Technical Documentation

for metraTec DwarfG2-Mini UHF SMD Module

Date: March 2017

Version: 1.4

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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.

1.2 Symbols Used

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

ATTENTION

Indicates 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.

1.3 Security Advice

The DwarfG2-Mini UHF SMD Module was not designed for use in dangerous environments. 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.

1.4 Export Restriction

The DwarfG2-Mini UHF SMD Module 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.

1.5 Further Documentation

For module firmware protocol descriptions visit:

Source: http://www.metratec.com → Support → Downloads → Documentation

2 Features

- ✔ ultra compact UHF RFID Reader module
- ✔ single 3.3 V supply
- ✔ UART interface
- ✔ up to 13 dBm RF output power
- ✔ SMT solderable, U.FL and wire to board interface optional
- ✔ four 3.3 V GPIOs
- ✔ fully EPC Gen 2 compatible
- ✔ European version according to EN 302 208
- ✔ EN 55022 class B

3 Electrical Specifications

	Min.	Typ.	Max.
Supply voltage [1]	3.15 V	3.3 V	3.6 V
Supply Current Standby		20 mA	
Supply Current RF on	150 mA	170 mA	185 mA
Max. RF output power	11 dBm	12dBm	13dBm
Operating Temperature [2]	-40 °C	20 °C	+85 °C
Antenna port impedance		50 Ohm	
Carrier frequency [3]	865 MHz		868 MHz
Start-up time [4]	185 ms	200 ms	225 ms

1 Power black outs / brown outs below minimum voltage will lead to reset of the module.

2 RFID performance may vary with temperature, check in application

3 European (ETSI) version, others on request

4 The internal reset circuitry monitors the voltage at the +3V3 pin. If the voltage is above 3.08V for 200 ms the module is started.

4 UART interface

	Min.	Typ.	Max.
Baudrate [5]	114 000	115 200	116 500
Databits		8	
Parity		None	
Stopbits	1	1	1.5
Vlow	-0.3 V	0	0.5 V
Vhigh	2.1 V	3.15 V	3.3 V

ATTENTION

The UART is not 5 V tolerant.

5 Others on request

5 Pad description

Pad name	Pad Nr.	Direction	Function
GND	1	Pas	GND connection, use as ground reference for antenna
RF	2	Out	50 Ohm RF port, connect to RFID antenna, use 50 Ohm PCB traces or cable, RF signal can be routed to optional onboard U.FL connector on request, only one port can be used at a time
TXD	3	Out	3.3 V UART data output
RXD	4	In	3.3 V UART data input
GND	5	Pas	GND connection, use as ground reference for power supply and UART
+3V3	6	Pwr In	module power supply, use a regulated low noise supply to power the module, place decoupling capacitors close to the pin, The internal reset circuitry monitors the voltage at this pin. If the voltage is above 3.08V for 200ms the module is started.
RFU	7	NC	Reserved, do not connect
GPIO_3	8	I/O	3.3V GPIO, direction is configurable via FW command, internal 50 Ohm series resistor, 4mA drive strength in output mode, 100uA pullup current in input mode
GPIO_2	9	I/O	3.3V GPIO, direction is configurable via FW command, internal 50 Ohm series resistor, 4mA drive strength in output mode, 100uA pullup current in input mode
GPIO_1	10	I/O	3.3V GPIO, direction is configurable via FW command, internal 50 Ohm series resistor, 4mA drive strength in output mode, 100uA pullup current in input mode
GPIO_0	11	I/O	3.3V GPIO, direction is configurable via FW command, internal 50 Ohm series resistor, 4mA drive strength in output mode, 100uA pullup current in input mode
GND	12	Pas	GND connection, use as ground reference for GPIOs

