

# **TEST REPORT**

Report No.	CISRR24121715706	
Project No.	CISR241217157	
FCC ID	2A49W-M2	
Applicant	Shenzhen Shengmai Electronics Co., Ltd.	
Address	4th Floor,Building 1,No. 34,Hezhou Road,Hezhou Community,Hangcheng Street,Baoan District,Shenzhen,China	
Manufacturer	Shenzhen Shengmai Electronics Co., Ltd.	
Address	4th Floor,Building 1,No. 34,Hezhou Road,Hezhou Community,Hangcheng Street,Baoan District,Shenzhen,China	
Product Name	Smart voice recorder	
Trade Mark	sumci sumci	
Model/Type reference	M2	
Listed Model(s)	D20, M20, R20, H20, E20, G20, D2, R2, H2, E2, G2	
Standard	47 CFR Part 15.247	
Test date	December 18, 2024 to December 24, 2024	
Issue date	December 26, 2024	
Test result	Complied	

Edward Womg

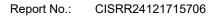
Prepared by: Edward Wang

GenryLong

Approved by: Genry Long

The test results relate only to the tested samples.

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# 1. <u>REPORT VERSION</u>

Version No.	Issue date	Description
00	December 26, 2024	Original

# 2. TEST DESCRIPTION

No.	Test Item	Standard Requirement	Result
1	Antenna Requirement	47 CFR 15.203	Pass
2	Conducted Emission at AC power line	47 CFR 15.207(a)	Pass
3	6dB Bandwidth	47 CFR 15.247(a)(2)	Pass
4	Maximum Conducted Output Power	47 CFR 15.247(b)(3)	Pass
5	Power Spectral Density	47 CFR 15.247(e)	Pass
6	Conducted band edge and spurious emission	47 CFR 15.247(d), 15.209, 15.205	Pass
7	Radiated band edge emission	47 CFR 15.247(d), 15.209, 15.205	Pass
8	Radiated Spurious Emission (below 1GHz)	47 CFR 15.247(d), 15.209, 15.205	Pass
9	Radiated Spurious Emission (Above 1GHz)	47 CFR 15.247(d), 15.209, 15.205	Pass

Note:

- The measurement uncertainty is not included in the test result.

## 3. SUMMARY

## 3.1. Product Description \*

Main unit information:		
Product Name:	Smart voice recorder	
Trade Mark:	sumai sumai	
Model No.:	M2	
Listed Model(s):	D20, M20, R20, H20, E20, G20, D2, R2, H2, E2, G2	
Model difference:	The series model is the same product, there are not any different in material or color changed, with only different model names due to marketing sales.	
Power supply:	DC 5V	
Hardware version:	V1.0	
Software version:	V1.0	
Accessory unit information:		
Battery information:	3.7V	

## 3.2. Radio Specification Description \*

Modulation type:	802.11b: DSSS(CCK, DQPSK, DBPSK); 802.11g/n(HT20) OFDM(BPSK, QPSK, 16QAM)
Operation frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz;
Channel number:	802.11b/g/n(HT20): 11 Channels;
Channel separation:	5MHz
Antenna type:	Chip Antenna
Antenna gain:	1.7dBi

Note:

1) \*: Since the above information is provided by the applicant relevant results or conclusions of this report are only made for these information, Bangce is not responsible for the authenticity, integrity and results of the information and/or the validity of the conclusion.

#### 3.3. Modification of EUT

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

#### 3.4. Deviation from standards

None

## 3.5. Testing Site

Laboratory Name	Shenzhen Bangce Testing Technology Co., Ltd.	
Laboratory Location	101, building 10, Yunli Intelligent Park, Shutianpu community, Matian Street, Guangming District, Shenzhen,Guangdong, China	
Contact information	Tel: 86-755-2319 6848, email: <u>service@cis-cn.net</u> Website: <u>http://www.cis-cn.net/</u>	
FCC registration number	736346	
FCC designation number	CN1372	

# 4. TEST CONFIGURATION

## 4.1. Test frequency list

Lowest Channel (LCH)	Middle Channel (MCH)	Highest Channel (HCH)
(MHz)	(MHz)	(MHz)
2412	2437	2462

## 4.2. Descriptions of test mode

No	Test mode	Description
TM1	802.11b mode	Keep the EUT in 802.11b transmitting mode at lowest, middle and highest channel.
TM2	802.11g mode	Keep the EUT in 802.11g transmitting mode at lowest, middle and highest channel.
ТМЗ	802.11n(HT20) mode	Keep the EUT in 802.11n(HT20) transmitting mode at lowest, middle and highest channel.
TM4	Link mode	Keep the EUT in WiFi linking mode with AE.
TM5	Charging mode	Keep the EUT in Charging mode with AE.

## 4.3. Support unit used in test configuration

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Item	Equipment name	Trade Name	Model No.
1	Adapter	Guangdong Sangu Technology Co. Itd	SG-0501000AU
2	Phone	Huawei	NZONE S7

## 4.4. Test sample information

Туре	Sample No.
Engineer sample	CISR241217157-S01
Normal sample	CISR241217157-S02

## 4.5. Environmental conditions

Туре	Requirement
Temperature:	15~35°C
Relative Humidity:	25~75%
Air Pressure:	860~1060mbar

## 4.6. Equipment Used during the Test

Condu	Conducted Emission at AC power line					
Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	EMI Test Receiver	Rohde&schwarz	ESCI7	100853	2024-01-08	2025-01-07
2	Artificial power network	Schwarzbeck	NSLK812 7	8127-01096	2024-01-08	2025-01-07
3	8-wire Impedance Stabilization Network	Schwarzbeck	NTFM 8158	8158-00337	2024-01-08	2025-01-07
4	Artificial power network	Schwarzbeck	ENV216	1	2024-01-08	2025-01-07

6dB Bandwidth Maximum Conducted Output Power Power Spectral Density Emissions in non-restricted frequency bands						
Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	MXG RF Signal Generator	Agilent	N5181A	MY50145362	2024-01-08	2025-01-07
2	Spectrum analyzer	R&S	FSV-40N	102130	2024-01-08	2025-01-07
3	Vector Signal Generator	Agilent	N5182A	MY50142364	2024-06-14	2025-06-13
4	Power Meter	WCS	WCS-PM	WCSPM23040 5A	2024-01-08	2025-01-07

Band edge emissions (Radiated) Emissions in frequency bands (below 1GHz) Emissions in frequency bands (above 1GHz)

Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	EMI Test Receiver	Rohde&schwarz	ESCI7	100853	2024-01-08	2025-01-07
2	Amplifier	Tonscend	TAP9K3G 40	AP23A806027 0	2024-01-08	2025-01-07
3	Prime amplifier	Tonscend	TAP0101 8050	AP23A806028 0	2024-01-08	2025-01-07
4	9*6*6 anechoic chamber	SKET	9.3*6.3*6	N/A	2024-09-02	2027-09-01
5	Spectrum analyzer	Agilent	N9020A	MY50530263	2024-01-08	2025-01-07
6	Spectrum analyzer	R&S	FSV-40N	102130	2024-01-08	2025-01-07
7	Bilog Antenna	Schwarzbeck	VULB 9163	1463	2023-01-09	2025-01-08
8	Horn Antenna	SCHWARZBECK	BBHA 9120 D	2487	2023-01-09	2025-01-08
9	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	/	2023-01-09	2025-01-08



10	RF Cable	Tonscend	Cable 1	1	2024-01-08	2025-01-07
11	RF Cable	Tonscend	Cable 2	1	2024-01-08	2025-01-07
12	RF Cable	SKET	Cable 3	1	2024-01-08	2025-01-07
13	L.I.S.N.#1	Schwarzbeck	NSLK812 7	/	2024-01-08	2025-01-07
14	L.I.S.N.#2	ROHDE&SCHWA RZ	ENV216	/	2024-01-08	2025-01-07
15	Horn Antenna	SCHWARZBECK	BBHA917 0	1130	2023-01-09	2025-01-08
16	Preamplifier	Tonscend	TAP1804 0048	AP21C806126	2024-01-08	2025-01-07
17	Variable-frequency power source	Pinhong	PH1110	/	2024-01-08	2025-01-07
18	6dB Attenuator	SKET	DC-6G	1	1	/
19	Antenna tower	SKT	Bk-4AT- BS	AT202104010 1-V1	2024-06-14	2025-06-13

# 5. TEST RESULTS

#### 5.1. Evaluation Results (Evaluation)

#### 5.1.1. Antenna Requirement

Test Requirement:	Refer to 47 CFR Part 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.
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#### 5.1.1.1. Test Result

Pass

#### 5.1.1.2. Conclusion:

The EUT antenna is Chip Antenna(1.7dBi), the directional gain of the antenna less than 6dBi. It comply with the standard requirement. In case of replacement of broken antenna the same antenna type must be used. Antenna structure please refer to the EUT internal photographs antenna photo.

