Product Information

PC8-FLUTE • CompactPCI® PlusIO • CPU Card

Intel® Atom™ x6000 Series Processor • Elkhart Lake SoC

Preliminary Edition

General

The PC8-FLUTE is a low power CompactPCI® PlusIO CPU board, based on an Intel® Atom™ x6000RE (Elkhart Lake Industrial) System-on-Chip processor. The front panel is provided with three 2.5Gbps RJ45 Ethernet jacks, and three Type-C USB3/DisplayPort connectors. The board is equipped with 16GB directly soldered DDR4 IBECC RAM, and in addition a DDR4 SODIMM socket for another 16GB.

High speed PCIe® x4 SSD mass storage is available via low profile mezzanine modules (4HP assembly), or multi-function side cards (8HP). The PC8-FLUTE backplane connectors comply with the CompactPCI® PlusIO specification, suitable for system expansion with classic CompactPCI® peripheral cards via J1, and in addition high speed I/O such as PCI Express® lanes and 2.5GBASE-T across J2.

Feature Summary

General

- CompactPCI® PlusIO (PICMG® CPCI 2.30) System Slot Controller
- Form factor single size Eurocard (board dimensions 100x160mm²)
- Mounting height 3U
- Front panel width 4HP (8HP/12HP assembly with optional mezzanine side card)
- Front panel I/O for versatile system configuration (3 x USB3/DisplayPort, 3 x 2.5Gbps Ethernet)
- Backplane communication via CompactPCI® PlusIO connectors
- J1 - PCI® 32bit 66MHz (PICMG® CPCI 2.0)
- J2 - PCIe®, GbE, SATA, USB (PICMG® CPCI 2.30)
- On-board PCIe® mezzanine expansion option for mass storage modules or side cards
- Side cards and low profile mass storage modules available as COTS and also as custom specific

Processor

- Intel® Atom® Industrial SoC x6000RE Series (Elkhart Lake)
- x6425RE • 4 Cores • 1.9GHz • 12W TDP • 400MHz/32EUs Gfx
- x6416RE • 4 Cores • 1.7GHz • 9W TDP • 450MHz/16EUs Gfx
- x6414RE • 4 Cores • 1.5GHz • 9W TDP • 400MHz/16EUs Gfx
- x6214RE • 2 Cores • 1.4GHz • 6W TDP • 400MHz/16EUs Gfx
- x6212RE • 2 Cores • 1.2GHz • 6W TDP • 350MHz/16EUs Gfx

all frequencies not final and subject to change

- *Intel® Atom® Embedded SoC x6000E Series (Elkhart Lake)*
- *x6425E • 4 Cores • 2.0GHz • 12W TDP • 500MHz/32EUs Gfx*
- *x6413E • 4 Cores • 1.5GHz • 9W TDP • 500MHz/16EUs Gfx*
- *x6211E • 2 Cores • 1.3GHz • 6W TDP • 350MHz/16EUs Gfx*

- *Intel® Atom® Industrial FuSa SoC x6000FE Series (Elkhart Lake)*
- *x6427FE • 4 Cores • 1.9GHz • 12W TDP • 400MHz/32EUs Gfx • FuSa*
- *x6200FE • 2 Cores • 1.0GHz • 4.5W TDP • tbd MHz/tbd EUs Gfx • FuSa*

italic grey: SKUs not plan of release

- In-band ECC
- Intel® Programmable Services Engine
- Intel® Time Coordinate Computing (Intel® TCC) and TSN
- Operating life 10 years up to 100% active
- T_a -40°C to 85°C

Feature Summary

Firmware

- Phoenix® UEFI (Unified Extensible Firmware Interface) V2.7 with CSM*
- Phoenix® SCT (SecureCore Technology) Release V4.3.0
- ACPI tbd
- Fully customizable by EKF
- Secure Boot and Measured Boot supported
- Windows®, Linux and other (RT)OS' supported

** 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 fo up to 32GB DDR4 w. IBECC, 3200MT/s
- 16GB Soldered memory for rugged applications
- 16GB SODIMM socket

Mass Storage

- 128Mbit SPI Flash (UEFI firmware and customer application data)
- PCIe® based SSD module options via P-HSE1 & P-HSE2 mezzanine connectors
- M.2 socket(s) on low profile mezzanine modules (4HP) or side cards (8HP)
- Up to 2 x M.2 NVMe SSD size 2280, PCIe x4 (P-HSE1) and PCIe x1 (P-HSE2)
- Up to 2 x 2TB as of current
- Option custom specific mezzanine mass storage board design on request

