Warning statement

FCC STATEMENT

1. 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.

(2) This device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: 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 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.

The EMW3162 module is designed to comply with the FCC statement. FCC ID is P53-EMW3162. The host system using EMW3162, should have label indicated FCC ID P53-EMW3162.

User Manual

Embedded M2M Module with 802.11b/g/n 1T1R WiFi

(Project Name)	Embedded M2M Module with Broadcom 802.11bgn(1x1) WiFi single chip
(Foxconn Part No.)	T77H497.00
(Customer Part No.)	EMW3162

Content

1. Introduction

Project Name: Embedded M2M Module with Broadcom 802.11bgn (1x1) WiFi.
Project Number: T77H497.00.
This documentation describes the engineering requirements specification of WiFi module with T77H497.00. It is a confidential document of Foxconn.

1.1 RF module Overview

This M2M (Machine to Machine) module integrates 32 bit MCU and Broadcom WiFi. It provides wireless modem functionality utilizing direct sequence spread spectrum and OFDM/CCK technology. It operates in 2.4GHz ISM band, compatible with the IEEE 802.11b/g/n standard. It can implement the wireless network function on the embedded devices easily and improve the product's competitiveness. It supports TCP/IP protocol and all of the Wi-Fi security. This module has implemented some efficient mechanisms in its software and hardware to maximize the performance.

The functional block diagram is shown in Figure .1.

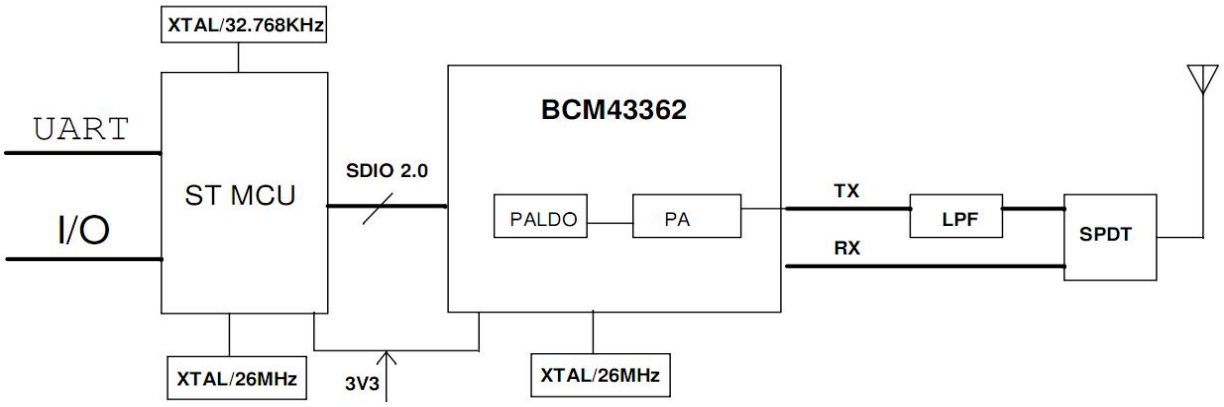


Figure 1 Module Block Diagram

1.2 Specification reference

This specification is based on additional references listed below.

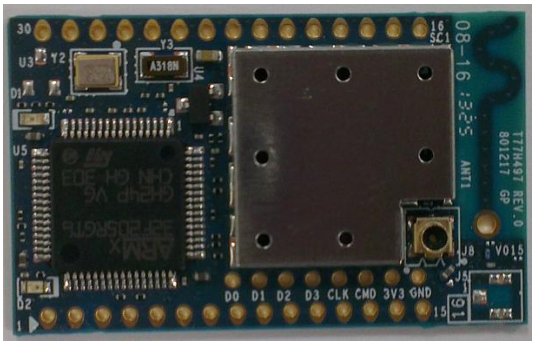
- IEEE Std. 802.11b
- IEEE Std. 802.11g
- IEEE Std. 802.11n

