



Product Information

PC6-TANGO • CompactPCI® PlusIO • CPU Card

Intel® Atom™ E3900 Series Processor • Apollo Lake SoC

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General

The PC6-TANGO is a low power 4HP/3U CompactPCI® PlusIO CPU board, equipped with an Intel® Atom™ E39xx-series System-on-Chip processor (Apollo Lake). The front panel is provided with two Gigabit Ethernet jacks (option M12-X), two USB 3.0 receptacles, two DisplayPort connectors, and optionally a Micro SD Card slot.

The PC6-TANGO is equipped with 8GB directly soldered DDR3L ECC RAM, and a CFast™ card socket as on-board SSD mass storage solution.

Optionally available is an on-board 64GByte e•MMC flash memory chip. Further more, low profile SATA SSD mezzanine modules are available as additional on-board mass storage solution. The PC6-TANGO backplane connectors comply with the CompactPCI® PlusIO specification, suitable for system expansion with classic CompactPCI® peripheral cards via J1, and in addition a rear I/O module attached to J2, or up to four CompactPCI® Serial cards accessed on a hybrid backplane.



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 connectors for typical system configuration (2 x USB3, 2 x DisplayPort, 2 x GbE)
- ▶ Backplane communication via CompactPCI® J1 and J2 hard metric connectors
- ▶ J1 Connector for PICMG® CompactPCI® 32-Bit support
- ▶ J2 Connector (UHM high speed) for CompactPCI® PlusIO support (PCIe, SATA, USB, GbE)
- ▶ J2 PlusIO configuration allows for either CompactPCI® Serial backplane usage or rear I/O module attachment
- ▶ On-board 2 x SATA 6G 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
- ▶ +5V only board design for low cost system power supply
- ▶ PC6-TANGO can deliver +3.3V to CompactPCI® peripheral boards

Processor

- ▶ Intel® Apollo Lake-I (APL-I) SoC E39xx Series
- ▶ x7-E3950 • 4 Cores • 1.6/2.0GHz • 12W TDP/cTDP • 500/650MHz graphics • 2MB LLC
- ▶ x5-E3940 • 4 Cores • 1.6/1.8GHz • 9.5W TDP/cTDP • 400/600MHz graphics • 2MB LLC
- ▶ x5-E3930 • 2 Cores • 1.3/1.8GHz • 6.5W TDP/cTDP • 400/550MHz graphics • 2MB LLC
- ▶
- ▶ Graphics Burst, CPU Burst, Intel® Speedstep®
- ▶ Intel® Virtualization Technology (Intel® VT-x / VT-d)
- ▶ Intel® Trusted Execution Engine (Intel® TXE) 3.0

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

** 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 8GB DDR3L 1600 +ECC
- ▶ Soldered memory for rugged applications

Feature Summary

Mass Storage

- ▶ On-board CFast™ Card socket (SATA based CompactFlash)
- ▶ Option front I/O Micro SD Card socket (SDHC, SDXC), available on request
- ▶ 128Mbit SPI Flash (UEFI firmware and customer application data)
- ▶ Option e•MMC (embedded MMC 5.0 64GByte soldered)
- ▶ Option low profile mezzanine card C41-CFAST (secondary CFast™ card socket) via P-HSE connector
- ▶ Option low profile mezzanine card C42-SATA (1.8-inch Micro SATA SSD socket) via P-HSE connector
- ▶ Option low profile mezzanine card C47-MSATA (dual mSATA SSD module sockets) via P-HSE connector
- ▶ Option low profile mezzanine card C48-M2 (dual M.2 SATA SSD module sockets) via P-HSE connector
- ▶ Option 8HP assembly side card PCU-UPTempo (dual M.2 SATA SSD module sockets) via P-HSE connector
- ▶ Option 8HP assembly side card C44-SATA (2.5-inch SATA SSD/HDD) via P-HSE connector
- ▶ Option custom specific mezzanine board design on request

