MEASUREMENT REPORT

FCC ID:	2APPT-312
Applicant:	Airthings ASA
Product:	Space CO2 Mini
Model No.:	312
Brand Name:	Airthings
FCC Classification:	FCC Part 15 Spread Spectrum Transmitter (FHSS)
FCC Rule Part(s):	Part 15 Subpart C (Section 15.247)
Result:	Complies
Test Date:	2022-09-01 ~ 2022-09-27

Reviewed By: Sunny Sun

Approved By: Robin Wu

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.02

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2206RSU014-U3	Rev. 01	Initial Report	2022-11-02	Invalid
2206RSU014-U3	Rev. 02	Revise Antenna Type	2022-11-25	Valid

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1. General Information

1.1. Applicant

Airthings ASA

Wergelandsveien 7, 0167 Oslo, Norway

1.2. Manufacturer

Airthings ASA

Wergelandsveien 7, 0167 Oslo, Norway

1.3. Test Facility

☒	**Test Site – MRT Suzhou Laboratory**				
	Laboratory Location (Suzhou - Wuzhong) D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China **Laboratory Location (Suzhou - SIP)** 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China				
	Laboratory Accreditations				
	A2LA: 3628.01		CNAS: L10551		
	FCC: CN1166		ISED: CN0001		
	VCCI:	☐R-20025	☐G-20034	☐C-20020	☐T-20020
		☐R-20141	☐G-20134	☐C-20103	☐T-20104
☐	**Test Site – MRT Shenzhen Laboratory**				
	Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China				
	Laboratory Accreditations				
	A2LA: 3628.02		CNAS: L10551		
	FCC: CN1284		ISED: CN0105		
☐	**Test Site – MRT Taiwan Laboratory**				
	Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)				
	Laboratory Accreditations				
	TAF: L3261-190725				
	FCC: 291082, TW3261		ISED: TW3261		

1.4. Product Information

Product Name	Space CO2 Mini
Model No.	312
SRD Specification	902 ~ 928MHz
Bluetooth Version	v5.1 Single Mode (BLE)
Thread Specification	802.15.4
Antenna Information	Refer to section 1.5
Operating Voltage	2.4 ~ 3.6Vdc, Nominal 3.0Vdc (2 x AA batteries)
Operating Temperature	0 ~ 45˚C
Test Device Identification No.	CERT_B9_2 (Radiated) CERT_B9_3 (Conducted)
Remark: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.5. Radio Specification under Test

SRD Specification	902 ~ 928MHz
Channel Number	52
Type of Modulation	FSK
Antenna Type	Fixed Internal Antenna
Antenna Gain	2.7dBi

1.6. Working Frequencies

Channel	Frequency	Channel	Frequency	Channel	Frequency
01	905.600 MHz	02	906.000 MHz	03	906.400 MHz
04	906.800 MHz	05	907.200 MHz	06	907.600 MHz
07	908.000 MHz	08	908.400 MHz	09	908.800 MHz
10	909.200 MHz	11	909.600 MHz	12	910.000 MHz
13	910.400 MHz	14	910.800 MHz	15	911.200 MHz
16	911.600 MHz	17	912.000 MHz	18	912.400 MHz
19	912.800 MHz	20	913.200 MHz	21	913.600 MHz
22	914.000 MHz	23	914.400 MHz	24	914.800 MHz
25	915.200 MHz	26	915.600 MHz	27	916.000 MHz
28	916.400 MHz	29	916.800 MHz	30	917.200 MHz
31	917.600 MHz	32	918.000 MHz	33	918.400 MHz
34	918.800 MHz	35	919.200 MHz	36	919.600 MHz
37	920.000 MHz	38	920.400 MHz	39	920.800 MHz
40	921.200 MHz	41	921.600 MHz	42	922.000 MHz
43	922.400 MHz	44	922.800 MHz	45	923.200 MHz
46	923.600 MHz	47	924.000 MHz	48	924.400 MHz
49	924.800 MHz	50	925.200 MHz	51	925.600 MHz
52	926.000 MHz	--	--	--	--

2. Test Configuration

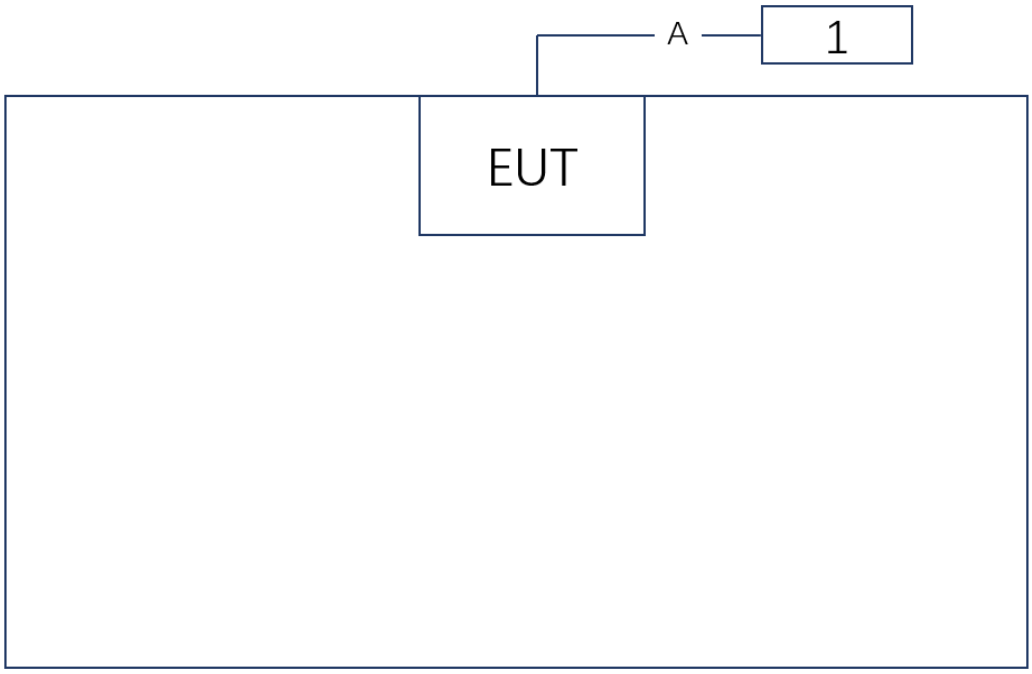
2.1. Test Mode

Mode 1: Transmit by SRD

2.2. Test System Connection Diagram

The device was tested per the guidance ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated emissions testing and AC line conducted testing.

Connection Diagram – Radiated Emission testing



No.	Cable Type	Cable Spec.	Length
A	Serial Cable	Non-Shielding	< 1.0m
No.	Product	Manufacturer	Model No.
1	Notebook	HP	3L1J1PA#AB2

2.3. Test Software

The test utility software used during testing was “IPOP.exe” and command was provided by the manufacturer.

2.4. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15.247
- KDB 558074 D01v05r02
- ANSI C63.10-2013

2.5. Test Environment Condition

Ambient Temperature	15 ~ 35°C
Relative Humidity	20 ~75%RH

3. Antenna Requirements

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 antenna of the device is **permanently attached.**
- There are no provisions for connection to an external antenna.

Conclusion:

The unit complies with the requirement of §15.203.

4. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2022-12-29	WZ-AC1
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2023-08-22	WZ-AC1
Preamplifier	Agilent	83017A	MRTSUE06076	1 year	2022-11-12	WZ-AC1
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2023-06-21	WZ-AC1
Anechoic Chamber	TDK	WZ-AC1	MRTSUE06212	1 year	2023-04-21	WZ-AC1
Thermohygrometer	testo	608-H1	MRTSUE06403	1 year	2023-06-06	WZ-AC1
Signal Analyzer	Keysight	N9010B	MRTSUE06607	1 year	2022-12-29	WZ-AC1
Thermohygrometer	testo	Testo 608-H1	MRTSUE11039	1 year	2022-11-11	WZ-AC1
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2022-10-28	WZ-AC1
Horn Antenna	ETS	3117	MRTSUE06257	1 year	2023-09-18	WZ-AC1
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2022-12-01	WZ-AC1
Thermohygrometer	testo	608-H1	MRTSUE06402	1 year	2023-06-06	WZ-SR5
Shielding Room	HUAMING	WZ-SR5	MRTSUE06442	N/A	N/A	WZ-SR5
USB Power Sensor	Keysight	U2021XA	MRTSUE06447	1 year	2023-06-04	WZ-SR5
Signal Analyzer	Keysight	N9020B	MRTSUE07037	1 year	2023-03-29	WZ-SR5
Attenuator	MVE	MVE2213	MRTSUE11079	1 year	2023-06-09	WZ-SR5

Software	Version	Function
EMI V3	V 3.0.0	EMI Test Software
Controller_MF 7802	2.03C	RE Antenna & Turntable

5. Decision Rules and Measurement Uncertainty

5.1. Decision Rules

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2.

(Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.2. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

AC Conducted Emission Measurement
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz~150kHz: 3.74dB 150kHz~30MHz: 3.44dB
Radiated Disturbance
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Horizontal: 30MHz~300MHz: 5.04dB 300MHz~1GHz: 4.95dB 1GHz~40GHz: 6.40dB Vertical: 30MHz~300MHz: 5.24dB 300MHz~1GHz: 6.03dB 1GHz~40GHz: 6.40dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.78dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.13dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.15dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.28%

6. Test Result

6.1. Summary

FCC Section(s)	Test Description	Test Condition	Verdict
15.247(a)(1)(i)	20dB Bandwidth	Conducted	Pass
15.247(b)(2)	Output Power		Pass
15.247(a)(1)	Carrier Frequency Separation		Pass
15.247(a)(1)(i)	Number of Hopping Channels		Pass
15.247(a)(1)(i)	Time of Occupancy		Pass
15.247(d)	Band Edge / Out- of-Band Emissions		Pass
15.205 15.209	General Field Strength (Restricted Bands and Radiated Emission)	Radiated	Pass
15.207	AC Conducted Emissions 150kHz - 30MHz	Line Conducted	N/A

Remark:

1. The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
2. For radiated emission tests, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst-case emissions.
3. “N/A” means not applicable.

6.2. 20dB Bandwidth Measurement

6.2.1.Test Limit

N/A

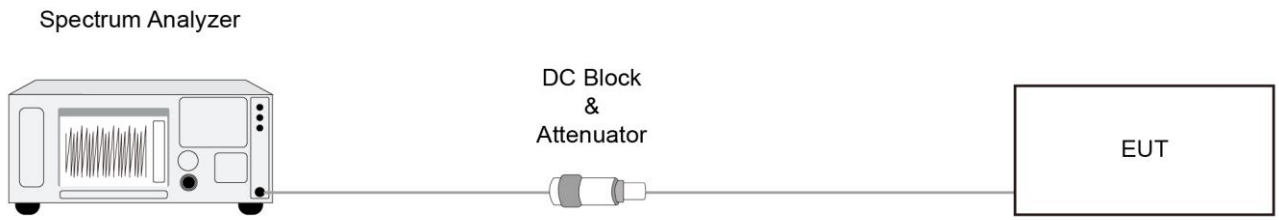
6.2.2.Test Procedure Used

ANSI C63.10-2013 - Section 6.9.2

6.2.3.Test Setting

1. Set RBW ≥ 1% to 5% of the OBW
2. VBW = Approximately three times RBW
3. Span = Approximately 2 to 5 times the OBW, centered on a hopping channel
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep = Auto couple
7. Allow the trace to stabilize
8. 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.

