



Product Information

SP9-TK

*CompactPCI® Serial*  
Dual PCI Express® Mini Card Carrier  
Supports Wireless Technologies



## General

*The SP9-TK is a peripheral board for CompactPCI® Serial systems and serves as a dual PCI Express® Mini Card carrier, either full- or half-size style. Each PCI Express® Mini Card socket can accommodate either an USB or PCIe® based module.*

For wireless applications, the module sockets are provided with individual front panel Micro SIM card slots. The SP9-TK and can be installed into any PCI Express® enabled peripheral slot of a CompactPCI®Serial backplane.



SP9-TK

## Feature Summary

### *General*

- ▶ PICMG® CompactPCI® Serial standard (CPCI-S.0) peripheral slot card
- ▶ Single Size Eurocard 100x160mm<sup>2</sup>
- ▶ Backplane connector P1 (PCIe® x1)
- ▶ Optional backplane connector P2 (special function)

### *PCI Express® Interface*

- ▶ Gen2 PCI Express® 4-port packet switch
- ▶ Upstream port: PCI Express® x1 Gen2 (5.0Gbps) or Gen1 (2.5Gbps) supported
- ▶ Downstream ports: 2 x PCIe® Mini Card, 1 x PCIe® quad port USB controller

### *PCI Express® Mini Card*

- ▶ 2 x PCI Express® Mini Card sockets, full-size or half-size modules
- ▶ 2 x Micro SIM card holder associated (15mm x 12mm ETSI TS 102 221 V9.0.0, Mini-UICC)
- ▶ PCI Express® Mini Cards of both styles supported: USB and PCIe® based
- ▶ F/P antenna connectors SMA R/P via pigtail cables
- ▶ Custom specific F/P design for pigtail antenna connectors (8HP width)

### *Applications*

- ▶ Wireless networking (WWAN LTE) with or w/o data transfer rate aggregation
- ▶ Industrial WLAN/Bluetooth communication - IoT
- ▶ Popular Mini Card sockets for general use, either PCIe® based or USB 2.0 based Mini Cards

