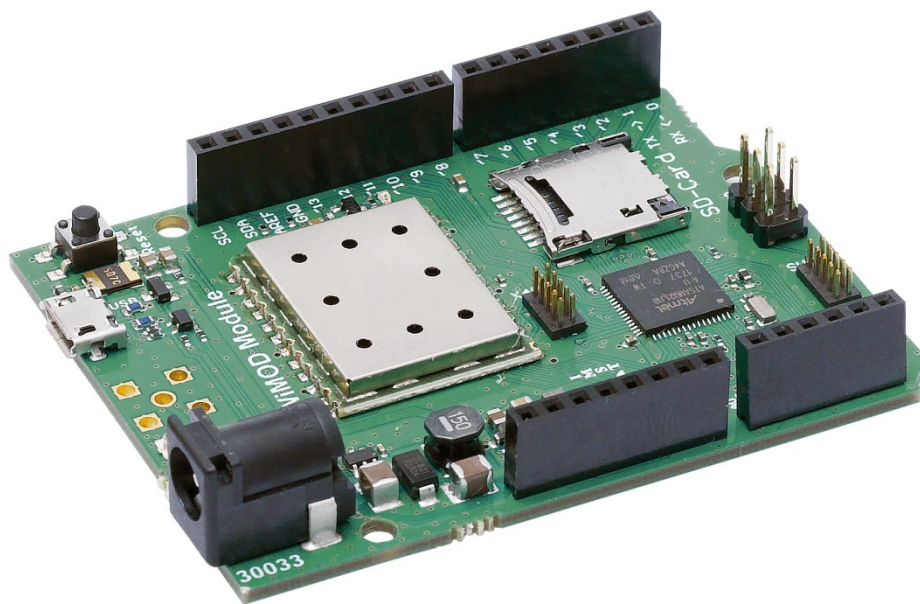


WiMODino

Datasheet



Document ID: 4100/40140/0136

IMST GmbH

Carl-Friedrich-Gauß-Str. 2-4

47475 KAMP-LINTFORT

GERMANY



Document Information

| | |
|-------------|-------------------------|
| File name | WiMODino_Datasheet.docx |
| Created | 2019-05-24 |
| Total pages | 20 |

Revision History

| Version | Note |
|---------|-----------------------------------|
| 0.1 | Created |
| 0.2 | All chapter, corrected devicename |
| 0.3 | Reviewed |
| 1.0 | Released |
| | |

Aim of this Document

The aim of this document is to give a detailed product description including interfaces, features and performance of the device WiMODino.

Table of Contents

| | |
|---|----|
| 1. IMPORTANT USER INFORMATION | 5 |
| 2. INTRODUCTION | 6 |
| 2.1 Key Features | 6 |
| 2.2 Applications | 6 |
| 2.3 Supported Radio Modules | 7 |
| 3. DEVICE OVERVIEW | 8 |
| 4. TECHNICAL SPECIFICATION | 10 |
| 4.1 General Specification | 10 |
| 4.2 Arduino™ Specification | 10 |
| 5. PIN-OUT DESCRIPTION | 11 |
| 5.1 Overview | 11 |
| 5.2 Arduino IOH-X200 | 12 |
| 5.3 Arduino IOL-X202 | 12 |
| 5.4 Arduino Power-X204 | 13 |
| 5.5 Arduino ADC-X206 | 13 |
| 5.6 Arduino ICSP-X207 | 13 |
| 5.7 SAMD21 SWD Programming Connector X203 | 14 |
| 5.8 WiMOD Module Connections | 14 |
| 5.9 WiMOD SWD Programming Connector X400 | 15 |
| 5.10 Micro-SD Card Connections | 15 |
| 6. ORDERING INFORMATION | 16 |
| 7. APPENDIX | 17 |
| 7.1 List of Abbreviations | 17 |
| 7.2 List of Figures | 18 |
| 7.3 List of Tables | 18 |
| 8. RESTRICTIONS AND LIMITATIONS | 19 |
| 8.1 Hardware Restrictions and Limitations | 19 |
| 8.2 Software Restrictions and Limitations | 19 |
| 8.3 Compliancy Restrictions and Limitations | 19 |
| 9. IMPORTANT NOTICE | 20 |

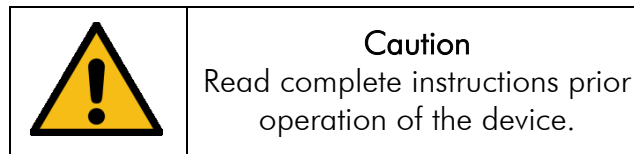


| | |
|--------------------------------|-----------|
| 9.1 Disclaimer | 20 |
| 9.2 Contact Information | 20 |



1. Important User Information

This device is only for usage of professionals or authorized person.



