



## Product Information

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

Rear I/O Transition Module • Mezzanine Expansion Module



## 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, SU2-BALLAD or SU3-ENSEMBLE 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<sup>2</sup> (3U), 4HP rear panel width
- ▶ Suitable for CompactPCI® Serial octal UART peripheral cards SU1-TWIST, SU2-BALLAD or SU3-ENSEMBLE (matching SU1, SU2 or SU3 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, SU2-BALLAD and SU3-ENSEMBLE (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 *isoPower*)
- ▶ 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, EN55035, 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 contact [support@ekf.com](mailto:support@ekf.com) for availability of additional

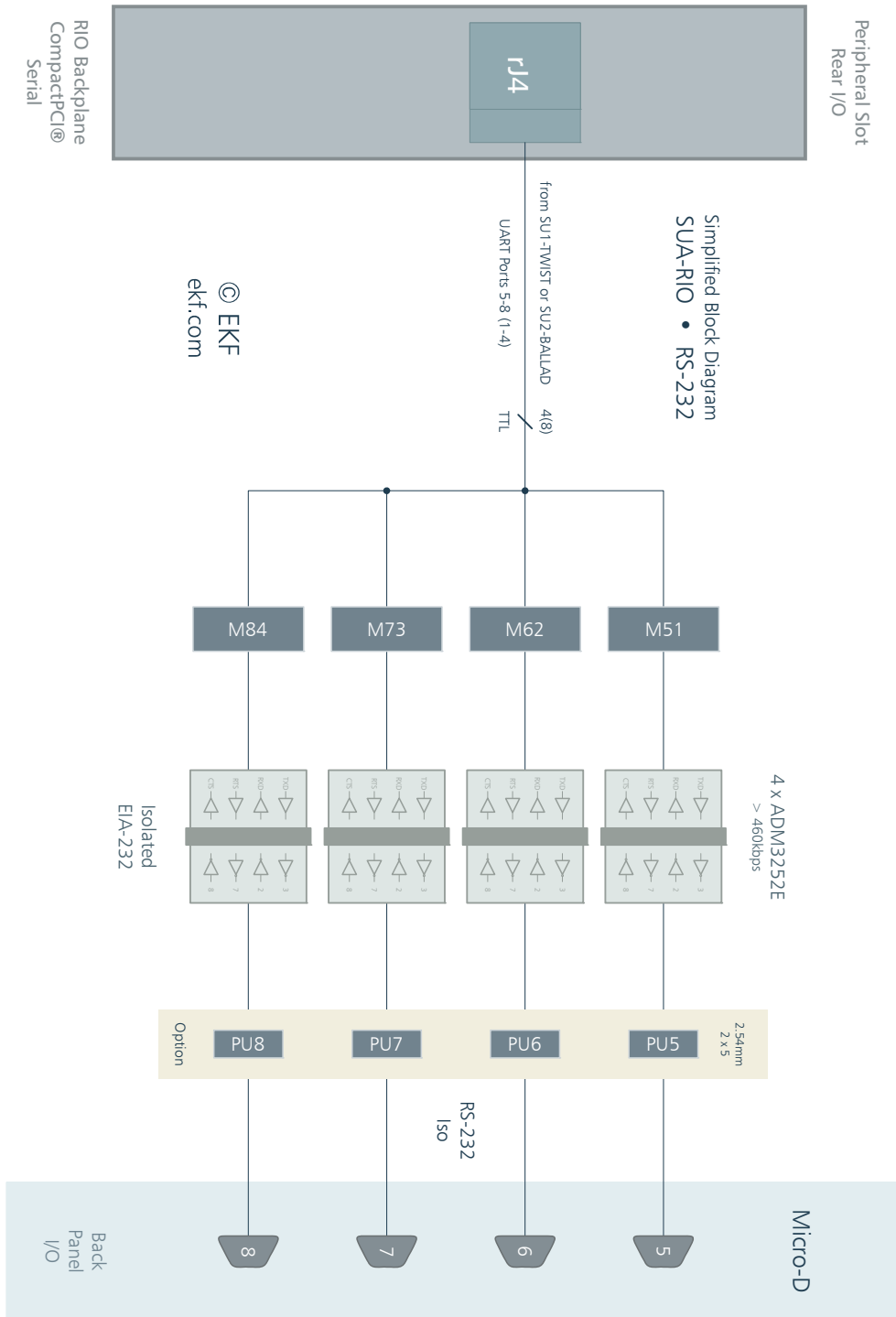


special sign according to ISO 7010 M002, please documentation which may be important for proper usage.



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

Block Diagram



[www.ekf.com/s/sua/img/sua\\_blk.pdf](http://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, SU2-BALLAD or SU3-ENSEMBLE P4 rear I/O connector pin assignment.

