




## FCC PART 15.407 TEST REPORT

For

**Grandstream Networks, Inc.**

126 Brookline Ave., 3rd Floor Boston, MA 02215, USA

**FCC ID: YZZGSC3510**

<b>Report Type:</b> Original Report	<b>Product Type:</b> SIP Two-Way Intercom Speaker
<b>Report Number:</b> RSZ190401001-00C	
<b>Report Date:</b> 2019-06-26	
<b>Reviewed By:</b>	Nancy Wang RF Engineer 
<b>Prepared By:</b>	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 <a href="http://www.baclcorp.com.cn">www.baclcorp.com.cn</a>

**Note:** This report must not be used by the customer to claim product certification, approval, or endorsement by A2LA\* or any agency of the Federal Government. \* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk “\*”.

The information marked # is provided by the applicant, the laboratory is not responsible for its authenticity.

## **TABLE OF CONTENTS**

<b>GENERAL INFORMATION.....</b>	<b>4</b>
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....	4
OBJECTIVE .....	4
RELATED SUBMITTAL(S)/GRANT(S).....	4
TEST METHODOLOGY .....	5
MEASUREMENT UNCERTAINTY.....	5
TEST FACILITY .....	5
<b>SYSTEM TEST CONFIGURATION.....</b>	<b>6</b>
DESCRIPTION OF TEST CONFIGURATION .....	6
EUT EXERCISE SOFTWARE .....	7
EQUIPMENT MODIFICATIONS .....	10
SUPPORT EQUIPMENT LIST AND DETAILS .....	10
EXTERNAL I/O CABLE.....	11
BLOCK DIAGRAM OF TEST SETUP .....	11
<b>SUMMARY OF TEST RESULTS.....</b>	<b>12</b>
<b>TEST EQUIPMENT LIST .....</b>	<b>13</b>
<b>§1.1307 (b) (1) &amp; §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE) .....</b>	<b>15</b>
APPLICABLE STANDARD .....	15
RESULT .....	15
<b>FCC §15.203 – ANTENNA REQUIREMENT .....</b>	<b>16</b>
APPLICABLE STANDARD .....	16
ANTENNA CONNECTOR CONSTRUCTION .....	16
<b>FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS .....</b>	<b>17</b>
APPLICABLE STANDARD .....	17
EUT SETUP.....	17
EMI TEST RECEIVER SETUP.....	17
TEST PROCEDURE .....	17
TEST RESULTS SUMMARY .....	18
TEST DATA .....	18
<b>§15.205 &amp; §15.209 &amp; §15.407(B) (1), (2), (3), (4),(6),(7) – UNDESIRABLE EMISSION .....</b>	<b>21</b>
APPLICABLE STANDARD .....	21
EUT SETUP .....	22
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP .....	23
TEST PROCEDURE .....	23
CORRECTED AMPLITUDE & MARGIN CALCULATION .....	24
TEST RESULTS SUMMARY .....	24
TEST DATA .....	24
<b>FCC §15.407(a) (1) – 26 dB &amp; 6dB EMISSION BANDWIDTH.....</b>	<b>38</b>
APPLICABLE STANDARD .....	38
TEST PROCEDURE .....	38
TEST DATA .....	38
<b>FCC §15.407(a) (1) (2)(3) – CONDUCTED TRANSMITTER OUTPUT POWER.....</b>	<b>64</b>

APPLICABLE STANDARD .....64

TEST PROCEDURE .....64

TEST DATA .....65

**FCC §15.407(a) (1) (2) (3) - POWER SPECTRAL DENSITY .....68**

APPLICABLE STANDARD .....68

TEST PROCEDURE .....68

TEST DATA .....69

## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

Product	SIP Two-Way Intercom Speaker
Tested Model	GSC3510
Multiple Model <sup>#</sup>	GSC3505
Frequency Range	5G WI-FI: 5150-5250 MHz; 5250-5350 MHz; 5470-5725 MHz, 5725-5850 MHz
Transmit Power	5150-5250 MHz: 13.34dBm (802.11a), 12.45dBm(802.11n20), 12.45 dBm(802.11n40), 5250-5350 MHz: 14.29dBm (802.11a), 14.54dBm(802.11n20), 14.62 dBm(802.11n40), 5470-5725 MHz 14.91dBm (802.11a), 14.79dBm(802.11n20), 12.86 dBm(802.11n40), 5725-5850 MHz 14.41dBm (802.11a), 14.09dBm(802.11n20), 14.15 dBm(802.11n40),
Modulation Technique	WIFI: OFDM
Antenna Specification	PCB Antenna: 3.5dBi@5GHz
Voltage Range	DC 48V from POE
Date of Test	2019/06/04~2019/06/18
Sample serial number	190401001
Received date	2019/04/01
Sample/EUT Status	Good condition

*Notes: This series products model: GSC3505 and GSC3510 are identical schematics, Model GSC3510 was selected for fully testing, the detailed information can be referred to the declaration which was stated and guaranteed by the applicant.*

### Objective

This type approval report is prepared on behalf of *Grandstream Networks, Inc.* 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 15B JAB and FCC Part 15.247 DSS&DTS submissions with FCC ID: YZZGSC3510.

## 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

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: 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 device support 802.11a/n20/n40 modes.

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

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

For 5250-5350MHz Band, 6 channels are provided to testing:

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

For 5470-5725MHz Band, 16 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
100	5500	120	5600
102	5510	124	5620
104	5520	126	5630
108	5540	128	5640
110	5550	132	5660
112	5560	134	5670
116	5580	136	5680
118	5590	140	5700

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

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

### EUT Exercise Software

“Vysor-win32-ia32.exe” software was used. Test frequencies and power level were configured as below:

U-NII	Mode	Channel Number	Frequency (MHz)	Rate (Mbps)	Power Level
5150 – 5250MHz	802.11 a	CH36	5180	6	16
		CH40	5200	6	15
		CH48	5240	6	16
	802.11 n20	CH36	5180	MCS0	15
		CH40	5200	MCS0	14
		CH48	5240	MCS0	15
	802.11 n40	CH38	5190	MCS0	15
		CH46	5230	MCS0	15
5250 – 5350MHz	802.11 a	CH52	5260	6	17
		CH56	5280	6	17
		CH64	5320	6	17
	802.11 n20	CH52	5260	MCS0	17
		CH56	5280	MCS0	17
		CH64	5320	MCS0	17
	802.11 n40	CH54	5270	MCS0	17
		CH62	5310	MCS0	15

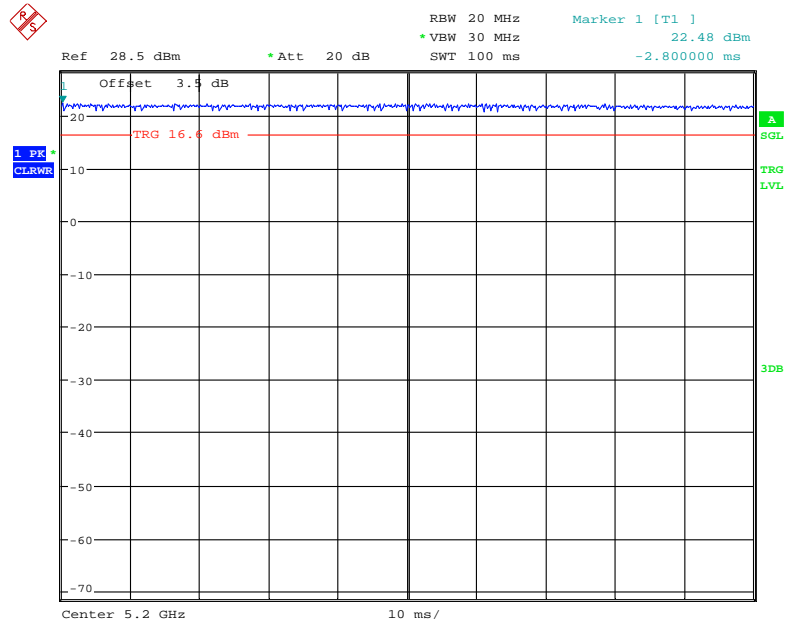
U-NII	Mode	Channel Number	Frequency (MHz)	Rate (Mbps)	Power Level
5470 – 5725MHz	802.11 a	CH100	5500	6	17
		CH120	5600	6	17
		CH140	5700	6	16
	802.11 n20	CH100	5500	MCS0	17
		CH120	5600	MCS0	17
		CH140	5700	MCS0	15
	802.11 n40	CH102	5510	MCS0	15
		CH118	5590	MCS0	15
		CH134	5670	MCS0	15
5725 – 5850MHz	802.11 a	CH149	5745	6	17
		CH157	5785	6	17
		CH165	5825	6	17
	802.11 n20	CH149	5745	MCS0	17
		CH157	5785	MCS0	17
		CH165	5825	MCS0	17
	802.11 n40	CH151	5755	MCS0	17
		CH159	5795	MCS0	17



