Product Information

DX4-BADGER

XMC Module

6G mSATA RAID

The DX4-BADGER is a XMC style mezzanine card, equipped with a quad-channel PCI Express® to SATA 6Gbps controller, and three on-board sockets for mSATA solid state drives (SSD). With a capacity available of up to 1TB as of current, mSATA is a fast growing storage module form factor. The Marvell® SATA 3.0 controller allows RAID or non RAID operation, and incorporates speed negotiation to backward support 3Gbps and 1.5Gbps. A front bezel eSATA connector is provided for attachment of an external SATA storage device.

The DX4-BADGER connects up to four SATA III (6G) devices to a PCIe 2.0 host, delivering up to 1 Gigabyte-per-second (GBps) bandwidth when a two-lane 5.0 Gbps interface is available. In addition, hardware RAID operation is supported, running with an enhanced ARM-based processor to offload the host CPU, and Marvell® HyperDuo technology for automated SSD/HDD tiering. With respect to the three mSATA sockets provided on the DX4-BADGER, a Terabyte RAID system can be simply configured.
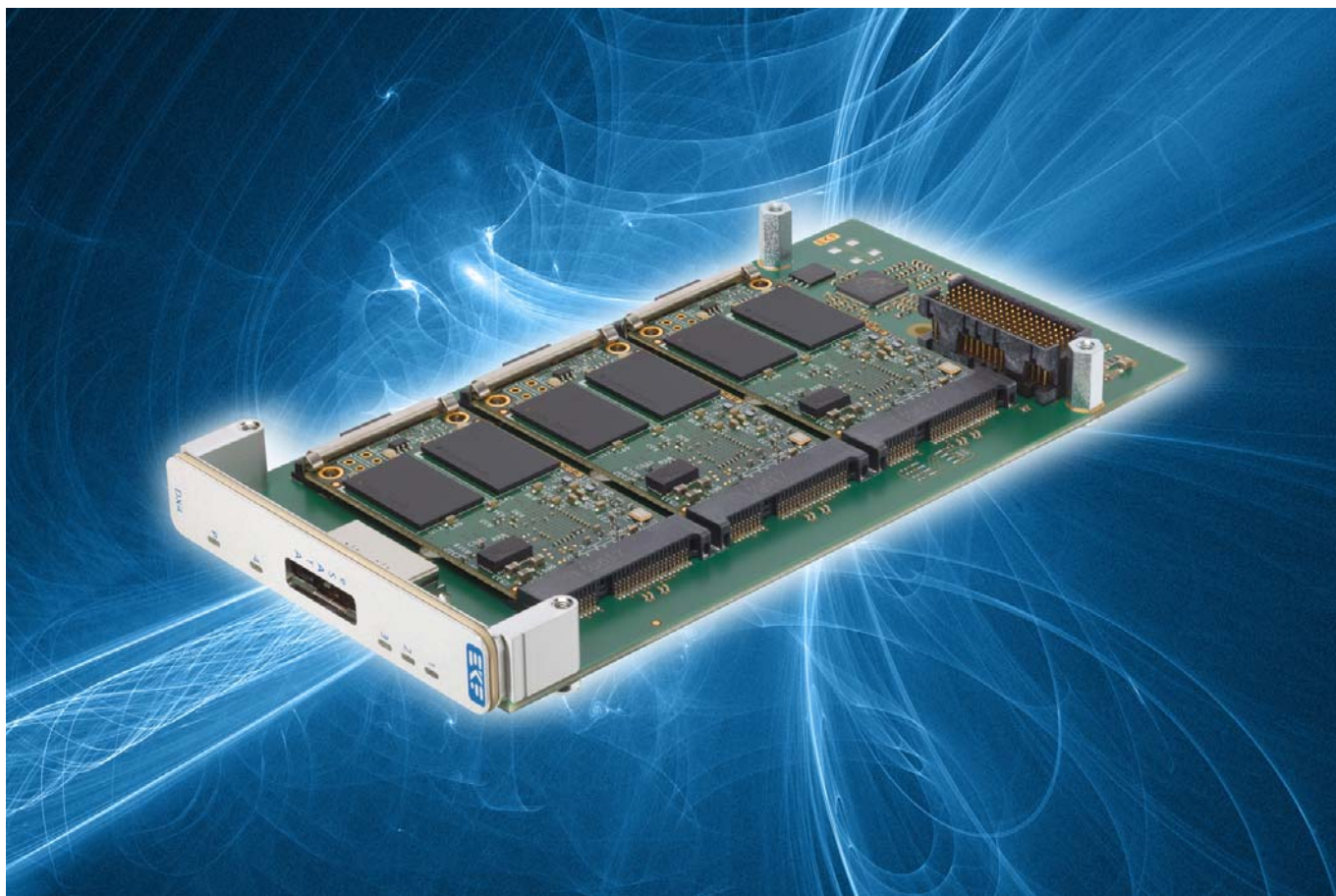
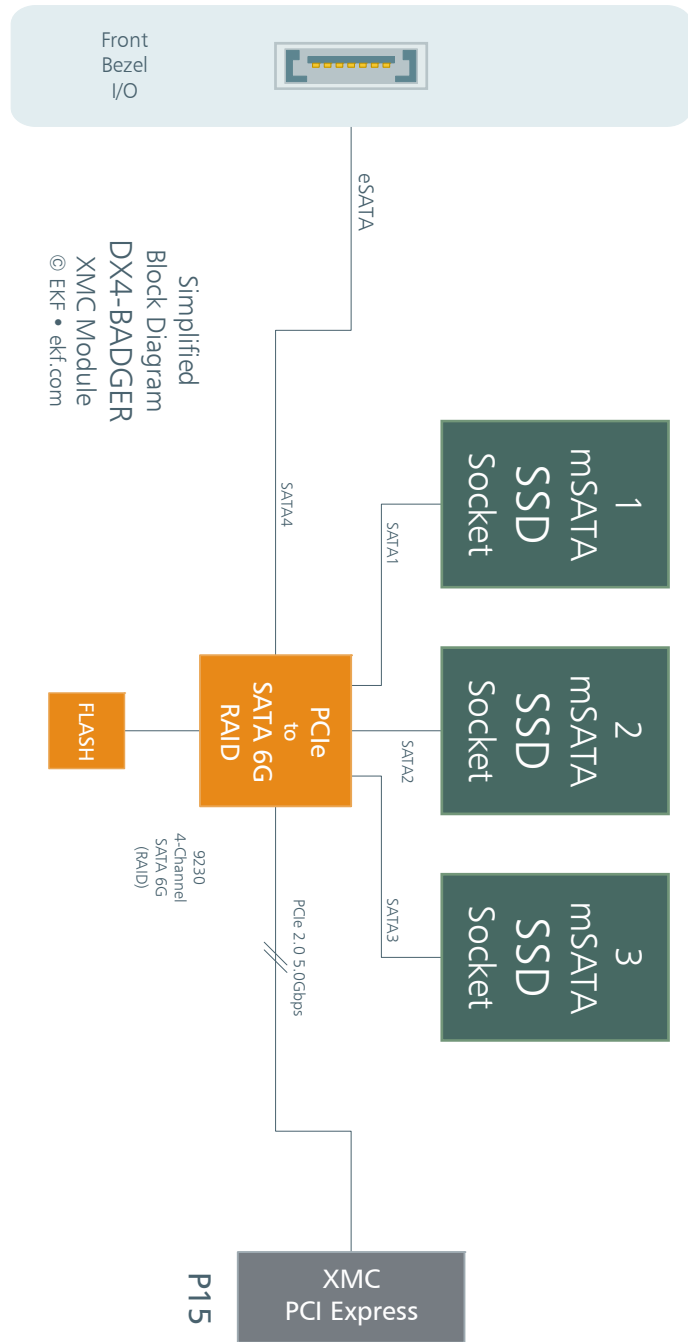
DX4-BADGER (w. mSATA Modules Loaded)

Feature Summary

- ▸ Form factor XMC single-width mezzanine card 149mm x 74mm
- ▸ Stack height 10mm XMC to host
- ▸ Host I/F Connector P15 XMC (Option XMC 2.0)
- ▸ x 1 or x 2 PCI Express® 2.0 (5.0 Gbps), single or dual lane
- ▸ +3.3V only operated (VPWR not in use)

