SYSTEM

Product Information

CUE-BALLAD • *CompactPCI®* • Quad Port Isolated RS-232 I/F

Document No. 8296 • 7 September 2018

Short Description

Proven and reliable, RS-232 stays a popular point-to-point low power communication interface.

The CUE-BALLAD is a peripheral slot card for CompactPCI® systems, equipped with four front panel RS-232 ports, available through RJ45 jacks. Isolation barrier transceivers are provided for optimum noise and EMC immunity up to 460kbps data rate, as required for industrial use and operation in harsh environments.

The CUE-BALLAD is based on an octal PCI Express® to UART bridge. The 950-style UARTs are compatible with many asynchronous serial applications and protocols.

While four ports are available via RJ45 front panel jacks across isolated transceivers conforming to TIA/EIA-232-E and ITU-T V.28 specifications, another four UART channels are wired to the CompactPCI® backplane connector J2, as TTL level signals for rear I/O usage up to 15Mbps data rate per port.

Feature Summary

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CompactPCI® ▸ PICMG® CompactPCI® Classic (CPCI 2.0) standard ▸ Single size Eurocard 3U 4HP 100x160mm^2 ▸ Suitable for CompactPCI® peripheral slot ▸ CompactPCI® backplane connector J1 for PCI® 32-bit 33/66MHz support ▸ Option CompactPCI® backplane connector J2 for rear I/O (4 x UART RX/TX CTS/RTS TTL level signals) ▸ On-board PCI® to PCI Express® bridge ▸ Option +5V only power supply
UART ▸ Pericom® PCI Express® octal UART PI7C9X7958 ▸ High performance 950-class UARTs ▸ 16C550 software compatible ▸ 128-Byte FIFO for each transmitter/receiver ▸ Baud rate up to 15Mbps ▸ XON/XOFF in-band flow control ▸ CTS/RTS or DSR/DTR out-of-band control ▸ Data frame 5, 6, 7, 8 and 9 bits ▸ Clock prescaling 4 to 46 ▸ Windows® WHQL device driver support

Feature Summary

RS-232 Transceivers

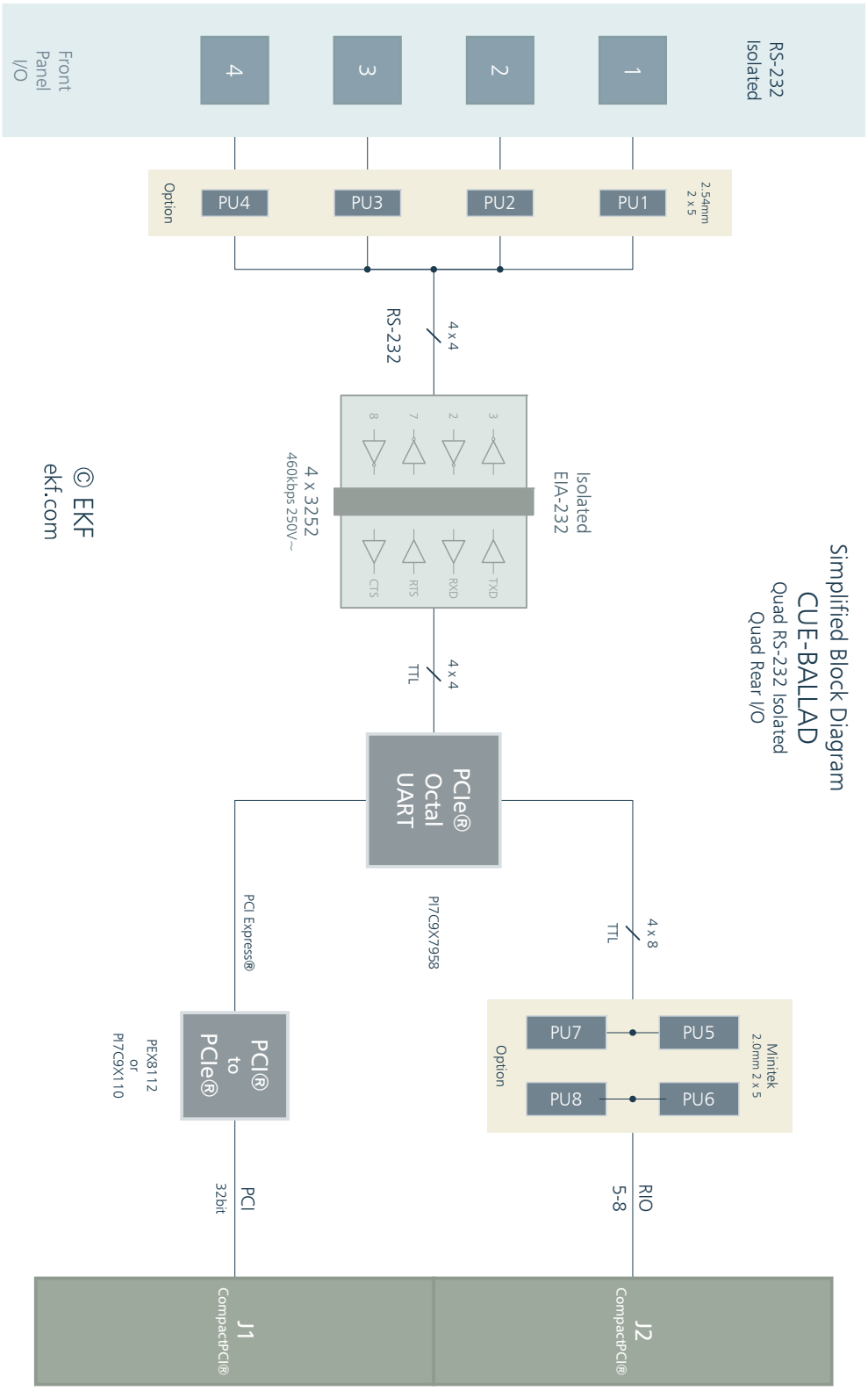
- 2.5kV Isolation barrier RS-232 transceivers (Analog Devices *iso*Power)
- Transceivers meet EIA/TIA-232-E specifications
- High data rate up to 460kbps
- ±8 kV/±15 kV ESD protection on transceiver input/output pins
- High common-mode transient immunity >25 kV/µs
- Suitable for high noise data communications and diagnostic ports
- RS-232 front panel ports isolated against each other and board circuitry
- 4 x Front panel RJ45 connectors 8-lead, two different pin assignments available by order
- - RJ45 CUE-BALLAD native pin order allows use of low cost Ethernet T/P crossover patch cables
- - RJ45 CU4-SOPRANO legacy pin arrangement for seamless changeover of applications
- Option 2 x D-SUB9 front panel connectors on request (4HP, 2 x micro ribbon flat cable assembly)
- Option 4 x D-SUB9 front panel connectors on request (8HP, 4 x micro ribbon flat cable assembly)

