TEST REPORT

Application No.:	SZEM2101000446CR
Applicant:	Shantou Helicute Model Aircraft Industrial Co., Ltd
Address of Applicant:	Jiangbei Road, Longtian, Guangyi Street, Chenghai District, Chenghai, Shantou City, Guangdong, Shantou, China
Manufacturer:	Shantou Helicute Model Aircraft Industrial Co., Ltd
Address of Manufacturer:	Jiangbei Road, Longtian, Guangyi Street, Chenghai District, Chenghai, Shantou City, Guangdong, Shantou, China
Factory:	Shantou Helicute Model Aircraft Industrial Co., Ltd
Address of Factory:	Jiangbei Road, Longtian, Guangyi Street, Chenghai District, Chenghai, Shantou City, Guangdong, Shantou, China
Equipment Under Test (EUT):	
EUT Name:	R/C Drone
Model No.:	Please refer to section 2 ♣
♣	Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
FCC ID:	2AKPP2021HELI1
Standard(s) :	47 CFR Part 15, Subpart E 15.407
Date of Receipt:	2021-01-12
Date of Test:	2021-01-19 to 2021-02-01
Date of Issue:	2021-02-03
Test Result:	**Pass***

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

Keny Xu
EMC Laboratory Manager

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2021-02-03		Original

Authorized for issue by:				
		Gebin Sun **Gebin Sun/Project Engineer**		
		Eric Fu **Eric Fu/Reviewer**		

2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart E 15.407	N/A	47 CFR Part 15, Subpart C 15.203	Pass
Transmission in the Absence of Data	47 CFR Part 15, Subpart E 15.407	N/A	47 CFR Part 15, Subpart C 15.407 (c)	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Duty Cycle	47 CFR Part 15, Subpart E 15.407	KDB 789033 II B 1	KDB 789033 D02 II B 1	Pass
26dB Emission bandwidth	47 CFR Part 15, Subpart E 15.407	KDB 789033 D02 II C 1	47 CFR Part 15, Subpart C 15.407 (a)	Pass
Maximum Conducted output power	47 CFR Part 15, Subpart E 15.407	KDB 789033 D02 II E	47 CFR Part 15, Subpart C 15.407 (a)	Pass
Peak Power spectrum density	47 CFR Part 15, Subpart E 15.407	KDB 789033 D02 II F	47 CFR Part 15, Subpart C 15.407 (a)	Pass
Radiated Emissions (Below 1GHz)	47 CFR Part 15, Subpart E 15.407	KDB 789033 D02 II G	47 CFR Part 15, Subpart C 15.209 & 15.407(b)	Pass
Radiated Emissions (Above 1GHz)	47 CFR Part 15, Subpart E 15.407	KDB 789033 D02 II G	47 CFR Part 15, Subpart C 15.209 & 15.407(b)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart E 15.407	KDB 789033 D02 II G	47 CFR Part 15, Subpart C 15.209 & 15.407(b)	Pass
Frequency Stability	47 CFR Part 15, Subpart E 15.407	ANSI C63.10 (2013) Section 6.8	47 CFR Part 15, Subpart C 15.407 (g)	Pass

Declaration of EUT Family Grouping:

Model No.: DRC-447, DRC-445, H05NL, H05NCL, H07NL, H07NCL, H09NL, H09NCL, M801R, M803R, H805, H805W, H806, H806W, H809HW, H809SW, H811C, H811W, H812R, S812, H815HW, H815SC, H815SW, H816H, H816HC, H816HW, H817, H817C, H817W, H817H, H817HC, H817HW, H818H, H181HW, H818HC, H818S, H818SC, H818SW, H818HP, H818HPC, H818HPW, H819, H819HW, H820H, H820HC, H820HW, H821H, H821HC, H821HW, H822HW, H823, H823W, H823H, H823HW, H802G, H802W, H02G, H01C, H825, H825G, H825W, H826H, H826HW, H826HP, H826HPW, H827S, H827SC, H827SW, H828P, H828PC, H828PW, H829, H830, H831, H832, H833, H835, H836, H837, H838, H839, H850, H851, H851SW, H851SWP, H852, H853, H855, H856, H857, H858, H859, H860, H860HW, H860SW, H860SPW

Only the model DRC-447 was tested, since according to the declaration from the applicant, the electrical circuit design, layout, components used, internal wiring and functions were identical for the above models, with only difference on packaging.

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply:	Rechargeable battery DC7.4V 1500mAh for Drone, Charged by DC5V			
Cable(s):	USB cable:50cm unshielded			
Operation Frequency:	Band	Mode	Frequency Range(MHz)	Number of channels
	UNII Band 1	IEEE 802.11a	5180-5240	4
		IEEE 802.11n 20MHz	5180-5240	4
Type of Modulation:	IEEE 802.11a: OFDM(BPSK/QPSK/16QAM/64QAM) IEEE 802.11n: OFDM(BPSK/QPSK/16QAM/64QAM)			
DFS Function:	Not Support			
TPC Function:	Not Support			
Antenna Type:	Integral Antenna			
Antenna Gain:	2dBi			

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
--	--	--	--
The EUT has been tested as an independent unit.			

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Duty Cycle	± 0.37%
26dB Emission bandwidth	± 3%
Maximum Conducted output power	± 0.75dB
Peak Power spectrum density	± 2.84dB
Radiated Emissions (Above 1GHz)	± 4.8dB
Radiated Emissions which fall in the restricted bands	± 4.5dB (below 1GHz); ± 4.8dB (above 1GHz);
Frequency Stability	± 7.25 x 10-8
Radiated Emissions (Below 1GHz)	± 4.5dB
Temperature test	± 1℃
Humidity test	± 3%
Supply voltages	± 1%
Time	± 3%
Remark: The U_{lab} (lab Uncertainty) is less than U_{cispr} (CISPR Uncertainty), so the test results – compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit; – non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.	

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

5 Equipment List

Duty Cycle					
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	FSU43	SEM004-08	2020-04-01	2021-03-31
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2020-09-23	2021-09-22
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2020-07-10	2021-07-09
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2020-05-21	2021-05-20
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2020-03-25	2021-03-24

26dB Emission bandwidth					
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	FSU43	SEM004-08	2020-04-01	2021-03-31
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2020-09-23	2021-09-22
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2020-07-10	2021-07-09
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2020-05-21	2021-05-20
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2020-03-25	2021-03-24

Maximum Conducted 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	FSU43	SEM004-08	2020-04-01	2021-03-31
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2020-09-23	2021-09-22
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2020-07-10	2021-07-09
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2020-05-21	2021-05-20

Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2020-03-25	2021-03-24

Peak Power spectrum density					
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	FSU43	SEM004-08	2020-04-01	2021-03-31
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2020-09-23	2021-09-22
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2020-07-10	2021-07-09
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2020-05-21	2021-05-20
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2020-03-25	2021-03-24

Radiated Emissions (Below 1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2020-07-19	2023-07-18
MXE EMI Receiver	Agilent Technologies	N9038A	SEM004-15	2020-11-02	2021-11-01
BiConiLog Antenna	ETS-LINDGREN	3142C	SEM003-02	2019-05-24	2022-05-23
Pre-Amplifier	Agilent Technologies	8447D	SEM005-01	2020-04-01	2021-03-31
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2020-07-10	2021-07-09

Radiated Emissions (Above 1GHz)					
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
EXA Signal 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
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2020-09-23	2021-09-22
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2020-07-10	2021-07-09

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

Radiated Emissions which fall in the restricted bands					
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
EXA Signal 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
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2020-09-23	2021-09-22
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2020-07-10	2021-07-09

General used equipment					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2020-09-15	2021-09-14
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2020-09-15	2021-09-14
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2020-04-07	2021-04-06

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

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 antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

6.1.2 Conclusion

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the Antenna: 2dBi.

Antenna location: Refer to Appendix(Internal photos)

6.2 Transmission in the Absence of Data

6.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.407 (c)

6.2.1 Conclusion

standard Requirement:

The device shall automatically discontinue transmission in cases of absence of information to transmit, or operational failure. A description on how this is done shall accompany the application for equipment certification. Note that this is not intended to prohibit transmission of control or signalling information or the use of repetitive codes where required by the technology.

EUT Details:

WIFI chip support automatically discontinue transmission in case of either absence of information to transmit or operational failure, if the chip detect absence of information to transmit or operational failure, it will be automatically shut off.

7 Radio Spectrum Matter Test Results

7.1 Duty Cycle

Test Requirement KDB 789033 D02 II B 1
Test Method: KDB 789033 II B 1

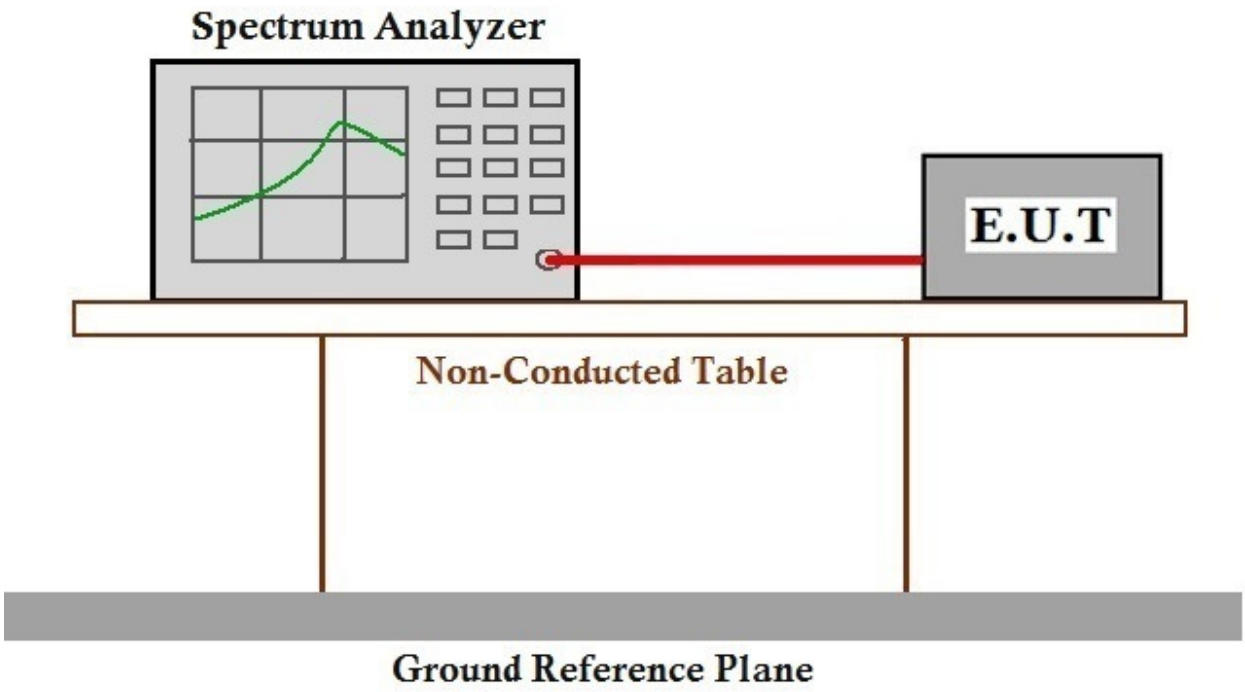
7.1.1 E.U.T. Operation

Operating Environment:
Temperature: 25.2 °C Humidity: 36.1 % RH Atmospheric Pressure: 1010 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode (U-NII-1)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20). Only the data of worst case is recorded in the report.

7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

Please Refer To Appendix For Details

7.2 26dB Emission bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.407 (a)
Test Method: KDB 789033 D02 II C 1

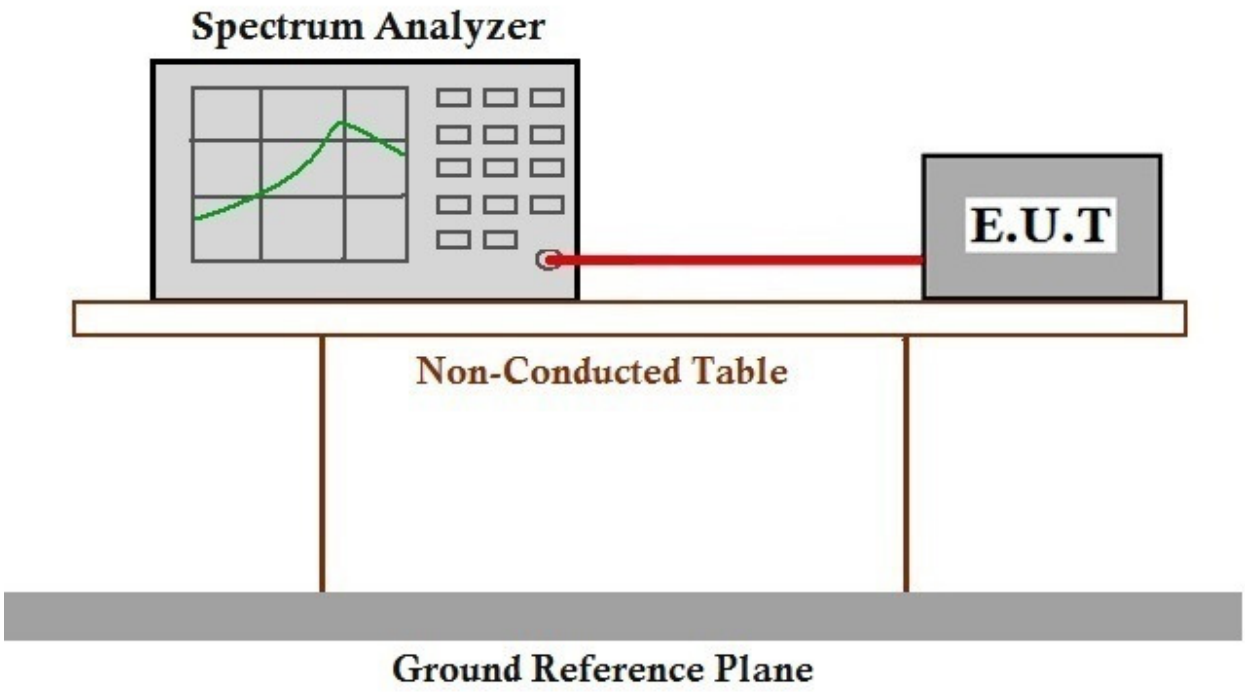
7.2.1 E.U.T. Operation

Operating Environment:
Temperature: 25.2 °C Humidity: 36.1 % RH Atmospheric Pressure: 1010 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode (U-NII-1)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20). Only the data of worst case is recorded in the report.

7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data

Please Refer To Appendix For Details

7.3 Maximum Conducted output power

Test Requirement 47 CFR Part 15, Subpart C 15.407 (a)
Test Method: KDB 789033 D02 II E

Limit:

Frequency band(MHz)	Limit
5150-5250	≤1W(30dBm) for master device
	≤250mW(24dBm) for client device
5250-5350	≤250mW(24dBm) for client device or 11dBm+10logB*
5470-5725	≤250mW(24dBm) for client device or 11dBm+10logB*
5725-5850	≤1W(30dBm)
Remark:	* Where B is the 26dB emission bandwidth in MHz. The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

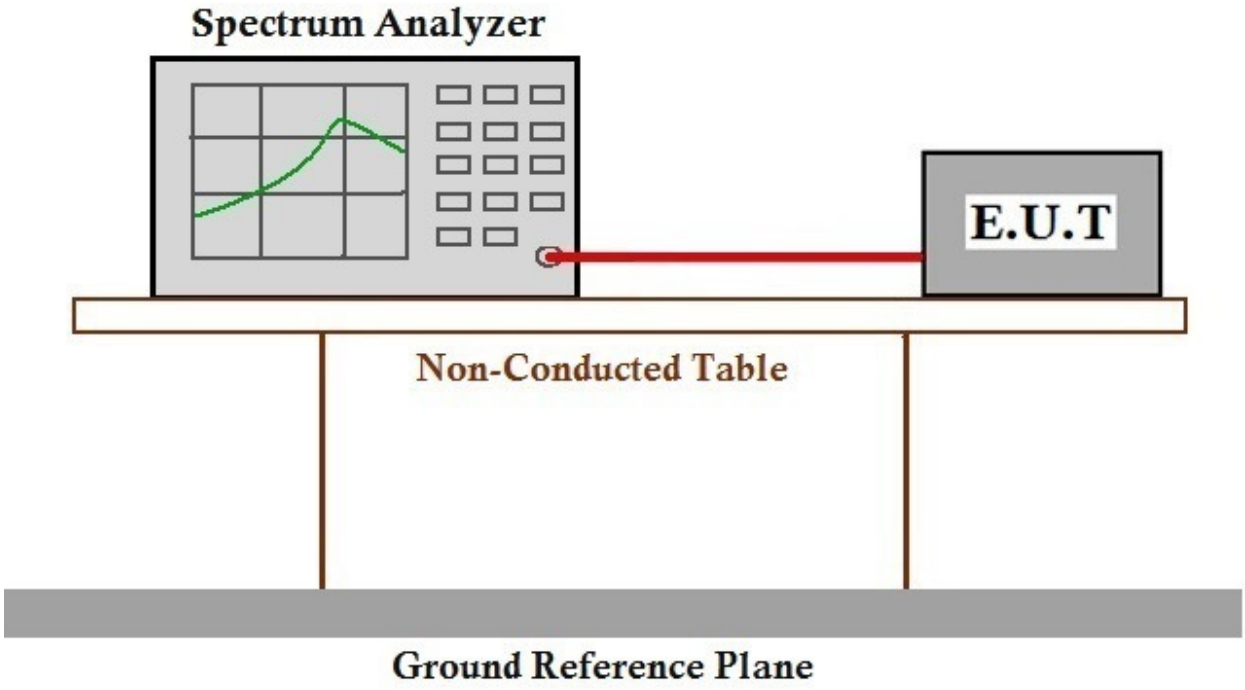
7.3.1 E.U.T. Operation

Operating Environment:
Temperature: 25.2 °C Humidity: 36.1 % RH Atmospheric Pressure: 1010 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode (U-NII-1)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20). Only the data of worst case is recorded in the report.

7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

Please Refer To Appendix For Details

7.4 Peak Power spectrum density

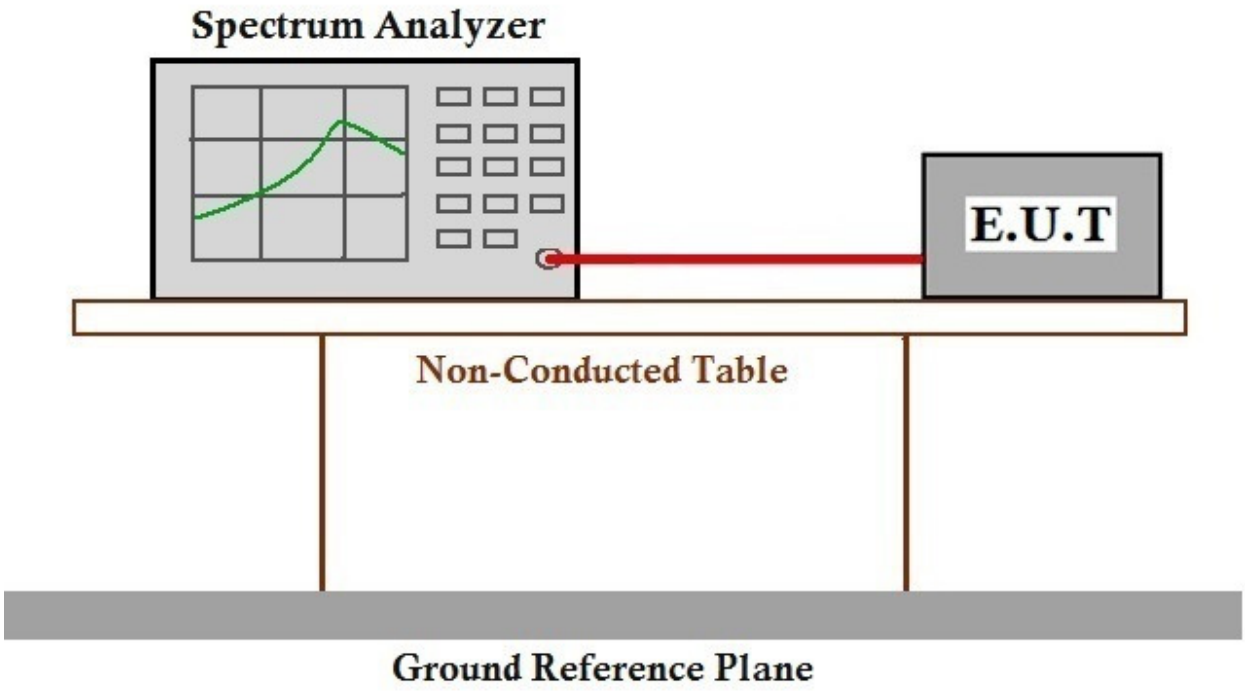
Test Requirement 47 CFR Part 15, Subpart C 15.407 (a)
Test Method: KDB 789033 D02 II F
Limit:

Frequency band(MHz)	Limit
5150-5250	≤17dBm in 1MHz for master device
	≤11dBm in 1MHz for client device
5250-5350	≤11dBm in 1MHz for client device
5470-5725	≤11dBm in 1MHz for client device
5725-5850	≤30dBm in 500 kHz
Remark:	The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test.

