RADIO PERFORMANCE TEST REPORT

Test Report No.	**: OT-223-RWD-042**
Reception No.	**: 2112005097**
Applicant	**: LG Innotek Co., Ltd.**
Address	**: 26, Hanamsandan 5beon-ro Gwangsan-gu, Gwangju, 506-731, South Korea**
Manufacturer	**: LG Innotek Co., Ltd.**
Address	**: 26, Hanamsandan 5beon-ro Gwangsan-gu, Gwangju, 506-731, South Korea**
Type of Equipment	**: RF Module**
FCC ID.	**: YZP-ATC6NPL002**
Model Name	**: ATC6NPL002**
Serial number	**: N/A**
Total page of Report	**: 67 pages (including this page)**
Date of Incoming	**: December 01, 2021**
Date of issue	**: March 21, 2022**

SUMMARY

The equipment complies with the regulation; ***FCC PART 15 SUBPART C Section 15.247***

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.

Tested by	Reviewed by	Approved by
Youngyong Kim/ Manager	Tae-Ho, Kim / Senior Manager	Ki-Hong, Nam / General Manager
ONETECH Corp.	ONETECH Corp.	ONETECH Corp.

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※ Please refer to the Annex section for All test plots

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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-223-RWD-042	March 21, 2022	Initial Release	All

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1. VERIFICATION OF COMPLIANCE

Applicant : LG Innotek Co., Ltd.

Address : 26, Hanamsandan 5beon-ro Gwangsan-gu, Gwangju, 506-731, South Korea

Contact Person : Jeong Inchang / Senior Research Engineer

Telephone No. : +82-62-950-0332

FCC ID : YZP-ATC6NPL002

Model Name : ATC6NPL002

Brand Name : LG Innotek

Serial Number : N/A

Date : March 21, 2022

EQUIPMENT CLASS	DTS – DIGITAL TRNSMISSION SYSTEM
E.U.T. DESCRIPTION	RF Module
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2020
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247 KDB 558074 D01 15.247 Meas Guidance v05r02
Modifications on the Equipment to Achieve Compliance	None
Final Test was Conducted On	3 m, Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

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2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
15.247 (a) (2)	Minimum 6 dB Bandwidth	Met the Limit / PASS
15.247 (b) (3)	Maximum Peak Conducted Output Power	Met the Limit / PASS
15.247 (d)	100 kHz Bandwidth Outside the Frequency Band	Met the Limit / PASS
15.247 (d)	Radiated Emission which fall in the Restricted Band	Met the Limit / PASS
15.247 (e)	Peak Power Spectral Density	Met the Limit / PASS
15.209	Radiated Emission Limits	Met the Limit / PASS
15.207	Conducted Limits	Met the Limit / PASS
15.203	Antenna Requirement	Met requirement / PASS

2.2 Additions, deviations, exclusions from standards

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

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in FCC PART 15 SUBPART C Section 15.247.

2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10: 2020. Radiated testing was performed at a distance of 3 m from EUT to the antenna.

2.6 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea.

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-20122/ C-14617/ G-10666/ T-11842

ISED (Innovation, Science and Economic Development Canada) – Registration No. Site# 3736A-3

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation NO. KT085

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

3. GENERAL INFORMATION

3.1 Product Description

The LG Innotek Co., Ltd., Model ATC6NPL002 (referred to as the EUT in this report) is a RF Module. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	RF Module	
OPERATING FREQUENCY	Bluetooth LE	2 402 MHz ~ 2 480 MHz
	Bluetooth	2 402 MHz ~ 2 480 MHz
	WLAN 2.4 GHz	2 412 MHz ~ 2 462 MHz (802.11b/g/n(HT20)/ax(HE20))
		2 422 MHz ~ 2 452 MHz (802.11n(HT40)/ax(HE40))
	WLAN 5 150 MHz ~ 5 250 MHz Band	5 180 MHz ~ 5 240 MHz (802.11a/n(HT20)/ac(VHT20)/ax(HE20))
		5 190 MHz ~ 5 230 MHz (802.11n(HT40)/ac(VHT40)/ax(HE40))
		5 210 MHz (802.11ac(VHT80)/ax(HE80))
	WLAN 5 250 MHz ~ 5 350 MHz Band	5 260 MHz ~ 5 320 MHz (802.11a/n(HT20)/ac(VHT20)/ax(HE20))
		5 270 MHz ~ 5 310 MHz (802.11n(HT40)/ac(VHT40)/ax(HE40))
		5 290 MHz (802.11ac(VHT80)/ax(HE80))
	WLAN 5 470 MHz ~ 5 725 MHz Band	5 500 MHz ~ 5 720 MHz (802.11a/n(HT20)/ac(VHT20)/ax(HE20))
		5 510 MHz ~ 5 710 MHz (802.11n(HT40)/ac(VHT40)/ax(HE40))
		5 530 MHz ~ 5 690 MHz (802.11ac(VHT80)/ax(HE80))
	WLAN 5 725 MHz ~ 5 850 MHz Band	5 745 MHz ~ 5 825 MHz (802.11a/n(HT20)/ac(VHT20)/ax(HE20))
		5 755 MHz ~ 5 795 MHz (802.11n(HT40)/ac(VHT40)/ax(HE40))
		5 775 MHz (802.11ac(VHT80)/ax(HE80))
MODULATION TYPE	Bluetooth LE	GFSK for 1 Mbps / 2 Mbps / 125 kbps / 500 kbps
	Bluetooth	GFSK for 1Mbps, π/4-DQPSK for 2Mbps, 8-DPSK for 3Mbps
	WLAN 2.4 GHz	802.11b: DSSS Modulation(DBPSK/DQPSK/CCK) 802.11g/n(HT20)/n(HT40)/ax(HE20)/ax(HE40): OFDM Modulation(BPSK/QPSK/16QAM/64QAM)
	WLAN 5 GHz	802.11a/n(HT20)/n(HT40)/ac(VHT80)/ax(HE20)/ax(HE40)/ax(HE80): OFDM Modulation(BPSK/QPSK/16QAM/64QAM)

