



TEST REPORT

Applicant: Chengdu Meross Technology Co., Ltd.

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Product Name: Smart Presence Sensor

FCC ID: 2AMUU-MS600

IC: 24963-MS600

HVIN: MS600

**47 CFR Part 15, Subpart C(15.249)
RSS-210 Issue 10, December 2019,**

Standard(s): Amendment (April 2020)
RSS-Gen, Issue 5, February 2021 Amendment 2
ANSI C63.10-2013

Report Number: 2402S31882-RF-00A

Report Date: 2024/6/26

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

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	2402S31882-RF-00A	Original Report	2024/6/26

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Name:	Smart Presence Sensor
Trade Name:	meross, Refoss, Flysocks
EUT Model:	MS600
FCC Multiple Models:	PS300, MS650
Operation Frequency:	24025-24225MHz
Modulation Type:	FMCW
Rated Input Voltage:	DC 5V from Adapter
Serial Number:	2JDG-2
EUT Received Date:	2024/4/11
EUT Received Status:	Good

Note:

The Multiple models are electrically identical with the test model. The difference is only the model name. Please refer to the declaration letter for more detail, which was provided by manufacturer.

1.2 Accessory Information

Accessory Description	Manufacturer	Model	Parameters
Adapter	SHENZHEN KEYU POWER SUPPLY TECHNOLOGY CO.,LTD.	BS05A-0501000US	Input:100-240Vac,50/60Hz,0.25A Max Output:5.0Vdc,1.0A

1.3 Antenna Information Detail▲:

Antenna Manufacturer	Antenna Type	input impedance (Ohm)	Frequency Range	Antenna Gain
SGR SEMICONDUCTORS INC.	Array	50	24~24.25GHz	9.7dBi
The design of compliance with §15.203:				
<input checked="" type="checkbox"/> Unit uses a permanently attached antenna.				
<input type="checkbox"/> Unit uses a unique coupling to the intentional radiator.				
<input type="checkbox"/> Unit was professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.				

1.4 Equipment Modifications

No modifications are made to the EUT during all test items.

2. SUMMARY OF TEST RESULTS

Standard(s)/Rule(s)	Description of Test	Result
§15.203 RSS-Gen Clause 6.8	Antenna Requirement	Compliant
§15.207(a) RSS-Gen Clause 8.8	Conduction Emissions	Compliant
15.205, §15.209, §15.249 RSS-Gen Clause 8.10 RSS-210 Annex B B.10	Radiated Emissions	Compliant
§15.215 (c)	20 dB Bandwidth	Compliant
RSS-Gen Clause 6.7	99% Occupied Bandwidth	Compliant

Note 1: For AC line conducted emissions, the maximum output power mode and channel was tested.

Note 2: For Radiated Spurious Emissions 9kHz~ 1GHz, the maximum output power mode and channel was tested.

3. DESCRIPTION OF TEST CONFIGURATION

3.1 Operation Frequency Detail

Sweep Start Frequency (MHz)	Sweep Stop Frequency (MHz)
24025	24225
The below frequencies were test:	
Low Channel	24025
Middle Channel	24125
High Channel	24225

3.2 EUT Operation Condition

The system was configured for testing in Engineering Mode, which was provided by the manufacturer.

3.3 EUT Exercise Software

No software was used in test.

3.4 Support Equipment List and Details

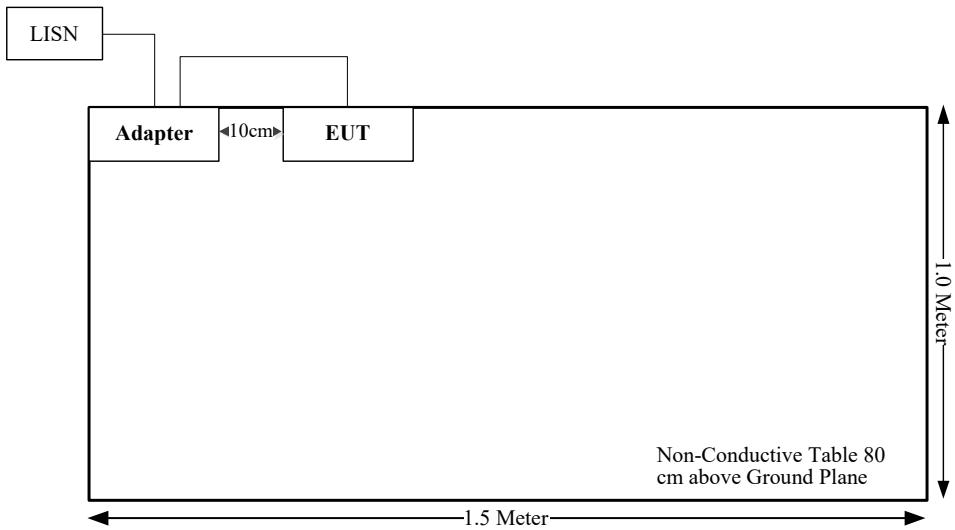
Manufacturer	Description	Model	Serial Number
/	/	/	/

3.5 Support Cable List and Details

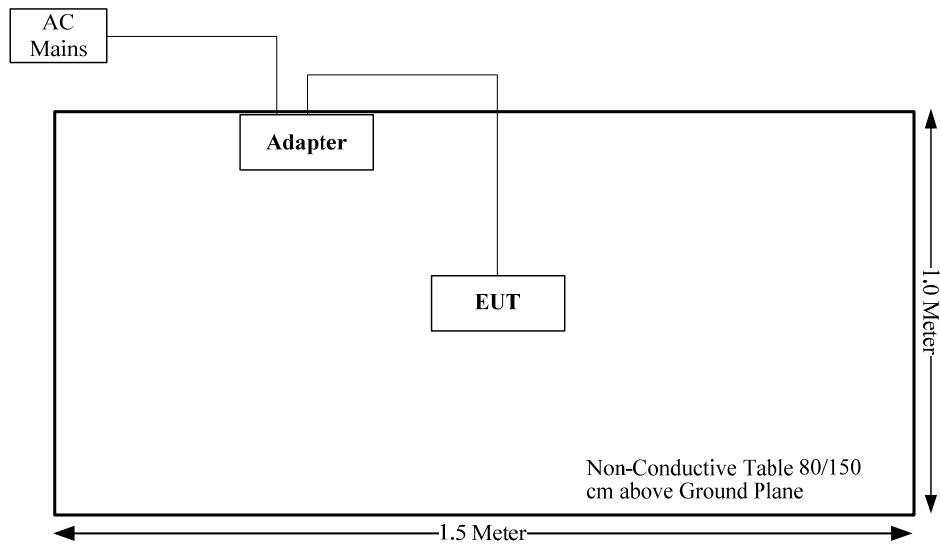
Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
USB Cable	No	No	0.8	Adapter	EUT

3.6 Block Diagram of Test Setup

AC line conducted emissions:



Radiated Spurious Emissions:



3.7 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.

3.8 Measurement Uncertainty

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
Unwanted Emissions, radiated	9kHz~30MHz: 3.3dB, 30MHz~200MHz: 4.55 dB, 200MHz~1GHz: 5.92 dB, 1GHz~6GHz: 4.98 dB, 6GHz~18GHz: 5.89 dB, 18GHz~26.5GHz: 5.47 dB, 26.5GHz~40GHz: 5.63 dB 40~60G: 4.83dB, 60G~90G: 4.94dB, 90G-140G: 5.46dB, 140G-220G: 6.00dB, 220G-325G: 7.35dB
Temperature	±1 °C
Humidity	±5%
DC and low frequency voltages	±0.4%
AC Power Lines Conducted Emission	3.11 dB (150 kHz to 30 MHz)

4. REQUIREMENTS AND TEST RESULTS

4.1 AC Line Conducted Emissions

4.1.1 Applicable Standard

FCC§15.207(a).

(a) Except as shown in paragraphs (b) and (c) of this section, 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 μ H/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 frequency ranges.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

(1) For carrier current system containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 μ V within the frequency band 535-1705 kHz, as measured using a 50 μ H/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in §15.205, §15.209, §15.221, §15.223, or §15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

RSS-Gen Clause 8.8

Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the limits in table 4, as measured using a 50 μ H / 50 Ω line impedance stabilization network. This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.

For an EUT that connects to the AC power lines indirectly, through another device, the requirement for compliance with the limits in table 4 shall apply at the terminals of the AC power-line mains cable of a representative support device, while it provides power to the EUT. The lower limit applies at the boundary between the frequency ranges. The device used to power the EUT shall be representative of typical applications.

Table 4 – AC power-line conducted emissions limits

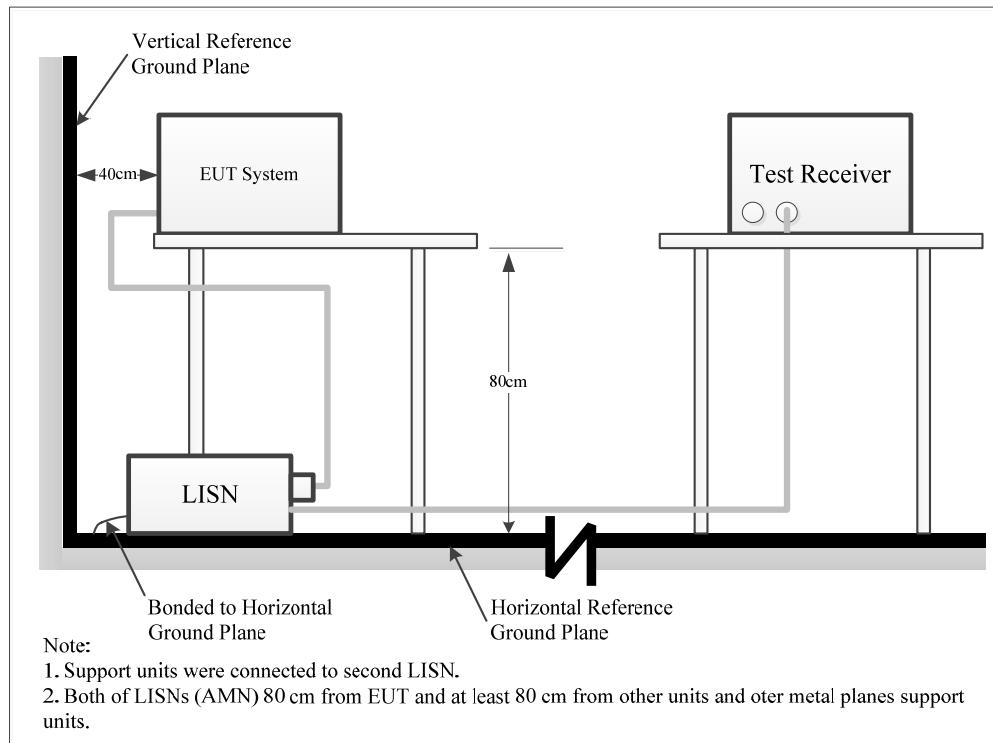
Frequency (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 ¹	56 to 46 ¹
0.5 - 5	56	46
5 - 30	60	50

Note 1: The level decreases linearly with the logarithm of the frequency.

