

TEST REPORT

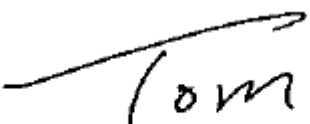
Applicant:	Allstar Products Group
Address:	2 SKYLINE DRIVE HAWTHORNE NEW YORK #10532 USA

Manufacturer or Supplier	Huapuou Plastic Electronics (HK) Co., Ltd.(Dongguan Linhe Technology Co., Ltd.
Address	No.128 Shajiao Xihu Road, Humen Town, Dongguan city, GD province, China
Product	Own Zone (RF-BK-H)
Brand Name:	N/A
Model:	30603
Additional Model & Model Difference	WN011112, 30763, WN061112, 30835, 30834; see items 3.1
Date of tests:	May 30, 2018 ~ Jun. 22, 2018

the tests have been carried out according to the requirements of the following standard:

☒ **FCC Part 15, Subpart C, Section 15.249**

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Tested by Tom Chen Project Engineer / EMC Department	Approved by Glyn He Supervisor / EMC Department
	 Date: Jul. 05, 2018

This report is governed by, and incorporates by reference, CPS Conditions of Service as posted at the date of issuance of this report at <http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions/> and is intended for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. Measurement uncertainty is only provided upon request for accredited tests. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence or if you require measurement uncertainty; provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.

TABLE OF CONTENTS

RELEASE CONTROL RECORD	4
1 SUMMARY OF TEST RESULTS.....	5
2 MEASUREMENT UNCERTAINTY	5
3 GENERAL INFORMATION	6
3.1 GENERAL DESCRIPTION OF EUT	6
3.2 DESCRIPTION OF TEST MODES	7
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS	8
3.4 DESCRIPTION OF SUPPORT UNITS	8
4. TEST TYPES AND RESULTS.....	9
4.1 CONDUCTED EMISSION MEASUREMENT	9
4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT	9
4.1.2 TEST INSTRUMENTS.....	9
4.1.3 TEST PROCEDURES	10
4.1.4 DEVIATION FROM TEST STANDARD	10
4.1.5 TEST SETUP.....	11
4.1.6 EUT OPERATING CONDITIONS	11
4.1.7 TEST RESULTS	12
4.2 RADIATED EMISSION MEASUREMENT.....	14
4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT	14
4.2.2 TEST INSTRUMENTS.....	15
4.2.3 TEST PROCEDURES	16
4.2.4 DEVIATION FROM TEST STANDARD	16
4.2.5 TEST SETUP.....	17
4.2.6 EUT OPERATING CONDITIONS	18
4.2.7 TEST RESULTS	19
4.3 20dB BANDWIDTH MEASUREMENT	26
4.3.1 LIMITS OF 20dB BANDWIDTH MEASUREMENT	26
4.3.2 TEST INSTRUMENTS.....	26
4.3.3 TEST PROCEDURE.....	27
4.3.4 DEVIATION FROM TEST STANDARD	27
4.3.5 TEST SETUP.....	27
4.3.6 EUT OPERATING CONDITIONS	27
4.3.7 TEST RESULTS	28
5. PHOTOGRAPHS OF THE TEST CONFIGURATION	30



Test Report No.: RF180530N014

6. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB.....	31
---	----



Test Report No.: RF180530N014

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF180530N014	Original release	Jul. 05, 2018

1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.249)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
§15.203	Antenna Requirement	PASS	No antenna connector is used
§15.207 (a)	Conducted Emission	PASS	Compliant
§15.205	Restricted Band of Operation	PASS	Compliant
§15.209 §15.249(a)	Radiated Emission	PASS	Compliant
§15.215(c)	20dB Bandwidth Test	PASS	Compliant

2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.70dB
Radiated emissions	9KHz ~ 30MHz	2.90dB
	30MHz ~ 1GMHz	3.83dB
	1GHz ~ 18GHz	4.93dB
	18GHz ~ 40GHz	4.80dB

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

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Own Zone (RF-BK-H)
MODEL NO.	30603
ADDITIONAL MODELS	WN011112, 30763, WN061112, 30835, 30834
FCC ID	2APZ3-RFBKH
NOMINAL VOLTAGE	DC 5V from USB Host Unit
MODULATION TECHNOLOGY	GFSK
OPERATING FREQUENCY	2410-2471MHz
ANTENNA TYPE	PCB Antenna, with 6dBi gain
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	N/A

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions, but only the worst case was shown in test report.
3. Please refer to the EUT photo document (Reference No.: 180530N014) for detailed product photo.
4. Additional models (see above table) are identical with the test model 30603 except the packing, color for trading purpose.

3.2 DESCRIPTION OF TEST MODES

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and packet type. The worst case was found when the EUT was positioned on X axis for radiated emission. The EUT was tested under the following mode.

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE<1G	RE≥1G	PLC	BW	
A	√	√	√	√	DC 5V from adapter

Where **RE<1G**: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission

RE≥1G: Radiated Emission above 1GHz
BW: 20db bandwidth

Following channel(s) was (were) selected for the test as listed below.

TESTED CHANNEL	TESTED FREQUENCY
Low	2410 MHz
Middle	2441 MHz
High	2471 MHz

Channel List

CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
1	2410	17	2426	33	2442	49	2458
2	2411	18	2427	34	2443	50	2459
3	2412	19	2428	35	2444	51	2460
4	2413	20	2429	36	2445	52	2461
5	2414	21	2430	37	2446	53	2462
6	2415	22	2431	38	2447	54	2463
7	2416	23	2432	39	2448	55	2464
8	2417	24	2433	40	2449	56	2465
9	2418	25	2434	41	2450	57	2466
10	2419	26	2435	42	2451	58	2467
11	2420	27	2436	43	2452	59	2468
12	2421	28	2437	44	2453	60	2469
13	2422	29	2438	45	2454	61	2470
14	2423	30	2439	46	2455	62	2471
15	2424	31	2440	47	2456		
16	2425	32	2441	48	2457		

