FCC Part 15C Test Report

FCC ID: 2AL4QRU6401

Product Name:	UHF Card Reader
Trademark:	N/A
Model Name :	CF-RU6401 CF-RU5112, CF-RU5109, CF-RU5106, CF-RU5205, CF-RU5114, CF-RU5202, CF-RU5400, CF-RU5102, CF-RU5104, CF-RU5103, CF-H501, CF-RU5200, CF-RU6402, CF-RU5100, CF-RU6100, CF-RU5208, CF-RU5206, CF-RU6120, CF-RU5107, CF-RU5207, CF-RU5111, CF-RU5108,CF-H201, CF-RU5209, CF-RU6403
Prepared For :	SHENZHEN CHAFON TECHNOLOGY CO., LTD
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Test Date:	Apr. 19, 2017 – Apr. 28, 2017
Date of Report :	Apr. 28, 2017
Report No.:	BCTC-FY170402221E

TEST RESULT CERTIFICATION

Applicant's name ..... : SHENZHEN CHAFON TECHNOLOGY CO., LTD

Address ..... : Floor 4, Minde Building, Minde Road, Minzhi Street, Longhua, Shenzhen, China

Manufacture's Name ..... : SHENZHEN CHAFON TECHNOLOGY CO., LTD

Address ..... : Floor 4, Minde Building, Minde Road, Minzhi Street, Longhua, Shenzhen, China

Product description

Product name..... : UHF Card Reader

Trademark..... : N/A

Model and/or type reference : CF-RU6401
CF-RU5112, CF-RU5109, CF-RU5106, CF-RU5205, CF-RU5114, CF-RU5202, CF-RU5400, CF-RU5102, CF-RU5104, CF-RU5103, CF-H501, CF-RU5200, CF-RU6402, CF-RU5100, CF-RU6100, CF-RU5208, CF-RU5206, CF-RU6120, CF-RU5107, CF-RU5207, CF-RU5111, CF-RU5108,CF-H201, CF-RU5209, CF-RU6403

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

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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** ± **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	±1.38dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	UHF Card Reader
Trade Name	N/A
Model Name	CF-RU6401 CF-RU5112, CF-RU5109, CF-RU5106, CF-RU5205, CF-RU5114, CF-RU5202, CF-RU5400, CF-RU5102, CF-RU5104, CF-RU5103, CF-H501, CF-RU5200, CF-RU6402, CF-RU5100, CF-RU6100, CF-RU5208, CF-RU5206, CF-RU6120, CF-RU5107, CF-RU5207, CF-RU5111, CF-RU5108,CF-H201, CF-RU5209, CF-RU6403
Model Difference	The product's different for model name and outlook color.
Product Description	The EUT is a Bluetooth Speaker Operation Frequency: 902.75-927.25MHz Modulation Type: FHSS(GFSK) Number Of Channel 50CH Antenna type: internal antenna Antenna Gain (dBi) 0dBi 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	
Mode 2	CH25	
Mode 3	CH50	
Mode 4	Link Mode	
For Conducted & Radiated Emission		
Final Test Mode	Description	
Mode 1	CH01	
Mode 2	CH25	
Mode 3	CH50	
Mode 4	Link Mode	

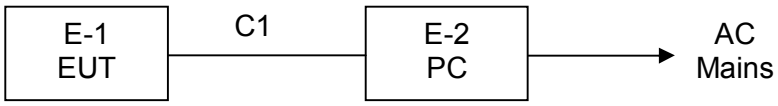
Note:

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

(2) Directional Gain=0dBi+10log(4)=6.0dBi

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	UHF Card Reader	N/A	CF-RU6401	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, Band-edge test and 6db bandwidth test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4407B	MY45108040	2016.08.27	2017.08.26
2	Test Receiver (9kHz-7GHz)	R&S	ESPI	101318	2016.08.27	2017.08.26
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB 9168	VULB91 68-438	2016.08.27	2017.08.26
4	Horn Antenna (1GHz-18GHz)	SCHWARZBECK	BBHA9120D	1201	2016.09.03	2017.09.03
5	Horn Antenna (14GHz-40GHz)	SCHWARZBECK	BBHA 9170	9170-181	2016.09.03	2017.09.03
6	Amplifier (9KHz-6GHz)	SCHWARZBECK	BBV9744	9744-0037	2016.08.27	2017.08.26
7	Amplifier (1GHz-18GHz)	SCHWARZBECK	BBV9718	9718-309	2016.08.27	2017.08.26
8	Amplifier (18GHz-40GHz)	SCHWARZBECK	BBV 9721	9721-205	2016.08.27	2017.08.26
9	Loop Antenna (9KHz-30MHz)	SCHWARZBECK	FMZB1519B	00014	2016.09.03	2017.09.03
10	RF cables1 (9kHz-1GHz)	R&S	R203	R20X	2016.08.27	2017.08.26
11	RF cables2 (1GHz-40GHz)	R&S	R204	R21X	2016.08.27	2017.08.26
12	Antenna connector	Florida RF Labs	N/A	RF 01#	2016.08.27	2017.08.26
13	Power Metter	ANRITSU	ML2487A	6K00001568	2016.08.27	2017.08.26
14	Power Sensor (AV)	ANRITSU	ML2491A	030989	2016.08.27	2017.08.26
15	Signal Analyzer 9kHz-26.5GHz	Agilent	N9010A	MY48030494	2016.08.27	2017.08.26
16	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	2016.08.27	2017.08.26
17	D.C. Power Supply	LongWei	PS-305D	010964729	2016.08.27	2017.08.26

Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Test Receiver	R&S	ESCI	1166.5950K03-1 01165-ha	2016.08.27	2017.08.26
2	LISN	SCHWARZBECK	NSLK8127	8127739	2016.08.27	2017.08.26
3	LISN	R&S	NSLK8126	8126487	2016.08.27	2017.08.26
4	RF cables	R&S	R204	R20X	2016.08.27	2017.08.26
5	Attenuator	R&S	ESH3-Z2	143206	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.

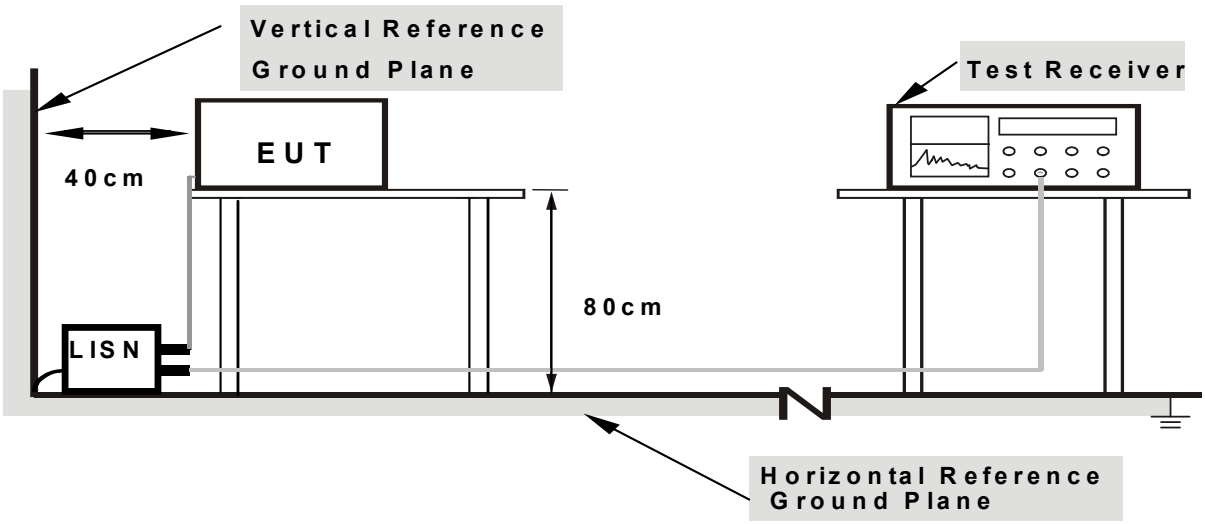
d. LISN at least 80 cm from nearest part of EUT chassis.

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



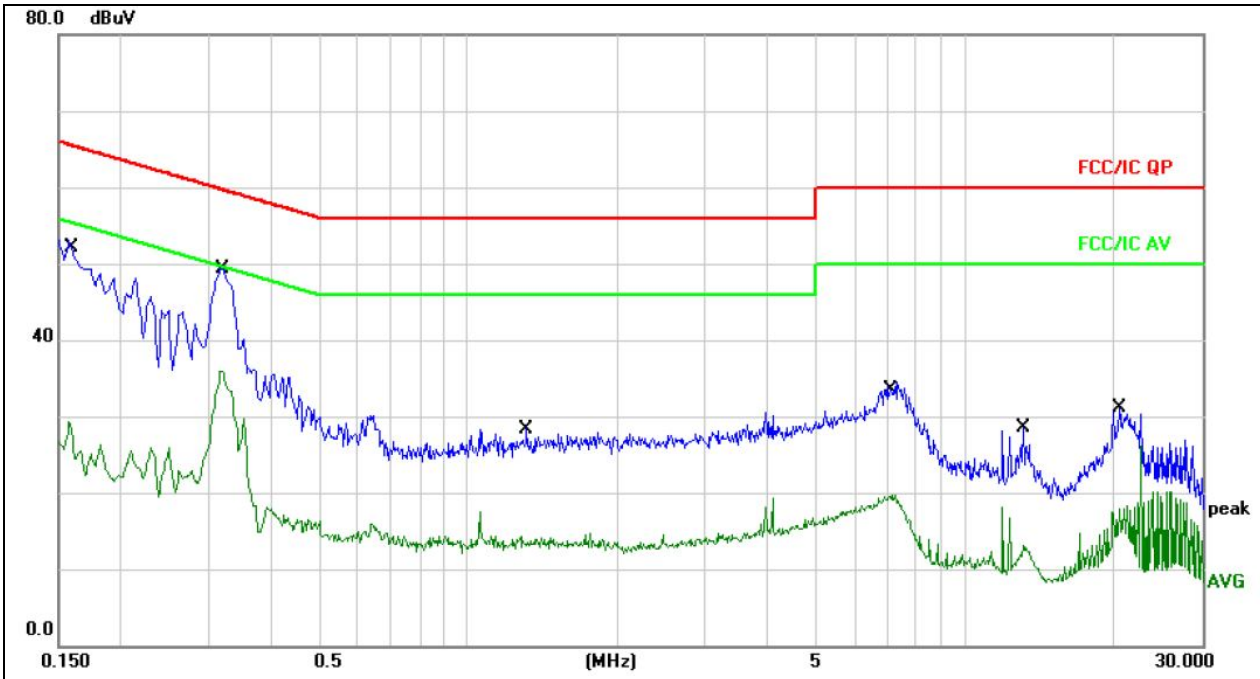
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

