

# TEST REPORT

**Application No.:**

GZCR2502000215AT

**Applicant:****TDK SensEl (Dongguan) Co. Ltd****Address of Applicant:**

Room 405, Building 6, No. 1, Xinke Road, Nancheng District, Dongguan City, Guangdong Province

**Manufacturer:****TDK SensEl (Dongguan) Co. Ltd****Address of Manufacturer:**

Room 405, Building 6, No. 1, Xinke Road, Nancheng District, Dongguan City, Guangdong Province

**Factory:**

VEXOS Dongguan Industrial Co., Ltd

**Address of Factory:**

Room 501, No. 2, Dongkeng Qianmei Road, Dongkeng Town, Dongguan City, Guangdong Province

**Product Name:**

edgeRX Gateway

**Model No.:**

SE5100204G-01

**Trade Mark:****Standard(s) :**

47 CFR Part 15, Subpart C 15.247

**Date of Receipt:**

2025-02-18

**Date of Test:**

2025-03-01 to 2025-04-20

**Date of Issue:**

2025-06-09

**Test Result:****Pass\***

\* In the configuration tested, the EUT complied with the standards specified above.

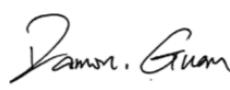
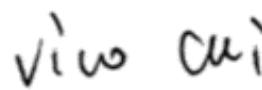


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Revision Record			
Version	Report No.	Date	Remark
01	GZCR250200021503	2025-06-09	Original

Authorized for issue by:			
	 Damon Guan		
	<hr/> Damon Guan/Project Engineer		
	 Vico Cui		
	<hr/> Vico Cui/Reviewer		



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## 2 Test Summary

<b>Radio Spectrum Technical Requirement</b>				
<b>Item</b>	<b>Standard</b>	<b>Method</b>	<b>Requirement</b>	<b>Result</b>
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass

<b>Radio Spectrum Matter Part</b>				
<b>Item</b>	<b>Standard</b>	<b>Method</b>	<b>Requirement</b>	<b>Result</b>
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Radiated Emissions which fall in the restricted bands		ANSI C63.10 (2013) Section 11.12	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions Below 1GHz		ANSI C63.10 (2013) Section 6.4,6.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions Above 1GHz		ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Conducted Peak Output Power		ANSI C63.10 (2013) Section 11.9.2	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Minimum 6dB Bandwidth		ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass
Power Spectrum Density		ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass
Conducted Band Edges Measurement		ANSI C63.10 (2013) Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions		ANSI C63.10 (2013) Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass

**Note:**

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.

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### 3 Contents

	Page
1 Cover Page .....	1
2 Test Summary .....	3
3 Contents .....	4
4 General Information.....	6
4.1 Details of E.U.T. .....	6
4.2 Description of Support Units .....	6
4.3 Measurement Uncertainty .....	7
4.4 Test Location.....	7
4.5 Test Facility .....	8
4.6 Deviation from Standards.....	8
4.7 Abnormalities from Standard Conditions .....	8
5 Equipment List.....	9
6 Radio Spectrum Technical Requirement .....	12
6.1 Antenna Requirement .....	12
6.1.1 Test Requirement: .....	12
6.1.2 Conclusion .....	12
7 Radio Spectrum Matter Test Results .....	13
7.1 Conducted Emissions at AC Power Line (150kHz-30MHz).....	13
7.1.1 E.U.T. Operation .....	13
7.1.2 Test Mode Description .....	13
7.1.3 Test Setup Diagram .....	14
7.1.4 Measurement Procedure and Data.....	14
7.2 Radiated Emissions which fall in the restricted bands .....	17
7.2.1 E.U.T. Operation .....	17
7.2.2 Test Mode Description .....	17
7.2.3 Test Setup Diagram .....	18
7.2.4 Measurement Procedure and Data.....	18
7.3 Radiated Spurious Emissions Below 1GHz .....	27
7.3.1 E.U.T. Operation .....	27
7.3.2 Test Mode Description .....	27
7.3.3 Test Setup Diagram .....	28
7.3.4 Measurement Procedure and Data.....	28
7.4 Radiated Spurious Emissions Above 1GHz.....	33
7.4.1 E.U.T. Operation .....	33
7.4.2 Test Mode Description .....	33
7.4.3 Test Setup Diagram .....	33
7.4.4 Measurement Procedure and Data.....	34
7.5 Conducted Peak Output Power.....	47
7.5.1 E.U.T. Operation .....	47
7.5.2 Test Mode Description .....	47
7.5.3 Test Setup Diagram .....	48



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7.5.4	Measurement Procedure and Data.....	48
7.6	Minimum 6dB Bandwidth .....	49
7.6.1	E.U.T. Operation .....	49
7.6.2	Test Mode Description .....	49
7.6.3	Test Setup Diagram .....	49
7.6.4	Measurement Procedure and Data.....	49
7.7	Power Spectrum Density.....	50
7.7.1	E.U.T. Operation .....	50
7.7.2	Test Mode Description .....	50
7.7.3	Test Setup Diagram .....	50
7.7.4	Measurement Procedure and Data.....	50
7.8	Conducted Band Edges Measurement .....	51
7.8.1	E.U.T. Operation .....	51
7.8.2	Test Mode Description .....	51
7.8.3	Test Setup Diagram .....	51
7.8.4	Measurement Procedure and Data.....	51
7.9	Conducted Spurious Emissions .....	52
7.9.1	E.U.T. Operation .....	52
7.9.2	Test Mode Description .....	52
7.9.3	Test Setup Diagram .....	52
7.9.4	Measurement Procedure and Data.....	52
<b>8</b>	<b>Test Setup Photo .....</b>	<b>53</b>
<b>9</b>	<b>EUT Constructional Details (EUT Photos) .....</b>	<b>54</b>
<b>10</b>	<b>Appendix.....</b>	<b>55</b>



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## 4 General Information

### 4.1 Details of E.U.T.

Power supply:	DC 12V for Gateway input.
Cable(s):	None.
Test Voltage:	AC 120 V, 60 Hz
Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2472MHz,
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK), 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Number of Channels:	802.11b/g/n(HT20):
Channel Spacing:	5MHz
Antenna Type:	RP-SMA Connector with dedicated antenna
Antenna Gain:	6 dBi according to antenna report
Antenna Number:	1 for BLE, another for 2.4GHz Wi-Fi & LTE

Remark: The information in this section is provided by the applicant or manufacturer, SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.

### 4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Note Book Computer	LENOVO	ThinkPad T490	PF1D1MVJ
AC/DC adapter:	Shenzhen Jingquanhua Electronics Co.,Ltd.	Model: CD264 Input: AC 100-240V 50/60Hz 600mA Max Output: DC 12V 2A	/



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**4.3 Measurement Uncertainty**

Test Item	Measurement Uncertainty
Conducted Emissions at AC Power Line (150kHz-30MHz)	±3.22dB
Radiated Emissions which fall in the restricted bands	±5.14dB (3m); ±4.90dB (10m); ±4.88dB (1GHz-6GHz); ±5.06dB (6GHz-18GHz); ±5.30dB (18GHz-40GHz)
Radiated Spurious Emissions Below 1GHz	±3.08dB (9kHz to 150kHz); ±3.19dB (150kHz to 30MHz); ±5.14dB (30MHz-1GHz) (3m); ±4.90dB (30MHz-1GHz) (10m)
Radiated Spurious Emissions Above 1GHz	±4.88dB (1GHz-6GHz); ±5.06dB (6GHz-18GHz); ±5.30dB (18GHz-40GHz)
Conducted Peak Output Power	± 0.75dB
Minimum 6dB Bandwidth	± 0.274%
Power Spectrum Density	± 2.84dB
Conducted Band Edges Measurement	± 0.75dB
Conducted Spurious Emissions	± 0.75dB

Remark:  
The  $U_{lab}$  (lab Uncertainty) is less than  $U_{cispr}$  (CISPR Uncertainty) or  $U_{ETSI}$  (ETSI Uncertainty).

Emission decision rule:

- Compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit, marked as Pass in the report.
- Non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit, marked as Fail in the report.

**4.4 Test Location**

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,  
No.198, Kezhu Road, Science City, Economic & Technological Development Area, Guangzhou,  
Guangdong, China 510663

Tel: +86 20 82155555

No tests were sub-contracted.



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## 4.5 Test Facility

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

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

- **ISED (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)**

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

## 4.6 Deviation from Standards

None

## 4.7 Abnormalities from Standard Conditions

None

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## 5 Equipment List

Conducted Emissions at AC Power Line (150kHz-30MHz)					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Coaxial Cable	HangTianXing	2m	EMC0107	2023-08-24	2025-08-23
Shielding Room	ChangZhou ZhongYu	8m x 3m x 3.8m	EMC0306	2022-10-16	2025-10-15
Two-Line V-Network-GZ	Rohde & Schwarz	ENV216	EMC2135	2024-09-02	2025-09-01
EMI Test Receiver (9kHz-3.6GHz)	Rohde & Schwarz	ESR3	EMC2221	2024-12-04	2025-12-03
Test Software E3r	Audix	Ver.6.191211	GZE100-77	N/A	N/A

Radiated Emissions which fall in the restricted bands					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2024-10-14	2025-10-13
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2024-09-02	2025-09-01
Chamber cable (Above 1GHz)	Scoflex	KMKG-8.0m	EMC0545	2024-08-19	2026-08-18
Horn Antenna (1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-23	2025-09-22
Horn Antenna (14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2023-06-18	2026-06-17
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2024-08-19	2025-08-18
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2024-10-14	2025-10-13
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2023-12-20	2026-12-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

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**Radiated Spurious Emissions Below 1GHz**

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2022-10-16	2025-10-15
Coaxial cable	Mirco-COAX UTIFLEX	311A	EMC0540	2024-08-19	2026-08-18
Amplifier (9kHz-1.3GHz)	HP	8447F	EMC2065	2024-12-04	2025-12-03
Active Loop Antenna-RED	ETS-Lindgren	6502	EMC2190	2024-04-08	2026-04-07
EMI Test Receiver (9kHz-7GHz)	Rohde & Schwarz	ESR7	EMC2220	2024-12-04	2025-12-03
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Trilog Broadband Antenna (25MHz-2GHz)	Schwarzbeck Mess-Elektronik	VULB 9168	EMC2174	2022-06-19	2025-06-18

**Radiated Spurious Emissions Above 1GHz**

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2024-10-14	2025-10-13
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2024-09-02	2025-09-01
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2024-08-19	2026-08-18
Horn Antenna (1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-23	2025-09-22
Horn Antenna (14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2023-06-18	2026-06-17
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2024-10-14	2025-10-13
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2024-08-19	2025-08-18
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2024-10-14	2025-10-13
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2023-12-20	2026-12-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

**RF Conducted Test**

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
MI CABLE	SGS-EMC	0.8M	EMC2137	2023-11-02	2025-11-01
4X4 Power sensor Unit	TST	TPSPS2023R	EMC2226	2024-08-19	2025-08-18
Test Software	TST	V2.0	GZE100-78	N/A	N/A
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2024-08-19	2025-08-18

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**General used equipment**

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2024-06-13	2025-06-12

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## 6 Radio Spectrum Technical Requirement

## 6.1 Antenna Requirement

### 6.1.1 Test Requirement:

## 47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

## 6.1.2 Conclusion

Standard Requirement: 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.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, 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 (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

## EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 6 dBi.

Antenna location: Refer to internal photo.

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## 7 Radio Spectrum Matter Test Results

### 7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

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

\*Decreases with the logarithm of the frequency.

Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

#### 7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 24.9 °C      Humidity: 56.4 % RH      Atmospheric Pressure: 1020 mbar

#### 7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

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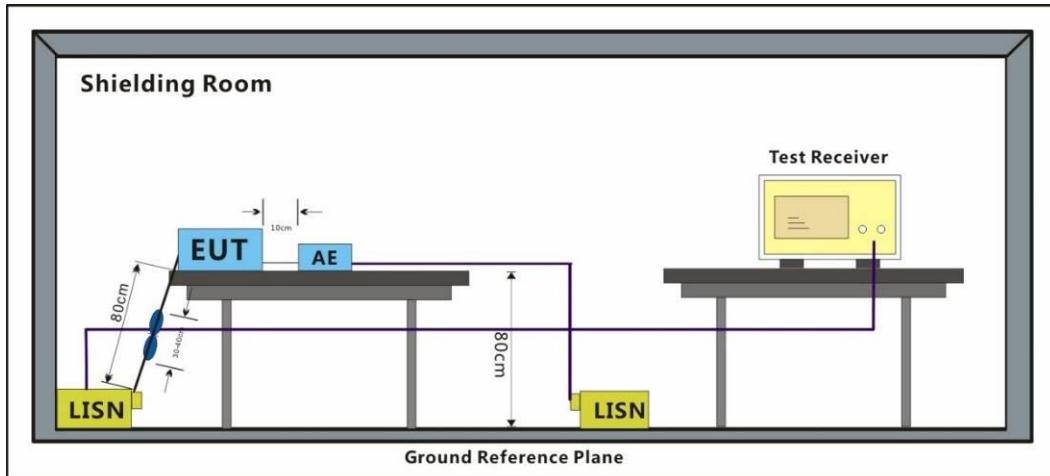
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### 7.1.3 Test Setup Diagram



### 7.1.4 Measurement Procedure and Data

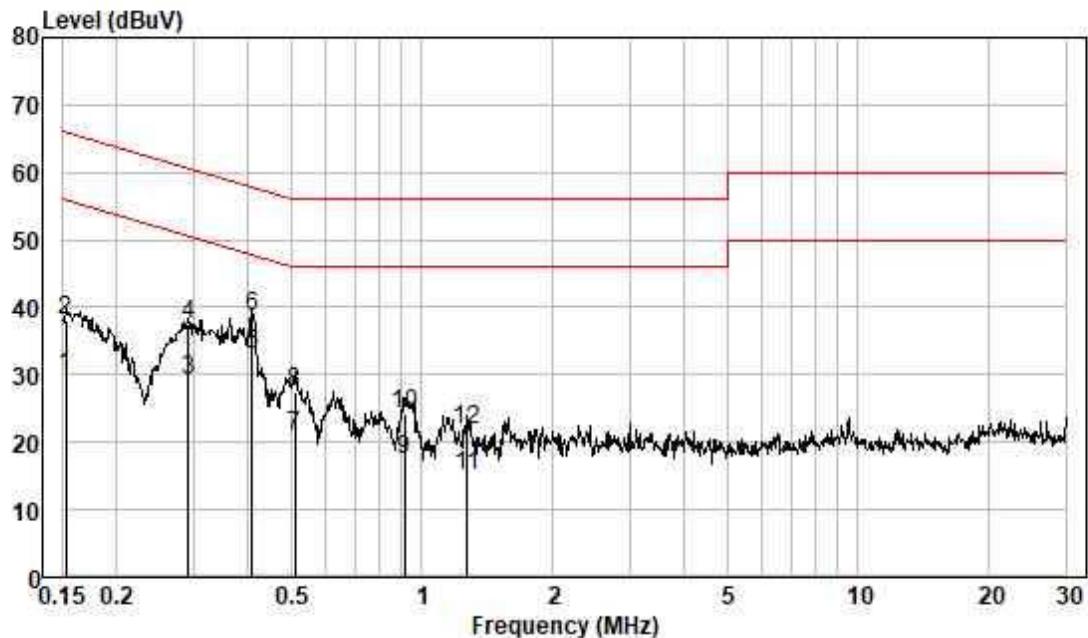
- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50 $\mu$ H + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: Level=Read Level+ Cable Loss+ LISN Factor

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Test Mode: 02; Line: Live line



Pol :LINE

Mode :

Model :

Power :

	Frequenc	Read	Cable	LISN	Measured	Limit	Over	Remark
	MHz	Level	Loss	Factor	Level	Line	Limit	
		dBuV	dB	dB	dBuV	dBuV	dB	
1	0.152	20.14	0.04	9.57	29.75	55.87	-26.12	Average
2	0.152	28.36	0.04	9.57	37.97	65.87	-27.90	QP
3	0.291	19.56	0.04	9.55	29.15	50.50	-21.35	Average
4	0.291	27.76	0.04	9.55	37.35	60.50	-23.15	QP
5	0.408	23.55	0.05	9.53	33.13	47.68	-14.55	Average
6	0.408	29.00	0.05	9.53	38.58	57.68	-19.10	QP
7	0.513	11.41	0.05	9.58	21.04	46.00	-24.96	Average
8	0.513	17.95	0.05	9.58	27.58	56.00	-28.42	QP
9	0.914	7.66	0.07	9.60	17.33	46.00	-28.67	Average
10	0.914	14.62	0.07	9.60	24.29	56.00	-31.71	QP
11	1.269	5.44	0.09	9.55	15.08	46.00	-30.92	Average
12	1.269	12.29	0.09	9.55	21.93	56.00	-34.07	QP

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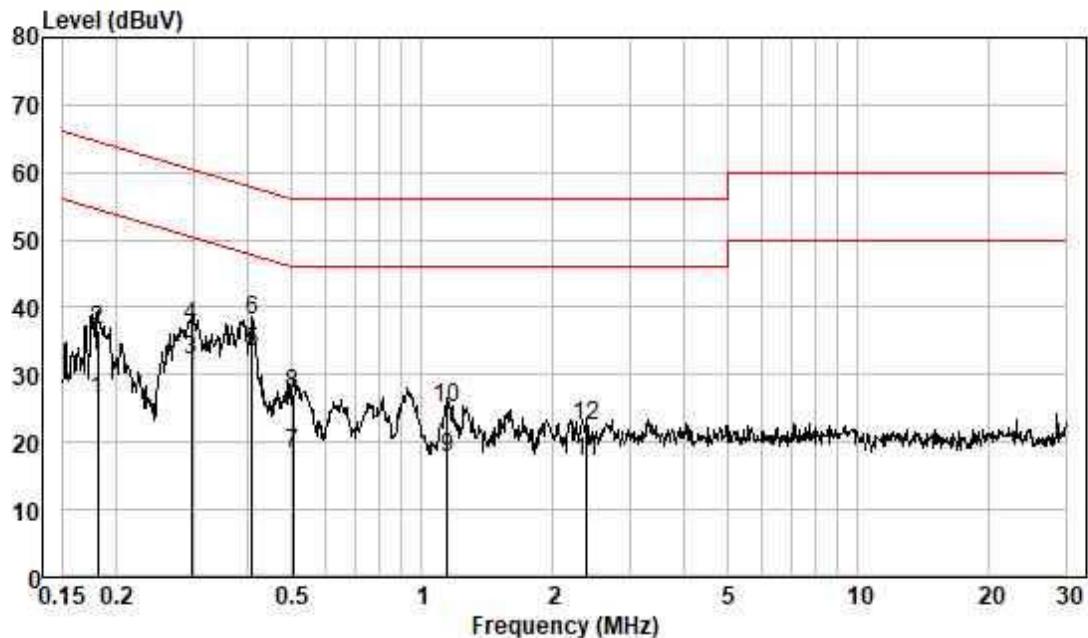


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Test Mode: 02; Line: Neutral Line



Pol : NEUTRAL

Mode :

Model :

Power :

	Frequenc	Read Level	Cable Loss	LISN Factor	Measured Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.181	16.67	0.04	9.54	26.25	54.46	-28.21	Average
2	0.181	27.07	0.04	9.54	36.65	64.46	-27.81	QP
3	0.296	22.55	0.04	9.54	32.13	50.37	-18.24	Average
4	0.296	27.73	0.04	9.54	37.31	60.37	-23.06	QP
5	0.408	23.81	0.05	9.54	33.40	47.68	-14.28	Average
6	0.408	28.49	0.05	9.54	38.08	57.68	-19.60	QP
7	0.507	8.81	0.05	9.58	18.44	46.00	-27.56	Average
8	0.507	17.56	0.05	9.58	27.19	56.00	-28.81	QP
9	1.141	8.08	0.08	9.56	17.72	46.00	-28.28	Average
10	1.141	15.31	0.08	9.56	24.95	56.00	-31.05	QP
11	2.384	7.40	0.14	9.57	17.11	46.00	-28.89	Average
12	2.384	12.62	0.14	9.57	22.33	56.00	-33.67	QP

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**7.2 Radiated Emissions which fall in the restricted bands**

Test Requirement 47 CFR Part 15, Subpart C 15.205 &amp; 15.209

Test Method: ANSI C63.10 (2013) Section 11.12

Limit:

Test Distance: 3 m

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
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

**7.2.1 E.U.T. Operation**

Operating Environment:

Temperature: 21.2 °C      Humidity: 48.6 % RH      Atmospheric Pressure: 1012 mbar

**7.2.2 Test Mode Description**

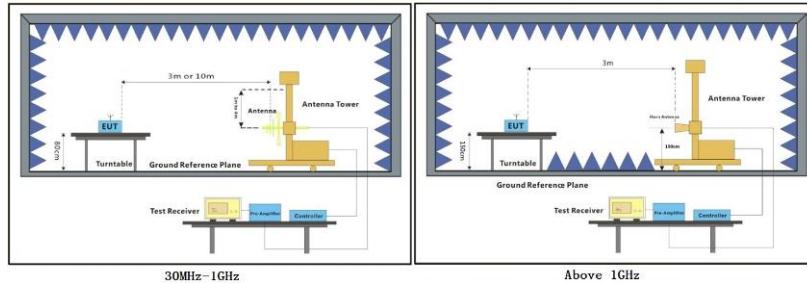
Pre-scan / Mode Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.



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### 7.2.3 Test Setup Diagram



#### 7.2.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits.

However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Remark 3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for Peak detection (PK) and Average detection (AV) at frequency above 1GHz.

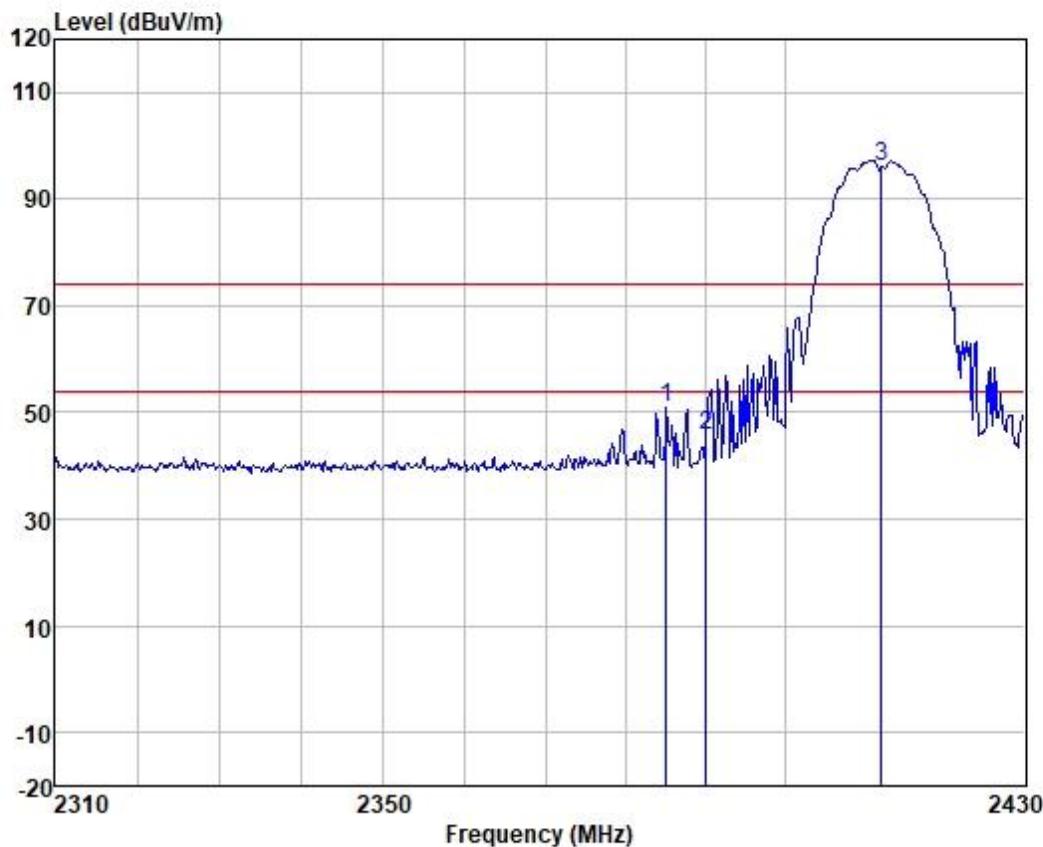
Remark 4: For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle  $< 98\%$ ) or 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.

