

UM2455

M-Stamp Module User Manual

Application Note

AN-2455-01

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M-Stamp Module User Manual

1. General Information

The M-Stamp module is a 2.4GHz solution that satisfies the requirements of low-cost, low-power, and wireless sensor networks. It provides a flexible and reliable module for users to develop solutions for their applications. Its small form factor saves the valuable board space. The modules are easy to use, consume minimal power and provide a reliable delivery of critical data between the devices.

The M-Stamp module operates within the ISM 2.4 – 2.5 GHz frequency band and contains UBEC's UM2455 and other necessary components such as a crystal, inductors, and capacitors. The UBEC 2.4GHz transceiver within the UM2455 features a maximum 5 MHz SPI (Serial Peripheral Interface) bus for controlling the IC and data transfer. It is a simple SPI slave device. The SPI consists of a 4-wire bus (SCLK, SI, SO, and SEN) and an interrupt signal (INT), and it provides access to various storage units such as MAC/BB/RF control/status registers, TXFIFOs, RXFIFOs, a security key table, etc.

2. PCB

Two types of the M-Stamp module are available, depending on the antenna configurations. Figure 1 shows the top view of a Printed Circuit Board (PCB) of the M-Stamp module with a printed circuit antenna. The PCB size is 28.6 mm x 14 mm.

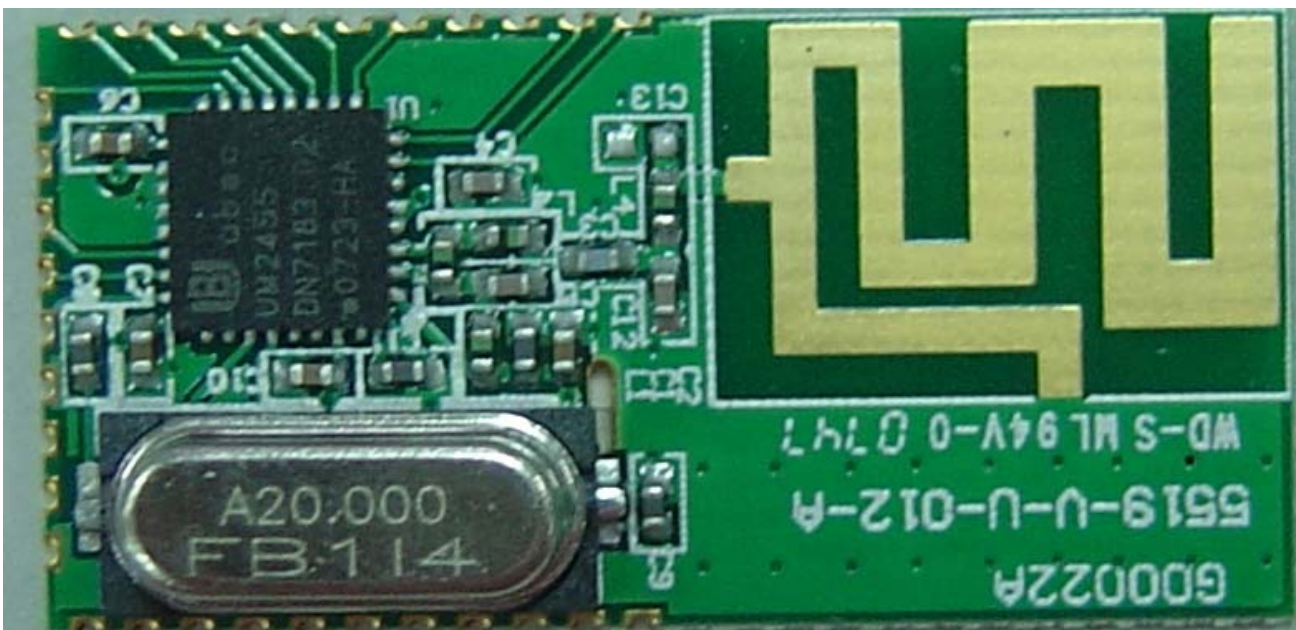


Figure 1. PCB of UM2455 M-Stamp Module

3. Pin Configuration

UM2455 M-Stamp module pin assignments and their functions are described below.

