

User Manual

WIRELESS LAN MODULE

MODEL FZ00010935-700

The purpose of this manual is to explain correct way how to integrate module FZ00010935-700 to the end product. It includes procedures that shall assist you to avoid unforeseen problems.

This manual presents information that shows how module and OEM product, where module integrated, complies with regulations in certain regions. Any modifications, not expressly approved by the manufacturer could void the authority to operate in these regions.

The wireless LAN module, model FZ00010935-700 has to be installed and used in accordance with the technical description/installation instructions provided by the manufacturer.

For detail information concerning type approval of this module (e.g. where this module is already pre-approved) please contact the authorized local distributor or the manufacturer.

The system may only be implemented in the configuration that was authorized.

Note that any changes or modifications to this equipment not expressly approved by the manufacturer could void the user's authority to operate this equipment.

Regulatory Information

Operational Information

Wireless Interoperability

The end product integrating this module is designed to be interoperable with any wireless LAN product that is based on direct sequence spread spectrum (DSSS) and orthogonal frequency division multiplexing (OFDM) radio technology and to comply with the following standards.

- IEEE Std 802.11b Standard on 2.4GHz Wireless LAN
- IEEE Std 802.11g Standard on 2.4GHz Wireless LAN
- IEEE Std 802.11 n Standard on 2.4GHz Wireless LAN

Federal Communications Commission (FCC) Statement

15.105(b) 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.

15.21: You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

FCC RF Radiation Exposure Statement:

- 1.This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
- 2.This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

FCC RF Exposure requirements:

This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.

15.19

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 of the device.

Labeling:

Wireless LAN module FZ00010935-700 labeled as below.

FCC ID: W2Z-02000003

The proposed with FCC ID label format is to be placed on the module. If FCC ID is not visible when the module is installed into the system, "Contains FCC ID:

W2Z-02000003" shall be placed on the outside of final host system

Instructions to OEM Integrators

A User manual provided to the end user must indicate the operating requirements and conditions that must be observed to ensure compliance with the above-mentioned FCC RF Exposure guideline.

If this module is intended for use in a portable device, integrators are responsible for separate evaluation and/or approval to satisfy FCC RF Exposure requirements.

The antenna used this module is as follows;

Antenna Type: PCB printed antenna

Antenna Gain: -4.14dBi

If an antenna with higher gain or new antenna type is used with this module, integrators must contact to manufacture for additional testing and submission to the FCC.

If other radio devices are to be integrated with this module, an additional evaluation and FCC submission may be required. Integrators are responsible for such additional evaluation and FCC submission.

Industry Canada Statement

This device complies with RSS-247 of Industry Canada. 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.

RF Radiation Exposure Statement:

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

Avis d'industrie Canada:

Le present appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.

L'exploitation est autorisee aux deux conditions suivantes:

- (1) l'appareil ne doit pas produire de brouillage, et, and (2) l'utilisateur de l'appareil doit accepter tout brouillage radioelectrique subi, meme si le brouillage est susceptible d'en compromettre le fonctionnement.

RF exposure:

To comply with the IC RF exposure compliance requirements, this device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

Pour se conformer aux exigences de conformité RF canadienne l'exposition, cet appareil et son antenne ne doivent pas être co-localisés ou fonctionnant en conjonction avec une autre antenne ou transmetteur.

Industry Canada Class B Emission Compliance Statement:

This Class B digital apparatus complies with Canadian ICES-003.

Avis de conformite a la reglementation d'Industrie Canada:

Cet appareil numerique de la classe B est conforme a la norme NMB-003 du Canada.

Déclaration d'exposition aux radiations:

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

Labeling:

Wireless LAN module FZ00010935-700 labeled as below.

IC: 7736B-02000003

The proposed with IC ID label format is to be placed on the module. If IC ID is not visible when the module is installed in to the system, "Contains IC: 7736B-02000003" shall be placed on the outside of final host system.

Instructions to OEM Integrators

A User manual provided to the end user must indicate the operating requirements and conditions that must be observed to ensure compliance with the above-mentioned IC RF Exposure guideline. If this module is intended for use in a portable device, integrators are responsible for separate evaluation and/or approval to satisfy IC RF Exposure requirements.

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If an antenna with higher gain or new antenna type is used with this module, integrators must contact manufacture for additional testing and submission to the IC.

