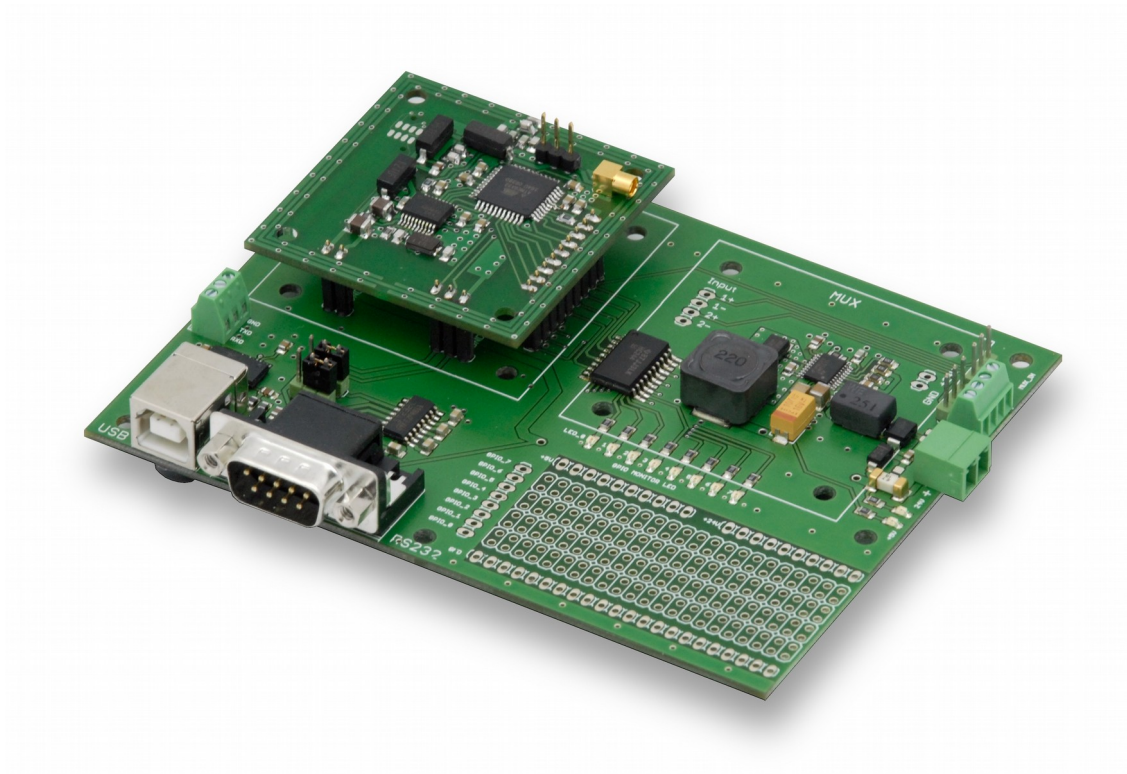


# Technical Documentation and Integration Guide

for metraTec UDB1 Development Board



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# 1 General Information / Security Advice

## 1.1 Notes on the Use of this Documentation

This user manual and integration guide uses different symbols to point out potentially dangerous situations. The following signs and symbols are used throughout the document.



### ATTENTION

Declares a potentially hazardous situation. If this is not avoided, the product or something in its surrounding could be damaged.



### NOTES

Declares notes for the user as well as other useful information, where no harmful or dangerous situations can be expected.

## 1.2 Security Advice

The UDB1 Development Board was only designed for evaluation of metraTec modules. It was not designed for use in dangerous environments of any kind. Using this product in applications where a failure could directly result in severe injuries or death (“high risk activities”) is not permitted. This includes but is not limited to applications in nuclear facilities, flight control systems, life support systems or weapon systems. The manufacturer denies the suitability of this device for such scenarios.

## 1.3 Export Restriction

The UDB1 Development Board contains components that underlie US export restrictions. It is therefore forbidden to export the product to countries that are on the US trade embargo list. The same applies to any countries that are on the EU embargo list.