Graphics

- Intel® UHD Graphics, 4kp60 (4096x2160@60Hz) on three simultaneous displays
- 2D/3D Hardware acceleration
- H.265/HEVC Decode/Encode
- H.264 Decode/Encode
- MPEG2 Decode
- VC1/WMV9 Decode
- VP8 Decode
- VP9 Decode/Encode
- JPEG/MPEG Decode/Encode
- HDCP 2.3, PAVP
- 3 x Type-C front panel connectors (DisplayPort Alternate Mode)
- DisplayPort™ 1.4 MST (multiple displays if monitor is equipped with bridge chip)

Feature Summary

Networking

- Up to 9 Multi-Gigabit Ethernet networking interfaces in total
- 3 x 2500BASE-T RJ45 front ports via Marvell® AQR115C PHYs
- 2 x 2500BASE-T backplane J2 connector (P82-GBE low profile mezzanine module - 2 x Intel® I226-IT)
- Option 4 x 2500BASE-T RJ45 front w. SCJ-VEENA short side card - 4 x Intel® I225-IT NIC (8HP assy)
- TSN Precision time protocol (Time-Sensitive-Networking) as required for OPC UA and OpenAvnu
- Enables ultra-reliable low-latency communication (URLLC)
- Intel® Time Coordinated Computing (Intel® TCC) for time synchronisation and timeliness

EHL SoC I/O Usage

- 3 x USB Type-C front panel connectors (DP Alt Mode)
- 3 x 2.5GBASE-T SGMII PHYs to RJ45 front ports
- 4 x PCIe® Gen3 to HSE1 mezzanine connector (configurable 1x4 or 4x1 links)
- 4 x PCIe® Gen3 to HSE2 mezzanine connector (4x1 links via PCIe® switch)
- 4 x PCIe® Gen3 to backplane connector J2 (x1 links, via PCIe® switch, Gen2/3 depends on application)
- PCIe® Gen3 1:5 switch (1 x USB3 controller, 4 x HSE2 mezzanine)
- PCIe® Gen3 1:5 switch (PCI® bridge to J1 backplane connector, 4 x PCIe® to J2)
- 4 x USB2 to J2 backplane connector
- eSPI, Audio, I2C, UART, CAN-FD, Time Sync to mezzanine expansion connector N-EXP
- TPM 2.0 module

Additional Building Blocks

- Additional on-board devices, PCIe® based
- 2 x PCIe® Gen3 packet switches PI7C9X3G606GP (6-port, 6-lane)
- Dual port PCIe® USB3 controller uPD720202 (front Type-C, HSE1)
- PCIe® to PCI® bridge PI7C9X112

Security

- Trusted Platform Module
- TPM 2.0 for highest level of certified platform protection
- Infineon Optiga™ SLM9670 cryptographic processor
- Conforming to TCG 2.0 specification

- AES hardware acceleration support (Intel® AES-NI)

Feature Summary

Front Panel I/O (4HP)

- 3 x 2.5 Gigabit Ethernet RJ45 (2.5GBASE-T, 1000BASE-T, 100BASE-TX, 10BASE-Te)
- 3 x DisplayPort (Type-C Alt Mode)
- 3 x USB 3.0 Type-C (same as DP connectors)
- 1 x USB 3.0 Type-C in addition w. S48-SSD low profile mezzanine

Front Panel I/O (8HP)

- Variety of side cards available, common front panel 8HP/12HP with CPU card
- Various I/O ports e.g. UART, Audio, 2.5G Ethernet
- Custom specific front panel and side card design

CompactPCI® (J1) Backplane Compliance

- PICMG® CompactPCI® Classic 32bit 33/66MHz
- Up to seven CompactPCI®peripheral cards on a classic style or hybrid backplane

CompactPCI® PlusIO (J2) Backplane Resources

- PICMG® CompactPCI® PlusIO CPU card (system slot controller)
- Up to four PCIe® based CompactPCI® Serial peripheral cards on a hybrid backplane, Gen1/2/3 x1 links
- PCIe® based rear I/O module
- PCIe® links/lanes derived from PI7C9X3G606GP PCIe® Gen3 switch
- Option 2 x 2.5GBASE-T Gigabit Ethernet via P82-GBE low profile mezzanine module (I226-IT NICs)
- 1 x SATA derived from EHL SoC
- 4 x USB2 from EHL SoC