In no event will IMST GmbH be responsible or liable for indirect or consequential damages resulting from use of this device.

Reproduction of the manuals content, in whole or in parts, without written permission of IMST GmbH is prohibited.

Warning: The WiMODino runs at 3.3V instead of 5V. The board could be damaged when applying voltages higher than 3.3V to any I/O pin.

2. Introduction

The WiMODino is an Arduino™ M0/Genuino Zero compatible board with an integrated radio module intended to be used in a variety of applications. It is fitted with a 32 bit ARM Cortex M0+ microcontroller, micro SD-Card holder and one of IMST's low power, bidirectional LoRa® radio module.

It is a platform for fast prototyping and easy evaluation of the WiMOD radio modules.

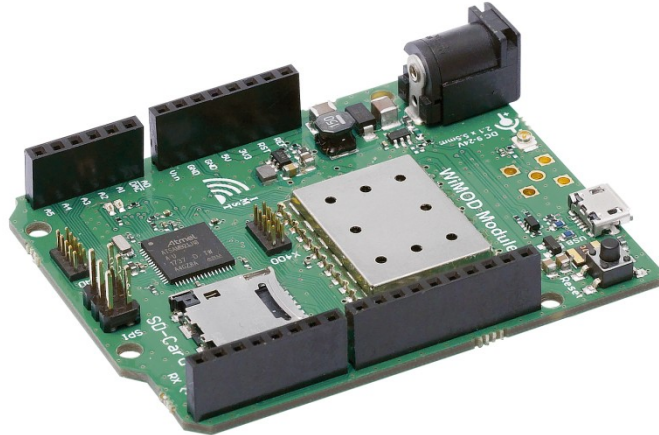


Figure 2-1: WiMODino

2.1 Key Features

- Compact size 54 x 69 x 15 mm
- LoRa® modulation technology
- Supplied by USB, external connector (9-24V DC) or pin header 5V/3.3V
- Internal switching regulator for 5V with max. 1.2A output current
- Internal switching regulator for 3.3V with max. 1.0A output current
- microSD-card holder
- U.FL. antenna connector
- Arduino-Zero hardware and software compatible
- LoRaWAN™ compliant to V1.0.1
- Certified according to
DIN EN 61000-4-2:2009
DIN EN 61000-4-3:2011
EN 55022:2011
ETSI EN300 220-2 V3.1.1
ETSI EN300 328 V2.1.1

2.2 Applications

- LoRa®/LoRaWAN™, IoT, Smart Cities
- Automated Meter Reading
- Wireless Networks
- Home-, Building-, Industrial automation
- Wireless Sensors
- Telemetry
- Wireless Alarm and Security Systems
- ...

Please visit our web site www.wireless-solutions.de for more information.

Copyright© 2019 IMST GmbH. LoRa is a registered trademark of Semtech Corporation. LoRaWAN is a registered trademark of the LoRa Alliance. Arduino is a registered trademark of Arduino SA. All rights reserved. Subject to technical changes without notice.

2.3 Supported Radio Modules

Within the following table the supported radio modules are listed.

| Module | LoRaWAN™ Protocol Stack | LR_Base Protocol Stack |
|--------|-------------------------|------------------------|
| iM880B | X | X |
| iM881A | X | X |
| iM980A | X | - |
| iM282A | - | X |

Table 2-1: Supported radio modules and firmware

3. Device Overview

The WiMODino is a high-performance Arduino™ compatible board for easy usage of certified WiMOD radio modules. The radio modules can operate in the license free 868/915 MHz or 2.4 GHz SRD frequency band and include all necessary components and firmware for wireless communication. For detailed information about the installed WiMOD radio module please refer to the corresponding datasheet on <http://wireless-solutions.de>.

