RADIO PERFORMANCE TEST REPORT

Test Report No.	**: OT-223-RWD-041**
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**
Multiple Model Name	**: N/A**
Serial number	**: N/A**
Total page of Report	**: 71 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

Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-223-RWD-041	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	DSS – PART 15 SPREAD SPECTRUM TRANSMITTER
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) (1)	Carrier Frequency Separation	Met the Limit / PASS
15.247 (a) (1) (iii)	Minimum Number of Hopping Channels	Met the Limit / PASS
15.247 (a) (1) (iii)	Average Time of Occupancy	Met the Limit / PASS
15.247 (b) (1)	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
15.209	Radiated Emission Limits, General Requirement	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

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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, 2 441 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)

Channel	Frequency[MHz]	Channel	Frequency[MHz]	Channel	Frequency[MHz]
0	2 402.00	27	2 429.00	54	2 456.00
1	2 403.00	28	2 430.00	55	2 457.00
2	2 404.00	29	2 431.00	56	2 458.00
3	2 405.00	30	2 432.00	57	2 459.00
4	2 406.00	31	2 433.00	58	2 460.00
5	2 407.00	32	2 434.00	59	2 461.00
6	2 408.00	33	2 435.00	60	2 462.00
7	2 409.00	34	2 436.00	61	2 463.00
8	2 410.00	35	2 437.00	62	2 464.00
9	2 411.00	36	2 438.00	63	2 465.00
10	2 412.00	37	2 439.00	64	2 466.00
11	2 413.00	38	2 440.00	65	2 467.00
12	2 414.00	39	2 441.00	66	2 468.00
13	2 415.00	40	2 442.00	67	2 469.00
14	2 416.00	41	2 443.00	68	2 470.00
15	2 417.00	42	2 444.00	69	2 471.00
16	2 418.00	43	2 445.00	70	2 472.00
17	2 419.00	44	2 446.00	71	2 473.00
18	2 420.00	45	2 447.00	72	2 474.00
19	2 421.00	46	2 448.00	73	2 475.00
20	2 422.00	47	2 449.00	74	2 476.00
21	2 423.00	48	2 450.00	75	2 477.00
22	2 424.00	49	2 451.00	76	2 478.00
23	2 425.00	50	2 452.00	77	2 479.00
24	2 426.00	51	2 453.00	78	2 480.00
25	2 427.00	52	2 454.00		
26	2 428.00	53	2 455.00		

-. Duty Cycle

Mode	Tx On Time [ms]	Tx Off Time [ms]	Duty Cycle [%]	Correction Factor [dB]
Bluetooth [1 Mbps]	3.76	2.88	56.63	2.47
Bluetooth [2 Mbps]	3.76	2.88	56.63	2.47
Bluetooth [3 Mbps]	3.76	2.88	56.63	2.47

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.

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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 20 dB BANDWIDTH

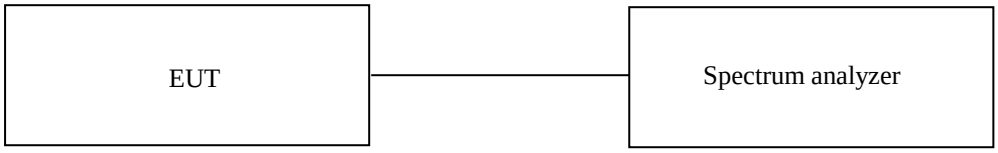
7.1 Operating environment

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 1 % to 5 % of the OBW, and peak detection was used. The 20 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 20 dB.



7.3 Test Date

December 05, 2021 ~ March 08, 2022

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7.4 Test data for 1 Mbps

CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402.00	954.00
Middle	2 441.00	944.10
High	2 480.00	959.00

7.5 Test data for 2 Mbps

CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402.00	1 381.70
Middle	2 441.00	1 318.70
High	2 480.00	1 318.70

7.6 Test data for 3 Mbps

CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402.00	1 278.70
Middle	2 441.00	1 278.70
High	2 480.00	1 278.70

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8. HOPPING FREQUENCY SEPARATION

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 frequency span is set to 10 MHz. The analyzer is set to peak hold then a pseudo-random hopping sequence of the transmitter is captured. The mark delta function was used to measure the frequency separation between two adjacent hopping channels.

8.3 Test Date

December 05, 2021 ~ March 08, 2022

8.4 Test data for 1 Mbps

-. Test Result : Pass

MEASURED VALUE (kHz)	Two-third of 20 dB Bandwidth (kHz)	LIMIT
999.00	629.40	Separated by a minimum of 629.40 kHz

8.5 Test data for 2 Mbps

-. Test Result : Pass

MEASURED VALUE (kHz)	Two-third of 20 dB Bandwidth (kHz)	LIMIT
999.00	879.13	Separated by a minimum of 879.13 kHz

8.6 Test data for 3 Mbps

-. Test Result : Pass

MEASURED VALUE (kHz)	Two-third of 20 dB Bandwidth (kHz)	LIMIT
999.00	852.47	Separated by a minimum of 852.47 kHz

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9. NUMBER OF HOPPING CHANNELS

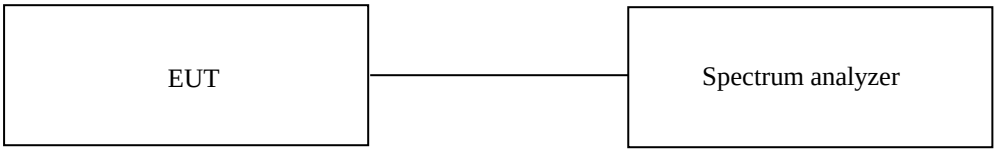
9.1 Operating environment

Temperature : 23 °C

Relative humidity : 46 % R.H.

9.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The frequency span is set to 100 kHz and the resolution bandwidth is set to 300 kHz. The analyzer is set to peak hold and then complete pseudo-random hopping sequence of the transmitter is captured.



9.3 Test Date

December 05, 2021 ~ March 08, 2022

9.4 Test data for 1 Mbps

-. Test Result : Pass

Data Transfer Rate	Measured value (Number)	Limit (Number)	Margin (Number)
1 Mbps	79	Minimum of 15	64

9.5 Test data for 2 Mbps

-. Test Result : Pass

Data Transfer Rate	Measured value (Number)	Limit (Number)	Margin (Number)
2 Mbps	79	Minimum of 15	64

9.6 Test data for 3 Mbps

-. Test Result : Pass

Data Transfer Rate	Measured value (Number)	Limit (Number)	Margin (Number)
3 Mbps	79	Minimum of 15	64

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10. TIME OF OCCUPANCY

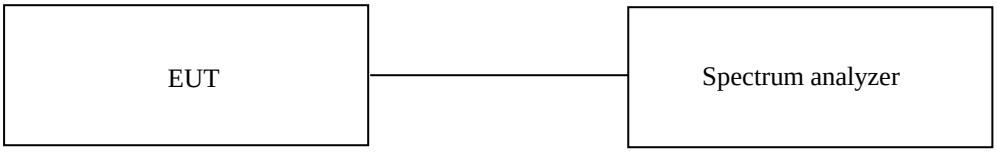
10.1 Operating environment

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 transmitter is set to operate in its normal frequency hopping mode. The center frequency of the spectrum analyzer is set to one of hopping channels near the center of the operating band and span is set to zero Hz. The sweep time is set to display one complete pulse. The mark delta function is used to measure the duration of the pulses.



10.3 Test Date

December 05, 2021 ~ March 08, 2022

10.4 Test data for 1 Mbps

The system makes worst case 1 600 hops per second or 1 time slot has a length of 625 µs with 79 channels.

For DH1 packet type, the EUT needs 1 time slot for transmitting and 1 time slot for receiving and for DH3 packet type, the EUT needs 3 times slots for transmitting and 1 time slot for receiving, and DH5 packet needs 5 times slots for transmitting and 1 time slot for receiving. So The EUT has each channel for 10.13 times per second (= 1 600/2/79) for DH1, and 5.06 times (= 1 600/4/79) for DH3, and 3.38 times (= 1 600/6/79) for DH5.

Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.38	10.13	31.60	121.64	400.00	PASS
DH3	1.65	5.06	31.60	263.83	400.00	
DH5	2.91	3.38	31.60	310.81	400.00	

Total dwell time is calculated as following.

Total Dwell Time = Pulse time * Hops per second with channels * period time

Remark: See next page for an overview sweep performed with peak detector.

10.5 Test data for 2 Mbps

The system makes worst case 1 600 hops per second or 1 time slot has a length of 625 µs with 79 channels.

For DH1 packet type, the EUT needs 1 time slot for transmitting and 1 time slot for receiving and for DH3 packet type, the EUT needs 3 times slots for transmitting and 1 time slot for receiving, and DH5 packet needs 5 times slots for transmitting and 1 time slot for receiving. So The EUT has each channel for 10.13 times per second (= 1 600/2/79) for DH1, and 5.06 times (= 1 600/4/79) for DH3, and 3.38 times (= 1 600/6/79) for DH5.

Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.38	10.13	31.60	121.64	400.00	PASS
DH3	1.64	5.06	31.60	262.23	400.00	
DH5	2.90	3.38	31.60	309.74	400.00	

Total dwell time is calculated as following.

Total Dwell Time = Pulse time * Hops per second with channels * period time

Remark: See next page for an overview sweep performed with peak detector.

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10.6 Test data for 3 Mbps

The system makes worst case 1 600 hops per second or 1 time slot has a length of 625 µs with 79 channels.

For DH1 packet type, the EUT needs 1 time slot for transmitting and 1 time slot for receiving and for DH3 packet type, the EUT needs 3 times slots for transmitting and 1 time slot for receiving, and DH5 packet needs 5 times slots for transmitting and 1 time slot for receiving. So The EUT has each channel for 10.13 times per second (= 1 600/2/79) for DH1, and 5.06 times (= 1 600/4/79) for DH3, and 3.38 times (= 1 600/6/79) for DH5.

Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.38	10.13	31.60	121.64	400.00	PASS
DH3	1.65	5.06	31.60	263.83	400.00	
DH5	2.89	3.38	31.60	308.68	400.00	

Total dwell time is calculated as following.

Total Dwell Time = Pulse time * Hops per second with channels * period time

Remark: See next page for an overview sweep performed with peak detector.