## 5.2. Radio Spectrum Matter Test Results (RF)

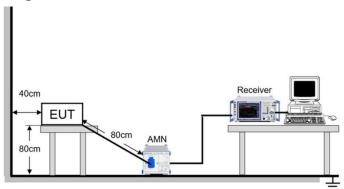
## 5.2.1. Conducted Emission at AC power line

Test Requirement:	Refer to 47 CFR 15.207(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 $\mu$ H/50 ohms line impedance stabilization network (LISN).					
	Frequency of emission (MHz)	Conducted limit (dBµV)				
		Quasi-peak	Average			
Test Limit:	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.					
Test Method:	ANSI C63.10-2020 section 6.2					
Procedure:	<ul> <li>ANSI C63.10-2020 section 6.2</li> <li>1. The EUT was setup according to ANSI C63.10 requirements.</li> <li>2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.</li> <li>3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.</li> <li>4. The peripheral devices are also connected to the main power through a LISN. (Refer to the block diagram of the test setup and photographs)</li> <li>5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.</li> <li>6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.</li> <li>7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.</li> </ul>					

## 5.2.1.1. E.U.T. Operation

Operating Environment:						
Temperature:	perature: 22.4 °C		Humidity:	55.6 %	Atmospheric Pressure:	103 kPa
Pre test mode:		TM5				
Final test mode:		TM5				

## 5.2.1.2. Test Setup Diagram

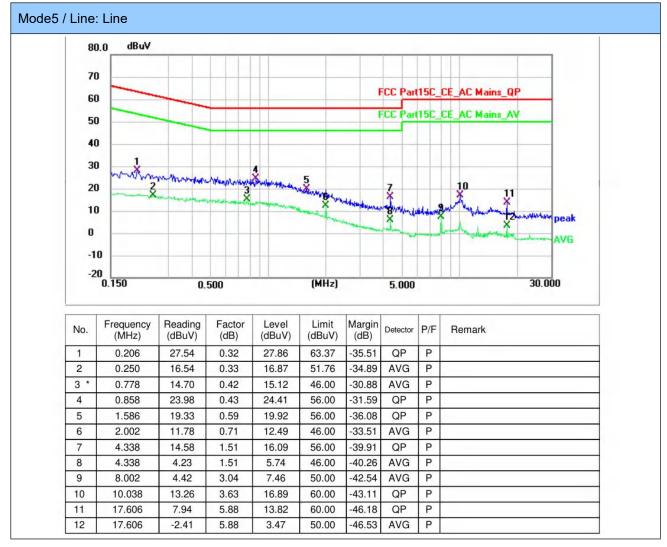


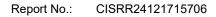


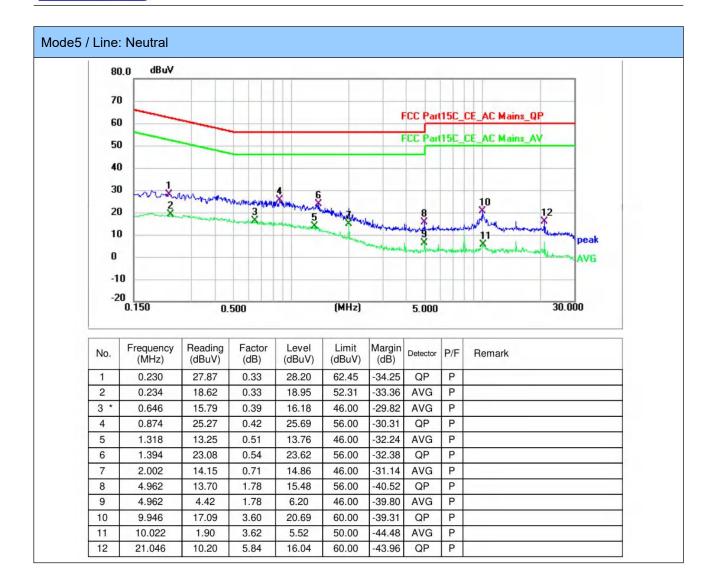
## 5.2.1.3. Test Result

Pass

## 5.2.1.4. Test Data







Note:

1). Result = Reading +Correct (Insertion Loss + Cable Loss + Attenuator Factor)

2). Margin = Result - Limit

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## 5.2.2. 6dB Bandwidth

Test Requirement:	47 CFR 15.247(a)(2)
Test Limit:	Refer to 47 CFR 15.247(a)(2), Systems using digital modulation techniques may operate in the 902-928 MHz, and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
Test Method:	ANSI C63.10-2020, section 11.8
Procedure:	11.8.1 Option 1 The steps for the first option are as follows: a) Set RBW = shall be in the range of 1% to 5% of the OBW but not less than 100 kHz. b) Set the VBW $\geq$ [3 × RBW]. c) Detector = peak. d) Trace mode = max-hold. e) Sweep = No faster than coupled (auto) time. f) Allow the trace to stabilize. g) Measure the maximum width of the emission by placing two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "-6 dB down amplitude". If a marker is below this "-6 dB down amplitude" value, then it shall be as close as possible to this value. 11.8.2 Option 2 The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e., RBW = 100 kHz, VBW $\geq$ 3 × RBW, and peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be $\geq$ 6 dB.

## 5.2.2.1. E.U.T. Operation

Operating Environment:						
Temperature:	22.4 °C	Humidity:	55.6 %	Atmospheric Pressure:	102 kPa	
Pre test mode:		TM1, TM2, TM3				
Final test mode:		TM1, TM2, TM3				

## 5.2.2.2. Test Setup Diagram



## 5.2.2.3. Test Result

Pass

## 5.2.2.4. Test Data



## 5.2.3. Maximum Conducted Output Power

Test Requirement:	47 CFR 15.247(b)(3)
Test Limit:	Refer to 47 CFR 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
Test Method:	ANSI C63.10-2020 section 11.9.1
Procedure:	ANSI C63.10-2020, section 11.9.1 Maximum peak conducted output power

## 5.2.3.1. E.U.T. Operation

Operating Environment:						
Temperature:	22.4 °C	C Humidity:	55.6 %	Atmospheric Pressure:	102 kPa	
Pre test mode:		TM1, TM2, TM3				
Final test mode:		TM1, TM2, TM3				

## 5.2.3.2. Test Setup Diagram



## 5.2.3.3. Test Result

Pass

#### 5.2.3.4. Test Data

## 5.2.4. Power Spectral Density

Test Requirement:	47 CFR 15.247(e)
Test Limit:	Refer to 47 CFR 15.247(e), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.
Test Method:	ANSI C63.10-2020, section 11.10
Procedure:	ANSI C63.10-2020, section 11.10, Maximum power spectral density level in the fundamental emission

## 5.2.4.1. E.U.T. Operation

Operating Environment:									
Temperature: 22.4 °C		Humidity:	55.6 %	Atmospheric Pressure:	102 kPa				
Pre test mode:		TM1, TM2, TM3							
Final test mode	e:	TM1, TM2, TM3							

## 5.2.4.2. Test Setup Diagram



## 5.2.4.3. Test Result

Pass

## 5.2.4.4. Test Data



## 5.2.5. Conducted band edge and spurious emission

Test Requirement:	47 CFR 15.247(d), 15.209, 15.205
Test Limit:	Refer to 47 CFR 15.247(d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required.
Test Method:	ANSI C63.10-2020 section 11.11
Procedure:	ANSI C63.10-2020 Section 11.11.1, Section 11.11.2, Section 11.11.3

## 5.2.5.1. E.U.T. Operation

Operating Environment:									
Temperature: 22.4 °C		Humidity:	55.6 %	Atmospheric Pressure:	102 kPa				
Pre test mode:		TM1, TM2, TM3							
Final test mode	e:	TM1, TM2, TM3							

