EKF

SYSTEM

Product Information

SUA-RIO • CompactPCI® Serial • Quad Port Isolated RS-232 I/F

Rear I/O Transition Module • Mezzanine Expansion Module

Document No. 8959 • 14 September 2018

Short Description

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

The SUA-RIO is basically a rear I/O transition module for CompactPCI® Serial systems. The board is equipped with four isolated rear panel RS-232 ports. Isolation barrier transceivers are provided for optimum noise and EMC immunity up to 920kbps data rate, as required for industrial use and operation in harsh environments.

In addition, the SUA-RIO can be configured as a mezzanine expansion module, suitable e.g. for the CompactPCI® Serial cards SU1-TWIST (isolated RS-485), SU2-BALLAD (isolated RS-232), SUB-RIO (isolated RS-485), and the SUA-RIO itself. When used as mezzanine board in addition to a carrier card, the SUA-RIO doubles the number of ports available from four to eight, and allows also mixed configurations RS-232 and RS-485.

When used as a rear I/O transition module, the SUA-RIO is equipped with the CompactPCI® Serial backplane connector rJ4, sourced from either the SU1-TWIST or SU2-BALLAD octal UART cards via P4 RIO.

When used as a mezzanine expansion module, the backplane connector rJ4 is not populated. Instead, TTL-level UART ports are passed via on-board stacking connectors M51 to M84, for either top or bottom mount assemblies, with a common 8HP rear (or front) panel.

The isolated RS-232 ports are wired to Micro-D rear (front) panel connectors. Micro-D to Micro-D cable assemblies are available, as well as Micro-D to D-Sub, and pigtail Micro-D cables in addition.

As an alternate, the SUA-RIO can be equipped with classic D-SUB 9-pin connectors, attached by means of flat cable assemblies (on-board headers PU5 to PU8).

Feature Summary

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CompactPCI® Serial

▸ PICMG® CompactPCI® Serial (CPCI-S.0) standard

▸ Rear I/O transition module

▸ CompactPCI® Serial backplane connector rJ4

▸ Dimensions 100x80mm^2 (3U), 4HP rear panel width

▸ Suitable for CompactPCI® Serial octal UART peripheral cards SU1-TWIST and SU2-BALLAD (matching SU1 and SU2 backplane connector P4)

▸ Expands front card to 8 ports in total (4 x front panel connectors, 4 x rear panel)

▸ Any 4 + 4 port mix of isolated RS-232 and RS-485

Mezzanine Option

▸ Mezzanine Expansion Module (rJ4 not populated)

▸ Expands carrier card to 8 front (or rear) ports, 8HP total panel width

▸ Suitable for CompactPCI® Serial octal UART peripheral carrier cards SU1-TWIST and SU2-BALLAD (8HP rear/front panel assembly)

▸ Suitable for rear I/O modules SUA-RIO and SUA-RIO (8HP rear panel assembly)

▸ Stacking connectors M51 - M84, pass through, top or bottom mount

▸ Any 4 + 4 port mix of isolated RS-232 and RS-485

RS-232 Transceivers

▸ 2.5kV Isolation barrier RS-232 transceivers (Analog Devices *iso*Power)

▸ Transceivers meet EIA/TIA-232-E specifications

▸ High data rate > 460kbps (each board tested @921.6kbps)

▸ ±8kV/±15kV ESD protection on transceiver input/output pins

▸ High common-mode transient immunity >25kV/μs

▸ Suitable for high noise data communications and diagnostic ports

Feature Summary

Panel I/O

▸ 4 x Rear or front panel Micro-D 9-pin high density male connectors

▸ RS-232 ports isolated against each other and board circuitry

▸ Micro-D cable assemblies available, e.g. Micro-D to classic style D-Sub male or female

▸ Ordering option D-Sub 9-pin panel connectors (4 ports require 8HP panel width)

▸ Option 2 x D-SUB9 panel connectors on request (4HP, 2 x micro ribbon flat cable assembly)

▸ Option 3 x D-SUB9 panel connectors on request (4HP, handle replaced by knurled screw)

▸ Option 4 x D-SUB9 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 89.4 years

▸ EC Regulations EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1)

items are subject to changes w/o further notice

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.

SUA-RIO w. SU1-TWIST (Isolated RS-485 Front Ports)

Block Diagram

RIO Backplane
CompactPCI®
Serial

Peripheral Slot
Rear I/O

rJ4

from SU1-TWIST or SU2-BALLAD

UART Ports 5-8 (1-4)

4(8)

TTL

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Simplified Block Diagram
SUA-RIO • RS-232

