FCC Part 15.247

TEST REPORT

For

Cisco Systems, Inc.

125 West Tasman Drive, San Jose, CA 95134, USA

FCC ID: LDKCNWLE2638

Report Type: Original Report	**Product Type:** Cisco Catalyst 9130AX Series Wi-Fi 6 Access Points

Report Producer : Coco Lin

Report Number : RXZ220804003RF01

Report Date : 2022-08-29

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Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
0.0	RXZ220804003	RXZ220804003RF01	2022-08-29	Original Report	Coco Lin

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Manufacturer	Cisco Systems, Inc.
	125 West Tasman Drive, San Jose, CA 95134, USA
Brand(Trade) Name	CISCO
Product (Equipment)	Cisco Catalyst 9130AX Series Wi-Fi 6 Access Points
Main Model Name	C9130AXE-B
Frequency Range	BLE Mode: 2402 ~ 2480 MHz
Channel Number	40
Transmit Power	0.86 dBm
Modulation Technique	BLE Mode: GFSK
Transmit Data Rate	BLE Mode: 1Mbps
Power Operation (Voltage Range)	55Vdc from PoE port
Received Date	2022/8/4
Date of Test	2022/8/5 ~ 2022/8/24

*All measurement and test data in this report was gathered from production sample serial number: RXZ220804003-01 (Assigned by BACL, New Taipei Laboratory).

1.2 Objective

This report is prepared on behalf of *Cisco Systems, Inc.* in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communication Commission's rules.

1.3 Related Submittal(s)/Grant(s)

N/A.

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.
KDB 558074 D01 15.247 Meas Guidance v05r02

1.5 Statement

Decision Rule: No, (The test results do not include MU judgment)

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
The determination of the test results does not require consideration of the uncertainty of the measurement, unless the assessment is required by customer agreement, regulation or standard document specification.
Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is not responsible for the authenticity of the information provided by the applicant that affects the test results.

1.6 Measurement Uncertainty

Parameter		Uncertainty
AC Mains		±2.36 (dB)
RF output power, conducted		±0.93 (dB)
Power Spectral Density, conducted		±0.92 (dBm/kHz)
Occupied Bandwidth		±0.35 (MHz)
Unwanted Emissions, conducted		±1.69 (dB)
Emissions, radiated	30 MHz~1GHz	±5.22(dB)
	1 GHz~18 GHz	±6.12(dB)
	18 GHz~40 GHz	±4.99(dB)
Temperature		+/- 1.27 °C
Humidity		+/- 3 %

1.7 Environmental Conditions

Test Site	Test Date	Temperature (℃)	Relative Humidity (%)	ATM Pressure (hPa)	Test Engineer
AC Line Conducted Emissions	2022/8/10	25.2	39	1010	Andy.Cheng
Radiation Spurious Emissions	2022/8/5~2022/8/10	23.6	61	1010	Andy.Cheng
Conducted Spurious Emissions	2022/8/24	25.9	50	1010	Boris
6 dB Emission Bandwidth	2022/8/24	25.9	50	1010	Boris
Maximum Output Power	2022/8/24	25.9	50	1010	Boris
100 kHz Bandwidth of Frequency Band Edge	2022/8/24	25.9	50	1010	Boris
Power Spectral Density	2022/8/24	25.9	50	1010	Boris

1.8 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) to collect test data is located on

☒70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 3732) and the FCC designation No.TW3732 under the Mutual Recognition Agreement (MRA) in FCC Test.

2 System Test Configuration

2.1 Description of Test Configuration

For BLE mode, there are totally 40 channels.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	--	--
2	2406	--	--
3	2408	37	2476
--	--	38	2478
19	2440	39	2480

For BLE Modes were tested with channel 0, 19 and 39.

The system was configured for testing in engineering mode, which was provided by manufacturer.

2.2 Equipment Modifications

No modification was made to the EUT.

2.3 EUT Exercise Software

The test software was used "Putty.exe v0.7"

Test Frequency		Low	Middle	High
Power Level Setting	BLE 1M	5	5	5

2.4 Support Equipment List and Details

Description	Manufacturer	Model Number	S/N
POE Adapter	CISCO	SB-PWR-INJ2	C18426663000003170
NB	DELL	E6410	8N7PXN1

2.5 External Cable List and Details

Cable Description	Length (m)	From	To
RJ-45 Cable	1	EUT	POE Adapter
RJ-45 to USB Serial Cable	2	EUT	NB

2.6 Test Mode

Mode 1: BLE ONLY

Mode 2: WIFI 2.4GHz XOR + WIFI 5GHz Regular(4TX) + WIFI 2.4GHz Aux + BLE

Mode 3: WIFI 2.4GHz XOR + WIFI 5GHz Regular(4TX) + WIFI 5GHz Aux + BLE

Mode 4: WIFI 5GHz XOR + WIFI 5GHz Regular(4TX) + WIFI 2.4GHz Aux + BLE

Mode 5: WIFI 5GHz XOR + WIFI 5GHz Regular(4TX) + WIFI 5GHz Aux + BLE

Mode 6: WIFI 5GHz Regular(8TX) + WIFI 2.4GHz Aux + BLE

Mode 7: WIFI 5GHz Regular(8TX) + WIFI 5GHz Aux + BLE

Radiated spurious emissions for Transmitting simultaneously test: Mode 2~7.

Full System (Mode 1: BLE ONLY) for all test item.

Conducted output power for worst case :

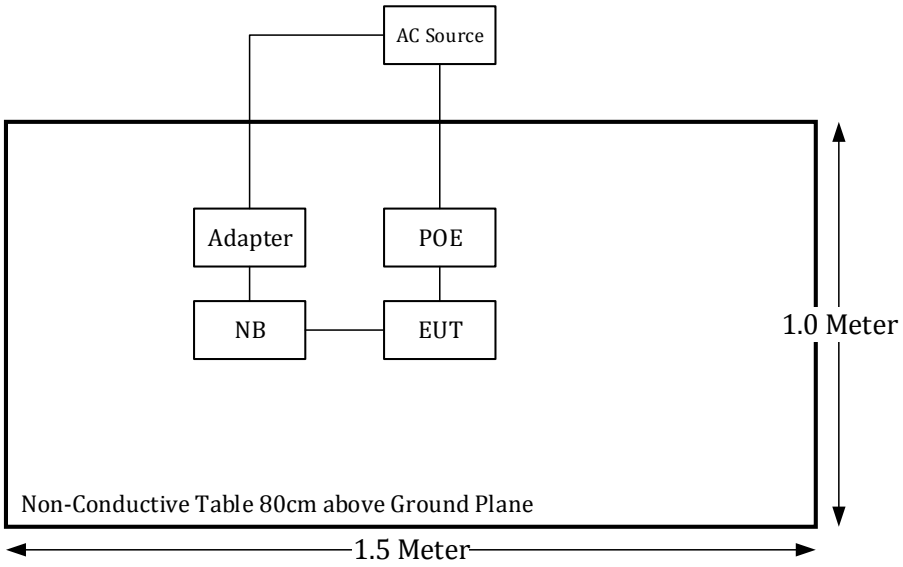
Worst case mode		Output power (dBm)
XOR WIFI-2.4GHz	AX20 Mode, 2437MHz	20.03
XOR WIFI-5GHz	AX80 Mode, 5775MHz	22.19
Regular WIFI-5GHz(4TX)	AX40 Mode, 5230 MHz	21.26
Regular WIFI-5GHz(8TX)	AX20 Mode, 5745MHz	25.24
AUX WIFI-2.4GHz	G Mode, 2437MHz	19.90
AUX WIFI-5GHz	A Mode, 5300MHz	19.96

2.7 Block Diagram of Test Setup

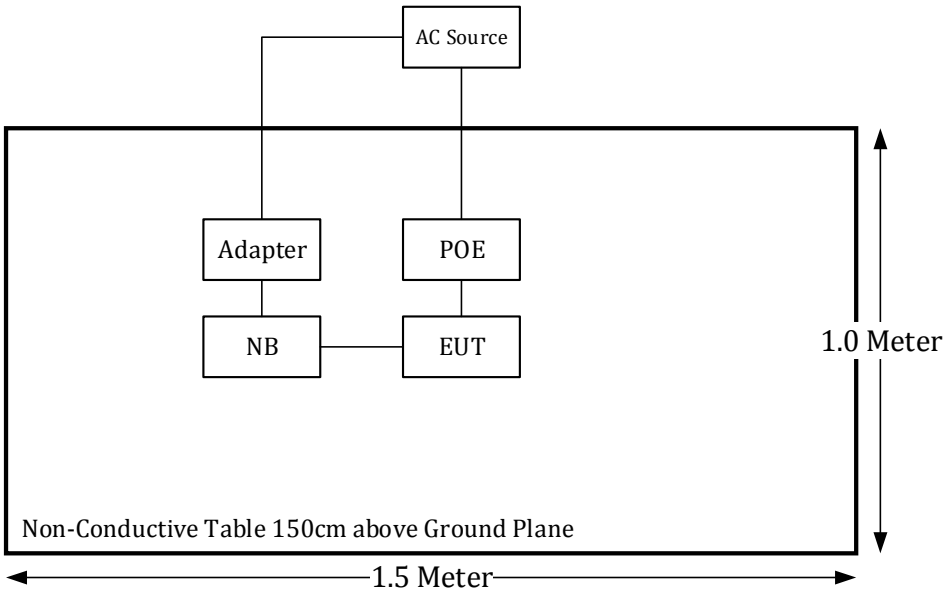
See test photographs attached in setup photos for the actual connections between EUT and support equipment.

Radiation:

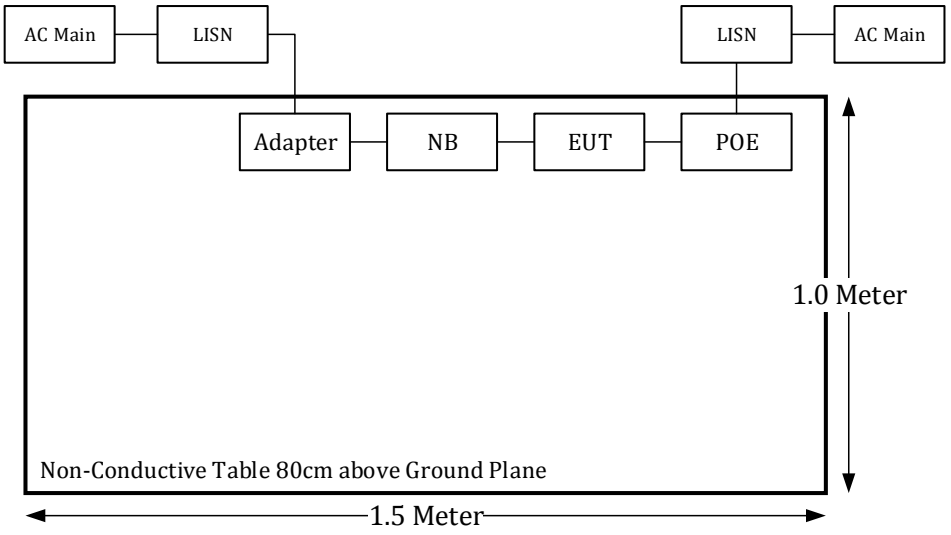
Below 1GHz:



Above 1GHz:



Conduction:


AC Main
LISN
LISN
AC Main
Adapter
NB
EUT
POE
1.0 Meter
Non-Conductive Table 80cm above Ground Plane
1.5 Meter

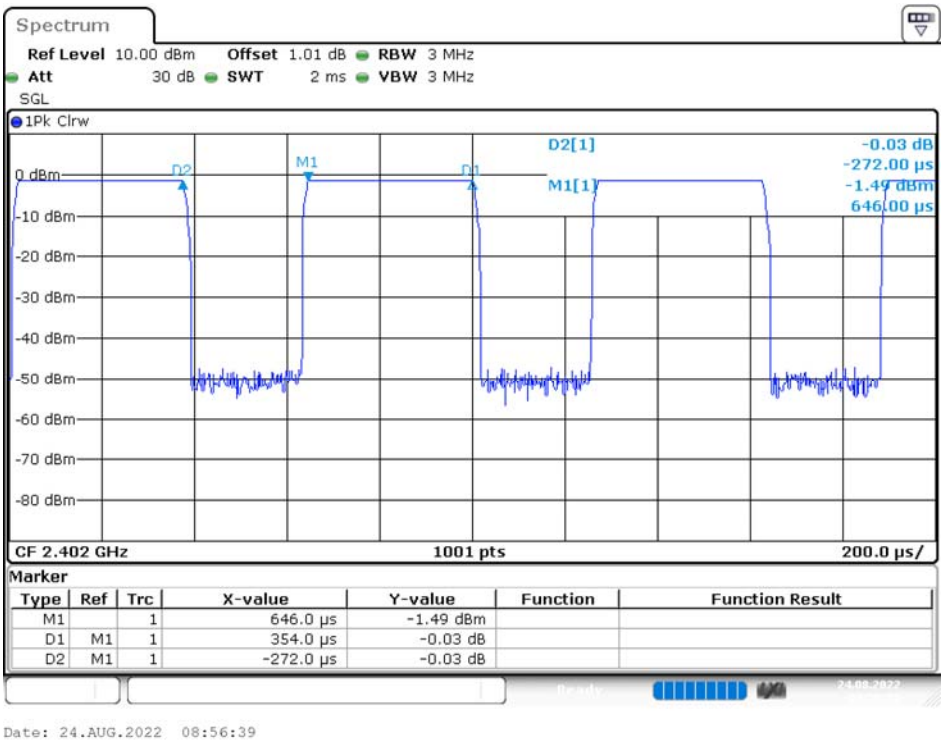
2.8 Duty Cycle

The duty cycle as below:

Radio Mode	T_{on} (ms)	$T_{on}+T_{off}$ (ms)	Duty Cycle (%)
BLE	0.354	0.626	57

Please refer to the following plots.