## 1.4 Further Documentation

This documentation explains the electrical and mechanical characteristics of the UDB1 Development Board. For more details on the DwarfG2 XR which can be connected to this board, please read the corresponding documentation of the module.

For understanding the programming of the DwarfG2 XR module, it might be useful to also read the according metraTec Protocol Guide, which explains the ASCII protocols used to control the module in full detail.

All further documents can be found on metraTec's website:

<http://www.metratec.com> → Support → Downloads → Documentation

## 2 Product Description

The UDB1 Development Board is meant to allow easy evaluation of metraTec RFID modules such as reader, HF multiplexer, and antennas. It provides communication possibilities and the needed power supply of 5 V for the reader and (if powered via the provided 24 V DC power supply) a 24 V power source needed for an optional multiplexer module. Evaluation of simple RFID scenarios is therefore possible without the need of designing an own board. The prototyping area can be used for development of own circuits. For this, also 5 V and 24 V are provided. Furthermore, direct access to the eight GPIOs of the reader is possible with the appropriate pads.

### 2.1 Intended Use

The UDB1 Development Board is intended to evaluate the performance of the metraTec RFID module DwarfG2 XR. It is designed for use in laboratory environment by experienced personnel with sufficient knowledge in electronics. This is not an end-user electronics board.

### 2.2 Technical Specification

Power Supply	9 – 30 V DC; 24 V DC if mux module is used
Communication	USB, RS232, UART (via pin headers)
Digital Inputs/Outputs	8 x 5 V DC, 1 x external MUX-In
Plug-In Slots	1 x Reader Module, 1 x Multiplexer Module
Operating Temperature	-20 °C to +70 °C
Dimensions	125 x 95 mm

### 2.3 System Overview

The board has four sub areas with the following functions:

- **Communication** - here are the connectors and drivers for the different communication options of the UDB1, such as USB, RS232 as well as pins for a direct UART connection.
- **Reader** - here a metraTec reader module can be plugged in.

- **MUX** - here the metraTec HF multiplexer module is plugged in. Below the HF mux module you find the wide input power supply which generates the 5 V for the reader module.
- **Prototyping Area** - here custom circuits can be applied to the UDB1. Power supply as well as the reader's GPIO can be connected easily. Eight LEDs show the status of the GPIOs.

