



FCC PART 15.407 TEST REPORT

For

AudioCodes Ltd.

1 Hayarden Street, Airport City, Lod, Israel

FCC ID: XAK445HDB

Report Type: Original Report	Product Type: IP Phone 445HD
Report Number: RSZ200514001-00C	
Report Date: 2020-06-18	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	IP Phone 445HD
Model	445HD
Frequency Range	5G Wi-Fi: 5150-5250MHz; 5250-5350MHz; 5470-5725MHz; 5725-5850MHz
Maximum Conducted Average Output Power	5150-5250 MHz: 14.06dBm (802.11a), 13.60dBm(802.11n20), 13.52dBm(802.11n40) 11.99dBm (802.11ac20), 11.28dBm(802.11 ac40), 11.15dBm(802.11 ac80) 5250-5350MHz: 14.62dBm (802.11a), 13.58dBm(802.11n20), 13.44 dBm(802.11n40) 11.43dBm (802.11ac20), 11.39dBm(802.11 ac40), 11.09dBm(802.11 ac80) 5470-5725MHz: 13.54dBm (802.11a), 13.65dBm(802.11n20), 13.61 dBm(802.11n40) 12.09dBm (802.11ac20), 11.30dBm(802.11 ac40), 12.81dBm(802.11 ac80) 5725-5850 MHz: 12.78dBm (802.11a), 12.57dBm(802.11n20), 12.28dBm(802.11n40) 10.57dBm (802.11ac20), 10.47dBm(802.11 ac40), 10.40dBm(802.11 ac80)
Modulation Technique	OFDM
Antenna Specification	5150-5250MHz:3.52dBi, 5250-5350MHz:3.03dBi, 5470-5725MHz:2.59dBi, 5725-5850MHz:1.97dBi
Voltage Range	DC12V from adapter
Date of Test	2020-05-21 to 2020-06-13
Sample serial number	RSZ200514001-RF-S1 (Assigned by BACL, Shenzhen)
Received date	2020-05-14
Sample/EUT Status	Good condition
Adapter information	Model: KSAS0121200100D5 Input: 100-240V~ 50/60Hz 0.4A Output: DC 12V, 1.0A

Objective

This type approval report is prepared on behalf of *AudioCodes Ltd.* 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.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS/DSS submissions with FCC ID: XAK445HDB.

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 Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF Output Power with Power meter		±0.73dB
RF conducted test with spectrum		±1.6dB
AC Power Lines Conducted Emissions		±1.95dB
Emissions, Radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB
Temperature		±1 °C
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 Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, 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.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

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

The EUT can operate in 802.11a/n20/n40/ac20/ac40/ac80 modes.

For 5150-5250MHz Band, 7 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
38	5190	46	5230
40	5200	48	5240
42	5210	/	/

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 5470-5725MHz Band, 18 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	140	5700
116	5580	/	/
118	5590	/	/
120	5600	/	/
122	5610	/	/

For 5725-5850MHz Band, 8 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	157	5785
151	5755	159	5795
153	5765	161	5805
155	5775	165	5825

EUT Exercise Software

“secureCRT.EXE” was used. Test frequencies and power level were configured as below:

U-NII	Mode	Channel Number	Frequency (MHz)	Data Rate	Power Level
5150 – 5250MHz	802.11 a	CH36	5180	6Mbps	58
		CH40	5200	6Mbps	58
		CH48	5240	6Mbps	58
	802.11 n20	CH36	5180	MCS0	55
		CH40	5200	MCS0	55
		CH48	5240	MCS0	55
	802.11 n40	CH38	5190	MCS0	53
		CH46	5230	MCS0	53
	802.11 ac20	CH36	5180	MCS0	49
		CH40	5200	MCS0	49
		CH48	5240	MCS0	49
	802.11 ac40	CH38	5190	MCS0	48
		CH46	5230	MCS0	48
5250 – 5350MHz	802.11 a	CH42	5210	MCS0	48
		CH52	5260	6Mbps	58
		CH56	5280	6Mbps	58
	802.11 n20	CH64	5320	6Mbps	58
		CH52	5260	MCS0	53
		CH56	5280	MCS0	53
	802.11 n40	CH64	5320	MCS0	53
		CH54	5270	MCS0	52
		CH62	5310	MCS0	52
	802.11 ac20	CH52	5260	MCS0	48
		CH56	5280	MCS0	48
		CH64	5320	MCS0	48
	802.11 ac40	CH54	5270	MCS0	48
		CH62	5310	MCS0	48
	802.11 ac80	CH58	5290	MCS0	48

U-NII	Mode	Channel Number	Frequency (MHz)	Data Rate set	Power Level
5470 – 5725MHz	802.11 a	CH100	5500	6Mbps	53
		CH116	5600	6Mbps	53
		CH140	5700	6Mbps	53
	802.11 n20	CH100	5500	MCS0	49
		CH116	5600	MCS0	49
		CH140	5700	MCS0	49
	802.11 n40	CH102	5510	MCS0	48
		CH110	5550	MCS0	48
		CH134	5670	MCS0	48
	802.11 ac20	CH100	5500	MCS0	46
		CH116	5600	MCS0	46
		CH140	5700	MCS0	46
	802.11 ac40	CH102	5510	MCS0	44
		CH110	5550	MCS0	44
		CH134	5670	MCS0	44
	802.11 ac80	CH106	5530	MCS0	48
		CH122	5610	MCS0	48
5725 – 5850MHz	802.11 a	CH149	5745	6Mbps	53
		CH157	5785	6Mbps	53
		CH165	5825	6Mbps	53
	802.11 n20	CH149	5745	MCS0	53
		CH157	5785	MCS0	53
		CH165	5825	MCS0	53
	802.11 n40	CH151	5755	MCS0	52
		CH159	5795	MCS0	52
	802.11 ac20	CH149	5745	MCS0	53
		CH157	5785	MCS0	48
		CH165	5825	MCS0	48
	802.11 ac40	CH151	5755	MCS0	48
		CH159	5795	MCS0	48
	802.11 ac80	CH155	5775	MCS0	48

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

Duty cycle

Test Result: Compliance. Please refer to the Appendix.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

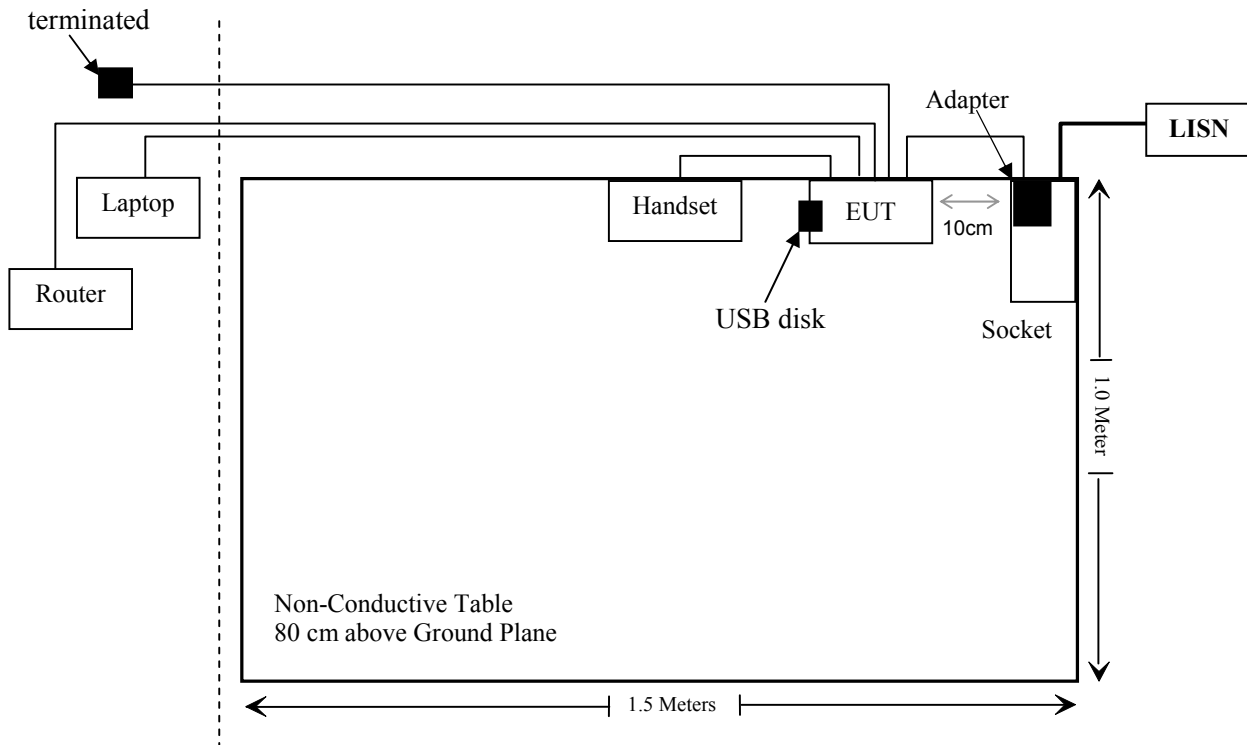
Manufacturer	Description	Model	Serial Number
BULL	Socket	GN-212	A37209315081183
HP	Laptop	Compaq CQ45	5CG33407QL
SAGEM	Router	SAGEM F@ST™ 2604 White	SE20546325821
TECLAST	USB disk	8GB	8GB
Dora	Handset	Dora	Dora

External I/O Cable

Cable Description	Length (m)	From Port	To
Un-shielded Un-detachable AC Cable	1.2	LISN	Socket
Un-shielding Un-detachable DC Cable	1.0	EUT	Adapter
Un-shielded detachable RJ45 Cable	8.0	EUT	Laptop
Un-shielded detachable RJ45 Cable	8.0	EUT	Router
Un-shielded detachable RJ9 Cable	0.5	EUT	Handset
Un-shielded detachable signal Cable	8.0	EUT	terminated

Block Diagram of Test Setup

For conducted emission



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307 (b) (1) & §2.1091	Maximum Permissible exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.407(b)(6)& §15.207(a)	Conducted Emissions	Compliance
§15.205& §15.209 &§15.407(b) (1), (2), (3), (4), (6) (7)	Undesirable Emission& Restricted Bands	Compliance
§15.407(a) (1), (5),(e)	26 dB Emission Bandwidth & 6dB Bandwidth	Compliance
§15.407(a)(1),(2), (3)	Conducted Transmitter Output Power	Compliance
§15.407 (a)(1), (2), (3)	Power Spectral Density	Compliance
§15.407 (h)	Transmit Power Control (TPC)	Not Applicable
§15.407 (h)	Dynamic Frequency Selection (DFS)	Compliance*

Not Applicable: the EUT has no TPC function which was declared by the applicant.

Compliance*: Please refer to the DFS report: RSZ200514002-00.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conducted test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2019/7/9	2020/7/8
Rohde & Schwarz	LISN	ENV216	101613	2020/1/22	2021/1/21
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2019/11/29	2020/11/28
Unknow	CE Cable	CE Cable	UF A210B-1-0720-504504	2019/11/29	2020/11/28
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
Radiated Emission Test					
R&S	EMI Test Receiver	ESR3	102455	2019/7/9	2020/7/8
Sonoma instrument	Pre-amplifier	310 N	186238	2020/4/20	2021/4/20
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017/12/22	2020/12/21
Unknow	Cable	Chamber Cable 1	F-03-EM236	2019/11/29	2020/11/28
Unknow	Cable 2	RF Cable 2	F-03-EM197	2019/11/29	2020/11/28
Rohde & Schwarz	Auto test software	EMC 32	V9.10	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40-N	102259	2019/7/22	2020/7/21
COM-POWER	Pre-amplifier	PA-122	181919	2019/11/29	2020/11/28
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2019/11/29	2020/11/28
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017/12/22	2020/12/21
Insulted Wire Inc.	RF Cable	SPS-2503-3150	02222010	2019/11/29	2020/11/28
Unknow	RF Cable	W1101-EQ1 OUT	F-19-EM005	2019/11/29	2020/11/28
SNSD	Band Reject filter	BSF5150-5850MN-0899-004	5G filter	2020/4/20	2021/4/20
Ducommun Technologies	Horn antenna	ARH-4223-02	1007726-02 1304	2017/12/6	2020/12/5
Ducommun Technologies	Horn antenna	ARH-2823-02	1007726-02 1302	2017/12/6	2020/12/5

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 1.1307 (b)(1), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (Minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Frequency (MHz)	Antenna Gain		Tune up conducted power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
	(dBi)	(numeric)	(dBm)	(mW)			
5150-5250	3.52	2.25	14.5	28.18	20	0.013	1
5250-5350	3.03	2.01	15.0	31.62	20	0.013	1
5470-5725	2.59	1.82	14.0	25.12	20	0.009	1
5725-5850	1.97	1.57	13.0	19.95	20	0.006	1

Note: The BT/BLE/2.4G Wi-Fi can't transmit with the 5G Wi-Fi at the same time.

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

Result: Compliance

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 for 5G Wi-Fi, which was permanently attached and the antenna gain is 3.52dBi(5150-5250MHz), 3.03dBi(5250-5350MHz), 2.59dBi(5470-5725MHz), 1.97dBi(5725-5850MHz), fulfill the requirement of this section. Please refer to the EUT photos.

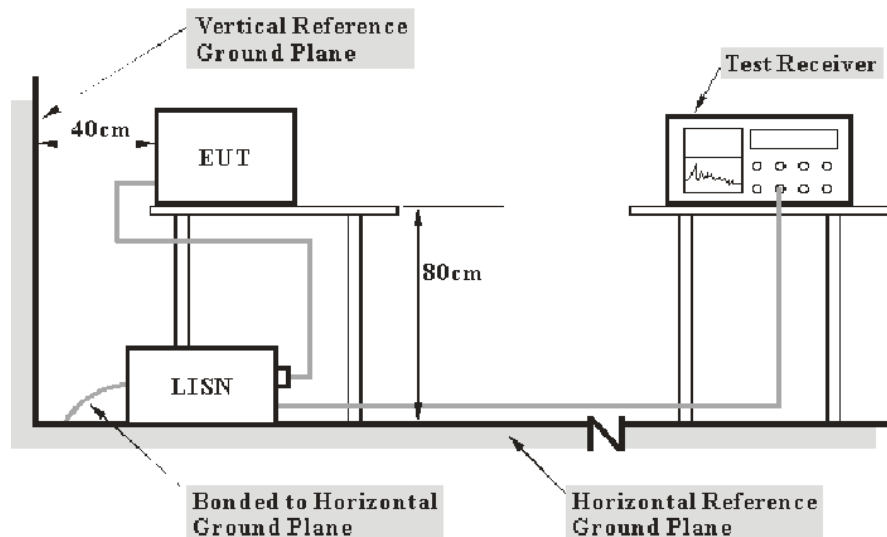
Result: Compliance.

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.

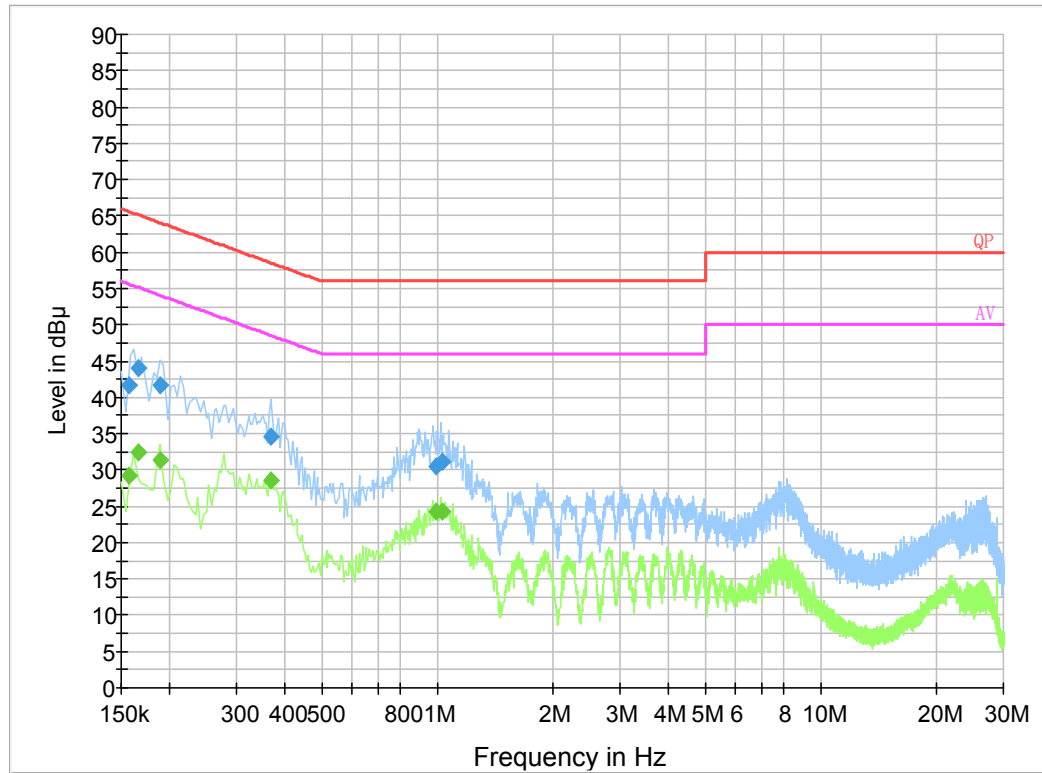
All data was recorded in the Quasi-peak and average detection mode.

