WizFi250
User Manual

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FCC Statement

NOTICE;

1. The RF module limited to OEM installation ONLY.

   The OEM integrator is responsible for the compliance to all the rules that apply to the product into which this certified RF module is integrated.

2. This device 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.

3. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

   This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

   - Reorient or relocate the receiving antenna.
   - Increase the separation between the equipment and receiver.
   - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
   - Consult the dealer or an experienced radio/TV technician for help.

FCC Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This device is intended only for OEM integrators under the following conditions:

The antenna must be installed such that 20 cm is maintained between the antenna and users, and The transmitter module may not be co-located with any other transmitter or antenna. As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

IMPORTANT NOTE:
In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling
This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following:
"Contains FCC ID: XR2WIZFI250".
The grantee's FCC ID can be used only when all FCC/ IC compliance requirements are met.

Manual Information To the End User
The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.
The end user manual shall include all required regulatory information/warning as show in this manual.

Introduction

The WM-N-BM-14 wireless WICED module which is a small size module and consists of a Broadcom BCM43362 single-chip, a ST STM32F205RG MCU, and a 2.4G antenna. The WM-N-BM-14 provides for the highest-level integration, featuring 802.11b/g and 802.11n.

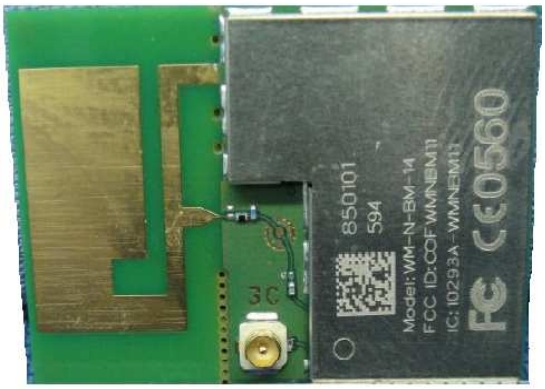
It includes a 2.4 GHz WLAN CMOS power amplifier (PA) that meets the output power requirements of most handheld systems. An optional external low-noise amplifier (LNA) and external PA are also supported. Along with the integrated power amplifier, the WM-N-BM-14 also includes integrated transmit and receive baluns, further reducing the overall solution cost.

The small size & low profile physical design make it easier for system design to enable high performance wireless connectivity without space constrain. This multi- functionality and board to board physical interface provides SPI/I2C/I2S/UART interface options.

Hardware WAPI acceleration engine, AES, TKIP, WPA and WPA2 are supported to provide the latest security requirement on your network.

For the software and driver development, USI provides extensive technical document and reference software code for the system integration under the agreement of Broadcom International Ltd.

Hardware evaluation kit and development utilities will be released base on listed OS and processors to OEM customers.



Features

BCM43362 Wi-Fi

- Single band 2.4GHz IEEE 802.11b/g/n
- Supports wireless data rates up to 65Mbit/s
- Integrated RF power amplifier

STM32F205RGY6 Microprocessor

- ARM 32-bit Cortex-M3 CPU
- CPU frequency up to 120MHz
- 1 MB Flash memory
- 128 kB SRAM
- Low-power sleep, standby and stop modes
- Extend one 8Mbit Flash memory

WM-N-BM-14 Wireless Module

- Featuring integrated IEEE 802.11 b/g/n
- Supports per packet Rx Antenna diversity
- Low power consumption & excellent power management performance extend battery life.
- Small size suitable for low volume system integration.
- Easy for integration into mobile and handheld device with flexible system configuration.
- 2.412-2.484 GHz two SKUs for worldwide market.
- Lead Free design which supporting Green design requirement, RoHS Compliance.

Pb Free

Device Package

- **28x20 mm**

Change Sheet					
Rev.	Date	Description of change			Approval & Date
		Page	Par	Change(s)	
1.1	01/15/13	All	All	Initial Release	Scarrie/Kevin
2.1	07/10/13	2		Update module picture in Introduction	Scarrie/Kevin
		12	5.5	Add power table of band eange-regulatory for US/Canada and EU market	
		24	10	Update recommend footprint dimension	

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1 EXECUTIVE SUMMARY

The WM-N-BM-14 module - is one of the product families in UG's product offering, targeting for system integration requiring a smaller form factor. It also provides the standard migration to high data rate to UG's current SIP customers.

The purpose of this document is to define the product specification for 802.11b/g/n WiFi module WM-N-BM-14. All the data in this document is based on Broadcom 43362 datasheet, STM32F205 datasheet and other documents provided from Broadcom and ST . The data will be updated after implementing the measurement of the module.

2 BLOCK DIAGRAM DESCRITPION

The WM-N-BM-14 module is designed based on Broadcom 43362 chipset and ST MCU solution. It supports generic SPI, UART, I2S, I2C interface to connect the WLAN to the host processor.

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3 DELIVERABLES

The following products and software will be part of the product.

