TEST REPORT

Applicant Name :	Vuzix Corporation
Address :	25 Hendrix Rd, West Henrietta, New York, United States 14586
Report Number :	SZ1211029-55736E-RF-00A1
FCC ID:	2AA9D-490

Test Standard (s)

FCC PART 15.407

Sample Description

Product Type:	M4000
Model No.:	490
Multiple Model(s) No.:	N/A
Trade Mark:	VUZIX
Date Received:	2021/10/29
Date of Test:	2021/11/11~2021/12/03
Report Date:	2022/02/08

Test Result:	Pass*

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

Prepared and Checked By:

Black Ding

EMC Engineer

Approved By:

Robert 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.

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Frequency Range	5G Wi-Fi: 5250-5350MHz; 5470-5725MHz
Mode	802.11a/n20/n40/ac20/ac40/ac80
Maximum Conducted Average Ouput Power	5250-5350MHz: 11.68dBm 5470-5725MHz: 12.75dBm
Modulation Technique	OFDM
Antenna Specification*	3.0 dBi (It is provided by the applicant)
Voltage Range	DC 3.7V from battery
Sample serial number	SZ1211029-55736E-RFA1-S2 for Conducted and Radiated Emissions SZ1211029-55736E-RFA1-S1 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, 15.207, 15.209 and 15.407 rules.

This is a CIIPC application of the device; the differences between the original device and the current one are as follows:

(1) Adding DFS bands (5250-5350MHz & 5470-5725MHz) by software.

Based on above differences, it will affected partial test data, so the changed items were performed.

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 429 7.01.

Listed by Innovation, Science and Economic Development Canada (ISEDC), 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 only supports 5G Wi-Fi 802.11a/n20/n40/ac20/ac40/ac80 modes.

For 5250-5350MHz Band, 7 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	60	5300
54	5270	62	5310
56	5280	64	5320
58	5290	/	/

For 802.11a, 802.11n20/ac20 mode: channel 52, 56, 64 were tested; For 802.11n40/ac40 mode: channel 54, 62 were tested. For 802.11ac80 mode, channel 58 was tested.

For 5470-5725MHz Band, 21 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
100	5500	124	5620
102	5510	126	5630
104	5520	128	5640
106	5530	132	5660
108	5540	134	5670
110	5550	136	5680
112	5560	138	5690
116	5580	140	5700
118	5590	142	5710
120	5600	144	5720
122	5610	/	/

For 802.11a, 802.11n20/ac20 mode: channel 100, 116, 144 were tested; For 802.11n40/ac40 mode: channel 102, 118, 142 were tested. For 802.11ac80 mode, channel 106, 122, 138 was tested.

For the highest channel are straddle channels, the OOBE emission was additional test on: For 802.11a, 802.11n20/ac20 mode: channel 140; For 802.11n40/ac40 mode: channel 134.

EUT Exercise Software

"QRCT"* exercise software was used. The software and power level was provided by the applicant.

The worst case was performed under:

Mode	Data Rate	Power Level*
802.11 a	6Mbps	15
802.11 n20	MCS0	15
802.11 n40	MCS0	15
802.11 ac20	MCS0	15
802.11 ac40	MCS0	15
802.11 ac80	MCS0	15

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 rated bandwidths, and modulations.

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

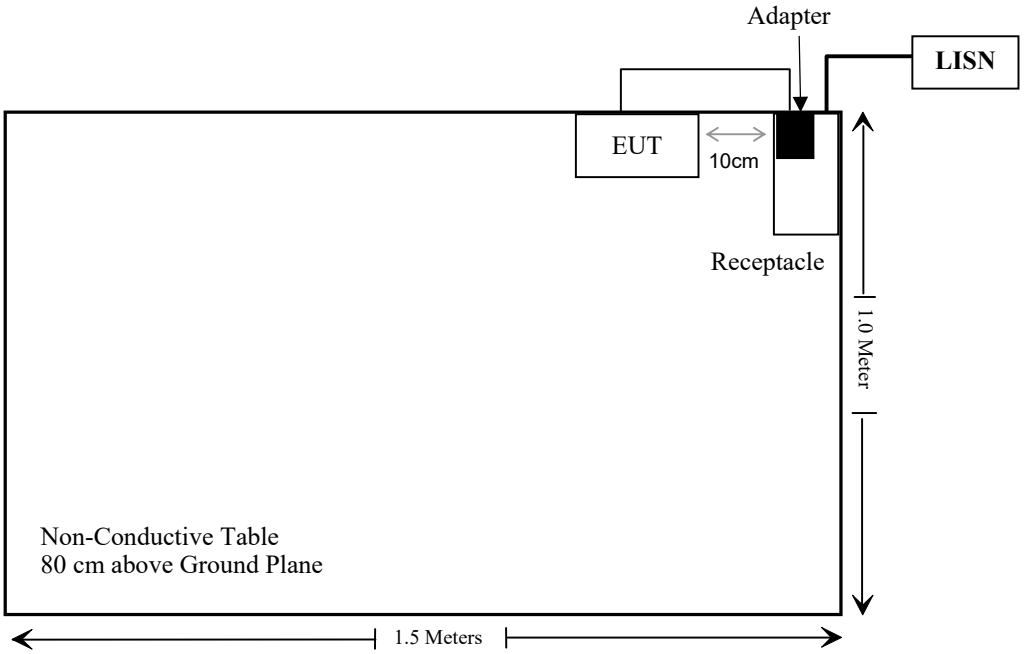
Manufacturer	Description	Model	Serial Number
HuaJin	Adapter	HJ-0502000W2-US	10294410

External I/O Cable

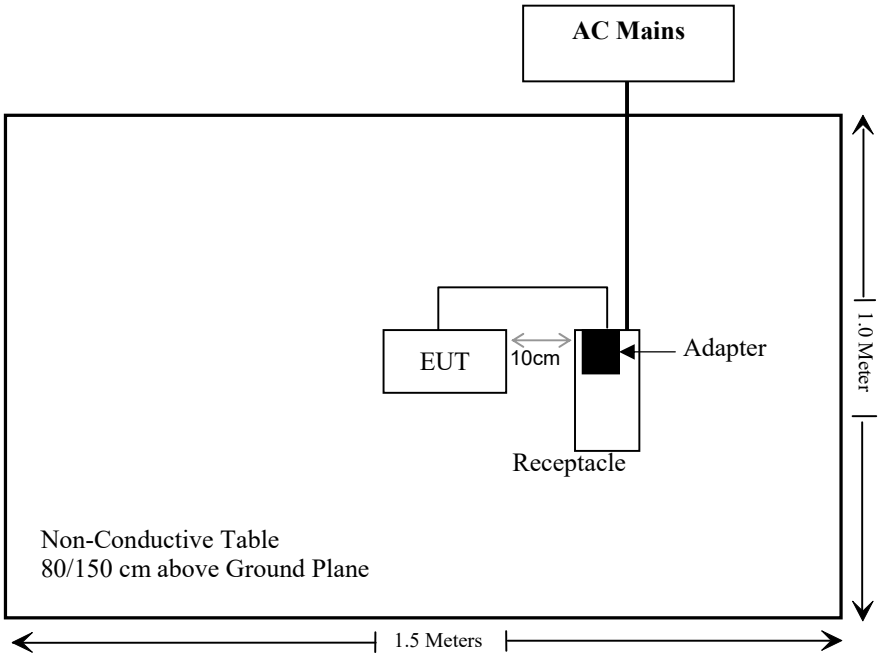
Cable Description	Length (m)	From Port	To
Un-shielding Un-Detachable USB Cable	1.2	Adapter	USB

Block Diagram of Test Setup

For conducted emission:



For Radiated emission:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§ 1.1307 , §2.1093	RF Exposure (SAR)	Compliant
§15.203	Antenna Requirement	Compliant
§15.407(b)(9)& §15.207(a)	Conducted Emissions	Compliant
§15.205& §15.209 &§15.407(b)	Undesirable Emission& Restricted Bands	Compliant
§15.407(a) (e)	26 dB Emission Bandwidth & 6dB Bandwidth	Compliant
§15.407(a)	Conducted Transmitter Output Power	Compliant
§15.407 (a)	Power Spectral Density	Compliant
§15.407 (h)	Transmit Power Control (TPC)	Not Applicable
§15.407 (h)	Dynamic Frequency Selection (DFS)	Compliant*

Not Applicable: the EUT has no TPC function which was declarded by the applicant.
Compliant*: Please refer to the DFS report: SZ1211029-55736E-RFA1.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted emission test					
Rohde& Schwarz	Test Receiver	ESPI3	100396	2020/12/24	2021/12/23
R & S	L.I.S.N.	ENV216	101314	2020/12/25	2021/12/24
Anritsu Corp	50ΩCoaxial Switch	MP59B	6200506474	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-2m	No.2	2020/12/25	2021/12/24
Conducted Emission Test Software: e3 19821G (V9)					
Radiated emission test					
Rohde& Schwarz	Test Receiver	ESR	101817	2020/12/24	2021/12/23
Rohde&Schwarz	Spectrum Analyzer	FSV40	101495	2020/12/24	2021/12/23
SONOMA INSTRUMENT	Amplifier	310 N	186131	2020/12/25	2021/12/24
A.H. Systems, inc.	Preamplifier	PAM-0118P	531	2021/07/08	2022/07/07
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2020/11/28	2021/11/27
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2020/12/25	2021/12/24
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2020/01/05	2023/01/04
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 19821G (V9)					
Unknown	RF Coaxial Cable	N-5m	No.3	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-5m	No.4	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-1m	No.5	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-1m	No.6	2020/12/25	2021/12/24
CD	Band Reject Filter	BRM-5.15/5.35g-45	075	2020/12/25	2021/12/24
CD	Band Reject Filter	BRM-5.47/5.725G-45	075	2020/12/25	2021/12/24

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF conducted test					
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101495	2020/12/24	2021/12/23
Tonscend	RF Control Unit	JS0806-2	19G8060182	2021/07/06	2022/07/05

*** 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 §1.1307(b) & §2.1093 - RF EXPOSURE INFORMATION

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliance, please refer to the SAR report: SZNS211029-55736E-SAA1.

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 has one internal antenna arrangement, which was permanently attached and the antenna gain is 3 dBi, fulfill the requirement of this section. Please refer to the EUT photos

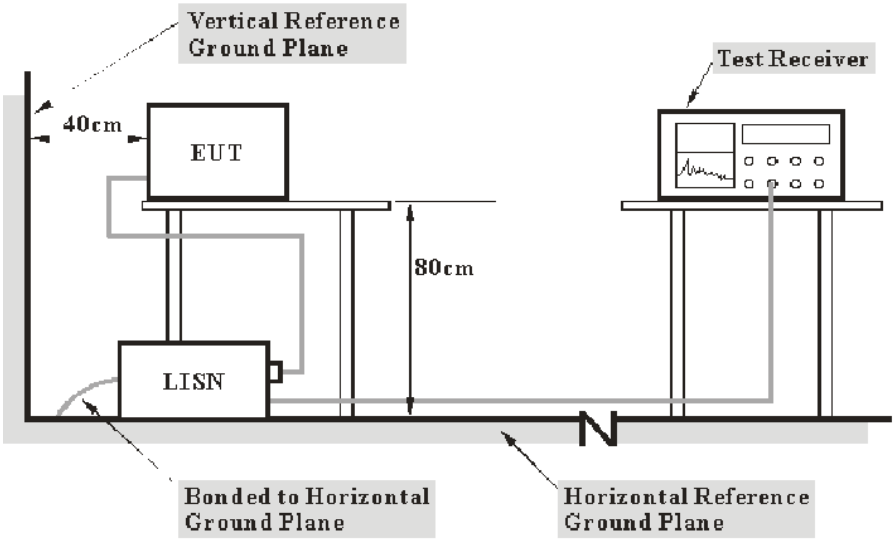
Result: Compliant.

FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207, §15.407(b) (6)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and Average detection mode.

Transd Factor & Margin Calculation

The Transd factor is calculated by adding LISN VDF (Voltage Division Factor) and Cable Loss. The basic equation is as follows:

Transd Factor = LISN VDF + Cable Loss

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

Over Limit = Level – Limit
Level = Read Level + Factor

Test Data

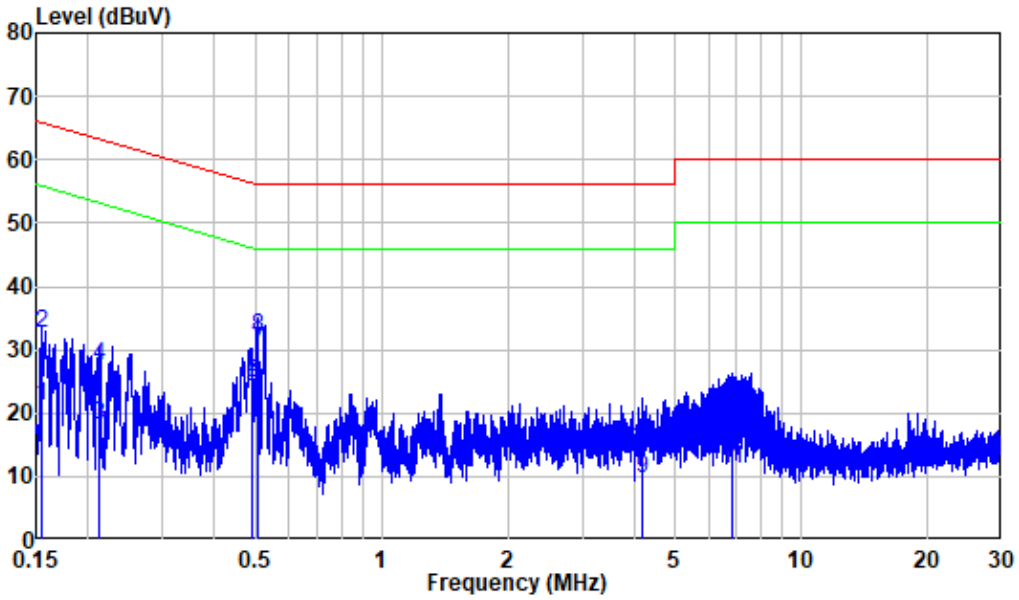
Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	64 %
ATM Pressure:	101.0 kPa

The testing was performed by Bin Duan on 2021-12-03.

EUT operation mode: Transmitting (worst case is 802.11a mode, low channel)

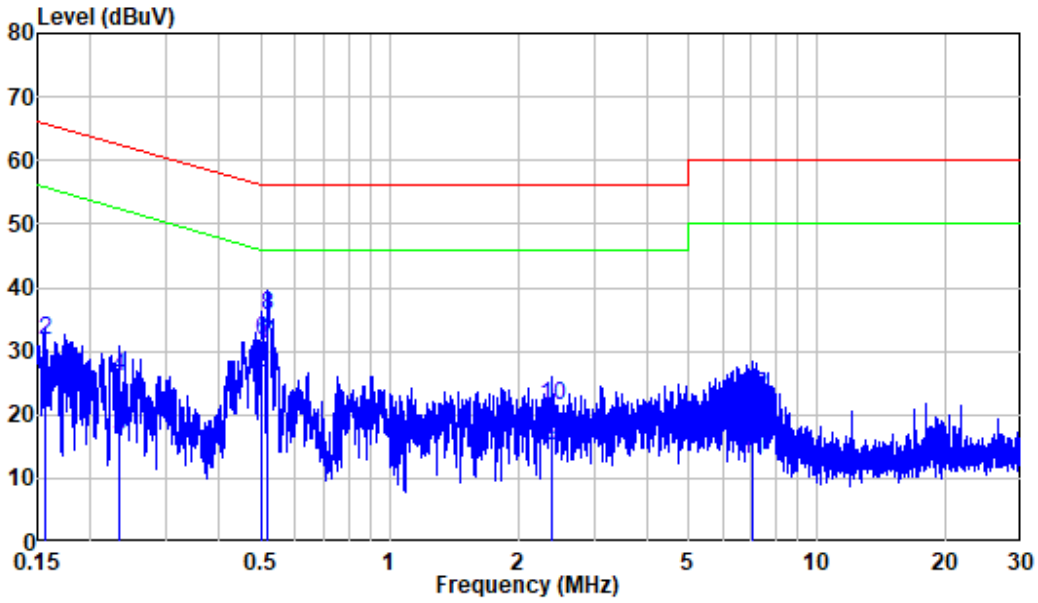
AC 120V/60 Hz, Line:



Site : Shielding Room
Condition: Line
Mode : Charging&Transmitting
Model : 490
Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.155	9.89	11.12	21.01	55.75	-34.74	Average
2	0.155	9.89	22.57	32.46	65.75	-33.29	QP
3	0.212	9.80	8.22	18.02	53.13	-35.11	Average
4	0.212	9.80	17.67	27.47	63.13	-35.66	QP
5	0.489	9.80	14.49	24.29	46.19	-21.90	Average
6	0.489	9.80	14.82	24.62	56.19	-31.57	QP
7	0.505	9.80	19.97	29.77	46.00	-16.23	Average
8	0.505	9.80	22.20	32.00	56.00	-24.00	QP
9	4.182	9.95	-0.27	9.68	46.00	-36.32	Average
10	4.182	9.95	4.53	14.48	56.00	-41.52	QP
11	6.832	10.07	1.21	11.28	50.00	-38.72	Average
12	6.832	10.07	10.98	21.05	60.00	-38.95	QP

AC 120V/60 Hz, Neutral:



Site : Shielding Room
Condition: Neutral
Mode : Charging&Transmitting
Model : 490
Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.156	9.91	11.51	21.42	55.65	-34.23	Average
2	0.156	9.91	21.65	31.56	65.65	-34.09	QP
3	0.232	9.98	6.71	16.69	52.37	-35.68	Average
4	0.232	9.98	16.01	25.99	62.37	-36.38	QP
5	0.500	9.90	16.61	26.51	46.00	-19.49	Average
6	0.500	9.90	21.77	31.67	56.00	-24.33	QP
7	0.520	9.91	21.33	31.24	46.00	-14.76	Average
8	0.520	9.91	25.64	35.55	56.00	-20.45	QP
9	2.401	9.95	5.10	15.05	46.00	-30.95	Average
10	2.401	9.95	11.40	21.35	56.00	-34.65	QP
11	7.025	10.07	3.06	13.13	50.00	-36.87	Average
12	7.025	10.07	12.76	22.83	60.00	-37.17	QP

§15.205 & §15.209 & §15.407(B)– UNDESIRABLE EMISSION

Applicable Standard

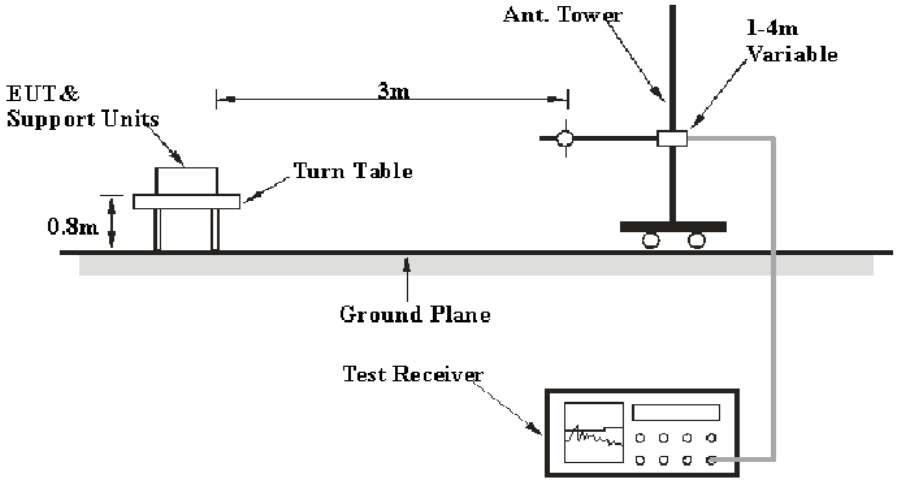
FCC §15.407 (b); §15.209; §15.205;

(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 5.25-5.35 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.
(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.