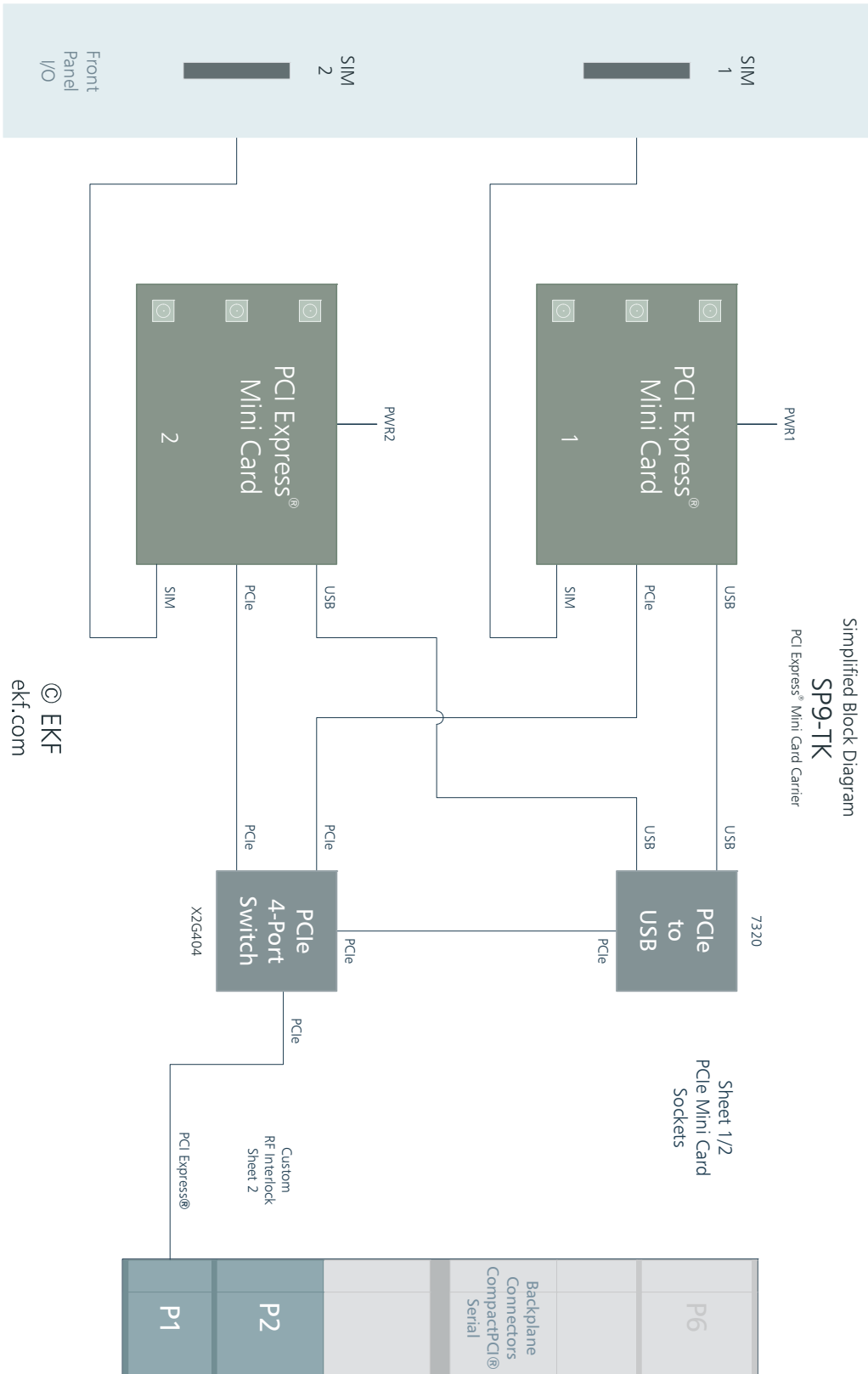
## Feature Summary

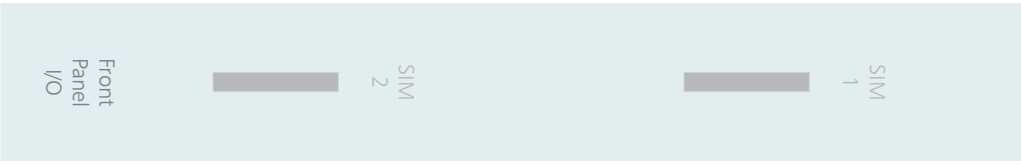
*Environment & Regulation*

- ▶ Designed & Manufactured in Germany
- ▶ ISO 9001 certified quality management
- ▶ Long term availability
- ▶ Rugged solution (coating, sealing, underfilling on request)
- ▶ RoHS compliant
- ▶ 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 62 years
- ▶ EC Regulatory EN55024, EN55032, EN62368-1 (CE)