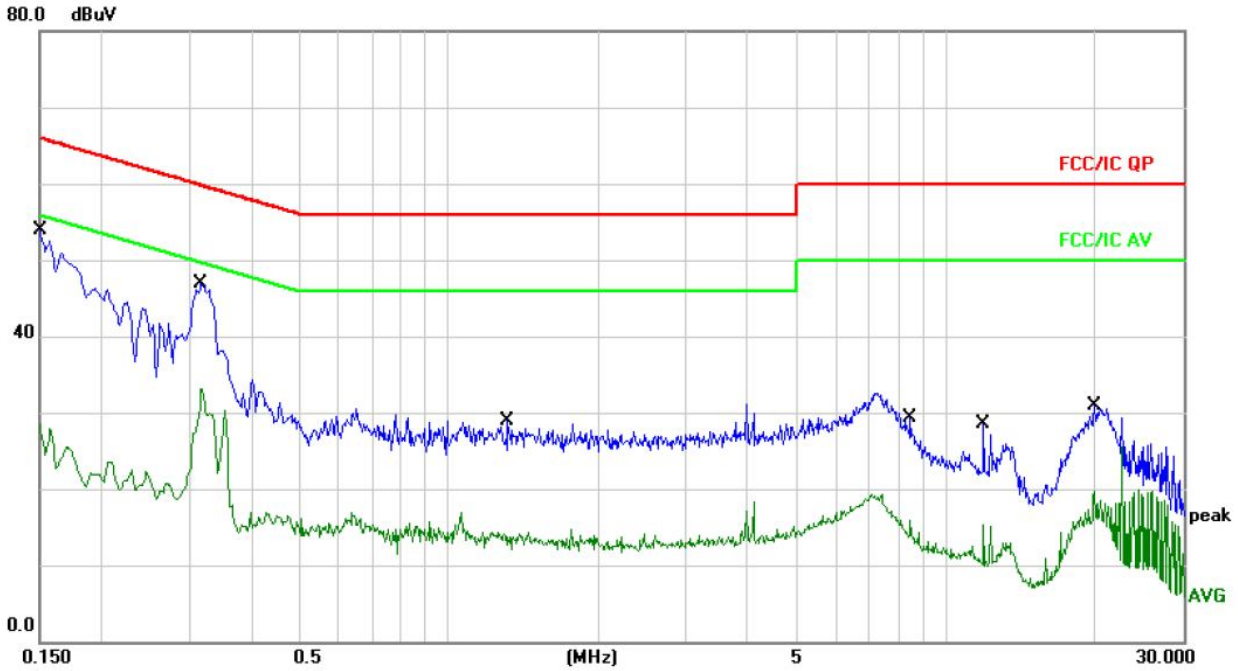
Temperature：	25 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	AC 120V/60Hz	Test Mode：	Mode 4



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

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
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 ℃	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.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	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 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 (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:

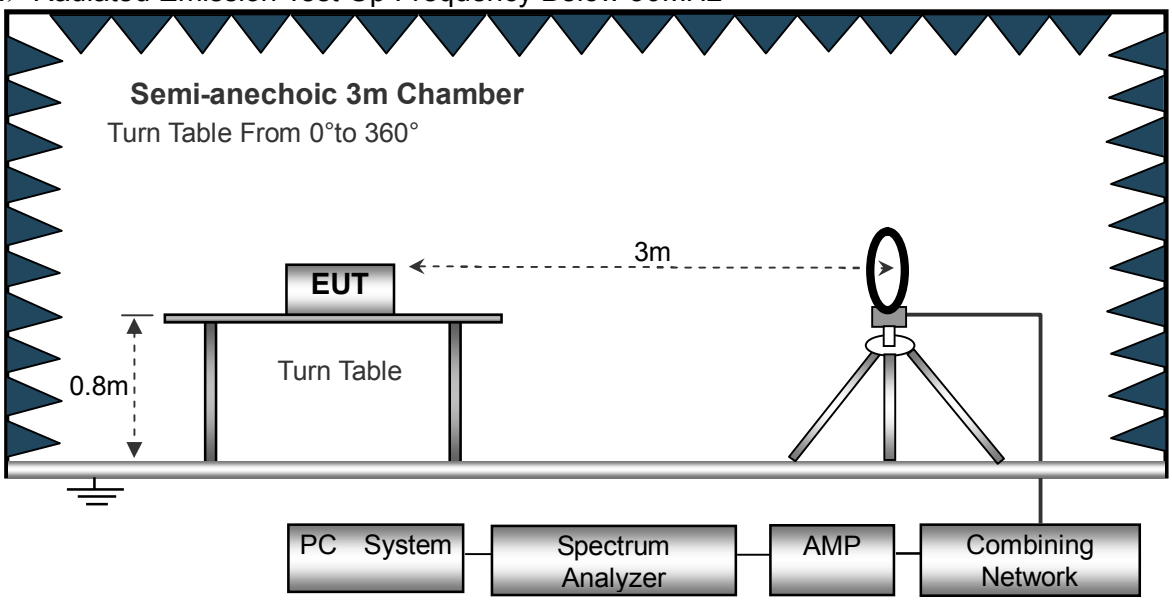
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

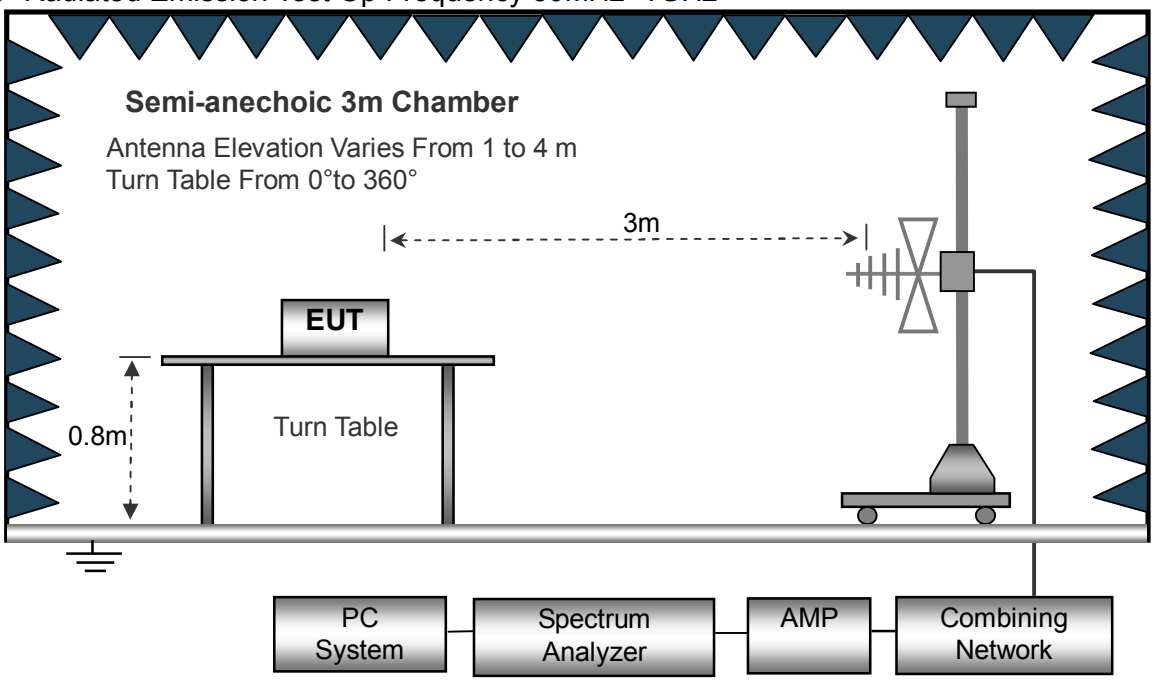
No deviation

3.2.4 TEST SETUP

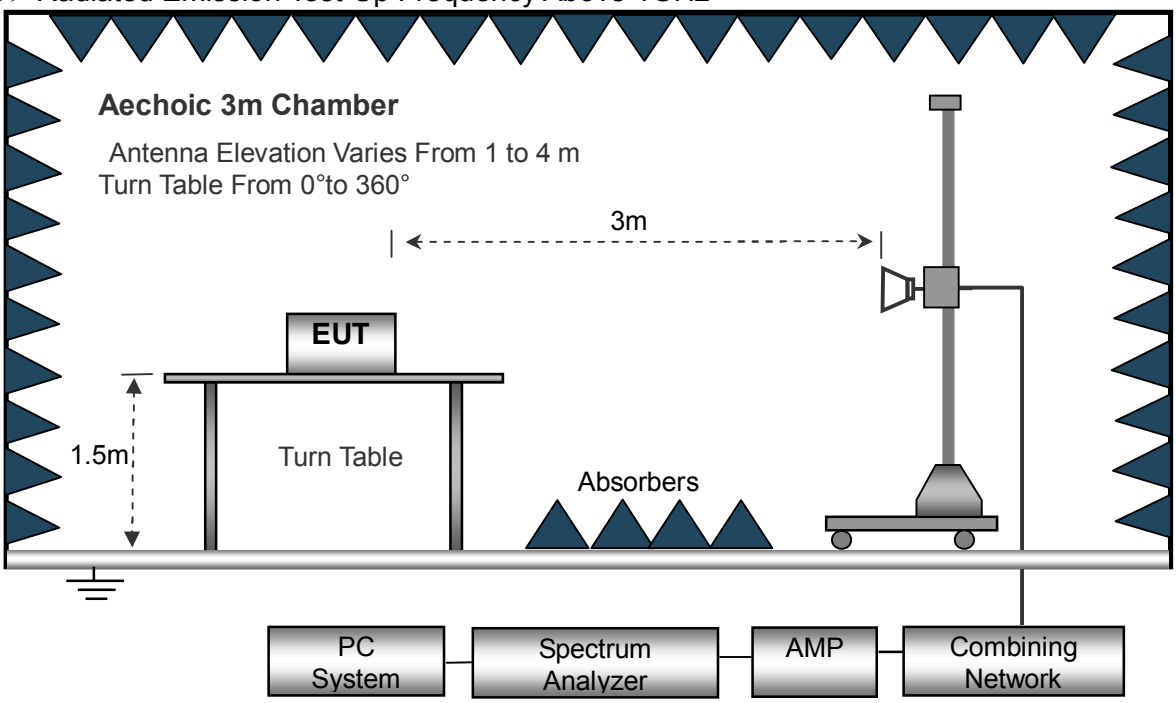
（A）Radiated Emission Test-Up Frequency Below 30MHz



（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℃	Relative Humidtity:	48%
Pressure:	1010 hPa	Test Voltage :	DC 9V from adapter input AC 120V/60Hz
Test Mode :	Mode 4	Polarization :	--

