



Technical Information

SCZ-NVM
Mezzanine I/O Expansion Board
Multifunction CPU Side Card

Edition 3

Document No. 8536 • 26 October 2017



Contents

About this Manual	3
Edition History	3
Related Documents	4
Nomenclature	4
Trade Marks	4
Legal Disclaimer - Liability Exclusion	4
Standards	5
Features	6
System Requirements	9
Storage Options	11
Front Panel I/O	12
Block Diagram	15
Summary of Connectors	16
Front Panel Connectors	16
On-Board Connectors	16
Inter-Board Connectors (CPU Carrier)	16
Installing and Replacing Components	17
Before You Begin	17
Warnings	17
Caution	17
Installing the Board	18
Removing the Board	19
EMC Recommendations	20
Technical Reference	21
Caution	21
Please Note	21
Front Panel Elements	22
COM-A/B	23
DisplayPort	24
USB 3.0	26
On-Board Connectors	27
FIO	28
M.2 Connectors	30
Inter-Board Connectors	33
Custom Specific Connector	37

About this Manual

This manual is a short form description of the technical aspects of the SCZ-NVM, required for installation and system integration. It is intended for the advanced user only. The latest version of this document may be obtained from www.ekf.com/s/scz/scz_ti.pdf.

Edition History

Ed.	Contents/ <i>Changes</i>	Author	Date
1	Technical Information SCZ-NVM, english, preliminary edition Text #8536, File: scz_ti.wpd	jj	13 June 2017
2	Description of custom specific connector (battery voltage) added	jj	19 October 2017
3	Photos added	jj	26 October 2017

Related Documents

Related Information SCZ-NVM	
SCZ-NVM Home	www.ekf.com/s/scz/scz.html
SCZ-NVM Technical Information (PDF)	www.ekf.com/s/scz/scz_ti.pdf
CompactPCI® Serial CPU Cards	www.ekf.com/s/serial.html#SC
CompactPCI® Serial Home	www.ekf.com/s/serial.html
CompactPCI® Serial Concept (PDF)	www.ekf.com/s/smart_solution.pdf
CompactPCI® Serial Products Short Selection (PDF)	www.ekf.com/s/serial_concise.pdf

Nomenclature

Signal names used herein with an attached '#' designate active low lines.

Trade Marks

Some terms used herein are property of their respective owners, e.g.

- ▶ Core™ i*, XEON® E3 : Intel®
- ▶ CompactPCI®, CompactPCI® PlusIO, CompactPCI® Serial: PICMG®
- ▶ Windows: Microsoft®
- ▶ EKF, ekf system: ® EKF

EKF does not claim this list to be complete.

Legal Disclaimer - Liability Exclusion

This manual has been edited as carefully as possible. We apologize for any potential mistake. Information provided herein is designated exclusively to the proficient user (system integrator, engineer). EKF can accept no responsibility for any damage caused by the use of this manual.

Standards

Reference Documents		
Term	Document	Origin
CompactPCI® Serial	PICMG® CPCI-S.0 R. 2.0	www.picmg.org
DisplayPort®	VESA DisplayPort Standard	www.vesa.org
M.2 Module	PCI Express M.2 Specification Revision 1.1 Formerly known as Next Generation Form Factor (NGFF)	www.pcisig.com
PCI Express®	PCI Express® Base Specification 3.0	www.pcisig.com
RS-232 EIA-232	Telecommunications Industry Association TIA 232 Sometimes inaccurately referred to as DOS COM port, based on a hardware interface called UART (universal asynchronous receiver/transmitter)	www.tiaonline.org
USB	USB 3.1 Universal Serial Bus Specification USB 2.0 Universal Serial Bus Specification	www.usb.org

Related Information CPU Carrier Cards	
New Mezzanine Connectors	www.ekf.com/s/sc4/new_mezzanine_connectors.pdf
SC4-CONCERTO	www.ekf.com/s/sc4/sc4.html
SC5-FESTIVAL	www.ekf.com/s/sc5/sc5.html

Features

Feature Summary

General

- ▶ Mixed function mezzanine side card for EKF CompactPCI® Serial CPU boards
- ▶ Based on new mezzanine connectors HSE1/HSE2 (8 x PCIe, DP, USB3)
- ▶ Suitable e.g. for use with CPU cards SC4-CONCERTO, SC5-FESTIVAL
- ▶ Provides additional front panel I/O, and dual M.2 NVMe SSD
- ▶ 8HP assembly together with CPU card
- ▶ 12HP assembly in total with CPU card and C32-FIO mezzanine

Front Panel I/O

- ▶ USB 3.1 Gen1 xHCI SuperSpeed F/P Type-A connector
- ▶ DisplayPort F/P connector (standard type, latched), 3rd graphics output
- ▶ 2 x RS-232 male D-Sub 9-pin (COM port) F/P connectors
- ▶ Option C32-FIO legacy front panel I/O (2 x RS-232, 1 x USB2 Type-A)
- ▶ Integrated 8HP front panel for CPU card and SCZ-NVM (12HP when C32-FIO third floor mezzanine is installed in addition)

On-Board Mass Storage Options

- ▶ 1 x M.2 connector (formerly known as NGFF), M-key, suitable for NVMe (PCIe Gen3 x4) SSD modules, up to 22110 size
- ▶ 1 x M.2 connector, M-key, suitable for standard NVMe (PCIe Gen3 x2) SSD and special function modules e.g. Intel® Optane™, or EKF M01-NVSRAM, up to 22110 size

UART

- ▶ Diodes/Pericom PI7C9X7954 PCI Express® bridge to quad port UART (Universal Asynchronous Receiver Transmitter), 16C550-type compatible, up to 15Mbps
- ▶ Two ports with RS-232 transceivers MAX3243E, TIA/EIA-232-F, up to 250kbps, for front panel I/O (D-Sub connectors 9-pin male, COM port pin assignment)
- ▶ Two UART ports for use on C32-FIO mezzanine module (option), TTL level signals

Feature Summary

Applications

- ▶ Local expansion (side card) for EKF CPU boards
- ▶ NVMe SSD based mass storage solution, 2 x M.2 connectors for PCIe based modules
- ▶ Classic COM port front I/O (RS-232), expandable to 4 ports
- ▶ 3rd DisplayPort receptacle (video output) for 4k capable multi-monitor applications
- ▶ USB 3.0 based port for communication or removable storage

Environmental, Regulatory

- ▶ Designed & manufactured in Germany
- ▶ ISO 9001 certified quality management
- ▶ Custom specific development available on request
- ▶ Long term availability
- ▶ Rugged solution
- ▶ Coating, sealing, underfilling on request
- ▶ RoHS compliant 2002/95/EC
- ▶ Operating temperature 0°C to +70°C (commercial temperature range)
- ▶ 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
- ▶ EC Regulations EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1)
- ▶ MTBF 59.6 years

General Information

Available as a mezzanine add-on expansion board (aka side card) e.g. to the SC5-FESTIVAL CompactPCI® Serial CPU, the SCZ-NVM is equipped with two M.2 NVMe type SSD module sockets, as a rugged mass storage solution. In addition, frequently required I/O functions (RS-232, USB 3.0, DisplayPort) are provided via front panel connectors.

Both M.2 sockets are suitable for PCIe based modules (M-key) up to the 22110 format. The upper connector establishes a PCIe Gen3 link x4 and should be used with the the main NVMe SSD. The lower connector M.2 socket supports a PCIe Gen3 link x2, for NVMe SSD backup storage, or special purpose modules such as the Intel® Optane™ SSD or the EKF M01-NVSRAM.



System Requirements

The SCZ-NVM is a mezzanine side card, to be fixed on top of a suitable CPU carrier board. The pitch between carrier PCB and mezzanine PCB is 4HP, resulting in a 8HP common front panel for the entire assembly.

