



## Product Information

### SC3-LARGO • *CompactPCI*® Serial CPU Card

#### 5<sup>th</sup> Generation Intel® Core™ Processor

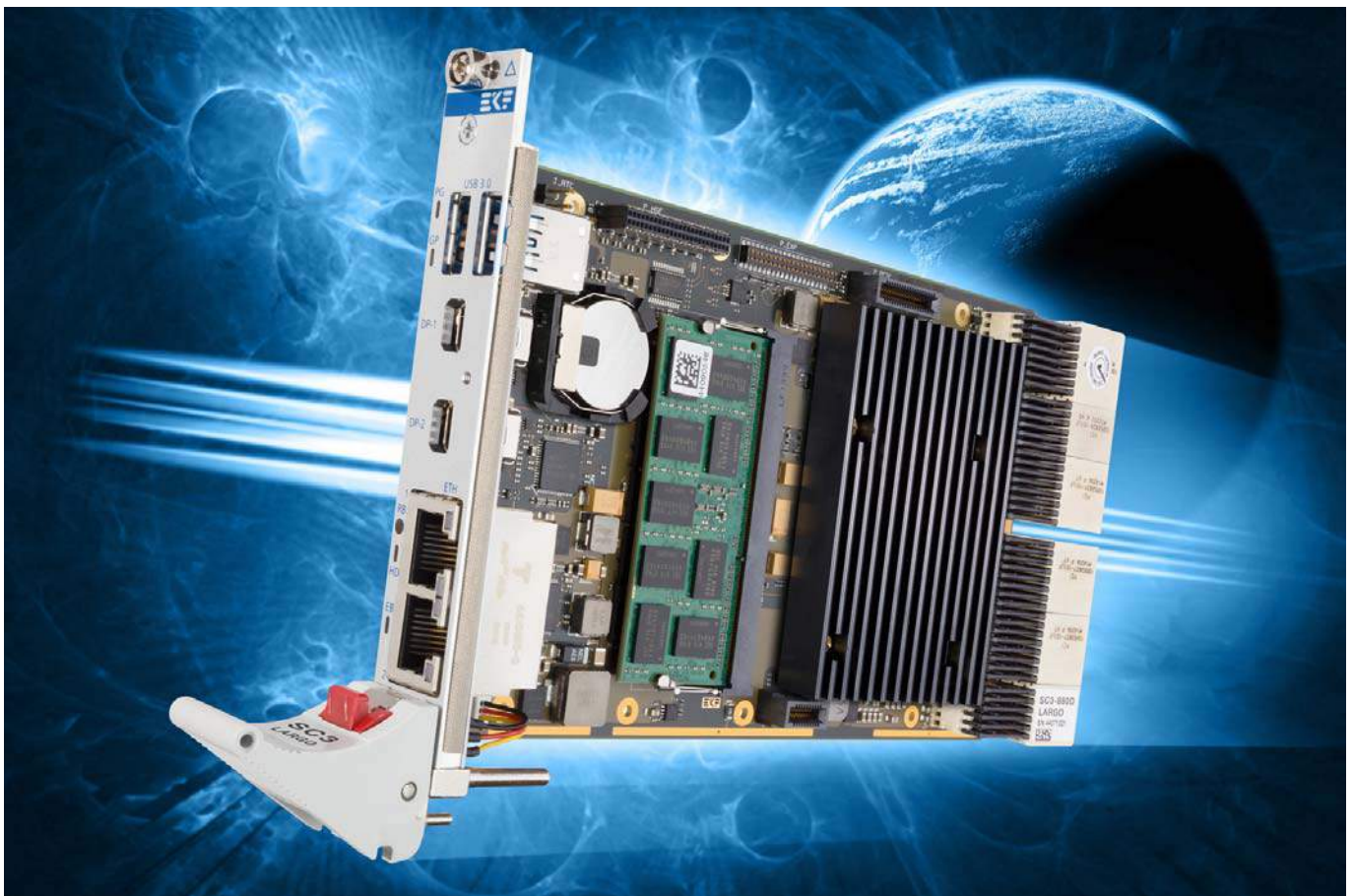
Document No. 7931 • 7 November 2017



## General

*The SC3-LARGO is a rich featured high performance 4HP/3U CompactPCI® Serial CPU board, equipped with a 5<sup>th</sup> generation Intel® Core™ mobile processor (Broadwell quad-core). The SC3-LARGO front panel is provided with two Gigabit Ethernet jacks, two USB 3.0 receptacles, and two mDP connectors (DisplayPort 1.2 MST, 4k UHD). Local expansion mezzanine cards are available for additional I/O.*

The SC3-LARGO is equipped with up to 24GB Low Power RAM with ECC support. Up to 8GB memory-down are provided for rugged applications, and another 16GB are available via the DDR3 ECC SO-DIMM socket. The on-board SATA 6G RAID controller allows for powerful mass storage solutions via the CompactPCI® Serial backplane. Low profile SSD mezzanine modules are available as on-board storage solution.



SC3-LARGO

## Feature Summary

### General

- ▶ PICMG® CompactPCI® Serial (CPCI-S.0) CPU card
- ▶ 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 Mini DisplayPort, 2 x GbE)
- ▶ Backplane communication via PCI Express® Gen3, SATA 6G, USB 3.0, Gigabit Ethernet
- ▶ Local mezzanine expansion option (side card), COTS and custom specific boards
- ▶ Heat spreader available for CoolConduct® technology heat exchanger systems (option)

### Processor

- ▶ 5<sup>th</sup> Generation Intel® Core™ CPU (Broadwell H)
- ▶ i7-5850EQ • 4 Cores • 2.7GHz (TB 3.4GHz) • 47/37W TDP/cTDP • GT3e-6200 Intel® Iris™ Pro graphics 1GHz • 6MB LLC • vPRO™/AMT
- ▶ i7-5700EQ • 4 Cores • 2.6GHz (TB 3.4GHz) • 47/37W TDP/cTDP • GT2-5600 Intel® HD graphics 1GHz • 6MB LLC • vPRO™/AMT

### 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 (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 24GB DDR3L 1600 +ECC
- ▶ DDR3L +ECC soldered memory up to 8GB
- ▶ DDR3L +ECC SO-DIMM memory module socket up to 16GB

## Feature Summary

### Performance Rating

- ▶ Passmark 8.0 performance test (Windows 8.1/64, 16GB RAM, C47-MSATA mezzanine SSD storage module)
- ▶ SC3-630D (i7-5700EQ): Passmark rating 2975, CPU rating 8620
- ▶ SC3-830D (i7-5850EQ): Passmark rating 3271, CPU rating 9167

### Graphics

- ▶ Integrated graphics engine, 3 symmetric independent displays
- ▶ 3D HW acceleration DX11.1, OpenCL 1.2, OpenGL 4.3, ES 2.0
- ▶ HW media acceleration DXVA 2, VAAPI
- ▶ HW video decode H264, SVC, AVC, MVC, MPEG-2, MJPEG, JPEG large frame support, VC-1, VP8
- ▶ HW video encode H264, SVC, AVC, MVC, MPEG-2
- ▶ Content protection PUMA, PAVP, HDCP
- ▶ Front panel options: Dual Mini-DisplayPort (mDP) or single VGA connector
- ▶ 3<sup>rd</sup> DisplayPort connector via mezzanine side card optional
- ▶ DisplayPort™ 1.2 Multi-Stream Transport (MST) - display daisy chaining
- ▶ Max Resolution 4096 x 2304 @60Hz (any DisplayPort), 1920 x 1200 (VGA)
- ▶ 4k x 2k @24Hz supported for Blu-ray playback
- ▶ Integrated audio

