TEST REPORT

Applicant Name :	Shenzhen VanTop Technology & Innovation Co., Ltd.
Address :	502, 5th Flr. BLDG 4, MinQi Technology Park, No. 65 Lishan Road, Taoyuan Street, Nanshan District, Shenzhen, China
Report Number :	SZNS220224-05823E-RF-00
FCC ID:	2AQ3A-SP7100Q0522

Test Standard (s)

FCC PART 15.407

Sample Description

Product Type:	R/C QUADCOPTER
Model No.:	SP7100
Multiple Model(s) No.:	SP530, SP650 PRO, SP7200, SP7300, SP7500, SP7100 mini , SP680 (model difference see product declaration letter of similarity)
Trade Mark:	N/A
Date Received:	2022/02/24
Report Date:	2022/05/17

Test Result:	Pass*

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

Prepared and Checked By:

Ting Lü
EMC Engineer

Approved By:

Candy Li
EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★ ".
Shenzhen Accurate Technology Co., Ltd. is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Frequency Range	5G Wi-Fi: 5150-5250MHz; 5725-5850MHz
Mode	802.11a/n20/n40
Maximum Conducted Average Ouput Power	5150-5250 MHz: 17.91dBm 5725-5850 MHz: 20.11dBm
Modulation Technique	OFDM
Antenna Specification*	Antenna gain: 3.07dBi (It is provided by the manufacturer)
Voltage Range	DC 7.6V from Battery
Sample serial number	SZNS220224-05823E-RF-S1 for Radiated Emissions SZNS220224-05823E-RF-S2 for RF Conducted Test (Assigned by ATC)
Sample/EUT Status	Good condition

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and E of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, section 15.203, 15.205, 15.209 and 15.407 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices. And KDB789033 D02 General U-NII Test Procedures New Rules v02r01.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
RF Frequency		$0.082*10^{-7}$
RF output power, conducted		0.73dB
Unwanted Emission, conducted		1.6dB
AC Power Lines Conducted Emissions		2.72dB
Emissions, Radiated	9kHz - 30MHz	2.66dB
	30MHz - 1GHz	4.28dB
	1GHz - 18GHz	4.98dB
	18GHz - 26.5GHz	5.06dB
	26.5GHz - 40GHz	4.72dB
Temperature		1℃
Humidity		6%
Supply voltages		0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189.

Accredited by American Association for Laboratory Accreditation (A2LA). The Certificate Number is 4297.01

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0016. The Registration Number is 5077A.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode, which was provided by manufacturer.

The device supports 5G Wi-Fi 802.11a/n20/n40 modes.

For 5150-5250MHz Band, 6 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
38	5190	46	5230
40	5200	48	5240

For 802.11a/n20 mode: channel 36, 40, 48 were tested; For 802.11n40 mode: channel 38, 46 were tested.

For 5725-5850MHz Band, 7 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	157	5785
151	5755	159	5795
153	5765	161	5805
/	/	165	5825

For 802.11a/n20 mode: channel 149, 157, 165 were tested; For 802.11n40 mode: channel 151, 159 were tested.

EUT Exercise Software

"SecureCRT*" software was used and power level as below:

U-NII	Mode	Data rate	Power Level*
5150 – 5250MHz	802.11a	6Mbps	Default
	802.11n-HT20	MCS0	Default
	802.11n-HT40	MCS0	Default
5725 – 5850MHz	802.11a	6Mbps	Default
	802.11n-HT20	MCS0	Default
	802.11n-HT40	MCS0	Default

The worse-case data rates are determined to be as follows for each mode based upon investigations by measuring the output power and PSD across all data rates, bandwidths, and modulations.

The software and power level was provided by applicant.

EUT have two antennas, for 802.11 a mode, EUT support SISO transmit, for 802.11 n20/n40 mode, EUT support MIMO transmit.

Duty cycle

Test Result: Pass. Please refer to the Appendix.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

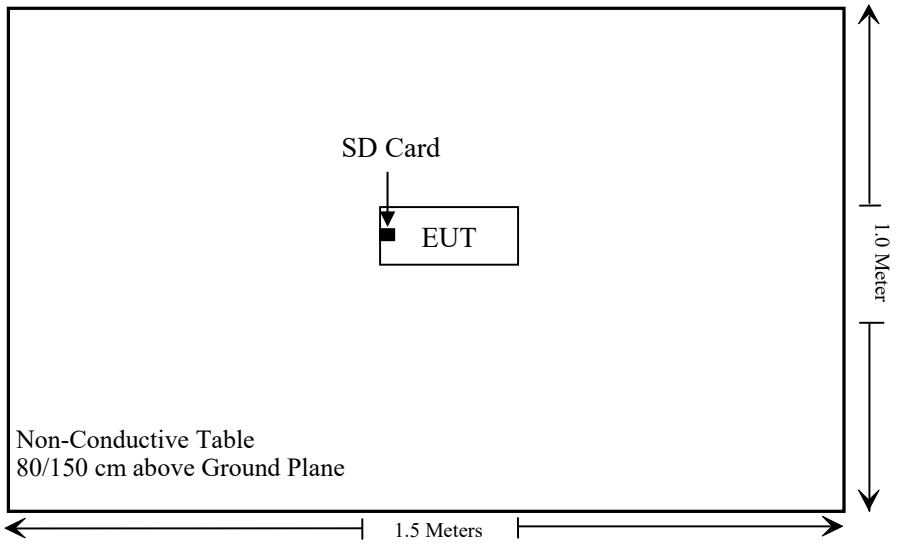
Manufacturer	Description	Model	Serial Number
aigo	SD Card	U312	Unknown

External I/O Cable

Cable Description	Length (m)	From/Port	To
/	/	/	/

Block Diagram of Test Setup

For radiated emission:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.407 (f), §1.1310 & §2.1091	MAXIMUM PERMISSIBLE EXPOSURE (MPE)	Compliant
§15.203	Antenna Requirement	Compliant
§15.407(b)(8) & §15.207(a)	Conducted Emissions	Not Applicable
§15.205 & §15.209 & §15.407(b) (1), (4), (7), (8), (9), (10)	Undesirable Emission& Restricted Bands	Compliant
§15.407(a) (12), (e)	26 dB Emission Bandwidth & 6dB Bandwidth	Compliant
§15.407(a) (1), (3)	Conducted Transmitter Output Power	Compliant
§15.407 (a) (1), (3)	Power Spectral Density	Compliant
§15.407 (h)	Transmit Power Control (TPC)	Not Applicable*
§15.407 (h)	Dynamic Frequency Selection (DFS)	Not Applicable**

Not Applicable: EUT was powered by battery when operate.
Not Applicable*: the EUT has no TPC function which was declared by the applicant.
Not Applicable**: EUT does not operate within frequency range of 5250-5350MHz and 5470-5725MHz.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emissions Test					
Rohde& Schwarz	Test Receiver	ESR	102725	2021/12/13	2022/12/12
Rohde&Schwarz	Spectrum Analyzer	FSV40	101949	2021/12/13	2022/12/12
SONOMA INSTRUMENT	Amplifier	310 N	186131	2021/11/09	2022/11/08
A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2021/11/09	2022/11/08
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2021/11/11	2022/11/10
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
Schwarzbeck	HORN ANTENNA	BBHA9170	9170-359	2020/01/05	2023/01/04
Radiated Emission Test Software: e3 19821b (V9)					
Unknown	RF Coaxial Cable	No.10	N050	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.11	N1000	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.12	N040	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.13	N300	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.14	N800	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.15	N600	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.16	N650	2021/12/14	2022/12/13
CD	Band Reject Filter	BRM-5.15/5.35g-45	075	2021/12/14	2022/12/13
CD	Band Reject Filter	BRM-5.725/5.875G-45	065	2021/12/14	2022/12/13
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101495	2021/12/13	2022/12/12
Tonscend	RF Control Unit	JS0806-2	19G8060182	2021/07/06	2022/07/05
HP	20dB Attenuator	8491A	53857	2021/12/14	2022/12/13
Unknown	RF Cable	Unknown	Unknown	Each time	
Unknown	RF Coaxial Cable	No.31	RF-01	Each time	

*** Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.407(f)& §1.1310 & §2.1091 – MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to KDB 447498 D04 Interim General RF Exposure Guidance v01, clause 2.1.4 –MPE-Based Exemption:

An alternative to the SAR-based exemption is provided in § 1.1307(b)(3)(i)(C), for a much wider frequency range, from 300 kHz to 100 GHz, applicable for separation distances greater or equal to $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. The MPE-based test exemption condition is in terms of ERP, defined as the product of the maximum antenna gain and the delivered maximum time-averaged power. For this case, a RF source is an RF exempt device if its ERP (watts) is no more than a frequency-dependent value, as detailed tabular form in Appendix B. These limits have been derived based on the basic specifications on Maximum Permissible Exposure (MPE) considered for the FCC rules in § 1.1310(e)(1).

Table to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R^2.
1.34-30	3,450 R^2/f^2.
30-300	3.83 R^2.
300-1,500	0.0128 R^2f.
1,500-100,000	19.2R^2.

f = frequency in MHz;
R = minimum separation distance from the body of a nearby person (appropriate units, e.g., m);

Test result

For worst case:

Mode	Frequency Range (MHz)	Tune-up Output Power		Antenna Gain		ERP		Evaluation Distance (cm)	MPE-Based Exemption Threshold (W)
		(dBm)	(W)	(dBi)	(dBd)	(dBm)	(W)		
Wi-Fi	5150-5250	18.0	0.063	3.07	0.92	18.92	0.078	20	0.768
	5725-5850	20.5	0.112	3.07	0.92	21.42	0.139	20	0.768

Note: The tune-up power and antenna gain was declared by the applicant.

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliant.

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.407 (a), if the transmitting antennas of directional gain greater than 6dBi are used, the transmit power and power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT have two internal Antenna arrangement, which was permanently attached and the antenna gain is 3.07dBi fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliant.

§15.205 & §15.209 & §15.407(B) (1), (4), (7), (8) , (9), (10) – UNDESIRABLE EMISSION

Applicable Standard

FCC §15.407 (b); §15.209; §15.205;

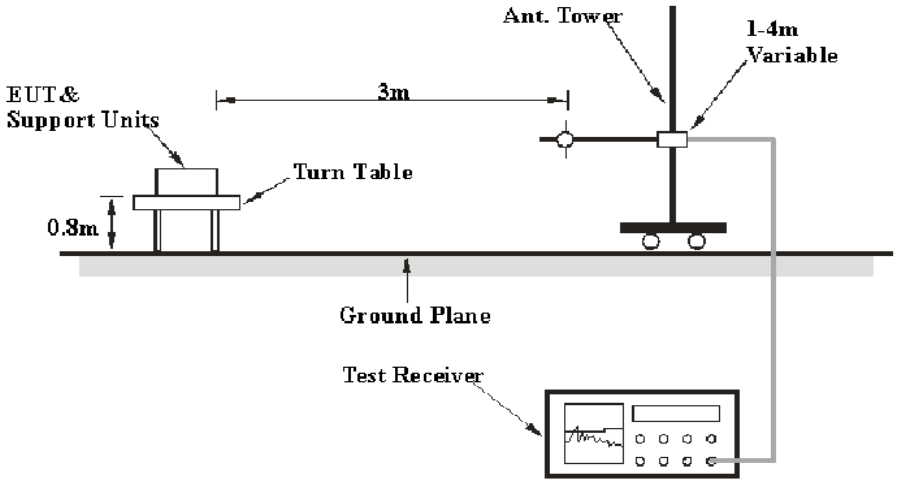
FCC §15.407 (b) (1), (4), (7), (8), (9), (10); §15.209; §15.205;

(b) Undesirable emission limits. Except as shown in paragraph (b) (7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:
(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.
(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.

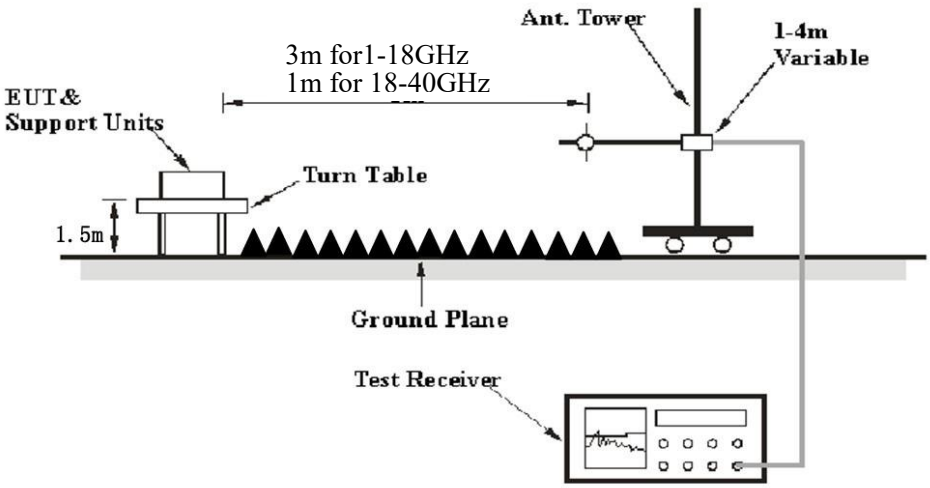
Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

EUT Setup

Below 1 GHz:



Above 1 GHz:



The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC 15.209 and FCC 15.407 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1MHz	10 Hz Note 1	/	Ave.erage
	1MHz	＞1/T Note 2	/	Ave.erage

Note 1: when duty cycle is no less than 98%
Note 2: when duty cycle is less than 98%

Test Procedure

Radiated Spurious Emission

During the radiated emission test, the adapter was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all the installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1GHz, peak and Ave.erage detection modes for frequencies above 1GHz.

According to ANSI C63.10-2013,9.4: For field strength measurements made at other than the distance at which the applicable limit is specified,extrapolate the measured field strength to the field strength at the distance specified by the limit using an inverse distance correction factor (20 dB/decade of distance). In some cases, a different distance correction factor may be required;

$$E_{\mathrm{SpecLimit}} = E_{\mathrm{Meas}} + 20\log\left(\frac{d_{\mathrm{Meas}}}{d_{\mathrm{SpecLimit}}}\right)$$

where

$E_{\mathrm{SpecLimit}}$	is the field strength of the emission at the distance specified by the limit, in dBμV/m
E_{Meas}	is the field strength of the emission at the measurement distance, in dBμV/m
d_{Meas}	is the measurement distance, in m
$d_{\mathrm{SpecLimit}}$	is the distance specified by the limit, in m

So the extrapolation factor of 1m is 20*log(1/3)= -9.5 dB, for 18-40GHz range, the limit of 1m distance was added by 9.5dB from limit of 3m to compared with the result measurement at 1m distance.

Corrected Factor & Margin Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

Factor = Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit/Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit/margin of -7dB means the emission is 7dB below the limit. The equation for calculation is as follows:

Over Limit/Margin = Level / Corrected Amplitude – Limit
Level / Corrected Amplitude = Read Level + Factor

Test Data

Environmental Conditions

Temperature:	24~26℃
Relative Humidity:	50~61%
ATM Pressure:	101.0 kPa

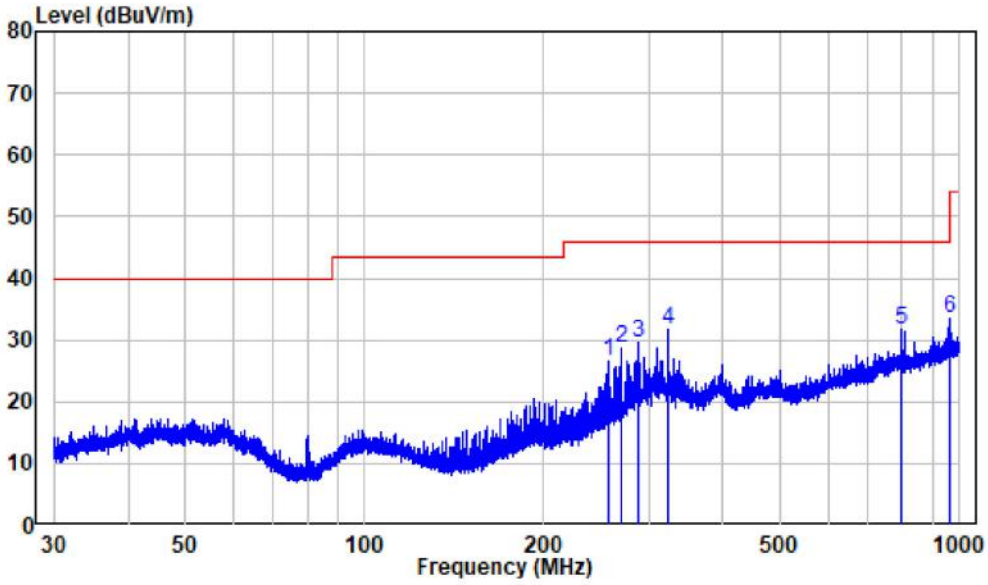
The testing was performed by Nick Fang from 2022-03-30 to 2022-04-13.

EUT operation mode: Transmitting (Pre-scan in the X, Y and Z axes of orientation, the worst case X-axis of orientation was recorded)

30 MHz – 1 GHz: *(worst case is 802.11 n40 mode, 5755MHz)*

Note: When the test result of peak was less than limit of QP more than 6dB, just the peak level was recorded.