1.3 System Functions

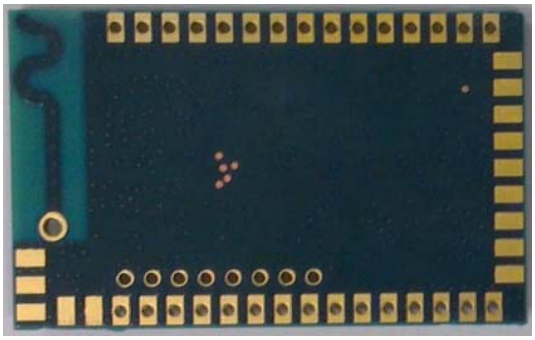
Table1: General Specification as below:

Main Chipset	32 bit MCU and Broadcom WiFi single chip
Operating Frequency	2412MHz~2462MHz
WiFi Standard	802.11b/g/n(1x1)
Modulation	11b: DBPSK, DQPSK, CCK and DSSS 11g: BPSK, QPSK, 16QAM, 64QAM and OFDM 11n: MCS0~7 OFDM
PHY Data rates	11b: 1, 2, 5.5 and 11Mbps 11g: 6, 9, 12, 18, 24, 36, 48 and 54 Mbps 11n(HT20): MCS0~7, up to 150Mbps
Form factor	44pin QFN design
Host Interface	SDIO 2.0
PCB Stack	4-layers single side design
PCBA Dimension	Typical, 38.60mm(W)*23.62mm(L)*3.30mm(T)
Antenna Type	● One printed antenna on board ● One U.F.L connector for external antenna
Operation Temperature	-30℃ to +80℃
Storage Temperature	-40℃ to +85℃

Sample picture is as below.