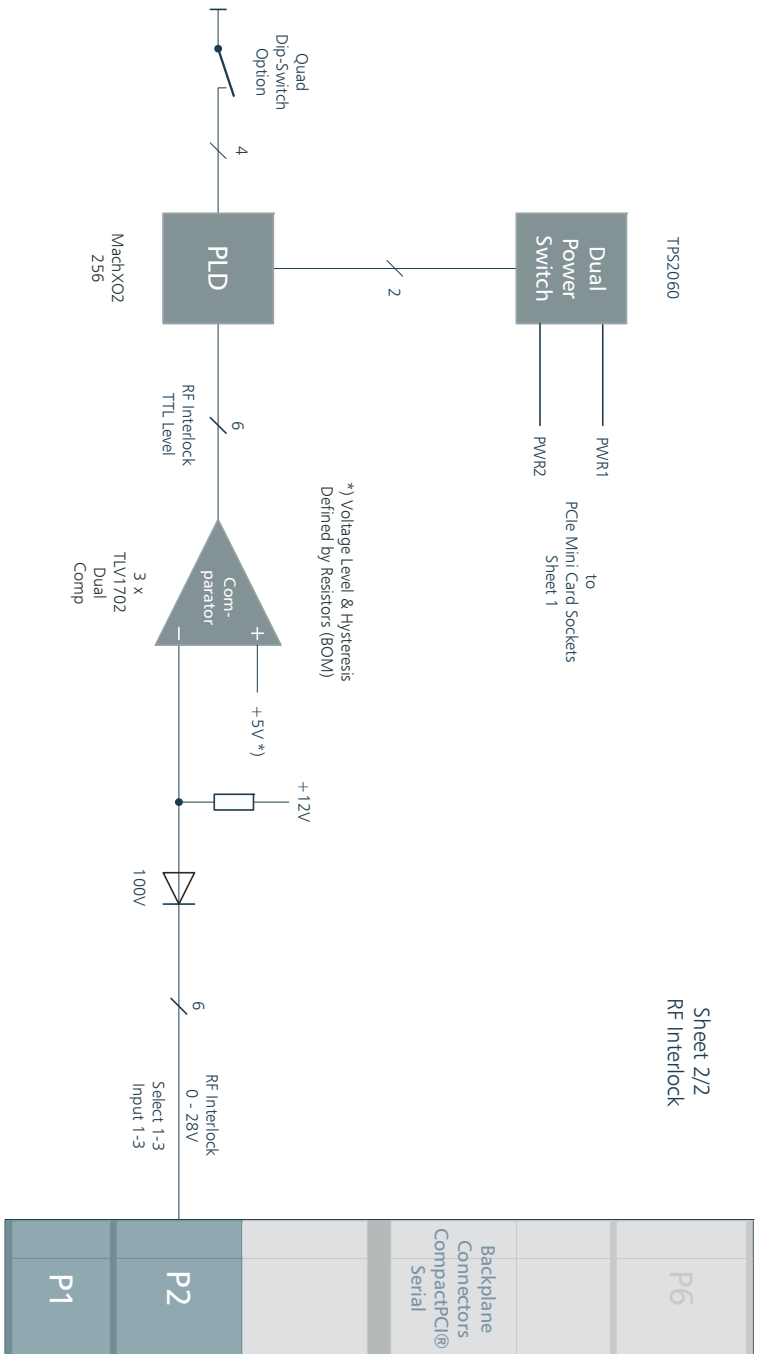
all items may be subject to technical changes w/o further notice

