

USER MANUAL

SERIAL(RS232/RS485) BRIDGE
FEATHERWING

2601167101001

VERSION 1.1

DECEMBER 1, 2025

WÜRTH ELEKTRONIK MORE THAN YOU EXPECT

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1 Abbreviations

Abbreviation	Name	Description
CTS	Clear To Send	
DC	Direct Current	
EV	Evaluation	
ESD	Electro Static Discharge	
EMC	Electro Magnetic Compatibility	
GND	Ground	Ground signal level that corresponds to 0 V
HIGH	High signal level	Digital voltage level that is detected as high by the module
LED	Light Emitting Diode	
Li-Po	Lithium-Polymer	
LOW	Low signal level	Digital voltage level that is detected as low by the module
PCB	Printed Circuit Board	
RTS	Request To Send	
RX	Data Receive	
TX	Data Transmit	
UART	Universal Asynchronous Receive Transmit	Serial protocol
VCC	Voltage Common Collector	Supply voltage
VDD	Voltage Drain Drain	Supply voltage

2 Revision history

Manual version	HW version	Notes	Date
1.0	2.0	Initial version	February 2024
1.1	2.0	Update chapter Terms of Use for Würth Elektronik eiSos GmbH & Co. KG EV-Boards, evaluation kits and evaluation modules	November 2025

3 General description

3.1 Introduction

The Würth Elektronik eiSos Serial(RS232/RS485) bridge FeatherWing is a development board that acts as a bridge between UART and RS232/RS485/RS422. It is fully compatible with the popular Adafruit Feather line of development boards and can be used as plug-and-play solution to connect any D-SUB9 interfaced device to the Feather ecosystem. This FeatherWing acts as a bridge between legacy RS232/RS485 devices and modern wired/wireless digital interfaces.

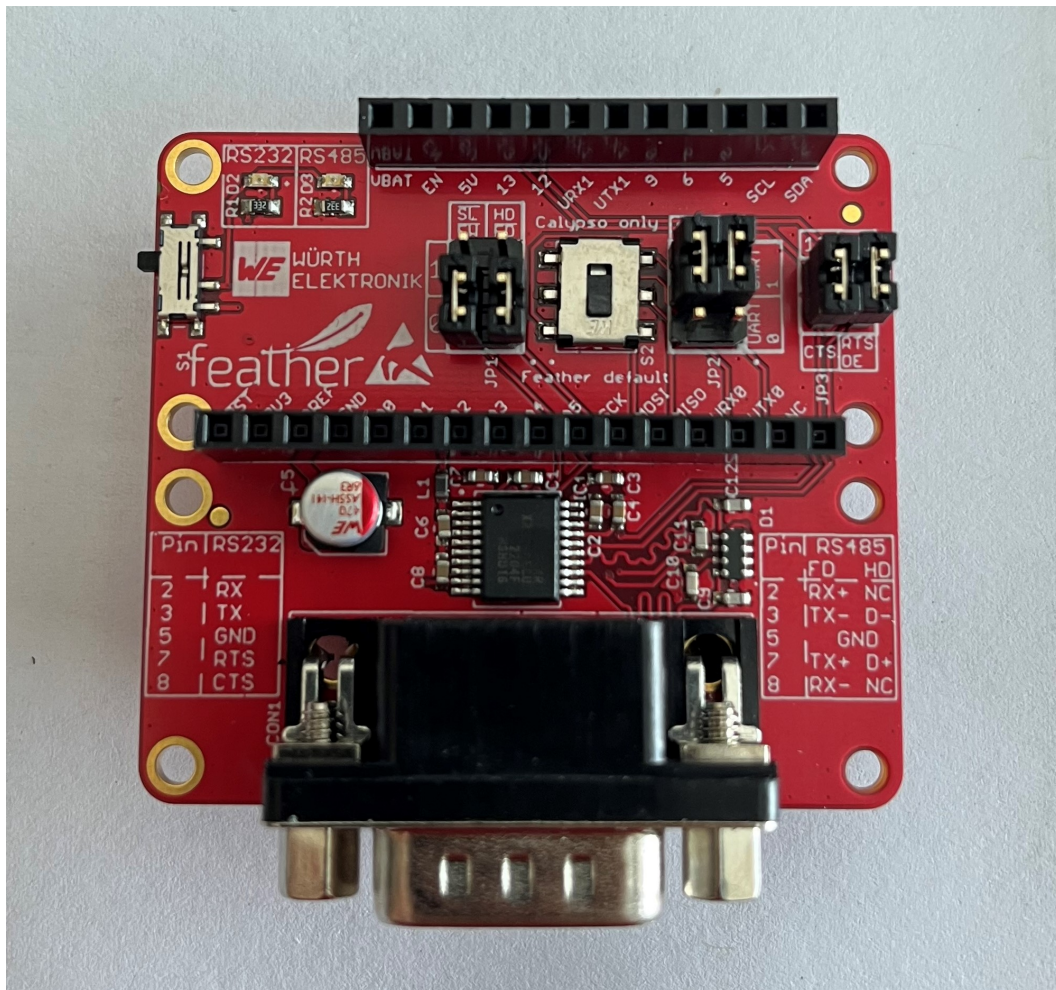


Figure 1: The WE Serial(RS232/RS485) bridge FeatherWing (2601167101001)

