



RF MEASUREMENT REPORT

FCC ID: XIA-CTL2000
Applicant: Netcomm Wireless Pty Ltd
Product: Smart Installation Tool
Model No.: CTL-2000
Brand Name: CASA SYSTEMS
FCC Classification: Digital Transmission System (DTS)
FCC Rule Part(s): Part 15 Subpart C (Section 15.247)
Result: Complies
Received Date: 2023-11-27
Test Date: 2023-12-05 ~ 2023-12-25

Reviewed By:

Sunny Sun

Approved By:

Robin Wu



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
2311RSU070-U3	V01	Initial Report	2024-01-16	Valid

Note: This report is prepared for FCC Class II permissive supplement to FCC ID: XIA-CTL2000 making the hardware modification and making the spot check.

CONTENTS

Description	Page
1. General Information	5
1.1. Applicant.....	5
1.2. Manufacturer.....	5
1.3. Testing Facility	5
1.4. Product Information.....	6
1.5. Radio Specification under Test	6
1.6. Working Frequencies	7
2. Test Configuration	8
2.1. Test Mode	8
2.2. Test System Connection Diagram.....	8
2.3. Test Software	8
2.4. Applied Standards.....	9
2.5. Test Environment Condition.....	9
3. Antenna Requirements	10
4. Measuring Instrument.....	11
5. Decision Rules and Measurement Uncertainty.....	12
5.1. Decision Rules.....	12
5.2. Measurement Uncertainty	12
6. Test Result.....	13
6.1. Summary	13
6.2. Output Power Measurement.....	14
6.2.1. Test Limit	14
6.2.2. Test Procedure.....	14
6.2.3. Test Setting.....	14
6.2.4. Test Setup.....	14
6.2.5. Test Result.....	14
6.3. Radiated Spurious Emission Measurement	15
6.3.1. Test Limit	15
6.3.2. Test Procedure.....	15
6.3.3. Test Setting.....	15
6.3.4. Test Setup.....	17
6.3.5. Test Result.....	18
6.4. Radiated Restricted Band Edge Measurement	19
6.4.1. Test Limit	19
6.4.2. Test Procedure.....	20

6.4.3. Test Setting.....	20
6.4.4. Test Setup.....	21
6.4.5. Test Result.....	21
Appendix A – Test Result	22
A.1 Output Power Test Result.....	22
A.2 Radiated Spurious Emission Test Result	23
A.3 Radiated Restricted Band Edge Test Result	29
Appendix B – Test Setup Photograph.....	45
Appendix C – EUT Photograph	46

1.4. Product Information

Product Name	Smart Installation Tool
Model No.	CTL-2000
EUT Identification No. or Serial No.	20230411Sample#24 & 20231127Sample#08
Wi-Fi Specification	802.11b/g/n
Bluetooth Specification	Bluetooth-LE Only
Working Voltage	By Battery
Accessories	
Rechargeable Li-ion Battery	Model No.: BAT-0007 Rated Capacity: 2000mAh, 22.2Wh Rated Voltage: 11.1V
Note: 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

Frequency Range	802.11b/g/n-HT20: 2412 ~ 2462MHz 802.11n-HT40: 2422 ~ 2452MHz
Channel Number	802.11b/g/n-HT20: 11 802.11n-HT40: 7
Type of Modulation	802.11b: DSSS 802.11g/n: OFDM
Data Rate	802.11b: 1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 150Mbps
Antenna Type	PCB
Antenna Gain	3.30dBi

1.6. Working Frequencies

802.11b/g/n-HT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz
04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz
10	2457 MHz	11	2462 MHz	--	--

802.11n-HT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
03	2422 MHz	04	2427 MHz	05	2432 MHz
06	2437 MHz	07	2442 MHz	08	2447 MHz
09	2452 MHz	--	--	--	--

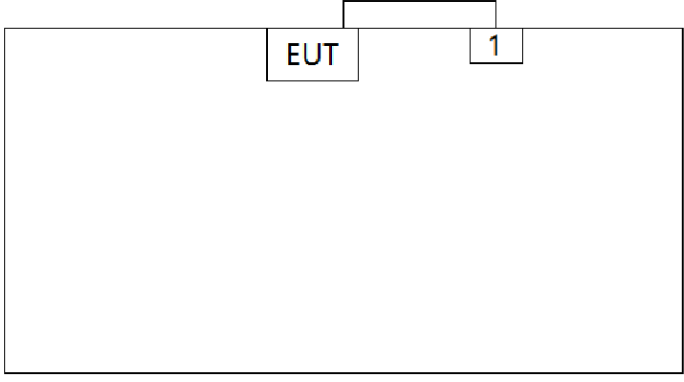
2. Test Configuration

2.1. Test Mode

Mode 1: Transmit by 802.11b (1Mbps)
Mode 2: Transmit by 802.11g (6Mbps)
Mode 3: Transmit by 802.11n-HT20 (MCS0)
Mode 4: Transmit by 802.11n-HT40 (MCS0)
Note: <ol style="list-style-type: none"> For Radiated emission, the modulation and the data rate picked for testing are determined by the Max. RF conducted power. As Designated by manufacturer, the lowest data rate was the worst condition, so all the tests were done with lowest data rate.

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		
		
Product	Manufacturer	Model No.
1 Notebook	Lenovo	E495

2.3. Test Software

The test utility software used during testing was “EspRFTTestTool_v2.6_Manual.exe”.

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
Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06598	1 year	2024-11-04	SIP-AC2
Preamplifier	EMCI	EMC051845SE	MRTSUE06601	1 year	2024-11-02	SIP-AC2
Thermohygrometer	testo	608-H1	MRTSUE06622	1 year	2024-11-03	SIP-AC2
Thermohygrometer	testo	608-H1	MRTSUE06624	1 year	2024-11-03	SIP-AC2
TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06647	1 year	2024-06-17	SIP-AC2
Anechoic Chamber	RIKEN	SIP-AC2	MRTSUE06781	1 year	2023-12-22	SIP-AC2
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06648	1 year	2024-10-21	SIP-AC2
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2024-12-17	SIP-AC2
Preamplifier	EMCI	EMC184045SE	MRTSUE06602	1 year	2024-10-09	SIP-AC2
Loop Antenna	Schwarzbeck	FMZB 1519 B	MRTSUE06937	1 year	2024-02-26	SIP-AC2
Signal Analyzer	Keysight	N9010B	MRTSUE07028	1 year	2024-10-23	SIP-AC2
Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2024-05-23	SIP-AC3
Horn Antenna	R&S	HF907	MRTSUE06611	1 year	2024-07-14	SIP-AC3
Thermohygrometer	testo	608-H1	MRTSUE06619	1 year	2024-10-28	SIP-AC3
Preamplifier	EMCI	EMC012645SE	MRTSUE06642	1 year	2024-01-12	SIP-AC3
Anechoic Chamber	RIKEN	SIP-AC3	MRTSUE06782	1 year	2024-12-21	SIP-AC3
Thermohygrometer	testo	608-H1	MRTSUE11255	1 year	2024-08-13	SIP-AC3
Thermohygrometer	testo	608-H1	MRTSUE11022	1 year	2024-10-28	SIP-TR1
USB Power Sensor	Keysight	U2021XA	MRTSUE06596	1 year	2024-07-31	SIP-TR1

Software	Version	Function
EMI V3	V 3.0.0	EMI Test Software
Controller_MF 7802BS	1.02	RE Antenna & Turntable
BenchVue Power Meter	2019	Power

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 $k = 2$.

Radiated Emission Measurement	
The maximum measurement uncertainty is evaluated as:	
Coaxial:	9kHz~30MHz: 2.61dB
Coplanar:	9kHz~30MHz: 2.62dB
Horizontal:	30MHz~200MHz: 3.79dB
	200MHz~1GHz: 3.91dB
	1GHz~40GHz: 4.99dB
Vertical:	30MHz~200MHz: 4.06dB
	200MHz~1GHz: 5.21dB
	1GHz~40GHz: 4.90dB
Output Power	
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$):	
1.4dB	

6. Test Result

6.1. Summary

FCC Section(s)	Test Description	Test Condition	Verdict
15.247(b)(3)	Output Power	Conducted	Pass
15.205 15.209	General Field Strength (Restricted Bands and Radiated Emission)	Radiated	Pass

Notes:

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.

6.2. Output Power Measurement

6.2.1. Test Limit

The maximum output power shall be less 1 Watt (30dBm).

The conducted output power limit specified in paragraph FCC Part 15.247(b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs FCC Part 15.247(b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

6.2.2. Test Procedure

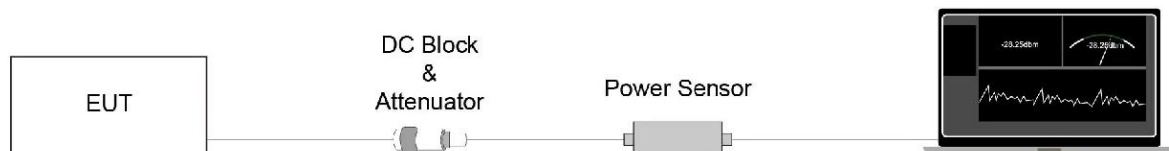
ANSI C63.10 - 2013 - Section 11.9.2.3.2

6.2.3. Test Setting

Average Power Measurement

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

6.2.4. Test Setup



6.2.5. Test Result

Refer to Appendix A.1.