Test Data**Environmental Conditions**

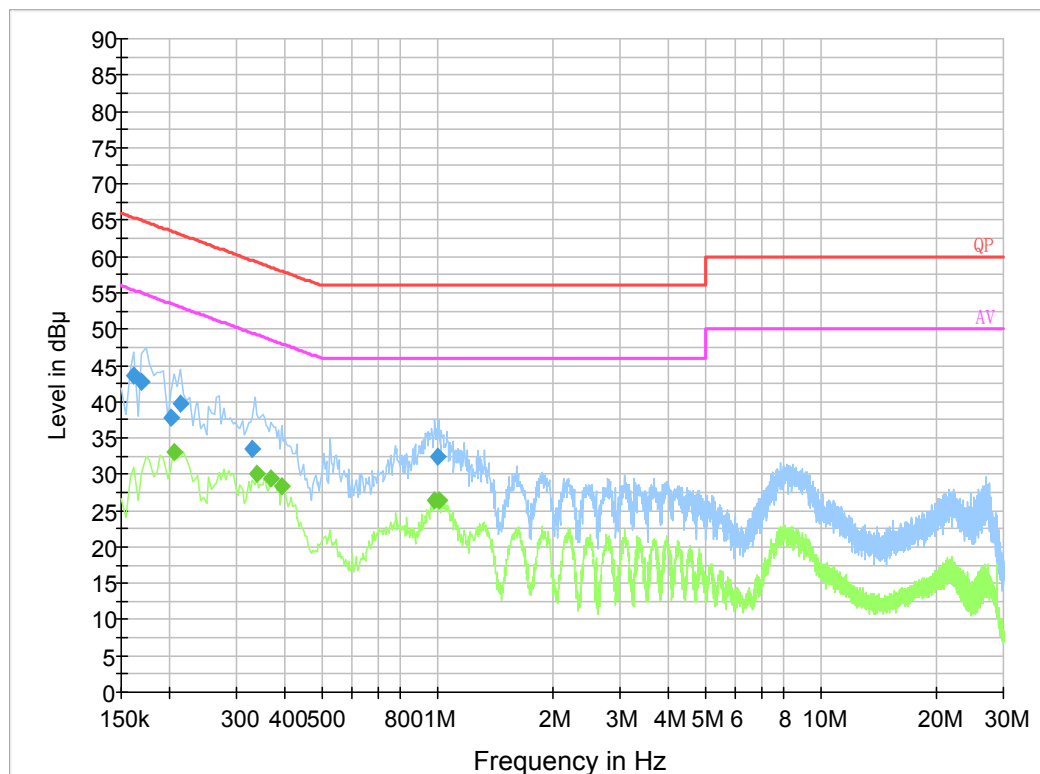
Temperature:	25 °C
Relative Humidity:	65 %
ATM Pressure:	101.0 kPa

The testing was performed by Haiguo Li on 2020-05-22.

EUT operation mode: Transmitting (worst case is 802.11a mode 5180 MHz)

AC 120V/60 Hz, Line:

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.157500	41.6	19.8	65.6	24.0	QP
0.165500	44.1	19.9	65.2	21.1	QP
0.189500	41.7	19.8	64.1	22.4	QP
0.368450	34.6	19.9	58.5	23.9	QP
0.992670	30.4	19.9	56.0	25.6	QP
1.034670	31.2	19.9	56.0	24.8	QP
0.157500	29.2	19.8	55.6	26.4	Ave.
0.165500	32.5	19.9	55.2	22.7	Ave.
0.189500	31.3	19.8	54.1	22.7	Ave.
0.368450	28.6	19.9	48.5	19.9	Ave.
0.992670	24.2	19.9	46.0	21.8	Ave.
1.034670	24.4	19.9	46.0	21.6	Ave.

AC120V, 60 Hz, Neutral:

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.161500	43.7	19.8	65.4	21.7	QP
0.169500	42.8	19.8	65.0	22.2	QP
0.201500	37.8	19.8	63.5	25.8	QP
0.213500	39.7	19.8	63.1	23.4	QP
0.328990	33.5	19.8	59.5	26.0	QP
1.000790	32.5	19.8	56.0	23.5	QP
0.206000	33.1	19.8	53.4	20.3	Ave.
0.338000	30.2	19.8	49.3	19.1	Ave.
0.370000	29.4	19.9	48.5	19.1	Ave.
0.394000	28.3	19.8	48.0	19.6	Ave.
0.986000	26.4	19.8	46.0	19.6	Ave.
1.014000	26.4	19.8	46.0	19.6	Ave.

Note:

- 1) Correction Factor = LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
- 2) Corrected Amplitude = Reading + Correction Factor
- 3) Margin = Limit – Corrected Amplitude

§15.205 & §15.209 & §15.407(B) (1), (2), (3), (4),(6),(7) – UNDESIRABLE EMISSION

Applicable Standard

FCC §15.407 (b) (1), (2), (3), (4), (6), (7); §15.209; §15.205;

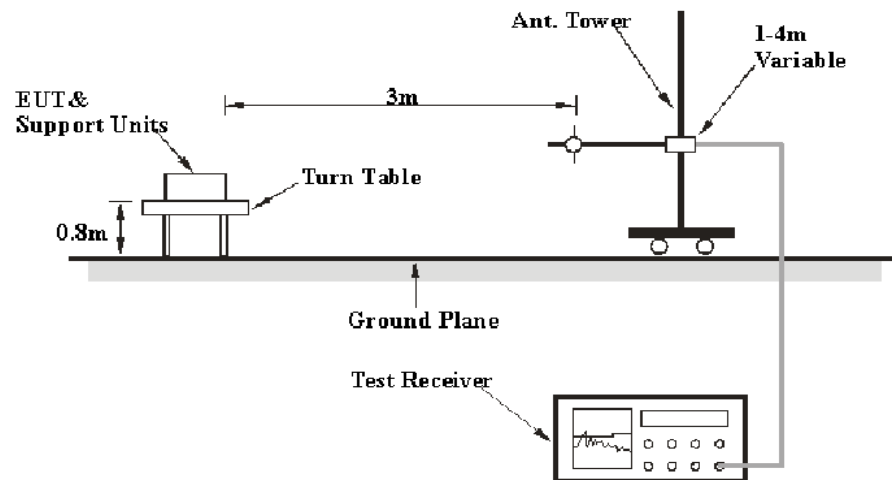
(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

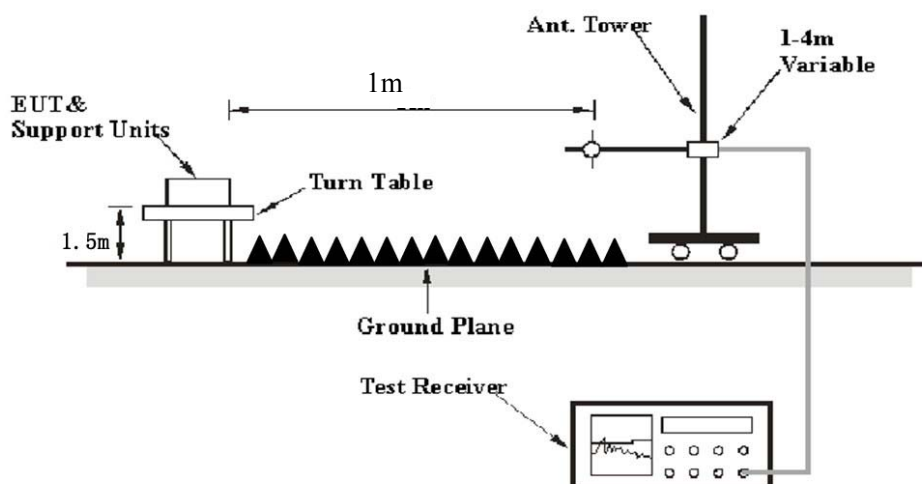
- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band:
 - (i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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.

Corrected Amplitude & Margin Calculation

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

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Data

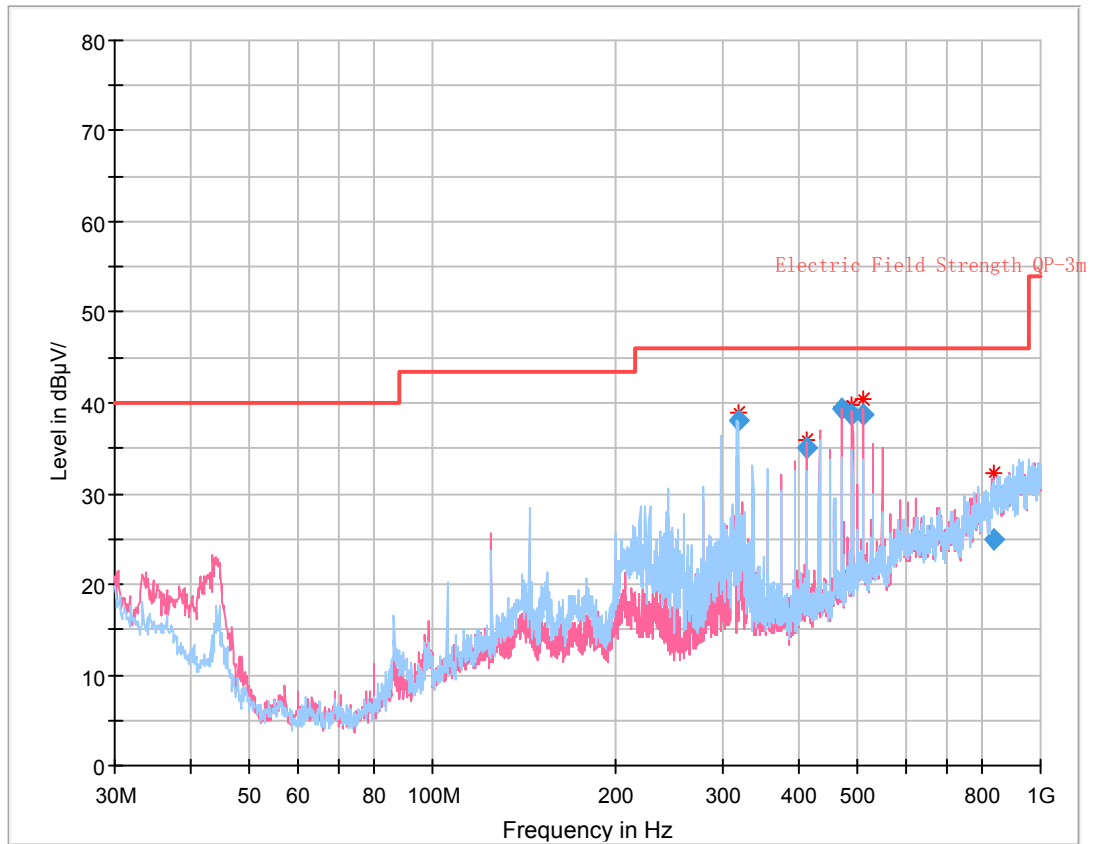
Environmental Conditions

Temperature:	24~25 °C
Relative Humidity:	52~65 %
ATM Pressure:	101.0 kPa

The testing was performed by Hollamd Yang on 2020-05-21 for below 1GHz and Leven Gan on 2020-06-04 and 2020-06-09 for above 1GHz.

EUT operation mode: Transmitting

30 MHz – 1 GHz: (worst case is 802.11a mode 5180 MHz)



Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
317.312750	38.04	102.0	H	354.0	-10.7	46.00	7.96
413.489000	34.99	109.0	V	300.0	-9.8	46.00	11.01
471.166000	39.45	103.0	V	118.0	-6.9	46.00	6.55
490.411000	38.74	109.0	V	117.0	-5.8	46.00	7.26
509.630875	38.69	111.0	V	54.0	-5.0	46.00	7.31
834.827375	24.88	176.0	V	244.0	2.7	46.00	21.12

1 ~ 40 GHz:

Note: The test distance is 1m, so the correct factor from 3m to 1m is $20\log(3/1)=9.5\text{dB}$ which was added into the final limit.

5150-5250 MHz:

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m)	FCC Part 15.407/205/209	
	Reading (dBµV)	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)			Limit (dBµV/m)	Margin (dB)
802.11a									
5180 MHz									
5148.15	39.74	PK	70	2.1	H	38.36	78.10	83.5	5.40
5148.15	20.42	Ave.	70	2.1	H	38.36	58.78	63.5	4.72
5352.63	28.69	PK	132	1.4	H	39.09	67.78	83.5	15.72
5352.63	14.36	Ave.	132	1.4	H	39.09	53.45	63.5	10.05
10360.00	48.14	PK	1	2.1	H	17.42	65.56	77.7	12.14
5200 MHz									
10400.00	47.31	PK	301	1.7	H	17.52	64.83	77.7	12.87
5240 MHz									
5146.38	28.62	PK	326	2.1	H	38.36	66.98	83.5	16.52
5146.38	14.45	Ave.	326	2.1	H	38.36	52.81	63.5	10.69
5351.26	28.76	PK	53	1.1	H	39.09	67.85	83.5	15.65
5351.26	14.51	Ave.	53	1.1	H	39.09	53.60	63.5	9.90
10480.00	45.87	PK	47	1.5	H	17.25	63.12	77.7	14.58
802.11n20									
5180 MHz									
5148.15	38.51	PK	84	2.4	H	38.36	76.87	83.5	6.63
5148.15	19.92	Ave.	84	2.4	H	38.36	58.28	63.5	5.22
5354.62	28.73	PK	9	1.9	H	39.09	67.82	83.5	15.68
5354.62	15.32	Ave.	9	1.9	H	39.09	54.41	63.5	9.09
10360.00	48.47	PK	76	2.2	H	17.42	65.89	77.7	11.81
5200 MHz									
10400.00	46.48	PK	120	1.0	H	17.52	64.00	77.7	13.70
5240 MHz									
5147.62	28.46	PK	51	2.4	H	38.36	66.82	83.5	16.68
5147.62	14.31	Ave.	51	2.4	H	38.36	52.67	63.5	10.83
5350.89	28.59	PK	57	1.1	H	39.09	67.68	83.5	15.82
5350.89	14.54	Ave.	57	1.1	H	39.09	53.63	63.5	9.87
10480.00	45.37	PK	305	1.3	H	17.25	62.62	77.7	15.08

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11n40									
5190 MHz									
5147.07	41.35	PK	262	1.3	H	38.36	79.71	83.5	3.79
5147.07	21.61	Ave.	262	1.3	H	38.36	59.97	63.5	3.53
5361.49	28.62	PK	184	1.3	H	39.09	67.71	83.5	15.79
5361.49	15.13	Ave.	184	1.3	H	39.09	54.22	63.5	9.28
10380.00	43.46	PK	294	1.9	H	17.42	60.88	77.7	16.82
5230 MHz									
5148.73	28.57	PK	357	2.5	H	38.36	66.93	83.5	16.57
5148.73	15.23	Ave.	357	2.5	H	38.36	53.59	63.5	9.91
5352.42	28.66	PK	311	1.5	H	39.09	67.75	83.5	15.75
5352.42	15.36	Ave.	311	1.5	H	39.09	54.45	63.5	9.05
10460.00	44.41	PK	335	2.3	H	17.15	61.56	77.7	16.14
802.11ac20									
5180 MHz									
5147.07	40.06	PK	244	1.9	H	38.36	78.42	83.5	5.08
5147.07	20.45	Ave.	244	1.9	H	38.36	58.81	63.5	4.69
5352.60	28.67	PK	343	1.9	H	39.09	67.76	83.5	15.74
5352.60	15.35	Ave.	343	1.9	H	39.09	54.44	63.5	9.06
10360.00	49.87	PK	211	2.1	H	17.42	67.29	77.7	10.41
5200 MHz									
10400.00	48.02	PK	250	1.8	H	17.52	65.54	77.7	12.16
5240 MHz									
5145.37	28.65	PK	202	2.3	H	38.36	67.01	83.5	16.49
5145.37	15.32	Ave.	202	2.3	H	38.36	53.68	63.5	9.82
5351.76	28.77	PK	39	2.3	H	39.09	67.86	83.5	15.64
5351.76	15.61	Ave.	39	2.3	H	39.09	54.70	63.5	8.80
10480.00	46.69	PK	231	2.1	H	17.25	63.94	77.7	13.76
802.11ac40									
5190 MHz									
5149.46	39.92	PK	103	1.3	H	38.36	78.28	83.5	5.22
5149.46	21.37	Ave.	103	1.3	H	38.36	59.73	63.5	3.77
5352.64	28.64	PK	197	2.0	H	39.09	67.73	83.5	15.77
5352.64	15.43	Ave.	197	2.0	H	39.09	54.52	63.5	8.98
10380.00	47.68	PK	332	2.0	H	17.42	65.10	77.7	12.60
5230 MHz									
5148.67	29.12	PK	105	1.4	H	38.36	67.48	83.5	16.02
5148.67	15.37	Ave.	105	1.4	H	38.36	53.73	63.5	9.77
5351.46	29.43	PK	166	2.5	H	39.09	68.52	83.5	14.98
5351.46	15.73	Ave.	166	2.5	H	39.09	54.82	63.5	8.68
10460.00	43.30	PK	349	2.2	H	17.15	60.45	77.7	17.25

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)			Limit (dBμV/m)	Margin (dB)
802.11ac80									
5120.37	39.16	PK	334	1.8	H	38.36	77.52	83.5	5.98
5120.37	21.40	Ave.	334	1.8	H	38.36	59.76	63.5	3.74
5356.48	29.63	PK	359	1.5	H	39.09	68.72	83.5	14.78
5356.48	15.62	Ave.	359	1.5	H	39.09	54.71	63.5	8.79
10420.00	42.62	PK	190	1.7	H	17.52	60.14	77.7	17.56

5250-5350 MHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11a									
5260 MHz									
5149.54	31.77	PK	6	1.7	H	38.36	70.13	83.5	13.37
5149.54	16.65	Ave.	6	1.7	H	38.36	55.01	63.5	8.49
5351.74	31.43	PK	112	1.0	H	39.09	70.52	83.5	12.98
5351.74	16.53	Ave.	112	1.0	H	39.09	55.62	63.5	7.88
10520.00	41.79	PK	45	1.4	H	17.25	59.04	77.7	18.66
5280 MHz									
10560.00	42.42	PK	306	1.3	H	17.91	60.33	77.7	17.37
5320 MHz									
5148.47	30.92	PK	323	1.3	H	38.36	69.28	83.5	14.22
5148.47	16.46	Ave.	323	1.3	H	38.36	54.82	63.5	8.68
5359.22	31.24	PK	358	1.9	H	39.09	70.33	83.5	13.17
5359.22	16.49	Ave.	358	1.9	H	39.09	55.58	63.5	7.92
10640.00	41.25	PK	299	1.3	H	18.01	59.26	83.5	24.24
10640.00	27.30	Ave.	299	1.3	H	18.01	45.31	63.5	18.19
802.11n20									
5260 MHz									
5147.45	29.15	PK	275	1.7	H	38.36	67.51	83.5	15.99
5147.45	16.24	Ave.	275	1.7	H	38.36	54.60	63.5	8.90
5354.51	30.87	PK	11	1.4	H	39.09	69.96	83.5	13.54
5354.51	16.53	Ave.	11	1.4	H	39.09	55.62	63.5	7.88
10520.00	42.84	PK	343	1.1	H	16.98	59.82	77.7	17.88
5280 MHz									
10560.00	41.20	PK	35	1.5	H	17.53	58.73	77.7	18.97
5320 MHz									
5148.24	31.21	PK	75	1.8	H	38.36	69.57	83.5	13.93
5148.24	16.45	Ave.	75	1.8	H	38.36	54.81	63.5	8.69
5351.22	41.24	PK	268	2.2	H	39.09	80.33	83.5	3.17
5351.22	19.61	Ave.	268	2.2	H	39.09	58.70	63.5	4.80
10640.00	46.37	PK	125	1.2	H	17.63	64.00	83.5	19.50
10640.00	29.92	Ave.	125	1.2	H	17.63	47.55	63.5	15.95