Environment, Regulatory

- Designed & manufactured in Germany
- Certified quality management according to ISO 9001
- Long term availability
- Rugged solution (coating, sealing, underfilling on request)
- Custom specific modifications on request
- RoHS compliant
- Operation 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 34.7 years
- EC Regulations EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1)

items are subject to changes w/o further notice

Block Diagram



www.ekf.com/c/ccom/cue/img/cue_blk.pdf

Theory of Operation

The CUE-BALLAD is equipped with the Pericom PI7C9X7958 PCI Express® octal UART, which is suitable for asynchronous baud rates up to 15Mbps. Four UART channels are wired to RJ45 front panel jacks across isolated RS-232 transceivers. Each port is comprised of the receive and transmit data signals (RXD, TXD), and in addition two hardware handshake signals (CTS, RTS) which may be used to control the data stream in order to avoid buffer overflow or underrun, as an alternate method to software control by X-ON/X-OFF characters.

Four ADM3252E transceivers are provided to meet the RS-232 physical layer specifications. The RS-232 signals of any particular RJ45 front panel jack are isolated from the board circuitry, and also isolated from each other port. Two pin assignments are available for the RJ45 jacks, a CUE-BALLAD native alignment which is optimized for low-cost Ethernet crossover patch cable usage as RS-232 connection between two CUE-BALLAD equipped systems, and a legacy CU4-SOPRANO layout.

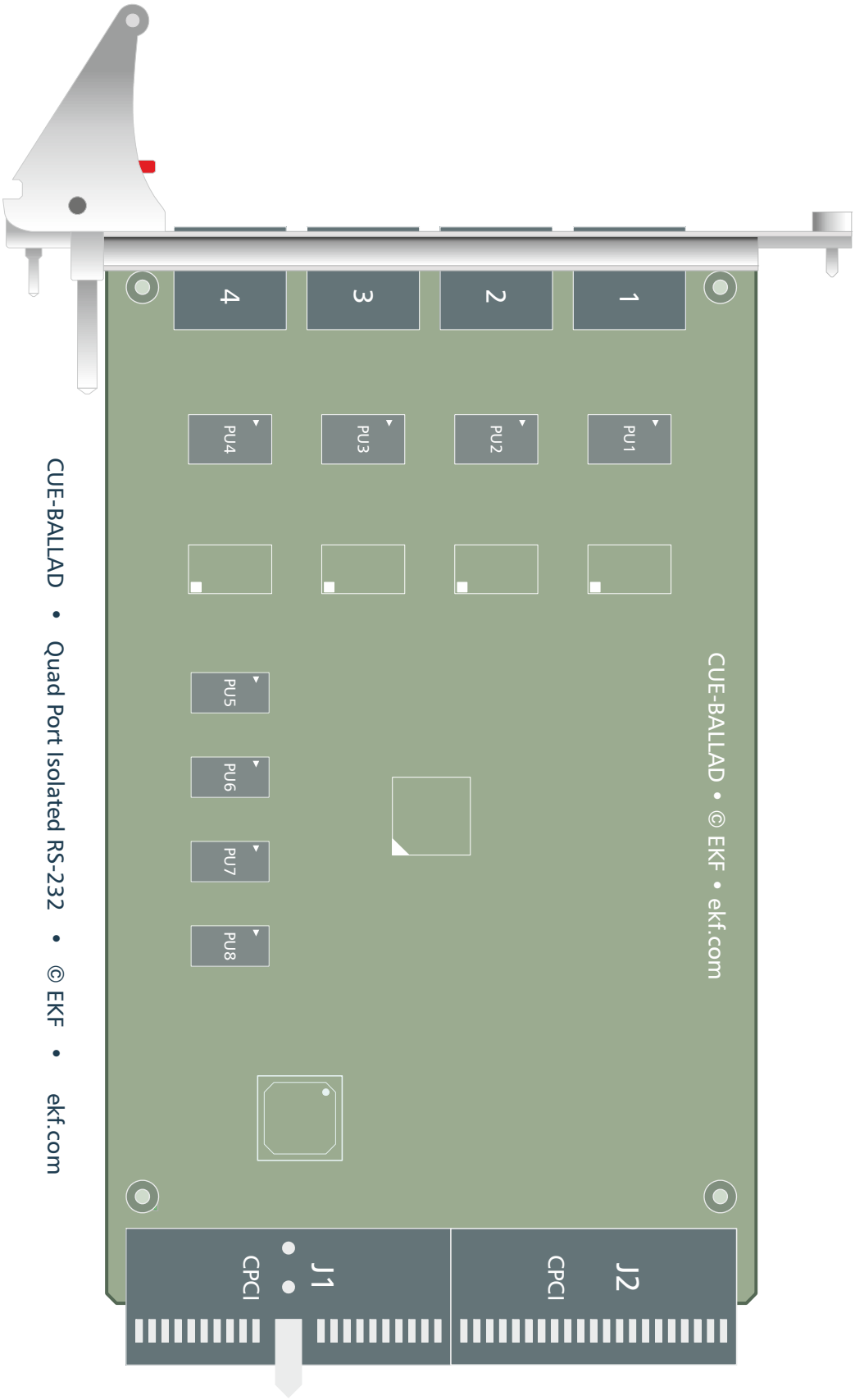
As an alternate to the RJ45 jacks, four 2.54mm pitch 2x5 position pin headers PU1-4 can be optionally populated on-board, for attachment of classic D-Sub 9-pin connectors by means of micro ribbon flat cables, to be combined with a non-standard 8HP width front panel.

