SYSTEM

Product Information

CompactPCI® Serial • SBR-RIO

16 Port USB 3.0 Rear I/O Module

Document No. 7332 • 15 June 2015

General

The SBR-RIO is a companion board to the CompactPCI® Serial peripheral card SBX-DUB, a 16-port xHCI SuperSpeed host controller. All USB 3.0 channels are passed across the the SBX-DUB backplane connectors P3/P4 to the corresponding SBR-RIO receptacles rJ3/rJ4.

The CompactPCI® Serial rear I/O module SBR-RIO is equipped with 16 USB 3.0 receptacles in total. 8 ports are available from the back panel, for attachment of external devices. Another 8 connectors are provided on-board, for system internal usage.

The P2/rJ2 backplane connectors commit +12V system power to a DC-DC converter on the SBR-RIO, which delivers +5V V_{BUS} to the USB connectors. 1.5A power switches, individually assigned to each USB receptacle, prevent from potential damage caused by overcurrent or even a short circuit represented by the external load.

EKF offers design support for custom specific variants of the SBR-RIO, e.g. 16 x on-board connectors, or 16 x USB 3.0 rear panel receptacles (8 HP assembly).

SBR-RIO

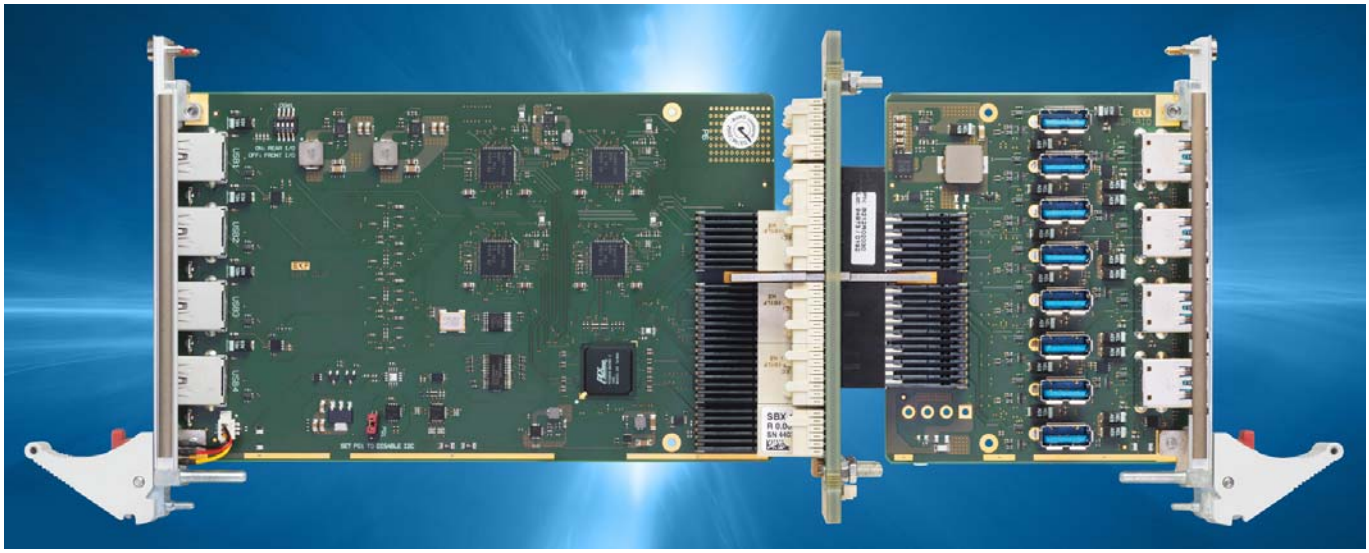
Feature Summary

- **General**
- PICMG® CompactPCI® Serial standard (CPCI-S.0) rear board (rear I/O module)
- 3U/4HP form factor 100x80mm^2
- CPCI-S backplane connectors rJ2, rJ3, rJ4, proprietary pin assignment matches with SBX-DUB controller card
- rJ4: 8 x USB 3.0 ports 1.1 - 2.4
- rJ3: 8 x USB 3.0 ports 3.1 - 4.4
- rJ2: +12V power