If other radio devices are to be integrated with this module, an additional evaluation and IC submission may be required. Integrators are responsible for such additional evaluation and IC submission.

Notice.

Since this module is not sold to general end users directly, there is no user manual of module. For the details about this module, please refer to the specification sheet of module.(Next Page)

This module should be installed in the host device according to the interface specification (installation procedure).

This module built-in use in equipment.

If you do not include the module to the equipment,only be operated by “TX continue” and “RX continue” stand alone mode separated.

MODULE SPECIFICATION

Contents.

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1.Product Summary

1-1.Scope

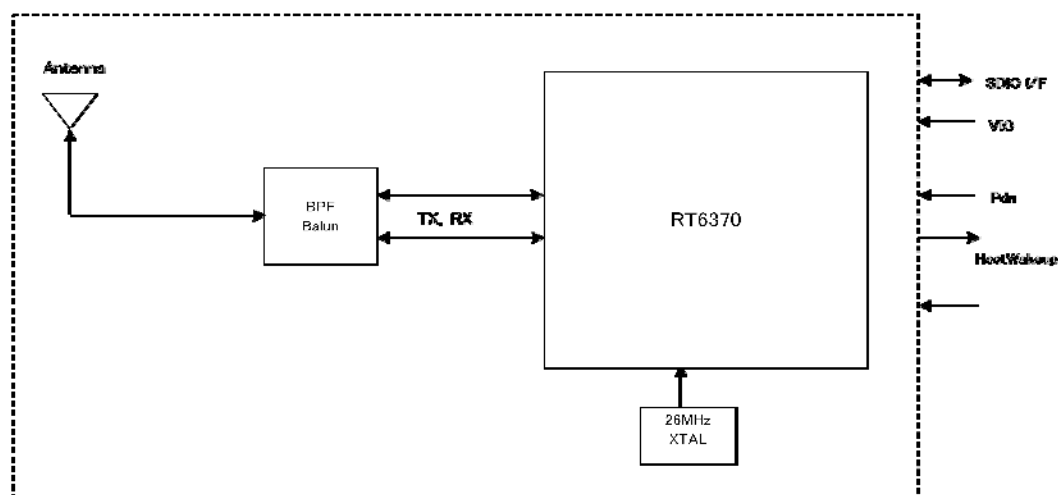
2.4 GHz WLAN module with integrated antenna
(IEEE 802.11 b/g/n supported)

1-2.General explanation

- | | |
|---------------------|-----------------|
| Standard | IEEE802.11b/g/n |
| Frequency | 2.4-2.4835GHz |
| Host Interface | SDIO ver2.0 |
| Frequency Bandwidth | 20MHz,40MHz |
| Weight | 0.5g typ |
- Chipset:MediaTek Inc.RT6370(WLCSP Package)
 - Modulation Types: DBPSK, DQPSK and CCK with 802.11b mode
OFDM(BPSK, QPSK, 16-QAM and 64-QAM) with 802.11g/n mode
 - Data rate: 1,2,5.5 and 11 with 802.11b mode
6,9,12,18,24,36,48 and 54 with 802.11g mode
MCS0-7 with 802.11n mode
 - Security: WEP(64 and 128bits), WPA-PSK(TKIP/AES) and WPA2-PSK(TKIP/AES)

2.Hardware Specification

2-1. Block diagram



2-2.Environmental condition

1) Operating environment

Operating temperature range : -20 ~ 85 °C ※Temperature on the bottom of the module
Operating humidity range: 20% ~ 80% (None dew)

2) Storage environment

Storage temperature range: -30 ~ 85 °C
Storage humidity range 20% ~ 85% (None dew)

2-3.Power supply

Symbol	Min.[V]	TYP .	Max.[V]
VDD33	3.14	-	3.46
VIO	1.60	-	3.46

3.Electrical Characteristics

3-1.Channel Plan

IEEE802.11b/g/n(HT20)

CH ID	Freq.[MHz]	CH ID	Freq.[MHz]	CH ID	Freq.[MHz]
1	2412	6	2437	11	2462
2	2417	7	2442	12	2467
3	2422	8	2447	13	2472
4	2427	9	2452		
5	2432	10	2457		

