SmartConnect

ATWILC3000 Shield User Guide

USER GUIDE

Preface

Atmel® ATWILC3000 Shield is an interface board designed to demonstrate ATWILC3000-MR110CA, a single chip IEEE® 802.11 b/g/n RF/ Baseband/MAC link controller and Bluetooth® 4.0 optimized for low-power mobile applications. ATWILC3000 module can be connected to host MCU board using either SDIO or SPI peripheral interface for Wi-Fi® and UART for Bluetooth.

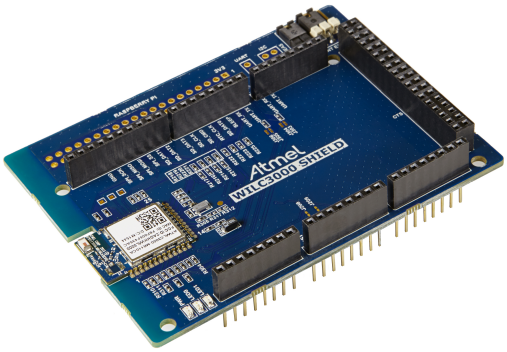


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1. Introduction

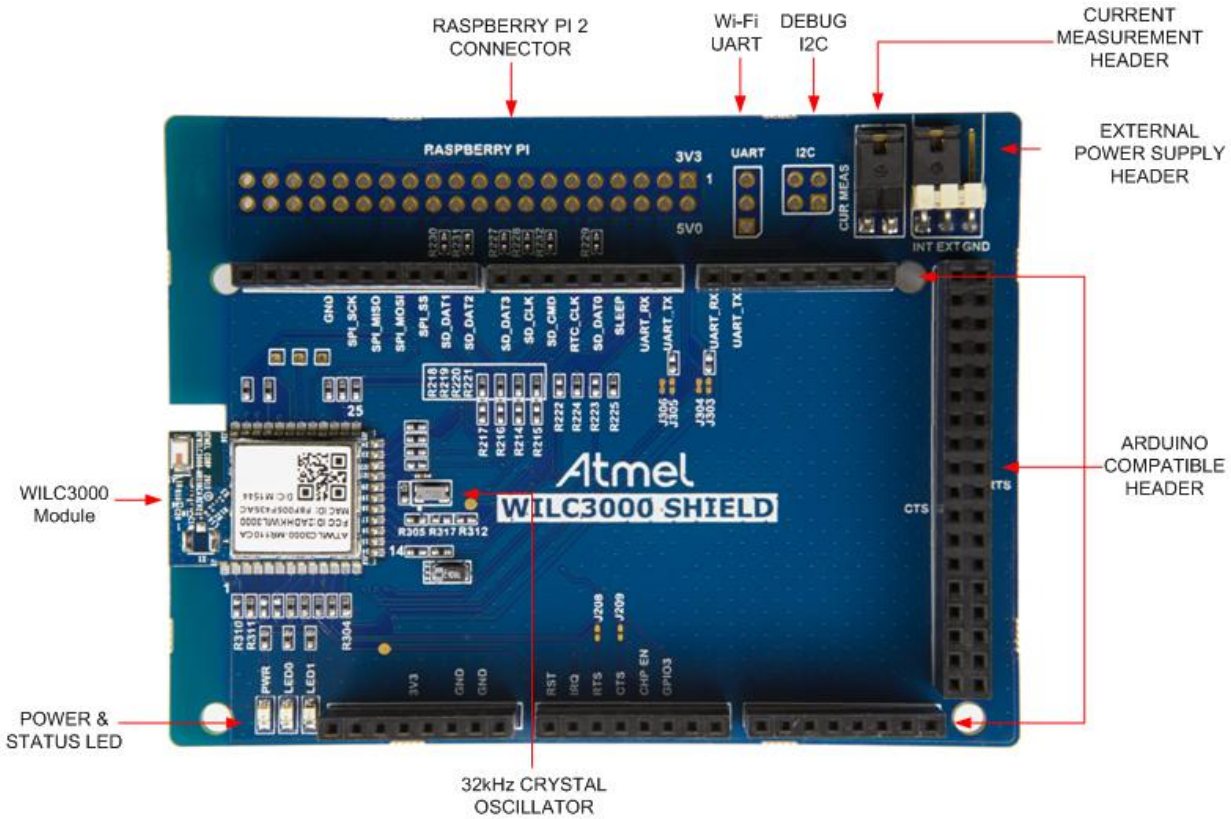
1.1. Features

- ATWILC3000-MR110CA low-power consumption 802.11 b/g/n IoT module
  - Single chip IEEE 802.11 b/g/n RF/Baseband/MAC link controller and Bluetooth 4.0 optimized for low-power mobile applications
  - Cortus APS3 32-bit processor
  - Chip antenna
- Debug I^2C header
- Debug UART header
- External power supply header
- Current measurement header
- Power and user LED
- 32.768kHz low-power SMD crystal oscillator
- Arduino Shield Stackable Connector
  - By default ATWILC3000 module connected through Arduino Shield Connector through SDIO for Wi-Fi. Pin-out compatible with ATSAMA5D4-XULT.