M84   M73   M62   M51

Isolated
EIA-232

4 x ADM3252E
> 460kbps

Option

PU8   PU7   PU6   PU5

2.54mm
2 x 5

RS-232
Iso

Back
Panel
I/O

Micro-D

8   7   6   5
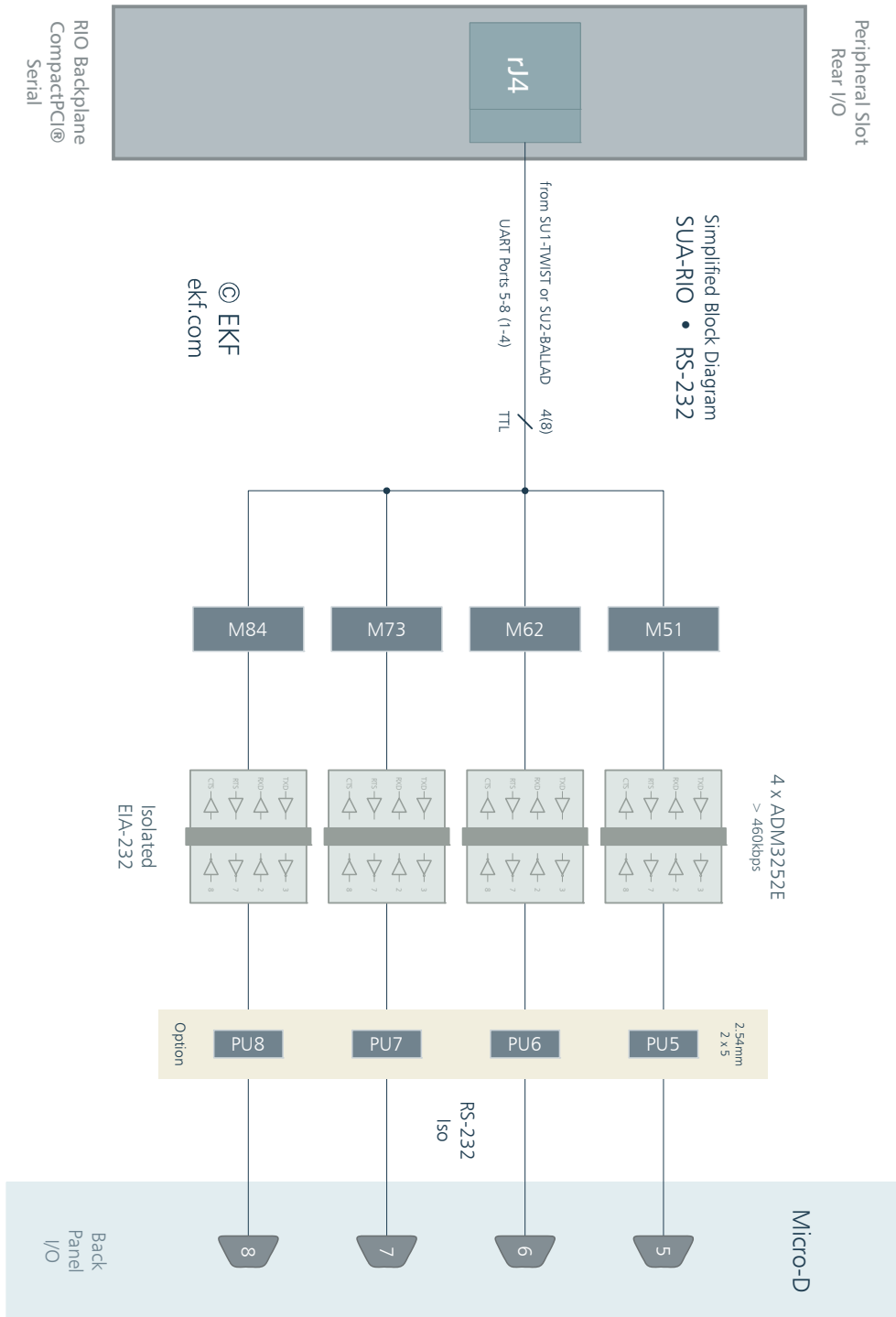
www.ekf.com/s/sua/img/sua_blk.pdf

