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FCC TEST REPORT

Under

FCC 15 Subpart C, Paragraph 15.231

Prepared For :

Ningbo Sentek Electronics Co., Ltd.

448 Yingchun Road, Wangchun Industrial Zone, Ningbo City 315175 China

FCC ID:ZE5-STK-10345

EUT: Door/window contact

Model: WC-10-345&WC-20-345

Issue Date: June 1, 2011

Report Type: Original Report

Test Engineer: Jacky Huang

Review By: Apollo Liu/ Manager

Test Engineer: *Jacky Huang*

Review By:



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1. General Information

1. 1 Notes

The test results of this report relate exclusively to the test item specified in 1.5. The KMO Lab does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the KMO Lab.

1. 2 Testing Laboratory

Site on File with the Federal Communications Commission – United States

Registration Number: 963441

Site Listed with Industry Canada of Ottawa, Canada

Registration Number: 7353A

1. 3 Details of Applicant

Name : Ningbo Sentek Electronics Co., Ltd.

Address : 448 Yingchun Road, Wangchun Industrial Zone, Ningbo City 315175 China

Contact : RenQian Zhu (Mr)

Tel : +86-574-87155635

Fax : N/A

1. 4 Application Details

Date of Receipt of Application : June 01, 2011

Date of Receipt of Test Item : June 01, 2011

Date of Test : June 01~Oct 25, 2011

1. 5 Test Item

Manufacturer : Same As Applicant

Address : Same As Applicant

Trade Name : Sentek

Model No.(Base) : WC-10-345

Model No.(Extension) : WC-20-345

Description : WC-10-345 is same as WC-20-345 only just model name is different

Additional Information

Frequency : 345MHz

Number of Channels : 1

Power Supply : DC 2*3.0V(by Battery)

Temperature: N/A

Resolution : N/A

1. 6 Test Standards

FCC 15 Subpart C, Paragraph 15.231

Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.

1. 7 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	0.15~30MHz	3.85dB	(1)
Radiated Emission	30~1000MHz	4.22dB	(1)
Radiated Emission	1~12.75GHz	4.35dB	(1)
20dB Bandwidth	/	0.25dB	(1)
Deactivation Time	/	0.5ms	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1. 8 Equipments Used during the Test

Radiated Emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ULTRA-BROADBAND ANTENNA	ROHDE & SCHWARZ	HL562	100015	2010/11/24
2	Amplifier	Sonoma	310 N	291722	2010/11/24
3	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2010/11/24
4	RF TEST PANEL	ROHDE & SCHWARZ	TS / RSP	335015/ 0017	2010/11/24
5	TURNTABLE	ETS	2088	2149	2010/11/24
6	ANTENNA MAST	ETS	2075	2346	2010/11/24
7	EMI TEST SOFTWARE	ROHDE & SCHWARZ	ESK1	N/A	2010/11/24
8	Double-Ridged-Waveguide Horn Antenna	ROHDE & SCHWARZ	HF906	100039	2010/11/24
9	Amplifier	ROHDE & SCHWARZ	HF906 (1-18)GMZ	00101800-28- 5A	2010/11/24
10	Loop Antenna	ROHDE & SCHWARZ	HFH2-Z2	100020	2010/11/24

20dB Bandwidth & Deactivation Time & Duty Cycle					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	100106	2010/11/24

2. Technical Test

2. 1 Summary of Test Results

The EUT has been tested according to the following specifications: Standard Test Type Result Notes

Mode 1: the product wakes up periodically (period is about 300ms), reads the status of the magnetic reed switch and battery. If no changes have been detected, it will go to sleep.

FCC Rules	Description of Test	Result
§15.207 (a)	Conducted Emissions	N/A
§15.205, §15.209, 15.35 (c), §15.231 (b)	Radiated Emissions	Compliant
§15.231(a)	Deactivation Testing	Compliant
§15.231(c)	20 dB Band Width Testing	Compliant
§15.203	Antenna Requirement	Compliant

NOTE: 1) The test report merely corresponds to the test sample.

2) It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Mode 2: the product will send monitor frame to the controller at intervals of about 70 minutes, indicating itself work properly.

FCC Rules	Description of Test	Result
§15.207 (a)	Conducted Emissions	N/A
§15.205, §15.209, 15.35 (c), §15.231 (e)	Radiated Emissions	Compliant
§15.231(e)	Deactivation Testing	Compliant
§15.231(c)	20 dB Band Width Testing	Compliant
§15.203	Antenna Requirement	Compliant

NOTE: 1) The test report merely corresponds to the test sample.

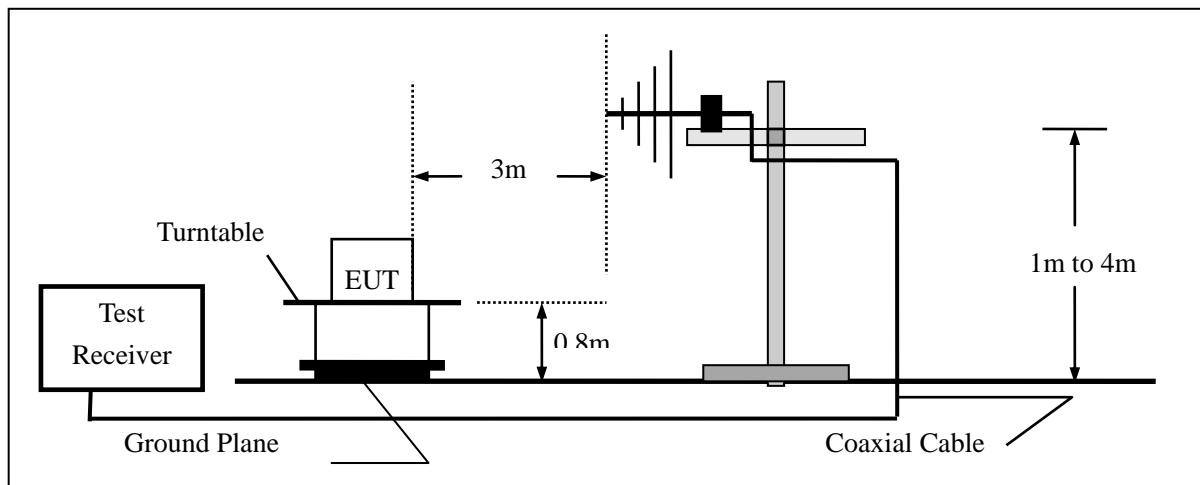
2) It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