6.3. Radiated Spurious Emission Measurement

6.3.1. 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 [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

6.3.2. Test Procedure

ANSI C63.10 - 2013 - Section 11.11 & 11.12

ANSI C63.10 - 2013 - Section 6.3 (General Requirements)

ANSI C63.10 - 2013 - Section 6.4 (Standard test method below 30MHz)

ANSI C63.10 - 2013 - Section 6.5 (Standard test method above 30MHz to 1GHz)

ANSI C63.10 - 2013 - Section 6.6 (Standard test method above 1GHz)

6.3.3. 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
> 1000MHz	1MHz

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

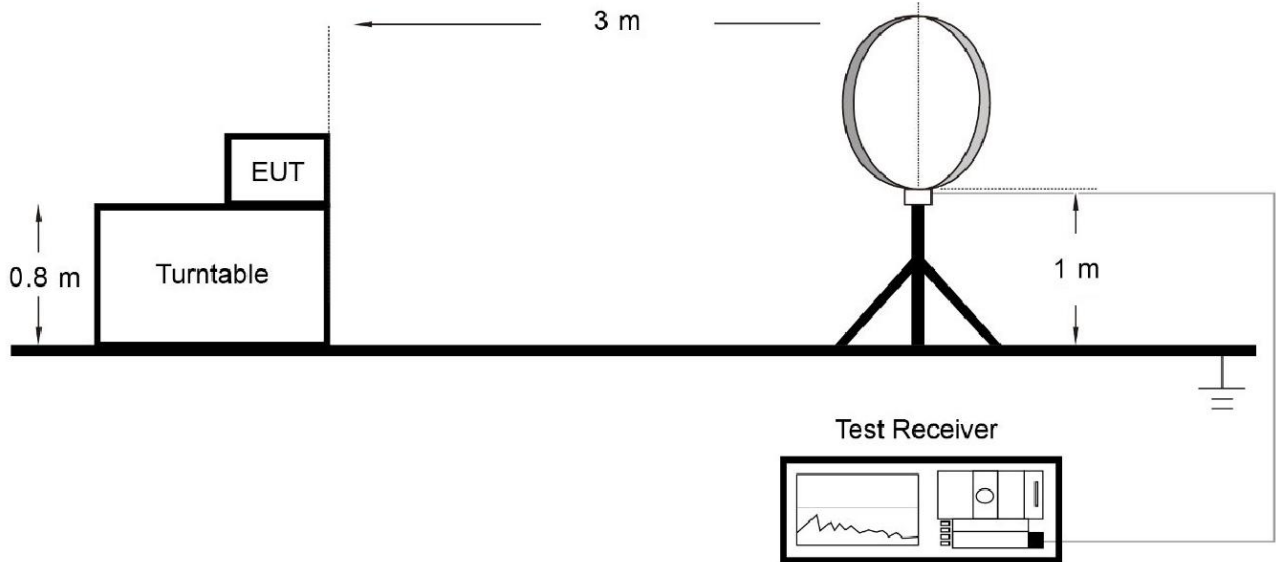
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Measurements above 1GHz (Method VB)

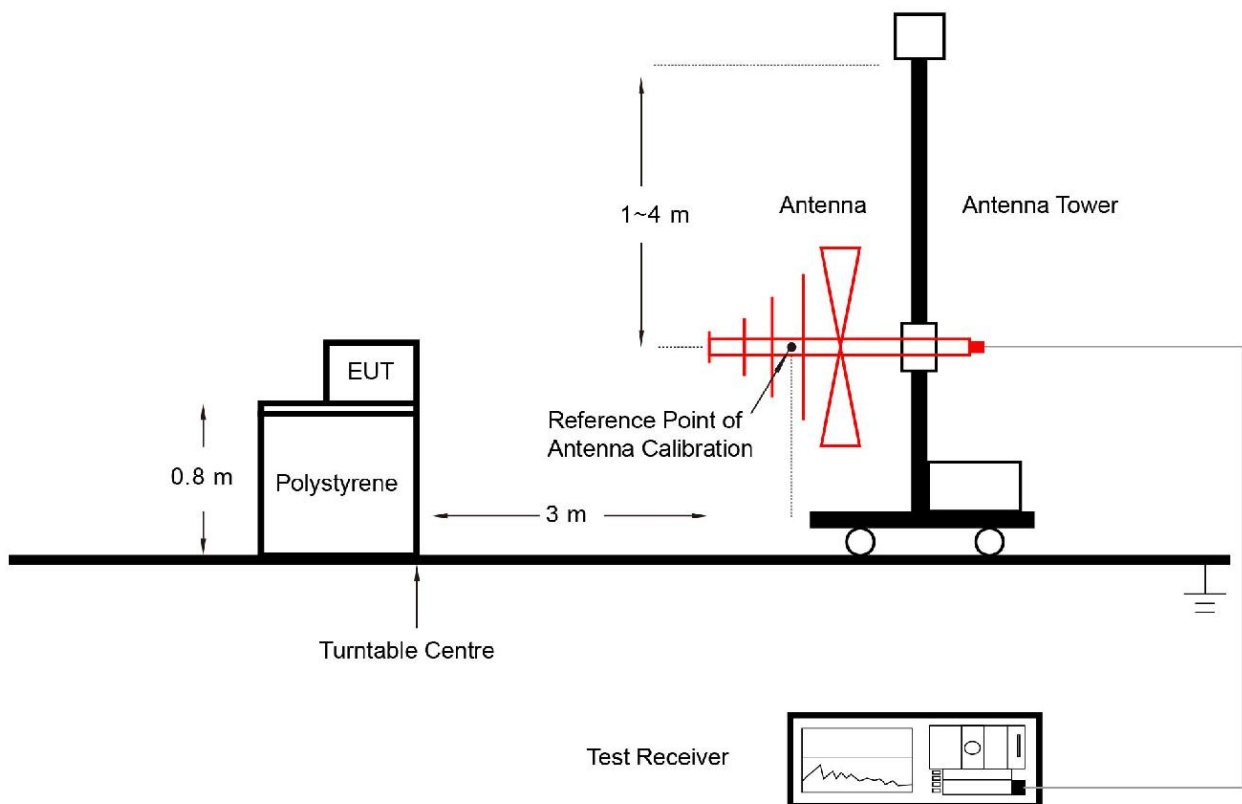
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle $\geq 98\%$, set VBW = 10 Hz.
If the EUT duty cycle is $< 98\%$, set VBW $\geq 1/T$. T is the minimum transmission duration.
4. Detector = Peak
5. Sweep time = auto
6. Trace mode = max hold
7. Trace was allowed to stabilize

6.3.4. Test Setup

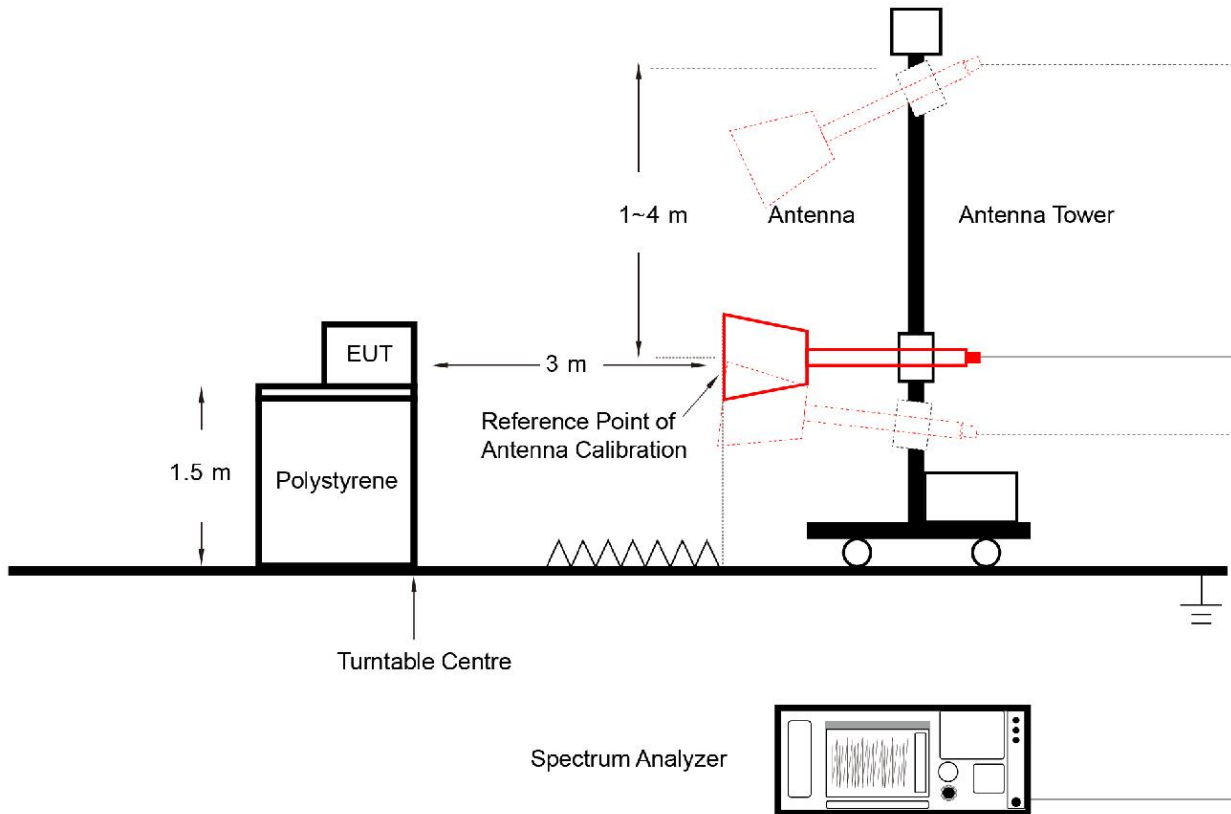
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



6.3.5. Test Result

Refer to Appendix A.2.

6.4. Radiated Restricted Band Edge Measurement

6.4.1. 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

6.4.2. Test Procedure

ANSI C63.10-2013 Section 6.3 & 6.6 & 11.13

6.4.3. Test Setting

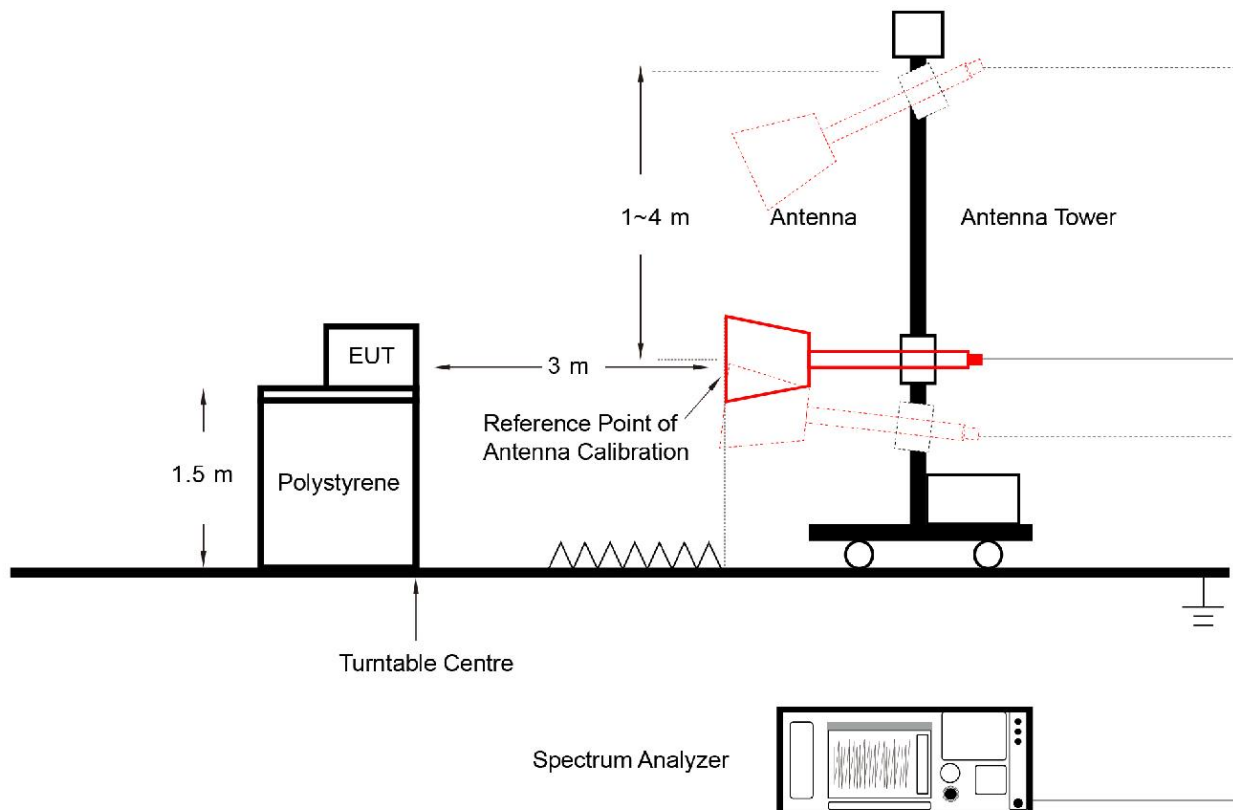
Peak Field Strength Measurements

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 $\geq 1/T$
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

6.4.4. Test Setup



6.4.5. Test Result

Refer to Appendix A.3.