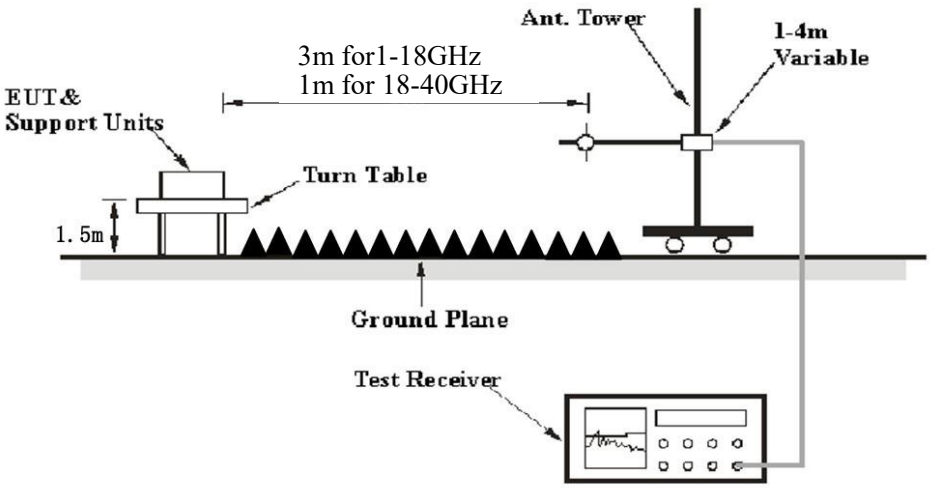
Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

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	/	Average
	1MHz	＞1/T Note 2	/	Average

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 Average 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

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

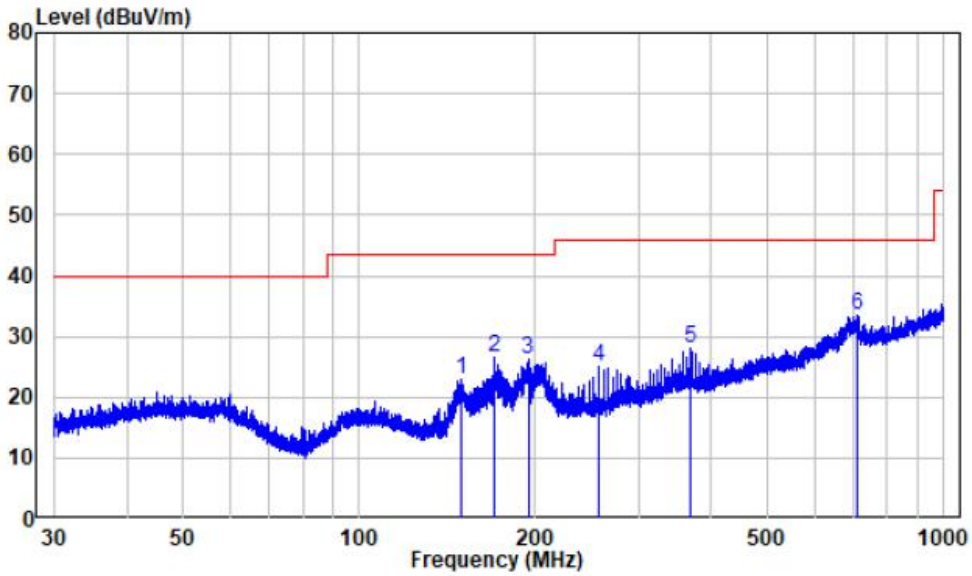
Temperature:	25 ℃
Relative Humidity:	64 %
ATM Pressure:	101.0 kPa

The testing was performed by Chao Mo on 2021-12-03 for below 1GHz, on 2021-11-16 and 2021-11-17 for above 1GHz.

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 802.11a, 5500MHz)*

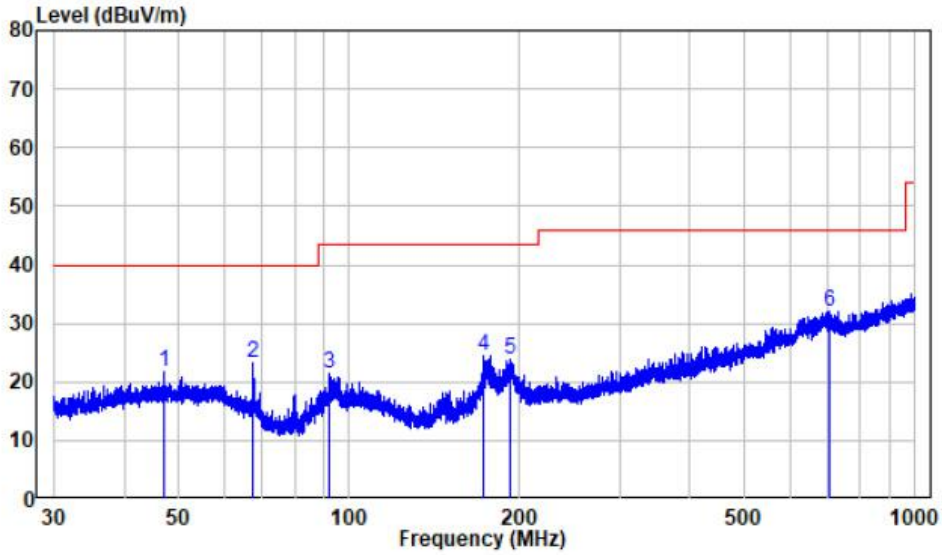
Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No. : SZ1211029-55736E-RFA1
Test Mode: Charging&Transmitting

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	149.03	-15.33	38.39	23.06	43.50	-20.44	Peak
2	170.42	-13.54	40.12	26.58	43.50	-16.92	Peak
3	194.45	-11.37	37.56	26.19	43.50	-17.31	Peak
4	256.75	-10.60	35.58	24.98	46.00	-21.02	Peak
5	367.31	-7.44	35.58	28.14	46.00	-17.86	Peak
6	708.56	-1.48	34.88	33.40	46.00	-12.60	Peak

Vertical



Site : chamber
Condition: 3m VERTICAL
Job No. : SZ1211029-55736E-RFA1
Test Mode: Charging&Transmitting

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	47.04	-10.00	31.70	21.70	40.00	-18.30	Peak
2	67.62	-13.66	36.76	23.10	40.00	-16.90	Peak
3	92.14	-13.26	34.65	21.39	43.50	-22.11	Peak
4	173.05	-13.27	37.75	24.48	43.50	-19.02	Peak
5	191.75	-11.29	35.14	23.85	43.50	-19.65	Peak
6	704.23	-1.49	33.49	32.00	46.00	-14.00	Peak

Above 1GHz:

5250-5350 MHz:

Frequency (MHz)	Receiver		Turn-Table	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407	
	Reading (dBμV)	PK/QP/AV	Angle Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11a									
5260 MHz									
4500	64.57	PK	201	2.1	H	-5.53	59.04	74	-14.96
4500	51.21	AV	201	2.1	H	-5.53	45.68	54	-8.32
4500	64.71	PK	41	2.3	V	-5.53	59.18	74	-14.82
4500	51.02	AV	41	2.3	V	-5.53	45.49	54	-8.51
5150	65.47	PK	275	1.6	H	-3.75	61.72	74	-12.28
5150	51.15	AV	275	1.6	H	-3.75	47.40	54	-6.60
5150	65.05	PK	267	1.3	V	-3.75	61.30	74	-12.70
5150	51.50	AV	267	1.3	V	-3.75	47.75	54	-6.25
10520	44.06	PK	303	2.2	H	6.18	50.24	68.2	-17.96
10520	43.95	PK	142	1.4	V	6.18	50.13	68.2	-18.07
5280 MHz									
10560	44.28	PK	25	1.2	H	6.14	50.42	68.2	-17.78
10560	44.32	PK	60	2.5	V	6.14	50.46	68.2	-17.74
5320MHz									
5350	63.69	PK	190	1.4	H	-2.68	61.01	74	-12.99
5350	50.28	AV	190	1.4	H	-2.68	47.60	54	-6.40
5350	63.69	PK	197	1.3	V	-2.68	61.01	74	-12.99
5350	50.30	AV	197	1.3	V	-2.68	47.62	54	-6.38
5460	63.02	PK	186	2	H	-2.13	60.89	74	-13.11
5460	51.33	AV	186	2	H	-2.13	49.20	54	-4.80
5460	63.77	PK	179	2	V	-2.13	61.64	74	-12.36
5460	51.44	AV	179	2	V	-2.13	49.31	54	-4.69
10640	44.81	PK	132	1.1	H	6.27	51.08	74	-22.92
10640	44.36	PK	50	2.3	V	6.27	50.63	74	-23.37

Frequency (MHz)	Receiver		Turn-Table	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407	
	Reading (dBμV)	PK/QP/AV	Angle Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11n20									
5260 MHz									
4500	65.01	PK	183	1.9	H	-5.53	59.48	74	-14.52
4500	51.07	AV	183	1.9	H	-5.53	45.54	54	-8.46
4500	65.35	PK	320	2.4	V	-5.53	59.82	74	-14.18
4500	51.37	AV	320	2.4	V	-5.53	45.84	54	-8.16
5150	65.43	PK	128	2.2	H	-3.75	61.68	74	-12.32
5150	51.47	AV	128	2.2	H	-3.75	47.72	54	-6.28
5150	65.19	PK	33	1.2	V	-3.75	61.44	74	-12.56
5150	51.43	AV	33	1.2	V	-3.75	47.68	54	-6.32
10520	44.04	PK	17	2	H	6.18	50.22	68.2	-17.98
10520	43.64	PK	258	1.1	V	6.18	49.82	68.2	-18.38
5280 MHz									
10560	44.55	PK	267	1.3	H	6.14	50.69	68.2	-17.51
10560	44.28	PK	123	2.3	V	6.14	50.42	68.2	-17.78
5320MHz									
5350	63.61	PK	154	2.1	H	-2.68	60.93	74	-13.07
5350	50.45	AV	154	2.1	H	-2.68	47.77	54	-6.23
5350	64.12	PK	62	1.4	V	-2.68	61.44	74	-12.56
5350	50.75	AV	62	1.4	V	-2.68	48.07	54	-5.93
5460	63.09	PK	122	2.3	H	-2.13	60.96	74	-13.04
5460	51.25	AV	122	2.3	H	-2.13	49.12	54	-4.88
5460	63.99	PK	257	2.1	V	-2.13	61.86	74	-12.14
5460	51.28	AV	257	2.1	V	-2.13	49.15	54	-4.85
10640	44.12	PK	217	1.9	H	6.27	50.39	74	-23.61
10640	44.17	PK	208	1.7	V	6.27	50.44	74	-23.56

Frequency (MHz)	Receiver		Turn-Table	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407	
	Reading (dBμV)	PK/QP/AV	Angle Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11n40									
5270 MHz									
4500	64.71	PK	147	1.6	H	-5.53	59.18	74	-14.82
4500	51.81	AV	147	1.6	H	-5.53	46.28	54	-7.72
4500	65.02	PK	341	1.7	V	-5.53	59.49	74	-14.51
4500	51.54	AV	341	1.7	V	-5.53	46.01	54	-7.99
5150	65.37	PK	73	1.2	H	-3.75	61.62	74	-12.38
5150	51.67	AV	73	1.2	H	-3.75	47.92	54	-6.08
5150	65.26	PK	193	1.8	V	-3.75	61.51	74	-12.49
5150	51.77	AV	193	1.8	V	-3.75	48.02	54	-5.98
10540	43.34	PK	239	2.1	H	6.16	49.50	68.2	-18.70
10540	43.36	PK	21	2.0	V	6.16	49.52	68.2	-18.68
5310 MHz									
5350	66.81	PK	207	2.2	H	-2.68	64.13	74	-9.87
5350	53.66	AV	207	2.2	H	-2.68	50.98	54	-3.02
5350	66.61	PK	174	2	V	-2.68	63.93	74	-10.07
5350	53.54	AV	174	2	V	-2.68	50.86	54	-3.14
5460	63.52	PK	111	1.1	H	-2.13	61.39	74	-12.61
5460	51.33	AV	111	1.1	H	-2.13	49.20	54	-4.80
5460	63.62	PK	18	2	V	-2.13	61.49	74	-12.51
5460	51.40	AV	18	2	V	-2.13	49.27	54	-4.73
10620	44.14	PK	357	2.1	H	6.29	50.43	74	-23.57
10620	43.89	PK	62	1.4	V	6.29	50.18	74	-23.82

Frequency (MHz)	Receiver		Turn-Table	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407	
	Reading (dBμV)	PK/QP/AV	Angle Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11ac20									
5260 MHz									
4500	65.04	PK	282	2	H	-5.53	59.51	74	-14.49
4500	51.28	AV	282	2	H	-5.53	45.75	54	-8.25
4500	65.33	PK	93	2	V	-5.53	59.80	74	-14.20
4500	51.28	AV	93	2	V	-5.53	45.75	54	-8.25
5150	64.94	PK	32	1.6	H	-3.75	61.19	74	-12.81
5150	51.30	AV	32	1.6	H	-3.75	47.55	54	-6.45
5150	64.27	PK	182	1.2	V	-3.75	60.52	74	-13.48
5150	51.17	AV	182	1.2	V	-3.75	47.42	54	-6.58
10520	43.52	PK	347	2.2	H	6.18	49.70	68.2	-18.50
10520	43.18	PK	210	1.7	V	6.18	49.36	68.2	-18.84
5280 MHz									
10560	43.85	PK	192	2.1	H	6.14	49.99	68.2	-18.21
10560	44.01	PK	81	1.7	V	6.14	50.15	68.2	-18.05
5320 MHz									
5350	64.00	PK	297	1.1	H	-2.68	61.32	74	-12.68
5350	50.96	AV	297	1.1	H	-2.68	48.28	54	-5.72
5350	63.93	PK	41	1.5	V	-2.68	61.25	74	-12.75
5350	50.78	AV	41	1.5	V	-2.68	48.10	54	-5.90
5460	63.99	PK	201	1.1	H	-2.13	61.86	74	-12.14
5460	50.72	AV	201	1.1	H	-2.13	48.59	54	-5.41
5460	63.77	PK	334	2.5	V	-2.13	61.64	74	-12.36
5460	50.80	AV	334	2.5	V	-2.13	48.67	54	-5.33
10640	43.83	PK	167	1.4	H	6.27	50.10	74	-23.90
10640	43.99	PK	240	1.6	V	6.27	50.26	74	-23.74

Frequency (MHz)	Receiver		Turn-Table	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407	
	Reading (dBμV)	Detector (PK/QP/AV)	Angle Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11ac40									
5270 MHz									
4500	64.68	PK	140	2.1	H	-5.53	59.15	74	-14.85
4500	51.40	AV	140	2.1	H	-5.53	45.87	54	-8.13
4500	64.96	PK	184	1.1	V	-5.53	59.43	74	-14.57
4500	51.67	AV	184	1.1	V	-5.53	46.14	54	-7.86
5150	64.35	PK	102	1.2	H	-3.75	60.60	74	-13.40
5150	51.84	AV	102	1.2	H	-3.75	48.09	54	-5.91
5150	65.09	PK	118	1.1	V	-3.75	61.34	74	-12.66
5150	51.86	AV	118	1.1	V	-3.75	48.11	54	-5.89
10540	43.56	PK	254	2.0	H	6.16	49.72	68.2	-18.48
10540	43.17	PK	264	1.2	V	6.16	49.33	68.2	-18.87
5310 MHz									
5350	66.95	PK	340	1.3	H	-2.68	64.27	74	-9.73
5350	53.28	AV	340	1.3	H	-2.68	50.60	54	-3.40
5350	66.78	PK	213	1.8	V	-2.68	64.10	74	-9.90
5350	53.32	AV	213	1.8	V	-2.68	50.64	54	-3.36
5460	63.54	PK	197	1.3	H	-2.13	61.41	74	-12.59
5460	50.72	AV	197	1.3	H	-2.13	48.59	54	-5.41
5460	63.65	PK	310	2.2	V	-2.13	61.52	74	-12.48
5460	50.70	AV	310	2.2	V	-2.13	48.57	54	-5.43
10620	43.95	PK	243	1.8	H	6.29	50.24	74	-23.76
10620	44.16	PK	142	1.6	V	6.29	50.45	74	-23.55