- WM-N-BM-14 Module with packaging
- Evaluation kits (with SPI / UART/ JTAG interface)
- Software utility which supporting customer for integration, performance test and homologation. Capable of testing, loading (firmware) and configuring (MAC, CIS) for the WM-N-BM-14 module.
- Unit Test / Qualification report
- Product Specifications.
- Agency certification pre-test report base on adapter boards

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4 REFERENCE DOCUMENTS

C.I.S.P.R. Pub. 22	"Limits and methods of measurement of radio interference characteristics of information technology equipment." International Special Committee on Radio Interference (C.I.S.P.R.), Third Edition, 1997.
CB Bulletin No. 96A	"Adherence to IEC Standards: “Requirements for IEC 950, 2nd Edition and Amendments 1 (1991), 2(1993), 3 (1995) and 4(1996). Product Categories: Meas, Med, Off, Tron." IEC System for Conformity Testing to Standards for Safety of Electrical Equipment (IECEE), April 2000.
CFR 47, Part 15-B	"Unintentional Radiators". Title 47 of the Code of Federal Regulations, Part 15, FCC Rules, Radio Frequency Devices, Subpart B.
CFR 47, Part 15-C	"Intentional Radiators". Title 47 of the Code of Federal Regulations, Part 15, FCC Rules, Subpart C. URL: http://www.access.gpo.gov/nara/cfr/waisidx_98/47cfr15_98.html
CSA C22.2 No. 950-95	"Safety of Information Technology Equipment including Electrical Business Equipment, Third Edition." Canadian Standards Association, 1995, including revised pages through July 1997.
EN 60 950	"Safety of Information Technology Equipment Including Electrical Business Equipment." European Committee for Electrotechnical Standardization (CENELEC), 1996, (IEC 950, Second Edition, including Amendment 1, 2, 3 and 4).
IEC 950	"Safety of Information Technology Equipment Including Electrical Business Equipment." European Committee for Electrotechnical Standardization, Intentional Electrotechnical Commission. 1991, Second Edition, including Amendments 1, 2, 3, and 4.
IEEE 802.11	“Wireless LAN Medium Access Control (MAC) And Physical Layer (PHY) Specifications.” Institute of Electrical and Electronics Engineers. 1999.

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5 TECHNICAL SPECIFICATION

5.1 ABSOLUTE MAXIMUM RATING

Supply Power	Max +3.6 Volt	
Non Operating Temperature	- 40° to 85° Celsius	
Voltage ripple	+/- 2%	Max. Values not exceeding Operating voltage

5.2 RECOMMENDABLE OPERATION CONDITION

5.2.1 TEMPERATURE, HUMIDITY

The WM-N-BM-14 module has to withstand the operational requirements as listed in the table below.

Operating Temperature	-20° to 75° Celsius	
Humidity range	Max 95%	Non condensing, relative humidity

* The maximum operating ambient temperature range can up to 85degC, but exposure to absolute-maximum-rated conditions may cause performance degradation and affect device reliability.

5.2.2 VOLTAGE

Power supply for the WM-N-BM-14 module will be provided by the host via the power pins

Symbol	Parameter	Min	Typ.	Max	Unit
VBAT_WL	power supply for BCM43362	3.0	3.3	3.6	V
VDDIO_3V3_WL	host Interface power supply	3.0	3.3	3.6	V
VBAT_MICRO	backup operating voltage	3.0	3.3	3.6	V
VDD_3V3	power supply for MCU	3.0	3.3	3.6	V

5.2.3 CURRENT CONSUMPTION

The WM-N-BM-14 on TX mode output current consumption :
(Typical spec is defined @3.3V 25℃ ; MAX. spec is defined @3.0V 70℃)

Current Consumption	**TYP.**	**MAX.**
Tx output power @16.5 dBm on 11b 1M	385 mA	430 mA
Tx output power @ 16.5 dBm on 11b 11M	370 mA	410 mA
Tx output power @ 15 dBm on 11g 6M	345 mA	380 mA
Tx output power @ 13 dBm on 11g 54M	290 mA	320 mA
Tx output power @ 14.5 dBm on 11n MCS0	315 mA	350 mA
Tx output power @ 12 dBm on 11n MCS7	265 mA	295 mA

The WM-N-BM-14 on RX mode current consumption :
(Typical spec is defined @3.3V 25℃ ; MAX. spec is defined @3.0V 70℃)

Current Consumption	TYP.	MAX.
Rx @ 11b 1M	120 mA	150 mA
Rx @ 11b 11M	120 mA	150 mA
Rx @ 11g 6M	120 mA	150 mA
Rx @ 11g 54M	120 mA	150 mA
Rx @ 11n MCS0	120 mA	150 mA
Rx @ 11n MCS7	120 mA	150 mA

5.3 WIRELESS SPECIFICATIONS

The WM-N-BM-14 module complies with the following features and standards;

Features	Description	
WLAN Standards	IEEE 802 11 b/g/n	
Antenna Connecter Port	One printed antenna, one U.FL connector for external antenna	
Frequency Band	2.400 GHz – 2.484 GHz	
Number of Sub Channels	CH1 to CH14	
Modulation	DSSS, CCK, OFDM, BPSK, QPSK,16QAM, 64QAM	
Supported data rates	11b	1, 2, 5.5, 11 (Mbps)
	11g	6, 9, 12, 18, 24, 36, 48, 54 (Mbps)
	11n	HT20 MCS0(6.5Mbps) to HT20 MCS7(65Mbps)

5.4 SPECIFICATIONS OF WIFI'S OUTPUT POWER、 EVM 、SENSITIVITY

The WM-N-BM-14 module WiFi output power as list in the table below:

Characteristics		TYP.	Criteria	Unit
RF Average Output Power, 802.11b CCK Mode	1M	16.5	+/- 1.5	dBm
	11M	16.5	+/- 1.5	dBm
RF Average Output Power, 802.11g OFDM Mode	6M	15	+/- 1.5	dBm
	54M	13	+/- 1.5	dBm
RF Average Output Power, 802.11n OFDM Mode	MCS0	14.5	+/- 1.5	dBm
	MCS7	12	+/- 1.5	dBm

WiFi TX EVM follow the IEEE spec that as list in the table below:

Characteristics		IEEE Spec	Unit
RF Average Output EVM (11b)	@1 Mbps	-10	dB
	@11 Mbps	-10	dB
RF Average Output EVM (11g)	@6 Mbps	-5	dB
	@54 Mbps	-25	dB
RF Average Output EVM (11n)	@ MCS0	-5	dB
	@ MCS7	-28	dB

The WM-N-BM-14 module WiFi sensitivity as list in the table below:

Receiver Characteristics	TYP.	MAX.	Unit
PER <8%, Rx Sensitivity @ 1 Mbps	-96	-89	dBm
PER <8%, Rx Sensitivity @ 11 Mbps	-88	-84	dBm
PER <10%, Rx Sensitivity @ 6 Mbps	-90	-83	dBm
PER <10%, Rx Sensitivity @ 54 Mbps	-74	-70	dBm
PER <10%, Rx Sensitivity @ MCS0	-89	-83	dBm
PER <10%, Rx Sensitivity @ MCS7	-71	-67	dBm

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5.5 SPECIFICATIONS OF WIFI'S BAND EANGE-REGULATORY POWERTABLE FOR US/CANADA AND EU MARKET

The power of WiFi Band eange-regulatory for **US/Canada market** as list in the table below:

Characteristics	Channel	Power (dBm)
RF Average Output Power, 802.11b CCK Mode	1~11	16.5
RF Average Output Power, 802.11g OFDM Mode	1	14.5
	2 ~ 10	15
	11	14.5
RF Average Output Power, 802.11n HT20 OFDM Mode	1	14.5
	2 ~ 10	15
	11	14.5

The power of WiFi Band eange-regulatory for **EU market** as list in the table below:

Characteristics	Channel	Power (dBm)
RF Average Output Power, 802.11b CCK Mode	1~13	16.5
RF Average Output Power, 802.11g OFDM Mode	1 ~ 13	15
RF Average Output Power, 802.11n HT20 OFDM Mode	1 ~ 13	15

6 FLASH MEMORY

6.1 MCU EMBEDDED FLASH MEMORY

The STM32F205RG devices embed a 128-bit wide Flash memory of 1 Mbytes available for storing programs and data. It also features 512 bytes of OTP memory that can be used to store critical user data such as Ethernet MAC addresses or cryptographic keys.

For information on programming, erasing and protection of the internal Flash memory, please refer to the STM32F205RG Flash programming manual. The reference and Flash programming manuals are both available from the STMicroelectronics website *www.st.com*.

6.2 MODULE INTERNAL MEMORY FLASH

The WM-N-BM-14 have one 8M SPI Flash in the module. This devices work voltage need 3.3V power supply. It is provide 512 bytes of OTP memory that can be used to store critical user data such as Ethernet MAC addresses or cryptographic keys. It have 86MHz speed.

For information on programming, erasing and protection of this 8M Flash memory, please refer to the Macronix MX25L8006E Flash programming manual. The reference and Flash programming manuals are both available from the Macronix website *www.macronix.com*.

7 I/O PORT CHARACTERISTICS

Unless otherwise specified, the parameters given as below *Table*.

For detail information of I/O injection parameters and conditions, please refer to STM32F205RG I/0 manual.

Table7.1 I/O static characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{IL}	Standard IO input low level voltage		–0.3		0.28*(V_{DD}-2 V)+0.8 V	V
	IO FT(1) input low level voltage		–0.3		0.32*(V_{DD}-2 V)+0.75 V	V
V_{IH}	Standard IO input high level voltage		0.41*(V_{DD}-2 V)+1.3 V		V_{DD}+0.3	V
	IO FT(1) input high level voltage	V_{DD} > 2 V	0.42*(V_{DD}-2 V)+1 V		5.5	V
		V_{DD} ≤ 2 V			5.2	
V_{hys}	Standard IO Schmitt trigger voltage hysteresis(2)		200			mV
	IO FT Schmitt trigger voltage hysteresis(2)		5% V_{DD}(3)			mV
I_{lkg}	Input leakage current (4)	V_{SS} ≤ V_{IN} ≤ V_{DD} Standard I/Os			±1	µA
		V_{IN}= 5 V, I/O FT			3	
R_{PU}	Weak pull-up equivalent resistor(5)	V_{IN} = V_{SS}	30	40	50	kΩ
R_{PD}	Weak pull-down equivalent resistor(5)	V_{IN} = V_{DD}	30	40	50	kΩ
C_{IO}	I/O pin capacitance			5		pF

1. FT = Five-volt tolerant. In order to sustain a voltage higher than VDD+0.3 the internal pull-up/pull-down resistors must be disabled.
2. Hysteresis voltage between Schmitt trigger switching levels. Based on characterization, not tested in production.
3. With a minimum of 100 mV.
4. Leakage could be higher than max. if negative current is injected on adjacent pins.
5. Pull-up and pull-down resistors are designed with a true resistance in series with a switchable PMOS/NMOS. This MOS/NMOS contribution to the series resistance is minimum (~10% order).

