TEST REPORT

Applicant: Shenzhen Ipetmon Creative Technology Co., Ltd.

Address: 101,No.93 Boguang Second Road, Shangcun Community, Gongming Street, Guangming District, Shenzhen, China

Product Name: Smart pet water dispenser

FCC ID: 2A4A7-PTM-633

Standard(s): 47 CFR Part 15, Subpart C (15.245)
ANSI C63.10-2013

Report Number: 2402Z26079E-RF-00A

Report Date: 2024/11/19

The above device has been tested and found compliant with the requirement of the relative standards by Bay Area Compliance Laboratories Corp. (Dongguan).

Reviewed By: Gavin Xu	*Approved By: Ivan Cao*
Title: **RF Engineer Manager**	Title: **EMC**

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	2402Z26079E-RF-00A	Original Report	2024-11-19

1 General Information

1.1 General Description Of Equipment Under Test (EUT)

EUT Name:	Smart pet water dispenser
EUT Model:	PTM-633
Multiple Model:	PTM-653, PTM-663
Model Difference:	All model's the function, software and electric circuit are the same, only with a product color and model named different. Test sample model: PTM-633.
Operation Frequency:	10.518GHz
Maximum Peak Output Power (Conducted):	ANT1: 93.94dBuV/m(Peak)@3m ANT2: 92.89dBuV/m(Peak)@3m
Modulation Type:	CW
Rated Input Voltage:	DC 3.7V, 5000mAh from battery or DC 5.0V from adapter
Adapter:	Model: YMK-10W050100 Input: 100-240VAC 50/60Hz, 0.3A Max Output: 5V DC, 1000mA
EUT Received Date:	Nov. 01, 2024
Test Date:	Nov. 01, 2024 ~ Nov. 18, 2024
Date of issue:	Nov. 19, 2024
EUT Received Status:	Good

1.2 Mechanical Description of EUT

The UUT measures approximately 19.2 cm (L) x 19.2 cm (W) x 16 cm (H).

1.3 Objective

This report was prepared on behalf of *Shenzhen Ipetmon Creative Technology Co., Ltd.* in accordance with Part 2, Subpart J, and Part 15, Subpart C of the Federal Communication Commission's rules.

The objective was to determine compliance with FCC Part 15.245 for Antenna Requirement, RF Exposure, Emission Bandwidth, Radiated Spurious Emissions, Band Edges and Field Strength.

1.4 Related Submittal(s)/Grant(s)

None

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Parameter	Measurement uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.57 dB
Power Spectral Density, conducted	±1.48dB
Unwanted Emissions, conducted	±1.57dB
All emissions, radiated	±4.0 dB
AC power line Conducted Emission	±2.0 dB
Temperature	±2 °C
Humidity	±5 %
DC and low frequency voltages	±1.0 %
Time	±2 %
Duty Cycle	±3 %

1.7 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 829273, the FCC Designation No. : CN5044.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

2 System Test Configuration

2.1 Justification

The EUT was configured for testing in accordance to ANSI C63.10.

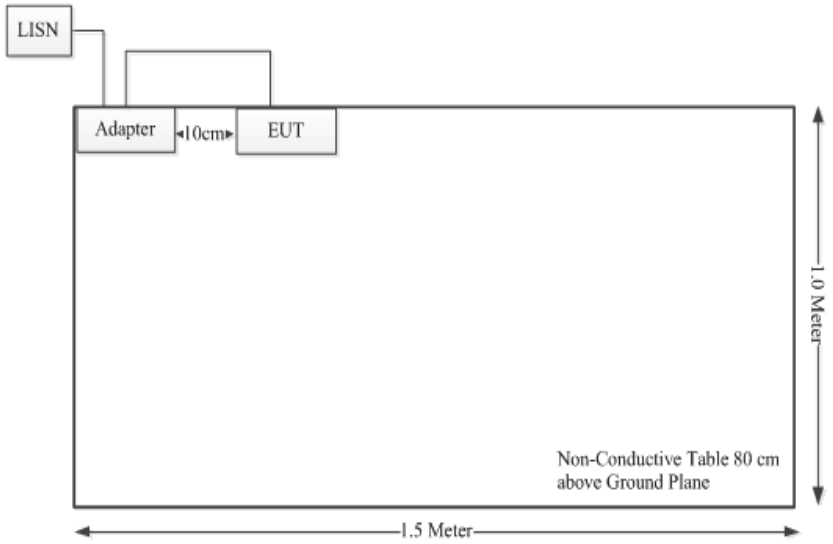
2.2 EUT Exercise Software

The software "AlphawaveGoldControlSoftware" was used to transmit signal for all the modules. The software was provided by *Shenzhen Ipetmon Creative Technology Co., Ltd.*

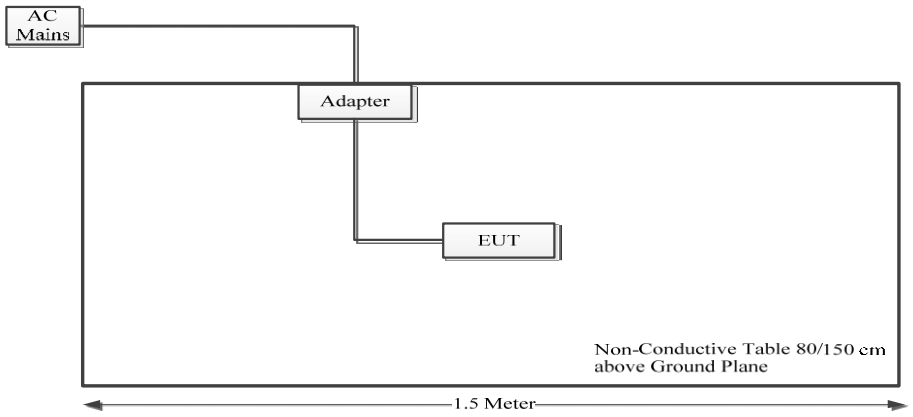
Test Antenna	Channel Frequency (MHz)
ANT 1	10518
ANT 2	10518

2.3 Block Diagram of Test Setup

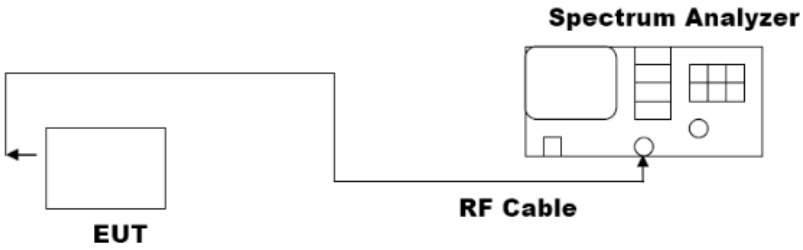
AC line conducted emissions:



Spurious Emissions:



Operation of EUT during RF Conducted testing:



2.4 Local Support Equipment

Manufacturer	Description	Model No.	Serial No.
Volteq	DC Power Supply	HY5003D	160402343
ASUS	Laptop	FX504G	J6NRCX037440249

2.5 Remote Support Equipment

Manufacturer	Description	Model
N/A	N/A	N/A

2.6 Interface Ports and Cabling

Cable Descriptions	Length (m)	From	To
Power Cable	< 1 m	DC Source	EUT

3 Summary of Test Results

Results reported relate only to the product tested.

FCC & ISEDC Rules	Description of Test	Results
FCC §15.203	Antenna Requirements	Compliant
FCC §15.207	AC Line Conducted Emissions	Compliant
FCC §15.209, §15.245(b)	Field Strength and Radiated Spurious Emissions	Compliant
FCC §2.1049 & §15.215	20 dB & 99% Emission Bandwidth	Compliant
FCC §15.245(3)	Frequency Band Edge	Compliant

Note:
"N/A" denotes test is not applicable in this Test Report.

4 FCC §15.203 - Antenna Requirements

4.1 Applicable Standards

According to FCC §15.203:

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

4.2 Antenna Description

External/Internal/ Integral	Frequency Range (MHz)	Antenna Type	Maximum Antenna Gain (dBi)
Internal	10500 - 10550 MHz	Patch	3

Antenna gain is information provided by customer.