3.2 Block diagram

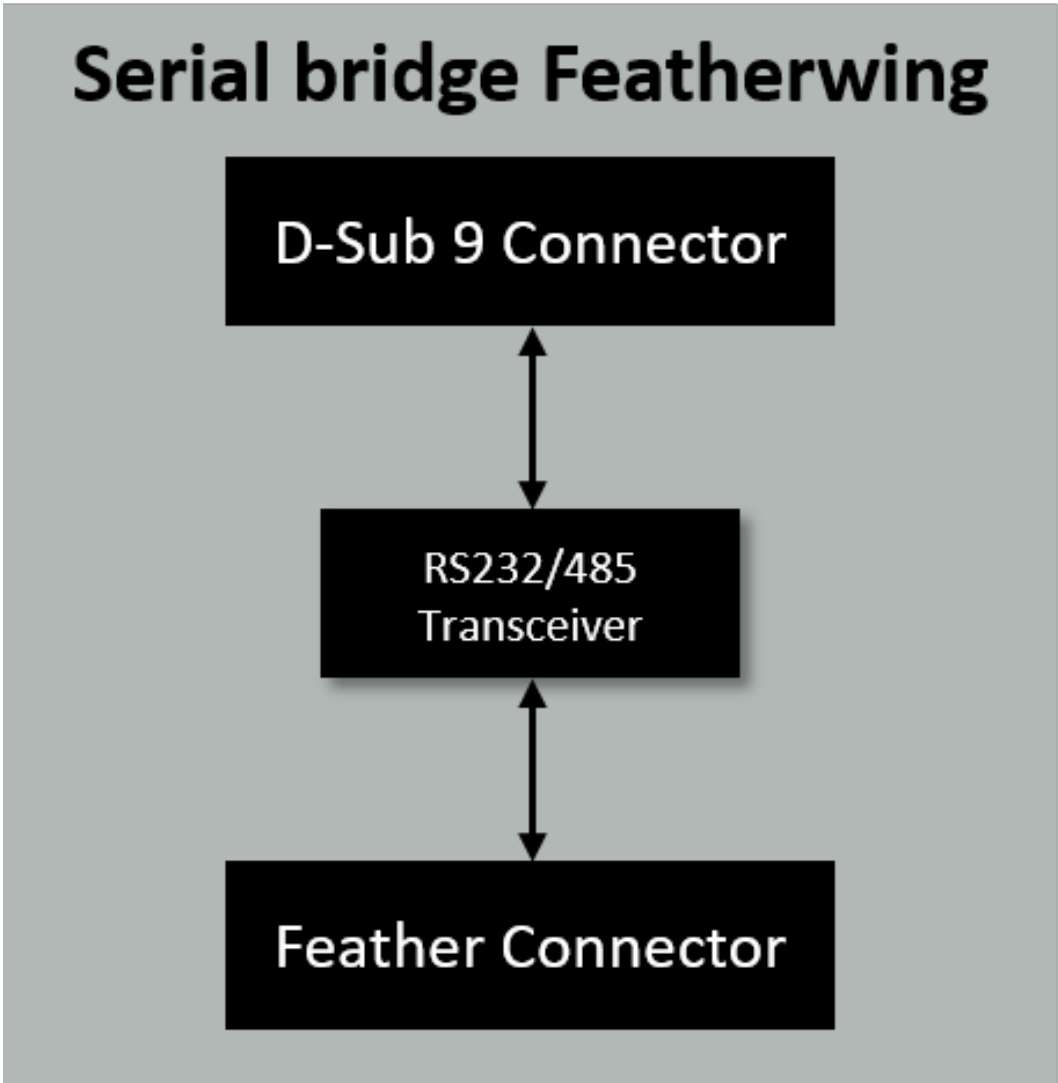


Figure 2: Block diagram - Serial(RS232/RS485) bridge FeatherWing

3.3 Contents

Description	Quantity
WE Serial(RS232/RS485) bridge FeatherWing	1
Packaging: ESD safe bag	1

Table 2: Contents 2601167101001

4 Functional description

The Serial(RS232/RS485) bridge FeatherWing was designed with rapid prototyping in mind. Being fully compatible with the Adafruit ecosystem, this FeatherWing allows the user the flexibility to choose the preferred host microcontroller.

The inherent modularity of the ecosystem allows the FeatherWing to be easily integrated into any project. The next sections provide a brief introduction to Adafruit's Feather ecosystem and details on the power modules.

