

TEST REPORT

Application No.: SZEM2005003819CR
Applicant: TomTom International BV
Address of Applicant: De Ruijterkade 154 1011 AC Amsterdam, The Netherlands
Manufacturer: TomTom International BV
Address of Manufacturer: De Ruijterkade 154 1011 AC Amsterdam, The Netherlands
Factory: Dongguan Apical Electronics Co., Ltd
Address of Factory: 6#, Shunxing 5 Rd, No.2 Industrial zone, Dajingtou, Dalang Town, Dongguan City
Equipment Under Test (EUT):
EUT Name: GPS Navigation System
Model No.: 4YB50
Trade Mark: TOMTOM
FCC ID: S4LFF50
Standard(s) : 47 CFR Part 15, Subpart C 15.247
Date of Receipt: 2020-05-15
Date of Test: 2020-05-21 to 2020-05-28
Date of Issue: 2020-06-22

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu

Keny Xu
EMC Laboratory Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2020-06-22		Original

Authorized for issue by:			
			
		Powell Bao /Project Engineer	
			
		Eric Fu /Reviewer	

2 Test Summary

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.9.1	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass

Remark:

Model No.: 4YB50

This test report (Ref. No.: SZEM200500381904) is only valid with the original test report (Ref. No.: RF200116W006-2).

Review with the original report, this report just add the information of factory and changed the manufacturer, product name, model No. and trade mark.

According to the declaration from the applicant, the RF module used in this report and the one in original report were identical(RF module, model No.. K019-CW43-DW).

Considering to the difference, pre-scan were performed on the sample in this report to find the items which can be influential to the result in the original test report for fully retest.

Therefore in this report Conducted Peak Output Power, Conducted Spurious Emissions and Radiated Spurious Emissions were fully retested on model 4YB50 and shown the data in this report, other tests please refer to original report RF200116W006-2.



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4 General Information

4.1 Details of E.U.T.

Power Supply:	Powered by DC3.7V rechargeable battery and can be charged by car charger
Cable:	Micro USB cable(Unshielded, 156cm)
Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Number of Channels:	802.11b/g/n(HT20):11
Channel Spacing:	5MHz
Antenna Type:	FPC
Antenna Gain:	-0.22dBi

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	Duty cycle	$\pm 0.37\%$
3	Occupied Bandwidth	$\pm 3\%$
4	Conduction emission	$\pm 3.0\text{dB}$ (150kHz to 30MHz)
5	RF conducted power	$\pm 0.75\text{dB}$
6	RF power density	$\pm 2.84\text{dB}$
7	Conducted Spurious emissions	$\pm 0.75\text{dB}$
8	RF Radiated power	$\pm 4.5\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (Above 1GHz)
9	Radiated Spurious emission test	$\pm 4.5\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (Above 1GHz)
10	Temperature test	$\pm 1^\circ\text{C}$
11	Humidity test	$\pm 3\%$
12	Supply voltages	$\pm 1\%$

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

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

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

Conducted Peak Output Power					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12
DC Power Supply	Rohde & Schwarz	NGSM 32/10	SEM011-04	2020-03-24	2021-03-23
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2019-07-11	2020-07-10
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23
Electric and Magnetic Field Analyzer	Narda	EHP-50F	SEM022-05	2019-11-28	2020-11-27

Conducted Spurious Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12
DC Power Supply	Rohde & Schwarz	NGSM 32/10	SEM011-04	2020-03-24	2021-03-23
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2019-07-11	2020-07-10
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23
Electric and Magnetic Field Analyzer	Narda	EHP-50F	SEM022-05	2019-11-28	2020-11-27

Radiated Spurious Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2019-07-11	2020-07-10
EXA Spectrum Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2020-04-09	2021-04-08
Horn Antenna	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12



Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23
Pre-amplifier	Rohde & Schwarz	CH14-H052	SEM005-17	2020-04-01	2021-03-31
Pre-amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2020-04-01	2021-03-31
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

RE in Chamber					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date	Cal. Due date
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2017-08-05	2020-08-04
MXE EMI Receiver (20Hz-8.4GHz)	Agilent Technologies	N9038A	SEM004-05	2018-09-25	2019-09-24
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2017-06-27	2020-06-26
Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEM005-01	2020-03-11	2021-03-30
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2019-07-11	2020-07-10

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2019-09-26	2020-09-25
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2019-09-26	2020-09-25
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2019-09-26	2020-09-25
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2020-04-07	2021-04-06



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6 Radio Spectrum Matter Test Results

6.1 Conducted Peak Output Power

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

Test Method: ANSI C63.10 (2013) Section 11.9.1

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥ 50 hopping channels
	0.25 for $25 \leq$ hopping channels < 50
	1 for digital modulation
2400-2483.5	1 for ≥ 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

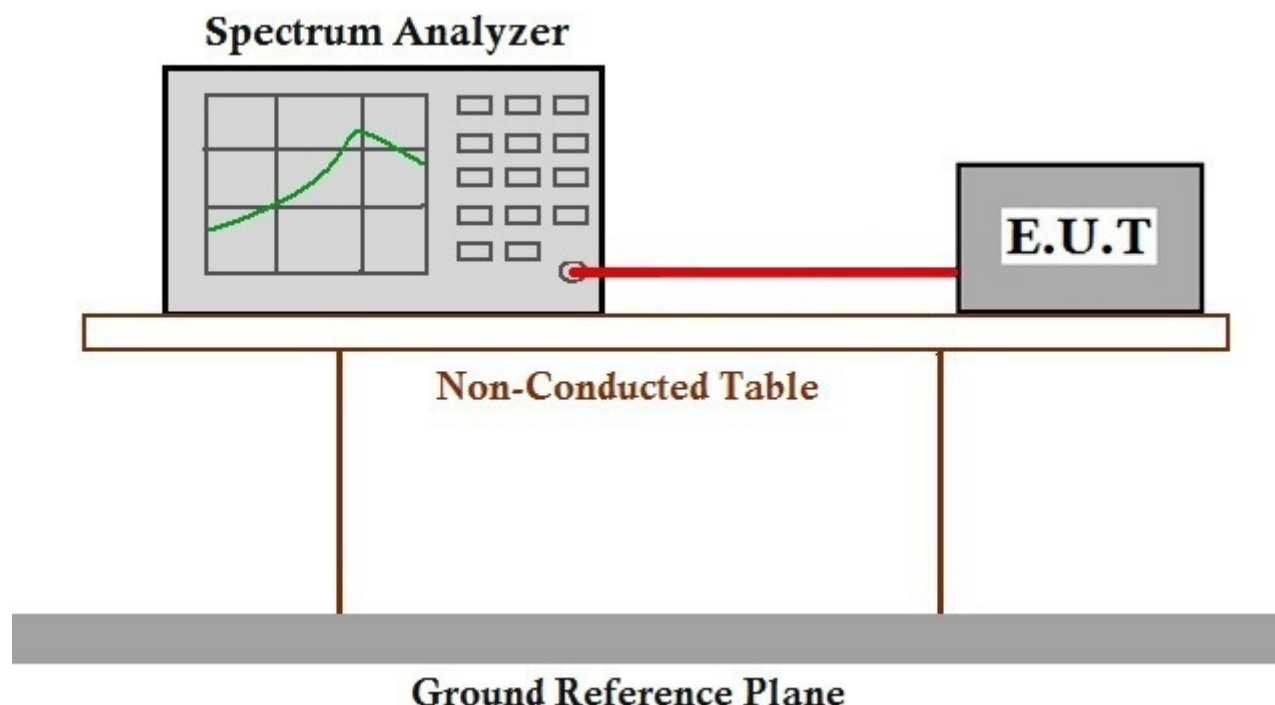
6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25.2 °C Humidity: 50.9 % RH Atmospheric Pressure: 1010 mbar

Test mode e: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); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40). Only the data of worst case is recorded in the report.

6.1.2 Test Setup Diagram



6.1.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

6.2 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))



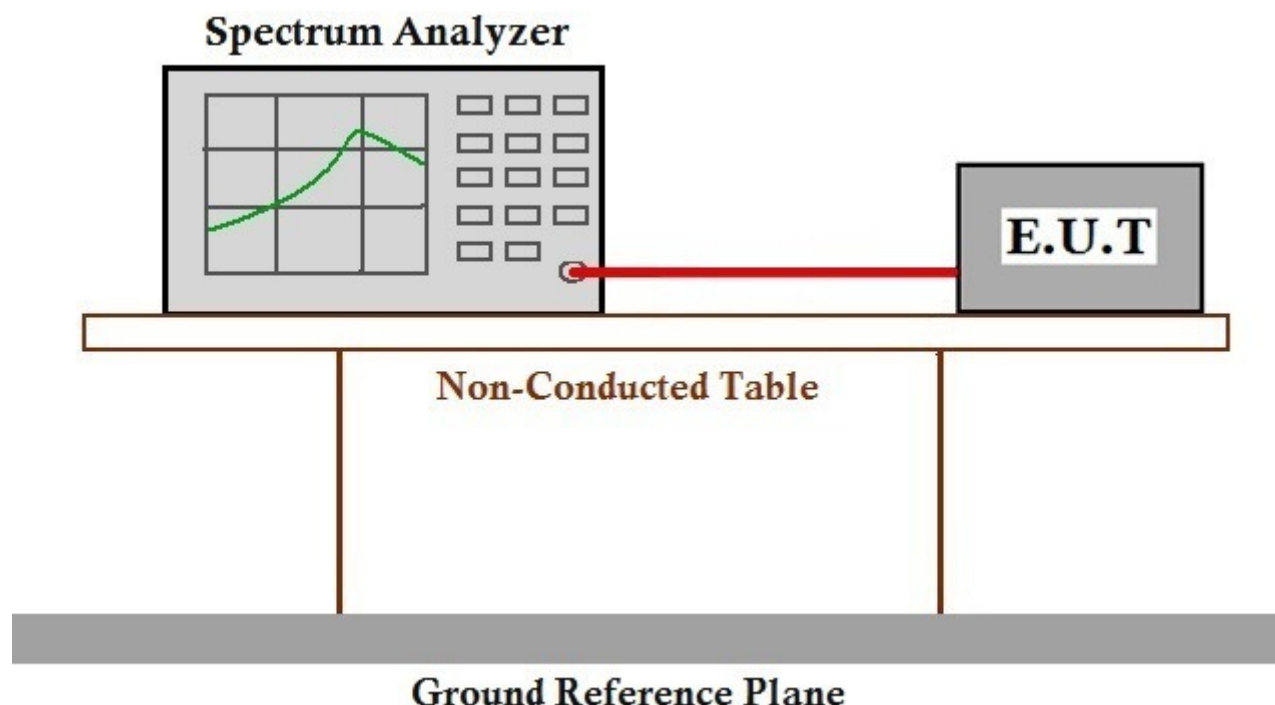
6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25.2 °C Humidity: 50.9 % RH Atmospheric Pressure: 1010 mbar

Test mode e: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); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40). Only the data of worst case is recorded in the report.

6.2.2 Test Setup Diagram



6.2.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

6.3 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.247(d)

Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6

Measurement Distance: 3m

Limit:

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.



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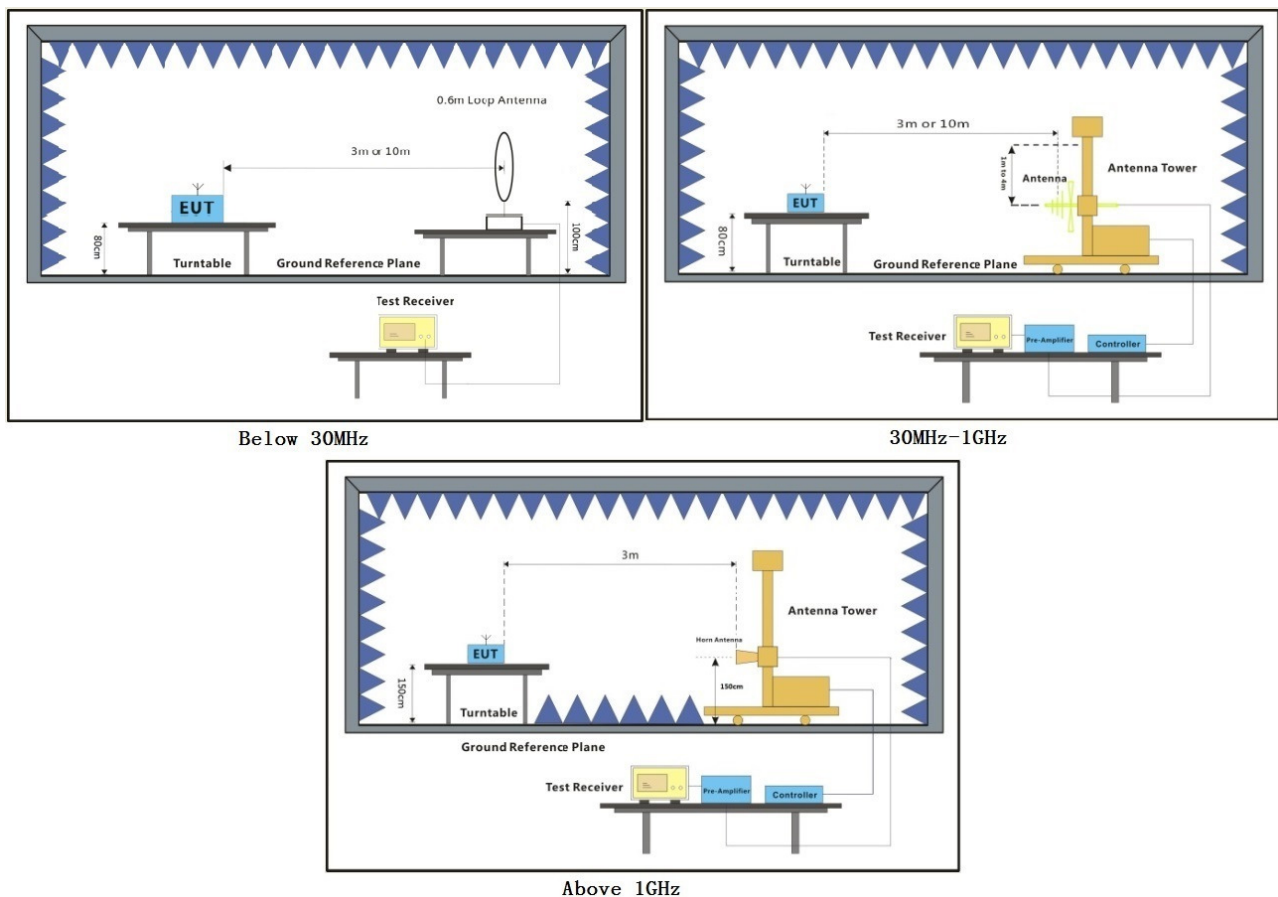
6.3.1 E.U.T. Operation

Operating Environment:

Temperature: 24.4 °C Humidity: 60 % RH Atmospheric Pressure: 1010 mbar

Test mode e: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); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40). Only the data of worst case is recorded in the report.

6.3.2 Test Setup Diagram



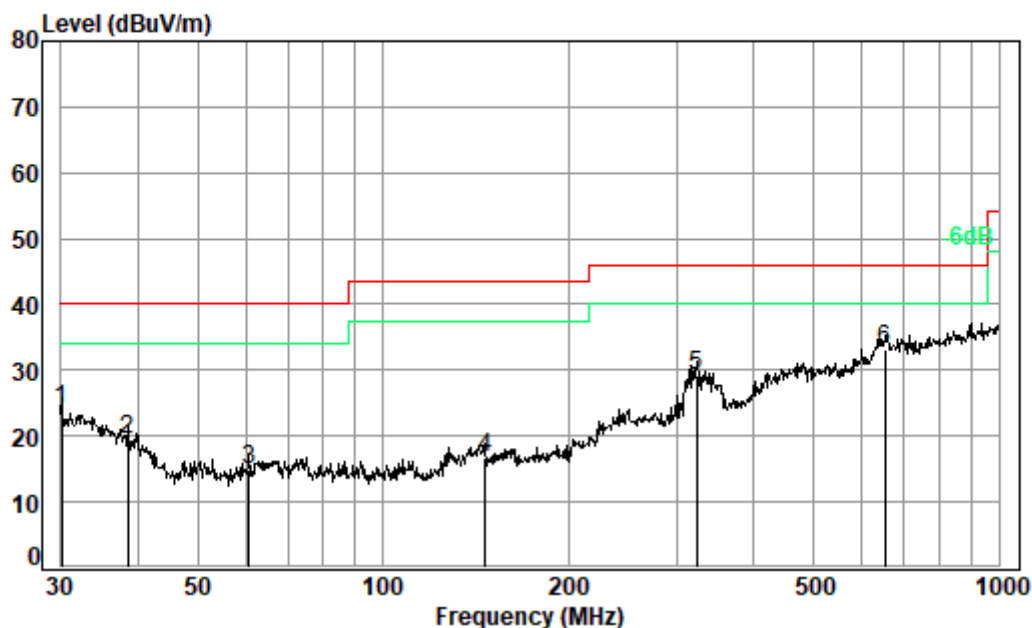
6.3.3 Measurement Procedure and Data

- 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 middle 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 it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark:

- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- 3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and 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.
- 4) 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.

