

TEST REPORT

Applicant:	YUXING TOYS FACTORY
Address:	CHENGHAI DISTRICT, SHANTOU CITY, GUANGDONG PROVINCE, CHINA

Manufacturer or Supplier	YUXING TOYS FACTORY
Address	CHENGHAI DISTRICT, SHANTOU CITY, GUANGDONG PROVINCE, CHINA
Product:	Remote control toy series
Brand Name:	N/A
Model:	33051
Additional Model & Model Difference	N/A
Date of tests:	June 09 to August 24, 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 Evans He Project Engineer / EMC Department	Approved by David Huang Supervisor / EMC Department
<i>Evans He</i>	<i>David Huang</i> Date: August 24, 2018

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Test Report No.: RF180612N043

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF180612N043	Original release	August 24, 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	N/A	Powered from battery
§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

NOTE: Test Lab Information:

Lab: Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch

Test Lab Address: Zone A, Floor 1, Building 2 Wan Ye Long Technology Park
South Side of Zhoushi Road, Bao'an District Shenzhen, Guangdong,
518108, People's Republic of China

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
Radiated emissions	9KHz ~ 30MHz	3.11dB
	30MHz ~ 1GMHz	2.73dB
	1GHz ~ 18GHz	5.12dB
	18GHz ~ 40GHz	5.34dB

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	Remote control toy series
MODEL NO.	33051
ADDITIONAL MODELS	N/A
FCC ID	2AIDA-33043
NOMINAL VOLTAGE	DC 6V(1.5V*4*AA) from Battery
MODULATION TECHNOLOGY	GFSK
OPERATING FREQUENCY	2420-2460MHz
ANTENNA TYPE	Wire antenna, with 0dBi 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.: 180612N043) for detailed product photo.

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 Y 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 6V from Battery

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

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

NOTE: No need to concern of Conducted Emission due to the EUT is powered by battery.

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

TESTED CHANNEL	TESTED FREQUENCY
Low	2420MHz
Middle	2440 MHz
High	2460 MHz

Channel List

Channel	Frequency (MHz)
1	2420
2	2440
3	2460

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

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE	23deg. C, 56%RH	DC 6V from Battery	Evans&Walker
BW	23deg. C, 56%RH	DC 6V from Battery	Aaron
PLC	-	-	-

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	-	-	-	-	-

NO.	DESCRIPTION OF THE ABOVE SUPPORT UNITS
1, 2	-

4. TEST TYPES AND RESULTS

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 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.

4.1.2 TEST INSTRUMENTS

Instrument	Model	Serial #	Cal Date	Cal Due
Agilent ESA-E SERIES SPECTRUM ANALYZER	E4407B	MY45108319	Feb 11, 18	Feb. 10, 19
EMI test receiver	ESL6	1300.5001K06-100262-eQ	Jan, 05, 18	Jan. 04, 19
SYNTHESIZED SIGNAL GENERATOR	8665B	3744A01293	Jan, 05, 18	Jan. 04, 19
Bilog Antenna (30MHz~6GHz)	JB6	A110712	Feb 08, 18	Feb. 07, 19
Bilog Antenna (30MHz~2GHz)	JB1	A112017	Jan 26, 18	Jan. 25, 19
A-INFOMW Horn Antenna (1~18GHz)	AH-118	71259	Jan 26, 18	Jan. 25, 19
Pre-Amplifier (100MHz-26.5GHz)	EMC 012645	980077	May 18, 18	May 17, 19
Pre-Amplifier (18GHz-40GHz)	EMC 184045	980102	Nov. 08,17	Nov. 07,18
EMCO Horn Antenna (1~18GHz)	AH-118	71283	Feb 02, 18	Feb. 01, 19
OPT 010 AMPLIFIER (0.1~1300MHz)	8447E	2727A02430	Dec. 09, 17	Dec. 08, 18
Horn Antenna	BBHA 9170	BBHA9170147	Mar. 14, 18	Mar. 13, 19
Microwave Preamplifier (0.5 ~ 18GHz)	PAM-118	443008	Dec. 09, 17	Dec. 08, 18
Large Loop Antenna	RF300	Rf300	Dec. 09, 17	Dec. 08, 18
Universal Radio Communication Tester	CMU200	121393	Feb 11, 18	Feb. 10, 19
Positioning Controller	UC3000	MF780208282	Dec. 09, 17	Dec. 08, 18
Test Software	EZ-EMC	ver.lcp-03A1	N/A	N/A

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 535293.