BLE Mode



3 Summary of Test Results

FCC Rules	Description of Test	Results
§15.247(i), §1.1310, §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207(a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247(a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum Peak Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

4 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conduction Room (CON-A)					
LISN	Rohde & Schwarz	ENV216	101612	2022/01/14	2023/01/13
LISN	Rohde & Schwarz	ENV216	101248	2022/6/22	2023/6/21
EMI Test Receiver	Rohde & Schwarz	ESW8	100947	2022/7/21	2023/7/20
Pulse Limiter	Rohde & Schwarz	ESH3Z2	TXZEM104	2022/7/19	2023/7/18
RF Cable	EMEC	EM-CB5D	1	2022/6/7	2023/6/6
Software	AUDIX	E3	V9.150826k	N.C.R	N.C.R
Radiation 3M Room (966-A)					
Bilog Antenna with 6 dB Attenuator	SUNOL SCIENCES & MINI-CIRCUITS	JB6/UNAT-6+	A050115/15542_01	2022/02/14	2023/02/13
Horn Antenna	EMCO	3115	9809-55583	2021/8/26	2022/8/25
Horn Antenna	ETS-Lindgren	3116	62638	2021/8/11	2022/8/10
Preamplifier	Sonoma	310N	130602	2022/6/8	2023/6/7
Preamplifier	A.H. system Inc.	PAM-0118P	466	2021/11/4	2022/11/3
Microware Preamplifier	EM Electronics Corporation	EM18G40G	60656	2021/12/27	2022/12/26
Spectrum Analyzer	Rohde & Schwarz	FSV40	101435	2021/12/27	2022/12/26
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2021/11/9	2022/11/8
Micro flex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2022/1/24	2023/1/23
Coaxial Cable	COMMATE	PEWC	8Dr	2021/12/24	2022/12/23
Coaxial Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2022/1/24	2023/1/23
Coaxial Cable	JUNFLON	J12J102248-00-B-5	AUG-07-15-044	2021/12/24	2022/12/23
Cable	EMC	EMC105-SM-SM-10000	201003	2022/1/24	2023/1/23
Coaxial Cable	ROSNOL	K1K50-UP0264-K1K50-450CM	160309-1	2022/1/24	2023/1/23
Coaxial Cable	ROSNOL	K1K50-UP0264-K1K50-50CM	15120-1	2022/1/18	2023/1/17
Software	Audix	e3	18621a bacl	N.C.R	N.C.R
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101435	2022/1/13	2023/1/12
Cable	UTIFLEX	UFA210A	9435	2021/10/5	2022/10/4
Power Sensor	KEYSIGHT	U2021XA	MY54080018	2022/1/24	2023/1/23

***Statement of Traceability:** BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to the SI System of Units via the R.O.C. Center for Measurement Standards of the Electronics Testing Center, Taiwan (ETC) or to another internationally recognized National Metrology Institute (NMI), and were compliant with the current Taiwan Accreditation Foundation (TAF) requirements.

5 FCC §15.247(i), §1.1310, §2.1091 - Maximum Permissible Exposure (MPE)

5.1 Applicable Standard

According to subpart 15.247(i)and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm2);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

5.2 RF Exposure Evaluation Result

Mode	Frequency Range (MHz)	Antenna Gain		Target Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
BLE	2402-2480	6	3.98	1	1.26	30	0.0004	1
WIFI 2.4GHz XOR	2412-2462	12	15.85	20.5	112.20	30	0.16	1
WIFI 5GHz XOR	5150-5850	12.02	15.92	22.5	177.83	30	0.25	1
WIFI 5GHz Regular	5150-5850	12.02	15.92	21.5	141.25	30	0.20	1
WIFI 5GHz Regular 8TX	5150-5850	13.78	23.88	25.5	354.81	30	0.75	1
WIFI 2.4GHz AUX	2412-2462	6	3.98	20	100.00	30	0.04	1
WIFI 5GHz AUX	5150-5850	6	3.98	20	100.00	30	0.04	1

Transmit simultaneously:

Worst case is Mode 6:

0.0004/1+0.75/1+0.04/1 = 0.7904 < 1

Result: The EUT meets exemption requirement- RF exposure evaluation greater than **30cm** distance.

6 FCC §15.203 – Antenna Requirements

6.1 Applicable Standard

According to § 15.203,

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna does not exceed 6dBi.

6.2 Antenna Information

Manufacturer	Type	Antenna Gain
N/A	External Antenna	6 dBi

Result: Compliance

7 FCC §15.207(a) – AC Line Conducted Emissions

7.1 Applicable Standard

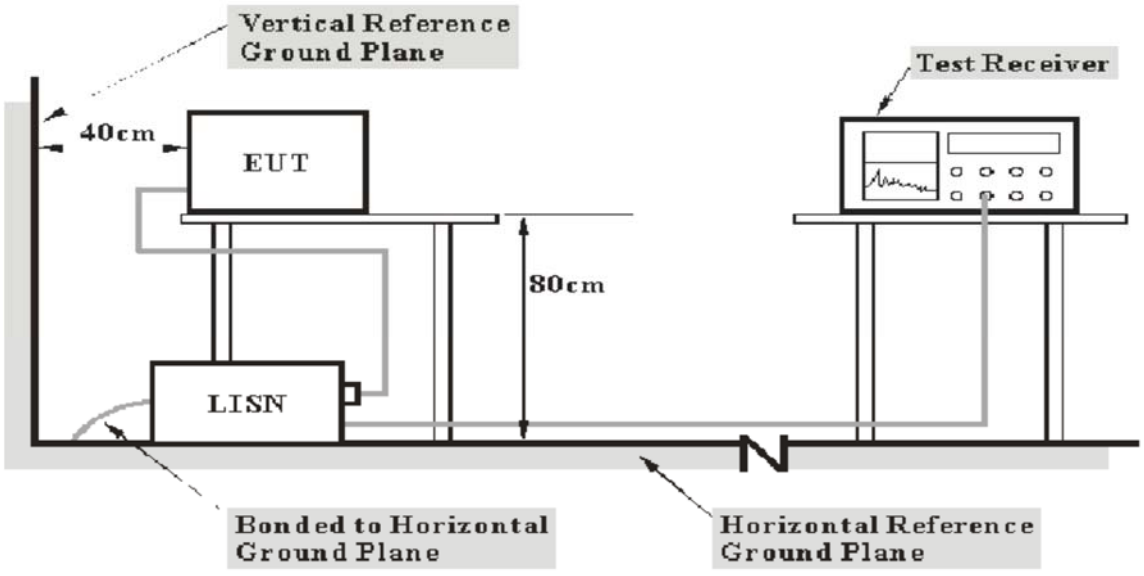
According to §15.207

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 Note 1	56 to 46 Note 1
0.5-5	56	46
5-30	60	50

Note 1: Decreases with the logarithm of the frequency.

7.2 EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

7.3 EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150kHz to 30MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations

Frequency Range	IF B/W
150kHz – 30MHz	9kHz

7.4 Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

7.5 Corrected Factor & Margin Calculation

The factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

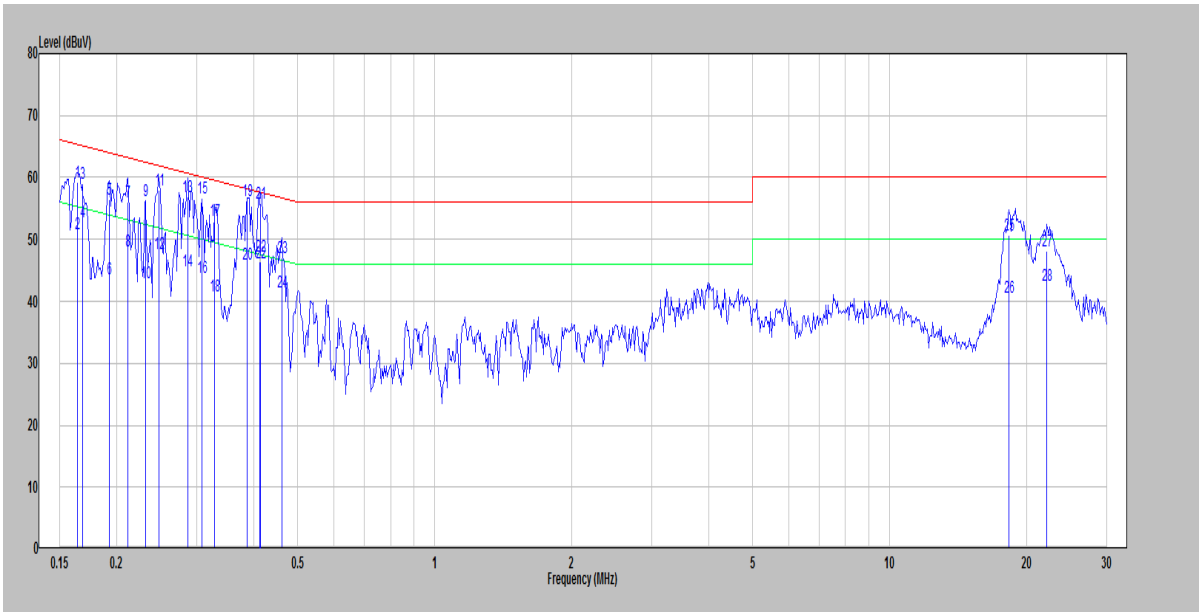
The “Over Limit” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an over limit of -7 dB means the emission is 7 dB below the limit. The equation for Over Limit calculation is as follows:

Over Limit = Level – Limit Line

7.6 Test Results

Test Mode: Transmitting

Main: AC120 V, 60 Hz, Line



No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	
1	0.164	39.82	19.52	59.34	65.25	-5.91	QP
2	0.164	31.45	19.52	50.97	55.25	-4.28	Average
3	0.169	39.53	19.52	59.05	65.03	-5.98	QP
4	0.169	33.29	19.52	52.81	55.03	-2.22	Average
5	0.192	36.92	19.52	56.44	63.93	-7.49	QP
6	0.192	24.10	19.52	43.62	53.93	-10.31	Average
7	0.212	36.62	19.52	56.14	63.14	-7.00	QP
8	0.212	28.62	19.52	48.14	53.14	-5.00	Average
9	0.232	36.76	19.52	56.28	62.39	-6.11	QP
10	0.232	23.42	19.52	42.94	52.39	-9.45	Average
11	0.248	38.49	19.52	58.01	61.82	-3.81	QP
12	0.248	28.12	19.52	47.64	51.82	-4.18	Average
13	0.286	37.41	19.52	56.93	60.63	-3.70	QP
14	0.286	25.46	19.52	44.98	50.63	-5.65	Average
15	0.308	37.27	19.52	56.79	60.02	-3.23	QP
16	0.308	24.35	19.52	43.87	50.02	-6.15	Average
17	0.329	33.46	19.52	52.98	59.49	-6.51	QP
18	0.329	21.37	19.52	40.89	49.49	-8.60	Average
19	0.387	36.75	19.53	56.28	58.12	-1.84	QP
20	0.387	26.44	19.53	45.97	48.12	-2.15	Average
21	0.415	36.27	19.53	55.80	57.55	-1.75	QP

22	0.415	26.70	19.53	46.23	47.55	-1.32	Average
23	0.461	27.42	19.53	46.95	56.67	-9.72	QP
24	0.461	21.92	19.53	41.45	46.67	-5.22	Average
25	18.328	30.93	19.83	50.76	60.00	-9.24	QP
26	18.328	20.73	19.83	40.56	50.00	-9.44	Average
27	22.180	28.20	19.88	48.08	60.00	-11.92	QP
28	22.180	22.66	19.88	42.54	50.00	-7.46	Average

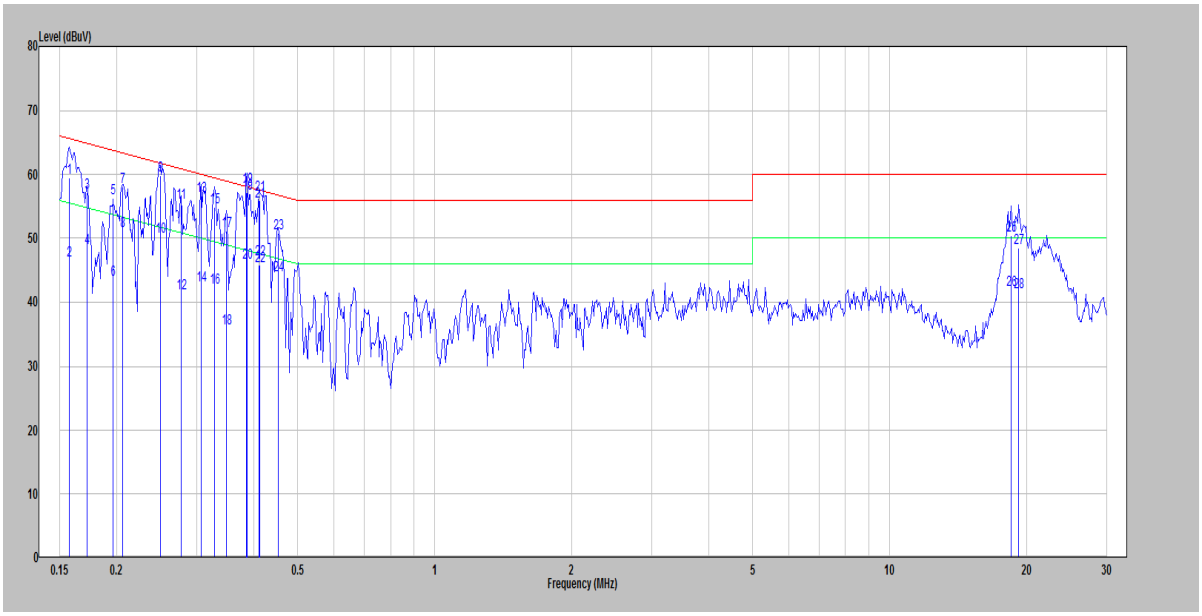
Note:

Level (Result) = Read Level + Factor

Over Limit = Level – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

Main: AC120 V, 60 Hz, Neutral



No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	
1	0.157	39.88	19.51	59.39	65.60	-6.21	QP
2	0.157	27.10	19.51	46.61	55.60	-8.99	Average
3	0.172	37.58	19.51	57.09	64.86	-7.77	QP
4	0.172	29.04	19.51	48.55	54.86	-6.31	Average
5	0.197	36.85	19.51	56.36	63.76	-7.40	QP
6	0.197	24.07	19.51	43.58	53.76	-10.18	Average
7	0.206	38.56	19.51	58.07	63.36	-5.29	QP
8	0.206	31.67	19.51	51.18	53.36	-2.18	Average
9	0.249	40.25	19.51	59.76	61.78	-2.02	QP
10	0.249	30.82	19.51	50.33	51.78	-1.45	Average
11	0.277	36.13	19.52	55.65	60.90	-5.25	QP
12	0.277	21.94	19.52	41.46	50.90	-9.44	Average
13	0.307	37.15	19.52	56.67	60.06	-3.39	QP
14	0.307	23.06	19.52	42.58	50.06	-7.48	Average
15	0.329	35.27	19.52	54.79	59.49	-4.70	QP
16	0.329	22.79	19.52	42.31	49.49	-7.18	Average
17	0.348	31.67	19.52	51.19	59.00	-7.81	QP
18	0.348	16.45	19.52	35.97	49.00	-13.03	Average
19	0.387	37.52	19.53	57.05	58.12	-1.07	QP
20	0.387	26.69	19.53	46.22	48.12	-1.90	Average
21	0.413	36.30	19.53	55.83	57.59	-1.76	QP
22	0.413	26.21	19.53	45.74	47.59	-1.85	Average
23	0.454	31.35	19.53	50.88	56.80	-5.92	QP

24	0.454	24.70	19.53	44.23	46.80	-2.57	Average
25	18.524	30.57	19.89	50.46	60.00	-9.54	QP
26	18.524	22.12	19.89	42.01	50.00	-7.99	Average
27	19.224	28.61	19.90	48.51	60.00	-11.49	QP
28	19.224	21.61	19.90	41.51	50.00	-8.49	Average

Note:

Level (Result) = Read Level + Factor

Over Limit = Level – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

8 FCC §15.209, §15.205 , §15.247(d) – Spurious Emissions

8.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1MHz.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	608 – 614	4. 5 – 5. 15
0.495 – 0.505	16.69475 – 16.69525	960 – 1240	5. 35 – 5. 46
2.1735 – 2.1905	16.80425 – 16.80475	1300 – 1427	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1435 – 1626.5	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1645.5 – 1646.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1660 – 1710	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1718.8 – 1722.2	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	2200 – 2300	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2310 – 2390	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2483.5 – 2500	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2690 – 2900	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	3260 – 3267	22.01 – 23.12
8.41425 – 8.41475	162.0125 –167.17	3.332 – 3.339	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3 3458 – 3 358	31.2 – 31.8
12.51975 – 12.52025	240 – 285	3.600 – 4.400	36.43 – 36.5
12.57675 – 12.57725	322 – 335.4		Above 38.6
13.36 – 13.41	399.9 – 410		

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

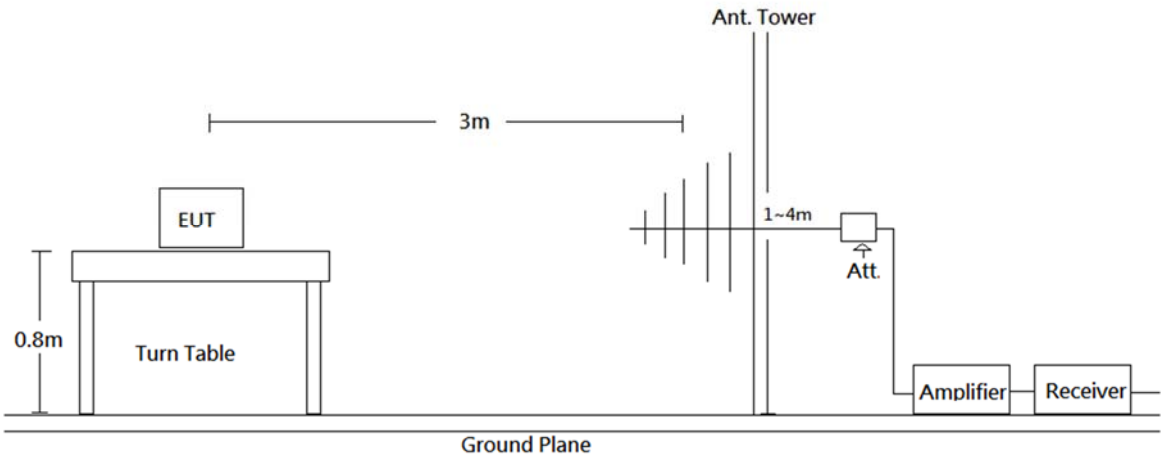
Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

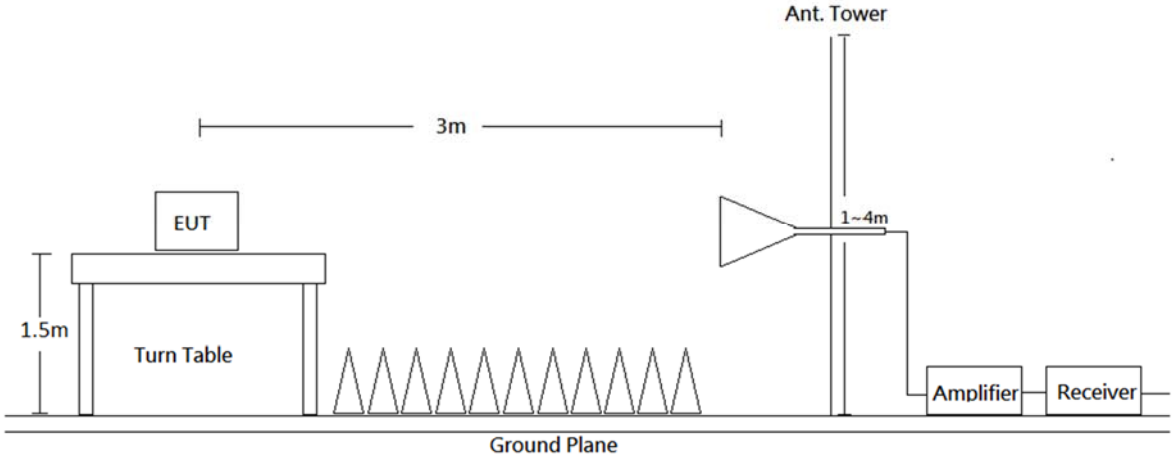
As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

8.2 EUT Setup

Below 1 GHz:



Above 1 GHz:



Radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC Part 15.209 and FCC 15.247 Limits.

8.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 26.5 GHz. During the radiated emission test, the EMI test receiver was set with the following configurations measurement method 6.3 in ANSI C63.10.

Frequency Range	RBW	VBW	Duty cycle	Measurement method
30-1000 MHz	120 kHz	/	/	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1 MHz	10 Hz	>98%	Ave
	1 MHz	1/T	<98%	Ave

Note: T is minimum transmission duration

8.4 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

8.5 Corrected Factor & Margin Calculation

The Correct Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

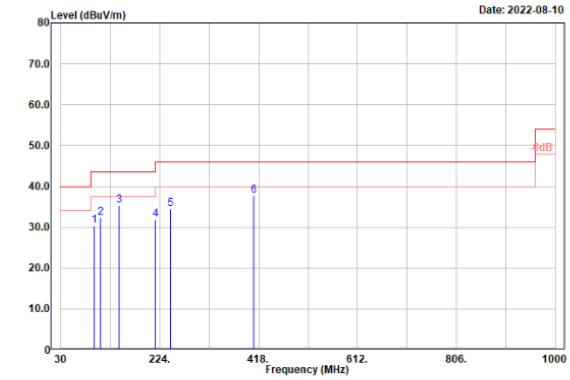
Margin = Result – Limit

8.6 Test Results

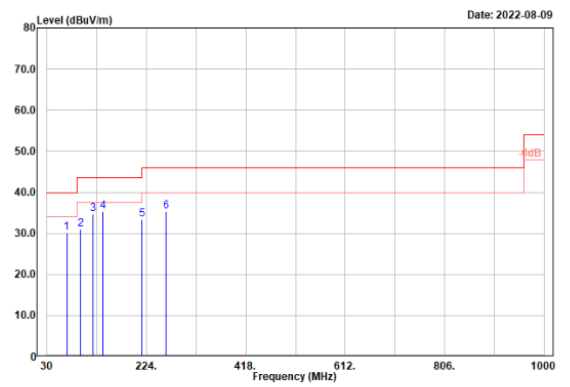
Test Mode: **BLE Mode** (Worst case is BLE mode high channel)

30MHz-1GHz:

BLE Mode / Horizontal	BLE Mode / Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
95.055	43.56	-13.15	30.41	43.50	-13.09	100	63	QP
108.649	42.06	-9.79	32.27	43.50	-11.23	100	86	QP
143.604	44.15	-8.91	35.24	43.50	-8.26	100	89	QP
215.456	42.55	-10.66	31.89	43.50	-11.61	100	75	QP
244.585	43.83	-9.26	34.57	46.00	-11.43	100	125	QP
407.708	41.71	-4.01	37.70	46.00	-8.30	100	147	QP



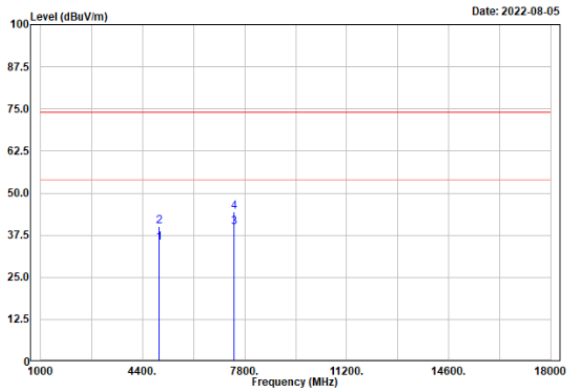
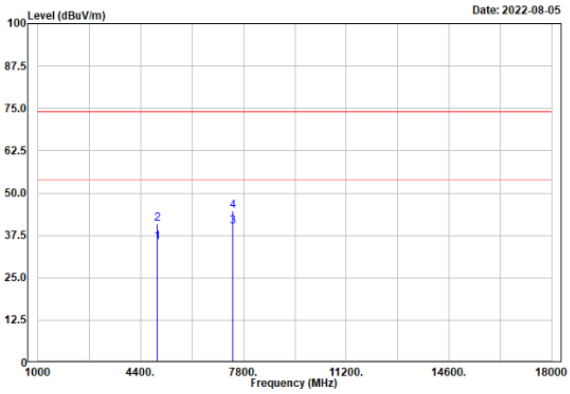
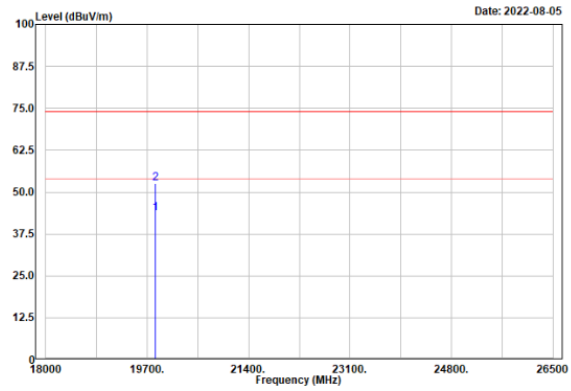
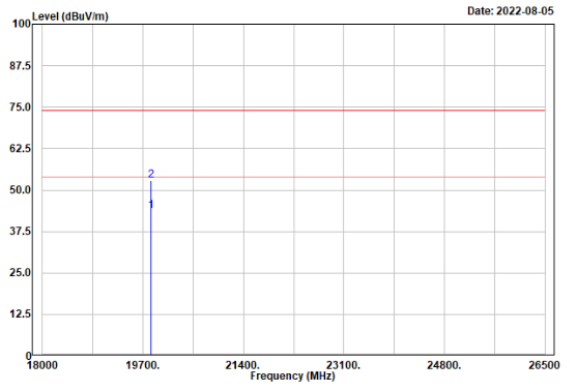
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
68.839	44.42	-14.26	30.16	40.00	-9.84	100	114	QP
95.055	44.09	-13.15	30.94	43.50	-12.56	100	157	QP
119.329	42.70	-8.11	34.59	43.50	-8.91	100	34	QP
139.720	43.97	-8.65	35.32	43.50	-8.18	100	1	QP
215.456	44.14	-10.66	33.48	43.50	-10.02	100	0	QP
263.033	43.72	-8.41	35.31	46.00	-10.69	100	38	QP