### Networking

- ▶ Up to 4 networking interfaces in total - 2 x front RJ45 GbE, 2 x backplane GbE via P6
- ▶ 1000BASE-T, 100BASE-TX, 10BASE-T connections
- ▶ Front port 1 - I217LM with Intel® AMT support
- ▶ Front port 2 - Intel® I210-IT -40°C to +85°C operating temperature GbE NIC w. integrated PHY
- ▶ Front port option M12 X-coded connectors (replacement for RJ45, requires 8HP front panel width)
- ▶ 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
- ▶ Backplane Gigabit Ethernet w. 2 x I210-IT NIC

### Chipset

- ▶ Intel® QM87 Lynx Point Platform Controller Hub (PCH)
- ▶ 8 x PCIe Gen2 5GT/s
- ▶ 6 x SATA 6G
- ▶ 10 x USB2, 4 x USB3
- ▶ LPC, Audio, Legacy



## Feature Summary

### *On-Board Building Blocks*

- ▶ Additional on-board devices, PCIe® based
- ▶ 3 x Gigabit Ethernet controllers Intel® I210IT
- ▶ 1 x Gigabit Ethernet PHY Intel® I217LM
- ▶ IEEE 1588-2008 Precision Time Protocol including PPS and PPM signals supported
- ▶ PCIe Gen2 packet switch 16-lane 16-port PLX PEX8618
- ▶ 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 by 5<sup>th</sup> Gen processor series (Intel® AES-NI)

### *Front Panel I/O (4HP)*

- ▶ 2 x Gigabit Ethernet RJ45 (1 = PCH & I217LM - iAMT, 2 = I210IT)
- ▶ 2 x DisplayPort (from processor integrated HD graphics engine, mDP style receptacles, optional cable connector retainer available)
- ▶ 2 x USB 3.0 Type-A

### *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 Intel® Core™ CPU)
- ▶ 6 x PCIe Gen2 5GT/s (6 links x 1 for peripheral slots)
- ▶ 3 x SATA 6G (from PCH)
- ▶ 4 x SATA 6G (Marvell hardware RAID controller)
- ▶ 4 x USB2, 2 x USB3 (from PCH)
- ▶ 2 x Gigabit Ethernet (I210IT networking controllers)

## Feature Summary

### *Local Expansion and Mass Storage Solutions*

- ▶ Mezzanine side card connectors for optional local expansion
- ▶ P-EXP - 2 x USB 2.0 & Legacy (from PCH)
- ▶ P-DP3 - 3<sup>rd</sup> DisplayPort video (from Intel® Core™ CPU)
- ▶ P-HSE - 3 x SATA 6G & 4 x USB 2.0 (from PCH)
- ▶ P-PCIE - PCIe Gen2 5GT/s 1 link x 4 lanes (from on-board PCIe® switch)
  
- ▶ 4HP Low profile mezzanine module options
- ▶ 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 storage & I/O module design
  
- ▶ 8HP/12HP Mezzanine side card options
- ▶ SCS-TRUMPET - 3<sup>rd</sup> DisplayPort F/P connector, RS-232, 2 x USB3, on-board 2.5-Inch SATA SSD or 2 x M.2/NGFF SATA SSD module sockets 2230 - 2280
- ▶ Variety of other side cards available
- ▶ Custom specific side card design

### *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 11.7 years (SC3-680D)
- ▶ 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 - under development
- ▶ Others - on request

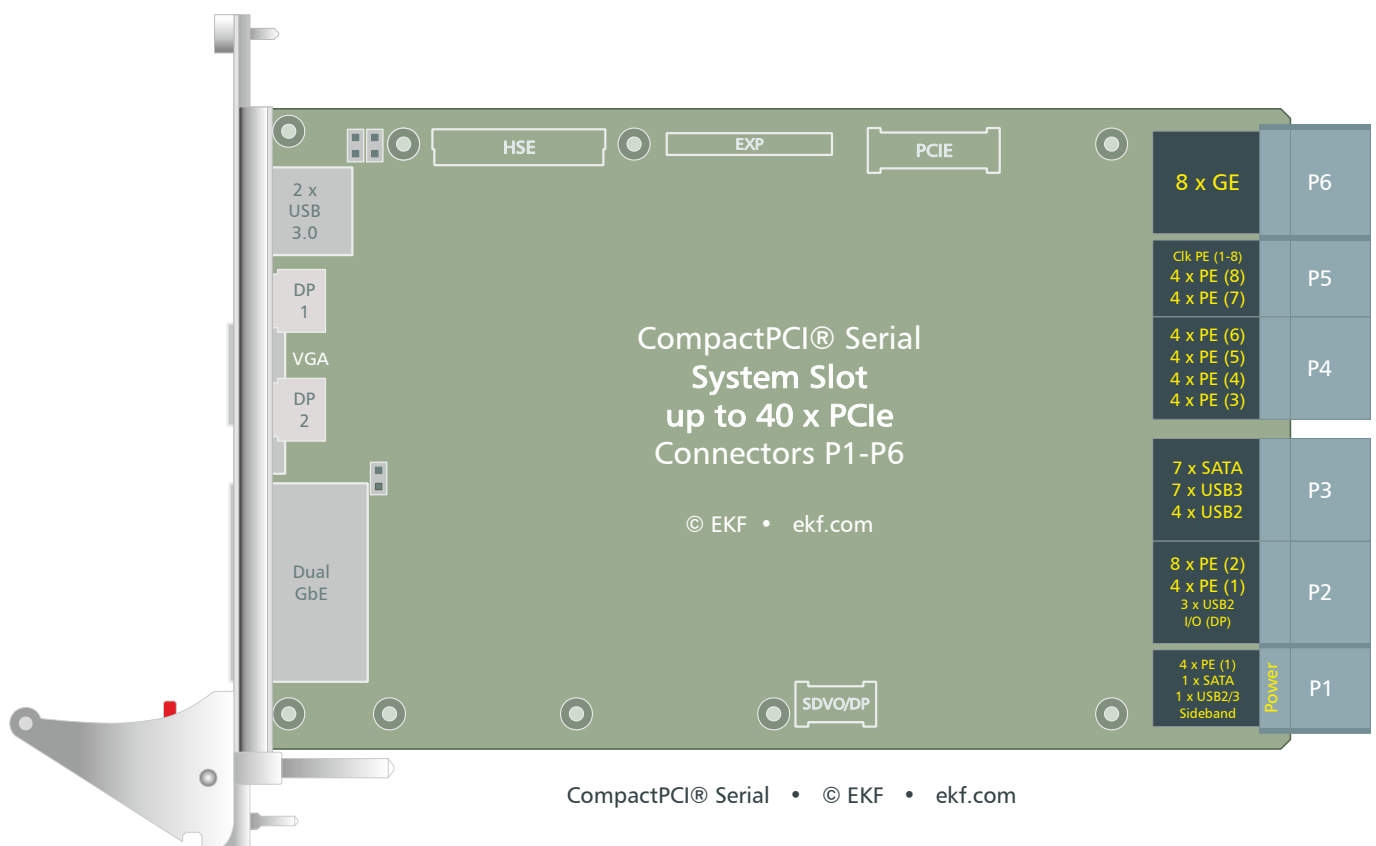
all items are subject to change w/o further notice

*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 SC3-LARGO, 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 SC3-LARGO 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® lanes, 6 x USB, 7 x SATA/RAID, 2 x GbE), very powerful industrial systems can be built.



