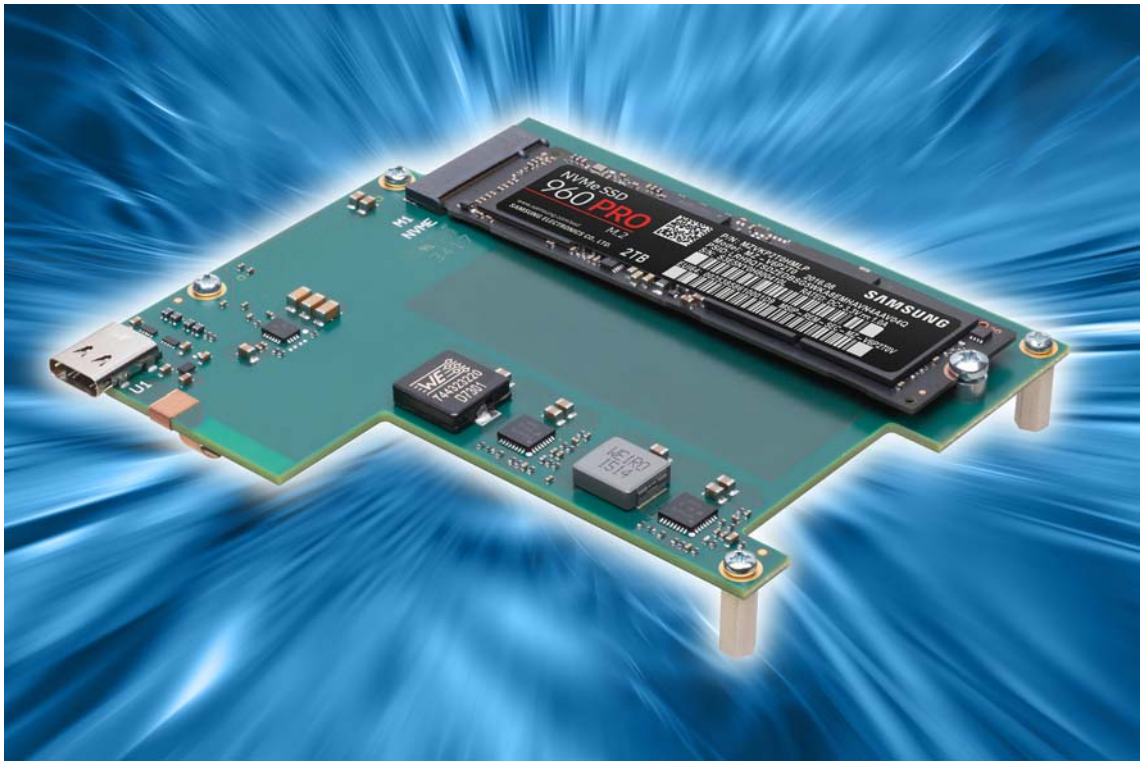
HSE1 can be configured for either 4 x PCIe *or* 4 x SATA, or 2 x PCIe *and* 2 x SATA, thanks to the flexible HSIO channels of the CM238 PCH. When HSE1 has been setup for SATA, the SC4-CONCERTO can be combined e.g. with low cost SSD mass storage mezzanine modules such as the C47-MSATA (dual mSATA carrier) or C48-M2 (dual M.2 SATA sockets). For high performance NVMe based SSD mezzanine modules (S20/40/80), HSE1 must be configured as PCIe x 4.

HSE2 is assigned to 4 x PCIe, and in addition the 3rd DisplayPort video output. While S20 and S60 get along with HSE1 only, the S40 and S80 mezzanine modules depend on both HSE1 and HSE2, for additional I/O.