Appendix A – Test Result

A.1 Output Power Test Result

Test Site	SIP-TR1	Test Engineer	Alisa Deng
Test Date	2023-12-05		

Test Mode	Data Rate /MCS	Channel No.	Freq. (MHz)	Average Power (dBm)	Limit (dBm)
11b	1Mbps	01	2412	12.17	≤ 30.00
11g	6Mbps	01	2412	14.98	≤ 30.00
11n-HT20	MCS0	01	2412	14.65	≤ 30.00
11n-HT40	MCS0	03	2422	14.14	≤ 30.00

A.2 Radiated Spurious Emission Test Result

Test Site	SIP-AC2	Test Engineer	Justin Guo
Test Date	2023-12-24	Test Mode	802.11b
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 (dB μ V)	Factor (dB/m)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polarization
01	4825.0	64.3	-7.3	57.0	74.0	-17.0	Peak	Horizontal
	4825.0	60.5	-7.3	53.2	54.0	-0.8	Average	Horizontal
	11378.5	40.7	6.0	46.7	74.0	-27.3	Peak	Horizontal
	18000.0	37.3	16.7	54.0	74.0	-20.0	Peak	Horizontal
	18000.0	25.9	16.7	42.6	54.0	-11.4	Average	Horizontal
	4825.0	62.4	-7.3	55.1	74.0	-18.9	Peak	Vertical
	4825.0	59.6	-7.3	52.3	54.0	-1.7	Average	Vertical
	11480.5	40.9	5.6	46.5	74.0	-27.5	Peak	Vertical
	17915.0	36.8	16.9	53.7	74.0	-20.3	Peak	Vertical
	17915.0	25.3	16.9	42.2	54.0	-11.8	Average	Vertical

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

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

Test Site	SIP-AC2	Test Engineer	Justin Guo
Test Date	2023-12-24	Test Mode	802.11g
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	4825.0	64.1	-7.3	56.8	74.0	-17.2	Peak	Horizontal
	4825.0	55.1	-7.3	47.8	54.0	-6.2	Average	Horizontal
	10775.0	42.4	4.4	46.8	74.0	-27.2	Peak	Horizontal
	18000.0	36.9	16.7	53.6	74.0	-20.4	Peak	Horizontal
	18000.0	25.8	16.7	42.5	54.0	-11.5	Average	Horizontal
	4816.5	64.0	-7.2	56.8	74.0	-17.2	Peak	Vertical
	4816.5	52.5	-7.2	45.3	54.0	-8.7	Average	Vertical
	11217.0	41.5	5.7	47.2	74.0	-26.8	Peak	Vertical
	18000.0	38.1	16.7	54.8	74.0	-19.2	Peak	Vertical
	18000.0	24.0	16.7	40.7	54.0	-13.3	Average	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)

Test Site	SIP-AC2	Test Engineer	Justin Guo
Test Date	2023-12-24	Test Mode	802.11n-HT20
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	4825.0	63.5	-7.3	56.2	74.0	-17.8	Peak	Horizontal
	4825.0	53.6	-7.3	46.3	54.0	-7.7	Average	Horizontal
	11378.5	41.1	6.0	47.1	74.0	-26.9	Peak	Horizontal
	17991.5	37.6	16.3	53.9	74.0	-20.1	Peak	Horizontal
	17991.5	25.7	16.3	42.0	54.0	-12.0	Average	Horizontal
	4825.0	62.6	-7.3	55.3	74.0	-18.7	Peak	Vertical
	4825.0	52.8	-7.3	45.5	54.0	-8.5	Average	Vertical
	11217.0	41.7	5.7	47.4	74.0	-26.6	Peak	Vertical
	17991.5	37.1	16.3	53.4	74.0	-20.6	Peak	Vertical
	17991.5	25.8	16.3	42.1	54.0	-11.9	Average	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)

Test Site	SIP-AC2	Test Engineer	Justin Guo
Test Date	2023-12-24	Test Mode	802.11n-HT40
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.		

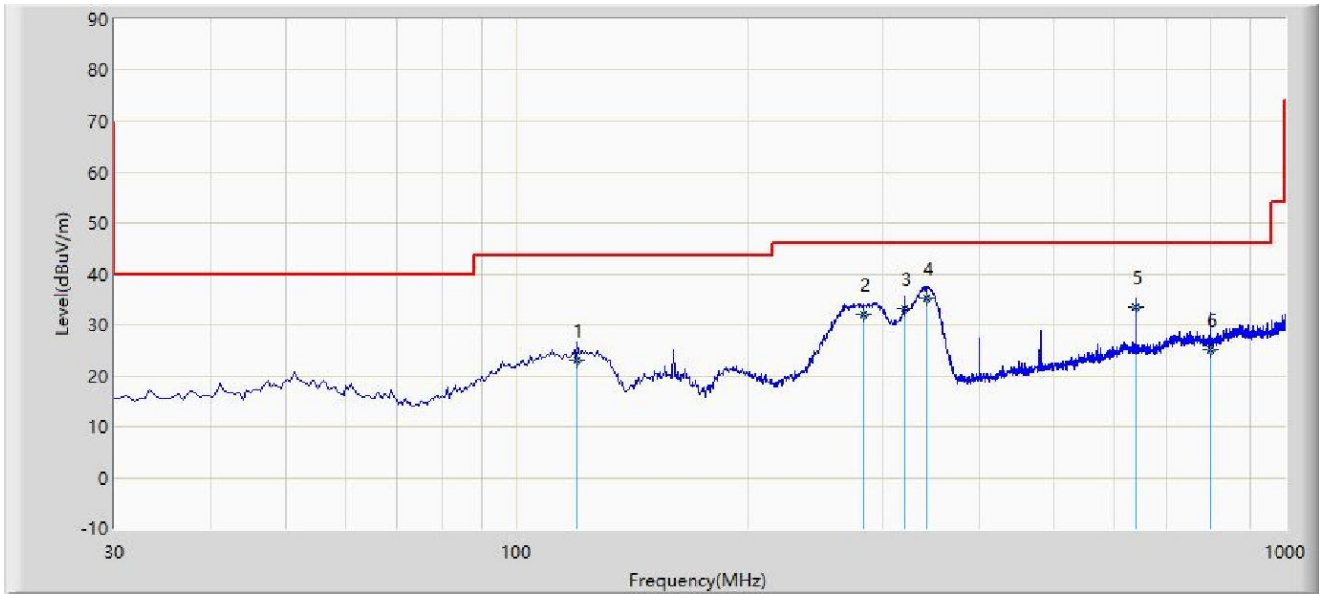
Test Channel	Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
03	4850.5	61.8	-7.3	54.5	74.0	-19.5	Peak	Horizontal
	4850.5	50.7	-7.3	43.4	54.0	-10.6	Average	Horizontal
	11531.5	41.0	5.3	46.3	74.0	-27.7	Peak	Horizontal
	17983.0	37.6	16.0	53.6	74.0	-20.4	Peak	Horizontal
	17983.0	25.7	16.0	41.7	54.0	-12.3	Average	Horizontal
	4842.0	61.0	-7.3	53.7	74.0	-20.3	Peak	Vertical
	4842.0	52.2	-7.3	44.9	54.0	-9.1	Average	Vertical
	11217.0	41.7	5.7	47.4	74.0	-26.6	Peak	Vertical
	17915.0	36.7	16.9	53.6	74.0	-20.4	Peak	Vertical
	17915.0	25.3	16.9	42.2	54.0	-11.8	Average	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: SIP-AC2	Test Date: 2023-12-25
Limit: FCC_Part15.209_RSE(3m)	Engineer: Fusco Pan
Probe: VULB 9168_00998_25-2000MHz	Polarity: Horizontal
EUT: Smart Installation Tool	Power: By Battery
Test Mode: Transmit by 802.11b at 2412MHz	



No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1		119.725	23.085	7.200	-20.415	43.500	15.886	QP
2		283.170	32.000	13.560	-14.000	46.000	18.440	QP
3		320.030	33.157	13.800	-12.843	46.000	19.356	QP
4	*	342.340	35.084	15.200	-10.916	46.000	19.884	QP
5		640.130	33.579	7.100	-12.421	46.000	26.479	QP
6		800.180	24.998	-3.300	-21.002	46.000	28.297	QP

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

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

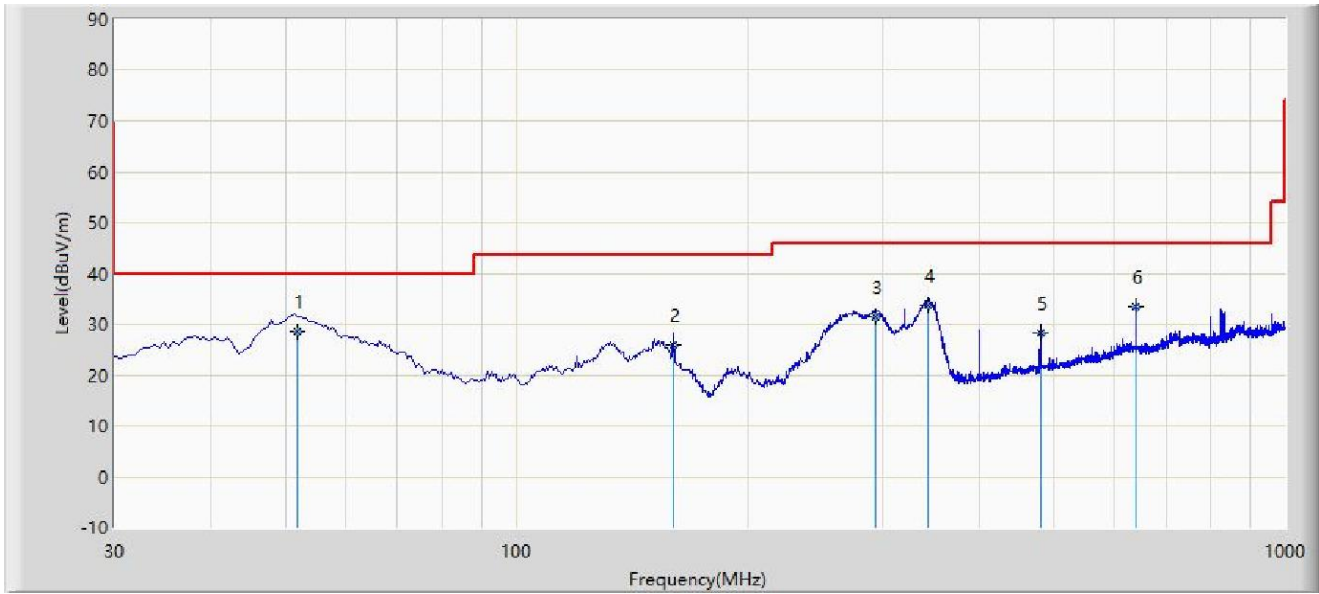
Note 3: Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m).