Graphics

- ▶ Integrated graphics engine, Gen 9 LP
- ▶ DirectX 12.0, OpenCL 2.0 Full Profile, OpenGL 4.3
- ▶ HW media acceleration DXVA 2, VA-API
- ▶ HW video decode H264 L5.2, H.265 HEVC, VP9, MVC, MPEG2, JPEG/MJPEG, VC1, WMV9, VP8
- ▶ HW video encode H264, SVC, AVC, MVC, MPEG-2
- ▶ Content protection PAVP, HDCP 1.4
- ▶ 2 x DisplayPort front panel connectors
- ▶ DisplayPort™ 1.2a
- ▶ Max Resolution 4096 x 2160 @60Hz

Networking

- ▶ Up to four networking interface controllers (NIC), 1000BASE-T, 100BASE-TX, 10BASE-T connections
- ▶ Intel® I210-IT -40°C to +85°C operating temperature GbE controllers 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-sensitive streams
- ▶ IEEE 1588 and 802.1AS packets hardware-based time stamping for high-precision time synchronization
- ▶ Two GbE ports via RJ45 front panel jacks (option 2 x M12-X with mezzanine module P01 8HP)
- ▶ Option two GbE ports via backplane connector J2 for rear I/O or CompactPCI® Serial backplane usage

Feature Summary

APL SoC I/O Usage

- ▶ 4 x PCIe Gen2 to J2 backplane connector - usage for CompactPCI® Serial peripheral cards or rear I/O module
- ▶ 1 x PCIe Gen2 to PCIe switch PI7C9X2G606PR 1:5 lanes (on-board PCIe devices)
- ▶ 1 x PCIe to PI7C9X112 PCI bridge (J1 backplane connector, for classic CompactPCI® card support)
- ▶ 1 x SATA 6G to on-board CFast™ SSD card socket - can be used as mass storage and boot device
- ▶ 1 x SATA 6G to mezzanine expansion connector P-HSE
- ▶ e•MMC I/F 400MByte/s (HS400) to embedded MMC 5.0 64GByte (ordering option, mass storage device)
- ▶ 2 x USB 3.0 to front panel connectors
- ▶ 2 x DisplayPort to front panel connectors
- ▶ SDIO (Micro SD Card) front panel slot (option)
- ▶ 4 x USB2 to J2 backplane connector
- ▶ LPC, Audio, I2C, 2 x USB2 to mezzanine expansion connector P-EXP
- ▶ LPC to TPM 2.0 module

On-Board Building Blocks

- ▶ Additional on-board controllers, PCIe® based
- ▶ PCIe® Gen2 packet switch PI7C9X2G606PR (6-port, 6-lane)
- ▶ 2 x Gigabit Ethernet controllers Intel® I210IT (front panel)
- ▶ Option 2 x Intel® I210IT (RIO via J2 backplane connector)
- ▶ PCIe® to PCI® bridge PI7C9X112 (7 x PCI 33/66MHz peripheral slots)
- ▶ Option dual port SATA 6G/3G* controller Marvell® 88SE9170 (to P-HSE mezzanine connector, and J2 RIO)
- ▶ Option e•MMC (embedded MMC 5.0 64GByte HS400)

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 (2 x I210IT)
- ▶ 2 x DisplayPort (APL SoC)
- ▶ 2 x USB 3.0 Type-A (APL SoC)
- ▶ Micro SD Card slot (APL SoC)

Feature Summary

Front Panel I/O (8HP)

- ▶ Option RS-232, Audio, USB w. PCU-UPTempo side card
- ▶ Option 2 x M12 X-coded receptacles for Gigabit Ethernet (as replacement for RJ45)
- ▶ Custom specific front panel and side card design

CompactPCI® & CompactPCI® PlusIO Backplane Resources

- ▶ PICMG® CompactPCI® 2.0 CPU card & system slot controller for J1 based 32-bit CompactPCI® systems
- ▶ Support for up to seven CompactPCI® peripheral boards, 33/66MHz (PI7C9X112 PCIe to PCI bridge)
- ▶ PICMG® CompactPCI® 2.30 J2 UHM connector according to CompactPCI® PlusIO
- ▶ J2 can be used to enable CompactPCI® Serial peripheral card slots for hybrid systems with a split backplane
- ▶ J2 can be used alternatively for a rear I/O module
- ▶ J2 is assigned to 4 x PCIe Gen2 5GT/s (from APL SoC), 1 x SATA 6G/3G* (from Marvell SATA controller), 4 x USB2 ports (from APL SoC), 2 x Gigabit Ethernet (optional I210IT networking controllers)

