SMARTCONNECT WI-FI MODULE

ATSAMW23G18-MD2

PRELIMINARY DATASHEET

Features

- IEEE® 802.11 b/g compliant
- Extreme low power
  - with an Idle mode < 150µA (keeping connection with an Access Point)
  - Deep Sleep mode 2µA
- Typical Wi-Fi Transmit Power: ~+6dBm
- Typical Wi-Fi Receive Sensitivity:
  - ~-81dBm, 10% PER, 11Mps
- Compact footprint: 20.0 x 34.3mm
- Operating Voltage: 2.3V to 3.6V
- Serial Host Interface SPI or UART
- Software Upgrade Over-The-Air
- Design based on Atmel® ATOZMO3000 and ATSAMD21E18
- Worldwide acceptance: FCC (USA), IC (Canada), and CE (Europe)
- RoHS compliant

Overview

The Wi-Fi SAM W23 modules are based on Atmel's industry-leading ultra-low-power Wi-Fi SoC (System on Chip) combined with Atmel's latest ARM® Cortex®-M0+ based microcontroller technology and Atmel 2.4GHz IEEE 802.11 b/g Wi-Fi ATOZMO3000. This turnkey system provides an integrated software solution with application and security protocols such as TLS, integrated network services (TCP/IP stack), and a standard Real Time Operating System (RTOS) which are all available through Atmel's Studio 6 integrated development platform (IDP).

The Atmel SmartConnect modules offer the ideal solutions for designers seeking to add Wi-Fi connectivity with no previous experience in 802.11, RTOS, IP Stack or RF. SmartConnect Wi-Fi from Atmel opens the door of the Internet of Things to the vast array of battery-powered devices and applications requiring the integration of WLAN connectivity without compromising on cost or power consumption.

While we compete with other Wi-Fi modules on size, RF performance, cost and other characteristics, our SmartConnect product family has a distinctive advantage when it comes to power consumption and power saving modes.

The ATSAMW23 device is capable of operating as a network co processor, allowing the use of a simple AT command set of host generated instructions, or as a standalone end point, where a complete small application can be executed on the module by itself. (Example – remote Wi-Fi sensor or keypad with a few inputs).

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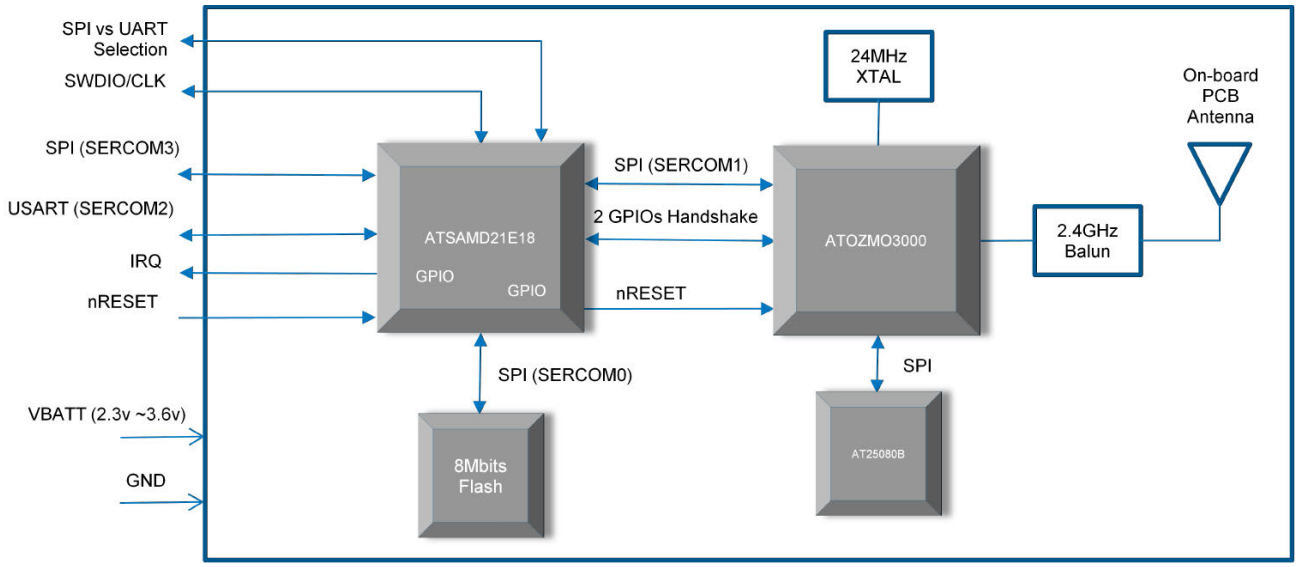
1 Description

1.1 Block Diagram

Figure 1-1. SAMW23G18 Module Block Diagram



1.2 Abbreviations and Acronyms

ADC	Analog-to-Digital Converter
GPIO	General Purpose Input/Output
HW	Hardware
I2C	Inter-Integrated Circuit
IRQ	Interrupt Request
JTAG	Digital interface for debugging, known as IEEE 1149.1 standard interface
PCB	Printed Circuit Board
SPI	Serial Peripheral Interface
UART	Universal Asynchronous Receiver/Transmitter
SWD	Cortex Serial Wire Debug Interface

1.3 Related Documents

[1] ATSAMD21 Datasheet:

Web page: http://www.atmel.com/products/microcontrollers/arm/sam-d.aspx?tab=documents.

Document: Atmel SAM D21 Datasheet (.pdf file).

Then select the required device (ATSAMD21E18A) and get the latest datasheet (.pdf file).

[2] ATOZMO3000 Datasheet.

[3] ATSAM W23 Network Controller Programming Guide.

[4] ATSAM W23 Starter Kit User Guide.