Feel free to check our YouTube channel:

www.youtube.com/user/WuerthElektronik/videos for video tutorials, hands-ons and webinars relating to our products.

4.1 Adafruit Feather

The Adafruit Feather ecosystem consists of two types of boards apart from a host of accessories:

- **Feather:** Adafruit Feathers are a complete line of development boards from Adafruit that are standalone and stackable. They can be powered either over the on-board micro-USB plugs or using a Li-Po battery. Feathers are portable, flexible and light as their namesake.
- **FeatherWing:** FeatherWings are stackable boards that when used along with a Feather add a certain functionality to the system.

The Feather system with more than 50+ Wings, several different types of accessories and arduino/circuit python based code support, provides a perfect ecosystem for rapid prototyping. Please refer to adafruit.com/feather for more details on the Adafruit Feather ecosystem.

4.2 Key features of the Serial(RS232/RS485) bridge FeatherWing

- 3V3 logic level UART interface on the Feather pin header.
- Support to 5V logic level
- RS232 with and without flow control
- Full and half duplex RS485
- Double throw slider to switch between RS232 and RS485

5 Hardware description

This section contains a detailed description of the hardware features of the Serial(RS232/RS485) bridge FeatherWing. The design files for this hardware can be downloaded from <https://github.com/WurthElektronik/FeatherWings>.

5.1 Connectors

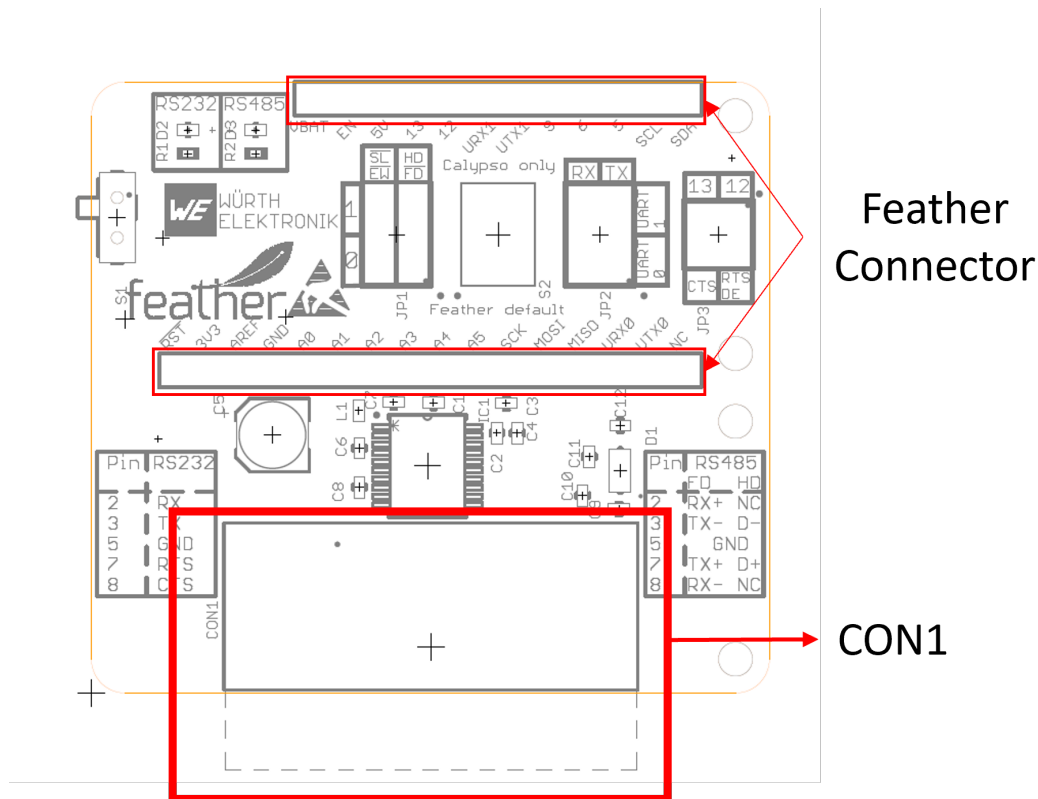


Figure 3: Connectors

5.1.1 CON1

This is a standard D-subminiature Male connector. The pinout for different modes of operation are as described in the table below.

