FCC & ISED CERTIFICATION TEST REPORT

Project Number	**: EA2103C-075**
Test Report Number	**: TR-W2106-001**
Type of Equipment	**: Electronic Bidet Seat**
Model Name	**: DB-5600**
Multiple Model Name	**: EF-BM-6000**
Equipment Class	**: DXX - Part 15 Low Power Communication Device Transmitter**
FCC ID	**: 2AZYF-DB-5600**
ISED Canada ID	**: 27289-DB5600**
Applicant	**: DAELIM TRADING CO., LTD JEUNGPYEONG FACTORY**
Address	**: 23, Jeungpyeongsandan-ro, Jeungpyeong-eup, Jeungpyeong-gun, Chungcheongbuk-do, Republic of Korea**
Manufacturer	**: DAELIM TRADING CO., LTD JEUNGPYEONG FACTORY**
Address	**: 23, Jeungpyeongsandan-ro, Jeungpyeong-eup, Jeungpyeong-gun, Chungcheongbuk-do, Republic of Korea**
Regulation	**: FCC Part 15 Subpart C Section 15.249, ISED RSS-210 Issue10**
Total page of Report	**: 23 Pages**
Date of Receipt	**: 2021-03-31**
Date of Issue	**: 2021-06-07**
Test Result	**: PASS**

This test report only contains the result of a single test of the sample supplied for the examination.
It is not a generally valid assessment of the features of the respective products of the mass-production.

Prepared by	Song, In-young / Senior Engineer	Signature	2021-06-07 Date
Reviewed by	Choi, Yeong-min / Technical Manager	Signature	2021-06-07 Date

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Release Control Record

Issue Report No.	Issued Date	Details/Revisions
TR-W2106-001	2021-06-07	Initial Release
-	-	-

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1. TEST SUMMARY

1.1 Regulations and results

The sample submitted for evaluation (Hereafter referred to as the EUT) has been tested in accordance with the following regulations or standards.

FCC Reference Section	ISED Reference Section	Description	Result			
			P	F	N.T.	Note
15.205, 15.209 & 15.249(a), (d)	RSS-210 B.10	Radiated Emissions & Restricted band around Fundamental Frequency	**P**			
15.215	RSS GEN 6.6	20 dB Bandwidth, 99 % Bandwidth	**P**			
15.207	RSS GEN 8.8	AC Power-line Conducted Emissions	**P**			

Remark:
P means Passed **F** means Failed **N.T.** means Not Tested

1.2 Test Methodology

The tests mentioned in clause 1.1 in this test report were performed according to FCC CFR 47 Part 2, CFR 47 Part 15 and ANSI C63.10-2013, and RSS-Gen Issue 5.

1.3 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

1.4 Purpose of the test

The test was performed to determine whether the equipment under test fulfills the requirements of the regulation stated in FCC Part 15 Subpart C Section 15.249, RSS-Gen and RSS-210.

1.5 Test Facility

The measurement facilities are located at 135-60 Gyeongchung-daero, Gonjiam-eup, Gwangju-si, Gyeonggi-do 12813, Korea. Our test facilities are accredited as a Conformity Assessment Body (CAB) by the FCC and ISED Canada, designated by the RRA (National Radio Research Agency), and accredited by KOLAS (Korea Laboratory Accreditation Scheme) in Korea and approved by TUV Rheinland, TUV SÜD and Korean Register of Shipping according to the requirement of ISO/IEC 17025.

Laboratory Qualification	Registration No.	Mark
FCC	KR0160	
ISED Canada	12721A	
RRA	KR0160	National Radio Research Agency
TUV Rheinland	UA 50314109-0002	TÜVRheinland
TUV SÜD	CARAT 094465 0004 Rev.00	
Korean Agency for Technology and Standards	KT733	
KOREAN REGISTER OF SHIPPING	PCT40841-TL001	

Remark. This report is not related to KOLAS accreditation and relevant regulation.

2. EUT (Equipment Under Test) INFORMATION

2.1 General Description

The DAELIM TRADING CO., LTD JEUNGPYEONG FACTORY, Model DB-5600 (referred to as the EUT in this report) is an Electronic Bidet Seat. The product specification described herein was obtained from product data sheet or user's manual.

Equipment Class	***DXX – Part 15 Low Power Communication Device Transmitter***
Operating Frequency	2 448 MHz
Max. RF Output Power	73.67 dBμV/m (Peak)
Modulation Types	GFSK
Number of Channels	1 channel
Generated or used Freq. in EUT	16 MHz
Type of Antenna	■ Integrated Type (PCB Pattern) ☐ Dedicated Type
Antenna Gain	0 dBi
Operating Temperature	37.4°F ~ 104°F
Normal Test Voltage	AC 120 V
Electrical Rating	AC 120 V
Test SW Version	N/A
RF power setting in TEST SW	N/A
Software Version	SWR 1.0
Hardware Version	HWR 1.0

2.2 Additional Model

Model Name	Model Difference
DB-5600	Basic Model
EF-BM-6000	The models are identical to basic model, except for the model designation only.
NOTE: The Manufacturer has declared to all the additional model names into basic model name without any further evaluation by ENG Co., Ltd.	

3. TEST CONDITION

3.1 Equipment Used During Test

The following peripheral devices and/or interface cables were connected during the measurement:

Description	Model No.	Serial No.	Manufacturer.
Electronic Bidet Seat (EUT)	DB-5600	N/A	DAELIM TRADING CO., LTD JEUNGPYEONG FACTORY

3.2 Mode of operation during the test

For transmitting continuous modulation signal and maximum RF output power, supply AC power to the EUT and then press the operating button on the EUT to the manufacturer's guidance.

3.3 Preliminary Testing for Worst case configuration

Since the EUT is a fixed type device and use only one channel, so all spurious emission tests were performed in one axis direction and one channel.