6.2.4.Test Setup



6.2.5.Test Result

Refer to Appendix A.2.

6.3. Output Power Measurement

6.3.1.Test Limit

For frequency hopping systems operating in the 902-928 MHz band: 1 watt (30 dBm) for systems employing at least 50 hopping channels.

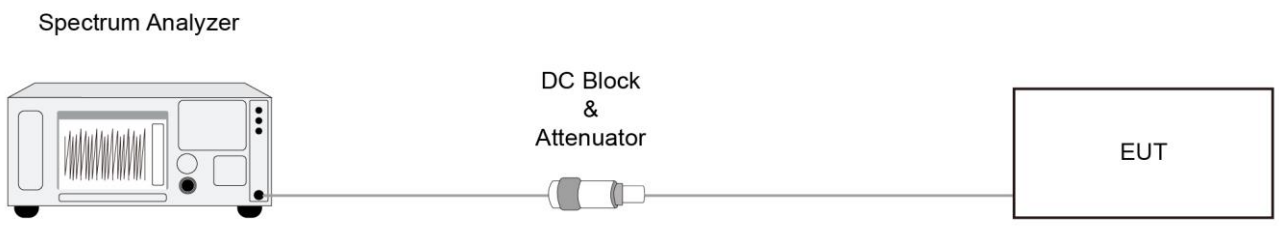
6.3.2.Test Procedure Used

ANSI C63.10-2013 - Section 7.8.5

6.3.3.Test Setting

1. Set RBW ≥ the 20 dB bandwidth of the emission being measured.
2. VBW ≥ RBW
3. Span = approximately five times the 20dB bandwidth, centered on a hopping channel
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep = Auto couple
7. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (don't forget added the external attenuation and cable loss)

6.3.4.Test Setup



6.3.5.Test Result

Refer to Appendix A.3.

6.4. Carrier Frequency Separation Measurement

6.4.1.Test Limit

The minimum permissible channel separation for this system is 25kHz or the 20dB BW, whichever is greater.

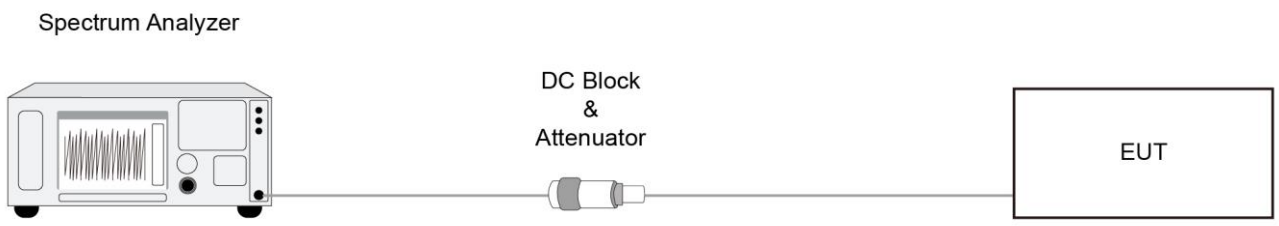
6.4.2.Test Procedure Used

ANSI C63.10-2013 - Section 7.8.2

6.4.3.Test Setting

1. Span = Wide enough to capture the peaks of two adjacent channels.
2. Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
3. VBW ≥ RBW
4. Sweep time = Auto couple
5. Detector = Peak
6. Trace mode = Max hold
7. Allowed the trace to stabilize
8. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

6.4.4.Test Setup



6.4.5.Test Result

Refer to Appendix A.4.

6.5. Number of Hopping Channels Measurement

6.5.1.Test Limit

This frequency hopping system must employ a minimum of 50 hopping channels.

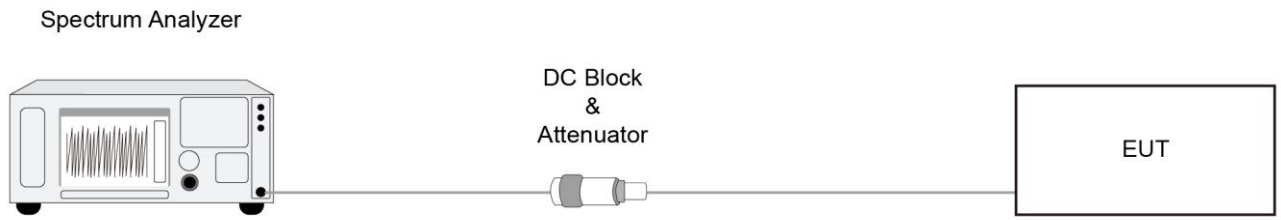
6.5.2.Test Procedure Used

ANSI C63.10-2013 - Section 7.8.3

6.5.3.Test Setting

1. Span = The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
2. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
3. VBW ≥ RBW
4. Sweep time = Auto couple
5. Detector = Peak
6. Trace mode = Max hold
7. Allow the trace to stabilize

6.5.4.Test Setup



6.5.5.Test Result

Refer to Appendix A.5.

6.6. Time of Occupancy Measurement

6.6.1.Test Limit

The maximum permissible time of occupancy is 400ms within a period of 20s.

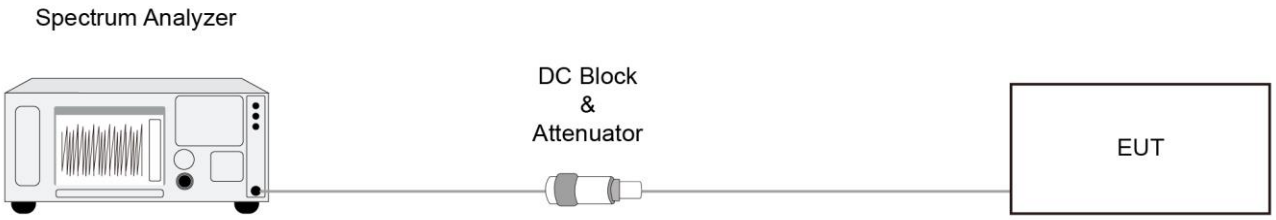
6.6.2.Test Procedure Used

ANSI C63.10-2013 - Section 7.8.4

6.6.3.Test Setting

1. Span = Zero span, centered on a hopping channel.
2. RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.
3. VBW ≥ RBW
4. Sweep time = As necessary to capture the entire dwell time per hopping channel
5. Detector = Peak
6. Trace mode = Free run
7. Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time. An oscilloscope may be used instead of a spectrum analyzer. The EUT shall show compliance with the appropriate regulatory limit for the number of hopping channels. A plot of the data shall be included in the test report.

6.6.4.Test Setup



6.6.5.Test Result

Refer to Appendix A.6.

6.7. Band-edge Compliance Measurement

6.7.1.Test Limit

The maximum permissible emission level is 20dBc. Any emissions were lying outside of the emission bandwidth and in authorized band edges to a field strength limit specified in Section 15.209 of the Title 47 CFR.

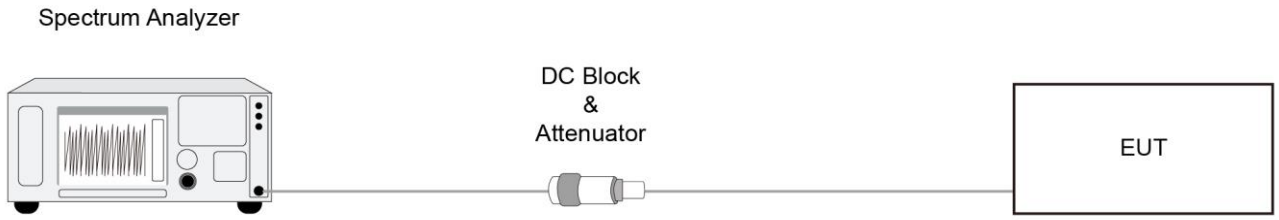
6.7.2.Test Procedure Used

ANSI C63.10-2013 - Section 6.10.4

6.7.3.Test Setting

1. 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.
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = Peak
5. Sweep time = Auto couple
6. Trace mode = Max hold
7. Allow the trace to stabilize. Set the marker on the emission at the band edge, or on the highest modulation product outside of the band, if this level is greater than that at the band edge. Enable the marker-delta function, than use the marker-to-peak function to move the marker to the peak of the in-band emission.

6.7.4.Test Setup



6.7.5.Test Result

Refer to Appendix A.7.

6.8. Conducted Spurious Emissions Measurement

6.8.1.Test Limit

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 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

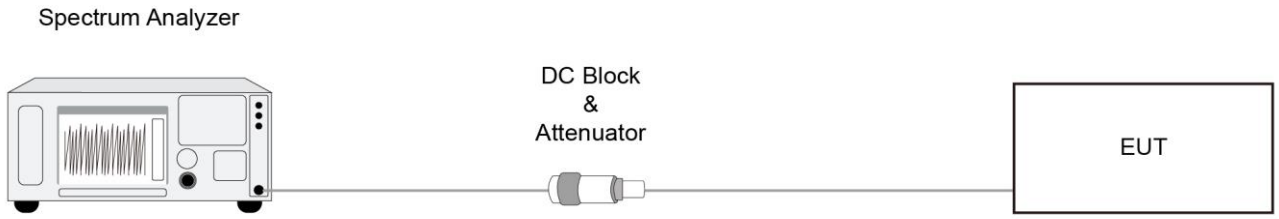
6.8.2.Test Procedure Used

ANSI C63.10-2013 - Section 7.8.8

6.8.3.Test Setting

1. Span = Wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = Peak
5. Sweep time = Auto couple
6. Trace mode = Max hold
7. Trace was allowed to stabilize
8. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this section.

6.8.4.Test Setup



6.8.5.Test Result

Refer to Appendix A.8.

