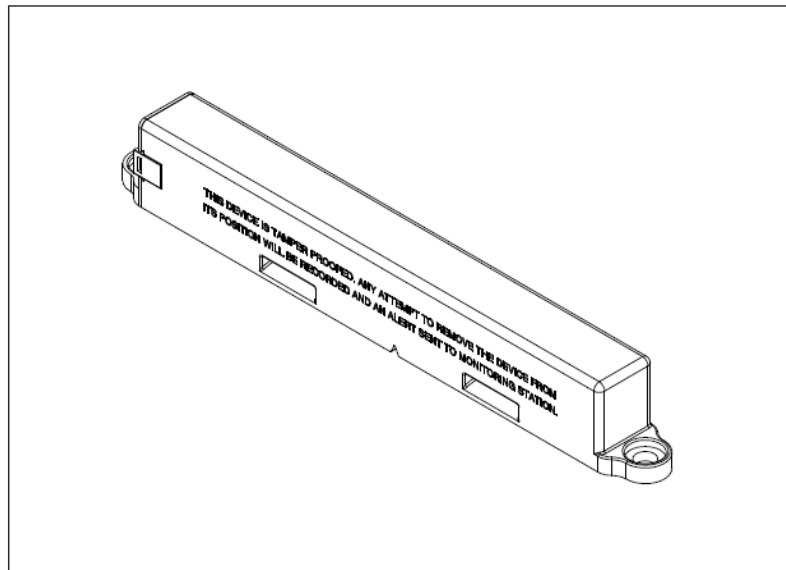


IET10MO User Manual



SEONG JI INDUSTRIAL CO., LTD

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1. Revision History

Date	Rev.	Editor	Description
Apr. 06, 2020	1.0	Kd.kim	First release

2. Features



Items	Description
Product size	197mm X 20mm X 27mm
Enclosure	Polycarbonate
Battery Spec.	Primary, Li-SOCl ₂ 2packs, 5400mAh, 3.6V Battery replaceable
Operating Temperature	-30 ~ +60°C
Ingress Protection code	IP68
IK code (Hammer impact)	IK10
Wireless functions	GPS, WIFI, Bluetooth, Sigfox
Terminal connection and upgrade	Bluetooth 4.2 support BLE FOTA
Host CPU	Cortex M4F, 512kB Flash / 64kB RAM
NFC	Tag-A support, Easy Bluetooth pairing with NFC tagging
Built-in sensor	3-axes accelerometer, Magnet reed switch
Current consumption	Standby current 28uA (*Different for each operation scenario.)
Life time	If you send 2 messages per day in RC1 at 20 degrees, it can be used for about 6 years. Actual usage time may vary depending on battery conditions and operating scenarios.

4. Electrical Characteristic

4.1. Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
OT	Operating Temperature	-30 to +60	°C
ST	Storage Temperature(*)	- 0 to +30	°C

4.2. DC Characteristic

Symbol	Parameter	Min	Typ.	Max	Unit
VBAT	Battery pack voltage		3.6		V
CBAT	Battery capacity per 1pack		2700		mAh
Current	Deep sleep current		4		uA
	Standby		28		uA
	WiFi scan mode		51	80	mA
	GPS scan mode		23	28	mA
	Sigfox RC Scan		21	22	mA
	Tx Current mode1 (RC1/3) (RF Power Level = 14dBm)	-	20	37	mA
	Tx Current mode2 (RC2/4) (RF Power Level = 24dBm)		200	240	mA
	Rx Current	-	12.22	22	mA

