



Product Information

SC6-TANGO • CompactPCI® Serial • CPU Card

Intel® Atom™ E3900 Series Processor • Apollo Lake SoC

Preliminary



## General

*The SC6-TANGO is a low power CompactPCI® Serial CPU board, based on an Intel® Atom™ E39xx-series System-on-Chip processor (Apollo Lake APL-I). The front panel is provided with two Gigabit Ethernet jacks (option M12-X), two USB 3.0 receptacles, and two DisplayPort connectors. The board is equipped with 8GB directly soldered DDR3L ECC RAM, and a CFast™ card socket as on-board SATA SSD mass storage solution.*

Optionally available is an on-board 64GByte e•MMC flash memory chip. Further more, a low profile dual M.2 SATA SSD mezzanine module is available as additional mass storage solution (4HP assembly), and also a multi-function side card (8HP). The SC6-TANGO backplane connectors comply with the CompactPCI® Serial system board specification, suitable for small system expansion via 4 x PCIe® and optionally 2 x GbE.



## Feature Summary

### *General*

- ▶ CompactPCI® Serial (PICMG® CPCI-S.0) System Slot Controller
- ▶ Form factor single size Eurocard (board dimensions 100x160mm<sup>2</sup>)
- ▶ 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® Serial connectors
- ▶ On-board 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

### *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

## Feature Summary

### *APL SoC I/O Usage*

- ▶ 4 x PCIe® Gen2 to backplane connectors, by default configured as 4 x 1 links
- ▶ 1 x PCIe® Gen2 to PCIe switch PI7C9X2G606PR 1:5 lanes (to on-board PCIe® SATA controller & NIC devices)
- ▶ 1 x PCIe® Gen2 to P-HSE mezzanine expansion connector (stuffing alternate, replaces SATA port)
- ▶ 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 backplane connectors
- ▶ LPC, Audio, I2C, 2 x USB2 to mezzanine expansion connector P-EXP
- ▶ LPC to TPM 2.0 module (option)

### *Additional 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 (via backplane connector)
- ▶ Option dual port SATA 6G controller Marvell® 88SE9170 (to P-HSE mezzanine connector)
- ▶ Option e•MMC (embedded MMC 5.0 64GByte HS400)

### *Security*

- ▶ Trusted Platform Module (option)
- ▶ 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)
- ▶ Option 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® Serial Backplane Resources*

- ▶ PICMG® CompactPCI® Serial CPU card (system slot controller)
- ▶ Support for up to four PCIe® based peripheral boards, Gen2 4x1 links
- ▶ Option PCIe® 1x4 link (manufacturing option)
- ▶ Option 2 x Gigabit Ethernet (I210IT networking controllers) suitable for star and mesh backplanes
- ▶ 4 x USB 2.0

### *Local Expansion*

- ▶ Mezzanine side card connectors for optional local expansion
- ▶ P-EXP - LPC, Audio, 2 x USB2, I2C (from APL SoC)
- ▶ P-HSE - 1 x SATA 6G (HSE port 1, from APL SoC)
- ▶ P-HSE - 2 x SATA 6G (HSE ports 2 and 3, from optional PCIe® to SATA controller 88SE9170)
- ▶ P-HSE - 1 x PCIe® (HSE port 1, from APL SoC, replaces SATA channel, manufacturing option)
  
- ▶ 4HP Low profile mezzanine module options (to be ordered separately)
- ▶ CFAST™ Card (SATA) with C41-CFAST mezzanine module
- ▶ Dual mSATA SSD with C47-MSATA mezzanine module
- ▶ Dual M.2/NGFF SATA SSD 2230 - 2280 size with C48-M2 mezzanine module
- ▶ M.2 PCIe® SSD S20-NVME 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*

- ▶ 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 11.5 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](http://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, IoT
- ▶ Stand-alone computer (fog computing), scalable via mezzanine I/O expansion options
- ▶ Small modular CompactPCI® Serial systems for expansion with up to four peripheral cards

*all items are subject to changes w/o further notice*



Related Information

SC6-TANGO Home	<a href="http://www.ekf.com/s/sc6/sc6.html">www.ekf.com/s/sc6/sc6.html</a>
<i>SC6-TANGO User Guide</i>	<a href="http://www.ekf.com/s/sc6/sc6_ug.pdf">www.ekf.com/s/sc6/sc6_ug.pdf</a>
CompactPCI® Serial Home	<a href="http://www.ekf.com/s/serial.html">www.ekf.com/s/serial.html</a>