- ▸ Marvell® PCI Express® 2.0 to SATA III host controller
- ▸ Four SATA 6Gbps interface ports (backward support 3Gbps and 1.5Gbps)
- ▸ Native Command Queuing
- ▸ Hardware RAID 0/1/10
- ▸ On-the-fly AES encryption 128/256-bit
- ▸ AHCI driver support
- ▸ Marvell HyperDuo technology for automated SSD/HDD tiering

- ▸ Front bezel eSATA connector for attachment of an external device
- ▸ eSATA is limited to 3Gbps by SATA specification
- ▸ eSATA is limited to 2m external cable length by SATA specification
- ▸ 6Gbps data rate and/or 5m eSATA cable length with suitable peripheral eSATA devices

- ▸ Up to three on-board mSATA SSD modules
- ▸ Half or full size accepted
- ▸ Various brands of mSATA SSDs available (e.g. Intel, Micron, Samsung)
- ▸ RAID option for dual or triple device configuration

- ▸ Designed and manufactured in Germany
- ▸ ISO 9000 certified quality management
- ▸ Long term availability
- ▸ Coating, sealing, underfilling on request
- ▸ RoHS compliant 2002/95/EC
- ▸ Operating temperature: 0°C to +70°C
- ▸ 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 100.5 years
- ▸ EC Regulatory EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1)
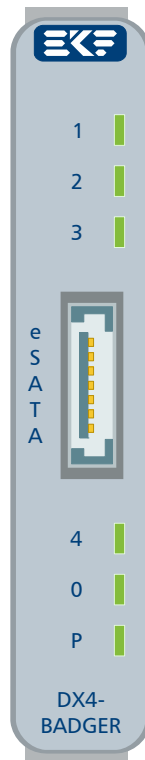
items are subject to changes

Related Information	
Ordering Information	www.ekf.com/liste/liste_22.html#DX4
DX4-BADGER Home	www.ekf.com/d/dide/dx4/dx4.html

Block Diagram

Front
Bezel
I/O

eSATA

Simplified
Block Diagram
DX4-BADGER
XMC Module
© EKF • ekf.com

SATA4

1
mSATA
SSD
Socket

SATA1

FLASH

PCIe
to
SATA 6G
RAID

2
mSATA
SSD
Socket

SATA2

9230
4-Channel
SATA 6G
(RAID)

SATA3

3
mSATA
SSD
Socket

PCIe 2.0 5.0Gbps

P15

XMC
PCI Express
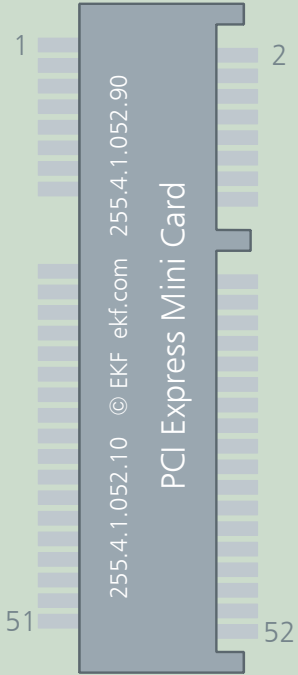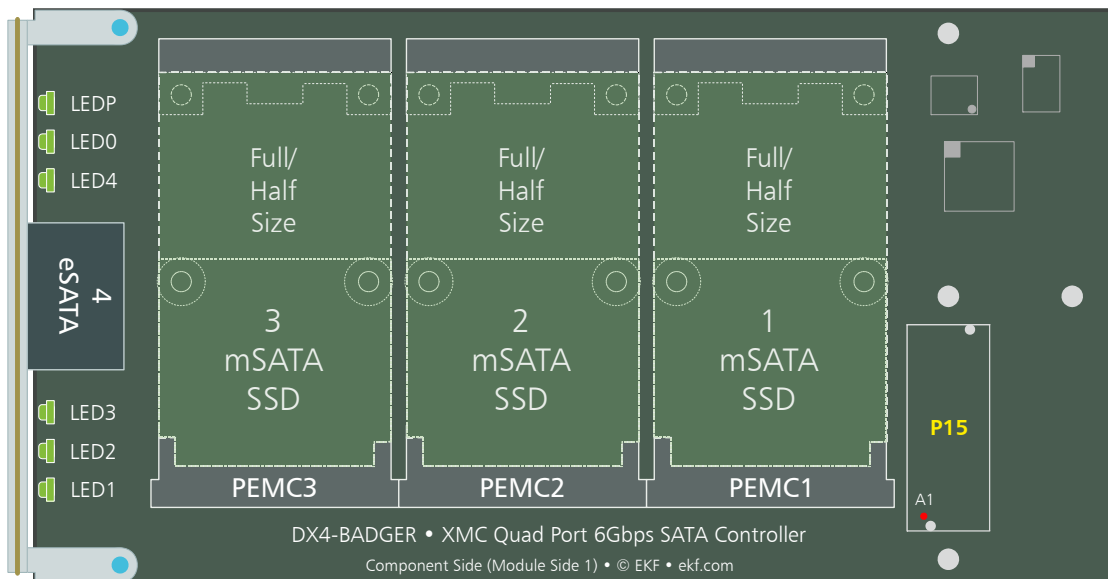
Front Bezel Options