5. RF Specifications

5.1 Sigfox

Conditions: VCC=3.3V, Temp=25°C

Parameter		Min	Typ.	Max	Unit	
Frequency Range	RC1	Tx	868.034	868.130	868.226	MHz
		Rx	869.429	869.525	869.621	MHz
	RC2	Tx	902.104	902.200	902.296	MHz
		Rx	905.104	905.200	905.296	MHz
	RC3	Tx	923.104	923.200	923.296	MHz
		Rx	922.104	922.200	922.296	MHz
	RC4	Tx	920.704	920.800	920.896	MHz
		Rx	922.204	922.300	922.396	MHz
	RC5	Tx	923.004	923.100	923.196	MHz
		Rx	922.004	922.100	922.196	MHz
	RC6	Tx	865.104	865.200	865.296	MHz
		Rx	866.204	866.300	866.396	MHz
Tx output power	RC1, RC6		+12.5	+14.5	-	dBm
	RC2, RC4		+21.5	+23.5	-	dBm
	RC3, RC5		+11.0	+13.0	-	dBm
Frequency Error Tolerance(+25°C)			-3.0	-	+3.0	ppm
2 nd Harmonics(conducted)			-	-45	-35	dBm
3 rd Harmonics(conducted)			-	-53	-35	dBm
Rx Sensitivity(@600bps, GFSK)			-	-	-123	dBm
Rx Spurious Emission(30MHz~12.75GHz)			-	-	-54	dBm

5.2 BLE (Bluetooth Low Energy)

Conditions: VCC=3.3V, Temp=25°C

Parameter		Min	Typ.	Max	Unit
RF Characteristics					
RF Frequency Range		2.402	-	2.480	GHz
Output Power [TRM-LE/CA/01/C]		-1.0	3.0	7	dBm
In Band Emission[TRM-LE/CA/03/C] ±2MHz offset				-20	dBm
±3MHz offset				-30	
Modulation Characteristics [TRM-LE/CA/05/C]	Delta F1 Avg.	225	-	275	KHz
	Delta F2 Max.	185	-	-	KHz
	Delta F2 Avg/F1 Avg	0.8	-	-	-
Carrier Frequency Offset and Drift [TRM-LE/CA/06/C]	Initial Center Frequency Tolerance	-50	-	50	KHz
	Fn Max.	-150	-	150	KHz
	F0 -Fn Max.	-	-	50	KHz
	F1 – F0	-	-	20	KHz
	Fn = Fn-5 max.	-	-	20	KHz
Receiver Sensitivity [PER<30.8%, 1500packets]		-	-93.5	-70	dBm
Maximum input level [PER<30.8%, 1500packets]		-10	0		dBm

5.3 WiFi

Conditions: VCC=3.3V, Temp=25°C

Parameter		Min	Typ.	Max	Unit
Target Power for TX					
2.4GHz	Tx mode, Cont.Tx@11M		215		mA
	Tx mode, Cont.Tx@54M		155		mA
	Tx mode, Cont.Tx@HT20 MCS7		156		mA
	Rx mode, Cont. Rx@11M		77		mA
	Rx mode, Cont. Rx@54M		77		mA
	Rx mode, Cont. Rx@HT20 MCS7		77		mA

Parameter	Conditions	Min	Typ.	Max	Unit
Minimum Receiver Sensitivity in 802.11b mode					
1Mbps	PER<8%, Packet size = 1024bytes	-	-95	-80	dBm
2Mbps		-	-91	-80	dBm
5.5Mbps		-	-84	-76	dBm
11Mbps		-	-84	-76	dBm
Minimum Receiver Sensitivity in 802.11g mode					
6Mbps	PER<10%, Packet size = 1024bytes	-	-89	-82	dBm
9Mbps		-	-88	-81	dBm
12Mbps		-	-87	-79	dBm
18Mbps		-	-85	-77	dBm
24Mbps		-	-82	-74	dBm
36Mbps		-	-79	-70	dBm
48Mbps		-	-74	-66	dBm
54Mbps		-	-72	-65	dBm
Minimum Receiver Sensitivity in 802.11n mode					
HT20, MCS7	PER<10%	-	-70	-64	dBm
Maximum Input Signal Level					
802.11b mode	PER<8%	-10	-	-	dBm
802.11g mode	PER<10%	-20	-	-	dBm
802.11n mode	PER<10%	-20	-	-	dBm
Adjacent channel rejection (ACR) in 802.11b mode					
1Mbps	PER<8%, Packet size = 1024bytes	35	-	-	dB
2Mbps		35	-	-	dB
5.5Mbps		35	-	-	dB