5 FCC - RF Exposure

Please refer to the attachment

6 FCC §15.207 – AC Line Conducted Emissions

6.1 Applicable Standards

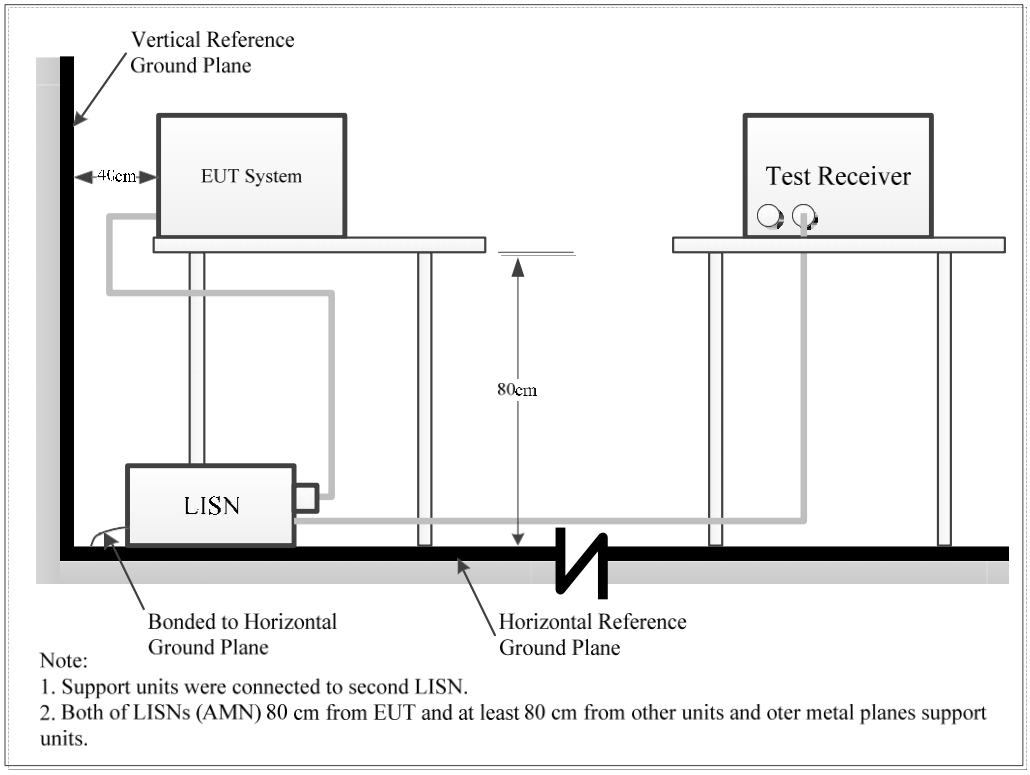
As per FCC §15.207 Conducted limits:

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 Note1	56 to 46 Note2
0.5-5	56	46
5-30	60	50

Note1: Decreases with the logarithm of the frequency.
Note2: A linear average detector is required

6.2 Test Setup



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

The measurement was performed at shield room, using the setup per ANSI C63.10-2013 measurement procedure. The specification used were FCC §15.207 limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The AC/DC power adapter of the EUT was connected with LISN-1 which provided 120 V / 60 Hz AC power.

6.3 Test Procedure

The frequency and amplitude of the six highest ac power-line conducted emissions relative to the limit,measured over all the current-carrying conductors of the EUT power cords, and the operating frequency or frequency to which the EUT is tuned (if appropriate), should be reported, unless such emissions are more than 20 dB below the limit. AC power-line conducted emissions measurements are to be separately carried out only on each of the phase ("hot") line(s) and (if used) on the neutral line(s), but not on the ground[protective earth] line(s). If less than six emission frequencies are within 20 dB of the limit, then the noise level of the measuring instrument at representative frequencies should be reported. The specific conductor of the power-line cord for each of the reported emissions should be identified. Measure the six highest emissions with respect to the limit on each current-carrying conductor of each power cord associated with the EUT (but not the power cords of associated or peripheral equipment that are part of the test configuration). Then, report the six highest emissions with respect to the limit from among all the measurements identifying the frequency and specific current- carrying conductor identified with the emission. The six highest emissions should be reported for each of the current-carrying conductors, or the six highest emissions may be reported over all the current- carrying conductors.

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

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

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

6.4 Corrected Amplitude and Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Correction Factor (CF) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + CF

For example, a corrected amplitude of 46.2 dBuV = Indicated Reading (32.5 dBuV) + Correction Factor (13.7 dB)

The Correction Factor is calculated by adding Cable loss (CL) and attenuation of the impulse limiter and the high pass filter. The basic equation is as follows:

CF= CL + Attenuator

For example, a corrected amplitude of 13.7 dB = Cable Loss (3.7 dB) + Attenuation (10 dB)

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

Margin = Corrected Amplitude – Limit

6.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	Receiver, EMI Test	ESCI 1166.5950.03	100044	2023-10-26	2.5 years
Rohde and Schwarz	Impulse Limiter	ESH3-Z2	101964	2024-07-01	1 year
Solar Electronics Company	High Pass Filter	Type 7930-100	7930150204	2024-03-02	1 year
Suirong	30 ft conductive emission cable	LMR 400	-	N/R	N/A
FCC	LISN	FCC-LISN-50-25-2-10-CISPR16	160130	2024-10-13	1 year
HP	DC Source	E3617A	KR32500606	N/R	N/A
Vasona	Test software	V6.0 build 11	10400213	N/R	N/A

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

6.6 Test Environmental Conditions

Temperature:	20 ºC
Relative Humidity:	53 %
ATM Pressure:	101.6 kPa

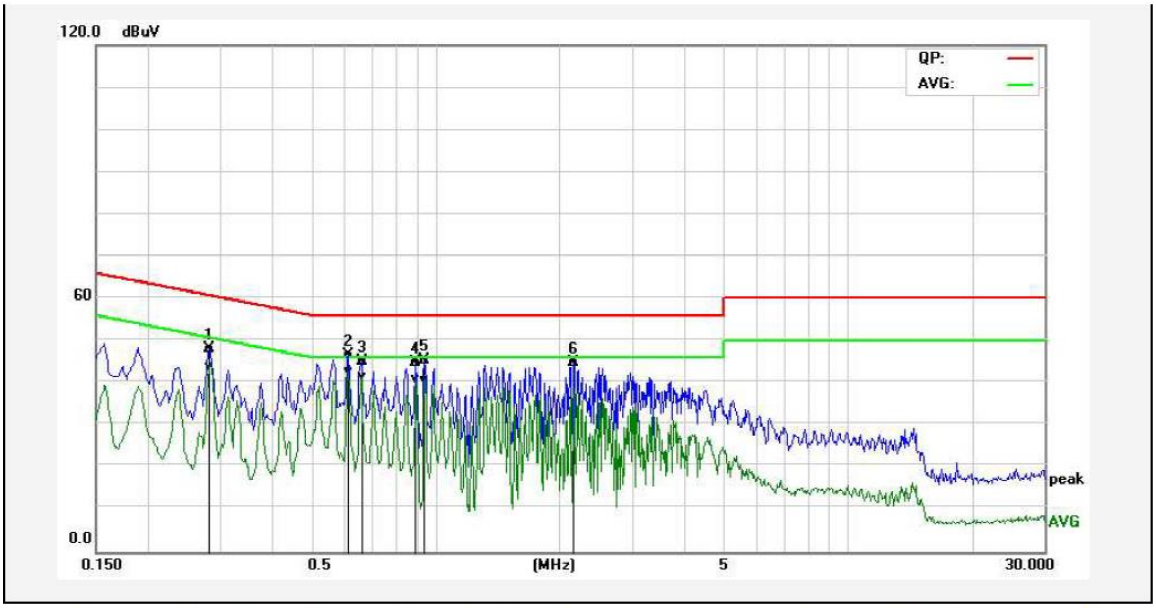
6.7 Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC 15C conducted emissions limits, with the margin reading of:

Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-8.06	0.5580	Line	0.15-30

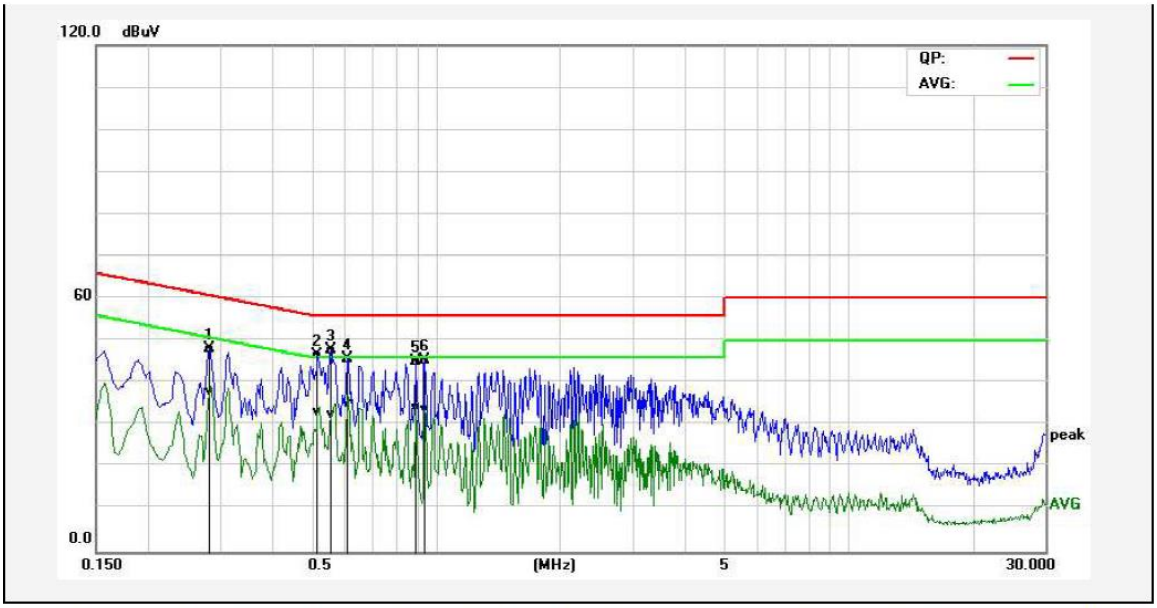
6.8 Conducted Emissions Test Plots and Data