### Block Diagram





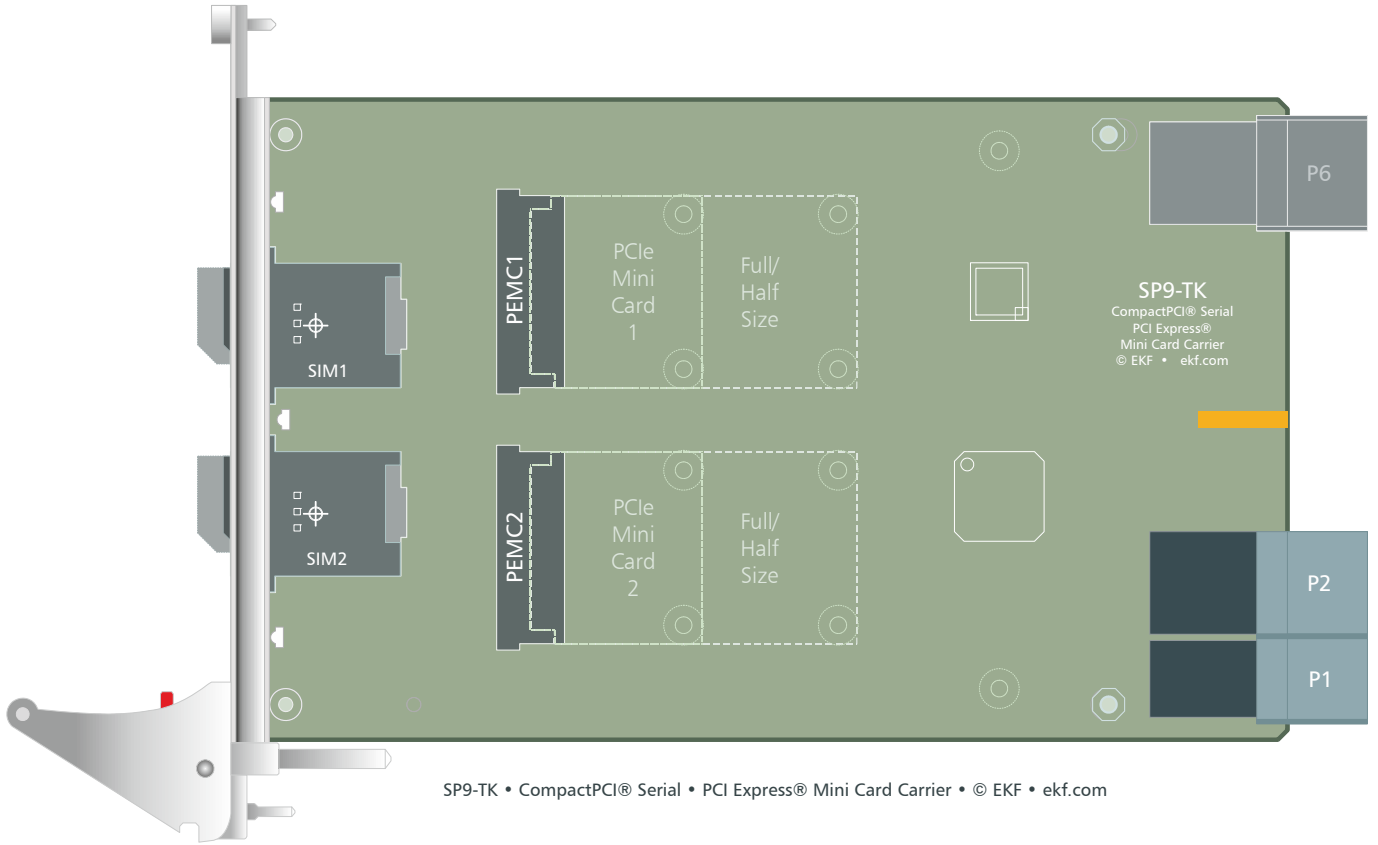
Simplified Block Diagram  
**SP9-TK**  
 PCI Express® Mini Card Carrier



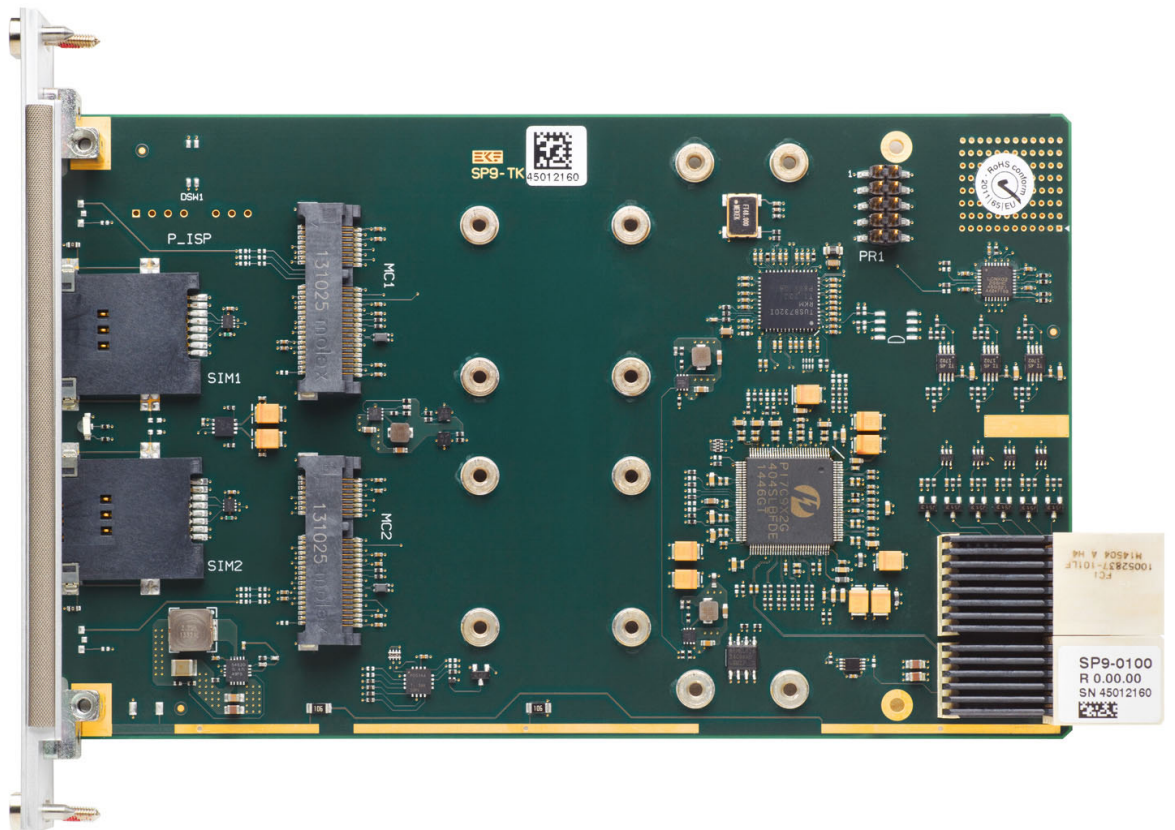
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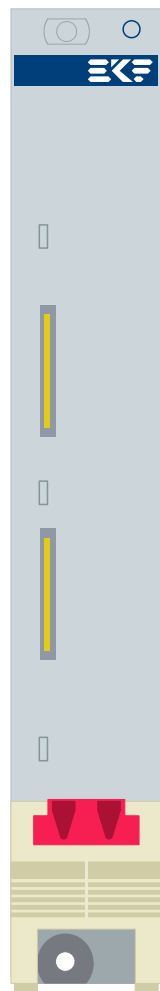
### Component Assembly