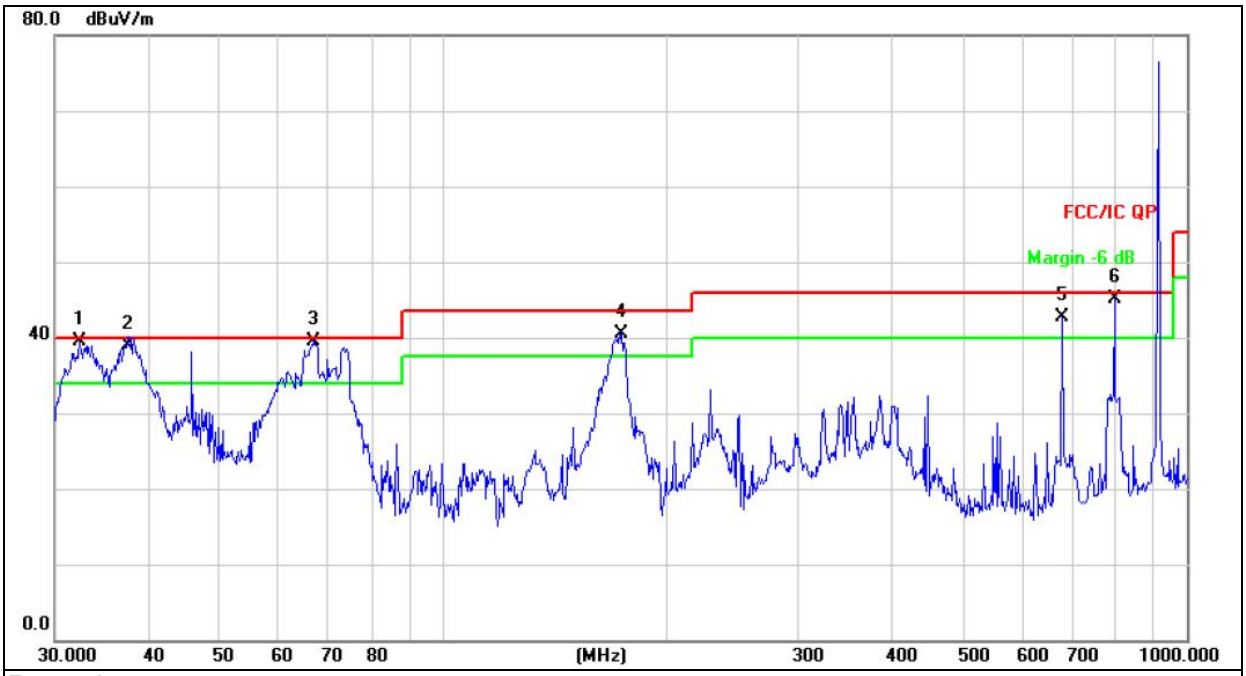
Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

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 (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

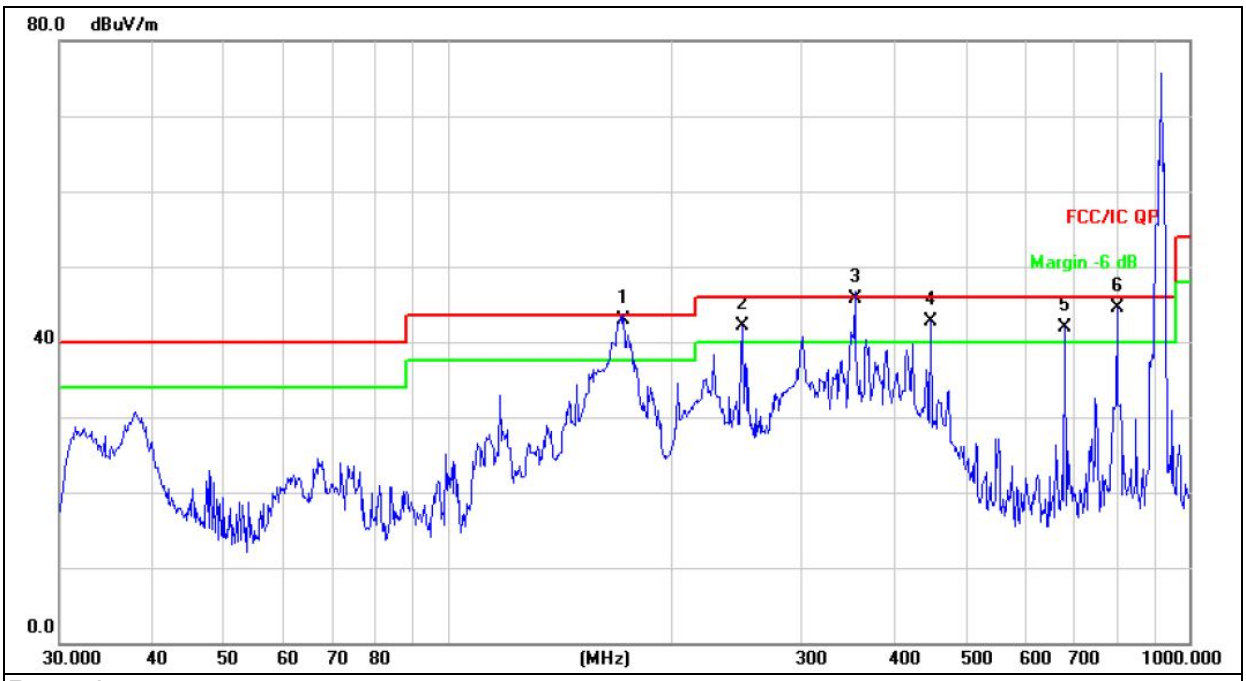
Temperature :	26℃	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Horizontal
Test Voltage :	DC 9V from adapter input AC 120V/60Hz		
Test Mode :	Mode 4		



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

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	32.4059	47.81	-8.36	39.45	40.00	-0.55	QP
2	!	37.6798	47.65	-8.74	38.91	40.00	-1.09	QP
3	!	66.9669	52.76	-13.32	39.44	40.00	-0.56	QP
4	!	173.8135	54.29	-13.79	40.50	43.50	-3.00	QP
5	!	679.9600	47.48	-4.69	42.79	46.00	-3.21	QP
6	!	798.9796	47.56	-2.52	45.04	46.00	-0.96	QP

Temperature :	26℃	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Vertical
Test Voltage :	DC 9V from adapter input AC 120V/60Hz		
Test Mode :	Mode 4		



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

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	!	172.5988	56.65	-13.68	42.97	43.50	-0.53	QP
2	!	250.3011	56.25	-14.19	42.06	46.00	-3.94	QP
3	*	354.1831	57.00	-11.31	45.69	46.00	-0.31	QP
4	!	447.9821	51.73	-9.06	42.67	46.00	-3.33	QP
5	!	679.9600	46.64	-4.69	41.95	46.00	-4.05	QP
6	!	798.9796	47.05	-2.52	44.53	46.00	-1.47	QP

3.2.8 TEST RESULTS (1GHZ~11GHZ)

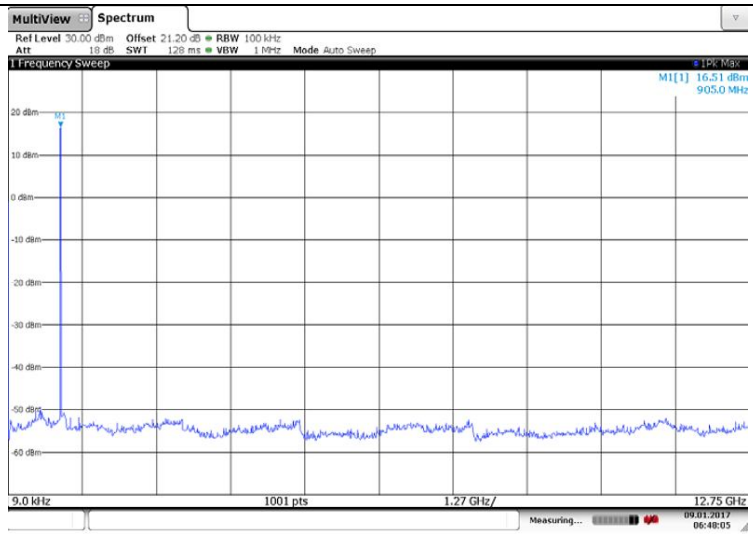
Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:902.75									
V	1805.50	64.40	33.75	5.38	20.46	56.49	74.00	-17.51	PK
V	1805.50	60.06	33.75	5.38	20.46	52.15	54.00	-1.85	AV
V	2708.25	62.85	34.45	6.61	21.57	56.58	74.00	-17.42	PK
V	2708.25	58.02	34.45	6.61	21.57	51.75	54.00	-2.25	AV
V	10308.00	54.88	36.29	9.16	24.57	52.32	74.00	-21.68	PK
H	1805.50	64.93	33.75	5.38	20.46	57.02	74.00	-16.98	PK
H	1805.50	60.31	33.75	5.38	20.46	52.40	54.00	-1.60	AV
H	2708.25	62.89	34.45	6.61	21.57	56.62	74.00	-17.38	PK
H	2708.25	58.32	34.45	6.61	21.57	52.05	54.00	-1.95	AV
H	10308.00	55.03	36.29	9.16	24.57	52.47	74.00	-21.53	PK
operation frequency:914.75									
V	1829.50	64.67	33.75	5.38	20.46	56.76	74.00	-17.24	PK
V	1829.50	60.53	33.75	5.38	20.46	52.62	54.00	-1.38	AV
V	2744.25	62.32	34.45	6.61	21.57	56.05	74.00	-17.95	PK
V	2744.25	59.27	34.45	6.61	21.57	53.00	54.00	-1.00	AV
V	10308.00	54.92	36.29	9.16	24.57	52.36	74.00	-21.64	PK
H	1829.50	64.32	33.75	5.38	20.46	56.41	74.00	-17.59	PK
H	1829.50	59.59	33.75	5.38	20.46	51.68	54.00	-2.32	AV
H	2744.25	62.54	34.45	6.61	21.57	56.27	74.00	-17.73	PK
H	2744.25	58.14	34.45	6.61	21.57	51.87	54.00	-2.13	AV
H	10308.00	55.07	36.29	9.16	24.57	52.51	74.00	-21.49	PK
operation frequency:927.25									
V	1854.50	63.44	33.88	5.42	20.57	55.55	74.00	-18.45	PK
V	1854.50	58.94	33.88	5.42	20.57	51.05	54.00	-2.95	AV
V	2781.75	62.45	34.61	6.68	21.69	56.21	74.00	-17.79	PK
V	2781.75	57.29	34.61	6.68	21.69	51.05	54.00	-2.95	AV
V	10308.00	54.91	36.29	9.16	24.57	52.35	74.00	-21.65	PK
H	1854.50	63.63	33.88	5.42	20.57	55.74	74.00	-18.26	PK
H	1854.50	59.10	33.88	5.42	20.57	51.21	54.00	-2.79	AV
H	2781.75	62.10	34.61	6.68	21.69	55.86	74.00	-18.14	PK
H	2781.75	58.00	34.61	6.68	21.69	51.76	54.00	-2.24	AV
H	10308.00	54.96	36.29	9.16	24.57	52.40	74.00	-21.60	PK