C48-M2 Mezzanine Module

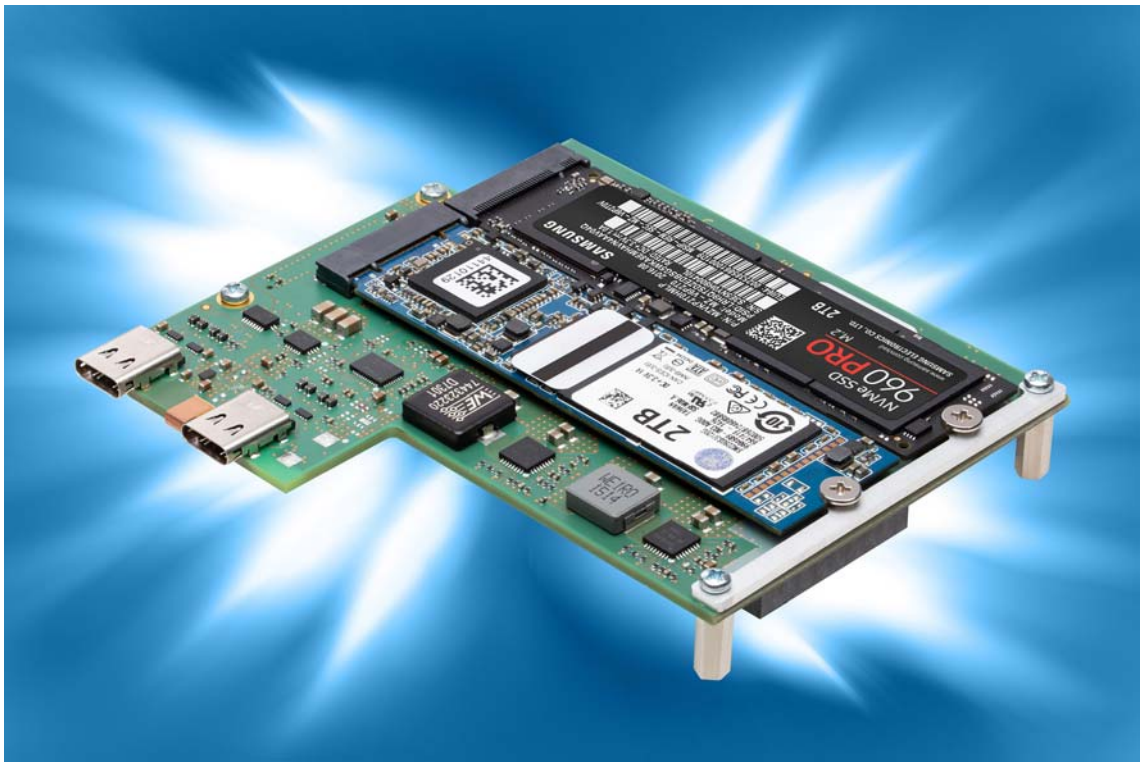
Related Information Mezzanine Connectors