3.3.1 Radiated Test Channel and Frequency

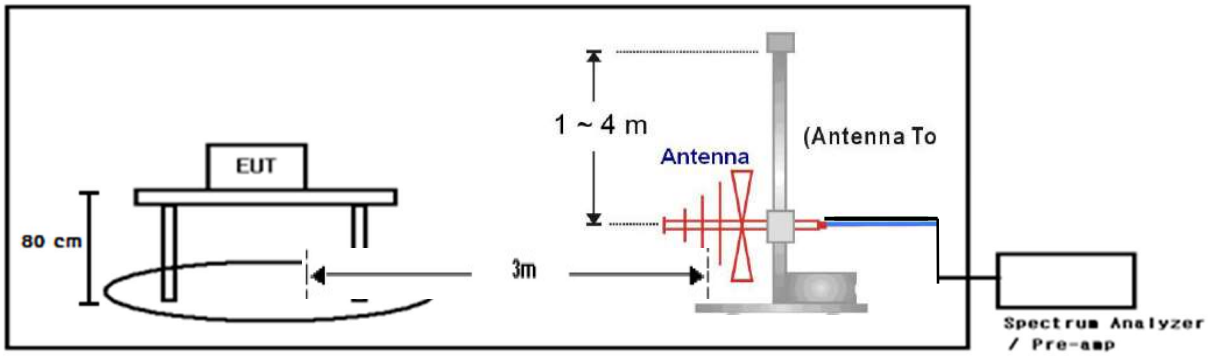
Test Channel	Channel	Frequency
Dedicated Channel	-	2 448 MHz

3.3.2 AC power line conducted Emission Test Mode

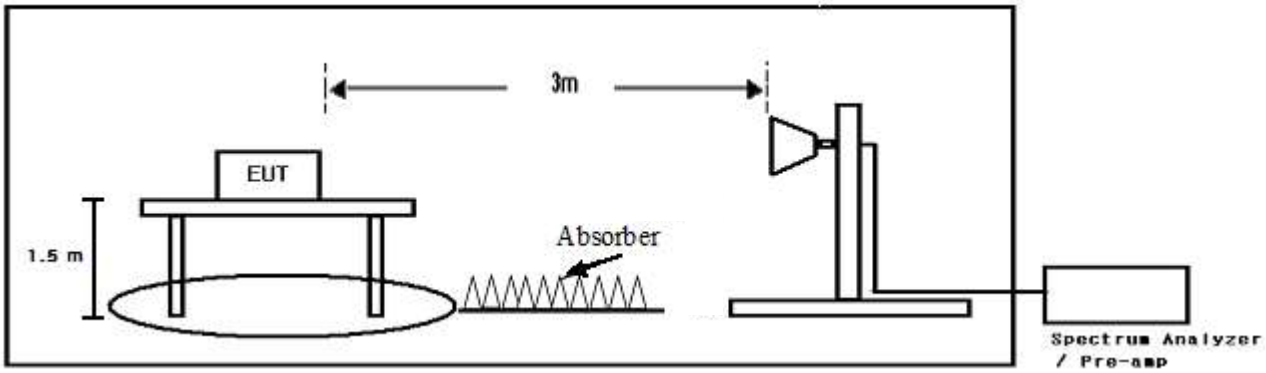
Test Channel	Channel	Frequency
Dedicated Channel	-	2 448 MHz

3.4 Test Setup Drawing

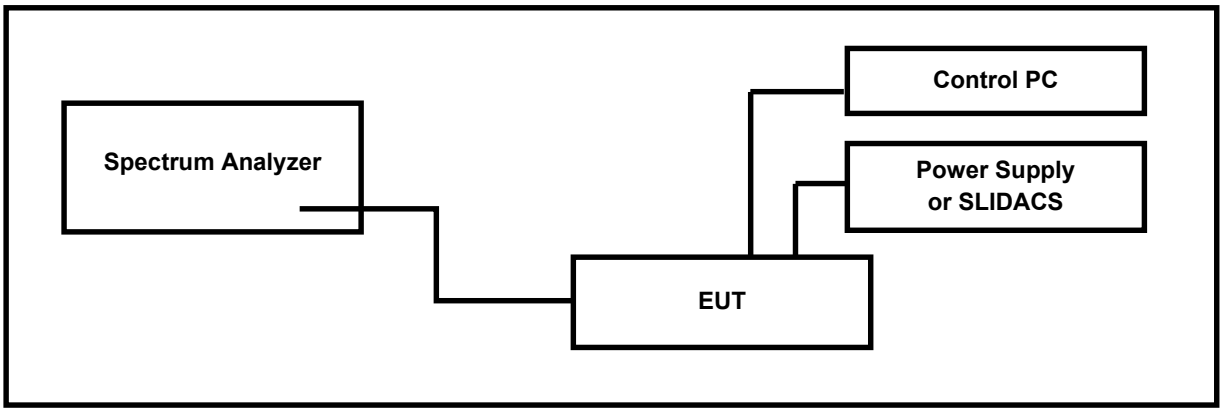
(Radiated Test below 1 GHz)



(Radiated Test above 1 GHz)



(Conducted Test)



3.5 EUT Modifications

- No EMC Relevant Modifications were performed by this test laboratory.

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4. ANTENNA REQUIREMENT

According to FCC CFR 47 Part 15 section 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 provision of this section.

4.1 Antenna Description

Frequency Band (GHz)	Antenna Type	Max Peak Gain (dBi)	Connector Type
2.402 – 2.480	PCB Pattern	0	-

4.2 Conclusion

The antenna type of the EUT is PCB Pattern Antenna, so the EUT met the requirement.

5. TEST DATA

5.1 Radiated emissions and Restricted band around fundamental frequency

5.1.1 Regulation

Acc. To section 15.249 and RSS-210 Annex B.10, following table shall be applied.

Fundamental Frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902 – 928 MHz	50	500
2 400 -2 483.5 MHz	50	500
5 725 -5 875 MHz	50	500
24.0 – 24.25 GHz	250	2500

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits as below table, whichever is the lesser attenuation.

Frequency (MHz)	Field strength limit (μV/m)	Field strength limit (dBμV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F (kHz) = 266.7 – 4.9	48.5 – 13.8	300
0.490 – 1.705	24000/F (kHz) = 49.0 – 14.1	33.8 - 23.0	30
1.705 – 30.0	30	29.5	30
30 – 88	100	40.0	3
88 - 216	150	43.5	3
216 - 960	200	46.0	3
Above 960	500	54.0	3

Note: The emission limits shown in the above table are based on measurement instrumentation employing a CISPR quasi-peak detector. For the frequency bands 9 – 90 kHz, 110 – 490 kHz and above 1000 MHz, the radiated emission limits are based on measurements employing an average detector.

5.1.2 Method of Measurement

The preliminary radiated emission test was performed using the procedure in ANSI C63.10 2013 to determine the worse operating conditions. The radiated emissions measurements were performed on the 10 m Semi Anechoic Chamber

Radiated Emissions Test, 9 kHz to 30 MHz (Magnetic Field Test)

For frequencies from 9 kHz to 30 MHz measurements were made of the magnetic H field. The EUT was placed on the top of the 0.8-meter height, 1 × 1.5 meter non-metallic table. The measuring antenna is an electrically screened loop antenna. Emissions from the EUT are maximized by adjusting the orientation of the Loop antenna and rotating the EUT on the turntable. Manipulating the system cables also maximizes EUT emissions if applicable. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.

