SYSTEM

Product Information

SE1-PITCH • *CompactPCI® Serial* • M.2 NVMe (PCIe) SSD

Document No. 8104 • 12 October 2016

General

The SE1-PITCH is a peripheral slot card for CompactPCI® Serial systems, equipped with two M.2 sockets for SSD (Solid-State Drive) modules.

One of the M.2 sockets is suitable for a NVMe type SSD module, with a PCIe x4 Gen3 interface for superior data transfer rates. When used as main mass storage device in a system, the NVMe SSD can speed up the overall system performance dramatically.

The other M.2 connector can accommodate a classic AHCI SATA style SSD, used e.g. as backup for the NVMe module.

The SE1-PITCH is suitable for all module sizes defined by the M.2 specification for SSD drives, up to the 22110 form factor. In order to avoid mix-up, both M.2 sockets are mechanically coded. The NVMe module socket is provided with an M-key, and the SATA module connector features a B-key, according to the PCI Express® M.2 Specification (PCI-SIG).

For optimum NVMe SSD module performance, a PCI Express® x4 enabled backplane slot would be required (e.g. CompactPCI® Express fat pipe slot). In addition, SATA backplane support is needed for the SATA SSD module.

Feature Summary

- PICMG® CompactPCI® Serial standard (CPCI-S.0)
- Single size Eurocard 3U 4HP 100x160mm²
- Suitable for CompactPCI® Serial peripheral slot (PCI Express® & SATA enabled)
- CompactPCI® Serial fat pipe slot or peripheral slot PCIe x4 recommended
- CompactPCI® Serial backplane connector P1 for PCI Express® x4 and SATA

- PCI Express® Gen3 (8GTps) redriver for optimum PCIe signal integrity
- SATA 6Gbps redriver for optimum SATA signal integrity

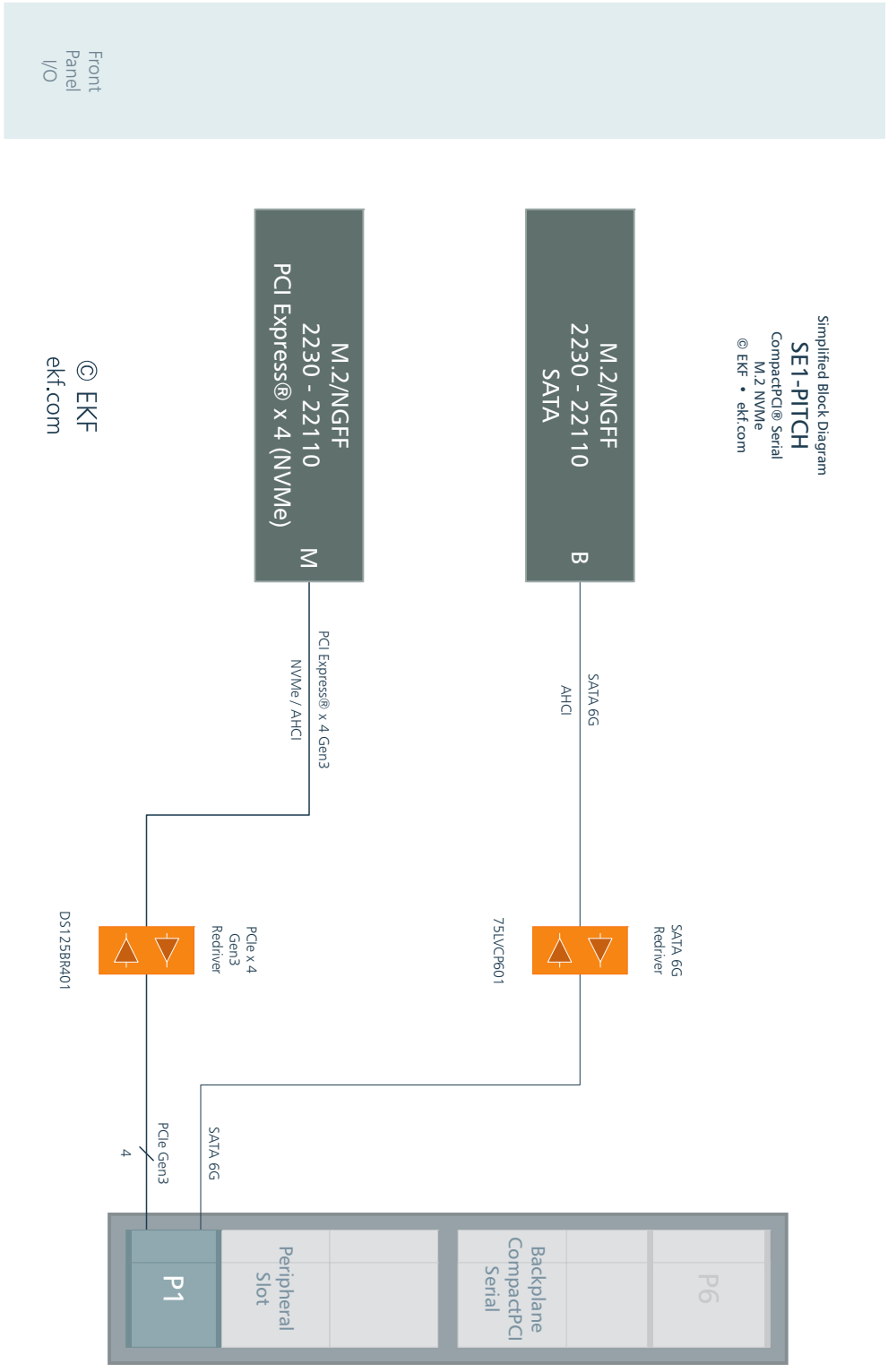
- Designed according to PCI-SIG® PCI Express® M.2 Specification (aka NGFF)
- M.2 NVMe SSD module socket (M-key) pin-out according to 'Socket 3 PCIe x4 SSD'
- M.2 SATA SSD module socket (B-key) pin-out according to 'Socket 2 SATA SSD'
- M.2 module size 22110, 2280, 2260, 2242, 2230, 4.2H (accepts double-sided modules)