  - Optional SPI connection to ATWILC3000 module for Wi-Fi. Pin-out compatible with Arduino header specification.
  - ATWILC3000 module connected through UART for Bluetooth
- Raspberry Pi Stackable Connector
  - ATWILC3000 module connected to Raspberry Pi connector using SPI or SDIO for Wi-Fi and UART for Bluetooth

1.2. Kit Overview

The Atmel ATWILC3000 Shield is a shield board containing the ATWILC3000-MR110CA, low-power consumption 802.11 b/g/n IoT module. The shield board can be connected to a Host MCU board through either SDIO or SPI peripheral interface. ATWILC3000 Shield is by default configured to be used with SDIO interface compatible with Atmel SAMA5D4-XULT.

Figure 1-1. ATWILC3000 Shield Evaluation Kit Overview



2. Getting Started

ATWILC3000 Shield is by default configured to be used with the Atmel SAMA5D4-XULT using an SDIO peripheral interface. The ATWILC3000 Shield can also be configured to be used with other host MCU boards using SPI peripheral interface exposed through Arduino compatible connectors. Refer to **ATWILC3000 Wiki** for the list of supported boards and getting started user guides.

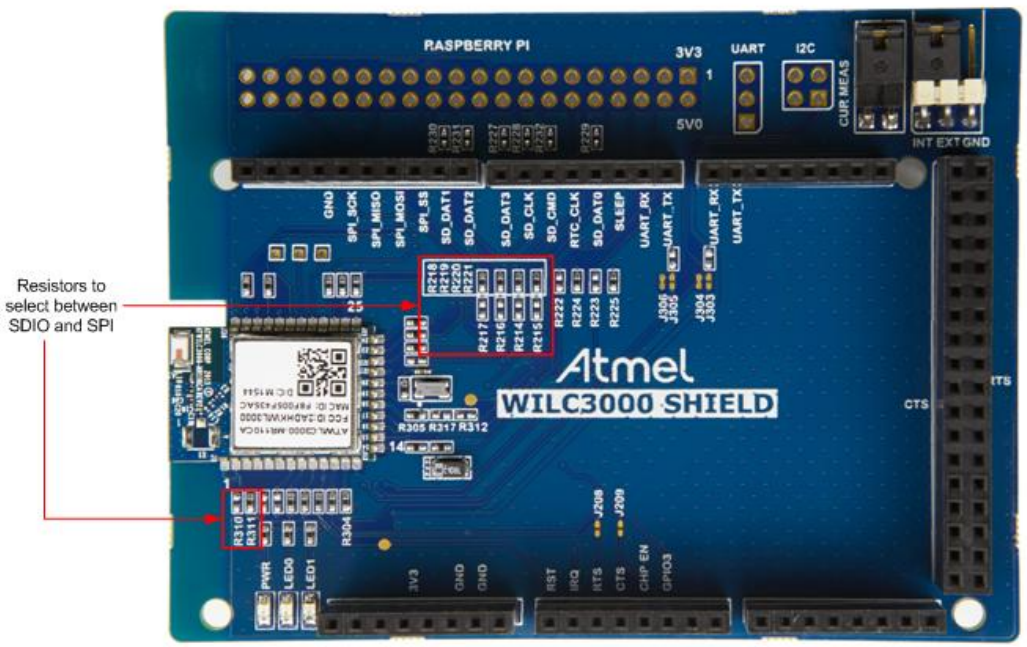
3. ATWILC3000 Shield Peripheral Configuration

