

# WFM60-SFP201

---

2.4GHz WLAN(IEEE 802.11b/g/n)  
Stand-alone Module

October.25, 2017

Rev.0.1



# TABLE OF CONTENTS

<b>1. APPLICATION</b> .....	<b>3</b>
<b>2. QUALITY</b> .....	<b>3</b>
<b>3. APPEARANCE AND CHARACTERISTICS</b> .....	<b>3</b>
3.1 APPEARANCE.....	3
3.2 CHARACTERISTICS.....	3
<b>4. APPLICATION OF 2.4GHZ WLAN(802.11B/G/N) STAND-ALONE MODULE</b> .....	<b>3</b>
<b>5. ABSOLUTE MAXIMUM RATING</b> .....	<b>3</b>
<b>6. TEST</b> .....	<b>3</b>
<b>7. MECHANICAL DIMENSION</b> .....	<b>4</b>
<b>8. GENERAL DESCRIPTION</b> .....	<b>4</b>
<b>9. INPUT/OUTPUT DC TERMINAL CHARACTERISTICS</b> .....	<b>5</b>
<b>10. ELECTRICAL CHARACTERISTICS</b> .....	<b>5</b>
10.1 OPERATING CONDITION.....	5
10.2 TX CHARACTERISTICS.....	5
10.3 RX CHARACTERISTICS .....	6
<b>11. PIN ASSIGNMENT (TOP VIEW, BOTTOM LAYER)</b> .....	<b>7</b>
<b>12. PIN DESCRIPTION</b> .....	<b>8</b>
<b>13. BLOCK DIAGRAM</b> .....	<b>9</b>
<b>14. REVISION HISTORY</b> .....	<b>9</b>

## 1. Application

This specification is applied to the 2.4GHz WLAN(802.11b/g/n) Stand-Alone module of I&C TECHNOLOGY.

## 2. Quality

Quality should meet each condition which are mentioned on this specification. However, items which are not mentioned on this specification should follow the inspection agreements and standards which are agreed with both companies.

## 3. Appearance and Characteristics

### 3.1 Appearance

Appearance should not be contaminated by harmful materials and have cracks etc.  
Mechanical dimension should meet the contents of clause 7.

### 3.2 Characteristics

Electrical characteristics should meet the contents of clause 12.

## 4. Application of 2.4GHz WLAN(802.11b/g/n) Stand-Alone Module

WFM60-SFP201 is a 2.4GHz WLAN(802.11b/g/n) Stand-Alone Module for IoT(Internet of Things) such as Home electronic appliance, Room controller, Smart plug, etc. But, this module is not designed for Life Support Application. it is recommended that this module should be mounted by reflow soldering.

## 5. Absolute Maximum Rating

		Min.	Max.	Unit
Storage Temperature		-40	85	deg.C
Supply Voltage	VDD_SYS		+3.6	V
	VDD_PA		+3.6	
	VDDIO_1,2		+3.6	
	VDD_BBPLL		+3.6	
	VDD_MEM	-0.5	+4.0	

## 6. Test

Electrical characteristics are tested for every product. However, if there are any objections in judgment, it should be treated with agreements of companies.

### 7. Mechanical Dimension

Dimension	29.0mm× 17.0mm × 3.1mm(Max.)
-----------	------------------------------

Figure 1 and Figure 2 show the Bottom Layer (Top View) and the side dimension of WFM60-SFP201 package outline

