



# Shenzhen HTT Technology Co., Ltd.

## TEST REPORT

### FCC PART 15.247 RSS 247 Issue 2, February 2017

Report Reference No.....: HTT202310621F01  
IC.....: 31565-HT013B001  
FCC ID.....: 2BDGB-HT013B001

Compiled by  
( position+printed name+signature) : File administrators

Supervised by  
( position+printed name+signature) : Project Engineer

Approved by  
( position+printed name+signature) : RF Manager

Date of issue .....: Nov,03,2023

*Heber He*

*Bruce Zhu*

*Kevin Tang*



Testing Laboratory Name .....: **Shenzhen HTT Technology Co.,Ltd.**

Address.....: 1F, Building B, Huafeng International Robotics Industrial Park,  
Hangcheng Road, Nanchang Community, Xixiang Street, Bao'an  
District, Shenzhen, Guangdong, China

Applicant's name.....: **Shenzhen Inspiration of Tea Technology Co., Ltd.**

Address .....: NO.1108-1, Main Tower, Marine Center, NO.59 LinHai Ave,  
Qianhai Shenzhen and HongKong Cooperation District, Shenzhen

Test specification .....:

**FCC PART 15.247**

Standard .....: **RSS 247 Issue 2, February 2017**

**Shenzhen HTT Technology Co.,Ltd. All rights reserved.**

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen HTT Technology Co.,Ltd. is acknowledged as copyright owner and source of the material. Shenzhen HTT Technology Co.,Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Test item description .....: **10.1" tea helper**

Trade Mark .....: N/A

Manufacturer .....: Huiling-tech Robotic Co., Ltd

Model/Type reference .....: HT013B001

Listed Models .....: /

Modulation Type .....: CCK/DSSS/ OFDM

Operation Frequency.....: From 2412 - 2462MHz

Rating .....: DC 12V

Result .....: **PASS**

## TEST REPORT

Equipment under Test : 10.1" tea helper

Model /Type : HT013B001

HVIN : HT013B001

Applicant : Shenzhen Inspiration of Tea Technology Co., Ltd.

Address : NO.1108-1,Main Tower,Marine Center,NO .59 LinHai Ave,Qianhai Shenzhen and HongKong Cooperation District,ShenZhen

Manufacturer : Huiling-tech Robotic Co., Ltd

Address : 2F, Building E, Huafeng International Robot Industrial Park, Bao'an District, Shenzhen, China

<b>Test Result:</b>	<b>PASS</b>
---------------------	-------------

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

## Contents

<u>1</u>	<u>TEST STANDARDS</u>	4
<u>2</u>	<u>SUMMARY</u>	5
2.1	General Remarks	5
2.2	Product Description	5
2.3	Equipment Under Test	5
2.4	Short description of the Equipment under Test (EUT)	5
2.5	EUT operation mode	6
2.6	Block Diagram of Test Setup	6
2.7	Related Submittal(s) / Grant (s)	6
2.8	Modifications	6
<u>3</u>	<u>TEST ENVIRONMENT</u>	7
3.1	Address of the test laboratory	7
3.2	Test Facility	7
3.3	Environmental conditions	7
3.4	Test Description	8
3.5	Statement of the measurement uncertainty	8
3.6	Equipments Used during the Test	9
<u>4</u>	<u>TEST CONDITIONS AND RESULTS</u>	10
4.1	AC Power Conducted Emission	10
4.2	Radiated Emission	13
4.3	Maximum Peak Conducted Output Power	20
4.4	Power Spectral Density	21
4.5	6dB Bandwidth and 99% Bandwidth	24
4.6	Out-of-band Emissions	29
4.7	Antenna Requirement	38
<u>5</u>	<u>TEST SETUP PHOTOS OF THE EUT</u>	39
<u>6</u>	<u>PHOTOS OF THE EUT</u>	39

## 1 TEST STANDARDS

The tests were performed according to following standards:

[\*\*FCC Rules Part 15.247\*\*](#): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

[\*\*RSS-247-Issue 2\*\*](#): Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.

[\*\*ANSI C63.10:2013\*\*](#) : American National Standard for Testing Unlicensed Wireless Devices

[\*\*ANSI C63.4: 2014\*\*](#): –American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz

[\*\*RSS-Gen Issue 5, April 2018+Amendment 1, March 2019+Amendment 2, February 2021\*\*](#): General Requirements for Compliance of Radio Apparatus

[\*\*KDB558074 D01 V03r05\*\*](#): Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

## 2 SUMMARY

### 2.1 General Remarks

Date of receipt of test sample	:	Oct,25,2023
Testing commenced on	:	Oct,25,2023
Testing concluded on	:	Nov,03,2023

### 2.2 Product Description

Product Name:	10.1" tea helper
Model/Type reference:	HT013B001
Power supply:	DC 12V
Adapter Information:	Mode: EADP-60DB A Input: AC100-240V, 50/60Hz, 1.5A Output: DC 12V, 5A
testing sample ID:	HTT202310621-1# (Engineer sample), HTT202310621-2# (Normal sample)
Hardware version:	V1.0
Software version:	V1.0
<b>WIFI :</b>	
Supported type:	802.11b/802.11g/802.11n(H20)/ 802.11n(H40)
Modulation:	802.11b: DSSS 802.11g/802.11n(H20)/ 802.11n(H40): OFDM
Operation frequency:	802.11b/802.11g/802.11n(H20): 2412MHz~2462MHz 802.11n(H40): 2422MHz~2452MHz
Channel number:	802.11b/802.11g/802.11n(H20): 11 802.11n(H40):7
Channel separation:	5MHz
Antenna type:	FPC antenna
Antenna gain:	0.00 dBi

### 2.3 Equipment Under Test

#### Power supply system utilised

Power supply voltage	:	<input type="radio"/>	230V / 50 Hz	<input type="radio"/>	120V / 60Hz
		<input checked="" type="radio"/>	12 V DC	<input type="radio"/>	24 V DC
		<input type="radio"/>	Other (specified in blank below)		

/

### 2.4 Short description of the Equipment under Test (EUT)

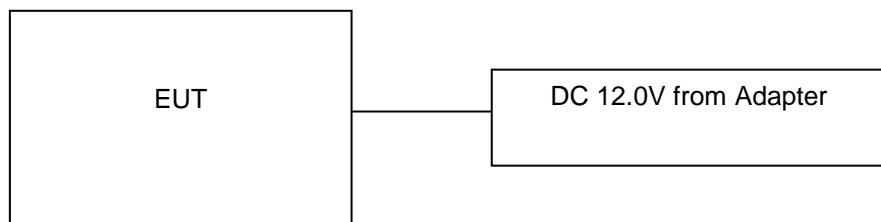
This is a 10.1" tea helper.  
For more details, refer to the user's manual of the EUT.

## 2.5 EUT operation mode

The application provider specific test software(AT command) to control sample in continuous TX and RX (Duty Cycle >98%) for testing meet KDB558074 test requirement.  
IEEE 802.11b/g/n: Thirteen channels are provided to the EUT.

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432		
<b>6</b>	2437		
7	2442		

## 2.6 Block Diagram of Test Setup



## 2.7 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

## 2.8 Modifications

No modifications were implemented to meet testing criteria.

### **3 TEST ENVIRONMENT**

#### **3.1 Address of the test laboratory**

##### **Shenzhen HTT Technology Co.,Ltd.**

1F, Building B, Huafeng International Robotics Industrial Park, Hangcheng Road, Nanchang Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China

#### **3.2 Test Facility**

The test facility is recognized, certified, or accredited by the following organizations:

##### **FCC-Registration No.: 779513 Designation Number: CN1319**

Shenzhen HTT Technology Co.,Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

##### **A2LA-Lab Cert. No.: 6435.01**

Shenzhen HTT Technology Co.,Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

##### **ISED#: 27952 CAB identifier: CN0128**

Shenzhen HTT Technology Co.,Ltd. has been listed by Innovation, Science and Economic Development Canada to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010

#### **3.3 Environmental conditions**

During the measurement the environmental conditions were within the listed ranges:

Radiated Emission:

Temperature:	24 ° C
Humidity:	45 %
Atmospheric pressure:	950-1050mbar

AC Power Conducted Emission:

Temperature:	25 ° C
Humidity:	46 %
Atmospheric pressure:	950-1050mbar

Conducted testing:

Temperature:	25 ° C
Humidity:	44 %
Atmospheric pressure:	950-1050mbar

### 3.4 Test Description

FCC and IC Requirements		
RSS-Gen 8.8 FCC 15.107(a) FCC 15.207	AC Power Conducted Emission	PASS
RSS 247 5.2(a) RSS GEN FCC 15.247(a)(2)	6dB Bandwidth & 99% Bandwidth	PASS
RSS 247 5.5 FCC 15.247(d)	Spurious RF Conducted Emission	PASS
RSS 247 5.4 (d) FCC 15.247(b)(1)	Maximum Peak Conducted Output Power	PASS
RSS 247 5.2(b) FCC 15.247(e)	Power Spectral Density	PASS
FCC Part 15.205/ 15.209 RSS-Gen 8.9	Radiated Emissions	PASS
RSS-Gen 8.10 FCC15.205 FCC 15.247(d)	Band Edge	PASS
FCC 15.203/FCC15.247(c) (1) (l) RSS-Gen 6.8	Antenna Requirement	PASS

#### Data Rate Used:

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel
Maximum Peak Conducted Output Power	11b/DSSS	1 Mbps	1/6/11
Power Spectral Density	11g/OFDM	6 Mbps	1/6/11
6dB Bandwidth	11n(20MHz)/OFDM	6.5Mbps	1/6/11
Spurious RF conducted emission	11n(40MHz)/OFDM	13.5Mbps	3/6/9
Radiated Emission 9KHz~1GHz&			
Radiated Emission 1GHz~10 <sup>th</sup> Harmonic			
Band Edge	11b/DSSS	1 Mbps	1/11
	11g/OFDM	6 Mbps	1/11
	11n(20MHz)/OFDM	6.5Mbps	1/11
	11n(40MHz)/OFDM	13.5Mbps	3/9

### 3.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the Shenzhen HTT Technology Co.,Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen HTT Technology Co.,Ltd. :

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	3.45 dB	(1)
Radiated Emission	1~18GHz	3.54 dB	(1)
Radiated Emission	18-40GHz	5.38 dB	(1)

Conducted Disturbance	0.15~30MHz	2.66 dB	(1)
(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.			