5. Radiated Emission

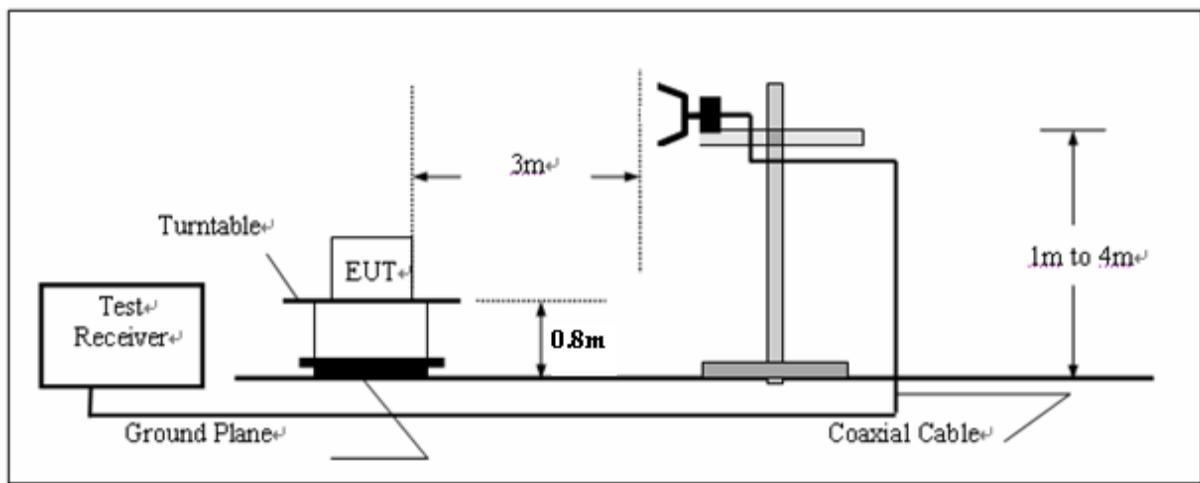
TEST CONFIGURATION

Radiated Emission Test Set-Up

Frequency range 30MHz – 1000MHz



Frequency range 1GHz – 5GHz



TEST PROCEDURE

- 1, The EUT was placed on a turn table which is 0.8m above ground plane, Put the battery into the EUT and the EUT will transmit automatic at 345MHz.
- 2, Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0 ° to 360 ° to acquire the highest emissions from EUT., each

emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

3, Repeat above procedures until all frequency measurements have been completed.

EMI Test Receiver Setup

The system was investigated from 9 KHz to 5 GHz.

During the radiated emission test, the test receiver was set with the following configurations:

Frequency Range	RBW	VBW	Dectector
9kHz- 150kHz	200 Hz	1 kHz	QP \leftrightarrow
150kHz- 30 MHz	9 KHz	30 KHz	QP \leftrightarrow
30MHz – 1000 MHz	100 kHz	300 kHz	QP \leftrightarrow
1000 MHz – 5 GHz	1 MHz	3 MHz	PK \leftrightarrow
1000 MHz – 5 GHz	1 MHz	10 Hz	AV \leftrightarrow

Note: The measurement employ AV detector for the frequency bands 9KHz-90KHz and 110KHz-490KHz . \leftrightarrow

RADIATION LIMIT

According to §15.231 (b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field Strength of Fundamental (Microvolts /meter)	Field Strength of spurious emissions ((Microvolts /meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,370 *	125 to 375 *
174-260	3,750	375
260-470	3,750 to 12, 500*	375 to 1,250*
Above 470	12,500	1,250

*Linear interpolations.

Note: The above field strength limits are specified at a distance of 3-meters the tighter limits apply at the band edges.

For periodic transmitter, according to § 15.231(e), the field strength of fundamental from device at a distance of 3 meters shall not exceed the following values:

Fundamental frequency (MHz)	Distance (Meters)	Field strength of fundamental	
		(μV/m)	(dB μV/m)
40.66-40.70	3	1000	60
70-130	3	500	54
130-174	3	500 to 1500	54 to 63.5
174-260	3	1500	63.5
260-470	3	1500 to 5000	63.5 to 74
Above 470	3	5000	74

FCC Part 15B § 15.209, all spurious emissions shall comply with the limits of table as follow:

Frequency (MHz)	Distance (Meters)	Field strength(microvolts/meter)
0.009-0.490	300	2400/F(KHz)
0.490-1.705	30	24000/F(KHz)
1.705-30.0	30	30
30-88	3	100
88-216	3	150
216-960	3	200
Above 960	3	500

Note: 1.The spurious emissions shall be attenuated to the average limits shown in above table or to the general limits shown in section 15.209, which limit permits a higher field strength.

TEST RESULT**Radiated emission of fundamental emission of mode 1**

Frequency (MHz)	Corrected Reading (dB μ V/m)@3m	FCC Limit (dB μ V/m) @3m	Margin (dB)	Detector	Polarization
345	75.52	97.26	21.74	PK	Horizontal
345	58.34	77.26	18.92	AV	Horizontal
345	80.68	97.26	16.58	PK	Vertical
345	63.50	77.26	13.76	AV	Vertical

Spurious radiated emission of mode 1

Frequency (MHz)	Corrected Reading (dB μ V/m)@3m	FCC Limit (dB μ V/m) @3m	Margin (dB)	Detector	Polarization
231.80	31.30	46.00	14. 7	QP	Horizontal
375.30	29.90	46.00	16. 1	QP	Horizontal
867.84	59.2	77.01	17. 81	PK	Horizontal
867.84	42.02	57.01	14. 99	AV	Horizontal
1301.71	55.90	74.00	18. 1	PK	Horizontal
1301.71	38.72	54.00	15. 28	AV	Horizontal
3037.39	63.60	77.01	13. 41	PK	Horizontal
3037.39	46.42	57.01	10. 59	AV	Horizontal
47.49	26.90	40.00	13. 1	QP	Vertical
375.30	31.70	46.00	14. 3	QP	Vertical
867.84	59.90	77.01	17. 11	PK	Vertical
867.84	42.72	57.01	14. 29	AV	Vertical
1301.71	55.30	74.00	18. 7	PK	Vertical
1301.71	38.12	54.00	15. 88	AV	Vertical
3037.39	61.20	77.01	15. 81	PK	Vertical
3037.39	44.02	57.01	12. 99	AV	Vertical

Note1: According to section 15.35(b), when average radiated emission measurements are specified, including emission measurement below 1000MHz, there also is limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated.