RF OUTPUT POWER	Bluetooth LE	1 Mbps	1.21 dBm
		2 Mbps	1.17 dBm
		125 kbps	1.22 dBm
		500 kbps	1.24 dBm
	Bluetooth	1 Mbps	0.67 dBm
		2 Mbps	-0.27 dBm
		3 Mbps	0.09 dBm
	WLAN 2.4 GHz	Antenna 0	15.57 dBm(802.11b) 11.80 dBm(802.11g) 11.67 dBm(802.11n_HT20) 13.27 dBm(802.11ax_HE20)_26 Tone 13.06 dBm(802.11ax_HE20)_52 Tone 12.66 dBm(802.11ax_HE20)_106 Tone 11.85 dBm(802.11ax_HE20)_242 Tone 11.47 dBm(802.11ax_HE20)_Single User 11.31 dBm(802.11n_HT40) 12.02 dBm(802.11ax_HE40)_26 Tone 12.93 dBm(802.11ax_HE40)_52 Tone 13.04 dBm(802.11ax_HE40)_106 Tone 12.44 dBm(802.11ax_HE40)_242 Tone 11.52 dBm(802.11ax_HE40)_484 Tone 11.50 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 2.4 GHz	Antenna 1	16.19 dBm(802.11b) 12.88 dBm(802.11g) 13.11 dBm(802.11n_HT20) 13.35 dBm(802.11ax_HE20)_26 Tone 13.57 dBm(802.11ax_HE20)_52 Tone 13.47 dBm(802.11ax_HE20)_106 Tone 13.33 dBm(802.11ax_HE20)_242 Tone 13.65 dBm(802.11ax_HE20)_Single User 12.11 dBm(802.11n_HT40) 12.31 dBm(802.11ax_HE40)_26 Tone 12.67 dBm(802.11ax_HE40)_52 Tone 12.70 dBm(802.11ax_HE40)_106 Tone 12.68 dBm(802.11ax_HE40)_242 Tone 12.48 dBm(802.11ax_HE40)_484 Tone 12.69 dBm(802.11ax_HE40)_Single User
		Multiple Antenna	15.46 dBm(802.11n_HT20) 16.32 dBm(802.11ax_HE20)_26 Tone 16.22 dBm(802.11ax_HE20)_52 Tone 16.09 dBm(802.11ax_HE20)_106 Tone 15.66 dBm(802.11ax_HE20)_242 Tone 15.70 dBm(802.11ax_HE20)_Single User 14.74 dBm(802.11n_HT40) 14.90 dBm(802.11ax_HE40)_26 Tone 15.78 dBm(802.11ax_HE40)_52 Tone 15.83 dBm(802.11ax_HE40)_106 Tone 15.57 dBm(802.11ax_HE40)_242 Tone 15.04 dBm(802.11ax_HE40)_484 Tone 15.15 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 5 150 MHz ~ 5 250 MHz Band	Antenna 0	12.59 dBm(802.11a) 12.15 dBm(802.11n_HT20) 2.53 dBm(802.11ax_HE20)_26 Tone 4.65 dBm(802.11ax_HE20)_52 Tone 7.54 dBm(802.11ax_HE20)_106 Tone 10.29 dBm(802.11ax_HE20)_242 Tone 12.19 dBm(802.11ax_HE20)_Single User 9.02 dBm(802.11n_HT40) 3.32 dBm(802.11ax_HE40)_26 Tone 5.26 dBm(802.11ax_HE40)_52 Tone 7.72 dBm(802.11ax_HE40)_106 Tone 7.54 dBm(802.11ax_HE40)_242 Tone 7.43 dBm(802.11ax_HE40)_484 Tone 9.15 dBm(802.11ax_HE40)_Single User 8.33 dBm(802.11ac_VHT80) 3.10 dBm(802.11ax_HE40)_26 Tone 5.03 dBm(802.11ax_HE40)_52 Tone 4.87 dBm(802.11ax_HE40)_106 Tone 4.76 dBm(802.11ax_HE40)_242 Tone 4.72 dBm(802.11ax_HE40)_484 Tone 4.33 dBm(802.11ax_HE40)_996 Tone 8.55 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 5 150 MHz ~ 5 250 MHz Band	Antenna 1	12.45 dBm(802.11a) 12.01 dBm(802.11n_HT20) 3.45 dBm(802.11ax_HE20)_26 Tone 5.63 dBm(802.11ax_HE20)_52 Tone 8.30 dBm(802.11ax_HE20)_106 Tone 10.77 dBm(802.11ax_HE20)_242 Tone 12.02 dBm(802.11ax_HE20)_Single User 8.87 dBm(802.11n_HT40) 4.18 dBm(802.11ax_HE40)_26 Tone 6.25 dBm(802.11ax_HE40)_52 Tone 8.44 dBm(802.11ax_HE40)_106 Tone 8.29 dBm(802.11ax_HE40)_242 Tone 8.20 dBm(802.11ax_HE40)_484 Tone 9.21 dBm(802.11ax_HE40)_Single User 8.11 dBm(802.11ac_VHT80) 4.10 dBm(802.11ax_HE40)_26 Tone 6.10 dBm(802.11ax_HE40)_52 Tone 5.90 dBm(802.11ax_HE40)_106 Tone 5.81 dBm(802.11ax_HE40)_242 Tone 5.75 dBm(802.11ax_HE40)_484 Tone 5.50 dBm(802.11ax_HE40)_996 Tone 8.27 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 5 150 MHz ~ 5 250 MHz Band	Multiple Antenna	15.09 dBm(802.11n_HT20) 6.03 dBm(802.11ax_HE20)_26 Tone 8.18 dBm(802.11ax_HE20)_52 Tone 10.95 dBm(802.11ax_HE20)_106 Tone 13.55 dBm(802.11ax_HE20)_242 Tone 15.11 dBm(802.11ax_HE20)_Single User 11.95 dBm(802.11n_HT40) 6.78 dBm(802.11ax_HE40)_26 Tone 8.80 dBm(802.11ax_HE40)_52 Tone 11.11 dBm(802.11ax_HE40)_106 Tone 10.94 dBm(802.11ax_HE40)_242 Tone 10.84 dBm(802.11ax_HE40)_484 Tone 12.19 dBm(802.11ax_HE40)_Single User 11.24 dBm(802.11ac_VHT80) 6.64 dBm(802.11ax_HE40)_26 Tone 8.61 dBm(802.11ax_HE40)_52 Tone 8.42 dBm(802.11ax_HE40)_106 Tone 8.32 dBm(802.11ax_HE40)_242 Tone 8.27 dBm(802.11ax_HE40)_484 Tone 7.96 dBm(802.11ax_HE40)_996 Tone 11.42 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 5 250 MHz ~ 5 350 MHz Band	Antenna 0	12.38 dBm(802.11a) 11.90 dBm(802.11n_HT20) 2.66 dBm(802.11ax_HE20)_26 Tone 4.79 dBm(802.11ax_HE20)_52 Tone 7.63 dBm(802.11ax_HE20)_106 Tone 10.35 dBm(802.11ax_HE20)_242 Tone 11.97 dBm(802.11ax_HE20)_Single User 8.28 dBm(802.11n_HT40) 3.52 dBm(802.11ax_HE40)_26 Tone 5.62 dBm(802.11ax_HE40)_52 Tone 7.88 dBm(802.11ax_HE40)_106 Tone 5.55 dBm(802.11ax_HE40)_242 Tone 7.49 dBm(802.11ax_HE40)_484 Tone 8.44 dBm(802.11ax_HE40)_Single User 6.35 dBm(802.11ac_VHT80) 3.18 dBm(802.11ax_HE40)_26 Tone 5.13 dBm(802.11ax_HE40)_52 Tone 4.96 dBm(802.11ax_HE40)_106 Tone 4.88 dBm(802.11ax_HE40)_242 Tone 4.86 dBm(802.11ax_HE40)_484 Tone 4.82 dBm(802.11ax_HE40)_996 Tone 6.54 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 5 250 MHz ~ 5 350 MHz Band	Antenna 1	12.39 dBm(802.11a) 11.94 dBm(802.11n_HT20) 3.67 dBm(802.11ax_HE20)_26 Tone 5.73 dBm(802.11ax_HE20)_52 Tone 8.46 dBm(802.11ax_HE20)_106 Tone 10.87 dBm(802.11ax_HE20)_242 Tone 12.03 dBm(802.11ax_HE20)_Single User 8.21 dBm(802.11n_HT40) 4.43 dBm(802.11ax_HE40)_26 Tone 6.58 dBm(802.11ax_HE40)_52 Tone 8.63 dBm(802.11ax_HE40)_106 Tone 6.48 dBm(802.11ax_HE40)_242 Tone 8.39 dBm(802.11ax_HE40)_484 Tone 8.48 dBm(802.11ax_HE40)_Single User 6.23 dBm(802.11ac_VHT80) 4.28 dBm(802.11ax_HE40)_26 Tone 6.24 dBm(802.11ax_HE40)_52 Tone 6.07 dBm(802.11ax_HE40)_106 Tone 5.88 dBm(802.11ax_HE40)_242 Tone 5.90 dBm(802.11ax_HE40)_484 Tone 5.86 dBm(802.11ax_HE40)_996 Tone 6.54 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 5 250 MHz ~ 5 350 MHz Band	Multiple Antenna	14.89 dBm(802.11n_HT20) 6.21 dBm(802.11ax_HE20)_26 Tone 8.29 dBm(802.11ax_HE20)_52 Tone 11.07 dBm(802.11ax_HE20)_106 Tone 13.58 dBm(802.11ax_HE20)_242 Tone 15.01 dBm(802.11ax_HE20)_Single User 11.23 dBm(802.11n_HT40) 6.98 dBm(802.11ax_HE40)_26 Tone 9.14 dBm(802.11ax_HE40)_52 Tone 11.28 dBm(802.11ax_HE40)_106 Tone 9.05 dBm(802.11ax_HE40)_242 Tone 10.97 dBm(802.11ax_HE40)_484 Tone 11.47 dBm(802.11ax_HE40)_Single User 9.30 dBm(802.11ac_VHT80) 6.77 dBm(802.11ax_HE40)_26 Tone 8.73 dBm(802.11ax_HE40)_52 Tone 8.56 dBm(802.11ax_HE40)_106 Tone 8.41 dBm(802.11ax_HE40)_242 Tone 8.42 dBm(802.11ax_HE40)_484 Tone 8.38 dBm(802.11ax_HE40)_996 Tone 9.55 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 5 470 MHz ~ 5 725 MHz Band	Antenna 0	12.24 dBm(802.11a) 11.76 dBm(802.11n_HT20) 2.82 dBm(802.11ax_HE20)_26 Tone 4.98 dBm(802.11ax_HE20)_52 Tone 7.90 dBm(802.11ax_HE20)_106 Tone 10.64 dBm(802.11ax_HE20)_242 Tone 12.03 dBm(802.11ax_HE20)_Single User 9.62 dBm(802.11n_HT40) 3.69 dBm(802.11ax_HE40)_26 Tone 5.92 dBm(802.11ax_HE40)_52 Tone 8.02 dBm(802.11ax_HE40)_106 Tone 7.72 dBm(802.11ax_HE40)_242 Tone 7.76 dBm(802.11ax_HE40)_484 Tone 9.99 dBm(802.11ax_HE40)_Single User 5.91 dBm(802.11ac_VHT80) 3.20 dBm(802.11ax_HE40)_26 Tone 5.21 dBm(802.11ax_HE40)_52 Tone 4.98 dBm(802.11ax_HE40)_106 Tone 4.80 dBm(802.11ax_HE40)_242 Tone 4.78 dBm(802.11ax_HE40)_484 Tone 4.46 dBm(802.11ax_HE40)_996 Tone 6.27 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 5 470 MHz ~ 5 725 MHz Band	Antenna 0_Straddle	9.32 dBm(802.11a) 9.20 dBm(802.11n_HT20) 2.00 dBm(802.11ax_HE20)_26 Tone 4.19 dBm(802.11ax_HE20)_52 Tone 6.86 dBm(802.11ax_HE20)_106 Tone 8.57 dBm(802.11ax_HE20)_242 Tone 9.31 dBm(802.11ax_HE20)_Single User 7.36 dBm(802.11n_HT40) -14.30 dBm(802.11ax_HE40)_26 Tone -6.24 dBm(802.11ax_HE40)_52 Tone 3.73 dBm(802.11ax_HE40)_106 Tone 5.66 dBm(802.11ax_HE40)_242 Tone 6.45 dBm(802.11ax_HE40)_484 Tone 7.74 dBm(802.11ax_HE40)_Single User 4.72 dBm(802.11ac_VHT80) -15.24 dBm(802.11ax_HE40)_26 Tone -7.11 dBm(802.11ax_HE40)_52 Tone 1.12 dBm(802.11ax_HE40)_106 Tone 2.80 dBm(802.11ax_HE40)_242 Tone 3.65 dBm(802.11ax_HE40)_484 Tone 4.16 dBm(802.11ax_HE40)_996 Tone 5.03 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 5 470 MHz ~ 5 725 MHz Band	Antenna 1	12.50 dBm(802.11a) 11.89 dBm(802.11n_HT20) 3.90 dBm(802.11ax_HE20)_26 Tone 8.53 dBm(802.11ax_HE20)_52 Tone 8.55 dBm(802.11ax_HE20)_106 Tone 11.07 dBm(802.11ax_HE20)_242 Tone 12.15 dBm(802.11ax_HE20)_Single User 9.93 dBm(802.11n_HT40) 5.05 dBm(802.11ax_HE40)_26 Tone 7.13 dBm(802.11ax_HE40)_52 Tone 9.13 dBm(802.11ax_HE40)_106 Tone 8.84 dBm(802.11ax_HE40)_242 Tone 8.81 dBm(802.11ax_HE40)_484 Tone 10.15 dBm(802.11ax_HE40)_Single User 5.90 dBm(802.11ac_VHT80) 4.26 dBm(802.11ax_HE40)_26 Tone 6.28 dBm(802.11ax_HE40)_52 Tone 6.15 dBm(802.11ax_HE40)_106 Tone 6.02 dBm(802.11ax_HE40)_242 Tone 5.96 dBm(802.11ax_HE40)_484 Tone 5.71 dBm(802.11ax_HE40)_996 Tone 6.27 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 5 470 MHz ~ 5 725 MHz Band	Antenna 1_Straddle	9.42 dBm(802.11a) 9.23 dBm(802.11n_HT20) 3.92 dBm(802.11ax_HE20)_26 Tone 5.88 dBm(802.11ax_HE20)_52 Tone 8.59 dBm(802.11ax_HE20)_106 Tone 9.80 dBm(802.11ax_HE20)_242 Tone 9.35 dBm(802.11ax_HE20)_Single User 7.45 dBm(802.11n_HT40) -12.01 dBm(802.11ax_HE40)_26 Tone -4.37 dBm(802.11ax_HE40)_52 Tone 5.52 dBm(802.11ax_HE40)_106 Tone 7.38 dBm(802.11ax_HE40)_242 Tone 7.74 dBm(802.11ax_HE40)_484 Tone 7.79 dBm(802.11ax_HE40)_Single User 4.37 dBm(802.11ac_VHT80) -13.11 dBm(802.11ax_HE40)_26 Tone -5.17 dBm(802.11ax_HE40)_52 Tone 2.86 dBm(802.11ax_HE40)_106 Tone 4.42 dBm(802.11ax_HE40)_242 Tone 5.11 dBm(802.11ax_HE40)_484 Tone 5.32 dBm(802.11ax_HE40)_996 Tone 4.66 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 5 470 MHz ~ 5 725 MHz Band	Multiple Antenna	14.89 dBm(802.11n_HT20) 6.33 dBm(802.11ax_HE20)_26 Tone 9.99 dBm(802.11ax_HE20)_52 Tone 11.21 dBm(802.11ax_HE20)_106 Tone 13.87 dBm(802.11ax_HE20)_242 Tone 15.10 dBm(802.11ax_HE20)_Single User 12.79 dBm(802.11n_HT40) 7.44 dBm(802.11ax_HE40)_26 Tone 9.58 dBm(802.11ax_HE40)_52 Tone 11.62 dBm(802.11ax_HE40)_106 Tone 11.31 dBm(802.11ax_HE40)_242 Tone 11.33 dBm(802.11ax_HE40)_484 Tone 13.09 dBm(802.11ax_HE40)_Single User 8.92 dBm(802.11ac_VHT80) 6.77 dBm(802.11ax_HE40)_26 Tone 8.79 dBm(802.11ax_HE40)_52 Tone 8.61 dBm(802.11ax_HE40)_106 Tone 8.46 dBm(802.11ax_HE40)_242 Tone 8.42 dBm(802.11ax_HE40)_484 Tone 8.14 dBm(802.11ax_HE40)_996 Tone 9.28 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 5 470 MHz ~ 5 725 MHz Band	Multiple Antenna _Straddle	12.22 dBm(802.11n_HT20) 5.99 dBm(802.11ax_HE20)_26 Tone 8.12 dBm(802.11ax_HE20)_52 Tone 10.82 dBm(802.11ax_HE20)_106 Tone 12.24 dBm(802.11ax_HE20)_242 Tone 12.34 dBm(802.11ax_HE20)_Single User 10.41 dBm(802.11n_HT40) -9.99 dBm(802.11ax_HE40)_26 Tone -2.19 dBm(802.11ax_HE40)_52 Tone 7.73 dBm(802.11ax_HE40)_106 Tone 9.62 dBm(802.11ax_HE40)_242 Tone 10.15 dBm(802.11ax_HE40)_484 Tone 10.78 dBm(802.11ax_HE40)_Single User 7.56 dBm(802.11ac_VHT80) -11.04 dBm(802.11ax_HE40)_26 Tone -3.02 dBm(802.11ax_HE40)_52 Tone 5.08 dBm(802.11ax_HE40)_106 Tone 6.69 dBm(802.11ax_HE40)_242 Tone 7.45 dBm(802.11ax_HE40)_484 Tone 7.79 dBm(802.11ax_HE40)_996 Tone 7.86 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 5 725 MHz ~ 5 850 MHz Band	Antenna 0	11.47 dBm(802.11a) 11.43 dBm(802.11n_HT20) 10.25 dBm(802.11ax_HE20)_26 Tone 10.40 dBm(802.11ax_HE20)_52 Tone 10.13 dBm(802.11ax_HE20)_106 Tone 10.13 dBm(802.11ax_HE20)_242 Tone 11.28 dBm(802.11ax_HE20)_Single User 10.37 dBm(802.11n_HT40) 7.10 dBm(802.11ax_HE40)_26 Tone 7.39 dBm(802.11ax_HE40)_52 Tone 7.69 dBm(802.11ax_HE40)_106 Tone 7.32 dBm(802.11ax_HE40)_242 Tone 7.16 dBm(802.11ax_HE40)_484 Tone 10.38 dBm(802.11ax_HE40)_Single User 8.02 dBm(802.11ac_VHT80) 4.77 dBm(802.11ax_HE40)_26 Tone 4.91 dBm(802.11ax_HE40)_52 Tone 4.76 dBm(802.11ax_HE40)_106 Tone 4.66 dBm(802.11ax_HE40)_242 Tone 4.57 dBm(802.11ax_HE40)_484 Tone 4.48 dBm(802.11ax_HE40)_996 Tone 8.01 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 5 725 MHz ~ 5 850 MHz Band	Antenna 0_Straddle	3.14 dBm(802.11a) 3.50 dBm(802.11n_HT20) 1.68 dBm(802.11ax_HE20)_26 Tone 3.49 dBm(802.11ax_HE20)_52 Tone 3.76 dBm(802.11ax_HE20)_106 Tone 3.11 dBm(802.11ax_HE20)_242 Tone 3.94 dBm(802.11ax_HE20)_Single User -2.90 dBm(802.11n_HT40) 1.45 dBm(802.11ax_HE40)_26 Tone 4.04 dBm(802.11ax_HE40)_52 Tone 3.01 dBm(802.11ax_HE40)_106 Tone -0.30 dBm(802.11ax_HE40)_242 Tone -3.47 dBm(802.11ax_HE40)_484 Tone -2.02 dBm(802.11ax_HE40)_Single User -9.20 dBm(802.11ac_VHT80) 2.00 dBm(802.11ax_HE40)_26 Tone 3.63 dBm(802.11ax_HE40)_52 Tone 0.73 dBm(802.11ax_HE40)_106 Tone -2.85 dBm(802.11ax_HE40)_242 Tone -5.78 dBm(802.11ax_HE40)_484 Tone -8.89 dBm(802.11ax_HE40)_996 Tone -8.06 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 5 725 MHz ~ 5 850 MHz Band	Antenna 1	11.78 dBm(802.11a) 11.49 dBm(802.11n_HT20) 11.36 dBm(802.11ax_HE20)_26 Tone 11.55 dBm(802.11ax_HE20)_52 Tone 11.29 dBm(802.11ax_HE20)_106 Tone 11.21 dBm(802.11ax_HE20)_242 Tone 11.16 dBm(802.11ax_HE20)_Single User 10.47 dBm(802.11n_HT40) 8.73 dBm(802.11ax_HE40)_26 Tone 9.01 dBm(802.11ax_HE40)_52 Tone 9.13 dBm(802.11ax_HE40)_106 Tone 8.83 dBm(802.11ax_HE40)_242 Tone 8.72 dBm(802.11ax_HE40)_484 Tone 10.31 dBm(802.11ax_HE40)_Single User 7.69 dBm(802.11ac_VHT80) 6.50 dBm(802.11ax_HE40)_26 Tone 6.53 dBm(802.11ax_HE40)_52 Tone 6.39 dBm(802.11ax_HE40)_106 Tone 6.26 dBm(802.11ax_HE40)_242 Tone 6.26 dBm(802.11ax_HE40)_484 Tone 5.91 dBm(802.11ax_HE40)_996 Tone 7.47 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 5 725 MHz ~ 5 850 MHz Band	Antenna 1_Straddle	3.33 dBm(802.11a) 3.62 dBm(802.11n_HT20) 3.83 dBm(802.11ax_HE20)_26 Tone 5.36 dBm(802.11ax_HE20)_52 Tone 5.47 dBm(802.11ax_HE20)_106 Tone 4.50 dBm(802.11ax_HE20)_242 Tone 4.12 dBm(802.11ax_HE20)_Single User -2.38 dBm(802.11n_HT40) 3.33 dBm(802.11ax_HE40)_26 Tone 5.93 dBm(802.11ax_HE40)_52 Tone 4.85 dBm(802.11ax_HE40)_106 Tone 1.50 dBm(802.11ax_HE40)_242 Tone -1.68 dBm(802.11ax_HE40)_484 Tone -1.56 dBm(802.11ax_HE40)_Single User -8.90 dBm(802.11ac_VHT80) 3.96 dBm(802.11ax_HE40)_26 Tone 5.51 dBm(802.11ax_HE40)_52 Tone 2.53 dBm(802.11ax_HE40)_106 Tone -0.93 dBm(802.11ax_HE40)_242 Tone -3.96 dBm(802.11ax_HE40)_484 Tone -7.03 dBm(802.11ax_HE40)_996 Tone -7.70 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 5 725 MHz ~ 5 850 MHz Band	Multiple Antenna	14.34 dBm(802.11n_HT20) 13.70 dBm(802.11ax_HE20)_26 Tone 13.90 dBm(802.11ax_HE20)_52 Tone 13.63 dBm(802.11ax_HE20)_106 Tone 13.54 dBm(802.11ax_HE20)_242 Tone 14.17 dBm(802.11ax_HE20)_Single User 13.43 dBm(802.11n_HT40) 10.97 dBm(802.11ax_HE40)_26 Tone 11.25 dBm(802.11ax_HE40)_52 Tone 11.33 dBm(802.11ax_HE40)_106 Tone 11.04 dBm(802.11ax_HE40)_242 Tone 11.02 dBm(802.11ax_HE40)_484 Tone 13.34 dBm(802.11ax_HE40)_Single User 10.87 dBm(802.11ac_VHT80) 8.60 dBm(802.11ax_HE40)_26 Tone 8.61 dBm(802.11ax_HE40)_52 Tone 8.50 dBm(802.11ax_HE40)_106 Tone 8.50 dBm(802.11ax_HE40)_242 Tone 8.48 dBm(802.11ax_HE40)_484 Tone 8.26 dBm(802.11ax_HE40)_996 Tone 10.76 dBm(802.11ax_HE40)_Single User

