



Test Report No.: RF2311WDG0023-1



TEST REPORT

Applicant:	Voyetra Turtle Beach, Inc.
Address:	44 South Broadway, 4th Floor WHITE PLAINS, NEW YORK 10601 USA

Manufacturer or Supplier	Voyetra Turtle Beach, Inc.
Address	44 South Broadway, 4th Floor WHITE PLAINS, NEW YORK 10601 USA
Product:	VelocityOne Wheel Front
Brand Name:	TURTLE BEACH
Model:	VelocityOne RACE
Additional Model & Model Difference	N/A
Date of tests:	Nov. 07, 2023 ~ Dec. 25, 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: Jan. 15, 2024

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF2311WDG0023-1	Original release	Jan. 15, 2024

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	0.15MHz ~ 30MHz	3.09dB
Radiated emissions	9KHz ~ 30MHz	2.72dB
	30MHz ~ 1GMHz	4.24dB
	1GHz ~ 18GHz	4.10dB
	18GHz ~ 40GHz	4.10dB

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	VelocityOne Wheel Front
MODEL NO.	VelocityOne RACE
ADDITIONAL MODEL	N/A
FCC ID	XGB-231103TW
NOMINAL VOLTAGE	DC 5V
MODULATION TECHNOLOGY	GFSK
OPERATING FREQUENCY	2402MHz ~ 2480MHz
ANTENNA TYPE	PCB Antenna, with 1.26dBi gain
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	Refer to user's manual

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.: 2311WDG0023-1) 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 Z 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 Notebook

Where **RE<1G**: Radiated Emission below 1GHz **RE≥1G**: Radiated Emission above 1GHz
PLC: Power Line Conducted Emission **BW**: 20db bandwidth

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

TESTED CHANNEL	TESTED FREQUENCY
Low	2402 MHz
Middle	2440 MHz
High	2480 MHz

Channel List

CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

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 Notebook	Ryker
BW	25deg. C, 56%RH	DC 5V from Notebook	Ryker
PLC	25deg. C, 56%RH	DC 5V from Notebook	Bob

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.

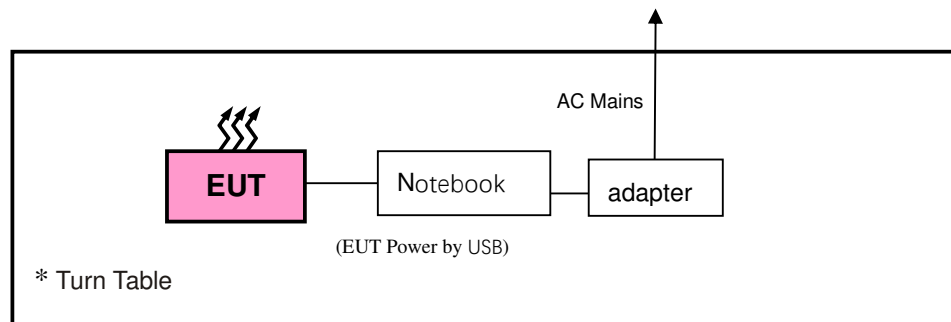
3.4 DESCRIPTION OF SUPPORT UNITS

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	Notebook	DELL	Latitude 5420	127710614	N/A
2	Notebook	DELL	Latitude 3420	127764357/7	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	AC Line: Unshielded, Detachable 1.0m; DC Line: Unshielded, Detachable 2.0m.
2	AC Line: Unshielded, Detachable 0.8m; DC Line: Shielded, Detachable 1.8m.

3.5 CONFIGURATION OF SYSTEM UNDER TEST



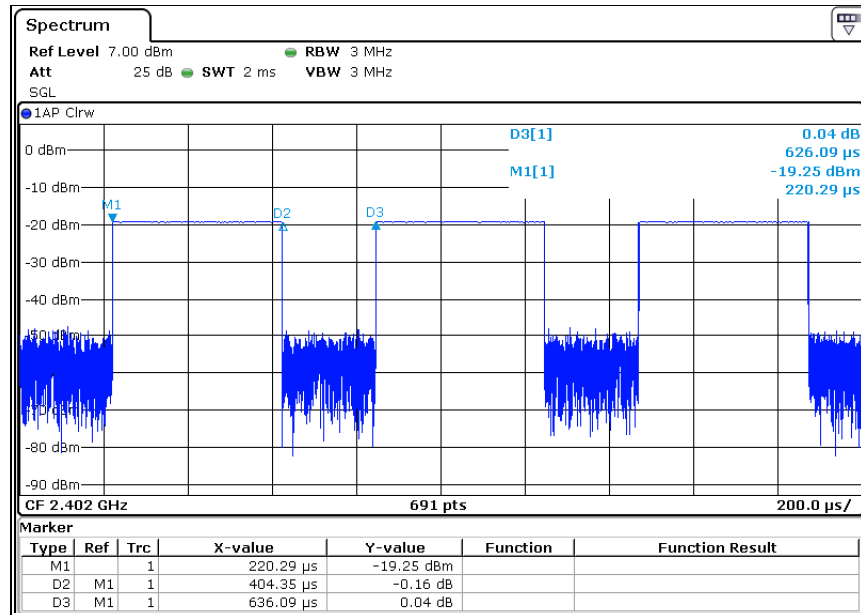
3.6 DUTY CYCLE OF TESET SIGNAL

$T_p = 0.63609\text{ms}$

$T_{on} = 404.35/1000 = 0.40435\text{ms}$

Duty Cycle = $T_{on} / T_p * 100\% = 0.40435/0.63609 * 100\% \approx 64.0\%$

AV factor = $20 \log(\text{Duty cycle}) = 20 \log(64.0\%) \approx -3.88\text{dB}$