EKF

1

2

3

eSATA

© EKF • draft - do not scale • ekf.com

4

0

P

DX4-BADGER

LED 0 is not populated by default
SATA activity LEDs 1-4 assigned to mSATA 1-3 and eSATA 4
P = module power good

LEDP
LED0
LED4

4
eSATA

Full/
Half
Size

Full/
Half
Size

Full/
Half
Size

3
mSATA
SSD

2
mSATA
SSD

1
mSATA
SSD

P15

A1

LED3
LED2
LED1

PEMC3

PEMC2

PEMC1

DX4-BADGER • XMC Quad Port 6Gbps SATA Controller
Component Side (Module Side 1) • © EKF • ekf.com
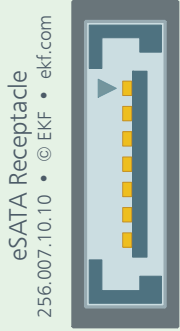
mSATA Host Connectors

The DX4-BADGER is provided with three mSATA module host connectors. After inserted, the mSATA 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.

PEMC1 - PEMC3			
mSATA / PCI Express® Mini Card Socket (255.4.1.052.10) & Latch (255.4.1.052.90)			
NC	1	2	+3.3V
NC	3	4	GND
NC	5	6	+1.5V
NC	7	8	NC
GND	9	10	NC
NC	11	12	NC
NC	13	14	NC
GND	15	16	NC
NC	17	18	GND
NC	19	20	NC
GND	21	22	NC
SATA_RXP (+B)	23	24	+3.3V
SATA RXN (-B)	25	26	GND
GND	27	28	+1.5V
GND	29	30	NC
SATA TXN (-A)	31	32	NC
SATA TXP (+A)	33	34	GND
GND	35	36	NC
GND	37	38	NC
+3.3V	39	40	GND
+3.3V	41	42	NC
NC	43	44	NC
NC	45	46	NC
NC	47	48	+1.5V
DA/DSS	49	50	GND
Presence	51	52	+3.3V

PCI Express Mini Card

255.4.1.052.90
255.4.1.052.10 © EKF ekf.com

1
2
51
52

With two or three mSATA Solid-State Drives engaged, the DX4-BADGER allows for hardware RAID level 0/1 operation.

Front Bezel eSATA Connector

The DX4-BADGER front bezel is provided with an eSATA receptacle for attachment of an external SATA device. TX/RX designation of signals are shown with respect to the SATA controller. High quality shielded SATA cable assemblies are recommended for optimum performance and reliable industrial usage. By specification, eSATA is limited to 3Gbps and 2m cable length. However, there are cable assemblies available up to 5m. For testing, suitable peripheral eSATA devices may be operated at 6Gbps and/or cable length >2m.

Front Bezel eSATA #256.007.10.10		
	1	GND
	2	SATA_TX+
	3	SATA_TX-
	4	GND
	5	SATA_RX-
	6	SATA_RX+
	7	GND

The typical external cable length should not exceed 2m. Remember that SATA is a high speed data link. Chose the minimum distance possible for locating the external SATA device, and use high quality cable assemblies for reliable industrial operation. Compared to internal SATA cabling, the eSATA front bezel connectors offer superior shielding and provide EMI protection. eSATA cable harnesses used must adhere to the design specifications recommended by the Serial ATA International Organization (SATA-IO).

