

TEST REPORT



Applicant	3Dconnexion
Address	7, Boulevard du Jardin Exotique, 98000 Monaco

Manufacturer or Supplier	3Dconnexion
Address	7, Boulevard du Jardin Exotique, 98000 Monaco
Product	Numpad Pro
Brand Name	3Dconnexion
Models	3DX-600081
Additional Models & Model Difference	See items 3.1
Date of tests	Jun. 28, 2021 ~ Aug. 10, 2021

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 Andrew Sha Project Engineer / EMC Department	Approved by Glyn He Assistant Manager / EMC Department
	
	Date: Mar. 03, 2022

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**BUREAU
VERITAS**

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**BUREAU
VERITAS**

Test Report No.: RF2106WDG0230-1

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF2106WDG0230-1	Original release	Mar. 03, 2022

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	3.05dB
Radiated emissions	9KHz ~ 30MHz	2.16dB
	30MHz ~ 1GMHz	4.00dB
	1GHz ~ 18GHz	5.17dB
	18GHz ~ 40GHz	5.07dB

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	Numpad Pro
MODELS NO.	3DX-600081
ADDITIONAL MODELS	3DX-600080, 3DX-600082, 3DX-600083, 3DX-600084, 3DX-600085, 3DX-600086, 3DX-600087, 3DX-600088, 3DX-600089, 3DX-600090, 3DX-600091, 3DX-600092, 3DX-600093, 3DX-600094, 3DX-600095, 3DX-700105
FCC ID	2AAHQ-NPP
NOMINAL VOLTAGE	DC 5V from USB Host Unit or DC 3.7V from Li-ion Battery
MODULATION TECHNOLOGY	GFSK
OPERATING FREQUENCY	2404-2477MHz
ANTENNA TYPE	PCB Antenna, with 0.62dBi gain
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	USB Cable: Unshielded detachable 0.15m.

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.: 2106WDG0230) for detailed product photo.
4. Additional models (see above table) are identical with the test models 3DX-600081 except model number 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 USB Host Unit or DC 3.7V from Li-ion Battery

Where **RE<1G**: Radiated Emission below 1GHz **RE≥1G**: Radiated Emission above 1GHz
PLC: Power Line Conducted Emission **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	2404 MHz
Middle	2442 MHz
High	2477 MHz

Channel List

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
1	2404	2	2425	3	2442	4	2463
5	2477						

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	yoyo
BW	25deg. C, 56%RH	DC 3.7V from Li-ion Battery	yoyo
PLC	25deg. C, 56%RH	DC 5V from adapter	yoyo

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

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

- NOTES:**
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	ESR7	101494	Mar. 07,22
Artificial Mains Network	Rohde&Schwarz	ENV216	101173	Mar. 07,22
Artificial Mains Network	Rohde&Schwarz	ESH3-Z5	100317	Mar. 07,22
Voltage probe	SCHWARZBECK	TK 9421	TK 9421-176	Sep. 17,21
Test software	ADT	ADT_Cond_V7.3.7	N/A	N/A

NOTES:

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

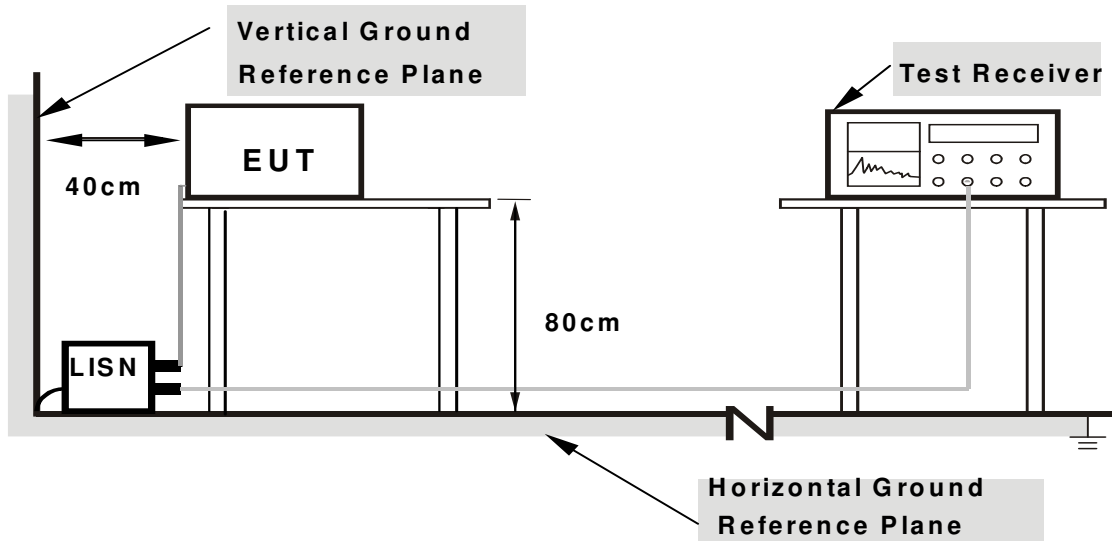
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