** CompactPCI® PlusIO specifies SATA 3G over J2. SATA 6G may be functional but is not guaranteed. The Marvell SATA RAID controller port available via J2 is therefore configured for 3Gbps by default.*

Local Expansion

- ▶ Mezzanine side card connectors for optional local expansion
- ▶ P-EXP - LPC, Audio, 2 x USB2, I2C (from APL SoC)
- ▶ P-HSE - 2 x SATA 6G (port 1 from APL SoC, port 2 from optional PCIe to SATA controller 88SE9170)

- ▶ 4HP Low profile mezzanine module options (to be ordered separately)
- ▶ CFast™ Card with C41-CFAST mezzanine module
- ▶ SATA 1.8-Inch Solid State Drive with C42-SATA mezzanine module
- ▶ Dual mSATA SSD with C47-MSATA mezzanine module
- ▶ Dual M.2/NGFF SATA SSD 2230 - 2280 size with C48-M2 mezzanine module
- ▶ Custom specific module design

- ▶ 8HP Mezzanine side card option (to be ordered separately)
- ▶ PCU-UPTempo side board w. 2 x M.2 SATA sockets & front I/O
- ▶ 2.5-inch SATA SSD/HDD available with C44-SATA
- ▶ Custom specific side card design

Feature Summary

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 11.2 years
- ▶ EC Regulatory EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1)

RT OS Board Support Packages & Driver

- ▶ Please refer to external document www.ekf.com/s/rtos_support.pdf

Applications

- ▶ General low power industrial computing, for x86 based software
- ▶ Rugged systems (e.g. transportation)
- ▶ Data concentrator, router, gateway, kiosk systems
- ▶ Stand-alone computer (edge computing), mezzanine and rear I/O expansion options
- ▶ Small modular systems, CompactPCI® and/or CompactPCI® Serial peripheral card expansion

all items are subject to changes

Related Information

PC6-TANGO Home	www.ekf.com/p/pc6/pc6.html
PC6-TANGO User Guide	www.ekf.com/p/pc6/pc6_ug.pdf

Related Documents CompactPCI® Serial & CompactPCI® PlusIO

CompactPCI® PlusIO Overview	www.ekf.com/p/plusio.pdf
CompactPCI® PlusIO Home	www.ekf.com/p/plus.html
CompactPCI® Serial Home	www.ekf.com/s/serial.html

Related Documents Mezzanine Modules and Side Cards

PCU-UPTempo Side Board	www.ekf.com/p/pcu/pcu.html
C40 ... C48 Series Mezzanine Storage Modules	www.ekf.com/c/ccpu/c4x_mezz_ovw.pdf
C48-M2 Dual M.2 SATA SSD Mezzanine Storage Module	www.ekf.com/c/ccpu/c48/c48.html