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RF OUTPUT POWER	WLAN 5 725 MHz ~ 5 850 MHz Band	Multiple Antenna _Straddle	6.57 dBm(802.11n_HT20) 5.90 dBm(802.11ax_HE20)_26 Tone 7.53 dBm(802.11ax_HE20)_52 Tone 7.71 dBm(802.11ax_HE20)_106 Tone 6.87 dBm(802.11ax_HE20)_242 Tone 7.04 dBm(802.11ax_HE20)_Single User 0.38 dBm(802.11n_HT40) 5.50 dBm(802.11ax_HE40)_26 Tone 8.10 dBm(802.11ax_HE40)_52 Tone 7.05 dBm(802.11ax_HE40)_106 Tone 3.70 dBm(802.11ax_HE40)_242 Tone 0.53 dBm(802.11ax_HE40)_484 Tone 1.23 dBm(802.11ax_HE40)_Single User -6.03 dBm(802.11ac_VHT80) 6.10 dBm(802.11ax_HE40)_26 Tone 7.68 dBm(802.11ax_HE40)_52 Tone 4.73 dBm(802.11ax_HE40)_106 Tone 1.23 dBm(802.11ax_HE40)_242 Tone -1.76 dBm(802.11ax_HE40)_484 Tone -4.85 dBm(802.11ax_HE40)_996 Tone -4.87 dBm(802.11ax_HE40)_Single User

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ANTENNA TYPE	Dipole Antenna		
ANTENNA GAIN	Bluetooth LE	7 dBi	
	Bluetooth	7 dBi	
	WLAN 2.4 GHz	Antenna 0	7 dBi
		Antenna 1	7 dBi
		Multiple Antenna	10.01 dBi
	5 150 MHz ~ 5 250 MHz Band	Antenna 0	9 dBi
		Antenna 1	9 dBi
		Multiple Antenna	12.01 dBi
	5 250 MHz ~ 5 350 MHz Band	Antenna 0	9 dBi
		Antenna 1	9 dBi
		Multiple Antenna	12.01 dBi
	5 470 MHz ~ 5 725 MHz Band	Antenna 0	9 dBi
		Antenna 1	9 dBi
		Multiple Antenna	12.01 dBi
	5 725 MHz ~ 5 850 MHz Band	Antenna 0	9 dBi
		Antenna 1	9 dBi
		Multiple Antenna	12.01 dBi
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	40 MHz		

3.2 Alternative type(s)/model(s); also covered by this test report.

-. None

4. EUT MODIFICATIONS

-. None

5. SYSTEM TEST CONFIGURATION

5.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	LG Innotek Co., Ltd.	cTP3.0_Rev0.1	N/A

5.2 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

Model	Manufacturer	Description	Connected to
ATC6NPL002	LG Innotek Co., Ltd.	RF Module (EUT)	-
ZUP36-6	NEMIC-LAMBDA	DC Power Supply	EUT
ideapad320	Lenovo	Notebokk PC	EUT

5.3 Mode of operation during the test

For the testing, software used to control the EUT for staying in continuous transmitting is programmed.

For final testing, the EUT was set at 2 402 MHz, 2 440 MHz, and 2 480 MHz to get a maximum emission levels from the EUT. The EUT was moved throughout the XY, XZ, and YZ planes and the worst case is "XY" axis, but the worst data was recorded in this report.

-. Channel List (Bluetooth LE)

Channel	Frequency[MHz]	Channel	Frequency[MHz]	Channel	Frequency[MHz]
0	2 402.00	14	2 430.00	28	2 458.00
1	2 404.00	15	2 432.00	29	2 460.00
2	2 406.00	16	2 434.00	30	2 462.00
3	2 408.00	17	2 436.00	31	2 464.00
4	2 410.00	18	2 438.00	32	2 466.00
5	2 412.00	19	2 440.00	33	2 468.00
6	2 414.00	20	2 442.00	34	2 470.00
7	2 416.00	21	2 444.00	35	2 472.00
8	2 418.00	22	2 446.00	36	2 474.00
9	2 420.00	23	2 448.00	37	2 476.00
10	2 422.00	24	2 450.00	38	2 478.00
11	2 424.00	25	2 452.00	39	2 480.00
12	2 426.00	26	2 454.00		
13	2 428.00	27	2 456.00		

-. Duty Cycle

Mode	Tx On Time [ms]	Tx Off Time [ms]	Duty Cycle [%]	Correction Factor [dB]
Bluetooth LE_1 Mbps	0.385	0.24	61.60	2.10
Bluetooth LE_2 Mbps	0.2	0.425	32.00	4.95
Bluetooth LE_125 kbps	3.1	1.9	62.00	2.08
Bluetooth LE_500 kbps	1.06	0.19	84.80	0.72

Note – Duty Cycle : (Tx On Time / (Tx On Time + Tx Off Time)) * 100

Correction Factor : 10 * Log(1 / (Duty Cycle / 100))

-. For the Duty cycle test data, Please See The Appendix Data File.

5.4 Configuration of Test System

Line Conducted Test: The EUT was tested in the Transmitting mode. All supporting equipment were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.10: 2020 to determine the worse operating conditions.

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2020 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meter 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.

5.5 Antenna Requirement

For intentional device, according to 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.

Antenna Construction:

The antenna of the EUT is a Dipole Antenna. However, The manufacture has designed a strucyure that connects to the antenna using a unique coupling connector of the Fakra Type. So no consideration of replacement by the user.

6. PRELIMINARY TEST

6.1 AC Power line Conducted Emissions Tests

During Preliminary Test, the following operating mode was investigated.

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	X

6.2 General Radiated Emissions Tests

During Preliminary Test, the following operating mode was investigated.

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	X

7. MINIMUM 6 dB BANDWIDTH

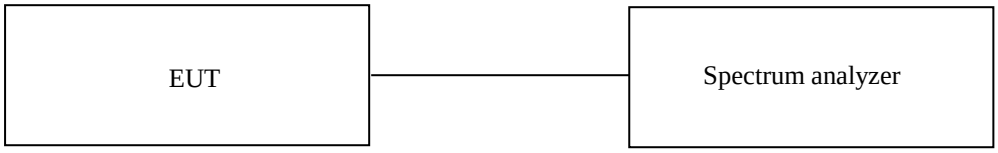
7.1 Operating environment

Temperature : 23 °C

Relative humidity : 46 % R.H.

7.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz, and peak detection was used. The 6 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 6 dB.



7.3 Test Date

December 05, 2021 ~ March 08, 2022

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7.4 Test data for 1 Mbps

CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2 402.00	709.30	500.00	209.30
Middle	2 440.00	704.30	500.00	204.30
High	2 480.00	719.30	500.00	219.30

Remark. Margin = Measured Value - Limit

7.5 Test data for 2 Mbps

CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2 402.00	1 149.00	500.00	649.00
Middle	2 440.00	1 169.00	500.00	669.00
High	2 480.00	1 119.00	500.00	619.00

Remark. Margin = Measured Value - Limit

7.6 Test data for 125 kbps

CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2 402.00	624.40	500.00	124.40
Middle	2 440.00	629.40	500.00	129.40
High	2 480.00	639.40	500.00	139.40

Remark. Margin = Measured Value - Limit

7.7 Test data for 500 kbps

CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2 402.00	664.30	500.00	164.30
Middle	2 440.00	709.30	500.00	209.30
High	2 480.00	659.30	500.00	159.30

Remark. Margin = Measured Value - Limit

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8. MAXIMUM PEAK OUTPUT POWER

8.1 Operating environment

Temperature : 23 °C

Relative humidity : 46 % R.H.

8.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer.

The resolution bandwidth is set to ≥ DTS Bandwidth, the video bandwidth is set to 3 times the resolution bandwidth.

8.3 Test Date

December 05, 2021 ~ March 08, 2022

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8.4 Test data for 1 Mbps

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (kHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	709.30	0.34	30.00	29.66
MIDDLE	2 440.00	704.30	0.13	30.00	29.87
HIGH	2 480.00	719.30	1.21	30.00	28.79

Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

8.5 Test data for 2 Mbps

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (kHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	1 149.00	0.30	30.00	29.70
MIDDLE	2 440.00	1 169.00	0.14	30.00	29.86
HIGH	2 480.00	1 119.00	1.17	30.00	28.83

Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

8.6 Test data for 125 kbps

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (kHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	624.40	0.35	30.00	29.65
MIDDLE	2 440.00	629.40	0.14	30.00	29.86
HIGH	2 480.00	639.40	1.22	30.00	28.78

Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

8.7 Test data for 500 kbps

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (kHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	0 664.30	0.37	30.00	29.63
MIDDLE	2 440.00	0 709.30	0.16	30.00	29.84
HIGH	2 480.00	0 659.30	1.24	30.00	28.76

Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

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9. 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

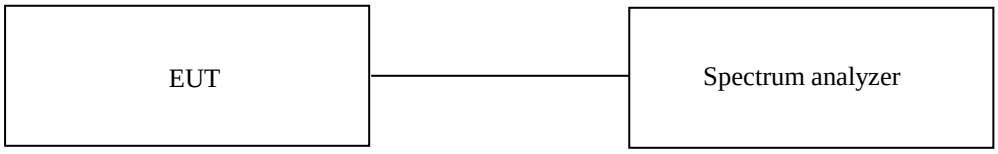
9.1 Operating environment

Temperature : 23 °C

Relative humidity : 46 % R.H.

9.2 Test set-up for conducted measurement

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz, the video bandwidth is set to 3 times the resolution bandwidth and peak detection was used.



9.3 Test set-up for radiated measurement

The radiated emissions measurements were performed on the 3 m semi anechoic chamber. The EUT was placed on turntable approximately 1.5 m above the ground plane.

The frequency spectrum from 30 MHz 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.

9.4 Test Date

December 05, 2021 ~ March 08, 2022

9.5 Test data for conducted emission

Please refer to the Annex

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9.6 Test data for radiated emission

9.6.1 Radiated Emission which fall in the Restricted Band

9.6.1.1 Test data for 1 Mbps

-. Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode
1 MHz and RMS Detector for Average Mode

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Measurement distance : 3 m

-. Duty Cycle : 61.60 %

-. Result : PASSED

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Factor	ATT (dB)	Duty Factor (dB)	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel											
2 349.750	54.56	Peak	H	28.30	6.03	45.14	6.05	-	49.80	74.00	24.20
2 334.034	44.04	Average	H	28.30	6.03	45.14	6.05	2.10	41.38	54.00	12.62
2 333.114	54.29	Peak	V	28.30	6.03	45.14	6.05	-	49.53	74.00	24.47
2 334.034	43.95	Average	V	28.30	6.03	45.14	6.05	2.10	41.29	54.00	12.71
Test Data for High Channel											
2 492.357	54.83	Peak	H	28.70	6.12	45.79	6.08	-	49.94	74.00	24.06
2 483.566	42.97	Average	H	28.70	6.12	45.79	6.08	2.10	40.18	54.00	13.82
2 484.445	55.07	Peak	V	28.70	6.12	45.79	6.08	-	50.18	74.00	23.82
2 483.886	42.88	Average	V	28.70	6.12	45.79	6.08	2.10	40.09	54.00	13.91

Remark: “H”: Horizontal, “V”: Vertical

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss + ATT + Duty Factor– AMP Gain

9.6.1.2 Test data for 2 Mbps

-. Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode
1 MHz and RMS Detector for Average Mode

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Measurement distance : 3 m

-. Duty Cycle : 32.00 %

-. Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Factor	ATT (dB)	Duty Factor (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel											
2 335.136	54.91	Peak	H	28.30	6.03	45.14	6.05	-	50.15	74.00	23.85
2 333.942	44.05	Average	H	28.30	6.03	45.14	6.05	4.95	44.24	54.00	9.76
2 322.361	54.34	Peak	V	28.30	6.03	45.14	6.05	-	49.58	74.00	24.42
2 334.585	44.02	Average	V	28.30	6.03	45.14	6.05	4.95	44.21	54.00	9.79
Test Data for High Channel											
2 483.686	54.65	Peak	H	28.70	6.12	45.79	6.08	-	49.76	74.00	24.24
2 484.026	43.25	Average	H	28.70	6.12	45.79	6.08	4.95	43.31	54.00	10.69
2 483.526	55.17	Peak	V	28.70	6.12	45.79	6.08	-	50.28	74.00	23.72
2 483.506	43.49	Average	V	28.70	6.12	45.79	6.08	4.95	43.55	54.00	10.45

Remark: “H”: Horizontal, “V”: Vertical

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss + ATT + Duty Factor– AMP Gain

9.6.1.3 Test data for 125 kbps

-. Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode
1 MHz and RMS Detector for Average Mode

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Measurement distance : 3 m

-. Duty Cycle : 62.00 %

-. Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Factor	ATT (dB)	Duty Factor (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel											
2 325.762	54.25	Peak	H	28.30	6.03	45.14	6.05	-	49.49	74.00	24.51
2 324.383	44.15	Average	H	28.30	6.03	45.14	6.05	2.08	41.47	54.00	12.53
2 319.512	54.46	Peak	V	28.30	6.03	45.14	6.05	-	49.70	74.00	24.30
2 319.512	44.18	Average	V	28.30	6.03	45.14	6.05	2.08	41.50	54.00	12.50
Test Data for High Channel											
2 483.806	54.59	Peak	H	28.70	6.12	45.79	6.08	-	49.70	74.00	24.30
2 484.365	43.01	Average	H	28.70	6.12	45.79	6.08	2.08	40.20	54.00	13.80
2 484.385	54.37	Peak	V	28.70	6.12	45.79	6.08	-	49.48	74.00	24.52
2 483.786	43.06	Average	V	28.70	6.12	45.79	6.08	2.08	40.25	54.00	13.75

