

TEST REPORT

Applicant:	Shantou Chenghai Huabo Smart Living Technology Co., Ltd
Address:	Next to Chengjiang Road, Dutou Village, Shanghua County, Chenghai District, Shantou City, Guangdong, China

Manufacturer or Supplier	Shantou Chenghai Huabo Smart Living Technology Co., Ltd
Address	Next to Chengjiang Road, Dutou Village, Shanghua County, Chenghai District, Shantou City, Guangdong, China
Product:	Toy RC Hydro Racer
Brand Name:	Sharper Image
Model:	1017332
Additional Models & Model Difference	1017936, HB2023S, 101XXXX (where XXX can be digits 0000-9999 which represent different customers), see item 3.1
Date of tests:	Oct. 11, 2023 ~ Nov. 01, 2023

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 Loren Luo Project Engineer / EMC Department	Approved by Glyn He Assistant Manager / EMC Department
	 Date: Nov. 29, 2023

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TABLE OF CONTENTS

RELEASE CONTROL RECORD	3
1 SUMMARY OF TEST RESULTS.....	4
2 MEASUREMENT UNCERTAINTY	4
3 GENERAL INFORMATION	5
3.1 GENERAL DESCRIPTION OF EUT.....	5
3.2 DESCRIPTION OF TEST MODES.....	6
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS.....	8
3.4 DESCRIPTION OF SUPPORT UNITS.....	8
3.5 CONFIGURATION OF SYSTEM UNDER TEST.....	8
3.6 DUTY CYCLE OF TESET SIGNAL	9
4. TEST TYPES AND RESULTS.....	10
4.1 RADIATED EMISSION MEASUREMENT	10
4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT	10
4.1.2 TEST INSTRUMENTS.....	11
4.1.3 TEST PROCEDURES	12
4.1.4 DEVIATION FROM TEST STANDARD	12
4.1.5 TEST SETUP	13
4.1.6 EUT OPERATING CONDITIONS	14
4.1.7 TEST RESULTS	15
4.2 20dB BANDWIDTH MEASUREMENT	22
4.2.1 LIMITS OF 20dB BANDWIDTH MEASUREMENT	22
4.2.2 TEST INSTRUMENTS	22
4.2.3 TEST PROCEDURE	23
4.2.4 DEVIATION FROM TEST STANDARD	23
4.2.5 TEST SETUP	23
4.2.6 EUT OPERATING CONDITIONS.....	23
4.2.7 TEST RESULTS.....	24
5. PHOTOGRAPHS OF THE TEST CONFIGURATION.....	26
6. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB.....	27



Test Report No.: RF2310WDG0007-2

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF2310WDG0007-2	Original release	Nov. 29, 2023

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

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	2.72dB
	30MHz ~ 1GMHz	4.24dB
	1GHz ~ 18GHz	4.78dB
	18GHz ~ 40GHz	4.50dB

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	Toy RC Hydro Racer
MODEL NO.	1017332
ADDITIONAL MODELS	1017936, HB2023S, 101XXXX (where XXX can be digits 0000-9999 which represent different customers)
FCC ID	2A4XIHB2023S24GR
NOMINAL VOLTAGE	DC 1.2V from battery
MODULATION TECHNOLOGY	GFSK
OPERATING FREQUENCY	2410MHz -2473MHz
ANTENNA TYPE	Wire Antenna, with -3dBi gain
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	N/A

NOTES:

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.: 2310WDG0007-2) for detailed product photo.
4. Additional models (see above table) are identical with the test model 1017332 except the color of the appearance and model number for trading purpose.
5. The EUT doesn't normal working while USB charging.

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 1.2V 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	2410 MHz
Middle	2442 MHz
High	2473 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	63	2472
16	2425	32	2441	48	2457	64	2473

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 1.2V from Battery	Ryker
BW	25deg. C, 56%RH	DC 1.2V from Battery	Ryker
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

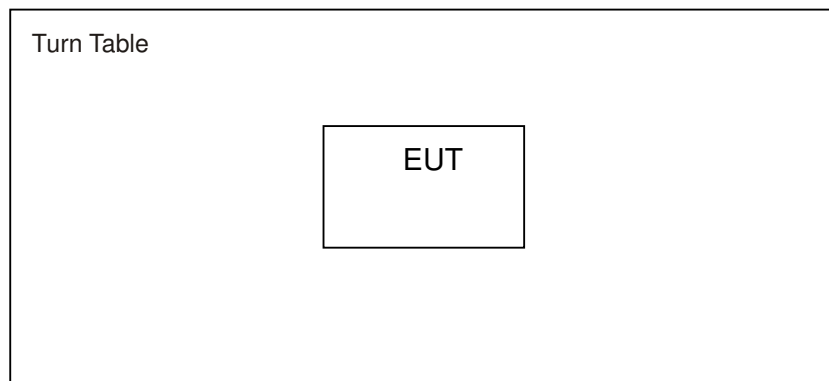
ANSI C63.10-2013

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 without any other necessary accessories or support units