Frequency (MHz)	Receiver		Turn-Table	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407	
	Reading (dBμV)	Detector (PK/QP/AV)	Angle Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11ac80									
5290 MHz									
4500	64.52	PK	37	1.2	H	-5.53	58.99	74	-15.01
4500	52.26	AV	37	1.2	H	-5.53	46.73	54	-7.27
4500	64.44	PK	45	1.4	V	-5.53	58.91	74	-15.09
4500	52.15	AV	45	1.4	V	-5.53	46.62	54	-7.38
5150	64.08	PK	99	1.3	H	-3.75	60.33	74	-13.67
5150	52.17	AV	99	1.3	H	-3.75	48.42	54	-5.58
5150	64.44	PK	87	1.7	V	-3.75	60.69	74	-13.31
5150	52.19	AV	87	1.7	V	-3.75	48.44	54	-5.56
5350	64.49	PK	7	1.9	H	-2.68	61.81	74	-12.19
5350	52.34	AV	7	1.9	H	-2.68	49.66	54	-4.34
5350	65.06	PK	173	2.3	V	-2.68	62.38	74	-11.62
5350	52.73	AV	173	2.3	V	-2.68	50.05	54	-3.95
5460	63.55	PK	348	2.3	H	-2.13	61.42	74	-12.58
5460	51.23	AV	348	2.3	H	-2.13	49.10	54	-4.90
5460	63.05	PK	213	2.3	V	-2.13	60.92	74	-13.08
5460	51.00	AV	213	2.3	V	-2.13	48.87	54	-5.13
10580	43.89	PK	198	2.3	H	6.22	50.11	68.2	-18.09
10580	43.75	PK	221	1.5	V	6.22	49.97	68.2	-18.23

5470-5725 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/AV)	Angle Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11a									
5500 MHz									
5460	64.33	PK	33	2.4	H	-2.26	62.07	74	-11.93
5460	50.17	AV	33	2.4	H	-2.26	47.91	54	-6.09
5460	64.59	PK	97	1.1	V	-2.26	62.33	74	-11.67
5460	50.67	AV	97	1.1	V	-2.26	48.41	54	-5.59
5470	64.56	PK	182	1.1	H	-2.10	62.46	68.2	-5.74
5470	64.35	PK	344	1.3	V	-2.10	62.25	68.2	-5.95
11000	42.13	PK	108	1.8	H	7.53	49.66	74	-24.34
11000	42.01	PK	104	1.3	V	7.53	49.54	74	-24.46
5580 MHz									
11160	41.55	PK	211	1.6	H	8.01	49.56	74	-24.44
11160	40.97	PK	118	2.2	V	8.01	48.98	74	-25.02
5700MHz									
5725	64.20	PK	112	1.1	H	-1.96	62.24	68.2	-5.96
5725	65.37	PK	113	1.5	V	-1.96	63.41	68.2	-4.79
11400	41.50	PK	196	1.3	H	7.26	48.76	74	-25.24
11400	41.34	PK	67	2.1	V	7.26	48.60	74	-25.40
5720 MHz									
5850	63.95	PK	295	1	H	0.74	64.69	68.2	-3.51
5850	64.08	PK	306	2.3	V	0.74	64.82	68.2	-3.38
6000	64.03	PK	214	2	H	-1.17	62.86	68.2	-5.34
6000	64.41	PK	185	1.7	V	-1.17	63.24	68.2	-4.96
11440	41.11	PK	76	1.8	H	8.87	49.98	74	-24.02
11440	40.50	PK	282	1.9	V	8.87	49.37	74	-24.63

Frequency (MHz)	Receiver		Turn-Table	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407	
	Reading (dBμV)	Detector (PK/QP/AV)	Angle Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11n20									
5500 MHz									
5460	64.14	PK	291	1.5	H	-2.26	61.88	74	-12.12
5460	50.26	AV	291	1.5	H	-2.26	48.00	54	-6.00
5460	64.66	PK	224	2.2	V	-2.26	62.40	74	-11.60
5460	50.61	AV	224	2.2	V	-2.26	48.35	54	-5.65
5470	64.64	PK	35	1.8	H	-2.10	62.54	68.2	-5.66
5470	64.94	PK	353	1.3	V	-2.10	62.84	68.2	-5.36
11000	42.58	PK	91	2.5	H	7.53	50.11	74	-23.89
11000	41.66	PK	132	1.1	V	7.53	49.19	74	-24.81
5580 MHz									
11160	41.81	PK	250	2	H	8.01	49.82	74	-24.18
11160	41.05	PK	296	2.1	V	8.01	49.06	74	-24.94
5700MHz									
5725	64.67	PK	208	1.8	H	-1.96	62.71	68.2	-5.49
5725	65.27	PK	241	2.1	V	-1.96	63.31	68.2	-4.89
11400	40.65	PK	335	1.4	H	7.26	47.91	74	-26.09
11400	41.26	PK	101	1.3	V	7.26	48.52	74	-25.48
5720 MHz									
5850	64.07	PK	10	1.7	H	0.74	64.81	68.2	-3.39
5850	63.82	PK	92	1.6	V	0.74	64.56	68.2	-3.64
6000	64.32	PK	84	2.3	H	-1.17	63.15	68.2	-5.05
6000	64.50	PK	113	2.1	V	-1.17	63.33	68.2	-4.87
11440	41.25	PK	39	1.5	H	8.87	50.12	74	-23.88
11440	40.56	PK	250	2.3	V	8.87	49.43	74	-24.57

Frequency (MHz)	Receiver		Turn-Table	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407	
	Reading (dBμV)	Detector (PK/QP/AV)	Angle Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11n40									
5510 MHz									
5460	64.38	PK	360	2	H	-2.26	62.12	74	-11.88
5460	50.12	AV	360	2	H	-2.26	47.86	54	-6.14
5460	64.79	PK	283	1.1	V	-2.26	62.53	74	-11.47
5460	50.55	AV	283	1.1	V	-2.26	48.29	54	-5.71
5470	64.63	PK	138	2.3	H	-2.10	62.53	68.2	-5.67
5470	64.50	PK	138	2.2	V	-2.10	62.40	68.2	-5.80
11020	42.10	PK	45	1.7	H	7.56	49.66	74	-24.34
11020	41.68	PK	43	2.0	V	7.56	49.24	74	-24.76
5590 MHz									
11180	40.76	PK	251	1.2	H	8.04	48.80	74	-25.20
11180	40.38	PK	69	2.1	V	8.04	48.42	74	-25.58
5670MHz									
5725	65.54	PK	258	1.3	H	-1.96	63.58	68.2	-4.62
5725	65.24	PK	35	1.3	V	-1.96	63.28	68.2	-4.92
11340	41.89	PK	335	1.7	H	7.67	49.56	74	-24.44
11340	41.97	PK	220	1.6	V	7.67	49.64	74	-24.36
5710 MHz									
5850	64.01	PK	99	1.2	H	0.74	64.75	68.2	-3.45
5850	63.93	PK	326	1.1	V	0.74	64.67	68.2	-3.53
6000	64.13	PK	257	1.7	H	-1.17	62.96	68.2	-5.24
6000	64.31	PK	97	2.0	V	-1.17	63.14	68.2	-5.06
11420	41.25	PK	19	1.9	H	8.88	50.13	74	-23.87
11420	40.51	PK	352	2.4	V	8.88	49.39	74	-24.61

Frequency (MHz)	Receiver		Turn-Table	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407	
	Reading (dBμV)	Detector (PK/QP/AV)	Angle Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11ac20									
5500 MHz									
5460	64.15	PK	95	2.4	H	-2.26	61.89	74	-12.11
5460	50.29	AV	95	2.4	H	-2.26	48.03	54	-5.97
5460	64.56	PK	341	1.8	V	-2.26	62.30	74	-11.70
5460	50.94	AV	341	1.8	V	-2.26	48.68	54	-5.32
5470	64.47	PK	36	1.6	H	-2.10	62.37	68.2	-5.83
5470	64.11	PK	119	1.8	V	-2.10	62.01	68.2	-6.19
11000	42.37	PK	347	2.2	H	7.53	49.90	74	-24.10
11000	41.76	PK	181	1.0	V	7.53	49.29	74	-24.71
5580 MHz									
11160	41.68	PK	199	2.1	H	8.01	49.69	74	-24.31
11160	40.91	PK	180	2.4	V	8.01	48.92	74	-25.08
5700MHz									
5725	64.76	PK	139	1.6	H	-1.96	62.80	68.2	-5.40
5725	64.23	PK	70	2.1	V	-1.96	62.27	68.2	-5.93
11400	41.62	PK	104	1.5	H	7.26	48.88	74	-25.12
11400	41.58	PK	204	1.9	V	7.26	48.84	74	-25.16
5720 MHz									
5850	63.19	PK	286	1.3	H	0.74	63.93	68.2	-4.27
5850	63.33	PK	252	2.0	V	0.74	64.07	68.2	-4.13
6000	63.40	PK	214	2.2	H	-1.17	62.23	68.2	-5.97
6000	62.83	PK	93	2.2	V	-1.17	61.66	68.2	-6.54
11440	41.12	PK	42	2.1	H	8.87	49.99	74	-24.01
11440	40.86	PK	299	2.3	V	8.87	49.73	74	-24.27

Frequency (MHz)	Receiver		Turn-Table	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407	
	Reading (dBμV)	Detector (PK/QP/AV)	Angle Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11ac40									
5510 MHz									
5460	64.41	PK	5	2.4	H	-2.26	62.15	74	-11.85
5460	50.23	AV	5	2.4	H	-2.26	47.97	54	-6.03
5460	64.93	PK	166	2.2	V	-2.26	62.67	74	-11.33
5460	50.52	AV	166	2.2	V	-2.26	48.26	54	-5.74
5470	64.66	PK	80	1.8	H	-2.10	62.56	68.2	-5.64
5470	64.89	PK	229	1.6	V	-2.10	62.79	68.2	-5.41
11020	42.55	PK	333	2.4	H	7.56	50.11	74	-23.89
11020	42.05	PK	177	1.4	V	7.56	49.61	74	-24.39
5590 MHz									
11180	41.71	PK	110	1.9	H	8.04	49.75	74	-24.25
11180	41.00	PK	202	1.2	V	8.04	49.04	74	-24.96
5670MHz									
5725	64.94	PK	275	1.6	H	-1.96	62.98	68.2	-5.22
5725	65.43	PK	107	2.1	V	-1.96	63.47	68.2	-4.73
11340	41.70	PK	149	1.8	H	7.67	49.37	74	-24.63
11340	42.02	PK	303	1.0	V	7.67	49.69	74	-24.31
5710 MHz									
5850	64.27	PK	255	1.9	H	0.74	65.01	68.2	-3.19
5850	63.99	PK	32	1.8	V	0.74	64.73	68.2	-3.47
6000	63.87	PK	194	1.4	H	-1.17	62.70	68.2	-5.50
6000	64.15	PK	332	1.8	V	-1.17	62.98	68.2	-5.22
11420	40.86	PK	133	1.3	H	8.88	49.74	74	-24.26
11420	40.42	PK	141	1.3	V	8.88	49.30	74	-24.70

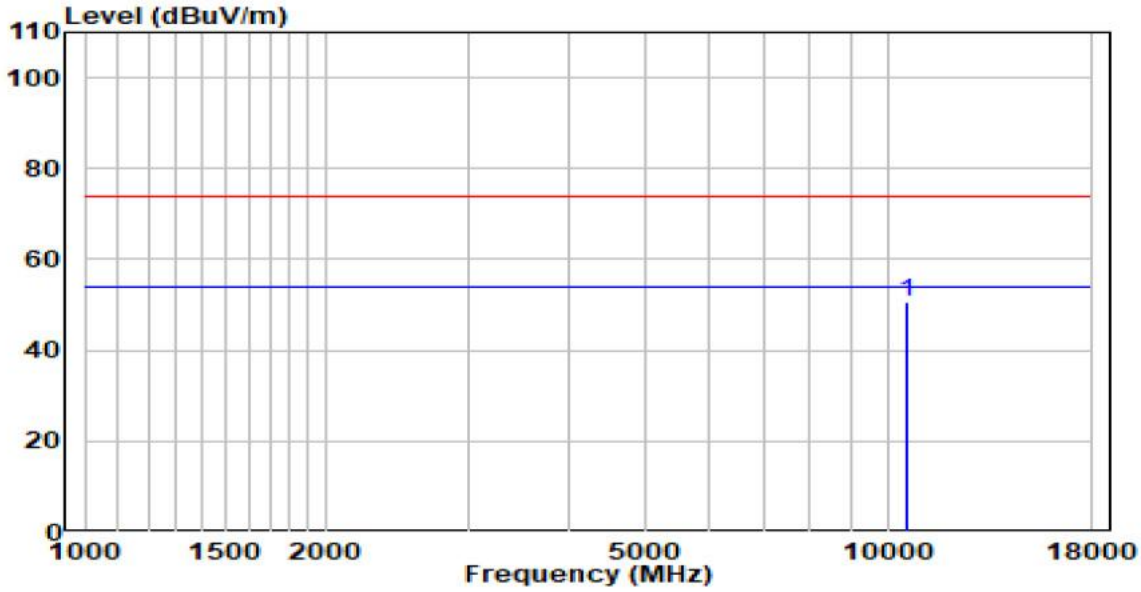
Frequency (MHz)	Receiver		Turn-Table	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407	
	Reading (dBμV)	Detector (PK/QP/AV)	Angle Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11ac80									
5530 MHz									
5460	64.16	PK	280	1.1	H	-2.26	61.90	74	-12.10
5460	50.35	AV	280	1.1	H	-2.26	48.09	54	-5.91
5460	64.77	PK	40	2.1	V	-2.26	62.51	74	-11.49
5460	50.94	AV	40	2.1	V	-2.26	48.68	54	-5.32
5470	64.67	PK	127	1.6	H	-2.10	62.57	68.2	-5.63
5470	64.79	PK	83	1.9	V	-2.10	62.69	68.2	-5.51
11060	41.57	PK	86	1.5	H	7.63	49.20	74	-24.80
11060	40.86	PK	345	1.5	V	7.63	48.49	74	-25.51
5610 MHz									
5725	64.92	PK	69	1.6	H	-1.96	62.96	68.2	-5.24
5725	65.50	PK	270	1.2	V	-1.96	63.54	68.2	-4.66
11220	41.36	PK	133	2.1	H	8.30	49.66	74	-24.34
11220	41.04	PK	284	2.5	V	8.30	49.34	74	-24.66
5690 MHz									
5850	63.68	PK	169	2.4	H	0.74	64.42	68.2	-3.78
5850	63.89	PK	237	1.4	V	0.74	64.63	68.2	-3.57
6000	64.26	PK	340	2.1	H	-1.17	63.09	68.2	-5.11
6000	63.90	PK	181	1.7	V	-1.17	62.73	68.2	-5.47
11380	41.28	PK	306	1.7	H	8.90	50.18	74	-23.82
11380	40.39	PK	236	1.8	V	8.90	49.29	74	-24.71

Note:
Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Corrected Factor + Reading
Margin = Corrected. Amplitude - Limit
The other spurious emission which is in the noise floor level was not recorded.
The test result of peak was less than the limit of average, so just peak values were recorded.