www.ekf.com/s/sc4/new_mezzanine_connectors.pdf

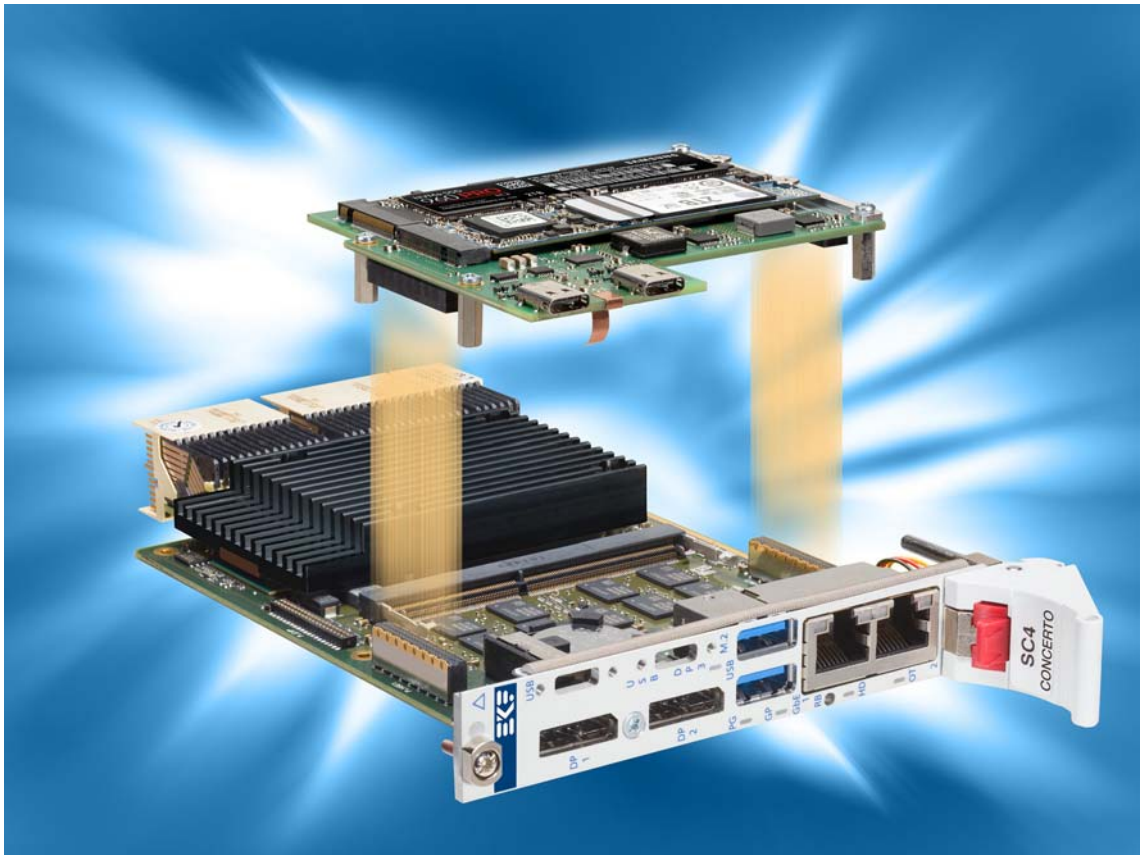


S20-NVME Mezzanine Module

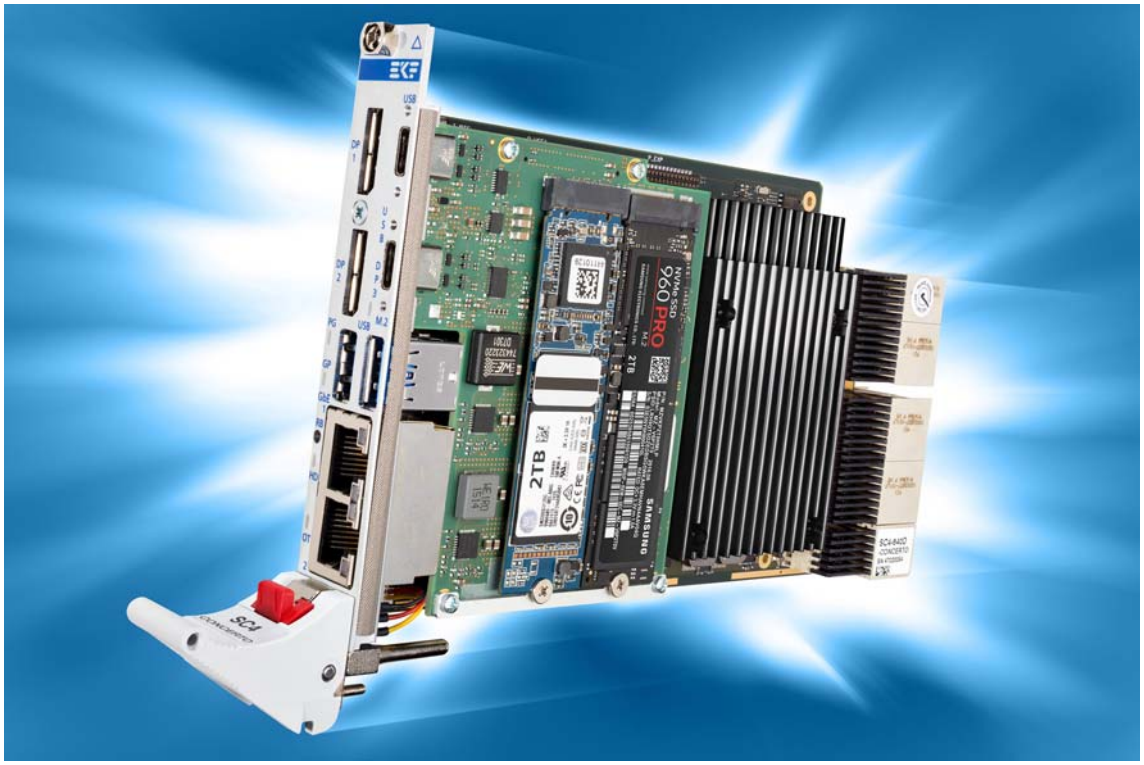
SC4-CONCERTO w. S20-NVME