6.9. Radiated Spurious Emission Measurement

6.9.1.Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency (MHz)	Field Strength (μV/m)	Measured Distance (m)
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

6.9.2.Test Procedure Used

ANSI C63.10-2013 - Section 6.3 & 6.4 & 6.5 & 6.6

6.9.3.Test Setting

Table 1 - RBW as a function of frequency

Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

Quasi-Peak Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = As specified in Table 1
4. Detector = CISPR quasi-peak
5. Sweep time = Auto couple
6. Trace was allowed to stabilize

Peak Measurements above 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = Peak
5. Sweep time = Auto couple
6. Trace mode = Max hold
7. Trace was allowed to stabilize

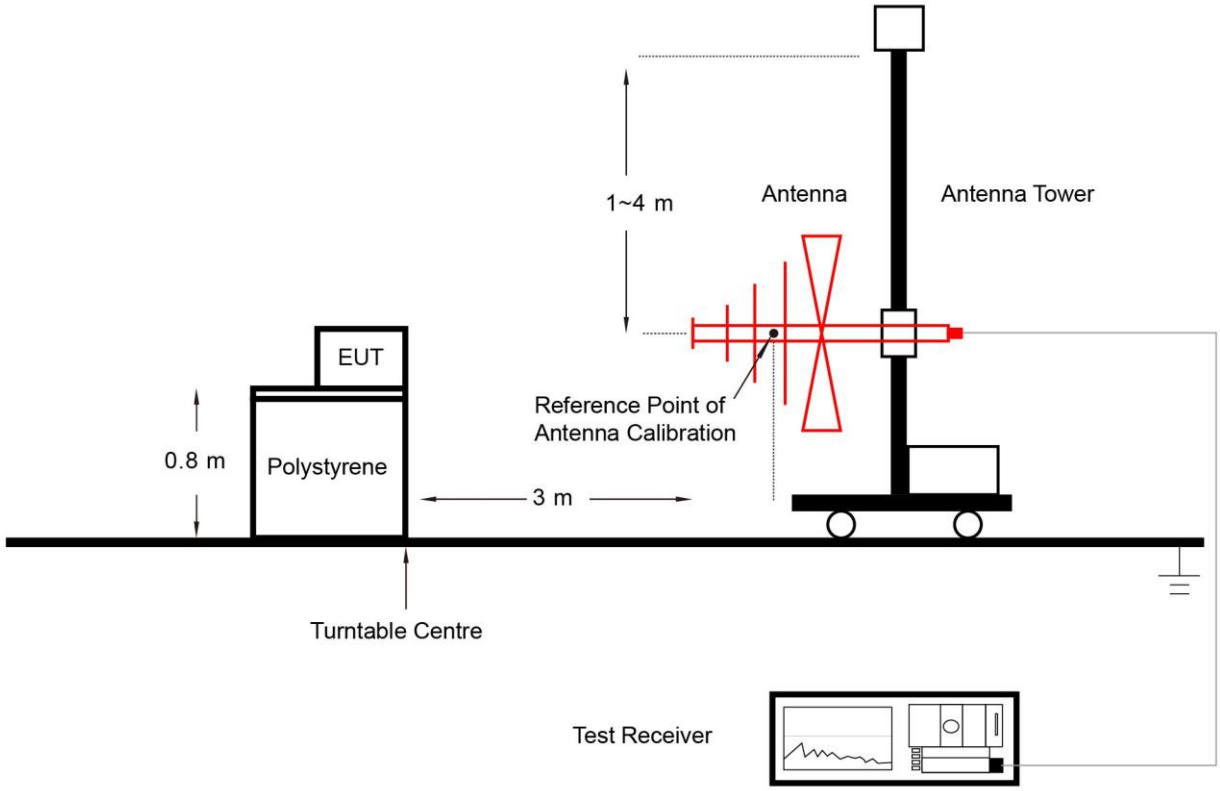
Average Measurements above 1GHz (Method VB)

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle ≥ 98%, set VBW = 10Hz

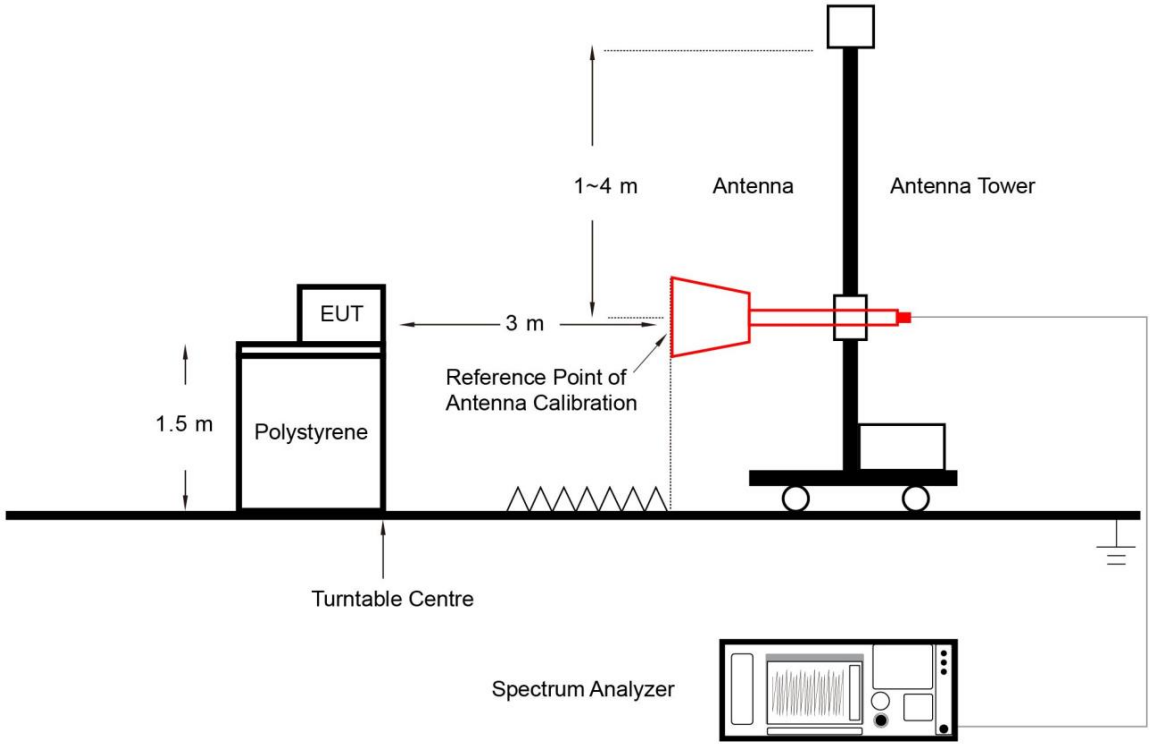
   If the EUT duty cycle is < 98%, set VBW ≥ 1/T. T is the minimum transmission duration
4. Detector = Peak
5. Sweep time = Auto
6. Trace mode = Max hold
7. Trace was allowed to stabilize

6.9.4.Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



6.9.5.Test Result

Refer to Appendix A.9.

6.10. Radiated Restricted Band Edge Measurement

6.10.1.Test Limit

For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1] 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41	--	--	--

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

6.10.2.Test Procedure

ANSI C63.10-2013 - Section 6.3

ANSI C63.10-2013 - Section 6.6

ANSI C63.10-2013 - Section 11.13

6.10.3.Test Setting

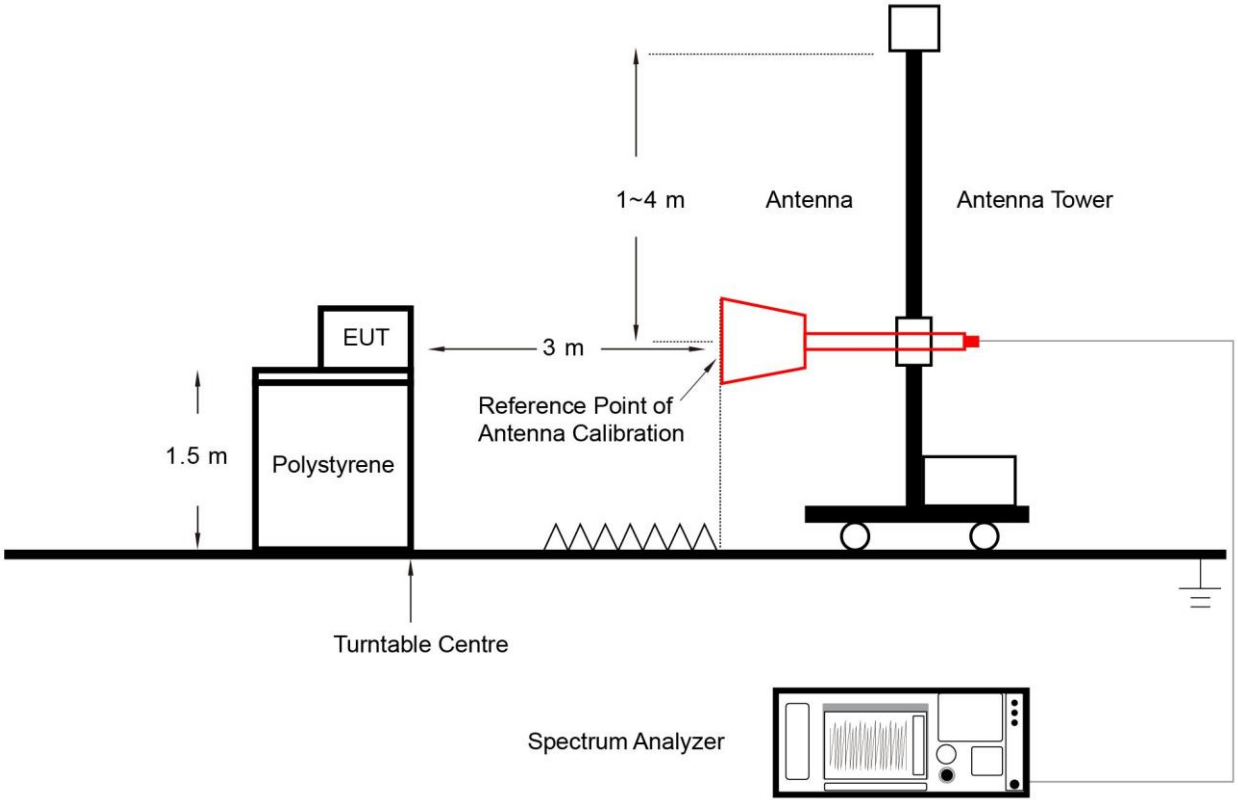
Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW ≥ 1/T
4. As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode
5. Detector = Peak
6. Sweep time = auto
7. Trace mode = max hold
8. Allow max hold to run for at least 50 times (1/duty cycle) traces

6.10.4.Test Setup



6.10.5.Test Result

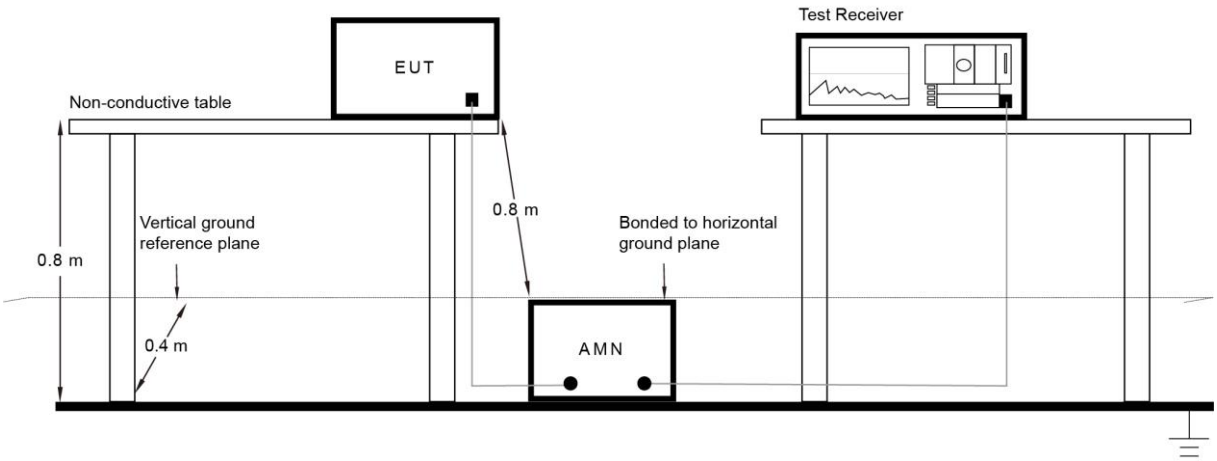
Refer to Appendix A.10.