8 COMMUNICATIONS INTERFACE

8.1 I2C Interface Characteristics

The I2C bus interfaces can operate in multi-master and slave modes. They can support the Standard- and Fast-modes. The I2C characteristics are described in below Table. If need detail information, please refer to STM32F205RG I/0 or Interface manual.

I2C characteristics

Symbol	Parameter	Standard mode I^2C(1)		Fast mode I^2C(1)(2)		Unit
		Min	Max	Min	Max	
$t_{w(SCLL)}$	SCL clock low time	4.7		1.3		µs
$t_{w(SCLH)}$	SCL clock high time	4.0		0.6		
$t_{su(SDA)}$	SDA setup time	250		100		ns
$t_{h(SDA)}$	SDA data hold time	0(3)		0(4)	900(3)	
$t_{r(SDA)}$ $t_{r(SCL)}$	SDA and SCL rise time		1000	20 + 0.1C_b	300	
$t_{f(SDA)}$ $t_{f(SCL)}$	SDA and SCL fall time		300		300	
$t_{h(STA)}$	Start condition hold time	4.0		0.6		µs
$t_{su(STA)}$	Repeated Start condition setup time	4.7		0.6		
$t_{su(STO)}$	Stop condition setup time	4.0		0.6		µs
$t_{w(STO:STA)}$	Stop to Start condition time (bus free)	4.7		1.3		µs
C_b	Capacitive load for each bus line		400		400	pF

1. Guaranteed by design, not tested in production.
2. fPCLK1 must be higher than 2 MHz to achieve standard mode I2C frequencies. It must be higher than 4 MHz to achieve the fast mode I2C frequencies and it must be a multiple of 10 MHz in order to reach the I2C fast mode maximum clock speed of 400 kHz
3. The maximum hold time of the Start condition has only to be met if the interface does not stretch the low period of SCL signal.
4. The device must internally provide a hold time of at least 300ns for the SDA signal in order to bridge the undefined region of the falling edge of SCL.

8.2 SPI / I2S interface characteristics

Unless otherwise specified, the SPI /I2S parameters are given in below Table.

Refer to STM32F205RG Datasheet : I/O port characteristics for more details on the input/output alternate function characteristics (NSS, SCK, MOSI, MISO for SPI and WS, CK, SD for I2S).

SPI characteristics

Symbol	Parameter	Conditions	Min	Max	Unit
f_{SCK} $1/t_{c(SCK)}$	SPI clock frequency	Master mode	-	30	MHz
		Slave mode	-	30	
$t_{r(SCL)}$ $t_{f(SCL)}$	SPI clock rise and fall time	Capacitive load: C = 30 pF	-	8	ns
DuCy(SCK)	SPI slave input clock duty cycle	Slave mode	30	70	%
$t_{su(NSS)}$ (3)	NSS setup time	Slave mode	4 t_{PCLK}	-	ns
$t_{h(NSS)}$ (3)	NSS hold time	Slave mode	2 t_{PCLK}	-	
$t_{w(SCLH)}$ (3) $t_{w(SCLL)}$ (3)	SCK high and low time	Master mode, f_{PCLK} = 30 MHz, presc = 4	TBD	TBD	
$t_{su(MI)}$ (3) $t_{su(SI)}$ (3)	Data input setup time	Master mode	5	-	
		Slave mode	5	-	
$t_{h(MI)}$ (3) $t_{h(SI)}$ (3)	Data input hold time	Master mode	5	-	
		Slave mode	4	-	
$t_{a(SO)}$ (3)(4)	Data output access time	Slave mode, f_{PCLK} = 20 MHz	0	3 t_{PCLK}	
$t_{dis(SO)}$ (3)(5)	Data output disable time	Slave mode	2	10	
$t_{v(SO)}$ (3)(1)	Data output valid time	Slave mode (after enable edge)	-	25	
$t_{v(MO)}$ (3)(1)	Data output valid time	Master mode (after enable edge)	-	5	
$t_{h(SO)}$ (3)	Data output hold time	Slave mode (after enable edge)	15	-	
$t_{h(MO)}$ (3)		Master mode (after enable edge)	2	-	

1. Remapped SPI1 characteristics to be determined.
2. TBD stands for “to be defined”.
3. Based on characterization, not tested in production.
4. Min time is for the minimum time to drive the output and the max time is for the maximum time to validate the data.
5. Min time is for the minimum time to invalidate the output and the max time is for the maximum time to put the data in Hi-Z