Theory of Operation

The SUA-RIO is a quad isolating transceiver module, translating TTL-level UART (COM port) signals to RS-232. When used as rear I/O transition module as defined by the CompactPCI® Serial specification, all UART channels are passed across the backplane connector rJ4, mating the SU1-TWIST or SU2-BALLAD P4 rear I/O connector pin assignment.
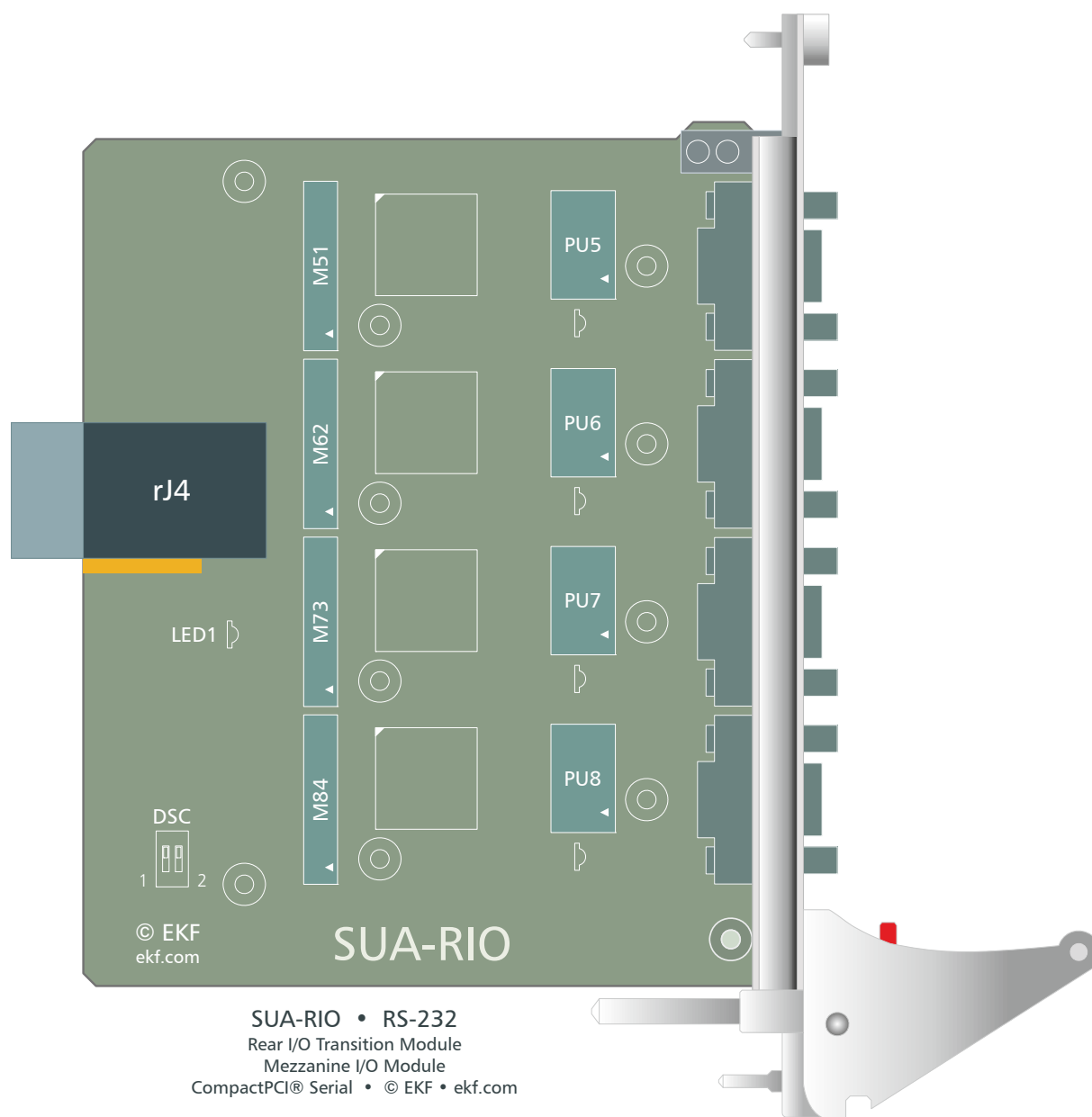
As an alternate, the SUA-RIO can be configured as mezzanine expansion board, for use on the SU1-TWIST or SU2-BALLAD carrier cards, and also on the SUB-RIO (or SUA-RIO itself) transition modules. For this application rJ4 will be not equipped on the SUA-RIO, and the TTL UART signals are handed over from the carrier via pass through stacking connectors M51 to M84. The mezzanine assembly expands the SU1-TWIST or SU2-BALLAD from four to eight front or rear panel ports, together with a common 8HP front or back panel.
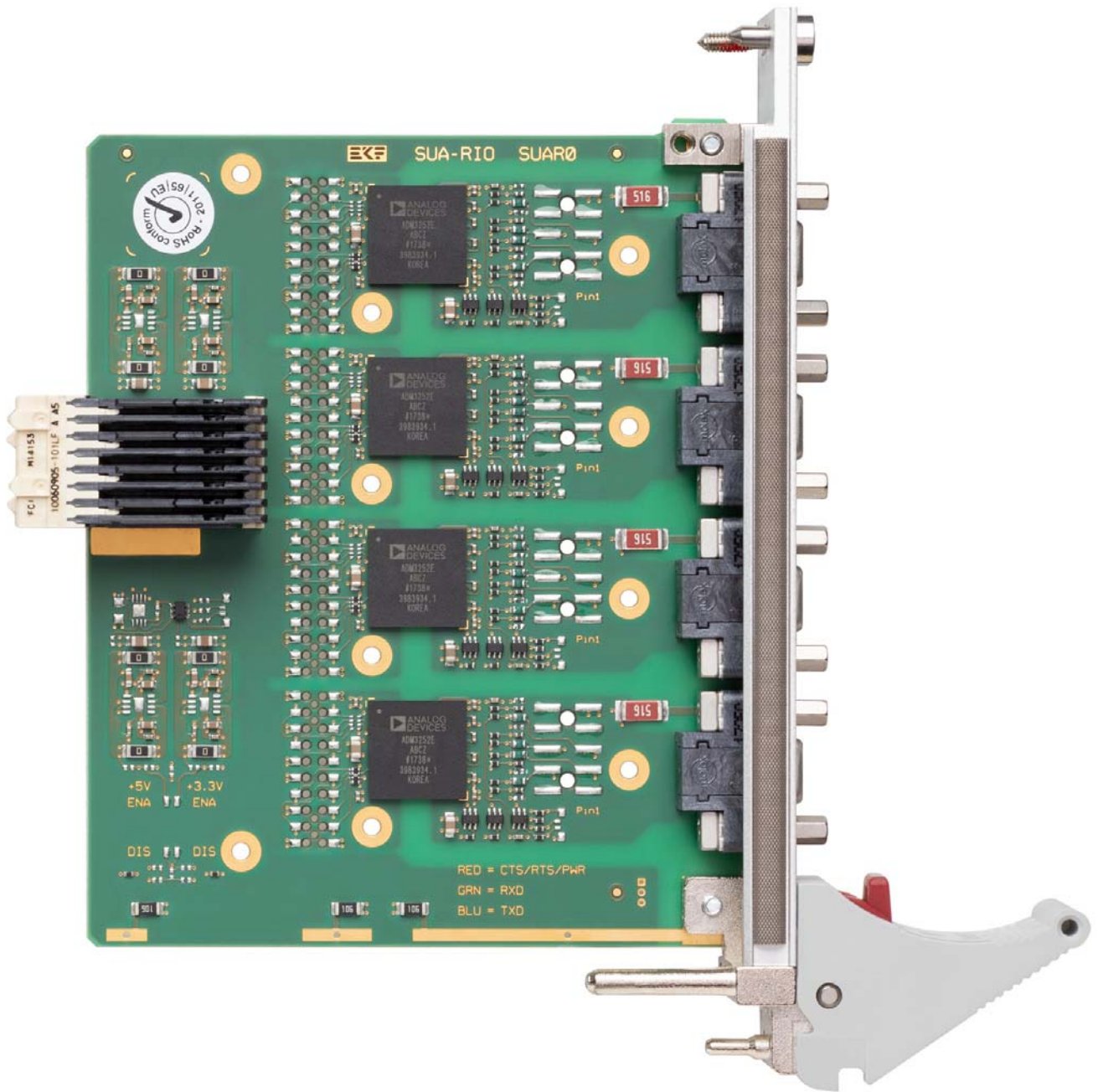
On the SUA-RIO, four UART channels are wired to Micro-D back (front) panel connectors across isolating RS-232 transceivers. Each port is comprised of the receive and transmit data signals (RXD, TXD), and in addition two hardware handshake signals (CTS, RTS) which may be used to control peripheral devices 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 Micro-D front panel connector are isolated from the board circuitry, and also isolated from each other front port. Driver and receiver enable is controlled by dedicated UART signals.
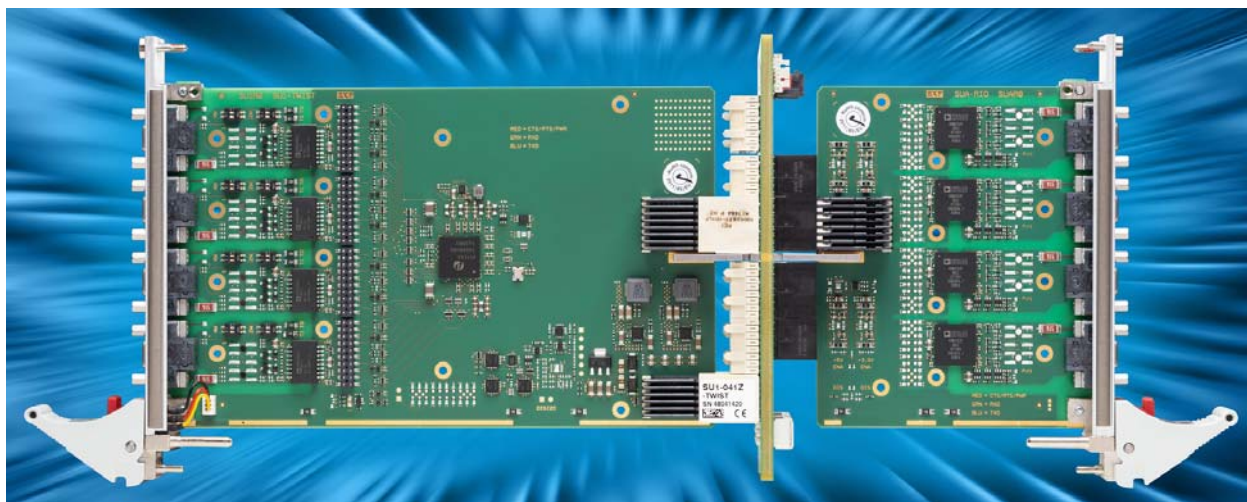
Micro-D to Micro-D cable assemblies are available, as well as Micro-D to D-Sub, and pigtail Micro-D cables in addition. As an alternate to the Micro-D connectors, four 2.54mm pitch 2x5 position pin headers PU5-8 can be optionally populated on-board, for attachment of classic D-Sub 9-pin connectors by means of micro ribbon flat cables, to be combined with a non-standard 4HP or 8HP width rear or front panel. Three different D-Sub 9-pin assignments are available as manufacturing option.
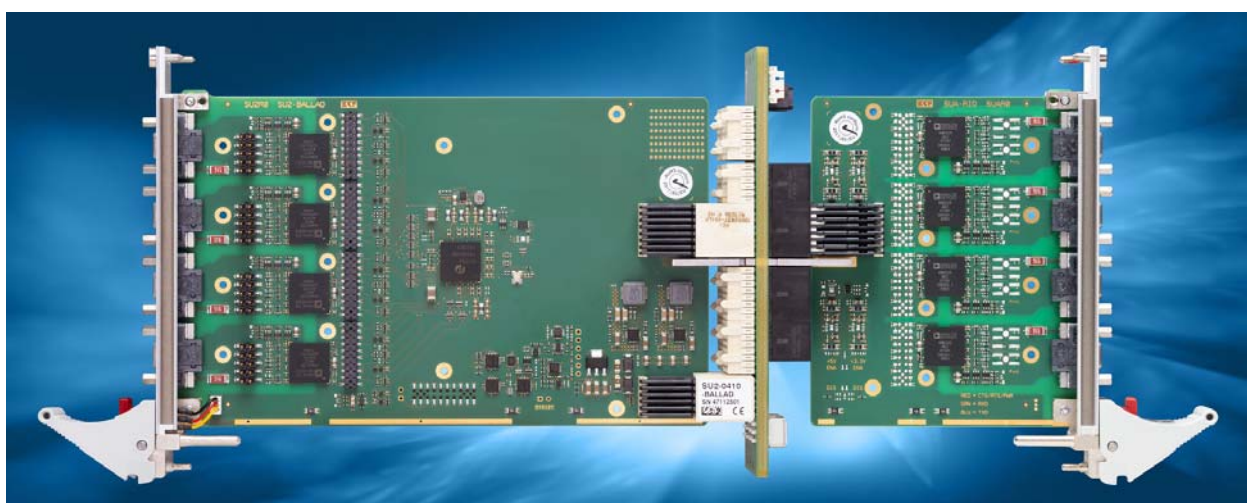
Component Orientation