The following instrument list is provided by BV:

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESU40	100449	Mar. 21,18	Mar. 20,19
Bilog Antenna	Teseq	CBL 6111D	30643	Jul. 28, 17	Jul. 27, 18
Amplifier	Burgeon	BPA-530	100220	Apr. 18,18	Apr. 18,19
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

4.1.3 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:

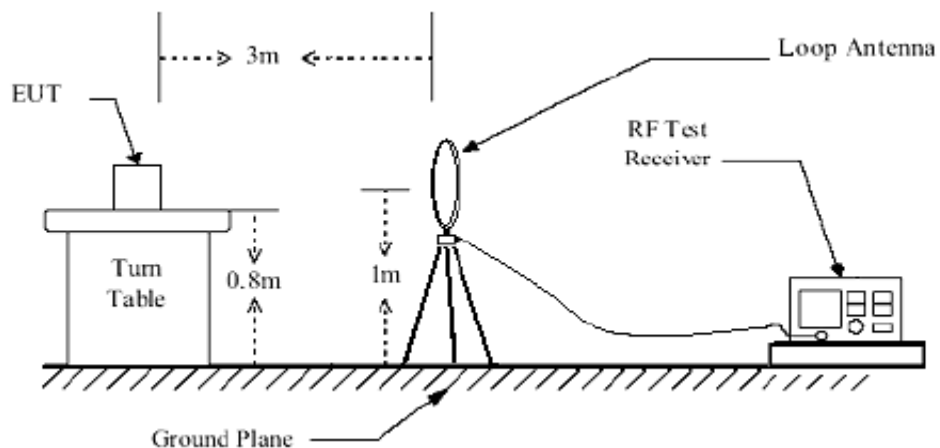
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution 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.

4.1.4 DEVIATION FROM TEST STANDARD

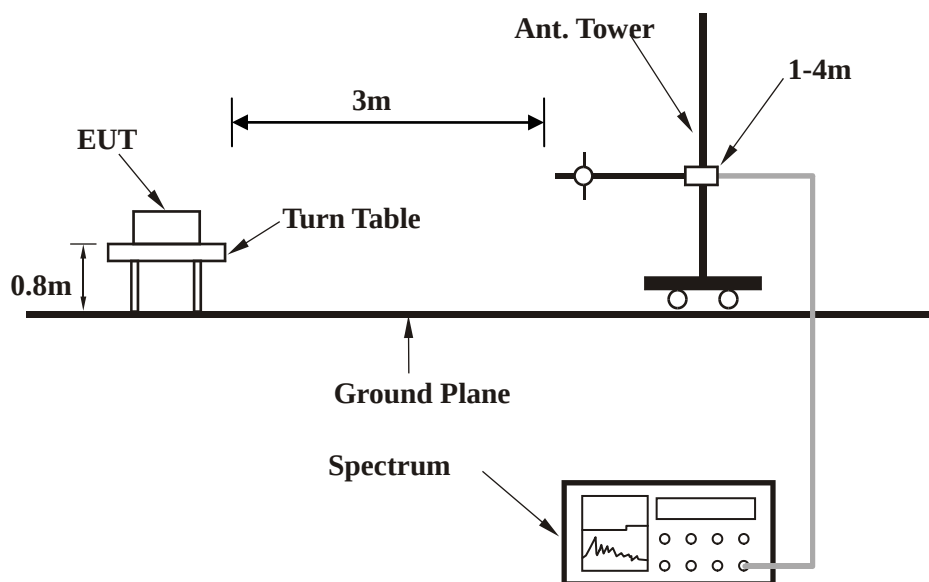
No deviation.

4.1.5 TEST SETUP

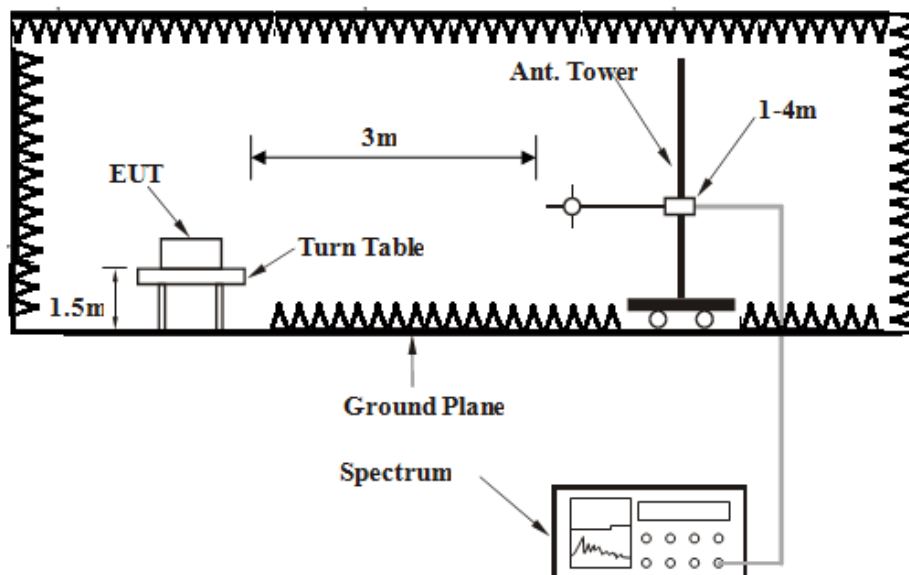
Below 30MHz test setup



Below 1GHz test setup



Above 1GHz test setup



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

4.1.6 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.