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

Note 5: 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.

Site: SIP-AC2	Test Date: 2023-12-25
Limit: FCC_Part15.209_RSE(3m)	Engineer: Fusco Pan
Probe: VULB 9168_00998_25-2000MHz	Polarity: Vertical
EUT: Smart Installation Tool	Power: By Battery
Test Mode: Transmit by 802.11b at 2412MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB/m)	Type
1	*	51.980	28.601	10.200	-11.399	40.000	18.401	QP
2		159.980	25.816	7.600	-17.684	43.500	18.216	QP
3		292.870	31.361	12.800	-14.639	46.000	18.560	QP
4		343.310	33.769	13.900	-12.231	46.000	19.869	QP
5		480.050	28.313	4.900	-17.687	46.000	23.413	QP
6		640.130	33.579	7.100	-12.421	46.000	26.479	QP

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

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

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

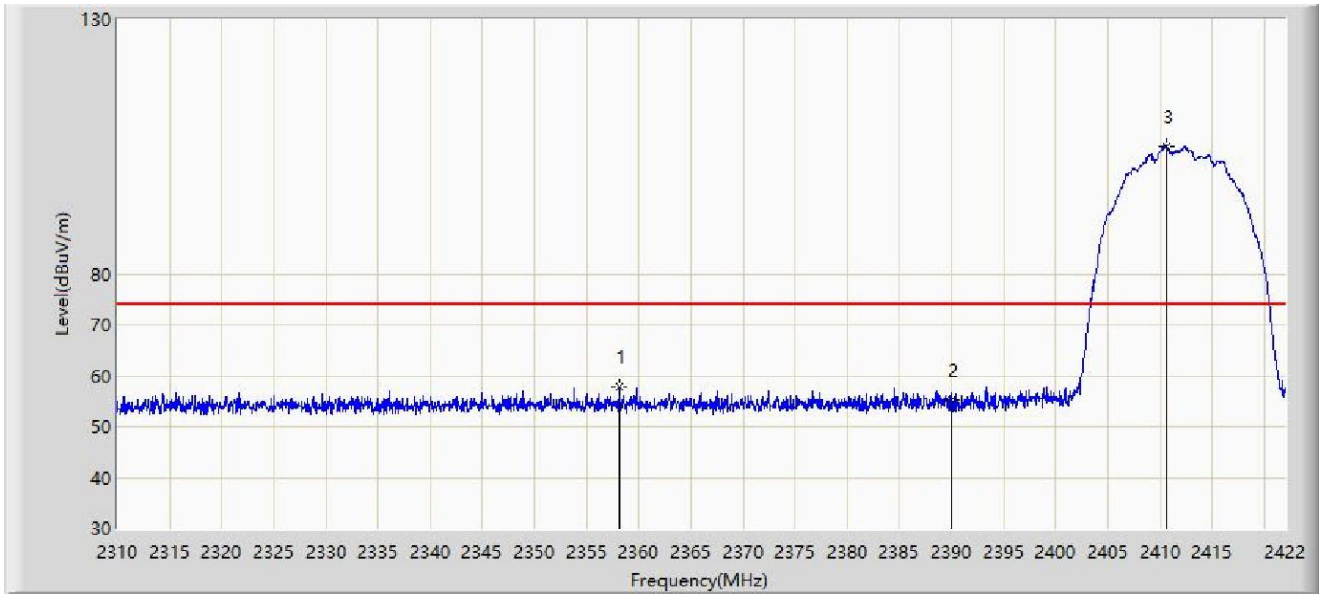
Note 4: Quasi-Peak measurement was not performed when peak measure level was lower than the quasi-peak limit.

Note 5: 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.3 Radiated Restricted Band Edge Test Result

Site: SIP-AC3	Test Date: 2023-12-24
Limit: FCC_2.4G_RE(3m)	Engineer: Justin Guo
Probe: HF907_102861_1-18GHz	Polarity: Horizontal
EUT: Smart Installation Tool	Power: By Battery
Test Mode: Transmit by 802.11b at 2412MHz	



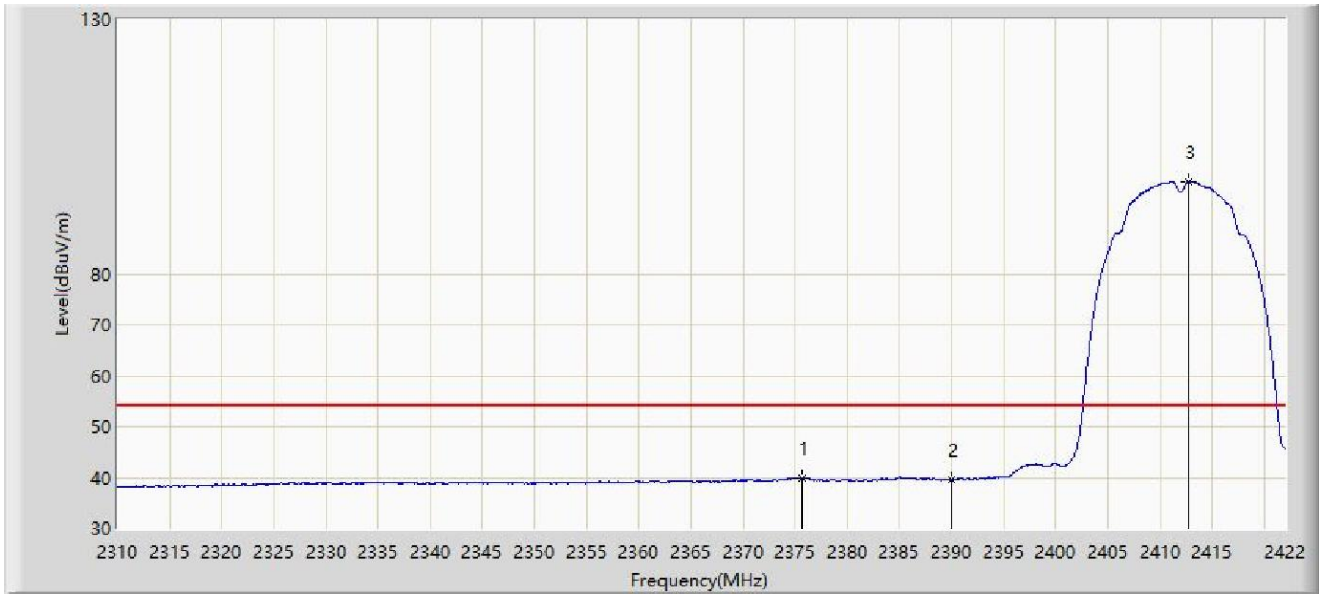
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2358.104	57.899	26.001	-16.101	74.000	31.898	PK
2		2390.000	55.134	23.111	-18.866	74.000	32.023	PK
3		2410.632	105.181	73.136	N/A	N/A	32.045	PK

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

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

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

Site: SIP-AC3	Test Date: 2023-12-24
Limit: FCC_2.4G_RE(3m)	Engineer: Justin Guo
Probe: HF907_102861_1-18GHz	Polarity: Horizontal
EUT: Smart Installation Tool	Power: By Battery
Test Mode: Transmit by 802.11b at 2412MHz	



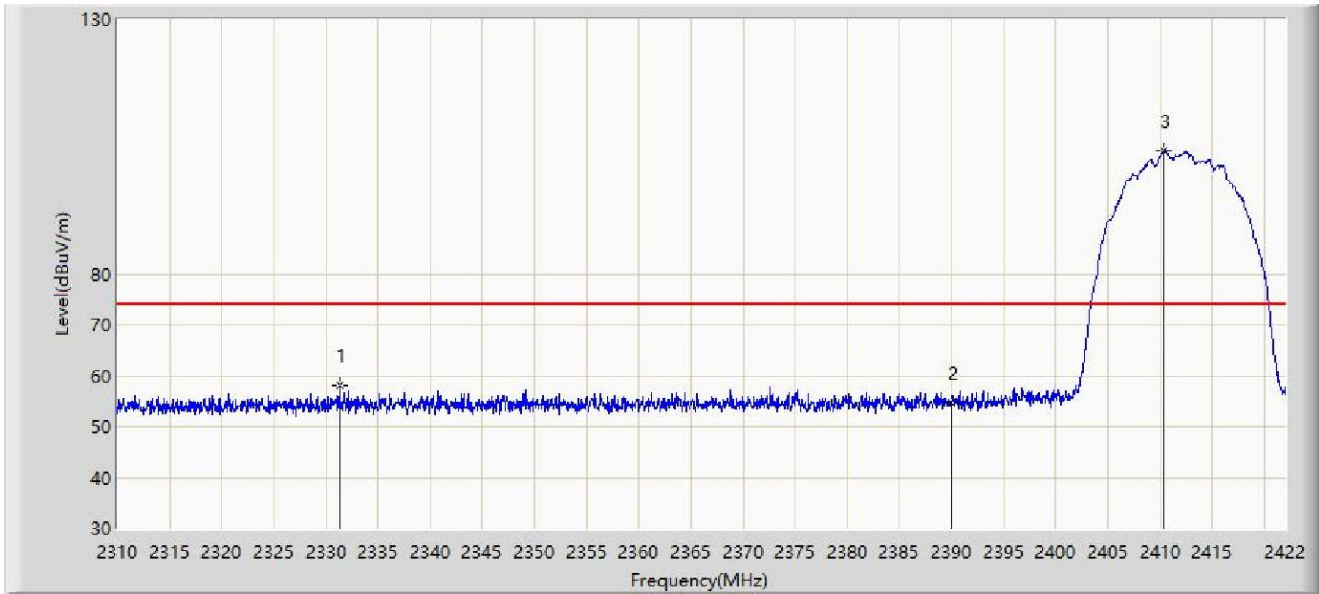
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2375.632	39.887	7.897	-14.113	54.000	31.991	AV
2		2390.000	39.568	7.545	-14.432	54.000	32.023	AV
3		2412.704	98.194	66.149	N/A	N/A	32.045	AV