Pin	RS232	RS485(Full Duplex)	RS485(Half Duplex)
1	Not connected	Not connected	Not connected
2	RX	RX+	Not connected
3	TX	TX-	D-
4	Not connected	Not connected	Not connected
5	GND	GND	GND
6	Not connected	Not connected	Not connected
7	RTS	TX+	D+
8	CTS	RX-	Not connected
9	Not connected	Not connected	Not connected

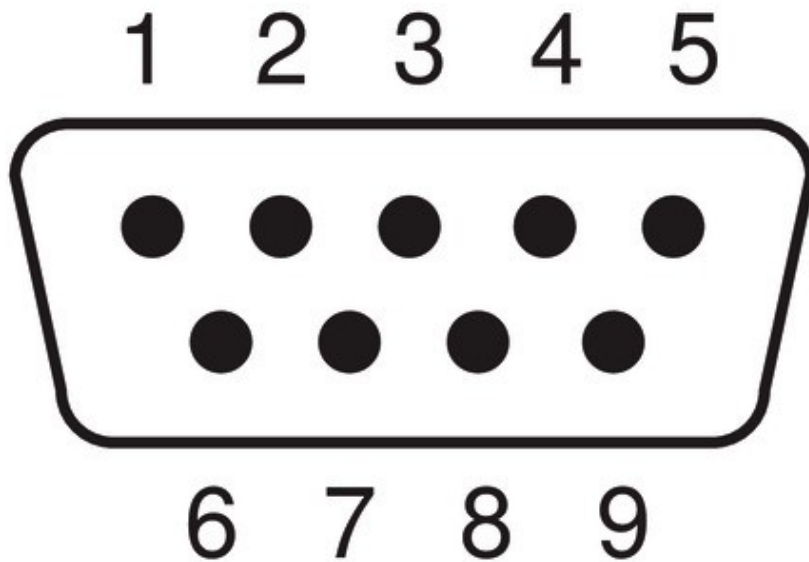


Figure 4: Pinout DSUB 9 connector

5.1.2 Feather connector

This is the standard set of connectors that is used across the Feather ecosystem. The table below describes the functions of each of the 28 pins as applicable to this FeatherWing.

Pin Number	Pin name	Function
1	\overline{RST}	Not connected
2	3V3	3.3 V power supply
3	AREF	Not connected
4	GND	Ground
5	A0	Not connected
6	A1	Not connected
7	A2	Not connected
8	A3	Not connected
9	A4	Not connected
10	A5	Not connected
11	SCK	Not connected
12	MOSI	Not connected
13	MISO	Not connected
14	U0RX	Connected to UART TX(RS232/RS485 TX)
15	U0TX	Connected to UART RX(RS232/RS485 RX)
16	NC	Not connected
17	SDA	Not connected
18	SCL	Not connected
19	5	Not connected
20	6	Not connected
21	9	Not connected
22	U1TX	(optional) Connected to UART RX(RS232 RS485 RX)
23	U1RX	(optional) Connected to UART RX(RS232 RS485 RX)
24	12	Connected to RTS/DE via JP3
25	13	Connected to CTS via JP3
26	5 V	5 V Power supply
27	EN	Not connected
28	VBAT	Not connected

5.2 Switches

This sliding switch can be used to select between the two input signal options, RS232 or RS485.

Position	Mode
Top (Away from D-SUB 9 connector)	RS232
Bottom (Towards D-SUB 9 connector)	RS485

5.2.1 S2

This sliding switch determines if the RX/TX lines are crossed to connect directly to another UART peripheral such as a radio module.

Position	Mode
Top (Away from D-SUB 9 connector)	TX and RX are crossed
Bottom (Towards D-SUB 9 connector)	TX and RX are not crossed

