



Product Information

SE4-TEMPO • CompactPCI® Serial • Quad M.2 NVMe (PCIe) SSD

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General

The SE4-TEMPO is a peripheral slot card for CompactPCI® Serial systems, equipped with four M.2 sockets for SSD (Solid-State Drive) modules.

Each M.2 socket can accommodate an NVMe type SSD module, with a PCI Express® x4 Gen3 interface for superior data transfer rates. When used as main mass storage devices in a system, the NVMe SSDs can speed up the overall system performance dramatically.

The SE4-TEMPO is suitable for NGFF SSD module sizes up to the 2280 form factor. The M.2 sockets are mechanically coded with an M-Key for popular PCIe x4 (NVMe) modules.

For optimum SE4-TEMPO performance, a PCI Express® Gen3 x8 enabled backplane slot is recommended (CompactPCI® Serial fat pipe slot).



Feature Summary

General

- ▶ PICMG® CompactPCI® Serial standard (CPCI-S.0)
- ▶ Single size Eurocard 3U 4HP 100x160mm²
- ▶ Suitable for CompactPCI® Serial peripheral slot (PCI Express® enabled)
- ▶ CompactPCI® Serial fat pipe slot PCIe x8 or at least peripheral slot PCIe x4 recommended
- ▶ CompactPCI® Serial backplane connectors P1 & P2 for PCI Express® x8
- ▶ Clamshell available for extremely rugged applications e.g. ATR & conductive cooled assembly (CCA)

M.2 NVMe

- ▶ Designed according to PCI-SIG® PCI Express® M.2 Specification (aka NGFF)
- ▶ Quad M.2 NVMe SSD module sockets (M-key) pin-out according to 'Socket 3 PCIe x4 SSD'
- ▶ M.2 NVMe module size 2280, 2260, 2242, 2230, 4.2H (accepts double-sided modules)
- ▶ +3.3V/4.5A continuous current per M.2 socket (peak up to 10A limited by electronic power switches)
- ▶ On-board PCI Express® Gen3 (8GT/s) packet switch 5 ports 24 lanes for maximum NVMe performance via all M.2 NVMe module sockets simultaneously
- ▶ Maximum performance with backplane slot PCIe x8 Gen2/3
- ▶ Primarily for NVMe protocol based M.2 SSD modules
- ▶ Suitable also for OEM legacy AHCI protocol based M.2 modules (PCIe SATA controller)
- ▶ Optional I2C module control (if supported by module manufacturer)
- ▶ 2TB NVMe modules available as of current for a total of 8TB
- ▶ Individual drive configuration or soft RAID operation
- ▶ Boot capability requires NVMe enabled BIOS for NVMe protocol modules
- ▶ Recommended usage as high speed mass storage for demanding applications

Feature Summary

Regulatory

- ▶ 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 42.7 years
- ▶ EC Regulations EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1)