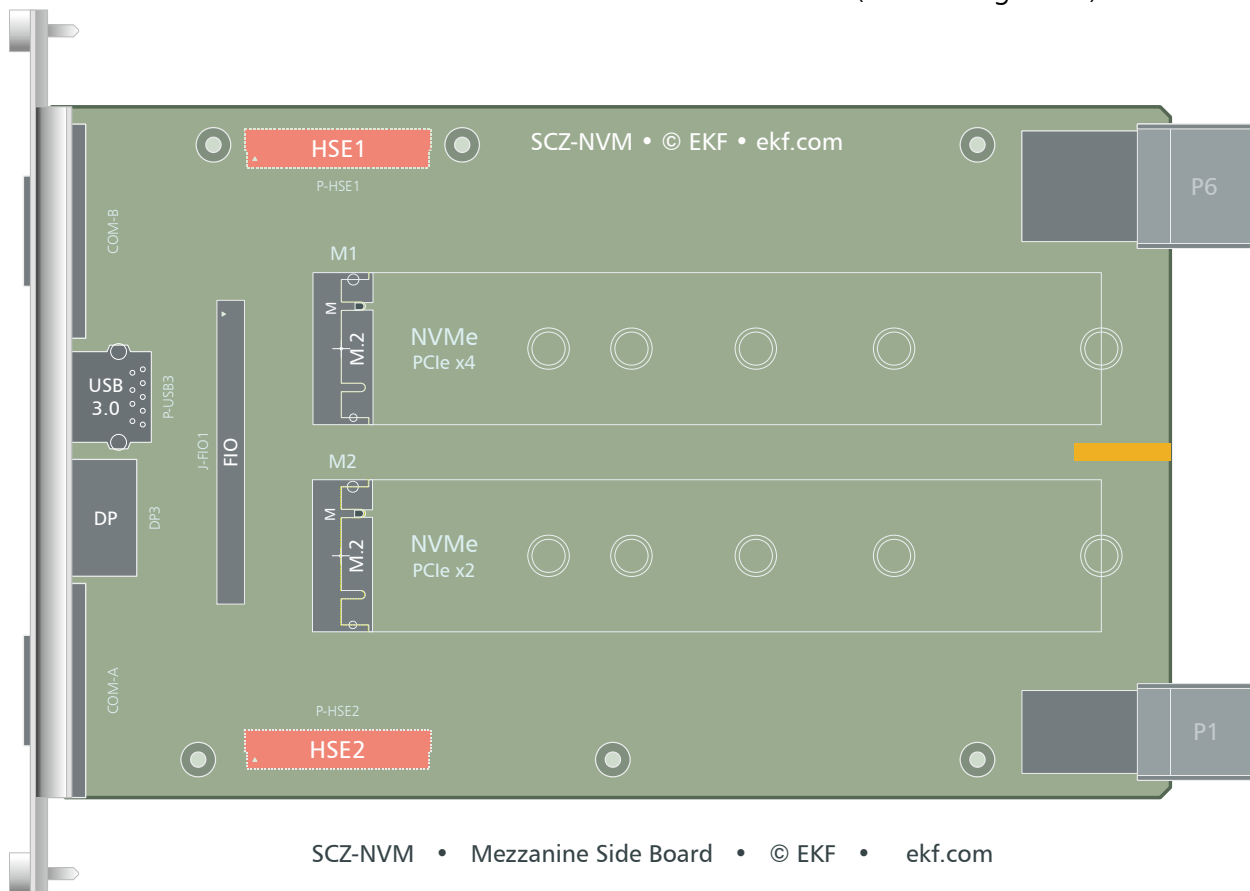
Two mezzanine inter-board connectors are in use, for distribution of high speed I/O signals from the CPU carrier to the side board. These are referred to as *HSE1* (PCIe x4 and USB3 High Speed Expansion), and *HSE2* (PCIe x4 and DisplayPort). The mezzanine connectors are situated on the bottom side of the SCZ-NVM, facing towards their mating CPU card connectors.

For full functionality, suitable CPU carrier boards must conform to the EKF '2017 New Mezzanine Concept' (i.e. HSE1 and HSE2 connectors supported).

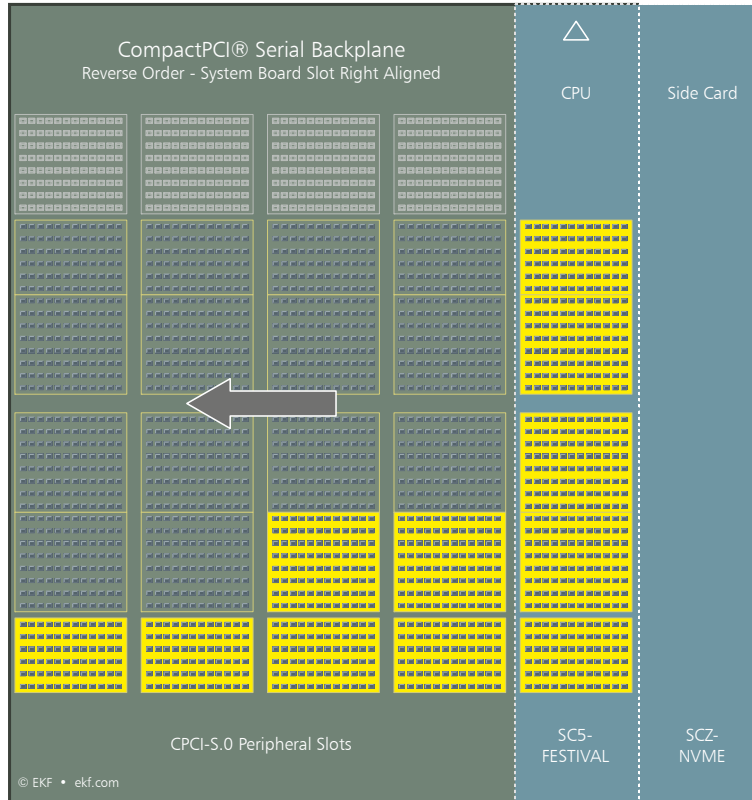
The SCZ-NVM also is a carrier board itself, which can accommodate a 3rd floor front panel I/O expansion card, as an option.

It is recommended to use a CompactPCI[®] Serial backplane which provides the CPU card system slot on the right edge, in order to prevent loss of a peripheral card backplane slot (the SCZ-NVM is then positioned out of the backplane shape).

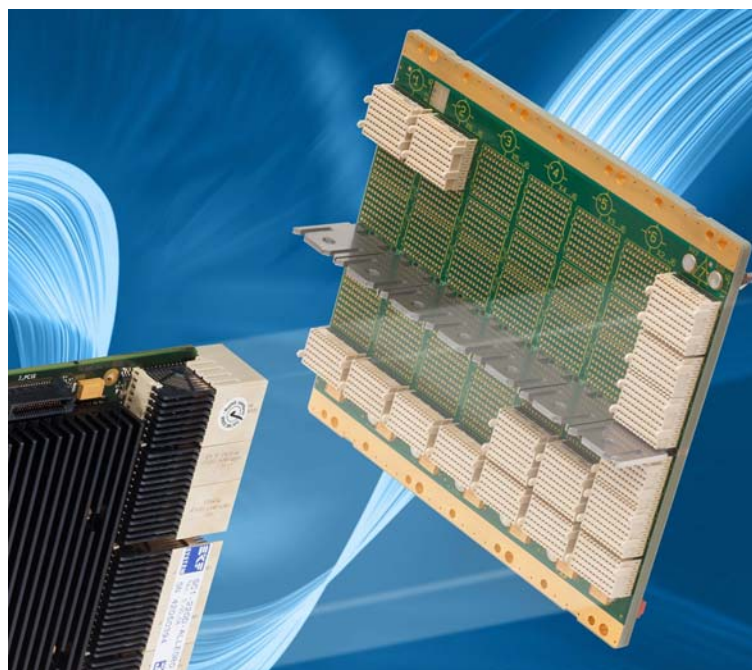
Bottom Side Mezzanine Connectors HSE1 & HSE2 (see-through PCB)



Mounting recommendation



Illustrated above is a sample 4+1 slot CompactPCI® Serial backplane, with its system slot (CPU card) right aligned. This results in a mounting position of the side card out of the backplane shape. In contrast, a peripheral card slot would get lost, blocked by the side card, when using a system slot left aligned backplane.



Sample Backplane System Slot Right

Storage Options

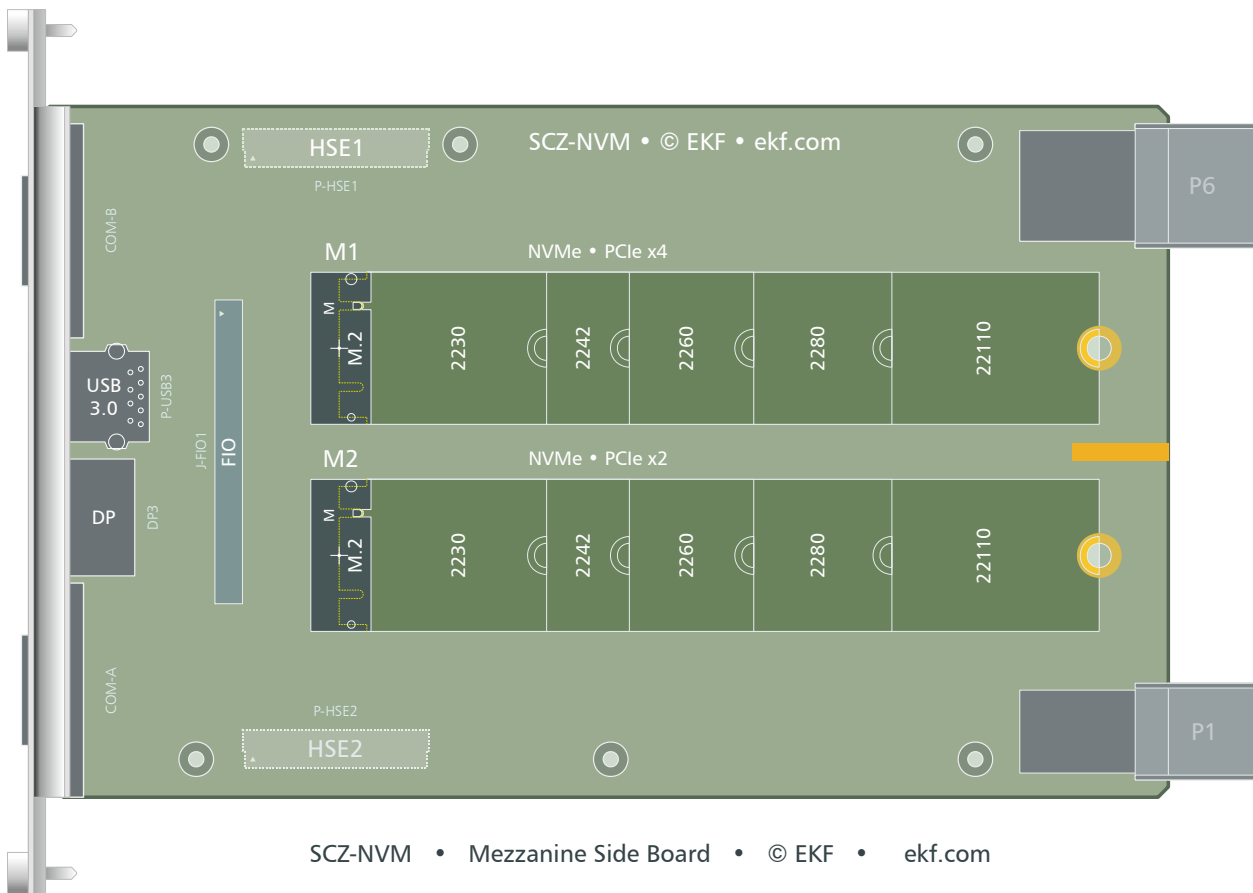
The SCZ-NVM can be populated with two M.2 (NGFF) PCI Express® driven SSD storage modules, up to the 22110 size.