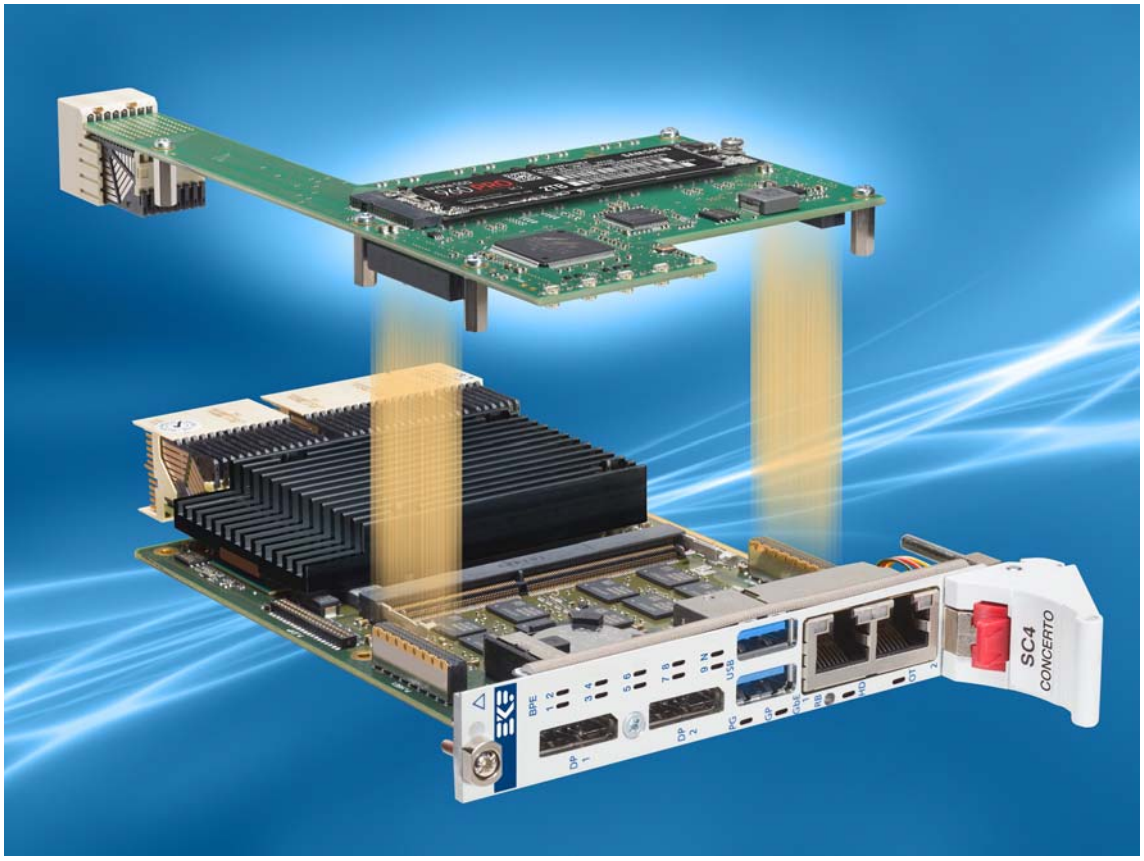


S40-NVME Mezzanine Module



SC4-CONCERTO w. S40-NVME

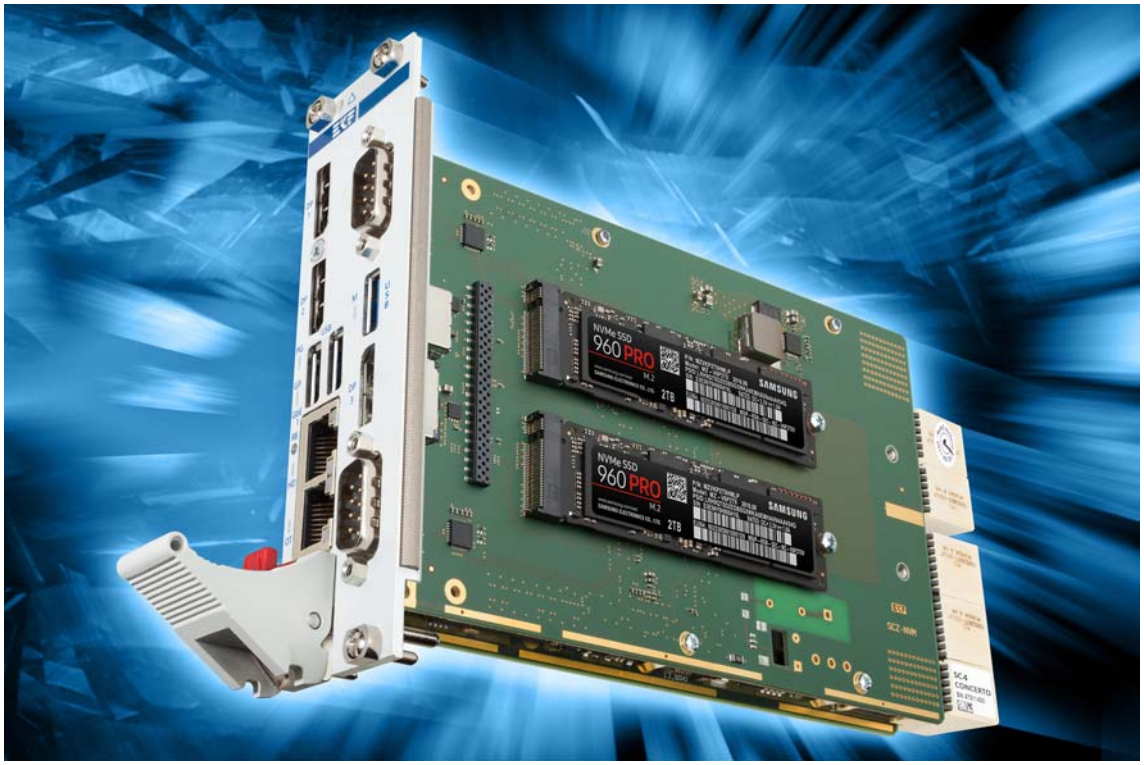




S80-P6 Mezzanine Module

SC4-CONCERTO w. S80-P6