ANT 1: AC 120 V, 60 Hz – Line



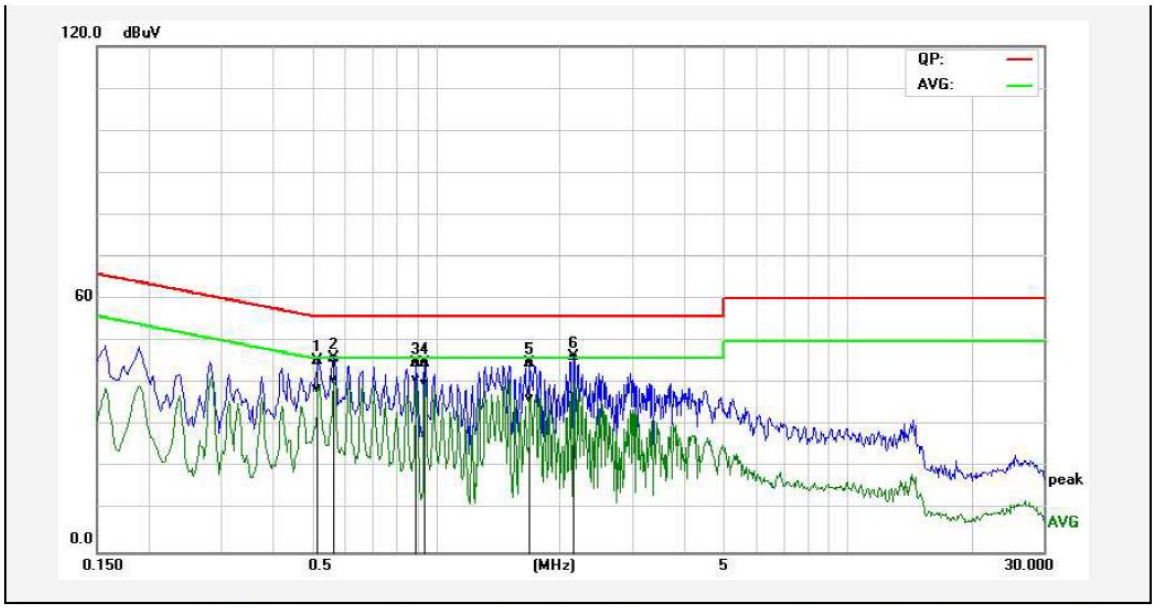
No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1P	0.2819	37.89	33.85	10.14	48.03	43.99	60.76	50.76	-12.73	-6.77	Pass
2*	0.6140	36.69	32.76	10.07	46.76	42.83	56.00	46.00	-9.24	-3.17	Pass
3P	0.6620	34.95	31.37	10.09	45.04	41.46	56.00	46.00	-10.96	-4.54	Pass
4P	0.8980	34.84	30.87	10.12	44.96	40.99	56.00	46.00	-11.04	-5.01	Pass
5P	0.9420	35.34	30.41	10.12	45.46	40.53	56.00	46.00	-10.54	-5.47	Pass
6P	2.1660	34.66	25.58	10.22	44.88	35.80	56.00	46.00	-11.12	-10.20	Pass

ANT 1: AC 120 V, 60 Hz – Neutral



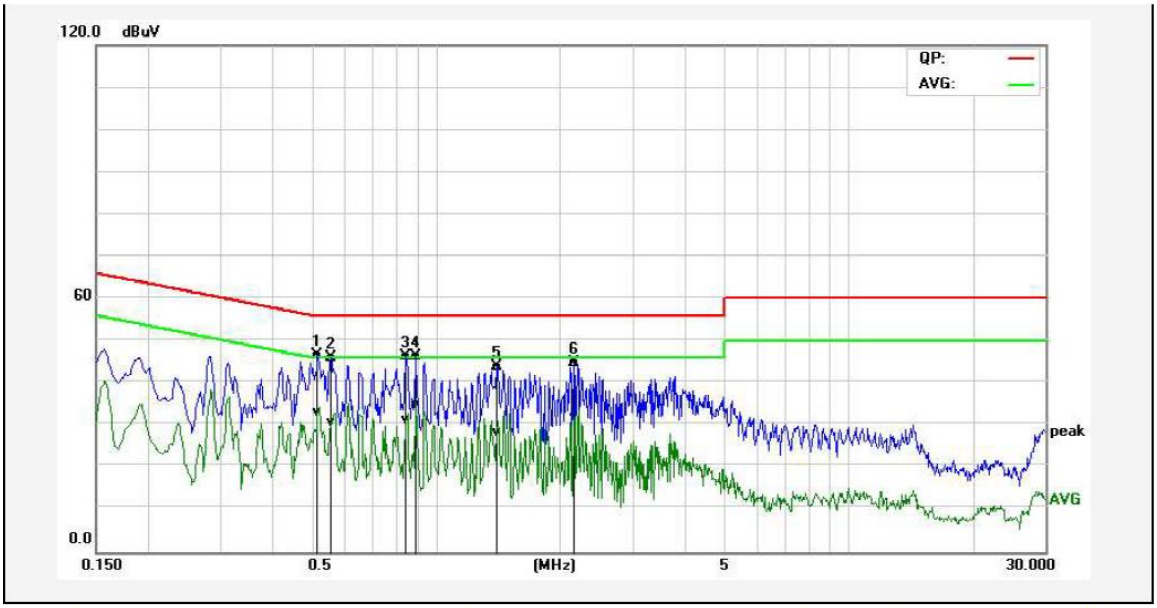
No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1P	0.2819	38.15	27.85	10.14	48.29	37.99	60.76	50.76	-12.47	-12.77	Pass
2P	0.5180	36.61	22.94	10.08	46.69	33.02	56.00	46.00	-9.31	-12.98	Pass
3*	0.5580	37.86	22.55	10.08	47.94	32.63	56.00	46.00	-8.06	-13.37	Pass
4P	0.6100	35.60	25.32	10.07	45.67	35.39	56.00	46.00	-10.33	-10.61	Pass
5P	0.8940	35.15	23.92	10.12	45.27	34.04	56.00	46.00	-10.73	-11.96	Pass
6P	0.9420	35.35	23.56	10.12	45.47	33.68	56.00	46.00	-10.53	-12.32	Pass

ANT 2: AC 120 V, 60 Hz – Line



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1P	0.5180	35.51	28.85	10.08	45.59	38.93	56.00	46.00	-10.41	-7.07	Pass
2*	0.5660	35.94	30.97	10.07	46.01	41.04	56.00	46.00	-9.99	-4.96	Pass
3P	0.8980	34.84	30.87	10.12	44.96	40.99	56.00	46.00	-11.04	-5.01	Pass
4P	0.9420	34.84	29.91	10.12	44.96	40.03	56.00	46.00	-11.04	-5.97	Pass
5P	1.6980	34.58	26.18	10.17	44.75	36.35	56.00	46.00	-11.25	-9.65	Pass
6P	2.1660	36.16	27.08	10.22	46.38	37.30	56.00	46.00	-9.62	-8.70	Pass

ANT 2: AC 120 V, 60 Hz – Neutral



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.5180	36.61	22.94	10.08	46.69	33.02	56.00	46.00	-9.31	-12.98	Pass
2P	0.5580	35.86	20.55	10.08	45.94	30.63	56.00	46.00	-10.06	-15.37	Pass
3P	0.8460	36.37	21.20	10.12	46.49	31.32	56.00	46.00	-9.51	-14.68	Pass
4P	0.8940	36.15	24.92	10.12	46.27	35.04	56.00	46.00	-9.73	-10.96	Pass
5P	1.4100	33.62	18.10	10.21	43.83	28.31	56.00	46.00	-12.17	-17.69	Pass
6P	2.1660	34.51	21.82	10.22	44.73	32.04	56.00	46.00	-11.27	-13.96	Pass

7 FCC §15.209, §15.245(b) –Field Strength and Spurious Radiated Emissions

7.1 Applicable Standards

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 1 MHz.

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

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

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:

** 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.

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F (kHz)	-	Quasi-peak	300
0.490MHz-1.705MHz	24000/F (kHz)	-	Quasi-peak	30
1.705MHz-30MHz	30	-	Quasi-peak	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3
		74.0	Peak	3

Limit: (Field strength of the fundamental signal)

Frequency	Limit (dBuV/m @3m)	Remark
2400MHz-2483.5MHz	94.0	Average Value
	114.0	Peak Value

Frequency	Field Strength microvolts/m at specific distance	
	Transmitters	Receivers
18-40GHz	63.5dBuV/m@1m	63.5dBuV/m@1m
Above 40GHz	80.00dBuV/m @0.15m	80.00dBuV/m @0.15m

As per FCC §15.245 (b) The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (millivolts/meter)
902-928	500	1.6
2435-2465	500	1.6
5785-5815	500	1.6
10500-10550	2500	25.0
24075-24175	2500	25.0

* Field strength limits are specified at a distance of 3 meters.

Fundamental Limit Conversion		
Average (mV/m) at 3m	Average (dBuV/m) at 3m	Peak (dBuV/m) at 3m
2500000	127.9588	147.9588

Harmonics Limit Conversion				
Average (mV/m) at 3m	Average (dBuV/m)		Peak (dBuV/m)	
	3m	1m	3m	1m
25000	87.95	97.04	107.95	117.49

Note: dBuV/m=20log(mV/m)

Average Limit(dBuV/m)= 20log(25000)+20log(3/1)=97.04dBuV/m.