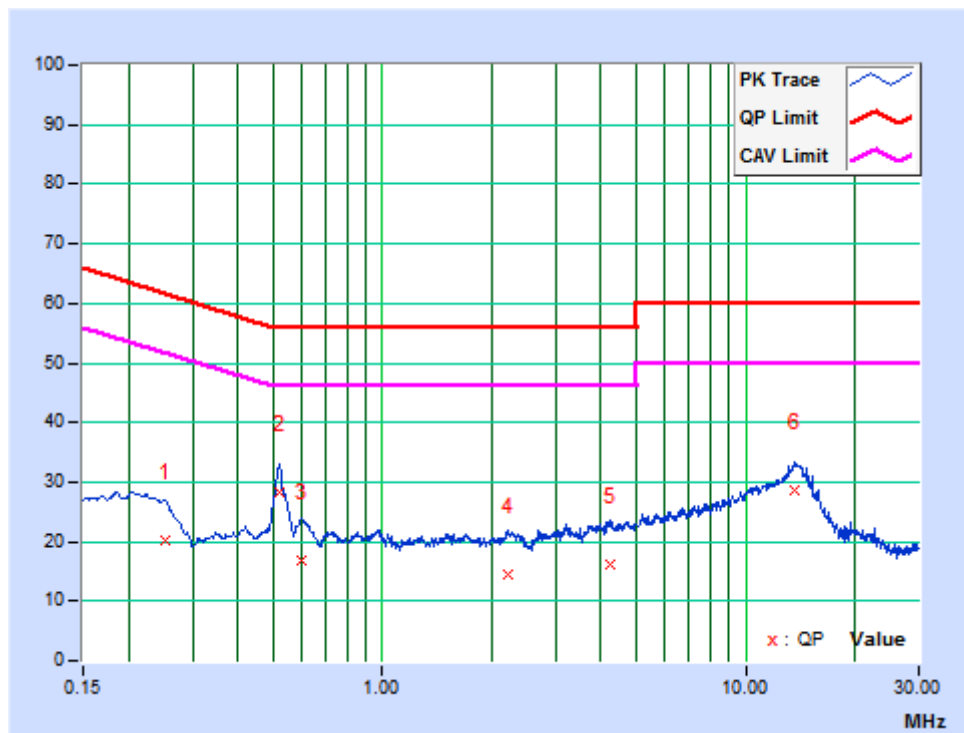
4.1.7 TEST RESULTS

CONDUCTED WORST-CASE DATA:

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	0.25144	9.74	10.58	0.16	20.32	9.90	61.71	51.71	-41.39	-41.81
2	0.52109	9.83	18.33	10.65	28.16	20.48	56.00	46.00	-27.84	-25.52
3	0.59620	9.82	7.08	0.62	16.90	10.44	56.00	46.00	-39.10	-35.56
4	2.20425	9.85	4.61	-0.17	14.46	9.68	56.00	46.00	-41.54	-36.32
5	4.21350	9.85	6.47	-0.61	16.32	9.24	56.00	46.00	-39.68	-36.76
6	13.63425	10.06	18.71	8.46	28.77	18.52	60.00	50.00	-31.23	-31.48

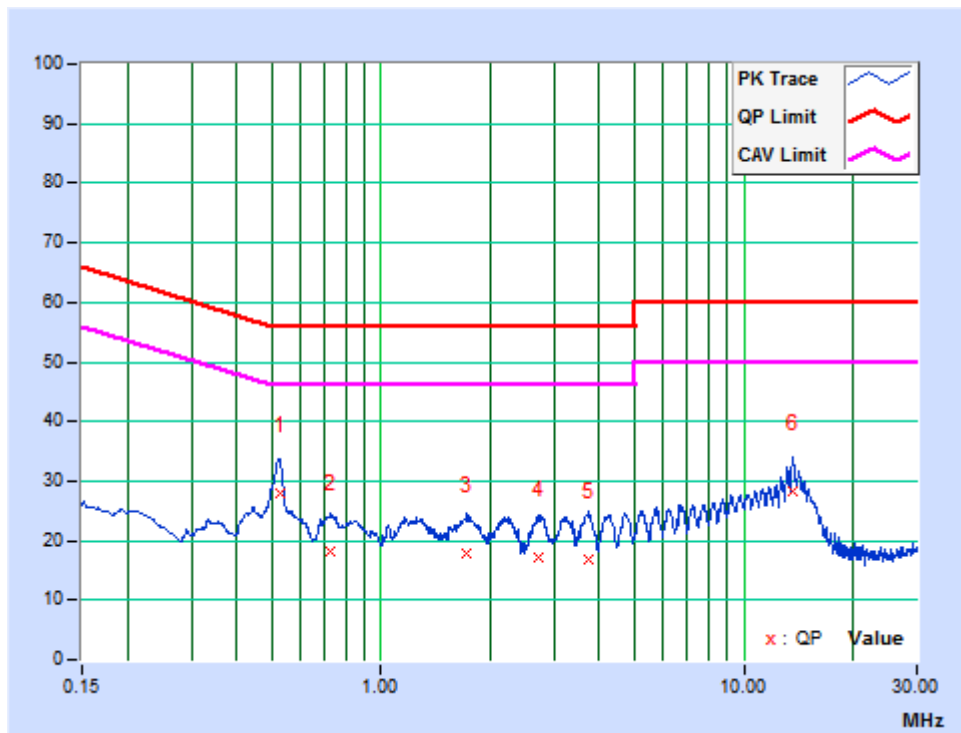
REMARK: The emission levels of other frequencies were very low against the limit.