M51

M62

M73

M84

rJ4

LED1

DSC

1 2

PU5

PU6

PU7

PU8

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SUA-RIO

SUA-RIO • RS-232
Rear I/O Transition Module
Mezzanine I/O Module
CompactPCI® Serial • © EKF • ekf.com

Eight Port Assemblies 4HP

SUA-RIO w. SU1-TWIST (Front Ports Isolated RS-485)

SUA-RIO w. SU2-BALLAD (Front Ports Isolated RS-232)
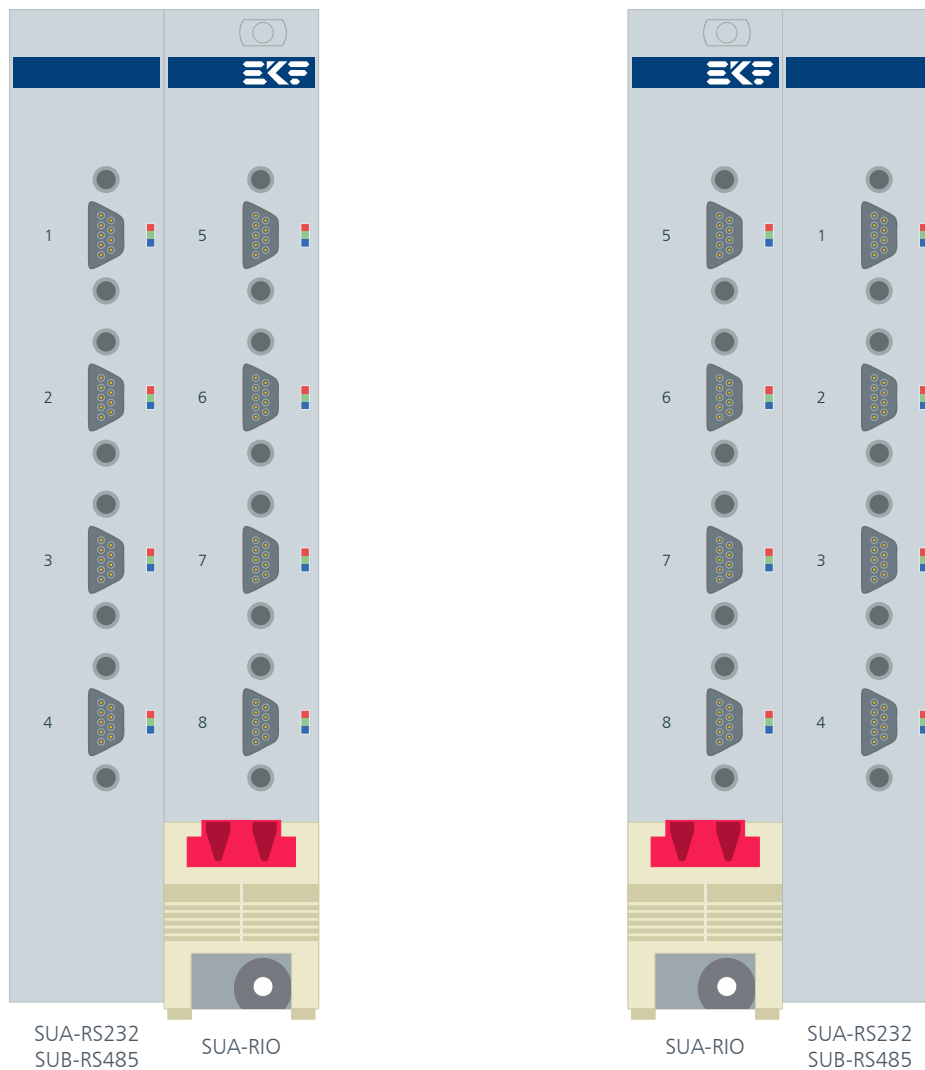
Rear Panel 4HP

