SYSTEM

Product Information

SPY-RIG

CompactPCI® Serial • Octal WWAN Module Carrier

General

The SPY-RIG is a peripheral slot card for CompactPCI® Serial systems. The board serves as a carrier for up to eight WWAN modules, e.g. 3G or 4G (LTE) modems, and also forthcoming technologies beyond 4G. Four M.2 sockets are provided to accommodate M.2 3042 style modules, related to front panel Mini SIM card slots.

Another four WWAN modules are directly soldered to the PCB, combined w. on-board Micro SIM card sockets.

The module antenna I/Os are strapped to an on-board 8:1 R/F combiner circuit, which has its sum port wired to the SMA type front panel antenna connector, for minimum external antenna cabling effort. The M.2 sockets support USB2 and USB3 based WWAN 3G/4G (LTE) and future 3042 size modules. The soldered 3G modems are USB2 controlled.

The SPY-RIG is well suited especially for high throughput applications which require WWAN bandwidth aggregation.

SPY-0100 • M.2 Modules Removed - Soldered Modules Visible

Feature Summary

General

- PICMG® CompactPCI® Serial (CPCI-S.0) standard peripheral slot card
- Single Size Eurocard 3U 4HP 100x160mm^2
- CompactPCI® Serial backplane connector P1
- Suitable for PCIe® x1 or x2 Gen2 enabled peripheral slots
- On-board PCIe® packet switch PEX8605

USB Controllers

- 2 x Texas Instruments PCI Express® to quad-port USB 3.0 controller TUSB7340
- PCI Express® x 1 Gen2 interface
- USB 3.0 xHCI (eXtensible host controller interface) SuperSpeed supported
- USB 2.0 high-speed, full-speed, low-speed supported
- USB 3.0 & USB 2.0 for M.2 WWAN module sockets
- USB 2.0 for soldered WWAN modules
- Drivers available for download

M.2 Sockets

- 4 x M.2 sockets, for 30mm x 42mm cards, B-key
- Socket 2 WWAN configuration according to PCI Express M.2 Specification Rev. 1.1 2016
- USB controlled host I/F, USB 3.0 and USB 2.0
- Future proof by USB 3.0 SuperSpeed, maximum data rate 5Gbps full duplex
- Legacy compliant 2G/3G/4G (LTE) by USB 2.0 480Mbps
- +3.3V power supply, 3.7A typ. current limited electronic power switches, option I2C controlled M.2 socket power on/off
- F/P Mini SIM card holder associated to each socket (default configuration), 2 x dual-slot
- Suitable for 25mm x 15mm 2FF UICC, often referred to as 'Standard SIM'
- Front panel screw lock solution available for Mini SIM cards
- Analog crosspoint switches provided for SIM card sockets, optional selection between front slots and on-board sockets via I^{2}C programming
- Front panel LED array associated to M.2 modem LED outputs (with SPY-0200-RIG only)
- Common F/P antenna connector SMA for simplified external antenna cabling
- Custom specific F/P design for additional pigtail antenna connectors (8HP/12HP width)

Soldered WWAN Modules

- 4 x Telit HE910-GL quad band 3G embedded modules (global use version)
- HSPA+ upload 5.76Mbps, download 7.2Mbps
- GSM/GPRS/EDGE MHz 800/850, 900, 1800, 1900
- UMTS/HSPA MHz 800/850, 900, AWS1700, 1900, 2100
- On-board Micro SIM card holder associated to each module (default assignment)
- Analog crosspoint switches provided for SIM card sockets, optional selection between front slots and on-board sockets via I^2C programming

R/F Combiner/Splitter Circuit

- Mini-Circuits SEPS-8-272+, on-board soldering, 8:1
- 700-2700MHz, 50 Ohm
- Isolation 20dB typ.
- Insertion loss 10.8dB typ. 900-2400MHz
- On-board R/F strapping from M.2 WWAN modules (main antenna connector) to combiner/splitter via e.g. Hirose W.FL or I-PEX MHF4 or Murata HSC ($2x2mm^2$) coaxial connectors and cable assemblies
- Combiner/splitter bypassing option w. pigtail antenna connectors (custom specific F/P required e.g. 8HP width)
- On-board R/F routing from soldered WWAN modules to combiner splitter
- RF SMA front panel connector 1 (main antenna)
- Option additional combiner/splitter for 8 x diversity antenna module I/O (7 x EP2W+, with SPY-0100-RIG only)
- Option auxiliary SMA front panel connector 2 (diversity antenna, with SPY-0100-RIG only)