7.4.1 E.U.T. Operation

Operating Environment:
Temperature: 25.2 °C Humidity: 36.1 % RH Atmospheric Pressure: 1010 mbar

7.4.2 Test Setup Diagram



7.4.3 Measurement Procedure and Data

Please Refer To Appendix For Details

7.5 Radiated Emissions (Below 1GHz)

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.407(b)
Test Method: KDB 789033 D02 II G
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
960-1000	500	3

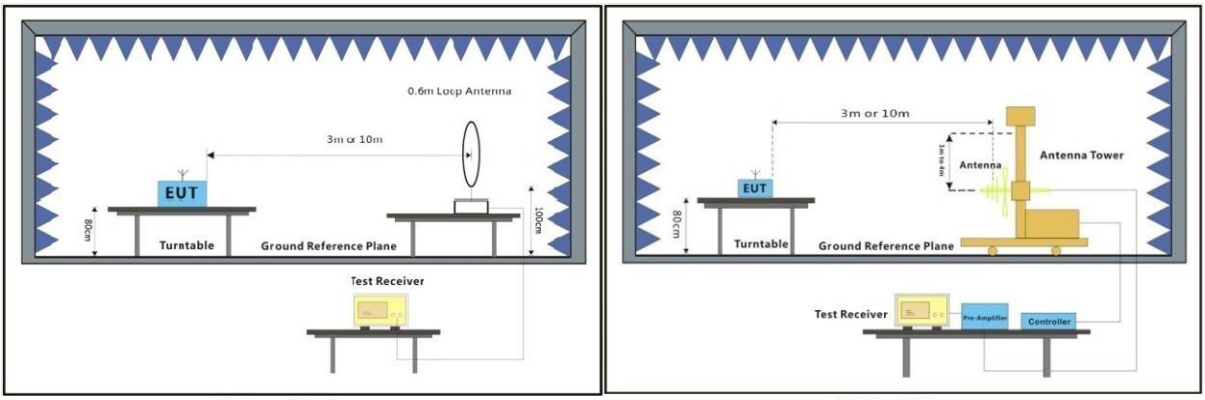
7.5.1 E.U.T. Operation

Operating Environment:
Temperature: 25.6 °C Humidity: 48.5 % RH Atmospheric Pressure: 1010 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode (U-NII-1)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20). Only the data of worst case is recorded in the report.

7.5.3 Test Setup Diagram



Below 30MHz　　30MHz-1GHz

7.5.4 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 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. 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.

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 quasi-peak 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.

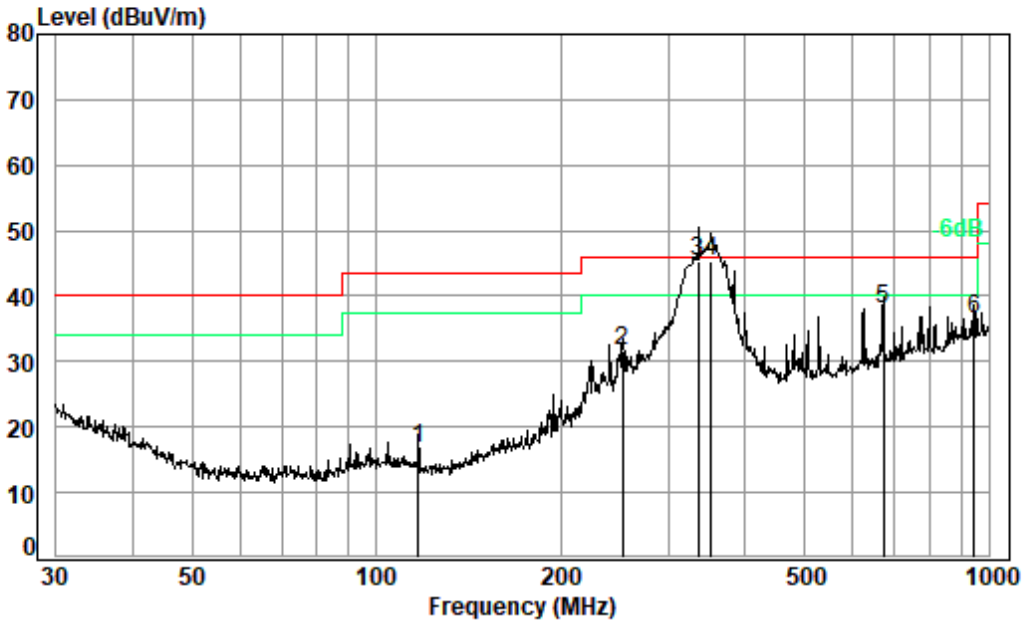
Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

2. For emission below 1GHz, through the pre-scan found the worst case is the lowest channel of 802.11a. Only the worst case is recorded in the report.

3. 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.

Test Mode: 00; Polarity: Horizontal

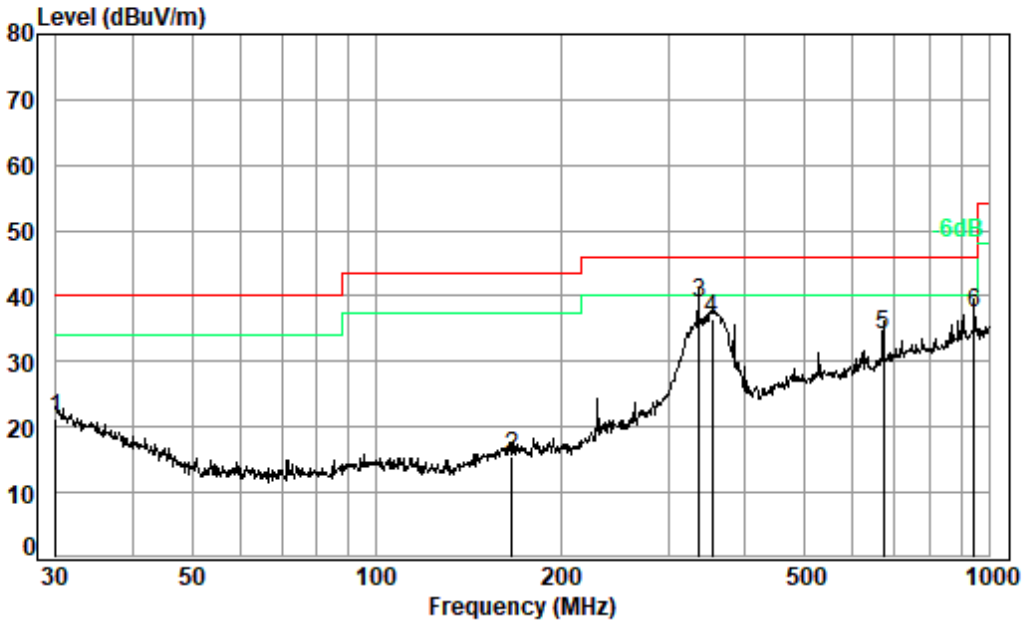


Condition: 3m HORIZONTAL
Job No. : 00446CR
Test Mode: 00

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	116.95	1.12	13.21	27.50	30.05	16.88	43.50	-26.62	QP
2	252.06	1.66	18.18	26.99	38.66	31.51	46.00	-14.49	QP
3 pp	336.00	2.12	20.32	27.08	50.06	45.42	46.00	-0.58	QP
4	351.71	2.17	21.12	27.16	49.21	45.34	46.00	-0.66	QP
5	672.84	2.85	27.13	27.97	35.88	37.89	46.00	-8.11	QP
6	945.44	3.55	29.28	26.93	30.60	36.50	46.00	-9.50	QP

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

Test Mode: 00; Polarity: Vertical



Condition: 3m VERTICAL
Job No. : 00446CR
Test Mode: 00

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	30.00	0.60	23.00	27.74	25.38	21.24	40.00	-18.76	QP
2	166.65	1.17	15.53	27.27	26.20	15.63	43.50	-27.87	QP
3 pp	336.04	2.12	20.32	27.08	43.73	39.09	46.00	-6.91	QP
4	352.94	2.17	21.21	27.17	40.20	36.41	46.00	-9.59	QP
5	672.84	2.85	27.13	27.97	32.08	34.09	46.00	-11.91	QP
6	945.44	3.55	29.28	26.93	31.51	37.41	46.00	-8.59	QP

7.6 Radiated Emissions (Above 1GHz)

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.407(b)
Test Method: KDB 789033 D02 II G
Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
Above 1GHz	500	3

*(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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.

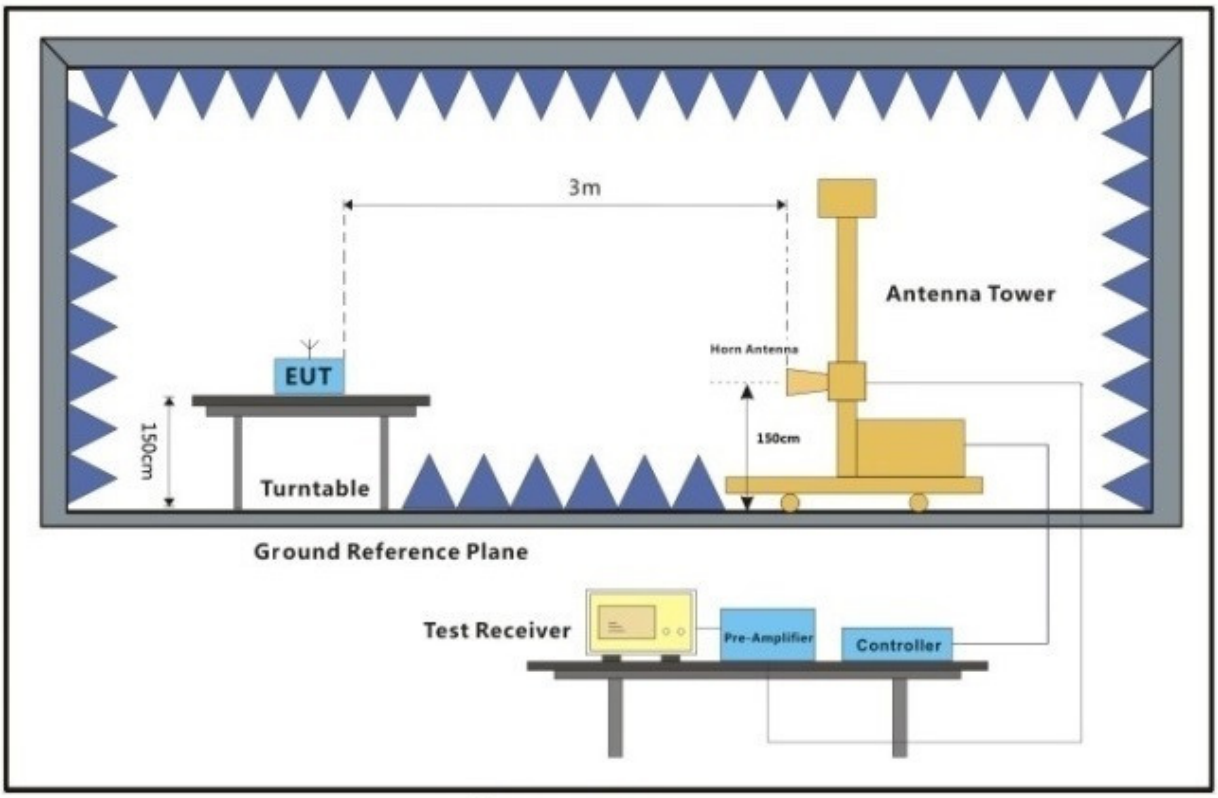
7.6.1 E.U.T. Operation

Operating Environment:
Temperature: 23.5 °C Humidity: 56.3 % RH Atmospheric Pressure: 1010 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode (U-NII-1)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20). Only the data of worst case is recorded in the report.

7.6.3 Test Setup Diagram



Above 1GHz

7.6.4 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.

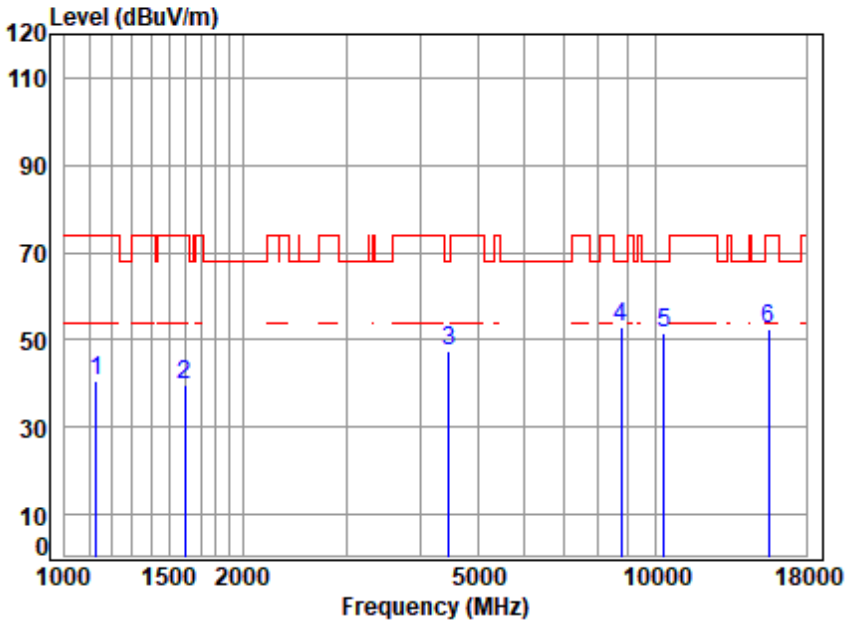
Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

2. Scan from 18GHz to 40GHz, 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.

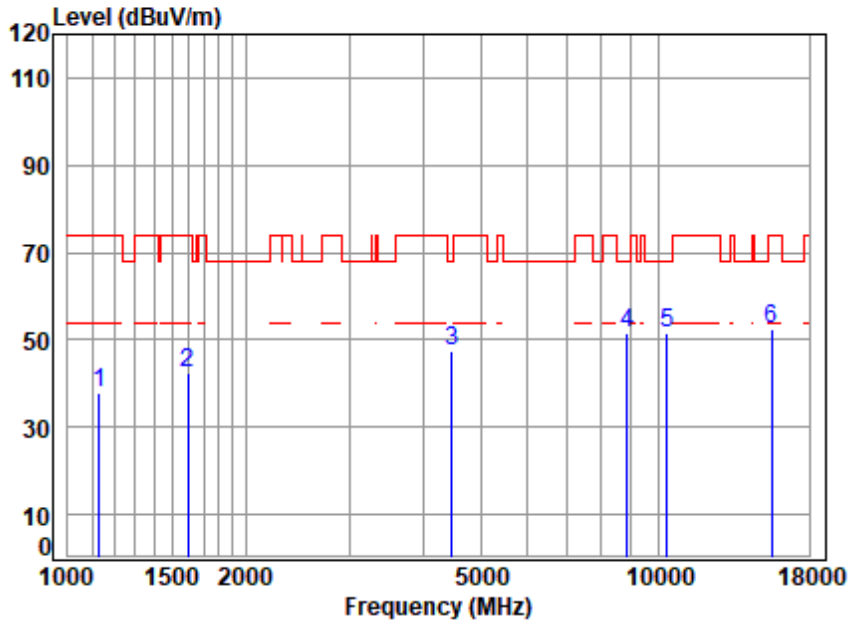
Test Mode: 00; Polarity: Horizontal; Modulation:802.11a; Bandwidth:20MHz; Channel:Low



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00446CR
Mode : 5180 TX SE
Note : 5G WIFI 11A

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1132.340	2.64	24.27	39.71	53.58	40.78	74.00	-33.22	peak
2	1597.181	3.35	26.24	40.01	50.13	39.71	74.00	-34.29	peak
3	4469.214	6.73	33.55	41.85	49.14	47.57	68.20	-20.63	peak
4	8764.146	10.21	37.11	39.29	44.99	53.02	68.20	-15.18	peak
5	10360.000	10.57	37.76	37.29	40.57	51.61	68.20	-16.59	peak
6	15540.000	13.97	40.72	40.38	38.03	52.34	74.00	-21.66	peak

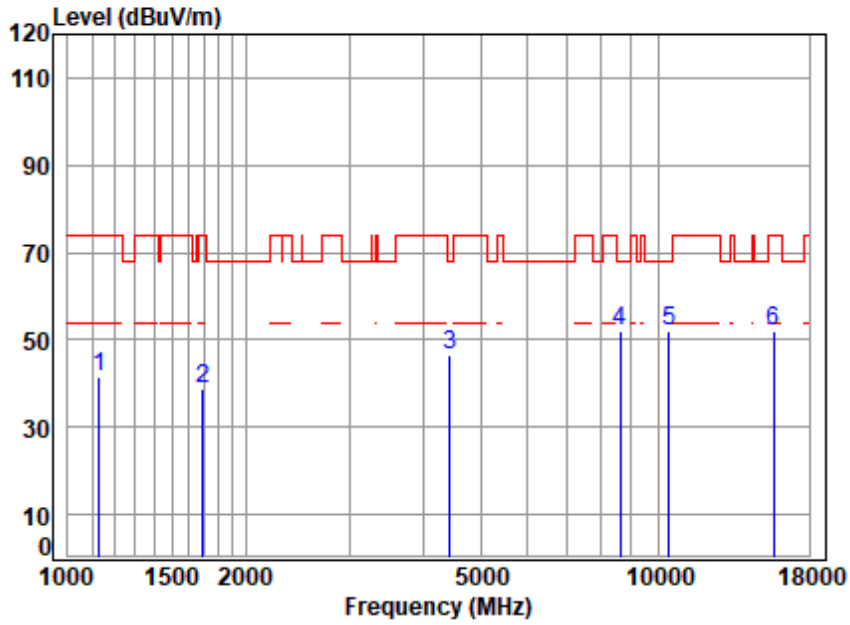
Test Mode: 00; Polarity: Vertical; Modulation:802.11a; Bandwidth:20MHz; Channel:Low



Site : chamber
Condition: 3m VERTICAL
Job No : 00446CR
Mode : 5180 TX SE
Note : 5G WIFI 11A

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1132.340	2.64	24.27	39.71	50.83	38.03	74.00	-35.97	peak
2	1597.181	3.35	26.24	40.01	52.90	42.48	74.00	-31.52	peak
3	4469.214	6.73	33.55	41.85	49.24	47.67	68.20	-20.53	peak
4	8866.062	10.25	37.15	39.10	43.44	51.74	68.20	-16.46	peak
5	10360.000	10.57	37.76	37.29	40.60	51.64	68.20	-16.56	peak
6	15540.000	13.97	40.72	40.38	38.33	52.64	74.00	-21.36	peak

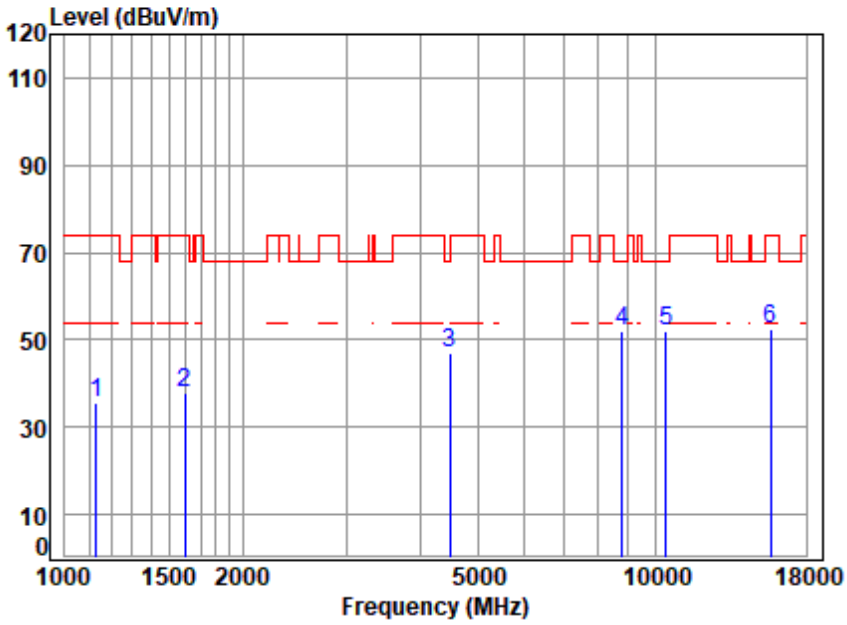
Test Mode: 00; Polarity: Horizontal; Modulation:802.11a; Bandwidth:20MHz; Channel:middle