General Backplane Connector Assignment  
According to PICMG® CPCIS.0



SC3-LARGO • Resources w. 1 + 8 Slots Backplane (System Slot Left)

	1	2	3	4	5	6	7	8	9
									
	SYS								
P6	GbE (1-2)	GbE (1)	GbE (2)						
P5	CLK PE (1-8) 2 x PE (7-8) Gen2 2 Links x 1	GA 111	GA 110	GA 101	GA 100	GA 011	GA 010	GA 001	GA 000
P4	4 x PE (3-6) Gen2 4 Links x 1	PER 1	PER 2	PER 3	PER 4	PER 5	PER 6	PER 7	PER 8
P3	3 x SATA (PCH) 4 x SATA (RAID) 1 x USB3 (2) 2 x USB2 (5-6)								
P2	PE Gen3 x 8 (2) PE Gen3 1/2 x 8 (1) 2 x USB2 (3-4) I/O								
P1	PE Gen3 1/2 x 8 (1) 1 x USB3 (1) Sideband	PE Gen3 x 8 USB3	PE Gen3 x 8 SATA 3G (PCH) USB3	PE Gen2 x 1 SATA 6G (RAID) USB2	PE Gen2 x 1 SATA 6G (RAID) USB2	PE Gen2 x 1 SATA 6G (RAID) USB2	PE Gen2 x 1 SATA 6G (RAID) USB2	PE Gen2 x 1 SATA 6G (PCH)	PE Gen2 x 1 SATA 6G (PCH)
SC3-LARGO	Fat Pipe Slot	Fat Pipe Slot	Peripheral Slot	Peripheral Slot	Peripheral Slot	Peripheral Slot	Peripheral Slot	Peripheral Slot	Peripheral Slot

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system slot connector assignment numbers in brackets (e.g. SATA PCH (7-8) according to the CPCI-S.0 specification table 44/45  
SATA (PCH) assigned connectors are Intel QM87 Platform Controller Hub derived ports  
SATA (RAID) assigned connectors are Marvell 88SE9230 hardware RAID controller derived ports (may be operated non RAID)

Backplane Resources SC3-LARGO (System Slot Left)

[www.ekf.com/s/sc3/img/sc3\\_backplane.pdf](http://www.ekf.com/s/sc3/img/sc3_backplane.pdf)

SC3-LARGO • Resources w. 1+8 Slots Backplane (System Slot Right)

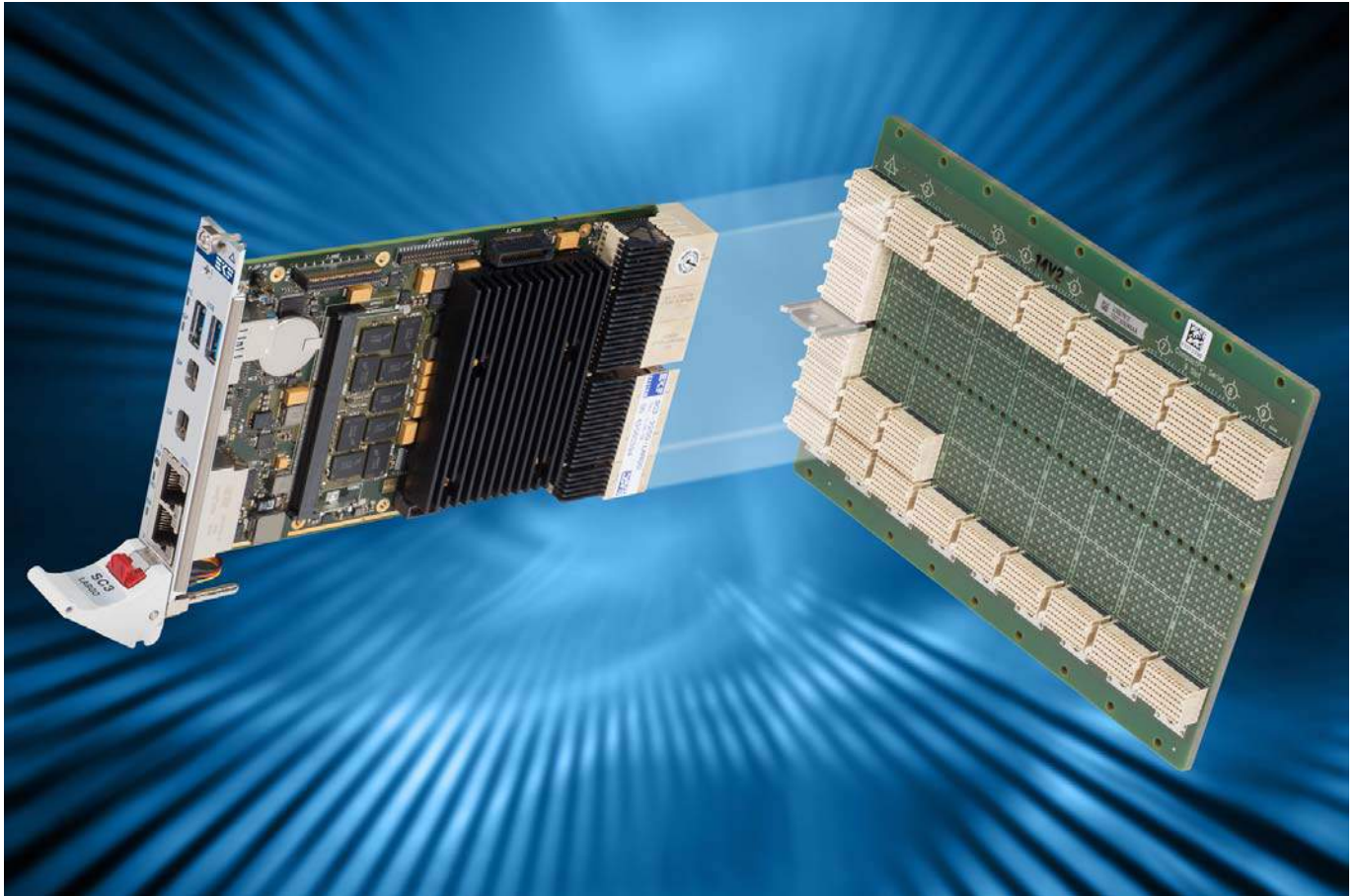
	①	②	③	④	⑤	⑥	⑦	⑧	⑨ SYS
P6							GbE (2)	GbE (1)	GbE (1-2)
P5	GA 000	GA 001	GA 010	GA 011	GA 100	GA 101	GA 110	GA 111	CLK PE (1-8) 2 x PE (7-8) Gen2 2 Links x 1
P4	PER 8	PER 7	PER 6	PER 5	PER 4	PER 3	PER 2	PER 1	4 x PE (3-6) Gen2 4 Links x 1
P3									3 x SATA (PCH) 4 x SATA (RAID) 1 x USB3 (2) 2 x USB2 (5-6)
P2									PE Gen3 x 8 (2) PE Gen3 1½ x 8 (1) 2 x USB2 (3-4) I/O
P1	PE Gen2 x 1 SATA 6G (PCH)	PE Gen2 x 1 SATA 6G (PCH)	PE Gen2 x 1 SATA 6G (RAID) USB2	PE Gen2 x 1 SATA 6G (RAID) USB2	PE Gen2 x 1 SATA 6G (RAID) USB2	PE Gen2 x 1 SATA 6G (RAID) USB2	PE Gen3 x 8 SATA 3G (PCH) USB3	PE Gen3 x 8 USB3	PE Gen3 1½ x 8 (1) 1 x USB3 (1) Sideband
	Peripheral Slot	Peripheral Slot	Peripheral Slot	Peripheral Slot	Peripheral Slot	Peripheral Slot	Fat Pipe Slot	Fat Pipe Slot	SC3- LARGO

