



Product Information

## SF2-CANDY

**CompactPCI<sup>®</sup> Serial • Multi-Port CAN Controller**  
8/16 Port CAN 2.0B/CAN-FD  
Quad PCI Express<sup>®</sup> Mini Card Carrier

Document No. 8850 • 14 November 2018



## General

*The SF2-CANDY is a quad PCI Express® Mini Card carrier, suitable for CompactPCI® Serial systems. The board can be used together with PCIe® based CAN fieldbus modules, available as single-port, dual-port or even quad-port CAN controllers. This results in a scalable solution from 1 up to 16 CAN I/O ports, wired to a common D-SUB front panel connector. Validated CAN modules are available for classic CAN 2.0A/B, and also CAN-FD (Flexible Data Rate).*

Two front panel connector solutions are available from stock, either D-SUB 25-position for up to 8 CAN 2.0B ports, or D-SUB 50-position for up to 16 CAN-FD ports. Each CAN port is individually isolated for optimum fieldbus reliability.

The SF2-CANDY is equipped with an on-board PCI Express® packet switch, and can be installed into any peripheral slot of a CompactPCI® Serial backplane.



SF2-1080-CANDY • 8-Port Isolated CAN 2.0B

## Feature Summary

### *General*

- ▶ PICMG® CompactPCI® Serial standard (CPCI-S.0) peripheral slot card
- ▶ Single Size Eurocard 3U 4HP 100x160mm<sup>2</sup>
- ▶ Backplane connector P1 (PCIe® x1)

### *PCI Express® Interface*

- ▶ Gen2 PCI Express® 6-port packet switch
- ▶ Upstream port: PCI Express® x1 Gen2 (5.0Gbps) or Gen1 (2.5Gbps) supported
- ▶ Downstream ports: 4 x PCIe® Mini Card, Gen1 and Gen2 support

### *PCI Express® Mini Card*

- ▶ 4 x PCI Express® Mini Card sockets, full-size or half-size modules, PCIe® based
- ▶ Validated with PEAK System PCAN-miniPCIe Dual Channel CAN 2.0A and 2.0B
- ▶ Validated with PEAK System PCAN-miniPCIe FD Four Channel CAN FD

### *Front Panel Connector*

- ▶ 4 HP front panel design
- ▶ D-SUB 37-pin connector and cable harness for up to 4 x PCAN-miniPCIe (8 ports)
- ▶ D-SUB 50-pin connector and cable harness for up to 4 x PCAN-miniPCIe FD (16 ports)
- ▶ Custom specific front panel design, e.g. 8 x D-SUB 9-pin connectors with 12HP front panel width

### *Applications*

- ▶ Test equipment for automotive networks
- ▶ Industrial automation
- ▶ Autonomous devices - IoT
- ▶ Medical equipment

## Feature Summary

### *Special Features SF2-1080-CANDY • CAN 2.0A/B*

- ▶ Up to 4 x Peak System PCAN-miniPCIe dual channel CAN I/O module, PCIe® based
- ▶ 4 x 2 High-speed CAN channels (ISO 11989-2)
- ▶ Bit rates from 5 kbit/s up to 1 Mbit/s
- ▶ Bus length up to 13km
- ▶ Compliant with CAN specifications 2.0A (11-bit ID) and 2.0B (29-bit ID)
- ▶ FPGA implementation of the CAN controller (SJA1000 compatible)
- ▶ NXP PCA82C251 CAN transceiver
- ▶ Galvanic isolation on the CAN connection up to 300 V, separate for each CAN channel
- ▶ Extended operating temperature range from -40°C to +85°C
- ▶ Full device driver support Windows 10, 8.1, 7 and Linux 32/64-bit
- ▶ Programming interface PCAN-Basic for developing applications with CAN connection
- ▶ Programming interfaces for standardized protocols from the automotive sector
- ▶ 4HP front panel width - up to 8 CAN ports wired to a common front panel connector D-SUB 25-pin
- ▶ 4HP, 8HP and beyond custom specific front panel design with other connector(s) on request