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Test Mode: 02; Polarity: Vertical; Modulation:802.11b; Bandwidth:20MHz; Channel:Low



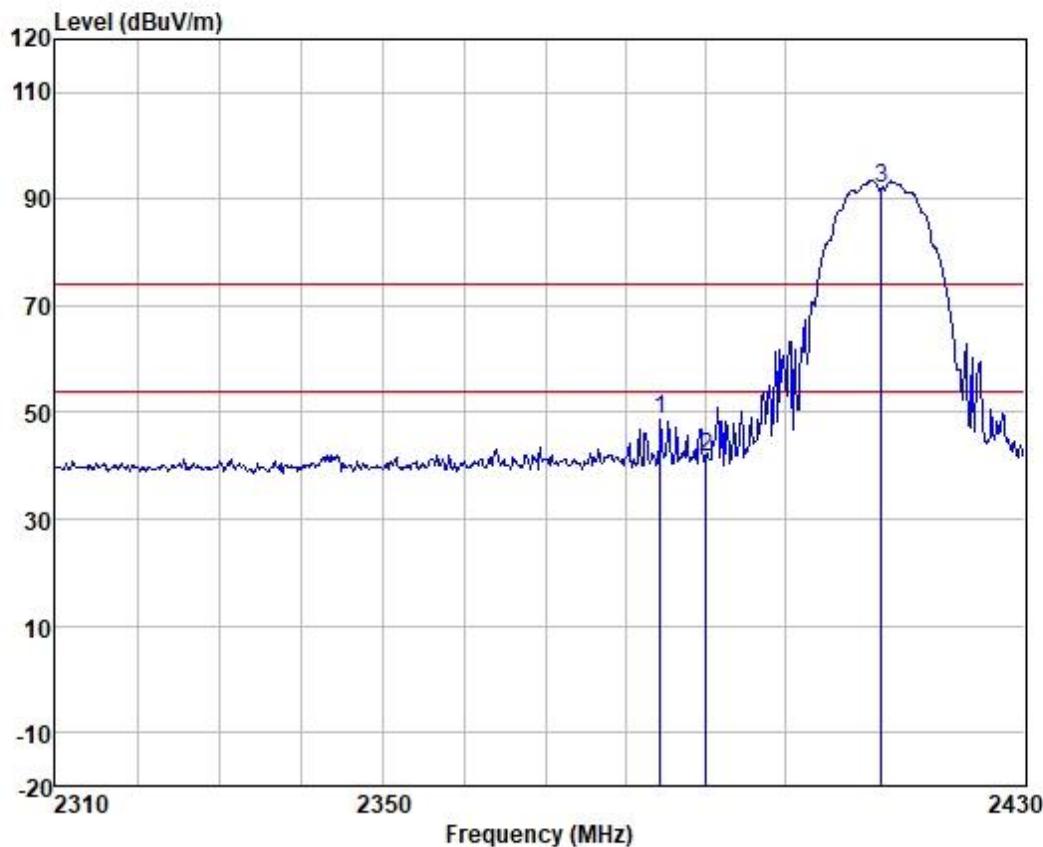
Freq	ReadAntenna		Cable		Preamp Level	Limit Line	Over Limit	Over Limit Pol/Phase	Remark
	MHz	Level Factor	Loss Factor	dB	dBuV/m	dBuV/m	dB		
1	2385.011	57.65	27.68	3.44	37.77	51.00	74.00	-23.00	VERTICAL peak
2	2390.000	52.36	27.68	3.44	37.77	45.71	74.00	-28.29	VERTICAL peak
3 *	2412.000	102.59	27.74	3.46	37.77	96.02	74.00	22.02	VERTICAL peak



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Test Mode: 02; Polarity: Horizontal; Modulation:802.11b; Bandwidth:20MHz; Channel:Low



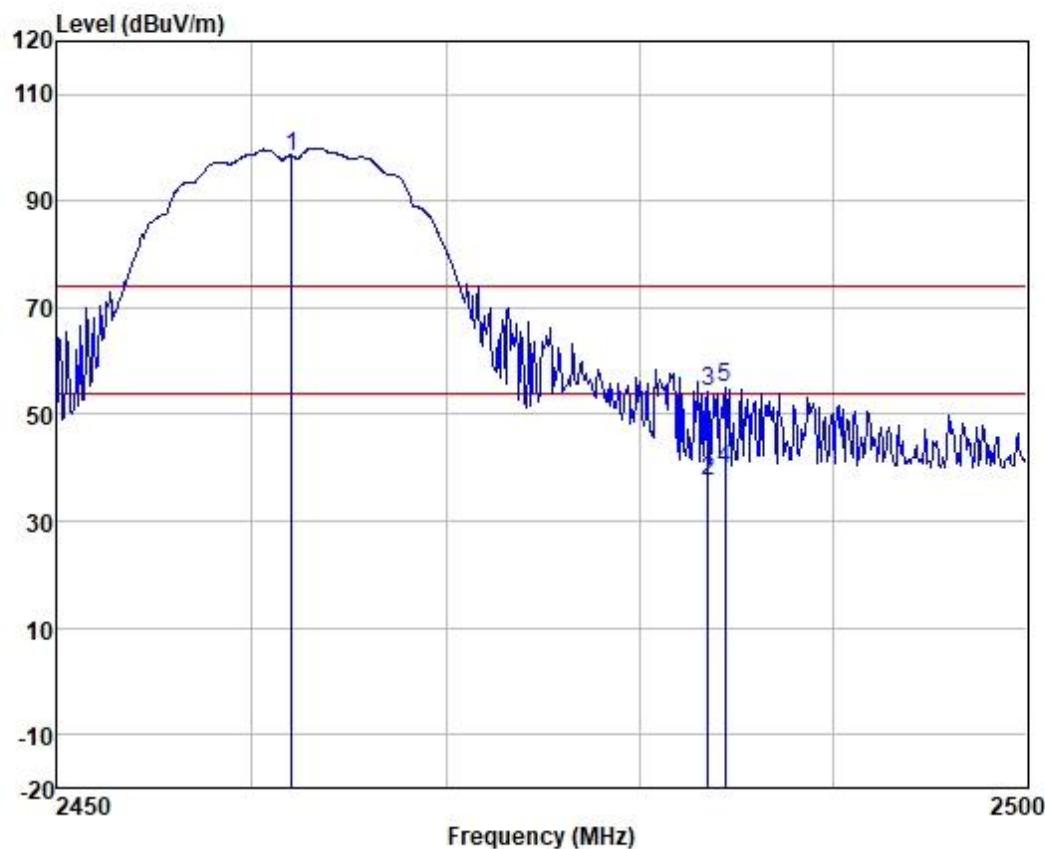
Freq	ReadAntenna		Cable		Preamp Level	Limit Line	Over Limit	Over Limit Pol/Phase	Remark
	MHz	dBuV	Level Factor	Loss Factor					
1	2384.286	55.20	27.68	3.44	37.77	48.55	74.00	-25.45	HORIZONTAL peak
2	2390.000	48.15	27.68	3.44	37.77	41.50	74.00	-32.50	HORIZONTAL peak
3 *	2412.000	98.74	27.74	3.46	37.77	92.17	74.00	18.17	HORIZONTAL peak



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Test Mode: 02; Polarity: Vertical; Modulation:802.11b; Bandwidth:20MHz; Channel:High

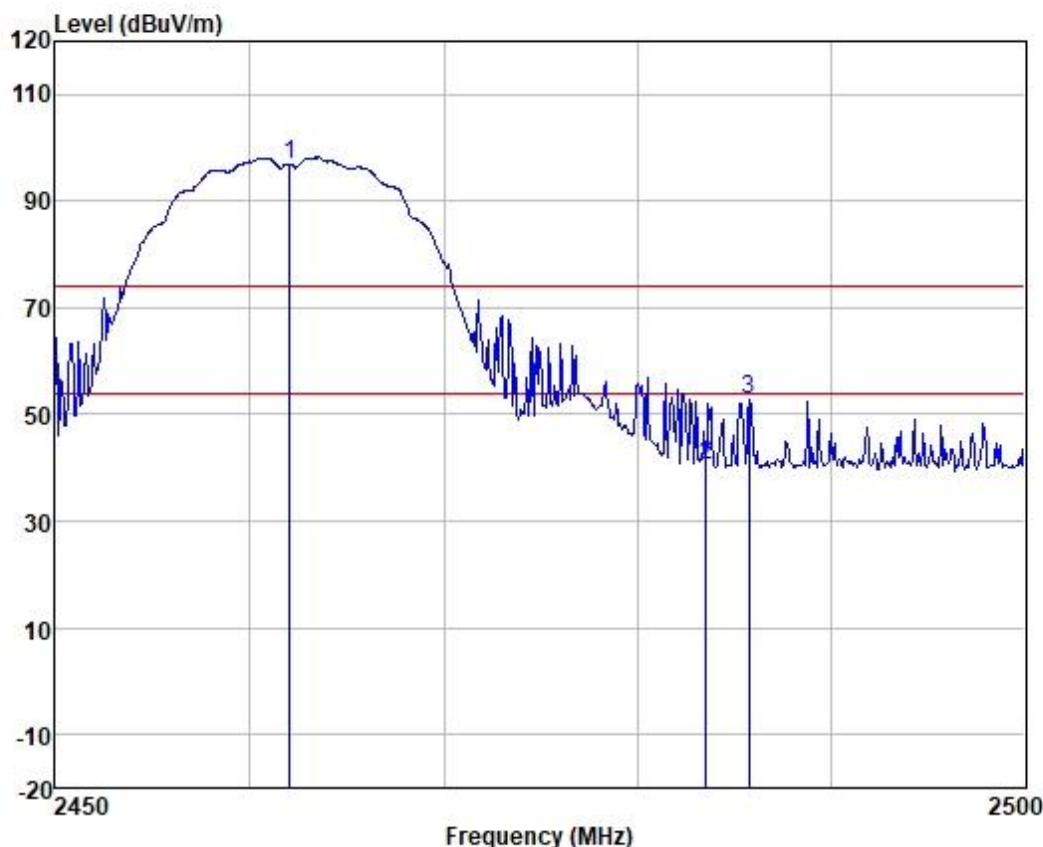


Freq	ReadAntenna		Cable		Preamp		Limit Line	Over Limit	Pol/Phase	Remark
	MHz	Level	Factor	Loss	Factor	Level	dB	dBuV/m	dBuV/m	dB
1 * 2462.000	104.98	27.82	3.48	37.76	98.52	74.00	24.52	VERTICAL	peak	
2 2483.500	43.90	27.85	3.49	37.76	37.48	54.00	-16.52	VERTICAL	Average	
3 2483.500	60.83	27.85	3.49	37.76	54.41	74.00	-19.59	VERTICAL	peak	
4 2484.392	46.19	27.85	3.49	37.76	39.77	54.00	-14.23	VERTICAL	Average	
5 2484.392	61.57	27.85	3.49	37.76	55.15	74.00	-18.85	VERTICAL	peak	

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Test Mode: 02; Polarity: Horizontal; Modulation:802.11b; Bandwidth:20MHz; Channel:High



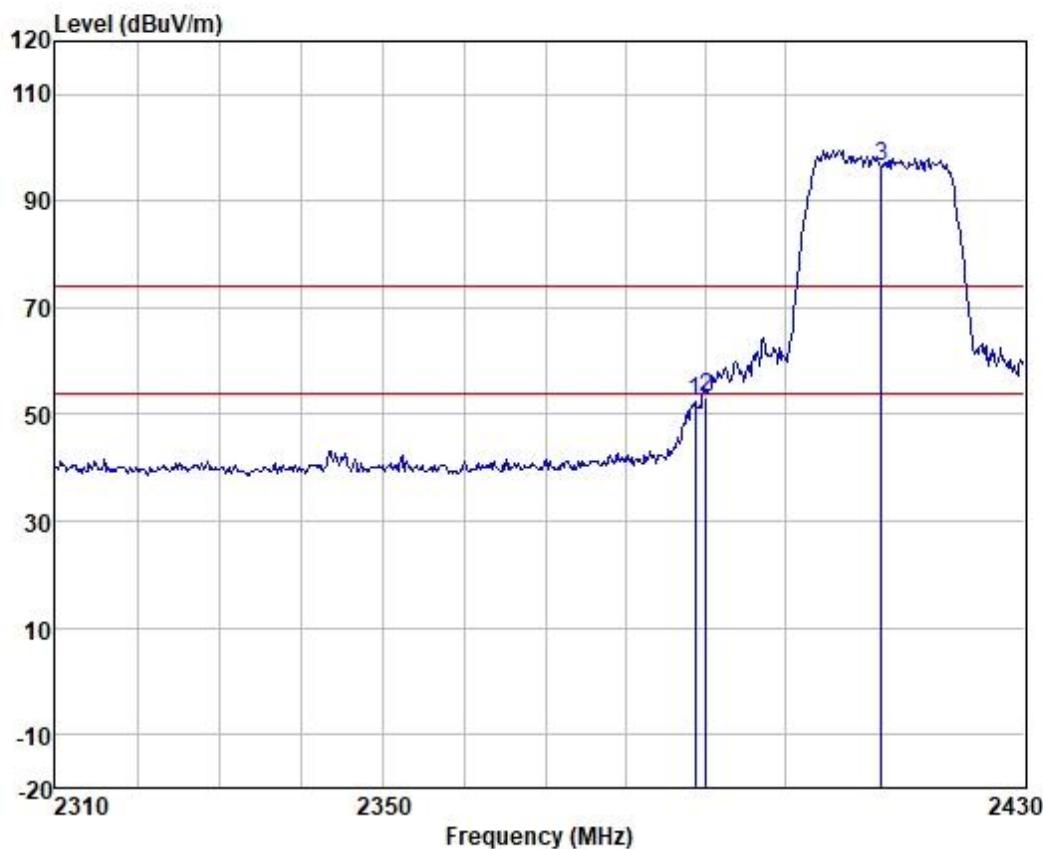
Freq	ReadAntenna		Cable		Preamp Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	Level dBuV	Factor	Loss dB					
1 * 2462.000	103.44	27.82	3.48	37.76	96.98	74.00	22.98	HORIZONTAL	peak
2 2483.500	46.99	27.85	3.49	37.76	40.57	74.00	-33.43	HORIZONTAL	peak
3 2485.747	59.19	27.85	3.49	37.76	52.77	74.00	-21.23	HORIZONTAL	peak



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Test Mode: 02; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:Low



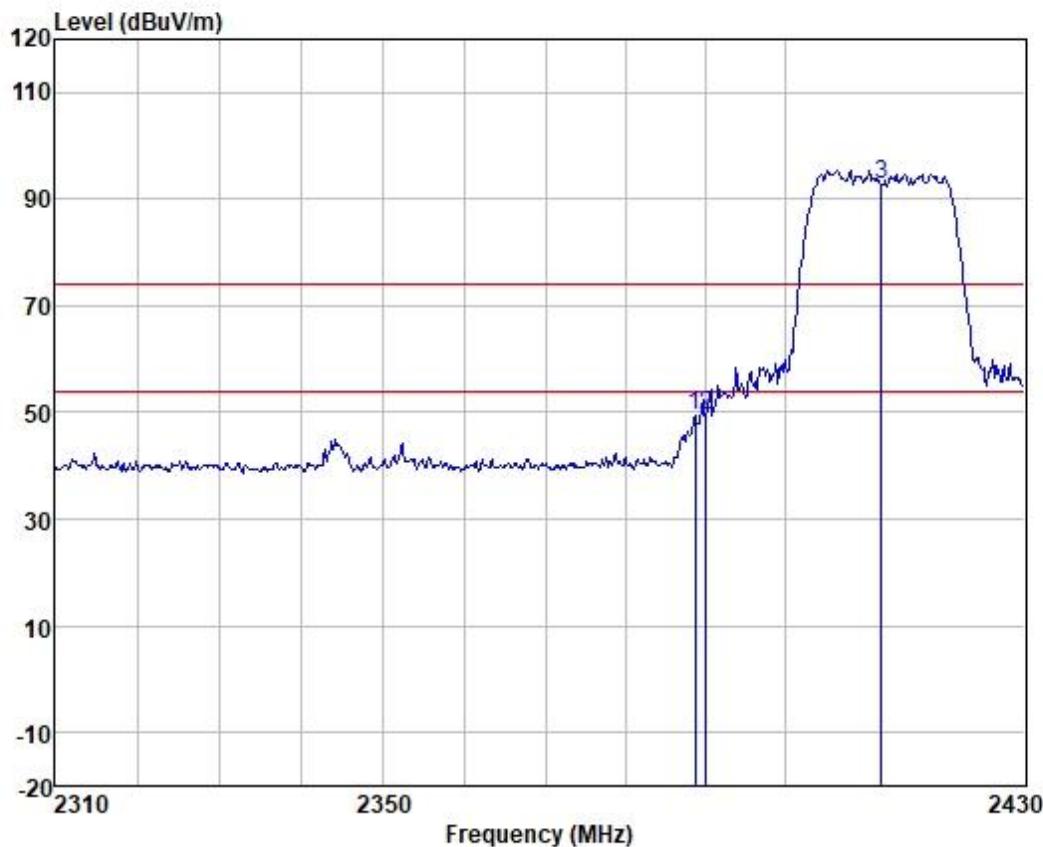
Freq	ReadAntenna		Cable		Preamp Level	Limit Line	Over Limit	Over Limit Pol/Phase	Remark
	MHz	Level Factor	Loss Factor	dB	dBuV/m	dBuV/m	dB	dB	
1	2388.637	59.22	27.68	3.44	37.77	52.57	74.00	-21.43	VERTICAL peak
2	2390.000	59.85	27.68	3.44	37.77	53.20	74.00	-20.80	VERTICAL peak
3 *	2412.000	102.88	27.74	3.46	37.77	96.31	74.00	22.31	VERTICAL peak



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Test Mode: 02; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:Low



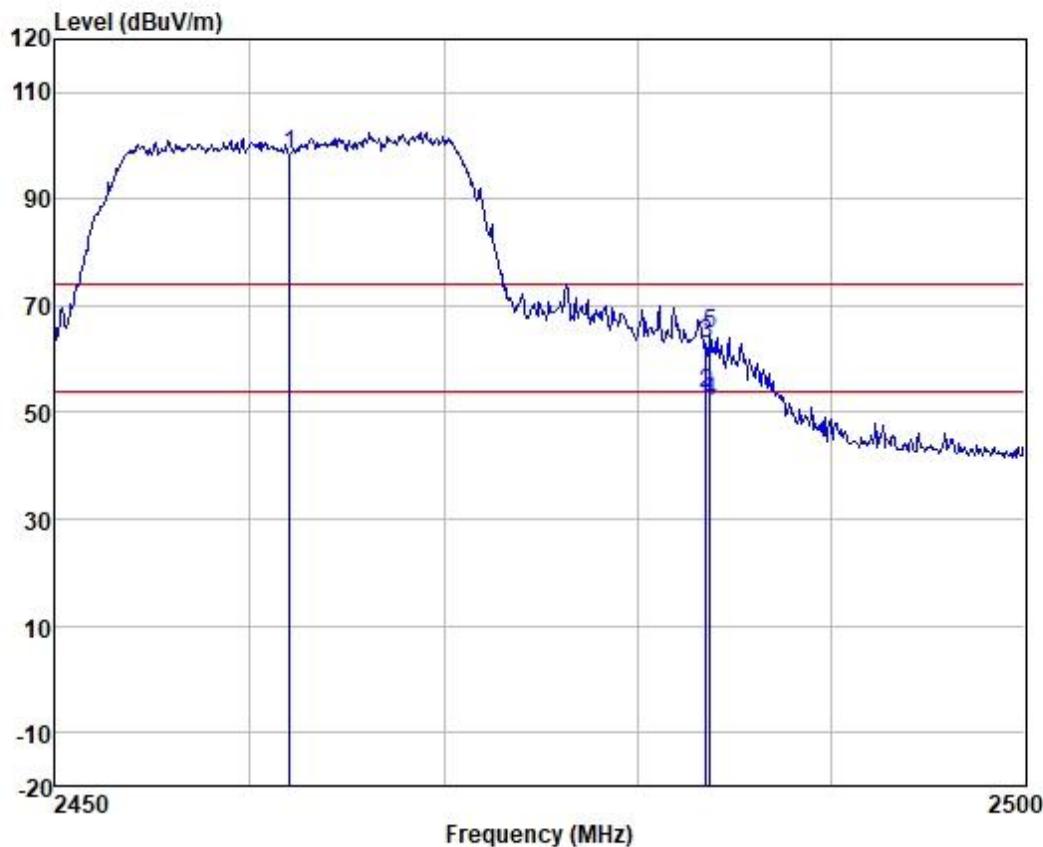
Freq	ReadAntenna		Cable		Preamp Level	Limit Line	Over Limit	Over Limit Pol/Phase	Remark
	MHz	Level Factor	Loss Factor	dB	dBuV/m	dBuV/m	dB		
1	2388.637	56.15	27.68	3.44	37.77	49.50	74.00	-24.50	HORIZONTAL peak
2	2390.000	56.10	27.68	3.44	37.77	49.45	74.00	-24.55	HORIZONTAL peak
3 *	2412.000	99.41	27.74	3.46	37.77	92.84	74.00	18.84	HORIZONTAL peak



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Test Mode: 02; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:High

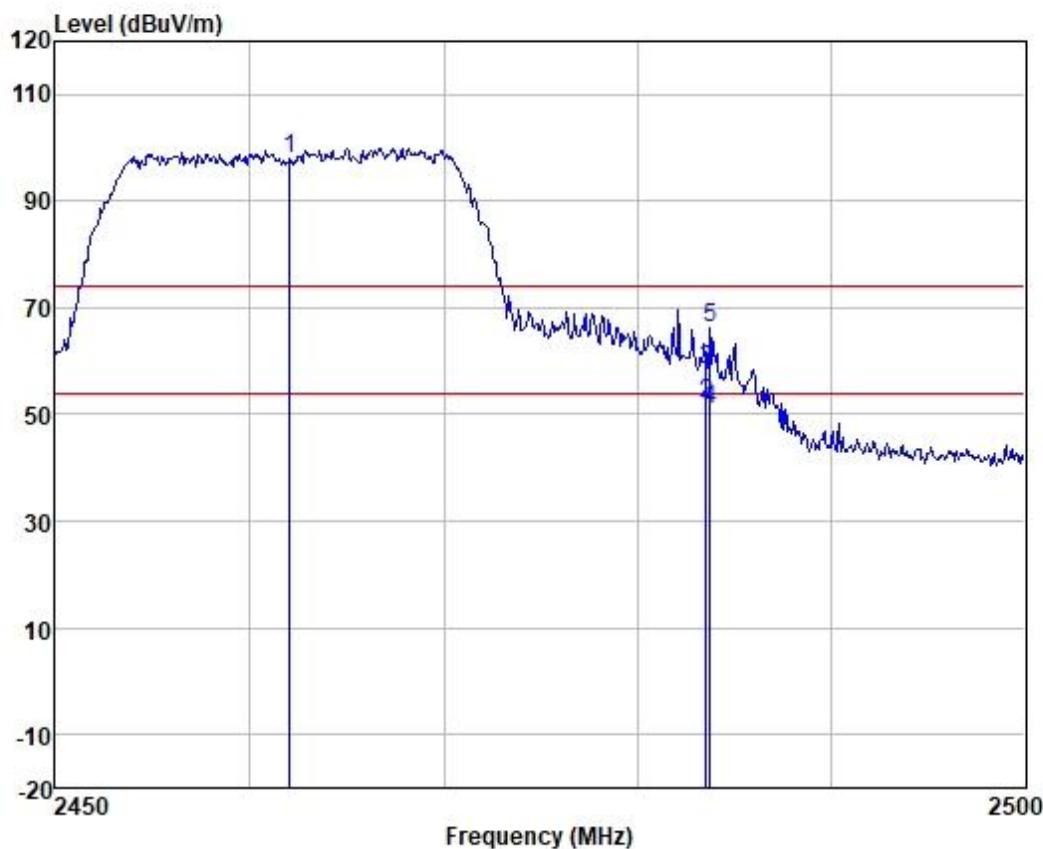


Freq	Read	Antenna	Cable	Preamp	Limit	Over	Over	Pol/Phase	Remark
	Level	Factor	Loss	Factor					
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1 *	2462.000	104.85	27.82	3.48	37.76	98.39	74.00	24.39	VERTICAL peak
2	2483.500	60.00	27.85	3.49	37.76	53.58	54.00	-0.42	VERTICAL Average
3	2483.500	69.37	27.85	3.49	37.76	62.95	74.00	-11.05	VERTICAL peak
4	2483.689	58.63	27.85	3.49	37.76	52.21	54.00	-1.79	VERTICAL Average
5	2483.689	71.31	27.85	3.49	37.76	64.89	74.00	-9.11	VERTICAL peak

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Test Mode: 02; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:High



Freq	ReadAntenna		Cable		Preamp Level	Limit Line	Over Limit	Over Limit Pol/Phase	Remark
	MHz	dBuV	Level Factor	Loss					
					dBuV/m	dBuV/m			
1 *	2462.000	104.39	27.82	3.48	37.76	97.93	74.00	23.93	HORIZONTAL peak
2	2483.500	58.36	27.85	3.49	37.76	51.94	54.00	-2.06	HORIZONTAL Average
3	2483.500	64.88	27.85	3.49	37.76	58.46	74.00	-15.54	HORIZONTAL peak
4	2483.689	57.40	27.85	3.49	37.76	50.98	54.00	-3.02	HORIZONTAL Average
5	2483.689	72.74	27.85	3.49	37.76	66.32	74.00	-7.68	HORIZONTAL peak

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### 7.3 Radiated Spurious Emissions Below 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.205 &amp; 15.209

Test Method: ANSI C63.10 (2013) Section 6.4,6.5

Limit:

Test Distance: 3 m below 30MHz, 10 m above 30MHz

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
216-960	200	3
960-1000	500	3

#### 7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 22.9 °C Humidity: 67.0 % RH Atmospheric Pressure: 1020 mbar

#### 7.3.2 Test Mode Description

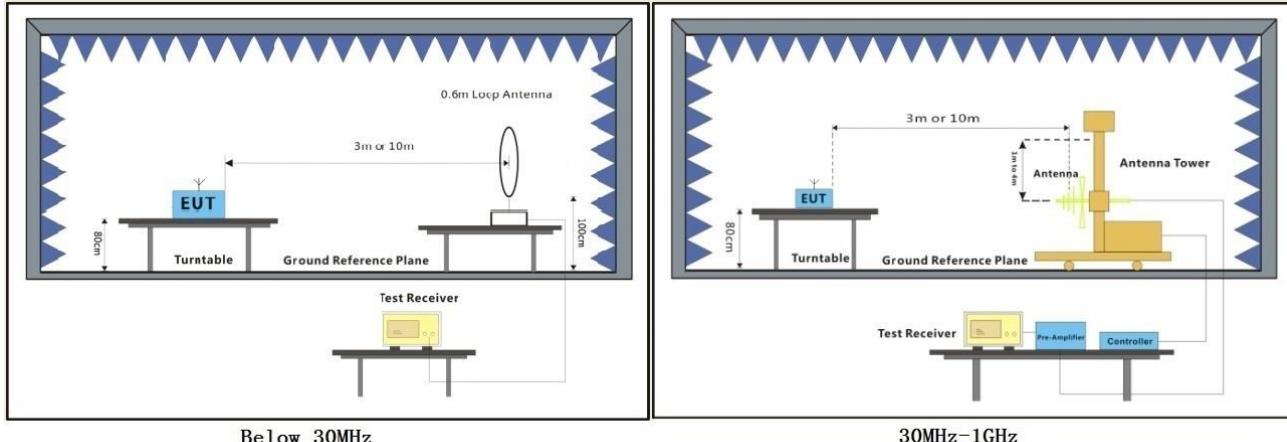
Pre-scan / Mode Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.



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### 7.3.3 Test Setup Diagram



### 7.3.4 Measurement Procedure and Data

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using quasi-peak method as specified and then reported in a data sheet.
- Test the EUT in the lowest channel, the middle channel, the Highest channel.
- The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- Repeat above procedures until all frequencies measured was complete.

Remark:

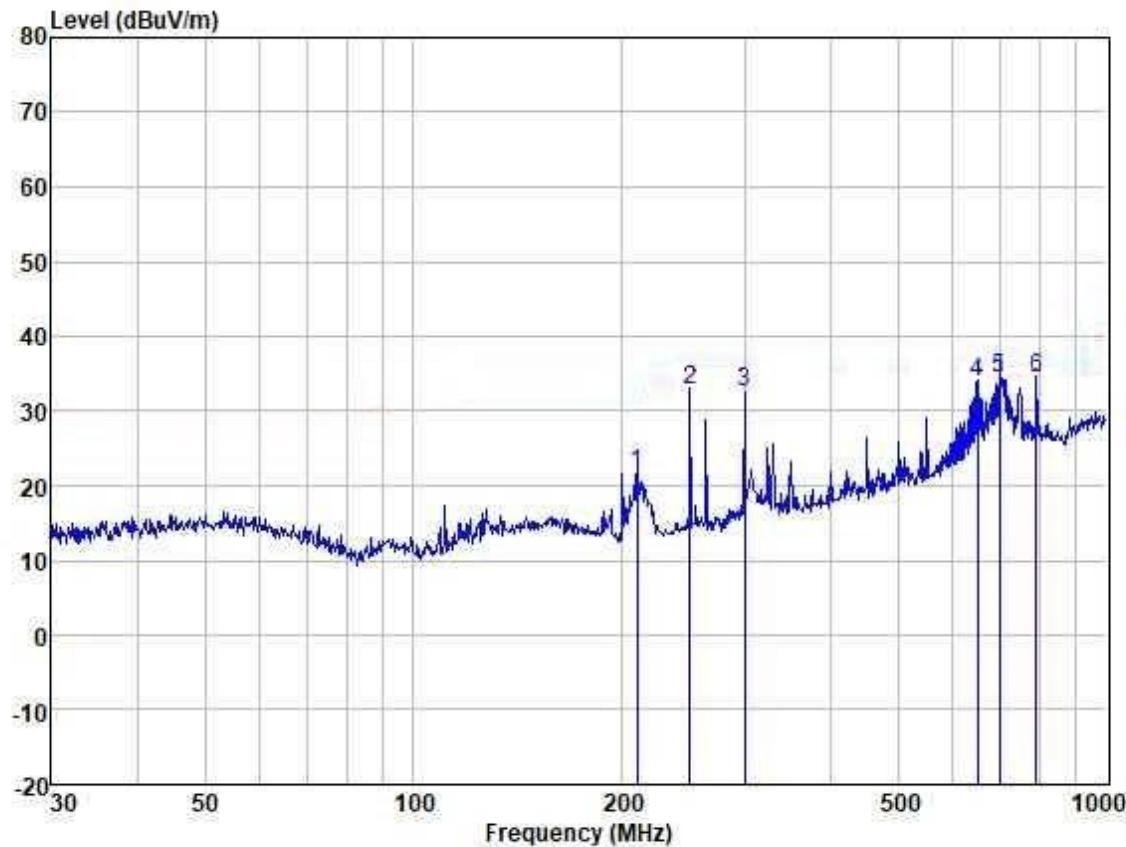
- Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
- Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.