1.4 Module Footprint

Figure 1-2. SAMW23G18 Module Dimensions

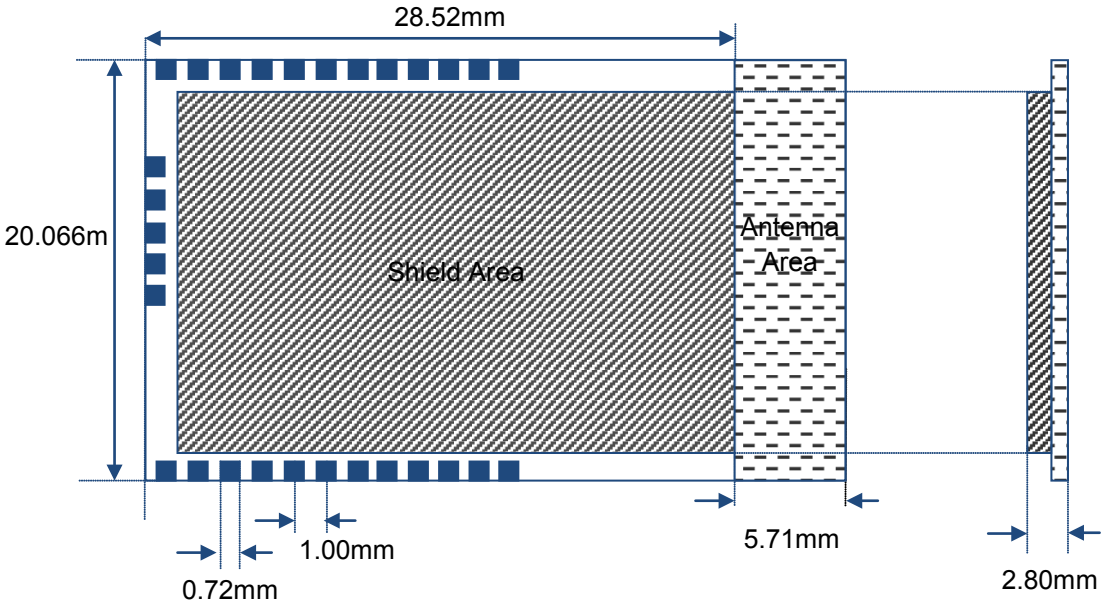


Table 1-1. Module Pinout Description

Pin #	Pin Description	I/O Type	Function (default)
1	GND	N/A	Common Ground
2	GND	N/A	Common Ground
3	VBATT	N/A	Common Power input
4	VBATT	N/A	Common Power input
5	RST_N	B	General Reset
6	PA23/SPI_SS/SERCOM[PAD1]	B	Host Interface SPI Chip Select (Active Low)
7	PA22/SPI_MOSI/SERCOM[PAD0]	B	Host Interface SPI Data In
8	PA24/SPI_MISO/SERCOM[PAD3]	B	Host Interface SPI Data Out, (1)
9	PA25/SPI_CLK/SERCOM[PAD4]	B	Host Interface SPI Clock
10	PA14/GPIO/USART TX/SERCOM[PAD2]	B	Host Interface UART TX, (2)
11	PA15/GPIO/USART RX/SERCOM[PAD3]	B	Host Interface UART RX
12	GND	N/A	Common Ground
13	Not Connected	N/A	Not Connected (recommended to connect to the GND)
14	Not Connected	N/A	Not Connected (recommended to connect to the GND)
15	Not Connected	N/A	Not Connected (recommended to connect to the GND)
16	Not Connected	N/A	Not Connected (recommended to connect to the GND)
17	Not Connected	N/A	Not Connected (recommended to connect to the GND)
18	Wi-Fi JTAG TCK	A	Wi-Fi JTAG TCK
19	Wi-Fi JTAG TDI	A	Wi-Fi JTAG TDI
20	Wi-Fi JTAG TDO	A	Wi-Fi JTAG TDO
21	Wi-Fi JTAG TMS	A	Wi-Fi JTAG TMS
22	Wi-Fi UART RX	A	Wi-Fi UART RX
23	Wi-Fi PODRSTN	A	Wi-Fi PODRSTN
24	Wi-Fi UART TX	A	Wi-Fi UART TX
25	Not Connected	N/A	Not Connected (recommended to connect to the GND)
26	PA00/GPIO/XIN32	B	GPIO(3)
27	PA01/GPIO/XOUT32	B	GPIO(4)
28	PA03/GPIO/ADC	B	Host Interface SPI Interrupt Event (IRQ, Active Low)
29	GND	N/A	Common Ground
30	Not Connected	A	Not Connected (recommended to keep it open)
31	Not Connected	A	Not Connected (recommended to keep it open)
32	PA31/SWDIO	B	Cortex Serial Wire Debug Interface Data I/O
33	PA30/SWCLK	B	Cortex Serial Wire Debug Interface CLK
34	PA11/GPIO/SERCOM[PAD3]	B	Serial Debug Port RX
35	PA10/GPIO/SERCOM[PAD2]	B	Serial Debug Port TX
36	PA09/GPIO/I2C_SCL/SERCOM[PAD1]	B	GPIO
37	PA08/GPIO/I2C_SDA/SERCOM[PAD0]	B	GPIO(5)
38	Not Connected	N/A	Not Connected (recommended to connect to the GND)
39	Not Connected	N/A	Not Connected (recommended to connect to the GND)
40	Not Connected	N/A	Not Connected (recommended to connect to the GND)
41	GND	N/A	Common Ground
42	GND	N/A	Common Ground

(1) Pin read at Power-On of the module to determine if the Host Interface is SPI or UART:

Low level = UART, High level = SPI.

(2) Pin read at Power-On of the module to determine if the module must reboot from the factory image after a software upgrade:

Low level = Yes, Restart from factory image, High level = No, continue with the new image.

(3) Pin is an output, set at HIGH level when the Wi-Fi is power-on. It can be used to enable a level converter being between the Wi-Fi module and the Host MCU.

(4) Pin is an output. It can drive an on-board LED to represent the Wi-Fi module status (refer to the User Guide for further details).

(5) By default, the pin is an input. Through an ATcommand, it can be configured to control an on-board LED to represent the Wi-Fi module status (refer to the User Guide for further details).

1.5 Module Power-Up

The normal operation mode is:

1. At power-up, the SAMW23 module will set the pin-26 at HIGH level.
2. The SAMW23 module will read the pin-11 to decide if it has to start the factory default firmware image (it can be required it case of firmware upgrade failure).
3. The Host MCU selects the Host interface type (SPI or UART) by setting the pin-6.
4. The SAMW23 module will control the pin-27 to provide the status.

