WiMOD – iU893A-XL

Datasheet Version 1.0

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Version	Note
0.5	Initial
1.0	RF and antenna characteristics added

General user information

The aim of this document is to give a detailed product description including interfaces, features and performance of the USB stick iU893A-XL.

The iU893A-XL is almost identical to the iU891A, but has an integrated antenna. For further information on the iU891A please refer to 7.3.

This document has to be treated confidentially. The content must not be published, duplicated or passed to third parties without our express permission.

Observe the safety instructions and warnings in this documentation.

Keep this document for future reference.

Disposal of the device

Do not dispose this product at the end of its life in the household waste, but in the designated places for recycling old electrical equipment. Beware the environment.

Table of Contents

1. Introduction

The iU893A-XL is a compact, low power, bidirectional USB adapter for the 868 MHz frequency band using Semtech's LoRa® (LoRaWAN®) modulation technology and provides an internal antenna. In addition, the sophisticated IMST ProLink protocol stack is also available. It combines compliant LoRaWAN functions and proprietary LoRa functions within one stack. The adapter provides ultra-long range spread spectrum communication and high interference immunity whilst minimising current consumption. With an integrated power amplifier ranges well beyond 10 km can be achieved. It also supports conventional modulation techniques.

In addition, iU893A-XL supports the wireless M-Bus modes S, C, T and C/T with packet formats A and B as well as the OMS security modes 5 and 7. This makes the iU893A-XL an ideal solution for numerous applications such as meter reading, wireless M-Bus Gateway expansion, LPWAN and IoT sensors, as well as home-, building- and industrial-automation.

Figure 1-1: Picture of iU893A-XL with wireless M-Bus and LoRaWAN functionality

1.1 Key Features

- iM893A-XL Radio Module
- RED certified for usage of
  a. ProLink LoRaWAN or
  b. wireless M-Bus/OMS
- Integrated antenna
- Small size[1] 46 x 21 x 11 mm

1.2 Applications

- Automated Meter Reading
- Wireless Networks
- Home-, Building-, Industrial automation
- Remote Control
- Wireless Sensors
- Telemetry
- Wireless Alarm and Security Systems
- …

Please visit our web site www.wireless-solutions.de for more information as well as the latest documents and software versions.

[1] Without USB connector

2. Block Diagram

The iU893A-XL is an ultra-long range, high-performance, pre-certified USB-adapter for wireless communication. It operates in the license free 868 MHz SRD frequency band and includes all necessary passive components for wireless communication as depicted in the following figure.

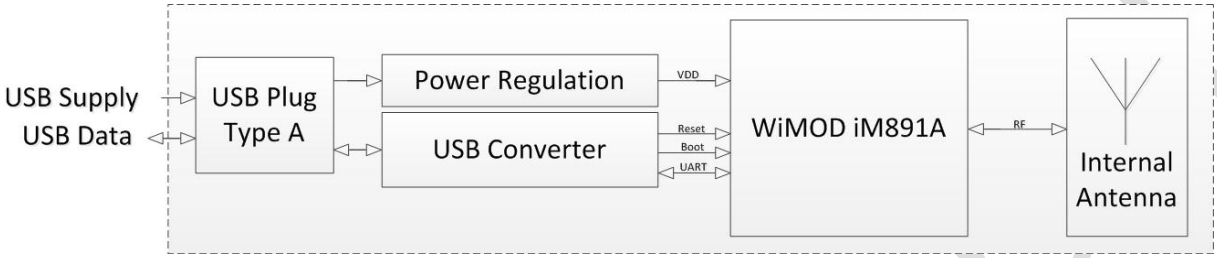


Figure 2-1: Block Diagram of iU893A-XL

3. Electrical Characteristics

In the following different electrical characteristics of the iU893A-XL are listed. Furthermore, details and other parameter ranges are available on request.

3.1 Absolute Maximum Ratings

Note: Stress exceeding of one or more of the limiting values listed under "Absolute Maximum Ratings" may cause permanent damage to the radio module.