The WiMODino has an USB interface for configuration and development purposes and it comes preprogrammed with the bootloader for the Arduino™ MO Pro. An external antenna can be attached to the U.FL. connector. In Figure 3-1 the main hardware components of the WiMODino are marked and in Figure 3-2 all available connectors are described.

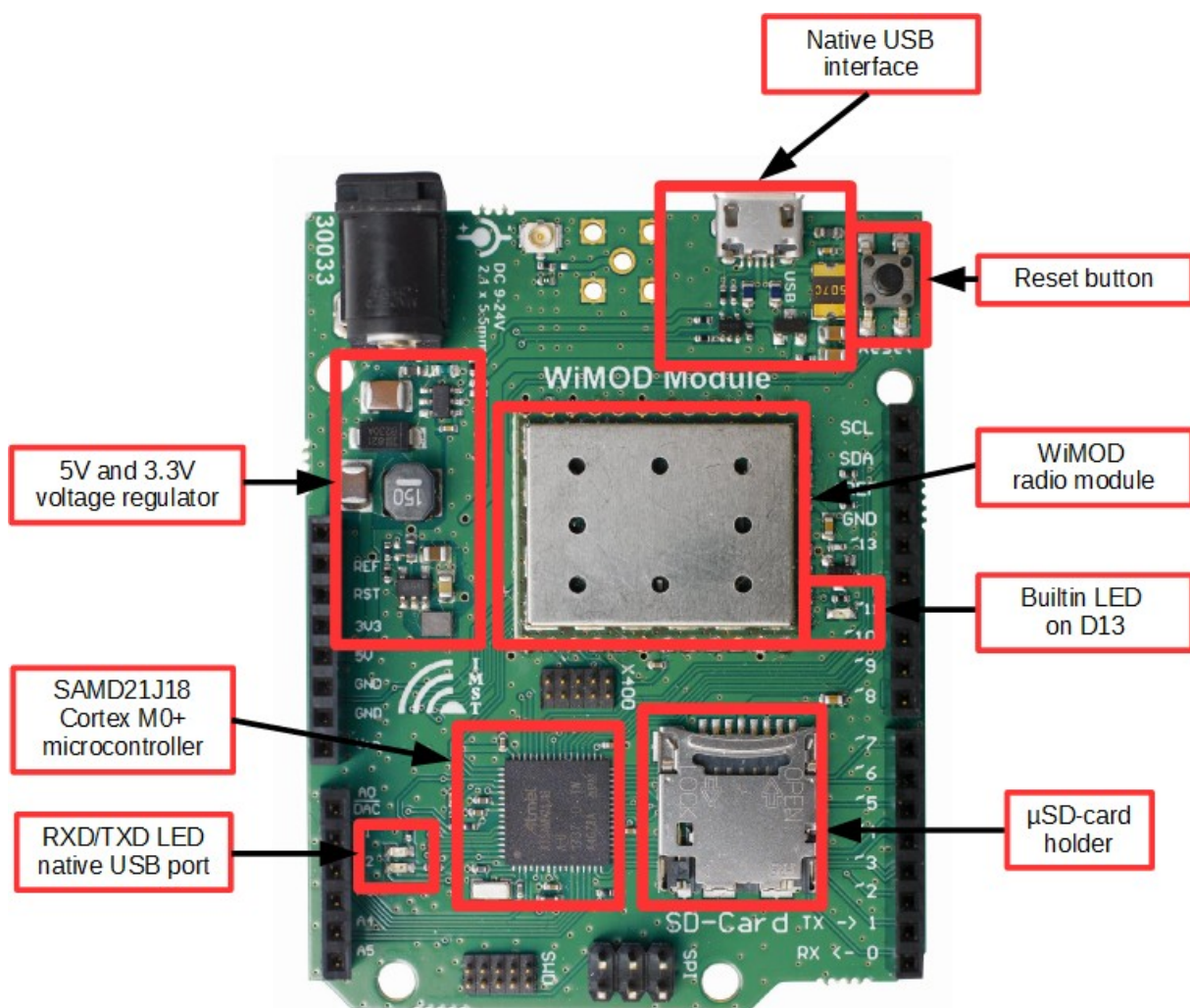


Figure 3-1: WiMODino Hardware Components

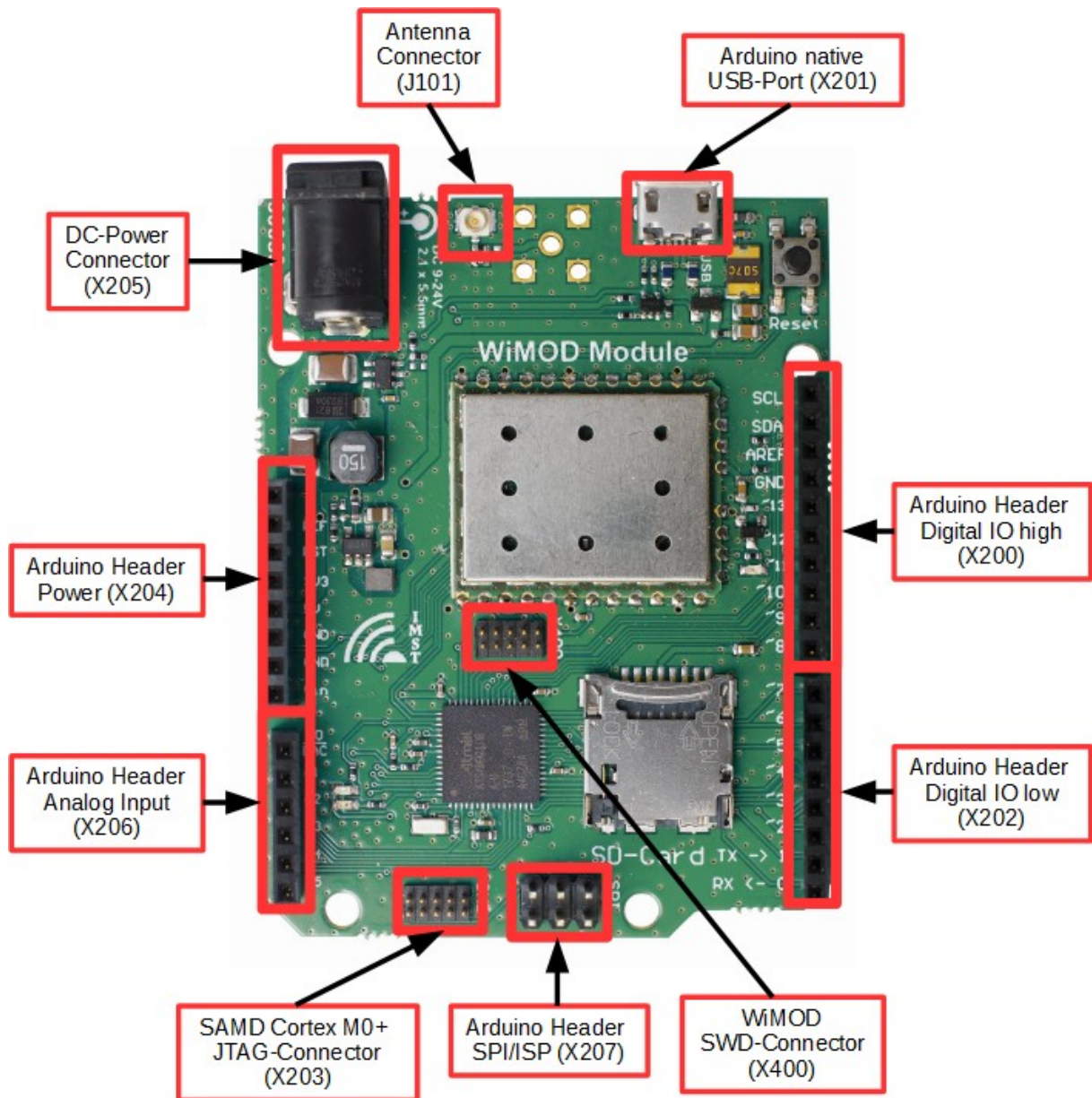


Figure 3-2: WiMODino Hardware Connectors

4. Technical Specification

For technical details of the used WiMOD radio module please have a look into the corresponding datasheet on <http://wireless-solutions.de>.