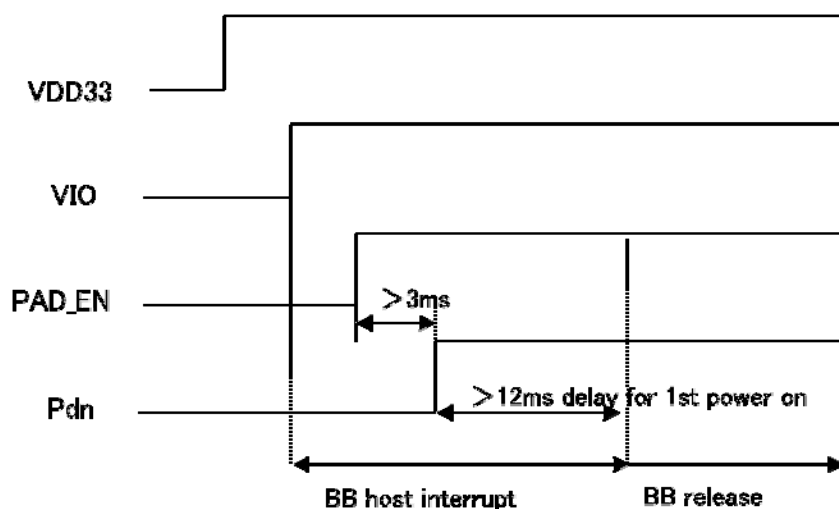
IEEE802.11n(HT40)

CH ID	Freq.[MHz]	CH ID	Freq.[MHz]
1	2422	6	2447
2	2427	7	2452
3	2432		
4	2437		
5	2442		

3-2.Power Sequence

Recommended power on timing

VDD33 be ready before VIO and then enable PAD_EN for internal PMU blocks

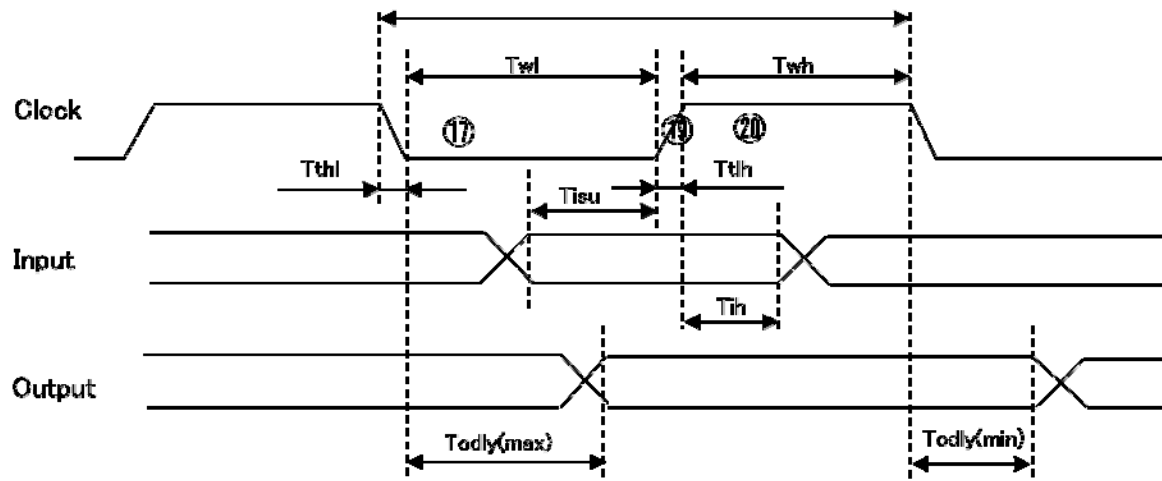


3-3. Interface specification (SDIO)