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Test Mode: 02; Polarity: Horizontal



Site : SGS  
Job :  
Model :  
Power : 120V 60Hz  
Test Mode : TX

Freq	Read	Antena	Cable	Preamp	Measured	Limit	Over	Pol/ Phase	Remark
	Level	Factor	Loss	Factor	Level	Line	Limit		
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1 210.048	37.88	9.97	1.26	27.41	21.70			HORIZONTAL	QP
2 250.301	45.63	11.79	1.54	27.27	31.69			HORIZONTAL	QP
3 300.367	44.53	13.43	1.68	27.20	32.44			HORIZONTAL	QP
4 651.942	37.72	20.44	2.15	28.40	31.91			HORIZONTAL	QP
5 701.761	37.04	21.30	2.31	28.33	32.32			HORIZONTAL	QP
6 793.396	35.57	22.67	2.51	28.30	32.45			HORIZONTAL	QP

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Frequency (MHz)	Level @10m (dBuV/m)	Convert Factor (dB)*	Level @ 3m (dBuV/m)	Limit @3m (dBuV/m)	Over limit (dB)	Remark
210.048	21.70	10.46	32.16	43.52	-11.36	QP
250.301	31.69	10.46	42.15	46.02	-3.87	QP
300.367	32.44	10.46	42.90	46.02	-3.12	QP
651.942	31.91	10.46	42.37	46.02	-3.65	QP
701.761	32.32	10.46	42.78	46.02	-3.24	QP
793.396	32.45	10.46	42.91	46.02	-3.11	QP

\*Remark:

Level (dBuV/m) @3m = Level (dBuV/m) @10m + Convert Factor (dB)

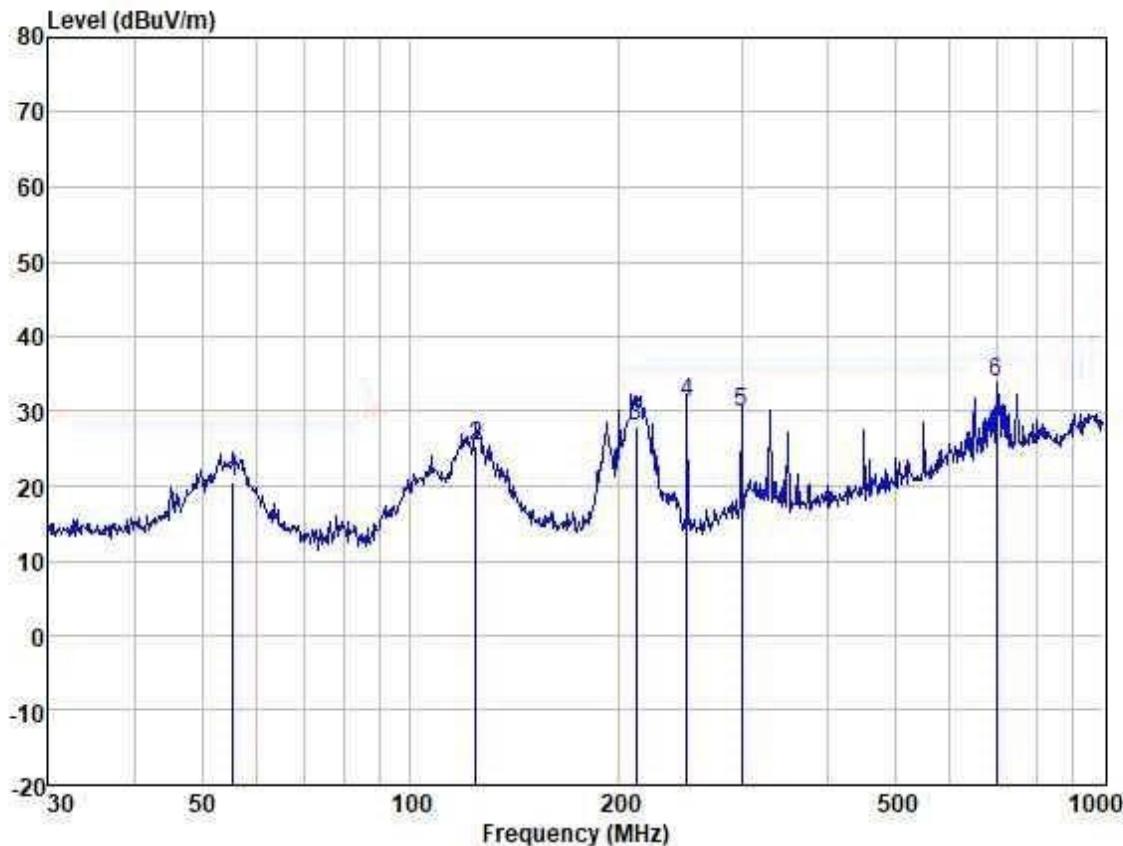
Convert Factor (dB) =  $20 \times \log(\text{Measurement Distance}/\text{Specified Distance}) = 20 \times \log(10/3) = 10.46 \text{ dB}$   
according to 15.31 (f) (1)



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Test Mode: 02; Polarity: Vertical



Site : SGS  
Job :  
Model :  
Power : 120V 60Hz  
Test Mode : TX

Freq	Read	Antena	Cable	Preamp	Measured	Limit	Over	Pol/ Phase	Remark
	Level	Factor	Loss	Factor	Level	Line	Limit		
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1 55.415	33.90	13.81	0.76	27.95	20.52			VERTICAL	QP
2 124.133	40.71	11.59	0.91	27.77	25.44			VERTICAL	QP
3 211.527	44.29	9.98	1.26	27.40	28.13			VERTICAL	QP
4 250.301	45.09	11.79	1.54	27.27	31.15			VERTICAL	QP
5 300.367	41.89	13.43	1.68	27.20	29.80			VERTICAL	QP
6 701.761	36.53	21.30	2.31	28.33	31.81			VERTICAL	QP

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Frequency (MHz)	Level @10m (dBuV/m)	Convert Factor (dB)*	Level @ 3m (dBuV/m)	Limit @3m (dBuV/m)	Over limit (dB)	Remark
55.415	20.52	10.46	30.98	40.00	-9.02	QP
124.133	25.44	10.46	35.90	43.52	-7.62	QP
211.527	28.13	10.46	38.59	43.52	-4.93	QP
250.301	31.15	10.46	41.61	46.02	-4.41	QP
300.367	29.80	10.46	40.26	46.02	-5.76	QP
701.761	31.81	10.46	42.27	46.02	-3.75	QP

\*Remark:

Level (dBuV/m) @3m = Level (dBuV/m) @10m + Convert Factor (dB)

Convert Factor (dB) =  $20 \times \log(\text{Measurement Distance}/\text{Specified Distance}) = 20 \times \log(10/3) = 10.46 \text{ dB}$   
according to 15.31 (f) (1)



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## 7.4 Radiated Spurious Emissions Above 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.6

**Limit:**

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance(meters)
Above 1000	500	3

#### 7.4.1 E.U.T. Operation

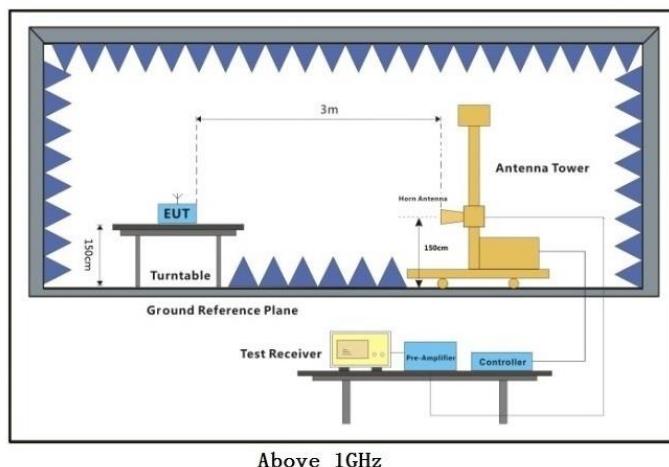
## Operating Environment:

Temperature: 21.2 °C      Humidity: 48.6 % RH      Atmospheric Pressure: 1012 mbar

#### 7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

### 7.4.3 Test Setup Diagram



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**7.4.4 Measurement Procedure and Data**

- a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.

Remark:

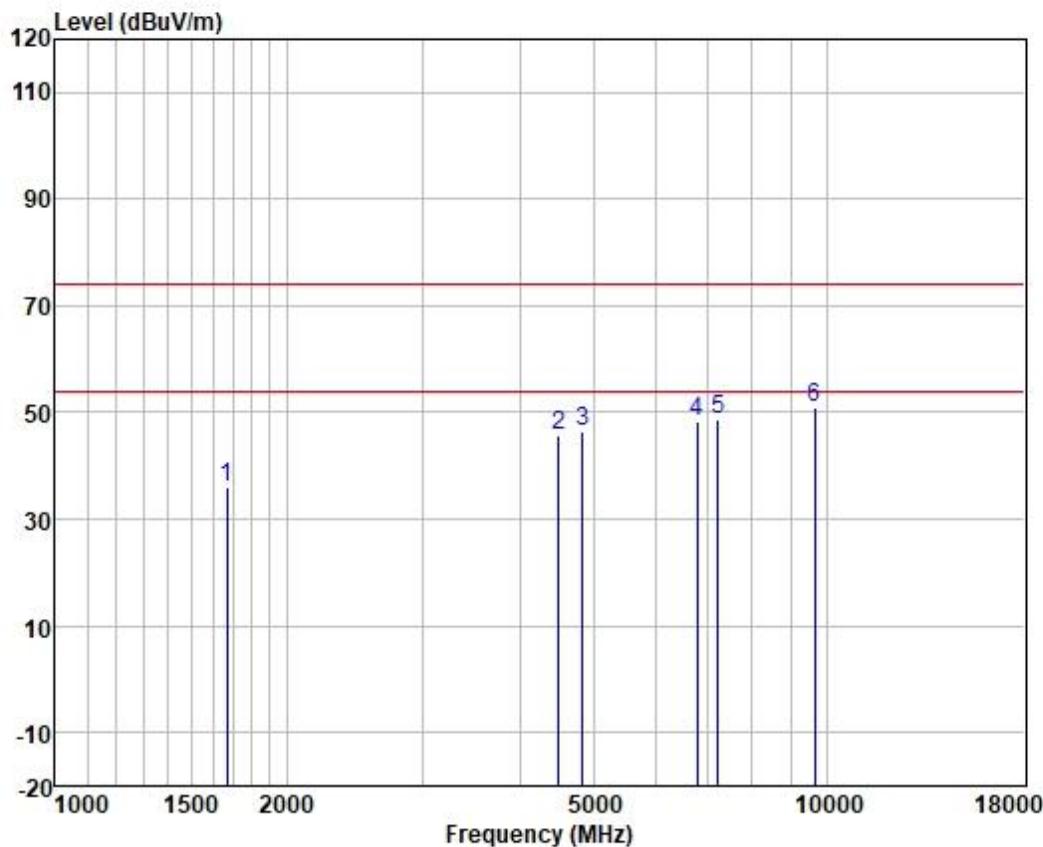
1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 1GHz to 25GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.
- 4: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for Peak detection (PK) and Average detection (AV) at frequency above 1GHz.
- 5:For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle  $< 98\%$ ) or 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz.



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Test Mode: 02; Polarity: Vertical; Modulation:802.11b; Bandwidth:20MHz; Channel:Low

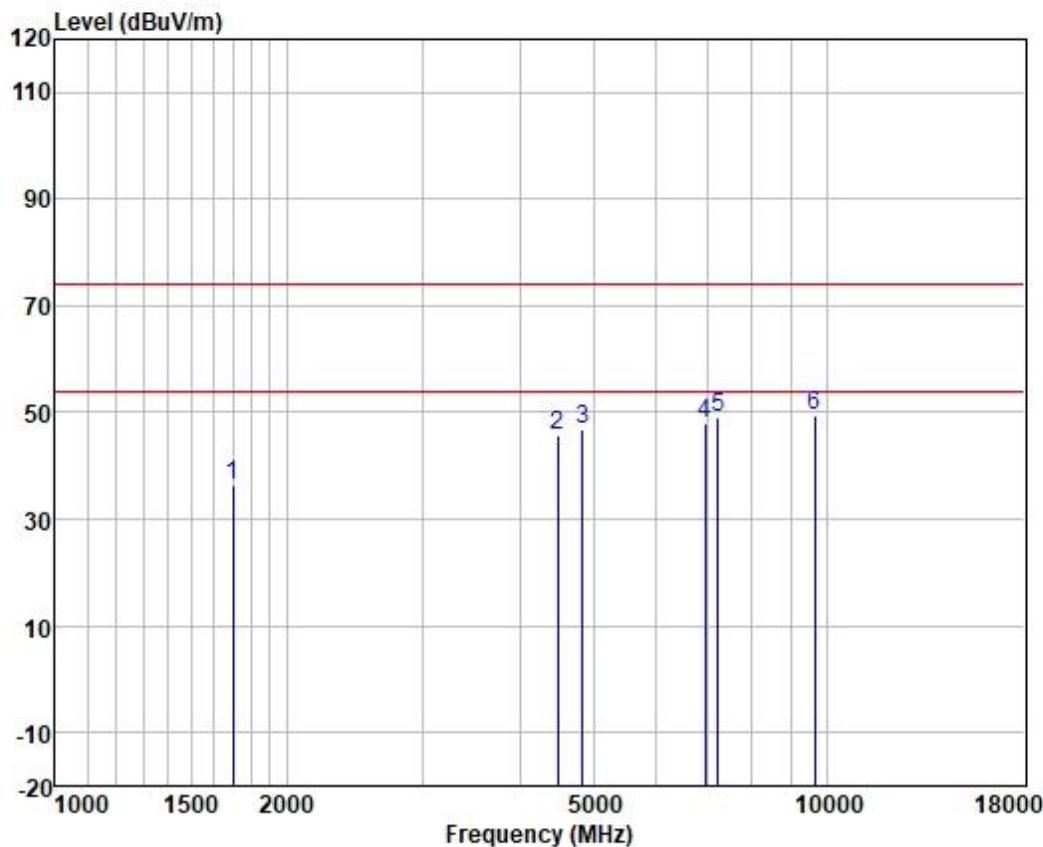


Freq	ReadAntenna		Cable		Preamp		Limit	Over	Over	Remark
	Freq	Level	Antenna	Loss	Preamp	Level				
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1672.779	46.38	24.98	2.82	38.05	36.13	74.00	-37.87	VERTICAL	peak
2	4495.125	44.54	34.17	4.62	37.44	45.89	74.00	-28.11	VERTICAL	peak
3	4824.000	44.79	34.16	4.82	37.37	46.40	74.00	-27.60	VERTICAL	peak
4	6795.879	44.96	34.69	5.79	37.13	48.31	74.00	-25.69	VERTICAL	peak
5	7236.000	44.19	35.78	5.95	37.17	48.75	74.00	-25.25	VERTICAL	peak
6	9648.000	42.47	38.70	7.05	37.11	51.11	74.00	-22.89	VERTICAL	peak

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Test Mode: 02; Polarity: Horizontal; Modulation:802.11b; Bandwidth:20MHz; Channel:Low



Freq	ReadAntenna		Cable		Preamp Level	Limit Line	Over Limit	Over Line Pol/Phase	Remark
	Freq	Level Factor	Loss	Factor					
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1 1702.042	46.55	25.15	2.85	38.03	36.52	74.00	-37.48	HORIZONTAL	peak
2 4482.150	44.58	34.12	4.62	37.44	45.88	74.00	-28.12	HORIZONTAL	peak
3 4824.000	45.29	34.16	4.82	37.37	46.90	74.00	-27.10	HORIZONTAL	peak
4 6954.852	44.27	35.04	5.86	37.14	48.03	74.00	-25.97	HORIZONTAL	peak
5 7236.000	44.64	35.78	5.95	37.17	49.20	74.00	-24.80	HORIZONTAL	peak
6 9648.000	40.92	38.70	7.05	37.11	49.56	74.00	-24.44	HORIZONTAL	peak

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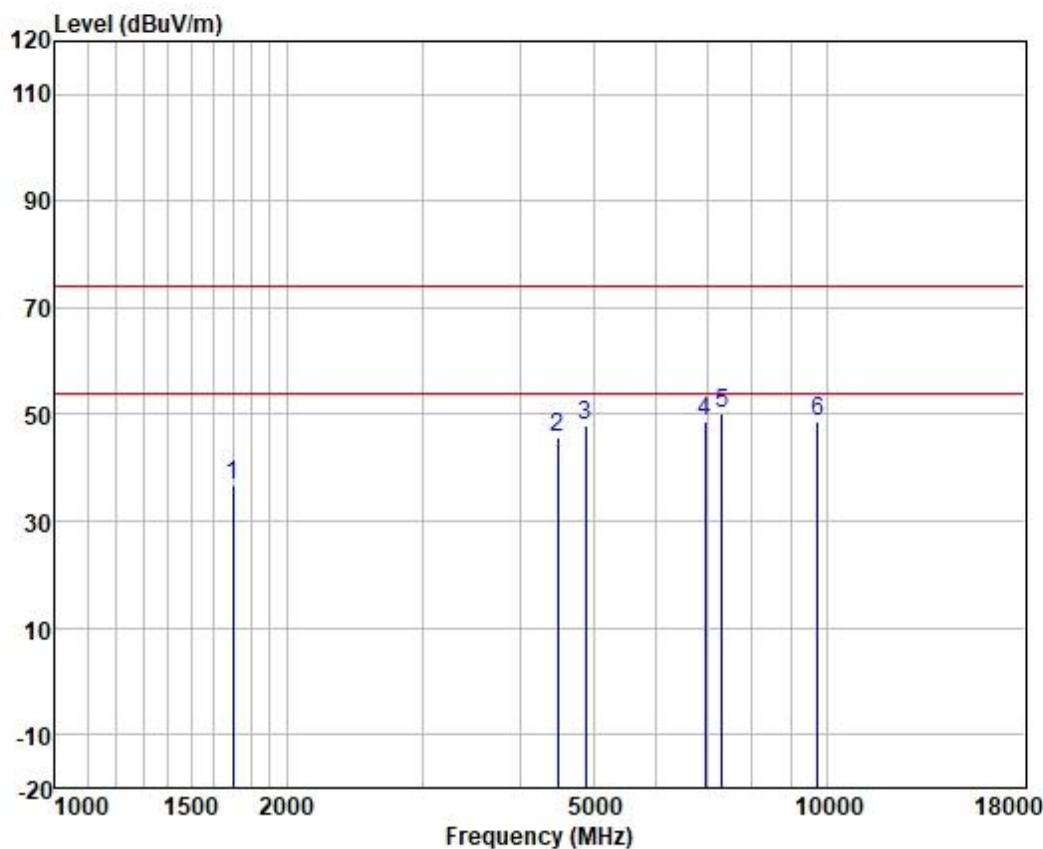


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t (86-20) 82155555 [sgs.china@sgs.com](mailto:sgs.china@sgs.com)

Test Mode: 02; Polarity: Vertical; Modulation:802.11b; Bandwidth:20MHz; Channel:middle



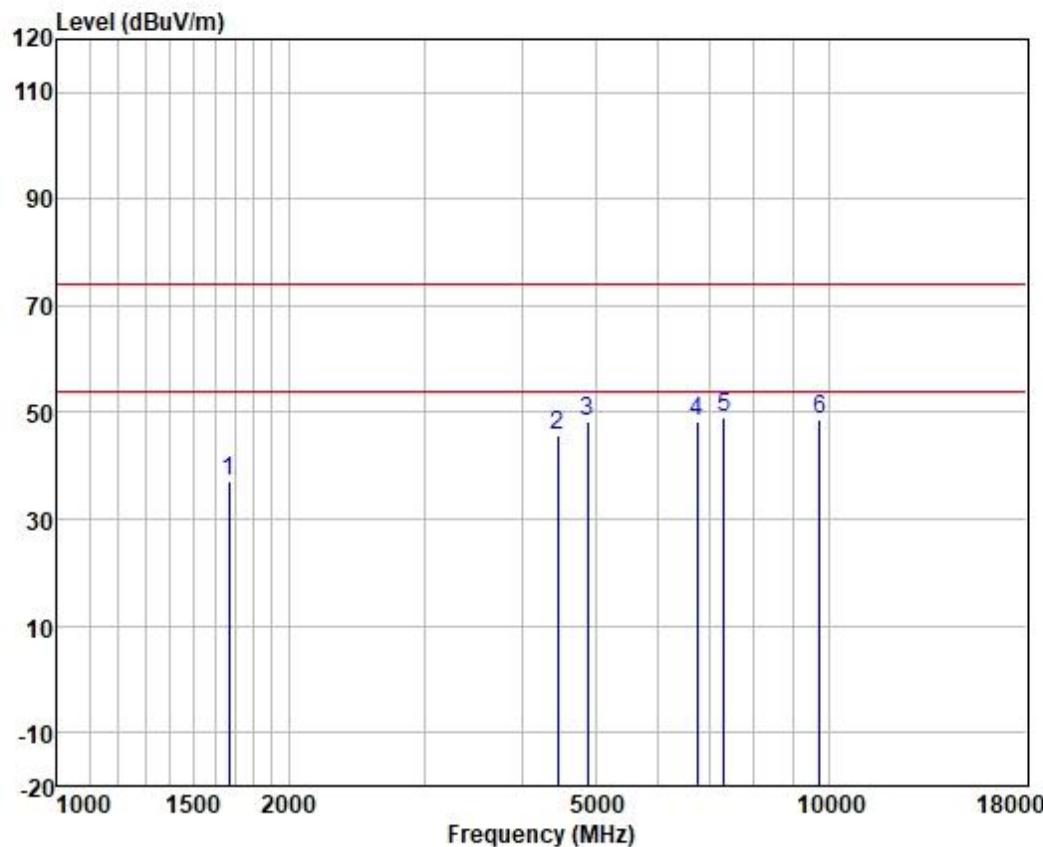
Freq	ReadAntenna		Cable		Preamp		Limit Line	Over Limit	Over Limit Pol/Phase	Remark
	Freq	Level Factor	Loss	Factor	Level	dBuV/m	dBuV/m	dB		
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB			
1 1702.042	46.82	25.15	2.85	38.03	36.79	74.00	-37.21	VERTICAL	peak	
2 4482.150	44.50	34.12	4.62	37.44	45.80	74.00	-28.20	VERTICAL	peak	
3 4874.000	46.46	34.15	4.85	37.35	48.11	74.00	-25.89	VERTICAL	peak	
4 6954.852	44.83	35.04	5.86	37.14	48.59	74.00	-25.41	VERTICAL	peak	
5 7311.000	45.24	36.00	5.98	37.18	50.04	74.00	-23.96	VERTICAL	peak	
6 9748.000	39.96	38.81	7.11	37.11	48.77	74.00	-25.23	VERTICAL	peak	

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Test Mode: 02; Polarity: Horizontal; Modulation:802.11b; Bandwidth:20MHz; Channel:middle



Freq	ReadAntenna		Cable		Preamp		Limit Line	Over Limit	Over Limit Pol/Phase	Remark
	Freq	Level	Antenna Factor	Loss	Preamp Factor	Level				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV/m	dB		
1 1672.779	47.20	24.98	2.82	38.05	36.95	74.00	-37.05	HORIZONTAL	peak	
2 4456.315	44.66	34.00	4.61	37.45	45.82	74.00	-28.18	HORIZONTAL	peak	
3 4874.000	46.56	34.15	4.85	37.35	48.21	74.00	-25.79	HORIZONTAL	peak	
4 6756.708	45.31	34.56	5.77	37.13	48.51	74.00	-25.49	HORIZONTAL	peak	
5 7311.000	44.42	36.00	5.98	37.18	49.22	74.00	-24.78	HORIZONTAL	peak	
6 9748.000	39.72	38.81	7.11	37.11	48.53	74.00	-25.47	HORIZONTAL	peak	

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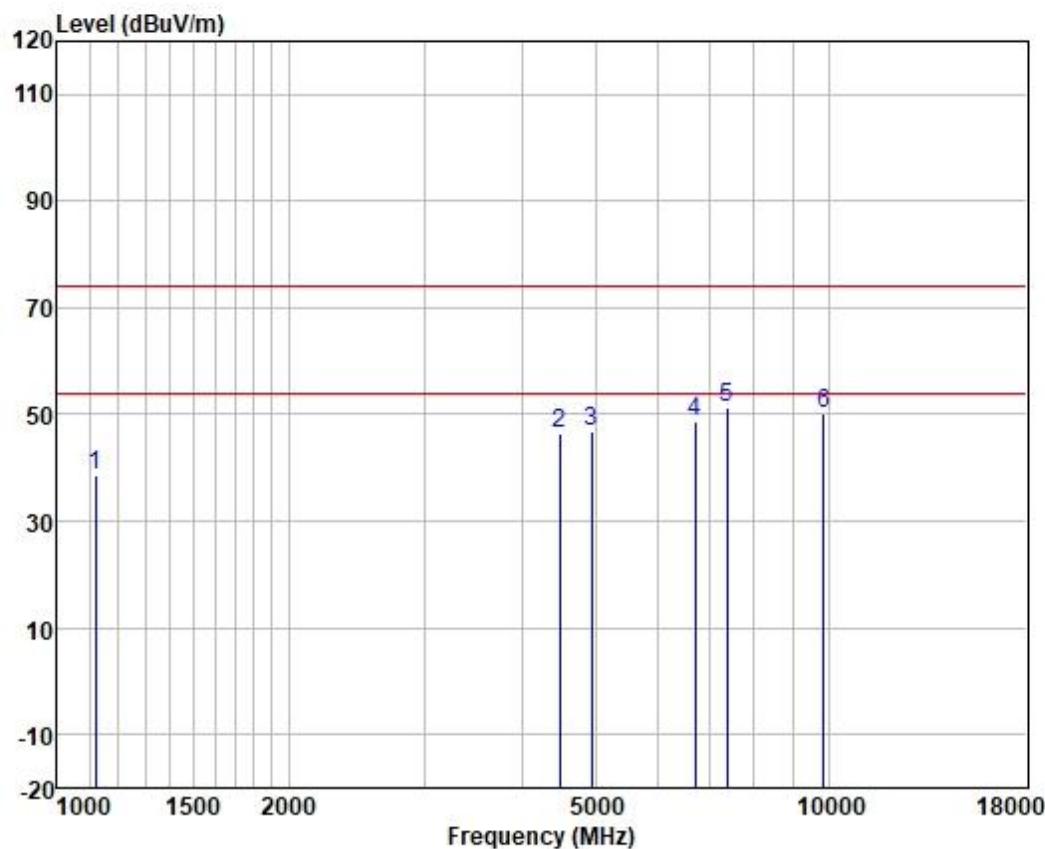


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Test Mode: 02; Polarity: Vertical; Modulation:802.11b; Bandwidth:20MHz; Channel:High