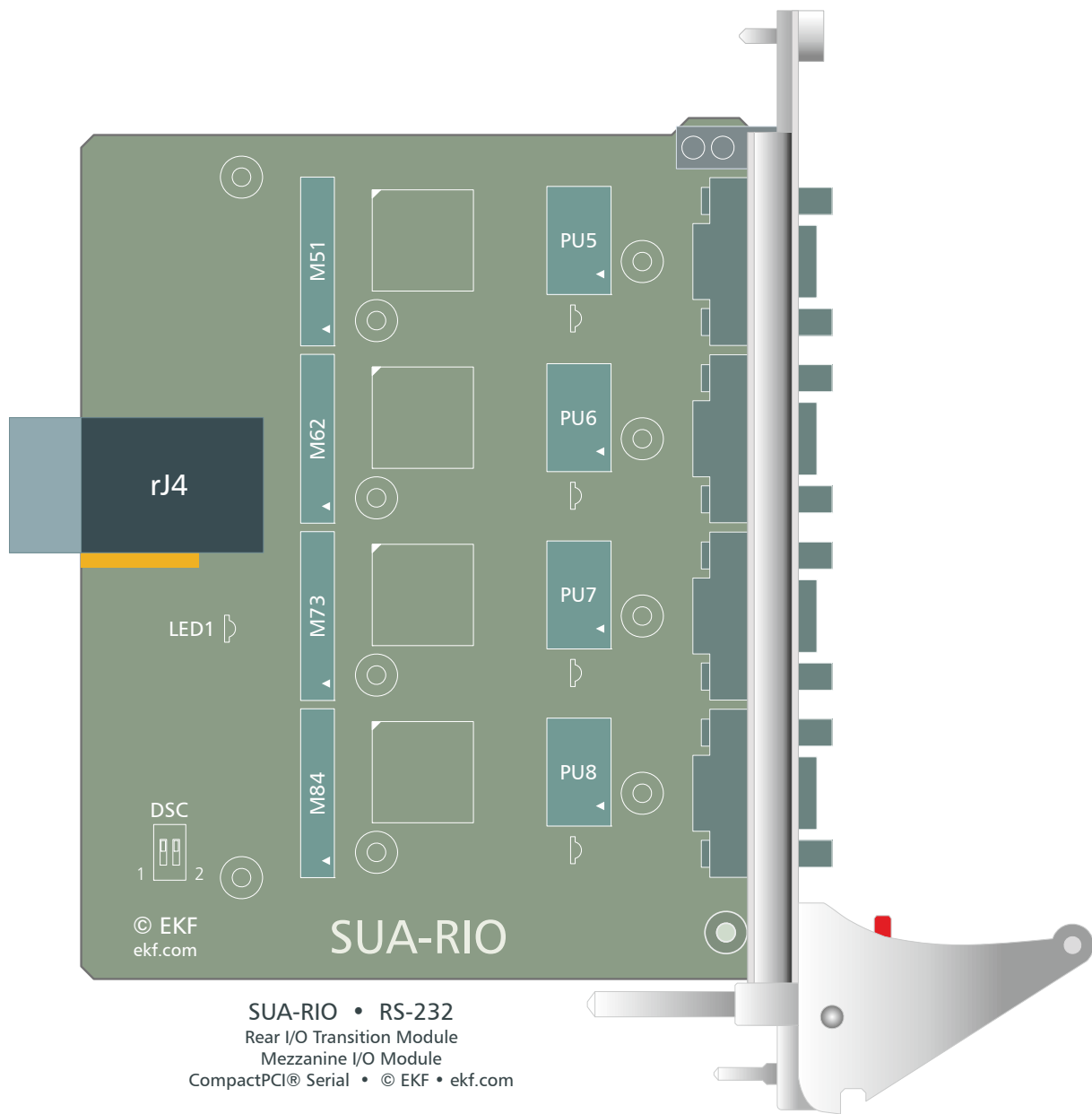
As an alternate, the SUA-RIO can be configured as mezzanine expansion board, for use on the SU1-TWIST or SU2-BALLAD carrier cards, and also on the SUB-RIO (or SUA-RIO itself) transition modules. For this application rJ4 will be not equipped on the SUA-RIO, and the TTL UART signals are handed over from 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.