The ATWILC3000 module on the shield board can communicate with the host board using either SDIO or SPI. By default SDIO is supported on board. A resistor combination has to be modified to add SPI support. Refer to the below table for more information.

Table 3-1. ATWILC3000 Shield Resistor Configuration for SDIO/SPI

Peripheral interface	Modification required in resistors
SDIO	Mounted resistors: R311, R218, R219, R220, R221 Not mounted resistors: R214, R215, R216, R217, R310
SPI	Mounted resistors: R214, R215, R216, R217, R310 Not mounted resistors: R218, R219, R220, R221, R311

Figure 3-1. ATWILC3000 Shield SDIO-SPI Resistors



4. Design Documentation and Relevant Links

The following list contains links to the most relevant documents and software for ATWILC3000 Shield:

- **Xplained products** - Atmel Xplained evaluation kits are a series of easy-to-use evaluation kits for Atmel microcontrollers and other Atmel products. For low pin-count devices the Xplained Nano series provides a minimalistic solution with access to all I/O pins of the target microcontroller. Xplained Mini kits are for medium pin-count devices and adds Arduino Uno compatible header footprint and a prototyping area. Xplained Pro kits are for medium to high pin-count devices, they features advanced debugging and standardized extensions for peripheral functions. All these kits have on board programmers/debuggers which creates a set of low-cost boards for evaluation and demonstration of features and capabilities of different Atmel products.
- **Atmel Studio** - Free Atmel IDE for development of C/C++ and assembler code for Atmel microcontrollers.
- **Atmel Data Visualizer** - Atmel Data Visualizer is a program used for processing and visualizing data. Data Visualizer can receive data from various sources such as the Embedded Debugger Data Gateway Interface found on Xplained Pro boards and COM ports.
- **ATWILC3000**
- **ATWILC3000 Wireless Wiki**
- **Atmel | SMART SAMA5 ARM® Cortex® Based MPUs**

5. Hardware Users Guide

5.1. Headers and Connectors

5.1.1. ATWILC3000 Shield Arduino Shield Stacking Connector

ATWILC3000 Shield has Arduino Shield stacking connectors making it possible to connect the board to an MCU base board as well as exposing the unused pins to the user. The pin-out definition for the Shield connector is given in the tables below.

Table 5-1. J200 Stacking Connector

Pins on J200	Function	Description
1	SD_DAT2	SDIO Data 2
2	SD_DAT1	SDIO Data 1
3	SPI_SS	SPI Select. By default not connected. Mount R217 (0Ω) to connect.
4	SPI_MOSI	SPI MOSI. By default not connected. Mount R216 (0Ω) to connect.
5	SPI_MISO	SPI MISO. By default not connected. Mount R215 (0Ω) to connect.
6	SPI_SCK	SPI Clock. By default not connected. Mount R214 (0Ω) to connect.
7	GND	Ground
8	NC	Not Connected
9	NC	Not Connected
10	NC	Not Connected

Table 5-2. J201 Stacking Connector

Pin on J201	Function	Description
1	NC	Not Connected
2	NC	Not Connected
3	NC	Not Connected
4	VCC_INT_P3V3	3.3V Power Supply. Mount Jumper Cap on J300-1 and J300-2 to use this supply.
5	NC	Not Connected
6	GND	Ground

Pin on J201	Function	Description
7	GND	Ground
8	NC	Not Connected

Table 5-3. J202 Stacking Connector

Pin on J202	Function	Description
1	SD_DAT3	SDIO Data 3
2	SD_CLK	SDIO Clock
3	SD_CMD	SDIO Command
4	PWML2/RTC_CLK	By default not connected. Mount R315 (0Ω) to connect.
5	SD_DAT0	SDIO Data 0
6	SLEEP	Sleep Mode Control
7	UART RX	Bluetooth UART RXD. By default not connected. Mount R222 (0Ω) to connect.
8	UART TX	Bluetooth UART TXD. By default not connected. Mount R223 (0Ω) to connect.