11. MAXIMUM PEAK OUTPUT POWER

11.1 Operating environment

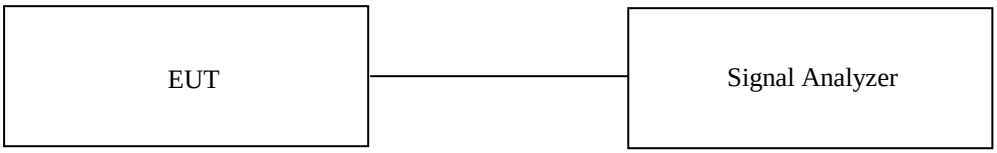
Temperature : 23 °C

Relative humidity : 46 % R.H.

11.2 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.



11.3 Test Date

December 05, 2021 ~ March 08, 2022

11.4 Test data for 1 Mbps

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	0.10	21.00	20.90
MIDDLE	2 441.00	-0.06	21.00	21.06
HIGH	2 480.00	0.67	21.00	20.33

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

11.5 Test data for 2 Mbps

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	-0.78	21.00	21.78
MIDDLE	2 441.00	-0.89	21.00	21.89
HIGH	2 480.00	-0.27	21.00	21.27

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

11.6 Test data for 3 Mbps

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	-0.51	21.00	21.51
MIDDLE	2 441.00	-0.63	21.00	21.63
HIGH	2 480.00	0.09	21.00	20.91

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

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12. 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

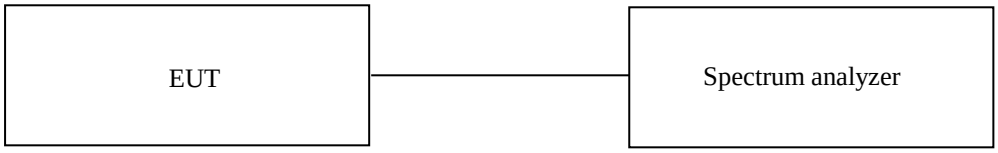
12.1 Operating environment

Temperature : 23 °C

Relative humidity : 46 % R.H.

12.2 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 and video bandwidth is set to 300 kHz, and peak detection was used.



12.3 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.

12.4 Test Date

December 05, 2021 ~ March 08, 2022

12.5 Test data for conducted emission

Please refer to the Annex

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12.6 Test data for Transmitting mode radiated emission

12.6.1 Radiated Emission which fall in the Restricted Band

12.6.1.1 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 : 76.60 %

-. 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											
2 334.402	54.63	Peak	H	28.30	6.03	45.14	6.05	-	49.87	74.00	24.13
2 330.817	42.68	Average	H	28.30	6.03	45.14	6.05	2.47	39.08	54.00	13.61
2 372.452	53.16	Peak	V	28.30	6.03	45.14	6.05	-	48.40	74.00	25.60
2 330.817	41.59	Average	V	28.30	6.03	45.14	6.05	2.47	37.99	54.00	14.70
Test Data for High Channel											
2 497.592	54.24	Peak	H	28.70	6.12	45.79	6.08	-	49.35	74.00	24.65
2 484.125	43.29	Average	H	28.70	6.12	45.79	6.08	2.47	39.56	54.00	13.13
2 492.957	54.05	Peak	V	28.70	6.12	45.79	6.08	-	49.16	74.00	24.84
2 483.686	43.28	Average	V	28.70	6.12	45.79	6.08	2.4	39.55	54.00	13.14

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 Factor

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12.6.1.2 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 : 76.60 %

-. 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											
2 335.228	54.79	Peak	H	28.30	6.03	45.14	6.05	-	50.03	74.00	23.97
2 324.751	44.55	Average	H	28.30	6.03	45.14	6.05	2.47	40.95	54.00	11.74
2 337.802	54.15	Peak	V	28.30	6.03	45.14	6.05	-	49.39	74.00	24.61
2 334.677	44.48	Average	V	28.30	6.03	45.14	6.05	2.47	40.88	54.00	11.81
Test Data for High Channel											
2 489.200	53.87	Peak	H	28.70	6.12	45.79	6.08	-	48.98	74.00	25.02
2 483.666	43.08	Average	H	28.70	6.12	45.79	6.08	2.47	39.35	54.00	1334
2 492.018	54.56	Peak	V	28.70	6.12	45.79	6.08	-	49.67	74.00	24.33
2 487.302	43.10	Average	V	28.70	6.12	45.79	6.08	2.47	39.37	54.00	13.32

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 Factor

12.6.1.3 Test data for 3 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 : 76.60 %

-. 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											
2 334.309	54.54	Peak	H	28.30	6.03	45.14	6.05	-	49.78	74.00	24.22
2 334.401	45.32	Average	H	28.30	6.03	45.14	6.05	2.47	41.72	54.00	10.97
2 335.412	54.98	Peak	V	28.30	6.03	45.14	6.05	-	50.22	74.00	23.78
2 334.125	45.13	Average	V	28.30	6.03	45.14	6.05	2.47	41.53	54.00	11.16
Test Data for High Channel											
2 483.606	56.34	Peak	H	28.70	6.12	45.79	6.08	-	51.45	74.00	22.55
2 483.506	43.43	Average	H	28.70	6.12	45.79	6.08	2.47	39.70	54.00	12.99
2 483.706	55.68	Peak	V	28.70	6.12	45.79	6.08	-	50.79	74.00	23.21
2 483.566	43.83	Average	V	28.70	6.12	45.79	6.08	2.47	40.10	54.00	12.59

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 Factor

12.6.2 Spurious & Harmonic Radiated Emission above 1 GHz

12.6.2.1 Test data for 1 Mbps

-. Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band
100 kHz 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 : 76.60 %

-. 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	51.44	Peak	H	33.40	7.91	45.10	-	47.65	74.00	26.35
4 804.000	38.97	Average	H	33.40	7.91	45.10	2.47	36.34	54.00	1635
4 804.000	51.38	Peak	V	33.40	7.91	45.10	-	47.59	74.00	26.41
4 804.000	38.61	Average	V	33.40	7.91	45.10	2.47	35.98	54.00	16.71
Test Data for Middle Channel										
4 882.000	51.36	Peak	H	33.50	8.08	45.08	-	47.86	74.00	26.14
4 882.000	38.95	Average	H	33.50	8.08	45.08	2.47	36.61	54.00	16.08
4 882.000	51.22	Peak	V	33.50	8.08	45.08	-	47.72	74.00	26.28
4 882.000	38.71	Average	V	33.50	8.08	45.08	2.47	36.37	54.00	16.32
Test Data for High Channel										
4 960.000	51.48	Peak	H	33.30	8.14	45.03	-	47.89	74.00	26.11
4 960.000	38.68	Average	H	33.30	8.14	45.03	2.47	36.25	54.00	16.44
4 960.000	51.29	Peak	V	33.30	8.14	45.03	-	47.70	74.00	26.30
4 960.000	38.71	Average	V	33.30	8.14	45.03	2.47	36.28	54.00	16.41

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

12.6.2.2 Test data for 2 Mbps

-. Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band
100 kHz 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 : 76.60 %

-. 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	51.33	Peak	H	33.40	7.91	45.10	-	47.54	74.00	26.46
4 804.000	38.26	Average	H	33.40	7.91	45.10	2.47	35.63	54.00	17.06
4 804.000	51.22	Peak	V	33.40	7.91	45.10	-	47.43	74.00	26.57
4 804.000	38.62	Average	V	33.40	7.91	45.10	2.47	35.99	54.00	16.70
Test Data for Middle Channel										
4 882.000	51.62	Peak	H	33.50	8.08	45.08	-	48.12	74.00	25.88
4 882.000	38.56	Average	H	33.50	8.08	45.08	2.47	36.22	54.00	16.47
4 882.000	51.22	Peak	V	33.50	8.08	45.08	-	47.72	74.00	26.28
4 882.000	38.74	Average	V	33.50	8.08	45.08	2.47	36.40	54.00	16.29
Test Data for High Channel										
4 960.000	51.59	Peak	H	33.30	8.14	45.03	-	48.00	74.00	26.00
4 960.000	38.61	Average	H	33.30	8.14	45.03	2.47	36.18	54.00	16.51
4 960.000	51.66	Peak	V	33.30	8.14	45.03	-	48.07	74.00	25.93
4 960.000	38.67	Average	V	33.30	8.14	45.03	2.47	36.24	54.00	16.45

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

12.6.2.3 Test data for 3 Mbps

-. Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band
100 kHz 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 : 76.60 %

-. 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	51.62	Peak	H	33.40	7.91	45.10	-	47.83	74.00	26.17
4 804.000	38.65	Average	H	33.40	7.91	45.10	2.47	36.02	54.00	16.67
4 804.000	51.82	Peak	V	33.40	7.91	45.10	-	48.03	74.00	25.97
4 804.000	38.69	Average	V	33.40	7.91	45.10	2.47	36.06	54.00	16.63
Test Data for Middle Channel										
4 882.000	51.38	Peak	H	33.50	8.08	45.08	-	47.88	74.00	26.12
4 882.000	38.71	Average	H	33.50	8.08	45.08	2.47	36.37	54.00	16.32
4 882.000	51.75	Peak	V	33.50	8.08	45.08	-	48.25	74.00	25.75
4 882.000	38.65	Average	V	33.50	8.08	45.08	2.47	36.31	54.00	16.38
Test Data for High Channel										
4 960.000	51.44	Peak	H	33.30	8.14	45.03	-	47.85	74.00	26.15
4 960.000	38.68	Average	H	33.30	8.14	45.03	2.47	36.25	54.00	16.44
4 960.000	51.29	Peak	V	33.30	8.14	45.03	-	47.70	74.00	26.30
4 960.000	38.71	Average	V	33.30	8.14	45.03	2.47	36.28	54.00	16.41

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

13. RADIATED EMISSION TEST

13.1 Operating environment

Temperature : 22 °C

Relative humidity : 46 % R.H.