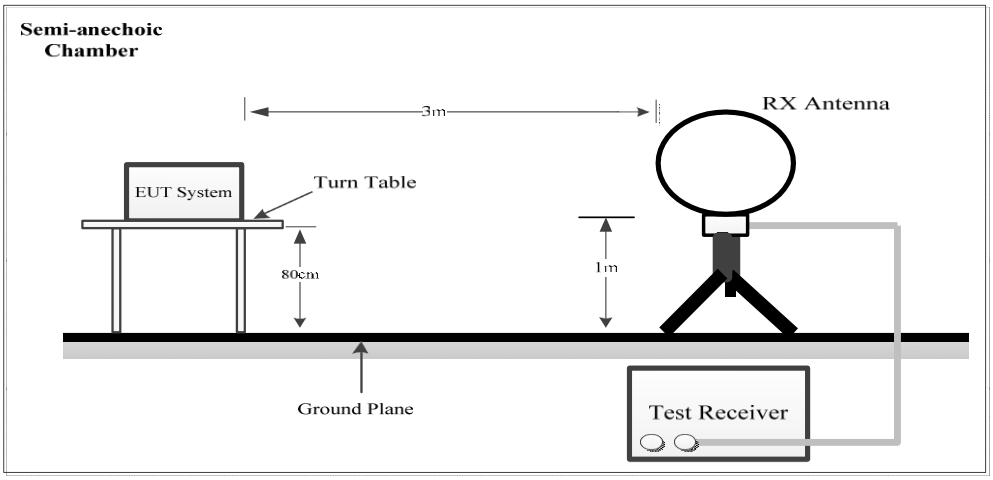
(1) Regardless of the limits shown in the above table, harmonic emissions in the restricted bands below 17.7 GHz, as specified in §15.205, shall not exceed the field strength limits shown in §15.209. Harmonic emissions in the restricted bands at and above 17.7 GHz shall not exceed the following field strength limits:
(i) For the second and third harmonics of field disturbance sensors operating in the 24075-24175 MHz band and for other field disturbance sensors designed for use only within a building or to open building doors, 25.0 mV/m.
(2) For all other field disturbance sensors, 7.5mV/m.

(i) Field disturbance sensors designed to be used in motor vehicles or aircraft must include features to prevent continuous operation unless their emissions in the restricted bands, other than the second and third harmonics from devices operating in the 24075-24175 MHz band, fully comply with the limits given in §15.209. Continuous operation of field disturbance sensors designed to be used in farm equipment, vehicles such as fork lifts that are intended primarily for use indoors or for very specialized operations, or railroad locomotives, railroad cars and other equipment which travels on fixed tracks is permitted. A field disturbance sensor will be considered not to be operating in a continuous mode if its operation is limited to specific activities of limited duration (e.g., putting a vehicle into reverse gear, activating a turn signal, etc.).
(3) Field strength limits are specified at a distance of 3 meters.

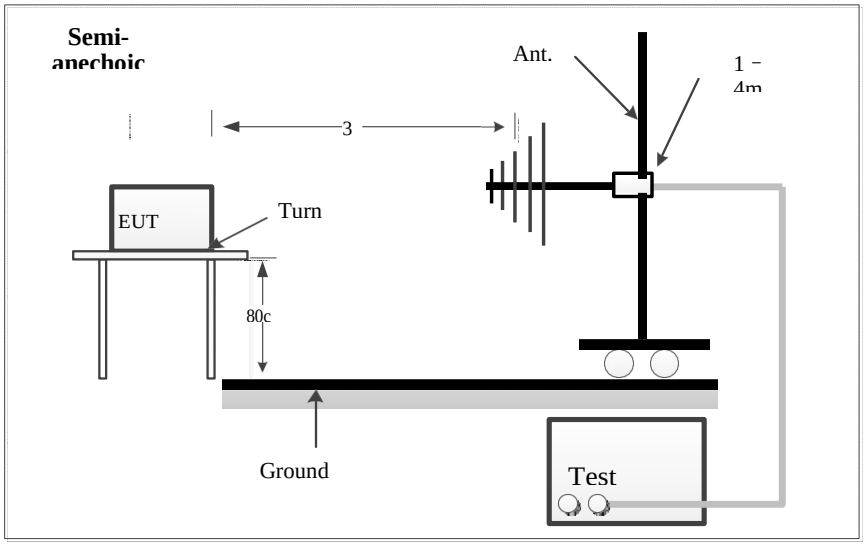
(4) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.
(5) The emission limits shown above are based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

7.2 Test Setup

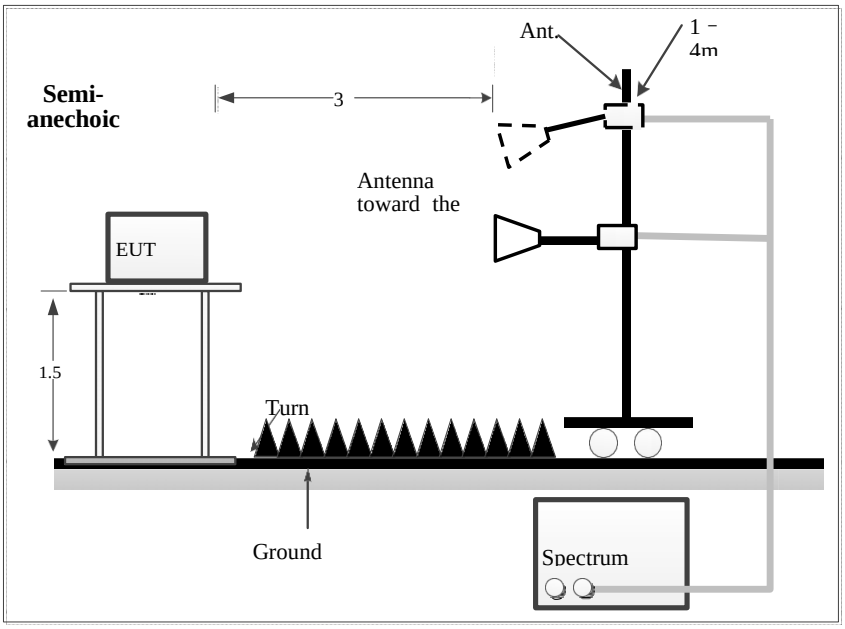
9kHz-30MHz:



30MHz~1GHz:



Above 1GHz:



The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.10-2013. The specification used was the FCC 15 Subpart C limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

7.3 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords was connected to the AC floor outlet.

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

The EUT was set 3 meter away from the testing antenna, which was varied from 1-4 meter, and the EUT was placed on a turntable, which was 0.8 meter and 1.5 meter above the ground plane for below and above 1000 MHz measurements, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

7.4 Corrected Amplitude & Margin Calculation

For emissions below 1 GHz,

The Corrected Amplitude (CA) is calculated by adding the Correction Factor to the S.A. Reading. The basic equation is as follows:

CA = S.A. Reading + Correction Factor

For example, a corrected amplitude of 40.3 dBuV/m = S.A. Reading (32.5 dBuV) + Correction Factor (7.8 dB/m)

The Correction Factor is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) together. This calculation is done in the measurement software, and reported in the test result section. The basic equation is as follows:

Correction Factor = AF + CL + Atten – Ga

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

Margin = Corrected Amplitude – Limit

For emission above 1 GHz,

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

For the emissions from 40 GHz and above

The Corrected Amplitude (CA) is calculated by adding the Conversion Factor (CF), Distance Correction Factor (DCF) and The basic equation is as follows:

$$CR = SA + CF + DCF$$

For example, a corrected amplitude of 49.26 dBuV/m = S.A. Reading (25.16 dBuV) + Conversion Factor (33.64 dB) + DCF (20*log(1/3) = -9.54)

The test was at 1 meter, the DCF converted the field strength level from 1 meter to 3meters

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

$$Margin = Corrected\ Amplitude - Limit$$

7.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100044	2023-10-26	2 years
Agilent	Spectrum Analyzer	E4446A	US44300386	2023-08-24	2 years
Sunol Science Corp	System Controller	SC110V	122303-1	N/R	N/A
HP	Pre-Amplifier	8447D	2944A07030	2024-08-17	1 year
HP	Pre-Amplifier	8449B OPT HO2	3008A0113	2024-04-15	1 year
AH System	Pre-Amplifier	PAM 1840 VH	170	2024-11-09	1 year
BACL	RF Sensitivity Box	1	2	2024-10-27	1 year
Wisewave	Horn Antenna	ARH-4223-02	10555-02	2023-03-02	2 years
Wisewave	Horn Antenna	ARH-4223-02	10555-01	2023-03-02	2 years
ETS Lindgren	Horn Antenna	3117	00218973	2023-02-13	2.5 years
Sunol Sciences	Biconilog Antenna	JB3	A020106-2	2023-11-20	2 years
OML	Harmonic Mixer Set	M19HWA	170615-1	N/A	N/A
-	RF cable	-	-	Each time[1]	N/A
Insulted Wire Corp.	157 Series 2.92 SM (x2) Armored 33 ft. Cable	KPS-1571AN-3960-KPS	DC 1917	2024-02-28	1 year
Insulted Wire Corp.	157 Series 2.92 SM (x2) Armored 33 ft. Cable	KPS-1571AN-3960-KPS	DC 1917	2024-02-28	1 year
MDP Digital	Times Microwave LMR 400 UltraFex Coaxial Cable 35\'	LMR400UF	BACL1904161	2024-05-20	1 year
IW Microwave	157 Series Cable Armored with 2.92mm Male Plugs	KPS-1571AN-2400	DC 1922	2024-06-06	1 year