Ordering Information

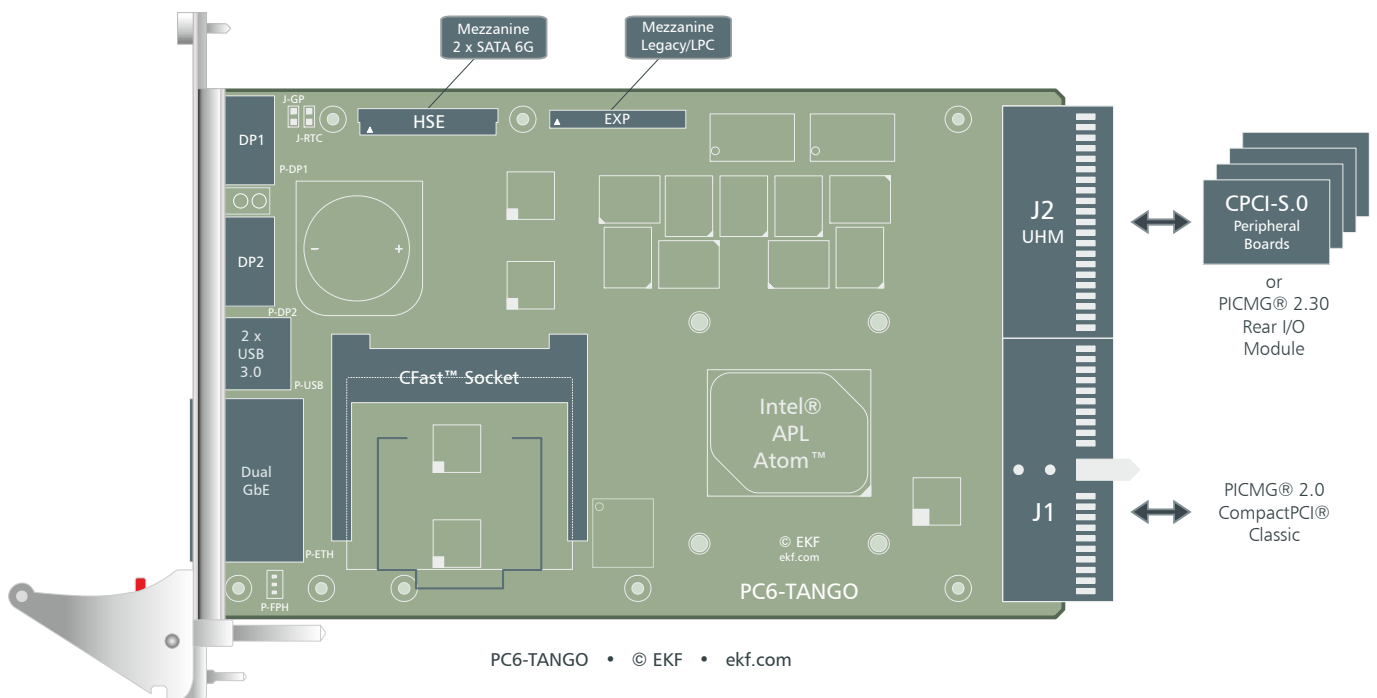
For popular PC6-TANGO SKUs please refer to www.ekf.com/liste/liste_21.html#PC6

For popular Mezzanine Side Cards please refer to www.ekf.com/liste/liste_20.html#C40

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 PC6-TANGO through the special UHM J2 connector to the backplane, for usage either with a PlusIO rear I/O transition module, or recent CompactPCI® Serial 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 PC6-TANGO in the middle as controller for both backplane segments, combining the technologies of both worlds.