Remark:

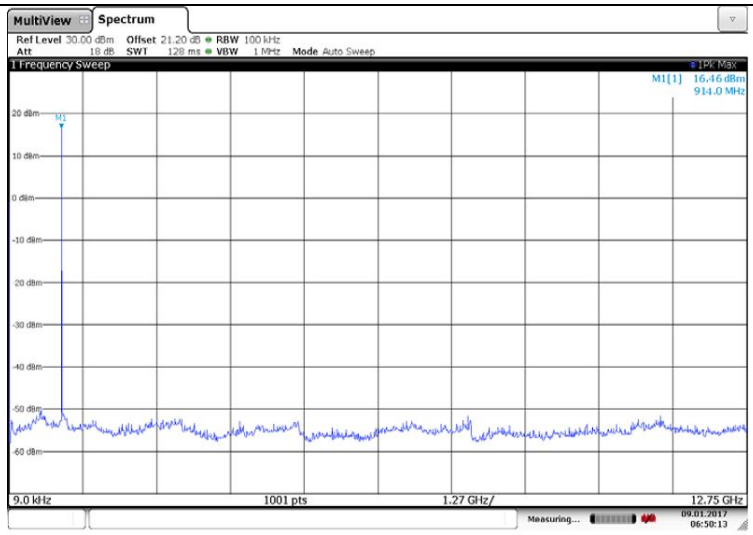
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to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

For Conducted

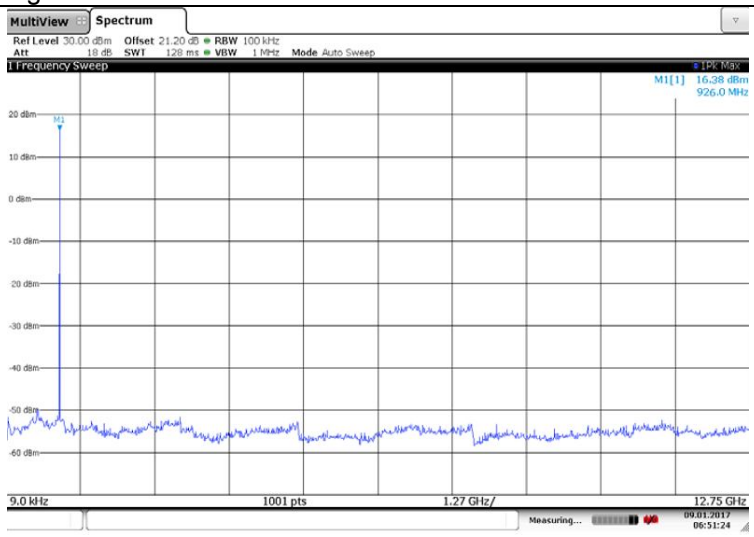
Lowest channel



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:

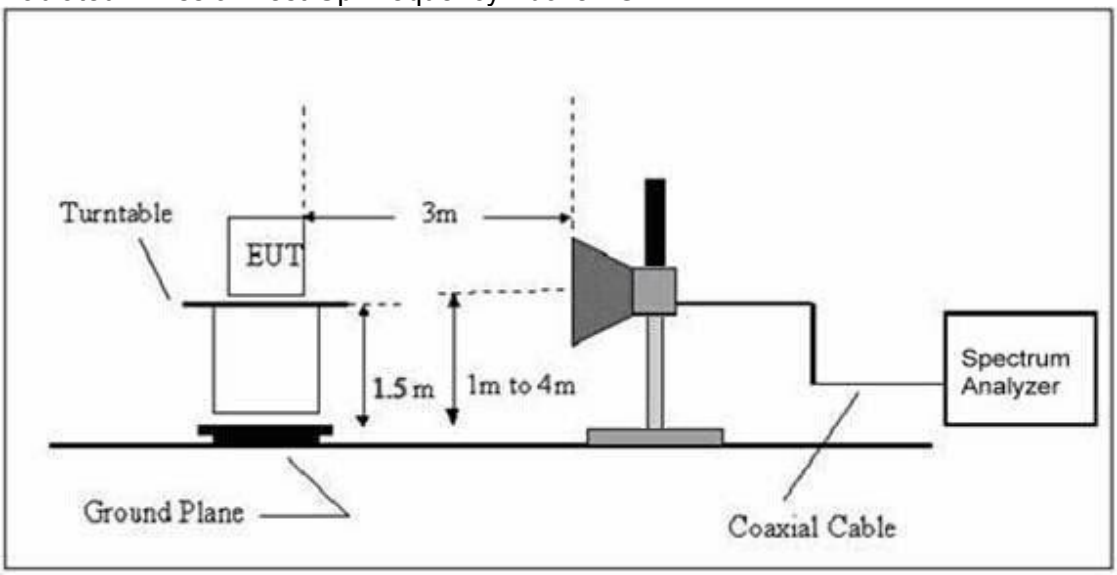
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

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

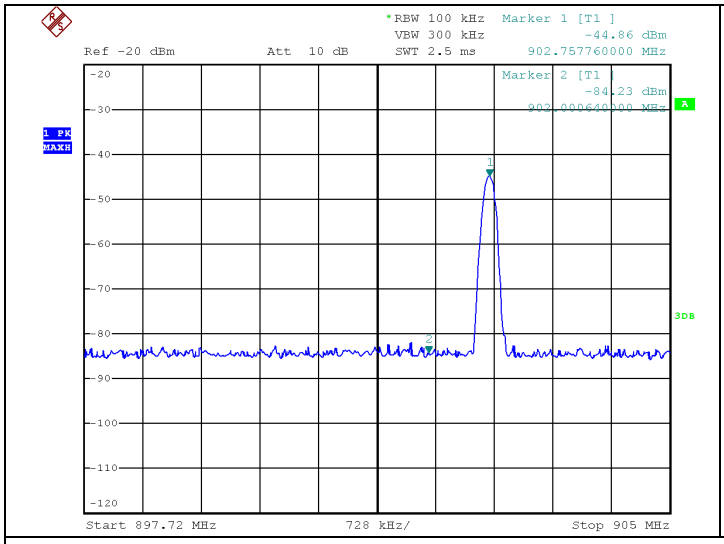
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	!	893.5500	43.02	-1.60	41.42	46.00	-4.58	QP
2	*	901.0000	43.38	-1.43	41.95	46.00	-4.05	QP
3	!	902.0000	41.77	-1.42	40.35	46.00	-5.65	QP
4		928.0000	39.24	-0.93	38.31	46.00	-7.69	QP
5		932.9500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

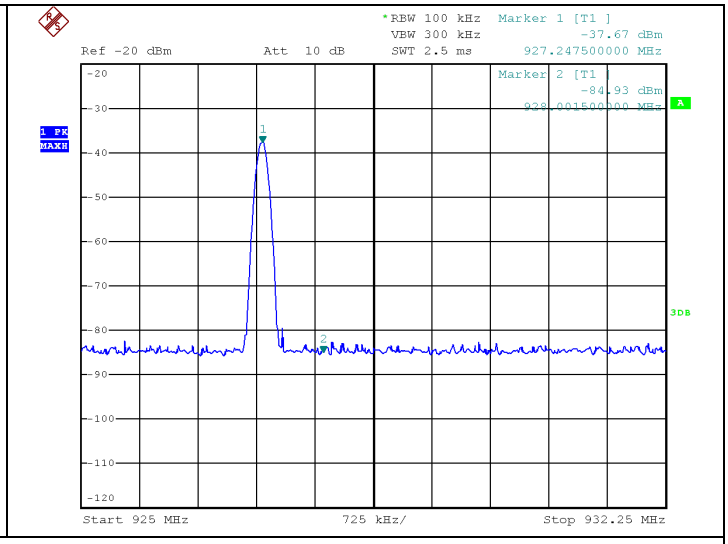
Remark:

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.

