



FCC Part 15C Test Report

FCC ID: 2AJXEASR-P30U

Product Name:	AsReader Desktop
Trademark:	N/A
Model Name :	ASR-P30U
Prepared For :	ASTERISK,INC.
Address :	5-6-16 Nishinakajima, Yodogawa-ku, Shin-Osaka Dainichi Bldg 201, Osaka, 532-0011, Japan
Prepared By :	Shenzhen BCTC Technology Co., Ltd.
Address :	No.101,Yousong Road,Longhua New District, Shenzhen,China
Test Date:	Apr. 01, 2017 – Apr. 12, 2017
Date of Report :	Apr. 12, 2017
Report No.:	BCTC-FY170301573E



TEST RESULT CERTIFICATION

Applicant's name : ASTERISK, INC.

Address : 5-6-16 Nishinakajima, Yodogawa-ku, Shin-Osaka Dainichi Bldg 201, Osaka, 532-0011, Japan

Manufacture's Name : Shenzhen RoyalRay Science and Technology Co., Ltd.

Address : 4F, West Wing, A1 Bldg., Xiufeng Industrial Park, Xiufeng Rd., Longgang Dist., Shenzhen, 518112, China

Product description

Product name : AsReader Desktop

Trademark : N/A

Model and/or type reference : ASR-P30U

Standards : FCC Part15.247
ANSI C63.10-2013

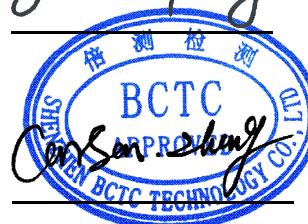
This device described above has been tested by BCTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Prepared by(Engineer): Snow Zeng

Reviewer(Supervisor): Jade Yang

Approved(Manager): Carson Zhang



**Table of Contents**

	Page
1 . SUMMARY OF TEST RESULTS	5
1.1 TEST FACILITY	5
1.2 MEASUREMENT UNCERTAINTY	6
2 . GENERAL INFORMATION	7
2.1 GENERAL DESCRIPTION OF EUT	7
2.2 DESCRIPTION OF TEST MODES	8
2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	9
2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)	9
2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS	10
3 . EMC EMISSION TEST	11
3.1 CONDUCTED EMISSION MEASUREMENT	11
3.1.1 POWER LINE CONDUCTED EMISSION LIMITS	11
3.1.2 TEST PROCEDURE	11
3.1.3 DEVIATION FROM TEST STANDARD	11
3.1.4 TEST SETUP	12
3.1.5 EUT OPERATING CONDITIONS	12
3.1.6 TEST RESULTS	12
3.2 RADIATED EMISSION MEASUREMENT	15
3.2.1 RADIATED EMISSION LIMITS	15
3.2.2 TEST PROCEDURE	16
3.2.3 DEVIATION FROM TEST STANDARD	16
3.2.4 TEST SETUP	16
3.2.5 EUT OPERATING CONDITIONS	17
3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)	18
3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)	19
3.2.8 TEST RESULTS (1GHZ~25GHZ)	21
3.3 RADIATED BAND EMISSION MEASUREMENT	23
3.3.1 TEST REQUIREMENT:	23
3.3.2 TEST PROCEDURE	23
3.3.3 DEVIATION FROM TEST STANDARD	24
3.3.4 TEST SETUP	24
3.3.5 EUT OPERATING CONDITIONS	24
4 . BANDWIDTH TEST	27
4.1 APPLIED PROCEDURES / LIMIT	27
4.1.1 TEST PROCEDURE	27
4.1.2 DEVIATION FROM STANDARD	27
4.1.3 TEST SETUP	27
4.1.4 EUT OPERATION CONDITIONS	27
4.1.5 TEST RESULTS	28
5 . NUMBER OF HOPPING CHANNEL	30
5.1 APPLIED PROCEDURES / LIMIT	30
5.1.1 TEST PROCEDURE	30
5.1.2 DEVIATION FROM STANDARD	30
5.1.3 TEST SETUP	30



Table of Contents

	Page
5.1.4 EUT OPERATION CONDITIONS	30
5.1.5 TEST RESULTS	30
6 . AVERAGE TIME OF OCCUPANCY	32
6.1 APPLIED PROCEDURES / LIMIT	32
6.1.1 TEST PROCEDURE	32
6.1.2 DEVIATION FROM STANDARD	32
6.1.3 TEST SETUP	32
6.1.4 EUT OPERATION CONDITIONS	32
6.1.5 TEST RESULTS	33
7 . HOPPING CHANNEL SEPARATION MEASUREMENT	34
7.1 APPLIED PROCEDURES / LIMIT	34
7.1.1 TEST PROCEDURE	34
7.1.2 DEVIATION FROM STANDARD	34
7.1.3 TEST SETUP	34
7.1.4 EUT OPERATION CONDITIONS	34
7.1.5 TEST RESULTS	35
8 . HOPPING CHANNEL SEPARATION MEASUREMENT	36
8.1 APPLIED PROCEDURES / LIMIT	36
8.1.1 TEST PROCEDURE	36
8.1.2 DEVIATION FROM STANDARD	36
8.1.3 TEST SETUP	36
8.1.4 EUT OPERATION CONDITIONS	36
8.1.5 TEST RESULTS	36
9 . ANTENNA REQUIREMENT	37
9.1 STANDARD REQUIREMENT	37
9.2 EUT ANTENNA	37
10 . TEST SEUUP PHOTO	38
11 . EUT PHOTO	40



1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247(a)(1)	Hopping Channel Separation	PASS	
15.247(b)(1)	Peak Output Power	PASS	
15.247(c)	Radiated Spurious Emission	PASS	
15.247(a)(iii)	Number of Hopping Frequency	PASS	
15.247(a)(iii)	Dwell Time	PASS	
15.247(a)(1)	Bandwidth	PASS	
15.205	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

1.1 TEST FACILITY

Shenzhen BCTC Technology Co., Ltd.

Add. : No.101, Yousong Road, Longhua New District, Shenzhen, China

FCC Registered No.: 187086



1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 % .

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power,conducted	$\pm 0.16\text{dB}$
3	Spurious emissions,conducted	$\pm 0.21\text{dB}$
4	All emissions,radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^\circ\text{C}$
7	Humidity	$\pm 2\%$



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	AsReader Desktop											
Trade Name	N/A											
Model Name	ASR-P30U											
Model Difference	The product's different for model name and outlook color.											
Product Description	<p>The EUT is a Bluetooth Speaker</p> <table border="1"><tr><td>Operation Frequency:</td><td>902.75-927.25MHz</td></tr><tr><td>Modulation Type:</td><td>FHSS(GFSK)</td></tr><tr><td>Number Of Channel</td><td>50CH</td></tr><tr><td>Antenna type:</td><td>internal antenna</td></tr><tr><td>Antenna Gain (dBi)</td><td>2dBi</td></tr></table>		Operation Frequency:	902.75-927.25MHz	Modulation Type:	FHSS(GFSK)	Number Of Channel	50CH	Antenna type:	internal antenna	Antenna Gain (dBi)	2dBi
Operation Frequency:	902.75-927.25MHz											
Modulation Type:	FHSS(GFSK)											
Number Of Channel	50CH											
Antenna type:	internal antenna											
Antenna Gain (dBi)	2dBi											
	Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.											
Channel List	Please refer to the Note 2.											
Power	DC 5V from adapter											
Adapter	--											
hardware version	--											
Software version	--											
Serial number	--											
Connecting I/O Port(s)	Please refer to the User's Manual											

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



2.	Channel List							
	CH	Center frequency (MHz)	CH	Center frequency (MHz)	CH	Center frequency (MHz)	CH	Center frequency (MHz)
1	902.75	14	909.25	27	915.75	39	921.75	
2	903.25	15	909.75	28	916.25	40	922.25	
3	903.75	16	910.25	29	916.75	41	922.75	
4	904.25	17	910.75	30	917.25	42	923.25	
5	904.75	18	911.25	31	917.75	43	923.75	
6	905.25	19	911.75	32	918.25	44	924.25	
7	905.75	20	912.25	33	918.75	45	924.75	
8	906.25	21	912.75	34	919.25	46	925.25	
9	906.75	22	913.25	35	919.75	47	925.75	
10	907.25	23	913.75	36	920.25	48	926.25	
11	907.75	24	914.25	37	920.75	49	926.75	
12	908.25	25	914.75	38	921.25	50	927.25	
13	908.75	26	915.25					

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description		
Mode 1	CH01	CH28	
Mode 2	CH28		
Mode 3	CH50		
Mode 4	Link Mode		
For Conducted & Radiated Emission			
Final Test Mode	Description		
Mode 1	CH01	CH28	
Mode 2	CH28		
Mode 3	CH50		
Mode 4	Link Mode		

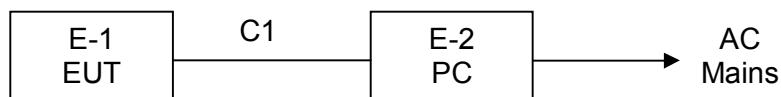
Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.



2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated & Conducted Spurious Emission Test



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	AsReader Desktop	N/A	ASR-P30U	N/A	EUT
E-2	PC	ASUS	AWT8000	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C1	No	No	1.5m	USB Line

Note:

- (1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.