## 5.2.5.2. Test Setup Diagram



#### 5.2.5.3. Test Result

Pass

#### 5.2.5.4. Test Data

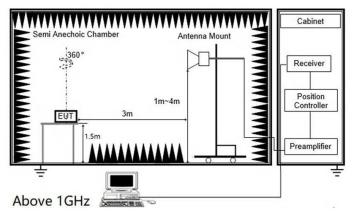
# 5.2.6. Radiated band edge emission

Test Requirement:	Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`					
	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)			
	0.009-0.490	2400/F(kHz)	300			
	0.490-1.705	24000/F(kHz)	30			
	1.705-30.0	30	30			
	30-88	100 **	3			
	88-216	150 **	3			
<b>T</b>	216-960	200 **	3			
Test Limit:	Above 960	500	3			
	<ul> <li>these frequency bands is permitted under other sections of this part, e.g., §§</li> <li>15.231 and 15.241.</li> <li>In the emission table above, the tighter limit applies at the band edges.</li> <li>The emission limits shown in the above table are based on measurements</li> <li>employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz,</li> <li>110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands</li> <li>are based on measurements employing an average detector.</li> </ul>					
Test Method:	ANSI C63.10-2020 section	6.10				
Procedure:	<ol> <li>EUT was setup and tested according to ANSI C63.10 .</li> <li>The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.</li> <li>The EUT waspositioned such that the distance from antenna to the EUT was 3 meters.</li> <li>The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This repeated for both horizontal and vertical polarization of the antenna. In order to find themaximum emission, all of the interface cables were manipulated according to ANSI C63.10 on radiated measurement.</li> <li>Use the following spectrum analyzer settings:         <ul> <li>Span shall wide enough to fully capture the emission being measured</li> <li>Set RBW=1MHz, VBW=3MHz for &gt;1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement</li> <li>For average measurement: use duty cycle correction factor method (DCCF), Averager level = Peak level + DCCF</li> </ul> </li> </ol>					

## 5.2.6.1. E.U.T. Operation

Operating Environment:										
Temperature: 22.2 °C		Humidity:	55.1 %	Atmospheric Pressure:	102 kPa					
Pre test mode:		TM1, TM2, TM3								
Final test mode	e:	TM1, TM2, TM3								

## 5.2.6.2. Test Setup Diagram



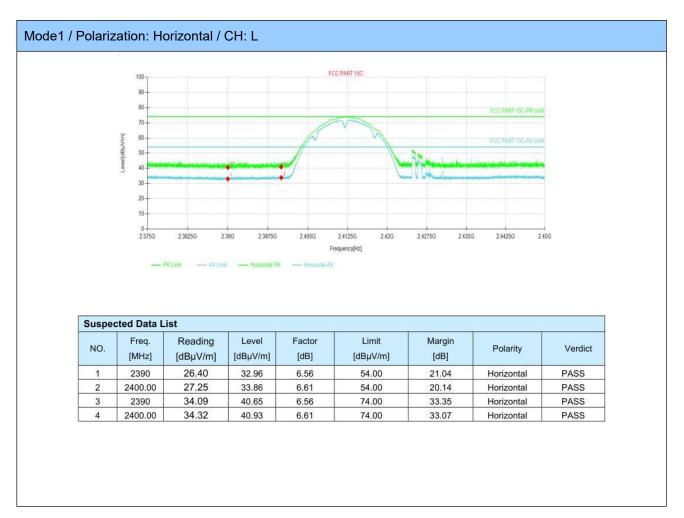
## 5.2.6.3. Test Result

Pass



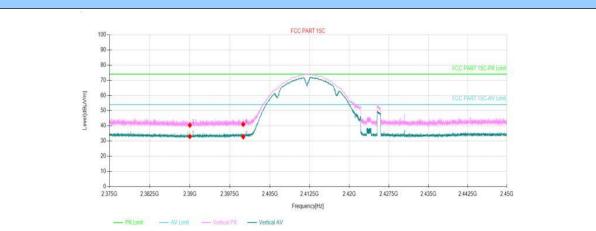
#### 5.2.6.4. Test Data

Have pre-scan all test mode, found 802.11b which it was worst case, so only show the worst case's data on this report.





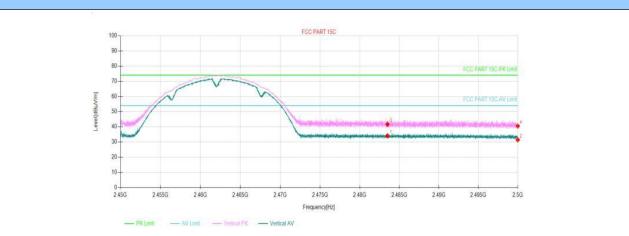
#### Mode1 / Polarization: Vertical / CH: L



NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Polarity	Verdict
1	2390	26.39	32.95	6.56	54.00	21.05	Vertical	PASS
2	2400.00	26.12	32.73	6.61	54.00	21.27	Vertical	PASS
3	2390	33.84	40.40	6.56	74.00	33.60	Vertical	PASS
4	2400.00	34.38	40.99	6.61	74.00	33.01	Vertical	PASS



## Mode1 / Polarization: Horizontal / CH: H



NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Polarity	Verdict
1	2483.5	27.48	34.04	6.56	54.00	19.96	Vertical	PASS
2	2500	24.88	31.43	6.55	54.00	22.57	Vertical	PASS
3	2483.5	35.09	41.65	6.56	74.00	32.35	Vertical	PASS
4	2500	33.98	40.53	6.55	74.00	33.47	Vertical	PASS



#### Mode1 / Polarization: Vertical / CH: H



NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Polarity	Verdict
1	2483.5	28.27	34.83	6.56	54.00	19.17	Horizontal	PASS
2	2500	27.33	33.88	6.55	54.00	20.12	Horizontal	PASS
3	2483.5	37.17	43.73	6.56	74.00	30.27	Horizontal	PASS
4	2500	33.59	40.14	6.55	74.00	33.86	Horizontal	PASS



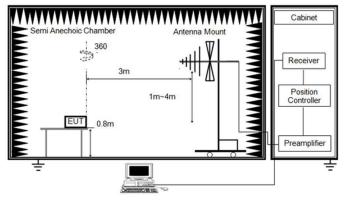
# 5.2.7. Radiated Spurious Emission (below 1GHz)

Test Requirement:	Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).					
	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)			
	0.009-0.490	2400/F(kHz)	300			
	0.490-1.705	24000/F(kHz)	30			
	1.705-30.0	30	30			
	30-88	100 **	3			
	88-216	150 **	3			
To at Lingity	216-960	200 **	3			
Test Limit:	Above 960	500	3			
	54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241. In the emission table above, the tighter limit applies at the band edges. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.					
Test Method:	ANSI C63.10-2020 section 6.6.4					
Procedure:						

## 5.2.7.1. E.U.T. Operation

Operating Environment:									
Temperature: 22.2 °C		Humidity:	55.1 %	Atmospheric Pressure:	102 kPa				
Pre test mode:		TM1, TM2, TM3,	TM4, TM5						
Final test mode	e:	TM1, TM2, TM3, <sup>-</sup>	TM4, TM5						

## 5.2.7.2. Test Setup Diagram



Below 1 GHz and above 30 MHz

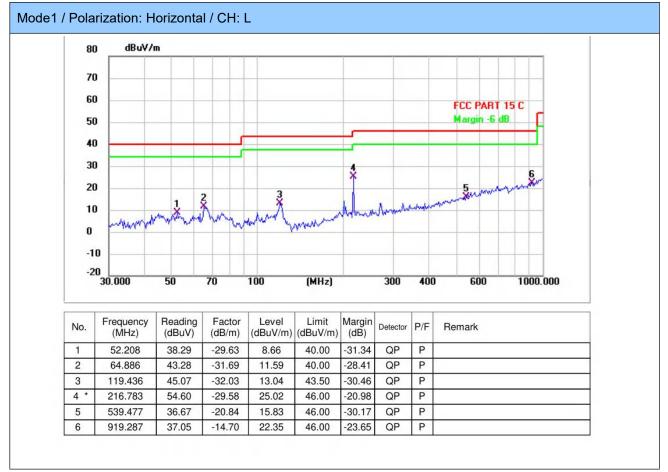
## 5.2.7.3. Test Result

Pass

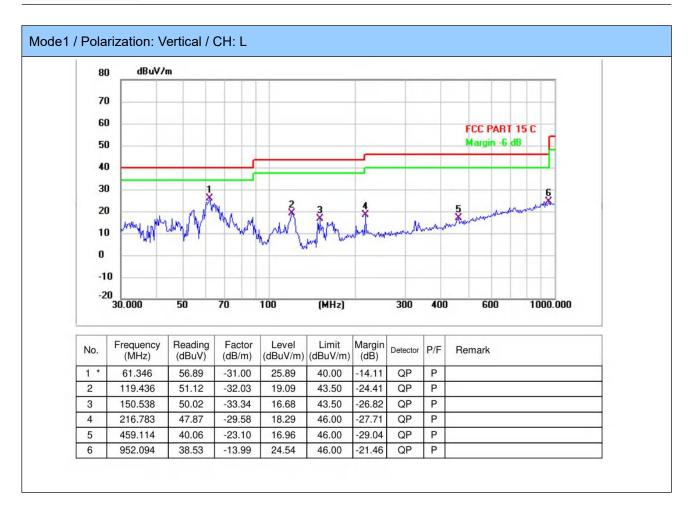


## 5.2.7.4. Test Data

3.Have pre-scan all test channel, found CH1(802.11b) which it was worst case, so only show the worst case' s data on this report.