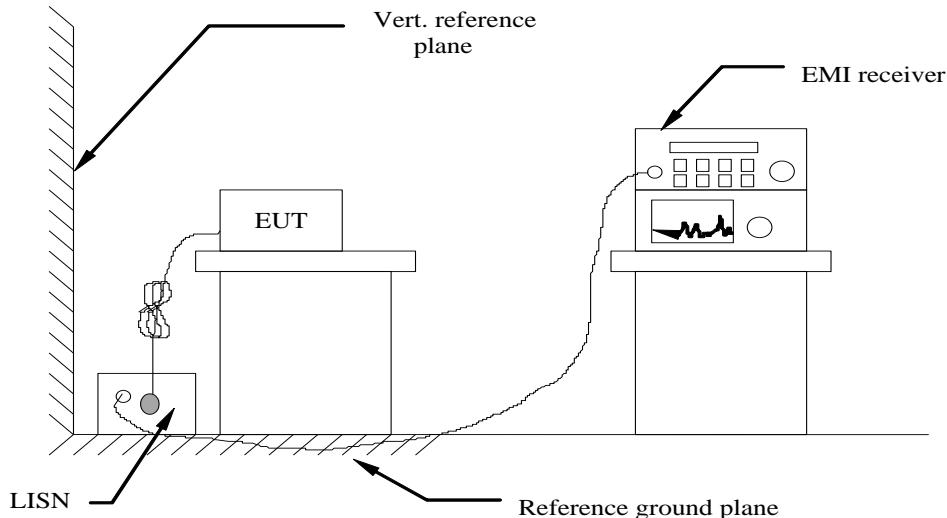
### 3.6 Equipments Used during the Test

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	Shenzhen C.R.T technology co., LTD	9*6*6	HTT-E028	Aug. 10 2021	Aug. 09 2024
2	Control Room	Shenzhen C.R.T technology co., LTD	4.8*3.5*3.0	HTT-E030	Aug. 10 2021	Aug. 09 2024
3	EMI Test Receiver	Rohde&Schwarz	ESCI7	HTT-E022	Apr. 26 2023	Apr. 25 2024
4	Spectrum Analyzer	Rohde&Schwarz	FSP	HTT-E037	Apr. 26 2023	Apr. 25 2024
5	Coaxial Cable	ZDecl	ZT26-NJ-NJ-0.6M	HTT-E018	Apr. 26 2023	Apr. 25 2024
6	Coaxial Cable	ZDecl	ZT26-NJ-SMAJ-2M	HTT-E019	Apr. 26 2023	Apr. 25 2024
7	Coaxial Cable	ZDecl	ZT26-NJ-SMAJ-0.6M	HTT-E020	Apr. 26 2023	Apr. 25 2024
8	Coaxial Cable	ZDecl	ZT26-NJ-SMAJ-8.5M	HTT-E021	Apr. 26 2023	Apr. 25 2024
9	Composite logarithmic antenna	Schwarzbeck	VULB 9168	HTT-E017	May. 21 2023	May. 20 2024
10	Horn Antenna	Schwarzbeck	BBHA9120D	HTT-E016	May. 20 2023	May. 19 2024
11	Loop Antenna	Zhinan	ZN30900C	HTT-E039	Apr. 26 2023	Apr. 25 2024
12	Horn Antenna	Beijing Hangwei Dayang	OBH100400	HTT-E040	Apr. 26 2023	Apr. 25 2024
13	low frequency Amplifier	Sonoma Instrument	310	HTT-E015	Apr. 26 2023	Apr. 25 2024
14	high-frequency Amplifier	HP	8449B	HTT-E014	Apr. 26 2023	Apr. 25 2024
15	Variable frequency power supply	Shenzhen Anbiao Instrument Co., Ltd	ANB-10VA	HTT-082	Apr. 26 2023	Apr. 25 2024
16	EMI Test Receiver	Rohde & Schwarz	ESCS30	HTT-E004	Apr. 26 2023	Apr. 25 2024
17	Artificial Mains	Rohde & Schwarz	ESH3-Z5	HTT-E006	May. 23 2023	May. 22 2024
18	Artificial Mains	Rohde & Schwarz	ENV-216	HTT-E038	May. 23 2023	May. 22 2024
19	Cable Line	Robinson	Z302S-NJ-BNCJ-1.5M	HTT-E001	Apr. 26 2023	Apr. 25 2024
20	Attenuator	Robinson	6810.17A	HTT-E007	Apr. 26 2023	Apr. 25 2024
21	Variable frequency power supply	Shenzhen Yanghong Electric Co., Ltd	YF-650 (5KVA)	HTT-E032	Apr. 26 2023	Apr. 25 2024
22	Control Room	Shenzhen C.R.T technology co., LTD	8*4*3.5	HTT-E029	Aug. 10 2021	Aug. 09 2024
23	DC power supply	Agilent	E3632A	HTT-E023	Apr. 26 2023	Apr. 25 2024
24	EMI Test Receiver	Agilent	N9020A	HTT-E024	Apr. 26 2023	Apr. 25 2024
25	Analog signal generator	Agilent	N5181A	HTT-E025	Apr. 26 2023	Apr. 25 2024
26	Vector signal generator	Agilent	N5182A	HTT-E026	Apr. 26 2023	Apr. 25 2024
27	Power sensor	Keysight	U2021XA	HTT-E027	Apr. 26 2023	Apr. 25 2024
28	Temperature and humidity meter	Shenzhen Anbiao Instrument Co., Ltd	TH10R	HTT-074	Apr. 28 2023	Apr. 27 2024
29	Radiated Emission Test Software	Farad	EZ-EMC	N/A	N/A	N/A
30	Conducted Emission Test Software	Farad	EZ-EMC	N/A	N/A	N/A
31	RF Test Software	panshanrf	TST	N/A	N/A	N/A

## 4 TEST CONDITIONS AND RESULTS

### 4.1 AC Power Conducted Emission

#### TEST CONFIGURATION



#### TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
- 2 Support equipment, if needed, was placed as per ANSI C63.10-2013
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
- 4 The EUT received power from adapter, the adapter received AC120V/60Hz and AC 240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

#### AC Power Conducted Emission Limit

For intentional device, according to RSS-Gen 8.8. AC Power Conducted Emission Limits is as following :

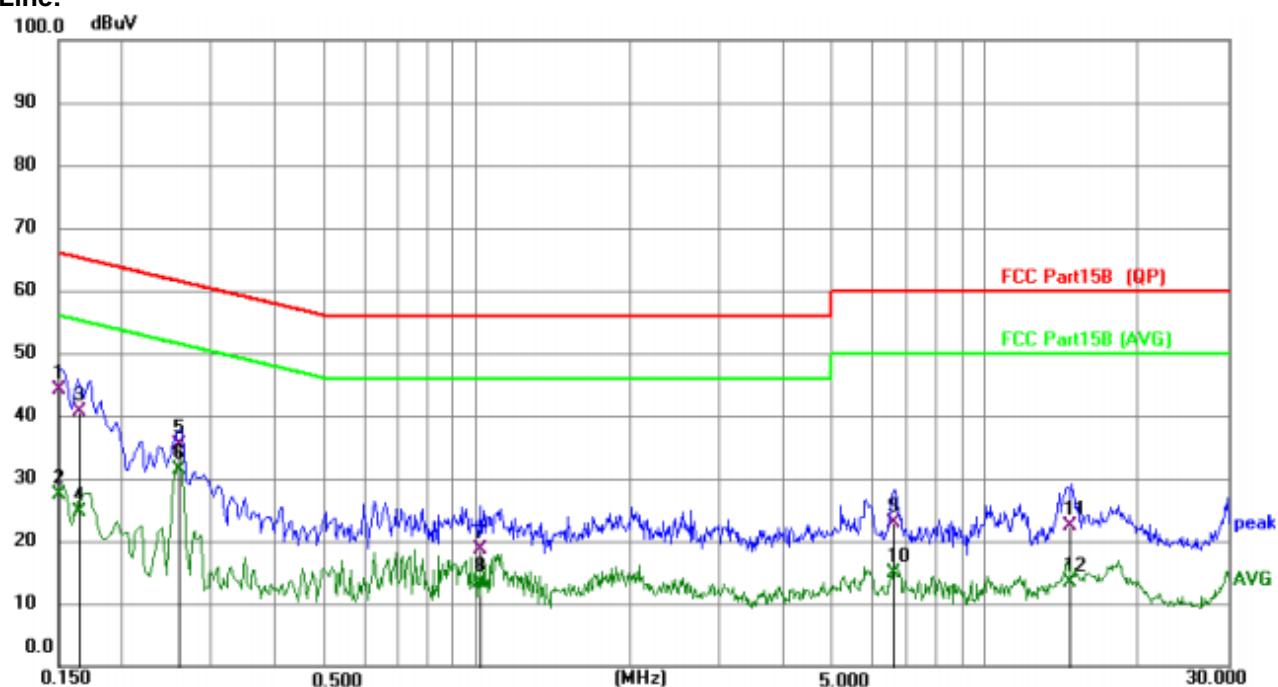
Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\* Decreases with the logarithm of the frequency.

#### TEST RESULTS

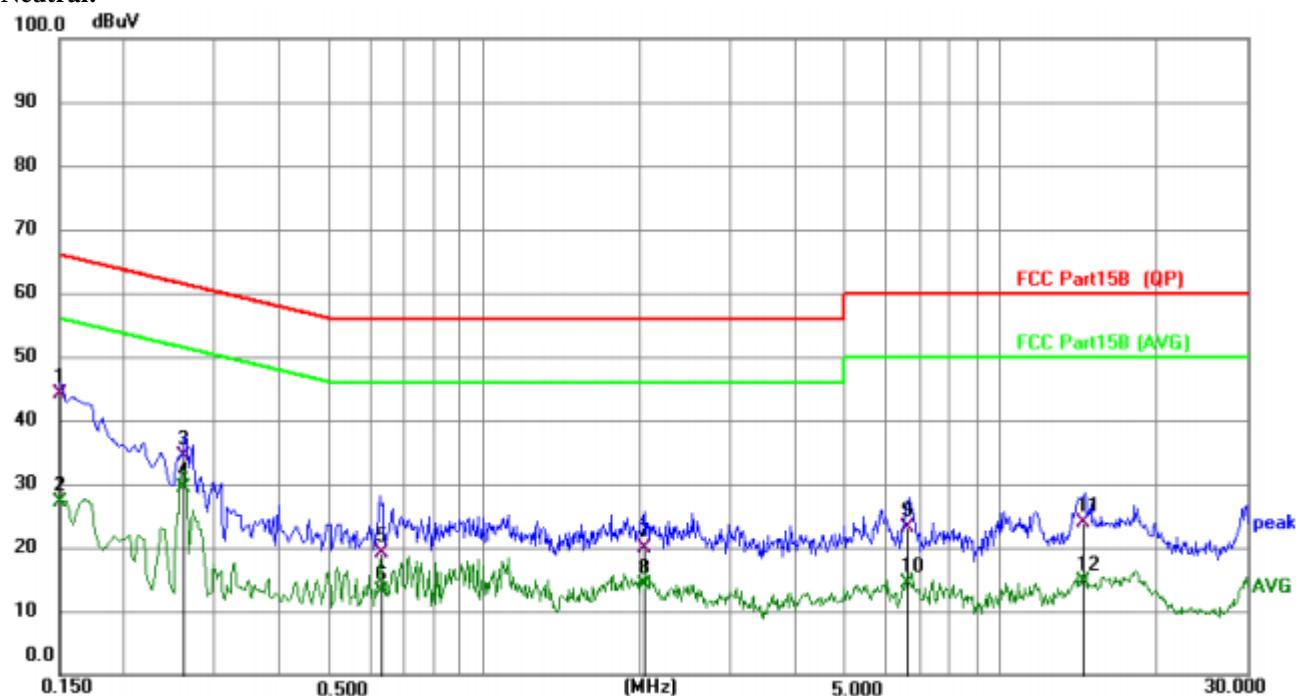
PASS

Remark: Both high and low voltages have been tested to show only the worst low voltage test data.

**Measurement data:****Line:**

No.	Mk.	Freq. MHz	Reading	Correct	Measure-	Limit	Over			
			Level	Factor	ment					
						dB	dBuV	dBuV	dB	Detector
1		0.1514	34.08	10.16	44.24	65.92	-21.68	-21.68	QP	
2		0.1514	17.25	10.16	27.41	55.92	-28.51	-28.51	AVG	
3		0.1655	30.35	10.18	40.53	65.18	-24.65	-24.65	QP	
4		0.1655	14.43	10.18	24.61	55.18	-30.57	-30.57	AVG	
5		0.2593	25.08	10.23	35.31	61.45	-26.14	-26.14	QP	
6	*	0.2593	21.16	10.23	31.39	51.45	-20.06	-20.06	AVG	
7		1.0203	8.34	10.41	18.75	56.00	-37.25	-37.25	QP	
8		1.0203	3.08	10.41	13.49	46.00	-32.51	-32.51	AVG	
9		6.6371	12.21	10.62	22.83	60.00	-37.17	-37.17	QP	
10		6.6371	4.27	10.62	14.89	50.00	-35.11	-35.11	AVG	
11		14.7543	11.25	11.04	22.29	60.00	-37.71	-37.71	QP	
12		14.7543	2.35	11.04	13.39	50.00	-36.61	-36.61	AVG	

## Neutral:



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
			Level	Factor	ment			
		MHz		dB	dBuV	dBuV	dB	Detector
1	*	0.1503	33.92	10.16	44.08	65.98	-21.90	QP
2		0.1503	17.01	10.16	27.17	55.98	-28.81	AVG
3		0.2613	24.11	10.22	34.33	61.39	-27.06	QP
4		0.2613	19.18	10.22	29.40	51.39	-21.99	AVG
5		0.6341	8.84	10.35	19.19	56.00	-36.81	QP
6		0.6341	2.68	10.35	13.03	46.00	-32.97	AVG
7		2.0436	9.50	10.40	19.90	56.00	-36.10	QP
8		2.0436	3.79	10.40	14.19	46.00	-31.81	AVG
9		6.6314	12.42	10.67	23.09	60.00	-36.91	QP
10		6.6314	3.60	10.67	14.27	50.00	-35.73	AVG
11		14.5807	12.75	11.14	23.89	60.00	-36.11	QP
12		14.5807	3.52	11.14	14.66	50.00	-35.34	AVG

