I&C TECHNOLOGY

www.inctech.co.kr

WFM50-SFC201

2.4GHz WLAN
Stand-alone Module

Dec. 19, 2014

Rev.0.3

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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, the items which are not mentioned on this specification following 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

WFM50-SFC201 is a 2.4GHz WLAN(802.11b/g/n) Stand-Alone Module for Mobile phone, PDA, Smart Phone applications. But this module is not designed for Life Support Application.

Also it is recommended that this module mounted by reflow soldering.

5. Absolute Maximum Rating

		Min.	Max.	Unit
Storage Temperature		-40	+85	deg.C
Supply Voltage	VBAT_A, B	-0.5	+4.6	V
	VDDIO_1,2	-0.5	+4.0	
	VDDIO_RF	-0.5	+4.0	
	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	28.0mm× 18.0mm × 2.7mm(Max.)

Figure 1 and Figure 2 show the Bottom Layer (Top View) and the side dimension of WFM50-SFC201 package outline, respectively.

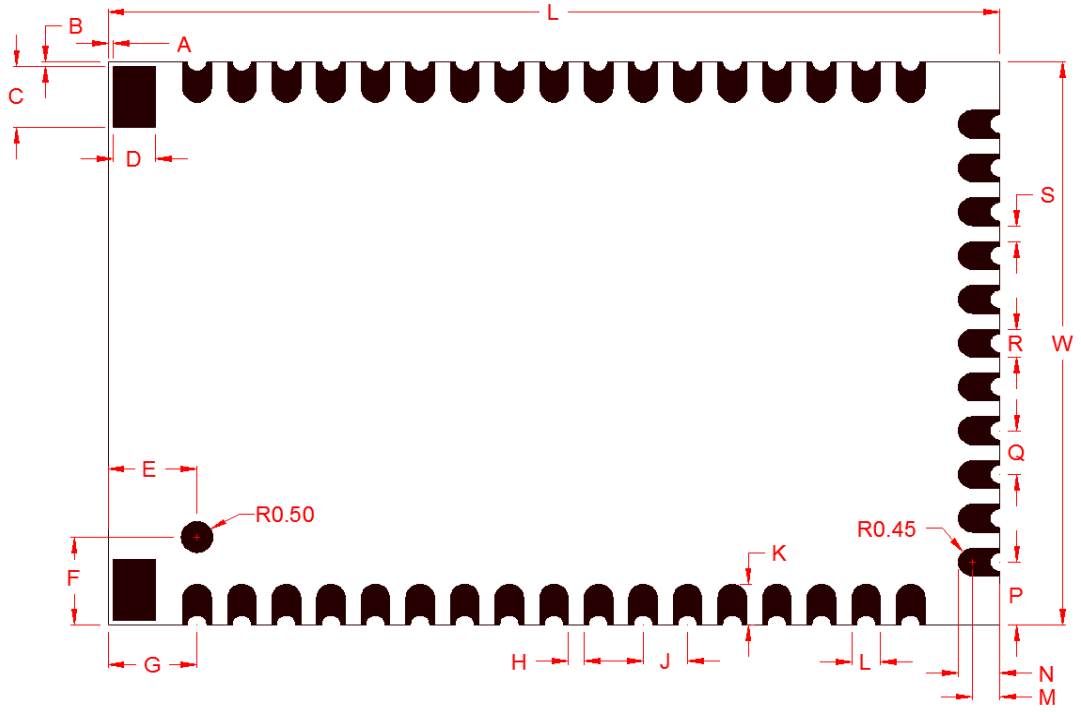


Figure 1. Package Outline(Top View)

Mark	Dimension	Mark	Dimension	Mark	Dimension	Mark	Dimension
L	28.0±0.2	D	1.35±0.1	J	1.4±0.1	P	2.0±0.1
W	18.0±0.2	E	2.8±0.1	K	1.3±0.1	Q	1.4±0.1
A	0.15±0.1	F	2.8±0.1	T	0.9±0.1	R	0.9±0.1
B	0.15±0.1	G	2.8±0.1	M	0.85±0.1	S	0.5±0.1
C	1.95±0.1	H	0.5±0.1	N	1.3±0.1		