Note:

1) For 9 kHz ~ 30 MHz Measurement

The EUT was pre-scanned this frequency band, found the radiated level 20dB lower than the limit, so don't show data on this report.

2) Level= Reading + Factor; Factor = Antenna Factor+ Cable Loss- Preamp Factor

3) Margin = Limit – Level



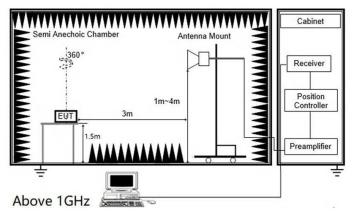
# 5.2.8. Radiated Spurious Emission (Above 1GHz)

Test Requirement:	In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).					
	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)			
	0.009-0.490	2400/F(kHz)	300			
	0.490-1.705	24000/F(kHz)	30			
	1.705-30.0	30	30			
	30-88	100 **	3			
	88-216	150 **	3			
Test Limit:	216-960	200 **	3			
Test Limit.	Above 960	500	3			
	54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241. In the emission table above, the tighter limit applies at the band edges. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.					
Test Method:	ANSI C63.10-2020 sectio	n 6.6.4				
Procedure:	<ul> <li>ANSI C63.10-2020 section 6.6.4</li> <li>1. The EUT was setup and tested according to ANSI C63.10.</li> <li>2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.</li> <li>3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.</li> <li>4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.</li> <li>5. Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>6. Use the following spectrum analyzer settings <ul> <li>a) Span shall wide enough to fully capture the emission being measured;</li> <li>b) Set RBW=1MHz, VBW=3MHz for &gt;1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement</li> <li>For average measurement: use duty cycle correction factor method (DCCF)Averager level = Peak level + DCCF</li> </ul> </li> </ul>					

## 5.2.8.1. E.U.T. Operation

Operating Environment:										
Temperature: 22.2 °C		;	Humidity:	55.1 %	Atmospheric Pressure:	102 kPa				
Pre test mode: TM1, T			1, TM2, TM3, T	FM4, TM5						
Final test mode:			1, TM2, TM3, T	FM4, TM5						

## 5.2.8.2. Test Setup Diagram



## 5.2.8.3. Test Result

Pass



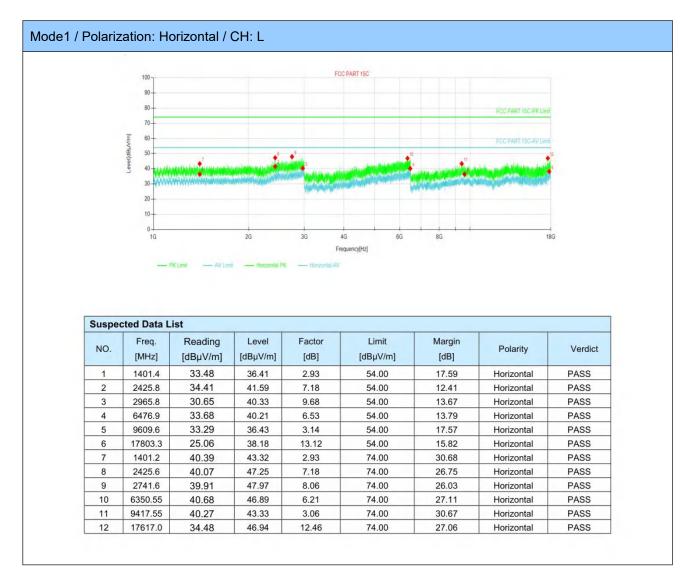
#### 5.2.8.4. Test Data

Note:

1. In order to prevent the amplifier from saturating, we add a band-stop filter that filters out the main frequency.

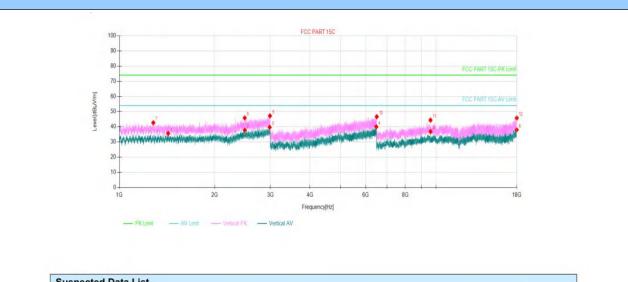
2.18GHz-25GHz is the background of the site, there is no radiated spurious.

3.Have pre-scan all test mode, found 802.11b which it was worst case, so only show the worst case's data on this report.





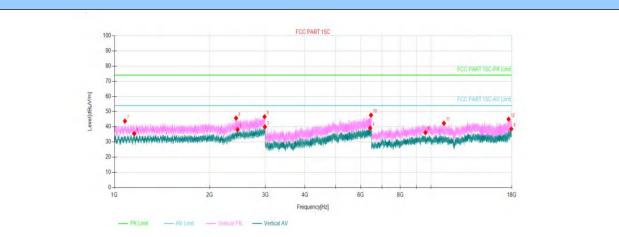
#### Mode1 / Polarization: Vertical / CH: L



NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Polarity	Verdict
1	1426.2	32.57	35.58	3.01	54.00	18.42	Vertical	PASS
2	2489.2	30.11	37.77	7.66	54.00	16.23	Vertical	PASS
3	2983.4	29.84	39.67	9.83	54.00	14.33	Vertical	PASS
4	6480.4	33.47	40.00	6.53	54.00	14.00	Vertical	PASS
5	9609.6	33.72	36.86	3.14	54.00	17.14	Vertical	PASS
6	17997.7	24.49	38.01	13.52	54.00	15.99	Vertical	PASS
7	1280	40.38	42.66	2.28	74.00	31.34	Vertical	PASS
8	2488.6	38.16	45.81	7.65	74.00	28.19	Vertical	PASS
9	2990	37.32	47.21	9.89	74.00	26.79	Vertical	PASS
10	6498.95	40.13	46.66	6.53	74.00	27.34	Vertical	PASS
11	9608.45	41.25	44.39	3.14	74.00	29.61	Vertical	PASS
12	18000	32.28	45.81	13.53	74.00	28.19	Vertical	PASS



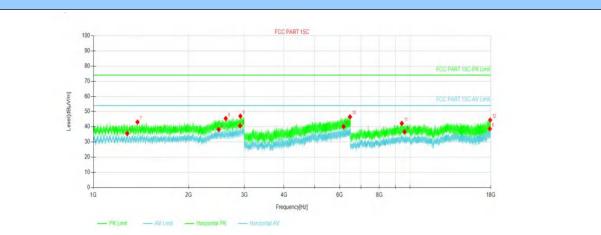
#### Mode1 / Polarization: Horizontal / CH: M



NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Polarity	Verdict
1	1156.2	34.00	35.47	1.47	54.00	18.53	Vertical	PASS
2	2450.6	30.75	38.12	7.37	54.00	15.88	Vertical	PASS
3	2988.4	30.06	39.93	9.87	54.00	14.07	Vertical	PASS
4	6426.15	32.62	39.15	6.53	54.00	14.85	Vertical	PASS
5	9609.6	33.05	36.19	3.14	54.00	17.81	Vertical	PASS
6	17943.6	25.40	38.57	13.17	54.00	15.43	Vertical	PASS
7	1080	42.91	43.76	0.85	74.00	30.24	Vertical	PASS
8	2423.8	38.54	45.71	7.17	74.00	28.29	Vertical	PASS
9	2982	36.83	46.65	9.82	74.00	27.35	Vertical	PASS
10	6465.35	41.14	47.67	6.53	74.00	26.33	Vertical	PASS
11	10988.4	37.74	42.30	4.56	74.00	31.70	Vertical	PASS
12	17590.6	32.64	45.00	12.36	74.00	29.00	Vertical	PASS