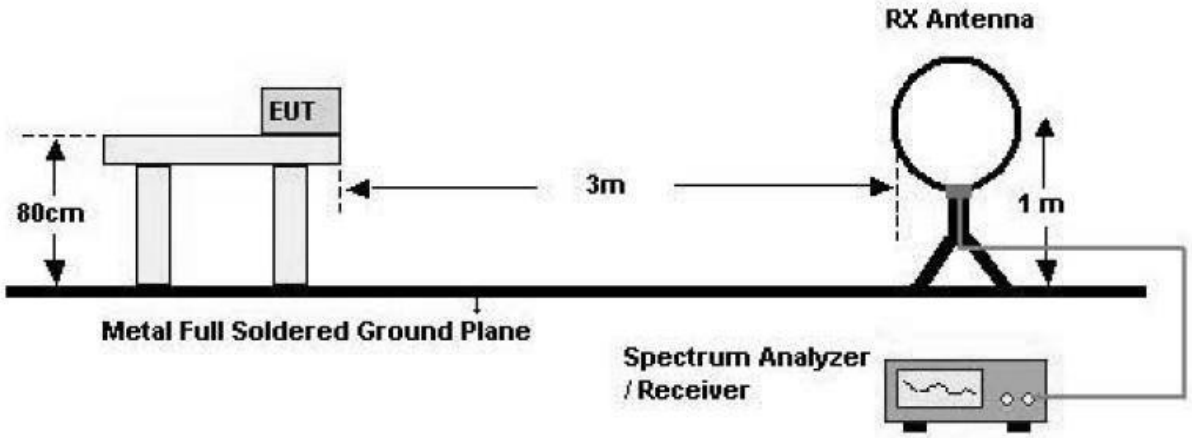
13.2 Test set-up

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.

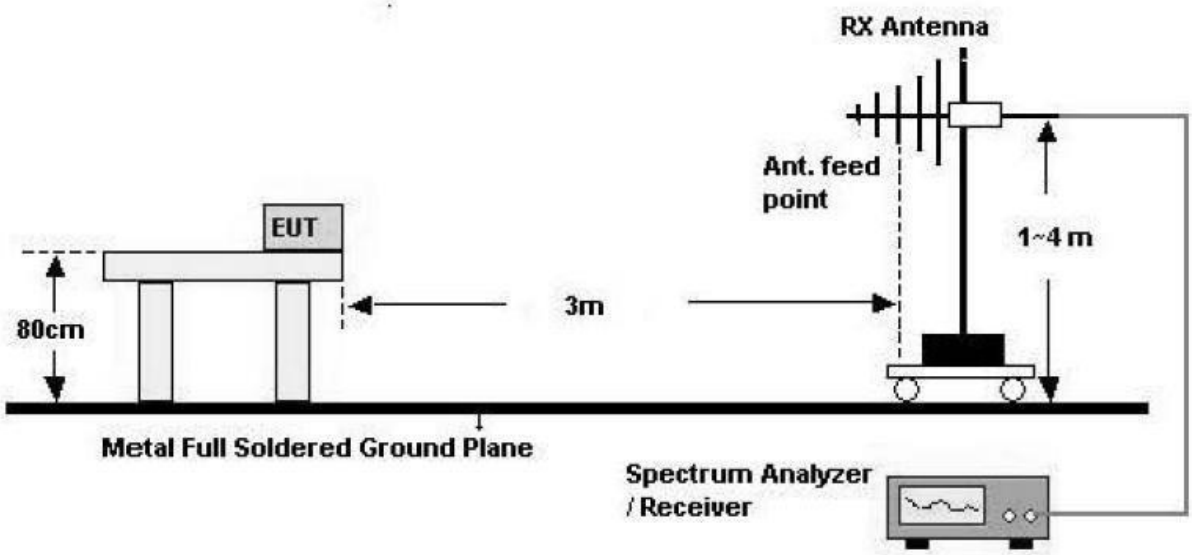
The frequency spectrum from 30 MHz to 26.5 GHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal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

- Test Configuration

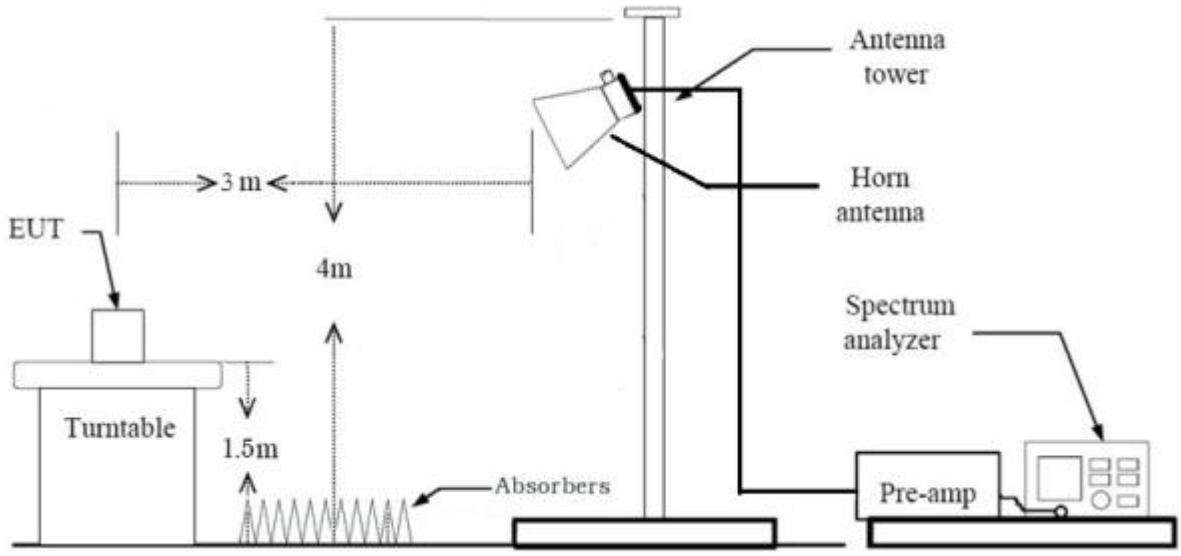
1. Below 30 MHz



2. 30 MHz - 1 GHz



3. Above 1 GHz



13.3 Test Date

December 05, 2021 ~ March 08, 2022

13.4 Test data for 30 MHz ~ 1 000 MHz

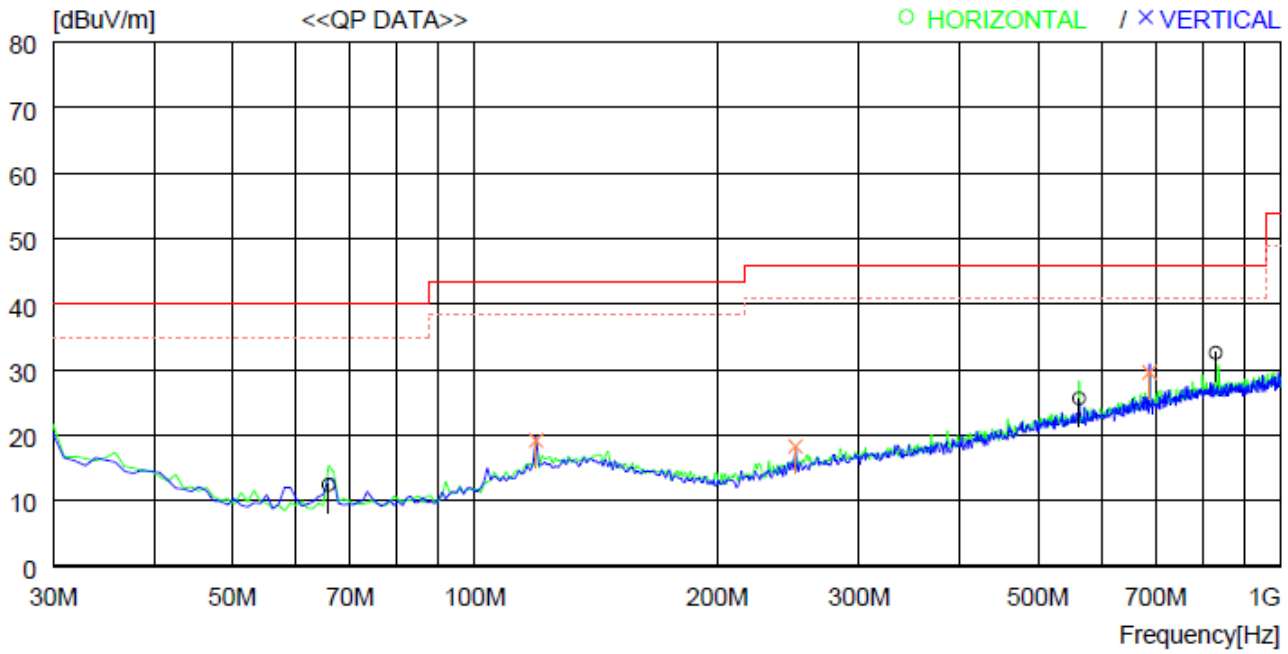
13.4.1 Test data for Bluetooth

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

-. Measurement distance : 3 m

LIMIT : FCC Part15 Subpart.B Class B (3m)
MARGIN: 5 dB



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	30.3	12.6	1.5	32.0	12.4	40.0	27.6	100	338
2	562.529	30.1	23.8	4.1	32.4	25.6	46.0	20.4	200	263
3	831.211	32.5	27.2	5.1	32.2	32.6	46.0	13.4	200	106
----- Vertical ------										
4	119.240	30.8	18.5	2.0	32.1	19.2	43.5	24.3	200	0
5	250.190	29.9	17.8	2.8	32.2	18.3	46.0	27.7	200	0
6	687.655	32.0	25.4	4.6	32.4	29.6	46.0	16.4	200	0