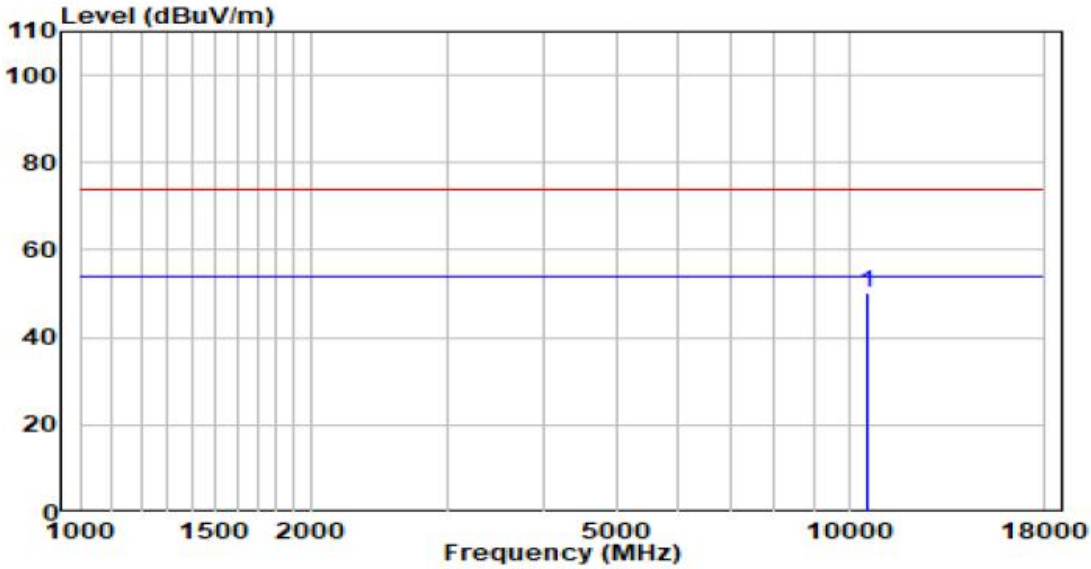
1 GHz - 18 GHz: (Pre-Scan plots)

802.11a, 5500MHz

Horizontal



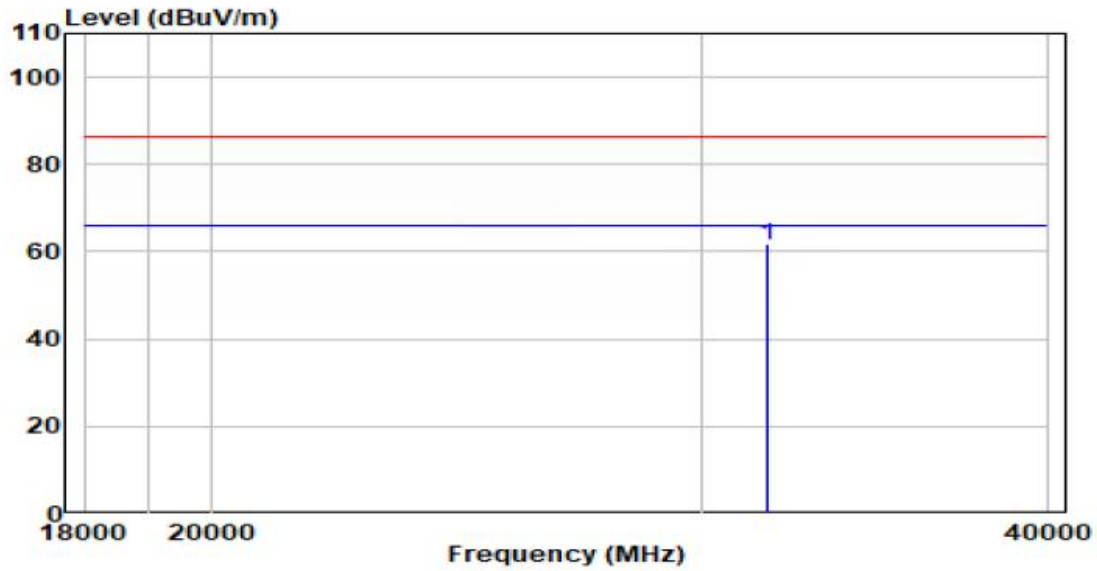
Vertical



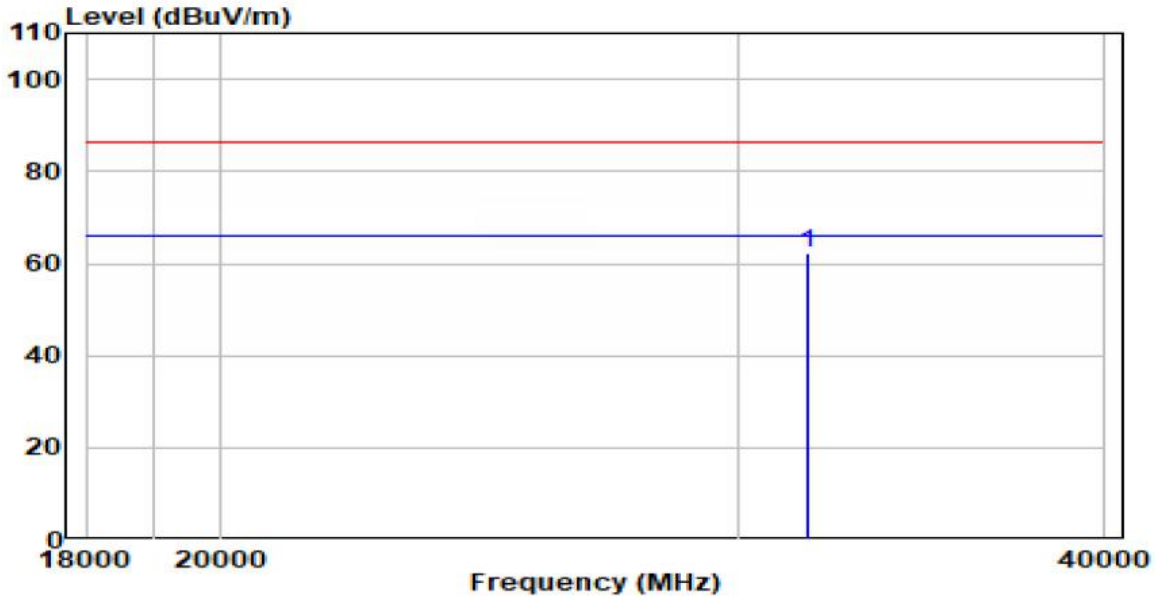
18-40GHz: (Pre-Scan plots)

802.11a, 5500MHz

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 5.25-5.35 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.

Test Procedure

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%.

Test Data

Environmental Conditions

Temperature:	21~27 ℃
Relative Humidity:	56~60 %
ATM Pressure:	101.0 kPa

The testing was performed by Fan Yang from 2021-11-11 to 2021-11-29.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to the Appendix.

FCC §15.407(a) – CONDUCTED TRANSMITTER OUTPUT POWER

Applicable Standard

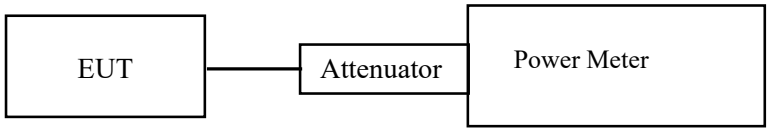
For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 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.

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.



Test Data

Environmental Conditions

Temperature:	21~27 ℃
Relative Humidity:	56~60 %
ATM Pressure:	101.0 kPa

The testing was performed by Fan Yang from 2021-11-17 to 2021-11-29.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to the Appendix.

FCC §15.407(a) - POWER SPECTRAL DENSITY

Applicable Standard

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. 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.

Test Procedure

For devices operating in the bands 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). 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 ≥ 1/T, where T is defined in section II.B.l.a).
b) Set VBW ≥ 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:	21~27 ℃
Relative Humidity:	56~60 %
ATM Pressure:	101.0 kPa

The testing was performed by Fan Yang from 2021-11-11 to 2021-11-17.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to the Appendix.

APPENDIX

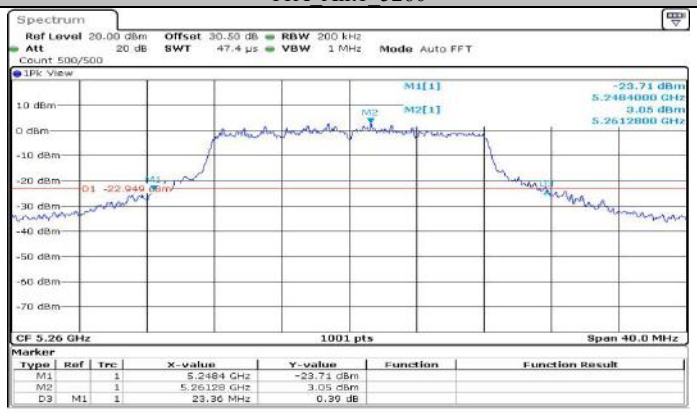
Appendix A1: Emission Bandwidth

Test Result

Test Mode	Antenna	Channel	26db EBW [MHz]	Limit[MHz]	Verdict
11A	Ant1	5260	23.360	---	PASS
		5280	19.840	---	PASS
		5320	22.960	---	PASS
		5500	24.120	---	PASS
		5580	22.480	---	PASS
		5720	23.000	---	PASS
		5720_UNII-2C	16.56	---	PASS
		5720_UNII-3	6.44	---	PASS
11N20SISO	Ant1	5260	20.280	---	PASS
		5280	22.840	---	PASS
		5320	20.280	---	PASS
		5500	23.400	---	PASS
		5580	22.800	---	PASS
		5720	22.600	---	PASS
		5720_UNII-2C	16.32	---	PASS
		5720_UNII-3	6.28	---	PASS
11N40SISO	Ant1	5270	41.840	---	PASS
		5310	42.160	---	PASS
		5510	42.000	---	PASS
		5590	42.240	---	PASS
		5710	41.840	---	PASS
		5710_UNII-2C	35.8	---	PASS
		5710_UNII-3	6.04	---	PASS
11AC20SISO	Ant1	5260	22.640	---	PASS
		5280	22.960	---	PASS
		5320	23.000	---	PASS
		5500	23.120	---	PASS
		5580	22.920	---	PASS
		5720	23.440	---	PASS
		5720_UNII-2C	16.68	---	PASS
		5720_UNII-3	6.76	---	PASS
11AC40SISO	Ant1	5270	42.320	---	PASS
		5310	42.160	---	PASS
		5510	42.160	---	PASS
		5590	42.160	---	PASS
		5710	41.840	---	PASS
		5710_UNII-2C	35.88	---	PASS
		5710_UNII-3	5.96	---	PASS
11AC80SISO	Ant1	5290	84.480	---	PASS
		5530	85.920	---	PASS
		5610	83.360	---	PASS
		5690	84.640	---	PASS
		5690_UNII-2C	76.76	---	PASS
		5690_UNII-3	7.88	---	PASS

Test Graphs

11A_Ant1_5260



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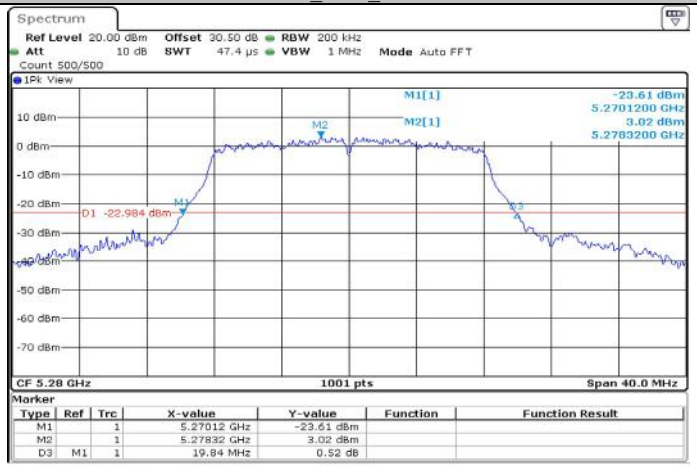

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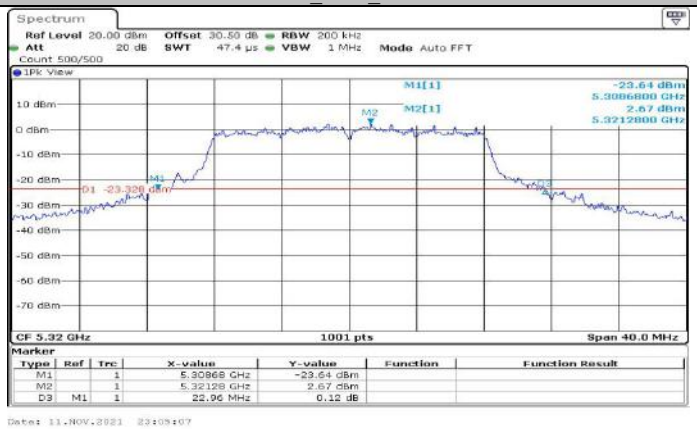

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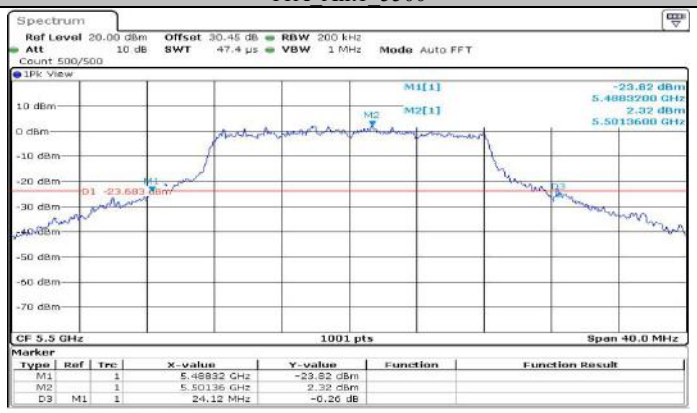
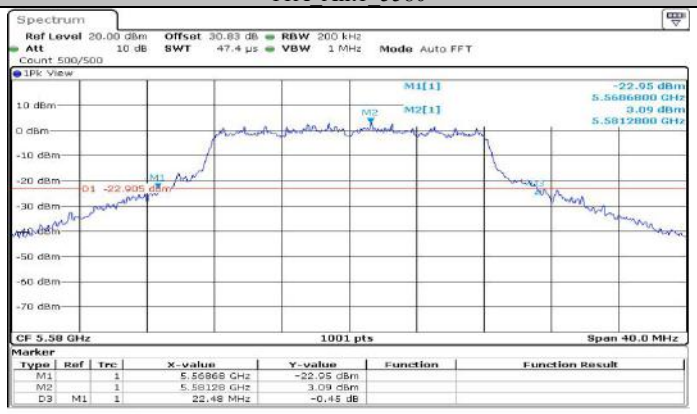


11A_Ant1_5580



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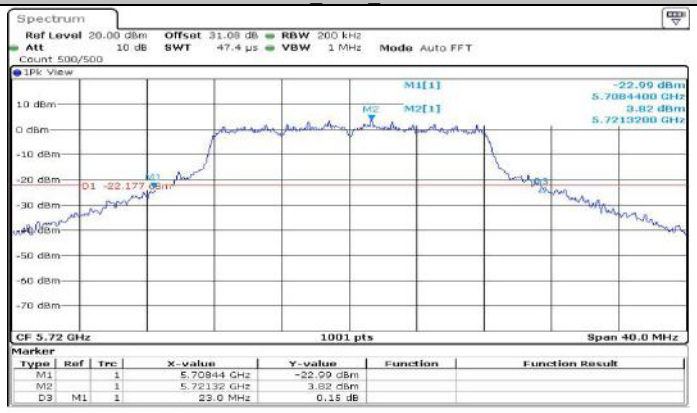

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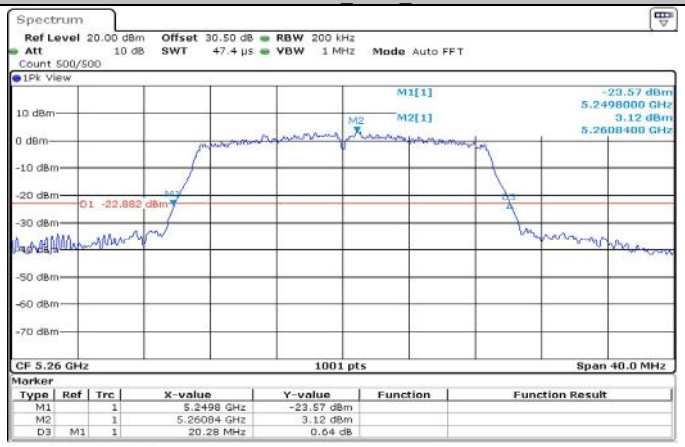

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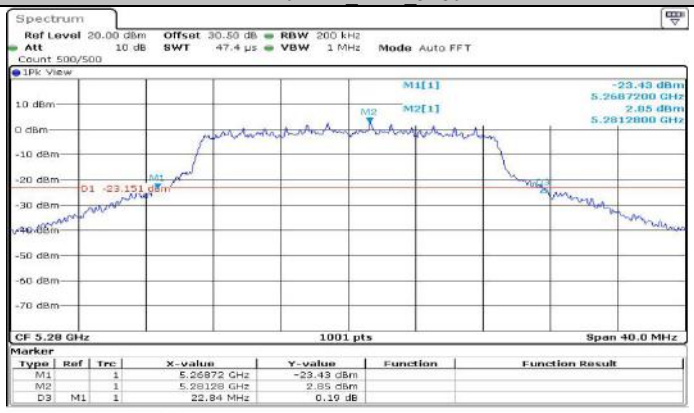

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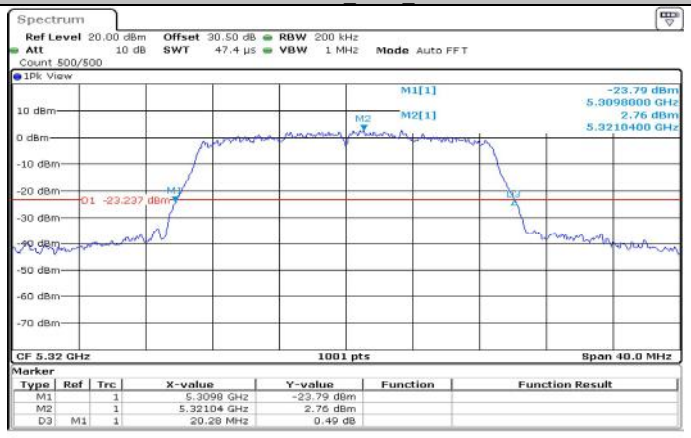

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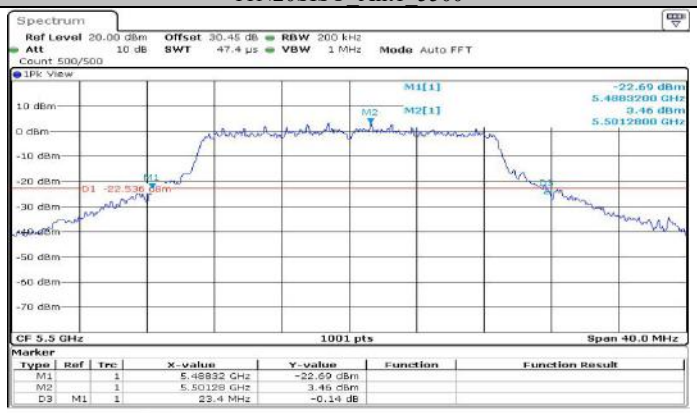

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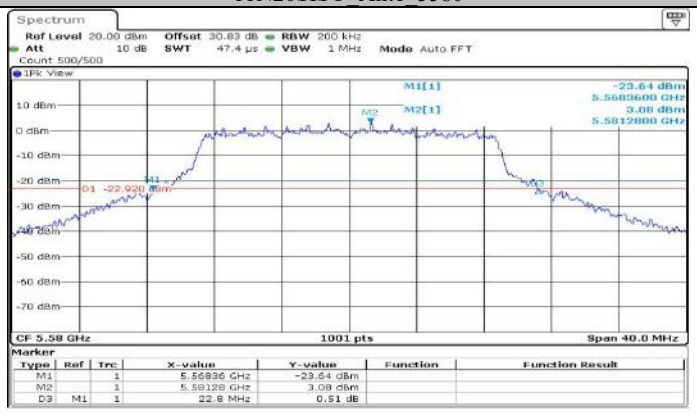