2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer	Agilent	E4407B	MY45109572	2016.08.27	2017.08.26
2	Test Receiver	R&S	ESPI	101396	2016.08.27	2017.08.26
3	Bilog Antenna	SCHWARZBECK	VULB9160	VULB9160-3369	2016.08.27	2017.08.26
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016.08.27	2017.08.26
5	Spectrum Analyzer	Agilent	N9020A	MY5051041	2016.08.27	2017.08.26
6	Horn Antenna	SCHWARZBECK	9120D	9120D-1275	2016.08.29	2017.08.28
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2016.08.29	2017.08.28
8	Amplifier	SCHWARZBECK	BBV9718	9718-270	2016.08.29	2017.08.28
9	Amplifier	SCHWARZBECK	BBV9743	9743-119	2016.08.29	2017.08.28
10	Loop Antenna	ARA	PLM600D MI-BTH0730/B	1029	2016.07.06	2017.07.05
11	Power Meter	R&S	NRVS	100696	2016.08.27	2017.08.26
12	Power Sensor	R&S	URV5-Z4	0395.1619.05	2016.08.27	2017.08.26
13	RF cables	R&S	N/A	N/A	2016.08.27	2017.08.26
14	966 chamber	ChengYu	966 Room	966	2016.08.27	2017.08.26

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Test Receiver	R&S	ESCI	1166.5950K03-101165-ha	2016.08.27	2017.08.26
2	LISN	R&S	NSLK8126	8126466	2016.08.27	2017.08.26
3	LISN	R&S	NSLK8126	8126487	2016.08.27	2017.08.26
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2016.08.27	2017.08.26
5	RF cables	R&S	R204	R20X	2016.08.27	2017.08.26



3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

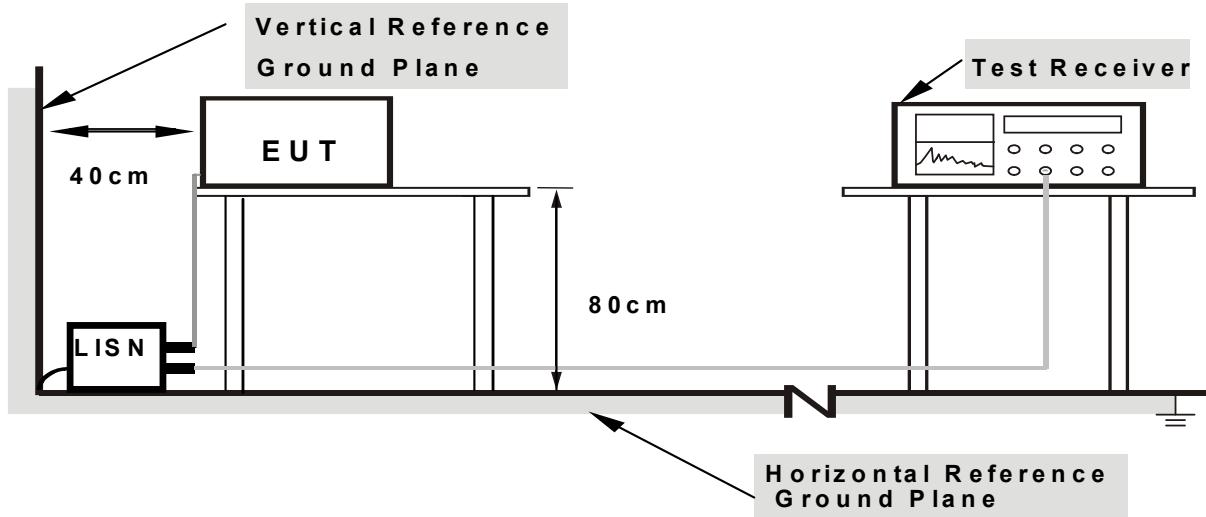
3.1.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



Note:

1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

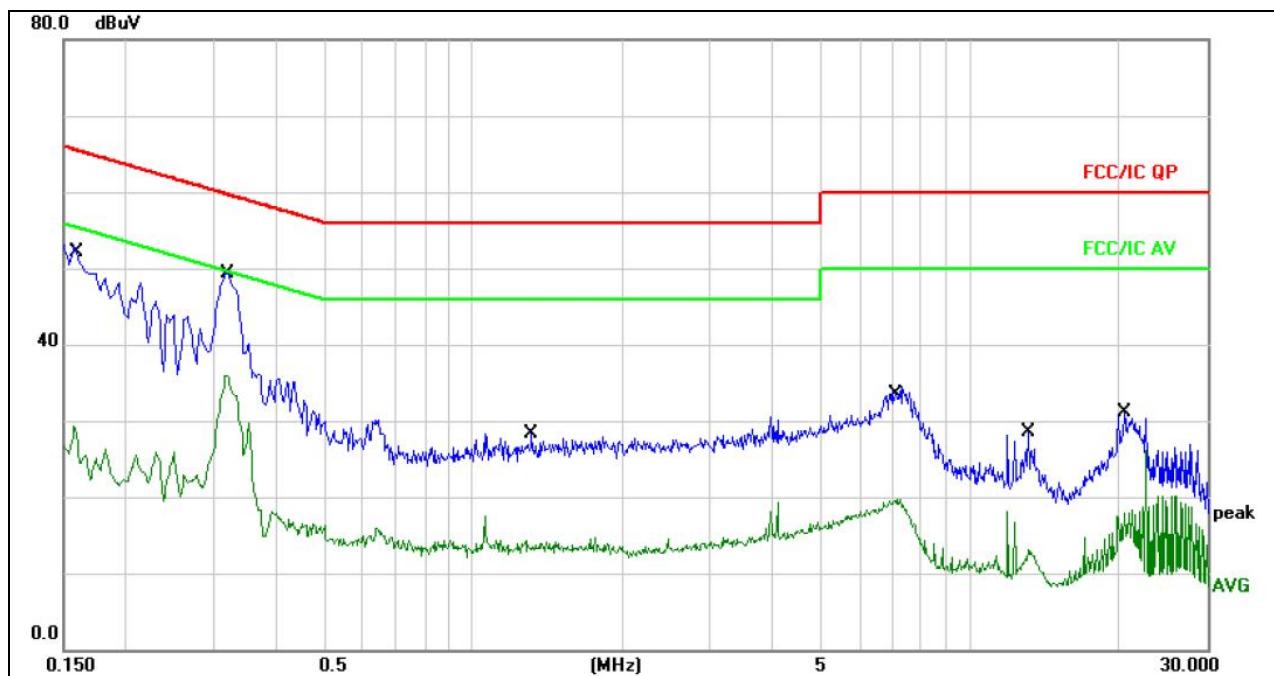
3.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.1.6 TEST RESULTS



Temperature :	25 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 4

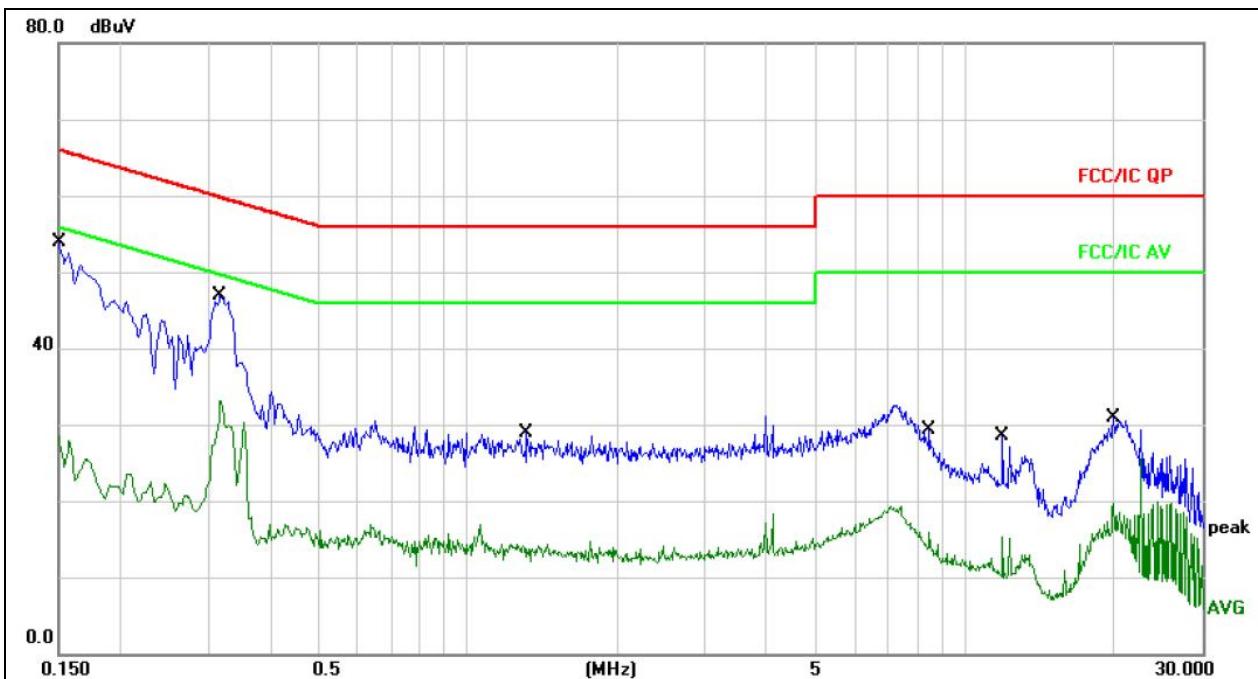
**Remark:**

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

No.	Mk.	Freq. MHz	Reading Level	Correct Factor	Measure- ment	Limit	Over	Comment
			dBuV	dB	dBuV	dB	Detector	
1		0.1607	39.75	10.05	49.80	65.42	-15.62	QP
2		0.1607	15.99	10.05	26.04	55.42	-29.38	AVG
3	*	0.3180	39.17	10.10	49.27	59.76	-10.49	QP
4		0.3180	25.75	10.10	35.85	49.76	-13.91	AVG
5		1.3099	18.18	10.17	28.35	56.00	-27.65	QP
6		1.3099	3.66	10.17	13.83	46.00	-32.17	AVG
7		7.1100	24.40	10.10	34.50	60.00	-25.50	QP
8		7.1100	9.60	10.10	19.70	50.00	-30.30	AVG
9		13.0900	18.40	10.14	28.54	60.00	-31.46	QP
10		13.0900	2.96	10.14	13.10	50.00	-36.90	AVG
11		20.4780	20.85	10.17	31.02	60.00	-28.98	QP
12		20.4780	7.73	10.17	17.90	50.00	-32.10	AVG