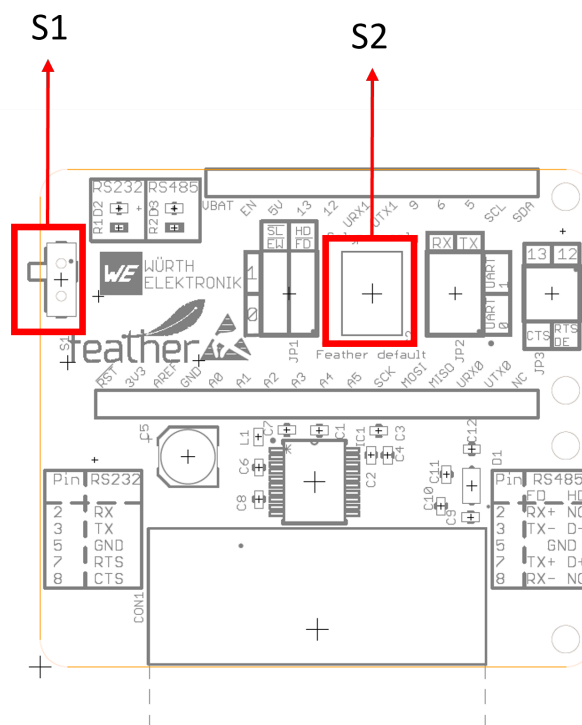


Figure 5: Switches

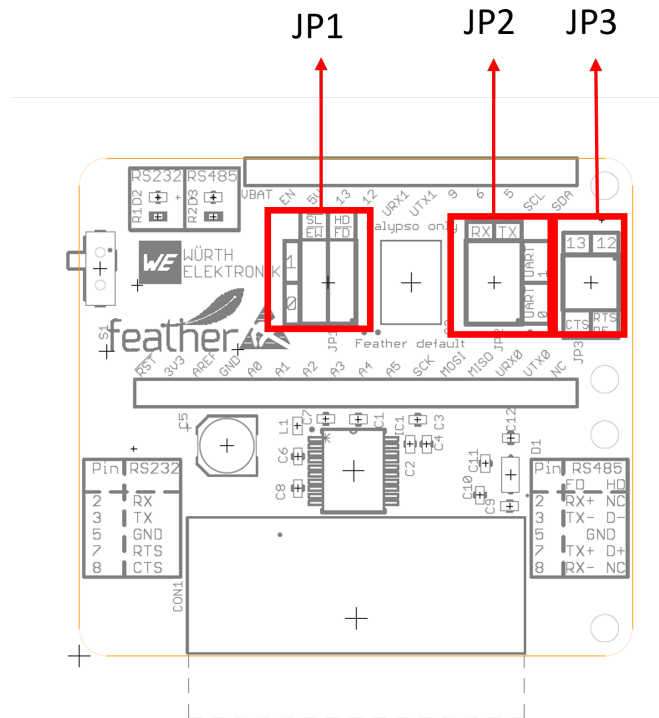


Figure 6: Jumpers

5.3 Jumpers

5.3.1 J1

This jumper enables switching between half and full duplex modes as well as enabling/disabling the slew rate.

Connection	Mode
1-3	Full duplex
3-5	Half duplex

Connection	Mode
2-4	Slew rate enabled
4-6	Slew rate disabled

5.3.2 J2

This jumper enables switching between the UART0 and UART1 on the feather connector.

Connection	Mode
1-3 and 2-4	UART0
3-5 and 4-6	UART1

5.3.3 J3

This jumper enables connecting the flow control pins to the GPIOs on the feather connector

Connection	Mode
1-2	RTS/DE connected to GPIO12
3-4	CTS connected to GPIO13

5.4 LEDs

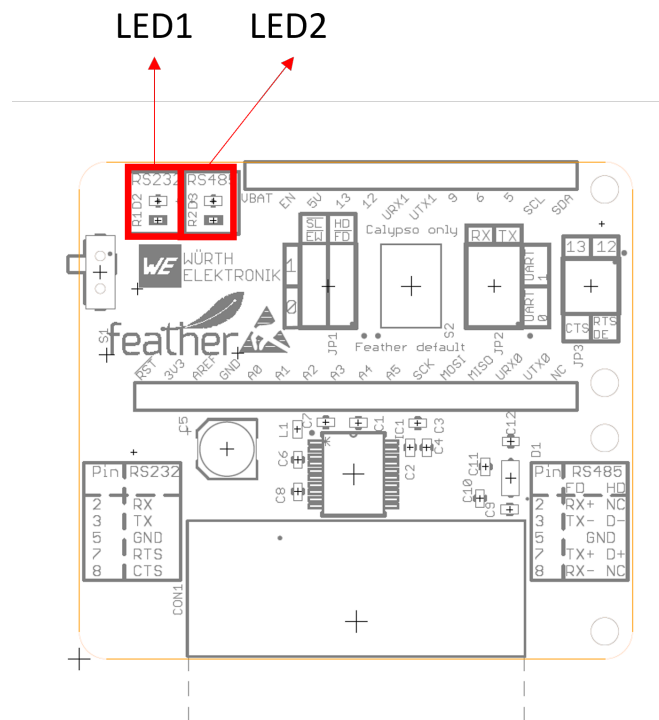


Figure 7: LEDs

There are two LEDs on this FeatherWing with the following indications when switched on,