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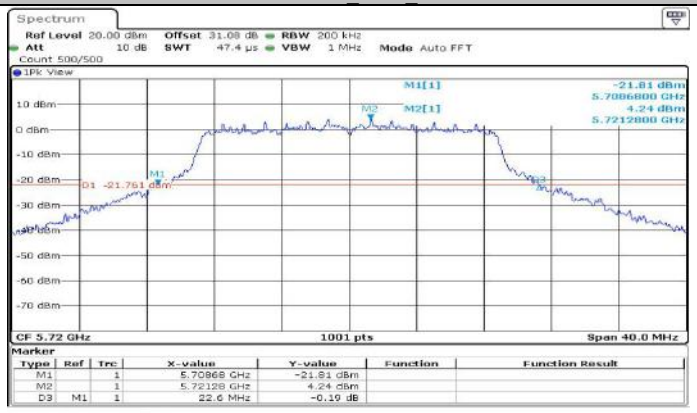

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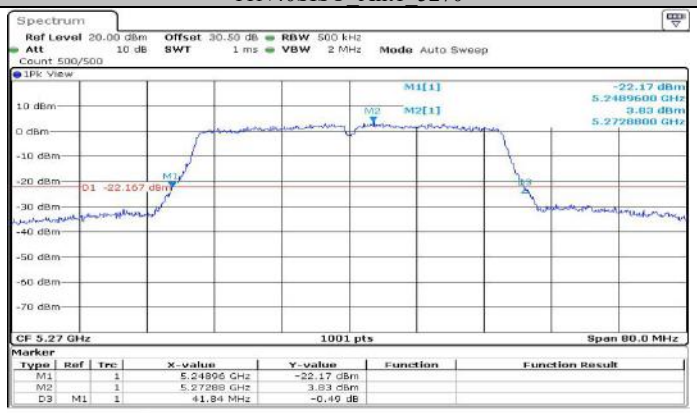

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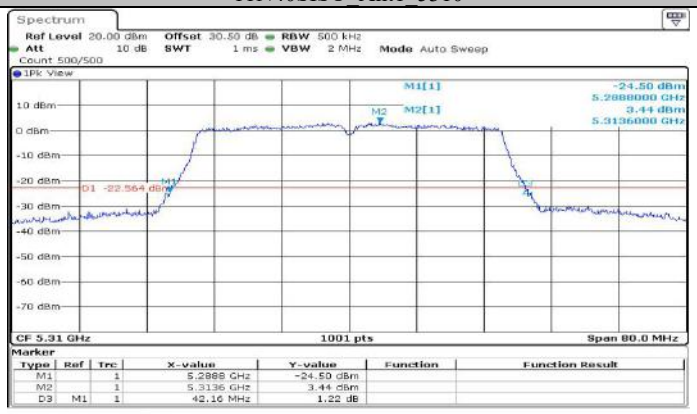

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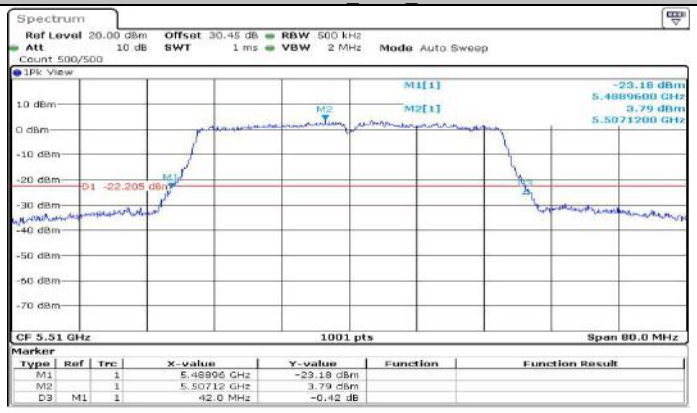

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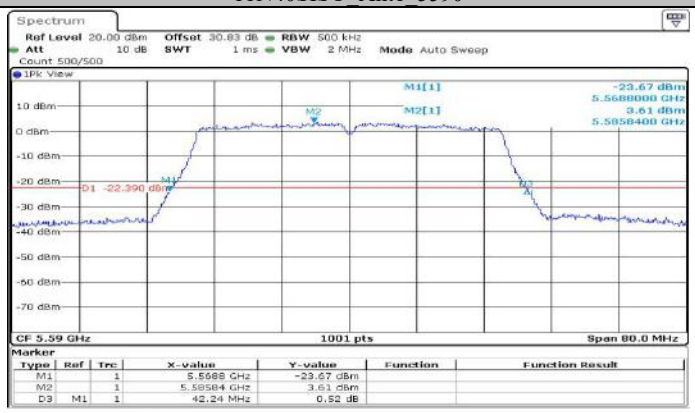

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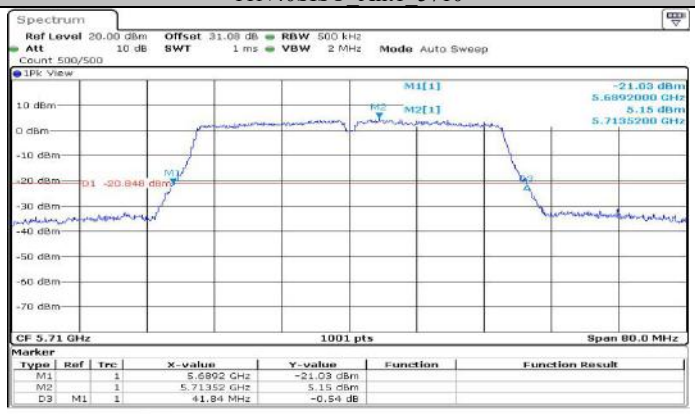

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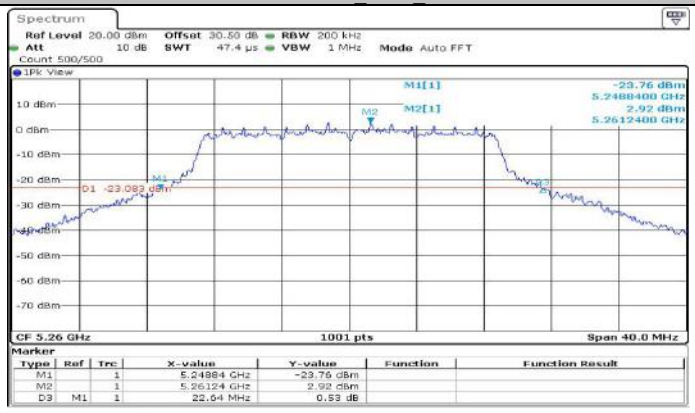

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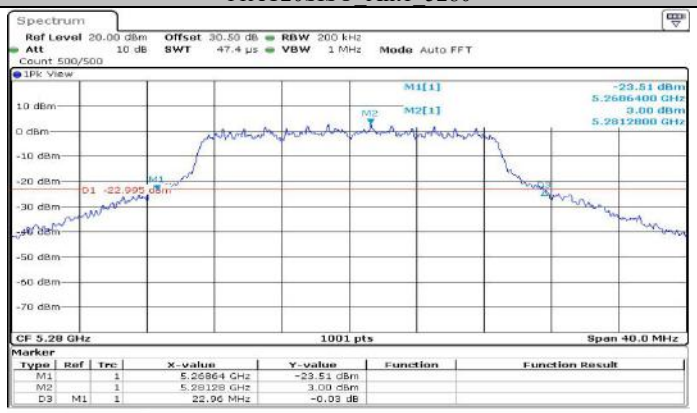

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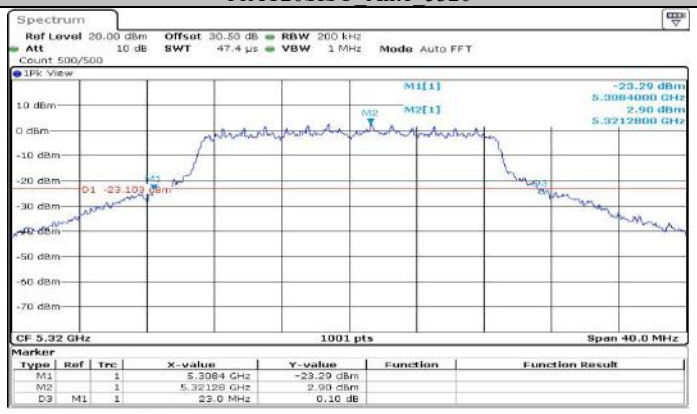

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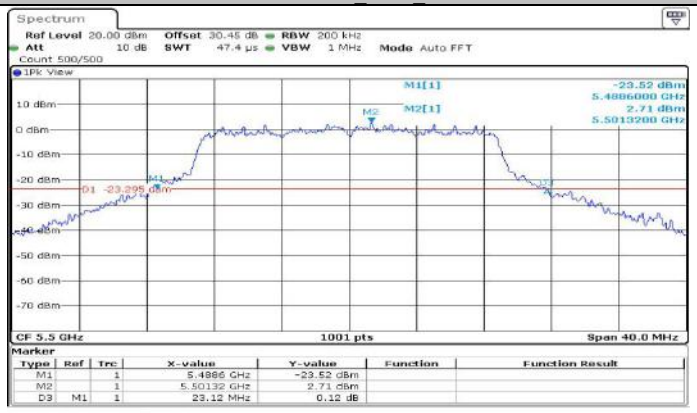

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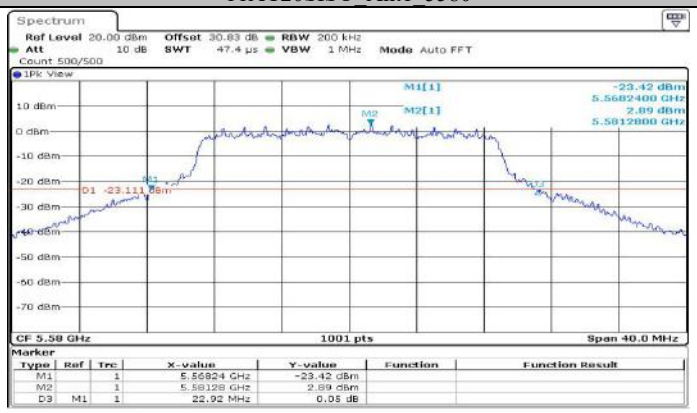

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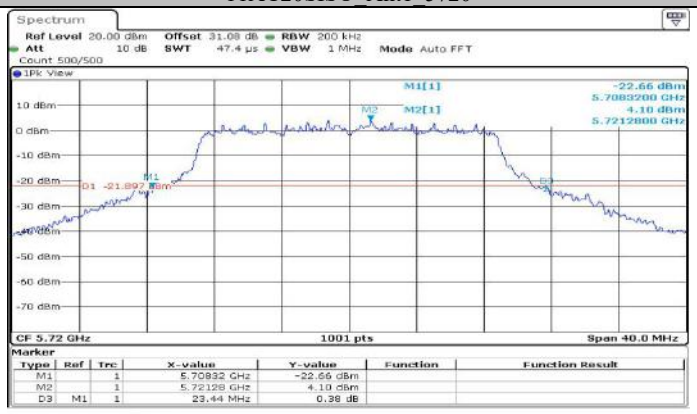

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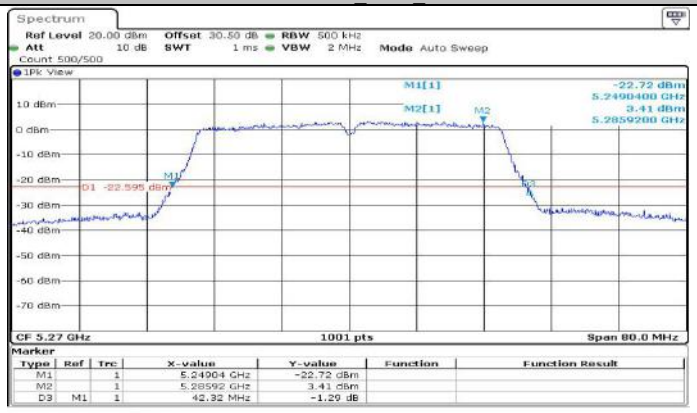

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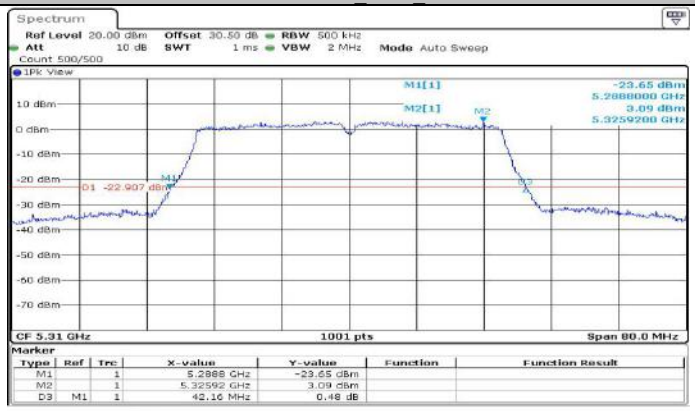

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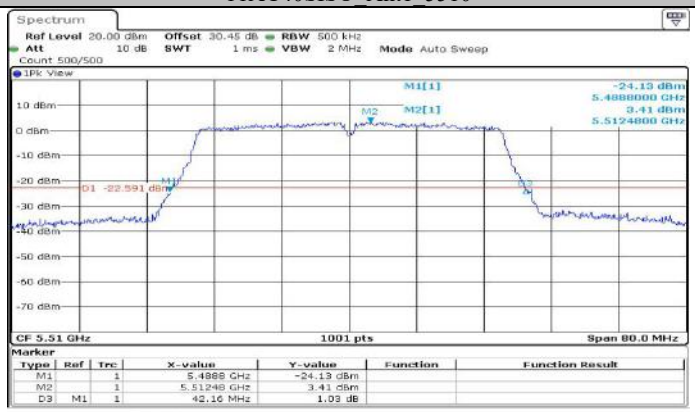
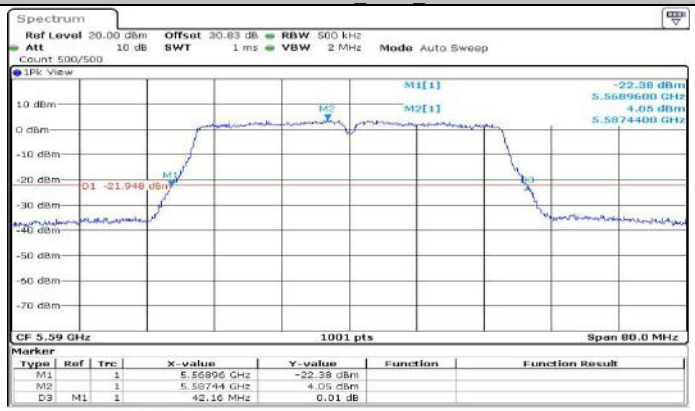
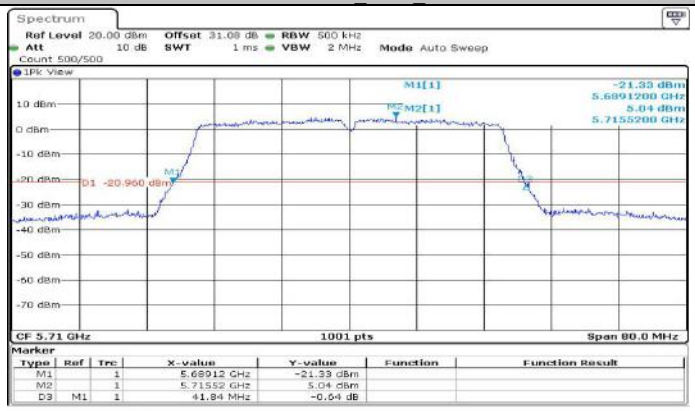