3.5 CONFIGURATION OF SYSTEM UNDER TEST



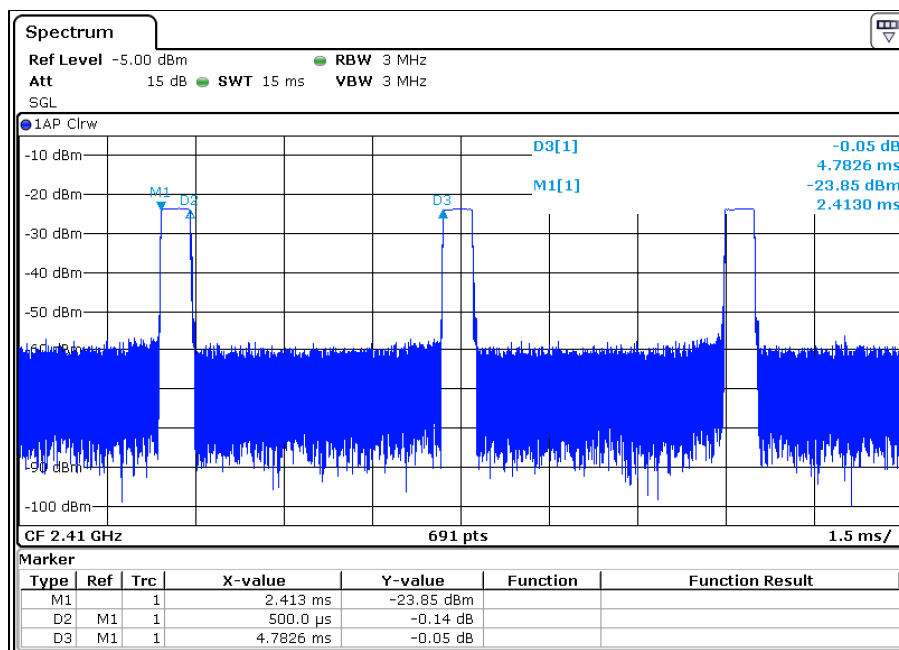
3.6 DUTY CYCLE OF TESET SIGNAL

$T_p = 4.7826 \text{ ms}$

$T_{on} = (500)/1000 \approx 0.5 \text{ ms}$

$\text{Duty Cycle} = T_{on} / T_p * 100\% = 0.5/4.7826 \approx 10.455\%$

$\text{AV factor} = 20 \log (\text{Duty cycle}) = 20 \log (10.455\%) \approx -19.61 \text{ dB}$



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.

NOTES:

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

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
Spectrum Analyzer	Rohde&Schwarz	FSV3044	101326	July 13, 24
EMI Test Receiver	Rohde&Schwarz	ESU8	100372	Apr. 06, 24
Bilog Antenna	SCHWARZBECK	VULB 9168	9168-555	Jan. 08, 24
Pre-Amplifier	Agilent	8447D	2944A10488	July. 26, 24
3m Semi-anechoic Chamber	ETS-Lindgren	9m*6m*6m	D3040003DG-1	July 30, 24
Coaxial RF Cable	Joinfront	JFAA6-NMNM-8000	2100033742	July 10, 24
Coaxial RF Cable	Joinfront	JFAR-NMBNCM-2000	2100033742	July 10, 24
Coaxial RF Cable	Joinfront	JFAR-BNCMSMM-500	2100033742	July 10, 24
Test software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A
Horn Antenna	ETS-Lindgren	3117	00240041	May 06, 24
Horn Antenna	SCHWARZBECK	BBHA 9170	01024	Oct. 16, 24
Pre-Amplifier (1GHz-18GHz)	Rohde&Schwarz	SCU18	102265	Apr. 01, 24
Pre-Amplifier (18GHz-40GHz)	Rohde&Schwarz	SCU40	100437	Oct. 10, 24
Coaxial RF Cable	Joinfront	JFAA6-NMNM-8000	2100033742	July 10, 24
Coaxial RF Cable	Joinfront	JFAA6-NMSMM-2000	2100033742	July 10, 24
Coaxial RF Cable	Joinfront	JFAA6-NMSMM-800	2100033742	July 10, 24

NOTES:

1. The test was performed in 966 Chamber-3.
2. The calibration interval of the above test instruments are 12/24* months and the calibrations are traceable to CEPREI/CHINA, GREGT/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.
5. Test site: No. 122, Houjie Avenue West Houjie Town, Dongguan City Guangdong Province, 523960, People's Republic of China.