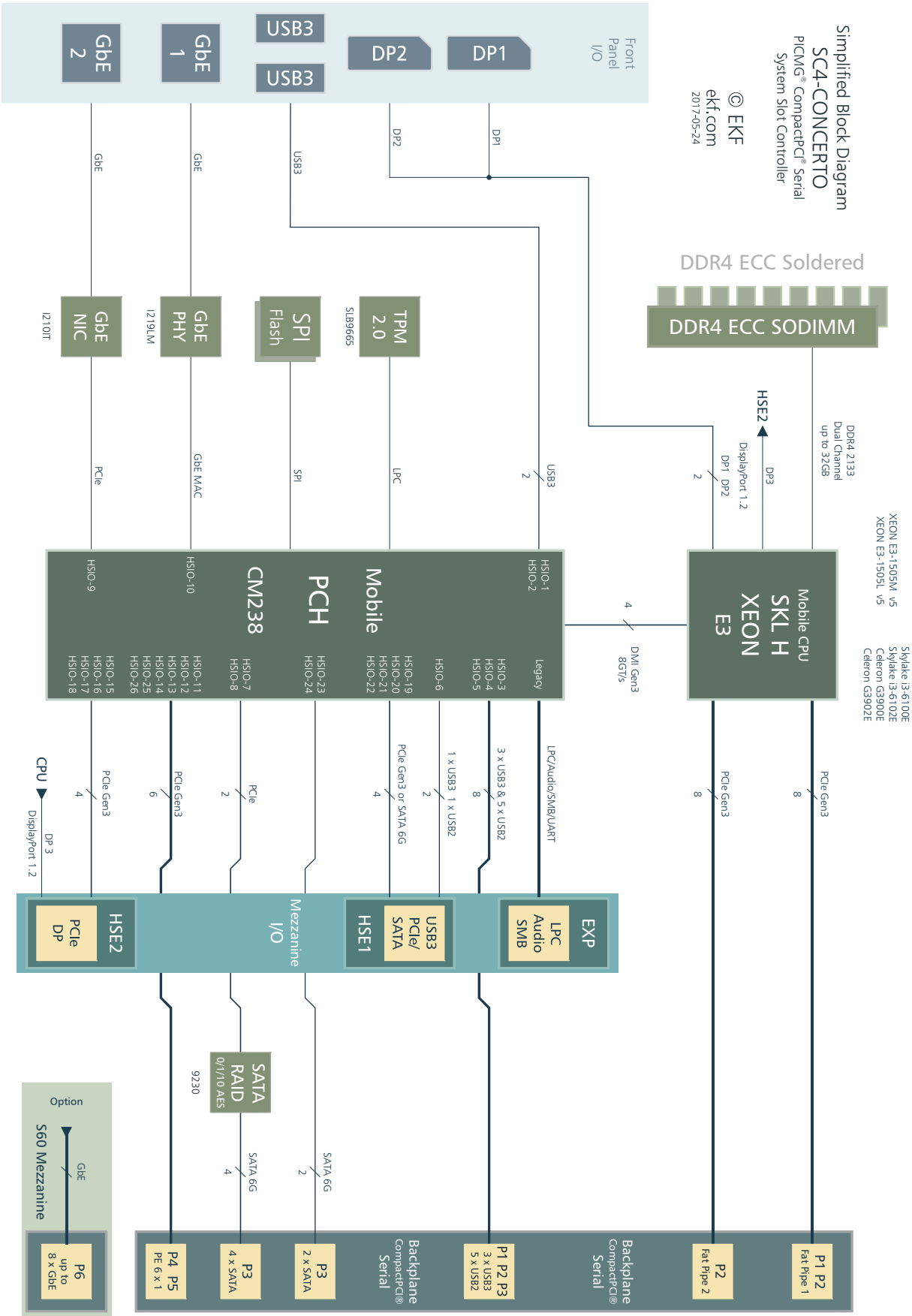
8HP Assembly SC4-CONCERTO w. SCL-RHYTHM Side Card



8HP Assembly SC4-CONCERTO w. SCZ-NVM Side Card

12HP Assembly

Block Diagram