Pin Number	Pin Name	Type	Description
1	GPIO0	DIO	General purpose digital I/O, also used as an external PA enable
2	GPIO1	DIO	General purpose digital I/O, also used as an external TX/RX switch control
3	NC		
4	NC		
5	GPIO2	DIO	General purpose digital I/O, also used as an external TX/RX switch control
6	NC		
7	RESETN	DI	Global hardware reset pin, active low
8	WAKE	DI	External wake up trigger, active high /low can be programmable.
9	INT	DO	Interrupt pin to micro-processor : Level trigger, high /low programmable
10	SO	DIO	Serial interface data output from UM2455
11	SI	DIO	Serial interface data input to UM2455
12	SCLK	DI	Serial interface clock
13	SEN	DI	Serial interface enable
14	CLKOUT	DIO	20/10/5/2.5 MHz Clock output
15	XTAL32N	AI	32 kHz Crystal input (-) for the internal RTC used
16	XTAL32P	AI	32 kHz Crystal input (+) for the internal RTC used
17	GND	Ground	Ground
18	VCC	Power	3V
19	VCC	Power	3V
20	GND	Ground	Ground
21~31	NC		

Figure 2 shows the names and number allocation map of the connecting pins of the UM2455 M-Stamp module. It can interface with other devices such as a sensor, a LED, a host controller, a push button, a joystick, or power relays through GPIO signals.

4. Electrical Specifications

ITEM	SPECIFICATION	UNIT
Frequency range	ISM band 2.4 – 2.5	GHz
Input voltage	3	V
Current consumption	TX 25.5 RX 20.7	mA
TX Output power	-2 (Typ.)	dBm
TX EVM	18% (2405 ~ 2480 MHz)	%
RX sensitivity	-92	dBm

For the detailed functional descriptions and electrical characteristics of the UM2455 RF chip, please refer to UM2455 datasheet.