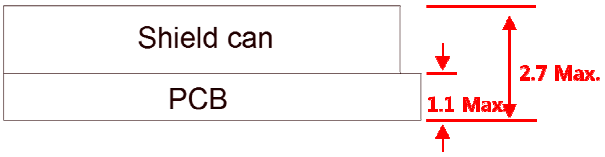


Figure 2. Package Outline(Side View)

8. Recommended Land Patterns (Top View)

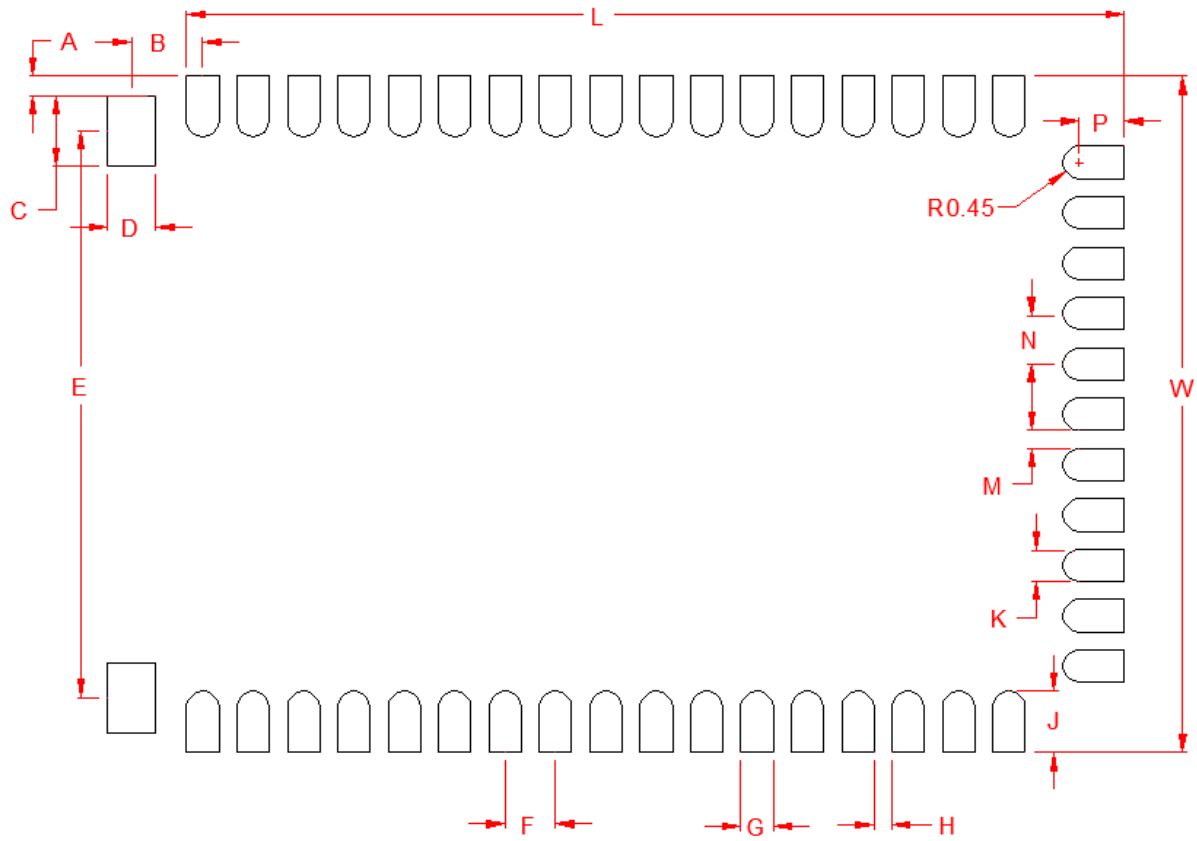


Figure 3. Recommend Land Patterns

Mark	Dimension	Mark	Dimension	Mark	Dimension
L	26.05	D	1.35	J	1.70
W	18.80	E	15.75	K	0.90
A	0.55	F	1.40	M	0.50
B	1.97	G	0.90	N	1.40
C	1.95	H	0.50	P	1.25