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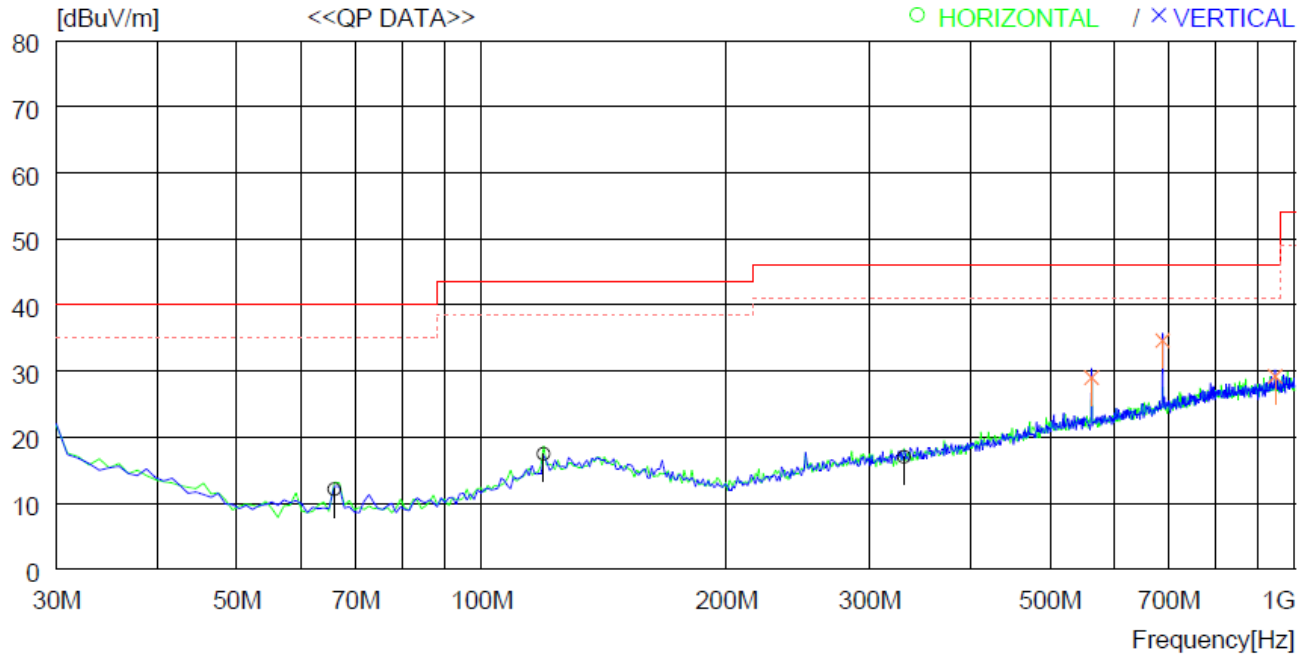
13.4.2 Test data for Intermodulation Mode(Bluetooth + WLAN 2.4 GHz)

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

-. Measurement distance : 3 m



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	30.0	12.6	1.5	32.0	12.1	40.0	27.9	100	359
2	119.240	29.1	18.5	2.0	32.1	17.5	43.5	26.0	100	276
3	330.700	26.3	19.7	3.2	32.2	17.0	46.0	29.0	100	359
----- Vertical ------										
4	562.529	33.5	23.8	4.1	32.4	29.0	46.0	17.0	100	359
5	687.655	37.0	25.4	4.6	32.4	34.6	46.0	11.4	100	359
6	945.668	27.5	28.0	5.4	31.7	29.2	46.0	16.8	200	0

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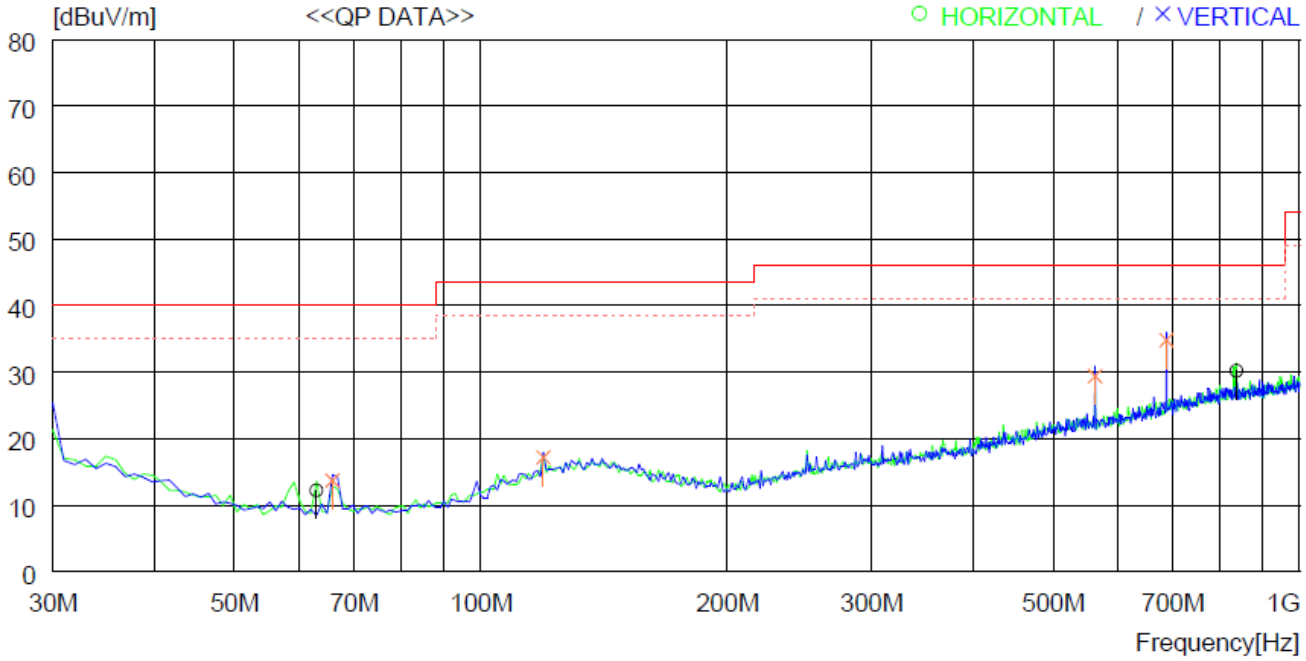
13.4.3 Test data for Intermodulation Mode(Bluetooth + WLAN 5 GHz)

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

-. Measurement distance : 3 m



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	62.980	30.4	12.3	1.5	32.0	12.2	40.0	27.8	200	107
2	837.031	30.1	27.2	5.1	32.2	30.2	46.0	15.8	100	58
----- Vertical ------										
3	65.890	31.6	12.6	1.5	32.0	13.7	40.0	26.3	200	0
4	119.240	28.8	18.5	2.0	32.1	17.2	43.5	26.3	100	359
5	562.529	33.9	23.8	4.1	32.4	29.4	46.0	16.6	100	359
6	687.655	37.2	25.4	4.6	32.4	34.8	46.0	11.2	100	179

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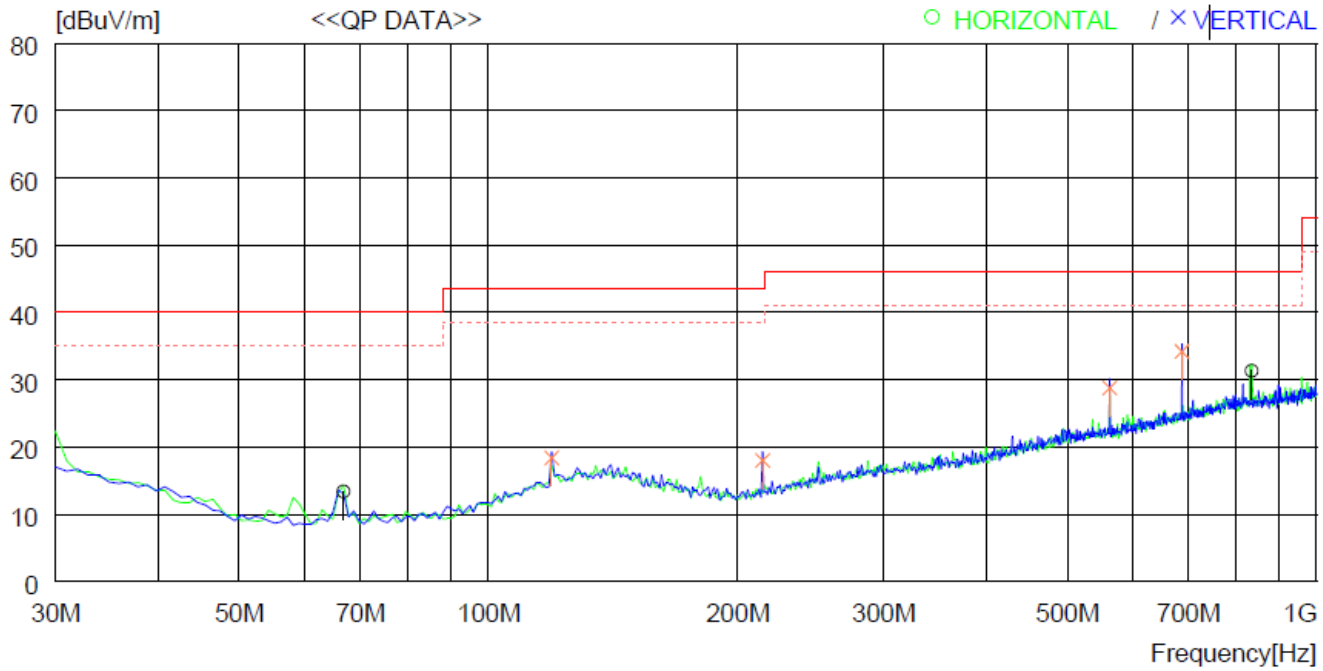
13.4.4 Test data for Intermodulation Mode(Bluetooth + WLAN 2 GHz AX Mode)

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

-. Measurement distance : 3 m



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	31.2	12.6	1.6	32.0	13.4	40.0	26.6	100	359
2	835.091	31.2	27.2	5.1	32.2	31.3	46.0	14.7	200	0
----- Vertical ------										
3	119.240	30.0	18.5	2.0	32.1	18.4	43.5	25.1	200	234
4	214.300	31.4	16.2	2.5	32.1	18.0	43.5	25.5	100	359
5	562.529	33.3	23.8	4.1	32.4	28.8	46.0	17.2	100	359
6	687.655	36.6	25.4	4.6	32.4	34.2	46.0	11.8	100	359

