



시험 성적서

TEST REPORT

페이지(page) : (1)/ (총(Total) 20)

성적서 번호 Report No.		ICRT-TR-E210433-0A	
신청자 Client	기관명 Name	Comosia Co.,Ltd	
	주 소 Address	#504-1, Business Incubator, 545, Seobu-ro, Uijeongbu-si, Gyeonggi-do, 11618, Korea	
시험대상품목 Sample description		BLE Module	
모델명 Type designation		COMO-N832C	
정 격 Ratings		DC 3.0 V	
시험장소 Place of test		☒ 고정시험(Inside test) ☐ 현장시험(Field test) 주소지(Address): 112, Hwanggeum 3-ro 7beon-gil, Hagun-ri, Yangchon-eup, Gimpo-si, Gyeonggi-do, Korea	
시험기간 Date of test		17. Feb. 2021	
시험방법/항목 Test Method/Item		FCC Part 15 Subpart C §15.247	
시험결과 Test Results		Refer to 3. Test Summary	
확 인 Affirmation	작성자 Tested by	기술책임자 Technical Manager	
	성 명 Name Yeong-Hwan, Hong (Signature)	성 명 Name Hong-Kyu, Lee (Signature)	
☐ 위 성적서는 고객이 제공한 시료에 대한 시험결과 입니다. This is certified that the above mentioned products have been tested for the sample ☐ 위 성적서는 KS Q ISO/IEC 17025 및 한국인정기구(KOLAS)인정과 관련이 없습니다. The above test report is not related to accreditation by KS Q ISO/IEC 17025 and Korea Laboratory Accreditation scheme. ☐ 위 성적서는 주식회사 아이씨알의 승인 없이는 일부 복제에 대해 금지됩니다. The test report is prohibited for some reproduction without the approval of the ICR.			
2021. 02. 22 주식회사 아이씨알 대표이사 The head of INTERNATIONAL CERTIFICATION REGISTRAR 			

본 성적서의 진위 확인은 G4B 혹은 ICR 홈페이지에서 가능합니다.

The authenticity of the test report can be checked on the G4B or ICR website.

경기도 김포시 양촌읍 황금3로7번길 112 / Tel: 02-6351-9001 ~ 6



페이지(page) : (2)/(총(Total) 20)

Contents

1. Applicant & Manufacturer & Test Laboratory Information	4
1.1 Applicant information.....	4
1.2 Manufacturer Information	4
1.3 Test Laboratory Information	4
2. Equipment under Test(EUT) Information	5
2.1 General Information.....	5
2.2 Additional Information	5
2.3 Mode of operation during the test	5
2.4 Modifications of EUT	5
3. Test Summary	6
3.1 Test standards and results	6
3.2 Purpose of the test	6
3.3 Test Methodology	6
3.4 Configuration of Test System.....	6
3.5 Antenna requirement.....	7
4. Used equipment on test	8
5. Radiated Spurious Emission	9
5.1 Operating environment	9
5.2 Measurement method	9
5.3 Test setup	9
5.4 Test data	11



페이지(page) : (3)/(총(Total) 20)

Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
ICRT-TR-E210433-0A	22-Feb-2021	Initial Issue	All



1. Applicant & Manufacturer & Test Laboratory Information

1.1 Applicant information

Applicant	Comosia Co.,Ltd
Address	#504-1, Business Incubator, 545, Seobu-ro, Uijeongbu-si, Gyeonggi-do, 11618, Korea
Contact Person	Cho Youngryul
Telephone No.	+82-70-7949-8907
Fax No.	+82 070-7949-8907
E-mail	miniyuli@naver.com

1.2 Manufacturer Information

Manufacturer	Comosia Co.,Ltd
Address	#504-1, Business Incubator, 545, Seobu-ro, Uijeongbu-si, Gyeonggi-do, 11618, 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	BLE Module
Brand Name	-
Model Name	COMO-N832C
Additional Model Name	-
FCC ID	2AXON-COMO-N832C
Hardware Version	1.4
Software Version	1.0
Power Supply	DC 3.0 V
EUT Firmware Version	1.0
Target Power	4.0
EUT Serial Number	Test 1

2.2 Additional Information

Equipment Class	DTS-Digital Transmission System
Device Type	Stand-alone
Operating Frequency	2 402 MHz ~ 2 480 MHz
Number of Channel	40
Modulation Type	GFSK
Antenna Type	LDS Antenna
Antenna Gain	1.83 dBi
Antenna Operating Mode	Single Antenna Equipment with only one antenna
List of Each Oscillator or Crystal Frequency	32 MHz / 32.768 kHz

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
§15.247 (a) (2)	6 dB Bandwidth	☐	N/A (Note 1)
§15.247 (b) (3)	Maximum Conducted Output Power	☐	N/A (Note 1)
§15.247 (e)	Power Spectral Density	☐	N/A (Note 1)
§15.247 (d)	Conducted Spurious Emission	☐	N/A (Note 1)
§15.247 (d) & §15.209 & §15.205	Radiated Spurious Emission	☒	PASS
§15.207	Power Line Conducted Emission	☐	N/A (Note 1)
§15.203	Antenna Requirement	☒	PASS

- Note 1 : The product replaces this test with a certificate using an authenticated module.

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 15.247.

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.



3.5 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.

And according to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi.

Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.5.1 Result: Pass

The Basic model transmitter has a **LDS Antenna**. The directional gain of the antenna is **1.83 dBi**.



4. Used equipment on test

	Description	Model Name	Serial Number	Manufacturer	Next Cal. (cycle)
☐	Spectrum analyzer	FSW85	100864	Rohde & Schwarz	2021. 03. 02 (1Y)
☐	Spectrum analyzer	FSV40	101455	Rohde & Schwarz	2021 .06. 24 (1Y)
☐	Signal Generator	SMB100A	180607	Rohde & Schwarz	2021. 03. 03 (1Y)
☐	Wideband Power Sensor	NRP-Z81	103673	Rohde & Schwarz	2021. 03. 03 (1Y)
☐	Open Switch and Control Platform	OSP150	101000	Rohde & Schwarz	2021. 03. 03 (1Y)
☐	Environmental Test Chamber	MHK-408NKDA	1060908	TERCHY	2021. 03. 03 (1Y)
☒	DC Power Supply	XDL 35-5P	J00385373	Sorensen	2021. 03. 02 (1Y)
☐	DC Power Supply	6603D	672483	Topward	2021. 03. 02 (1Y)
☒	Loop Antenna	HFH2-Z2	100506	Rohde & Schwarz	2021. 06. 27 (2Y)
☒	TRILOG BROADBAND ANTENNA	VULB9162	120	SCHWARZBECK	2022. 12. 15 (2Y)
☒	RF Pre Amplifier	SCU08	100747	Rohde & Schwarz	2021. 04. 16 (1Y)
☒	DOUBLE-RIDGE WAVEGUIDE HORN ANTENNA	HF907	102556	Rohde & Schwarz	2021. 08. 19 (2Y)
☒	RF Pre Amplifier	SCU18	102342	Rohde & Schwarz	2021. 04. 16 (1Y)
☒	Horn Antenna	LB-42-10-C-KF	J202024625	AINFO Inc.	2021. 03. 10 (2Y)
☒	RF Pre Amplifier	AMF-4F-18265-35-8P-1	771846	MITEQ	2021. 03. 04 (1Y)
☐	Horn Antenna	LB-28-10-C-KF	J202024627	AINFO Inc.	2021. 03. 10 (2Y)
☐	RF Pre Amplifier	AMF-4D-260400-45-6P	779919	MITEQ	2021. 03. 03 (1Y)
☒	EMI Test Receiver	ESR26	101461	Rohde & Schwarz	2021. 04. 16 (1Y)
☒	EMI Test Receiver	ESR26	101462	Rohde & Schwarz	2021. 04. 16 (1Y)
☐	LISN	ENV216	102194	Rohde & Schwarz	2021. 04. 16 (1Y)
☐	EMI Test Receiver	ESR3	102119	Rohde & Schwarz	2021. 04. 16 (1Y)

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

5. Radiated Spurious Emission

5.1 Operating environment

Temperature : 24 °C
Relative humidity : 48 %

5.2 Measurement method

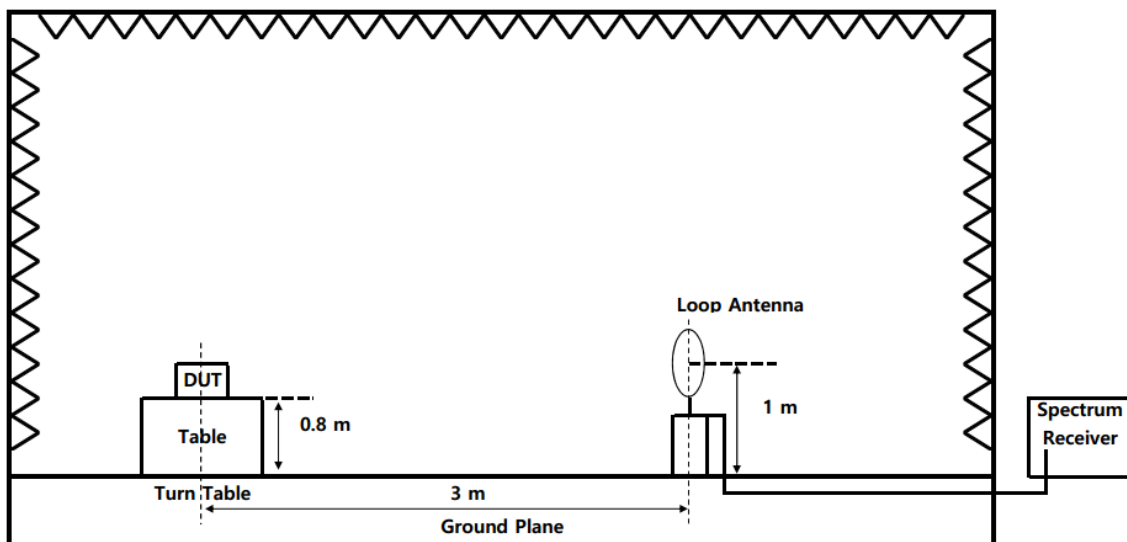
Standard : §15.247 (d), §15.209, §15.205