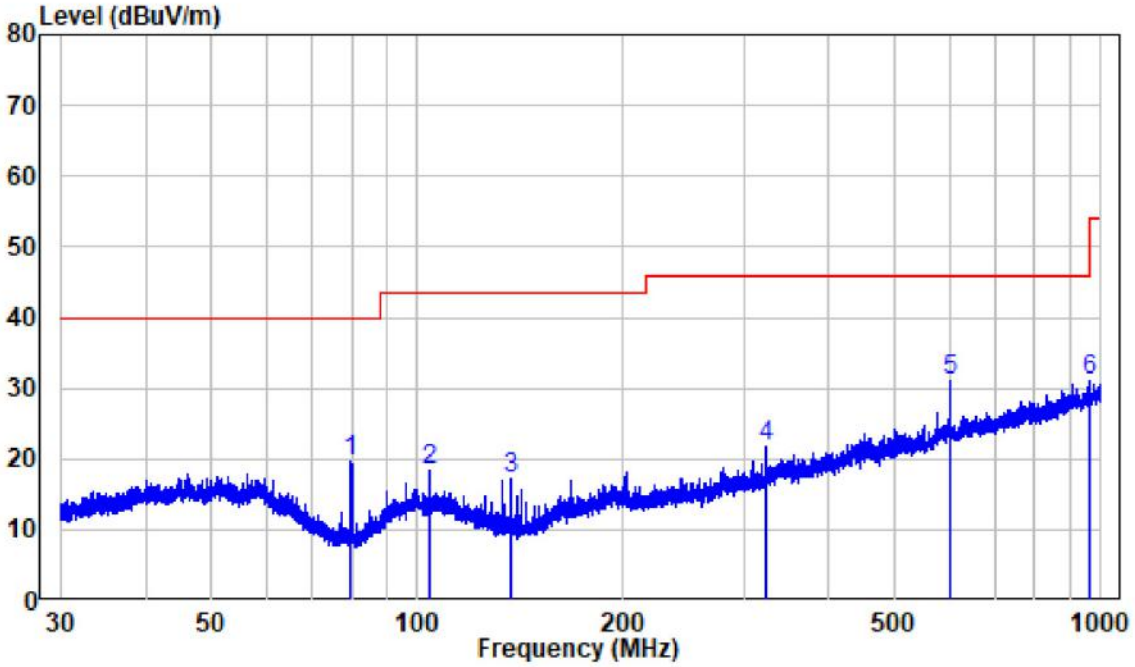
Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No. : SZNS220224-05823E-RF
Test Mode: Transmitting

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	256.859	-10.60	37.07	26.47	46.00	-19.53	Peak
2	270.256	-10.21	38.77	28.56	46.00	-17.44	Peak
3	287.990	-9.36	38.83	29.47	46.00	-16.53	Peak
4	324.030	-8.30	39.85	31.55	46.00	-14.45	Peak
5	800.031	-0.35	32.01	31.66	46.00	-14.34	Peak
6	961.741	2.38	31.18	33.56	54.00	-20.44	Peak

Vertical



Site : chamber
Condition: 3m VERTICAL
Job No. : SZNS220224-05823E-RF
Test Mode: Transmitting

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	79.975	-16.79	36.31	19.52	40.00	-20.48	Peak
2	104.307	-11.77	30.24	18.47	43.50	-25.03	Peak
3	137.360	-15.26	32.48	17.22	43.50	-26.28	Peak
4	324.030	-8.30	30.03	21.73	46.00	-24.27	Peak
5	600.110	-2.43	33.50	31.07	46.00	-14.93	Peak
6	960.056	2.36	28.79	31.15	54.00	-22.85	Peak

1GHz-40GHz:

5150-5250 MHz:

Frequency (MHz)	Receiver		Turn-Table	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407	
	Reading (dBμV)	PK/QP/Ave.	Angle Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11a(Worst Case: Ant1)									
5180 MHz									
4500	63.48	PK	122	1.6	H	-4.72	58.76	74	-15.24
4500	49.99	Ave.	122	1.6	H	-4.72	45.27	54	-8.73
4500	62.64	PK	164	1.5	V	-4.72	57.92	74	-16.08
4500	49.97	Ave.	164	1.5	V	-4.72	45.25	54	-8.75
5150	63.59	PK	49	2.4	H	-2.73	60.86	74	-13.14
5150	50.11	Ave.	49	2.4	H	-2.73	47.38	54	-6.62
5150	63.60	PK	2	1.8	V	-2.73	60.87	74	-13.13
5150	50.14	Ave.	2	1.8	V	-2.73	47.41	54	-6.59
10360	50.23	PK	90	2.5	H	8.12	58.35	68.2	-9.85
10360	49.10	PK	239	2.2	V	8.12	57.22	68.2	-10.98
5200 MHz									
10400	50.15	PK	186	2.3	H	8.24	58.39	68.2	-9.81
10400	49.06	PK	251	1.2	V	8.24	57.30	68.2	-10.90
5240 MHz									
5350	63.23	PK	49	1.7	H	-2.33	60.90	74	-13.10
5350	50.40	Ave.	49	1.7	H	-2.33	48.07	54	-5.93
5350	63.40	PK	312	2.3	V	-2.33	61.07	74	-12.93
5350	50.38	Ave.	312	2.3	V	-2.33	48.05	54	-5.95
5460	64.49	PK	321	1.7	H	-2.60	61.89	74	-12.11
5460	50.90	Ave.	321	1.7	H	-2.60	48.30	54	-5.70
5460	64.79	PK	204	1.2	V	-2.60	62.19	74	-11.81
5460	50.70	Ave.	204	1.2	V	-2.60	48.10	54	-5.90
10480	49.26	PK	231	1.8	H	8.56	57.82	68.2	-10.38
10480	48.60	PK	351	1.1	V	8.56	57.16	68.2	-11.04

Frequency (MHz)	Receiver		Turn-Table	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407	
	Reading (dBμV)	PK/QP/Ave.	Angle Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11n20(Worst Case: MIMO)									
5180 MHz									
4500	63.07	PK	241	1.4	H	-4.72	58.35	74	-15.65
4500	49.87	Ave.	241	1.4	H	-4.72	45.15	54	-8.85
4500	62.79	PK	89	1.8	V	-4.72	58.07	74	-15.93
4500	50.05	Ave.	89	1.8	V	-4.72	45.33	54	-8.67
5150	63.16	PK	165	1.6	H	-2.73	60.43	74	-13.57
5150	50.22	Ave.	165	1.6	H	-2.73	47.49	54	-6.51
5150	63.44	PK	337	2.2	V	-2.73	60.71	74	-13.29
5150	50.19	Ave.	337	2.2	V	-2.73	47.46	54	-6.54
10360	50.83	PK	176	2	H	8.12	58.95	68.2	-9.25
10360	50.13	PK	277	1.8	V	8.12	58.25	68.2	-9.95
5200 MHz									
10400	51.08	PK	95	2.3	H	8.24	59.32	68.2	-8.88
10400	49.96	PK	81	1.6	V	8.24	58.20	68.2	-10.00
5240 MHz									
5350	63.05	PK	113	2.2	H	-2.33	60.72	74	-13.28
5350	50.17	Ave.	113	2.2	H	-2.33	47.84	54	-6.16
5350	63.19	PK	53	1	V	-2.33	60.86	74	-13.14
5350	50.40	Ave.	53	1	V	-2.33	48.07	54	-5.93
5460	64.73	PK	193	2.4	H	-2.60	62.13	74	-11.87
5460	50.70	Ave.	193	2.4	H	-2.60	48.10	54	-5.90
5460	64.73	PK	167	1.9	V	-2.60	62.13	74	-11.87
5460	50.92	Ave.	167	1.9	V	-2.60	48.32	54	-5.68
10480	50.44	PK	238	1.5	H	8.56	59.00	68.2	-9.20
10480	50.39	PK	229	2	V	8.56	58.95	68.2	-9.25

Frequency (MHz)	Receiver		Turn-Table	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407	
	Reading (dBμV)	PK/QP/Ave.	Angle Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11n40(Worst Case: MIMO)									
5190 MHz									
4500	62.91	PK	284	1.9	H	-4.72	58.19	74	-15.81
4500	51.16	Ave.	284	1.9	H	-4.72	46.44	54	-7.56
4500	63.03	PK	273	1.7	V	-4.72	58.31	74	-15.69
4500	51.36	Ave.	273	1.7	V	-4.72	46.64	54	-7.36
5150	66.29	PK	236	2.5	H	-2.73	63.56	74	-10.44
5150	54.13	Ave.	236	2.5	H	-2.73	51.40	54	-2.60
5150	65.77	PK	143	1.3	V	-2.73	63.04	74	-10.96
5150	54.15	Ave.	143	1.3	V	-2.73	51.42	54	-2.58
10380	48.88	PK	180	1.2	H	8.18	57.06	68.2	-11.14
10380	48.81	PK	292	1.5	V	8.18	56.99	68.2	-11.21
5230 MHz									
5350	62.93	PK	1	2.4	H	-2.33	60.60	74	-13.40
5350	50.32	Ave.	1	2.4	H	-2.33	47.99	54	-6.01
5350	63.02	PK	153	2	V	-2.33	60.69	74	-13.31
5350	50.34	Ave.	153	2	V	-2.33	48.01	54	-5.99
5460	64.74	PK	172	1.1	H	-2.60	62.14	74	-11.86
5460	51.81	Ave.	172	1.1	H	-2.60	49.21	54	-4.79
5460	64.49	PK	26	2	V	-2.60	61.89	74	-12.11
5460	51.87	Ave.	26	2	V	-2.60	49.27	54	-4.73
10460	48.58	PK	190	1.2	H	8.47	57.05	68.2	-11.15
10460	48.33	PK	189	1.1	V	8.47	56.80	68.2	-11.40

5725-5850 MHz:

Frequency (MHz)	Receiver		Turn-Table	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407	
	Reading (dBμV)	Detector (PK/QP/Ave.)	Angle Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11a(Worst Case: Ant1)									
5745 MHz									
5650	65.22	PK	174	1.6	H	-1.95	63.27	68.2	-4.93
5650	65.42	PK	282	2.3	V	-1.95	63.47	68.2	-4.73
5700	65.11	PK	128	1.9	H	-2.02	63.09	105.2	-42.11
5700	65.34	PK	191	1.2	V	-2.02	63.32	105.2	-41.88
5720	67.23	PK	43	1.4	H	-1.97	65.26	110.8	-45.54
5720	66.25	PK	341	2.5	V	-1.97	64.28	110.8	-46.52
5725	71.35	PK	98	2.4	H	-1.96	69.39	122.2	-52.81
5725	69.98	PK	3	1.6	V	-1.96	68.02	122.2	-54.18
11490	44.87	PK	278	1.1	H	6.63	51.50	74	-22.50
11490	45.01	PK	345	1.7	V	6.63	51.64	74	-22.36
5785 MHz									
11570	45.07	PK	259	2.1	H	6.59	51.66	74	-22.34
11570	45.41	PK	18	1.6	V	6.59	52.00	74	-22.00
5825 MHz									
5850	68.56	PK	180	1.9	H	-1.81	66.75	122.2	-55.45
5850	67.61	PK	25	2.4	V	-1.81	65.80	122.2	-56.40
5855	66.66	PK	274	1.7	H	-1.82	64.84	110.8	-45.96
5855	66.37	PK	174	2	V	-1.82	64.55	110.8	-46.25
5875	66.00	PK	350	1	H	-1.84	64.16	105.2	-41.04
5875	66.08	PK	142	1.4	V	-1.84	64.24	105.2	-40.96
5925	65.38	PK	303	2	H	-1.82	63.56	68.2	-4.64
5925	66.13	PK	274	2.4	V	-1.82	64.31	68.2	-3.89
11650	43.58	PK	344	1.6	H	6.77	50.35	74	-23.65
11650	43.82	PK	122	1.5	V	6.77	50.59	74	-23.41

Frequency (MHz)	Receiver		Turn-Table	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407	
	Reading (dBμV)	Detector (PK/QP/Ave.)	Angle Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11n20(Worst Case: MIMO)									
5745 MHz									
5650	65.36	PK	277	2.1	H	-1.95	63.41	68.2	-4.79
5650	65.09	PK	122	1.3	V	-1.95	63.14	68.2	-5.06
5700	65.38	PK	3	2.5	H	-2.02	63.36	105.2	-41.84
5700	65.20	PK	36	2.1	V	-2.02	63.18	105.2	-42.02
5720	67.76	PK	47	1.1	H	-1.97	65.79	110.8	-45.01
5720	67.65	PK	185	1.3	V	-1.97	65.68	110.8	-45.12
5725	72.04	PK	40	2.3	H	-1.96	70.08	122.2	-52.12
5725	71.41	PK	315	2.1	V	-1.96	69.45	122.2	-52.75
11490	44.99	PK	151	1.4	H	6.63	51.62	74	-22.38
11490	45.10	PK	223	1.3	V	6.63	51.73	74	-22.27
5785 MHz									
11570	45.18	PK	101	1	H	6.59	51.77	74	-22.23
11570	44.96	PK	284	1.5	V	6.59	51.55	74	-22.45
5825 MHz									
5850	72.56	PK	219	2.3	H	-1.81	70.75	122.2	-51.45
5850	70.25	PK	271	1.2	V	-1.81	68.44	122.2	-53.76
5855	67.35	PK	77	2	H	-1.82	65.53	110.8	-45.27
5855	66.72	PK	106	2.4	V	-1.82	64.90	110.8	-45.90
5875	65.31	PK	123	1.3	H	-1.84	63.47	105.2	-41.73
5875	65.41	PK	221	1.5	V	-1.84	63.57	105.2	-41.63
5925	65.56	PK	169	1.9	H	-1.82	63.74	68.2	-4.46
5925	65.40	PK	84	1.3	V	-1.82	63.58	68.2	-4.62
11650	43.60	PK	141	2.2	H	6.77	50.37	74	-23.63
11650	43.80	PK	274	2.1	V	6.77	50.57	74	-23.43

Frequency (MHz)	Receiver		Turn-Table	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407	
	Reading (dBμV)	PK/QP/Ave.	Angle Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11n40 (Worst Case: MIMO)									
5755 MHz									
5650	65.16	PK	321	1.9	H	-1.95	63.21	68.2	-4.99
5650	65.23	PK	142	2	V	-1.95	63.28	68.2	-4.92
5700	68.48	PK	27	2.3	H	-2.02	66.46	105.2	-38.74
5700	67.26	PK	303	1.6	V	-2.02	65.24	105.2	-39.96
5720	77.26	PK	34	2.3	H	-1.97	75.29	110.8	-35.51
5720	75.46	PK	163	1.7	V	-1.97	73.49	110.8	-37.31
5725	77.97	PK	23	1.6	H	-1.96	76.01	122.2	-46.19
5725	76.14	PK	15	1.1	V	-1.96	74.18	122.2	-48.02
11510	44.32	PK	65	1.3	H	6.59	50.91	74	-23.09
11510	44.40	PK	313	1.4	V	6.59	50.99	74	-23.01
5795 MHz									
5850	69.37	PK	325	1.8	H	-1.81	67.56	122.2	-54.64
5850	68.58	PK	47	2.4	V	-1.81	66.77	122.2	-55.43
5855	66.95	PK	205	1.1	H	-1.82	65.13	110.8	-45.67
5855	66.68	PK	91	1.6	V	-1.82	64.86	110.8	-45.94
5875	65.24	PK	32	2.2	H	-1.84	63.40	105.2	-41.80
5875	65.61	PK	135	1.6	V	-1.84	63.77	105.2	-41.43
5925	65.30	PK	167	2.4	H	-1.82	63.48	68.2	-4.72
5925	65.53	PK	101	2.1	V	-1.82	63.71	68.2	-4.49
11590	44.10	PK	347	1.2	H	6.57	50.67	74	-23.33
11590	44.40	PK	337	2.4	V	6.57	50.97	74	-23.03

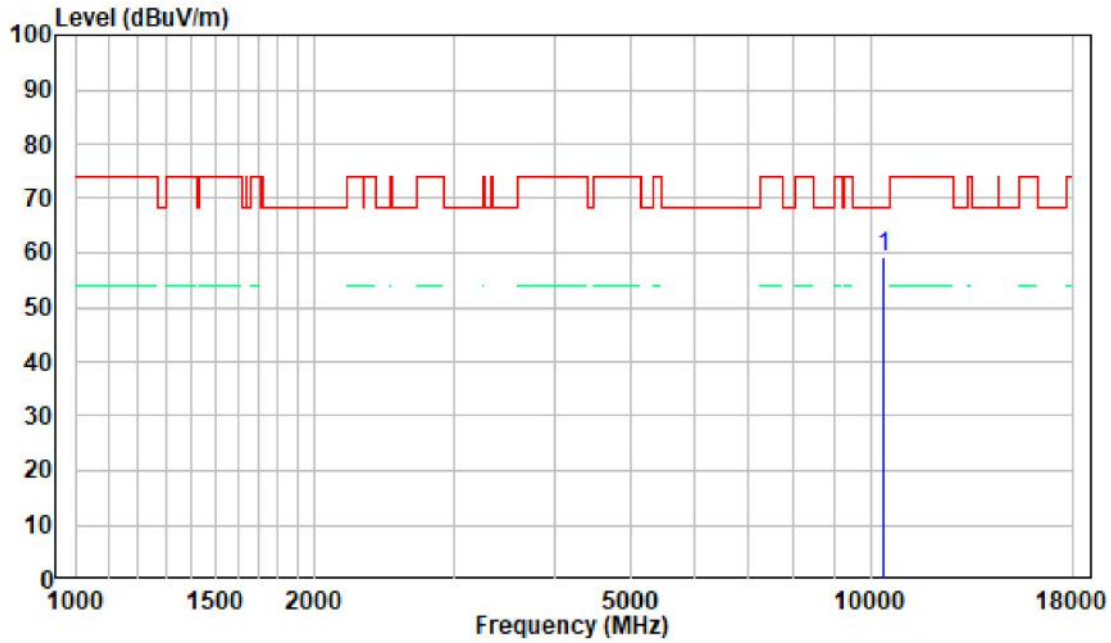
Note:
Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Absolute Level (Corrected Amplitude) = Factor + Reading
Margin = Absolute Level (Corrected Amplitude) – Limit
The other spurious emission which is in the noise floor level was not recorded.
The test result of peak was 20dB below to the limit of peak, which can be compliant to the average limit, so just peak value was recorded.