4.1.7 TEST RESULTS

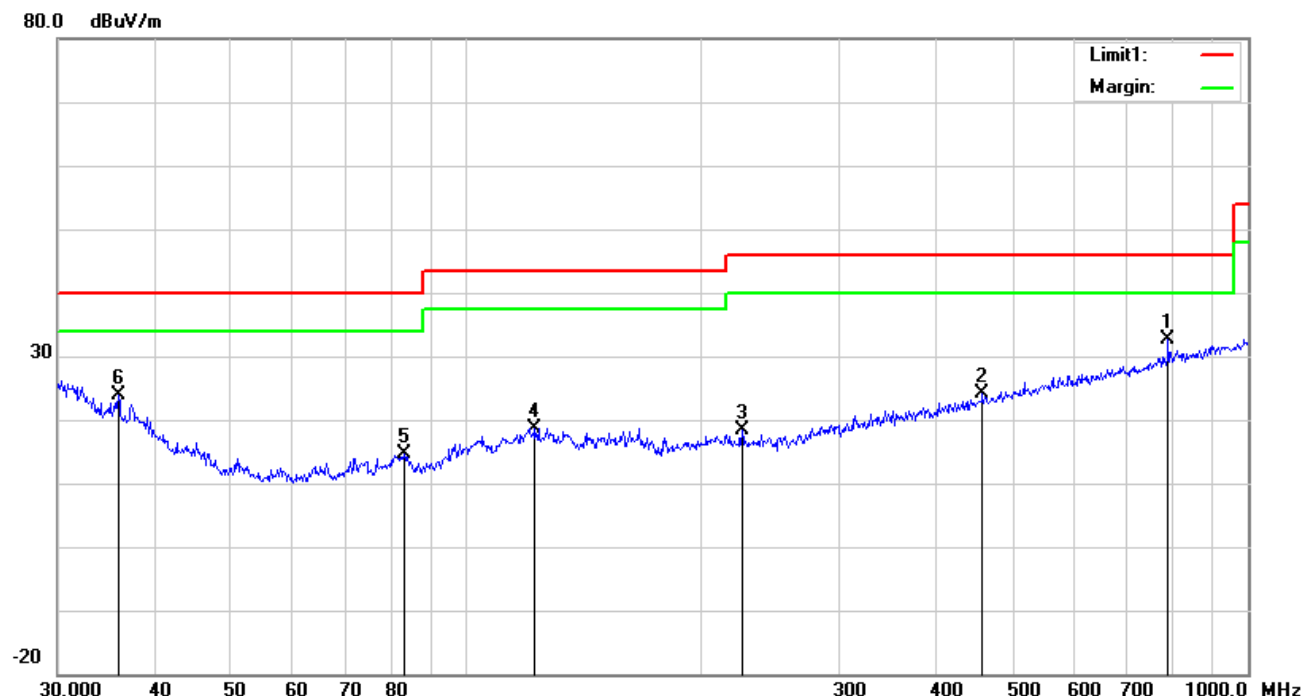
BELOW 1GHz WORST-CASE DATA

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

ANTENNA POLARITY & test distance: HORIZONTAL at 3 m										
No.	Frequency (MHz)	Reading (dBuV/m)	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	790.6188	29.50	21.29	21.17	2.94	32.56	46.00	-13.44	100	113
2	457.5073	27.09	16.85	21.89	2.17	24.22	46.00	-21.78	200	74
3	225.3080	27.32	11.75	22.33	1.62	18.36	46.00	-27.64	100	272
4	122.4040	26.14	13.74	22.37	1.17	18.68	43.50	-24.82	100	74
5	83.2298	28.25	7.73	22.39	1.06	14.65	40.00	-25.35	100	128
6	35.8747	28.42	16.91	22.26	0.77	23.84	40.00	-16.16	100	79

REMARKS:

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

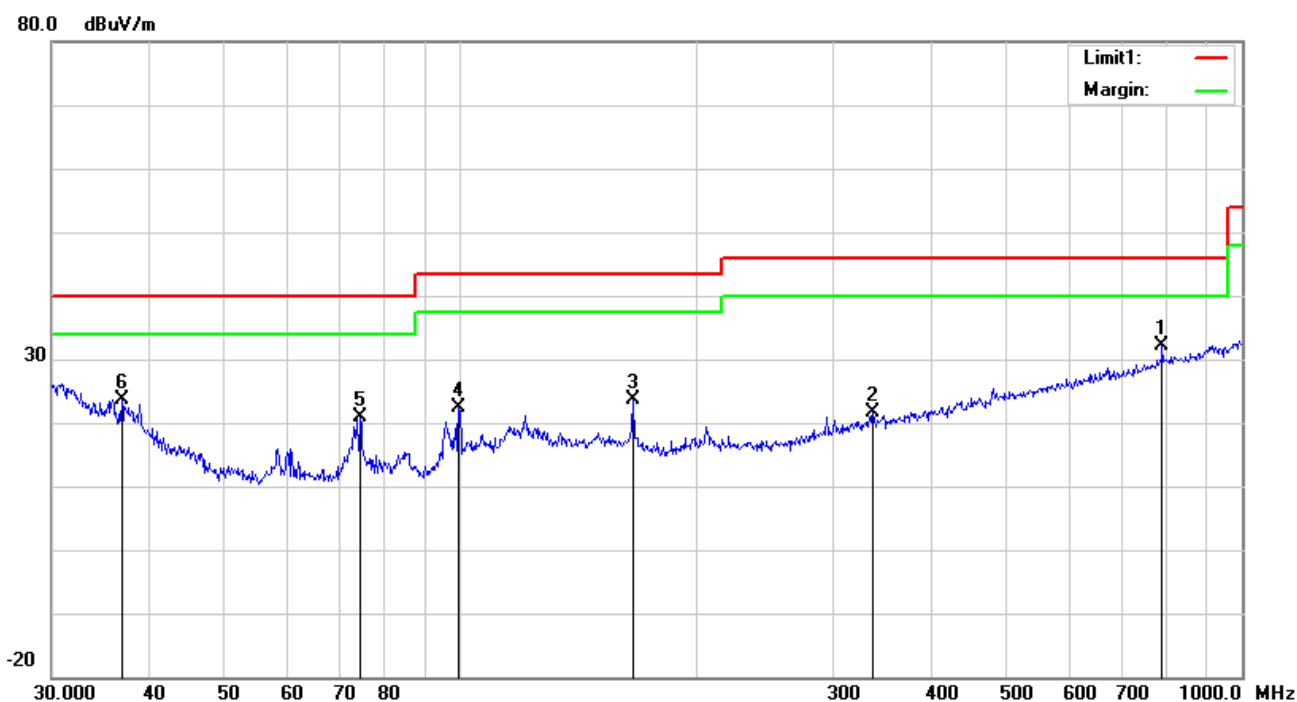


CHANNEL	TX Middle Channel	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9KHz ~ 1GHz		

ANTENNA POLARITY & test distance: Vertical at 3 m										
No.	Frequency (MHz)	Reading (dBuV/m)	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	790.6188	29.16	21.29	21.17	2.94	32.22	46.00	-13.78	100	6
2	337.2155	27.57	14.38	22.19	1.98	21.74	46.00	-24.26	100	144
3	166.0680	32.43	12.11	22.26	1.37	23.65	43.50	-19.85	100	320
4	99.5281	33.38	10.29	22.32	1.11	22.46	43.50	-21.04	100	107
5	74.3955	34.53	7.71	22.40	0.96	20.80	40.00	-19.20	100	107
6	36.8953	28.91	16.17	22.26	0.77	23.59	40.00	-16.41	100	285

REMARKS:

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



ABOVE 1GHz WORST-CASE DATA:

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

Frequency (MHz)	Average Factor (dB)	Polarity (H/V)	Field Strength(PK) (dBuV/m)	Field Strength(AV) (dBuV/m)	Limit(PK) (dBuV/m)	Limit(AV) (dBuV/m)	Margin(PK) (dB)	Margin(AV) (dB)
4840	-10.59	H	59.29	48.7	74	54	-14.71	-5.3
7260	-10.59	H	50.9	40.31	74	54	-23.1	-13.69
4840	-10.59	V	57.13	46.54	74	54	-16.87	-7.46
7260	-10.59	V	51.2	40.61	74	54	-22.8	-13.39