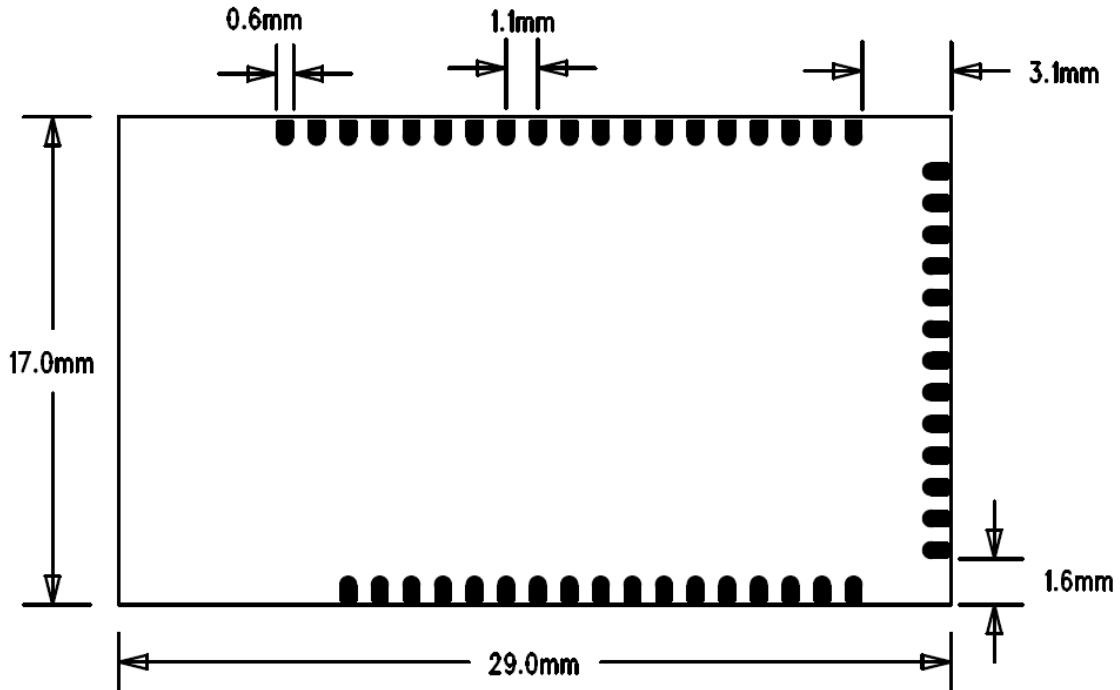


Figure 1. Package Outline (Top View)

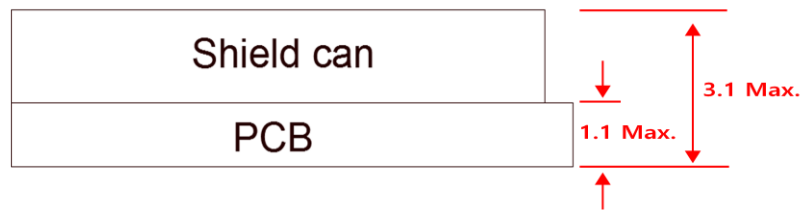


Figure 2. Package Outline (Side View)

### 8. General Description

WFM60-SFP201 is a module for 2.4GHz WLAN(IEEE 802.11b/g/n).

WFM60-SFP201 is available as 49 pin LGA package. (29.0mm x 17.0mm x 3.1mm)

## 9. Input/Output DC Terminal Characteristics

	Parameters	Conditions	Min.	Typ.	Max.	Unit
V <sub>IH</sub>	High Level Input Voltage	VDDIO=3.3V	2.1			V
V <sub>IL</sub>	Low Level Input Voltage	VDDIO=3.3V			0.7	V
V <sub>OH</sub>	High Level Output Voltage	VDDIO=3.3V	VDDIO-0.4			V
V <sub>OL</sub>	Low Level Output Voltage	VDDIO=3.3V			0.4	V

## 10. Electrical Characteristics

### 10.1 Operating Condition

		Min.	Typ.	Max.	Unit
Operating Temperature		-30	25	85	deg.C
Supply Voltage	VDD_SYS	3.0	3.3	3.6	V
	VDD_PA	3.0	3.3	3.6	
	VDD_BBPLL	3.0	3.3	3.6	
	VDDIO_1,2	3.0	3.3	3.6	
	VDD_MEM	3.0	3.3	3.6	

\* The optimal RF performance specified in this datasheet is guaranteed for temperatures from -20°C~+70°C

### 10.2 Tx Characteristics

All measurements are made under nominal supply voltage and tested at External Antenna Port.

(VDD\_SYS = 3.3V, VDD\_PA=3.3V, VDDIO\_1,2=3.3V, VDD\_BBPLL=3.3V, VDD\_MEM=3.3V)  
and room temperature(25°C) condition.