SUA-RIO

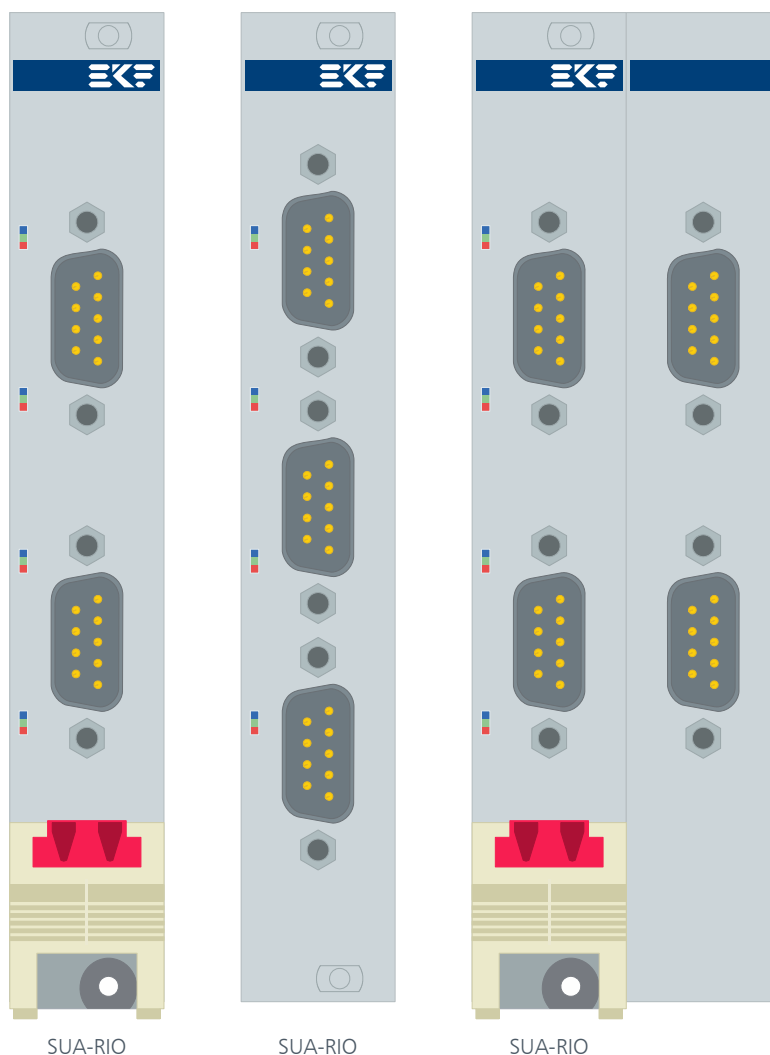www.ekf.com/s/sua/img/sua_rpl.pdf

activity on each connector
red LED = Isolated Power Good
green LED = RxD
blue LED = TxD

Rear Panel 8HP

The SUA-RIO can be used as a carrier for another SUA-RS232 or SUB-RS485 mezzanine card, either top or bottom mount, as 8HP assembly.

Option D-SUB Back Panel

SUA-RIO   SUA-RIO   SUA-RIO

When equipped with optional D-SUB 9-pin connectors, knurled screws will replace the handle (three connector panel). The quad connector assembly requires 8HP in total.

Rear Panel Connectors

Due to space restrictions, the SUA-RIO is provided with four Micro-D male connectors, which are considerably smaller than standard D-Sub connectors and therefore allow a 4HP rear panel for the board. The Micro-D connector pin assignment is illustrated below (top view).
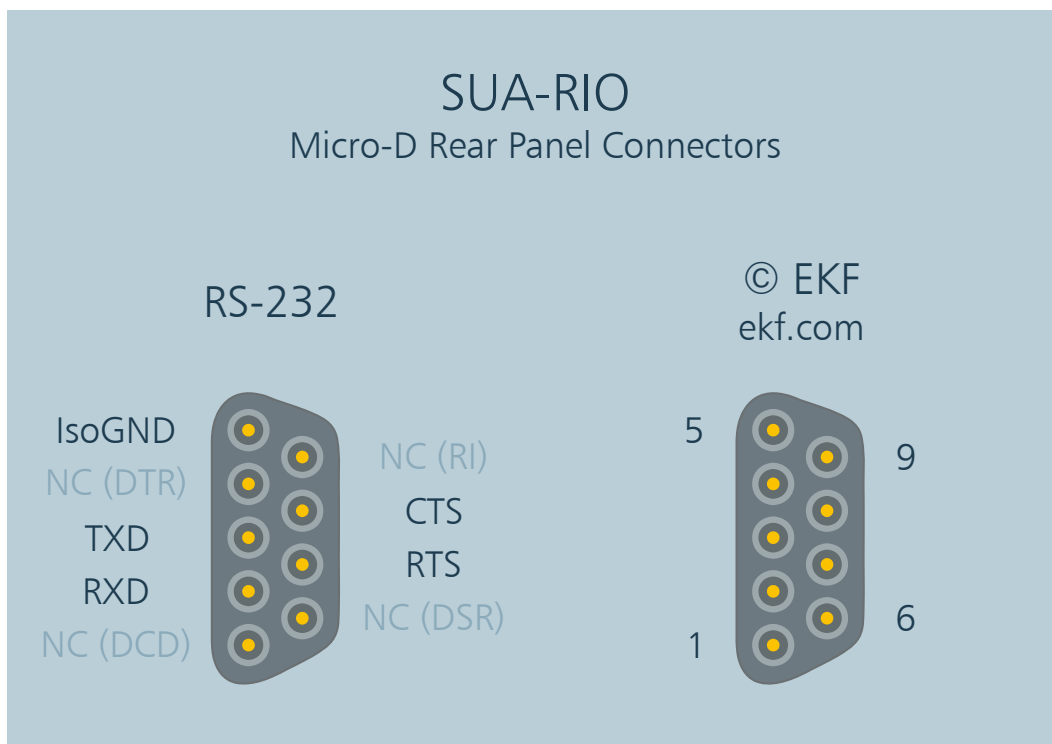

The Micro-D pin assignment replicates the classic COM port 9-position D-SUB. Due to the configuration of the isolated RS-232 transceivers, side band signals DCD, DSR, DTR and RI are not supported (NC). For hardware controlled out-of-band handshake, select the CTS/RTS UART driver software protocol.

Micro-D Cables

Some ready to use adapter cable assemblies are available from stock, e.g. Micro-D to D-Sub (female or male), wired straight pin to pin. In addition, custom specific cable assemblies are available on request.