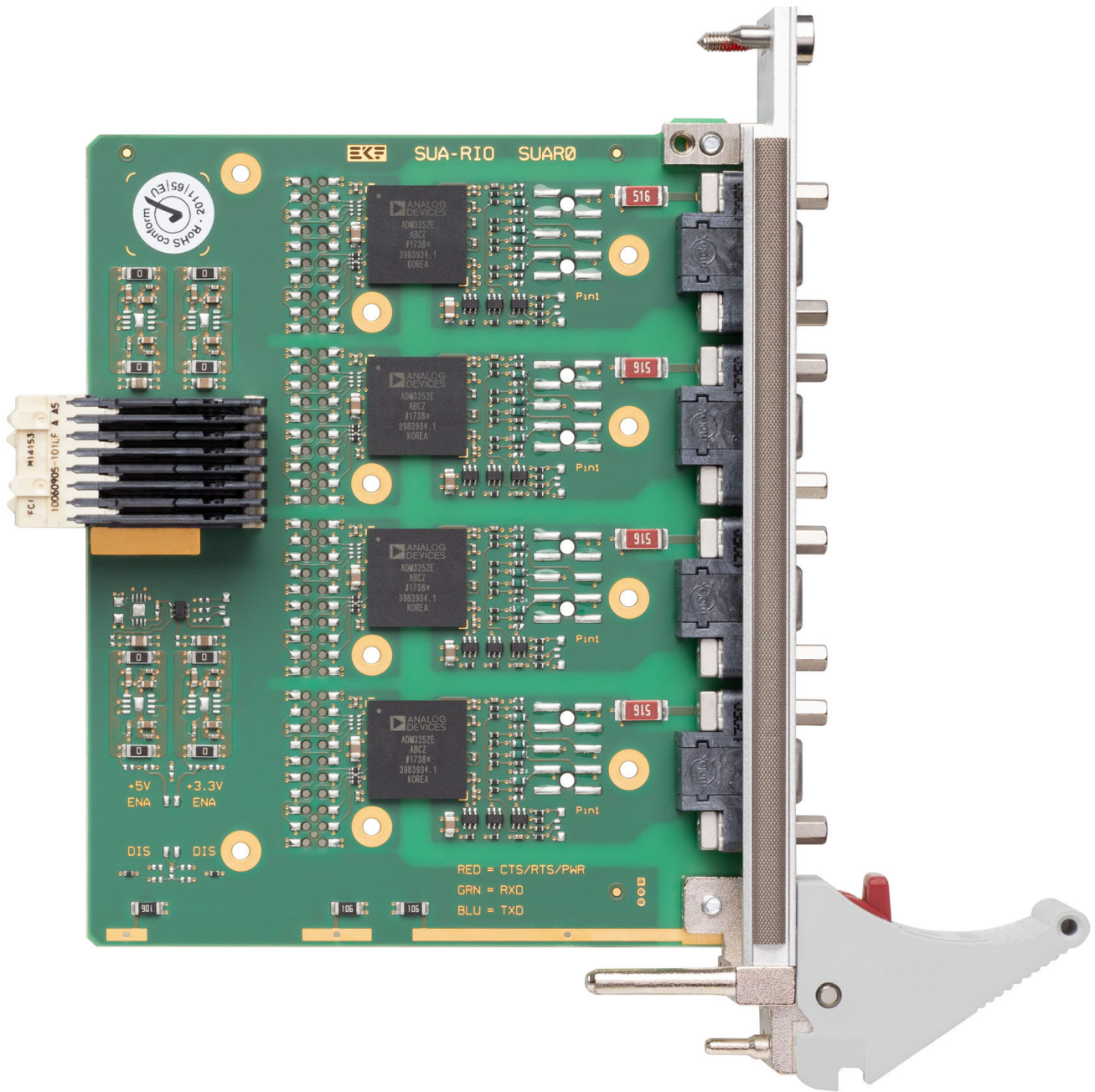
Four ADM3252E transceivers are provided to meet the RS-232 physical layer specifications. The RS-232 signals of any particular Micro-D front panel connector are isolated from the board circuitry, and also isolated from each other front port. Driver and receiver enable is controlled by dedicated UART 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.