Figure 1-3. Power-Up Timing

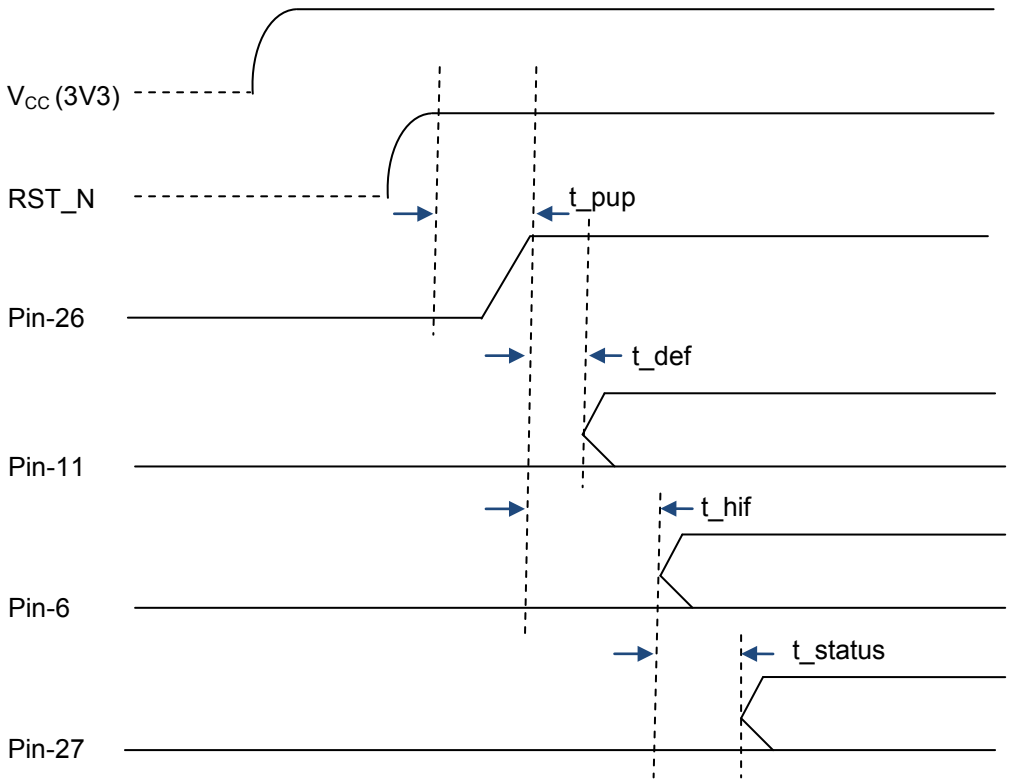


Table 1-2. Power-Up Timing Characteristics

Symbol	Min.	Max.	Unit
t_pup	TBD	N/A	ms
t_def	TBD	N/A	ms
t_hif	TBD	N/A	ms
t_status	TBD	N/A	ms

1.6 Module Host Interface

The main interface to the SAMW23 Module is a Serial Peripheral Interface (SPI).

An optional interface can be a Universal asynchronous receiver/transmitter (UART).

Refer to the Programmer's Guide [3] for the supported commands and supported sequences.

1.6.1 Serial Peripheral Interface (SPI)

Section 1.6.1 describes the SPI Host Controller interface.

Overview

The SPI is a high-speed synchronous data transfer interface. It allows fast communication between the device and peripheral devices.

The SPI can operate as master or slave. As master, the SPI initiates and controls all data transactions.

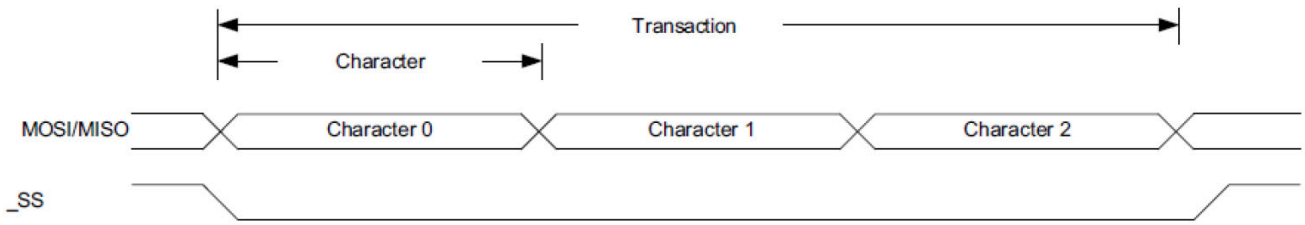
The SPI is single buffered for transmitting and double buffered for receiving. When transmitting data, the Data register can be loaded with the next character to be transmitted while the current transmission is in progress. For receiving, this means that the data is transferred to the two-level receive buffer upon reception, and the receiver is ready for a new character.

The SPI transaction format is shown below, where each transaction can contain one or more characters.

The SPI master must initiate a transaction by pulling low the slave select line (_SS) of the desired slave. The master and slave prepare data to be sent in their respective shift registers, and the master generates the serial clock on the SCK line.

The SAM W23 operates as a slave.

Figure 1-4. SPI Transaction Format



The SPI is based on the five-line, master/slave communication model see below:

Figure 1-5. SPI Interface Signals

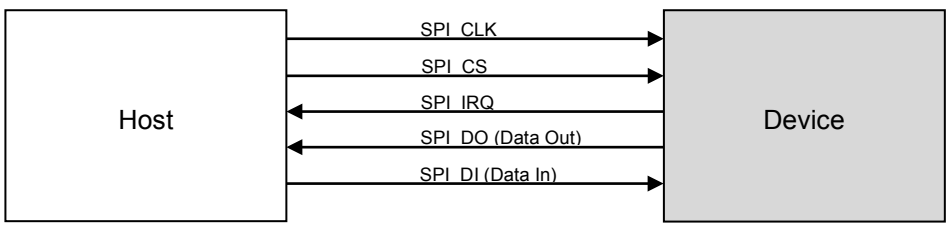


Table 1-3. SPI Interface Signals Description

Port Name	Input/Output	Description
SPI_CLK	Input	Clock (0MHz to 16MHz) from host to device
SPI_DI	Input	Data from host to device (MOSI)
SPI_CS(1)	Input	CS signal from host to device (active low)
SPI_IRQ(2)	Output	Interrupt from device to host
SPI_DO	Output	Data from device to host (MISO)

