SmartConnect

ATWINC3400-XPRO

USER GUIDE

Preface

Atmel® ATWINC3400-XPRO is an extension board to evaluate the performance of ATWINC3400-MR210CA, an IEEE® 802.11 b/g/n RF/Baseband/MAC Link Controller with Integrated Low Energy Bluetooth® 4.0 compliant module. ATWINC3400 Xplained Pro extension is designed to provide Wi-Fi® and Bluetooth functionality in 2.4GHz ISM band to the Atmel Xplained Pro evaluation platform. This kit provides easy access to the features of the ATWINC3400-MR210CA and explains how to integrate the device in a custom design.

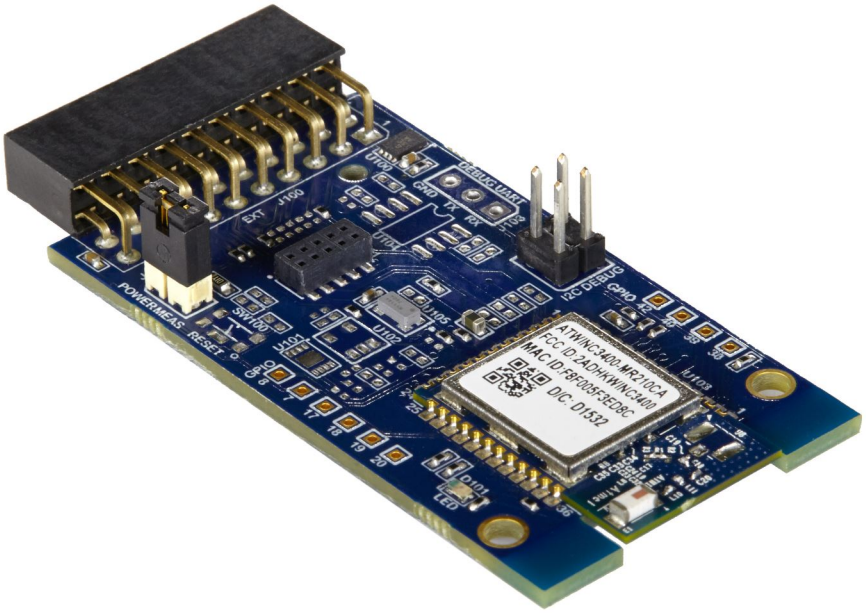


Table of Contents

Preface 1

1. Introduction 3
   - 1.1. Features 3
   - 1.2. Kit Overview 3
2. Getting Started 5
   - 2.1. Xplained Pro Quick Start 5
   - 2.2. Design Documentation and Relevant Links 5
3. Xplained Pro 7
   - 3.1. Hardware Identification System 7
   - 3.2. Xplained Pro Standard Extension Header 7
4. Hardware Users Guide 9
   - 4.1. Headers and Connectors 9
   - 4.2. ATWINC3400-XPRO Peripherals 11
5. Hardware Revision History and Known Issues 13
   - 5.1. Identifying Product ID and Revision 13
   - 5.2. Revision 13
6. Evaluation Board/Kit Important Notice 14
7. Document Revision History 15

