




시험 성적서 TEST REPORT

페이지(page) : (1) / (총(Total) 20)

성적서 번호 Report No.		ICRT-TR-E190659-0A	
신청자 Client	기관명 Name	YouVR INC	
	주소 Address	R&D Tower-1007, 396, WorldCup buk-ro, Mapo-gu, Seoul, South Korea	
시험대상품목 Sample description		Rotator	
모델명 Type designation		PIVO-R1	
정격 Ratings		DC 3.7 V	
시험기간 Date of test		Apr. 08, 2019 ~ Apr. 10, 2019	
시험방법/항목 Test Method/Item		FCC Part 15 Subpart C §15.249	
시험결과 Test Results		Refer to 3. Test Summary	
확 인 Affirmation	작성자 Tested by	기술책임자 Technical Manager	
	성명 Name Hong-Kyu, Lee (Signature)	성명 Name Jun-Hui, Lee (Signature)	
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경기도 김포시 양촌읍 황금3로7번길 112

112, Hwanggeum3-ro 7beon-gil, Yangchon-eup, Gimpo-si, Gyeonggi-do, Korea



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Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
ICRT-TR-E190659-0A	19-Apr-2019	Initial Issue	All



1. Applicant & Manufacturer & Test Laboratory Information

1.1 Applicant information

Applicant	YouVR INC
Address	R&D Tower-1007, 396, WorldCup buk-ro, Mapo-gu, Seoul, South Korea
Contact Person	Yealin Maeng
Telephone No.	+82-70-4756-2133
Fax No.	+82-2-6442-8593
E-mail	rnd@3i.ai

1.2 Manufacturer Information

Manufacturer	3i.Inc
Address	101-117, 29, Dongbu-ro, Dong-gu, Daegu, Korea

1.3 Test Laboratory Information

Conducted tests were performed at	
Laboratory	ICR Co., Ltd.
Address	112, Hwanggeum 3-ro 7beon-gil, Hagun-ri, Yangchon-eup, Gimpo-si, Gyeonggi-do, Korea
Telephone No.	+82-2-6351-9002
Fax No.	+82-2-6351-9007
RRA No.	KR0165
KOLAS No.	KT652



2. Equipment under Test(EUT) Information

2.1 General Information

Product Name	Rotator
Brand Name	-
Model Name	PIVO-R1
Additional Model Name	-
FCC ID	2AS3Q-PIVO-R1
Hardware Version	-
Software Version	-
Power Supply	DC 3.7 V

2.2 Additional Information

Equipment Class	DXX-Low Power Communication Device Transmitter
Device Type	Stand-alone
Operating Frequency	2 440 MHz
Max. Field Strength	64.69 dB μ V/m at 3 m
Number of Channel	1
Modulation Type	GFSK
Antenna Type	PCB Pattern Antenna
Antenna Gain	0 dBi
Antenna Operating Mode	Single Antenna Equipment with only one antenna
List of Each Oscillator or Crystal Frequency	32 MHz

2.3 Mode of operation during the test

- The EUT is continuous transmission mode during the test with set at Low Channel, Middle Channel, and High Channel. To get a maximum radiated emission levels from the EUT, the EUT was moved throughout the XY, YZ, XZ planes.

2.4 Modifications of EUT

- None



3. Test Summary

3.1 Test standards and results

FCC Part 15 Subpart C			
Clause	Test items	Applied	Results
§15.249 (a) & §15.209 & §15.205	Radiated Spurious Emission	<input checked="" type="checkbox"/>	PASS
§15.207	Power Line Conducted Emission	<input checked="" type="checkbox"/>	PASS
§15.215	20 dB Bandwidth	<input checked="" type="checkbox"/>	PASS
§15.203	Antenna Requirement	<input checked="" type="checkbox"/>	PASS

3.2 Purpose of the test

- To determine whether the equipment under test fulfills the requirements of the standards stated in FCC Part 15 Subpart C Section 15.249.

3.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10: 2013.

Radiated testing was performed at a distance of 3 m from EUT to the antenna.

3.4 Configuration of Test System

3.4.1 Radiated emission test

Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 m Semi Anechoic Chamber. The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

3.4.2 AC powerline conducted emission test

The EUT was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions.



3.5 Antenna requirement

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section.

The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

3.5.1 Result: Pass

The transmitter has a *PCB Pattern Antenna*.