LED	Indication
D2	RS232 mode
D3	RS485 mode

5.5 Schematics

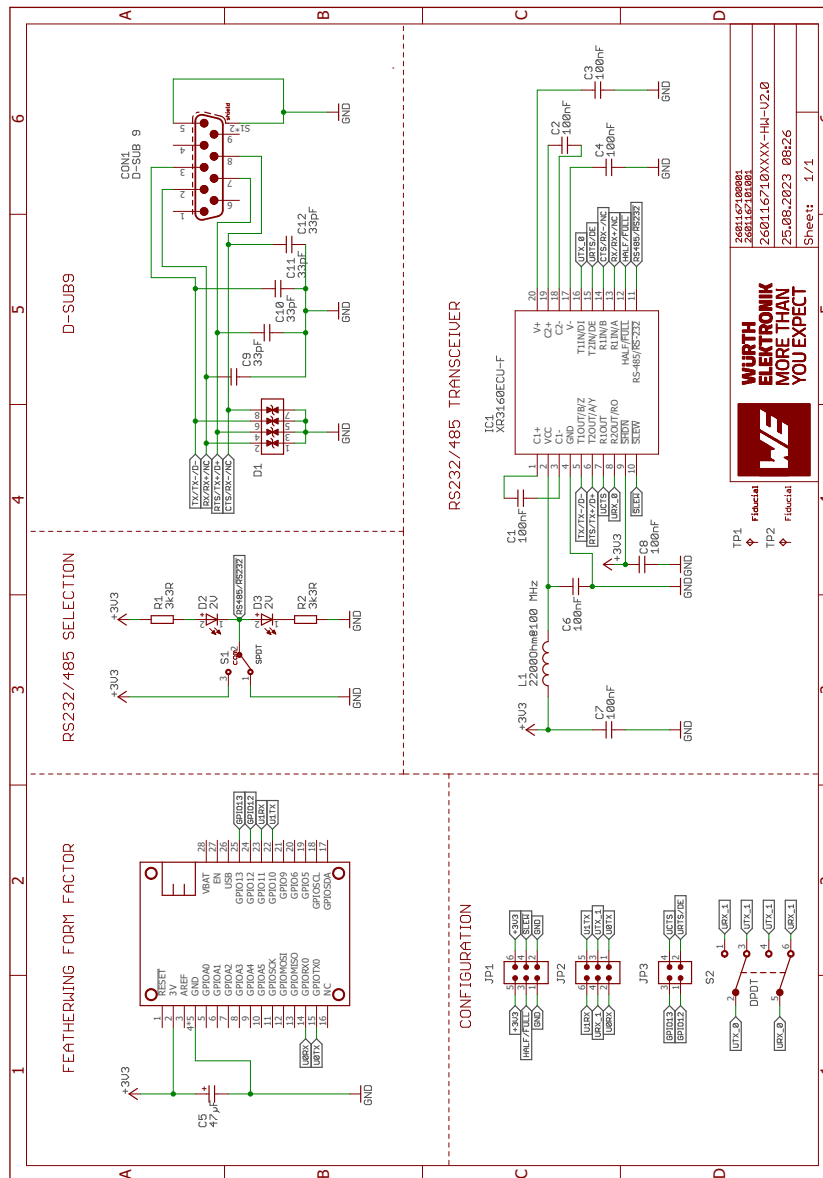


Figure 8: Schematics

5.6 Layout

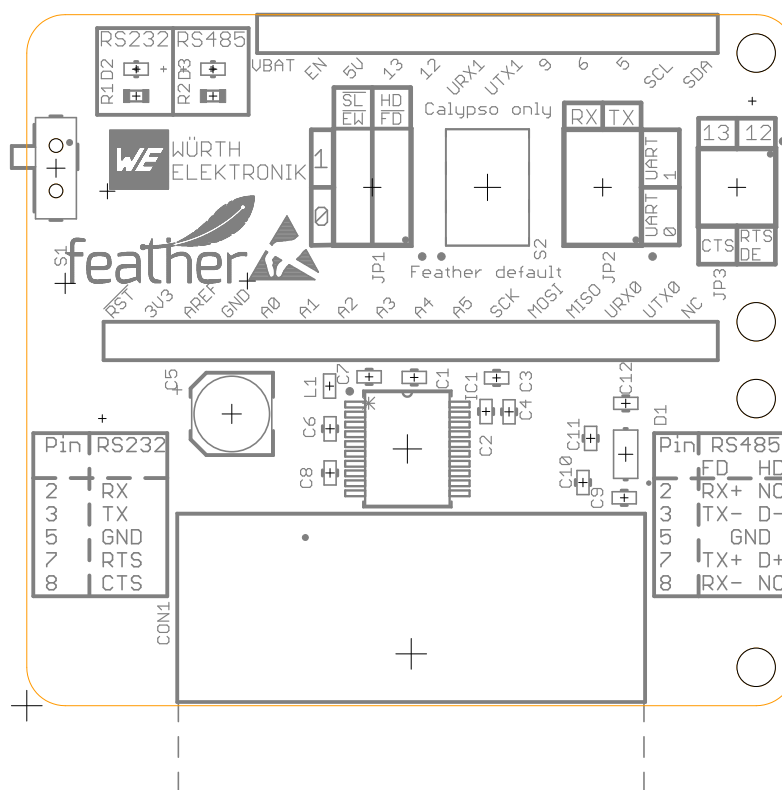


Figure 9: Assembly diagram

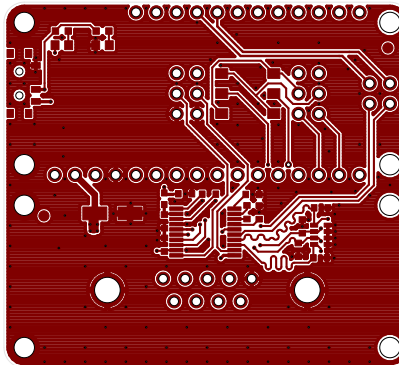


Figure 10: Top layer

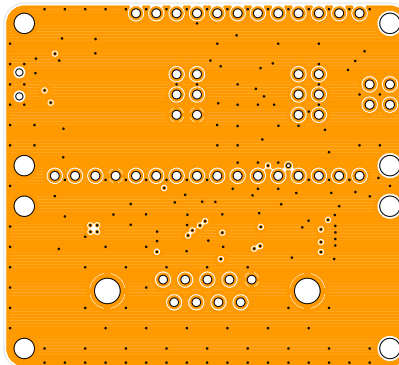


Figure 11: Layer 2

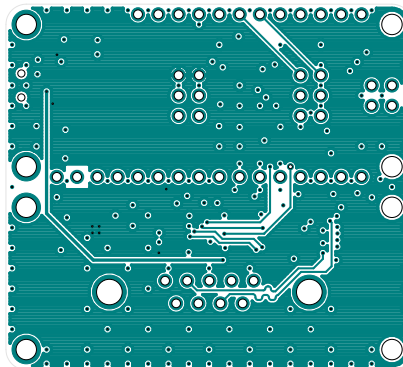


Figure 12: Layer 3

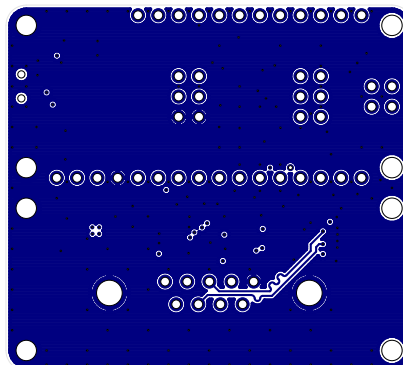


Figure 13: Bottom layer

6 Regulatory compliance information

Pursuant to Article 1 (2.) of the EU directive 2014/53/EU, Article 1 (2.) the directive does not apply to equipment listed in Annex I (4.): custom-built EV-Kits destined for professionals to be used solely at research and development facilities for such purposes.

Nevertheless this EV-Board has been tested to satisfy general EMC requirements. Following standards have been applied:

- IEC 61000-4-3
- IEC 61000-4-4
- IEC 61000-4-6
- CISPR 16-2-1
- CISPR 16-2-3

6.1 Exemption clause

Relevant regulation requirements are subject to change. Würth Elektronik eiSos does not guarantee the accuracy of the before mentioned information. Directives, technical standards, procedural descriptions and the like may be interpreted differently by the national authorities. Equally, the national laws and restrictions may vary with the country. In case of doubt or uncertainty, we recommend that you consult with the authorities or official certification organizations of the relevant countries. Würth Elektronik eiSos is exempt from any responsibilities or liabilities related to regulatory compliance.

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Some goods within the product range of Würth Elektronik eiSos GmbH & Co. KG contain statements regarding general suitability for certain application areas. These statements about suitability are based on our knowledge and experience of typical requirements concerning the areas, serve as general guidance and cannot be estimated as binding statements about the suitability for a customer application. The responsibility for the applicability and use in a particular customer design is always solely within the authority of the customer. Due to this fact, it is up to the customer to evaluate, where appropriate to investigate and to decide whether the device with the specific product characteristics described in the product specification is valid and suitable for the respective customer application or not. Accordingly, the customer is cautioned to verify that the documentation is current before placing orders.