Suitable PCIe x4 SSD modules are provided with an M-key and conform to the M.2 specification 'Socket 3' pinout. M.2 NVMe SSD modules are available up to 2TB as of current, mostly as 2280 type.

The upper socket *M1* is wired to the mezzanine connector HSE1, for a PCIe Gen3 x4 link, resulting in a theoretical maximum bandwidth of 32Gbps.

The lower M.2 connector *M2* is controlled by a x2 link, established via the HSE2 mezzanine connector, for a maximum data transfer rate of up to 16Gbps.

SCZ-NVM • On-Board M.2 PCIe x4 SSD Module Sockets

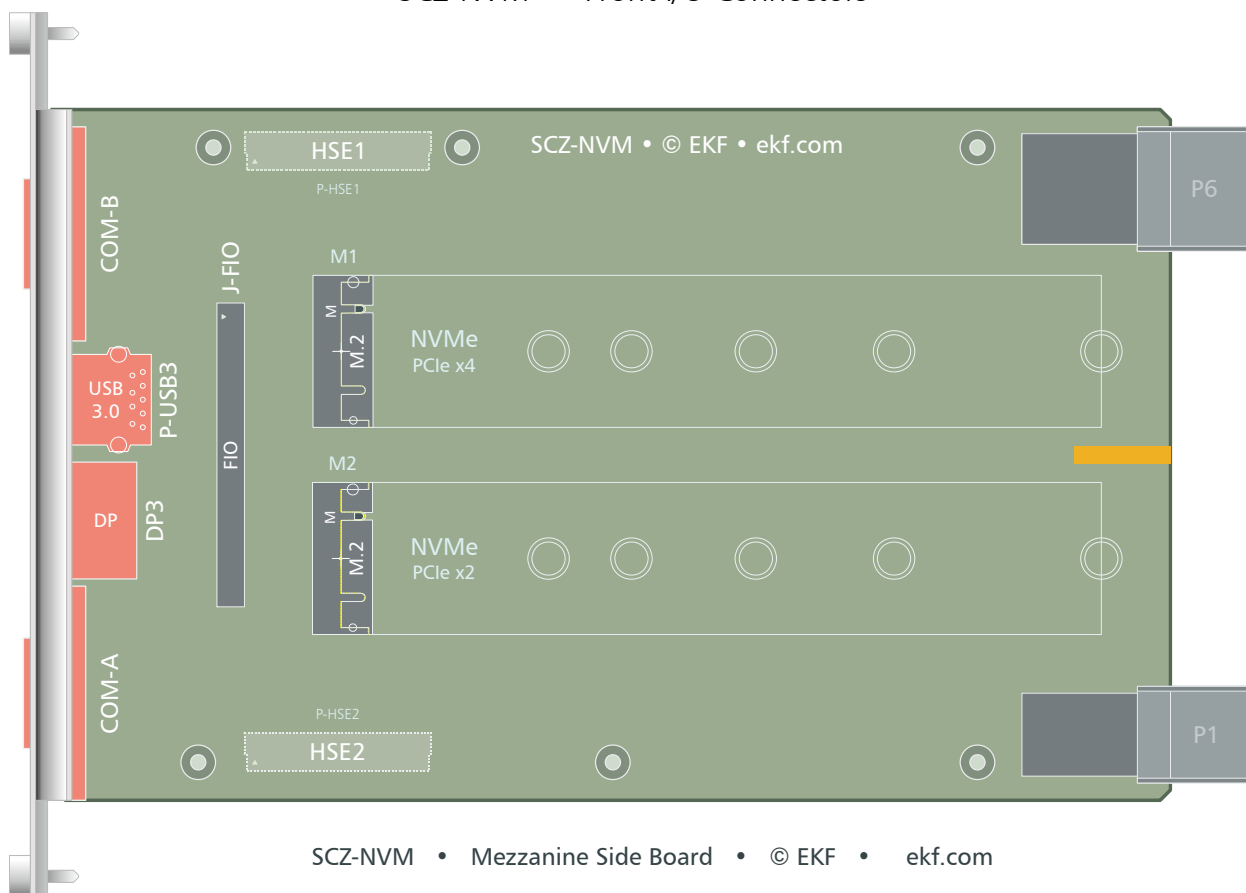


Front Panel I/O

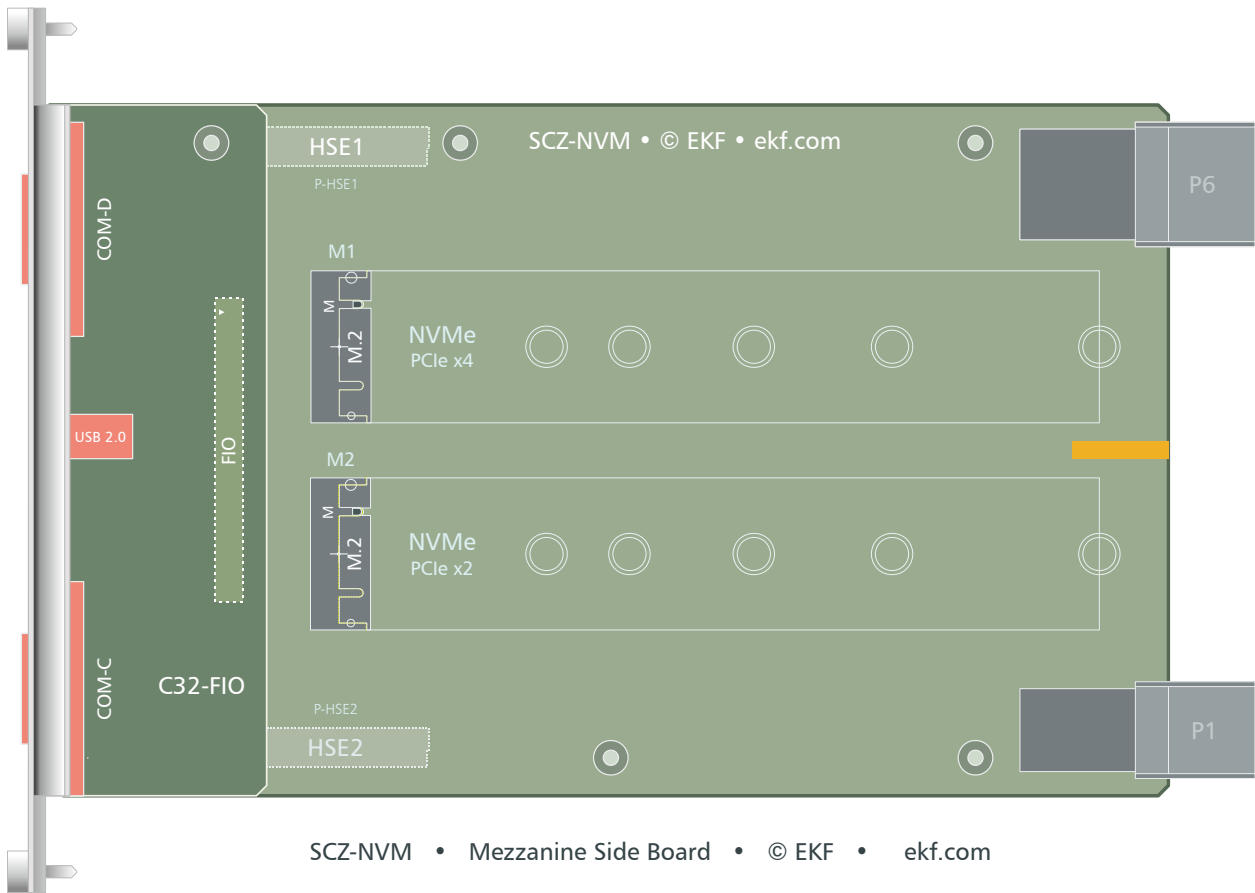
The SCZ-NVM expands the suite of front panel connectors of a particular CPU carrier board by an USB 3.0 receptacle, a DisplayPort video output, and two D-Sub connectors with EIA-232 signal level COM port pin assignment.