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.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	100666	Apr. 06, 24
Artificial Mains Network	Rohde&Schwarz	ENV216	102477	Apr. 06, 24
Artificial Mains Network	SCHWARZBECK	NSLK 8127	8127713	Apr. 02, 24
Voltage Probe	SCHWARZBECK	TK 9421	9421-0332	Apr. 05, 24
Current Probe	Rohde&Schwarz	EZ-17	0816.2063.02	Apr. 02, 24
ISN	Rohde&Schwarz	ENY81-CA6	101928	Apr. 06, 24
ISN	TESEQ	ISN T800	34373	Jan. 11, 24
Coaxial RF Cable	COMMATE	CFD300-NL	5D-001	Oct. 16, 24
Shielding Room	Burgeon	5m*4m*3m	D3040008DG-1	Jul 22, 24
Test software	ADT	ADT_Cond_V7.3.7	N/A	N/A

- NOTE:**
1. The test was performed in shielded room 543.
 2. The calibration interval of the above test equipment (except shielded room and chamber) 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.

4.1.3 TEST PROCEDURES

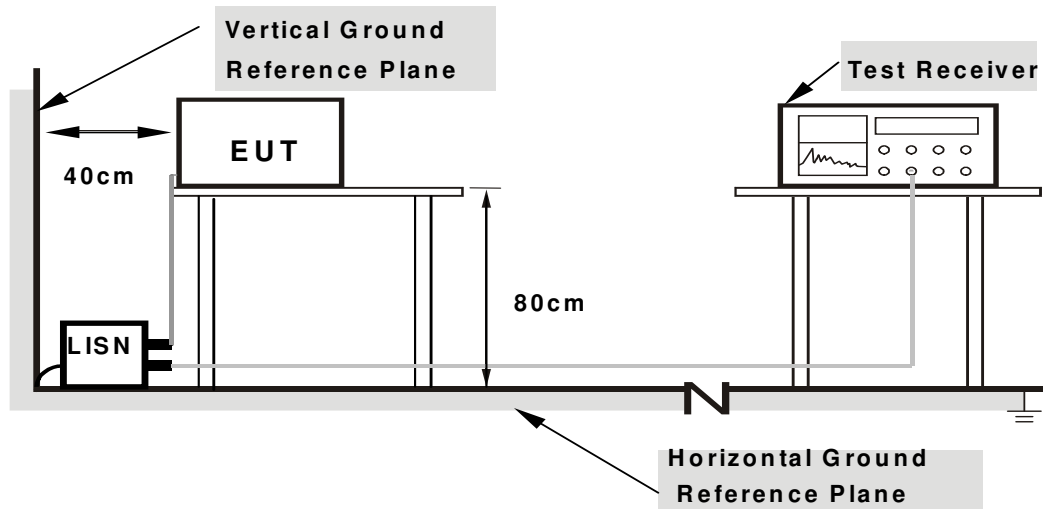
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling 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.