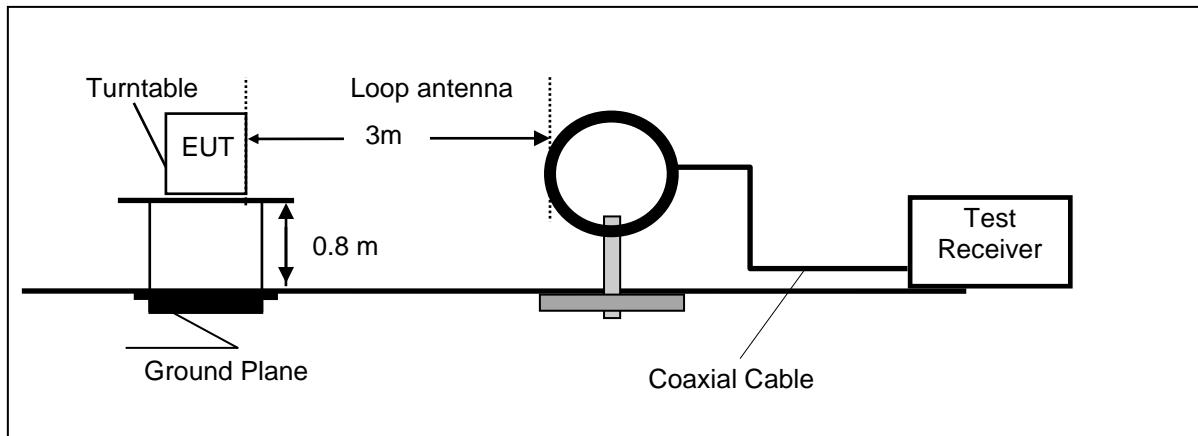
## Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss

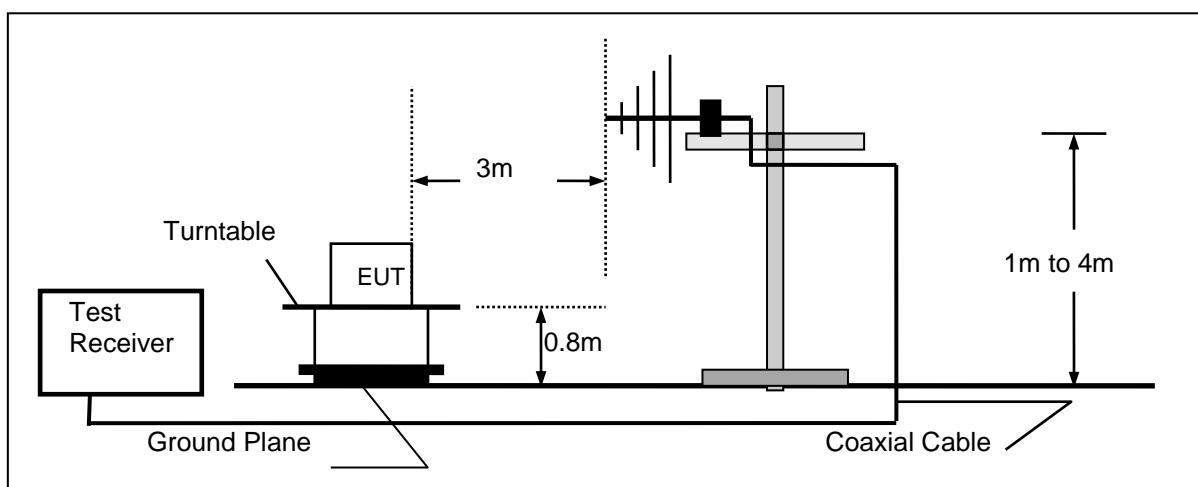
## 4.2 Radiated Emission

### TEST CONFIGURATION

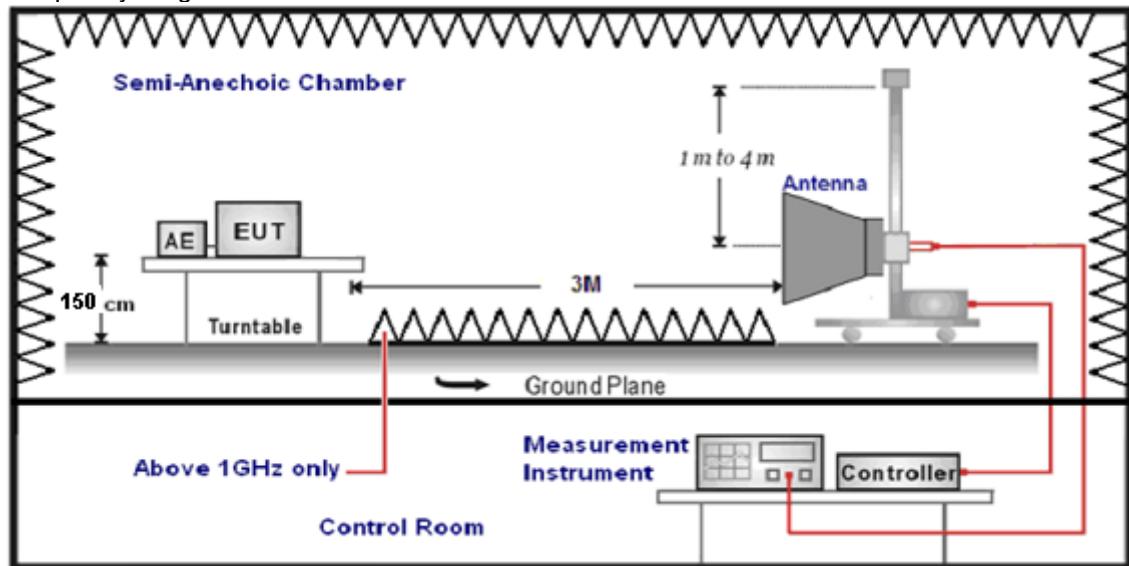
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



**TEST PROCEDURE**

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –1GHz; the EUT was placed on a turn table which is 1.5m above ground plane when testing frequency range 1GHz – 25GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. Radiated emission test frequency band from 9KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Ultra-Broadband Antenna	3
1GHz-18GHz	Double Ridged Horn Antenna	3
18GHz-25GHz	Horn Antenna	1

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz, Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz, Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz, Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

**Field Strength Calculation**

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

Transd=AF +CL-AG

**RADIATION LIMIT**

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

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)

Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in table below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission

Unwanted emissions that fall into restricted bands shall comply with the limits specified in RSS-Gen; and Unwanted emissions that do not fall within the restricted frequency bands shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.

Frequency (MHz)	Distance (Meters)	Radiated (dB $\mu$ V/m)	Radiated ( $\mu$ V/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)

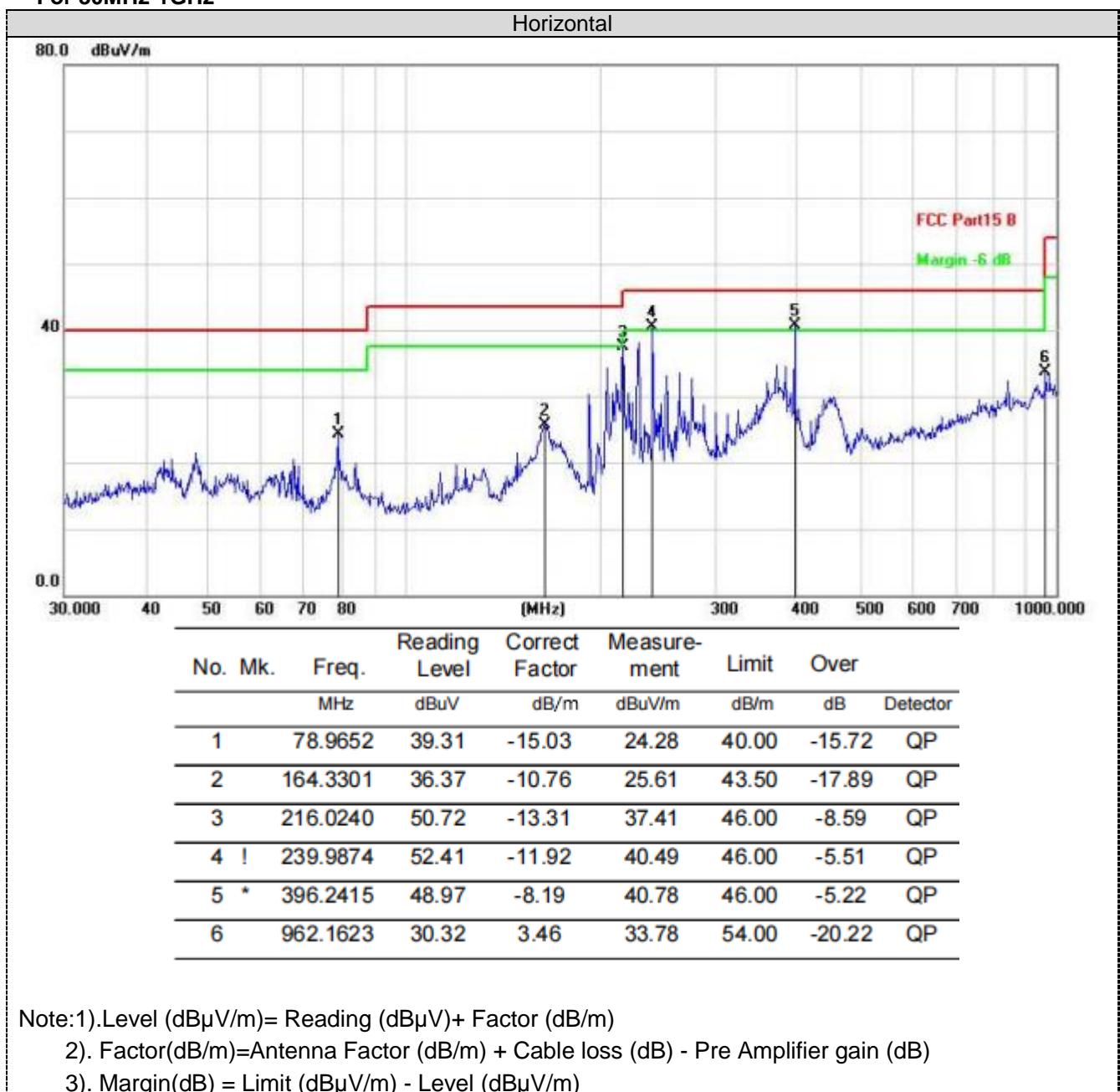
1.705-30	3	$20\log(30) + 40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

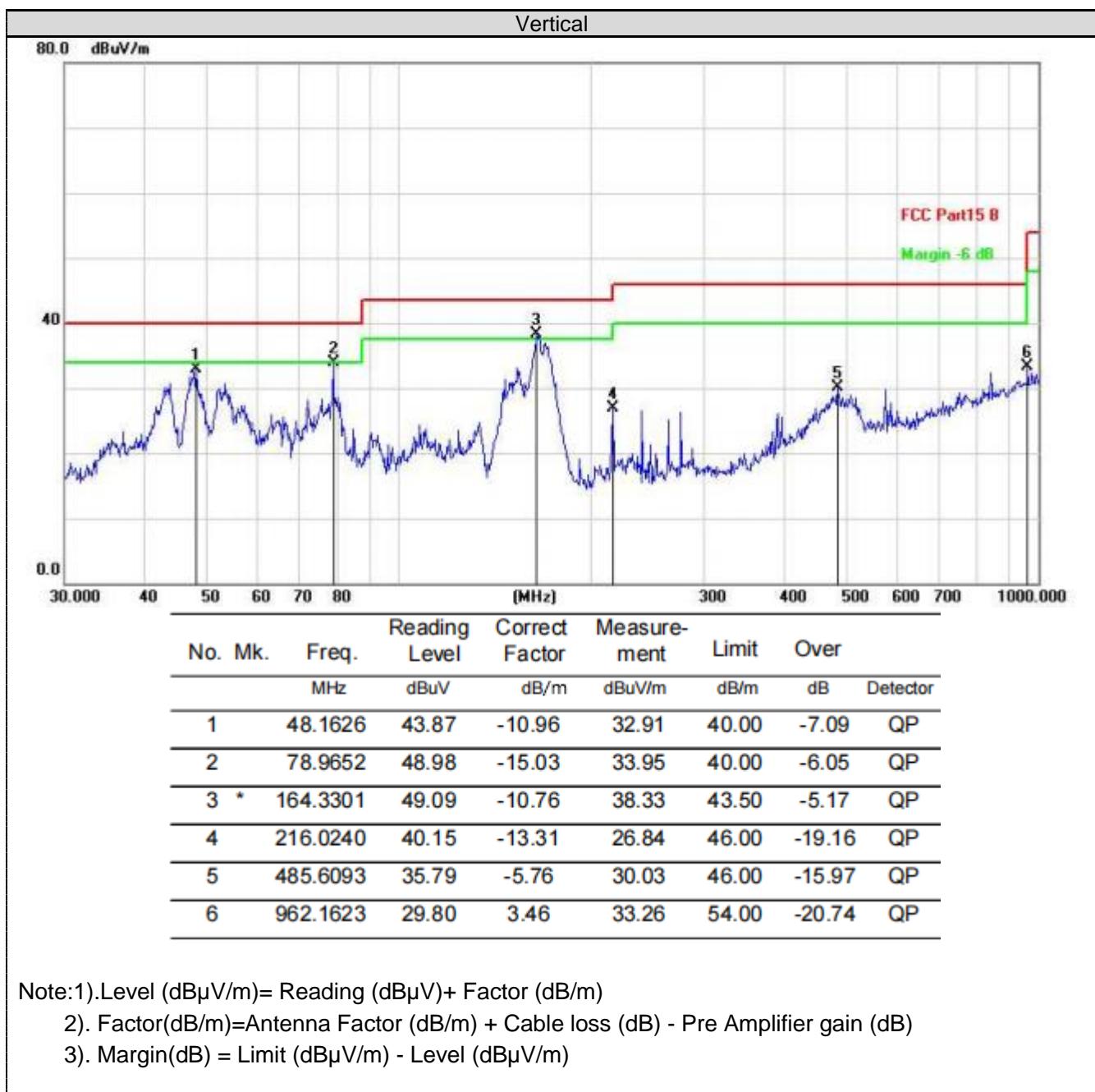
## TEST RESULTS

### Remark:

1. This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.
2. All three channels (lowest/middle/highest) of each mode were measured below 1GHz and recorded worst case at 802.11b low channel.
3. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