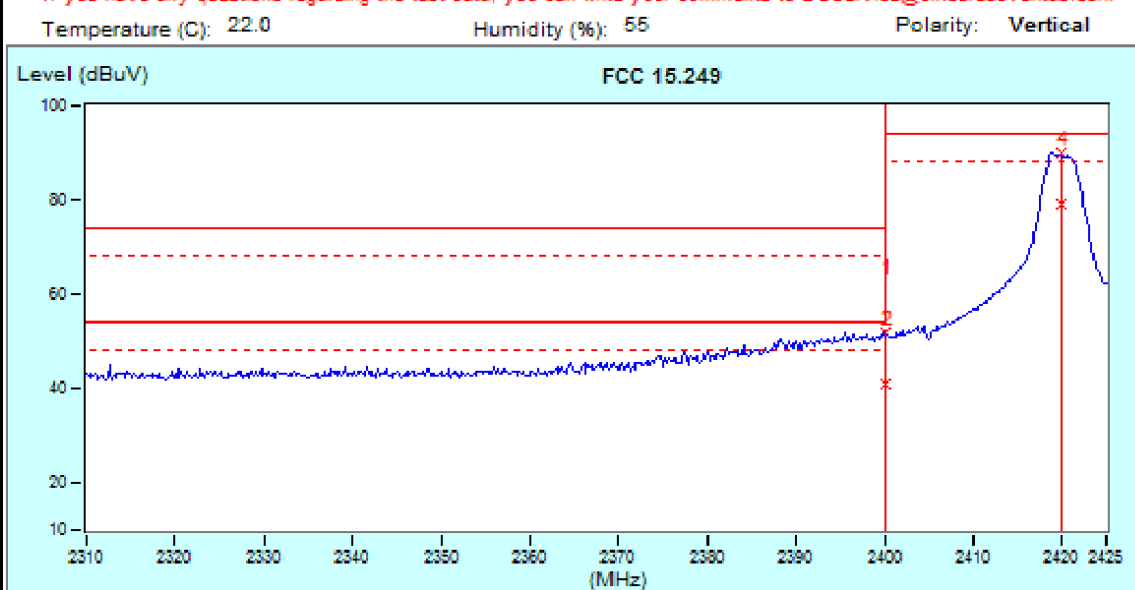
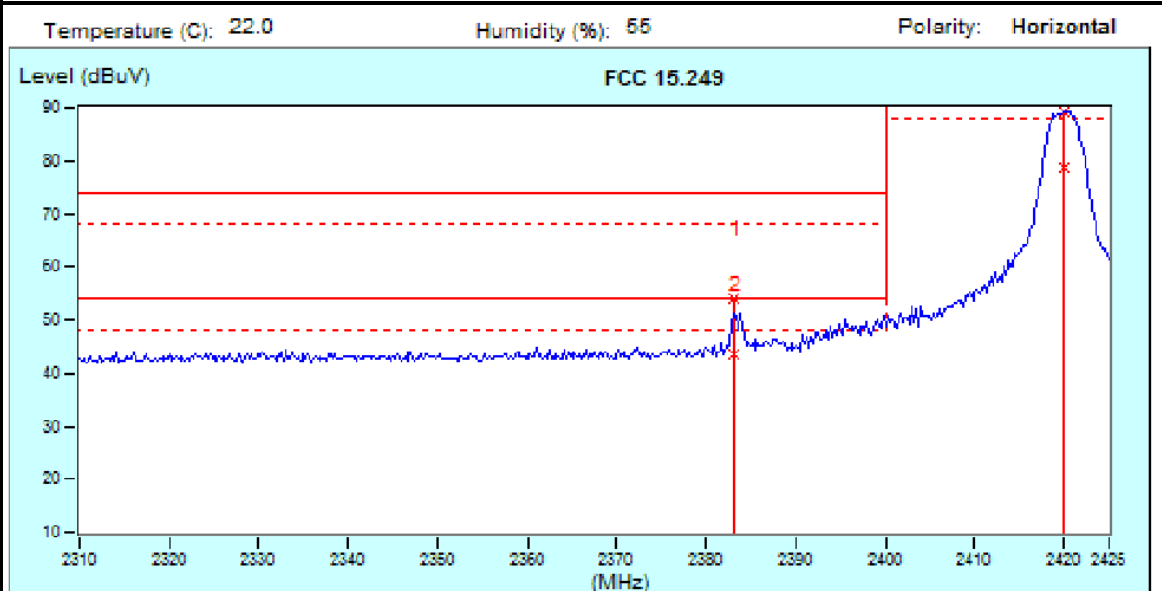
Frequency (MHz)	Average Factor (dB)	Polarity (H/V)	Field Strength(PK) (dBuV/m)	Field Strength(AV) (dBuV/m)	Limit(PK) (dBuV/m)	Limit(AV) (dBuV/m)	Margin(PK) (dB)	Margin(AV) (dB)
*2420	-10.59	H	89.17	78.58	114	94	-24.83	-15.42
*2420	-10.59	V	89.9	79.31	114	94	-24.1	-14.69

REMARKS:

1. Field strength value(AV) (dBuV/m) = Field strength value(PK) (dBuV/m) + Average Factor (dB).
2. Margin value = Field strength value – Limit value..
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. . " * ": Fundamental frequency.

Band edge Plot

2420MHz Horizontal and Vertical



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

Frequency	Average	Polarity	Field	Field	Limit(PK)	Limit(AV)	Margin(PK)	Margin(AV)
(MHz)	Factor (dB)	(H/V)	Strength(PK) (dBuV/m)	Strength(AV) (dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	(dB)
4880	-10.59	H	57.92	47.33	74	54	-16.08	-6.67
7320	-10.59	H	50.23	39.64	74	54	-23.77	-14.36
4880	-10.59	V	60.37	49.78	74	54	-13.63	-4.22
7320	-10.59	V	49.5	38.91	74	54	-24.5	-15.09

Frequency	Average	Polarity	Field	Field	Limit(PK)	Limit(AV)	Margin(PK)	Margin(AV)
(MHz)	Factor (dB)	(H/V)	Strength(PK) (dBuV/m)	Strength(AV) (dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	(dB)
*2440	-10.59	H	90.65	80.06	114	94	-23.35	-13.94
*2440	-10.59	V	89.95	79.36	114	94	-24.05	-14.64

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)