Applications

- WWAN e.g. 3G/4G/LTE with data transfer rate aggregation
- Railway, transportation
- Industrial IoT networking

Environment & Regulation

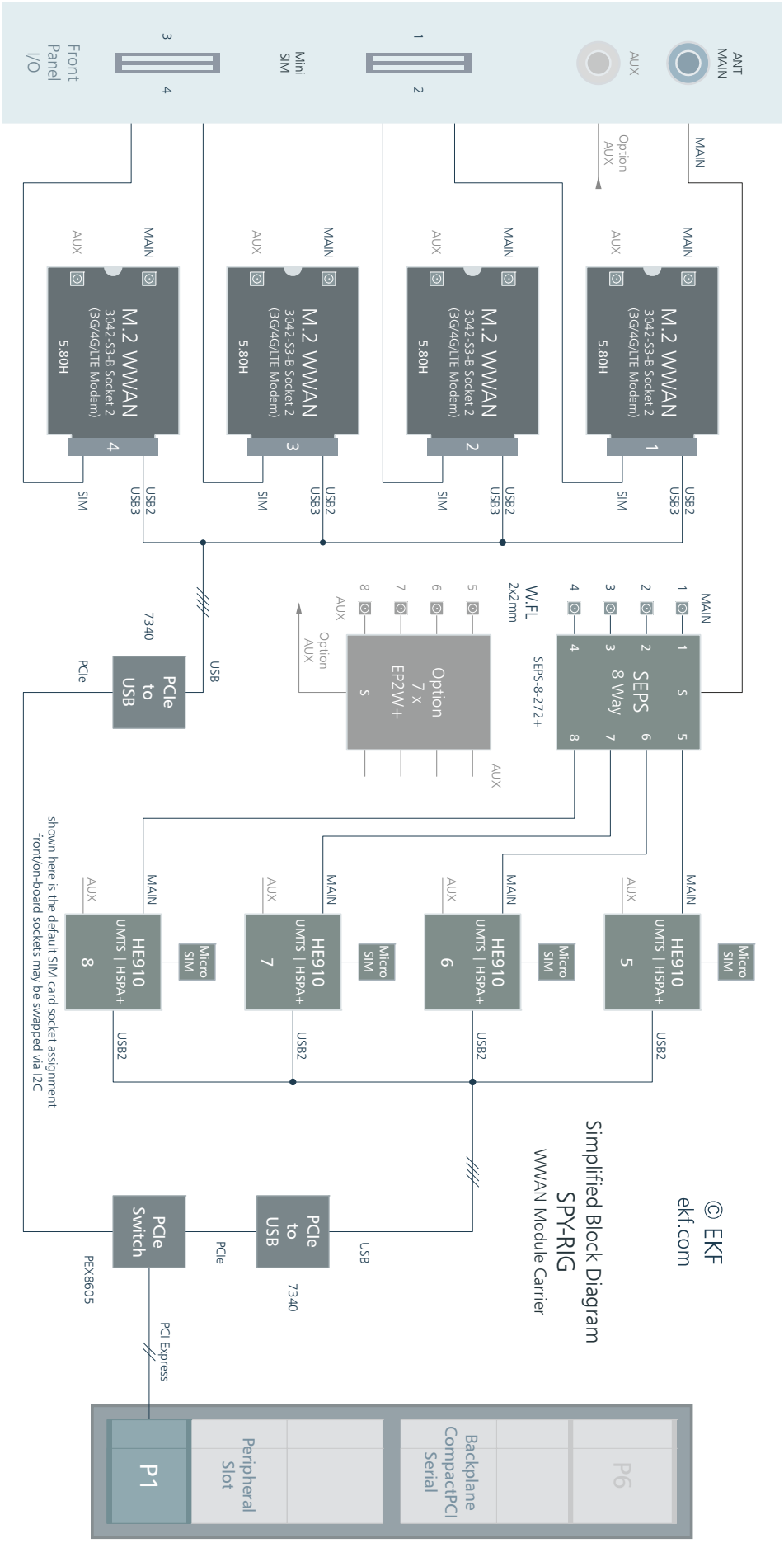
- Designed & manufactured in Germany
- ISO 9001 certified quality management
- Long term availability
- Rugged solution (coating, sealing, underfilling on request)
- RoHS compliant
- Operating temperature: -40°C to +85°C industrial temperature range
- Storage temperature: -40°C to +85°C, max. gradient 5°C/min
- Humidity 5% ... 95% RH non condensing
- Altitude -300m ... +3000m
- Shock 15g 0.33ms, 6g 6ms
- Vibration 1g 5-2000Hz
- MTBF 26.4 years (carrier board w/o WWAN modules)
- EC Regulations EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1)