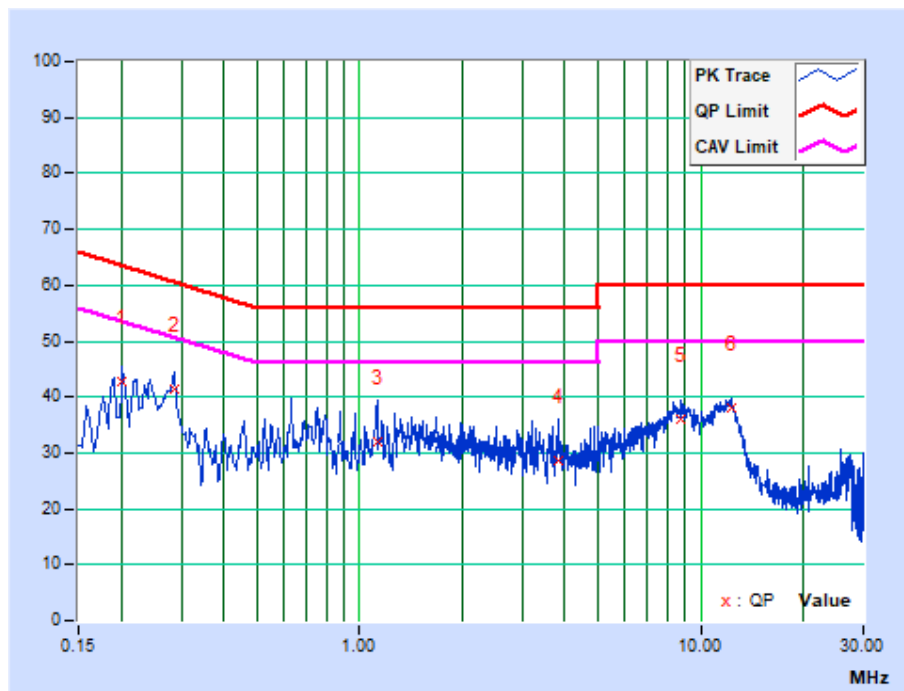
4.1.7 TEST RESULTS

CONDUCTED WORST-CASE DATA: 2.4G Link CH39

PHASE	Line	6dB BANDWIDTH	9kHz
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No.	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.20201	9.58	33.32	20.20	42.90	29.78	63.53	53.53	-20.63	-23.75
2	0.28603	9.62	31.80	18.93	41.42	28.55	60.64	50.64	-19.22	-22.09
3	1.12600	9.65	22.40	10.83	32.05	20.48	56.00	46.00	-23.95	-25.52
4	3.81000	9.69	18.98	10.99	28.67	20.68	56.00	46.00	-27.33	-25.32
5	8.79000	9.88	26.02	25.78	35.90	35.66	60.00	50.00	-24.10	-14.34
6	12.25800	9.96	28.22	28.09	38.18	38.05	60.00	50.00	-21.82	-11.95

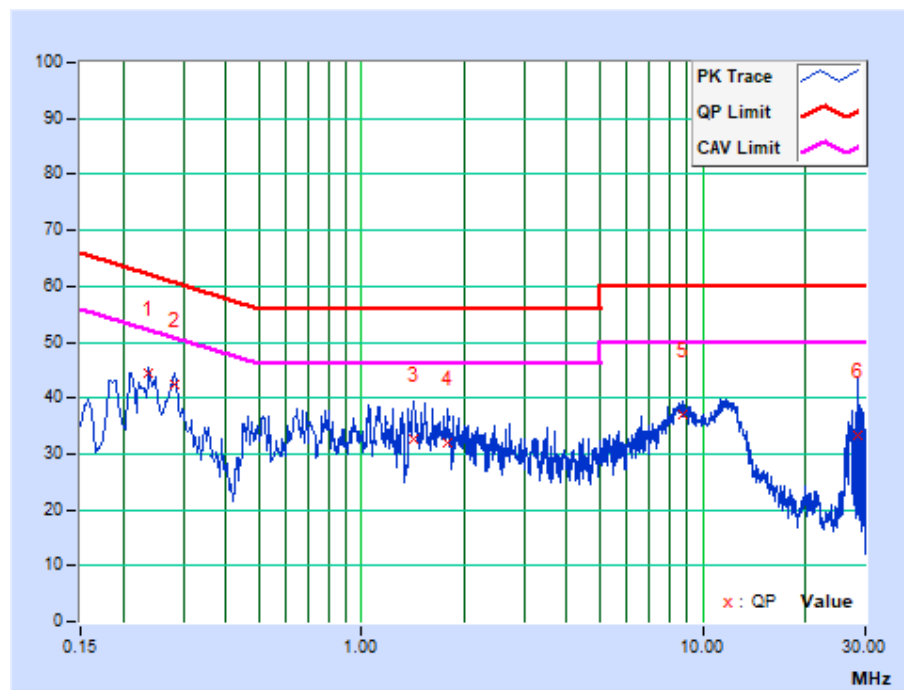
REMARKS: The emission levels of other frequencies were very low against the limit.



PHASE	Neutral	6dB BANDWIDTH	9kHz
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No.	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.23800	9.63	34.96	23.72	44.59	33.35	62.17	52.17	-17.57	-18.81
2	0.28200	9.64	32.64	19.76	42.28	29.40	60.76	50.76	-18.48	-21.36
3	1.42678	9.66	23.11	11.54	32.77	21.20	56.00	46.00	-23.23	-24.80
4	1.79800	9.65	22.31	11.78	31.96	21.43	56.00	46.00	-24.04	-24.57
5	8.70200	9.87	27.19	26.82	37.06	36.69	60.00	50.00	-22.94	-13.31
6	28.69400	9.95	23.30	8.32	33.25	18.27	60.00	50.00	-26.75	-31.73

REMARKS: The emission levels of other frequencies were very low against the limit.



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.

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.



4.2.2 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, 25
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 /24months 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 above1 GHz 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.

4.2.3 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 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:

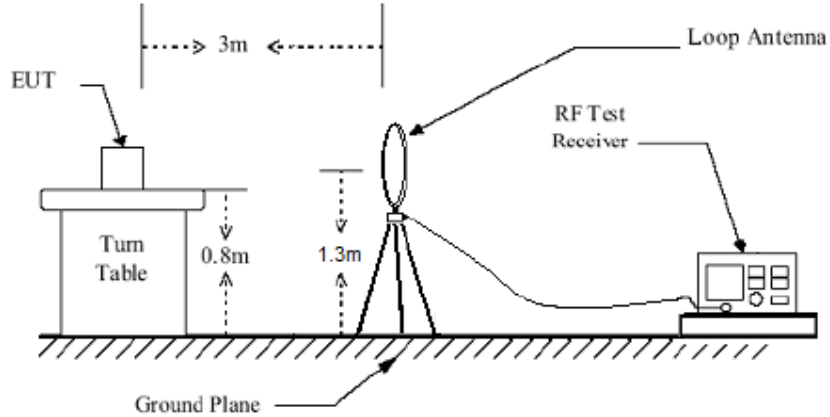
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. Average value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