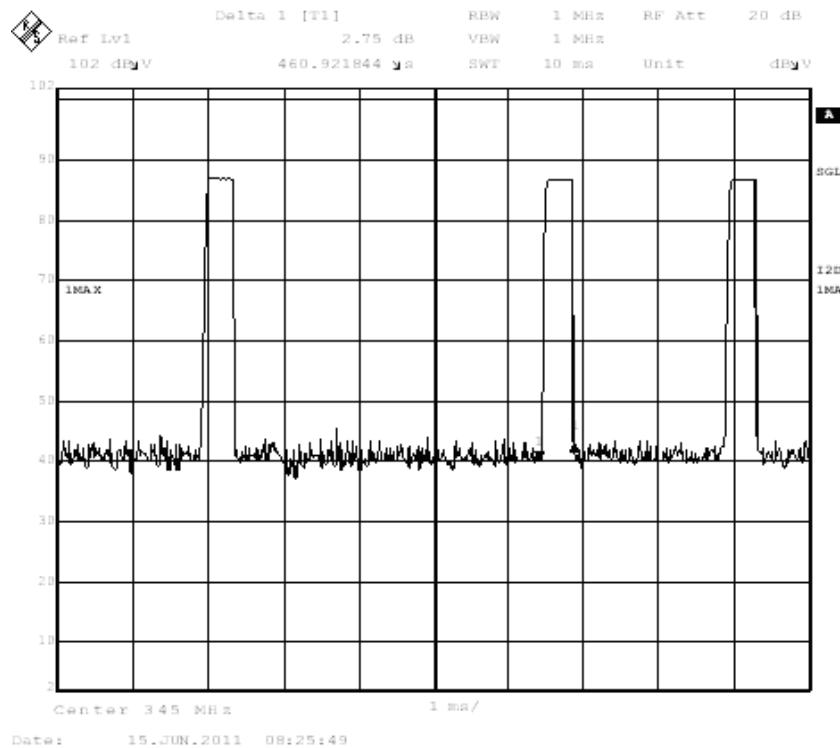
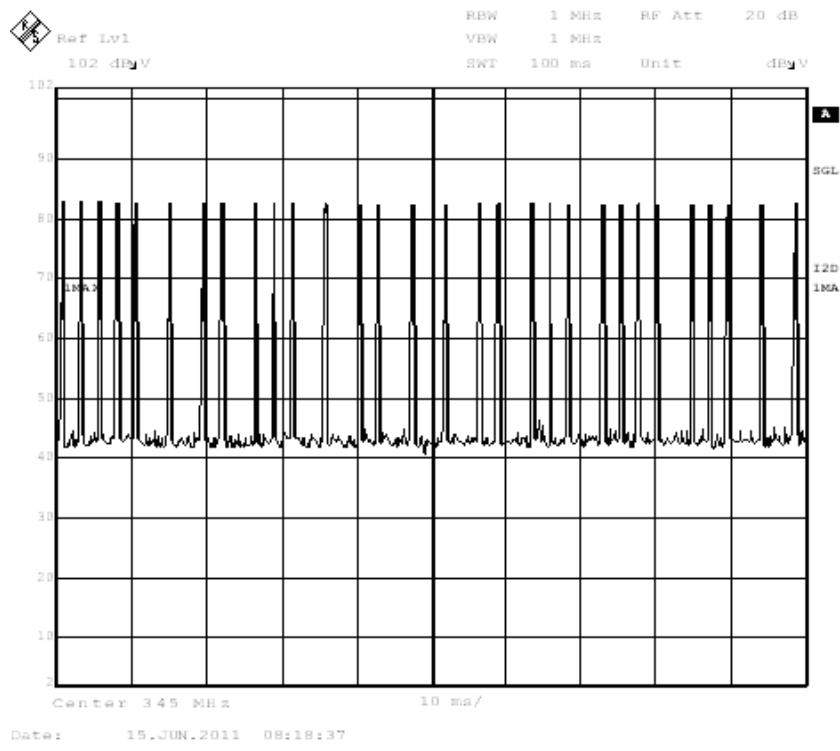
Note 2: Average Result =Peak Field Strength+Duty Cycle Correction Factor.

Note3: Duty Cycle Correction Factor value refers to below.

Total pulse on time:0.461 millisecond

Duty Cycle = TX on/100ms X 100% = $0.461 \times 30 \text{ ms} / 100 \text{ ms} \times 100\% = 13.83\%$

Duty Cycle Correction Factor = $20 \log (\text{Duty Cycle}) = -17.18$



Radiated emission of fundamental emission of mode 2

Frequency (MHz)	Corrected Reading (dB μ V/m)@3m	FCC Limit (dB μ V/m) @3m	Margin (dB)	Detector	Polarization
345	74.32	89.30	14.98	PK	Horizontal
345	57.42	69.30	11.88	AV	Horizontal
345	77.06	89.30	12.24	PK	Vertical
345	60.16	69.30	9.14	AV	Vertical

Spurious radiated emission of mode 2

Frequency (MHz)	Corrected Reading (dB μ V/m)@3m	FCC Limit (dB μ V/m) @3m	Margin (dB)	Detector	Polarization
141.80	31.59	40.00	8. 41	QP	Horizontal
245.37	30.25	46.00	15. 75	QP	Horizontal
868.14	41.79	69.30	27. 51	PK	Horizontal
868.14	24.89	49.30	24. 41	AV	Horizontal
2170.34	43.16	69.30	26. 14	PK	Horizontal
2170.34	26.26	49.30	23. 04	AV	Horizontal
3036.07	47.14	69.30	22. 16	PK	Horizontal
3036.07	30.24	49.30	19. 06	AV	Horizontal
142.43	27.16	40.00	12. 84	QP	Vertical
245.37	31.57	46.00	14. 43	QP	Vertical
868.14	40.27	69.30	29. 03	PK	Vertical
868.14	23.37	49.30	25. 93	AV	Vertical
2170.34	50.45	69.30	18. 85	PK	Vertical
2170.34	33.55	49.30	15. 75	AV	Vertical
3036.07	46.86	69.30	22. 44	PK	Vertical
3036.07	29.96	49.30	19. 34	AV	Vertical

Note 1: According to section 15.35(b), when average radiated emission measurements are specified, including emission measurement below 1000MHz, there also is limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated.