Parameter	Condition	Min	Typ.	Max	Unit
Supply Voltage (VDD)	USB	4.53		5.25	V
Current Consumption				200	mA
Storage Temperature		-40	-	+85	°C
Operating Temperature		-40	-	+85	°C
RF Input Power				+0	dBm
ESD (Human Body Model)			2000		V
ESD (Charge Device Model)			500		V
Notes: 1) Unless otherwise noted, all voltages are with respect to GND					

Table 1: Absolute Maximum Ratings

Note: To avoid too large input power level, the distance to other transmitting devices shall be at least 1 m

3.2 Global Electrical Characteristics of iU893A-XL

T = 25°C, VDD = 5.0 V (typ.), if nothing else stated

Parameter	Condition	Min	Typ.	Max	Unit
Supply Voltage (VDD)		4.35	5.0	5.25	V
RF Frequency Range		863		870	MHz
RF Sensitivity Note 1	DR 7.8 kHz, SF7		-137		dBm
	DR 7.8 kHz, SF12		-149		dBm
	DR 125 kHz, SF7		-125		dBm
	DR 125 kHz, SF12		-138		dBm
	S1-Mode 868.3 MHz, DR 32.768 kbps, Frequency-Deviation: ±50 kHz		-106		dBm
	T1-Mode 868.95 MHz, DR 100 kbps, Frequency-Deviation: ±50 kHz		-106		dBm
	C1-Mode 868.95 MHz, DR 100 kbps, Frequency-Deviation: ±45 kHz		-106		dBm
Notes: 1) from iU891A (SMA)					

Table 2: Global Electrical Characteristic of iU893A

3.3 RF Characteristics

3.3.1 Applicable Frequency Bands and Sub-Bands

The applicable frequency bands and sub bands within the 868 MHz band for "Non-Specific Short Range Devices" are specified in the ERC Recommendation 70-03.

Note: National laws and regulations, as well as their interpretation can vary with the country. In case of uncertainty, it is recommended to contact either IMST's accredited Test Center or to consult the local authorities of the relevant countries.

3.3.2 Transmitter RF Characteristics

The iU893A-XL has an excellent transmitter performance as given by Table 3.

T = 25°C, VDD = 5 V (typ.), 866.5 MHz if nothing else stated

Parameter	Condition	Min	Typ.	Max	Unit
Frequency Range		863	-	870	MHz
RF Output Power (EIRP)	Level Setting 16		15.5		dBm
Modulation Techniques	LoRa™, FSK				
TX Frequency Variation vs. Temperature	-40 to +85°C	-	±0.5	-	ppm
TX Power Variation vs. Temperature		-	±1	-	dB

Table 3: Transmitter RF Characteristics

Note: The duty cycle of transmission at maximum output power is limited to 1%.

3.4 Antenna Characteristic

The antenna characteristic has been tested with a test board (size of approximately 100mm x 70mm) and may vary when using boards of other dimensions and other electrical characteristics.

3.4.1 868.3 MHz

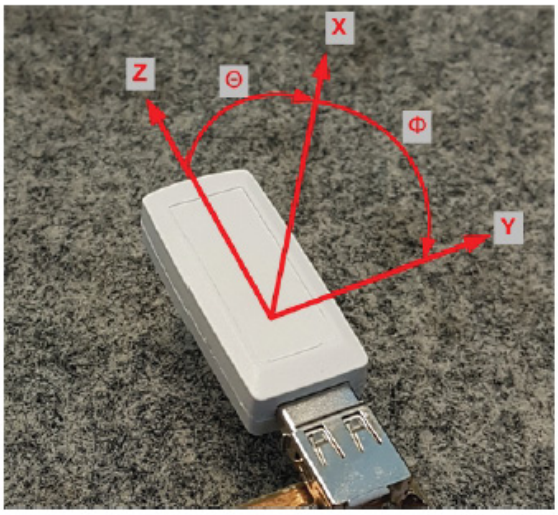
Frequency: 868300300 Hz

TRP: 12.5 dBm

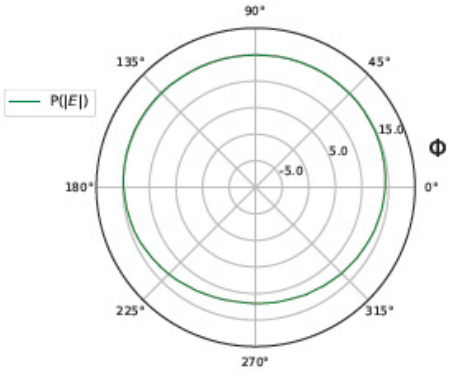
max. EIRP (Θ): 15.3 dBm at (Θ=100.0°, Φ=145.0°)

max. EIRP (Φ): 4.1 dBm at (Θ=160.0°, Φ=180.0°)