6.11. AC Conducted Emissions Measurement

6.11.1.Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBμV)	Average (dBμV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50
Note 1: The lower limit shall apply at the transition frequencies. Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.		

6.11.2.Test Setup



6.11.3.Test Result

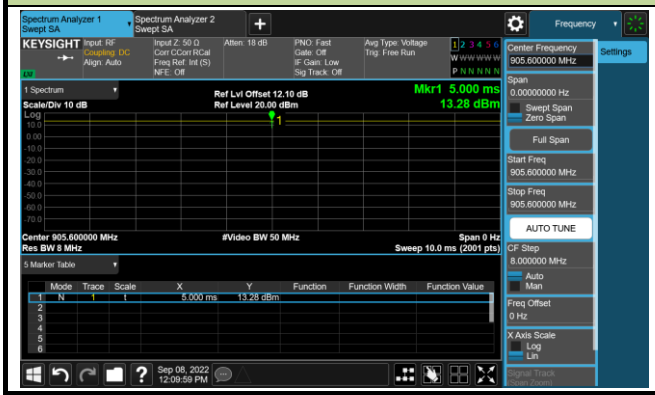
Refer to Appendix A.11.

Appendix A - Test Result

A.1 Duty Cycle Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2022-09-08		

Test Mode	Duty Cycle
Mode 1	100%

Duty Cycle	
905.6MHz	
	

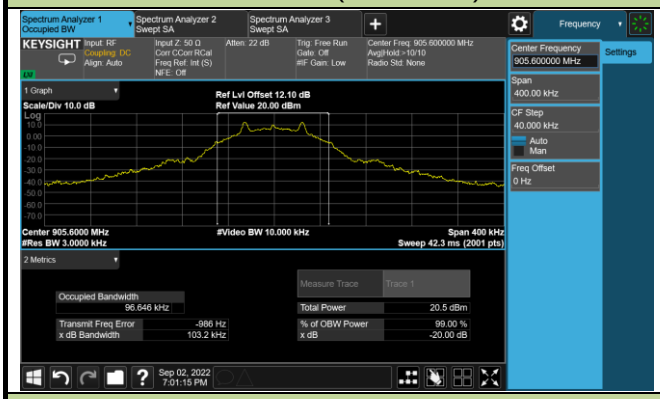
A.2 20dB Bandwidth Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2022-09-02		

Test Mode	Channel No.	Frequency (MHz)	20dB Bandwidth (kHz)
Mode 1	01	905.6	103.2
	27	916.0	103.2
	52	926.0	102.1

20dB Bandwidth

Channel 01 (905.6 MHz)



Channel 27 (916.0 MHz)

Channel 52 (926.0 MHz)

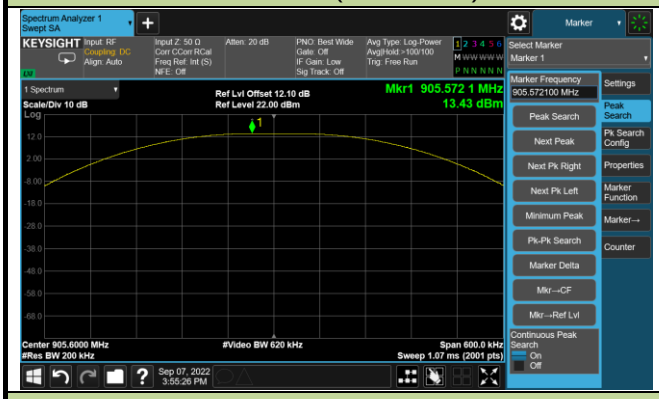
A.3 Output Power Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2022-09-07 ~ 2022-09-16		

Test Mode	Channel No.	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Result
Mode 1	01	905.6	13.43	≤ 30.00	Pass
	27	916.0	13.50	≤ 30.00	Pass
	52	926.0	12.77	≤ 30.00	Pass

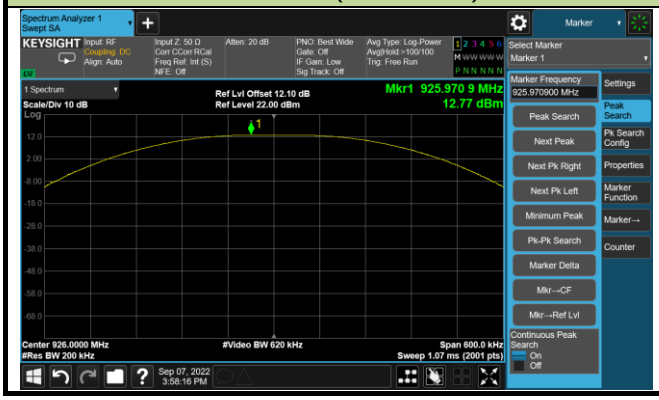
Output Power

Channel 01 (905.6 MHz)



Channel 27 (916.0 MHz)

Channel 52 (926.0 MHz)

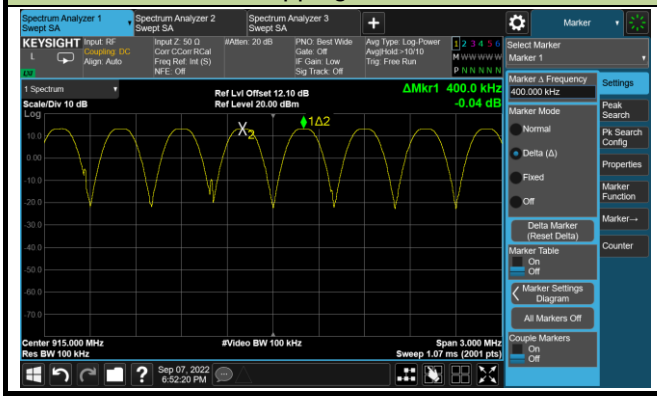


A.4 Carrier Frequency Separation Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2022-09-07		

Test Mode	Channel No.	Frequency (MHz)	Carrier Frequency Separation (kHz)	Limit (kHz)	Result
Mode 1	24	914.8	400	≥ 103.2	Pass

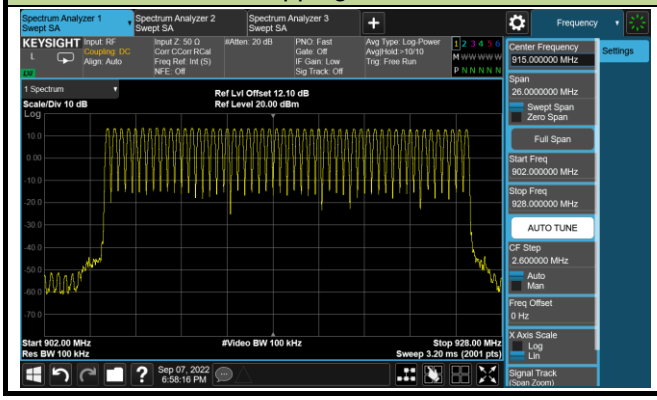
Note: The Limit is the value of the 20dB BW.

Carrier Frequency Separation	
Hopping Mode	
	

A.5 Number of Hopping Channels Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2022-09-07		

Test Mode	Channel No.	Frequency (MHz)	Channel Numbers	Limit (Hopping Channels)	Result
Mode 1	01 ~ 52	905.6 ~ 926.0 (Hopping)	52	≥ 50	Pass

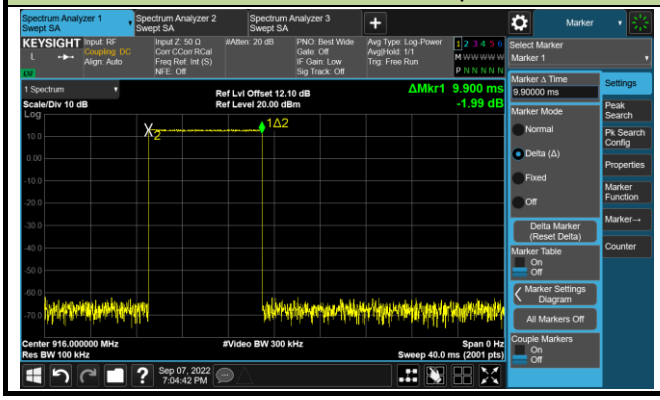
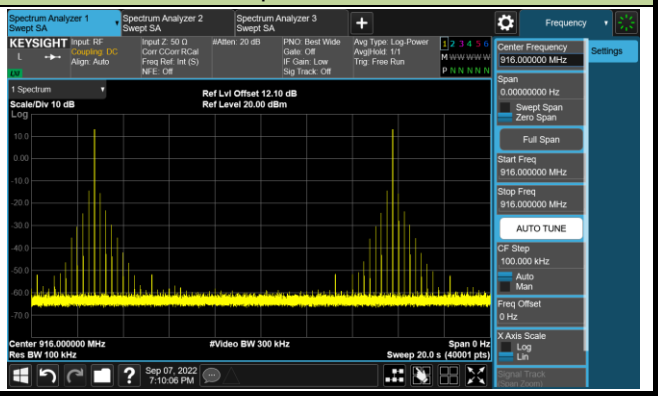
Number of Hopping Channels	
Hopping Mode	
	

A.6 Time of Occupancy Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2022-09-07		

Test Mode	Channel No.	Frequency (MHz)	Transmit Time Per Hop (ms)	Number of Hops in Observation Period	Time of Occupancy (ms)	Limit (ms)	Result
Mode 1	01 ~ 52	905.6 ~ 926.0 (Hopping)	9.900	2	19.800	≤ 400	Pass

Note: Time of Occupancy (ms) = Packet Transfer Time (ms) * Hops Over Occupancy Time.