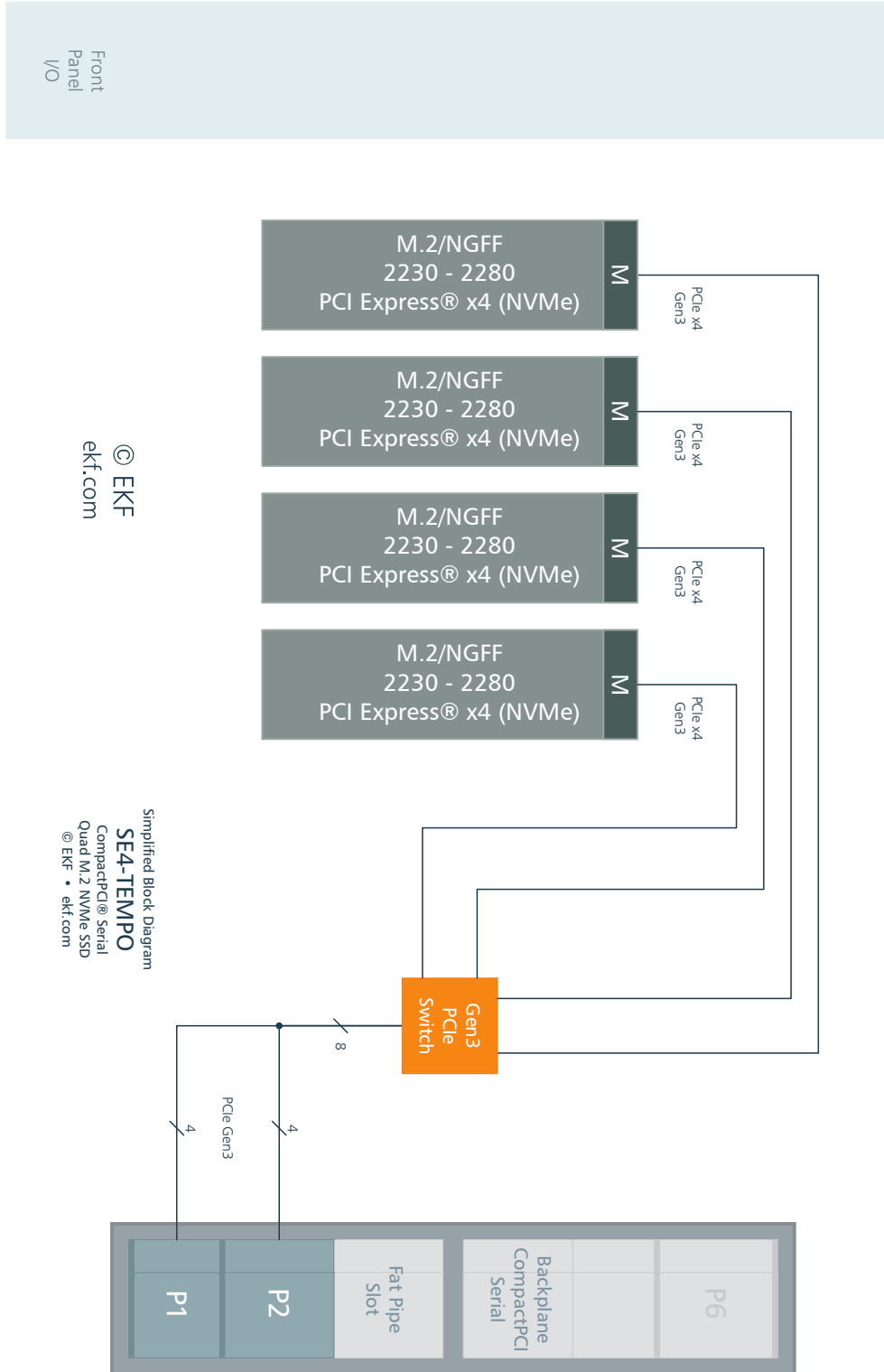
all items are subject to change