### For 30MHz-1GHz





**For 1GHz to 25GHz**

Note: 802.11b/802.11g/802.11n (H20)/802.11n (H40) Mode all have been tested, only worse case 802.11b mode is reported

**(above 1GHz)**

Frequency(MHz):		2412		Polarity:		HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4824.00	58.85	PK	74	15.15	53.03	31.05	6.52	31.75
4824.00	44.50	AV	54	9.50	38.68	31.05	6.52	31.75
7236.00	55.75	PK	74	18.25	42.94	36.08	8.18	31.45
7236.00	46.59	AV	54	7.41	33.78	36.08	8.18	31.45
								12.81

Frequency(MHz):		2412		Polarity:		VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4824.00	59.55	PK	74	14.45	53.73	31.05	6.52	31.75
4824.00	43.87	AV	54	10.13	38.05	31.05	6.52	31.75
7236.00	56.58	PK	74	17.42	43.77	36.08	8.18	31.45
7236.00	46.76	AV	54	7.24	33.95	36.08	8.18	31.45
								12.81

Frequency(MHz):		2437		Polarity:		HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4874.00	62.51	PK	74	11.49	56.07	31.25	6.7	31.51
4874.00	44.38	AV	54	9.62	37.94	31.25	6.7	31.51
7311.00	56.05	PK	74	17.95	42.91	36.25	8.31	31.42
7311.00	45.25	AV	54	8.75	32.11	36.25	8.31	31.42
								13.14

Frequency(MHz):		2437		Polarity:		VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4874.00	61.86	PK	74	12.14	55.42	31.25	6.7	31.51
4874.00	46.23	AV	54	7.77	39.79	31.25	6.7	31.51
7311.00	57.51	PK	74	16.49	44.37	36.25	8.31	31.42
7311.00	47.51	AV	54	6.49	34.37	36.25	8.31	31.42
								13.14

Frequency(MHz):		2462		Polarity:		HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4924.00	60.44	PK	74	13.56	53.57	31.52	6.8	31.45
4924.00	44.86	AV	54	9.14	37.99	31.52	6.8	31.45
7386.00	55.58	PK	74	18.42	42.02	36.51	8.4	31.35
7386.00	46.47	AV	54	7.53	32.91	36.51	8.4	31.35
								13.56

Frequency(MHz):		2462		Polarity:		VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4924.00	61.06	PK	74	12.94	54.19	31.52	6.8	31.45
4924.00	45.08	AV	54	8.92	38.21	31.52	6.8	31.45
7386.00	56.49	PK	74	17.51	42.93	36.51	8.4	31.35
7386.00	46.38	AV	54	7.62	32.82	36.51	8.4	31.35
								13.56

- 1) Emission level (dBuV/m) = Meter Reading+ antenna Factor+ cable loss- preamp factor.
- 2) Margin value = Limits-Emission level.
- 3) -- Mean the PK detector measured value is below average limit.
- 4) The other emission levels were very low against the limit.
- 5) RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.

**Results of Band Edges Test (Radiated)**

Note: 802.11b/802.11g/802.11n (H20)/802.11n (H40) Mode all have been tested, only worse case 802.11b mode is reported

Frequency(MHz):		2412		Polarity:		HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2390.00	61.50	PK	74	12.50	62.89	27.2	4.31	32.9
2390.00	44.62	AV	54	9.38	46.01	27.2	4.31	32.9
Frequency(MHz):		2412		Polarity:		VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2390.00	59.70	PK	74	14.30	61.09	27.2	4.31	32.9
2390.00	46.53	AV	54	7.47	47.92	27.2	4.31	32.9
Frequency(MHz):		2462		Polarity:		HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2483.50	57.11	PK	74	16.89	58.04	27.4	4.47	32.8
2483.50	44.92	AV	54	9.08	45.85	27.4	4.47	32.8
Frequency(MHz):		2462		Polarity:		VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2483.50	55.20	PK	74	18.80	56.13	27.4	4.47	32.8
2483.50	44.39	AV	54	9.61	45.32	27.4	4.47	32.8

Note:

- 1) Emission level (dBuV/m) = Meter Reading+ antenna Factor+ cable loss- preamp factor.
- 2) Margin value = Limits-Emission level.
- 3) -- Mean the PK detector measured value is below average limit.
- 4) The other emission levels were very low against the limit.
- 5) RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.

### 4.3 Maximum Peak Conducted Output Power

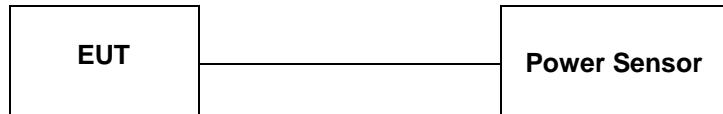
#### Limit

The Maximum Peak Output Power Measurement is 30dBm.

#### Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.

#### Test Configuration



#### Test Results

Type	Channel	Output power PK (dBm)	Limit (dBm)	Result
802.11b	01	3.24	30.00	Pass
	06	2.73		
	11	1.92		
802.11g	01	4.82	30.00	Pass
	06	4.84		
	11	3.95		
802.11n(HT20)	01	5.98	30.00	Pass
	06	5.14		
	11	3.80		
802.11n(HT40)	03	3.73	30.00	Pass
	06	3.21		
	09	2.63		

#### Note:

- 1) Measured output power at difference data rate for each mode and recorded worst case for each mode.
- 2) Test results including cable loss.
- 3) Worst case data at 1Mbps at IEEE 802.11b; 6Mbps at IEEE 802.11g; 6.5Mbps at IEEE 802.11n HT20; 13.5Mbps at IEEE 802.11n HT40;

## 4.4 Power Spectral Density

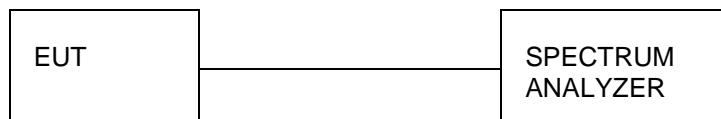
### Limit

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.

### Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW  $\geq$  3 kHz.
3. Set the VBW  $\geq 3 \times$  RBW.
4. Set the span to 1.5 times the DTS channel bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be 8dBm.