Note: The more detailed channel, please refer to the product specifications

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE	25deg. C, 55%RH	DC 5V from adapter	Hardy
BW	25deg. C, 55%RH	DC 5V from adapter	Hardy
PLC	25deg. C, 55%RH	DC 5V from adapter	Hardy

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C, Section 15.249

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

3.4 DESCRIPTION OF SUPPORT UNITS

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.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Adapter	N/A	C-P57	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A

4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
 3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR7	101494	Apr. 05,18	Apr. 04,19
Artificial Mains Network	Rohde&Schwarz	ENV216	101173	Mar. 03,18	Mar. 02,19
Artificial Mains Network	Rohde&Schwarz	ESH3-Z5	100317	Apr. 05,18	Apr. 04,19
Voltage probe	SCHWARZBECK	TK 9421	TK 9421-176	Jan. 17,18	Jan. 16,19
Test software	ADT	ADT_Cond_V7.3.7	N/A	N/A	N/A

NOTE:

1. The test was performed in shielded room 553.
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

4.1.3 TEST PROCEDURES

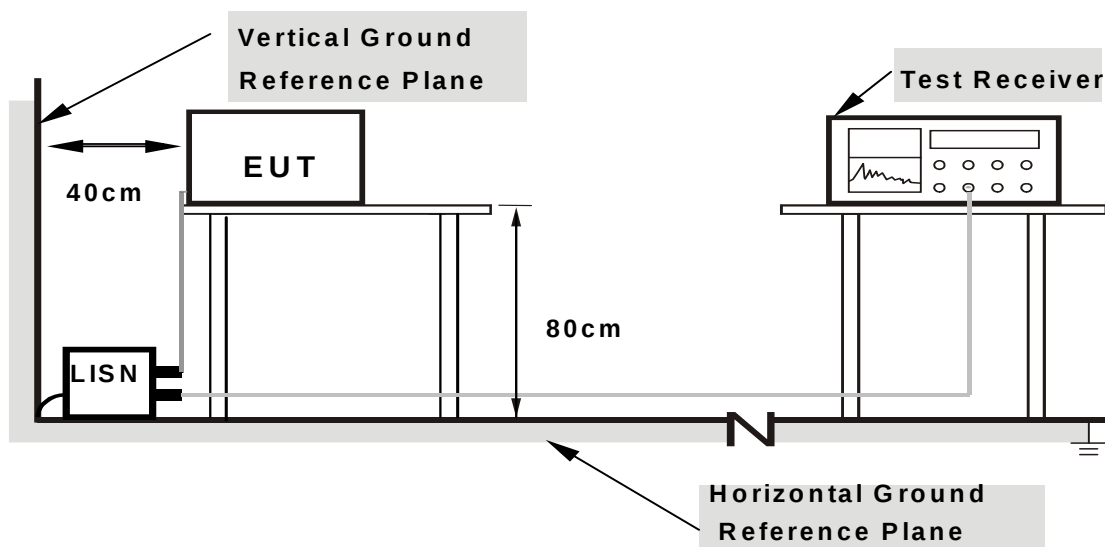
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

4.1.5 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

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT OPERATING CONDITIONS

- a. Turned on the power and connected of all equipment.
- b. EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.

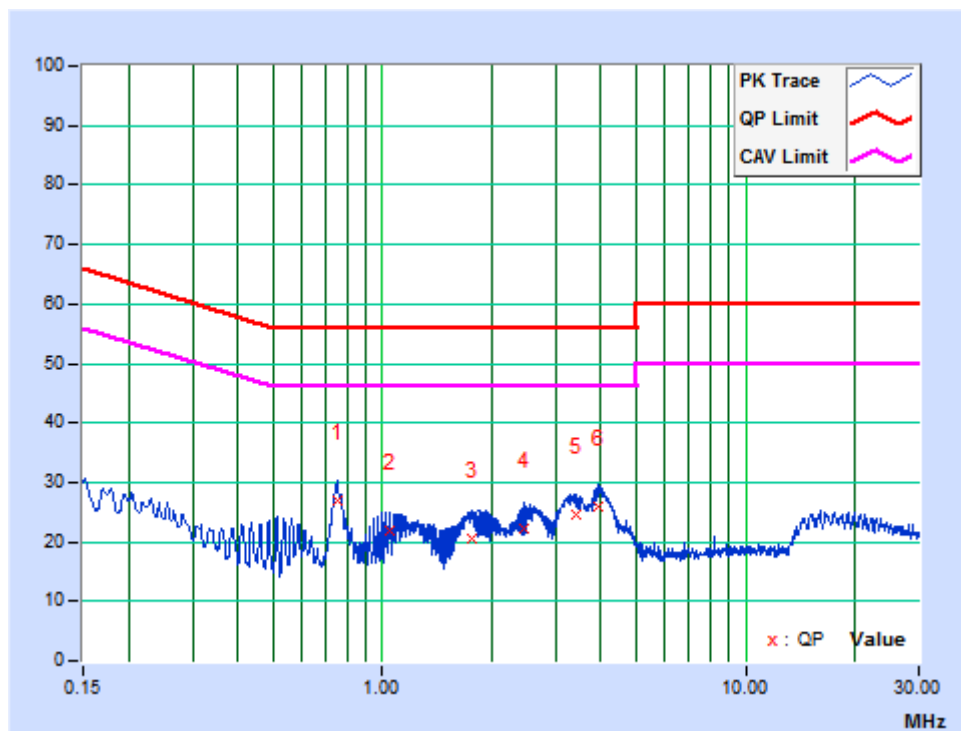
4.1.7 TEST RESULTS

CONDUCTED WORST-CASE DATA: GFSK CH39

PHASE	Line	6dB BANDWIDTH	9kHz
-------	------	---------------	------

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.75413	10.19	16.67	7.47	26.86	17.66	56.00	46.00	-29.14	-28.34
2	1.04901	10.29	11.57	6.75	21.86	17.04	56.00	46.00	-34.14	-28.96
3	1.76775	10.27	10.14	2.25	20.41	12.52	56.00	46.00	-35.59	-33.48
4	2.45850	10.05	12.30	6.54	22.35	16.59	56.00	46.00	-33.65	-29.41
5	3.43050	9.76	14.84	7.73	24.60	17.49	56.00	46.00	-31.40	-28.51
6	3.94350	9.88	16.06	7.88	25.94	17.76	56.00	46.00	-30.06	-28.24