11Mbps		35	-	-	dB
Adjacent channel rejection (ACR) in 802.11g mode					
6Mbps	PER<10%, Packet size = 1024bytes	16	-	-	dB
9Mbps		15	-	-	dB
12Mbps		13	-	-	dB
18Mbps		11	-	-	dB
24Mbps		8	-	-	dB
36Mbps		4	-	-	dB
48Mbps		0	-	-	dB
54Mbps		-1	-	-	dB
Adjacent channel rejection (ACR) in 802.11n mode					
MCS0	PER<10%	16	-	-	dB
MCS7		-2	-	-	dB

Parameter	Conditions	Min	Typ.	Max	Unit
Output Power in 802.11b mode, CCK					
1~11Mbps	As specified in IEEE802.11	7.5	10	12.0	dBm
Output Power in 802.11g mode, OFDM					
6M~54Mbps	As specified in IEEE802.11	7.5	10	12.0	dBm
Output Power in 802.11n mode, HT20, OFDM					
MCS0~7	As specified in IEEE802.11	7.5	10	12.0	dBm
Spectrum mask					
Margin to 802.11b/g/n all mode	Maximum output power	0	-	-	dB
Modulation Accuracy in 802.11b mode					
1Mbps	As specified in IEEE802.11	-	-	35	%
2Mbps		-	-	35	%
5.5Mbps		-	-	35	%
11Mbps		-	-	35	%
Modulation Accuracy in 802.11g mode					
6Mbps	As specified in IEEE802.11	-	-	-5	dB
9Mbps		-	-	-8	dB
12Mbps		-	-	-10	dB
18Mbps		-	-	-13	dB
24Mbps		-	-	-16	dB
36Mbps		-	-	-19	dB

48Mbps		-	-	-22	dB
54Mbps		-	-	-25	dB
Modulation Accuracy in 802.11n mode					
HT20, MCS7	Full packet	-	-	-27	dB
Frequency Tolerance					
802.11b/g/n	Operating Temp.	-25	0	25	ppm

5.4 GPS

Conditions: VCC=3.3V, Temp=25°C

Parameter	Min	Typ.	Max	Unit
Frequency		1575.42		MHz
GPS Sensitivity				
Tracking		-160		dBm
Navigation		-159		dBm
Acquisition (Cold start)		-145		dBm
Time To First Fix (All satellites at -130dBm)				
Cold start		30		sec
Hot start		2		sec