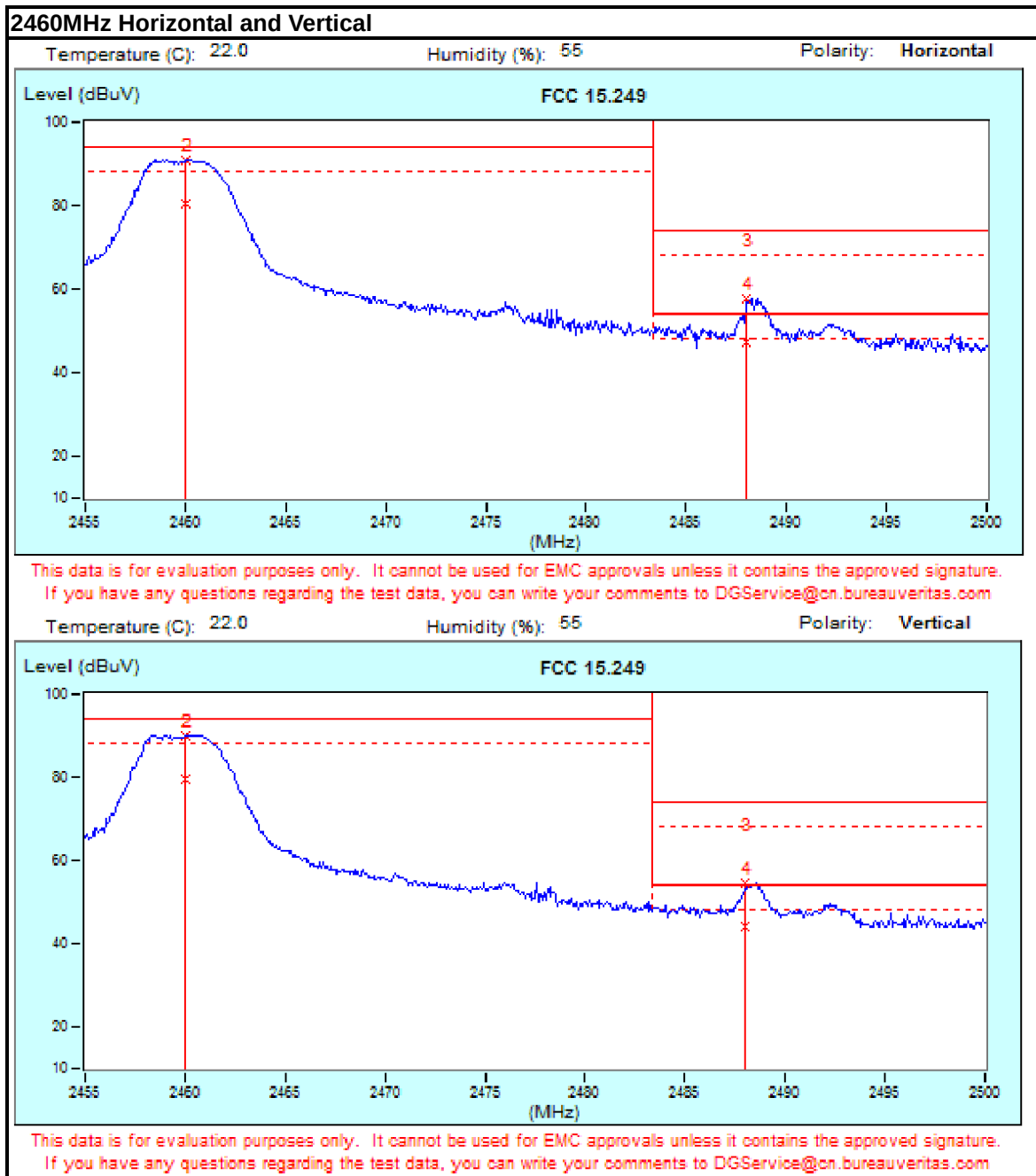
Frequency (MHz)	Average Factor (dB)	Polarity (H/V)	Field Strength(PK) (dBuV/m)	Field Strength(AV) (dBuV/m)	Limit(PK) (dBuV/m)	Limit(AV) (dBuV/m)	Margin(PK) (dB)	Margin(AV) (dB)
4920	-10.59	H	58.39	47.8	74	54	-15.61	-6.2
7380	-10.59	H	50.67	40.08	74	54	-23.33	-13.92
4920	-10.59	V	60.05	49.46	74	54	-13.95	-4.54
7380	-10.59	V	49.89	39.3	74	54	-24.11	-14.7

Frequency (MHz)	Average Factor (dB)	Polarity (H/V)	Field Strength(PK) (dBuV/m)	Field Strength(AV) (dBuV/m)	Limit(PK) (dBuV/m)	Limit(AV) (dBuV/m)	Margin(PK) (dB)	Margin(AV) (dB)
*2460	-10.59	H	91.1	80.51	114	94	-22.9	-13.49
*2460	-10.59	V	90.21	79.62	114	94	-23.79	-14.38

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



NOTE: The TX ABOVE 1GHz date is test to Bureau Veritas (Dongguan-China) Laboratories.