5.3 Test setup

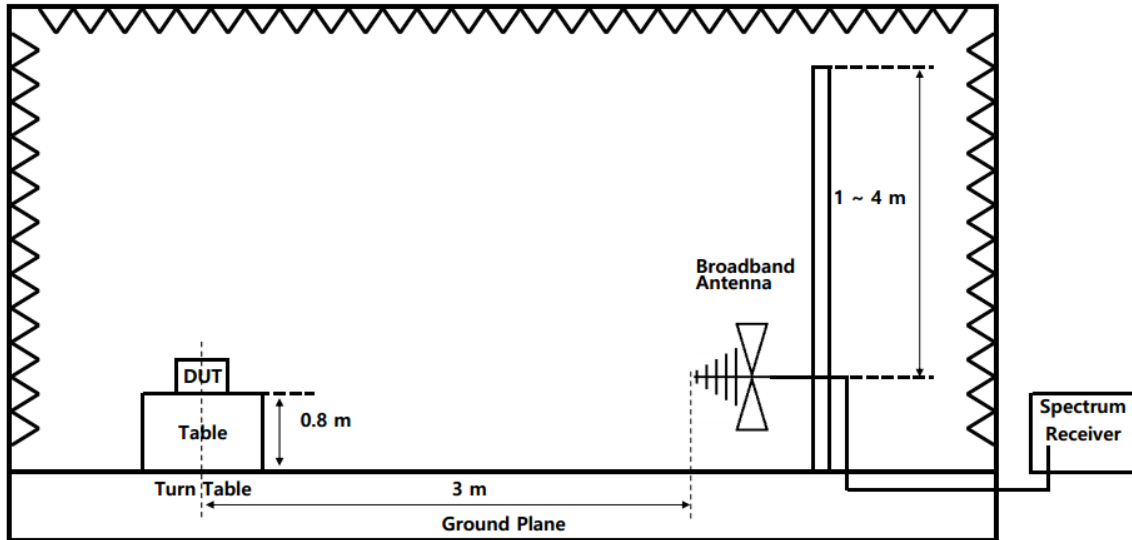
The radiated emissions measurements were performed on the 3 m, Semi-Anechoic Chamber. The EUT was placed on a non-conductive turntable above the ground plane.

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.

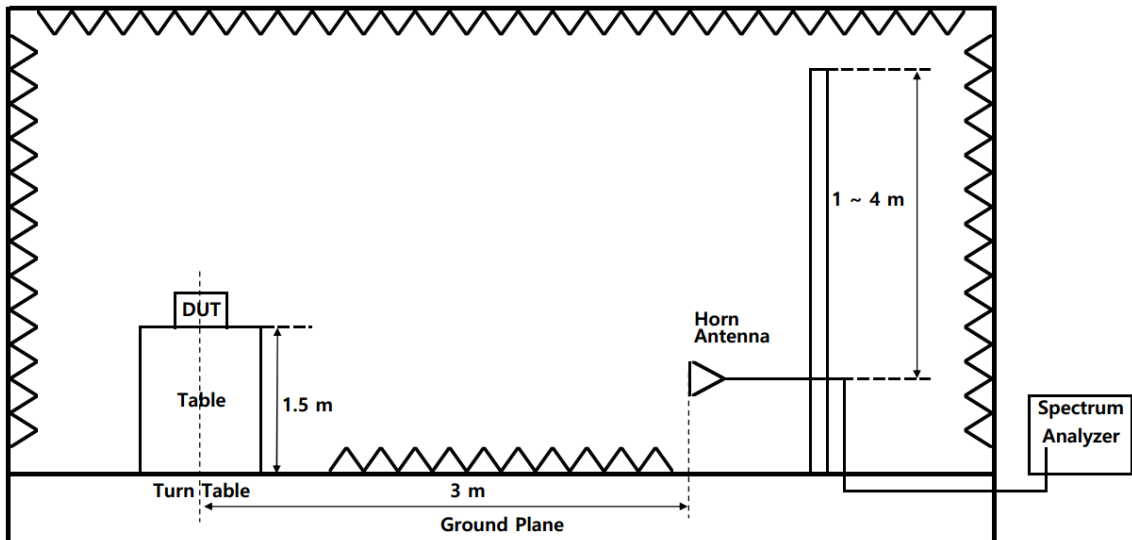
5.3.1 Below 30 MHz



5.3.2 30 MHz to 1 GHz



5.3.3 Above 1 GHz





5.4 Test data

Test date : 17. Feb. 2021
 Operating mode : Transmit mode
 Test Result : Pass

5.4.1 Test data for Restricted band (LE_1 Mbps)

Frequency (MHz)	Reading (dBμV)	Detector	Ant. Pol. (H/V)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
2 390.00	58.79	Peak	H	-13.13	45.66	73.98	28.32
	42.95	Average	H		29.82	53.98	24.16
High CH							
2 483.50	72.31	Peak	H	-12.63	59.68	73.98	14.30
	41.52	Average	H		28.89	53.98	25.09

5.4.2 Test data for Restricted band (LE_2 Mbps)

Frequency (MHz)	Reading (dBμV)	Detector	Ant. Pol. (H/V)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
2 390.00	58.90	Peak	H	-13.13	45.77	73.98	28.21
	36.44	Average	H		23.31	53.98	30.67
High CH							
2 483.50	72.10	Peak	H	-12.63	59.47	73.98	14.51
	40.78	Average	H		28.15	53.98	25.83