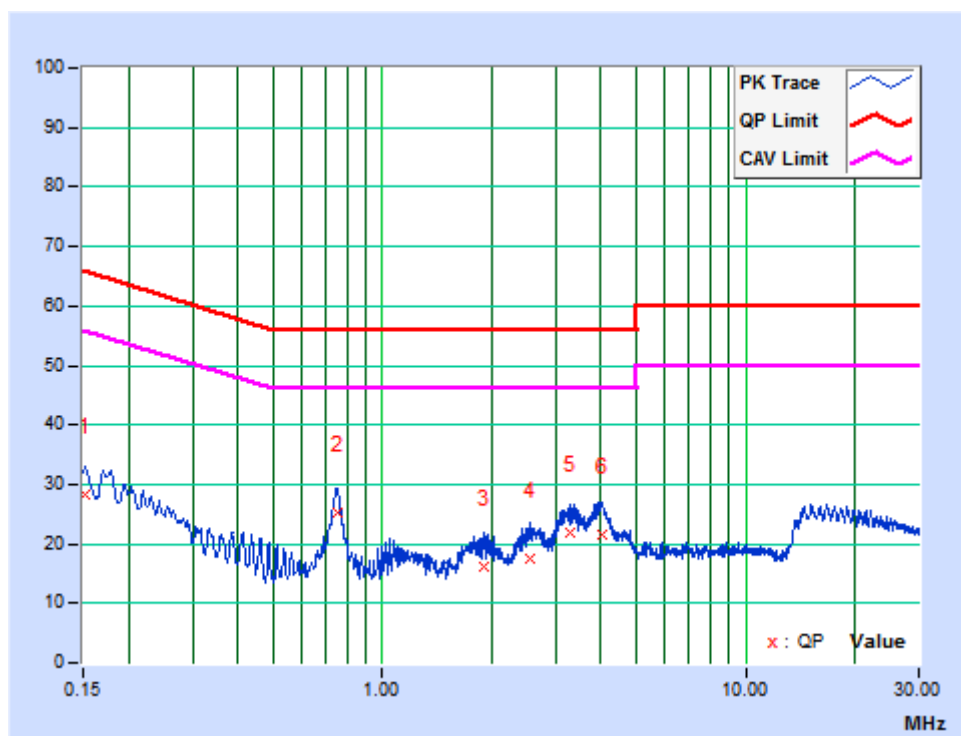
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.



PHASE	Neutral	6dB BANDWIDTH	9kHz
-------	---------	---------------	------

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15225	9.79	18.42	2.24	28.21	12.03	65.88	55.88	-37.67	-43.85
2	0.75016	9.98	15.14	6.20	25.12	16.18	56.00	46.00	-30.88	-29.82
3	1.89825	10.25	5.94	0.64	16.19	10.89	56.00	46.00	-39.81	-35.11
4	2.55750	9.86	7.71	1.58	17.57	11.44	56.00	46.00	-38.43	-34.56
5	3.30450	10.09	11.68	4.00	21.77	14.09	56.00	46.00	-34.23	-31.91
6	4.02200	9.73	11.92	3.91	21.65	13.64	56.00	46.00	-34.35	-32.36

- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/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

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of harmonics (micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESU40	100449	Mar. 21,18	Mar. 20,19
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV7	102331	Nov. 04,17	Nov. 03,18
Active Loop Antenna (9KHz -30MHz)	SCHWARZBECK	FMZB 1519B	1519B-045	May 31,18	May 30,19
Amplifier (9KHz -1GHz)	Burgeon	BPA-530	100210	Apr. 18,18	Apr. 18,19
Bilog Antenna (20MHz -2GHz)	Teseq	CBL 6111D	30643	Jul. 28, 17	Jul. 27, 18
Horn Antenna (1GHz -18GHz)	ETS -Lindgren	3117	00062558	Jun. 02,18	Jun. 01,19
Horn Antenna (18GHz -40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170242	May 05,18	May 04,19
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	NSEMC003	Feb. 10,18	Feb. 09,19
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A	N/A
Broadband Preamplifier (1GHz~18GHz)	SCHWARZBECK	BBV9718	305	Apr. 18,18	Apr. 18,19
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 08,17	Nov. 07,18
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A	N/A
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	Aug. 10,17	Aug. 09,18

NOTE:

1. The test was performed in 966 Chamber.
2. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 749762.

4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 1.5 meters (above 1GHz) and 0.8 meters (below 1GHz) above the ground at a 3 meters 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 is a broadband antenna, and its 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 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. For below 30MHz, a loop antenna with its vertical plane is place 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1m above the ground.
- g. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:

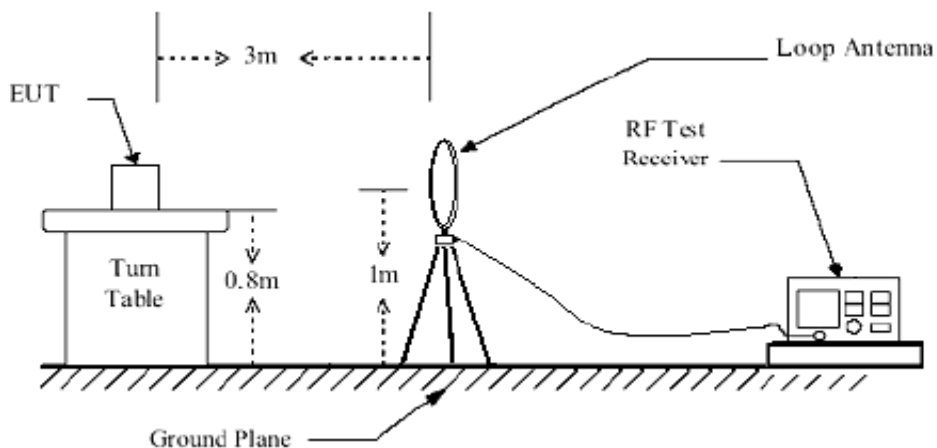
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.
5. The testing of the EUT was performed on all 3 orthogonal axes; the worst-case test configuration was reported on the file test setup photo.