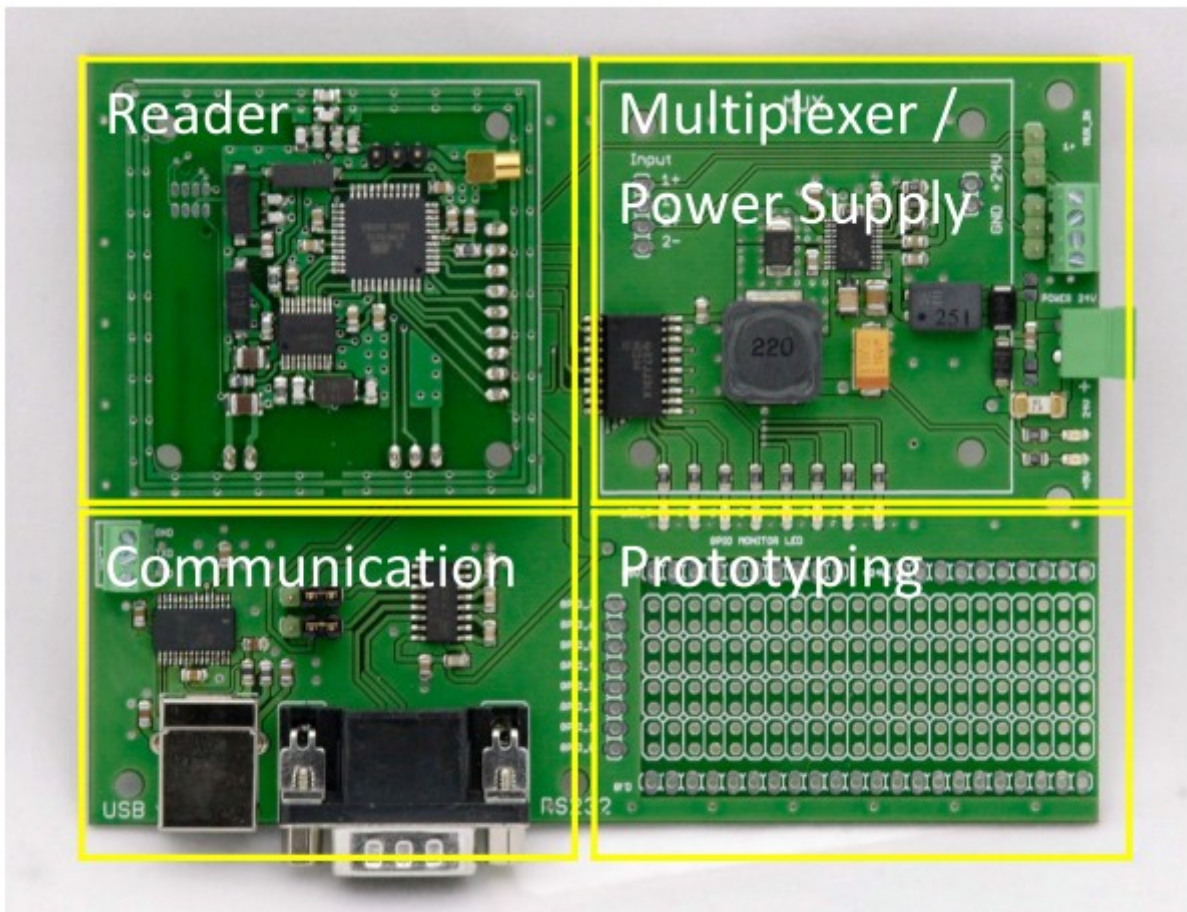


Fig. 1: UDB1 with plugged in reader module

## 2.4 Scope of Delivery

The UDB1 usually comes as part of an Embedded RFID Starter Kit with the following components:

- DwarfG2 XR UHF RFID Module on UDB Adapter
- 24 V DC power supply
- USB cable



### 3 Power Supply

The module is equipped with a switching power supply with a supply voltage of 24 V. After connection via the two-pole socket, the two green LEDs signal the correct functioning of the power supply. If the +5 V LED is not shining although the 24 V LED is on, the power supply of the board was turned off, e.g. by an overcurrent cut off due to a short circuit on the prototyping area.

If the external power supply is connected correctly but both LEDs remain dark, the fuse F1 has to be checked and exchanged, if necessary.