In addition, the SCZ-NVM can accommodate the C32-FIO front panel I/O mezzanine module, for a total front panel width of 12HP. The C32-FIO provides another two RS-232 COM ports, and an USB 2.0 receptacle.

SCZ-NVM • Front I/O Connectors



SCZ-NVM • C32-FIO Mezzanine Module - COM Port Front Connectors

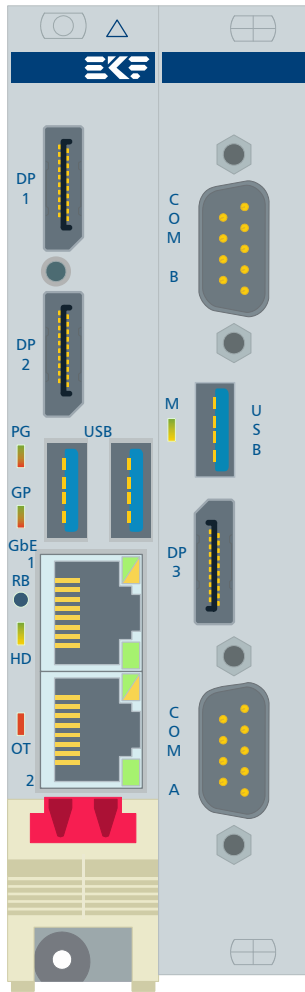


Related Documents

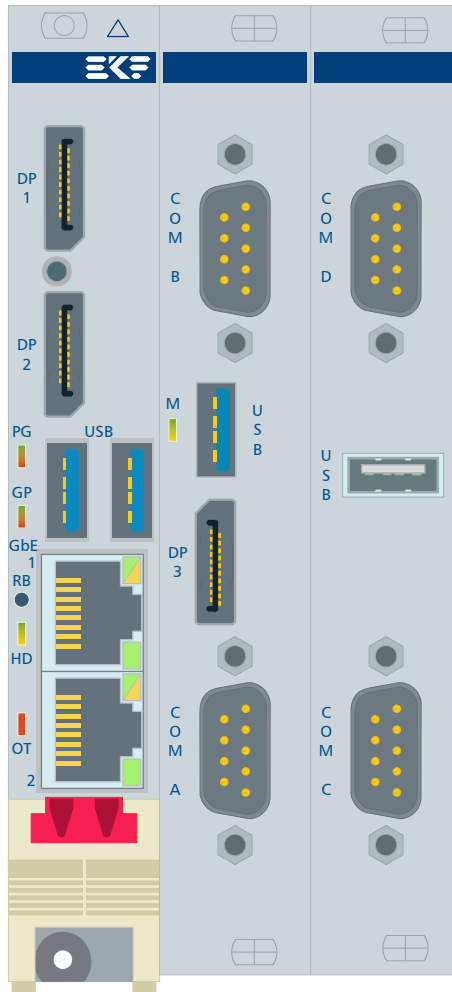
C32-FIO Mezzanine Front I/O Module

www.ekf.com/c/ccpu/c32/c32_tie.pdf

Sample Front Panels 8HP & 12HP

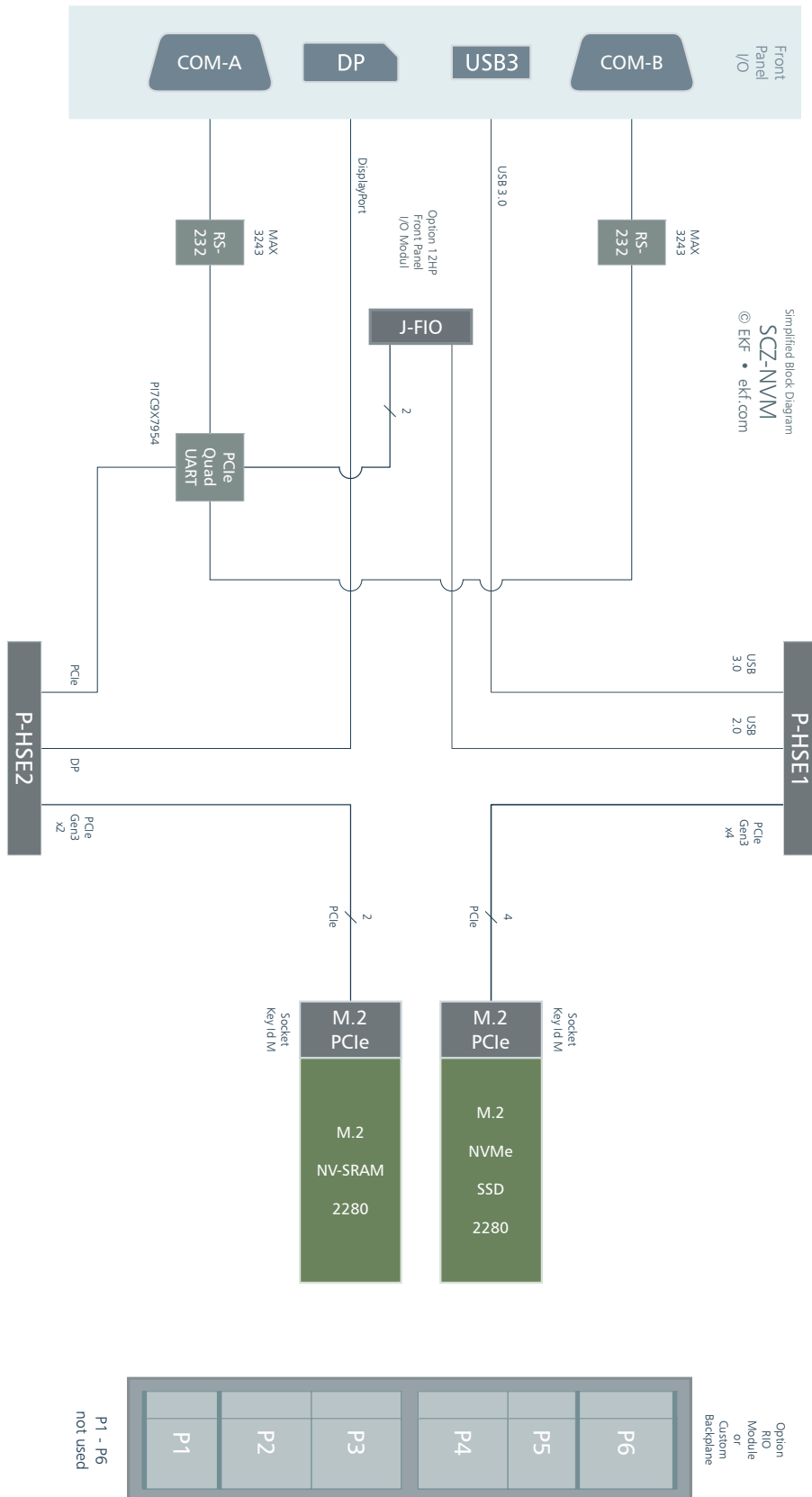


SC5-FESTIVAL SCZ-NVM



SC5-FESTIVAL SCZ-NVM C32-FIO

Block Diagram



Summary of Connectors

Not all of the connectors or other elements listed below may be present or functional on your actual SCZ-NVM board. Assembly of these connectors is highly custom specific. Discuss your needs (target application) with EKF before ordering, for an optimum CPU & side card configuration.

Front Panel Connectors

COM-A	D-Sub 9-pin male connector, EIA 232 signal level
COM-B	D-Sub 9-pin male connector, EIA 232 signal level
DP3	DisplayPort video output connector, latching type, standard mount
USB3	USB 3.0 receptacle Type-A (USB 3.1 Gen1 5Gbps)

On-Board Connectors

FIO	Option, 12HP front panel I/O mezzanine card connector, suitable for the C32-FIO module (UART ports TTL level, USB)
M1	M.2 module socket (M-key), suitable for an on-board M.2 style NVMe SSD storage module, PCIe Gen3 x4 support, 2230-22110 module size
M2	M.2 module socket (M-key), suitable for an on-board M.2 style NVMe SSD storage module, PCIe Gen3 x2 support, 2230-22110 module size

Inter-Board Connectors (CPU Carrier)

HSE1	High speed mezzanine connector, available from bottom of the SCZ-NVM PCB, mating with the corresponding connector on the CPU carrier board, comprising of: <ul style="list-style-type: none"> ▶ PCI Express® Gen3, configured for single link x4 ▶ 1 x USB3 ▶ 1 x USB2
HSE2	High speed mezzanine connector, available from bottom of the SCZ-NVM PCB, mating with the corresponding connector on the CPU carrier board, comprising of: <ul style="list-style-type: none"> ▶ PCI Express® Gen3, configured as two links x2 ▶ 1 x DisplayPort

Installing and Replacing Components

Before You Begin

Warnings

The procedures in this chapter assume familiarity with the general terminology associated with industrial electronics and with safety practices and regulatory compliance required for using and modifying electronic equipment. Disconnect the system from its power source and from any telecommunication links, networks or modems before performing any of the procedures described in this chapter. Failure to disconnect power, or telecommunication links before you open the system or perform any procedures can result in personal injury or equipment damage. Some parts of the system can continue to operate even though the power switch is in its off state.



