



## USER MANUAL

MAGI<sup>3</sup>C POWER FEATHERWING

2601157101001

VERSION 1.3

DECEMBER 1, 2025

**WÜRTH ELEKTRONIK** MORE THAN YOU EXPECT

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# 1 Abbreviations

Abbreviation	Name	Description
CISPR	Comité International Spécial des Perturbations Radioélectriques	International Special Committee on Radio
DC	Direct current	
EV	Evaluation	
ESD	Electro Static Discharge	
FDSM	Fixed Step Down Regulator Module	
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
IDE	Integrated development environment	
IEC	International Electrotechnical Commission	
IEEE	Institute for electrical and electronic engineers	
JTAG	Joint Test Action Group	Flash interface for the micro controller
LED	Light Emitting Diode	
Li-Po	Lithium-Polymer	
LOW	Low signal level	Digital voltage level that is detected as low by the module
PC	Personal Computer	
PCB	Printed Circuit Board	
VCC	Voltage Common Collector	Supply voltage
VDD	Voltage Drain Drain	Supply voltage
VDMM	Variable Step Down MicroModule	

## 2 Revision history

Manual version	HW version	Notes	Date
1.0	2.0	Initial version	November 2020
1.1	2.0	Updated GitHub repository links	February 2020
1.2	2.0	New corporate design	June 2023
1.3	2.0	<ul style="list-style-type: none"><li>• Actualized chapter Switches</li><li>• Update chapter Terms of Use for Würth Elektronik eiSos GmbH &amp; Co. KG EV-Boards, evaluation kits and evaluation modules</li></ul>	November 2025

## 3 General description

### 3.1 Introduction

The Würth Elektronik eiSos MagI<sup>3</sup>C Power FeatherWing is a development board that offers 5 V and 3.3 V power supply. It is fully compatible to popular the Adafruit Feather line of development boards and can be used as plug-and-play solution for a range of industrial input voltages (5 V, 9V, 12V, 15 V, 18V and 24V ).

The MagI<sup>3</sup>C Power FeatherWing consists of two important components,

- MagI<sup>3</sup>C FDSM (173010535) - A power module with Input 6V - 36V, 1A current and a 5 V output.
- MagI<sup>3</sup>C VDMM (171010550) - A power module with Input 2.5 V - 5.5 V, 1.2A current and a 3.3 V output.

It offers a stable output voltage for a wide range of input voltages making it an ideal power supply add-on to any Feather project.

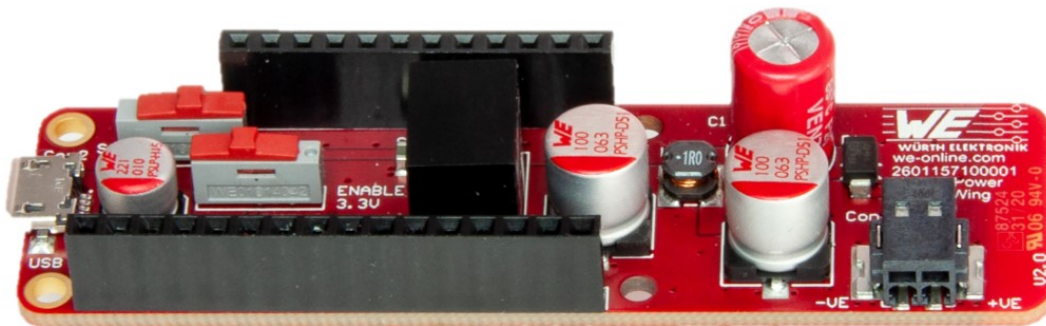


Figure 1: The WE MagI<sup>3</sup>C Power FeatherWing (2601157101001)