Mode:e; Polarization:Horizontal



Condition: 3m HORIZONTAL

Job No. : 03819CR

Test Mode: e

	Freq	Cable	Ant	Preamp	Read	Limit	Over	
	MHz	Loss	Factor	Factor	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	30.11	0.60	22.44	27.74	28.59	23.89	40.00	-16.11 QP
2	38.48	0.60	18.17	27.71	28.50	19.56	40.00	-20.44 QP
3	60.70	0.80	13.17	27.66	28.59	14.90	40.00	-25.10 QP
4	146.37	1.31	14.30	27.35	28.45	16.71	43.50	-26.79 QP
5	323.32	1.98	20.33	27.01	33.99	29.29	46.00	-16.71 QP
6 pp	651.94	2.81	27.30	28.01	31.18	33.28	46.00	-12.72 QP

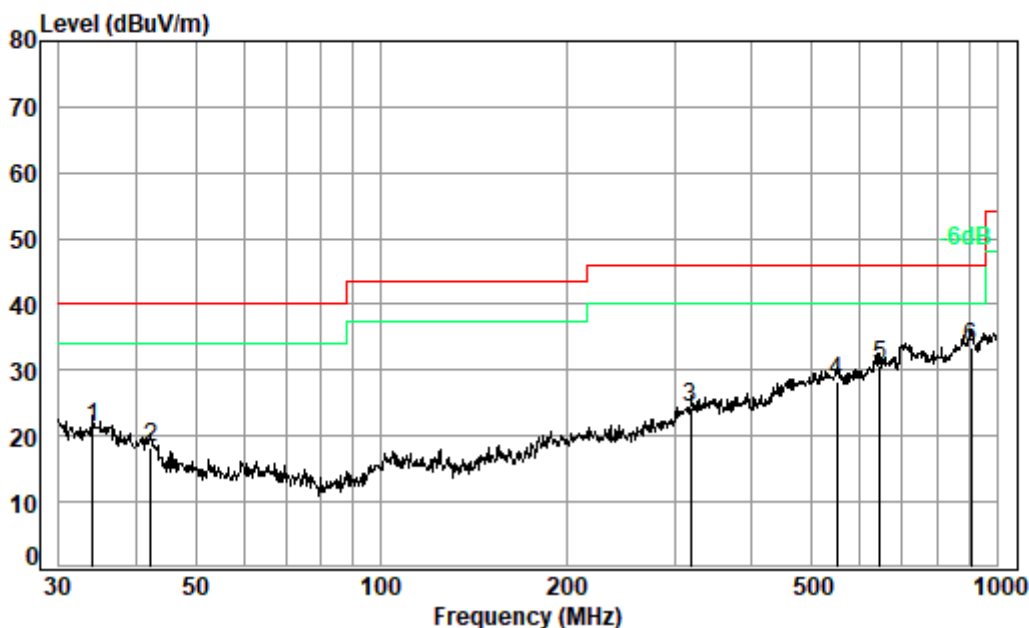


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Mode:e; Polarization:Vertical



Condition: 3m VERTICAL

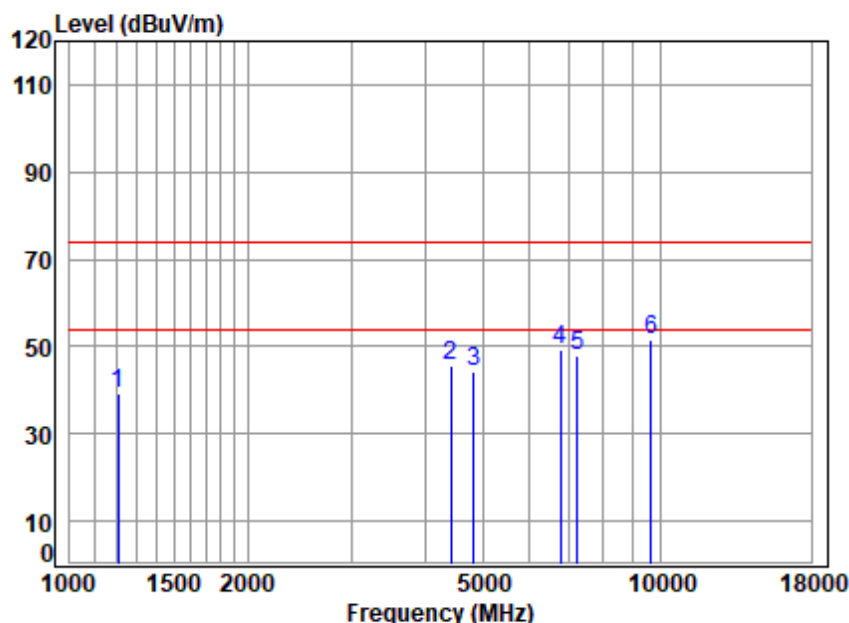
Job No. : 03819CR

Test Mode: e

	Freq	Cable	Ant	Preamp	Read	Limit	Over	
	MHz	Loss	Factor	Factor	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	34.04	0.60	20.31	27.72	28.03	21.22	40.00	-18.78 QP
2	42.30	0.65	16.67	27.70	28.75	18.37	40.00	-21.63 QP
3	318.82	1.96	20.19	26.98	29.01	24.18	46.00	-21.82 QP
4	549.02	2.65	25.63	27.97	28.07	28.38	46.00	-17.62 QP
5	645.12	2.80	27.21	28.03	28.60	30.58	46.00	-15.42 QP
6 pp	906.48	3.61	29.83	27.13	27.00	33.31	46.00	-12.69 QP



Mode:e; Polarization:Horizontal; Modulation:802.11b; bandwidth:20MHz; Channel:Low

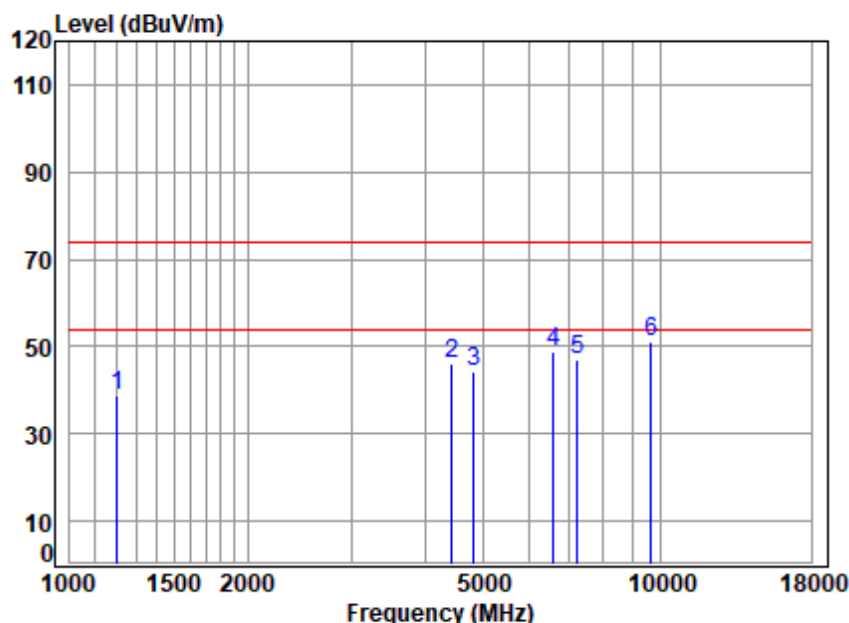


Site : chamber
Condition: 3m HORIZONTAL
Job No : 03819CR/03820CR
Mode : 2412 TX RSE
Note : 2.4G WIFI 11B

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1206.682	2.65	24.62	40.29	52.46	39.44	74.00	-34.56	peak
2	4417.841	6.63	33.46	42.49	47.83	45.43	74.00	-28.57	peak
3	4824.000	6.86	34.00	42.78	46.01	44.09	74.00	-29.91	peak
4	6776.265	8.07	35.77	41.80	47.19	49.23	74.00	-24.77	peak
5	7236.000	8.43	36.09	41.56	44.99	47.95	74.00	-26.05	peak
6	9648.000	9.41	37.69	38.51	43.03	51.62	74.00	-22.38	peak



Mode:e; Polarization:Vertical; Modulation:802.11b; bandwidth:20MHz; Channel:Low

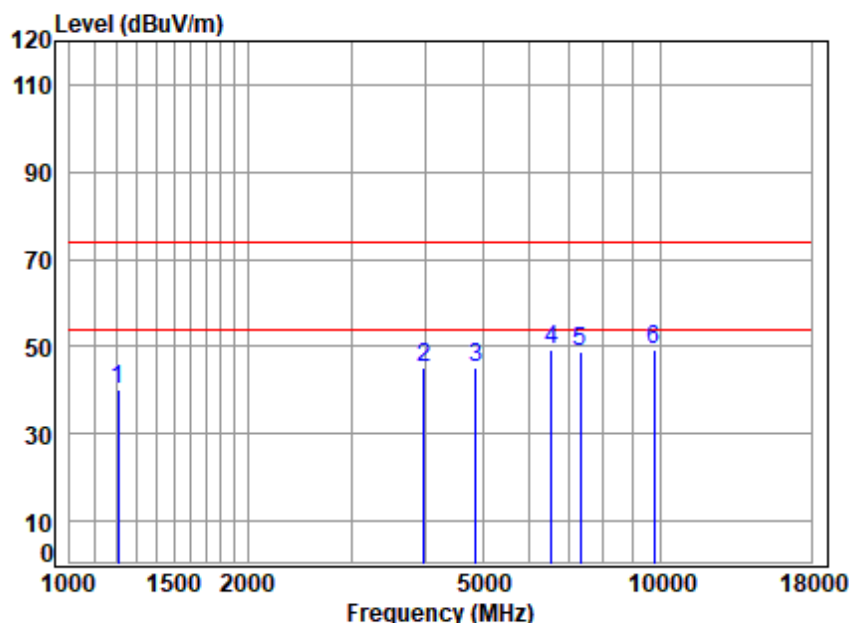


Site : chamber
Condition: 3m VERTICAL
Job No : 03819CR/03820CR
Mode : 2412 TX RSE
Note : 2.4G WIFI 11B

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1203.199	2.64	24.60	40.29	51.62	38.57	74.00	-35.43	peak
2	4430.628	6.59	33.48	42.50	48.30	45.87	74.00	-28.13	peak
3	4824.000	6.86	34.00	42.78	45.97	44.05	74.00	-29.95	peak
4	6583.209	7.90	35.65	41.91	47.40	49.04	74.00	-24.96	peak
5	7236.000	8.43	36.09	41.56	44.12	47.08	74.00	-26.92	peak
6	9648.000	9.41	37.69	38.51	42.36	50.95	74.00	-23.05	peak



Mode:e; Polarization:Horizontal; Modulation:802.11b; bandwidth:20MHz; Channel:middle

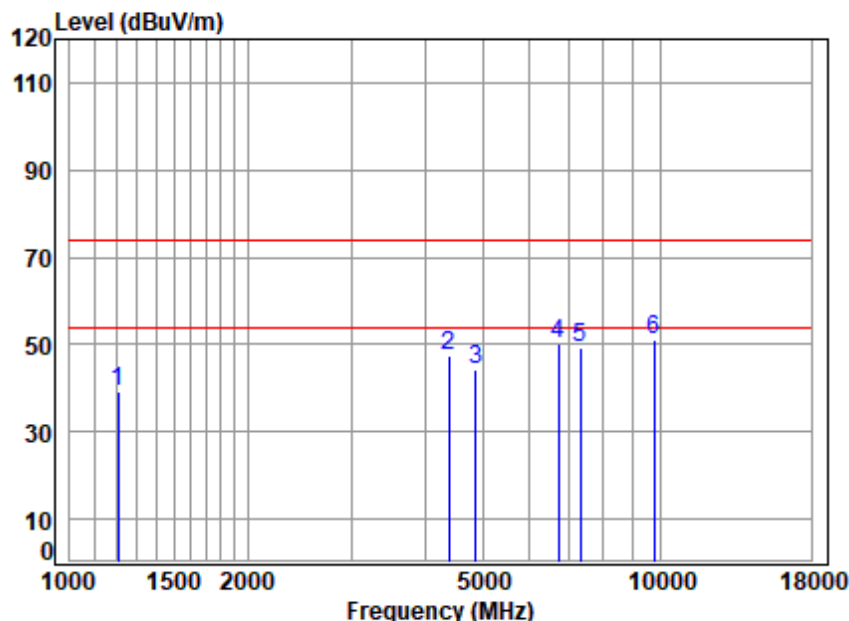


Site : chamber
Condition: 3m HORIZONTAL
Job No : 03819CR/03820CR
Mode : 2437 TX RSE
Note : 2.4G WIFI 11B

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1206.682	2.65	24.62	40.29	52.97	39.95	74.00	-34.05	peak
2	3981.257	5.97	32.66	42.14	48.74	45.23	74.00	-28.77	peak
3	4874.000	7.01	34.05	42.82	46.93	45.17	74.00	-28.83	peak
4	6545.263	7.68	35.63	41.93	47.84	49.22	74.00	-24.78	peak
5	7311.000	8.38	36.15	41.53	45.93	48.93	74.00	-25.07	peak
6	9748.000	9.41	37.75	38.37	40.39	49.18	74.00	-24.82	peak



Mode:e; Polarization:Vertical; Modulation:802.11b; bandwidth:20MHz; Channel:middle

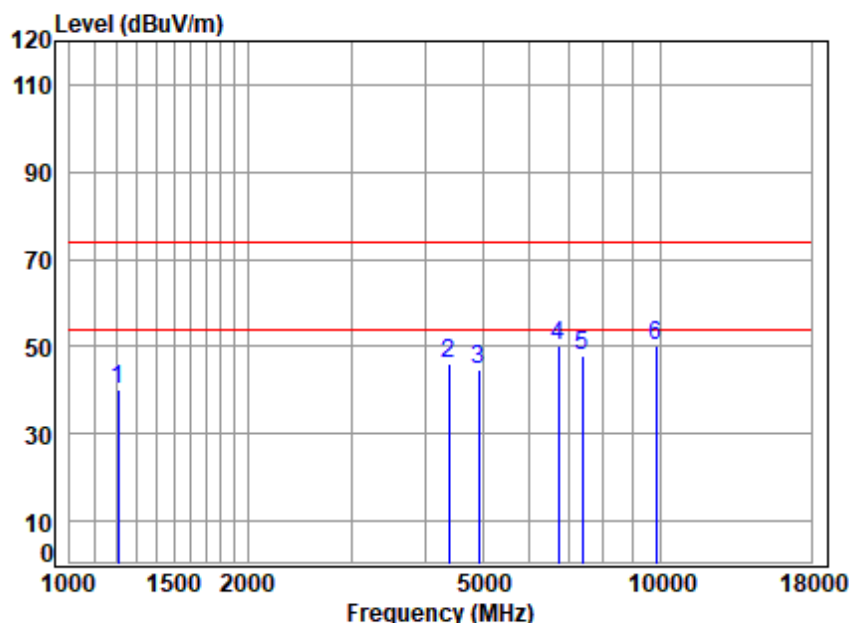


Site : chamber
Condition: 3m VERTICAL
Job No : 03819CR/03820CR
Mode : 2437 TX RSE
Note : 2.4G WIFI 11B

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1206.682	2.65	24.62	40.29	52.37	39.35	74.00	-34.65	peak
2	4379.699	6.61	33.39	42.46	49.70	47.24	74.00	-26.76	peak
3	4874.000	7.01	34.05	42.82	45.95	44.19	74.00	-29.81	peak
4	6717.762	8.28	35.73	41.83	48.20	50.38	74.00	-23.62	peak
5	7311.000	8.38	36.15	41.53	46.16	49.16	74.00	-24.84	peak
6	9748.000	9.41	37.75	38.37	42.21	51.00	74.00	-23.00	peak



Mode:e; Polarization:Horizontal; Modulation:802.11b; bandwidth:20MHz; Channel:High



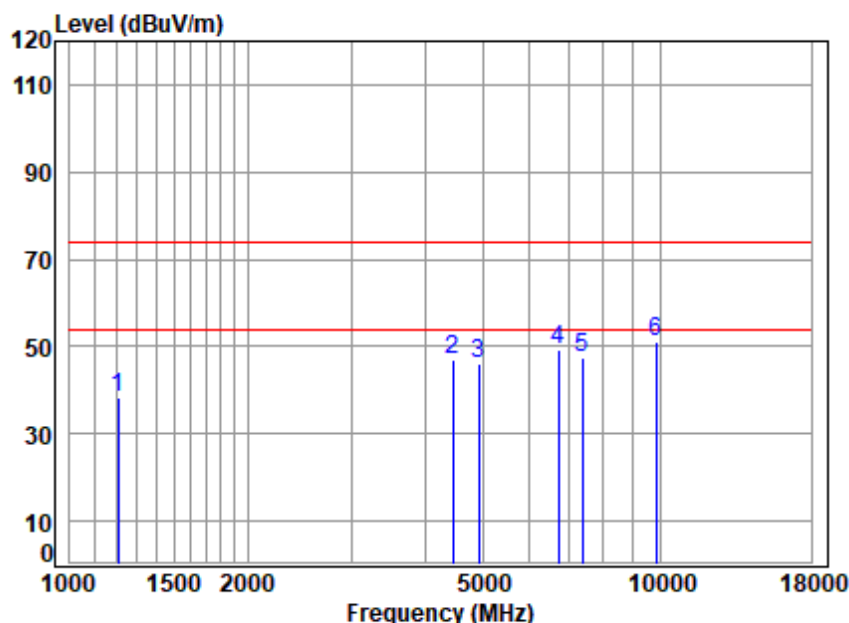
Site : chamber
Condition: 3m HORIZONTAL
Job No : 03819CR/03820CR
Mode : 2462 TX RSE
Note : 2.4G WIFI 11B

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1206.682	2.65	24.62	40.29	53.11	40.09	74.00	-33.91	peak
2	4392.376	6.66	33.42	42.47	48.36	45.97	74.00	-28.03	peak
3	4924.000	7.06	34.11	42.85	46.31	44.63	74.00	-29.37	peak
4	6717.762	8.28	35.73	41.83	47.85	50.03	74.00	-23.97	peak
5	7386.000	8.21	36.21	41.49	45.17	48.10	74.00	-25.90	peak
6	9848.000	9.02	37.81	38.22	41.57	50.18	74.00	-23.82	peak



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Mode:e; Polarization:Vertical; Modulation:802.11b; bandwidth:20MHz; Channel:High

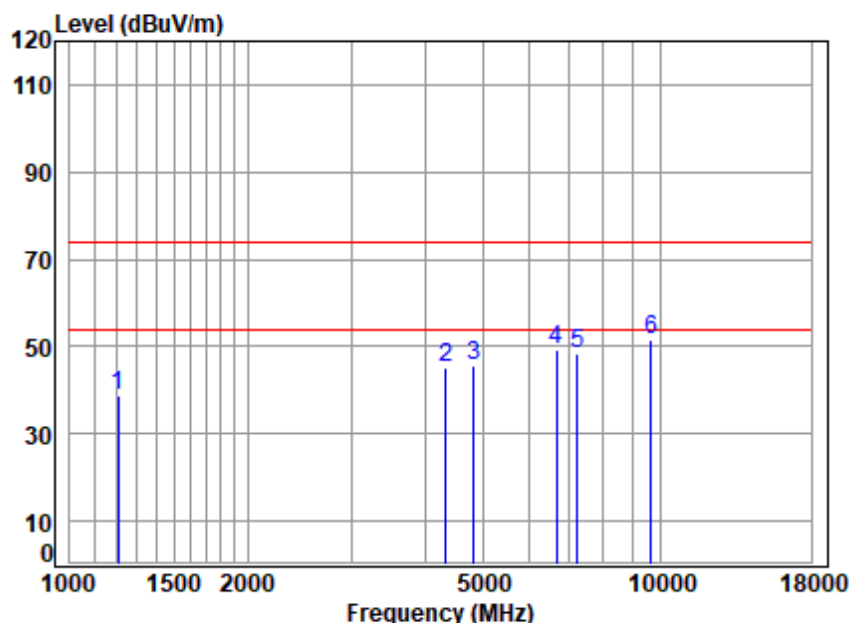


Site : chamber
Condition: 3m VERTICAL
Job No : 03819CR/03820CR
Mode : 2462 TX RSE
Note : 2.4G WIFI 11B

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1206.682	2.65	24.62	40.29	51.56	38.54	74.00	-35.46	peak
2	4456.315	6.51	33.53	42.52	49.33	46.85	74.00	-27.15	peak
3	4924.000	7.06	34.11	42.85	47.61	45.93	74.00	-28.07	peak
4	6717.762	8.28	35.73	41.83	47.09	49.27	74.00	-24.73	peak
5	7386.000	8.21	36.21	41.49	44.41	47.34	74.00	-26.66	peak
6	9848.000	9.02	37.81	38.22	42.54	51.15	74.00	-22.85	peak



Mode:e; Polarization:Horizontal; Modulation:802.11g; bandwidth:20MHz; Channel:Low

