

RADIO PERFORMANCE TEST REPORT

Test Report No. : OT-23N-RWD-002

Reception No. : 2309003183

Applicant : Samsung Electronics Co Ltd

Address : 19 Chapin Rd., Building D, Pine Brook, New Jersey, 07058, United States

Manufacturer : Samsung Electronics Co Ltd

Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do 16677, Korea

Type of Equipment : Wi-Fi/BT Transceiver

FCC ID. : A3LWCD730M

Model Name : WCD730M

Multiple Model Name : N/A

Serial number : N/A

Total page of Report : 43 pages (including this page)

Date of Incoming : October 04, 2023

Date of issue : November 01, 2023

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.

This report is not correlated with the "KS Q ISO/IEC 17025 and KOLAS accreditation" of Korean Laboratory Accreditation Scheme.



Tested by
Ju-Yun, Park / Sr. Engineer
ONETECH Corp.

Reviewed by
Tae-Ho, Kim / Chief Engineer
ONETECH Corp.

Approved by
Jae-Ho, Lee / Chief Engineer
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-23N-RWD-002	November 01, 2023	Initial Release	All

1. VERIFICATION OF COMPLIANCE

Applicant : Samsung Electronics Co Ltd

Address : 19 Chapin Rd., Building D, Pine Brook, New Jersey, 07058, United States

Contact Person : Youngjoong, Noh / Principal Engineer

Telephone No. : +82-31-277-0598

FCC ID : A3LWCD730M

Model Name : WCD730M

Brand Name : 

Serial Number : N/A

Date : November 01, 2023

EQUIPMENT CLASS	DSS – PART 15 SPREAD SPECTRUM TRANSMITTER
E.U.T. DESCRIPTION	Modular Transmitter, Wi-Fi/BT Transceiver
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
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.

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: 2013. 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

-. Lab Accreditation:

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

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

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

3. GENERAL INFORMATION

3.1 Product Description

The Samsung Electronics Co Ltd, Model WCD730M (referred to as the EUT in this report) is a Wi-Fi/BT Transceiver. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Wi-Fi/BT Transceiver	
Temperature Range	-20 °C ~ 50 °C	
OPERATING FREQUENCY	Bluetooth LE	2 402 MHz ~ 2 480 MHz
	Bluetooth	2 402 MHz ~ 2 480 MHz
	WLAN 2.4 GHz	2 412 MHz ~ 2 472 MHz (802.11b/g/n(HT20))
	WLAN	5 180 MHz ~ 5 240 MHz (802.11a/n(HT20)/ac(VHT20))
	5 150 MHz ~	5 190 MHz ~ 5 230 MHz (802.11n(HT40)/ac(VHT40))
	5 250 MHz Band	5 210 MHz (802.11ac(VHT80))
	WLAN	5 260 MHz ~ 5 320 MHz (802.11a/n(HT20)/ac(VHT20))
	5 250 MHz ~	5 270 MHz ~ 5 310 MHz (802.11n(HT40)/ac(VHT40))
	5 350 MHz Band	5 290 MHz (802.11ac(VHT80))
	WLAN	5 500 MHz ~ 5 720 MHz (802.11a/n(HT20)/ac(VHT20))
	5 470 MHz ~	5 510 MHz ~ 5 710 MHz (802.11n(HT40)/ac(VHT40))
	5 725 MHz Band	5 530 MHz ~ 5 690 MHz (802.11ac(VHT80))
	WLAN	5 745 MHz ~ 5 825 MHz (802.11a/n(HT20)/ac(VHT20))
	5 725 MHz ~	5 755 MHz ~ 5 795 MHz (802.11n(HT40)/ac(VHT40))
	5 850 MHz Band	5 775 MHz (802.11ac(VHT80))
MODULATION TYPE	Bluetooth LE	GFSK for 1 Mbps / 2 Mbps
	Bluetooth	GFSK for 1Mbps, $\pi/4$ -DQPSK for 2Mbps, 8-DPSK for 3Mbps
	WLAN 2.4 GHz	802.11b: DSSS Modulation(DBPSK/DQPSK/CCK) 802.11g/n(HT20): OFDM Modulation(BPSK/QPSK/16QAM/64QAM)
	WLAN 5 GHz	802.11a/n(HT20)/n(HT40)/ac(VHT80): OFDM Modulation(BPSK/QPSK/16QAM/64QAM)

RF OUTPUT POWER	Bluetooth LE	1 Mbps	9.98 dBm
		2 Mbps	9.89 dBm
	Bluetooth	1 Mbps	10.97 dBm
		2 Mbps	10.51 dBm
		3 Mbps	10.53 dBm
	WLAN 2.4 GHz	Antenna 1	18.08 dBm(802.11b) 15.61 dBm(802.11g) 15.01 dBm(802.11n_HT20)
		Antenna 2	20.59 dBm(802.11b) 16.75 dBm(802.11g) 16.61 dBm(802.11n_HT20)
		Multiple Antenna	18.77 dBm(802.11g) 18.72 dBm(802.11n_HT20)
	WLAN 5 150 MHz ~ 5 250 MHz Band	Antenna 1	12.31 dBm(802.11a) 12.38 dBm(802.11n_HT20) 14.12 dBm(802.11n_HT40) 12.73 dBm(802.11ac_VHT80)
		Antenna 2	12.08 dBm(802.11a) 12.08 dBm(802.11n_HT20) 14.21 dBm(802.11n_HT40) 13.14 dBm(802.11ac_VHT80)
		Multiple Antenna	15.16 dBm(802.11a) 15.24 dBm(802.11n_HT20) 17.08 dBm(802.11n_HT40) 15.95 dBm(802.11ac_VHT80)
	WLAN 5 250 MHz ~ 5 350 MHz Band	Antenna 1	15.75 dBm(802.11a) 15.56 dBm(802.11n_HT20) 14.73 dBm(802.11n_HT40) 12.16 dBm(802.11ac_VHT80)
		Antenna 2	15.75 dBm(802.11a) 15.55 dBm(802.11n_HT20) 14.61 dBm(802.11n_HT40) 12.08 dBm(802.11ac_VHT80)
		Multiple Antenna	18.76 dBm(802.11a) 18.57 dBm(802.11n_HT20) 17.60 dBm(802.11n_HT40) 15.13 dBm(802.11ac_VHT80)

RF OUTPUT POWER	WLAN 5 470 MHz ~ 5 725 MHz Band	Antenna 1	14.38 dBm(802.11a) 14.81 dBm(802.11n_HT20) 14.26 dBm(802.11n_HT40) 10.22 dBm(802.11ac_VHT80)
		Antenna 1_Straddle	8.30 dBm(802.11a) 9.04 dBm(802.11n_HT20) 8.64 dBm(802.11n_HT40) 9.43 dBm(802.11ac_VHT80)
		Antenna 2	15.71 dBm(802.11a) 16.41 dBm(802.11n_HT20) 15.71 dBm(802.11n_HT40) 12.03 dBm(802.11ac_VHT80)
		Antenna 2_Straddle	10.51 dBm(802.11a) 11.10 dBm(802.11n_HT20) 10.86 dBm(802.11n_HT40) 11.96 dBm(802.11ac_VHT80)
		Multiple Antenna	18.11 dBm(802.11a) 18.69 dBm(802.11n_HT20) 17.97 dBm(802.11n_HT40) 14.23 dBm(802.11ac_VHT80)
		Multiple Antenna _Straddle	12.55 dBm(802.11a) 13.20 dBm(802.11n_HT20) 12.90 dBm(802.11n_HT40) 13.89 dBm(802.11ac_VHT80)