4.2.4 DEVIATION FROM TEST STANDARD

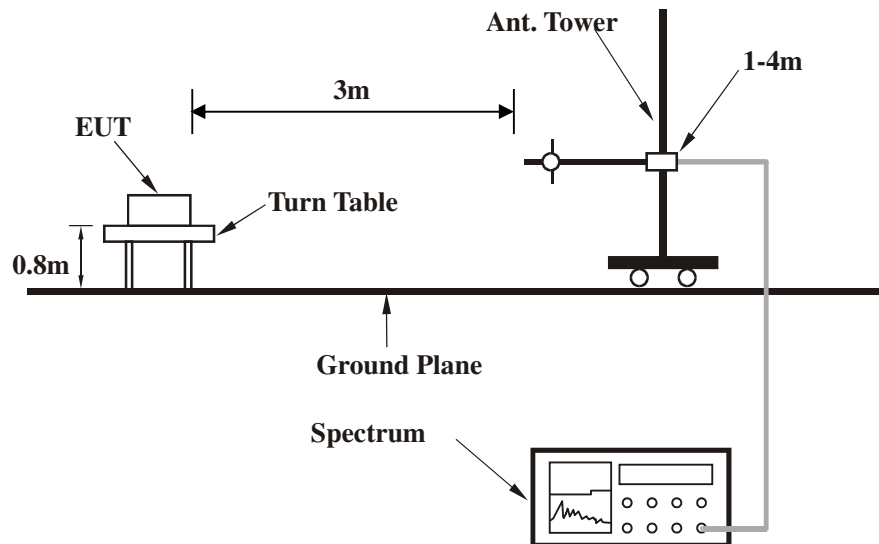
No deviation.

4.2.5 TEST SETUP

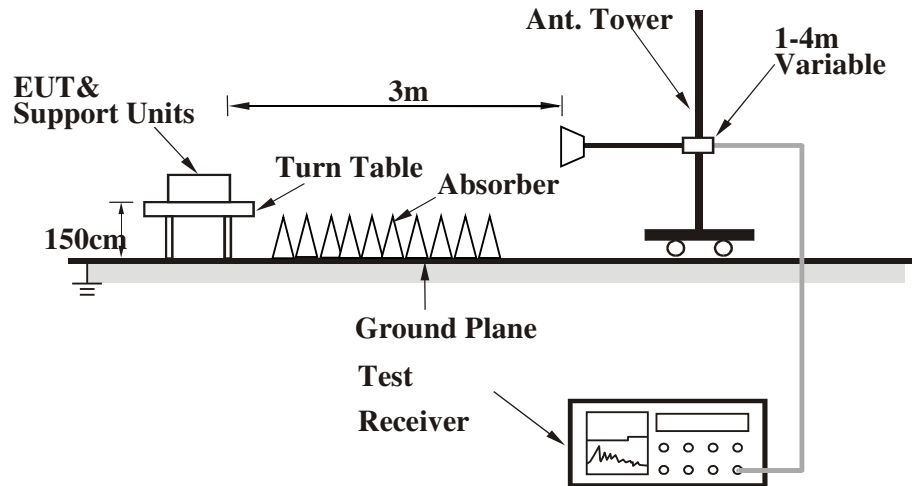
Below 30MHz test setup



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

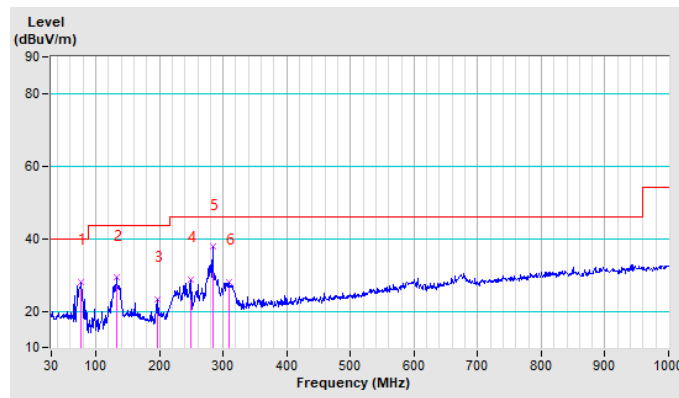
BELOW 1GHz WORST-CASE DATA

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	76.61	27.90 QP	40.00	-12.10	2.46 H	71	40.67	-12.77
2	131.95	29.18 QP	43.50	-14.32	3.25 H	283	39.11	-9.93
3	197.01	23.33 QP	43.50	-20.17	2.16H	264	34.66	-11.33
4	248.47	28.80 QP	46.00	-17.20	2.89 H	224	37.84	-9.04
5	283.42	37.69 QP	46.00	-8.31	3.25H	282	45.48	-7.79
6	308.67	28.11 QP	46.00	-17.89	1.35 H	127	35.38	-7.27

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.