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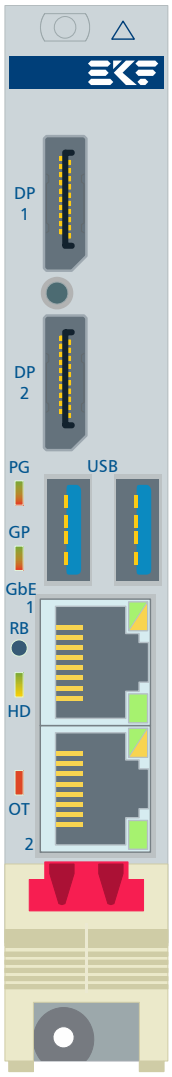
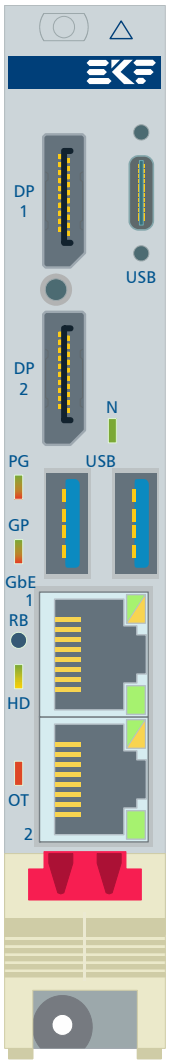
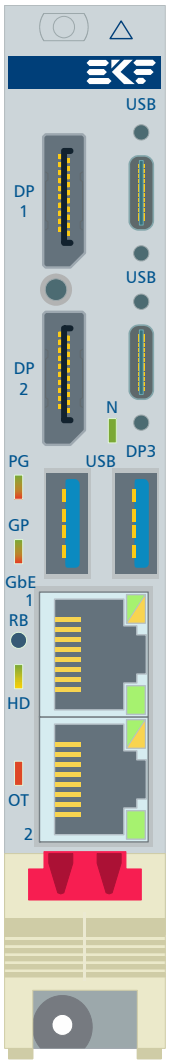
Front Panel Options