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00446CR
Mode : 5220 TX SE
Note : 5G WIFI 11A

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1132.340	2.64	24.27	39.71	54.10	41.30	74.00	-32.70	peak
2	1692.231	3.42	26.64	40.06	48.58	38.58	74.00	-35.42	peak
3	4443.453	6.71	33.50	41.82	48.27	46.66	68.20	-21.54	peak
4	8613.468	10.15	37.05	39.57	44.26	51.89	68.20	-16.31	peak
5	10440.000	10.55	37.72	37.34	41.28	52.21	68.20	-15.99	peak
6	15660.000	14.02	40.80	40.44	37.85	52.23	74.00	-21.77	peak

Test Mode: 00; Polarity: Vertical; Modulation:802.11a; Bandwidth:20MHz; Channel:middle

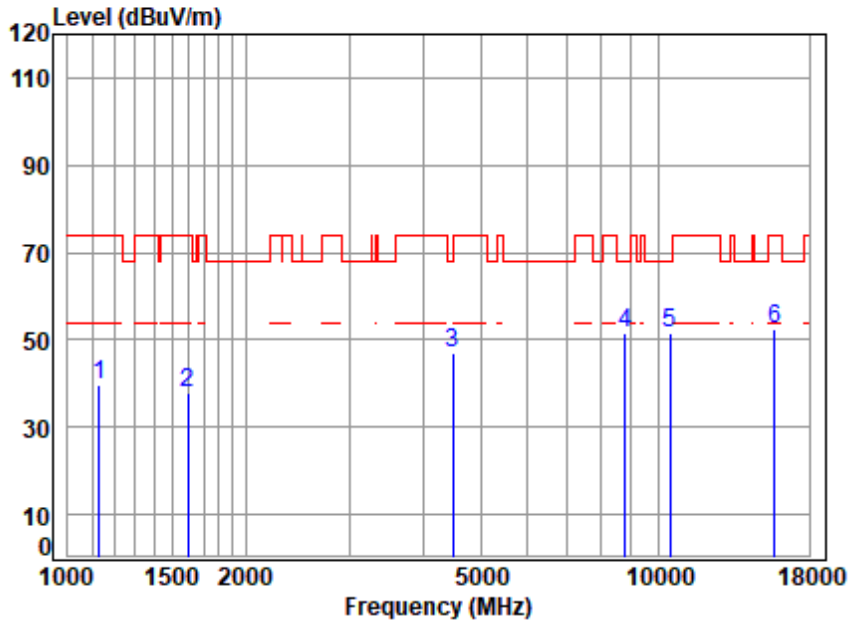


Site : chamber
Condition: 3m VERTICAL
Job No : 00446CR
Mode : 5220 TX SE
Note : 5G WIFI 11A

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1132.340	2.64	24.27	39.71	48.43	35.63	74.00	-38.37	peak
2	1597.181	3.35	26.24	40.01	48.09	37.67	74.00	-36.33	peak
3	4495.125	6.76	33.59	41.87	48.46	46.94	68.20	-21.26	peak
4	8789.516	10.22	37.12	39.24	43.94	52.04	68.20	-16.16	peak
5	10440.000	10.55	37.72	37.34	41.18	52.11	68.20	-16.09	peak
6	15660.000	14.02	40.80	40.44	38.09	52.47	74.00	-21.53	peak

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

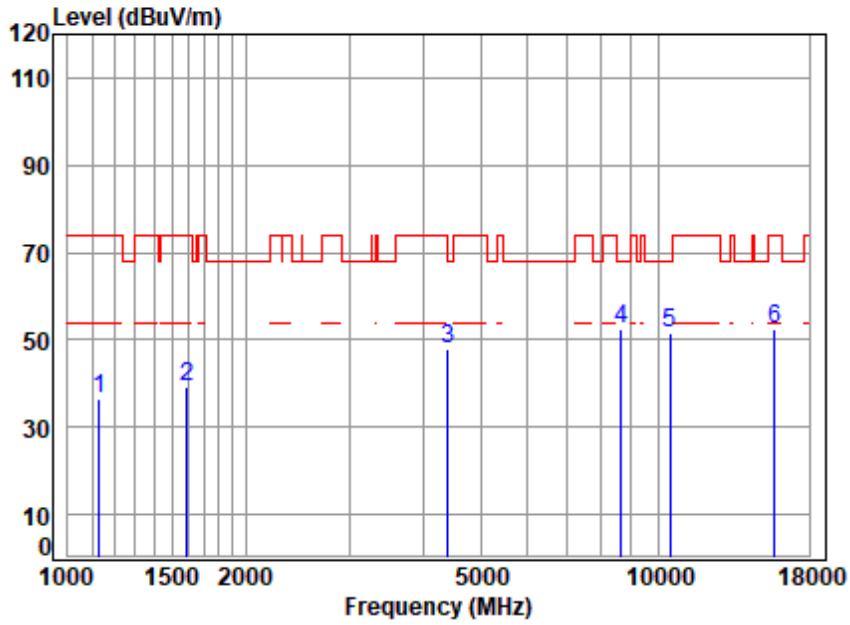
Test Mode: 00; Polarity: Horizontal; Modulation:802.11a; Bandwidth:20MHz; Channel:High



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00446CR
Mode : 5240 TX SE
Note : 5G WIFI 11A

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1132.340	2.64	24.27	39.71	52.37	39.57	74.00	-34.43	peak
2	1597.181	3.35	26.24	40.01	48.20	37.78	74.00	-36.22	peak
3	4482.150	6.74	33.57	41.86	48.56	47.01	68.20	-21.19	peak
4	8789.516	10.22	37.12	39.24	43.63	51.73	68.20	-16.47	peak
5	10480.000	10.54	37.71	37.36	40.89	51.78	68.20	-16.42	peak
6	15720.000	14.04	40.83	40.47	38.25	52.65	74.00	-21.35	peak

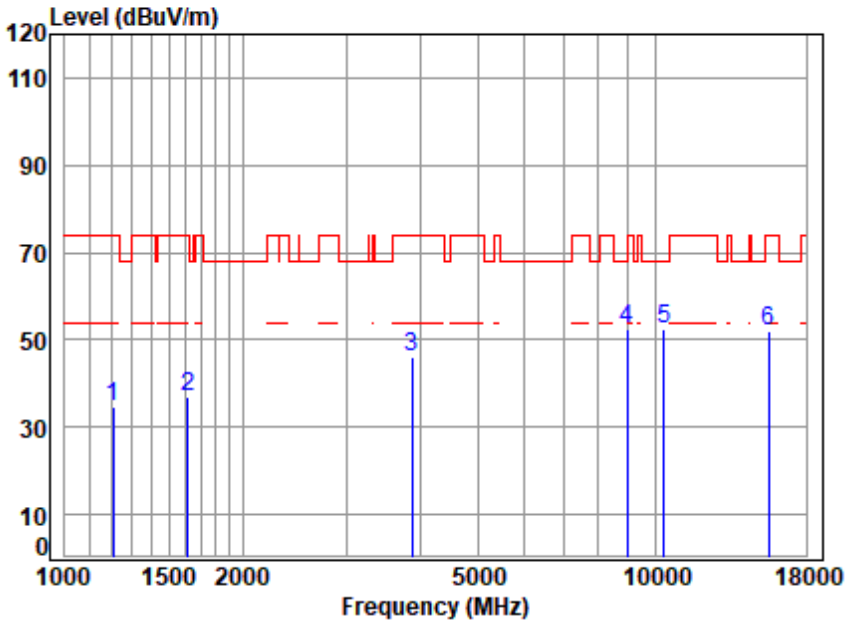
Test Mode: 00; Polarity: Vertical; Modulation:802.11a; Bandwidth:20MHz; Channel:High



Site : chamber
Condition: 3m VERTICAL
Job No : 00446CR
Mode : 5240 TX SE
Note : 5G WIFI 11A

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1132.340	2.64	24.27	39.71	49.28	36.48	74.00	-37.52	peak
2	1592.571	3.34	26.22	40.00	49.57	39.13	74.00	-34.87	peak
3	4405.090	6.67	33.44	41.79	49.60	47.92	68.20	-20.28	peak
4	8638.399	10.16	37.06	39.53	44.70	52.39	68.20	-15.81	peak
5	10480.000	10.54	37.71	37.36	40.86	51.75	68.20	-16.45	peak
6	15720.000	14.04	40.83	40.47	37.85	52.25	74.00	-21.75	peak

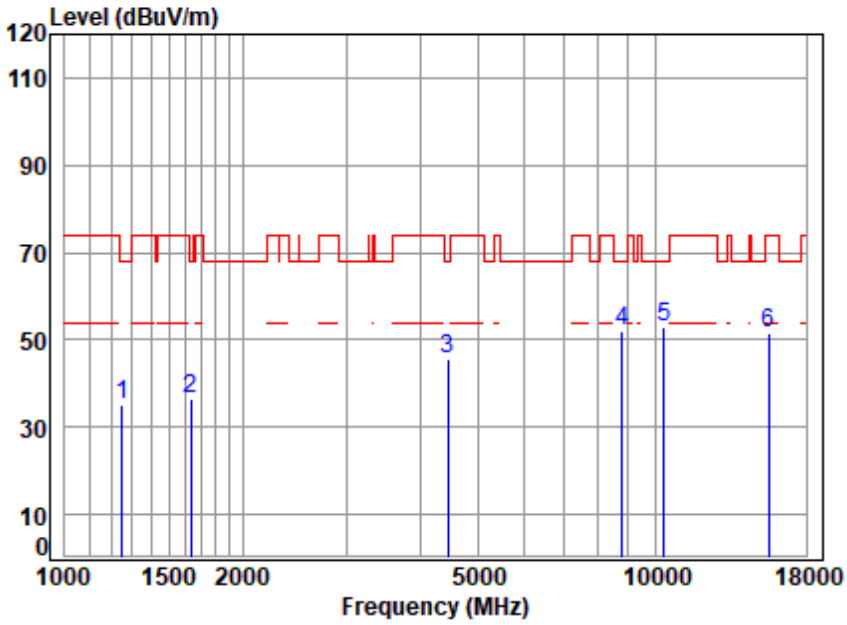
Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:Low



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00446CR
Mode : 5180 TX SE
Note : 5G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1206.682	2.78	24.62	39.76	47.21	34.85	74.00	-39.15	peak
2	1615.754	3.36	26.32	40.02	47.20	36.86	74.00	-37.14	peak
3	3867.831	6.09	32.45	41.32	49.06	46.28	74.00	-27.72	peak
4	8943.274	10.28	37.18	38.95	43.78	52.29	68.20	-15.91	peak
5	10360.000	10.57	37.76	37.29	41.56	52.60	68.20	-15.60	peak
6	15540.000	13.97	40.72	40.38	37.89	52.20	74.00	-21.80	peak

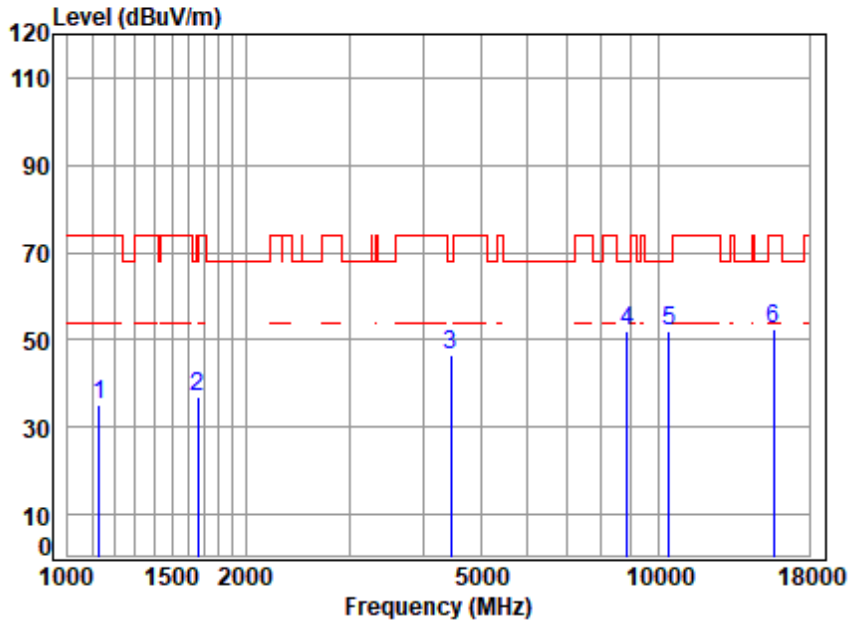
Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:Low



Site : chamber
Condition: 3m VERTICAL
Job No : 00446CR
Mode : 5180 TX SE
Note : 5G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1249.269	2.85	24.81	39.79	47.39	35.26	68.20	-32.94	peak
2	1634.543	3.38	26.40	40.03	46.74	36.49	68.20	-31.71	peak
3	4456.315	6.72	33.53	41.84	47.28	45.69	68.20	-22.51	peak
4	8789.516	10.22	37.12	39.24	43.90	52.00	68.20	-16.20	peak
5	10360.000	10.57	37.76	37.29	41.78	52.82	68.20	-15.38	peak
6	15540.000	13.97	40.72	40.38	37.30	51.61	74.00	-22.39	peak

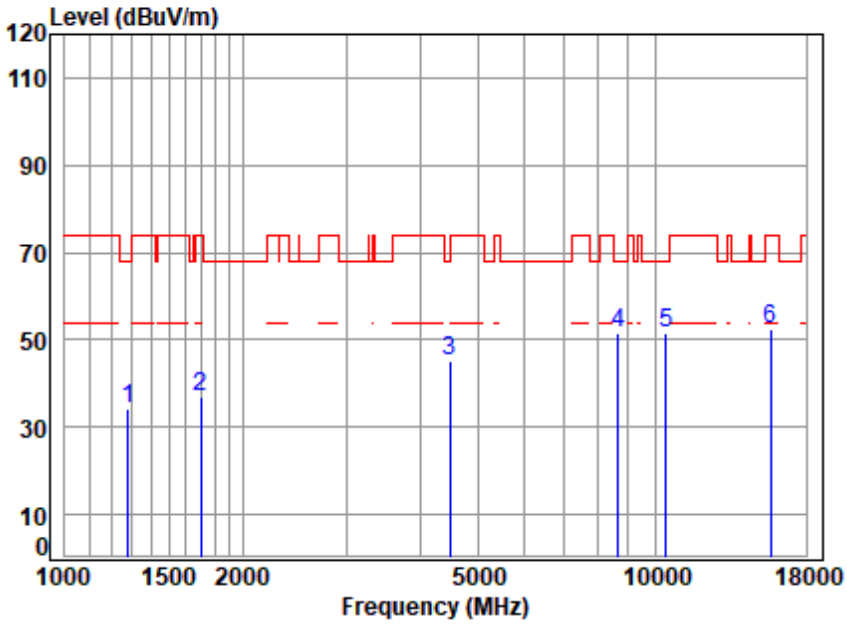
Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:middle



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00446CR
Mode : 5220 TX SE
Note : 5G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1132.340	2.64	24.27	39.71	47.75	34.95	74.00	-39.05	peak
2	1658.337	3.40	26.50	40.04	47.27	37.13	68.20	-31.07	peak
3	4456.315	6.72	33.53	41.84	48.00	46.41	68.20	-21.79	peak
4	8840.473	10.24	37.14	39.14	43.89	52.13	68.20	-16.07	peak
5	10440.000	10.55	37.72	37.34	40.94	51.87	68.20	-16.33	peak
6	15660.000	14.02	40.80	40.44	38.24	52.62	74.00	-21.38	peak

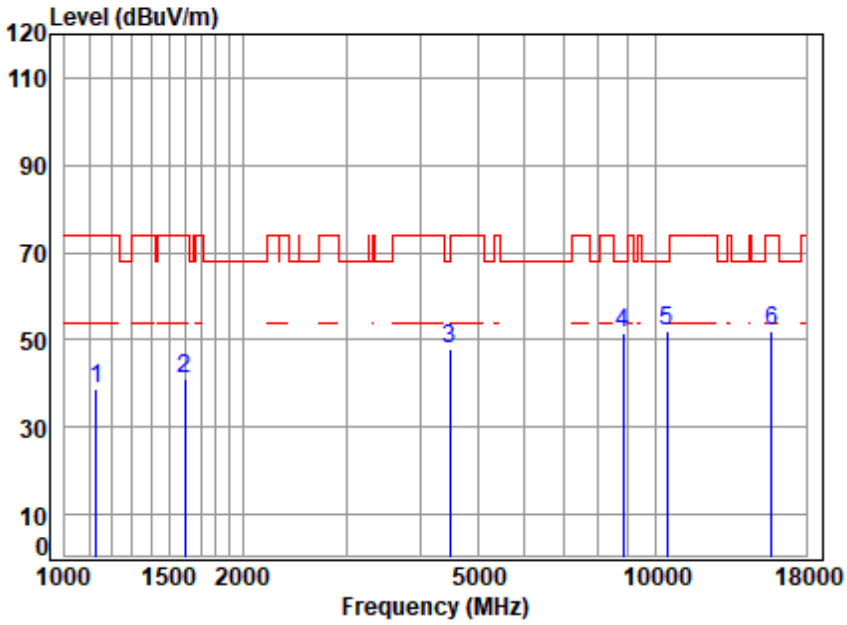
Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:middle



Site : chamber
Condition: 3m VERTICAL
Job No : 00446CR
Mode : 5220 TX SE
Note : 5G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1282.193	2.91	24.95	39.82	46.08	34.12	68.20	-34.08	peak
2	1697.129	3.43	26.66	40.06	46.91	36.94	74.00	-37.06	peak
3	4495.125	6.76	33.59	41.87	46.72	45.20	68.20	-23.00	peak
4	8663.404	10.17	37.07	39.48	43.73	51.49	68.20	-16.71	peak
5	10440.000	10.55	37.72	37.34	40.62	51.55	68.20	-16.65	peak
6	15660.000	14.02	40.80	40.44	37.87	52.25	74.00	-21.75	peak

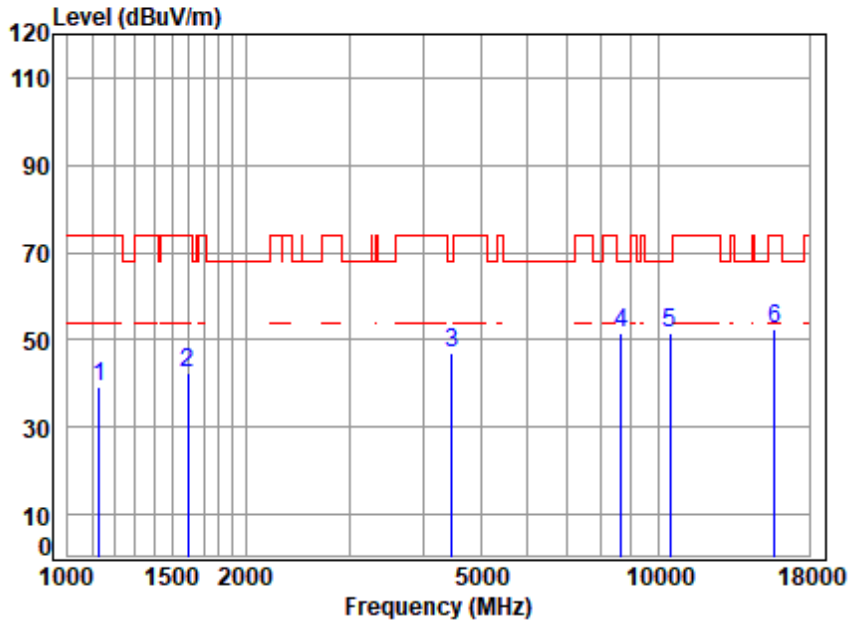
Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:High



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00446CR
Mode : 5240 TX SE
Note : 5G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1132.340	2.64	24.27	39.71	51.65	38.85	74.00	-35.15	peak
2	1597.181	3.35	26.24	40.01	51.40	40.98	74.00	-33.02	peak
3	4482.150	6.74	33.57	41.86	49.57	48.02	68.20	-20.18	peak
4	8814.957	10.23	37.13	39.19	43.19	51.36	68.20	-16.84	peak
5	10480.000	10.54	37.71	37.36	41.19	52.08	68.20	-16.12	peak
6	15720.000	14.04	40.83	40.47	37.78	52.18	74.00	-21.82	peak

Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:High



Site : chamber
Condition: 3m VERTICAL
Job No : 00446CR
Mode : 5240 TX SE
Note : 5G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1132.340	2.64	24.27	39.71	52.01	39.21	74.00	-34.79	peak
2	1597.181	3.35	26.24	40.01	52.73	42.31	74.00	-31.69	peak
3	4469.214	6.73	33.55	41.85	48.76	47.19	68.20	-21.01	peak
4	8663.404	10.17	37.07	39.48	43.99	51.75	68.20	-16.45	peak
5	10480.000	10.54	37.71	37.36	40.72	51.61	68.20	-16.59	peak
6	15720.000	14.04	40.83	40.47	38.19	52.59	74.00	-21.41	peak

7.7 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.407(b)
Test Method: KDB 789033 D02 II G
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

*(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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.