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11n40									
5270MHz									
5147.84	31.23	PK	53	2.3	H	38.36	69.59	83.5	13.91
5147.84	16.60	Ave.	53	2.3	H	38.36	54.96	63.5	8.54
5352.44	30.89	PK	155	2.0	H	39.09	69.98	83.5	13.52
5352.44	16.39	Ave.	155	2.0	H	39.09	55.48	63.5	8.02
10540.00	46.74	PK	25	1.2	H	17.25	63.99	77.7	13.71
5310MHz									
5148.33	31.40	PK	288	2.4	H	38.36	69.76	83.5	13.74
5148.33	16.52	Ave.	288	2.4	H	38.36	54.88	63.5	8.62
5350.93	36.93	PK	294	1.1	H	39.09	76.02	83.5	7.48
5350.93	19.85	Ave.	294	1.1	H	39.09	58.94	63.5	4.56
10620.00	41.56	PK	265	1.2	H	18.01	59.57	83.5	23.93
10620.00	27.04	Ave.	265	1.2	H	18.01	45.05	63.5	18.45
802.11ac20									
5260 MHz									
5149.61	30.27	PK	326	2.4	H	38.36	68.63	83.5	14.87
5149.61	16.25	Ave.	326	2.4	H	38.36	54.61	63.5	8.89
5351.66	30.34	PK	208	1.9	H	39.09	69.43	83.5	14.07
5351.66	16.27	Ave.	208	1.9	H	39.09	55.36	63.5	8.14
10520.00	41.12	PK	64	1.6	H	18.01	59.13	77.7	18.57
5280 MHz									
10560.00	41.58	PK	196	1.4	H	17.91	59.49	77.7	18.21
5320 MHz									
5149.85	30.14	PK	285	2.3	H	38.36	68.50	83.5	15.00
5149.85	16.34	Ave.	285	2.3	H	38.36	54.70	63.5	8.80
5352.46	19.87	PK	320	1.9	H	39.09	58.96	83.5	24.54
5352.46	16.19	Ave.	320	1.9	H	39.09	55.28	63.5	8.22
10640.00	41.76	PK	114	2.1	H	18.01	59.77	83.5	23.73
10640.00	27.14	Ave.	114	2.1	H	18.01	45.15	63.5	18.35

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11ac40									
5270 MHz									
5149.87	30.78	PK	282	2.4	H	38.36	69.14	83.5	14.36
5149.87	16.47	Ave.	282	2.4	H	38.36	54.83	63.5	8.67
5351.49	31.01	PK	306	1.2	H	39.09	70.10	83.5	13.40
5351.49	16.53	Ave.	306	1.2	H	39.09	55.62	63.5	7.88
10540.00	41.45	PK	146	2.2	H	17.25	58.70	77.7	19.00
5310 MHz									
5148.88	31.24	PK	171	1.8	H	38.36	69.60	83.5	13.90
5148.88	16.62	Ave.	171	1.8	H	38.36	54.98	63.5	8.52
5352.55	30.91	PK	165	2.2	H	39.09	70.00	83.5	13.50
5352.55	16.57	Ave.	165	2.2	H	39.09	55.66	63.5	7.84
10620.00	41.78	PK	340	1.7	H	18.01	59.79	83.5	23.71
10620.00	27.05	Ave.	340	1.7	H	18.01	45.06	63.5	18.44
802.11ac80									
5290MHz									
5147.68	30.13	PK	291	1.5	H	38.36	68.49	83.5	15.01
5147.68	16.14	Ave.	291	1.5	H	38.36	54.50	63.5	9.00
5351.12	30.26	PK	252	1.2	H	39.09	69.35	83.5	14.15
5351.12	16.17	Ave.	252	1.2	H	39.09	55.26	63.5	8.24
10580.00	41.10	PK	77	1.6	H	18.01	59.11	77.7	18.59

5470-5725MHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11a									
5500 MHz									
5469.78	31.06	PK	91	2.5	H	39.37	70.43	77.7	7.27
5725.64	30.59	PK	27	2.3	H	39.49	70.08	77.7	7.62
11000.00	41.58	PK	251	2.0	H	17.66	59.24	83.5	24.26
11000.00	26.71	Ave.	251	2.0	H	17.66	44.37	63.5	19.13
5600MHz									
11200.00	42.10	PK	221	2.4	H	17.39	59.49	83.5	24.01
11200.00	26.98	Ave.	221	2.4	H	17.39	44.37	63.5	19.13
5700 MHz									
5468.65	31.24	PK	227	1.2	H	39.37	70.61	77.7	7.09
5726.47	31.04	PK	156	2.4	H	39.49	70.53	77.7	7.17
11400.00	42.21	PK	216	2.1	H	17.73	59.94	83.5	23.56
11400.00	27.04	Ave.	216	2.1	H	17.73	44.77	63.5	18.73
802.11n20									
5500 MHz									
5468.77	30.42	PK	32	1.1	H	39.37	69.79	77.7	7.91
5725.42	30.37	PK	329	1.4	H	39.49	69.86	77.7	7.84
11000.00	42.57	PK	125	2.3	H	17.66	60.23	83.5	23.27
11000.00	27.13	Ave.	125	2.3	H	17.66	44.79	63.5	18.71
5600 MHz									
11200.00	42.50	PK	7	1.4	H	17.39	59.89	83.5	23.61
11200.00	27.11	Ave.	7	1.4	H	17.39	44.50	63.5	19.00
5700MHz									
5468.81	31.06	PK	101	1.4	H	39.37	70.43	77.7	7.27
5726.74	30.72	PK	31	2.1	H	39.49	70.21	77.7	7.49
11400.00	41.68	PK	268	1.7	H	17.73	59.41	83.5	24.09
11400.00	26.78	Ave.	268	1.7	H	17.73	44.51	63.5	18.99

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11n40									
5510 MHz									
5467.05	36.26	PK	324	2.2	H	39.37	75.63	77.7	2.07
5727.21	31.21	PK	286	2.3	H	39.49	70.70	77.7	7.00
11020.00	42.02	PK	132	1.3	H	17.66	59.68	83.5	23.82
11020.00	26.74	Ave.	132	1.3	H	17.66	44.40	63.5	19.10
5590 MHz									
11180.00	42.87	PK	305	2.0	H	17.39	60.26	83.5	23.24
11180.00	27.05	Ave.	305	2.0	H	17.39	44.44	63.5	19.06
5670 MHz									
5469.41	31.21	PK	146	1.9	H	39.37	70.58	77.7	7.12
5727.21	33.10	PK	123	2.4	H	39.49	72.59	77.7	5.11
11340.00	43.04	PK	73	2.2	H	17.43	60.47	83.5	23.03
11340.00	26.77	Ave.	73	2.2	H	17.43	44.20	63.5	19.30
802.11ac20									
5500 MHz									
5468.71	32.58	PK	4	2.5	H	39.37	71.95	77.7	5.75
5726.35	31.42	PK	51	1.6	H	39.49	70.91	77.7	6.79
11000.00	43.50	PK	183	1.3	H	17.66	61.16	83.5	22.34
11000.00	29.69	Ave.	183	1.3	H	17.66	47.35	63.5	16.15
5600 MHz									
11200.00	42.57	PK	221	2.5	H	17.39	59.96	83.5	23.54
11200.00	28.69	Ave.	221	2.5	H	17.39	46.08	63.5	17.42
5700 MHz									
5469.68	31.73	PK	313	1.1	H	39.37	71.10	77.7	6.60
5726.35	31.12	PK	136	1.0	H	39.49	70.61	77.7	7.09
11400.00	42.24	PK	113	1.5	H	17.73	59.97	83.5	23.53
11400.00	28.36	Ave.	113	1.5	H	17.73	46.09	63.5	17.41

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11ac40									
5510 MHz									
5469.25	34.55	PK	172	1.6	H	39.37	73.92	77.7	3.78
5726.11	31.26	PK	294	2.5	H	39.49	70.75	77.7	6.95
11020.00	42.15	PK	221	1.8	H	17.80	59.95	83.5	23.55
11020.00	29.95	Ave.	221	1.8	H	17.80	47.75	63.5	15.75
5590 MHz									
11180.00	42.33	PK	93	2.4	H	17.39	59.72	83.5	23.78
11180.00	29.13	Ave.	93	2.4	H	17.39	46.52	63.5	16.98
5670 MHz									
5469.45	31.14	PK	21	1.2	H	39.37	70.51	77.7	7.19
5725.72	32.72	PK	129	1.9	H	39.49	72.21	77.7	5.49
11340.00	42.68	PK	79	1.2	H	16.94	59.62	83.5	23.88
11340.00	29.52	Ave.	79	1.2	H	16.94	46.46	63.5	17.04
802.11ac80									
5530MHz									
5471.53	32.66	PK	275	1.4	H	39.37	72.03	77.7	5.67
5725.63	32.12	PK	217	2.4	H	39.49	71.61	77.7	6.09
11060.00	42.63	PK	268	1.4	H	16.72	59.35	83.5	24.15
11060.00	29.35	AV	268	1.4	H	16.72	46.07	63.5	17.43
5610 MHz									
5468.32	31.56	PK	94	1.7	H	39.37	70.93	77.7	6.77
5726.04	32.51	PK	13	1.0	H	39.49	72.00	77.7	5.70
11220.00	42.14	PK	303	1.4	H	17.39	59.53	83.5	23.97
11220.00	28.75	Ave.	303	1.4	H	17.39	46.14	63.5	17.36

5725-5850 MHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11a									
5745 MHz									
3604.59	31.91	PK	75	1.1	H	35.15	67.06	77.7	10.64
5664.44	32.08	PK	332	1.5	H	39.49	71.57	88.39	16.82
5715.06	31.78	PK	29	2.2	H	39.49	71.27	118.92	47.65
5720.38	31.90	PK	202	1.4	H	39.49	71.39	121.17	49.78
11490.00	46.67	PK	53	1.0	H	17.47	64.14	83.5	19.36
11490.00	30.87	Ave.	53	1.0	H	17.47	48.34	63.5	15.16
5785 MHz									
11570.00	41.82	PK	144	1.6	H	17.51	59.33	83.5	24.17
11570.00	27.63	Ave.	144	1.6	H	17.51	45.14	63.5	18.36
5825 MHz									
5853.13	33.55	PK	132	1.2	H	39.87	73.42	124.56	51.14
5874.87	33.34	PK	41	2.3	H	39.87	73.21	114.74	41.53
5893.19	33.54	PK	218	1.8	H	39.87	73.41	101.24	27.83
5955.06	33.93	PK	288	1.6	H	39.84	73.77	77.7	3.93
11650.00	43.68	PK	268	2.3	H	16.18	59.86	83.5	23.64
11650.00	28.37	Ave.	268	2.3	H	16.18	44.55	63.5	18.95
802.11n20									
5745 MHz									
5646.63	31.35	PK	281	1.7	H	39.46	70.81	77.7	6.89
5692.51	31.82	PK	232	1.2	H	39.49	71.31	109.16	37.85
5719.05	32.65	PK	87	2.0	H	39.49	72.14	120.04	47.90
5724.76	35.18	PK	308	1.0	H	39.49	74.67	131.15	56.48
11490.00	41.19	PK	152	2.1	H	17.47	58.66	83.5	24.84
11490.00	27.37	Ave.	152	2.1	H	17.47	44.84	63.5	18.66
5785 MHz									
11570.00	42.21	PK	39	1.1	H	17.51	59.72	83.5	23.78
11570.00	27.67	Ave.	39	1.1	H	17.51	45.18	63.5	18.32
5825 MHz									
5852.63	33.49	PK	178	1.4	H	39.87	73.36	125.7	52.34
5858.46	32.92	PK	188	1.7	H	39.87	72.79	119.33	46.54
5922.86	33.72	PK	334	2.1	H	39.97	73.69	79.28	5.59
5949.06	33.32	PK	16	1.3	H	39.97	73.29	77.7	4.41
11650.00	42.37	PK	310	1.9	H	16.18	58.55	83.5	24.95
11650.00	27.74	Ave.	310	1.9	H	16.18	43.92	63.5	19.58

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11n40									
5755 MHz									
5647.36	31.40	PK	76	1.7	H	39.46	70.86	77.7	6.84
5698.22	32.38	PK	196	2.1	H	39.49	71.87	113.38	41.51
5717.55	39.58	PK	171	1.1	H	39.49	79.07	119.61	40.54
5721.20	39.46	PK	148	2.1	H	39.49	78.95	123.04	44.09
11510.00	42.85	PK	347	1.0	H	17.47	60.32	83.5	23.18
11510.00	29.42	Ave.	347	1.0	H	17.47	46.89	63.5	16.61
5795 MHz									
5854.97	33.98	PK	223	1.9	H	39.87	73.85	120.37	46.52
5874.58	33.66	PK	275	2.2	H	39.87	73.53	114.82	41.29
5923.22	33.44	PK	187	1.3	H	39.97	73.41	79.02	5.61
5954.48	33.80	PK	232	2.2	H	39.84	73.64	77.7	4.06
11590.00	43.01	PK	114	1.7	H	17.51	60.52	83.5	22.98
11590.00	29.76	Ave.	114	1.7	H	17.51	47.27	63.5	16.23
802.11ac20									
5745 MHz									
5605.97	33.80	PK	128	1.6	H	39.46	73.26	77.7	4.44
5675.71	33.37	PK	291	1.4	H	39.49	72.86	96.73	23.87
5715.24	33.47	PK	228	1.9	H	39.49	72.96	118.97	46.01
5724.29	33.51	PK	226	1.7	H	39.49	73.00	130.08	57.08
11490.00	42.14	PK	357	2.2	H	17.51	59.65	83.5	23.85
11490.00	27.54	Ave.	357	2.2	H	17.51	45.05	63.5	18.45
5785 MHz									
11570.00	42.34	PK	321	1.5	H	17.51	59.85	83.5	23.65
11570.00	27.61	Ave.	321	1.5	H	17.51	45.12	63.5	18.38
5825 MHz									
5854.05	33.02	PK	306	2.4	H	39.87	72.89	122.44	49.55
5870.70	33.18	PK	141	1.5	H	39.87	73.05	115.9	42.85
5895.51	34.00	PK	319	2.4	H	39.87	73.87	99.52	25.65
5962.30	33.24	PK	36	1.1	H	39.84	73.08	77.7	4.62
11650.00	43.01	PK	125	1.7	H	16.18	59.19	83.5	24.31
11650.00	27.79	Ave.	125	1.7	H	16.18	43.97	63.5	19.53

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11ac40									
5755 MHz									
5646.92	30.82	PK	276	2.0	H	39.46	70.28	77.7	7.42
5670.94	31.33	PK	161	1.2	H	39.49	70.82	93.2	22.38
5717.44	39.02	PK	296	1.2	H	39.49	78.51	119.58	41.07
5722.96	40.13	PK	146	1.4	H	39.49	79.62	127.05	47.43
11510.00	42.24	PK	64	2.5	H	17.47	59.71	83.5	23.79
11510.00	27.87	Ave.	64	2.5	H	17.47	45.34	63.5	18.16
5795 MHz									
5851.00	32.50	PK	183	1.0	H	39.87	72.37	128.05	55.68
5870.30	33.14	PK	125	1.2	H	39.87	73.01	116.02	43.01
5922.41	33.09	PK	227	1.4	H	39.97	73.06	79.62	6.56
5973.22	33.48	PK	125	1.6	H	39.84	73.32	77.7	4.38
11590.00	42.31	PK	346	2.2	H	17.51	59.82	83.5	23.68
11590.00	27.88	Ave.	346	2.2	H	17.51	45.39	63.5	18.11
802.11ac80									
5775 MHz									
5631.44	31.55	PK	322	2.2	H	39.46	71.01	77.7	6.69
5697.75	35.23	PK	234	1.1	H	39.49	74.72	113.04	38.32
5697.75	38.69	PK	241	1.5	H	39.49	78.18	119.83	41.65
5723.44	38.69	PK	163	1.2	H	39.49	78.18	128.17	49.99
5751.66	38.02	PK	324	2.1	H	39.61	77.63	127.92	50.29
5871.31	36.91	PK	216	2.5	H	39.87	76.78	115.73	38.95
5921.77	33.95	PK	128	2.1	H	39.97	73.92	80.09	6.17
5737.41	32.98	PK	294	2.4	H	39.49	72.47	77.7	5.23
11550.00	42.96	PK	283	1.9	H	17.51	60.47	83.5	23.03
11550.00	28.24	Ave.	283	1.9	H	17.51	45.75	63.5	17.75

Note:

Corrected Amplitude = Corrected Factor + Reading

Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor

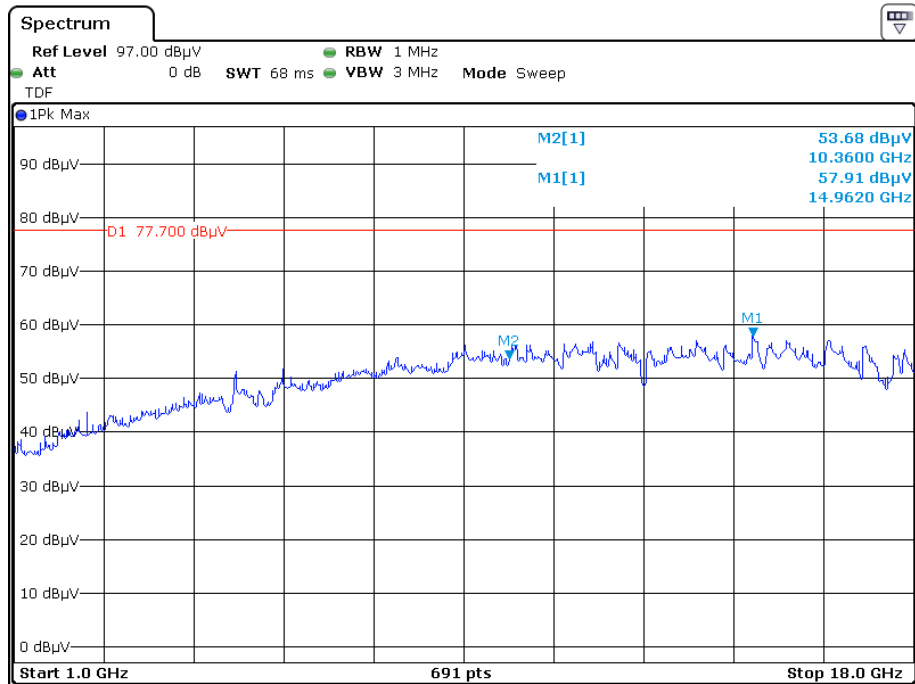
Margin = Limit- Corr. Amplitude

All other spurious emissions are 20 dB below the limit or are on the system noise floor level.