Radiated Emissions Test, from 30 MHz to 1 GHz

The frequency spectrum from 30 MHz to 1 GHz was scanned and maximum emission levels maximized at each frequency recorded. The EUT was placed on the top of a rotating table of 0.8-meter height, 1 × 1.5 meter non-metallic table. The measuring antenna was broadband Tri-log antenna. The system 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 both horizontal and vertical polarization of the receiving antenna. The test receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode. The EUT is situated in three orthogonal planes (if appropriate).

Radiated Emissions Test, above 1 GHz

The frequency spectrum of above 1 GHz was scanned and maximum emission levels maximized at each frequency recorded. The EUT was placed on the top of a rotating table of 1.5-meter height. The measuring antenna was broadband horn antenna. The system 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 both horizontal and vertical polarization of the receiving antenna. The test receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode. If the peak measured value also meets average limit, measurement with the average detector is unnecessary. The EUT is situated in three orthogonal planes (if appropriate).

5.1.3 Test Site Requirement for KDB 937606

Acc. to KDB 937606, Semi Anechoic Chamber (SAC) shall be verified test results below 30 MHz with Open Area Test Site (OATS), so we compared test results between the measurements from our SAC and an OATS and found test results almost same, so we declare test result for below 30 MHz from our SAC is valid and met the requirement acc. to KDB 937606.

5.1.4 Measurement Uncertainty

Measurement uncertainties were not taken into account and following uncertainty levels have been estimated for tests performed on the apparatus. The measurement uncertainties are given with at least 95 % confidence.

Frequency Range	Uncertainty	Frequency Range	Uncertainty
9 kHz ~ 30 MHz	±2.9 dB	30 MHz ~ 1 GHz	±4.3 dB
1 GHz ~ 18 GHz	±4.9 dB	18 GHz ~ 25 GHz	±5.2 dB

5.1.5 Sample Calculated Example

At 80 MHz Limit = 40.0 dBuV/m

Result =Receiver reading value + Antenna Factor + Cable Loss – Pre-amplifier gain = 30 dBuV/m

Margin = Limit – Result = 40 – 30 = 10 so the EUT has 10.0 dB margin at 80 MHz

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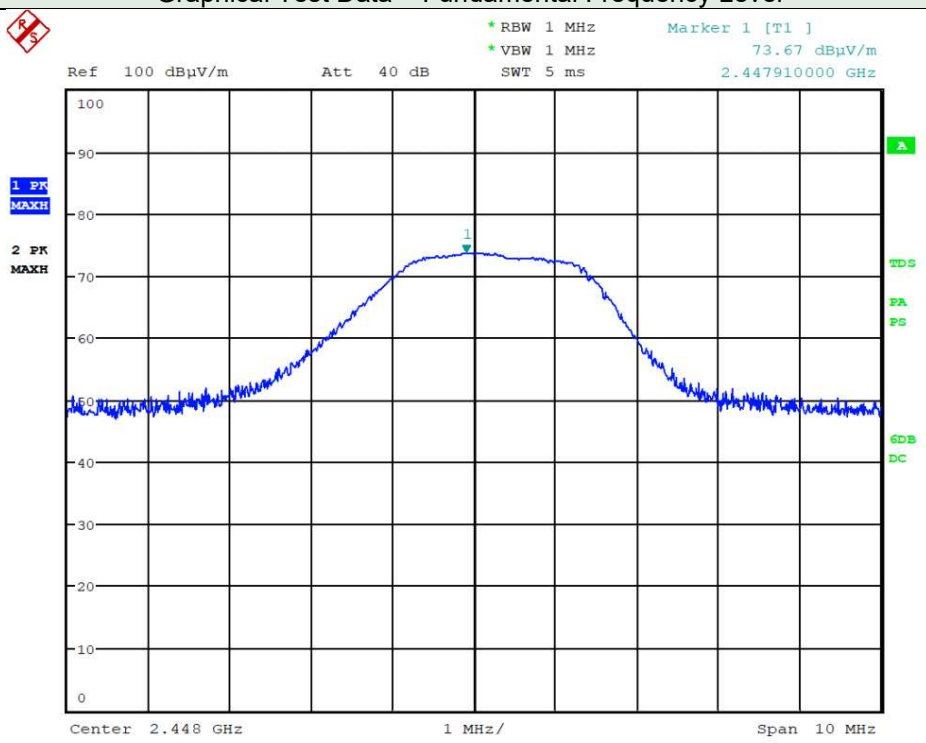
5.1.6 Test Data

Date of Test	2021-05-12 ~ 2021-05-14	Temperature	(25.6 ± 2.7) °C
		Relative humidity	(61.4 ± 5.9) % R.H.
Measurement Frequency Range		9 kHz ~ 1 GHz	
Test Result	***PASS***	Tested By	Do-heon Kim

Frequency range	Detector Mode	Resolution BW	Video BW	Video Filtering	Measurement distance
Below 30 MHz	Peak or Q.P.	9 kHz	30 kHz	-	3 m
30 MHz ~ 1 000 MHz	Peak or Q.P.	100 kHz	300 kHz	-	3 m
30 MHz ~ 1 000 MHz	Peak or Average	1 MHz	3 MHz	-	3 m