3.2 Block diagram

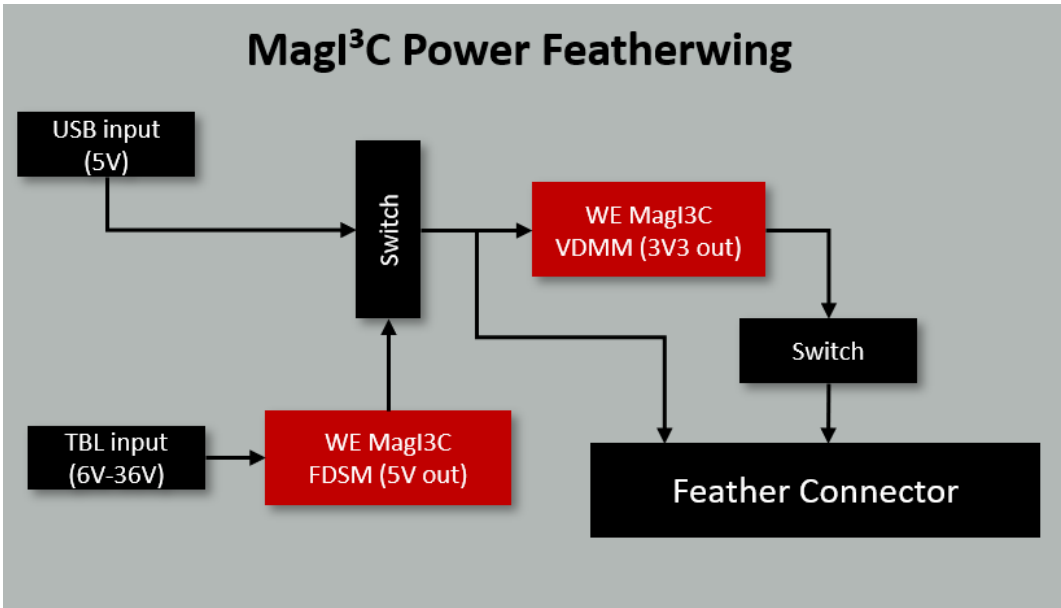


Figure 2: Block diagram - Magl<sup>3</sup>C Power FeatherWing

3.3 Contents

Description	Quantity
WE Magl <sup>3</sup> C Power FeatherWing	1
Packaging: ESD safe bag	1

Table 2: Contents 2601157101001

## 4 Functional description

The MagI<sup>3</sup>C Power FeatherWing was designed with rapid prototyping in mind. Being fully compatible with the Adafruit ecosystem, this FeatherWing allows the user the flexibility to choose from a range of input voltages to power the system. 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](http://www.youtube.com/user/WuerthElektronik/videos) for video tutorials, hands-ons and webinars relating to our products.

### 4.1 Adafruit Feather

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

- **Feather:** Adafruit Feather 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](http://adafruit.com/feather) for more details on the Adafruit Feather ecosystem.

### 4.2 MagI<sup>3</sup>C Power modules

In this section a brief description of the power modules is given.

#### 4.2.1 MagI<sup>3</sup>C FDSM (173010535)

The FDSM series of the MagI<sup>3</sup>C Power Module family is a fixed output voltage, fully integrated DC-DC power supply including the switching regulator, inductor and capacitors all in one package.

The module requires only an input capacitor and no other external components for operation, reducing design effort and complexity to a minimum.

The FDSM ensures fast time to market and low development costs. It is pin compatible with the common 78xx linear regulator series. The high efficiency reduces the power dissipation and in many cases a heat sink and assembly parts are unnecessary.

## Key features

- Peak efficiency up to 94 %
- Current capability up to 1 A
- Output voltage: 3.3 V or 5 V
- Output voltage accuracy:  $\pm 4$  % max
- No minimum load required
- Partially integrated input and output capacitors
- Integrated inductor
- Low output voltage ripple (< 20 mVpp)
- Fixed 520kHz switching frequency
- Current mode control
- Pulse skipping for high efficiency at light loads
- Internal soft-start
- Thermal shutdown
- Short circuit protection
- Cycle by cycle current limit
- Pin compatible with the FDSM power modules series
- Operating ambient temperature range: 40 °C to 85 °C
- RoHS and REACH compliant
- Case and potting material UL 94 Class V0 (flammability testing) certified
- Complies with EN55032 class B conducted and radiated emissions standard

Further details about MagI<sup>3</sup>C FDSM can be found under  
[we-online.de/katalog/en/MAGIC\\_FDSM\\_FIXED\\_OUTPUT\\_VOLTAGE](http://we-online.de/katalog/en/MAGIC_FDSM_FIXED_OUTPUT_VOLTAGE)

### 4.2.2 MagI<sup>3</sup>C VDMM (171010550)

The VDMM 171010550 MagI<sup>3</sup>C MicroModule provides a fully integrated DC-DC power supply including the switching regulator with integrated MOSFETs, compensation, and shielded inductor in one package.