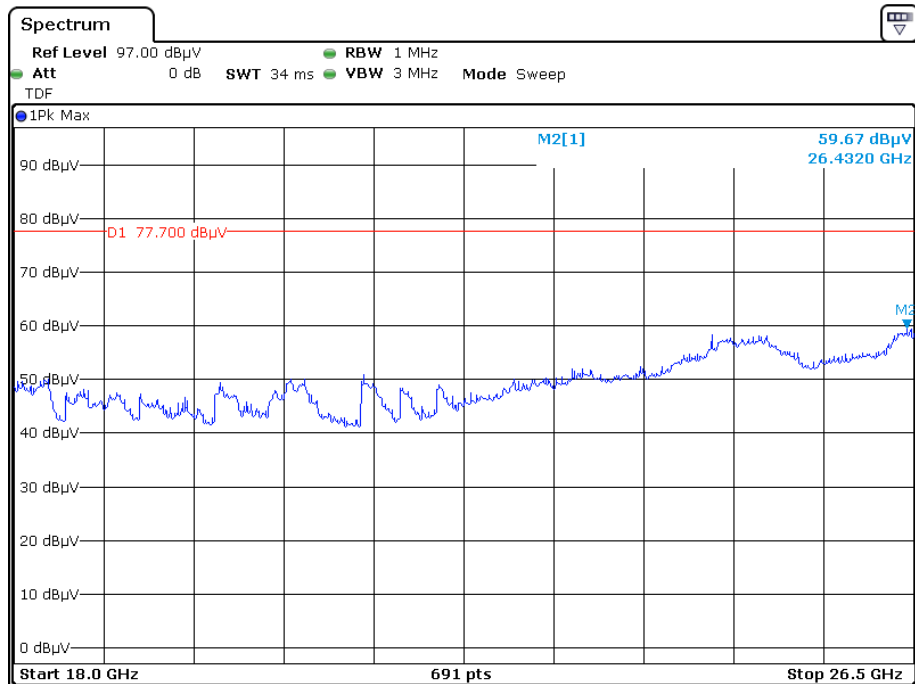
Peak

Pre-scan with 802.11ac20 5180MHz

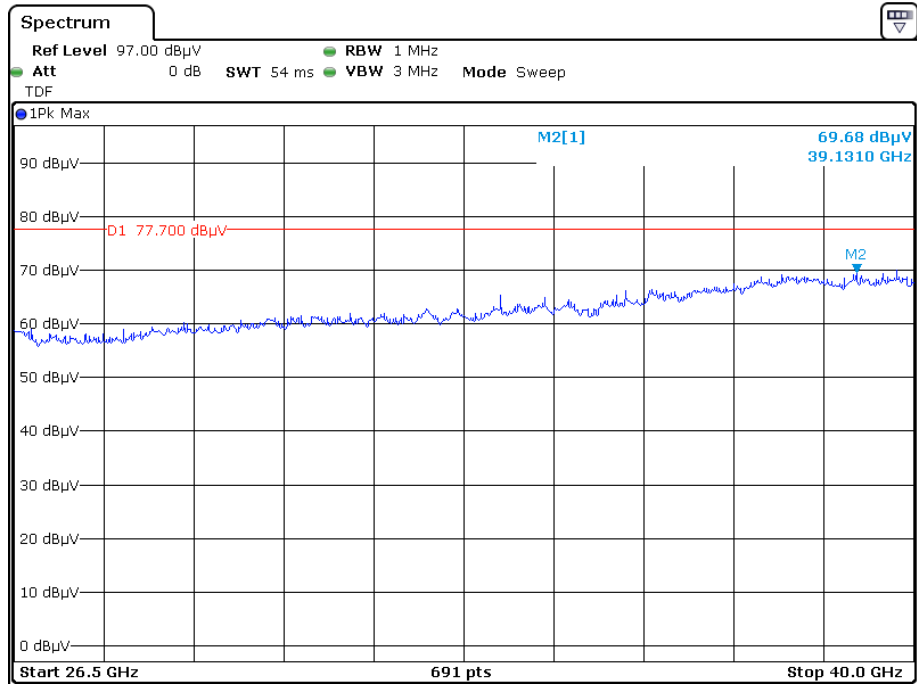
Horizontal



Date: 8. JUN. 2020 21:35:31

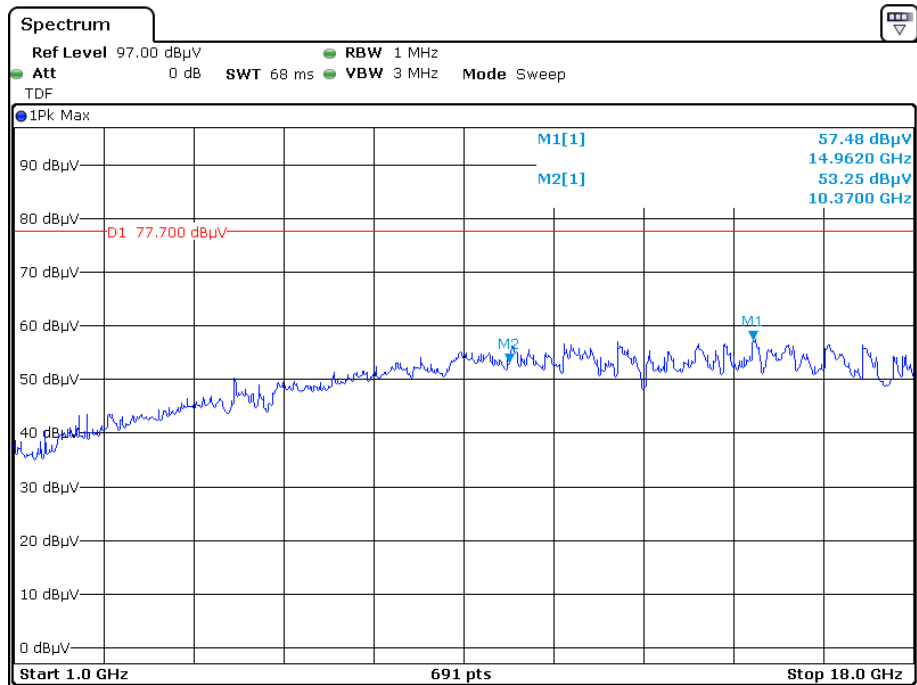


Date: 8. JUN. 2020 22:21:03

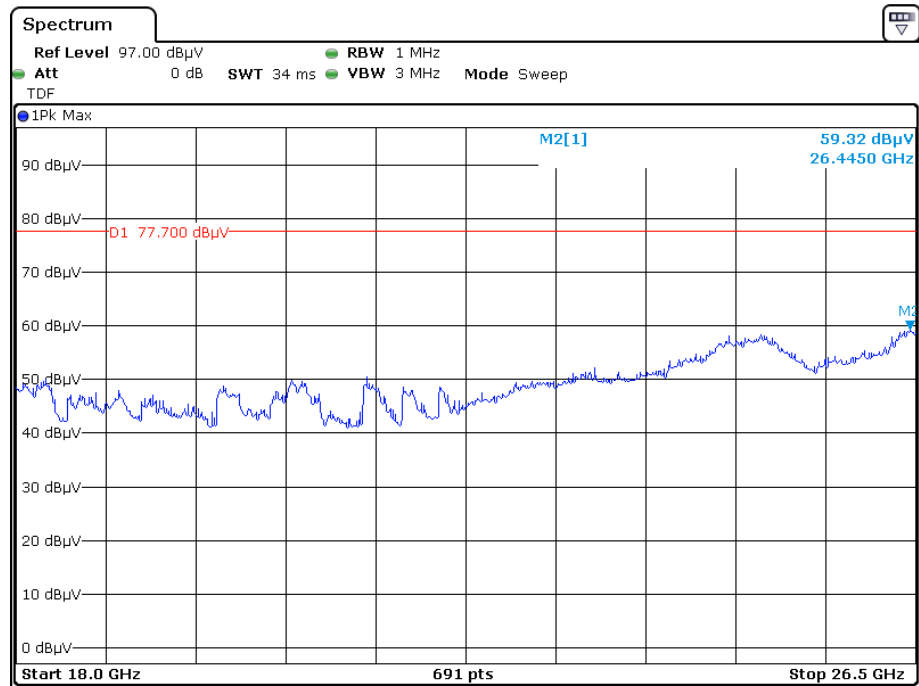


Date: 8.JUN.2020 22:59:05

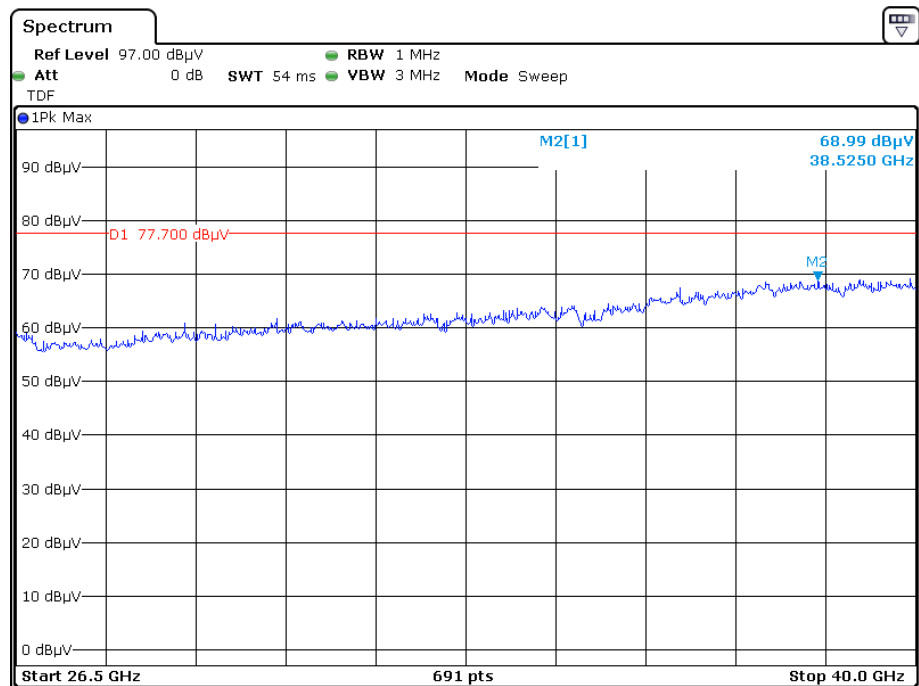
Vertical



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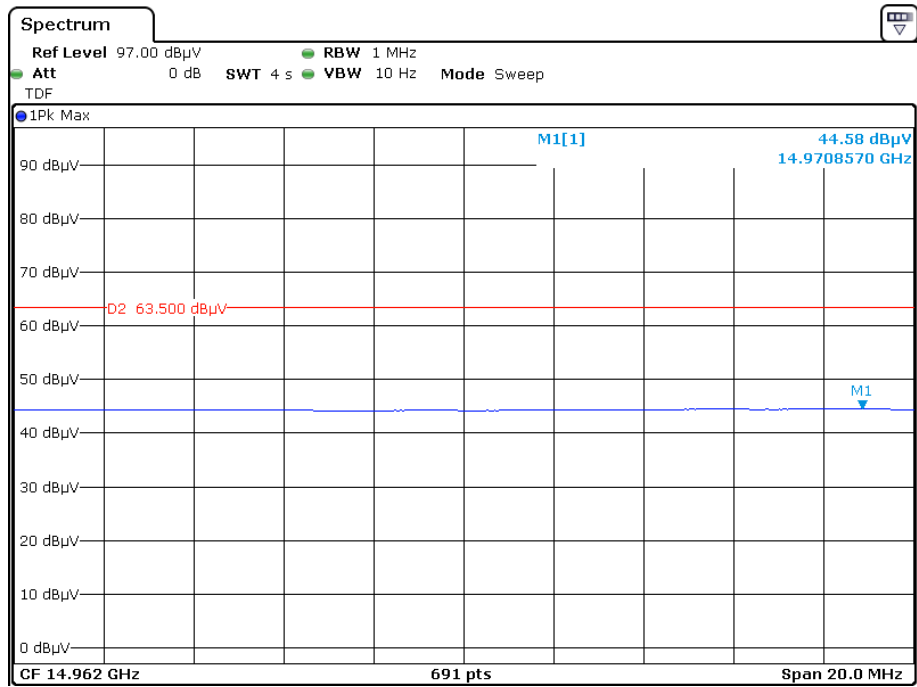