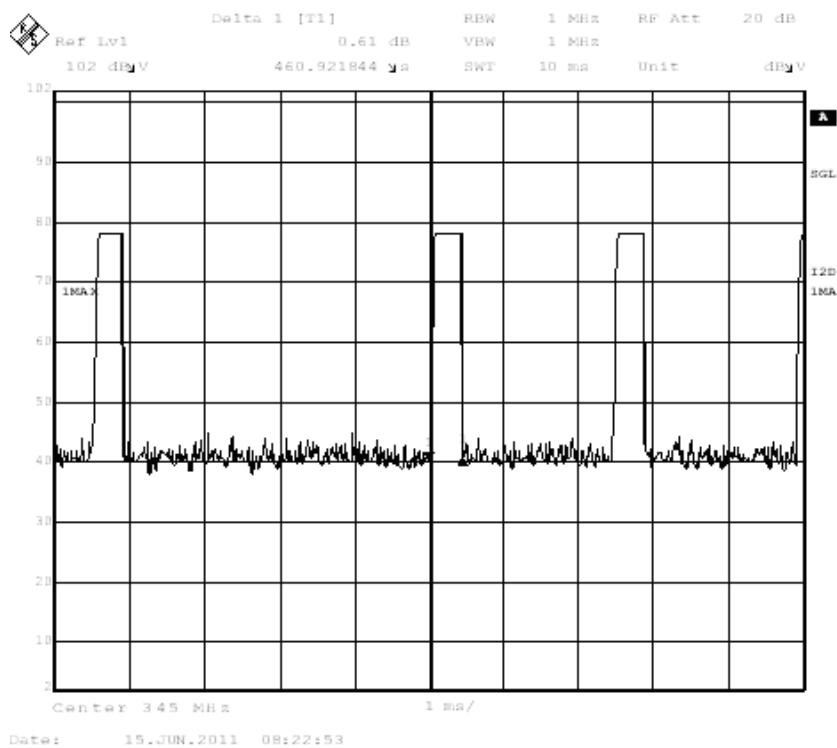
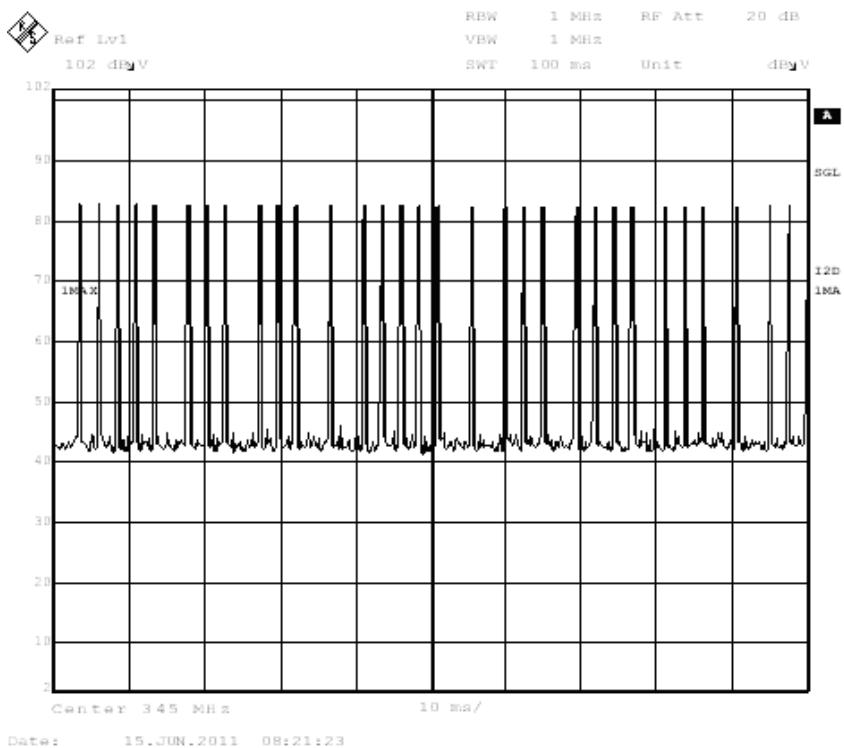
Note 2: Average Result =Peak Field Strength+Duty Cycle Correction Factor.

Note 3: Duty Cycle Correction Factor value refers to below.

Total pulse on time:0.461 millisecond

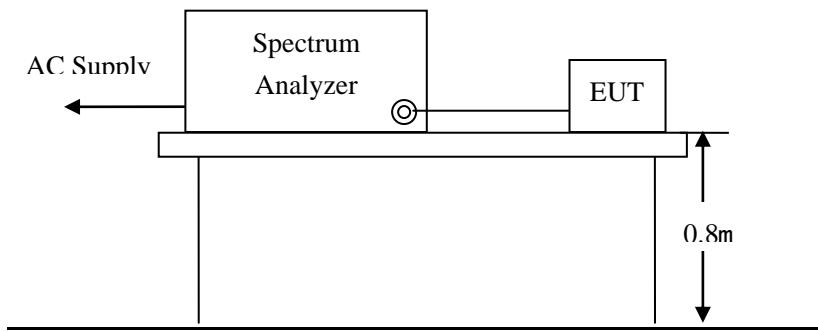
$$\text{Duty Cycle} = \text{TX on}/100\text{ms} \times 100\% = 0.461 \times 31 \text{ ms}/100\text{ms} \times 100\% = 14.29\%$$

Duty Cycle Correction Factor = $20 \log_{10} (\text{Duty Cycle}) = -16.90$



6. 20dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

- 1 The EUT was placed on a wooden table which is 0.8m height and close to receiver antenna of spectrum analyzer.
- 2 The spectrum analyzer resolution bandwidth was set to 10 kHz and video bandwidth was set to 30 kHz to encompass all significant spectral components during the test. The detector was set to peak and hold mode to clearly observe the components.

Limit

According to FCC Part 15C § 15.231(c)

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz.