I2S characteristics

Symbol	Parameter	Conditions	Min	Max	Unit
f_{CK} $1/t_{c(CK)}$	I^2S clock frequency	Master	TBD	TBD	MHz
		Slave	0	TBD	
$t_{r(CK)}$ $t_{f(CK)}$	I^2S clock rise and fall time	capacitive load C_L = 50 pF	-	TBD	ns
$t_{v(WS)}$ (2)	WS valid time	Master	TBD	-	
$t_{h(WS)}$ (2)	WS hold time	Master	TBD	-	
$t_{su(WS)}$ (2)	WS setup time	Slave	TBD	-	
$t_{h(WS)}$ (2)	WS hold time	Slave	TBD	-	
$t_{w(CKH)}$ (2) $t_{w(CKL)}$ (2)	CK high and low time	Master f_{PCLK}= TBD, presc = TBD	TBD	-	
$t_{su(SD\_MR)}$ (2) $t_{su(SD\_SR)}$ (2)	Data input setup time	Master receiver Slave receiver	TBD TBD	-	
$t_{h(SD\_MR)}$ (2)(3) $t_{h(SD\_SR)}$ (2)(3)	Data input hold time	Master receiver Slave receiver	TBD TBD	-	
$t_{h(SD\_MR)}$ (2) $t_{h(SD\_SR)}$ (2)	Data input hold time	Master f_{PCLK} = TBD Slave f_{PCLK} = TBD	TBD TBD	-	
$t_{v(SD\_ST)}$ (2)(3)	Data output valid time	Slave transmitter (after enable edge)	-	TBD	
		f_{PCLK} = TBD	-	TBD	
$t_{h(SD\_ST)}$ (2)	Data output hold time	Slave transmitter (after enable edge)	TBD	-	
$t_{v(SD\_MT)}$ (2)(3)	Data output valid time	Master transmitter (after enable edge)	-	TBD	
		f_{PCLK} = TBD	TBD	TBD	
$t_{h(SD\_MT)}$ (2)	Data output hold time	Master transmitter (after enable edge)	TBD	-	

1. TBD stands for “to be defined”.
2. Based on design simulation and/or characterization results, not tested in production.
3. Depends on fPCLK. For example, if fPCLK=8 MHz, then TPCLK = 1/fPLCLK =125 ns.

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8.3 UART interface characteristics

WM-N-BM-14 Module have two universal synchronous/asynchronous receiver transmitters, USART1 and USART2. The USART1 can communicate at speeds of up to 7.5 Mbit/s. And the USAR2 interfaces communicate at up to 3.75 Mbit/s.

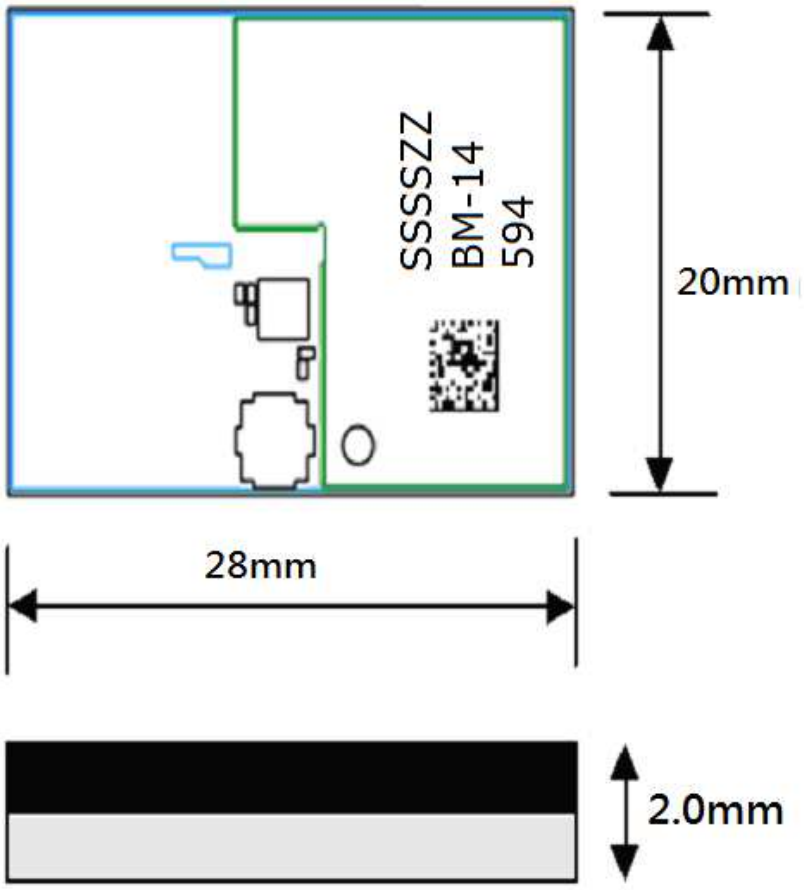
If need more detail information, please refer to STM32F205RG I/0 or Interface manual.

9 DIMENSIONS, WEIGHT AND MOUNTING

The following paragraphs provide the requirements for the size, weight and mounting of the WM-N-BM-14 module.