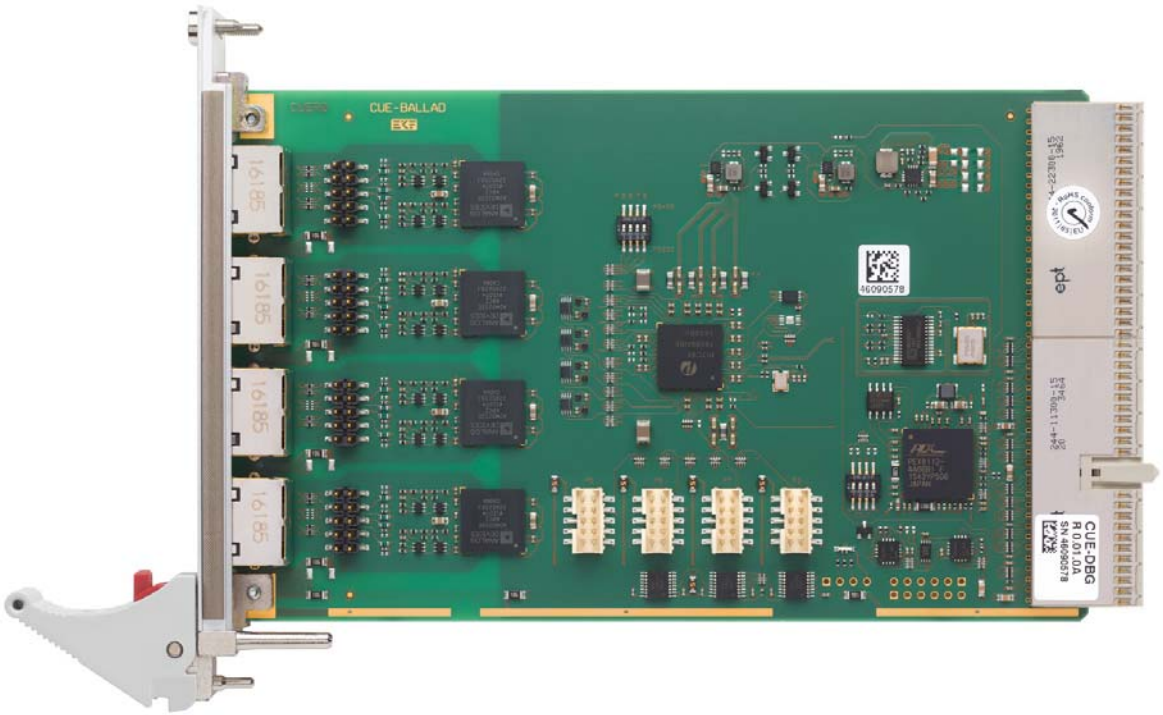
The CUE-BALLAD can be configured also for rear I/O usage. Four UART ports are wired as TTL level signals to the optional backplane connector J2, for use with a suitable RIO PHY module, typically configured as either RS-232 or RS-485. Hence, with both front and rear I/O capabilities utilised, the CUE-BALLAD is a true 8-port asynchronous serial interface solution.

As an alternate to J2 RIO, optional 2.0mm pitch shrouded headers PU5-8 can be provided on-board, for attachment of CU-series PHY modules.