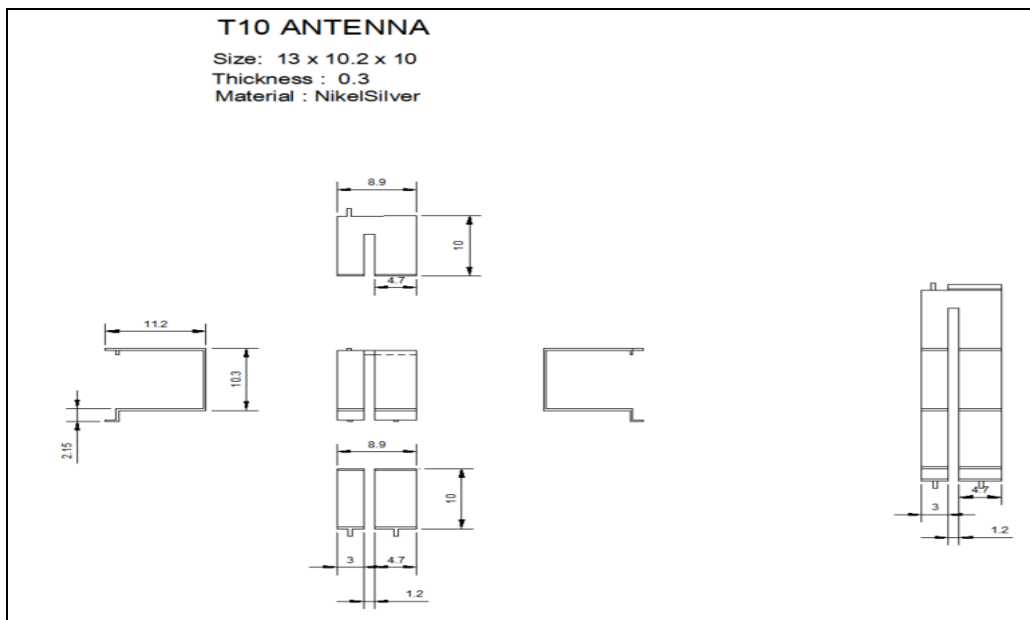
5.5 NFC

Parameter	Min	Typ.	Max	Unit
RF Input Frequency		13.56		MHz
ISO-14443A				
Carrier modulation index	95			%
Data Rate		106		Kbps
Modulation sub carrier frequency		13.56 /16		MHz

6. Antenna Specifications

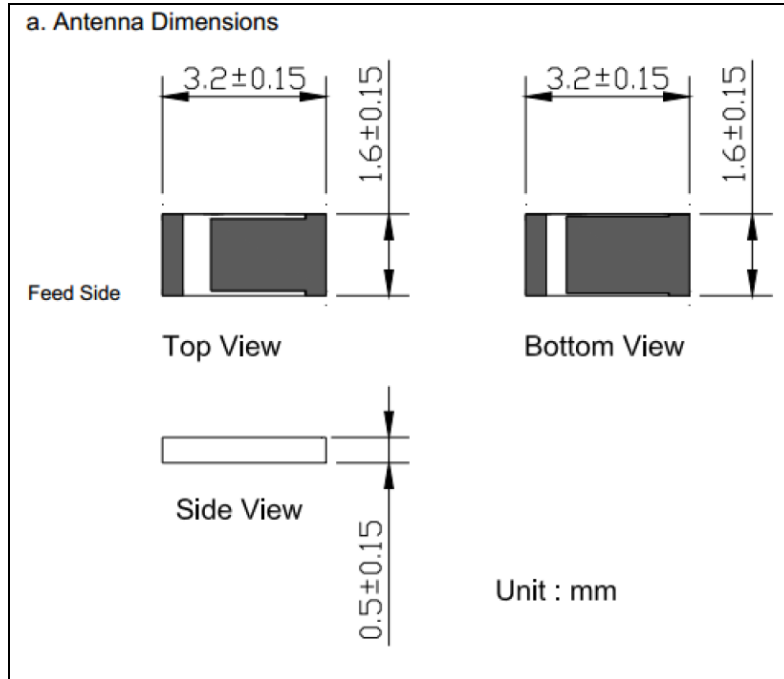
6.1 Sigfox Antenna Specifications

Frequency Range	900 ~ 930 (MHz)
V.S.W.R	LESS THAN 1.5:1
Max. Gain (dBi)	4.3
Average. Gain (dBi)	-1.5
Impedance	50Ω