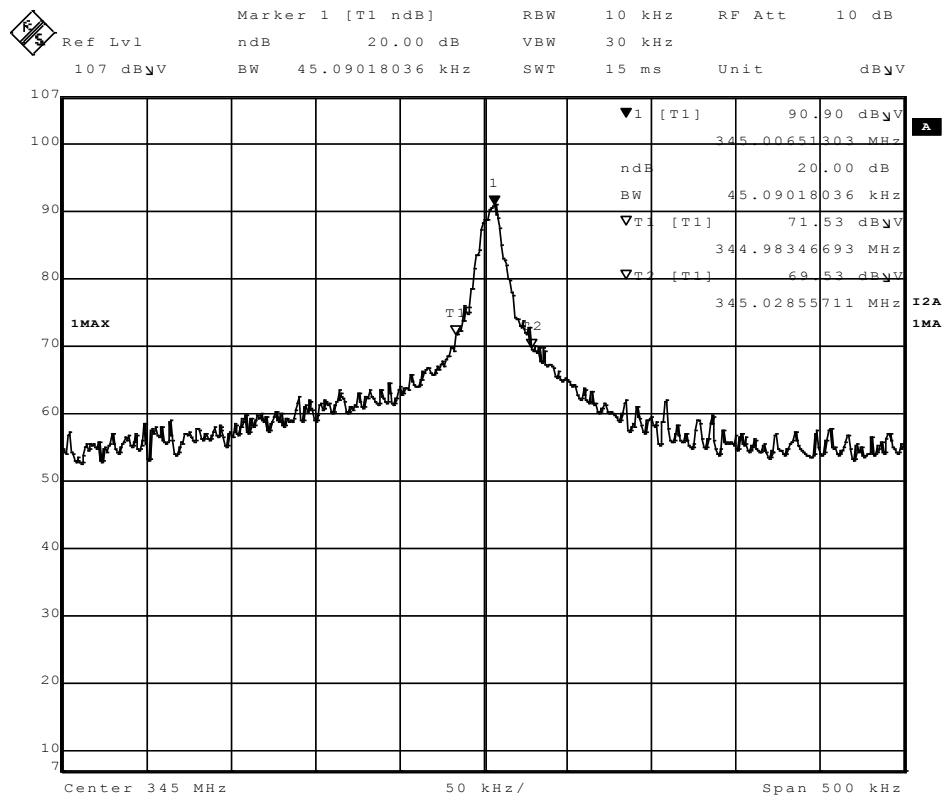
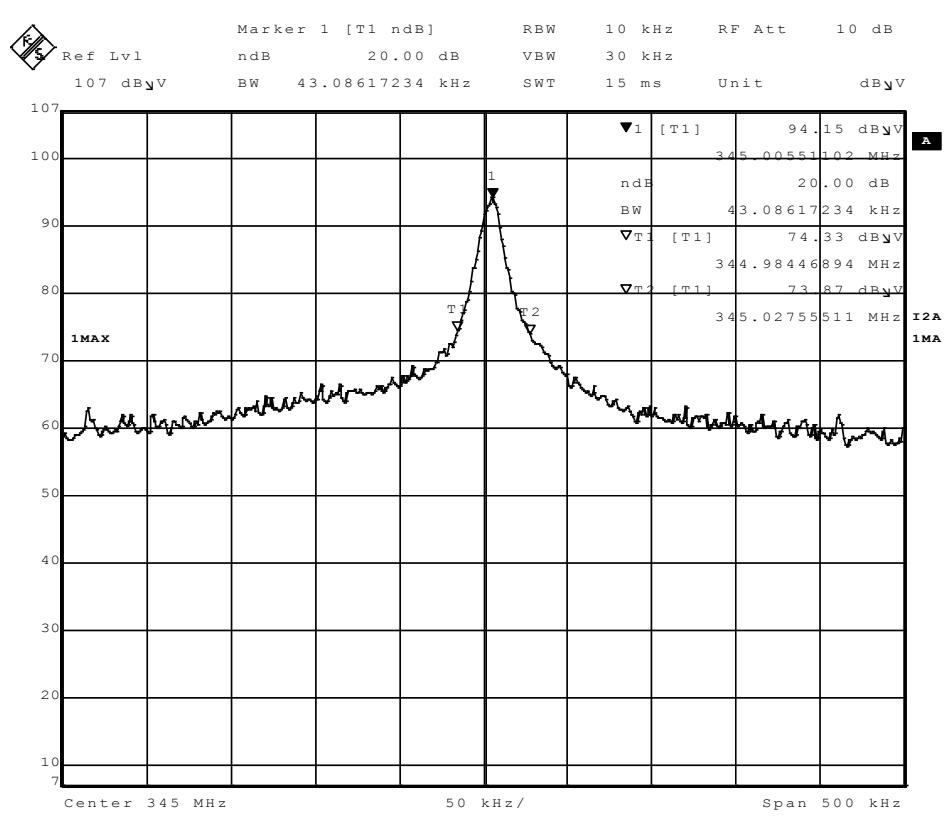
TEST RESULTS

Mode 1

Frequency (MHz)	20dB Bandwidth Measurement Bandwidth (KHz)	Limit (kHz)	Result
345	45.09	862.5	Pass

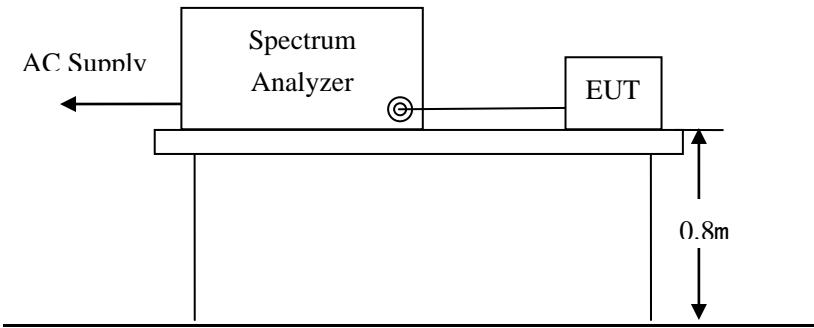
Mode 2

Frequency (MHz)	20dB Bandwidth Measurement Bandwidth (KHz)	Limit (kHz)	Result
345	43.09	862.5	Pass