### Test Configuration



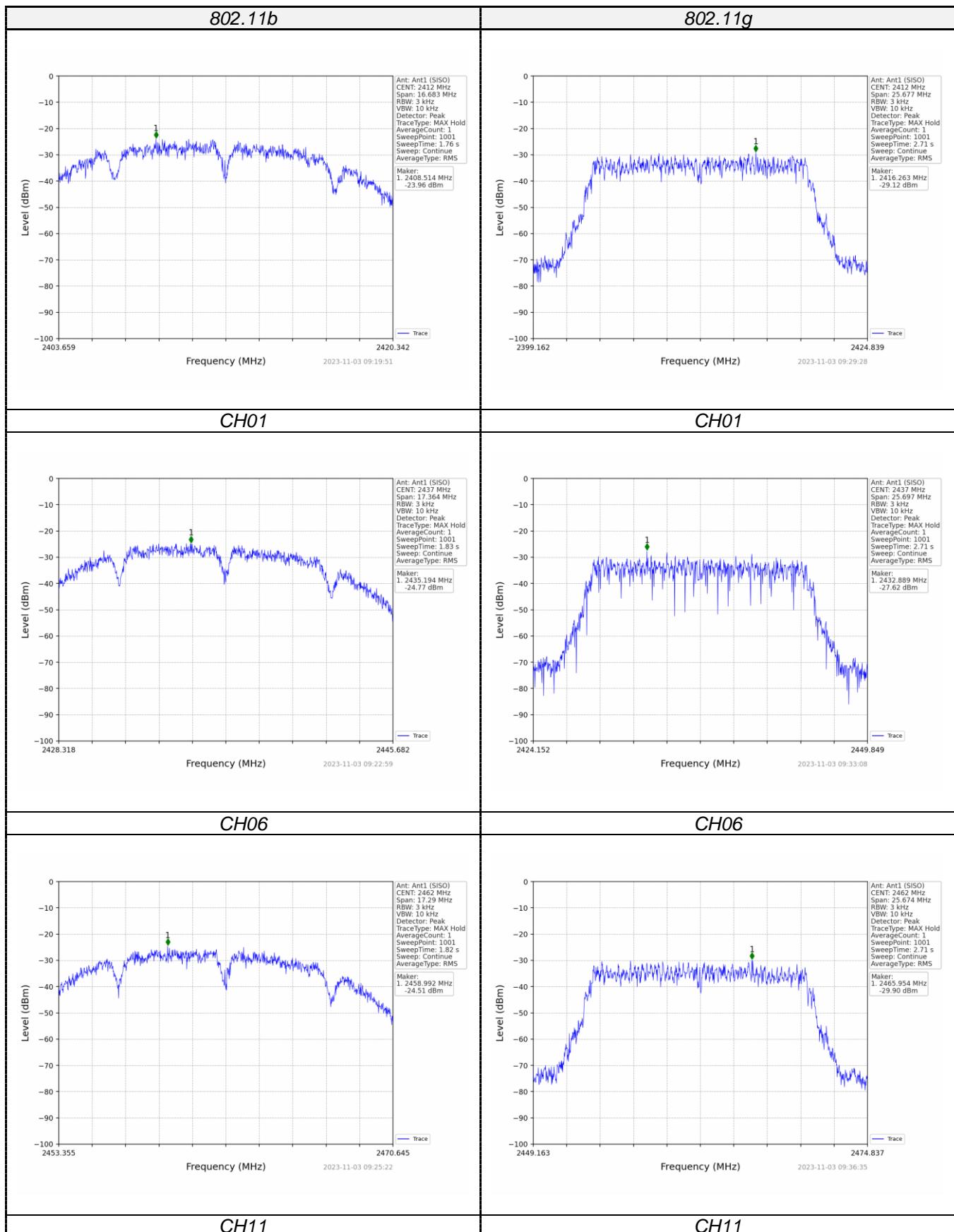
### Test Results

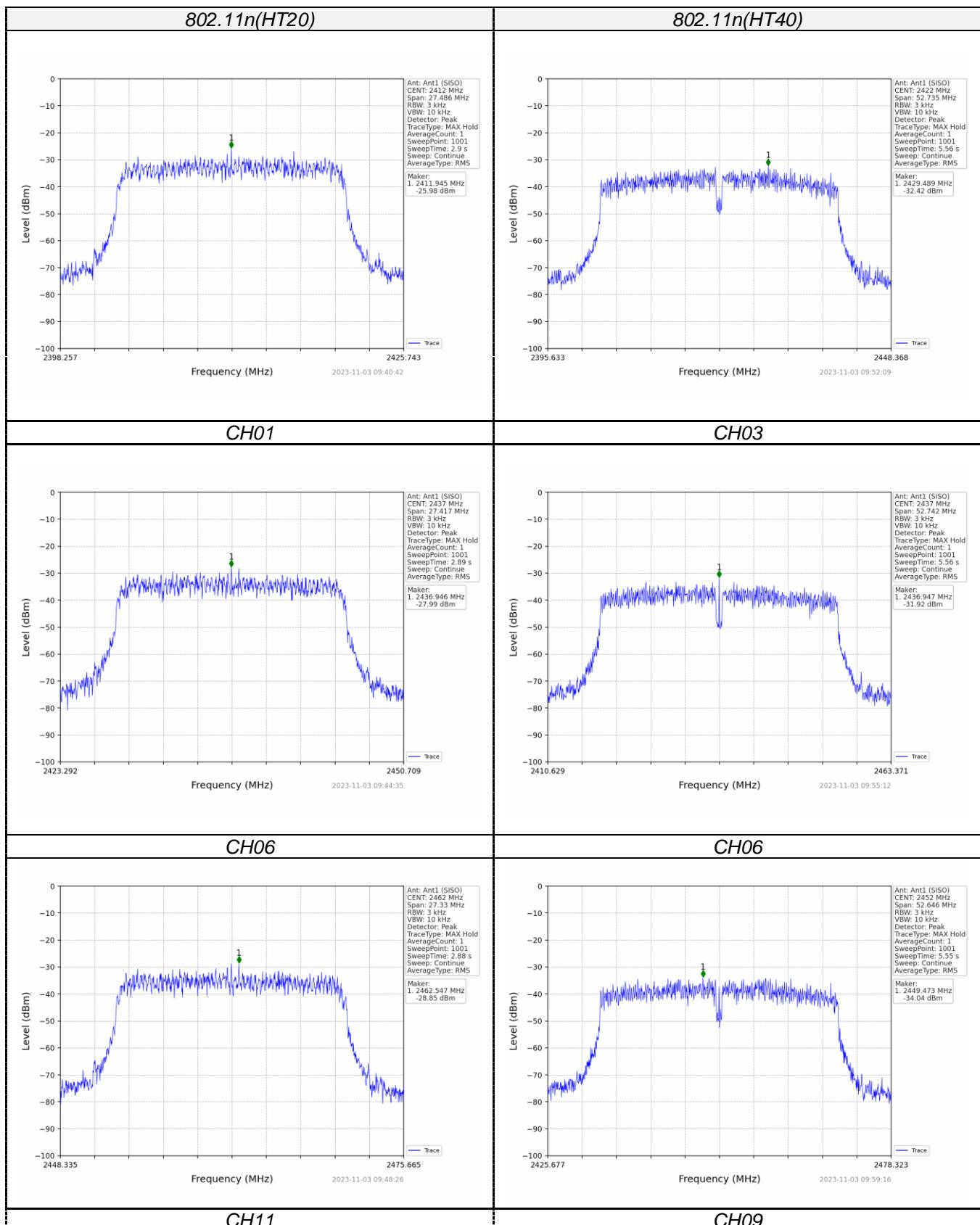
Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11b	01	-23.96	8.00	Pass
	06	-24.77		
	11	-24.51		
802.11g	01	-29.12	8.00	Pass
	06	-27.62		
	11	-29.90		
802.11n(HT20)	01	-25.98	8.00	Pass
	06	-27.99		
	11	-28.85		
802.11n(HT40)	03	-32.42	8.00	Pass
	06	-31.92		
	09	-34.04		

#### Note:

- 1) Measured peak power spectrum density at difference data rate for each mode and recorded worst case for each mode.
- 2) Test results including cable loss;
- 3) Worst case data at 1Mbps at IEEE 802.11b; 6Mbps at IEEE 802.11g; 6.5Mbps at IEEE 802.11n HT20; 13.5Mbps at IEEE 802.11n HT40;

Please refer to following plots;





## 4.5 6dB Bandwidth and 99% Bandwidth

### Limit

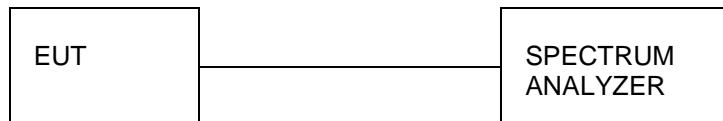
For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

### Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 430 KHz RBW and 1.3MHz VBW record the 99% bandwidth.

### Test Configuration



### Test Results

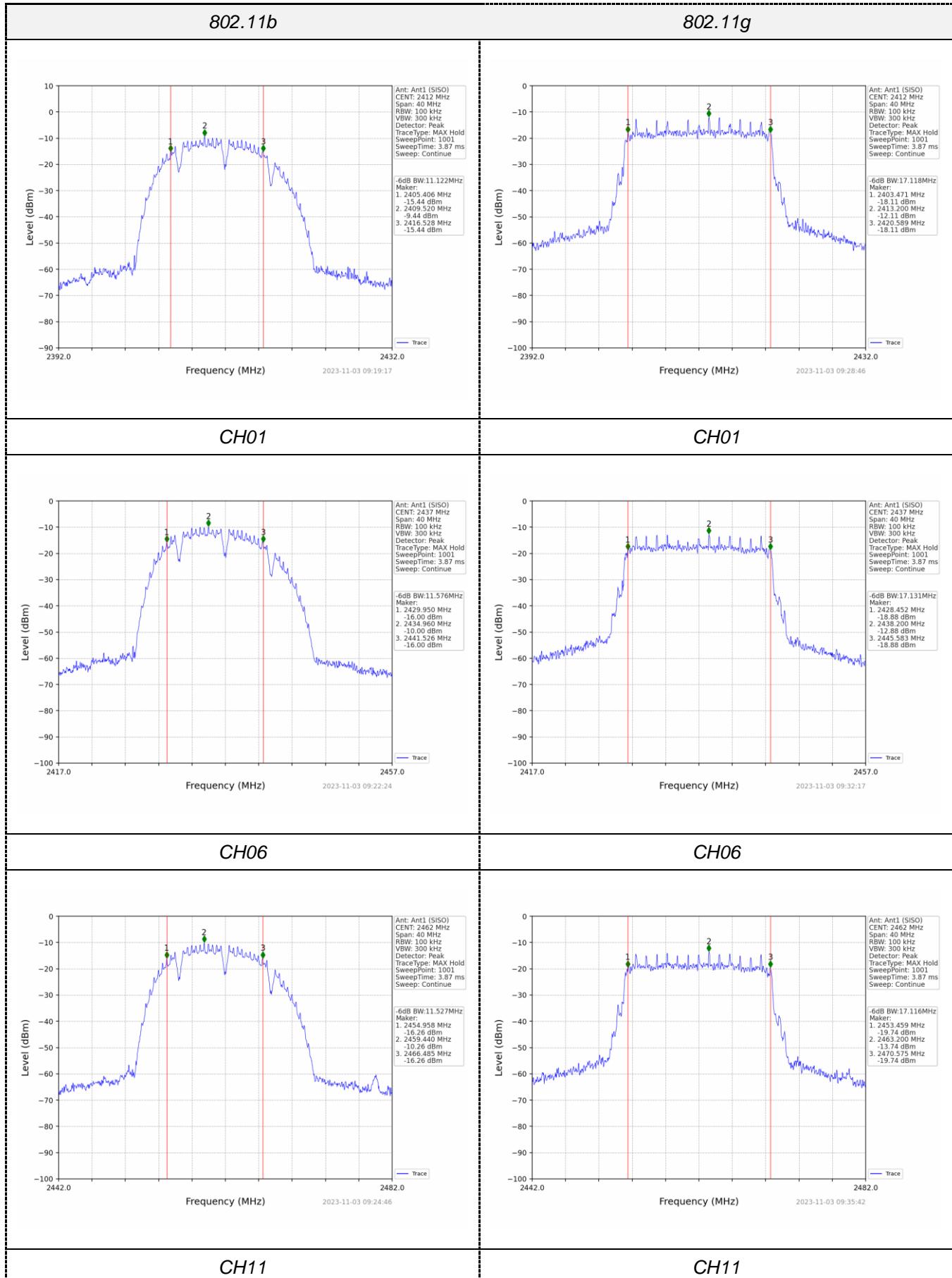
Type	Channel	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (KHz)	Result
802.11b	01	11.122	15.207	≥500	Pass
	06	11.576	15.214		
	11	11.527	14.993		
802.11g	01	17.118	17.902	≥500	Pass
	06	17.131	17.884		
	11	17.116	17.756		
802.11n(HT20)	01	18.324	18.846	≥500	Pass
	06	18.278	18.819		
	11	18.220	18.860		
802.11n(HT40)	03	35.157	36.269	≥500	Pass
	06	35.161	36.464		
	09	35.097	36.332		

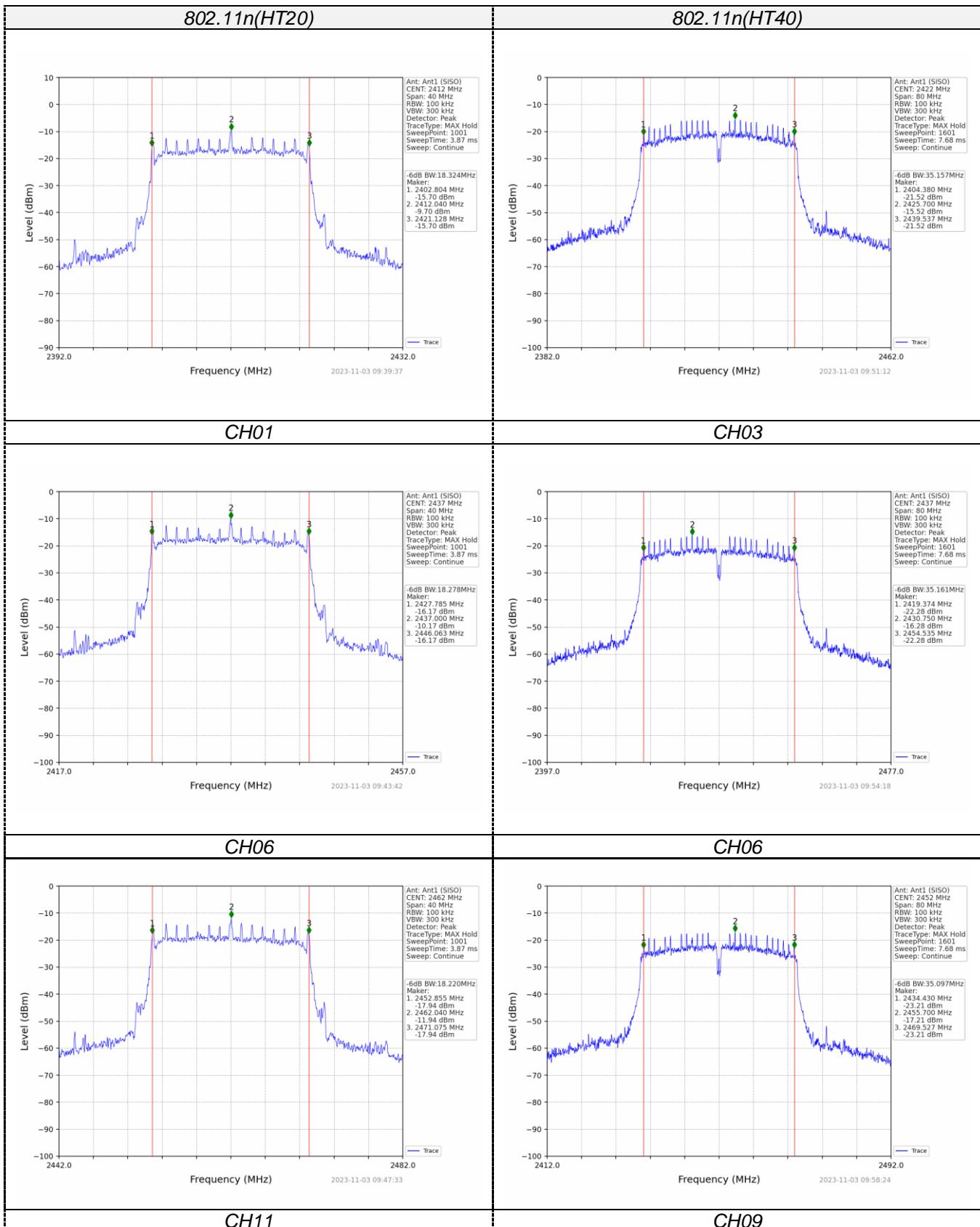
#### Note:

- 1) Measured peak power spectrum density at difference data rate for each mode and recorded worst case for each mode.
- 2) Test results including cable loss;
- 3) Worst case data at 1Mbps at IEEE 802.11b; 6Mbps at IEEE 802.11g; 6.5Mbps at IEEE 802.11n HT20; 13.5Mbps at IEEE 802.11n HT40;