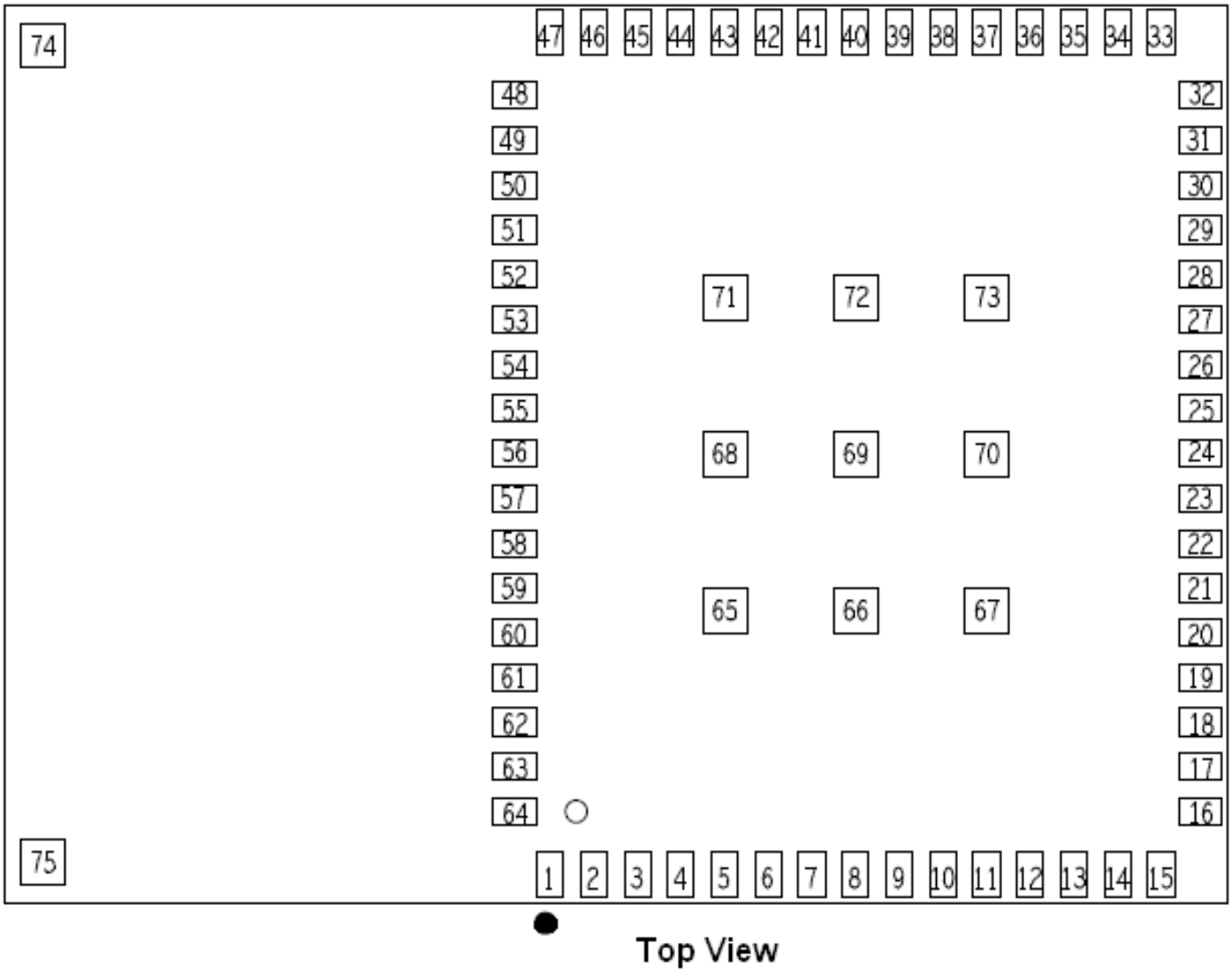
9.1 Dimensions

The size and thickness of the WM-N-BM-14 module is “28 mm (W) x 20 mm (L) x 2.0 mm (H) +/- 0.1mm “ (Including metal shielding)



9.2 Pin Out and Pin Description

PIN OUT



Top View

Pin Description

Pin-Number	Pin-Define	Type	Description
1	GND	--	Ground
2	VBAT_WL	I	Battery supply input
3	VBAT_WL	I	Battery supply input
4	GND	--	Ground
5	VDDIO_3V3_WL	I	Digital I/O supply.
6	GND	--	Ground
7	WL_REG_ON	--	WiFi reset .
8	NC	--	--
9	NC	--	--
10	NC	--	--
11	NC	--	--
12	NC	--	--
13	GND	--	Ground
14	NC	--	--
15	GND	--	Ground
16	WL_JTAG_TDI	I/O	1. For normal operation, if JTAG is not used, this pin can be left unconnected (NC). 2. This pin is also muxed UART_RX, which can be enabled by software.
17	WL_JTAG_TCK	I	For normal operation, if JTAG is not used, this pin can be left unconnected (NC).
18	WL_JTAG_TRST	I	For normal operation, if JTAG is not used, this pin can be left unconnected (NC).
19	WL_JTAG_TMS	I	For normal operation, if JTAG is not used, this pin can be left unconnected (NC).
20	WL_JTAG_TDO	I/O	1. For normal operation, if JTAG is not used, this pin can be left unconnected (NC). 2. This pin is also muxed UART_TX, which can be enabled by software.