1-18GHz

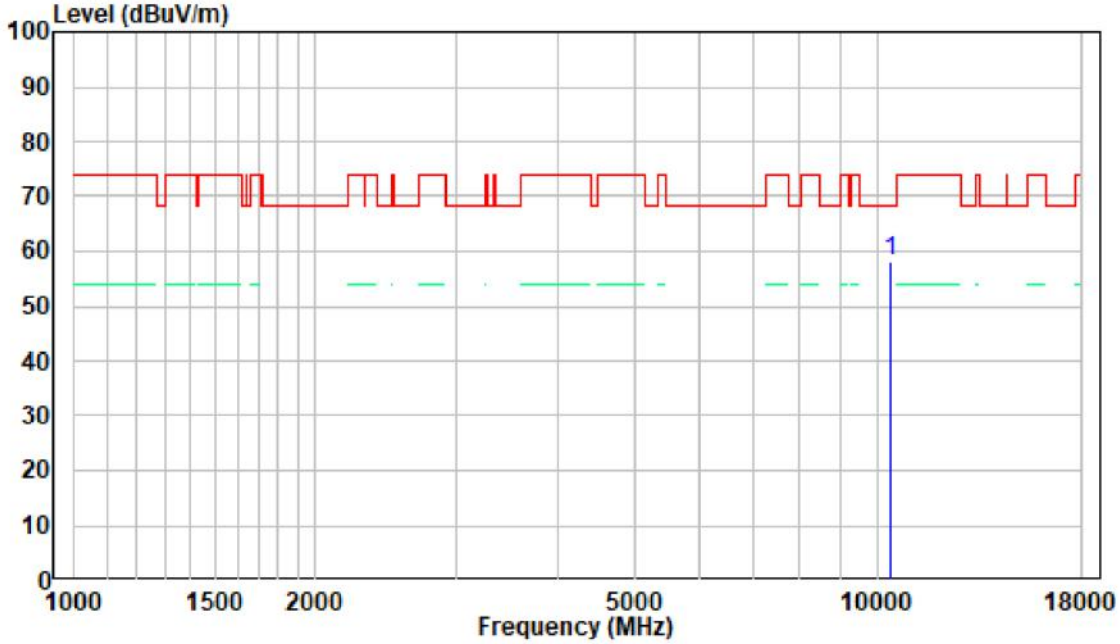
Pre-scan plots:

802.11n20, 5200MHz

Horizontal:



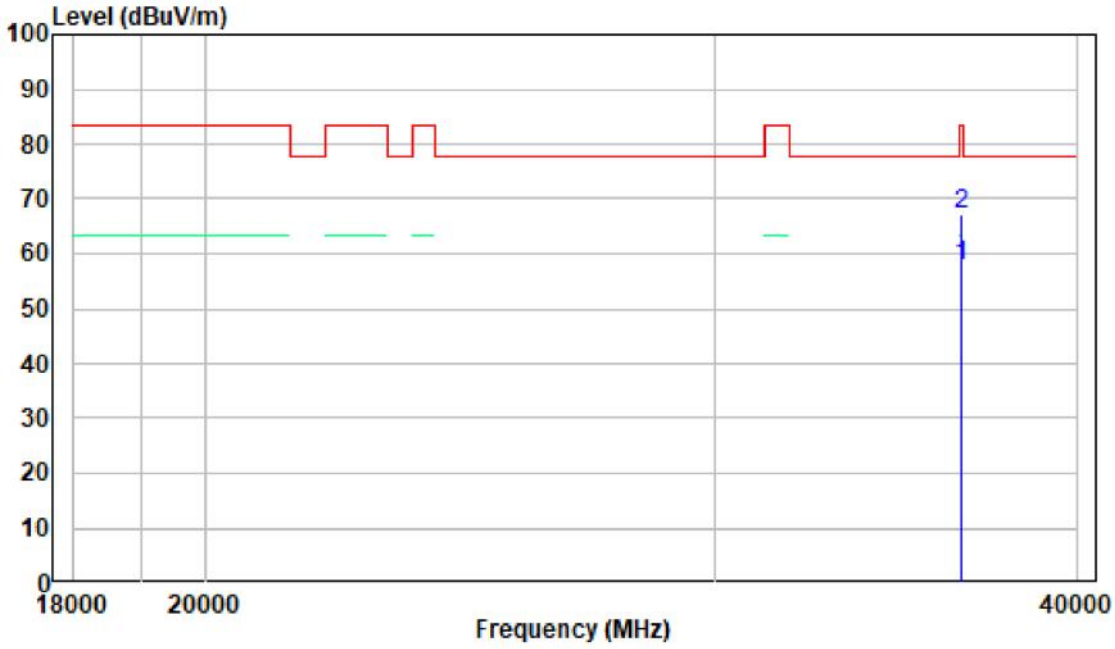
Vertical:



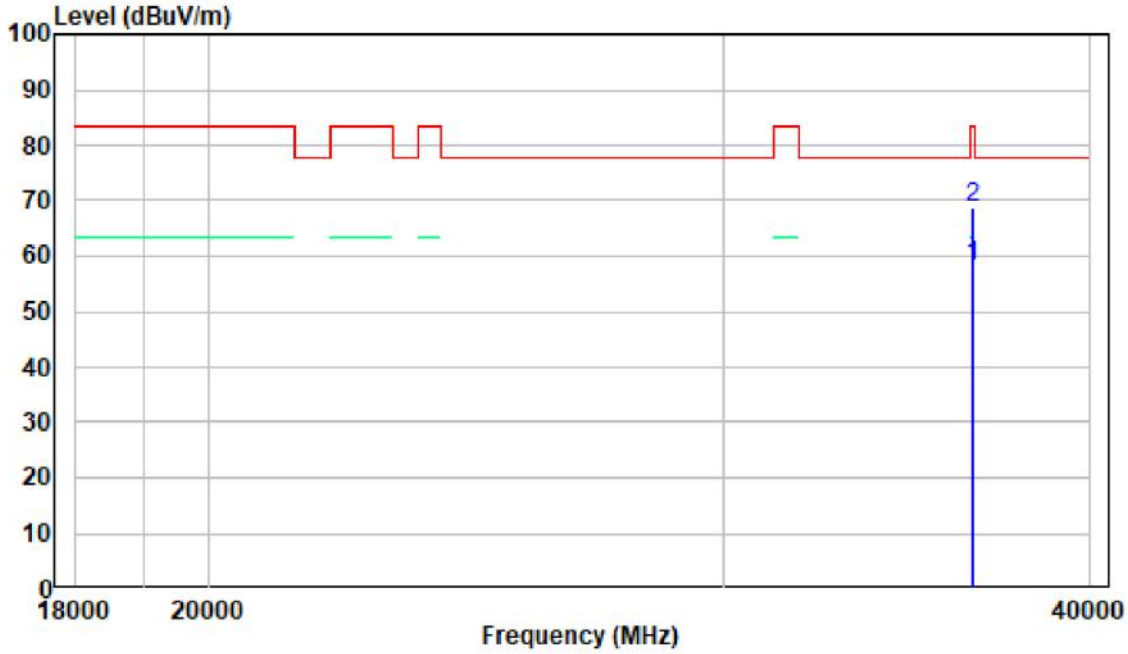
18-40GHz

Pre-scan plots:

802.11n20, 5200MHz
Horizontal:



Vertical:



FCC §15.407(a),(e) – 26 dB & 6dB EMISSION BANDWIDTH

Applicable Standard

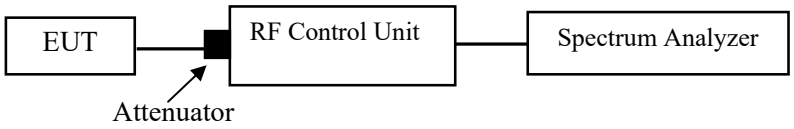
The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test Procedure

1. Emission Bandwidth (EBW)
a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

2. **Minimum Emission Bandwidth for the band 5.725-5.85 GHz**
Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.725-5.85 GHz. The following procedure shall be used for measuring this bandwidth:
a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Data

Environmental Conditions

Temperature:	24-26℃
Relative Humidity:	52-55%
ATM Pressure:	101.0 kPa

The testing was performed by Key Pei from 2022-04-09 to 2022-05-06.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to the Appendix.

FCC §15.407(a) (1) (3) – CONDUCTED TRANSMITTER OUTPUT POWER

Applicable Standard

For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

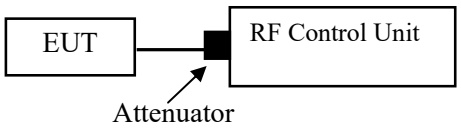
For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure

c. Place the EUT on a bench and set it in transmitting mode.

d. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.

e. Add a correction factor to the display.



Note: the RF control unit has a built-on power sensor.

Test Data

Environmental Conditions

Temperature:	24-26℃
Relative Humidity:	52-55%
ATM Pressure:	101.0 kPa

The testing was performed by Key Pei from 2022-04-09 to 2022-05-06.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to the Appendix.

FCC §15.407(a) (1) (3) - POWER SPECTRAL DENSITY

Applicable Standard

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

a) Set RBW $\geqslant$ 1/T, where T is defined in section II.B.l.a).
b) Set VBW $\geqslant$ 3 RBW.
c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 kHz/RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log (1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Test Data

Environmental Conditions

Temperature:	24-26℃
Relative Humidity:	52-55%
ATM Pressure:	101.0 kPa

The testing was performed by Key Pei from 2022-04-09 to 2022-05-06.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to the Appendix.

APPENDIX

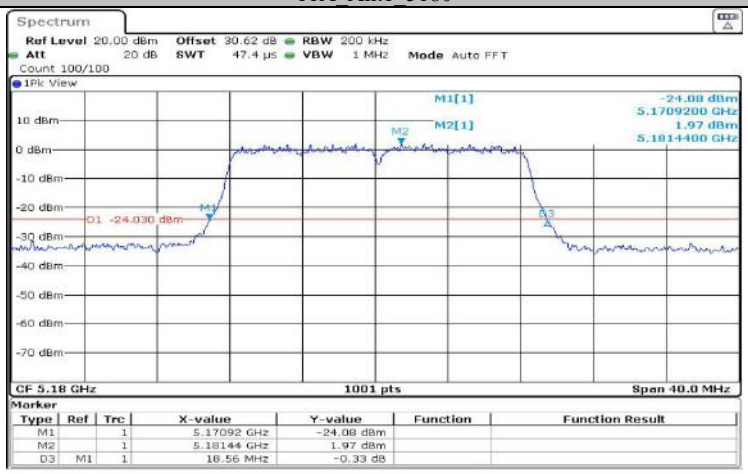
Appendix A1: Emission Bandwidth

Test Result

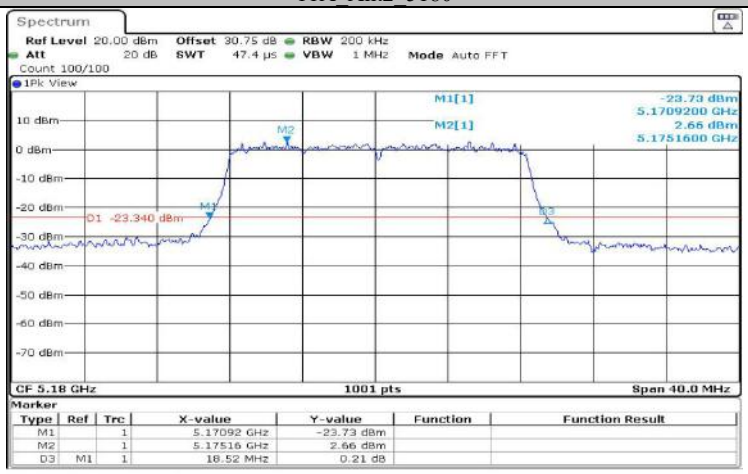
Test Mode	Antenna	Channel	26db EBW [MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	18.56	---	---
	Ant2	5180	18.52	---	---
	Ant1	5200	18.72	---	---
	Ant2	5200	18.52	---	---
	Ant1	5240	18.44	---	---
	Ant2	5240	18.40	---	---
11N20MIMO	Ant1	5180	19.44	---	---
	Ant2	5180	19.44	---	---
	Ant1	5200	19.52	---	---
	Ant2	5200	19.52	---	---
	Ant1	5240	19.48	---	---
	Ant2	5240	19.52	---	---
11N40MIMO	Ant1	5190	42.16	---	---
	Ant2	5190	41.76	---	---
	Ant1	5230	42.48	---	---
	Ant2	5230	42.56	---	---