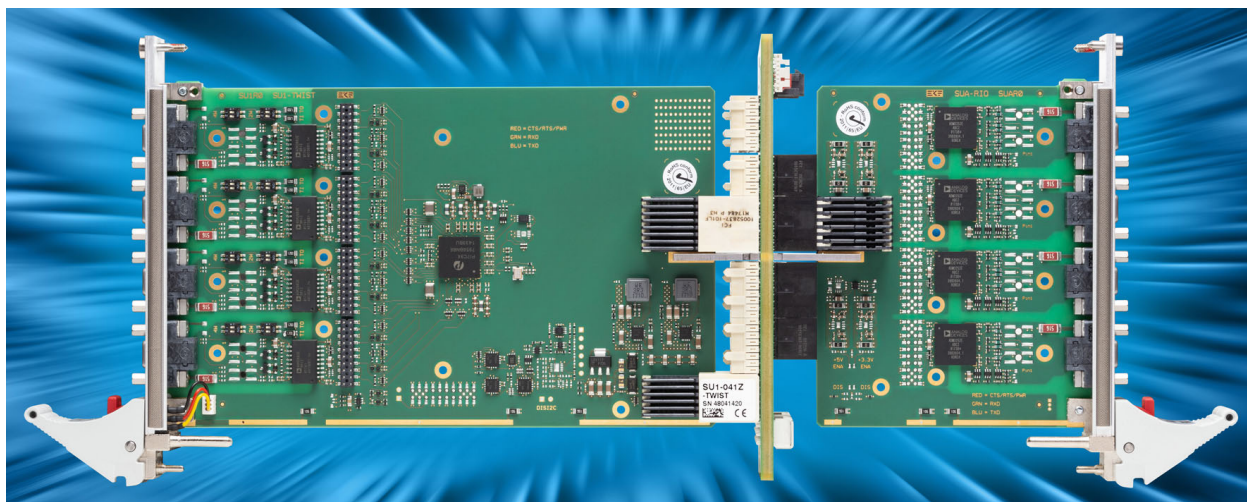
Component Orientation



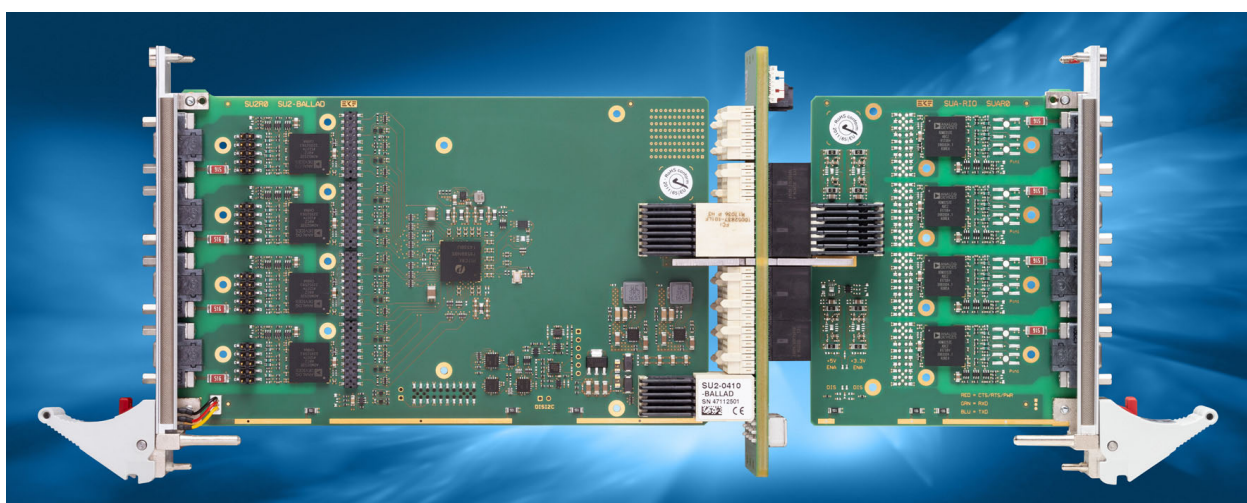




## Eight Port Assemblies 4HP



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



SUA-RIO w. SU2-BALLAD (Front Ports Isolated RS-232)

## Rear Panel 4HP

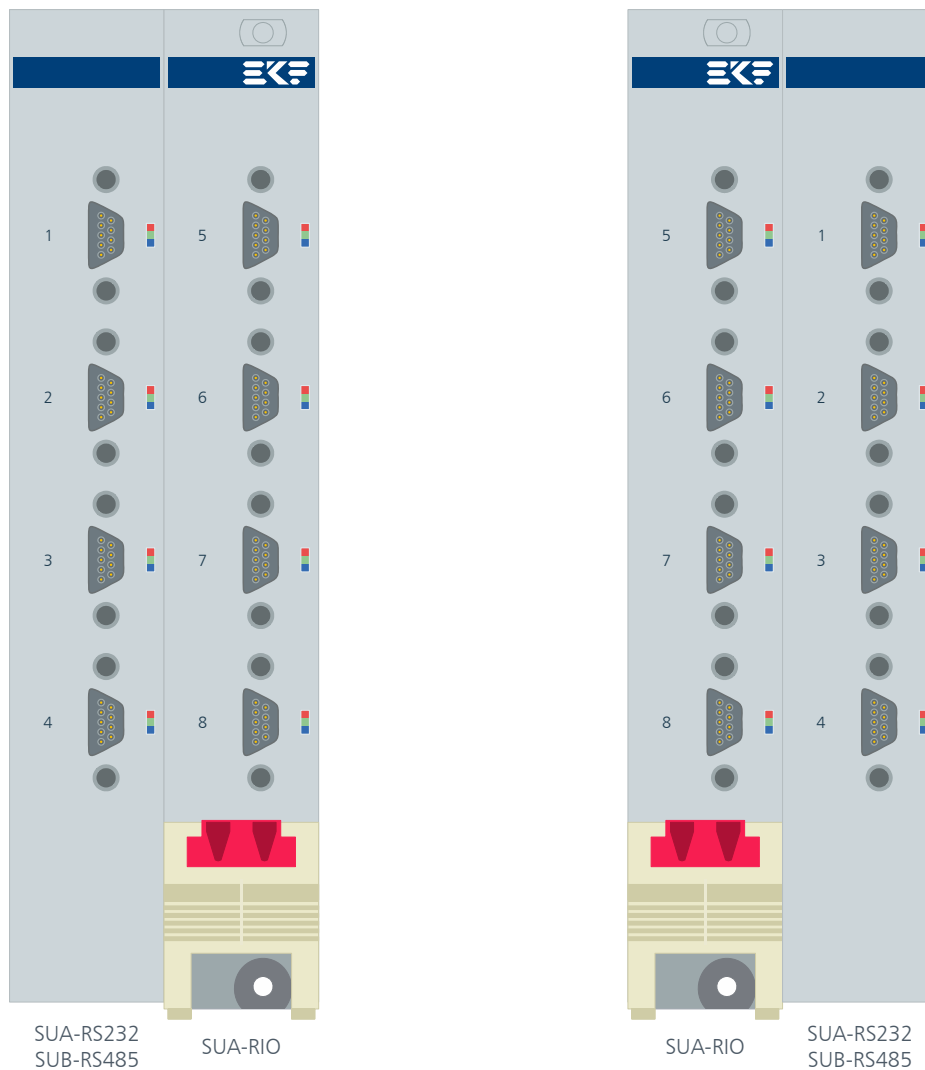


SUA-RIO

[www.ekf.com/s/sua/img/sua\\_rpl.pdf](http://www.ekf.com/s/sua/img/sua_rpl.pdf)