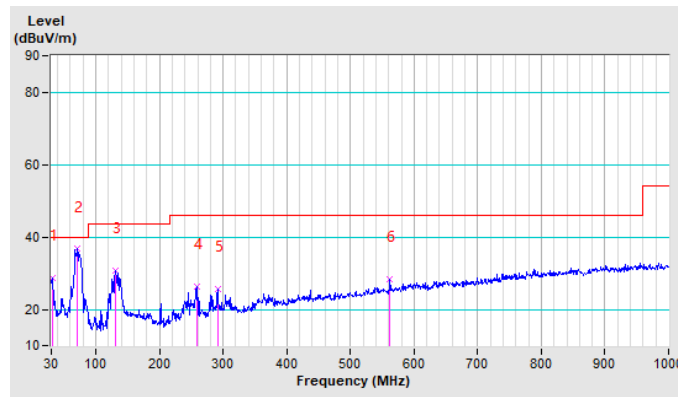


CHANNEL	TX Middle Channel	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9KHz ~ 1GHz		

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	30.97	28.69 QP	40.00	-11.31	1.25 V	343	38.86	-10.17
2	70.78	36.68 QP	40.00	-3.32	2.25 V	284	47.91	-11.23
3	130.98	30.70 QP	43.50	-12.80	2.78 V	42	40.75	-10.05
4	258.18	26.31 QP	46.00	-19.69	1.47V	264	35.02	-8.71
5	291.19	25.65 QP	46.00	-20.35	3.55 V	153	33.34	-7.69
6	562.09	28.25 QP	46.00	-17.75	1.77 V	242	30.73	-2.48

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	51.11 PK	74.00	-22.89	1.20 H	130	54.33	-3.22
2	2400.00	47.23 AV	54.00	-6.77	1.20 H	130	50.45	-3.22
3	*2402.00	70.06 PK	114.00	-43.94	1.20 H	130	73.28	-3.22
4	*2402.00	66.18 AV	94.00	-27.82	1.20 H	130	69.40	-3.22
5	4804.00	49.76 PK	74.00	-24.24	1.00 H	174	51.98	-2.22
6	4804.00	45.88 AV	54.00	-8.12	1.00 H	174	48.10	-2.22
7	7206.00	52.34 PK	74.00	-21.66	1.00 H	158	50.97	1.37
8	7206.00	48.46 AV	54.00	-5.54	1.00 H	158	47.09	1.37