# Duty cycle

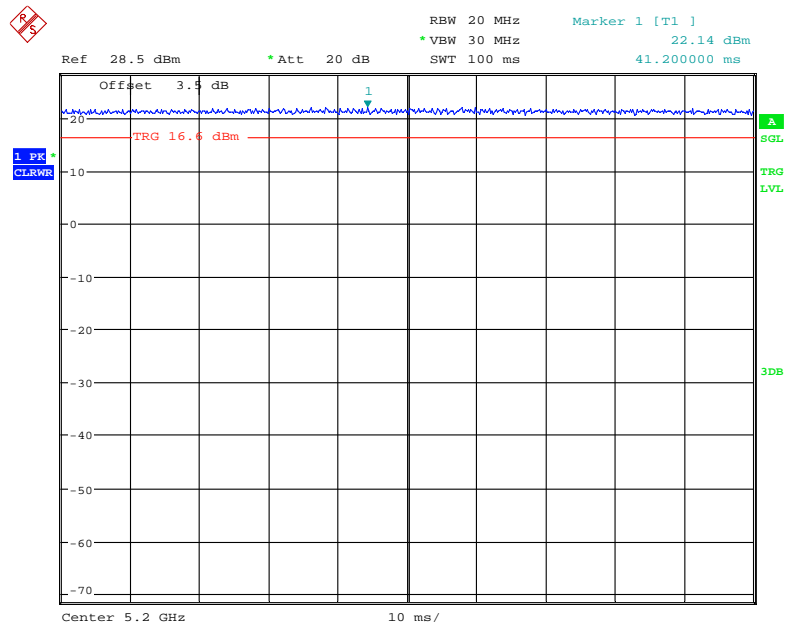
5150-5250 MHz

## 802.11a mode

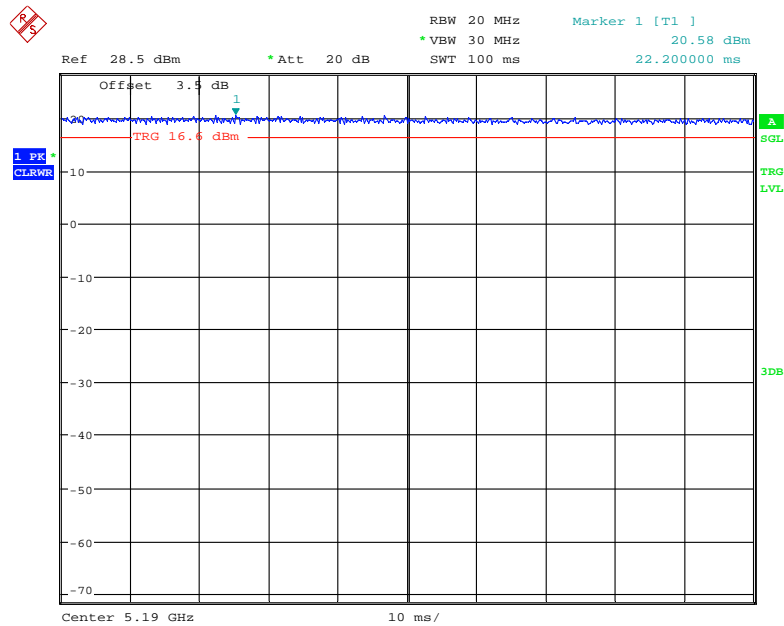


Date: 18.JUN.2019 15:05:42

## 802.11n20 mode



Date: 18.JUN.2019 15:05:16

**802.11n40 mode**

Date: 18.JUN.2019 15:00:39

Band	Duty Cycle (%)	T(ms)	1/T(kHz)	VBW Setting	10log(1/x)
802.11a	100	-	-	10Hz	-
802.11n20	100	-	-	10Hz	-
802.11n40	100	-	-	10Hz	-

Note: 5250-5350MHz band, 5470-5725MHz band and 5725-5850MHz band was used the same duty cycle to test for each mode.

**Equipment Modifications**

No modification was made to the EUT tested.

**Support Equipment List and Details**

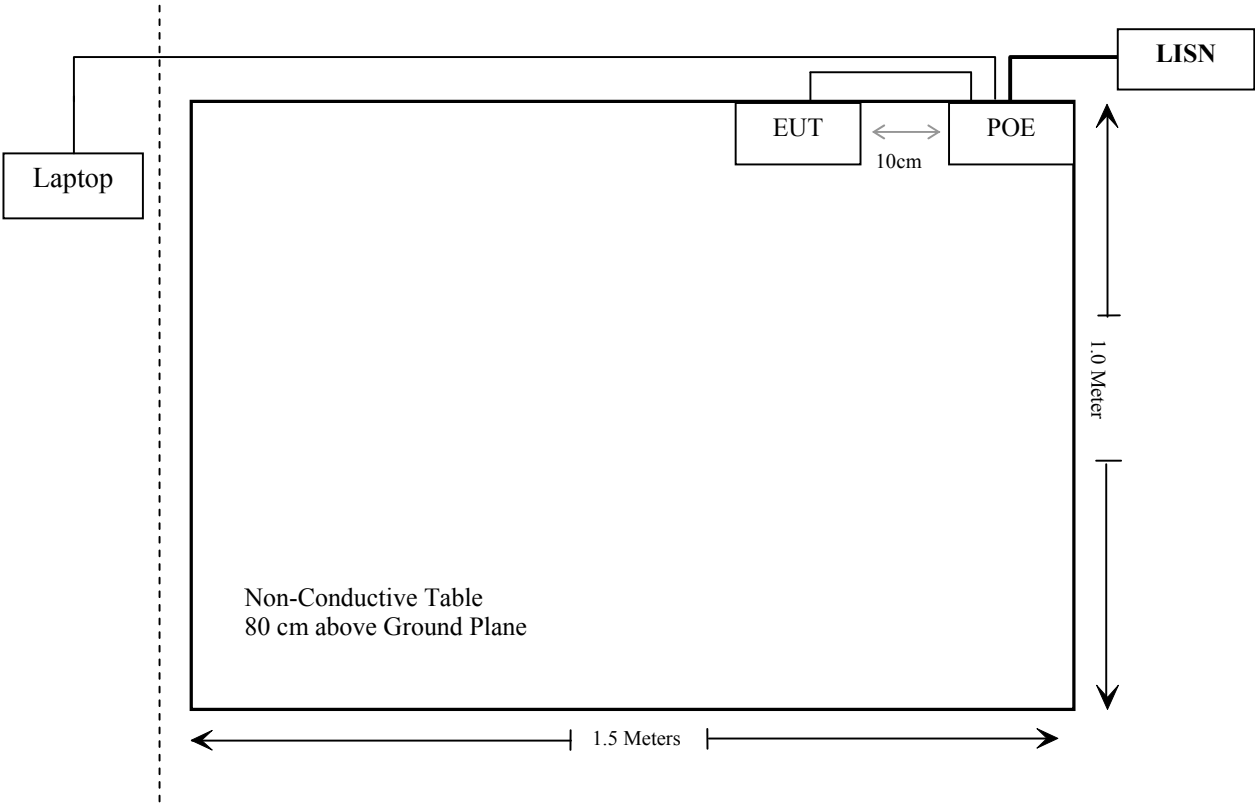
Manufacturer	Description	Model	Serial Number
Dcoma	POE	PSE801G	N/A
HP	Laptop	Compaq CQ45	5CG33407QL

External I/O Cable

Cable Description	Length (m)	From Port	To
Unshielded detachable AC Cable	1.0	LISN	POE
Unshielded detachable RJ45 Cable	1.2	POE	EUT
Unshielded detachable RJ45 Cable	8.0	POE	Laptop

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),(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

DFS report please refer to RSZ190511002-00E issued by Bay Area Compliance Laboratories Corp.(Dongguan).

**TEST EQUIPMENT LIST**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>AC Line Conducted test</b>					
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2018-07-11	2019-07-11
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2019-01-25	2020-01-25
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2019-03-02	2020-03-02
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
N/A Unknown	Conducted Emission Cable	78652	UF A210B-1-0720-504504	2018-11-12	2019-11-12
<b>Radiated Emission Test</b>					
A.H. System	Horn Antenna	SAS-200/571	135	2018-09-01	2021-08-31
Rohde & Schwarz	Signal Analyzer	FSV40	101473	2019-01-09	2020-01-08
Agilent	Spectrum Analyzer	8564E	3943A01781	2019-01-04	2020-01-04
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017-12-22	2020-12-21
COM-POWER	Pre-amplifier	PA-122	181919	2018-11-12	2019-11-12
Sonoma instrument	Amplifier	310 N	186238	2018-11-12	2019-11-12
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03-101746-zn	2018-07-11	2019-07-11
Ducommun technologies	RF Cable	UFA147A-2362-100100	MFR64639 231029-003	2018-11-12	2019-11-12
Ducommun technologies	RF Cable	104PEA	218124002	2018-11-12	2019-11-12
Ducommun technologies	RF Cable	RG-214	1	2018-11-12	2019-11-12
Ducommun technologies	RF Cable	RG-214	2	2018-11-12	2019-11-12
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2017-12-29	2020-12-28
Ducommun Technologies	Horn Antenna	ARH-4283-02	1007726-03	2017-12-29	2020-12-28
Heatsink Required	Amplifier	QLW-18405536-J0	15964001002	2018-11-12	2019-11-12
Un-known	Band Reject Filter	BSF5150-5850MN-0899-004	Un-known	2018-11-12	2019-11-12

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSU26	200120	2018-12-24	2019-12-24
Agilent	USB wideband power meter	U2021XA	MY54250003	2018-06-23	2019-06-23
Ducommun technologies	RF Cable	RG-214	3	Each Time	
WEINSCHTEL	3dB Attenuator	6231	666	Each Time	

\* **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 <sup>2</sup> )	Averaging Time (Minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	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/cm<sup>2</sup>)

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 <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
	(dBi)	(numeric)	(dBm)	(mW)			
5150-5250	3.5	2.24	13.5	22.39	20	0.010	1.0
5250-5350	3.5	2.24	15.0	31.62	20	0.014	1.0
5470-5725	3.5	2.24	15.0	31.62	20	0.014	1.0
5725-5850	3.5	2.24	14.5	28.18	20	0.013	1.0

Note:

- 1) The conducted power is the tune-up power of the Max Conducted Output Power.
- 2) 2.4GHz or 5GHz Wi-Fi can't transmit simultaneously for this device.

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, which was permanently attached and the antenna gain is 3.5 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

**Result:** Compliance.

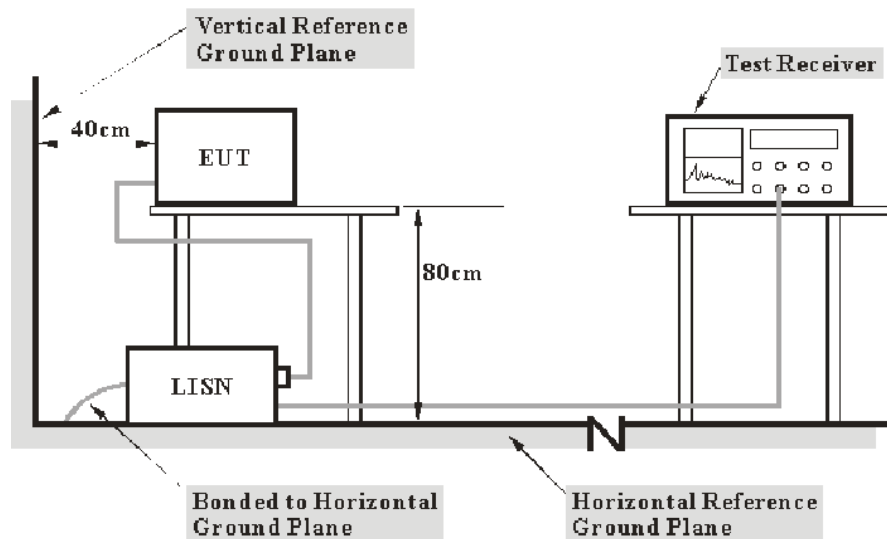


## FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS

### 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 Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL,  $U_{(Lm)}$  is less than  $U_{cispr}$ , if  $L_m$  is less than  $L_{lim}$ , it implies that the EUT complies with the limit.