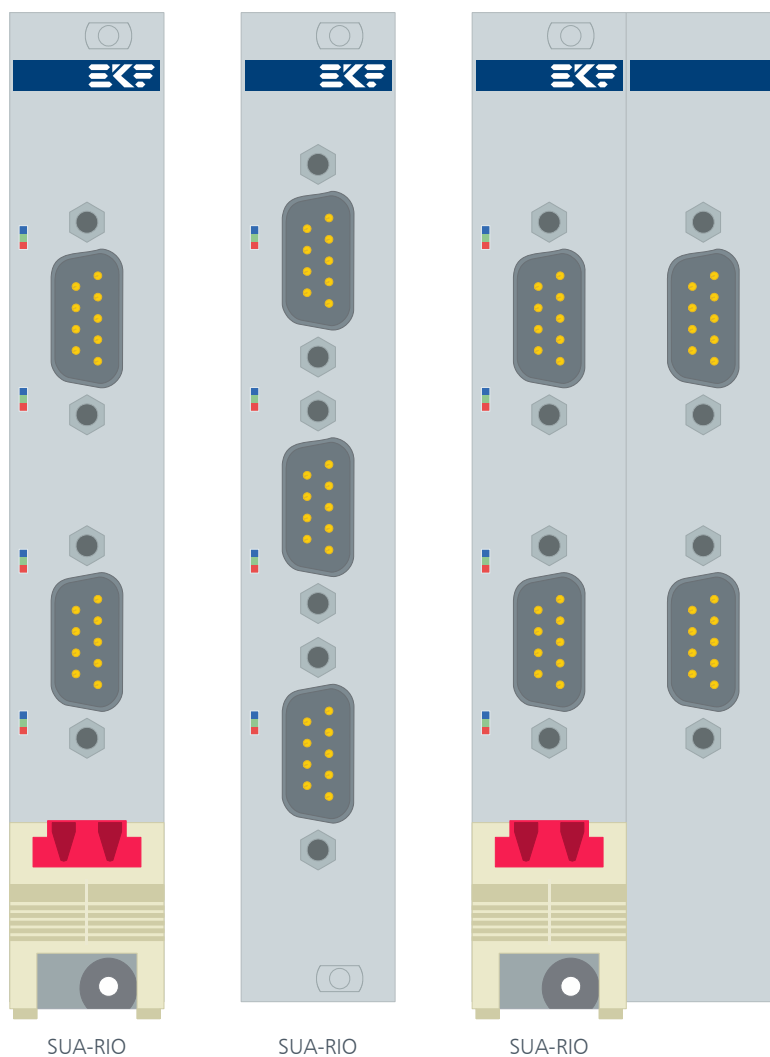
activity on each connector  
red LED = Isolated Power Good  
green LED = RxD  
blue LED = TxD

## 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.

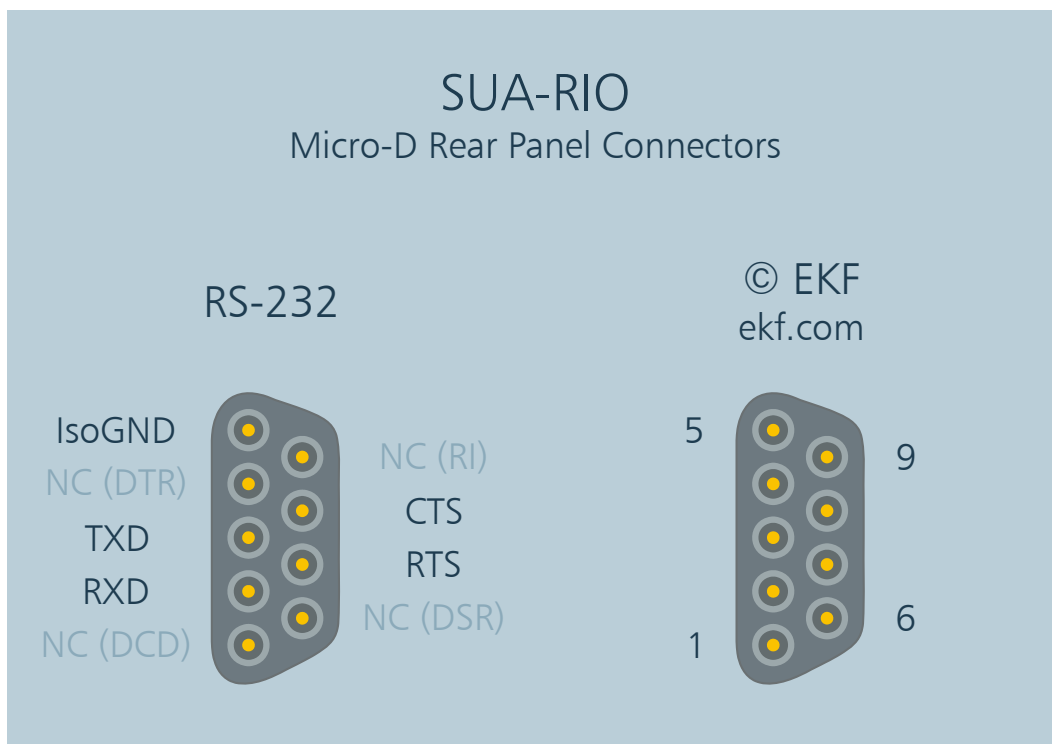
## Option D-SUB Back Panel



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.