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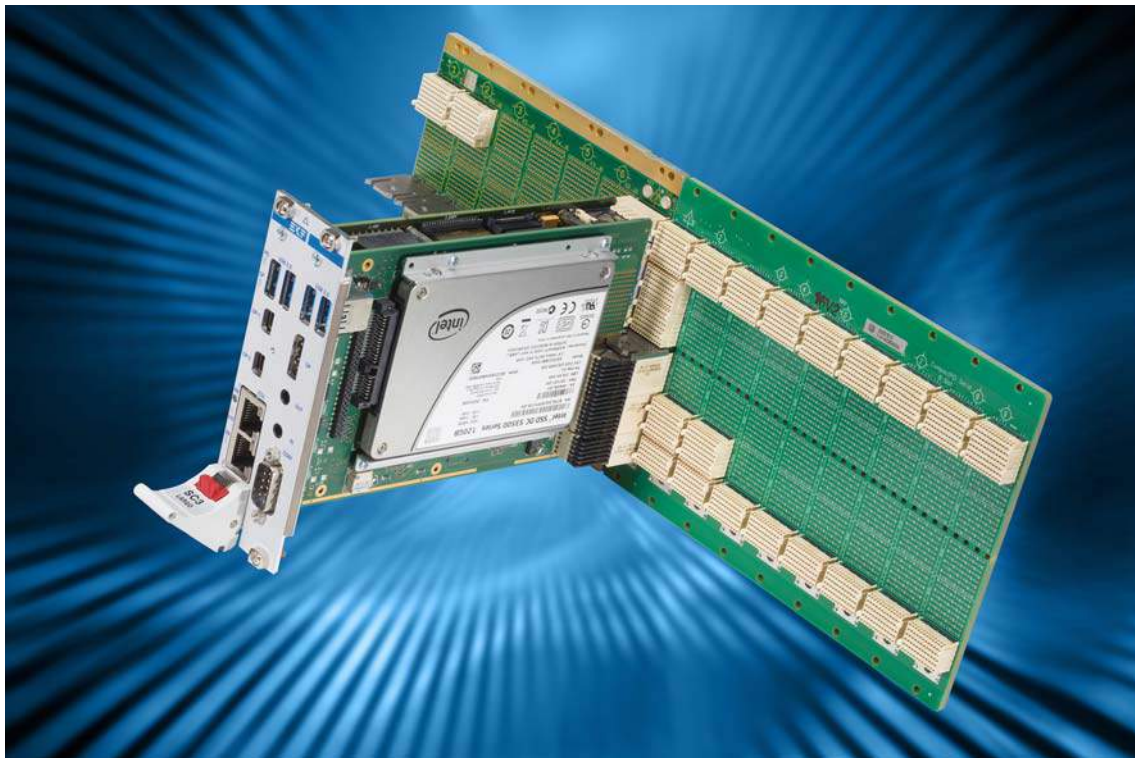
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Backplane Resources SC3-LARGO (System Slot Right)

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8 + 1 Slots CompactPCI® Serial Backplane

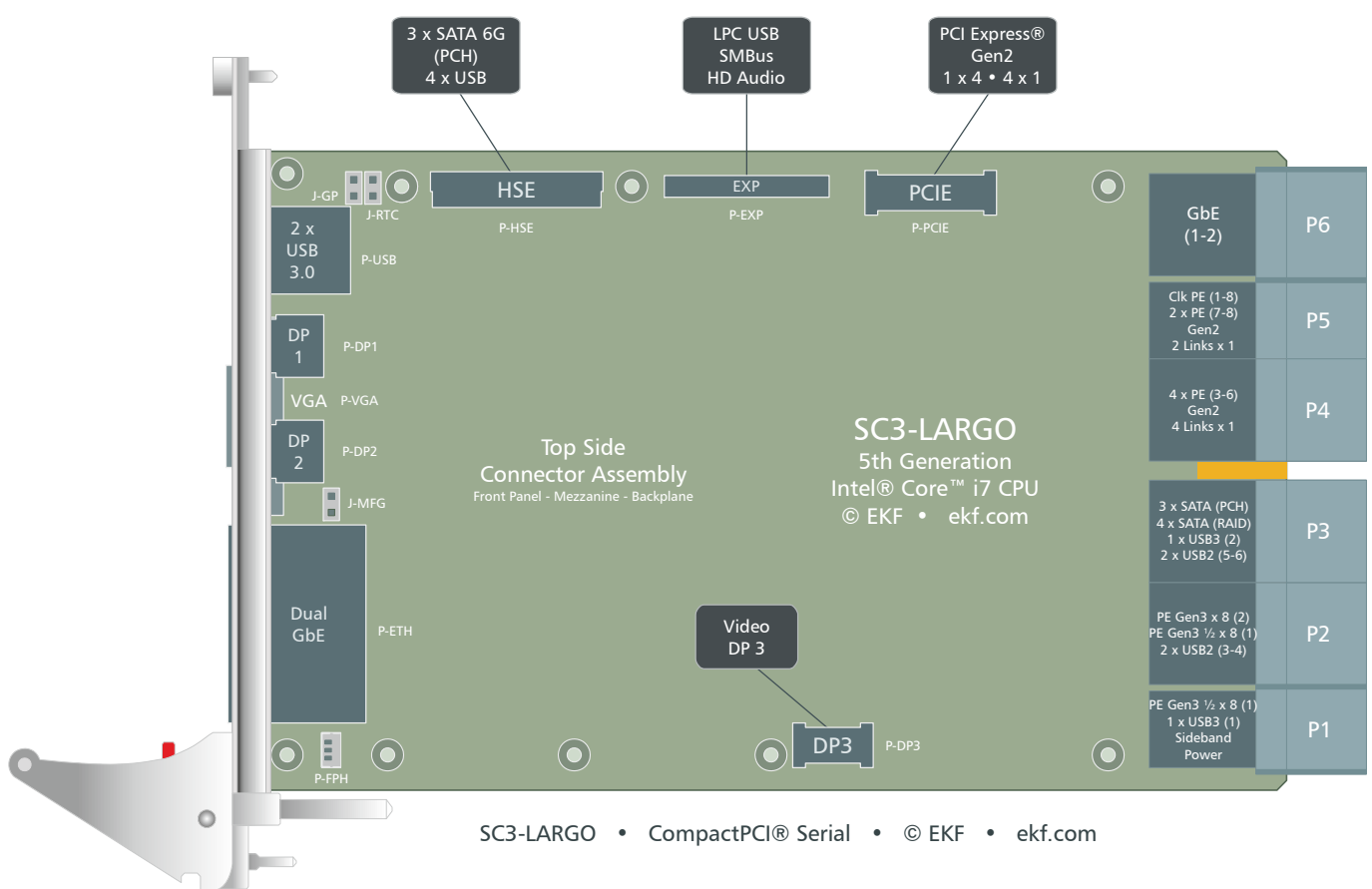


SC3-LARGO w. SCS-TRUMPET Side Card & Dual Backplane

## Local Expansion and Mass Storage Solutions

The SC3-LARGO is equipped with a set of high-speed local expansion interface connectors, which can be optionally used to attach a mezzanine side board. A variety of expansion cards is available, e.g. providing legacy I/O such as RS-232, and additional PCI Express® based I/O controllers such as SATA, USB 3.0 and Gigabit Ethernet, and also a third video output.

Most mezzanine side cards can accommodate in addition a 2.5-inch drive. Typically, the SC3-LARGO and the related side card would come as a readily assembled 8HP unit. As an alternate, M.2 (NGFF) or mSATA SSD based low profile mezzanine mass-storage modules are available that fit into the SC3-LARGO 4HP envelope.