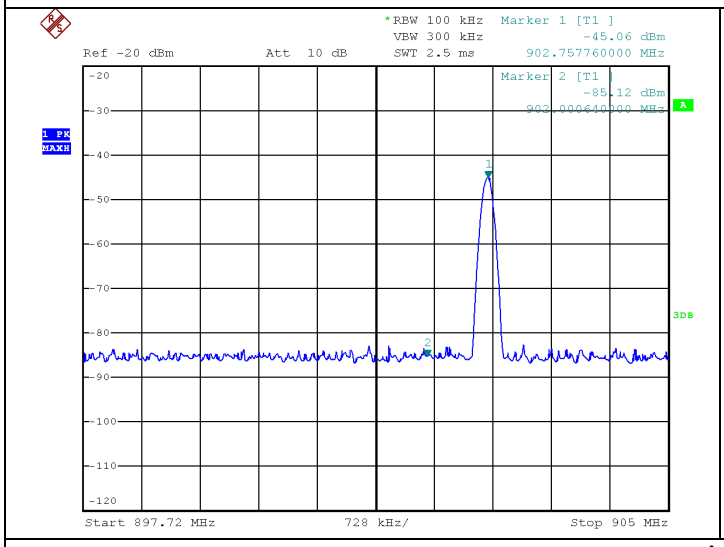
For Conducted

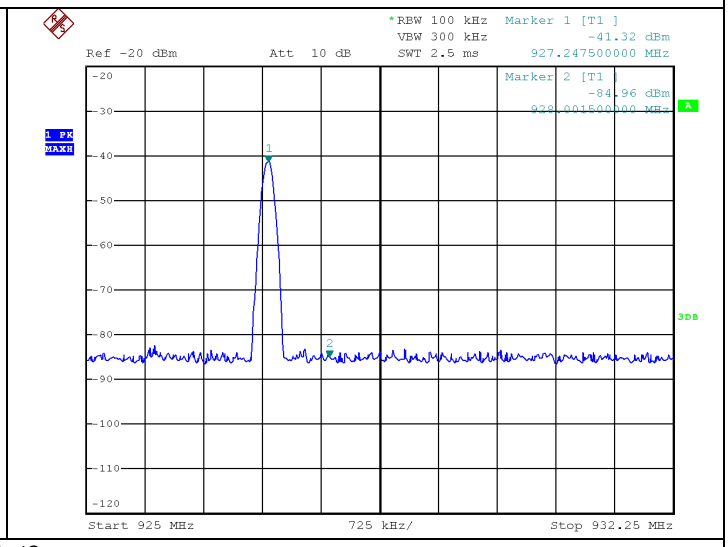
Unhopping



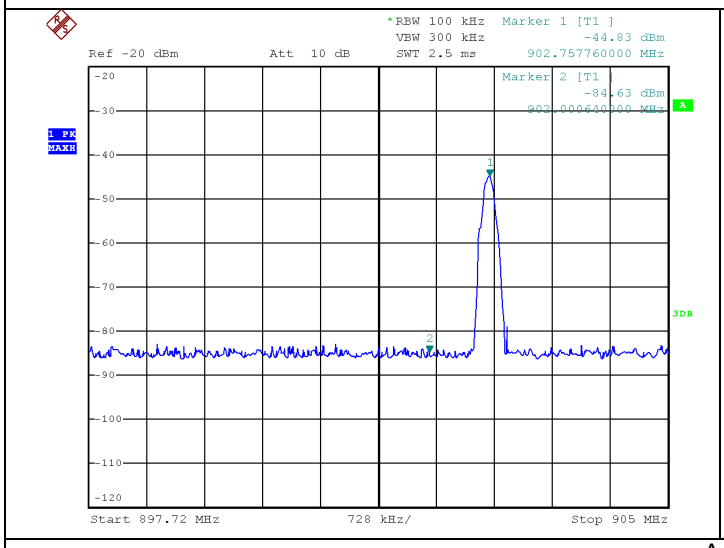


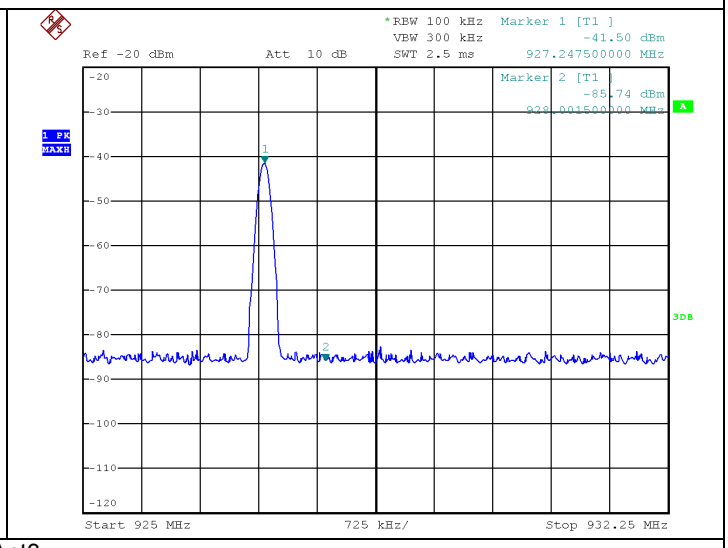
Ant1



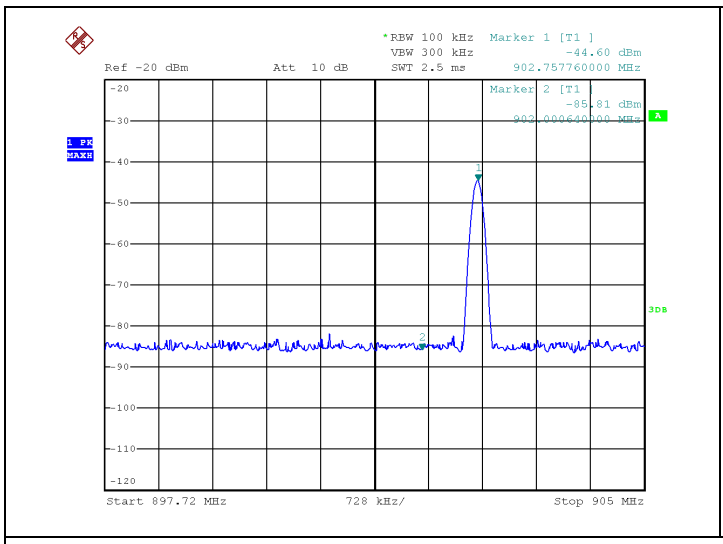


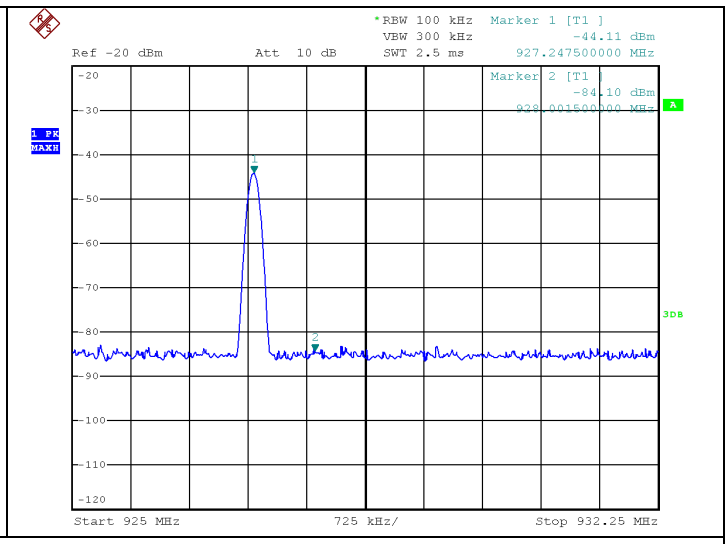
Ant2



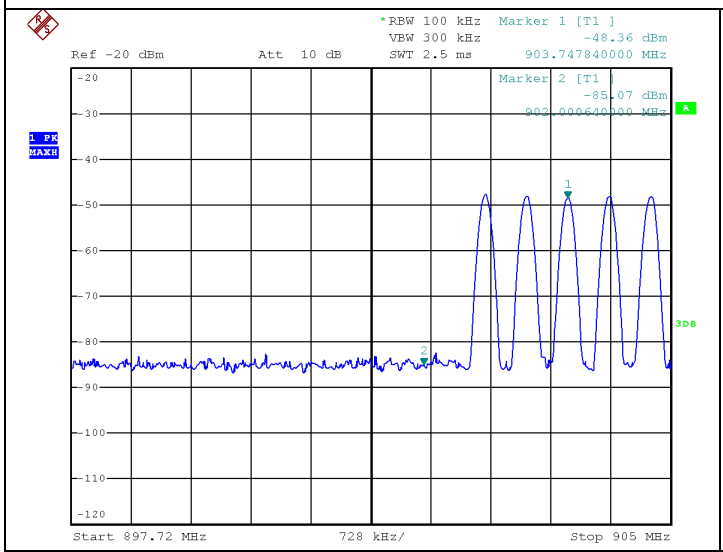


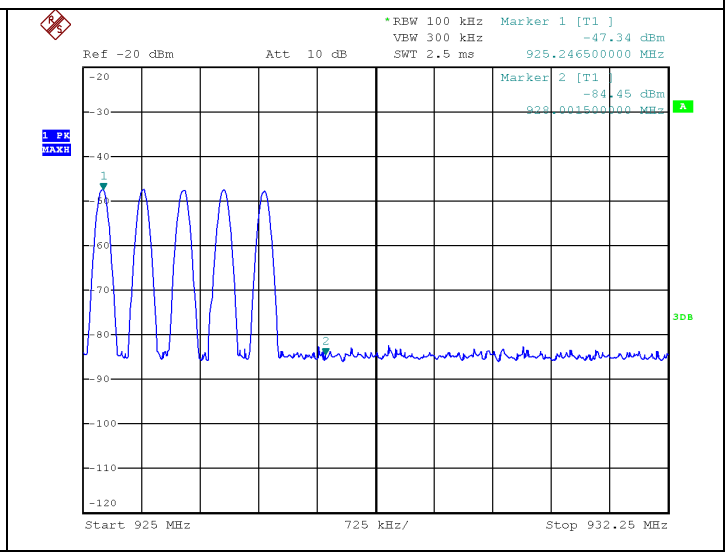
Ant3





Ant4





Hopping

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.

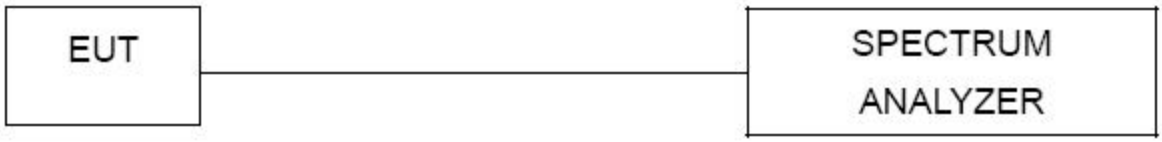
4.1.1 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥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