Caution

Electrostatic discharge (ESD) can damage components. Perform the procedures described in this chapter only at an ESD workstation. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis or board front panel. Store the board only in its original ESD protected packaging. Retain the original packaging (antistatic bag and antistatic box) in case of returning the board to EKF for repair.



Installing the Board

Warning

This procedure should be done only by qualified technical personnel. Disconnect the system from its power source before doing the procedures described here. Failure to disconnect power, or telecommunication links before you open the system or perform any procedures can result in personal injury or equipment damage.

Typically you will perform the following steps:

- Switch off the system, remove the AC power cord
- Attach your antistatic wrist strap to a metallic part of the system
- Remove the board assembly packaging, be sure to touch the board only at the front panel
- Identify the related CompactPCI slot (peripheral slot for I/O boards, system slot for CPU boards, with the system slot typically most right or most left to the backplane)
- Insert card carefully (be sure not to damage components mounted on the bottom side of the board by scratching neighbored front panels)
- A card with onboard connectors requires attachment of associated cabling now
- Lock the ejector lever, fix screws at the front panel (top/bottom)
- Retain original packaging in case of return



Removing the Board

Warning

This procedure should be done only by qualified technical personnel. Disconnect the system from its power source before doing the procedures described here. Failure to disconnect power, or telecommunication links before you open the system or perform any procedures can result in personal injury or equipment damage.

Typically you will perform the following steps:

- Switch off the system, remove the AC power cord
- Attach your antistatic wrist strap to a metallic part of the system
- Identify the board, be sure to touch the board only at the front panel
- Unfasten any front panel screws (top/bottom), unlock the ejector lever
- Remove any onboard cabling assembly
- Activate the ejector lever
- Remove the card assembly carefully (be sure not to damage components mounted on the bottom side of the board by scratching neighbored front panels)
- Store board in the original packaging, do not touch any components, hold the board at the front panel only



Warning

Do not expose the card to fire. Battery cells and other components could explode and cause personal injury.



EMC Recommendations



In order to comply with the CE regulations for EMC, it is mandatory to observe the following rules:

- The chassis or rack including other boards in use must comply entirely with CE
- Close all board slots not in use with a blind front panel
- Front panels must be fastened by built-in screws
- Cover any unused front panel mounted connector with a shielding cap
- External communications cable assemblies must be shielded (shield connected only at one end of the cable)
- Use ferrite beads for cabling wherever appropriate
- Some connectors may require additional isolating parts

Technical Reference

Caution

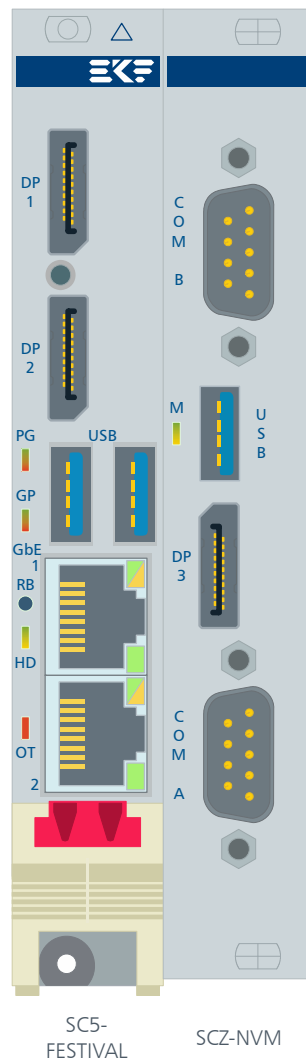
Some of the connectors may provide operating voltage (e.g. +12V, +5V and +3.3V) to devices inside the system chassis, such as internal peripherals. Not all of these connectors are overcurrent protected. Do not use these connectors for powering devices external to the computer chassis. A fault in the load presented by the external devices could cause damage to the board, the interconnecting cable and the external devices themselves.

Please Note

The SCZ-NVM mezzanine module may be equipped with several on-board connectors for system internal usage. Not all of these connectors may be present on a particular board. Be sure to specify your individual needs when ordering the SCZ-NVM board. Characteristic features and the pin assignments of each connector are described on the following pages (connector designation in alphabetical order within the groups 'front panel connectors', 'on-board connectors', 'inter-board connectors', and 'rear I/O connectors').

Front Panel Elements

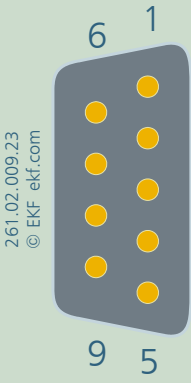
As of current, suitable CPU carrier boards for use together with the SCZ-NVM side card are the SC4-CONCERTO and SC5-FESTIVAL. The SCZ-NVM side board mounts on top (at the right side) of the CPU card. By default, the SCZ-NVM shares an 8HP (~40.6mm) front panel with the CPU. When combined with the C32-FIO mezzanine module, the assembly width would be 12HP (~61mm) in total. Further more, custom specific front panel options are available on request. Shown below is a popular variant of the SCZ-NVM front assembly.



COM-A	Male D-SUB 9-pin, RS-232E
COM-B	Male D-SUB 9-pin, RS-232E
DP3	DisplayPort front panel video connector
LED M	M.2 Module activity LED M1 =green, M2 =yellow
USB3	USB 3.0 Type-A

COM-A/B

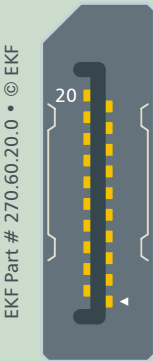
The SCZ-NVM is provided with an on-board PCI Express® to quad port UART bridge (Diodes/Pericom PI7C9X7954). Two asynchronous serial interfaces are available via the front panel (EIA/TIA 232). The other two (TTL-level) can be used across the mezzanine connector FIO by means of the C32-FIO mezzanine board (12HP front panel assembly). Two on-board ESD protected RS-232E transceivers (MAX3243E) allow a bit rate of 250kbps via COM-A/B.

COM-A/B • RS-232				
Male D-Sub 9 (261.02.009.23)				
			1	DCD
	DSR	6		
			2	RXD
	RTS	7		
			3	TXD
	CTS	8		
			4	DTR
	RI	9		
			5	GND

DisplayPort

As of current, the Intel® graphics processing unit (GPU) on the CPU carrier card incorporates three external DisplayPort video channels. Two video outputs are typically available via the CPU card front panel. The SCZ-NVM front panel is provided with a third DP connector.

The related SCZ-NVM DisplayPort video signals are passed from the CPU carrier board through the HSE2 inter-board mezzanine connector to the side card. Independent operation of multiple displays (e.g. Windows® Expanded Desktop) is enabled by the Intel® graphics drivers.

DP3 • DisplayPort Video				
Standard DisplayPort Receptacle, 20-lead (270.60.20.0)				
	20	Power +3.3V 0.5A 1)	19	Return
	18	Hot Plug Detect	17	AUX(N)
	16	GND	15	AUX(P)
	14	CONFIG2 (GND)	13	CONFIG1
	12	LANE3(N)	11	GND
	10	LANE3(P)	9	LANE2(N)
	8	GND	7	LANE2(P)
	6	LANE1(N)	5	GND
	4	LANE1(P)	3	LANE0(N)
	2	GND	1	LANE0(P)

¹⁾ sourced via electronic power switch (back driving protected), maximum current for short circuit detection > 1.5A

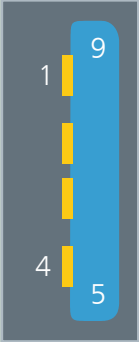
For optimum manual handling of latching DP cable connectors, the SCZ-NVM DP receptacle intentionally is a *standard* mount type, while the DP connectors of the CPU card front panel are *reverse* mount.

Specified by the VESA DisplayPort connector standard is a dedicated power pin 20 (+3.3V 0.5A). Both the SCZ-NVM (source side) and a DP monitor (sink side) must provide power via this pin. A VESA specified standard DisplayPort cable however must not connect the pins 20 of both cable ends, in order to avoid a back driving conflict. Unfortunately there are cable assemblies available with pin 20 passed through, with unpredictable results on the system behaviour, e.g. for CPU sleep states. Therefore the SCZ-NVM is equipped with a power switch in order to protect the CPU and side card assembly from back driving effects caused by non VESA style cables.