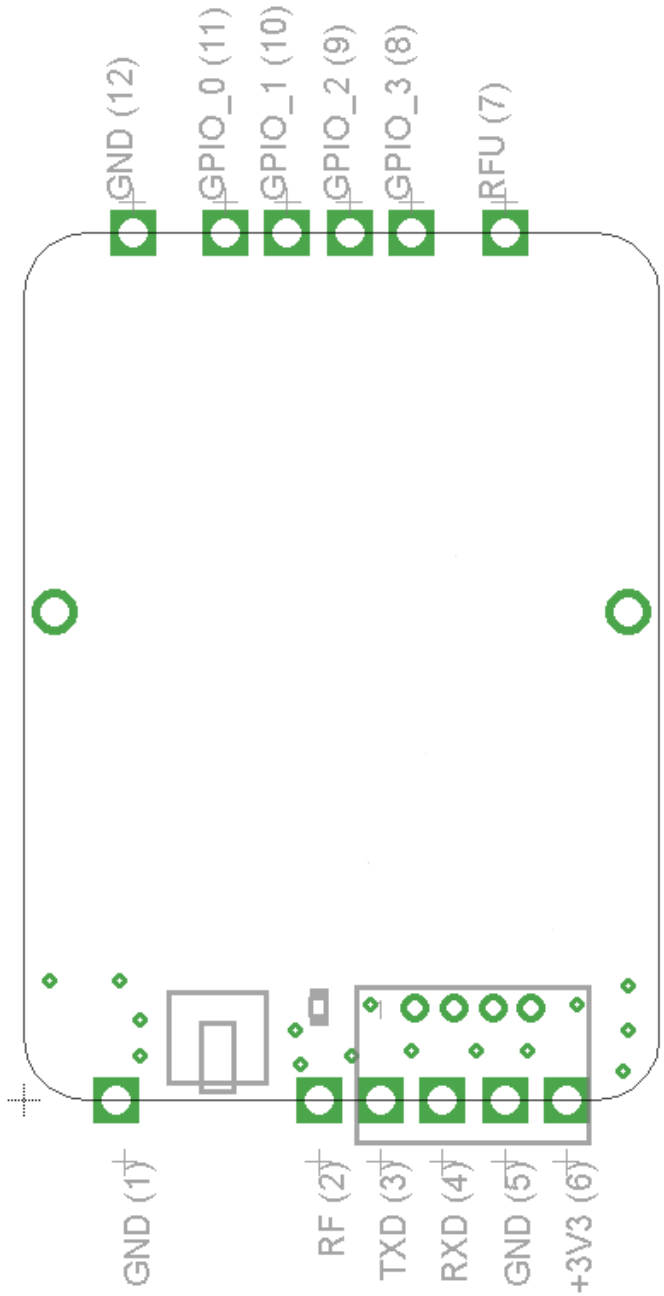


Fig. 1: Pad Positions

NOTES

An Eagle library is available to facilitate designing in the DwarfG2-Mini.

6 External connectors

6.1 U.FL antenna connector (X1)

50 Ohm RF antenna connection available on request. Use 50 Ohm U.FL or compatible cable to connect to antenna. RF output on SMT pad #2 is standard configuration.

6.2 Wire to Board connector (X2)

The UART and power signals are available on a Würth WR-WTB4-1.25-THT connector (PN 653004117322) on request. This connector is not mounted in standard configuration.

Pin name	Pin Nr.	Direction	Function
TXD	X1:1	Out	3.3 V UART data output
RXD	X1:2	In	3.3 V UART data input
GND	X1:3	Pas	GND connection, use as ground reference for power supply and UART
+3V3	X1:4	Pwr In	module power supply, use a regulated low noise supply to power the module, place decoupling capacitors close to the pin