Level (Result) = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

BLE Mode / Horizontal (1GHz-18GHz)	BLE Mode / Vertical (1GHz-18GHz)
	
BLE Mode / Horizontal (18GHz – 26.5GHz)	**BLE Mode / Vertical (18GHz – 26.5GHz)**
	

Above 1GHz

Horizontal

Low channel

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4804.000	36.50	-2.70	33.80	54.00	-20.20	176	203	Average
4804.000	42.60	-2.70	39.90	74.00	-34.10	176	203	Peak
7206.000	36.77	2.76	39.53	54.00	-14.47	145	107	Average
7206.000	41.24	2.76	44.00	74.00	-30.00	145	107	Peak

Middle channel

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4880.000	37.23	-2.68	34.55	54.00	-19.45	143	304	Average
4880.000	42.77	-2.68	40.09	74.00	-33.91	143	304	Peak
7320.000	36.60	3.18	39.78	54.00	-14.22	175	359	Average
7320.000	42.00	3.18	45.18	74.00	-28.82	175	359	Peak

High channel

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4960.000	37.69	-2.44	35.25	54.00	-18.75	181	196	Average
4960.000	42.59	-2.44	40.15	74.00	-33.85	181	196	Peak
7440.000	36.33	3.56	39.89	54.00	-14.11	164	350	Average
7440.000	40.91	3.56	44.47	74.00	-29.53	164	350	Peak

Level (Result) = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Low channel

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4804.000	36.72	-2.70	34.02	54.00	-19.98	167	235	Average
4804.000	42.88	-2.70	40.18	74.00	-33.82	167	235	Peak
7206.000	36.94	2.76	39.70	54.00	-14.30	149	0	Average
7206.000	42.31	2.76	45.07	74.00	-28.93	149	0	Peak

Middle channel

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4880.000	37.44	-2.68	34.76	54.00	-19.24	187	337	Average
4880.000	43.91	-2.68	41.23	74.00	-32.77	187	337	Peak
7320.000	36.92	3.18	40.10	54.00	-13.90	200	274	Average
7320.000	42.44	3.18	45.62	74.00	-28.38	200	274	Peak

High channel

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4960.000	37.82	-2.44	35.38	54.00	-18.62	194	192	Average
4960.000	43.23	-2.44	40.79	74.00	-33.21	194	192	Peak
7440.000	36.46	3.56	40.02	54.00	-13.98	168	63	Average
7440.000	41.27	3.56	44.83	74.00	-29.17	168	63	Peak

Level (Result) = Reading + Factor.

Margin = Level – Limit.

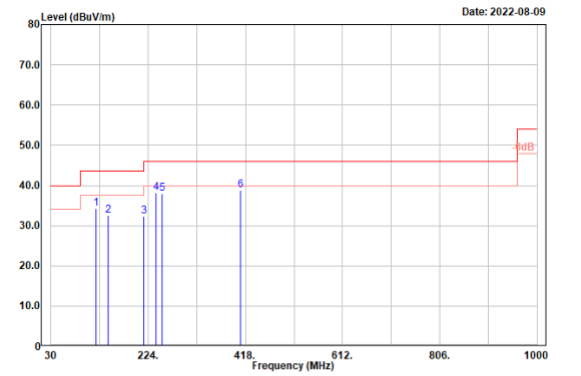
Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

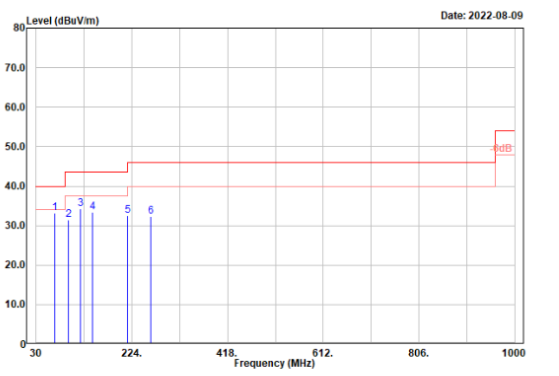
Transmitting simultaneously test:

30MHz-1GHz:

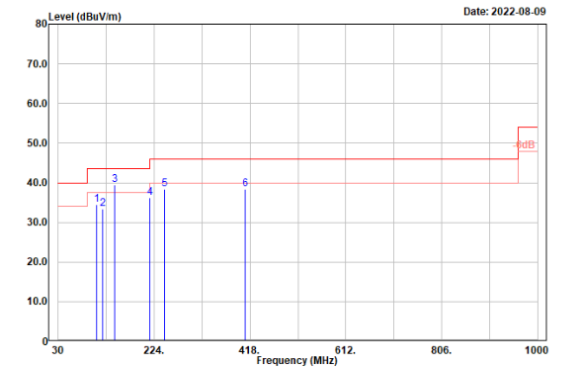
Mode 2 / Horizontal	Mode 2 / Vertical
Mode 3 / Horizontal	Mode 3 / Vertical



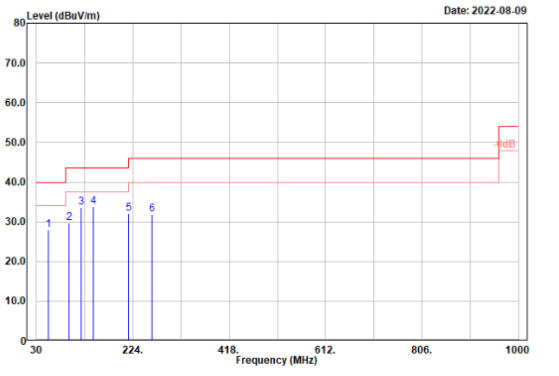
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
119.329	42.36	-8.11	34.25	43.50	-9.25	100	86	QP
143.604	41.45	-8.91	32.54	43.50	-10.96	100	93	QP
215.456	42.88	-10.66	32.22	43.50	-11.28	100	86	QP
239.730	47.62	-9.39	38.23	46.00	-7.77	100	105	QP
251.381	47.38	-9.41	37.97	46.00	-8.03	100	139	QP
407.708	42.84	-4.01	38.83	46.00	-7.17	100	105	QP



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
67.868	47.32	-14.13	33.19	40.00	-6.81	100	24	QP
95.055	44.61	-13.15	31.46	43.50	-12.04	100	24	QP
119.329	42.27	-8.11	34.16	43.50	-9.34	100	0	QP
143.604	42.39	-8.91	33.48	43.50	-10.02	100	1	QP
215.456	43.18	-10.66	32.52	43.50	-10.98	100	350	QP
263.033	40.67	-8.41	32.26	46.00	-13.74	100	335	QP



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
107.678	44.56	-9.99	34.57	43.50	-8.93	100	103	QP
119.329	41.39	-8.11	33.28	43.50	-10.22	100	99	QP
143.604	48.34	-8.91	39.43	43.50	-4.07	100	99	QP
215.456	46.90	-10.66	36.24	43.50	-7.26	100	87	QP
244.585	47.64	-9.26	38.38	46.00	-7.62	100	127	QP
407.708	42.48	-4.01	38.47	46.00	-7.53	100	103	QP



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
53.303	42.98	-15.06	27.92	40.00	-12.08	100	81	QP
95.055	42.81	-13.15	29.66	43.50	-13.84	100	0	QP
119.329	41.73	-8.11	33.62	43.50	-9.88	100	360	QP
143.604	42.63	-8.91	33.72	43.50	-9.78	100	360	QP
215.456	42.77	-10.66	32.11	43.50	-11.39	100	334	QP
263.033	40.32	-8.41	31.91	46.00	-14.09	100	319	QP

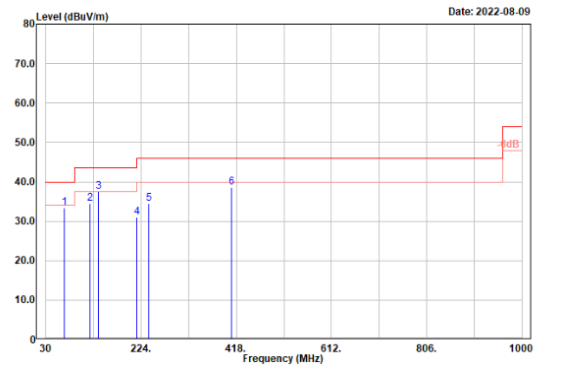
Level (Result) = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

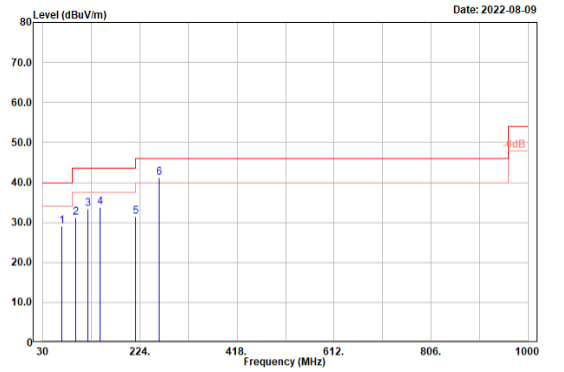
Spurious emissions more than 20 dB below the limit were not reported.

Mode 4 / Horizontal



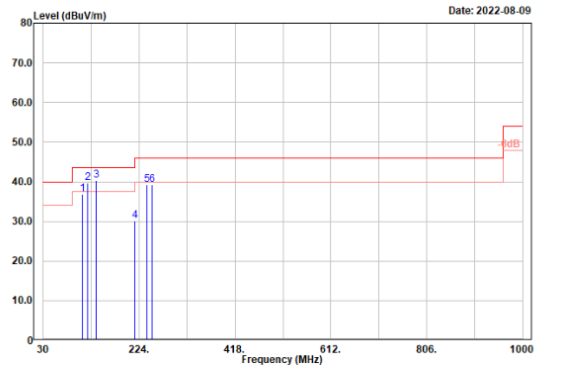
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
67.868	47.47	-14.13	33.34	40.00	-6.66	100	201	QP
119.329	42.61	-8.11	34.50	43.50	-9.00	100	76	QP
137.778	45.89	-8.47	37.42	43.50	-6.08	100	112	QP
215.456	41.77	-10.66	31.11	43.50	-12.39	100	299	QP
239.730	43.78	-9.39	34.39	46.00	-11.61	100	99	QP
407.708	42.52	-4.01	38.51	46.00	-7.49	100	150	QP

Mode 4 / Vertical



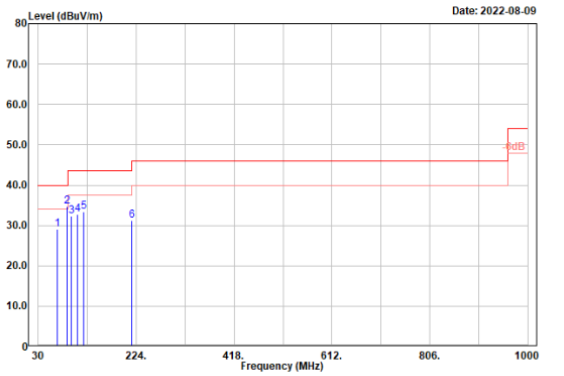
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
67.868	43.28	-14.13	29.15	40.00	-10.85	100	180	QP
95.055	44.28	-13.15	31.13	43.50	-12.37	100	15	QP
119.329	41.39	-8.11	33.28	43.50	-10.22	100	359	QP
143.604	42.66	-8.91	33.75	43.50	-9.75	100	10	QP
215.456	42.17	-10.66	31.51	43.50	-11.99	100	357	QP
263.033	49.53	-8.41	41.12	46.00	-4.88	100	217	QP

Mode 5 / Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
109.620	46.30	-9.55	36.75	43.50	-6.75	100	85	QP
119.329	47.74	-8.11	39.63	43.50	-3.87	100	109	QP
137.778	48.73	-8.47	40.26	43.50	-3.24	100	82	QP
215.456	40.75	-10.66	30.09	43.50	-13.41	100	93	QP
239.730	48.67	-9.39	39.28	46.00	-6.72	100	104	QP
250.410	48.76	-9.42	39.34	46.00	-6.66	100	104	QP

Mode 5 / Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
67.868	43.11	-14.13	28.98	40.00	-11.02	100	261	QP
87.287	49.37	-14.76	34.61	40.00	-5.39	100	114	QP
95.055	45.39	-13.15	32.24	43.50	-11.26	100	28	QP
107.678	42.70	-9.99	32.71	43.50	-10.79	100	352	QP
119.329	41.51	-8.11	33.40	43.50	-10.10	100	352	QP
215.456	41.80	-10.66	31.14	43.50	-12.36	100	352	QP

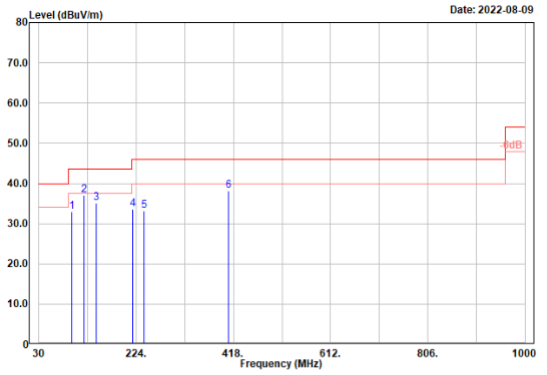
Level (Result) = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

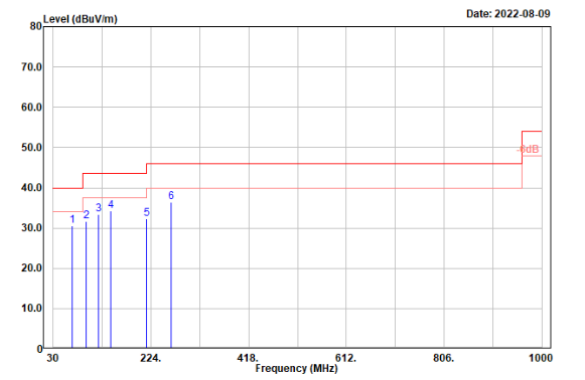
Spurious emissions more than 20 dB below the limit were not reported.