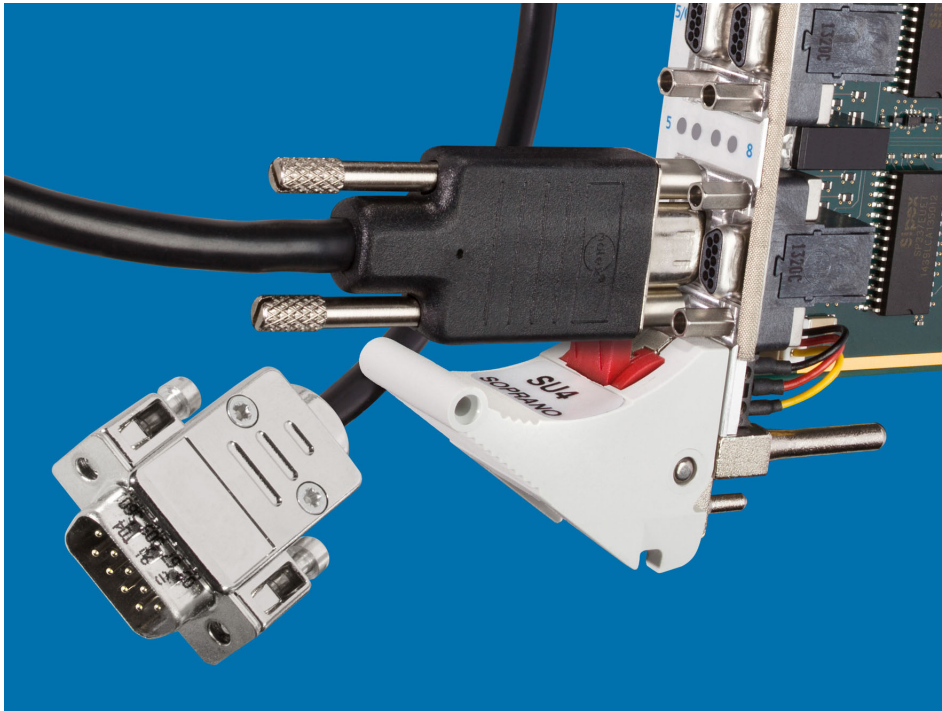
## Micro-D Cables

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.

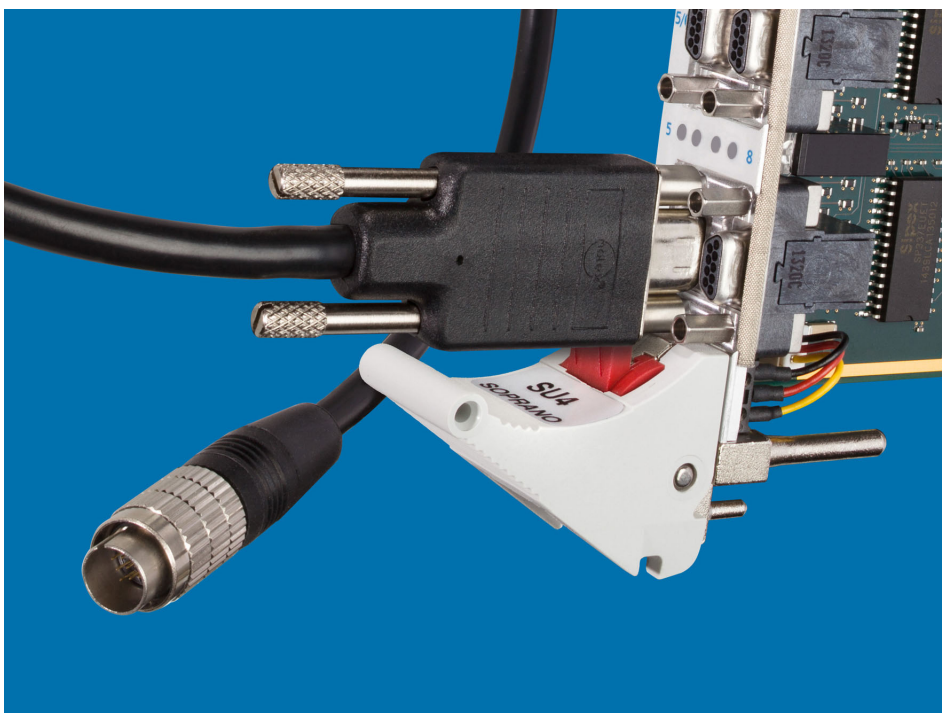
EKF Part Numbers Micro-D Cable Assemblies RS-232	
259.901.0009.18	Micro-D to Micro-D cable assembly, 9 circuits, 1.8m, female to female cable connectors
259.921.0009.18	Micro-D to D-SUB cable assembly, 9 circuits, 1.8m, Micro-D female connector to male D-SUB
259.931.0009.18	Micro-D to D-SUB cable assembly, 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		
<p>SU2-BALLAD RS-232 Option D-Sub</p>	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