### *Special Features SF2-2160-CANDY • CAN-FD*

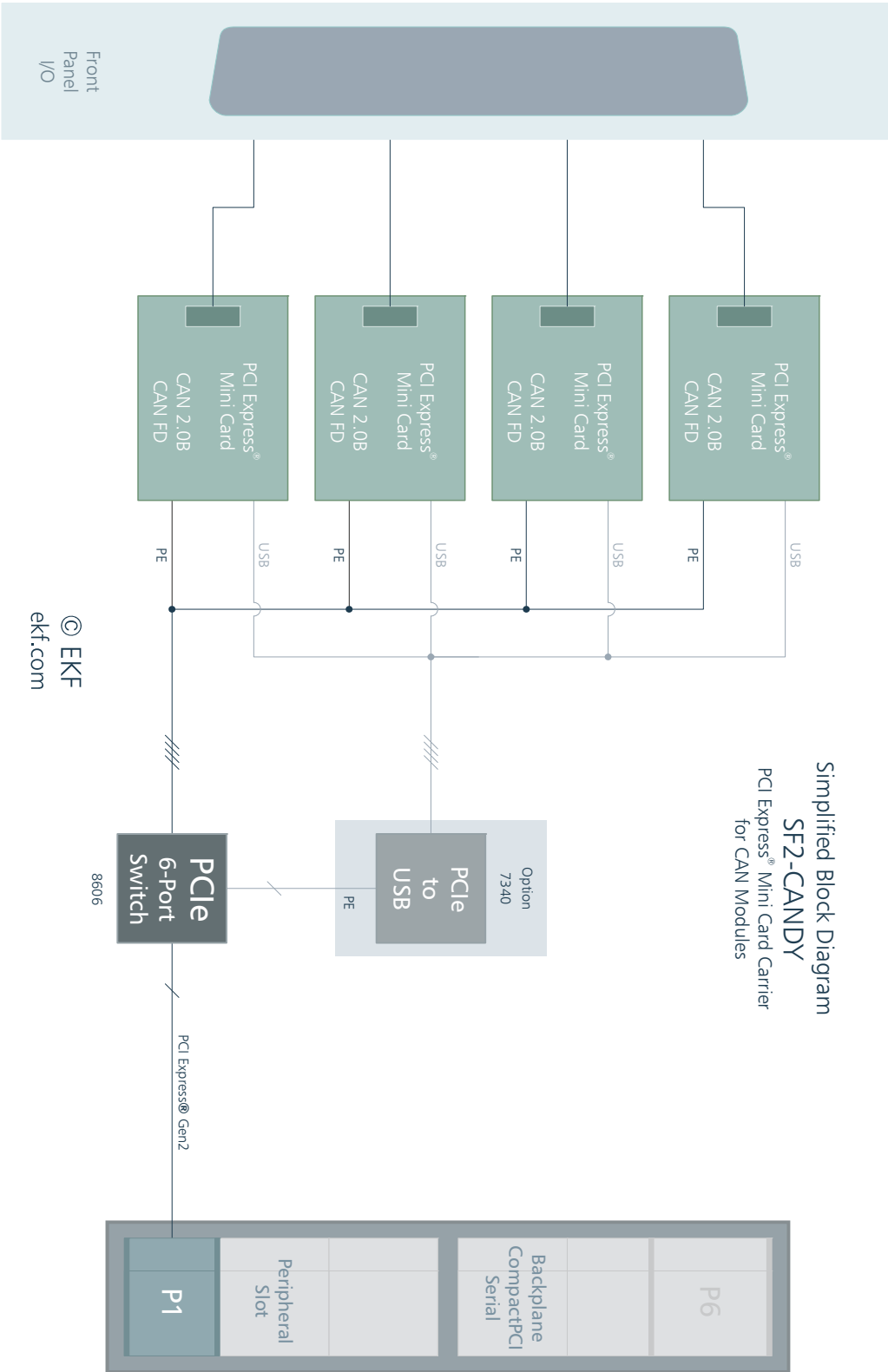
- ▶ Up to 4 x Peak System PCAN-miniPCIe FD quad channel CAN I/O module, PCIe® based
- ▶ 4 x 4 High-speed CAN channels (ISO 11989-2)
- ▶ Complies with CAN specifications 2.0A/B and FD
- ▶ CAN FD support for ISO and Non-ISO standards switchable
- ▶ CAN FD bit rates for the data field (64 bytes max.) from 25 kbit/s up to 12 Mbit/s
- ▶ CAN bit rates from 25 kbit/s up to 1 Mbit/s
- ▶ FPGA implementation of the CAN controller (SJA1000 compatible)
- ▶ NXP TJA1044GT CAN transceiver
- ▶ Galvanic isolation on the CAN connection up to 300 V, separate for each CAN channel
- ▶ PCIe data transfer via bus master DMA
- ▶ DMA memory access operations with 32- and 64-bit addresses
- ▶ Measurement of bus load including error/overload frames on the physical bus
- ▶ Induced error generation for incoming and outgoing CAN messages
- ▶ Extended operating temperature range from -40°C to +85°C
- ▶ Full device driver support Windows 10, 8.1, 7 and Linux 32/64-bit
- ▶ Programming interface PCAN-Basic for developing applications with CAN connection
- ▶ Programming interfaces for standardized protocols from the automotive sector
- ▶ 4HP front panel width - up to 16 CAN ports wired to a common front panel connector D-SUB 50-pin
- ▶ 4HP, 8HP and beyond custom specific front panel design with other connector(s) on request