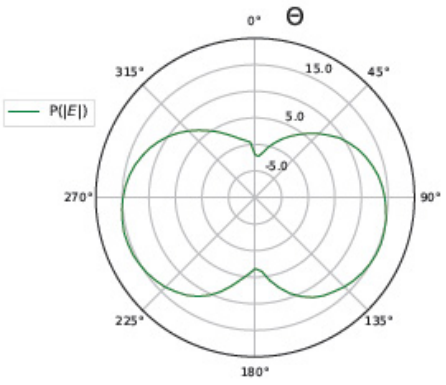
max. EIRP (abs): 15.6 dBm at (Θ=105.0°, Φ=180.0°)



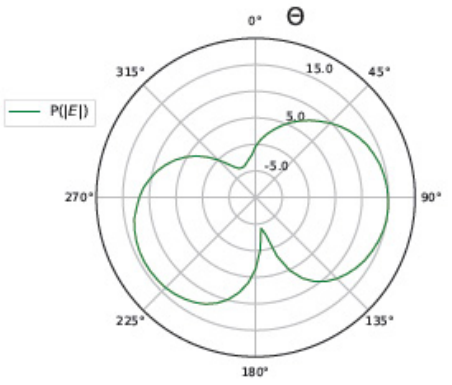
(a) Device under Test



(b) xy-plane



(c) xz-plane



(d) yz-plane

Figure 3-1: 2-D Plots of iU893A-XL at 868.3MHz and Power Setting 16

4. Dimensions

The iU893A-XL is characterized by the following typical dimensions[1]:

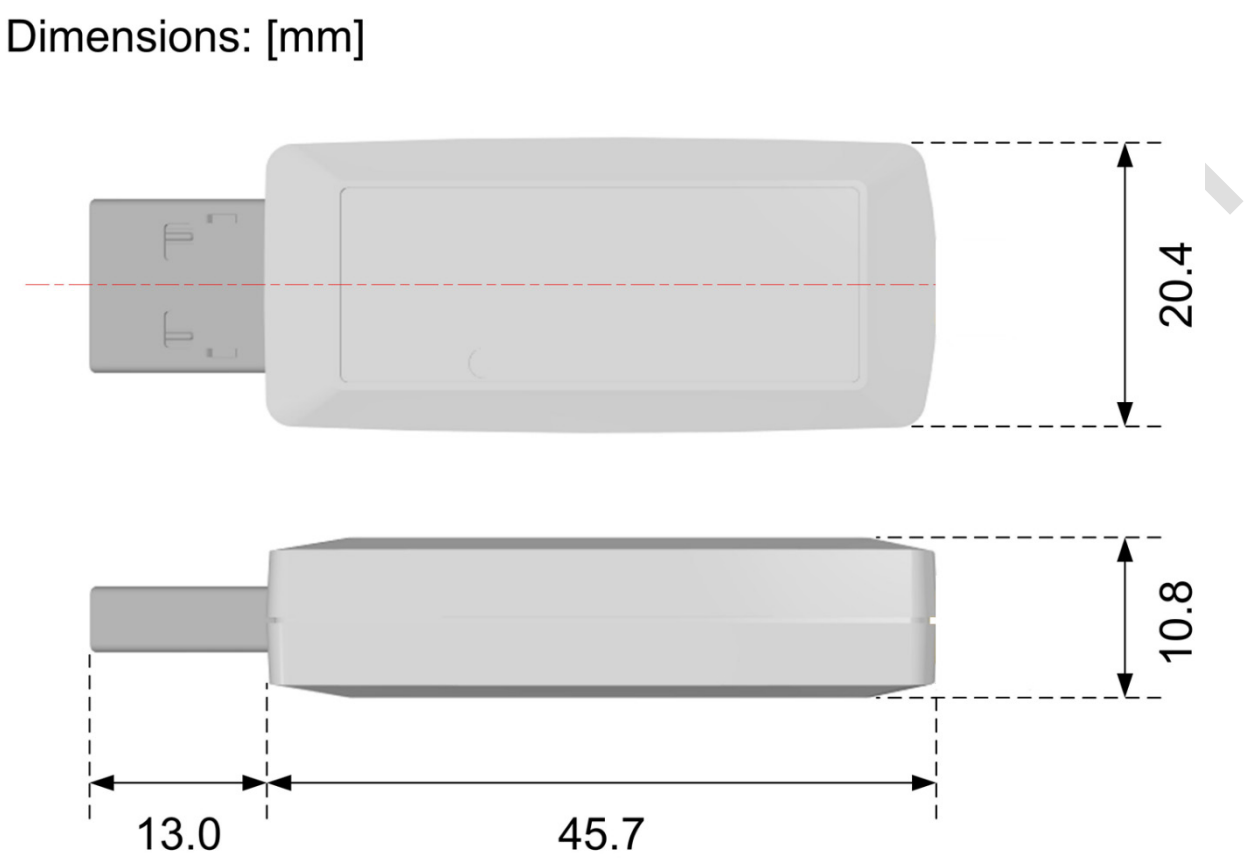


Figure 4-1: Typical Dimensions of iU893A-XL

[1] Dimensions not to scale

5. Interface Characteristics

The iU893A-XL provides several interfaces through the USB-converter chip to get access to the radio module iM891A-XL, which is part of the iU893A-XL. It is highly recommended, to implement all interfaces at the host device to guarantee a reliable usage of the iU893A-XL. In detail, there is a UART interface, a reset signal and a boot loading signal.

5.1 Cypress Driver

The USB-converter of the iU893A-XL is an Infineon CY7C65213A-32LTXIT. Please refer to https://www.infineon.com for detailed information of the chip and required drivers for the host system.

5.2 Radio Module Reset Interface

The reset signal for the radio module iM891A-XL is connected to the GPIO2 signal of the USB-converter. This GPIO can be used, to execute a reset of the radio module. To perform a reset of the radio module, GPIO2 needs to be set to low-level for at least 100 ms. Afterwards, the pin needs to be released or pulled to high-level. It is recommended to implement this functionality on the host system.

5.3 Radio Module Boot Loading Interface

The firmware of the radio module iM891A-XL is capable of being updated via the USB-converter interfaces. First, the boot loading signal needs to be applied to high-level via the USB-converter GPIO3. Afterwards, a reset needs to be executed as described in chapter 5.2. Now, the radio module is ready in boot loading mode and the firmware can be transferred using the USB-converter via UART interface (USB-converter virtual comport interface). Please refer STM AN2606 and AN3155 for detailed information. It is recommended to implement this functionality on the host system.

6. Ordering Information for USB Sticks and Antennas

Ordering Part Number	Description	Distributor
404926	iU891A-XL with SMA connector and wireless M-Bus firmware	
404927	iU891A-XL with SMA connector and LoRaWAN firmware	
404936	iU893A-XL with internal antenna and wireless M-Bus firmware	
404937	iU893A-XL with internal antenna and LoRaWAN firmware	
404829	Antenna_A dipol 142mm x 10mm	sales@imst.de
404825	Antenna_B dipol 105mm x 11mm	

Table 4: Ordering Information

7. Appendix

7.1 List of Figures

7.2 List of Tables

7.3 References

[1] WiMOD iM891A-XL Datasheet, https://wireless-solutions.de/

[2] https://wireless-solutions.de/products/wm-bus-iu891a-xl.html

8. Restrictions and Limitations

8.1 Hardware Restrictions and Limitations

The characteristic values given by the present document are typically obtained by measurements based on evaluation kits of the entitled device. Using other carrier boards or connected equipment might lead to different characteristics. Subject to given measurement results the characteristic values might show the best performance of the entitled device, independent from any compliancy restriction of final operation purposes. All given values are subject to changes without prior notice.

8.2 Software Restrictions and Limitations

The present document is a datasheet of the entitled device which intentional use is to provide information about basic characteristics related to the device hardware. Typically, all described characteristic values require software for obtaining them accordingly. All features of the available software are subject to changes without claim to be complete at any time. Characteristically values might also be provided based on datasheets of the appropriate key components unless there are test results available based on the available software. For more information regarding current supported features of the available software refer to www.wireless-solutions.de.

8.3 Compliancy Restrictions and Limitations

The entitled device has been designed to comply with the standards namely given in the present document. The intentional operation shall be in so called ISM bands, which can be used free of charge within the European Union and typically licences free all over the world. Nevertheless, restrictions such as maximum allowed radiated RF power or duty cycle may apply which might result in a reduction of these parameters accordingly.

In addition, the use of radio frequencies might be limited by national regulations which requirements also need to be met.

In case the entitled device will be embedded into other products (referred as “final products”), the manufacturer for this final product is responsible to declare the conformity to required standards accordingly. A proof of conformity for the entitled device is available from IMST GmbH on request. Beside the entitled device the conformity also considers software as well as supporting hardware characteristics which might also have an impact accordingly.

The applicable regulation requirements are subject to change. IMST GmbH does not take any responsibility for the correctness and accuracy of the aforementioned information. National laws and regulations, as well as their interpretation can vary with the country. In case of uncertainty, it is recommended to contact either IMST’s accredited Test Center or to consult the local authorities of the relevant countries.

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