Figure 1-6. SPI Timings

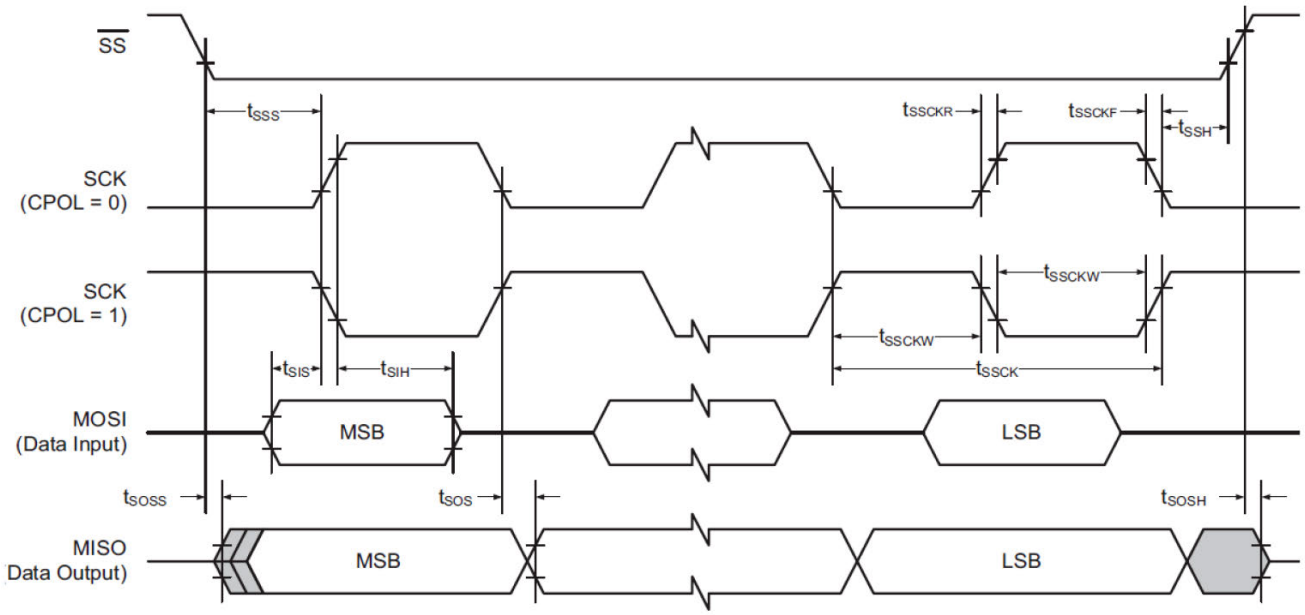


Table 1-4. SPI Timing Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
SCK	Slave SCK Frequency	Slave	-	-	16	MHz
tSSCK	Slave SCK Period	Slave	-	N/A	-	ns
tSSCKW	SCK High/Low Width	Slave	0.5*$_{SSCK}$	-	-	ns
t_{SSCKR}	SCK rise time	Slave, load = 20pF, V_{DD} = 3.3V	-	-	15	ns
t_{SSCKF}	SCK fall time	Slave, load = 20pF, V_{DD} = 3.3V	-	-	15	ns
t_{SIS}	MOSI setup to SCK	Slave	T_{SSCK}/2 – 19	-	-	ns
t_{SIH}	MOSI hold after SCK	Slave	T_{SSCK}/2 – 5	-	-	ns
t_{SSS}	SS setup to SCK	Slave	T_{SOS} + 7	-	-	ns
t_{SSH}	SS hold after SCK	Slave	T_{SIH} – 4	-	-	ns
t_{SOS}	MISO setup SCK	Slave	-	T_{SSCK}/2 – 20	-	ns
t_{SOH}	MISO hold after SCK	Slave	-	20	-	ns
t_{SOSS}	MISO setup after SS low	Slave	-	16	-	ns
t_{SOSH}	MISO hold after SS high	Slave	-	11	-	ns

Table 1-5. SPI Characteristics

Parameters	Value	Comments
Character size	Eight bits	-
Clock Parity	0: idle state of the signal is Low level; 1: idle state of the signal is High level	Default: 0
Clock Phase	0: data is captured on the first edge of the clock; 1: data is captured on the second edge of the clock	Default: 0
Flow Control	Enable, disable	Default: no flow control

Frame Format over SPI

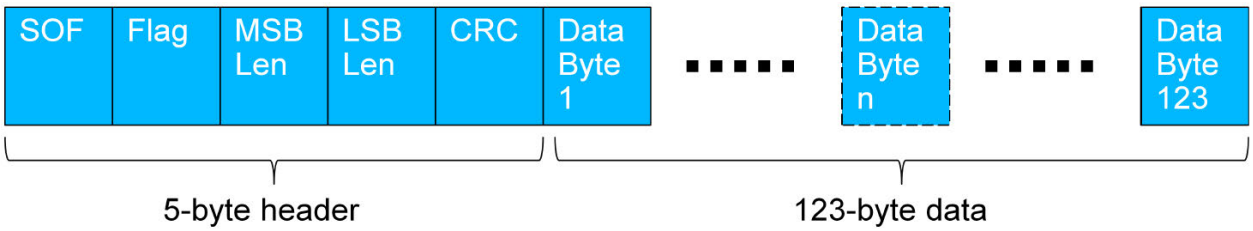
The SPI is a high-speed synchronous data transfer interface. It allows fast communication between the device and peripheral devices.

Data transmission on the SPI interface is performed with one or more frames of fixed length. We choose 128-byte frame as the default setting.

Every frame consists of a 5-byte header and 123-byte payload. When data to send has more than 123 bytes, multiple frames have to be used to transmit the entire data.

The packet format is illustrated below:

Figure 1-7. Frame Format over SPI



- SOF: Start of message character, fixed to 0xC3
- Flag: Properties of the frame capture in a bitmap
  - 0x01: First frame in a transmission that may involve multiple frames
  - 0x02: More frames to follow
  - 0x04: Network Controller application frame
  - 0x10: Cancel the current multi-frame transmission
  - 0x80: At least one frame has error for the last data transmission. In this case, it is up to the sender to re-transmit the data or ignore this error.
- MSB Len: MSB for length of useful data bytes in this frame, always 0 for 128-byte frame
- LSB Len: LSB for length of useful data bytes in this frame, from 1 to 123 for 128-byte frame
- CRC: Checksum from Flag byte to the last useful data byte. The checksum is computed as byte-wise XOR.
- Data: Actual data of Len bytes

1.6.2 Universal Asynchronous Receiver/Transmitter (UART)

Section 1.6.2 describes the UART Host Controller interface.

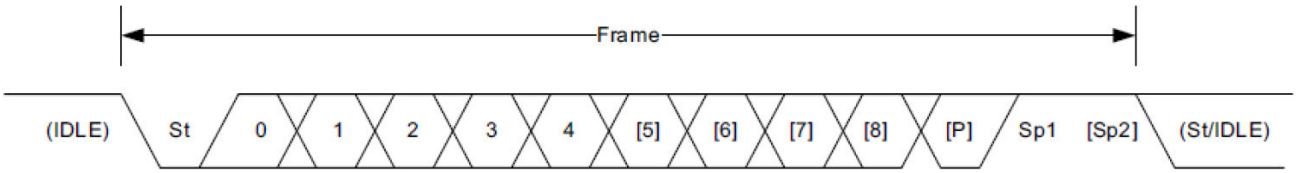
Overview

UART data transfer is frame based, where a serial frame consists of:

- One start bit
- Eight data bits
- MSB first
- No, even or odd parity bit
- One or two stop bits

A frame starts with the start bit followed by one character of data bits. If enabled, the parity bit is inserted after the data bits and before the first stop bit. One frame can be directly followed by a new frame, or the communication line can return to the idle (high) state. Below figure illustrates the possible frame formats. Bits inside brackets are optional.