PHASE	Neutral	6dB BANDWIDTH	9kHz
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No.	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
	1	0.52523	9.84	18.10	11.42	27.94	21.26	56.00	46.00	-28.06
2	0.72600	9.82	8.43	2.50	18.25	12.32	56.00	46.00	-37.75	-33.68
3	1.71874	9.85	7.89	2.10	17.74	11.95	56.00	46.00	-38.26	-34.05
4	2.70150	9.87	7.28	1.57	17.15	11.44	56.00	46.00	-38.85	-34.56
5	3.72975	9.88	7.10	1.48	16.98	11.36	56.00	46.00	-39.02	-34.64
6	13.65000	10.09	18.12	5.10	28.21	15.19	60.00	50.00	-31.79	-34.81

REMARK: 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.
EMI Test Receiver	Rohde&Schwarz	ESU40	100449	Mar. 07,22
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV7	102331	May 09, 22
Active Loop Antenna (9KHz -30MHz)	SCHWARZBECK	FMZB 1519B	1519B-045	May 29,22
Amplifier (9KHz -1GHz)	Burgeon	BPA-530	100210	Mar. 13,22
Bilog Antenna (20MHz -2GHz)	Teseq	CBL 6111D	30643	May 29,22
Horn Antenna (1GHz -18GHz)	ETS -Lindgren	3117	00062558	May 29,22
Horn Antenna (18GHz -40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170147	May 09, 22
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	NSEMC003	May 22,22
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A
Broadband Preamplifier (1GHz~18GHz)	SCHWARZBECK	BBV9718	305	May 08,22
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Mar. 13,22
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	N/A

NOTES:

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.

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. 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.

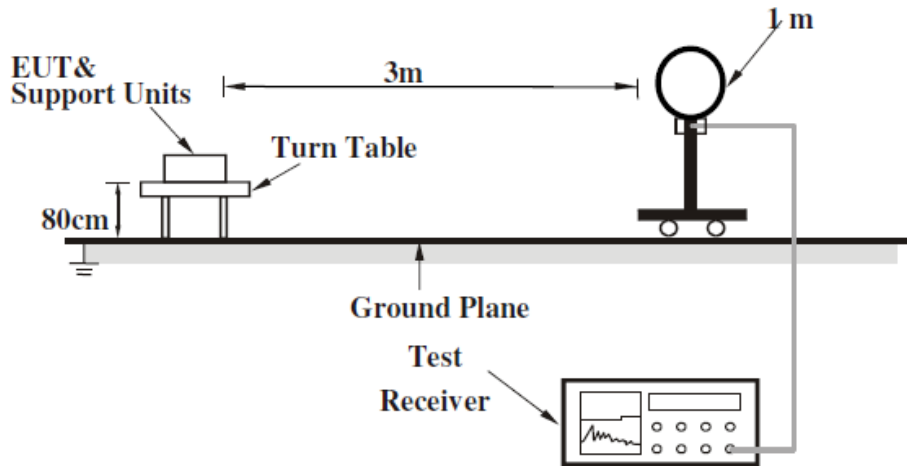
4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