- USB 3.0 front panel connector (ordering option)
- Gigabit Ethernet RJ45 front panel connector (ordering option)

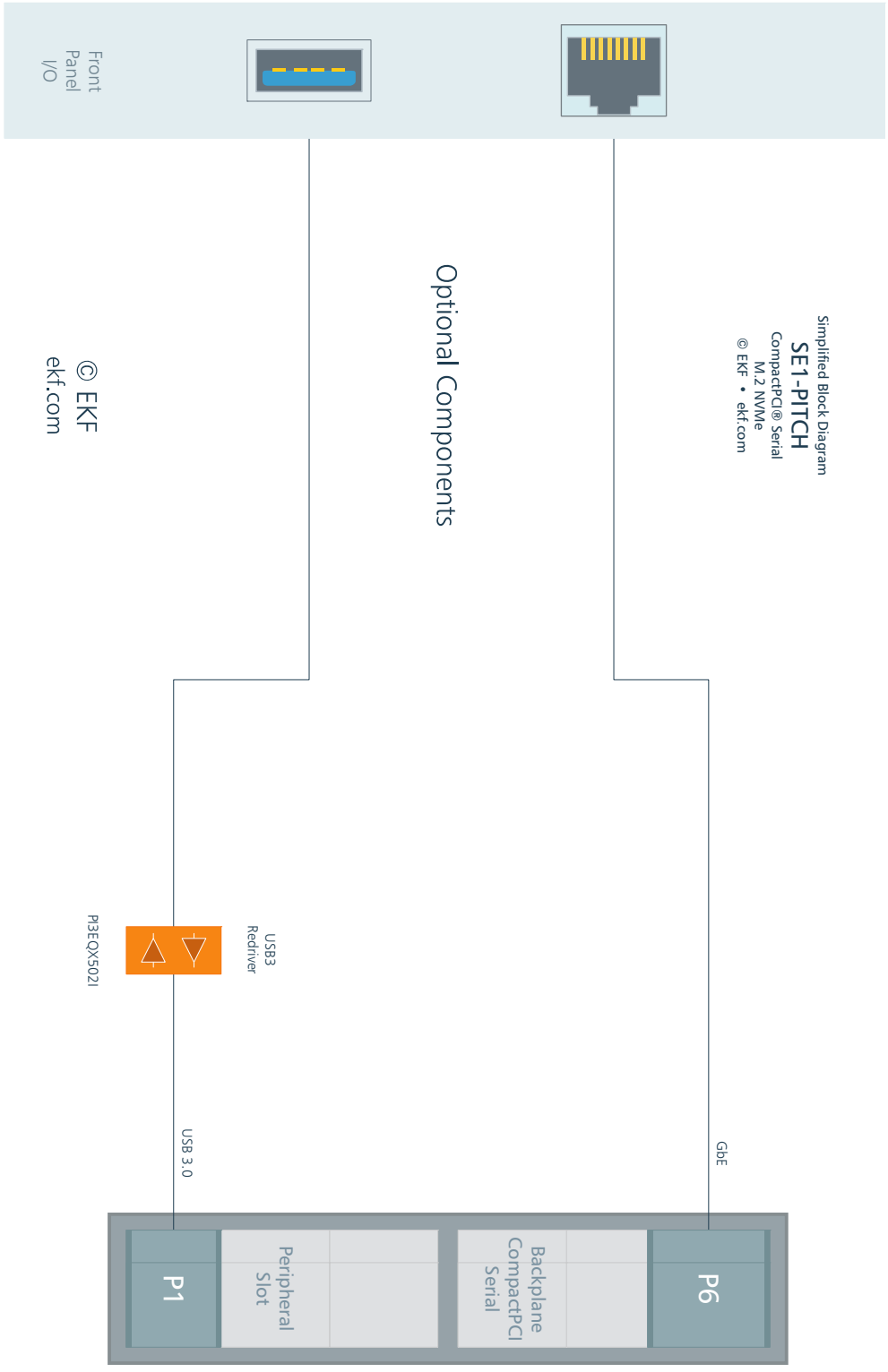
- Designed & manufactured in Germany
- Certified quality management according to ISO 9001
- Long term availability
- Rugged solution (coating, sealing, underfilling on request)
- RoHS compliant
- Operation temperature 0°C to +70°C (commercial temperature range)
- Operation temperature -40°C to +85°C (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 218.0 years (SE1-0100), 201.1 years (SE1-0200)
- EC Regulations EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1)