Figure 1-8. UART Frame Format



St Start bit; always low.

(n) Data bits; 0 to 8.

P Parity bit; odd or even.

Sp Stop bit; always high.

IDLE No transfers on the communication line; always high in this state.

Table 1-6. UART Characteristics

Parameters	Value	Comments
Character size	Eight bytes	-
Baud rate	9600, 19200, 38400, 57600, 115200	Default: 9600
Parity	Even, odd, none	Default: none
Stop Bits	1 or 2	Default: 1
Flow Control	Enable, disable	Default: no flow control

2 Characteristics

Disclaimer

All typical values are measured at T = 25°C unless otherwise specified. All minimum and maximum values are valid across operating temperature and voltage unless otherwise specified.

Table 2-1. Absolute Maximum Ratings

Parameters	Min.	Max.	Unit
Power Supply Voltage	0	3.63	V
Current into VBat pin	-	TBD	mA
Storage temperature range	-40	+125	°C

Table 2-2. General Operating Ratings

Parameters	Min.	Typ.	Max.	Unit
VBATT	2.30	3.30	3.60	V
Voltage on pins	0	3.30	VBATT	V
Operating temperature range	0	25	70	°C

Table 2-3. Physical Characteristics

Parameters	Value	Comments
Size	20.0 x 34.3mm	-
Connector pins pitch	1.0mm	-

Table 2-4. I/O Pins (Type B) Characteristics

T_A=25°C.

Parameters	Conditions	Min.	Typ.	Max.	Unit
R_{PULL}, Pull-up - Pull-down resistance	-	20	40	60	kΩ
V_{IL}, Input Logic Low	-	-	-	$0.3*V_{DD}$	V
V_{IH}, Input Logic High	-	$0.55*V_{DD}$	-	-	V
V_{OL}, Output Logic Low	-	-	$0.1*V_{DD}$	$0.2*V_{DD}$	V
V_{OH}, Output Logic High	-	$0.8*V_{DD}$	$0.9*V_{DD}$	-	V
I_{LEAK}, Input Leakage Current	Pull-up resistors disabled				

Table 2-5. I/O Pins (Type A) Characteristics

Parameters	Conditions	Min.	Typ.	Max.	Unit
R_{PULL}, Pull-up - Pull-down resistance	-	-	40	-	kΩ
V_{IL}, Input Logic Low	1.8 < VBATT < 3.6	-	-	0.3*VBATT	V
V_{IH}, Input Logic High	1.8 < VBATT < 3.6	0.7*VBATT	-	-	V
ΔV, Input Hysteresis	-	-	0.4	-	V
I_I, Input Resistance	Pull-up Resistor to VBATT	-	42	-	KΩ
II, Input Resistance	Pull-down Resistor to GND	-	42	-	KΩ
V_{OL}, Output Logic Low	I_{OL} = 8mA	-	-	0.2*VBATT	V
V_{OH}, Output Logic High	I_{OH} = 8mA	0.8*VBATT	-	-	V
I_{OZ}, Output Tri-State Current	0.0V < V0 < 3.6V	-10	-	10	µA
C_I, Input Capacitance	-	-	3	-	pF
C_{IO}, Input/Output Capacitance	-	-	3	-	pF

Table 2-6. Power-On-Reset (POR) Characteristics

Parameters	Conditions	Min.	Typ.	Max.	Unit
Minimum Reset pulse width	-	10	-	-	ns
Voltage threshold on VBATT rising	V_{DD} falls at 1V/ms or slower	1.27	1.45	1.58	V
Voltage threshold on VBATT falling	-	0.72	0.99	1.02	V

Table 2-7. Software Features

Function	Description
Security Protocols	WPA/WPA2 Personal, TLS, SSL
Networking Services	DHCP, DNS, TCP/IP (IPv4), UDP, HTTP, HTTPS

Table 2-8. Radio Characteristics

Parameter	Description
Frequency Band	2.4GHz ISM band: 2412~2472MHz
Operating Channels	2.4GHz ISM band: channels 1~13
Data rate	802.11b/g rates (1~24Mbps)

Table 2-9. Radio Power Consumption

Parameter	Conditions	Min.	Typ.	Max.	Unit
I_{CC}, Active RX, listen	2.45GHz; VBATT = 3.6V	-	60	-	mA
I_{CC}, Active RX, packet	2.45GHz; VBATT = 3.6V	-	70	-	mA
I_{CC}, Standby	VBATT = 1.8V	-	6	-	mA
I_{CC}, Doze	VBATT = 1.8V	-	900	-	µA
I_{CC}, Dream	VBATT = 1.8V	-	750	-	µA
I_{CC}, Sleep	VBATT = 2.3V	-	175	-	µA
I_{CC}, Deep Sleep	VBATT = 2.3V		2	-	µA