TOP



BOTTOM

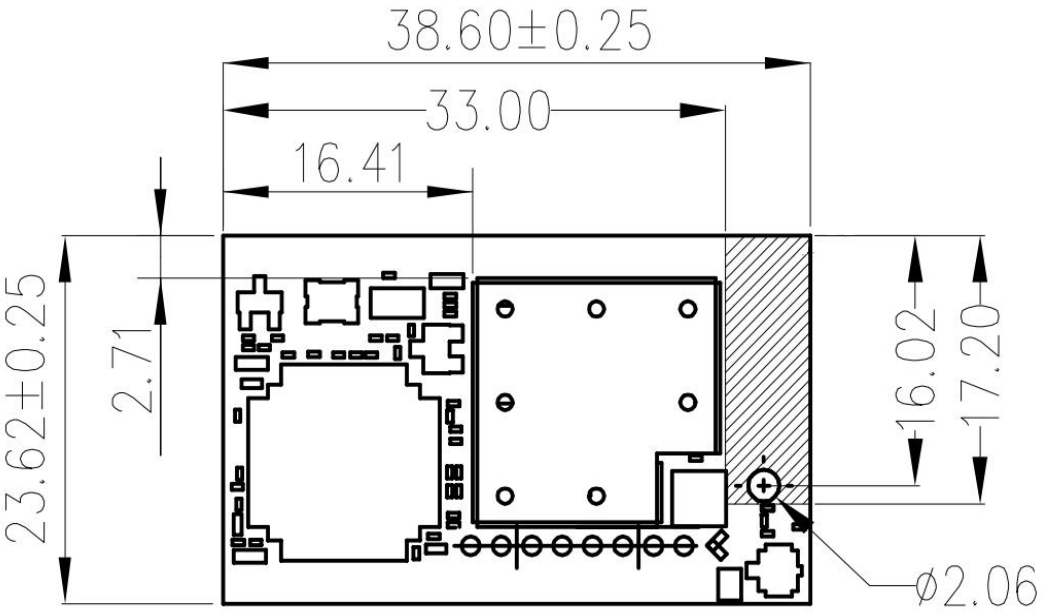
2. Mechanical Specification

2.1 Mechanical Drawing

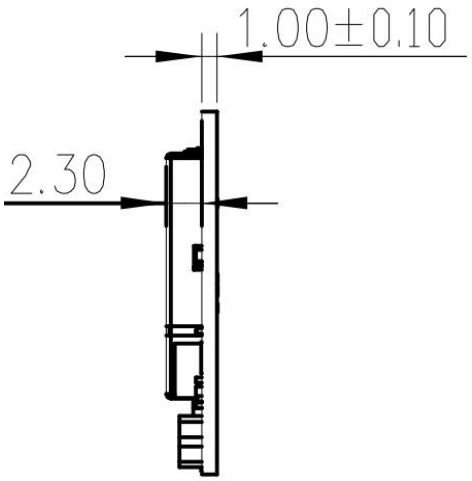
Typical Dimension (W x L x T): 38.60x23.62x3.30 mm

.

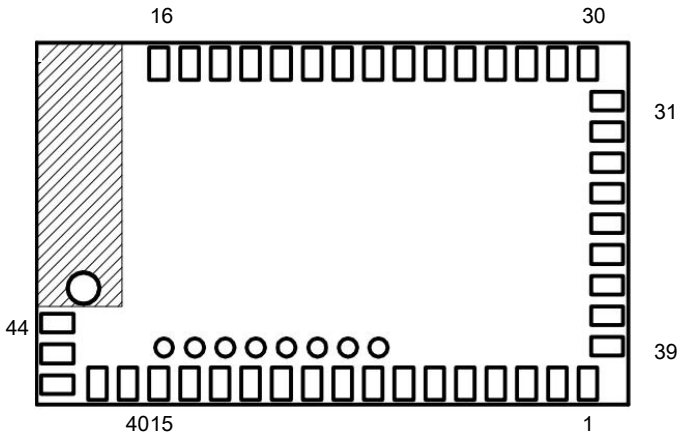
Unit: mm



TOP VIEW



SIDE VIEW



BOTTOM VIEW

2.2 44pin QFN Pin definition

The pin definition is as below, and its pin number refers to item 2.1.

Pin #	Name	Pin #	Name
1	I2C_SCL	21	nCTS_DM
2	I2C_SDA	22	TXD
3	JTMSSWDIO	23	RXD
4	I2S_MCK	24	VCC3V3
5	PA3_RX2-TCP	26	32K_SLPCLK_OUT
6	SPI-NSS_I2S-WS	27	BOOT0
7	JTDO_SPI-CLK_I2S-CK	28	JTCKSWCLK
8	NJTRST_SPI-MISO_I2Sext_SD	29	WAKE_UP
9	SPI-MOSI_I2S-SD	30	status
10	SPI_INT	31	GPIO_PA5
11	Readyness	32	GPIO_PA6
12	GPIO_PC2	33	GPIO_PA7
13	GPIO_PB14	34	GPIO_PB15
14	GPIO_PC6	35	GPIO_PC3
16	nRF_LED	36	GPIO_PC4
17	nRESET	37	GPIO_PC0
18	JTDI_DSR	38	PA2_TX2
19	DATA_RDY	15,25,39~44	GND
20	nRTS_DP		

3. Electrical Specification

3.1 802.11b Mode

Items	Contents				
Standard	IEEE802.11b				
Modulation Type	DSSS / CCK				
Frequency range	2412MHz~2462MHz				
Channel	CH1 to CH11				
Data rate	1, 2, 5.5, 11Mbps				
TX Characteristics	Min.	Typ.	Max.	Unit	
1. Transmitter Output Power					
1) 11b Target Power	15	16.5	18	dBm	
2. Spectrum Mask @ target power					
1) fc +/-11MHz to +/-22MHz	-	-	-30	dBr	
2) fc > +/-22MHz	-	-	-50	dBr	
3. Frequency Error	-25	-	+25	ppm	
4 Constellation Error(peak EVM)@ target power					
1) 1~11Mbps	-	-	35%		
RX Characteristics	Min.	Typ.	Max.	Unit	
5 Minimum Input Level Sensitivity					
1) 1Mbps (FER≦8%)	-	-	-83	dBm	
2) 2Mbps (FER≦8%)	-	-	-80	dBm	
3) 5.5Mbps (FER≦8%)	-	-	-79	dBm	
4) 11Mbps (FER≦8%)	-	-	-76	dBm	
6 Maximum Input Level (FER≦8%)	-10	-	-	dBm	

