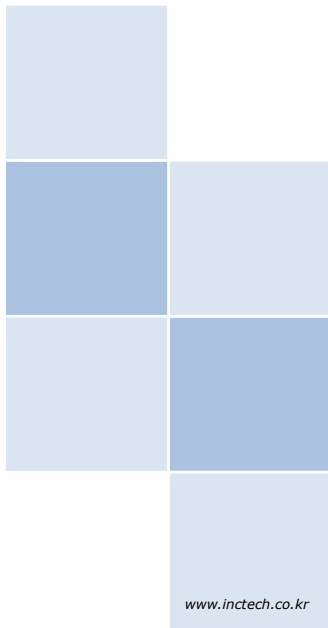




WFM60-SFP202

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



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1. Application

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

2. Quality

Quality should meet each condition which is 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-SFP202 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	
	VCC_5.0V	-0.5	6.5	

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	35.5mm× 23.5mm × 10.9mm(Max.)
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Figure1, 2 and 3 show the Top, Bottom and Side View of WFM60-SFPC202 package outline.

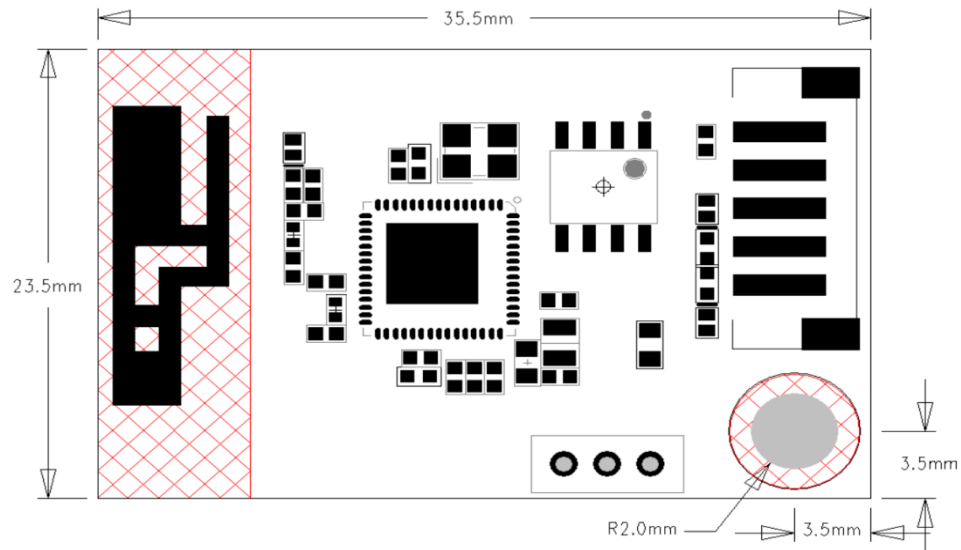


Figure 1. Package Outline(Top View)

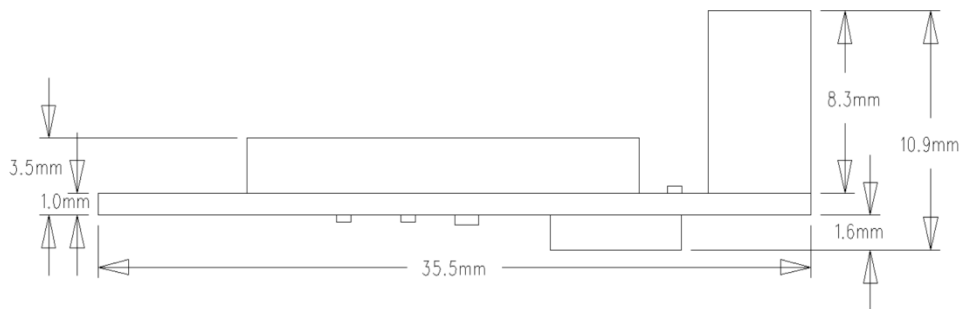


Figure 2. Package Outline(Side View)