2.1.1 Radio Receiver

Table 2-10. Radio Receiver Performances

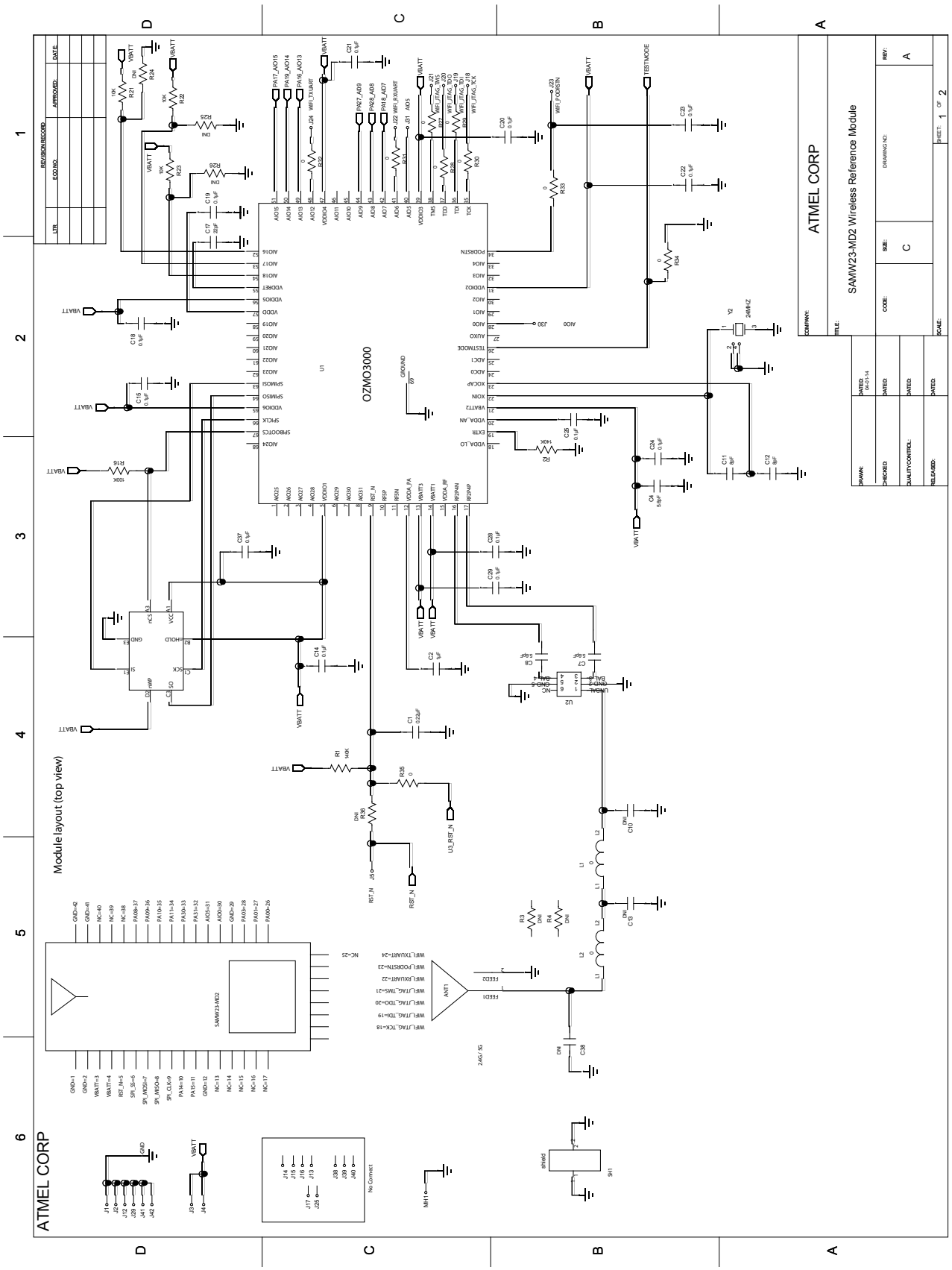
Parameter	Conditions	Min.	Typ.	Max.	Unit
Sensitivity at 10% PER, 1000 bytes Packet	6Mbps	-	-78	-	dBm
	9Mbps		-76		
	12Mbps	-	-74	-	dBm
	18Mbps	-	-71	-	dBm
	1.0Mbps, 2.0Mbps, 5.5Mbps, 11.0Mbps	-	TBD	-	dBm
Maximum Received Signal Strength at 10% PER, 1000 bytes Packet	6Mbps	-	-5	-	dBm
	9Mbps	-	-5	-	dBm
	12Mbp	-	-5	-	dBm
	18Mbps	-	-5	-	dBm
	1.0Mbps, 2.0Mbps, 5.5Mbps, 11.0Mbps	-	-TBD	-	dBm

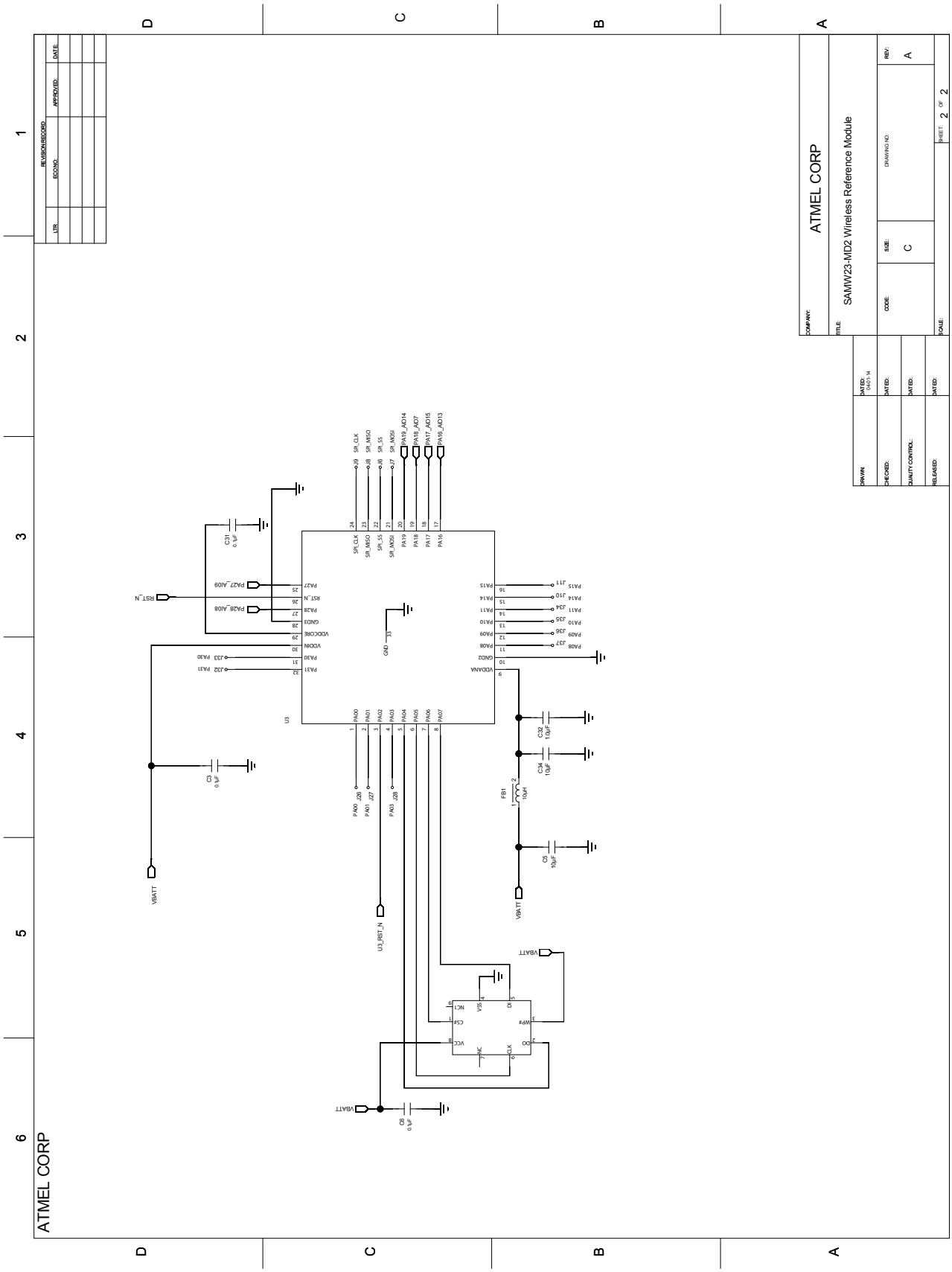
2.1.2 Radio Transmitter

Table 2-11. Radio Transmitter Performances

Parameter	Conditions	Min.	Typ.	Max.	Unit
Relative Constellation Error (EVM) @ 6Mbps Data Rate	2.45GHz	-	-15	-	dB