4.1 General Specification

| Parameter | Min | Typ | Max | Unit |
|--|-----|--------------|------|------|
| Input-Voltage DC-Plug | 9 | 12 | 24 | V |
| USB-Voltage | 4.5 | 5 | 5.5 | V |
| Power Consumption ¹ | - | 19 | - | mA |
| Digital I/O Pins | - | 14 | - | - |
| PWM Outputs | - | 12 | - | - |
| Analog I/O Pins | - | 6 + 1 DAC | - | - |
| DC Current per I/O Pin ² | - | - | 7 | mA |
| DC Current via USB | - | - | 500 | mA |
| Output current on board 5V regulator | - | - | 1200 | mA |
| Output current on board 3.3V regulator | - | - | 1000 | mA |
| Storage Temperature | -40 | - | +85 | °C |
| ESD contact discharge | - | - | ±4 | kV |
| ESD air discharge | - | - | ±8 | kV |

Table 4-1: General specification

4.2 Arduino™ Specification

| Parameter | Description |
|-----------------|-------------------------|
| Microcontroller | ATSAMD21J18, 64 pin QFN |
| Architecture | ARM Cortex-M0+ |
| Operating Value | 3.3V |
| Flash memory | 256KB |
| SRAM | 32kB |
| Clock Speed | 48MHz |
| Compatibility | Arduino™ M0 / M0 Pro |

Table 4-2: Arduino specification

¹ With running example code "M0_UARTBridge" and iM282A in RX-mode

² For detailed information to the SAMD21-specific parameters please refer to the corresponding SAMD21 datasheet

5. Pin-out Description

This chapter describes the different connectors of WiMODino.