## Feature Summary

### *Environment & Regulation*

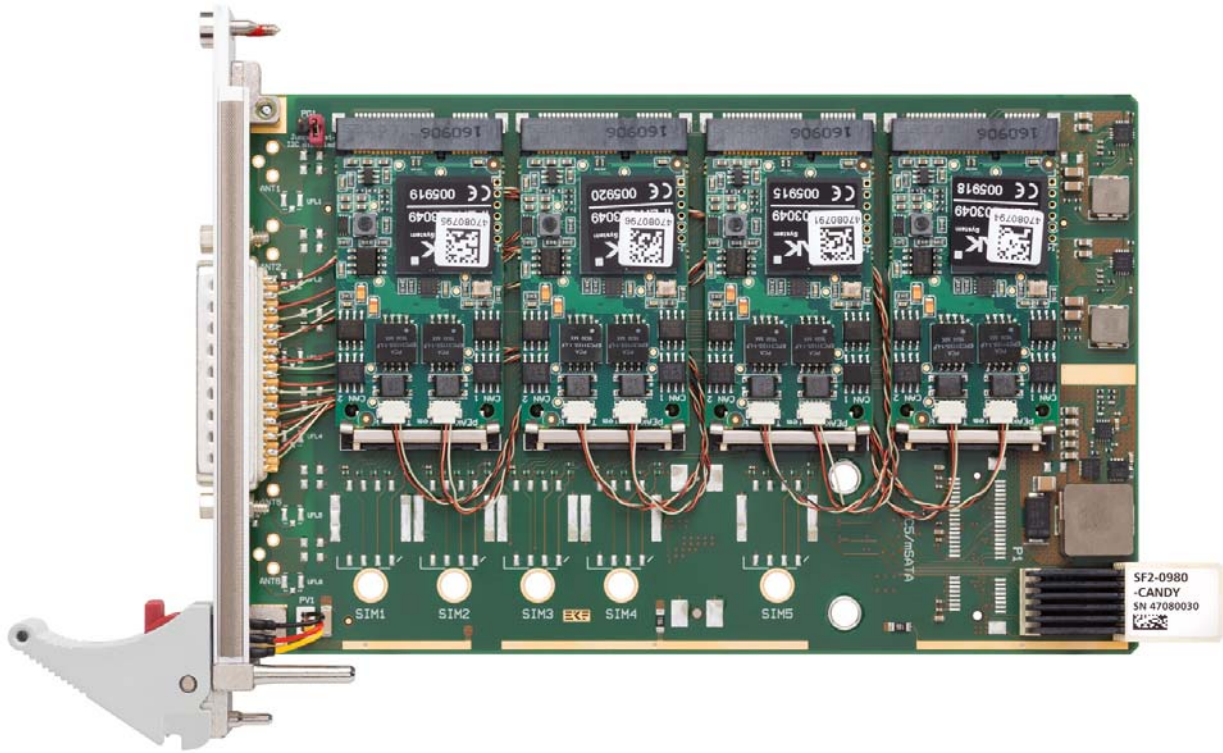
- ▶ Designed & Manufactured in Germany
- ▶ ISO 9001 certified quality management
- ▶ Long term availability
- ▶ Rugged solution (coating, sealing, underfilling on request)
- ▶ RoHS compliant
- ▶ Operating temperature: -40°C to +85°C (industrial temperature range)
- ▶ Storage temperature: -40°C to +85°C, 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 39.6 years (carrier card)
- ▶ EC Regulations EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1)