items are subject to changes

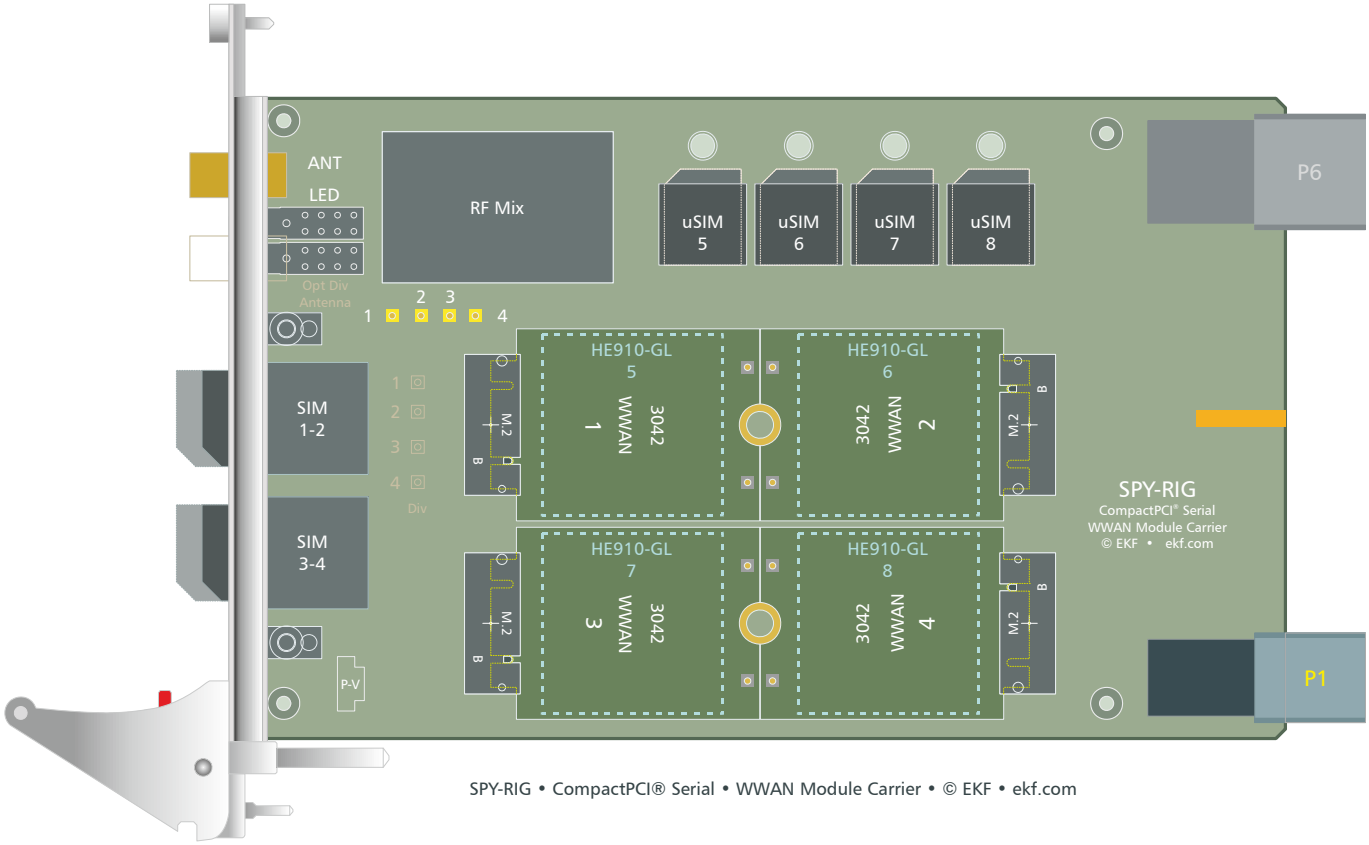
SPY-0100-RIG

SPY-0100-RIG • M.2 Modules Removed - Soldered Modules Visible

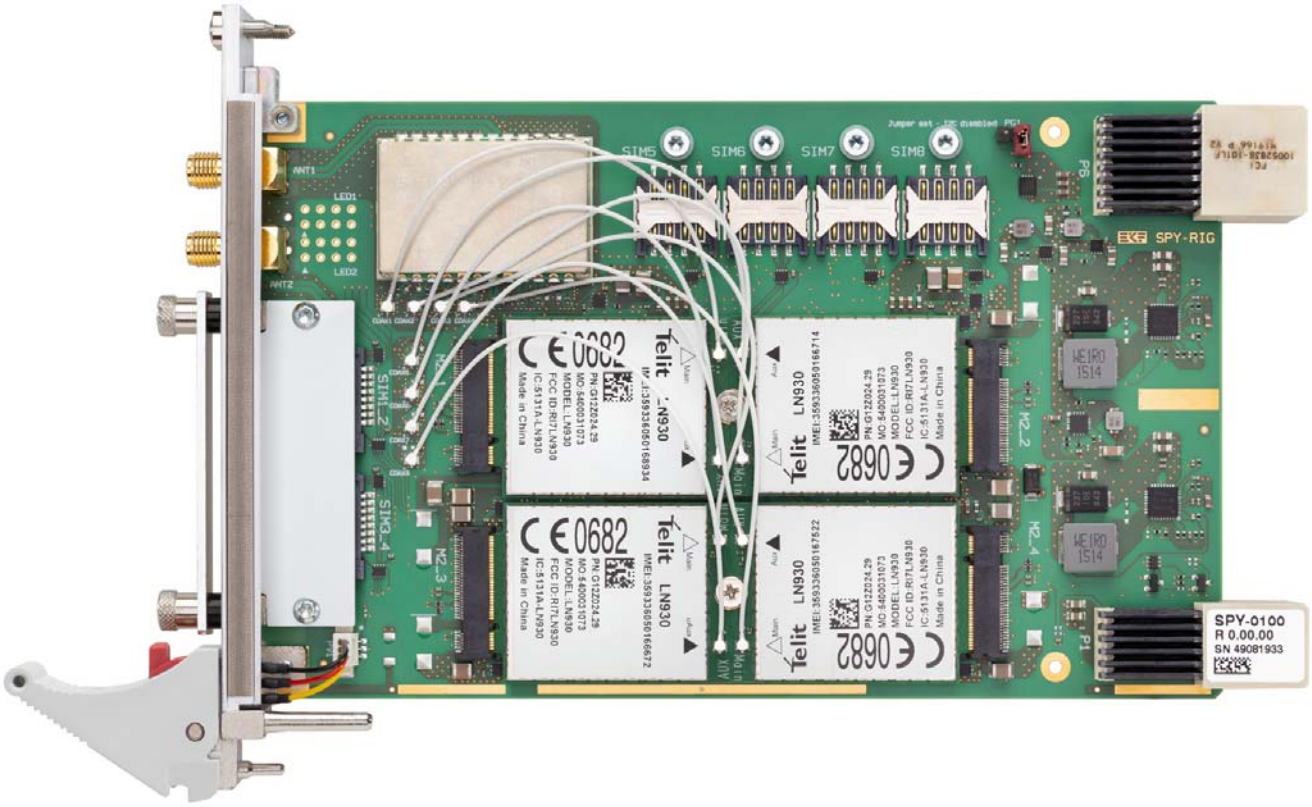
Block Diagram

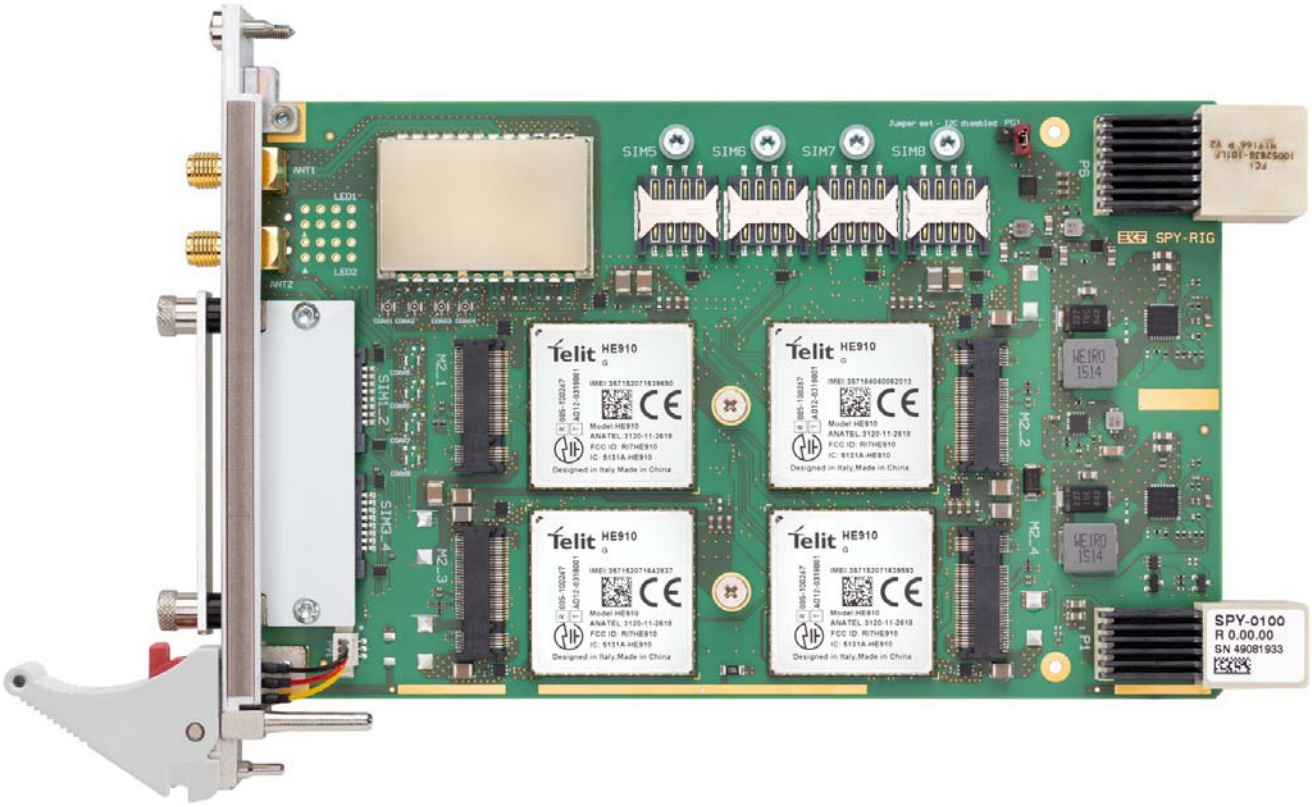


Component Assembly

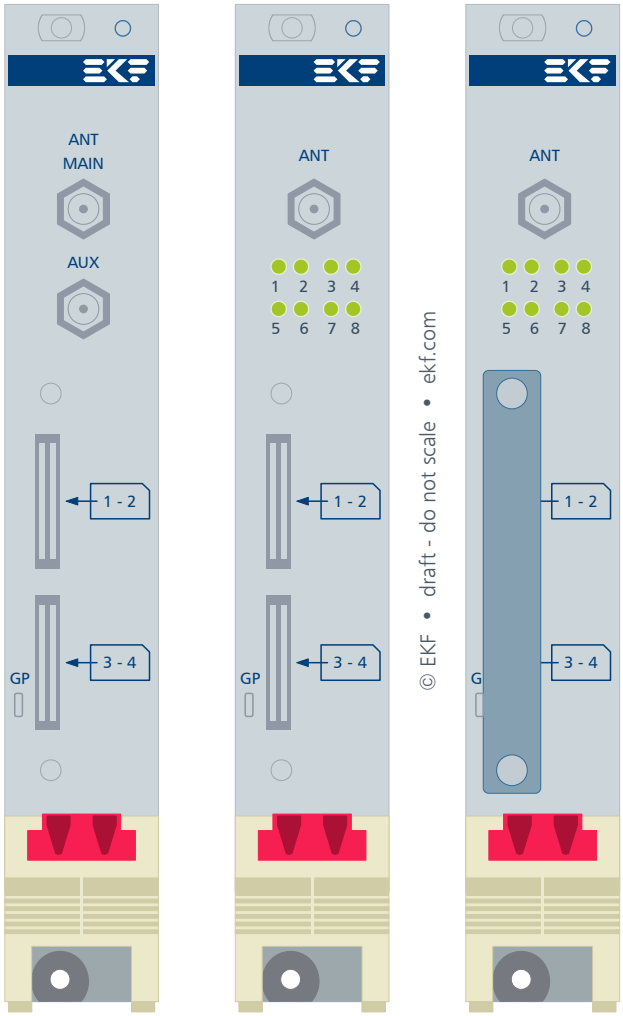