4.2 20dB BANDWIDTH MEASUREMENT

4.2.1 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.

4.2.2 TEST INSTRUMENTS

Instrument	Model	Serial #	Cal Date	Cal Due
Power Sensor	Dare RPR3006C/P/W	N/A	Jan. 05, 18	Jan. 04, 19
Power Sensor	Dare RPR3006C/P/W	N/A	Jan. 05, 18	Jan. 04, 19
Agilent ESA-E SERIES SPECTRUM ANALYZER	E4407B	MY45108319	Feb. 11, 18	Feb. 10, 19
EMI test receiver	ESL6	1300.5001K06- 100262-eQ	Jan. 05, 18	Jan. 04, 19
Power Splitter	1#	1#	Dec. 09, 17	Dec. 08, 18
SYNTHESIZED SIGNAL GENERATOR	8665B	3744A01293	Jan. 05, 18	Jan. 04, 19
DC Power Supply	E3640A	MY40004013	Jan. 05, 18	Jan. 04, 19
Bilog Antenna (30MHz~6GHz)	JB6	A110712	Feb. 08, 18	Feb. 07, 19
Bilog Antenna (30MHz~2GHz)	JB1	A112017	Jan. 26, 18	Jan. 25, 19
A-INFOMW Horn Antenna (1~18GHz)	AH-118	71259	Jan. 26, 18	Jan. 25, 19
Pre-Amplifier (100MHz-26.5GHz)	EMC 012645	980077	May 18, 18	May 17, 19
Pre-Amplifier (18GHz-40GHz)	EMC 184045	980102	Nov. 08, 17	Nov. 07, 18
EMCO Horn Antenna (1~18GHz)	AH-118	71283	Feb. 02, 18	Feb. 01, 19
OPT 010 AMPLIFIER (0.1~1300MHz)	8447E	2727A02430	Dec. 09, 17	Dec. 08, 18
Horn Antenna	BBHA 9170	BBHA9170147	Mar. 14, 18	Mar. 13, 19
Microwave Preamplifier (0.5 ~ 18GHz)	PAM-118	443008	Dec. 09, 17	Dec. 08, 18
Attenuator	MINI	N/A	Dec. 09, 17	Dec. 08, 18
Test Software	EZ-EMC	ver.lcp-03A1	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.

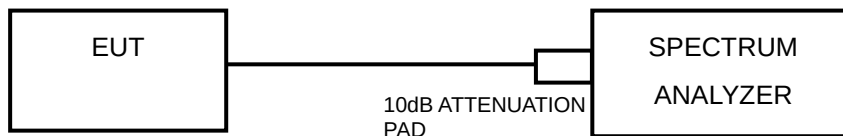
4.2.3 TEST PROCEDURE

- 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.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



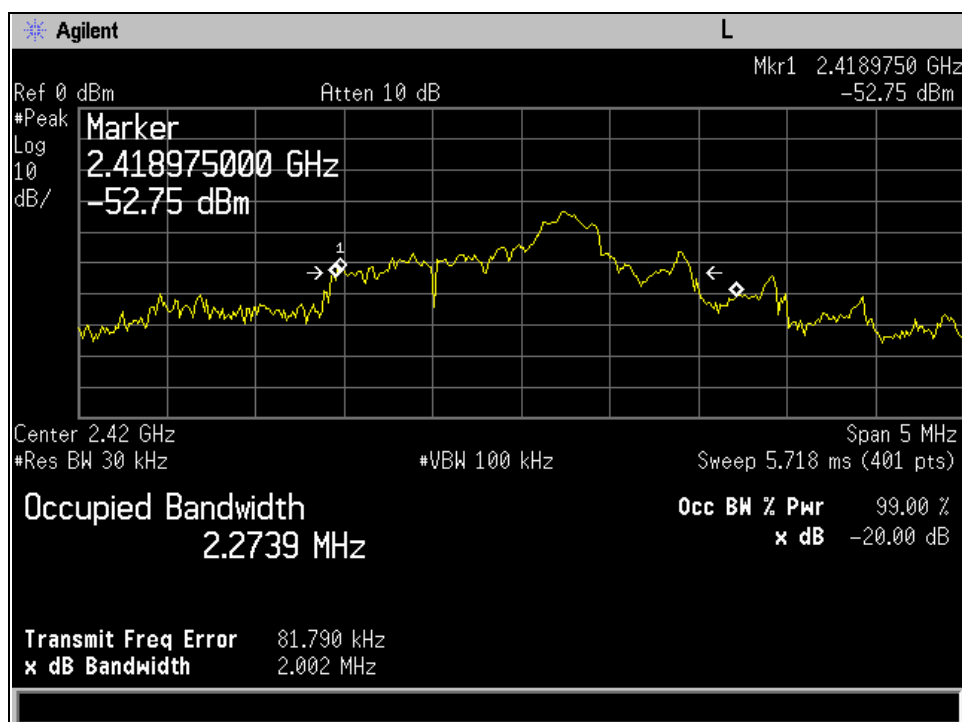
4.2.6 EUT OPERATING CONDITIONS

- 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.