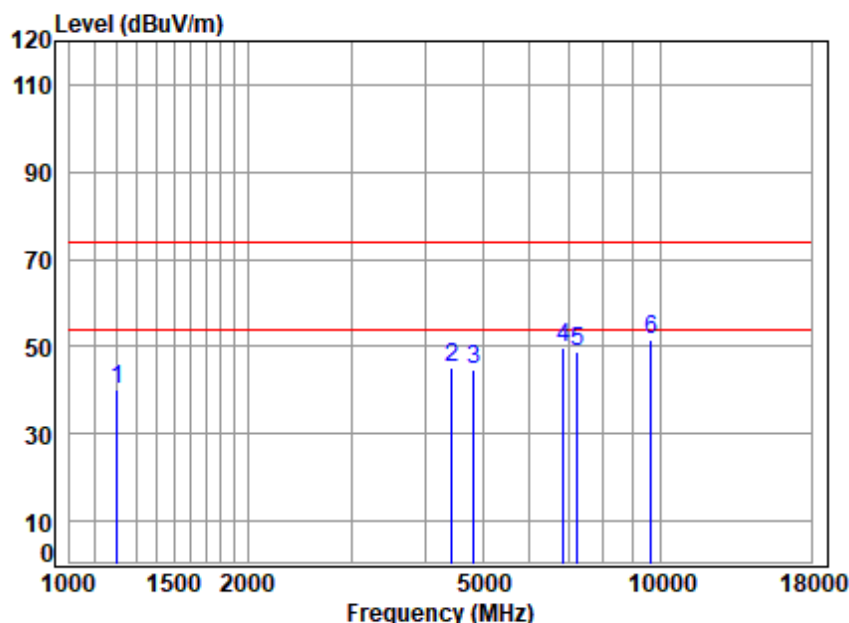


Site : chamber
Condition: 3m HORIZONTAL
Job No : 03819CR/03820CR
Mode : 2412 TX RSE
Note : 2.4G WIFI 11G

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1206.682	2.65	24.62	40.29	51.76	38.74	74.00	-35.26	peak
2	4341.886	6.46	33.33	42.43	47.76	45.12	74.00	-28.88	peak
3	4824.000	6.86	34.00	42.78	47.50	45.58	74.00	-28.42	peak
4	6679.040	8.27	35.71	41.85	46.99	49.12	74.00	-24.88	peak
5	7236.000	8.43	36.09	41.56	45.23	48.19	74.00	-25.81	peak
6	9648.000	9.41	37.69	38.51	43.02	51.61	74.00	-22.39	peak



Mode:e; Polarization:Vertical; Modulation:802.11g; bandwidth:20MHz; Channel:Low

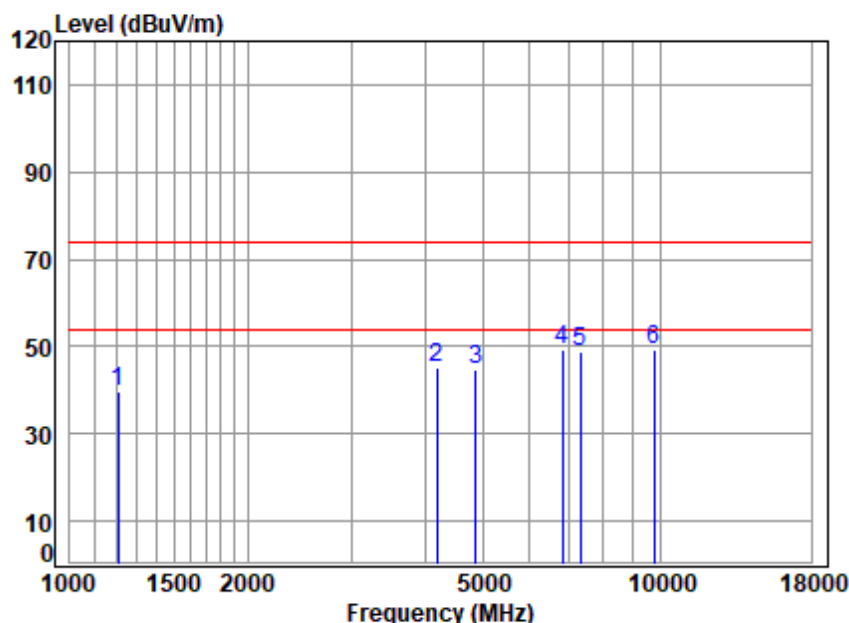


Site : chamber
Condition: 3m VERTICAL
Job No : 03819CR/03820CR
Mode : 2412 TX RSE
Note : 2.4G WIFI 11G

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1203.199	2.64	24.60	40.29	53.15	40.10	74.00	-33.90	peak
2	4443.453	6.55	33.50	42.51	47.61	45.15	74.00	-28.85	peak
3	4824.000	6.86	34.00	42.78	46.72	44.80	74.00	-29.20	peak
4	6855.063	7.90	35.82	41.76	47.57	49.53	74.00	-24.47	peak
5	7236.000	8.43	36.09	41.56	45.76	48.72	74.00	-25.28	peak
6	9648.000	9.41	37.69	38.51	43.01	51.60	74.00	-22.40	peak



Mode:e; Polarization:Horizontal; Modulation:802.11g; bandwidth:20MHz; Channel:middle

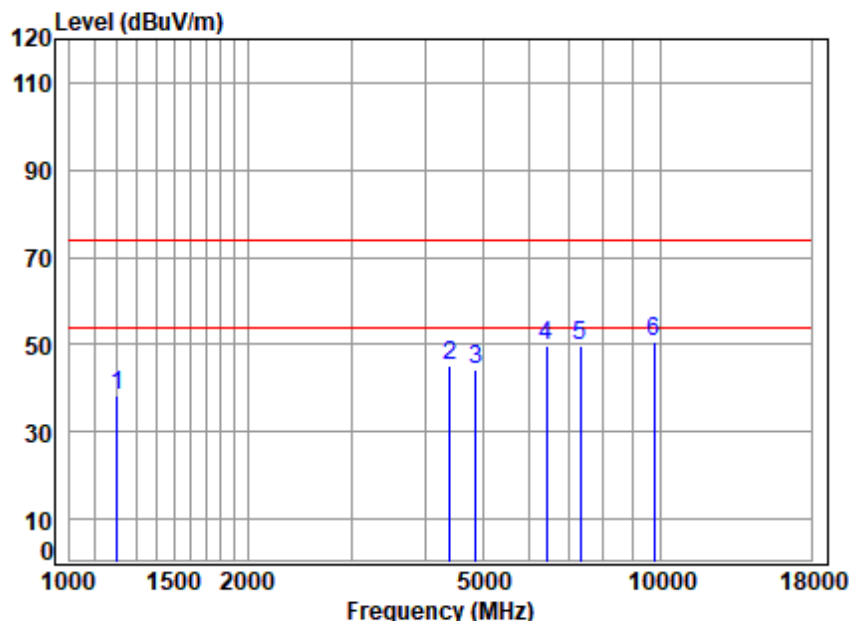


Site : chamber
Condition: 3m HORIZONTAL
Job No : 03819CR/03820CR
Mode : 2437 TX RSE
Note : 2.4G WIFI 11G

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1206.682	2.65	24.62	40.29	52.94	39.92	74.00	-34.08	peak
2	4181.768	6.10	33.04	42.31	48.57	45.40	74.00	-28.60	peak
3	4874.000	7.01	34.05	42.82	46.27	44.51	74.00	-29.49	peak
4	6815.551	7.96	35.79	41.78	47.11	49.08	74.00	-24.92	peak
5	7311.000	8.38	36.15	41.53	46.03	49.03	74.00	-24.97	peak
6	9748.000	9.41	37.75	38.37	40.61	49.40	74.00	-24.60	peak



Mode:e; Polarization:Vertical; Modulation:802.11g; bandwidth:20MHz; Channel:middle

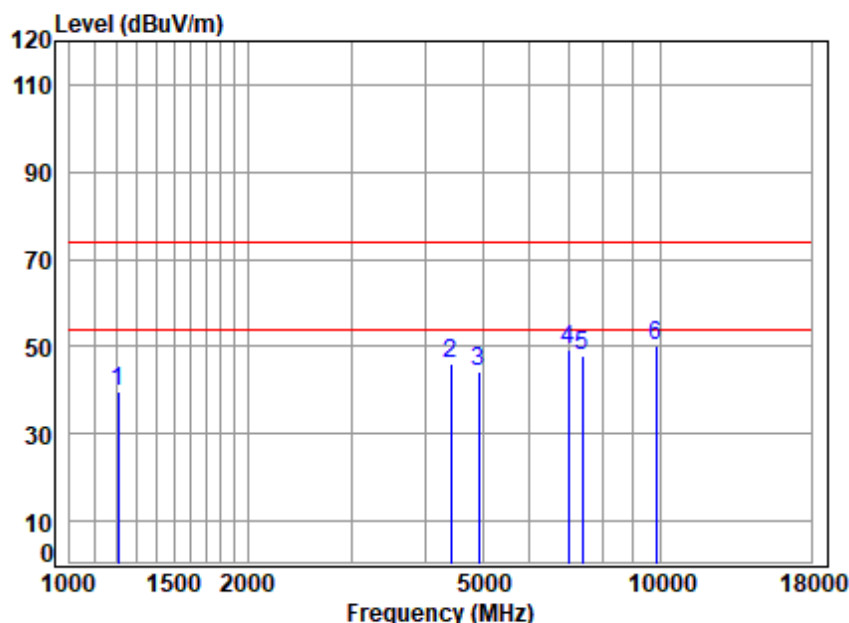


Site : chamber
Condition: 3m VERTICAL
Job No : 03819CR/03820CR
Mode : 2437 TX RSE
Note : 2.4G WIFI 11G

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1203.199	2.64	24.60	40.29	51.55	38.50	74.00	-35.50	peak
2	4405.090	6.67	33.44	42.48	47.61	45.24	74.00	-28.76	peak
3	4874.000	7.01	34.05	42.82	46.05	44.29	74.00	-29.71	peak
4	6414.167	7.63	35.52	42.00	48.36	49.51	74.00	-24.49	peak
5	7311.000	8.38	36.15	41.53	46.80	49.80	74.00	-24.20	peak
6	9748.000	9.41	37.75	38.37	42.07	50.86	74.00	-23.14	peak



Mode:e; Polarization:Horizontal; Modulation:802.11g; bandwidth:20MHz; Channel:High



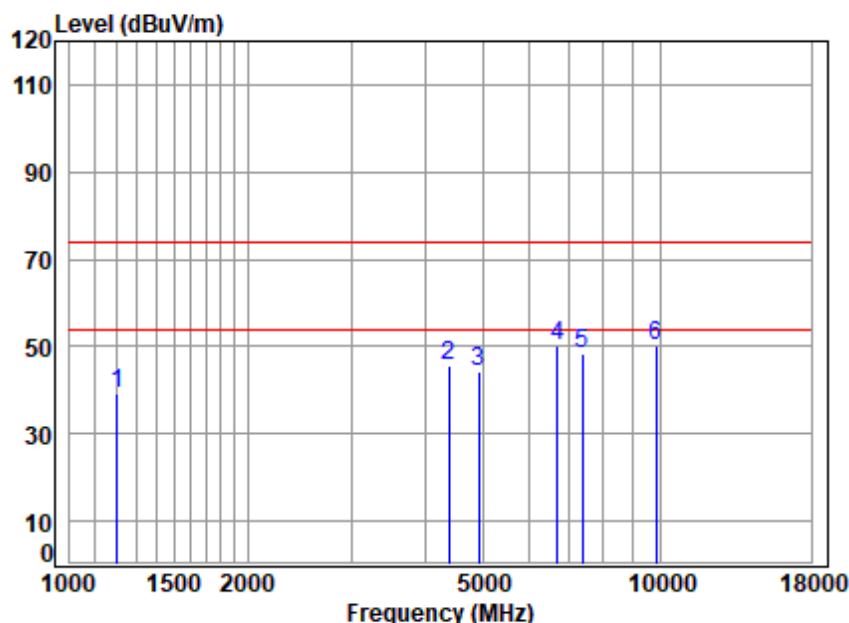
Site : chamber
Condition: 3m HORIZONTAL
Job No : 03819CR/03820CR
Mode : 2462 TX RSE
Note : 2.4G WIFI 11G

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1206.682	2.65	24.62	40.29	52.89	39.87	74.00	-34.13	peak
2	4417.841	6.63	33.46	42.49	48.39	45.99	74.00	-28.01	peak
3	4924.000	7.06	34.11	42.85	45.77	44.09	74.00	-29.91	peak
4	6974.982	7.81	35.89	41.70	47.30	49.30	74.00	-24.70	peak
5	7386.000	8.21	36.21	41.49	44.79	47.72	74.00	-26.28	peak
6	9848.000	9.02	37.81	38.22	41.54	50.15	74.00	-23.85	peak



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Mode:e; Polarization:Vertical; Modulation:802.11g; bandwidth:20MHz; Channel:High

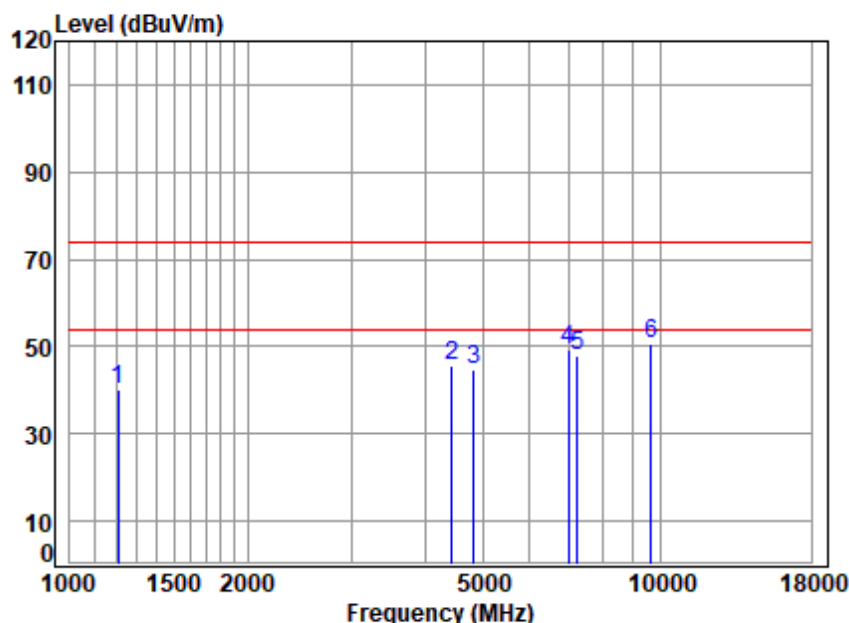


Site : chamber
Condition: 3m VERTICAL
Job No : 03819CR/03820CR
Mode : 2462 TX RSE
Note : 2.4G WIFI 11G

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1203.199	2.64	24.60	40.29	52.48	39.43	74.00	-34.57	peak
2	4392.376	6.66	33.42	42.47	47.86	45.47	74.00	-28.53	peak
3	4924.000	7.06	34.11	42.85	46.03	44.35	74.00	-29.65	peak
4	6698.373	8.34	35.72	41.84	48.16	50.38	74.00	-23.62	peak
5	7386.000	8.21	36.21	41.49	45.37	48.30	74.00	-25.70	peak
6	9848.000	9.02	37.81	38.22	41.45	50.06	74.00	-23.94	peak



Mode:e; Polarization:Horizontal; Modulation:802.11n; bandwidth:20MHz; Channel:Low

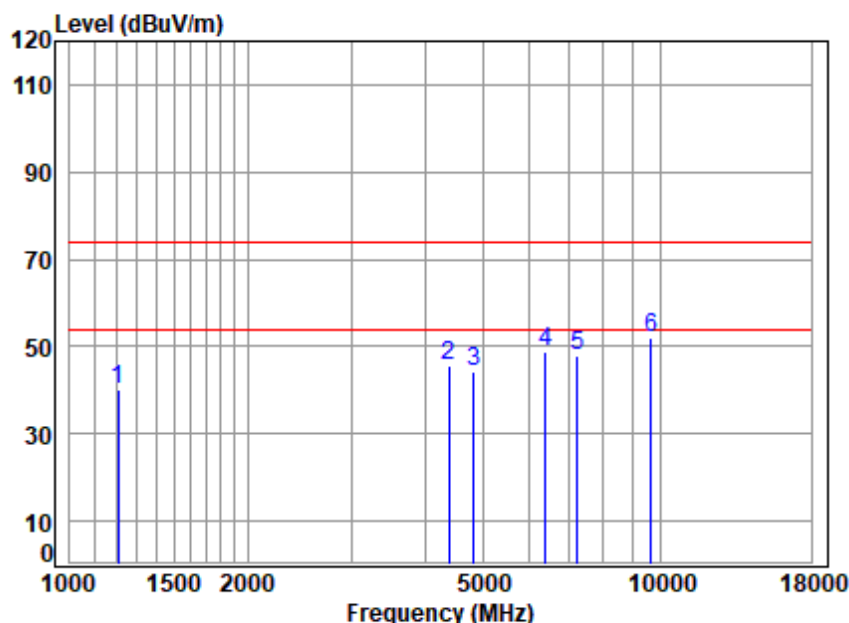


Site : chamber
Condition: 3m HORIZONTAL
Job No : 03819CR/03820CR
Mode : 2412 TX RSE
Note : 2.4G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1206.682	2.65	24.62	40.29	53.11	40.09	74.00	-33.91	peak
2	4430.628	6.59	33.48	42.50	48.20	45.77	74.00	-28.23	peak
3	4824.000	6.86	34.00	42.78	46.60	44.68	74.00	-29.32	peak
4	6995.172	7.81	35.90	41.69	47.18	49.20	74.00	-24.80	peak
5	7236.000	8.43	36.09	41.56	44.97	47.93	74.00	-26.07	peak
6	9648.000	9.41	37.69	38.51	42.19	50.78	74.00	-23.22	peak



Mode:e; Polarization:Vertical; Modulation:802.11n; bandwidth:20MHz; Channel:Low

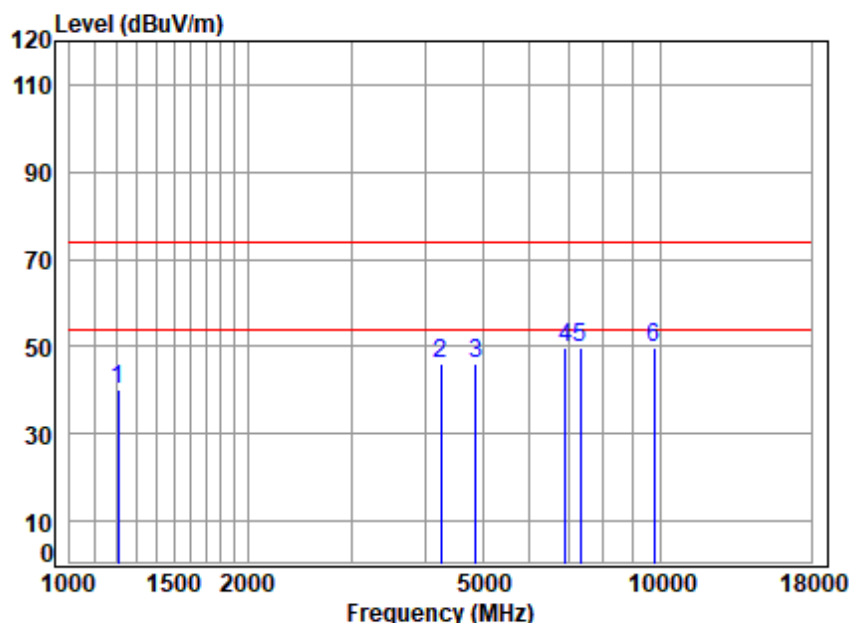


Site : chamber
Condition: 3m VERTICAL
Job No : 03819CR/03820CR
Mode : 2412 TX RSE
Note : 2.4G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1206.682	2.65	24.62	40.29	53.12	40.10	74.00	-33.90	peak
2	4392.376	6.66	33.42	42.47	47.97	45.58	74.00	-28.42	peak
3	4824.000	6.86	34.00	42.78	46.33	44.41	74.00	-29.59	peak
4	6395.654	7.64	35.50	42.01	47.78	48.91	74.00	-25.09	peak
5	7236.000	8.43	36.09	41.56	44.87	47.83	74.00	-26.17	peak
6	9648.000	9.41	37.69	38.51	43.60	52.19	74.00	-21.81	peak