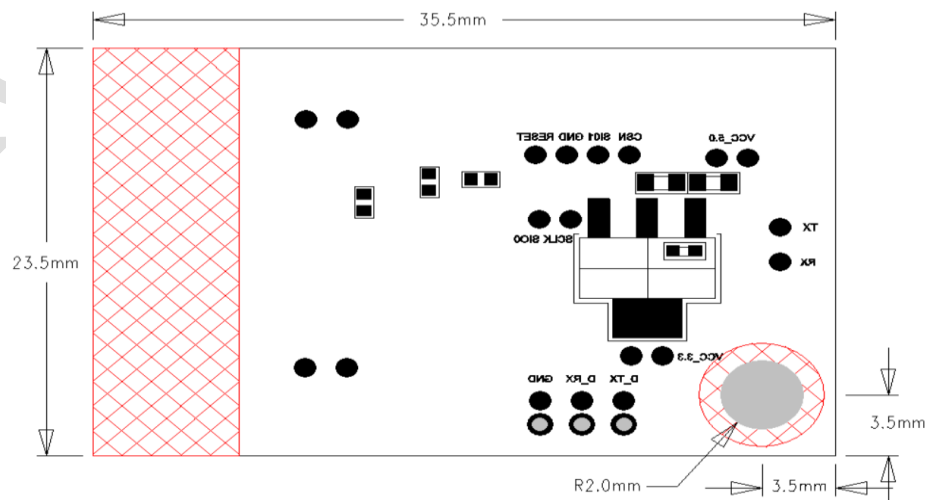


Figure 3. Package Outline(Bottom View)

8. I/O Connector Pin Assign



Figure 4. Top View

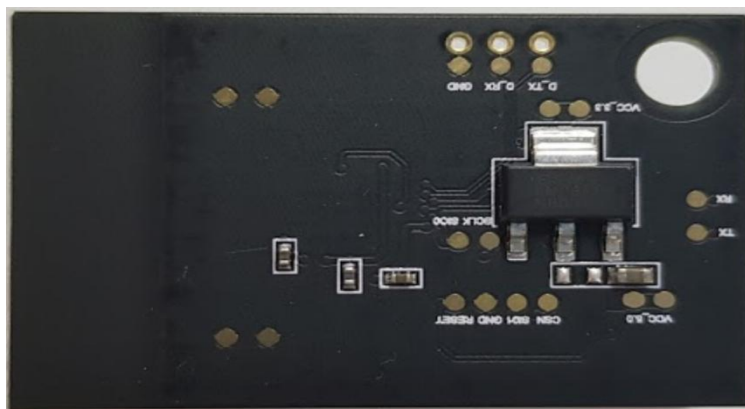


Figure 5. Bottom View

1. RSTN
2. VCC_5.0V
3. GND
4. TX
5. RX

ITEM	PIN No.	PIN Name	Function Description
SMW200-H05G (2.0mm Pitch Right Angle SMT Type Connector)	1	RSTN	5V level low active Reset Input
	2	VCC_5.0V	Power Supply Input (5.0V)
	3	GND	System Ground
	4	TX	5V level UART TXD
	5	RX	5V level UART RXD

9. General Description

WFM60-SFP202 is a module for 2.4GHz WLAN(IEEE 802.11b/g/n).

WFM60-SFP202 is available as 5 pin Module. (35.5mm x 23.5mm x 10.9mm)

10. Input/Output DC Terminal Characteristics

	Parameters	Conditions	Min.	Typ.	Max.	Unit
V_{IH}	High Level Input Voltage	VDDIO=5.0V	4.2			V
V_{IL}	Low Level Input Voltage	VDDIO=5.0V			0.6	V
V_{OH}	High Level Output Voltage	VDDIO=5.0V	VDDIO-0.8			V
V_{OL}	Low Level Output Voltage	VDDIO=5.0V			0.8	V

11. Electrical Characteristics

11.1 Operating Condition

Parameter		Min.	Max.	Unit
Operating Temperature		-30	+85	℃
Supply Voltage	VCC_5.0V	4.5	6.0	V

11.2 Tx Characteristics

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

(VCC_5.0V = 5.0V) and room temperature (25℃) condition.

Parameters	Conditions	Spec.			
		Min.	Typ.	Max.	Unit
Frequency Range		2400	-	2500	MHz
Output Power (VCC_5.0V = 5.0V, spectral mask, EVM compliance)	802.11b, EVM = -9 dB		19.5		dBm
	OFDM, BPSK, EVM = -8 dB		18.5		
	OFDM, QPSK, EVM = -13 dB		18.5		
	OFDM, 16QAM, EVM = -19 dB		18		
	OFDM, 64QAM ^{3/4} , EVM = -25dB		16.5		
	OFDM, 64QAM ^{5/6} , EVM = -28dB		15.5		

These Tx measurements are average output power of module. (802.11b mode)

11.3 Rx Characteristics

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

(VCC_5.0V = 5.0V) and room temperature (25°C) condition.