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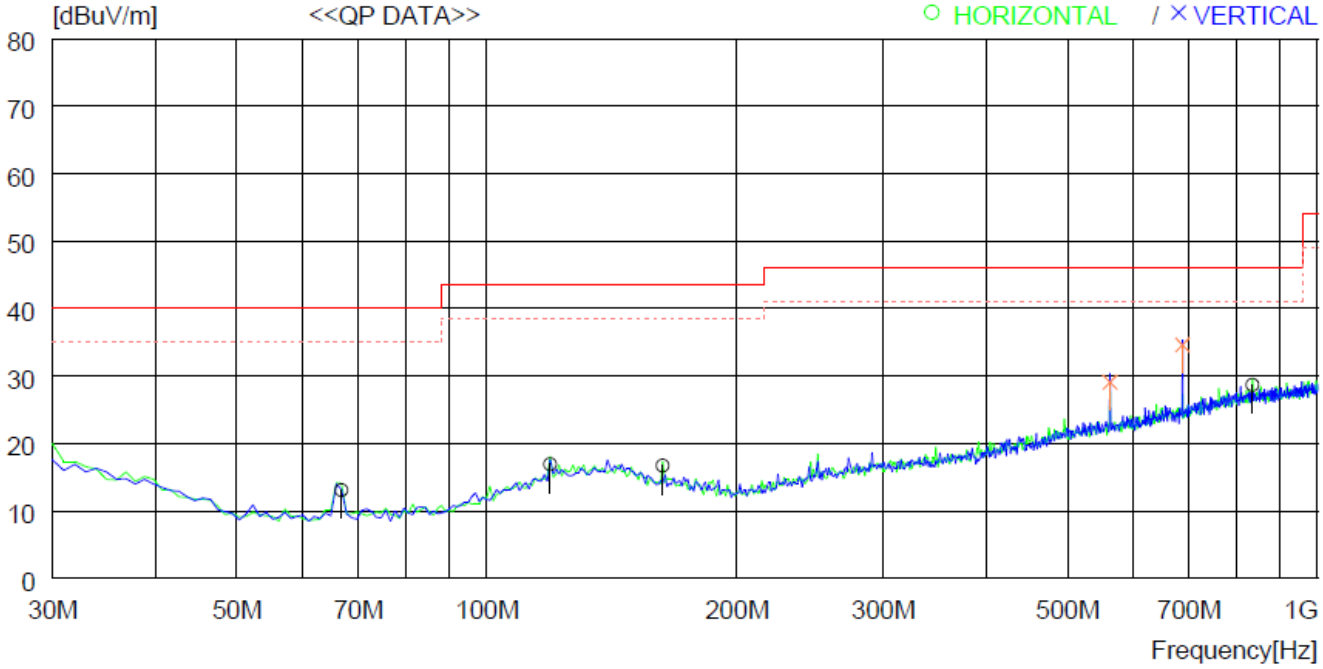
13.4.5 Test data for Intermodulation Mode(Bluetooth + WLAN 5 GHz AX Mode)

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

-. Measurement distance : 3 m



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	30.9	12.6	1.6	32.0	13.1	40.0	26.9	100	174
2	119.240	28.5	18.5	2.0	32.1	16.9	43.5	26.6	200	0
3	162.890	28.8	17.7	2.3	32.1	16.7	43.5	26.8	100	350
4	835.091	28.6	27.2	5.1	32.2	28.7	46.0	17.3	100	359
----- Vertical ------										
5	562.529	33.6	23.8	4.1	32.4	29.1	46.0	16.9	100	359
6	687.655	37.0	25.4	4.6	32.4	34.6	46.0	11.4	100	191

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13.5 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

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

13.6 Test data for above 1 GHz

-. 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

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

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

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14. CONDUCTED EMISSION TEST

14.1 Operating environment

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

14.2 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.

14.3 Test Date

December 05, 2021 ~ March 08, 2022

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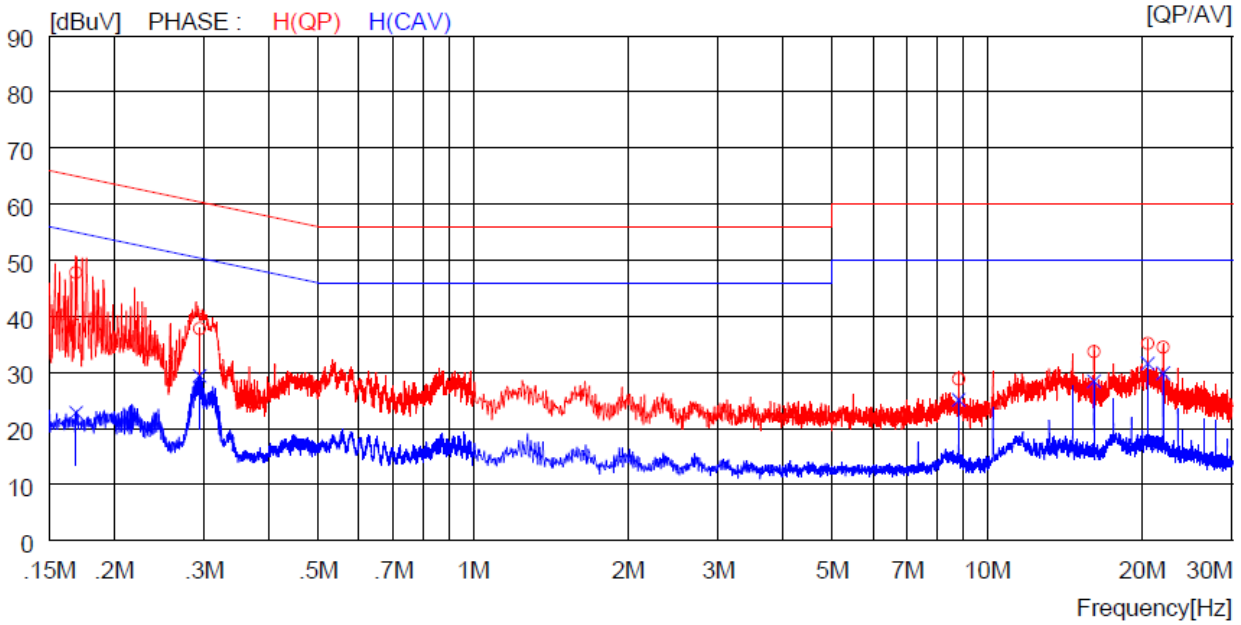
14.4 Test data for Bluetooth

-. 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	37.8	----	10.0	47.8	----	65.0	----	17.2	----	H(QP)
2	0.29400	27.8	----	10.0	37.8	----	60.4	----	22.6	----	H(QP)
3	8.80500	18.6	----	10.2	28.8	----	60.0	----	31.2	----	H(QP)
4	16.14000	23.4	----	10.3	33.7	----	60.0	----	26.3	----	H(QP)
5	20.54000	24.8	----	10.4	35.2	----	60.0	----	24.8	----	H(QP)
6	22.01000	24.1	----	10.4	34.5	----	60.0	----	25.5	----	H(QP)
7	0.16900	----	12.8	10.0	----	22.8	----	55.0	----	32.2	H(CAV)
8	0.29400	----	19.4	10.0	----	29.4	----	50.4	----	21.0	H(CAV)
9	8.80500	----	14.9	10.2	----	25.1	----	50.0	----	24.9	H(CAV)
10	16.14000	----	18.1	10.3	----	28.4	----	50.0	----	21.6	H(CAV)
11	20.54000	----	21.2	10.4	----	31.6	----	50.0	----	18.4	H(CAV)
12	22.01000	----	19.5	10.4	----	29.9	----	50.0	----	20.1	H(CAV)

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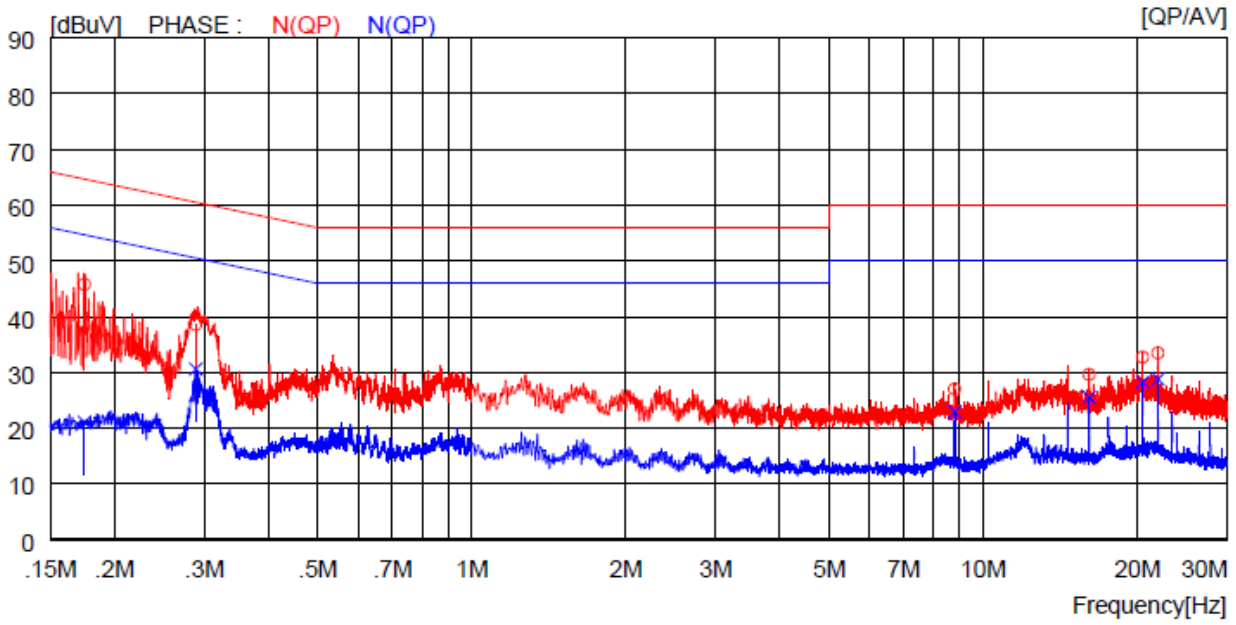
-. Tested Line : NEUTRAL LINE

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	0.17500	35.8	----	10.0	45.8	----	64.7	----	18.9	----	N(QP)
2	0.28900	28.6	----	10.0	38.6	----	60.6	----	22.0	----	N(QP)
3	8.79500	16.8	----	10.2	27.0	----	60.0	----	33.0	----	N(QP)
4	16.12000	19.3	----	10.3	29.6	----	60.0	----	30.4	----	N(QP)
5	20.51000	22.3	----	10.4	32.7	----	60.0	----	27.3	----	N(QP)
6	21.98000	23.1	----	10.4	33.5	----	60.0	----	26.5	----	N(QP)
7	0.17500	----	11.0	10.0	----	21.0	----	54.7	----	33.7	N(CAV)
8	0.28900	----	20.6	10.0	----	30.6	----	50.6	----	20.0	N(CAV)
9	8.79500	----	12.7	10.2	----	22.9	----	50.0	----	27.1	N(CAV)
10	16.12000	----	15.2	10.3	----	25.5	----	50.0	----	24.5	N(CAV)
11	20.51000	----	17.8	10.4	----	28.2	----	50.0	----	21.8	N(CAV)
12	21.98000	----	18.4	10.4	----	28.8	----	50.0	----	21.2	N(CAV)