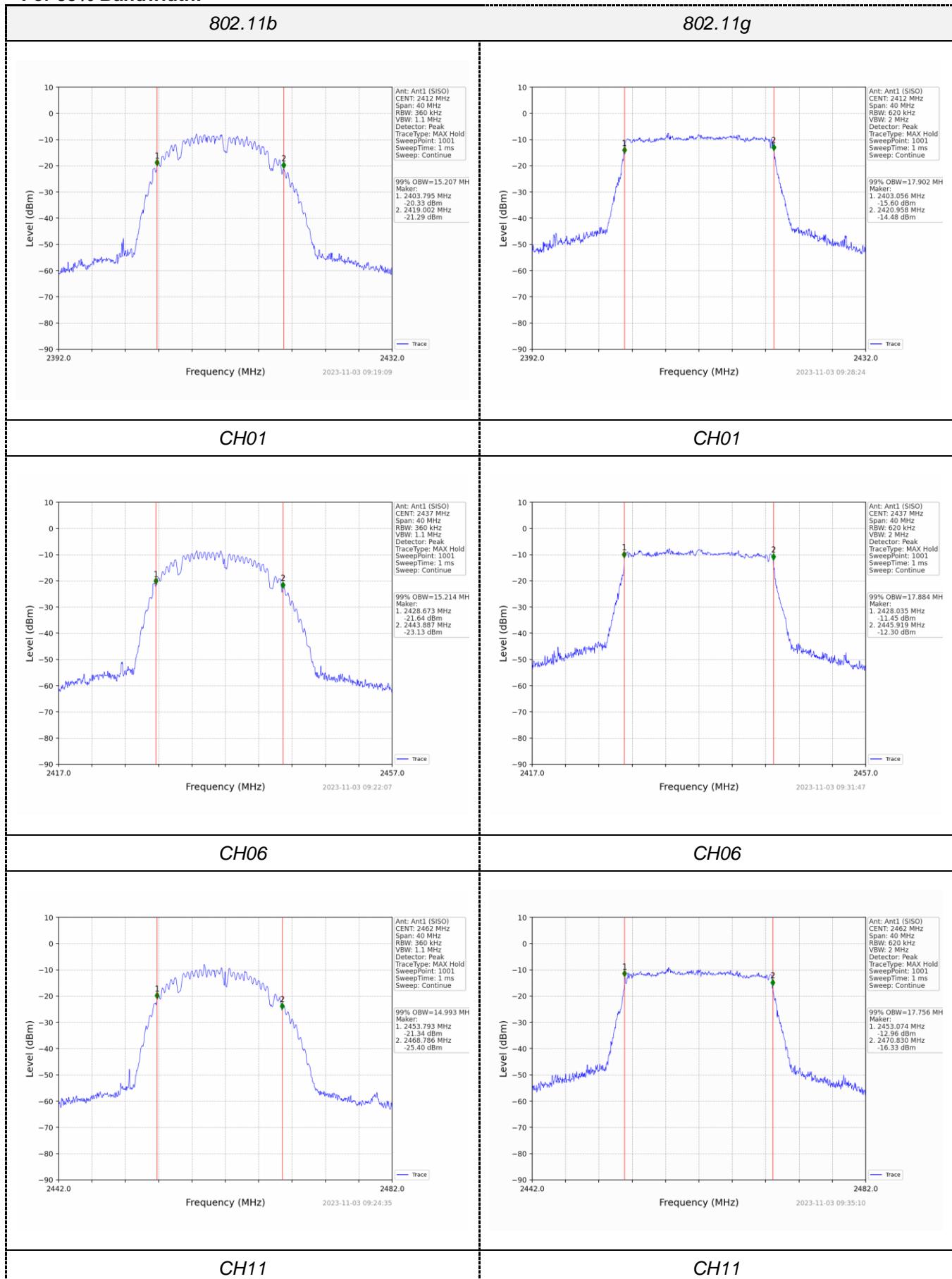
Please refer to following plots;

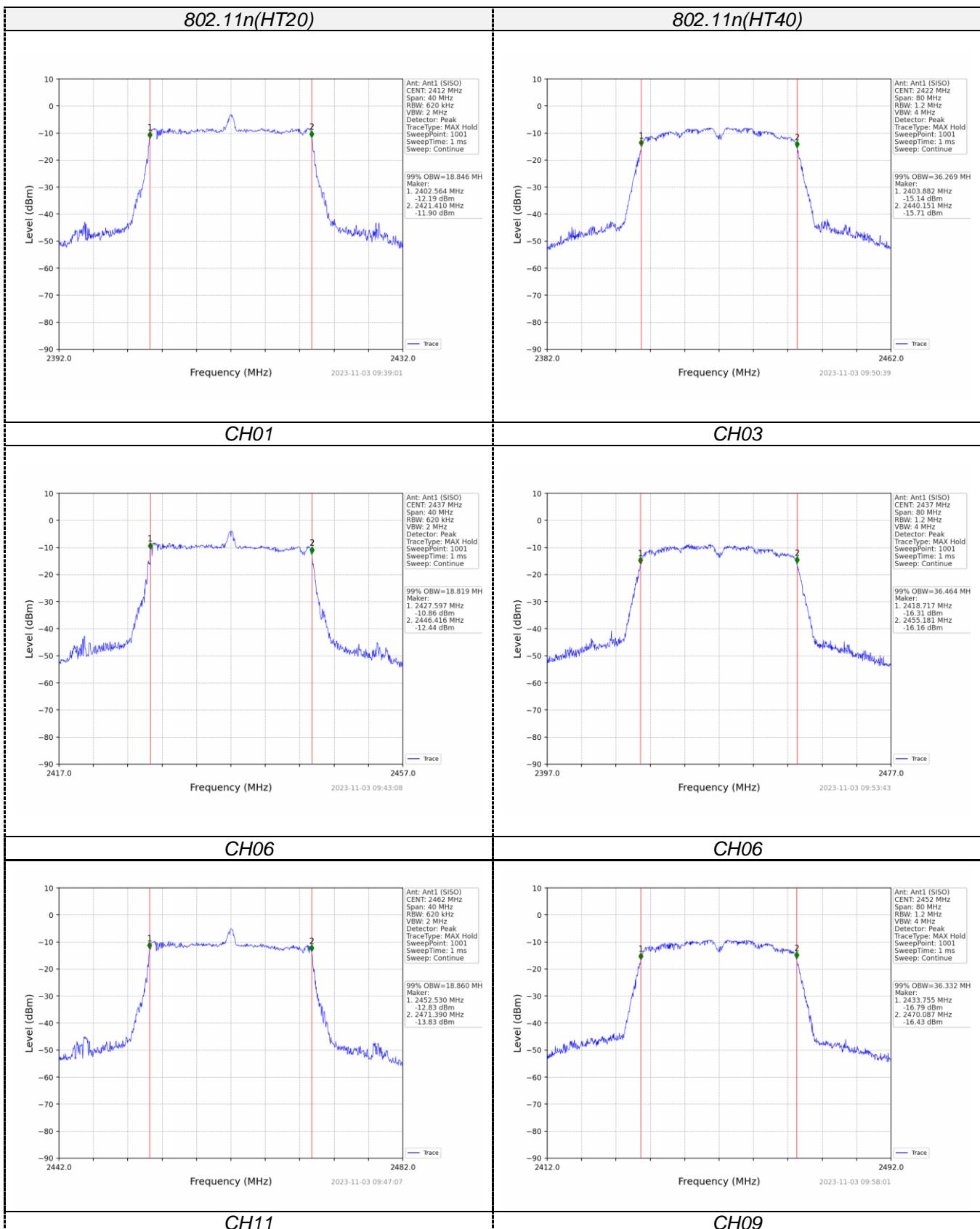
## For 6dB Bandwidth:





## For 99% Bandwidth:





## 4.6 Out-of-band Emissions

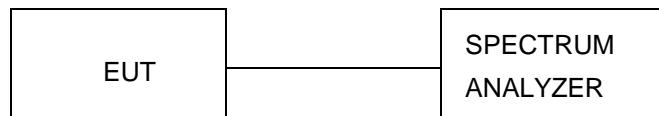
### Limit

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 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 Procedure

Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector , and max hold. Measurements utilizing these setting are made of the in-band reference level, bandedge and out-of-band emissions.