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

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

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

Site: SIP-AC3	Test Date: 2023-12-24
Limit: FCC_2.4G_RE(3m)	Engineer: Justin Guo
Probe: HF907_102861_1-18GHz	Polarity: Vertical
EUT: Smart Installation Tool	Power: By Battery
Test Mode: Transmit by 802.11b at 2412MHz	



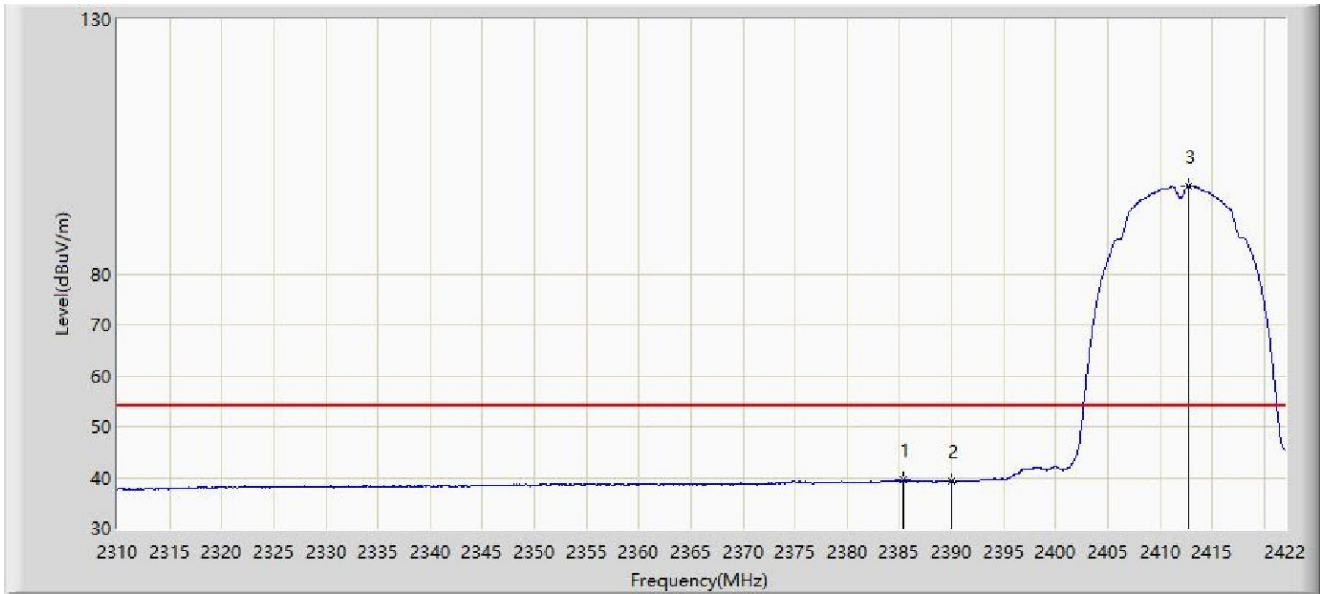
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2331.280	58.078	26.400	-15.922	74.000	31.678	PK
2		2390.000	54.513	22.490	-19.487	74.000	32.023	PK
3		2410.352	104.116	72.072	N/A	N/A	32.045	PK

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

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

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

Site: SIP-AC3	Test Date: 2023-12-24
Limit: FCC_2.4G_RE(3m)	Engineer: Justin Guo
Probe: HF907_102861_1-18GHz	Polarity: Vertical
EUT: Smart Installation Tool	Power: By Battery
Test Mode: Transmit by 802.11b at 2412MHz	



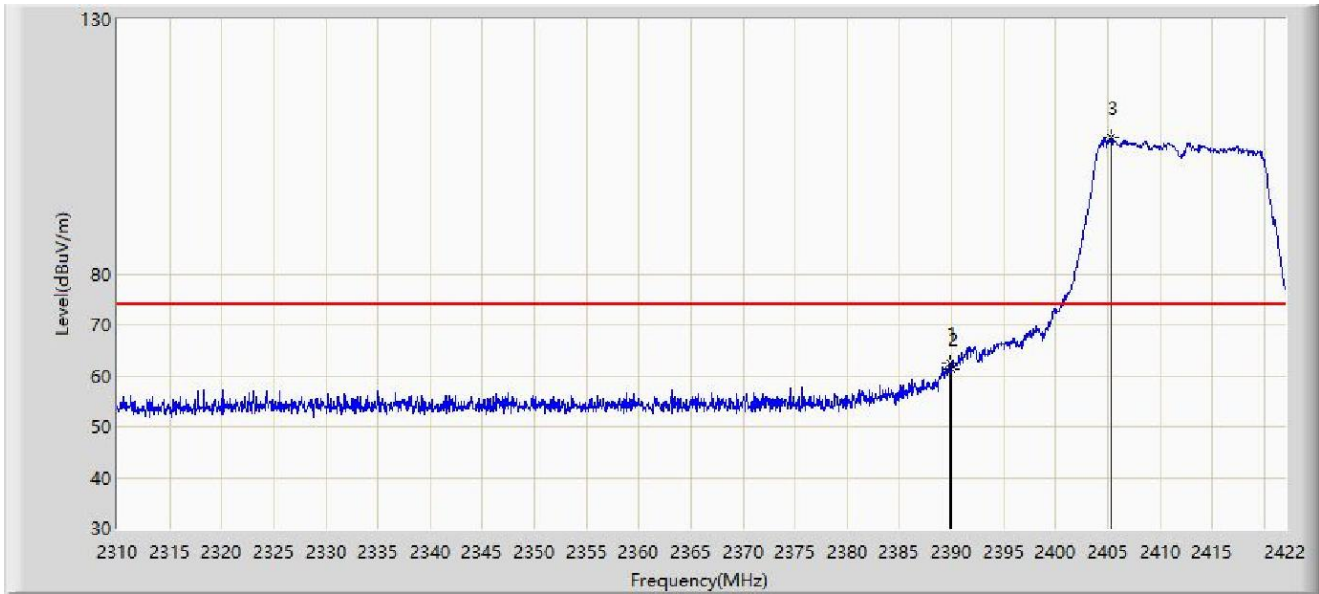
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2385.376	39.494	7.480	-14.506	54.000	32.014	AV
2		2390.000	39.193	7.170	-14.807	54.000	32.023	AV
3		2412.704	97.256	65.211	N/A	N/A	32.045	AV

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

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

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

Site: SIP-AC3	Test Date: 2023-12-24
Limit: FCC_2.4G_RE(3m)	Engineer: Justin Guo
Probe: HF907_102861_1-18GHz	Polarity: Horizontal
EUT: Smart Installation Tool	Power: By Battery
Test Mode: Transmit by 802.11g at 2412MHz	



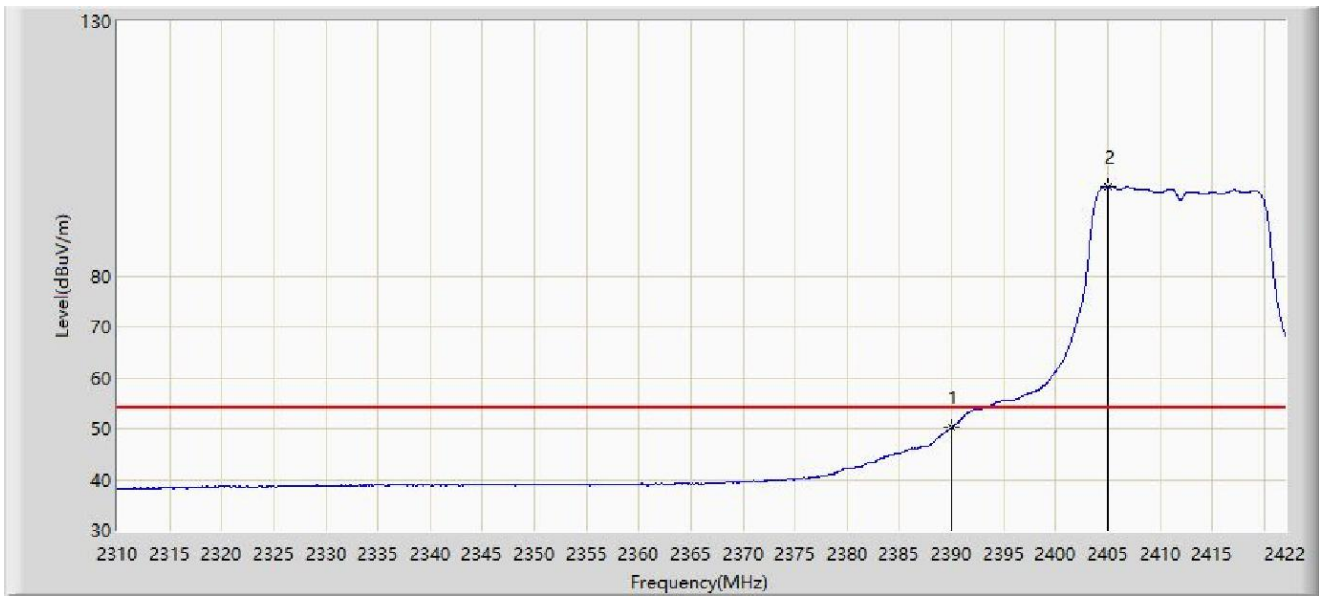
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2389.800	62.363	30.340	-11.637	74.000	32.022	PK
2		2390.000	61.164	29.141	-12.836	74.000	32.023	PK
3		2405.368	106.718	74.678	N/A	N/A	32.040	PK

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

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

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

Site: SIP-AC3	Test Date: 2023-12-24
Limit: FCC_2.4G_RE(3m)	Engineer: Justin Guo
Probe: HF907_102861_1-18GHz	Polarity: Horizontal
EUT: Smart Installation Tool	Power: By Battery
Test Mode: Transmit by 802.11g at 2412MHz	