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 1.3m 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.

NOTES:

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. Average value =PK Emission +AV Factor.
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

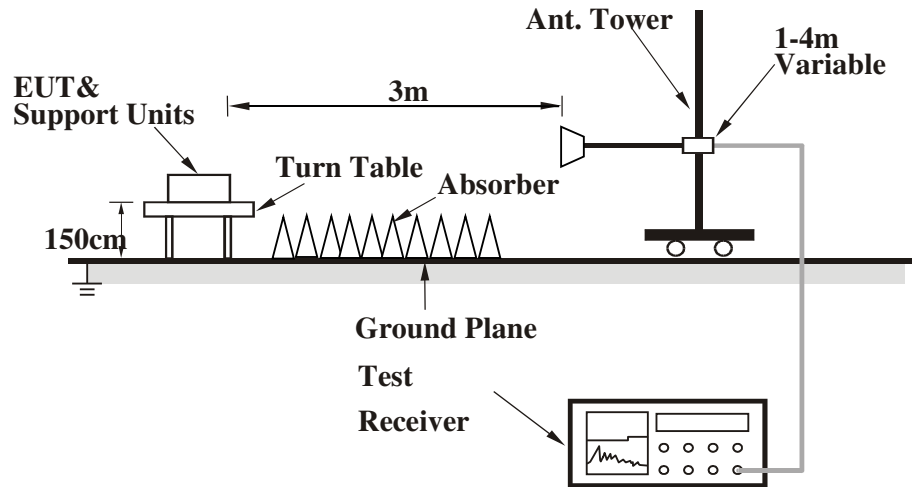
Below 30MHz test setup



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

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

4.1.7 TEST RESULTS

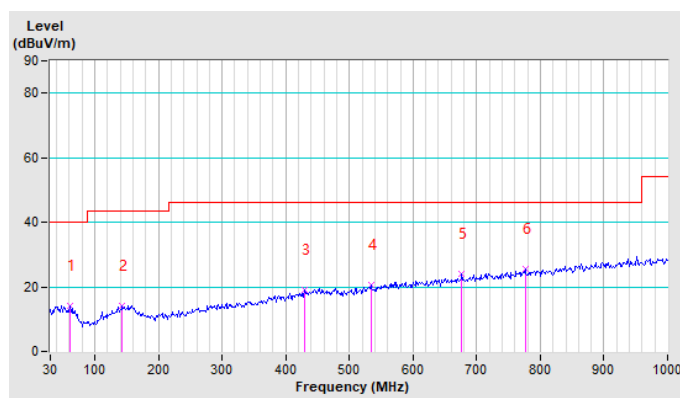
BELOW 1GHz WORST-CASE DATA

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	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	61.09	14.25 QP	40.00	-25.75	1.00 H	306	28.56	-14.31
2	143.48	14.23 QP	43.50	-29.27	1.00 H	174	27.44	-13.21
3	429.50	19.03 QP	46.00	-26.97	1.20 H	58	27.99	-8.96
4	533.65	20.69 QP	46.00	-25.31	1.20 H	183	27.89	-7.20
5	676.67	23.89 QP	46.00	-22.11	1.00 H	177	28.26	-4.37
6	776.15	25.58 QP	46.00	-20.42	1.00 H	285	27.85	-2.27

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 greater than 20dB margin.
4. 9KHz~30MHz have been test and test data more than 20dB margin.
5. Margin value = Emission level – Limit value.