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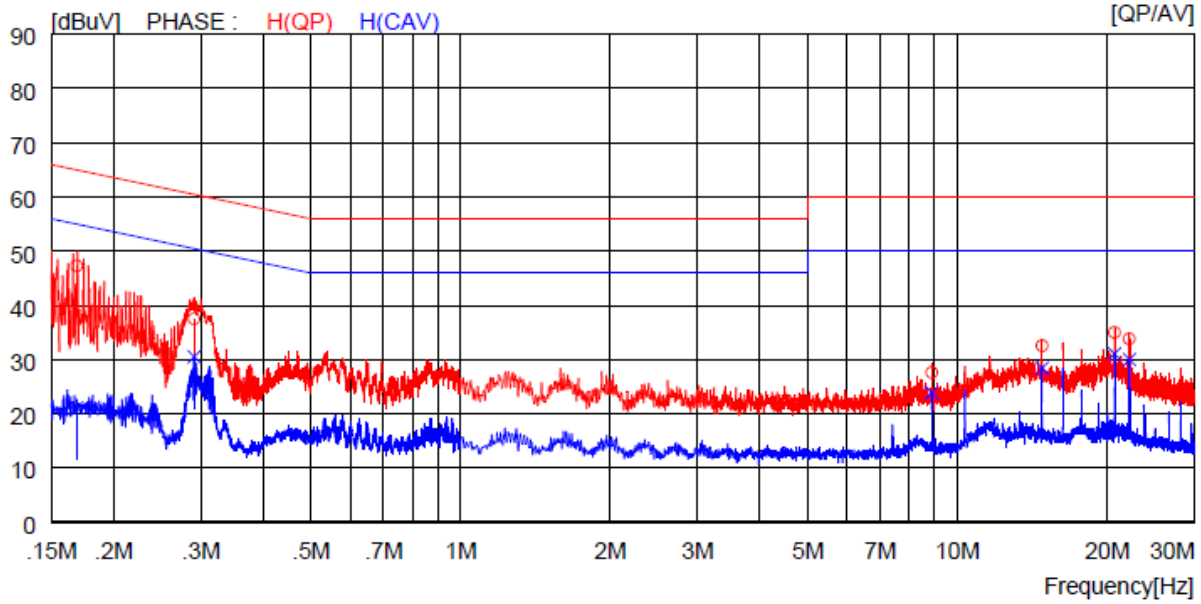
14.5 Test data for Intermodulation Mode(Bluetooth + WLAN 2 GHz)

-. 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	0.16900	37.3	----	10.0	47.3	----	65.0	----	17.7	----	H(QP)
2	0.29100	27.5	----	10.0	37.5	----	60.5	----	23.0	----	H(QP)
3	8.88500	17.4	----	10.2	27.6	----	60.0	----	32.4	----	H(QP)
4	14.81000	22.3	----	10.3	32.6	----	60.0	----	27.4	----	H(QP)
5	20.73000	24.6	----	10.4	35.0	----	60.0	----	25.0	----	H(QP)
6	22.21000	23.4	----	10.4	33.8	----	60.0	----	26.2	----	H(QP)
7	0.16900	----	11.1	10.0	----	21.1	----	55.0	----	33.9	H(CAV)
8	0.29100	----	20.5	10.0	----	30.5	----	50.5	----	20.0	H(CAV)
9	8.88500	----	13.7	10.2	----	23.9	----	50.0	----	26.1	H(CAV)
10	14.81000	----	18.1	10.3	----	28.4	----	50.0	----	21.6	H(CAV)
11	20.73000	----	20.7	10.4	----	31.1	----	50.0	----	18.9	H(CAV)
12	22.21000	----	19.6	10.4	----	30.0	----	50.0	----	20.0	H(CAV)

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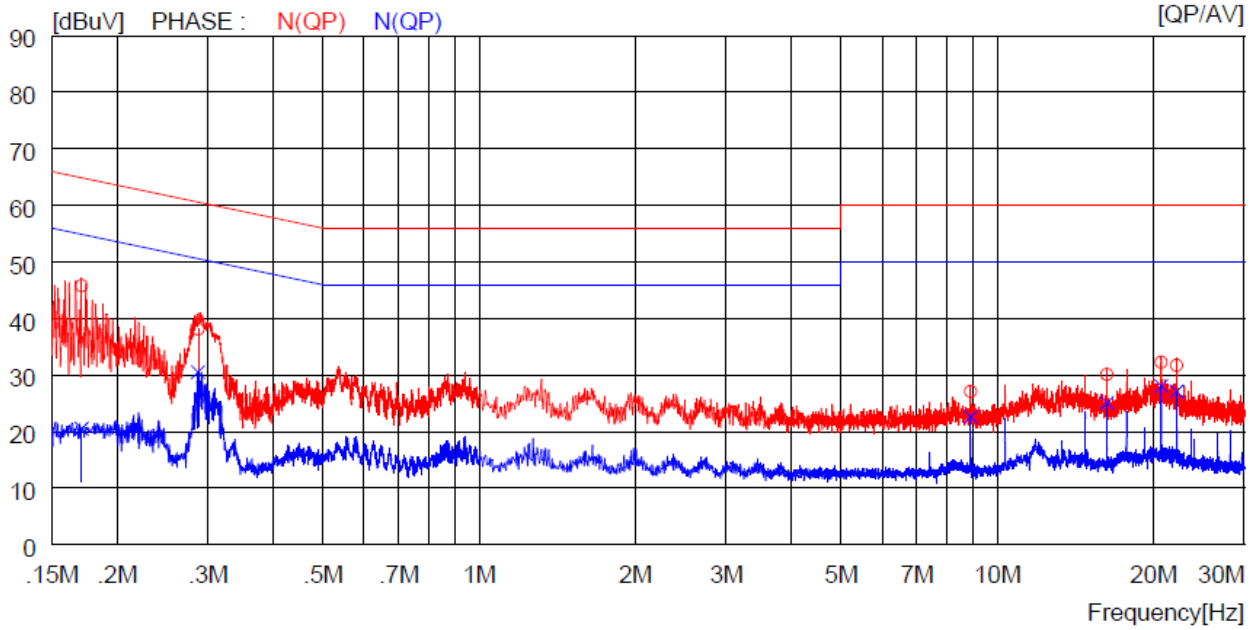
-. Tested Line : NEUTRAL LINE

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	35.8	----	10.0	45.8	----	64.9	----	19.1	----	N(QP)
2	0.28700	28.1	----	10.0	38.1	----	60.6	----	22.5	----	N(QP)
3	8.88500	16.9	----	10.2	27.1	----	60.0	----	32.9	----	N(QP)
4	16.29000	19.8	----	10.3	30.1	----	60.0	----	29.9	----	N(QP)
5	20.72000	21.9	----	10.4	32.3	----	60.0	----	27.7	----	N(QP)
6	22.21000	21.3	----	10.4	31.7	----	60.0	----	28.3	----	N(QP)
7	0.17100	----	10.5	10.0	----	20.5	----	54.9	----	34.4	N(CAV)
8	0.28700	----	20.5	10.0	----	30.5	----	50.6	----	20.1	N(CAV)
9	8.88500	----	12.4	10.2	----	22.6	----	50.0	----	27.4	N(CAV)
10	16.29000	----	14.8	10.3	----	25.1	----	50.0	----	24.9	N(CAV)
11	20.72000	----	17.7	10.4	----	28.1	----	50.0	----	21.9	N(CAV)
12	22.21000	----	16.7	10.4	----	27.1	----	50.0	----	22.9	N(CAV)

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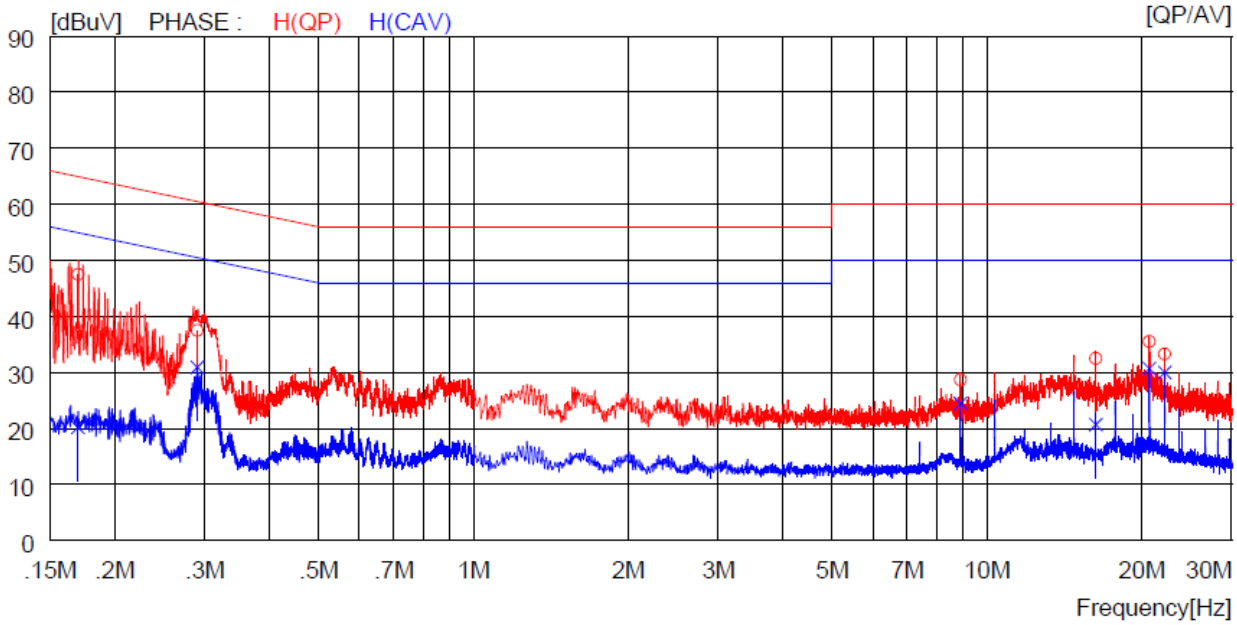
14.6 Test data for Intermodulation Mode(Bluetooth + WLAN 5 GHz)