Related Documents Mezzanine Modules and Side Cards

C47-SATA Dual mSATA SSD Low Profile Mezzanine Storage Module	<a href="http://www.ekf.com/c/ccpu/c47/c47.html">www.ekf.com/c/ccpu/c47/c47.html</a>
C48-M2 Dual M.2 SATA SSD Low Profile Mezzanine Storage Module	<a href="http://www.ekf.com/c/ccpu/c48/c48.html">www.ekf.com/c/ccpu/c48/c48.html</a>
PCU-UPTempo Side Card (8/12HP Assembly)	<a href="http://www.ekf.com/p/pcu/pcu.html">www.ekf.com/p/pcu/pcu.html</a>
S20-NVME M.2 NVMe SSD Low Profile Mezzanine Storage Module	<a href="http://www.ekf.com/s/s20/s20.html">www.ekf.com/s/s20/s20.html</a>

Ordering Information

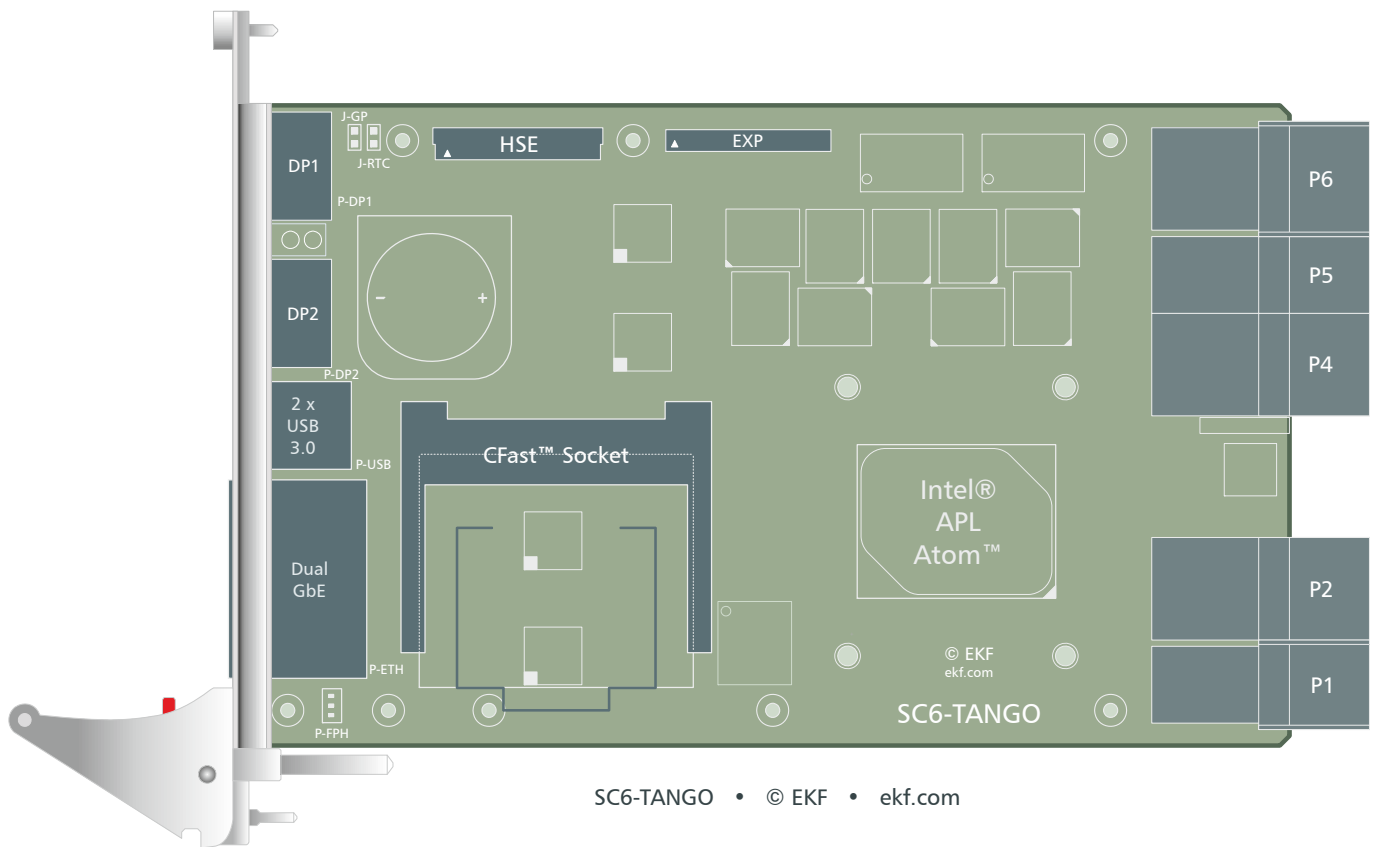
For popular SC6-TANGO SKUs please refer to [www.ekf.com/liste/liste\\_21.html#SC6](http://www.ekf.com/liste/liste_21.html#SC6)



## CompactPCI® Serial

While mechanically compliant to CompactPCI® Classic, CompactPCI® Serial defines a new card slot, based on PCI Express®, SATA, GbE and USB data lines. A passive backplane is used for high speed signal distribution from the system slot to each of up to 8 peripheral slots (4 slots with respect to the SC6-TANGO).