9. General Description

- WFM50-SFC201 is a compact size and low power System-in-Package (SiP) for 2.4GHz WLAN(802.11b/g/n) aimed at embedded and mobile applications.
- WFM50-SFC201 can be available as 47 pin LGA package. (28.0mm x 18.0mm x 2.70mm)

10. External Clock Reference

10.1 External LPO Signal Requirement

Parameters	External LPO Clock	Unit
Nominal input frequency	32.768	kHz
Frequency accuracy	±200	ppm
Input signal amplitude*	VDDIO	mVp-p
Signal type	Square-wave or sine-wave	-
Input impedance	> 100k < 5 When power is applied or power is off	Ω pF

11. Input/Output DC Terminal Characteristics

	Parameters	Conditions	Min.	Typ.	Max.	Unit
V_{IH}	High Level Input Voltage	VDDIO=3.3V	0.7xVDDIO			V
V_{IL}	Low Level Input Voltage	VDDIO=3.3V			0.3xVDDIO	V
V_{OH}	High Level Output Voltage	@100uA, 3.3V	VDDIO-0.3			V
		@2mA, 3.3V	VDDIO-0.35			V
V_{OL}	Low Level Output Voltage	@100uA, 3.3V			0.4	V
		@2mA, 3.3V			0.4	V
C_{IN}	Input Capacitance				5	pF

12. Electrical Characteristics

12.1 Operating Condition

		Min.	Typ.	Max.	Unit
Operating Temperature		-30	25	+85	deg.C
Supply Voltage	VBAT_A,B	3.3	3.6	4.5	V
	VDDIO_RF	3.0	3.3	3.6	
	VDDIO_1,2	3.0	3.3	3.6	
	VDD_MEM	3.0	3.3	3.6	

12.2 Tx Characteristics

All measurements are made under nominal supply voltage and tested at External Ant Port. (VBAT_A,B = 3.3V, VDDIO_1,2=3.3V, VDDIO_RF=3.3V, VDD_MEM=3.3V) and room temperature (25℃) 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		17		dBm
	OFDM , BPSK, EVM = -8 dB		15.5		
	OFDM, QPSK, EVM = -13 dB		15.5		
	OFDM, 16QAM, EVM = -19 dB		15.5		
	OFDM, 64QAM $^{3/4}$, EVM = -25 dB		14.5		
	OFDM, 64QAM $^{5/6}$, EVM = -28 dB		13.5		

12.3 Rx Characteristics

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

(VBAT_A,B = 3.3V, VDDIO_1,2=3.3V, VDDIO_RF=3.3V, VDD_MEM=3.3V) and room temperature (25℃) 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		-96.5		dBm
	CCK, 2 Mbps		-94.5		
	CCK, 5.5 Mbps		-92.5		
	CCK, 11 Mbps		-89.5		
11g, Rx Sensitivity (10% PER for 1024 octet PSDU)	OFDM, 6 Mbps		-93.5		
	OFDM, 9 Mbps		-91.5		
	OFDM, 12 Mbps		-90.5		
	OFDM, 18 Mbps		-88.5		
	OFDM, 24 Mbps		-86.5		
	OFDM, 36 Mbps		-82.5		
	OFDM, 48 Mbps		-79.5		
	OFDM, 54 Mbps		-77.5		
11n, Rx Sensitivity (10% PER for 4096 octet PSDU)	HT20, MCS0		-93.5		
	HT20, MCS1		-89.5		
	HT20, MCS2		-87.5		
	HT20, MCS3		-84.5		
	HT20, MCS4		-81.5		
	HT20, MCS5		-77.5		
	HT20, MCS6		-76.5		
	HT20, MCS7		-74.5		
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	-		
Max Input level	11b 1M,2M		0		dBm
	11b 5.5M, 11M		0		
	11g		-10		
	11n		-10		