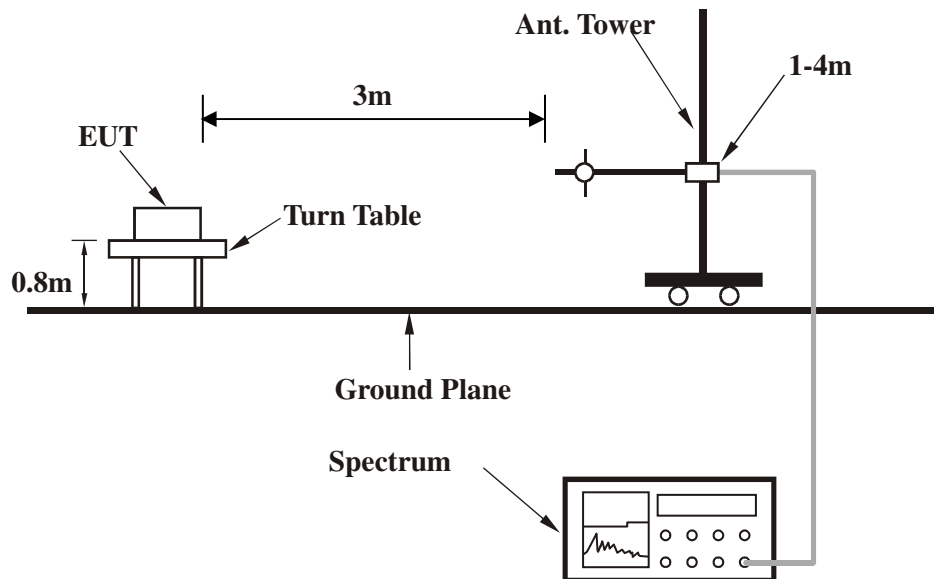


4.2.5 TEST SETUP

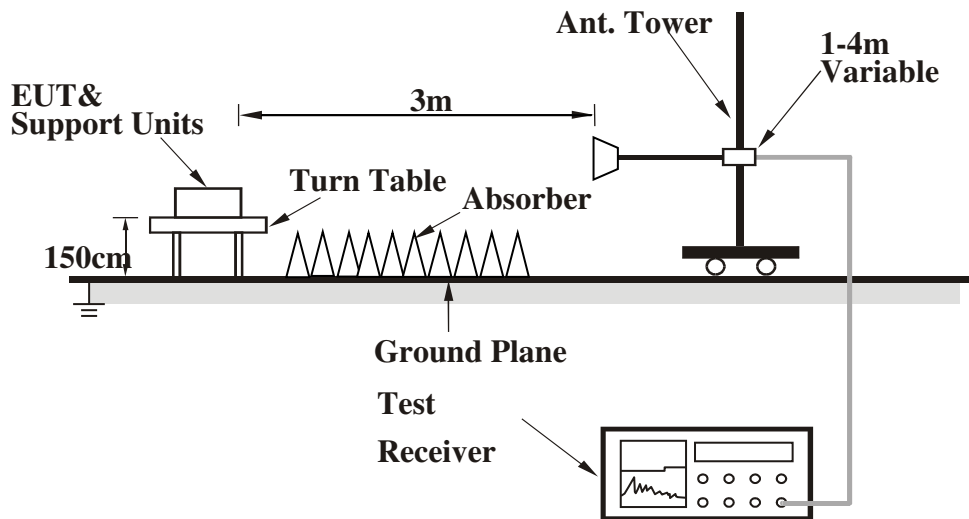
Below 30MHz test setup



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

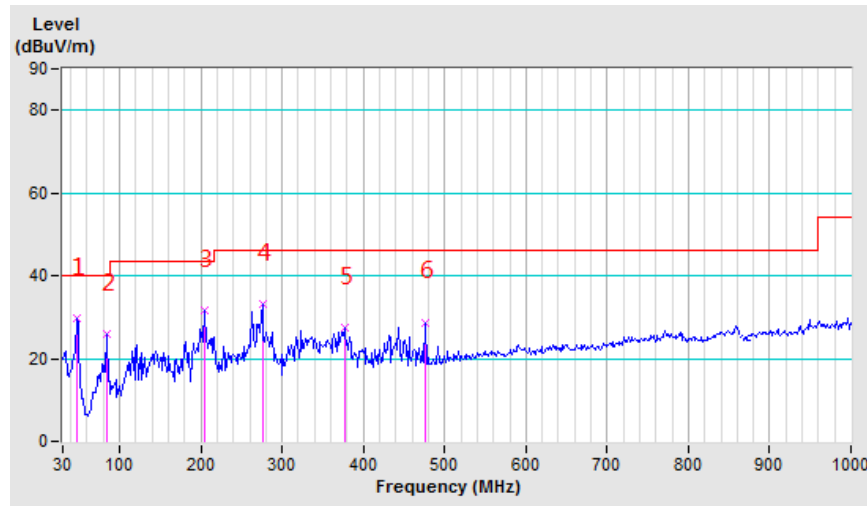
BELOW 1GHz WORST-CASE DATA

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	47.10	29.84 QP	40.00	-10.16	1.00 H	112	49.29	-19.45
2	84.41	26.03 QP	40.00	-13.97	1.00 H	226	47.54	-21.51
3	204.10	31.79 QP	43.50	-11.71	1.00 H	223	51.05	-19.26
4	275.61	33.14 QP	46.00	-12.86	1.00 H	210	48.51	-15.37
5	376.65	27.46 QP	46.00	-18.54	1.00 H	122	39.38	-11.92
6	476.14	28.78 QP	46.00	-17.22	1.00 H	215	38.73	-9.95

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.



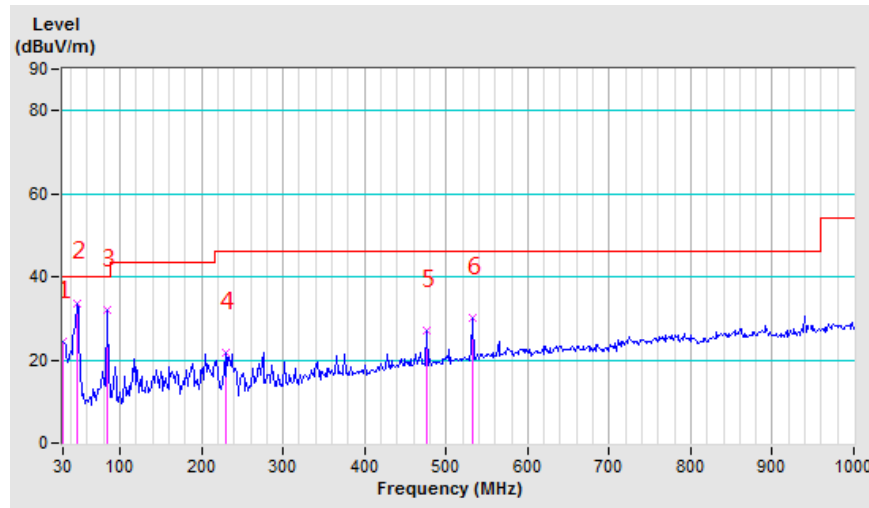


CHANNEL	TX Middle Channel	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9KHz ~ 1GHz		

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	30.00	24.55 QP	40.00	-15.45	1.00 V	110	36.61	-12.06
2	47.10	33.72 QP	40.00	-6.28	1.00 V	123	53.17	-19.45
3	84.41	32.05 QP	40.00	-7.95	1.00 V	225	53.56	-21.51
4	228.97	21.62 QP	46.00	-24.38	1.00 V	213	40.32	-18.70
5	476.14	27.15 QP	46.00	-18.85	1.00 V	113	37.10	-9.95
6	532.10	30.14 QP	46.00	-15.86	1.00 V	138	38.49	-8.35