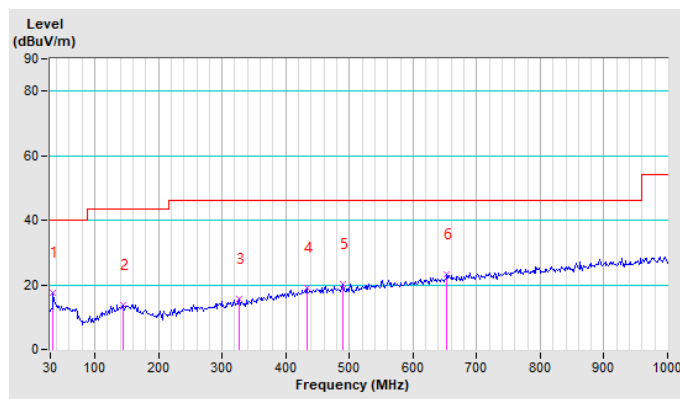


CHANNEL	TX Middle Channel	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9KHz ~ 1GHz		

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	34.66	17.57 QP	40.00	-22.43	1.00 V	158	31.94	-14.37
2	145.03	13.85 QP	43.50	-29.65	1.00 V	122	26.98	-13.13
3	326.91	15.59 QP	46.00	-30.41	1.10 V	212	26.51	-10.92
4	432.61	19.15 QP	46.00	-26.85	1.10 V	134	27.95	-8.80
5	490.13	20.11 QP	46.00	-25.89	1.30 V	182	28.37	-8.26
6	653.35	23.34 QP	46.00	-22.66	1.30 V	262	28.10	-4.76

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 greater than 20dB margin.
4. 9KHz~30MHz have been test and test data more than 20dB margin.
5. 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)

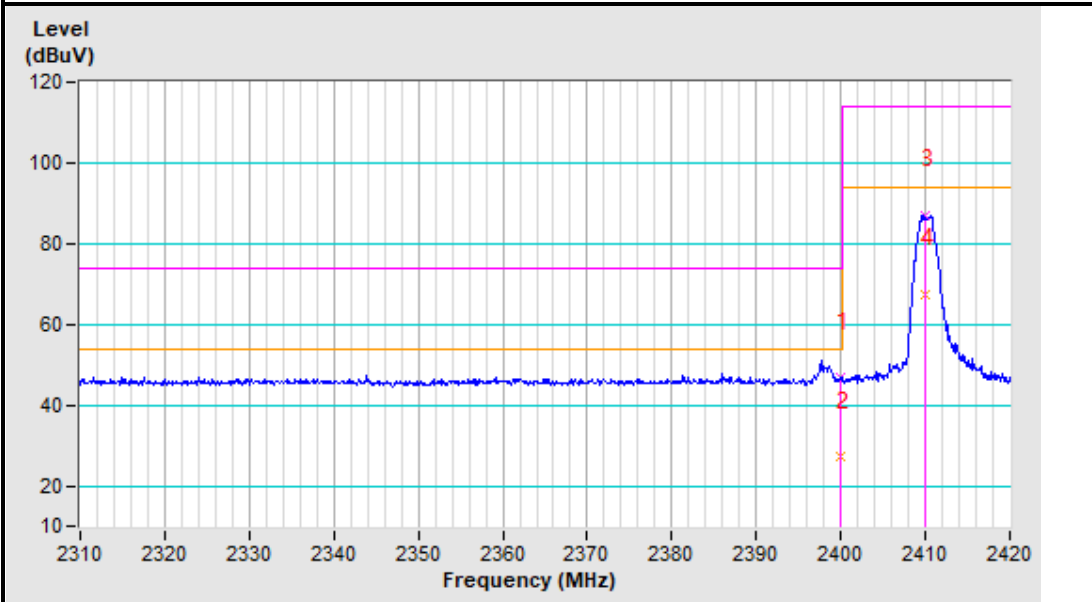
ANTENNA POLARITY & TEST DISTANCE : HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2400.00	46.66 PK	74.00	-27.34	1.20 H	130	49.88	-3.22
2	2400.00	27.05 AV	54.00	-26.95	1.20 H	130	30.27	-3.22
3	*2410.00	87.01 PK	114.00	-26.99	1.20 H	130	90.21	-3.20
4	*2410.00	67.40 AV	94.00	-26.60	1.20 H	130	70.60	-3.20
5	4820.00	52.14 PK	74.00	-21.86	1.00 H	236	54.35	-2.21
6	4820.00	32.53 AV	54.00	-21.47	1.00 H	236	34.74	-2.21
7	7230.00	52.52 PK	74.00	-21.48	1.00 H	152	51.25	1.27
8	7230.00	32.91 AV	54.00	-21.09	1.00 H	152	31.64	1.27
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	2400.00	45.61 PK	74.00	-28.39	1.00 V	200	48.83	-3.22
2	2400.00	26.00 AV	54.00	-28.00	1.00 V	200	29.22	-3.22
3	*2410.00	83.54 PK	114.00	-30.46	1.00 V	200	86.74	-3.20
4	*2410.00	63.93 AV	94.00	-30.07	1.00 V	200	67.13	-3.20
5	4820.00	51.79 PK	74.00	-22.21	1.00 V	158	54.00	-2.21
6	4820.00	32.18 AV	54.00	-21.82	1.00 V	158	34.39	-2.21
7	7230.00	52.48 PK	74.00	-21.52	1.00 V	144	51.21	1.27
8	7230.00	32.87 AV	54.00	-21.13	1.00 V	144	31.60	1.27