3 Schematic


ATMEL CORP
SAMW23-MD2 Wireless Reference Module
OZM03000
SAMW23-MD2
Module layout (top view)


ATMEL CORP
SAMW23-MD2 Wireless Reference Module
SPI_CLK
SPI_MISO
SPI_SS
SPI_MOSI
PA19_AD14
PA18_AD7
PA17_AD15
PA16_AD13
RST_N
PA27_AD9
PA28_AD8
VBATT
U3_RST_N
P A00_J29
P A01_J27
P A03_J28
C31 0.1µF
C3 0.1µF
C6 0.1µF
C29 1.0µF
C34 10µF
C5 10µF
FB1 10µH

4 Bill of Materials

Table 4-1. Components List

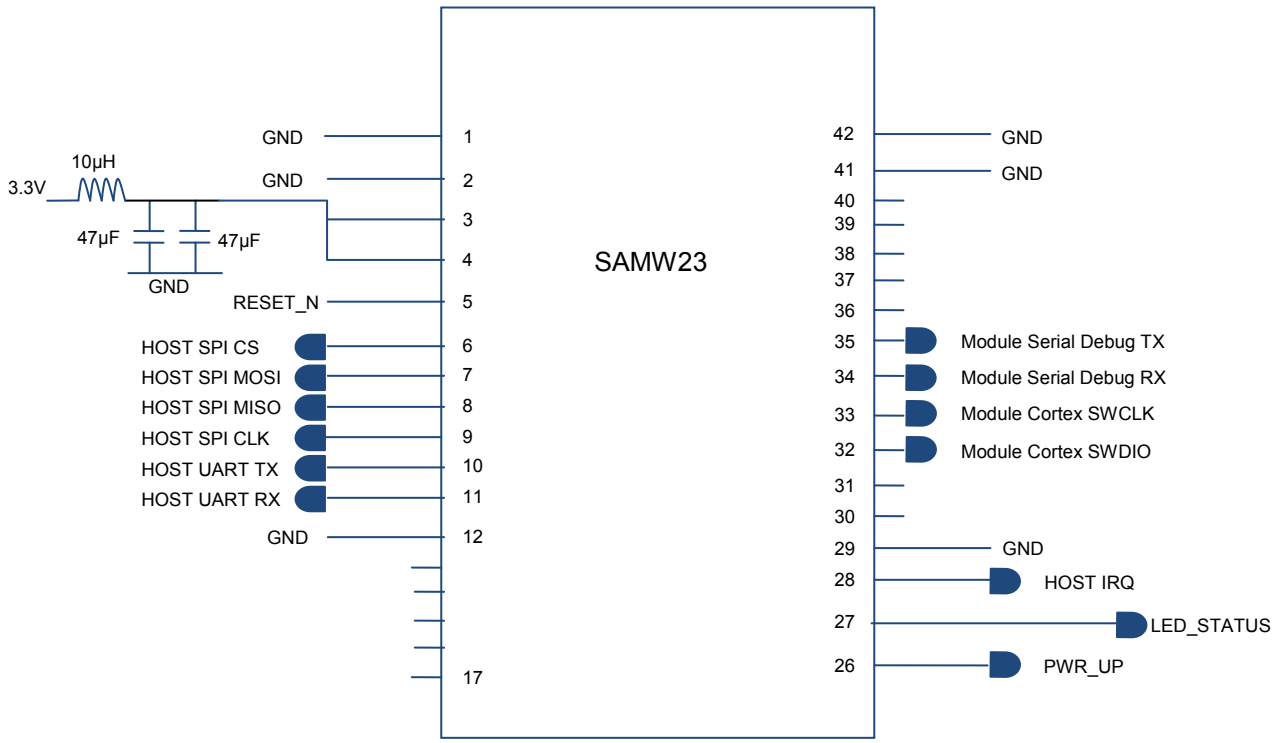
Qty	Reference	Recommended Manufacturer	Recommended Manufacturer Part #	VALUE
1	C1	Panasonic	C0603X7R1E222K030BA	0.22µF
2	C11, C12	Murata	GRM1555C1H8R0DA01D	8pF
1	C17	Murata	C0603C0G1E220J030BA	22pF
2	C2, C32	Murata	JMK105BJ105KV-F	1µF
16	C3, C6, C14, C15, C18-C25, C28, C29, C31, C37	Murata	C0603X5R0J104M030BC	0.1µF
3	C4, C7, C8	Murata	GJM0335C1E5R6CB01D	5.6PF
2	C5, C34	-	CL10A106MQ8NNNC	10µF
1	FB1	-	BK1005HW601-T	10µH
3	L1, L2, R35	Panasonic	RC0603J000CS	0
2	R1, R2	Panasonic	MCR006YRTF1403	140K
1	R16	Panasonic	RC0603J104CS	100K
3	R21-R23	Panasonic	ERJ-1GEJ103C	10K
8	R27-R34	Panasonic	ERJ-1GE0R00C	0
1	SH1	-	Shield	-
1	U1	Atmel	OZMO3000	OZMO3000
1	U2	Murata	LDB182G4510G-120	LDB182G4510G-120
1	U3	Atmel	ATSAMD21E18A	ATSAMD21E18A
1	U4	EON	EN25Q80B	-
1	U5	Atmel	AT25080B-UUL-T	-
1	Y2	Murata/TEW	120-21013	24MHz

5 Reference Design

5.1 Reference Schematic

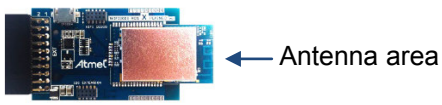
The following reference schematic shows the recommend connections in an application circuit.