5.1 Overview

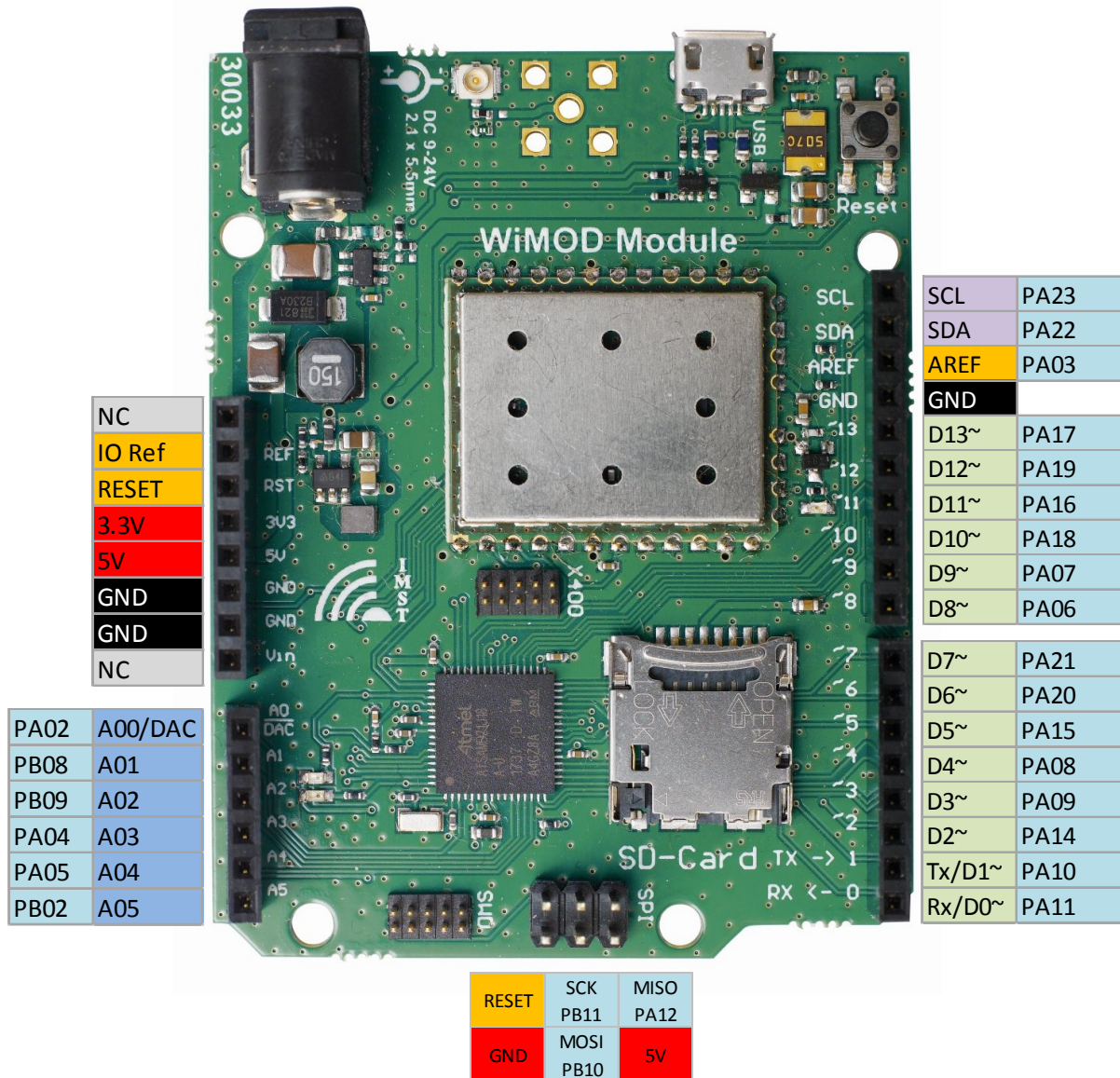


Figure 5-1: WiMODino pin-description

5.2 Arduino IOH-X200

X200 is the Arduino socket for the higher digital IO's D8 to D13, analog reference input and the I2C interface.

| Pin | Name | ATSAMD21 Pin | Description |
|-----|------|--------------|-------------|
| 1 | D8 | PA06 | |
| 2 | D9 | PA07 | |
| 3 | D10 | PA18 | |
| 4 | D11 | PA16 | |
| 5 | D12 | PA19 | |
| 6 | D13 | PA17 | |
| 7 | GND | - | |
| 8 | AREF | PA03 | |
| 9 | SDA | PA22 | |
| 10 | SCL | PA23 | |

Table 5-1: Pin-description X204

5.3 Arduino IOL-X202

X202 is the Arduino socket for the lower digital IO's D0 to D7.

| Pin | Name | ATSAMD21 Pin | Description |
|-----|------|--------------|-------------|
| 1 | D0 | PA11 | |
| 2 | D1 | PA10 | |
| 3 | D2 | PA14 | |
| 4 | D3 | PA09 | |
| 5 | D4 | PA08 | |
| 6 | D5 | PA15 | |
| 7 | D6 | PA20 | |
| 8 | D7 | PA21 | |

Table 5-2: Pin-description X202

5.4 Arduino Power-X204

X204 is the Arduino socket for the power supply.

| Pin | Name | ATSAMD21 Pin | Description |
|-----|----------|--------------|---|
| 1 | Reserved | - | |
| 2 | IOREF | - | Connected to 3.3V |
| 3 | nReset | NRESET | |
| 4 | 3V3 | - | 3.3V input/output, connected to output of internal 3.3V voltage regulator |
| 5 | 5V | - | 5V input/output, connected to USB and 3.3V regulator input |
| 6 | GND | - | |
| 7 | GND | - | |
| 8 | VIN | - | Connected to power supply jack |

Table 5-3: Pin-description X204

5.5 Arduino ADC-X206

X206 is the Arduino socket for the analog IO's A0 to A5.

| Pin | Name | ATSAMD21 Pin | Description |
|-----|--------|--------------|-------------|
| 1 | A0-DAC | PA02 | |
| 2 | A1 | PB08 | |
| 3 | A2 | PB09 | |
| 4 | A3 | PA04 | |
| 5 | A4 | PA05 | |
| 6 | A5 | PB02 | |

Table 5-4: Pin-description X206

5.6 Arduino ICSP-X207

X207 is the Arduino ICSP header for Arduino's SPI interface.