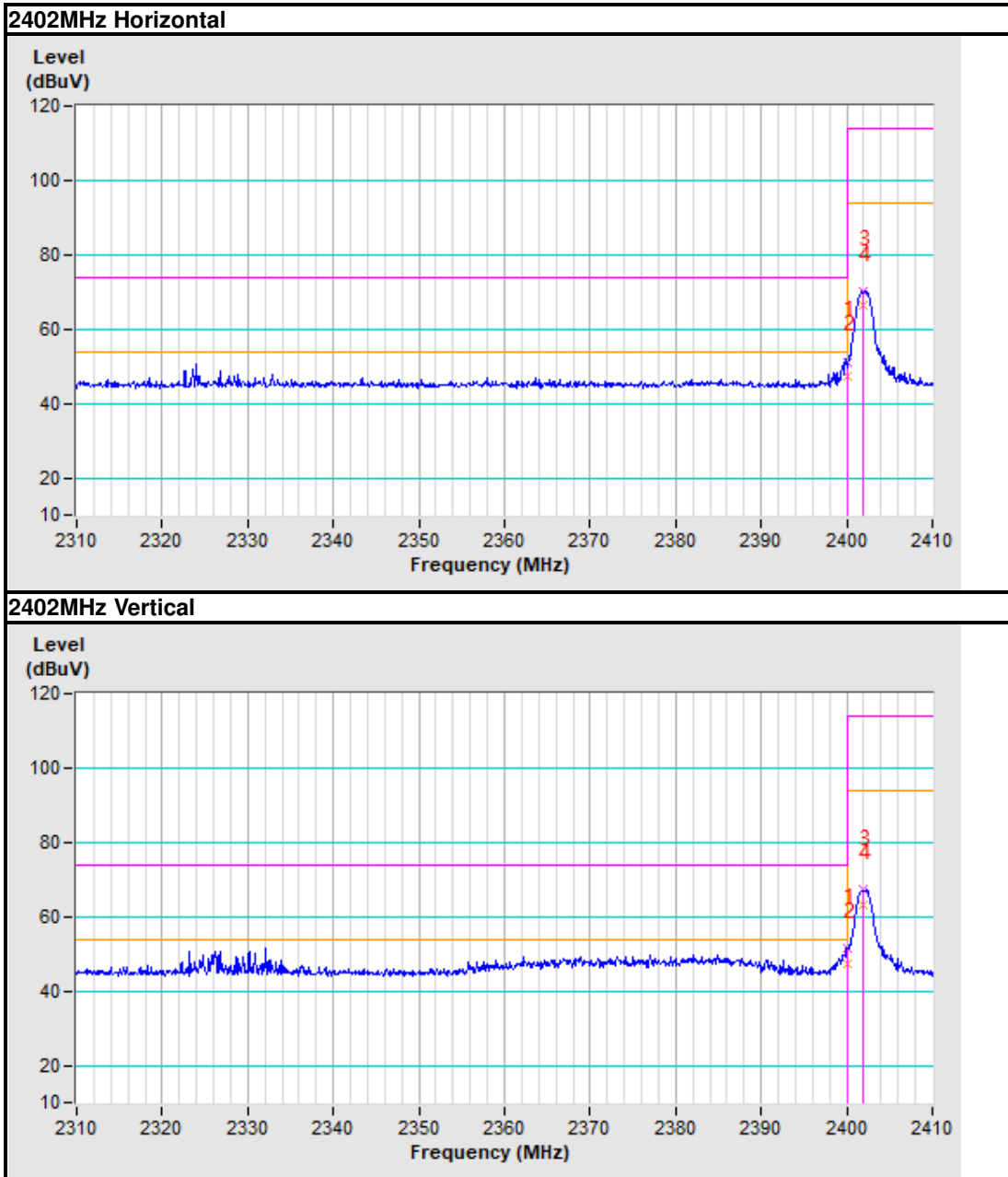
ANTENNA POLARITY & TEST DISTANCE : VERTICAL AT 3 M

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	51.28 PK	74.00	-22.72	1.30 V	150	54.50	-3.22
2	2400.00	47.40 AV	54.00	-6.60	1.30 V	150	50.62	-3.22
3	*2402.00	67.15 PK	114.00	-46.85	1.30 V	150	70.37	-3.22
4	*2402.00	63.27 AV	94.00	-30.73	1.30 V	150	66.49	-3.22
5	4804.00	48.98 PK	74.00	-25.02	1.00 V	125	51.20	-2.22
6	4804.00	45.10 AV	54.00	-8.90	1.00 V	125	47.32	-2.22
7	7206.00	52.84 PK	74.00	-21.16	1.20 V	155	51.47	1.37
8	7206.00	48.96 AV	54.00	-5.04	1.20 V	155	47.59	1.37

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: $20 \log(\text{Duty cycle}) = 20 \log(64.0\%) \approx -3.88 \text{dB}$, Please see page 9 for plotted duty.

Band edge Plot



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	*2440.00	65.71 PK	114.00	-48.29	1.20 H	130	68.83	-3.12
2	*2440.00	61.38 AV	94.00	-32.62	1.20 H	130	64.50	-3.12
3	4880.00	51.16 PK	74.00	-22.84	1.44 H	256	53.35	-2.19
4	4880.00	47.28 AV	54.00	-6.72	1.44 H	256	49.47	-2.19
5	7320.00	52.49 PK	74.00	-21.51	1.00 H	122	51.63	0.86
6	7320.00	48.61 AV	54.00	-5.39	1.00 H	122	47.75	0.86

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	*2440.00	66.52 PK	114.00	-47.48	1.20 V	155	69.64	-3.12
2	*2440.00	62.64 AV	94.00	-31.36	1.20 V	155	65.76	-3.12
3	4880.00	51.24 PK	74.00	-22.76	1.00 V	185	53.43	-2.19
4	4880.00	47.36 AV	54.00	-6.64	1.00 V	185	49.55	-2.19
5	7320.00	51.63 PK	74.00	-22.37	1.54 V	320	50.77	0.86
6	7320.00	47.75 AV	54.00	-6.25	1.54 V	320	46.89	0.86

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(64.0%) ≈ -3.88dB, Please see page 9 for plotted duty.