Temperature :	25 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 4

**Remark:**

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment Limit dBuV	Over dB	Detector	Comment
1	*	0.1500	43.82	10.05	53.87	65.99	-12.12	QP
2		0.1500	15.98	10.05	26.03	55.99	-29.96	AVG
3		0.3180	36.86	10.10	46.96	59.76	-12.80	QP
4		0.3180	23.08	10.10	33.18	49.76	-16.58	AVG
5		1.3099	18.79	10.17	28.96	56.00	-27.04	QP
6		1.3099	3.62	10.17	13.79	46.00	-32.21	AVG
7		8.4700	19.10	10.11	29.21	60.00	-30.79	QP
8		8.4700	3.95	10.11	14.06	50.00	-35.94	AVG
9		11.9100	18.34	10.13	28.47	60.00	-31.53	QP
10		11.9100	-0.20	10.13	9.93	50.00	-40.07	AVG
11		19.8500	20.73	10.17	30.90	60.00	-29.10	QP
12		19.8500	9.57	10.17	19.74	50.00	-30.26	AVG



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	25GHz
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

Below 1GHz test procedure as below:

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

- g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
- h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel

Note:

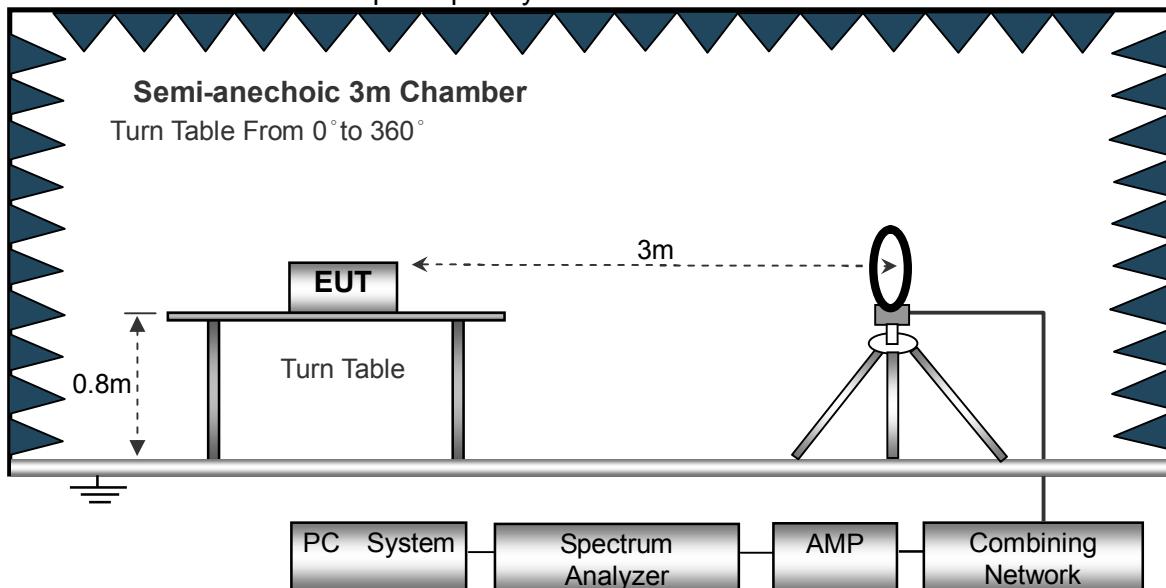
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

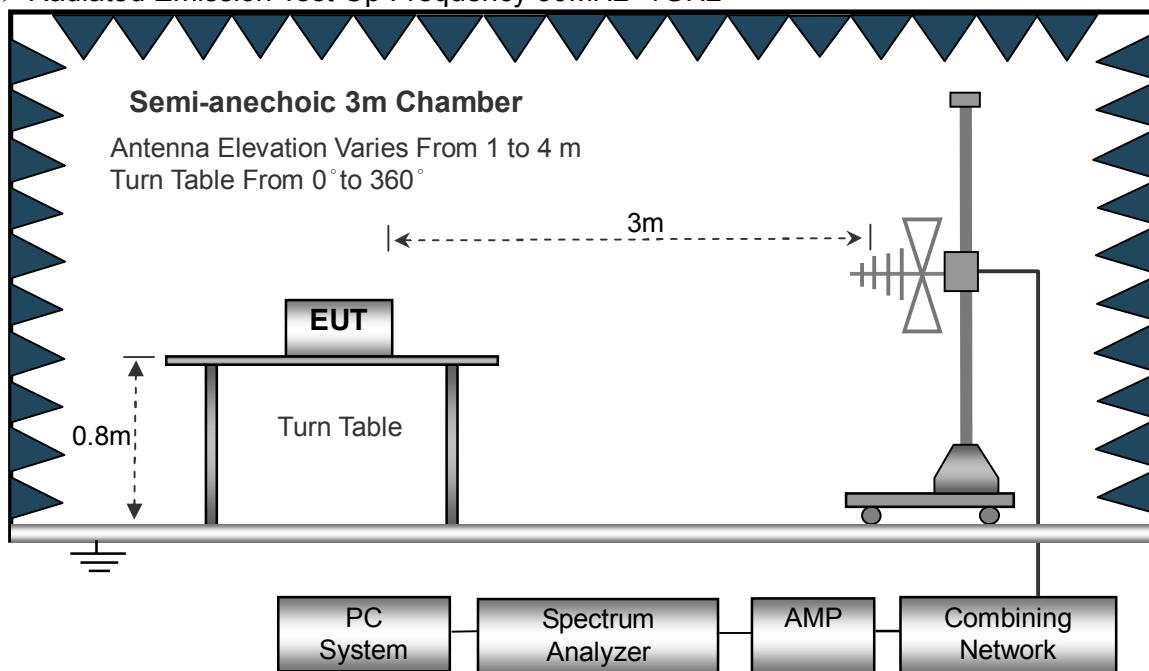
No deviation

3.2.4 TEST SETUP

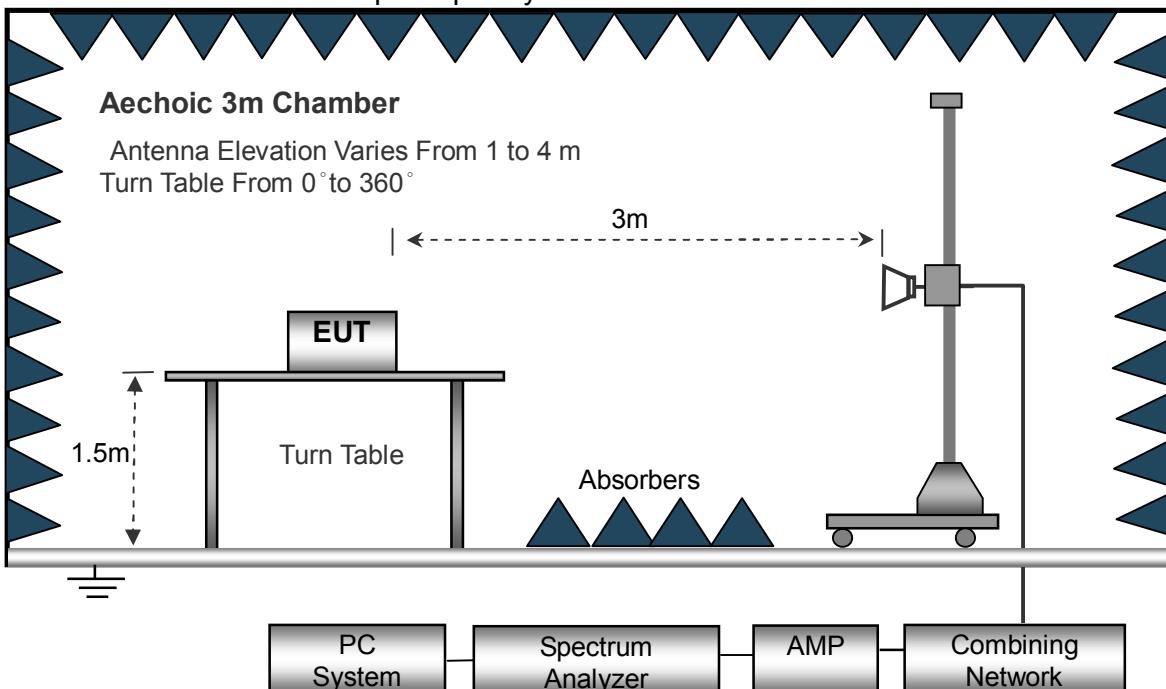
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)

Temperature:	20°C	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	DC 5V from PC input AC 120V/60Hz
Test Mode :	Mode 4	Polarization :	--

Freq. (MHz)	Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	State
--	--	--	--	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