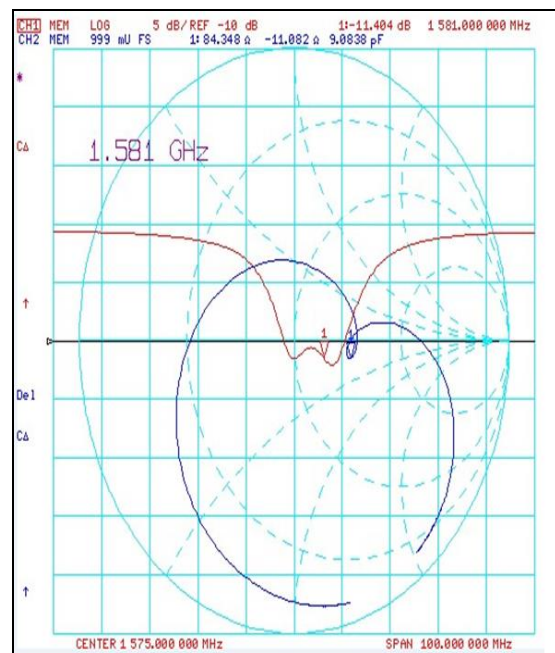
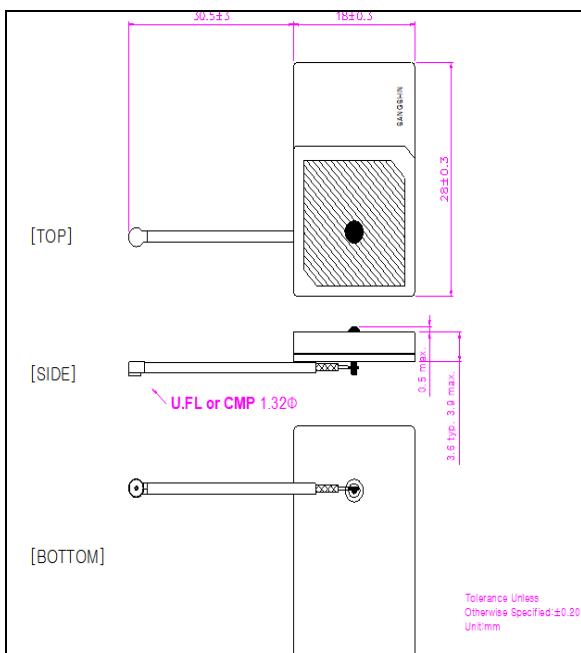
6.2 BLE and WIFI Antenna Specifications

Parameter	Specifications	Unit	
Outline Dimensions	3.2x1.6x0.5	mm	
Frequency	2400~2500	MHz	
Bandwidth	100	MHz	
VSWR	2(typical)		
Impedance	50	Ω	
Gain	Peak	2.5(typical)	dBi
	Efficiency	84(typical)	%