Sample VESA Compliant DisplayPort Cable Assemblies 2.0m Plug to Plug, w. Latches • EKF Part. #270.66.1.02.0	
Manhattan	307116, 391931
Molex	68783-0007
TE (Tyco)	2040687-2, 2040638-2

USB 3.0

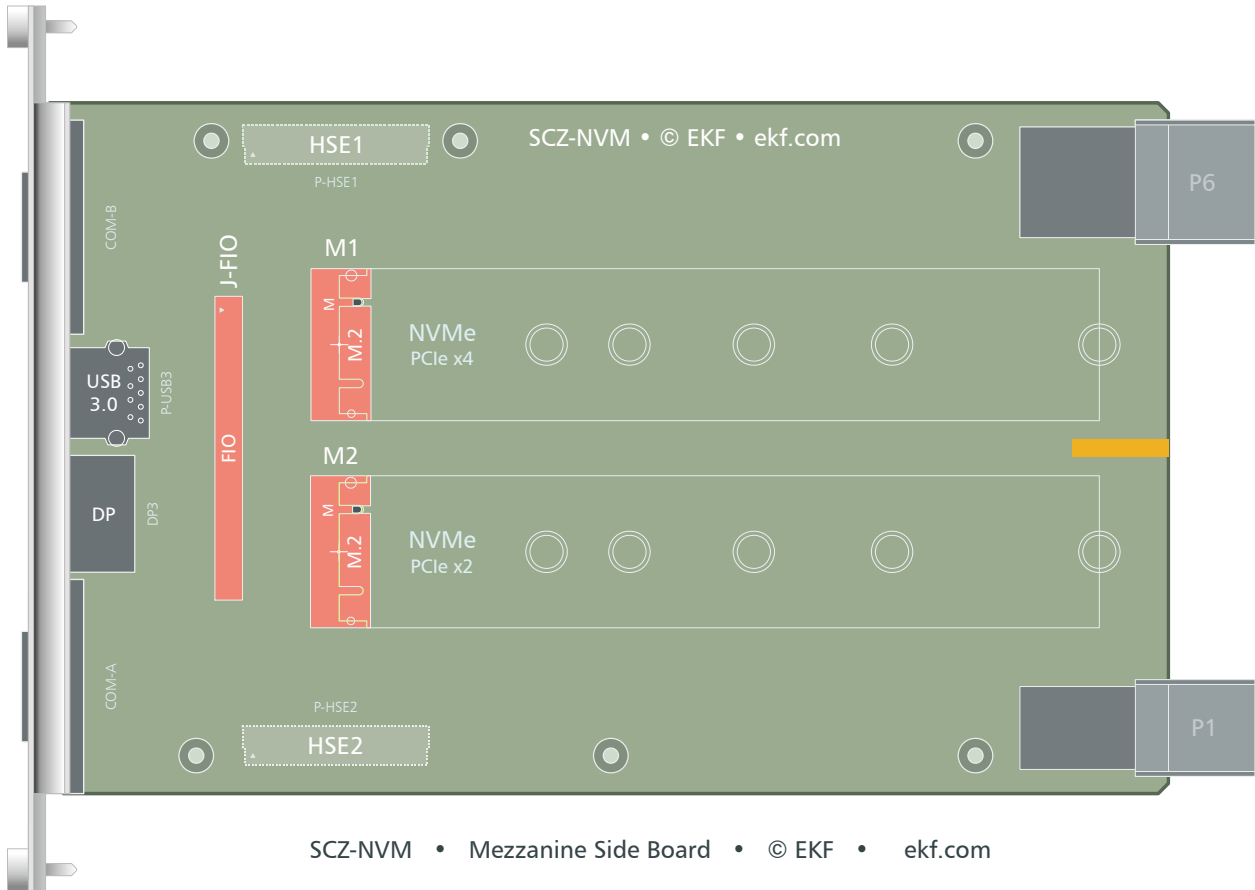
The SCZ-NVM is equipped with a front panel Type-A USB 3.0 receptacle (USB 3.1 Gen1 SuperSpeed 5Gbps). This port is derived from the CPU carrier card PCH (platform controller hub) and passed across the inter-board mezzanine connector HSE1 to the SCZ-NVM.

USB 3.0 Receptacle		
	1	VBUS +5V 1.5Amax
	2	USB D-
	3	USB D+
	4	GND
	5	SS RX-
	6	SS RX+
	7	GND
	8	SS TX-
	9	SS TX+

The connector provides +5V (V_{BUS}) for powering external devices. The electronic power switch (TPS2064) used on the SCZ-NVM limits the maximum V_{BUS} output current to a safe level. The USB power switch is rated at >1.5A current limit, which is suitable even for applications where heavy capacitive loads are likely to be encountered, e.g. V_{BUS} powered USB disk drives. The electronic switch signals a fault condition to the CPU card PCH.

On-Board Connectors

The SCZ-NVM is equipped with several on-board connectors, for M.2 SSD accommodation and front I/O mezzanine module expansion.



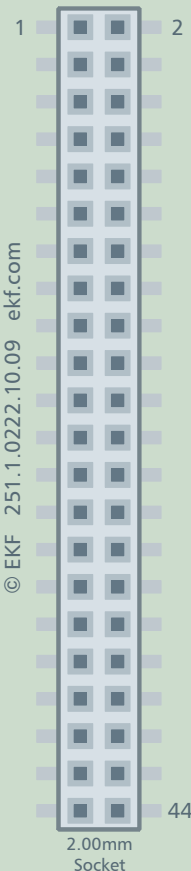
FIO (Mezzanine Expansion Module C32-FIO)	
I/F Type	SOURCE
Serial (UART) COM-C COM-D	SCZ-NVM on-board PI7C9X7954
USB 2.0	CPU carrier (HSE1)

M.2 (2 x Sockets for M.2 Style NVMe SSD)	
I/F Type	SOURCE
PCI Express®	CPU Carrier (HSE1, HSE2)

FIO

As an option, the SCZ-NVM can be expanded by a small front panel I/O mezzanine module, the C32-FIO. This requires a 12HP front panel in total (CPU carrier, SCZ-NVM, C32-FIO). The C32-FIO provides additional COM-Ports and an USB 2.0 Type-A receptacle.

J-FIO is a 2mm pitch dual row socket on top of the SCZ-NVM, which connects to the C32-FIO by means of a board stacker element. For a description of the C32-FIO mezzanine module refer to www.ekf.com/c/ccpu/c32/c32_tie.pdf.

FIO • Secondary I/O Mezzanine Expansion Interface (COM - USB)				
2.00mm Socket 2 x 22 (251.1.0222.10.09)				
	GND	1	2	+3.3VS 2)
	SP4_RI#	3	4	SP4_DSR#
	SP4_TXD	5	6	SP4_RXD
	SP4_RTS#	7	8	SP4_DTR#
	SP4_DCD#	9	10	SP4_CTS#
	GND	11	12	+3.3VS 2)
	SP3_RI#	13	14	SP3_DSR#
	SP3_TXD	15	16	SP3_RXD
	SP3_RTS#	17	18	SP3_DTR#
	SP3_DCD#	19	20	SP3_CTS#
	GND	21	22	+5VS 2)
	USB_2N 1)	23	24	NC
	USB_2P 1)	25	26	NC
	USB_OC# 1)	27	28	RSVD
	NC	29	30	NC
	NC	31	32	NC
	GND	33	34	+5VPS 2)
	SP3_DRVSEL1	35	36	SP4_DRVSEL1
	SP3_DRVSEL2	37	38	SP4_DRVSEL2
	SP3_DRVSEL3	39	40	SP4_DRVSEL3
	NC	41	42	NC
	NC	43	44	NC

- 1) passed from/to CPU carrier card mezzanine connector HSE1
- 2) power voltages - please refer to the HSE1 connector table

The SP3/SP4 serial port signals (UART TTL-level) are wired to RS-232 transceivers on the C32-FIO. For future mezzanines with RS-485 transceivers there are additional control signals SP*_DRVSEL1-3 available, which would be required for PartyLine operation (half-duplex RS-485).



M.2 Connectors

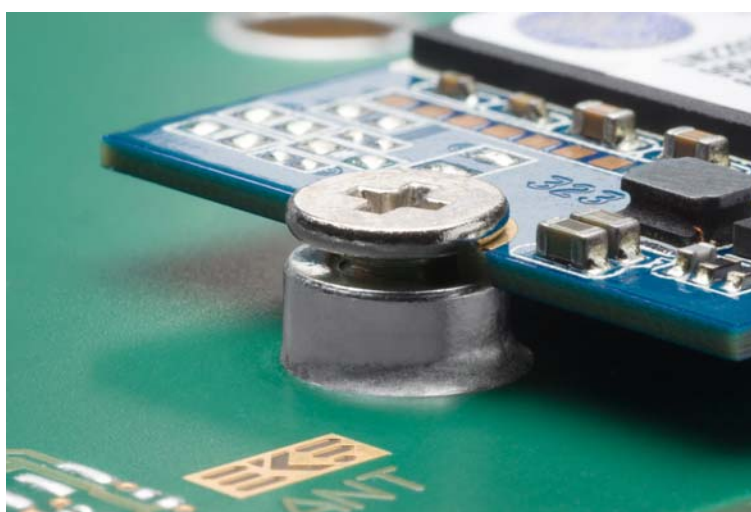
The SCZ-NVM is equipped with two M.2 module host connectors. Mechanical details and pin-out configurations are described by the PCI-SIG 'PCI Express M.2 Specification'. The M.2 pin-out complies with the 'Socket 3 M SSD Drive', with module dimensions from 'Type 2242 to 22110', either height option 'S2, D2, S3, D3, D5'.

Both M-key coded connectors are suitable for PCIe (NVMe) SSD modules. The M1 connector provides a PCIe Gen3 x4 link, derived from the HSE1 mezzanine interface, while the M2 connector is PCIe Gen3 x2 configured, routed via HSE2. Both M.2 sockets can be used together with PCIe x4 based M.2 modules, but only the upper socket M1 delivers the maximum data transfer rate of 4x8Gbps, while the lower socket has its bandwidth limit at 2x8Gbps.