## SC3-LARGO • Connector Assembly

[www.ekf.com/s/sc3/img/sc3\\_draft\\_mezzanine.pdf](http://www.ekf.com/s/sc3/img/sc3_draft_mezzanine.pdf)

## Related Documents Mezzanine Modules and Side Cards

C4\* Series  
Mezzanine Storage Modules

[www.ekf.com/c/ccpu/c4x\\_mezz\\_ovw.pdf](http://www.ekf.com/c/ccpu/c4x_mezz_ovw.pdf)

SCS-TRUMPET Mezzanine Side Card

[www.ekf.com/s/csc/scs.html](http://www.ekf.com/s/csc/scs.html)





SC3-LARGO w. SCS-TRUMPET Mezzanine Side Card 8HP Assembly



SC3-LARGO Local Expansion I/F Connectors





SC3-LARGO w. C47-MSATA Mezzanine Module 4HP Assembly



C47-MSATA • Low Profile Dual-SSD Mezzanine Module



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



SC3-LARGO w. C48-M2 SATA Mezzanine Storage Modul 4HP Assembly





SC3-LARGO w. C41-CFAST Mezzanine Module 4HP Assembly



SC3-LARGO w. C42-SATA Mezzanine Module 4HP Assembly



SC3-LARGO w. C44-SATA Mezzanine Module 8HP Assembly



SC3-LARGO w. C45-SATA Mezzanine Module 8HP Assembly



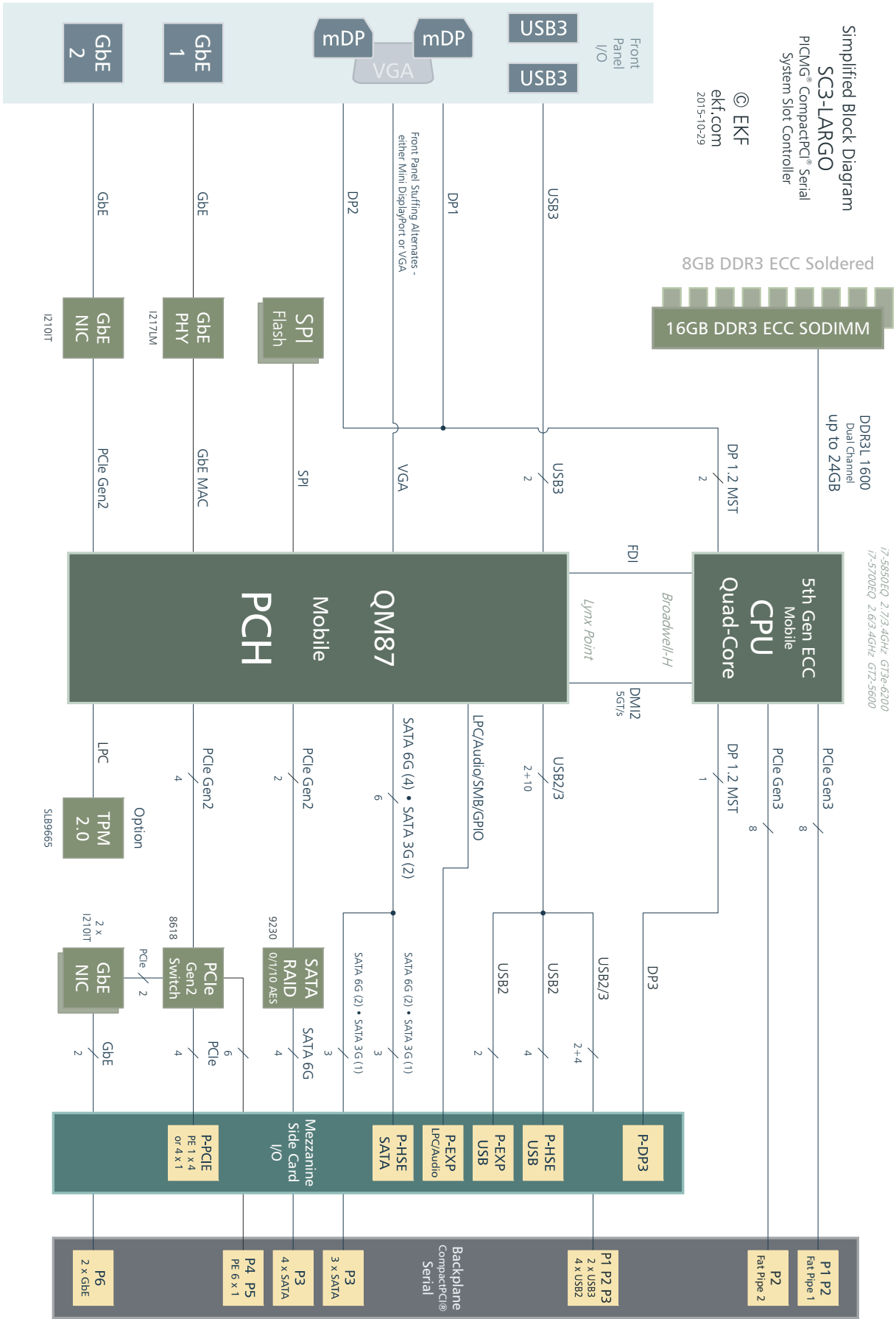


8HP Assembly w. SCS-TRUMPET Side Card & 2.5-Inch SATA SSD



8HP Assembly w. SCS-TRUMPET Side Card & Dual M.2 SATA SSD

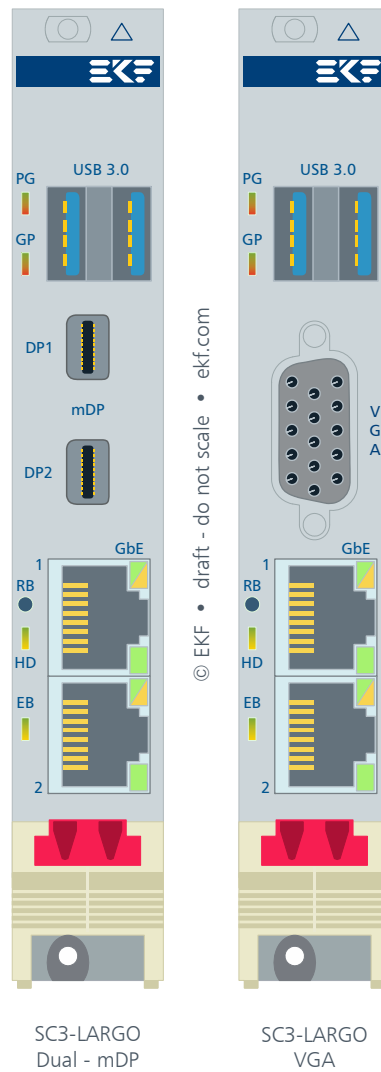
Block Diagram



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## Front Panel Options



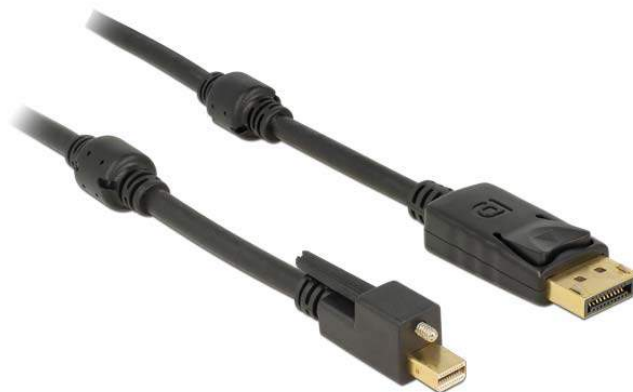
### Screw Locking Option for mDP Connectors

Opposite to the Standard DisplayPort cable connectors, mDP connectors are not provided with a latching device. For rugged applications with need for a connector locking mechanism, EKF offers two methods of fixing.