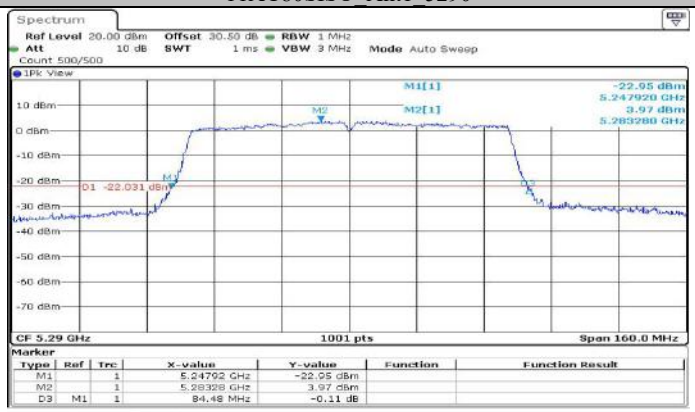
11AC40SISO_Ant1_5590



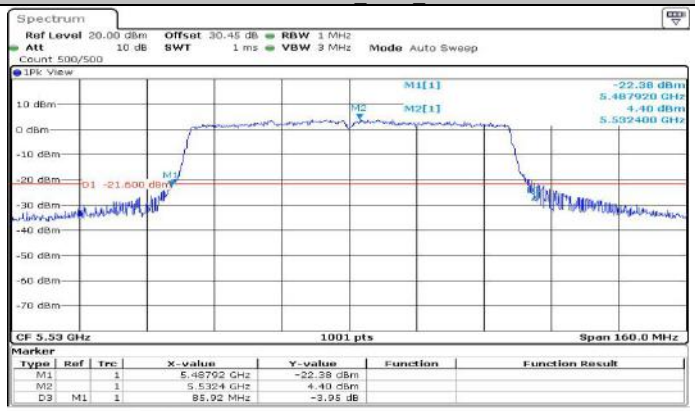
11AC40SISO_Ant1_5710



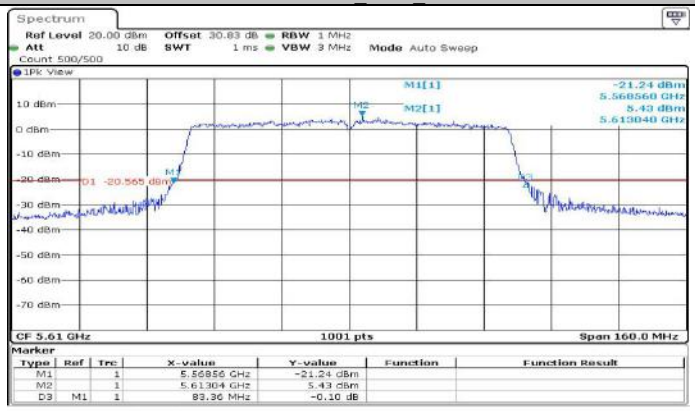
11AC80SISO_Ant1_5290



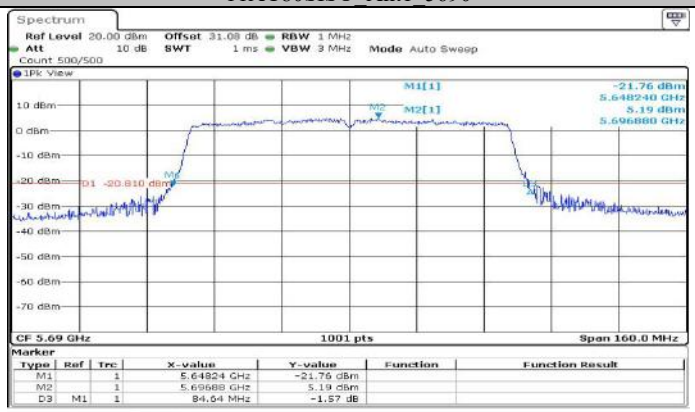
11AC80SISO_Ant1_5530



11AC80SISO_Ant1_5610



11AC80SISO_Ant1_5690



Appendix A2: Occupied channel bandwidth

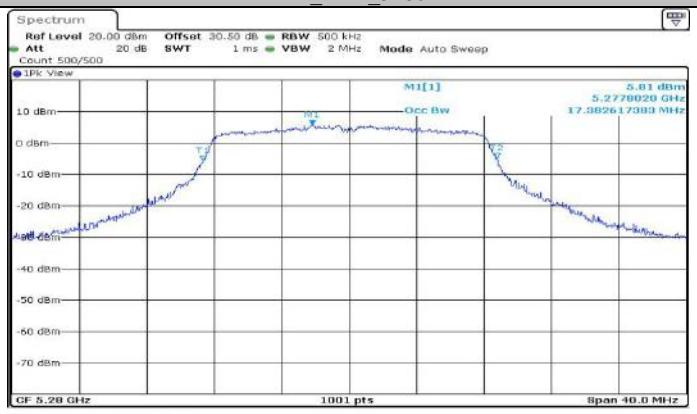
Test Result

Test Mode	Antenna	Channel	OCB [MHz]	Limit[MHz]	Verdict
11A	Ant1	5260	17.423	---	PASS
		5280	17.383	---	PASS
		5320	17.383	---	PASS
		5500	17.383	---	PASS
		5580	17.423	---	PASS
		5720	17.343	---	PASS
		5720_UNII-2C	13.631	---	PASS
		5720_UNII-3	3.711	---	PASS
11N20SISO	Ant1	5260	18.501	---	PASS
		5280	18.501	---	PASS
		5320	18.541	---	PASS
		5500	18.462	---	PASS
		5580	18.501	---	PASS
		5720	18.462	---	PASS
		5720_UNII-2C	14.151	---	PASS
		5720_UNII-3	4.311	---	PASS
11N40SISO	Ant1	5270	36.763	---	PASS
		5310	36.683	---	PASS
		5510	36.603	---	PASS
		5590	36.763	---	PASS
		5710	36.683	---	PASS
		5710_UNII-2C	33.302	---	PASS
		5710_UNII-3	3.382	---	PASS
11AC20SISO	Ant1	5260	18.462	---	PASS
		5280	18.462	---	PASS
		5320	18.541	---	PASS
		5500	18.462	---	PASS
		5580	18.501	---	PASS
		5720	18.462	---	PASS
		5720_UNII-2C	14.191	---	PASS
		5720_UNII-3	4.271	---	PASS
11AC40SISO	Ant1	5270	36.603	---	PASS
		5310	36.683	---	PASS
		5510	36.603	---	PASS
		5590	36.763	---	PASS
		5710	36.603	---	PASS
		5710_UNII-2C	33.222	---	PASS
		5710_UNII-3	3.382	---	PASS
11AC80SISO	Ant1	5290	75.924	---	PASS
		5530	76.084	---	PASS
		5610	76.244	---	PASS
		5690	76.084	---	PASS
		5690_UNII-2C	72.882	---	PASS
		5690_UNII-3	3.202	---	PASS

Test Graphs

11A_Ant1_5260

11A_Ant1_5280

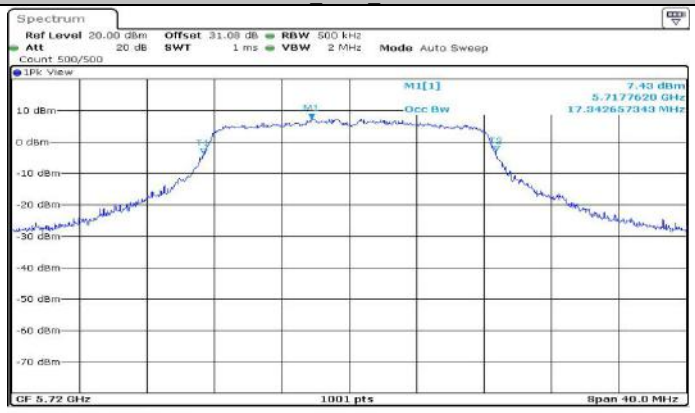


11A_Ant1_5320

11A_Ant1_5500

11A_Ant1_5580

11A_Ant1_5720



11N20SISO_Ant1_5260

11N20SISO_Ant1_5280

11N20SISO_Ant1_5320

11N20SISO_Ant1_5500

11N20SISO_Ant1_5580

11N20SISO_Ant1_5720

11N40SISO_Ant1_5270

11N40SISO_Ant1_5310

11N40SISO_Ant1_5510

11N40SISO_Ant1_5590

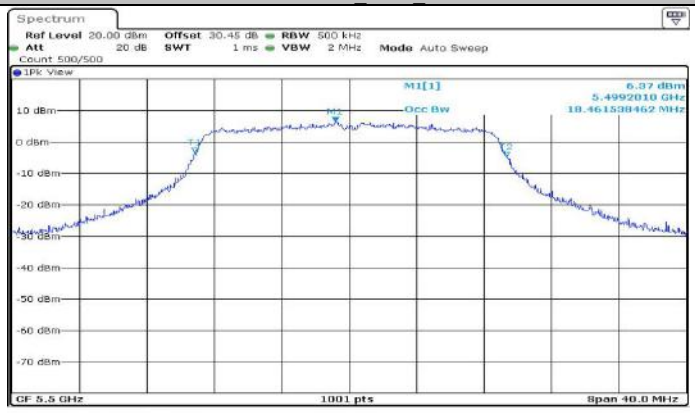
11N40SISO_Ant1_5710

11AC20SISO_Ant1_5260

11AC20SISO_Ant1_5280

11AC20SISO_Ant1_5320

11AC20SISO_Ant1_5500



11AC20SISO_Ant1_5580

11AC20SISO_Ant1_5720

11AC40SISO_Ant1_5270

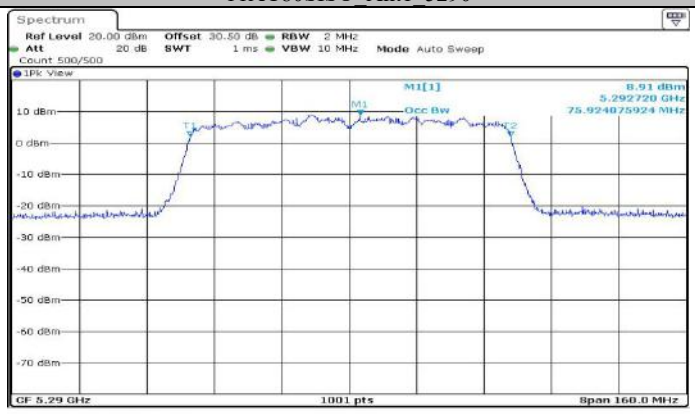
11AC40SISO_Ant1_5310

11AC40SISO_Ant1_5510

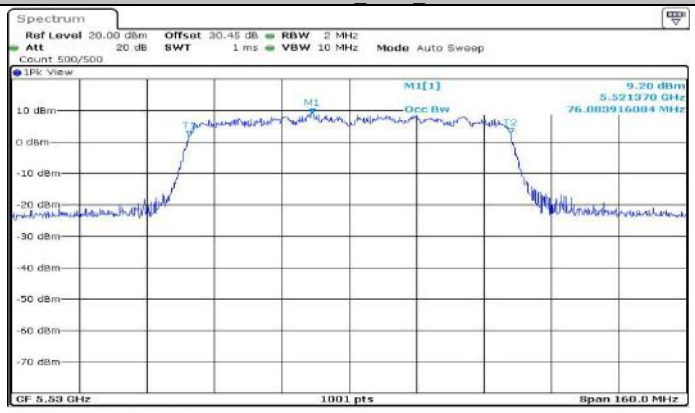
11AC40SISO_Ant1_5590

11AC40SISO_Ant1_5710

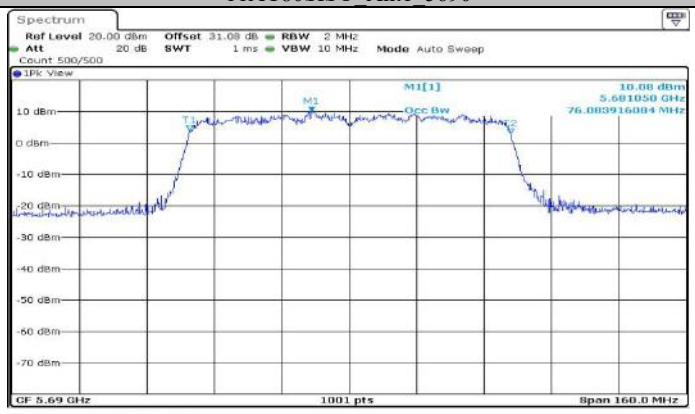
11AC80SISO_Ant1_5290



11AC80SISO_Ant1_5530



11AC80SISO_Ant1_5610

11AC80SISO_Ant1_5690


Appendix B: Maximum conducted output power

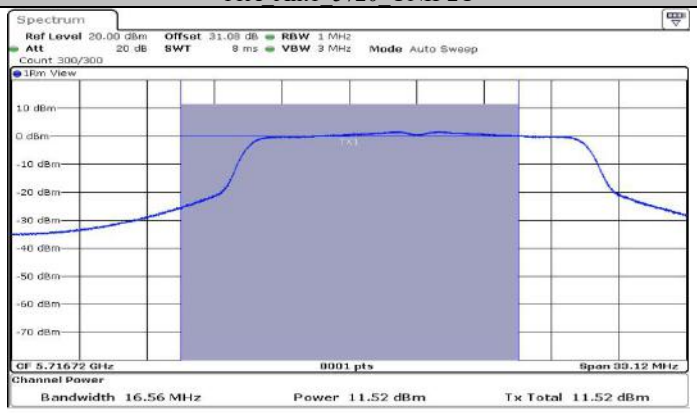
Test Result

Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11A	Ant1	5260	10.23	≤23.98	PASS
		5280	10.72	≤23.98	PASS
		5320	10.31	≤23.98	PASS
		5500	11.13	≤23.98	PASS
		5580	10.56	≤23.98	PASS
		5720_UNII-2C	11.52	≤23.19	PASS
		5720_UNII-3	4.81	≤30	PASS
11N20SISO	Ant1	5260	10.19	≤23.98	PASS
		5280	10.58	≤23.98	PASS
		5320	10.36	≤23.98	PASS
		5500	10.78	≤23.98	PASS
		5580	10.64	≤23.98	PASS
		5720_UNII-2C	11.26	≤23.13	PASS
		5720_UNII-3	5.09	≤30	PASS
11N40SISO	Ant1	5270	11.68	≤23.98	PASS
		5310	11.13	≤23.98	PASS
		5510	12.03	≤23.98	PASS
		5590	11.91	≤23.98	PASS
		5710_UNII-2C	12.42	≤23.98	PASS
		5710_UNII-3	1.83	≤30	PASS
11AC20SISO	Ant1	5260	10.62	≤23.98	PASS
		5280	10.71	≤23.98	PASS
		5320	10.38	≤23.98	PASS
		5500	10.86	≤23.98	PASS
		5580	10.74	≤23.98	PASS
		5720_UNII-2C	11.26	≤23.22	PASS
		5720_UNII-3	5.11	≤30	PASS
11AC40SISO	Ant1	5270	11.52	≤23.98	PASS
		5310	11.26	≤23.98	PASS
		5510	12.10	≤23.98	PASS
		5590	12.01	≤23.98	PASS
		5710_UNII-2C	12.75	≤23.98	PASS
		5710_UNII-3	2.08	≤30	PASS
11AC80SISO	Ant1	5290	11.36	≤23.98	PASS
		5530	11.68	≤23.98	PASS
		5610	12.01	≤23.98	PASS
		5690_UNII-2C	12.26	≤23.98	PASS
		5690_UNII-3	-1.59	≤30	PASS

Note: for the cross-band channel, use the spectrum analyzer.