4. Used equipment on test

	Description	Model Name	Serial Number	Manufacturer	Last Cal. (cycle)
<input type="checkbox"/>	Spectrum analyzer	FSW85	100864	Rohde & Schwarz	2019. 03. 04 (1Y)
<input checked="" type="checkbox"/>	Spectrum analyzer	FSV40	101455	Rohde & Schwarz	2018 .07. 10 (1Y)
<input checked="" type="checkbox"/>	Signal Generator	SMB100A	180607	Rohde & Schwarz	2019. 03. 04 (1Y)
<input type="checkbox"/>	Wideband Power Sensor	NRP-Z81	103673	Rohde & Schwarz	2019. 03. 05 (1Y)
<input type="checkbox"/>	Open Switch and Control Platform	OSP150	101000	Rohde & Schwarz	2019. 03. 05 (1Y)
<input type="checkbox"/>	Environmental Test Chamber	MHK-408NKDA	1060908	TERCHY	2019. 03. 04 (1Y)
<input checked="" type="checkbox"/>	DC Power Supply	XDL 35-5P	J00385373	Sorensen	2019. 03. 05 (1Y)
<input type="checkbox"/>	DC Power Supply	6603D	672483	Topward	2019. 03. 05 (1Y)
<input checked="" type="checkbox"/>	Loop Antenna	HFH2-Z2	100506	Rohde & Schwarz	2017. 06. 19 (2Y)
<input checked="" type="checkbox"/>	TRILOG BROADBAND ANTENNA	VULB9162	120	SCHWARZBECK	2018. 11. 23 (2Y)
<input checked="" type="checkbox"/>	RF Pre Amplifier	SCU08	100747	Rohde & Schwarz	2018. 04. 17 (1Y)
<input checked="" type="checkbox"/>	DOUBLE-RIDGE WAVEGUIDE HORN ANTENNA	HF907	102556	Rohde & Schwarz	2017. 07. 05 (2Y)
<input checked="" type="checkbox"/>	RF Pre Amplifier	SCU18	102342	Rohde & Schwarz	2018. 04. 17 (1Y)
<input checked="" type="checkbox"/>	Horn Antenna	LB-42-10-C-KF	J202024625	AINFO Inc.	2018. 04. 20 (1Y)
<input checked="" type="checkbox"/>	RF Pre Amplifier	AMF-4F-18265-35-8P-1	771846	MITEQ	2019. 03. 04 (1Y)
<input type="checkbox"/>	Horn Antenna	LB-28-10-C-KF	J202024627	AINFO Inc.	2018. 04. 20 (1Y)
<input type="checkbox"/>	RF Pre Amplifier	AMF-4D-260400-45-6P	779919	MITEQ	2019. 03. 04 (1Y)
<input checked="" type="checkbox"/>	EMI Test Receiver	ESR26	101461	Rohde & Schwarz	2018. 04. 17 (1Y)
<input checked="" type="checkbox"/>	EMI Test Receiver	ESR3	102119	Rohde & Schwarz	2018. 04. 17 (1Y)
<input checked="" type="checkbox"/>	LISN	ENV216	102194	Rohde & Schwarz	2018. 04. 16 (1Y)
<input checked="" type="checkbox"/>	RF Cable	MULTIFLEX_86	-	HUBER & SUHNER	-
<input checked="" type="checkbox"/>	Chamber Cable	mwX221	-	Junkosha	-

※ All test equipment used is calibration on a regular basis.