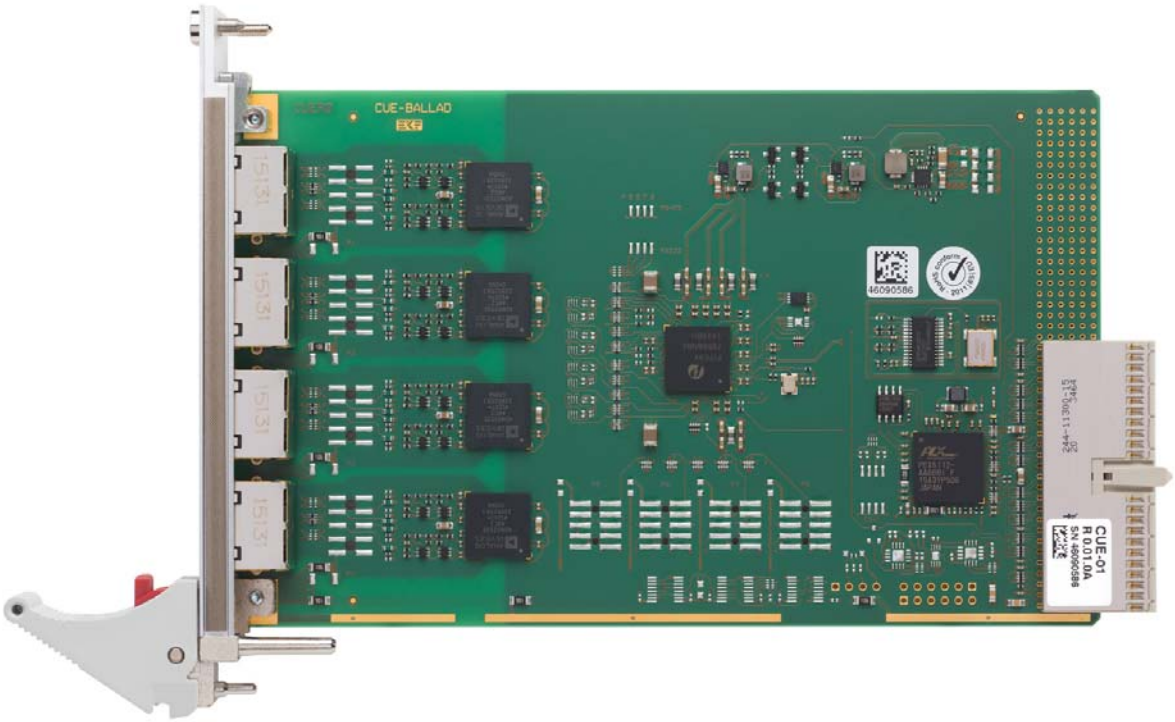
CUE-01-BALLAD (Front I/O)

Component Orientation





8-Port (4 x Front, 4 x RIO)



4-Port (Front Panel I/O)

Front Panel

CUE-BALLAD
RS-232 ISO

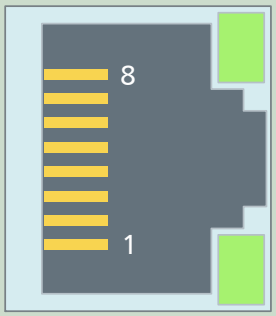
www.ekf.com/c/ccom/cue/img/cue_fpl.pdf

each connector
upper LED = RxD
lower LED = TxD

RJ45 Connectors - Option CU4-SOPRANO Pin Assignment

The front panel RS-232 ports are routed to RJ45 jacks. There are two pin assignments available by order. For seamless changeover from CU4-SOPRANO based applications, the CUE-BALLAD can be ordered as *CUE-01-BALLAD* with a legacy pin assignment, which emulates the CU4-SOPRANO pinout when operated as RS-232 interface.

CUE-BALLAD Legacy Pin Assignment (CU4-SOPRANO)
Serial Ports 1 - 4 • Shielded RJ45 Jacks
EKF Part # 270.00.08.6



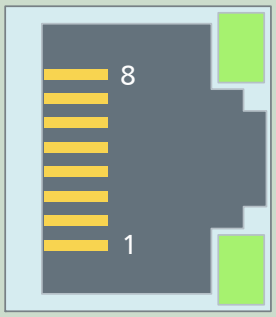
1	NC *DSR*
2	NC *DCD*
3	NC *DTR*
4	Isolated Ground
5	RXD (Input)
6	TXD (Output)
7	CTS (Input)
8	RTS (Output)

Pins 1-3 not in use with CUE-BALLAD Legacy Pin Assignment - Side Band Signals with CU4-SOPRANO

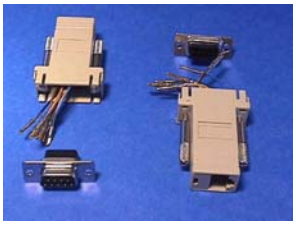
With respect to the CU4-SOPRANO legacy pin assignment, external adapters from RJ45 to DB9 plug (male) or receptacle (female) are available, which are pre-assembled for custom configuring. By means of a pliers or inserting tool, the jumper wires from the RJ45 jack are ready to be pushed into the appropriate spot on the DB9 connector. The adapter itself must be connected to the corresponding RJ(1..4) jack of the CUE-BALLAD. A suitable cable requires all 8 leads wired up straight forward 1:1. A short 4-pair 100BASE-TX Ethernet patch cable could be used (avoid cross over patch cables here, or old 4-wire 10BASE-T Ethernet cables, or ISDN cables).