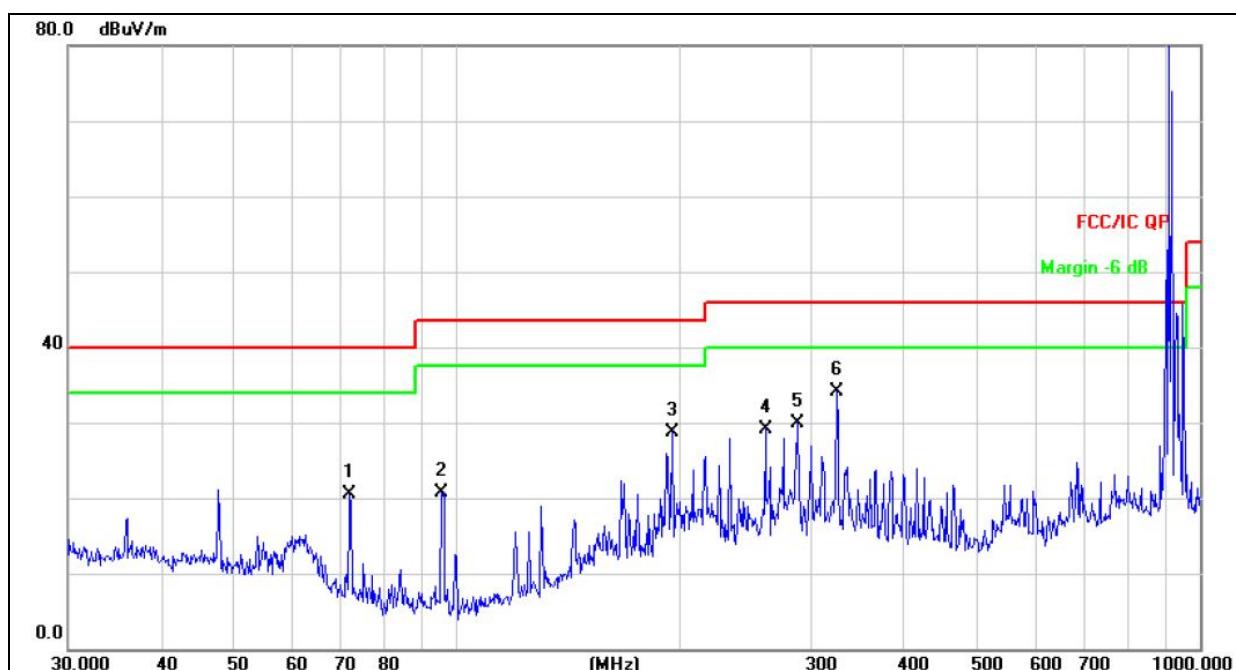
Distance extrapolation factor = $40 \log(\text{specific distance}/\text{test distance})$ (dB);

Limit line = specific limits(dBuV) + distance extrapolation factor.



3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

Temperature :	26°C	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Horizontal
Test Voltage :	DC 5V from PC input AC 120V/60Hz		
Test Mode :	Mode 4		



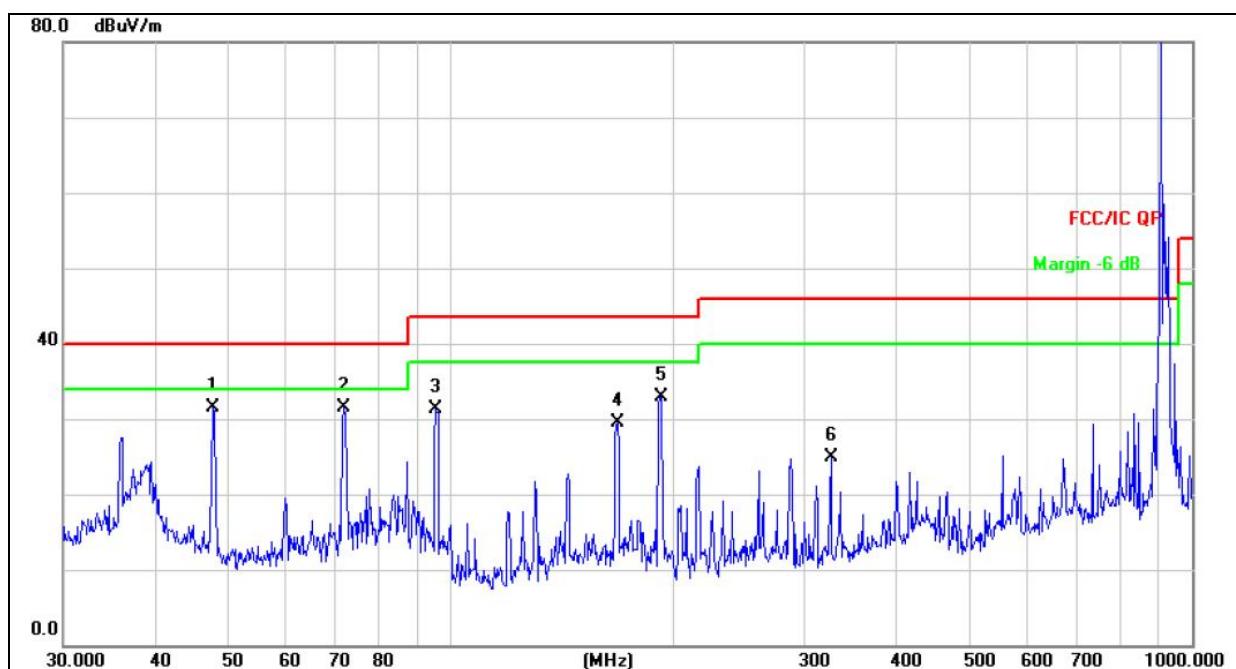
Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Over Detector
1		71.8320	35.73	-15.19	20.54	40.00	-19.46	QP
2		95.4270	37.76	-16.98	20.78	43.50	-22.72	QP
3		195.1365	44.64	-15.90	28.74	43.50	-14.76	QP
4		260.1444	43.11	-13.91	29.20	46.00	-16.80	QP
5		287.9904	42.81	-12.89	29.92	46.00	-16.08	QP
6	*	324.4561	46.03	-11.95	34.08	46.00	-11.92	QP



Temperature :	26°C	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Vertical
Test Voltage :	DC 5V from PC input AC 120V/60Hz		
Test Mode :	Mode 4		



Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Over Detector
1		47.8260	41.39	-9.94	31.45	40.00	-8.55	QP
2	*	71.8320	46.71	-15.19	31.52	40.00	-8.48	QP
3		95.4270	48.34	-16.98	31.36	43.50	-12.14	QP
4		167.8243	42.73	-13.32	29.41	43.50	-14.09	QP
5		192.4186	48.73	-15.73	33.00	43.50	-10.50	QP
6		325.5958	36.76	-11.92	24.84	46.00	-21.16	QP



3.2.8 TEST RESULTS (1GHZ~11GHZ)

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:902.75									
V	1805.50	64.23	33.75	5.38	20.46	56.32	74.00	-17.68	PK
V	1805.50	59.90	33.75	5.38	20.46	51.99	54.00	-2.01	AV
V	2708.25	62.68	34.45	6.61	21.57	56.41	74.00	-17.59	PK
V	2708.25	57.86	34.45	6.61	21.57	51.59	54.00	-2.41	AV
V	10308.00	54.73	36.29	9.16	24.57	52.17	74.00	-21.83	PK
H	1805.50	64.76	33.75	5.38	20.46	56.85	74.00	-17.15	PK
H	1805.50	60.15	33.75	5.38	20.46	52.24	54.00	-1.76	AV
H	2708.25	62.72	34.45	6.61	21.57	56.45	74.00	-17.55	PK
H	2708.25	58.16	34.45	6.61	21.57	51.89	54.00	-2.11	AV
H	10308.00	54.88	36.29	9.16	24.57	52.32	74.00	-21.68	PK
operation frequency:916.25									
V	1830.50	64.50	33.75	5.38	20.46	56.59	74.00	-17.41	PK
V	1830.50	60.37	33.75	5.38	20.46	52.46	54.00	-1.54	AV
V	2745.75	62.15	34.45	6.61	21.57	55.88	74.00	-18.12	PK
V	2745.75	59.11	34.45	6.61	21.57	52.84	54.00	-1.16	AV
V	10308.00	54.77	36.29	9.16	24.57	52.21	74.00	-21.79	PK
H	1830.50	64.15	33.75	5.38	20.46	56.24	74.00	-17.76	PK
H	1830.50	59.43	33.75	5.38	20.46	51.52	54.00	-2.48	AV
H	2745.75	62.37	34.45	6.61	21.57	56.10	74.00	-17.90	PK
H	2745.75	57.98	34.45	6.61	21.57	51.71	54.00	-2.29	AV
H	10308.00	54.92	36.29	9.16	24.57	52.36	74.00	-21.64	PK
operation frequency:927.25									
V	1854.50	63.27	33.88	5.42	20.57	55.38	74.00	-18.62	PK
V	1854.50	58.78	33.88	5.42	20.57	50.89	54.00	-3.11	AV
V	2781.75	62.28	34.61	6.68	21.69	56.04	74.00	-17.96	PK
V	2781.75	57.14	34.61	6.68	21.69	50.90	54.00	-3.10	AV
V	10308.00	54.76	36.29	9.16	24.57	52.20	74.00	-21.80	PK
H	1854.50	63.46	33.88	5.42	20.57	55.57	74.00	-18.43	PK
H	1854.50	58.94	33.88	5.42	20.57	51.05	54.00	-2.95	AV
H	2781.75	61.93	34.61	6.68	21.69	55.69	74.00	-18.31	PK
H	2781.75	57.84	34.61	6.68	21.69	51.60	54.00	-2.40	AV
H	10308.00	54.81	36.29	9.16	24.57	52.25	74.00	-21.75	PK

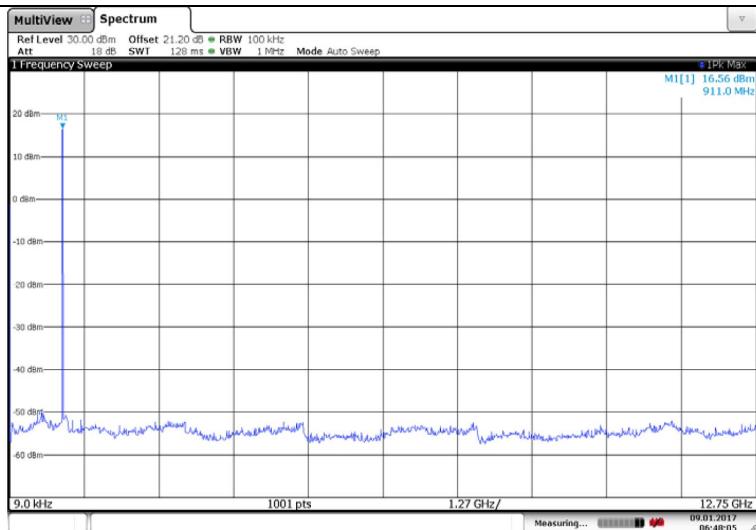
Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