RF OUTPUT POWER	WLAN 5 725 MHz ~ 5 850 MHz Band	Antenna 1	11.65 dBm(802.11a) 12.51 dBm(802.11n_HT20) 12.85 dBm(802.11n_HT40) 11.75 dBm(802.11ac_VHT80)
		Antenna 1_Straddle	0.48 dBm(802.11a) 1.71 dBm(802.11n_HT20) -3.17 dBm(802.11n_HT40) -4.98 dBm(802.11ac_VHT80)
		Antenna 2	14.18 dBm(802.11a) 15.01 dBm(802.11n_HT20) 15.55 dBm(802.11n_HT40) 14.25 dBm(802.11ac_VHT80)
		Antenna 2_Straddle	2.76 dBm(802.11a) 3.73 dBm(802.11n_HT20) -1.00 dBm(802.11n_HT40) -2.61 dBm(802.11ac_VHT80)
		Multiple Antenna	16.11 dBm(802.11a) 16.95 dBm(802.11n_HT20) 17.42 dBm(802.11n_HT40) 16.19 dBm(802.11ac_VHT80)
		Multiple Antenna _Straddle	4.78 dBm(802.11a) 5.85 dBm(802.11n_HT20) 1.06 dBm(802.11n_HT40) -0.62 dBm(802.11ac_VHT80)

ANTENNA TYPE	Chip Antenna		
ANTENNA GAIN	Bluetooth LE	-1.82 dBi	
	Bluetooth	-1.82 dBi	
	WLAN 2.4 GHz	Antenna 1	0.71 dBi
		Antenna 2	1.38 dBi
		Multiple Antenna	4.07 dBi
	5 150 MHz ~ 5 250 MHz Band	Antenna 1	1.39 dBi
		Antenna 2	1.43 dBi
		Multiple Antenna	4.42 dBi
	5 250 MHz ~ 5 350 MHz Band	Antenna 1	1.43 dBi
		Antenna 2	1.43 dBi
		Multiple Antenna	4.44 dBi
	5 470 MHz ~ 5 725 MHz Band	Antenna 1	1.40 dBi
		Antenna 2	1.43 dBi
		Multiple Antenna	4.43 dBi
	5 725 MHz ~ 5 850 MHz Band	Antenna 1	1.32 dBi
		Antenna 2	1.41 dBi
		Multiple Antenna	4.38 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.

-. The following lists consist of the added model and their differences.

Model Name	Differences	Tested
WCD730M	Basic: MIC and Accelation sensor at the top side.	☒
	Option 1: This model is identical to the basic model except for the removal MIC.	☐
	Option 2: This model is identical to the basic model except for the removal MIC and Accelation sensor at the top side.	☐

Note: 1. Applicant consigns only basic model to test, therefore this test report just guarantees the units, which have been tested.

2. The Applicant/manufacture is responsible for the compliance of all variants.

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	Samsung Electronics Co Ltd	HDWB-2470 V1.0	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
WCD730M	Samsung Electronics Co Ltd	Wi-Fi/BT Transceiver (EUT)	
Ideapad320	LENOVO	Notebook PC	EUT
ADL45WCE	CHICONY POWER TECHNOLOGY(SUZHOU) CO.,LTD.	AC Adapter	

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 441MHz, 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.

-. Frequency / Channel Operations

Channel	Frequency
0	2 402
39	2 441
78	2 480

-. Duty Cycle

Mode	Tx On Time [ms]	Tx Off Time [ms]	Duty Cycle [%]	Correction Factor [dB]
Bluetooth [1 Mbps]	2.860	2.140	57.20	2.43
Bluetooth [2 Mbps]	2.880	2.120	57.60	2.40
Bluetooth [3 Mbps]	2.880	2.120	57.60	2.40

Note – Duty Cycle : $(\text{Tx On Time} / (\text{Tx On Time} + \text{Tx Off Time})) * 100$

Correction Factor : $10 * \text{Log}(1 / (\text{Duty Cycle} / 100))$

5.4 Configuration of Test System

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

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 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 Chip Antenna on the main board in the EUT, so no consideration of replacement by the user.

6. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence.

The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (dB)
Conducted Output Power	0.68
Conducted Spurious Emission < 26.5 GHz	1.60
Power Spectral Density	1.55
Line Conducted Disturbance (150 kHz ~ 30 MHz)	2.00
Radiated Disturbance (9 kHz ~ 30 MHz)	4.09
Radiated Disturbance (30 MHz ~ 1 GHz)	3.98
Radiated Disturbance (1 GHz ~ 18 GHz)	5.56
Radiated Disturbance (18 GHz ~ 40 GHz)	5.65

7. PRELIMINARY TEST

7.1 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

7.2 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

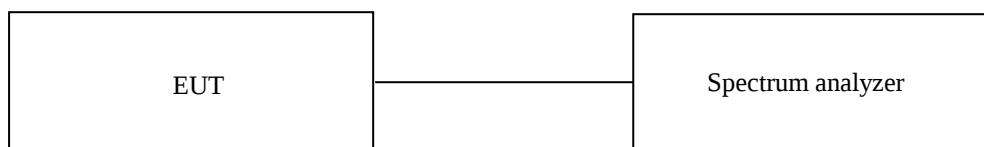
8. MINIMUM 20 dB BANDWIDTH

8.1 Operating environment

Temperature : 22 °C
Relative humidity : 41 % 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 20 kHz, and peak detection was used. The 20 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 20 dB.



8.3 Test Date

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8.4 Test data for 1 Mbps

CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402.00	869.10
Middle	2 441.00	869.10
High	2 480.00	869.10

8.5 Test data for 2 Mbps

CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402.00	1 248.80
Middle	2 441.00	1 258.70
High	2 480.00	1 318.70

8.6 Test data for 3 Mbps

CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402.00	1 253.70
Middle	2 441.00	1 253.70
High	2 480.00	1 253.70

9. HOPPING FREQUENCY SEPARATION

9.1 Operating environment

Temperature : 22 °C
Relative humidity : 41 % 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 5 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.