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	46.40 PK	74.00	-27.60	1.00 H	133	41.28	5.12
2	2400.00	8.20 AV	54.00	-45.80	1.00 H	133	3.08	5.12
3	*2404.00	101.05 PK	114.00	-12.95	1.00 H	133	95.90	5.15
4	*2404.00	62.85 AV	94.00	-31.15	1.00 H	133	57.70	5.15
5	4808.00	54.55 PK	74.00	-19.45	1.00 H	125	43.92	10.63
6	4808.00	16.35 AV	54.00	-37.65	1.00 H	125	5.72	10.63
7	*7212.00	59.05 PK	74.00	-14.95	1.00 H	112	42.17	16.88
8	*7212.00	20.85 AV	54.00	-33.15	1.00 H	112	3.97	16.88
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	47.11 PK	74.00	-26.89	1.00 V	185	41.99	5.12
2	*2400.00	8.91 AV	54.00	-45.09	1.00 V	185	3.79	5.12
3	*2404.00	92.40 PK	114.00	-21.60	1.00 V	185	87.25	5.15
4	*2404.00	54.20 AV	94.00	-39.80	1.00 V	185	49.05	5.15
5	4808.00	55.08 PK	74.00	-18.92	1.00 V	165	44.45	10.63
6	4808.00	16.88 AV	54.00	-37.12	1.00 V	165	6.25	10.63
7	*7212.00	53.69 PK	74.00	-20.31	1.00 V	136	36.81	16.88
8	*7212.00	15.49 AV	54.00	-38.51	1.00 V	136	-1.39	16.88

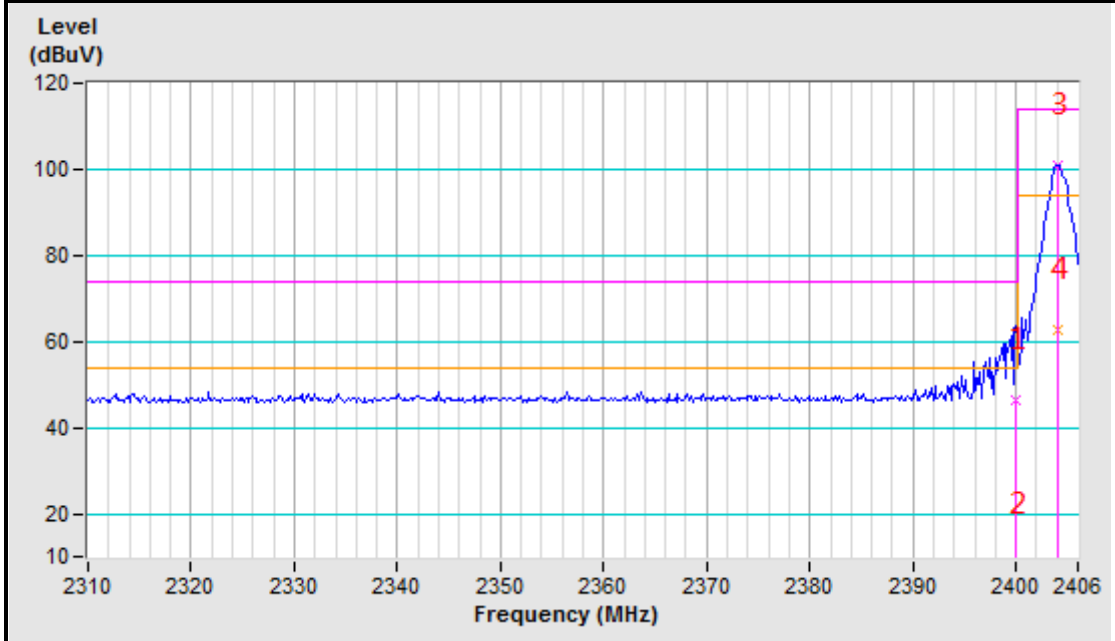
REMARK:

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.