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



5.4.3 Test data for Spurious & Harmonic

5.4.3.1 Measurement Results for below 30 MHz (LE_1 Mbps)

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

5.4.3.2 Measurement Results for below 30 MHz (LE_2 Mbps)

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

※ Ant. Pol. : Antenna Polarization

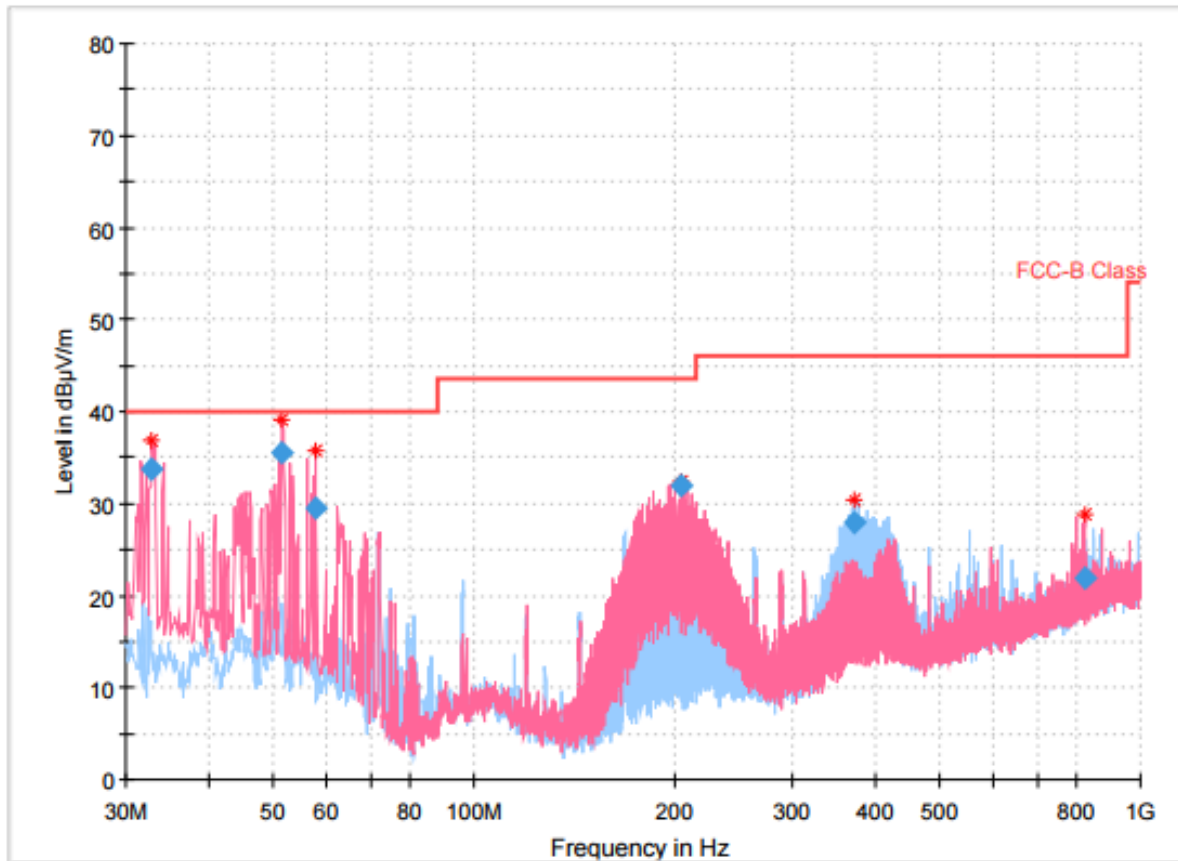
※ Corr. Factor. : Antenna Factor + Cable Loss - Amplifier Gain

※ Result = Reading + Corr. Factor

※ Margin = Limit – Result



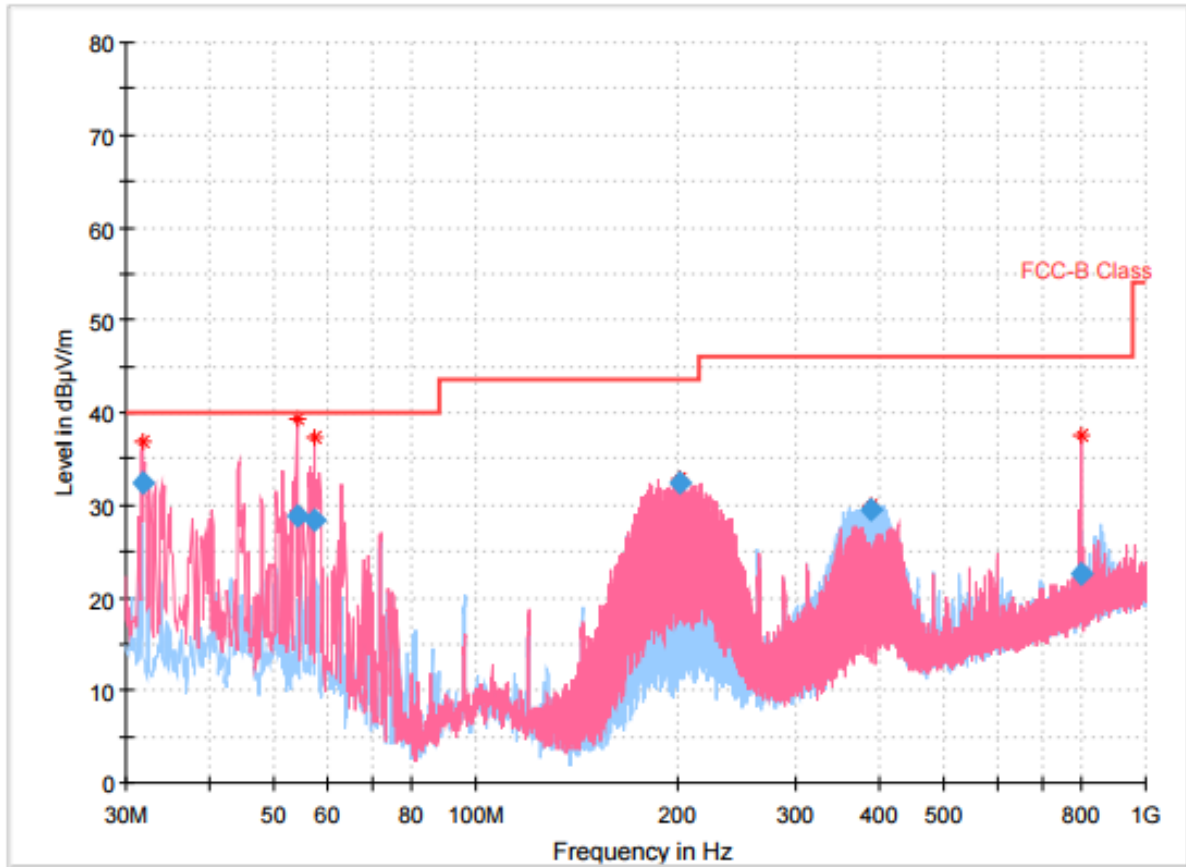
5.4.3.3 Measurement Results for below 1 GHz (LE_1 Mbps)