! Signal level should not exceed 3.3V !

| Pin | Name | ATSAMD21 Pin | Description |
|-----|--------|--------------|-----------------------|
| 1 | MISO | PA12 | Arduino SPI MISO line |
| 2 | 5V | - | |
| 3 | SCK | PB11 | Arduino SPI SCK line |
| 4 | MOSI | PB10 | Arduino SPI MOSI line |
| 5 | nReset | NRESET | |
| 6 | GND | - | |

Table 5-5: Pin-description X207

5.7 SAMD21 SWD Programming Connector X203

X203 is the programming header for the ATSAM21J18.

| Pin | Name | ATSAMD21 Pin | Description |
|-----|-------|---------------|-------------|
| 1 | Vcc | Vcc | |
| 2 | SWDIO | PA31 / SWDIO | |
| 3 | GND | GND | |
| 4 | SWCLK | PA30 / SWCLK | |
| 5 | GND | GND | |
| 6 | SWO | not connected | |
| 7 | N/U | not connected | |
| 8 | N/U | not connected | |
| 9 | GND | GND | |
| 10 | RESET | RESET | |

Table 5-6: Pin-description X203

5.8 WiMOD Module Connections

| WiMOD Pin | ATSAMD21 Pin | Description / Symbolic name within the Arduino IDE |
|-----------|--------------|--|
| P7-#RESET | PB05 | PIN_WIMOD_NRST |
| P8-CTS | PB23 | PIN_WIMOD_CTS |
| P9-RTS | PB22 | PIN_WIMOD_RTS |
| P12-SW2 | PB15 | PIN_WIMOD_SW2 |
| P13-SW1 | PB14 | PIN_WIMOD_SW1 |
| P14-SW3 | PB16 | PIN_WIMOD_SW3 |
| P18-RXD | PB30 | PIN_WIMOD_UART_RX ; use "SerialWiMOD" as interface inside .ino |
| P19-TXD | PB31 | PIN_WIMOD_UART_TX; use "SerialWiMOD" as interface inside .ino |
| P20-LED4 | PB13 | PIN_WIMOD_LED4 |
| P24-LED3 | PB12 | PIN_WIMOD_LED3 |
| P25-LED2 | PB00 | PIN_WIMOD_LED2 |
| P26-Boot | PB04 | PIN_WIMOD_BOOT |
| P29-LED1 | PB01 | PIN_WIMOD_LED1 |

Table 5-7: Description of WiMOD module connections

5.9 WIMOD SWD Programming Connector X400

| Pin | Name | WiMOD Pin | Description |
|-----|-------|---------------|-------------|
| 1 | Vcc | Vcc | |
| 2 | SWDIO | P3 / SWDAT | |
| 3 | GND | GND | |
| 4 | SWCLK | P2 / SWCLK | |
| 5 | GND | GND | |
| 6 | SWO | not connected | |
| 7 | N/U | not connected | |
| 8 | N/U | not connected | |
| 9 | GND | GND | |
| 10 | RESET | P7 / RESET | |

Table 5-8: Pin description X203

5.10 Micro-SD Card Connections

| μ SD-Card | ATSAMD21 Pin | Description |
|---------------|--------------|--|
| SCK | PB11 | |
| MOSI | PB10 | |
| MISO | PA12 | |
| CS | PA13 | Chip select for the micro SD card SPI interface. (PIN_USD_CARD_CS) |
| CD | PB17 | Card detect signal from micro SD card holder. (PIN_USD_CARD_CD) |

Table 5-9: Description of micro-SD card connections

6. Ordering Information

| Name/Part Number | Description | Weight | Distributor |
|--|---|--------|--|
| WiMODino-iM880B/ Art.Nr.: 404804 | WiMODino with LoRa® Module iM880B | Tbd. | sales@imst.de webshop.imst.de |
| WiMODino-iM881A/ Art.Nr.: 404803 | WiMODino with LoRa® Module iM881A | Tbd. | sales@imst.de webshop.imst.de |
| WiMODino-iM282A/ Art.Nr.: 404814 | WiMODino with LoRa® Module iM282A | Tbd. | sales@imst.de webshop.imst.de |
| Related Components | | | |
| iM880B-L LR_BASE/Art.Nr.: 404785 iM880B-L LoRaWAN™/Art.Nr.: 404791 | LoRa® Module with LR_BASE SW LoRa® Module with LoRaWAN™ SW | Tbd. | sales@imst.de webshop.imst.de |
| iM881A-M LR_BASE/Art.Nr.: 404771 iM881A-XL LoRaWAN™/Art.Nr.: 404774 | LoRa® Module with LR_BASE SW LoRa® Module with LoRaWAN™ SW | Tbd. | sales@imst.de webshop.imst.de |
| iM282A-L LR_BASE PLUS/Art.Nr.: 404744 | LoRa® Module with LR_BASE Plus SW | Tbd. | sales@imst.de webshop.imst.de |