Mode:e; Polarization:Horizontal; Modulation:802.11n; bandwidth:20MHz; Channel:middle

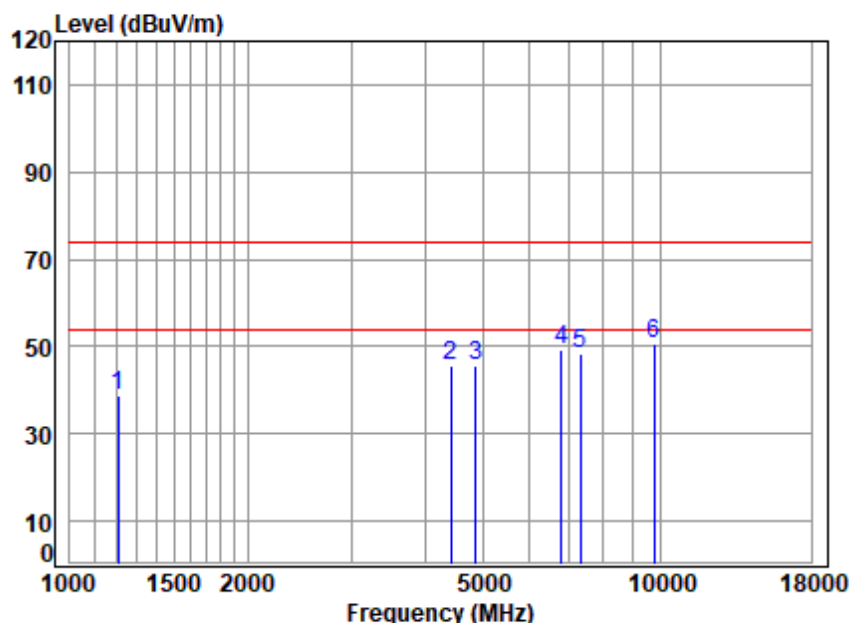


Site : chamber
Condition: 3m HORIZONTAL
Job No : 03819CR/03820CR
Mode : 2437 TX RSE
Note : 2.4G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1206.682	2.65	24.62	40.29	53.27	40.25	74.00	-33.75	peak
2	4242.641	6.20	33.15	42.35	49.07	46.07	74.00	-27.93	peak
3	4874.000	7.01	34.05	42.82	47.62	45.86	74.00	-28.14	peak
4	6914.763	7.83	35.85	41.73	47.68	49.63	74.00	-24.37	peak
5	7311.000	8.38	36.15	41.53	46.65	49.65	74.00	-24.35	peak
6	9748.000	9.41	37.75	38.37	40.84	49.63	74.00	-24.37	peak



Mode:e; Polarization:Vertical; Modulation:802.11n; bandwidth:20MHz; Channel:middle

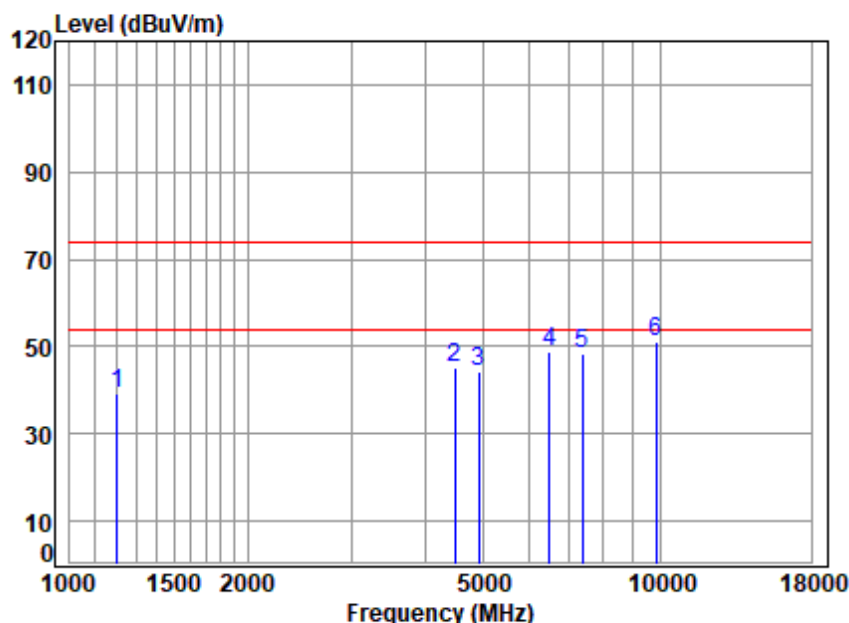


Site : chamber
Condition: 3m VERTICAL
Job No : 03819CR/03820CR
Mode : 2437 TX RSE
Note : 2.4G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1206.682	2.65	24.62	40.29	51.94	38.92	74.00	-35.08	peak
2	4417.841	6.63	33.46	42.49	47.97	45.57	74.00	-28.43	peak
3	4874.000	7.01	34.05	42.82	47.26	45.50	74.00	-28.50	peak
4	6795.879	8.00	35.78	41.79	47.11	49.10	74.00	-24.90	peak
5	7311.000	8.38	36.15	41.53	45.53	48.53	74.00	-25.47	peak
6	9748.000	9.41	37.75	38.37	41.67	50.46	74.00	-23.54	peak



Mode:e; Polarization:Horizontal; Modulation:802.11n; bandwidth:20MHz; Channel:High

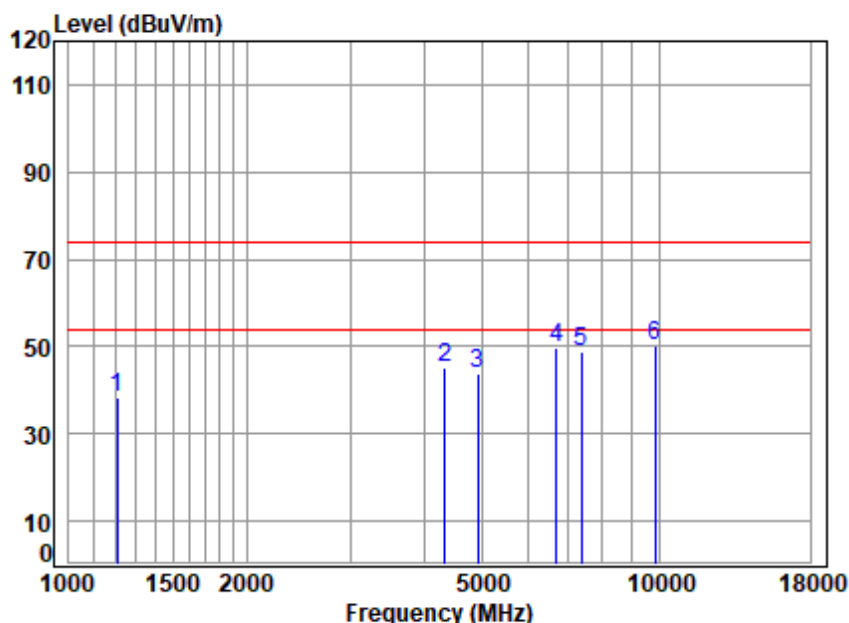


Site : chamber
Condition: 3m HORIZONTAL
Job No : 03819CR/03820CR
Mode : 2462 TX RSE
Note : 2.4G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1203.199	2.64	24.60	40.29	52.09	39.04	74.00	-34.96	peak
2	4482.150	6.43	33.57	42.54	47.62	45.08	74.00	-28.92	peak
3	4924.000	7.06	34.11	42.85	45.90	44.22	74.00	-29.78	peak
4	6488.754	7.46	35.59	41.96	47.85	48.94	74.00	-25.06	peak
5	7386.000	8.21	36.21	41.49	45.65	48.58	74.00	-25.42	peak
6	9848.000	9.02	37.81	38.22	42.55	51.16	74.00	-22.84	peak



Mode:e; Polarization:Vertical; Modulation:802.11n; bandwidth:20MHz; Channel:High



Site : chamber
Condition: 3m VERTICAL
Job No : 03819CR/03820CR
Mode : 2462 TX RSE
Note : 2.4G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1206.682	2.65	24.62	40.29	51.44	38.42	74.00	-35.58	peak
2	4341.886	6.46	33.33	42.43	48.04	45.40	74.00	-28.60	peak
3	4924.000	7.06	34.11	42.85	45.67	43.99	74.00	-30.01	peak
4	6698.373	8.34	35.72	41.84	47.56	49.78	74.00	-24.22	peak
5	7386.000	8.21	36.21	41.49	46.05	48.98	74.00	-25.02	peak
6	9848.000	9.02	37.81	38.22	41.80	50.41	74.00	-23.59	peak



7 Photographs

7.1 Test Setup

Please refer to setup photos.

7.2 EUT Constructional Details (EUT Photos)

Please Refer to external and internal photos for details.



8 Appendix

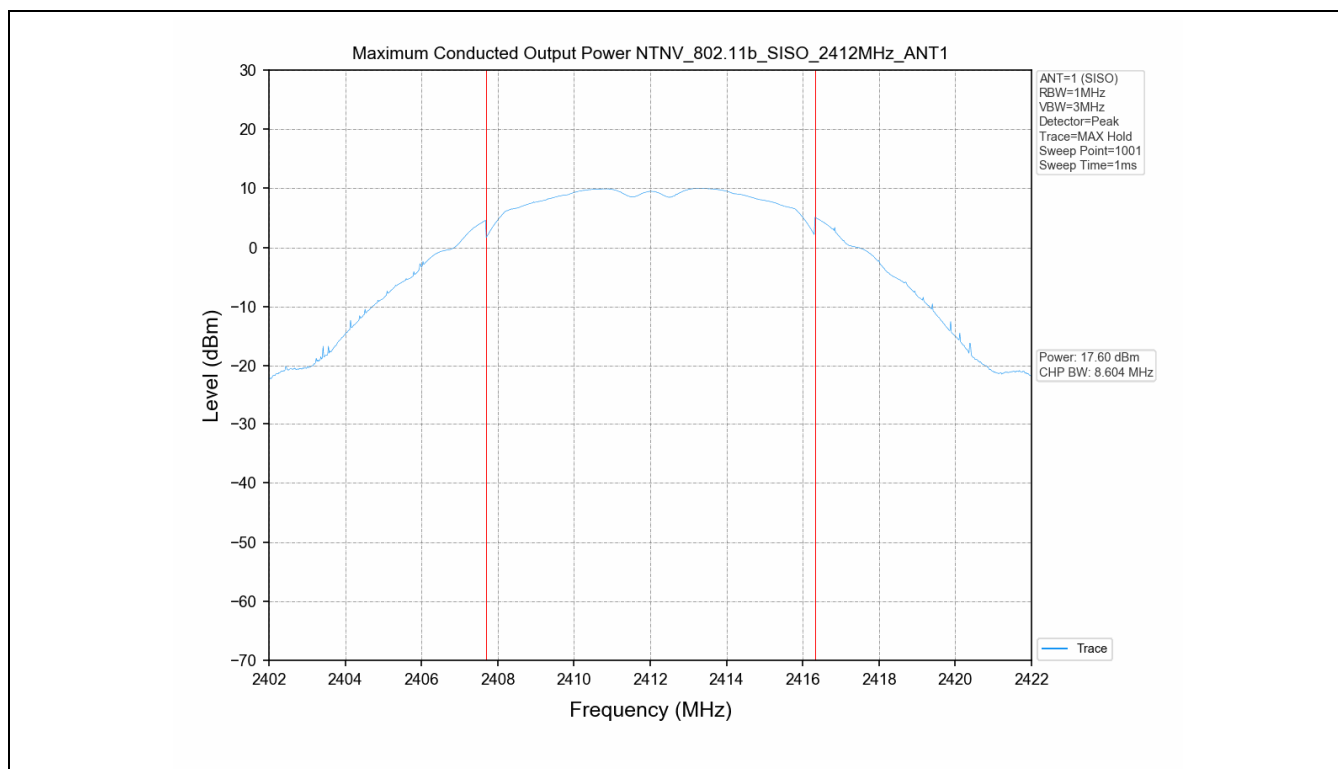
8.1 Appendix 15.247

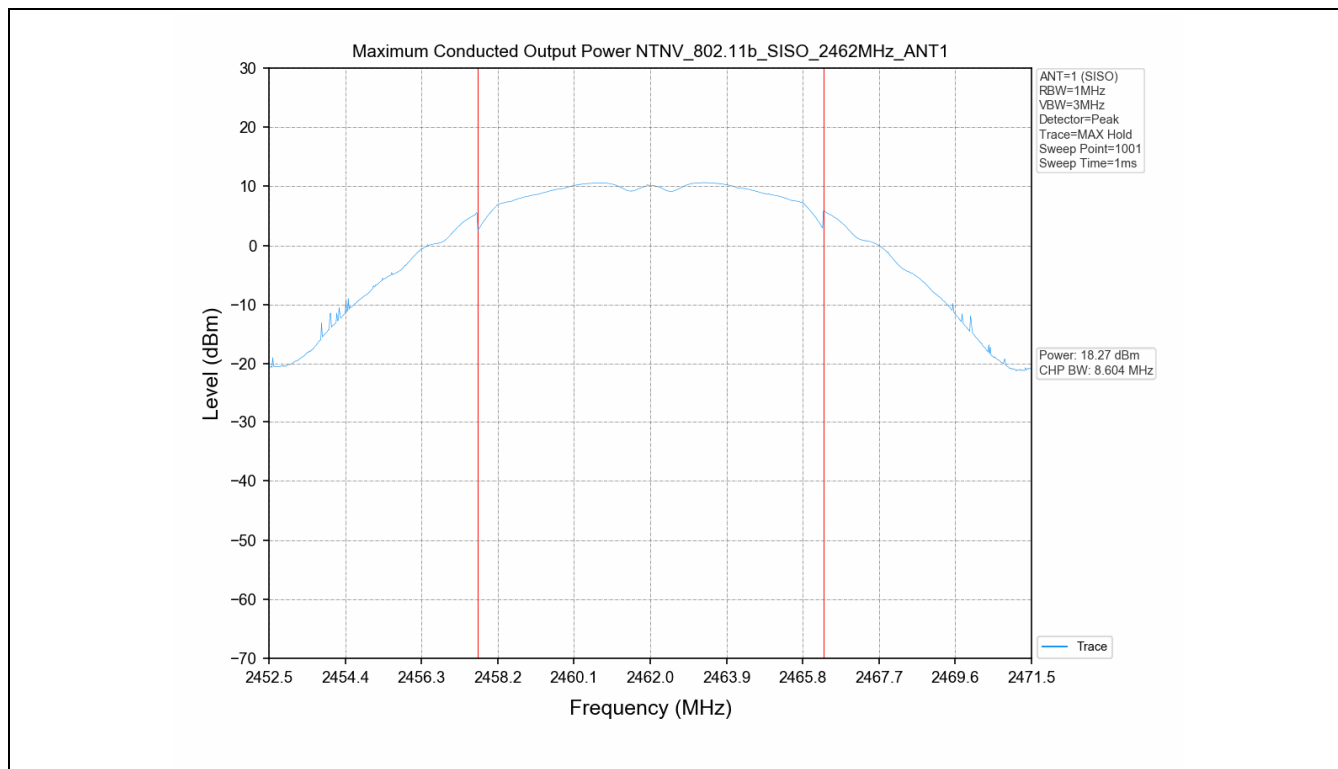
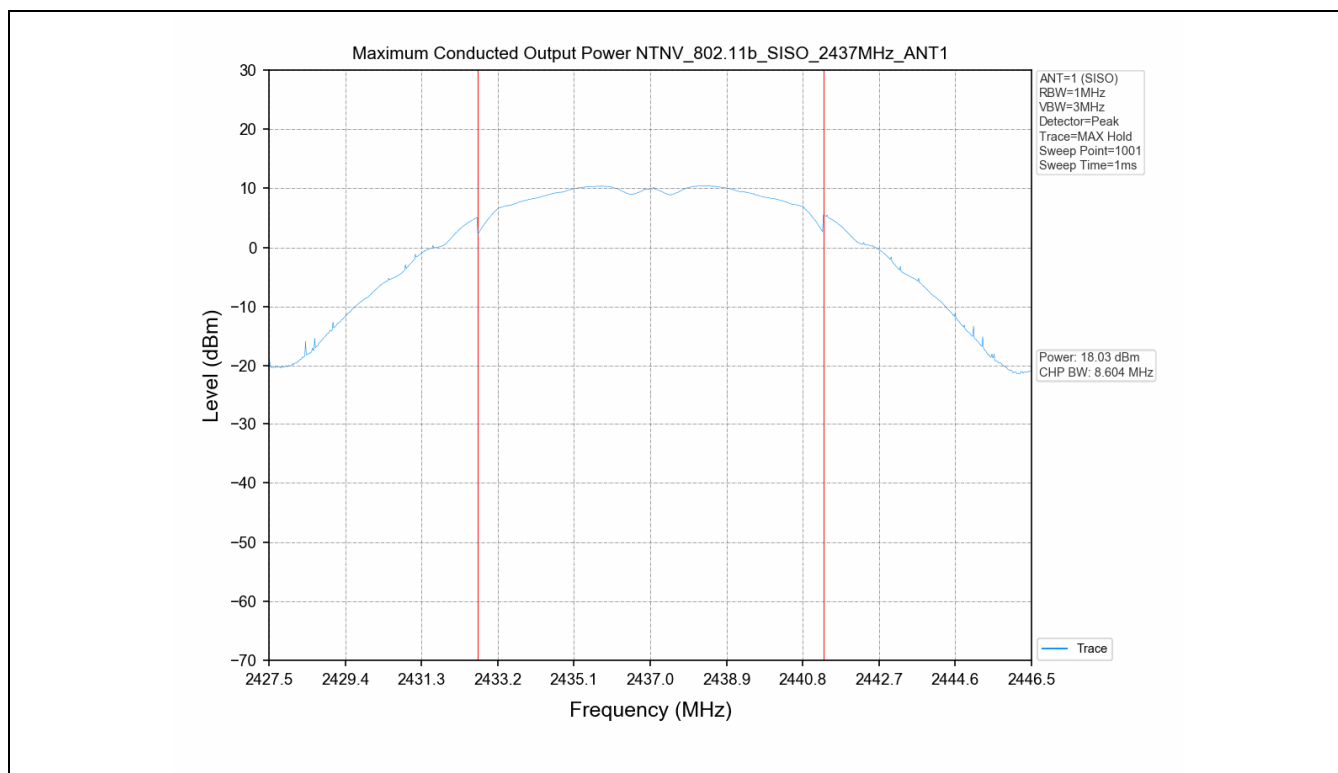
1. Maximum Conducted Output Power