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
32.813000	33.79	40.00	6.21	5000.0	120.000	100.0	V	302.0	-25.4
51.534000	35.49	40.00	4.51	5000.0	120.000	100.0	V	302.0	-21.3
57.936000	29.56	40.00	10.44	5000.0	120.000	100.0	V	254.0	-22.0
204.503000	31.88	43.50	9.62	5000.0	120.000	300.0	V	67.0	-23.4
370.858000	27.83	46.00	18.17	5000.0	120.000	300.0	H	225.0	-18.4
822.490000	21.91	46.00	24.09	5000.0	120.000	100.0	V	240.0	-10.4

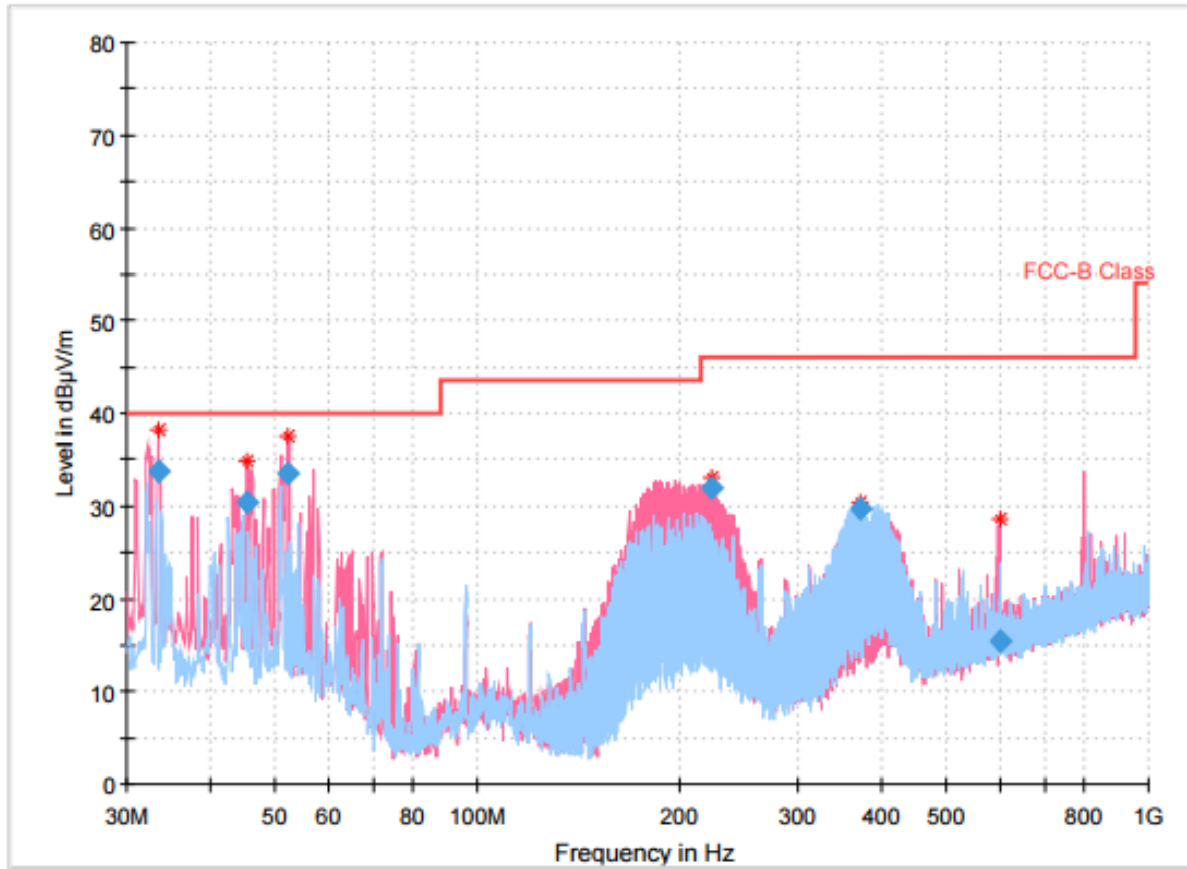
Low CH (1 Mbps)