M.2 NVMe and M.2 PCIe x4 are often used as synonyms. However, NVMe (NVM Express™ - non-volatile memory attached through the PCI Express® bus) is both an interface and also a command set or software protocol. Any recent operating system should incorporate NVMe drivers. In addition, the UEFI firmware (aka BIOS) should be verified in order to be able to boot from an NVMe device. This is true for EKF CPU cards such as the SC5-FESTIVAL.

There are also PCIe x4 based SSDs available which comply with the AHCI (SATA) protocol, for legacy systems. When ordering PCIe based SSD modules, be sure to choose the version which is most suitable for your application.

After insertion, an M.2 module must be locked manually by a screw, in order to withstand shock and vibration.



M.2 Module Fixation (Picture Similar)

NVMe PCIe x4 M.2 M-Key • Pin 1 - 38 EKF Part #255.50.2.2242.10			
GND	1	2	+3.3V
GND	3	4	+3.3V
PETN3	5	6	NC
PETP3	7	8	NC
GND	9	10	LED1#
PERN3	11	12	+3.3V
PERP3	13	14	+3.3V
GND	15	16	+3.3V
PETN2	17	18	+3.3V
PETP2	19	20	NC
GND	21	22	NC
PERN2	23	24	NC
PERP2	25	26	NC
GND	27	28	NC
PETN1	29	30	NC
PETP1	31	32	NC
GND	33	34	NC
PERN1	35	36	NC
PERP1	37	38	NC



NVMe PCIe x4			
M.2 M-Key continued • Pin 39 - 75			
GND	39	40	NC
PETNO	41	42	NC
PETPO	43	44	NC
GND	45	46	NC
PERNO	47	48	NC
PERPO	49	50	PERST#
GND	51	52	CLKREQ#
REFCLKN	53	54	PEWAKE#
REFCLKP	55	56	RSV
GND	57	58	RSV
M-Key	59	60	M-Key
M-Key	61	62	M-Key
M-Key	63	64	M-Key
M-Key	65	66	M-Key
NC	67	68	RSV
NC	69	70	+3.3V
GND	71	72	+3.3V
GND	73	74	+3.3V
GND	75		

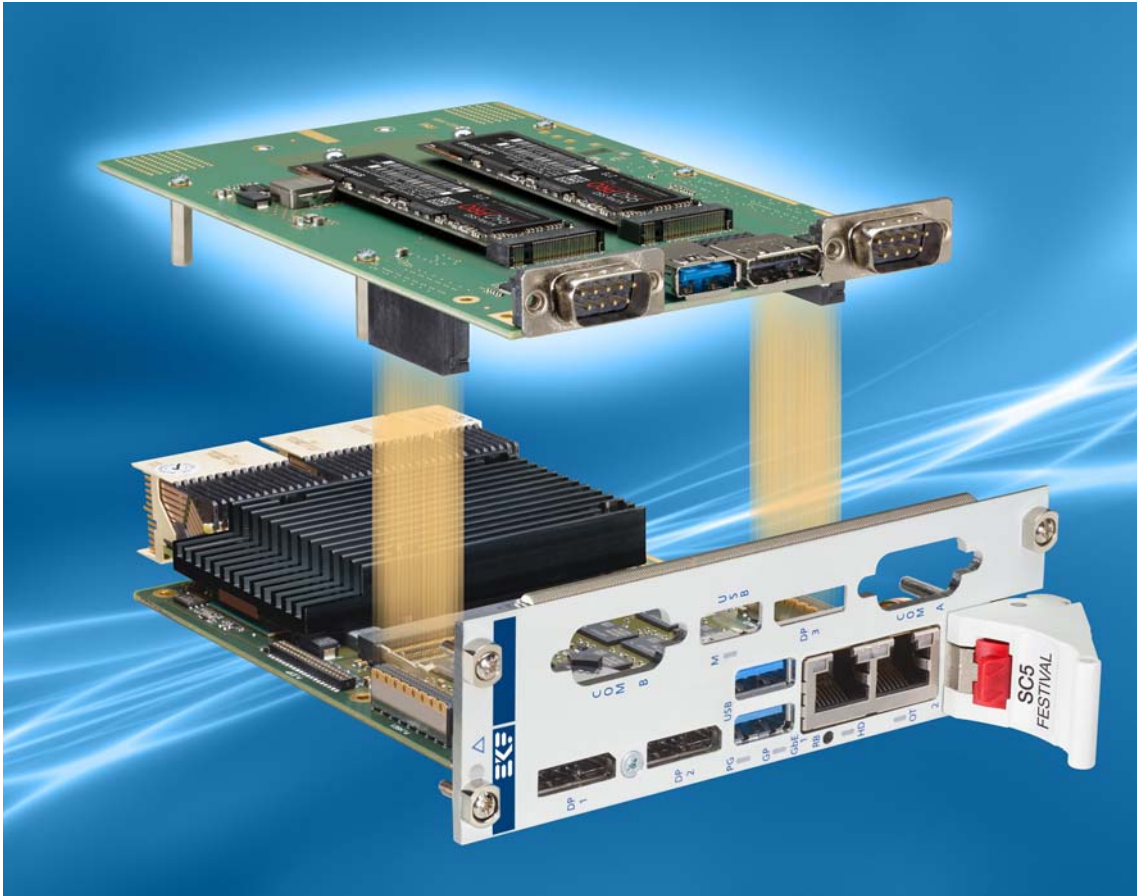
Inter-Board Connectors

The SCZ-NVM is equipped with 2 inter-board connectors. These are the HSE1 (4-lane PCI Express® & USB) and the HSE2 (4-lane PCI Express® & DisplayPort) connectors. The host CPU inter-board connectors are situated at the bottom of the SCZ-NVM and establish the data path and power link to the carrier board CPU.

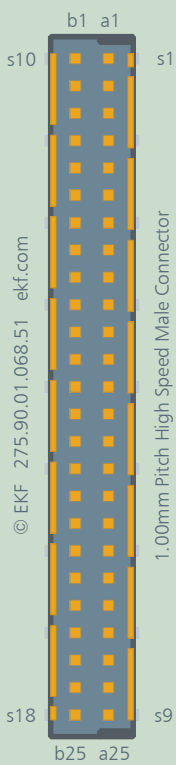
As the SCZ-NVM comes typically mounted as a unit together with the SC4-CONCERTO or SC5-FESTIVAL (or other carrier board), there is normally no need for the user to get access to any of the inter-board connectors. They are described here as a reference only and for better understanding of the SCZ-NVM.

HSE1	
I/F Type	Origin (SC5-FESTIVAL)
PCI Express® x4 Gen3	PCH (Platform Controller Hub)
1 x USB 3.0	PCH (Platform Controller Hub)
1 x USB 2.0	PCH (Platform Controller Hub)

HSE2	
I/F Type	Origin (SC5-FESTIVAL)
PCI Express® x4 Gen3 (2x2 cfg.)	PCH (Platform Controller Hub)
DisplayPort	CPU/GPU



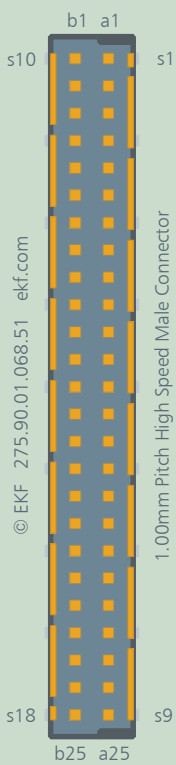
Carrier card connector 8mm female ERNI Microspeed 275.90.08.068.01
 Supplement 10mm male connector for nominal height 18mm (SC* side card, B2B 18.7mm)

High Speed Expansion P-HSE1				
	CFG_34 *	b1	a1	CFG_12 *
	3_PCIE_TXP	b2	a2	1_PCIE_TXP
	3_PCIE_TXN	b3	a3	1_PCIE_TXN
	GND	b4	a4	GND
	3_PCIE_RXN	b5	a5	1_PCIE_RXN
	3_PCIE_RXP	b6	a6	1_PCIE_RXP
	GND	b7	a7	GND
	4_PCIE_TXP	b8	a8	2_PCIE_TXP
	4_PCIE_TXN	b9	a9	2_PCIE_TXN
	GND	b10	a10	GND
	4_PCIE_RXN	b11	a11	2_PCIE_RXN
	4_PCIE_RXP	b12	a12	2_PCIE_RXP
	GND	b13	a13	GND
	2_USB3_TXP	b14	a14	1_USB2_P
	2_USB3_TXN	b15	a15	1_USB2_N
	GND	b16	a16	GND
	2_USB3_RXP	b17	a17	2_USB2_P
	2_USB3_RXN	b18	a18	2_USB2_N
	GND	b19	a19	GND
	PCIE_CLK_P	b20	a20	1_2_USB_OC#
	PCIE_CLK_N	b21	a21	PLTRST#
	+5VS ¹⁾	b22	a22	+3.3VS ¹⁾
	+5VS ¹⁾	b23	a23	+3.3VS ¹⁾
	+5VPS ²⁾	b24	a24	+3.3VA ³⁾
	+12VPS ²⁾	b25	a25	+12VPS ²⁾