please note: M.2 modules must be ordered separately

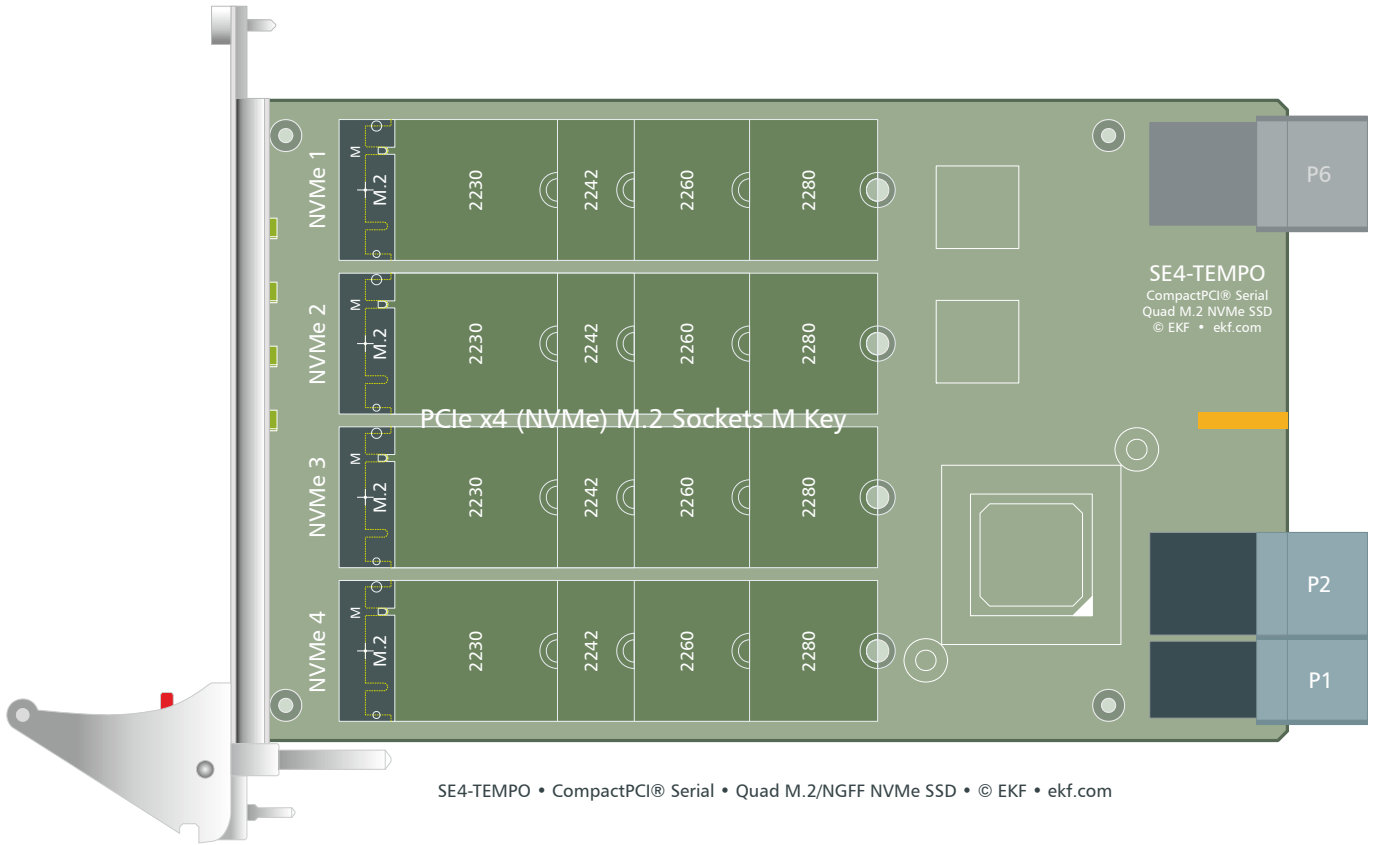