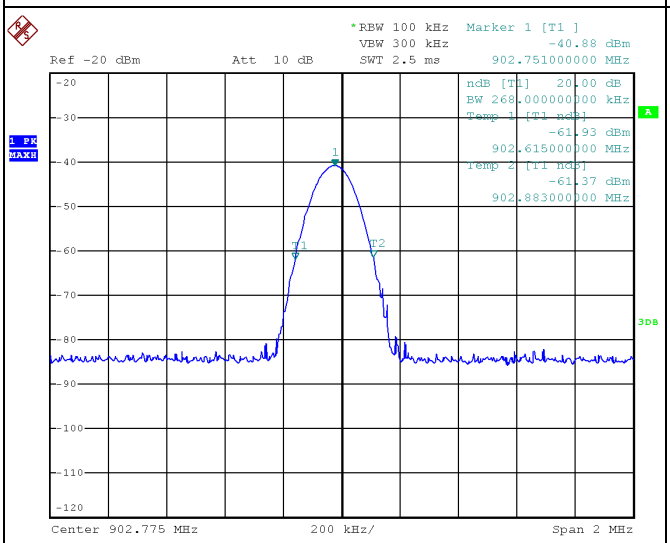
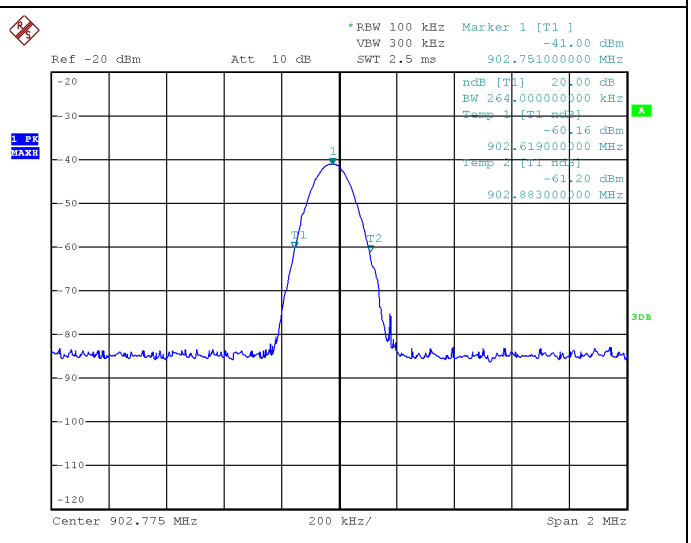
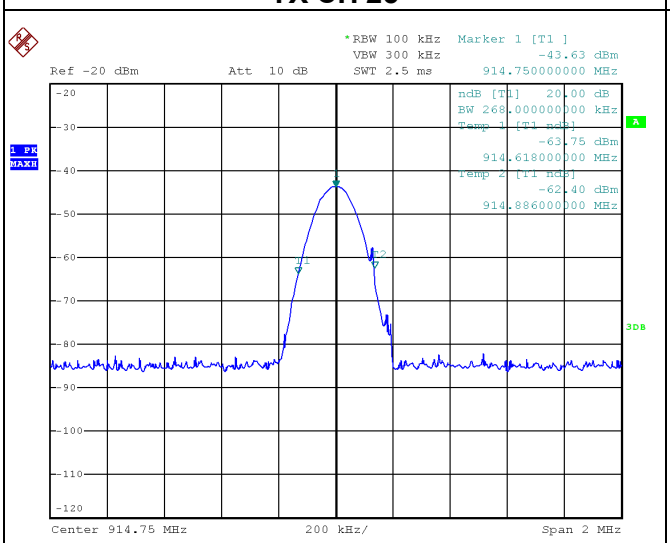
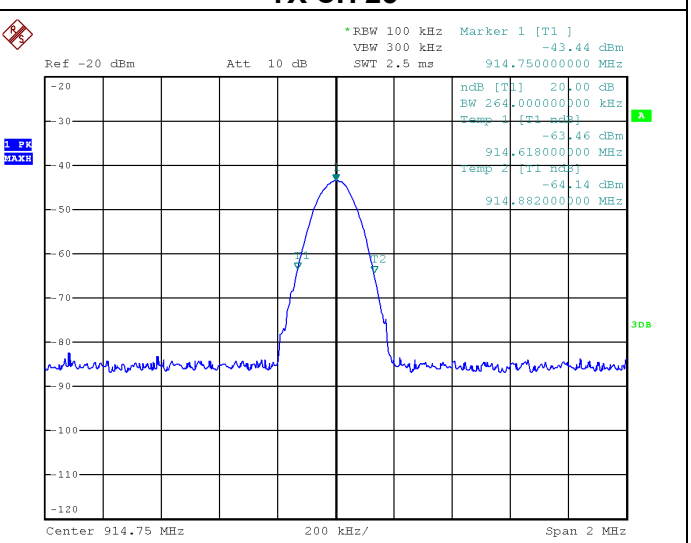
4.1.4 EUT OPERATION CONDITIONS

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℃	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 9V from adapter input AC 120V/60Hz
Test Mode :	TX Mode /CH00, CH25, CH78		

	Frequency (MHz)	20dB Bandwidth (kHz)	Result
Ant1	902.75	268.00	Pass
	914.75	268.00	Pass
	927.25	260.00	Pass
Ant2	902.75	264.00	Pass
	914.75	264.00	Pass
	927.25	264.00	Pass
Ant3	902.75	264.00	Pass
	914.75	268.00	Pass
	927.25	264.00	Pass
Ant4	902.75	264.00	Pass
	914.75	264.00	Pass
	927.25	272.00	Pass

Ant1	Ant2
TX CH 01	**TX CH 01**
	
TX CH 25	**TX CH 25**
	
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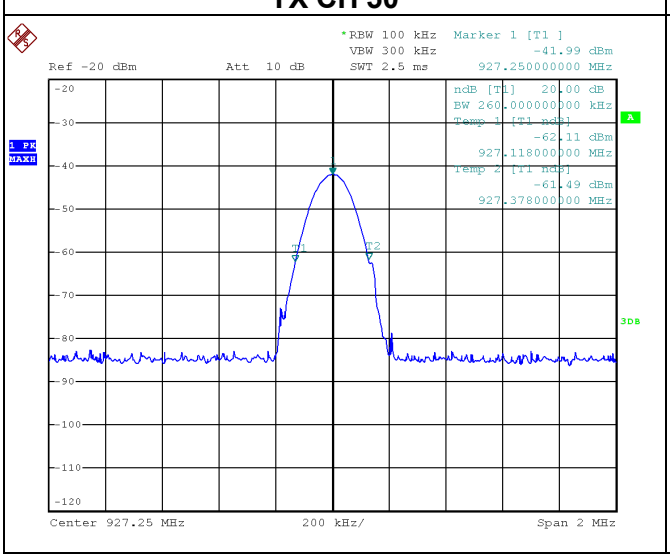
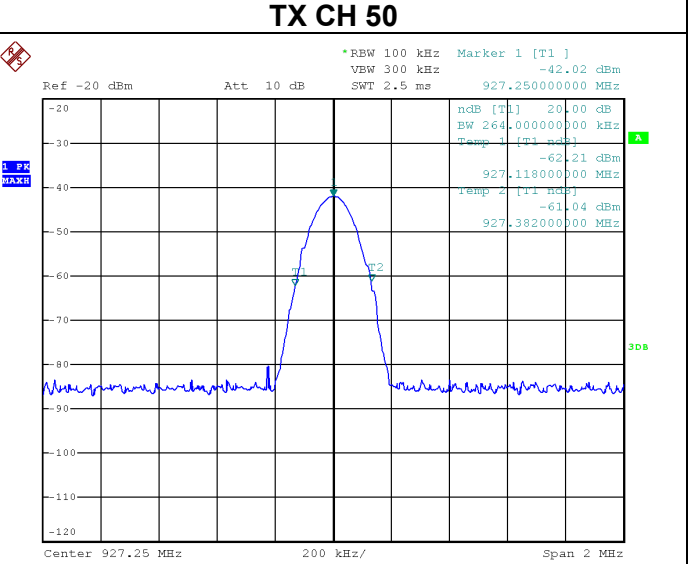
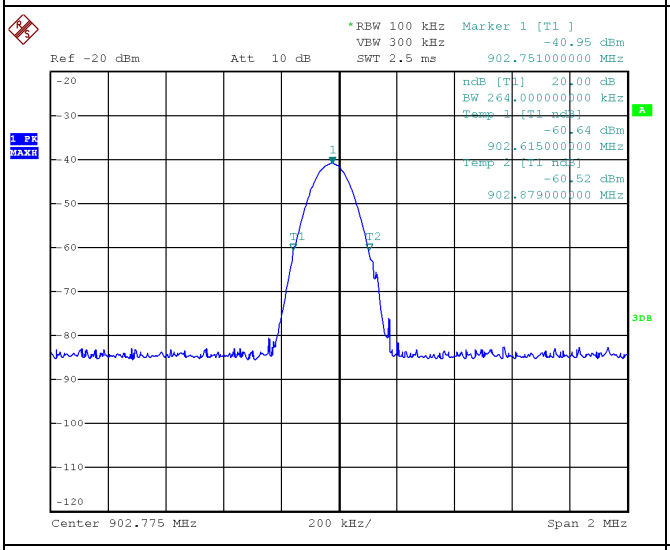
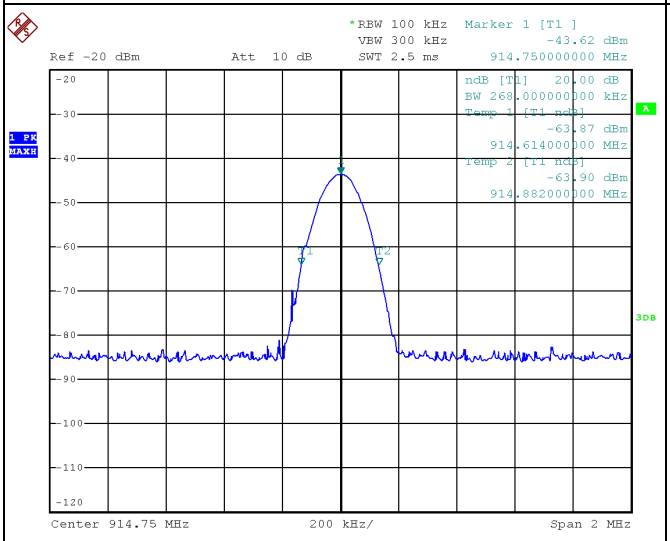
	