13.Pin Assignment (Top View, Bottom Layer)

No.	Pin Name	No.	Pin Name	No.	Pin Name
1	N.C	17	GND	33	SD_CLK
2	N.C	18	PMIC_EN	34	SD_D0
3	GND	19	GP12	35	SD_D1
4	GND	20	GP15	36	GND
5	GND	21	GP13	37	GP05
6	GND	22	VBAT_B	38	GP07
7	VDDIO_1	23	CLK_RTC	39	GND
8	RSTN	24	GP09	40	GP11
9	GP14	25	GP08	41	GP10
10	SF_SEL	26	GP06	42	GND

11	VDDIO_2	27	GP04	43	GND
12	JTAG_SEL	28	VDD_MEM	44	2.4G_EXT_ANT
13	VDDIO_RF	29	GND	45	GND
14	VBAT_A	30	SD_D2	46	GND
15	GND	31	SD_D3	47	N.C
16	GND	32	SD_CMD		

14.Pin Description #1

Pin Num.	Pin Name	Description
1	N.C	Not connected
2	N.C	
3	GND	Module Ground
4	GND	
5	GND	
6	GND	
7	VDDIO_1	GP5~GP15 IO PWR(JTAG, SDIO etc)
8	RSTN	RESET input
9	GP14	PMIP reset out/GPIO
10	SF_SEL	Serial Flash boot select
11	VDDIO_2	GP5~GP15 IO PWR(JTAG, SDIO etc)
12	JTAG_SEL	JTAG Debug select
13	VDDIO_RF	GP00/GP01 IO PWR(Internal RF SW control)GP02/GP03 IO PWR
14	VBAT_A	Internal 1.4V DC_DC POWER input(3.3V~4.7V)
15	GND	Module Ground
16	GND	
17	GND	
18	PMIC_EN	PMIP reset out/GPIO
19	GP12	UART2 TXD/GPIO
20	GP15	GPIO
21	GP13	UART2 RXD/GPIO
22	VBAT_B	Internal 2.5V LDO, 3.3V LDO POWER input(3.3V~4.7V)
23	CLK_RTC	Low speed clock input
24	GP09	UART0 RXD/GPIO
25	GP08	UART0 TXD/GPIO
26	GP06	SF_SIO0/JTAG TMS/GPIO
27	GP04	SF_SCLK/JTAG TCK/GPIO
28	VDD_MEM	Internal Flash Memory Power input
29	GND	Module Ground
30	SD_D2	SDIO Data 2
31	SD_D3	SDIO Data 3/SDIO SPI Mode CS
32	SD_CMD	SD CMD/SDIO SPI Mode DI/Wake-up for MD_WAKEUP
33	SD_CLK	SDIO Clock (~50 MHz)/SDIO SPI Mode CLK(~50MHz)
34	SD_D0	SD Data 0/SDIO SPI Mode DO
35	SD_D1	SD Data 1/SDIO SPI Mode IRQ
36	GND	Module Ground
37	GP05	SF_CSN/JTAG TDI/GPIO
38	GP07	SF_SIO1/JTAG TDO/GPIO

39	GND	Module Ground
40	GP11	SF_SIO3/GPIO
41	GP10	SF_SIO2/GPIO
42	GND	Module Ground
43	GND	

14.Pin Description #2

Pin Num.	Pin Name	Description
44	2.4G_EXT_ANT	2.4GHz External Antenna Port
45	GND	Module Ground
46	GND	
47	N.C	Not connected