For an EUT with a permanent or detachable antenna operating between 150 kHz and 30 MHz, the AC power-line conducted emissions must be measured using the following configurations:

- (a) Perform the AC power-line conducted emissions test with the antenna connected to determine compliance with the limits of table 4 outside the transmitter's fundamental emission band.
- (b) Retest with a dummy load instead of the antenna to determine compliance with the limits of table 4 within the transmitter's fundamental emission band. For a detachable antenna, remove the antenna and connect a suitable dummy load to the antenna connector. For a permanent antenna, remove the antenna and terminate the RF output with a dummy load or network that simulates the antenna in the fundamental frequency band.

4.1.2 EUT Setup



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

The spacing between the peripherals was 10 cm.

The adapter or EUT was connected to the main LISN with a 120 V/60 Hz AC power source.

4.1.3 EMI Test Receiver Setup

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

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

4.1.4 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.

4.1.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor

Factor = attenuation caused by cable loss + voltage division factor of AMN

The “Margin” column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

4.1.6 Test Result

Serial Number:	2JDG-2	Test Date:	2024/6/8
Test Site:	CE	Test Mode:	Transmitting
Tester:	Wright Lai	Test Result:	Pass

Environmental Conditions:

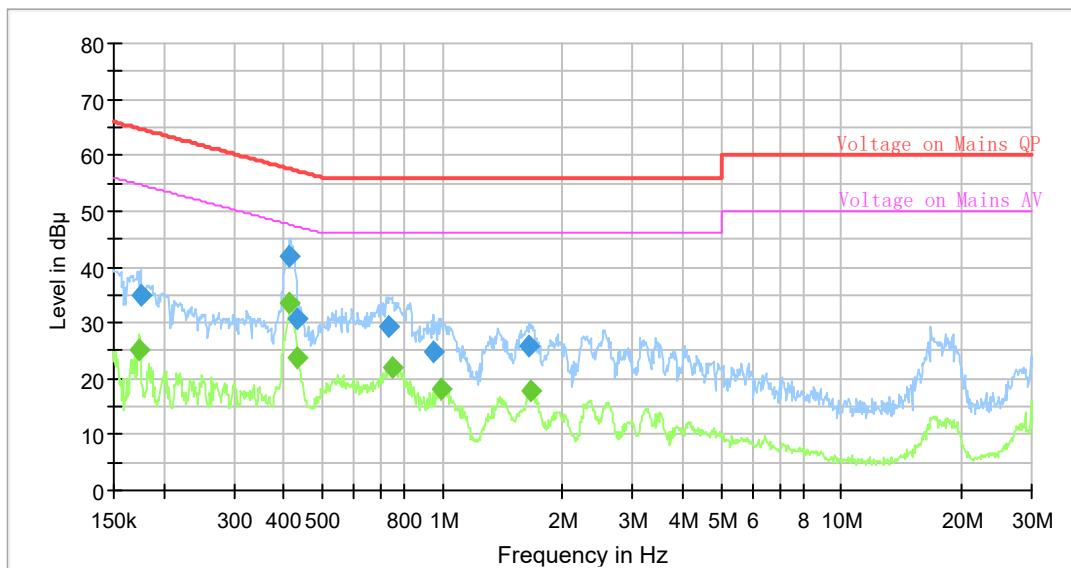
Temperature: (°C)	24.9	Relative Humidity: (%)	67	ATM Pressure: (kPa)	100.7
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Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	LISN	ENV216	101614	2023/10/18	2024/10/17
MICRO-COAX	Coaxial Cable	C-NJNJ-50	C-0200-01	2023/9/5	2024/9/4
R&S	EMI Test Receiver	ESCI	100035	2023/8/18	2024/8/17
R&S	Test Software	EMC32	V9.10.00	N/A	N/A

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

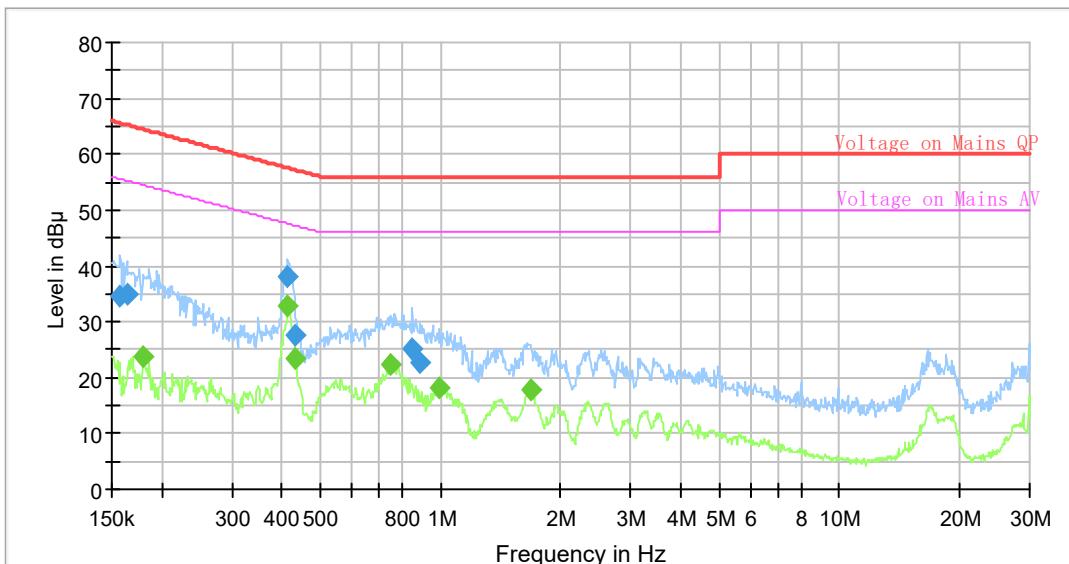
Project No: 2402S31882-RF
 Test Date: 2024-6-8
 Test Engineer: Wright Lai
 Port: L
 Test Mode: Transmitting
 Power Source: AC 120V/60Hz
 Note: Low channel



Final Result

Frequency (MHz)	QuasiPeak (dB μV)	Average (dB μV)	Limit (dB μV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.174210	---	25.30	54.76	29.46	9.000	L1	10.8
0.175081	34.98	---	64.72	29.74	9.000	L1	10.8
0.414923	---	33.68	47.55	13.87	9.000	L1	10.8
0.414923	42.04	---	57.55	15.51	9.000	L1	10.8
0.433973	---	23.89	47.18	23.29	9.000	L1	10.8
0.433973	30.57	---	57.18	26.61	9.000	L1	10.8
0.736317	29.33	---	56.00	26.67	9.000	L1	10.9
0.751154	---	22.10	46.00	23.90	9.000	L1	10.9
0.949586	24.97	---	56.00	31.03	9.000	L1	10.9
0.998148	---	18.33	46.00	27.67	9.000	L1	10.9
1.651836	25.71	---	56.00	30.29	9.000	L1	10.8
1.668396	---	17.93	46.00	28.07	9.000	L1	10.8

Project No: 2402S31882-RF
 Test Date: 2024-6-8
 Test Engineer: Wright Lai
 Port: N
 Test Mode: Transmitting
 Power Source: AC 120V/60Hz
 Note: Low channel



Final Result

Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.157671	34.43	---	65.59	31.16	9.000	N	10.9
0.163273	34.91	---	65.30	30.39	9.000	N	10.9
0.179502	---	23.70	54.51	30.81	9.000	N	10.9
0.414923	32.87	47.55	14.68	9.000	N	10.8	
0.414923	38.01	---	57.55	19.54	9.000	N	10.8
0.433973	27.44	---	57.18	29.74	9.000	N	10.8
0.433973	---	23.56	47.18	23.62	9.000	N	10.8
0.751154	---	22.46	46.00	23.54	9.000	N	10.8
0.850904	25.23	---	56.00	30.77	9.000	N	10.8
0.889970	22.68	---	56.00	33.32	9.000	N	10.8
0.998148	---	18.26	46.00	27.74	9.000	N	10.8
1.676738	---	17.93	46.00	28.07	9.000	N	10.9

4.2 Radiated Emissions

4.2.1 Applicable Standard

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

(d) 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.

RSS-210, Annex B, B.10

Devices shall comply with the following requirements:

(a) The field strength of fundamental and harmonic emissions measured at 3 m shall not exceed the limits in table B2.

Table B2 — Field strength limits at various frequencies

Frequency bands (MHz)	Field strength (mV/m)	
	Fundamental emissions	Harmonic emissions
902-928	50	0.5
2400-2483.5	50	0.5
5725-5875	50	0.5
24000-24250	250	2.5

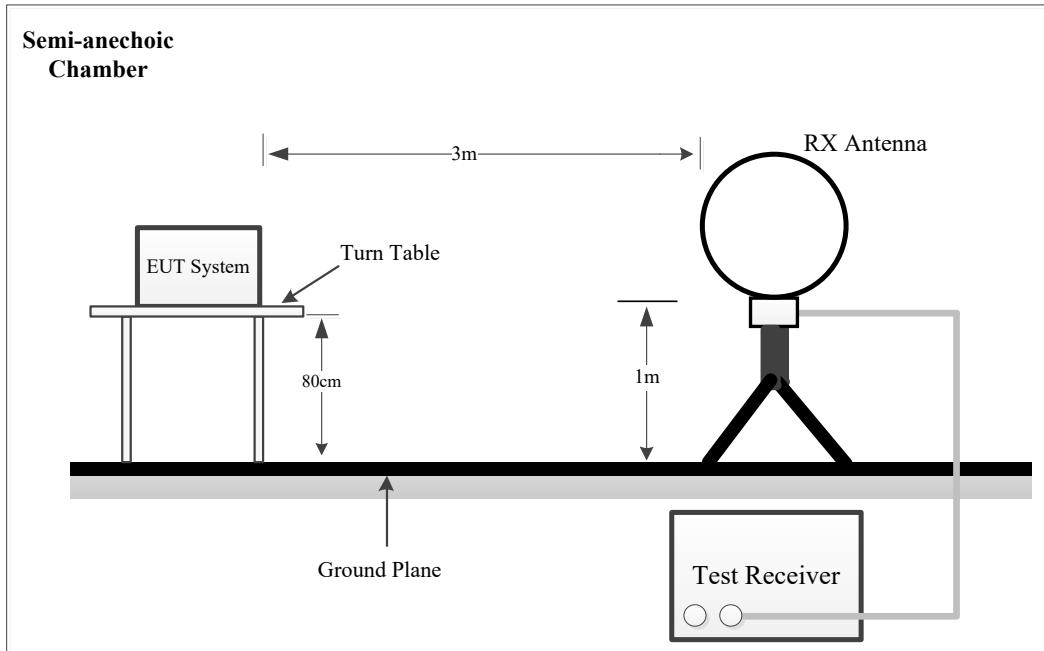
The field strength shall be measured using an average detector, except for the fundamental emission in the frequency band 902–928 MHz, which is based on measurements using an