Please note: SSD modules must be ordered separately

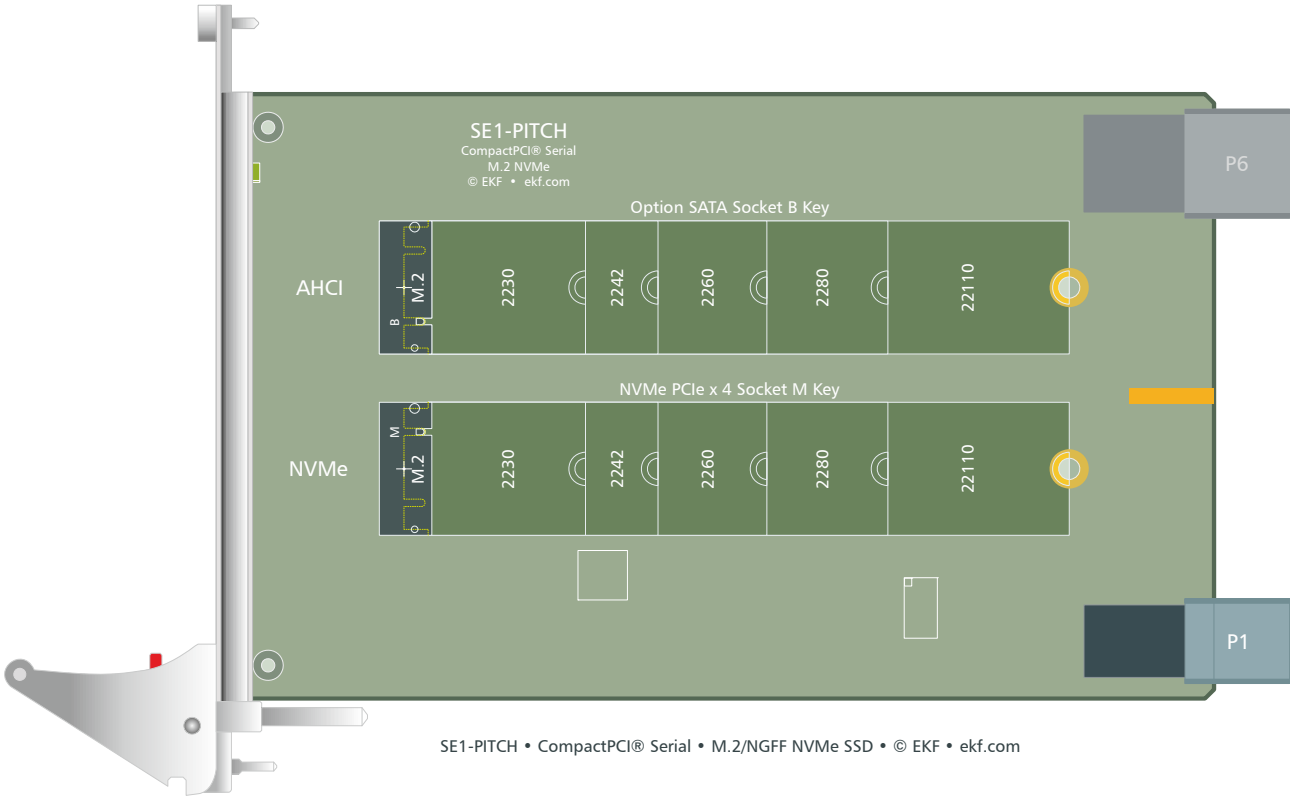
Block Diagram



Optional Components

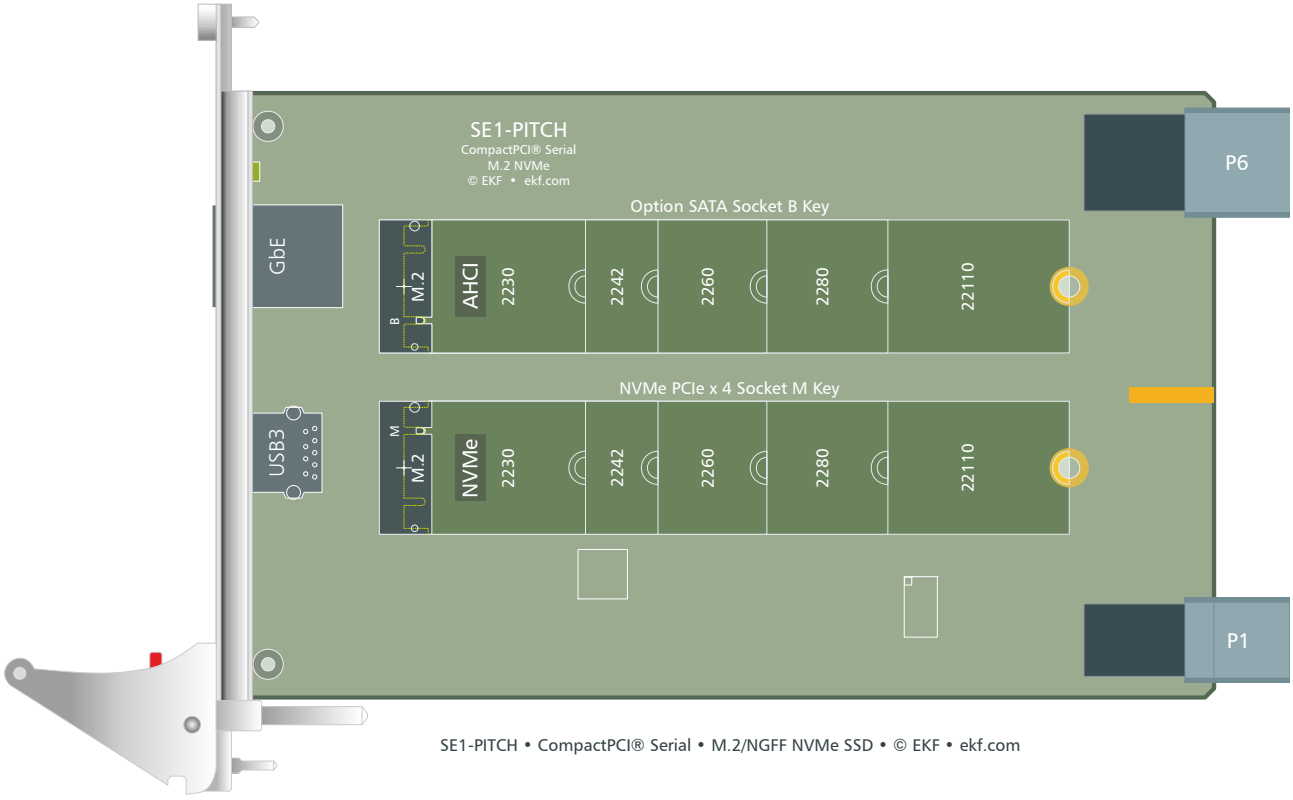


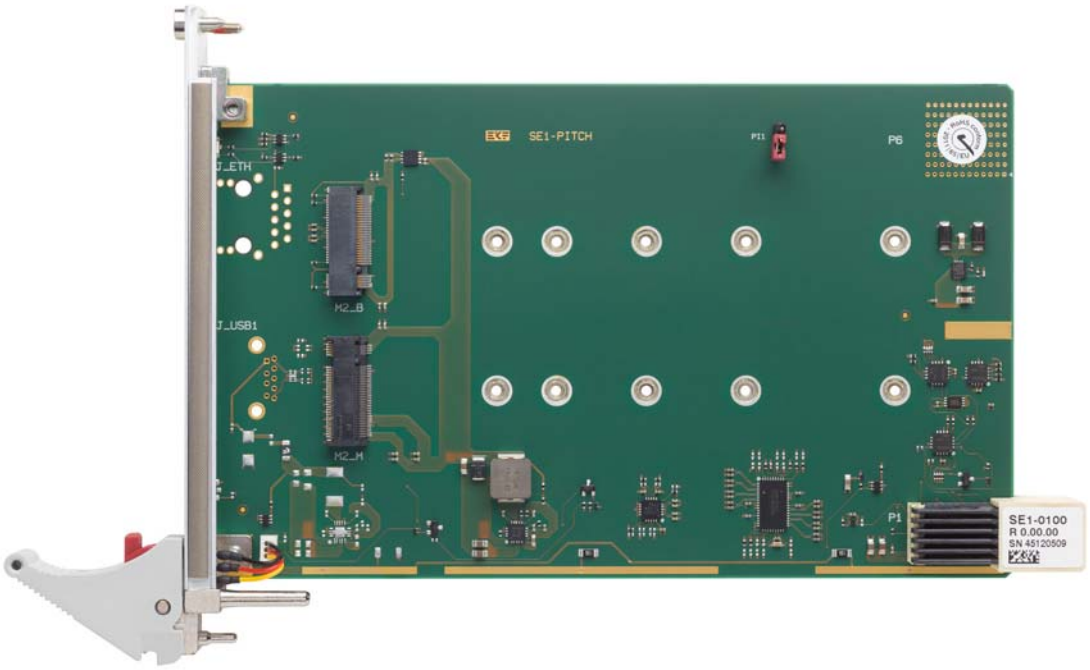
Component Orientation