Parameters	Conditions	Spec.			
		Min.	Typ.	Max.	Unit
Frequency Range		2400	-	2500	MHz
Output Power (VBAT=3.3V, spectral mask, EVM compliance)	802. 11b, EVM = -9 dB		19		dBm
	OFDM , BPSK, EVM = -8 dB		18		
	OFDM, QPSK, EVM = -13 dB		17.5		
	OFDM, 16QAM, EVM = -19 dB		17		
	OFDM, 64QAM <sup>3/4</sup> , EVM = -25 dB		16		
	OFDM, 64QAM <sup>5/6</sup> , EVM = -27 dB		15		

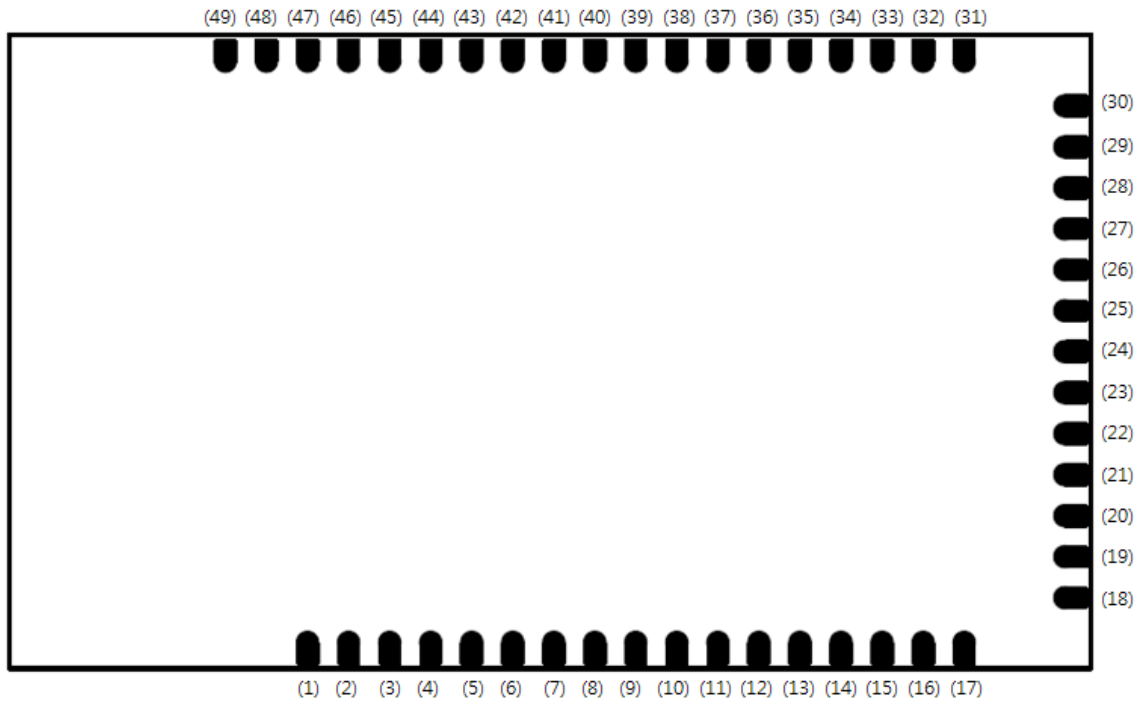
### 10.3 Rx Characteristics

All measurements are made under nominal supply voltage and tested at External Antenna Port.

(VDD\_SYS = 3.3V, VDD\_PA = 3.3V, VDDIO\_1,2=3.3V, VDD\_BBPLL=3.3V, VDD\_MEM=3.3V)  
and room temperature (25°C) condition.