Remark: “H”: Horizontal, “V”: Vertical

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss + ATT + Duty Factor– AMP Gain

9.6.1.4 Test data for 500 kbps

-. Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode
1 MHz and RMS Detector for Average Mode

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Measurement distance : 3 m

-. Duty Cycle : 84.80 %

-. Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Factor	ATT (dB)	Duty Factor (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel											
2 331.920	54.89	Peak	H	28.30	6.03	45.14	6.05	-	50.13	74.00	23.87
2 324.659	44.31	Average	H	28.30	6.03	45.14	6.05	0.72	40.27	54.00	13.73
2 335.320	54.92	Peak	V	28.30	6.03	45.14	6.05	-	50.16	74.00	23.84
2 334.401	44.28	Average	V	28.30	6.03	45.14	6.05	0.72	40.24	54.00	13.76
Test Data for High Channel											
2 483.506	54.25	Peak	H	28.70	6.12	45.79	6.08	-	49.36	74.00	24.64
2 497.472	42.93	Average	H	28.70	6.12	45.79	6.08	0.72	38.76	54.00	15.24
2 495.874	54.26	Peak	V	28.70	6.12	45.79	6.08	-	49.37	74.00	24.63
2 483.506	42.89	Average	V	28.70	6.12	45.79	6.08	0.72	38.72	54.00	15.28

Remark: “H”: Horizontal, “V”: Vertical

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss + ATT + Duty Factor– AMP Gain

9.6.2 Spurious & Harmonic Radiated Emission

9.6.2.1 Test data for 1 Mbps

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
1 MHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Duty Cycle : 61.60 %

-. Result : PASSED

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Factor	Duty Factor (dB)	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel										
4 804.000	51.71	Peak	H	33.40	7.91	45.10	-	47.92	74.00	26.08
4 804.000	40.84	Average	H	33.40	7.91	45.10	2.10	39.15	54.00	14.85
4 804.000	51.65	Peak	V	33.40	7.91	45.10	-	47.86	74.00	26.14
4 804.000	40.55	Average	V	33.40	7.91	45.10	2.10	38.86	54.00	15.14
Test Data for Middle Channel										
4 880.000	51.65	Peak	H	33.50	8.08	45.08	-	48.15	74.00	25.85
4 880.000	40.21	Average	H	33.50	8.08	45.08	2.10	38.81	54.00	15.19
4 880.000	51.65	Peak	V	33.50	8.08	45.08	-	48.15	74.00	25.85
4 880.000	40.15	Average	V	33.50	8.08	45.08	2.10	38.75	54.00	15.25
Test Data for High Channel										
4 960.000	51.81	Peak	H	33.30	8.14	45.03	-	48.22	74.00	25.78
4 960.000	40.79	Average	H	33.30	8.14	45.03	2.10	39.30	54.00	14.70
4 960.000	51.81	Peak	V	33.30	8.14	45.03	-	48.22	74.00	25.78
4 960.000	40.15	Average	V	33.30	8.14	45.03	2.10	38.66	54.00	15.34

Remark: “H”: Horizontal, “V”: Vertical

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss + Duty Factor – AMP Factor

9.6.2.2 Test data for 2 Mbps

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
1 MHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Duty Cycle : 32.00 %

-. Result : PASSED

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Factor	Duty Factor (dB)	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel										
4 804.000	51.65	Peak	H	33.40	7.91	45.10	-	47.86	74.00	26.14
4 804.000	40.71	Average	H	33.40	7.91	45.10	4.95	41.87	54.00	12.13
4 804.000	51.44	Peak	V	33.40	7.91	45.10	-	47.65	74.00	26.35
4 804.000	40.48	Average	V	33.40	7.91	45.10	4.95	41.64	54.00	12.36
Test Data for Middle Channel										
4 880.000	51.55	Peak	H	33.50	8.08	45.08	-	48.05	74.00	25.95
4 880.000	40.32	Average	H	33.50	8.08	45.08	4.95	41.77	54.00	12.23
4 880.000	51.62	Peak	V	33.50	8.08	45.08	-	48.12	74.00	25.88
4 880.000	40.22	Average	V	33.50	8.08	45.08	4.95	41.67	54.00	12.33
Test Data for High Channel										
4 960.000	51.38	Peak	H	33.30	8.14	45.03	-	47.79	74.00	26.21
4 960.000	40.62	Average	H	33.30	8.14	45.03	4.95	41.98	54.00	12.02
4 960.000	51.62	Peak	V	33.30	8.14	45.03	-	48.03	74.00	25.97
4 960.000	40.55	Average	V	33.30	8.14	45.03	4.95	41.91	54.00	12.09

Remark: “H”: Horizontal, “V”: Vertical

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss + Duty Factor – AMP Factor

9.6.2.3 Test data for 125 kbps

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
1 MHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Duty Cycle : 62.00 %

-. Result : PASSED

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Factor	Duty Factor (dB)	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel										
4 804.000	51.66	Peak	H	33.40	7.91	45.10	-	47.87	74.00	26.13
4 804.000	40.68	Average	H	33.40	7.91	45.10	2.08	38.97	54.00	15.03
4 804.000	51.42	Peak	V	33.40	7.91	45.10	-	47.63	74.00	26.37
4 804.000	40.36	Average	V	33.40	7.91	45.10	2.08	38.65	54.00	15.35
Test Data for Middle Channel										
4 880.000	51.62	Peak	H	33.50	8.08	45.08	-	48.12	74.00	25.88
4 880.000	40.63	Average	H	33.50	8.08	45.08	2.08	39.21	54.00	14.79
4 880.000	51.44	Peak	V	33.50	8.08	45.08	-	47.94	74.00	26.06
4 880.000	40.56	Average	V	33.50	8.08	45.08	2.08	39.14	54.00	14.86
Test Data for High Channel										
4 960.000	51.65	Peak	H	33.30	8.14	45.03	-	48.06	74.00	25.94
4 960.000	40.71	Average	H	33.30	8.14	45.03	2.08	39.20	54.00	14.80
4 960.000	51.58	Peak	V	33.30	8.14	45.03	-	47.99	74.00	26.01
4 960.000	40.62	Average	V	33.30	8.14	45.03	2.08	39.11	54.00	14.89

Remark: “H”: Horizontal, “V”: Vertical

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss + Duty Factor – AMP Factor

9.6.2.4 Test data for 500 kbps

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
1 MHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Duty Cycle : 84.80 %

-. Result : PASSED

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Factor	Duty Factor (dB)	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel										
4 804.000	51.65	Peak	H	33.40	7.91	45.10	-	47.86	74.00	26.14
4 804.000	40.71	Average	H	33.40	7.91	45.10	0.72	37.64	54.00	16.36
4 804.000	51.68	Peak	V	33.40	7.91	45.10	-	47.89	74.00	26.11
4 804.000	40.53	Average	V	33.40	7.91	45.10	0.72	37.46	54.00	16.54
Test Data for Middle Channel										
4 880.000	51.71	Peak	H	33.50	8.08	45.08	-	48.21	74.00	25.79
4 880.000	40.56	Average	H	33.50	8.08	45.08	0.72	37.78	54.00	16.22
4 880.000	51.62	Peak	V	33.50	8.08	45.08	-	48.12	74.00	25.88
4 880.000	40.38	Average	V	33.50	8.08	45.08	0.72	37.60	54.00	16.40
Test Data for High Channel										
4 960.000	51.66	Peak	H	33.30	8.14	45.03	-	48.07	74.00	25.93
4 960.000	40.73	Average	H	33.30	8.14	45.03	0.72	37.86	54.00	16.14
4 960.000	51.62	Peak	V	33.30	8.14	45.03	-	48.03	74.00	25.97
4 960.000	40.55	Average	V	33.30	8.14	45.03	0.72	37.68	54.00	16.32

Remark: “H”: Horizontal, “V”: Vertical

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss + Duty Factor – AMP Factor

10. PEAK POWER SPECTRAL DENSITY

10.1 Operating environment

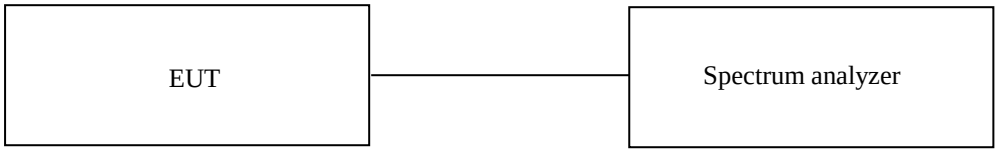
Temperature : 23 °C

Relative humidity : 46 % R.H.

10.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer.

The resolution bandwidth is set to 3 kHz ≤ RBW ≤100 kHz, the video bandwidth is set to 3 times the resolution bandwidth.



10.3 Test Date

December 05, 2021 ~ March 08, 2022

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10.4 Test data for 1 Mbps

-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 402.00	-15.18	8.00	23.18
Middle	2 440.00	-15.24	8.00	23.24
High	2 480.00	-14.38	8.00	22.38

Remark. Margin = Limit – Measured value

10.5 Test data for 2 Mbps

-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 402.00	-18.27	8.00	26.27
Middle	2 440.00	-18.34	8.00	26.34
High	2 480.00	-17.57	8.00	25.57

Remark. Margin = Limit – Measured value

10.6 Test data for 125 kbps

-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 402.00	-5.79	8.00	13.79
Middle	2 440.00	-6.00	8.00	14.00
High	2 480.00	-4.93	8.00	12.93

Remark. Margin = Limit – Measured value

10.7 Test data for 500 kbps

-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 402.00	-5.94	8.00	13.94
Middle	2 440.00	-6.15	8.00	14.15
High	2 480.00	-5.07	8.00	13.07

Remark. Margin = Limit – Measured value

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11. RADIATED EMISSION TEST

11.1 Operating environment

Temperature : 23 °C

Relative humidity : 46 % R.H.

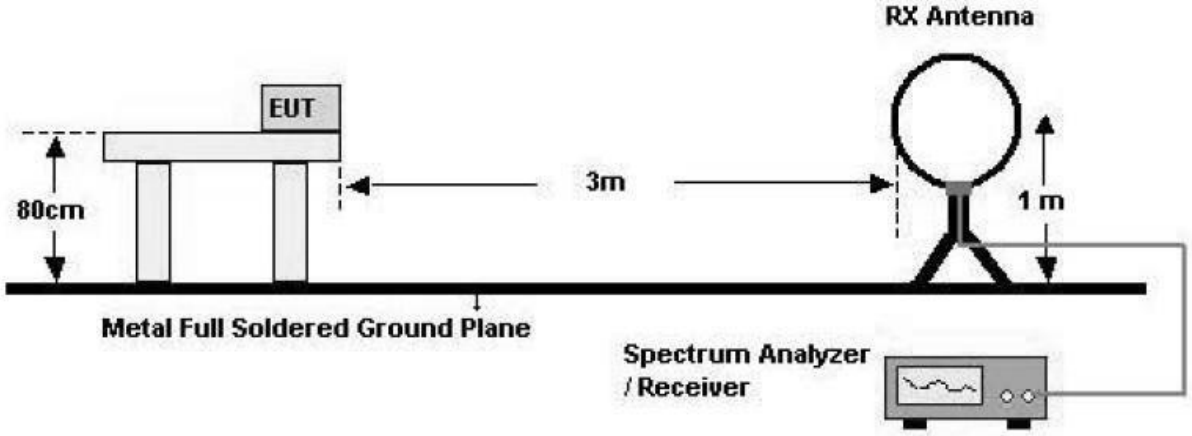
11.2 Test set-up

The radiated emissions measurements were on the 3 m semi anechoic chamber. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

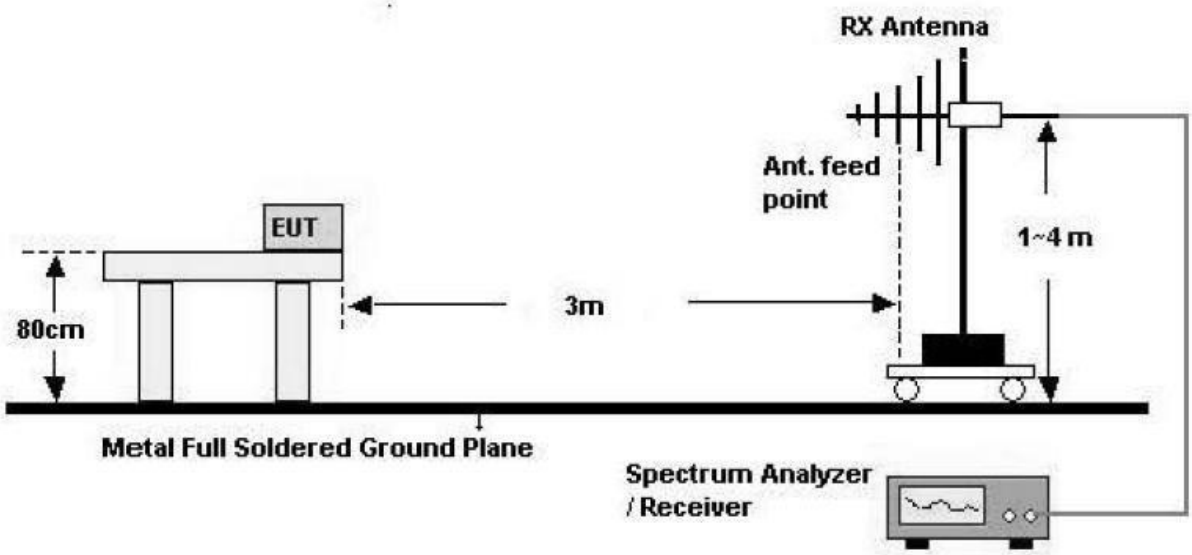
The frequency spectrum from 30 MHz to 26.5 GHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