1. Introduction

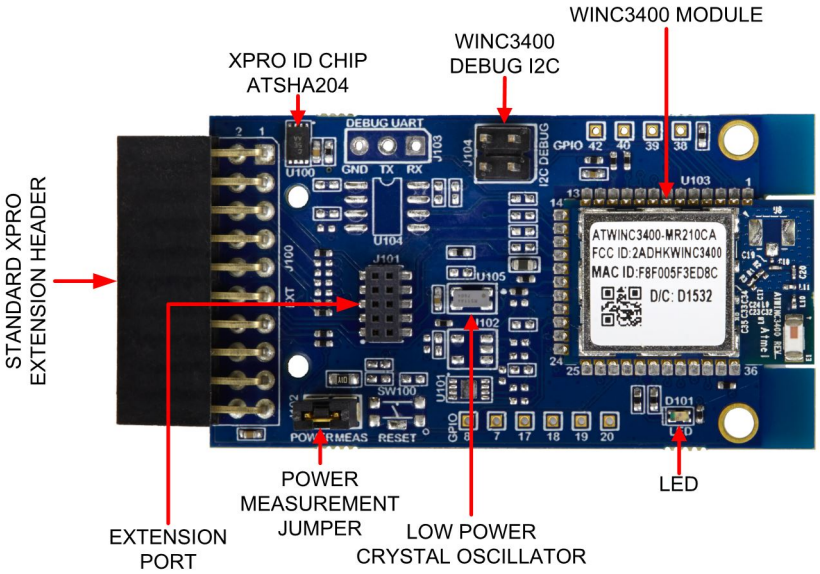
1.1. Features

- Atmel **ATWINC3400-MR210CA**: IEEE 802.11 b/g/n Link Controller with Integrated Low Energy Bluetooth 4.0 compliant module
  - IEEE 802.11 b/g/n 20MHz (1x1) Wi-Fi solution
    - Single spatial stream, up to 72Mbps PHY rate in 2.4GHz ISM band
    - Network features: TCP, UDP, DHCP, ARP, HTTP, SSL, and DNS
    - Host interface via SPI
  - Bluetooth Low Energy (BLE) 4.0
    - Class 1 and 2 transmission
    - Adaptive Frequency Hopping
    - HCI (Host Control Interface) via high speed UART
  - Integrated PA, T/R switch and chip antenna
  - Superior sensitivity and range
  - On-Chip Network Stack to offload MCU
  - Integrated flash memory for system software
  - I^2C and UART host interfaces
  - Operating temperature range -40 to +85°C
- Debug I^2C and UART headers
- Current Measurement header
- Optional SPI flash boot
- Optional Crypto Authentication
- Xplained Pro extension hardware identification system

1.2. Kit Overview

The Atmel ATWINC3400-XPRO is a carrier board for the SmartConnect-ATWINC3400-MR210CA Wi-Fi/BT module for the Xplained Pro platform. It connects to any Xplained Pro standard extension header on any Xplained Pro MCU board to provide Wi-Fi/BT functionality.

Figure 1-1. ATWINC3400-XPRO



2. Getting Started

ATWINC3400-XPRO has been designed to be connected to an Xplained Pro extension header marked as EXT1. However, it is compatible with all Xplained Pro EXT headers. Refer to the pin-out of your Xplained Pro evaluation kit to find out which Xplained Pro EXT headers can be used.

2.1. Xplained Pro Quick Start

Steps to start exploring the Atmel Xplained Pro platform:

1. Download Atmel Studio.
2. Launch Atmel Studio.
3. Connect a USB cable (Standard-A to Micro-B or Micro-AB) between the PC and the DEBUG USB port on the kit.
4. Connect ATWINC3400-XPRO to an Xplained Pro MCU board and connect a USB cable to the DEBUG USB port on the Xplained Pro MCU board.

When the Xplained Pro MCU kit is connected to your computer for the first time, the operating system will perform a driver software installation. The driver file supports both 32- and 64-bit versions of Microsoft® Windows® XP, Windows Vista®, Windows 7, Windows 8, Windows 10, and Windows Server 2012.

Once the Xplained Pro MCU board is powered the green power LED will be lit and Atmel Studio will auto detect which Xplained Pro MCU- and extension board(s) are connected. Atmel Studio will present relevant information like datasheets and kit documentation. The kit landing page in Atmel Studio also has the option to launch Atmel Software Framework (ASF) example applications for the kit. The target device is programmed and debugged by the on-board Embedded Debugger and therefore no external programmer or debugger tool is needed.