Mode 6 / Horizontal



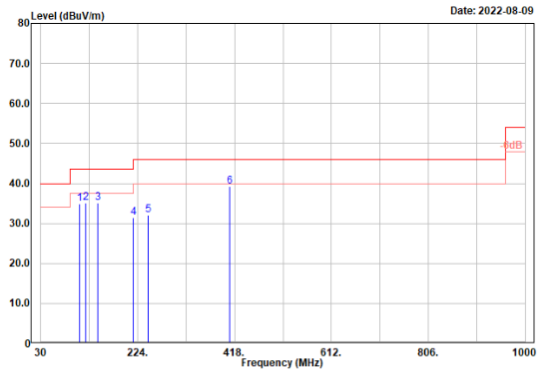
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
95.055	46.04	-13.15	32.89	43.50	-10.61	100	71	QP
119.329	45.11	-8.11	37.00	43.50	-6.50	100	86	QP
143.604	44.00	-8.91	35.09	43.50	-8.41	100	74	QP
217.397	44.19	-10.52	33.67	46.00	-12.33	100	90	QP
239.730	42.49	-9.39	33.10	46.00	-12.90	100	94	QP
407.708	42.09	-4.01	38.08	46.00	-7.92	100	106	QP

Mode 6 / Vertical



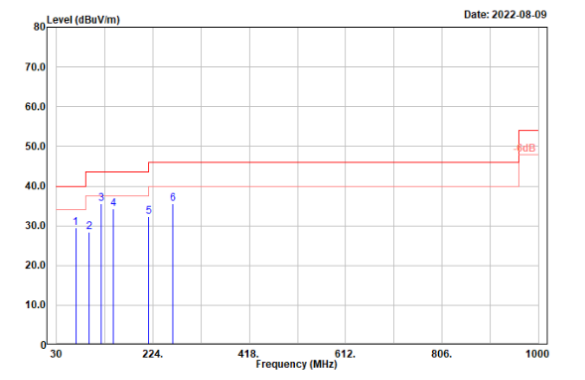
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
67.868	44.71	-14.13	30.58	40.00	-9.42	100	51	QP
95.055	44.80	-13.15	31.65	43.50	-11.85	100	23	QP
119.329	41.56	-8.11	33.45	43.50	-10.05	100	328	QP
143.604	43.19	-8.91	34.28	43.50	-9.22	100	15	QP
215.456	42.93	-10.66	32.27	43.50	-11.23	100	351	QP
264.004	44.62	-8.26	36.36	46.00	-9.64	100	336	QP

Mode 7 / Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
107.678	44.93	-9.99	34.94	43.50	-8.56	100	67	QP
119.329	43.32	-8.11	35.21	43.50	-8.29	100	99	QP
143.604	43.94	-8.91	35.03	43.50	-8.47	100	59	QP
215.456	42.02	-10.66	31.36	43.50	-12.14	100	99	QP
244.585	41.26	-9.26	32.00	46.00	-14.00	100	126	QP
407.708	43.33	-4.01	39.32	46.00	-6.68	100	111	QP

Mode 7 / Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
68.839	43.78	-14.26	29.52	40.00	-10.48	100	88	QP
95.055	41.59	-13.15	28.44	43.50	-15.06	100	17	QP
119.329	43.77	-8.11	35.66	43.50	-7.84	100	338	QP
143.604	43.15	-8.91	34.24	43.50	-9.26	100	9	QP
215.456	42.91	-10.66	32.25	43.50	-11.25	100	359	QP
264.004	43.83	-8.26	35.57	46.00	-10.43	100	326	QP

Level (Result) = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Above 1GHz

Mode 2 :

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	30.16	-3.25	26.91	54.00	-27.09	167	217	Average
4874.000	43.19	-3.25	39.94	74.00	-34.06	167	217	Peak
4960.000	32.70	-3.04	29.66	54.00	-24.34	179	117	Average
4960.000	42.66	-3.04	39.62	74.00	-34.38	179	117	Peak
7311.000	30.49	2.46	32.95	54.00	-21.05	201	272	Average
7311.000	40.95	2.46	43.41	74.00	-30.59	201	272	Peak
7440.000	33.35	2.88	36.23	54.00	-17.77	159	323	Average
7440.000	41.34	2.88	44.22	74.00	-29.78	159	323	Peak
10460.000	32.69	7.20	39.89	54.00	-14.11	174	244	Average
10460.000	40.15	7.20	47.35	74.00	-26.65	174	244	Peak
15690.000	32.09	7.34	39.43	54.00	-14.57	185	323	Average
15690.000	42.52	7.34	49.86	74.00	-24.14	185	323	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19496.000	40.28	0.25	40.53	54.00	-13.47	150	345	Average
19496.000	50.94	0.25	51.19	74.00	-22.81	150	345	Peak
19840.000	41.53	1.22	42.75	54.00	-11.25	150	70	Average
19840.000	51.95	1.22	53.17	74.00	-20.83	150	70	Peak
20920.000	39.69	1.81	41.50	54.00	-12.50	150	264	Average
20920.000	48.54	1.81	50.35	74.00	-23.65	150	264	Peak

Level (Result) = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	34.59	-3.25	31.34	54.00	-22.66	175	27	Average
4874.000	45.31	-3.25	42.06	74.00	-31.94	175	27	Peak
4960.000	33.78	-3.04	30.74	54.00	-23.26	163	165	Average
4960.000	45.61	-3.04	42.57	74.00	-31.43	163	165	Peak
7311.000	32.88	2.46	35.34	54.00	-18.66	169	12	Average
7311.000	42.43	2.46	44.89	74.00	-29.11	169	12	Peak
7440.000	33.70	2.88	36.58	54.00	-17.42	188	335	Average
7440.000	41.89	2.88	44.77	74.00	-29.23	188	335	Peak
10460.000	32.75	7.20	39.95	54.00	-14.05	200	39	Average
10460.000	40.97	7.20	48.17	74.00	-25.83	200	39	Peak
15690.000	32.86	7.34	40.20	54.00	-13.80	179	229	Average
15690.000	42.89	7.34	50.23	74.00	-23.77	179	229	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19496.000	41.97	0.25	42.22	54.00	-11.78	150	0	Average
19496.000	51.15	0.25	51.40	74.00	-22.60	150	0	Peak
19840.000	40.22	1.22	41.44	54.00	-12.56	150	301	Average
19840.000	50.76	1.22	51.98	74.00	-22.02	150	301	Peak
20920.000	39.28	1.81	41.09	54.00	-12.91	150	332	Average
20920.000	49.70	1.81	51.51	74.00	-22.49	150	332	Peak

Level (Result) = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Mode 3:

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	31.87	-3.25	28.62	54.00	-25.38	203	151	Average
4874.000	43.23	-3.25	39.98	74.00	-34.02	203	151	Peak
4960.000	32.77	-3.04	29.73	54.00	-24.27	199	186	Average
4960.000	42.40	-3.04	39.36	74.00	-34.64	199	186	Peak
7311.000	30.43	2.46	32.89	54.00	-21.11	192	197	Average
7311.000	40.29	2.46	42.75	74.00	-31.25	192	197	Peak
7440.000	30.15	2.88	33.03	54.00	-20.97	183	0	Average
7440.000	41.40	2.88	44.28	74.00	-29.72	183	0	Peak
10460.000	30.54	7.20	37.74	54.00	-16.26	171	182	Average
10460.000	40.51	7.20	47.71	74.00	-26.29	171	182	Peak
10600.000	32.19	7.55	39.74	54.00	-14.26	144	10	Average
10600.000	40.52	7.55	48.07	74.00	-25.93	144	10	Peak
15690.000	33.40	7.34	40.74	54.00	-13.26	180	309	Average
15690.000	42.57	7.34	49.91	74.00	-24.09	180	309	Peak
15900.000	32.09	7.30	39.39	54.00	-14.61	153	359	Average
15900.000	41.88	7.30	49.18	74.00	-24.82	153	359	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19496.000	31.59	0.25	31.84	54.00	-22.16	150	170	Average
19496.000	51.11	0.25	51.36	74.00	-22.64	150	170	Peak
19840.000	41.75	1.22	42.97	54.00	-11.03	150	332	Average
19840.000	51.21	1.22	52.43	74.00	-21.57	150	332	Peak
20920.000	39.88	1.81	41.69	54.00	-12.31	150	301	Average
20920.000	49.23	1.81	51.04	74.00	-22.96	150	301	Peak
21200.000	39.75	1.85	41.60	54.00	-12.40	150	2	Average
21200.000	48.93	1.85	50.78	74.00	-23.22	150	2	Peak

Level (Result) = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	32.44	-3.25	29.19	54.00	-24.81	193	127	Average
4874.000	43.52	-3.25	40.27	74.00	-33.73	193	127	Peak
4960.000	32.95	-3.04	29.91	54.00	-24.09	188	197	Average
4960.000	42.49	-3.04	39.45	74.00	-34.55	188	197	Peak
7311.000	30.90	2.46	33.36	54.00	-20.64	163	197	Average
7311.000	40.67	2.46	43.13	74.00	-30.87	163	197	Peak
7440.000	30.68	2.88	33.56	54.00	-20.44	180	360	Average
7440.000	41.54	2.88	44.42	74.00	-29.58	180	360	Peak
10460.000	30.63	7.20	37.83	54.00	-16.17	170	47	Average
10460.000	40.67	7.20	47.87	74.00	-26.13	170	47	Peak
10600.000	32.43	7.55	39.98	54.00	-14.02	201	192	Average
10600.000	40.96	7.55	48.51	74.00	-25.49	201	192	Peak
15690.000	33.55	7.34	40.89	54.00	-13.11	174	75	Average
15690.000	43.78	7.34	51.12	74.00	-22.88	174	75	Peak
15900.000	32.15	7.30	39.45	54.00	-14.55	153	251	Average
15900.000	42.44	7.30	49.74	74.00	-24.26	153	251	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19496.000	42.52	0.25	42.77	54.00	-11.23	150	126	Average
19496.000	52.34	0.25	52.59	74.00	-21.41	150	126	Peak
19840.000	42.10	1.22	43.32	54.00	-10.68	150	126	Average
19840.000	52.13	1.22	53.35	74.00	-20.65	150	126	Peak
20920.000	40.58	1.81	42.39	54.00	-11.61	150	309	Average
20920.000	49.13	1.81	50.94	74.00	-23.06	150	309	Peak
21200.000	41.35	1.85	43.20	54.00	-10.80	150	352	Average
21200.000	49.41	1.85	51.26	74.00	-22.74	150	352	Peak

Level (Result) = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Mode 4:

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4960.000	33.83	-3.04	30.79	54.00	-23.21	153	325	Average
4960.000	42.81	-3.04	39.77	74.00	-34.23	153	325	Peak
7440.000	31.22	2.88	34.10	54.00	-19.90	164	69	Average
7440.000	41.04	2.88	43.92	74.00	-30.08	164	69	Peak
10460.000	31.28	7.20	38.48	54.00	-15.52	179	155	Average
10460.000	40.08	7.20	47.28	74.00	-26.72	179	155	Peak
10600.000	30.46	7.55	38.01	54.00	-15.99	205	166	Average
10600.000	40.36	7.55	47.91	74.00	-26.09	205	166	Peak
11550.000	31.38	7.70	39.08	54.00	-14.92	160	22	Average
11550.000	40.32	7.70	48.02	74.00	-25.98	160	22	Peak
15690.000	32.74	7.34	40.08	54.00	-13.92	169	310	Average
15690.000	42.82	7.34	50.16	74.00	-23.84	169	310	Peak
15900.000	31.80	7.30	39.10	54.00	-14.90	172	333	Average
15900.000	42.42	7.30	49.72	74.00	-24.28	172	333	Peak
17325.000	32.06	13.49	45.55	54.00	-8.45	155	69	Average
17325.000	40.58	13.49	54.07	74.00	-19.93	155	69	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19496.000	41.52	0.25	41.77	54.00	-12.23	150	23	Average
19496.000	51.08	0.25	51.33	74.00	-22.67	150	23	Peak
19840.000	40.33	1.22	41.55	54.00	-12.45	150	210	Average
19840.000	50.64	1.22	51.86	74.00	-22.14	150	210	Peak
20920.000	39.55	1.81	41.36	54.00	-12.64	150	23	Average
20920.000	49.35	1.81	51.16	74.00	-22.84	150	23	Peak
23100.000	38.07	2.28	40.35	54.00	-13.65	150	116	Average
23100.000	48.20	2.28	50.48	74.00	-23.52	150	116	Peak