4.2.4 DEVIATION FROM TEST STANDARD

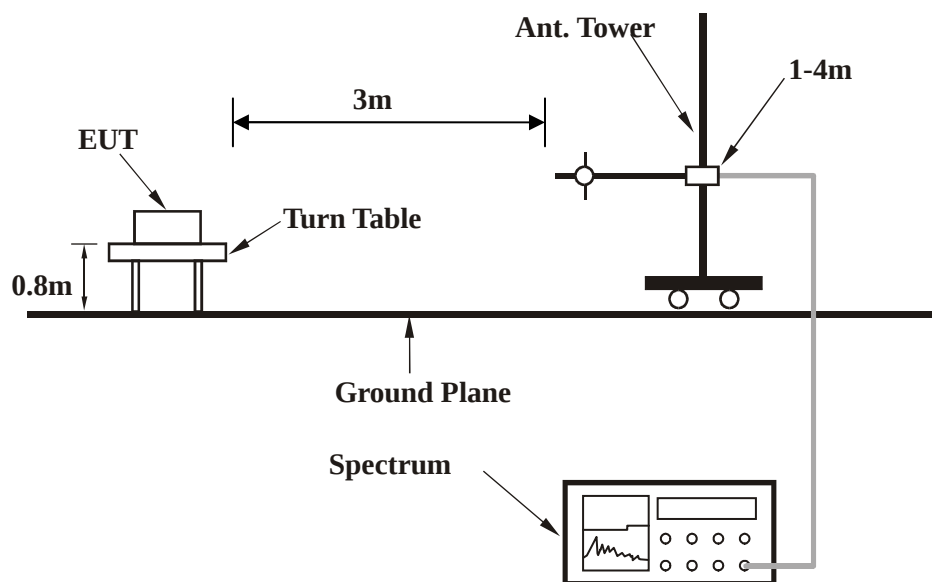
No deviation.

4.2.5 TEST SETUP

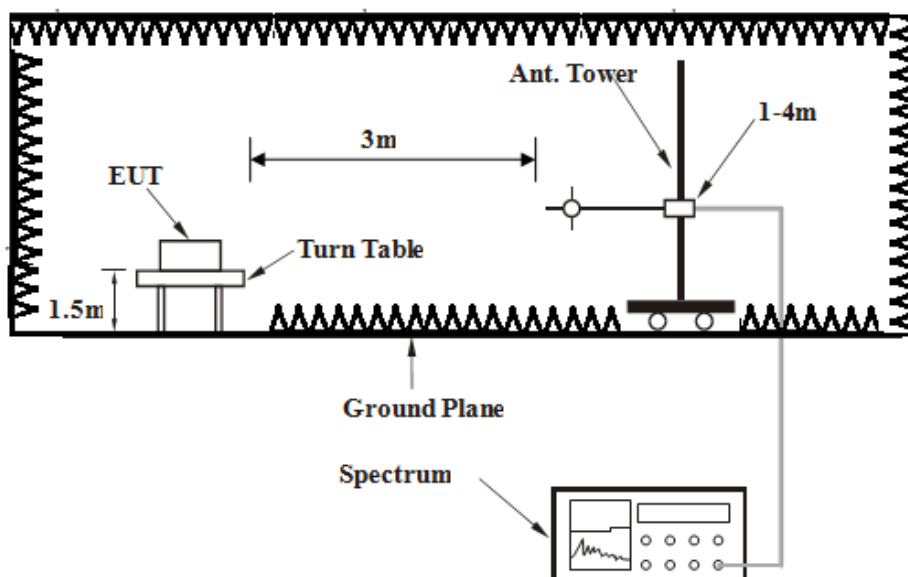
Below 30MHz test setup



Below 1GHz test setup



Above 1GHz test setup



Note: For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT OPERATING CONDITIONS

- c) Turned on the power of all equipment.
- d) EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.

4.2.7 TEST RESULTS

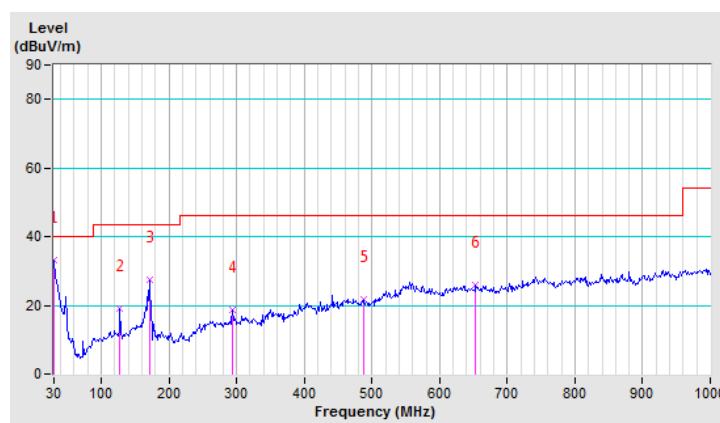
BELOW 1GHz WORST-CASE DATA

CHANNEL	TX Middle Channel	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9KHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	33.03 QP	40.00	-6.97	1.00 H	298	44.16	-11.13
2	127.93	18.96 QP	43.50	-24.54	1.00 H	281	36.14	-17.18
3	171.46	27.59 QP	43.50	-15.91	1.00 H	320	45.45	-17.86
4	294.26	18.77 QP	46.00	-27.23	1.00 H	359	32.27	-13.50
5	487.02	21.83 QP	46.00	-24.17	1.00 H	356	29.08	-7.25
6	653.35	25.87 QP	46.00	-20.13	1.00 H	339	28.99	-3.12

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.