5. Radiated Spurious Emission

5.1 Operating environment

Temperature : 22 °C

Relative humidity : 42 %

5.2 Measurement method

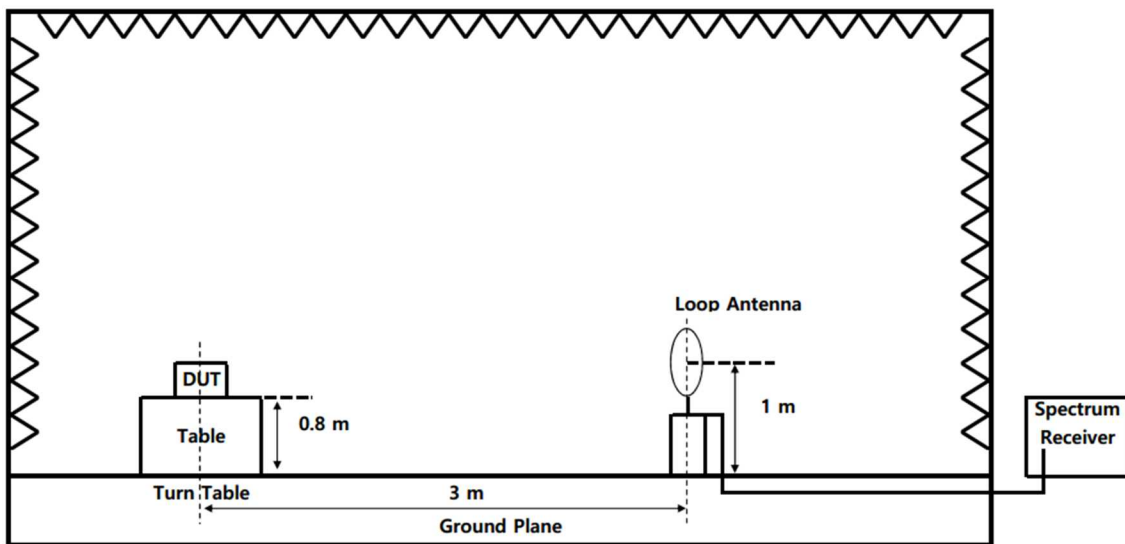
Standard : §15.249 (a) & §15.209 & §15.205

5.3 Test setup

The radiated emissions measurements were performed on the 3 m, Semi-Anechoic Chamber. The EUT was placed on a non-conductive turntable above the ground plane.

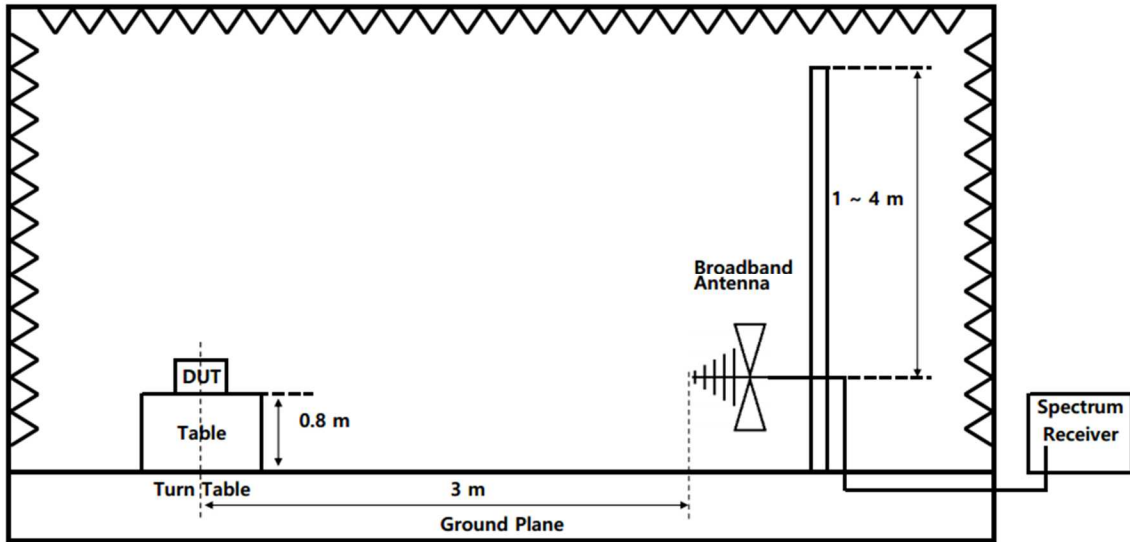
The frequency spectrum from 9 kHz to 26.5 GHz was scanned and maximum emission levels at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for horizontal and vertical polarization of the receiving antenna.