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.746000	32.31	40.00	7.69	5000.0	120.000	200.1	V	0.0	-25.4
53.959000	28.73	40.00	11.27	5000.0	120.000	100.0	V	354.0	-21.6
57.451000	28.47	40.00	11.53	5000.0	120.000	100.0	V	346.0	-22.0
201.690000	32.47	43.50	11.03	5000.0	120.000	300.1	V	105.0	-23.0
388.027000	29.40	46.00	16.60	5000.0	120.000	200.1	H	338.0	-17.6
799.404000	22.68	46.00	23.32	5000.0	120.000	100.0	V	214.0	-10.5

Mid CH (1 Mbps)



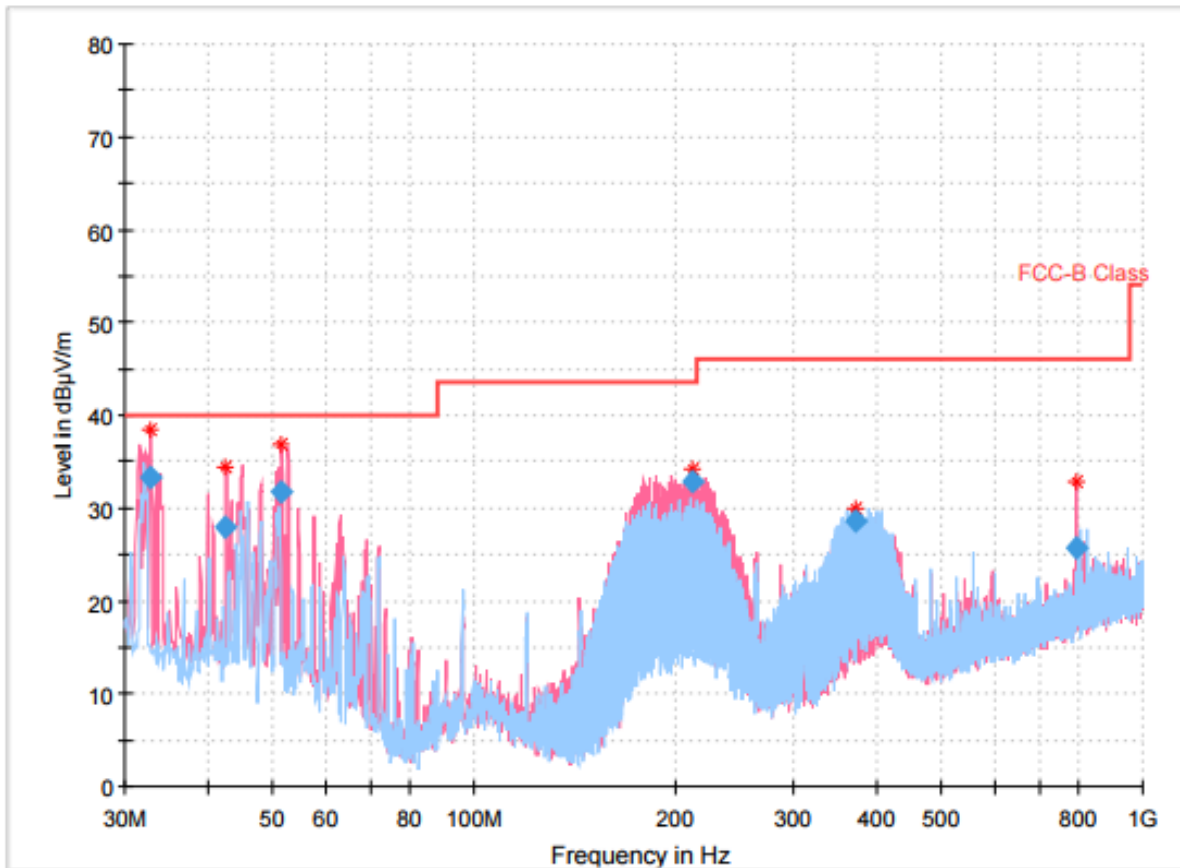
Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
33.395000	33.81	40.00	6.19	5000.0	120.000	100.0	V	326.0	-25.2
45.326000	30.44	40.00	9.56	5000.0	120.000	100.0	V	249.0	-21.5
52.213000	33.55	40.00	6.45	5000.0	120.000	100.0	V	326.0	-21.3
223.612000	31.88	46.00	14.12	5000.0	120.000	200.1	V	0.0	-22.7
371.828000	29.75	46.00	16.25	5000.0	120.000	200.1	H	333.0	-18.4
599.584000	15.52	46.00	30.48	5000.0	120.000	200.1	V	17.0	-13.6

High CH (1 Mbps)