9.3 Test Date

October 04, 2023 ~ October 20, 2023

9.4 Test data for 1 Mbps

-. Test Result : Pass

MEASURED VLAUE (kHz)	Two-third of 20 dB Bandwidth (kHz)	LIMIT
999.00	579.40	Separated by a minimum of 579.40 kHz

9.5 Test data for 2 Mbps

-. Test Result : Pass

MEASURED VLAUE (kHz)	Two-third of 20 dB Bandwidth (kHz)	LIMIT
999.00	839.13	Separated by a minimum of 839.13 kHz

9.6 Test data for 3 Mbps

-. Test Result : Pass

MEASURED VLAUE (kHz)	Two-third of 20 dB Bandwidth (kHz)	LIMIT
999.00	835.80	Separated by a minimum of 835.80 kHz

10. NUMBER OF HOPPING CHANNELS

10.1 Operating environment

Temperature : 22 °C
Relative humidity : 46 % R.H.

10.2 Test set-up

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



10.3 Test Date

October 04, 2023 ~ October 20, 2023

10.4 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

10.5 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

10.6 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

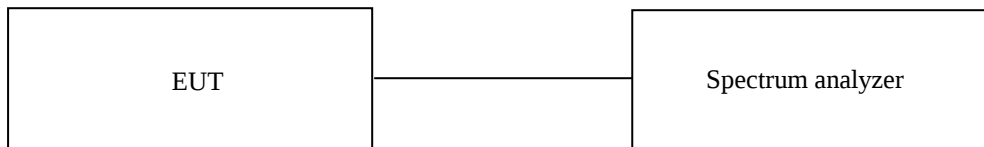
11. TIME OF OCCUPANCY

11.1 Operating environment

Temperature : 22 °C
Relative humidity : 41 % R.H.

11.2 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.



11.3 Test Date

October 04, 2023 ~ October 20, 2023

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	1.64	5.06	31.60	262.23	400.00	
DH5	2.86	3.38	31.60	305.47	400.00	

Total dwell time is calculated as following.

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

11.5 Test data for 2 Mbps

The system makes worst case 1 600 hops per second or 1 time slot has a length of 625 μ s 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	2.88	3.38	31.60	307.61	400.00	

Total dwell time is calculated as following.

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

11.6 Test data for 3 Mbps

The system makes worst case 1 600 hops per second or 1 time slot has a length of 625 μ s 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	1.62	5.06	31.60	259.03	400.00	
DH5	2.88	3.38	31.60	307.61	400.00	

Total dwell time is calculated as following.

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

12. MAXIMUM PEAK OUTPUT POWER

12.1 Operating environment

Temperature : 22 °C
Relative humidity : 41 % R.H.

12.2 Test set-up

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

The resolution bandwidth is set to $\geq$ DTS Bandwidth, the video bandwidth is set to 3 times the resolution bandwidth.



12.3 Test Date

October 04, 2023 ~ October 20, 2023

12.4 Test data for 1 Mbps

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	9.63	21.00	11.37
MIDDLE	2 441.00	10.44	21.00	10.56
HIGH	2 480.00	10.97	21.00	10.03

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

12.5 Test data for 2 Mbps

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	9.05	21.00	11.95
MIDDLE	2 441.00	9.87	21.00	11.13
HIGH	2 480.00	10.51	21.00	10.49

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

12.6 Test data for 3 Mbps

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	9.23	21.00	11.77
MIDDLE	2 441.00	9.83	21.00	11.17
HIGH	2 480.00	10.53	21.00	10.47

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

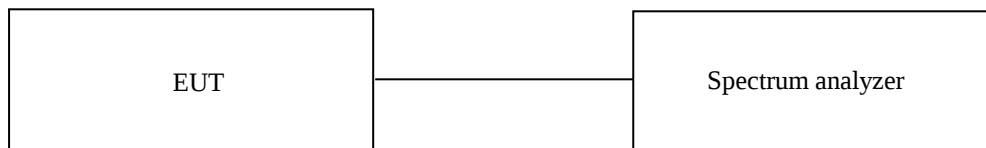
13. 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

13.1 Operating environment

Temperature : 22 °C
Relative humidity : 41 % R.H.

13.2 Test set-up for conducted measurement

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



13.3 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.

13.4 Test Date

October 04, 2023 ~ October 20, 2023

13.5 Test data for conducted emission

For Test data for conducted emission, please refer to the Annex.

13.6 Test data for Transmitting mode radiated emission

13.6.1 Radiated Emission which fall in the Restricted Band

13.6.1.1 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 : 57.20 %
- . Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	ATT (dB)	Duty Factor (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel											
2 322.27	52.81	Peak	H	27.77	6.73	42.57	10.44	-	55.18	74.00	18.82
2 383.02	40.95	Average	H	27.53	6.96	42.55	10.42	2.43	45.74	54.00	8.26
2 342.77	53.12	Peak	V	27.64	6.72	42.56	10.41	-	55.33	74.00	18.67
2 363.81	40.85	Average	V	27.57	6.76	42.55	10.41	2.43	45.47	54.00	8.53
Test Data for High Channel											
2 496.09	53.26	Peak	H	27.51	6.99	42.50	10.44	-	55.70	74.00	18.30
2 483.59	41.62	Average	H	27.53	6.98	42.51	10.45	2.43	46.50	54.00	7.50
2 488.90	52.98	Peak	V	27.52	7.07	42.50	10.44	-	55.51	74.00	18.49
2 486.56	41.46	Average	V	27.53	6.98	42.51	10.45	2.43	46.34	54.00	7.66

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

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

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

13.6.1.2 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 : 57.60 %
- . Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	ATT (dB)	Duty Factor (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel											
2 353.15	53.50	Peak	H	27.59	6.69	42.56	10.41	-	55.63	74.00	18.37
2 386.42	40.91	Average	H	27.53	7.04	42.55	10.43	2.40	45.76	54.00	8.24
2 332.29	52.80	Peak	V	27.71	6.70	42.57	10.44	-	55.08	74.00	18.92
2 383.02	40.91	Average	V	27.53	6.96	42.55	10.42	2.40	45.67	54.00	8.33
Test Data for High Channel											
2 485.25	53.05	Peak	H	27.53	6.98	42.51	10.45	-	55.50	74.00	18.50
2 485.70	41.38	Average	H	27.53	6.98	42.51	10.45	2.40	46.23	54.00	7.77
2 494.72	53.20	Peak	V	27.51	7.07	42.50	10.44	-	55.72	74.00	18.28
2 484.79	41.66	Average	V	27.53	6.98	42.51	10.45	2.40	46.51	54.00	7.49

Tabulated test data for Restricted Band

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

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{AMP Gain} + \text{ATT} + \text{Duty Factor}$$

13.6.1.3 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 : 57.60 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	ATT (dB)	Duty Factor (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel											
2 347.45	52.99	Peak	H	27.62	6.69	42.56	10.41	-	55.15	74.00	18.85
2 381.55	41.10	Average	H	27.54	6.96	42.55	10.42	2.40	45.87	54.00	8.13
2 364.36	52.67	Peak	V	27.57	6.76	42.55	10.41	-	54.86	74.00	19.14
2 375.58	40.92	Average	V	27.55	6.96	42.55	10.42	2.40	45.70	54.00	8.30
Test Data for High Channel											
2 495.61	53.19	Peak	H	27.51	6.99	42.50	10.44	-	55.63	74.00	15.97
2 496.07	41.55	Average	H	27.51	6.99	42.50	10.44	2.40	46.39	54.00	3.05
2 498.57	52.89	Peak	V	27.50	6.99	42.50	10.44	-	55.32	74.00	15.88
2 484.25	41.40	Average	V	27.53	6.98	42.51	10.45	2.40	46.25	54.00	3.34