- **USB Interfaces**
- 8 x on-board USB 3.0 connectors
- 8 x rear panel USB 3.0 connectors
- Complies with USB 3.0 xHCI (eXtensible host controller interface) SuperSpeed
- Complies with USB 2.0 high-speed, full-speed, low-speed
- ESD protection (TVS diodes)
- EMC protection (common mode inductors)
- V_{BUS} (+5V) 1.5A high current power switches assigned to all connectors
- Rear panel provided with 16 x power good LEDs
- Custom specific rear I/O module design offered

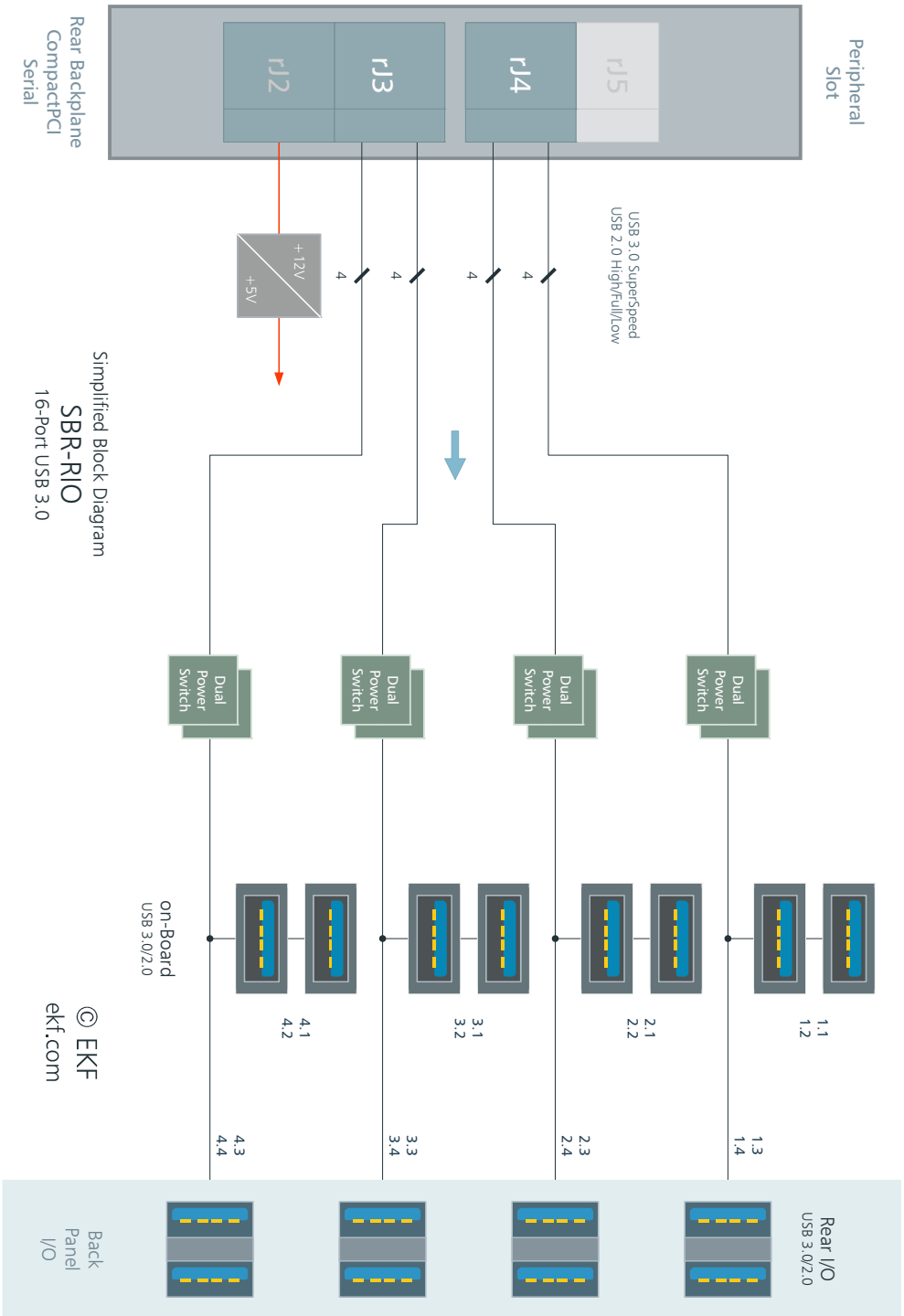
- **Environment & Regulation**
- Designed & manufactured in Germany
- ISO 9000 certified quality management
- Long term availability
- Rugged solution (coating, sealing, underfilling on request)
- RoHS compliant 2002/95/EC
- Operating temperature: 0°C to +70°C (industrial temperature range on request)
- 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 42.1years
- EC Regulations EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1)