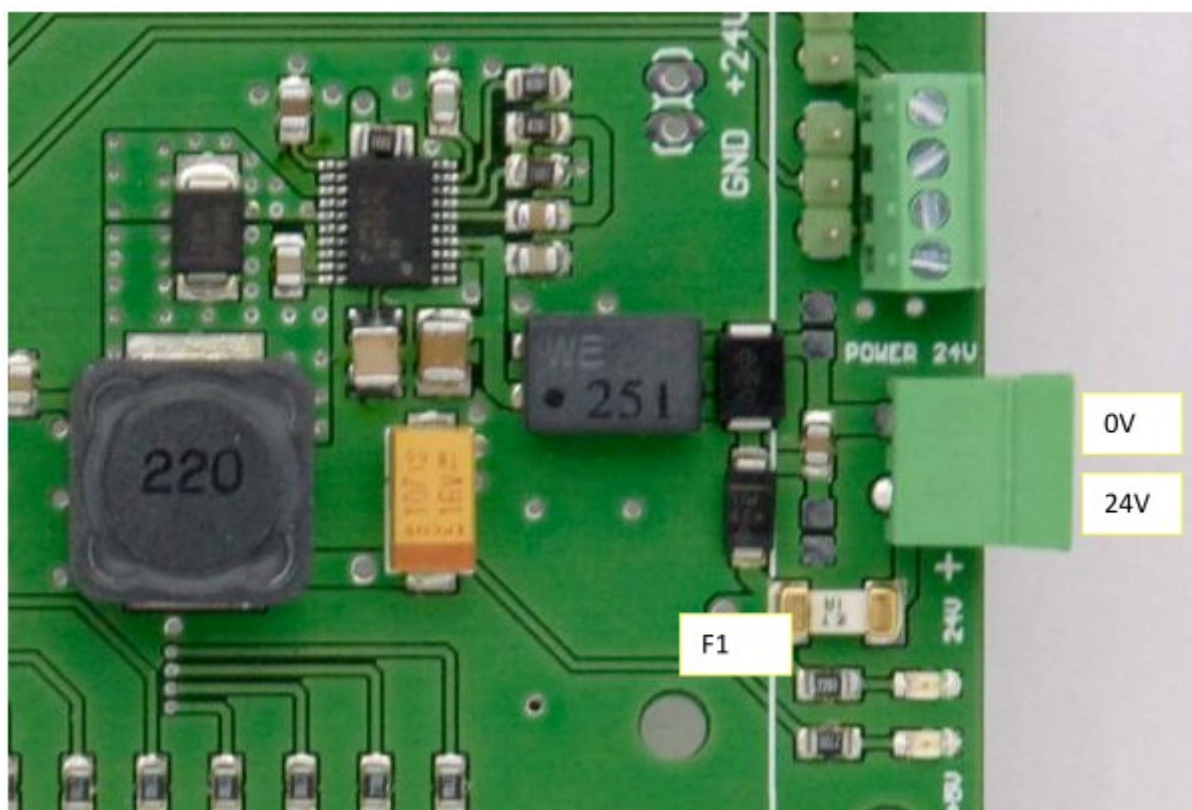


Fig. 2: Power supply area

RFID systems require a high quality supply voltage. The use of linear regulators of high precision and control speed is recommended. In case of switching power supply the minimum switching frequency should be 500 kHz and the layout should be EMV capable. Fig. 3 shows the schematic of the UDB1's power supply.





## 4 Communication

The UDB1 can be connected and controlled to external controllers or PCs using RS232, USB, or UART (via the terminal block on the side).