Tabulated test data for Restricted Band

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

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

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

13.6.2 Spurious & Harmonic Radiated Emission above 1 GHz

13.6.2.1 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 : 57.20 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	Duty Factor (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
4 804.21	49.88	Peak	H	31.21	10.40	41.84	-	49.65	74.00	24.35
4 804.04	39.33	Average	H	31.21	10.40	41.84	2.43	41.53	54.00	12.47
7 206.32	51.73	Peak	H	36.41	12.93	41.80	-	59.27	74.00	14.73
7 206.07	42.43	Average	H	36.41	12.93	41.80	2.43	52.40	54.00	1.60
4 804.62	49.36	Peak	V	31.21	10.40	41.84	-	49.13	74.00	24.87
4 804.36	37.42	Average	V	31.21	10.40	41.84	2.43	39.62	54.00	14.38
7 205.47	49.31	Peak	V	36.41	12.93	41.80	-	56.85	74.00	17.15
7 206.03	38.44	Average	V	36.41	12.93	41.80	2.43	48.41	54.00	5.59
Test Data for Middle Channel										
4 881.96	49.98	Peak	H	31.30	10.31	41.82	-	49.77	74.00	24.23
4 881.96	38.94	Average	H	31.30	10.31	41.82	2.43	41.16	54.00	12.84
7 322.80	51.88	Peak	H	36.30	12.63	41.80	-	59.01	74.00	14.99
7 322.96	41.97	Average	H	36.30	12.63	41.80	2.43	51.53	54.00	2.47
4 880.68	48.96	Peak	V	31.30	10.31	41.82	-	48.75	74.00	25.25
4 881.32	37.31	Average	V	31.30	10.31	41.82	2.43	39.53	54.00	14.47
7 323.33	50.95	Peak	V	36.30	12.63	41.80	-	58.08	74.00	15.92
7 323.04	41.16	Average	V	36.30	12.63	41.80	2.43	50.72	54.00	3.28

Test Data for High Channel										
4 960.10	49.34	Peak	H	31.22	10.41	41.81	-	49.16	74.00	24.84
4 959.78	37.82	Average	H	31.22	10.41	41.81	2.43	40.07	54.00	13.93
7 440.27	49.36	Peak	H	36.56	13.86	41.80	-	57.98	74.00	16.02
7 440.12	36.46	Average	H	36.56	13.86	41.80	2.43	47.51	54.00	6.49
4 960.88	49.38	Peak	V	31.22	10.41	41.81	-	49.20	74.00	24.80
4 957.94	37.21	Average	V	31.22	10.41	41.81	2.43	39.46	54.00	14.54
7 439.91	48.53	Peak	V	36.56	13.86	41.80	-	57.15	74.00	16.85
7 442.03	36.28	Average	V	36.57	13.86	41.80	2.43	47.34	54.00	6.66

Remark: "H": Horizontal, "V": Vertical

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

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

13.6.2.2 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 : 57.60 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	Duty Factor (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
4 803.77	50.13	Peak	H	31.21	10.40	41.84	-	49.90	74.00	24.10
4 804.18	37.33	Average	H	31.21	10.40	41.84	2.40	39.50	54.00	14.50
7 206.67	50.55	Peak	H	36.41	12.93	41.80	-	58.09	74.00	15.91
7 206.10	38.83	Average	H	36.41	12.93	41.80	2.40	48.77	54.00	5.23
4 805.99	49.17	Peak	V	31.21	10.40	41.84	-	48.94	74.00	25.06
4 802.65	37.18	Average	V	31.21	10.40	41.84	2.40	39.35	54.00	14.65
7 206.30	48.46	Peak	V	36.41	12.93	41.80	-	56.00	74.00	18.00
7 205.75	36.40	Average	V	36.41	12.93	41.80	2.40	46.34	54.00	7.66
Test Data for Middle Channel										
4 882.06	50.00	Peak	H	31.30	10.31	41.82	-	49.79	74.00	24.21
4 881.95	37.69	Average	H	31.30	10.31	41.82	2.40	39.88	54.00	14.12
7 323.74	49.62	Peak	H	36.30	12.63	41.80	-	56.75	74.00	17.25
7 322.92	37.81	Average	H	36.30	12.63	41.80	2.40	47.34	54.00	6.66
4 884.25	49.56	Peak	V	31.30	10.31	41.82	-	49.35	74.00	24.65
4 883.40	37.30	Average	V	31.30	10.31	41.82	2.40	39.49	54.00	14.51
7 323.25	50.34	Peak	V	36.30	12.63	41.80	-	57.47	74.00	16.53
7 322.80	37.48	Average	V	36.30	12.63	41.80	2.40	47.01	54.00	6.99
4 882.06	50.00	Peak	H	31.30	10.31	41.82	-	49.79	74.00	24.21

Test Data for High Channel										
4 958.83	49.39	Peak	H	31.22	10.41	41.81	-	49.21	74.00	24.79
4 960.16	37.40	Average	H	31.22	10.41	41.81	2.40	39.62	54.00	14.38
7 438.06	48.53	Peak	H	36.55	13.86	41.80	-	57.14	74.00	16.86
7 441.89	36.37	Average	H	36.57	13.86	41.80	2.40	47.40	54.00	6.60
4 960.00	49.21	Peak	V	31.22	10.41	41.81	-	49.03	74.00	24.97
4 959.18	37.23	Average	V	31.22	10.41	41.81	2.40	39.45	54.00	14.55
7 439.21	48.52	Peak	V	36.56	13.86	41.80	-	57.14	74.00	16.86
7 441.89	36.45	Average	V	36.57	13.86	41.80	2.40	47.48	54.00	6.52

Remark: "H": Horizontal, "V": Vertical

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

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

13.6.2.3 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 : 57.60 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	Duty Factor (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
4 803.00	49.21	Peak	H	31.21	10.40	41.84	-	48.98	74.00	25.02
4 804.54	37.31	Average	H	31.21	10.40	41.84	2.40	39.48	54.00	14.52
7 205.50	49.95	Peak	H	36.41	12.93	41.80	-	57.49	74.00	16.51
7 205.62	37.88	Average	H	36.41	12.93	41.80	2.40	47.82	54.00	6.18
4 802.96	49.08	Peak	V	31.21	10.40	41.84	-	48.85	74.00	25.15
4 801.58	37.29	Average	V	31.20	10.40	41.84	2.40	39.45	54.00	14.55
7 206.05	49.18	Peak	V	36.41	12.93	41.80	-	56.72	74.00	17.28
7 205.79	36.96	Average	V	36.41	12.93	41.80	2.40	46.90	54.00	7.10
Test Data for Middle Channel										
4 884.18	50.15	Peak	H	31.30	10.31	41.82	-	49.94	74.00	24.06
4 884.08	37.39	Average	H	31.30	10.31	41.82	2.40	39.58	54.00	14.42
7 323.26	49.42	Peak	H	36.30	12.63	41.80	-	56.55	74.00	17.45
7 323.20	37.56	Average	H	36.30	12.63	41.80	2.40	47.09	54.00	6.91
4 879.56	49.46	Peak	V	31.30	10.31	41.82	-	49.25	74.00	24.75
4 882.73	37.33	Average	V	31.30	10.31	41.82	2.40	39.52	54.00	14.48
7 323.29	49.79	Peak	V	36.30	12.63	41.80	-	56.92	74.00	17.08
7 322.78	37.97	Average	V	36.30	12.63	41.80	2.40	47.50	54.00	6.50