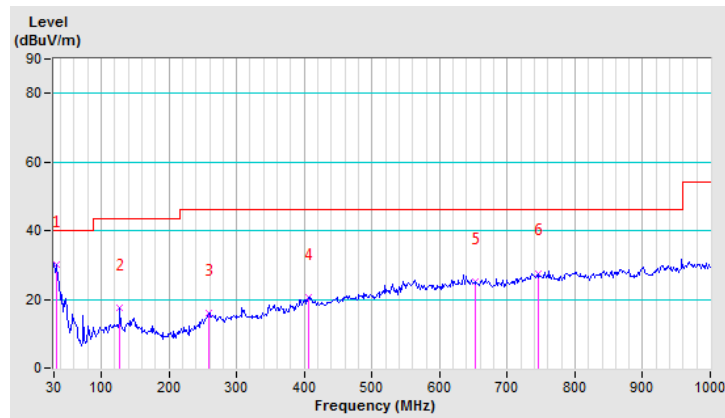


CHANNEL	TX Middle Channel	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9KHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	33.11	29.96 QP	40.00	-10.04	1.00 V	152	42.68	-12.72
2	127.93	17.59 QP	43.50	-25.91	1.00 V	253	34.77	-17.18
3	258.51	15.96 QP	46.00	-30.04	1.00 V	235	29.27	-13.31
4	406.19	20.44 QP	46.00	-25.56	1.00 V	360	28.76	-8.32
5	653.35	25.09 QP	46.00	-20.91	1.00 V	359	28.21	-3.12
6	745.06	27.62 QP	46.00	-18.38	1.00 V	312	28.67	-1.05

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.



ABOVE 1GHz WORST-CASE DATA:

CHANNEL	TX Low Channel	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2400.00	63.18 PK	74.00	-10.82	1.20 H	145	60.30	2.88
2	2400.00	51.98 AV	54.00	-2.02	1.20 H	145	49.10	2.88
3	*2410.00	96.89 PK	114.00	-17.11	1.20 H	147	93.97	2.92
4	*2410.00	85.69 AV	94.00	-8.31	1.20 H	147	82.77	2.92
5	4820.00	55.89 PK	74.00	-18.11	1.68 H	249	49.55	6.34
6	4820.00	44.69 AV	54.00	-9.31	1.68 H	249	38.35	6.34
7	7230.00	52.58 PK	74.00	-21.42	1.23 H	268	43.29	9.29
8	7230.00	41.38 AV	54.00	-12.62	1.23 H	268	32.09	9.29
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2397.98	51.29 PK	74.00	-22.71	1.20 V	146	48.42	2.87
2	2397.98	40.09 AV	54.00	-13.91	1.20 V	146	37.22	2.87
3	2400.00	49.37 PK	74.00	-24.63	1.56 V	248	46.49	2.88
4	2400.00	38.17 AV	54.00	-15.83	1.56 V	248	35.29	2.88
5	*2410.00	88.17 PK	114.00	-25.83	1.68 V	246	85.25	2.92
6	*2410.00	76.97 AV	94.00	-17.03	1.68 V	246	74.05	2.92
7	4820.00	49.68 PK	74.00	-24.32	1.68 V	247	43.34	6.34
8	4820.00	38.48 AV	54.00	-15.52	1.68 V	247	32.14	6.34
9	7230.00	51.23 PK	74.00	-22.77	1.69 V	247	41.94	9.29
10	7230.00	40.03 AV	54.00	-13.97	1.69 V	247	30.74	9.29

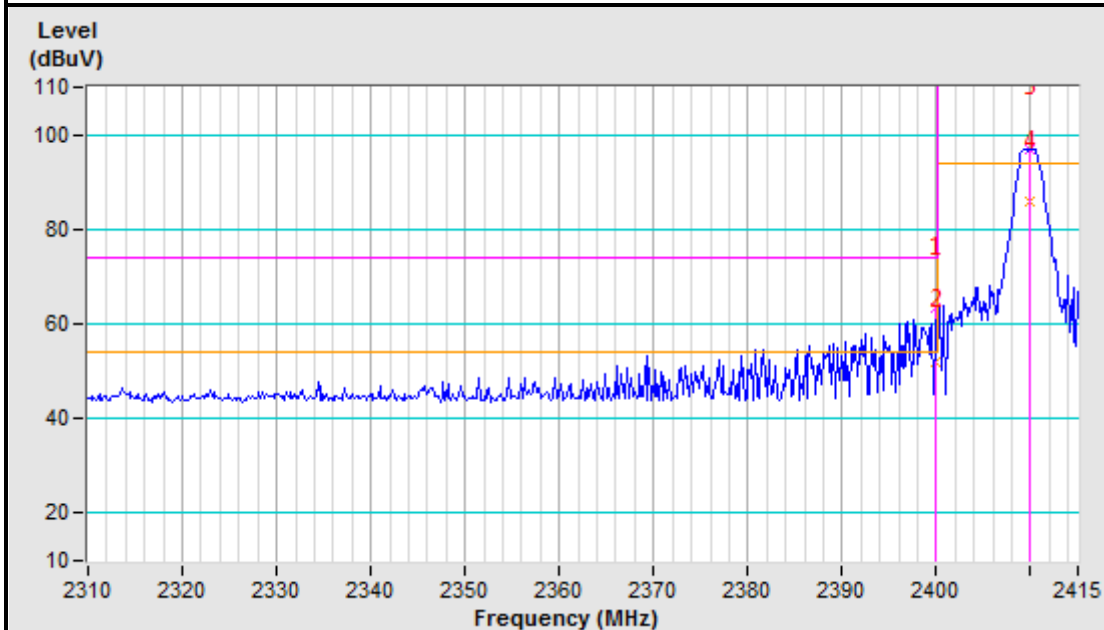
CREMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.