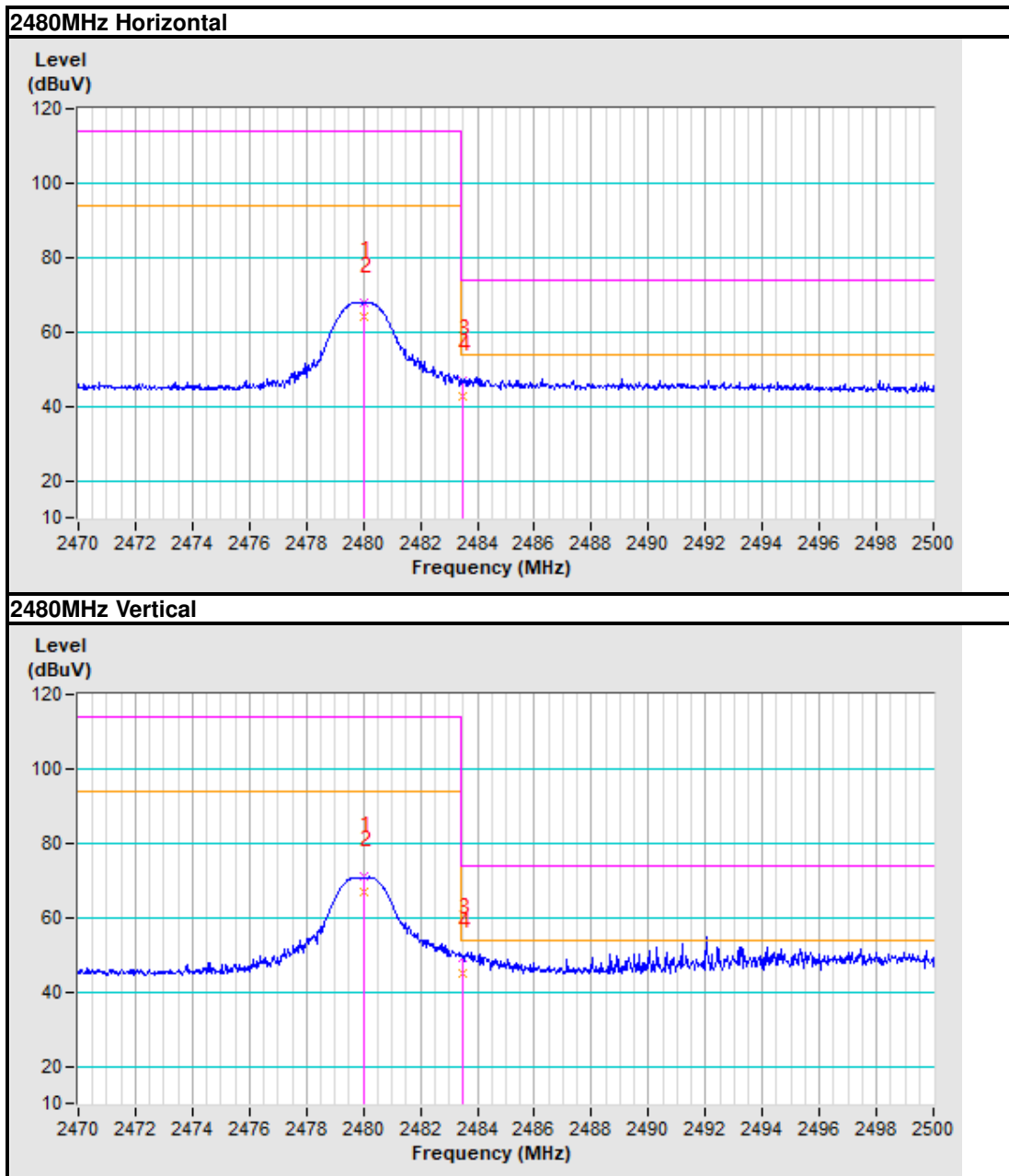
CHANNEL	TX High Channel	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	*2480.00	67.83 PK	114.00	-46.17	1.20 H	180	70.85	-3.02
2	*2480.00	63.95 AV	94.00	-30.05	1.20 H	180	66.97	-3.02
3	2483.50	46.74 PK	74.00	-27.26	1.20 H	180	49.74	-3.00
4	2483.50	42.86 AV	54.00	-11.14	1.20 H	180	45.86	-3.00
5	4960.00	48.23 PK	74.00	-25.77	1.20 H	188	50.38	-2.15
6	4960.00	44.35 AV	54.00	-9.65	1.20 H	188	46.50	-2.15
7	7440.00	51.67 PK	74.00	-22.33	1.88 H	236	51.34	0.33
8	7440.00	47.79 AV	54.00	-6.21	1.88 H	236	47.46	0.33
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	*2480.00	70.85 PK	114.00	-43.15	1.20 V	130	73.87	-3.02
2	*2480.00	66.97 AV	94.00	-27.03	1.20 V	130	69.99	-3.02
3	2483.50	48.98 PK	74.00	-25.02	1.20 V	130	51.98	-3.00
4	2483.50	45.10 AV	54.00	-8.90	1.20 V	130	48.10	-3.00
5	4960.00	49.90 PK	74.00	-24.10	1.00 V	136	52.05	-2.15
6	4960.00	46.02 AV	54.00	-7.98	1.00 V	136	48.17	-2.15
7	7440.00	51.30 PK	74.00	-22.70	1.20 V	155	50.97	0.33
8	7440.00	47.42 AV	54.00	-6.58	1.20 V	155	47.09	0.33

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(64.0%) ≈ -3.88dB, Please see page 9 for plotted duty.

Band edge Plot



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.	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.