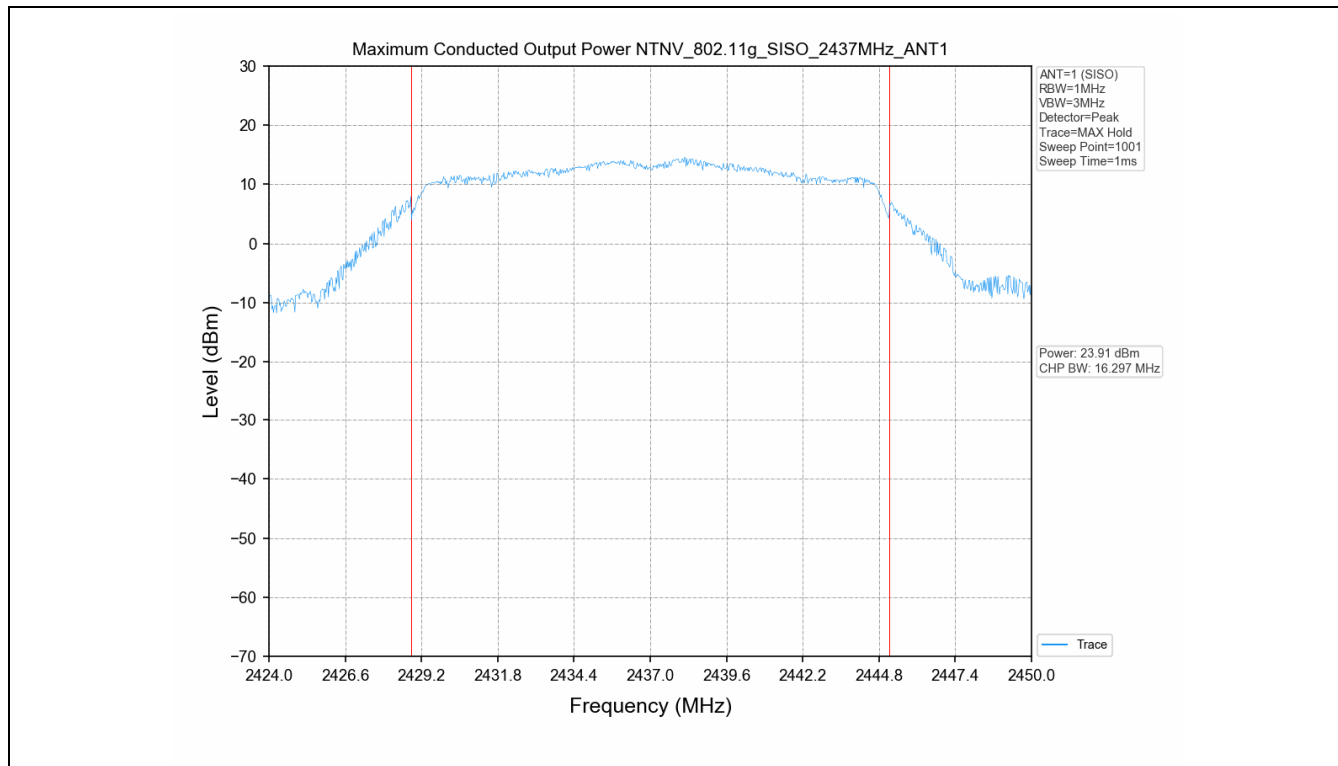
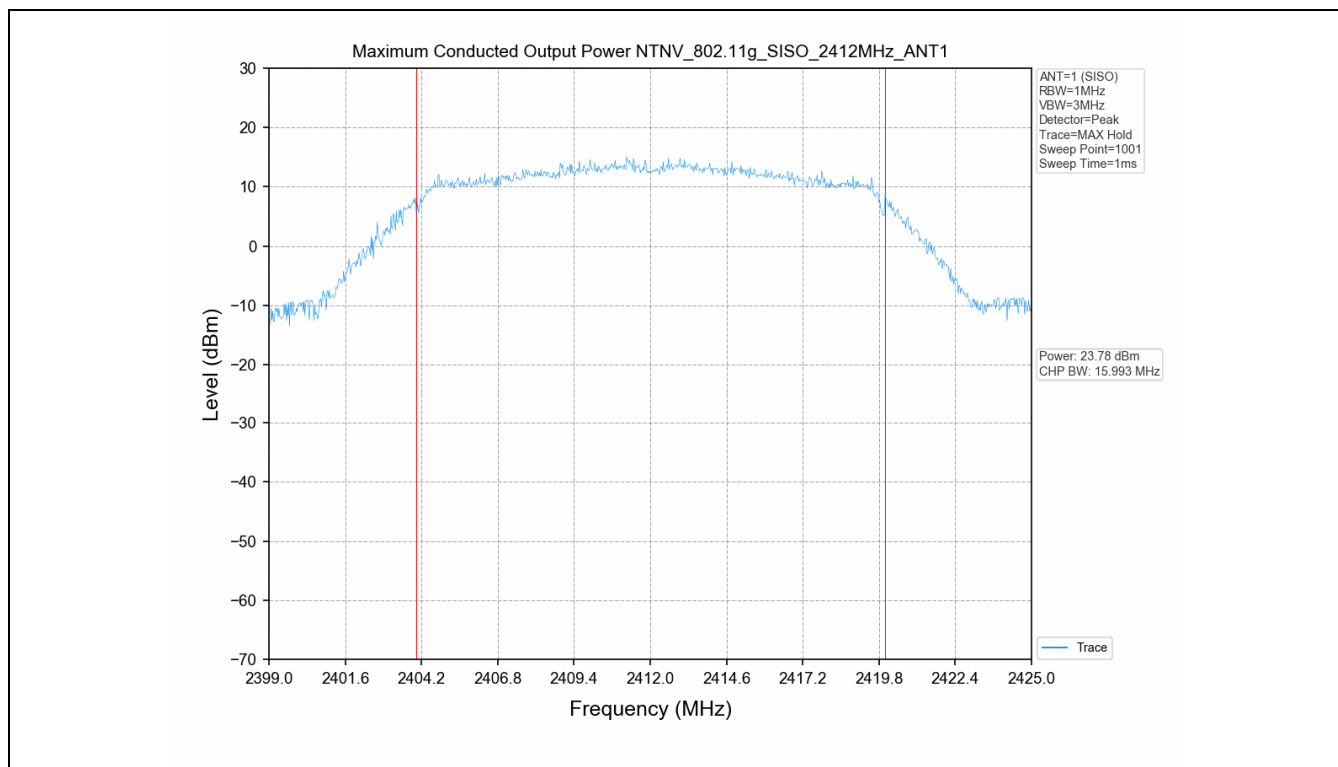
1.1 Test Result

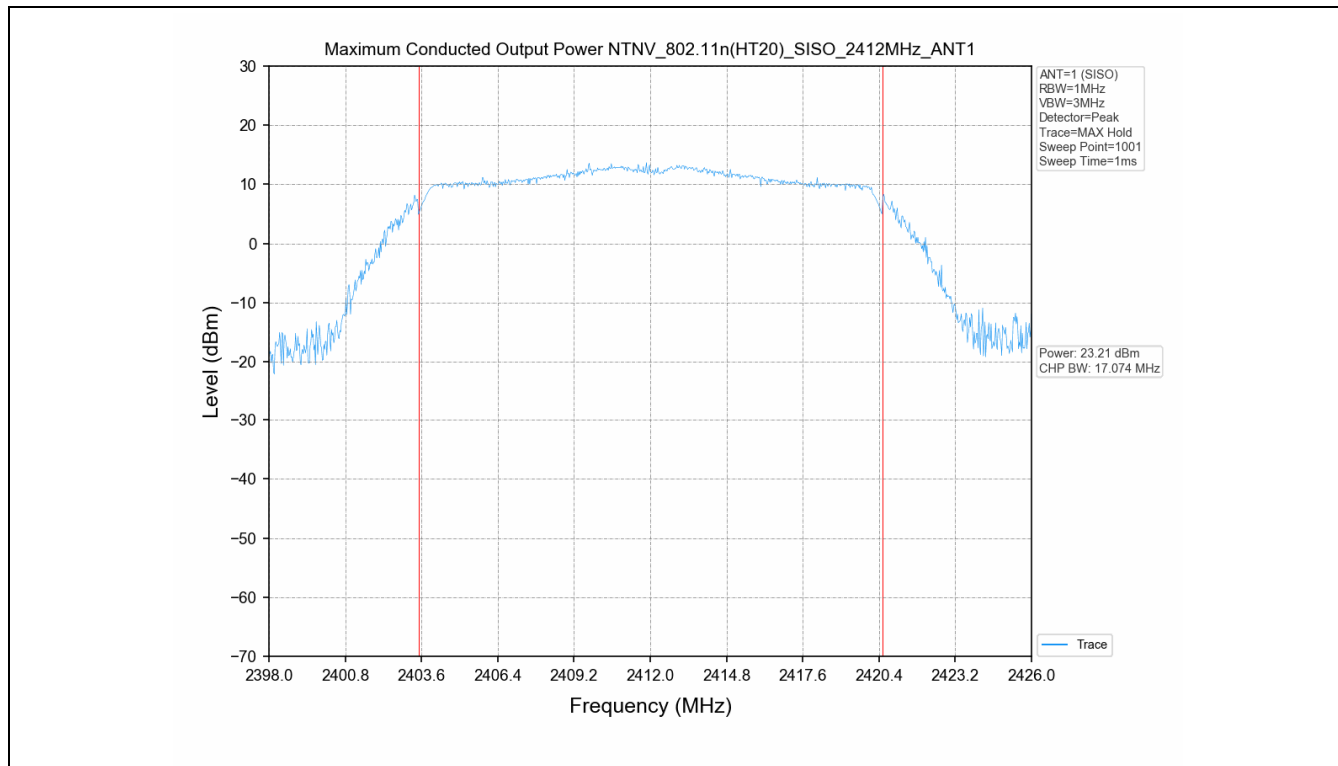
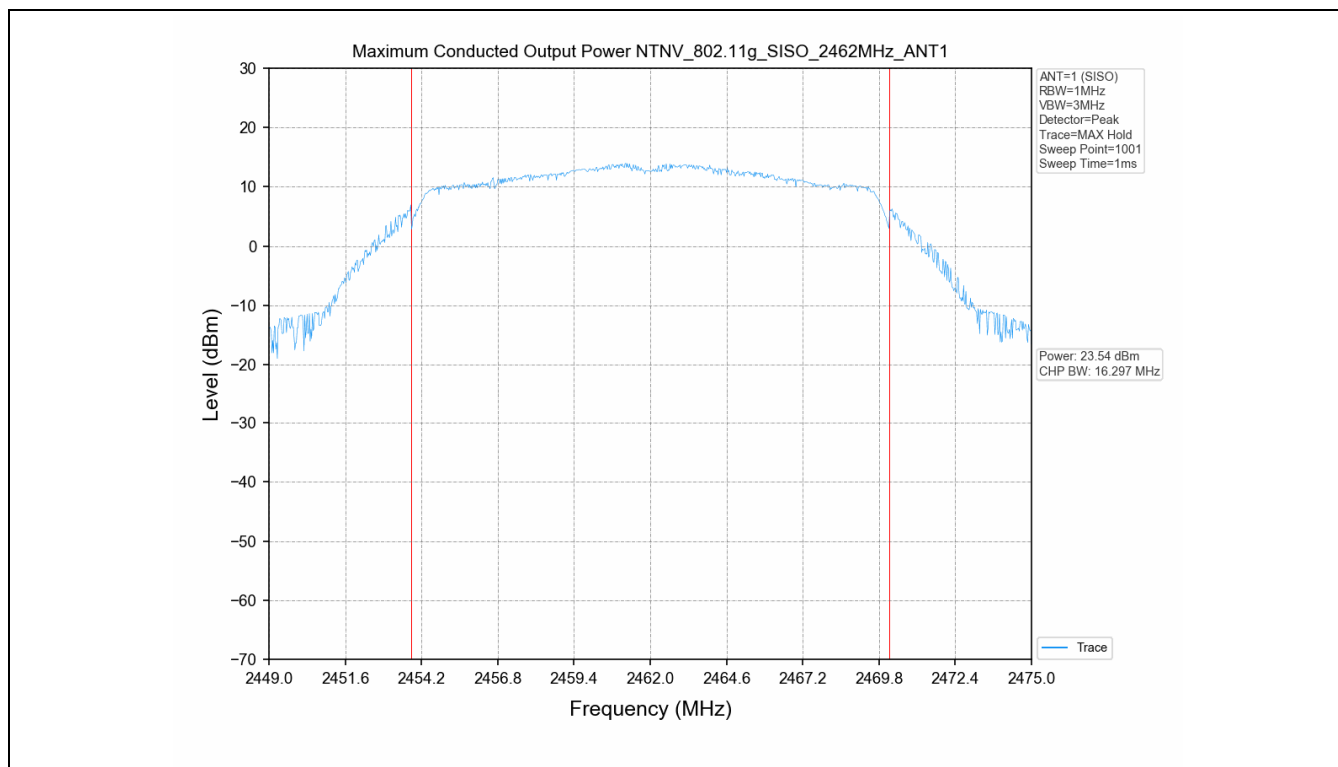
Test Mode	Frequency (MHz)	Tx Type	Measured Peak Output Power (dBm)	Limits (dBm)	Verdict
			Ant 1		
802.11b	2412	SISO	17.60	30	PASS
	2437	SISO	18.03	30	PASS
	2462	SISO	18.27	30	PASS
802.11g	2412	SISO	23.78	30	PASS
	2437	SISO	23.91	30	PASS
	2462	SISO	23.54	30	PASS
802.11n(HT20)	2412	SISO	23.21	30	PASS
	2437	SISO	22.89	30	PASS
	2462	SISO	22.90	30	PASS

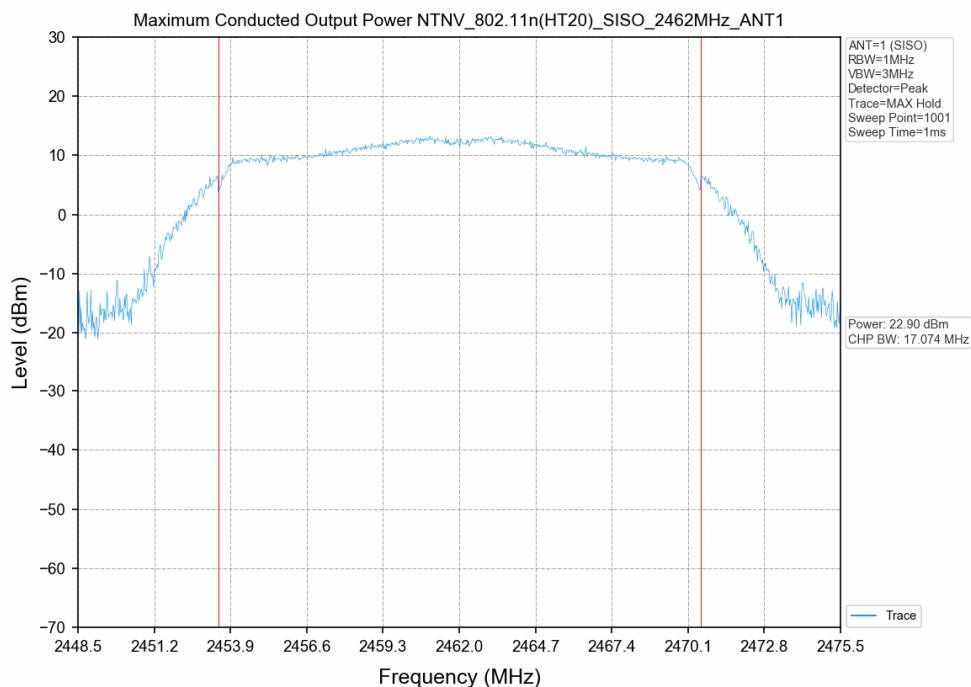
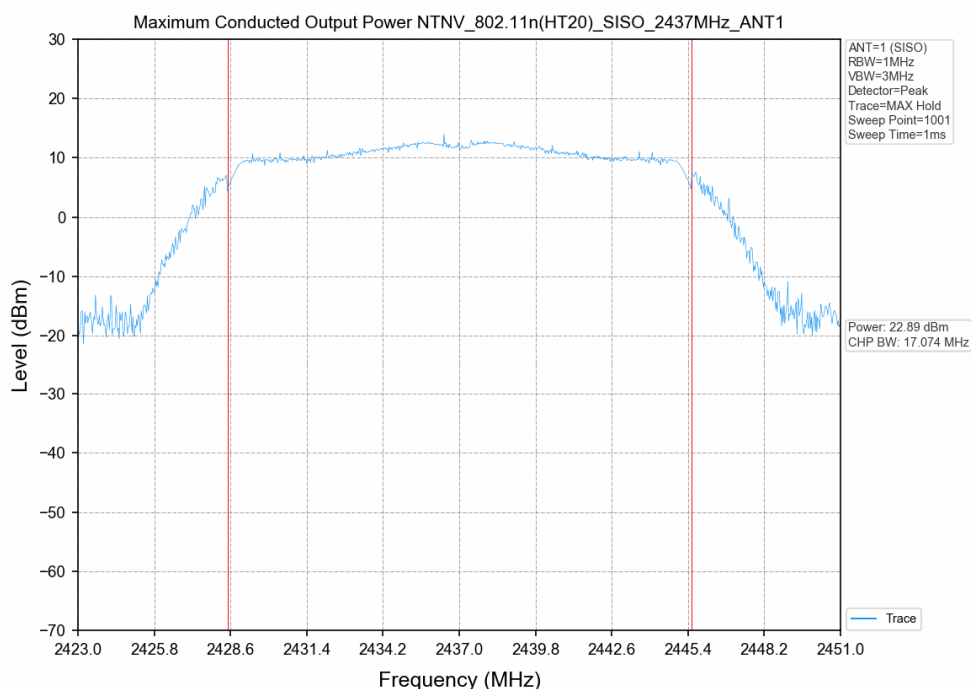
1.2 Test Graph