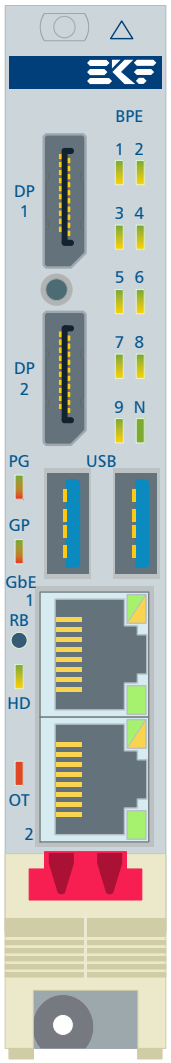
SC4-CONCERTO



SC4-CONCERTO w. S20

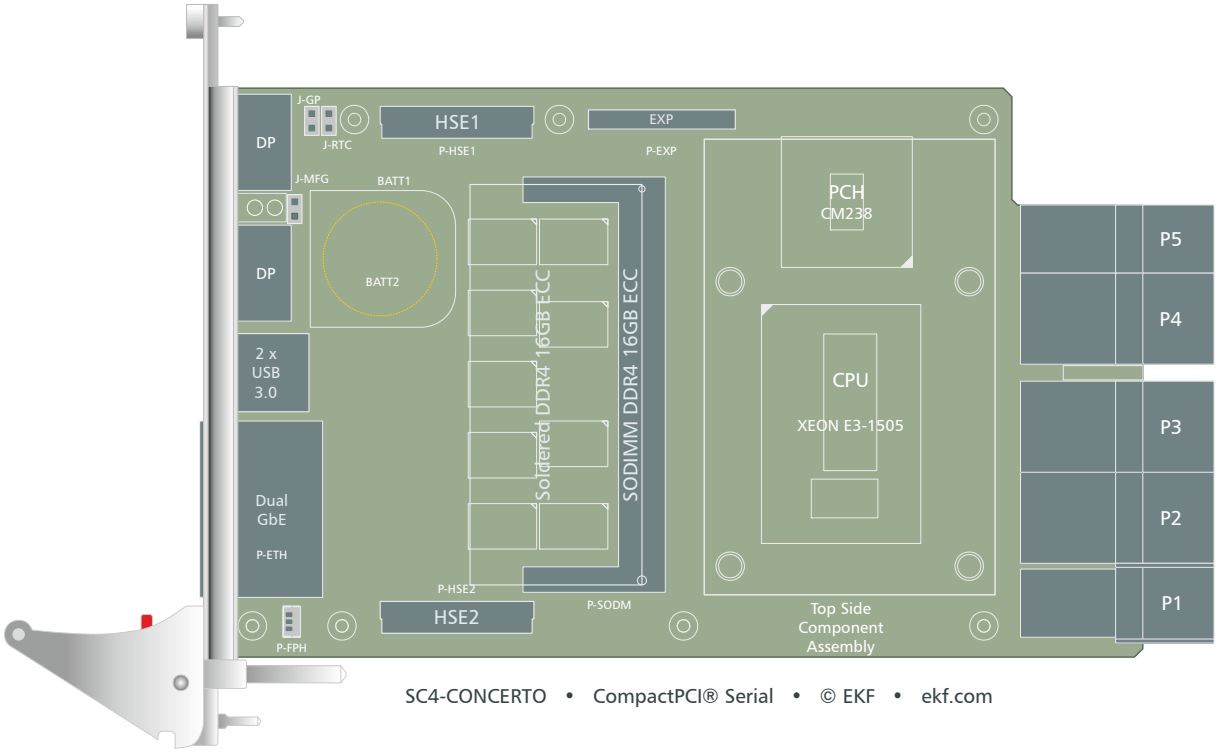


SC4-CONCERTO w. S40



SC4-CONCERTO w. S80

Component Orientation



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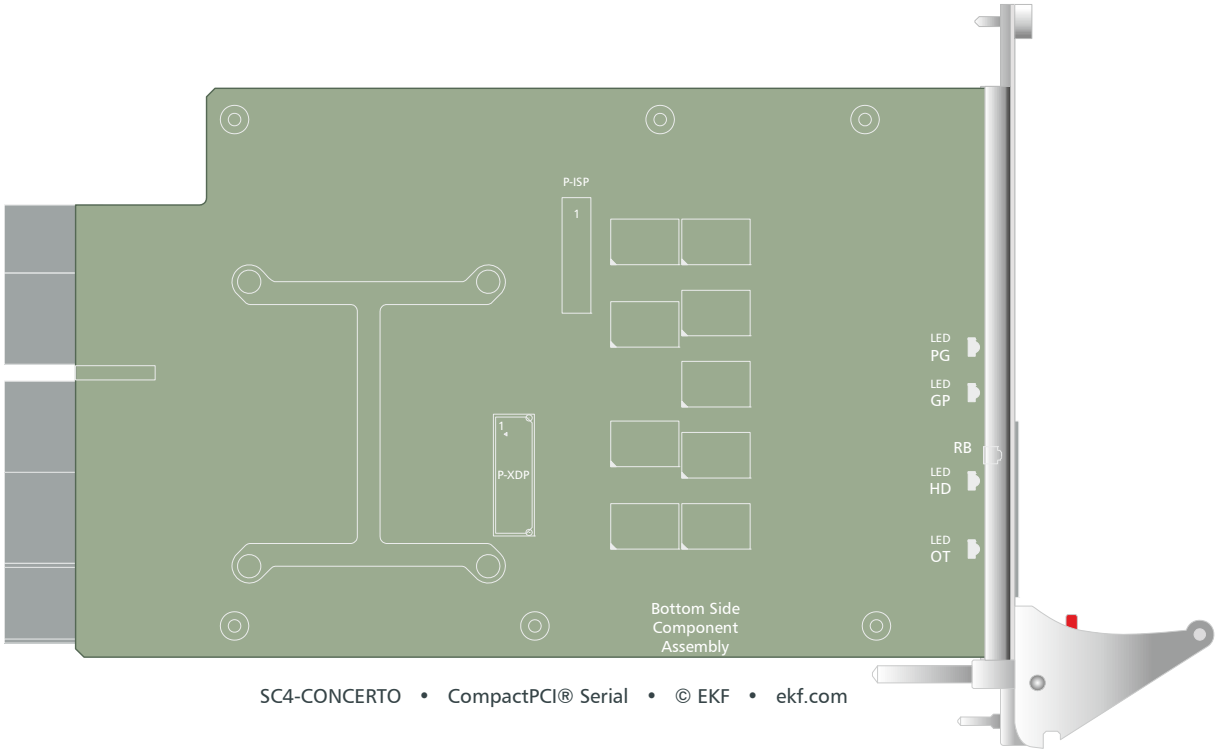

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Related Information	
SC4-CONCERTO Home	www.ekf.com/s/sc4/sc4.html
SC4-CONCERTO User Guide	www.ekf.com/s/sc4/sc4_ug.pdf
S20-NVME Low Profile Mezzanine	www.ekf.com/s/s20/s20.html
S40-NVME Low Profile Mezzanine	www.ekf.com/s/s40/s40.html
S80-P6 Low Profile Mezzanine	www.ekf.com/s/s80/s80.html
S82-P6 Low Profile Mezzanine	www.ekf.com/s/s82/s82.html
SCL-RHYTHM Mezzanine Side Card	www.ekf.com/s/scl/scl.html
SCZ-NVM Mezzanine Side Card	www.ekf.com/s/scz/scz.html
New Mezzanine Connectors	www.ekf.com/s/sc4/new_mezzanine_connectors.pdf

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CompactPCI® Serial Concise Overview	www.ekf.com/s/serial_concise.pdf
CompactPCI® Serial All You Need to Know	www.ekf.com/s/smart_solution.pdf
CompactPCI® Serial Home	www.ekf.com/s/serial.html

Ordering Information
For popular SC4-CONCERTO SKUs please refer to www.ekf.com/liste/liste_21.html#SC4
For new mezzanine connector based low profile modules please refer to www.ekf.com/liste/liste_21.html#S20
For SATA based low profile mezzanine modules please refer to www.ekf.com/liste/liste_20.html#C40

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