REMARK:

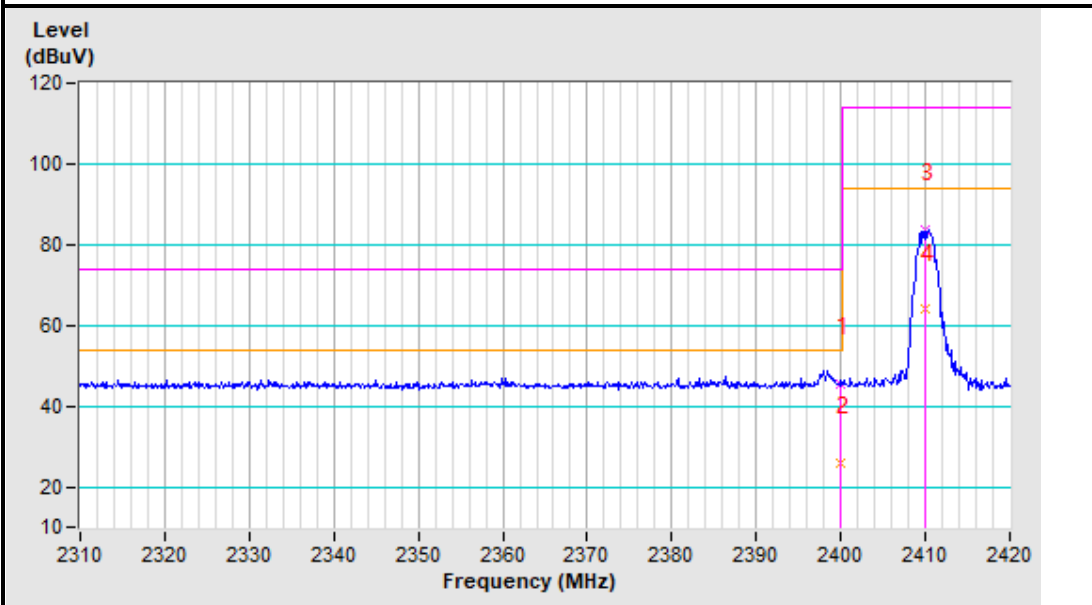
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were greater than 20dB margin.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. Average value = PK Emission + 20*log(duty cycle) Where the duty factor is calculated from following formula: 20 log (Duty cycle) = 20Log(10.455%) = -19.61dB, Please see page 9 for plotted duty.

Band edge Plot

2410MHz Horizontal



2410MHz 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	*2442.00	82.26 PK	114.00	-31.74	1.00 H	125	85.37	-3.11
2	*2442.00	62.65 AV	94.00	-31.35	1.00 H	125	65.76	-3.11
3	4884.00	53.09 PK	74.00	-20.91	1.52 H	206	55.28	-2.19
4	4884.00	33.48 AV	54.00	-20.52	1.52 H	206	35.67	-2.19
5	7326.00	52.40 PK	74.00	-21.60	1.15 H	188	51.56	0.84
6	7326.00	32.79 AV	54.00	-21.21	1.15 H	188	31.95	0.84
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	*2442.00	76.35 PK	114.00	-37.65	1.00 V	125	79.46	-3.11
2	*2442.00	56.74 AV	94.00	-37.26	1.00 V	125	59.85	-3.11
3	4884.00	51.81 PK	74.00	-22.19	1.20 V	130	54.00	-2.19
4	4884.00	32.20 AV	54.00	-21.80	1.20 V	130	34.39	-2.19
5	7326.00	52.51 PK	74.00	-21.49	1.00 V	145	51.67	0.84
6	7326.00	32.90 AV	54.00	-21.10	1.00 V	145	32.06	0.84

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 greater than 20dB margin.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. Average value =PK Emission +20*log(duty cycle)Where the duty factor is calculated from following formula:20 log (Duty cycle) = 20Log(10.455%)= -19.61dB, Please see page 9 for plotted duty.