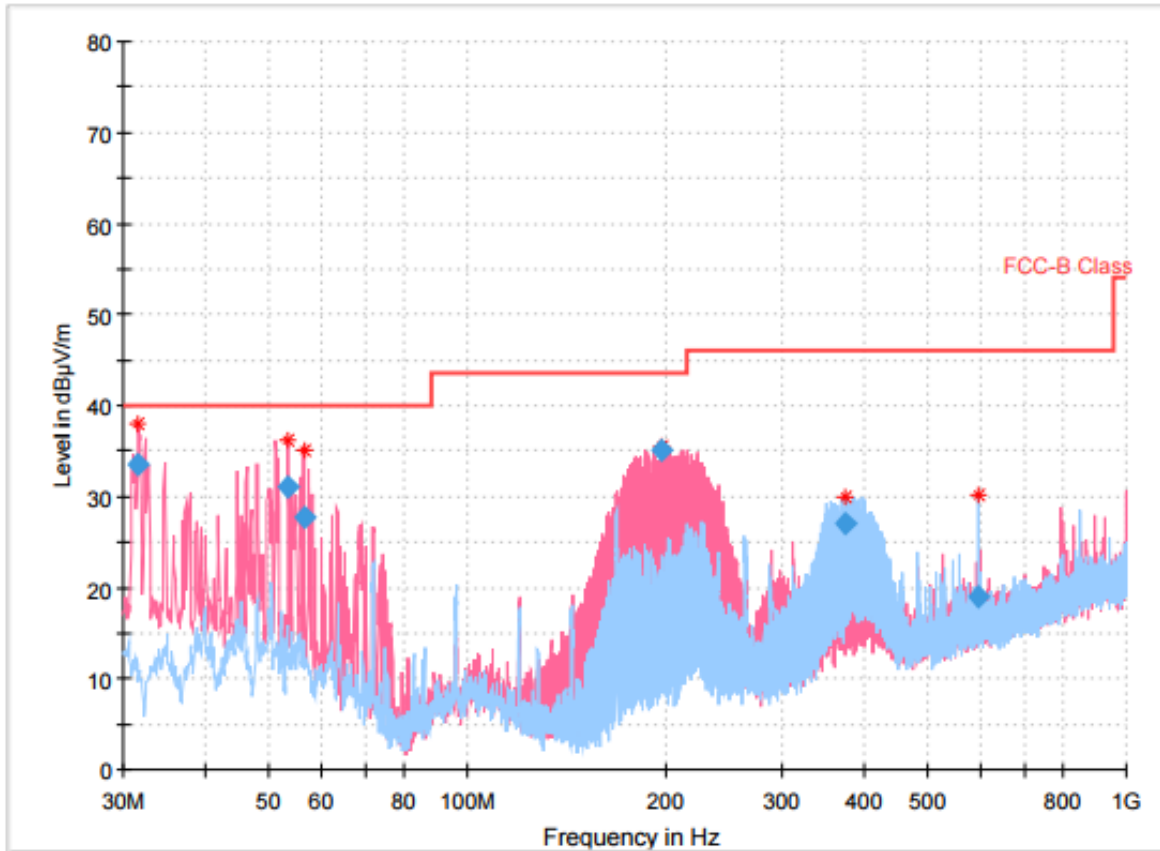
5.4.3.4 Measurement Results for below 1 GHz (LE_2 Mbps)



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	DET 2 (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
32.813000	33.29	---	40.00	6.71	5000.0	120.000	99.9	V	209.0	-25.4
42.513000	27.92	---	40.00	12.08	5000.0	120.000	99.9	V	276.0	-21.9
51.534000	31.84	---	40.00	8.16	5000.0	120.000	99.9	V	209.0	-21.3
212.166000	32.77	---	43.50	10.73	5000.0	120.000	200.1	V	170.0	-23.4
370.761000	28.64	---	46.00	17.36	5000.0	120.000	200.1	H	319.0	-18.4
797.852000	25.80	---	46.00	20.20	5000.0	120.000	99.9	V	227.0	-10.6

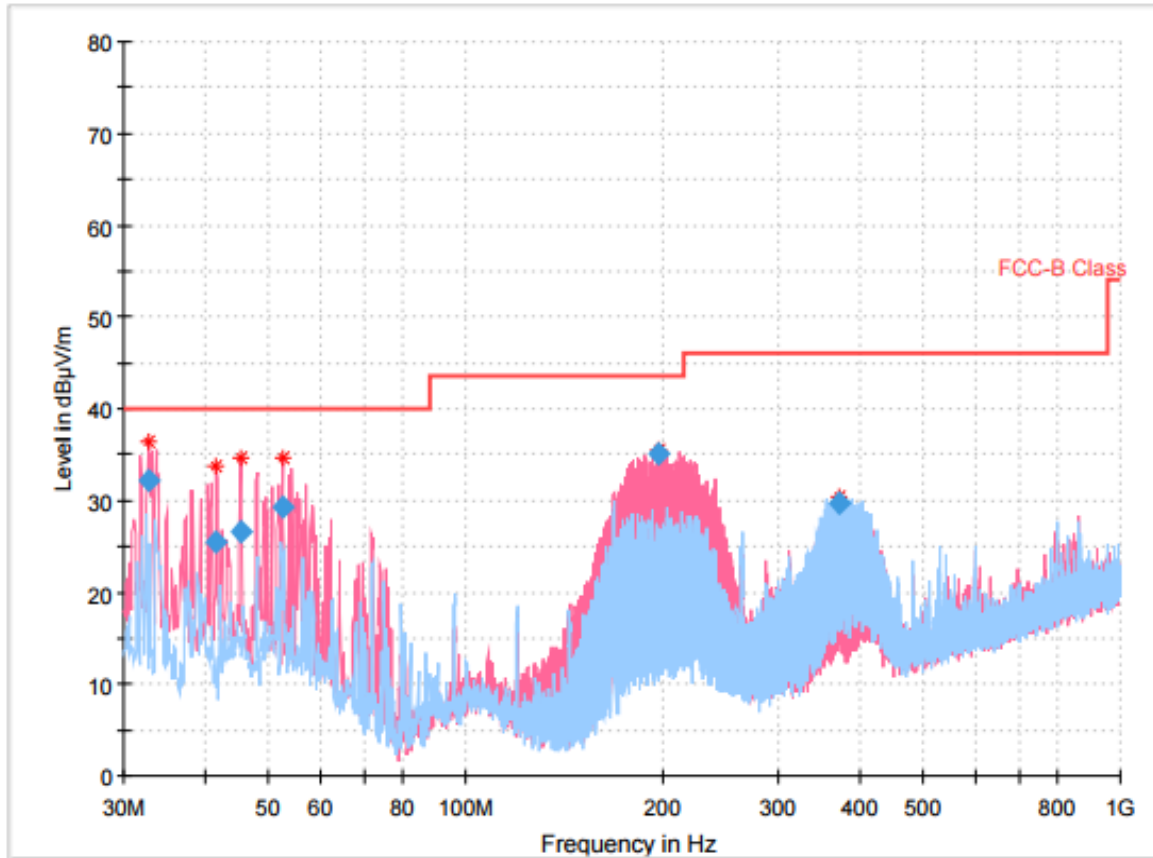
Low CH (2 Mbps)