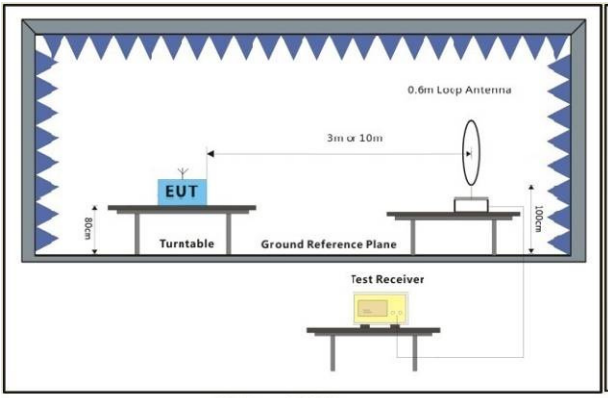
7.7.1 E.U.T. Operation

Operating Environment:
Temperature: 23.5 °C Humidity: 56.3 % RH Atmospheric Pressure: 1010 mbar

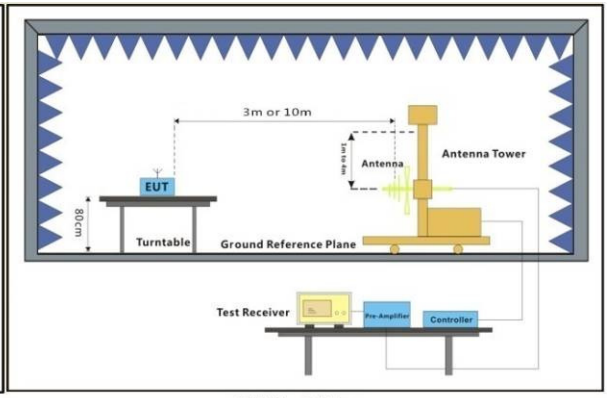
7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode (U-NII-1)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20). Only the data of worst case is recorded in the report.

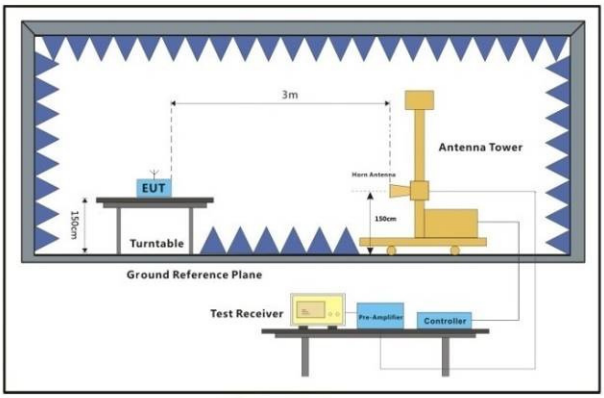
7.7.3 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

7.7.4 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.

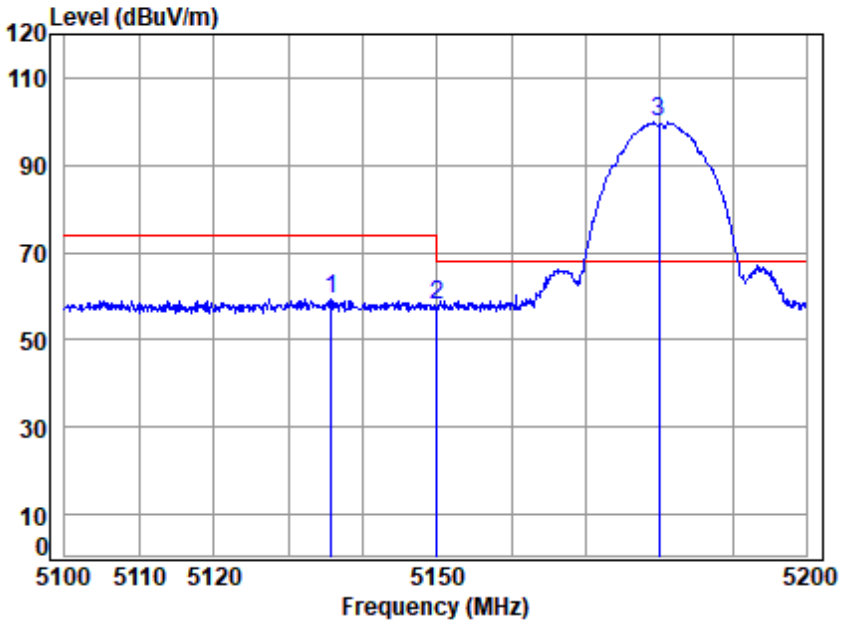
h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

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

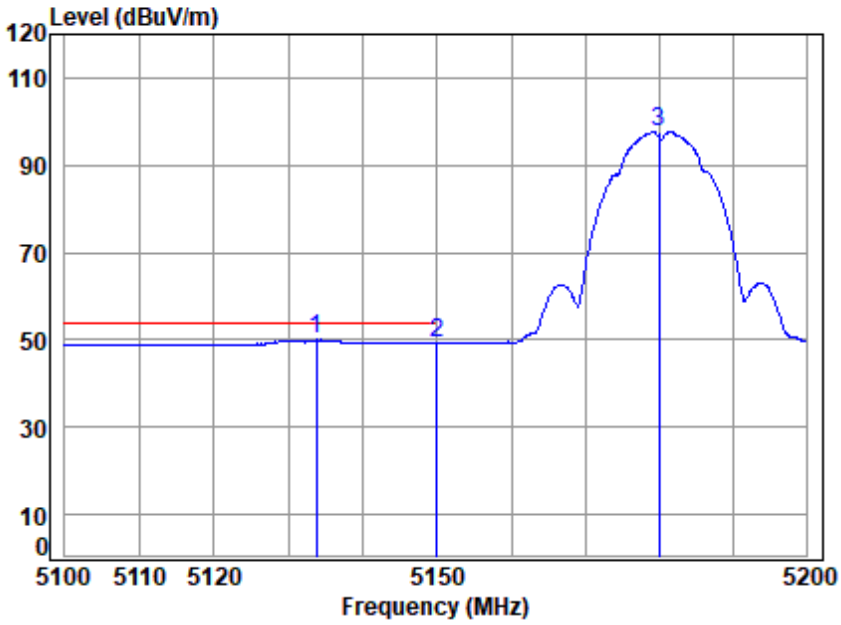
Test Mode: 00; Polarity: Horizontal; Modulation:802.11a; Bandwidth:20MHz; Channel:Low



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00446CR
Mode : 5180 Band edge
: 5G WIFI 11A

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	5135.776	7.55	34.31	42.31	59.97	59.52	74.00	-14.48	peak
2	5149.980	7.57	34.32	42.32	58.42	57.99	74.00	-16.01	peak
3 *	5180.000	7.63	34.35	42.32	100.24	99.90	68.20	31.70	peak

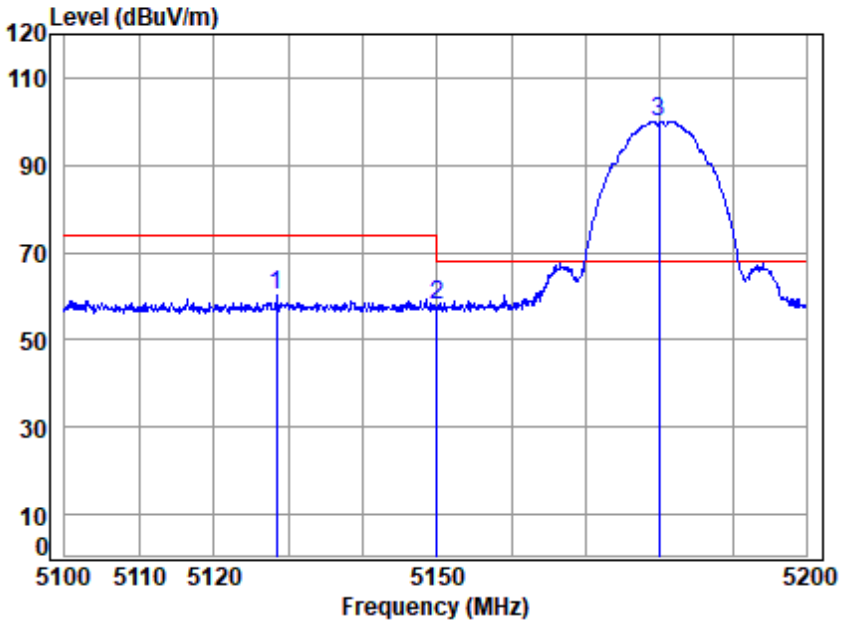
Test Mode: 00; Polarity: Horizontal; Modulation:802.11a; Bandwidth:20MHz; Channel:Low



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00446CR
Mode : 5180 Band edge
: 5G WIFI 11A

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	5133.782	7.54	34.31	42.31	50.46	50.00	54.00	-4.00	Average
2	5149.980	7.57	34.32	42.32	49.64	49.21	54.00	-4.79	Average
3	5180.000	7.63	34.35	42.32	97.89	97.55	------	------	Average

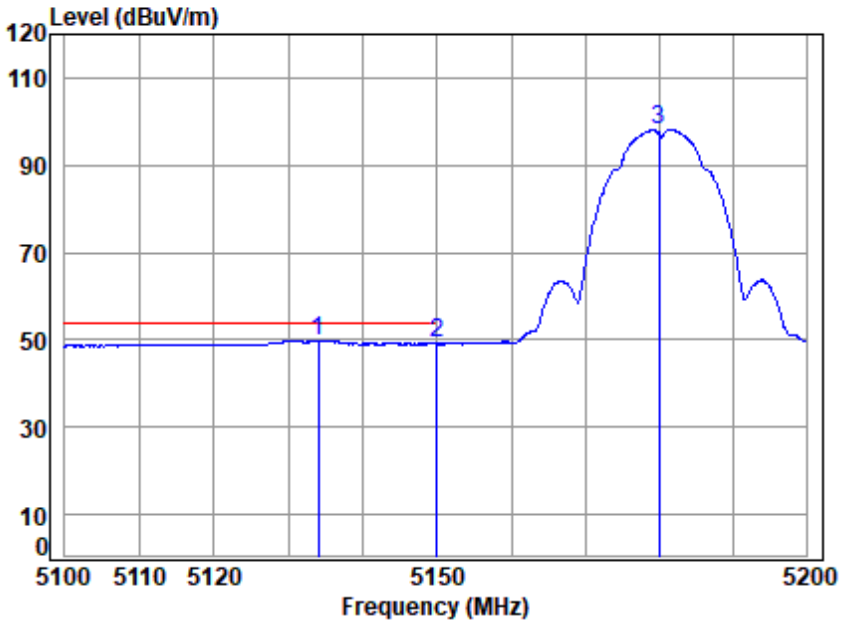
Test Mode: 00; Polarity: Vertical; Modulation:802.11a; Bandwidth:20MHz; Channel:Low



Site : chamber
Condition: 3m VERTICAL
Job No : 00446CR
Mode : 5180 Band edge
: 5G WIFI 11A

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	5128.402	7.53	34.31	42.31	60.53	60.06	74.00	-13.94	Peak
2	5149.980	7.57	34.32	42.32	58.50	58.07	74.00	-15.93	Peak
3 *	5180.000	7.63	34.35	42.32	100.42	100.08	68.20	31.88	Peak

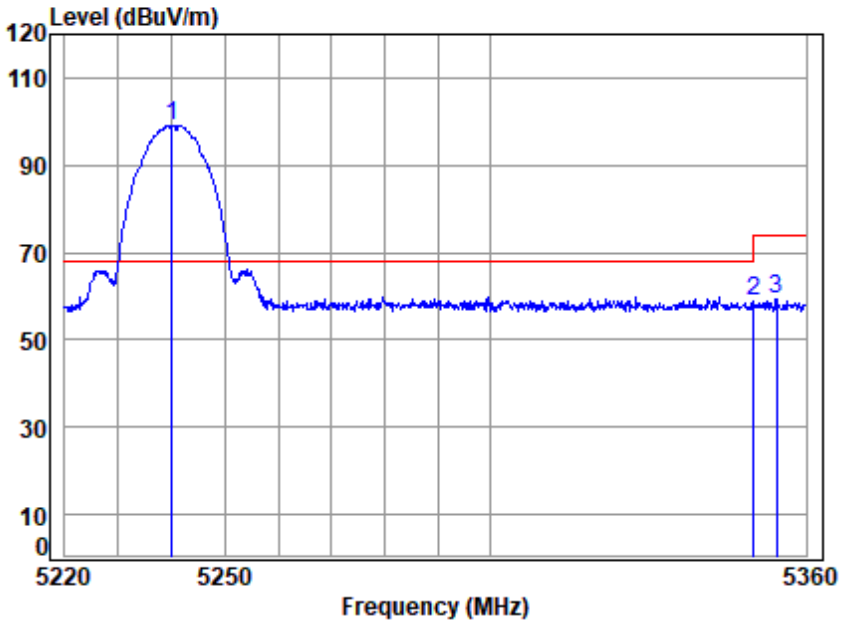
Test Mode: 00; Polarity: Vertical; Modulation:802.11a; Bandwidth:20MHz; Channel:Low



Site : chamber
Condition: 3m VERTICAL
Job No : 00446CR
Mode : 5180 Band edge
: 5G WIFI 11A

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	5133.982	7.54	34.31	42.31	50.41	49.95	54.00	-4.05	Average
2	5149.980	7.57	34.32	42.32	49.56	49.13	54.00	-4.87	Average
3	5180.000	7.63	34.35	42.32	98.52	98.18	------	------	Average

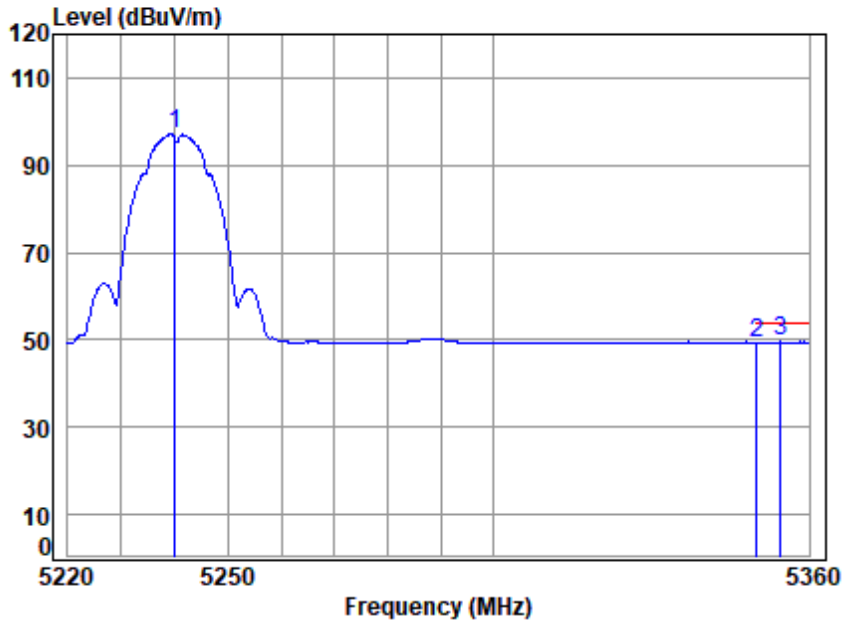
Test Mode: 00; Polarity: Horizontal; Modulation:802.11a; Bandwidth:20MHz; Channel:High



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00446CR
Mode : 5240 Band edge
: 5G WIFI 11A

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	* 5240.000	7.73	34.40	42.33	99.25	99.05	68.20	30.85	peak
2	5350.020	7.92	34.48	42.34	58.82	58.88	74.00	-15.12	peak
3	5354.329	7.93	34.49	42.34	59.11	59.19	74.00	-14.81	peak

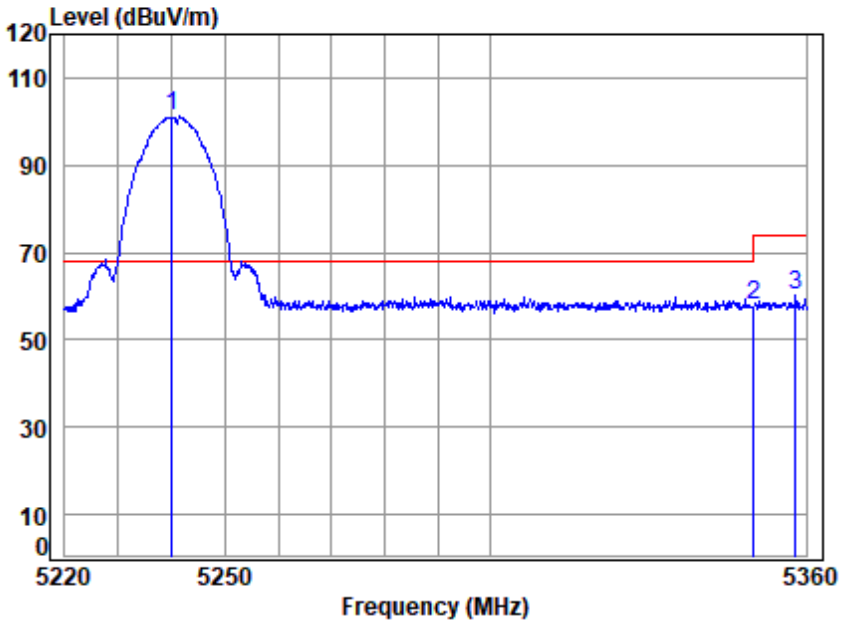
Test Mode: 00; Polarity: Horizontal; Modulation:802.11a; Bandwidth:20MHz; Channel:High



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00446CR
Mode : 5240 Band edge
: 5G WIFI 11A

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	5240.000	7.73	34.40	42.33	97.31	97.11	------	------	Average
2	5350.020	7.92	34.48	42.34	49.36	49.42	54.00	-4.58	Average
3	5354.612	7.93	34.49	42.34	49.44	49.52	54.00	-4.48	Average

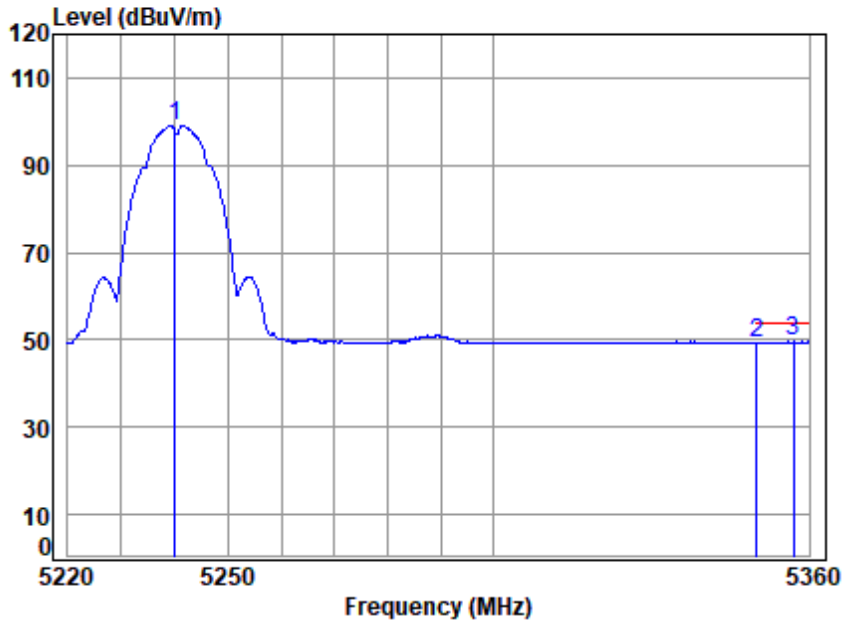
Test Mode: 00; Polarity: Vertical; Modulation:802.11a; Bandwidth:20MHz; Channel:High