RJ45 Connectors - CUE-BALLAD Native Pin Assignment

The *CUE-11-BALLAD* native arrangement allows utilisation of low-cost 100BASE-TX ***crossover type*** Ethernet twisted pair cables for direct interconnection of CUE-BALLAD equipped systems. Such cables establish a connection between pin 1 and pin 3, as required for joining TXD with RXD, and tie pin 2 to pin 6, for a RTS/CTS hardware handshake between both ports.

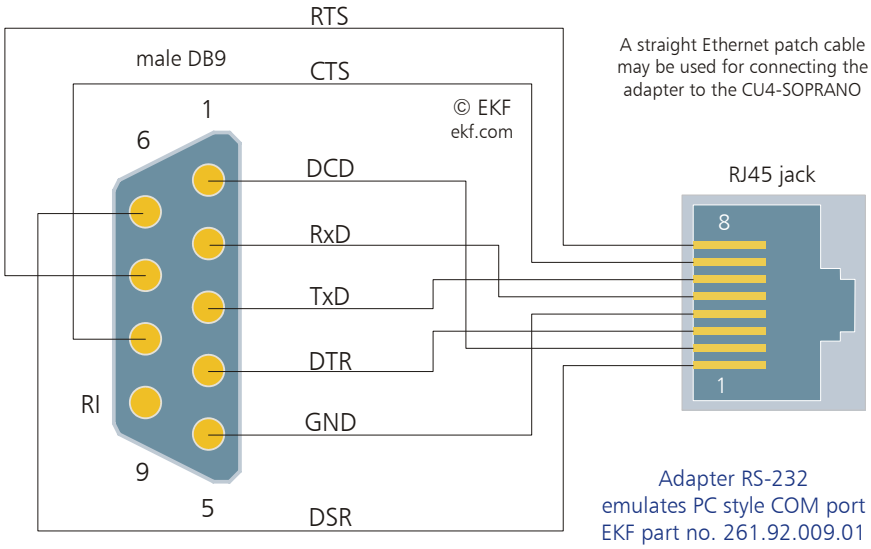
CUE-BALLAD Native Pin Assignment Serial Ports 1 - 4 • Shielded RJ45 Jacks EKF Part # 270.00.08.6		
	1	TXD (Output)
	2	RTS (Output)
	3	RXD (Input)
	4	Isolated Ground
	5	Isolated Ground
	6	CTS (Input)
	7	Isolated Ground
	8	Isolated Ground

Adapters RJ45 to D-Sub are available from several distributors, but can also ordered directly from EKF. Please note, that the adapters are preassembled kits only, which should be configured (strapped) by the customers themselves to fit their requirements. Configuration would vary dependent from the Ethernet patch cable type in use, either straight or crossover.

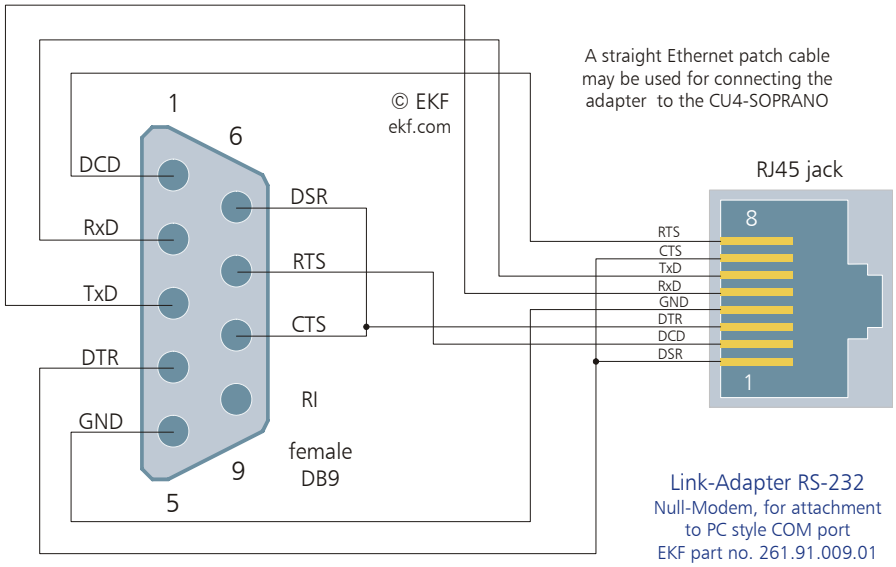


Do not use 10BASE-T cables for interconnection, which provide 4 wires only. The pins 4-5-7-8 would be left unconnected with these cables, resulting in a missing reference ground which is required for the asymmetric RS-232 signals.

A male DB9 connector is required to emulate the serial RS-232 interface (COM port) of a desktop PC. The adapter must be wired up according to the scheme below. Due to missing legacy sideband signal lines, the modem-signal RI (Ring Indicator) is not provided across the RJ45 jacks, and in addition DSR, DCD, and DTR, which were yet available with the CU4-SOPRANO.



In order to connect the CUE-BALLAD to a desktop PC, an adapter cable with a female DB9 connector can be directly attached to the COM port of the PC. The wiring scheme of the adapter emulates a null-modem cable. A typical configuration is shown in the diagram below. Again, the overcome sideband signals RI, DSR, DCD and DTR are not available with the CUE-BALLAD (all NC).