Mode 1**Mode 2**

7. Deactivation test

TEST CONFIGURATION



TEST PROCEDURE

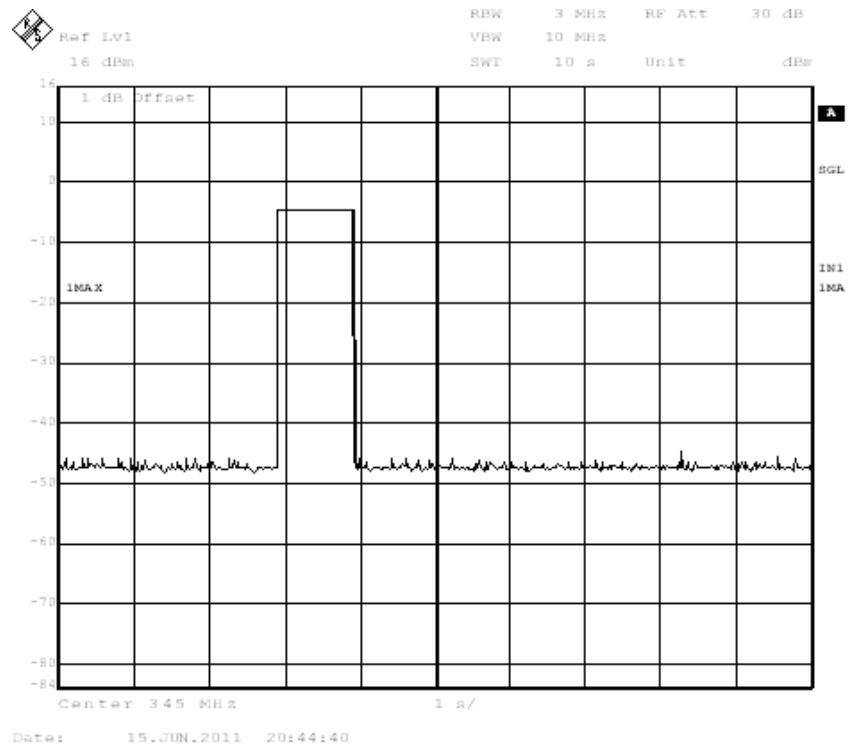
- 1 The EUT was placed on a wooden table which is 0.8m height and close to receiver antenna of spectrum analyzer.
- 2 The spectrum analyzer resolution bandwidth was set to 3 MHz and video bandwidth was set to 10 MHz to encompass all significant spectral components during the test. The spectrum analyzer was operated in linear scale and zero span mode after tuning to the transmitter carrier frequency.

Limit (mode 1)

Per 15.231(a) (2), A transmitter activated automatically shall cease transmission within 5 seconds after activation.

TEST RESULTS

EUT statement: The transmitter was automatically activated, and the carrier frequency 345 MHz:



Limit (mode 2)

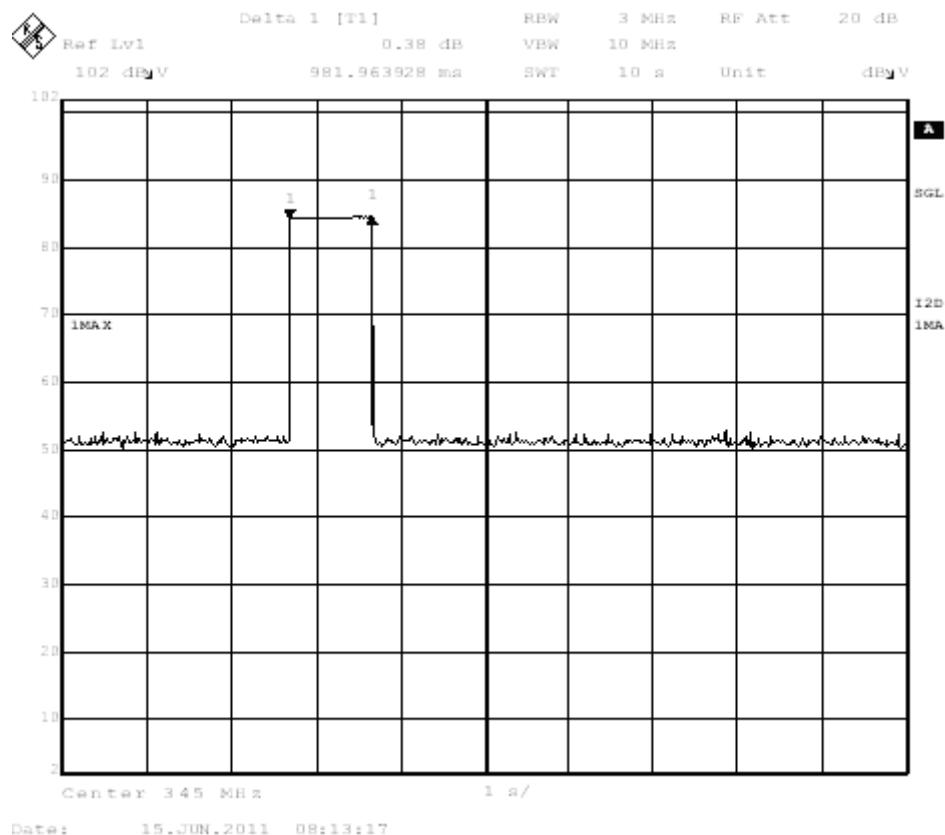
For periodic transmitter, according to FCC Part 15C § 15.231(e)

Item	Limit (second)
One transmission time	not greater than 1 second
Transmission period	at least 30 times the duration of the transmission but in no case less than 10 second

TEST RESULTS

EUT statement: the carrier frequency 345 MHz:
the WC10-345 will also send monitor frame to the controller at intervals of about 70 minutes, indicating itself work properly.