Site : chamber
Condition: 3m VERTICAL
Job No : 00446CR
Mode : 5240 Band edge
: 5G WIFI 11A

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	* 5240.000	7.73	34.40	42.33	101.26	101.06	68.20	32.86	Peak
2	5350.020	7.92	34.48	42.34	58.07	58.13	74.00	-15.87	Peak
3	5358.014	7.94	34.49	42.34	59.99	60.08	74.00	-13.92	Peak

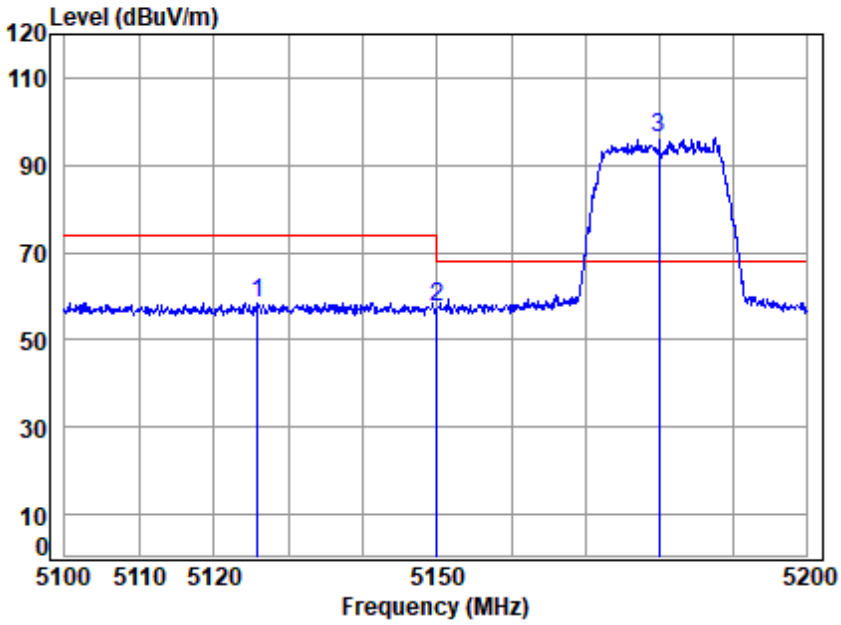
Test Mode: 00; Polarity: Vertical; Modulation:802.11a; Bandwidth:20MHz; Channel:High



Site : chamber
Condition: 3m VERTICAL
Job No : 00446CR
Mode : 5240 Band edge
: 5G WIFI 11A

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	5240.000	7.73	34.40	42.33	99.18	98.98	------	------	Average
2	5350.020	7.92	34.48	42.34	49.39	49.45	54.00	-4.55	Average
3	5357.022	7.94	34.49	42.34	49.47	49.56	54.00	-4.44	Average

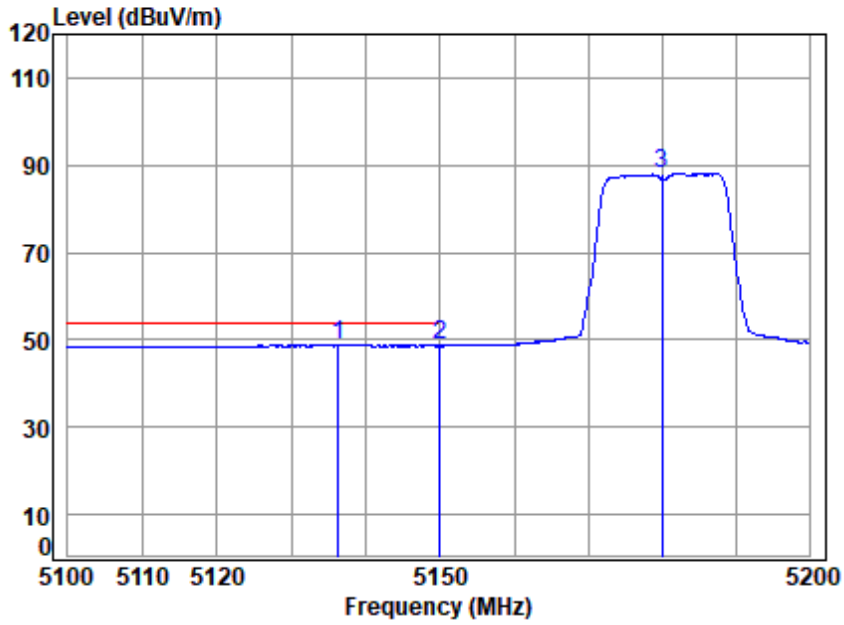
Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:Low



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00446CR
Mode : 5180 Band edge
: 5G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	5125.813	7.53	34.30	42.31	58.97	58.49	74.00	-15.51	peak
2	5149.980	7.57	34.32	42.32	58.03	57.60	74.00	-16.40	peak
3 *	5180.000	7.63	34.35	42.32	96.52	96.18	68.20	27.98	peak

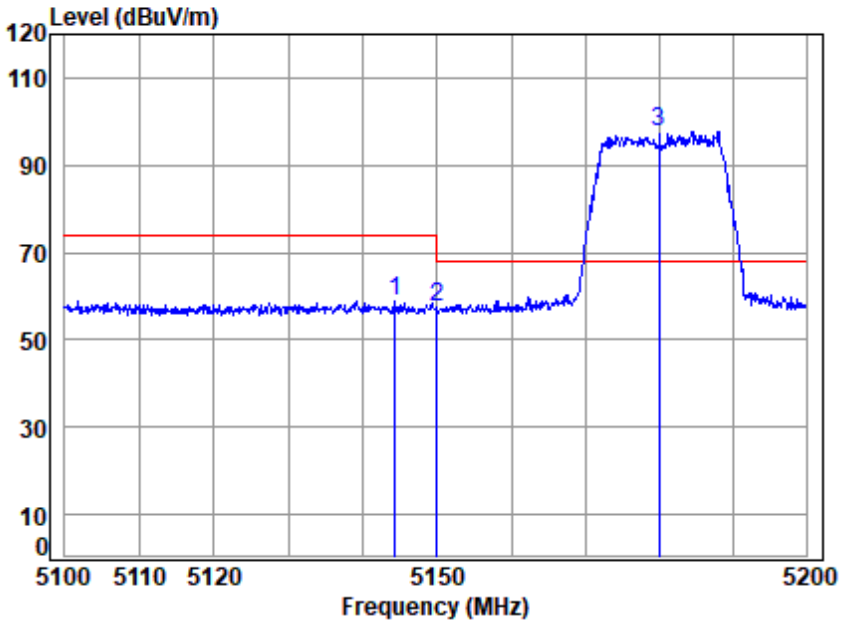
Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:Low



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00446CR
Mode : 5180 Band edge
: 5G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	5136.275	7.55	34.31	42.31	49.41	48.96	54.00	-5.04	Average
2	5149.980	7.57	34.32	42.32	49.04	48.61	54.00	-5.39	Average
3	5180.000	7.63	34.35	42.32	88.31	87.97	------	------	Average

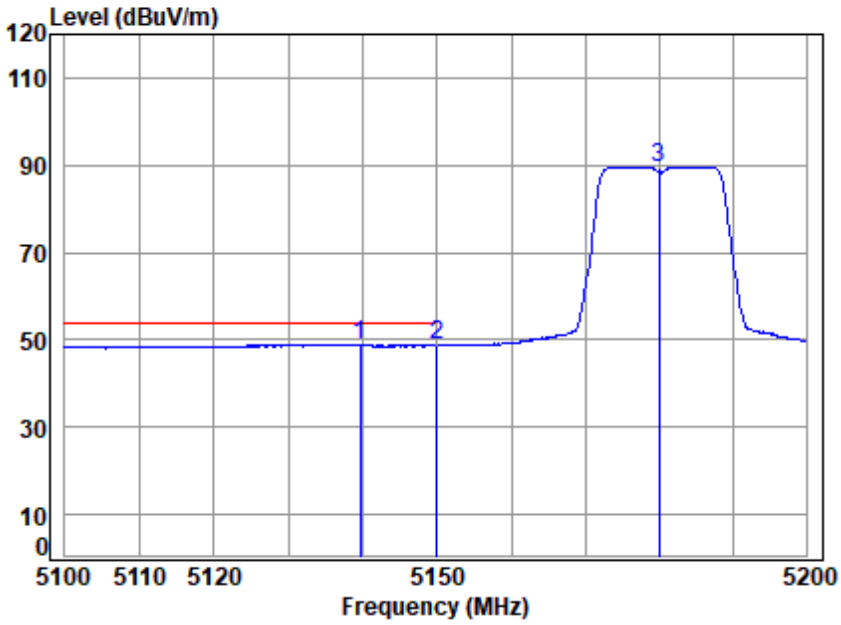
Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:Low



Site : chamber
Condition: 3m VERTICAL
Job No : 00446CR
Mode : 5180 Band edge
: 5G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	5144.360	7.56	34.32	42.32	59.41	58.97	74.00	-15.03	Peak
2	5149.980	7.57	34.32	42.32	58.03	57.60	74.00	-16.40	Peak
3 *	5180.000	7.63	34.35	42.32	98.05	97.71	68.20	29.51	Peak

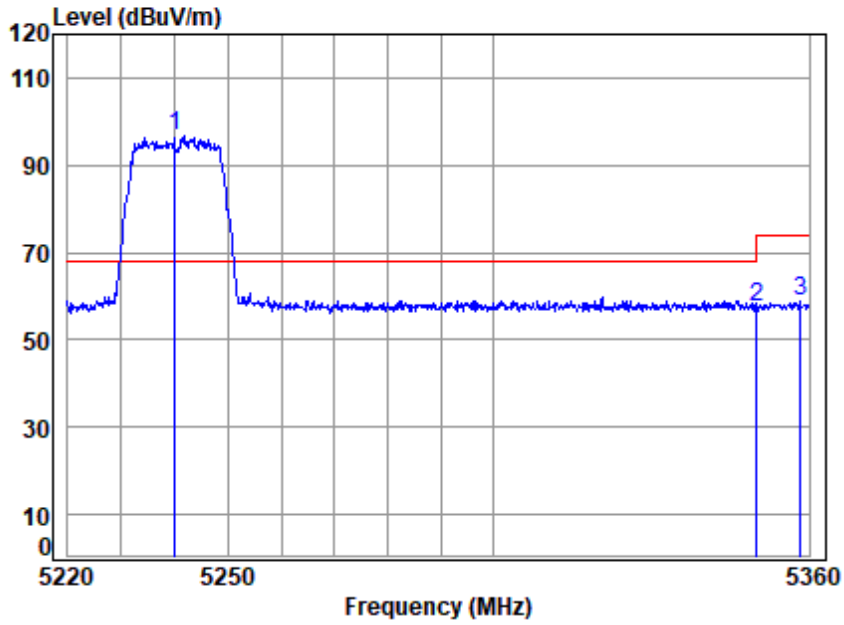
Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:Low



Site : chamber
Condition: 3m VERTICAL
Job No : 00446CR
Mode : 5180 Band edge
: 5G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	5139.567	7.55	34.32	42.32	49.48	49.03	54.00	-4.97	Average
2	5149.980	7.57	34.32	42.32	49.11	48.68	54.00	-5.32	Average
3	5180.000	7.63	34.35	42.32	89.87	89.53	------	------	Average

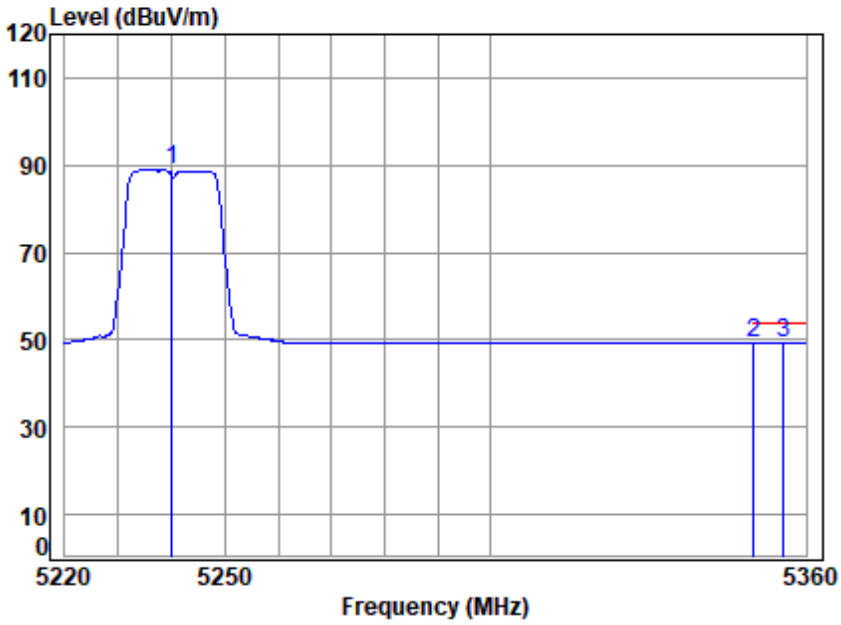
Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:High



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00446CR
Mode : 5240 Band edge
: 5G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 *	5240.000	7.73	34.40	42.33	96.96	96.76	68.20	28.56	peak
2	5350.020	7.92	34.48	42.34	57.40	57.46	74.00	-16.54	peak
3	5358.298	7.94	34.49	42.34	58.80	58.89	74.00	-15.11	peak

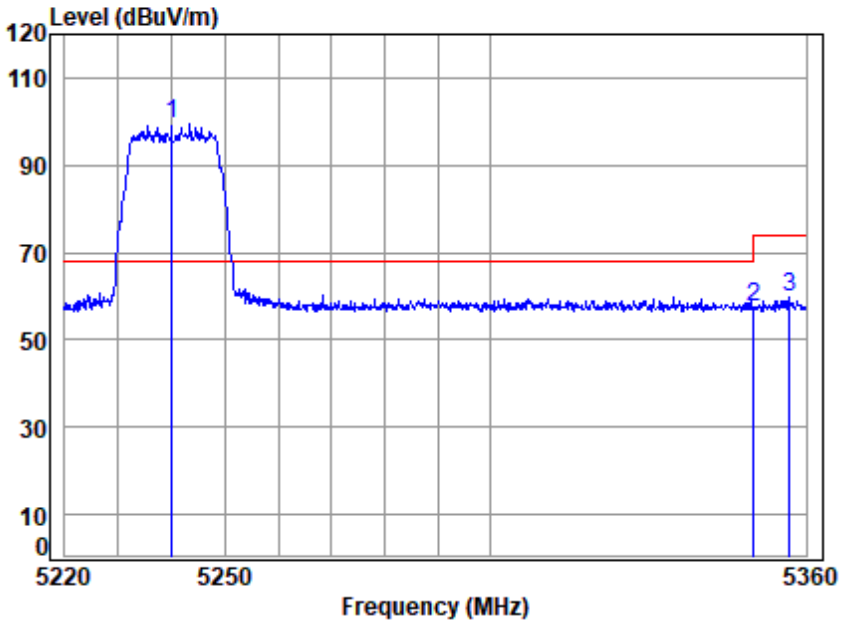
Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:High



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00446CR
Mode : 5240 Band edge
: 5G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	5240.000	7.73	34.40	42.33	89.08	88.88	------	------	Average
2	5350.020	7.92	34.48	42.34	49.24	49.30	54.00	-4.70	Average
3	5355.746	7.93	34.49	42.34	49.39	49.47	54.00	-4.53	Average

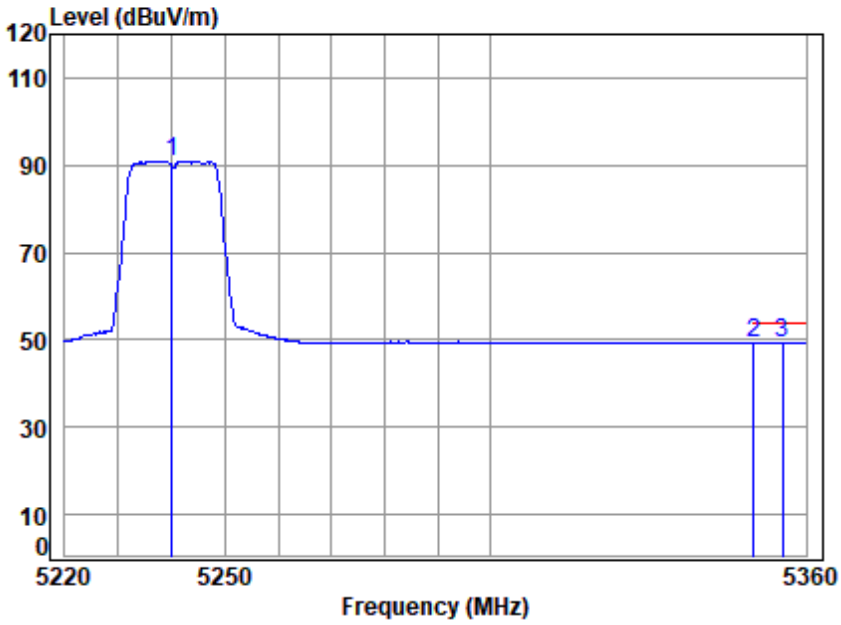
Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:High



Site : chamber
Condition: 3m VERTICAL
Job No : 00446CR
Mode : 5240 Band edge
: 5G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 *	5240.000	7.73	34.40	42.33	99.54	99.34	68.20	31.14	Peak
2	5350.020	7.92	34.48	42.34	57.54	57.60	74.00	-16.40	Peak
3	5356.880	7.94	34.49	42.34	59.67	59.76	74.00	-14.24	Peak

Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:High



Site : chamber
Condition: 3m VERTICAL
Job No : 00446CR
Mode : 5240 Band edge
: 5G WIFI 11N20

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	5240.000	7.73	34.40	42.33	91.03	90.83	------	------	Average
2	5350.020	7.92	34.48	42.34	49.21	49.27	54.00	-4.73	Average
3	5355.462	7.93	34.49	42.34	49.36	49.44	54.00	-4.56	Average

7.8 Frequency Stability

Test Requirement 47 CFR Part 15, Subpart C 15.407 (g)

Test Method: ANSI C63.10 (2013) Section 6.8

Limit: The frequency tolerance shall be maintained within the band of operation frequency over a temperature variation of 0 degrees to 35 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

7.8.1 E.U.T. Operation

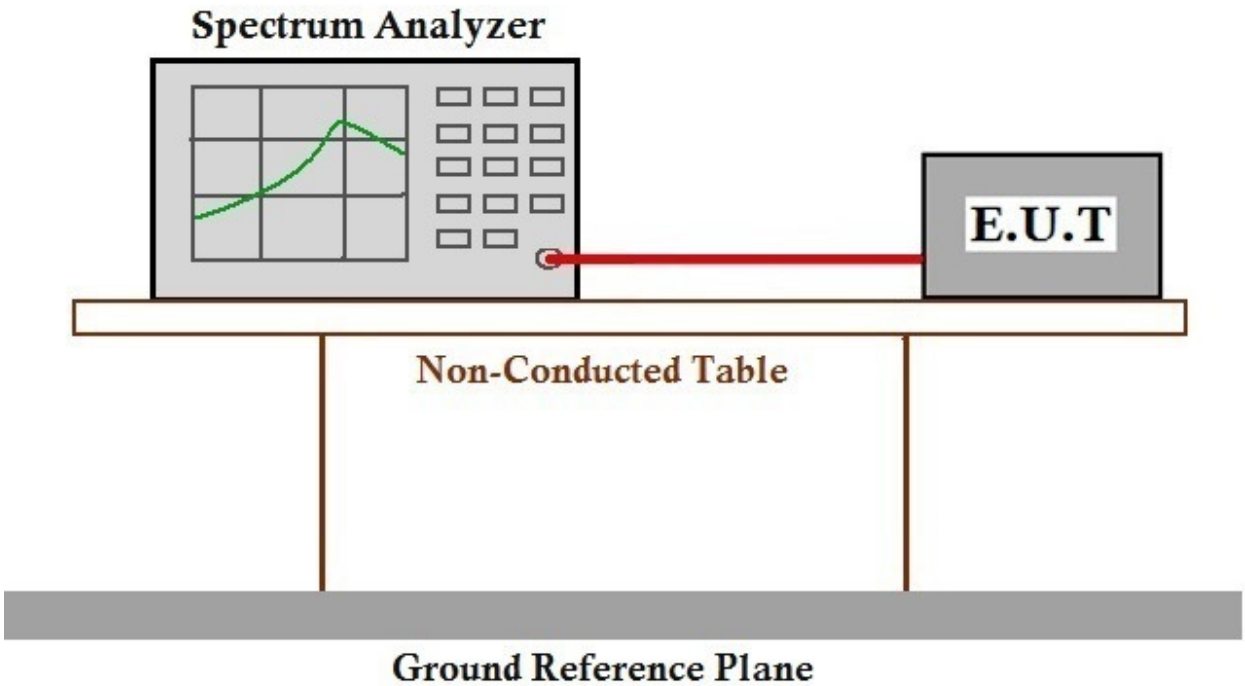
Operating Environment:

Temperature: 25.2 °C Humidity: 36.1 % RH Atmospheric Pressure: 1010 mbar

7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode (U-NII-1)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20). Only the data of worst case is recorded in the report.