5.1.6.1 Test Data Fundamental Frequency Level

Graphical Test Data – Fundamental Frequency Level



Tabulated Test Data - Fundamental Frequency Level

Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2 448	73.67	93.97	20.30

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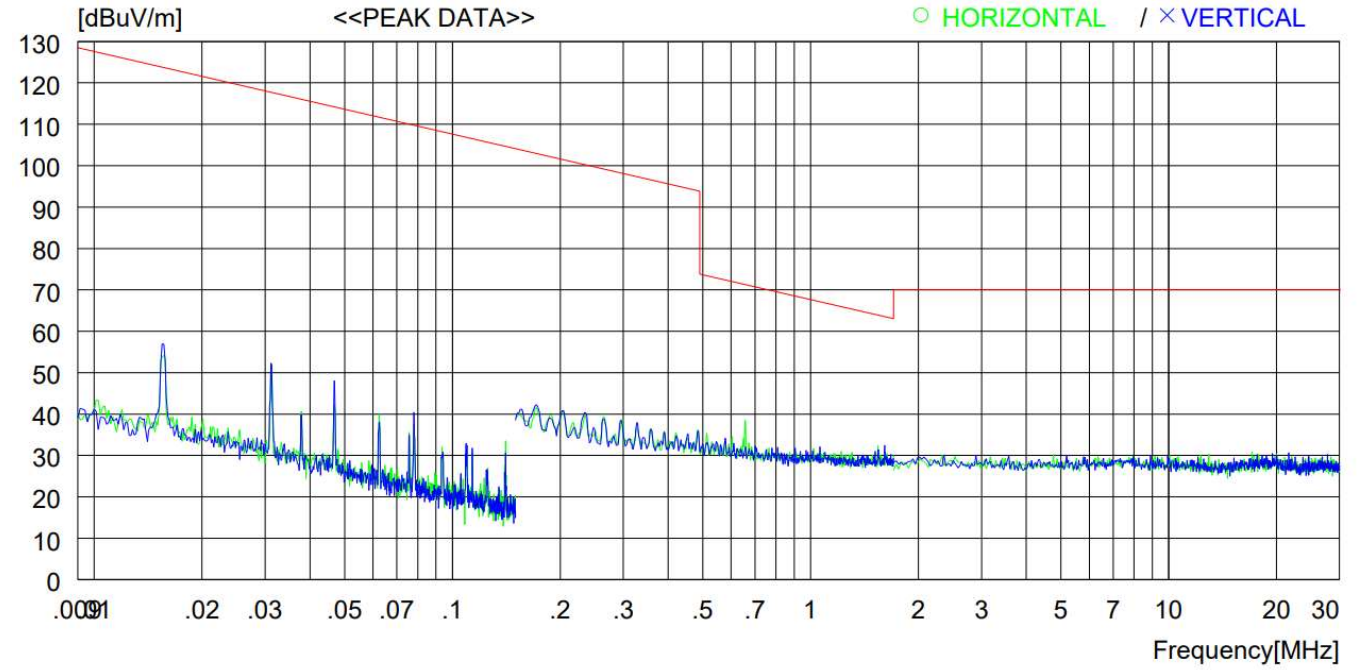
5.1.6.2 Test Data below 30 MHz

Graphical Test Data – Below 30 MHz



Tabulated Test Data - Below 30 MHz

Frequency (MHz)	Receiver Reading (dBuV)	Detector Mode	Pol.	Ant. Factor (dB/m)	Corr. Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Degree)
* Spurious emissions that 20 dB below the limits didn't be recorded										

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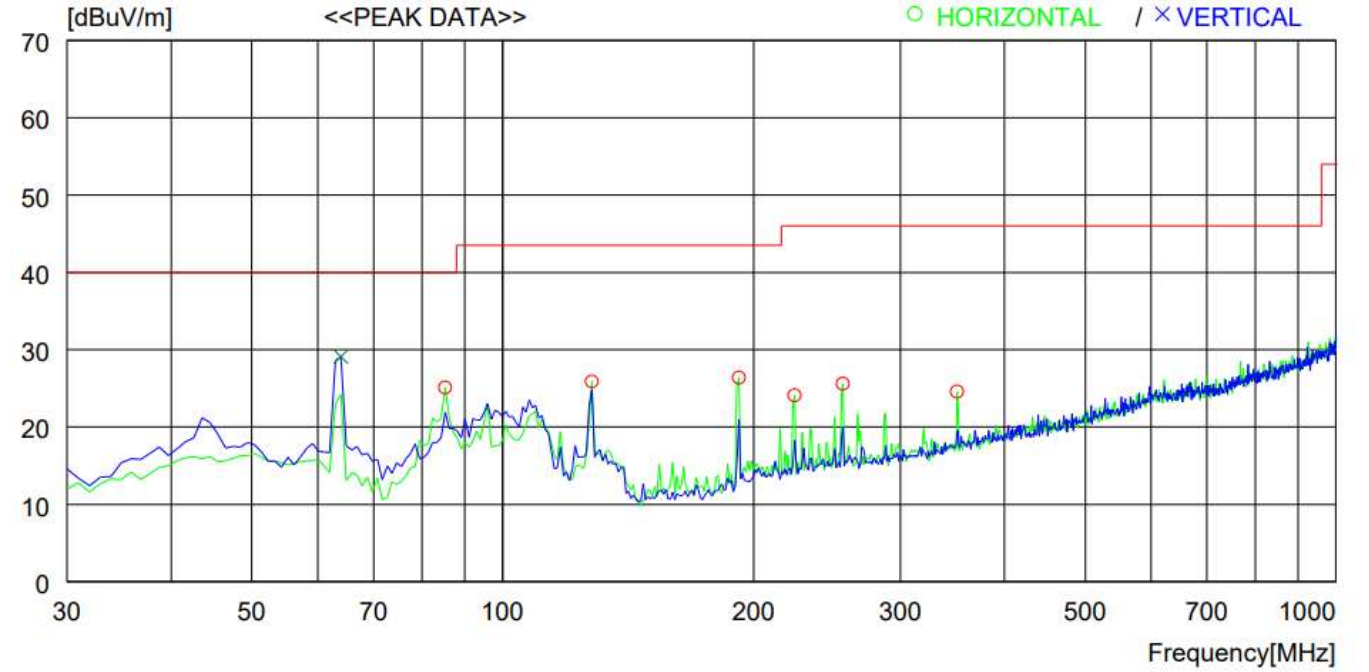
5.1.6.3 Test Data from 30 MHz to 1 GHz

Graphical Test Data – Below 1 GHz, Channel



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	85.290	41.4	8.5	7.9	32.7	25.1	40.0	14.9	200	0
2	127.970	41.3	8.9	8.4	32.7	25.9	43.5	17.6	200	30
3	191.990	39.8	10.3	9.0	32.7	26.4	43.5	17.1	200	0
4	224.000	35.8	11.8	9.2	32.7	24.1	46.0	21.9	100	359
5	256.010	36.2	12.5	9.5	32.6	25.6	46.0	20.4	100	43
6	351.070	32.6	14.5	10.2	32.7	24.6	46.0	21.4	100	127
----- Vertical ------										
7	63.950	42.5	11.7	7.6	32.7	29.1	40.0	10.9	100	295