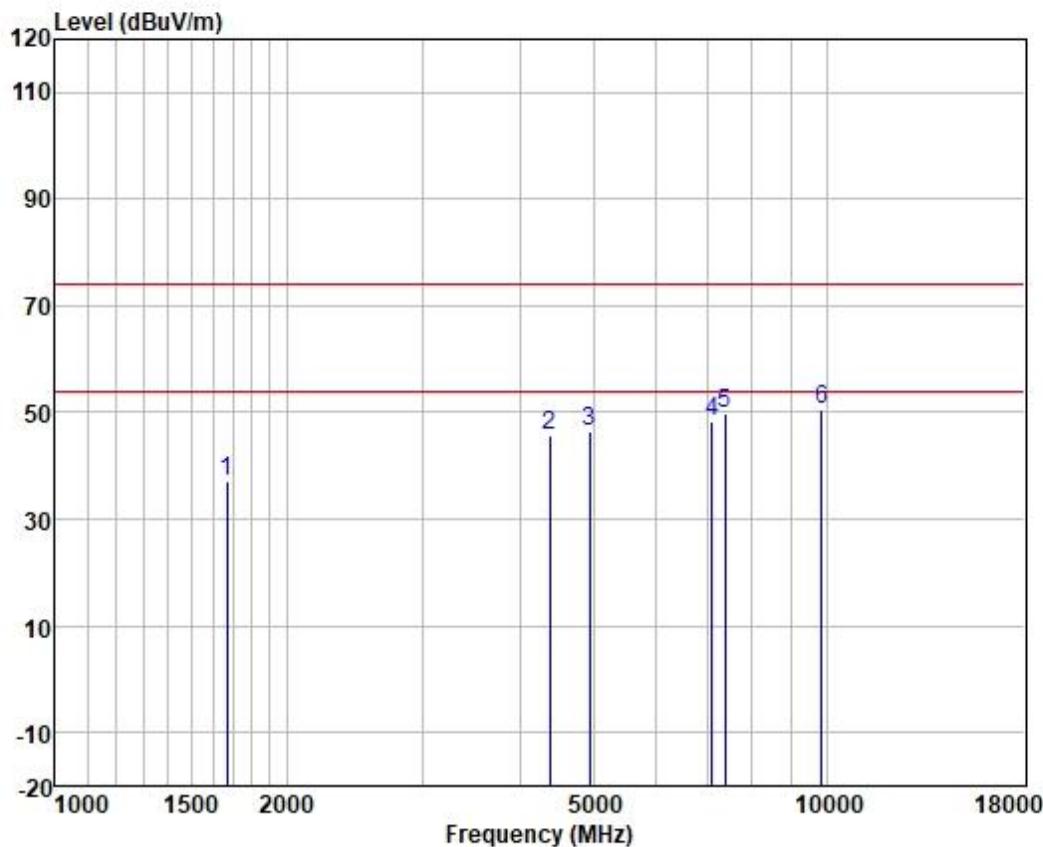


Freq	ReadAntenna		Cable		Preamp		Limit	Over	Over	Remark
	Freq	Level	Antenna	Loss	Factor	Level				
MHz	dBuV	dB/m			dB	dB	dBuV/m	dBuV/m		
1	1122.563	52.26	22.75	2.29	38.73	38.57	74.00	-35.43	VERTICAL	peak
2	4482.150	45.28	34.12	4.62	37.44	46.58	74.00	-27.42	VERTICAL	peak
3	4924.000	45.13	34.15	4.88	37.33	46.83	74.00	-27.17	VERTICAL	peak
4	6717.762	45.81	34.42	5.75	37.12	48.86	74.00	-25.14	VERTICAL	peak
5	7386.000	46.18	36.23	6.00	37.18	51.23	74.00	-22.77	VERTICAL	peak
6	9848.000	41.23	38.88	7.15	37.10	50.16	74.00	-23.84	VERTICAL	peak

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Test Mode: 02; Polarity: Horizontal; Modulation:802.11b; Bandwidth:20MHz; Channel:High



Freq	ReadAntenna		Cable		Preamp		Limit	Over	Over	Remark
	Level	Factor	Loss	Factor	Level	Line				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB			
1 1672.779	47.19	24.98	2.82	38.05	36.94	74.00	-37.06	HORIZONTAL	peak	
2 4379.699	45.09	33.59	4.60	37.46	45.82	74.00	-28.18	HORIZONTAL	peak	
3 4924.000	44.72	34.15	4.88	37.33	46.42	74.00	-27.58	HORIZONTAL	peak	
4 7096.999	44.26	35.33	5.90	37.16	48.33	74.00	-25.67	HORIZONTAL	peak	
5 7386.000	44.70	36.23	6.00	37.18	49.75	74.00	-24.25	HORIZONTAL	peak	
6 9848.000	41.51	38.88	7.15	37.10	50.44	74.00	-23.56	HORIZONTAL	peak	

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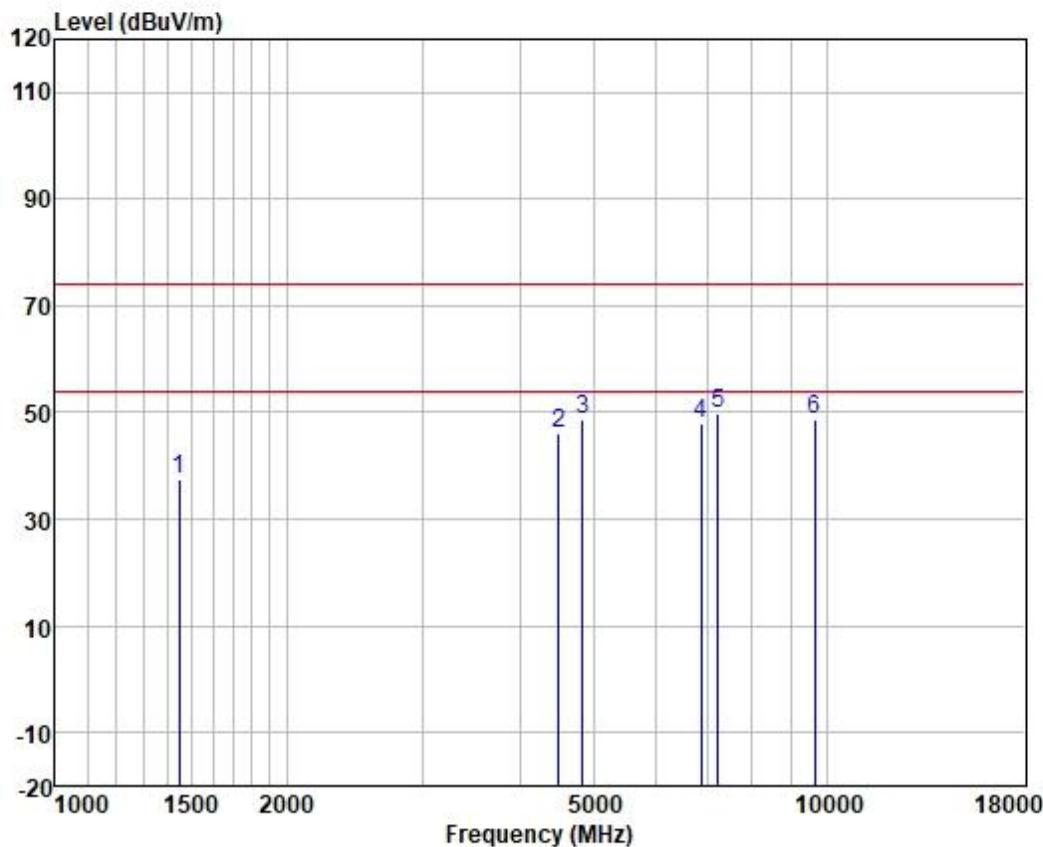


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t (86-20) 82155555 [sgs.china@sgs.com](mailto:sgs.china@sgs.com)

Test Mode: 02; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:Low



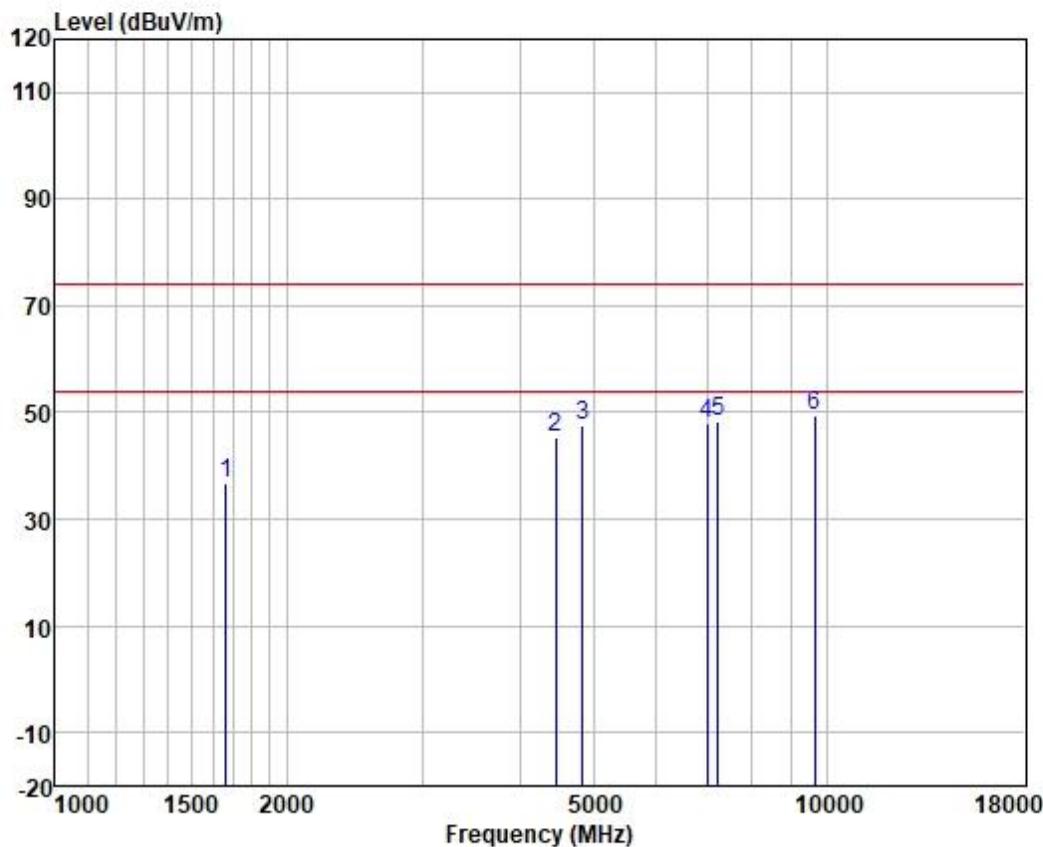
Freq	ReadAntenna		Cable		Preamp		Limit Line	Over Limit	Over Pol/Phase	Remark
	Freq	Level Factor	Loss	Factor	Level	dBuV/m	dBuV/m	dB		
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1447.688	48.90	24.35	2.68	38.42	37.51	74.00	-36.49	VERTICAL	peak
2	4495.125	44.55	34.17	4.62	37.44	45.90	74.00	-28.10	VERTICAL	peak
3	4824.000	47.03	34.16	4.82	37.37	48.64	74.00	-25.36	VERTICAL	peak
4	6874.906	44.40	34.88	5.83	37.14	47.97	74.00	-26.03	VERTICAL	peak
5	7236.000	45.15	35.78	5.95	37.17	49.71	74.00	-24.29	VERTICAL	peak
6	9648.000	39.93	38.70	7.05	37.11	48.57	74.00	-25.43	VERTICAL	peak



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Test Mode: 02; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:Low



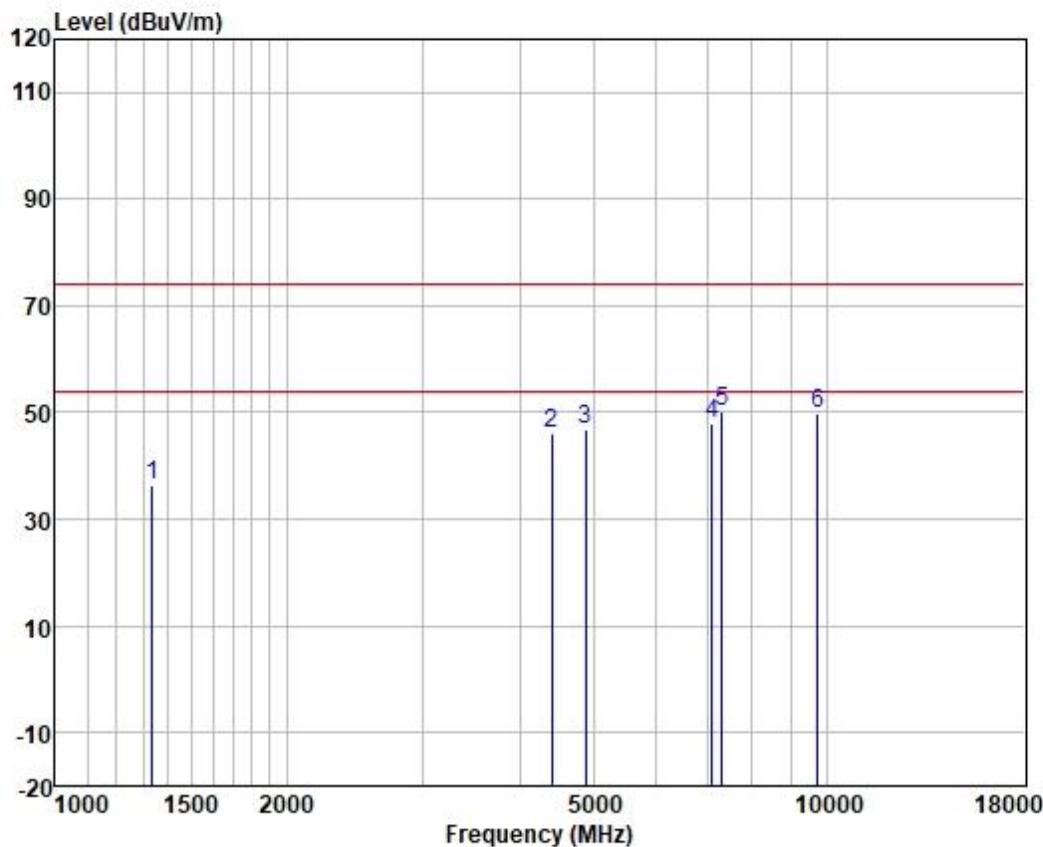
Freq	ReadAntenna		Cable		Preamp		Limit	Over	Over	Remark
	Freq	Level	Antenna	Loss	Factor	Level				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB			
1 1663.137	47.00	24.93	2.81	38.06	36.68	74.00	-37.32	HORIZONTAL	peak	
2 4456.315	44.13	34.00	4.61	37.45	45.29	74.00	-28.71	HORIZONTAL	peak	
3 4824.000	45.83	34.16	4.82	37.37	47.44	74.00	-26.56	HORIZONTAL	peak	
4 6995.172	44.23	35.11	5.87	37.15	48.06	74.00	-25.94	HORIZONTAL	peak	
5 7236.000	43.94	35.78	5.95	37.17	48.50	74.00	-25.50	HORIZONTAL	peak	
6 9648.000	40.75	38.70	7.05	37.11	49.39	74.00	-24.61	HORIZONTAL	peak	

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Test Mode: 02; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:middle



Freq	ReadAntenna		Cable		Preamp		Limit	Over	Over	Remark
	Level	Factor	Loss	Factor	Level	Line				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB			
1 1335.141	48.12	24.09	2.62	38.55	36.28	74.00	-37.72	VERTICAL	peak	
2 4405.090	45.17	33.74	4.61	37.46	46.06	74.00	-27.94	VERTICAL	peak	
3 4874.000	45.15	34.15	4.85	37.35	46.80	74.00	-27.20	VERTICAL	peak	
4 7096.999	44.01	35.33	5.90	37.16	48.08	74.00	-25.92	VERTICAL	peak	
5 7311.000	45.51	36.00	5.98	37.18	50.31	74.00	-23.69	VERTICAL	peak	
6 9748.000	41.10	38.81	7.11	37.11	49.91	74.00	-24.09	VERTICAL	peak	

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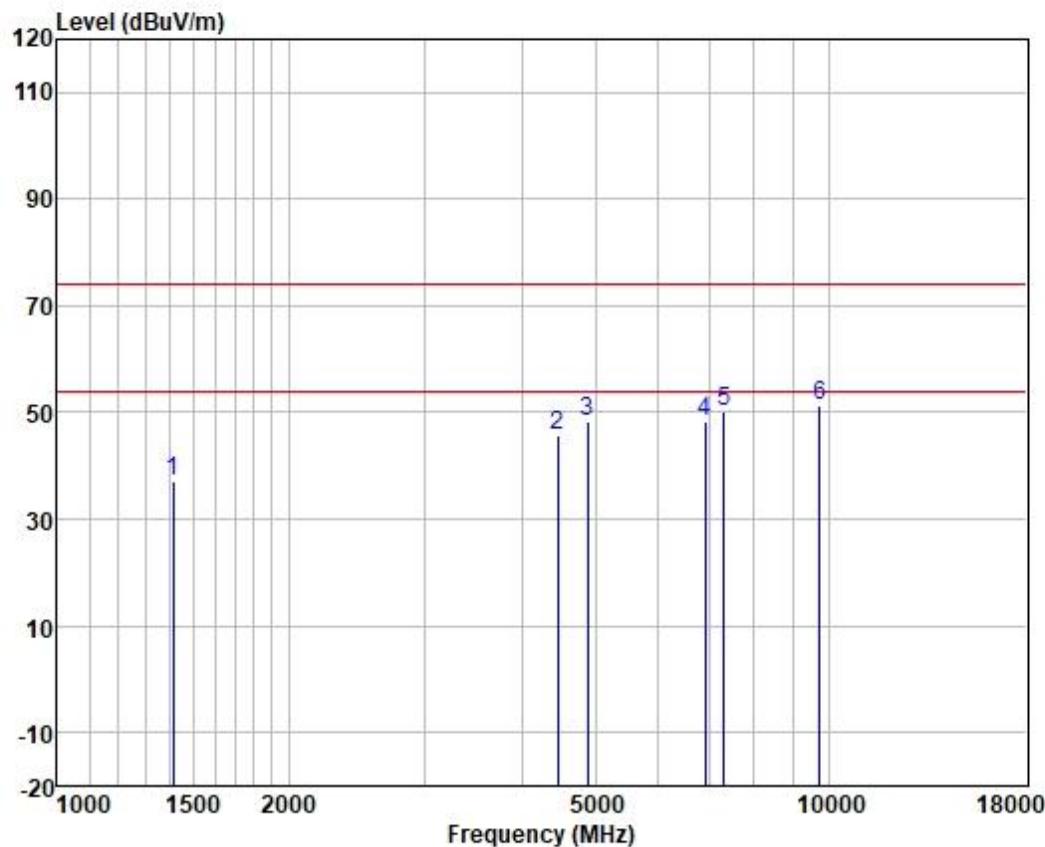


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Test Mode: 02; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:middle



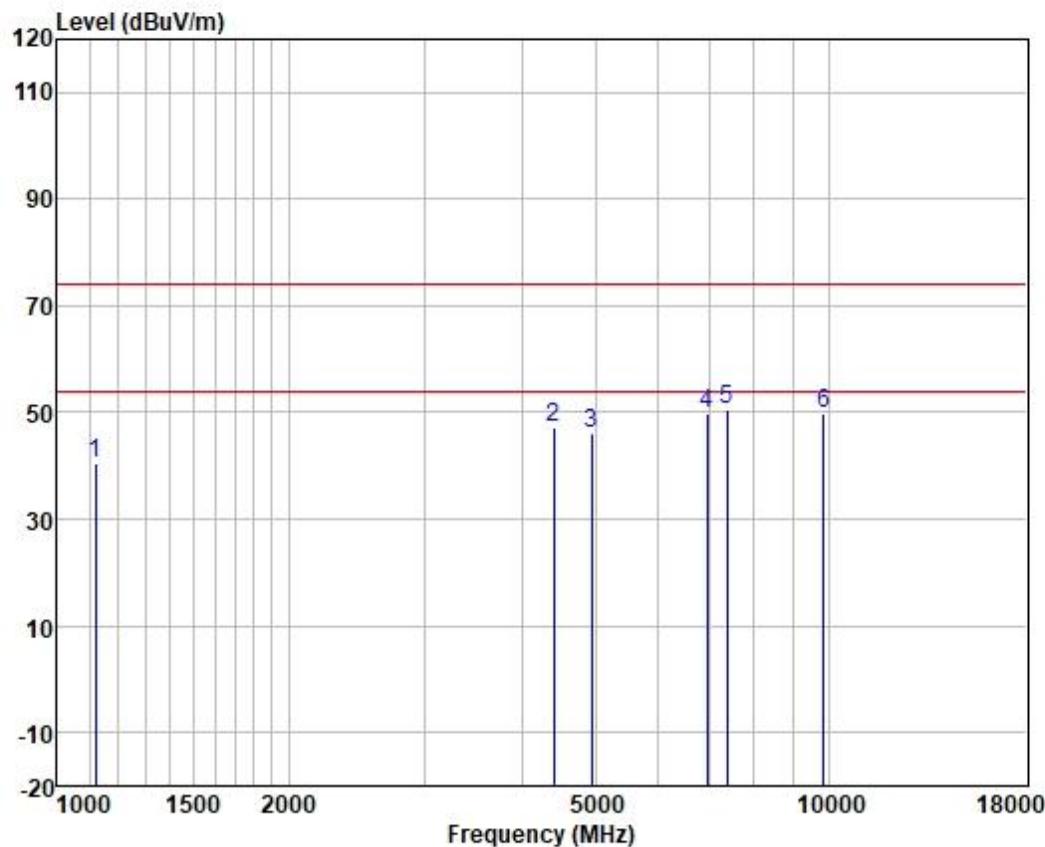
Freq	ReadAntenna		Cable		Preamp		Limit	Over	Over	Remark
	Freq	Level	Antenna	Loss	Preamp	Level				
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB			
1 1414.597	48.59	24.29	2.67	38.47	37.08	74.00	-36.92	HORIZONTAL	peak	
2 4456.315	44.70	34.00	4.61	37.45	45.86	74.00	-28.14	HORIZONTAL	peak	
3 4874.000	46.50	34.15	4.85	37.35	48.15	74.00	-25.85	HORIZONTAL	peak	
4 6914.763	44.54	34.97	5.84	37.14	48.21	74.00	-25.79	HORIZONTAL	peak	
5 7311.000	45.48	36.00	5.98	37.18	50.28	74.00	-23.72	HORIZONTAL	peak	
6 9748.000	42.37	38.81	7.11	37.11	51.18	74.00	-22.82	HORIZONTAL	peak	



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Test Mode: 02; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:High



Freq	ReadAntenna		Cable		Preamp	Limit	Over	Over	Remark
	Level	Factor	Loss	Factor					
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1 1122.563	54.15	22.75	2.29	38.73	40.46	74.00	-33.54	VERTICAL	peak
2 4405.090	46.19	33.74	4.61	37.46	47.08	74.00	-26.92	VERTICAL	peak
3 4924.000	44.39	34.15	4.88	37.33	46.09	74.00	-27.91	VERTICAL	peak
4 6954.852	45.99	35.04	5.86	37.14	49.75	74.00	-24.25	VERTICAL	peak
5 7386.000	45.50	36.23	6.00	37.18	50.55	74.00	-23.45	VERTICAL	peak
6 9848.000	41.03	38.88	7.15	37.10	49.96	74.00	-24.04	VERTICAL	peak

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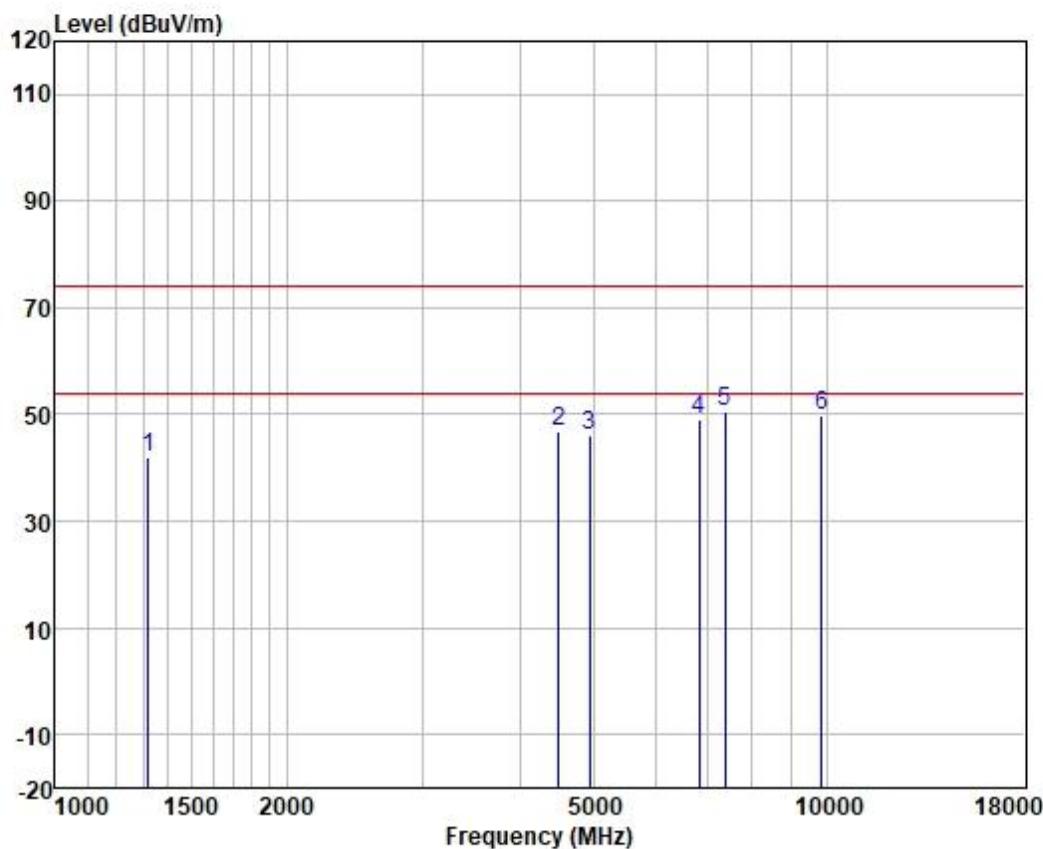
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t (86-20) 82155555 sgs.china@sgs.com

Test Mode: 02; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:High



Freq	ReadAntenna Level	Antenna Factor	Cable Loss		Preamp Factor	Level	Limit Line	Over Limit	Over Line Pol/Phase	Remark
			MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB	
1	1319.794	53.78	24.04	2.61	38.57	41.86	74.00	-32.14	HORIZONTAL	peak
2	4495.125	45.60	34.17	4.62	37.44	46.95	74.00	-27.05	HORIZONTAL	peak
3	4924.000	44.27	34.15	4.88	37.33	45.97	74.00	-28.03	HORIZONTAL	peak
4	6835.278	45.59	34.79	5.81	37.13	49.06	74.00	-24.94	HORIZONTAL	peak
5	7386.000	45.61	36.23	6.00	37.18	50.66	74.00	-23.34	HORIZONTAL	peak
6	9848.000	41.00	38.88	7.15	37.10	49.93	74.00	-24.07	HORIZONTAL	peak

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## 7.5 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3)

Test Method: ANSI C63.10 (2013) Section 11.9.2

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for $\geq 50$ hopping channels
	0.25 for $25 \leq$ hopping channels $< 50$
	1 for digital modulation
2400-2483.5	1 for $\geq 75$ non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

### 7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 21.4 °C      Humidity: 42.3 % RH      Atmospheric Pressure: 1020 mbar

### 7.5.2 Test Mode Description

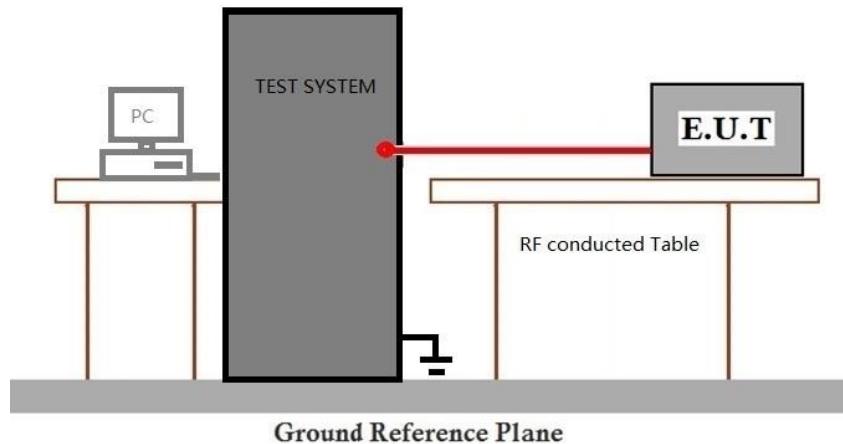
Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.