Note[1]: cable and notch filter included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

7.6 Test Environmental Conditions

Temperature:	21-24 ℃
Relative Humidity:	42-47 %
ATM Pressure:	102.2 kPa

7.7 Summary of Test Results

According to the data hereinafter, the EUT complied with FCC Part 15C standard's radiated emissions limits, and had the worst margin of:

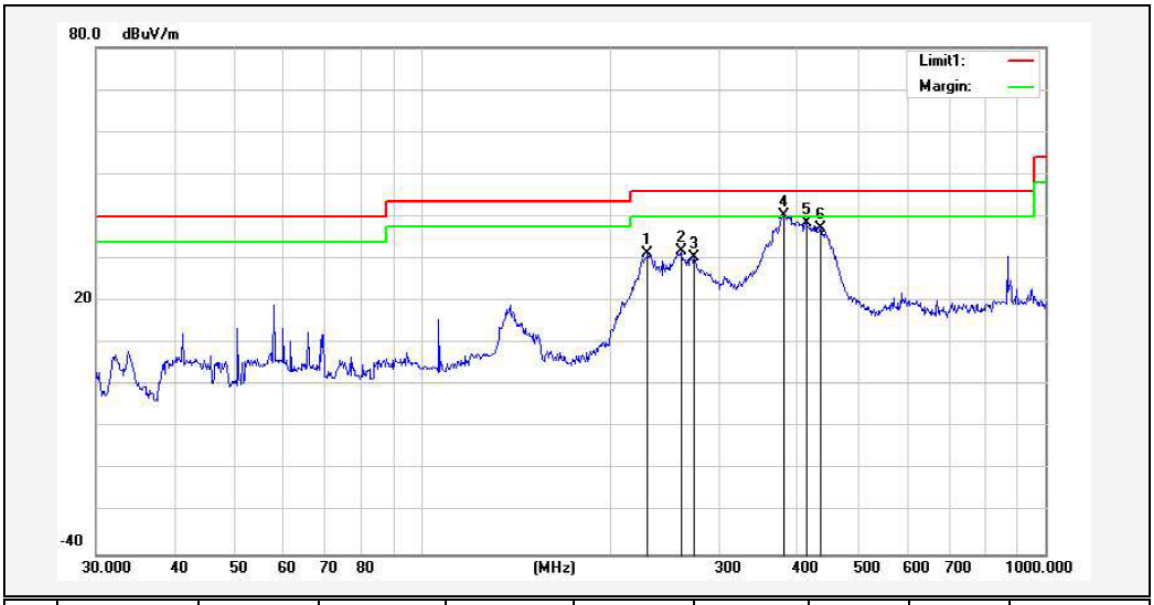
Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Transmitting Channel (MHz)**
-5.74	379.9141	H	10518MHz

7.8 Radiated Emissions Test Results

Note: 1. Test Mode 1 was determined to be the worst case after pre-scanning both Test Modes as described in Section 2.2 of this report. Therefore, Test Mode 1 was selected for formal testing.
2. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "X axis" position was the worst, and test data recorded in this report.
3. Radiated emission test from 9kHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9kHz to 30MHz and not recorded in this report.

1) 30 MHz – 1 GHz Worst Case, Measured at 3 meters

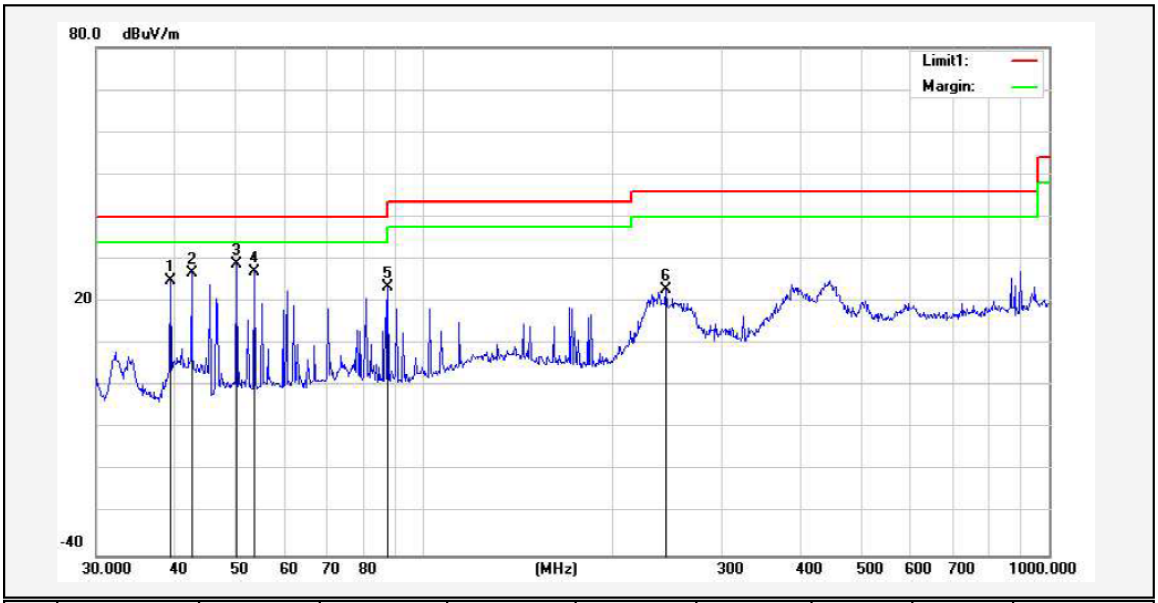
ANT 1-H:



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	230.0985	52.78	-21.47	31.31	46.00	-14.69	148	100	QP
2	260.1444	52.42	-20.57	31.85	46.00	-14.15	179	100	QP
3	273.2341	49.75	-19.44	30.31	46.00	-15.69	137	100	QP
4*	379.9141	58.29	-18.03	40.26	46.00	-5.74	151	100	QP
5	413.2706	55.71	-17.12	38.59	46.00	-7.41	187	100	QP
6	435.5898	54.78	-17.57	37.21	46.00	-8.79	102	100	QP

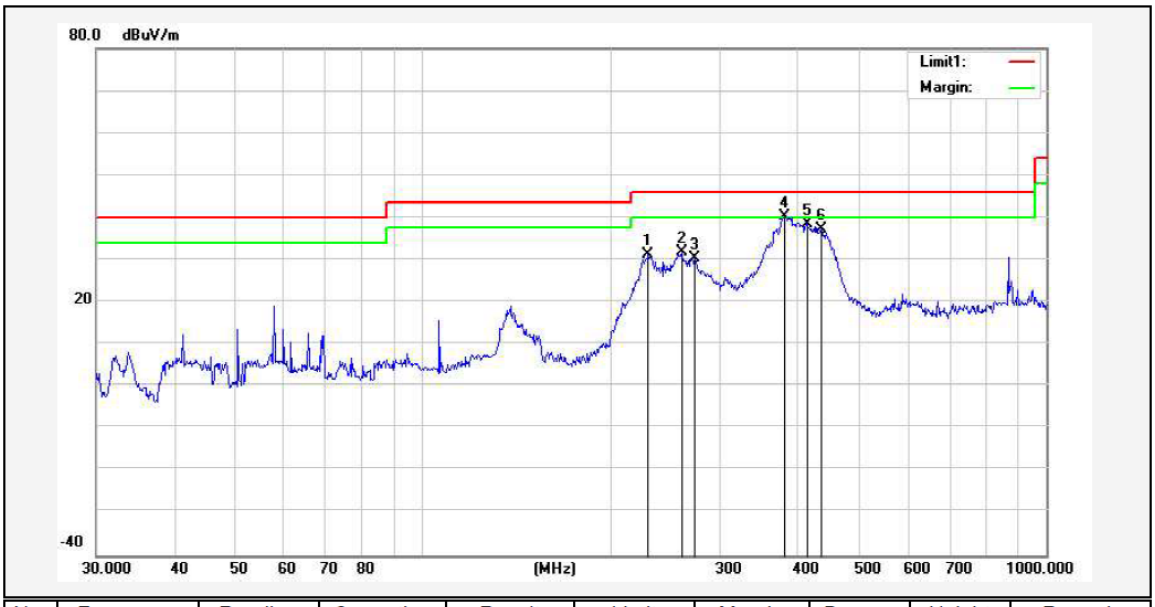
Note: The frequency which falls outside the restrict band, limit was 50dBc from the fundamental.*

ANT 1-V:



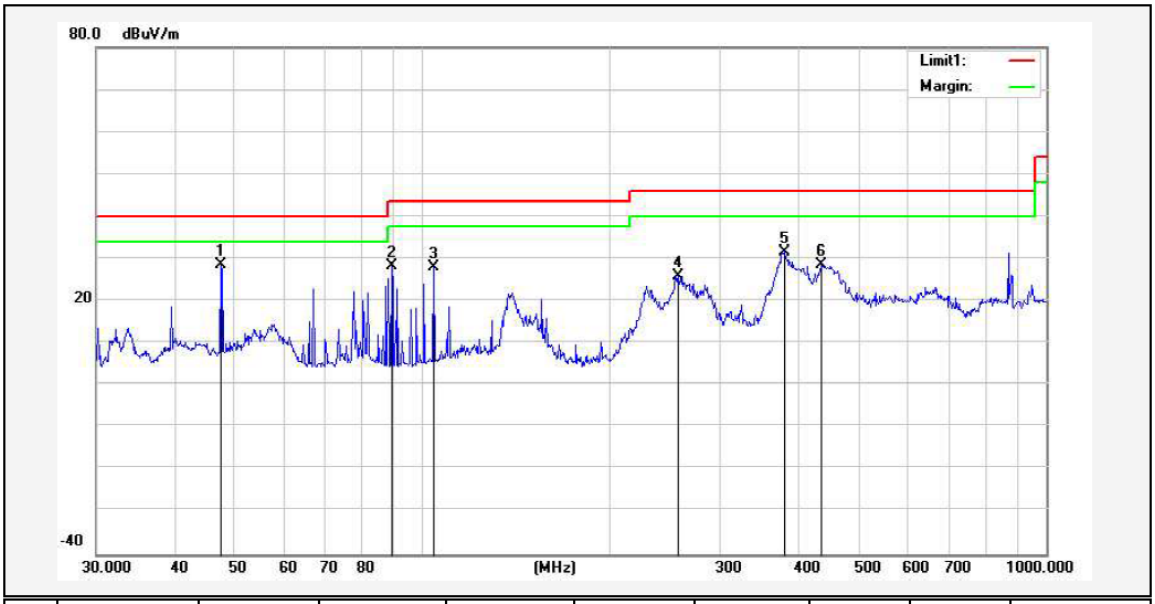
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	39.4371	45.88	-21.02	24.86	40.00	-15.14	111	100	peak
2	42.6000	49.47	-22.58	26.89	40.00	-13.11	197	100	peak
3*	50.2324	55.74	-26.92	28.82	40.00	-11.18	145	100	peak
4	53.6932	54.39	-27.36	27.03	40.00	-12.97	89	100	peak
5	87.7248	49.20	-25.76	23.44	40.00	-16.56	171	100	peak
6	244.2321	44.02	-21.19	22.83	46.00	-23.17	183	100	peak

ANT 2-H:



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	230.0985	52.78	-21.47	31.31	46.00	-14.69	148	100	QP
2	260.1444	52.42	-20.57	31.85	46.00	-14.15	179	100	QP
3	273.2341	49.75	-19.44	30.31	46.00	-15.69	137	100	QP
4*	379.9141	58.29	-18.03	40.26	46.00	-5.74	151	100	QP
5	413.2706	55.71	-17.12	38.59	46.00	-7.41	187	100	QP
6	435.5898	54.78	-17.57	37.21	46.00	-8.79	102	100	QP

ANT 2-V:



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	47.4917	53.99	-25.43	28.56	40.00	-11.44	176	100	QP
2	89.2763	53.99	-25.72	28.27	43.50	-15.23	105	100	QP
3	104.1701	51.84	-23.98	27.86	43.50	-15.64	113	100	QP
4	257.4221	46.63	-20.73	25.90	46.00	-20.10	193	100	QP
5	381.2486	49.56	-17.97	31.59	46.00	-14.41	168	100	QP
6	435.5898	46.10	-17.57	28.53	46.00	-17.47	127	100	QP

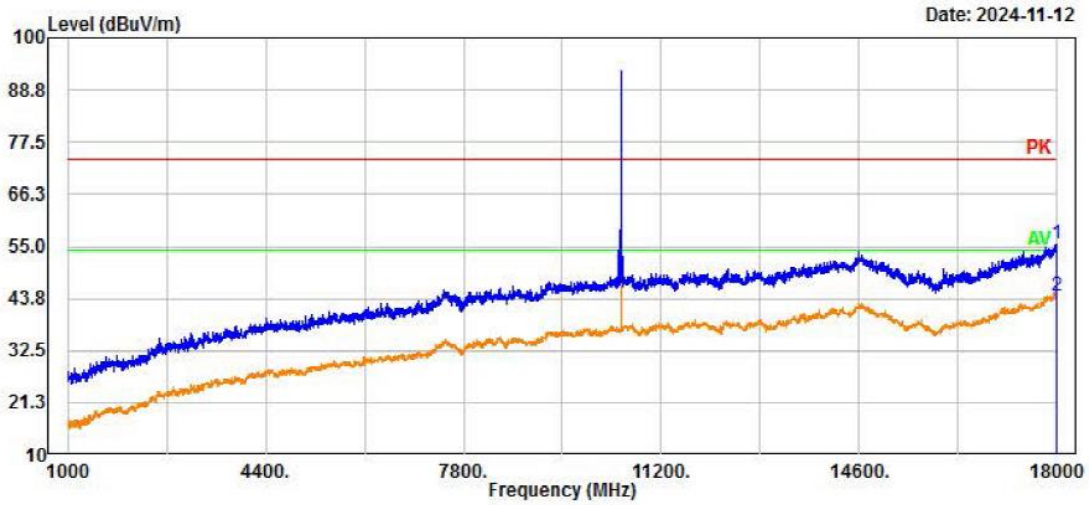
2) Fundamental Field Strength, Harmonics and Band Edge measurement.

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Distance (m)	Note
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)		
ANT 1												
10518.0	76.25	360	232	V	38.20	6.74	--	93.94	127.95	-34.01	3	Ave
10506	75.38	360	232	V	38.20	6.74	--	93.25	127.95	-34.7	3	Ave
10507.5	75.84	360	232	V	38.20	6.74	--	93.78	127.95	-34.17	3	Ave
10500	6.02	360	232	V	38.20	6.74	--	50.96	54	-3.04	3	Ave
10550	6.05	360	232	V	38.20	6.74	--	50.99	54	-3.01	3	Ave
21015	40.67	355	150	H	34.89	20.20	21.65	74.11	117.49	-43.38	1	Peak
21015	37.36	320	117	V	34.89	20.20	21.65	70.8	117.49	-46.69	1	Peak
21015	38.41	355	150	H	34.89	20.20	21.65	71.85	97.04	-25.19	1	Ave
21015	33.02	320	117	V	34.89	20.20	21.65	66.46	97.04	-30.58	1	Ave
31518	40.43	307	150	H	39.52	35.33	34.84	80.44	117.49	-37.05	1	PK
31518	41.77	323	185	V	39.52	35.33	34.84	81.78	117.49	-35.71	1	PK
31518	33.23	307	150	H	39.52	35.33	34.84	73.24	97.04	-23.8	1	Ave
31518	34.51	323	185	V	39.52	35.33	34.84	74.52	97.04	-22.52	1	Ave
ANT 2												
10518.0	76.12	360	232	V	38.20	6.74	--	92.89	127.95	-35.06	3	Ave
10525	75.39	360	232	V	38.20	6.74	--	91.58	127.95	-36.37	3	Ave
10526.5	75.91	360	232	V	38.20	6.74	--	92.64	127.95	-35.31	3	Ave
21053	41.79	345	150	H	34.89	20.20	21.65	75.23	117.49	-42.26	1	Peak
21053	37.65	317	140	V	34.89	20.20	21.65	71.09	117.49	-46.4	1	Peak
31575	38.96	345	150	H	34.89	20.20	21.65	72.4	97.04	-24.64	1	Ave
31575	31.85	317	140	V	34.89	20.20	21.65	65.29	97.04	-31.75	1	Ave
31575	41.33	12	150	H	39.52	35.33	34.84	81.34	117.49	-36.15	1	Peak
31575	39.69	350	150	V	39.52	35.33	34.84	79.7	117.49	-37.79	1	Peak

Note: The fundamental and the band edge was measured at 3 meters with the radiated sample. The harmonics was measured at 1 meter.

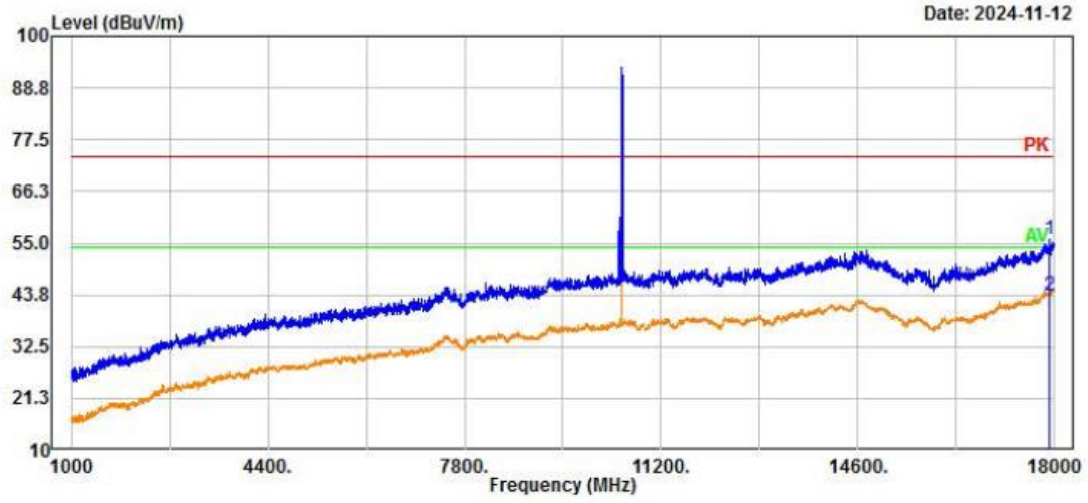
1 – 18 GHz Worst Case Pre-Scan, Measured at 1 meter