Time of Occupancy	
Transmit Time Per Hop	Number of Hops in Observation Period
	

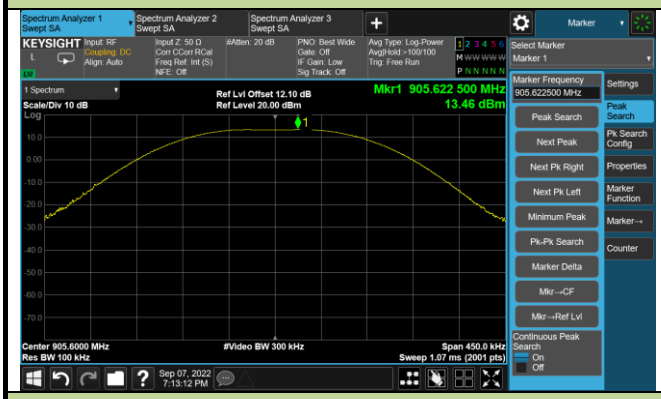
A.7 Band-edge Compliance Test Result

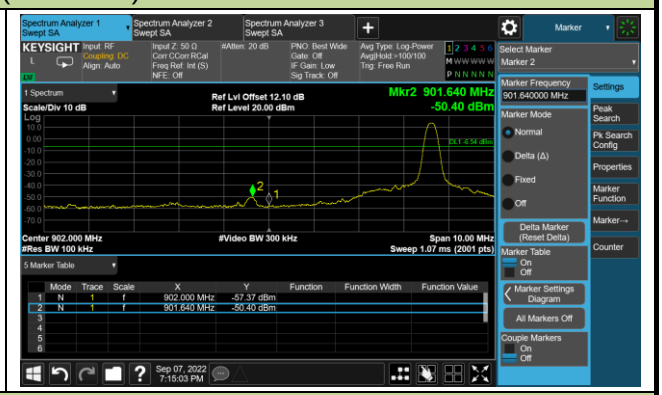
Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2022-09-07		

Test Mode	Channel No.	Frequency (MHz)	Limit	Result
Mode 1	01	905.6	20dBc	Pass
	52	926.0	20dBc	Pass
	01 ~ 52	905.6 ~ 926.0 (Hopping)	20dBc	Pass

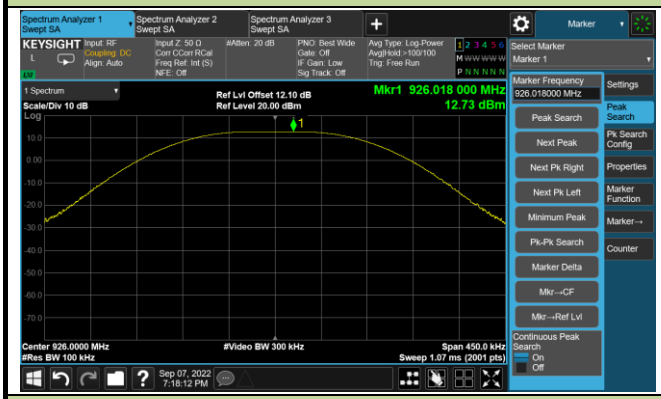
Band-edge Compliance

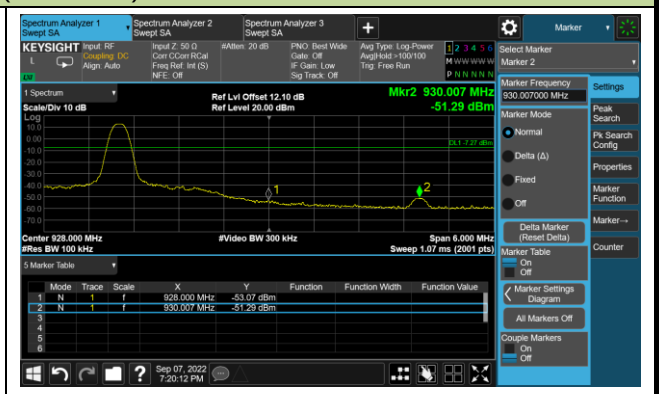
Channel 01 (905.6MHz)



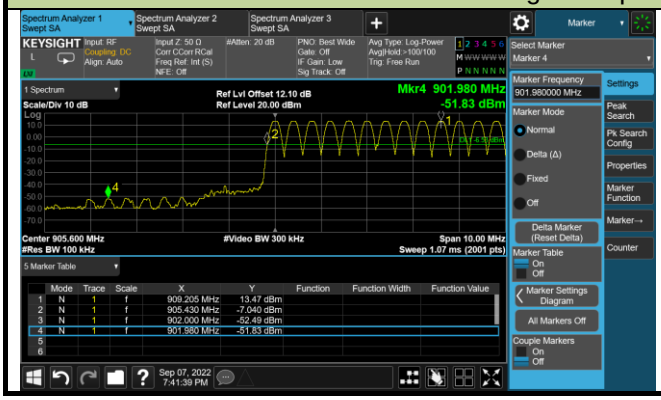


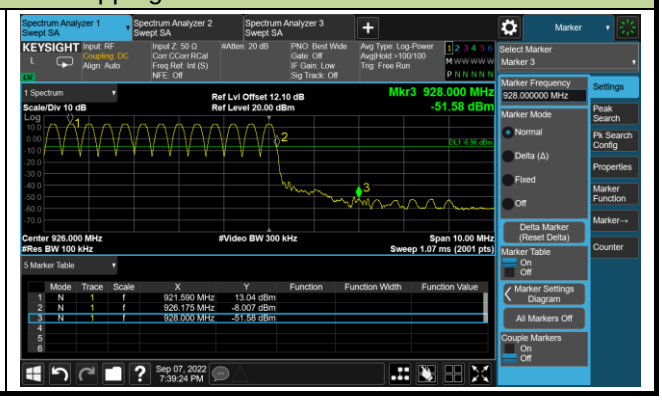
Channel 52 (926.0MHz)





Band-edge Compliance - Hopping Mode





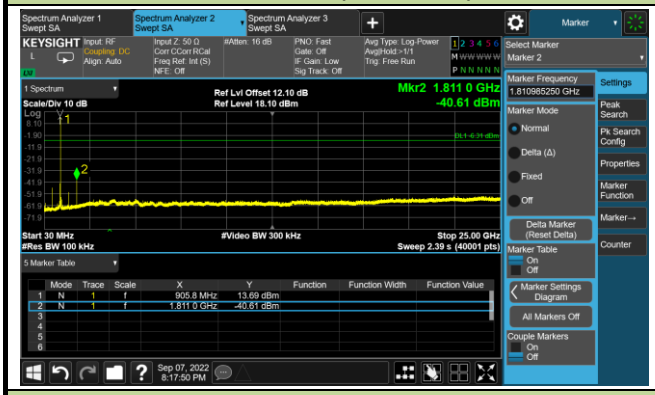
A.8 Conducted Spurious Emissions Test Result

Test Site	WZ-SR5	Test Engineer	Lynn Yang
Test Date	2022-09-07		

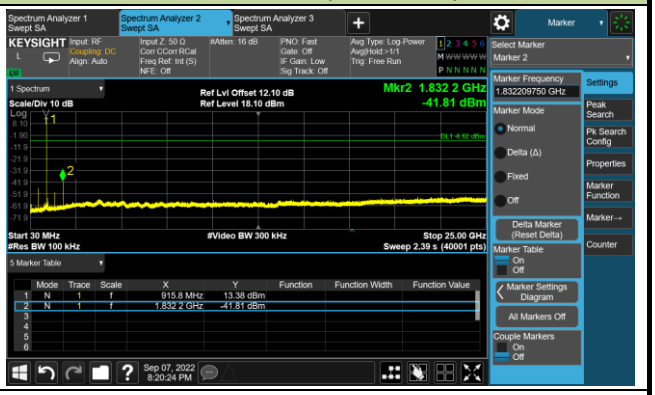
Test Mode	Channel No.	Frequency (MHz)	Limit	Result
Mode 1	01	905.6	20dBc	Pass
	27	916.0	20dBc	Pass
	52	926.0	20dBc	Pass

Conducted Spurious Emissions

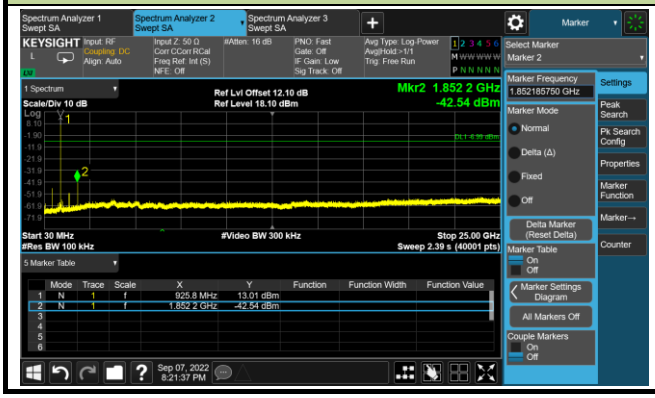
Channel 01 (905.6MHz)



Channel 27 (916.0MHz)



Channel 52 (926.0MHz)



A.9 Radiated Spurious Emission Test Result

Test Site	WZ-AC1	Test Engineer	Carl Jiang
Test Date	2022-09-02	Test Mode	Mode 1
Remark	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

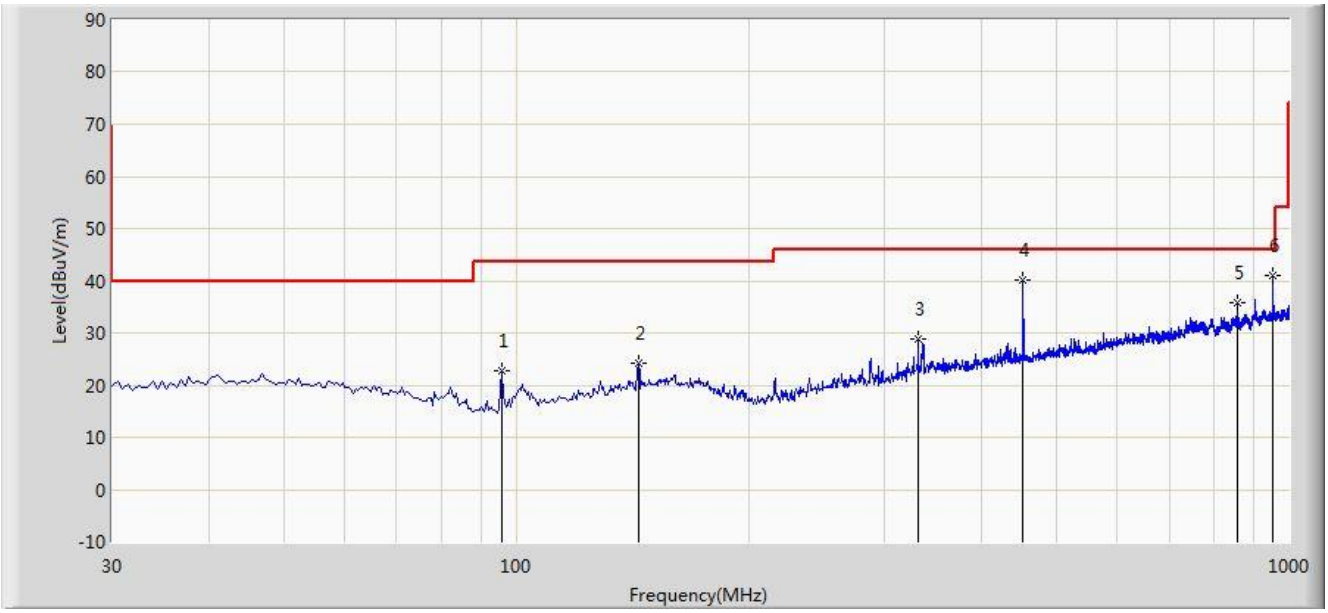
Test Channel	Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
01	1360.0	51.4	-5.8	45.6	74.0	-28.4	Peak	Horizontal
	2719.0	45.5	-2.6	42.9	74.0	-31.1	Peak	Horizontal
	4528.0	38.7	2.0	40.7	74.0	-33.3	Peak	Horizontal
	1360.0	49.4	-5.8	43.6	74.0	-30.4	Peak	Vertical
	4267.0	41.3	1.2	42.5	74.0	-31.5	Peak	Vertical
	4789.0	39.2	2.8	42.0	74.0	-32.0	Peak	Vertical
27	1373.5	50.4	-5.7	44.7	74.0	-29.3	Peak	Horizontal
	2746.0	46.2	-2.5	43.7	74.0	-30.3	Peak	Horizontal
	7673.5	38.1	7.8	45.9	74.0	-28.1	Peak	Horizontal
	1373.5	50.5	-5.7	44.8	74.0	-29.2	Peak	Vertical
	4253.5	42.6	1.0	43.6	74.0	-30.4	Peak	Vertical
	4798.0	40.4	2.9	43.3	74.0	-30.7	Peak	Vertical
52	1112.5	46.0	-7.2	38.8	74.0	-35.2	Peak	Horizontal
	2777.5	45.7	-2.4	43.3	74.0	-30.7	Peak	Horizontal
	3988.0	38.3	0.5	38.8	74.0	-35.2	Peak	Horizontal
	1387.0	47.9	-5.7	42.2	74.0	-31.8	Peak	Vertical
	4258.0	44.9	1.0	45.9	74.0	-28.1	Peak	Vertical
	4780.0	40.2	2.6	42.8	74.0	-31.2	Peak	Vertical