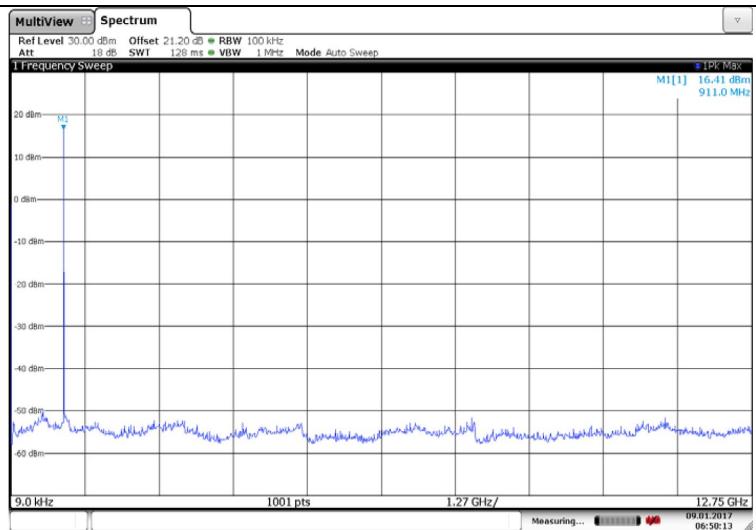


For Conducted

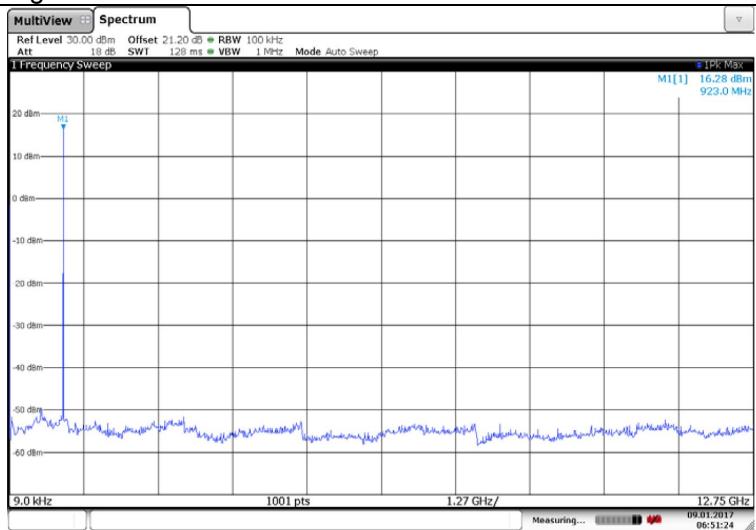
Lowest channel



Middle channel



Highest channel





3.3 RADIATED BAND EMISSION MEASUREMENT

3.3.1 TEST REQUIREMENT:

FCC Part15 C Section 15.209 and 15.205

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	2300MHz
Stop Frequency	2520
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

3.3.2 TEST PROCEDURE

Above 1GHz test procedure as below:

- a. 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the Highest channel

Note:

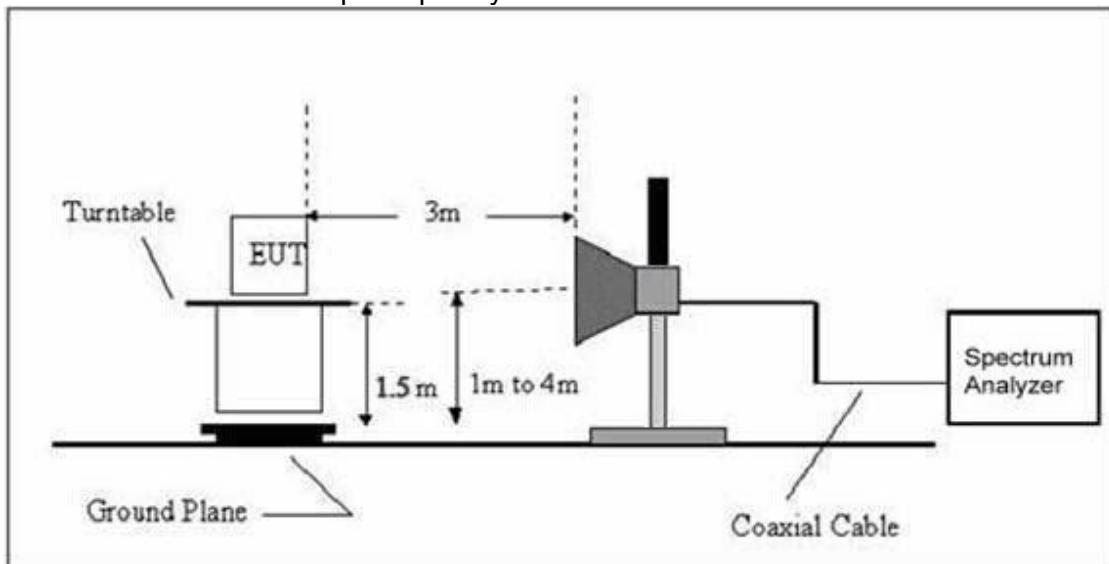
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



3.3.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



3.3.6 TEST RESULT

GFSK

902.75MHz

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		895.4500	38.37	-1.55	36.82	46.00	-9.18	QP
2		899.4500	40.70	-1.46	39.24	46.00	-6.76	QP
3		902.0000	27.15	-1.42	25.73	46.00	-20.27	QP
4		928.0000	35.52	-0.93	34.59	46.00	-11.41	QP
5	*	929.6000	42.20	-0.90	41.30	46.00	-4.70	QP
6	!	931.5500	41.95	-0.86	41.09	46.00	-4.91	QP

927.25MHz

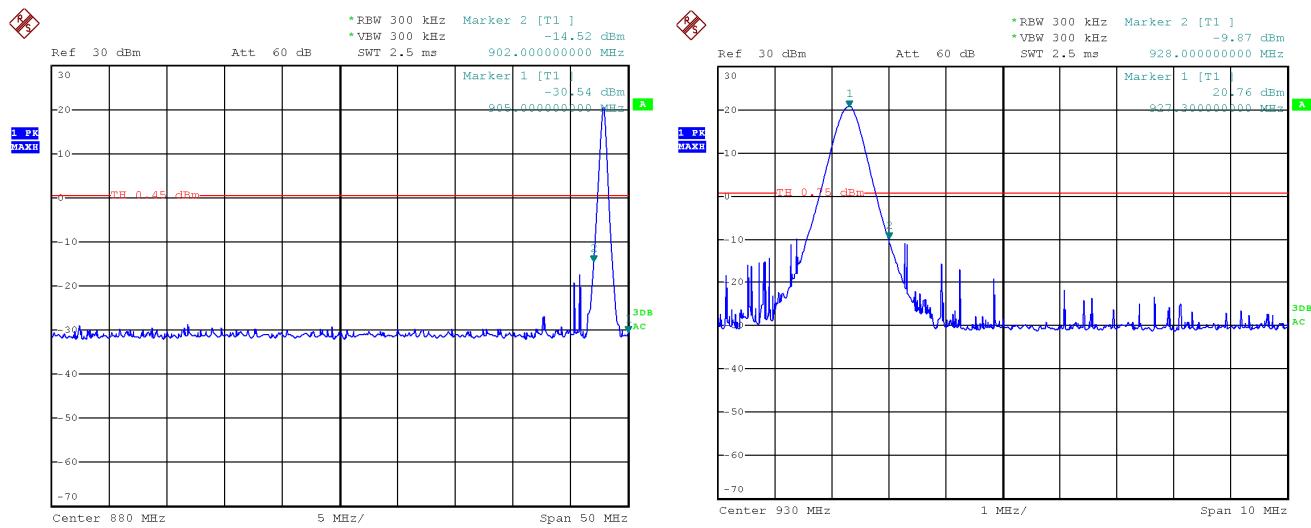
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	!	893.5500	43.02	-1.60	41.42	46.00	-4.58	QP
2	*	901.0000	43.38	-1.43	41.95	46.00	-4.05	QP
3	!	902.0000	41.77	-1.42	40.35	46.00	-5.65	QP
4		928.0000	39.24	-0.93	38.31	46.00	-7.69	QP
5		932.9500	40.17	-0.83	39.34	46.00	-6.66	QP
6	!	935.1500	41.21	-0.79	40.42	46.00	-5.58	QP

Remark:

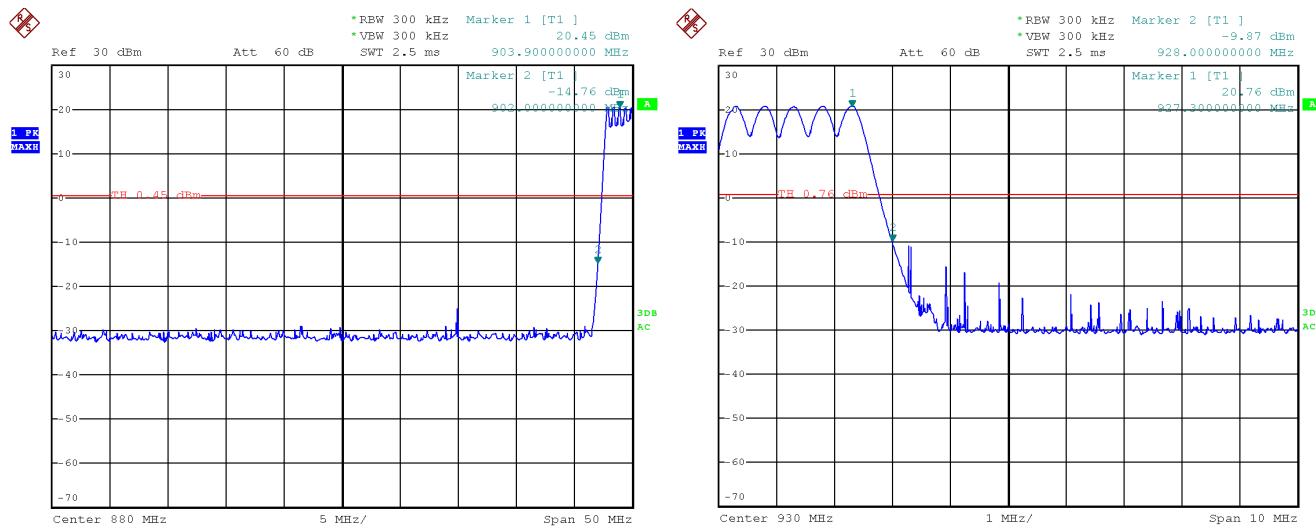
1. Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