Frequency (MHz)	One transmission time (second)	Result
345	0.982<1	Pass

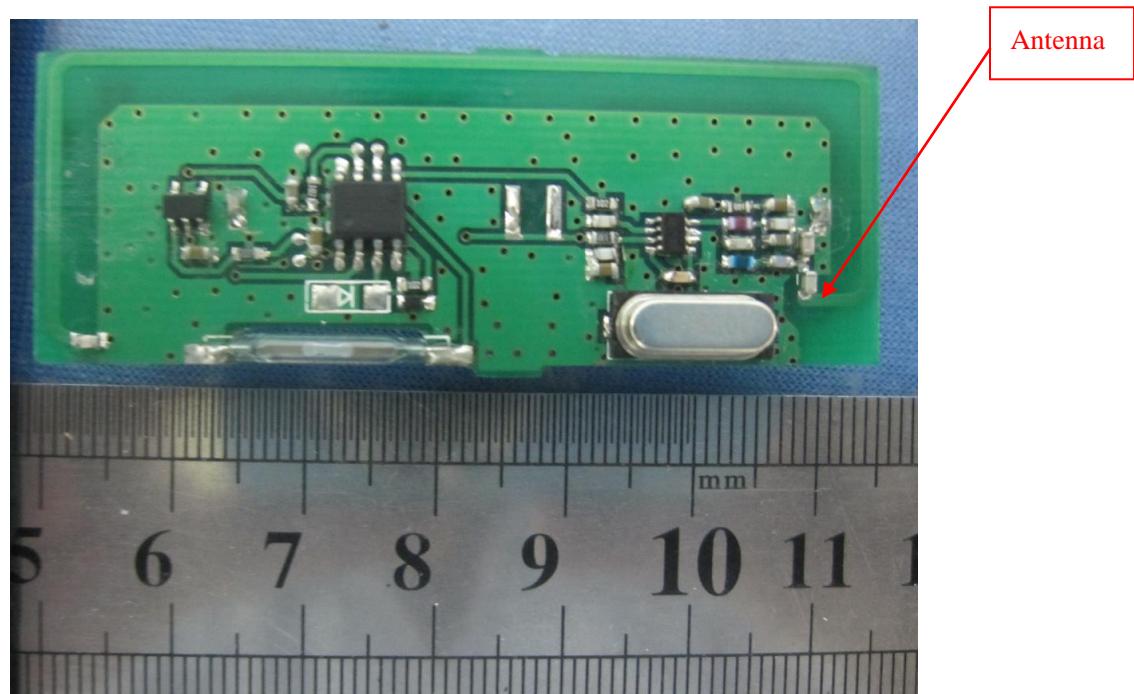


8. Antenna Requirement

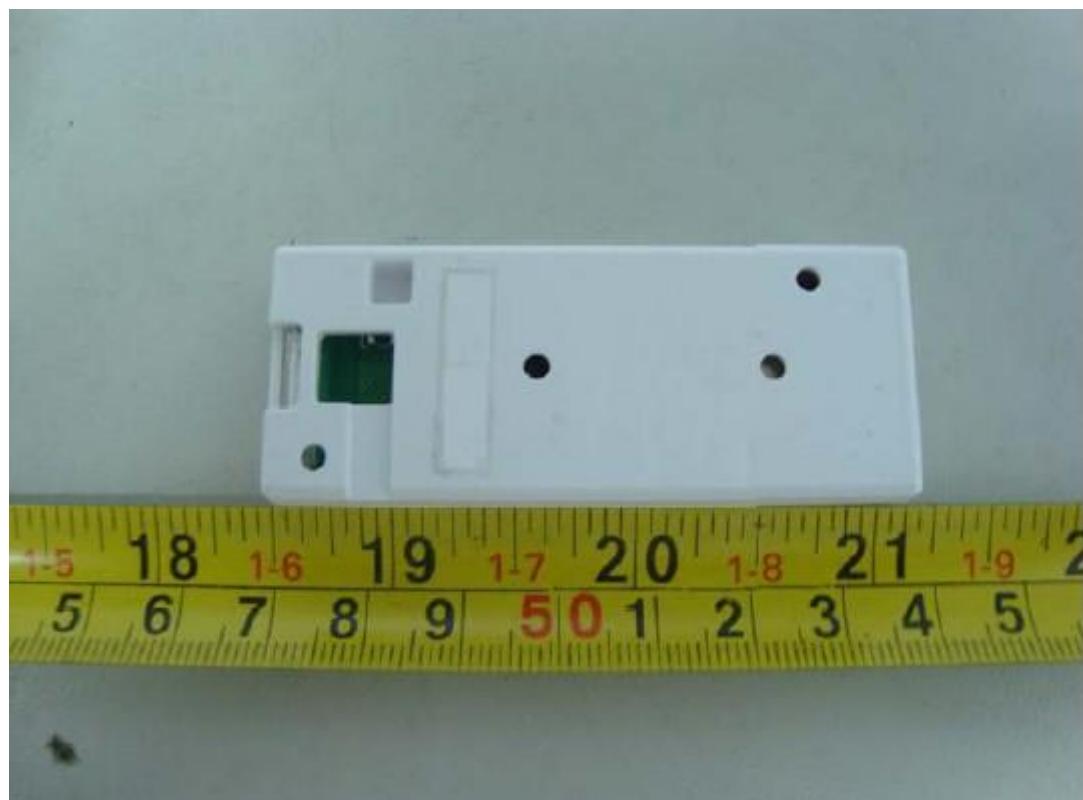
According to FCC Part 15C § 15.203,

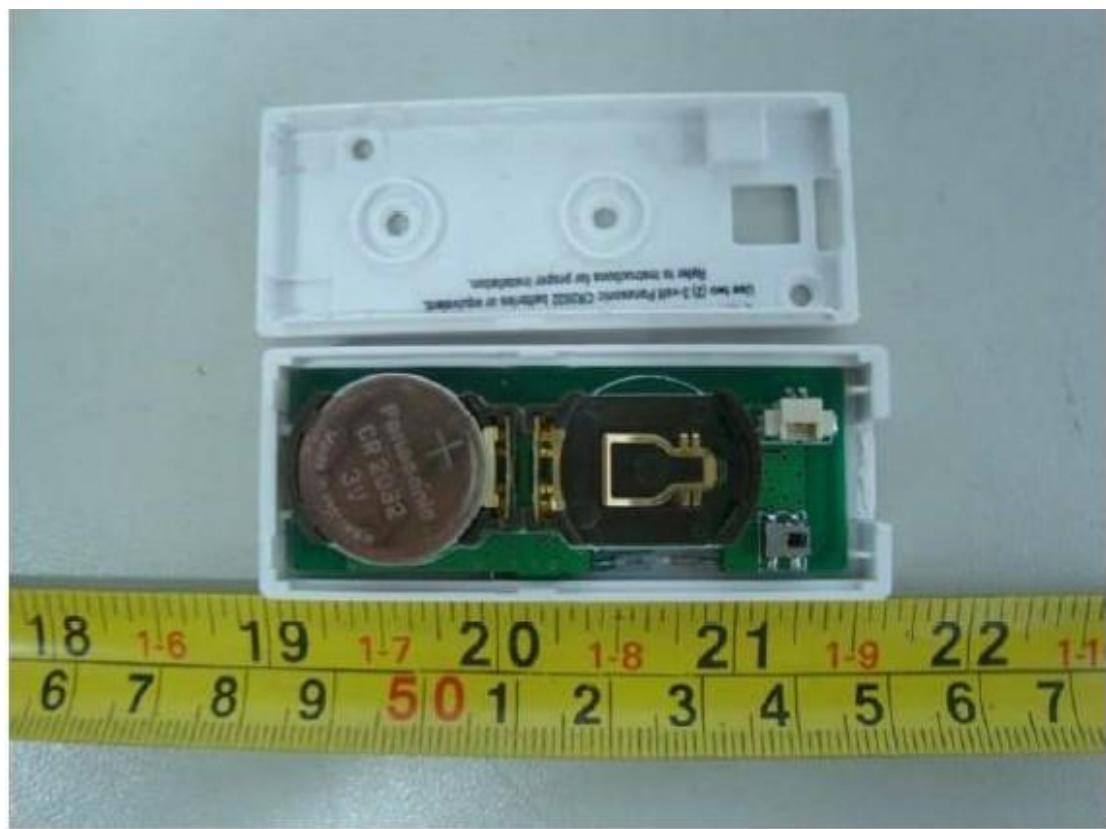
- a), An intentional radiator shall be de-signed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.
- b), The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