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m)

Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

The Result of Radiated Emission below 1GHz:

Site: WZ-AC1	Test Date: 2022-09-02
Limit: FCC_2.4G_RE(3m)	Engineer: Carl Jiang
Probe: VULB 9168_25-2000MHz	Polarity: Horizontal
EUT: Space CO2 Mini	Power: By Battery
Test Mode: Transmit at 905.6MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		95.960	22.806	10.092	-20.694	43.500	12.714	PK
2		143.975	24.210	6.495	-19.290	43.500	17.715	PK
3		331.185	28.737	9.335	-17.263	46.000	19.401	PK
4		452.920	40.219	17.906	-5.781	46.000	22.313	PK
5		857.410	35.819	6.860	-10.181	46.000	28.959	PK
6	*	953.440	41.072	11.399	-4.928	46.000	29.673	PK

Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

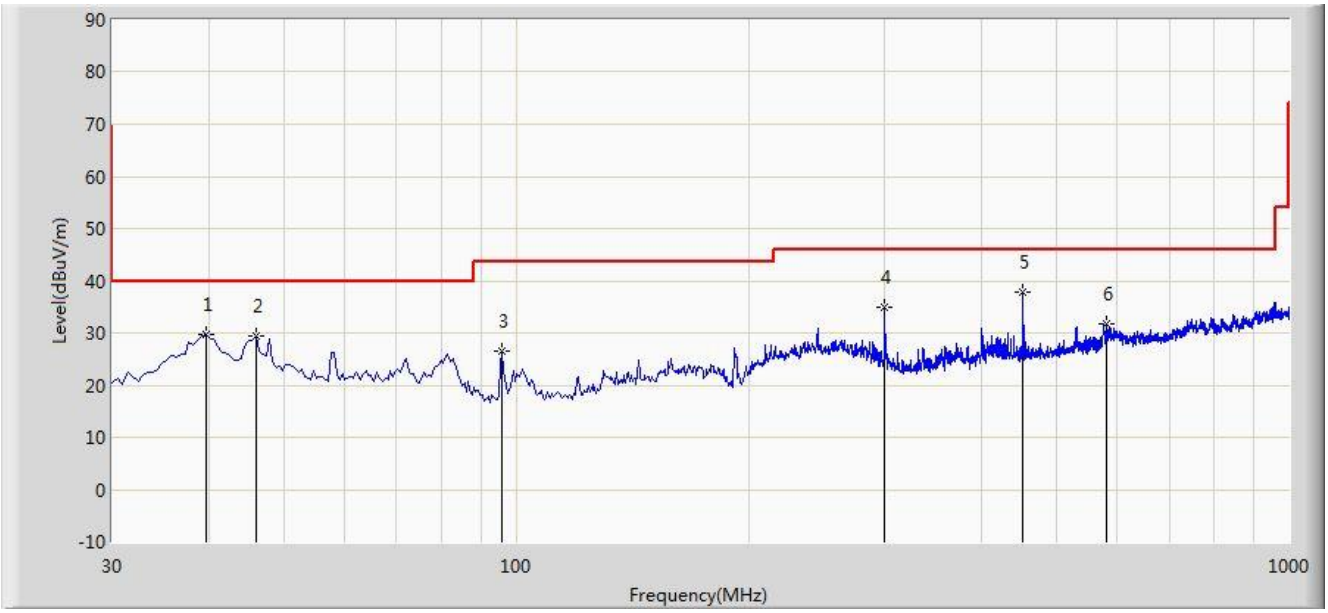
Note 3: QP measurement was not performed when peak measure level was lower than the QP limit.

Note 4: The amplitude of radiated emissions (frequency range from 9kHz to 30MHz) is

that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value.

Therefore, the data is not presented in the report.

Site: WZ-AC1	Test Date: 2022-09-02
Limit: FCC_2.4G_RE(3m)	Engineer: Carl Jiang
Probe: VULB 9168_25-2000MHz	Polarity: Vertical
EUT: Space CO2 Mini	Power: By Battery
Test Mode: Transmit at 905.6MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		39.700	29.707	11.509	-10.293	40.000	18.198	PK
2		46.005	29.374	11.009	-10.626	40.000	18.364	PK
3		95.960	26.444	13.730	-17.056	43.500	12.714	PK
4		300.145	34.977	16.564	-11.023	46.000	18.413	PK
5	*	452.920	37.917	15.604	-8.083	46.000	22.313	PK
6		580.475	31.617	6.640	-14.383	46.000	24.977	PK

Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

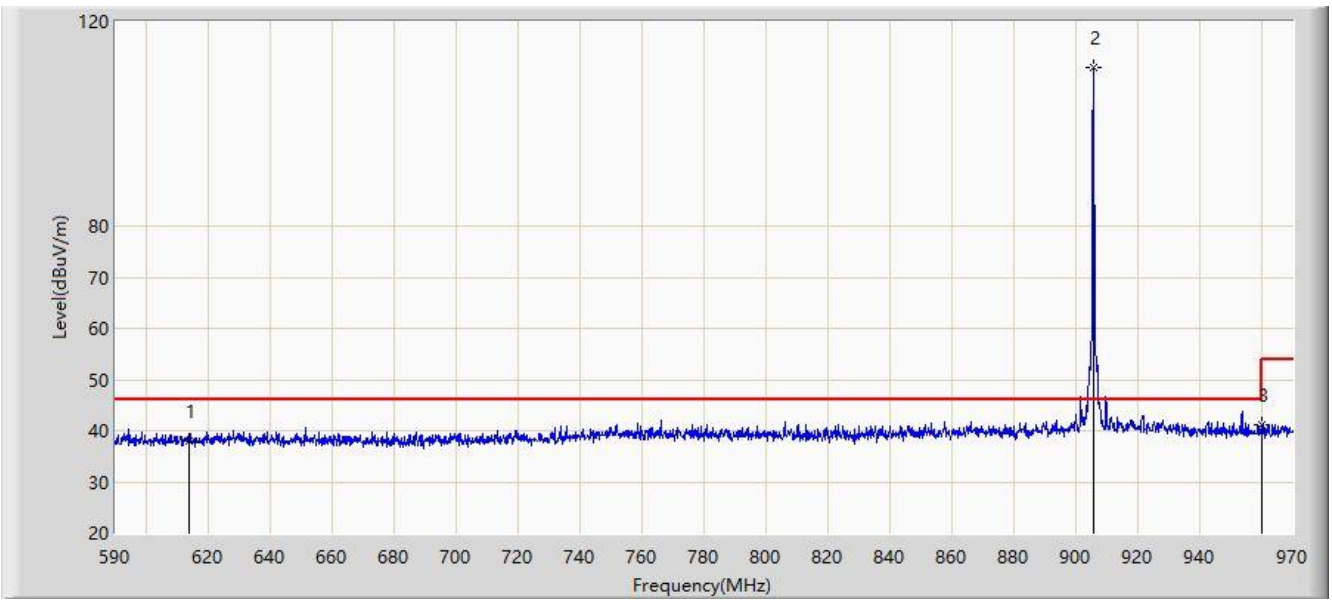
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 3: QP measurement was not performed when peak measure level was lower than the QP limit.

Note 4: The amplitude of radiated emissions (frequency range from 9kHz to 30MHz and 18GHz to 25GHz) is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value. Therefore, the data is not presented in the report.

A.10 Radiated Restricted Band Edge Test Result

Site: WZ-AC1	Test Date: 2022-09-27
Temperature: 24.6°C	Humidity: 61.9%
Limit: FCC_Part15.109_RE(3m)_Class B	Engineer: Edith Yu
Probe: VULB 9168_25-2000MHz	Polarity: Horizontal
EUT: Space CO2 Mini	Power: By Battery
Note: Transmit at 905.6MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	38.008	12.276	-7.992	46.000	25.732	PK
2	*	905.590	111.093	81.563	N/A	N/A	29.529	PK
3		960.000	41.048	11.269	-4.952	46.000	29.779	PK

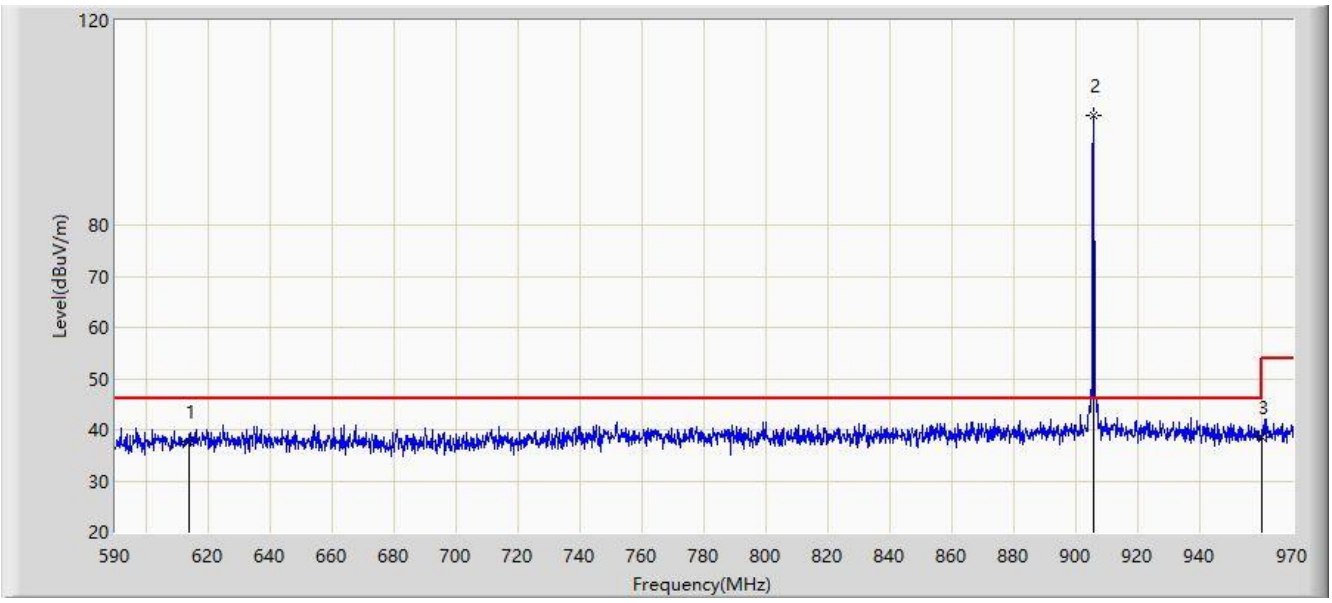
Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 4: Quasi-Peak measurement was not performed when peak measure level was lower than the quasi-peak limit.