The 171010550 offers high efficiency and delivers up to 1.2 A of output current. It operates with an input voltage from 2.5 V to 5.5 V and is designed for a small solution size.



The selectable forced PWM or PFM/PWM mode allows for the choice between high efficiency and low output voltage ripple at light load.

It is available in an LGA-6EP package (2.5 x 2.5 x 1.2 mm). This module has integrated protection circuitry that guards against thermal overstress with thermal shut-down and protects against electrical damage using over-current, short-circuit and under-voltage protections.

### **Key features**

- Peak efficiency up to 96 %
- Output current up to 1.2 A
- Input voltage range: 2.5 V to 5.5 V
- Output voltage range: 0.8 V to 5.5 V
- 25 µA typical quiescent current
- Integrated shielded inductor
- Low output voltage ripple:  $\pm 6$  mV typ.
- Output voltage accuracy over temperature: 2 % max.
- Fixed switching frequency: 4 MHz
- Constant On-Time control
- Synchronous operation
- Selectable forced PWM or PFM/PWM mode
- Undervoltage lockout protection (UVLO)
- Embedded soft-start
- Thermal shutdown
- Short-circuit protection
- Cycle-by-cycle current limit
- RoHS and REACH compliant
- Operating ambient temperature up to 85 °C
- Operating junction temp. range: -40 to 125 °C
- Complies with EN55032 class B radiated emissions standard

Further details about the MagI<sup>3</sup>C FDSM can be found under [we-online.de/katalog/en/MAGIC-VDMM](http://we-online.de/katalog/en/MAGIC-VDMM)

## 5 Hardware description

This section contains a detailed description of the hardware features of the MagI<sup>3</sup>C Power FeatherWing. The design files for this hardware can be downloaded from [github.com/WurthElektronik/FeatherWings-Hardware](https://github.com/WurthElektronik/FeatherWings-Hardware).

### 5.1 Connectors

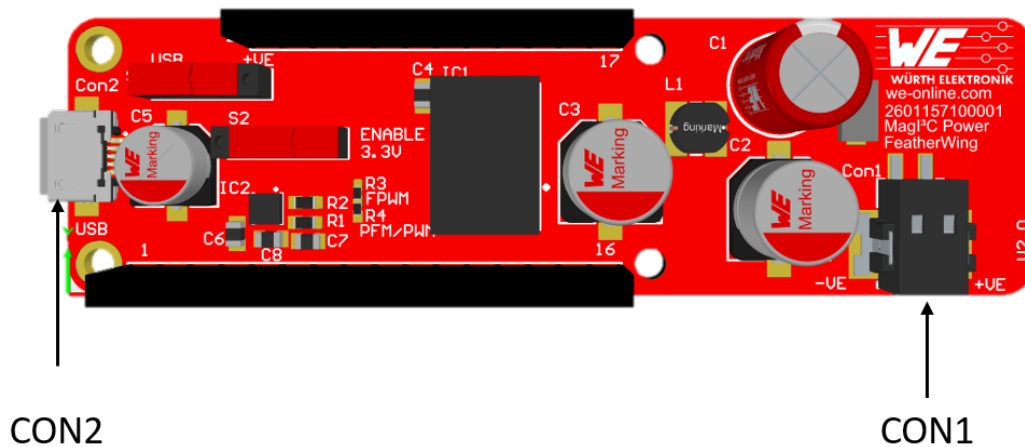


Figure 3: Connectors

#### 5.1.1 CON1

This is a 2-pole WR-TBL series horizontal entry screwless connector to connect input DC voltage from 6V to 36V.

Pin	Function	Description
1	-VE	Connect to GND
2	+VE	Connect to positive supply voltage (6V - 36V)

#### 5.1.2 CON2

This is a standard micro-USB connector to connect 5 V input.