Date: 8.JUN.2020 22:29:03

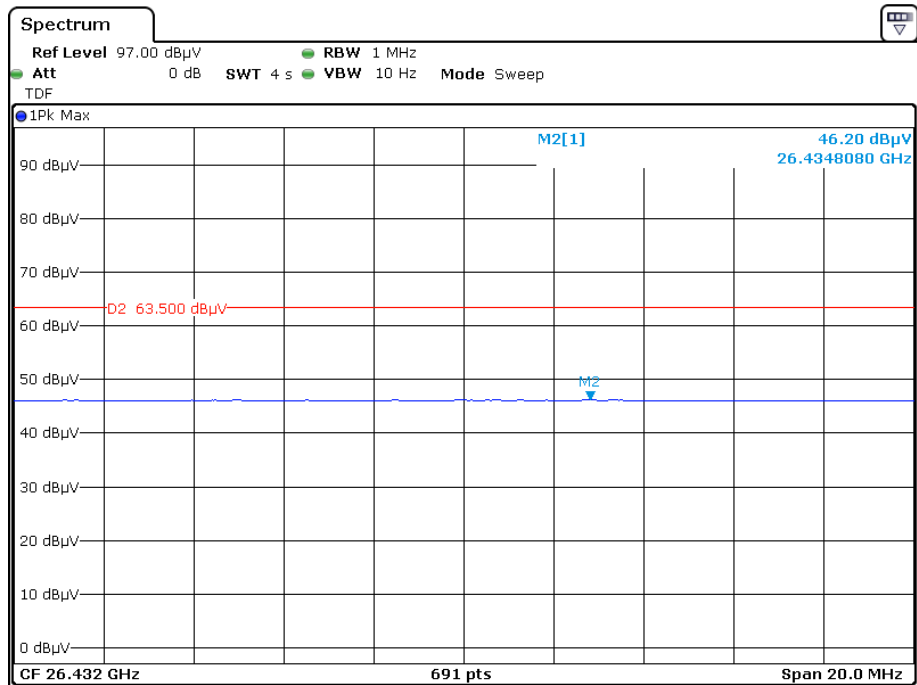


Date: 8.JUN.2020 23:06:01

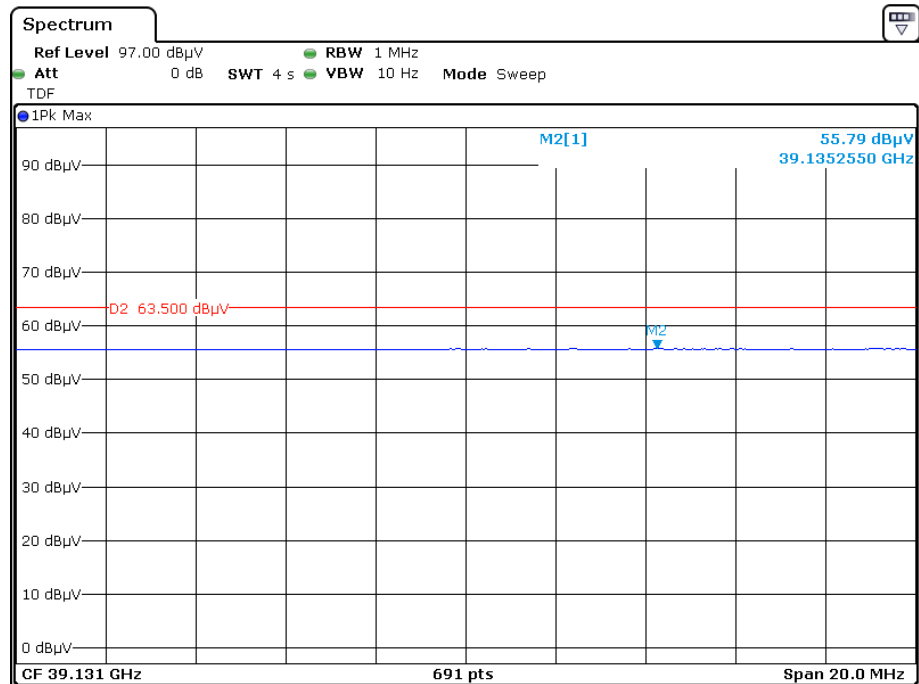
Average Horizontal



Date: 8.JUN.2020 21:39:29

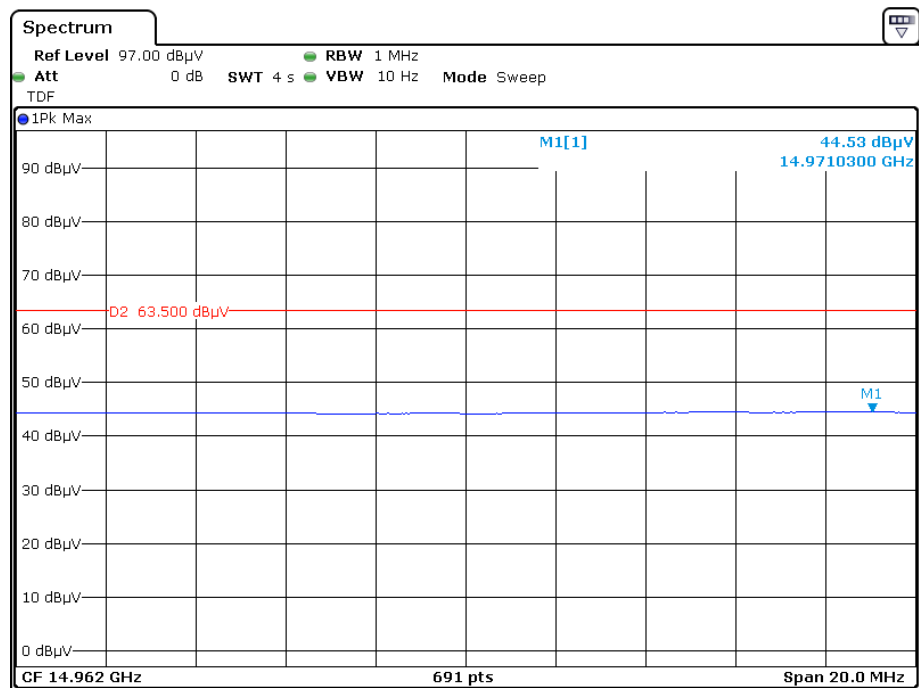


Date: 8.JUN.2020 22:24:28

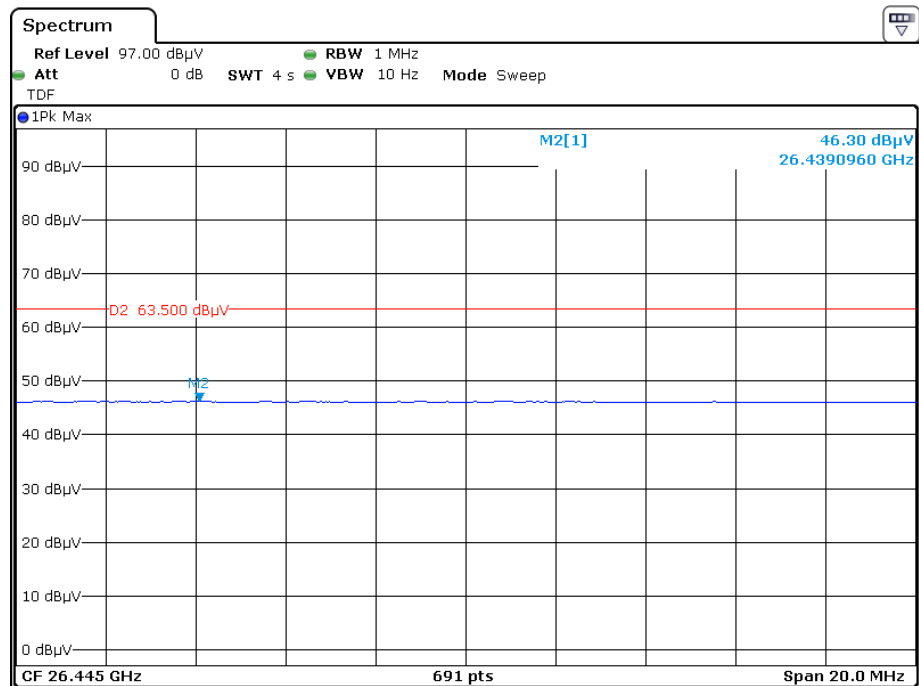


Date: 8.JUN.2020 23:02:28

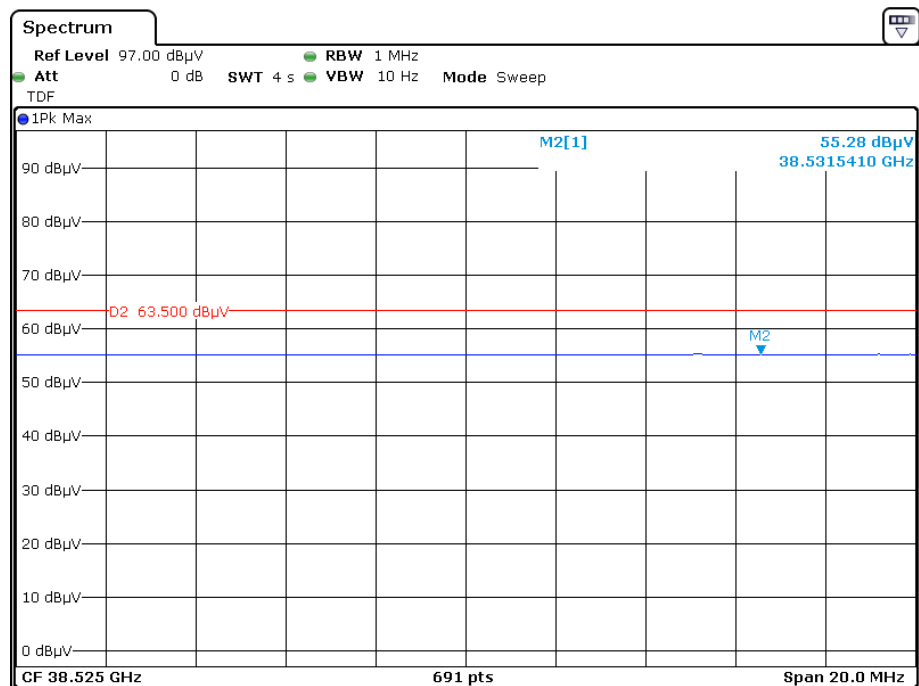
Vertical



Date: 8.JUN.2020 21:46:28



Date: 8.JUN.2020 22:29:21



Date: 8.JUN.2020 23:10:28

FCC §15.407(1), (5),(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

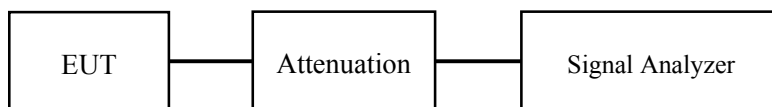
1. Emission Bandwidth (EBW)

- Set RBW = approximately 1% of the emission bandwidth.
- Set the VBW > RBW.
- Detector = Peak.
- Trace mode = max hold.
- 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:

- Set RBW = 100 kHz.
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Allow the trace to stabilize.
- 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:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by James Fu on 2020-06-13.

EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the Appendix.

FCC §15.407(a)(1)(2)(3) – CONDUCTED TRANSMITTER OUTPUT POWER

Applicable Standard

For an indoor 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.

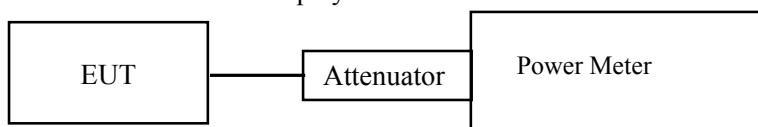
For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting 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 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 $11 \text{ dBm} + 10 \log B$, 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.

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

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.



Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by James Fu on 2020-06-13 and 2020-7-3.

EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the Appendix.

FCC §15.407(a) (1) (2) (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 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 $11 \text{ dBm} + 10 \log B$, 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.

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 ($< 1 \text{ MHz}$, or $< 500 \text{ kHz}$) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

- a) Set $\text{RBW} \geq 1/T$, where T is defined in section II.B.1.a).
- b) Set $\text{VBW} \geq 3 \text{ RBW}$.
- c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10 \log (500 \text{ kHz}/\text{RBW})$ to the measured result, whereas $\text{RBW} (< 500 \text{ kHz})$ 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 $10 \log (1\text{MHz}/\text{RBW})$ to the measured result, whereas $\text{RBW} (< 1 \text{ MHz})$ 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:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by James Fu on 2020-06-13 and 2020-7-3.

EUT operation mode: Transmitting

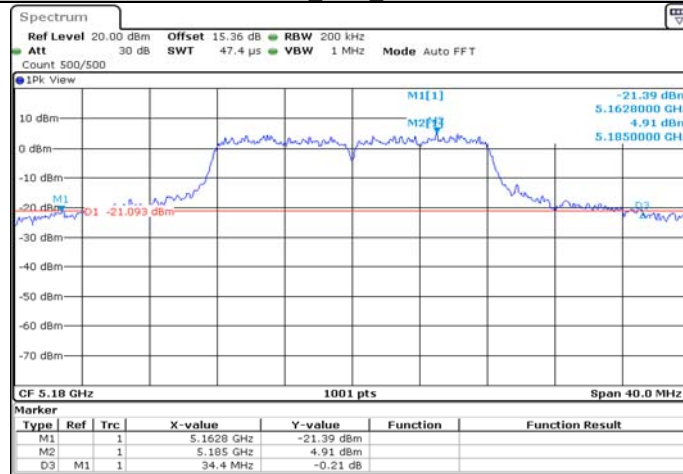
Test Result: Compliance. Please refer to the Appendix.

Appendix A1:Emission Bandwidth Test Result

TestMode	Antenna	Channel	26db EBW [MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	34.400	---	PASS
		5200	34.880	---	PASS
		5240	34.320	---	PASS
		5260	35.360	---	PASS
		5280	32.280	---	PASS
		5320	32.920	---	PASS
		5500	25.680	---	PASS
		5600	25.040	---	PASS
11N20SISO	Ant1	5700	27.920	---	PASS
		5180	32.000	---	PASS
		5200	21.200	---	PASS
		5240	30.360	---	PASS
		5260	27.240	---	PASS
		5280	25.360	---	PASS
		5320	25.000	---	PASS
		5500	33.920	---	PASS
11N40SISO	Ant1	5600	23.080	---	PASS
		5700	28.520	---	PASS
		5190	50.240	---	PASS
		5230	75.600	---	PASS
		5270	70.080	---	PASS
		5310	63.760	---	PASS
		5510	70.080	---	PASS
11AC20SISO	Ant1	5550	61.520	---	PASS
		5670	73.600	---	PASS
		5180	27.240	---	PASS
		5200	24.440	---	PASS
		5240	22.840	---	PASS
		5260	21.720	---	PASS
		5280	22.680	---	PASS
		5320	21.360	---	PASS
11AC40SISO	Ant1	5500	23.840	---	PASS
		5600	21.600	---	PASS
		5700	21.720	---	PASS
		5190	57.040	---	PASS
		5230	44.960	---	PASS
		5270	42.960	---	PASS
		5310	45.200	---	PASS
11AC80SISO	Ant1	5510	56.720	---	PASS
		5550	43.040	---	PASS
		5670	42.960	---	PASS
		5210	91.040	---	PASS
	Ant1	5290	97.920	---	PASS
		5530	102.080	---	PASS
		5610	92.320	---	PASS