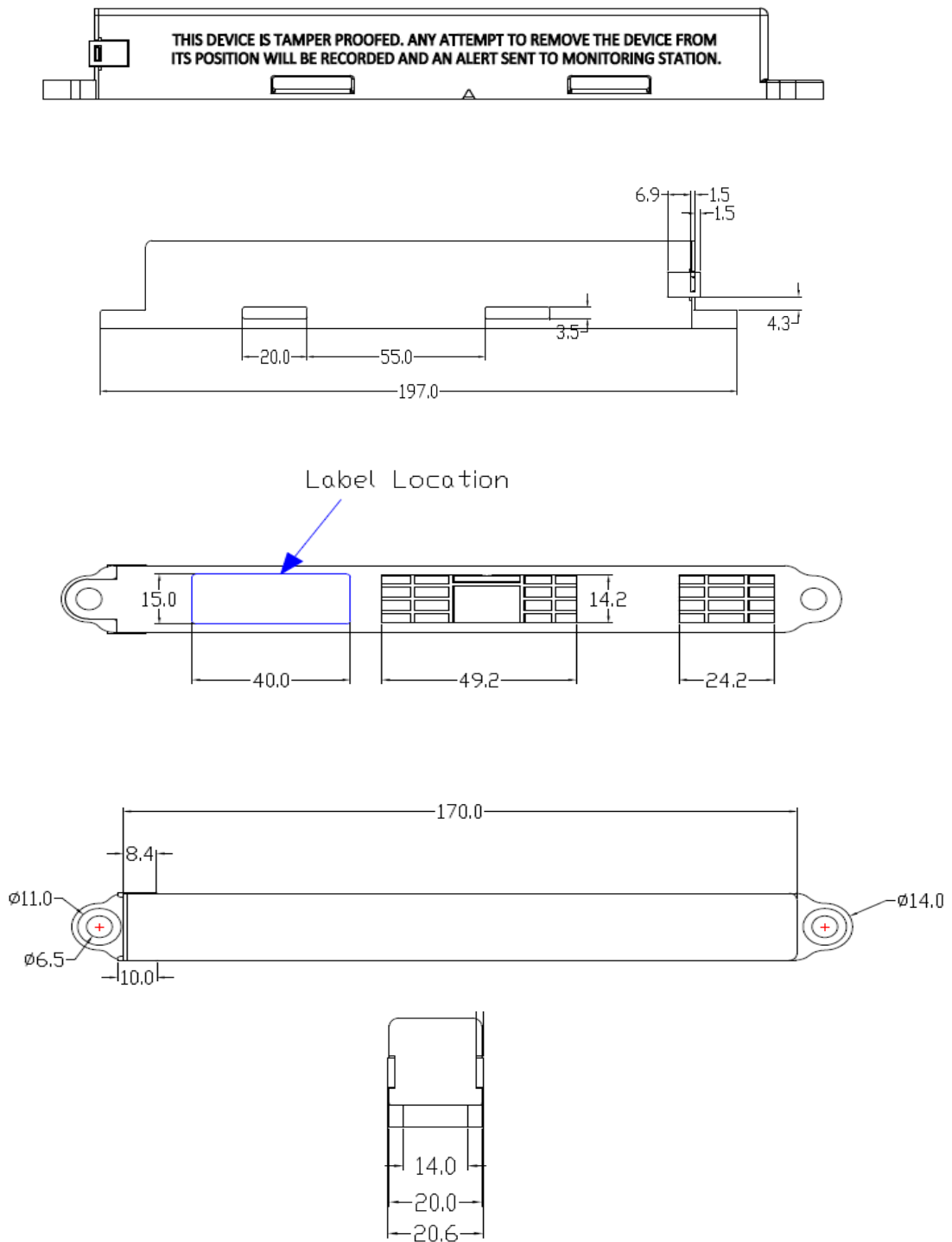
6.3 GPS Antenna Specifications

Parameter	Specifications	Unit
Outline Dimensions	18x28x3.6	mm
Frequency	1581±3	MHz
Polarization	R.H.C.P	
Return Loss	5dB min	dB
Impedance	50	Ω



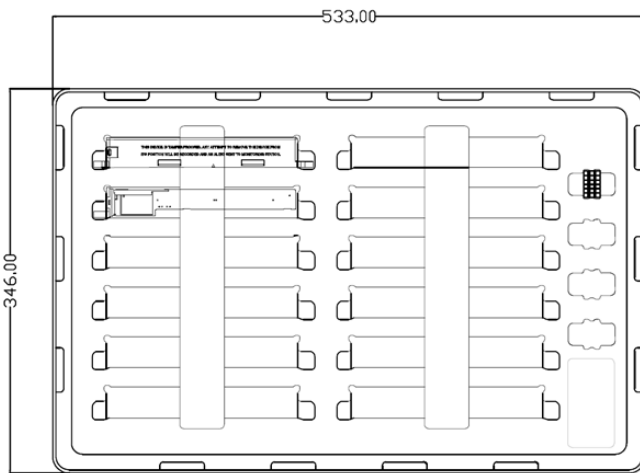
7. Enclosure

- ① Dimension : 197mm X 20mm X 27mm
- ② Materials : PC (polycarbonate)



8. Package

< TRAY >

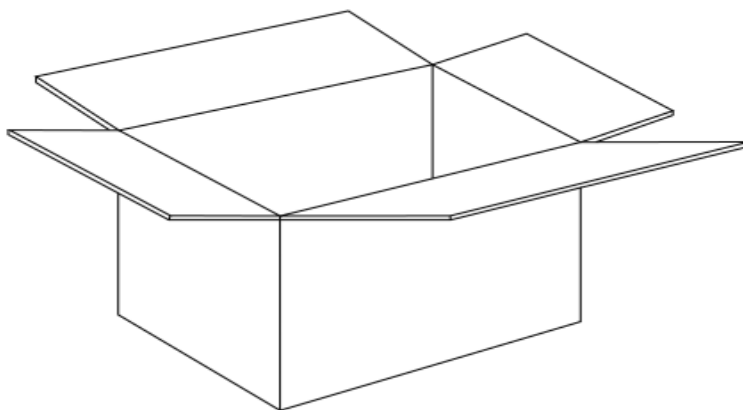
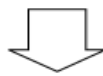
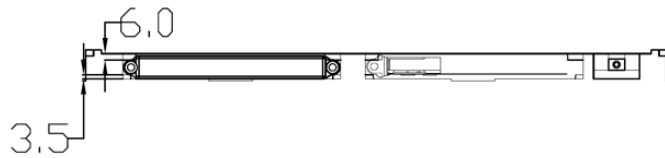