Parameters	Conditions	Spec.			Unit
		Min.	Typ.	Max.	
Frequency Range		2400	-	2500	MHz
11b, Rx Sensitivity (8% PER for 1024 octet PSDU)	CCK, 1 Mbps		-95		dBm
	CCK, 2 Mbps		-92.5		
	CCK, 5.5 Mbps		-89.5		
	CCK, 11 Mbps		-86		
11g, Rx Sensitivity (10% PER for 1024 octet PSDU)	OFDM, 6 Mbps		-91		
	OFDM, 9 Mbps		-89		
	OFDM, 12 Mbps		-88		
	OFDM, 18 Mbps		-85.5		
	OFDM, 24 Mbps		-82.5		
	OFDM, 36 Mbps		-79		
	OFDM, 48 Mbps		-75		
	OFDM, 54 Mbps		-73		
11n, Rx Sensitivity (10% PER for 4096 octet PSDU)	HT20, MCS0		-90		
	HT20, MCS1		-87		
	HT20, MCS2		-84.5		
	HT20, MCS3		-81.5		
	HT20, MCS4		-78		
	HT20, MCS5		-74		
	HT20, MCS6		-72.5		
	HT20, MCS7		-71.5		
Adjacent Channel Rejection	CCK, 1 Mbps (signal; -74dBm)	35	-		dB
	CCK, 11 Mbps (signal; -70dBm)	35	-		
	OFDM, 6 Mbps (signal; -79dBm)	16	-		
	OFDM, 54 Mbps (signal; -62dBm)	-1	-		
	HT20, MCS0 (signal; -79dBm)	16	-		
	HT20, MCS7 (signal; -61dBm)	-2	-		

11.4 Power Consumption

The power consumption is typically measured at Ta = 25 °C (VCC 5.0V).

Parameter	Condition	MIN	TYP	MAX	UNIT
2.4 GHz, Rx 11n Active	MCS7 @ -70 dBm		60		mA
2.4 GHz, Tx 11b, CCK	19 dBm @ EVM = -9 dB		305		mA
2.4 GHz, Tx 11n, MCS7	15 dBm @ EVM = -28 dB		230		mA