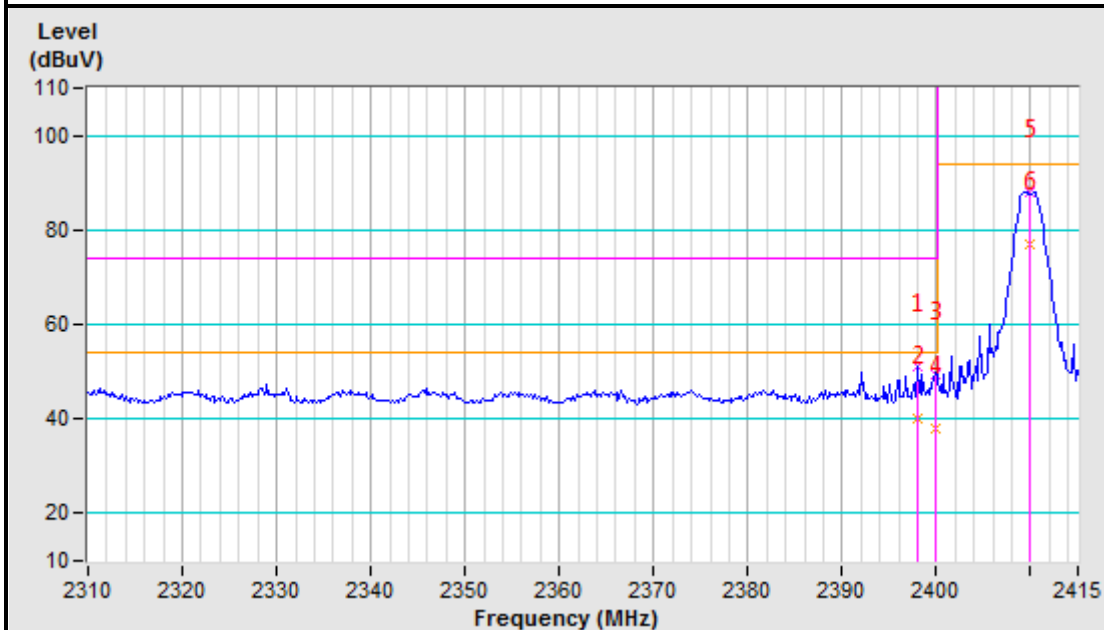


Band edge Plot

2400MHz Horizontal



2400MHz Vertical



CHANNEL	TX Middle Channel	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	96.65 PK	114.00	-17.35	1.25 H	147	93.63	3.02
2	*2441.00	85.45 AV	94.00	-8.55	1.25 H	147	82.43	3.02
3	4882.00	51.57 PK	74.00	-22.43	1.02 H	148	45.19	6.38
4	4882.00	40.37 AV	54.00	-13.63	1.02 H	148	33.99	6.38
5	7323.00	52.89 PK	74.00	-21.11	1.04 H	254	43.64	9.25
6	7323.00	41.69 AV	54.00	-12.31	1.04 H	254	32.44	9.25
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2441.00	83.98 PK	114.00	-30.02	1.35 V	247	80.96	3.02
2	*2441.00	72.69 AV	94.00	-21.31	1.35 V	247	69.67	3.02
3	4882.00	52.58 PK	74.00	-21.42	1.32 V	216	46.20	6.38
4	4882.00	41.38 AV	54.00	-12.62	1.32 V	216	35.00	6.38
5	7323.00	51.89 PK	74.00	-22.11	1.36 V	247	42.64	9.25
6	7323.00	40.69 AV	54.00	-13.31	1.36 V	247	31.44	9.25

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.

CHANNEL	TX High Channel	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

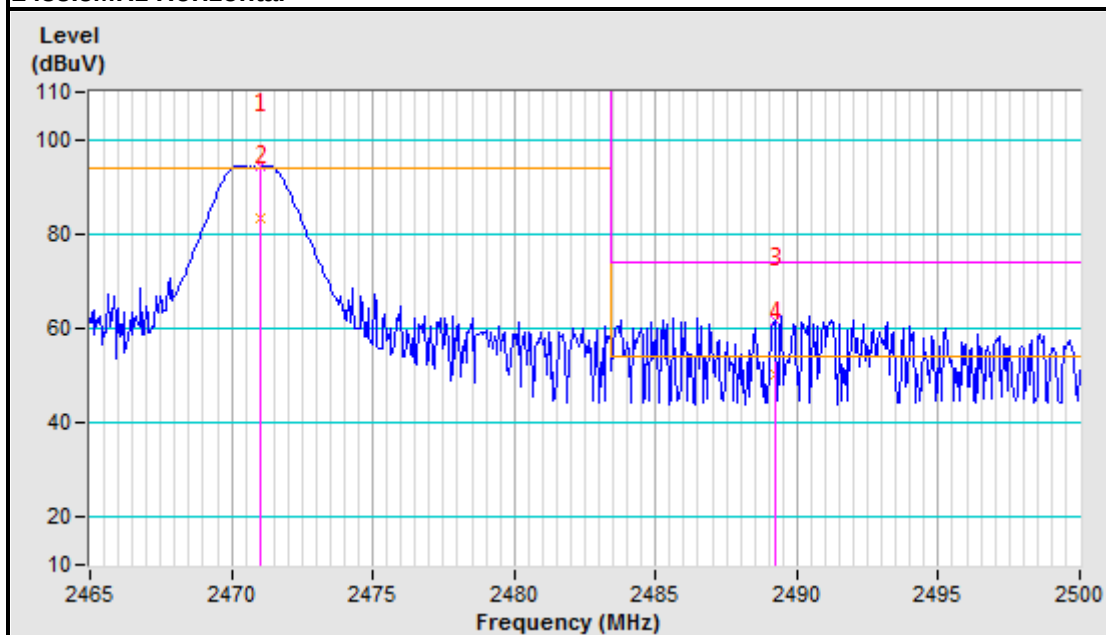
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2471.00	94.45 PK	114.00	-19.55	1.50 H	120	91.33	3.12
2	*2471.00	83.25 AV	94.00	-10.75	1.50 H	120	80.13	3.12
3	2489.23	61.64 PK	74.00	-12.36	1.25 H	146	58.46	3.18
4	2489.23	50.44 AV	54.00	-3.56	1.25 H	146	47.26	3.18
5	4942.00	53.85 PK	74.00	-20.15	1.25 H	147	47.43	6.42
6	4942.00	42.65 AV	54.00	-11.35	1.25 H	147	36.23	6.42
7	7413.00	51.32 PK	74.00	-22.68	1.68 H	248	42.11	9.21
8	7413.00	40.12 AV	54.00	-13.88	1.68 H	248	30.91	9.21
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2471.00	86.66 PK	114.00	-27.34	1.54 V	147	83.54	3.12
2	*2471.00	75.46 AV	94.00	-18.54	1.54 V	147	72.34	3.12
3	2485.40	53.46 PK	74.00	-20.54	1.20 V	145	50.29	3.17
4	2485.40	42.26 AV	54.00	-11.74	1.20 V	145	39.09	3.17
5	4942.00	50.89 PK	74.00	-23.11	1.00 V	168	44.47	6.42
6	4942.00	39.69 AV	54.00	-14.31	1.00 V	168	33.27	6.42
7	7413.00	51.23 PK	74.00	-22.77	1.69 V	248	42.02	9.21
8	7413.00	40.03 AV	54.00	-13.97	1.69 V	248	30.82	9.21