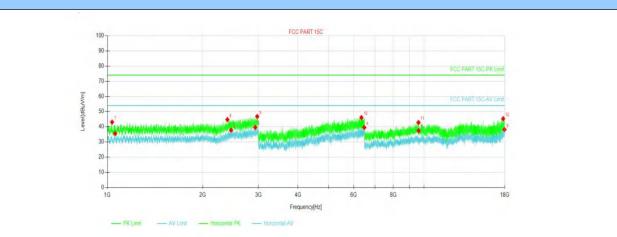
#### Mode1 / Polarization: Vertical / CH: M



NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Polarity	Verdict
1	1279.6	33.28	35.56	2.28	54.00	18.44	Horizontal	PASS
2	2489.2	30.54	38.20	7.66	54.00	15.80	Horizontal	PASS
3	2907	31.43	40.61	9.18	54.00	13.39	Horizontal	PASS
4	6169.6	34.57	40.13	5.56	54.00	13.87	Horizontal	PASS
5	9609.6	33.56	36.70	3.14	54.00	17.30	Horizontal	PASS
6	17889.6	25.76	38.68	12.92	54.00	15.32	Horizontal	PASS
7	1378.6	40.30	43.12	2.82	74.00	30.88	Horizontal	PASS
8	2618.8	38.12	45.48	7.36	74.00	28.52	Horizontal	PASS
9	2913.6	37.79	47.03	9.24	74.00	26.97	Horizontal	PASS
10	6465.35	40.04	46.57	6.53	74.00	27.43	Horizontal	PASS
11	9425.6	39.19	42.26	3.07	74.00	31.74	Horizontal	PASS
12	17921.8	31.41	44.44	13.03	74.00	29.56	Horizontal	PASS



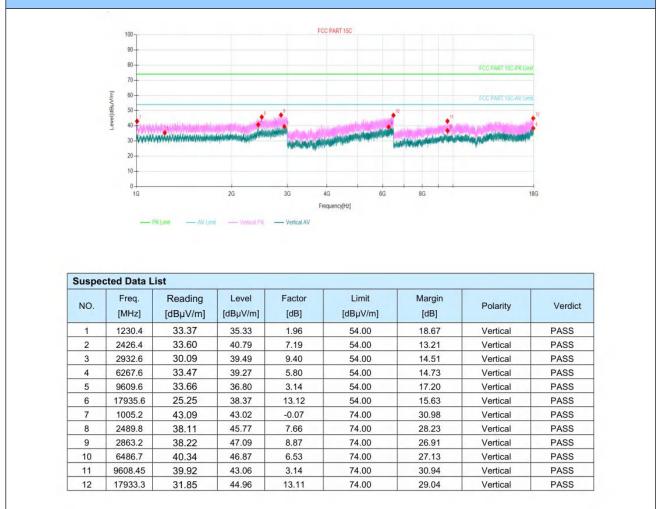
#### Mode1 / Polarization: Horizontal / CH: H



NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Polarity	Verdict
1	1058.2	34.97	35.55	0.58	54.00	18.45	Horizontal	PASS
2	2459.2	30.29	37.72	7.43	54.00	16.28	Horizontal	PASS
3	2931.8	30.19	39.58	9.39	54.00	14.42	Horizontal	PASS
4	6480.75	33.00	39.53	6.53	54.00	14.47	Horizontal	PASS
5	9609.6	34.25	37.39	3.14	54.00	16.61	Horizontal	PASS
6	17965.5	24.85	38.16	13.31	54.00	15.84	Horizontal	PASS
7	1035.2	42.78	43.08	0.30	74.00	30.92	Horizontal	PASS
8	2394	37.77	44.73	6.96	74.00	29.27	Horizontal	PASS
9	2975.2	37.02	46.78	9.76	74.00	27.22	Horizontal	PASS
10	6345.65	39.88	46.06	6.18	74.00	27.94	Horizontal	PASS
11	9607.3	39.67	42.81	3.14	74.00	31.19	Horizontal	PASS
12	17798.7	32.21	45.33	13.12	74.00	28.67	Horizontal	PASS



#### Mode1 / Polarization: Vertical / CH: H



Note:

1) Level= Reading + Factor; Factor = Antenna Factor+ Cable Loss- Preamp Factor

2) Margin = Limit – Level

3) Average measurement was not performed if peak level is lower than average limit (54dBuV/m) for above 1GHz.

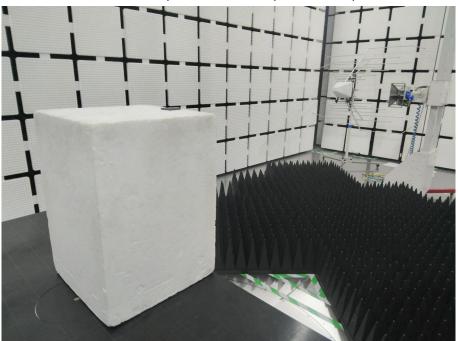


# 6. TEST SETUP PHOTOS

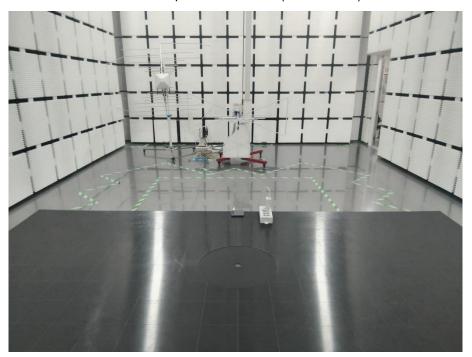


Conducted Emission at AC power line

Radiated band edge emission Radiated Spurious Emission (Above 1GHz)







Radiated Spurious Emission (below 1GHz)

7. Appendix Report



# **Appendix Report**

Report No.: CISRR24121715706

Test Engineer:

Mark Fu

Rory Huang

Supervised by:

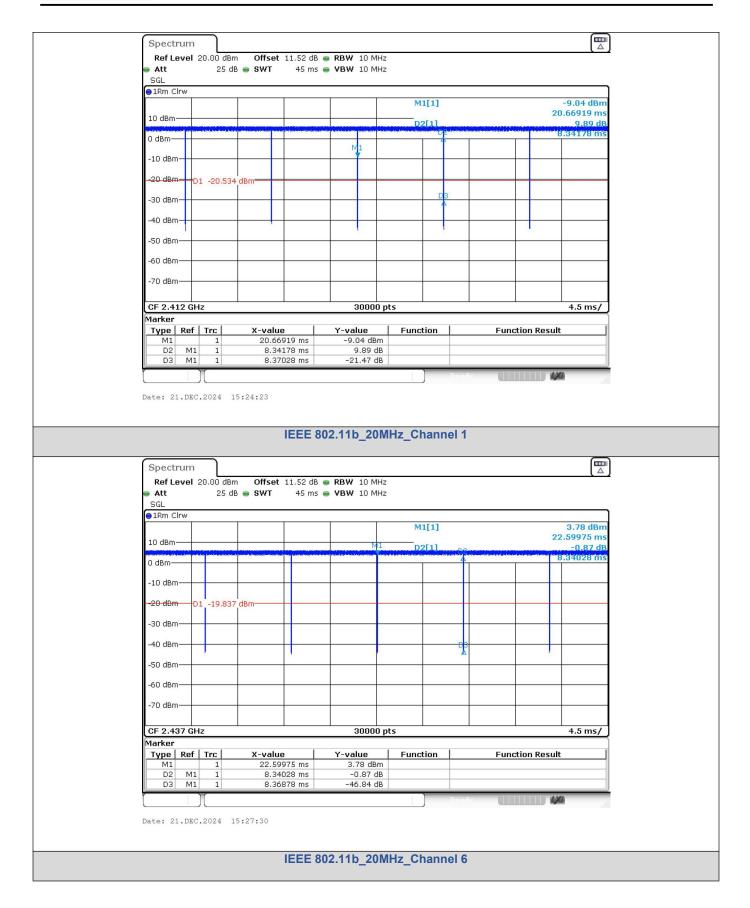


# **Duty Cycle**

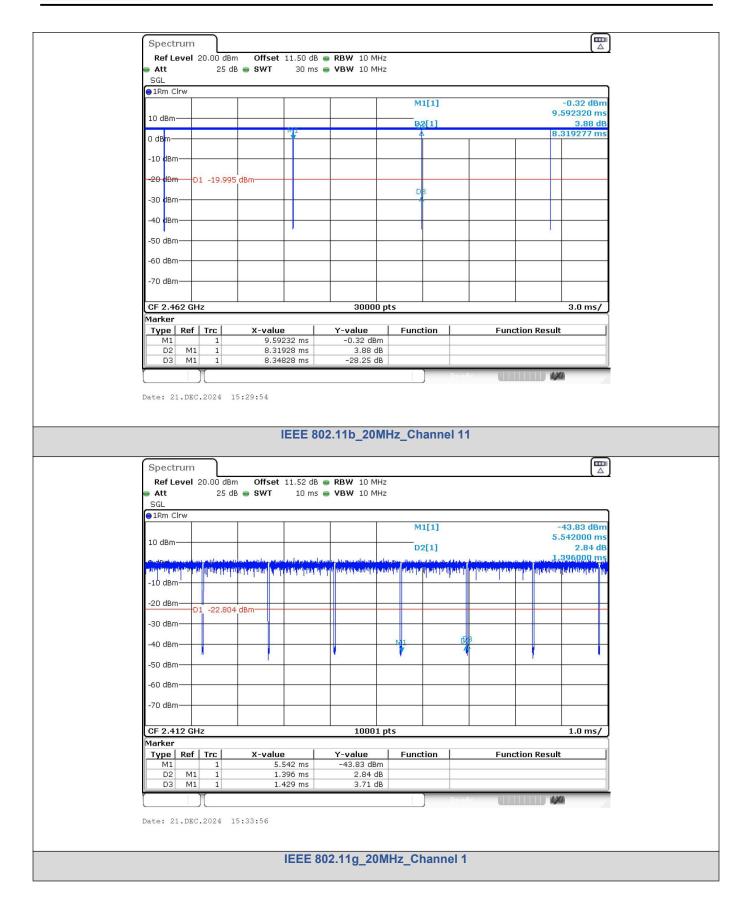
#### **Test Result**

Mode	Data rates	Channel	Antenna	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle (linear)	Duty Cycle Factor (dB)	1/T
	. 1	1	1	8.342	8.370	99.66	0.9966	0.0148	0.1199
IEEE 802.11b		6		8.340	8.369	99.66	0.9966	0.0148	0.1199
		11		8.319	8.348	99.65	0.9965	0.0152	0.1202
		1		1.396	1.429	97.69	0.9769	0.1015	0.7163
IEEE 802.11g		6		1.396	1.429	97.69	0.9769	0.1015	0.7163
		11		1.396	1.429	97.69	0.9769	0.1015	0.7163
IEEE 802.11n_20	MCS 0	1		1.304	1.337	97.53	0.9753	0.1086	0.7669
		6		1.304	1.337	97.53	0.9753	0.1086	0.7669
		11		1.304	1.337	97.53	0.9753	0.1086	0.7669