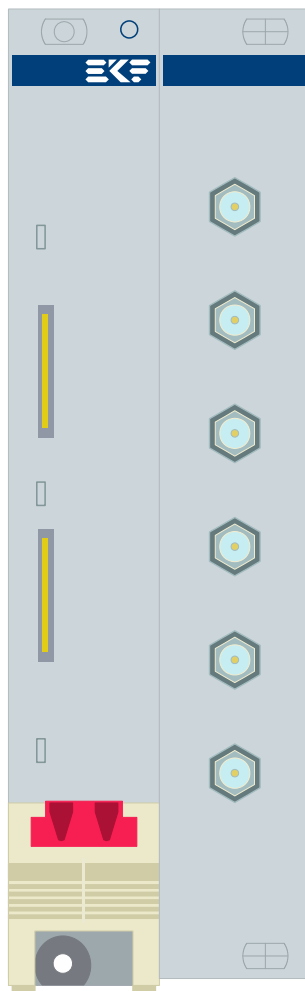
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### Front Panel



SP9-TK



SP9-TK



## Mini Card Host Connectors

The SP9-TK is provided with two PCI Express® Mini Card host connectors. These are suitable for PCIe® based modules, and also USB 2.0 driven Mini Card modules. After inserted, the Mini Card has to be fixed manually, in order to withstand shock and vibration. M2.5 soldered nuts are provided on the SP9-TK PCB, for use with M2.5x4mm screws. 0.5mm height nylon washers are required in addition as spacing elements between the PCB nuts and the Mini Card.

The on-board quad port USB controller is a Texas Instruments TUSB7320 which is USB 2.0 & USB3.0 compliant. With respect to the mini card sockets, only the USB 2.0 high speed internal controller section is in use, with native driver support by any recent operating system.

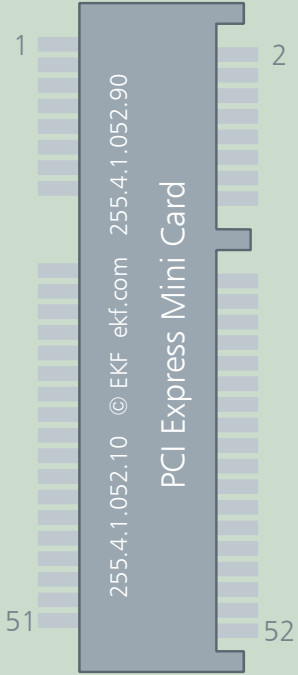
The Mini Card sockets are not suitable for some proprietary modules, which may provide special services, e.g. voice I/O, resulting in conflicts with the host connector pin assignment. Be sure that your Mini Card complies with the PCI Express® Mini Card Specification (PCI-SIG). Furthermore, mSATA modules are not supported.