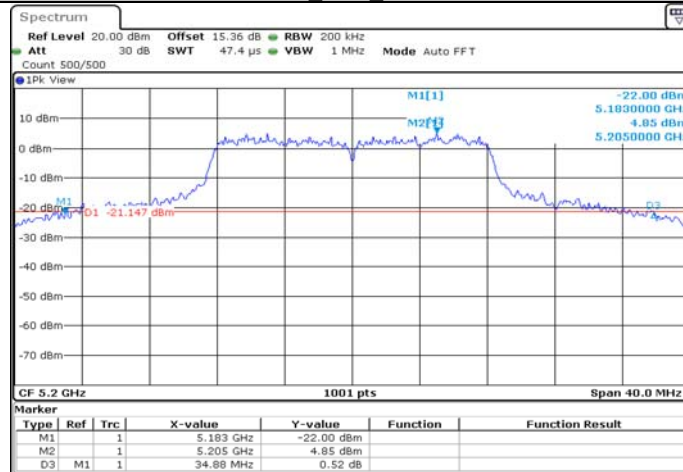
Test Graphs

11A_Ant1_5180



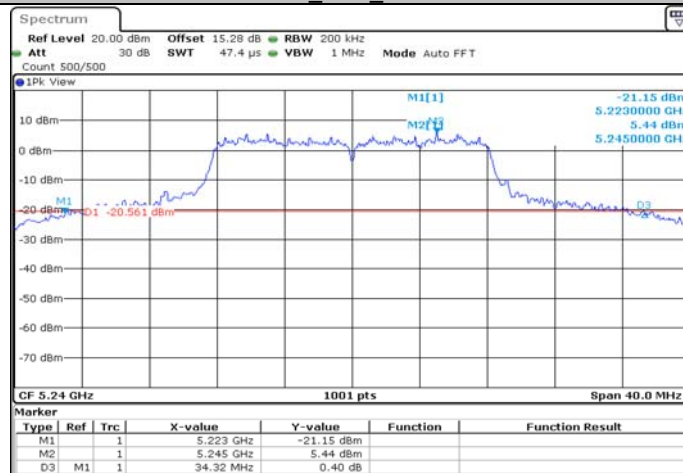
Date: 13 JUN 2020 20:23:49

11A_Ant1_5200



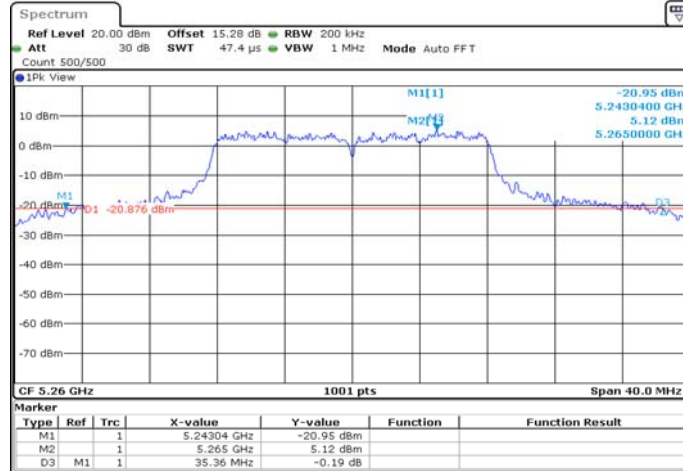
Date: 13 JUN 2020 20:15:04

11A_Ant1_5240



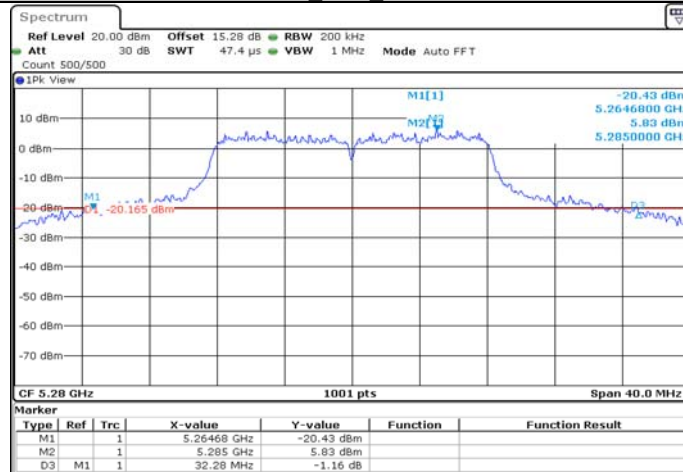
Date: 13 JUN 2020 20:25:34

11A_Ant1_5260



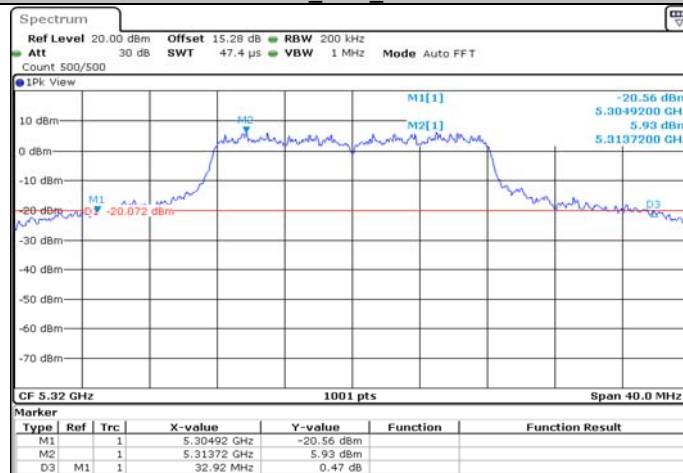
Date: 13 JUN 2020 20:27:57

11A_Ant1_5280



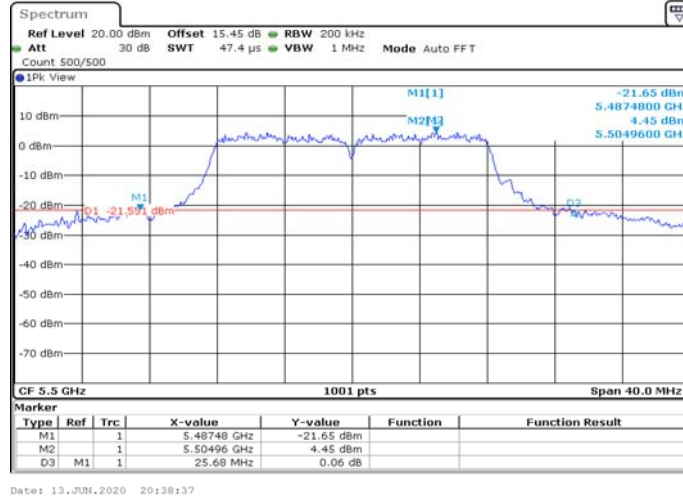
Date: 13 JUN 2020 20:30:11

11A_Ant1_5320

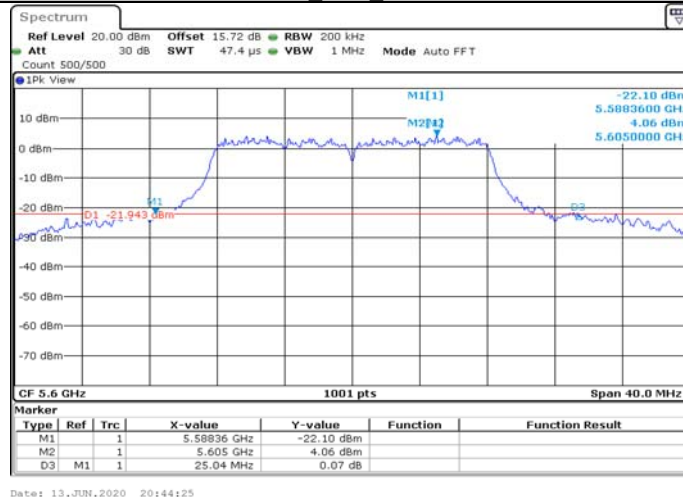


Date: 13 JUN 2020 20:33:17

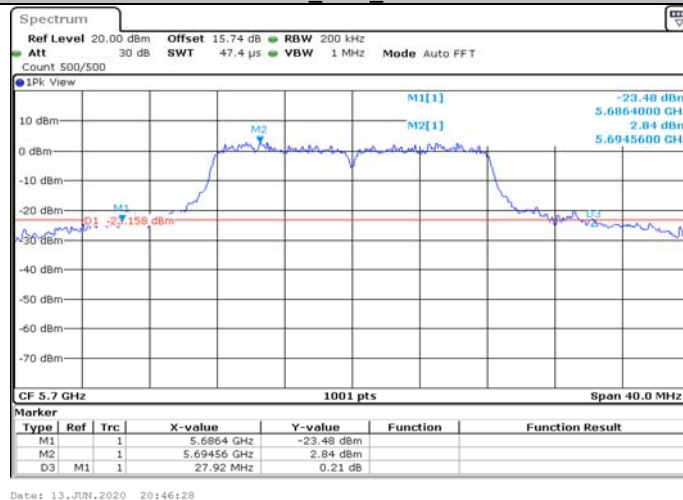
11A_Ant1_5500



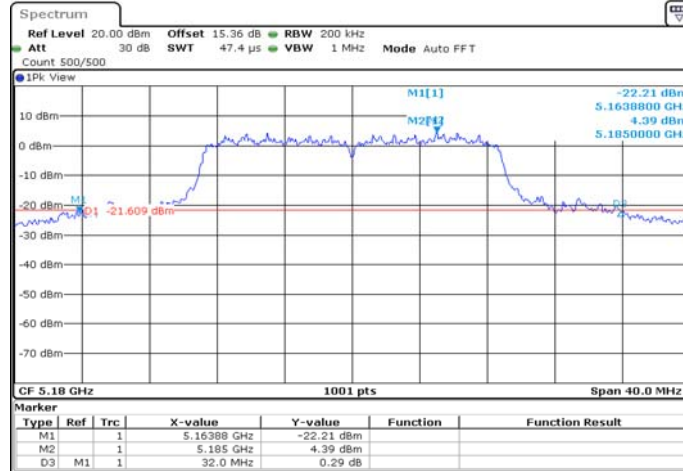
11A_Ant1_5600



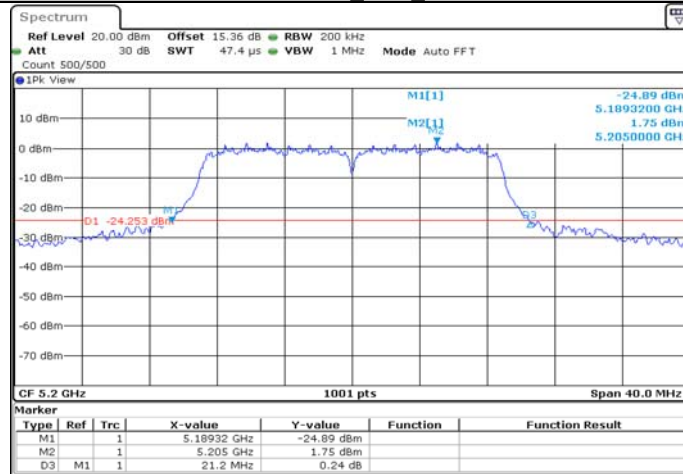
11A_Ant1_5700



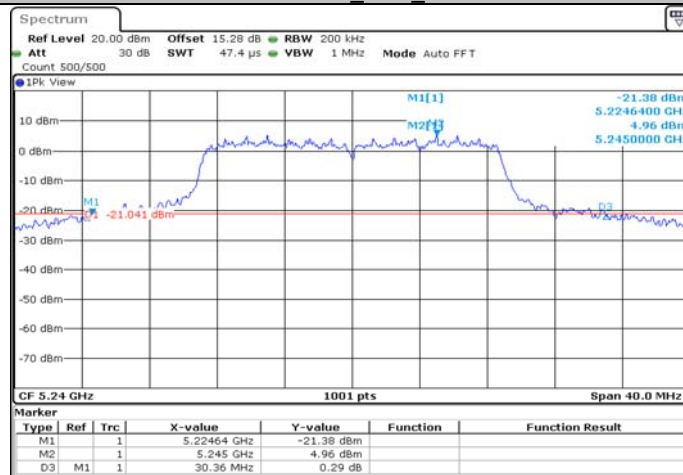
11N20SISO_Ant1_5180



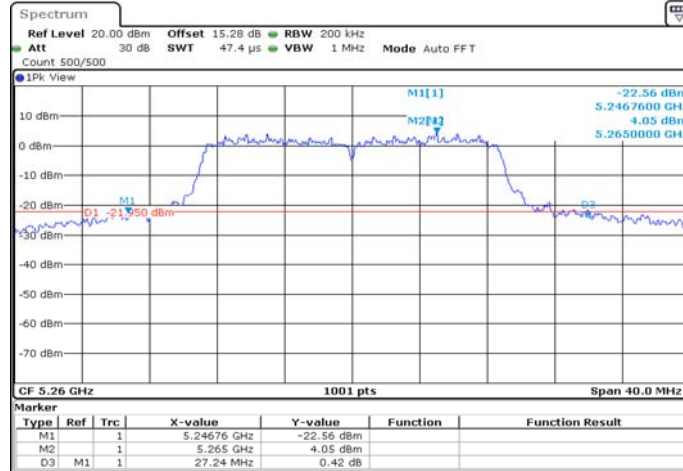
11N20SISO_Ant1_5200



11N20SISO_Ant1_5240

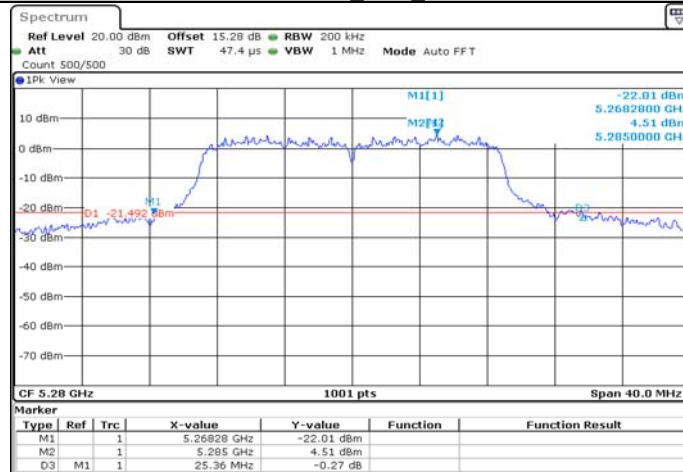


11N20SISO_Ant1_5260



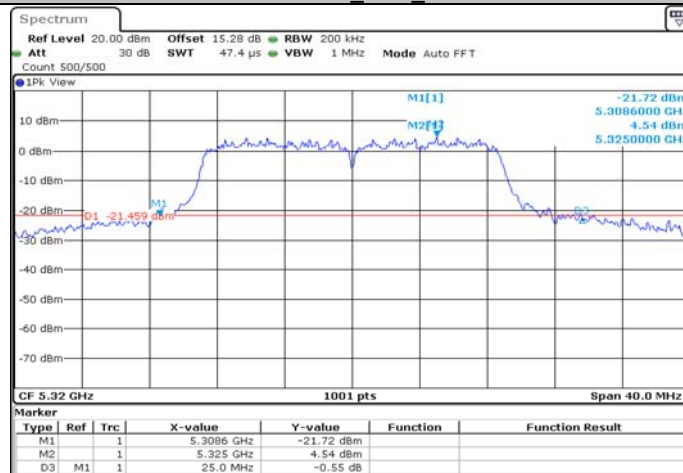
Date: 13 JUN 2020 21:05:21

11N20SISO_Ant1_5280



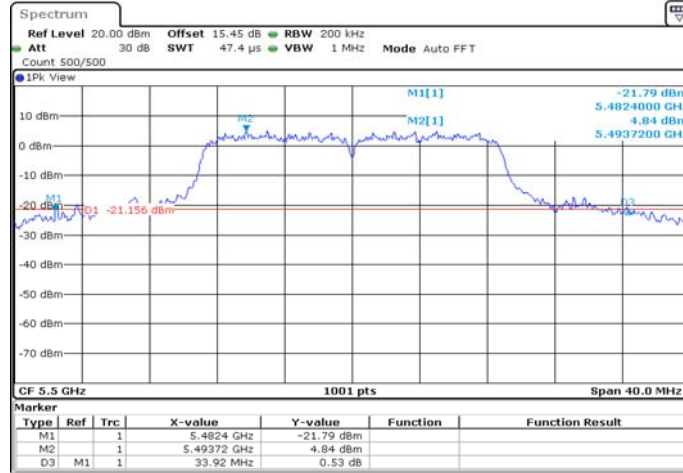
Date: 13 JUN 2020 21:07:02

11N20SISO_Ant1_5320

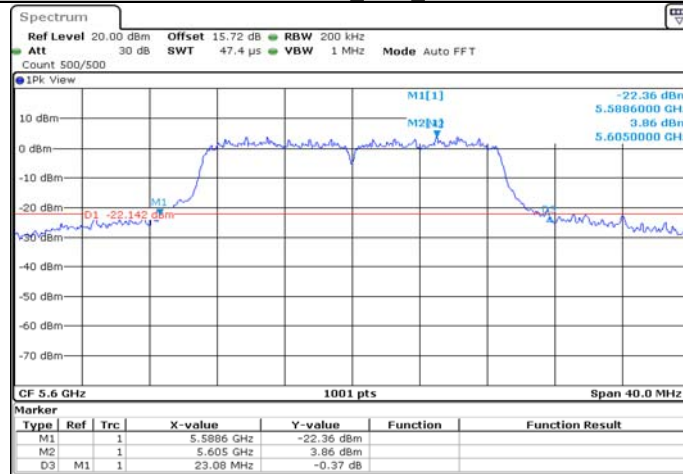


Date: 13 JUN 2020 21:08:51

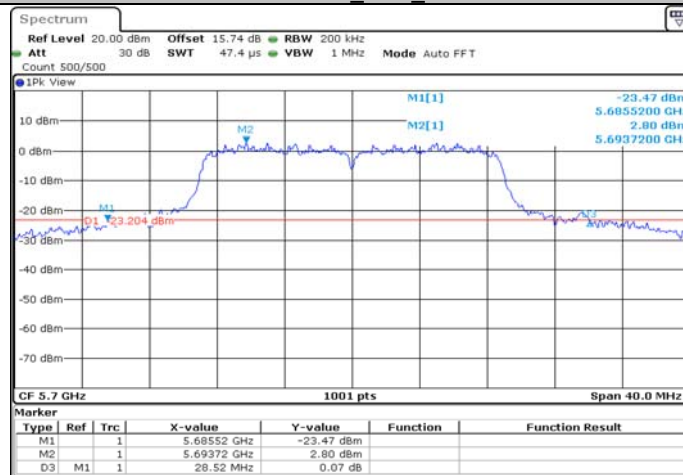
11N20SISO_Ant1_5500



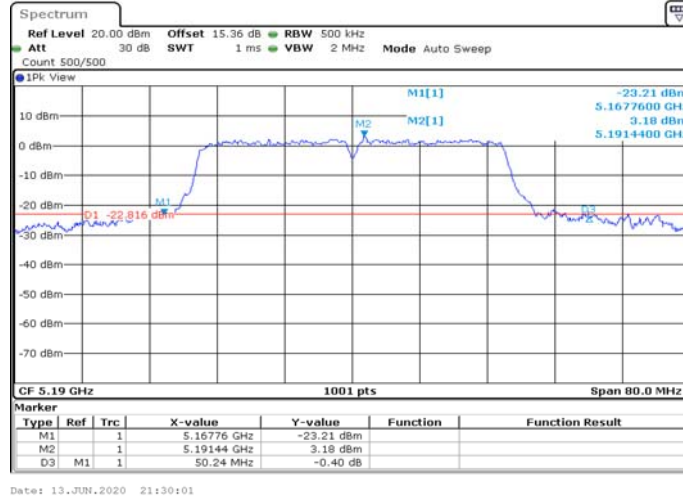
11N20SISO_Ant1_5600



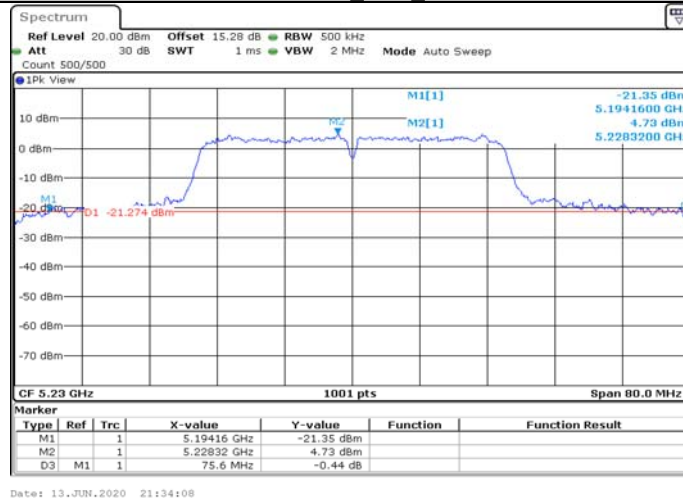
11N20SISO_Ant1_5700



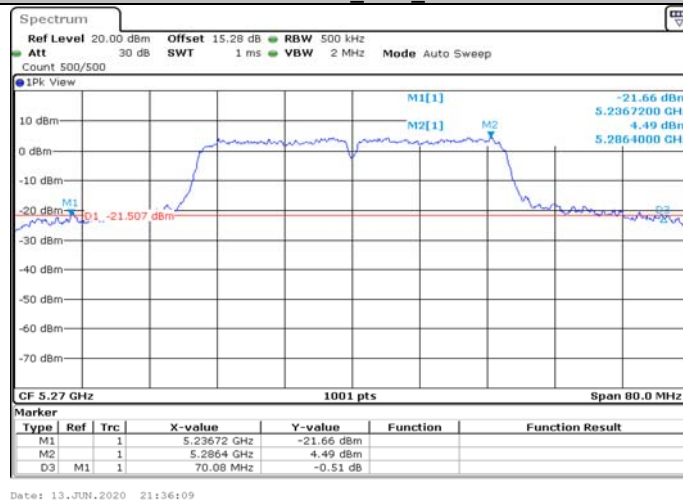
11N40SISO_Ant1_5190



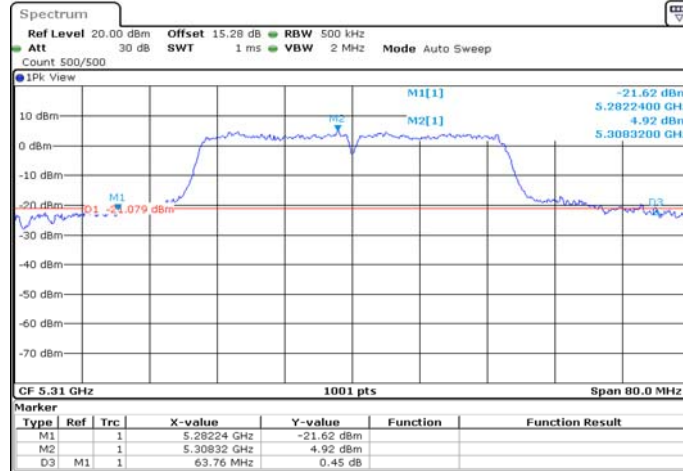
11N40SISO_Ant1_5230



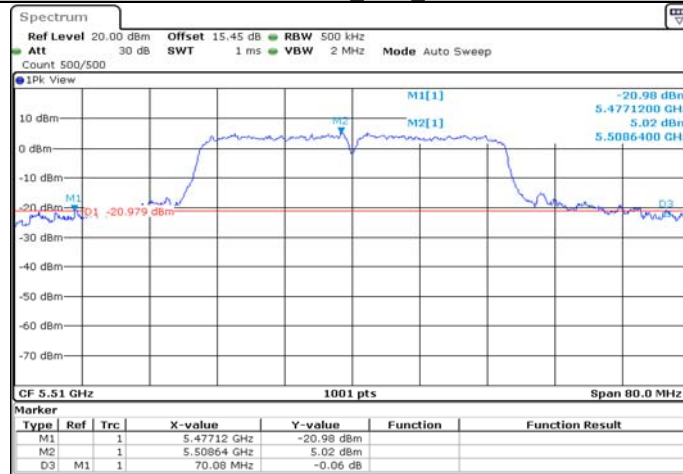
11N40SISO_Ant1_5270



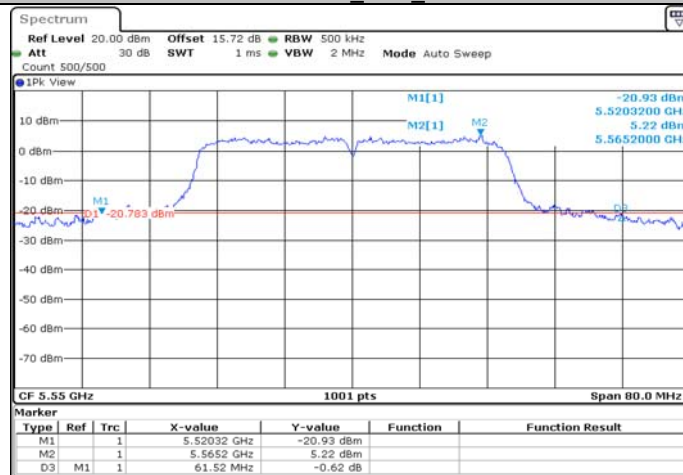
11N40SISO_Ant1_5310



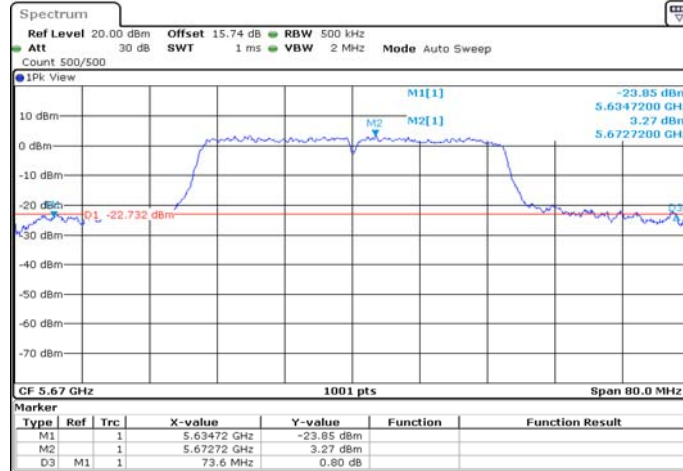
11N40SISO_Ant1_5510



11N40SISO_Ant1_5550

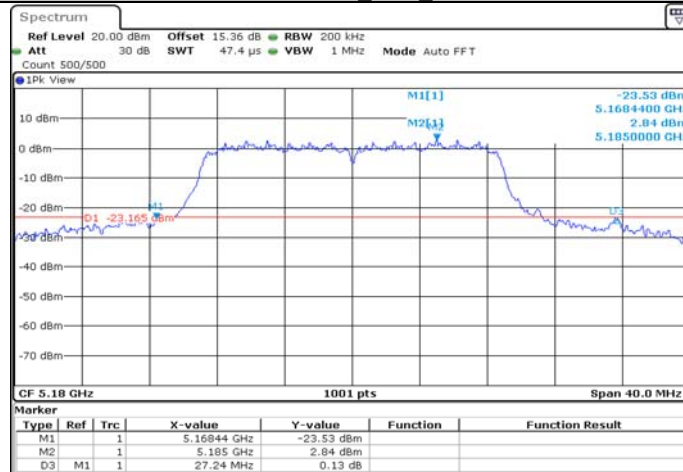


11N40SISO_Ant1_5670



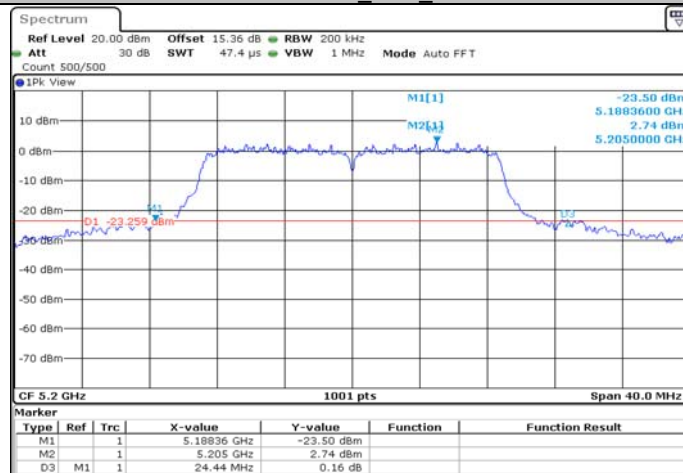