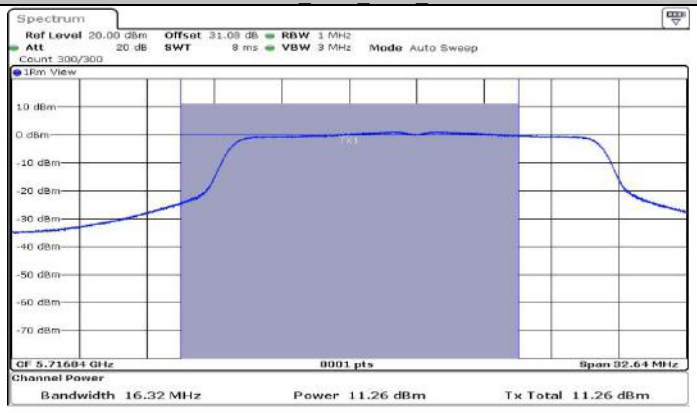
Test Graphs

11A_Ant1_5720_UNII-2C

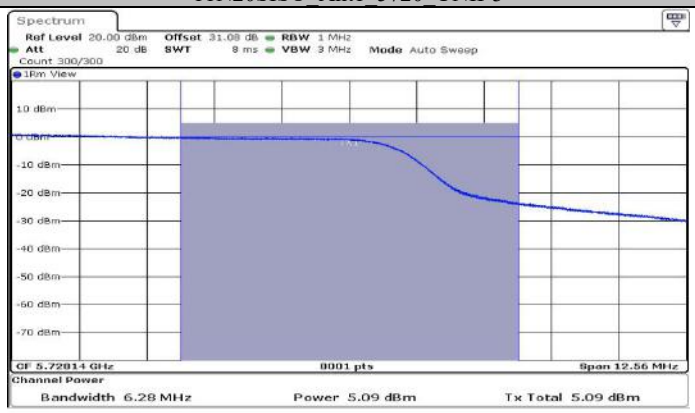


11A_Ant1_5720_UNII-3

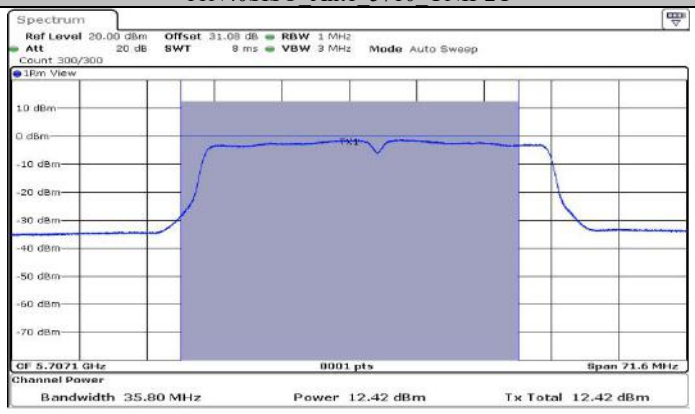
11N20SISO_Ant1_5720_UNII-2C



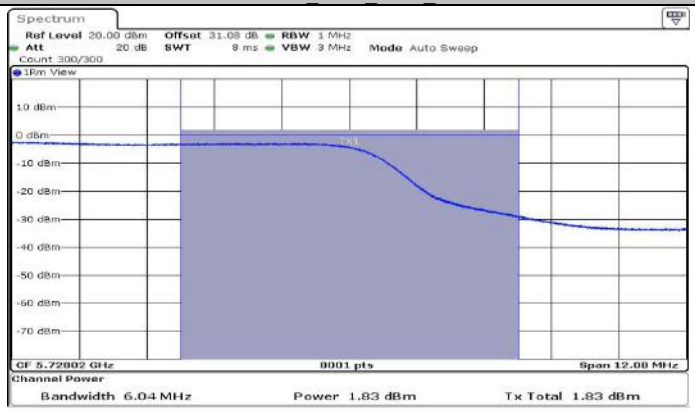
11N20SISO_Ant1_5720_UNII-3



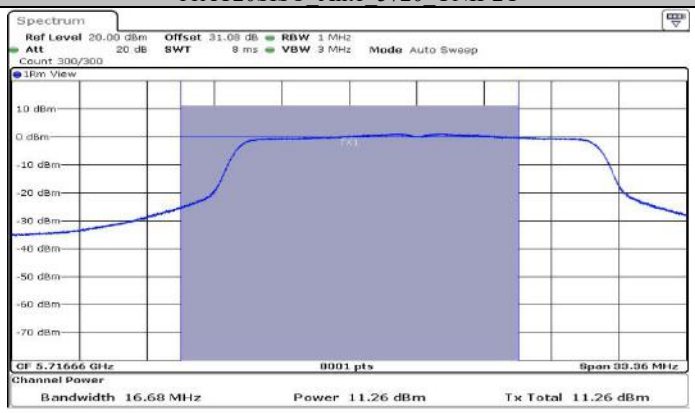
11N40SISO_Ant1_5710_UNII-2C



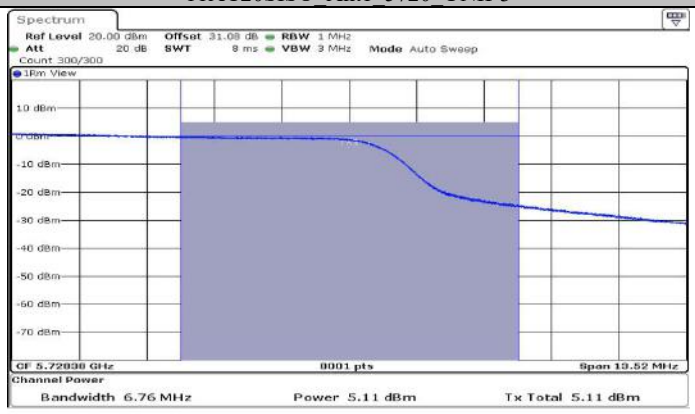
11N40SISO_Ant1_5710_UNII-3



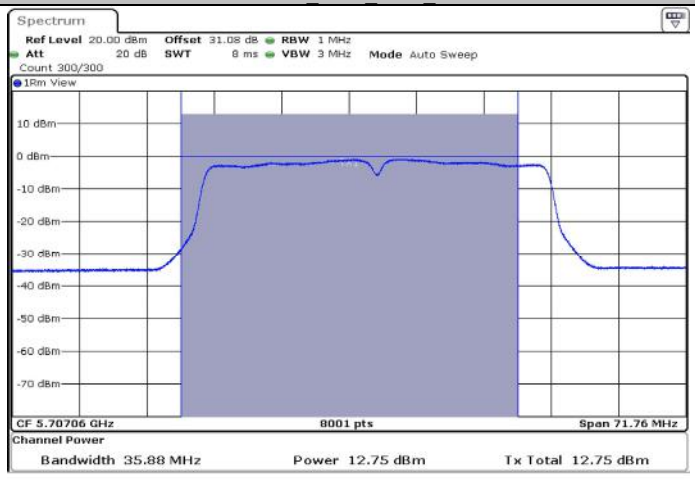
11AC20SISO_Ant1_5720_UNII-2C



11AC20SISO_Ant1_5720_UNII-3

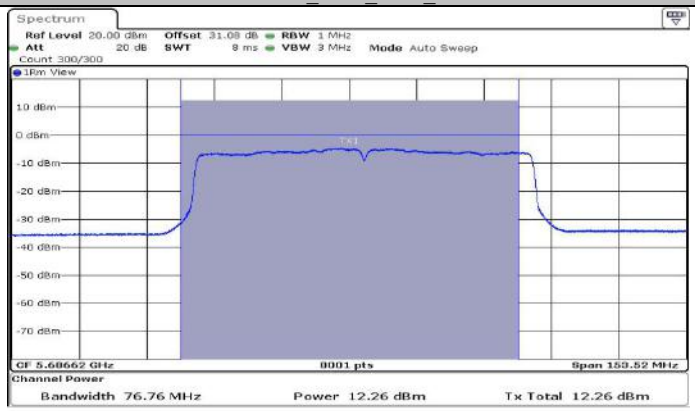


11AC40SISO_Ant1_5710_UNII-2C



11AC40SISO_Ant1_5710_UNII-3

11AC80SISO_Ant1_5690_UNII-2C



11AC80SISO_Ant1_5690_UNII-3

Appendix C: Maximum power spectral density

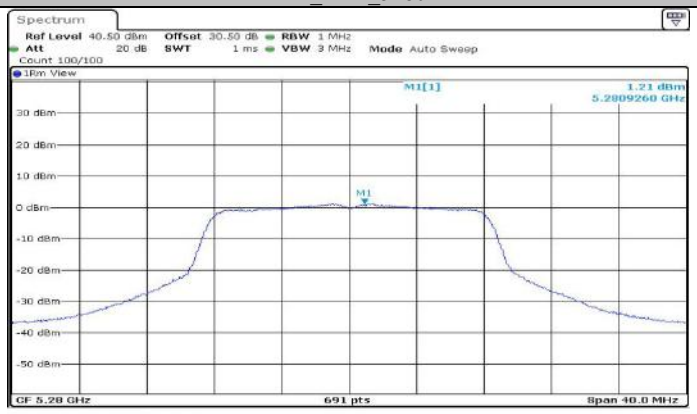
Test Result

Test Mode	Antenna	Channel	Result [dBm/MHz]	Limit[dBm/MHz]	Verdict
11A	Ant1	5260	0.54	≤11	PASS
		5280	1.21	≤11	PASS
		5320	0.74	≤11	PASS
		5500	1.49	≤11	PASS
		5580	1	≤11	PASS
		5720_UNII-2C	2.21	≤11	PASS
		5720_UNII-3	-2.14	≤11	PASS
11N20SISO	Ant1	5260	0.3	≤11	PASS
		5280	0.57	≤11	PASS
		5320	0.42	≤11	PASS
		5500	0.95	≤11	PASS
		5580	0.81	≤11	PASS
		5720_UNII-2C	1.79	≤11	PASS
		5720_UNII-3	-2.49	≤11	PASS
11N40SISO	Ant1	5270	-1.74	≤11	PASS
		5310	-2.11	≤11	PASS
		5510	-1.36	≤11	PASS
		5590	-1.63	≤11	PASS
		5710_UNII-2C	-0.76	≤11	PASS
		5710_UNII-3	-5.34	≤11	PASS
11AC20SISO	Ant1	5260	0.39	≤11	PASS
		5280	0.46	≤11	PASS
		5320	0.36	≤11	PASS
		5500	1.04	≤11	PASS
		5580	0.71	≤11	PASS
		5720_UNII-2C	1.91	≤11	PASS
		5720_UNII-3	-2.54	≤11	PASS
11AC40SISO	Ant1	5270	-1.83	≤11	PASS
		5310	-2.02	≤11	PASS
		5510	-1.37	≤11	PASS
		5590	-1.53	≤11	PASS
		5710_UNII-2C	-0.67	≤11	PASS
		5710_UNII-3	-5.27	≤11	PASS
11AC80SISO	Ant1	5290	-5.41	≤11	PASS
		5530	-4.98	≤11	PASS
		5610	-4.64	≤11	PASS
		5690_UNII-2C	-4.13	≤11	PASS
		5690_UNII-3	-8.27	≤11	PASS