Table 5-4. J203 Stacking Connector

Pin on J203	Function	Description
1	RST	ATWILC3000 Reset to be controlled by the host MCU
2	IRQN	Host Interrupt Request Output
3	RTS	Bluetooth UART RTS Output. By default not connected. Short J208 to connect.
4	CTS	Bluetooth UART CTS Input. By default not connected. Short J209 to connect.
5	CHIP_EN	Chip Enable
6	GPIO3/SUSPEND	GPIO signal
7	NC	Not Connected
8	NC	Not Connected

Table 5-5. J204 Stacking Connector

Pin on J204	Function	Description
1	UART_RX_1	Bluetooth UART RXD
2	UART_TX_1	Bluetooth UART TXD
3	NC	Not Connected
4	NC	Not Connected
5	NC	Not Connected
6	NC	Not Connected
7	NC	Not Connected
8	NC	Not Connected

Table 5-6. J205 Stacking Connector

Pin on J205	Function	Description
20	UART RTS	Bluetooth UART RTS Output
21	UART CTS	Bluetooth UART CTS Input
35	GND	Ground
36	GND	Ground

5.1.2. ATWILC3000 Shield Raspberry Pi Stacking Connector

ATWILC3000 Shield has Raspberry Pi compatible 40-pin stacking connectors making it possible to connect the board to Raspberry Pi base board as well as exposing the unused pins to the user. The pin-out definition for the Raspberry Pi connector is given below.

Table 5-7. J207 Stacking Connector

Pin no. on J207	Function	Description
1	VCC_INT_P3V3	3.3V Power supply. Insert Jumper Cap on J300-1 and J300-2 to use this power supply.
2	NC	Not Connected
3	GPIO3/SUSPEND	GPIO signal
4	NC	Not Connected
5	CHIP EN	ATWILC3000 Chip Enable to be controlled by the host MCU
6	GND	Ground
7	IRQN	Host Interrupt Request Output
8	UART_RX	Bluetooth UART RXD
9	GND	Ground
10	UART_TX	Bluetooth UART TXD

Pin no. on J207	Function	Description
11	CTS	Bluetooth UART CTS Input
12	GEN1/RTC_CLK	By default not connected. Mount R315 (0Ω) to connect.
13	SDDATA3	SDIO Data 3. By default not connected. Mount R227 (0Ω) to connect.
14	GND	Ground
15	SDCLK	SDIO Clock. By default not connected. Mount R228 (0Ω) to connect.
16	SDCMD	SDIO Command. By default not connected. Mount R232 (0Ω) to connect.
17	SDCLK	SDIO Clock. By default not connected. Mount R228 (0Ω) to connect.
18	NC	Not Connected
19	SPI MOSI	SPI MOSI. By default not connected. Mount R216 (0Ω) to connect.
20	GND	Ground
21	SPI MISO	SPI MISO. By default not connected. Mount R215 (0Ω) to connect.
22	SDDATA1	SDIO Data 1. By default not connected. Mount R230 (0Ω) to connect.
23	SPI SCLK	SPI Clock. By default not connected. Mount R214 (0Ω) to connect.
24	SPI CS0	SPI Select. By default not connected. Mount R217 (0Ω) to connect.
25	GND	Ground
26	SLEEP	Sleep Mode Control
27	NC	Not Connected
28	NC	Not Connected
29	NC	Not Connected
30	GND	Ground

Pin no. on J207	Function	Description
31	NC	Not Connected
32	RST	ATWILC3000 Reset to be controlled by host MCU
33	NC	Not Connected
34	GND	Ground
35	NC	Not Connected
36	RTS	Bluetooth UART RTS Output. By default not connected. Short J208 to connect.
37	SDDATA2	SDIO Data 1. By default not connected. Mount R231 (0Ω) to connect.
38	NC	Not Connected
39	GND	Ground
40	NC	Not Connected

5.1.3. Power Supply

The ATWILC3000 Shield can be powered either from the Shield Connector or from external power supply. Header J300 is used to choose between 3.3V supply from Shield connector or 3.3V external power supply. Refer to the table below for more information.