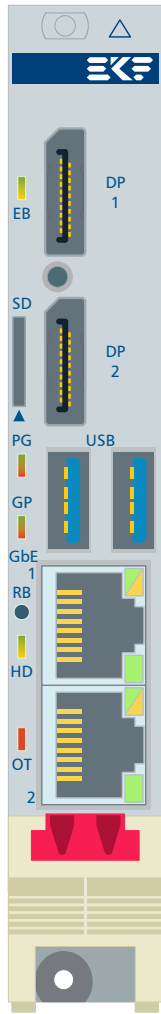
Most CompactPCI® Serial peripheral slot cards require only the backplane connector P1, which comprises PCIe® (up to x4 link) and other signals, resulting in a concise and inexpensive peripheral board design. For optional Gigabit Ethernet backplane communication the connector P6 will be required.



SC6-TANGO • Connector Orientation

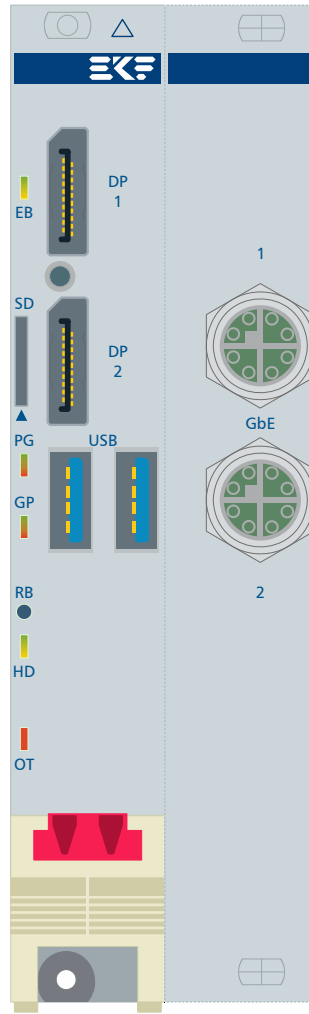


Front Panel



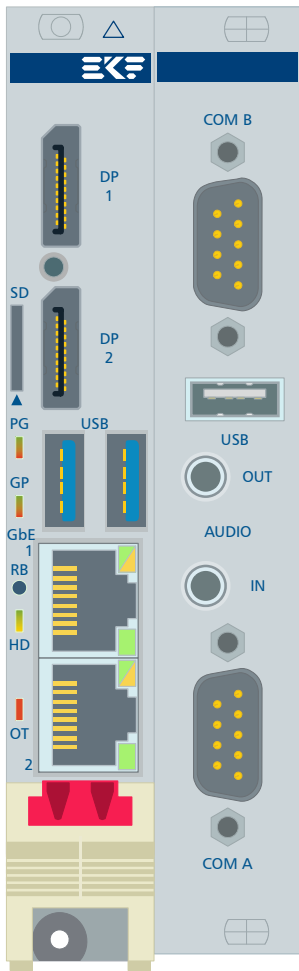
SC6-TANGO

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



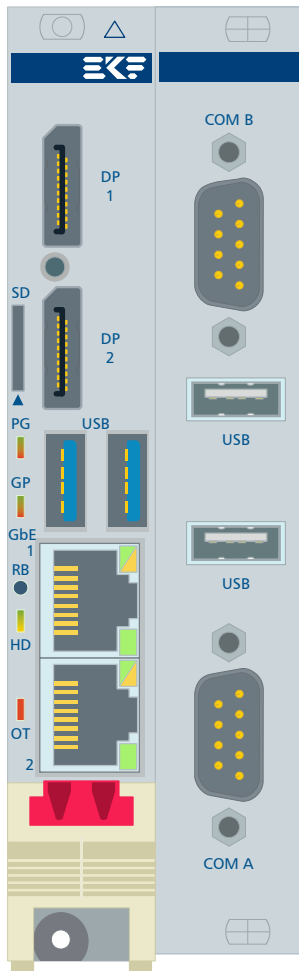
SC6-TANGO P01-M12

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



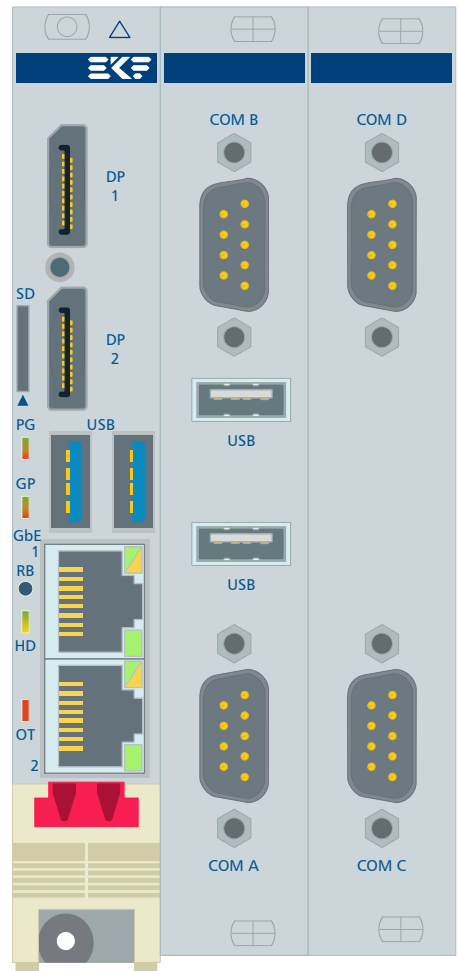
SC6-TANGO PCU-UPTempo  
AUDIO

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



SC6-TANGO PCU-UPTempo  