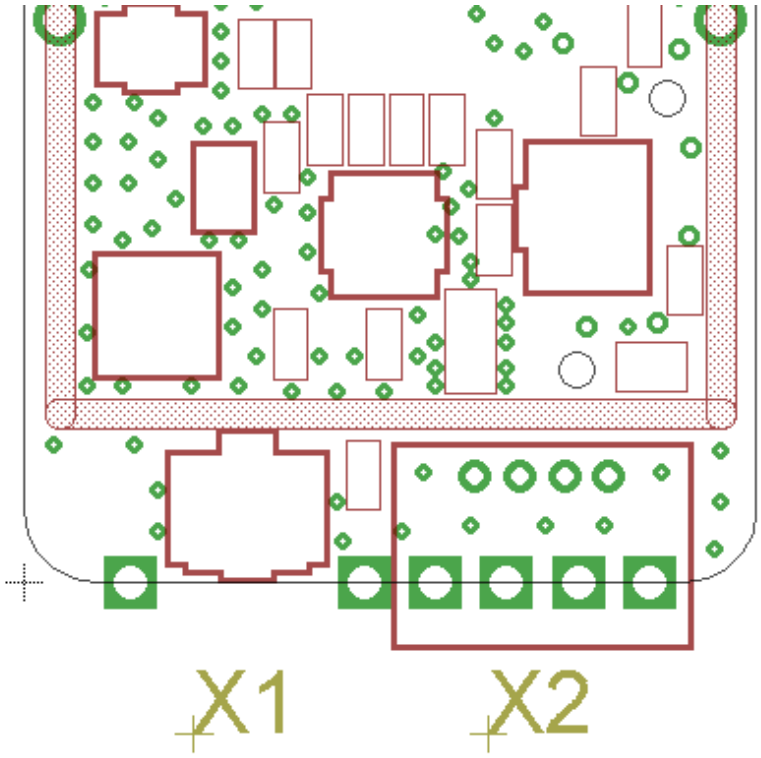


Fig. 2: Positions of optional external connectors on DwarfG2-Mini

7 Dimensions

All pads are 1.4 x 1.4 mm.

Pad positions as in Fig. 3.

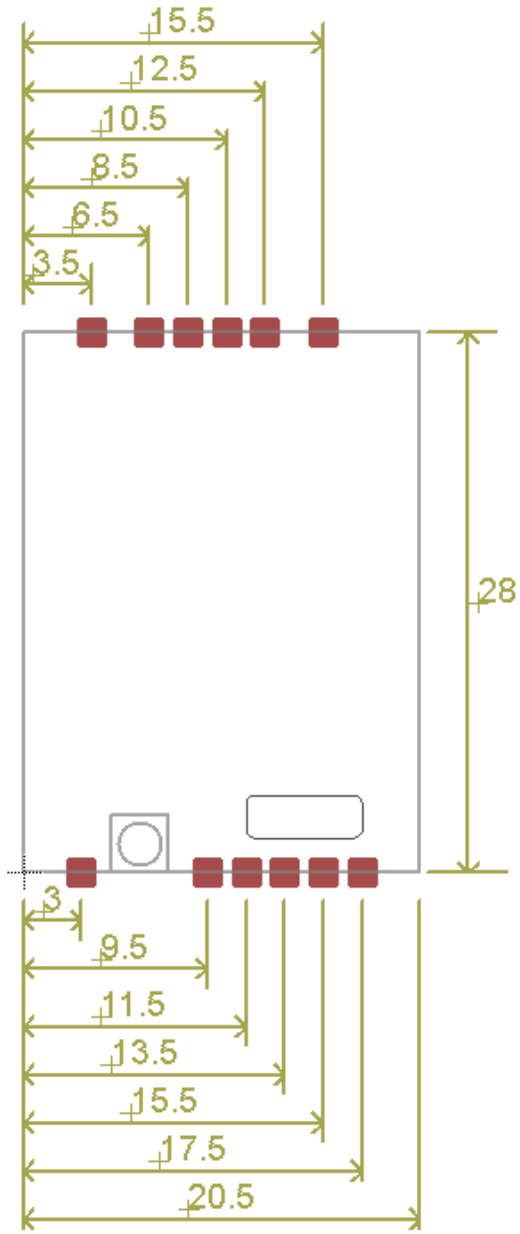


Fig. 3: Dimensions and pad positions

8 Certification

ATTENTION

Changes or modifications to the module not expressly approved by metraTec could void the user's authority to operate the equipment.

The DwarfG2-Mini UHF SMD Module complies with ETSI Rule EN 302 208.

The DwarfG2-Mini complies with EN 55022 class B emission limits.

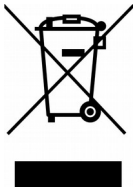
Nonetheless, the integrator of the module has to make sure that all requirements are met by the final product. It is his obligation to declare product conformity. We recommend to assign this task to a qualified third-party test lab specialized on EMC measurements.

Product versions for regulations other than ETSI, e.g. FCC (USA) or CI (Canada) on request.

9 Further Notes

Electronic devices like the DwarfG2-Mini UHF SMD Module 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.



10 Version History

Version	*Changes*	*Changed by*	*Date*
1.0	created	TM	12.02.2015
1.1	Chapters Certification and Further Notes added, minor changes	CS	18.06.2015
1.2	Certifications added	TM	25.9.2015
1.3	GPIO currents added	TM	2.10.2015
1.4	update address, picture added	KS	06.03.2017

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Changes in function, form, features can happen without prior notice.