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### 7.5.3 Test Setup Diagram



### 7.5.4 Measurement Procedure and Data

Note: Since the verify power the same operating range bandwidth and smaller power can be covered by the higher power.

Please Refer to Appendix for Details



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## 7.6 Minimum 6dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247a(2)

Test Method: ANSI C63.10 (2013) Section 11.8.1

Limit:  $\geq 500$  kHz

### 7.6.1 E.U.T. Operation

Operating Environment:

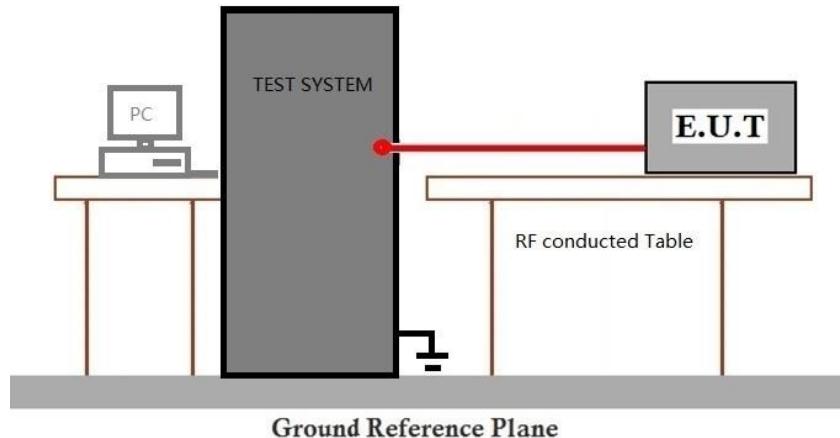
Temperature: 21.4 °C Humidity: 42.3 % RH Atmospheric Pressure: 1020 mbar

### 7.6.2 Test Mode Description

Pre-scan / Mode	Description
Final test	Code
Final test	02

TX mode\_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

### 7.6.3 Test Setup Diagram



### 7.6.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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## 7.7 Power Spectrum Density

Test Requirement 47 CFR Part 15, Subpart C 15.247(e)

Test Method: ANSI C63.10 (2013) Section 11.10.2

Limit:

≤8dBm in any 3 kHz band during any time interval of continuous transmission

### 7.7.1 E.U.T. Operation

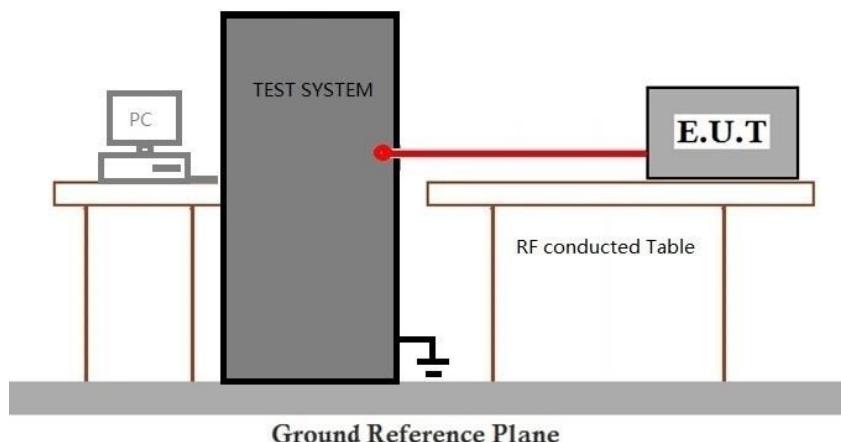
Operating Environment:

Temperature: 21.4 °C Humidity: 42.3 % RH Atmospheric Pressure: 1020 mbar

### 7.7.2 Test Mode Description

Pre-scan / Mode Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

### 7.7.3 Test Setup Diagram



### 7.7.4 Measurement Procedure and Data

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## 7.8 Conducted Band Edges Measurement

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)

Test Method: ANSI C63.10 (2013) Section 11.13.3.2

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. 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)).

### 7.8.1 E.U.T. Operation

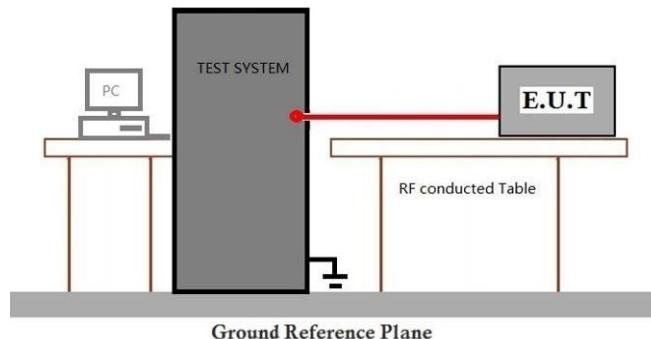
Operating Environment:

Temperature: 21.4 °C      Humidity: 42.3 % RH      Atmospheric Pressure: 1020 mbar

### 7.8.2 Test Mode Description

Pre-scan / Mode	Mode	Description
Final test	Code	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.
Final test	02	

### 7.8.3 Test Setup Diagram



### 7.8.4 Measurement Procedure and Data

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## 7.9 Conducted Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)

Test Method: ANSI C63.10 (2013) Section 11.11

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. 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)).

### 7.9.1 E.U.T. Operation

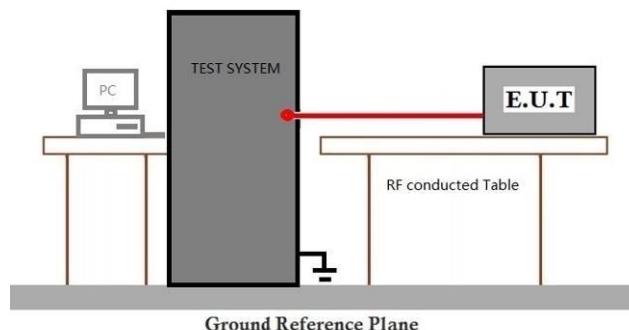
Operating Environment:

Temperature: 21.4 °C      Humidity: 42.3 % RH      Atmospheric Pressure: 1020 mbar

### 7.9.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

### 7.9.3 Test Setup Diagram



### 7.9.4 Measurement Procedure and Data

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## 8 Test Setup Photo

Refer to Appendix - Test Setup Photo for GZCR250200021503



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## 9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for GZCR2502000215AT



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## 10 Appendix

### 1. Duty Cycle

#### 1.1 Test Result

##### 1.1.1 Ant1

Ant1							
Mode	TX Type	Frequency (MHz)	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)
802.11b	SISO	2412	4.530	9.940	45.57	3.41	10.78
		2437	4.534	9.960	45.52	3.42	6.82
		2462	4.530	10.120	44.76	3.49	8.54
802.11g	SISO	2412	2.114	5.724	36.93	4.33	11.09
		2437	2.113	5.902	35.80	4.46	14.23
		2462	2.113	6.042	34.97	4.56	16.56
802.11n (HT20)	SISO	2412	1.969	5.878	33.50	4.75	10.06
		2437	1.969	5.658	34.80	4.58	26.81
		2462	1.969	5.740	34.30	4.65	13.75

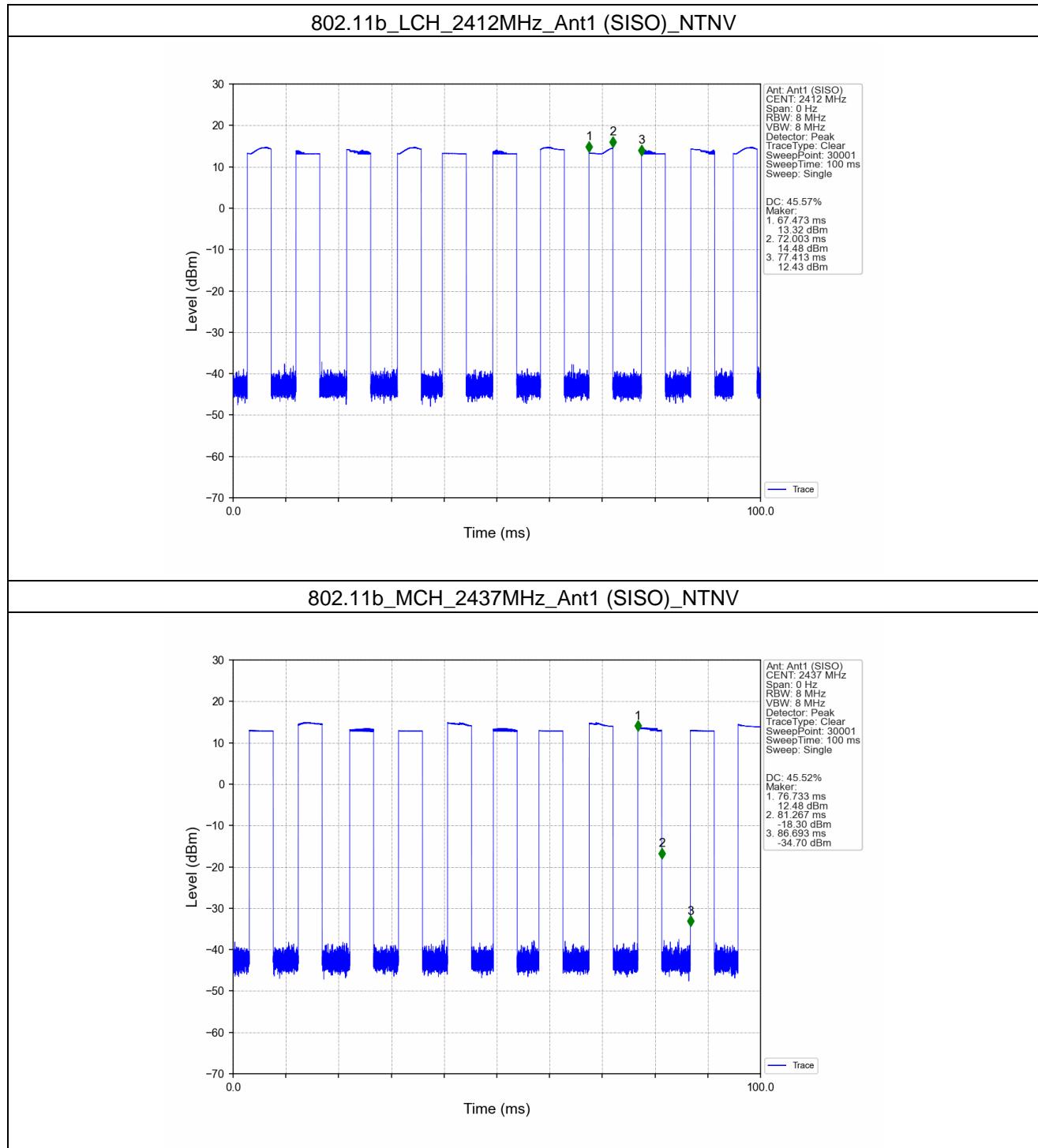


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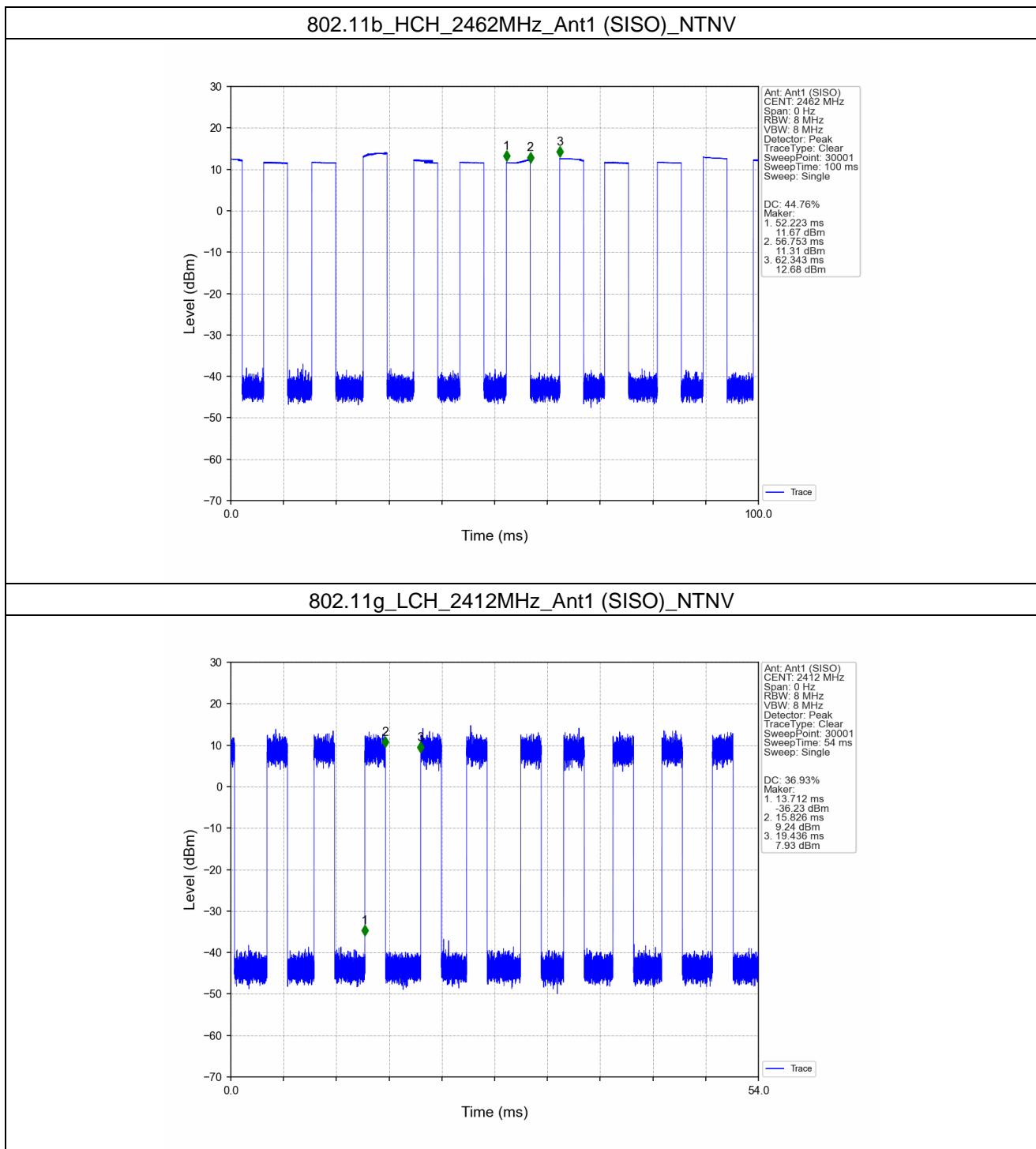
## 1.2 Test Graph

### 1.2.1 Ant1



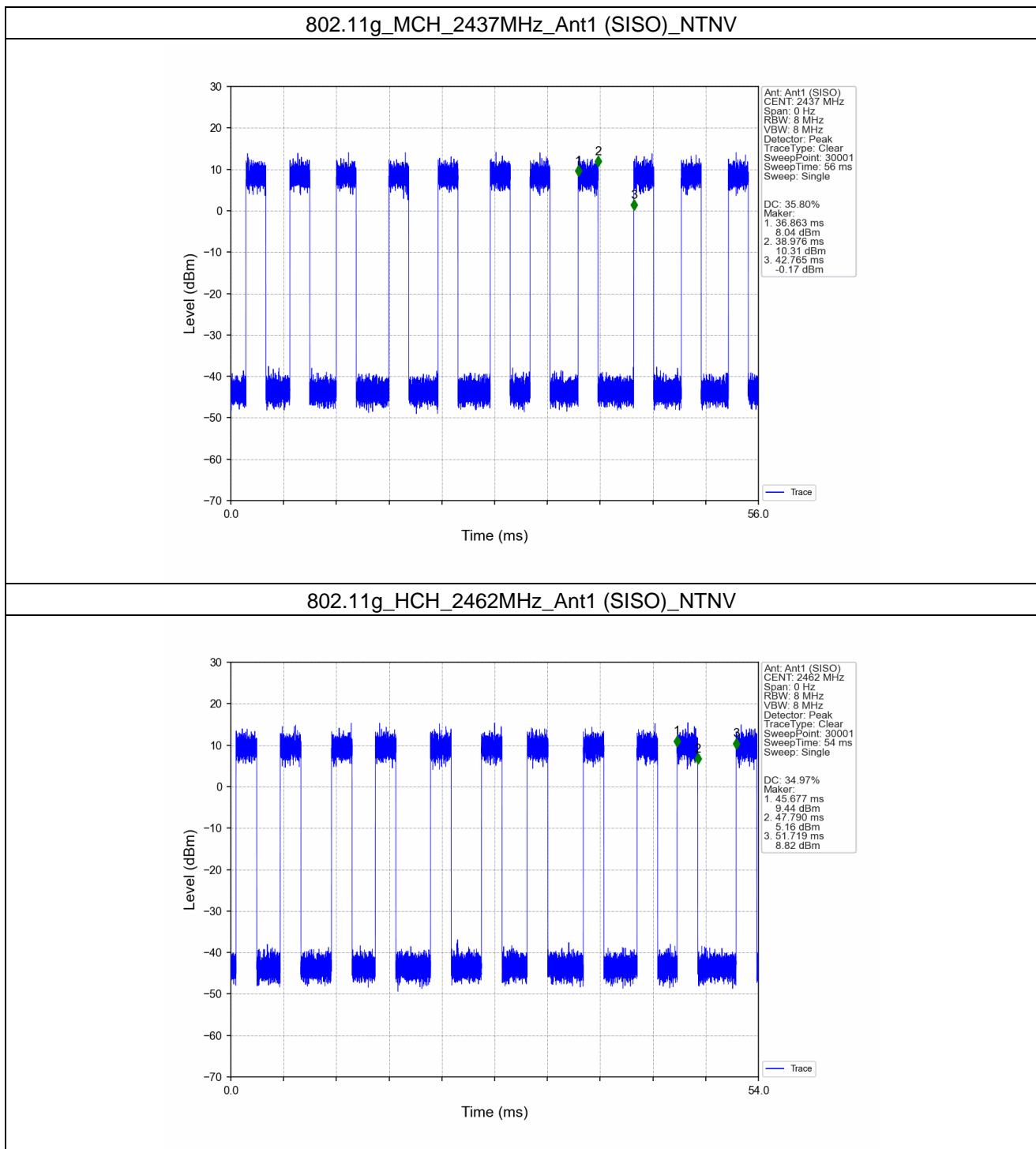
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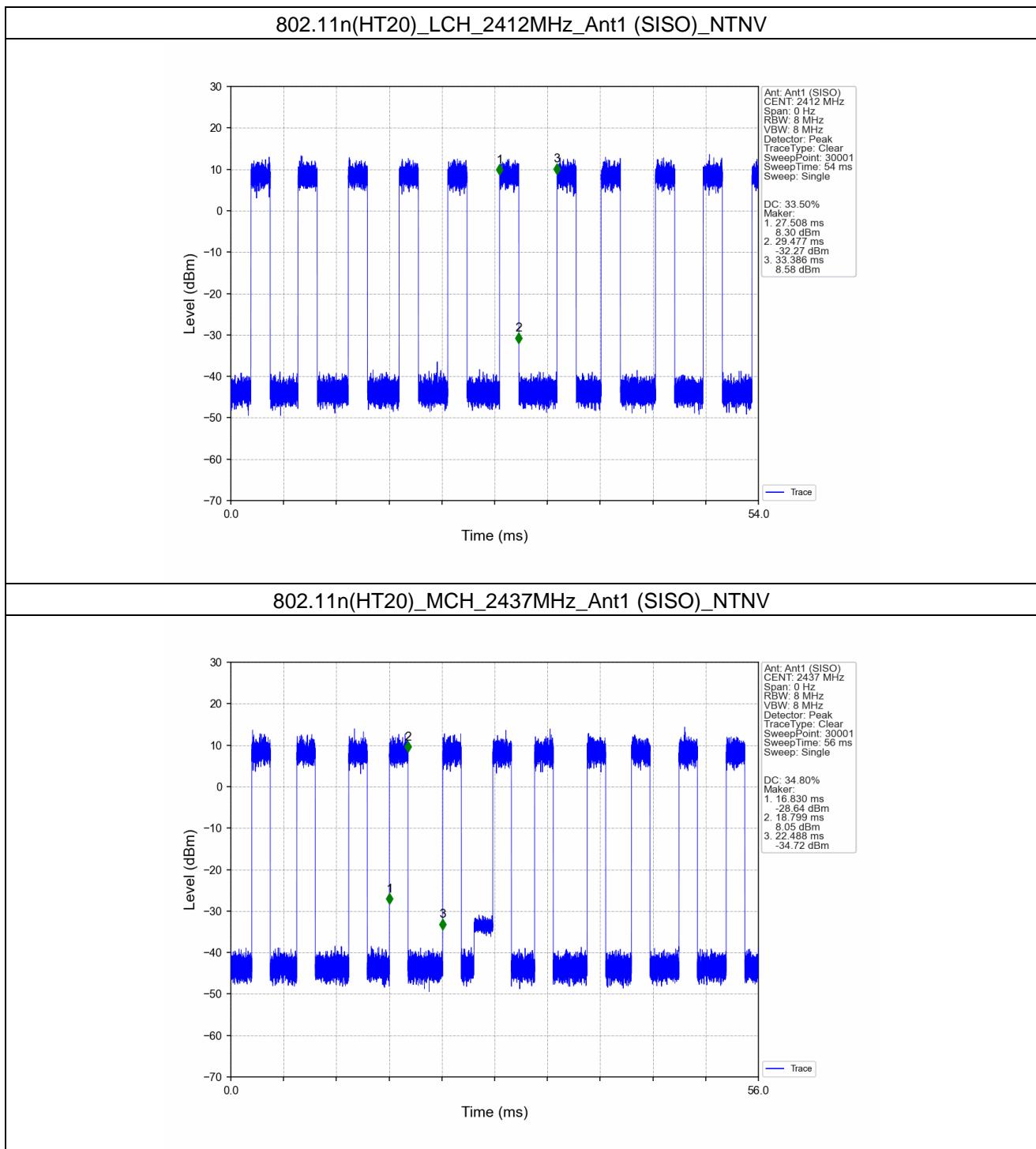
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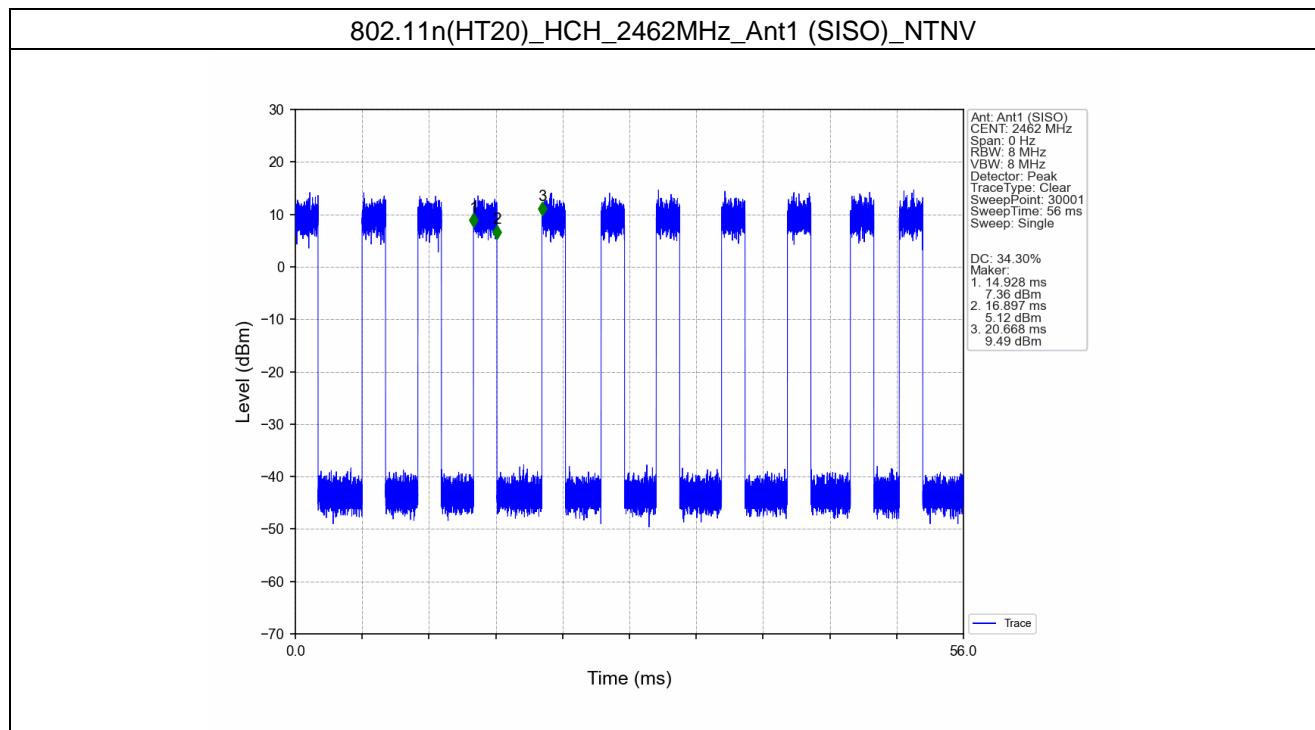
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## 2. Bandwidth

### 2.1 Test Result

#### 2.1.1 6dB BW

Mode	TX Type	Frequency (MHz)	ANT	6dB Bandwidth (MHz)		Verdict
				Result	Limit	
802.11b	SISO	2412	1	9.646	>=0.5	Pass
		2437	1	10.100	>=0.5	Pass
		2462	1	10.085	>=0.5	Pass
802.11g	SISO	2412	1	16.101	>=0.5	Pass
		2437	1	16.413	>=0.5	Pass
		2462	1	16.050	>=0.5	Pass
802.11n (HT20)	SISO	2412	1	17.260	>=0.5	Pass
		2437	1	17.643	>=0.5	Pass
		2462	1	16.741	>=0.5	Pass