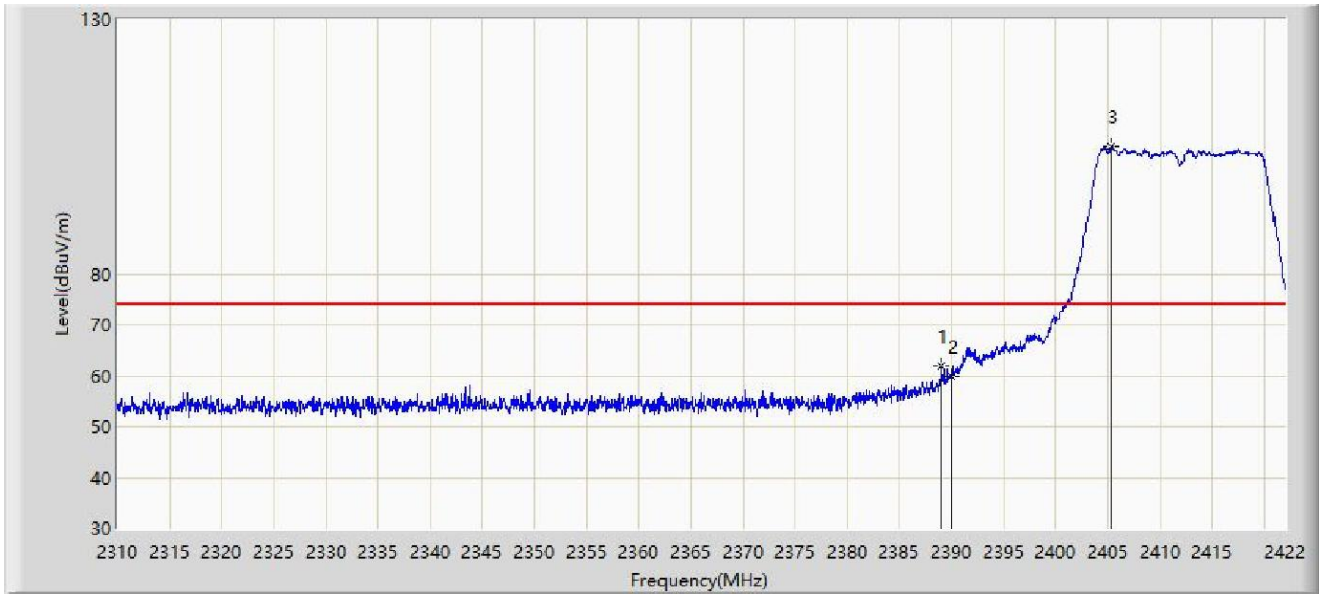
No	Mark	Frequency (MHz)	Measure Level (dBμV/m)	Reading Level (dBμV)	Margin (dB)	Limit (dBμV/m)	Factor (dB/m)	Type
1	*	2390.000	50.258	18.235	-3.742	54.000	32.023	AV
2		2405.032	97.598	65.558	N/A	N/A	32.040	AV

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).

Site: SIP-AC3	Test Date: 2023-12-24
Limit: FCC_2.4G_RE(3m)	Engineer: Justin Guo
Probe: HF907_102861_1-18GHz	Polarity: Vertical
EUT: Smart Installation Tool	Power: By Battery
Test Mode: Transmit by 802.11g at 2412MHz	



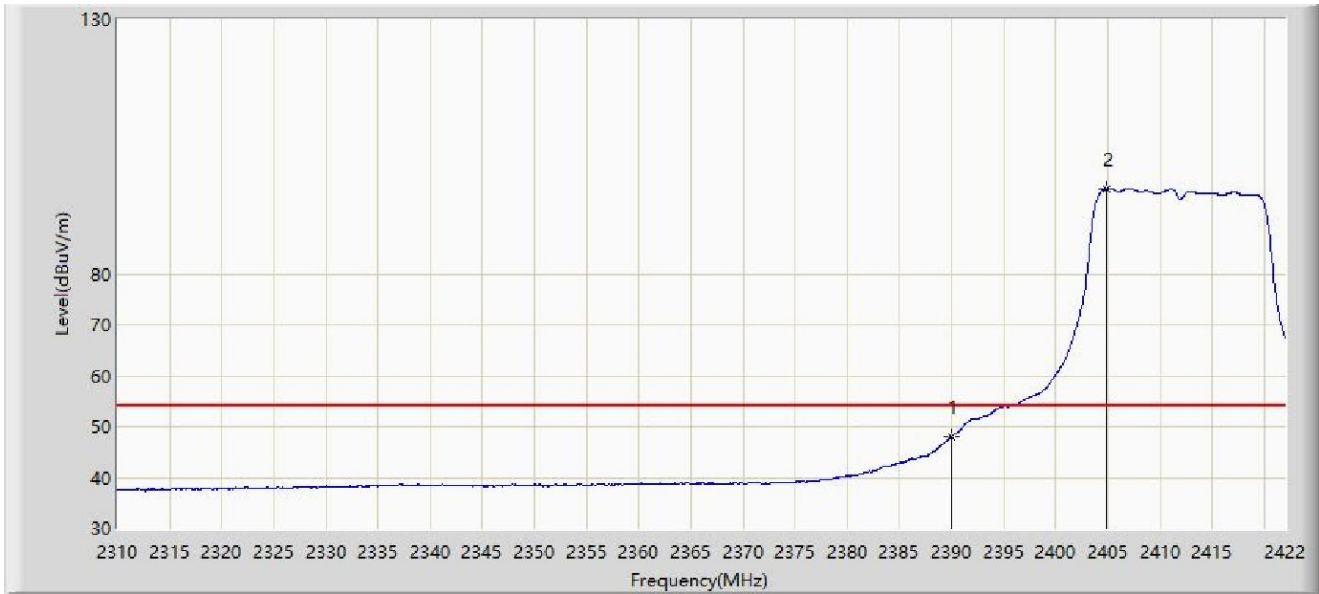
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2389.072	61.767	29.746	-12.233	74.000	32.021	PK
2		2390.000	59.974	27.951	-14.026	74.000	32.023	PK
3		2405.256	105.031	72.991	N/A	N/A	32.040	PK

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

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

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

Site: SIP-AC3	Test Date: 2023-12-24
Limit: FCC_2.4G_RE(3m)	Engineer: Justin Guo
Probe: HF907_102861_1-18GHz	Polarity: Vertical
EUT: Smart Installation Tool	Power: By Battery
Test Mode: Transmit by 802.11g at 2412MHz	



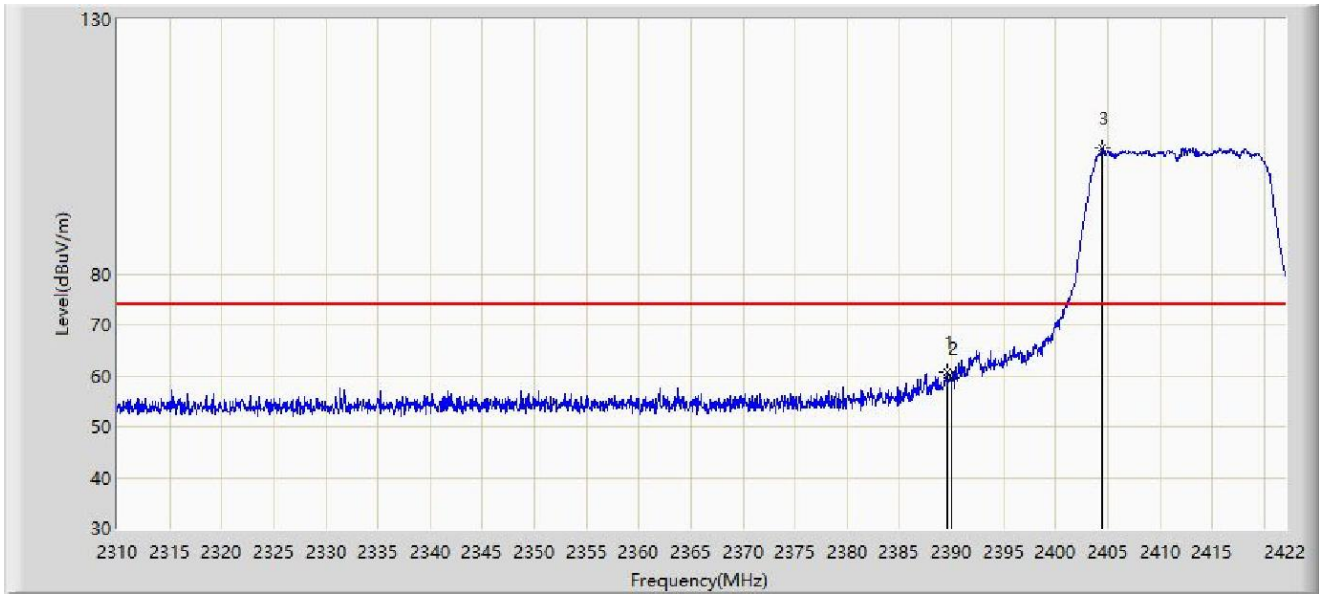
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2390.000	48.051	16.028	-5.949	54.000	32.023	AV
2		2404.864	96.708	64.668	N/A	N/A	32.040	AV

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

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

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

Site: SIP-AC3	Test Date: 2023-12-24
Limit: FCC_2.4G_RE(3m)	Engineer: Justin Guo
Probe: HF907_102861_1-18GHz	Polarity: Horizontal
EUT: Smart Installation Tool	Power: By Battery
Test Mode: Transmit by 802.11n-HT20 at 2412MHz	