SBR-RIO with SBX-DUB

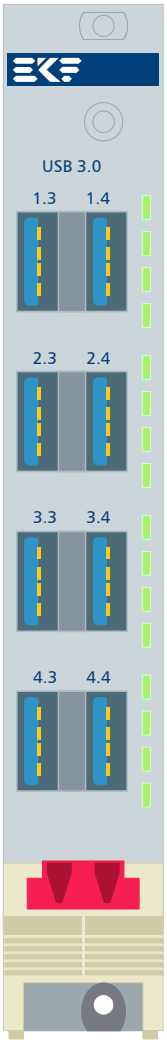


SBX-DUB with SBR-RIO

Block Diagram



Rear Panel



SBR-RIO

LED Function

Green - USB Power

USB Connectors

The SBR-RIO is equipped with 4 x 2 USB receptacles available from the rear panel, for external attachment of USB 3.0 or USB 2.0 devices. Another 8 connectors are situated on-board, for system internal usage. Please consider sufficient additional headroom in a system rack which would be required for internal USB cable connectors or internal USB sticks.

When connected to USB 2.0 compliant devices, only the classic 4 contacts (data pair, +5V and GND) are in use. USB 3.0 devices in addition communicate via the SuperSpeed differential transmit and receive signal pairs, available across another 5 contact pins.

Back panel LEDs are provided to indicate the power state and initialization status of each USB port.