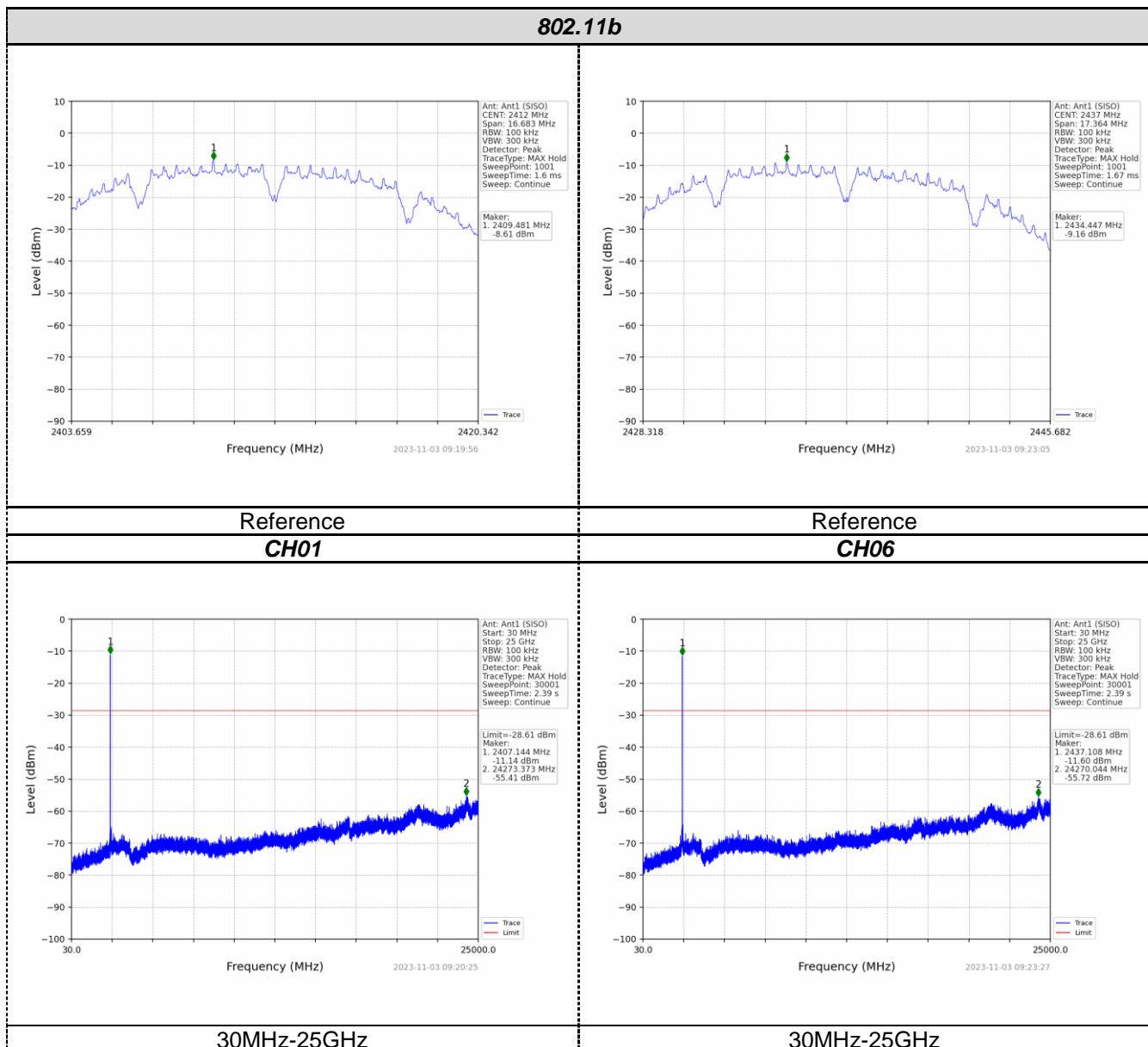
### Test Configuration

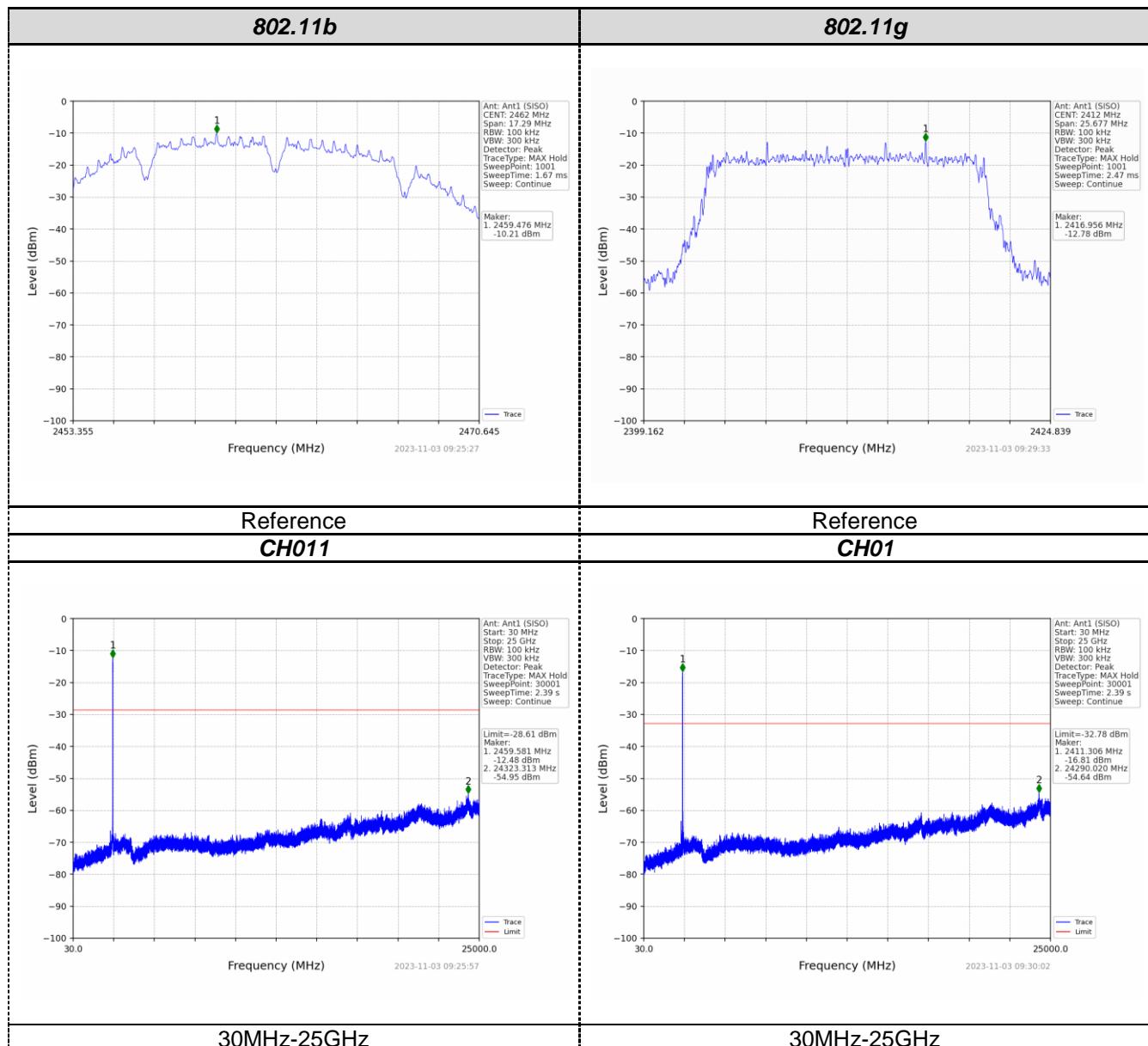


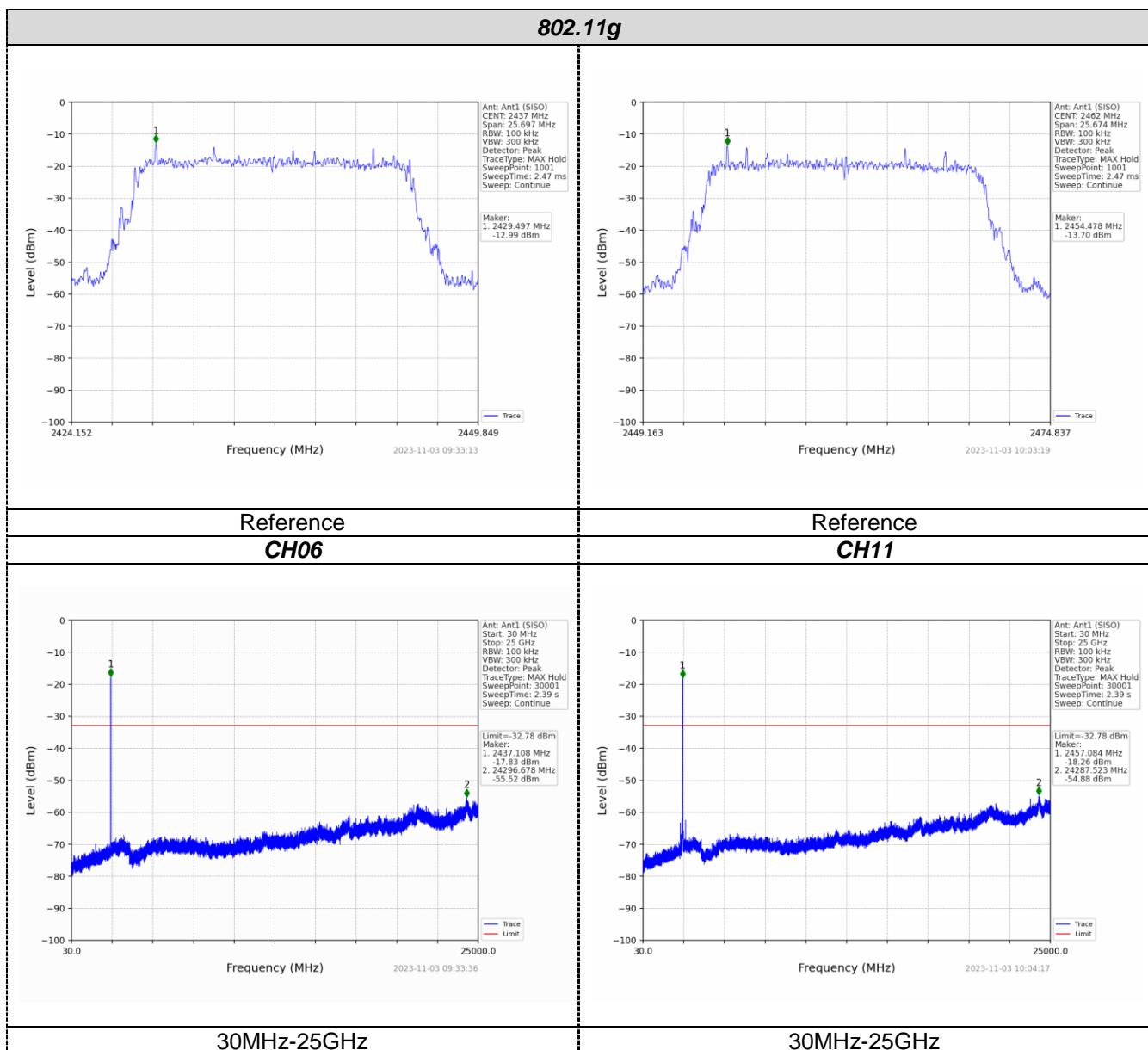
### Test Results

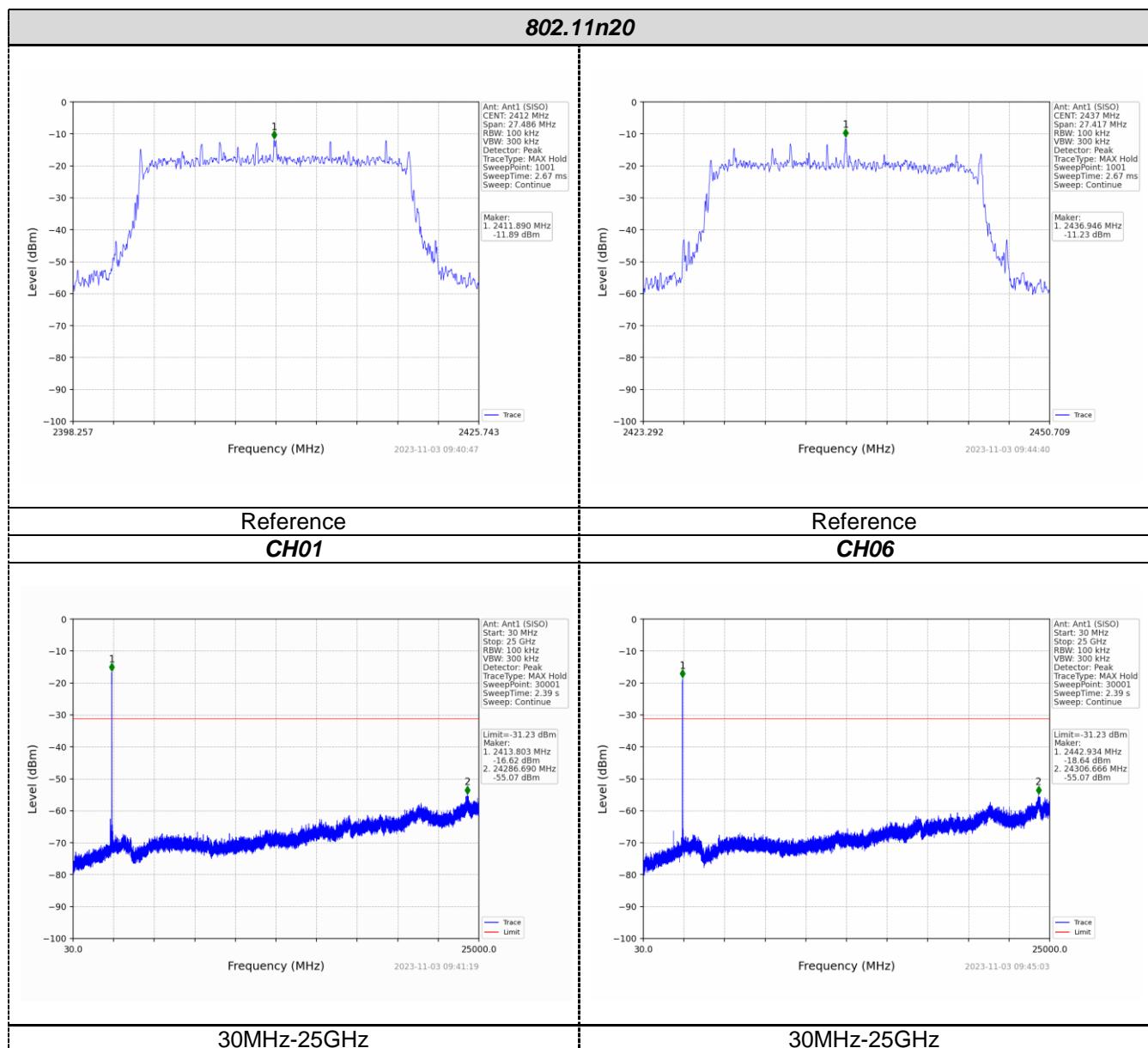
Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandage measurement data. And record the worst data in the report.

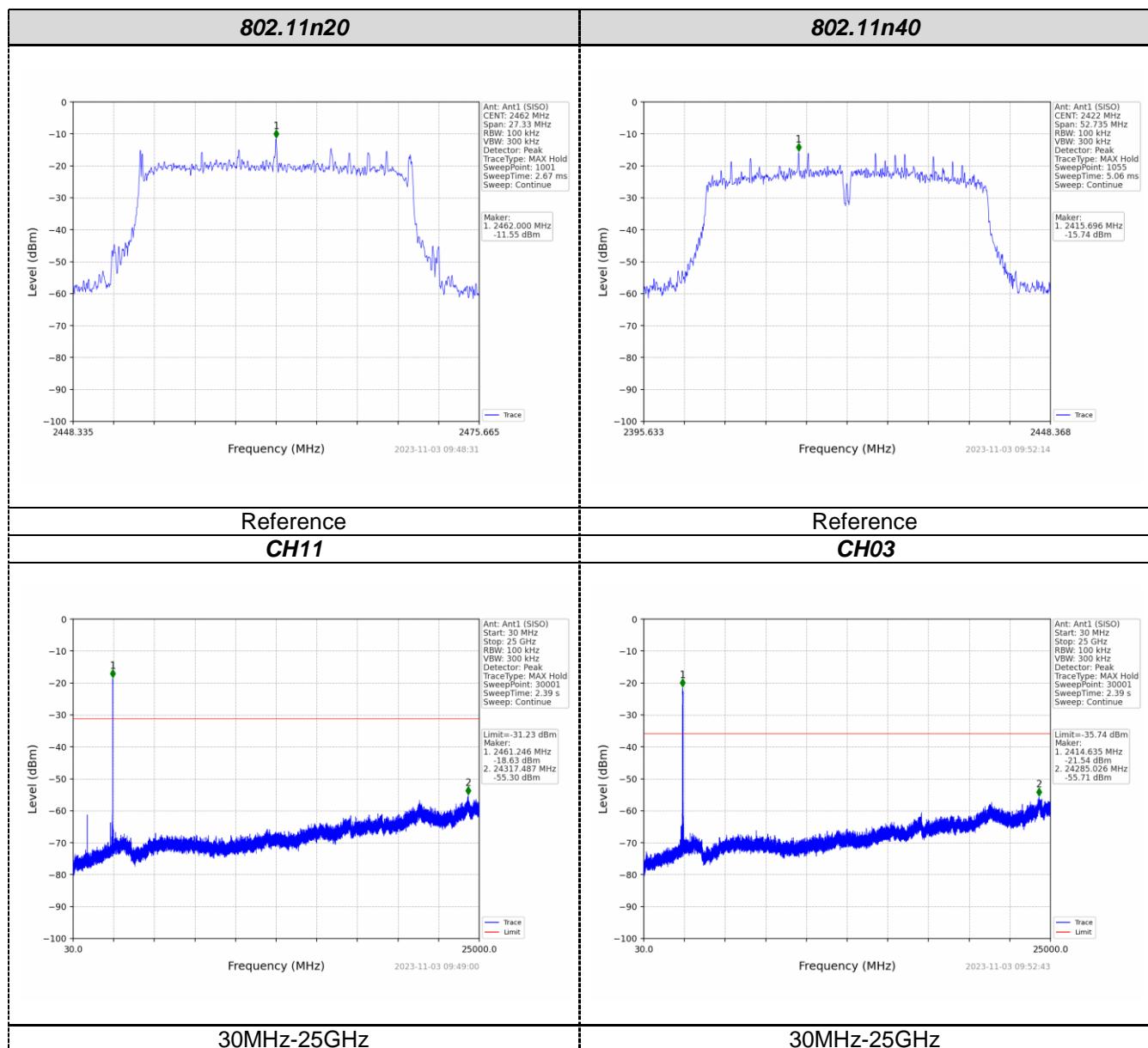
Test plot as follows:

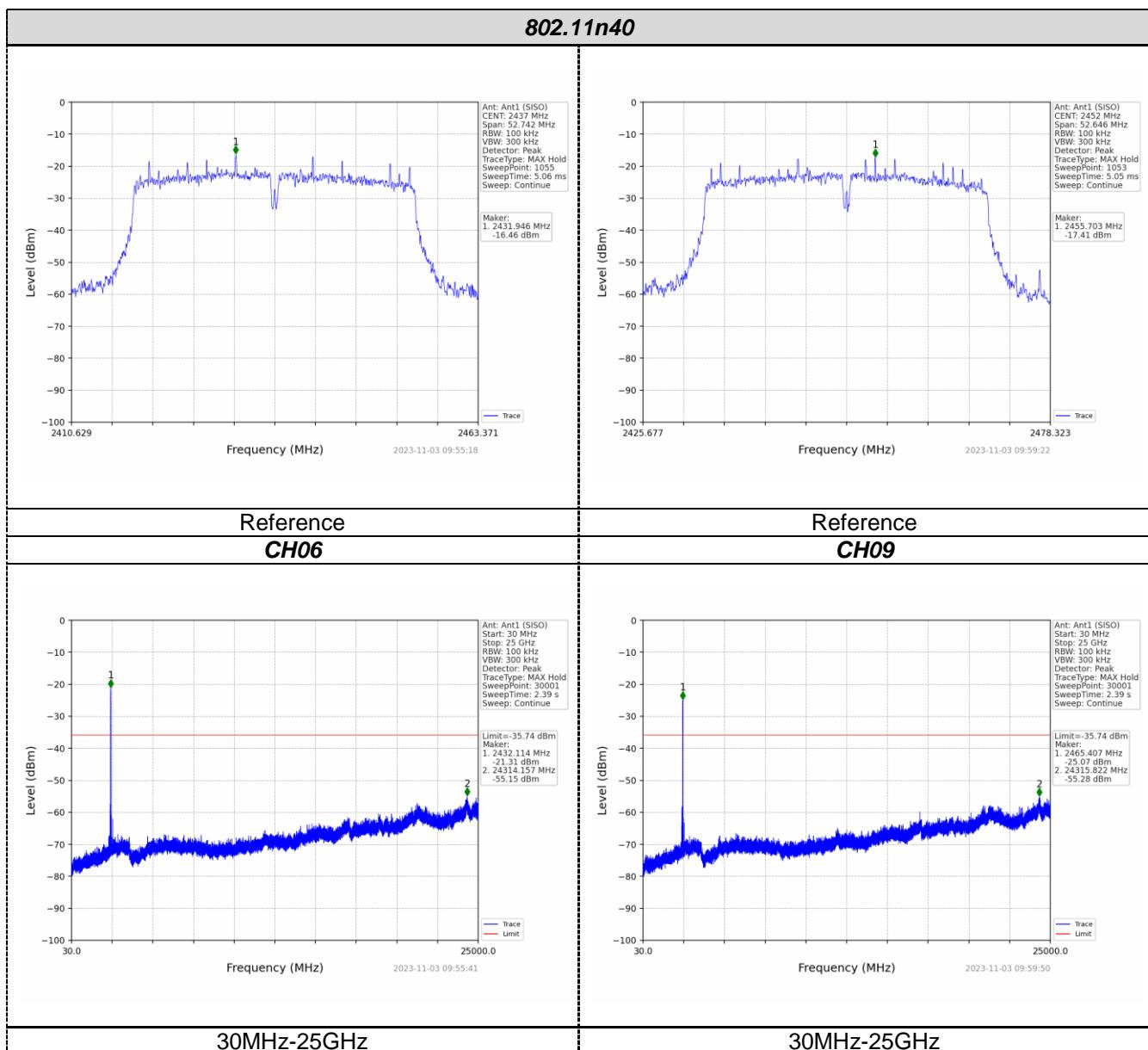


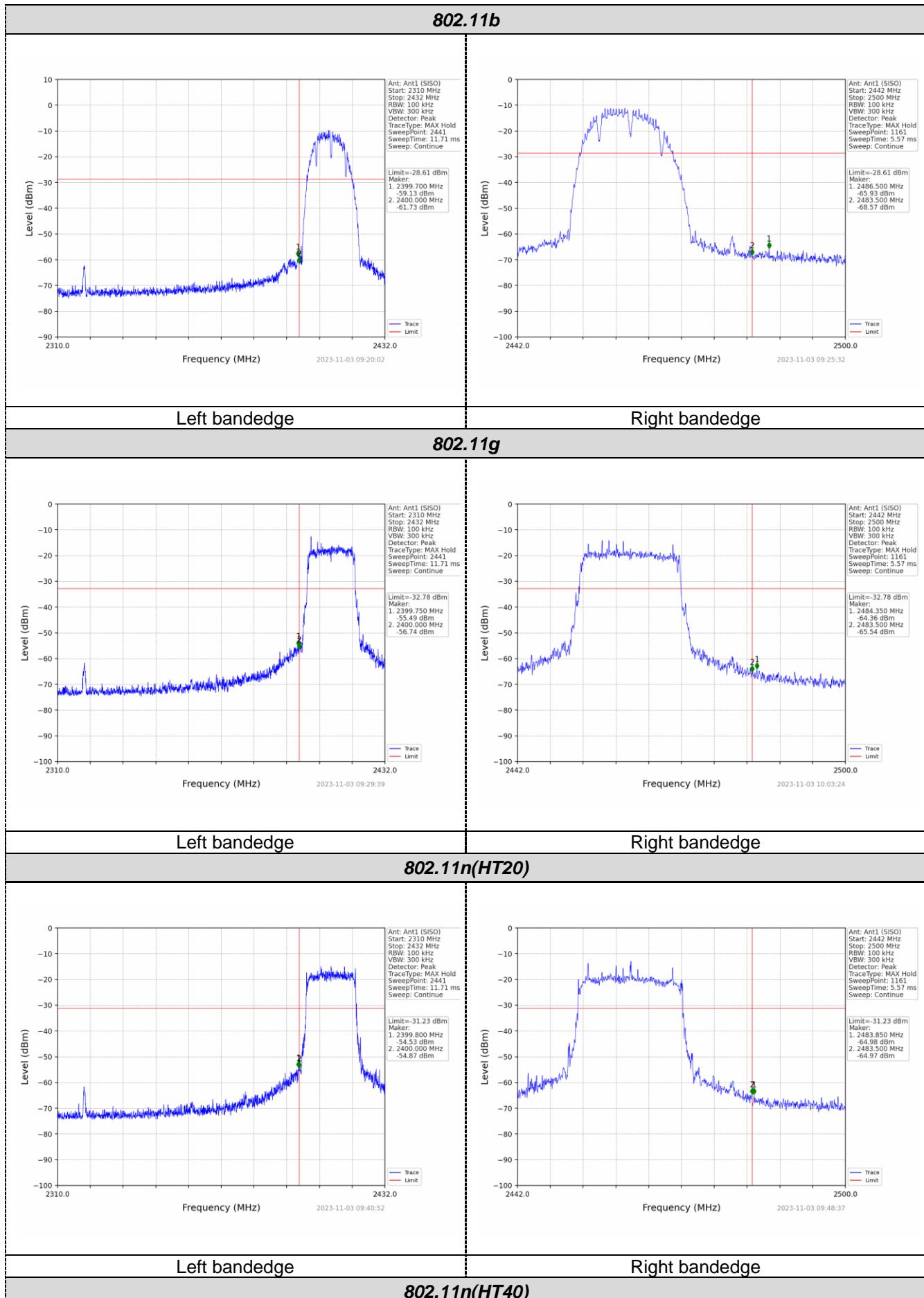


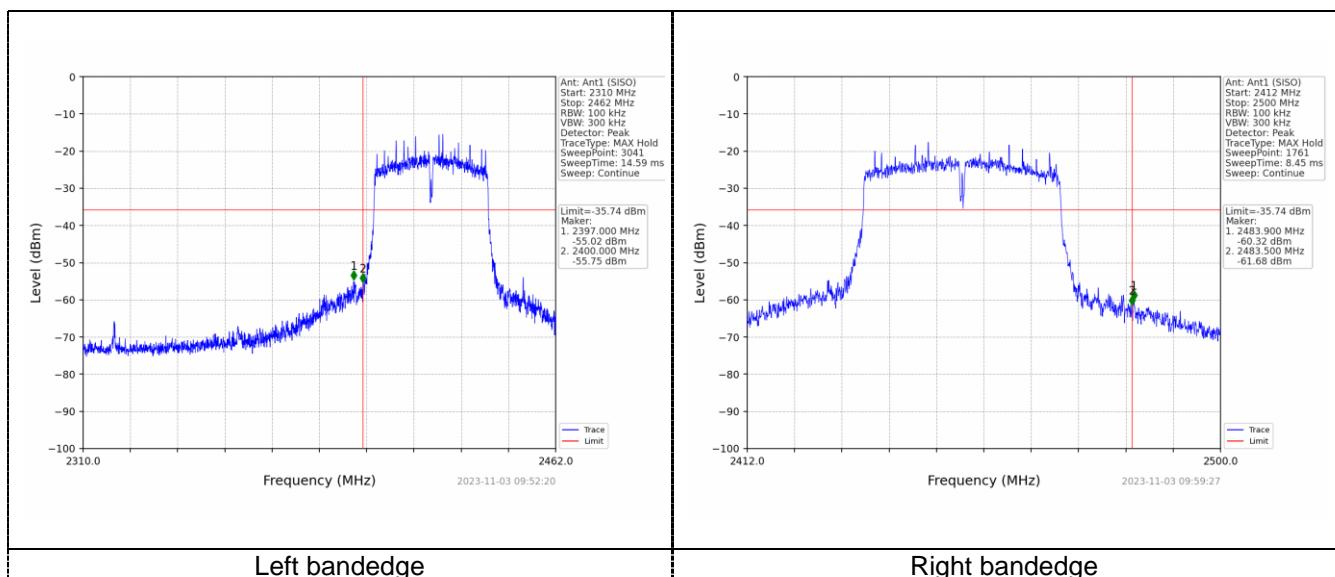








**Band-edge Measurements for RF Conducted Emissions:**



## 4.7 Antenna Requirement

### Standard Applicable

For intentional device, according to RSS-Gen 6.8:

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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

### Test Result:

The maximum gain of antenna was 0.00 dBi.

Remark: The antenna gain is provided by the customer, if the data provided by the customer is not accurate, Shenzhen HTT Technology Co.,Ltd. does not assume any responsibility.

## **5 Test Setup Photos of the EUT**

Reference to the **appendix I** for details.

## **6 Photos of the EUT**

Reference to the **appendix II** for details.

\*\*\*\*\* **End of Report** \*\*\*\*\*