Level (Result) = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4960.000	34.30	-3.04	31.26	54.00	-22.74	167	171	Average
4960.000	43.61	-3.04	40.57	74.00	-33.43	167	171	Peak
7440.000	31.58	2.88	34.46	54.00	-19.54	158	67	Average
7440.000	41.98	2.88	44.86	74.00	-29.14	158	67	Peak
10460.000	31.34	7.20	38.54	54.00	-15.46	178	105	Average
10460.000	40.15	7.20	47.35	74.00	-26.65	178	105	Peak
10600.000	30.75	7.55	38.30	54.00	-15.70	152	17	Average
10600.000	41.58	7.55	49.13	74.00	-24.87	152	17	Peak
11550.000	31.59	7.70	39.29	54.00	-14.71	202	206	Average
11550.000	40.58	7.70	48.28	74.00	-25.72	202	206	Peak
15690.000	33.87	7.34	41.21	54.00	-12.79	161	350	Average
15690.000	43.67	7.34	51.01	74.00	-22.99	161	350	Peak
15900.000	31.92	7.30	39.22	54.00	-14.78	164	32	Average
15900.000	42.51	7.30	49.81	74.00	-24.19	164	32	Peak
17325.000	32.16	13.49	45.65	54.00	-8.35	176	36	Average
17325.000	40.68	13.49	54.17	74.00	-19.83	176	36	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19496.000	41.63	0.25	41.88	54.00	-12.12	150	85	Average
19496.000	51.18	0.25	51.43	74.00	-22.57	150	85	Peak
19840.000	40.46	1.22	41.68	54.00	-12.32	150	214	Average
19840.000	50.91	1.22	52.13	74.00	-21.87	150	214	Peak
20920.000	39.71	1.81	41.52	54.00	-12.48	150	350	Average
20920.000	49.84	1.81	51.65	74.00	-22.35	150	350	Peak
23100.000	38.34	2.28	40.62	54.00	-13.38	150	229	Average
23100.000	48.59	2.28	50.87	74.00	-23.13	150	229	Peak

Level (Result) = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Mode 5:

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4960.000	31.30	-3.04	28.26	54.00	-25.74	192	2	Average
4960.000	43.40	-3.04	40.36	74.00	-33.64	192	2	Peak
7440.000	30.39	2.88	33.27	54.00	-20.73	179	156	Average
7440.000	41.18	2.88	44.06	74.00	-29.94	179	156	Peak
10460.000	30.59	7.20	37.79	54.00	-16.21	186	180	Average
10460.000	40.71	7.20	47.91	74.00	-26.09	186	180	Peak
10600.000	30.86	7.55	38.41	54.00	-15.59	143	176	Average
10600.000	40.98	7.55	48.53	74.00	-25.47	143	176	Peak
11550.000	31.52	7.70	39.22	54.00	-14.78	165	289	Average
11550.000	40.21	7.70	47.91	74.00	-26.09	165	289	Peak
15690.000	32.33	7.34	39.67	54.00	-14.33	157	3	Average
15690.000	42.09	7.34	49.43	74.00	-24.57	157	3	Peak
15900.000	32.23	7.30	39.53	54.00	-14.47	171	214	Average
15900.000	41.10	7.30	48.40	74.00	-25.60	171	214	Peak
17325.000	30.07	13.49	43.56	54.00	-10.44	166	360	Average
17325.000	40.28	13.49	53.77	74.00	-20.23	166	360	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19840.000	38.04	1.22	39.26	54.00	-14.74	150	174	Average
19840.000	48.53	1.22	49.75	74.00	-24.25	150	174	Peak
20920.000	38.55	1.81	40.36	54.00	-13.64	150	1	Average
20920.000	48.11	1.81	49.92	74.00	-24.08	150	1	Peak
21200.000	38.57	1.85	40.42	54.00	-13.58	150	96	Average
21200.000	48.49	1.85	50.34	74.00	-23.66	150	96	Peak
23100.000	42.08	2.28	44.36	54.00	-9.64	150	236	Average
23100.000	49.27	2.28	51.55	74.00	-22.45	150	236	Peak

Level (Result) = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4960.000	31.34	-3.04	28.30	54.00	-25.70	169	77	Average
4960.000	43.44	-3.04	40.40	74.00	-33.60	169	77	Peak
7440.000	30.46	2.88	33.34	54.00	-20.66	147	353	Average
7440.000	41.22	2.88	44.10	74.00	-29.90	147	353	Peak
10460.000	30.68	7.20	37.88	54.00	-16.12	153	124	Average
10460.000	40.80	7.20	48.00	74.00	-26.00	153	124	Peak
10600.000	30.91	7.55	38.46	54.00	-15.54	164	261	Average
10600.000	41.05	7.55	48.60	74.00	-25.40	164	261	Peak
11550.000	31.77	7.70	39.47	54.00	-14.53	179	170	Average
11550.000	40.36	7.70	48.06	74.00	-25.94	179	170	Peak
15690.000	32.72	7.34	40.06	54.00	-13.94	181	272	Average
15690.000	42.38	7.34	49.72	74.00	-24.28	181	272	Peak
15900.000	32.46	7.30	39.76	54.00	-14.24	184	3	Average
15900.000	42.14	7.30	49.44	74.00	-24.56	184	3	Peak
17325.000	30.23	13.49	43.72	54.00	-10.28	159	162	Average
17325.000	40.49	13.49	53.98	74.00	-20.02	159	162	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19840.000	42.19	1.22	43.41	54.00	-10.59	150	264	Average
19840.000	52.39	1.22	53.61	74.00	-20.39	150	264	Peak
20920.000	38.92	1.81	40.73	54.00	-13.27	150	127	Average
20920.000	48.22	1.81	50.03	74.00	-23.97	150	127	Peak
21200.000	39.25	1.85	41.10	54.00	-12.90	150	95	Average
21200.000	49.77	1.85	51.62	74.00	-22.38	150	95	Peak
23100.000	38.27	2.28	40.55	54.00	-13.45	150	48	Average
23100.000	48.65	2.28	50.93	74.00	-23.07	150	48	Peak

Level (Result) = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Mode 6:

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	31.11	-3.25	27.86	54.00	-26.14	188	229	Average
4874.000	42.22	-3.25	38.97	74.00	-35.03	188	229	Peak
4960.000	30.27	-3.04	27.23	54.00	-26.77	203	229	Average
4960.000	42.07	-3.04	39.03	74.00	-34.97	203	229	Peak
7311.000	32.54	2.46	35.00	54.00	-19.00	169	5	Average
7311.000	41.00	2.46	43.46	74.00	-30.54	169	5	Peak
7440.000	30.87	2.88	33.75	54.00	-20.25	173	197	Average
7440.000	39.88	2.88	42.76	74.00	-31.24	173	197	Peak
11490.000	31.15	7.50	38.65	54.00	-15.35	165	112	Average
11490.000	39.62	7.50	47.12	74.00	-26.88	165	112	Peak
17235.000	31.63	12.83	44.46	54.00	-9.54	167	327	Average
17235.000	41.03	12.83	53.86	74.00	-20.14	167	327	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19496.000	41.25	0.25	41.50	54.00	-12.50	150	253	Average
19496.000	51.49	0.25	51.74	74.00	-22.26	150	253	Peak
19840.000	40.44	1.22	41.66	54.00	-12.34	150	342	Average
19840.000	50.68	1.22	51.90	74.00	-22.10	150	342	Peak
22980.000	41.10	2.57	43.67	54.00	-10.33	150	360	Average
22980.000	48.56	2.57	51.13	74.00	-22.87	150	360	Peak

Level (Result) = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	31.41	-3.25	28.16	54.00	-25.84	160	29	Average
4874.000	42.56	-3.25	39.31	74.00	-34.69	160	29	Peak
4960.000	30.98	-3.04	27.94	54.00	-26.06	173	180	Average
4960.000	42.42	-3.04	39.38	74.00	-34.62	173	180	Peak
7311.000	32.67	2.46	35.13	54.00	-18.87	155	226	Average
7311.000	42.14	2.46	44.60	74.00	-29.40	155	226	Peak
7440.000	30.92	2.88	33.80	54.00	-20.20	200	188	Average
7440.000	41.00	2.88	43.88	74.00	-30.12	200	188	Peak
11490.000	31.56	7.50	39.06	54.00	-14.94	197	219	Average
11490.000	39.97	7.50	47.47	74.00	-26.53	197	219	Peak
17235.000	31.99	12.83	44.82	54.00	-9.18	180	156	Average
17235.000	41.07	12.83	53.90	74.00	-20.10	180	156	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19496.000	41.52	0.25	41.77	54.00	-12.23	150	273	Average
19496.000	51.93	0.25	52.18	74.00	-21.82	150	273	Peak
19840.000	40.55	1.22	41.77	54.00	-12.23	150	108	Average
19840.000	50.96	1.22	52.18	74.00	-21.82	150	108	Peak
22980.000	41.27	2.57	43.84	54.00	-10.16	150	192	Average
22980.000	48.64	2.57	51.21	74.00	-22.79	150	192	Peak

Level (Result) = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Mode 7:

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	32.12	-3.25	28.87	54.00	-25.13	155	266	Average
4874.000	42.16	-3.25	38.91	74.00	-35.09	155	266	Peak
4960.000	31.21	-3.04	28.17	54.00	-25.83	172	76	Average
4960.000	42.20	-3.04	39.16	74.00	-34.84	172	76	Peak
7311.000	30.01	2.46	32.47	54.00	-21.53	199	320	Average
7311.000	40.05	2.46	42.51	74.00	-31.49	199	320	Peak
7440.000	30.28	2.88	33.16	54.00	-20.84	187	59	Average
7440.000	40.46	2.88	43.34	74.00	-30.66	187	59	Peak
10600.000	30.43	7.55	37.98	54.00	-16.02	142	173	Average
10600.000	40.27	7.55	47.82	74.00	-26.18	142	173	Peak
11490.000	30.08	7.50	37.58	54.00	-16.42	163	339	Average
11490.000	39.91	7.50	47.41	74.00	-26.59	163	339	Peak
15900.000	31.67	7.30	38.97	54.00	-15.03	200	199	Average
15900.000	41.26	7.30	48.56	74.00	-25.44	200	199	Peak
17235.000	30.11	12.83	42.94	54.00	-11.06	202	281	Average
17235.000	40.63	12.83	53.46	74.00	-20.54	202	281	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19496.000	40.15	0.25	40.40	54.00	-13.60	150	73	Average
19496.000	50.09	0.25	50.34	74.00	-23.66	150	73	Peak
19840.000	41.33	1.22	42.55	54.00	-11.45	150	0	Average
19840.000	51.28	1.22	52.50	74.00	-21.50	150	0	Peak
21200.000	40.00	1.85	41.85	54.00	-12.15	150	245	Average
21200.000	48.48	1.85	50.33	74.00	-23.67	150	245	Peak
22980.000	39.86	2.57	42.43	54.00	-11.57	150	81	Average
22980.000	49.24	2.57	51.81	74.00	-22.19	150	81	Peak

Level (Result) = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	33.51	-3.25	30.26	54.00	-23.74	171	346	Average
4874.000	43.33	-3.25	40.08	74.00	-33.92	171	346	Peak
4960.000	32.38	-3.04	29.34	54.00	-24.66	164	88	Average
4960.000	42.44	-3.04	39.40	74.00	-34.60	164	88	Peak
7311.000	30.26	2.46	32.72	54.00	-21.28	142	156	Average
7311.000	40.35	2.46	42.81	74.00	-31.19	142	156	Peak
7440.000	30.71	2.88	33.59	54.00	-20.41	189	305	Average
7440.000	40.39	2.88	43.27	74.00	-30.73	189	305	Peak
10600.000	30.16	7.55	37.71	54.00	-16.29	201	309	Average
10600.000	40.84	7.55	48.39	74.00	-25.61	201	309	Peak
11490.000	30.22	7.50	37.72	54.00	-16.28	193	301	Average
11490.000	40.37	7.50	47.87	74.00	-26.13	193	301	Peak
15900.000	31.54	7.30	38.84	54.00	-15.16	182	103	Average
15900.000	41.79	7.30	49.09	74.00	-24.91	182	103	Peak
17235.000	31.73	12.83	44.56	54.00	-9.44	155	42	Average
17235.000	41.34	12.83	54.17	74.00	-19.83	155	42	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19496.000	40.28	0.25	40.53	54.00	-13.47	150	66	Average
19496.000	50.16	0.25	50.41	74.00	-23.59	150	66	Peak
19840.000	41.57	1.22	42.79	54.00	-11.21	150	197	Average
19840.000	51.35	1.22	52.57	74.00	-21.43	150	197	Peak
21200.000	40.07	1.85	41.92	54.00	-12.08	150	89	Average
21200.000	49.16	1.85	51.01	74.00	-22.99	150	89	Peak
22980.000	40.10	2.57	42.67	54.00	-11.33	150	77	Average
22980.000	49.39	2.57	51.96	74.00	-22.04	150	77	Peak