* CFG_12 and CFG_34 = open on SCZ (10k PU on CPU carrier board) indicating that a PCIe x4 link is requested

- 1) Power rail switched on in S0 state only
- 2) Power rail switched on in S0-S4 state
- 3) Power always on

Carrier card connector 8mm female ERNI Microspeed 275.90.08.068.01
 Supplement 10mm male connector for nominal height 18mm (SC* side card, B2B 18.7mm)

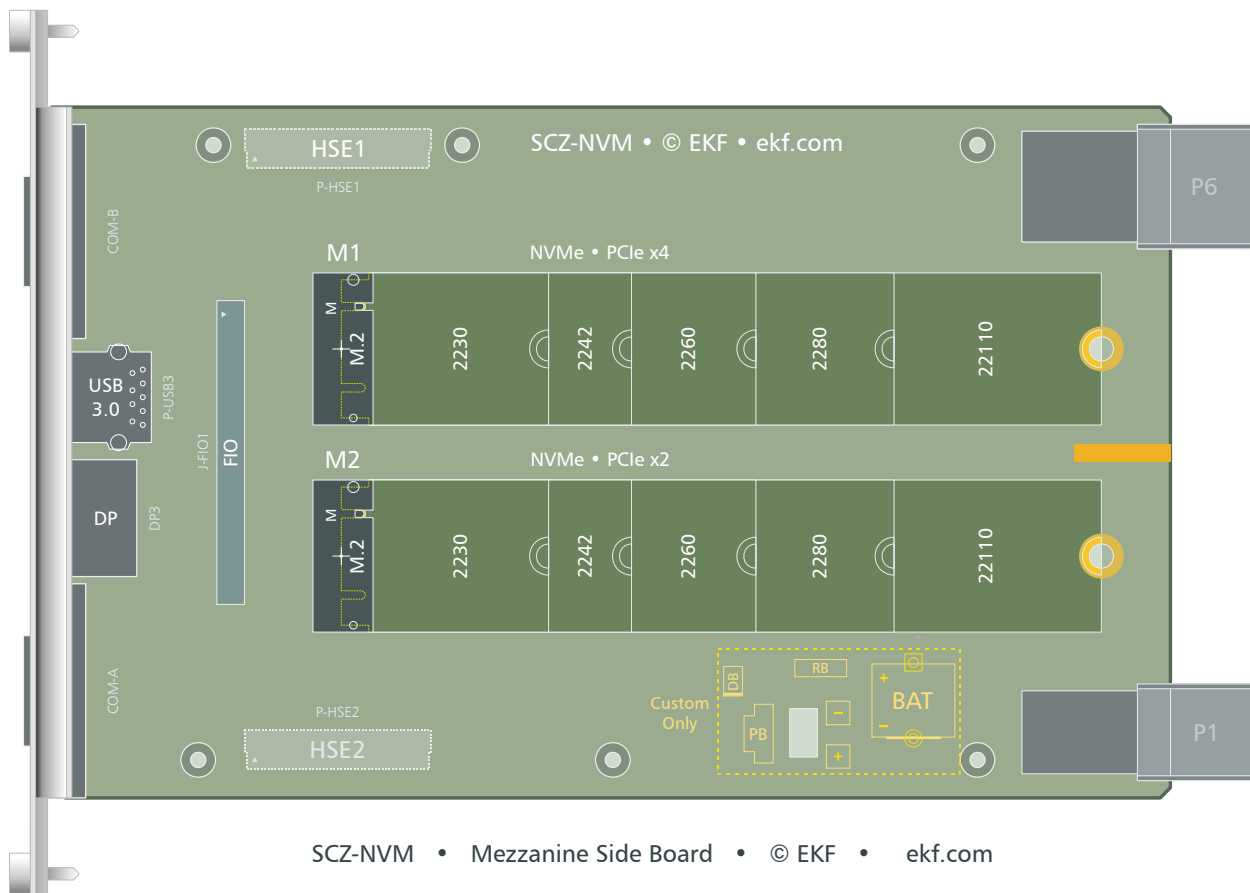
High Speed Expansion P-HSE2				
	3_PCIE_TXP	b1	a1	1_PCIE_TXP
	3_PCIE_TXN	b2	a2	1_PCIE_TXN
	GND	b3	a3	GND
	3_PCIE_RXN	b4	a4	1_PCIE_RXN
	3_PCIE_RXP	b5	a5	1_PCIE_RXP
	GND	b6	a6	GND
	4_PCIE_TXP	b7	a7	2_PCIE_TXP
	4_PCIE_TXN	b8	a8	2_PCIE_TXN
	GND	b9	a9	GND
	4_PCIE_RXN	b10	a10	2_PCIE_RXN
	4_PCIE_RXP	b11	a11	2_PCIE_RXP
	GND	b12	a12	GND
	DP_LANE2_P	b13	a13	DP_LANE0_P
	DP_LANE2_N	b14	a14	DP_LANE0_N
	GND	b15	a15	GND
	DP_LANE3_P	b16	a16	DP_LANE1_P
	DP_LANE3_N	b17	a17	DP_LANE1_N
	GND	b18	a18	GND
	DP_AUX_P	b19	a19	PCIE_CLK_P
	DP_AUX_N	b20	a20	PCIE_CLK_N
	DP_CFG1	b21	a21	GND
	DP_HPDP	b22	a22	SMB_SCL ¹⁾
	PLTRST#	b23	a23	SMB_SDA ¹⁾
	+12VPS ²⁾	b24	a24	+12VPS ²⁾
	+12VPS ²⁾	b25	a25	+12VPS ²⁾

PCIe pre-configured 2x2 via soft-straps (Flash image), programming tool will be provided by EKF

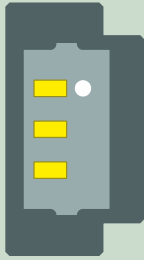
- 1) Connection to SMBus, isolated after system reset
- 2) Power rail switched on in S0-S4 state

Custom Specific Connector

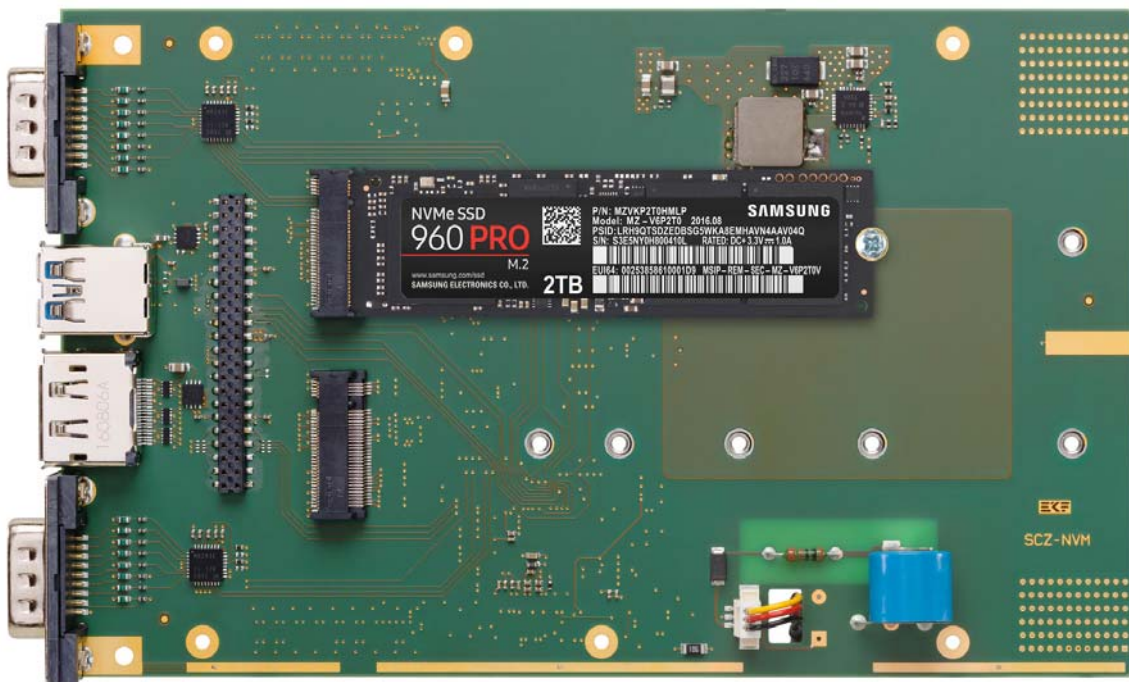
For a special application the SCZ-NVM can be equipped with a 3V soldered Li battery, and associated board to wire connector PB (Molex PicoBlade series, 1.25mm pitch, 3-position).



SCZ-NVM • Mezzanine Side Board • © EKF • ekf.com

PB • Battery Voltage Connector • Custom Specific Only PicoBlade 3-Pos (276.01.003.01)		
 <p>276.01.003.01 1.25mm Pitch PicoBlade © EKF • ekf.com</p>	1	+3V BAT
	2	GND
	3	NC

A matching cable assembly would be e.g. the Molex part no. 151340302. For connection to the carrier card a suitable cutout within the PCB may be useful.



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