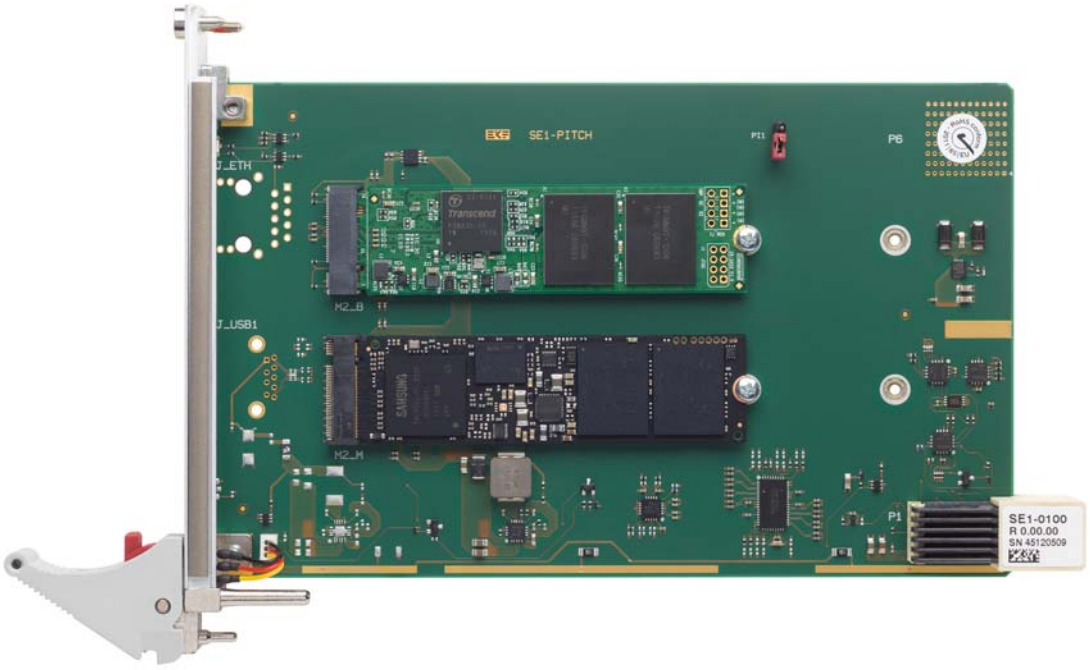
P6 is not populated by default. This connector can be provided on request for even more mechanical stability, e.g. railway applications, or together with the optional front panel Gigabit Ethernet connector.