Test Data for High Channel										
4 959.37	49.19	Peak	H	31.22	10.41	41.81	-	49.01	74.00	24.99
4 960.53	37.14	Average	H	31.22	10.41	41.81	2.40	39.36	54.00	14.64
7 442.43	48.38	Peak	H	36.57	13.86	41.80	-	57.01	74.00	16.99
7 441.76	36.41	Average	H	36.57	13.86	41.80	2.40	47.44	54.00	6.56
4 958.92	49.79	Peak	V	31.22	10.41	41.81	-	49.61	74.00	24.39
4 957.72	37.22	Average	V	31.22	10.41	41.81	2.40	39.44	54.00	14.56
7 439.34	48.74	Peak	V	36.56	13.86	41.80	-	57.36	74.00	16.64
7 440.07	36.33	Average	V	36.56	13.86	41.80	2.40	47.35	54.00	6.65

Remark: "H": Horizontal, "V": Vertical

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

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

14. RADIATED EMISSION TEST

14.1 Operating environment

Temperature : 22 °C
Relative humidity : 41 % R.H.

14.2 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.

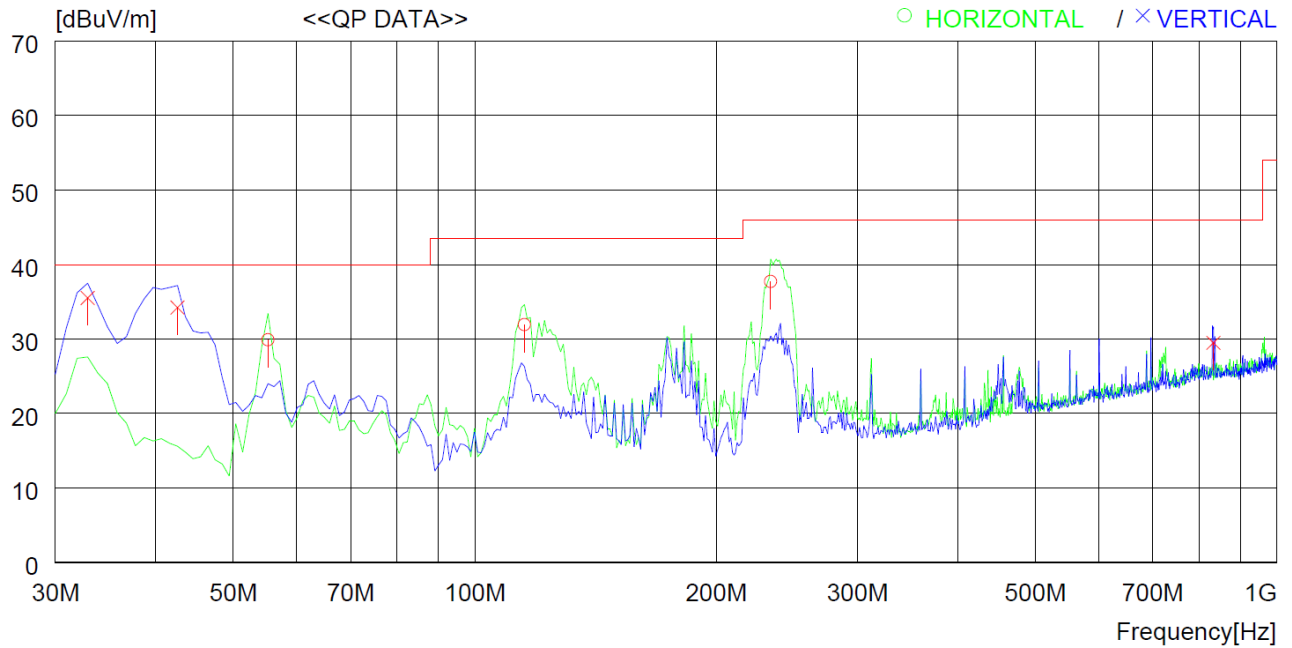
14.3 Test Date

October 04, 2023 ~ October 20, 2023

14.4 Test data for 30 MHz ~ 1 000 MHz

14.4.1 Test data for Bluetooth Mode

- Resolution bandwidth : 120 kHz
- Frequency range : 30 MHz ~ 1 000 MHz
- Measurement distance : 3 m



No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	[dBuV]	FACTOR	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Horizontal -----										
1	55.220	48.3	12.5	1.1	32.0	29.9	40.0	10.1	400	132
2	115.360	44.5	17.8	1.6	32.0	31.9	43.5	11.6	300	197
3	233.700	50.5	16.9	2.3	32.0	37.7	46.0	8.3	200	359
----- Vertical -----										
4	32.910	46.6	20.2	0.9	32.2	35.5	40.0	4.5	200	216
5	42.610	49.5	15.9	0.9	32.1	34.2	40.0	5.8	200	359
6	833.151	30.2	27.2	4.4	32.3	29.5	46.0	16.5	200	120