Block Diagram



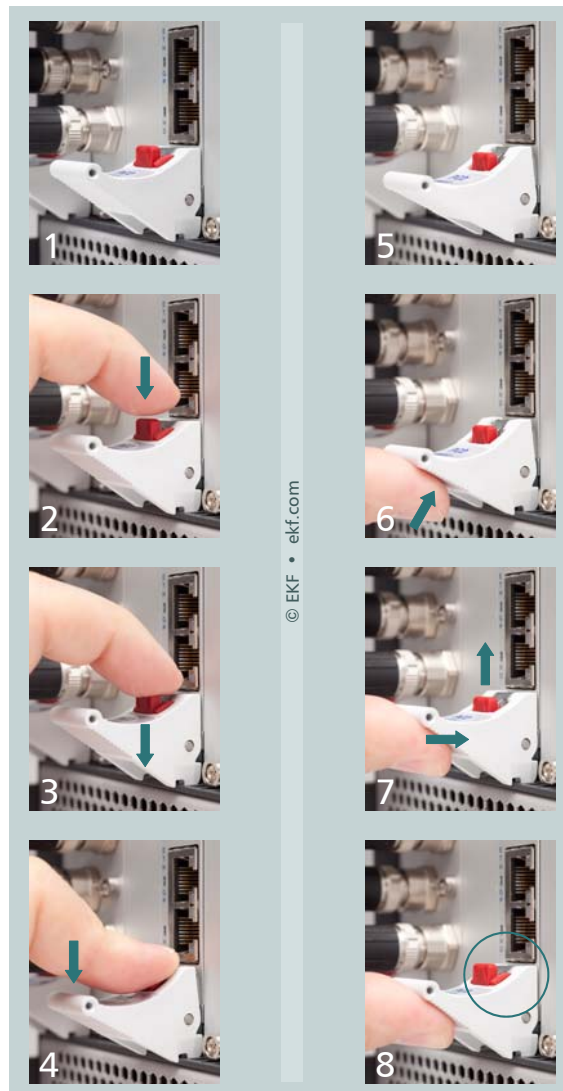


### Component Orientation



SF2-1080-CANDY (8 Port CAN 2.0B)

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

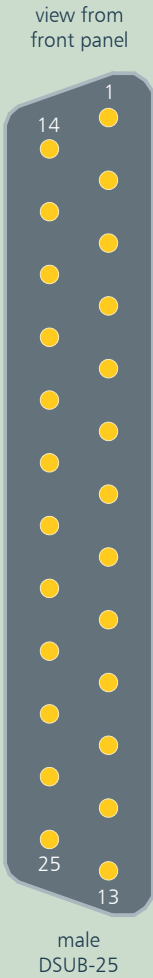
5 - 8: install board

1 & 8: on-board power enabled

2-7: on-board power disabled



SF2-1080-CANDY Octal-CAN 2.0B Front Panel Connector D-SUB 25-pos.