EKF Part Numbers Micro-D Cable Assemblies RS-232	
259.901.0009.18	Micro-D to Micro-D cable assembly, 9 circuits, 1.8m, female to female cable connectors
259.921.0009.18	Micro-D to D-SUB cable assembly, 9 circuits, 1.8m, Micro-D female connector to male D-SUB
259.931.0009.18	Micro-D to D-SUB cable assembly, 9 circuits, 1.8m, Micro-D female connector to female D-SUB
259.951.0009.18	Micro-D single ended cable assembly, 9 circuits, 1.8m, Micro-D female connector to pigtail
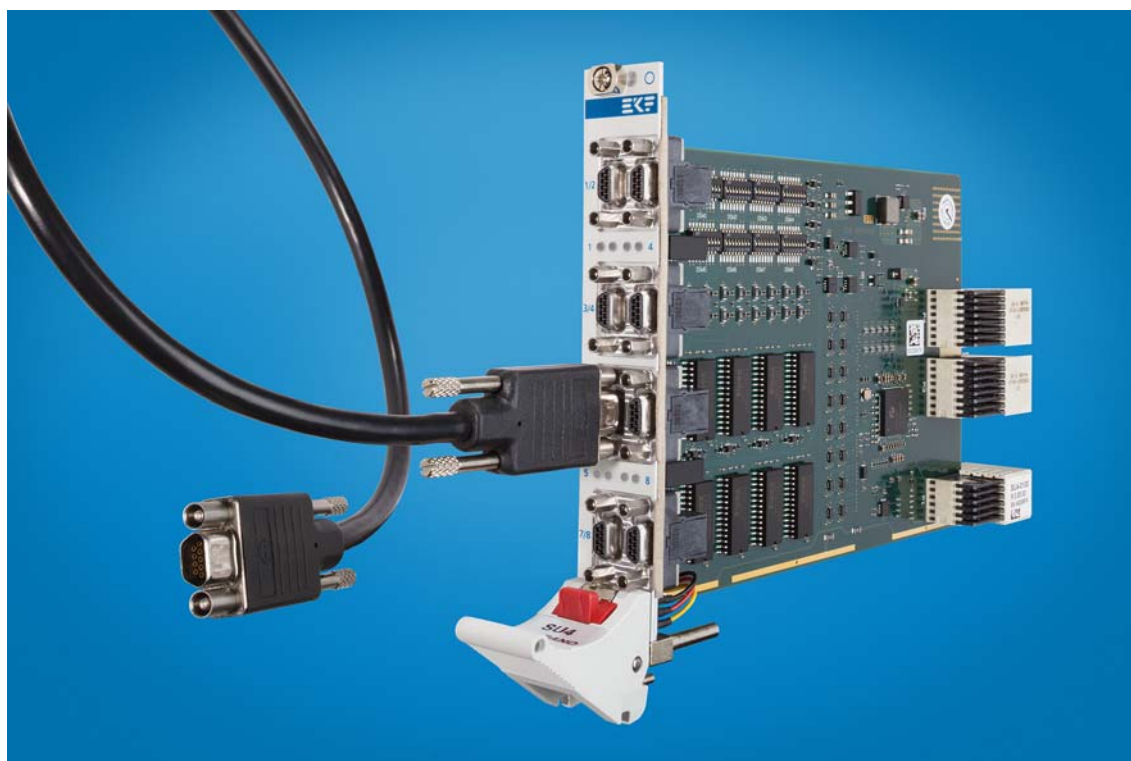
Micro-D to Micro-D Cable Assembly (Picture Similar)
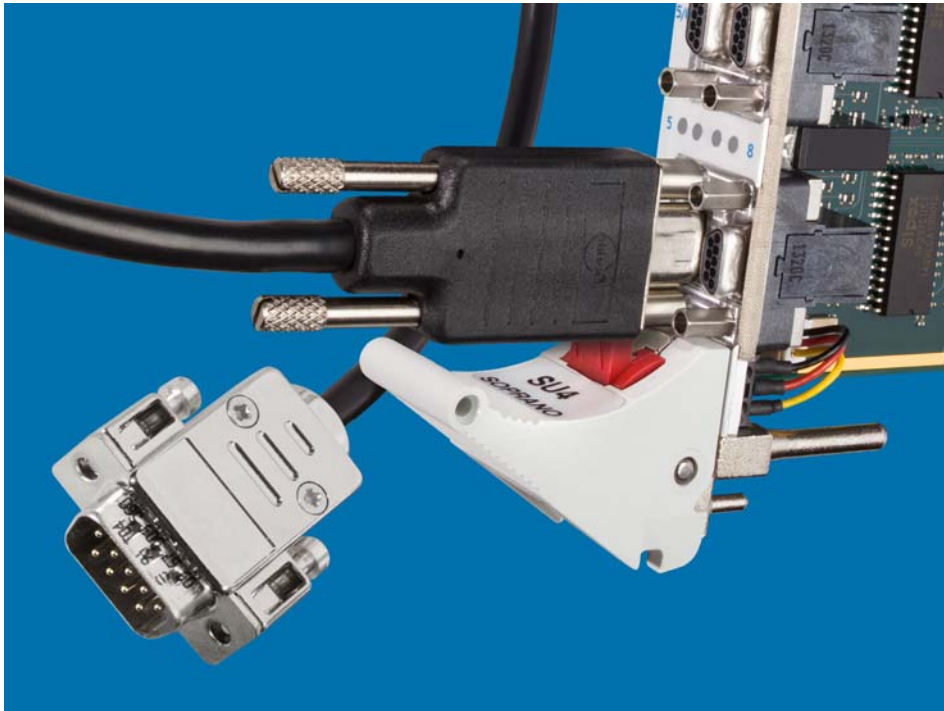
Micro-D to D-SUB Cable Assembly (Picture Similar)
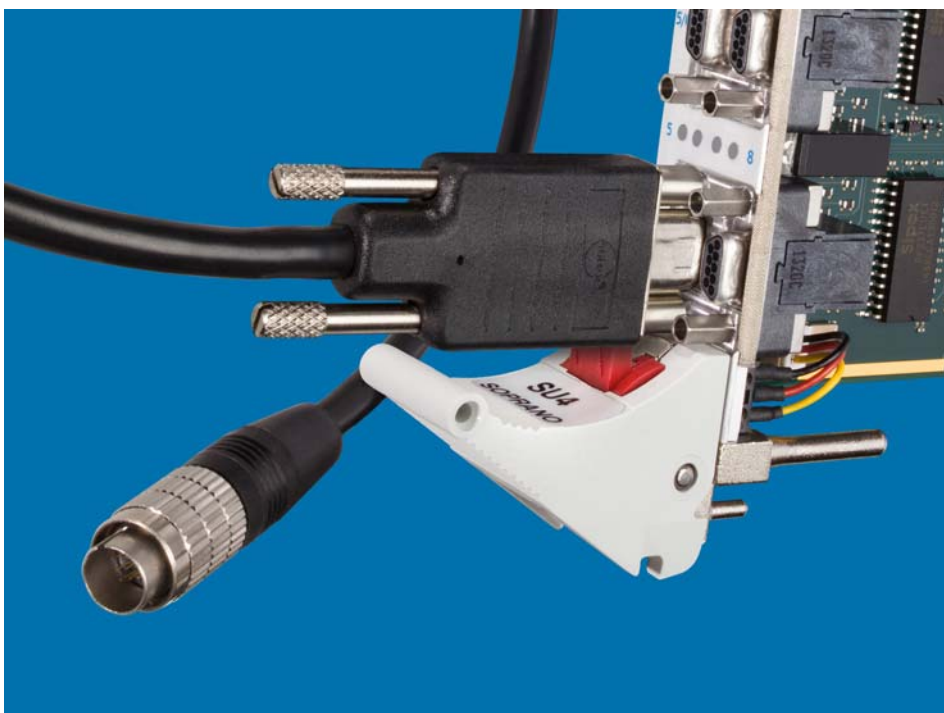
Micro-D to Custom Specific Connector Cable Assembly (Picture Similar)