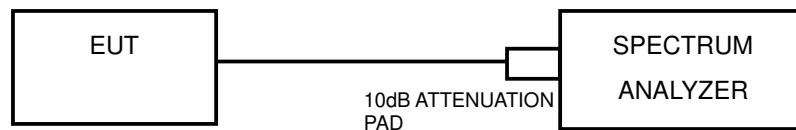
4.3.3 TEST PROCEDURE

- 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



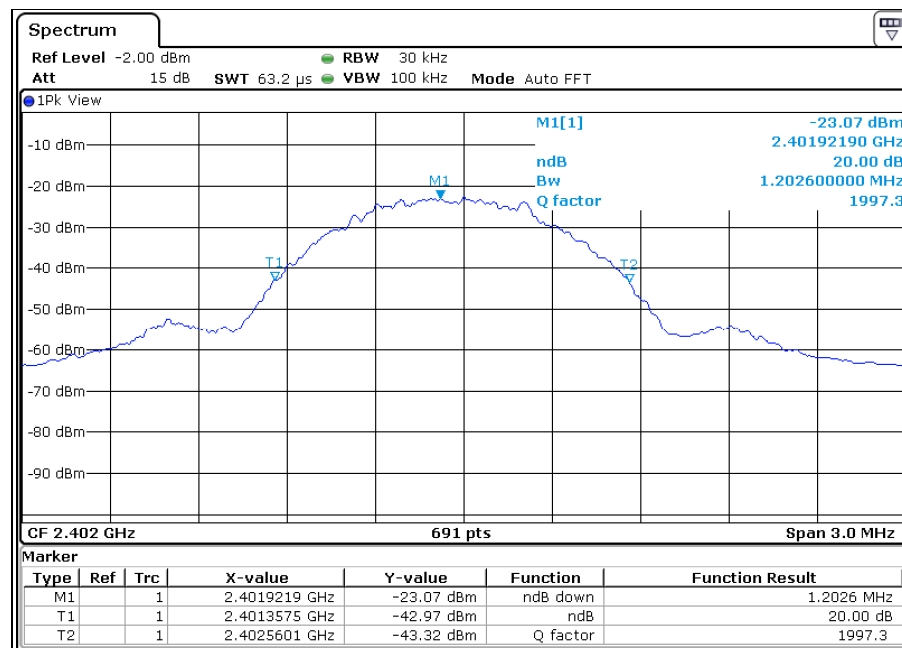
4.3.6 EUT OPERATING CONDITIONS

- 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.

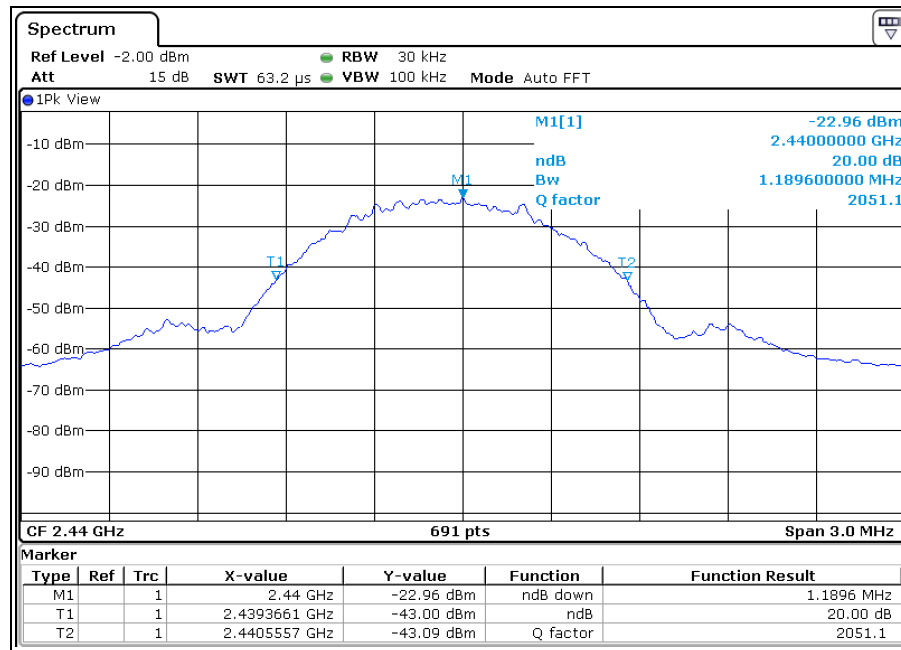
4.3.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
Low	2402	1.2026
Middle	2440	1.1896
High	2480	1.2113

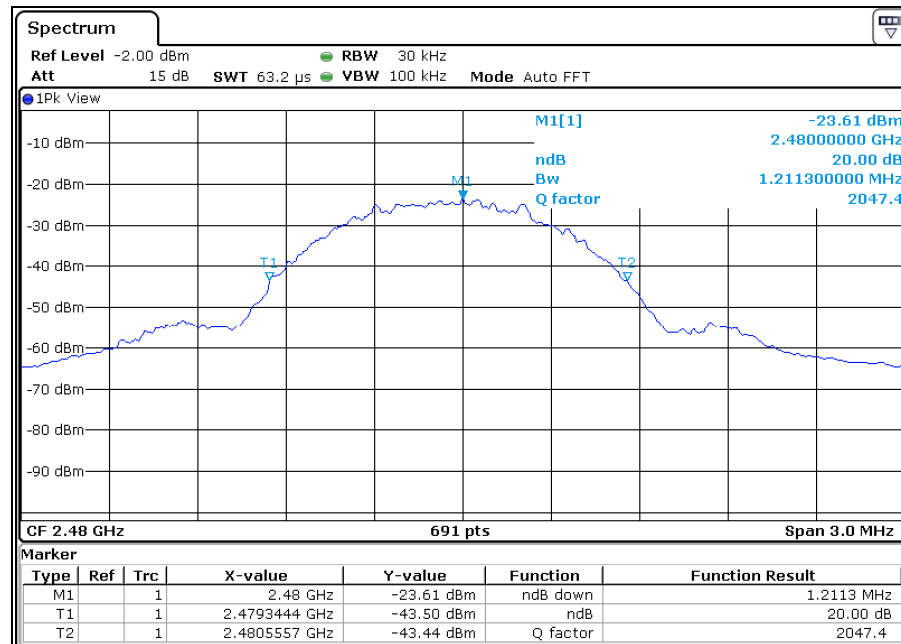
Test Data: Low channel



Test Data: Middle channel



Test Data: High channel





Test Report No.: RF2311WDG0023-1

5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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



Test Report No.: RF2311WDG0023-1

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---