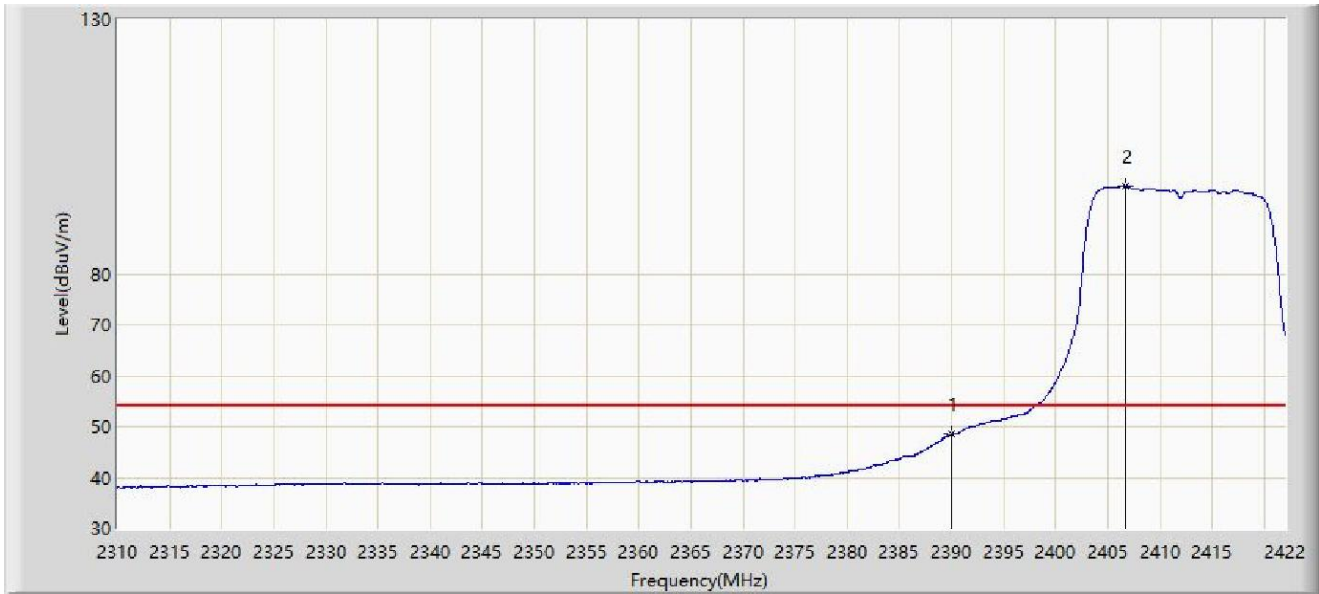
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2389.520	60.684	28.662	-13.316	74.000	32.022	PK
2		2390.000	59.452	27.429	-14.548	74.000	32.023	PK
3		2404.416	104.743	72.703	N/A	N/A	32.040	PK

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

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

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

Site: SIP-AC3	Test Date: 2023-12-24
Limit: FCC_2.4G_RE(3m)	Engineer: Justin Guo
Probe: HF907_102861_1-18GHz	Polarity: Horizontal
EUT: Smart Installation Tool	Power: By Battery
Test Mode: Transmit by 802.11n-HT20 at 2412MHz	



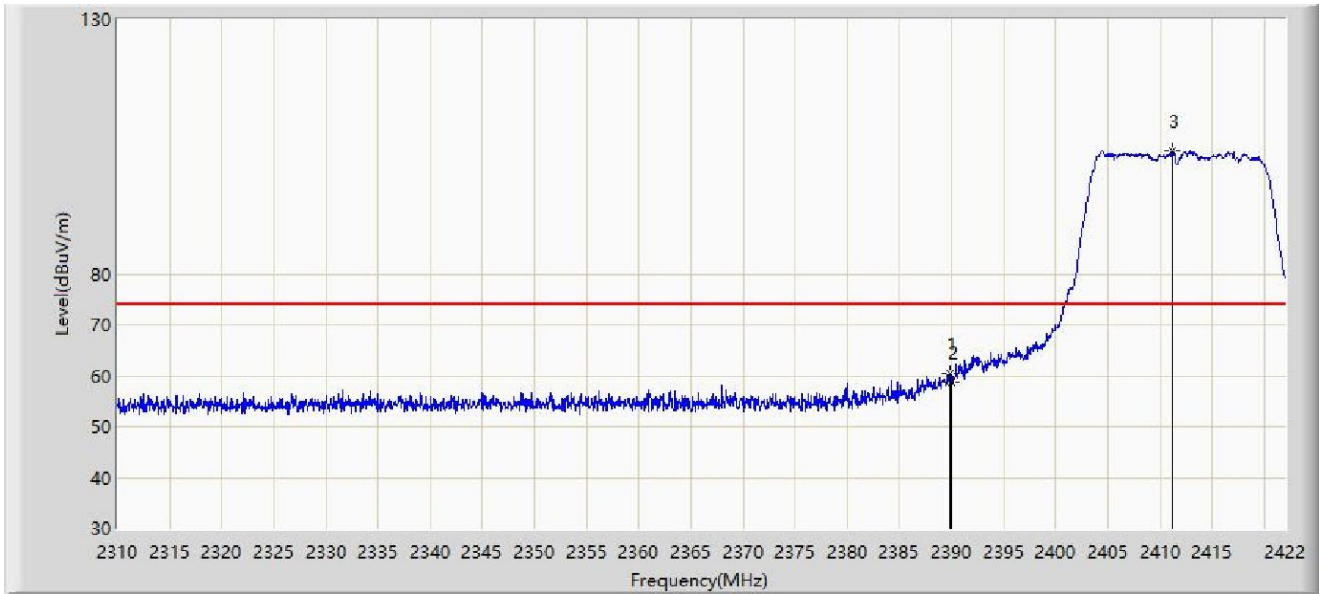
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2390.000	48.435	16.412	-5.565	54.000	32.023	AV
2		2406.768	97.270	65.228	N/A	N/A	32.042	AV

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

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

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

Site: SIP-AC3	Test Date: 2023-12-24
Limit: FCC_2.4G_RE(3m)	Engineer: Justin Guo
Probe: HF907_102861_1-18GHz	Polarity: Vertical
EUT: Smart Installation Tool	Power: By Battery
Test Mode: Transmit by 802.11n-HT20 at 2412MHz	



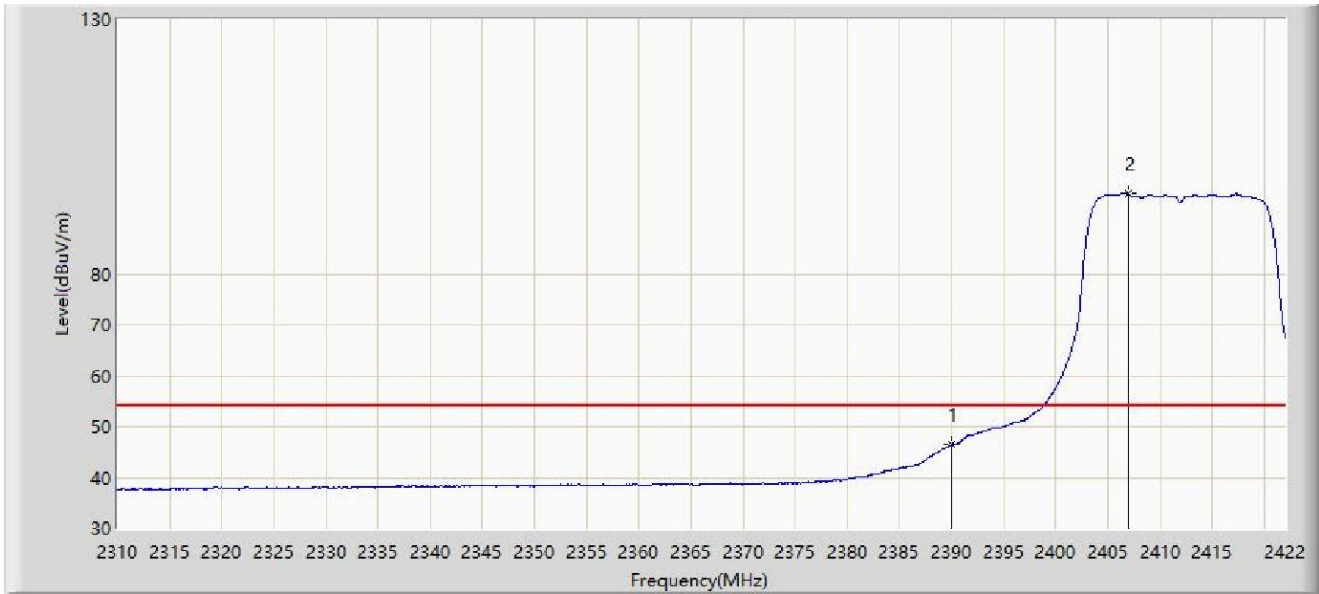
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2389.912	60.327	28.304	-13.673	74.000	32.023	PK
2		2390.000	58.630	26.607	-15.370	74.000	32.023	PK
3		2411.192	104.295	72.250	N/A	N/A	32.045	PK

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

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

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

Site: SIP-AC3	Test Date: 2023-12-24
Limit: FCC_2.4G_RE(3m)	Engineer: Justin Guo
Probe: HF907_102861_1-18GHz	Polarity: Vertical
EUT: Smart Installation Tool	Power: By Battery
Test Mode: Transmit by 802.11n-HT20 at 2412MHz	



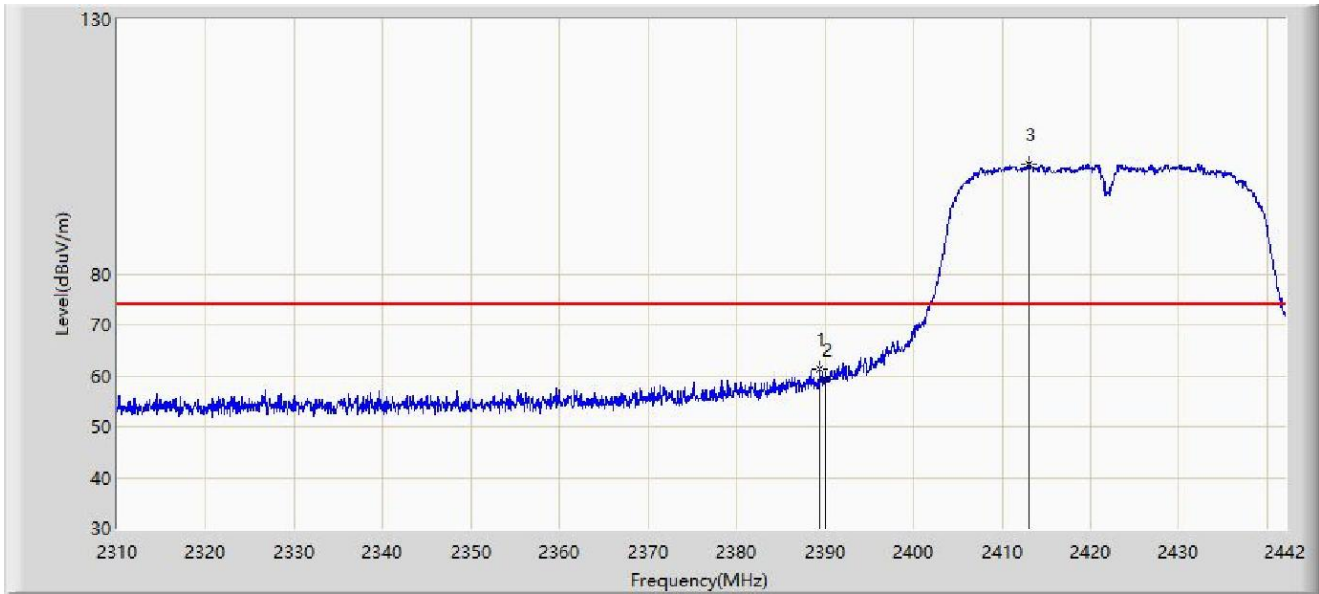
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2390.000	46.420	14.397	-7.580	54.000	32.023	AV
2		2406.936	95.685	63.643	N/A	N/A	32.041	AV