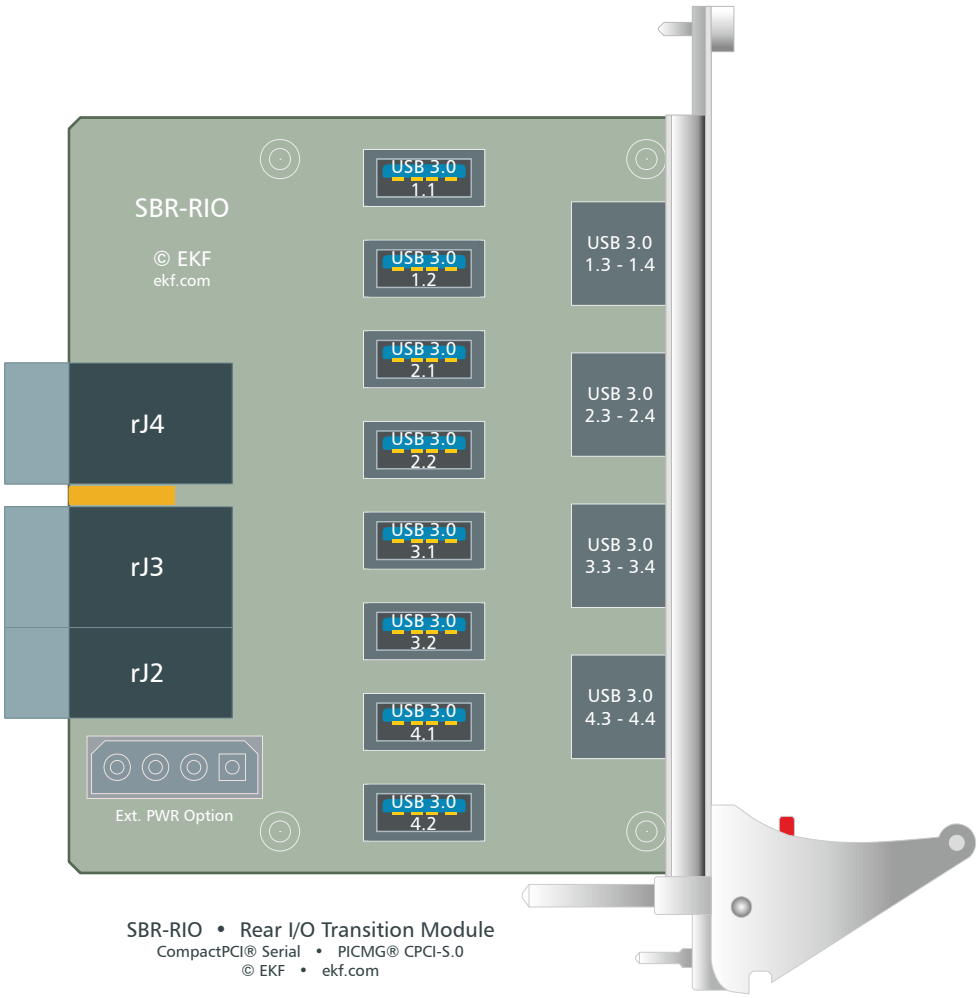
270.23.09.5

illustration shows on-board connectors

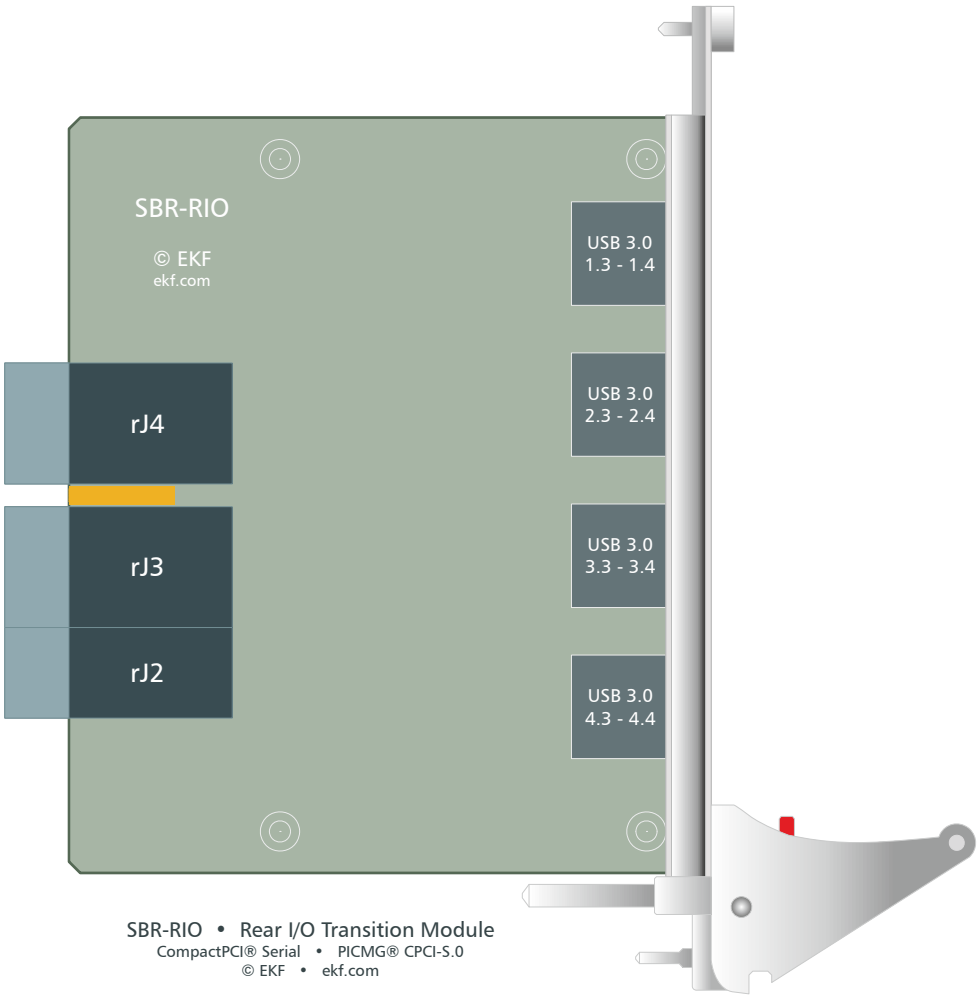
USB 3.0 Receptacles		
	1	VBUS +5V 1.5Amax
	2	USB D-
	3	USB D+
	4	GND
	5	SS RX-
	6	SS RX+
	7	GND
	8	SS TX-
	9	SS TX+