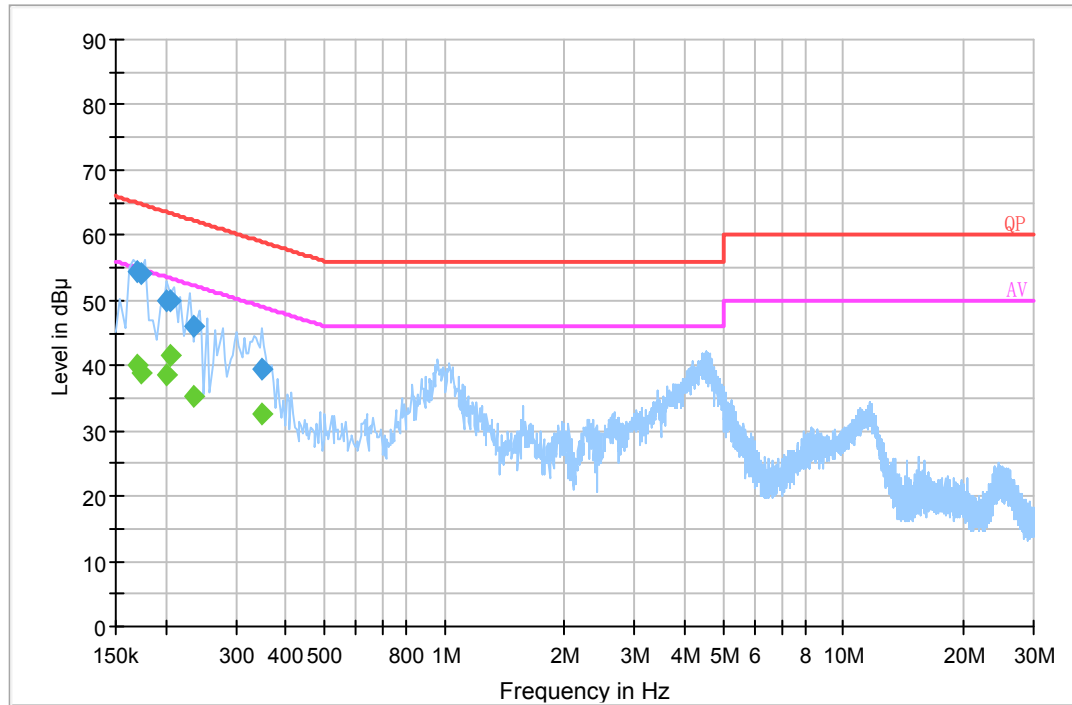
## Test Data

### Environmental Conditions

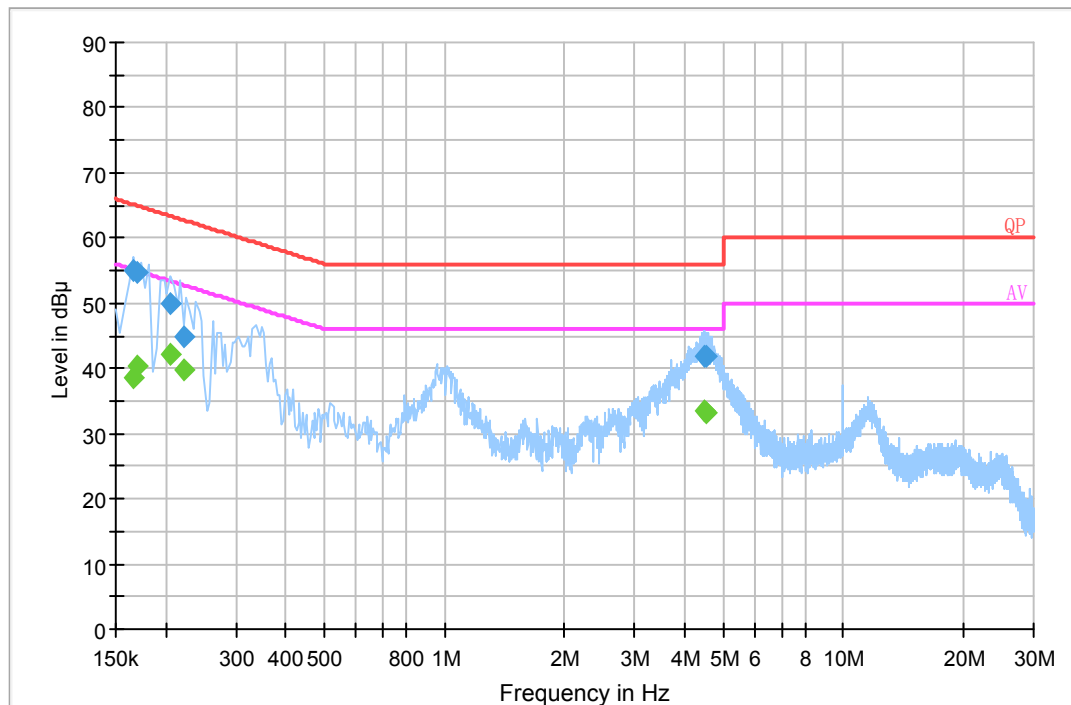
Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

*The testing was performed by Haiguo Li on 2019-06-05.*

*EUT operation mode: Transmitting (worst case)*

**AC 120 V/60 Hz, Line:**

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.170501	54.4	19.8	64.9	10.5	QP
0.173500	54.1	19.8	64.8	10.7	QP
0.201500	50.0	19.8	63.5	13.5	QP
0.205500	50.1	19.8	63.4	13.3	QP
0.234500	46.2	19.8	62.3	16.1	QP
0.348750	39.4	19.9	59.0	19.6	QP
0.170501	40.0	19.8	54.9	14.9	Ave.
0.173500	38.9	19.8	54.8	15.9	Ave.
0.201500	38.6	19.8	53.5	14.9	Ave.
0.205500	41.6	19.8	53.4	11.8	Ave.
0.234500	35.3	19.8	52.3	17.0	Ave.
0.348750	32.7	19.9	49.0	16.3	Ave.

**AC 120 V/60 Hz, Neutral:**

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.165500	55.1	19.8	65.2	10.1	QP
0.169500	54.7	19.8	65.0	10.3	QP
0.205500	50.1	19.8	63.4	13.3	QP
0.221500	44.7	19.8	62.8	18.1	QP
4.487670	41.9	19.9	56.0	14.1	QP
4.518710	42.0	19.9	56.0	14.0	QP
0.165500	38.5	19.8	55.2	16.7	Ave.
0.169500	40.3	19.8	55.0	14.7	Ave.
0.205500	42.1	19.8	53.4	11.3	Ave.
0.221500	39.8	19.8	52.8	13.0	Ave.
4.487670	33.5	19.9	46.0	12.5	Ave.
4.518710	33.3	19.9	46.0	12.7	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.

KDB 789033 D02 General UNII Test Procedures New Rules v02r01, clause G),  
 $E [dB\mu V/m] = EIRP [dBm] + 95.2$ , for  $d = 3$  meters.

The general limit of -27 dBm EIRP ( $= 68.2 \text{ dB}\mu V/m$ ) is applied for unwanted emission of U-NII devices.

However, compliance with unwanted emissions in restricted bands may need to be considered, *e.g.*, some harmonics may land in the restricted bands below 5.15 GHz and above 5.35 GHz (refer

The general limit of -27 dBm EIRP ( $= 68.2 \text{ dB}\mu V/m$ ) is applied for unwanted emission of U-NII devices.

However, compliance with unwanted emissions in restricted bands may need to be considered, *e.g.*, some harmonics may land in the restricted bands below 5.15 GHz and above 5.35 GHz (refer to § 15.205 for restricted bands) that have average and peak limits specified in §§ 15.209 and 15.35(b), respectively.

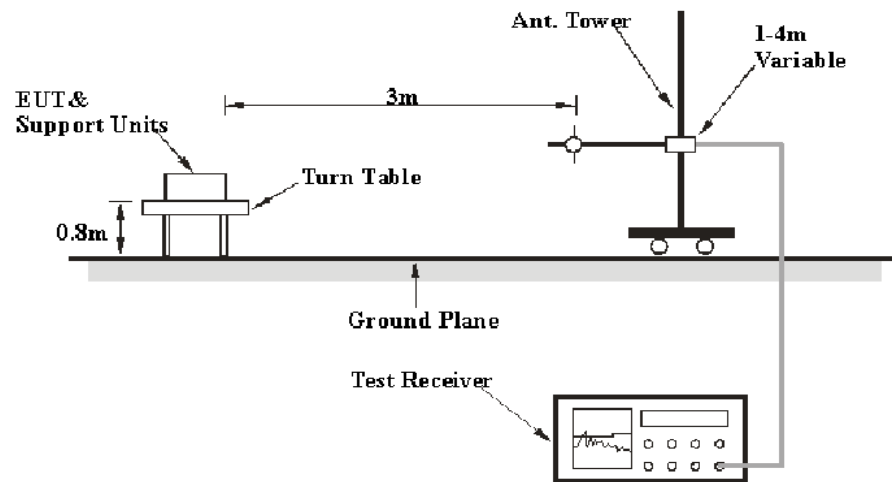
Although the peak limit of  $74 \text{ dB}\mu V/m$  (20 dB above  $54 \text{ dB}\mu V/m$ ) in the restricted band appears to be higher than  $68.2 \text{ dB}\mu V/m$ , the lower average limit of  $54 \text{ dB}\mu V/m$  in the restricted bands needs to be complied to

As to transmitters operating in the 5.725-5.85 GHz band, the strictest limit was applied for undesirable emissions, performed as below:

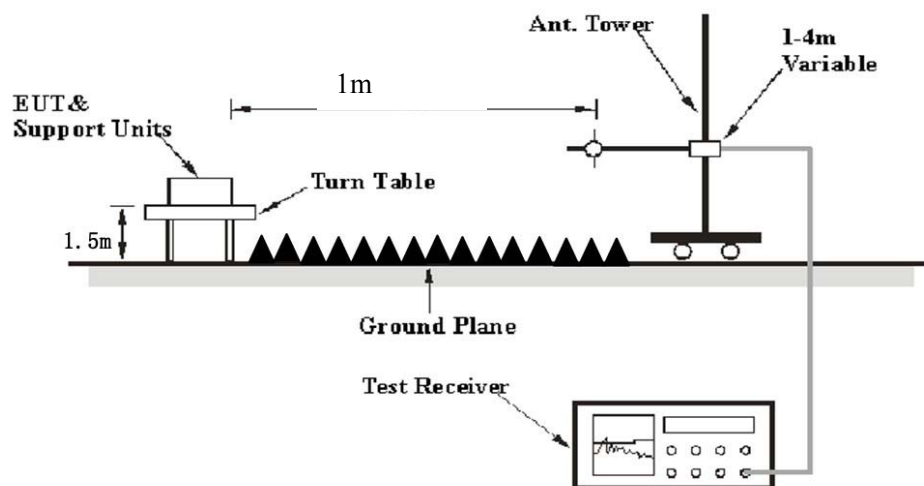
- 1) For 25MHz-75 MHz above or below the band edge, a level of -27 dBm/MHz ( $68.2 \text{ dB}\mu V/m$ ) was applied.
- 2) For 5MHz-25 MHz above or below the band edge, a level of 10 dBm/MHz ( $105.2 \text{ dB}\mu V/m$ ) was applied.
- 2) For 0MHz-5 MHz above or below the band edge, a level of 15.6 dBm/MHz ( $110.8 \text{ dB}\mu V/m$ ) was applied.