- Test Configuration

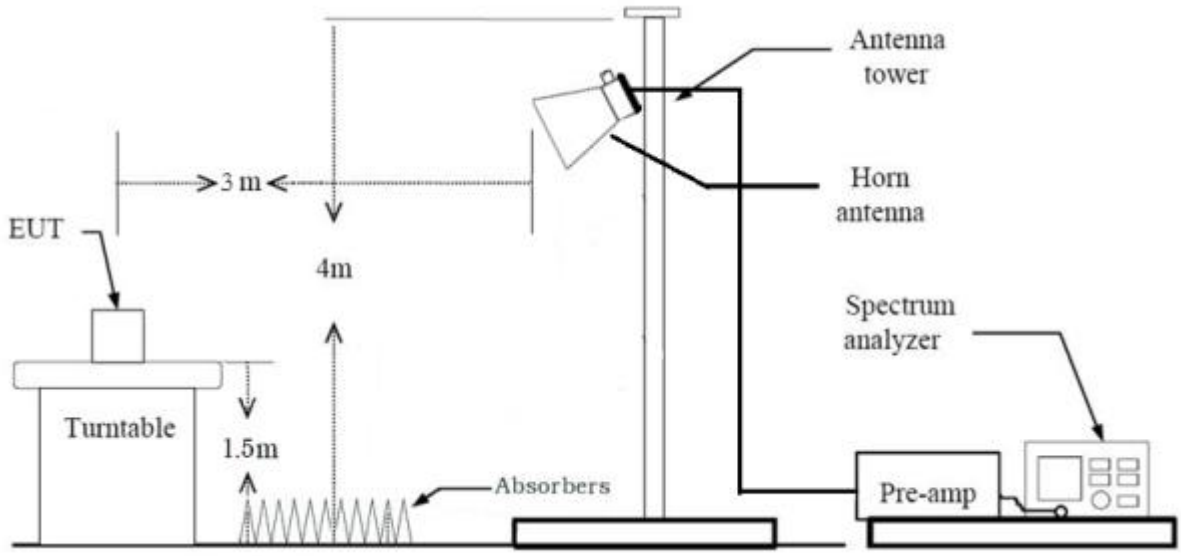
1. Below 30 MHz



2. 30 MHz - 1 GHz



3. Above 1 GHz



11.3 Test Date

December 05, 2021 ~ March 08, 2022

11.4 Test data for 30 MHz ~ 1 GHz

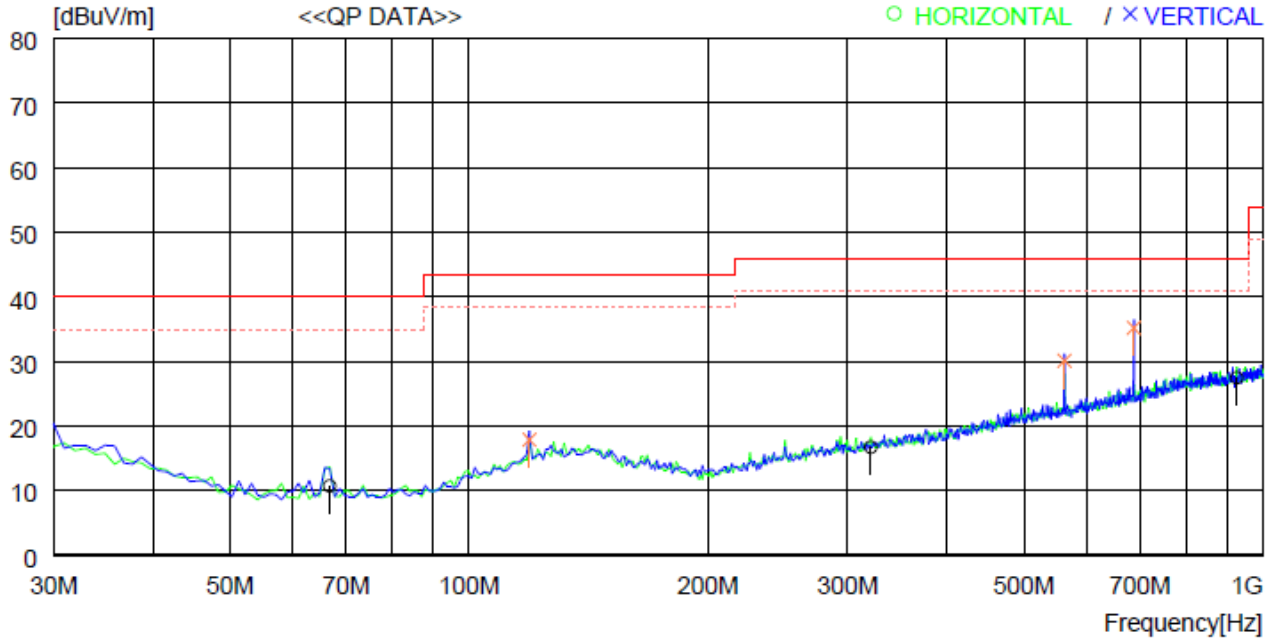
11.4.1 Test data for Bluetooth LE

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247

Result : PASSED

EUT : RF Module

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	66.860	28.5	12.6	1.6	32.0	10.7	40.0	29.3	200	54
2	321.000	26.3	19.5	3.1	32.2	16.7	46.0	29.3	100	259
3	927.238	26.1	27.8	5.4	31.8	27.5	46.0	18.5	200	0
----- Vertical ------										
4	119.240	29.5	18.5	2.0	32.1	17.9	43.5	25.6	100	168
5	562.529	34.6	23.8	4.1	32.4	30.1	46.0	15.9	100	356
6	687.655	37.6	25.4	4.6	32.4	35.2	46.0	10.8	100	145

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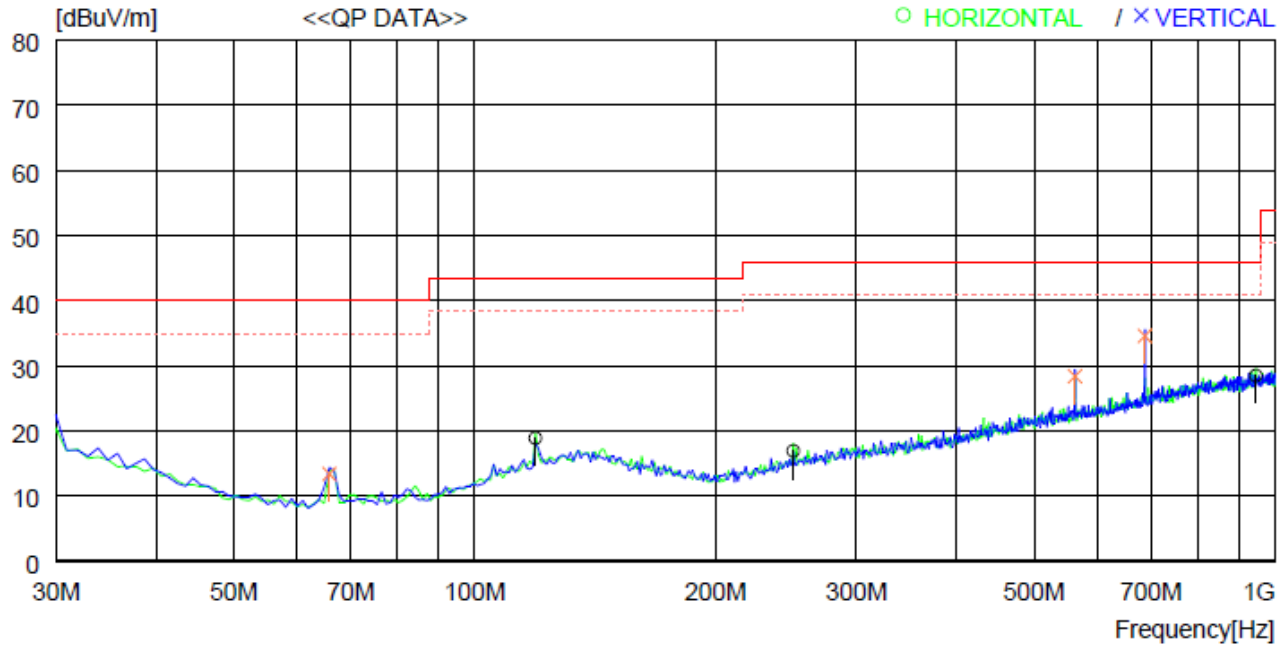
11.4.2 Test data for Intermodulation Mode(Bluetooth LE + WLAN 2.4 GHz)

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247

Result : PASSED

EUT : RF Module

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	119.240	30.5	18.5	2.0	32.1	18.9	43.5	24.6	200	0
2	250.190	28.5	17.8	2.8	32.2	16.9	46.0	29.1	200	0
3	946.638	26.8	28.0	5.4	31.7	28.5	46.0	17.5	200	0
----- Vertical ------										
4	65.890	31.3	12.6	1.5	32.0	13.4	40.0	26.6	100	140
5	562.529	32.9	23.8	4.1	32.4	28.4	46.0	17.6	100	0
6	687.655	37.0	25.4	4.6	32.4	34.6	46.0	11.4	100	0

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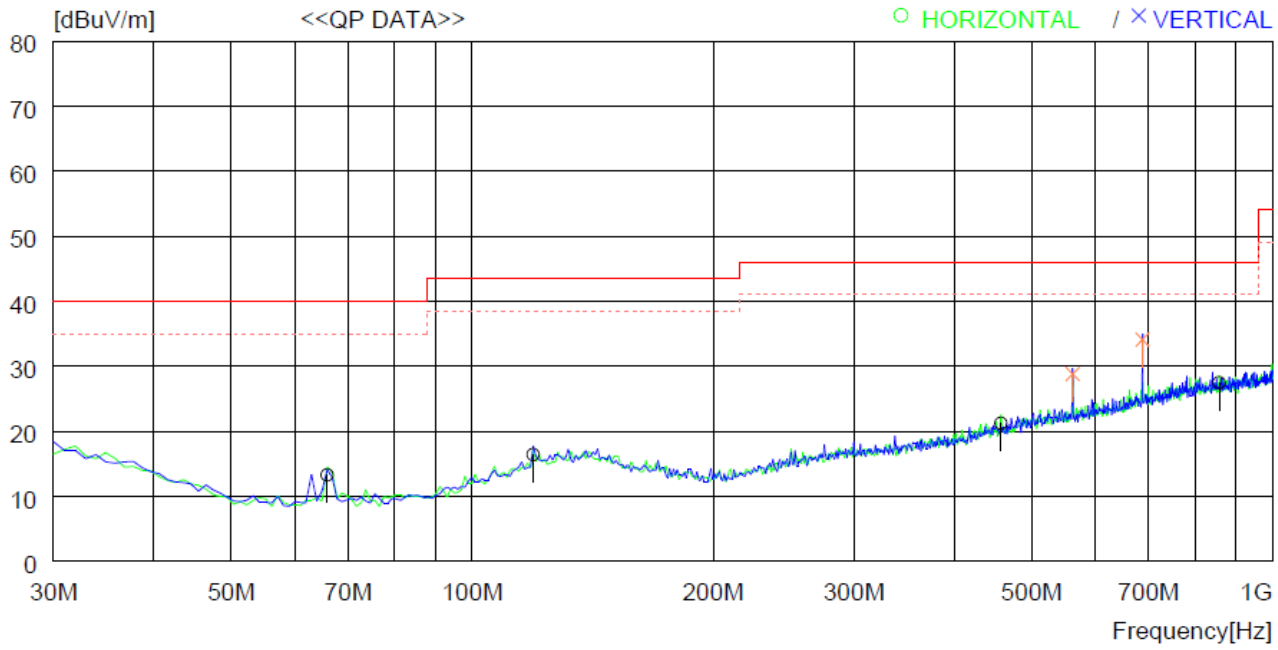
11.4.3 Test data for Intermodulation Mode(Bluetooth LE + WLAN 5 GHz)

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247

Result : PASSED

EUT : RF Module

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	65.890	31.2	12.6	1.5	32.0	13.3	40.0	26.7	200	359
2	119.240	28.0	18.5	2.0	32.1	16.4	43.5	27.1	100	105
3	457.771	27.7	22.1	3.7	32.3	21.2	46.0	24.8	200	359
4	857.400	27.2	27.3	5.1	32.1	27.5	46.0	18.5	100	0
----- Vertical ------										
5	562.529	33.3	23.8	4.1	32.4	28.8	46.0	17.2	100	0
6	687.655	36.5	25.4	4.6	32.4	34.1	46.0	11.9	100	0

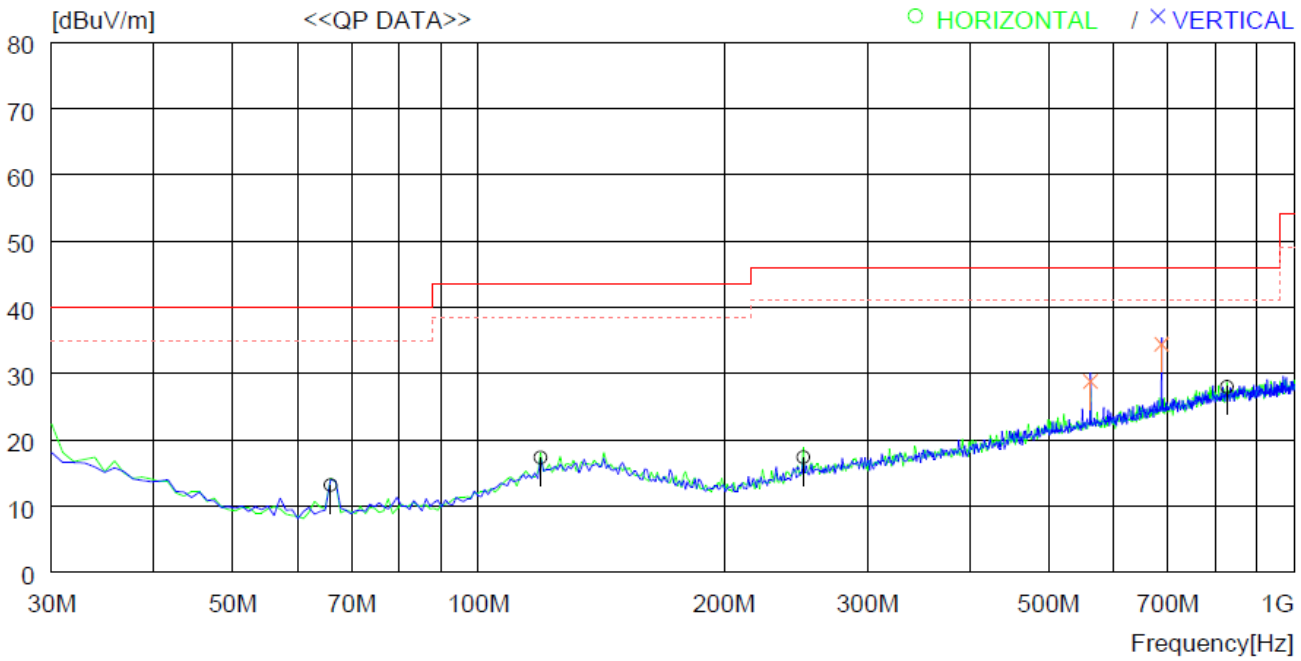
11.4.4 Test data for Intermodulation Mode(Bluetooth LE + WLAN 2 GHz AX Mode)

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247

Result : PASSED

EUT : RF Module

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	65.890	31.1	12.6	1.5	32.0	13.2	40.0	26.8	100	228
2	119.240	28.9	18.5	2.0	32.1	17.3	43.5	26.2	200	59
3	250.190	29.0	17.8	2.8	32.2	17.4	46.0	28.6	200	359
4	827.331	28.0	27.2	5.0	32.2	28.0	46.0	18.0	200	252
----- Vertical ------										
5	562.529	33.3	23.8	4.1	32.4	28.8	46.0	17.2	100	359
6	687.655	36.8	25.4	4.6	32.4	34.4	46.0	11.6	100	138