For Conducted Unhopping GFSK



Hopping Mode





4. BANDWIDTH TEST

4.1 APPLIED PROCEDURES / LIMIT

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

4.1.1 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) \geq RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



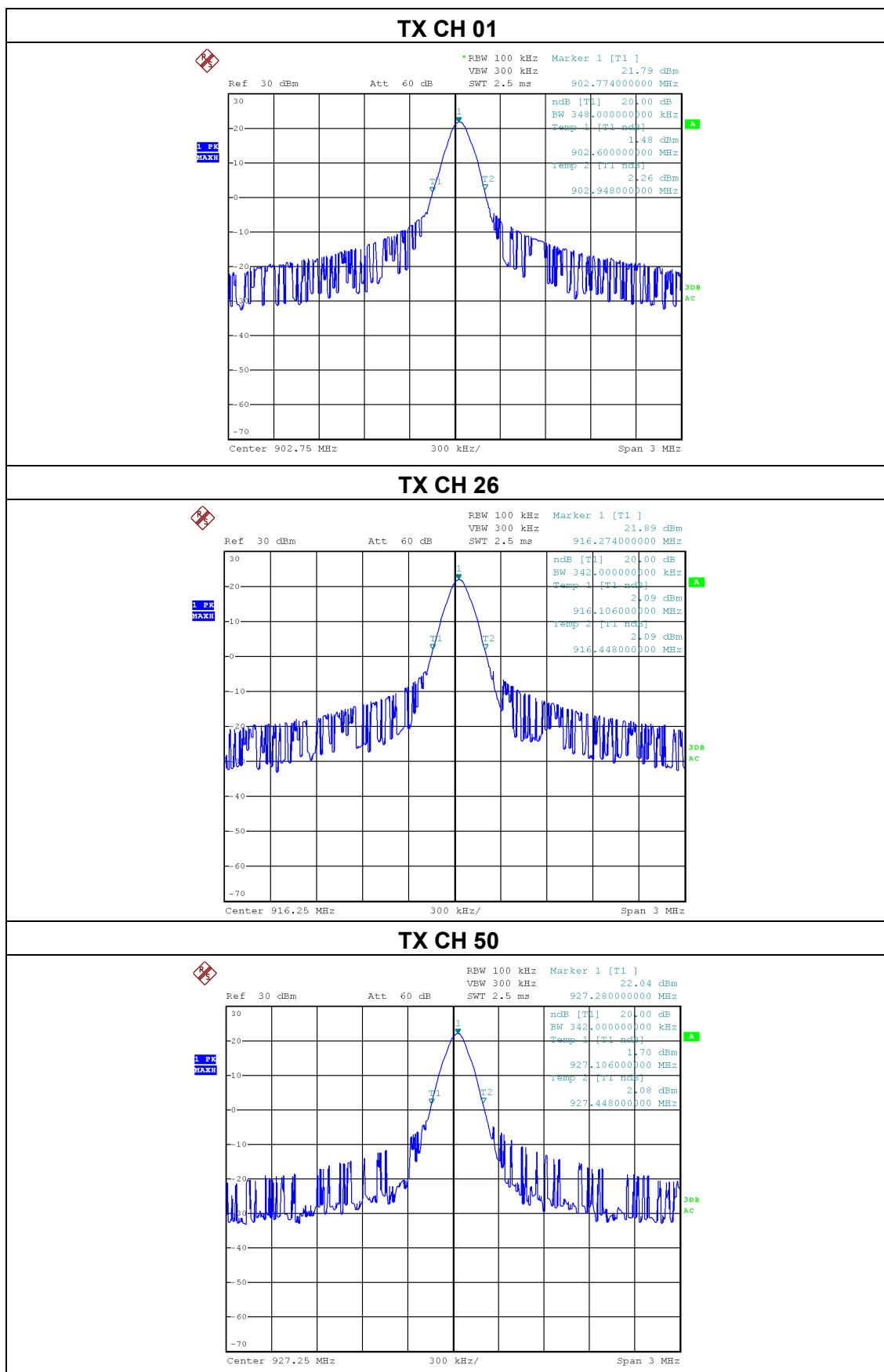
4.1.5 TEST RESULTS

Temperature :	25°C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 5V from PC input AC 120V/60Hz
Test Mode :	TX Mode /CH00, CH28, CH78		

	Frequency (MHz)	20dB Bandwidth (kHz)	Result
GFSK	902.75	348.00	Pass
	916.25	342.00	Pass
	927.25	342.00	Pass



GFSK





5. NUMBER OF HOPPING CHANNEL

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	≥25	902-928	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	= the frequency band of operation
RB	$RBW \geq 1\% \text{ of the span}$
VB	$VBW \geq RBW$
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 100KHz, VBW=3fere3rddrnryyt566tryiugmj00KHz, Sweep time = Auto.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

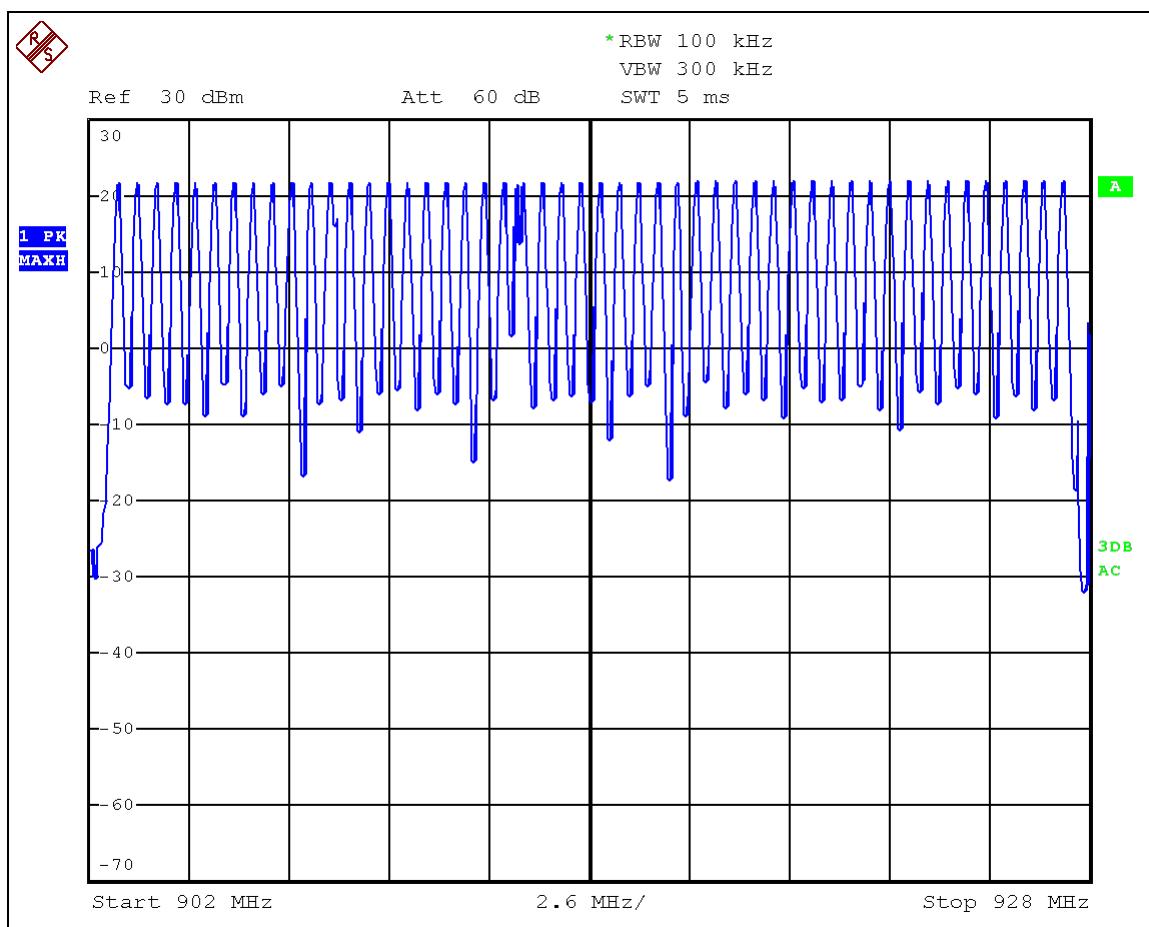
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 TEST RESULTS



Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	DC 5V from PC input AC 120V/60Hz
Test Mode :	Hopping Mode		

Number of Hopping Channel	Limit	Result
50	>25	PASS





6. AVERAGE TIME OF OCCUPANCY

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Average Time of Occupancy	0.4sec	902-928	PASS

6.1.1 TEST PROCEDURE

- a. The transmitter output (antenna port) was connected to the spectrum analyzer
- b. Set RBW of spectrum analyzer to 100KHz and VBW to 300KHz.
- c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
- d. Sweep Time is more than once pulse time.
- e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- f. Measure the maximum time duration of one single pulse.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