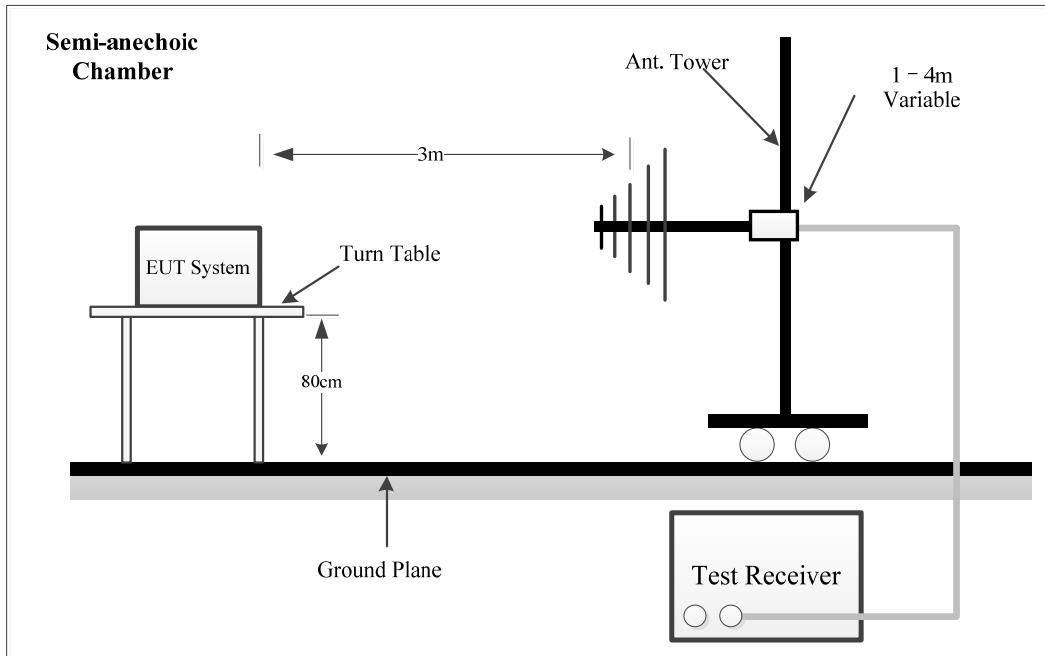
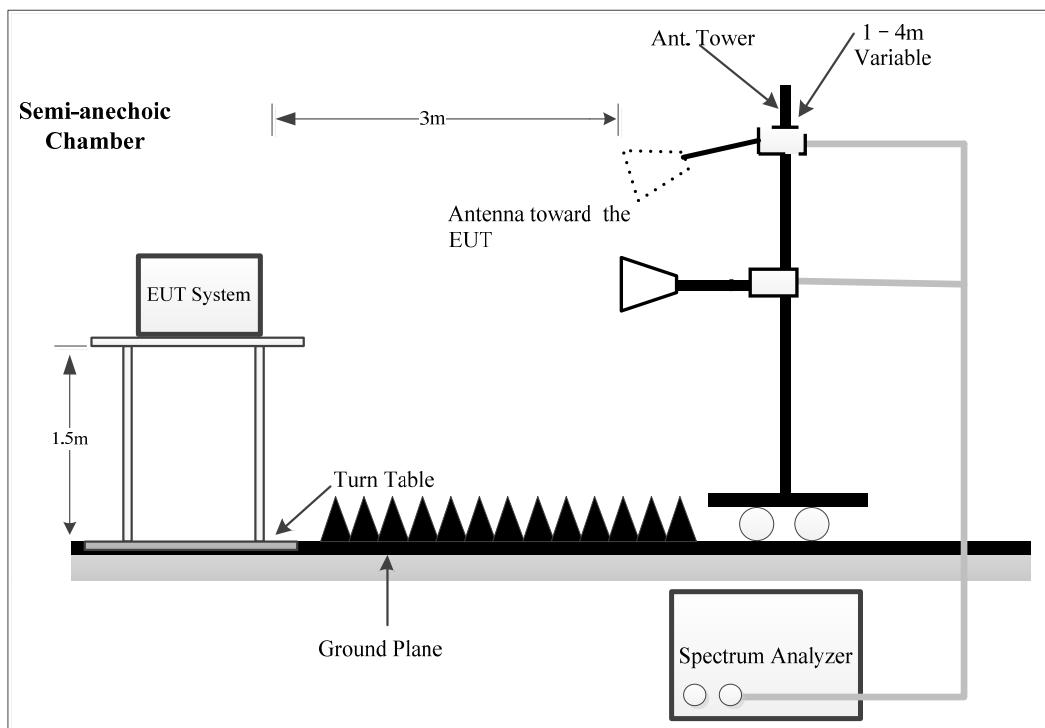
International Special Committee on Radio Interference (CISPR) quasi-peak detector.

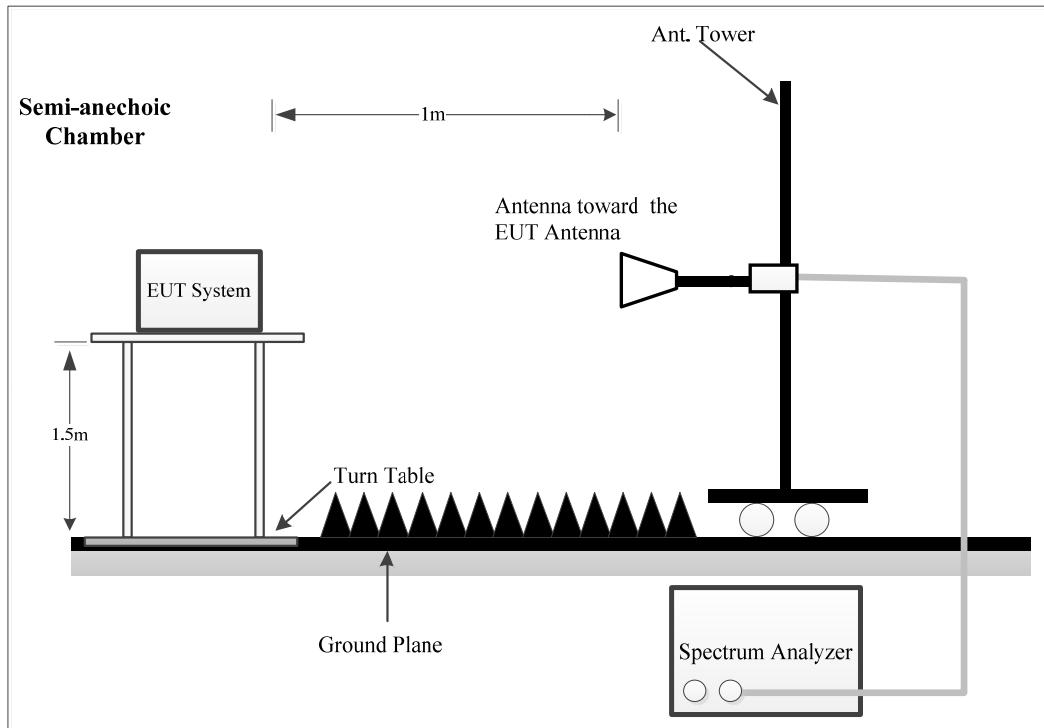
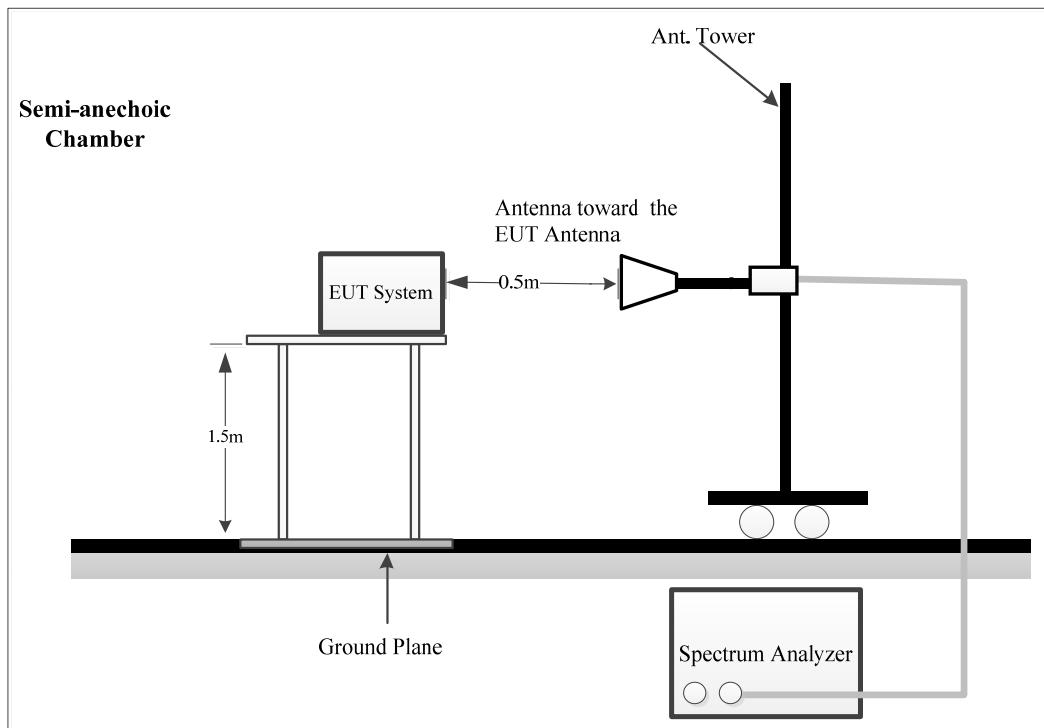
(b) Emissions radiated outside of the specified frequency bands, except for harmonic emissions, shall be attenuated by at least 50 dB below the level of the fundamental emissions or to the general field strength limits listed in [RSS-Gen](#), whichever is less stringent

4.2.2 EUT Setup

9kHz~30MHz:



Below 1GHz:**1GHz-40GHz:**

40~90 GHz:**90~100 GHz:**

For 9kHz-30MHz test, the lowest height of the magnetic antenna shall be 1 m above the ground and three antenna orientations (parallel, perpendicular, and ground-parallel) shall be measured.

For above 40GHz:

The antenna is scanned around the entire perimeter surface of the EUT, in both horizontal and vertical polarizations, at the distance of 1.0 m from 40 GHz to 90 GHz, and 0.5 m from 90 GHz to 100 GHz.

The radiated emission and out of band emission tests were performed in the 3 meters chamber, using the setup accordance with the ANSI C63.10-2013 The specification used was the FCC 15.209/15.205 and FCC 15.249 limits.

4.2.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 100 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

9kHz-100GHz:

Frequency Range	Measurement	RBW	Video B/W	IF B/W
9 kHz – 150 kHz	QP/AV	200 Hz	1 kHz	200 Hz
150 kHz – 30 MHz	QP/AV	9 kHz	30 kHz	9 kHz
30 MHz – 1000 MHz	PK	100 kHz	300 kHz	/
	QP	/	/	120 kHz
Above 1 GHz	PK	1MHz	3 MHz	/
	CISPR AV	/	/	1MHz

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

4.2.4 Test Procedure

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

Data was recorded in Quasi-peak detection mode for frequency range of 9 kHz -1 GHz, except 9-90 kHz, 110-490 kHz, employing an average detector, peak and Average detection modes for frequencies above 1 GHz.

For above 40GHz:

External harmonic mixers are utilized. The antenna is scanned around the entire perimeter surface of the EUT, in both horizontal and vertical polarizations. The Mixers and it's RF cables is compose a system for calibration, the conversion factor was added into the test Spectrum Analyzer in testing.