12. Block Diagram

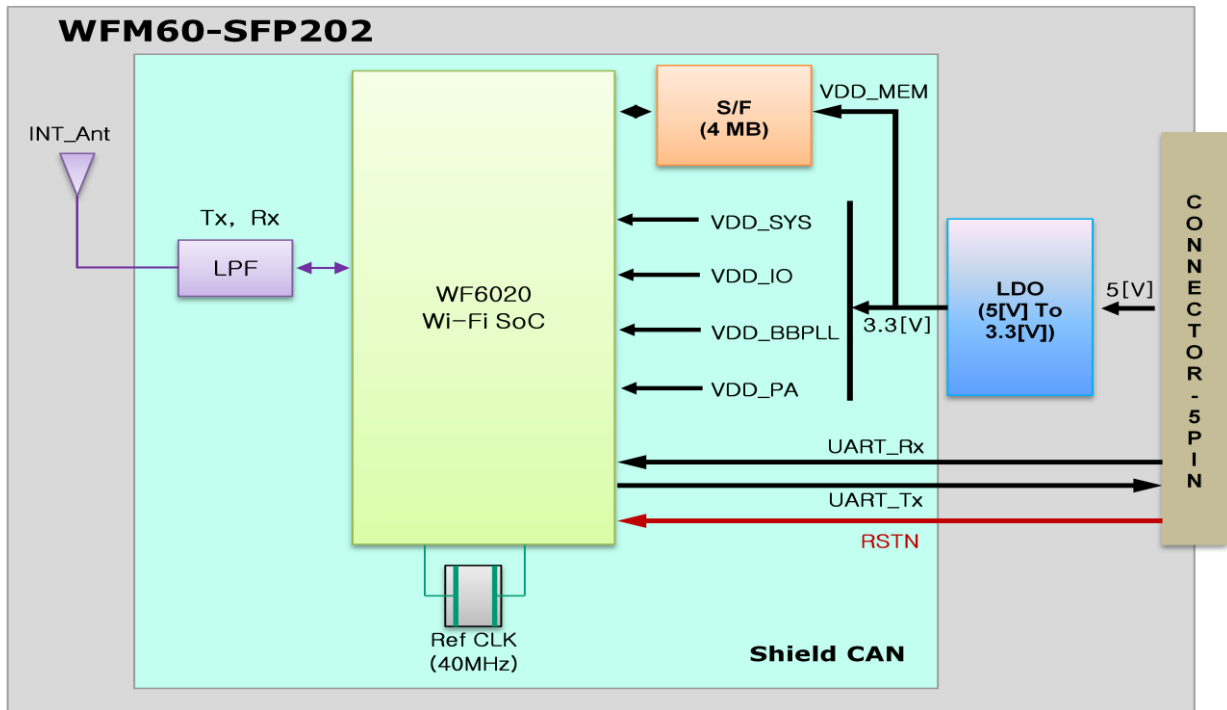


Figure 6. Block Diagram

13. Revision History

Ver.	Comment	Date	Author	Approver
0.1	Initial release.	May. 7, 2019	M.H.LEE	
0.2	Modify module dimensions.	AUG. 8, 2019	M.H.LEE	

14. FCC/IC Statement

<FCC/IC Warning>

FCC Part 15.19 Statements:	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. 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.				
FCC Part 15.21 statement	Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.				
<Regulatory notice to host manufacturer according to KDB 996369 D03 OEM Manual v01>					
List of applicable FCC rules	This module has been granted modular approval as below listed FCC rule parts. -FCC Rule parts 15C(15.247)				
Summarize the specific operational use conditions	-The OEM integrator should use equivalent antennas which is the same type and equal or less gain than an antenna listed in this instruction manual.				
RF exposure considerations ※ 1,2 Conditions of RF exposure considerations should be included in OEM manual and it should be informed to an end-user.	The module has been certified for integration into products only by OEM integrators under the following condition: -1. 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. -2. The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures. -Mobile use As long as the three conditions above are met, further transmitter testing will not be required. OEM integrators should provide the minimum separation distance to end users in their end-product manuals. l'exposition aux RF L'antenne (ou les antennes) doit être installée de façon à maintenir à tout instant une distance minimum de au moins 20 cm entre la source de radiation (l'antenne) et toute personne physique. Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment. Attention: Les changements ou modifications de cet appareil non expressément approuvé par le fabricant peuvent annuler votre droit à utiliser cet équipement.				
Antennas list	This radio transmitter [WFM60-SFP202] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device. This module is certified with the following integrated antenna. -Type: Printed antenna -Max. peak Antenna gain <table border="1"> <thead> <tr> <th>Frequency band</th><th>Wi-Fi(WFM60-SFP202)</th></tr> </thead> <tbody> <tr> <td>Wi-Fi(2.4GHz)</td><td>2.65dBi</td></tr> </tbody> </table> Any new antenna type, higher gain than listed antenna should be met the	Frequency band	Wi-Fi(WFM60-SFP202)	Wi-Fi(2.4GHz)	2.65dBi
Frequency band	Wi-Fi(WFM60-SFP202)				
Wi-Fi(2.4GHz)	2.65dBi				

	requirements of FCC rule 15.203 and 2.1043 as permissive change procedure. The use of a different trace layout other than approved requires a Class II Permissive Change or a New Grant as appropriate.
End Product Labeling	The module is labeled with its own FCC ID. 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. In that case, the final end product must be labeled in a visible area with the following: -Contains FCC ID: 2ADXS-WFM60-SFP202 -Contains IC: 12641A-WFM60SFP202 Le module WFM60-SFP202 est étiqueté avec sa propre identification FCC et son propre numéro de certification IC. Si l'identification FCC et le numéro de certification IC ne sont pas visibles lorsque le module est installé à l'intérieur d'un autre dispositif, la partie externe du dispositif dans lequel le module est installé devra également présenter une étiquette faisant référence au module inclus. Dans ce cas, le produit final devra être étiqueté sur une zone visible avec les informations suivantes : « Contient module émetteur identification FCC ID : 2ADXS-WFM60-SFP202 « Contient module émetteur IC : 12641A-WFM60SFP202
Information on test modes and additional testing requirements	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, additional transmitter in the host, etc.).
Additional testing, Part 15 Subpart B disclaimer	The final host product also requires Part 15 subpart B compliance testing with the modular transmitter installed to be properly authorized for operation as a Part 15 digital device.