Exceeding the absolute maximum values given in the data sheets of the MagI<sup>3</sup>C Power modules may affect the devices negatively and may cause permanent damage.



Please make sure that the USB power source is able to deliver enough current necessary for the application.

### 5.1.3 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	Not connected
15	U0TX	Not connected
16	NC	Not connected

Pin Number	Pin name	Function
17	SDA	Not connected
18	SCL	Not connected
19	5	Not connected
20	6	Not connected
21	9	Not connected
22	U1TX	Not connected
23	U1RX	Not connected
24	12	Not connected
25	13	Not connected
26	5 V	5 V Power supply
27	EN	Not connected
28	VBAT	Not connected

## 5.2 Switches

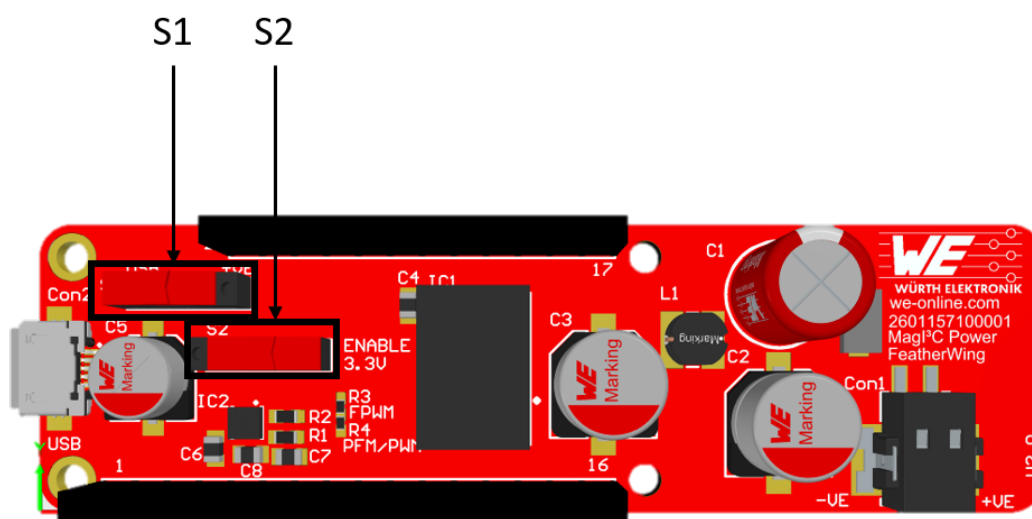


Figure 4: Switches

### 5.2.1 S1

This sliding switch can be used to select between the two input power sources.

Position	Source
"USB" (left towards CON2)	CON2 (5 V USB) as input source
"+VE" (right towards CON1)	CON1 (6V - 36V) as input source

### 5.2.2 S2

This sliding switch can be used to enable/disable the 3.3 V output.

Position	Source
"ON" (left towards CON2)	Power supply ON
"OFF" (right towards CON1)	Power supply OFF