7.8.3 Test Setup Diagram



7.8.4 Measurement Procedure and Data

The applicant declares that the emissions are maintained within the band of operation under all conditions of normal operation as specified in the user's manual and meets Section 15.407(g) requirements.

8 Test Setup Photo

Please refer to setup photos.

9 EUT Constructional Details (EUT Photos)

Please Refer to external and internal photos for details.

10 Appendix

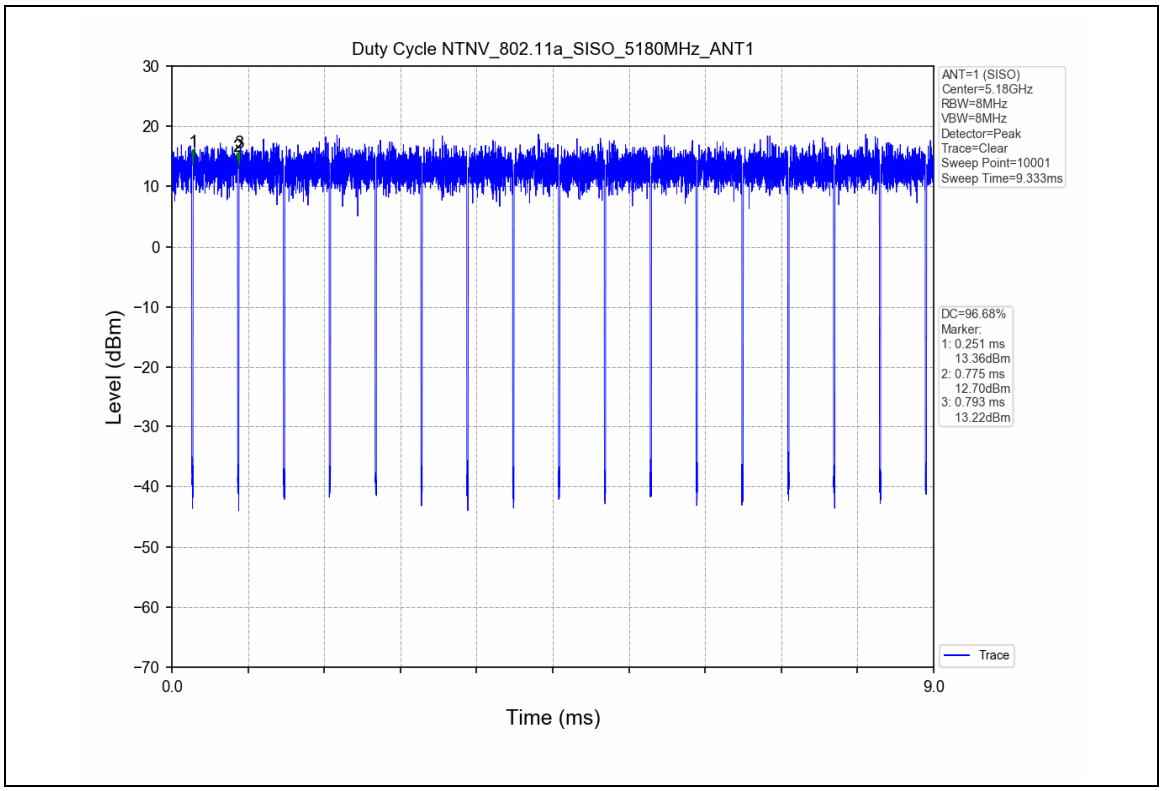
Appendix for 15.407

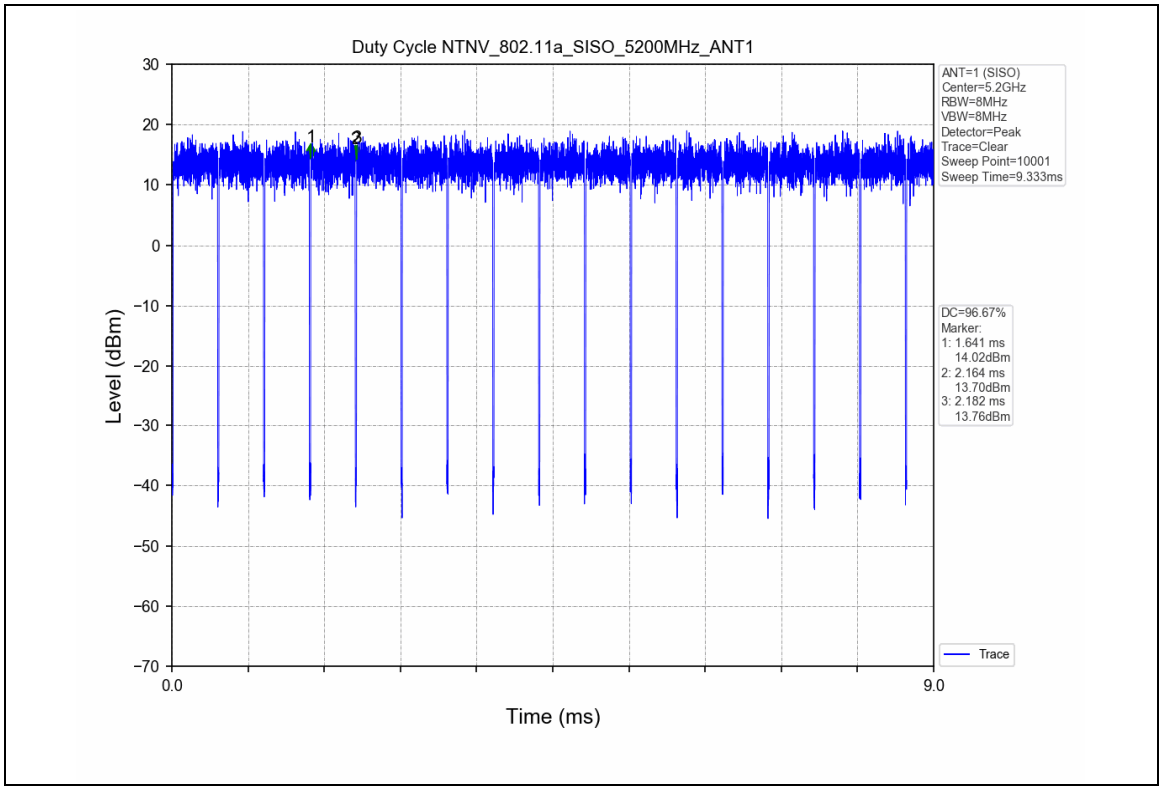
1. Duty Cycle

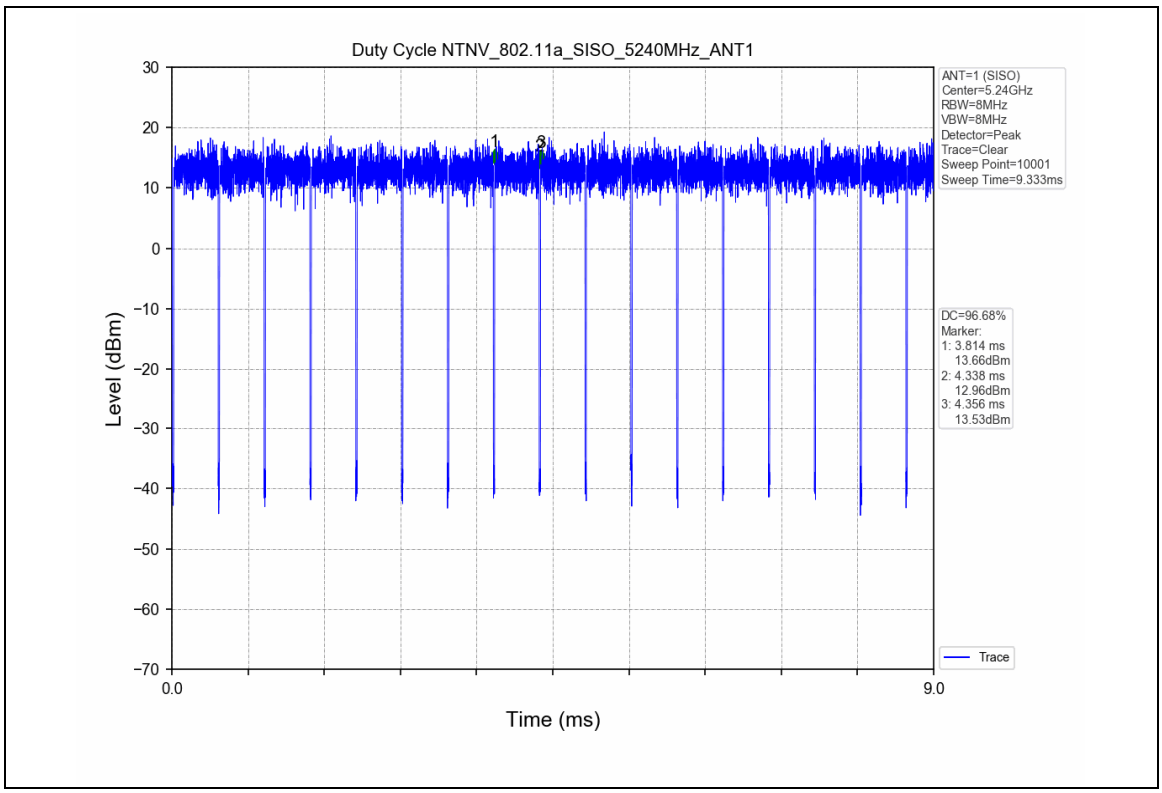
1.1 Test Result

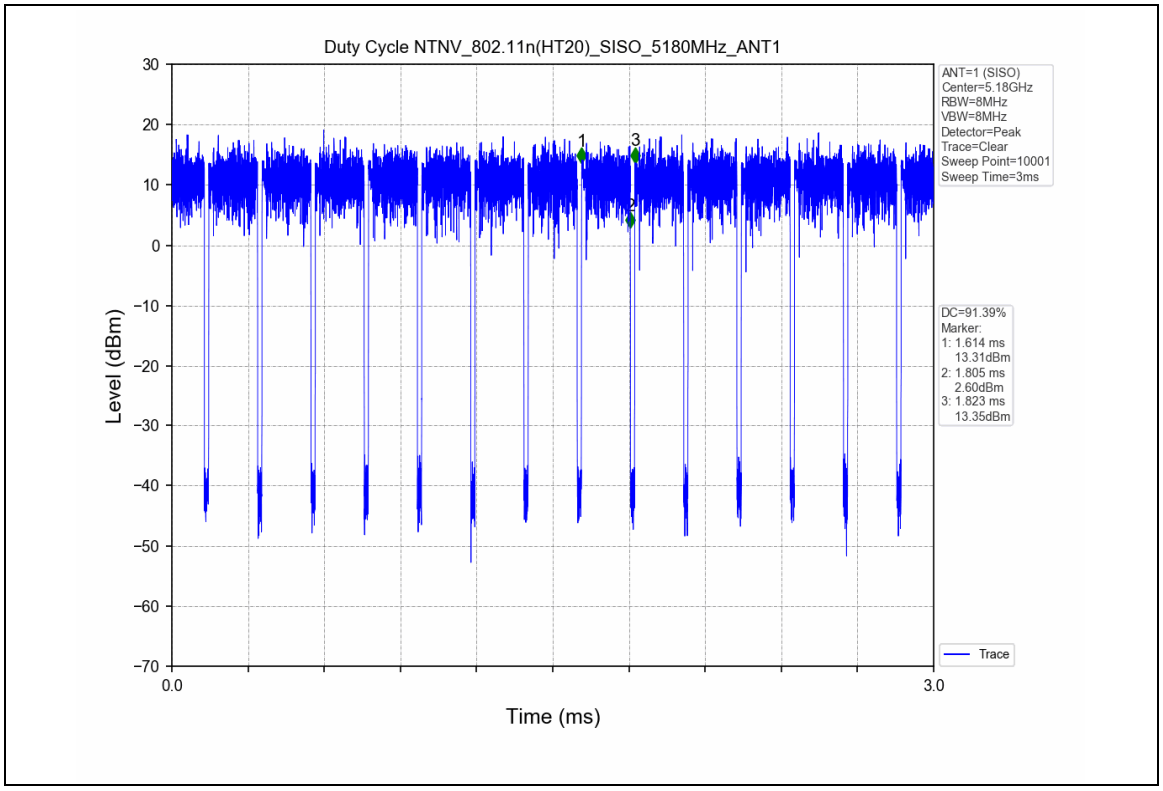
Test Mode	Channel Frequency (MHz)	TX Type	ANT No.	T_on (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11a	5180	SISO	1	0.524	0.542	96.68	0.15
	5200	SISO	1	0.523	0.541	96.67	0.15
	5240	SISO	1	0.524	0.542	96.68	0.15
802.11n(HT20)	5180	SISO	1	0.191	0.209	91.39	0.39
	5200	SISO	1	0.192	0.210	91.43	0.39
	5240	SISO	1	0.192	0.210	91.43	0.39