Date: 13 JUN 2020 21:45:14

11AC20SISO_Ant1_5180



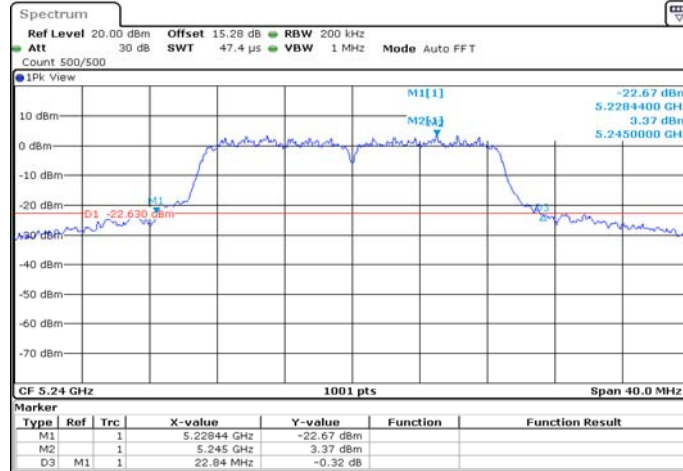
Date: 13 JUN 2020 21:54:45

11AC20SISO_Ant1_5200



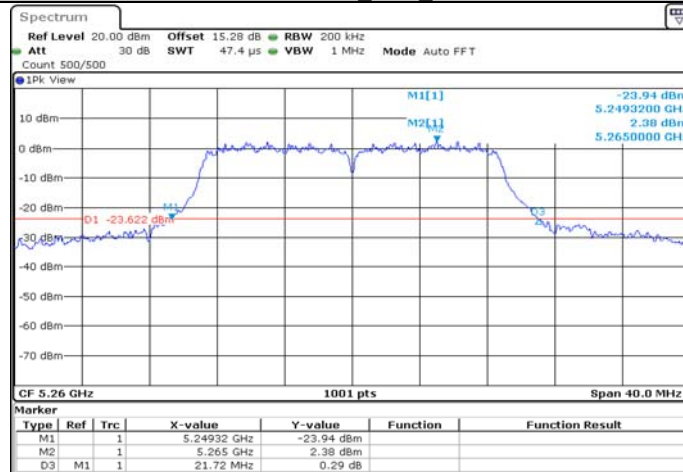
Date: 13 JUN 2020 21:56:55

11AC20SISO_Ant1_5240



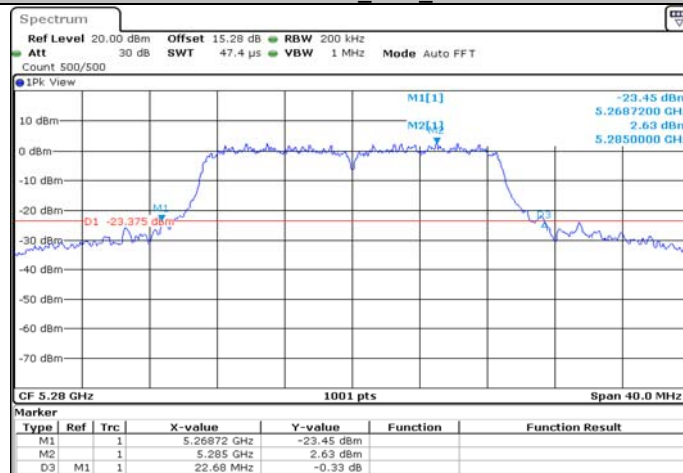
Date: 13 JUN 2020 21:58:39

11AC20SISO_Ant1_5260



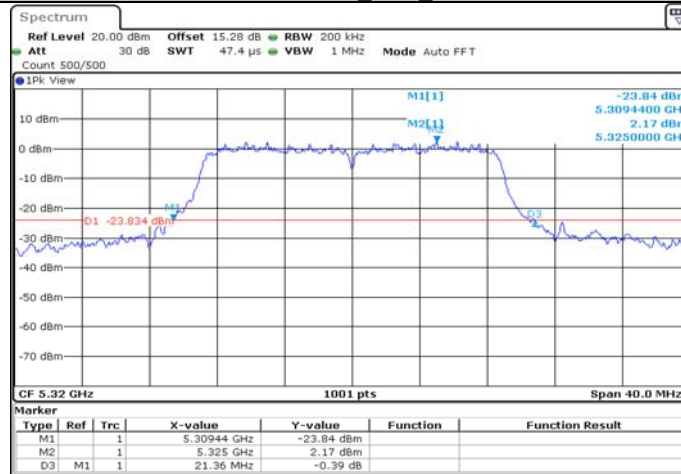
Date: 13 JUN 2020 22:01:45

11AC20SISO_Ant1_5280



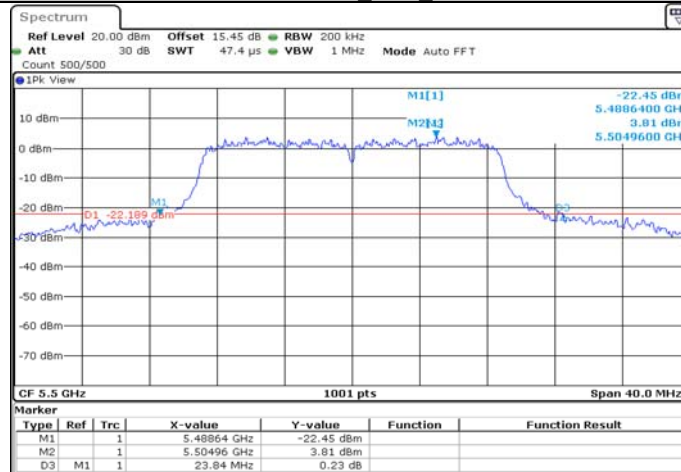
Date: 13 JUN 2020 22:03:24

11AC20SISO_Ant1_5320



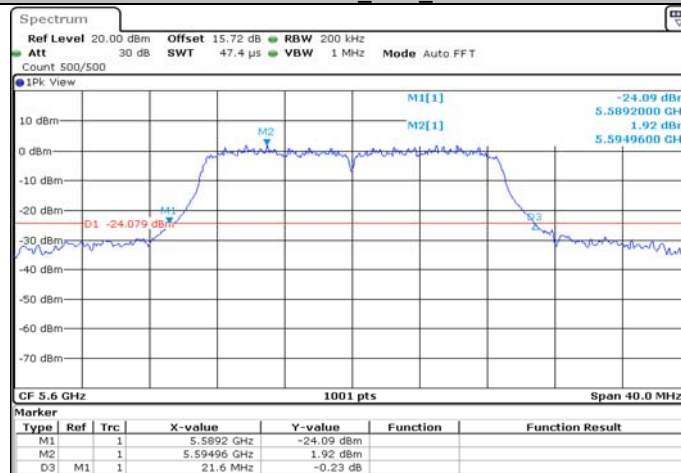
Date: 13 JUN 2020 22:05:10

11AC20SISO_Ant1_5500



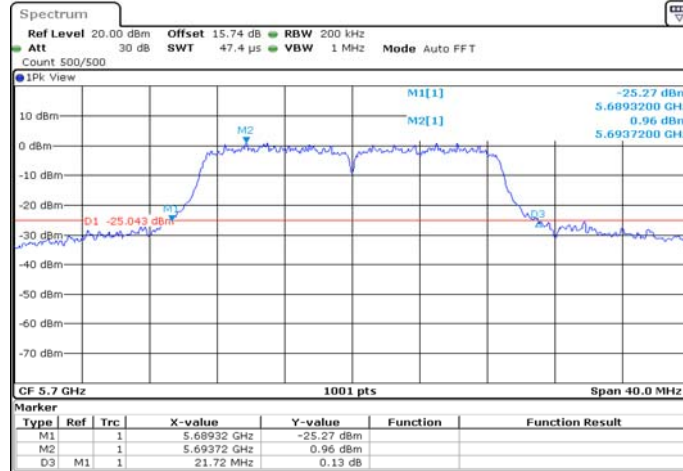
Date: 13 JUN 2020 22:06:53

11AC20SISO_Ant1_5600



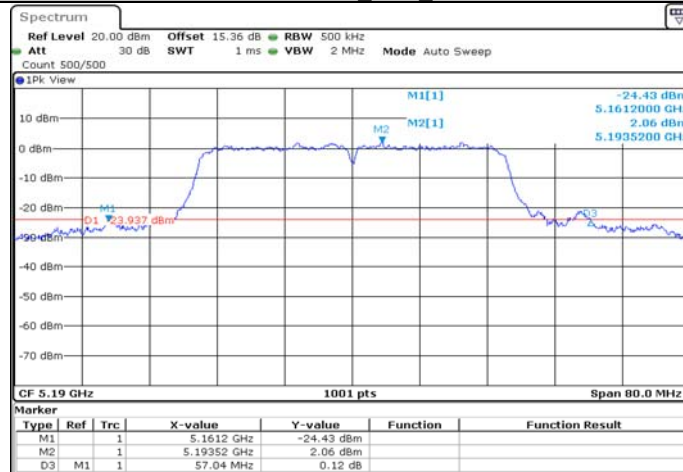
Date: 13 JUN 2020 22:09:56

11AC20SISO_Ant1_5700



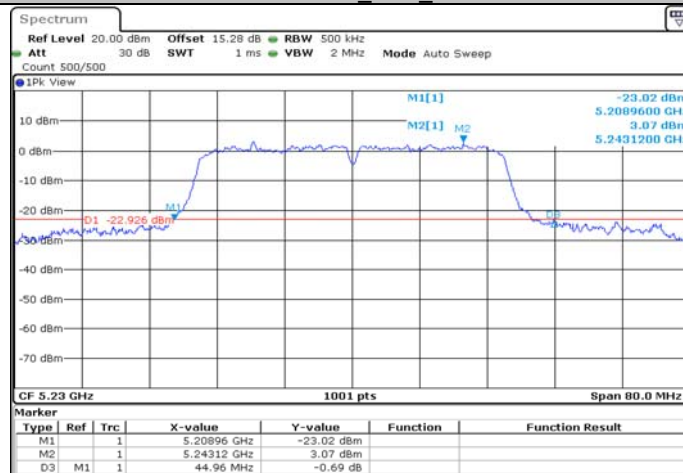
Date: 13 JUN 2020 22:11:38

11AC40SISO_Ant1_5190



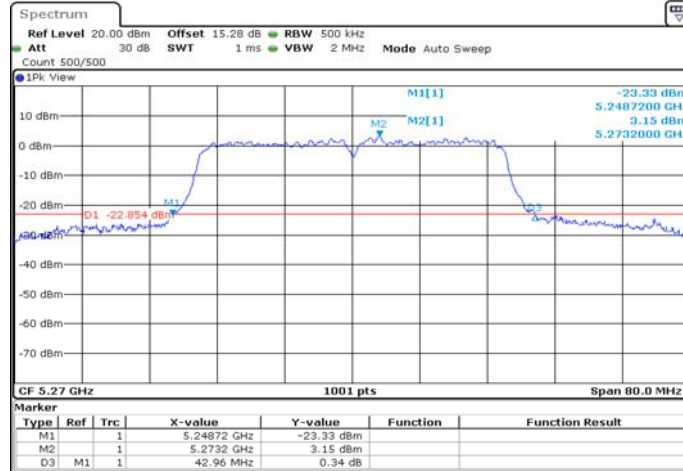
Date: 13 JUN 2020 22:20:22

11AC40SISO_Ant1_5230



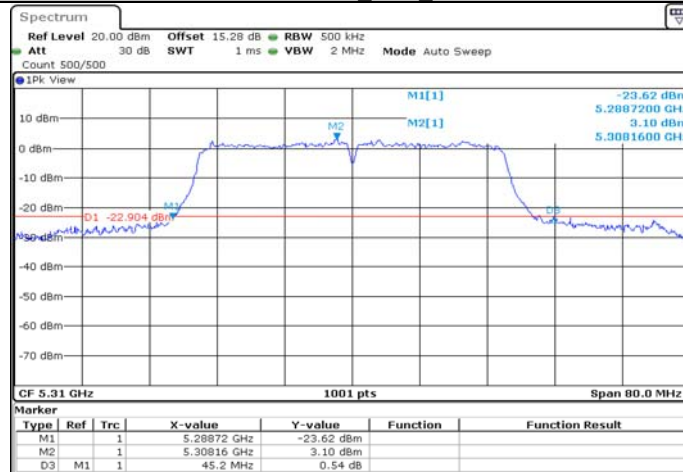
Date: 13 JUN 2020 22:22:19

11AC40SISO_Ant1_5270



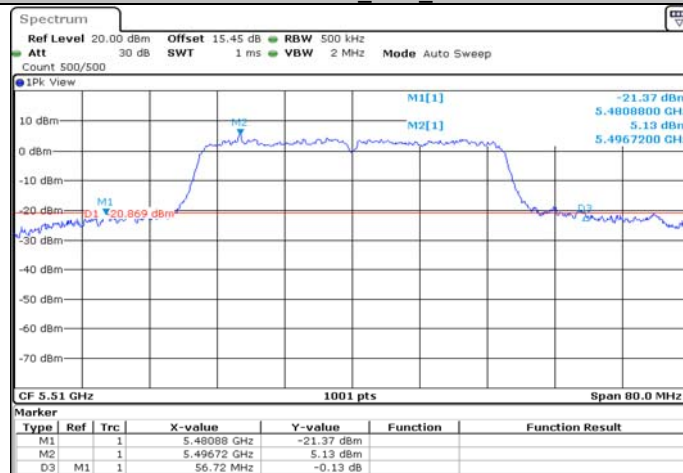
Date: 13 JUN 2020 22:23:52

11AC40SISO_Ant1_5310



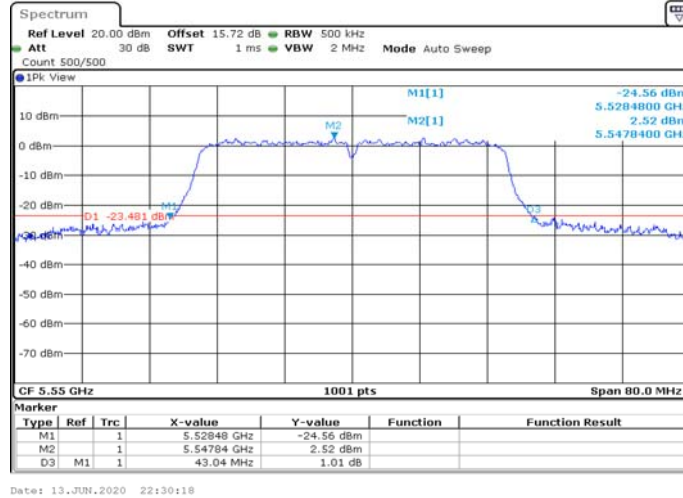
Date: 13 JUN 2020 22:25:50

11AC40SISO_Ant1_5510

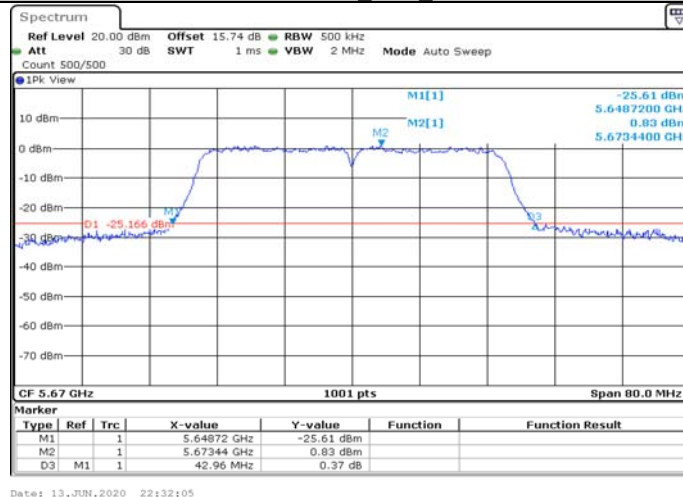


Date: 13 JUN 2020 22:27:31

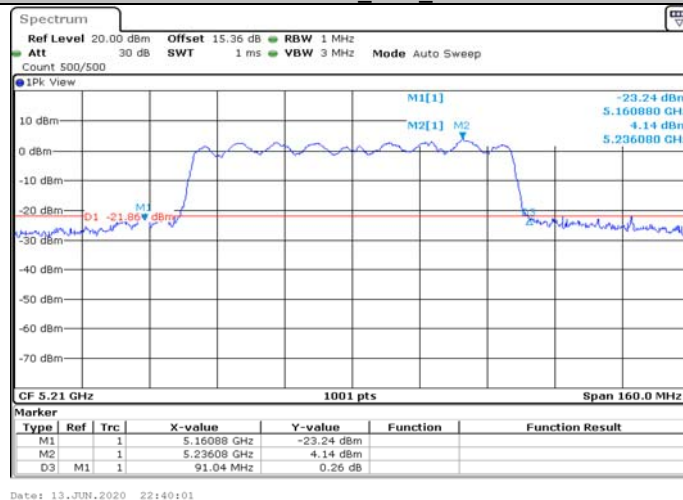
11AC40SISO_Ant1_5550



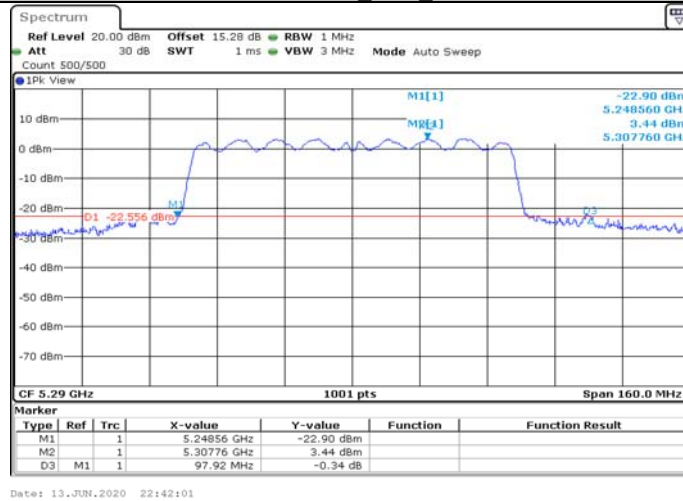
11AC40SISO_Ant1_5670



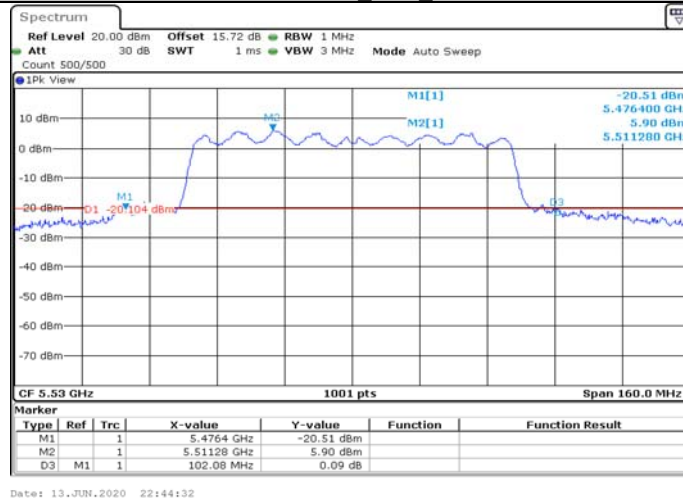
11AC80SISO_Ant1_5210



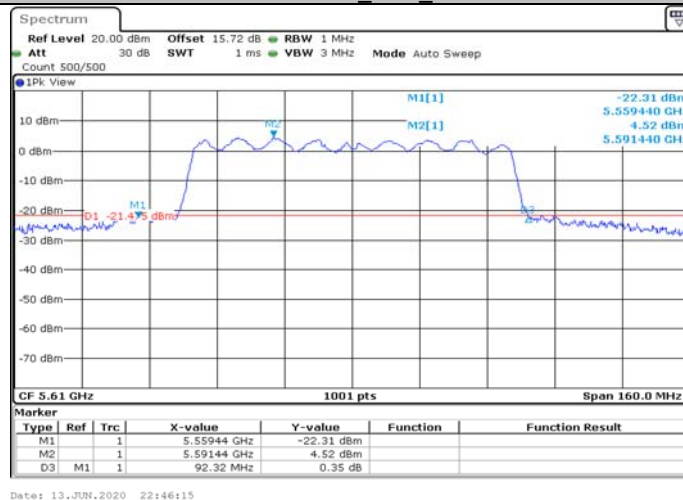
11AC80SISO_Ant1_5290



11AC80SISO_Ant1_5530



11AC80SISO_Ant1_5610

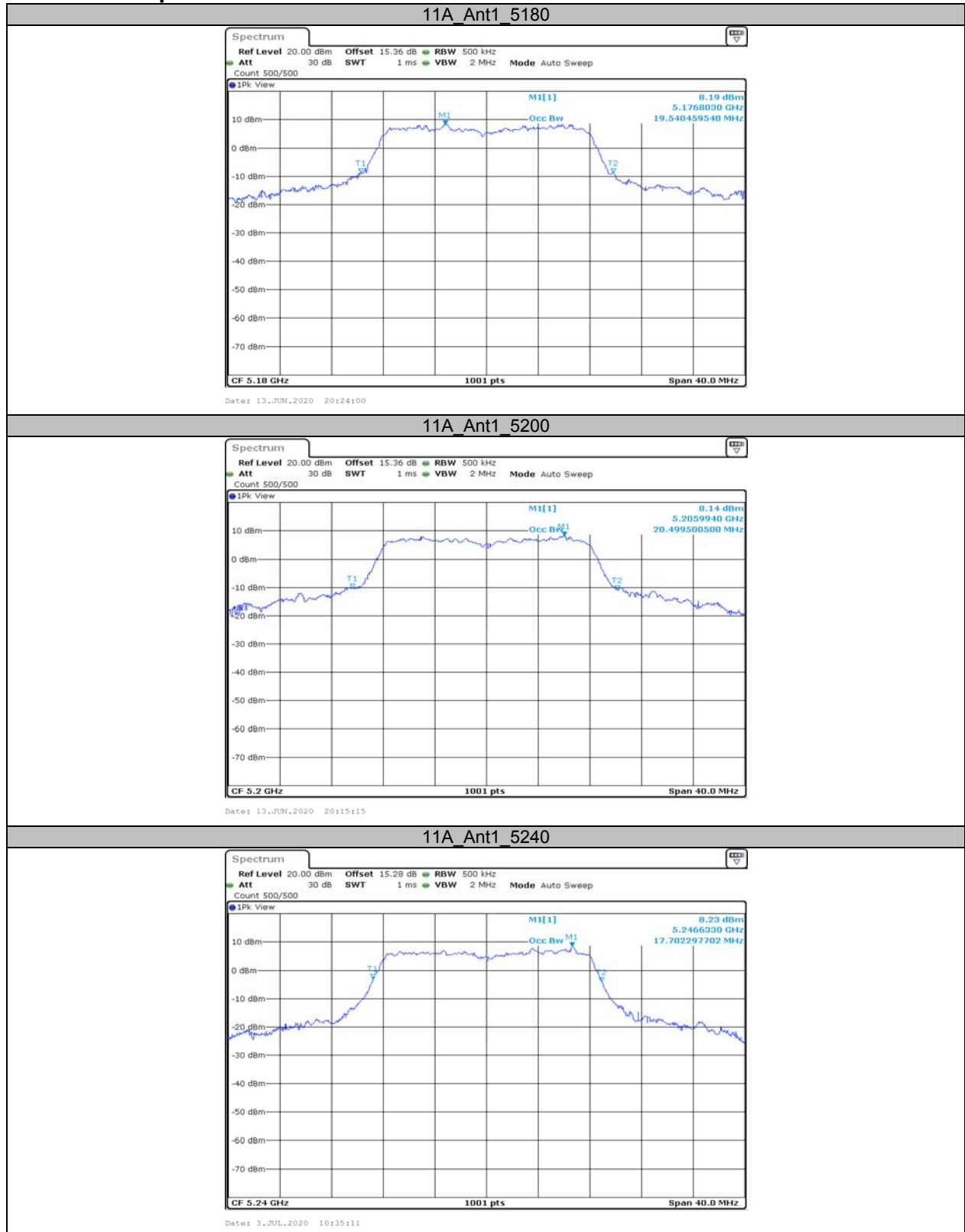


Appendix A2: Occupied channel bandwidth Test Result

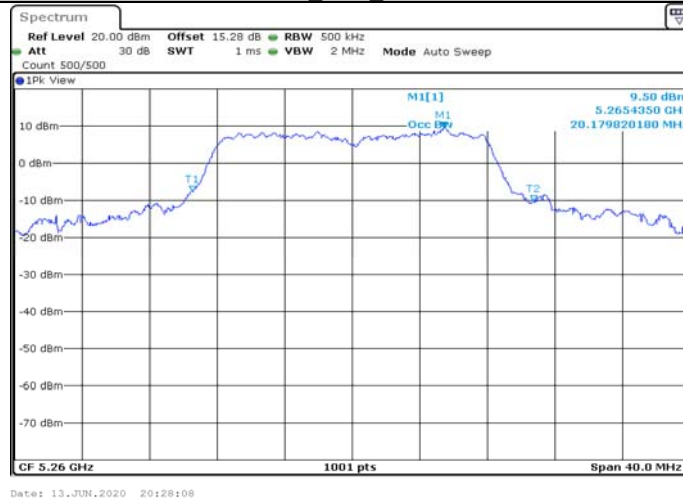
TestMode	Antenna	Channel	OCB [MHz]	Limit[MHz]	Verdict
11A	Ant1	5180	19.54	---	PASS
		5200	20.5	---	PASS