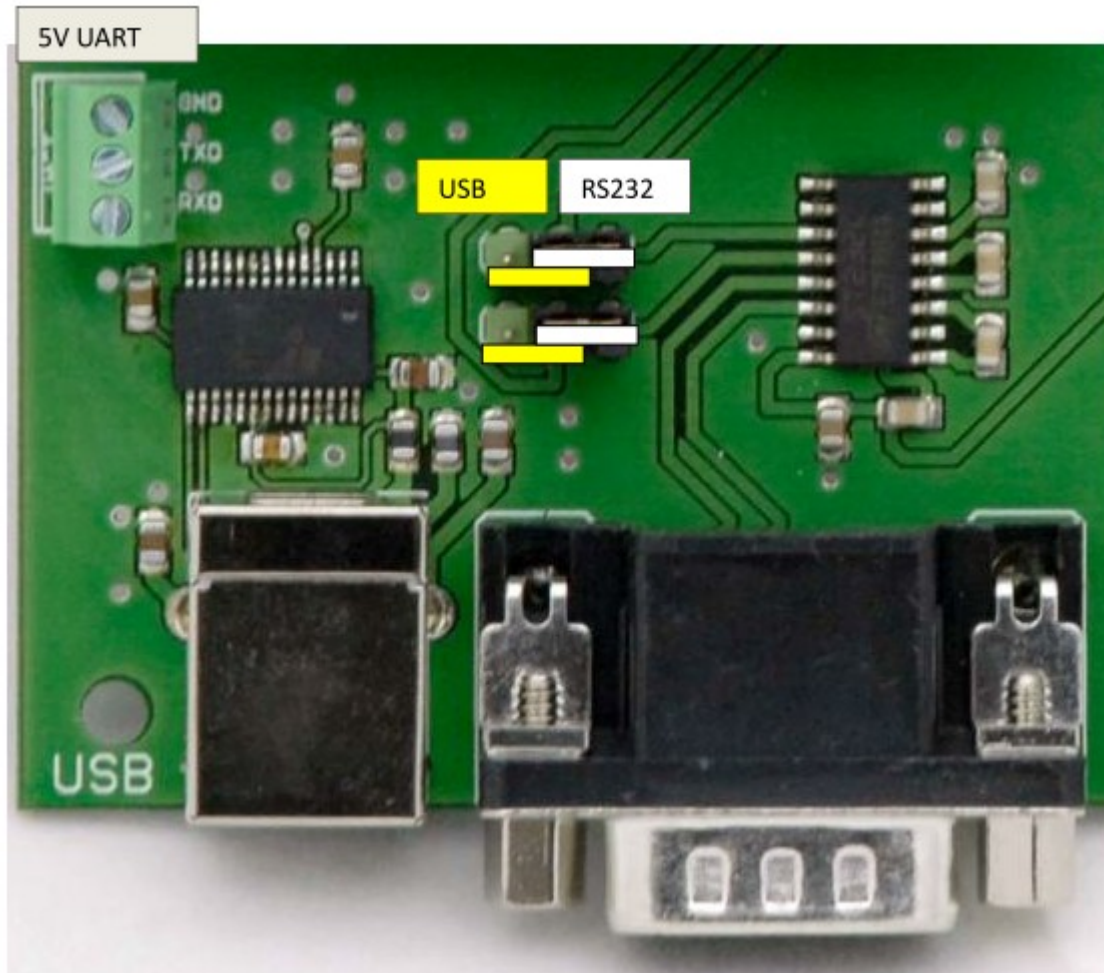


Fig. 4: Communication area

The placement of the jumpers defines the interface. If both jumpers are plugged in on the right side (marked white in Fig. 4), the internal UART of the reader module will be connected with the RS232 SubD9 plug. If both jumpers are placed left (marked yellow in Fig. 4), the reader's UART will be connected to the USB socket. If no jumpers are placed, communication can be done via the 3-pin screw terminal located on the side of the board, which directly provides the controller's 5 V UART interface.

Used as USB Interface IC is the FTDI FT232RL. It will be installed as a virtual COM port upon first connection to the host PC. The metraTec website provides drivers for your Windows-

System (<http://www.metratec.com>). Drivers for other operating systems can be found directly at FTDI's website (<http://www.ftdichip.com>).

Independent of the interface, the connection data are: 115.200 Baud, 8 data bits, no parity, 1 stop bit, no hardware flow control.

## 5 Prototyping Area

The prototyping area allows you to connect or build additional electronics on the UDB1 for own developments. The UDB1 supplies +5 V with a total of 1 A current as well as 24 V directly from the external power supply.

The GPIO can be found to the left of the prototyping area. These are directly connected to the input/output pins of the microcontroller. Using these pins it is possible to control external components, like buzzers, lights, etc. that are placed on the prototyping area.



### ATTENTION

If connecting signals to these pins care has to be taken not to exceed the permissible signal level of 5 V DC. Also, several outputs should not be operating on the same signal. Especially feeding of the 5 V pins with 24 V has to be avoided, since it would most probably lead to the destruction of the UDB1 as well as connected modules.

The LEDs show the current state of the GPIO pins of the reader, independent of their use as Input or Output pins.