## 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	Measurements
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1MHz	10 Hz <sup>Note 1</sup>	/	Average
	1MHz	> 1/T <sup>Note 2</sup>	/	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;

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

where

$E_{\text{SpecLimit}}$  is the field strength of the emission at the distance specified by the limit, in dB $\mu$ V/m

$E_{\text{Meas}}$  is the field strength of the emission at the measurement distance, in dB $\mu$ V/m

$d_{\text{Meas}}$  is the measurement distance, in m

$d_{\text{SpecLimit}}$  is the distance specified by the limit, in m

So the extrapolation factor of 1m is  $20 \cdot \log(1/3) = -9.5$  dB

### 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 Results Summary

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL,  $U_{(Lm)}$  is less than  $U_{cispr}$ , if  $L_m$  is less than  $L_{lim}$ , it implies that the EUT complies with the limit.

### Test Data

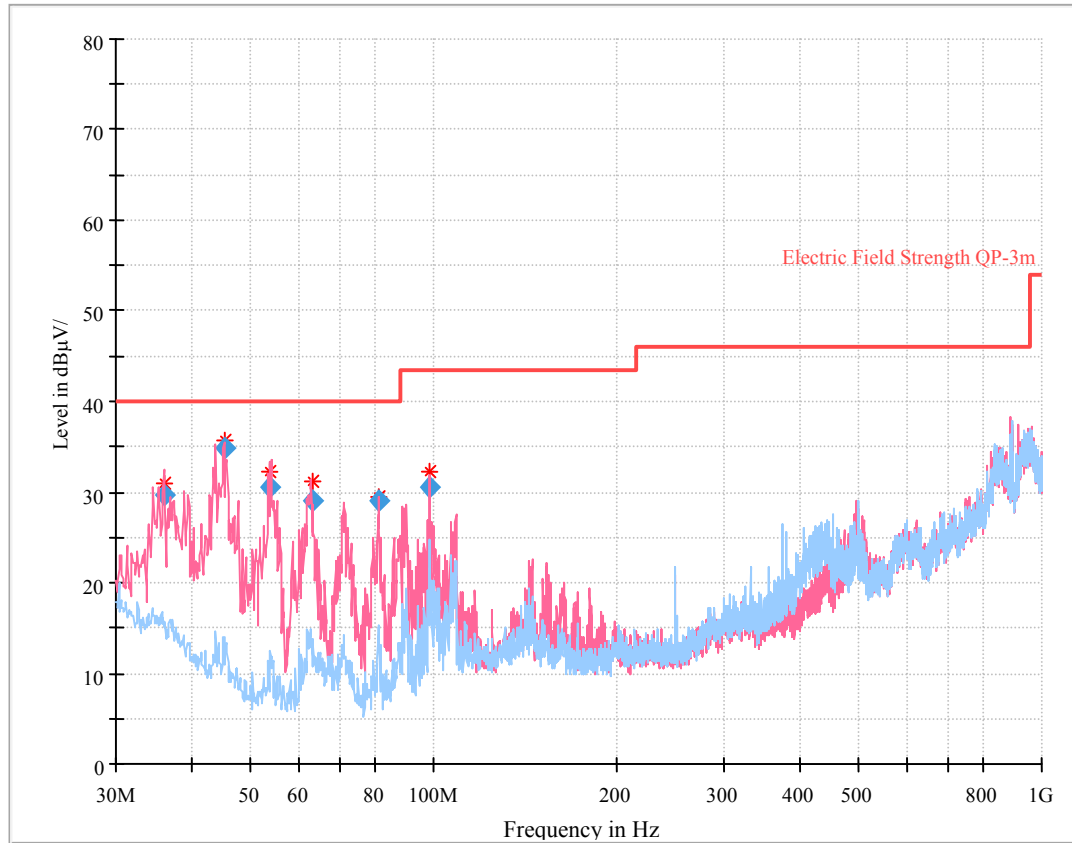
#### Environmental Conditions

Temperature:	24~25 °C
Relative Humidity:	50~52 %
ATM Pressure:	100.9~101.0 kPa

*The testing was performed by Alan He and Andy Yu from 2019-06-04 to 2019-06-07.*

*EUT operation mode: Transmitting*



**30 MHz – 1 GHz: (worst case)**

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
36.141125	29.76	115.0	V	0.0	-11.3	40.00	10.24
45.260250	34.80	116.0	V	0.0	-17.4	40.00	5.20
53.899000	30.46	106.0	V	176.0	-19.8	40.00	9.54
98.438875	30.56	113.0	V	88.0	-17.5	43.50	12.94
62.998875	29.08	100.0	V	0.0	-20.3	40.00	10.92
81.191125	28.98	102.0	V	308.0	-19.9	40.00	11.02

**30 MHz ~ 40 GHz:****5150-5250 MHz:**

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m) @1m	FCC Part 15.407	
	Reading (dBμV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)			Limit (dBμV/m) @1m	Margin (dB)
802.11a mode									
5180MHz									
5132.24	28.15	PK	309	1.9	H	38.36	66.51	83.5	16.99
5132.24	15.57	Ave.	309	1.9	H	38.36	53.93	63.5	9.57
5396.18	28.64	PK	52	2.5	H	39.19	67.83	83.5	15.67
5396.18	14.59	Ave.	52	2.5	H	39.19	53.78	63.5	9.72
10360.00	45.91	PK	83	1.5	H	17.42	63.33	77.7	14.37
15540.00	58.69	PK	127	1.3	H	17.54	76.23	83.5	7.27
15540.00	43.43	Ave.	127	1.3	H	17.54	60.97	63.5	2.53
5200MHz									
10400.00	47.80	PK	263	1.2	H	17.52	65.32	77.7	12.38
15600.00	57.80	PK	87	1.8	H	18.68	76.48	83.5	7.02
15600.00	42.77	Ave.	87	1.8	H	18.68	61.45	63.5	2.05
5240 MHz									
5143.89	28.09	PK	159	1.4	H	38.36	66.45	83.5	17.05
5143.89	14.58	Ave.	159	1.4	H	38.36	52.94	63.5	10.56
5414.81	29.02	PK	123	1.2	H	39.19	68.21	83.5	15.29
5414.81	15.11	Ave.	123	1.2	H	39.19	54.30	63.5	9.20
10480.00	46.91	PK	304	2.0	H	17.25	64.16	77.7	13.54
15720.00	57.12	PK	342	1.7	H	17.86	74.98	83.5	8.52
15720.00	42.49	Ave.	342	1.7	H	17.86	60.35	63.5	3.15
802.11N20 mode									
5180MHz									
5146.19	31.56	PK	109	1.6	H	38.36	69.92	83.5	13.58
5146.19	16.64	Ave.	109	1.6	H	38.36	55.00	63.5	8.50
5433.33	28.37	PK	168	2.5	H	39.29	67.66	83.5	15.84
5433.33	14.36	Ave.	168	2.5	H	39.29	53.65	63.5	9.85
10360.00	47.07	PK	228	2.4	H	17.42	64.49	77.7	13.21
15540.00	62.66	PK	241	2.0	H	17.54	80.20	83.5	3.30
15540.00	44.40	Ave.	241	2.0	H	17.54	61.94	63.5	1.56
5200MHz									
10400.00	45.02	PK	75	2.5	H	17.52	62.54	77.7	15.16
15600.00	60.86	PK	35	1.8	H	18.68	79.54	83.5	3.96
15600.00	42.91	Ave.	35	1.8	H	18.68	61.59	63.5	1.91
5240 MHz									
5143.99	28.53	PK	190	2.2	H	38.36	66.89	83.5	16.61
5143.99	14.68	Ave.	190	2.2	H	38.36	53.04	63.5	10.46
5432.44	28.26	PK	2	2.1	H	39.29	67.55	83.5	15.95
5432.44	15.06	Ave.	2	2.1	H	39.29	54.35	63.5	9.15
10480.00	46.24	PK	159	1.4	H	17.25	63.49	77.7	14.21
15720.00	58.90	PK	213	2.1	H	17.86	76.76	83.5	6.74
15720.00	40.95	Ave.	213	2.1	H	17.86	58.81	63.5	4.69

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m) @1m	FCC Part 15.407	
	Reading (dBμV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)			Limit (dBμV/m) @1m	Margin (dB)
802.11N40 mode									
5190MHz									
5150.00	39.33	PK	105	2.2	H	38.40	77.73	83.5	5.77
5150.00	23.50	Ave.	105	2.2	H	38.40	61.90	63.5	1.60
5391.44	28.07	PK	282	1.8	H	39.19	67.26	83.5	16.24
5391.44	14.78	Ave.	282	1.8	H	39.19	53.97	63.5	9.53
10380.00	43.52	PK	129	1.9	H	17.42	60.94	77.7	16.76
15570.00	57.01	PK	56	1.5	H	18.58	75.59	83.5	7.91
15570.00	42.41	Ave.	56	1.5	H	18.58	60.99	63.5	2.51
5230MHz									
5146.09	28.08	PK	220	1.9	H	38.36	66.44	83.5	17.06
5146.09	14.84	Ave.	220	1.9	H	38.36	53.20	63.5	10.30
5401.14	29.22	PK	131	1.8	H	39.19	68.41	83.5	15.09
5401.14	15.40	Ave.	131	1.8	H	39.19	54.59	63.5	8.91
10460.00	43.78	PK	207	1.0	H	17.15	60.93	77.7	16.77
15690.00	55.53	PK	207	2.3	H	17.76	73.29	83.5	10.21
15690.00	40.21	Ave.	207	2.3	H	17.76	57.97	63.5	5.53