Feature Summary

Local Expansion

- Mezzanine side card connectors for optional local expansion
- HSE1 - High speed expansion connector, PCIe® Gen3 fully configurable, derived from EHL SoC
- HSE2 - High speed expansion connector, PCIe® Gen3 configured 4x1, via PCIe® packet switch
- N-EXP - Sideband expansion connector, e.g. eSPI, Audio, UART (from EHL SoC)

- 4HP Low profile mezzanine module options (to be ordered separately)
- S48-SSD Mezzanine module - 2 x M.2 2280 NVMe SSD sockets, 1 x USB Type-C
- P82-GBE Mezzanine module - 1 x M.2 2280 NVMe, 2 x backplane (J2) 2.5GbE ports
- Custom specific module design

- 8HP Mezzanine side card option (to be ordered separately)
- SCJ-VEENA Quad RJ45 2.5GbE NIC & M.2 SSD storage
- PCZ-NVM Dual M.2 NVMe SSD, quad UART
- Custom specific side card design

Environmental & Regulatory

- 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 -40°C to +85°C (industrial temperature range)
- 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 tbd years (MIL-HDBK-217F, SN29500 @+40°C)
- EC Regulatory EN55035, EN55032, EN62368-1 (CE)

RT OS Board Support Packages & Driver

- Please contact sales@ekf.de

Feature Summary

Applications

- General low power industrial computing, for x86 based software
- Rugged systems (e.g. transportation, construction machines, harvester)
- Data concentrator, router, gateway, networking, kiosk systems, IoT
- Stand-alone computer (fog computing), scalable via mezzanine I/O expansion options
- Modular systems with up to 4 CompactPCI® Serial peripheral cards and up to 7 CompactPCI® boards

all items are subject to changes w/o further notice

Related Information	
PC8-FLUTE Home	https://www.ekf.com/p/pc8/pc8.html
CompactPCI® PlusIO Home	https://www.ekf.com/p/plus.html

Related Mezzanine Modules and Side Cards	
S48-SSD Low Profile Mezzanine	https://www.ekf.com/s/s48/s48.html
SCJ-VEENA Mezzanine Side Card	https://www.ekf.com/s/scj/scj.html
P82-GBE Low Profile Mezzanine	https://www.ekf.com/p/p82/p82.html
PCZ-NVM Mezzanine Side Card	https://www.ekf.com/p/pcz/pcz.html

Ordering Information

For popular PC8-FLUTE SKUs please refer to
https://www.ekf.com/liste/liste_21.html#PC8