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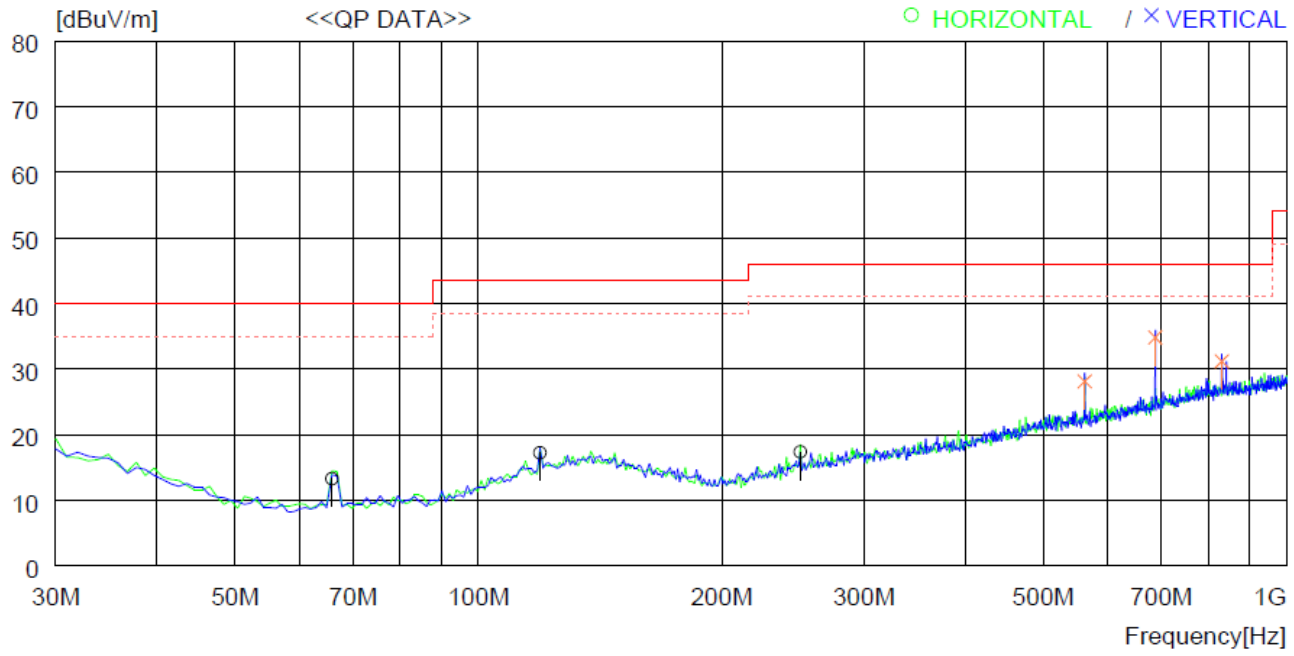
11.4.5 Test data for Intermodulation Mode(Bluetooth LE + WLAN 5 GHz AX Mode)

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247

Result : PASSED

EUT : RF Module

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	65.890	31.2	12.6	1.5	32.0	13.3	40.0	26.7	100	359
2	119.240	28.8	18.5	2.0	32.1	17.2	43.5	26.3	200	0
3	250.190	29.0	17.8	2.8	32.2	17.4	46.0	28.6	200	0
----- Vertical ------										
4	562.529	32.6	23.8	4.1	32.4	28.1	46.0	17.9	100	359
5	687.655	37.2	25.4	4.6	32.4	34.8	46.0	11.2	100	184
6	831.211	31.1	27.2	5.1	32.2	31.2	46.0	14.8	200	256

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11.5 Test data for Below 30 MHz

-. Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)

-. Frequency range : 9 kHz ~ 30 MHz

-. Measurement distance : 3 m

-.Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBµV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBµV/m)	Limits (dBµV/m)	Margin (dB)
Emission from the EUT more than 20 dB below the limit in each frequency range.									

11.6 Test data for above 1 GHz

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
1 MHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-.Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBµV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBµV/m)	Limits (dBµV/m)	Margin (dB)
Emission from the EUT more than 20 dB below the limit in each frequency range.									

12. CONDUCTED EMISSION TEST

12.1 Operating environment

Temperature	:	23 °C
Relative humidity	:	46 % R.H.

12.2 Test set-up

The EUT was placed on a wooden table, 0.8 m height above the floor. 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.

12.3 Test Date

December 05, 2021 ~ March 08, 2022

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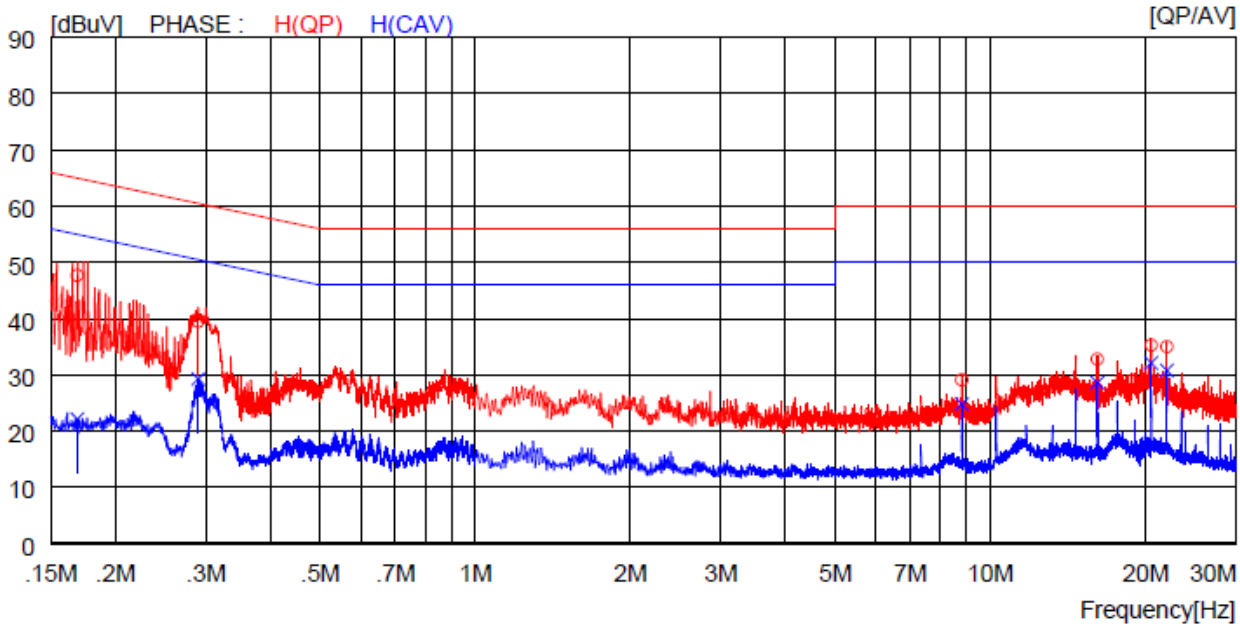
12.4 Test data for Bluetooth LE

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Tested Line : LIVE LINE



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.16900	37.7	----	10.0	47.7	----	65.0	----	17.3	----	H(QP)
2	0.29000	29.5	----	10.0	39.5	----	60.5	----	21.0	----	H(QP)
3	8.81000	18.9	----	10.2	29.1	----	60.0	----	30.9	----	H(QP)
4	16.15000	22.5	----	10.3	32.8	----	60.0	----	27.2	----	H(QP)
5	20.55000	24.9	----	10.4	35.3	----	60.0	----	24.7	----	H(QP)
6	22.02000	24.6	----	10.4	35.0	----	60.0	----	25.0	----	H(QP)
7	0.16900	----	12.1	10.0	----	22.1	----	55.0	----	32.9	H(CAV)
8	0.29000	----	19.3	10.0	----	29.3	----	50.5	----	21.2	H(CAV)
9	8.81000	----	14.6	10.2	----	24.8	----	50.0	----	25.2	H(CAV)
10	16.15000	----	18.3	10.3	----	28.6	----	50.0	----	21.4	H(CAV)
11	20.55000	----	21.7	10.4	----	32.1	----	50.0	----	17.9	H(CAV)
12	22.02000	----	20.4	10.4	----	30.8	----	50.0	----	19.2	H(CAV)

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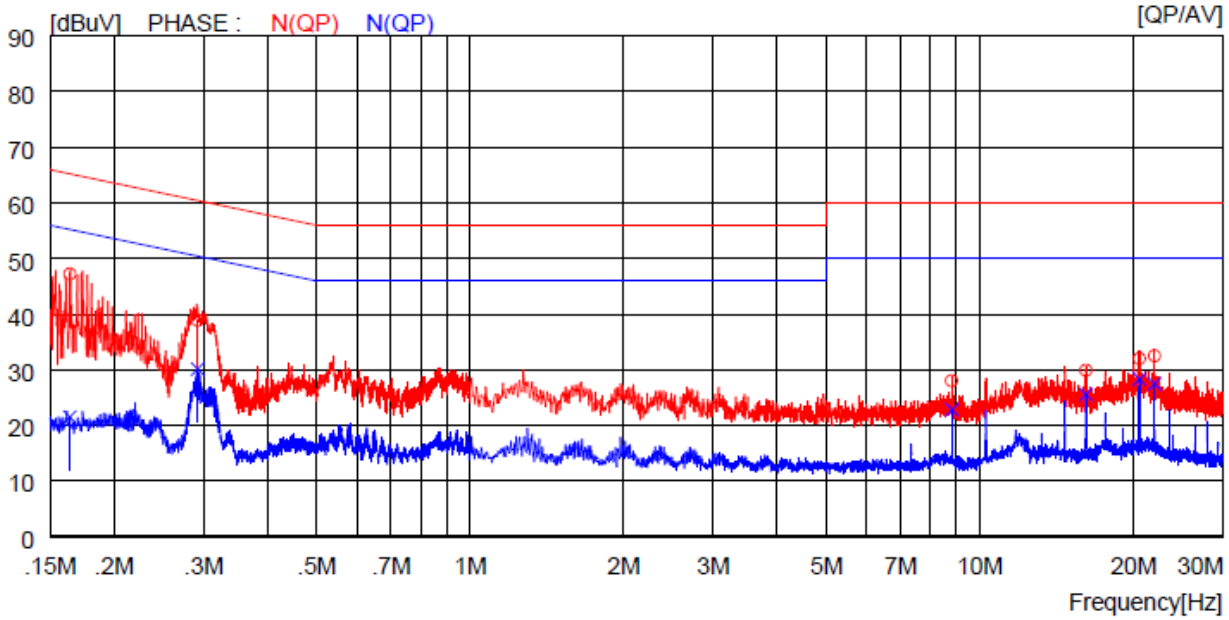
-. Tested Line : NEUTRAL LINE

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.16400	37.2	----	10.0	47.2	----	65.3	----	18.1	----	N(QP)
2	0.29200	28.9	----	10.0	38.9	----	60.5	----	21.6	----	N(QP)
3	8.81500	17.8	----	10.2	28.0	----	60.0	----	32.0	----	N(QP)
4	16.16000	19.6	----	10.3	29.9	----	60.0	----	30.1	----	N(QP)
5	20.57000	21.6	----	10.4	32.0	----	60.0	----	28.0	----	N(QP)
6	22.04000	22.1	----	10.4	32.5	----	60.0	----	27.5	----	N(QP)
7	0.16400	----	11.5	10.0	----	21.5	----	55.3	----	33.8	N(CAV)
8	0.29200	----	20.1	10.0	----	30.1	----	50.5	----	20.4	N(CAV)
9	8.81500	----	12.6	10.2	----	22.8	----	50.0	----	27.2	N(CAV)
10	16.16000	----	15.3	10.3	----	25.6	----	50.0	----	24.4	N(CAV)
11	20.57000	----	17.9	10.4	----	28.3	----	50.0	----	21.7	N(CAV)
12	22.04000	----	17.1	10.4	----	27.5	----	50.0	----	22.5	N(CAV)

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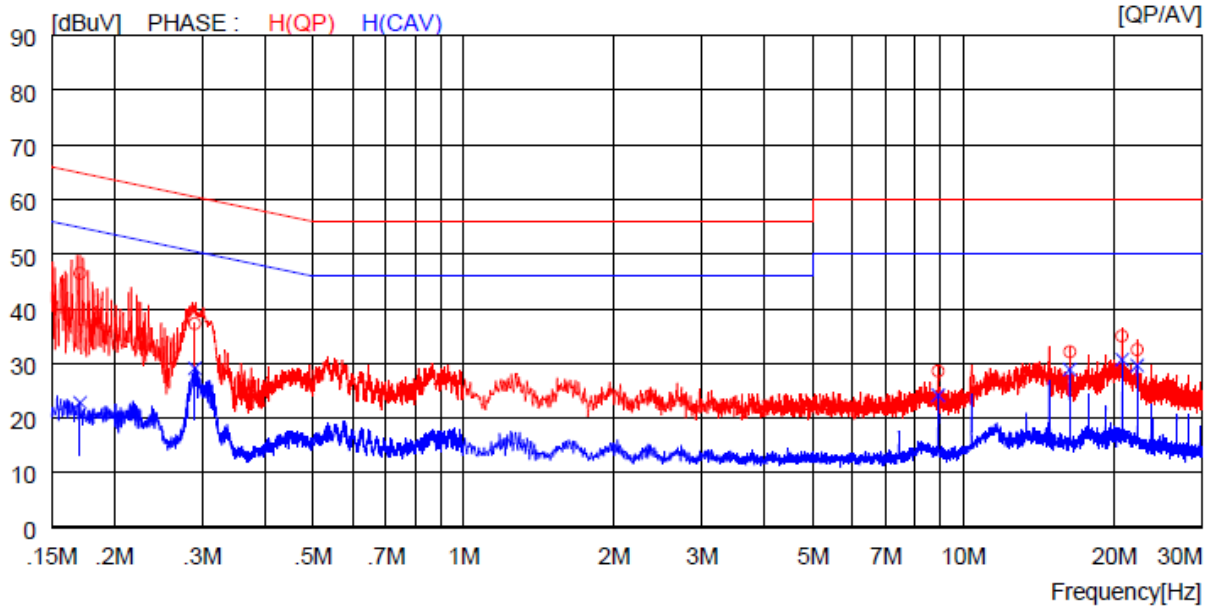
12.5 Test data for Intermodulation Mode(Bluetooth LE + WLAN 2 GHz)