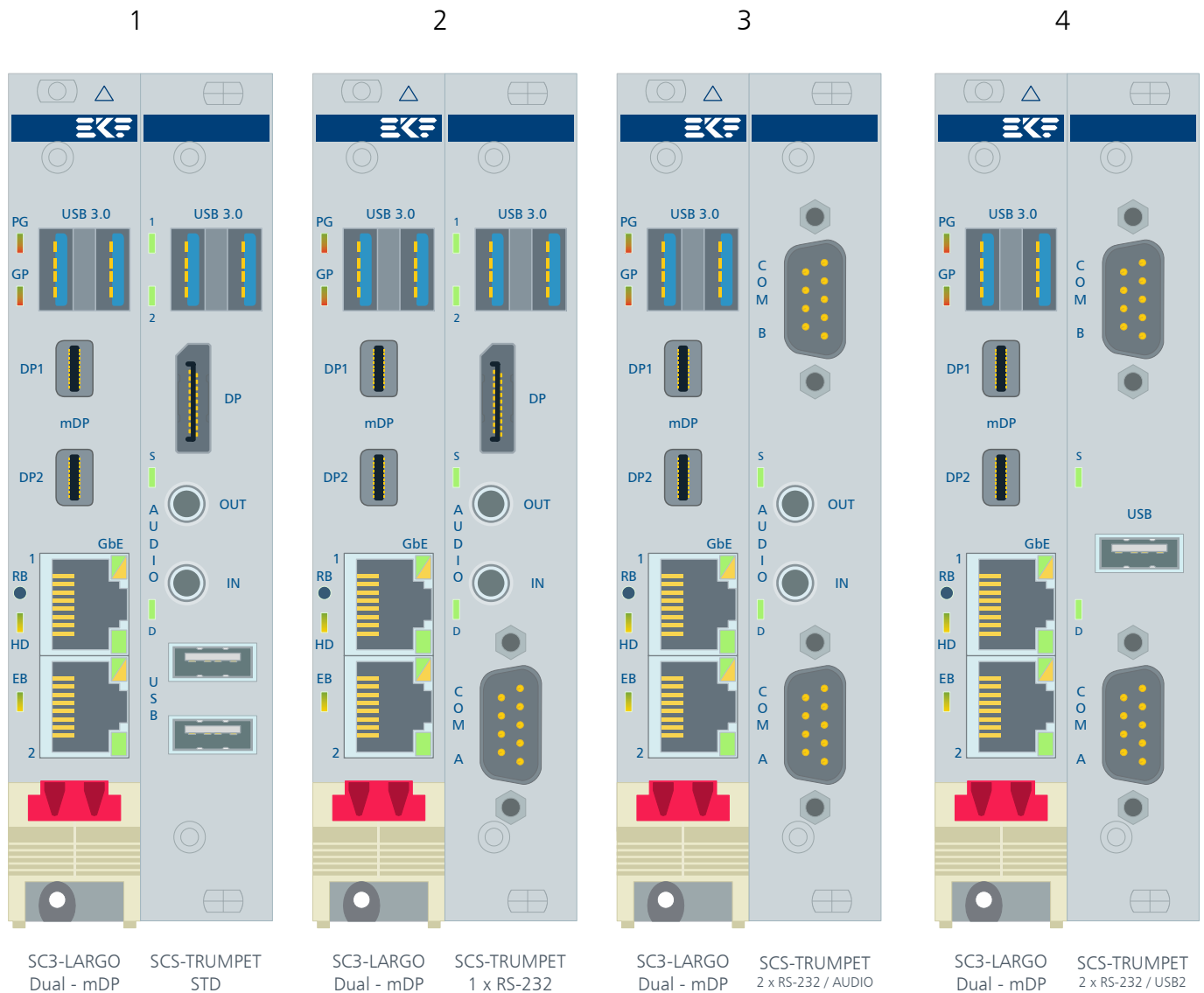
Option Screw-Lock Plate for mDP Cable Connectors

1. The front panel is provided with a threaded hole for fixing a removable H-shape retainer plate, which is available from EKF as accessory (image above).
2. As an alternate, the customer can use cable assemblies with screw-locked mDP connectors (image below). The front panel has to be modified however for this solution (two threaded holes in addition, please specify when ordering).



Screw-Locked mDP Connector Cable Assembly (Delock)

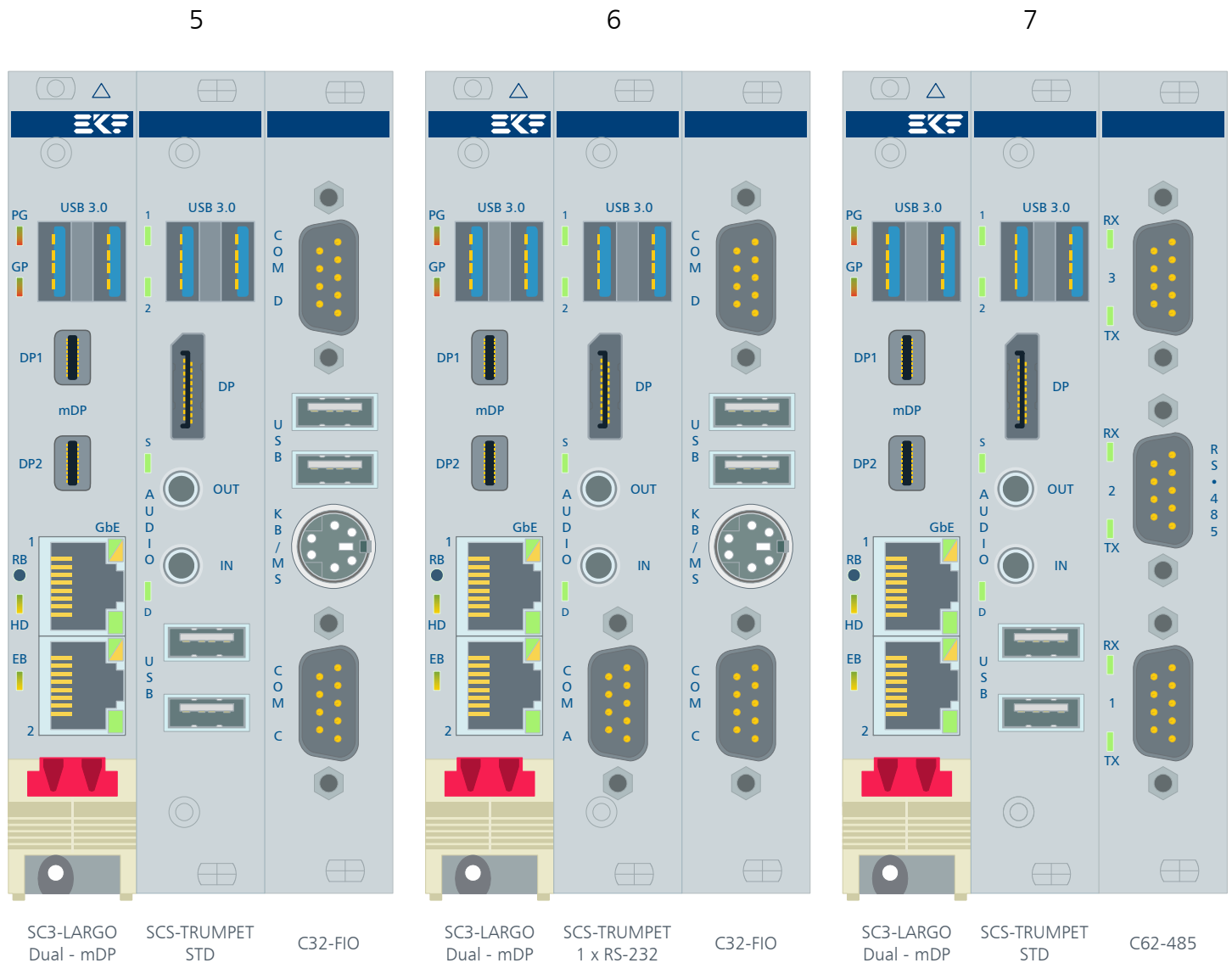
## Sample Front Panel Options 8HP



In Addition to CPU I/O:

1. Typical assembly, dual-USB 3.0, DisplayPort, 3.5mm stereo audio in/out, 2 x USB 2.0
2. Bottom RS-232 male D-Sub 9-pin (COM-A) replaces two USB 2.0 jacks
3. Top RS-232 male D-Sub 9-pin (COM-B) replaces dual-USB 3.0 and DisplayPort connectors
4. Center USB 2.0 receptacle replaces both 3.5mm stereo audio jacks

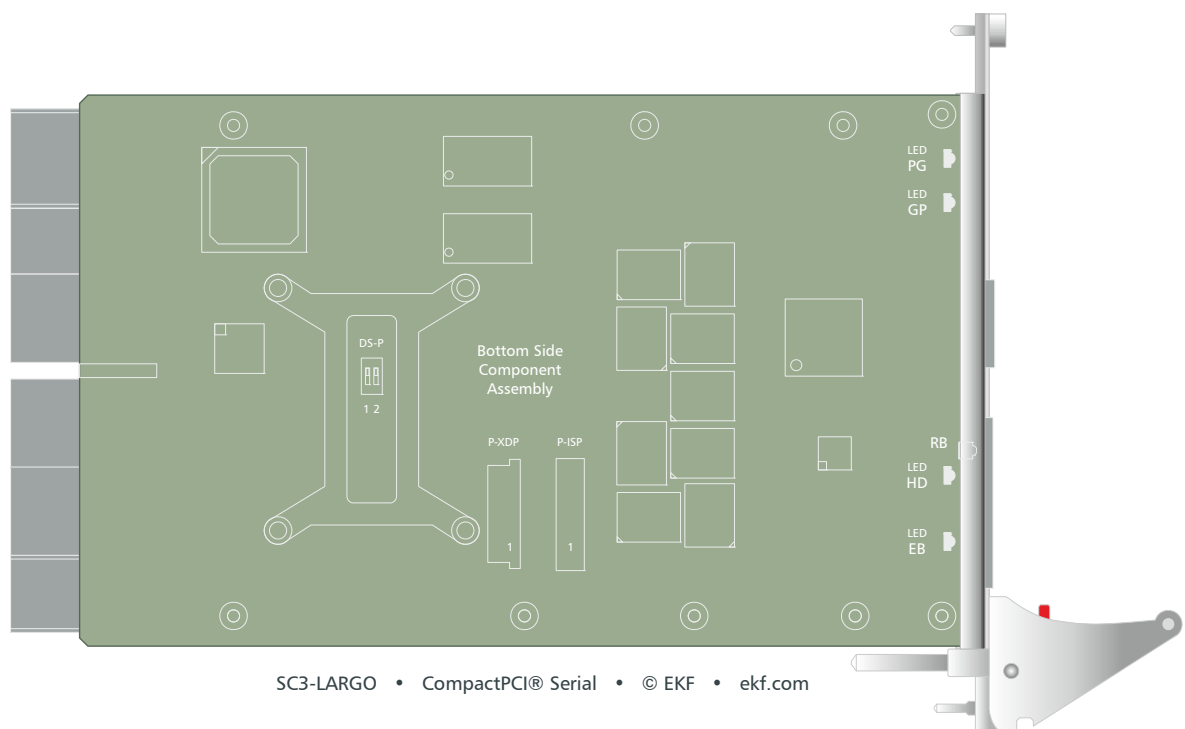
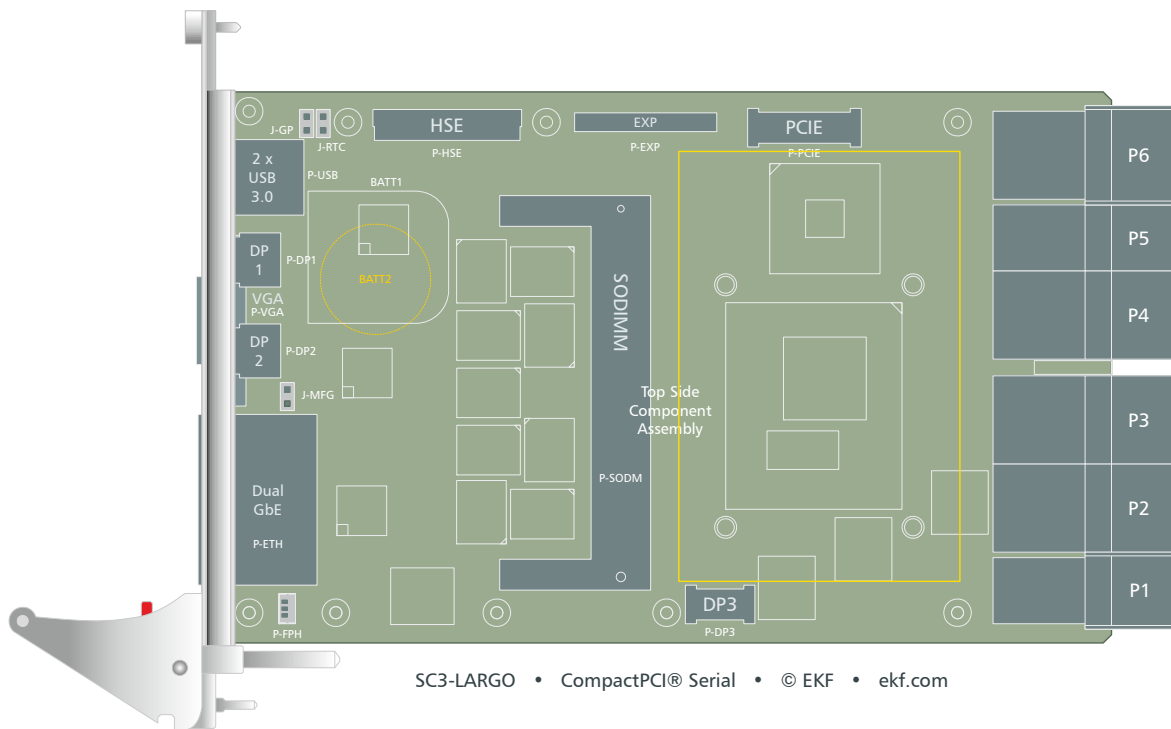
## Sample Front Panel Options 12HP



In Addition to CPU I/O:

- 5. Dual-USB 3.0, DisplayPort, 3.5mm stereo audio in/out, 4 x USB 2.0, 2 x RS-232 (COM-C/D)
- 6. Dual-USB 3.0, DisplayPort, 3.5mm stereo audio in/out, 2 x USB 2.0, 3 x RS-232 (COM-A/C/D)
- 7. Dual-USB 3.0, DisplayPort, 3.5mm stereo audio in/out, 2 x USB 2.0, 3 x RS-485 Isolated

## Major Components Top / Bottom View



[www.ekf.com/s/sc3/img/sc3\\_draft\\_2-3.pdf](http://www.ekf.com/s/sc3/img/sc3_draft_2-3.pdf)