Each connector provides +5V (VBUS) for powering external devices. Electronic switches limit the maximum output current of each individual USB connector to a safe level. The maximum current which can be delivered to all USB devices in total must not exceed 8A continuously.

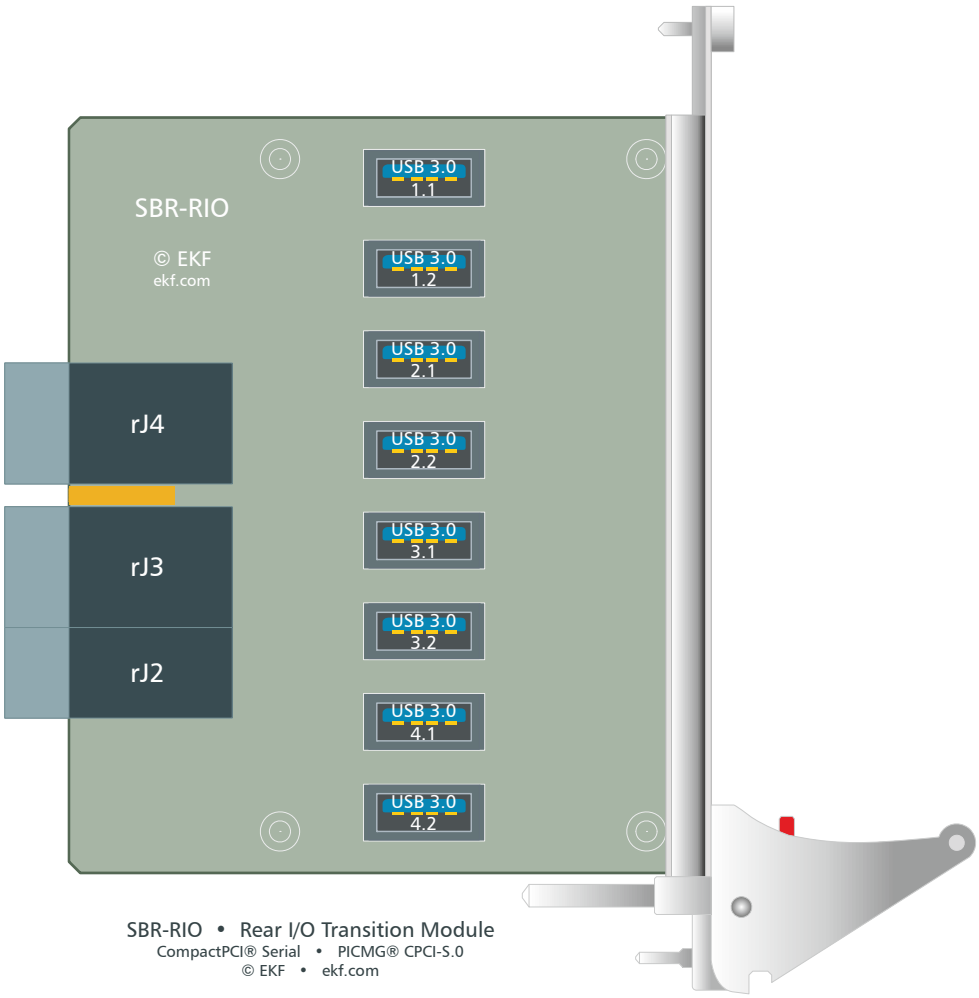
Connector Suite



the connector for external power is an option only and not populated by default



option external USB receptacles only



option internal USB receptacles only

CompactPCI® Serial Backplane Connectors

The CompactPCI® Serial specification describes up to 4 backplane connectors rJ2 - rJ5 for 3U rear boards, for user-defined applications. While rJ3 and rJ4 are assigned to 8 USB ports each on the SBR-RIO, rJ2 provides +12V system power, and side band signals (I^2C ports and GPIO lines) which are not normally used on the SBR-RIO. RJ5 is not engaged on the SBR-RIO.