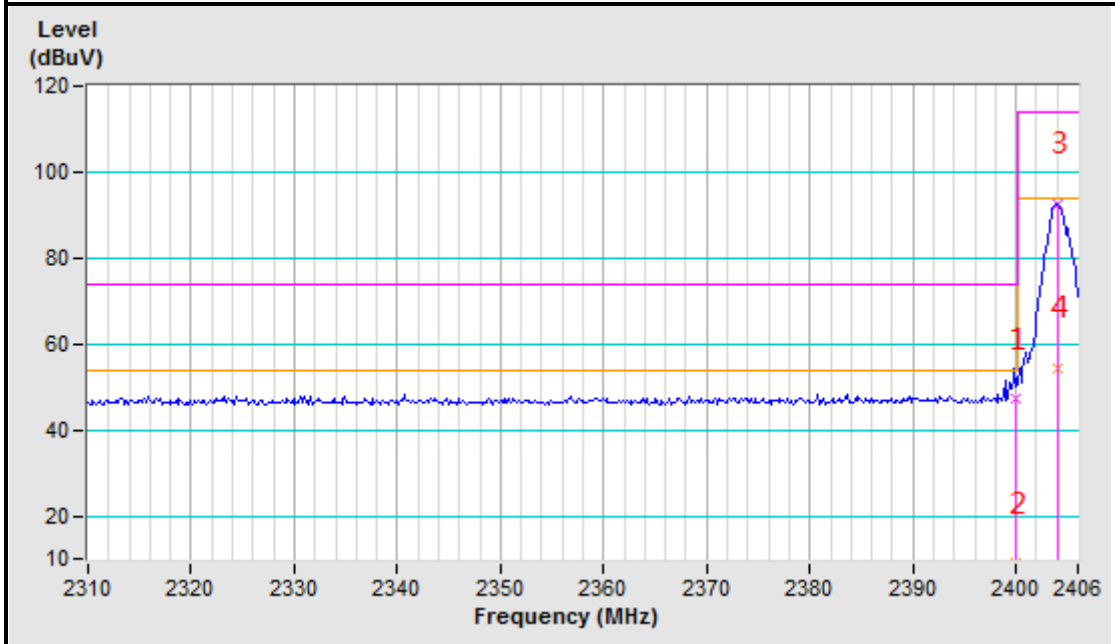


Band edge Plot

2404MHz Horizontal



2404MHz 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	97.59 PK	114.00	-16.41	1.00 H	243	92.25	5.34
2	*2442.00	59.39 AV	94.00	-34.61	1.00 H	243	54.05	5.34
3	4884.00	54.26 PK	74.00	-19.74	1.00 H	140	43.33	10.93
4	4884.00	16.06 AV	54.00	-37.94	1.00 H	140	5.13	10.93
5	7326.00	59.64 PK	74.00	-14.36	1.00 H	128	42.44	17.20
6	7326.00	21.44 AV	54.00	-32.56	1.00 H	128	4.24	17.20
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	94.48 PK	114.00	-19.52	1.00 V	221	89.14	5.34
2	*2442.00	56.28 AV	94.00	-37.72	1.00 V	221	50.94	5.34
3	4884.00	55.16 PK	74.00	-18.84	1.00 V	160	44.23	10.93
4	4884.00	16.96 AV	54.00	-37.04	1.00 V	160	6.03	10.93
5	7326.00	59.18 PK	74.00	-14.82	1.00 V	241	41.98	17.20
6	7326.00	20.98 AV	54.00	-33.02	1.00 V	241	3.78	17.20

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.



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	*2477.00	96.42 PK	114.00	-17.58	1.00 H	234	90.88	5.54
2	*2477.00	58.22 AV	94.00	-35.78	1.00 H	234	52.68	5.54
3	2483.50	47.21 PK	74.00	-26.79	1.00 H	234	41.64	5.57
4	2483.50	9.01 AV	54.00	-44.99	1.00 H	234	3.44	5.57
5	4954.00	54.90 PK	74.00	-19.10	1.00 H	223	43.69	11.21
6	4954.00	16.70 AV	54.00	-37.30	1.00 H	223	5.49	11.21
7	7431.00	60.29 PK	74.00	-13.71	1.00 H	211	42.80	17.49
8	7431.00	22.09 AV	54.00	-31.91	1.00 H	211	4.60	17.49

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

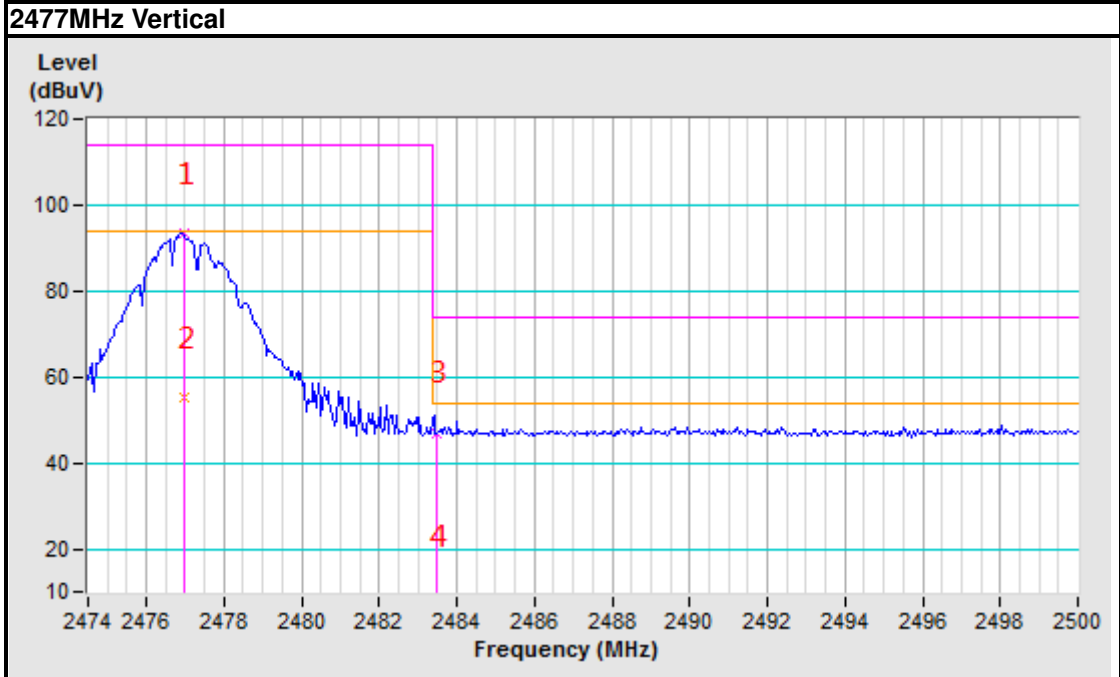
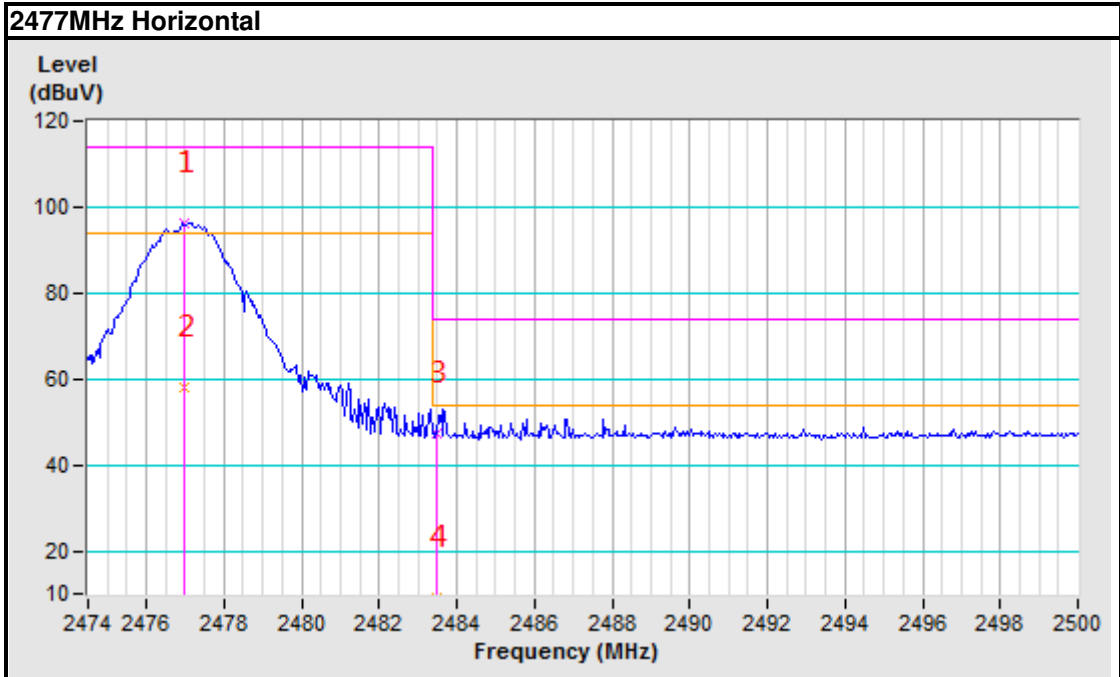
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2477.00	93.21 PK	114.00	-20.79	1.00 V	159	87.67	5.54
2	*2477.00	55.01 AV	94.00	-38.99	1.00 V	159	49.47	5.54
3	2483.50	46.94 PK	74.00	-27.06	1.00 V	159	41.37	5.57
4	2483.50	8.74 AV	54.00	-45.26	1.00 V	159	3.17	5.57
5	4954.00	55.26 PK	74.00	-18.74	1.00 V	116	44.05	11.21
6	4954.00	17.06 AV	54.00	-36.94	1.00 V	116	5.85	11.21
7	7431.00	61.05 PK	74.00	-12.95	1.00 V	224	43.56	17.49
8	7431.00	22.85 AV	54.00	-31.15	1.00 V	224	5.36	17.49