## Racks



SRS-BLUBOXX Series for up to 4 Peripheral Slot Cards





SRS-4401-RACK for up to 8 Peripheral Slot Cards



Custom Specific Racks 19-Inch

## CoolConduct® Heat Exchange Technology (Option)

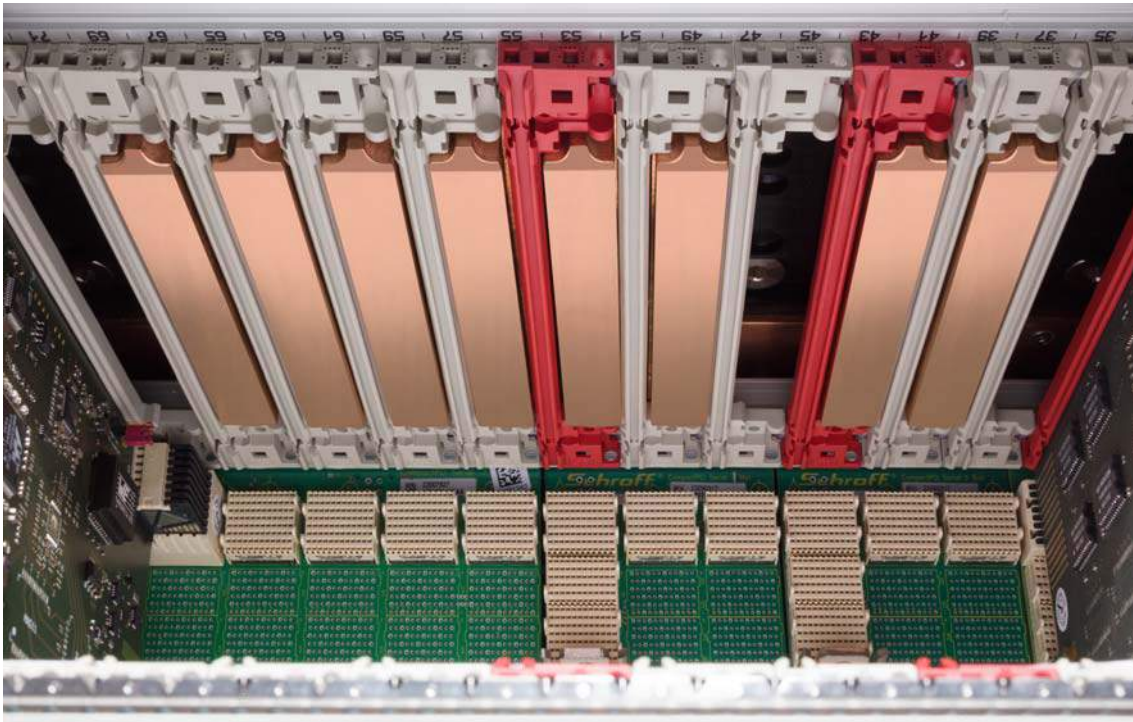


CoolConduct® Heat Spreader

**CoolConduct®** is a special technology developed by EKF and partners for optimum cooling of card slots, by means of a powerful heat exchanger system. Any card slot will be cooled down via flexible mounted skids, which match the ridge of a suitable heat spreader on the particular board.

Skids and heat spreaders are made up of massive copper. The runners are overcoated with a special substance for optimum heat conduction. **CoolConduct®** allows to swap boards easily. Several hundred Watts power can be dissipated as required for industrial high performance multiprocessing systems.





CoolConduct® Skids

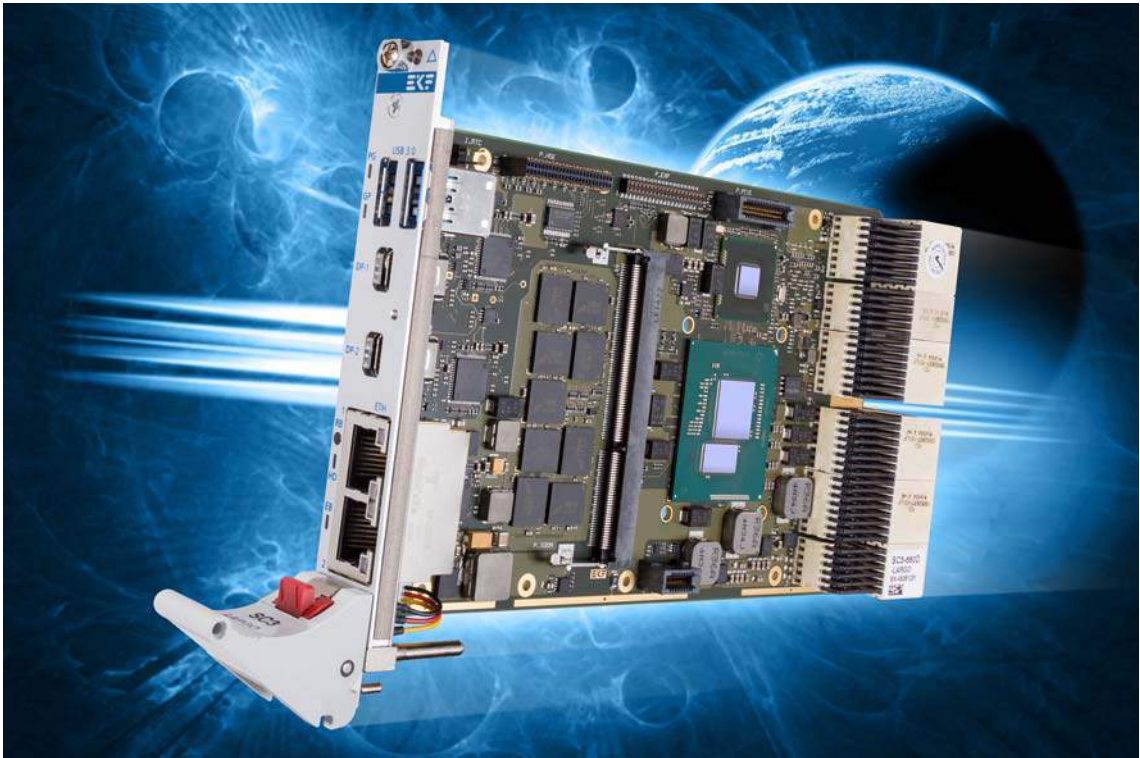


CoolConduct® System

Related Information	
SC3-LARGO Home	<a href="http://www.ekf.com/s/sc3/sc3.html">www.ekf.com/s/sc3/sc3.html</a>
SC3-LARGO User Guide	<a href="http://www.ekf.com/s/sc3/sc3_ug.pdf">www.ekf.com/s/sc3/sc3_ug.pdf</a>

General Information CompactPCI® PlusIO & CompactPCI® Serial	
CompactPCI® Serial Concise Overview	<a href="http://www.ekf.com/s/serial_concise.pdf">www.ekf.com/s/serial_concise.pdf</a>
CompactPCI® Serial All You Need to Know	<a href="http://www.ekf.com/s/smart_solution.pdf">www.ekf.com/s/smart_solution.pdf</a>
CompactPCI® Serial Home	<a href="http://www.ekf.com/s/serial.html">www.ekf.com/s/serial.html</a>
CompactPCI® PlusIO Home	<a href="http://www.ekf.com/p/plus.html">www.ekf.com/p/plus.html</a>

Ordering Information
For popular SC3-LARGO SKUs please refer to <a href="http://www.ekf.com/liste/liste_21.html#SC3">www.ekf.com/liste/liste_21.html#SC3</a>
For popular Mezzanine Side Cards please refer to <a href="http://www.ekf.com/liste/liste_20.html#C40">www.ekf.com/liste/liste_20.html#C40</a>









Beyond All Limits:  
EKF High Performance Embedded

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