The far-field boundary is given in ANSI C63.10-2013:

$$R_m = 2D^2 / \lambda$$

Where:

D is the largest dimension of the antenna aperture in m and
 λ is the free-space wavelength in m at the frequency of measurement.

The minimum test distance for the frequency range 40GHz-100GHz determine as below:

Model	Frequency Range (GHz)	Largest Dimension of the Horn Antenna (mm)	Minimum Test Distance R_m (m)
M19RH	40-60	46.3	0.57
M12RH	60-90	30.02	0.36
M08RH	90-140	19.7	0.23

Note: the test distances used were 1.0 m from 40 GHz to 90 GHz, and 0.5 m from 90 GHz to 100GHz, it can be seen that the EUT was always in the Far-field of the Receive Antenna during all Radiated Emissions Tests.

4.2.5 Corrected Amplitude & Margin Calculation

For 9kHz~40GHz:

The basic equation is as follows:

Result = Reading + Factor

Factor = Antenna Factor + Cable Loss- Amplifier Gain

Note: the antenna JB3 was calibrated with 6dB Attenuator, the antenna factor includes the insertion loss of the Attenuator.

For 40-90GHz:

Test result shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade from 3m to 1m.

Distance extrapolation factor = $20 \log (\text{specific distance [3m]}/\text{test distance [1m]})$ dB= 9.54 dB.

For 90-100GHz:

Test result shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade from 3m to 0.5m.

Distance extrapolation factor = $20 \log (\text{specific distance [3m]}/\text{test distance [0.5m]})$ dB=15.56 dB.

For 40GHz-100GHz

Result = Reading + Factor-Distance extrapolation Factor

The “Margin” column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

4.2.6 Test Result

Serial Number:	2JDG-2	Test Date:	Below 1GHz: 2024/6/5 Above 1GHz: 2024/6/21
Test Site:	Chamber 10, Chamber B	Test Mode:	Transmitting
Tester:	Zoo Zou, Colin Yang	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	25.5~26.9	Relative Humidity: (%)	49~66	ATM Pressure: (kPa)	100.9~101
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Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
9kHz~1000MHz					
EMCO	Passive Loop Antenna	6512	9706-1206	2023/10/21	2026/10/20
Sunol Sciences	Hybrid Antenna	JB3	A060611-1	2023/9/6	2026/9/5
Narda	Coaxial Attenuator	779-6dB	04269	2023/9/6	2026/9/5
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2023/8/1	2024/7/31
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-04	2023/8/1	2024/7/31
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2023/8/1	2024/7/31
Sonoma	Amplifier	310N	185914	2023/8/1	2024/7/31
R&S	EMI Test Receiver	ESCI	100224	2023/8/18	2024/8/17
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Above 1GHz					
ETS-Lindgren	Horn Antenna	3115	000 527 35	2023/9/7	2026/9/6
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-02 1304	2023/2/22	2026/2/21
Ducommun Technologies	Horn Antenna	ARH-2823-02	1007726-01 1302	2023/2/22	2026/2/21
Xinhang Macrowave	Coaxial Cable	XH750A-N/J-SMA/J-10M	20231117004 #0001	2023/11/17	2024/11/16
Xinhang Macrowave	Coaxial Cable	XH360A-2.92/J-2.92/J-6M-A	20231208001 #0001	2023/12/11	2024/12/10
AH	Preamplifier	PAM-0118P	469	2023/8/19	2024/8/18
AH	Preamplifier	PAM-1840VH	191	2023/9/7	2024/9/6
R&S	Spectrum Analyzer	FSV40	101944	2023/10/18	2024/10/17
Audix	Test Software	E3	191218 V9	N/A	N/A
OML	Waveguide Mixer	WR19/M19HWD	U60313-1	2023/2/16	2026/2/15
OML	Horn Antenna	M19RH	11648-01	2023/2/27	2026/2/26
OML	Waveguide Mixer	WR12/M12HWD	E60120-1	2023/2/16	2026/2/15
OML	Horn Antenna	M12RH	E60120-2	2023/2/27	2026/2/26
OML	Waveguide Mixer	WR08/M08HWD	F60313-1	2023/2/16	2026/2/15
OML	Horn Antenna	M08RH	F60313-2	2023/2/27	2026/2/26

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data:

Please refer to the below table and plots.

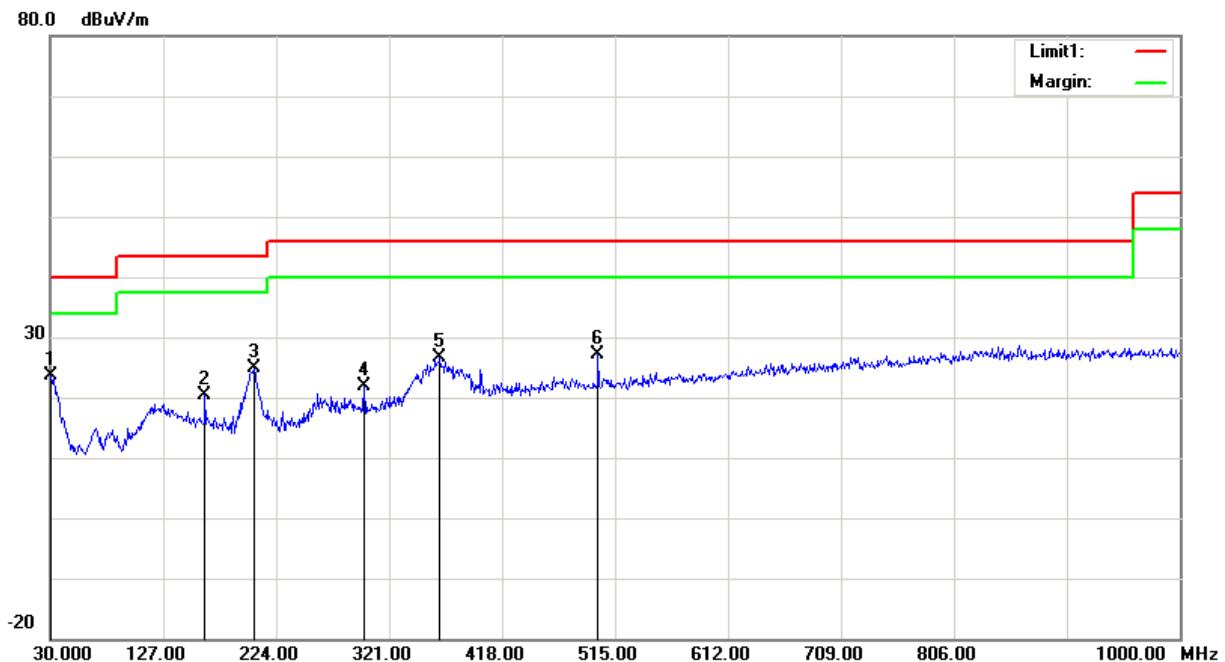
After pre-scan in the X, Y and Z axes of orientation, the worst case is below:

1) 9kHz~30MHz

Low Channel was tested. The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

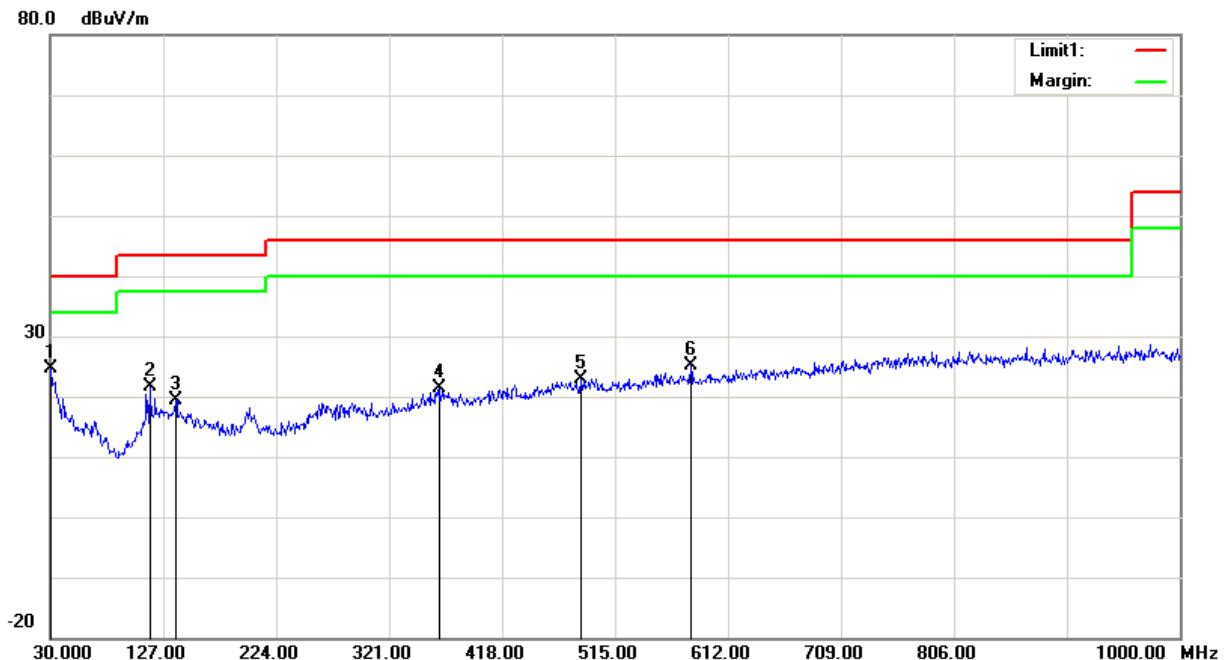
2) 30MHz-1GHz

Project No: 2402S31882-RF
Test Engineer: Zoo Zou
Test Date: 2024-6-5
Polarization: Horizontal
Test Mode: Transmitting
Power Source: AC 120V/60Hz
Note: Low channel