4.1. TX Output Power

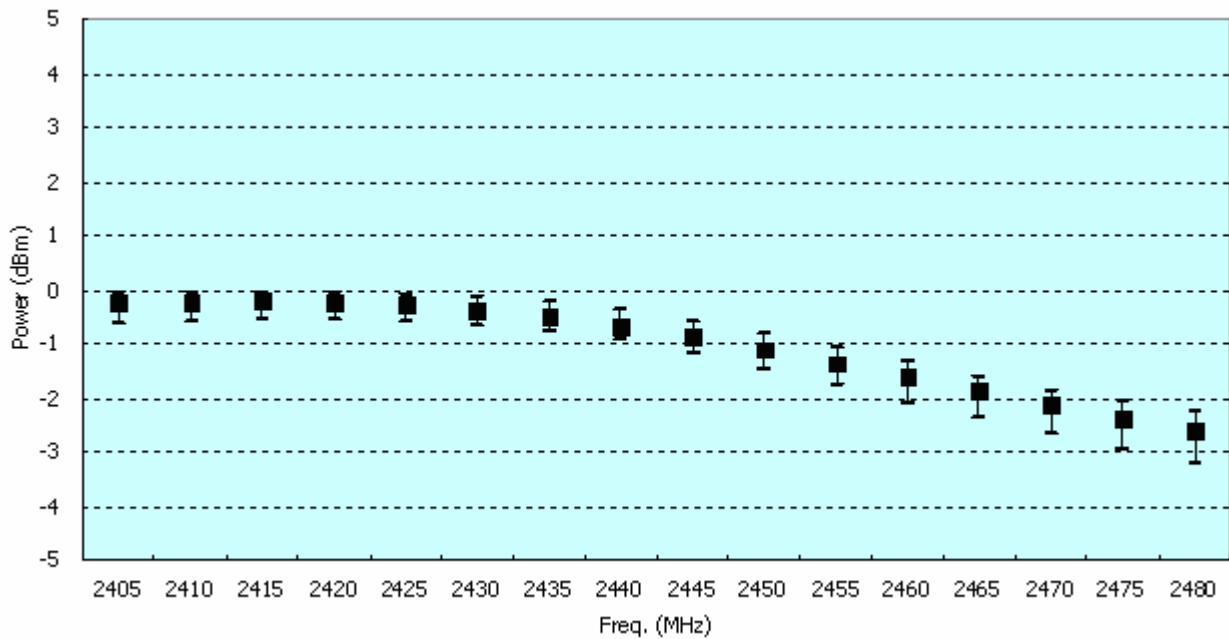


Figure 3. TX Output Power Test Results for the M-Stamp RF Module

4.2. TX EVM

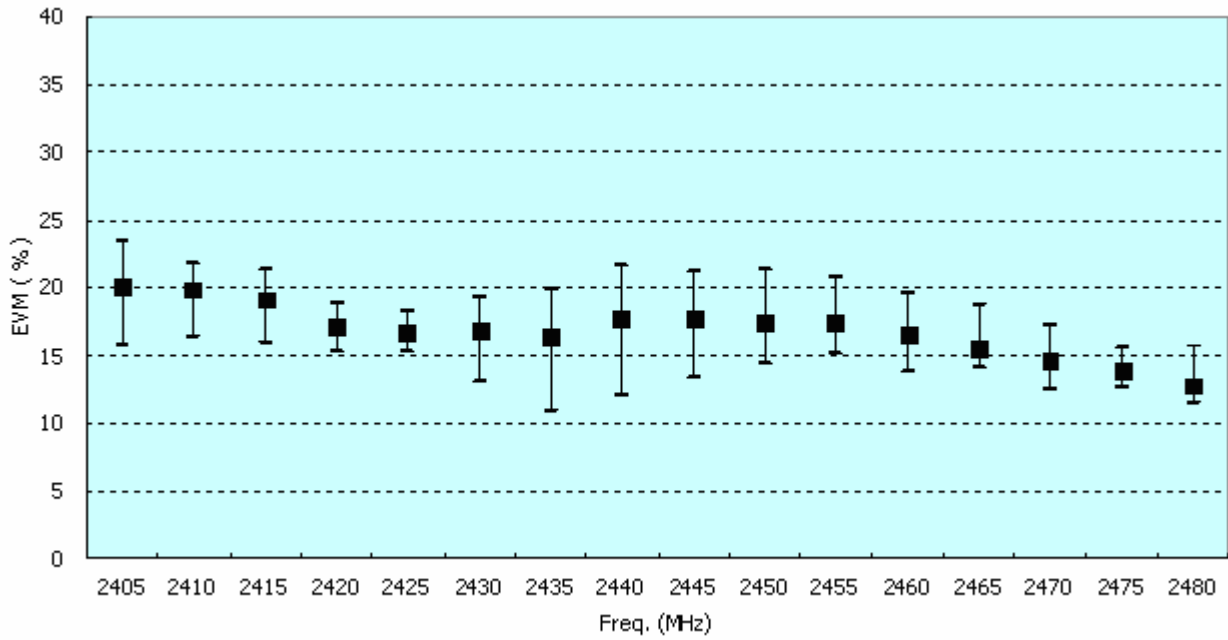


Figure 4. TX EVM Test Results for the M-Stamp RF Module

4.3. RX Sensitivity

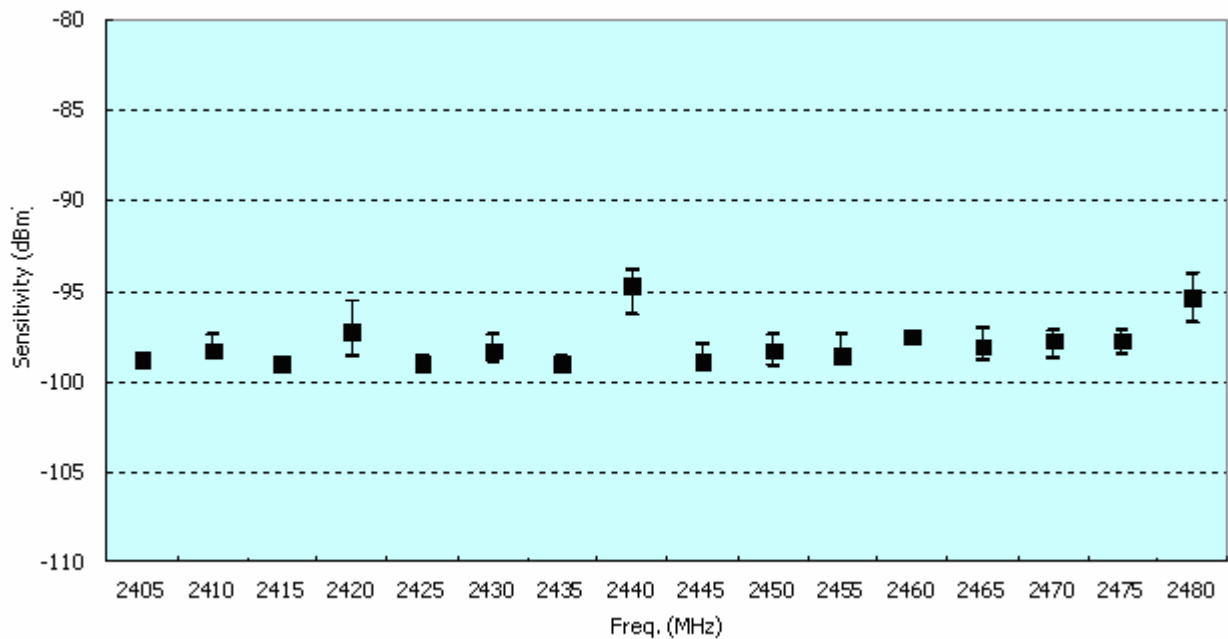


Figure 5. RX Sensitivity Test Results for the M-Stamp RF Module

5. Bill of Material

Item	UBEC part NO.	Part name	Footprint	Tolerance	Manufacturer	Vendor Part NO.	Qty	Reference
1	1-A-0M03-042000 5FBMA	0.5pF	402	50V COG ±0.25pF	C CHIP, Murata (台灣村田)	GRM1555C1HR50 CZ01	3	C4 C5 C12
1R	1-A-0M03-042000 5FBYO	0.5pF	402	50V NPO ±0.25pF	C CHIP Yageo (國巨)	C0402CRNP09BN R50		
2	1-A-0M03-042010 0FBMA	1pF	402	50V COG ±0.25pF	C CHIP, Murata (台灣村田)	GRM1555C1H1R0 CZ01	1	C3
2R	1-A-0M03-042010 0FBYO	1pF	402	50V NPO ±0.25pF	C CHIP Yageo (國巨)	C0402CRNP09BN 1R0		