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Tested Line : LIVE LINE



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.17100	36.5	----	10.0	46.5	----	64.9	----	18.4	----	H(QP)
2	0.29000	27.3	----	10.0	37.3	----	60.5	----	23.2	----	H(QP)
3	8.90000	18.4	----	10.2	28.6	----	60.0	----	31.4	----	H(QP)
4	16.32000	21.8	----	10.3	32.1	----	60.0	----	27.9	----	H(QP)
5	20.76000	24.6	----	10.4	35.0	----	60.0	----	25.0	----	H(QP)
6	22.25000	22.1	----	10.4	32.5	----	60.0	----	27.5	----	H(QP)
7	0.17100	----	12.8	10.0	----	22.8	----	54.9	----	32.1	H(CAV)
8	0.29000	----	19.1	10.0	----	29.1	----	50.5	----	21.4	H(CAV)
9	8.90000	----	14.0	10.2	----	24.2	----	50.0	----	25.8	H(CAV)
10	16.32000	----	18.6	10.3	----	28.9	----	50.0	----	21.1	H(CAV)
11	20.76000	----	20.3	10.4	----	30.7	----	50.0	----	19.3	H(CAV)
12	22.25000	----	19.2	10.4	----	29.6	----	50.0	----	20.4	H(CAV)

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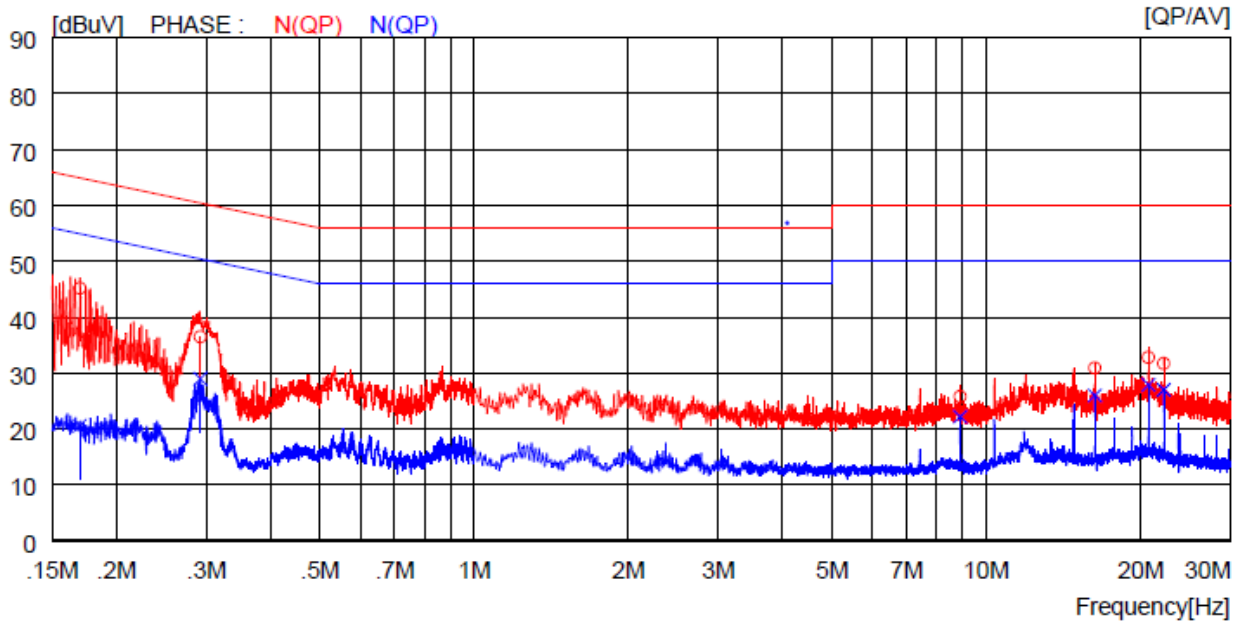
-. Tested Line : NEUTRAL LINE

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.17000	35.2	----	10.0	45.2	----	65.0	----	19.8	----	N(QP)
2	0.29200	26.5	----	10.0	36.5	----	60.5	----	24.0	----	N(QP)
3	8.90000	15.6	----	10.2	25.8	----	60.0	----	34.2	----	N(QP)
4	16.31000	20.6	----	10.3	30.9	----	60.0	----	29.1	----	N(QP)
5	20.75000	22.4	----	10.4	32.8	----	60.0	----	27.2	----	N(QP)
6	22.24000	21.3	----	10.4	31.7	----	60.0	----	28.3	----	N(QP)
7	0.17000	----	10.6	10.0	----	20.6	----	55.0	----	34.4	N(CAV)
8	0.29200	----	19.0	10.0	----	29.0	----	50.5	----	21.5	N(CAV)
9	8.90000	----	12.0	10.2	----	22.2	----	50.0	----	27.8	N(CAV)
10	16.31000	----	15.7	10.3	----	26.0	----	50.0	----	24.0	N(CAV)
11	20.75000	----	17.5	10.4	----	27.9	----	50.0	----	22.1	N(CAV)
12	22.24000	----	16.6	10.4	----	27.0	----	50.0	----	23.0	N(CAV)

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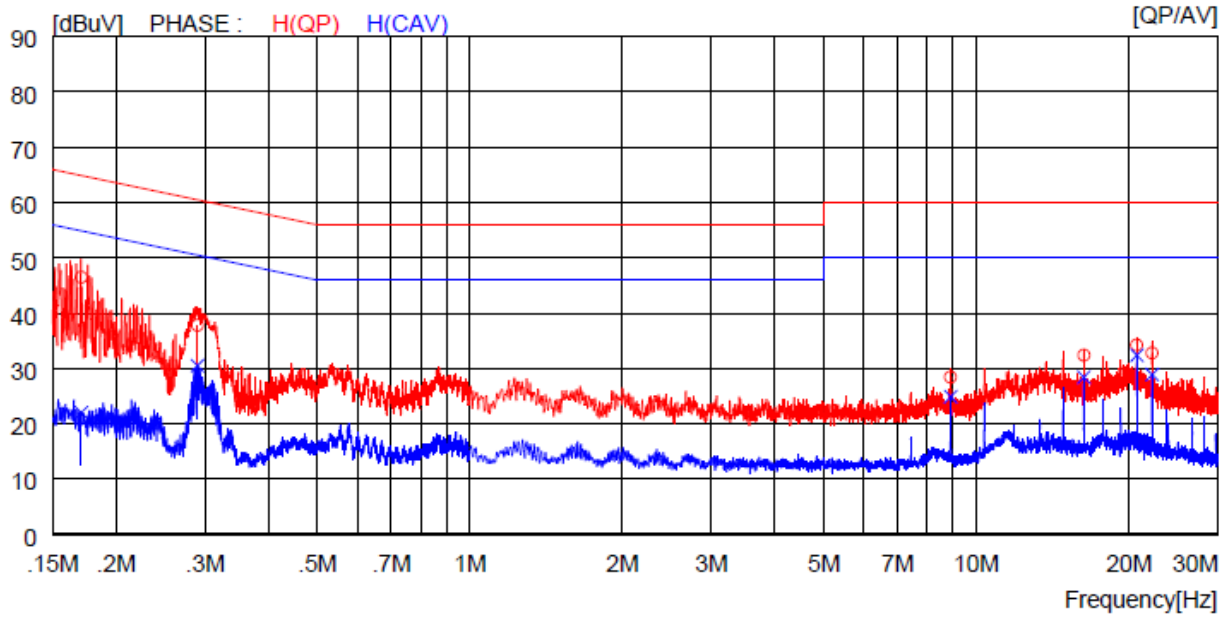
12.6 Test data for Intermodulation Mode(Bluetooth LE + WLAN 5 GHz)

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Tested Line : LIVE LINE



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.17100	36.5	----	10.0	46.5	----	64.9	----	18.4	----	H(QP)
2	0.29000	27.8	----	10.0	37.8	----	60.5	----	22.7	----	H(QP)
3	8.90500	18.2	----	10.2	28.4	----	60.0	----	31.6	----	H(QP)
4	16.32000	22.1	----	10.3	32.4	----	60.0	----	27.6	----	H(QP)
5	20.77000	23.8	----	10.4	34.2	----	60.0	----	25.8	----	H(QP)
6	22.25000	22.4	----	10.4	32.8	----	60.0	----	27.2	----	H(QP)
7	0.17100	----	12.0	10.0	----	22.0	----	54.9	----	32.9	H(CAV)
8	0.29000	----	20.5	10.0	----	30.5	----	50.5	----	20.0	H(CAV)
9	8.90500	----	14.7	10.2	----	24.9	----	50.0	----	25.1	H(CAV)
10	16.32000	----	18.1	10.3	----	28.4	----	50.0	----	21.6	H(CAV)
11	20.77000	----	22.0	10.4	----	32.4	----	50.0	----	17.6	H(CAV)
12	22.25000	----	18.5	10.4	----	28.9	----	50.0	----	21.1	H(CAV)

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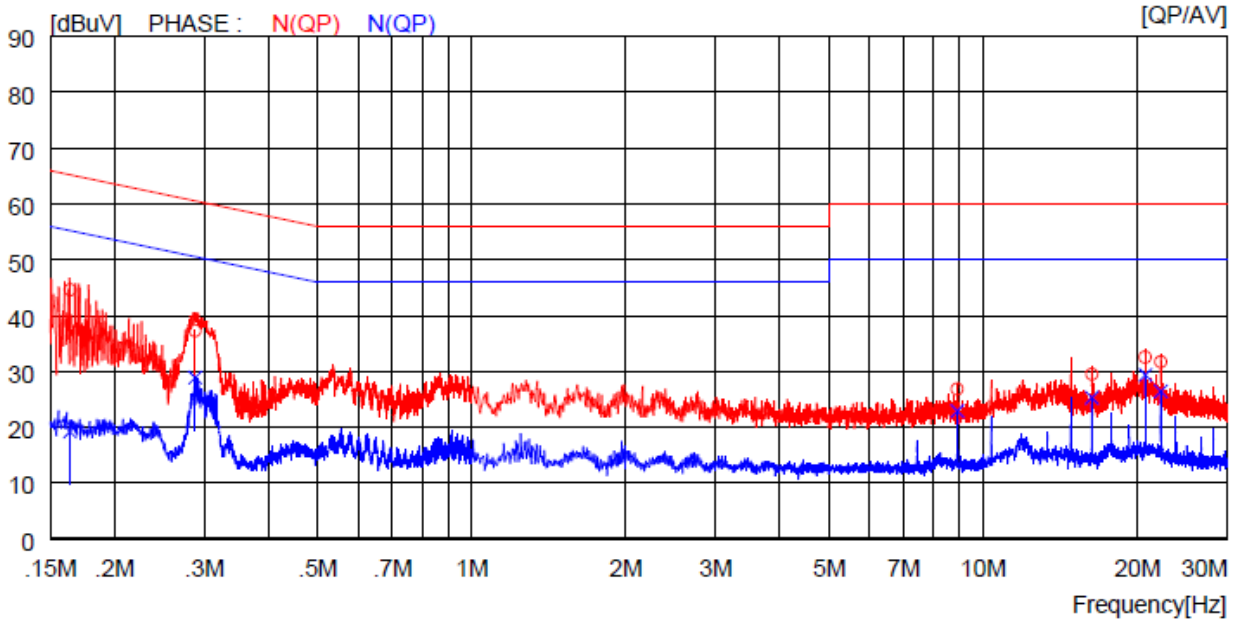
-. Tested Line : NEUTRAL LINE

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.16400	34.6	----	10.0	44.6	----	65.3	----	20.7	----	N(QP)
2	0.28800	27.3	----	10.0	37.3	----	60.6	----	23.3	----	N(QP)
3	8.90500	16.6	----	10.2	26.8	----	60.0	----	33.2	----	N(QP)
4	16.32000	19.2	----	10.3	29.5	----	60.0	----	30.5	----	N(QP)
5	20.77000	22.2	----	10.4	32.6	----	60.0	----	27.4	----	N(QP)
6	22.26000	21.3	----	10.4	31.7	----	60.0	----	28.3	----	N(QP)
7	0.16400	----	9.2	10.0	----	19.2	----	55.3	----	36.1	N(CAV)
8	0.28800	----	18.9	10.0	----	28.9	----	50.6	----	21.7	N(CAV)
9	8.90500	----	12.7	10.2	----	22.9	----	50.0	----	27.1	N(CAV)
10	16.32000	----	15.0	10.3	----	25.3	----	50.0	----	24.7	N(CAV)
11	20.77000	----	19.0	10.4	----	29.4	----	50.0	----	20.6	N(CAV)
12	22.26000	----	16.0	10.4	----	26.4	----	50.0	----	23.6	N(CAV)

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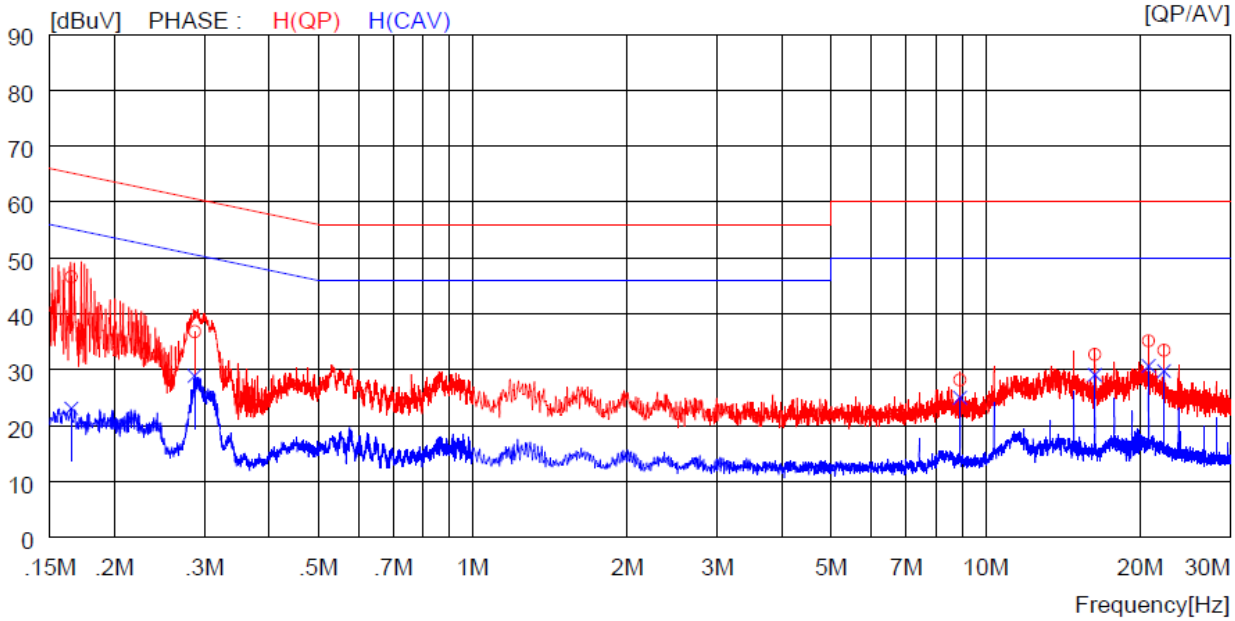
14.7 Test data for Intermodulation Mode(Bluetooth LE+ WLAN 2 GHz AX Mode)