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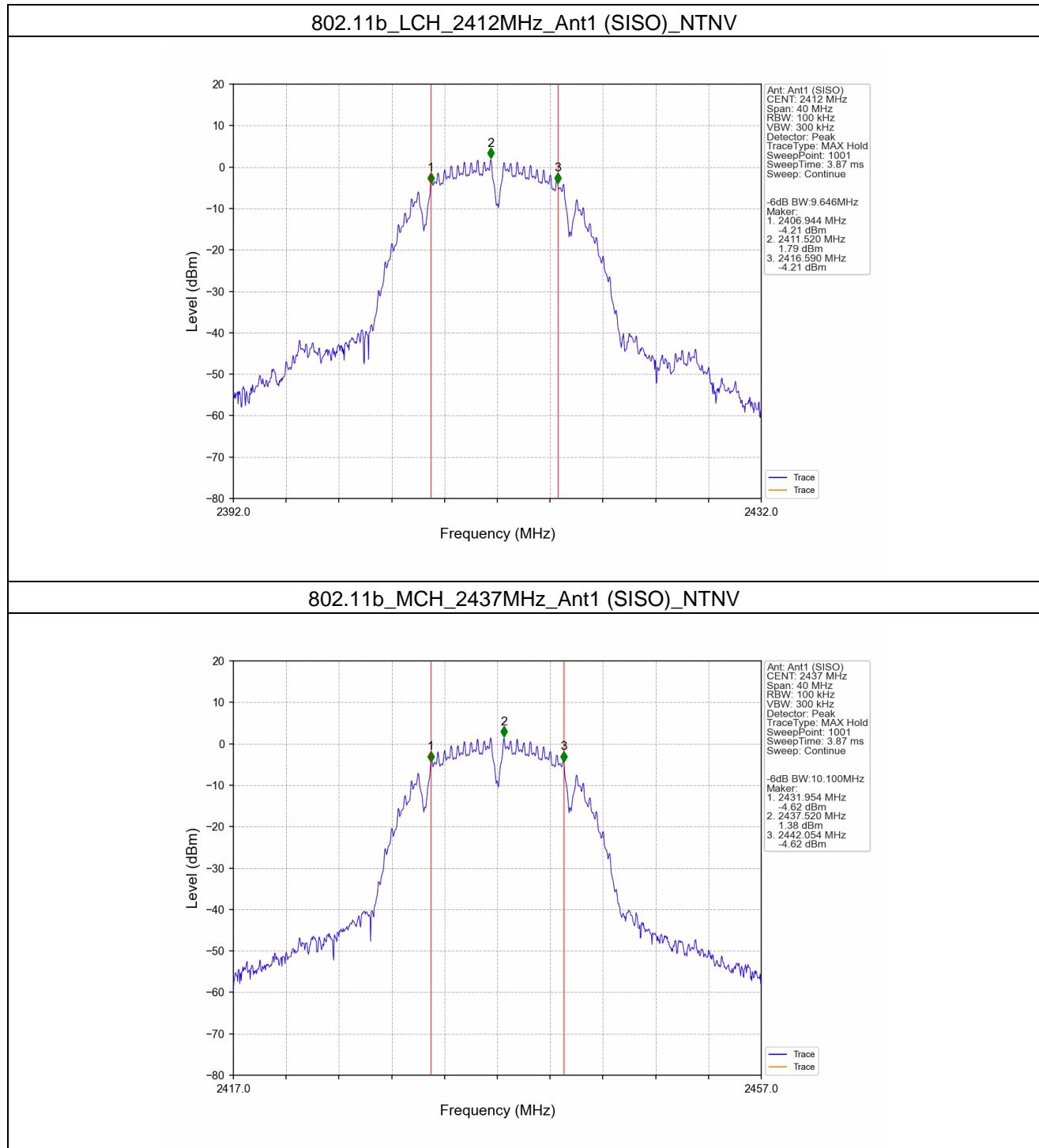


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## 2.2 Test Graph

### 2.2.1 6dB BW



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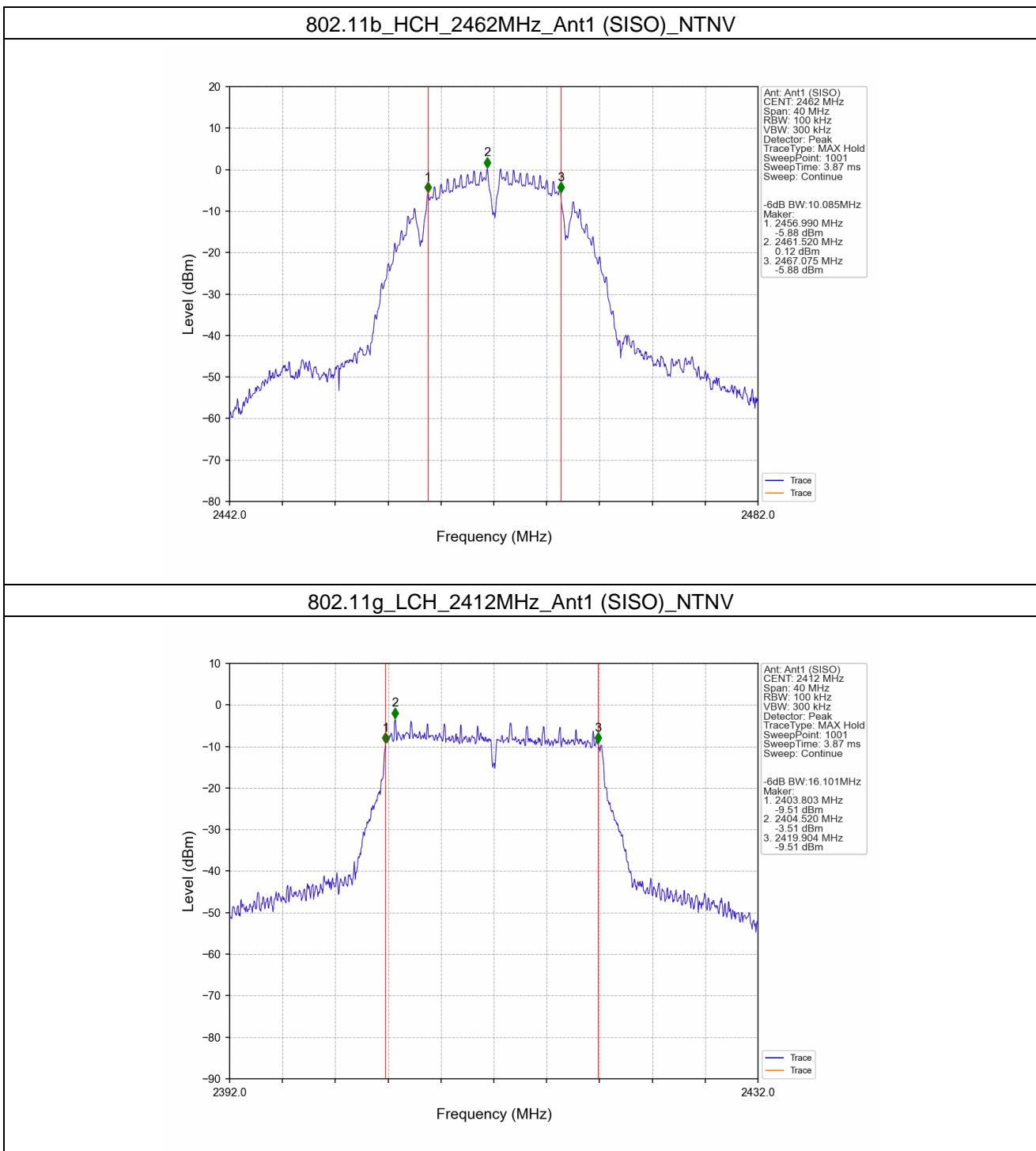
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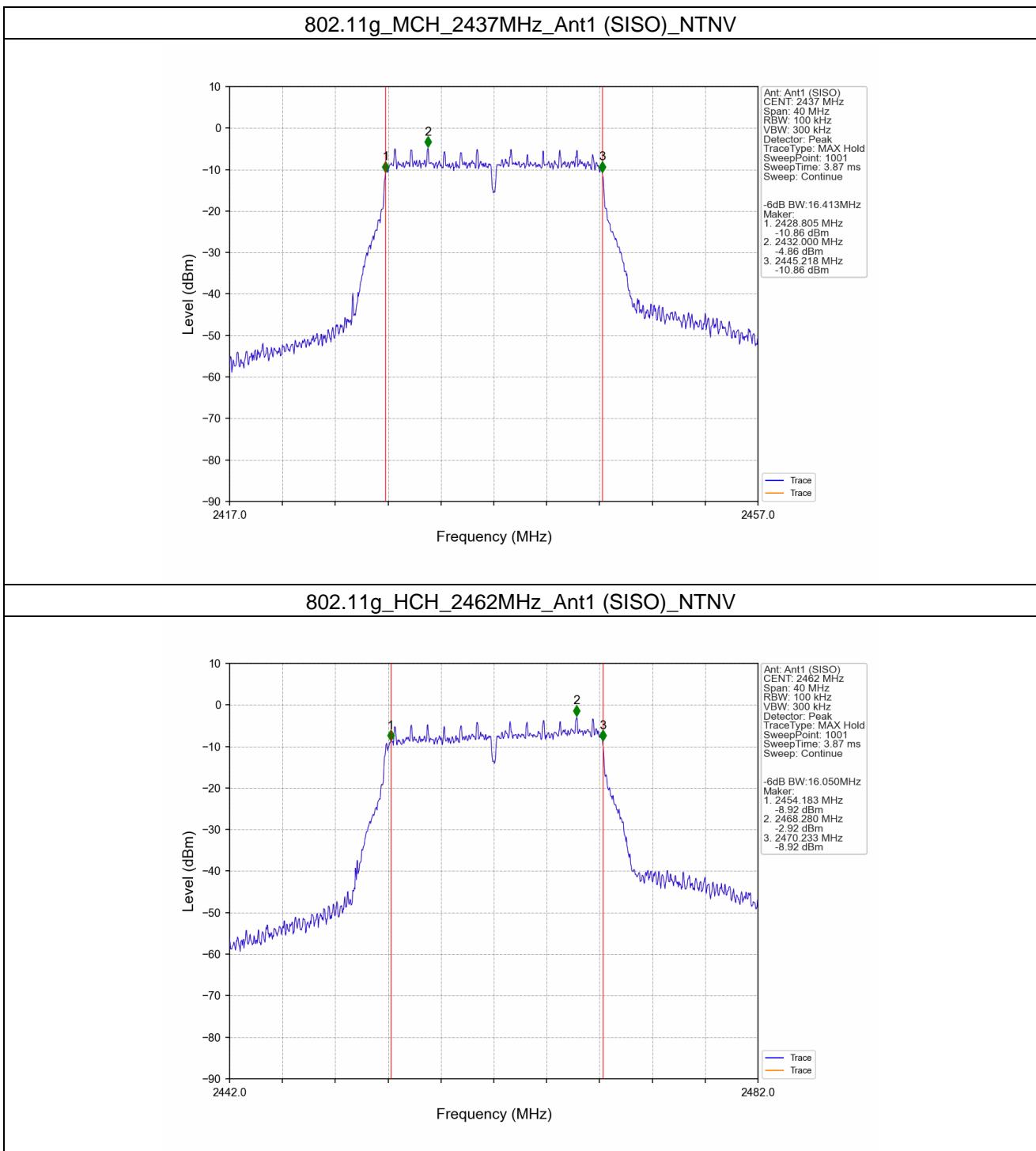
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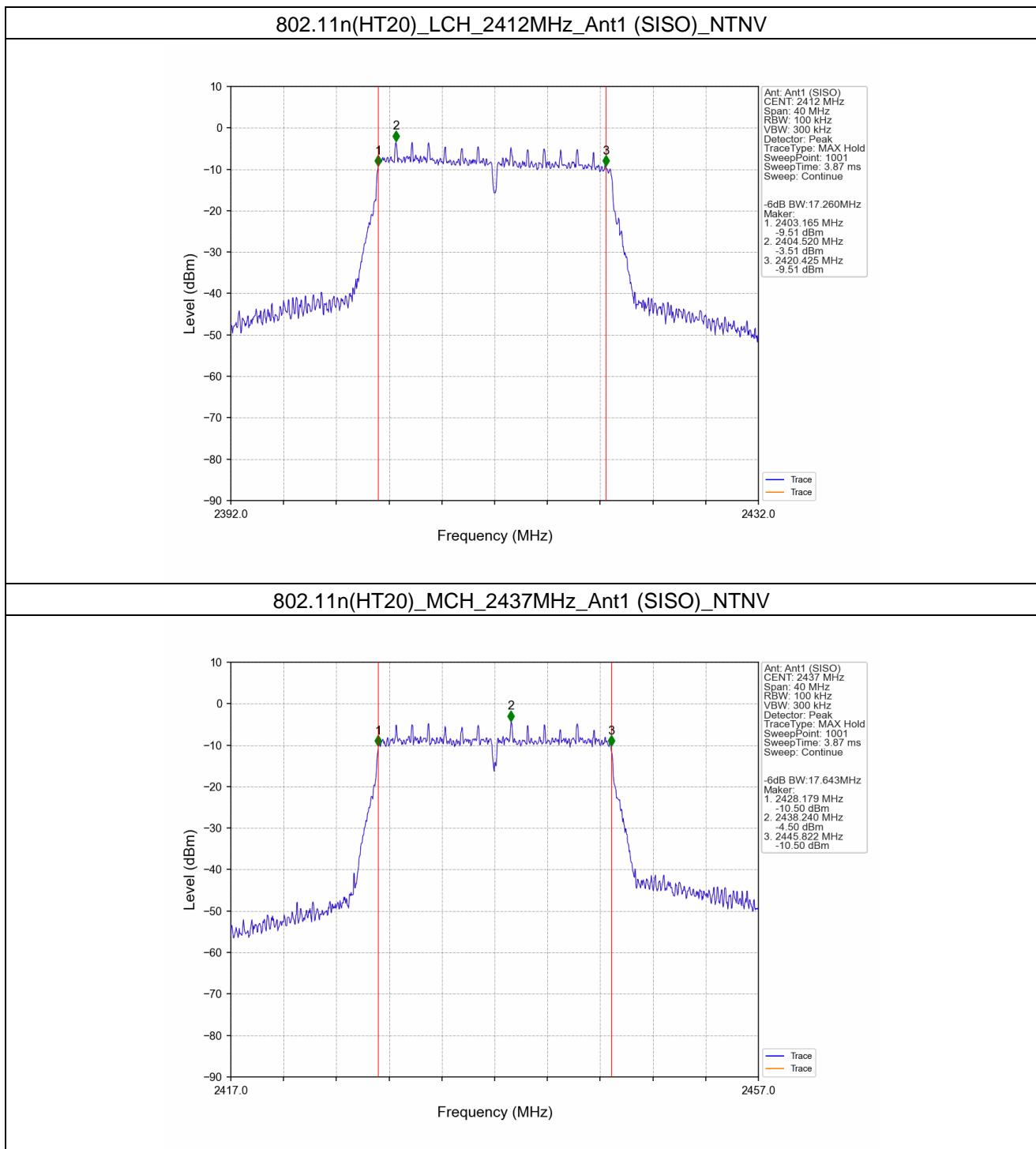
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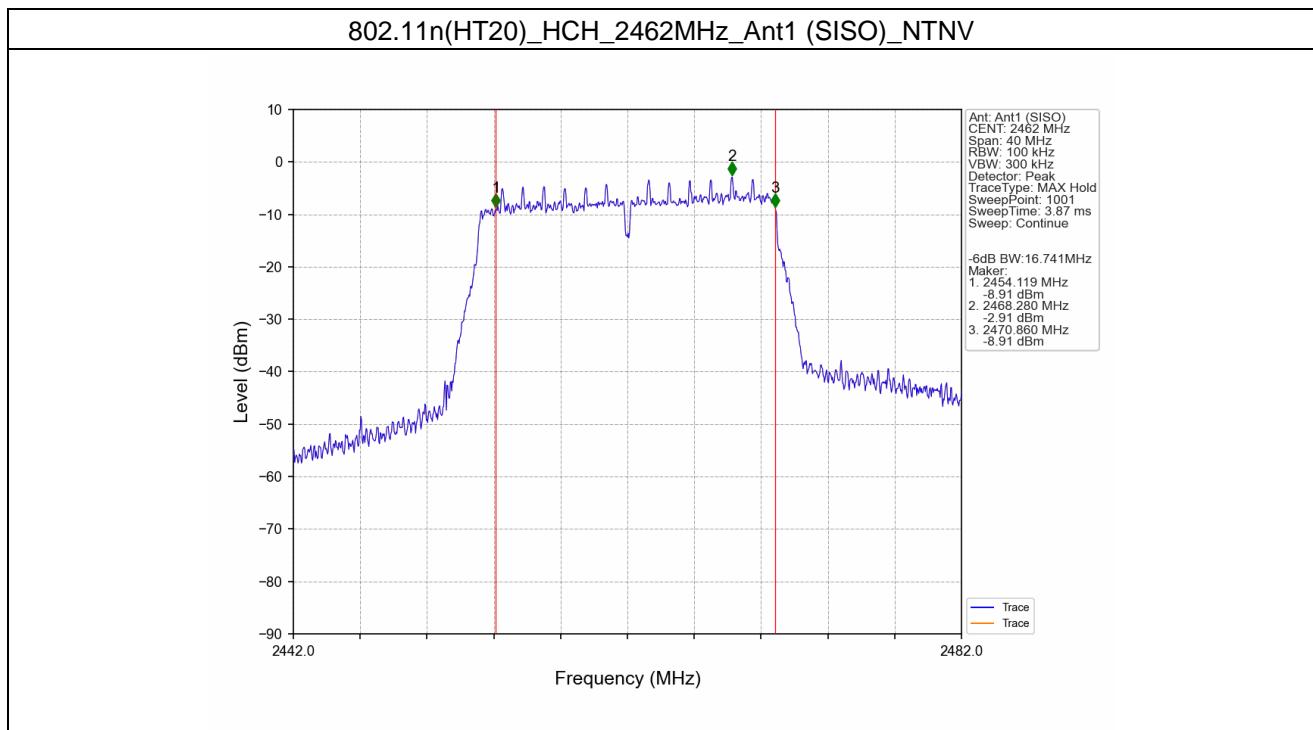
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### 3. Maximum Conducted Output Power

#### 3.1 Test Result

##### 3.1.1 Power

Mode	TX Type	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)		Verdict
			ANT1	Limit	
802.11b	SISO	2412	12.99	<=30	Pass
		2437	12.73	<=30	Pass
		2462	11.45	<=30	Pass
802.11g	SISO	2412	14.42	<=30	Pass
		2437	13.95	<=30	Pass
		2462	14.99	<=30	Pass
802.11n (HT20)	SISO	2412	14.49	<=30	Pass
		2437	14.30	<=30	Pass
		2462	<b>15.10</b>	<=30	Pass

Note1: Antenna Gain: Ant1: 6.00dBi;

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## 4. Maximum Power Spectral Density

### 4.1 Test Result

#### 4.1.1 PSD

Mode	TX Type	Frequency (MHz)	Maximum PSD (dBm/3kHz)		Verdict
			ANT1	Limit	
802.11b	SISO	2412	-12.85	<=8	Pass
		2437	-13.24	<=8	Pass
		2462	-14.46	<=8	Pass
802.11g	SISO	2412	-19.34	<=8	Pass
		2437	-19.77	<=8	Pass
		2462	-17.88	<=8	Pass
802.11n (HT20)	SISO	2412	-18.63	<=8	Pass
		2437	-19.53	<=8	Pass
		2462	-16.70	<=8	Pass

Note1: Antenna Gain: Ant1: 6.00dBi;

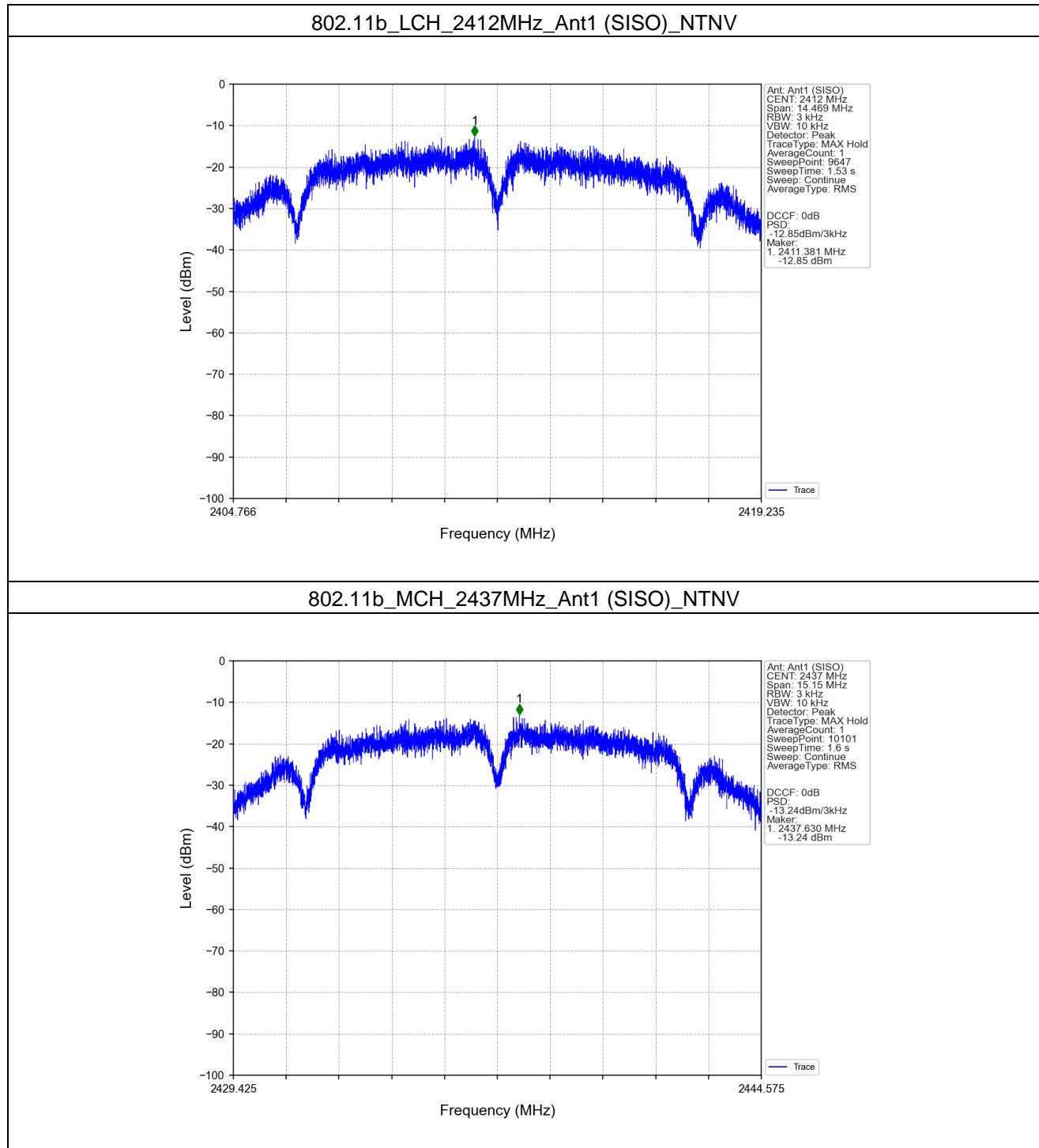
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## 4.2 Test Graph

### 4.2.1 PSD



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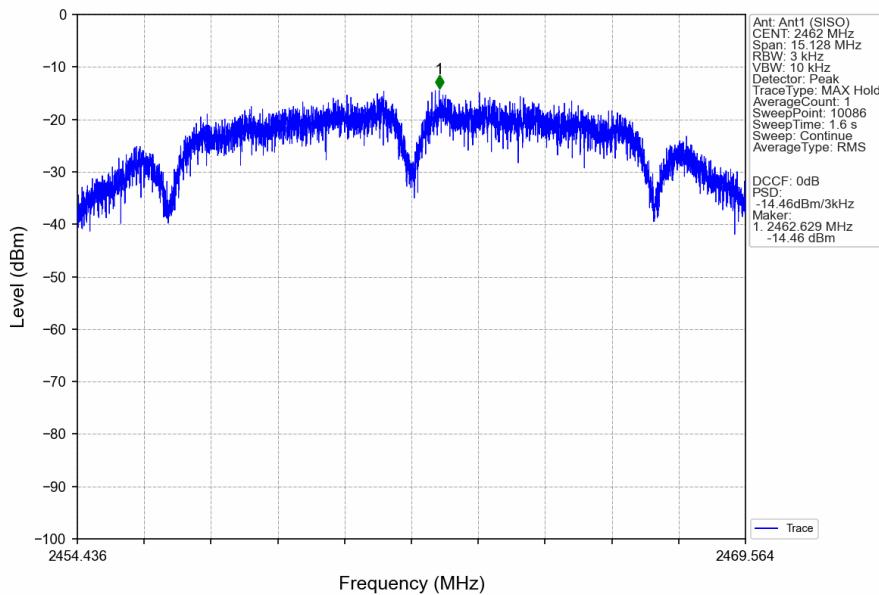
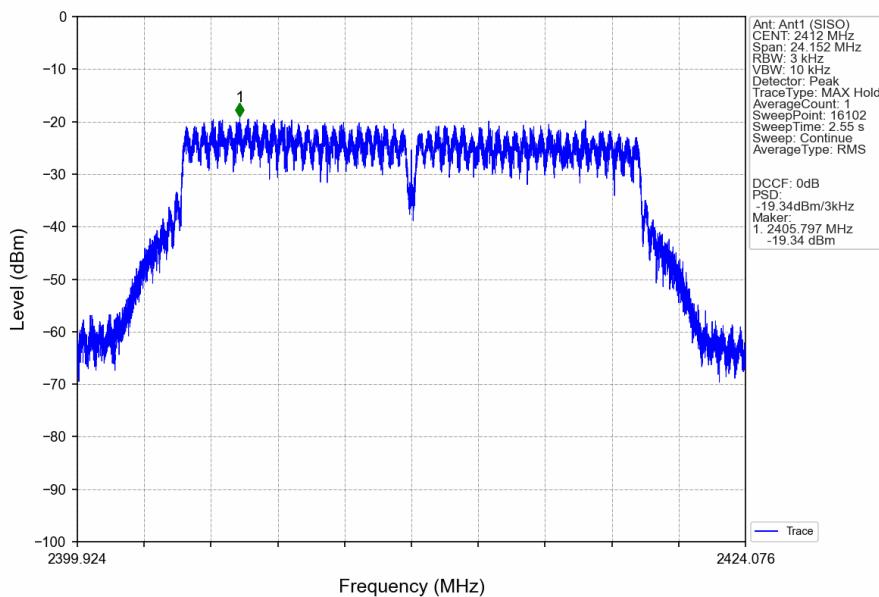
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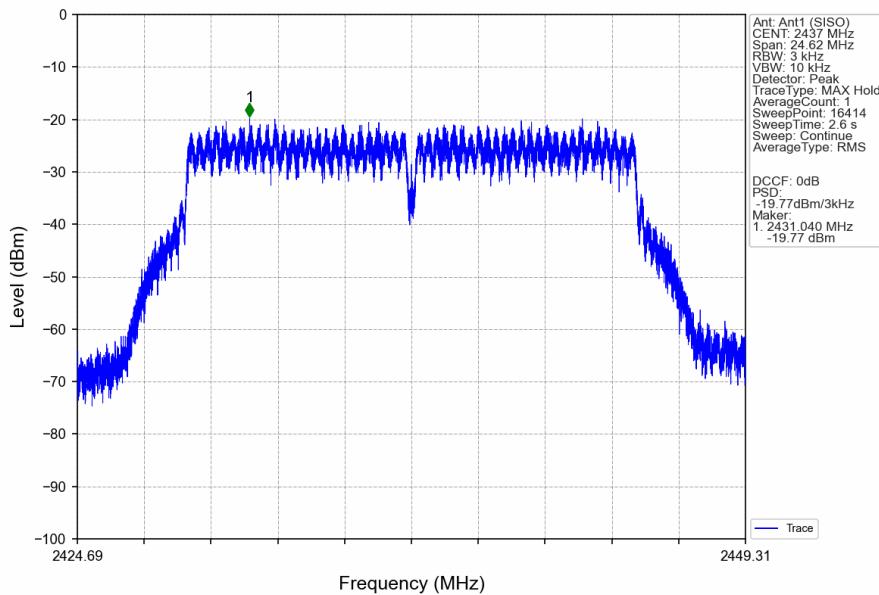
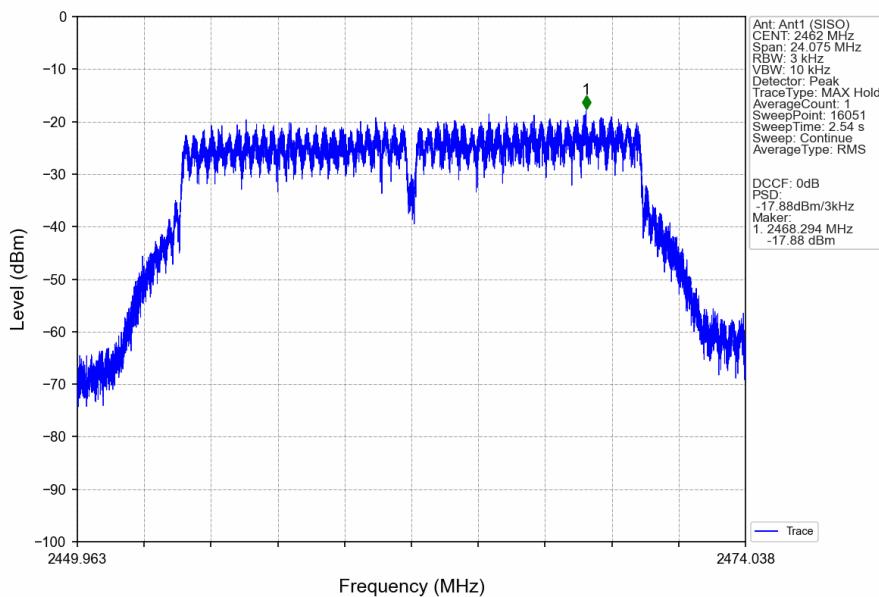
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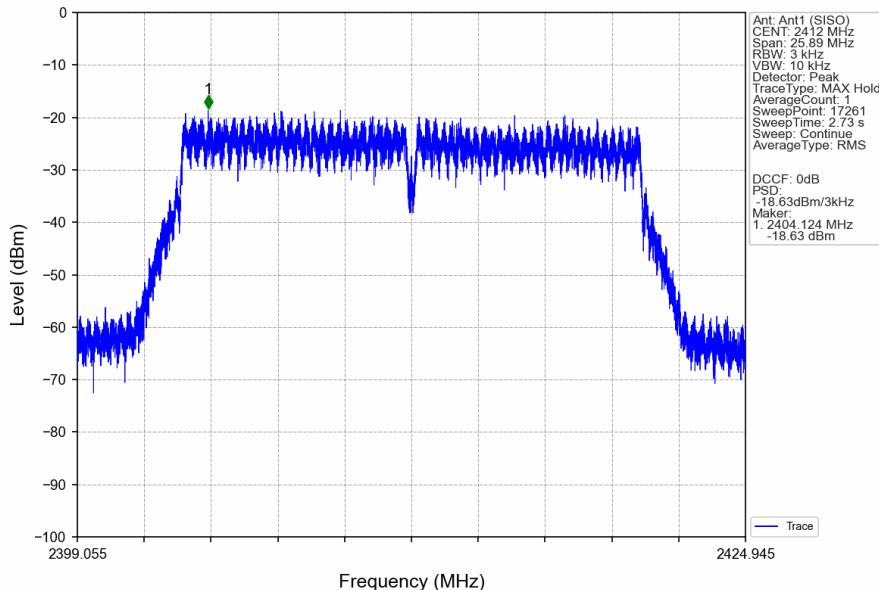
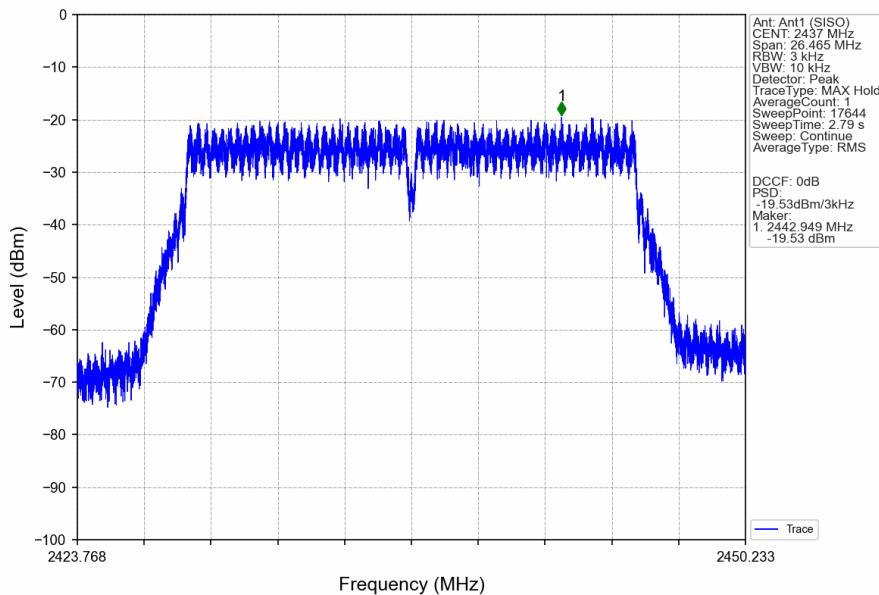
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**802.11g\_MCH\_2437MHz\_Ant1 (SISO)\_NTNV****802.11g\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV**