Parameters	Conditions	Spec.			
		Min.	Typ.	Max.	Unit
Frequency Range		2400	-	2500	MHz
11b, Rx Sensitivity (8% PER for 1024 octet PSDU)	CCK, 1 Mbps		-95.5		dBm
	CCK, 2 Mbps		-94.5		
	CCK, 5.5 Mbps		-90.5		
	CCK, 11 Mbps		-87.5		
11g, Rx Sensitivity (10% PER for 1024 octet PSDU)	OFDM, 6 Mbps		-92.5		
	OFDM, 9 Mbps		-91.5		
	OFDM, 12 Mbps		-89.5		
	OFDM, 18 Mbps		-87.5		
	OFDM, 24 Mbps		-84.5		
	OFDM, 36 Mbps		-80.5		
	OFDM, 48 Mbps		-76.5		
11n, Rx Sensitivity (10% PER for 4096 octet PSDU)	OFDM, 54 Mbps		-75.5		
	HT20, MCS0		-91.5		
	HT20, MCS1		-88.5		
	HT20, MCS2		-85.5		
	HT20, MCS3		-82.5		
	HT20, MCS4		-79.5		
	HT20, MCS5		-75.5		
Adjacent Channel Rejection	HT20, MCS6		-73.5		
	HT20, MCS7		-72.5		
	CCK, 1 Mbps (signal; -74dBm)	45	-		dB
	CCK, 11 Mbps (signal; -70dBm)	39	-		
	OFDM, 6 Mbps (signal; -79dBm)	31	-		
	OFDM, 54 Mbps (signal; -62dBm)	14	-		
HT20, MCS0 (signal; -79dBm)	31	-			
HT20, MCS7 (signal; -61dBm)	13	-			

### 11. Pin Assignment (Top View, Bottom Layer)



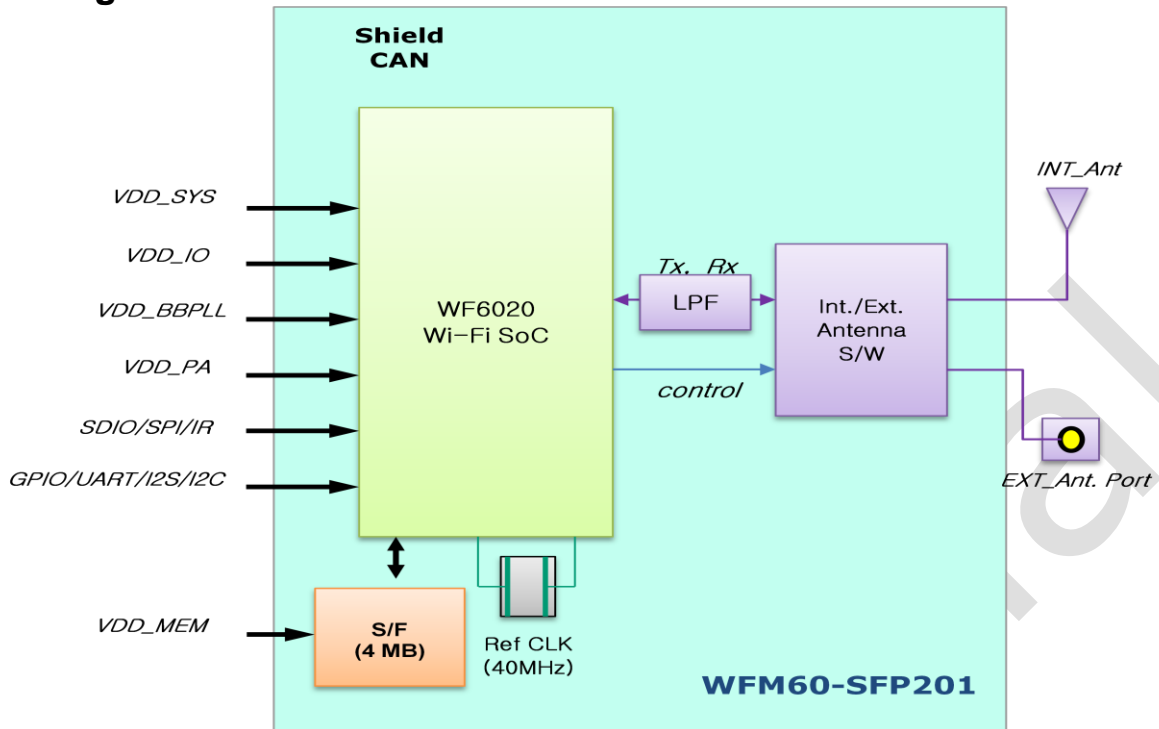
No.	Pin Name	No.	Pin Name	No.	Pin Name
1	GND	18	VDD_SYS	35	GP22
2	GND	19	GND	36	VDD_BBPLL
3	GND	20	UART_RXD0	37	GND
4	VDD_IO_1	21	UART_TXD0	38	GADC2
5	VDD_PA	22	SF_SIO0	39	GADC1
6	SD_D2	23	SF_SCLK	40	GADC0
7	SD_D3	24	GP00	41	GND
8	SD_CMD	25	GP01	42	GP05
9	SD_CLK	26	GP02	43	GP04
10	SD_D0	27	GP03	44	GP21
11	SD_D1	28	SF_CSN	45	GP06
12	GND	29	VDD_MEM	46	GP07
13	GP18	30	SF_SIO1	47	GND
14	GP23	31	GND	48	GND
15	GP24	32	VDD_IO_2	49	GND
16	PMIC_EN	33	GP25		
17	GND	34	RSTN		