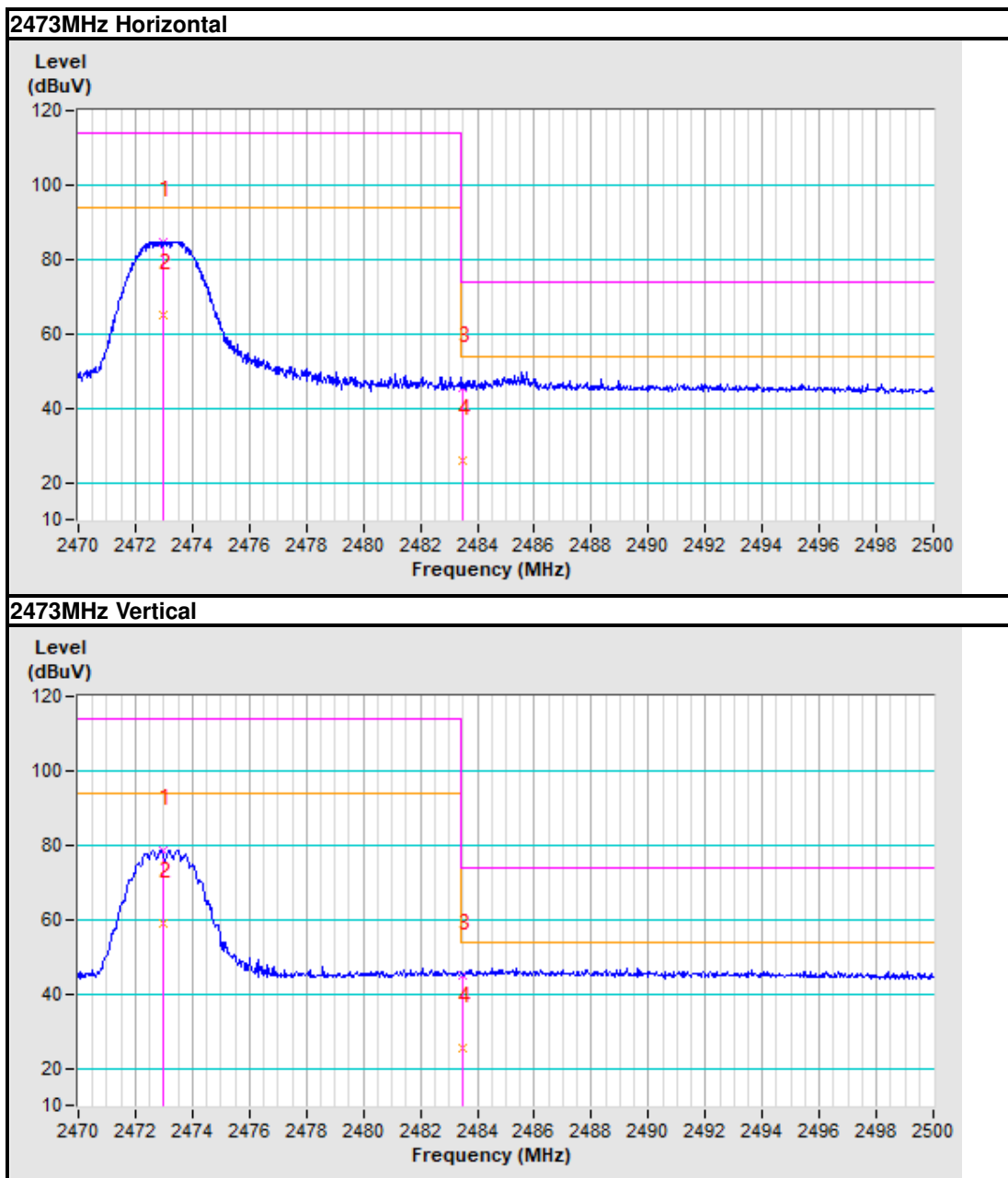
CHANNEL	TX High Channel	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	*2473.00	84.76 PK	114.00	-29.24	1.15 H	169	87.79	-3.03
2	*2473.00	65.15 AV	94.00	-28.85	1.15 H	169	68.18	-3.03
3	2483.50	45.61 PK	74.00	-28.39	1.15 H	169	48.61	-3.00
4	2483.50	26.00 AV	54.00	-28.00	1.15 H	169	29.00	-3.00
5	4946.00	53.34 PK	74.00	-20.66	1.25 H	145	55.50	-2.16
6	4946.00	33.73 AV	54.00	-20.27	1.25 H	145	35.89	-2.16
7	7419.00	52.01 PK	74.00	-21.99	1.00 H	152	51.59	0.42
8	7419.00	32.40 AV	54.00	-21.60	1.00 H	152	31.98	0.42
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	*2473.00	78.57 PK	114.00	-35.43	1.20 V	130	81.60	-3.03
2	*2473.00	58.96 AV	94.00	-35.04	1.20 V	130	61.99	-3.03
3	2483.50	45.05 PK	74.00	-28.95	1.20 V	130	48.05	-3.00
4	2483.50	25.44 AV	54.00	-28.56	1.20 V	130	28.44	-3.00
5	4946.00	50.91 PK	74.00	-23.09	1.00 V	125	53.07	-2.16
6	4946.00	31.30 AV	54.00	-22.70	1.00 V	125	33.46	-2.16
7	7419.00	51.78 PK	74.00	-22.22	1.00 V	185	51.36	0.42
8	7419.00	32.17 AV	54.00	-21.83	1.00 V	185	31.75	0.42