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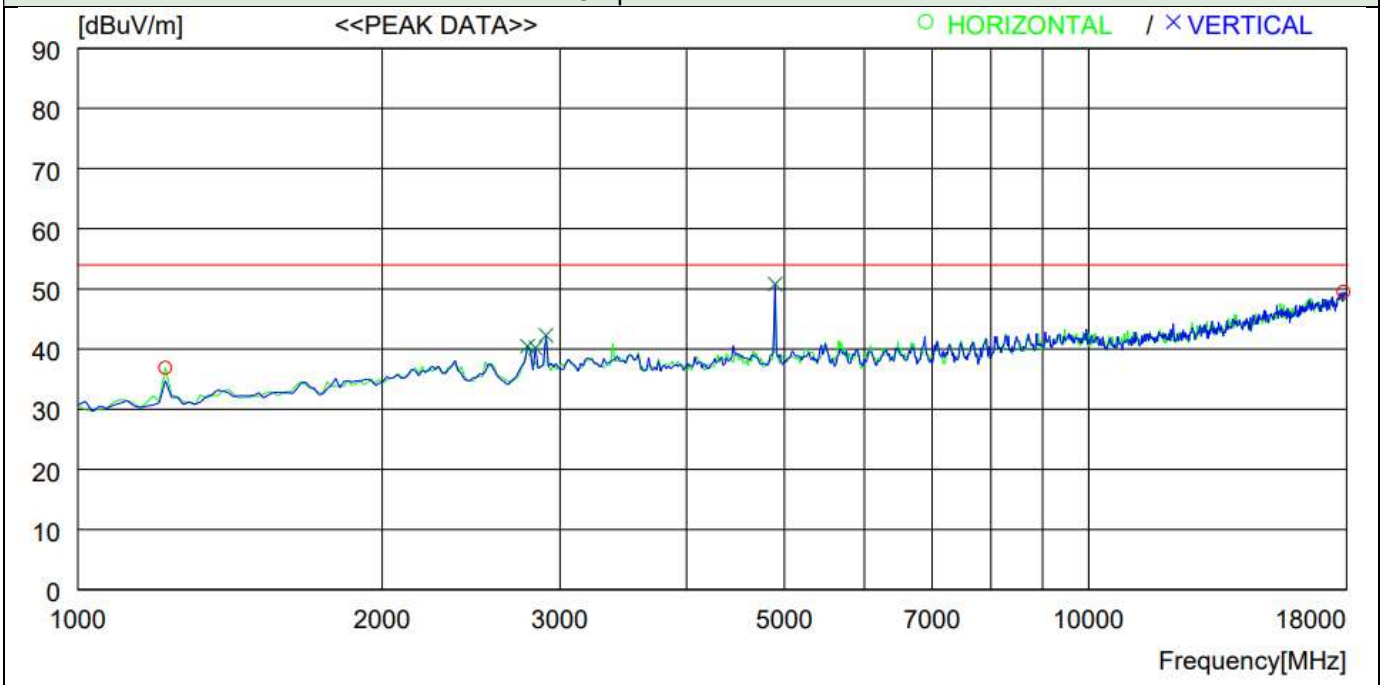
5.1.6.4 Test Data - above 1 GHz

Graphical Test Data



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	1221.000	48.8	25.1	2.9	39.9	36.9	54.0	17.1	153	254
2	17864.000	32.1	43.8	11.3	37.7	49.5	54.0	4.5	100	175
----- Vertical ------										
3	2785.000	45.0	30.1	5.2	39.8	40.5	54.0	13.5	200	0
4	2836.000	44.6	30.2	5.2	39.8	40.2	54.0	13.8	200	0
5	2904.000	46.4	30.4	5.3	39.8	42.3	54.0	11.7	200	0
6	4893.000	50.9	34.2	5.8	40.1	50.8	54.0	3.2	100	346

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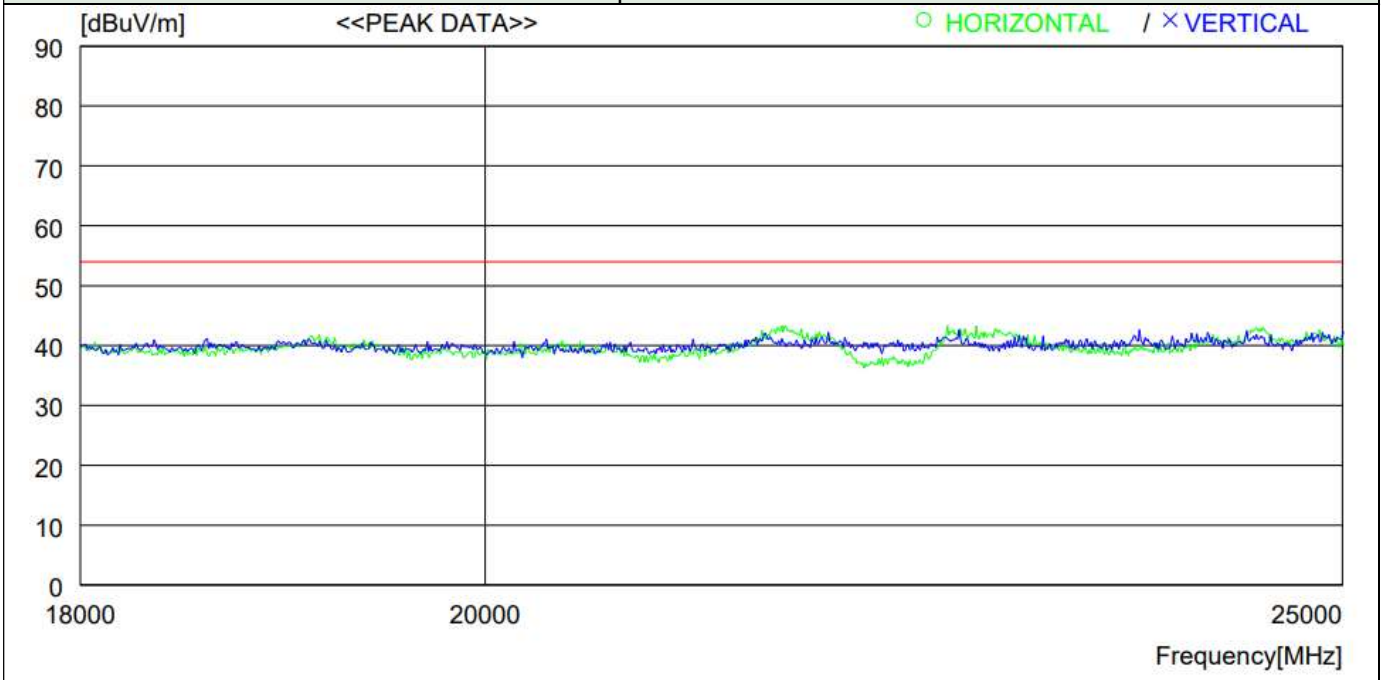
Graphical Test Data



Freq. (MHz)	Detector Mode	Pol.	Ant. Factor (dB/m)	Corr. Factor (dB)	Receiver Reading (dBuV/m)	Duty Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (Deg)
Low / Middle / High Channel											
* Spurious emissions that 20 dB below the limits didn't be recorded											

NOTE: Peak results are met average limit, so average measurement was not performed.