Option Front Panel I/O

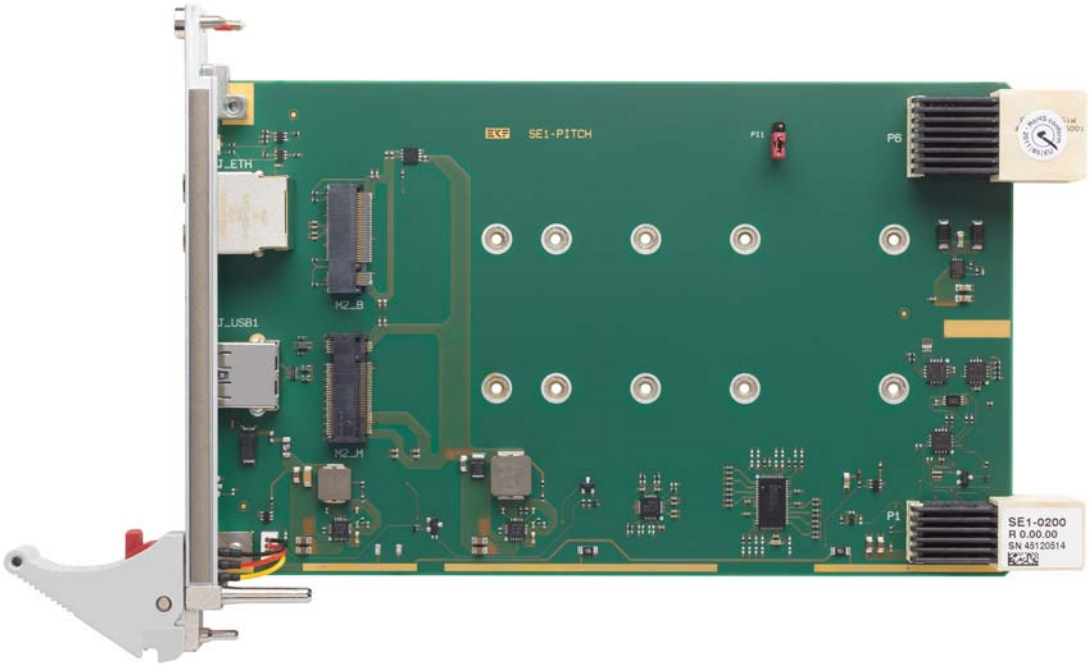




SE1-PITCH without Front Panel Connectors



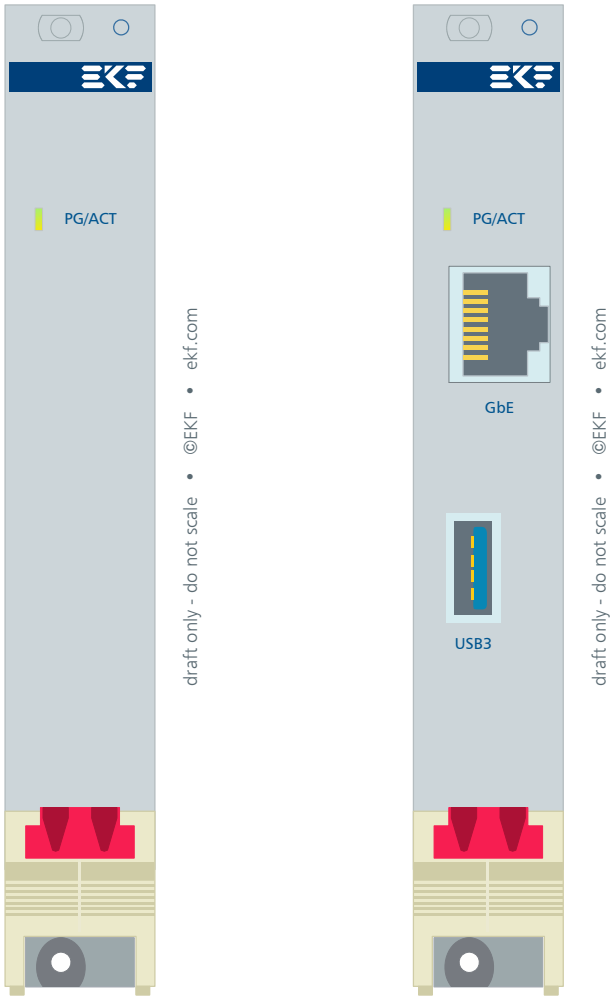
SE1-PITCH with 2280 M.2 Modules Populated



SE1-PITCH with Front Panel I/O Connectors

SE1-PITCH w. Front I/O and M.2 Modules

Front Panel



Please note: Front panel connectors shown are available on request only

M.2 Connectors

The SE1-PITCH is provided with two M.2 module host connectors, which differ in mechanical keying and electrical pin-out. Mechanical details and pin-out configurations are described by the PCI-SIG 'PCI Express M.2 Specification'.

With respect to the SE1-PITCH, the B-key connector must be used for the SATA SSD, with a pin-out according to 'Socket 2 B+M SSD', and module dimensions from 'Type 2230 to 22110', either height option 'S2, D2, S3, D3, D5'. For operability of the SATA SSD, the SE1-PITCH must be inserted into an SATA enabled CompactPCI® backplane slot (please refer to diagrams 'Backplane Resources' e.g. www.ekf.com/s/sc3/img/sc3_backplane.pdf). The SATA channel is derived from the