Site: WZ-AC1	Test Date: 2022-09-27
Temperature: 24.6°C	Humidity: 61.9%
Limit: FCC_Part15.109_RE(3m)_Class B	Engineer: Edith Yu
Probe: VULB 9168_25-2000MHz	Polarity: Vertical
EUT: Space CO2 Mini	Power: By Battery
Note: Transmit at 905.6MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	37.617	11.885	-8.383	46.000	25.732	PK
2	*	905.590	101.388	71.858	N/A	N/A	29.529	PK
3		960.000	38.691	8.912	-7.309	46.000	29.779	PK

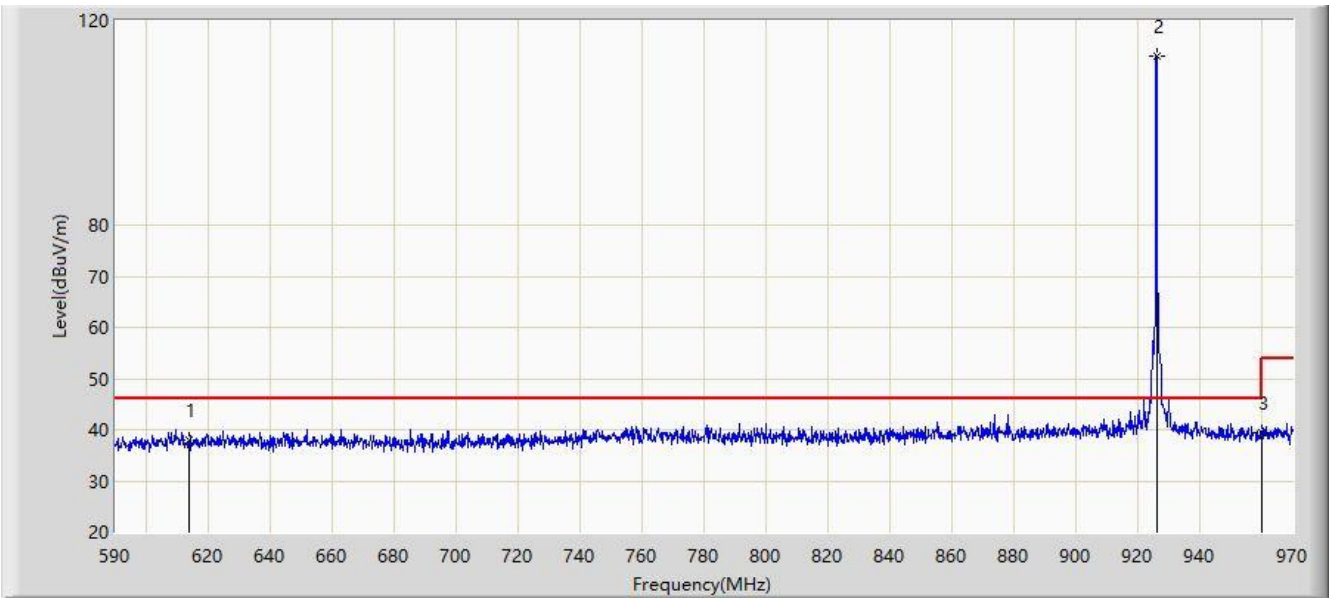
Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 4: Quasi-Peak measurement was not performed when peak measure level was lower than the quasi-peak limit.

Site: WZ-AC1	Test Date: 2022-09-27
Temperature: 24.6°C	Humidity: 61.9%
Limit: FCC_Part15.109_RE(3m)_Class B	Engineer: Edith Yu
Probe: VULB 9168_25-2000MHz	Polarity: Horizontal
EUT: Space CO2 Mini	Power: By Battery
Note: Transmit at 926MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	37.874	12.142	-8.126	46.000	25.732	PK
2	*	926.110	113.181	83.232	N/A	N/A	29.949	PK
3		960.000	39.324	9.545	-6.676	46.000	29.779	PK

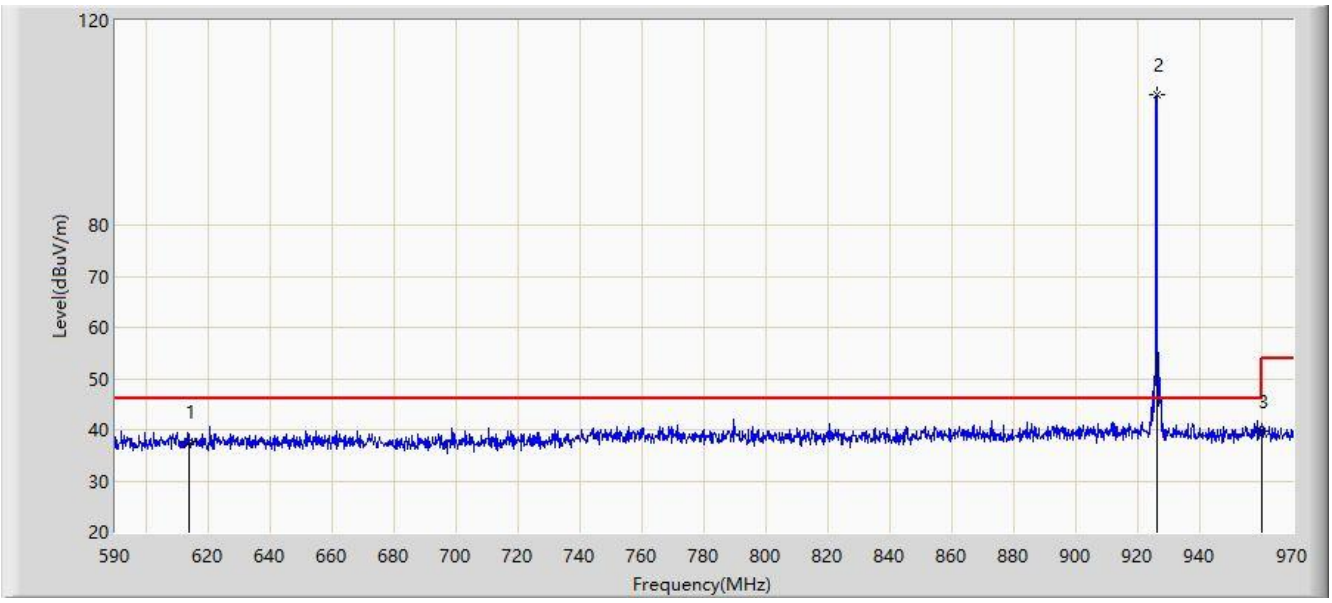
Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 4: Quasi-Peak measurement was not performed when peak measure level was lower than the quasi-peak limit.

Site: WZ-AC1	Test Date: 2022-09-27
Temperature: 24.6°C	Humidity: 61.9%
Limit: FCC_Part15.109_RE(3m)_Class B	Engineer: Edith Yu
Probe: VULB 9168_25-2000MHz	Polarity: Vertical
EUT: Space CO2 Mini	Power: By Battery
Note: Transmit at 926MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	37.571	11.839	-8.429	46.000	25.732	PK
2	*	926.110	105.481	75.532	N/A	N/A	29.949	PK
3		960.000	39.762	9.983	-6.238	46.000	29.779	PK

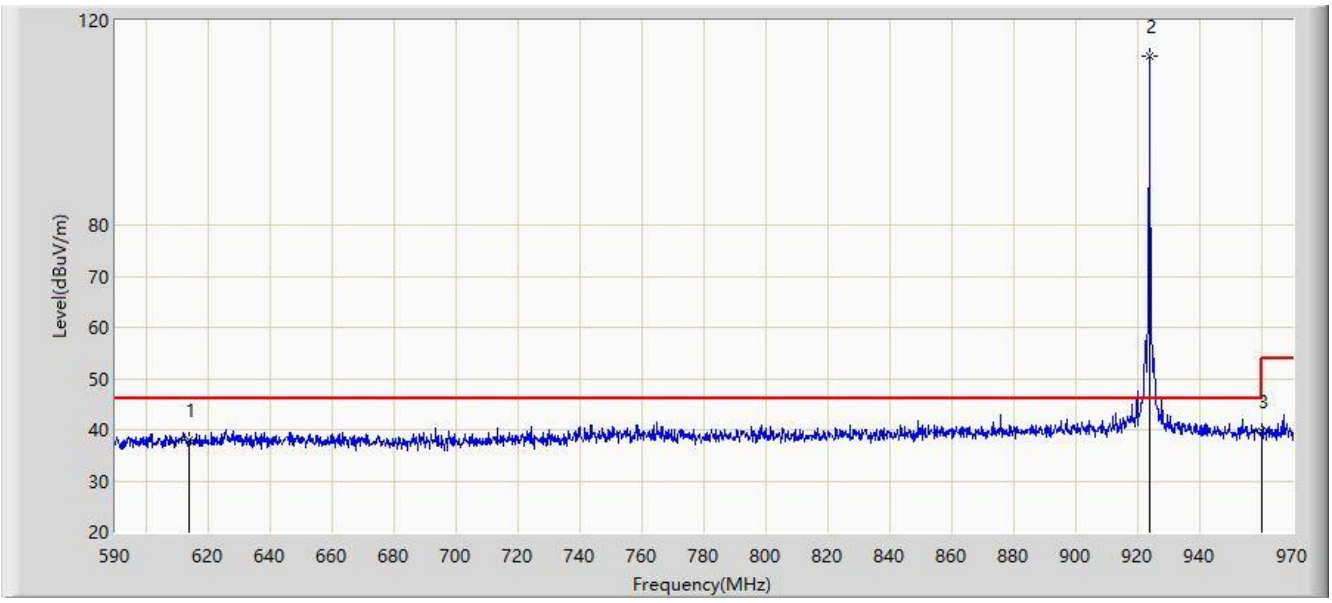
Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 4: Quasi-Peak measurement was not performed when peak measure level was lower than the quasi-peak limit.