3	1-A-0M03-042270 0FGMA	27pF	402	50V COG ±5%	C CHIP, Murata (台灣村田)	GRM1555C1H270 JZ01	2	C8 C9
4	1-A-0M03-042470 0FGMA	47pF	402	50V COG ±5%	C CHIP, Murata (台灣村田)	GRM1555C1H470 JZ01	1	C2
5	1-A-0M03-042101 0FGMA	100pF	402	50V COG ±5%	C CHIP, Murata (台灣村田)	GRM1555C1H101 JZ01	1	C11
6	1-A-0M03-042103 0FKMA	10nF	402	50V Y5V -20~+80%	C CHIP, Murata (台灣村田)	GRM155F51H103 ZA01	4	C1 C6 C7 C10
6R	1-A-0M03-042103 0CKYO	10nF	402	16V Y5V -20~+80%	C CHIP Yageo (國巨)	C0402ZRY5V7BB 103		
7	1-A-0M02-042020 00AMA	2nH	402	±0.3nH	L chip Murata (台灣村田)	LQG15HN2N0S02	1	L4
8	1-A-0M02-042050 60AMA	5.6nH	402	±0.3nH	L chip Murata (台灣村田)	LQG15HN5N6S02	2	L1 L2
9	1-A-0M02-042070 50GMA	7.5nH	402	±5%	L chip Murata (台灣村田)	LQG15HN7N5J02	1	L3
10	1-A-0M07-C020M B20AAR	CRYSTAL 20MHz	GF20000 06	20ppm/20pF/ 10*3.5*4	AKER (安碁)	49M-020000-FD4 D11	1	X1
11		UM2455	QFN-32		UBEC		1	U1
12	2-A-0M10-200001 0A0UC	5519-V-U -012-A	PCB	2-L,FR-4,G00 022A	UBEC		1	