5.2 20 dB bandwidth

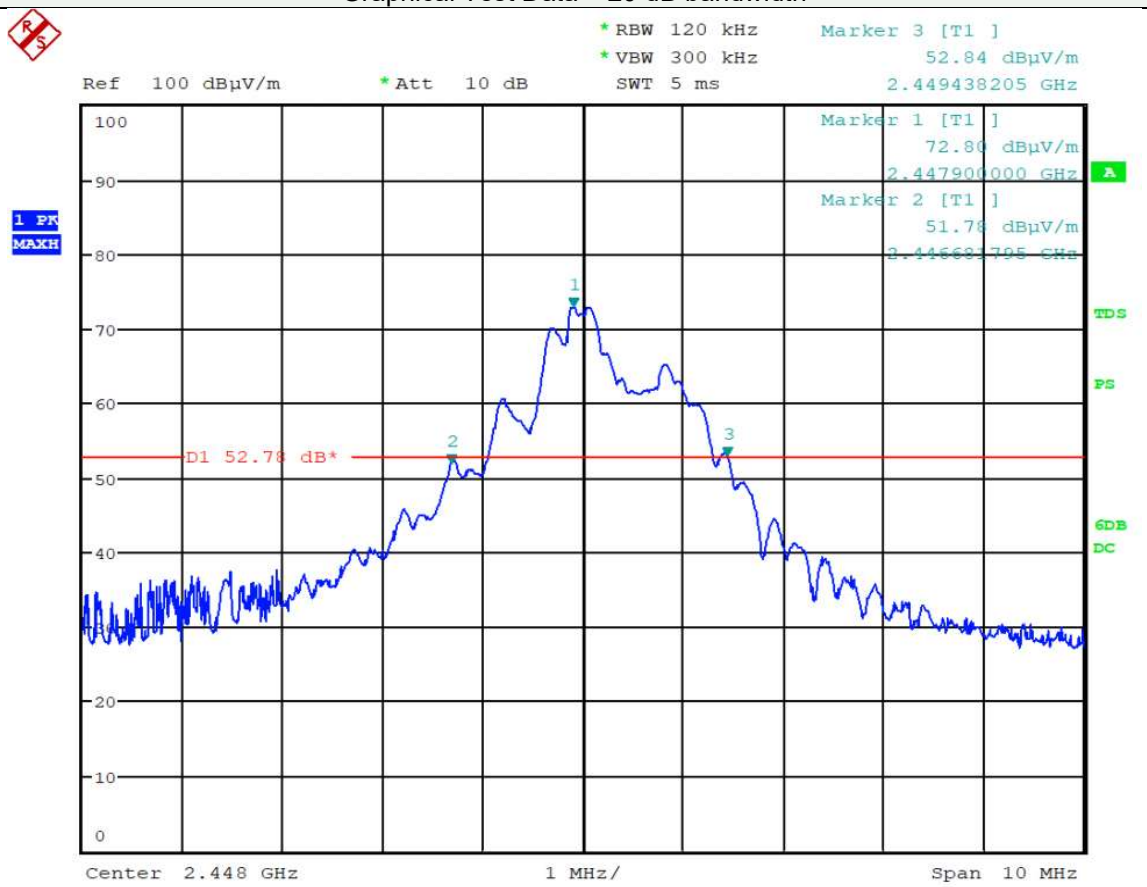
5.2.1 Method of Measurement

The antenna output of the EUT was connected to the spectrum analyzer. The resolution is set to 120 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.

5.2.2 Test Data

Date of Test	2021-05-12	Temperature	(25.6 ± 1.0) °C
		Relative humidity	(61.4 ± 3.0) % R.H.
Test Result	***PASS***	Tested by	Do-heon Kim

Graphical Test Data – 20 dB bandwidth



Tabulated Test Data – 20 dB bandwidth

Operating Frequency (MHz)	Measured Value (MHz)	Limit
2 448	2.756	2 400 MHz ~ 2 483.5 MHz