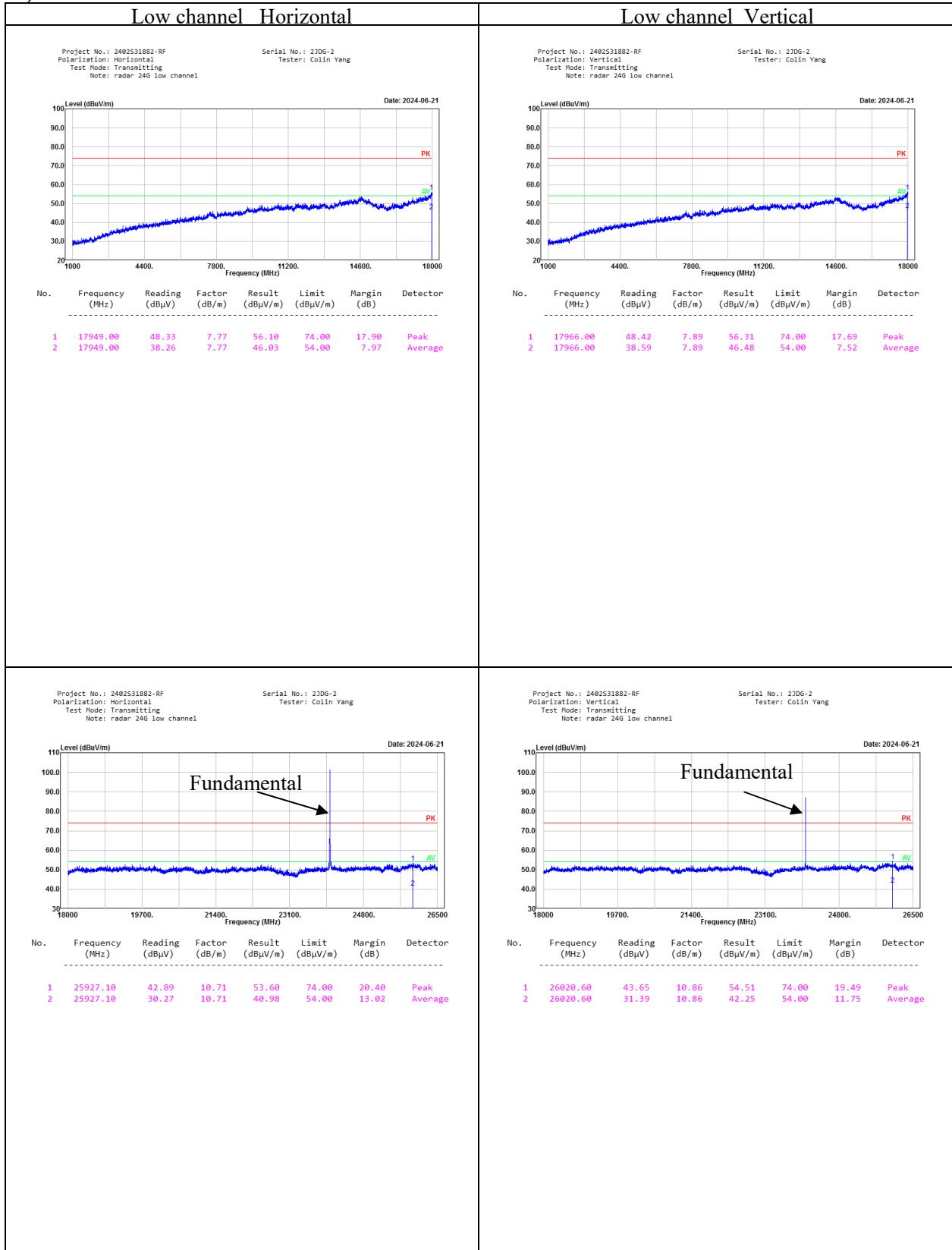
No.	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1	30.9700	27.98	peak	-4.31	23.67	40.00	16.33
2	162.8900	31.63	peak	-11.25	20.38	43.50	23.12
3	204.6000	36.87	peak	-11.96	24.91	43.50	18.59
4	299.6600	31.51	peak	-9.53	21.98	46.00	24.02
5	364.6500	34.86	peak	-8.22	26.64	46.00	19.36
6	500.4500	31.33	peak	-4.28	27.05	46.00	18.95

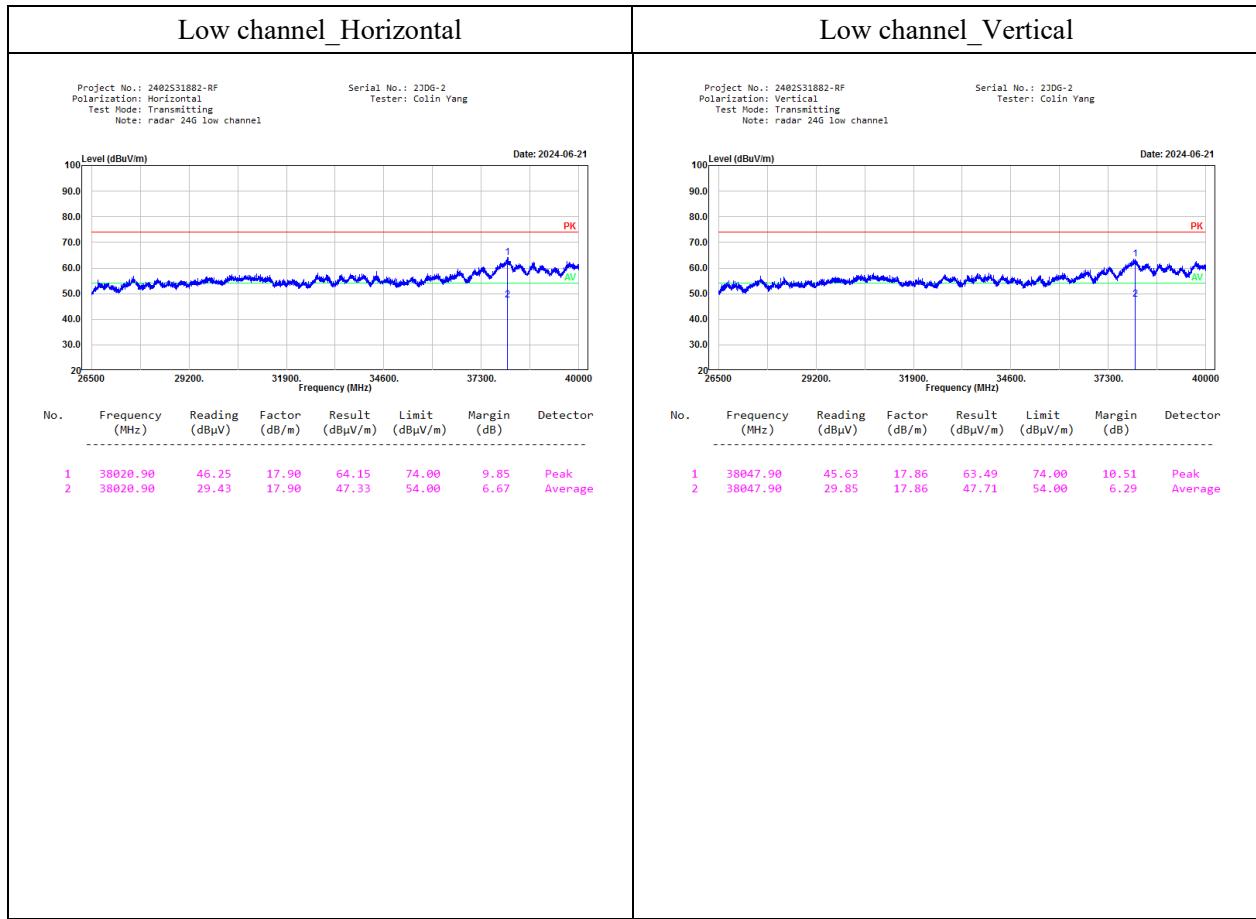
Project No: 2402S31882-RF
Test Engineer: Zoo Zou
Test Date: 2024-6-5
Polarization: Vertical
Test Mode: Transmitting
Power Source: AC 120V/60Hz
Note: Low channel