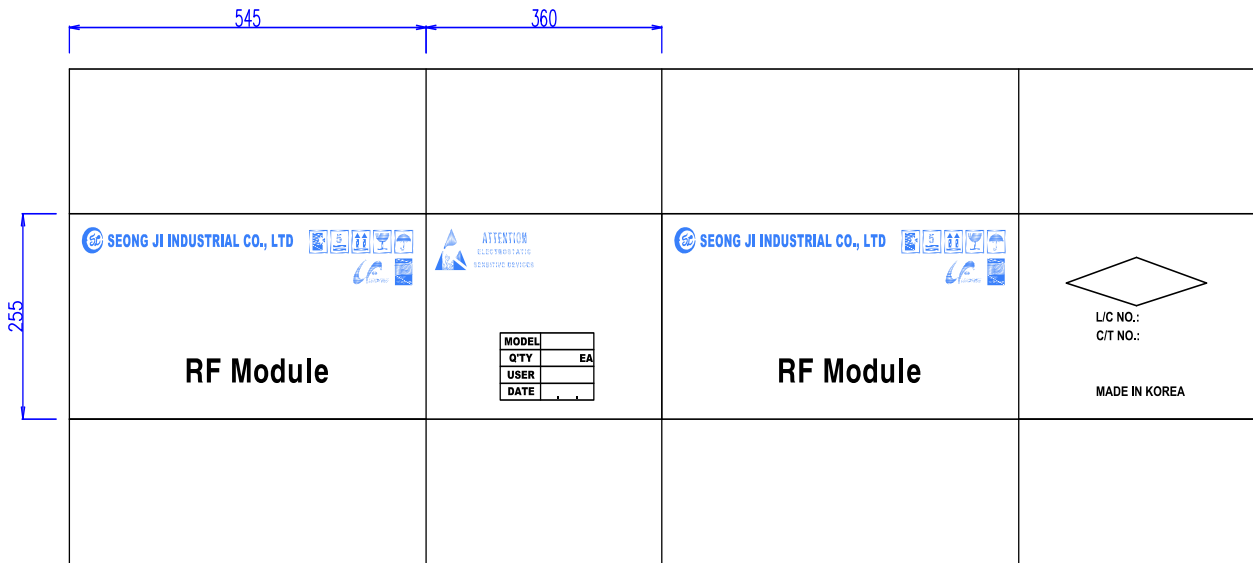
NOTE

SIZE : 533*346*28mm
 PET thickness : 0.7T
 Antistatic : 10⁴ ~ 10⁹

1Tray Q'ty : 2*6 = 12EA

1BOX Q'ty
 : 9Tray * 12EA = 108EA

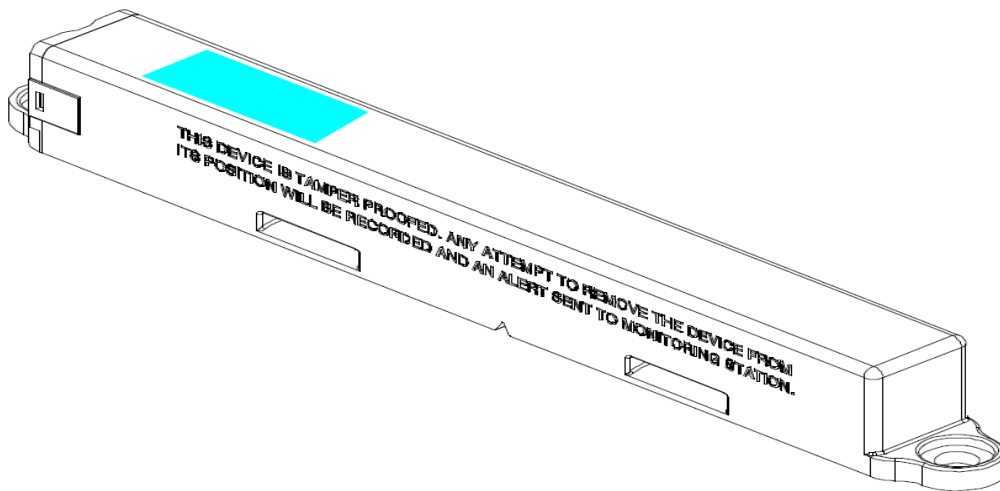




9. Getting Started

- ① The user receives the product set in the shipping mode.
- ② To activate the product, touch the NFC reader on the top of the product.
- ③ It takes about 10 seconds to activate the product.
- ④ After activation, you can connect to the product through the provided APP.
- ⑤ When connected to the product, Sigfox ID, Sigfox PAC and BT MAC can be obtained, and scenario operation is also possible.

NFC antenna is built in the blue marked part in the picture below.



9. Battery information

- The battery can be replaced by opening the product.
- Before installing the battery in the product, be sure to check the battery and the polarity indicated on the product.



- The specifications of the provided battery are as follows.

Model	ER14505
Manufacturer	EVE ENERGY
Material	Lithium-thionyl Chloride (Li-SOCl ₂)
Norminal Capacity	2700mAh
Norminal Voltage	3.6V
Size	AA

- Be sure to use a lithium thionyl chloride battery with a nominal voltage of 3.6V. We recommend EVE ENERGY's ER14505.

10. Precautions

- This product supports waterproof function, but may not be waterproof due to damage, wear, random disassembly and reassembly.
- This product may cause radio interference depending on the wireless environment in the installation and operating environment.
- There may be a shaded area of wireless communication.
- Depending on the status of each location service, there may be an error in location information.
- Do not disassemble, repair or modify.
- The battery can be replaced, but we cannot be held responsible for any problems that may arise during disassembly and reassembly.
- If repair is required, contact our CS.
- The life of the product may vary depending on the user's request scenario.
- You can use it for the longest time at 20 degrees.
- As the temperature decreases, the capacity of the battery decreases.