## 12.Pin Description

Pin No.	Pin Name	Description
1	GND	Module Ground
2	GND	
3	GND	
4	VDD_IO_1	IO Supply Voltage
5	VDD_PA	PA supply voltage (3.3V DC)
6	SD_D2	SDIO Data 2 / I2C Data / GPIO14
7	SD_D3	SDIO Data 3 or SDIO SPI Mode CS or SPI CS / IR TX Output / GPIO15
8	SD_CMD	SD CMD or SDIO SPI Mode DI or SPI DI / GPIO10
9	SD_CLK	SDIO Clock (33Ω series connect*) or SDIO SPI Mode CLK or SPI Clock / GPIO11
10	SD_D0	SD Data 0 or SDIO SPI Mode DO or SPI DO/ GP12
11	SD_D1	SD Data 1 or SDIO SPI Mode IRQ / IR RX input / I2C Clock / GPIO 13
12	GND	Module Ground
13	GP18	GPIO18
14	GP23	IR TX Output / GPIO23
15	GP24	IR RX input / GPIO24
16	PMIC_EN	INTERNAL PMIC PWR EN
17	GND	Module Ground
18	VDD_SYS	INTERNAL DCDC analog supply input
19	GND	Module Ground
20	UART_RXD0	Debug UART0 RXD / I2S Clock / GPIO8
21	UART_TXD0	Debug UART0 TXD / I2C Data / GPIO9
22	SF_SIO0	Not connected (Internal SF_SIO0)
23	SF_SCLK	Not connected (Internal SF_SCLK)
24	GP00	UART RX Input for UART 1 / I2S LRCK / GPIO 0
25	GP01	UART TX Output for UART 1 / I2S BCK /GPIO1
26	GP02	UART RX Input for UART2 / I2S Data Out for I2S Master / I2S Data In for I2S Slave / GPIO2
27	GP03	UART TX Output for UART 2 / I2S Master Clock / GPIO3
28	SF_CSN	Not connected (Internal SF_CSN)
29	VDD_MEM	Internal Flash Memory Power input
30	SF_SIO1	Not connected (Internal SF_SIO1)
31	GND	Module Ground
32	VDD_IO_2	IO Supply Voltage
33	GP25	RESET Select( "H" : External Reset, "L" : Internal POR) / GPIO25
34	\RST	Reset (Active Low)
35	GP22	Boot Select(External PU : SF Boot, PD : ROM Boot) / GPIO22
36	VDD_BBPLL	Wi-Fi PLL Analog Supply Voltage(3.3V DC)
37	GND	Module Ground
38	GADC2	ADC INPUT
39	GADC1	ADC INPUT
40	GADC0	ADC INPUT
41	GND	Module Ground
42	GP05	UART RX Input for UART1/ SPI DI / GPIO5
43	GP04	UART TX Output for UART1/ SPI DO / GPIO4
44	GP21	I2S SDO1 for Master or Slave / I2S SDI1 for Master or Slave / GPIO 21
45	GP06	SPI Clock(Master : Out, Slave : In) / I2C Data / GPIO6
46	GP07	SPI Chip Select(Master : Out, Slave : In) / I2C Clock / GPIO7
47	GND	Module Ground
48	GND	
49	GND	



## 13. Block Diagram



## 14. FCC Statement

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.

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

The antenna(s) must be installed such that a minimum separation distance of at least 20 cm is maintained between the radiator (antenna) and all persons at all times. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

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.

The module is labeled with its own FCC ID. If the FCC ID are 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. In that case, the final end product must be labeled in a visible area with the following:

"Contains FCC ID: 2ADXS-WFM60-SFP201"