system slot CPU card. The maximum SATA data transfer rate 3G or 6G may depend on the particular CPU card and the backplane slot selected for the SE1-PITCH. An on-board SATA redriver is provided for optimum signal integrity.

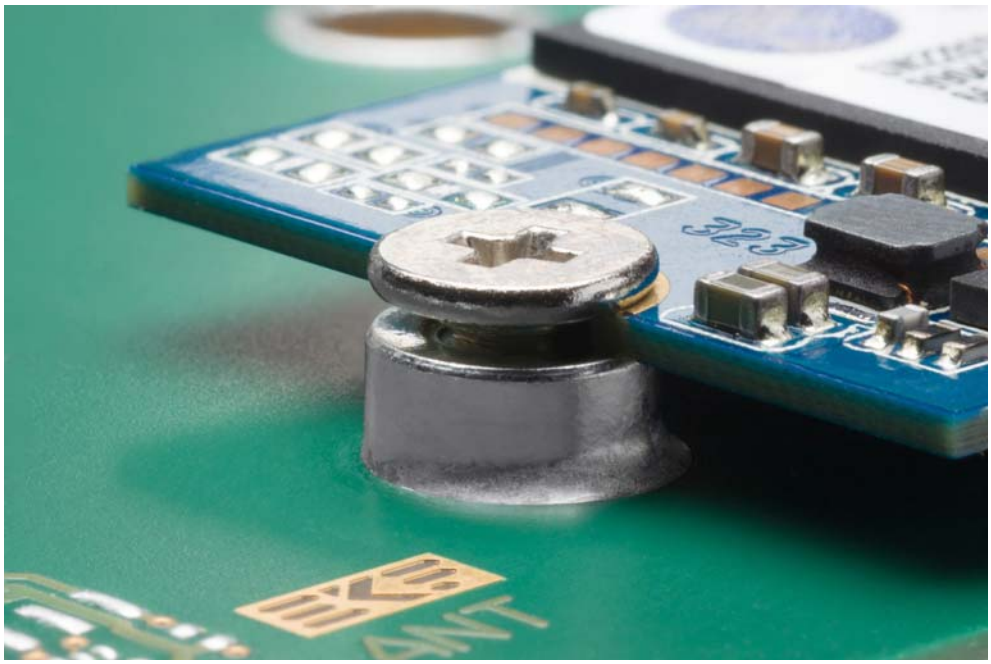
The M-key connector is provided for the PCIe x4 (NVMe) SSD module. The pin-out complies with the 'Socket 3 M SSD Drive', with module dimensions from 'Type 2242 to 22110', either height option 'S2, D2, S3, D3, D5'. For operability of the PCIe based SSD, the SE1-PITCH must be inserted into a PCIe enabled CompactPCI® backplane slot (please refer to diagrams 'Backplane Resources' e.g. www.ekf.com/s/sc3/img/sc3_backplane.pdf). The PCIe link is established by the system slot CPU card. The maximum PCIe data transfer rate Gen2 (5GTps) or Gen3 (8GTps) may depend on the particular CPU card and the backplane slot selected for the SE1-PITCH. For optimum performance, a Gen3 x4 powered backplane slot should be chosen, e.g. one of the 'Fat Pipe' slots. An on-board PCIe redriver is provided for optimum signal integrity.