5.3.1 Below 30 MHz

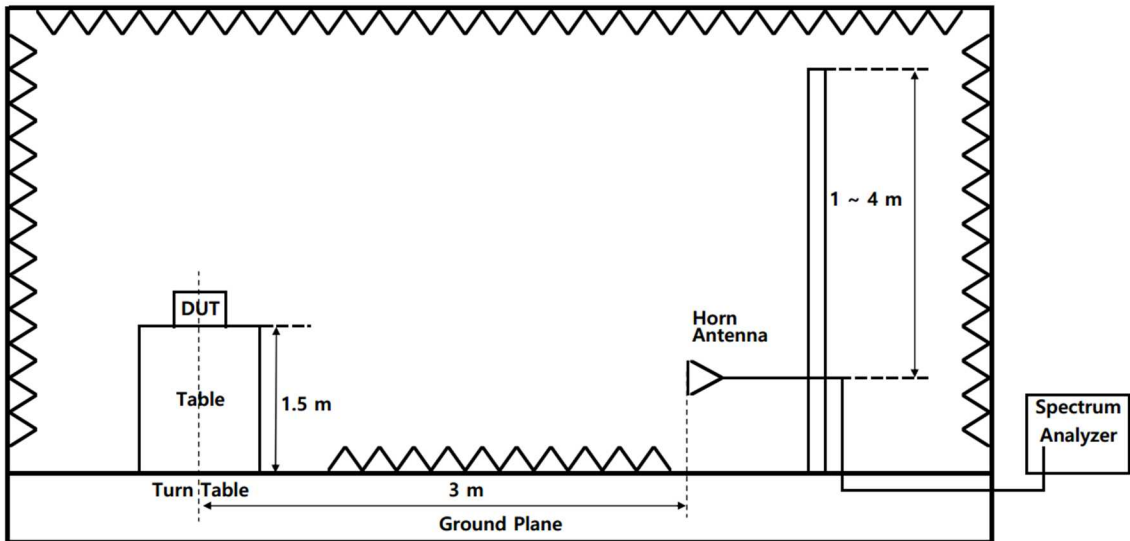




5.3.2 30 MHz to 1 GHz



5.3.3 Above 1 GHz





5.4 Test data

Test date : 09. Apr. 2019 ~ 09. Apr. 2019
 Operating mode : Transmit mode
 Test Result : Pass

5.4.1 Test data for Restricted band & Band edge

Frequency (MHz)	Reading (dB μ V)	Detector	Ant. Pol. (H/V)	Corr. Factor (dB)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
2 389.13	52.31	Peak	V	-9.91	42.40	73.98	-31.58
	34.95	Average	V		25.04	53.98	-28.94
2 483.50	46.96	Peak	V	-9.65	37.31	73.98	-36.67
	32.58	Average	V		22.93	53.98	-31.05

- ※ Ant. Pol. : Antenna Polarization
- ※ Corr. Factor. : Antenna Factor + Cable Loss - Amplifier Gain
- ※ Result = Reading + Corr. Factor
- ※ Margin = Result - Limit



5.4.2 Test data for Spurious

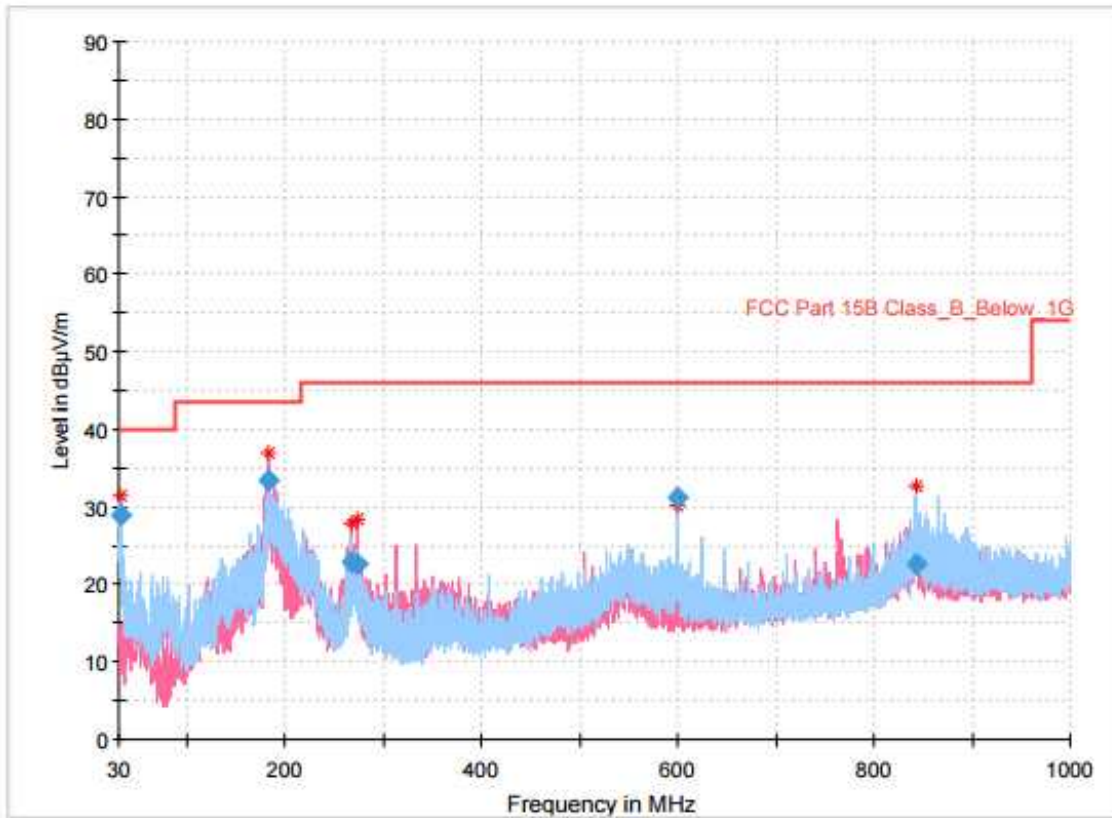
5.4.2.1 Measurement Results for below 30 MHz