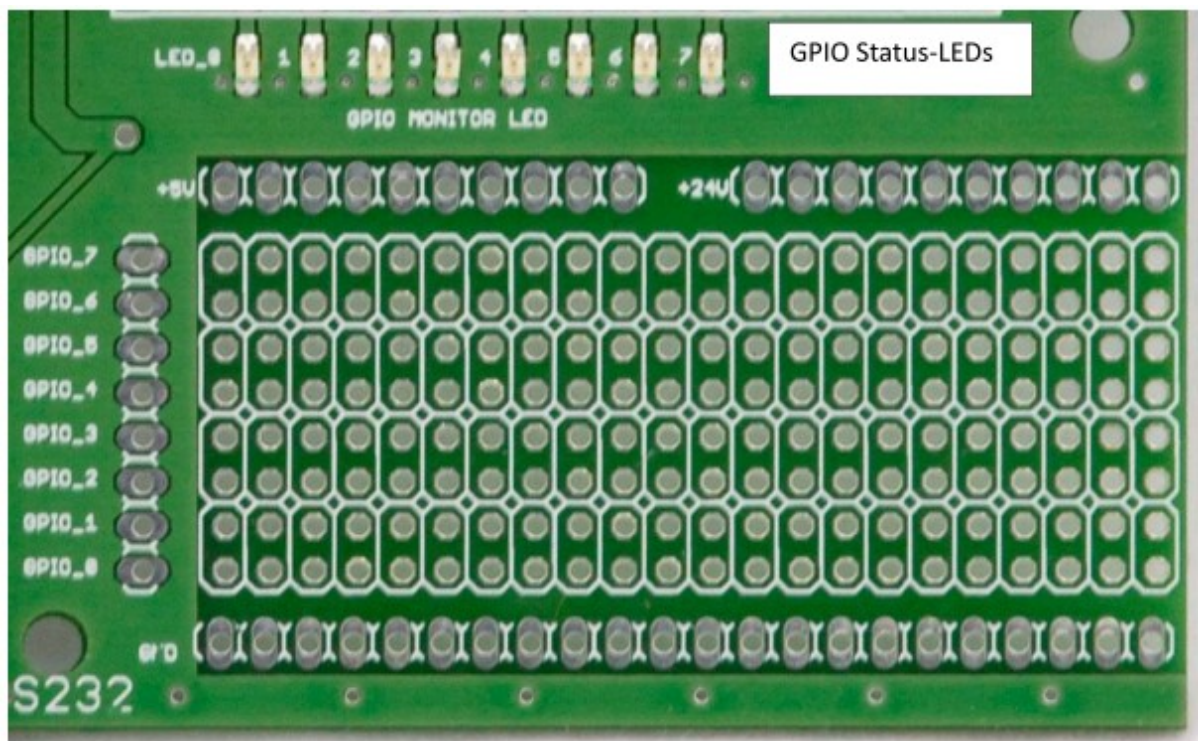


Fig. 5: Prototyping area

## 6 Mux (Multiplexer Area)

RFID systems with several antennas can be realized by the use of multiplexers at relatively low cost if real time requirements are not too high. The UDB1 enables the evaluation of HF multiplexer modules on a slot designed and intended for this purpose.