Level (Result) = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

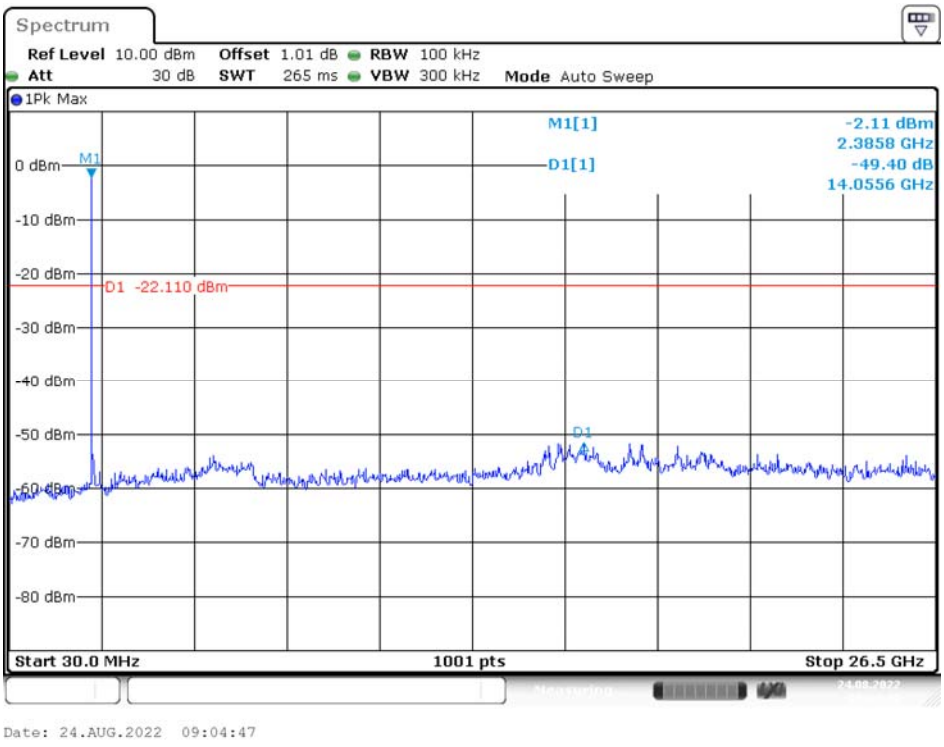
Spurious emissions more than 20 dB below the limit were not reported.

Conducted Spurious Emissions:

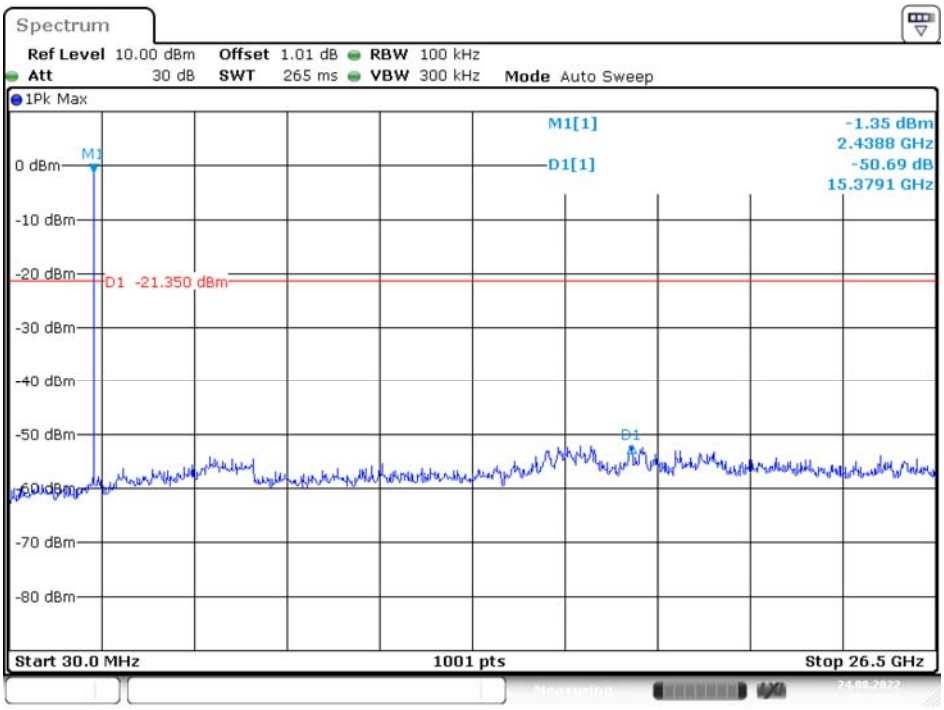
Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
Low	2402	49.40	≥ 20	PASS
Middle	2440	50.69	≥ 20	PASS
High	2480	50.43	≥ 20	PASS

BLE Mode

Low Channel



Middle Channel



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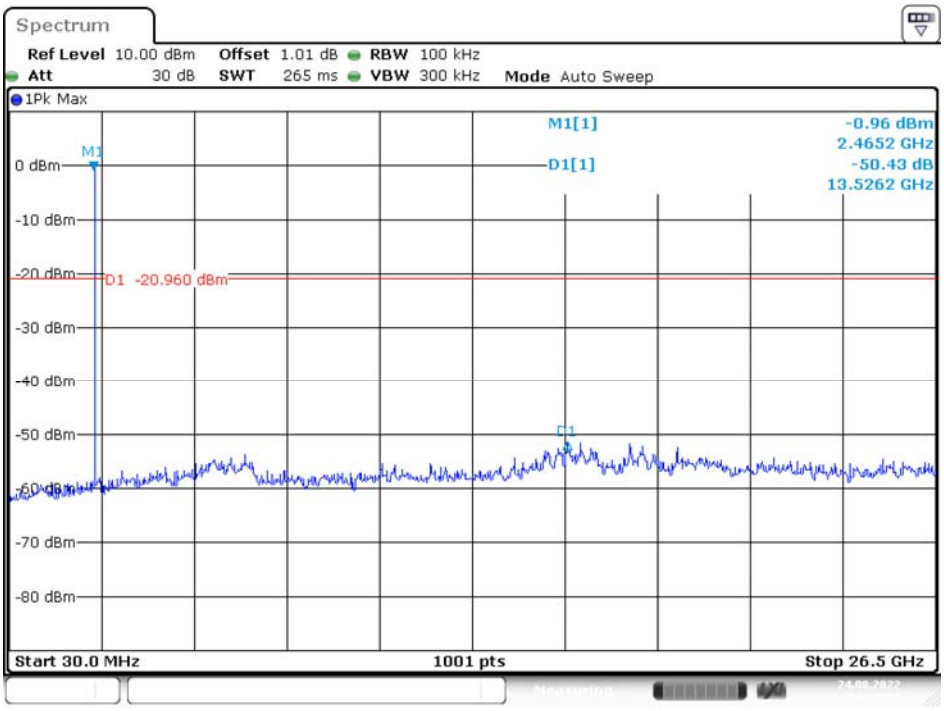
High Channel



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9 FCC §15.247(a)(2) – 6 dB Emission Bandwidth

9.1 Applicable Standard

According to FCC §15.247(a)(2).

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

9.2 Test Procedure

The steps for the first option are as follows:

a) Set RBW = 100 kHz.

b) Set the VBW ≥ [3 × RBW].

c) Detector = peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

f) Allow the trace to stabilize.

g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

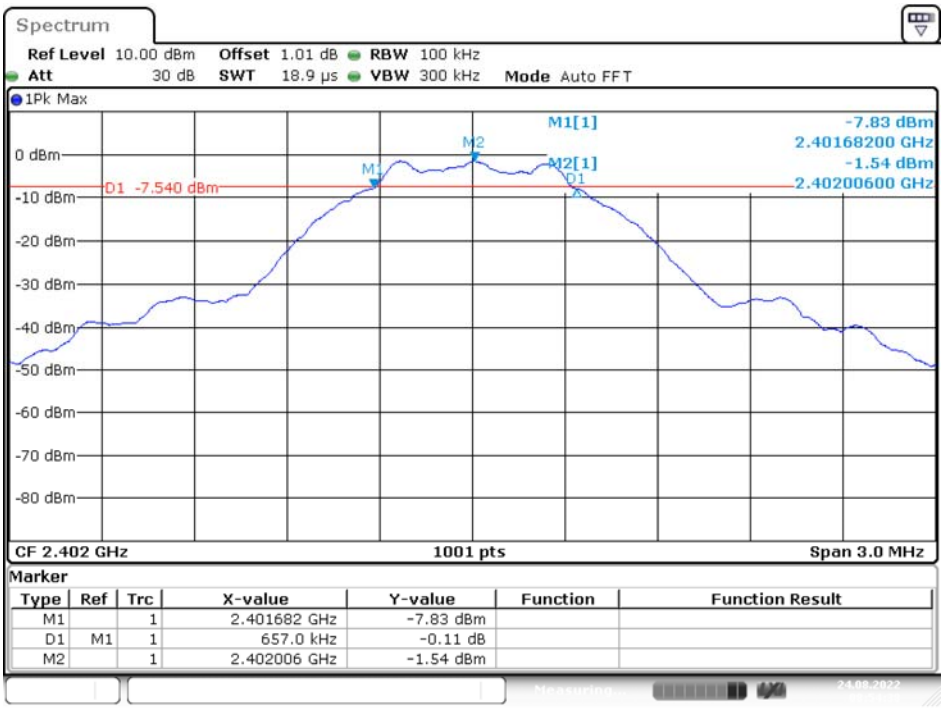
9.3 Test Results

Channel	Frequency (MHz)	6 dB Emission Bandwidth (kHz)	Limit (kHz)	Result
Low	2402	657	> 500	Compliance
Middle	2440	651	> 500	Compliance
High	2480	648	> 500	Compliance

Please refer to the following plots

BLE Mode

Low Channel



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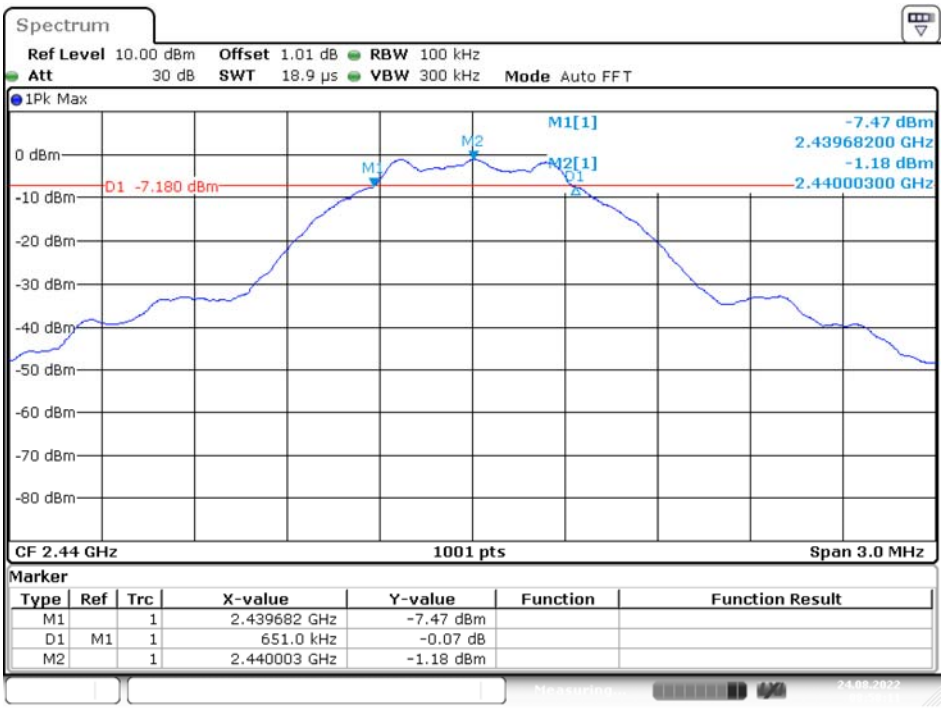
Middle Channel



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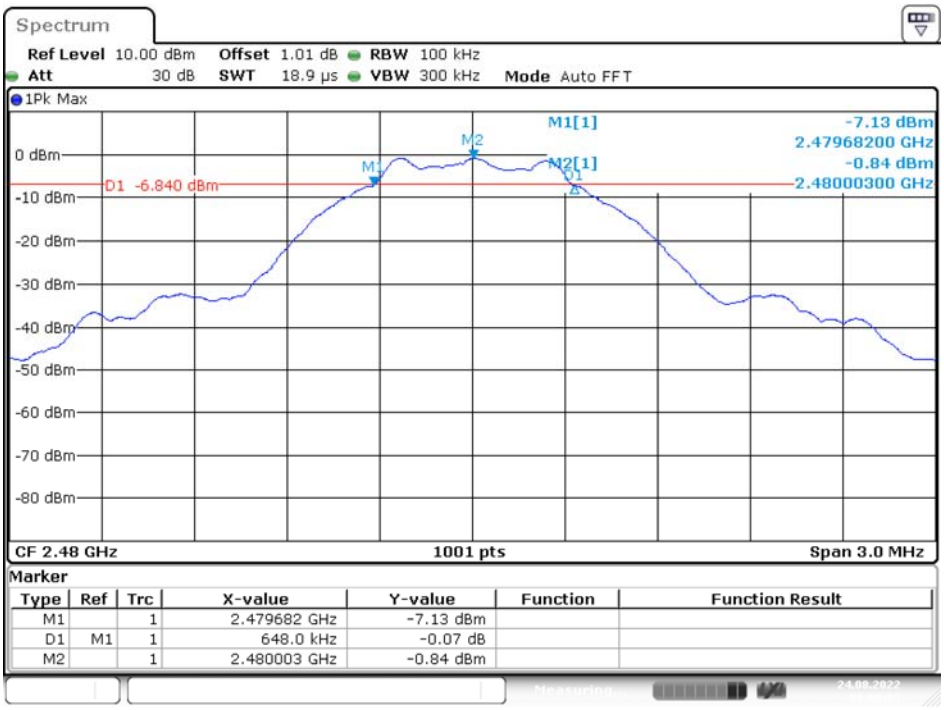
High Channel



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10 FCC §15.247(b)(3) – Maximum Output Power

10.1 Applicable Standard

According to FCC §15.247(b) (3).

Systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

10.2 Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.

2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to measuring equipment.

10.3 Test Results

Conducted Peak Output Power

Channel	Frequency (MHz)	Conducted Peak Output Power (dBm)	Power (W)	Limit (W)	Result
BLE Mode					
Low	2402	-0.38	0.001	1	PASS
Middle	2440	-0.06	0.001	1	PASS
High	2480	0.86	0.001	1	PASS

11 FCC§15.247(d) – 100 kHz Bandwidth of Frequency Band Edge

11.1 Applicable Standard

According to FCC §15.247(d).

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

11.2 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

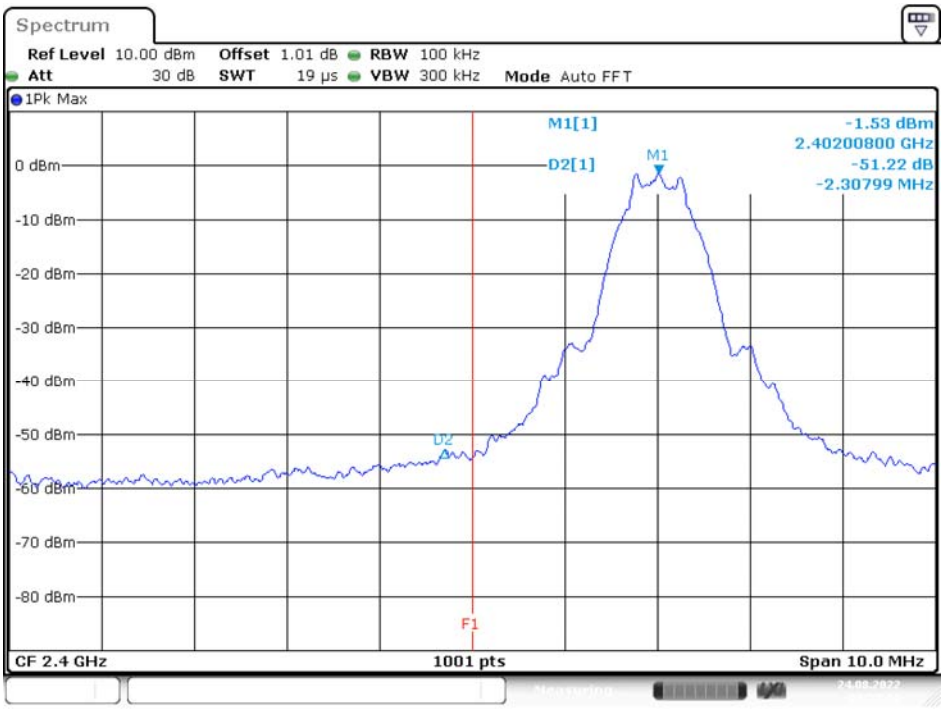
11.3 Test Results

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
Low	2402	51.22	≥ 20	PASS
High	2480	54.57	≥ 20	PASS

Please refer to the following plots

BLE Mode

Band Edge, Left Side



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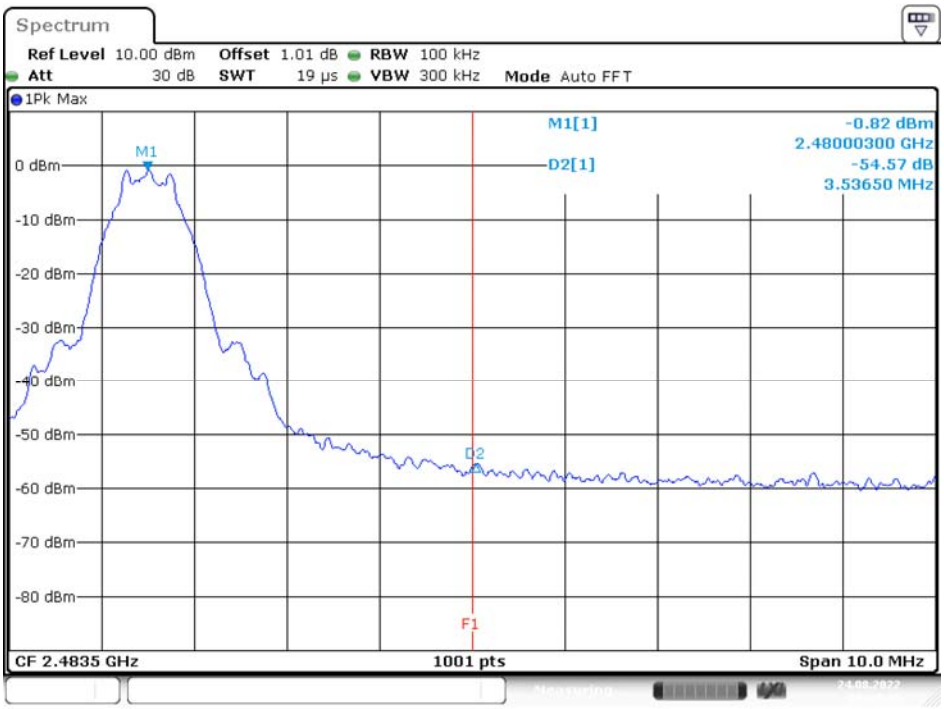
Band Edge, Right Side



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12 FCC §15.247(e) – Power Spectral Density

12.1 Applicable Standard

According to FCC §15.247(e).

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

12.2 Test Procedure

a) Set analyzer center frequency to DTS channel center frequency.

b) Set the span to 1.5 times the DTS bandwidth.

c) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.

d) Set the VBW ≥ [3 × RBW].

e) Detector = peak.

f) Sweep time = auto couple.

g) Trace mode = max hold.

h) Allow trace to fully stabilize.

i) Use the peak marker function to determine the maximum amplitude level within the RBW.

j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat

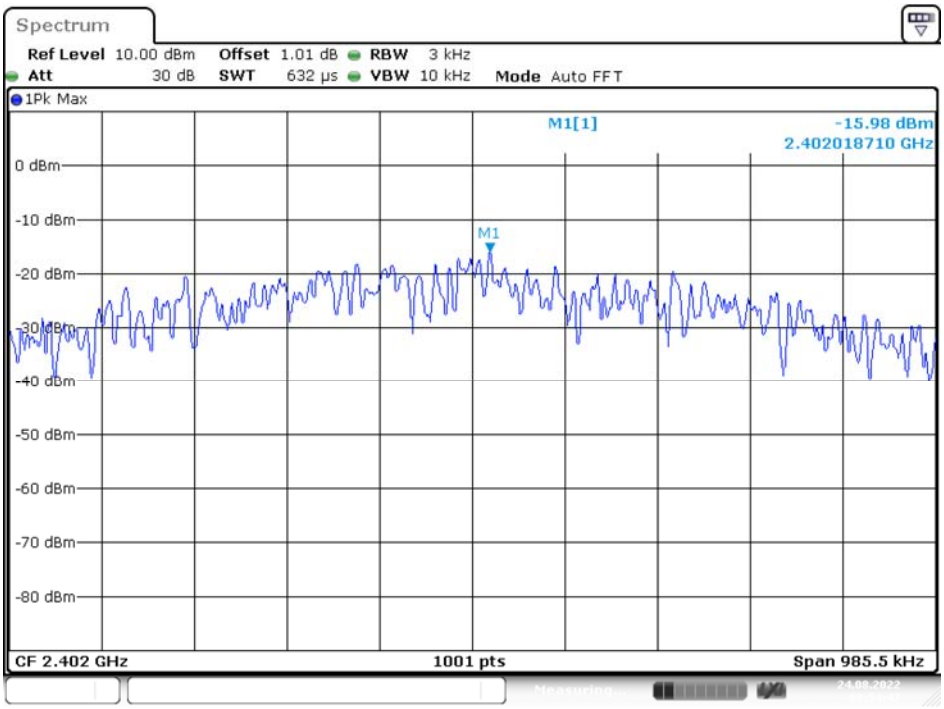
12.3 Test Results

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
Low	2402	-15.98	8	Compliance
Middle	2440	-15.51	8	Compliance
High	2480	-15.20	8	Compliance

Please refer to the following plots

BLE Mode

Low Channel



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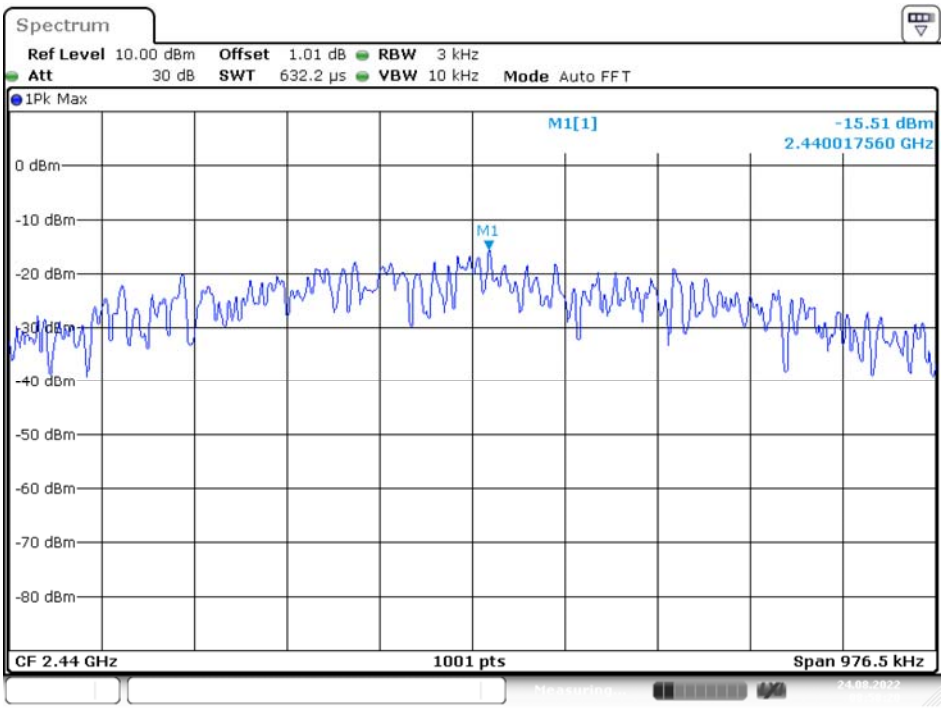
Middle Channel



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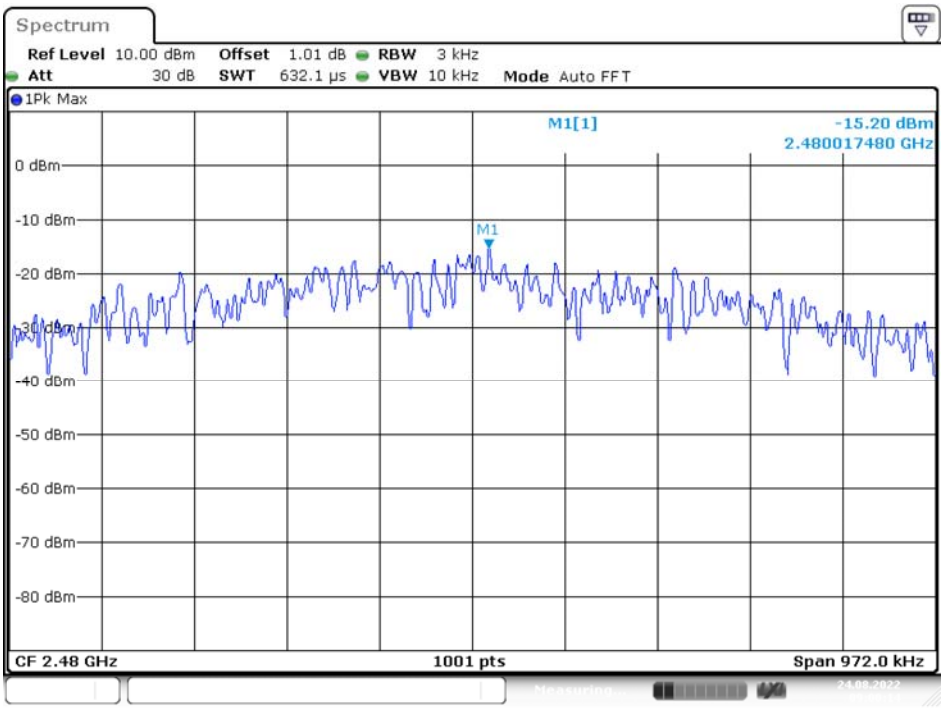
High Channel



******* END OF REPORT *******