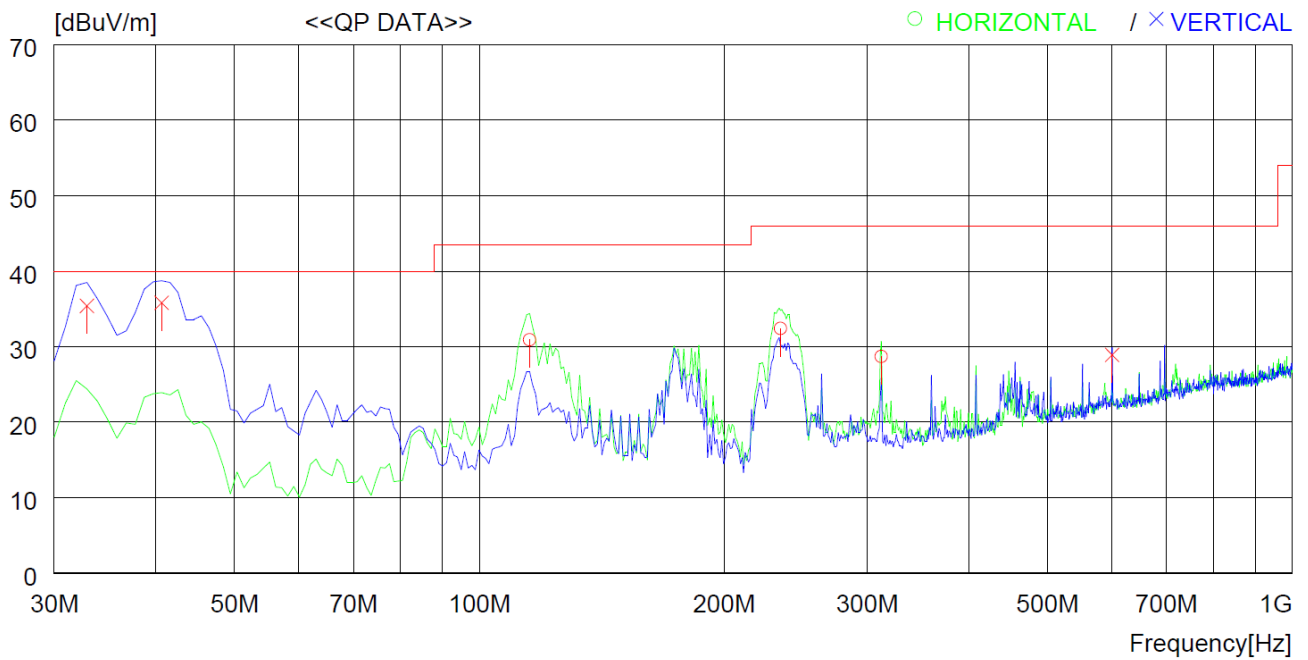
14.4.2 Test data for Intermodulation Mode(Bluetooth + WLAN 2.4 GHz + WLAN 5 GHz)

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

Result : PASSED

EUT : Wi-Fi/BT Transceiver

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



No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	QP	FACTOR							
		[dBuV]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Horizontal -----										
1	115.360	43.5	17.8	1.6	32.0	30.9	43.5	12.6	300	102
2	234.670	45.2	16.9	2.3	32.0	32.4	46.0	13.6	200	116
3	312.270	38.6	19.4	2.7	32.0	28.7	46.0	17.3	100	0
----- Vertical -----										
4	32.910	46.5	20.2	0.9	32.2	35.4	40.0	4.6	200	359
5	40.670	50.3	16.7	0.9	32.1	35.8	40.0	4.2	200	359
6	600.358	33.2	24.1	3.8	32.2	28.9	46.0	17.1	200	359

14.5 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.								

15. CONDUCTED EMISSION TEST

15.1 Operating environment

Temperature : 22 °C
Relative humidity : 41 % R.H.

15.2 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 $50\ \Omega$ / $50\ \mu\text{H}$ + $5\ \Omega$ Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