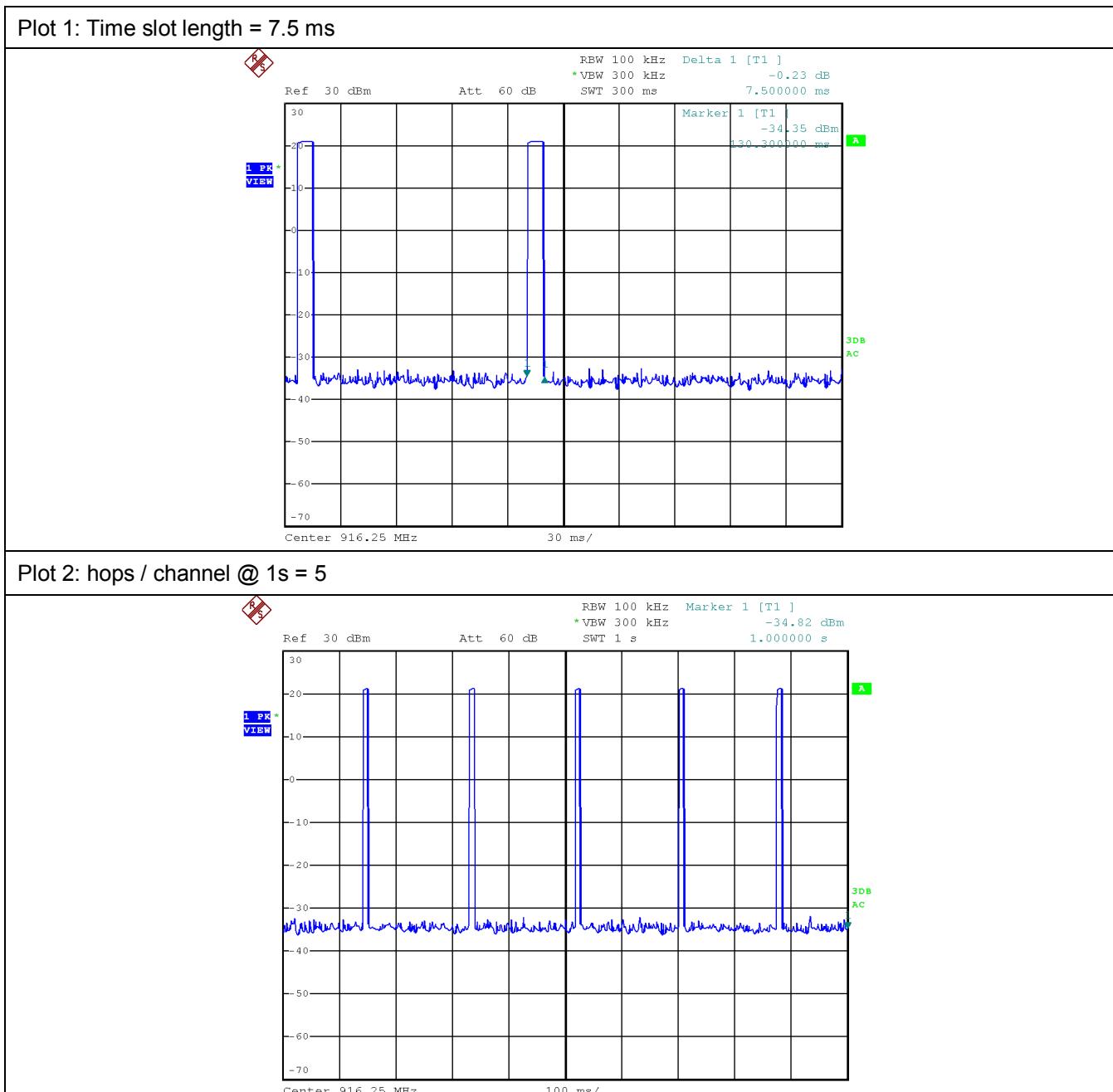


6.1.5 TEST RESULTS

Frequency	Dwell time(ms)	Limit(ms)	Result
916.25MHz	375.00	400	Pass

Within 10 s period, the average time of occupancy = $10 \text{ s} * 5 * 7.5 \text{ ms}$

The average time of occupancy = 375.00 ms





7. HOPPING CHANNEL SEPARATION MEASUREMENT

7.1 APPLIED PROCEDURES / LIMIT

Frequency hopping systems operating in the 902-928 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100 kHz (Channel Separation)
VB	300 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

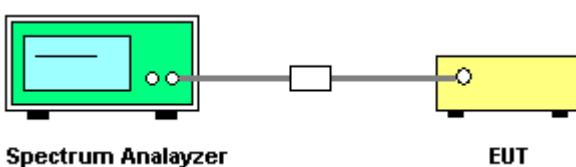
7.1.1 TEST PROCEDURE

- The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
- The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilised for channel separation measurement.

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

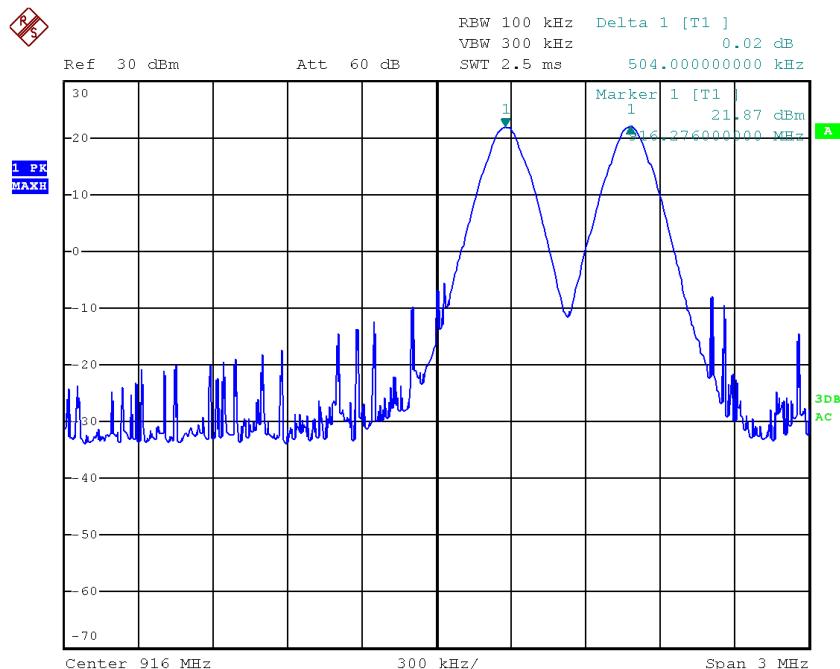


7.1.5 TEST RESULTS

Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 5V from PC input AC 120V/60Hz
Test Mode :	Tx Mode		

Test Mode	Ch. Separation (MHz)	Limit (MHz)	Result
TX	0.504	0.232	Complies

GFSK





8. PEAK OUTPUT POWER

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (b)(i)	Peak Output Power	30Bm or 20.96dBm	902-928	PASS

8.1.1 TEST PROCEDURE

- The EUT was directly connected to the Power meter

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.1.5 TEST RESULTS

Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 5V from PC input AC 120V/60Hz
Test Mode :	CH01/ CH28 /CH50		

Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)
CH00	902.75	23.35	30.00
CH28	916.25	23.32	30.00
CH78	927.25	23.33	30.00



9. ANTENNA REQUIREMENT

9.1 STANDARD REQUIREMENT

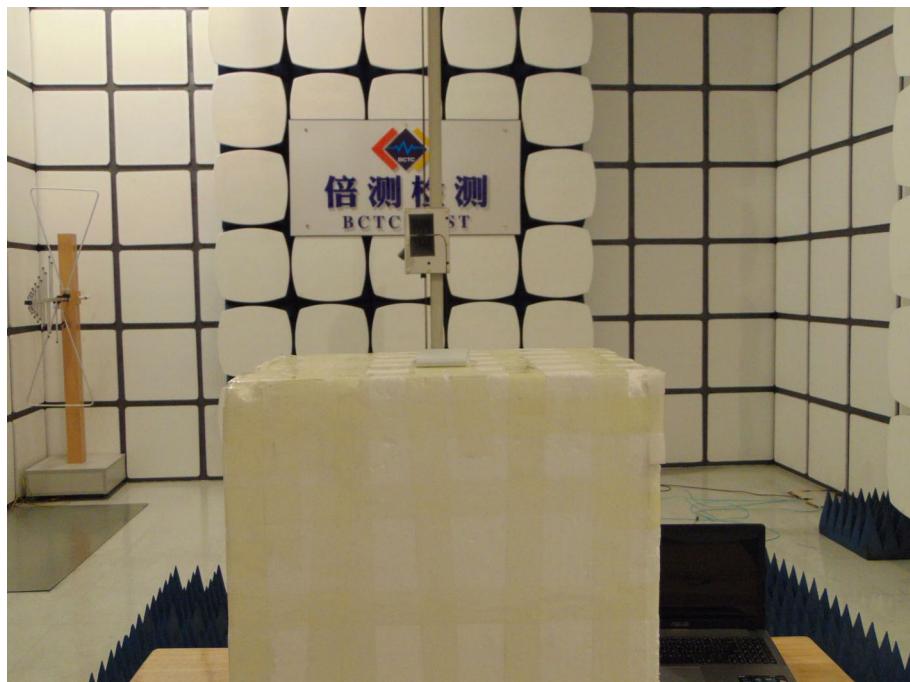
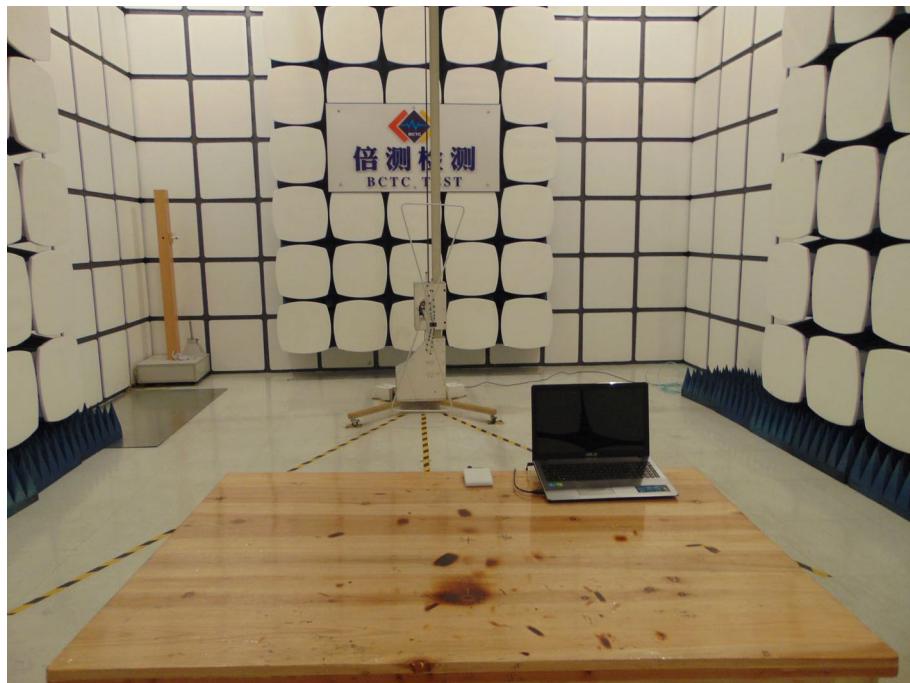
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