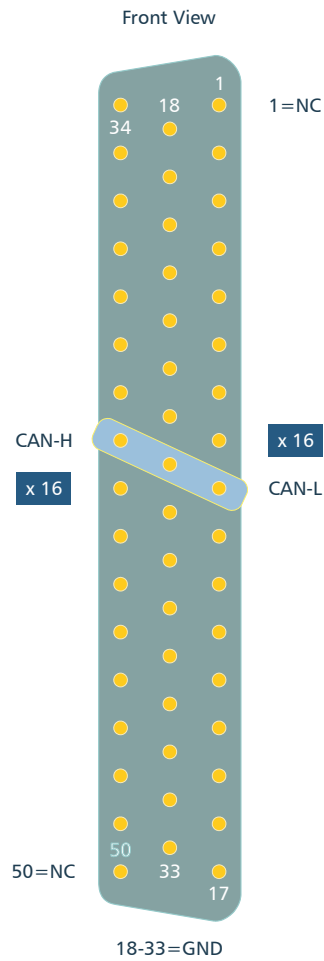


		1	1.1-GND
1.1-CAN_H	14		
		2	1.1_CAN_L
1.2-GND	15		
		3	1.2-CAN_H
1.2-CAN-L	16		
		4	2.1-GND
2.1-CAN_H	17		
		5	2.1_CAN_L
2.2-GND	18		
		6	2.2-CAN_H
2.2-CAN-L	19		
		7	3.1-GND
3.1-CAN_H	20		
		8	3.1_CAN_L
3.2-GND	21		
		9	3.2-CAN_H
3.2-CAN-L	22		
		10	4.1-GND
4.1-CAN_H	23		
		11	4.1_CAN_L
4.2-GND	24		
		12	4.2-CAN_H
4.2-CAN-L	25		
		13	NC

PCAN-miniPCIe JST SUR Connectors 1.1 - 4.2 (8x)	
1	
2	GND
3	CAN_H
4	CAN_L

## SF2-2160-CANDY 16-Port CAN FD Front Panel Connector D-SUB 50-pos.

1.1-CAN_H	34		1	NC
		18 (1.1-GND)		
1.2-CAN_H	35		2	1.1_CAN_L
		19 (1.2-GND)		
1.3-CAN_H	36		3	1.2_CAN_L
		20 (1.3-GND)		
1.4-CAN_H	37		4	1.3_CAN_L
		21 (1.4-GND)		
2.1-CAN_H	38		5	1.4_CAN_L
		22 (2.1-GND)		
2.2-CAN_H	39		6	2.1_CAN_L
		23 (2.2-GND)		
2.3-CAN_H	40		7	2.2_CAN_L
		24 (2.3-GND)		
2.4-CAN_H	41		8	2.3_CAN_L
		25 (2.4-GND)		
3.1-CAN_H	42		9	2.4_CAN_L
		26 (3.1-GND)		
3.2-CAN_H	43		10	3.1_CAN_L
		27 (3.2-GND)		
3.3-CAN_H	44		11	3.2_CAN_L
		28 (3.3-GND)		
3.4-CAN_H	45		12	3.3_CAN_L
		29 (3.4-GND)		
4.1-CAN_H	46		13	3.4_CAN_L
		30 (4.1-GND)		
4.2-CAN_H	47		14	4.1_CAN_L
		31 (4.2-GND)		
4.3-CAN_H	48		15	4.2_CAN_L
		32 (4.3-GND)		
4.4-CAN_H	49		16	4.3_CAN_L
		33 (4.4-GND)		
NC	50		17	4.4_CAN_L