The pin assignment of rJ2 - rJ4 is proprietary and matches the corresponding USB 3.0 controller board SBX-DUB. The ports are grouped four by four, reflecting the four associated USB 3.0 quad channel controller chips on the SBX-DUB. Please note that four ports 1.1 - 2.1 - 3.1 - 4.1 can be switched optionally to the SBX-DUB front panel. If configured for front I/O, these channels would be not available for usage via the SBR-RIO.

Any USB port is accompanied by two signals for power control. PWRON# (input to the SBR-RIO) enables the particular power switch. OC# (output from the SBR-RIO) indicates an overcurrent situation for a specific USB port. Rear panel LEDs indicate power good for any USB connector.

rJ4 CompactPCI® Serial Rear Board Backplane Connector
EKF Part #250.3.1208.10.00 • 96 pos. 12x8

rJ4	A	B	C	D	E	F	G	H	I	J	K	L
8	GND	1.2 USB2 D+	1.2 USB2 D-	GND	1.2 USB PWRON#	1.2 USB OC#	GND	1.1 USB2 D+	1.1 USB2 D-	GND	1.1 USB PWRON#	1.1 USB OC#
7	1.2 USB3 TX+	1.2 USB3 TX-	GND	1.2 USB3 RX+	1.2 USB3 RX-	GND	1.1 USB3 TX+	1.1 USB3 TX-	GND	1.1 USB3 RX+	1.1 USB3 RX-	GND
6	GND	1.4 USB2 D+	1.4 USB2 D-	GND	1.4 USB PWRON#	1.4 USB OC#	GND	1.3 USB2 D+	1.3 USB2 D-	GND	1.3 USB PWRON#	1.3 USB OC#
5	1.4 USB3 TX+	1.4 USB3 TX-	GND	1.4 USB3 RX+	1.4 USB3 RX-	GND	1.3 USB3 TX+	1.3 USB3 TX-	GND	1.3 USB3 RX+	1.3 USB3 RX-	GND
4	GND	2.2 USB2 D+	2.2 USB2 D-	GND	2.2 USB PWRON#	2.2 USB OC#	GND	2.1 USB2 D+	2.1 USB2 D-	GND	2.1 USB PWRON#	2.1 USB OC#
3	2.2 USB3 TX+	2.2 USB3 TX-	GND	2.2 USB3 RX+	2.2 USB3 RX-	GND	2.1 USB3 TX+	2.1 USB3 TX-	GND	2.1 USB3 RX+	2.1 USB3 RX-	GND
2	GND	2.4 USB2 D+	2.4 USB2 D-	GND	2.4 USB PWRON#	2.4 USB OC#	GND	2.3 USB2 D+	2.3 USB2 D-	GND	2.3 USB PWRON#	2.3 USB OC#
1	2.4 USB3 TX+	2.4 USB3 TX-	GND	2.4 USB3 RX+	2.4 USB3 RX-	GND	2.3 USB3 TX+	2.3 USB3 TX-	GND	2.3 USB3 RX+	2.3 USB3 RX-	GND