ANT 1-Horizontal:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	17996.60	47.25	8.11	55.36	74.00	18.64	Peak
2	17996.60	36.32	8.11	44.43	54.00	9.57	Average

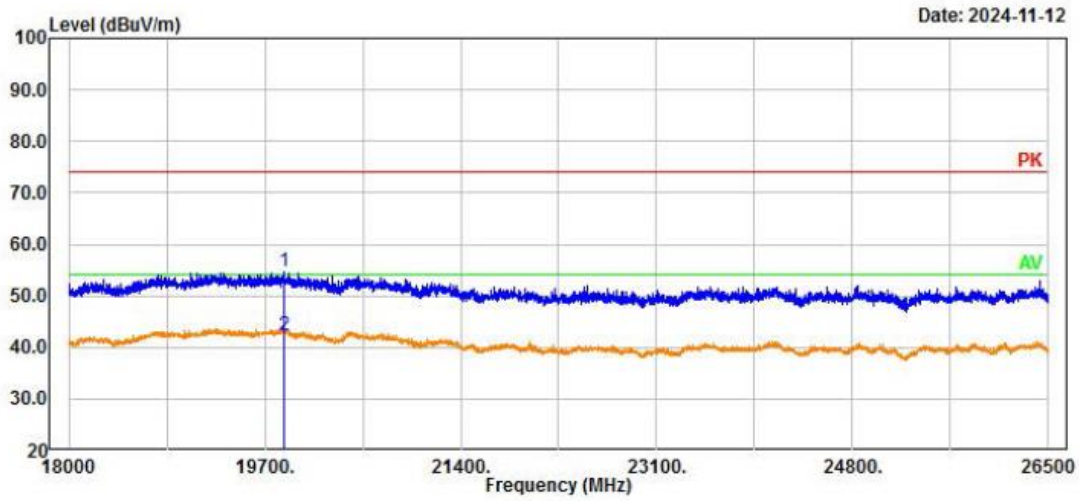
ANT 1-Vertical:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	17911.60	48.30	7.50	55.80	74.00	18.20	Peak
2	17911.60	36.23	7.50	43.73	54.00	10.27	Average

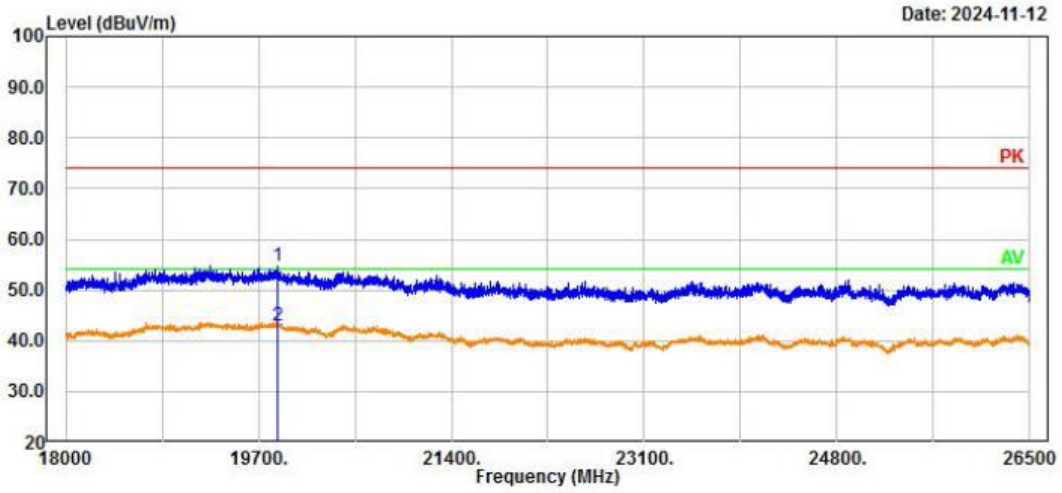
18 – 26.5 GHz Worst Case Pre-Scan, Measured at 1 meter

ANT 1-Horizontal:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	19866.60	46.92	7.80	54.72	74.00	19.28	Peak
2	19866.60	34.45	7.80	42.25	54.00	11.75	Average

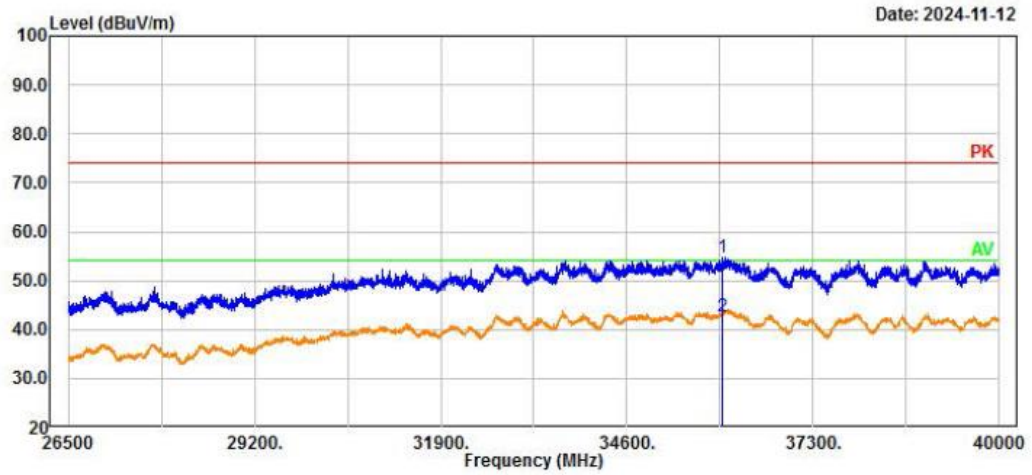
ANT 1-Vertical:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	19871.70	47.03	7.73	54.76	74.00	19.24	Peak
2	19871.70	35.31	7.73	43.04	54.00	10.96	Average

26.5 – 40 GHz Worst Case Pre-Scan, Measured at 1 meter

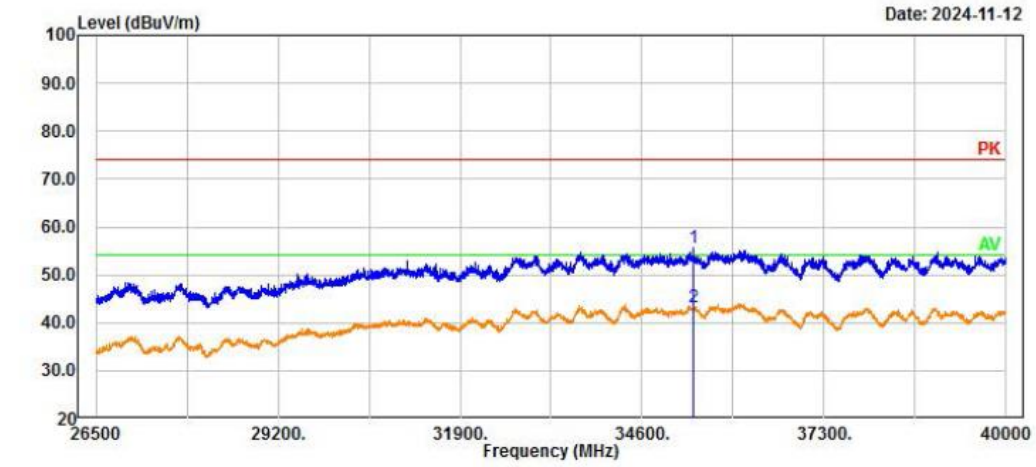
ANT 1-Horizontal:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	35977.00	46.72	8.09	54.81	74.00	19.19	Peak
2	35977.00	34.47	8.09	42.56	54.00	11.44	Average

ANT 1-Vertical:

Note: 10G



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	35356.00	47.77	7.73	55.50	74.00	18.50	Peak
2	35356.00	35.46	7.73	43.19	54.00	10.81	Average

Above 40-200GHz, Measured at 1 meter

ANT 1:

Frequency (GHz)	Receiver Reading (dBμV)	Polar (H/V)	Factor (dB/m)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
41.360	36.35	H	39.00	65.81	74.00	8.19
41.290	36.78	V	38.99	66.23	74.00	7.77
50.220	36.19	H	40.38	67.03	74.00	6.97
50.380	36.83	V	40.41	67.70	74.00	6.30

Note: All the antenna 1 and antenna 2 were tested, and only recorded the data of the worst case antenna 1 in this test report.

8 FCC §15.215 (2) - Emission Bandwidth

8.1 Applicable Standards

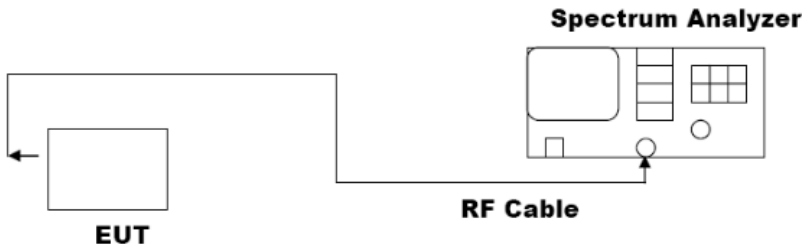
FCC §15.215.