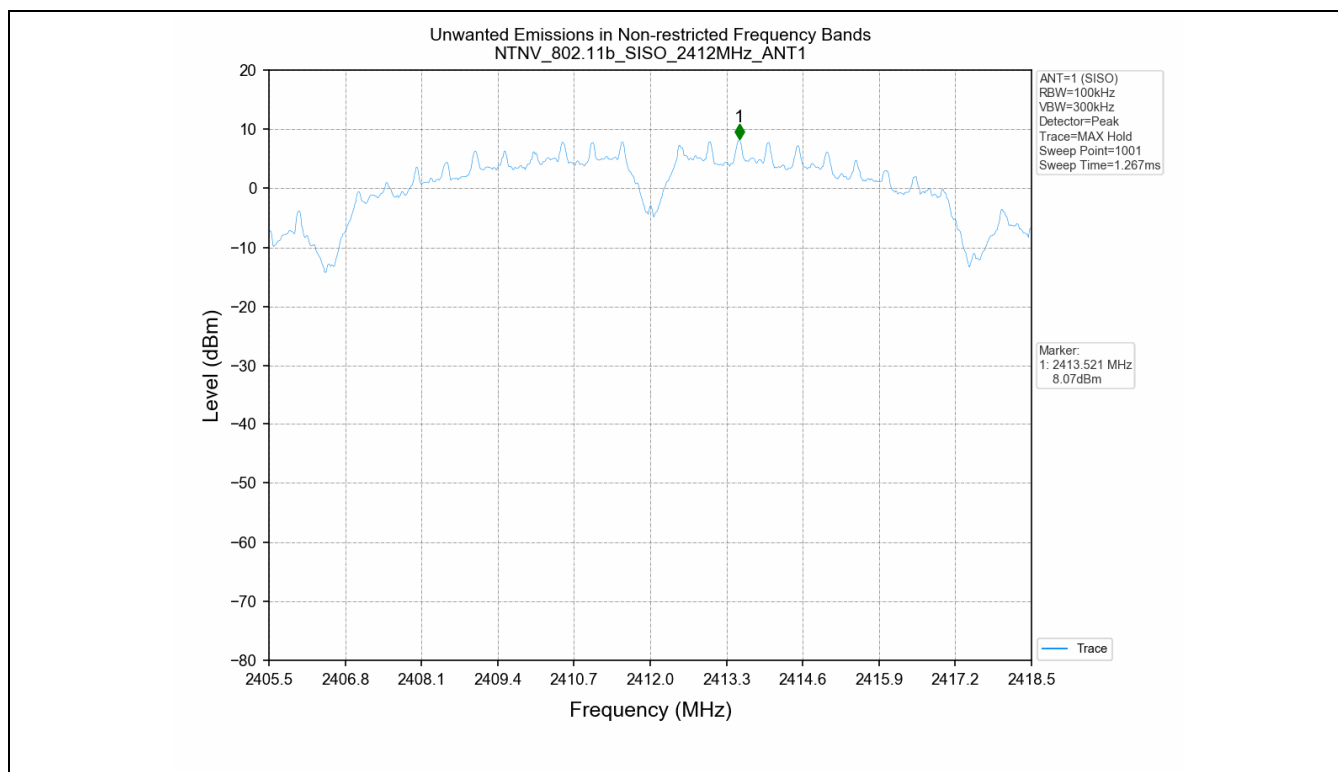


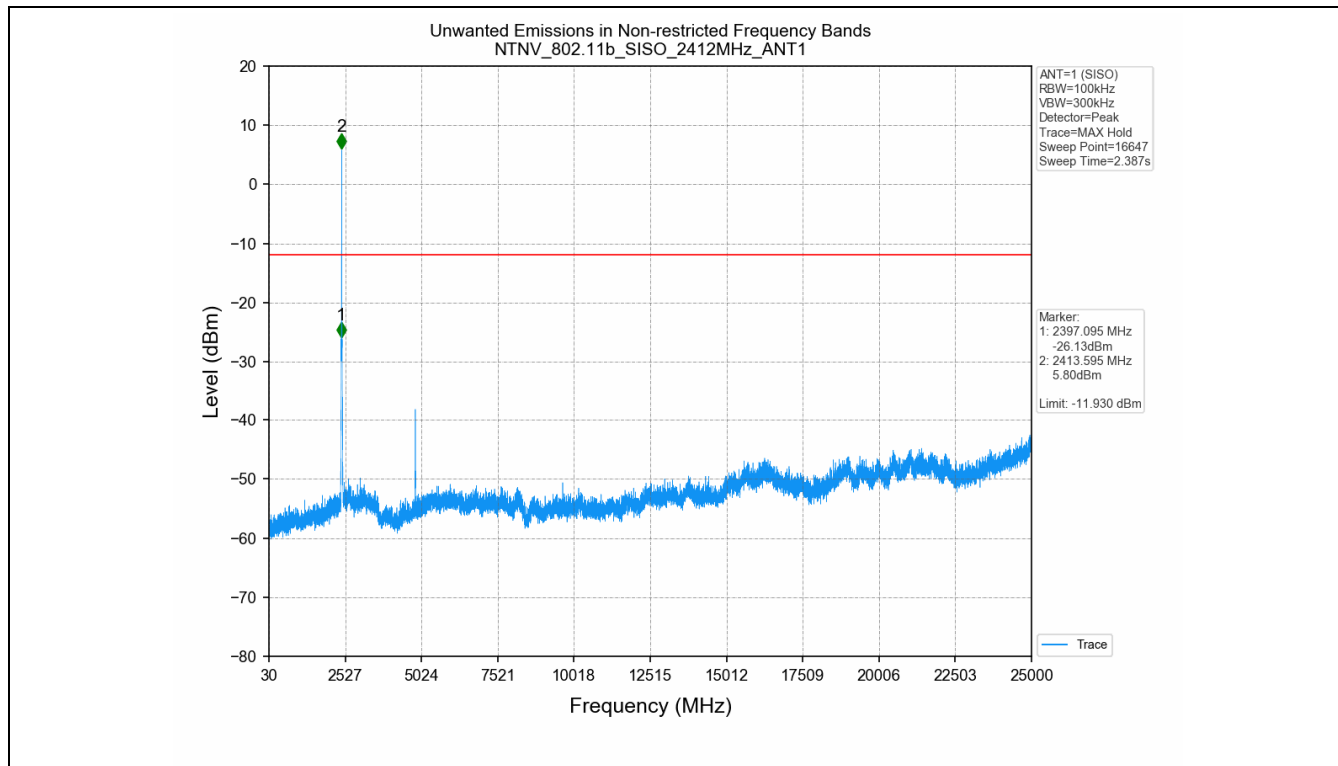
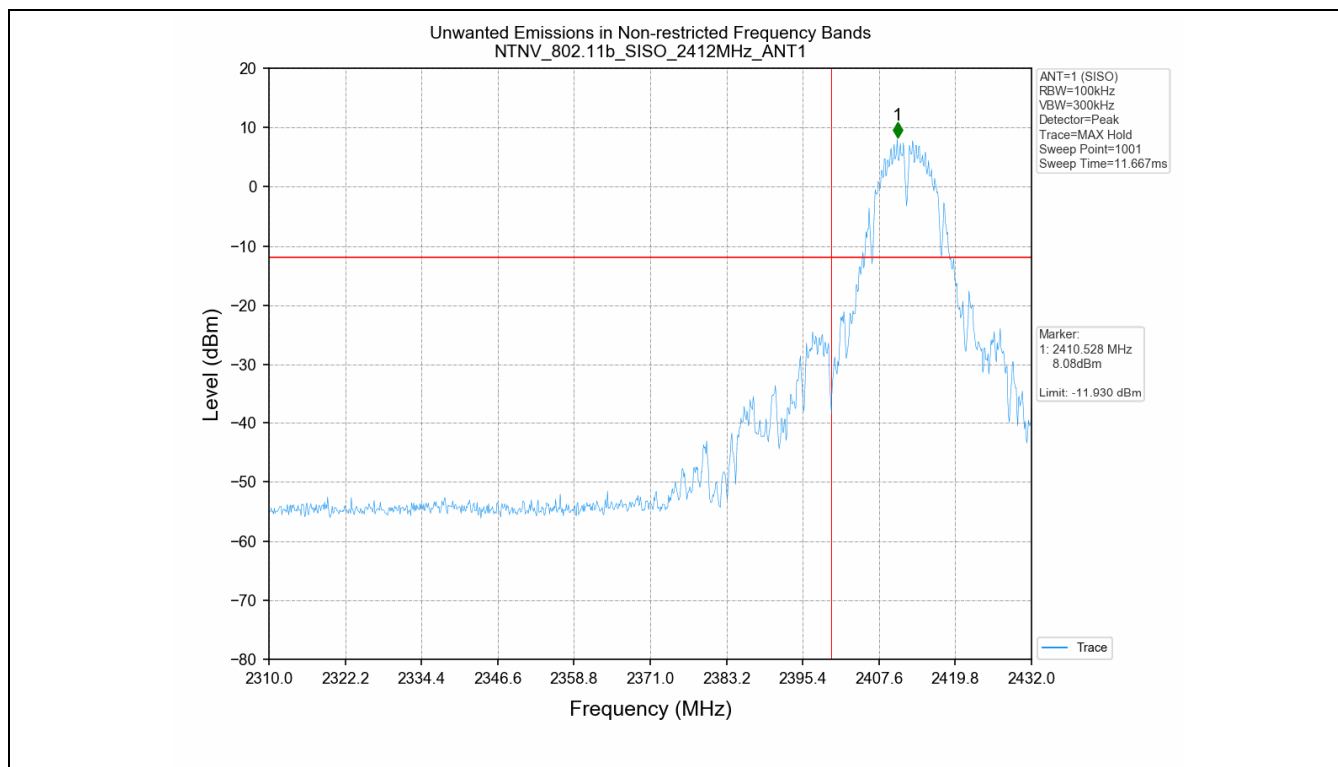
2. Unwanted Emissions in Non-restricted Frequency Bands

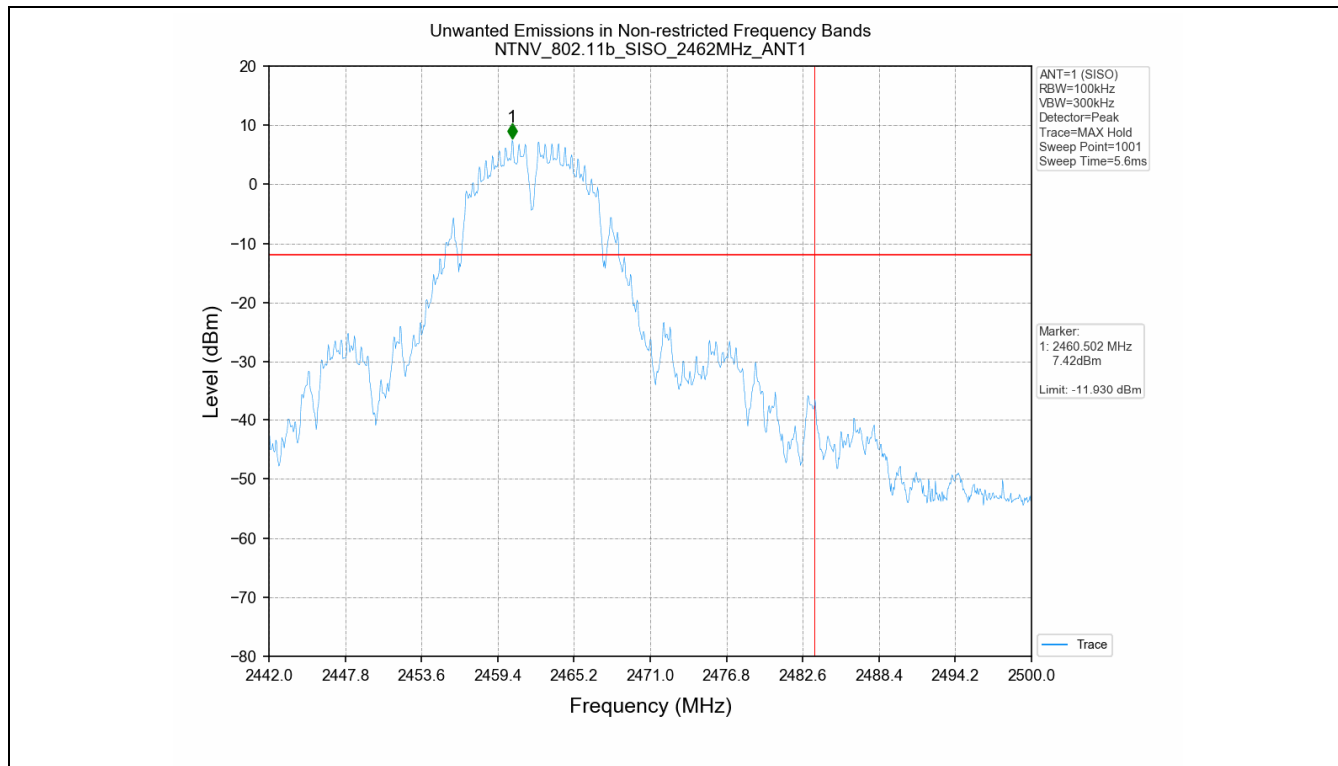
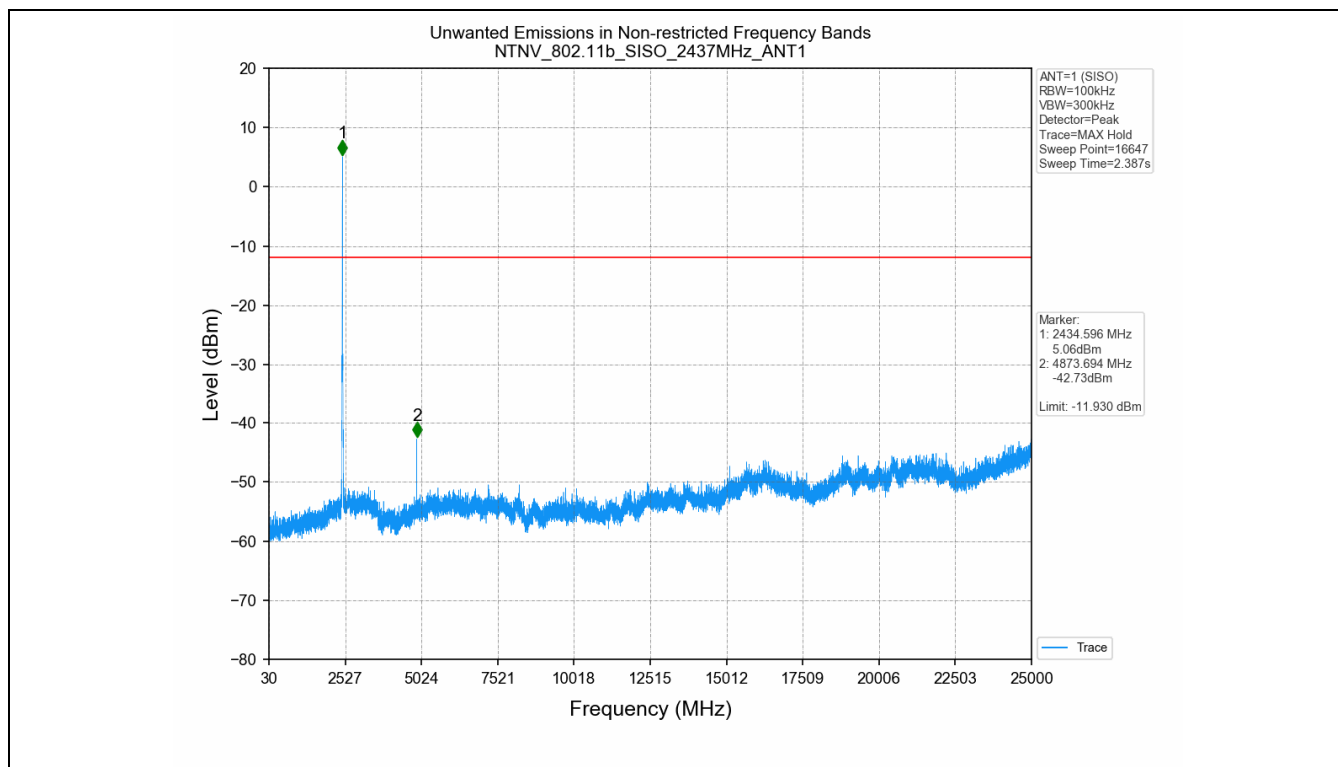
2.1 Test Result

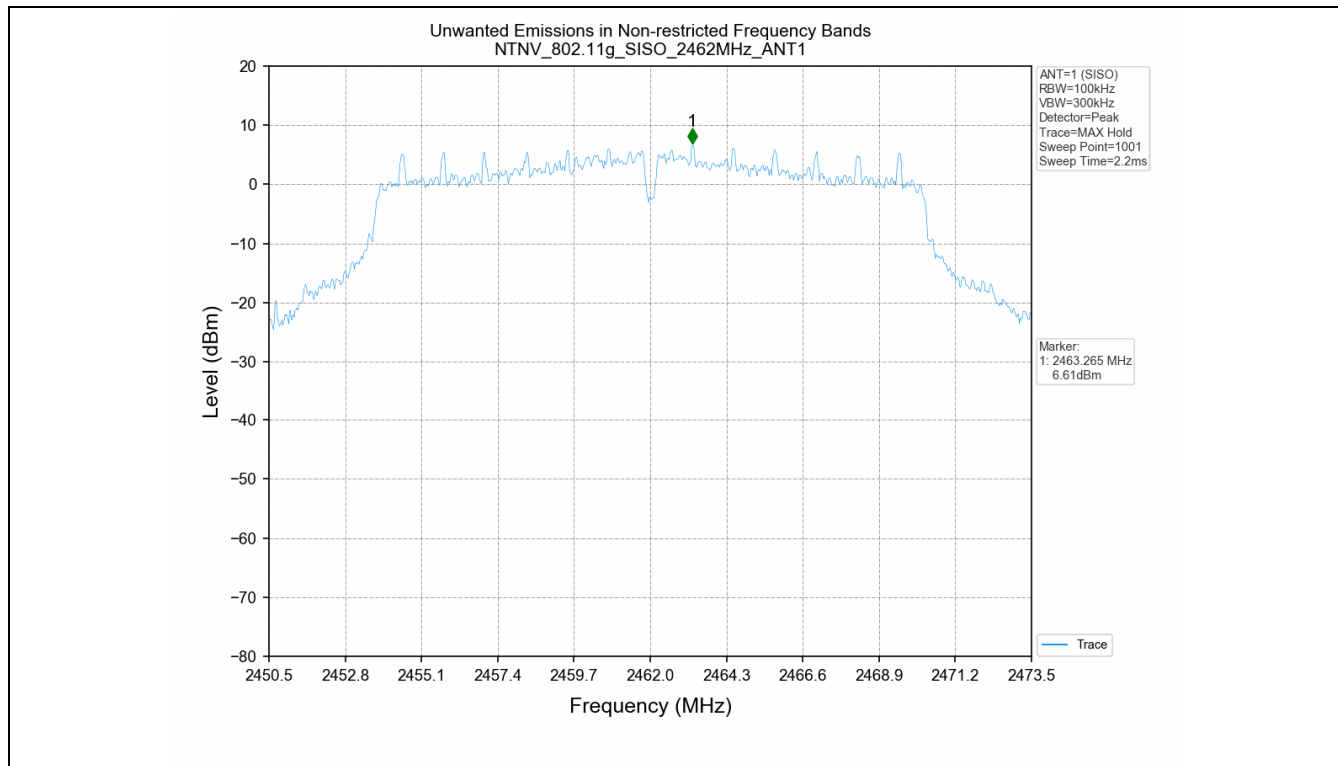
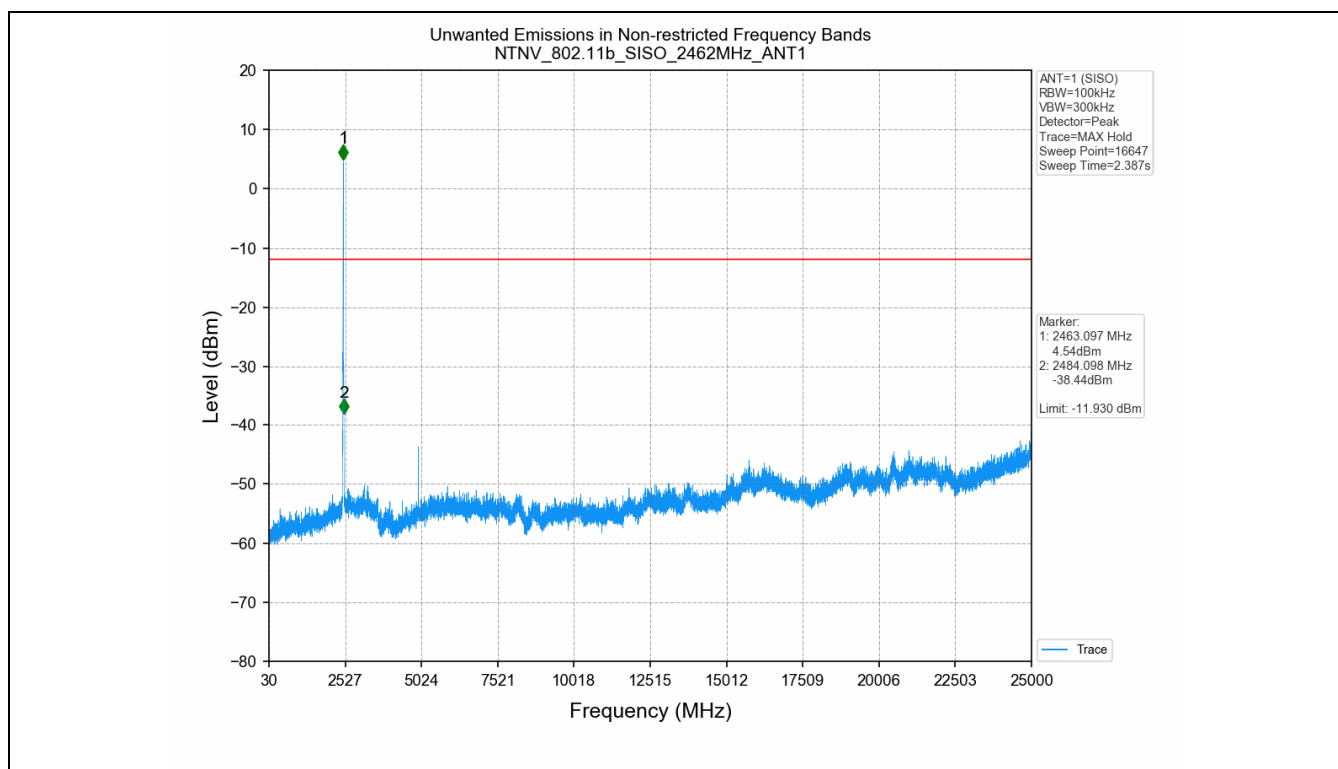
Test Mode	Frequency (MHz)	TX Type	ANT No.	Spurious Conducted Emission (dBm)	Limits (dBm)	Verdict
802.11b	2412	SISO	1	Refer to test graph	-11.93	PASS
	2437	SISO	1	Refer to test graph	-11.93	PASS
	2462	SISO	1	Refer to test graph	-11.93	PASS
802.11g	2412	SISO	1	Refer to test graph	-13.39	PASS
	2437	SISO	1	Refer to test graph	-13.39	PASS
	2462	SISO	1	Refer to test graph	-13.39	PASS
802.11n(HT20)	2412	SISO	1	Refer to test graph	-15.30	PASS
	2437	SISO	1	Refer to test graph	-15.30	PASS
	2462	SISO	1	Refer to test graph	-15.30	PASS