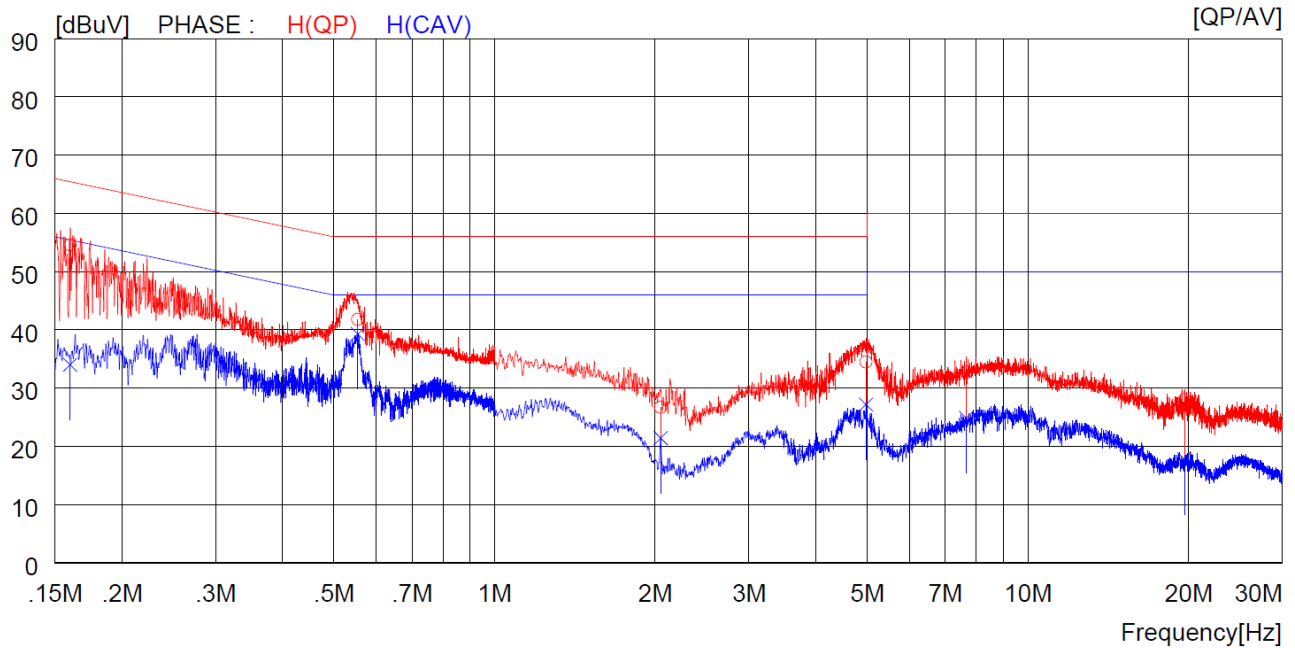
15.3 Test Date

October 04, 2023 ~ October 20, 2023

15.4 Test data

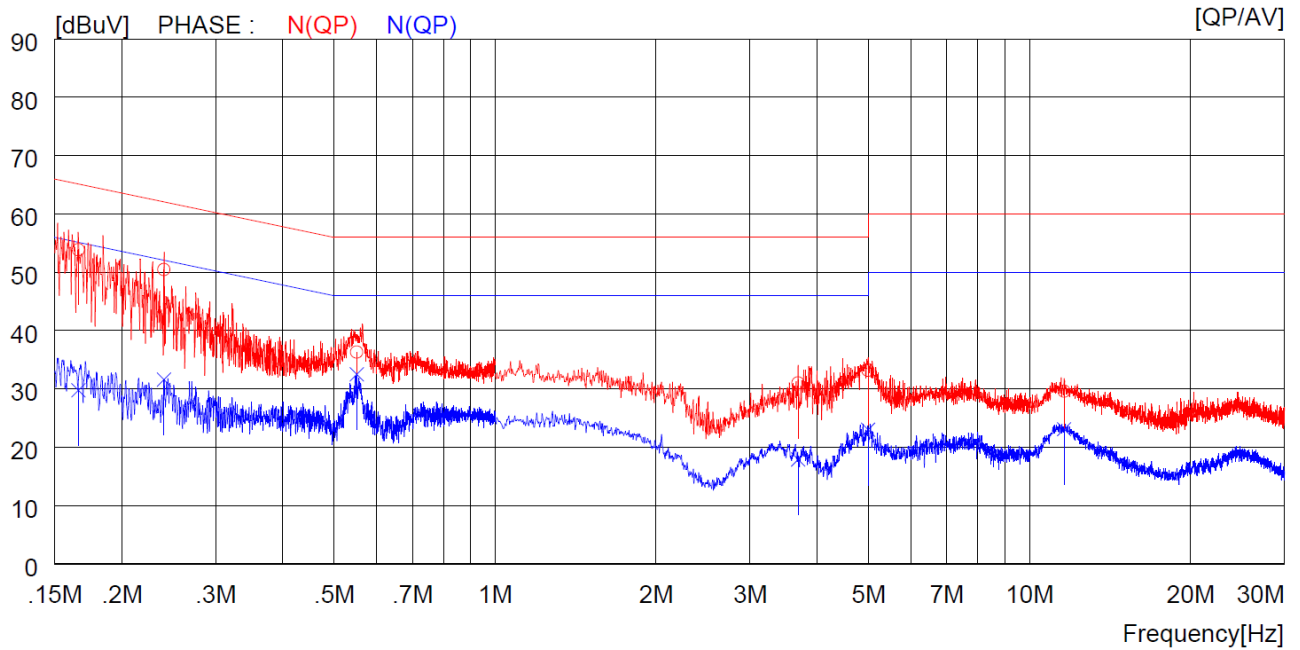
15.4.1 Test data for Bluetooth

- . Resolution bandwidth : 9 kHz
- . Frequency range : 0.15 MHz ~ 30 MHz
- . Tested Line : HOT LINE



NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.16000	44.5	----	10.1	54.6	----	65.5	----	10.9	----	H (QP)
2	0.55400	31.7	----	10.1	41.8	----	56.0	----	14.2	----	H (QP)
3	2.04800	16.4	----	10.3	26.7	----	56.0	----	29.3	----	H (QP)
4	4.96800	24.2	----	10.3	34.5	----	56.0	----	21.5	----	H (QP)
5	7.66000	22.3	----	10.4	32.7	----	60.0	----	27.3	----	H (QP)
6	19.65000	17.5	----	10.5	28.0	----	60.0	----	32.0	----	H (QP)
7	0.16000	----	23.9	10.1	----	34.0	----	55.5	----	21.5	H (CAV)
8	0.55400	----	29.2	10.1	----	39.3	----	46.0	----	6.7	H (CAV)
9	2.04800	----	11.1	10.3	----	21.4	----	46.0	----	24.6	H (CAV)
10	4.96800	----	16.9	10.3	----	27.2	----	46.0	----	18.8	H (CAV)
11	7.66000	----	14.5	10.4	----	24.9	----	50.0	----	25.1	H (CAV)
12	19.65000	----	7.3	10.5	----	17.8	----	50.0	----	32.2	H (CAV)

-. Tested Line : NEUTRAL LINE



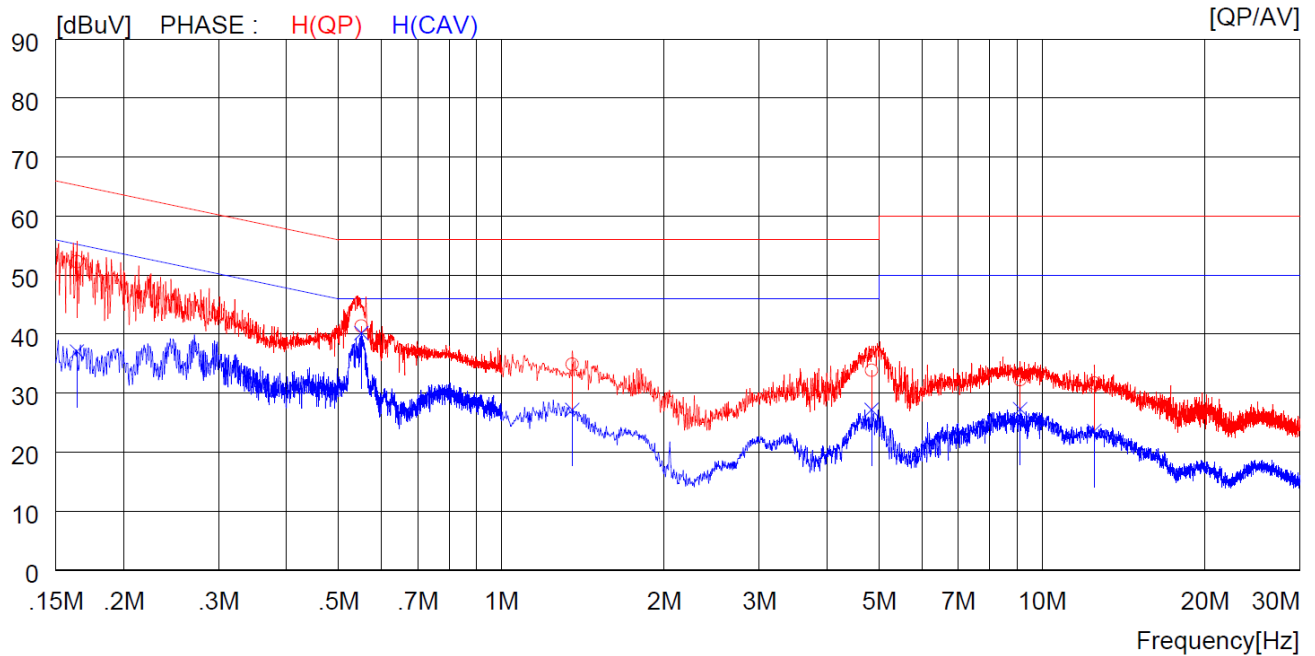
NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.16600	43.8	----	10.1	53.9	----	65.2	----	11.3	----	N(QP)
2	0.24000	40.4	----	10.1	50.5	----	62.1	----	11.6	----	N(QP)
3	0.55100	26.2	----	10.1	36.3	----	56.0	----	19.7	----	N(QP)
4	3.68800	20.7	----	10.3	31.0	----	56.0	----	25.0	----	N(QP)
5	4.98800	22.9	----	10.3	33.2	----	56.0	----	22.8	----	N(QP)
6	11.61000	19.1	----	10.5	29.6	----	60.0	----	30.4	----	N(QP)
7	0.16600	----	19.7	10.1	----	29.8	----	55.2	----	25.4	NCAV)
8	0.24000	----	21.5	10.1	----	31.6	----	52.1	----	20.5	NCAV)
9	0.55100	----	22.4	10.1	----	32.5	----	46.0	----	13.5	NCAV)
10	3.68800	----	7.6	10.3	----	17.9	----	46.0	----	28.1	NCAV)
11	4.98800	----	12.7	10.3	----	23.0	----	46.0	----	23.0	NCAV)
12	11.61000	----	12.6	10.5	----	23.1	----	50.0	----	26.9	NCAV)

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.