### 5.3 Schematics

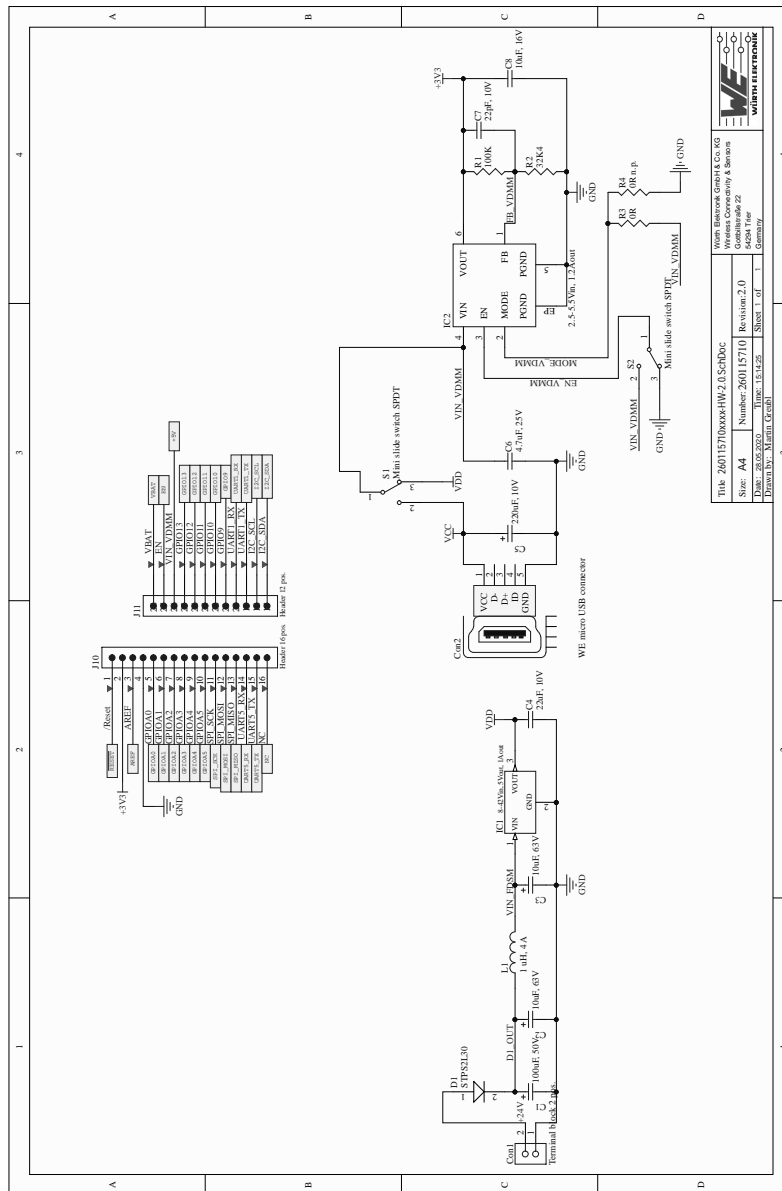


Figure 5: Schematics

## 5.4 Layout

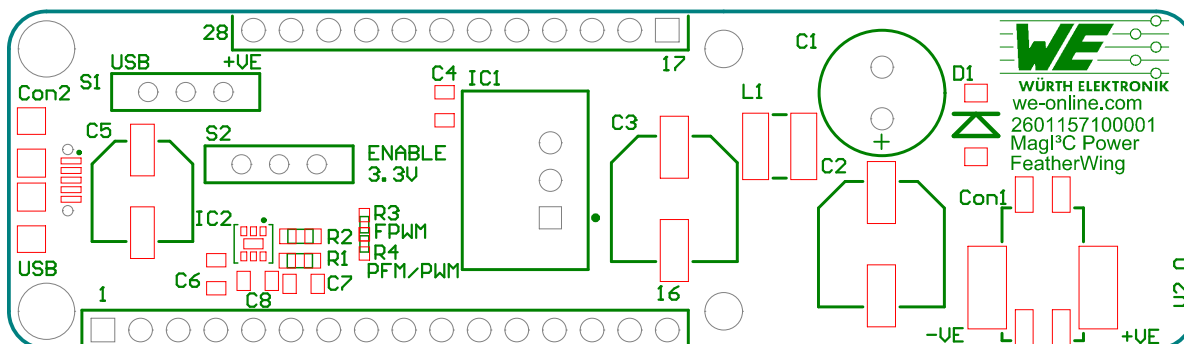


Figure 6: Assembly diagram

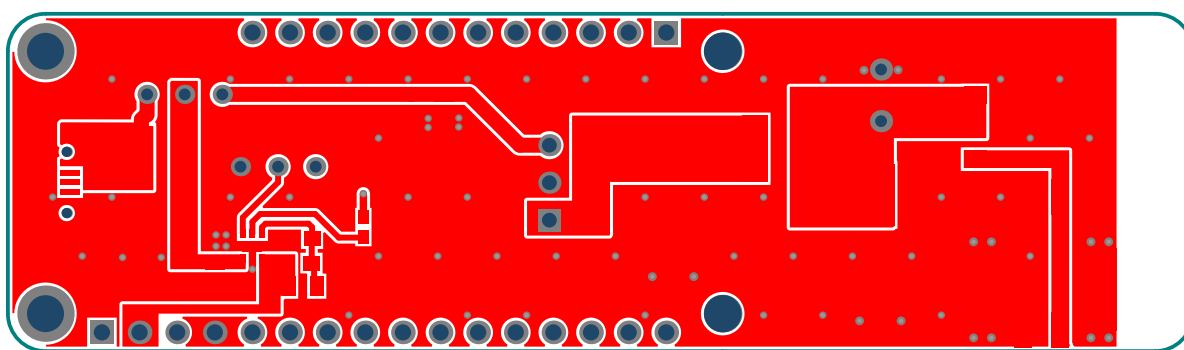


Figure 7: Top layer

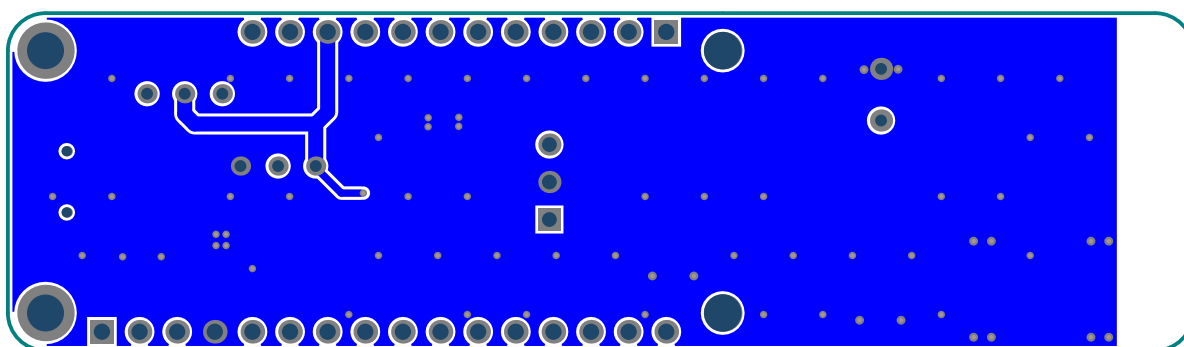


Figure 8: Bottom layer

## 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.

Notwithstanding the above, Würth Elektronik eiSos makes no representations and warranties of any kind related to their accuracy, correctness, completeness and/or usability for customer applications. No responsibility is assumed for inaccuracies or incompleteness.



## 7 Important notes

The following conditions apply to all goods within the wireless connectivity and sensors product range of Würth Elektronik eiSos GmbH & Co. KG:

### General customer responsibility

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.

### Customer support for product specifications

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.

### Product improvements

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.

### Product life cycle

Due to technical progress and economical evaluation, we also reserve the right to discontinue production and delivery of products. As a standard reporting procedure of the Product Termination Notification (PTN) according to the JEDEC-Standard we will inform at an early stage about inevitable product discontinuance. According to this, we cannot ensure that all products within our product range will always be available. Therefore, it needs to be verified with the Business Development Engineer (BDM) or the internal sales person in charge about the current product availability expectancy before or when the product for application design-in disposal is considered. The approach named above does not apply in the case of individual agreements deviating from the foregoing for customer-specific products. The approach named above does not apply in the case of EV-Boards. EV-Boards may be changed without any notification.

### Property rights

All the rights for contractual products produced by Würth Elektronik eiSos GmbH & Co. KG on the basis of ideas, development contracts as well as models or templates that are subject to copyright, patent or commercial protection supplied to the customer will remain with Würth Elektronik eiSos GmbH & Co. KG. Würth Elektronik eiSos GmbH & Co. KG does not warrant or represent that any license, either expressed or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, application, or process in which Würth Elektronik eiSos GmbH & Co. KG components or services are used.

### General terms and conditions

Unless otherwise agreed in individual contracts, all orders are subject to the current version of the "General Terms and Conditions of Würth Elektronik eiSos Group", last version available at [www.we-online.com](http://www.we-online.com).