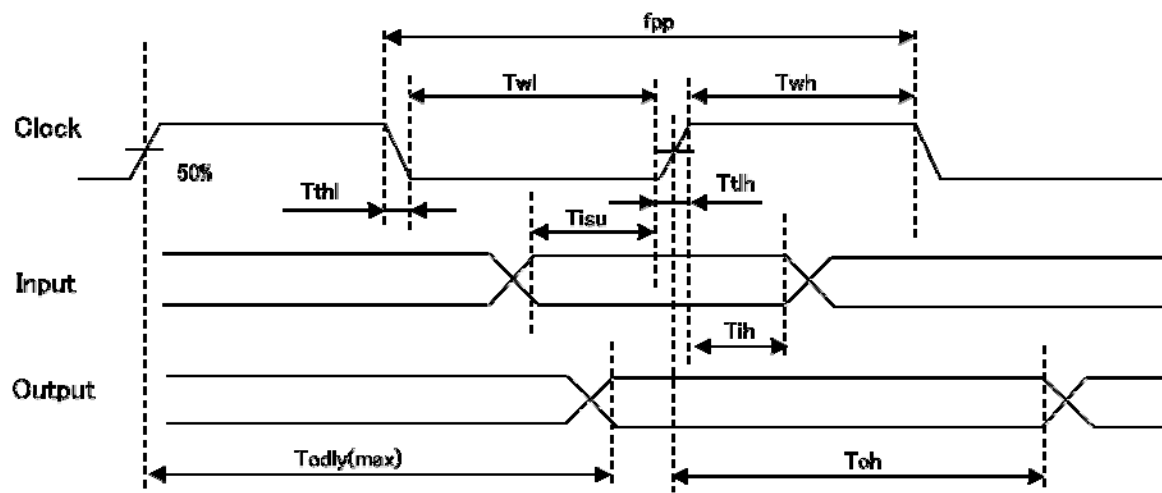
Parameter	Min. [V]	Typ.	Max. [V]
Input high voltage	$0.625 \cdot V_{IO}$	-	$V_{IO} + 0.3$
Input low voltage	-0.3	-	$0.25 \cdot V_{IO}$
Output high voltage	$0.75 \cdot V_{IO}$	-	-
Output low voltage		-	$0.125 \cdot V_{IO}$

3-4. SDIO Protocol Timing

3-4-1 Normal Mode



3-4-2 High Speed Mode



3-4-3. SDIO Timing Data

Symbol	Parameter	Mode	Min	Typ.	Max
fpp	Clock Frequency	Normal	0 [MHz]	-	25 [MHz]
		High Speed	0 [MHz]	-	50 [MHz]
Twl	Clock Low Time	Normal	10 [ns]	-	
		High Speed	7 [ns]	-	
Twh	Clock High Time	Normal	10 [ns]	-	
		High Speed	7 [ns]	-	
Tisu	Input Setup Time	Normal	5 [ns]	-	
		High Speed	6 [ns]	-	
Tih	Input Hold Time	Normal	5 [ns]	-	
		High Speed	2 [ns]	-	14 [ns]
Todly	Output Delay Time	Normal	0 [ns]	-	14 [ns]
		High Speed	-	-	14 [ns]
Toh	Output Hold Time	High Speed	2.5 [ns]	-	

3-5. Current consumption

TX mode

Standard	Data rate	VDD33 [mA]		VIO [mA]	
		Typ.	Max.	Typ.	Max.
802.11b	11Mbps	160	185	135	-
802.11g	54Mbps	115	135	135	-
802.11n	HT20 MCS7	110	135	135	-
802.11n	HT40 MCS7	97	120	135	-

RX mode

Standard	Data rate	VDD33 [mA]		VIO [mA]	
		Typ.	Max.	Typ.	Max.
802.11b	11Mbps	42	50	135	-
802.11g	54Mbps	42	50	135	-
802.11n	HT20 MCS7	42	50	135	-
802.11n	HT40 MCS7	42	50	135	-

3-6. Receiver characteristics

1) Minimum Receiver Sensitivity

Standard	Data rate	Min.[dBm]	Typ.[dBm]	Max.[dBm]	PER[%]
802.11b	1 Mbps	-	-95	-80	8
	2 Mbps	-	-93	-80	8
	5.5 bps	-	-89	-76	8
	11 Mbps	-	-86	-76	8
802.11b	6 Mbps	-	-89	-82	10
	9 Mbps	-	-88	-81	10
	12 Mbps	-	-86	-79	10
	18 Mbps	-	-84	-77	10
	24 Mbps	-	-81	-74	10
	36 Mbps	-	-80	-70	10
	48 Mbps	-	-74	-66	10
	54 Mbps	-	-72	-65	10
802.11n HT20	MCS0	-	-88	-82	10
	MCS1	-	-85	-79	10
	MCS2	-	-83	-77	10
	MCS3	-	-81	-74	10
	MCS4	-	-77	-70	10
	MCS5	-	-73	-66	10
	MCS6	-	-71	-65	10
	MCS7	-	-69	-64	10
802.11n HT40	MCS0	-	-87	-79	10
	MCS1	-	-84	-76	10
	MCS2	-	-82	-74	10
	MCS3	-	-80	-71	10
	MCS4	-	-76	-67	10
	MCS5	-	-72	-53	10
	MCS6	-	-69	-62	10
	MCS7	-	-67	-61	10