Frequency (MHz)	Reading (dB μ V)	Detector	Ant. Pol. (H/V)	Corr. Factor (dB)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
It was not found any emissions peaks found from the EUT.							

- ※ Ant. Pol. : Antenna Polarization
- ※ Corr. Factor. : Antenna Factor + Cable Loss - Amplifier Gain
- ※ Result = Reading + Corr. Factor
- ※ Margin = Result – Limit



5.4.2.2 Measurement Results for below 1 GHz



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.333750	28.89	40.00	11.11	1000.0	120.000	100.1	H	220.0	-24.5
183.381250	33.34	43.50	10.16	1000.0	120.000	100.1	V	330.0	-24.7
267.650000	22.75	46.00	23.25	1000.0	120.000	100.1	V	151.0	-22.2
273.106250	22.61	46.00	23.39	1000.0	120.000	100.1	V	300.0	-22.1
599.996250	31.06	46.00	14.94	1000.0	120.000	100.1	H	162.0	-14.8
843.890625	22.53	46.00	23.47	1000.0	120.000	200.0	H	118.0	-11.2



5.4.2.3 Measurement Results for Above 1 GHz

Frequency (MHz)	Reading (dB μ V)	Detector	Ant. Pol. (H/V)	Corr. Factor (dB)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
It was not found any emissions peaks found from the EUT.							

- ※ Ant. Pol. : Antenna Polarization
- ※ Corr. Factor. : Antenna Factor + Cable Loss - Amplifier Gain
- ※ Result = Reading + Corr. Factor
- ※ Margin = Result - Limit



5.4.3 Test data for Fundamental & Harmonic

Frequency (MHz)	Reading (dB μ V)	Detector	Ant. Pol. (H/V)	Corr. Factor (dB)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
2 440.00	74.44	Peak	H	-9.75	64.69	113.98	-49.29
	74.07	Average	H		64.32	93.98	-29.66
2 440.00	71.68	Peak	V	-9.75	61.93	113.98	-52.05
	70.10	Average	V		60.35	93.98	-33.63
4 880.00	42.38	Peak	H	-1.98	40.40	73.98	-33.58
	33.61	Average	H		31.63	53.98	-22.35
4 880.00	41.02	Peak	V	-1.98	39.04	73.98	-34.94
	30.95	Average	V		28.97	53.98	-25.01



6. Power Line Conducted Emission

6.1 Operating environment

Temperature : 24 °C

Relative humidity : 43 %

6.2 Measurement method

Standard : §15.207

6.3 Test setup

The EUT was placed on a wooden table, 0.8 m height above the floor. Power was fed to the EUT through a 50Ω / $50 \mu\text{H}$ + 5Ω Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.