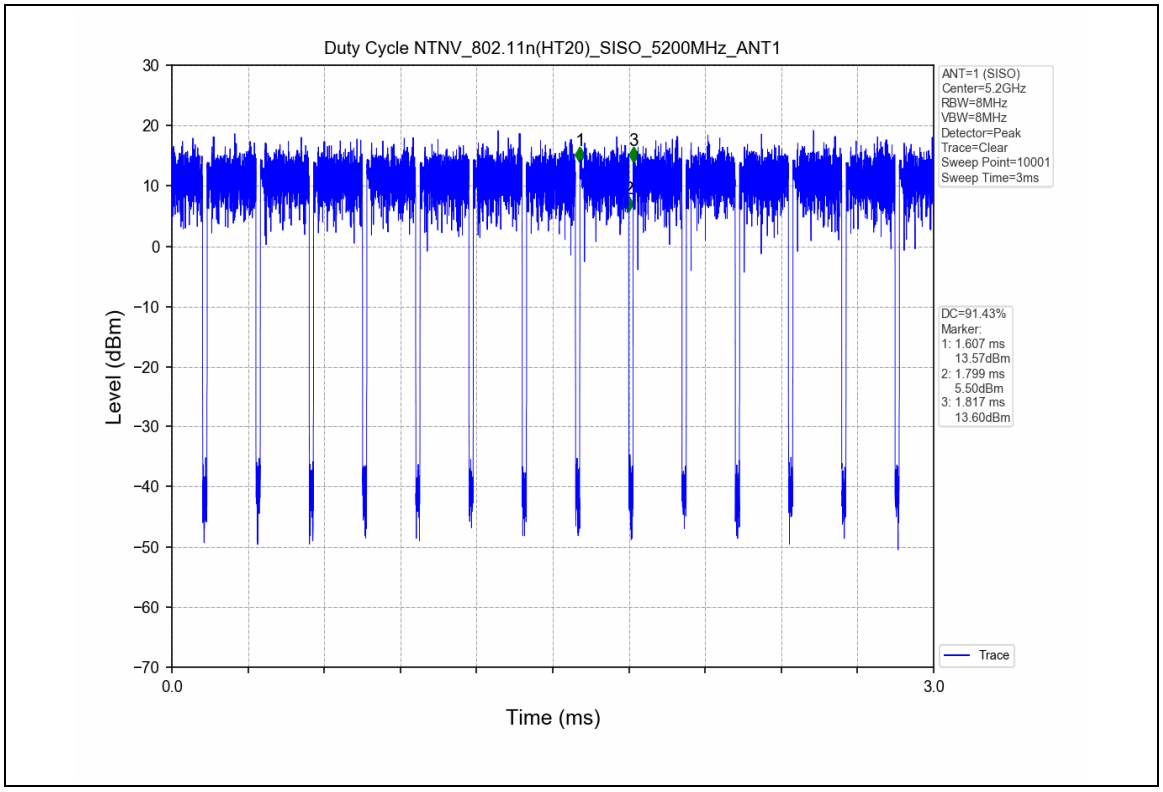
1.2 Test Graph

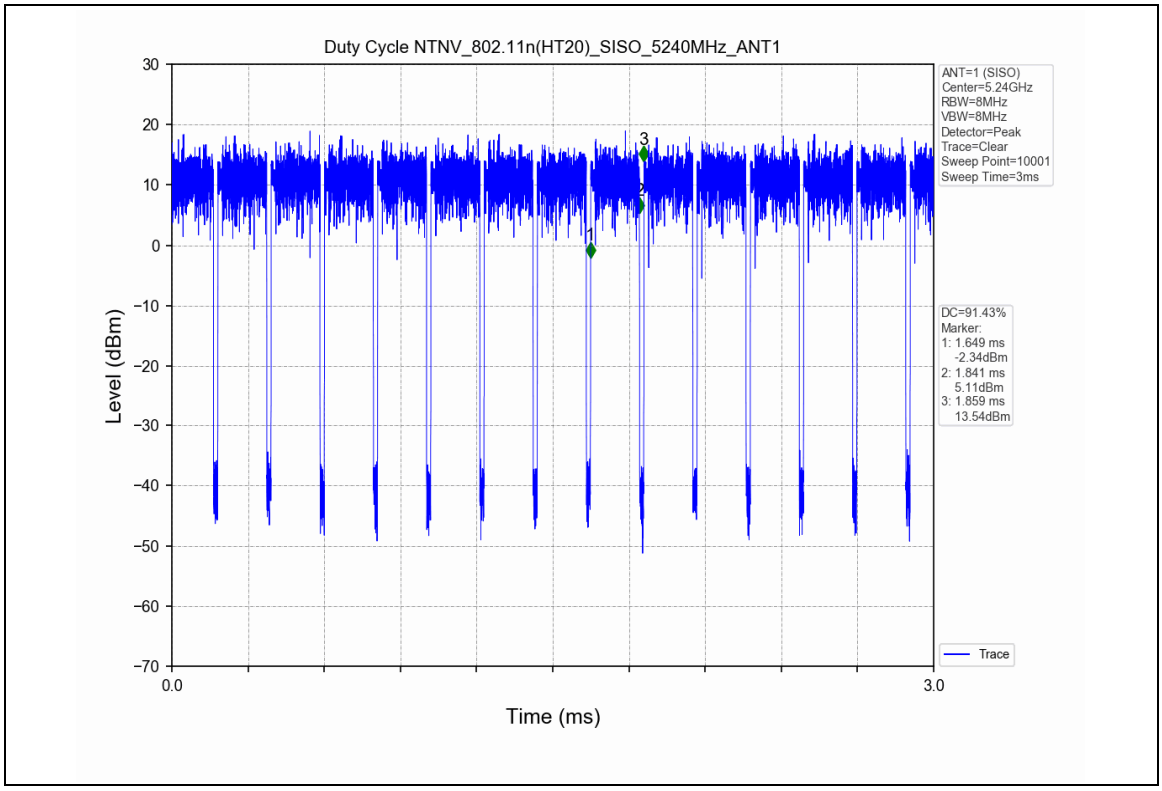










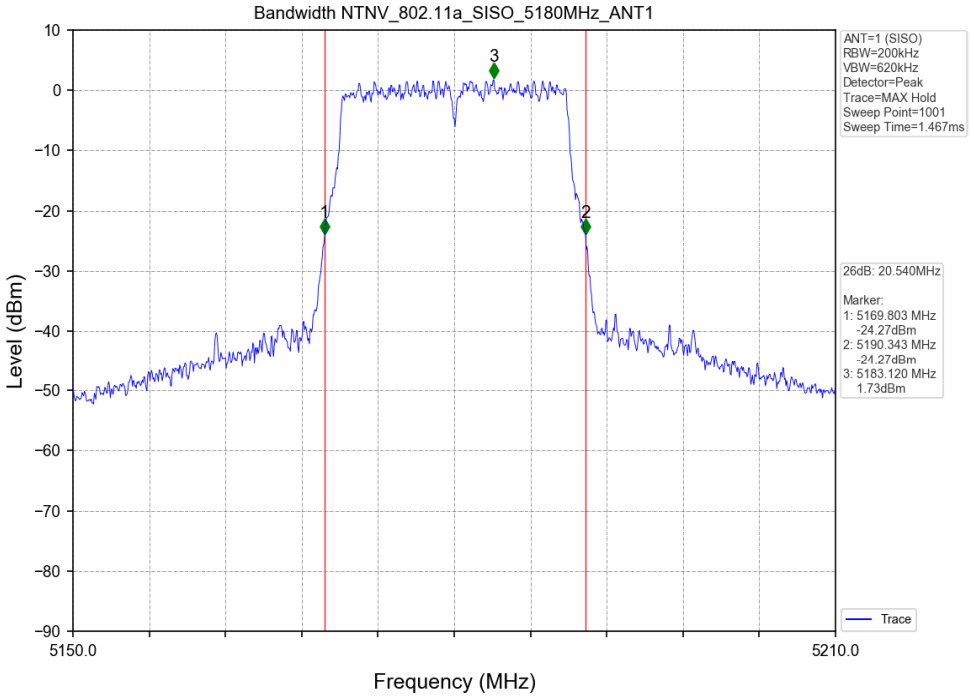


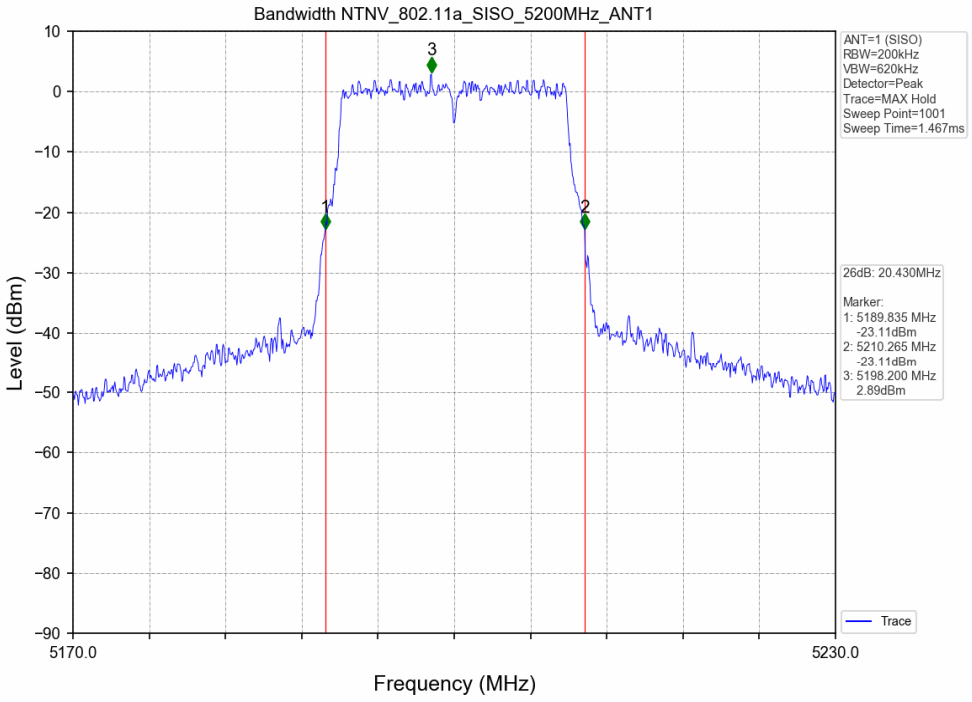
2. Bandwidth

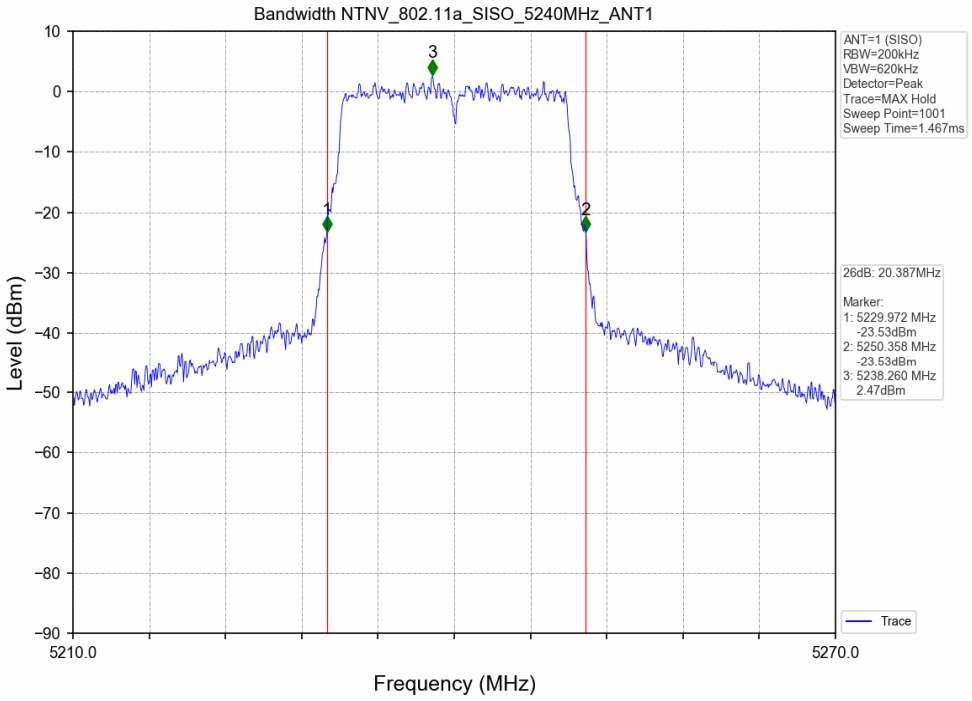
2.1 Test Result

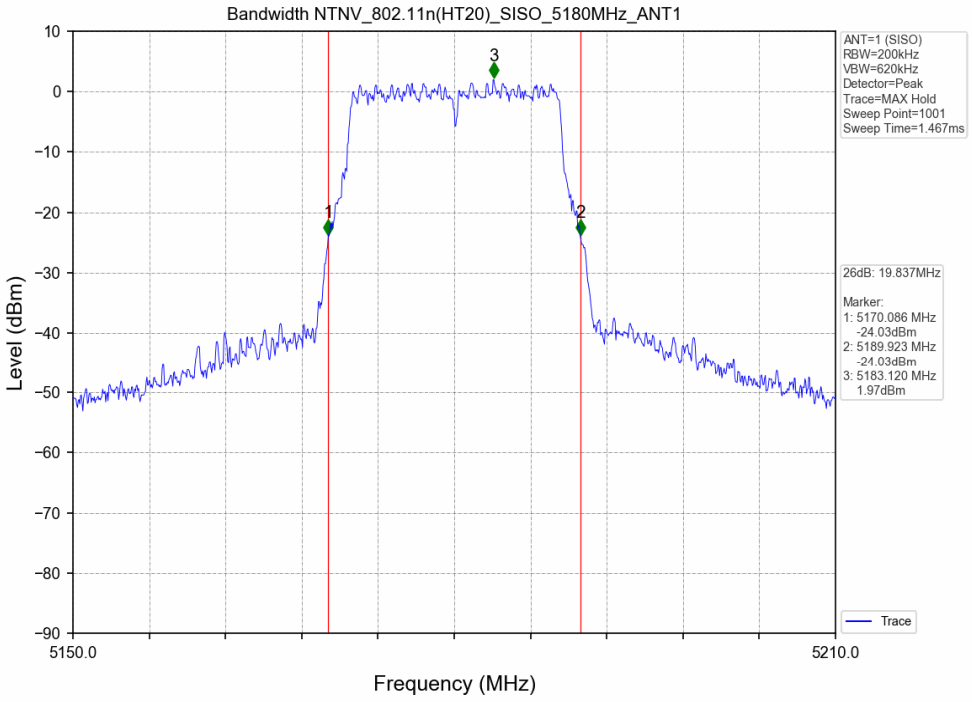
Test Mode	Frequency (MHz)	TX Type	ANT No.	Emission Bandwidth		Verdict
				Test Result (MHz)	Limits (MHz)	
802.11a	5180	SISO	1	20.540	Only for Report Use	PASS
	5200	SISO	1	20.430	Only for Report Use	PASS
	5240	SISO	1	20.387	Only for Report Use	PASS
802.11n(HT20)	5180	SISO	1	19.837	Only for Report Use	PASS
	5200	SISO	1	19.730	Only for Report Use	PASS
	5240	SISO	1	19.784	Only for Report Use	PASS

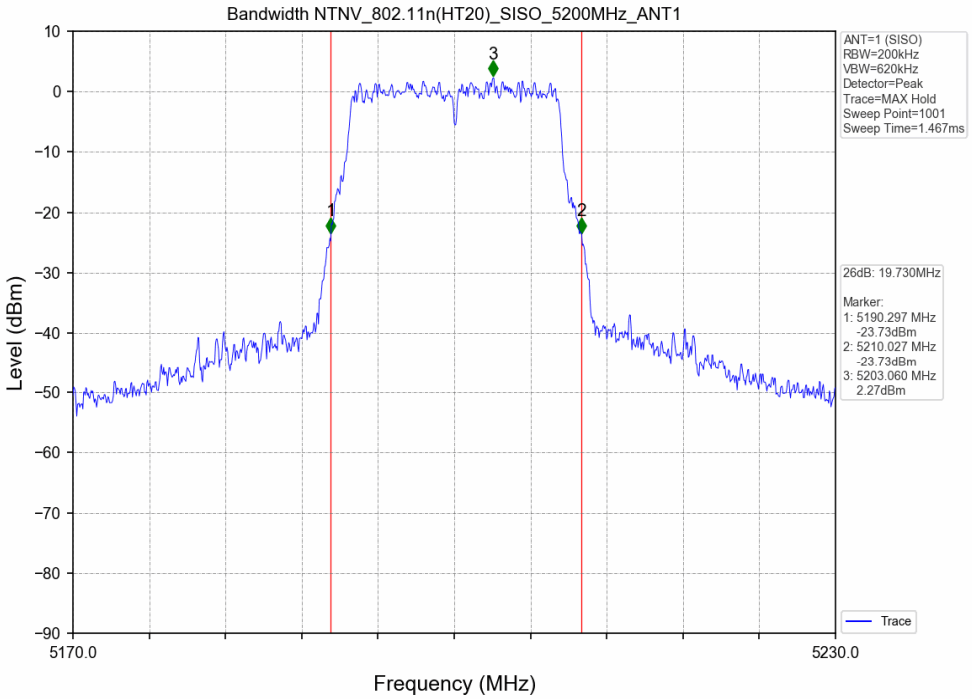
2.2 Test Graph - Emission Bandwidth

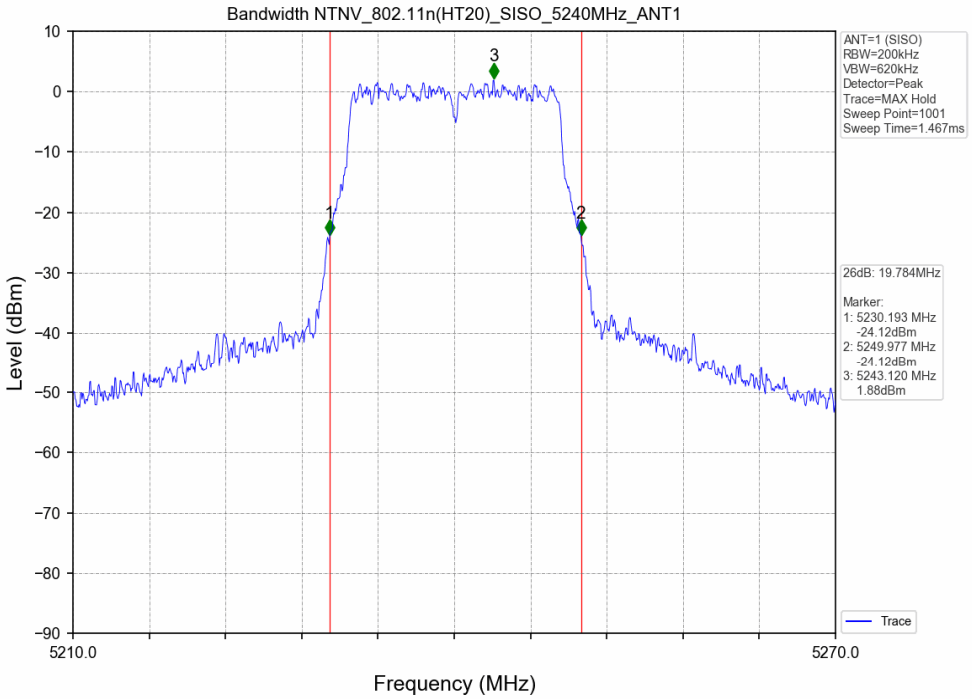










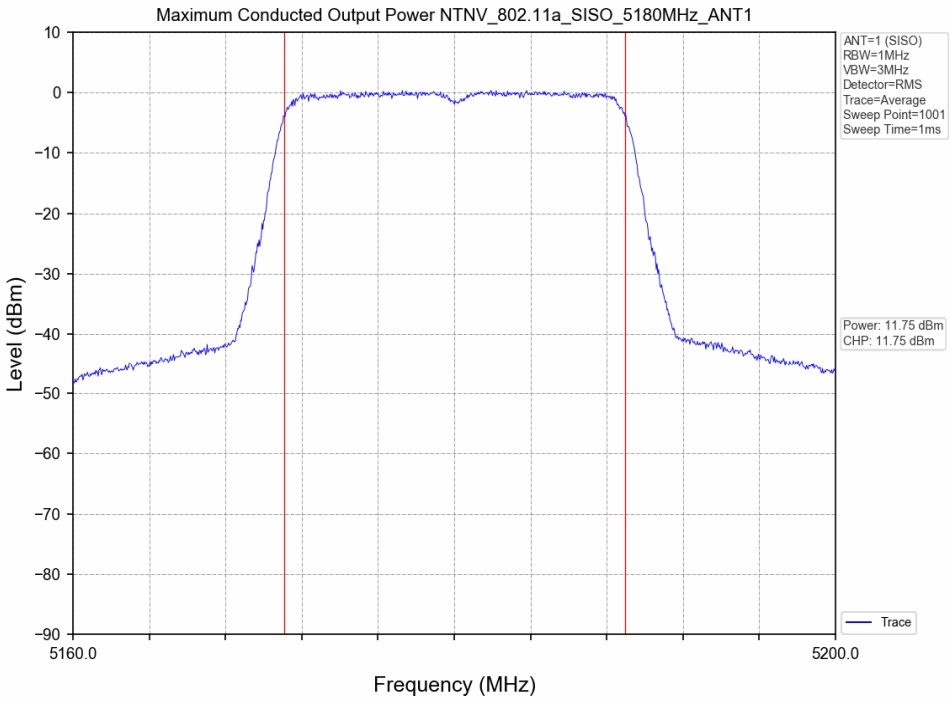


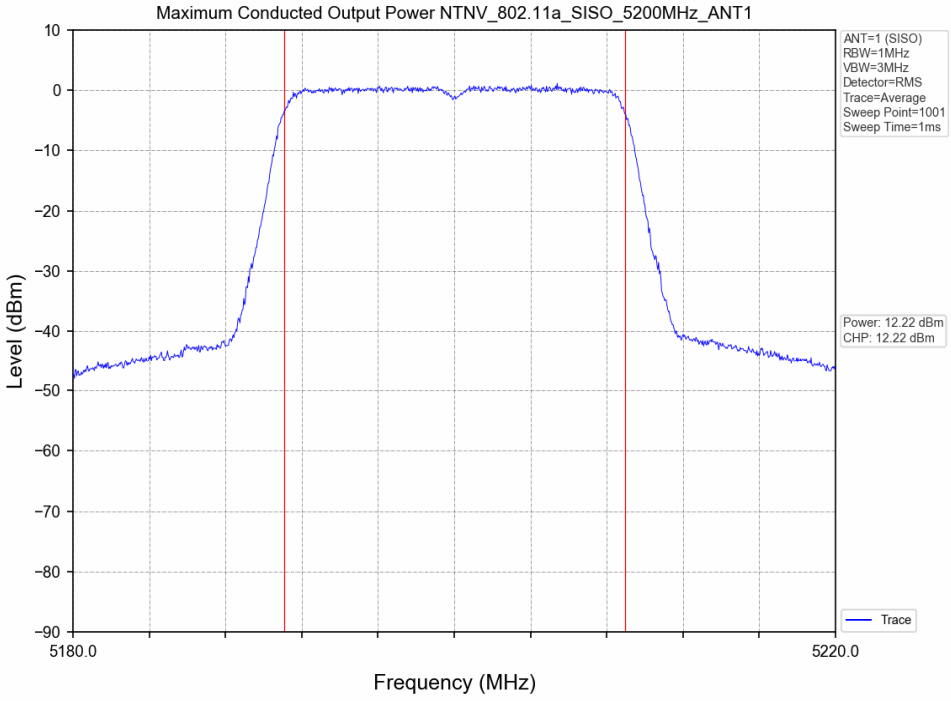
3. Maximum Conducted Output Power

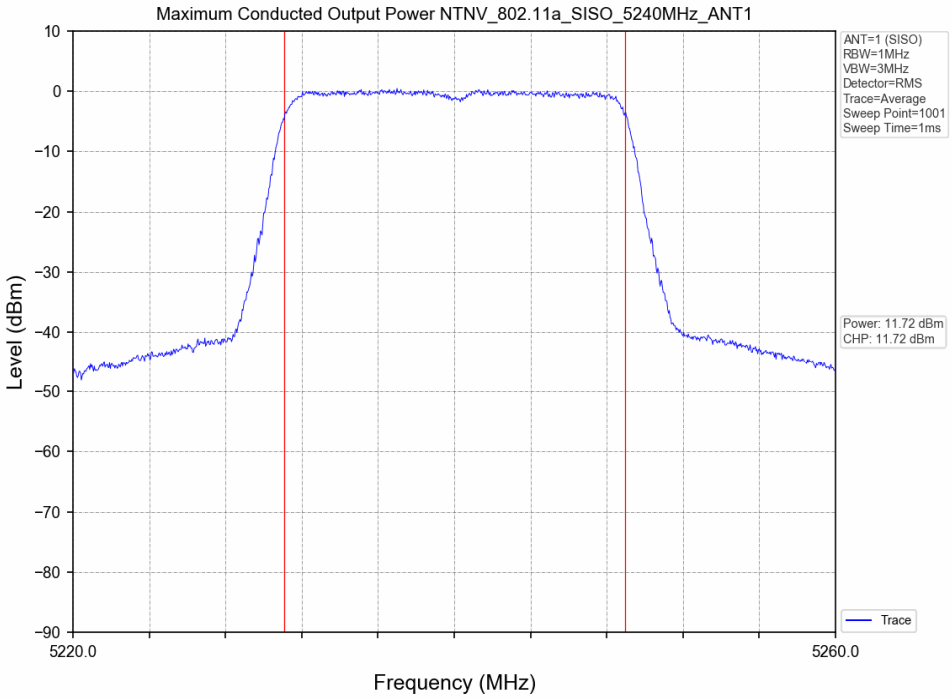
3.1 Test Result

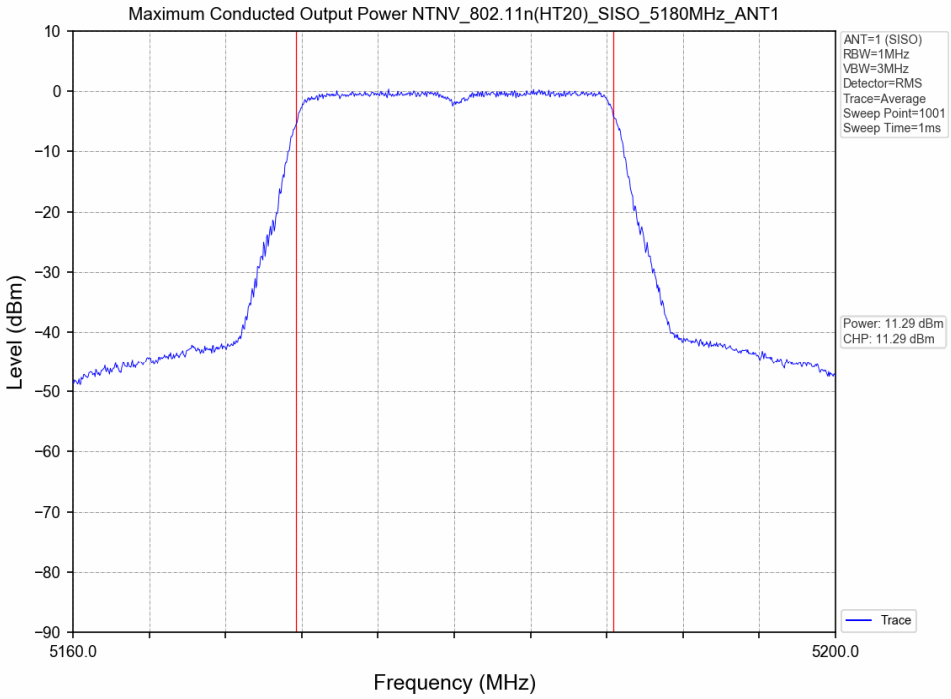
Test Mode	Frequency (MHz)	Tx Type	Measured Output Power (dBm)	Limit (dBm)	Verdict
			Ant 1		
802.11a	5180	SISO	11.75	≤23.98	PASS
	5200	SISO	12.22	≤23.98	PASS
	5240	SISO	11.72	≤23.98	PASS
802.11n(HT20)	5180	SISO	11.29	≤23.98	PASS
	5200	SISO	11.58	≤23.98	PASS
	5240	SISO	11.33	≤23.98	PASS