Option Pin Headers for D-Sub Connectors

The SUA-RIO can be equipped with pin headers for attachment of classic male 9-pin D-Sub front panel connectors, as an alternate to the Micro-D connectors. 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 (knurled-head screw as replacement for the front handle).

PU5 - PU8 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:

8HP Front Panel Width Option Serial Ports 5 - 8 • Option Male D-Sub 9 1.27mm Pitch Flat Cable IDC Connectors	

NC (DSR)
RTS
CTS
NC (RI)

6
1
NC (DCD)
RX Data
TX Data
NC (DTR)
IsoGND
9
5

SU2-BALLAD
RS-232
Option D-Sub

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)

D-Sub Rear Panel Option (Picture Similar)

Useful External Documents	
ADM3252E	Datasheet • Isolated, Dual Channel, RS-232 Line Driver/Receiver • www.analog.com/static/imported-files/data_sheets/ADM3252E.pdf
PI7C9X7958	Datasheet • Diodes® PCI Express® Octal UART • www.diodes.com

Standards - Specifications		
Term	Document	Origin
CompactPCI® Serial	CompactPCI® Serial Specification, PICMG® CPCI-S.0 R2.0	www.picmg.org
PCI Express®	PCI Express® Base Specification	www.pcisig.com
RS-232	TIA/EIA-232-F Standard	www.tiaonline.org

Sockets M51 - M84

The SUA-RIO can be used as a pure quad port rear I/O transition module, but was in addition designed to act as a carrier card for other mezzanine transceiver modules, with up to four additional I/O ports. Further more, the SUA-RIO can be used as mezzanine expansion module itself. The SUA-RIO is provided with four pass-through sockets, suitable for attachment of (or operation as) a mezzanine module. A mezzanine expansion module connects to the the SUA-RIO carrier card via pin stackers, and can be mounted either on top or to the bottom. Both alternates result in an 8HP rear panel. If configured as a mezzanine card, the SUA-RIO can also be used with the SU1-TWIST (isolated RS-232) and SU2-BALLAD (isolated RS-232) carrier boards (8HP front panel assembly).

M51 - M84 • TTL-Level Serial I/O 2.00mm Socket Strip 2 x 10 (251.1.0210.10.09)				
+5V	1	2	GND
RTS# (5-8)	3	4	RXD (5-8)
TXD (5-8)	5	6	+3.3V
DE (5-8)	7	8	CTS# (5-8)
RE# (5-8)	9	10	GND
RE# (1-4)	11	12	GND
DE (1-4)	13	14	CTS# (1-4)
TXD# (1-4)	15	16	+3.3V
RTS# (1-4)	17	18	RXD (1-4)
+5V	19	20	GND

Driver enable (DE) and receiver enable (RE#) are required for RS-485 ports configured for half-duplex (PartyLine) operation, to be used together e.g. with the SUB-RIO module. The driver enable signal is generated by the front card Pericom/Diodes UART in conjunction with the Pericom/Diodes driver software.

Typically, the serial ports 5 - 8 provided by the octal UART of an SU1-TWIST or SU2-BALLAD front card are available for either rear I/O across P4, or locally across the SU1/SU2 on-board Mxx mezzanine connectors. For usage of ports 5 - 8 as a rear I/O solution, only P4 must be engaged. A special case is rear I/O for all eight ports of a SU1/SU2 UART card. This will require that all transceivers on the front board are not populated, and two SU* rear I/O transition modules are in use, one acting as carrier, and the other configured as mezzanine expansion module.

CompactPCI® Serial Backplane Connector rJ4 (Option)

For usage as a rear I/O transition module the SUA-RIO is equipped with the backplane connector rJ4, which mates the SU1-TWIST and SU2-BALLAD P4 connector pin assignment, for up to eight UART ports (TTL level signals). Typically, the UART ports 1-4 are used on the front card, and 5-8 on the rear I/O module. If the SUA-RIO is used as a mezzanine module, rJ4 is not populated.

rJ4 CompactPCI® Serial Rear Board Backplane Connector
EKF Part #250.3.1208.10.00 • 96 pos. 12x8

rJ4	A	B	C	D	E	F	G	H	I	J	K	L
8	GND	+3.3V	+3.3V	GND	UART 1 RXD	UART 1 RTS#	GND	UART 1 RE#	UART 1 DE	GND	UART 1 TXD	UART 1 CTS#
7	+5V	I2C CLK	GND	UART 5 CTS#	UART 5 TXD	GND	UART 5 DE	UART 5 RE#	GND	UART 5 RTS#	UART 5 RXD	GND
6	GND	+3.3V	+3.3V	GND	UART 2 RXD	UART 2 RTS#	GND	UART 2 RE#	UART 2 DE	GND	UART 2 TXD	UART 2 CTS#
5	+5V	I2C DAT	GND	UART 6 CTS#	UART 6 TXD	GND	UART 6 DE	UART 6 RE#	GND	UART 6 RTS#	UART 6 RXD	GND
4	GND	+3.3V	+3.3V	GND	UART 3 RXD	UART 3 RTS#	GND	UART 3 RE#	UART 3 DE	GND	UART 3 TXD	UART 3 CTS#
3	+5V	I2C PWR	GND	UART 7 CTS#	UART 7 TXD	GND	UART 7 DE	UART 7 RE#	GND	UART 7 RTS#	UART 7 RXD	GND
2	GND	+3.3V	+3.3V	GND	UART 4 RXD	UART 4 RTS#	GND	UART 4 RE#	UART 4 DE	GND	UART 4 TXD	UART 4 CTS#
1	+5V	RIO ACT#	GND	UART 8 CTS#	UART 8 TXD	GND	UART 8 DE	UART 8 RE#	GND	UART 8 RTS#	UART 8 RXD	GND