PC6-TANGO • System Expansion Options

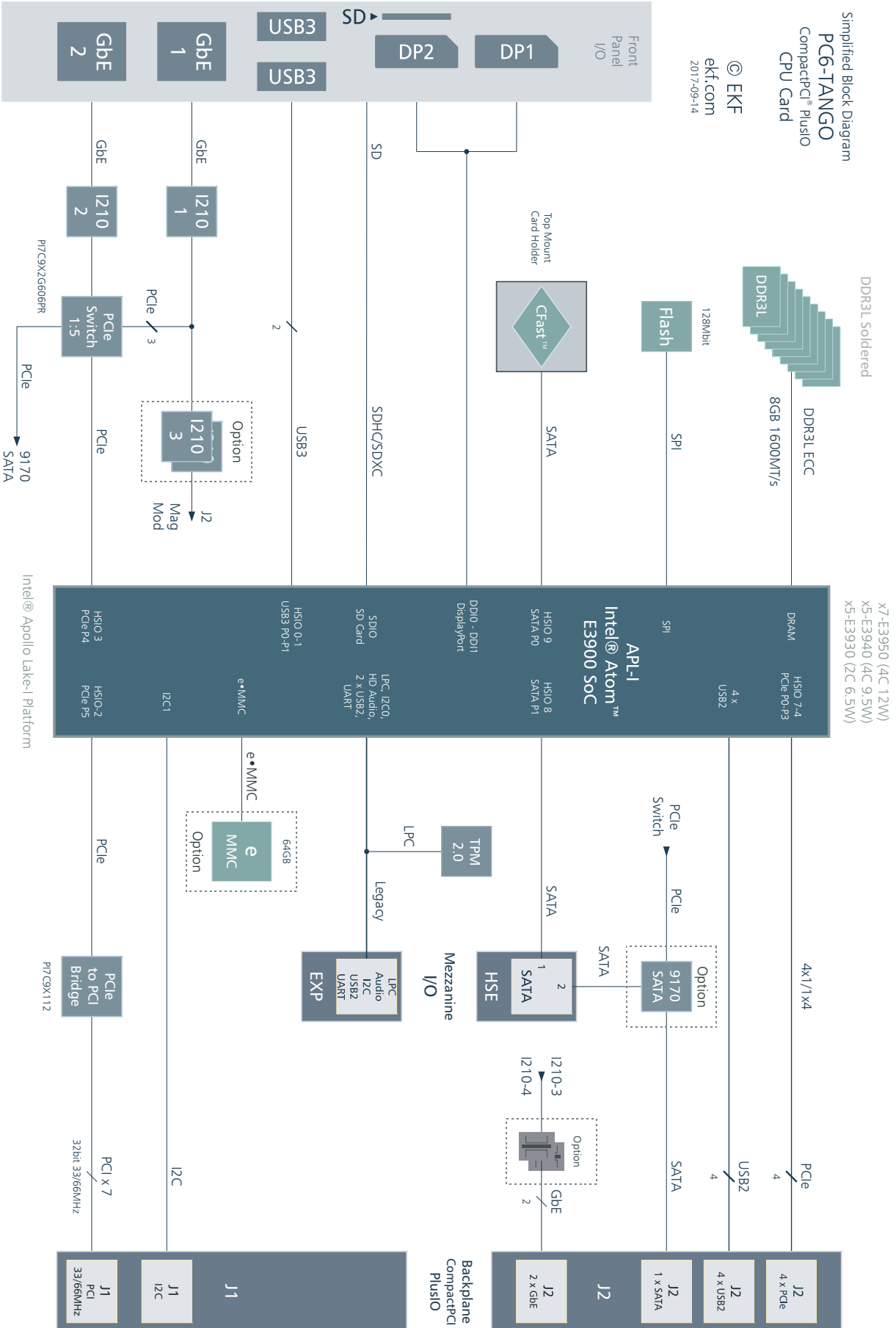


Sample CompactPCI® PlusIO Rack

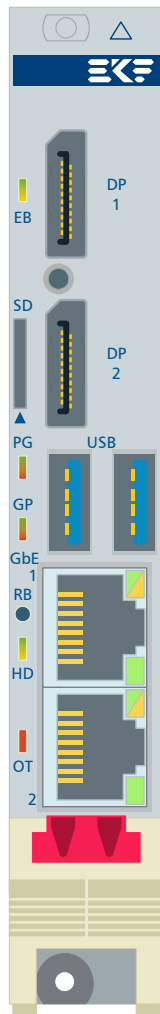


SRP-BLUBOXX

Block Diagram

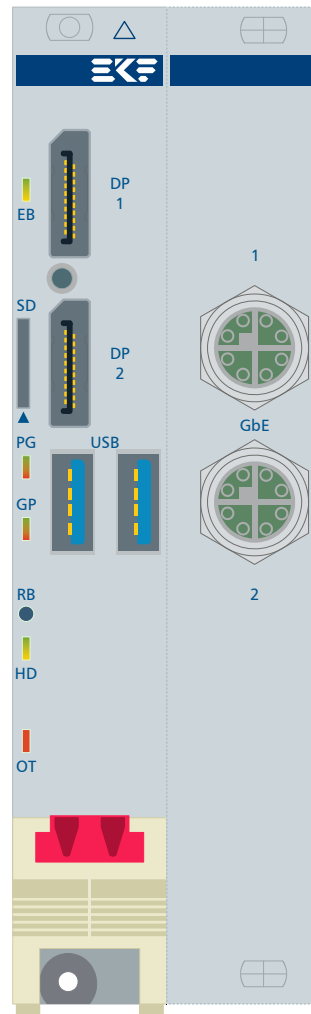


Front Panel



PC6-TANGO

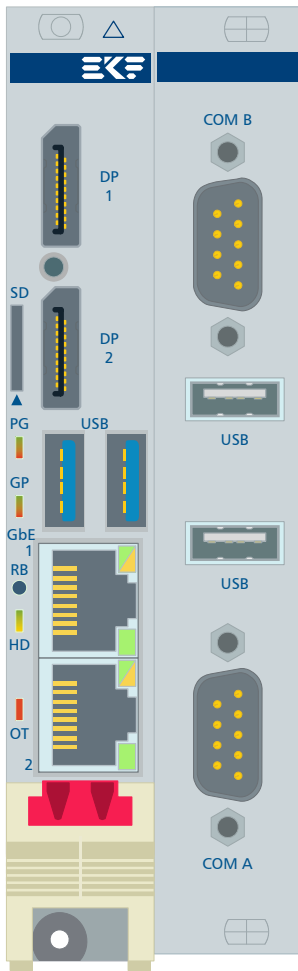
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PC6-TANGO

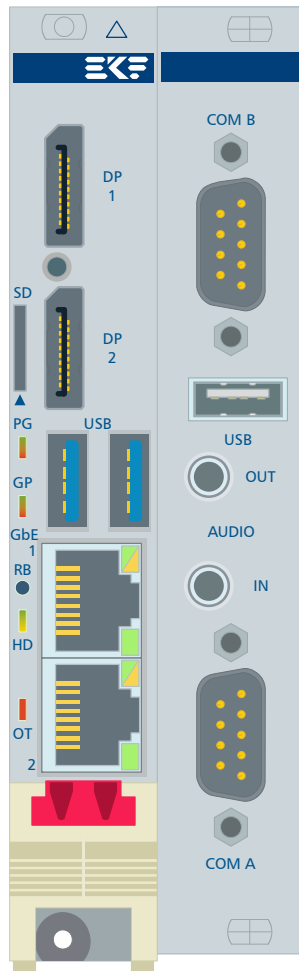
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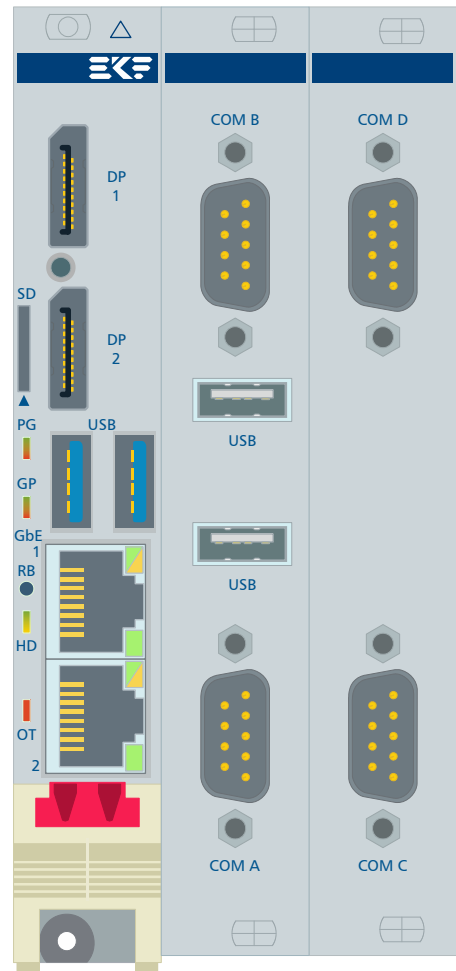
PC6-TANGO PCU-UPTEMPO
Dual USB

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PC6-TANGO PCU-UPTEMPO
AUDIO

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PC6-TANGO PCU-UPTEMPO C32-FIO

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Sample Low Profile Mezzanine Mass Storage Solutions



C47-MSATA • Low Profile Mezzanine mSATA SSD



C48-M2 • Low Profile Mezzanine M.2 SATA SSD



PC6-TANGO w. C48-M2 Low Profile SSD Module

PCU-UPTempo Mezzanine Side Card



PC6-TANGO w. PCU-UPTempo (8HP F/P Assembly)



Option M12 Ethernet





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boards. systems. solutions.

Beyond All Limits:
EKF High Performance Embedded

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