Clamshell Version for CCA



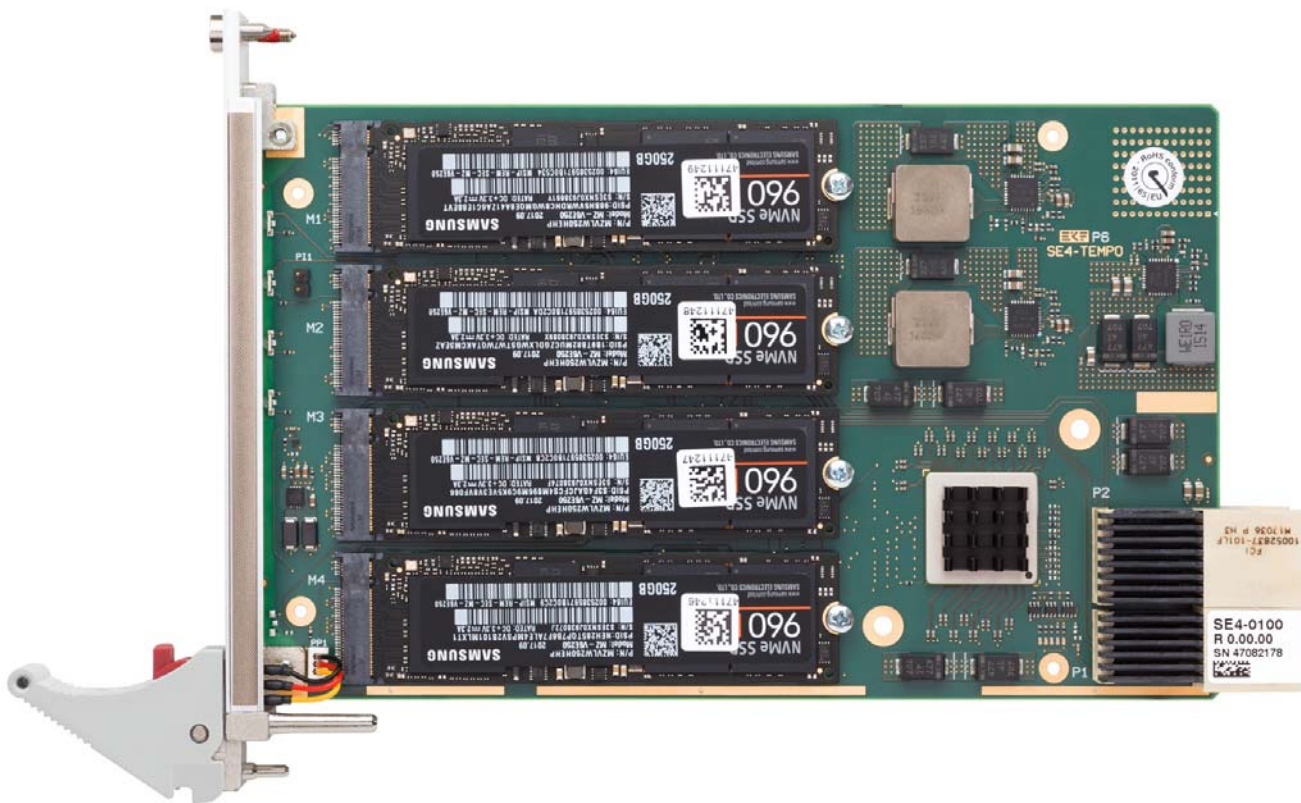