2) Maximum Receiver Sensitivity

Standard	Data rate	Min.[dBm]	Typ.[dBm]	Max.[dBm]	PER[%]
802.11b	1M,2M	-4	-	-	8
	5.5M,11M	-10	-	-	10
802.11g	6M to 54M	-20	-	-	10
802.11n HT20	MCS0 to 7	-20	-	-	10
802.11n HT40	MCS0 to 7	-30	-	-	10

3-7. Transmitter characteristics

1)Output Target Power Levels

The difference of the output is within $\pm 2.5\text{dB}$.

Output level, will be defined at the antenna feed point.

1)-1 2.4GHz Band

11b (DSSS)

Ch	Freq.[MHz]	Target Power [dBm]			
		1M	2M	5.5M	11M
1	2412	13.5	13.5	13.5	13.5
2	2417	13.5	13.5	13.5	13.5
3	2422	13.5	13.5	13.5	13.5
4	2427	13.5	13.5	13.5	13.5
5	2432	13.5	13.5	13.5	13.5
6	2437	13.5	13.5	13.5	13.5
7	2442	13.5	13.5	13.5	13.5
8	2447	13.5	13.5	13.5	13.5
9	2452	13.5	13.5	13.5	13.5
10	2457	13.5	13.5	13.5	13.5
11	2462	13.5	13.5	13.5	13.5
12	2467	13.5	13.5	13.5	13.5
13	2472	13.5	13.5	13.5	13.5

11g (OFDM)

Ch	Freq.[MHz]	Target Power [dBm]							
		6M	9M	12M	18M	24M	36M	48M	56M
1	2412	12	12	12	12	12	12	12	12
2	2417	12	12	12	12	12	12	12	12
3	2422	12	12	12	12	12	12	12	12
4	2427	12	12	12	12	12	12	12	12
5	2432	12	12	12	12	12	12	12	12
6	2437	12	12	12	12	12	12	12	12
7	2442	12	12	12	12	12	12	12	12
8	2447	12	12	12	12	12	12	12	12
9	2452	12	12	12	12	12	12	12	12
10	2457	12	12	12	12	12	12	12	12
11	2462	12	12	12	12	12	12	12	12
12	2467	12	12	12	12	12	12	12	12
13	2472	12	12	12	12	12	12	12	12

11n /HT20(OFDM)

11n /HT20(OFDM)

Ch (HT20)	Ch (HT40)	Freq. [MHz]	Target Power [dBm]							
			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
1	-	2412	12	12	12	12	12	12	12	12
2	-	2417	12	12	12	12	12	12	12	12
3	1	2422	12	12	12	12	12	12	12	12
4	2	2427	12	12	12	12	12	12	12	12
5	3	2432	12	12	12	12	12	12	12	12
6	4	2437	12	12	12	12	12	12	12	12
7	5	2442	12	12	12	12	12	12	12	12
8	6	2447	12	12	12	12	12	12	12	12
9	7	2452	12	12	12	12	12	12	12	12
10	-	2457	12	12	12	12	12	12	12	12
11	-	2462	12	12	12	12	12	12	12	12
12	-	2467	12	12	12	12	12	12	12	12
13	-	2472	12	12	12	12	12	12	12	12

2)EVM

ITEM	rate	EVM [%]
11b	1 Mbps	35
11b	2 Mbps	35
11b	5.5 Mbps	35
11b	11 Mbps	35
11b	6 Mbps	56.2
11g	9 Mbps	39.8
11g	12 Mbps	31.6
11g	18 Mbps	22.4
11g	24 Mbps	15.8
11g	36 Mbps	11.2
11g	48 Mbps	7.9
11g	54 mBps	5.6
11n HT20/HT40	MCS0	56.2
11n HT20/HT40	MCS1	31.6
11n HT20/HT40	MCS2	22.4
11n HT20/HT40	MCS3	15.8
11n HT20/HT40	MCS4	11.2
11n HT20/HT40	MCS5	7.9
11n HT20/HT40	MCS6	5.6
11n HT20/HT40	MCS7	4.0