Test Graphs

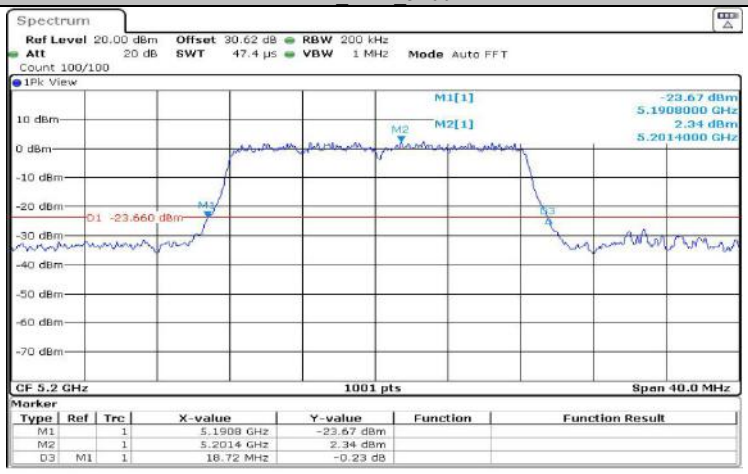
11A_Ant1_5180



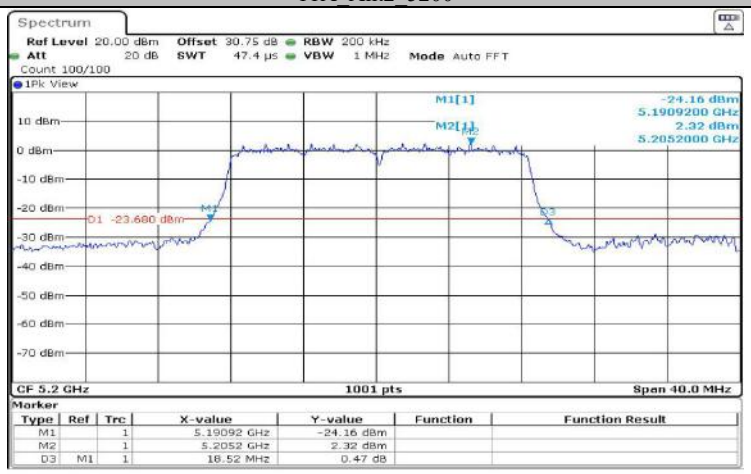
11A_Ant2_5180



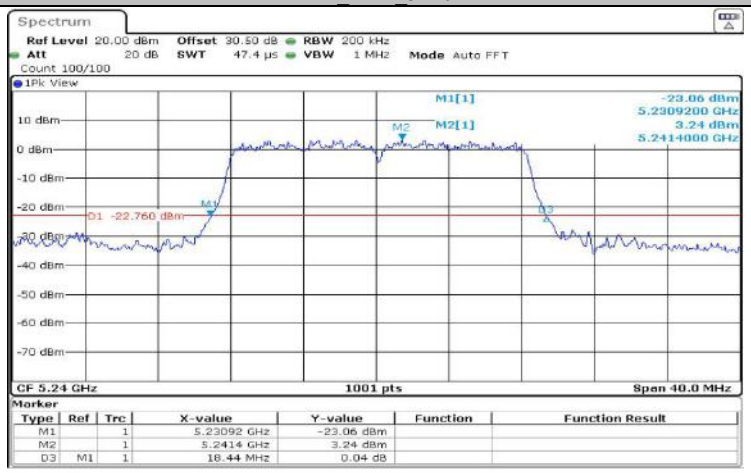
11A_Ant1_5200



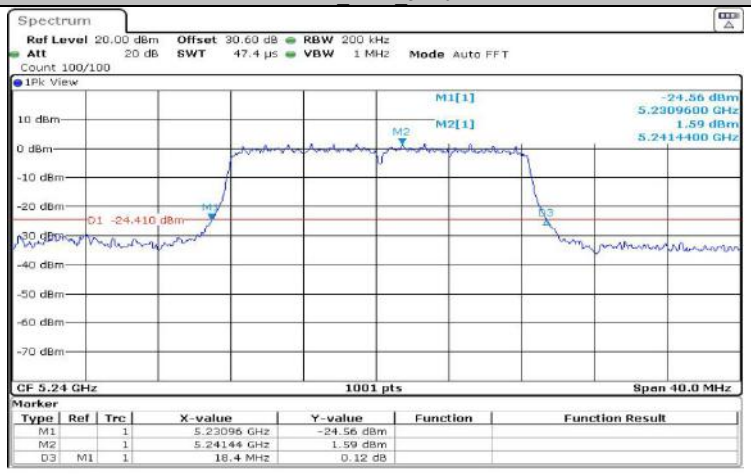
11A_Ant2_5200



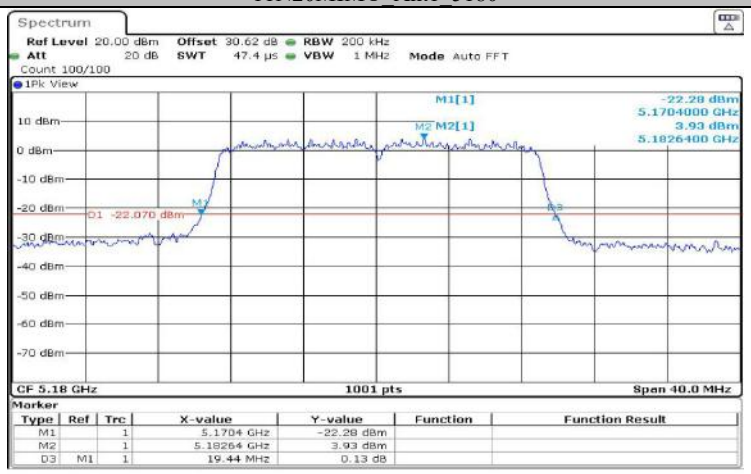
11A_Ant1_5240



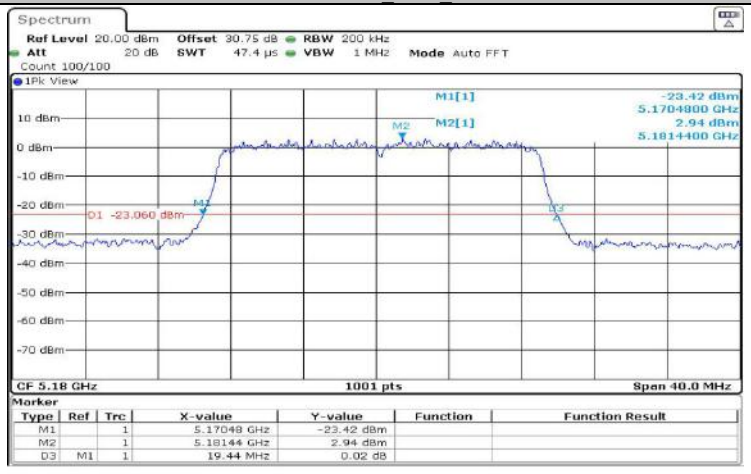
11A_Ant2_5240



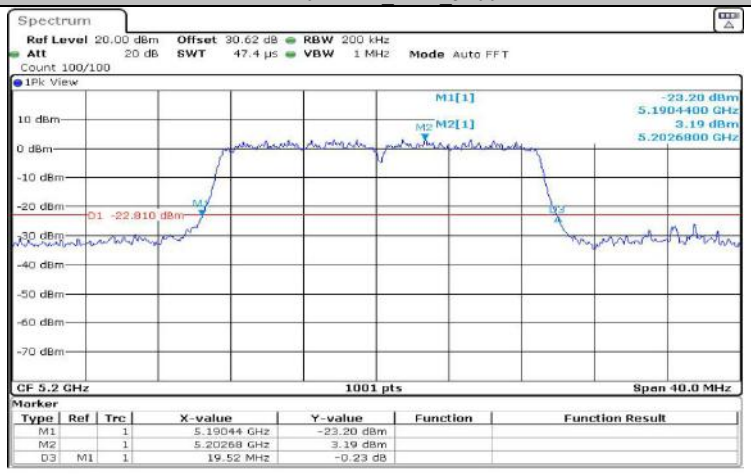
11N20MIMO_Ant1_5180



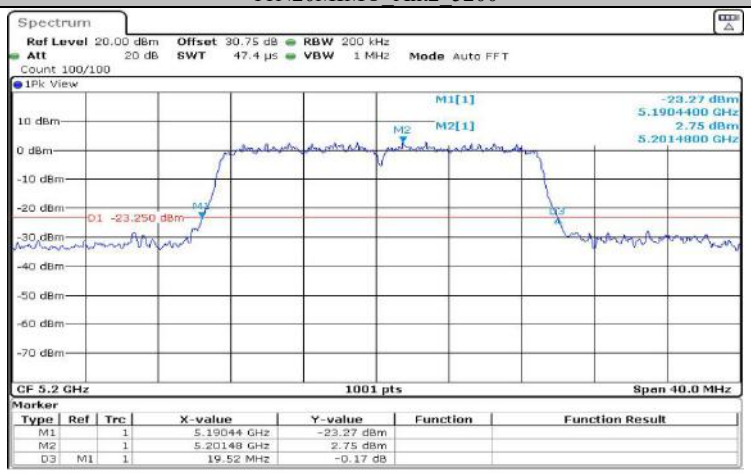
11N20MIMO_Ant2_5180



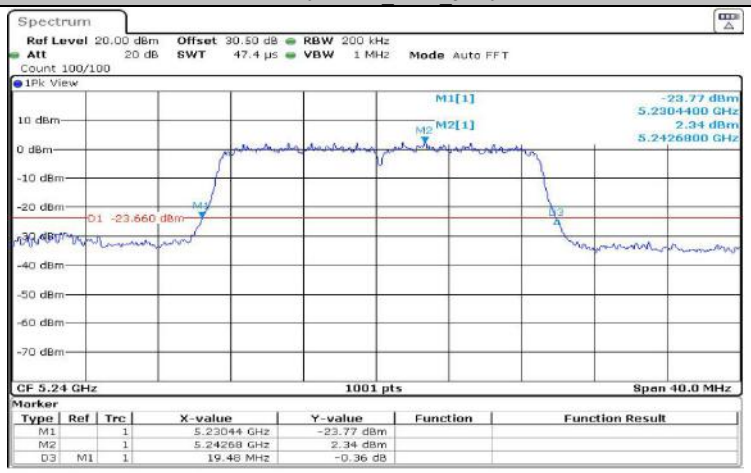
11N20MIMO_Ant1_5200



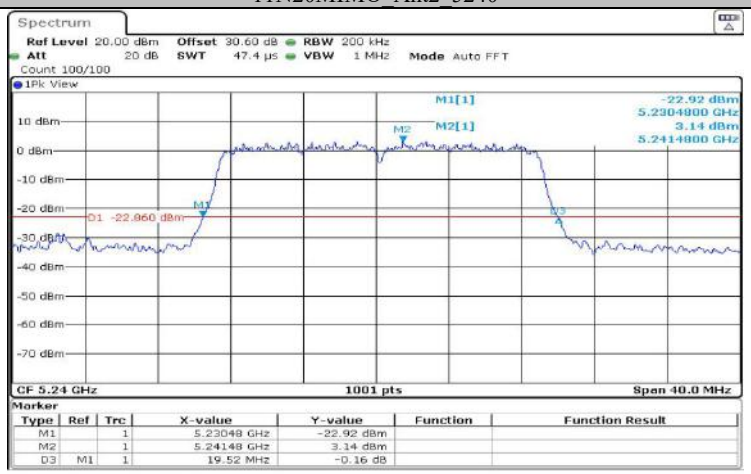
11N20MIMO_Ant2_5200



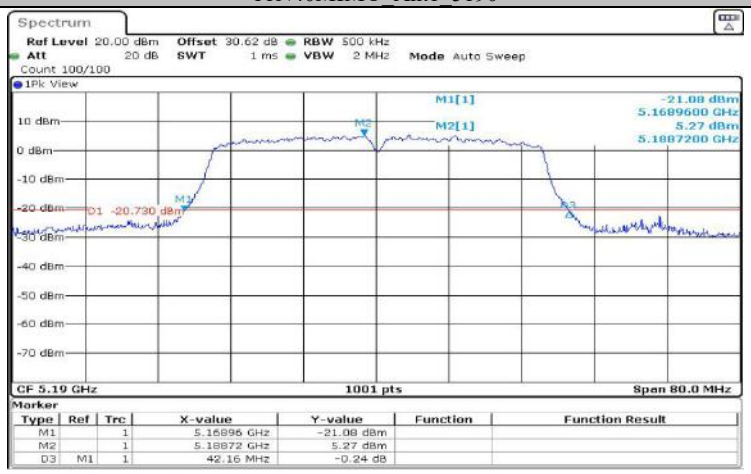
11N20MIMO_Ant1_5240



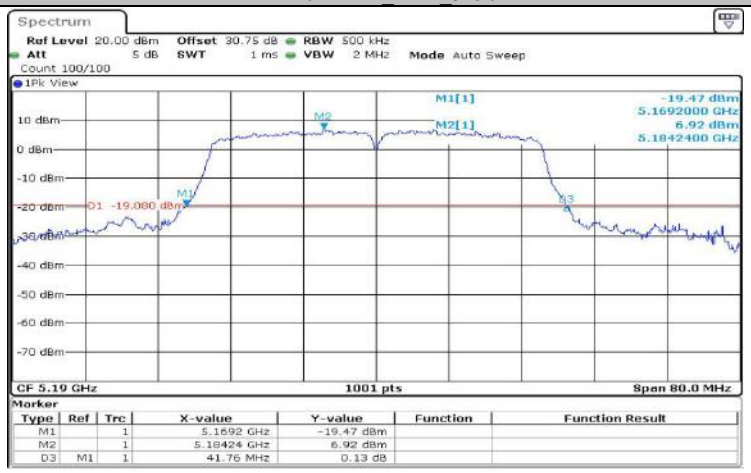
11N20MIMO_Ant2_5240



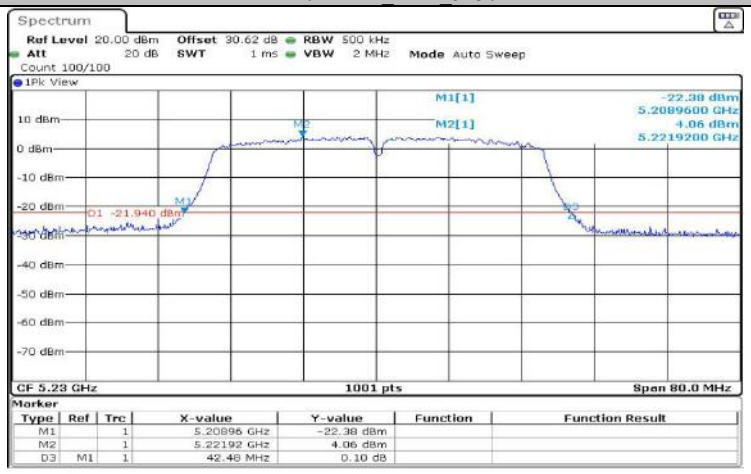
11N40MIMO_Ant1_5190



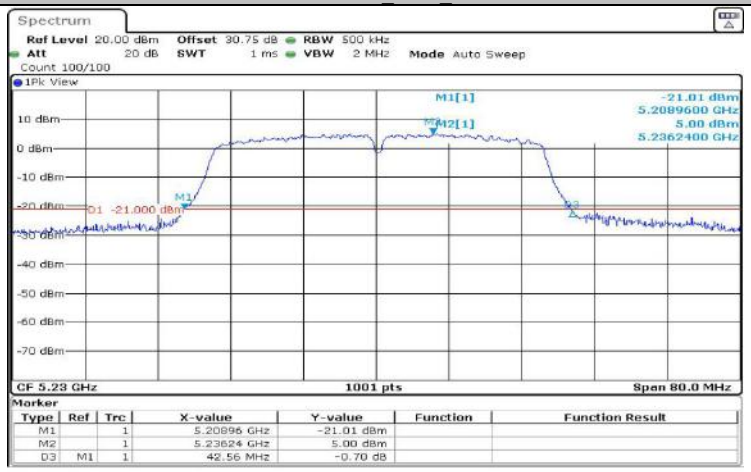
11N40MIMO_Ant2_5190



11N40MIMO_Ant1_5230



11N40MIMO_Ant2_5230



Appendix A2: Occupied channel bandwidth

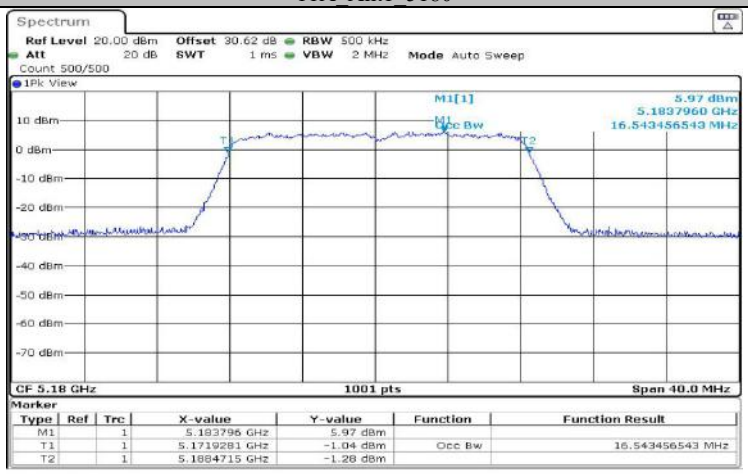
Test Result

Test Mode	Antenna	Channel	OCB [MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	16.543	---	---
	Ant2	5180	16.503	---	---
	Ant1	5200	16.663	---	---
	Ant2	5200	16.543	---	---
	Ant1	5240	16.583	---	---
	Ant2	5240	16.543	---	---
	Ant1	5745	16.663	---	---
	Ant2	5745	16.543	---	---
	Ant1	5785	16.503	---	---
	Ant2	5785	16.623	---	---
	Ant1	5825	16.543	---	---
	Ant2	5825	16.663	---	---
11N20MIMO	Ant1	5180	17.742	---	---
	Ant2	5180	17.742	---	---
	Ant1	5200	17.702	---	---
	Ant2	5200	17.742	---	---
	Ant1	5240	17.702	---	---
	Ant2	5240	17.702	---	---
	Ant1	5745	17.742	---	---
	Ant2	5745	17.742	---	---
	Ant1	5785	17.702	---	---
	Ant2	5785	17.742	---	---
	Ant1	5825	17.702	---	---
	Ant2	5825	17.702	---	---
11N40MIMO	Ant1	5190	36.763	---	---
	Ant2	5190	36.683	---	---
	Ant1	5230	36.683	---	---
	Ant2	5230	36.763	---	---
	Ant1	5755	36.683	---	---
	Ant2	5755	36.523	---	---
	Ant1	5795	36.843	---	---
	Ant2	5795	36.763	---	---

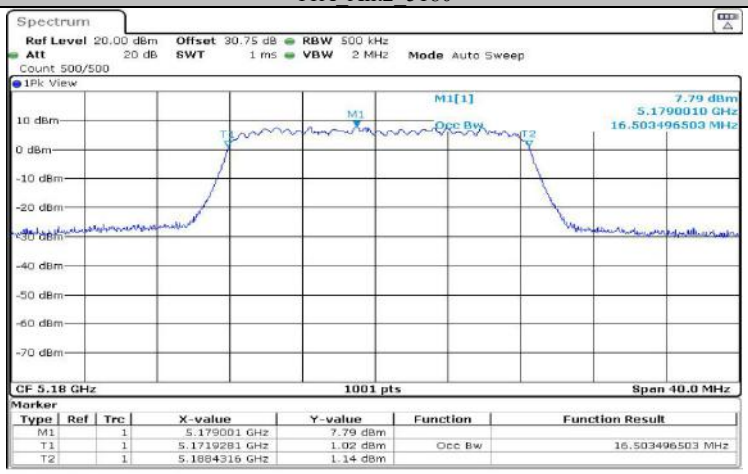
Note: EUT not operate with any part of OBW fall within 5250-5350MHz and 5470-5725MHz range.