Figure 5-1. Shows the Schematic for an Application Using the SAMW23-MD2



5.2 Layout Recommendations

- Minimum 2-layers PCB
- In case of a 4-layers PCB, the second layer shall be the ground plane
- All 'Not Connected' pins shall be connected to the ground
- No copper under the on-module PCB antenna area
- The area 350deg around the on-module PCB antenna need to be free of metal, components as below picture:



5.3 Soldering Profile

The following table gives the recommended soldering profile from J-STD-20.

A maximum of one reflow pass is allowed per component.

Table 5-1. Soldering Profile

Profile Feature	Green Package
Average Ramp-up Rate (217°C to peak)	3°C/s max
Preheat Temperature 175°C ± 25°C	180s max
Time Maintained Above 217°C	60-150s
Time within 5°C of Actual Peak Temperature	30s
Peak Temperature Range	260°C
Ramp-down Rate	6°C/s max
Time 25°C to Peak Temperature	Eight minutes max

5.4 Moisture Sensitivity Level (MSL)

Per J-STD-020, devices rated as MSL 3 and not stored in a sealed bag with desiccant pack should be baked prior to use.

After opening packaging, devices that will be subjected to reflow must be mounted within 72 hours of factory conditions (<30°C and 60% RH) or stored at <10% RH.

Bake devices for 48 hours at 125°C.

5.5 Handling Instructions

SAMW23 modules contain a highly sensitive electronic circuitry.

Handling without proper ESD protection may damage the module permanently.

SAMW23 modules are fixed with an EMI Shield to ensure compliance to Emission and Immunity rules. This shield is galvanic and NOT air tight. So cleaning of the module with IPA/other similar agents is not advised. Humidity protection coating (conformal) will cause deviated RF behavior and coating material being trapped inside EMI Shield. So this should be avoided.

For products requiring conformal coating, it is advised to suitably mask the SAMW23 module before applying the coating to rest of the board. To protect the SAMW23 module from humidity, the housing of the product should ensure suitable Ingress Protection standards are complied with.

In general, cleaning the populated modules is strongly discouraged. Residuals under the module cannot be easily removed with any cleaning process.

Cleaning with water can lead to capillary effects where water is absorbed into the gap between the host board and the module. The combination of soldering flux residuals and encapsulated water could lead to short circuits between neighboring pads. Water could also damage any stickers or labels.

Cleaning with alcohol or a similar organic solvent will likely flood soldering flux residuals into the RF shield, which is not accessible for post-washing inspection. The solvent could also damage any stickers or labels.

Ultrasonic cleaning could damage the module permanently.

5.6 General Recommendations

- Metal enclosure should not be used
- Placing high profile components next to antenna should be avoided
- Having holes/vias punched around the periphery of the board eliminates parasitic radiation from the board edges also distorting antenna pattern

6 Part Markings

The MAC address stored inside the module is a uniquely assigned ID for each Wi-Fi SAMW23 module and owned by Atmel.

User of the SAMW23 can use this unique MAC to address the Wi-Fi end-application product.

The MAC address can be read from the module via an AT command (refer to the 'SAM W23 Programmer's Guide' [3]).

7 Ordering Information

Atmel Ordering Code	Package
ATSAMW23G18-MD210PA	2.4GHz IEEE802.11b/g module. Tray

Notes: 1. Tape and Reel MOQ: 1000.

8 Agency Certifications

8.1 United States (FCC)

This equipment complies with Part 15 of the FCC rules and regulations. To fulfill FCC Certification requirements, an OEM manufacturer must comply with the following regulations:

1. The SAMW23-MD2 modular transmitter must be labeled with its own FCC ID number, and, if the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following:

Contains FCC ID: *TBD* The enclosed device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (i.) this device may not cause harmful interference and (ii.) this device must accept any interference received, including interference that may cause undesired operation.

Any similar wording that expresses the same meaning may be used.

IMPORTANT: This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation (FCC 15.19).

The internal antenna used for this mobile transmitter must provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance. This device is approved as a mobile device with respect to RF exposure compliance, and may only be marketed to OEM installers. Use in portable exposure conditions (FCC 2.1093) requires separate equipment authorization.

IMPORTANT: Modifications not expressly approved by this company could void the user's authority to operate this equipment (FCC section 15.21).

IMPORTANT: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense (FCC section 15.105).

8.2 European Union (ETSI)

The SAMW23-MD2 Module has been certified for use in European Union countries. If these modules are incorporated into a product, the manufacturer must ensure compliance of the final product to the European harmonized EMC and low voltage/safety standards. A Declaration of Conformity must be issued for each of these standards and kept on file as described in Annex II of the R&TTE Directive.

Furthermore, the manufacturer must maintain a copy of the modules' documentation and ensure the final product does not exceed the specified power ratings, antenna specifications, and/or installation requirements as specified in the user manual. If any of these specifications are exceeded in the final product, a submission must be made to a notified body for compliance testing to all required standards.

IMPORTANT: The 'CE' marking must be affixed to a visible location on the OEM product. The CE mark shall consist of the initials "CE" taking the following form:

The CE marking must have a height of at least 5mm except where this is not possible on account of the nature of the apparatus.

The CE marking must be affixed visibly, legibly, and indelibly.

More detailed information about CE marking requirements you can find at "DIRECTIVE 1999/5/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL" on 9. March 1999 at section 12.

8.3 Industry Canada (IC) Compliance Statement

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This equipment complies with radio frequency exposure limits set forth by Industry Canada for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the device and the user or bystanders.

Cet équipement est conforme aux limites d'exposition aux radiofréquences définies par Industrie Canada pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre le dispositif et l'utilisateur ou des tiers.

CAUTION: Any changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

The OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.). This Module is labeled with its own IC ID. If the IC ID Certification Number is not visible while installed inside another device, then the device should display the label on it referring the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

“Contains Transmitter Module IC:*TBD*”

OR

“Contains IC: *TBD*”

Ce module est étiqueté avec son propre ID IC. Si le numéro de certification IC ID n'est pas visible lorsqu'il est installé à l'intérieur d'un autre appareil, l'appareil doit afficher l'étiquette sur le module de référence ci-joint. Dans ce cas, le produit final doit être étiqueté dans un endroit visible par le texte suivant:

“Contains Transmitter Module IC: *TBD*”

OR

“Contains IC: *TBD*”

9 Revision History

Doc Rev.	Date	Comments
42333A	07/2014	Initial document release.

Atmel | Enabling Unlimited Possibilities®

Atmel Corporation 1600 Technology Drive, San Jose, CA 95110 USA **T:** (+1)(408) 441.0311 **F:** (+1)(408) 436.4200 | **www.atmel.com**