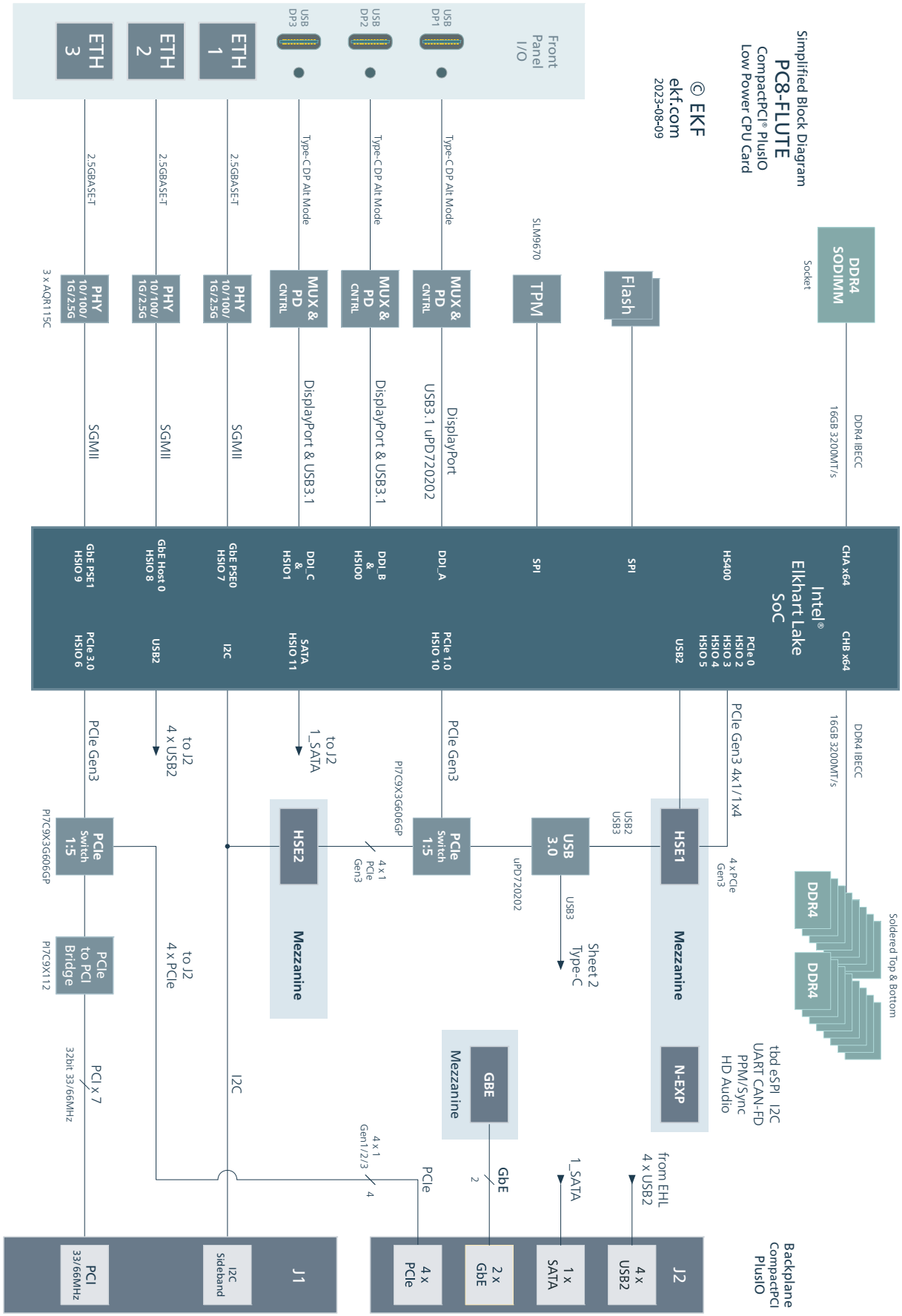
CompactPCI® PlusIO

CompactPCI® PlusIO (PICMG® 2.30) is an enhancement to CompactPCI® Classic which enables system expansion and rear I/O across J2. High speed signal lines (PCI Express®, SATA, Gigabit Ethernet and USB) are passed from the PC8-FLUTE via the J2 connector to the backplane, for usage either with a PlusIO rear I/O transition module, or CompactPCI® Serial peripheral cards.