9.2 EUT ANTENNA

The EUT antenna is internal antenna,. It comply with the standard requirement.

10. TEST SEUUP PHOTO

Radiated Measurement Photos



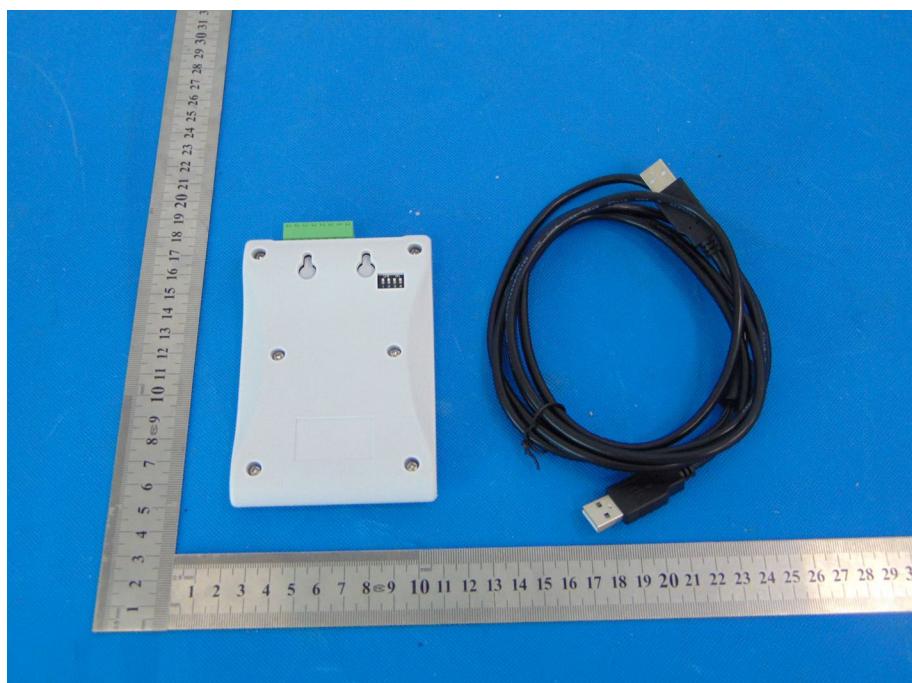
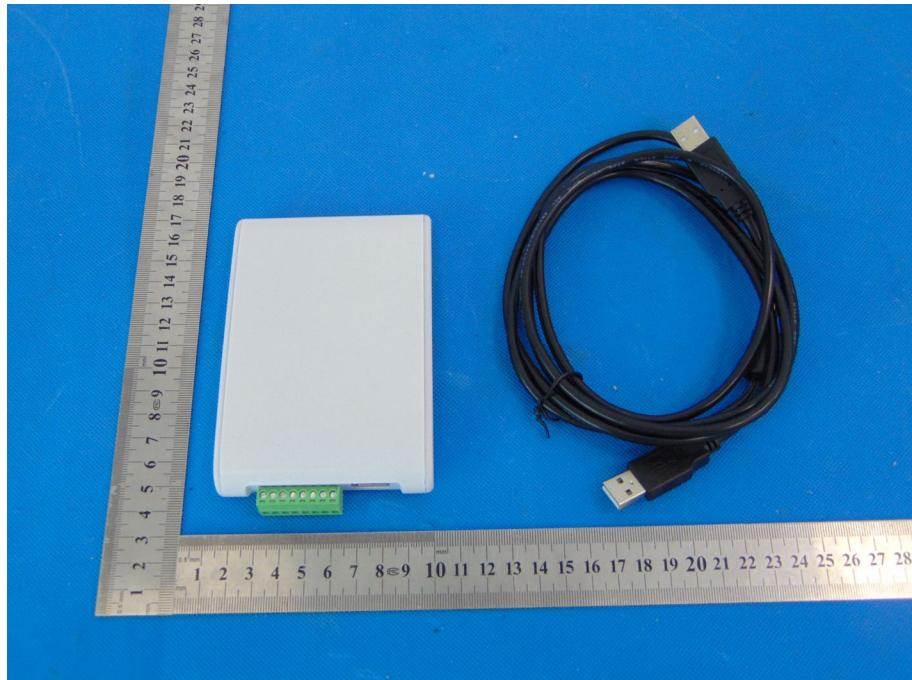


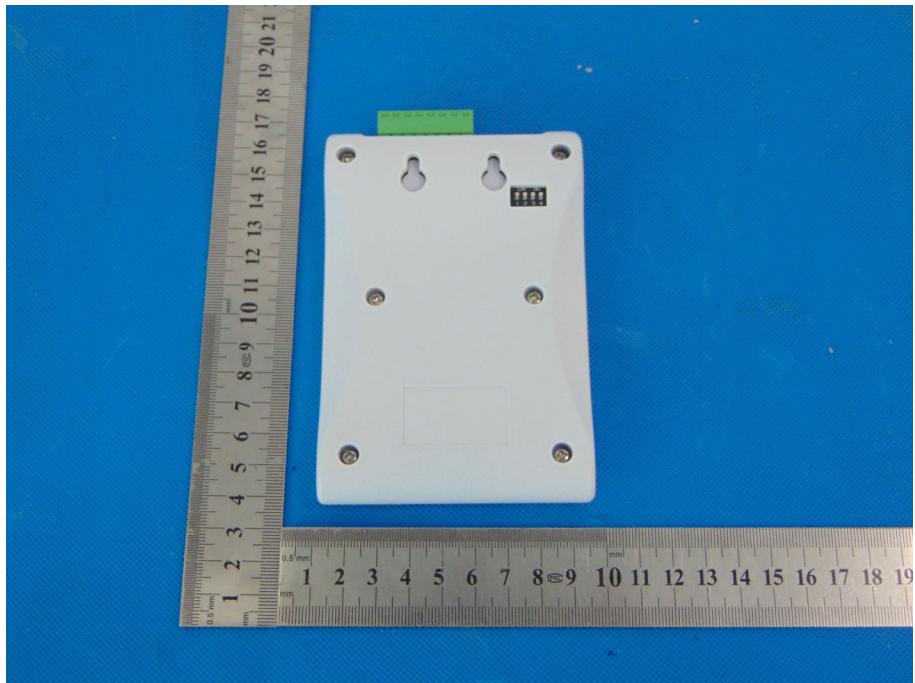
Conducted Measurement Photos

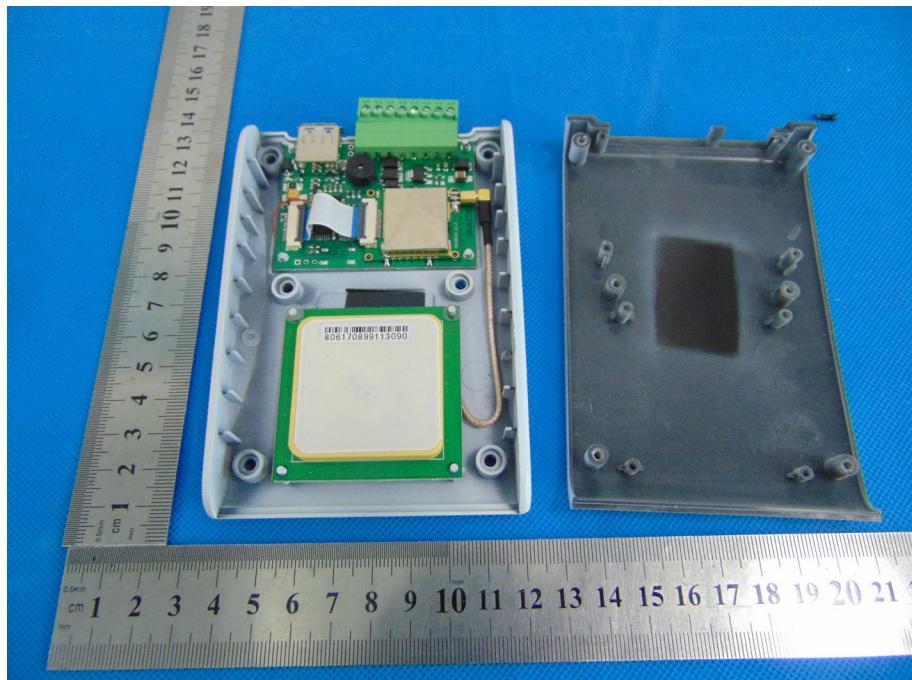




11. EUT PHOTO







***** END OF REPORT *****