Power and W\_DISABLE# pins can be controlled externally. The behaviour is controlled by means of a small FPGA (Lattice MachXO2). If required, please contact the EKF support (support@ekf.com) for details or modification.

Wireless Mini Cards are equipped with U.FL style RF coax connectors. EKF can provide a 8HP front panel for the SP9-TK, for mounting of SMA or SMA/RP RF antenna connectors. Use suitable pigtail coax cable assemblies SMA to U.FL , e.g. EKF #268.4.09.2.14.100 (100mm length). While SMA is typical for WWAN, SMA/RP is common for Wi-Fi.

## MC1 - MC2

## PCI Express® Mini Card Socket (255.4.1.052.14)



RSV/NC (PCIE_WAKE#)	1	2	+3.3V
RSV/NC	3	4	GND
RSV/NC	5	6	+1.5V
RSV/NC (CLKREQ#)	7	8	UIM_C1
GND	9	10	UIM_C7
PCIE_CLK-	11	12	UIM_C3
PCIE_CLK+	13	14	UIM_C2
GND	15	16	UIM_C6
UIM_C8	17	18	GND
UIM_C4	19	20	W_DIS1# (MachXO)
GND	21	22	RST#
PCIE_RN	23	24	+3.3V
PCIE_RP	25	26	GND
GND	27	28	+1.5V
GND	29	30	RSV/NC (SMB_CLK)
PCIE_TN	31	32	RSV/NC (SMB_DAT)
PCIE_TP	33	34	GND
GND	35	36	USB_D-
GND	37	38	USB_D+
+3.3V	39	40	GND
+3.3V	41	42	LED_WWAN#
GND	43	44	LED_WLAN#
RSV/NC	45	46	LED_WPAN#
RSV/NC	47	48	+1.5V
RSV/NC	49	50	GND
RSV/NC (W_DIS2# MachXO2)	51	52	+3.3V

each socket can supply a Mini Card with +3.3V/1.5A and +1.5V/1A

## P1 CompactPCI® Serial Backplane Connector

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	<i>PE TX02+</i>	<i>PE TX02-</i>	GND	<i>PE RX02+</i>	<i>PE RX02-</i>	GND	<i>PE TX03+</i>	<i>PE TX03-</i>	GND	<i>PE RX03+</i>	<i>PE RX03-</i>
5	<i>PE TX00+</i>	<i>PE TX00-</i>	GND	<i>PE RX00+</i>	<i>PE RX00-</i>	GND	<i>PE TX01+</i>	<i>PE TX01-</i>	GND	<i>PE RX01+</i>	<i>PE RX01-</i>	GND
4	GND	<i>USB2+</i>	<i>USB2-</i>	GND	<i>PE CLK+</i>	<i>PE CLK-</i>	GND	<i>SATA TX+</i>	<i>SATA TX-</i>	GND	<i>SATA RX+</i>	<i>SATA RX-</i>
3	<i>USB3 TX+</i>	<i>USB3 TX-</i>	GA0	<i>USB3 RX+</i>	<i>USB3 RX-</i>	GA1	<i>SATA SDI</i>	<i>SATA SDO</i>	GA2	<i>SATA SCL</i>	<i>SATA SL</i>	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 italic/white: not connected

For signal descriptions please refer to PICMG CPCI-5.0 R2.0 CompactPCI® Serial Specification

## P2 CompactPCI® Serial Backplane Connector

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	1 RF IN	1 RF SEL	GND	2 RF IN	2 RF SEL	GND	3 RF IN	3 RF SEL	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

The P2 connector is optional, for up to 6 external sensor/switch RF interlock signals 0V up to 28V, which are used as inputs to the MachXO2 PLD in order to control power and W\_DISABLE# pins of the Mini Card sockets.

# Beyond All Limits: EKF High Performance Embedded

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