all signals TTL level compliant, +3.45V maximum input voltage
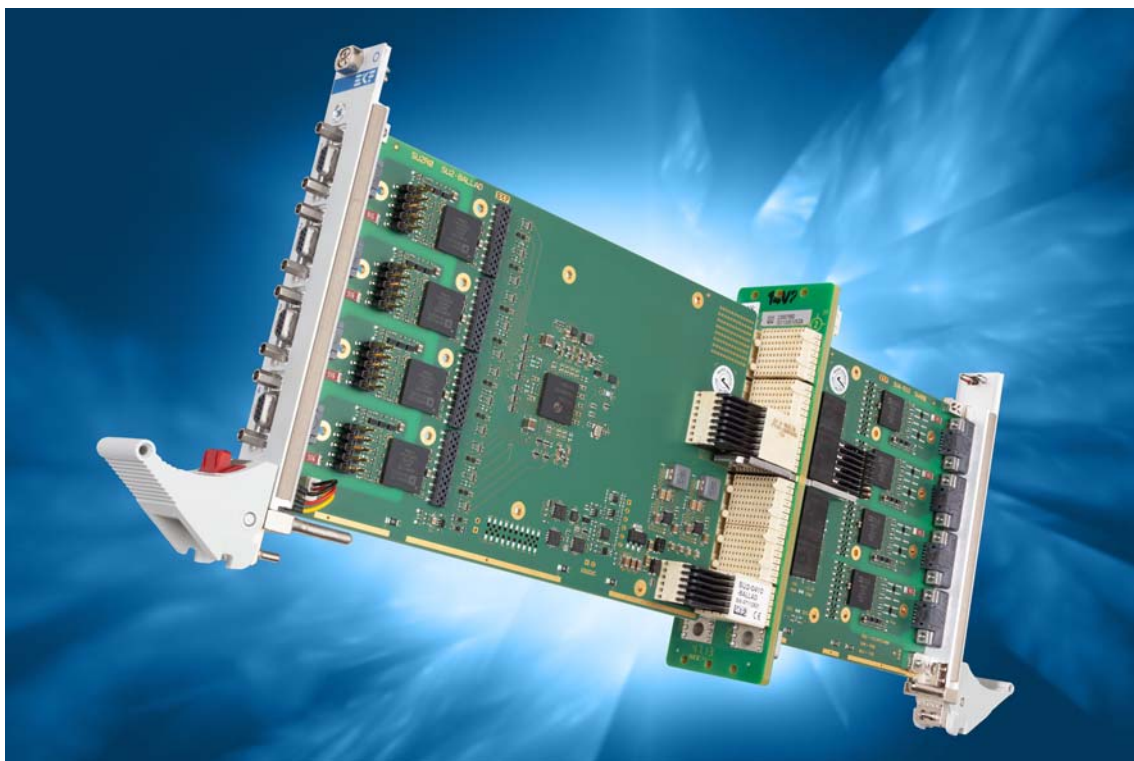
SU2-BALLAD w. SUA-RIO (Isolated RS-232 Front Ports)

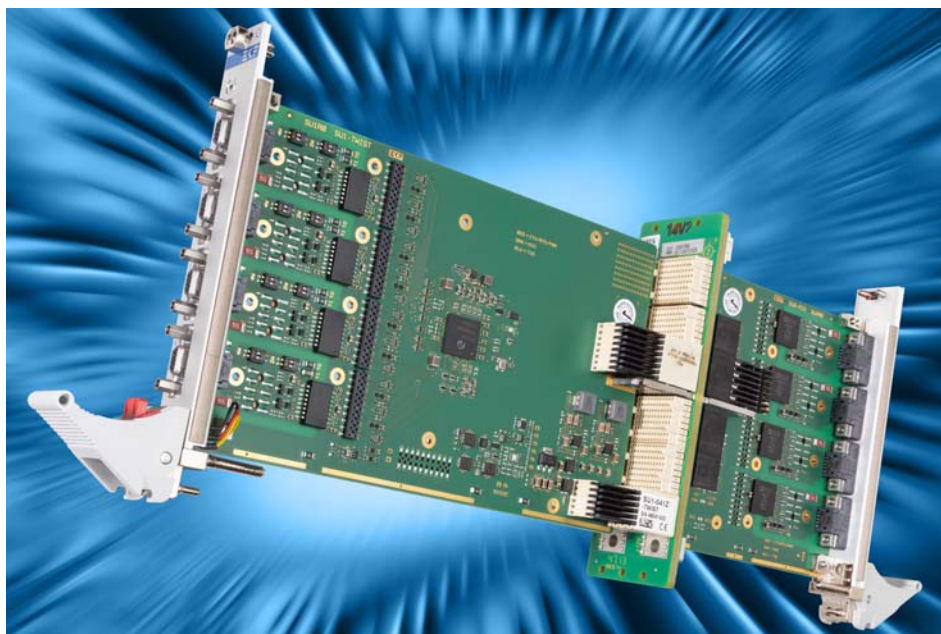SUA-RIO w. SU2-BALLAD (Eight Port 4HP Isolated RS-232 Solution)

Driver Software

UART drivers are available for download from the EKF website e.g. at https://www.ekf.com/s/su1/drv/.

Ordering Information

Ordering Information
For popular SUA-RIO SKUs please refer to www.ekf.com/liste/liste_21.html#SUA

Related Products

Related Links	
SU1-TWIST (Isolated RS-485)	www.ekf.com/s/su1/su1.html
SU2-BALLAD (Isolated RS-232)	www.ekf.com/s/su2/su2.html
SU4-SOPRANO (RS-232/232 Selectable)	www.ekf.com/s/su4/su4.html
SUA-RIO (Rear I/O Isolated RS-232)	www.ekf.com/s/sua/sua.html
SUB-RIO (Rear I/O Isolated RS-485)	www.ekf.com/s/sub/sub.html
CompactPCI® Serial UART Solutions	www.ekf.com/s/serial.html#SU
CompactPCI® Classic UART Solutions	www.ekf.com/c/ccom/ccom.html
XMC Module UART Solutions	www.ekf.com/d/dcom.html

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