Table 6-1: Ordering Information

7. Appendix

7.1 List of Abbreviations

| | |
|------------------|------------------------------|
| ADC | Analog-to-Digital Converter |
| CW | Continuous Wave |
| GND | Ground |
| GPIO | General Purpose Input/Output |
| I ² C | Inter-Integrated Circuit |
| MCU | Microcontroller Unit |
| PCB | Printed Circuit Board |
| RAM | Random Access Memory |
| RF | Radio Frequency |
| SMBus | System Management Bus |
| SMT | Surface Mounted Technology |
| SPI | Serial Peripheral Interface |
| TRX | Transceiver |
| USB | Universal Serial Bus |

7.2 List of Figures

| | |
|---|----|
| Figure 2-1: WiMODino | 6 |
| Figure 3-1: WiMODino Hardware Components..... | 8 |
| Figure 3-2: WiMODino Hardware Connectors..... | 9 |
| Figure 5-1: WiMODino pin-description | 11 |

7.3 List of Tables

| | |
|---|----|
| Table 2-1: Supported radio modules and firmware..... | 7 |
| Table 4-1: General specification | 10 |
| Table 4-2: Arduino specification | 10 |
| Table 5-1: Pin-description X204 | 12 |
| Table 5-2: Pin-description X202 | 12 |
| Table 5-3: Pin-description X204 | 13 |
| Table 5-4: Pin-description X206 | 13 |
| Table 5-5: Pin-description X207 | 13 |
| Table 5-6: Pin-description X203 | 14 |
| Table 5-7: Description of WiMOD module connections | 14 |
| Table 5-8: Pin description X203 | 15 |
| Table 5-9: Description of micro-SD card connections | 15 |
| Table 6-1: Ordering Information | 16 |



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 module. 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.

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.

9. Important Notice

9.1 Disclaimer

IMST GmbH points out that all information in this document is given on an “as is” basis. No guarantee, neither explicit nor implicit is given for the correctness at the time of publication. IMST GmbH reserves all rights to make corrections, modifications, enhancements, and other changes to its products and services at any time and to discontinue any product or service without prior notice. It is recommended for customers to refer to the latest relevant information before placing orders and to verify that such information is current and complete. All products are sold and delivered subject to “General Terms and Conditions” of IMST GmbH, supplied at the time of order acknowledgment.

IMST GmbH assumes no liability for the use of its products and does not grant any licenses for its patent rights or for any other of its intellectual property rights or third-party rights. It is the customer’s duty to bear responsibility for compliance of systems or units in which products from IMST GmbH are integrated with applicable legal regulations. Customers should provide adequate design and operating safeguards to minimize the risks associated with customer products and applications. The products are not approved for use in life supporting systems or other systems whose malfunction could result in personal injury to the user. Customers using the products within such applications do so at their own risk.

Any reproduction of information in datasheets of IMST GmbH is permissible only if reproduction is without alteration and is accompanied by all given associated warranties, conditions, limitations, and notices. Any resale of IMST GmbH products or services with statements different from or beyond the parameters stated by IMST GmbH for that product/solution or service is not allowed and voids all express and any implied warranties. The limitations on liability in favor of IMST GmbH shall also affect its employees, executive personnel and bodies in the same way. IMST GmbH is not responsible or liable for any such wrong statements.

Contact us to get information about the Declaration of Conformity.

Copyright © 2019, IMST GmbH

9.2 Contact Information

IMST GmbH

Carl-Friedrich-Gauss-Str. 2-4
47475 Kamp-Lintfort
Germany

T +49 2842 981 0 E sales@imst.de
F +49 2842 981 299 I www.wireless-solutions.de