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.



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.
Power Sensor	Keysight	U2021XA	MY55060016	Jun. 03,22
Power Sensor	Keysight	U2021XA	MY55060018	Jun. 03,22
Power Meter	Anritsu	ML2495A	1139001	Feb. 24,22
Power Sensor	Anritsu	MA2411B	1531155	Feb. 24,22
Digital Multimeter	FLUKE	15B	A1220010DG	N/A
Humid & Temp Programmable Tester	Haida	HD-225T	110807201	Nov. 03,21
Oscilloscope	Agilent	DSO9254A	MY51260160	Aug. 10,22
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101094	Feb. 24,22
Signal Generator	Agilent	N5183A	MY50140980	Aug. 10,22
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200288	Sep. 04,21
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	N/A
Attenuator	MINI	BW-S10W2+	S130129FGE2	N/A
DC Source	Keysight	E3642A	MY56146098	N/A

NOTES:

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

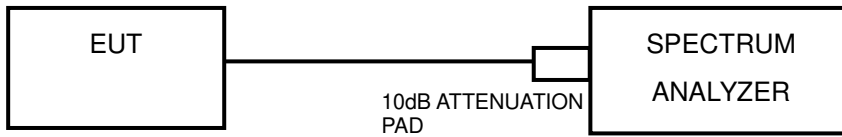
- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the 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



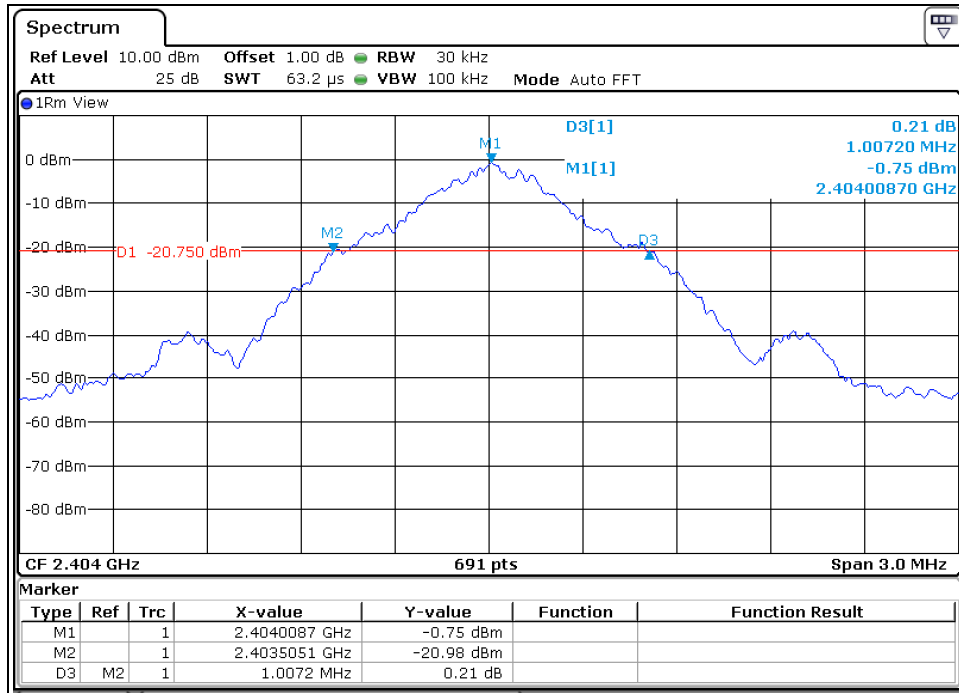
4.3.6 EUT OPERATING CONDITIONS

- 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.