7. PCB Layout

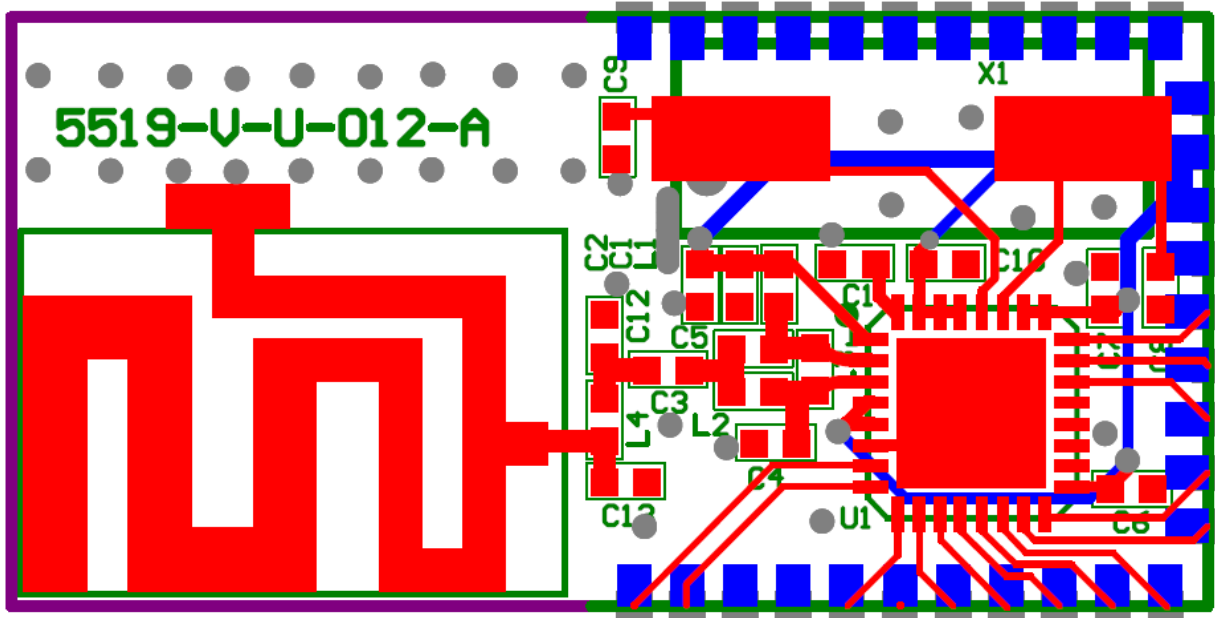


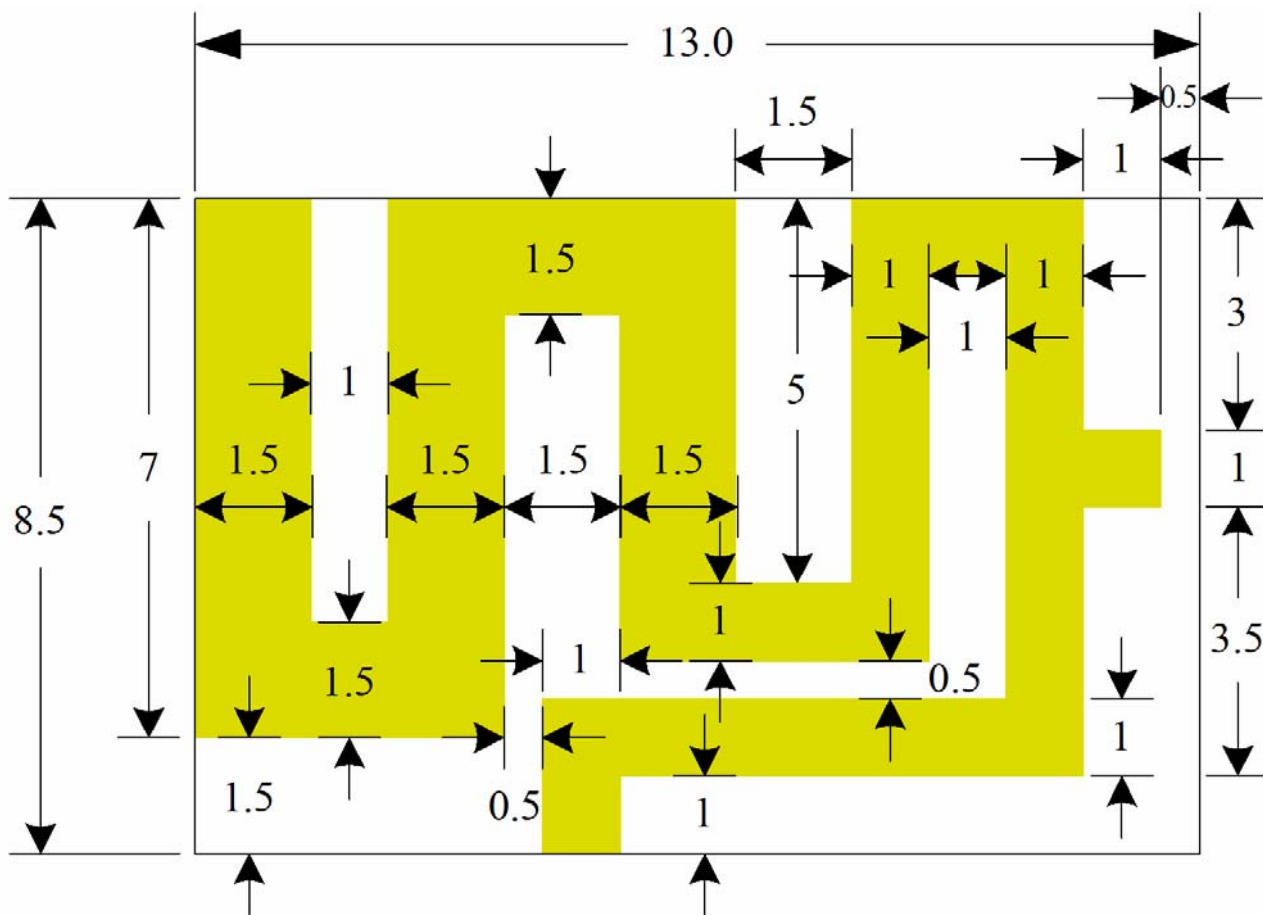


Figure 7. PCB Layout of the M-Stamp Module

 : Top Layer

 : Bottom Layer

8. Appendix



Unit : mm

Figure 8. The Pattern and Dimensions of the M-Stamp Meander Antenna

Revision History

Revision	Date	Description of Change
0.0	2007/07/12	Initial version
1.0	2008/01/22	Crystal change to 49M package.

Contact UBEC:

Headquarters

Address: 7F-1, No. 192, Dongguang Rd., Hsinchu, 300 Taiwan

Tel: +886-3-5729898

Fax: +886-3-5718599

Website: <http://www.ubec.com.tw>

Sales Services

Tel: +886-3-5729898

Fax: +886-3-5718599

E-mail: sales@ubec.com.tw

FAE Services

Tel: +886-3-5729898

Fax: +886-3-5718599

E-mail: fae@ubec.com.tw

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