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	DET 2 (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.649000	33.56	---	40.00	6.44	5000.0	120.000	99.9	V	0.0	-25.4
53.377000	31.06	---	40.00	8.94	5000.0	120.000	99.9	V	206.0	-21.4
56.481000	27.74	---	40.00	12.26	5000.0	120.000	200.1	V	0.0	-21.9
197.810000	35.05	---	43.50	8.45	5000.0	120.000	200.1	V	68.0	-22.6
374.641000	27.12	---	46.00	18.88	5000.0	120.000	200.1	H	180.0	-18.1
597.935000	18.94	---	46.00	27.06	5000.0	120.000	99.9	H	57.0	-13.6

Mid CH (2 Mbps)



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	DET 2 (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
32.716000	32.09	---	40.00	7.91	5000.0	120.000	200.1	V	286.0	-25.4
41.640000	25.53	---	40.00	14.47	5000.0	120.000	200.1	V	310.0	-22.1
45.229000	26.65	---	40.00	13.35	5000.0	120.000	99.9	V	121.0	-21.5
52.504000	29.30	---	40.00	10.70	5000.0	120.000	200.1	V	224.0	-21.3
197.810000	34.99	---	43.50	8.51	5000.0	120.000	200.1	V	99.0	-22.6
370.761000	29.61	---	46.00	16.39	5000.0	120.000	200.1	H	336.0	-18.4

High CH (2 Mbps)



5.4.3.5 Measurement Results for Above 1 GHz (1 Mbps)

Frequency (MHz)	Reading (dBμV)	Detector	Ant. Pol. (H/V)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
4 804.00	58.58	Peak	H	-4.95	53.63	73.98	20.35
	49.80	Average	H		44.85	53.98	9.13
7 206.00	54.10	Peak	V	-1.44	52.66	73.98	21.32
	40.68	Average	V		39.24	53.98	14.74
Mid CH							
4 880.00	57.54	Peak	H	-4.37	53.17	73.98	20.81
	48.88	Average	H		44.51	53.98	9.47
7 320.00	54.90	Peak	V	-1.05	53.85	73.98	20.13
	41.87	Average	V		40.82	53.98	13.16
High CH							
4 960.00	60.29	Peak	H	-4.27	56.02	73.98	17.96
	51.54	Average	H		47.27	53.98	6.71
7 440.00	55.97	Peak	V	-2.65	53.32	73.98	20.66
	42.57	Average	V		39.92	53.98	14.06



5.4.3.6 Measurement Results for Above 1 GHz (2 Mbps)

Frequency (MHz)	Reading (dBμV)	Detector	Ant. Pol. (H/V)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
4 804.00	58.86	Peak	H	-4.95	53.91	73.98	20.07
	41.91	Average	H		36.96	53.98	17.02
7 206.00	54.16	Peak	V	-1.44	52.72	73.98	21.26
	36.49	Average	V		35.05	53.98	18.93
Mid CH							
4 880.00	58.71	Peak	H	-4.37	54.34	73.98	19.64
	41.54	Average	H		37.17	53.98	16.81
7 320.00	54.62	Peak	V	-1.05	53.57	73.98	20.41
	36.82	Average	V		35.77	53.98	18.21
High CH							
4 960.00	57.41	Peak	V	-4.27	53.14	73.98	20.84
	41.44	Average	V		37.17	53.98	16.81
7 440.00	55.56	Peak	H	-2.65	52.91	73.98	21.07
	37.17	Average	V		34.52	53.98	19.46

※ Ant. Pol. : Antenna Polarization

※ Corr. Factor. : Antenna Factor + Cable Loss - Amplifier Gain

※ Result = Reading + Corr. Factor

※ Margin = Limit – Result

- END OF REPORT.