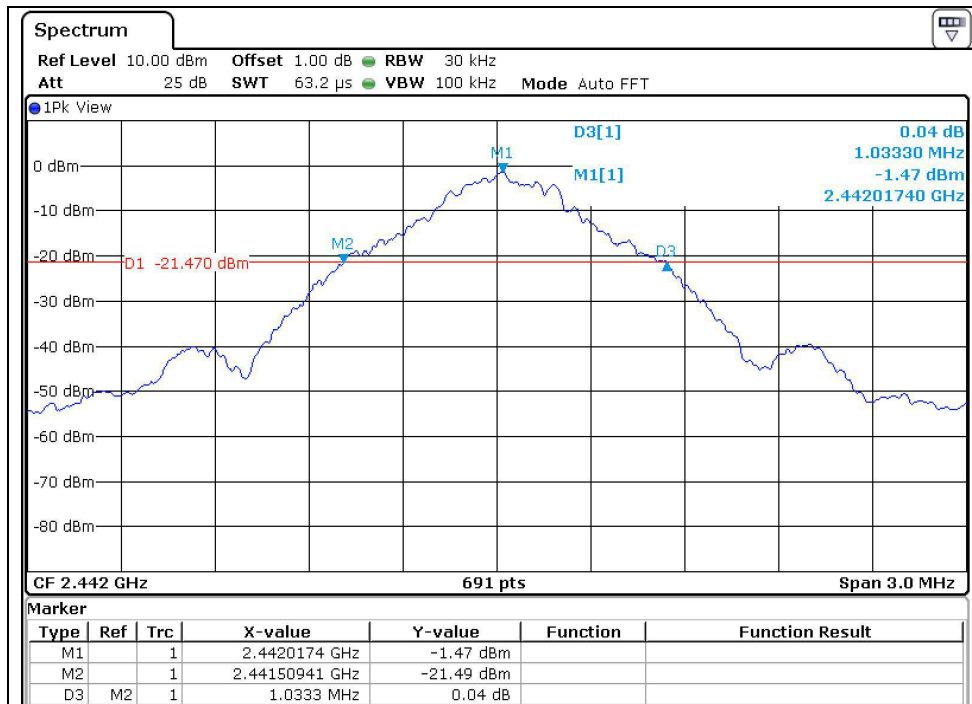
4.3.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
Low	2404	1.0072
Middle	2442	1.0333
High	2477	1.0289

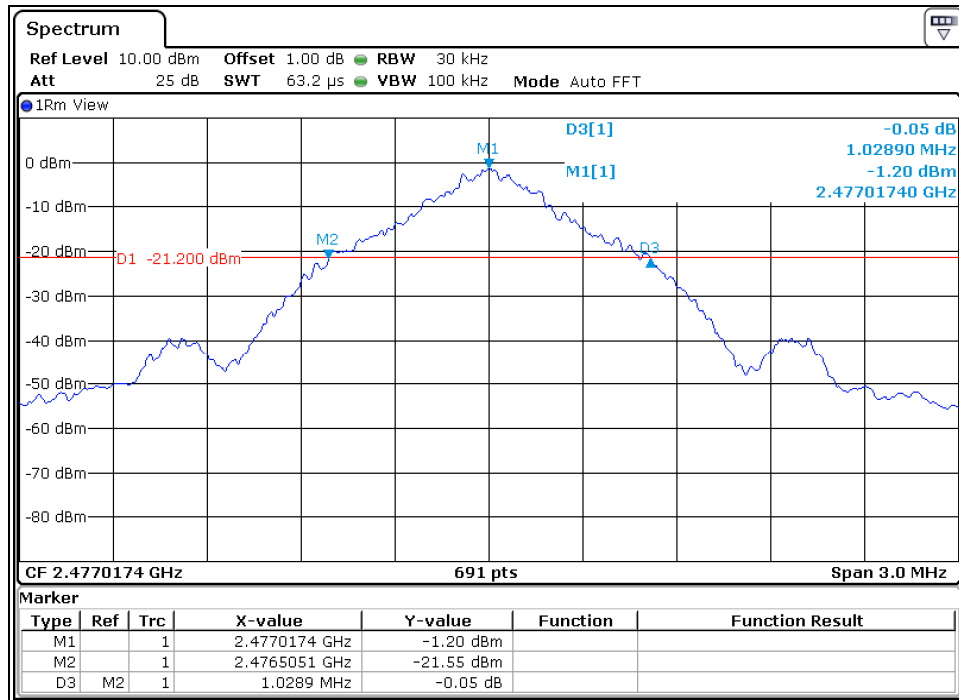
Test Data: Low channel



Test Data: Middle channel



Test Data: High channel





**BUREAU
VERITAS**

Test Report No.: RF2106WDG0230-1

5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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



**BUREAU
VERITAS**

Test Report No.: RF2106WDG0230-1

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---