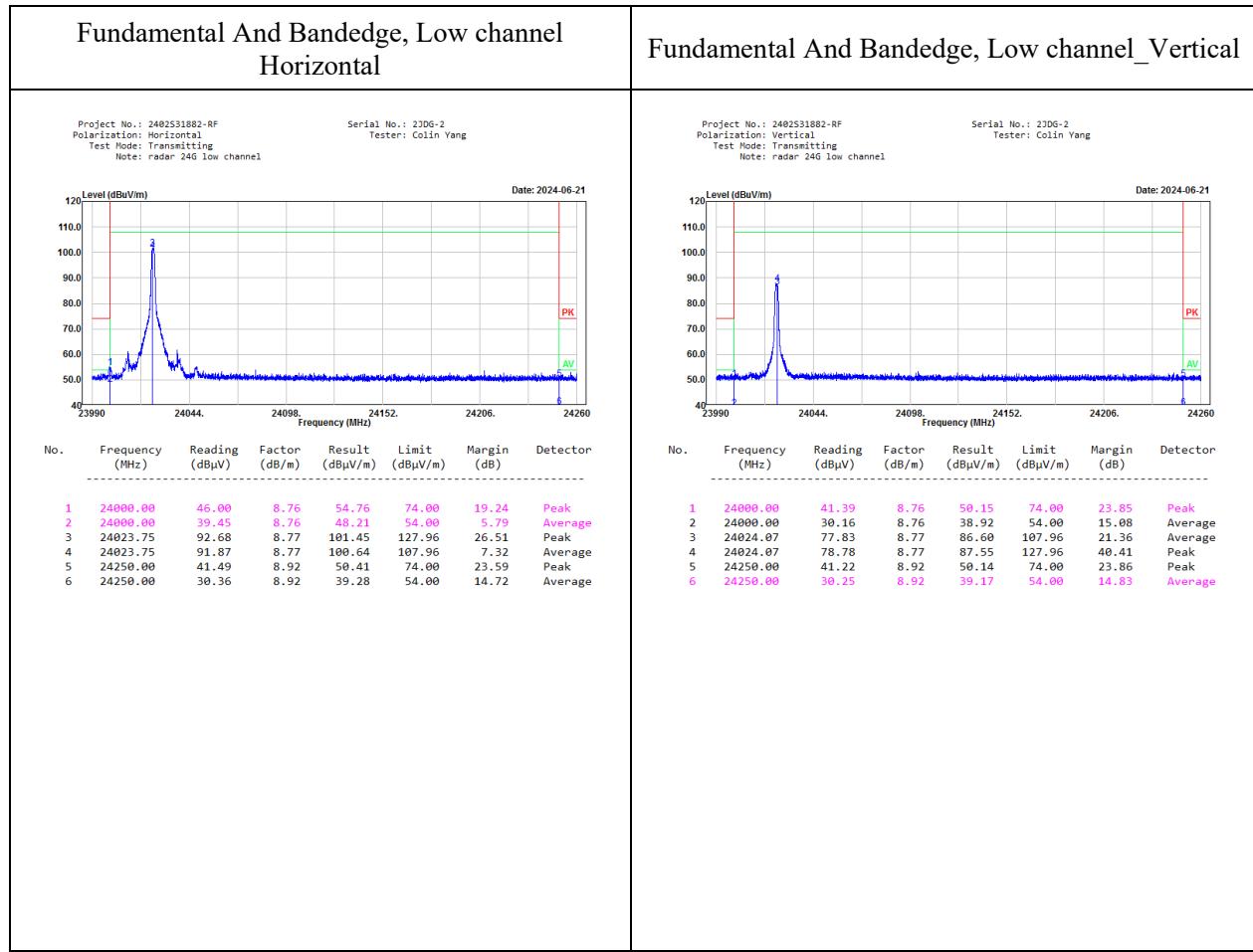


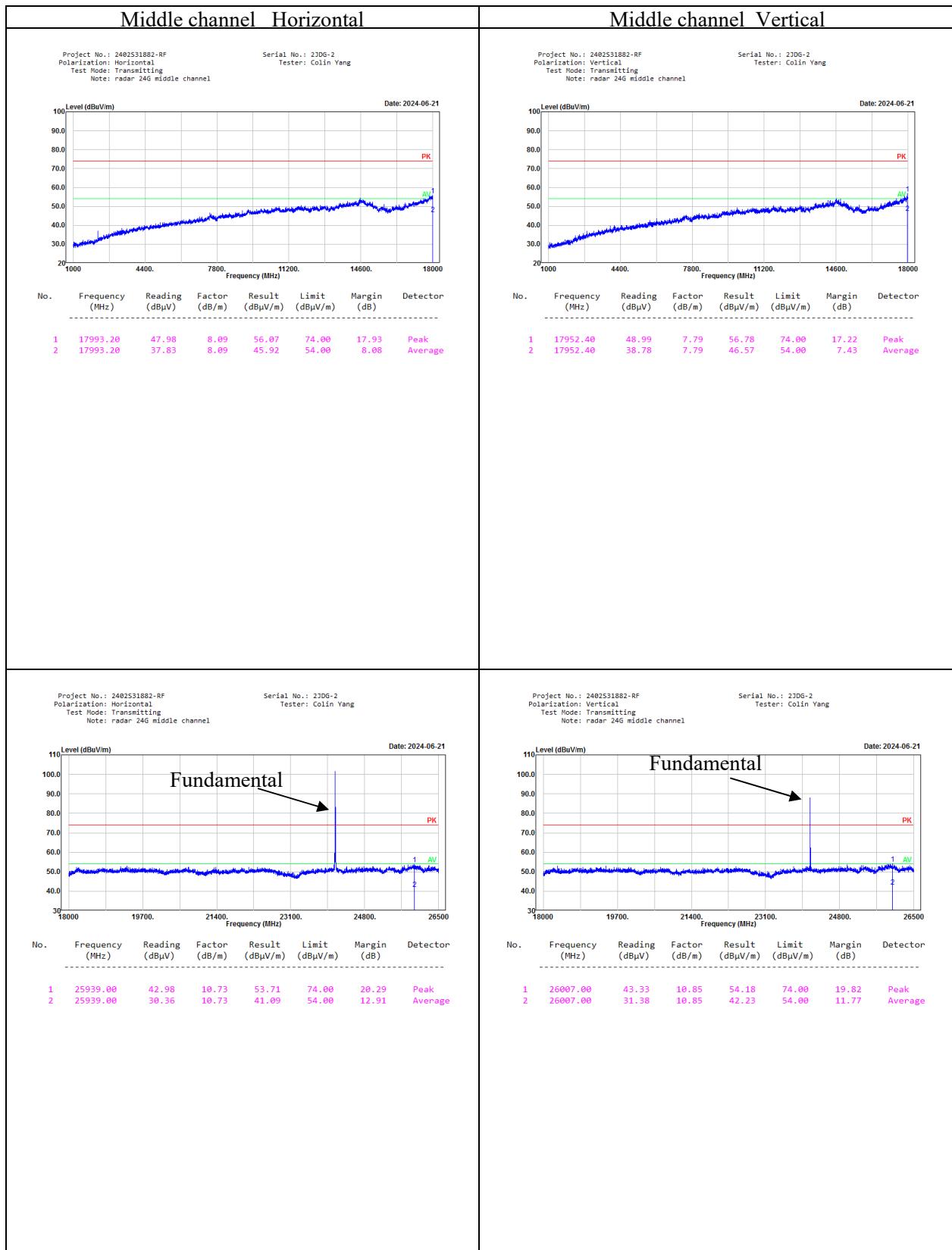
No.	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1	30.9700	28.99	peak	-4.31	24.68	40.00	15.32
2	115.3600	31.98	peak	-10.45	21.53	43.50	21.97
3	137.6700	29.69	peak	-10.33	19.36	43.50	24.14
4	364.6500	29.61	peak	-8.22	21.39	46.00	24.61
5	485.9000	27.24	peak	-4.36	22.88	46.00	23.12
6	579.9900	28.29	peak	-3.18	25.11	46.00	20.89

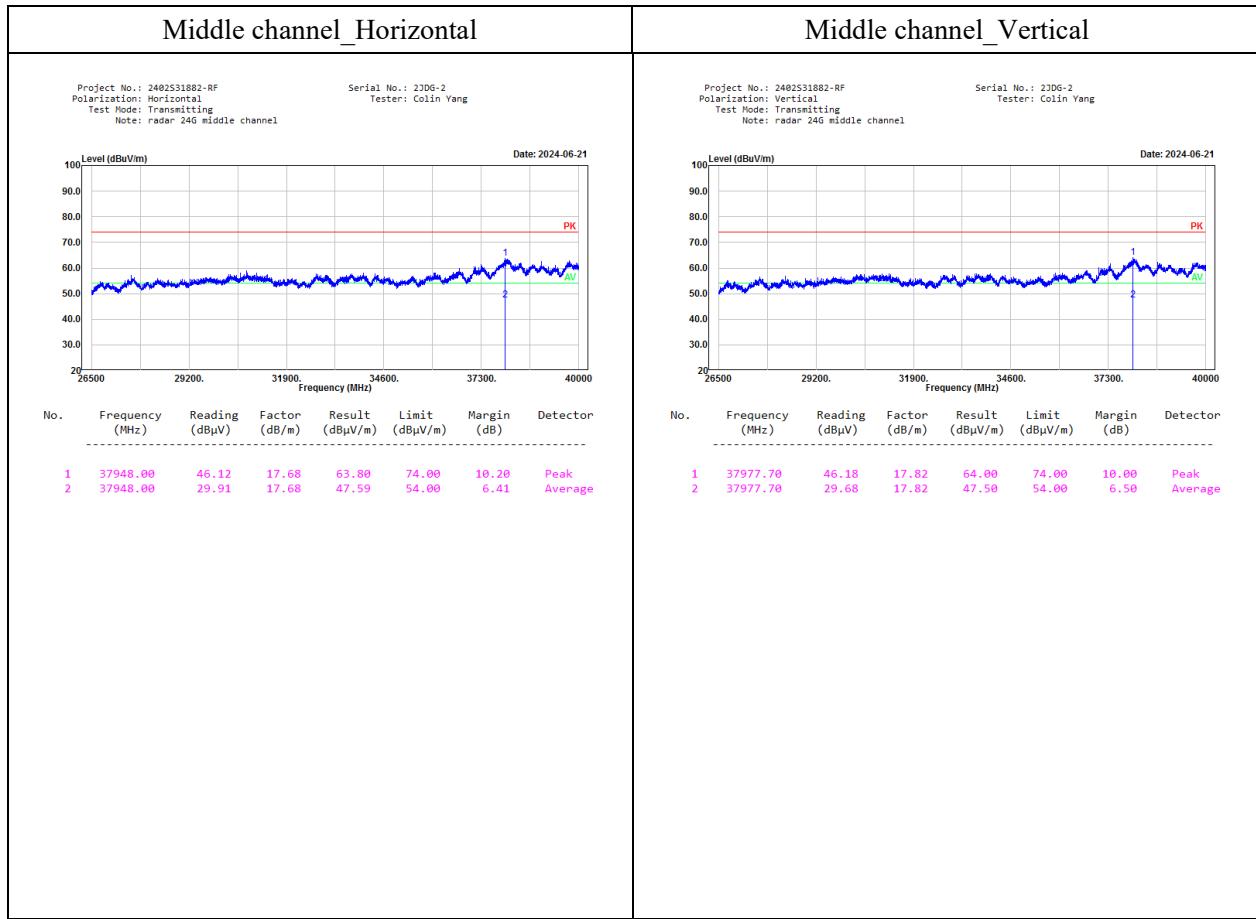
3) 1-40GHz:

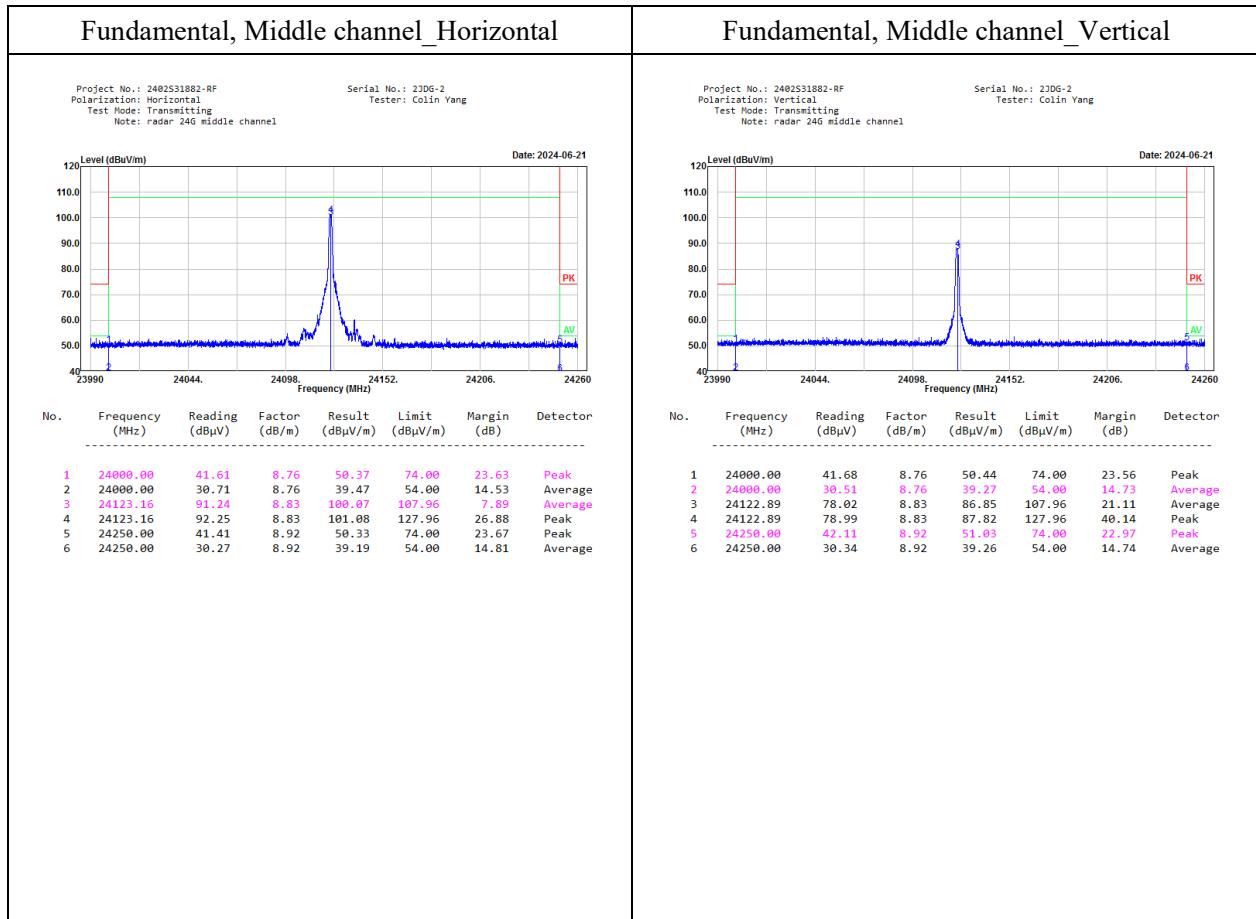


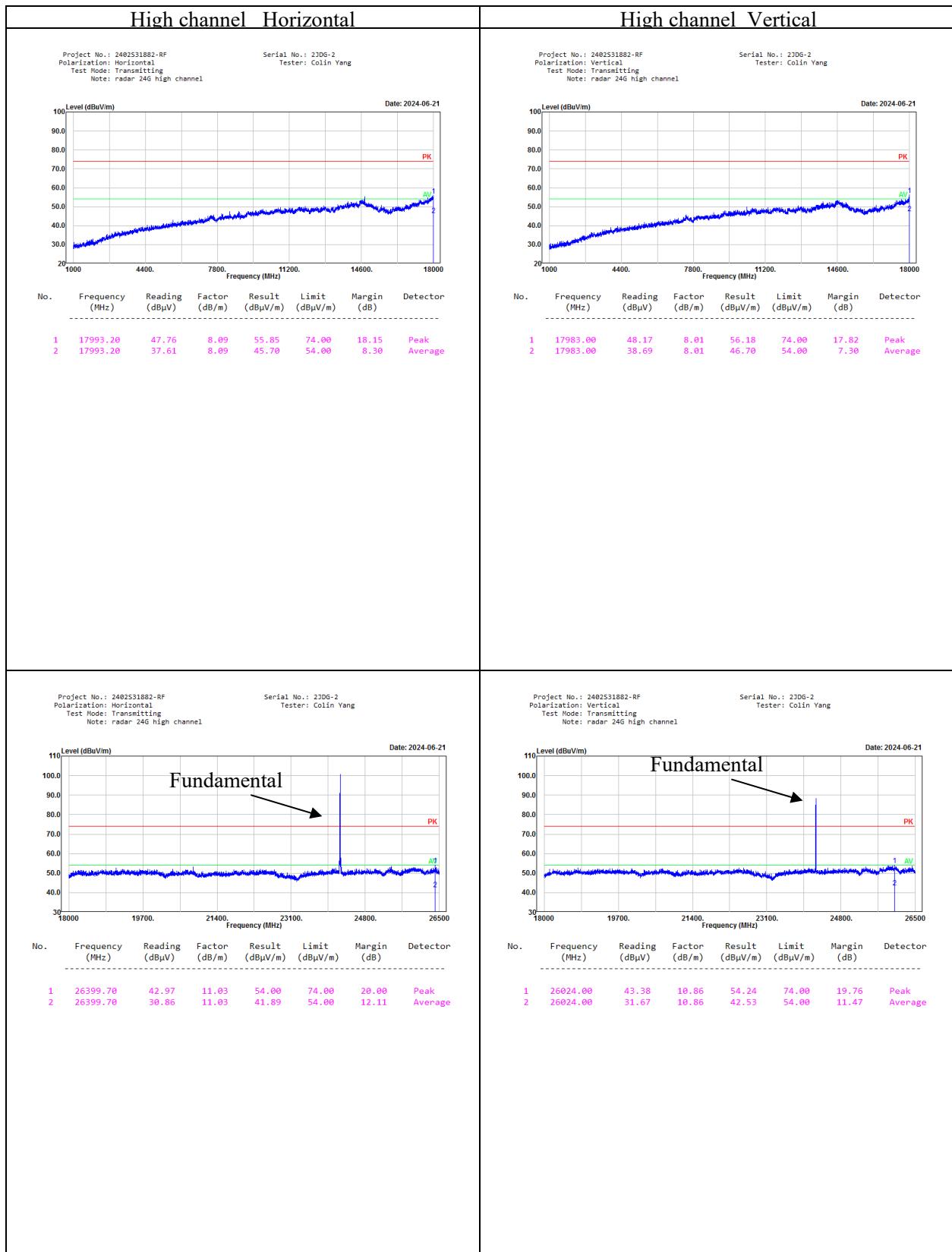


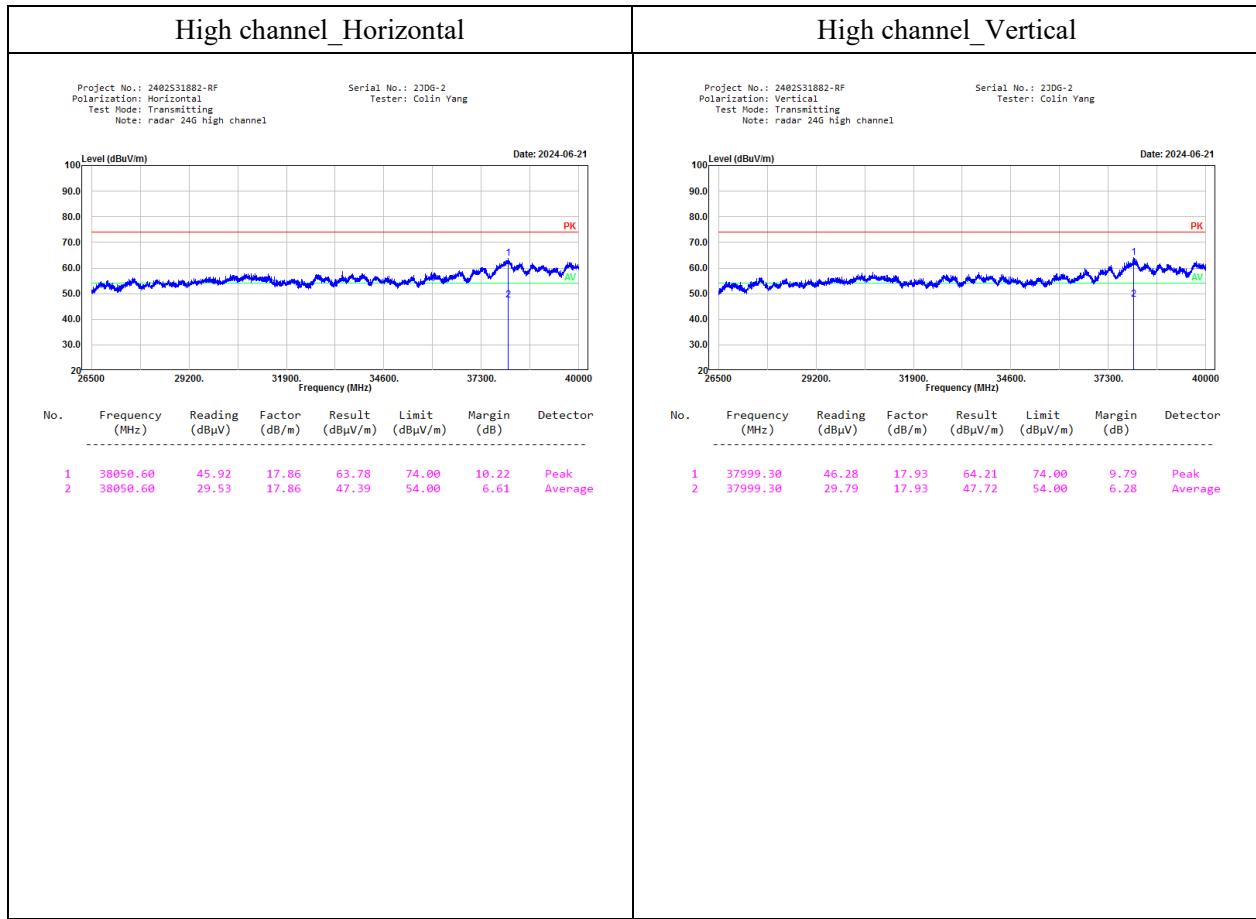


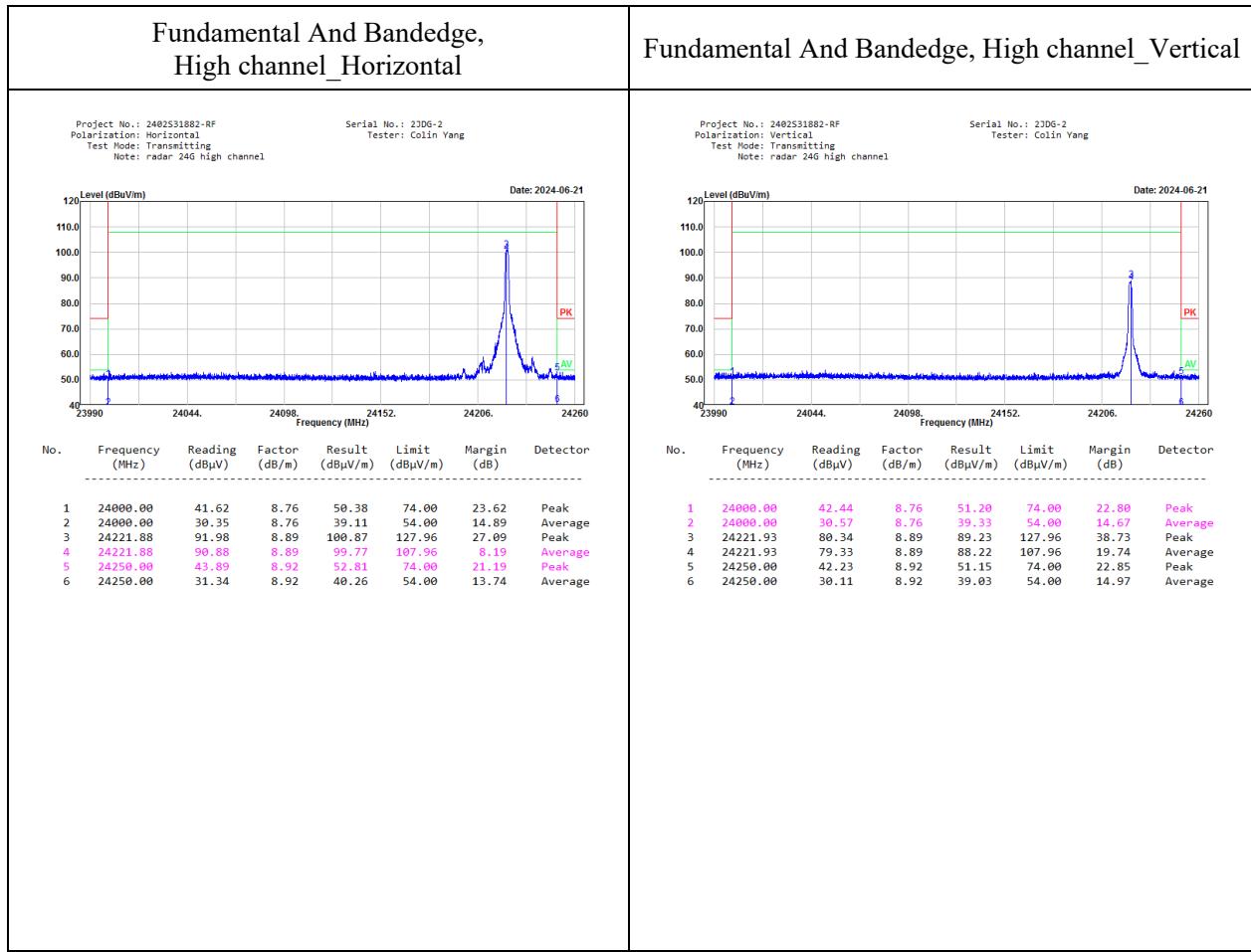












3) 40-100GHz:

Frequency (GHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
	Reading (dB μ V)	Detector					
Low channel 24.025 GHz							
48.050	45.77	PK	H	40.05	76.28	87.96	11.68
48.050	33.67	AV	H	40.05	64.18	67.96	3.78
48.050	45.26	PK	V	40.05	75.77	87.96	12.19
48.050	33.41	AV	V	40.05	63.92	67.96	4.04
72.075	42.62	PK	H	43.79	76.87	87.96	11.09
72.075	30.42	AV	H	43.79	64.67	67.96	3.29
72.075	42.77	PK	V	43.79	77.02	87.96	10.94
72.075	30.58	AV	V	43.79	64.83	67.96	3.13
Middle channel 24.125 GHz							
48.250	45.92	PK	H	40.08	76.46	87.96	11.50
48.250	33.74	AV	H	40.08	64.28	67.96	3.68
48.250	45.81	PK	V	40.08	76.35	87.96	11.61
48.250	33.56	AV	V	40.08	64.10	67.96	3.86
72.375	42.65	PK	H	43.84	76.95	87.96	11.01
72.375	30.62	AV	H	43.84	64.92	67.96	3.04
72.375	42.35	PK	V	43.84	76.65	87.96	11.31
72.375	30.17	AV	V	43.84	64.47	67.96	3.49
High channel 24.225 GHz							
48.450	45.62	PK	H	40.11	76.19	87.96	11.77
48.450	33.35	AV	H	40.11	63.92	67.96	4.04
48.450	45.79	PK	V	40.11	76.36	87.96	11.60
48.450	33.23	AV	V	40.11	63.80	67.96	4.16
72.675	43.16	PK	H	43.89	77.51	87.96	10.45
72.675	31.02	AV	H	43.89	65.37	67.96	2.59
72.675	42.79	PK	V	43.89	77.14	87.96	10.82
72.675	30.68	AV	V	43.89	65.03	67.96	2.93

Result = Reading + Factor- Distance extrapolation Factor

For 40-90GHz:

Distance extrapolation Factor = $20 \log (\text{specific distance [3m]}/\text{test distance [1m]})$ dB = 9.54 dB

For 90-100GHz:

Distance extrapolation Factor = $20 \log (\text{specific distance [3m]}/\text{test distance [0.5m]})$ dB = 15.56 dB

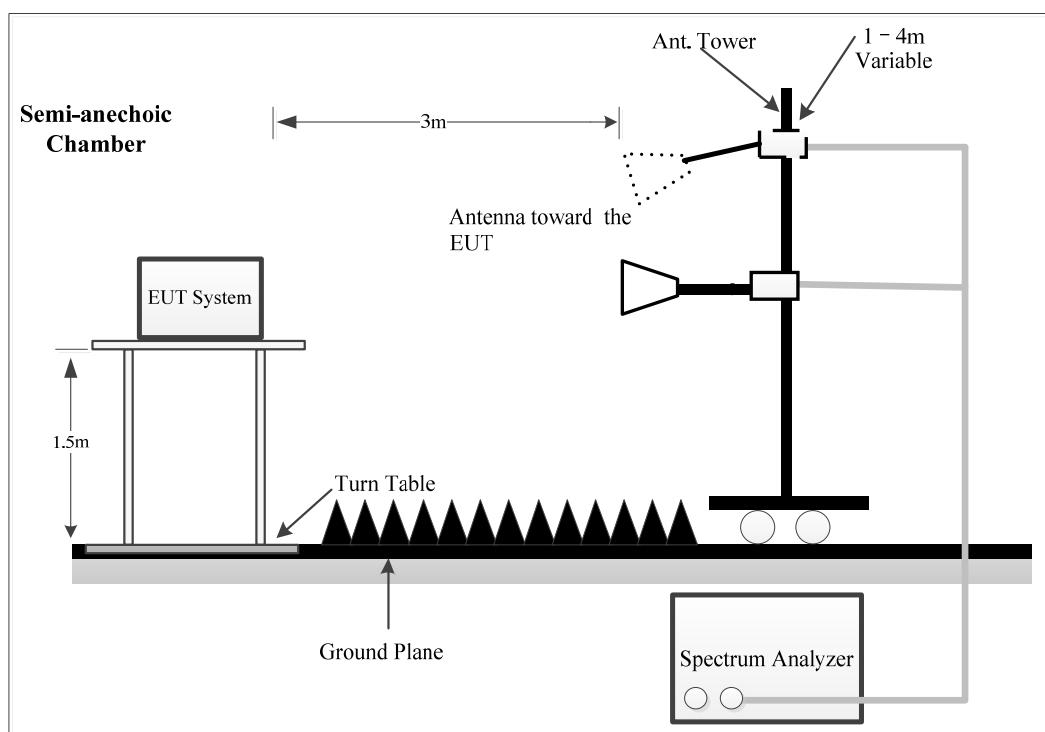
4.3 20 dB Emission Bandwidth

4.3.1 Applicable Standard

FCC §15.215

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

4.3.2 EUT Setup



4.3.3 Test Procedure

According to ANSI C63.10-2013 Section 6.9.2

- The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, unless otherwise specified by the applicable requirement.
- Set the video bandwidth (VBW) $\geq 3 \times \text{RBW}$.
- Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Allow the trace to stabilize.
- 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 20 dB relative to the maximum level measured in the fundamental emission.

4.3.4 Test Result

Serial No.:	2JDG-2	Test Date:	2024/6/25
Test Site:	Chamber B	Test Mode:	Transmitting
Tester:	Colin Yang	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	26.9	Relative Humidity: (%)	49	ATM Pressure: (kPa)	100.9
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Test Equipment List and Details:

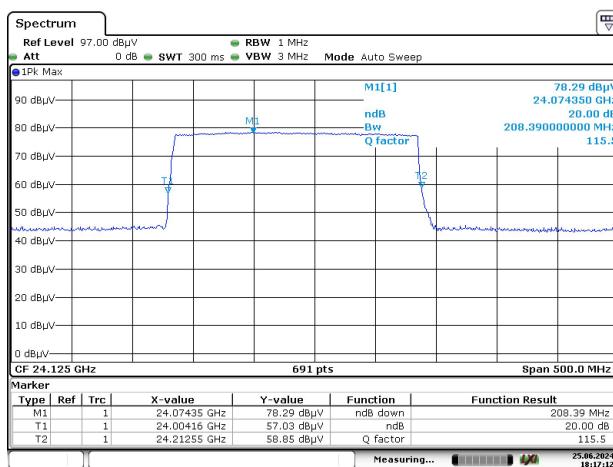
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-02 1304	2023/2/22	2026/2/21
AH	Preamplifier	PAM-1840VH	191	2023/9/7	2024/9/6
Xinhang Macrowave	Coaxial Cable	XH360A-2.92/J-2.92/J-6M-A	20231208001 #0001	2023/12/11	2024/12/10
R&S	Spectrum Analyzer	FSV40	101944	2023/10/18	2024/10/17

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data:

20 dB Bandwidth (MHz)	F _L (MHz)	F _L Limit (MHz)	F _H (MHz)	F _H Limit (MHz)
208.39	24004.16	24000	24212.55	24250

20 dB Bandwidth



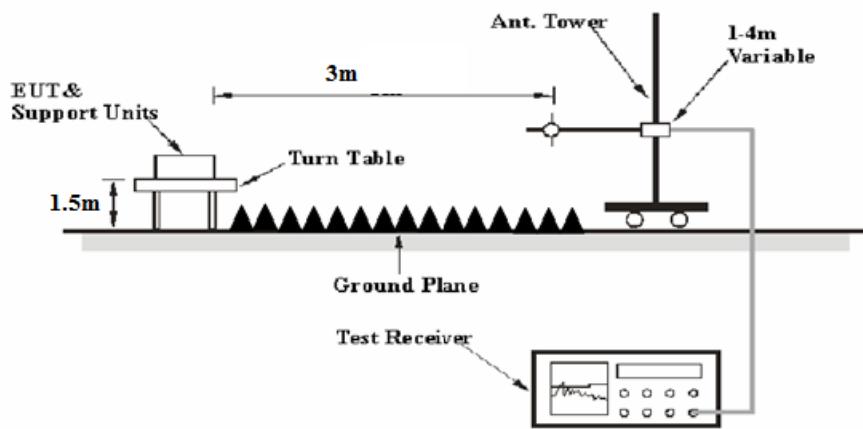
4.4 99% Occupied Bandwidth:

4.4.1 Applicable Standard

RSS-Gen Clause 6.7

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

4.4.2 EUT Setup



4.4.3 Test Procedure

According to ANSI C63.10-2013 Section 6.9.3

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

- a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
- c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (OBW/RBW)]$ below the reference level. Specific guidance is given in 4.1.5.2.
- d) Step a) through step c) might require iteration to adjust within the specified range.
- e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
- f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.

h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

4.4.4 Test Result

Serial No.:	2JDG-2	Test Date:	2024/6/25
Test Site:	Chamber B	Test Mode:	Transmitting
Tester:	Colin Yang	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	26.9	Relative Humidity: (%)	49	ATM Pressure: (kPa)	100.9
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Test Equipment List and Details:

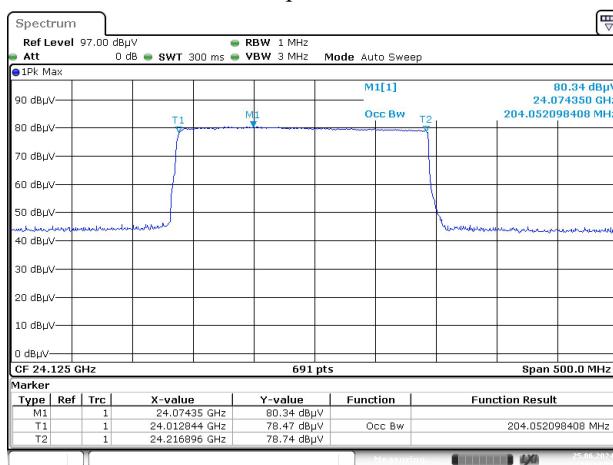
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-02 1304	2023/2/22	2026/2/21
AH	Preamplifier	PAM-1840VH	191	2023/9/7	2024/9/6
Xinhang Macrowave	Coaxial Cable	XH360A-2.92/J-2.92/J-6M-A	20231208001 #0001	2023/12/11	2024/12/10
R&S	Spectrum Analyzer	FSV40	101944	2023/10/18	2024/10/17

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data:

99% Bandwidth (MHz)	F _L (MHz)	F _L Limit (MHz)	F _H (MHz)	F _H Limit (MHz)
204.05	24012.844	24000	24216.896	24250

99% Occupied Bandwidth



Project No.: 2402S31882-RF Tester: Colin Yang
Date: 25.JUN.2024 18:14:20

4.4 Antenna Requirement

4.4.1 Applicable Standard

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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.
- c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

RSS-Gen Clause 6.8

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dB) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dB) and the required impedance for each antenna type.

4.4.2 Judgment

Compliant. Please refer to the Antenna Information detail in Section 1.3.

APPENDIX A - EUT PHOTOGRAPHS

Please refer to the attachment 2402S31882-RF-EXP EUT EXTERNAL PHOTOGRAPHS and 2402S31882-RF-INP EUT INTERNAL PHOTOGRAPHS

APPENDIX B - TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2402S31882-RF-00A-TSP TEST SETUP PHOTOGRAPHS.

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