Test Graphs

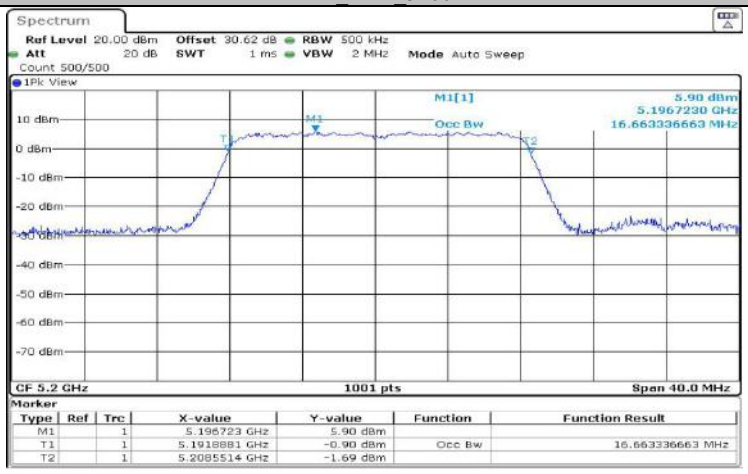
11A_Ant1_5180



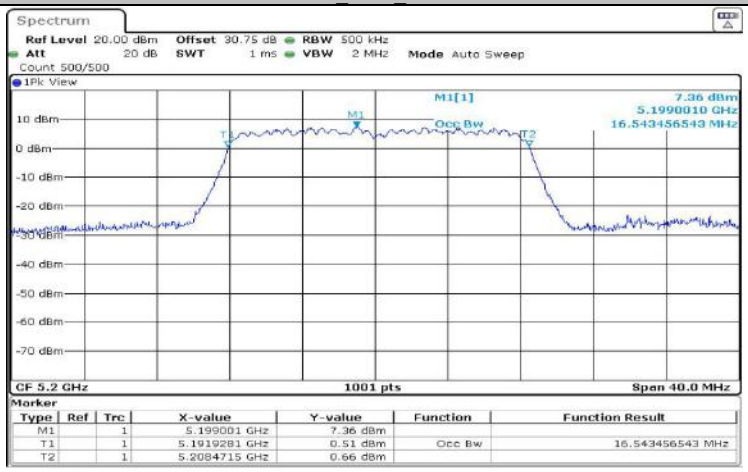
11A_Ant2_5180



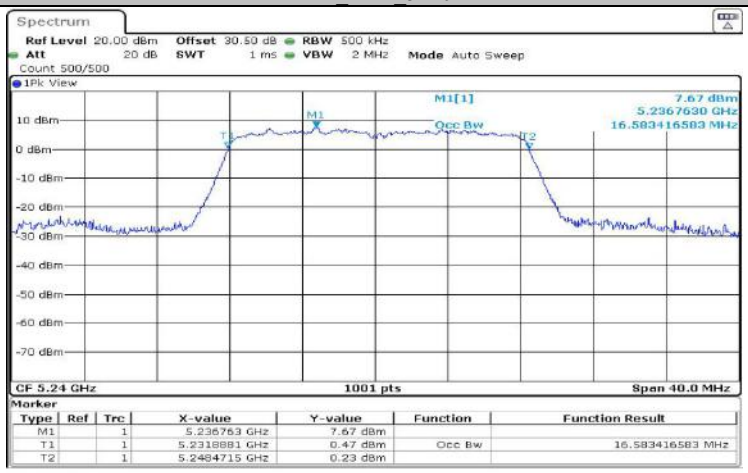
11A_Ant1_5200



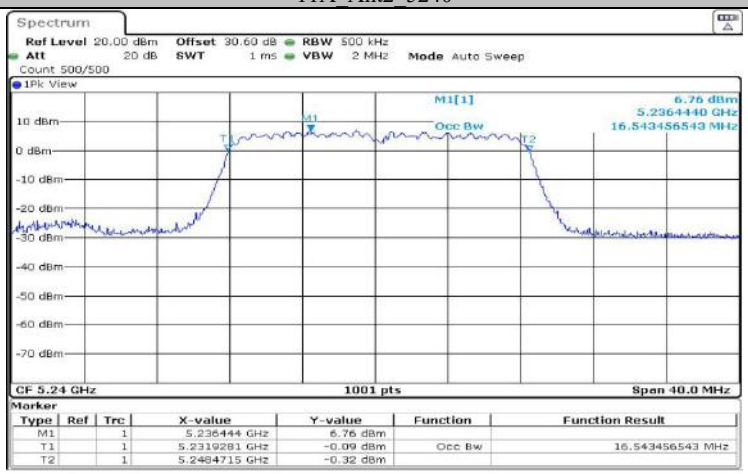
11A_Ant2_5200



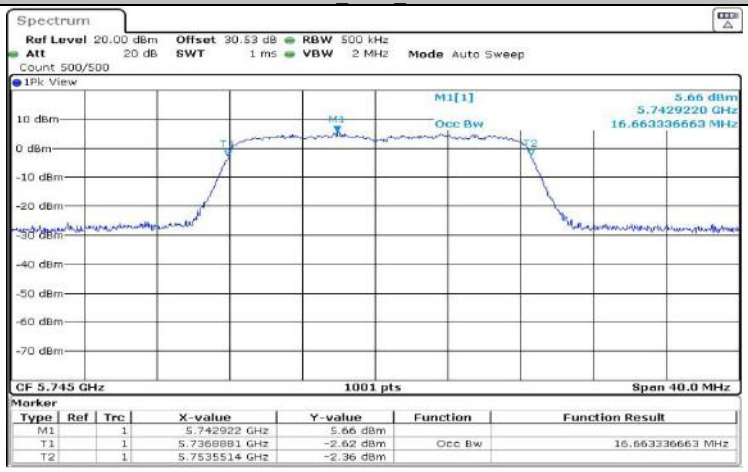
11A_Ant1_5240



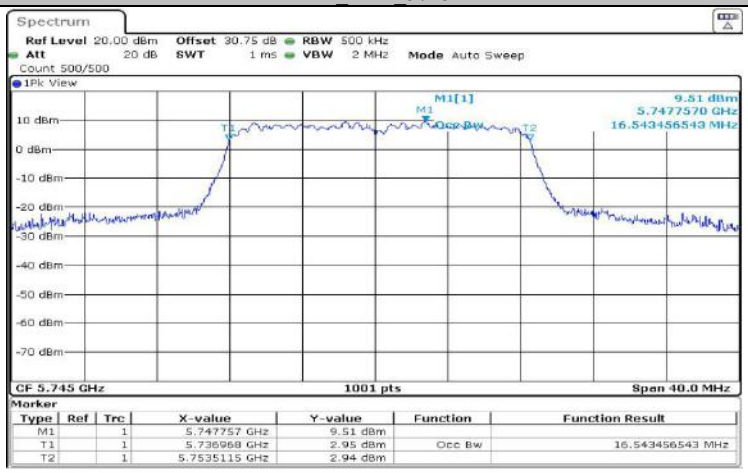
11A_Ant2_5240



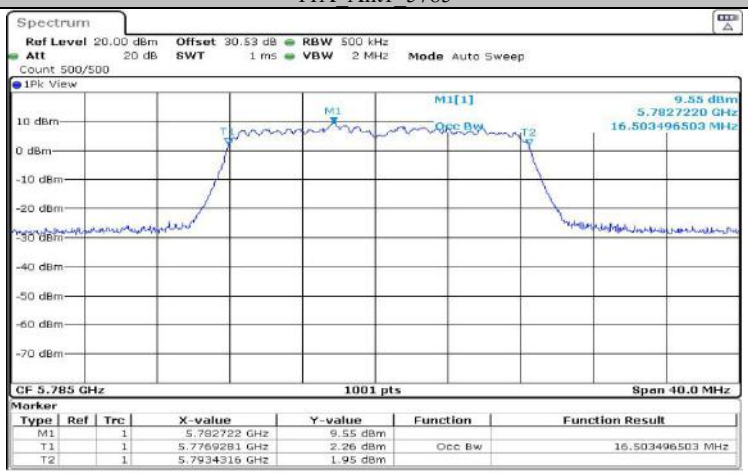
11A_Ant1_5745



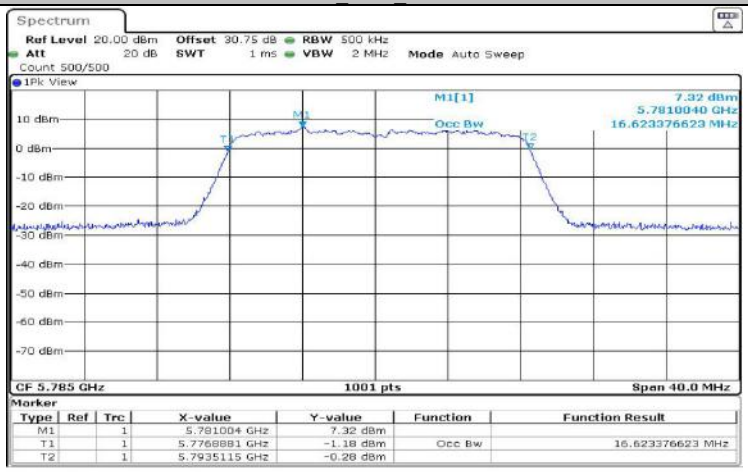
11A_Ant2_5745



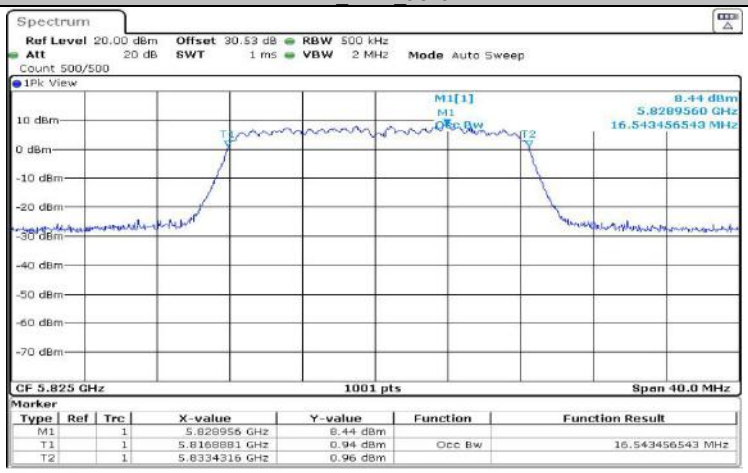
11A_Ant1_5785



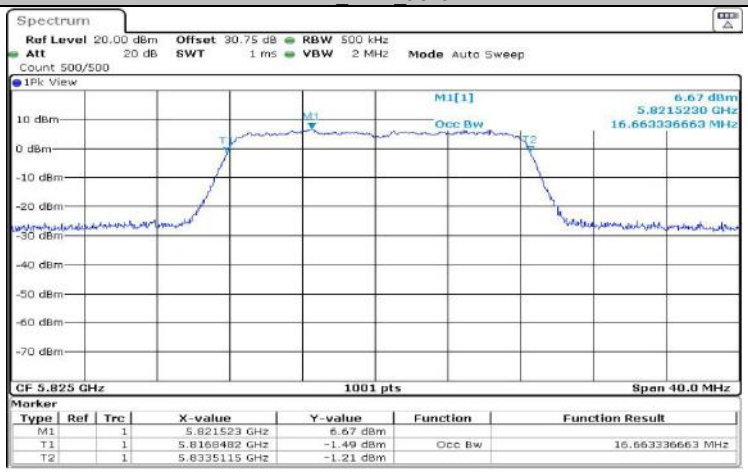
11A_Ant2_5785



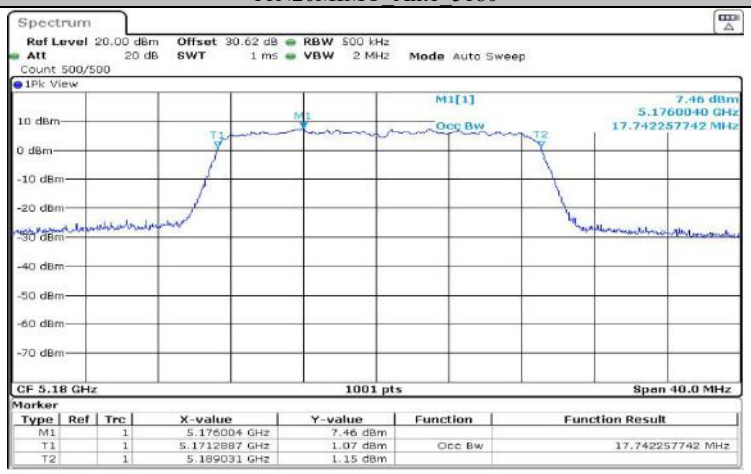
11A_Ant1_5825



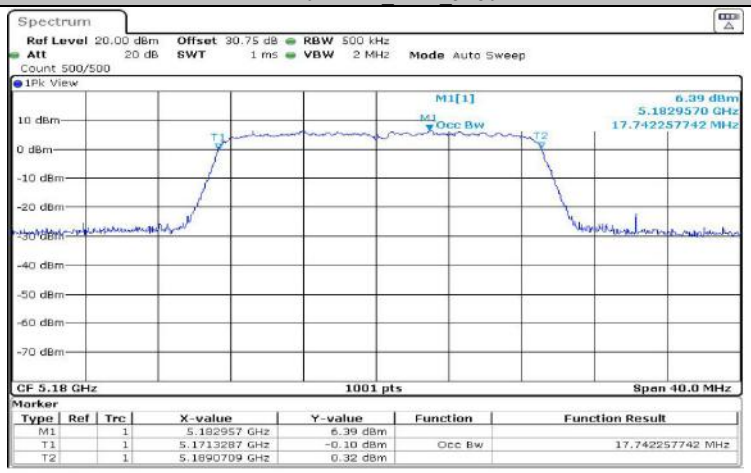
11A_Ant2_5825



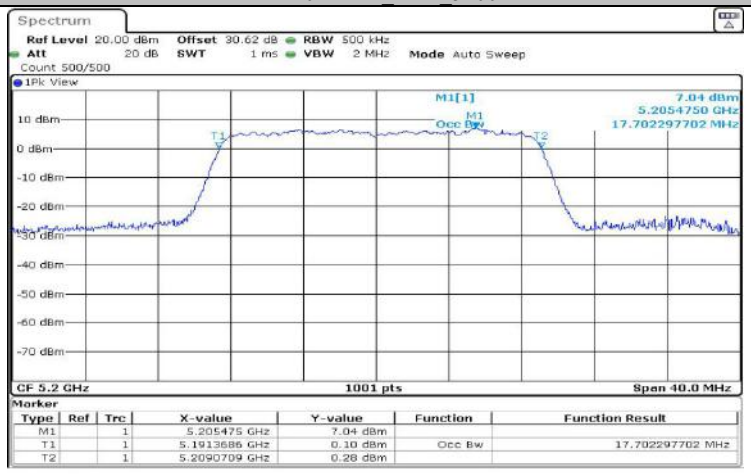
11N20MIMO_Ant1_5180



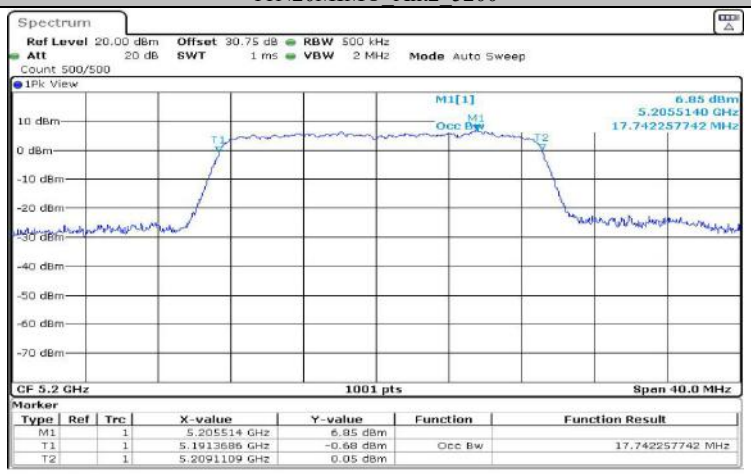
11N20MIMO_Ant2_5180



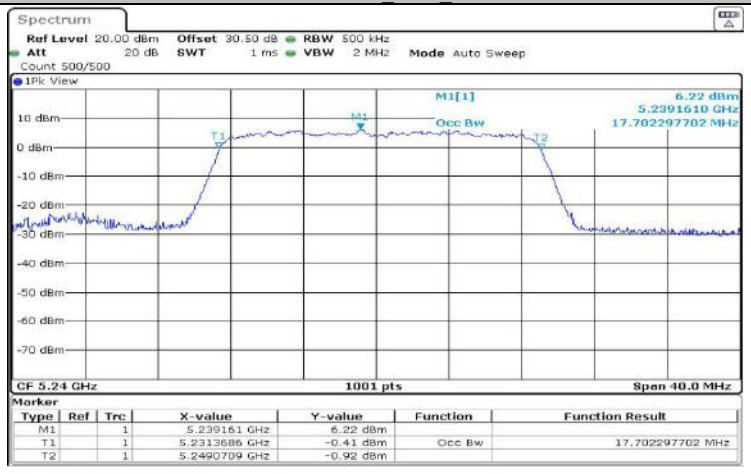
11N20MIMO_Ant1_5200



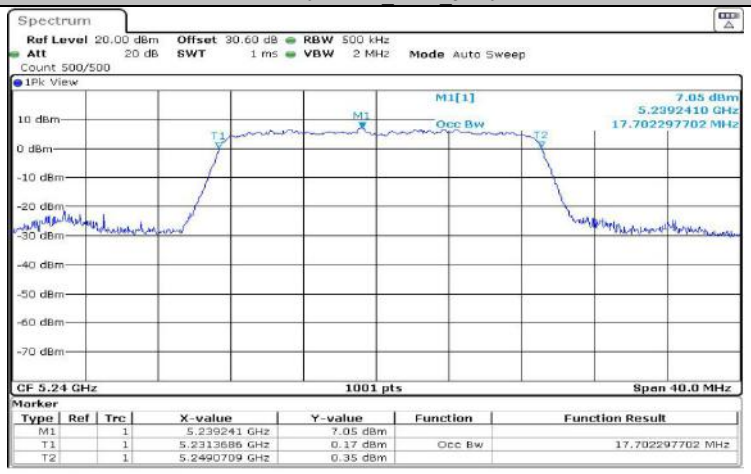
11N20MIMO_Ant2_5200



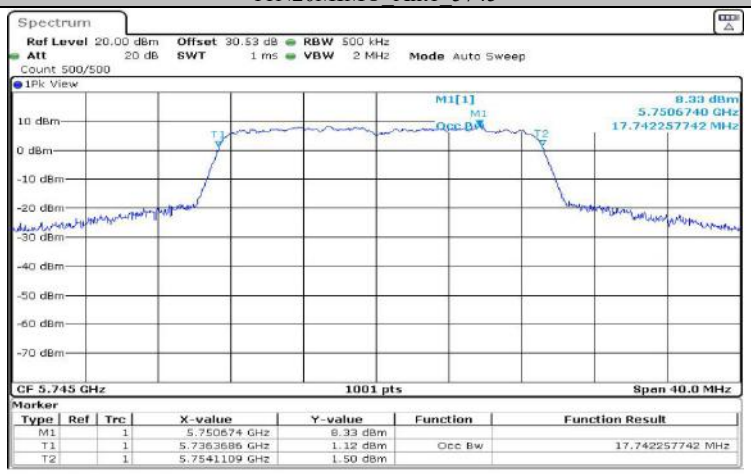
11N20MIMO_Ant1_5240



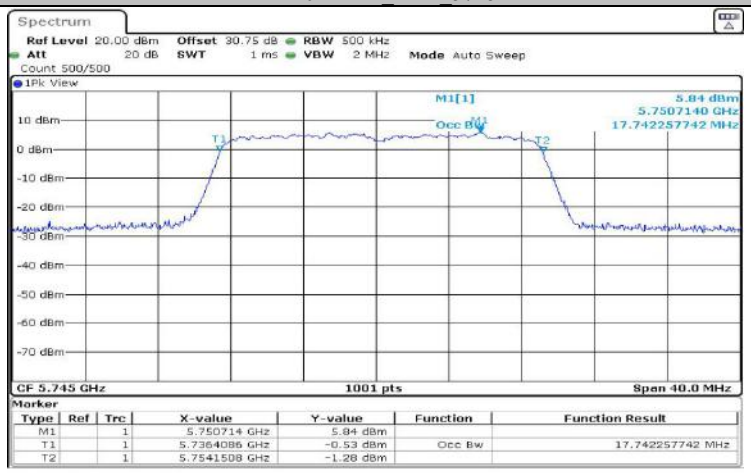
11N20MIMO_Ant2_5240



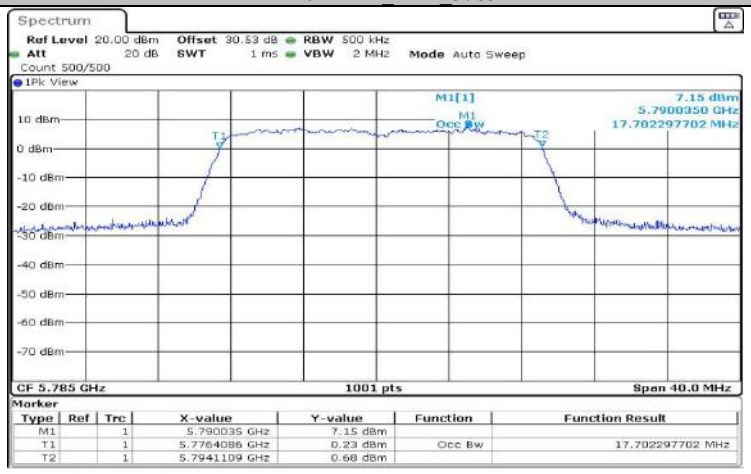
11N20MIMO_Ant1_5745



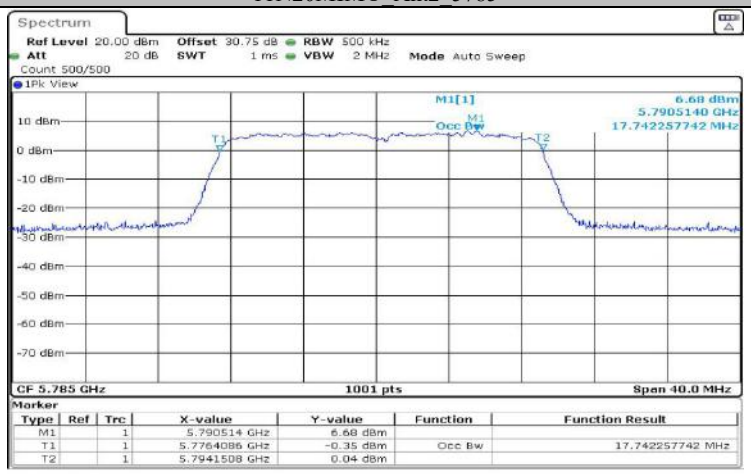
11N20MIMO_Ant2_5745