REMARK:

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 greater than 20dB margin.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. Average value = PK Emission + 20*log(duty cycle) Where the duty factor is calculated from following formula: 20 log (Duty cycle) = 20Log(10.455%) = -19.61dB, Please see page 9 for plotted duty.

Band edge Plot



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

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
Wireless Connectivity Tester	Rohde&Schwarz	CMW270	101601	Oct. 15, 24
Spectrum Analyzer	Rohde&Schwarz	FSV40	101003	Jan. 15, 24
Spectrum Analyzer	Rohde&Schwarz	FSV40	101094	Jan. 11, 24
Frequency Analyzer	Keysight	N9010B	MY60240432	Oct. 10, 24
Programmable Temperature&Humidity Chamber	Hongjin	HYC-TH-225DH	DG-180746	Jan. 11, 24
Attenuator	MINI	BW-S10W2+	S130129FGE2	N/A
DC Source	Agilent	E3640A	MY40004013	Feb. 08, 24
Test software	ADT	ADT_RF Test Software V6.6.5.3	N/A	N/A
Test software	ADT	ADT_RF Test Software V6.6.5.4	N/A	N/A

NOTES:

1. The test was performed in RF Test Shielded 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.
3. Test site: No. 122, Houjie Avenue West Houjie Town, Dongguan City Guangdong Province, 523960, People's Republic of 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



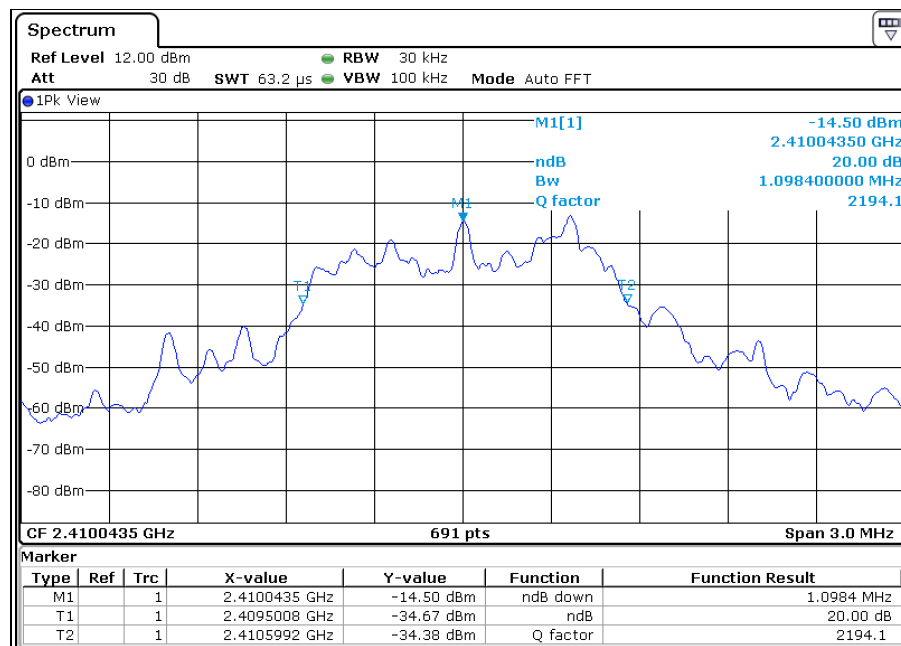
4.2.6 EUT OPERATING CONDITIONS

- 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.