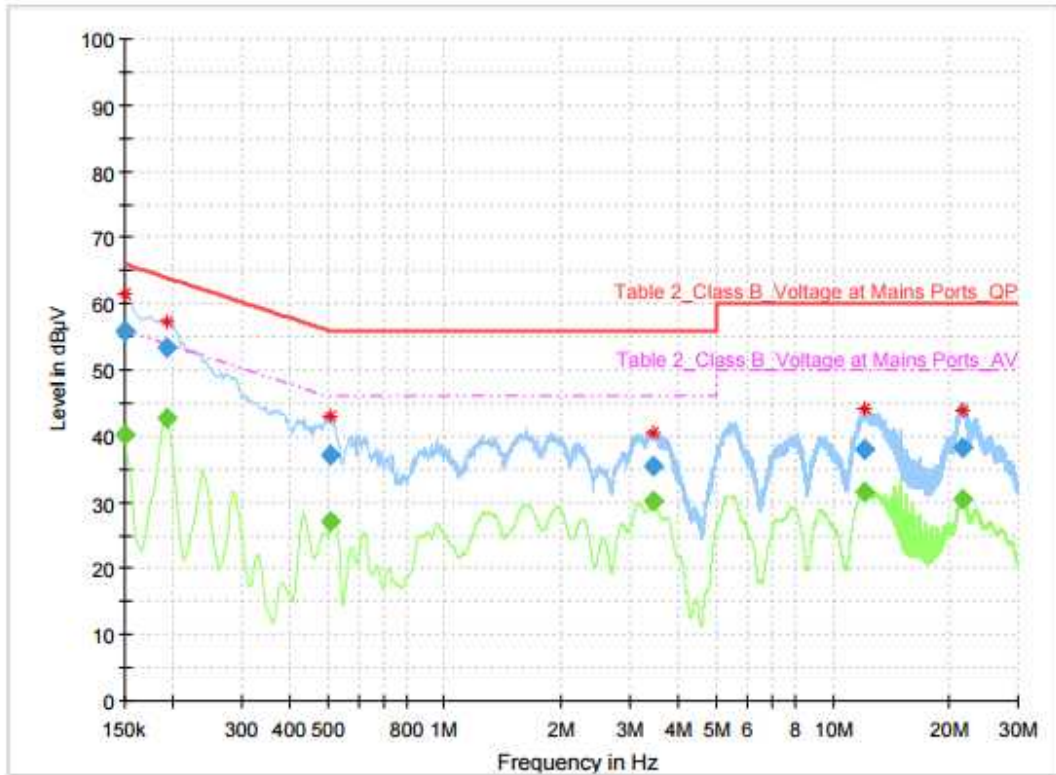


6.4 Test data

Test date : 10. Apr. 2019
 Operating mode : Transmit mode
 Test Result : Pass

6.4.1 Measured Results & Graph

Live line

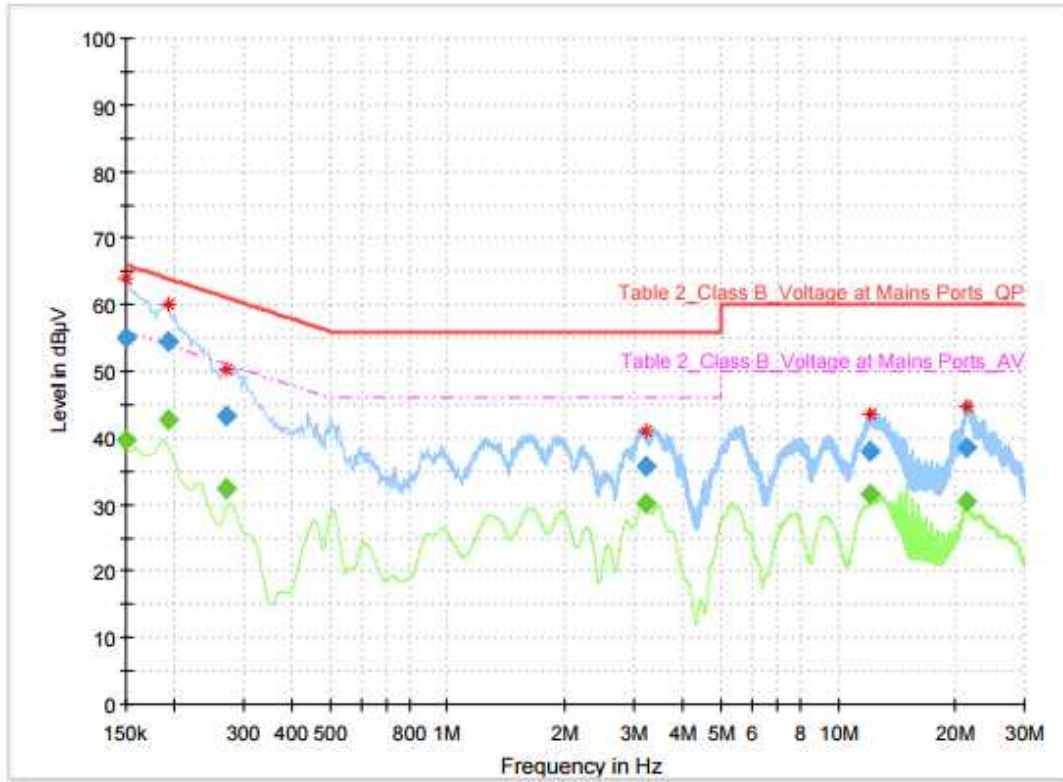


Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.150000	---	40.16	56.00	15.84	1000.0	9.000	L1	ON	9.8
0.150000	55.84	---	66.00	10.16	1000.0	9.000	L1	ON	9.8
0.192750	---	42.85	53.92	11.06	1000.0	9.000	L1	ON	9.9
0.192750	53.39	---	63.92	10.53	1000.0	9.000	L1	ON	9.9
0.505500	---	26.99	46.00	19.01	1000.0	9.000	L1	ON	9.9
0.505500	37.26	---	56.00	18.74	1000.0	9.000	L1	ON	9.9
3.448500	---	30.06	46.00	15.94	1000.0	9.000	L1	ON	9.8
3.448500	35.41	---	56.00	20.59	1000.0	9.000	L1	ON	9.8
12.113250	---	31.52	50.00	18.48	1000.0	9.000	L1	ON	10.0
12.113250	38.10	---	60.00	21.90	1000.0	9.000	L1	ON	10.0
21.552000	---	30.32	50.00	19.68	1000.0	9.000	L1	ON	10.1
21.552000	38.34	---	60.00	21.66	1000.0	9.000	L1	ON	10.1



Neutral line



Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.150000	---	39.59	56.00	16.41	1000.0	9.000	N	ON	9.8
0.150000	55.14	---	66.00	10.86	1000.0	9.000	N	ON	9.8