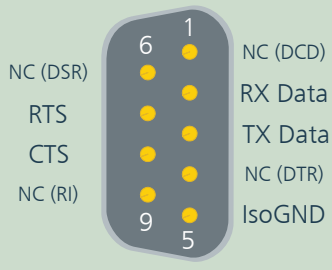
Pin Headers for Option D-Sub Connectors

The CUE-BALLAD can be equipped with pin headers for attachment of classic male 9-pin D-Sub front panel connectors, as an alternate to the proprietary RJ45 jacks. This option however requires an 8HP front panel for a quad port RS-232 solution, and micro ribbon flat cable assemblies. Three D-Sub connectors would be available with a modified 4HP front panel (see photo on next page).

PU1 - PU4 Option Dual-Row Header 2.54mm EKF Part No. 241.1.0205.20.00			
NC	1	2	NC
RXD	3	4	RTS
TXD	5	6	CTS
NC	7	8	NC
IsoGND	9	10	NC

Assuming IDC connectors at both endings of a micro ribbon flat cable, the resulting pin assignment on a 9-position male D-Sub connector is shown in the table below:

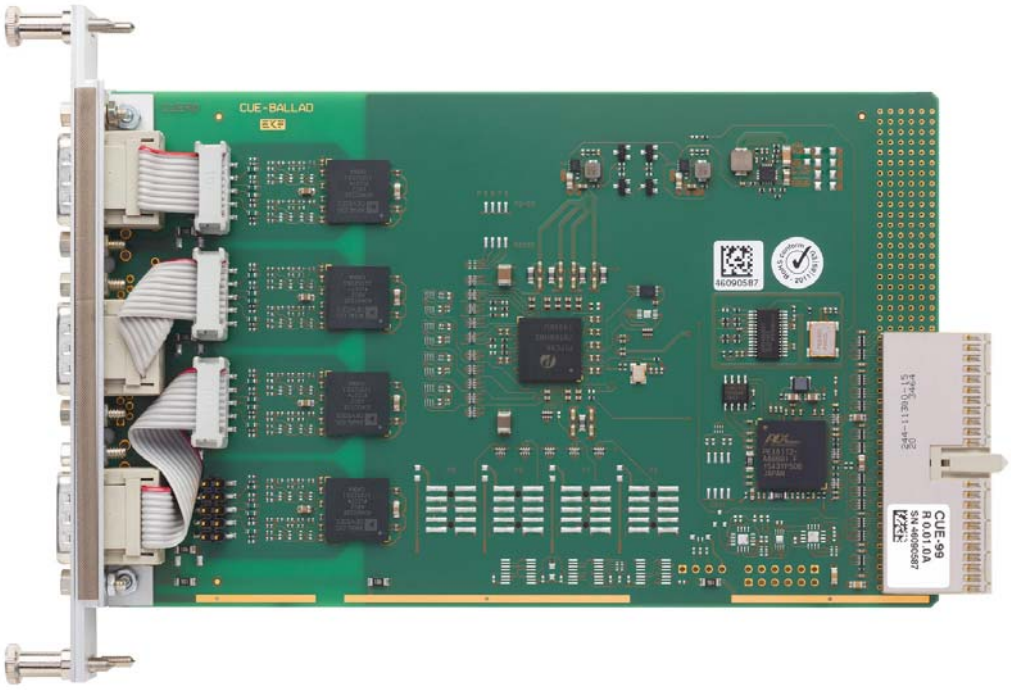
CUE-BALLAD 8HP Front Panel Width Option
Serial Ports 1 - 4 • Option Male D-Sub 9
1.27mm Pitch Flat Cable IDC Connectors



CUE-BALLAD
RS-232

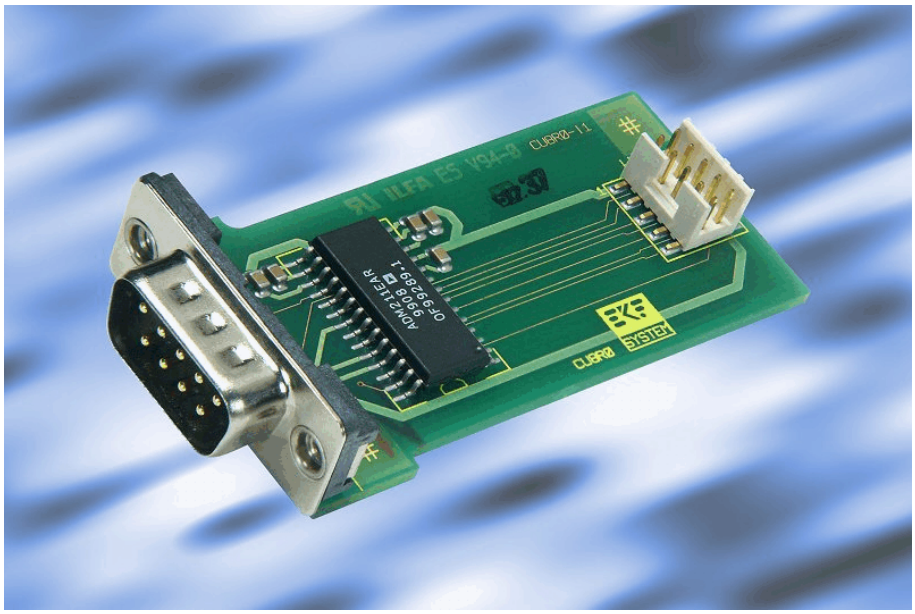
1	*NC*
2	RXD (Input)
3	TXD (Output)
4	*NC (DTR)*
5	Isolated Ground
6	*NC (DSR)*
7	RTS (Output)
8	CTS (Input)
9	*NC (RI)*