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5.3 99% bandwidth

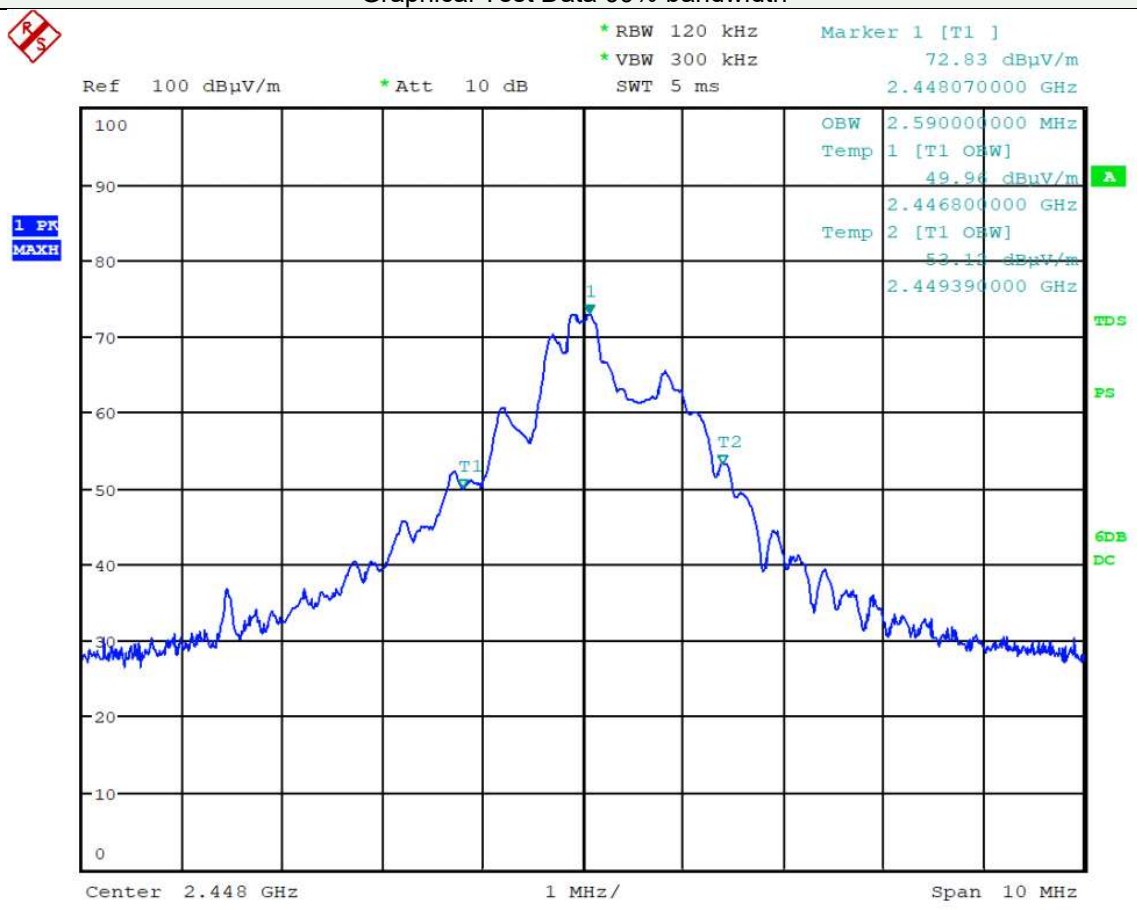
5.3.1 Method of Measurement

The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolutuon bandwidth (RBW) shall be in the range of 1 % to 5 % of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

5.3.2 Test Data

Date of Test	2021-05-12	Temperature	(25.6 ± 1.0) °C
		Relative humidity	(61.4 ± 3.0) % R.H.
Test Result	***PASS***	Tested by	Do-heon Kim

Graphical Test Data 99% bandwidth



Tabulated Test Data 99% bandwidth

Operating Frequency (MHz)	Measured Value (MHz)	Limit
2 448	2.590	2 400 MHz ~ 2 483.5 MHz

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5.4 AC Power Line Conducted Emission

5.4.1 Limit

Acc. to section 15.207 (a), RSS-GEN 8.8 following table shall be applied.

Frequency Range (MHz)	Quasi-Peak (dBuV)	Average (dBuV)
0.15 - 0.5	66 to 56	56 to 46
0.5 - 5	56	46
5 -30	60	50

5.4.2 Method of Measurement

The EUT was placed on a wooden table, 0.8 m height above the horizontal ground plane and 40 cm from the vertical ground plane. Power was fed to the EUT through a 50 Ω / 50 μH + 5 Ω Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

The test was performed for both Neutral and Hot lines.

5.4.3 Measurement Uncertainty

Measurement uncertainties were not taken into account and following uncertainty levels have been estimated for tests performed on the apparatus. The measurement uncertainties are given with at least 95 % confidence.

Frequency Range	Uncertainty	Frequency Range	Uncertainty
9 kHz ~ 150 kHz	± 2.2 dB	150 kHz ~ 30 MHz	± 2.2 dB

5.4.4 Sample Calculated Example

At 5.31 MHz QP Limit = 60.0 dBuV

Correction Factor (C. Factor) of LISN, Pulse Limiter and cable loss at 5.31 MHz = 9.7 dB

Q.P Reading from the Test receiver = 20.8 dBuV

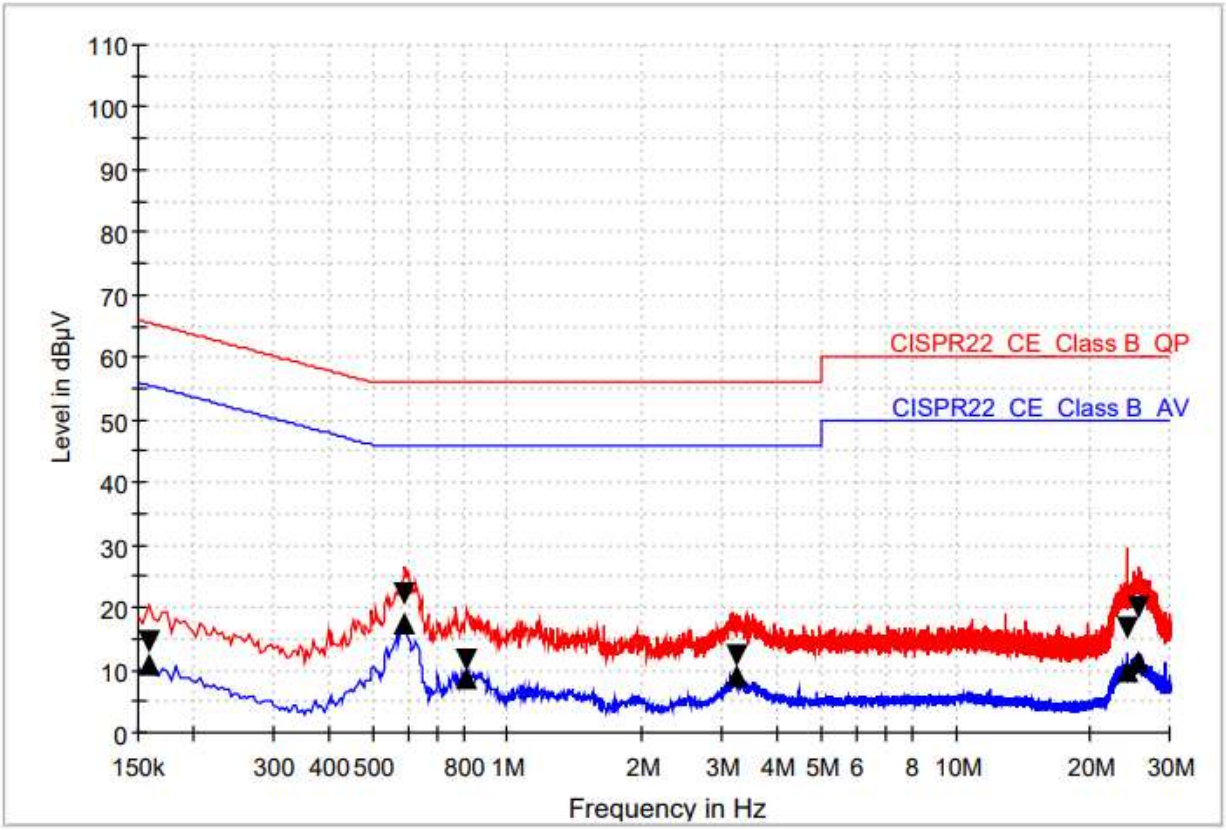
(Calculated value for system losses by software EMC32 manufactured by Rohde & Schwarz)

Therefore Q.P Margin = 60 - 20.8 = 39.2 so the EUT has 39.2 dB margin at 5.31 MHz