2.2. Design Documentation and Relevant Links

The following list contains the links to the most relevant documents and software for ATWINC3400-XPRO:

- **Xplained Pro products** - Atmel Xplained Pro is a series of small-sized and easy-to-use evaluation kits for Atmel microcontrollers and other Atmel products. It consists of a series of low-cost MCU boards for evaluation and demonstration of features and capabilities of different MCU families.
- **ATWINC3400-XPRO User Guide**- PDF version of this User Guide.
- **ATWINC3400-XPRO Design Documentation**- Package containing schematics, BOM, assembly drawings, 3D plots, layer plots, etc.
- **Atmel Studio**- Free Atmel IDE for development of C/C++ and assembler code for Atmel microcontrollers.
- **EDBG User Guide** - User guide containing more information about the on-board Embedded Debugger.
- **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.
- **ATWINC3400-XPRO**- Product page.
- **ATWINC3400-MR210CA**- Wireless module datasheet.
- **ATWINC3400**- Wireless chip datasheet.
- **ATWINC3400 BLE Provisioning – Setup and Usage**- Application Note.

- **ATECC508A-MAHDA-T** - Crypto Authentication Device datasheet.
- **AT24MAC602-STUM-T** - Serial EEPROM datasheet.

3. Xplained Pro

Xplained Pro is an evaluation platform that provides the full Atmel microcontroller experience. The platform consists of a series of Microcontroller (MCU) boards and extension boards, which are integrated with Atmel Studio, have Atmel Software Framework (ASF) drivers and demo code, support data streaming, and more. Xplained Pro MCU boards support a wide range of Xplained Pro extension boards, which are connected through a set of standardized headers and connectors. Each extension board has an identification (ID) chip to uniquely identify which boards are connected to an Xplained Pro MCU board. This information is used to present relevant user guides, application notes, datasheets, and example code through Atmel Studio.

3.1. Hardware Identification System

All Xplained Pro compatible extension boards have an Atmel ATSHA204 CryptoAuthentication™ chip mounted. This chip contains information that identifies the extension with its name and some extra data. When an Xplained Pro extension is connected to an Xplained Pro MCU board the information is read and sent to Atmel Studio. The Atmel Kits extension, installed with Atmel Studio, will give relevant information, code examples, and links to relevant documents. The table below shows the data fields stored in the ID chip with example content.

Table 3-1. Xplained Pro ID Chip Content

Data field	Data type	Example content
Manufacturer	ASCII string	Atmel'\0'
Product Name	ASCII string	Segment LCD1 Xplained Pro'\0'
Product Revision	ASCII string	02'\0'
Product Serial Number	ASCII string	1774020200000010'\0'
Minimum Voltage [mV]	uint16_t	3000
Maximum Voltage [mV]	uint16_t	3600
Maximum Current [mA]	uint16_t	30

3.2. Xplained Pro Standard Extension Header

All Xplained Pro kits have one or more dual row, 20-pin, 100mil extension header. Xplained Pro MCU boards have male headers, while Xplained Pro extensions have their female counterparts. Note that all pins are not always connected. All connected pins follow the defined pin-out description in the table below.

The extension headers can be used to connect a variety of Xplained Pro extensions to Xplained Pro MCU boards or to access the pins of the target MCU on Xplained Pro MCU boards directly.

Table 3-2. Xplained Pro Standard Extension Header

Pin number	Name	Description
1	ID	Communication line to the ID chip on an extension board
2	GND	Ground