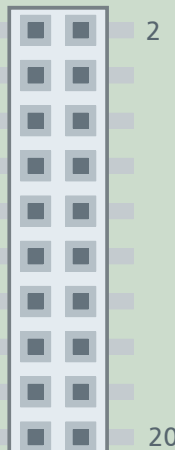
ADM3252E	Datasheet • Isolated, Dual Channel, RS-232 Line Driver/Receiver • <a href="http://www.analog.com/static/imported-files/data_sheets/ADM3252E.pdf">www.analog.com/static/imported-files/data_sheets/ADM3252E.pdf</a>
PI7C9X7958	Datasheet • Diodes® PCI Express® Octal UART • <a href="http://www.diodes.com">www.diodes.com</a>

### Standards - Specifications

Term	Document	Origin
CompactPCI® Serial	CompactPCI® Serial Specification, PICMG® CPCI-S.0 R2.0	<a href="http://www.picmg.org">www.picmg.org</a>
PCI Express®	PCI Express® Base Specification	<a href="http://www.pcisig.com">www.pcisig.com</a>
RS-232	TIA/EIA-232-F Standard	<a href="http://www.tiaonline.org">www.tiaonline.org</a>

## 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

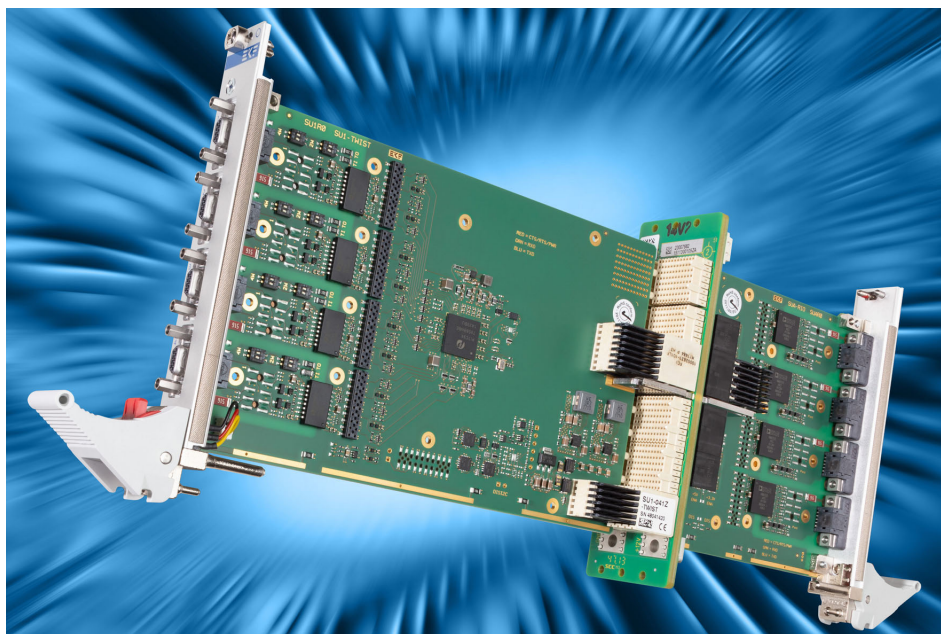
UART drivers are available for download from the EKF website e.g. at <https://www.ekf.com/s/su1/drv/>.