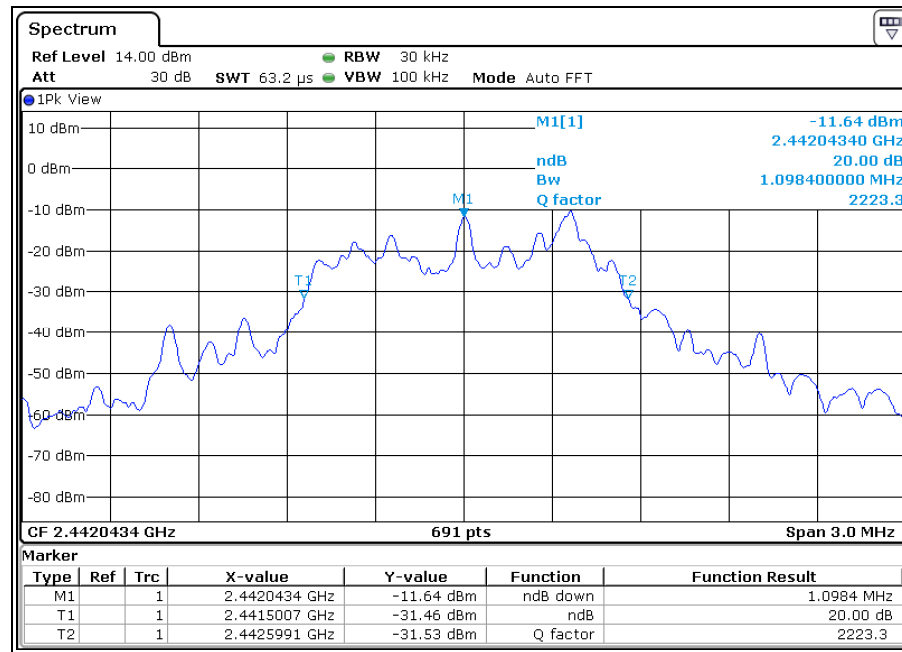
4.2.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
Low	2410	1.0984
Middle	2442	1.0984
High	2473	1.1071

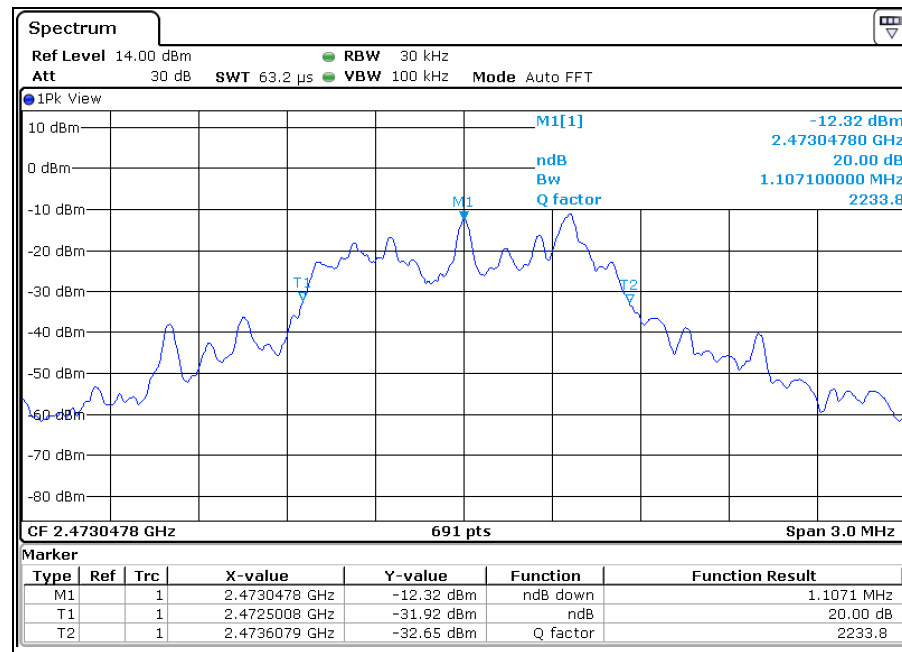
Test Data: Low channel



Test Data: Middle channel



Test Data: High channel





Test Report No.: RF2310WDG0007-2

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---