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

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

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

Site: SIP-AC3	Test Date: 2023-12-24
Limit: FCC_2.4G_RE(3m)	Engineer: Justin Guo
Probe: HF907_102861_1-18GHz	Polarity: Horizontal
EUT: Smart Installation Tool	Power: By Battery
Test Mode: Transmit by 802.11n-HT40 at 2422MHz	



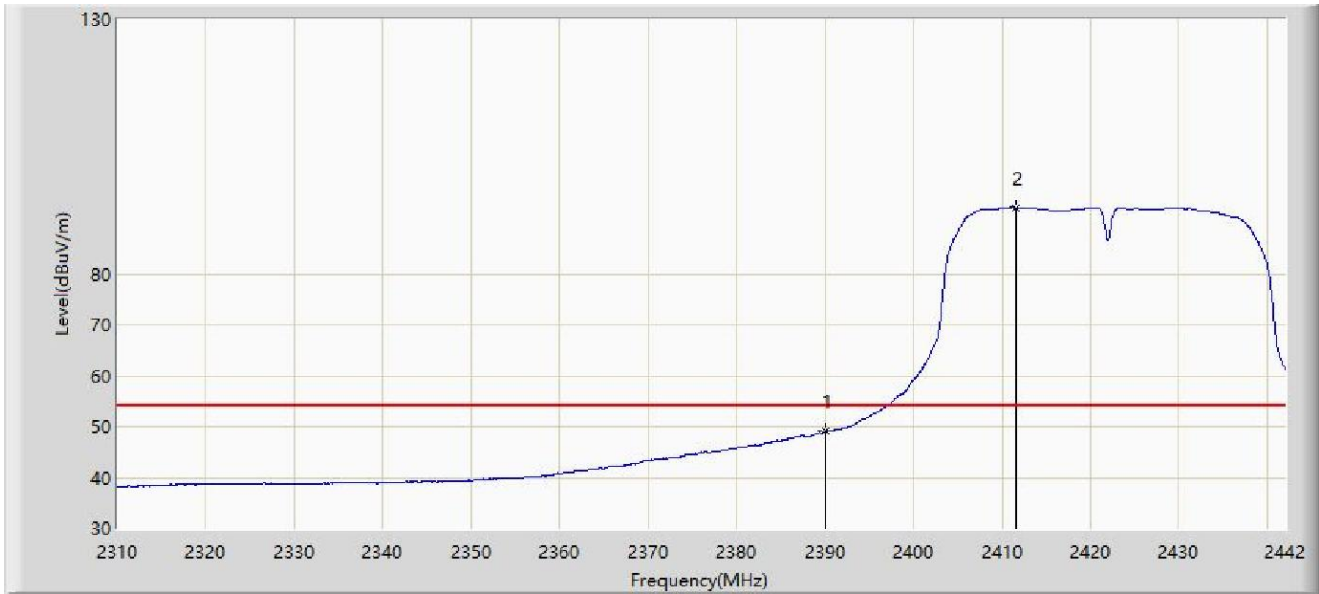
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2389.464	61.236	29.214	-12.764	74.000	32.022	PK
2		2390.000	59.332	27.309	-14.668	74.000	32.023	PK
3		2413.026	101.665	69.620	N/A	N/A	32.045	PK

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

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

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

Site: SIP-AC3	Test Date: 2023-12-24
Limit: FCC_2.4G_RE(3m)	Engineer: Justin Guo
Probe: HF907_102861_1-18GHz	Polarity: Horizontal
EUT: Smart Installation Tool	Power: By Battery
Test Mode: Transmit by 802.11n-HT40 at 2422MHz	



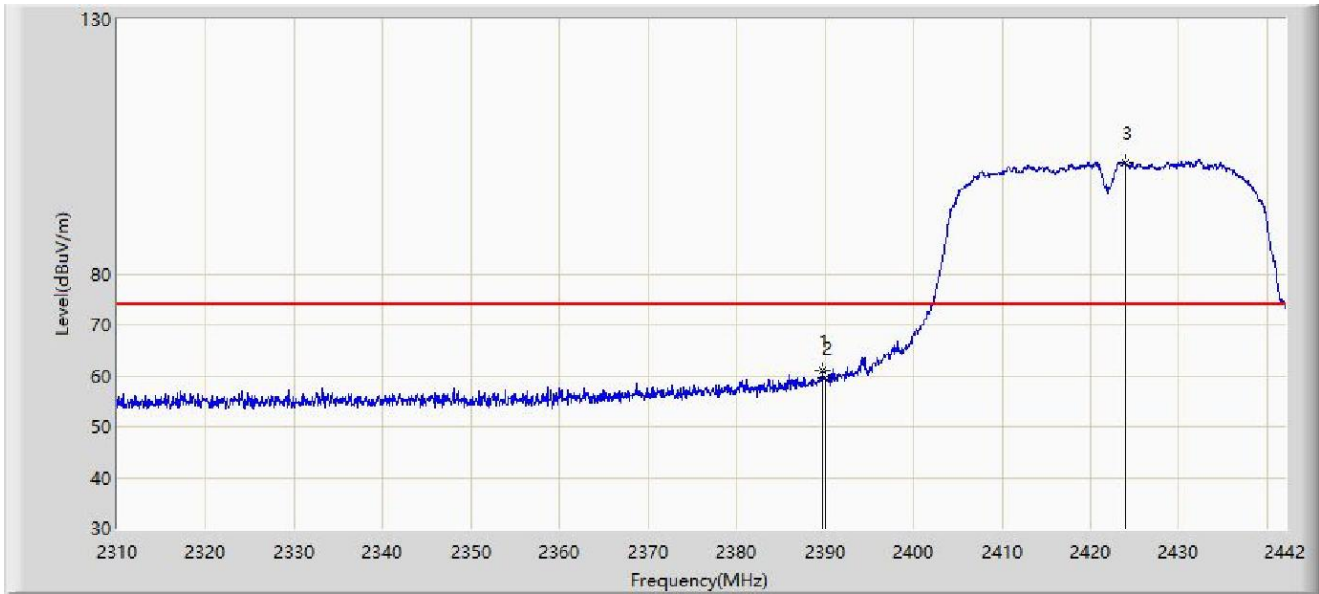
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2390.000	49.010	16.987	-4.990	54.000	32.023	AV
2		2411.574	93.013	60.968	N/A	N/A	32.045	AV

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

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

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

Site: SIP-AC3	Test Date: 2023-12-24
Limit: FCC_2.4G_RE(3m)	Engineer: Justin Guo
Probe: HF907_102861_1-18GHz	Polarity: Vertical
EUT: Smart Installation Tool	Power: By Battery
Test Mode: Transmit by 802.11n-HT40 at 2422MHz	



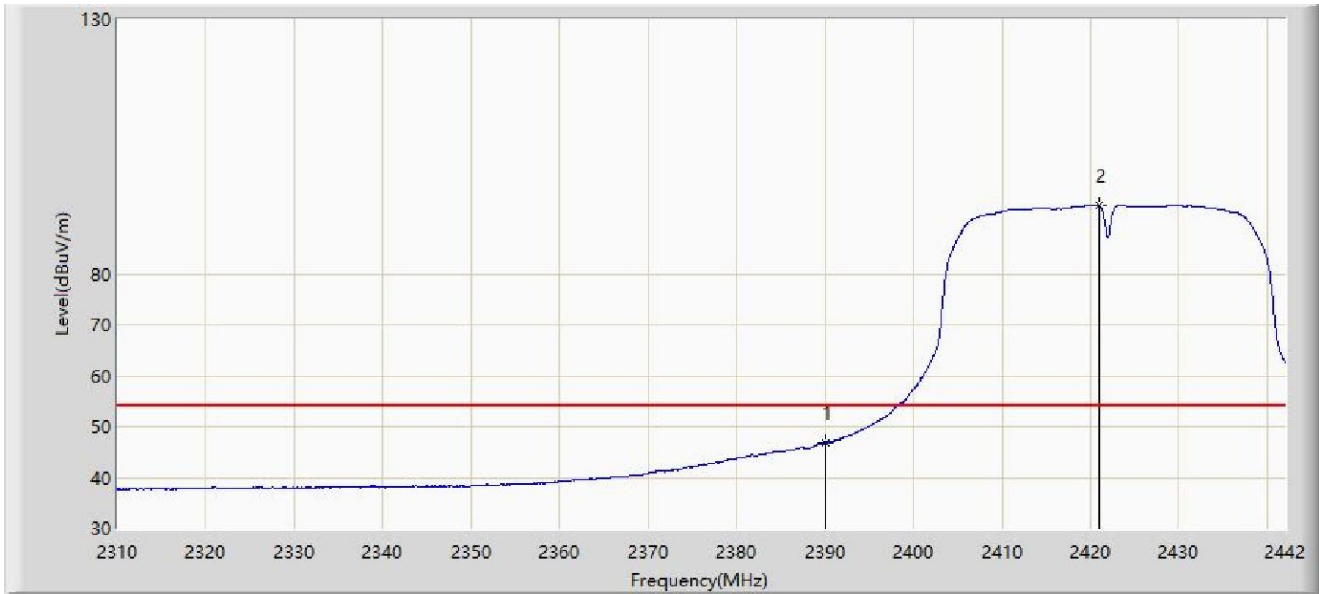
No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2389.662	61.037	29.015	-12.963	74.000	32.022	PK
2		2390.000	59.652	27.629	-14.348	74.000	32.023	PK
3		2424.048	101.987	69.941	N/A	N/A	32.046	PK

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

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

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

Site: SIP-AC3	Test Date: 2023-12-24
Limit: FCC_2.4G_RE(3m)	Engineer: Justin Guo
Probe: HF907_102861_1-18GHz	Polarity: Vertical
EUT: Smart Installation Tool	Power: By Battery
Test Mode: Transmit by 802.11n-HT40 at 2422MHz	



No	Mark	Frequency (MHz)	Measure Level (dB μ V/m)	Reading Level (dB μ V)	Margin (dB)	Limit (dB μ V/m)	Factor (dB/m)	Type
1	*	2390.000	46.851	14.828	-7.149	54.000	32.023	AV
2		2421.012	93.347	61.301	N/A	N/A	32.046	AV

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

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

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

Appendix B – Test Setup Photograph

Refer to “2311RSU070-UT” file.

Appendix C – EUT Photograph

Refer to “2311RSU070-UE” file.

_____ The End _____