**5250-5350 MHz:**

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m) @1m	FCC Part 15.407	
	Reading (dBμV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)			Limit (dBμV/m) @1m	Margin (dB)
802.11a mode									
5260MHz									
5150.00	28.50	PK	295	1.2	H	38.40	66.90	83.5	16.60
5150.00	14.07	Ave.	295	1.2	H	38.40	52.47	63.5	11.03
5459.78	28.55	PK	221	2.2	H	39.37	67.92	83.5	15.58
5459.78	14.43	Ave.	221	2.2	H	39.37	53.80	63.5	9.70
10520.00	44.86	PK	185	1.6	H	17.25	62.11	77.7	15.59
15780.00	56.45	PK	337	1.3	H	17.36	73.81	83.5	9.69
15780.00	41.43	Ave.	337	1.3	H	17.36	58.79	63.5	4.71
5280MHz									
10560.00	47.08	PK	238	2.2	H	17.91	64.99	77.7	12.71
15840.00	57.74	PK	341	1.1	H	17.46	75.20	83.5	8.30
15840.00	41.83	Ave.	341	1.1	H	17.46	59.29	63.5	4.21
5320 MHz									
5115.33	28.58	PK	337	2.1	H	38.36	66.94	83.5	16.56
5115.33	13.97	Ave.	337	2.1	H	38.36	52.33	63.5	11.17
5350.66	31.94	PK	349	1.1	H	39.09	71.03	83.5	12.47
5350.66	17.63	Ave.	349	1.1	H	39.09	56.72	63.5	6.78
10640.00	48.82	PK	183	1.6	H	18.01	66.83	83.5	16.67
10640.00	33.96	Ave.	183	1.6	H	18.01	51.97	63.5	11.53
15960.00	55.81	PK	95	1.2	H	16.97	72.78	83.5	10.72
15960.00	41.15	Ave.	95	1.2	H	16.97	58.12	63.5	5.38
802.11N20 mode									
5260MHz									
5108.52	28.10	PK	105	2.0	H	38.26	66.36	83.5	17.14
5108.52	14.51	Ave.	105	2.0	H	38.26	52.77	63.5	10.73
5356.61	28.76	PK	196	1.1	H	39.09	67.85	83.5	15.65
5356.61	15.18	Ave.	196	1.1	H	39.09	54.27	63.5	9.23
10520.00	50.87	PK	307	2.0	H	17.25	68.12	77.7	9.58
15780.00	59.54	PK	267	2.4	H	17.36	76.90	83.5	6.60
15780.00	42.34	Ave.	267	2.4	H	17.36	59.70	63.5	3.80
5280MHz									
10560.00	48.65	PK	284	1.4	H	17.91	66.56	77.7	11.14
15840.00	59.84	PK	17	2.5	H	17.46	77.30	83.5	6.20
15840.00	41.91	Ave.	17	2.5	H	17.46	59.37	63.5	4.13
5320 MHz									
5120.94	27.46	PK	51	1.4	H	38.36	65.82	83.5	17.68
5120.94	13.86	Ave.	51	1.4	H	38.36	52.22	63.5	11.28
5351.54	33.57	PK	125	1.2	H	39.09	72.66	83.5	10.84
5351.54	17.51	Ave.	125	1.2	H	39.09	56.60	63.5	6.90
10640.00	49.95	PK	201	1.6	H	18.01	67.96	83.5	15.54
10640.00	33.71	Ave.	201	1.6	H	18.01	51.72	63.5	11.78
15960.00	57.86	PK	190	1.1	H	16.97	74.83	83.5	8.67
15960.00	40.17	Ave.	190	1.1	H	16.97	57.14	63.5	6.36

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m) @1m	FCC Part 15.407	
	Reading (dBμV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)			Limit (dBμV/m) @1m	Margin (dB)
802.11N40 mode									
5270MHz									
5120.84	28.25	PK	85	1.7	H	38.36	66.61	83.5	16.89
5120.84	14.47	Ave.	85	1.7	H	38.36	52.83	63.5	10.67
5366.09	29.31	PK	308	2.0	H	39.09	68.40	83.5	15.10
5366.09	15.71	Ave.	308	2.0	H	39.09	54.80	63.5	8.70
10540.00	46.47	PK	133	1.1	H	17.25	63.72	77.7	13.98
15810.00	54.31	PK	121	1.5	H	17.46	71.77	83.5	11.73
15810.00	39.42	Ave.	121	1.5	H	17.46	56.88	63.5	6.62
5310MHz									
5132.67	26.42	PK	115	1.9	H	38.36	64.78	83.5	18.72
5132.67	12.13	Ave.	115	1.9	H	38.36	50.49	63.5	13.01
5350.00	37.54	PK	167	1.8	H	39.09	76.63	83.5	6.87
5350.00	21.89	Ave.	167	1.8	H	39.09	60.98	63.5	2.52
10620.00	44.63	PK	350	1.1	H	18.01	62.64	83.5	20.86
10620.00	31.79	Ave.	350	1.1	H	18.01	49.80	63.5	13.70
15930.00	49.02	PK	15	1.8	H	19.37	68.39	83.5	15.11
15930.00	34.58	Ave.	15	1.8	H	19.37	53.95	63.5	9.55

**5470-5725 MHz:**

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m) @1m	FCC Part 15.407	
	Reading (dBµV) @1m	PK/QP/Ave.		Degree	Height (m)			Polar (H / V)	Limit (dBµV/m) @1m
802.11a mode									
5500MHz									
5469.28	34.27	PK	194	1.7	H	39.37	73.64	77.7	4.06
5743.94	28.70	PK	356	1.8	H	39.49	68.19	77.7	9.51
11000.00	49.35	PK	44	2.3	H	17.66	67.01	83.5	16.49
11000.00	34.05	Ave.	44	2.3	H	17.66	51.71	63.5	11.79
16500.00	49.58	PK	199	1.0	H	19.82	69.40	77.7	8.30
5600MHz									
11200.00	49.83	PK	75	1.6	H	17.39	67.22	83.5	16.28
11200.00	34.46	Ave.	75	1.6	H	17.39	51.85	63.5	11.65
16800.00	47.17	PK	51	2.1	H	20.52	67.69	77.7	10.01
5700 MHz									
5394.97	29.05	PK	242	2.4	H	39.19	68.24	83.5	15.26
5394.97	14.57	Ave.	242	2.4	H	39.19	53.76	63.5	9.74
5725.15	36.06	PK	195	2.5	H	39.49	75.55	77.7	2.15
11400.00	47.96	PK	306	1.7	H	17.73	65.69	83.5	17.81
11400.00	33.93	Ave.	306	1.7	H	17.73	51.66	63.5	11.84
17100.00	43.32	PK	72	1.8	H	20.72	64.04	77.7	13.66
802.11N20 mode									
5500MHz									
5463.75	33.76	PK	141	1.5	H	39.37	73.13	77.7	4.57
5729.66	28.33	PK	292	1.6	H	39.49	67.82	77.7	9.88
11000.00	49.72	PK	131	2.0	H	17.66	67.38	83.5	16.12
11000.00	34.47	Ave.	131	2.0	H	17.66	52.13	63.5	11.37
16500.00	50.64	PK	80	1.4	H	19.82	70.46	77.7	7.24
5600MHz									
11200.00	50.87	PK	144	2.5	H	17.39	68.26	83.5	15.24
11200.00	34.96	Ave.	144	2.5	H	17.39	52.35	63.5	11.15
16800.00	47.34	PK	83	1.9	H	20.52	67.86	77.7	9.84
5700 MHz									
5375.13	28.49	PK	293	1.7	H	39.09	67.58	83.5	15.92
5375.13	14.50	Ave.	293	1.7	H	39.09	53.59	63.5	9.91
5725.00	34.88	PK	82	1.2	H	39.49	74.37	77.7	3.33
11400.00	48.64	PK	40	2.1	H	17.73	66.37	83.5	17.13
11400.00	33.50	Ave.	40	2.1	H	17.73	51.23	63.5	12.27
17100.00	43.71	PK	205	2.1	H	20.72	64.43	77.7	13.27

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m) @1m	FCC Part 15.407	
	Reading (dBμV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)			Limit (dBμV/m) @1m	Margin (dB)
802.11N40 mode									
5510MHz									
5470.00	36.78	PK	43	1.9	H	39.37	76.15	77.7	1.55
5754.16	28.57	PK	303	1.0	H	39.61	68.18	77.7	9.52
11020.00	42.89	PK	328	1.9	H	17.66	60.55	83.5	22.95
11020.00	27.63	Ave.	328	1.9	H	17.66	45.29	63.5	18.21
16530.00	43.77	PK	313	1.4	H	19.92	63.69	77.7	14.01
5590MHz									
11180.00	48.67	PK	50	1.4	H	17.39	66.06	83.5	17.44
11180.00	33.72	AV	50	1.4	H	17.39	51.11	63.5	12.39
16770.00	44.39	PK	334	2.1	H	20.32	64.71	77.7	12.99
5670MHz									
5467.60	28.31	PK	169	2.0	H	39.37	67.68	77.7	10.02
5725.15	37.07	PK	276	1.3	H	39.49	76.56	77.7	1.14
11340.00	43.31	PK	193	2.2	H	17.43	60.74	83.5	22.76
11340.00	29.70	Ave.	193	2.2	H	17.43	47.13	63.5	16.37

**5725-5850 MHz:**

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m) @1m	FCC Part 15.407	
	Reading (dBµV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)			Limit (dBµV/m) @1m	Margin (dB)
802.11a mode									
5745MHz									
5698.92	30.75	PK	279	1.1	H	39.49	70.24	113.9	43.66
5720.00	38.24	PK	279	1.1	H	39.49	77.73	120.3	42.57
5724.12	43.04	PK	157	2.1	H	39.49	82.53	129.69	47.16
4509.02	52.39	PK	31	2.0	H	6.47	58.86	83.5	24.64
4509.02	50.21	Ave.	31	2.0	H	6.47	56.68	63.5	6.82
11490.00	45.28	PK	255	1.6	H	17.47	62.75	83.5	20.75
11490.00	30.96	Ave.	255	1.6	H	17.47	48.43	63.5	15.07
17235.00	44.45	PK	35	1.1	H	22.14	66.59	77.7	11.11
5785MHz									
4509.02	50.65	PK	180	2.0	H	6.47	57.12	83.5	26.38
4509.02	47.36	Ave.	180	2.0	H	6.47	53.83	63.5	9.67
11570.00	42.25	PK	9	1.2	H	17.51	59.76	83.5	23.74
11570.00	27.19	Ave.	9	1.2	H	17.51	44.70	63.5	18.80
17355.00	43.02	PK	258	1.2	H	21.92	64.94	77.7	12.76
5825 MHz									
5850.88	35.82	PK	328	2.1	H	39.87	75.69	129.69	54.00
5856.96	32.93	PK	328	2.1	H	39.87	72.80	119.75	46.95
5892.33	29.79	PK	303	1.5	H	39.87	69.66	101.88	32.22
4509.02	51.12	PK	137	1.3	H	6.47	57.59	83.5	25.91
4509.02	48.26	Ave.	137	1.3	H	6.47	54.73	63.5	8.77
11650.00	43.05	PK	211	2.4	H	16.18	59.23	83.5	24.27
11650.00	27.11	Ave.	211	2.4	H	16.18	43.29	63.5	20.21
17475.00	47.95	PK	161	2.3	H	20.11	68.06	77.7	9.64
802.11N20 mode									
5745MHz									
5698.90	31.11	PK	257	1.1	H	39.49	70.60	113.89	43.29
5719.96	38.11	PK	257	1.1	H	39.49	77.60	120.29	42.69
5724.01	45.87	PK	101	2.3	H	39.49	85.36	129.44	44.08
4509.02	51.26	PK	243	1.5	H	6.47	57.73	83.5	25.77
4509.02	48.23	Ave.	243	1.5	H	6.47	54.70	63.5	8.80
11490.00	43.59	PK	31	2.0	H	17.47	61.06	83.5	22.44
11490.00	29.23	Ave.	31	2.0	H	17.47	46.70	63.5	16.80
17235.00	45.32	PK	54	1.1	H	22.14	67.46	77.7	10.24
5785MHz									
4509.02	50.69	PK	90	2.5	H	6.47	57.16	83.5	26.34
4509.02	48.14	Ave.	90	2.5	H	6.47	54.61	63.5	8.89
11570.00	42.13	PK	33	2.1	H	17.51	59.64	83.5	23.86
11570.00	27.08	Ave.	33	2.1	H	17.51	44.59	63.5	18.91
17355.00	47.30	PK	142	1.6	H	21.92	69.22	77.7	8.48



Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m) @1m	FCC Part 15.407	
	Reading (dBµV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)			Limit (dBµV/m) @1m	Margin (dB)
5825 MHz									
5850.04	31.11	PK	232	2.5	H	39.87	70.98	131.61	60.63
5856.20	33.29	PK	232	2.5	H	39.87	73.16	119.96	46.80
5880.41	29.54	PK	309	2.2	H	39.87	69.41	110.7	41.29
4509.02	51.55	PK	58	1.2	H	6.47	58.02	83.5	25.48
4509.02	48.34	Ave.	58	1.2	H	6.47	54.81	63.5	8.69
11650.00	42.49	PK	196	2.2	H	16.18	58.67	83.5	24.83
11650.00	28.11	Ave.	196	2.2	H	16.18	44.29	63.5	19.21
17475.00	49.92	PK	221	1.1	H	20.11	70.03	77.7	7.67
802.11N40 mode									
5755MHz									
5699.50	37.86	PK	323	1.2	H	39.49	77.35	114.33	36.98
5719.16	44.45	PK	323	1.2	H	39.49	83.94	120.06	36.12
5724.92	47.53	PK	75	1.3	H	39.49	87.02	131.52	44.50
4509.02	51.09	PK	225	1.4	H	6.47	57.56	83.5	25.94
4509.02	48.23	Ave.	225	1.4	H	6.47	54.70	63.5	8.80
11510.00	42.22	PK	44	1.3	H	17.47	59.69	83.5	23.81
11510.00	27.59	Ave.	44	1.3	H	17.47	45.06	63.5	18.44
17265.00	42.44	PK	317	1.9	H	18.97	61.41	77.7	16.29
5795MHz									
5850.49	36.16	PK	222	1.2	H	39.87	76.03	130.58	54.55
5858.85	34.31	PK	222	1.2	H	39.87	74.18	119.22	45.04
5889.63	30.22	PK	100	1.6	H	39.87	70.09	103.87	33.78
4509.02	51.28	PK	26	1.3	H	6.47	57.75	83.5	25.75
4509.02	48.35	Ave.	26	1.3	H	6.47	54.82	63.5	8.68
11590.00	41.90	PK	111	2.5	H	17.51	59.41	83.5	24.09
11590.00	27.86	Ave.	111	2.5	H	17.51	45.37	63.5	18.13
17385.00	42.90	PK	96	1.7	H	21.92	64.82	77.7	12.88

**Note:**

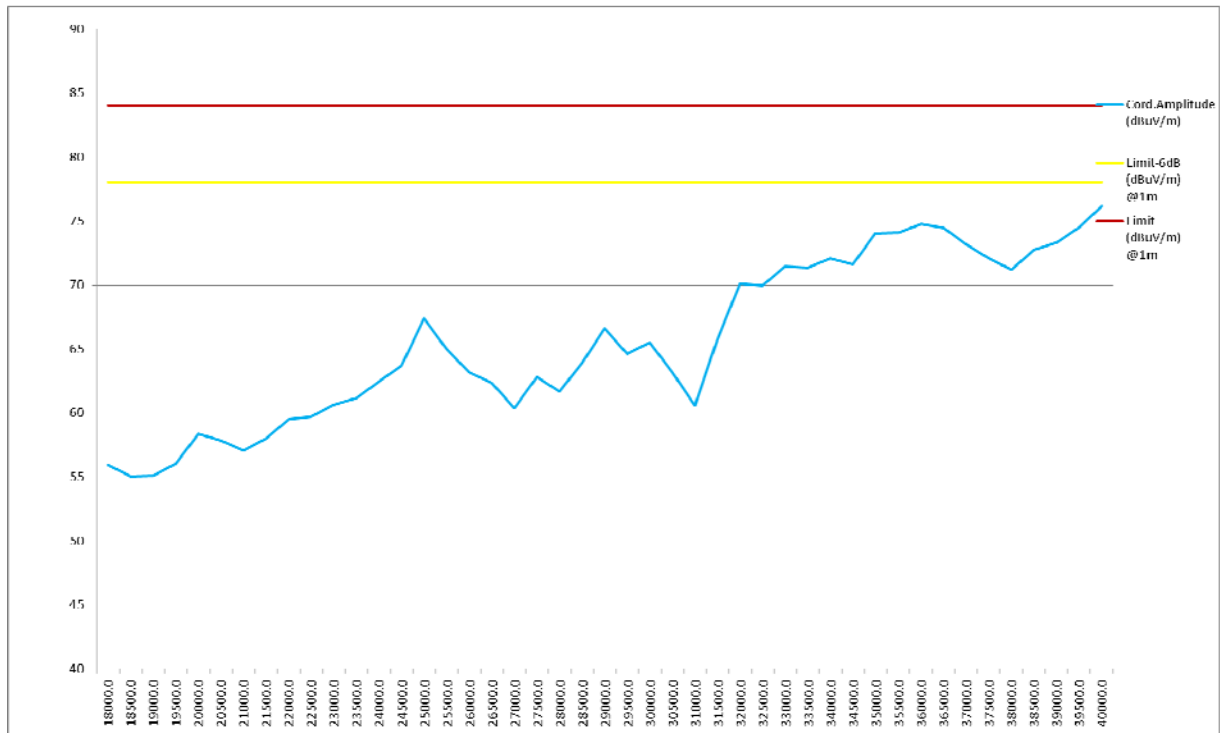
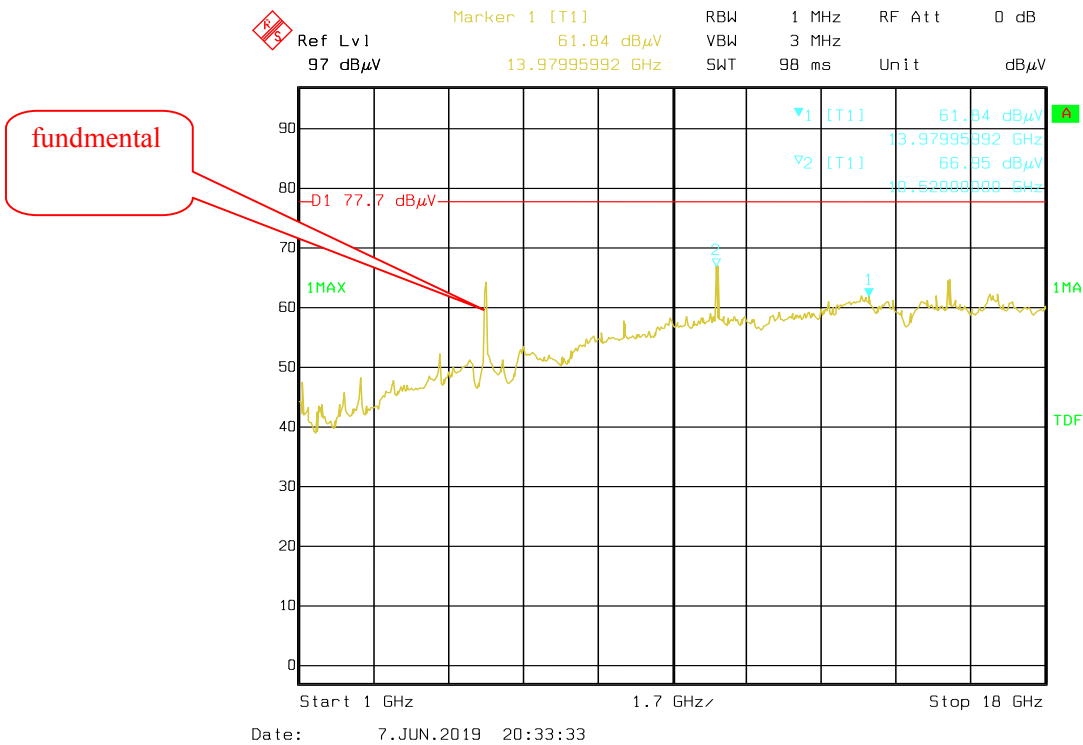
Corrected Amplitude = Corrected Factor + Reading

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.