Rear I/O Backplane Slot for Usage w. SBX-DUB

rJ3 CompactPCI® Serial Rear Board Backplane Connector

EKF Part #250.3.1208.10.00 • 96 pos. 12x8

rJ3	A	B	C	D	E	F	G	H	I	J	K	L
8	GND	3.2 USB2 D+	3.2 USB2 D-	GND	3.2 USB PWRON#	3.2 USB OC#	GND	3.1 USB2 D+	3.1 USB2 D-	GND	3.1 USB PWRON#	3.1 USB OC#
7	3.2 USB3 TX+	3.2 USB3 TX-	GND	3.2 USB3 RX+	3.2 USB3 RX-	GND	3.1 USB3 TX+	3.1 USB3 TX-	GND	3.1 USB3 RX+	3.1 USB3 RX-	GND
6	GND	3.4 USB2 D+	3.4 USB2 D-	GND	3.4 USB PWRON#	3.4 USB OC#	GND	3.3 USB2 D+	3.3 USB2 D-	GND	3.3 USB PWRON#	3.3 USB OC#
5	3.4 USB3 TX+	3.4 USB3 TX-	GND	3.4 USB3 RX+	3.4 USB3 RX-	GND	3.3 USB3 TX+	3.3 USB3 TX-	GND	3.3 USB3 RX+	3.3 USB3 RX-	GND
4	GND	4.2 USB2 D+	4.2 USB2 D-	GND	4.2 USB PWRON#	4.2 USB OC#	GND	4.1 USB2 D+	4.1 USB2 D-	GND	4.1 USB PWRON#	4.1 USB OC#
3	4.2 USB3 TX+	4.2 USB3 TX-	GND	4.2 USB3 RX+	4.2 USB3 RX-	GND	4.1 USB3 TX+	4.1 USB3 TX-	GND	4.1 USB3 RX+	4.1 USB3 RX-	GND
2	GND	4.4 USB2 D+	4.4 USB2 D-	GND	4.4 USB PWRON#	4.4 USB OC#	GND	4.3 USB2 D+	4.3 USB2 D-	GND	4.3 USB PWRON#	4.3 USB OC#
1	4.4 USB3 TX+	4.4 USB3 TX-	GND	4.4 USB3 RX+	4.4 USB3 RX-	GND	4.3 USB3 TX+	4.3 USB3 TX-	GND	4.3 USB3 RX+	4.3 USB3 RX-	GND

rJ2 CompactPCI® Serial Peripheral Slot Backplane Connector

EKF Part #250.3.1206.10.00 • 72 pos. 12x6

rJ2	A	B	C	D	E	F	G	H	I	J	K	L
6	GND	*3 TUSB GPIO0*	*3 TUSB GPIO1*	GND	*3 TUSB GPIO2*	*3 TUSB GPIO3*	GND	*4 TUSB GPIO0*	*4 TUSB GPIO1*	GND	*4 TUSB GPIO2*	*4 TUSB GPIO3*
5	*1 TUSB GPIO0*	*1 TUSB GPIO1*	GND	*1 TUSB GPIO2*	*1 TUSB GPIO3*	GND	*2 TUSB GPIO0*	*2 TUSB GPIO1*	GND	2 TUSB GPIO2	2 TUSB GPIO3	GND
4	GND	*5 I2C Clock*	*5 I2C Data*	GND	*6 I2C Clock*	*6 I2C Data*	GND	*7 I2C Clock*	*7 I2C Data*	GND	*8 I2C Clock*	*8 I2C Data*
3			GND			GND	*3 I2C Clock*	*3 I2C Data*	GND	*4 I2C Clock*	*4 I2C Data*	GND
2	GND			GND			GND	*Reset#*		GND		
1	+12V	+12V	GND	+12V	+12V	GND	+12V	+12V	GND	+12V	+12V	GND

pin positions printed white: not connected
pin positions printed grey: reserved (test)

The connector rJ2 may be not populated if the SBR-RIO has been equipped with an connector for external power (custom specific option).

Power Connector (Option)

Normally the USB power (+5V VBUS) will be derived from an on-board 12V to 5V DC/DC regulator, sourced via rJ2 from the backplane. A maximum of 8A VBUS continuous current in total should not be exceeded.

As an option, VBUS can be delivered from an external power supply via an on-board power connector (legacy hard disk style). Classic ATX power supplies may commit two voltages +12V and +5V via this connector type. Either voltage can be used for VBUS (specify when ordering). +12V would require the on-board DC/DC converter to be populated. +5V can be used to feed directly the VBUS rail, as an economic solution avoiding the DC/DC regulator. Both alternates would allow to omit the rJ2 connector where appropriate. Please communicate your needs prior to ordering (sales@ekf.com).

Connector PWR (Option) +12V or +5V Power • 264.02.004.13 • MATE-N-LOK		
   264.02.004.13 AMP MATE-N-LOK	1	+12V
	2	GND
	3	GND
	4	+5V

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