Site: WZ-AC1	Test Date: 2022-09-27
Temperature: 24.6°C	Humidity: 61.9%
Limit: FCC_Part15.109_RE(3m)_Class B	Engineer: Edith Yu
Probe: VULB 9168_25-2000MHz	Polarity: Horizontal
EUT: Space CO2 Mini	Power: By Battery
Note: Transmit at 923.8MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	37.830	12.098	-8.170	46.000	25.732	PK
2	*	923.830	112.948	83.030	N/A	N/A	29.919	PK
3		960.000	39.750	9.971	-6.250	46.000	29.779	PK

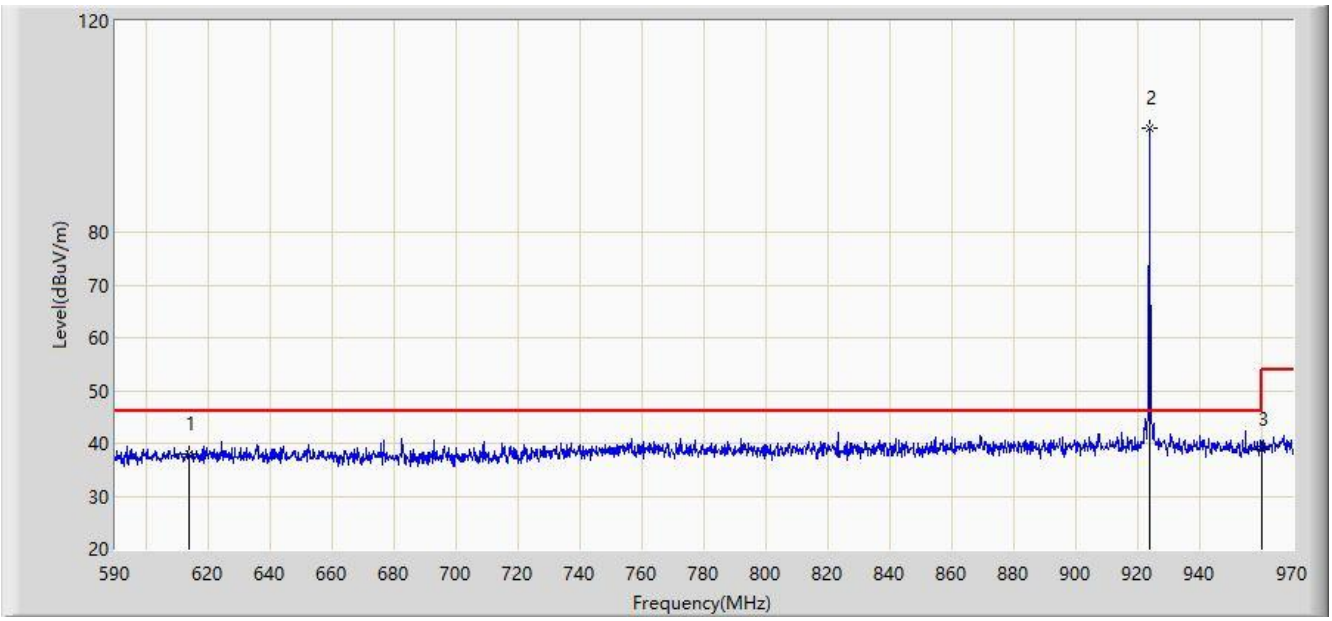
Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 4: Quasi-Peak measurement was not performed when peak measure level was lower than the quasi-peak limit.

Site: WZ-AC1	Test Date: 2022-09-27
Temperature: 24.6°C	Humidity: 61.9%
Limit: FCC_Part15.109_RE(3m)_Class B	Engineer: Edith Yu
Probe: VULB 9168_25-2000MHz	Polarity: Vertical
EUT: Space CO2 Mini	Power: By Battery
Note: Transmit at 923.8MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	37.837	12.105	-8.163	46.000	25.732	PK
2	*	923.830	99.667	69.749	N/A	N/A	29.919	PK
3		960.000	38.733	8.954	-7.267	46.000	29.779	PK

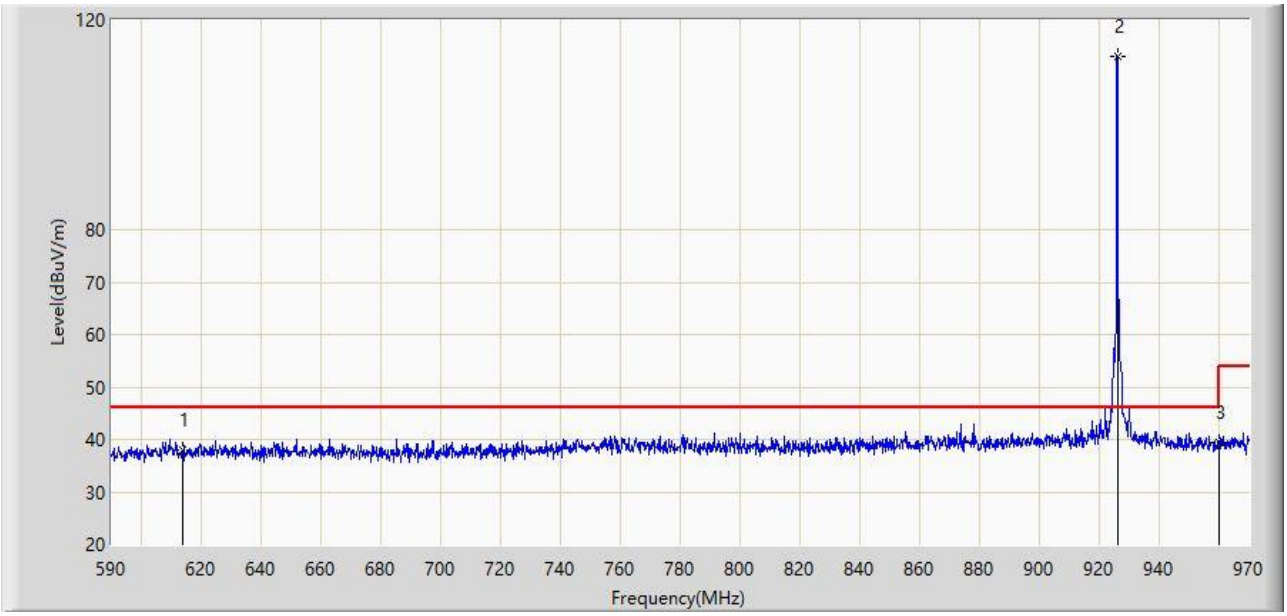
Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 4: Quasi-Peak measurement was not performed when peak measure level was lower than the quasi-peak limit.

Site: WZ-AC1	Test Date: 2022-09-27
Temperature: 24.6°C	Humidity: 61.9%
Limit: FCC_Part15.109_RE(3m)_Class B	Engineer: Edith Yu
Probe: VULB 9168_25-2000MHz	Polarity: Horizontal
EUT: Space CO2 Mini	Power: By Battery
Note: Transmit at 926MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	37.874	12.142	-8.126	46.000	25.732	PK
2	*	926.110	113.181	83.232	67.181	46.000	29.949	PK
3		960.000	39.324	9.545	-6.676	46.000	29.779	PK

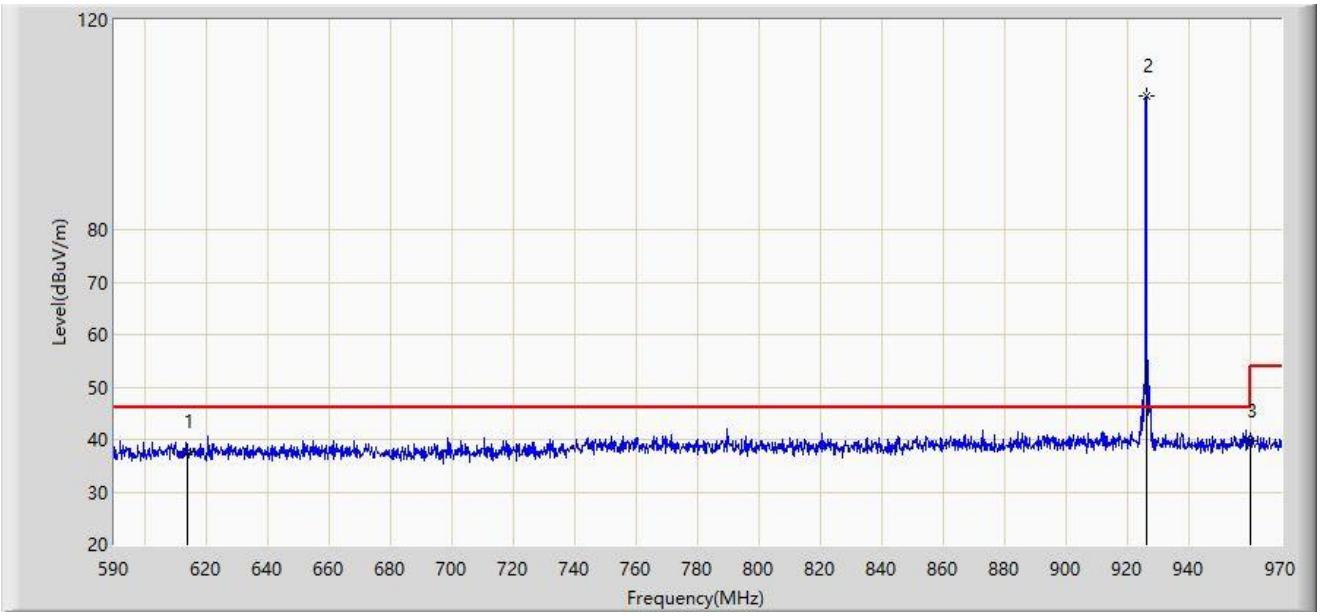
Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 4: Quasi-Peak measurement was not performed when peak measure level was lower than the quasi-peak limit.

Site: WZ-AC1	Test Date: 2022-09-27
Temperature: 24.6°C	Humidity: 61.9%
Limit: FCC_Part15.109_RE(3m)_Class B	Engineer: Edith Yu
Probe: VULB 9168_25-2000MHz	Polarity: Vertical
EUT: Space CO2 Mini	Power: By Battery
Note: Transmit at 926MHz	



No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1		614.000	37.571	11.839	-8.429	46.000	25.732	PK
2	*	926.110	105.481	75.532	59.481	46.000	29.949	PK
3		960.000	39.762	9.983	-6.238	46.000	29.779	PK

Note 1: " * ", means this data is the worst emission level.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 4: Quasi-Peak measurement was not performed when peak measure level was lower than the quasi-peak limit.

A.11 AC Conducted Emissions Test Result

This device is powered by battery, so this item is not applicable.

Appendix B - Test Setup Photograph

Refer to “2206RSU014-UT” file.

Appendix C - EUT Photograph

Refer to “2206RSU014-UE” file.

The End