8.2 Measurement Procedure

The measurements are based on ANSI C63.10-2013 Section 6.9 Occupied bandwidth tests.

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
4. For 20dB Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the emission bandwidth and set the Video bandwidth (VBW) ≥ 3 * RBW, Detector=Peak.
5. Measure and record the results in the test report.

8.3 Test Setup



8.4 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	Signal Analyzer	FSQ26	200749	2023-11-07	2 years
-	RF cable	-	-	Each time[1]	N/A
-	Attenuator	-	-	Each time[1]	N/A

Note[1]: cable included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

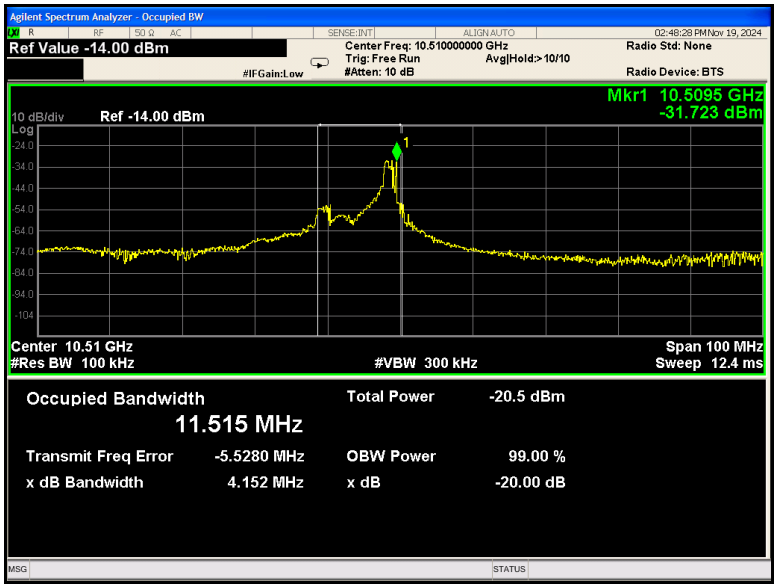
8.5 Test Environmental Conditions

Temperature:	24 ºC
Relative Humidity:	46 %
ATM Pressure:	102.1 KPa

8.6 Test Results

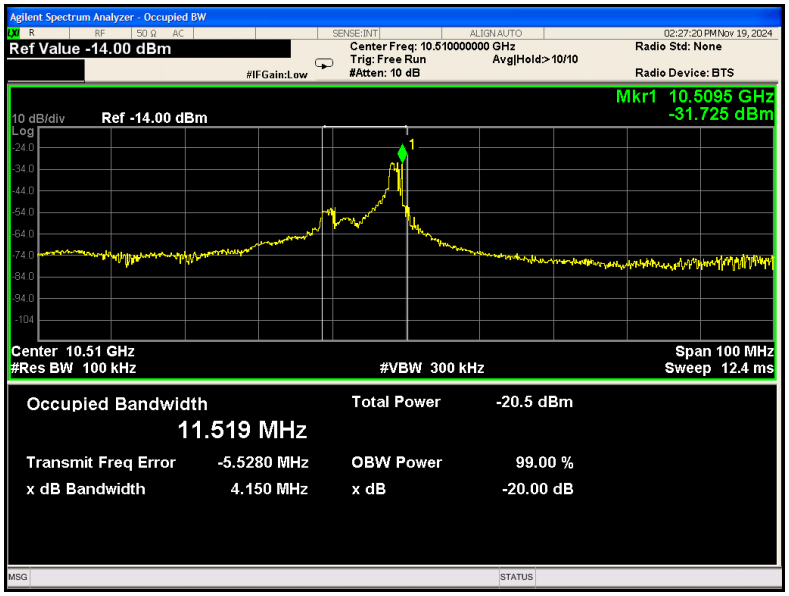
ANT 1:

Channel	99% OBW (MHz)	-20 dB OBW (MHz)
10.518MHZ	11.515	4.152



ANT 2:

Channel	99% OBW (MHz)	-20 dB OBW (MHz)
10.518MHZ	11.519	4.150



9 FCC §15.245(b) - Band Edges

9.1 Applicable Standards

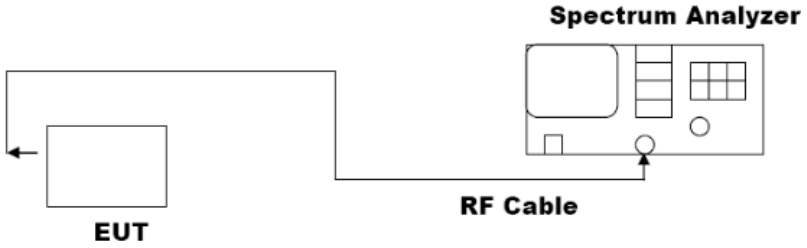
According to FCC §15.245(b) (3), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

9.2 Measurement Procedure

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation

RBW = 100 kHz
VBW = 300 kHz
Sweep = coupled
Detector function = peak
Trace = max hold

9.3 Test Setup



9.4 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	Signal Analyzer	FSQ26	200749	2023-11-07	2 years
-	RF cable	-	-	Each time[1]	N/A
-	Attenuator	-	-	Each time[1]	N/A

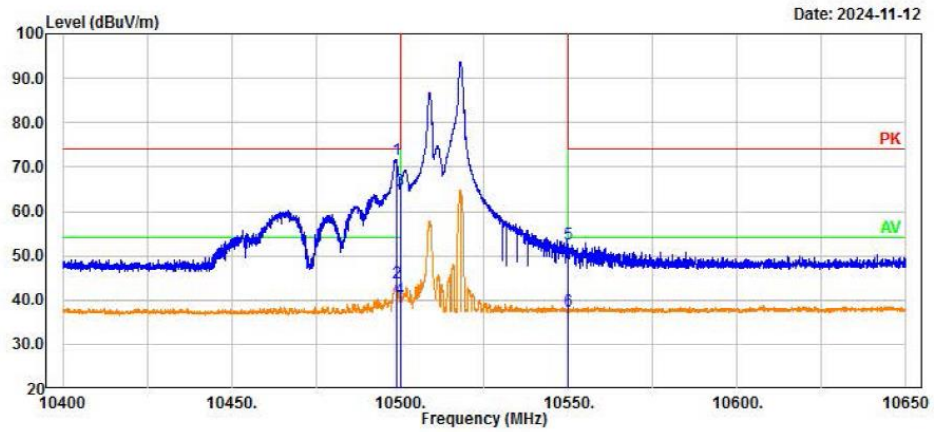
Note[1]: cable included in the test set-up will be checked each time before testing.
Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

9.5 Test Environmental Conditions

Temperature:	24 ºC
Relative Humidity:	46 %
ATM Pressure:	102.1 KPa

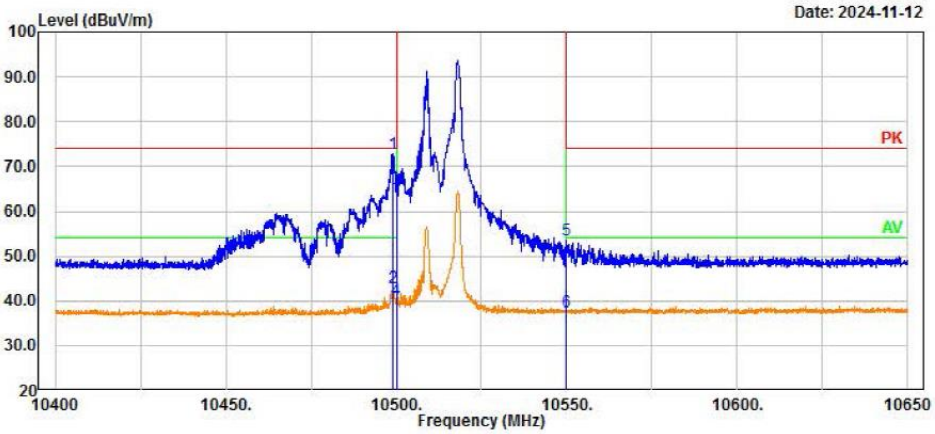
9.6 Test Results

ANT 1



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	10498.85	70.98	0.59	71.57	74.00	2.43	Peak
2	10498.85	43.38	0.59	43.97	54.00	10.03	Average
3	10500.00	64.24	0.59	64.83	74.00	9.17	Peak
4	10500.00	39.68	0.59	40.27	74.00	33.73	Peak
5	10550.00	51.88	0.61	52.49	74.00	21.51	Peak
6	10550.00	36.77	0.61	37.38	54.00	16.62	Average

ANT 2



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	10499.15	72.23	0.59	72.82	74.00	1.18	Peak
2	10499.15	42.35	0.59	42.94	54.00	11.06	Average
3	10500.00	64.26	0.59	64.85	74.00	9.15	Peak
4	10500.00	39.76	0.59	40.35	54.00	13.65	Average
5	10550.00	53.02	0.61	53.63	74.00	20.37	Peak
6	10550.00	36.87	0.61	37.48	54.00	16.52	Average

10 Annex A (Normative) - Test Setup Photographs

Please refer to the attachment

11 Annex B (Normative) - EUT External Photographs

Please refer to the attachment

12 Annex C (Normative) - EUT Internal Photographs

Please refer to the attachment

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