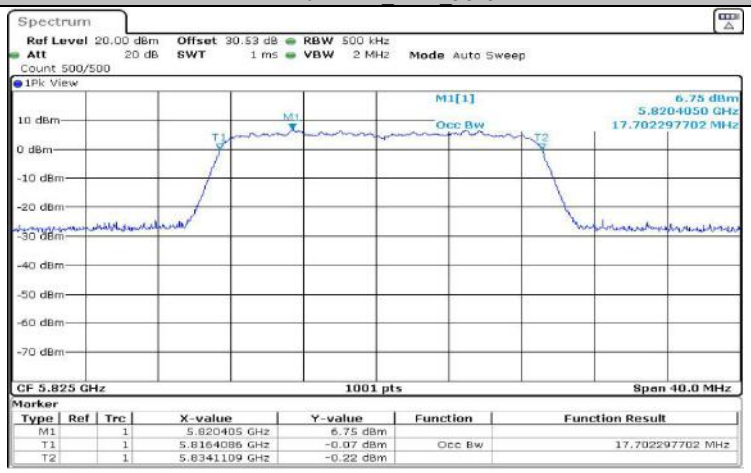
11N20MIMO_Ant1_5785



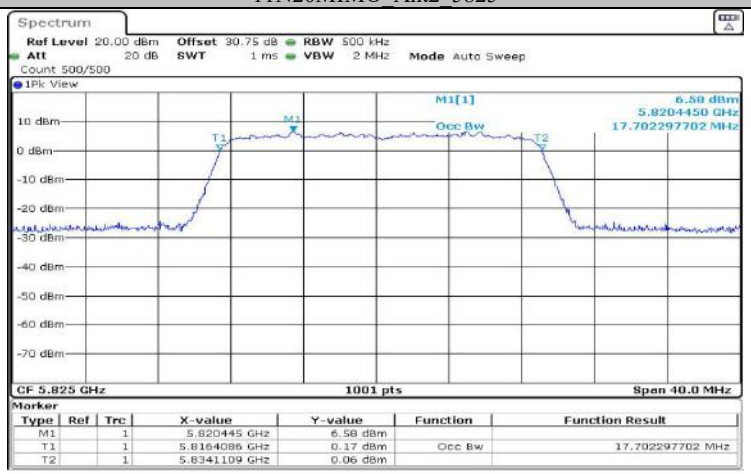
11N20MIMO_Ant2_5785



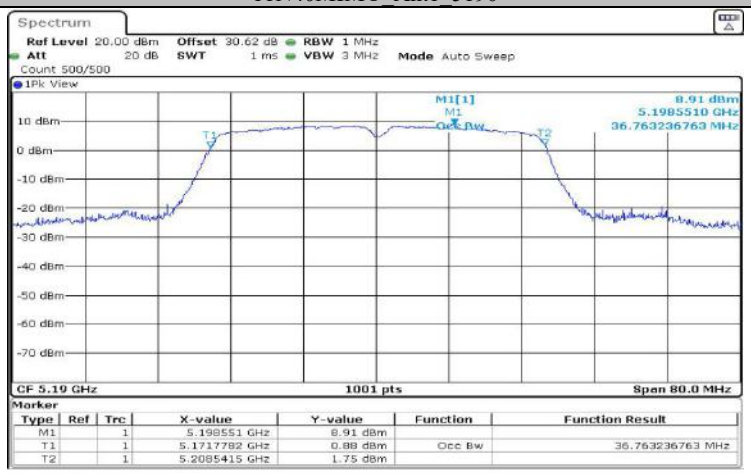
11N20MIMO_Ant1_5825



11N20MIMO_Ant2_5825

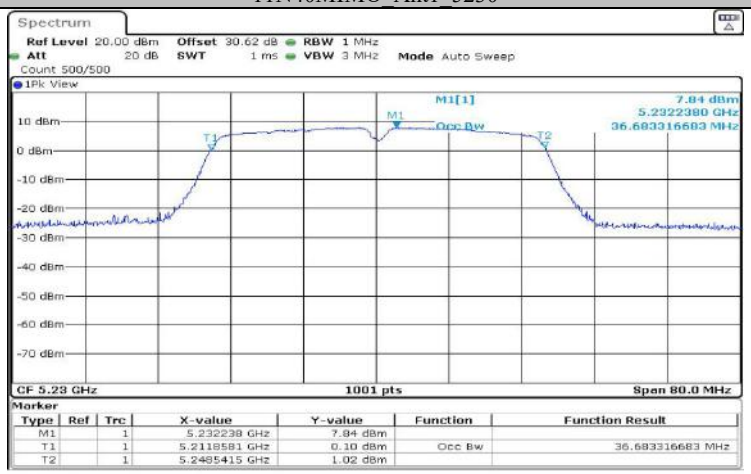


11N40MIMO_Ant1_5190

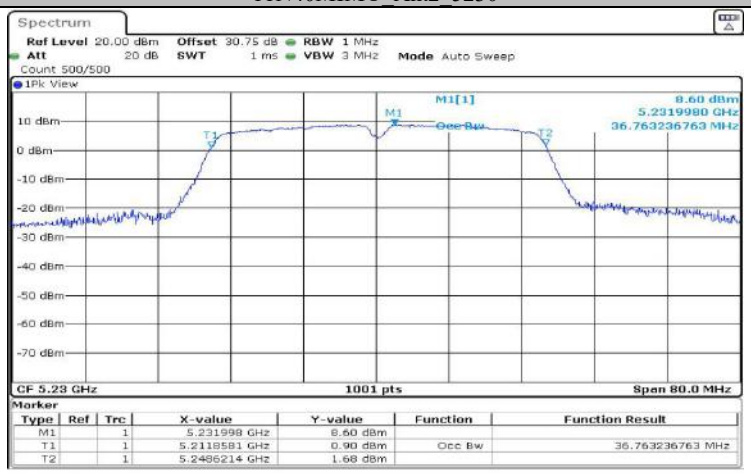


11N40MIMO_Ant2_5190

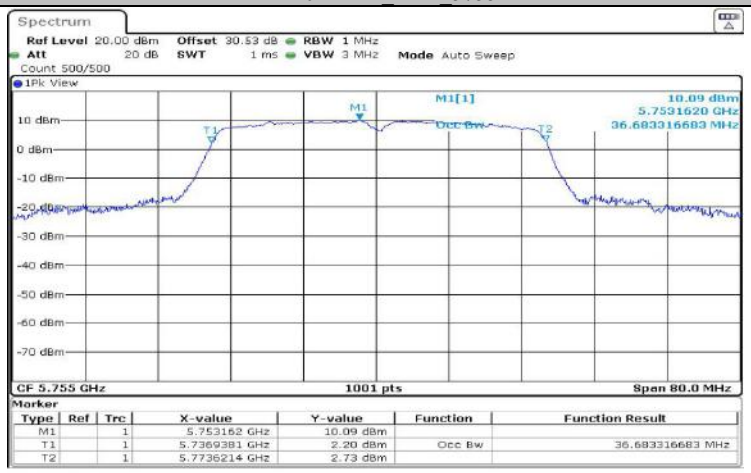
11N40MIMO_Ant1_5230



11N40MIMO_Ant2_5230

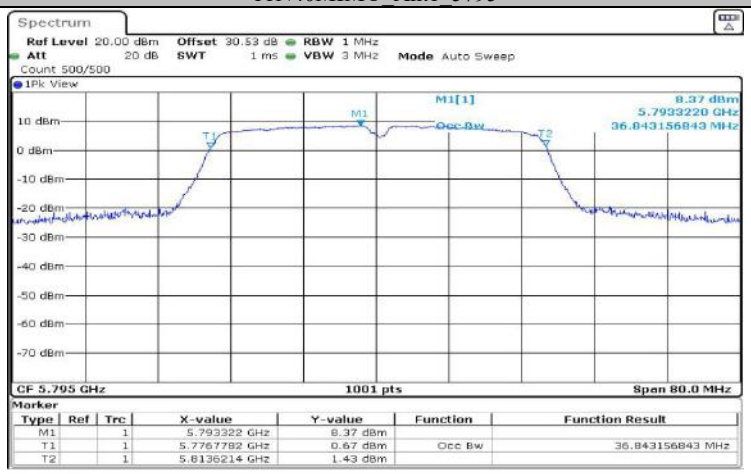


11N40MIMO_Ant1_5755

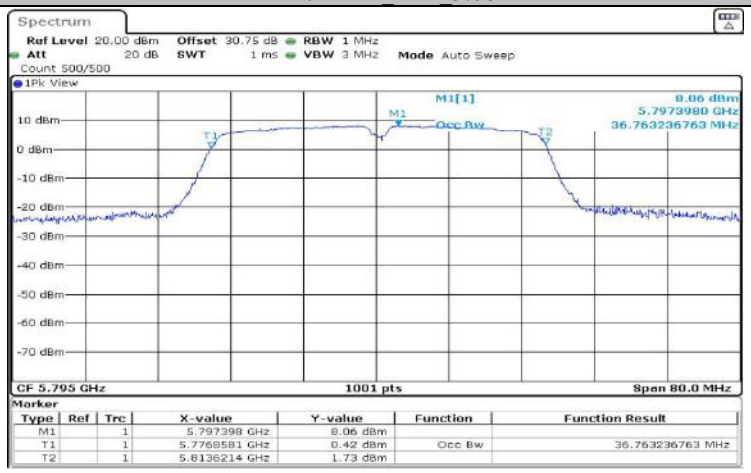


11N40MIMO_Ant2_5755

11N40MIMO_Ant1_5795



11N40MIMO_Ant2_5795



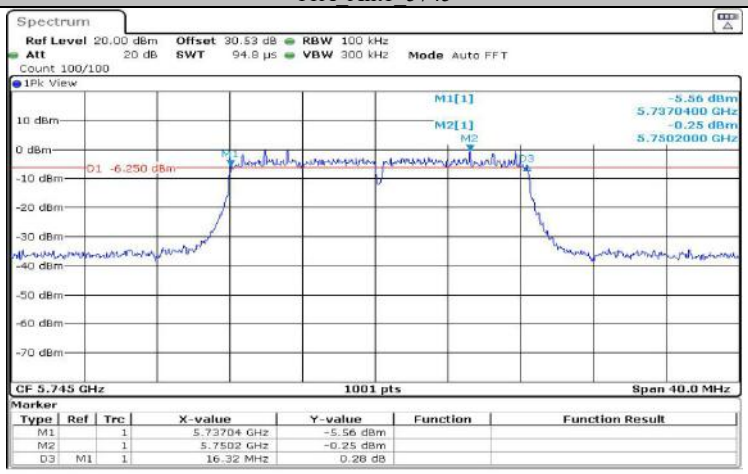
Appendix A3: Min emission bandwidth

Test Result

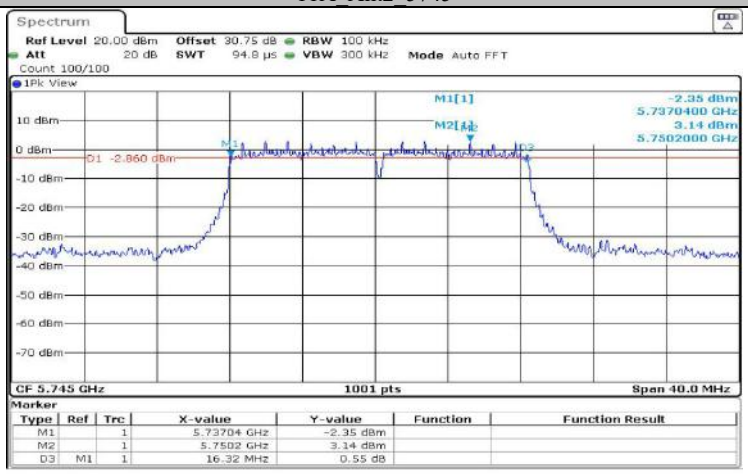
Test Mode	Antenna	Channel	6db EBW [MHz]	Limit[MHz]	Verdict
11A	Ant1	5745	16.32	0.5	PASS
	Ant2	5745	16.32	0.5	PASS
	Ant1	5785	16.32	0.5	PASS
	Ant2	5785	16.32	0.5	PASS
	Ant1	5825	16.28	0.5	PASS
	Ant2	5825	16.36	0.5	PASS
11N20MIMO	Ant1	5745	17.20	0.5	PASS
	Ant2	5745	17.52	0.5	PASS
	Ant1	5785	17.52	0.5	PASS
	Ant2	5785	17.56	0.5	PASS
	Ant1	5825	17.56	0.5	PASS
	Ant2	5825	17.56	0.5	PASS
11N40MIMO	Ant1	5755	35.12	0.5	PASS
	Ant2	5755	35.12	0.5	PASS
	Ant1	5795	35.04	0.5	PASS
	Ant2	5795	35.12	0.5	PASS