-. 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	0.17000	37.5	----	10.0	47.5	----	65.0	----	17.5	----	H(QP)
2	0.29000	27.5	----	10.0	37.5	----	60.5	----	23.0	----	H(QP)
3	8.88500	18.5	----	10.2	28.7	----	60.0	----	31.3	----	H(QP)
4	16.30000	22.2	----	10.3	32.5	----	60.0	----	27.5	----	H(QP)
5	20.73000	25.1	----	10.4	35.5	----	60.0	----	24.5	----	H(QP)
6	22.21000	22.9	----	10.4	33.3	----	60.0	----	26.7	----	H(QP)
7	0.17000	----	10.2	10.0	----	20.2	----	55.0	----	34.8	H(CAV)
8	0.29000	----	20.9	10.0	----	30.9	----	50.5	----	19.6	H(CAV)
9	8.88500	----	14.3	10.2	----	24.5	----	50.0	----	25.5	H(CAV)
10	16.30000	----	10.4	10.3	----	20.7	----	50.0	----	29.3	H(CAV)
11	20.73000	----	20.3	10.4	----	30.7	----	50.0	----	19.3	H(CAV)
12	22.21000	----	19.6	10.4	----	30.0	----	50.0	----	20.0	H(CAV)

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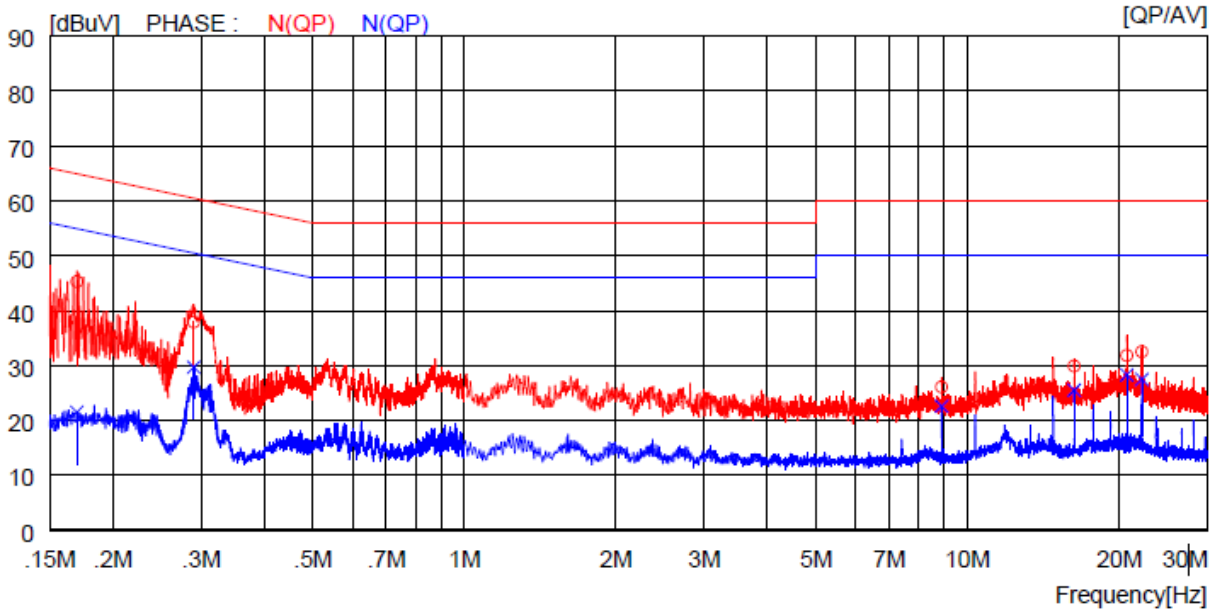
-. Tested Line : NEUTRAL LINE

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	27.9	----	10.0	37.9	----	60.5	----	22.6	----	N(QP)
3	8.89000	15.9	----	10.2	26.1	----	60.0	----	33.9	----	N(QP)
4	16.30000	19.6	----	10.3	29.9	----	60.0	----	30.1	----	N(QP)
5	20.74000	21.4	----	10.4	31.8	----	60.0	----	28.2	----	N(QP)
6	22.22000	22.1	----	10.4	32.5	----	60.0	----	27.5	----	N(QP)
7	0.17000	----	11.5	10.0	----	21.5	----	55.0	----	33.5	N(CAV)
8	0.29000	----	19.7	10.0	----	29.7	----	50.5	----	20.8	N(CAV)
9	8.89000	----	12.4	10.2	----	22.6	----	50.0	----	27.4	N(CAV)
10	16.30000	----	15.2	10.3	----	25.5	----	50.0	----	24.5	N(CAV)
11	20.74000	----	17.9	10.4	----	28.3	----	50.0	----	21.7	N(CAV)
12	22.22000	----	17.1	10.4	----	27.5	----	50.0	----	22.5	N(CAV)

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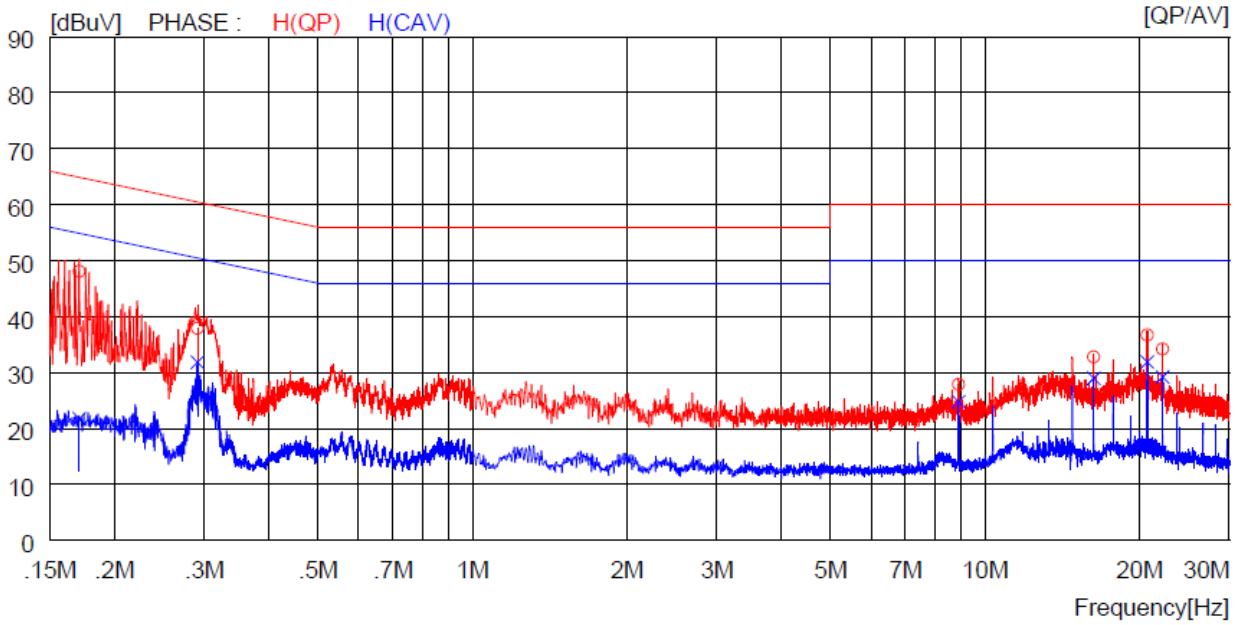
14.7 Test data for Intermodulation Mode(Bluetooth + WLAN 2 GHz AX Mode)

-. 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	0.17100	38.1	----	10.0	48.1	----	64.9	----	16.8	----	H(QP)
2	0.29100	27.9	----	10.0	37.9	----	60.5	----	22.6	----	H(QP)
3	8.89000	17.7	----	10.2	27.9	----	60.0	----	32.1	----	H(QP)
4	16.30000	22.5	----	10.3	32.8	----	60.0	----	27.2	----	H(QP)
5	20.74000	26.3	----	10.4	36.7	----	60.0	----	23.3	----	H(QP)
6	22.22000	23.8	----	10.4	34.2	----	60.0	----	25.8	----	H(QP)
7	0.17100	----	11.8	10.0	----	21.8	----	54.9	----	33.1	H(CAV)
8	0.29100	----	21.8	10.0	----	31.8	----	50.5	----	18.7	H(CAV)
9	8.89000	----	14.6	10.2	----	24.8	----	50.0	----	25.2	H(CAV)
10	16.30000	----	18.7	10.3	----	29.0	----	50.0	----	21.0	H(CAV)
11	20.74000	----	21.5	10.4	----	31.9	----	50.0	----	18.1	H(CAV)
12	22.22000	----	18.8	10.4	----	29.2	----	50.0	----	20.8	H(CAV)