Table 5-8. ATWILC3000-SHLD J300 Power Supply Connector

Pin No	Description
1	3.3V internal power supply from Shield Connector
2	3.3V external power supply pin
3	Ground

Table 5-9. ATWILC3000-SHLD Power Supply Connector Configuration

Power Supply	J300 connector configuration
3.3V supply from either Arduino Shield or Raspberry Pi depending on which one is used.	Place jumper cap between J300-1 and J300-2. J300-3 is not connected.
3.3V external power supply	Remove jumper cap from J300-1 and J300-2. Apply external power to J300-2 and J300-3.

5.1.4. Power Measurement Header

Current measurement header "J301" can be used to measure the current consumed by the ATWILC3000 module using an ammeter. There are two 0Ω resistors, "R304" and "R305", that can be used to measure the current consumed by individual power rails, "VDDIO" and "VBAT" respectively.

5.1.5. Debug Connectors

"Debug I^2C" (J302) and Wi-Fi UART (J307) are not mounted on the board.

Table 5-10. Debug I²C Connector

Pin on I²C connector	Pin on ATWILC3000 module	Function
1	10	I²C SCL
2	1	Ground
3	11	I²C SDA
4	-	Not Connected

Table 5-11. Wi-Fi UART Connector

Pin on extension port	Pin on ATWILC3000 module	Function
1	17	UART RX
2	16	UART TX
3	1	Ground

6. CE and FCC

The ATWILC3000 Shield unit has been tested at SDIO clock frequency of 29.34MHz in accordance to the essential requirements and other relevant provisions of :

- Emission
  - FCC part 15 subpart B: 2013 (Class B)EN 55022:2010 Class B
  - EN 55024:2010 Class B
- Immunity
  - EN 55024:2010
  - EN 61000-4-2:2009 contact: level 2 (±4kV), air: level 2 (±8kV)
  - EN 61000-4-3:2006+A2:2010 80-1000MHz, level 2 (3V/m)
  - EN 61000-4-8:2010 level 2 (3A/m), continuous field

The Technical Construction File is located at:

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Atmel Norway
Vestre Rosten 79
7075 Tiller
Norway
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Every effort has been made to minimize electromagnetic emissions from this product. However, under certain conditions, the system (this product connected to a target application circuit) may emit individual electromagnetic component frequencies which exceed the maximum values allowed by the above mentioned standards. The frequency and magnitude of the emissions will be determined by several factors, including layout and routing of the target application with which the product is used.

7. Hardware Revision History and Known Issues

7.1. Identifying Product ID and Revision

The revision and product identifier of ATWILC3000 Shield can be found by looking at the sticker on the bottom side of the PCB. The identifier and revision are printed in plain text as A09-nnnn\rr, where nnnn is the identifier and rr is the revision. Also the label contains a 10 digit serial number unique to each board.

The product identifier for ATWILC3000 Shield is A09-2616.

7.2. Revision

Revision 4 is the initially released revision, there are no known issues.

8. Evaluation Board/Kit Important Notice

This evaluation board/kit is intended for use for **FURTHER ENGINEERING, DEVELOPMENT, DEMONSTRATION, OR EVALUATION PURPOSES ONLY.** It is not a finished product and may not (yet) comply with some or any technical or legal requirements that are applicable to finished products, including, without limitation, directives regarding electromagnetic compatibility, recycling (WEEE), FCC, CE or UL (except as may be otherwise noted on the board/kit). Atmel supplied this board/kit "AS IS", without any warranties, with all faults, at the buyer's and further users' sole risk. The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user indemnifies Atmel from all claims arising from the handling or use of the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge and any other technical or legal concerns.

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9. Document Revision History

Doc. rev.	Date	Comment
42731A	05/2016	Initial document release.







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