Test Graphs

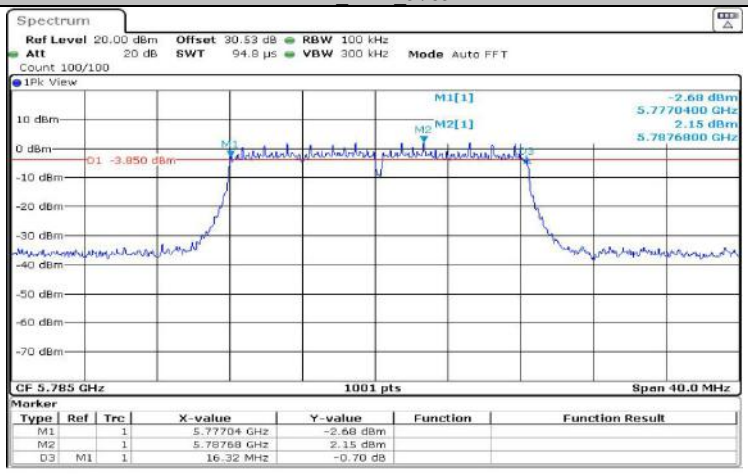
11A_Ant1_5745



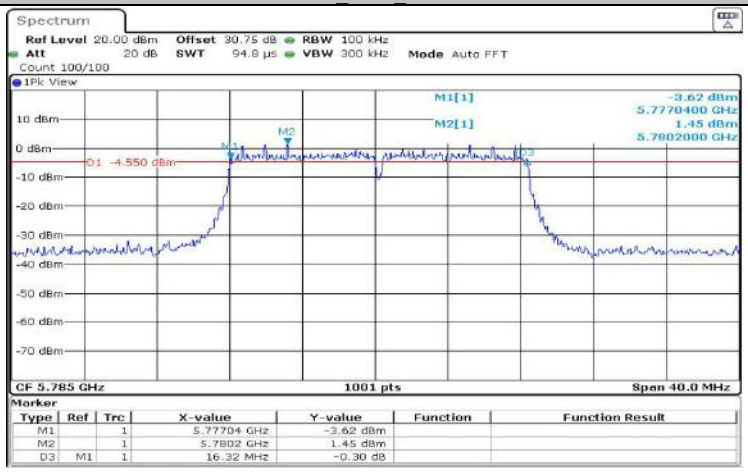
11A_Ant2_5745



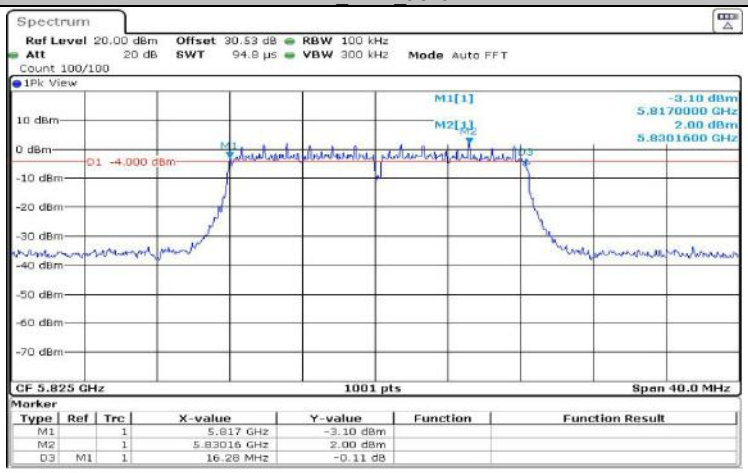
11A_Ant1_5785



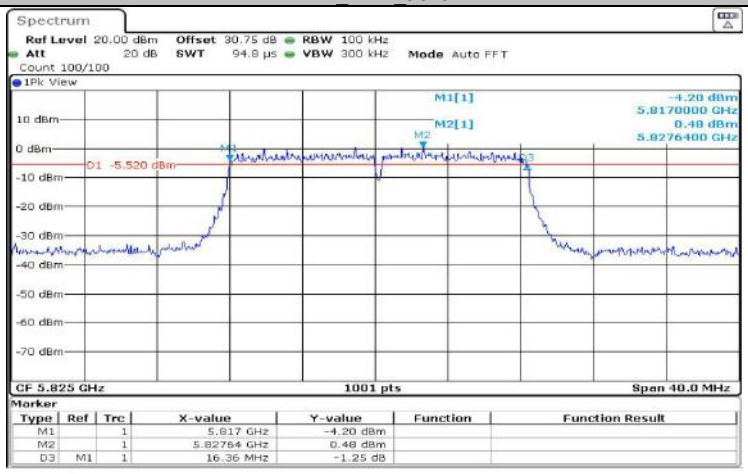
11A_Ant2_5785



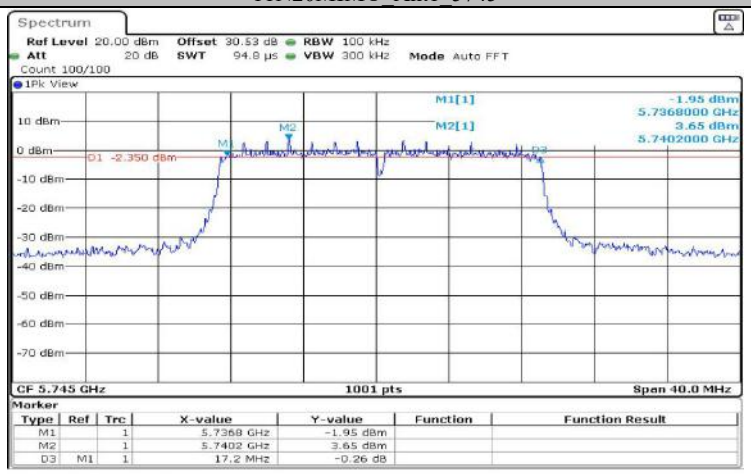
11A_Ant1_5825



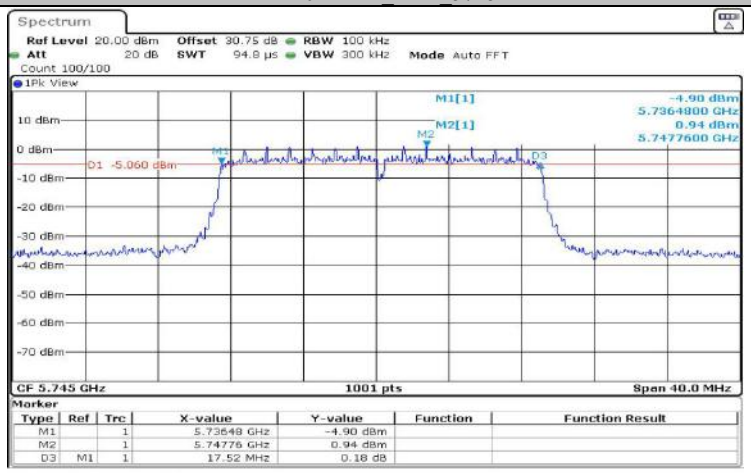
11A_Ant2_5825



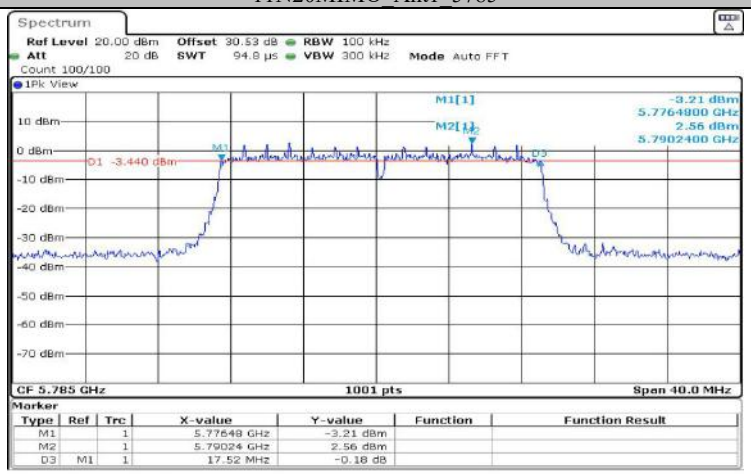
11N20MIMO_Ant1_5745



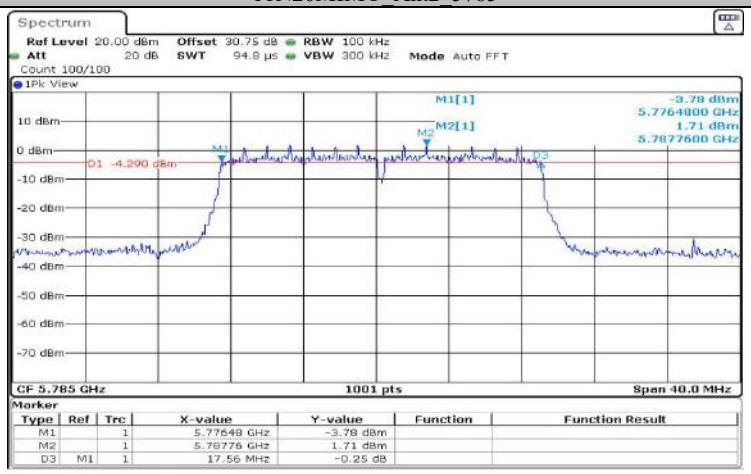
11N20MIMO_Ant2_5745



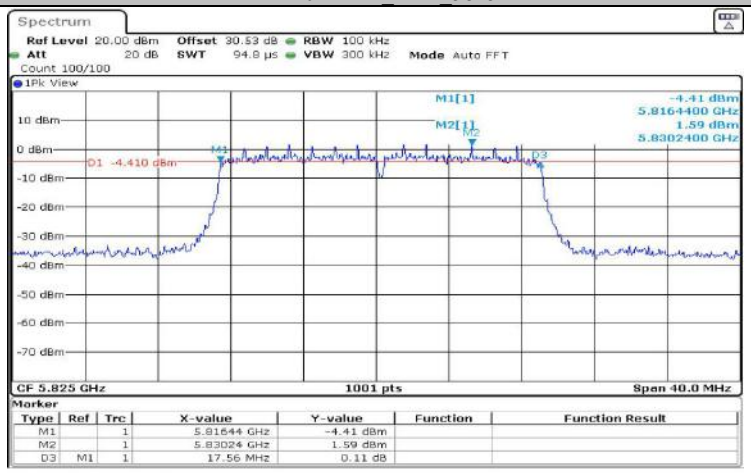
11N20MIMO_Ant1_5785



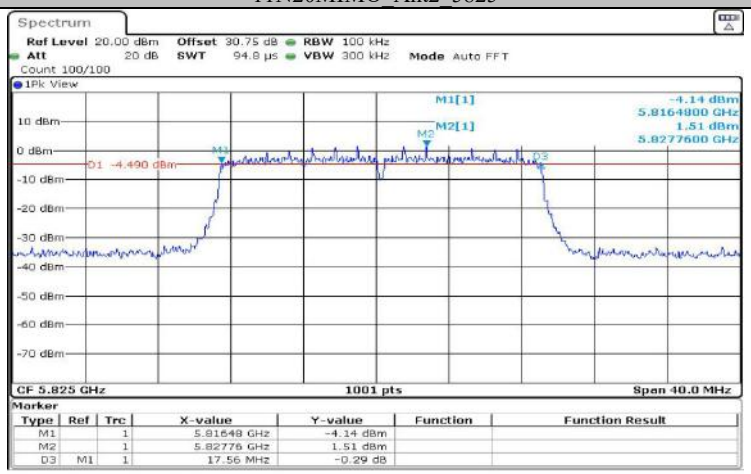
11N20MIMO_Ant2_5785



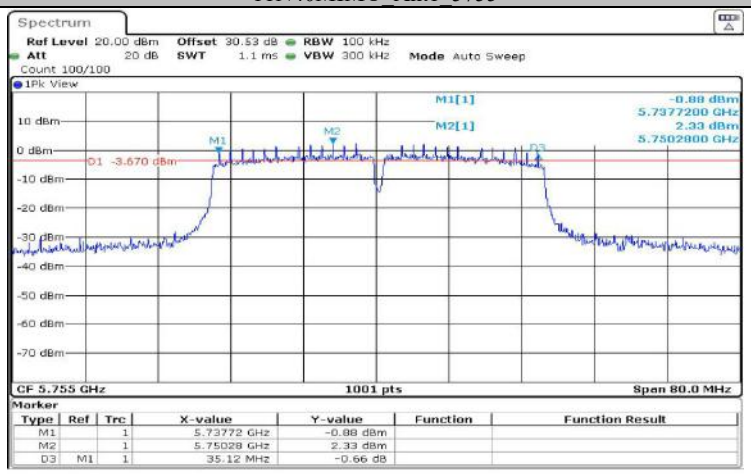
11N20MIMO_Ant1_5825



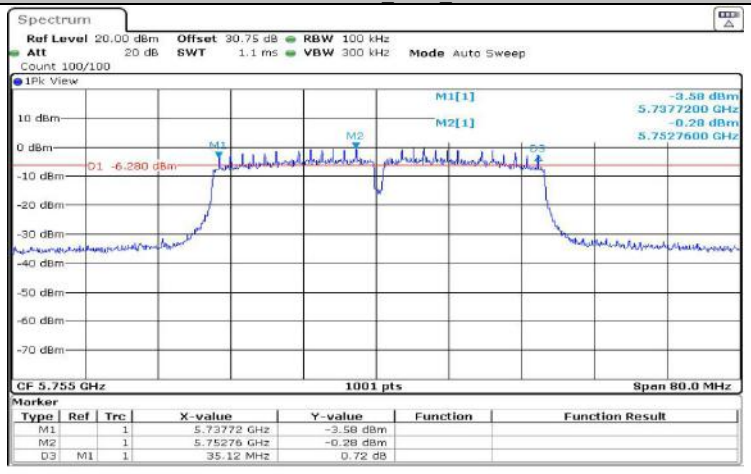
11N20MIMO_Ant2_5825



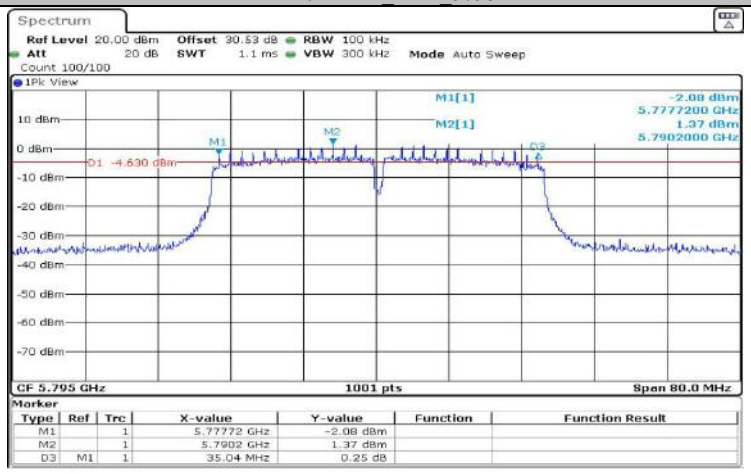
11N40MIMO_Ant1_5755



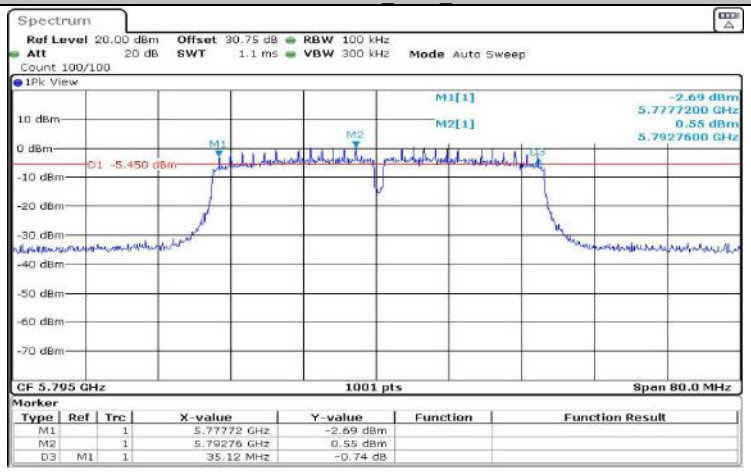
11N40MIMO_Ant2_5755



11N40MIMO_Ant1_5795



11N40MIMO_Ant2_5795



Appendix B: Maximum conducted output power

Test Result

Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11A	Ant1	5180	14.01	≤30.00	PASS
	Ant2	5180	13.51	≤30.00	PASS
	Ant1	5200	14.16	≤30.00	PASS
	Ant2	5200	13.23	≤30.00	PASS
	Ant1	5240	14.02	≤30.00	PASS
	Ant2	5240	13.96	≤30.00	PASS
	Ant1	5745	14.00	≤30.00	PASS
	Ant2	5745	13.91	≤30.00	PASS
	Ant1	5785	15.13	≤30.00	PASS
	Ant2	5785	14.84	≤30.00	PASS
	Ant1	5825	15.02	≤30.00	PASS
	Ant2	5825	14.57	≤30.00	PASS
11N20MIMO	Ant1	5180	15.02	≤30.00	PASS
	Ant2	5180	14.39	≤30.00	PASS
	total	5180	17.73	≤30.00	PASS
	Ant1	5200	14.83	≤30.00	PASS
	Ant2	5200	14.67	≤30.00	PASS
	total	5200	17.76	≤30.00	PASS
	Ant1	5240	14.81	≤30.00	PASS
	Ant2	5240	13.44	≤30.00	PASS
	total	5240	17.19	≤30.00	PASS
	Ant1	5745	14.07	≤30.00	PASS
	Ant2	5745	13.16	≤30.00	PASS
	total	5745	16.65	≤30.00	PASS
	Ant1	5785	15.38	≤30.00	PASS
	Ant2	5785	14.99	≤30.00	PASS
	total	5785	18.20	≤30.00	PASS
	Ant1	5825	14.21	≤30.00	PASS
	Ant2	5825	13.95	≤30.00	PASS
	total	5825	17.09	≤30.00	PASS
11N40MIMO	Ant1	5190	15.29	≤30.00	PASS
	Ant2	5190	14.46	≤30.00	PASS
	total	5190	17.91	≤30.00	PASS
	Ant1	5230	14.44	≤30.00	PASS
	Ant2	5230	14.16	≤30.00	PASS
	total	5230	17.31	≤30.00	PASS
	Ant1	5755	17.72	≤30.00	PASS
	Ant2	5755	16.37	≤30.00	PASS
	total	5755	20.11	≤30.00	PASS
	Ant1	5795	16.21	≤30.00	PASS
	Ant2	5795	15.98	≤30.00	PASS

	total	5795	19.11	≤30.00	PASS

Note 1:

EUT belongs to outdoor access point. The maximum antenna gain is 3.07dBi.

For 802.11n20/40 mode, EUT employ cyclic delay diversity (CDD)
According to KDB 662911 D01 v02r01, for power measurement on IEEE 802.11 devices:
Array Gain =0 dB (i.e., no array gain) for $N_{ANT}\leq 4$;
So Directional gain = G_{ANT} + Array Gain=3.07dBi<6dBi

Note 2:

For 5150-5250MHz band, the maximum EIRP=17.91dBm+3.07dBi=20.98dBm<21dBm, so it's can compliance with the requirement of the maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

Appendix C: Maximum power spectral density

Test Result

Test Mode	Antenna	Channel	Result [dBm/MHz]	Limit[dBm/MHz]	Verdict
11A	Ant1	5180	8.58	≤17	PASS
	Ant2	5180	7.62	≤17	PASS
	Ant1	5200	8.82	≤17	PASS
	Ant2	5200	7.03	≤17	PASS
	Ant1	5240	7.93	≤17	PASS
	Ant2	5240	7.82	≤17	PASS
	Ant1	5745	5.38	≤30	PASS
	Ant2	5745	5.24	≤30	PASS
	Ant1	5785	7.57	≤30	PASS
	Ant2	5785	6.94	≤30	PASS
	Ant1	5825	7.34	≤30	PASS
	Ant2	5825	6.10	≤30	PASS
11N20MIMO	Ant1	5180	8.05	≤16.93	PASS
	Ant2	5180	7.12	≤16.93	PASS
	total	5180	10.62	≤16.93	PASS
	Ant1	5200	7.82	≤16.93	PASS
	Ant2	5200	7.68	≤16.93	PASS
	total	5200	10.76	≤16.93	PASS
	Ant1	5240	7.52	≤16.93	PASS
	Ant2	5240	6.55	≤16.93	PASS
	total	5240	10.07	≤16.93	PASS
	Ant1	5745	4.85	≤29.93	PASS
	Ant2	5745	3.97	≤29.93	PASS
	total	5745	7.44	≤29.93	PASS
	Ant1	5785	6.43	≤29.93	PASS
	Ant2	5785	5.93	≤29.93	PASS
	total	5785	9.20	≤29.93	PASS
	Ant1	5825	5.87	≤29.93	PASS
	Ant2	5825	5.55	≤29.93	PASS
	total	5825	8.72	≤29.93	PASS
11N40MIMO	Ant1	5190	6.22	≤16.93	PASS
	Ant2	5190	5.77	≤16.93	PASS
	total	5190	9.01	≤16.93	PASS
	Ant1	5230	5.48	≤16.93	PASS
	Ant2	5230	5.04	≤16.93	PASS
	total	5230	8.28	≤16.93	PASS
	Ant1	5755	5.76	≤29.93	PASS
	Ant2	5755	4.18	≤29.93	PASS
	total	5755	8.05	≤29.93	PASS
	Ant1	5795	4.36	≤29.93	PASS
	Ant2	5795	4.08	≤29.93	PASS
	total	5795	7.23	≤29.93	PASS

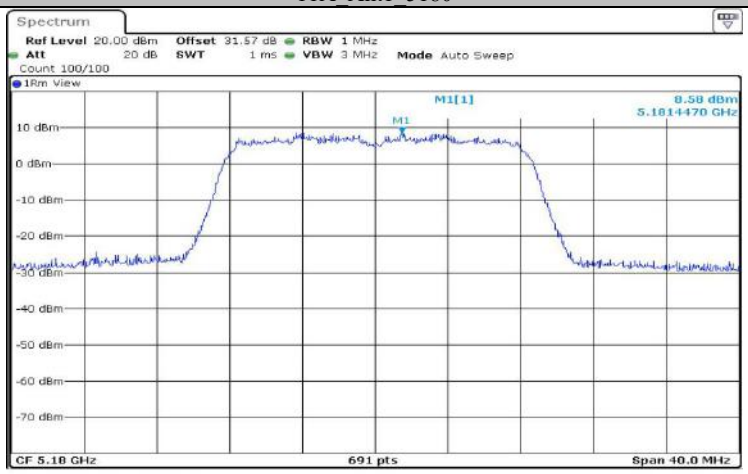
Note: 1. The Result and Limit Unit is dBm/500 kHz in the band 5.725–5.85 GHz.
2. The Duty Cycle Factor is compensated in the graph.
3. For 802.11n20/40 mode, EUT employ cyclic delay diversity (CDD)

According to KDB 662911 D01 v02r01, for PSD measurement on IEEE 802.11 devices:

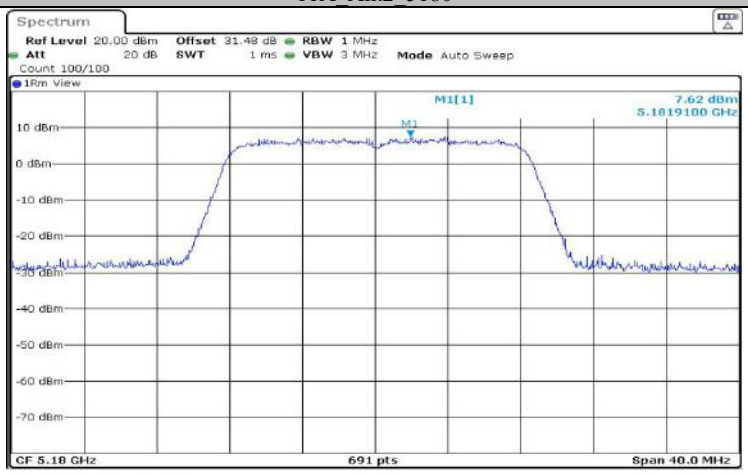
Array Gain =10*log(N_{ANT})=10*log(2)=3dB
Directional gain = G_{ANT} + Array Gain=3.07dBi+3dB-6.07dBi>6dBi
So the limit should reduce 0.07dB.