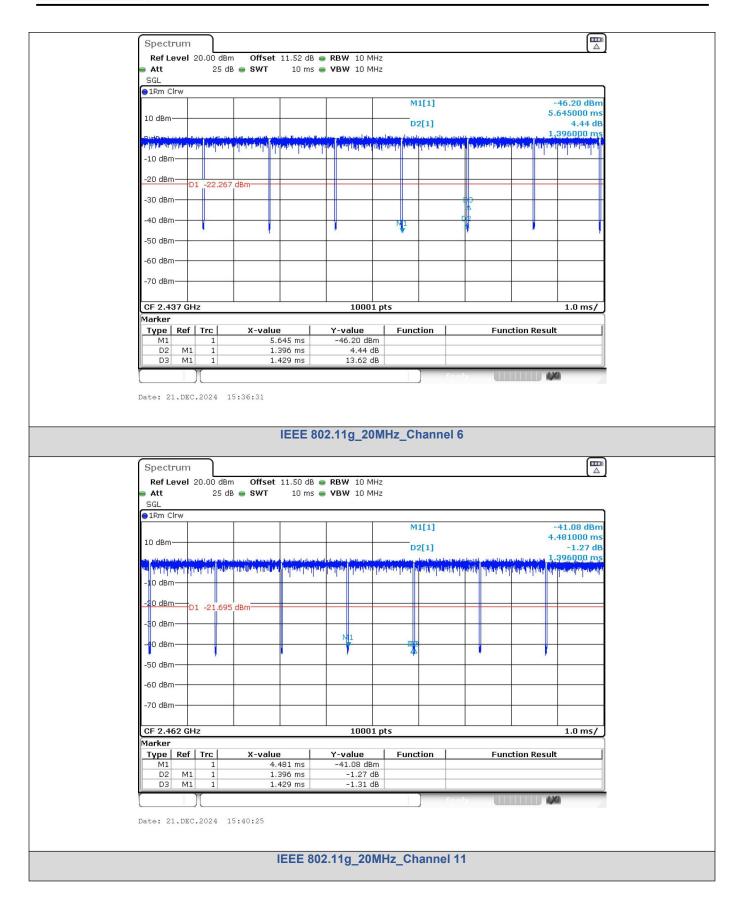




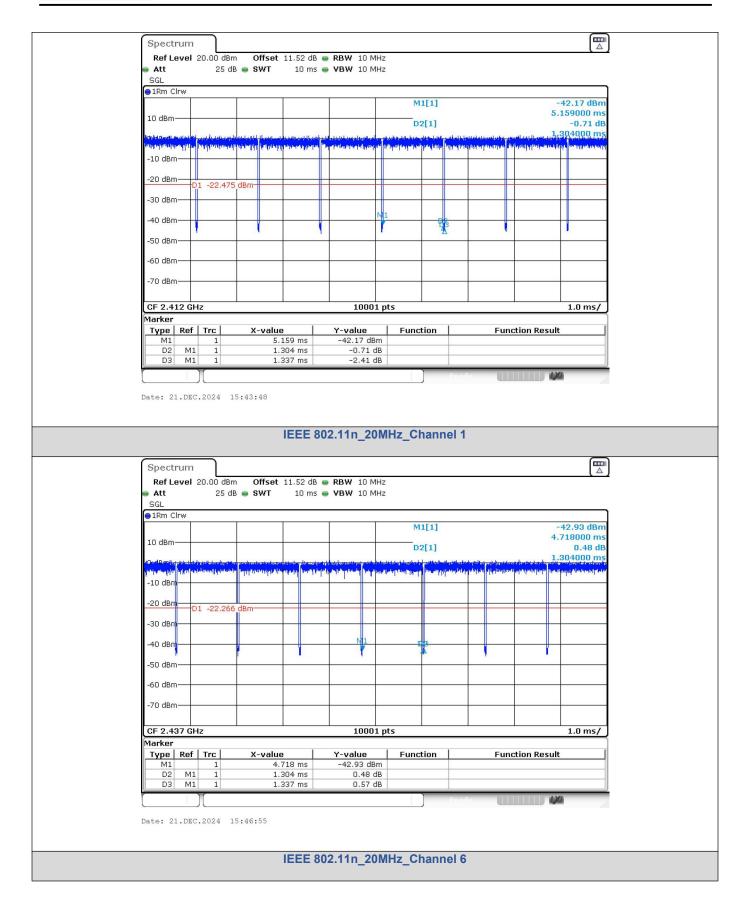




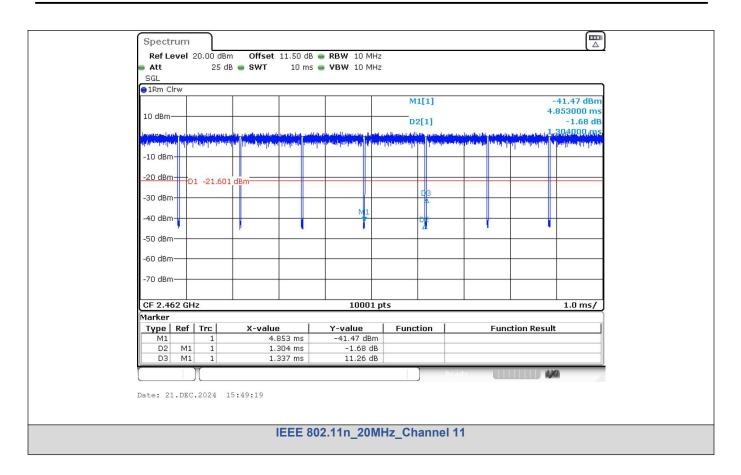










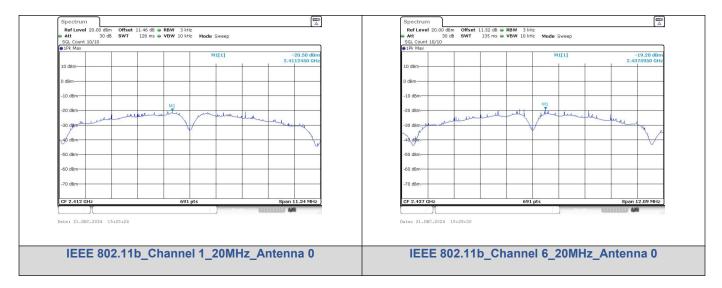




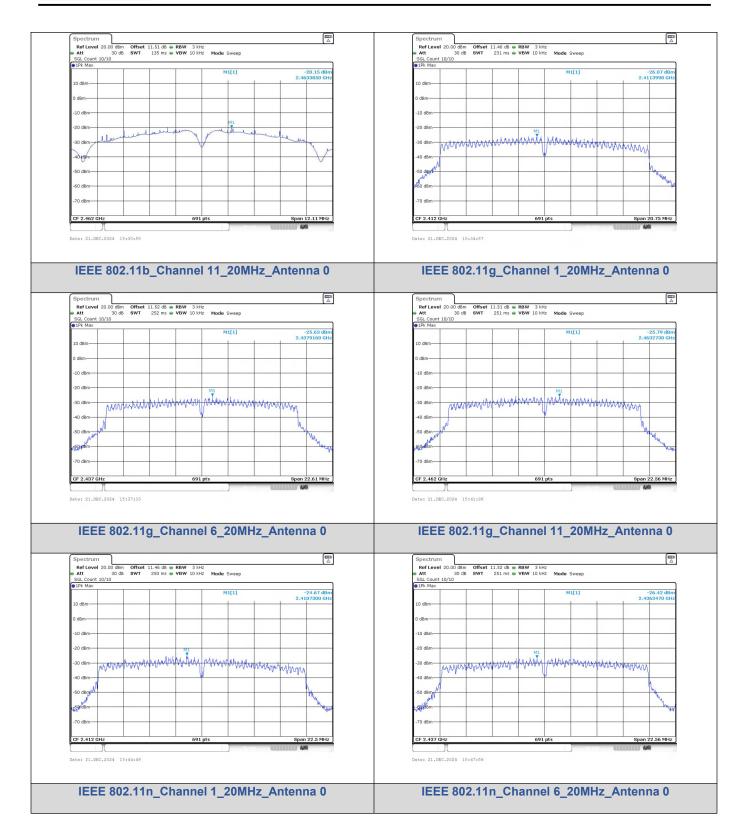
# **Power Spectral Density**

## **Test Result**

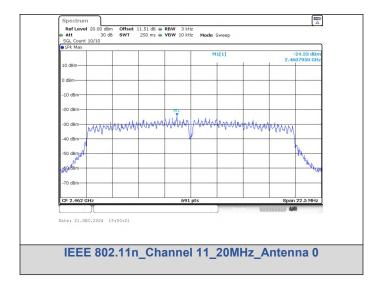
Mode	Channel	PSD (dBm/3kHz) Ant. 0	Limit (dBm/3kHz)	Result
	1	-20.500		PASS
IEEE 802.11b	6	-19.200		PASS
	11	-20.150		PASS
	1	-26.070		PASS
IEEE 802.11g	6	-25.630	≤8	PASS
	11	-25.790		PASS
	1	-24.670		PASS
IEEE 802.11n_20	6	-26.420		PASS
	11	-24.330		PASS













# **Conducted Output Power**

## Test Result

## Conducted Output Power

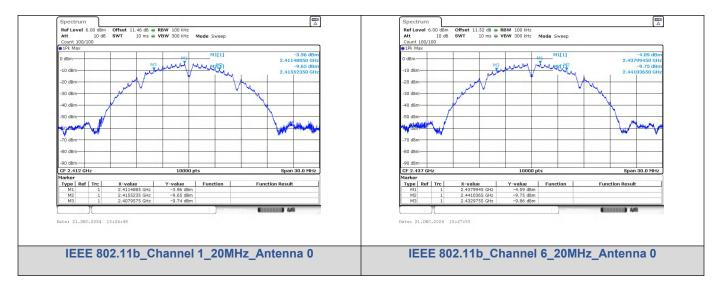
Mode	Channel	Ant. 0 (dBm)	Limit (dBm)	Result
	1	8.16	≤30	PASS
IEEE 802.11b	6	8.11	≤30	PASS
	11	8.35	≤30	PASS
	1	8.60	≤30	PASS
IEEE 802.11g	6	8.17	≤30	PASS
	11	8.97	≤30	PASS
	1	8.27	≤30	PASS
IEEE 802.11n_20	6	8.11	≤30	PASS
	11	8.72	≤30	PASS



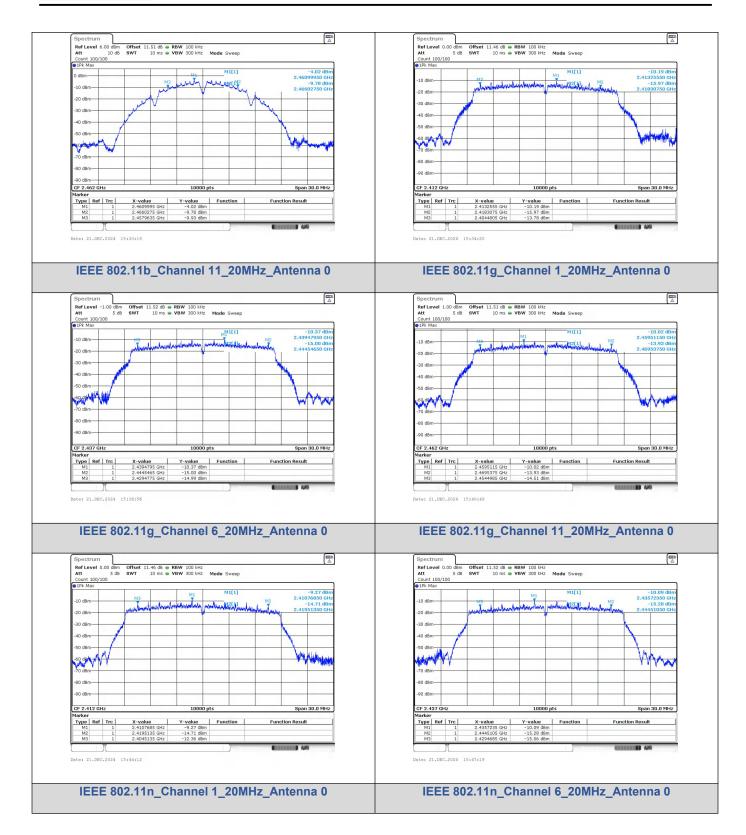
## 6dB Bandwidth

#### **Test Result**

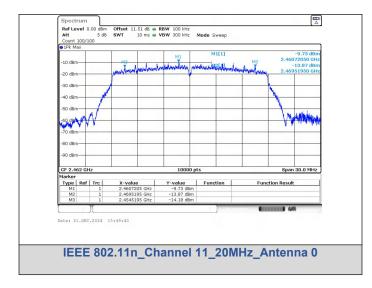
Mode	Channel	Ant.	Center Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)	Result
	1		2412	7.560		PASS
IEEE 802.11b	6		2437	8.060		PASS
	11		2462	8.070		PASS
	1		2412	13.83		PASS
IEEE 802.11g	6	0	2437	15.07	≥0.5	PASS
	11		2462	15.04		PASS
IEEE 802.11n_20	1		2412	15.00		PASS
	6		2437	15.04		PASS
	11		2462	15.00		PASS