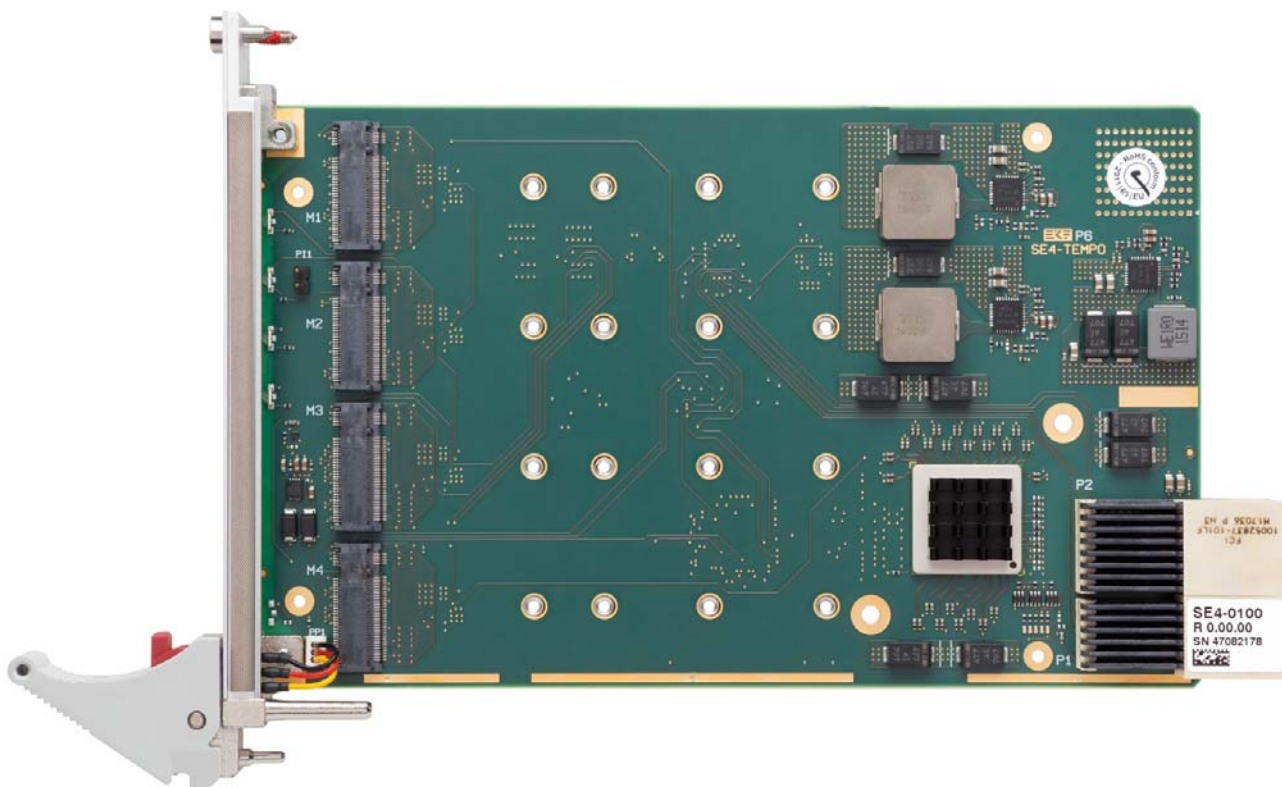
Block Diagram