## Ordering Information

### Ordering Information

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

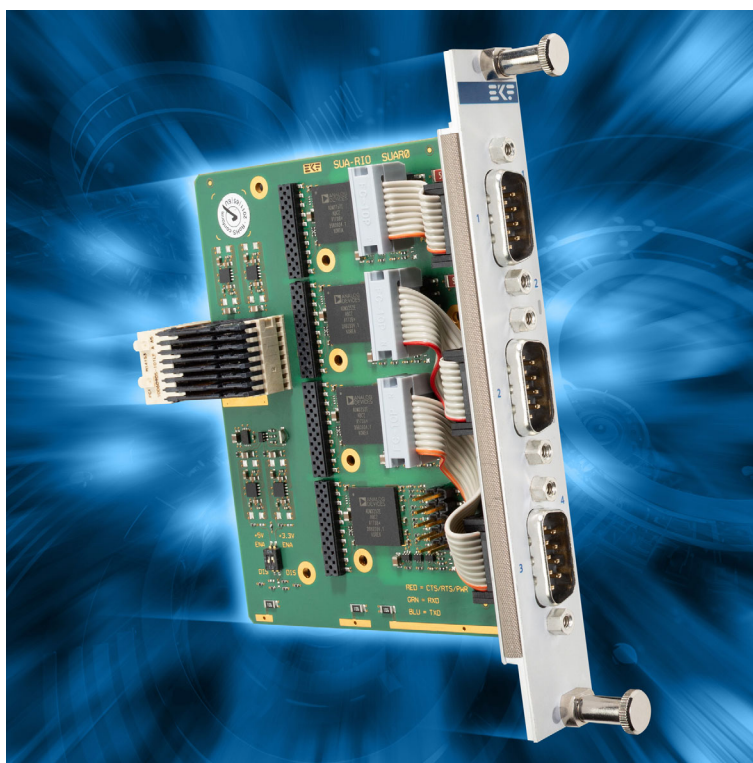
## Related Products

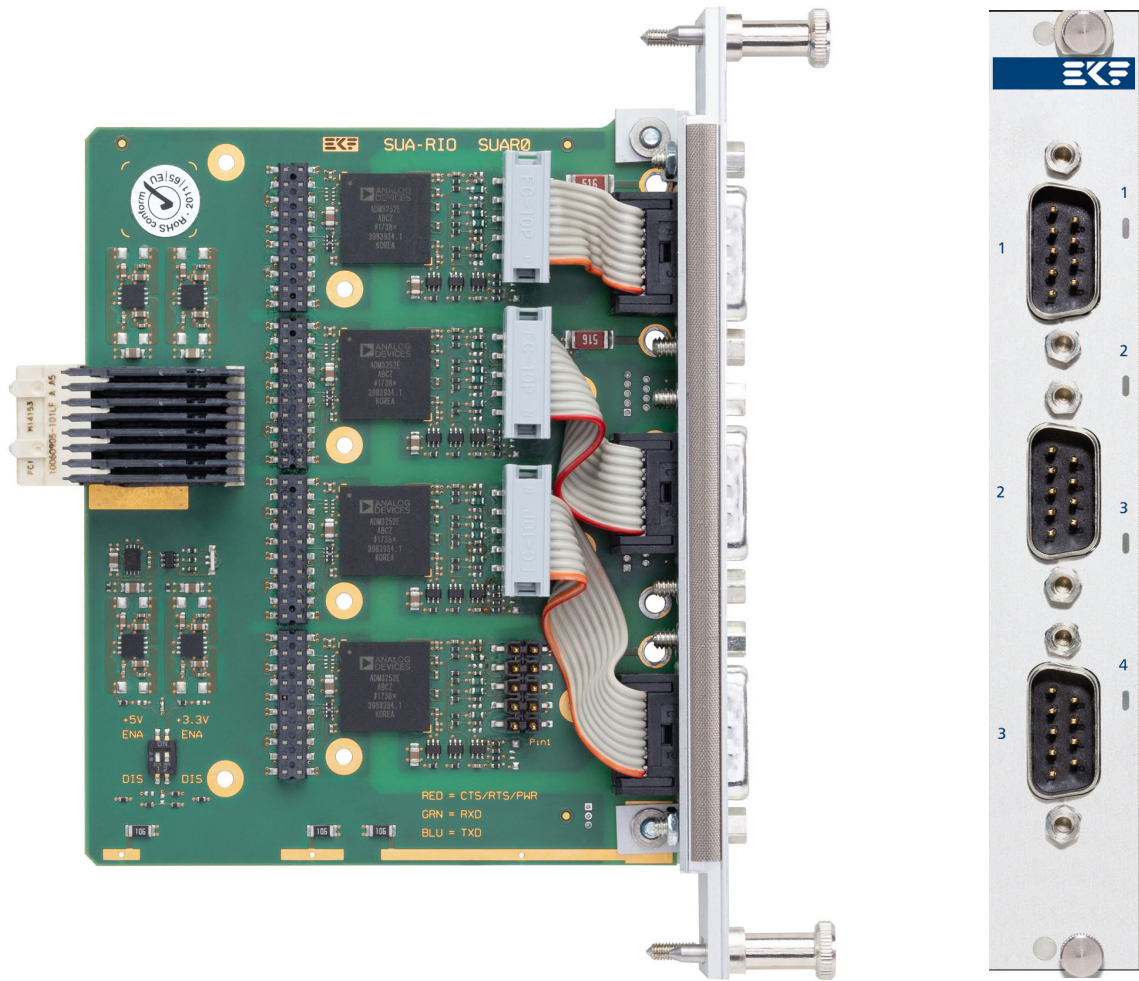


### Related Links

SU1-TWIST (Isolated RS-485)	<a href="https://www.ekf.com/s/su1/su1.html">https://www.ekf.com/s/su1/su1.html</a>
SU2-BALLAD (Isolated RS-232)	<a href="https://www.ekf.com/s/su2/su2.html">https://www.ekf.com/s/su2/su2.html</a>
SU3-ENSEMBLE (Isolated RS-***)	<a href="https://www.ekf.com/s/su3/su3.html">https://www.ekf.com/s/su3/su3.html</a>
SU4-SOPRANO (RS-232/232 Selectable)	<a href="https://www.ekf.com/s/su4/su4.html">https://www.ekf.com/s/su4/su4.html</a>
SUA-RIO (Rear I/O Isolated RS-232)	<a href="https://www.ekf.com/s/sua/sua.html">https://www.ekf.com/s/sua/sua.html</a>
SUB-RIO (Rear I/O Isolated RS-485)	<a href="https://www.ekf.com/s/sub/sub.html">https://www.ekf.com/s/sub/sub.html</a>
CompactPCI® Serial UART Solutions	<a href="https://www.ekf.com/s/serial.html#SU">https://www.ekf.com/s/serial.html#SU</a>
CompactPCI® Classic UART Solutions	<a href="https://www.ekf.com/c/com/com.html">https://www.ekf.com/c/com/com.html</a>
XMC Module UART Solutions	<a href="https://www.ekf.com/d/dcom.html">https://www.ekf.com/d/dcom.html</a>

SUA-0330-RIO (D-Sub)







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boards. systems. solutions.



Beyond All Limits:  
EKF High Performance Embedded

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