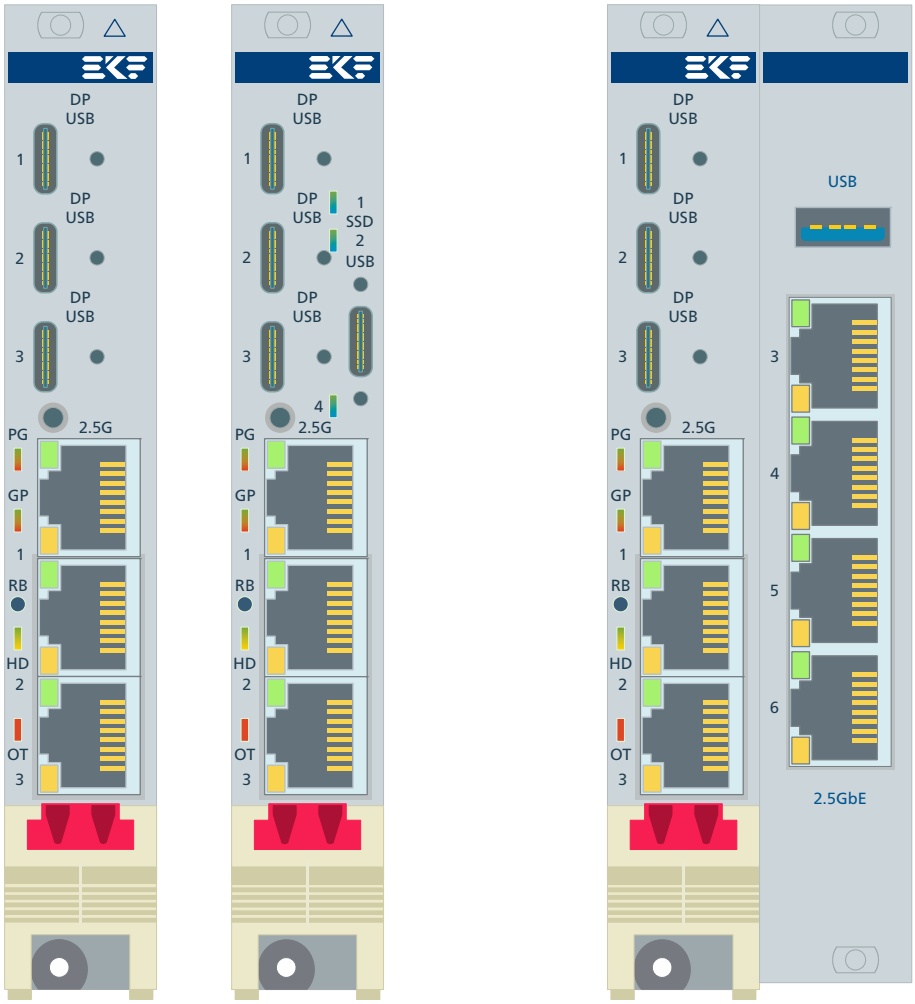
CompactPCI® Serial (PICMG® CPCIS.0) defines a card slot based on PCI Express®, SATA, Gigabit Ethernet and USB serial data lines. On a hybrid backplane, both card styles CompactPCI® and CompactPCI® Serial can reside, with the PC8-FLUTE in the middle as system controller for both backplane segments, combining the technologies of both worlds.