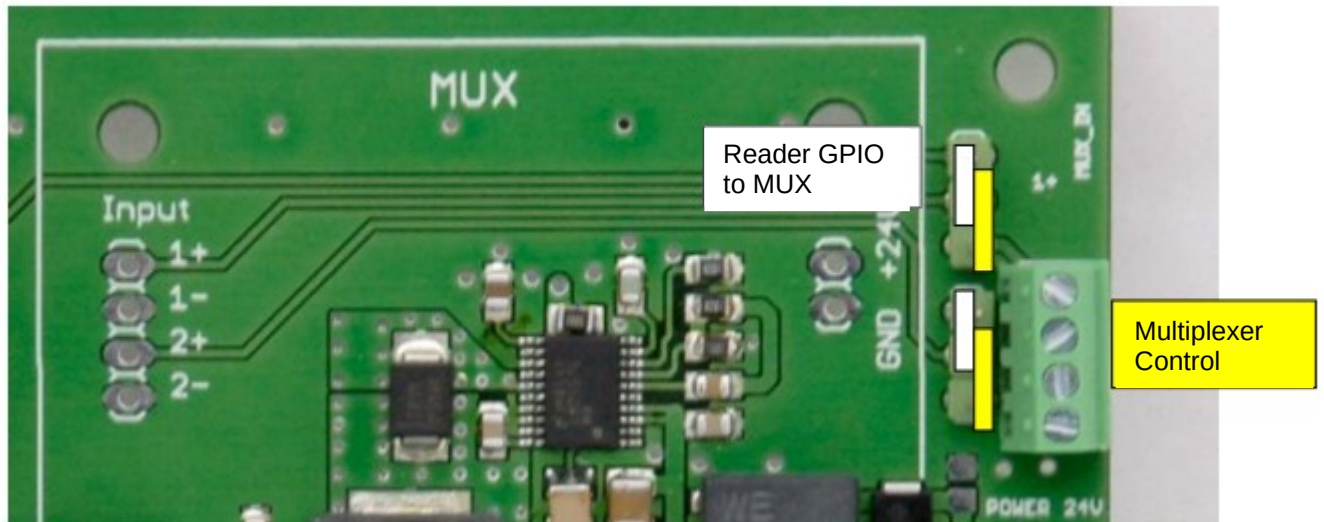


Fig. 6: Multiplexer area

metraTec's HF multiplexer module has optically isolated inputs for choosing the active antenna. These inputs can be connected directly to the GPIOs 0 and 1 of the reader module. Alternatively, the 4-pin screw terminal can be fed with external controlling signals. For use of the internal GPIOs of the reader the upper two jumper pins have to be set as indicated in Fig. 6. For the use of an external signal for control of the multiplexer, the lower two jumper pins have to be set.



### ATTENTION

The required voltage levels of the inputs of the multiplexer have to be considered at all times if external signals are used! In case of metraTec's MUX4 module (for HF) this would be 5 V. In this case, connecting the external inputs to 24 V will most probably lead to destruction of the multiplexer module and the whole UDB1.



## NOTES

Multiplexer modules like e.g. metraTec's MUX4 module often require relatively high operating voltages to be able to transfer RF signals of average power. Therefore, the MUX is being powered directly via the external 24 V power supply. Care has to be taken that indeed a 24 V DC power supply is being used.

## 7 Certification

The UDB1 is an evaluation board intended for use for ENGINEERING DEVELOPMENT, DEMONSTRATION, OR EVALUATION PURPOSES ONLY and is not considered by metraTec to be a finished end product fit for general consumer use. Persons handling the product(s) must have electronics training and observe good engineering practice standards.

### 7.1 CE / ETSI (EU)

The UDB1 Development Board and all original parts of the Embedded RFID Starter Kit comply with applicable EN / ISO standards. Nonetheless, the person handling the module(s) has to make sure that all requirements are met during customized use and especially by the final product. It is his obligation to declare product conformity. We recommend to assign this task to a qualified third-party test lab specialized on EMC measurements.

### 7.2 FCC (USA)

The UDB1 Development Board and all original parts of the Embedded RFID Starter Kit comply with Part 15 of the FCC Rules. The person handling the module(s) has to make sure that all requirements are met during customized use.

To fulfill all FCC requirements the person handling the module(s) must test the final product to comply with FCC regulations regarding intentional and unintentional radiators before declaring FCC compliance of his own product.

### 7.3 IC (Canada)

Certification requirements for Industry Canada (IC) are similar to those of the FCC. Limits of ICES-003 for radiated emissions are similar to the formats specified in FCC Part 15 and CISPR 22. Industry Canada accepts FCC test reports or CISPR 22 test reports for compliance with ICES-003. The integrator is responsible for its product to comply with all relevant IC rules.



## 8 Further Notes

Electronic devices like the UDB1 Development Board are covered by the (German) ElektroG (electronic waste law) as well as the European WEEE directive and as such may not be disposed of by way of the normal household trash. Instead they have to be recycled properly. For you as our customer this is no additional burden, however, as you can send the device back to us for proper recycling. We assure you that the devices received back will be recycled properly and in an environmentally friendly way. Our WEEE Registration ID is DE 56060482.

When selecting electronic components we additionally made sure that all components are free of heavy metals and other harmful substances as required by the RoHS Directive for many industries. Hence, our products are produced in the most environmentally friendly way possible.





## 9 Version History

<i>Version</i>	<i>Change</i>	<i>Changed by</i>	<i>Date</i>
1.0	Created	KD	26.1.2009
1.1	Minor corrections	KD	27.3.2009
1.2	Corrected use of label MIFARE®	CS	20.01.2014
1.3	Minor corrections, restored readability of pictures, inserted Chapter 7 Certification, correction of corresponding RFID module	CS	27.04.2015
1.4	minor changes chapter certification	CS	16.06.2015
1.5	update address	KS	09.03.2017

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