FCC Certification Notice

FCC ID : 2AS8LIET10MO

Contains FCC ID: 2AS8LSRM200A

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.

11. Warranty

- This product was produced through strict quality control and technical verification.
- The warranty period of the product is 1 year from the date of purchase.
- We are not responsible for product loss due to customer negligence.
- In case of malfunction due to customer's carelessness, repair cost may be charged.
- This product is a wireless communication product, but it does not guarantee the communication distance..

Support	brown@seongji.co.kr
Warranty Term ¹⁾	1 year from date of purchase
Manufacturer	SEONG JI INDUSTRIAL Co., LTD
Country of manufacture	Republic of Korea

¹⁾This is not the meaning of life time to able use this device.

The life time of device is different depending on messages per day.

Especially when the message is sent to Sigfox network every one hour, the life time can be shorter than one year.

FCC Information

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

Note: This equipment has been tested and found to comply with the limits for CLASS B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment 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 correct the interference by one or more of the following measures:

- 1.1. Reorient or relocate the receiving antenna.
- 1.2. Increase the separation between the equipment and receiver.
- 1.3. Connect the equipment into an outlet on a circuit different from that to which receiver is connected.
- 1.4. Consult the dealer or experienced radio/TV technician for help.

WARNING

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

“CAUTION : Exposure to Radio Frequency Radiation.

Antenna shall be mounted in such a manner to minimize the potential for human contact during normal operation. The antenna should not be contacted during operation to avoid the possibility of exceeding the FCC radio frequency exposure limit.

FCC Certification Notice

FCC ID : 2AS8LIET10MO

Contains FCC ID: 2AS8LSRM200A