Ant3

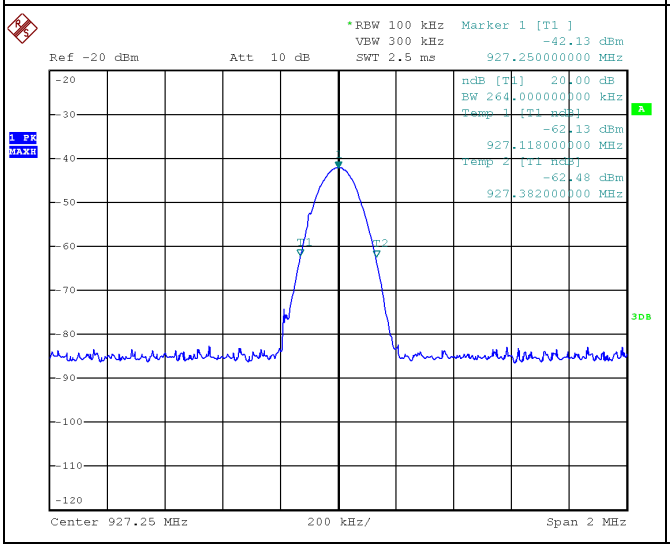
TX CH 01



TX CH 25

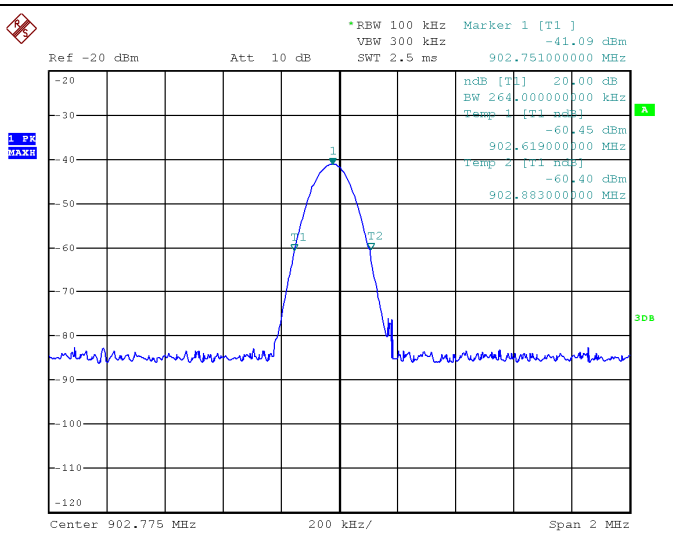


TX CH 50

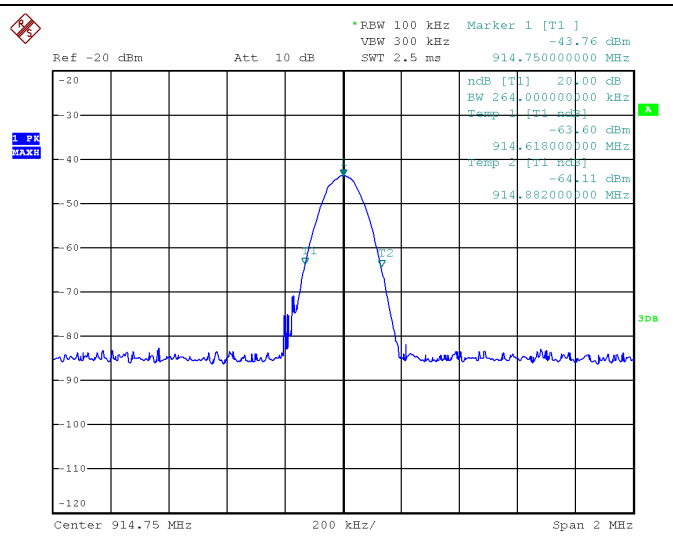


Ant4

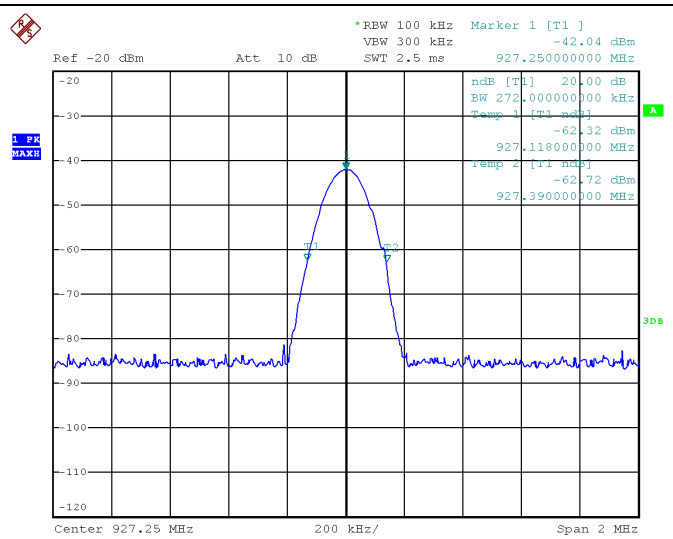
TX CH 01



TX CH 25



TX CH 50



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 ≥ 1% of the span
VB	VBW ≥ RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100KHz, VBW=3fere3rddrrnryyt566tryiugmj00KHz, Sweep time = Auto.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP

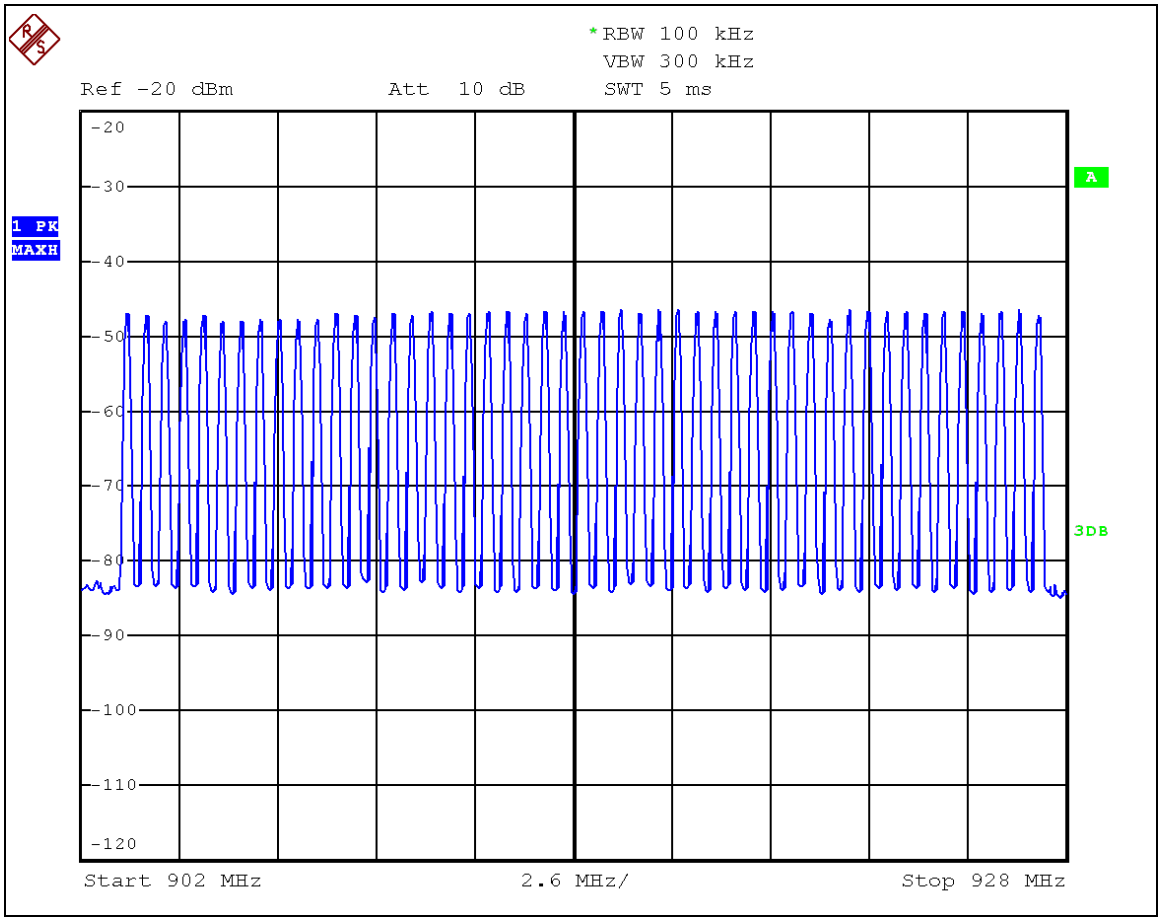
5.1.4 EUT OPERATION CONDITIONS

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 ℃	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	DC 9V from adapter 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

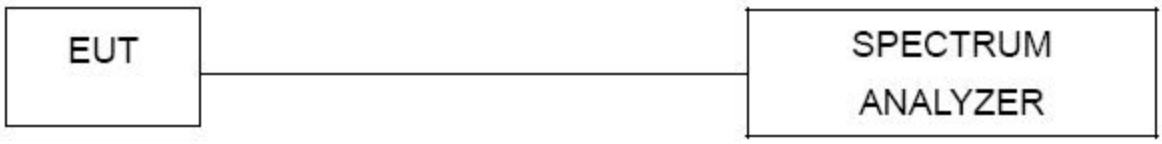
6.1.1 TEST PROCEDURE

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.

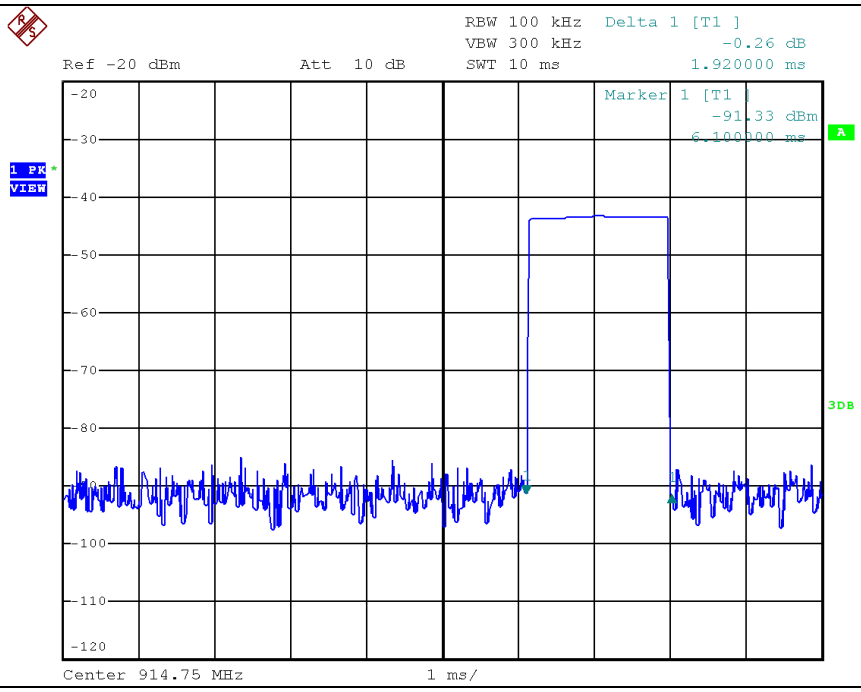
6.1.5 TEST RESULTS

Frequency	Dwell time(ms)	Limit(ms)	Result
914.75MHz	307.20	400	Pass

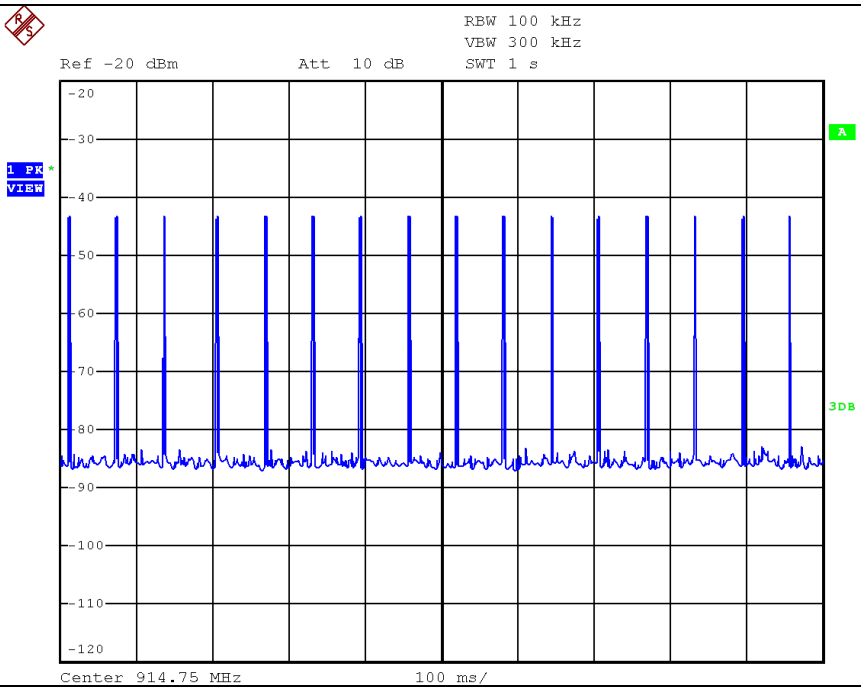
Within 10 s period, the average time of occupancy = 10 s * 16 * 1.92 ms