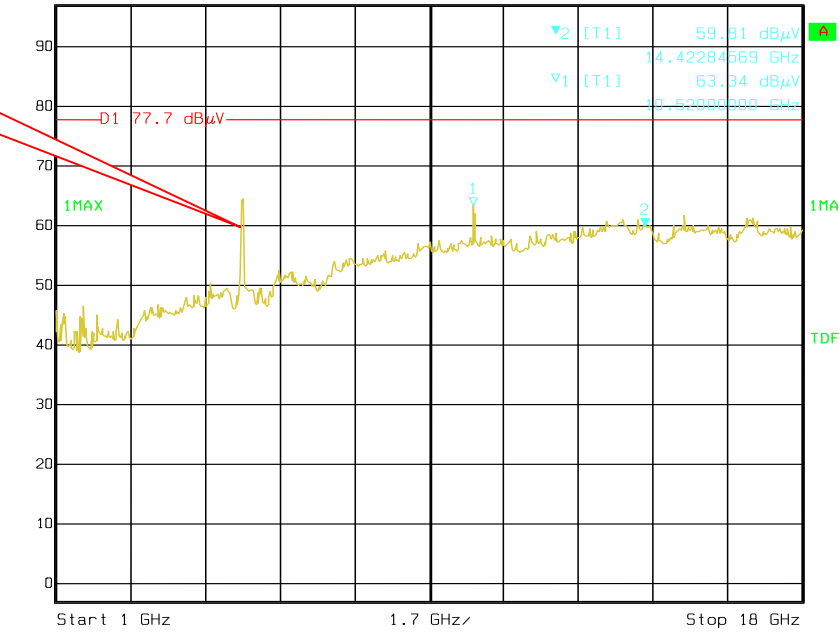
Pre-scan with 802.11n20 5260MHz, for Peak  
Horizontal



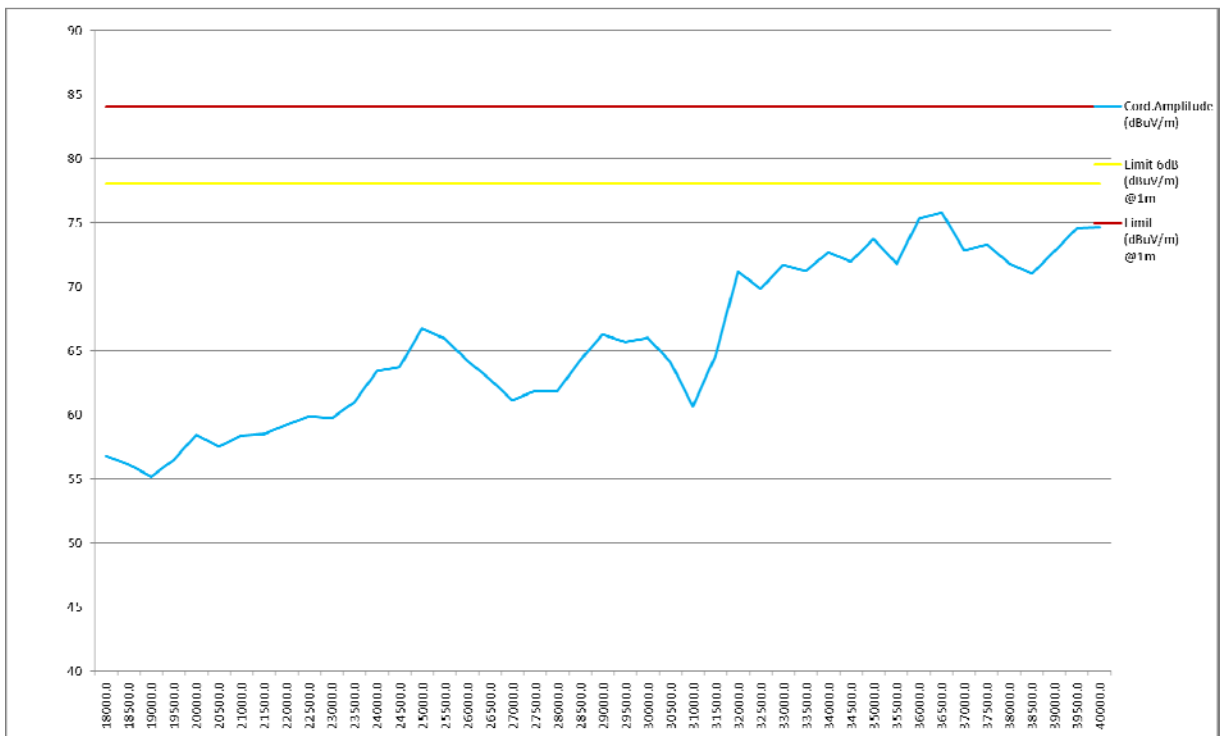
# Vertical


 Ref Lvl 97 dBμV  
 Marker 2 [T1] 59.81 dBμV  
 14.42284569 GHz  
 RBW 1 MHz RF Att 0 dB  
 VBW 3 MHz  
 SWT 98 ms Unit dBμV

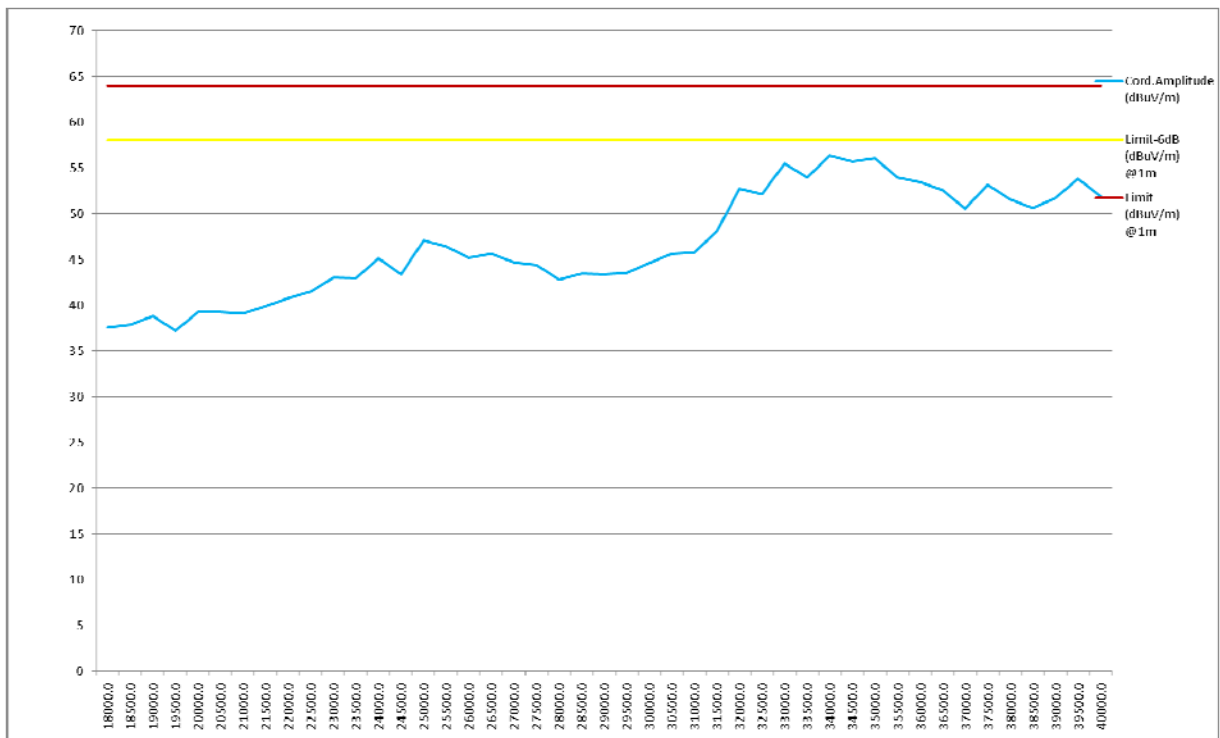
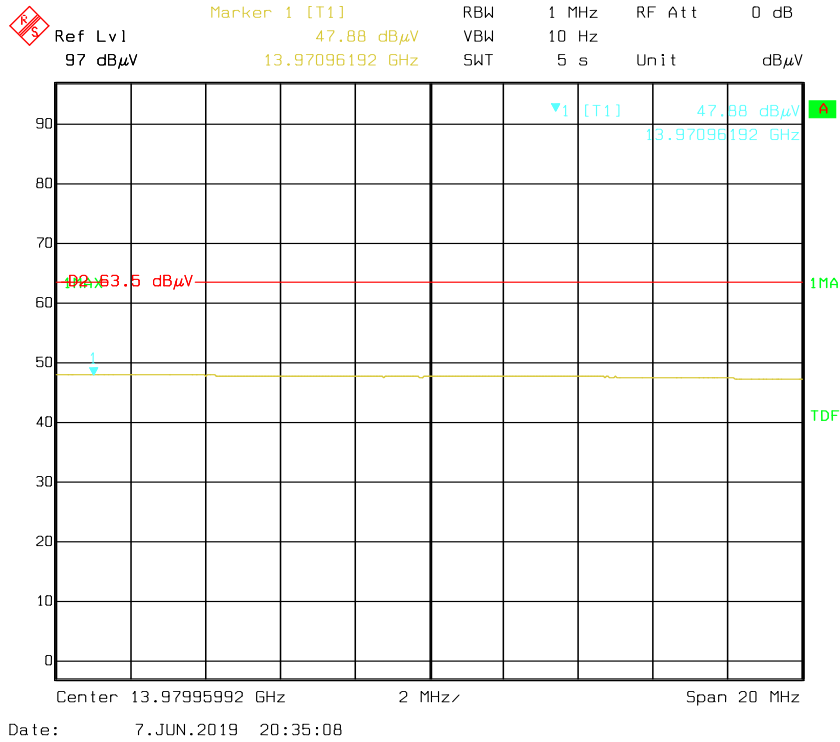
fundamental