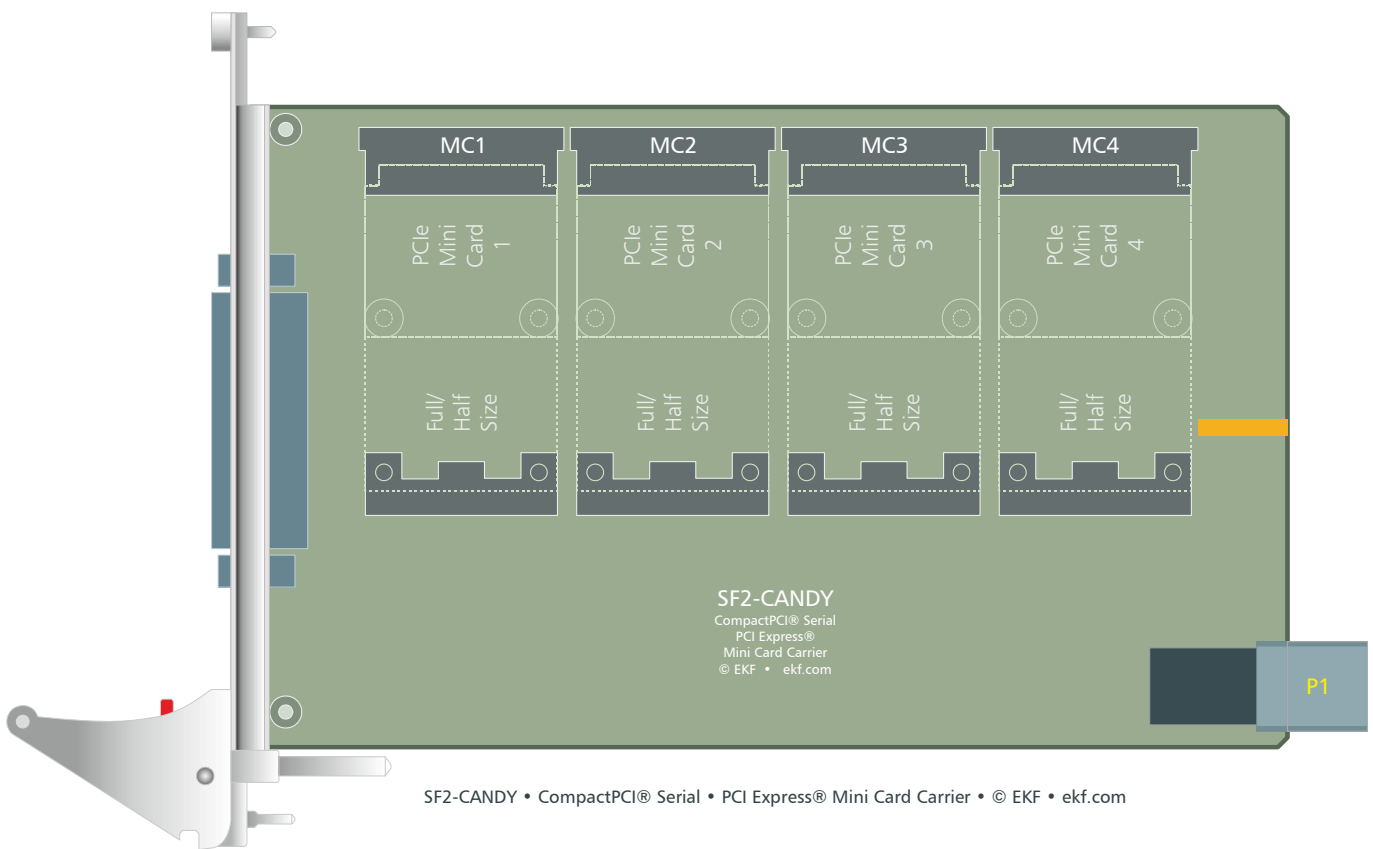
Front Panel Connector D-SUB 50-Position Male