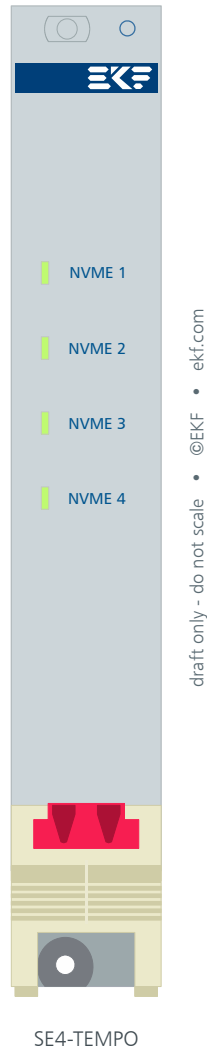
Component Orientation



P6 is not populated by default. This connector can be provided on request for even more mechanical stability, e.g. railway applications.



Front Panel



LED Function: Blink = Activity

M.2 Connectors

The SE4-TEMPO is equipped with M.2 module host connectors. Mechanical details and pin-out configurations are defined by the PCI-SIG 'PCI Express M.2 Specification'.

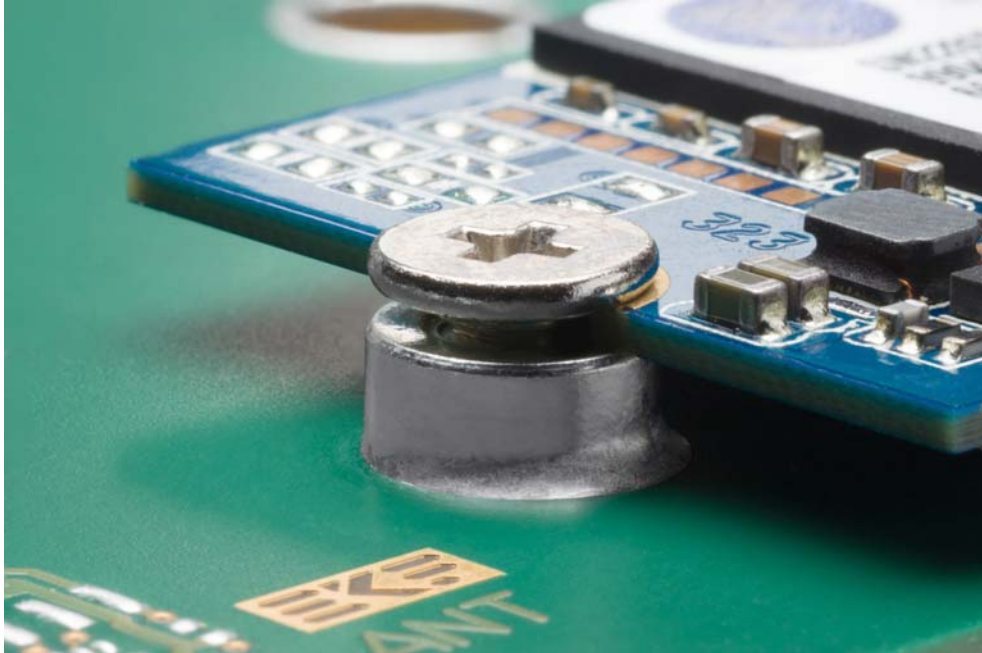
Four M-key coded connectors are provided for PCIe x4 (NVMe) SSD modules. The pin-out complies with the 'Socket 3 M SSD Drive', with module dimensions from 'Type 2242 to 2280', either height option 'S2, D2, S3, D3, D5'. For operability of PCIe based SSDs, the SE4-TEMPO must be inserted into a PCIe enabled 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 SE4-TEMPO. For optimum performance, a Gen3 x8 powered backplane slot (fat pipe slot) should be chosen for the SE4-TEMPO. The on-board Gen3 PCIe packet switch establishes four independent PCIe x4 Gen3 downstream links to the NVMe module connectors.

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 for OEMs 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, an 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 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	I2C CLK
PETN0	41	42	I2C DAT
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		



CompactPCI® Serial Backplane Connectors P1/P2

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

P2 CompactPCI® Serial Peripheral Slot Backplane Connector

EKF Part #250.3.1208.20.00 • 96 pos. 12x8, 16mm Width

P2	A	B	C	D	E	F	G	H	I	J	K	L
8	GND			GND			GND			GND		
7			GND			GND			GND			GND
6	GND			GND			GND			GND		
5			GND			GND			GND			GND
4	GND			GND			GND			GND		
3			GND			GND			GND			GND
2	GND	PE TX06+	PE TX06-	GND	PE RX06+	PE RX06-	GND	PE TX07+	PE TX07-	GND	PE RX07+	PE RX07-
1	PE TX04+	PE TX04-	GND	PE RX04+	PE RX04-	GND	PE TX05+	PE TX05-	GND	PE RX05+	PE RX05-	GND

Ordering Information

For popular SE4-TEMPO SKUs please refer to
www.ekf.com/liste/liste_21.html#SE4

Please note that the SE4-TEMPO is a carrier card which typically comes without M.2 module(s) populated, unless otherwise expressly ordered. Photos shown within this document and at other places may be equipped with M.2 modules just for application demonstration. If you need a turnkey solution with M.2 NVMe and/or M.2 SATA storage modules populated, please contact sales@ekf.com before ordering.

Related Links to CompactPCI® Serial Mass Storage Solutions

SE4-TEMPO Home	www.ekf.com/s/se4/se4.html
SE2-MOOD Home	www.ekf.com/s/se2/se2.html
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
SC5-FESTIVAL	www.ekf.com/s/sc5/sc5.html

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