The average time of occupancy = 307.20 ms

Plot 1: Time slot length = 7.5 ms



Plot 2: hops / channel @ 1s = 16



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

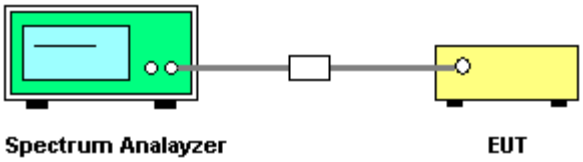
a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.

b. 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

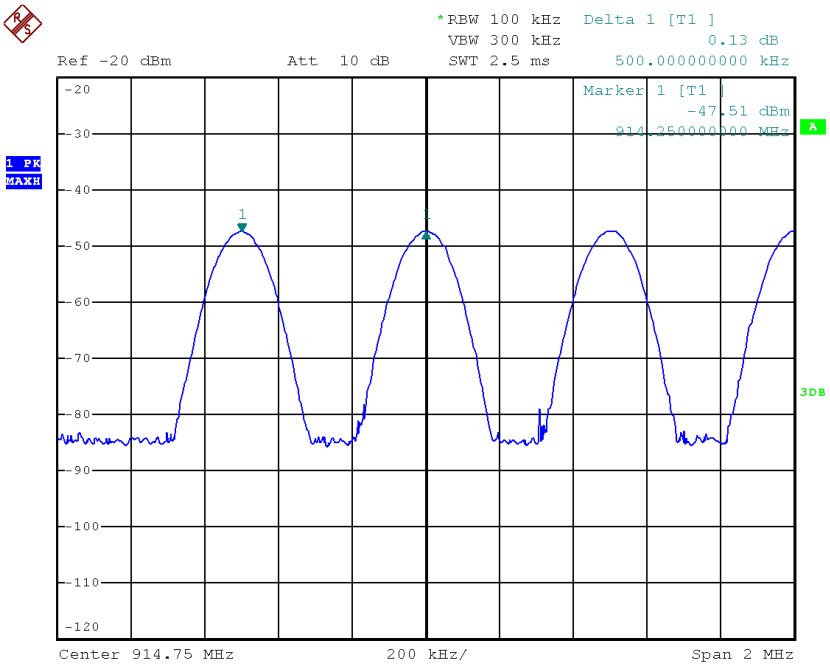
The EUT was programmed to be in continuously transmitting mode.

7.1.5 TEST RESULTS

Temperature :	25 ℃	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 9V from adapter input AC 120V/60Hz
Test Mode :	Tx Mode		

Test Mode	Ch. Separation (MHz)	Limit (MHz)	Result
TX	0.500	0.181	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

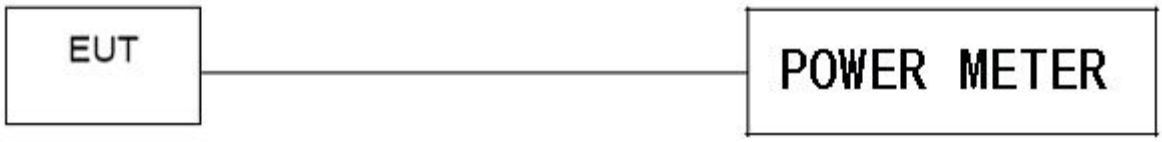
8.1.1 TEST PROCEDURE

a. 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 ℃	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 9V from adapter input AC 120V/60Hz
Test Mode :	CH01/ CH25 /CH50		

Test Channel		Peak Output Power (dBm)	Total Output Power (dBm)	LIMIT (dBm)
CH00	Ant1	9.35	15.36	30.00
	Ant2	9.32		
	Ant3	9.34		
	Ant4	9.33		
CH25	Ant1	9.35	15.35	30.00
	Ant2	9.31		
	Ant3	9.28		
	Ant4	9.36		
CH78	Ant1	9.27	15.31	30.00
	Ant2	9.26		
	Ant3	9.31		
	Ant4	9.32		

9. ANTENNA REQUIREMENT

9.1 STANDARD REQUIREMENT

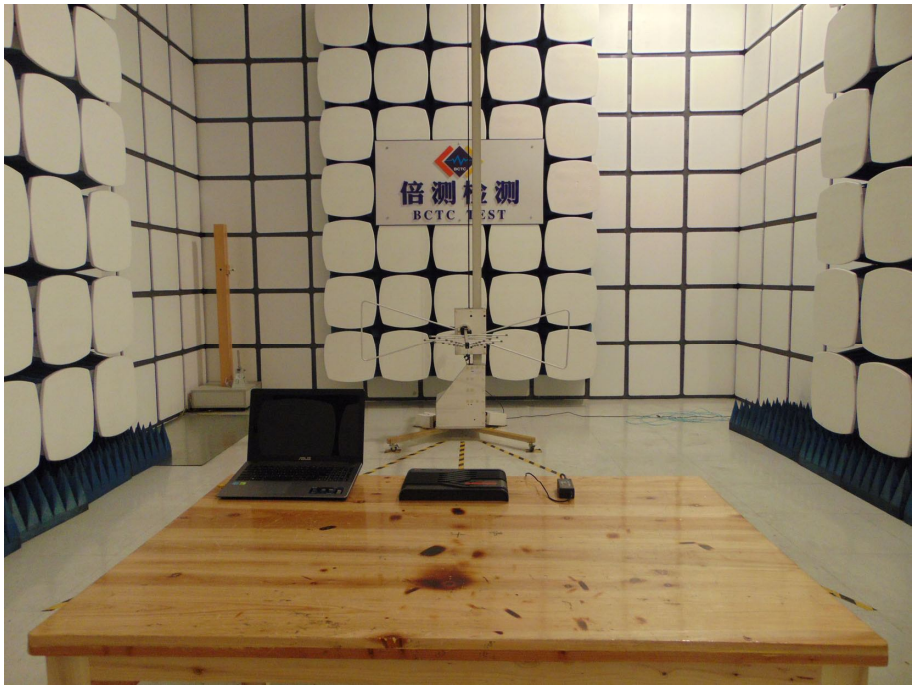
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

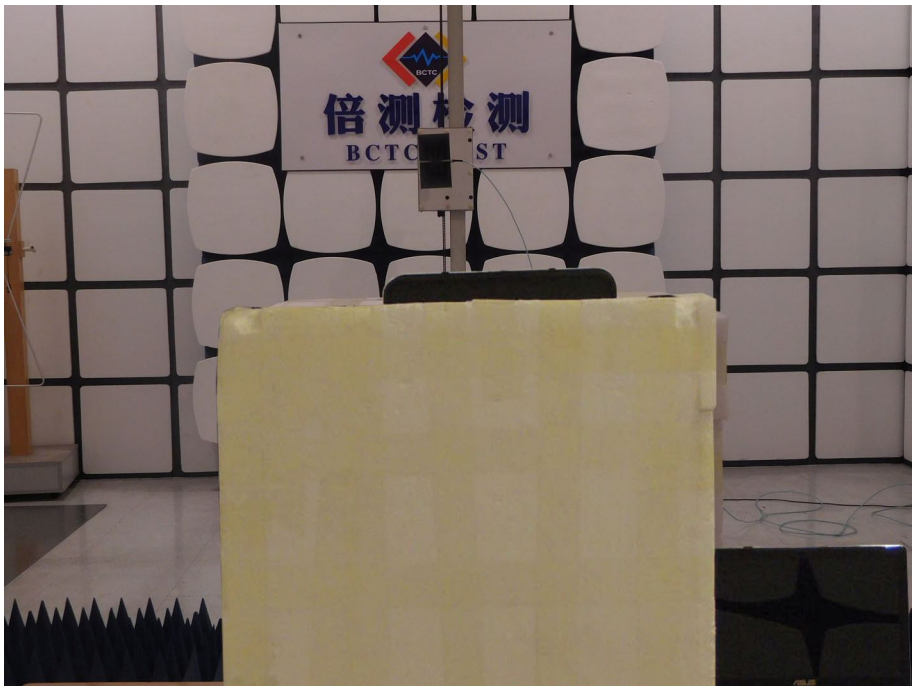
9.2 EUT ANTENNA

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

10. TEST SEUUP PHOTO

Radiated Measurement Photos



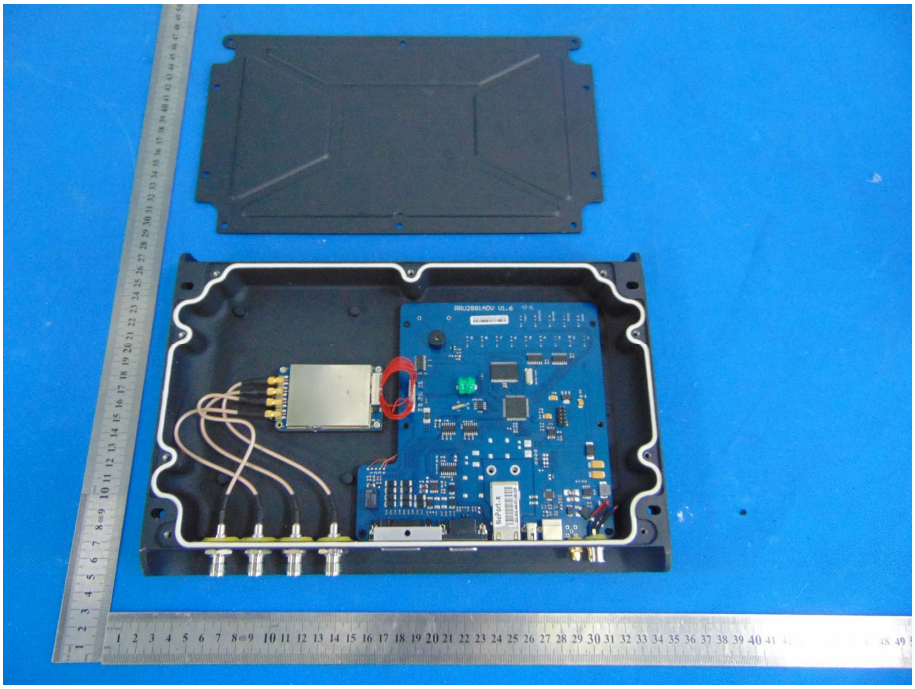


Conducted Measurement Photos

11. EUT PHOTO

UHF HIGH PERFORMANCE
FIXED READER
829170700243239
S/N: 17070024

RUN
WIRELESS
POWER
TAG
ALARM
RFID READER
PWR
LIN
1
2
3
4



※※※※※ **END OF REPORT** ※※※※※