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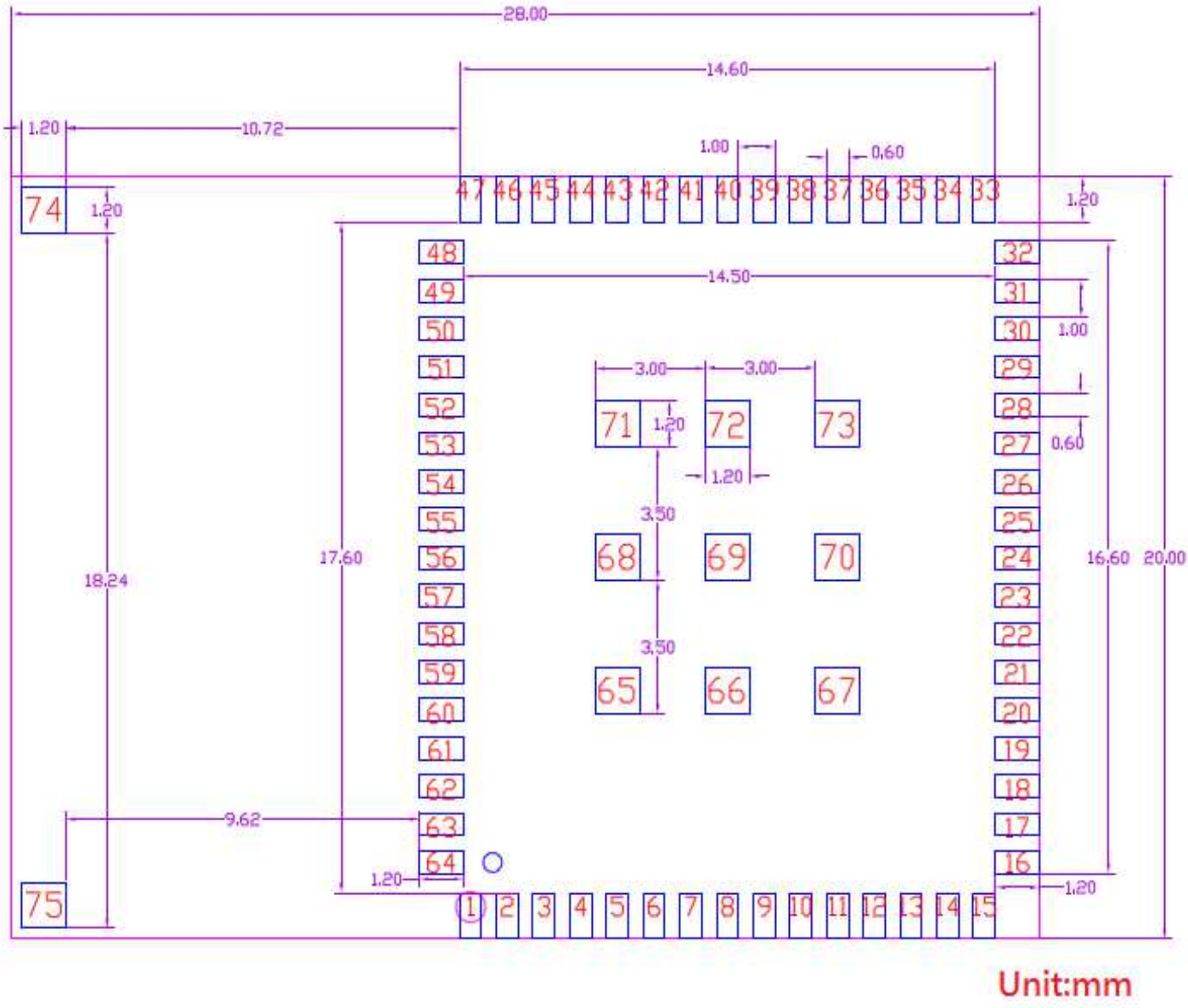
Pin-Number	Pin-Define	Type	Description
21	MICRO_SPI1_MISO	I/O	SPI1_MISO
22	MICRO_SPI1_SCK	I/O	SPI1 CLOCK
23	MICRO_SPI1_MOSI	I/O	SPI1_MOSI
24	MICRO_SPI1_NSS	I/O	SPI1_NSS
25	GND	--	Ground
26	VDD_3V3	I	Power supply for I/O and the internal regulator
27	VDD_3V3	I	Power supply for I/O and the internal regulator
28	GND	--	Ground
29	MICRO_UART2_RTS	I/O	MICRO_UART2_RTS
30	MICRO_UART2_CTS	I/O	MICRO_UART2_CTS
31	MICRO_UART2_RXD	I/O	MICRO_UART2_RXD
32	MICRO_UART2_TXD	I/O	MICRO_UART2_TXD
33	TESTMODE	I/O	GPIO pin
34	MICRO_RST_N	I	MICRO reset pin
35	MICRO_I2C1_SCL	I/O	the standard I2C communication protocol
36	MICRO_I2C1_SDA	I/O	the standard I2C communication protocol
37	GND	--	Ground
38	VBAT_MICRO	I	Power supply when VDD_3V3 is not present.
39	GND	--	Ground
40	MICRO_GPIO1	I/O	GPIO pin
41	MICRO_GPIO2	I/O	GPIO pin
42	MICRO_GPIO3	I/O	GPIO pin
43	MICRO_GPIO5	I/O	GPIO pin
44	MICRO_GPIO6	I/O	GPIO pin
45	MICRO_GPIO7 / I2S3_SD	I/O	GPIO pin / also can be used on I2S3_SD
46	MICRO_GPIO8 / I2S3_MCK	I/O	GPIO pin / also can be used on I2S3_MCK
47	MICRO_GPIO9	I/O	GPIO pin
48	MICRO_GPIO12	I/O	GPIO pin
49	MICRO_GPIO13	I/O	GPIO pin

.