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Tested Line : LIVE LINE



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.16500	36.6	----	10.0	46.6	----	65.2	----	18.6	----	H(QP)
2	0.28700	26.8	----	10.0	36.8	----	60.6	----	23.8	----	H(QP)
3	8.91000	18.0	----	10.2	28.2	----	60.0	----	31.8	----	H(QP)
4	16.33000	22.4	----	10.3	32.7	----	60.0	----	27.3	----	H(QP)
5	20.78000	24.8	----	10.4	35.2	----	60.0	----	24.8	----	H(QP)
6	22.27000	23.1	----	10.4	33.5	----	60.0	----	26.5	----	H(QP)
7	0.16500	----	13.1	10.0	----	23.1	----	55.2	----	32.1	H(CAV)
8	0.28700	----	18.9	10.0	----	28.9	----	50.6	----	21.7	H(CAV)
9	8.91000	----	14.8	10.2	----	25.0	----	50.0	----	25.0	H(CAV)
10	16.33000	----	18.8	10.3	----	29.1	----	50.0	----	20.9	H(CAV)
11	20.78000	----	20.3	10.4	----	30.7	----	50.0	----	19.3	H(CAV)
12	22.27000	----	19.4	10.4	----	29.8	----	50.0	----	20.2	H(CAV)

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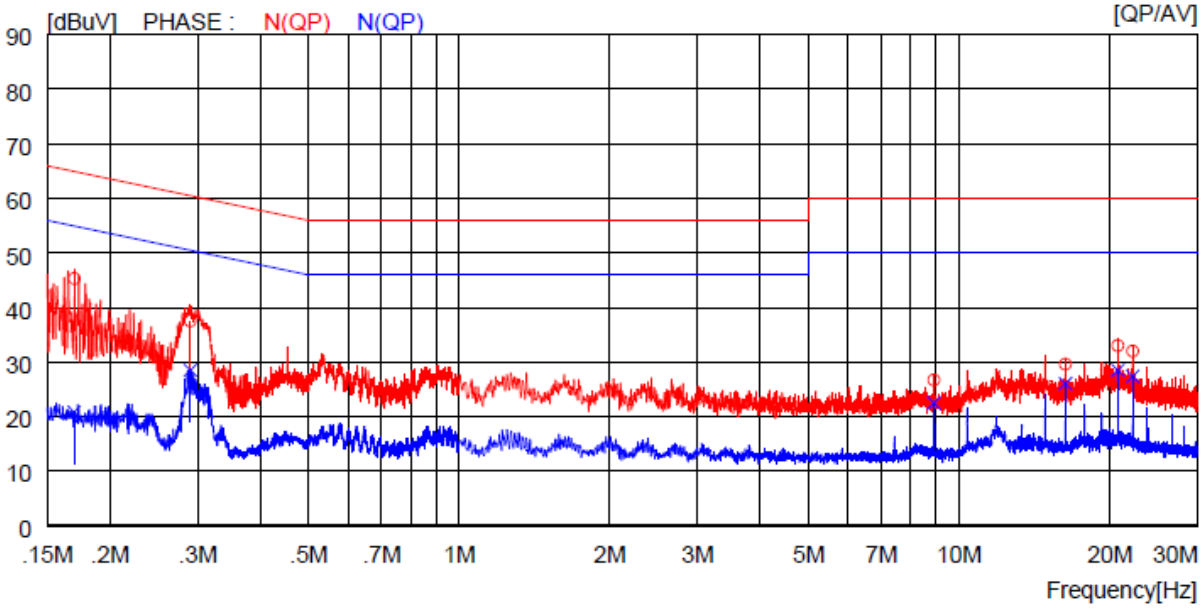
-. Tested Line : NEUTRAL LINE

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.17000	35.3	----	10.0	45.3	----	65.0	----	19.7	----	N(QP)
2	0.29000	27.5	----	10.0	37.5	----	60.5	----	23.0	----	N(QP)
3	8.91000	16.5	----	10.2	26.7	----	60.0	----	33.3	----	N(QP)
4	16.33000	19.3	----	10.3	29.6	----	60.0	----	30.4	----	N(QP)
5	20.78000	22.6	----	10.4	33.0	----	60.0	----	27.0	----	N(QP)
6	22.26000	21.6	----	10.4	32.0	----	60.0	----	28.0	----	N(QP)
7	0.17000	----	10.8	10.0	----	20.8	----	55.0	----	34.2	N(CAV)
8	0.29000	----	18.5	10.0	----	28.5	----	50.5	----	22.0	N(CAV)
9	8.91000	----	12.3	10.2	----	22.5	----	50.0	----	27.5	N(CAV)
10	16.33000	----	15.8	10.3	----	26.1	----	50.0	----	23.9	N(CAV)
11	20.78000	----	18.1	10.4	----	28.5	----	50.0	----	21.5	N(CAV)
12	22.26000	----	17.0	10.4	----	27.4	----	50.0	----	22.6	N(CAV)

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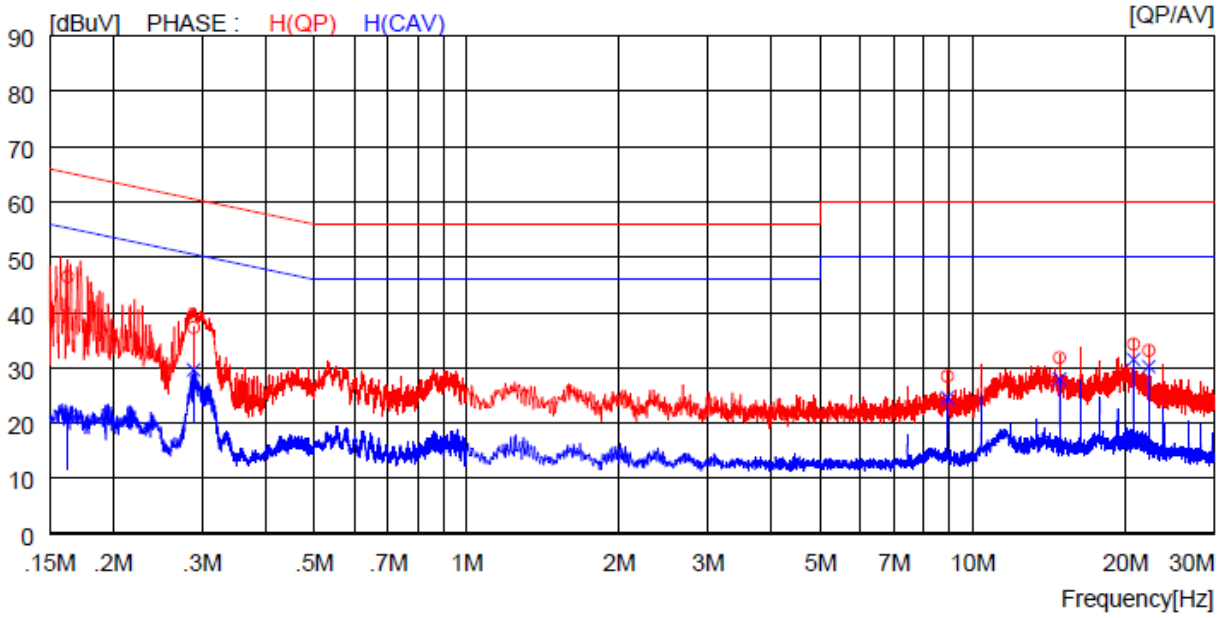
12.8 Test data for Intermodulation Mode(Bluetooth LE + WLAN 5 GHz AX Mode)

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Tested Line : LIVE LINE



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.16300	36.5	----	10.0	46.5	----	65.3	----	18.8	----	H(QP)
2	0.28900	27.3	----	10.0	37.3	----	60.6	----	23.3	----	H(QP)
3	8.91000	18.3	----	10.2	28.5	----	60.0	----	31.5	----	H(QP)
4	14.85000	21.5	----	10.3	31.8	----	60.0	----	28.2	----	H(QP)
5	20.78000	23.9	----	10.4	34.3	----	60.0	----	25.7	----	H(QP)
6	22.27000	22.7	----	10.4	33.1	----	60.0	----	26.9	----	H(QP)
7	0.16300	----	11.1	10.0	----	21.1	----	55.3	----	34.2	H(CAV)
8	0.28900	----	19.6	10.0	----	29.6	----	50.6	----	21.0	H(CAV)
9	8.91000	----	14.4	10.2	----	24.6	----	50.0	----	25.4	H(CAV)
10	14.85000	----	17.6	10.3	----	27.9	----	50.0	----	22.1	H(CAV)
11	20.78000	----	21.1	10.4	----	31.5	----	50.0	----	18.5	H(CAV)
12	22.27000	----	19.8	10.4	----	30.2	----	50.0	----	19.8	H(CAV)

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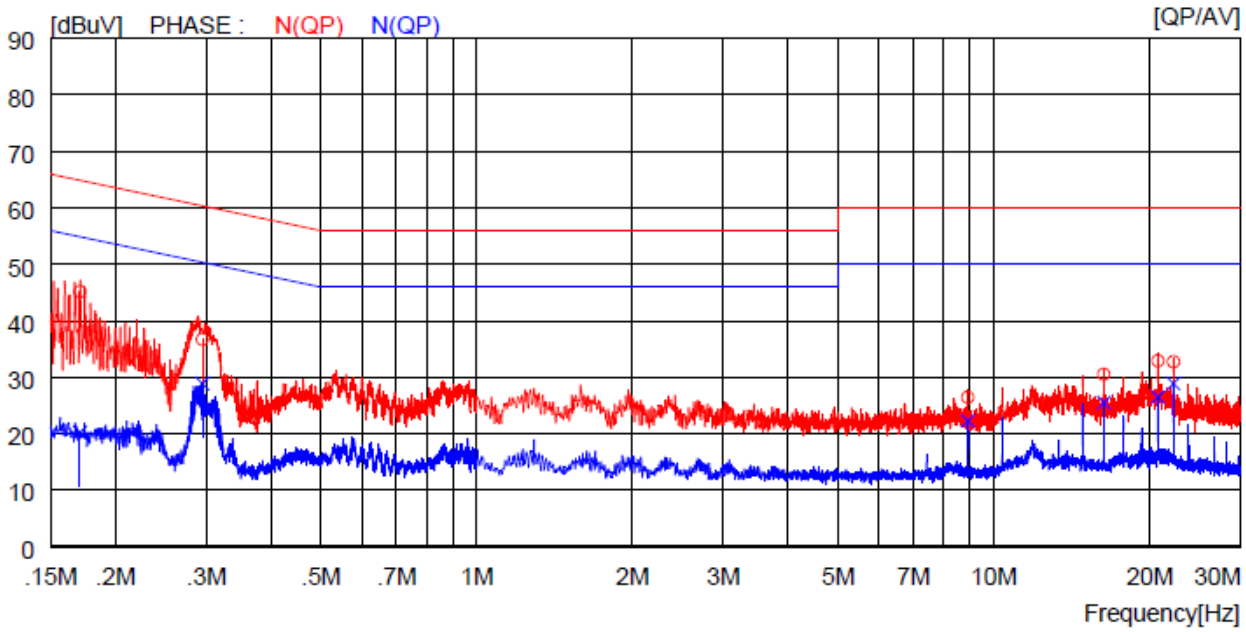
-. Tested Line : NEUTRAL LINE

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.17100	35.2	----	10.0	45.2	----	64.9	----	19.7	----	N(QP)
2	0.29500	26.7	----	10.0	36.7	----	60.4	----	23.7	----	N(QP)
3	8.91000	16.2	----	10.2	26.4	----	60.0	----	33.6	----	N(QP)
4	16.34000	20.2	----	10.3	30.5	----	60.0	----	29.5	----	N(QP)
5	20.79000	22.5	----	10.4	32.9	----	60.0	----	27.1	----	N(QP)
6	22.27000	22.3	----	10.4	32.7	----	60.0	----	27.3	----	N(QP)
7	0.17100	----	10.2	10.0	----	20.2	----	54.9	----	34.7	N(CAV)
8	0.29500	----	18.9	10.0	----	28.9	----	50.4	----	21.5	N(CAV)
9	8.91000	----	12.1	10.2	----	22.3	----	50.0	----	27.7	N(CAV)
10	16.34000	----	15.2	10.3	----	25.5	----	50.0	----	24.5	N(CAV)
11	20.79000	----	16.1	10.4	----	26.5	----	50.0	----	23.5	N(CAV)
12	22.27000	----	18.5	10.4	----	28.9	----	50.0	----	21.1	N(CAV)

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13. LIST OF TEST EQUIPMENT

Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
FSV40-N	Rohde & Schwarz	Signal Analyzer	102177	Apr. 16, 2021 (1Y)
ESW 44	Rohde & Schwarz	EMI Test Receiver	101851	Mar. 08, 2022 (1Y)
ZUP36-6	NEMIC-LAMBDA	DC Power Supply	YJV-535Z14-0018	Apr. 16, 2021(1Y)
310N	Sonoma Instrument	Pre-Amplifier	392756	Oct. 14, 2021 (1Y)
SCU18	Rohde & Schwarz	Pre-Amplifer	102266	Jul. 14, 2021 (1Y)
PAM-840A	Com-Power	Pre-Amplifier	461339	Oct. 12, 2021 (1Y)
DT3000-3t	Innco System	Turn Table	DT3000/093	N/A
MA-4000XPET	Innco System	Antenna Master	MA4000/509	N/A
FMZB 1513	Schwarzbeck	Loop Antenna	1513-235	Mar. 24, 2022 (2Y)
HLP-2008	TDK	Hybrid Antenna	131316	Mar. 07, 2022 (2Y)
BBHA9120D	Schwarzbeck	Horn Antenna	9120D-1366	Jul. 20, 2021 (1Y)
BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Jan. 06, 2022(1Y)
HPF 3GHz	Rohde & Schwarz	High Pass Filter	N/A	Jan. 19, 2022(1Y)
ESCI	Rohde & Schwarz	EMI TEST RECEIVER	101012	Oct. 20, 2021 (1Y)
NSLK8126	Schwarzbeck	AMN	8126-404	Mar. 14, 2021 (1Y)
ESH3-Z2	Rohde & Schwarz	PULSE LIMITER	100655	Mar. 14, 2021 (1Y)

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