The PCIe x4 M.2 socket allows considerable higher SSD I/O transfer rates compared to the SATA connector. This drive therefore should be chosen as boot device and mass storage for maximum system performance. The SATA SSD can be used as additional storage or backup medium in such a configuration.

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 from the SC2-PRESTO off.

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 chose the version which is most suitable for your application.

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



M.2 Module Fixation (Picture Similar)

Mounting Parts for M.2 SSD Modules	
440.08.025.006	Screw M2.5 x 6mm (supplied together with board)
442.0.02502.5	Spacer sleeve M2.5 x 2.5mm (supplied together with board)
440.45.025.015	M2.5 PCB nut, bottom mount threaded inserts (populated on-board by default)

M.2 SATA

AHCI SATA M.2 B-Key • Pin 1 - 38 EKF Part #255.50.1.2242.10			
CFG-3 *	1	2	+3.3V
GND	3	4	+3.3V
GND	5	6	NC
NC	7	8	NC
NC	9	10	DA/DSS
GND	11	12	B Key
B Key	13	14	B Key
B Key	15	16	B Key
B Key	17	18	B Key
B Key	19	20	NC
CFG-0 *	21	22	NC
NC	23	24	NC
NC	25	26	NC
GND	27	28	NC
NC	29	30	NC
NC	31	32	NC
GND	33	34	NC
NC	35	36	NC
NC	37	38	DEVSLP

* 10k pull-up +3.3V

AHCI SATA M.2 B-Key continued • Pin 39 - 75			
GND	39	40	NC
SATA B+ (SSD OUT)	41	42	NC
SATA B- (SSD OUT)	43	44	NC
GND	45	46	NC
SATA A- (SSD IN)	47	48	NC
SATA A+ (SSD IN)	49	50	NC
GND	51	52	NC
NC	53	54	NC
NC	55	56	NC
GND	57	58	NC
NC M-Key	59	60	NC M-Key
NC M-Key	61	62	NC M-Key
NC M-Key	63	64	NC M-Key
NC M-Key	65	66	NC M-Key
NC	67	68	NC
CFG-1 *	69	70	+3.3V
GND	71	72	+3.3V
GND	73	74	+3.3V
CFG-2 *	75		

* 10k pull-up +3.3V

M.2 PCIe x4

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

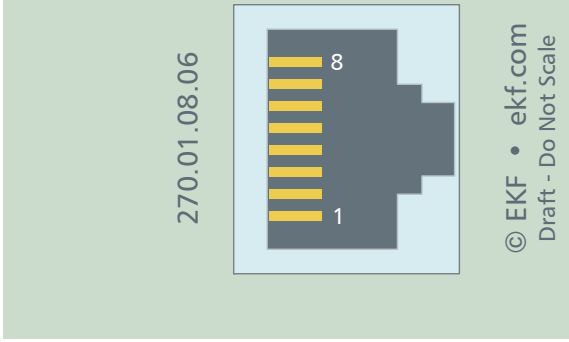
NVMe PCIe x4 M.2 M-Key continued • Pin 39 - 75			
GND	39	40	NC
PETN0	41	42	NC
PETP0	43	44	NC
GND	45	46	NC
PERN0	47	48	NC
PERP0	49	50	PERST#
GND	51	52	CLKREQ#
REFCLKN	53	54	PEWAKE#
REFCLKP	55	56	RSV
GND	57	58	RSV
M-Key	59	60	M-Key
M-Key	61	62	M-Key
M-Key	63	64	M-Key
M-Key	65	66	M-Key
NC	67	68	RSV
NC	69	70	+3.3V
GND	71	72	+3.3V
GND	73	74	+3.3V
GND	75		

Front Panel Connectors (Option)

Available on request, the SE1-PITCH front panel can be provided with I/O connectors for Gigabit Ethernet (RJ45) and USB 3.0. Both data ports are passed through from the associated backplane connectors, P6 for Gigabit Ethernet, and P1 with respect to USB3 and USB2. For operability, the CompactPCI® Serial backplane resources of the chosen backplane slot must be available (please refer to diagrams 'Backplane Resources' e.g. www.ekf.com/s/sc3/img/sc3_backplane.pdf).

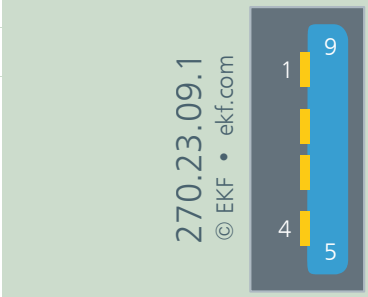
Usage of both I/O connectors is independent from the M.2 SSD mass storage devices. However, the USB connector may be useful for copying data from an SSD to an USB stick and vice versa. The Ethernet connector would allow to attach e.g. a NAS.