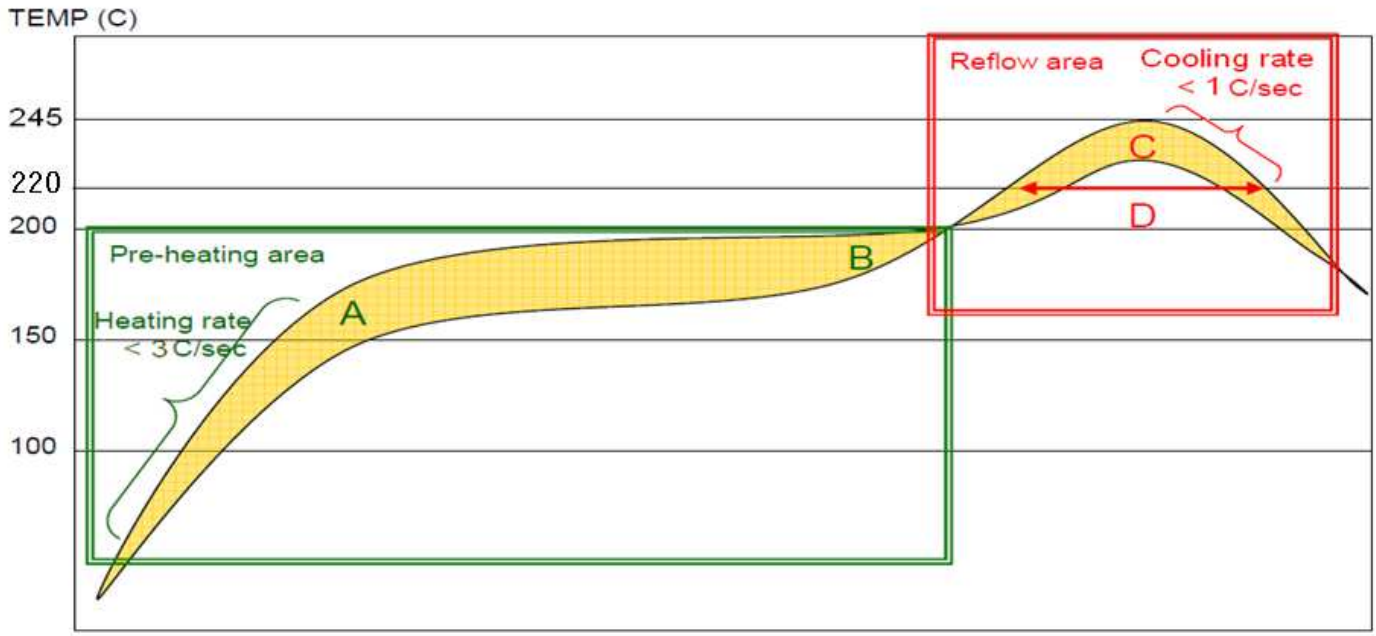
Pin-Number	Pin-Define	Type	Description
50	MICRO_GPIO14	I/O	GPIO pin
51	MICRO_JTAG_TRST	I	For normal operation, if JTAG is not used, this pin can be left unconnected (NC)
52	MICRO_JTAG_TDO / I2S3_SCK	I/O	1. For normal operation, if JTAG is not used, this pin can be left unconnected (NC) 2. also can be used on I2S3_SCK
53	MICRO_JTAG_TDI / I2S3_WS	I/O	1. For normal operation, if JTAG is not used, this pin can be left unconnected (NC) 2. also can be used on I2S3_WS
54	MICRO_JTAG_TMS	I	For normal operation, if JTAG is not used, this pin can be left unconnected (NC)
55	MICRO_JTAG_TCK	I	For normal operation, if JTAG is not used, this pin can be left unconnected (NC)
56	BTCX_STATUS	--	Multiplexed BT_Coex pin
57	BTCX_RF-ACTIVE	--	Multiplexed BT_Coex pin
58	BTCX_TXCONF	--	Multiplexed BT_Coex pin
59	GND	--	Ground
60	WL_SLEEP_CLK	I	Input pin for optional high- precision 32.768kHz Clock(Sleep Clock).
61	MICRO_UART1_RTS	I/O	Active-low request-to-send signal for UART interface
62	MICRO_UART1_CTS	I/O	Active-low clear-to-send signal for UART interface
63	MICRO_UART1_RXD	I/O	Serial data input for UART interface
64	MICRO_UART1_TXD	I/O	Serial data output for UART interface
65 ~ 73	GND	--	Ground

.

10 RECOMMEND FOOTPRINT



11 RECOMMEND REFLOW PROFILE



A-B. Temp.: 150~200℃; soak time:60~120sec.
C. Peak temp: 235~245℃
D. Time above 220 ℃: 40~90sec.
Suggestion: Optimal cooling rate is <1℃/sec. from peak to 220 ℃.

12 ESD LEVEL

Note:
1. Surface Resistivity:
   Interior:10^{9}~10^{11}Ω/SQUARE
   EXTERIOR:10^{8}~10^{12}Ω/SQUARE
2. Dimension:475*420mm
3. Tolerance:+5,0mm
4. Color:
   Background : Gray
   Text : Red

Length leader / trailer tape:
Leader tape: ≥550mm which includes ≥100mm of carrier tape with empty compartments and covered with tape; remaining part might be of cover tape only.
Trailer tape: ≥160mm with empty compartments and covered with tape.

NOTES:

1. **Material: Conductive Polystyrene (Recycle)**
2. **Color: Black**
3. **Surface reslstance: 10^{6} Ohms/square 以下.**
   Cumulative tolerance per 10 pictches(P_0) is ±0.2mm.
   A_0 & B_0 are measured on the plane by 0.3mm above the bottom of the pocket.
4. **K_0 is measured from the Inside bottom of the pocket to the top surface of the carrier.**
5. **Pocket position relative to sprocket hold is measured as true position of pocket, not sprocket hold.**

13 MSL LEVEL / STORAGE CONDITION