2.2 Test Graph







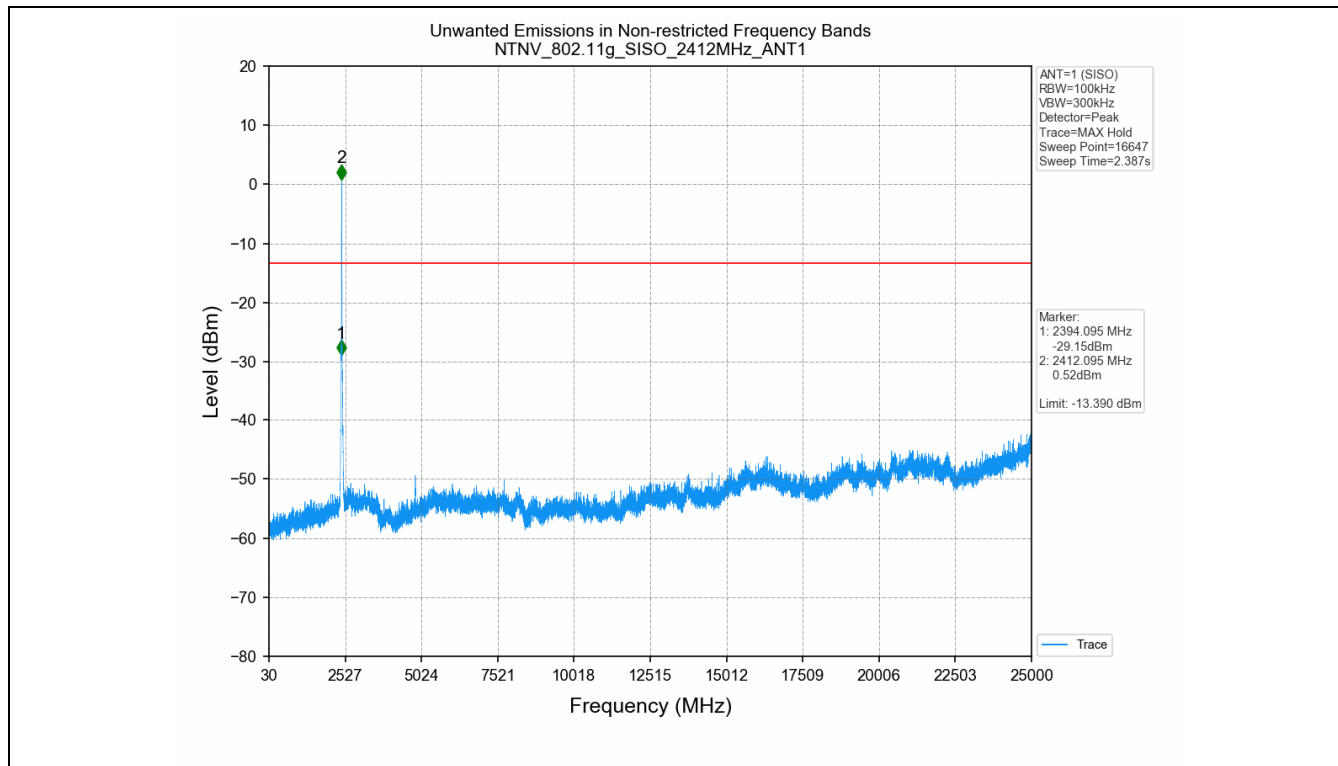
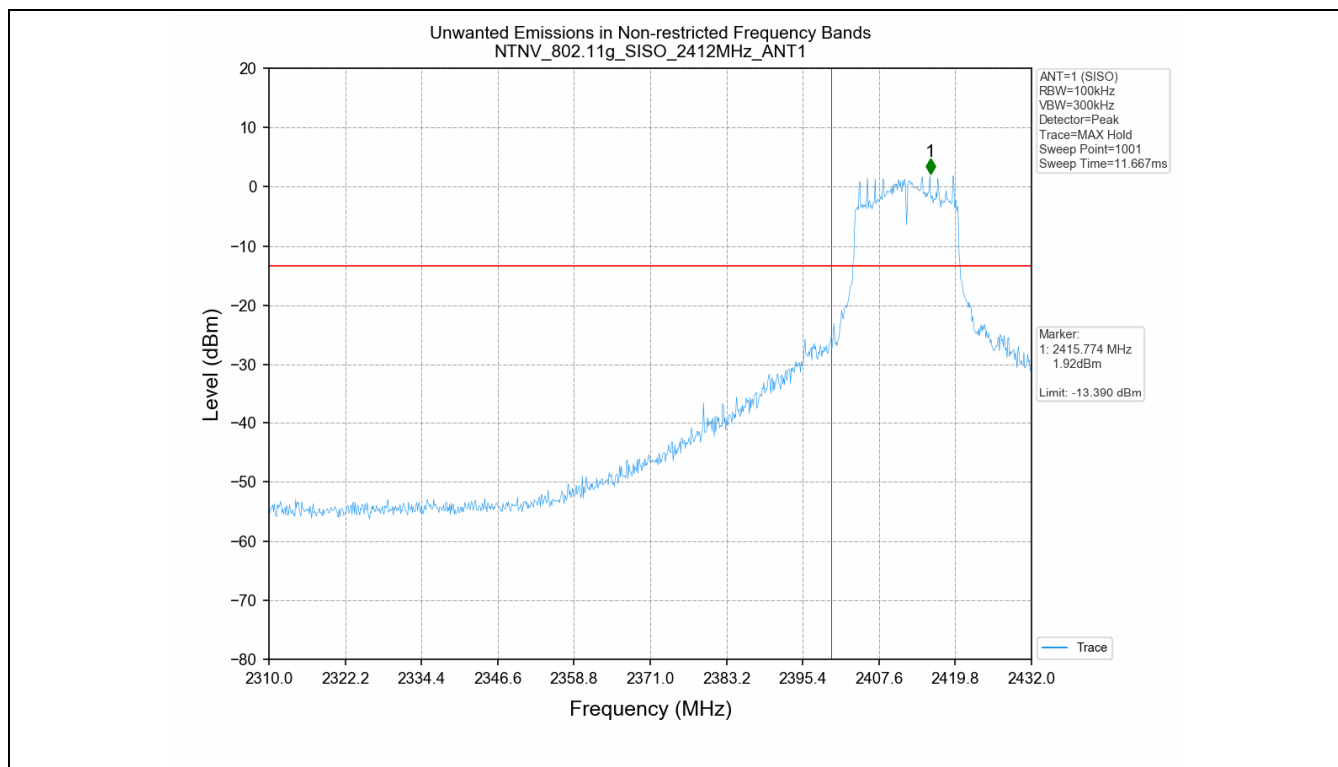