Gigabit Ethernet
270.01.08.6 • RJ45 Jack



1	MDX0+
2	MDX0-
3	MDX1+
4	MDX2+
5	MDX2-
6	MDX1-
7	MDX3+
8	MDX3-

USB 3.0
Standard Mount Receptacle • 270.23.09.1



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+

Please contact sales@ekf.de before ordering.

SE1-PITCH w. Front Panel Connectors GbE & USB

CompactPCI® Serial Backplane Connector P1

P1 CompactPCI® Serial Peripheral Slot Backplane Connector
EKF Part #250.3.1206.20.02 • 72 pos. 12x6, 14mm Width

P1	A	B	C	D	E	F	G	H	I	J	K	L
6	GND	PE TX02+	PE TX02-	GND	PE RX02+	PE RX02-	GND	PE TX03+	PE TX03-	GND	PE RX03+	PE RX03-
5	PE TX00+	PE TX00-	GND	PE RX00+	PE RX00-	GND	PE TX01+	PE TX01-	GND	PE RX01+	PE RX01-	GND
4	GND	USB2+	USB2-	GND	PE CLK+	PE CLK-	GND	SATA TX+	SATA TX-	GND	SATA RX+	SATA RX-
3	USB3 TX+	USB3 TX-	GA0	USB3 RX+	USB3 RX-	GA1	*SATA SDI*	*SATA SDO*	GA2	*SATA SCL*	*SATA SL*	GA3
2	GND	I2C SCL	I2C SDA	GND	RSV	RSV	GND	RST#	WAKE#	GND	PE EN#	SYS EN#
1	+12V	STBY	GND	+12V	+12V	GND	+12V	+12V	GND	+12V	+12V	GND

pin positions printed white: not connected

CompactPCI® Serial Backplane Connector P6

P6 CompactPCI® Serial Peripheral Slot Backplane Connector EKF Part #250.3.1208.20.02 • 96 pos. 12x8, 18mm width												
P6	A	B	C	D	E	F	G	H	I	J	K	L
8	GND	*8 ETH A+*	*8 ETH A-*	GND	*8 ETH B+*	*8 ETH B-*	GND	*8 ETH C+*	*8 ETH C-*	GND	*8 ETH D+*	*8 ETH D-*
7	*7 ETH A+*	*7 ETH A-*	GND	*7 ETH B+*	*7 ETH B-*	GND	*7 ETH C+*	*7 ETH C-*	GND	*7 ETH D+*	*7 ETH D-*	GND
6	GND	*6 ETH A+*	*6 ETH A-*	GND	*6 ETH B+*	*6 ETH B-*	GND	*6 ETH C+*	*6 ETH C-*	GND	*6 ETH D+*	*6 ETH D-*
5	*5 ETH A+*	*5 ETH A-*	GND	*5 ETH B+*	*5 ETH B-*	GND	*5 ETH C+*	*5 ETH C-*	GND	*5 ETH D+*	*5 ETH D-*	GND
4	GND	*4 ETH A+*	*4 ETH A-*	GND	*4 ETH B+*	*4 ETH B-*	GND	*4 ETH C+*	*4 ETH C-*	GND	*4 ETH D+*	*4 ETH D-*
3	*3 ETH A+*	*3 ETH A-*	GND	*3 ETH B+*	*3 ETH B-*	GND	*3 ETH C+*	*3 ETH C-*	GND	*3 ETH D+*	*3 ETH D-*	GND
2	GND	*2 ETH A+*	*2 ETH A-*	GND	*2 ETH B+*	*2 ETH B-*	GND	*2 ETH C+*	*2 ETH C-*	GND	*2 ETH D+*	*2 ETH D-*
1	1 ETH A+	1 ETH A-	GND	1 ETH B+	1 ETH B-	GND	1 ETH C+	1 ETH C-	GND	1 ETH D+	1 ETH D-	GND

pin positions printed white: not connected

This connector is not populated by default. It is required together with the optional front panel Gigabit Ethernet RJ45 jack (available on request only). In rare cases this connector is provided for optimized mechanical stability (reducing effects of shock and vibration).

Ordering Information
For popular SE1-PITCH SKUs please refer to www.ekf.com/liste/liste_21.html#SE1

Related Links to CompactPCI® Serial Mass Storage Solutions	
SE1-PITCH Home	www.ekf.com/s/se1/se1.html
CompactPCI® Serial PCIe Storage	www.ekf.com/s/serial.html#SE
CompactPCI® Serial SATA Storage	www.ekf.com/s/serial.html#SD
CompactPCI® Serial SAS Storage	www.ekf.com/s/serial.html#SS

Related Documents CompactPCI® Serial	
Basics / Overview CompactPCI® Serial	www.ekf.com/s/smart_solution.pdf
CompactPCI® Serial Home	www.ekf.com/s/serial.html

Recommended CPU Cards	
SC2-PRESTO	www.ekf.com/s/sc2/sc2.html
SC3-ALLEGRO	www.ekf.com/s/sc3/sc3.html
SC4-CONCERTO	www.ekf.com/s/sc4/sc4.html

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