REMARKS:

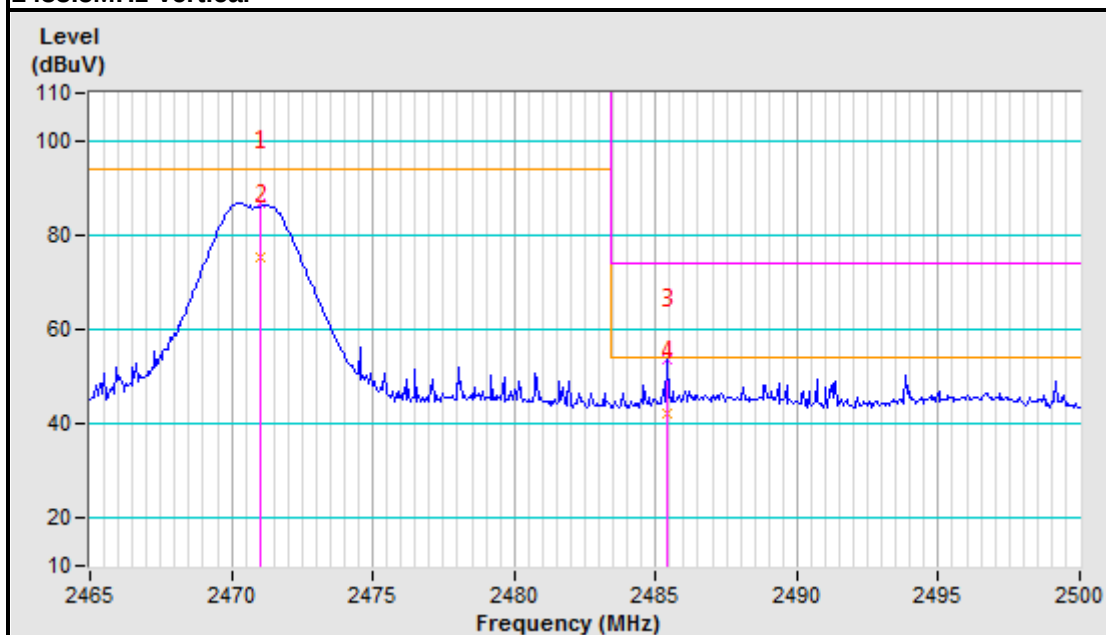
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.

Band edge Plot

2483.5MHz Horizontal



2483.5MHz Vertical



4.3 20dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 20dB BANDWIDTH MEASUREMENT

According to FCC 15.215(c), must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

4.3.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Power Sensor	Keysight	U2021XA	MY55060016	May 19,18	May 18,19
Power Sensor	Keysight	U2021XA	MY55060018	May 19,18	May 18,19
Power Meter	Anritsu	ML2495A	1139001	Apr. 13,18	Apr. 13,19
Power Sensor	Anritsu	MA2411B	1531155	Apr. 13,18	Apr. 13,19
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 21, 17	Oct.20, 18
Humid & Temp Programmable Tester	Haida	HD-2257	110807201	Sep.05,17	Sep. 04,18
Oscilloscope	Agilent	DSO9254A	MY51260160	Nov. 08,17	Nov. 07,18
Signal Analyzer	Rohde & Schwarz	FSV7	102331	Nov. 04,17	Nov. 03,18
Signal Generator	Agilent	N5183A	MY50140980	Jan. 02,18	Jan. 01,19
Agile Signal Generator	Agilent	8645A	Agilent	Sep.01, 17	Aug.31, 18
Spectrum Analyzer	Keysight	N9020A	MY55400499	Mar. 21,18	Mar. 20,19
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200288	Jan. 02,18	Jan. 01,19
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	Aug.10, 17	Aug.09, 18
Attenuator	MINI	BW-S10W2+	S130129FGE2	N/A	N/A
DC Source	Keysight	E3642A	MY56146098	N/A	N/A

NOTE:

1. The test was performed in RF Oven room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

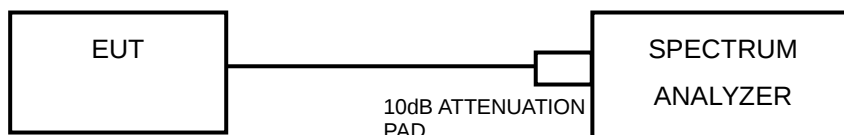
4.3.3 TEST PROCEDURE

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- d. Repeat above procedures until all frequencies measured were complete.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