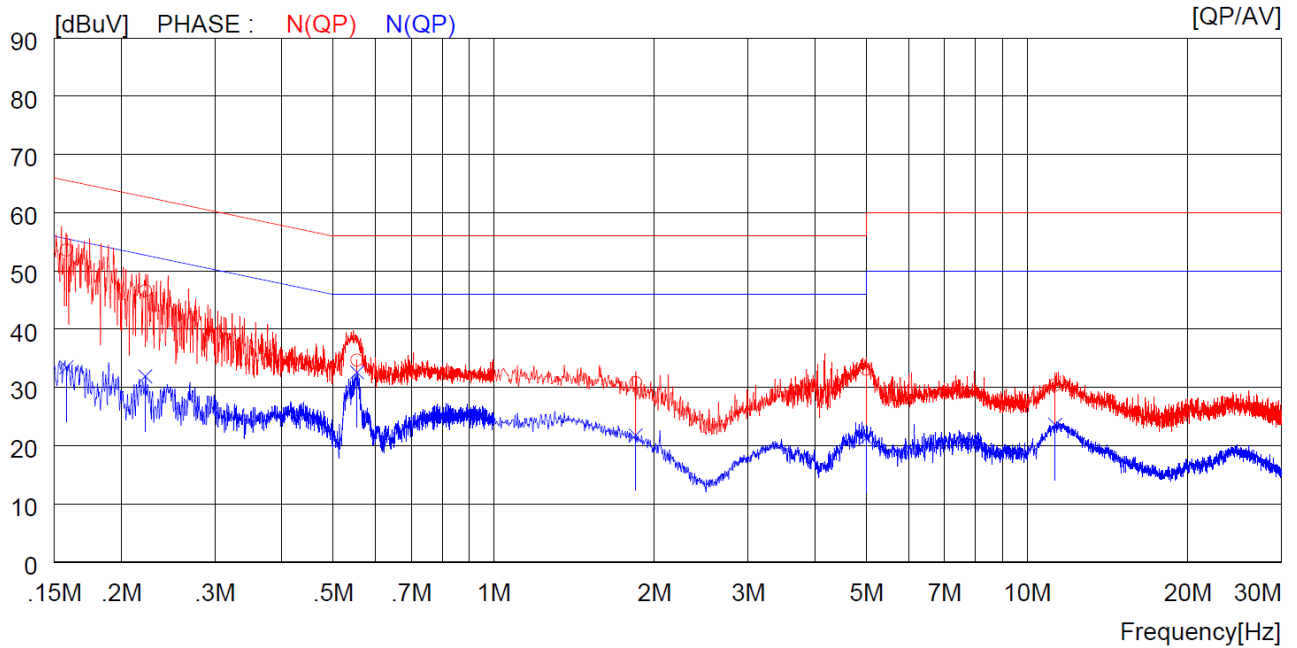
15.4.2 Test data for Intermodulation Mode(Bluetooth + WLAN 2.4 GHz + WLAN 5 GHz)

- Resolution bandwidth : 9 kHz
- Frequency range : 0.15 MHz ~ 30 MHz
- Tested Line : HOT LINE



NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.16400	42.2	----	10.1	52.3	----	65.3	----	13.0	----	H (QP)
2	0.55100	31.3	----	10.1	41.4	----	56.0	----	14.6	----	H (QP)
3	1.35200	24.8	----	10.1	34.9	----	56.0	----	21.1	----	H (QP)
4	4.83600	23.6	----	10.3	33.9	----	56.0	----	22.1	----	H (QP)
5	9.11000	21.8	----	10.5	32.3	----	60.0	----	27.7	----	H (QP)
6	12.49000	21.2	----	10.5	31.7	----	60.0	----	28.3	----	H (QP)
7	0.16400	----	27.0	10.1	----	37.1	----	55.3	----	18.2	H (CAV)
8	0.55100	----	30.1	10.1	----	40.2	----	46.0	----	5.8	H (CAV)
9	1.35200	----	17.1	10.1	----	27.2	----	46.0	----	18.8	H (CAV)
10	4.83600	----	16.9	10.3	----	27.2	----	46.0	----	18.8	H (CAV)
11	9.11000	----	16.8	10.5	----	27.3	----	50.0	----	22.7	H (CAV)
12	12.49000	----	13.1	10.5	----	23.6	----	50.0	----	26.4	H (CAV)

-. Tested Line : NEUTRAL LINE



NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.15800	43.5	----	10.1	53.6	----	65.6	----	12.0	----	N (QP)
2	0.22200	36.5	----	10.1	46.6	----	62.7	----	16.1	----	N (QP)
3	0.55400	24.6	----	10.1	34.7	----	56.0	----	21.3	----	N (QP)
4	1.84400	20.7	----	10.1	30.8	----	56.0	----	25.2	----	N (QP)
5	4.99200	22.8	----	10.3	33.1	----	56.0	----	22.9	----	N (QP)
6	11.28000	19.9	----	10.5	30.4	----	60.0	----	29.6	----	N (QP)
7	0.15800	----	23.4	10.1	----	33.5	----	55.6	----	22.1	NCAV)
8	0.22200	----	21.8	10.1	----	31.9	----	52.7	----	20.8	NCAV)
9	0.55400	----	22.5	10.1	----	32.6	----	46.0	----	13.4	NCAV)
10	1.84400	----	11.7	10.1	----	21.8	----	46.0	----	24.2	NCAV)
11	4.99200	----	11.0	10.3	----	21.3	----	46.0	----	24.7	NCAV)
12	11.28000	----	13.1	10.5	----	23.6	----	50.0	----	26.4	NCAV)

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.

16. LIST OF TEST EQUIPMENT

Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
FSV40-N	Rohde & Schwarz	Signal Analyzer	102196	Apr. 03, 2023 (1Y)
FSVA40	Rohde & Schwarz	Signal Analyzer	101598	Apr. 03, 2023 (1Y)
ESU	Rohde & Schwarz	EMI Test Receiver	100261	Mar. 06, 2023 (1Y)
310N	Sonoma Instrument	Pre-Amplifier	392756	Oct. 16, 2023 (1Y)
SCU18	Rohde & Schwarz	Pre-Amplifier	102266	Jul. 11, 2023 (1Y)
SCU40A	Rohde & Schwarz	Pre-Amplifier	100436	Jan. 18, 2023 (1Y)
DT2000-2t	Innco System	Turn Table	N/A	N/A
MA-4640-XPET	Innco System	Antenna Master	MA4640/652/43100318/P	N/A
CO3000	Innco System	Controller	1026/40960617/P	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	Jun. 22, 2023 (1Y)
BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Jan. 04, 2023 (1Y)
HPF 3GHz	Rohde & Schwarz	High Pass Filter	N/A	Jan. 16, 2023 (1Y)
10 dB Attenuator	Rohde & Schwarz	10 dB Attenuator	14100882-4	Jul. 11, 2023 (1Y)
ESCI	Rohde & Schwarz	EMI TEST RECEIVER	101012	Sep. 26, 2023 (1Y)
NSLK8128	Schwarzbeck	AMN	8128216	Mar. 14, 2023 (1Y)
ESH3-Z2	Rohde & Schwarz	PULSE LIMITER	100655	Mar. 13, 2023 (1Y)