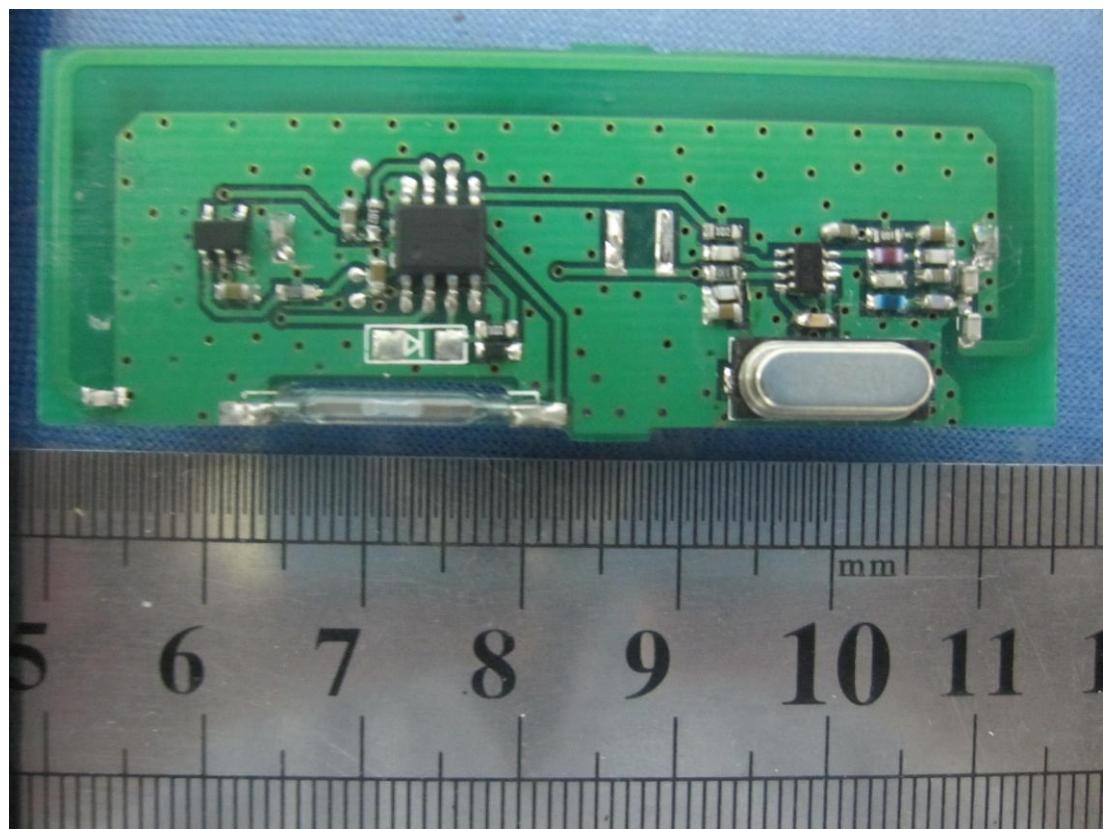
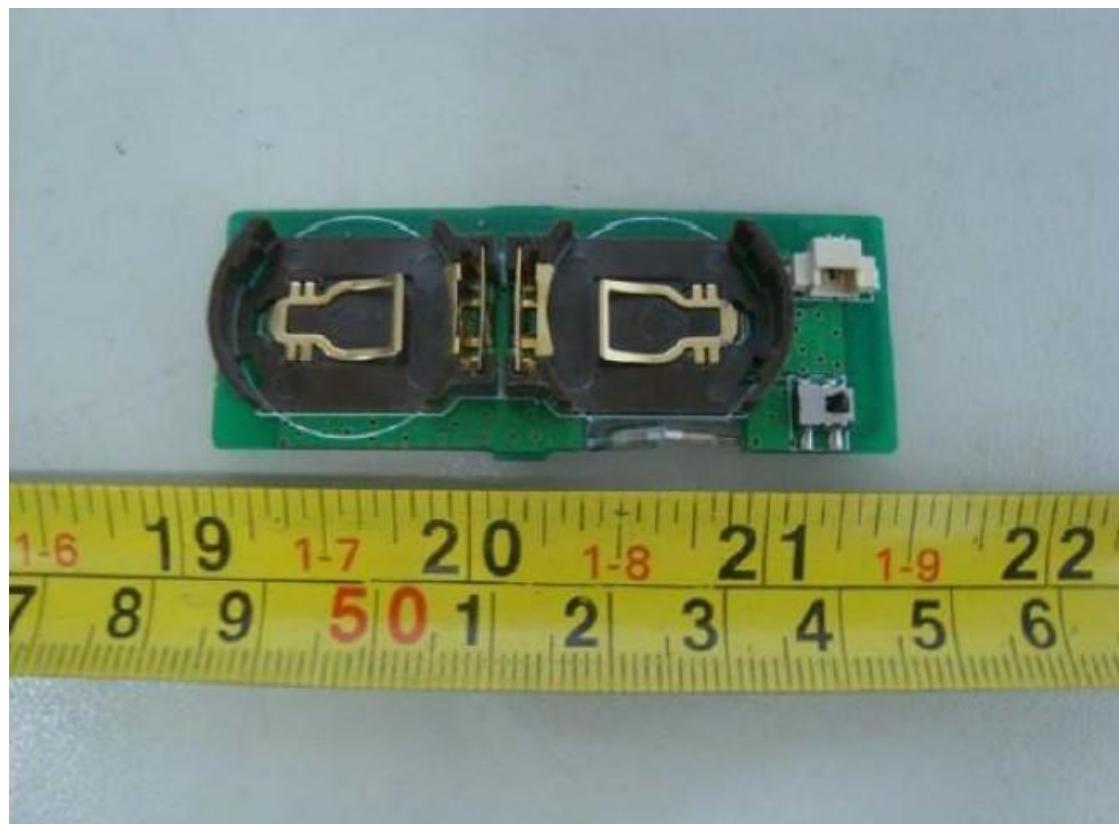
The EUT use of a Integral antenna. Please refer to the EUT Internal photos.



9. External and Internal Photos of the EUT







10. Test Setup Photos of the EUT