SPY-RIG • CompactPCI® Serial • WWAN Module Carrier • © EKF • ekf.com


SIM5
SIM6
SIM7
SIM8
SPY-RIG
Telit LN930
SPY-0100
R 0.00.00
SN 49081933


SIM5
SIM6
SIM7
SIM8
SPY-RIG
Telit HE910
SPY-0100
R 0.00.00
SN 49081933

Front Panel



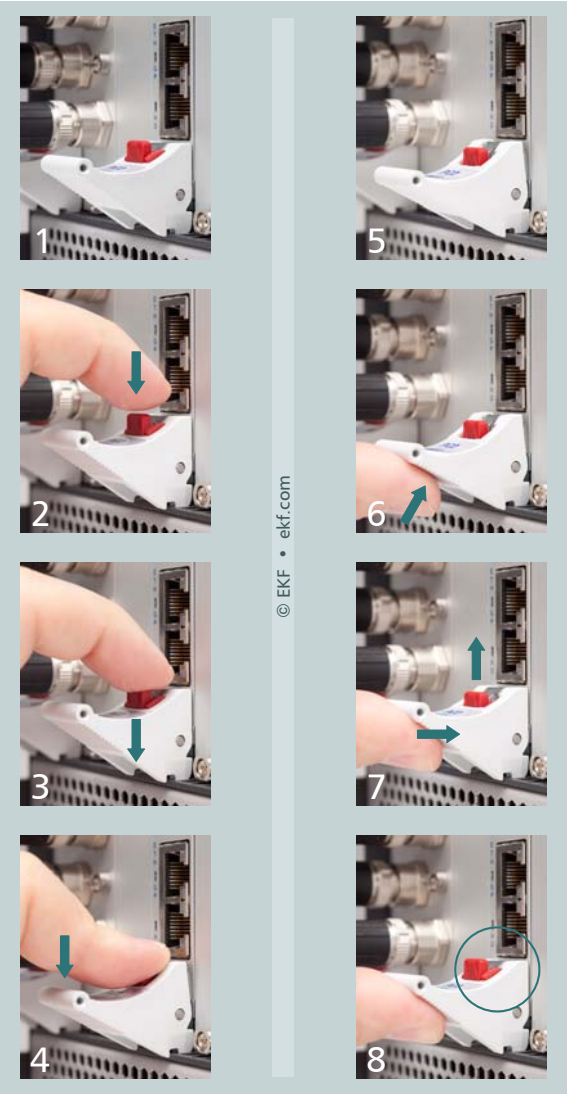
SPY-0100-RIG SPY-0200-RIG SPY-0200-RIG

LED Assignment

Array LEDs: defined by M.2 WWAN module manufacturer (with SPY-0200-RIG only)

GP LED: programmable I2C

Please note: The front handle is provided with a built-in microswitch, which is used to disable the on-board power circuit when released. Vice versa, the *on-board devices are enabled not before the handle gets locked*. Please refer to the illustration below and make sure that the eject lever has reached its final position for proper board operation, as shown in picture 8. A gentle click should be audible, when the red actuator pin moves into its raised position, indicating that the board is locked and ready for use.