Triple D-Sub Connector 4HP Front Panel



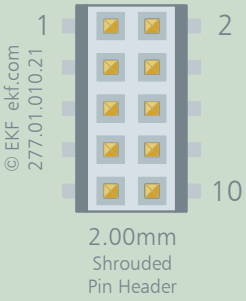
Pin Headers PU5 - PU8

As an option, the CUE-BALLAD can be equipped with four pin headers, wired to the UART channels 5 - 8, suitable for attachment of EKF CU-series PHY modules via a micro ribbon flat cable assembly. A PHY module is a transceiver from TTL level signals to a specific symmetric or asymmetric interface standard, e.g. EIA-485 or RS-232E, with or w/o galvanic isolation.



CU-Series PHY Module

Please contact sales@ekf.de for availability of different CU-series modules (inquiries for custom specific PHY or transition modules welcome).

PU5 - PU8 • TTL-Level Serial I/O 2.00mm Pin Header 2 x 5 (277.01.010.21)				
 2.00mm Shrouded Pin Header	+5V 0.75A [1]	1	2	DSR
	RI#	3	4	RXD
	TXD	5	6	DTR
	RTS	7	8	CTS
	DCD	9	10	GND

[1] short circuit protection by a PolySwitch resettable fuse

In addition, the serial ports 5 - 8 provided by the UART are also available for rear I/O across J2 (stuffing option). In order to avoid signal interference and malfunction, attach a transceiver module or other circuitry to these ports only once, either to the pin headers PU5 - PU8, or through a rear I/O transition module via J2.

CompactPCI® Peripheral Slot Connector J1

The CUE-BALLAD is equipped with a PCI to PCI Express® bridge. The card can be inserted in any peripheral slot of the CompactPCI® backplane for proper operation. As an option, the board can be populated with a +5V to +3.3V switched regulator, which would allow to use the CUE-BALLAD in a +5V only system.

#J1	A	B	C	D	E
25	+5V	*REQ64#*	*ENUM#*	+3.3V	+5V
24	AD1	+5V	VI/O	AD0	*ACK64#*
23	+3.3V	AD4	AD3	+5V	AD2
22	AD7	GND	+3.3V	AD6	AD5
21	+3.3V	AD9	AD8	M66EN	C/BE0#
20	AD12	GND	VI/O	AD11	AD10
19	+3.3V	AD15	AD14	GND	AD13
18	SERR#	GND	+3.3V	PAR	C/BE1#
17	+3.3V	IPMB SCL	IPMB SDA	GND	PERR#
16	DEVSEL#	GND	VI/O	STOP#	LOCK#
15	+3.3V	FRAME#	IRDY#	*BD_SEL#*	TRDY#
14					
13			Not Keyed		
12					
11	AD18	AD17	AD16	GND	C/BE2#
10	AD21	GND	+3.3V	AD20	AD19
9	C/BE3#	IDSEL	AD23	GND	AD22
8	AD26	GND	VI/O	AD25	AD24
7	AD30	AD29	AD28	GND	AD27
6	REQ#	GND	+3.3V	CLK	AD31
5	*BRSVP1A5*	*BRSVP1B5*	RST#	GND	GNT#
4	*IPMB PWR*	*HEALTHY#*	VI/O	*INTP*	*INTS*
3	INTA#	INTB#	INTC#	+5V	INTD#
2	*TCK*	+5V	*TMS*	TDO [1]	TDI [1]
1	+5V	*-12V*	*TRST#*	*+12V*	+5V

pin positions printed grey: not connected

1 TDO - TDI internally connected

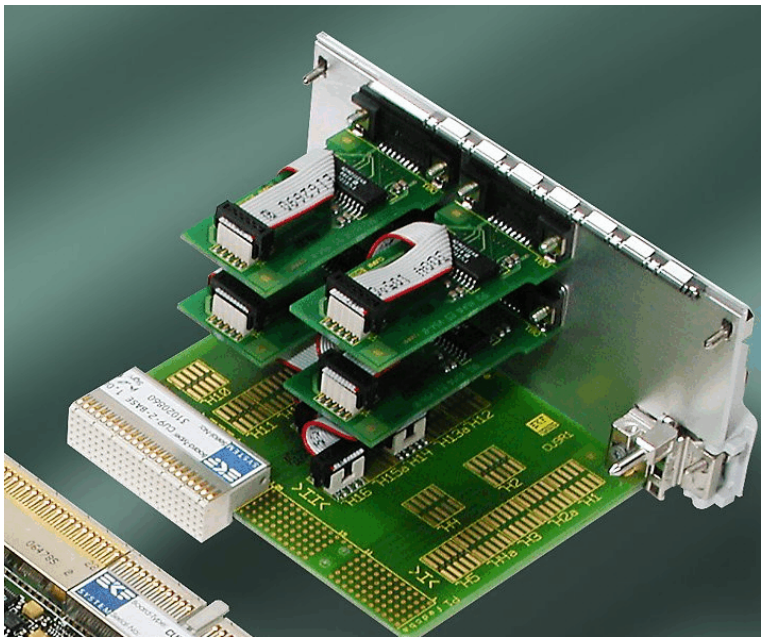
CompactPCI® Rear I/O Connector J2

The rear I/O connector J2 is stuffed as an option only. In order to avoid damages, before installing the CUD-TWIST with the J2 populated, ensure that your system is **not** equipped with a P2 CompactPCI 64-bit expansion backplane.