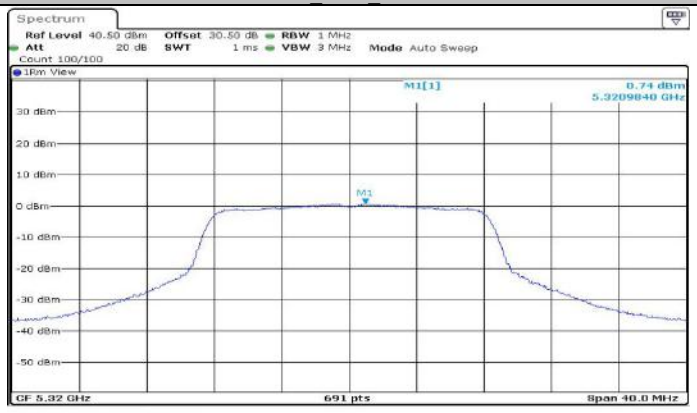
Test Graphs

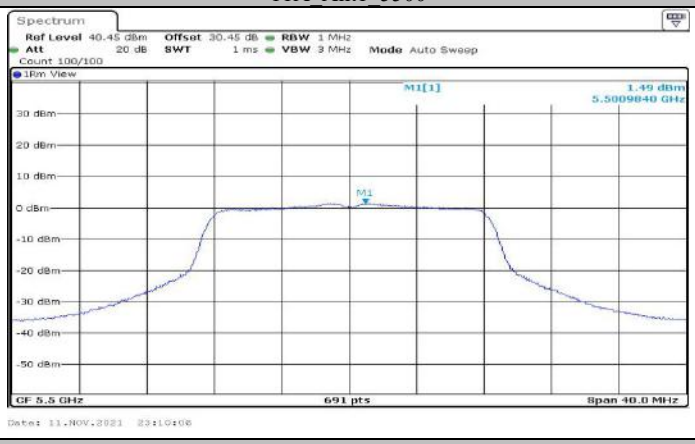
11A_Ant1_5260

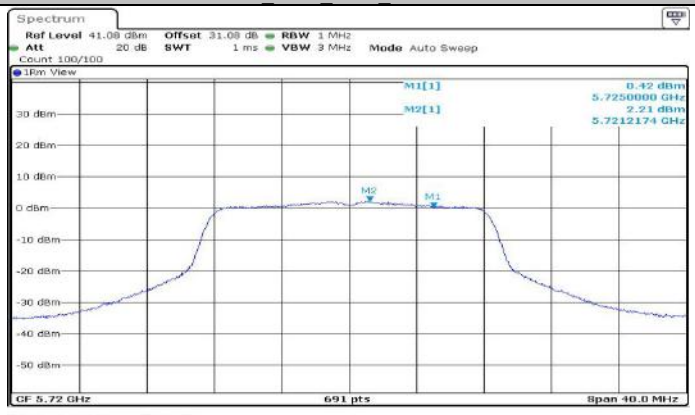
11A_Ant1_5280



11A_Ant1_5320



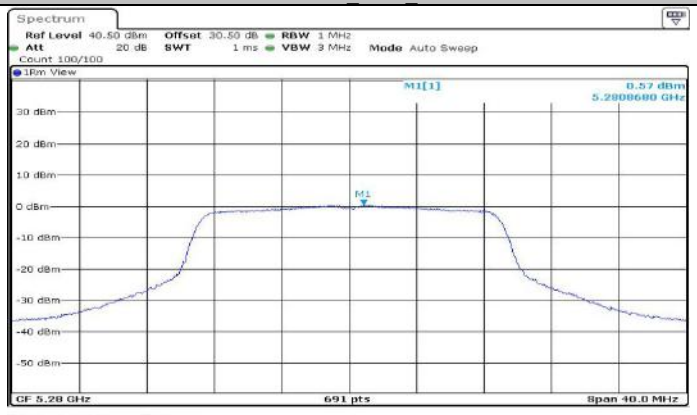
11A_Ant1_5500

11A_Ant1_5580

11A_Ant1_5720_UNII-2C


11A_Ant1_5720_UNII-3

11N20SISO_Ant1_5260

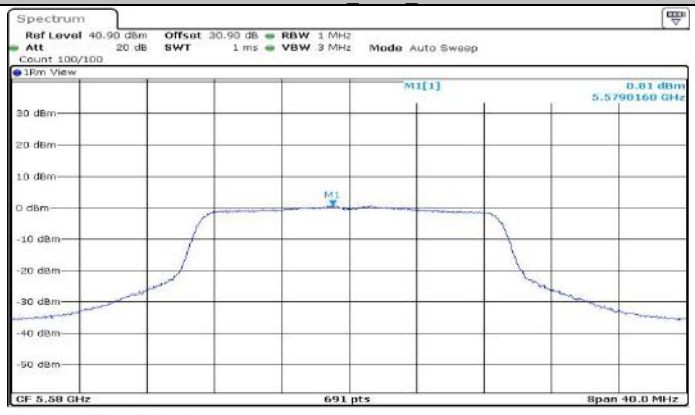
11N20SISO_Ant1_5280



11N20SISO_Ant1_5320

11N20SISO_Ant1_5500

11N20SISO_Ant1_5580



11N20SISO_Ant1_5720_UNII-2C

11N20SISO_Ant1_5720_UNII-3

11N40SISO_Ant1_5270

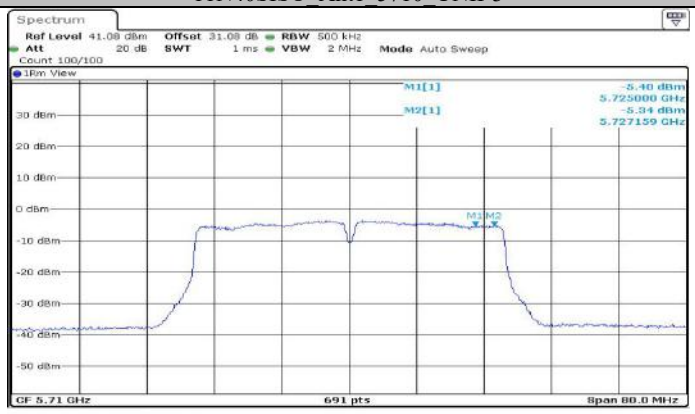
11N40SISO_Ant1_5310

11N40SISO_Ant1_5510

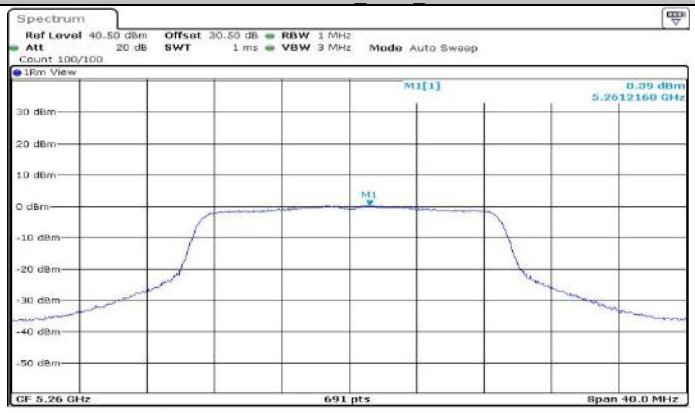
11N40SISO_Ant1_5590


11N40SISO_Ant1_5710_UNII-2C

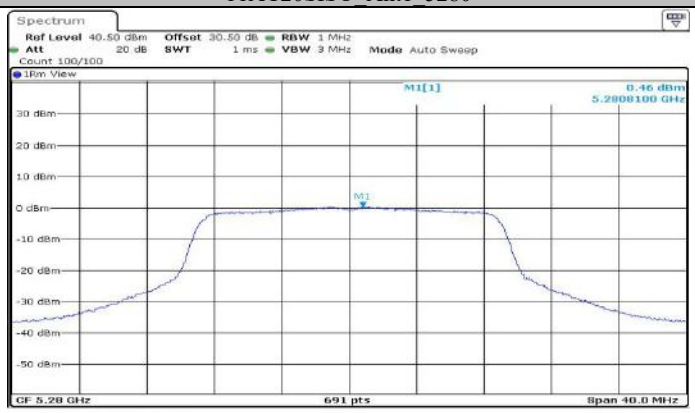
11N40SISO_Ant1_5710_UNII-3



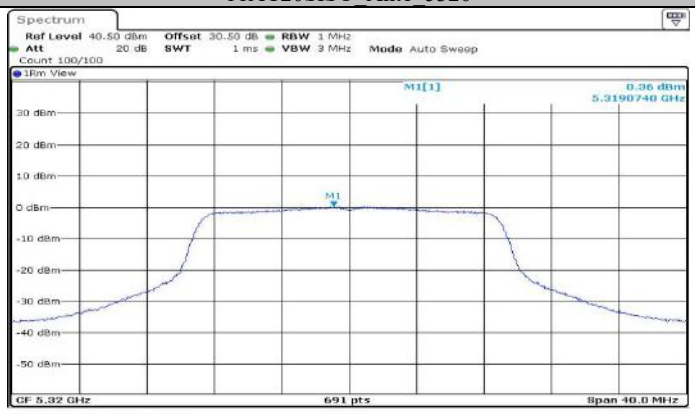
11AC20SISO_Ant1_5260



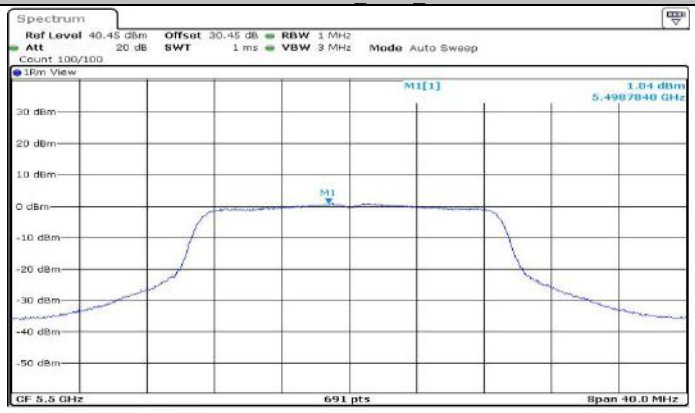
11AC20SISO_Ant1_5280



11AC20SISO_Ant1_5320

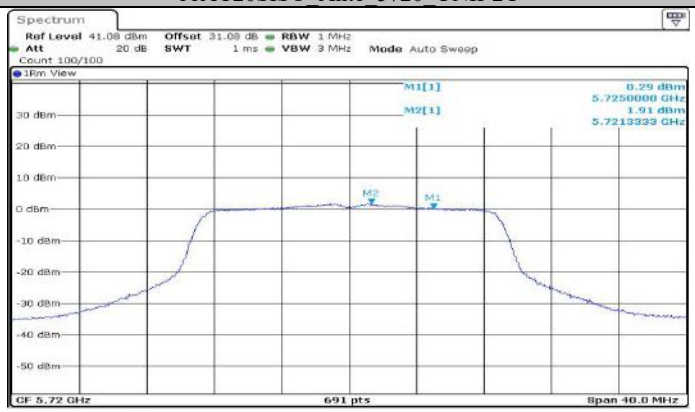


11AC20SISO_Ant1_5500

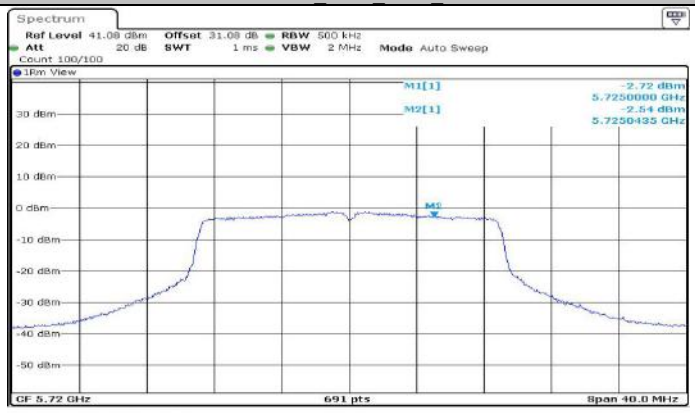


11AC20SISO_Ant1_5580

11AC20SISO_Ant1_5720_UNII-2C



11AC20SISO_Ant1_5720_UNII-3



11AC40SISO_Ant1_5270

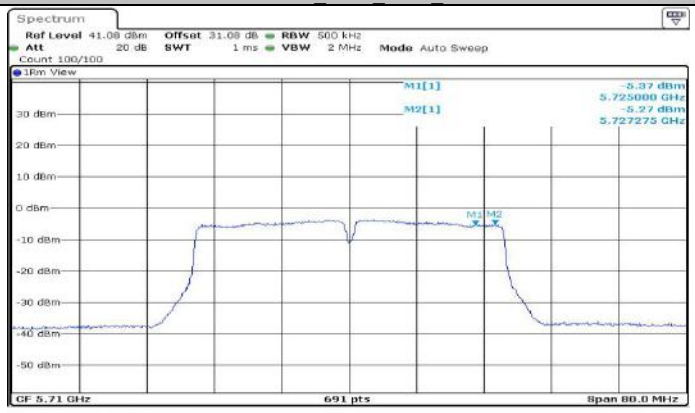
11AC40SISO_Ant1_5310

11AC40SISO_Ant1_5510

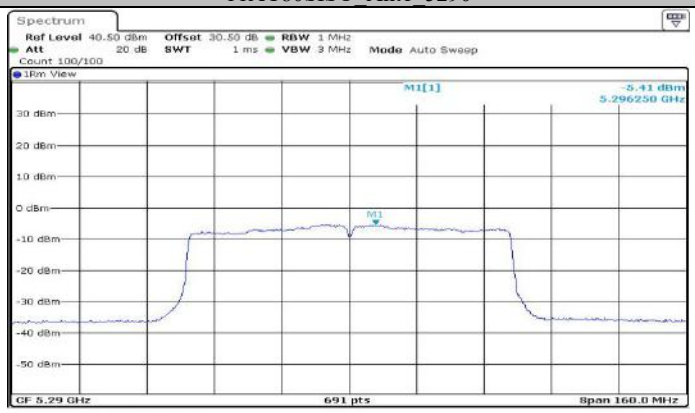
11AC40SISO_Ant1_5590

11AC40SISO_Ant1_5710_UNII-2C

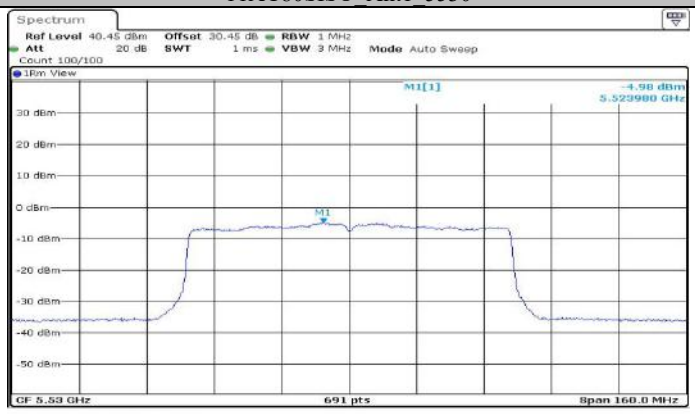
11AC40SISO_Ant1_5710_UNII-3



11AC80SISO_Ant1_5290



11AC80SISO_Ant1_5530



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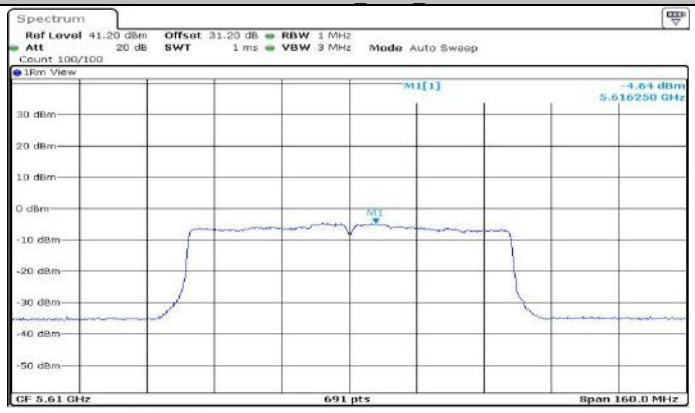

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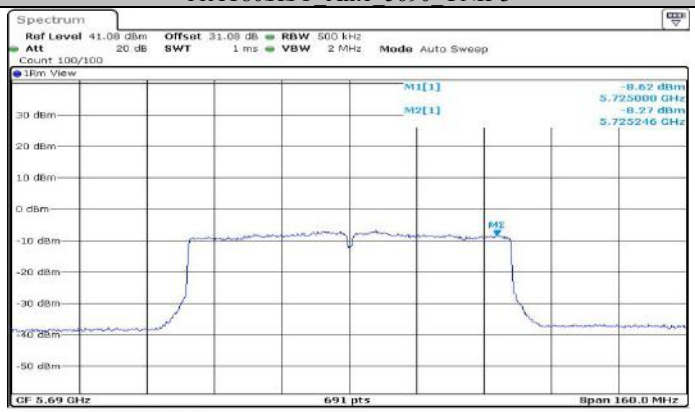


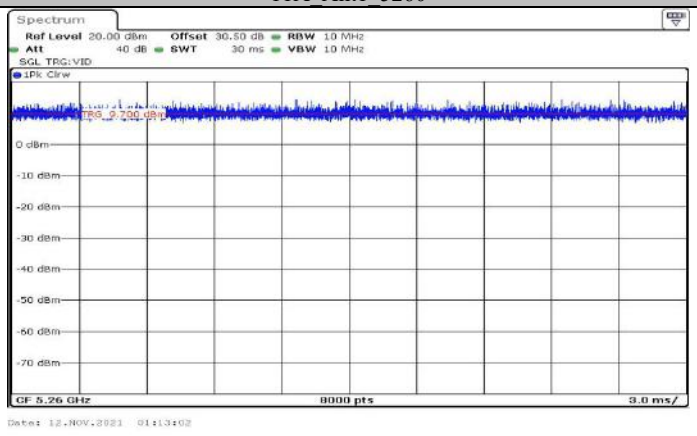
Appendix D: Duty Cycle

Test Result

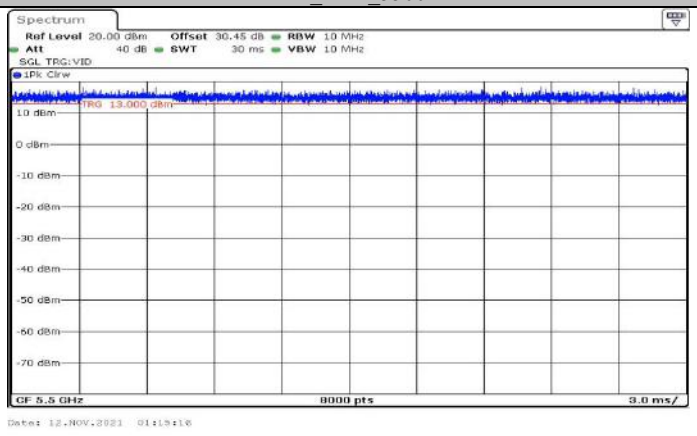
Test Mode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
11A	Ant1	5260	30.00	30.00	100.00
		5500	30.00	30.00	100.00
11N20SISO	Ant1	5260	30.00	30.00	100.00
		5500	30.00	30.00	100.00
11N40SISO	Ant1	5270	30.00	30.00	100.00
		5510	30.00	30.00	100.00
11AC20SISO	Ant1	5260	30.00	30.00	100.00
		5500	30.00	30.00	100.00
11AC40SISO	Ant1	5270	30.00	30.00	100.00
		5510	30.00	30.00	100.00
11AC80SISO	Ant1	5290	30.00	30.00	100.00
		5530	30.00	30.00	100.00

Test Graphs

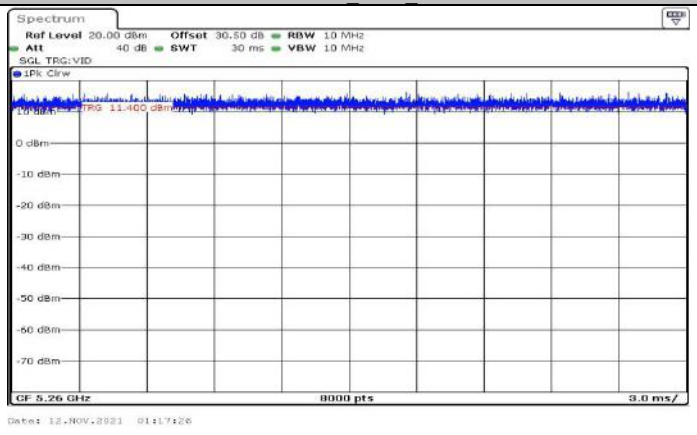
11A_Ant1_5260



11A_Ant1_5500



11N20SISO_Ant1_5260



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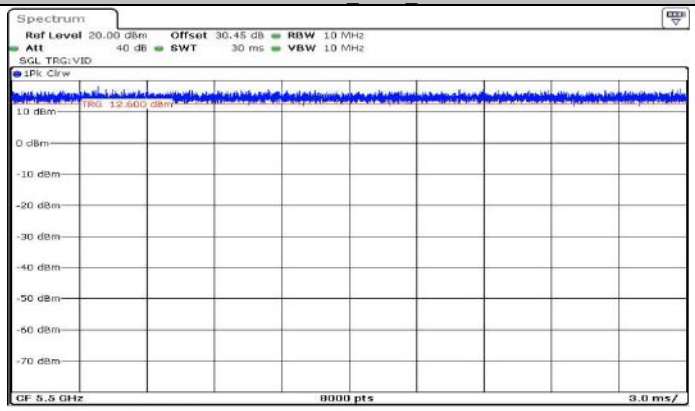

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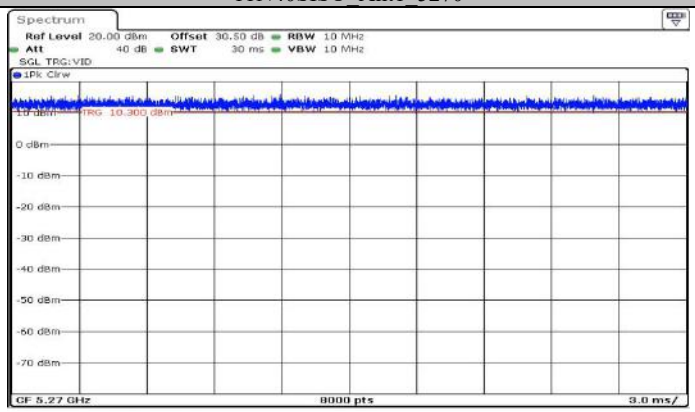

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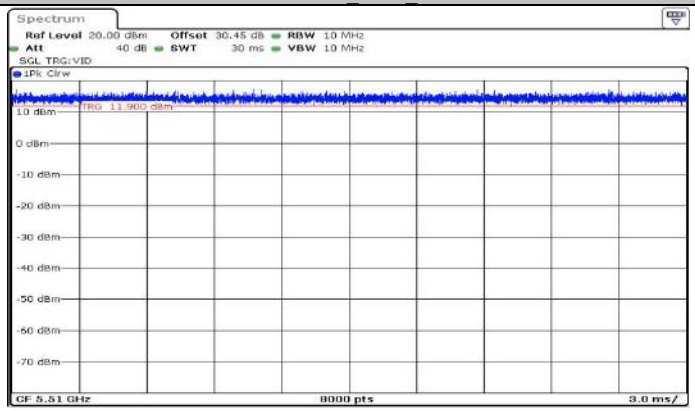

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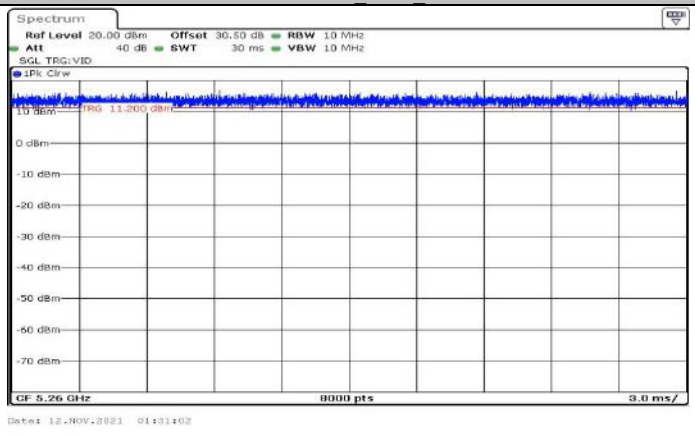

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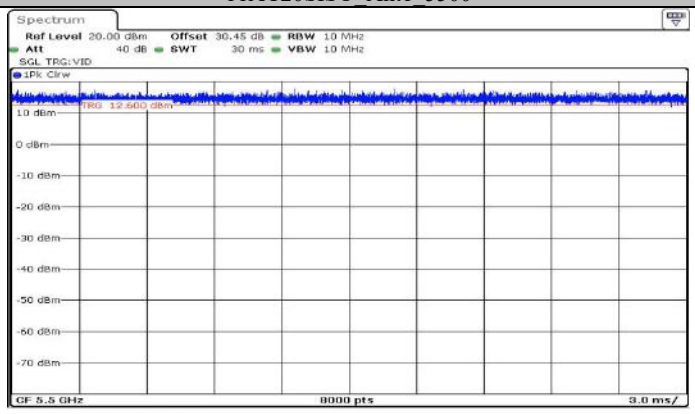

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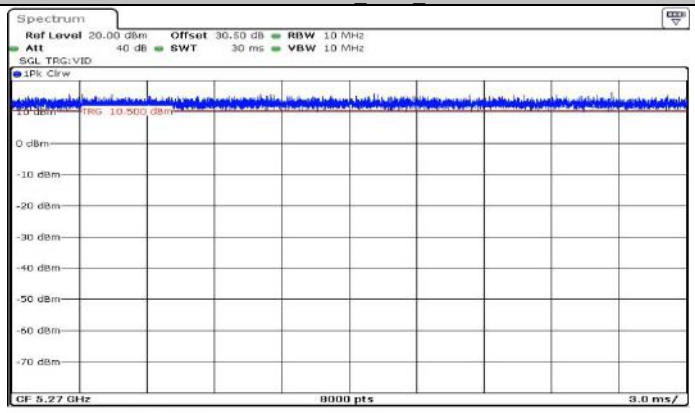

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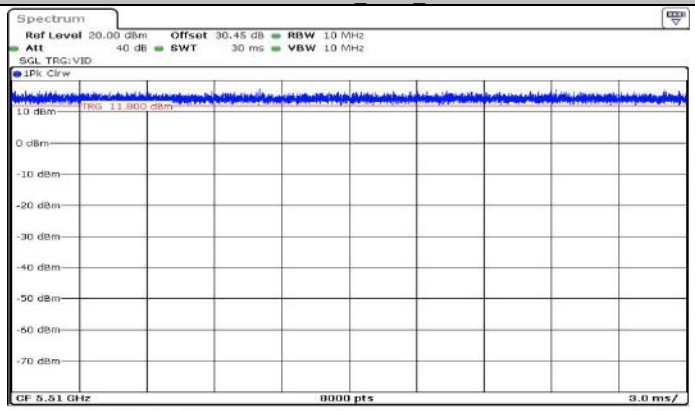
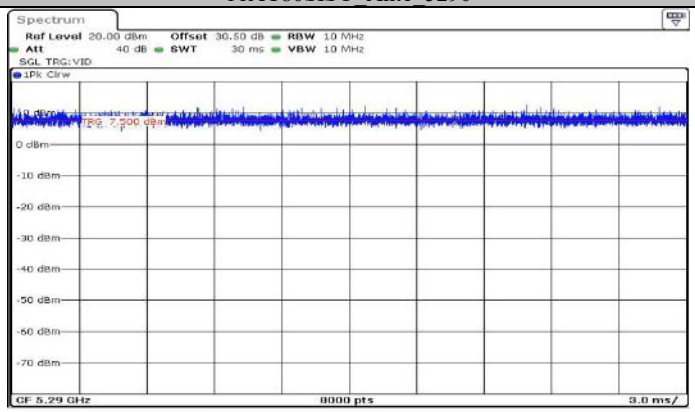
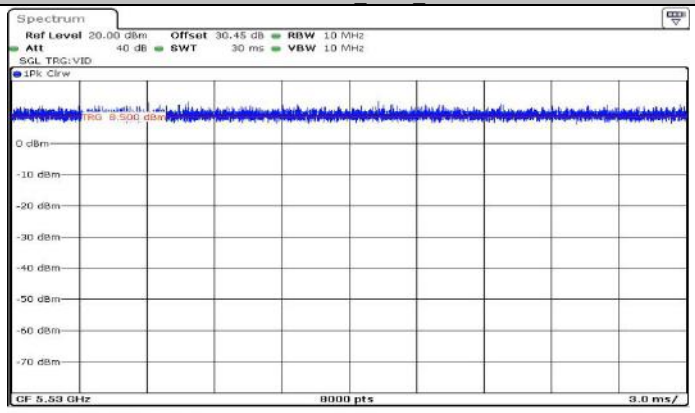


11AC80SISO_Ant1_5290



11AC80SISO_Ant1_5530



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