15.Block Diagram

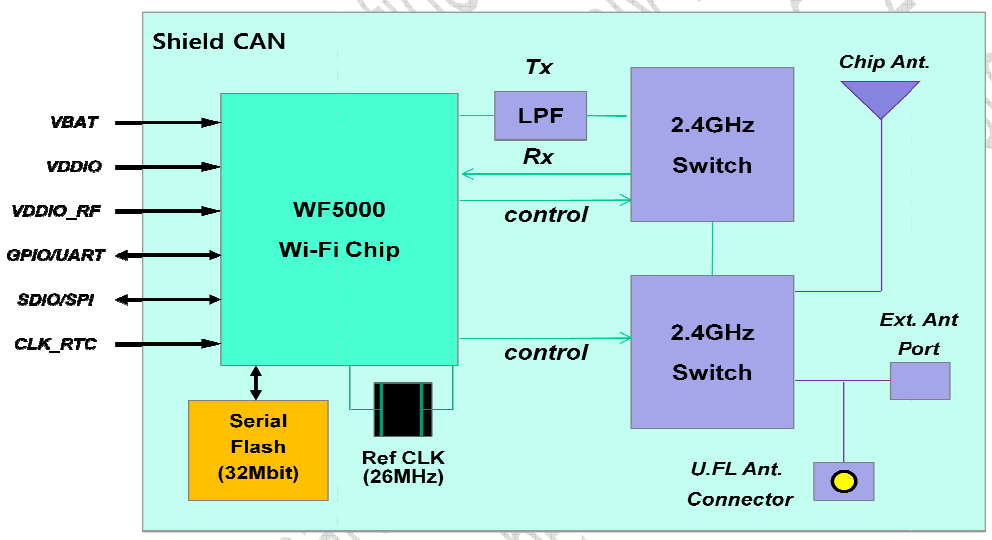
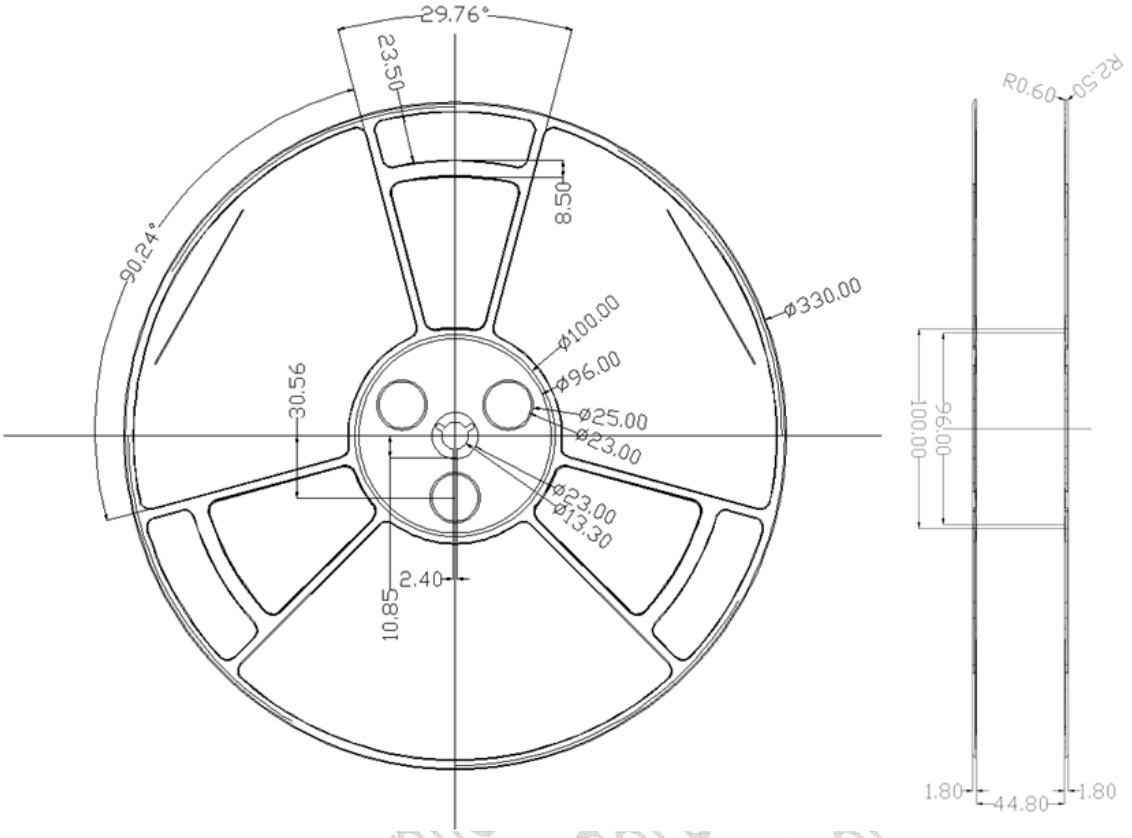