The eSATA connector provided on the DX4-BADGER does not comprise eSATAp (Power over eSATA) pins. Hence, attached eSATA(p) devices must be self powered, or may optionally +5V powered from an additional USB port by means of a suitable splitter cable.

BIOS Flash

The DX4-BADGER is equipped with a 4Mb SPI Flash memory, which contains the 88SE9230 BIOS and RAID firmware, as required for system boot and for hardware RAID operation, enabled by an integrated ARM processor subsystem.

Since being AHCI compatible, there is no need for installation of proprietary drivers for the 88SE9230. As an option however, Marvell® SATA drivers can be downloaded from the DX4-BADGER home at www.ekf.com/d/dide/dx4/dx4.html. In addition, RAID management support is available here.

P15 Mezzanine Connector

The DX4-BADGER is equipped with a high speed XMC mezzanine connector P15, mating with the host board J15 and establishing the data path (PCI Express®) and power link to the carrier. The pin assignment of P15/J15 is specified by VITA 42.3. The DX4-BADGER is organized as single-lane single-link PCI Express® device.

XMC Module
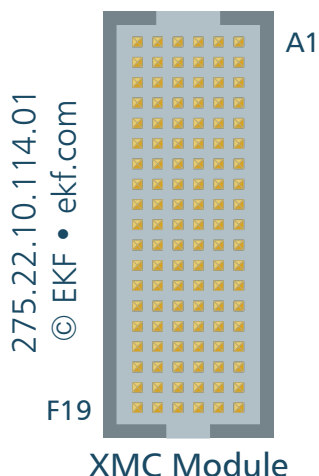
As an option, the DX4-BADGER can be equipped with a P15 connector according to the XMC 2.0 style, as defined by VITA 61.0. Carrier card and module connectors J15/P15 must match - VITA 61 and VITA 42 XMC connectors are not intermateable. Both connector styles can be easily distinguished from each other by the connector body colour as visual key.

Black = VITA 42 XMC
Off-white = VITA 61 XMC 2.0

Suitable carrier cards are available from EKF, e.g. the SK2-SESSION CompactPCI® Serial XMC module carrier board, or the CK2-SESSION, a carrier for CompactPCI® Classic systems.

| XMC Connector P15 - PCIe Fabric • EKF Part No. 275.22.10.114.01					
	A	B	C	D	E	F
1	PET0P0	PET0N0	+3.3V	PET0P1	PET0N1	VPWR [2)]
2	GND	GND	TRST# [1)]	GND	GND	MRSTI#
3	PET0P2	PET0N2	+3.3V	PET0P3	PET0N3	VPWR [2)]
4	GND	GND	TCK	GND	GND	MRSTO#
5	PET0P4	PET0N4	+3.3V	PET0P5	PET0N5	VPWR [2)]
6	GND	GND	TMS	GND	GND	+12V
7	PET0P6	PET0N6	+3.3V	PET0P7	PET0N7	VPWR [2)]
8	GND	GND	TDI	GND	GND	-12V
9	RFU	RFU	RFU	RFU	RFU	VPWR [2)]
10	GND	GND	TDO	GND	GND	GA0 [1)]
11	PER0P0	PER0N0	MBIST#	PER0P1	PER0N1	VPWR [2)]
12	GND	GND	GA1 [1)]	GND	GND	MPRESENT#
13	PER0P2	PER0N2	+3.3V_AUX	PER0P3	PER0N3	VPWR [2)]
14	GND	GND	GA2 [1)]	GND	GND	MSDA [1)]
15	PER0P4	PER0N4	RFU	PER0P5	PER0N5	VPWR [2)]
16	GND	GND	MVMRO	GND	GND	MSCL [1)]
17	PER0P6	PER0N6	RFU	PER0P7	PER0N7	RFU
18	GND	GND	RFU	GND	GND	RFU
19	CLKP_XMC	CLKN_XMC	RFU	WAKE#	ROOT0#	RFU

pin positions printed italic/gray: reserved by specification / not connected

1)   Serial EEPROM not populated by default (no IPMI)