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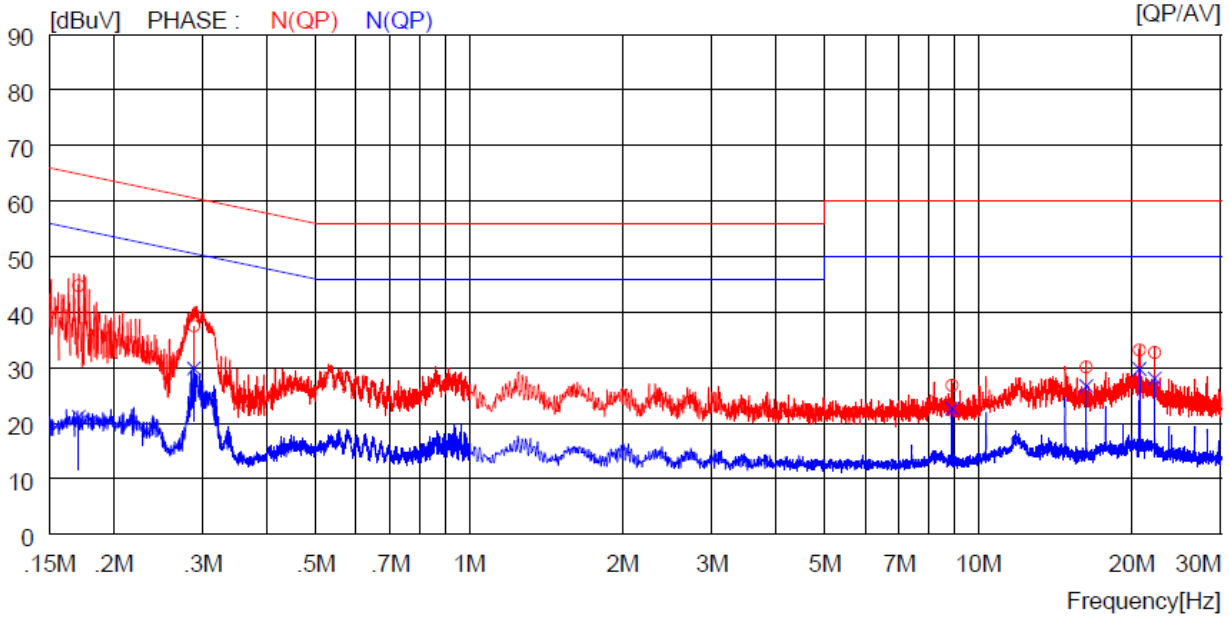
-. Tested Line : NEUTRAL LINE

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	34.8	----	10.0	44.8	----	64.9	----	20.1	----	N(QP)
2	0.28800	27.5	----	10.0	37.5	----	60.6	----	23.1	----	N(QP)
3	8.89000	16.6	----	10.2	26.8	----	60.0	----	33.2	----	N(QP)
4	16.30000	19.8	----	10.3	30.1	----	60.0	----	29.9	----	N(QP)
5	20.74000	22.8	----	10.4	33.2	----	60.0	----	26.8	----	N(QP)
6	22.22000	22.3	----	10.4	32.7	----	60.0	----	27.3	----	N(QP)
7	0.17100	----	11.2	10.0	----	21.2	----	54.9	----	33.7	N(CAV)
8	0.28800	----	19.9	10.0	----	29.9	----	50.6	----	20.7	N(CAV)
9	8.89000	----	12.5	10.2	----	22.7	----	50.0	----	27.3	N(CAV)
10	16.30000	----	16.4	10.3	----	26.7	----	50.0	----	23.3	N(CAV)
11	20.74000	----	19.4	10.4	----	29.8	----	50.0	----	20.2	N(CAV)
12	22.22000	----	17.7	10.4	----	28.1	----	50.0	----	21.9	N(CAV)

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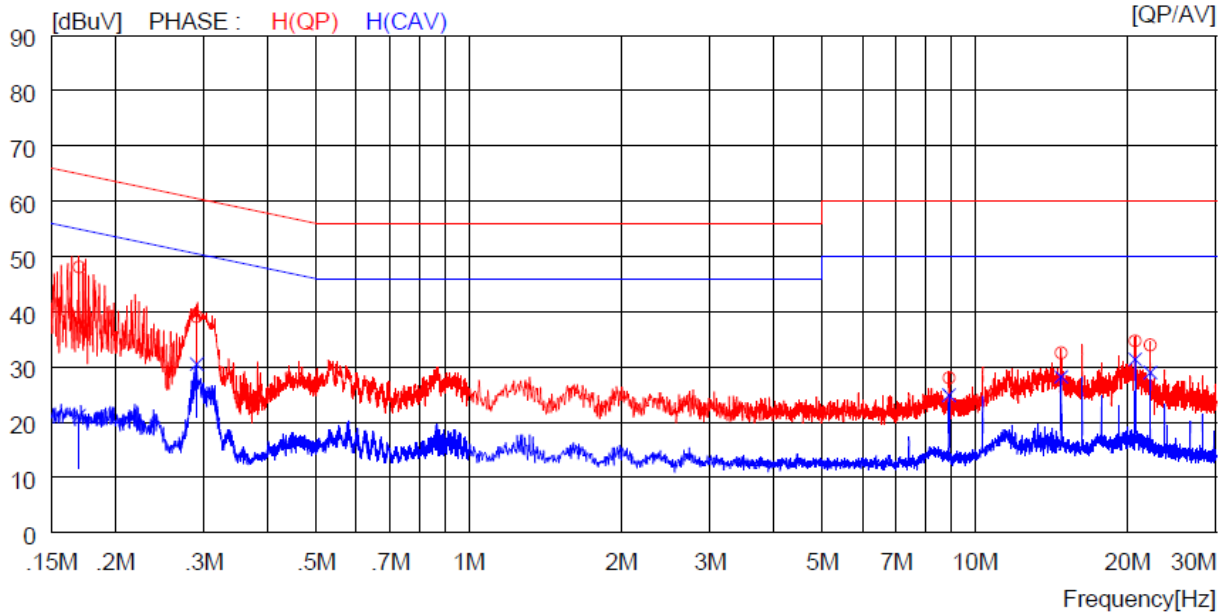
14.8 Test data for Intermodulation Mode(Bluetooth + WLAN 5 GHz AX Mode)

-. 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	0.17000	38.1	----	10.0	48.1	----	65.0	----	16.9	----	H(QP)
2	0.29000	29.1	----	10.0	39.1	----	60.5	----	21.4	----	H(QP)
3	8.89500	17.8	----	10.2	28.0	----	60.0	----	32.0	----	H(QP)
4	14.82000	22.3	----	10.3	32.6	----	60.0	----	27.4	----	H(QP)
5	20.74000	24.3	----	10.4	34.7	----	60.0	----	25.3	----	H(QP)
6	22.22000	23.6	----	10.4	34.0	----	60.0	----	26.0	----	H(QP)
7	0.17000	----	11.2	10.0	----	21.2	----	55.0	----	33.8	H(CAV)
8	0.29000	----	20.5	10.0	----	30.5	----	50.5	----	20.0	H(CAV)
9	8.89500	----	14.7	10.2	----	24.9	----	50.0	----	25.1	H(CAV)
10	14.82000	----	17.9	10.3	----	28.2	----	50.0	----	21.8	H(CAV)
11	20.74000	----	21.0	10.4	----	31.4	----	50.0	----	18.6	H(CAV)
12	22.22000	----	18.6	10.4	----	29.0	----	50.0	----	21.0	H(CAV)

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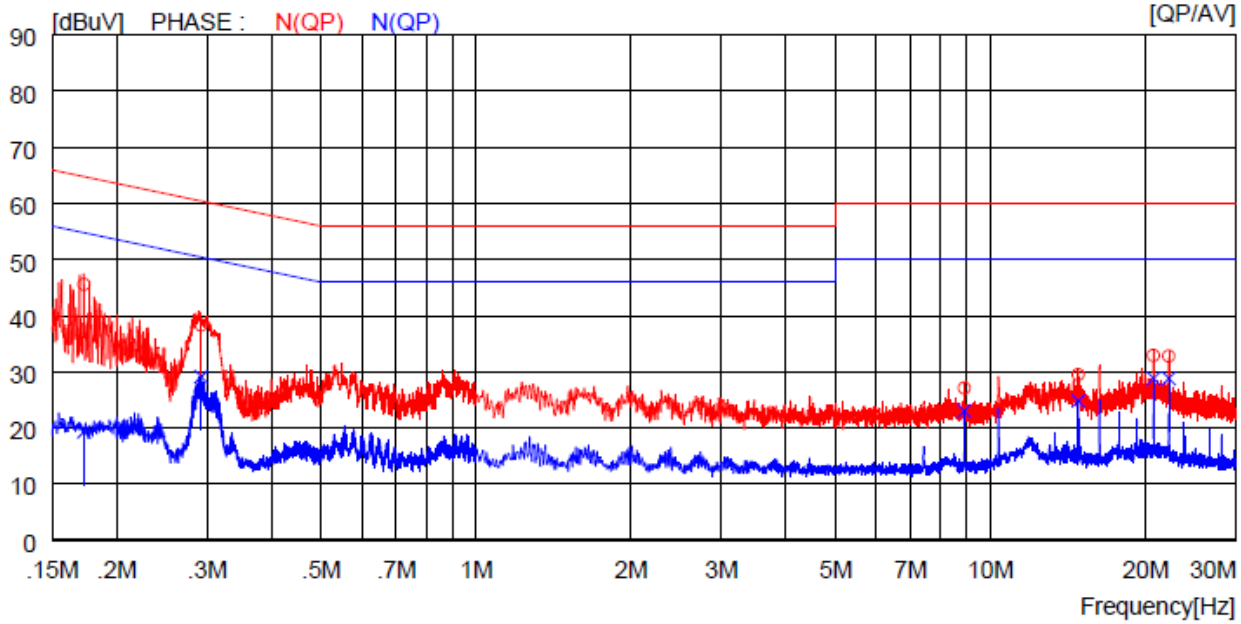
-. Tested Line : NEUTRAL LINE

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	0.17300	35.6	----	10.0	45.6	----	64.8	----	19.2	----	N(QP)
2	0.29200	28.3	----	10.0	38.3	----	60.5	----	22.2	----	N(QP)
3	8.89500	16.9	----	10.2	27.1	----	60.0	----	32.9	----	N(QP)
4	14.82000	19.2	----	10.3	29.5	----	60.0	----	30.5	----	N(QP)
5	20.75000	22.5	----	10.4	32.9	----	60.0	----	27.1	----	N(QP)
6	22.23000	22.4	----	10.4	32.8	----	60.0	----	27.2	----	N(QP)
7	0.17300	----	9.3	10.0	----	19.3	----	54.8	----	35.5	N(CAV)
8	0.29200	----	19.1	10.0	----	29.1	----	50.5	----	21.4	N(CAV)
9	8.89500	----	12.8	10.2	----	23.0	----	50.0	----	27.0	N(CAV)
10	14.82000	----	14.5	10.3	----	24.8	----	50.0	----	25.2	N(CAV)
11	20.75000	----	18.4	10.4	----	28.8	----	50.0	----	21.2	N(CAV)
12	22.23000	----	18.4	10.4	----	28.8	----	50.0	----	21.2	N(CAV)

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15. 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, 2022 (1Y)
ESH3-Z2	Rohde & Schwarz	PULSE LIMITER	100655	Mar. 14, 2022 (1Y)

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