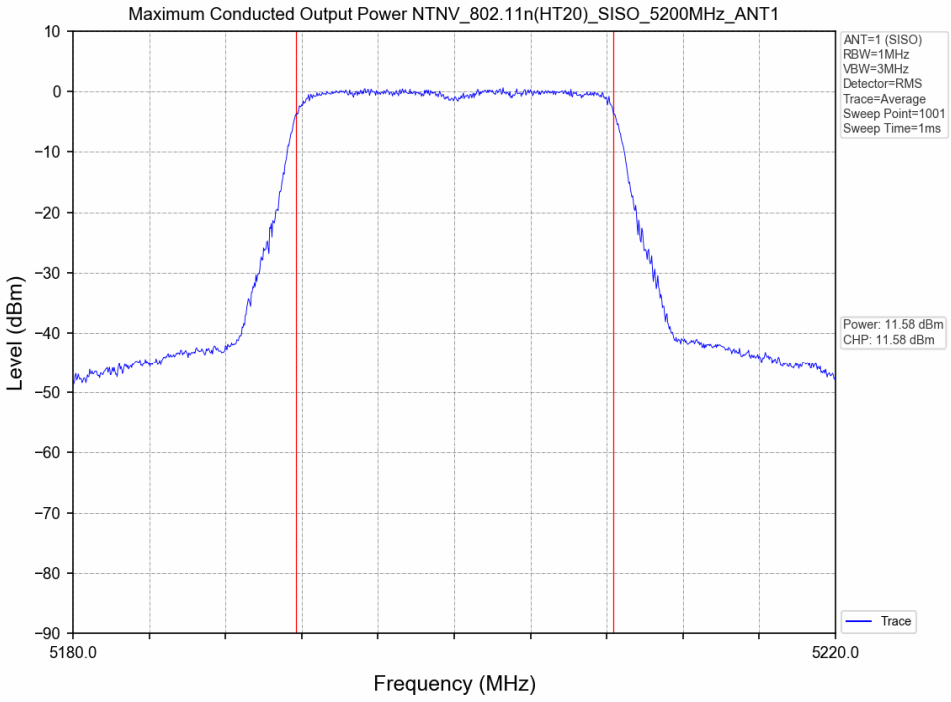
3.2 Test Graph

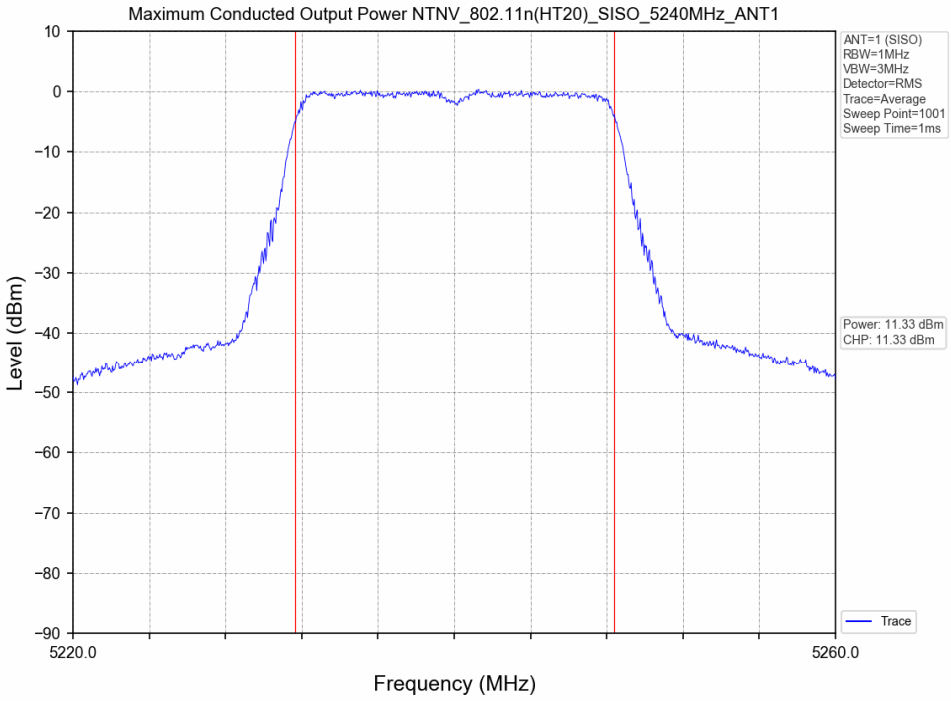










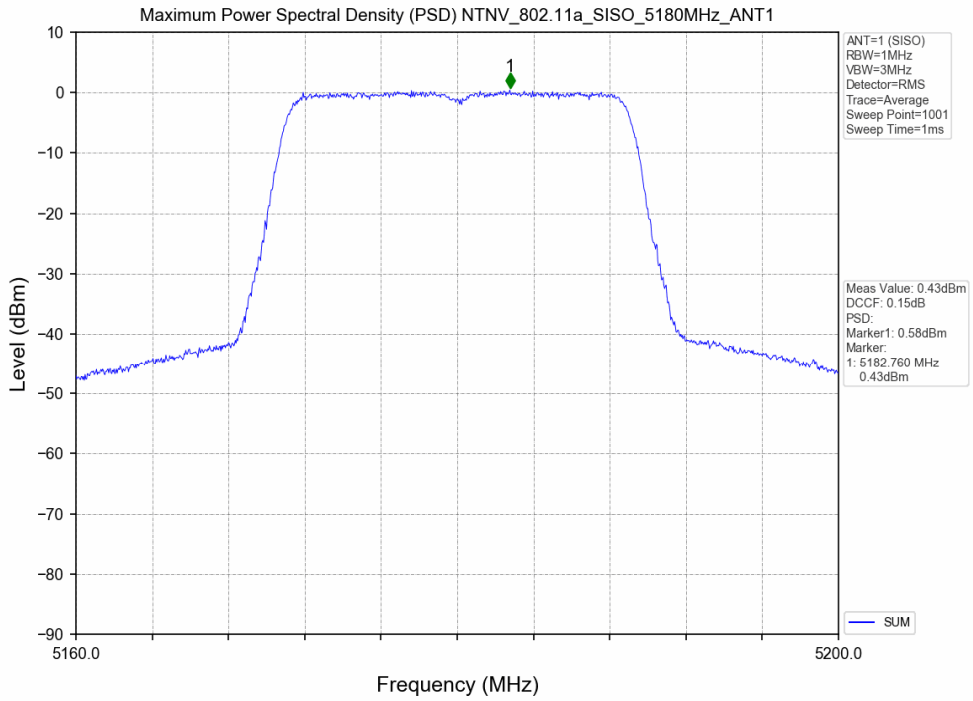


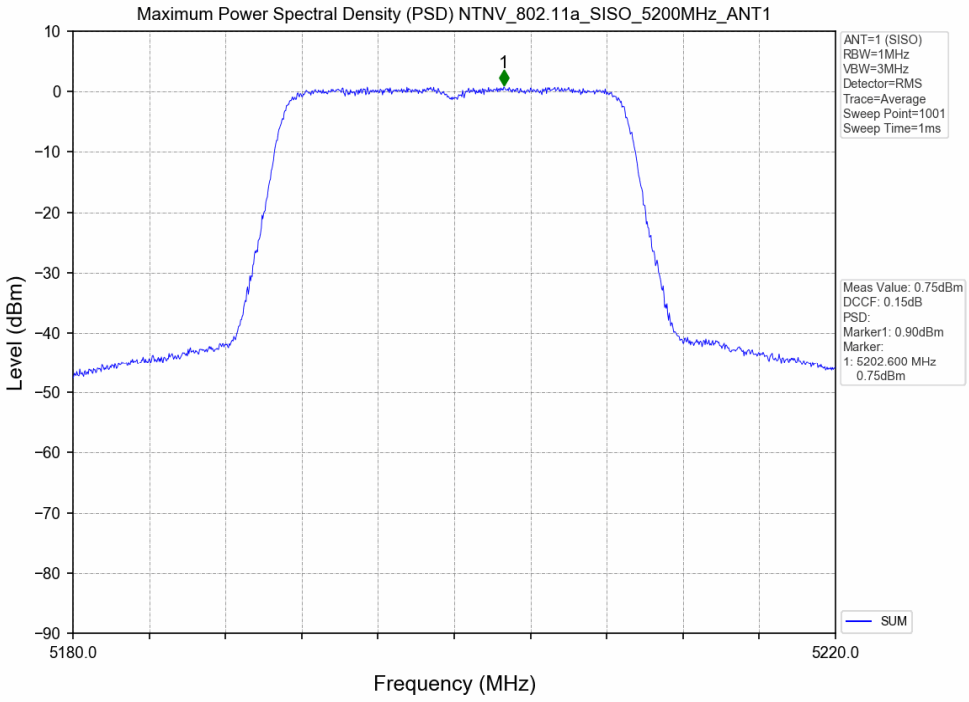
4. Maximum Power Spectral Density (PSD)

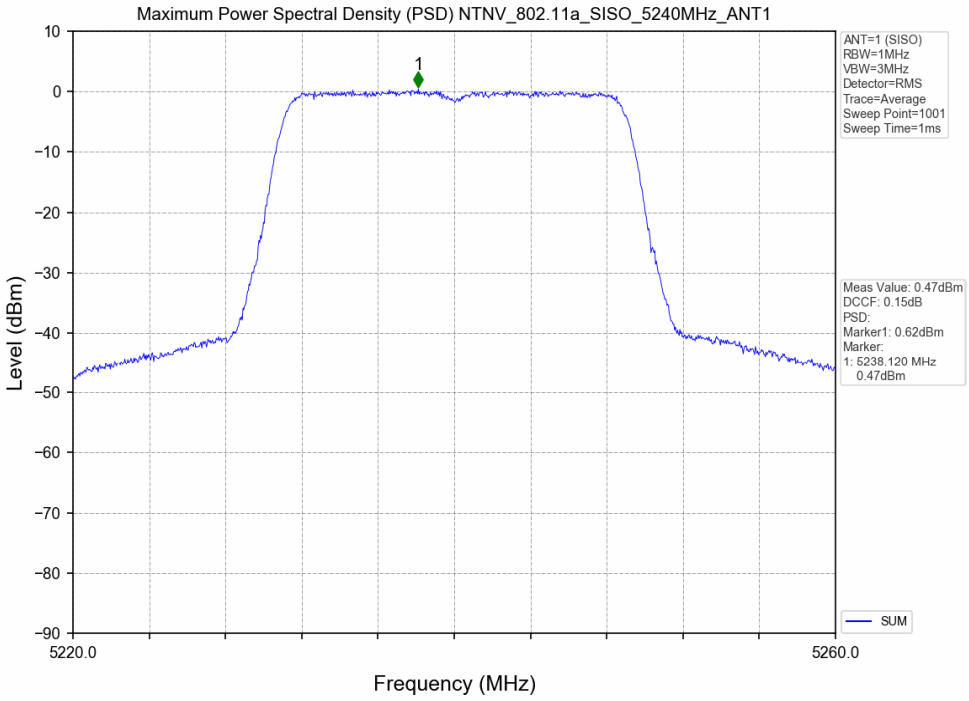
4.1 Test Result

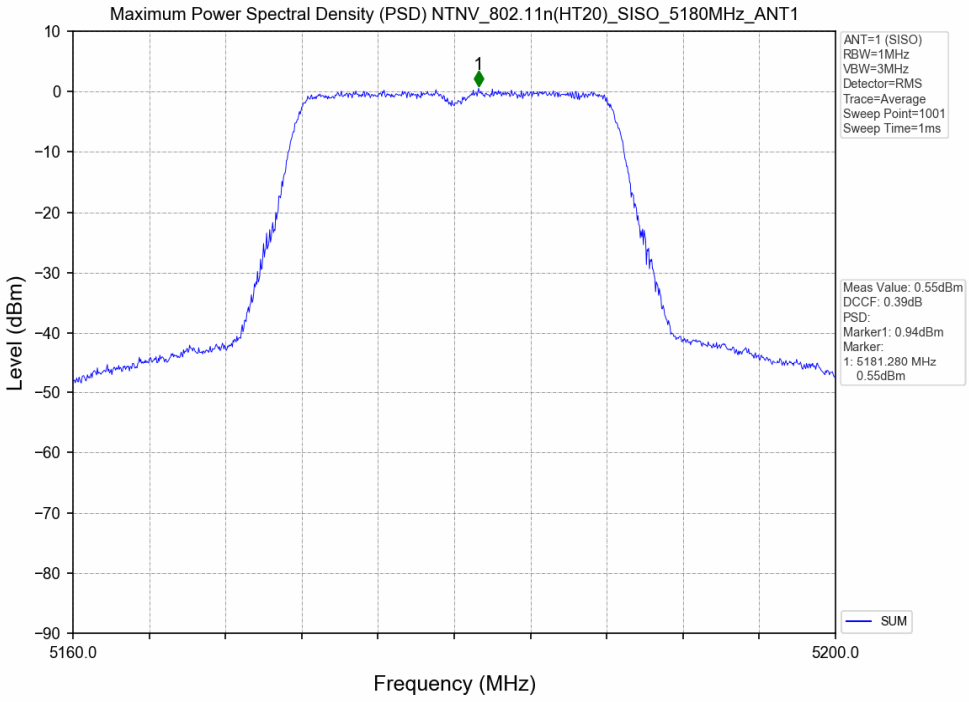
Test Mode	Frequency (MHz)	Tx Type	Maximum Power Spectral Density (dBm/MHz)	Limits (dBm/MHz)	Verdict
			Ant 1		
802.11a	5180	SISO	0.58	≤11	PASS
	5200	SISO	0.90	≤11	PASS
	5240	SISO	0.62	≤11	PASS
802.11n(HT20)	5180	SISO	0.94	≤11	PASS
	5200	SISO	0.95	≤11	PASS
	5240	SISO	0.71	≤11	PASS

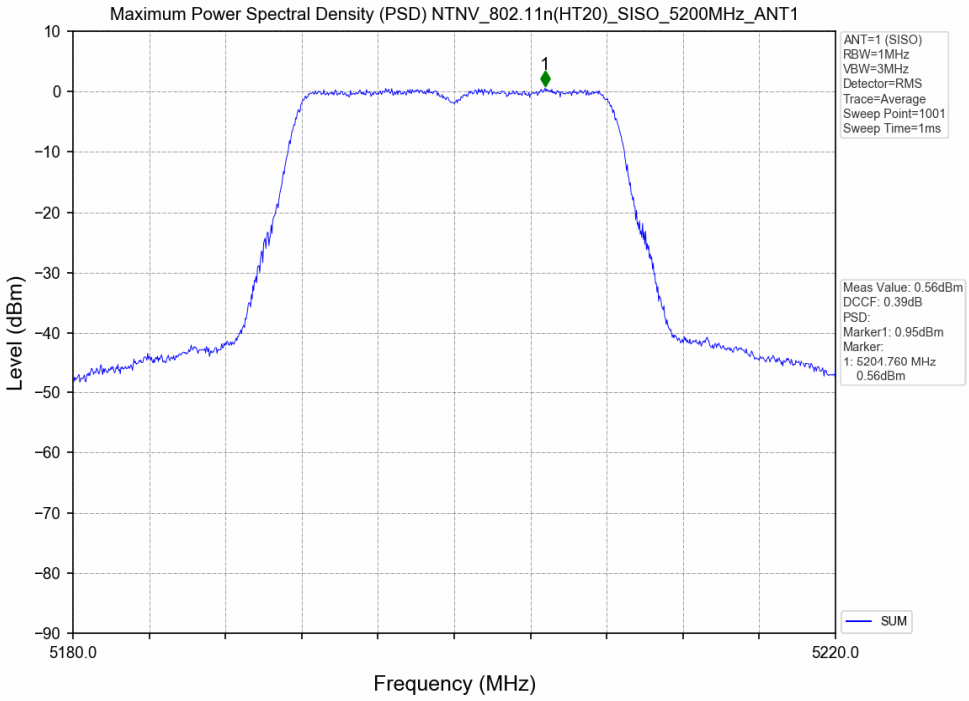
4.2 Test Graph

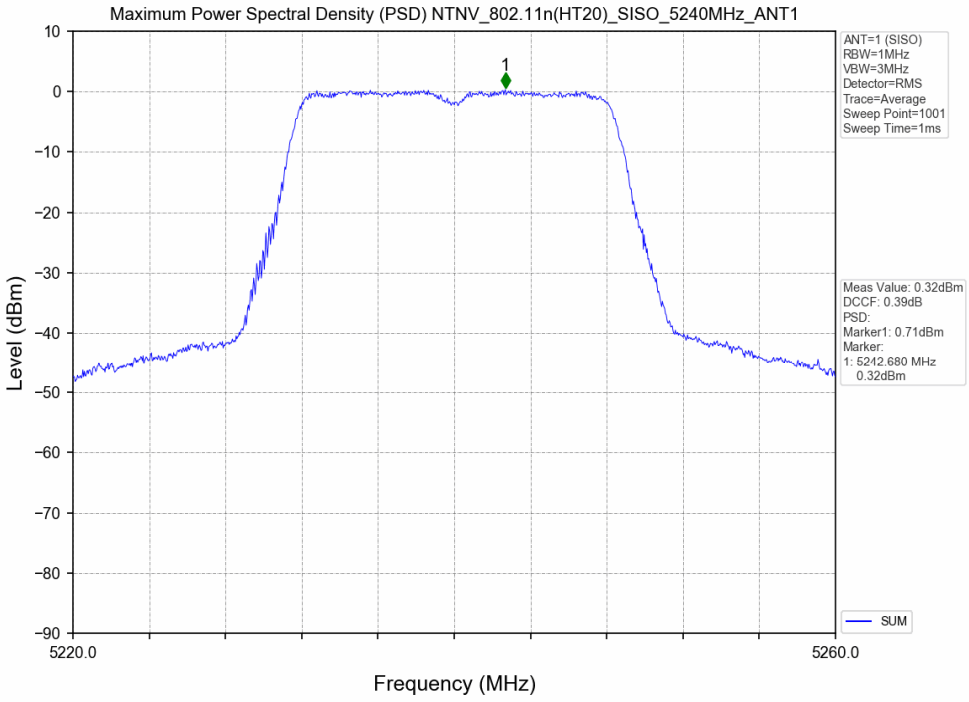












- End of the Report -