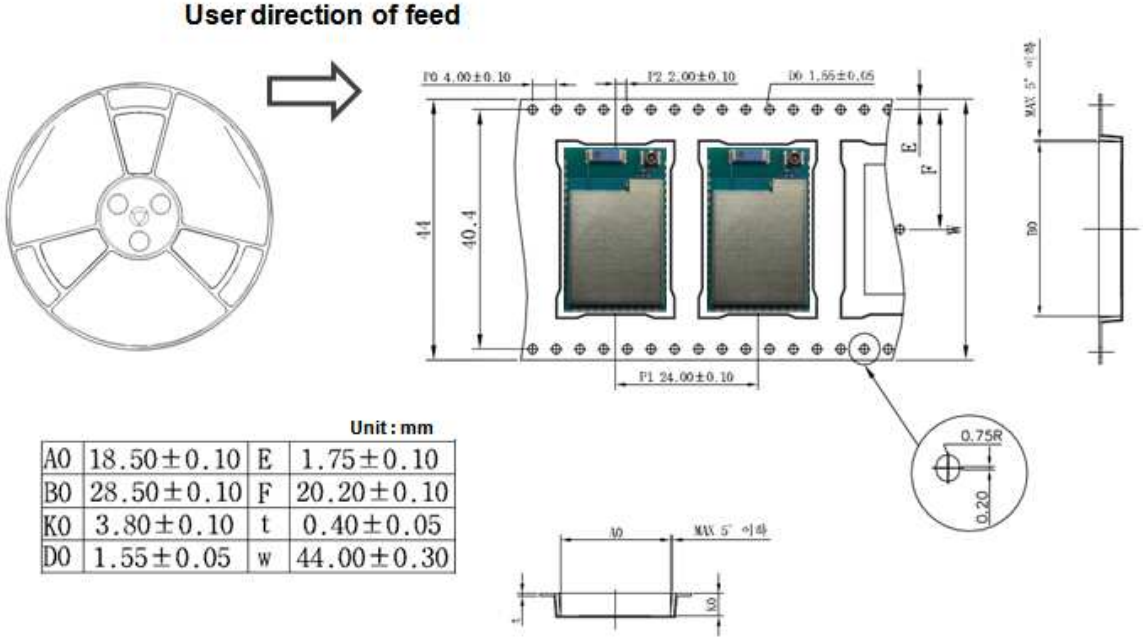
Figure 4. Block Diagram

16.Packing Information

16.1 Carrier dimension



16.2 Carrier tape dimension



Unit : mm

A0	18.50±0.10	E	1.75±0.10
B0	28.50±0.10	F	20.20±0.10
K0	3.80±0.10	t	0.40±0.05
D0	1.55±0.05	w	44.00±0.30

16.3 Inner Box

Inner Box	
Spec.	350 x 335 x 65 (mm)
1Box (S)	700 EA
Label	I&C Label

Note1) Recommendation : 72 hours floor time (≤ 30℃ / 60% RH)

Note2) Recommendation: The time between opening and Chip Mount should be within 72 hours.