3.2 802.11g Mode

Items	Contents				
Standard	IEEE802.11g				
Modulation Type	OFDM				
Frequency range	2412MHz~2462MHz				
Channel	CH1 to CH11				
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps				
TX Characteristics	Min.	Typ.	Max.	Unit	
1. Transmitter Output Power					
1) 11g Target Power	11.5	13	14.5	dBm	
2. Spectrum Mask @ target power					
1) at fc +/- 11MHz	-	-	-20	dBr	
2) at fc +/- 20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz	-	-	-40	dBr	
3 Constellation Error(EVM)@ target power					
1) 6Mbps	-	-	-5	dB	
2) 9Mbps	-	-	-8	dB	
3) 12Mbps	-	-	-10	dB	
4) 18Mbps	-	-	-13	dB	
5) 24Mbps	-	-	-16	dB	
6) 36Mbps	-	-	-19	dB	
7) 48Mbps	-	-	-22	dB	
8) 54Mbps	-	-	-25	dB	
4 Frequency Error	-25	-	+25	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5 Minimum Input Level Sensitivity					
1) 6Mbps (PER ≦ 10%)	-	-	-82	dBm	
2) 9Mbps (PER ≦ 10%)	-	-	-87	dBm	
3) 12Mbps (PER ≦ 10%)	-	-	-79	dBm	
4) 18Mbps (PER ≦ 10%)	-	-	-77	dBm	
5) 24Mbps (PER ≦ 10%)	-	-	-74	dBm	
6) 36Mbps (PER ≦ 10%)	-	-	-70	dBm	
7) 48Mbps (PER ≦ 10%)	-	-	-66	dBm	
8) 54Mbps (PER ≦ 10%)	-	-	-65	dBm	
6 Maximum Input Level (PER ≦ 10%)	-20	-	-	dBm	

3.3 802.11n HT20 Mode

Items	Contents				
Standard	IEEE802.11n HT20 @ 2.4GHz				
Modulation type	MIMO-OFDM				
Channel	CH1 to CH11				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7				
TX Characteristics	Min.	Typ.	Max.	Unit	
1. Transmitter Output Power					
1) 11n HT20 Target Power	10.5	12	13.5	dBm	
2. Spectrum Mask @ target power					
1) at fc +/- 11MHz	-	-	-20	dBr	
2) at fc +/- 20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz	-	-	-45	dBr	
3. Constellation Error(EVM)@ target power					
1) MCS0	-	-	-5	dB	
2) MCS1	-	-	-10	dB	
3) MCS2	-	-	-13	dB	
4) MCS3	-	-	-16	dB	
5) MCS4	-	-	-19	dB	
6) MCS5	-	-	-22	dB	
7) MCS6	-	-	-25	dB	
8) MCS7	-	-	-27	dB	
4. Frequency Error	-25	-	+25	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity					
1) MCS0 (PER ≦ 10%)	-	-	-82	dBm	
2) MCS1 (PER ≦ 10%)	-	-	-79	dBm	
3) MCS2 (PER ≦ 10%)	-	-	-77	dBm	
4) MCS3 (PER ≦ 10%)	-	-	-74	dBm	
5) MCS4 (PER ≦ 10%)	-	-	-70	dBm	
6) MCS5 (PER ≦ 10%)	-	-	-66	dBm	
7) MCS6 (PER ≦ 10%)	-	-	-65	dBm	
8) MCS7 (PER ≦ 10%)	-	-	-64	dBm	
6. Maximum Input Level (PER ≦ 10%)	-20	-	-	dBm	