1 - 4: remove board
5 - 8: install board

1 & 8: on-board power enabled
2-7: on-board power disabled

M.2 Sockets

M.2 Sockets Key B WWAN Module USB 3.0 Pin 1 - 38 EKF Part #255.50.1.2242.10			
CFG_3 *	1	2	+3.3V
GND	3	4	+3.3V
GND	5	6	FCPO# 2)
USB_D+	7	8	NC (W_DISABLE#) 2)
USB_D-	9	10	GPIO9_LED1# 4)
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 (GPIO_5)
CFG_0 *	21	22	NC (GPIO_6)
NC (WAKE_WWAN#)	23	24	NC (GPIO_7)
NC (DPR)	25	26	NC (GPIO_10)
GND	27	28	NC (GPIO_8)
USB3_Tx- 1)	29	30	UIM-RESET 5)
USB3_Tx+ 1)	31	32	UIM-CLK 5)
GND	33	34	UIM-DATA 5)
USB3_Rx- 1)	35	36	UIM-PWR 5)
USB3_Rx+ 1)	37	38	NC

* by default NC, option 10k pull-up +3.3V

1) pin assignment according to M.2 Specification - device point of view. The SPY-RIG however is controller (host) and receives SuperSpeed data from pins 29/31, and sends data to pin 35/37.
2) Full_Card_Power_Off - connected to on-board I2C controlled GPIO output.
3) Not connected by default (wireless permanent enabled). May by controlled by I2C GPIO (stuffing option).
4) Wired to front panel LED array.
5) Wired to associated front panel Mini SIM card slot

M.2 Sockets Key B WWAN Module USB 3.0 Continued • Pin 39 - 75			
GND	39	40	NC (GPIO_0)
NC	41	42	NC (GPIO_1)
NC	43	44	NC (GPIO_2)
GND	45	46	NC (GPIO_3)
NC	47	48	NC (GPIO_4)
NC	49	50	NC
GND	51	52	NC
NC	53	54	NC
NC	55	56	NC
GND	57	58	NC
NC (ANTCTL0)	59	60	NC (COEX3)
NC (ANTCTL1)	61	62	NC (COEX_RXD)
NC (ANTCTL2)	63	64	NC (COEX_TXD)
NC (ANTCTL3)	65	66	NC (SIM_DETECT)
RESET# 1)	67	68	NC (SUSCLK 32kHz)
CFG_1 *	69	70	+3.3V
GND	71	72	+3.3V
GND	73	74	+3.3V
CFG_2 *	75		

* by default NC, option 10k pull-up +3.3V

1) Buffered CompactPCI® Serial backplane signal RST#

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	*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 italic/white: not connected

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

SPY-RIG Links	
SPY-RIG Home	www.ekf.com/s/spy/spy.html
CompactPCI® Serial Wireless Solutions	www.ekf.com/s/serial.html#SP
CompactPCI® Serial Overview	www.ekf.com/s/serial_concise.pdf
CompactPCI® Serial - All You Need to Know	www.ekf.com/s/smart_solution.pdf

Driver Software	
USB 3.0 TUSB7340 xHCI Driver	www.ti.com/product/tusb7340#toolssoftware

Ordering Information	
SPY-0100-RIG	Dual SMA RF front connectors Main & Aux for antenna diversity
SPY-0200-RIG	SIngle SMA front connector, LED array
For popular SPY-RIG SKUs please refer to www.ekf.com/liste/liste_21.html#SPY	

SPY-0200-RIG • M.2 Modules Removed

SPY-0200-RIG

Up to 64 WWAN Modules in a CompactPCI® Serial Rack

Beyond All Limits:
EKF High Performance Embedded

Industrial Computers Made in Germany

boards. systems. solutions.

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