3)Spectrum Mask

		Mask [dBr]
DS	0MHz to +/-11MHz	0
DS	f+/-11MHz to 22MHz	-28
DS	f+/-22MHz	-50
OFDM	0MHz to +/-9MHz	0
OFDM	f+/-11MHz	-20
OFDM	f+/-20MHz	-28
OFDM	f+/-30MHz	-40
HT20	0MHz to +/-9MHz	0
HT20	f+/-11MHz	-20
HT20	f+/-20MHz	-28
HT20	f+/-30MHz	-45
HT40	0MHz to +/-9MHz	0
HT40	f+/-11MHz	-20
HT40	f+/-20MHz	-28
HT40	f+/-30MHz	-45

4)Frequency Accuracy

+/- 20 ppm

4.Mechanical Specifications

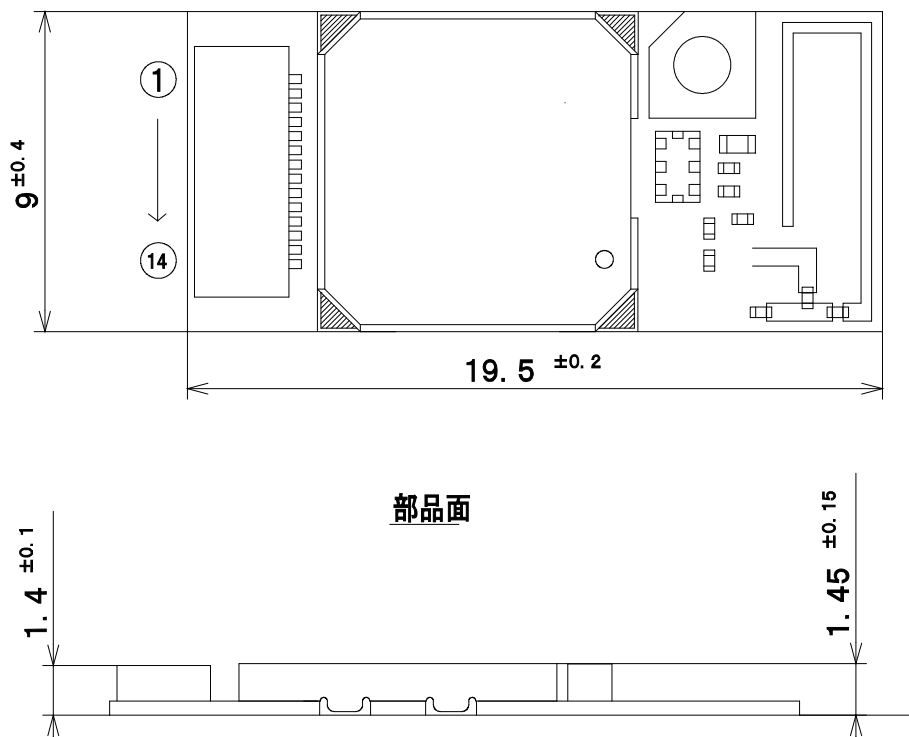
4-1. Dimension : 9.0mm×19.5mm, t= 1.6mm MAX

4-2. Weight : Typical 0.5g

4-3. Terminal number and name

No.	Name	Type	Function
1	Pdn	IN	Power on reset
2	VIO	POWER	I/F power supply
3	SD_CMD	IO	SDIO command
4	SD_D0	IO	SDIO data 0
5	SD_D1	IO	SDIO data 1
6	GND	GND	GND
7	SD_CLK	IO	SDIO clock
8	GND	GND	GND
9	SD_D3	IO	SDIO data 3
10	SD_D2	IO	SDIO data 2
11	GND	GND	GND
12	VDD33	POWER	Main power supply 3.3V
13	VDD33	POWER	Main power supply 3.3V
14	HostWakeup	OUT	Host Wake up

4-4. Module Overall Appearance



5.Revision

REV	Contents	Date	Name