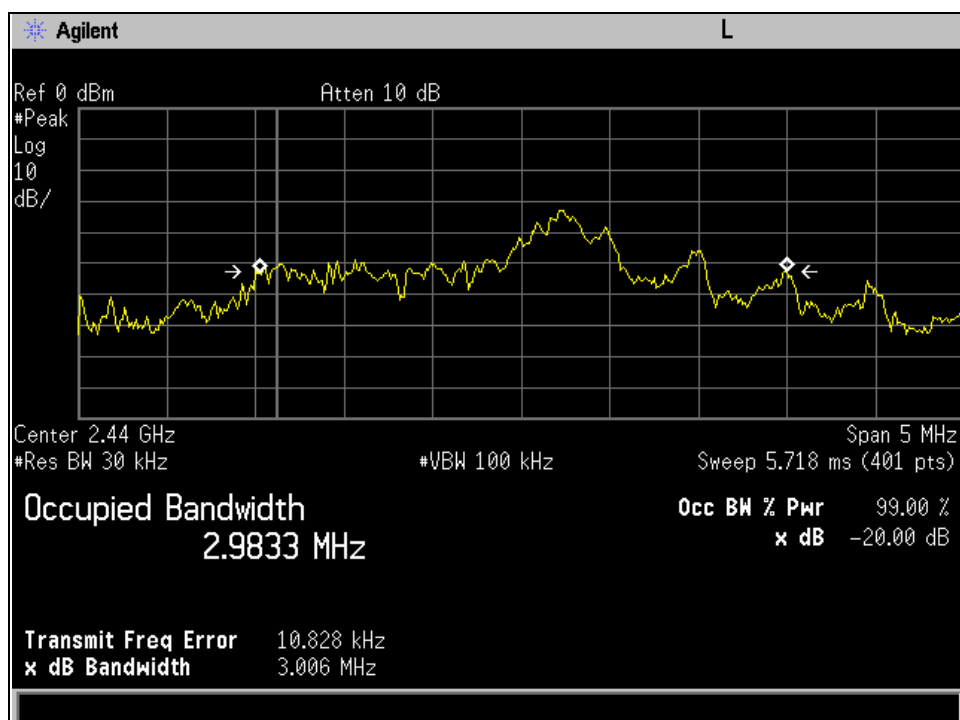
4.2.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
Low	2420	2.2739
Middle	2440	2.9833
High	2460	3.2810

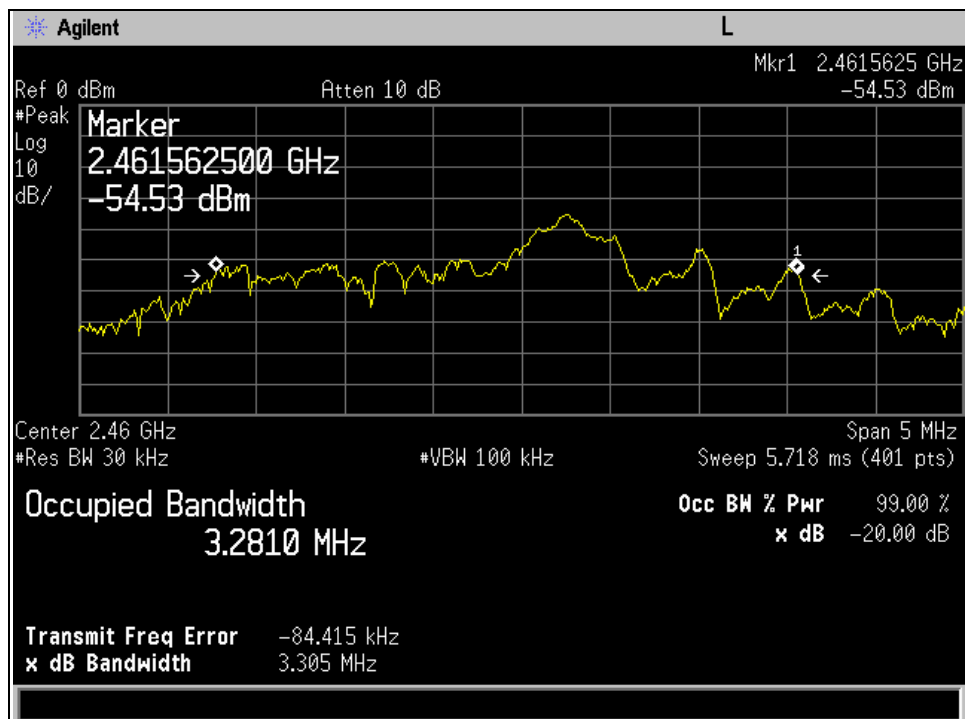
Test Data: Low channel



Test Data: Middle channel



Test Data: High channel



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---