Customer responsibility related to specific, in particular safety-relevant applications

It has to be clearly pointed out that the possibility of a malfunction of electronic components or failure before the end of the usual lifetime cannot be completely eliminated in the current state of the art, even if the products are operated within the range of the specifications. The same statement is valid for all software source code and firmware parts contained in or used with or for products in the wireless connectivity and sensor product range of Würth Elektronik eiSos GmbH & Co. KG. In certain customer applications requiring a high level of safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health, it must be ensured by most advanced technological aid of suitable design of the customer application that no injury or damage is caused to third parties in the event of malfunction or failure of an electronic component.

Best care and attention

Any product-specific data sheets, manuals, application notes, PCNs, warnings and cautions must be strictly observed in the most recent versions and matching to the products revisions. These documents can be downloaded from the product specific sections on the wireless connectivity and sensors homepage.

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Some products within the product range may contain substances, which are subject to restrictions in certain jurisdictions in order to serve specific technical requirements. Necessary information is available on request. In this case, the Business Development Engineer (BDM) or the internal sales person in charge should be contacted who will be happy to support in this matter.

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Due to constant product improvement, product specifications may change from time to time. As a standard reporting procedure of the Product Change Notification (PCN) according to the JEDEC-Standard, we inform about major changes. In case of further queries regarding the PCN, the Business Development Engineer (BDM), the internal sales person or the technical support team in charge should be contacted. The basic responsibility of the customer as per section 7 and 7 remains unaffected.

All software like "wireless connectivity SDK", "Sensor SDK" or other source codes as well as all PC software tools are not subject to the Product Change Notification information process.