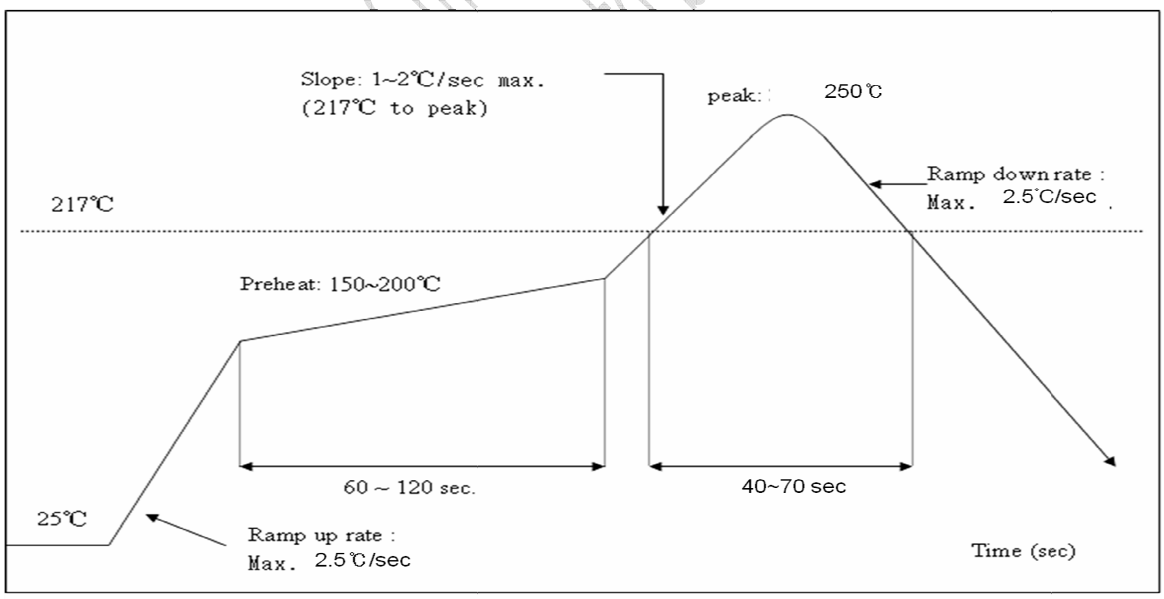
16.4 External Box

Out Box	
Spec.	365 x 340 x 350 (mm)
1Box (S)	5Box(S)=3,500 EA
Label	I&C Label

17.Reflow Profile

- Refer to the IPC/JEDEC standard.
- Peak Temperature : <250℃>

  Number of Times : ≤2 times



18.Revision History

Ver.	Comment	Date	Author	Approver
0.1	Initial release	Aug. 2, 2014	Y.W.KIM	
0.2	Tx/Rx Characteristics Up-date	Dec.17, 2014	H.Y.KIM	
0.3	Packing Information Up-date	Dec.19,2014	U.K.LEE	

FCC Information to User

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.

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.

IMPORTANT NOTE:

FCC RF 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 transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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 (for example, digital device emissions, PC peripheral requirements, etc.).

If the FCC identification number 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. This exterior label can use wording such as the following: '**Contains Transmitter Module FCC ID: 2ADXS-WFM50-SFC201**' or '**Contains FCC ID: 2ADXS-WFM50-SFC201**'

'**Contains Transmitter Module IC: 12641A-WFM50SFC201**' or '**Contains IC: 12641A-WFM50SFC201**' Any similar wording that expresses the same meaning may be used."

This module has been tested and should be used with below antennas:

Antenna Type	Model No.	Antenna Gain	Manufacturer
Dipole	CAPL-6000B	5.1 dBi	MOBITECH

RSS-GEN Section 7.1.3

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

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.

RSS-102 RF Exposure

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. Cet appareil ne doit pas être installé ou utilisé en conjonction avec une autre antenne ou émetteur.