PCAN-miniPCIe-FD JST SUR 0.8mm Pitch Connector SM05B-SUR-TF Shrouded Header (PCB Side Entry) 05SUR-32S or 05-SUR-36L IDC Cable Connector 1.1 - 4.4 (16x)	
1	NC (CAN_H daisy chain)
2	NC (CAN_L daisy chain)
3	GND
4	CAN_H
5	CAN_L

## Mini Card Host Connectors MC1 - MC4

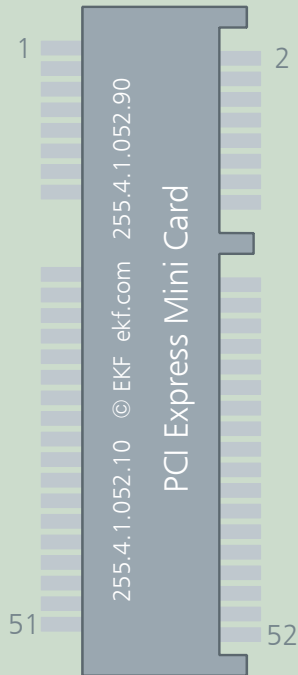
The SF2-CANDY is provided with four PCI Express® Mini Card host connectors. These are suitable for PCIe based modules, and also USB 2.0 driven Mini Card modules. After inserted, the Mini Card has to be fixed by a snap-in latch (full-size modules 50.80mm length), or will have to be secured manually by screws (mini size modules 26.80mm length), in order to withstand shock and vibration.

The optional on-board quad port USB controller is a Texas Instruments TUSB7340 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. USB is not required for the PCIe® based PEAK System CAN modules.



## MC1 - MC4

PCI Express® Mini Card Socket (255.4.1.052.14) &amp; Latch (255.4.1.052.94)



PCIE_WAKE#	1	2	+3.3V
COEX1 (GPIO2/6/10/14)	3	4	GND
COEX2 (GPIO3/7/11/15)	5	6	+1.5V
CLKREQ# (NC)	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# (GPIO0/4/8/12)
GND	21	22	RST#
PCIE_RN	23	24	+3.3V
PCIE_RP	25	26	GND
GND	27	28	+1.5V
GND	29	30	SMB_CLK
PCIE_TN	31	32	SMB_DAT
PCIE_TP	33	34	GND
GND	35	36	USB_D- (Option)
GND	37	38	USB_D+ (Option)
+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
W_DIS2# (GPIO1/5/9/13)	51	52	+3.3V

Power: Any socket MC1 - MC4 can supply a Mini Card with +3.3V/1.5A (7.5Amax. in total) and +1.5V/1A (5Amax. in total).

## Related Documents

### Industrial Ethernet & Fieldbus Module Carrier Cards

SF1-STUDIO • Dual PCI Express® Mini Card Carrier for Real Time Ethernet Modules	<a href="http://www.ekf.com/s/sf1/sf1.html">www.ekf.com/s/sf1/sf1.html</a>
SF2-CANDY • Quad PCI Express® Mini Card Carrier for CAN Modules	<a href="http://www.ekf.com/s/sf2/sf2.html">www.ekf.com/s/sf2/sf2.html</a>

### Overview

Concise Overview CompactPCI® Serial Boards	<a href="http://www.ekf.com/s/serial_concise.pdf">www.ekf.com/s/serial_concise.pdf</a>
The Smart Solution - CompactPCI® Serial Concept	<a href="http://www.ekf.com/s/smart_solution.pdf">www.ekf.com/s/smart_solution.pdf</a>

### Ordering Information

For popular SF2-CANDY SKUs please refer to [www.ekf.com/liste/liste\\_21.html#SF2](http://www.ekf.com/liste/liste_21.html#SF2)



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