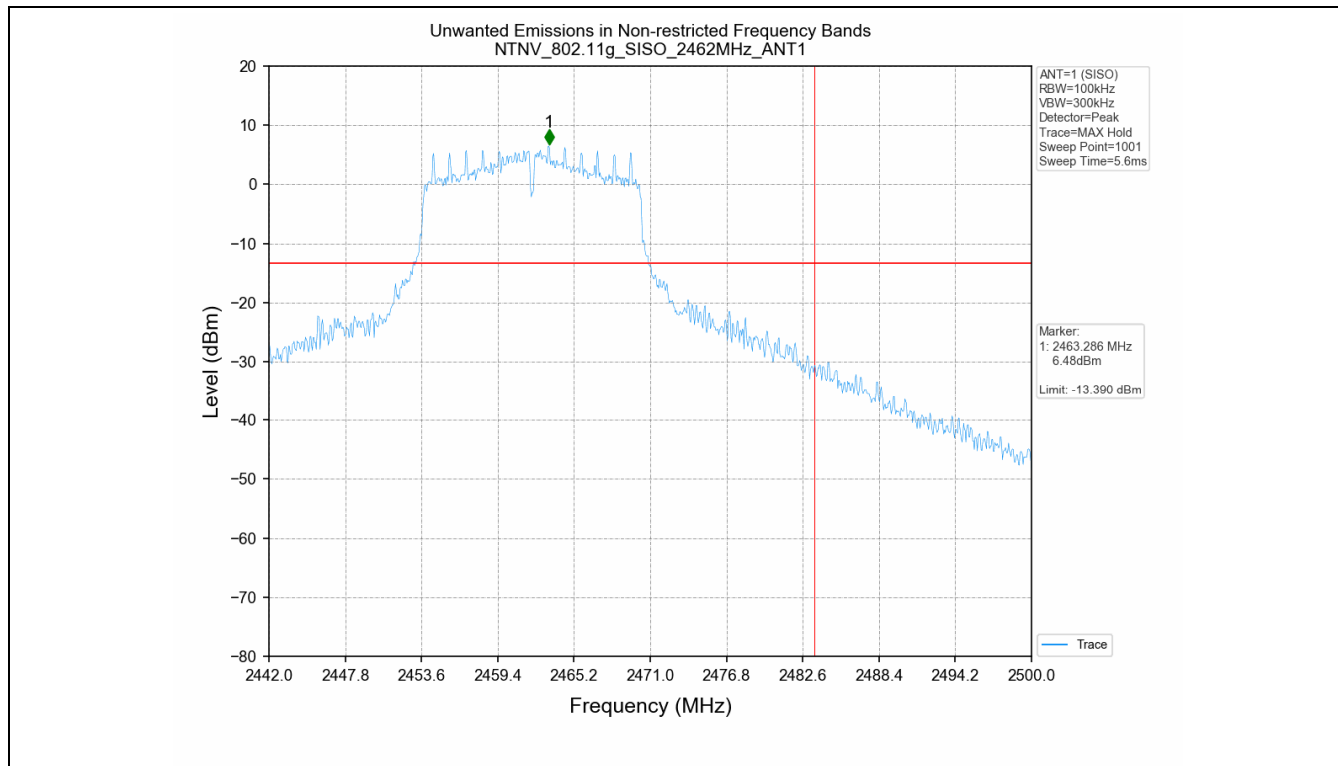
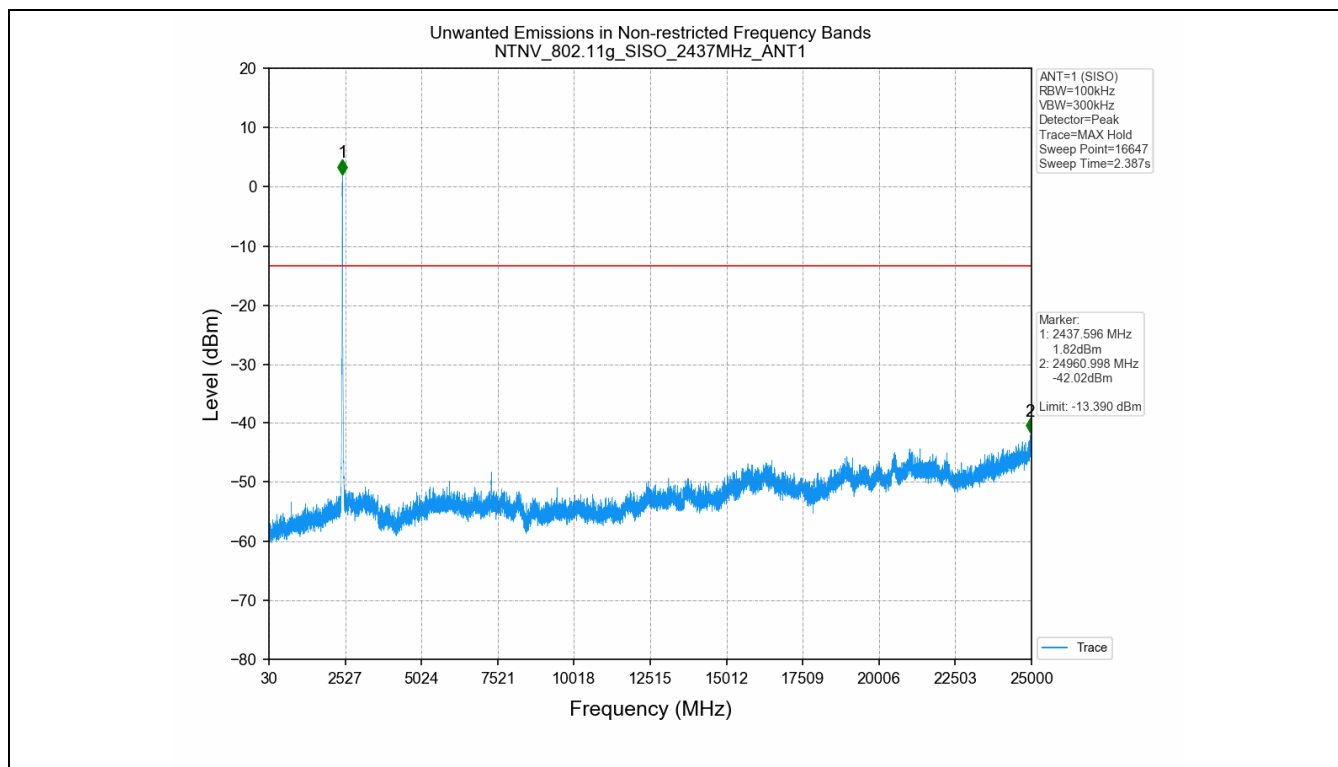
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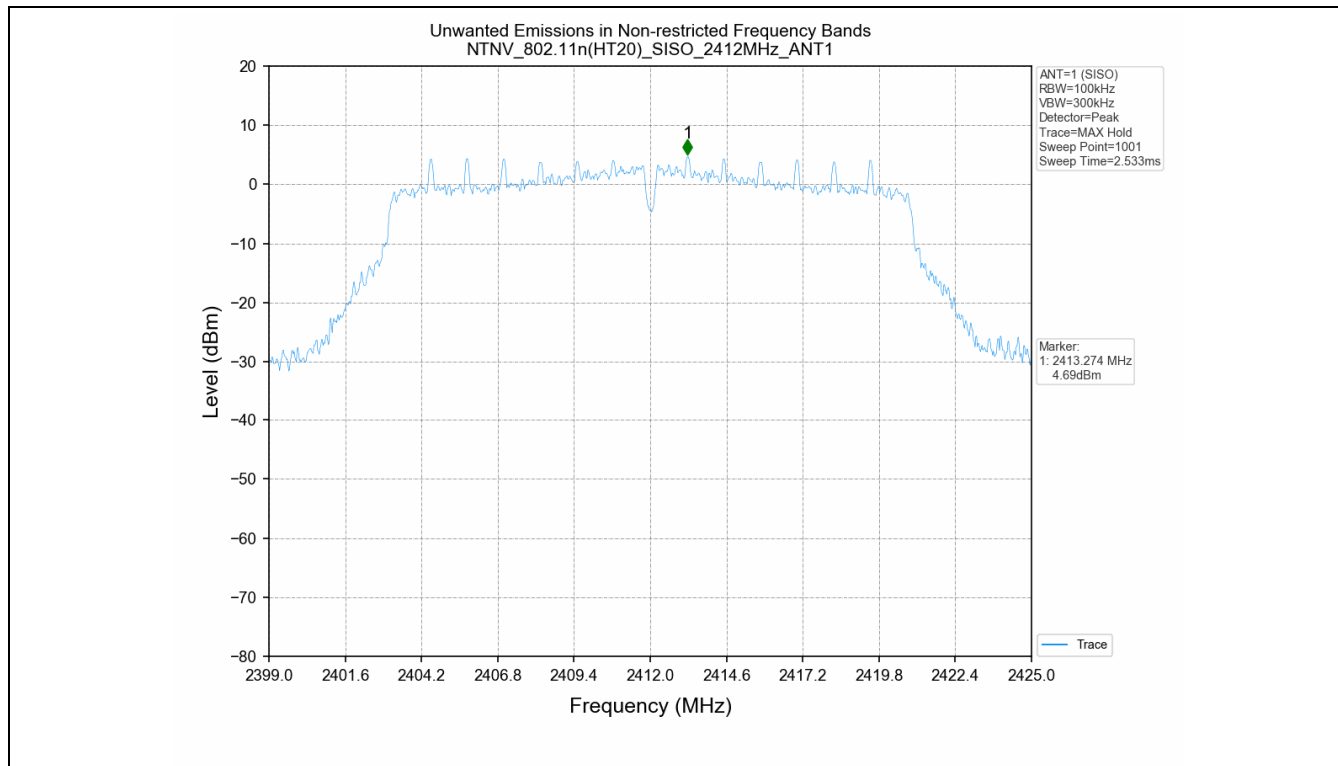
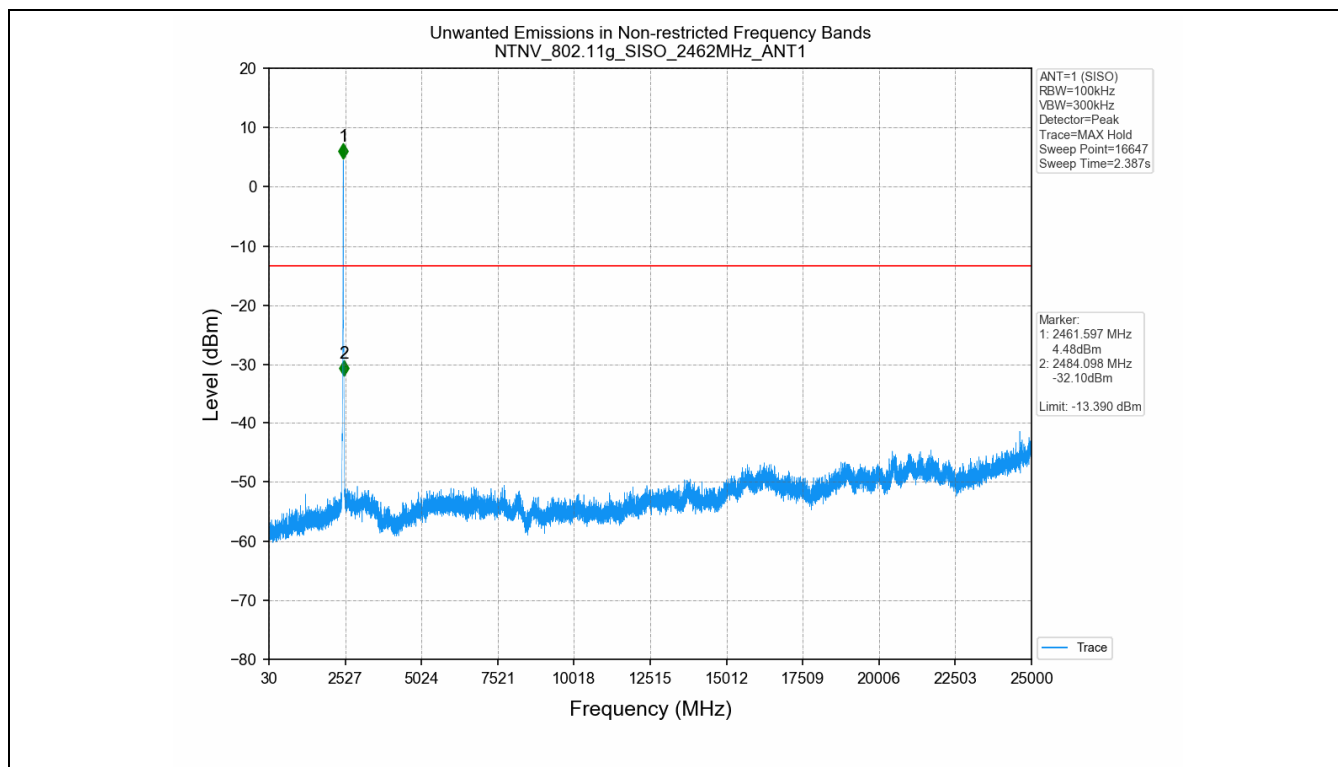
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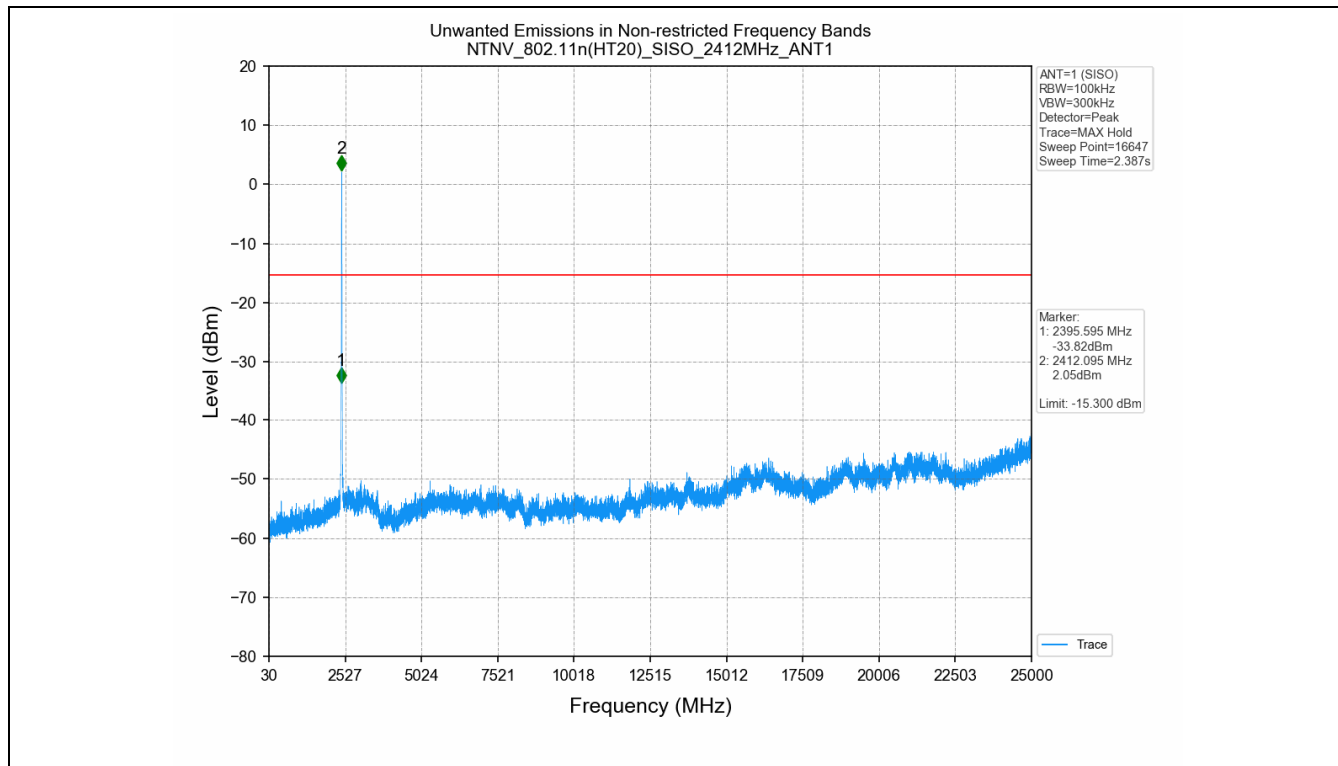
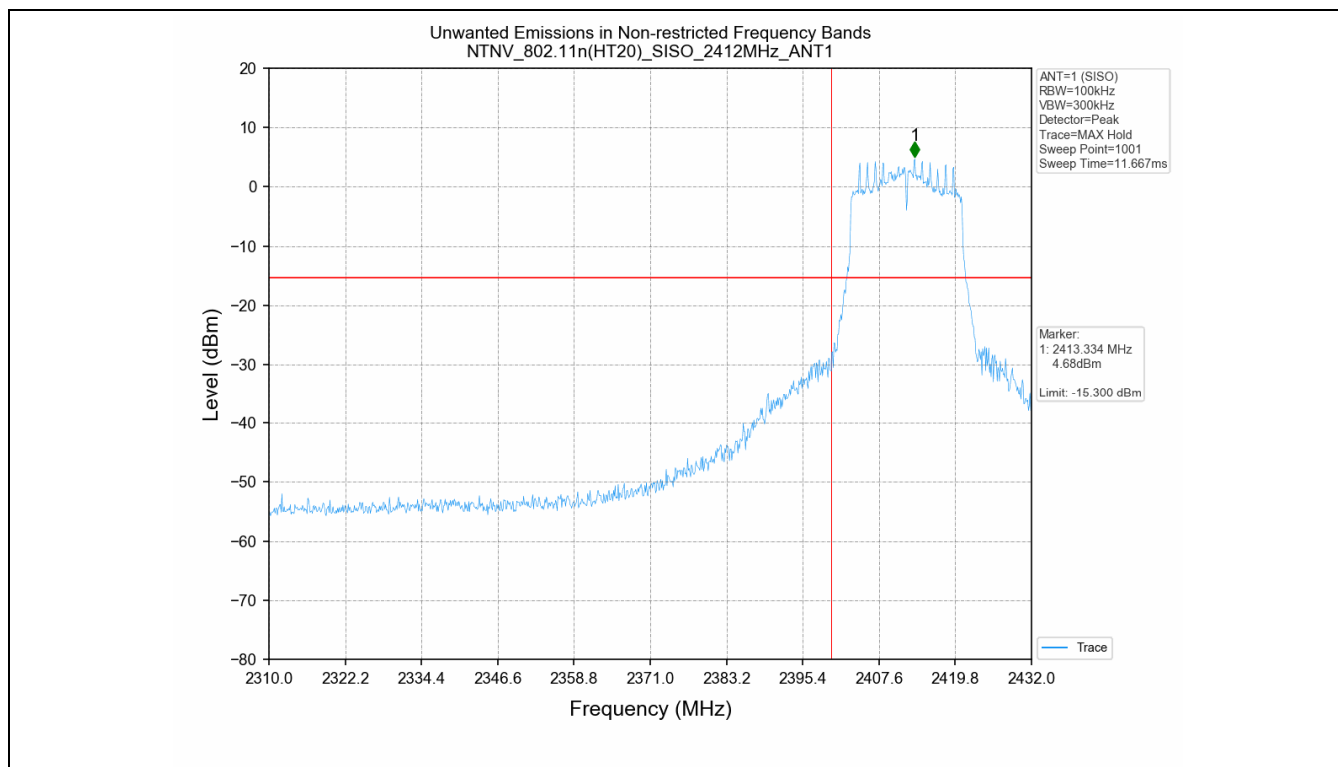
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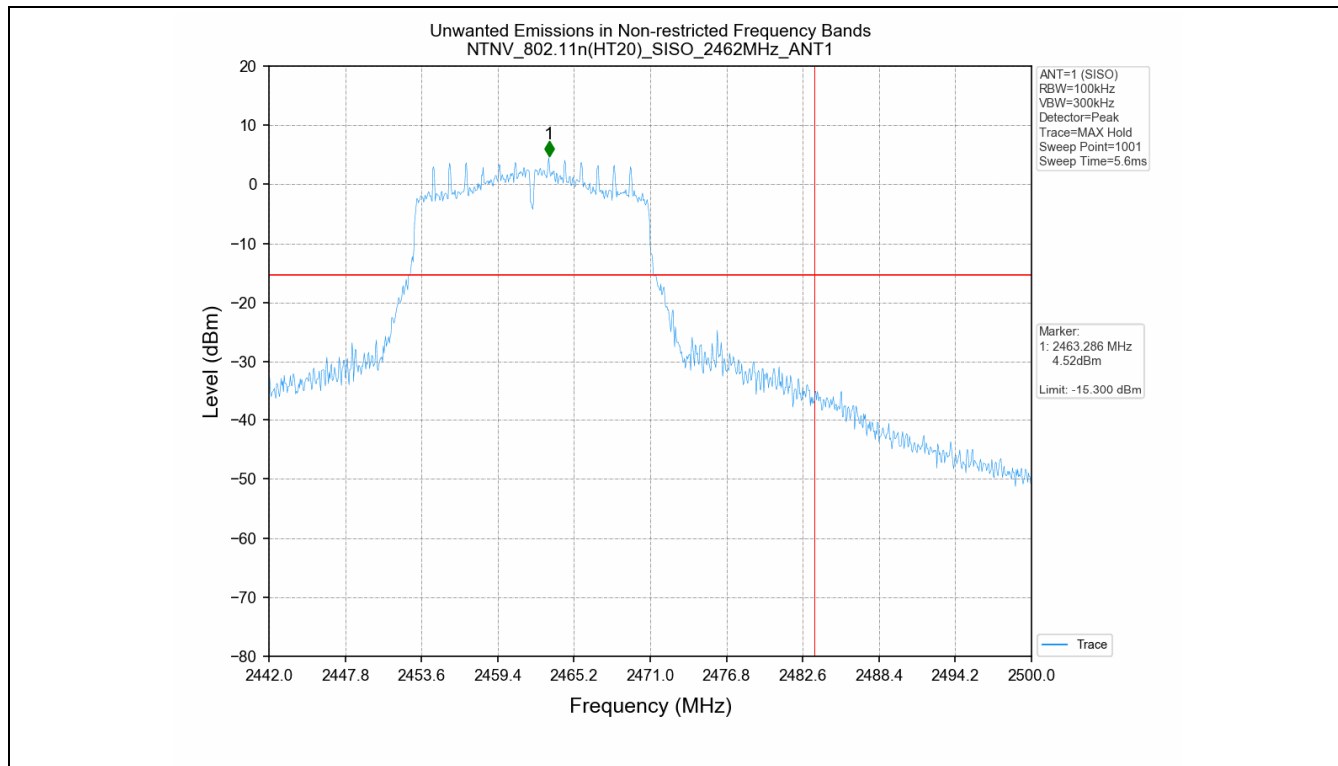
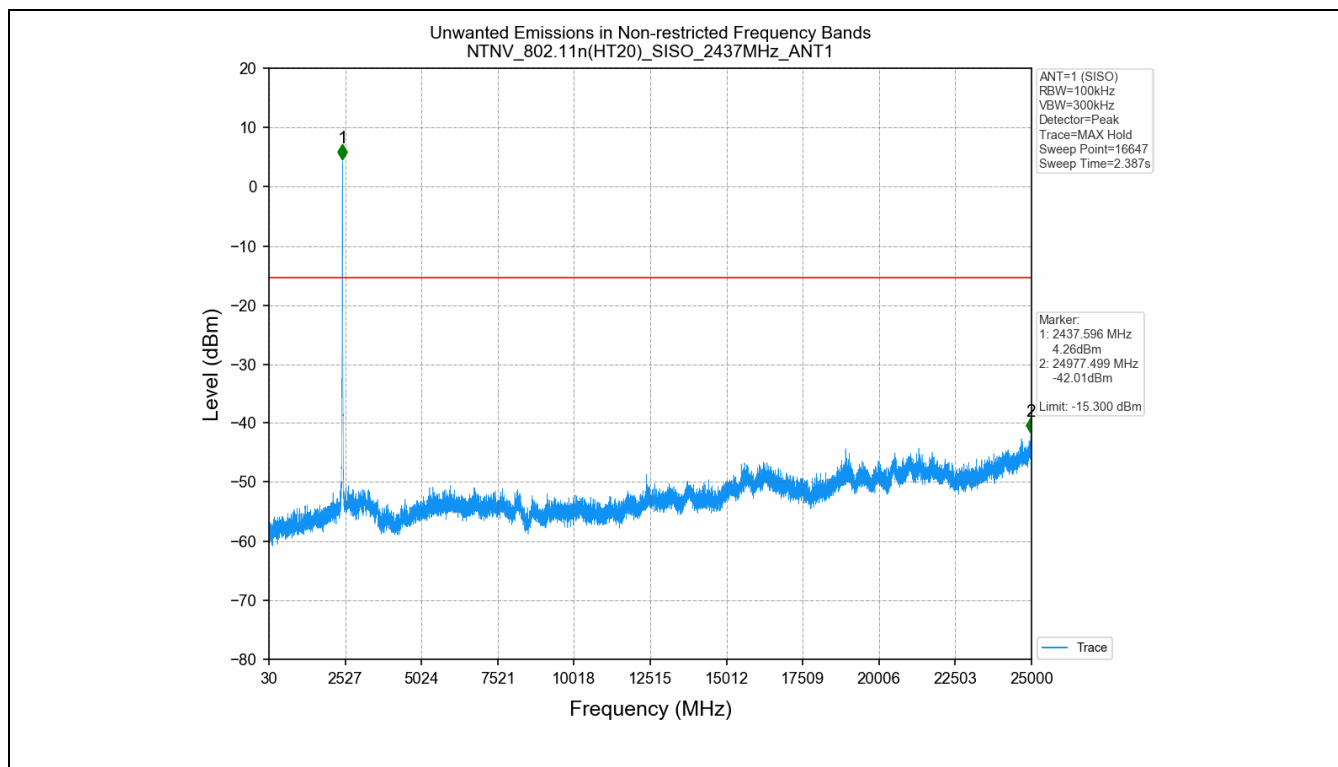
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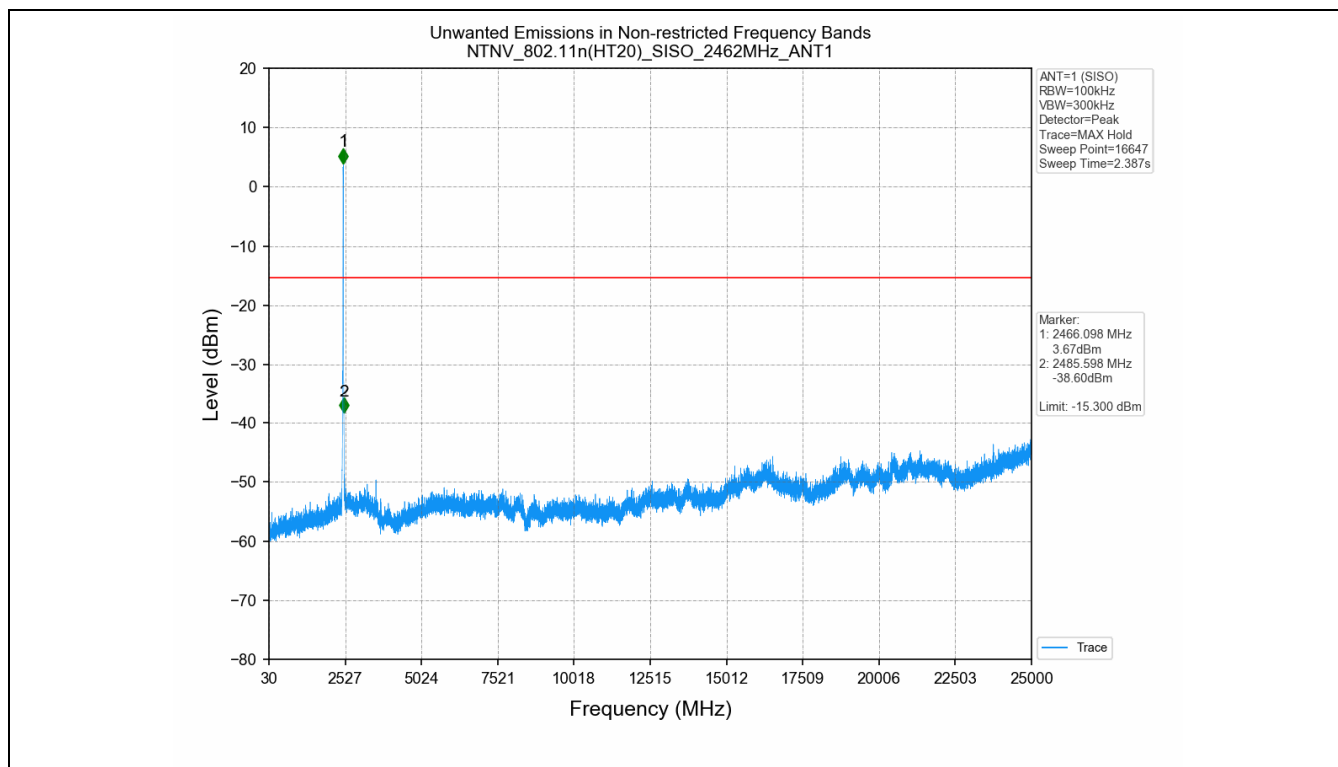












- End of the Report -