Pin number	Name	Description
3	ADC(+)	Analog to digital converter, alternatively positive part of differential ADC
4	ADC(-)	Analog to digital converter, alternatively negative part of differential ADC
5	GPIO1	General purpose I/O
6	GPIO2	General purpose I/O
7	PWM(+)	Pulse width modulation, alternatively positive part of differential PWM
8	PWM(-)	Pulse width modulation, alternatively negative part of differential PWM
9	IRQ/GPIO	Interrupt request line and/or general purpose I/O
10	SPI_SS_B/ GPIO	Slave select for SPI and/or general purpose I/O
11	I^2C_SDA	Data line for I^2C interface. Always implemented, bus type.
12	I^2C_SCL	Clock line for I^2C interface. Always implemented, bus type.
13	UART_RX	Receiver line of target device UART
14	UART_TX	Transmitter line of target device UART
15	SPI_SS_A	Slave select for SPI. Should preferably be unique.
16	SPI_MOSI	Master out slave in line of serial peripheral interface. Always implemented, bus type.
17	SPI_MISO	Master in slave out line of serial peripheral interface. Always implemented, bus type.
18	SPI_SCK	Clock for serial peripheral interface. Always implemented, bus type.
19	GND	Ground
20	VCC	Power for extension board

4. Hardware Users Guide

4.1. Headers and Connectors

4.1.1. ATWINC3400-XPRO Extension Header

ATWINC3400-XPRO implements one Xplained Pro Standard Extension Header marked with EXT in PCB silkscreen. This header makes it possible to connect the board to any Xplained Pro MCU board. The pin-out definition for the extension header can be seen below.

Table 4-1. ATWINC3400-XPRO Extension Connector

Pin on EXT	Function	Description
1	ID_DATA	Communication line to ID chip
2	GND	Ground
3	HOST_WAKEUP	Wakeup signal to the host from wireless module
4	RESET_N	Reset signal from Xpro's host MCU
5	UART_RTS	Request To Send (RTS) for 4-pin UART interface flow control/handshaking
6	UART_CTS	Clear To Send (CTS) for 4-pin UART interface flow control/ handshaking
7	CHIP_EN	Secondary optional Chip enable signal for wireless module from host MCU of an XPRO in which pin 10 of EXT header can't be used for Chip enable.
8	RTC_MCU	Real-time clock from Host MCU. It is secondary clock source. Primary clock is from on-board RTC oscillator.
9	IRQN	Interrupt request to host
10	CHIP_EN	Primary Chip enable signal for wireless module from host MCU
11	I2C_SDA_S	Data line for slave I^2C interface of wireless module
12	I2C_SCL_S	Clock line for slave I^2C interface of wireless module
13	BT_UART1_TXD	Transmit pin of wireless module's UART interface
14	BT_UART1_RXD	Receive pin of wireless module's UART interface
15	SPI_SSN_WiFi	Slave select/Chip select signal of slave SPI interface for Wi-Fi
16	SPI_MOSI_WiFi	Master out-Slave in signal of slave SPI interface for Wi-Fi
17	SPI_MISO_WiFi	Master in-Slave out signal of slave SPI interface for Wi-Fi
18	SPI_SCK_WiFi	Clock line of slave SPI interface for Wi-Fi
19	GND	Ground
20	VCC_TARGET	Target +3.3V supply voltage from host MCU board

4.1.2. Power Measurement Header

Current measurement header (J102) can be used to measure the total current consumed by the ATWINC3400-MR210CA module using a Voltmeter. To measure the total current consumption of the module, remove the jumper from J102 and connect a voltmeter across its pins. A 1Ω resistor available on-board across the jumper gives a 1:1 relationship between voltage drop and current consumption.

There are two 0Ω resistors, R135 and R136, that can be removed one by one to connect Ammeter across the corresponding resistor pads to measure the current consumed by individual power rails of ATWINC3400-MR210CA, VBAT and VDDIO respectively.

4.1.3. Debug Connectors

Debug I^2C Header (J104) is mounted on the board. The connector and module pinouts are given below.

Table 4-2. Debug I^2C Connector J104

Pin on I^2C connector	Pin on ATWINC3400-MR210CA module	Function
1	11	I^2C SCL
2	1	Ground
3	10	I^2C SDA
4	-	Not Connected

Debug UART Header (J103) is not mounted on the board. The connector and module pinouts are given below.