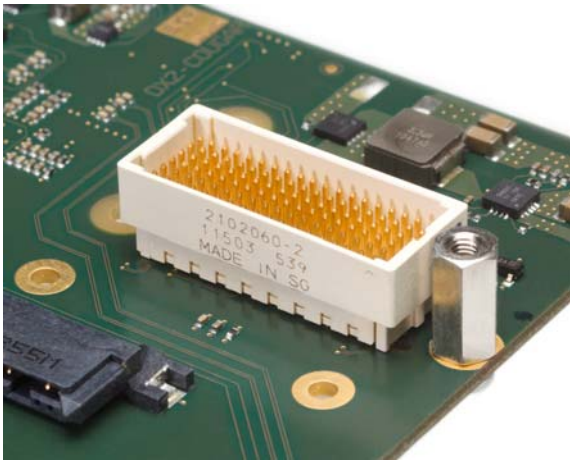2)   VPWR is not required - both the SATA controller and the SSDs are sourced from +3.3V
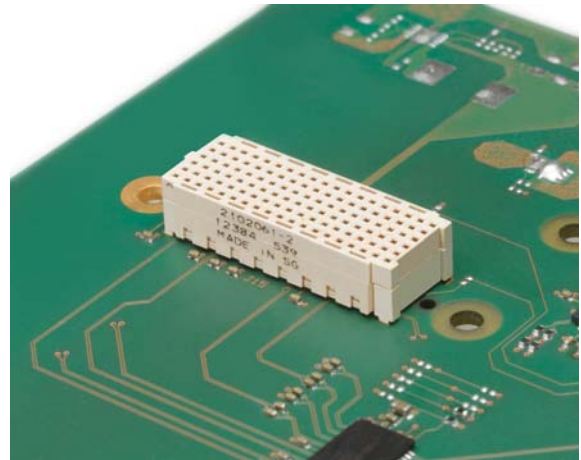
Black = VITA 42 XMC
Off-white = VITA 61 XMC 2.0
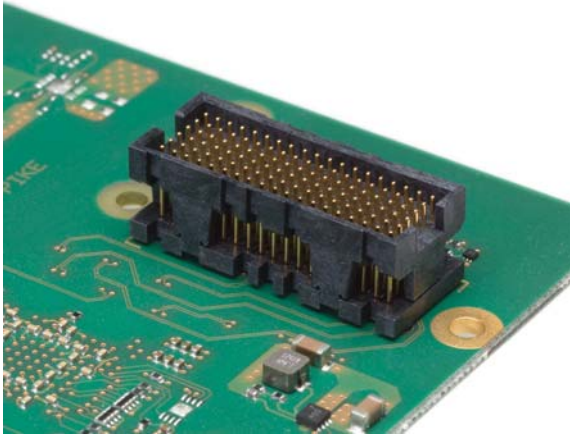
XMC Connector P15
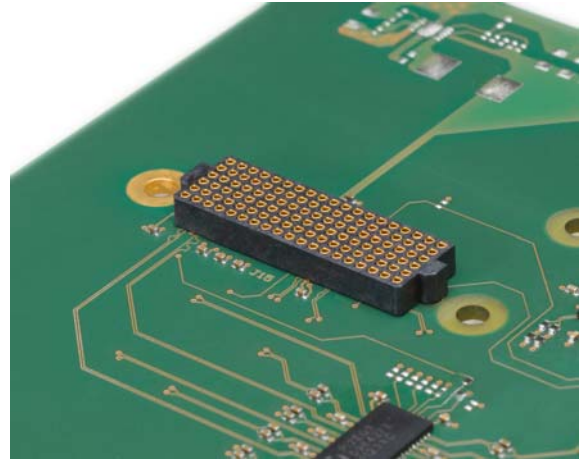
XMC Connector J15

XMC 2.0 Connector P15

XMC 2.0 Connector J15

Related XMC Carrier Cards	
SK2-SESSION CompactPCI® Serial	www.ekf.com/s/sk2/sk2.html
CK2-SESSION CompactPCI®	www.ekf.com/c/cpcc/ck2/ck2.html

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