4.3.5 TEST SETUP



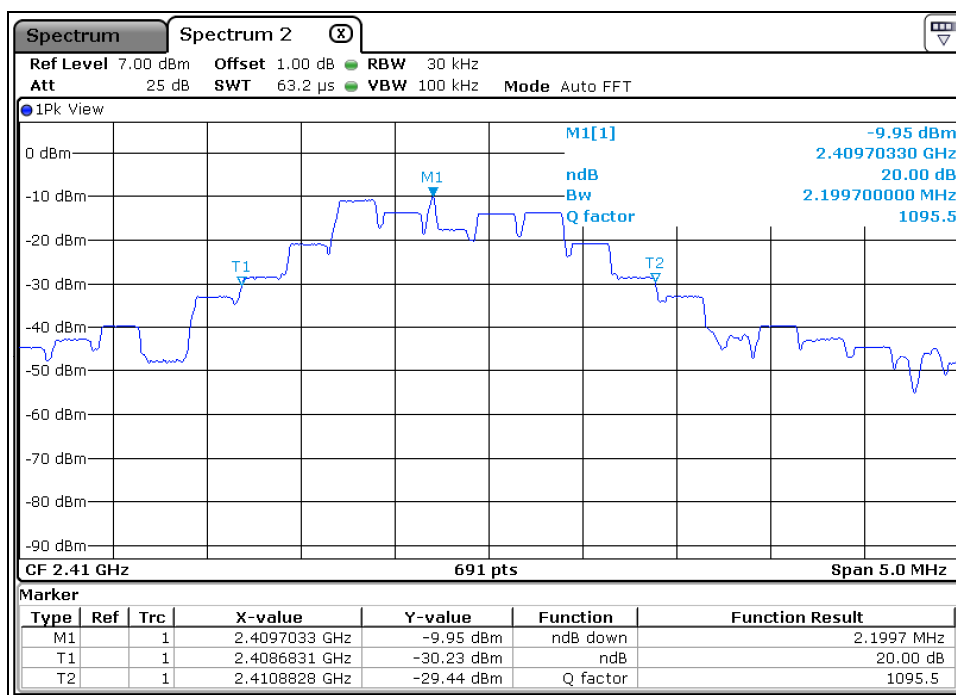
4.3.6 EUT OPERATING CONDITIONS

- a) Turned on the power of all equipment.
- b) EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.

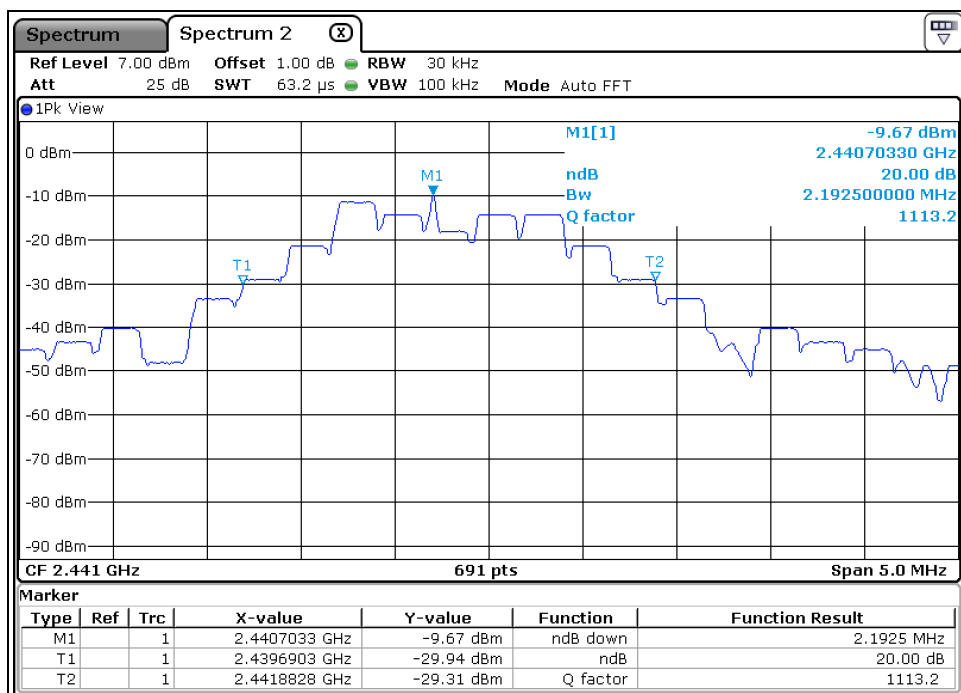
4.3.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
Low	2410	2.1997
Middle	2441	2.1925
High	2471	2.2069

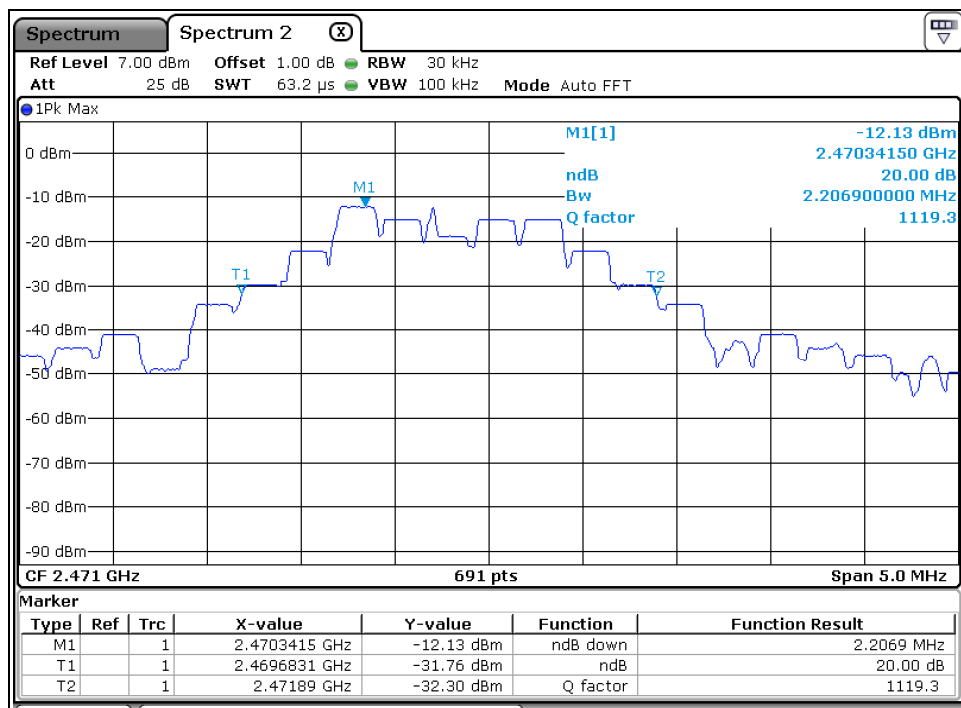
Test Data: Low channel



Test Data: Middle channel



Test Data: High channel





Test Report No.: RF180530N014

5. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

6. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

---END---