		5240	17.702	---	PASS
		5260	20.18	---	PASS
		5280	19.101	---	PASS
		5320	19.58	---	PASS
		5500	18.302	---	PASS
		5600	17.902	---	PASS
		5700	18.661	---	PASS
		5745	21.778	---	PASS
		5785	22.737	---	PASS
		5825	21.978	---	PASS
11N20SISO	Ant1	5180	18.981	---	PASS
		5200	18.462	---	PASS
		5240	19.221	---	PASS
		5260	18.701	---	PASS
		5280	18.581	---	PASS
		5320	18.581	---	PASS
		5500	19.54	---	PASS
		5600	18.621	---	PASS
		5700	19.341	---	PASS
		5745	19.381	---	PASS
		5785	21.698	---	PASS
		5825	22.617	---	PASS
11N40SISO	Ant1	5190	37.243	---	PASS
		5230	37.483	---	PASS
		5270	37.323	---	PASS
		5310	37.562	---	PASS
		5510	37.003	---	PASS
		5550	37.562	---	PASS
		5670	36.923	---	PASS
		5755	38.521	---	PASS
		5795	43.477	---	PASS
11AC20SISO	Ant1	5180	18.501	---	PASS
		5200	18.741	---	PASS
		5240	18.621	---	PASS
		5260	18.661	---	PASS
		5280	18.342	---	PASS
		5320	18.462	---	PASS
		5500	18.581	---	PASS
		5600	18.422	---	PASS
		5700	18.541	---	PASS
		5745	18.781	---	PASS
		5785	18.941	---	PASS
		5825	18.621	---	PASS
11AC40SISO	Ant1	5190	37.083	---	PASS
		5230	36.763	---	PASS
		5270	36.763	---	PASS
		5310	36.763	---	PASS
		5510	36.923	---	PASS
		5550	36.763	---	PASS
		5670	37.003	---	PASS
		5755	37.562	---	PASS
		5795	37.722	---	PASS
11AC80SISO	Ant1	5210	76.404	---	PASS
		5290	76.244	---	PASS

		5530	76.244	---	PASS
		5610	76.404	---	PASS
		5775	77.363	---	PASS

Test Graphs



11A_Ant1_5260



11A_Ant1_5280



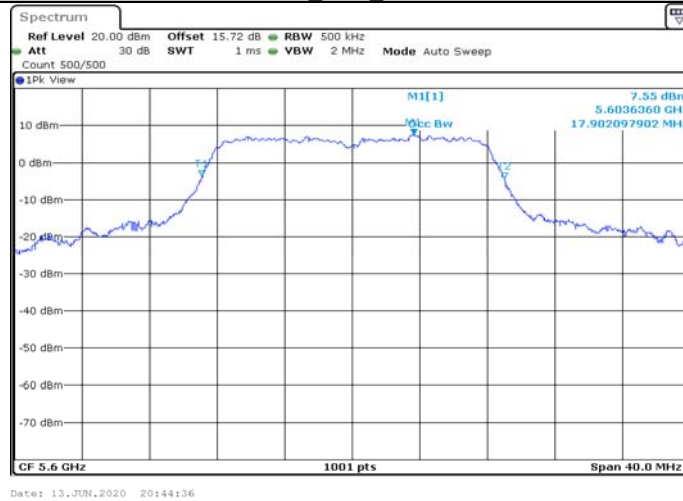
11A_Ant1_5320



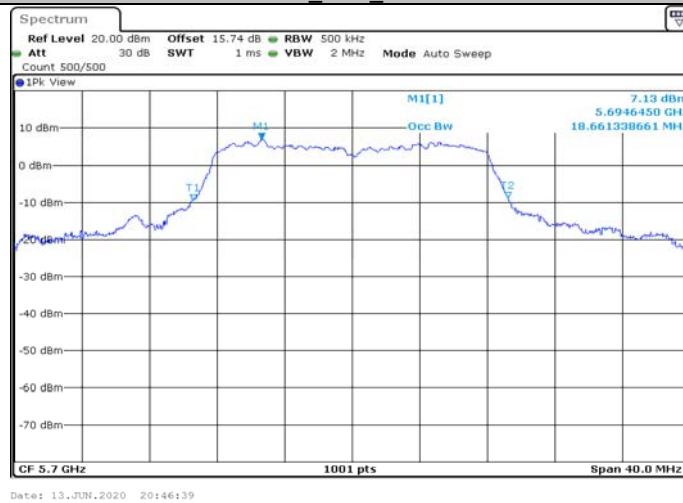
11A_Ant1_5500



11A_Ant1_5600



11A_Ant1_5700



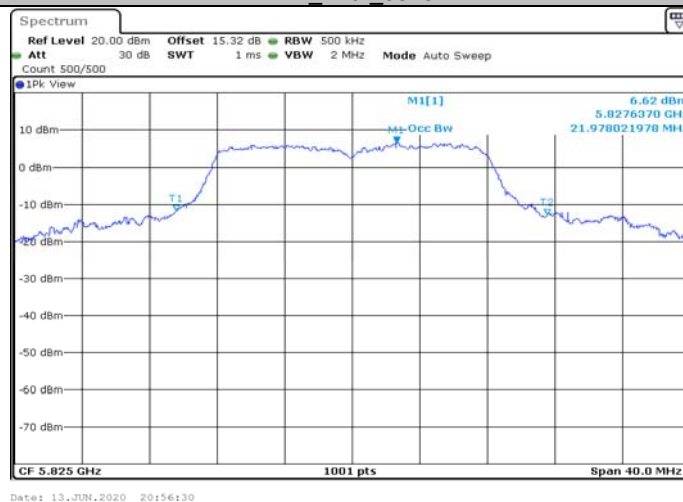
11A_Ant1_5745

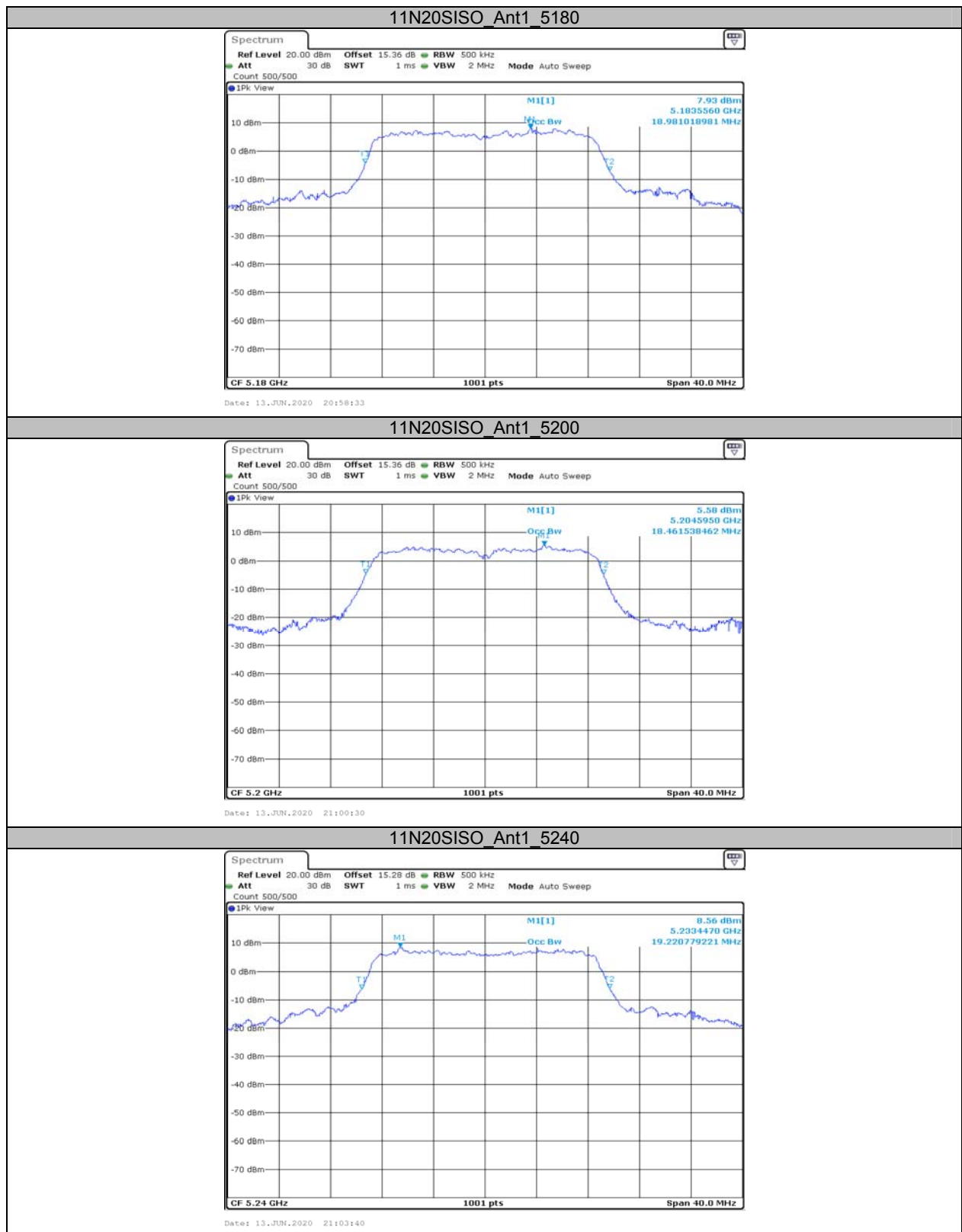


11A_Ant1_5785

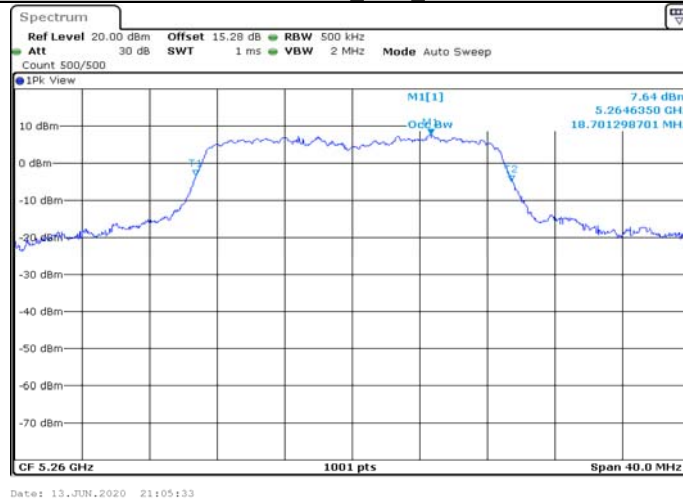


11A_Ant1_5825

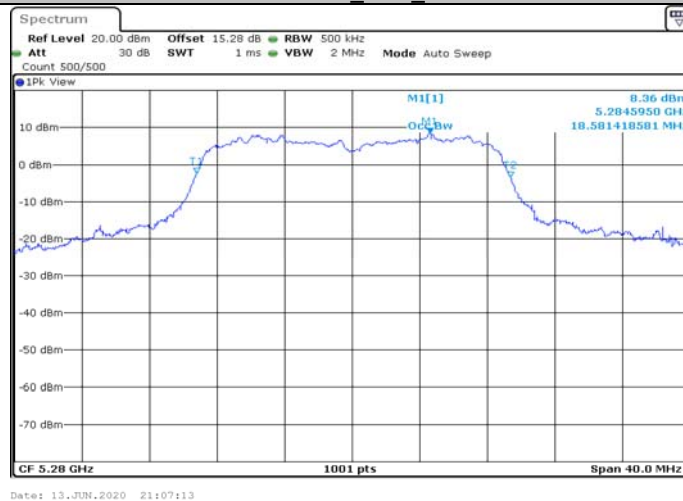




11N20SISO_Ant1_5260



11N20SISO_Ant1_5280



11N20SISO_Ant1_5320