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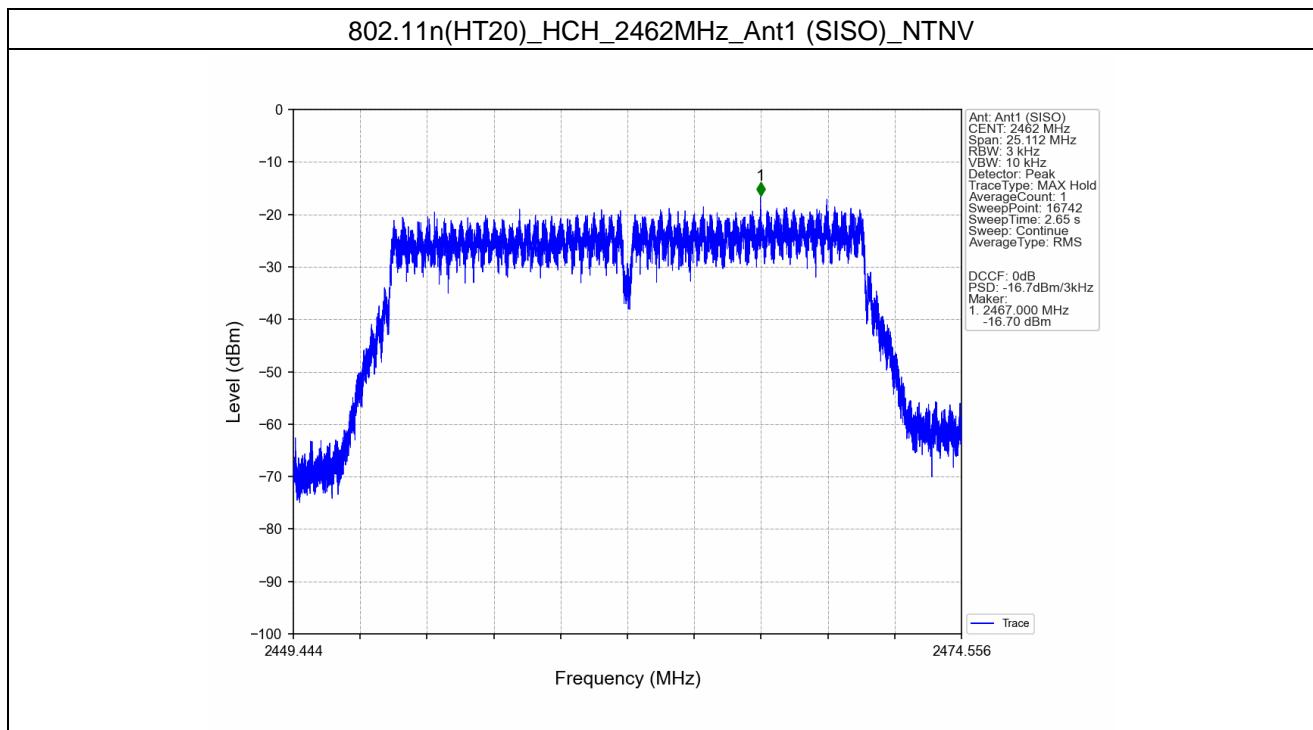
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## 5. Unwanted Emissions In Non-restricted Frequency Bands

### 5.1 Test Result

#### 5.1.1 Ref

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)
802.11b	SISO	2412	1	1.73
		2437	1	1.08
		2462	1	-0.49
802.11g	SISO	2412	1	-3.57
		2437	1	-5.10
		2462	1	-3.35
802.11n (HT20)	SISO	2412	1	-3.59
		2437	1	-5.36
		2462	1	-4.03

Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.

#### 5.1.2 CSE and Band Edges

Mode	TX Type	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict
802.11b	SISO	2412	1	1.73	-18.27	Pass
		2437	1	1.73	-18.27	Pass
		2462	1	1.73	-18.27	Pass
802.11g	SISO	2412	1	-3.35	-23.35	Pass
		2437	1	-3.35	-23.35	Pass
		2462	1	-3.35	-23.35	Pass
802.11n (HT20)	SISO	2412	1	-3.59	-23.59	Pass
		2437	1	-3.59	-23.59	Pass
		2462	1	-3.59	-23.59	Pass

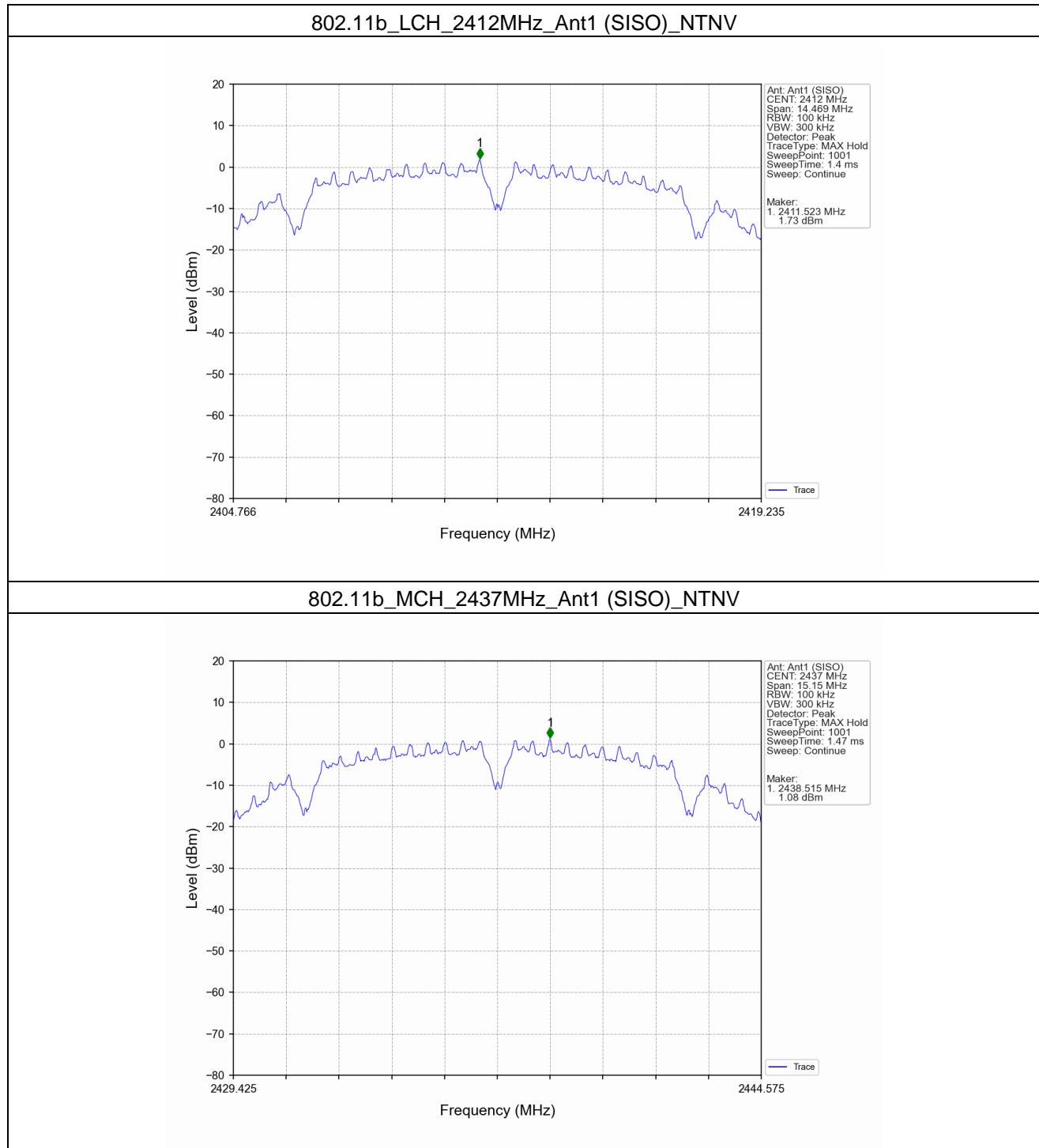
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.

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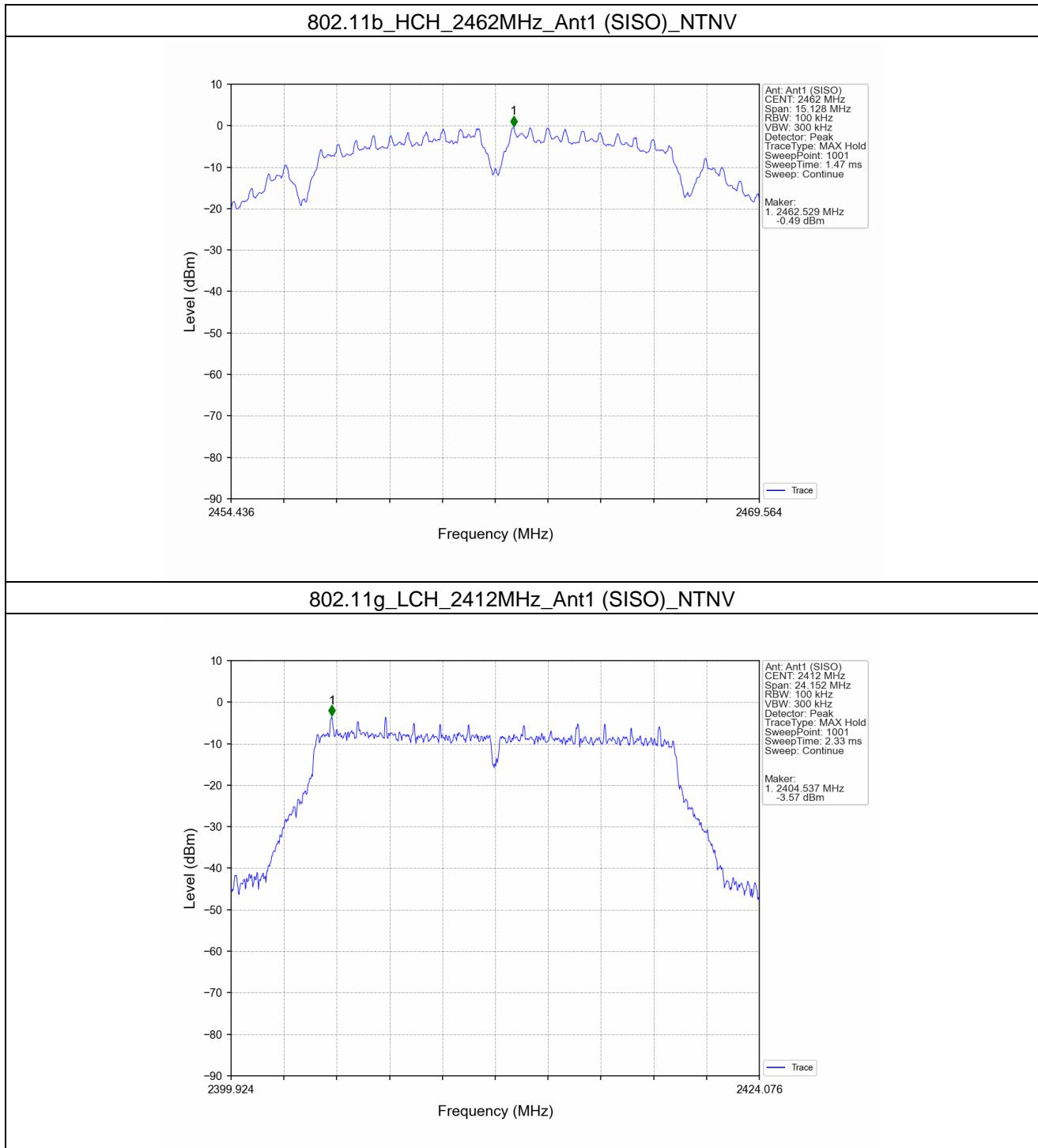
## 5.2 Test Graph

### 5.2.1 Ref



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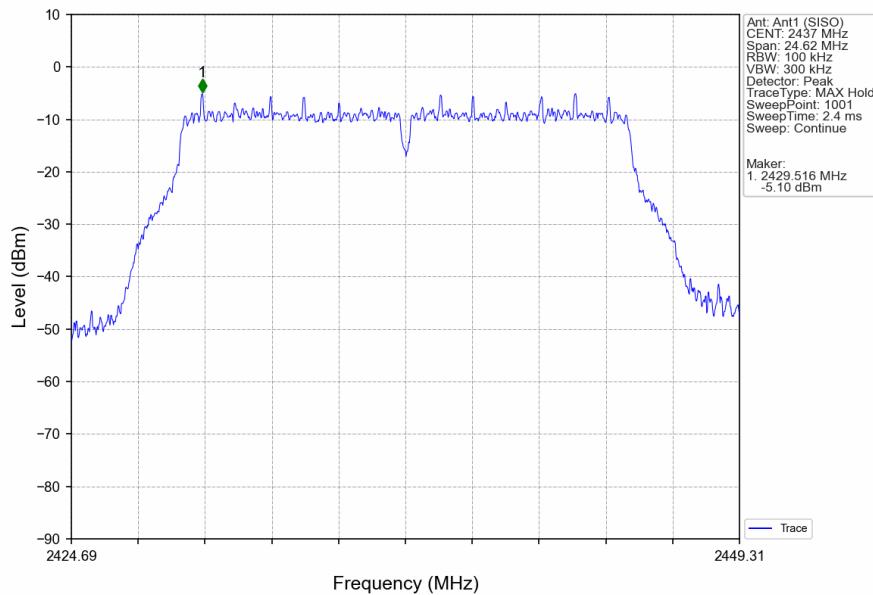
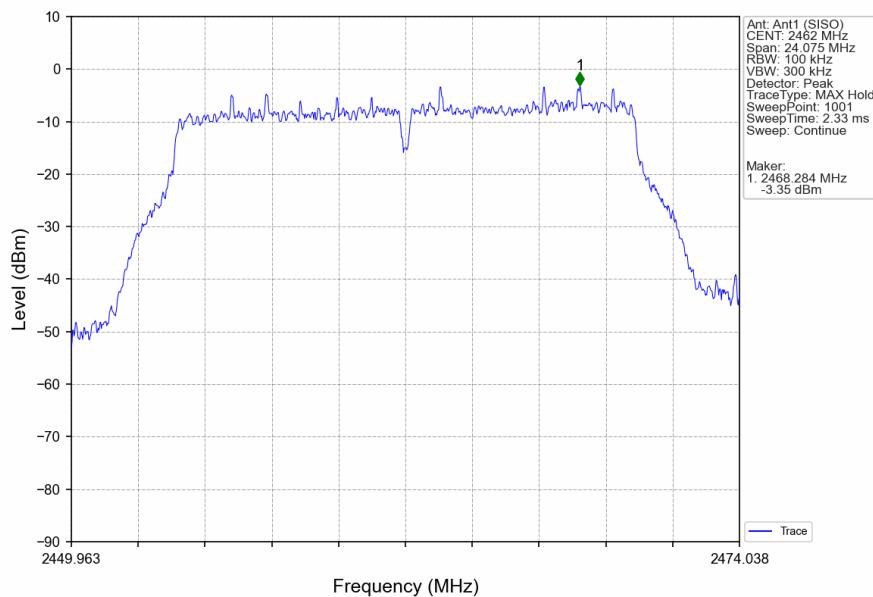
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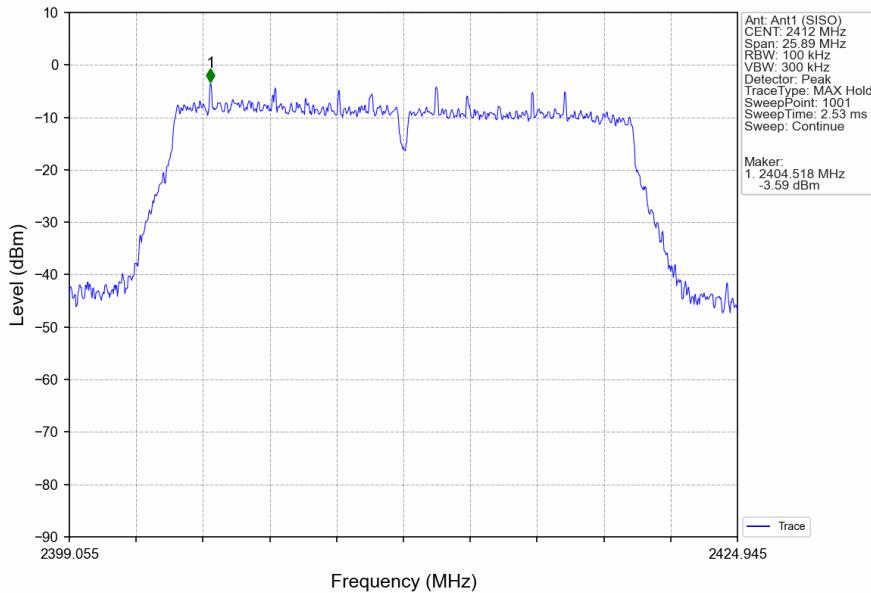
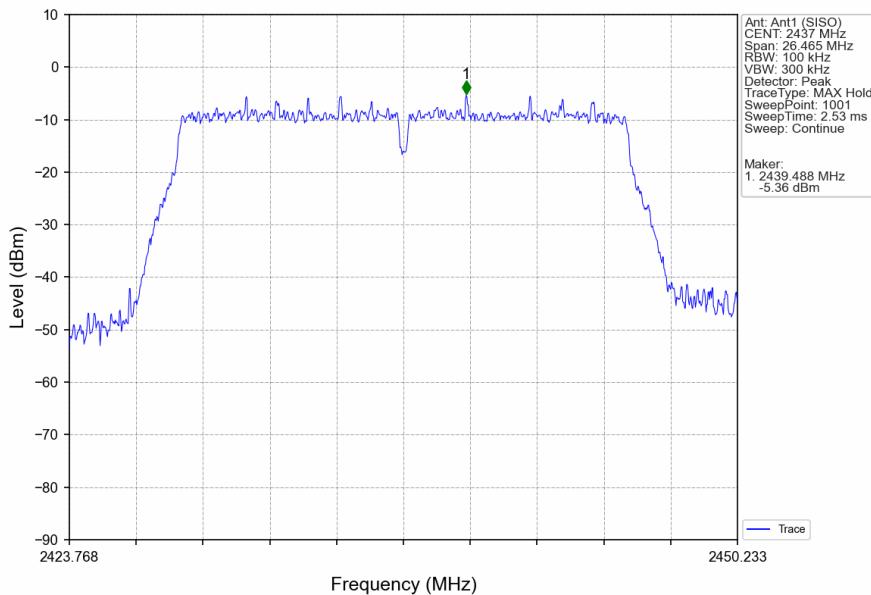
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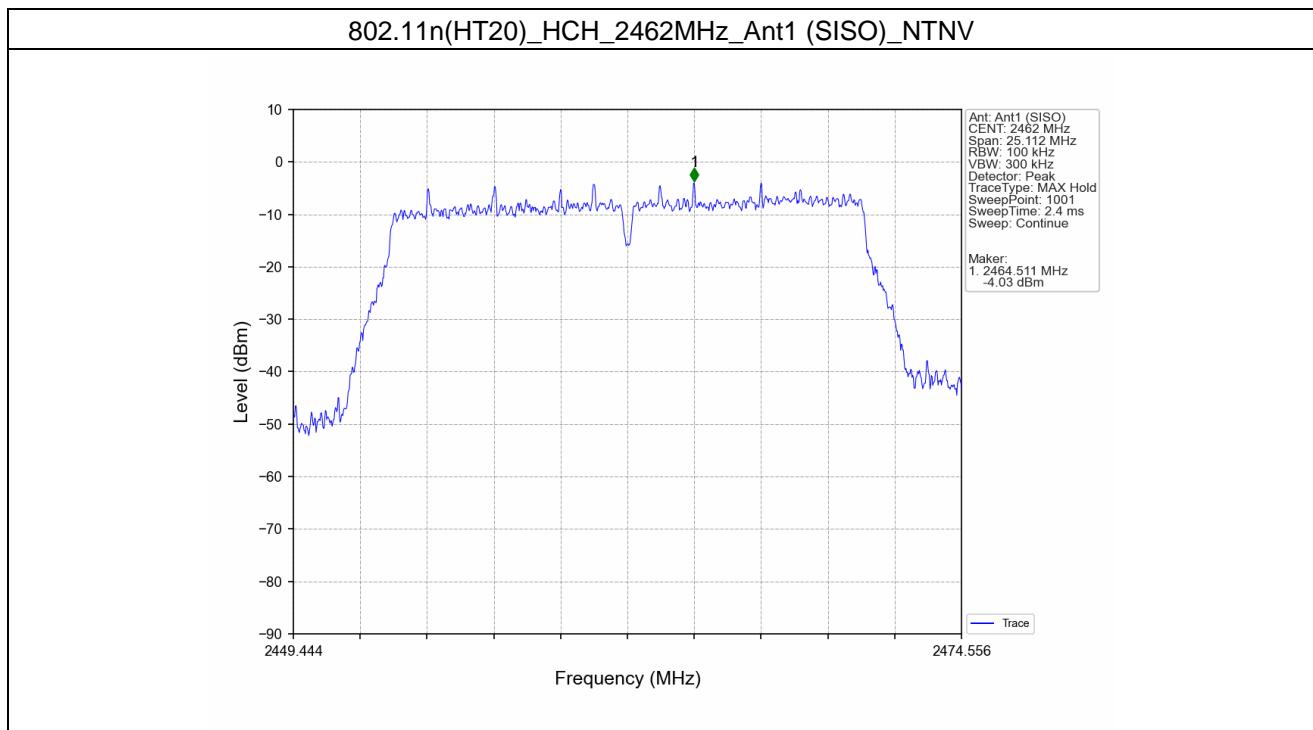
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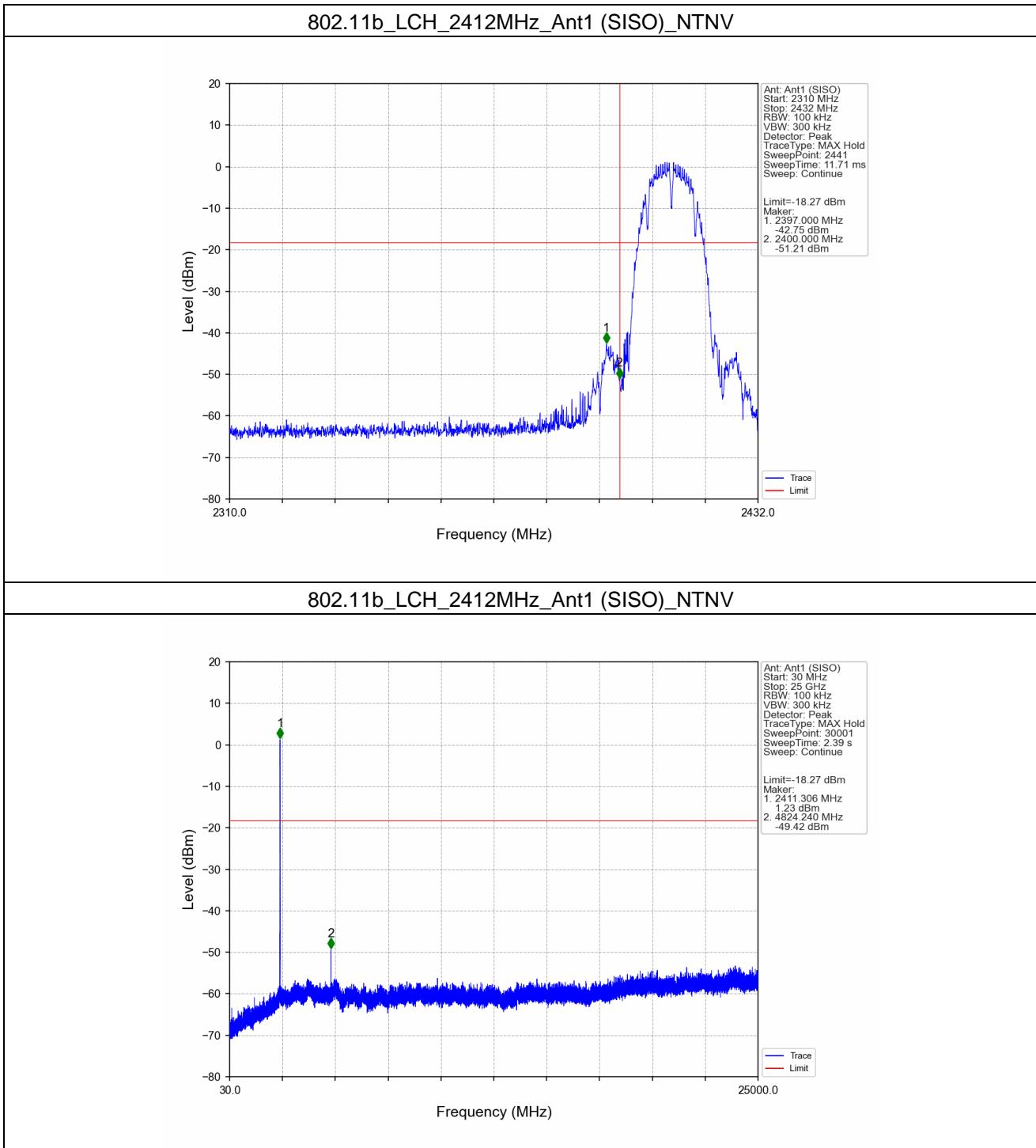
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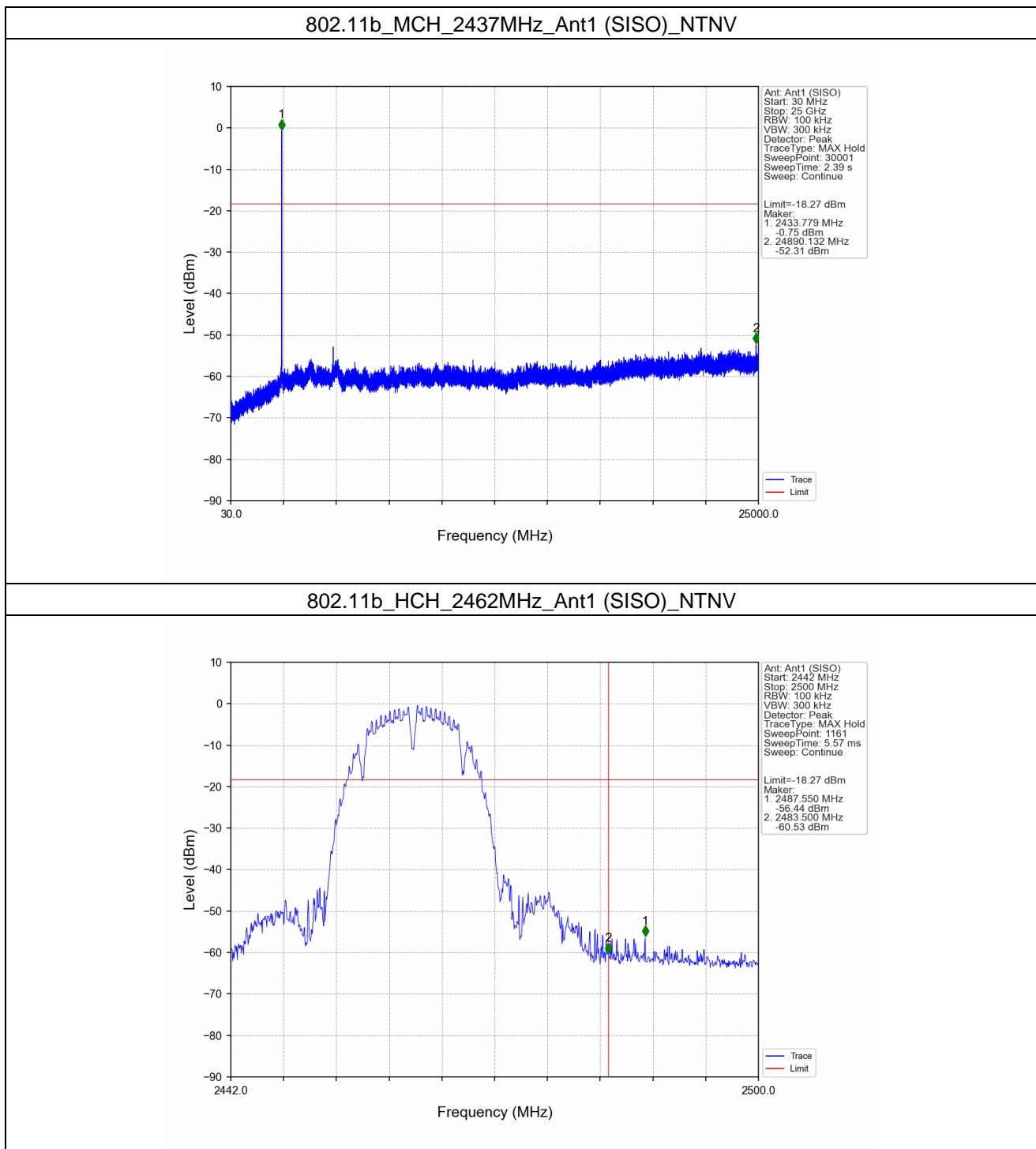
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## 5.2.2 CSE and Band Edges