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General warnings

Do not touch the EVB when it is live, and allow charged components, such as capacitors, to discharge completely before handling the EVB. Depending on the individual application, high voltages can occur on the EVB and some components can reach temperatures above 50 °C. Even after disconnecting the EVB from the power source, these conditions remain for a significant time. Please ensure that the appropriate safety precautions are taken when installing and operating this EVB, as one of the following may occur if you handle or use this EVB without observing the relevant safety precautions: - Death - Serious injury - Electric shock - Electric burns - Severe heat burns -

When using the EVB, you undertake to read the instructions for use in full together with the relevant information supplied and/or available on the homepage www.we-online.de/wcs-manuals before putting this EVB into operation. The following points have to be observed in particular:

- Do not touch the EVB while it is live.
- The EVB must be fully assembled and all devices to be tested must be connected before voltage is applied to the EVB.
- The EVB should never be left unattended during operation.
- Capacitors must be completely discharged. The capacitors must be actively discharged using a suitable resistor.

Protection against static electricity

Use the unpackaged product only in ESD protected areas. Wear the ESD personal protective equipment prescribed for these areas. Ground all conductive components, including personnel, as prescribed in ESD protected areas. Ensure that the product is only used by trained personnel.

Purpose and use

The EVB is not a finished product and is not intended for general use by the consumer. The EVB is intended exclusively for use in the evaluation of WE components in the lab or in development environments by highly qualified technicians or engineers, familiar with the risks involved in handling electrical or mechanical components, systems and subsystems. The use of the EVB is your full and independent responsibility. The EVB is expressly not intended to be installed in a terminal device or to be part of a terminal device in whole or in part. WE reserves the right, at its own discretion, to make corrections, improvements, adjustments or other changes to the EVB or to discontinue the EVB. The EVB is not intended for use in devices and applications for which a higher safety and reliability standard is prescribed. It is also not approved for use in safety-relevant applications or where personal injury or fatal consequences must be expected in the event of failure.

Operation of the EVB

The EVB may only be operated within the specifications and environmental parameters recommended by WE, as described in the instructions for use. Exceeding the specified parameters (including, but not limited to, input and output voltage, current, power, and ambient conditions) may result in damage to property. If you have questions about these electrical parameters, please contact WE at (regulatory-compliance@we-online.com) prior to connecting peripheral electronics (including the input voltage and intended loads). Any load outside a certain power range may lead to negative consequences, including, but not limited to, unintended or inaccurate evaluations or possibly permanent damage to the EVB or the electronics connected to it. Please ensure that the appropriate safety precautions are taken when working with the EVB, as serious injuries, including severe or even fatal injuries from electric shock or electric burns, may occur if you do not follow the appropriate safety precautions. Under no circumstances should the EVB be touched while live. When the EVB is connected to a power source, some of its components are electrically charged and/or have temperatures above 50 °C. This condition also applies for a short time after disconnecting from the supply voltage until the capacitors are completely discharged and hot components have cooled down. These components include connectors, linear regulators, switching transistors, heat sinks, resistors, diodes, inductors and other components, which can be identified from the documentation in the instructions for use. As with all electronic lab work, only qualified persons with knowledge of electronic performance evaluation, measurement and diagnostic tools, should use the EVB.

Hazards and warnings

Before putting the EVB into operation, please read the instructions for use and especially the various hazards and warnings described therein. The instructions for use contain important safety information on voltages and temperatures. You take full responsibility and liability for the proper and safe handling of the EVB. You agree to comply with all safety requirements, rules and regulations related to the use of the EVB. You also take full responsibility for: (1) establishing safeguards to ensure that the use of the EVB does not cause damage to property, personal injury or death, even if the EVB does not function as described, intended or expected, (2) the test setup in which the EVB is integrated, all safety requirements, rules and regulations and also that no damage to property, personal injury or other hazardous situation occurs even if the EVB fails, and (3) ensuring the safety of all activities performed by you or your employees when using the EVB. In particular, this means that the technical rules VDE [German Electrical Engineering, Electronic and Information Technology Association] 0105-100 and BGI [German trade association information] 891 (or corresponding applicable safety regulations outside Germany) for the operation of electrical test setups must be observed, the test area is protected against unauthorized access or accidental touching, current limitations, and emergency stop mechanisms are functional and test setups are never operated unattended. If you have any questions about the safe use of the EVB, please contact WE at regulatory-compliance@we-online.com for more information.

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- The EVB generates, uses and radiates radio frequency energy, but has not been tested for conformity with the limits applicable to the product category, which are applicable according to the European Union regulations for protection against radio frequency interference. Operation of the EVB may cause interference with radio communication. In this case, the costs incurred for necessary measures to remedy the interference are to be borne by the user.

As the EVB is not a finished product, it may not comply with applicable regulatory, safety or certification standards that are normally as-

sociated with other products, such as Directive 2011/65/EC of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of hazardous substances and Directive 2002/96/EC on waste electrical and electronic equipment (WEEE). You take full responsibility for compliance with such standards that apply to the EVB. You also take responsibility for the proper disposal of the components and materials of the EVB.

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