## 8 Terms of Use for Würth Elektronik eiSos GmbH & Co. KG EV-Boards, evaluation kits and evaluation modules

Würth Elektronik eiSos GmbH & Co. KG provide you as a user with technical data (including data sheets), design resources (including reference designs), recommendations for use or other design recommendations, web tools, safety information and other information in the form of evaluation-boards, -kits or -modules (hereinafter jointly referred to as "EVB") in accordance with the terms and conditions contained here. The EVB is provided in the "as is" state. WE disclaims all express and implied warranties, in particular those concerning the suitability for a certain purpose, the absence of defects or non-violation of third-party rights. The EVB is intended for experienced developers to develop

their application with WE components. As a user, you are solely responsible for: (1) selection of the appropriate WE components for the application, (2) design, validation and testing the application, and (3) assurance that the application meets the applicable standards and all other safety requirements and other applicable requirements. WE may change the EVB without prior notice. WE grants you permission to use the EVB only for developing an application suitable for using WE components. Any other duplication, representation or transfer of the EVB is expressly prohibited. WE does not grant any licenses for the use of the intellectual property rights from WE or third parties. WE is fully indemnified from all claims, damages, costs, losses and liabilities arising from the misuse of this EVB. The WE components are provided in accordance with WE's conditions of sale or other applicable conditions available either at <https://katalog.we-online.com> or in conjunction with such WE components. WE's provision of the EVB does not constitute an extended warranty in relation to the WE components.

#### 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](http://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](mailto: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](mailto:regulatory-compliance@we-online.com) for more information.

#### Your responsibility with regard to the applicable laws

- You are responsible for being sufficiently informed about and complying with all international, national, state and local applicable laws, rules and regulations that apply to the handling or use of the EVB by you or your employees.
- 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.

#### Exclusion of further rights and rights of use for intellectual property of EVB

The sale of an EVB does not constitute the granting by WE of any license or other right of any kind - expressly or implicitly - including, but not limited to, any patent, copyright, trademark or other proprietary rights. All rights from such patent, copyright, trademark or other proprietary rights are expressly reserved by WE. The EVB must not be used in any manner that directly or indirectly infringes any patent, copyright, trademark or other proprietary rights of WE.

#### Warranty of EVB

WE ensures that the EVB meets the specifications given in the instructions for use (within the deviations stated therein) for a period of 12 months from the date of purchase and functions in accordance with the instructions for use. On the basis of the underlying statutory provisions, WE shall rectify defects or offer free replacement of the EVB to which damage occurs that is evidently attributable to a defect for which WE is responsible and is at fault. A warranty claim is subject to the user having complied with the statutory duties of inspection and notification of defects and that the EVB has been received by WE no later than ten (10) days after expiry of the warranty period. This warranty is not transferable to others. This warranty does not apply to defects or impairments in performance resulting from incorrect use, use contrary to WE's instructions, improper installation, improper operation or misuse. WE accepts no liability whatsoever for the failure of equipment or other items not manufactured by or for WE, including, but not limited to, equipment or items to which the EVB is attached or for which the EVB is used. WE DOES NOT GRANT ANY WARRANTIES OR ASSURANCES WHATSOEVER, EXPRESS OR IMPLIED, WITH RESPECT TO THE EVB, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MARKETABILITY OR SUITABILITY FOR A PARTICULAR PURPOSE.

#### Limitation of liability for EVB

WE'S OVERALL LIABILITY FOR DAMAGE CAUSED BY WE IS LIMITED TO DAMAGE THAT TYPICALLY OCCURS. WE DOES NOT ACCEPT ANY LIABILITY FOR LOSS OF PROFIT, CONSEQUENTIAL OR SPECIAL LOSSES, OR SPECIAL, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGE. HOWEVER, THIS LIMITATION OF LIABILITY DOES NOT APPLY IN THE CASE OF INTENTIONAL OR GROSSLY NEGLIGENT ACTS AND FOR THE DAMAGE RESULTING FROM LOSS OF LIFE, PHYSICAL INJURY, HARM TO HEALTH OR IN CASE OF LEGAL MANDATORY LIABILITY [AS IN GERMAN PRODUCT LIABILITY LAW, ProdHaftG].

## 9 Legal notice

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We recommend you to be updated about the status of new firmware and software, which is available on our website or in our data sheet and manual, and to implement new software in your device where appropriate.

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