Test Graphs

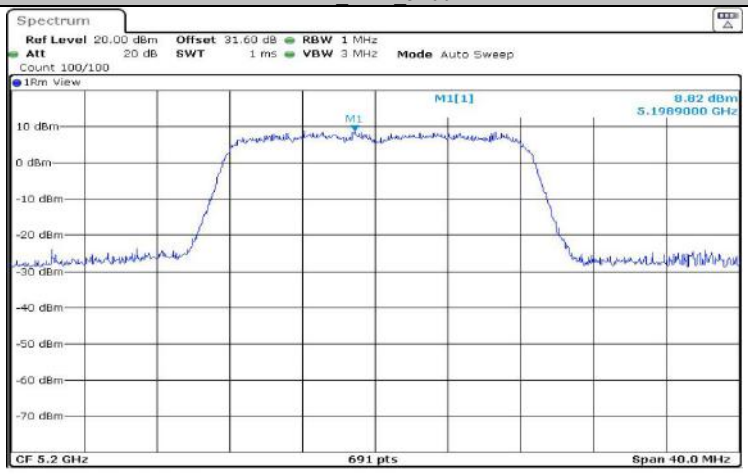
11A_Ant1_5180



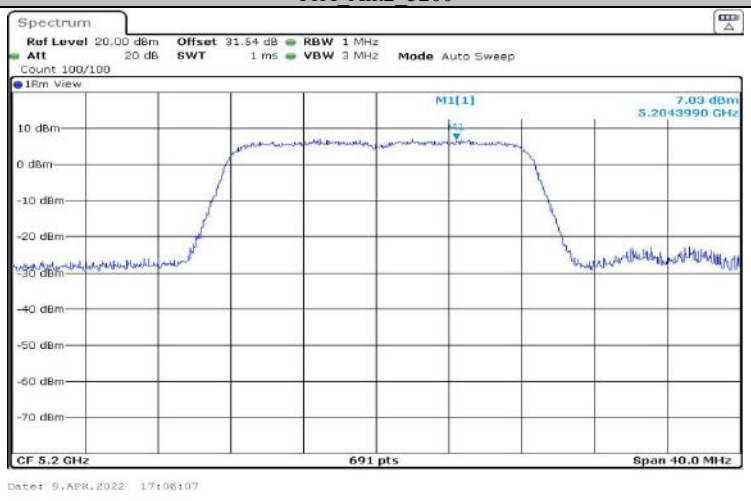
11A_Ant2_5180



11A_Ant1_5200



11A_Ant2_5200



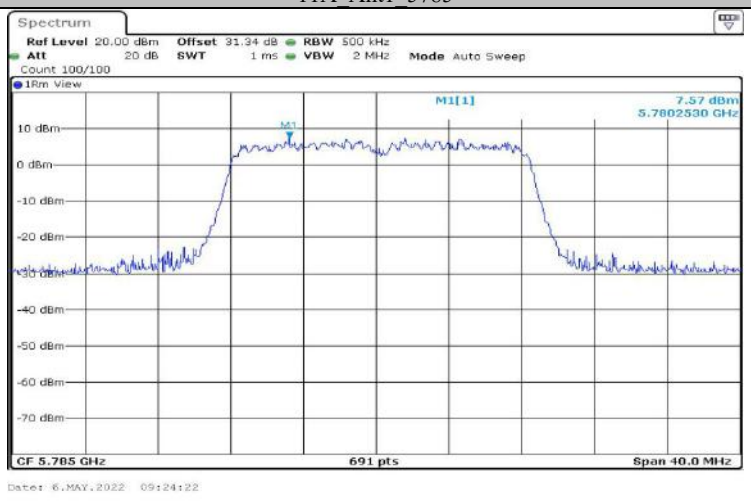
11A_Ant1_5240

11A_Ant2_5240

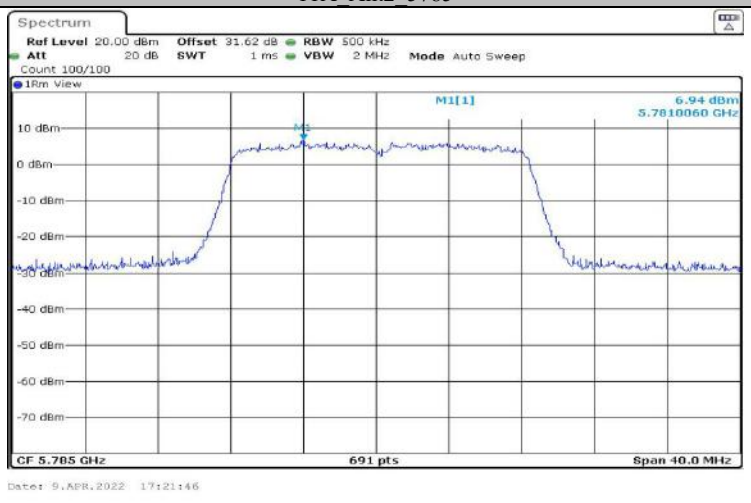
11A_Ant1_5745

11A_Ant2_5745

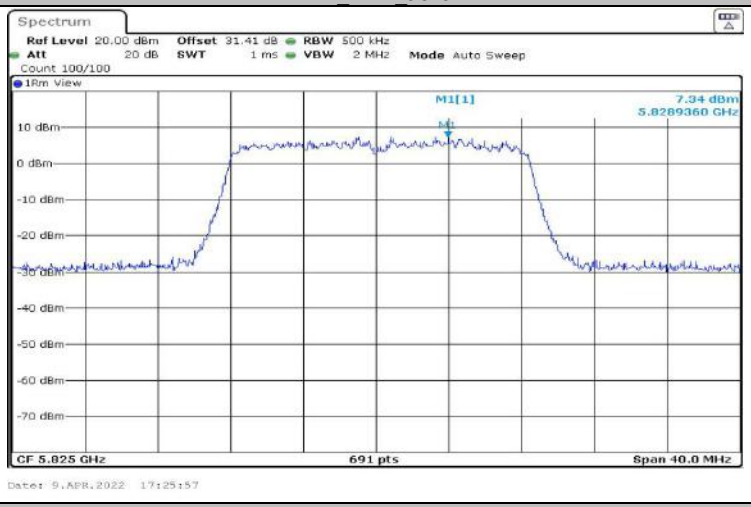
11A_Ant1_5785



11A_Ant2_5785

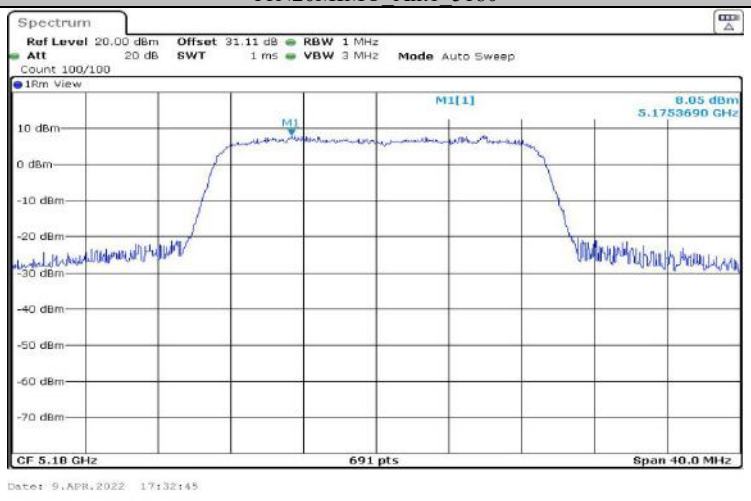


11A_Ant1_5825

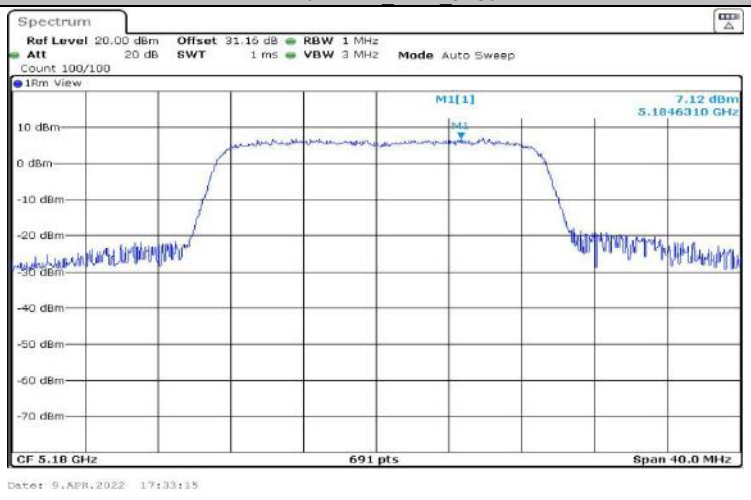


11A_Ant2_5825

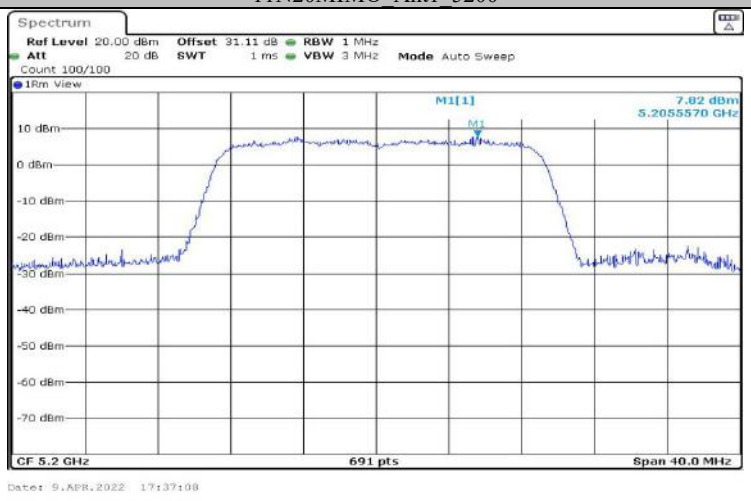
11N20MIMO_Ant1_5180



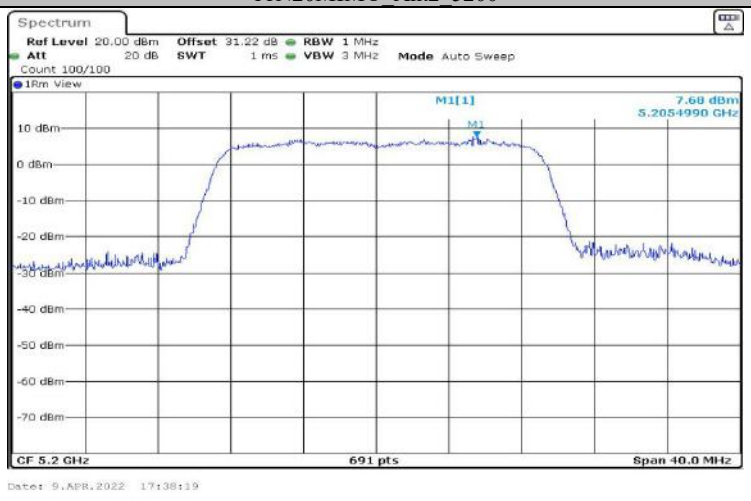
11N20MIMO_Ant2_5180



11N20MIMO_Ant1_5200



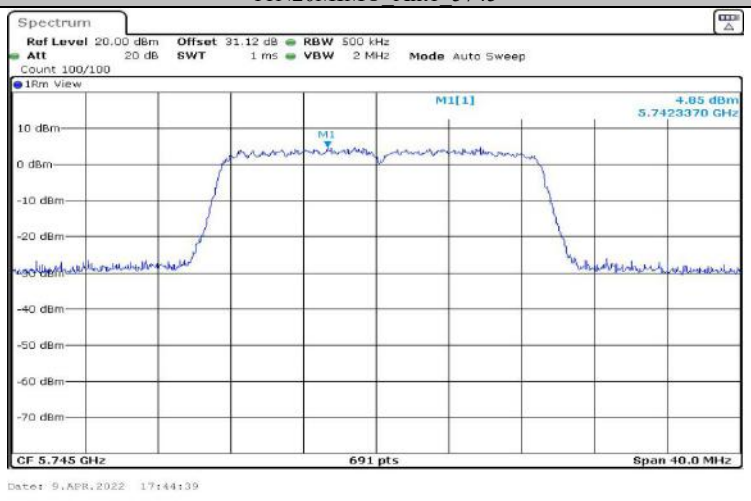
11N20MIMO_Ant2_5200



11N20MIMO_Ant1_5240

11N20MIMO_Ant2_5240

11N20MIMO_Ant1_5745



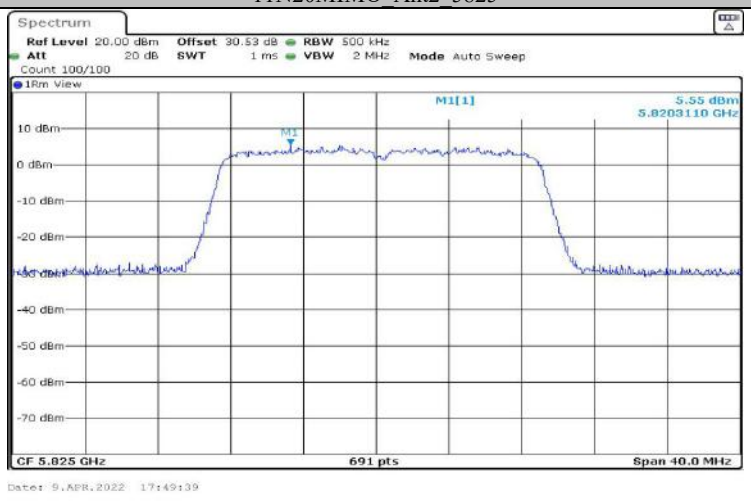
11N20MIMO_Ant2_5745

11N20MIMO_Ant1_5785

11N20MIMO_Ant2_5785

11N20MIMO_Ant1_5825

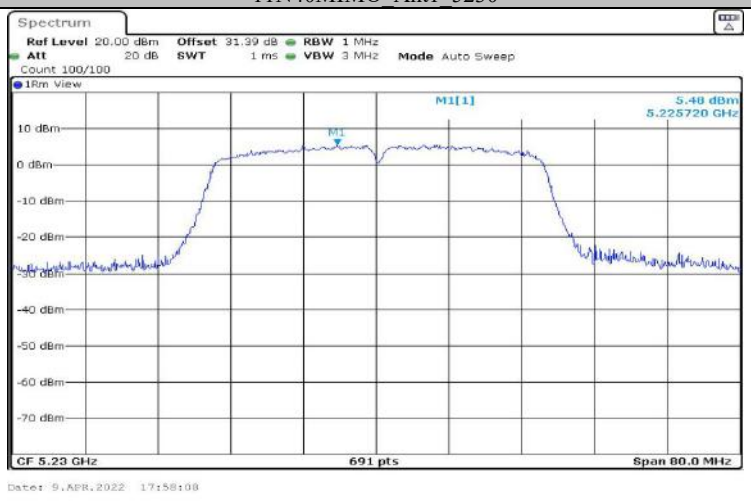
11N20MIMO_Ant2_5825



11N40MIMO_Ant1_5190

11N40MIMO_Ant2_5190

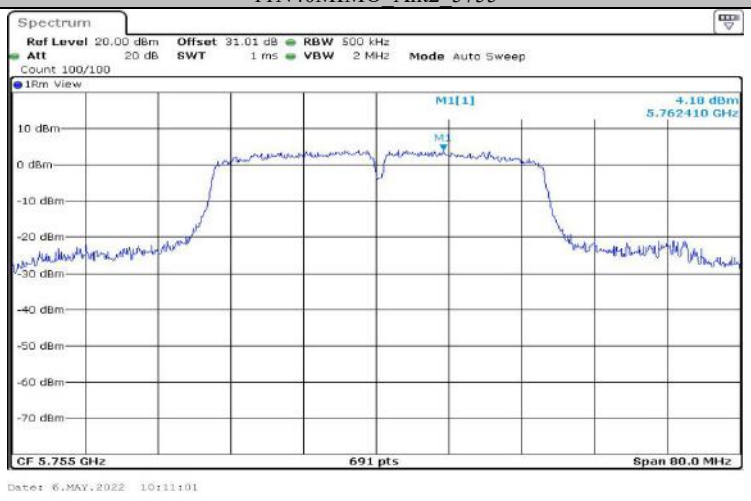
11N40MIMO_Ant1_5230

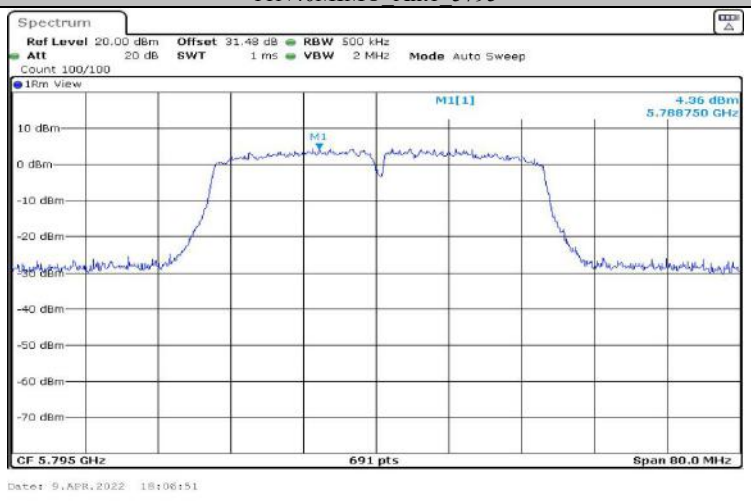


11N40MIMO_Ant2_5230

11N40MIMO_Ant1_5755

11N40MIMO_Ant2_5755



11N40MIMO_Ant1_5795

11N40MIMO_Ant2_5795

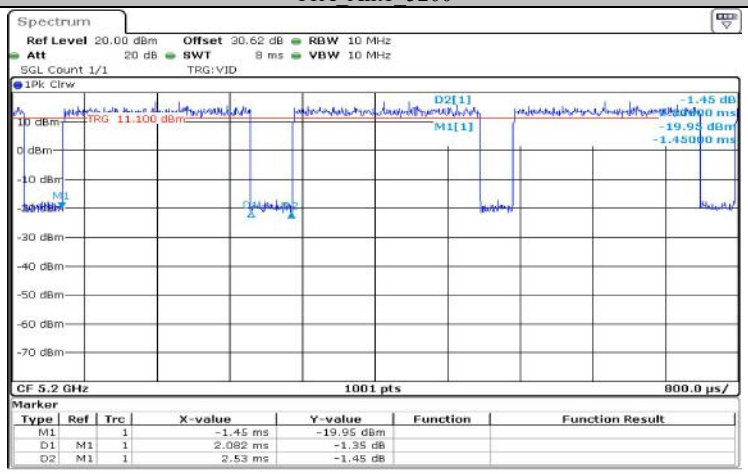

Appendix D: Duty Cycle

Test Result

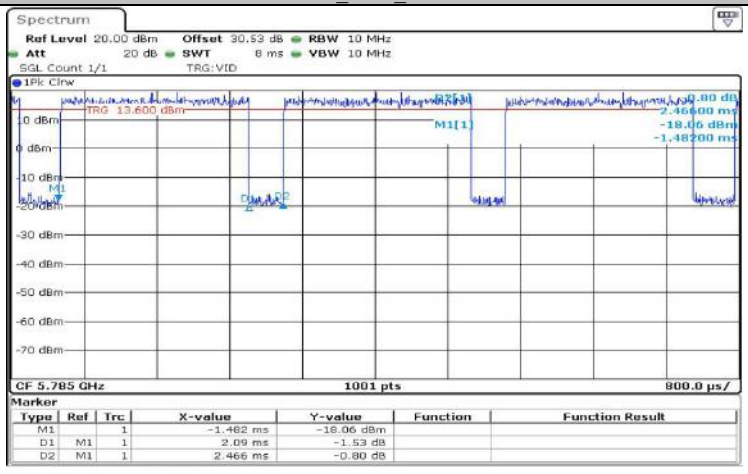
Test Mode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
11A	Ant1	5200	2.08	2.53	82.21
	Ant1	5785	2.09	2.47	84.62
11N20MIMO	Ant1	5200	1.94	2.08	93.27
	Ant1	5785	1.91	2.08	91.83
11N40MIMO	Ant1	5190	0.96	1.13	84.96
	Ant1	5755	0.96	1.09	88.07

Test Graphs

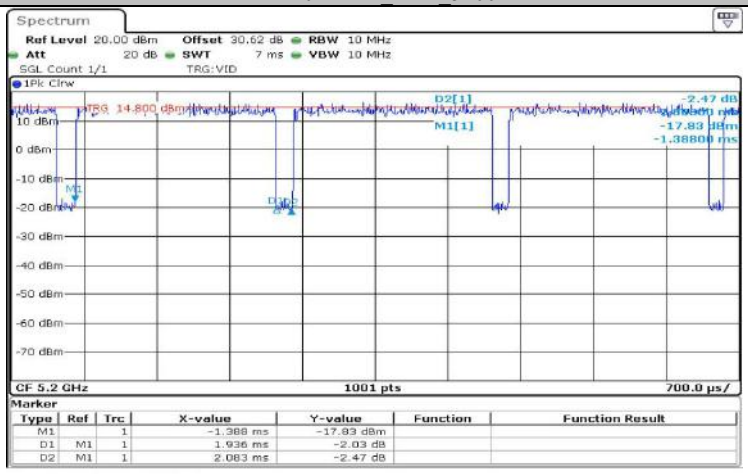
11A_Ant1_5200



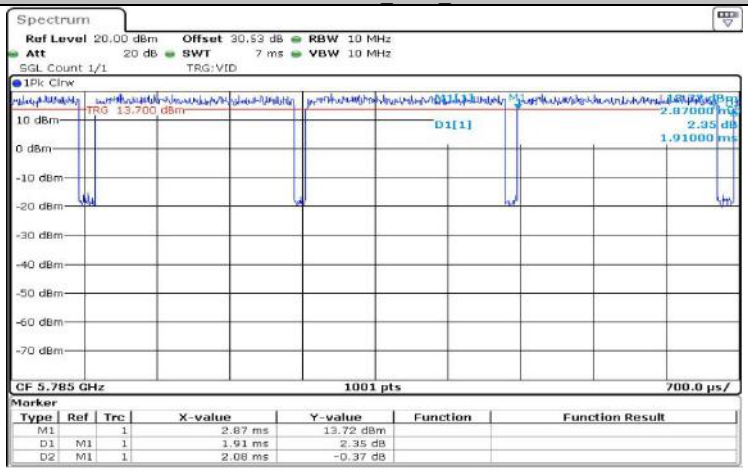
11A_Ant1_5785



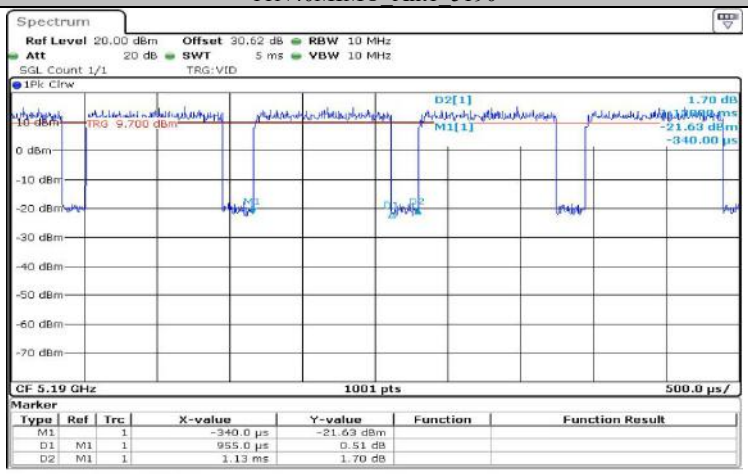
11N20MIMO_Ant1_5200



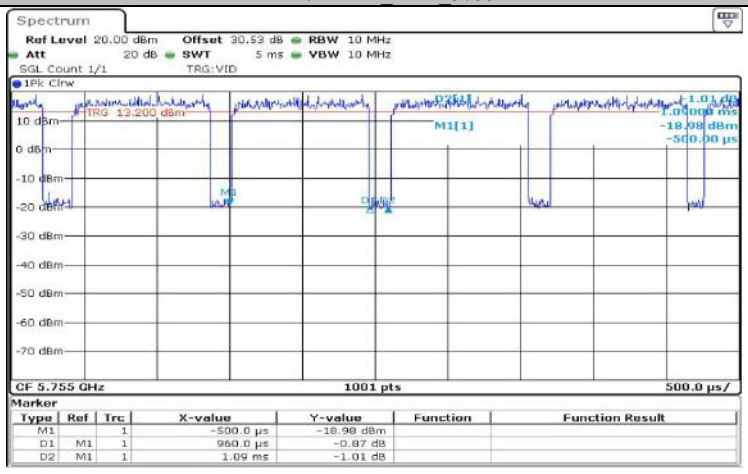
11N20MIMO_Ant1_5785



11N40MIMO_Ant1_5190



11N40MIMO_Ant1_5755



******* END OF REPORT *******