#J2	A	B	C	D	E
22					
21					
20					
19					
18					
17					
16					
15					
14					
13					
12					
11					
10					
9					
8	DSR5#	RXD5	DTR5#	CTS5#	GND
7	+5V	RI5#	TXD5	RTS5# or DE5#	DCD5#
6	DSR6#	RXD6	DTR6#	CTS6#	GND
5	+5V	RI6#	TXD6	RTS6# or DE6#	DCD6#
4	DSR7#	RXD7	DTR7#	CTS7#	GND
3	+5V	RI7#	TXD7	RTS7# or DE7#	DCD7#
2	DSR8#	RXD8	DTR8#	CTS8#	GND
1	+5V	RI8#	TXD8	RTS8# or DE8#	DCD8#

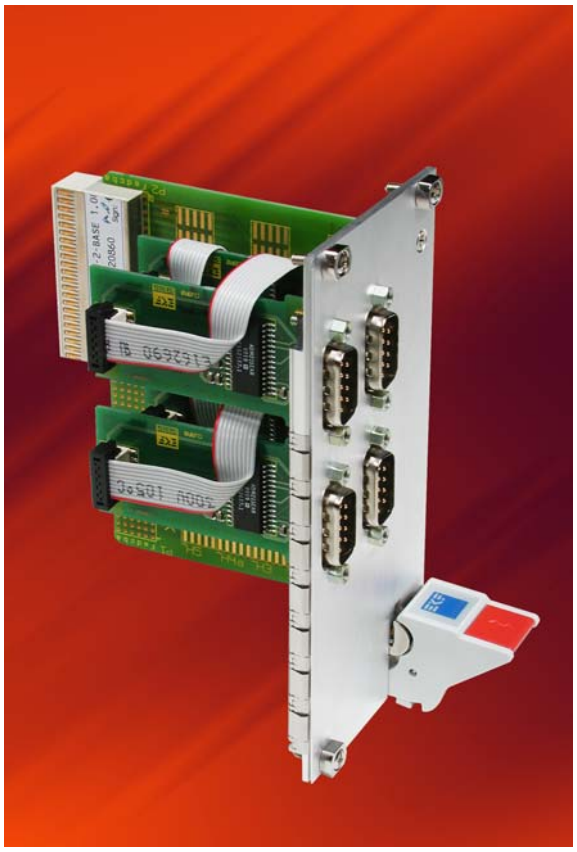
The signal assignment of the optional J2 connector matches the transition board CU9-2-BASE and CU9-4-BASE. Across the transition board, rear I/O PHY-modules of the CU7/CU8 series may be attached by means of a flat cable. **Warning**: For systems with a P2 64-bit CompactPCI expansion backplane, the connector J2 on the CUD-TWIST must **not** be stuffed!

For proper usage of the RTS*# or DE*# pins, please refer to MODSEL DIP switch settings described with the PU5 - PU8 connectors earlier in this document. In order to avoid signal interference and malfunction, attach a transceiver module or other circuitry to these ports only once, either to the pin headers PU5 - PU8, or through a rear I/O transition module via J2.



CU9-2-BASE with PHY Modules

The TTL signals from J2/P2 are routed across the rear I/O transition board CU9-2-BASE or CU9-4-BASE to its shrouded pin headers H13..H16. By means of a short flat ribbon cable, the PHY modules CU7-RS485 or CU8-RS232 are attached. Up to four PHY modules CU7 and CU8 can be mounted at the 3U/12HP back panel of the CU9-2-BASE. The CU9-4-BASE provides a 8HP rear panel, hence preferred by most customers. Custom specific rear panels are also available.



CU9-2-BASE

CU9-4-BASE

Driver Software

UART drivers are available for download from the EKF website at: http://www.ekf.com/c/ccom/cue/drv/

Ordering Information

Ordering Information
For popular CUE-BALLAD SKUs please refer to www.ekf.com/liste/liste_20.html#CUE

Related Links to CompactPCI® UART Cards	
CUE-BALLAD Home	www.ekf.com/c/ccom/cue/cue.html
CompactPCI® Classic UART Solutions	www.ekf.com/c/ccom/ccom.html
CompactPCI® Serial UART Solutions	www.ekf.com/s/serial.html#SU
XMC Module UART Solutions	www.ekf.com/d/dcom.html

Please note: If an EKF product was labelled with this  special sign according to ISO 7010 M002, please contact support@ekf.com for availability of additional documentation which may be important for proper usage.

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EKF Elektronik GmbH
Philipp-Reis-Str. 4 (Haus 1)
Lilienthalstr. 2 (Haus 2)
59065 HAMM
Germany

Phone +49 (0)2381/6890-0
Fax +49 (0)2381/6890-90
Internet www.ekf.com
E-Mail sales@ekf.com