0.192750	---	42.70	53.92	11.22	1000.0	9.000	N	ON	10.0
0.192750	54.36	---	63.92	9.55	1000.0	9.000	N	ON	10.0
0.271500	---	32.30	51.07	18.78	1000.0	9.000	N	ON	9.7
0.271500	43.39	---	61.07	17.68	1000.0	9.000	N	ON	9.7
3.207750	---	30.07	46.00	15.93	1000.0	9.000	N	ON	9.8
3.207750	35.67	---	56.00	20.33	1000.0	9.000	N	ON	9.8
12.007500	---	31.66	50.00	18.34	1000.0	9.000	N	ON	10.0
12.007500	38.07	---	60.00	21.93	1000.0	9.000	N	ON	10.0
21.372000	---	30.47	50.00	19.53	1000.0	9.000	N	ON	10.2
21.372000	38.64	---	60.00	21.36	1000.0	9.000	N	ON	10.2



7. 20 dB Bandwidth

7.1 Operating environment

Temperature : 21 °C

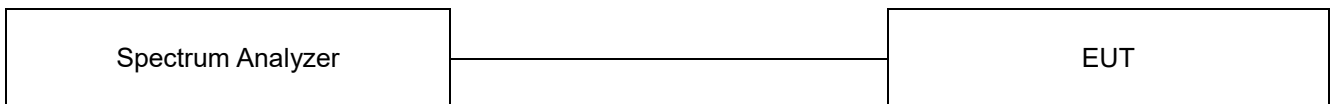
Relative humidity : 43 %

7.2 Measurement method

Standard : §15.215

7.3 Test setup

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 10 kHz, and peak detection was used. The 20 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 20 dB.





7.4 Test data

Test date : 08. Apr. 2019
Operating mode : Transmit mode
Test Result : Pass

7.4.1 Measured Results

Modulation Type	Frequency	Measured Value (kHz)
GFSK	2 440 MHz	82.5



7.4.2 Measured Graph (20 dB Bandwidth)