5.4.5 Worst Case Test Data

Date of Test	2021-05-11	Temperature	(24.8 ± 0.9) °C
		Relative humidity	(58.7 ± 0.8) % R.H.
Measurement Frequency Range		150 kHz ~ 30MHz	
Test Result	***PASS***	Tested By	Do-heon Kim

Hot Line



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.158000	14.7	10.9	9.000	L1	9.6	50.9	65.6	44.6	55.6
0.590000	22.1	17.5	9.000	L1	9.6	33.9	56.0	28.5	46.0
0.814000	11.8	8.6	9.000	L1	9.6	44.2	56.0	37.4	46.0
3.242000	12.2	8.9	9.000	L1	9.7	43.8	56.0	37.1	46.0
24.186000	16.7	9.8	9.000	L1	10.1	43.3	60.0	40.2	50.0
25.578000	20.1	11.3	9.000	L1	10.2	39.9	60.0	38.7	50.0

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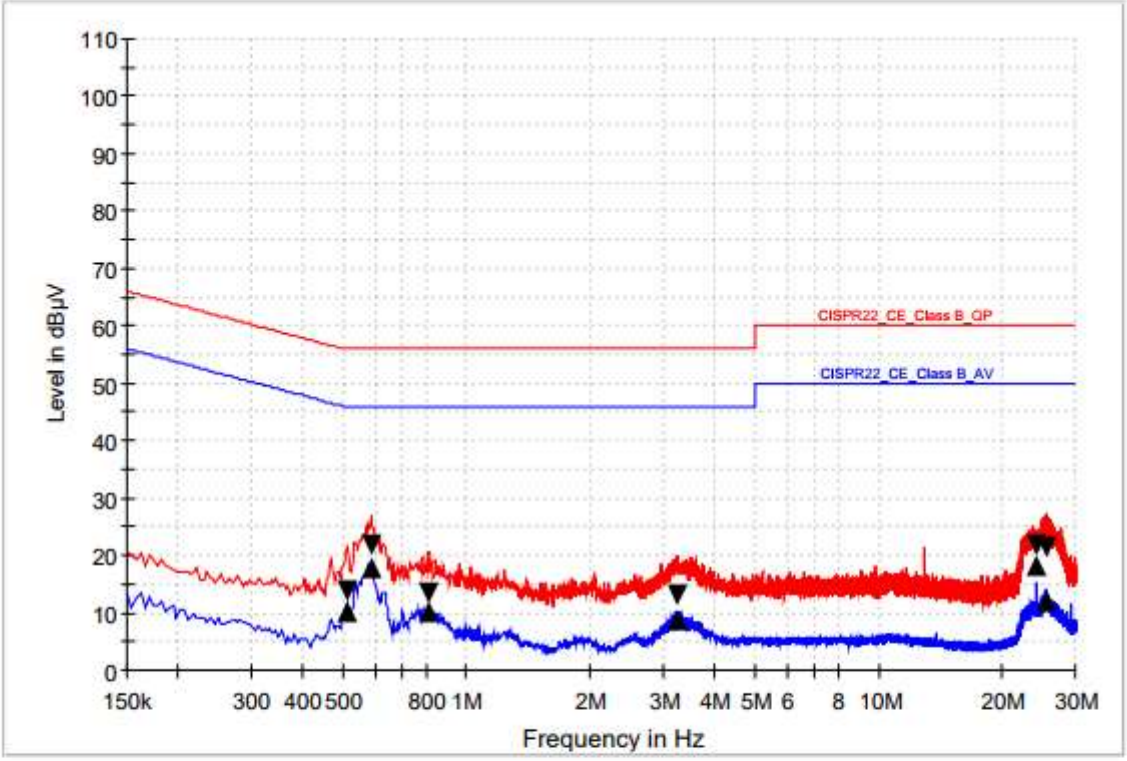
Neutral Line



Limit and Margin1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Margin - CAV (dB)	Limit - CAV (dBµV)
0.514000	13.7	10.1	9.000	N	9.6	42.3	56.0	35.9	46.0
0.586000	22.0	17.8	9.000	N	9.6	34.0	56.0	28.2	46.0
0.806000	13.6	10.3	9.000	N	9.6	42.4	56.0	35.7	46.0
3.258000	13.0	8.6	9.000	N	9.7	43.0	56.0	37.4	46.0
24.082000	21.7	18.3	9.000	N	10.1	38.3	60.0	31.7	50.0
25.470000	21.4	12.0	9.000	N	10.2	38.6	60.0	38.0	50.0

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Appendix I – Test Instrumentation

Description	Model No.	Serial No.	Manufacturer.	Due for Cal. Date	Cal. Interval
Test Receiver	ESU 26	100303	Rohde & Schwarz	2022-01-14	1 Y
Loop Antenna	HFH2-Z2	100341	Rohde & Schwarz	2021-06-21	2 Y
TRILOG Broadband Antenna	VULB9163	9163.799	Schwarzbeck	2021-09-17	2 Y
Horn Antenna	HF 907	102426	Rohde & Schwarz	2021-10-29	1 Y
Horn Antenna	BBHA 9170	BBHA 9170 #783	Schwarzbeck	2021-10-29	1 Y
Notch Filter	BRM50702	G318	MICRO-TRONICS	2021-11-04	1 Y
Attenuator	6dB	272.4110.50	Rohde & Schwarz	2022-01-14	1 Y
Pre-Amplifier	310N	344015	Sonoma Instrument	2022-01-14	1 Y
Pre-Amplifier	SCU 18D	19006450	Rohde & Schwarz	2022-04-15	1 Y
Pre-Amplifier	CBL18265035	28706	CERNEX	2022-03-09	1 Y
Turn Table	DT3000-3t	1310814	INNCO SYSTEM	-	N/A
Antenna Master	MA4000-EP	4600814	INNCO SYSTEM	-	N/A
Antenna Master	MA4000-XP-ET	-	INNCO SYSTEM	-	N/A
Camera Controller	HDCon4102	6531445048	PONTIS	-	N/A
CO3000 Controller	Co3000-4Port	CO3000/806/ 34130814/L	INNCO SYSTEM	-	N/A
CO3000 Controller	Co3000-4Port	CO3000/807/ 34130814/L	INNCO SYSTEM	-	N/A
EMI Test Receiver	ESCI 7	100722	Rohde & Schwarz	2022-01-14	1 Y
LISN	ENV216	100110	Rohde & Schwarz	2022-01-14	1 Y

The measuring equipment utilized to perform the tests documented in this test report has been calibrated in accordance with manufacturer's recommendations, and is traceable to recognized national standards.