Table 4-3. Debug UART Connector J103

Pin on UART Connector	Pin on ATWINC3400-MR210CA module	Function
1	15	UART RX
2	14	UART TX
3	1	Ground

I^2C and UART pins of wireless module are connected with Extension port receptacle J101. The connector can be used for connecting extension board or Debug purpose.

Table 4-4. Extension Port / Debug Connector J101

Pin on Extension Port	Pin on ATWINC3400-MR210CA module	Function
1	10	I2C_SDA_S
2	-	NC
3	11	I2C_SCL_S
4	17	WiFi_UART_RXD
5	1	GND
6	16	WiFi_UART_TXD
7	-	NC

Pin on Extension Port	Pin on ATWINC3400-MR210CA module	Function
8	1	GND
9	7	RESET_N
10	12 and 18	VCC_MODULE (+3.3V)

4.2. ATWINC3400-XPRO Peripherals

4.2.1. Serial Flash

ATWINC3400-XPRO features an external SPI Flash. Master SPI interface of ATWINC3400 is used for communication with Flash. Provision to assemble Flash on PCB is given; but, the device is not mounted on the board.

Table 4-5. Serial Flash Connections

Pin on ATWINC3400-MR210CA module	Function
14	SPI SCK
16	SPI MOSI
17	SPI MISO
15	SPI SS

4.2.2. LED

There is a dual green/red LED on the ATWINC3400-XPRO extension board that is controlled by the ATWINC3400-MR210CA. These LEDs are used to show the application status.

Table 4-6. LED Connection

Pin on ATWINC3400-MR210CA module	Function
29	Green LED
30	Red LED

4.2.3. Crypto Device

ATWINC3400-XPRO features an Atmel ATECC508A CryptoAuthentication device. Master I^2C interface of ATWINC3400 is used for communication with Crypto device. Provision to assemble crypto device on PCB is given; but, the device is not mounted on board.

Table 4-7. ATECC508A Connections

Pin on ATWINC3400-MR210CA module	Function
35	I^2C data
34	I^2C clock

4.2.4. EEPROM

ATWINC3400-XPRO features an external EEPROM. Master I^2C interface of ATWINC3400 is used for communication with EEPROM. Provision to assemble EEPROM is given; but, the device is not mounted in board.

Table 4-8. EEPROM Connections

Pin on ATWINC3400-MR210CA module	Function
35	I^2C data
34	I^2C clock

4.2.5. Test Points

Some test points are available for use on the board. TP101 and TP103 can be used in addition with SPI interface lines for SDIO inteface which needs some hardware rework. TP103, TP104, TP105, and TP106 can be used for PCM interface by appropriately disconnecting the multiplexed alternate functionality. TP107, TP108, TP109, and TP110 pins are GPIO38, 39, 40, and 42 pins of ATWINC3400 chip respectively.

Table 4-9. Test Point Connections

Test Point	Pin on ATWINC3400-MR210CA module	Function
TP101	22	GPIO8; Pin multiplexed with optional BT_UART1_CTS2
TP102	27	GPIO7; Pin multiplexed with optional BT_UART1_RTS2
TP103	29	GPIO17; Pin multiplexed with Dual LED D101 (Green)
TP104	30	GPIO18; Pin multiplexed with Dual LED D101 (Red)
TP105	31	GPIO19
TP106	32	GPIO20
TP107	3	GPIO 38 of ATWINC3400 Chip
TP108	4	GPIO 39 of ATWINC3400 Chip
TP109	5	GPIO 40 of ATWINC3400 Chip
TP110	6	GPIO 42 of ATWINC3400 Chip

5. Hardware Revision History and Known Issues

5.1. Identifying Product ID and Revision

The revision and product identifier of ATWINC3400-XPRO 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 ATWINC3400-XPRO is A09-2623.

5.2. Revision

Revision 5 is the initially released revision, there are no known issues.

6. 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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7. Document Revision History

Doc. rev.	Date	Comment
42690A	03/2016	Initial document release.

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