Dual USB

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



SC6-TANGO PCU-UPTempo C32-FIO

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

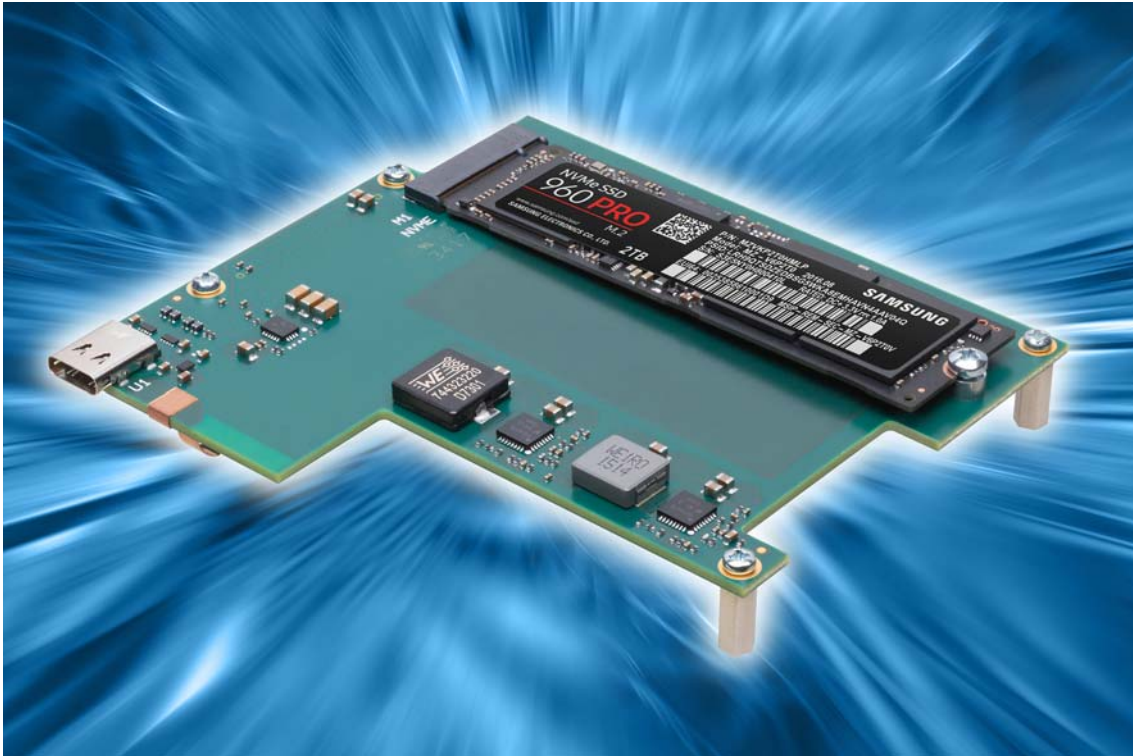
Sample Low Profile Mezzanine Mass Storage Solutions



C47-MSATA • Low Profile Mezzanine mSATA SSD



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



S20-NVME • Low Profile Mezzanine M.2 NVMe SSD



Industrial Computers Made in Germany  
boards. systems. solutions.

## Beyond All Limits: EKF High Performance Embedded

Document No. 9112 • 13 December 2018

EKF Elektronik GmbH  
Philipp-Reis-Str. 4 (Haus 1)  
Lilienthalstr. 2 (Haus 2)  
59065 HAMM  
Germany



Phone +49 (0)2381/6890-0  
Fax +49 (0)2381/6890-90  
Internet [www.ekf.com](http://www.ekf.com)  
E-Mail [sales@ekf.com](mailto:sales@ekf.com)