SRP-BLUBOXX

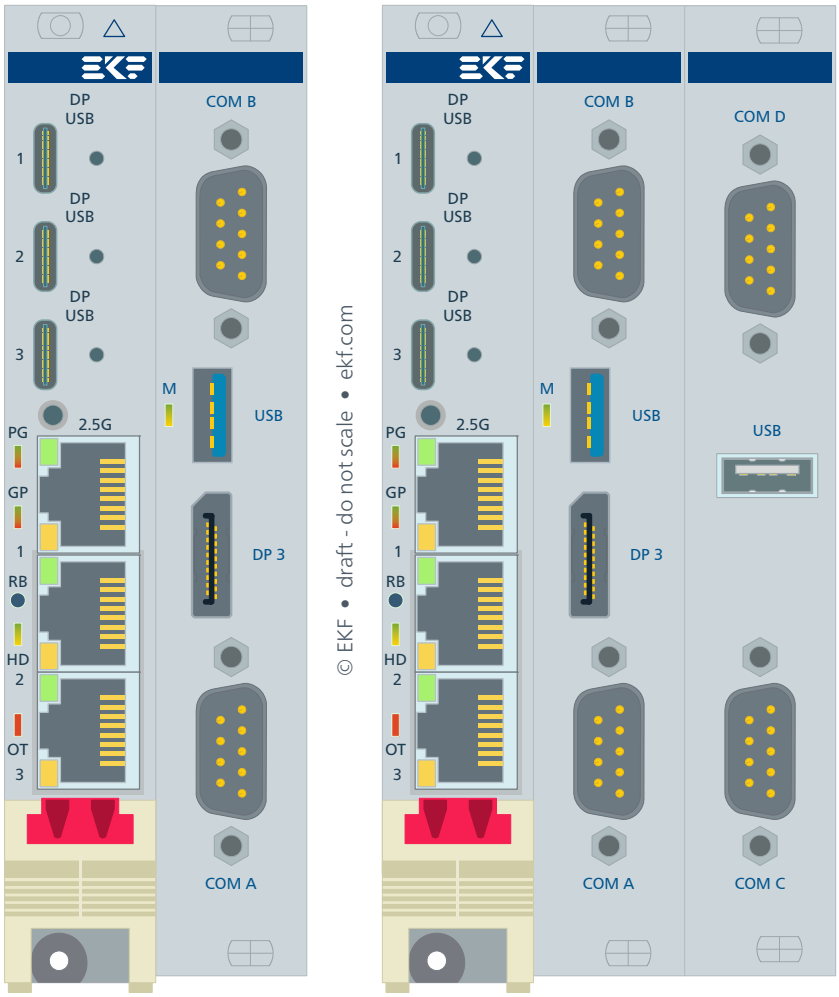
Block Diagram



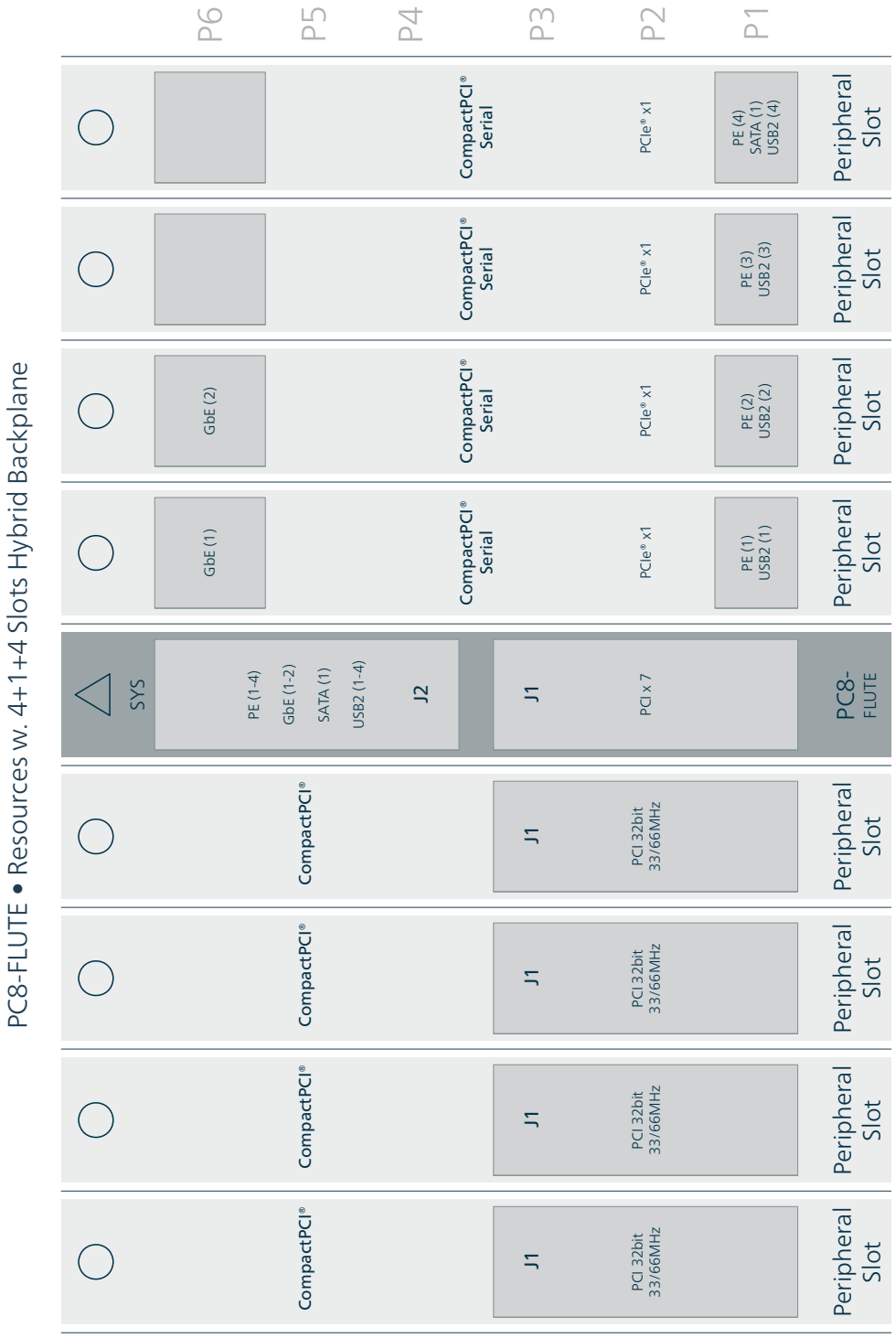
Front Panel



PC8-FLUTE | PC8 w. S48 | PC8-FLUTE | SCJ-VEENA

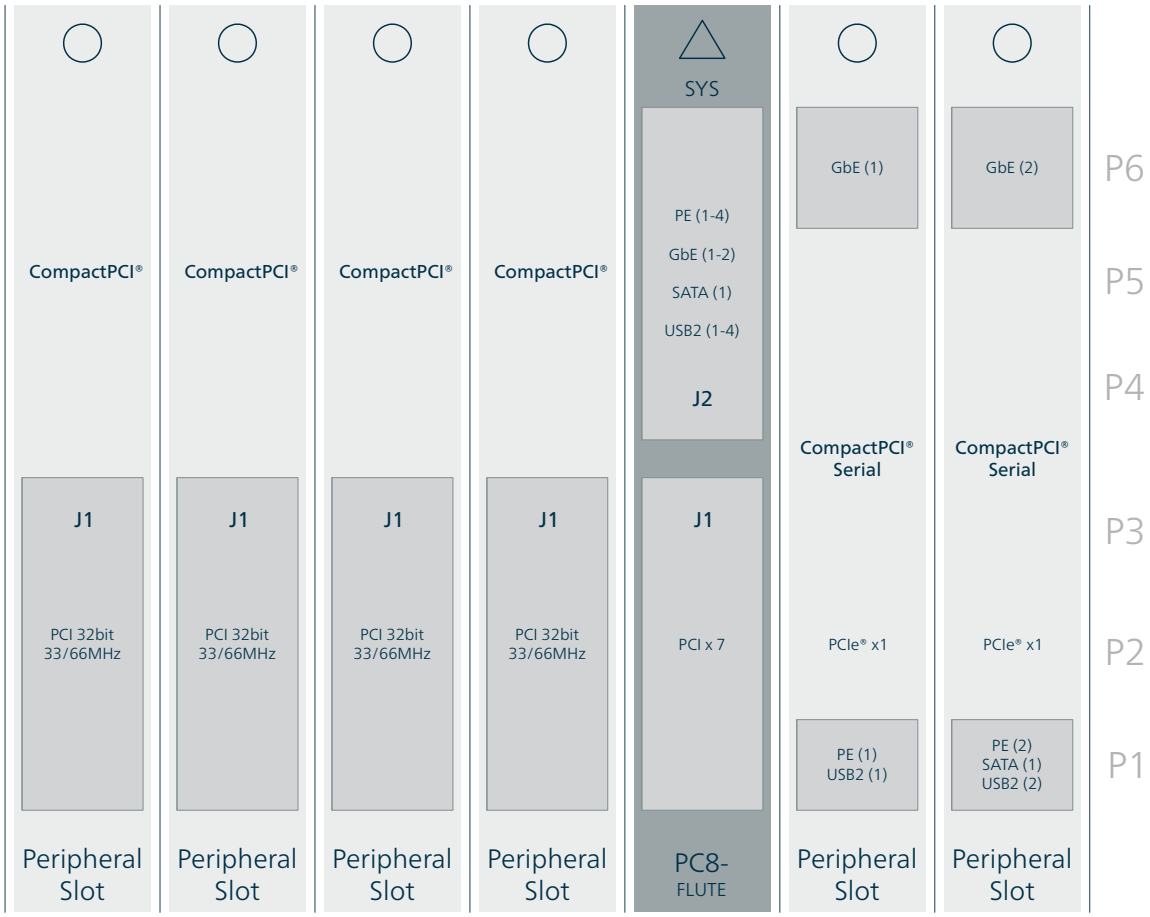


Typical Hybrid Backplanes



For 8HP front panel CPU assemblies consider a spare slot right to the system slot

PC8-FLUTE • Resources w. 4+1+2 Slots Hybrid Backplane



For 8HP front panel CPU assemblies consider a spare slot right to the system slot

The components used on the PC8-FLUTE are capable for PCIe® Gen3 and SATA 6G transfer speed. However, due to the J2/P2 legacy backplane connector construction, the CompactPCI® 2.30 PlusIO specification describes only PCIe® Gen1/2 and SATA 1.5G/3G protocols. Higher operational speed may work in a particular system configuration but cannot be guaranteed therefore.

SRP-4401

SRP-3201-BLUBOXX

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Beyond All Limits:
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Document No. 10055 • 26 September 2023

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