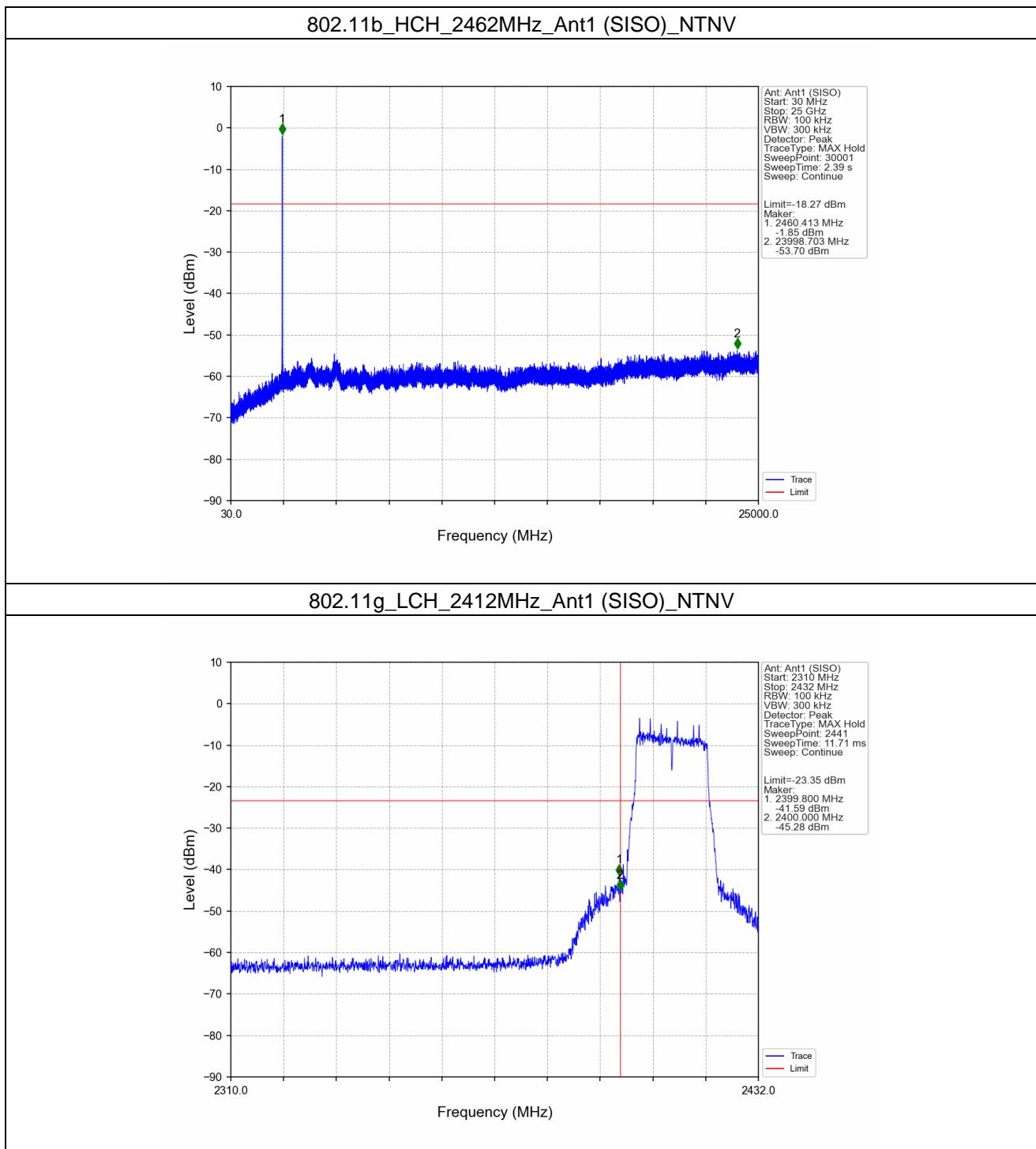
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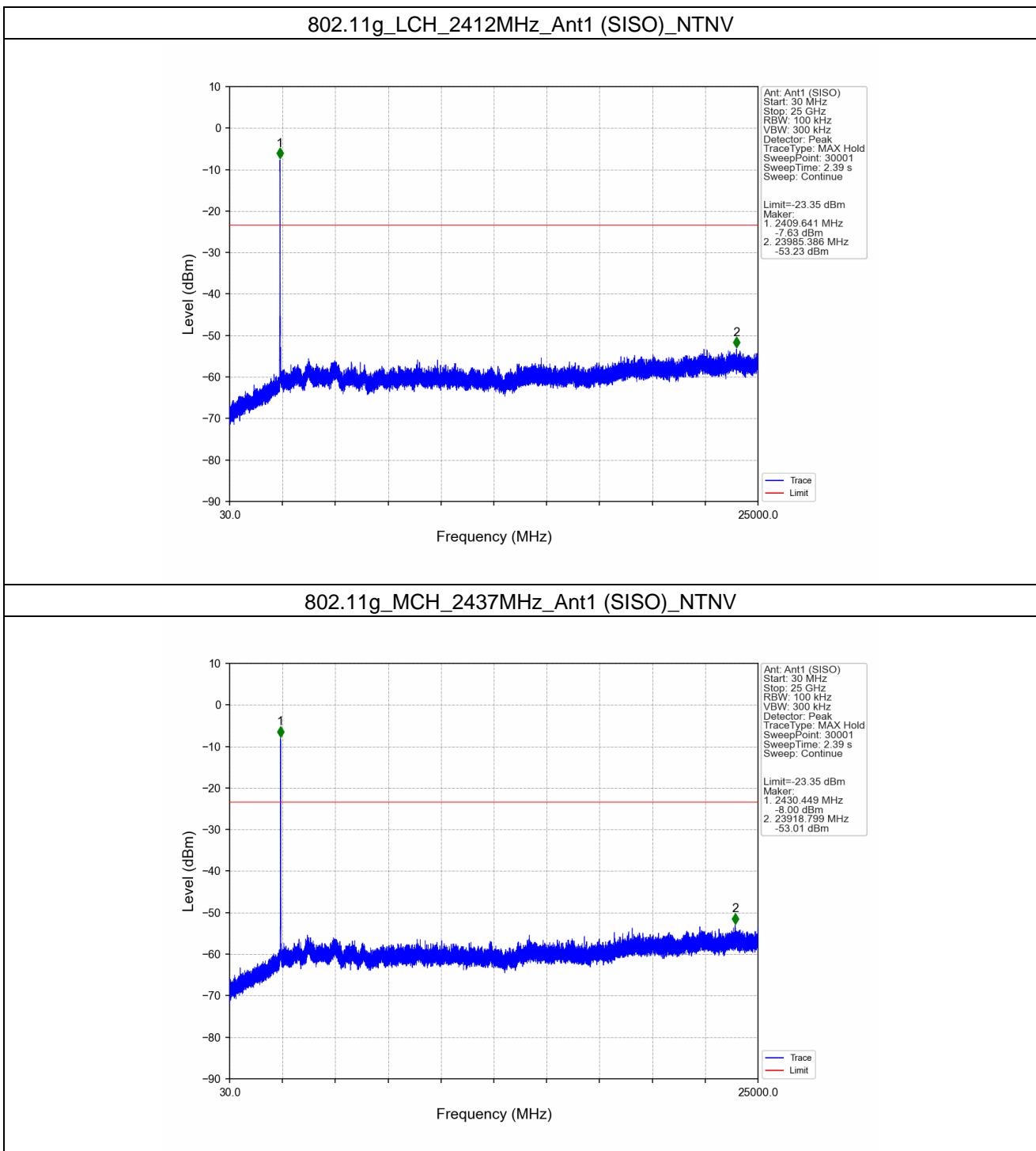
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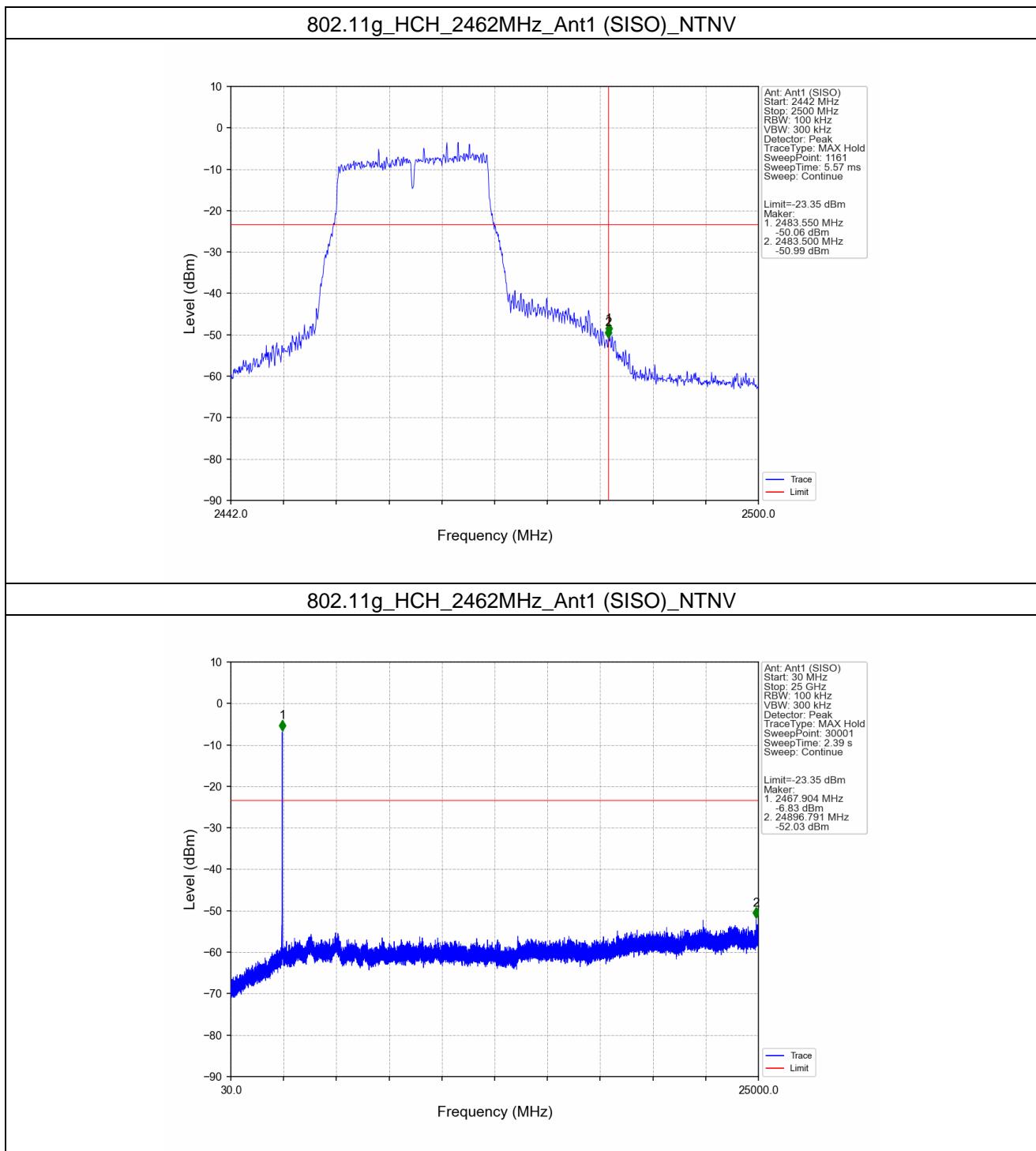
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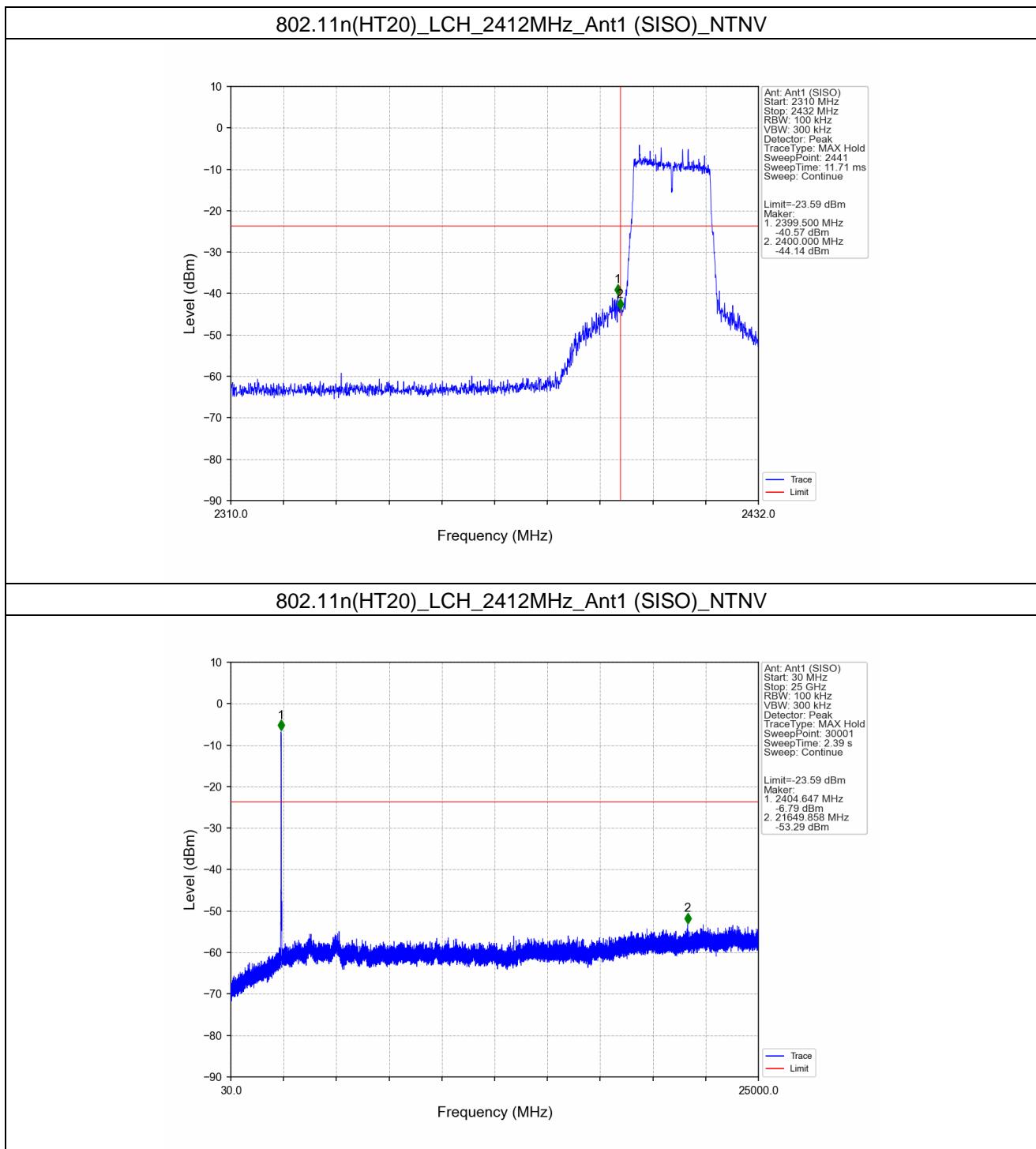
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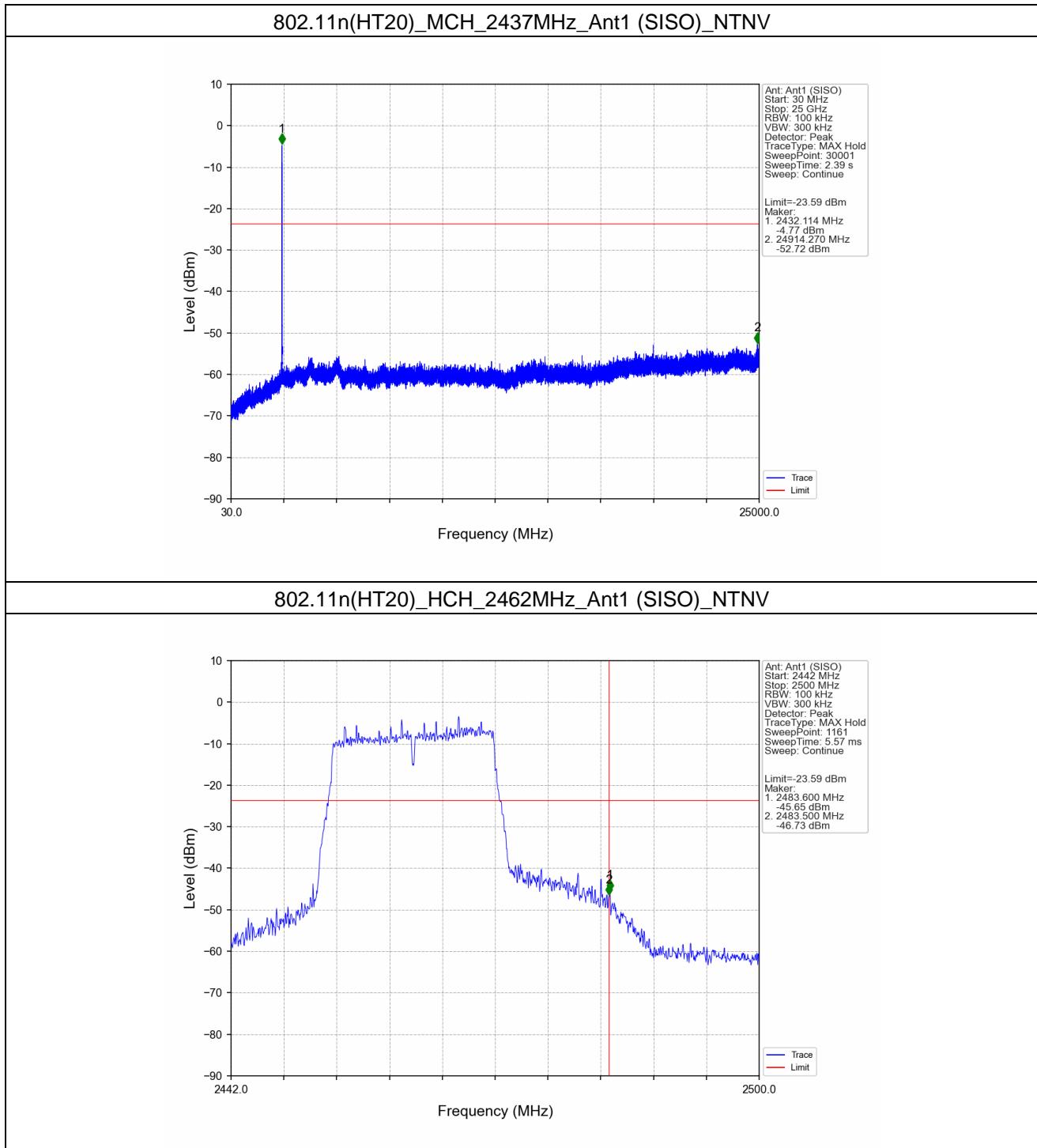
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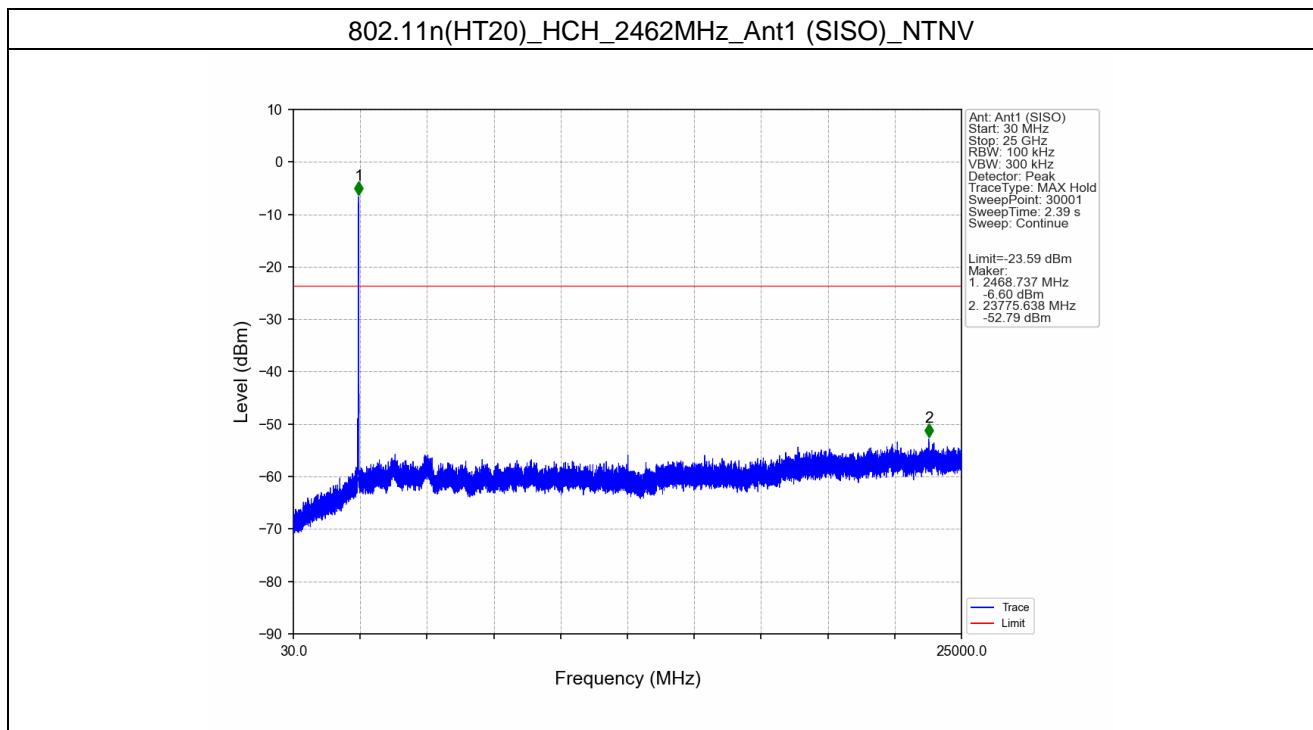
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