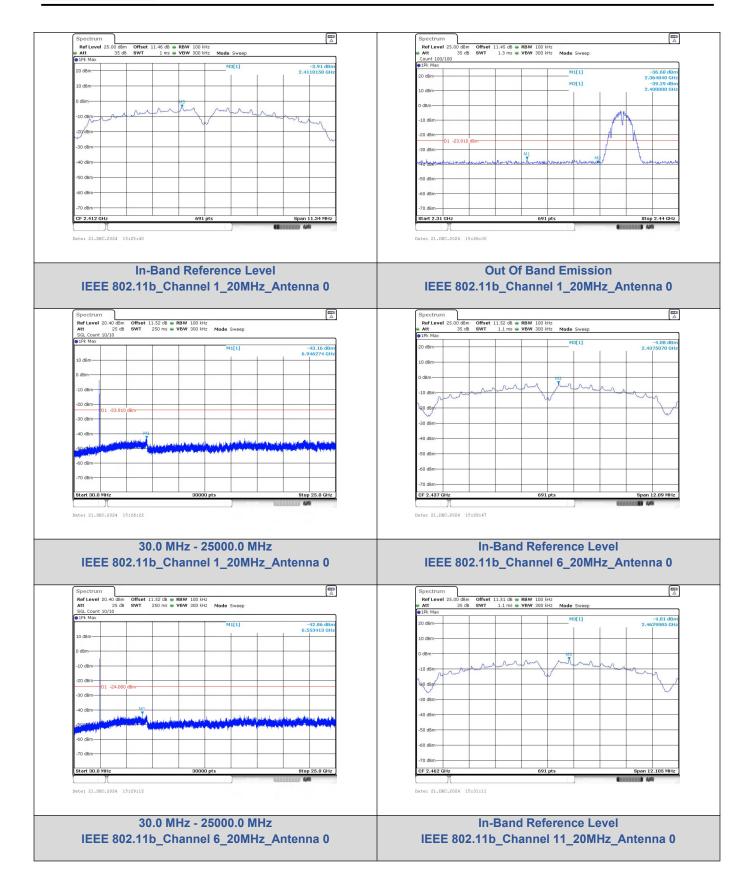


# **Conducted Out Of Band Emission**

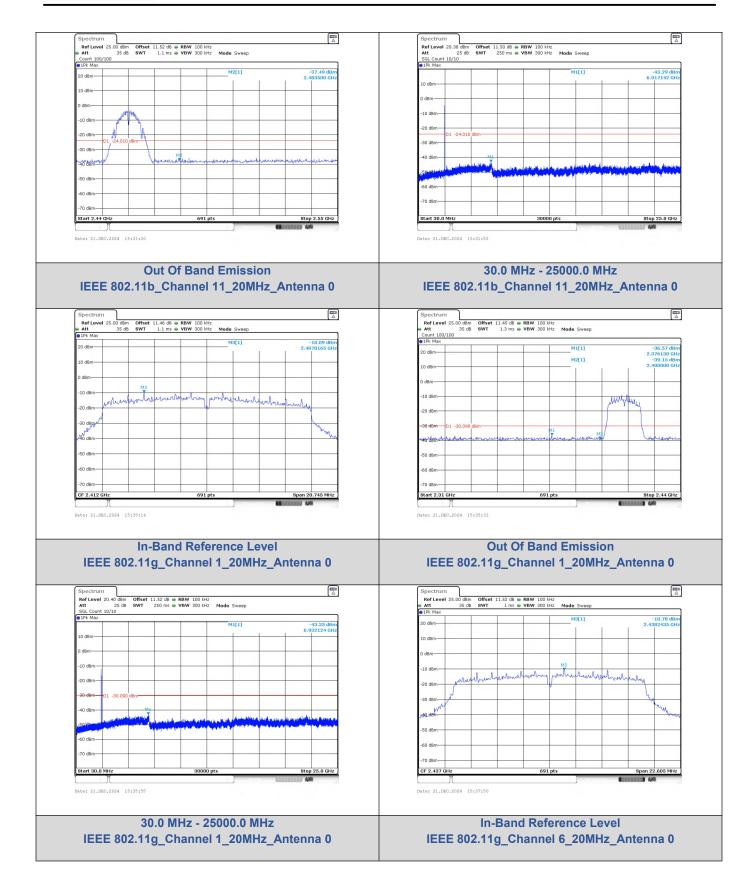
#### **Test Result**

Mode	Channel	Ant.	OOB Emission Frequency (MHz)	OOB Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result
			2364.84	-36.683	-23.91	-12.773	PASS
	1		2400.00	-39.290	-23.91	-15.380	PASS
IEEE			6946.30	-43.160	-23.91	-19.250	PASS
802.11b	6	0	6553.41	-42.862	-24.08	-18.782	PASS
	11		2483.50	-37.490	-24.01	-13.480	PASS
			6917.14	-43.286	-24.01	-19.276	PASS
	1		2376.13	-36.574	-30.09	-6.484	PASS
			2400.00	-39.150	-30.09	-9.060	PASS
IEEE			6932.10	-43.333	-30.09	-13.243	PASS
802.11g	6		6975.41	-42.536	-30.78	-11.756	PASS
	11		2483.50	-38.050	-29.56	-8.490	PASS
			21967.4	-43.362	-29.56	-13.802	PASS
	1		2386.10	-37.001	-30.16	-6.841	PASS
IEEE 802.11n_20			2400.00	-38.630	-30.16	-8.470	PASS
			6814.80	-42.708	-30.16	-12.548	PASS
	6		6893.00	-43.571	-30.22	-13.351	PASS
	11		2483.50	-37.810	-29.91	-7.900	PASS
			6817.26	-42.593	-29.91	-12.683	PASS

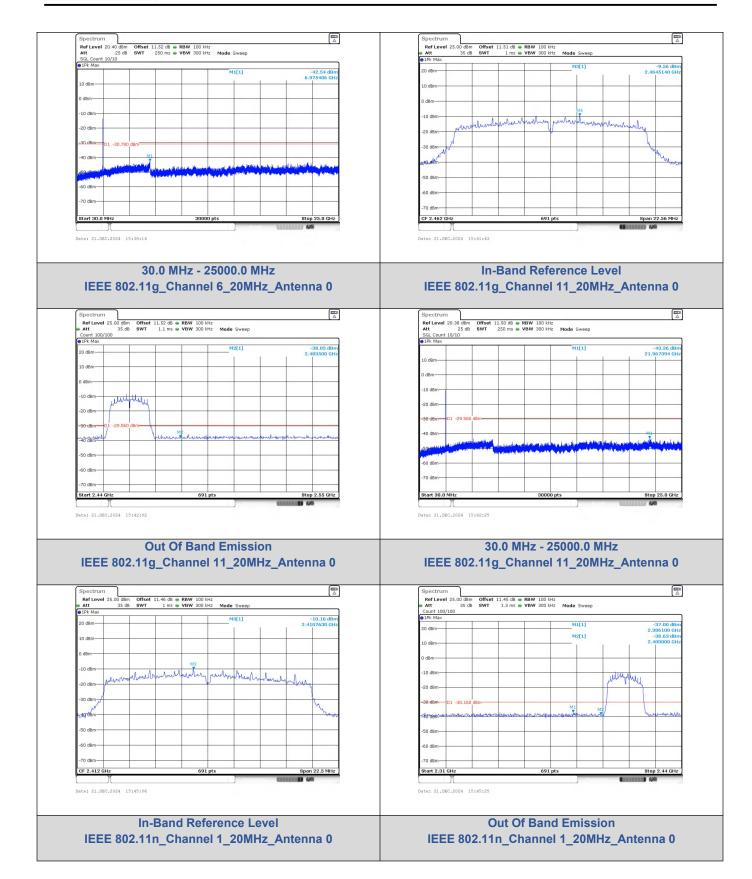




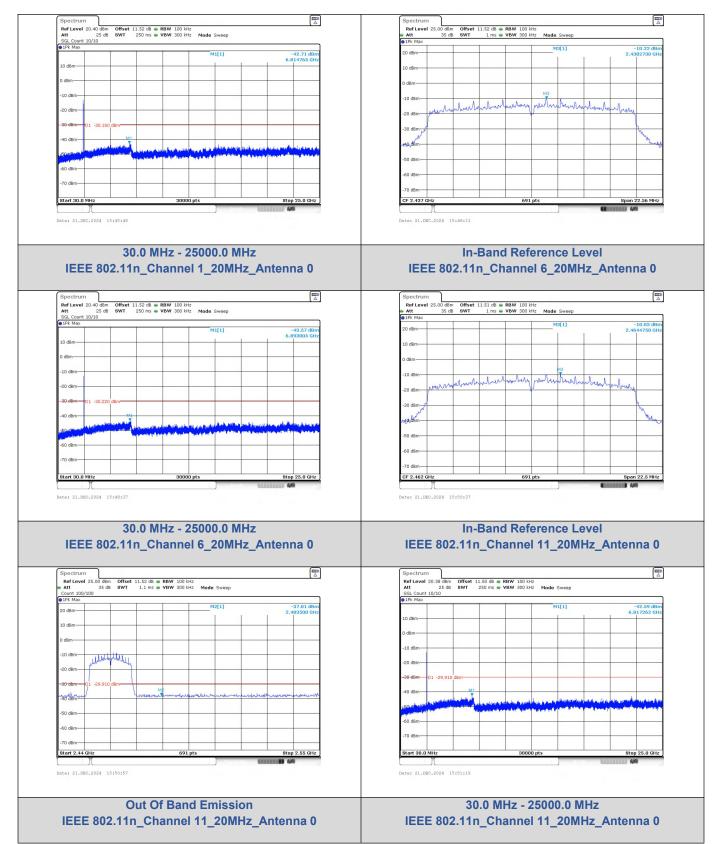












-----End of the report-----