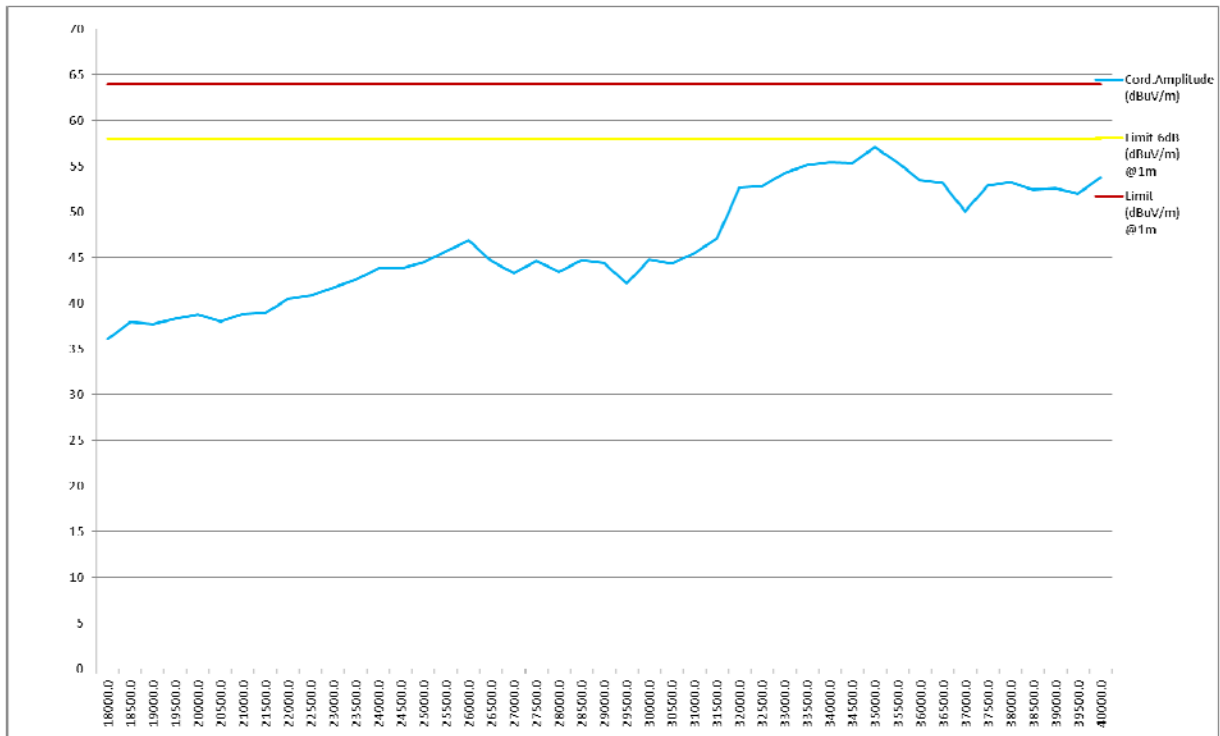
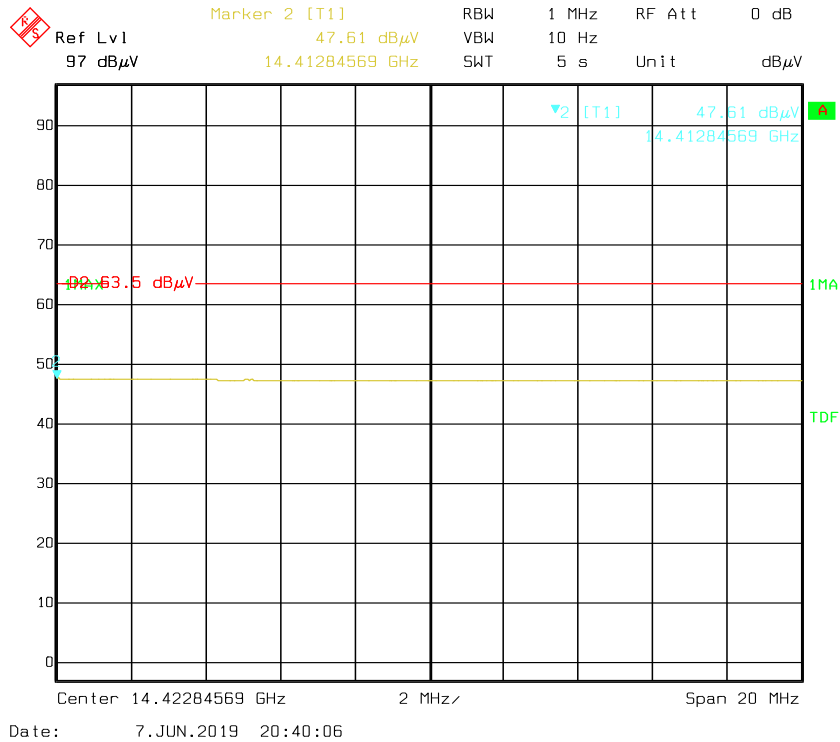
Date: 7.JUN.2019 20:37:26



Pre-scan with 802.11a 5590MHz, for **Average**  
Horizontal



# Vertical



**FCC §15.407(a) (1) – 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.

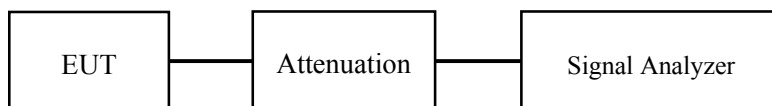
**Test Procedure****1. Emission Bandwidth (EBW)**

- 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 5.715-5.85 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:	52 %
ATM Pressure:	101.0 kPa

*The testing was performed by Kieron Luo on 2019-06-18.*

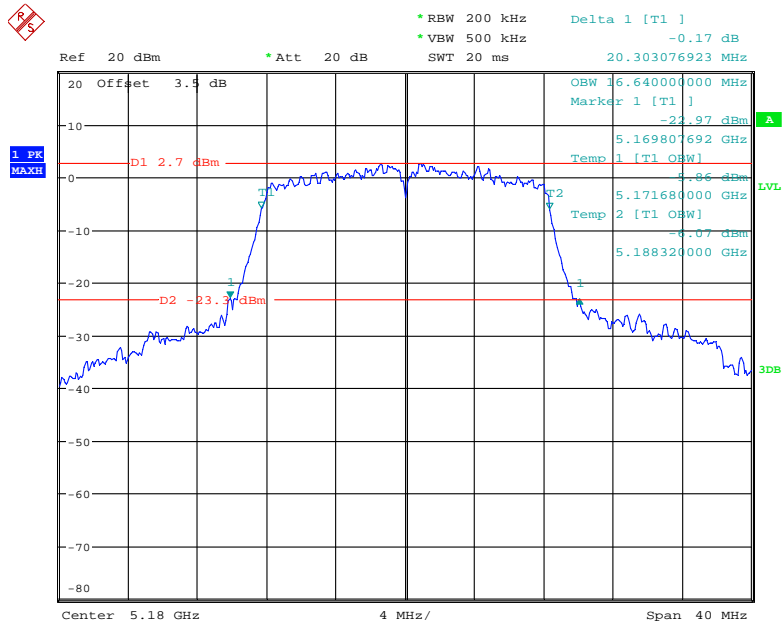
*EUT operation mode: Transmitting*

**Test Result:** Pass; please refer to the following tables and plots.

**5120 MHz - 5250 MHz:**

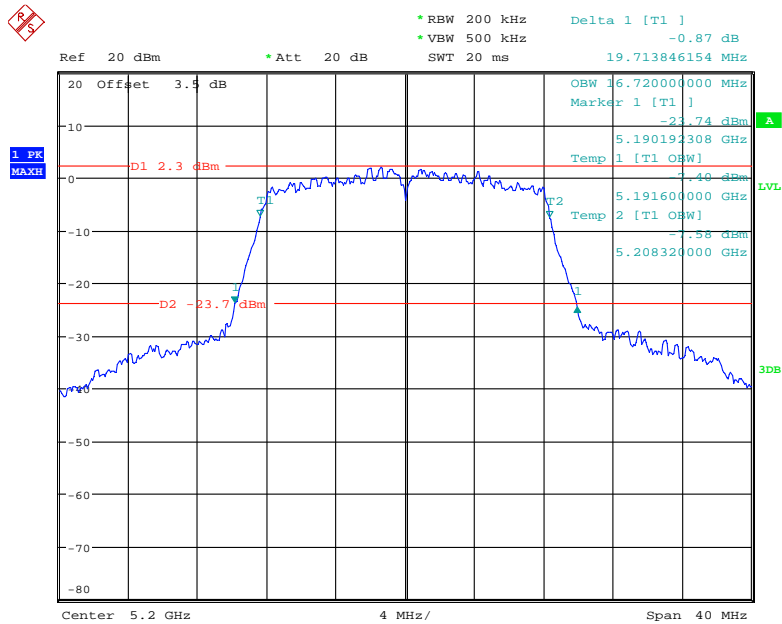
Frequency (MHz)	26dB bandwidth (MHz)	99% Bandwidth (MHz)	Remark
802.11a			No transmitted signal in the 99% bandwidth extends into the U-NII-2A band
5180	20.30	16.64	
5200	19.71	16.72	
5240	19.78	16.72	
802.11n20			
5180	20.03	17.68	
5200	19.95	17.68	
5240	20.01	17.68	
802.11n40			
5190	40.21	36.16	
5230	40.26	36.16	

### 802.11a mode, 26 dB Emissions & 99% Occupied Bandwidth, 5180 MHz



Date: 18.JUN.2019 11:42:17

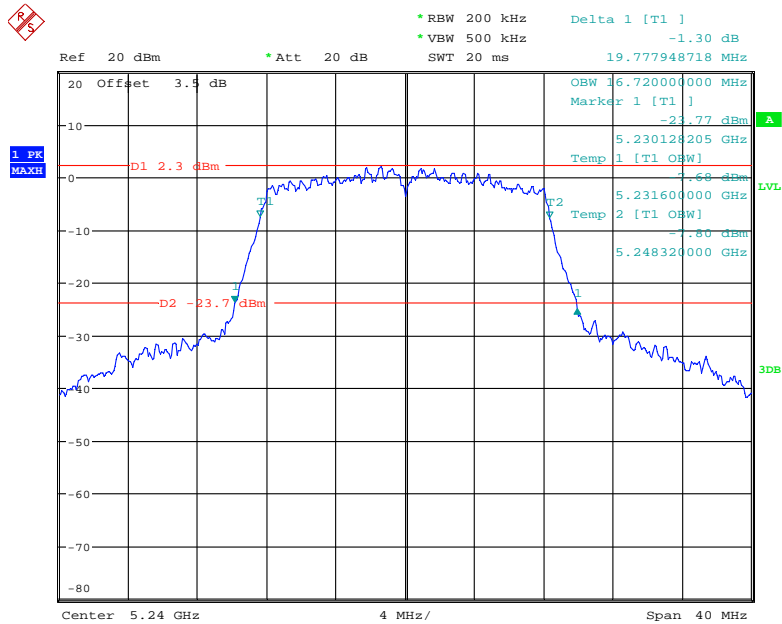
### 802.11a mode, 26 dB Emissions & 99% Occupied Bandwidth, 5200 MHz



Date: 18.JUN.2019 11:43:32

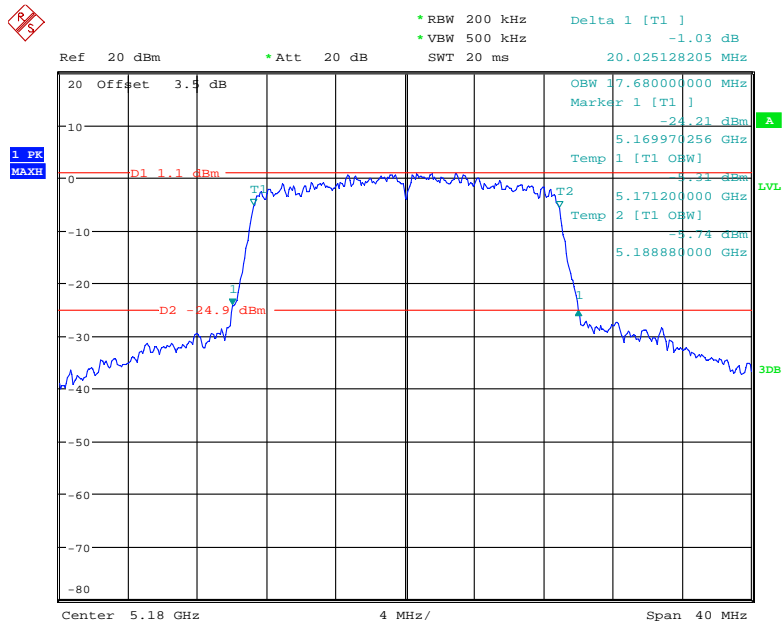


### 802.11a mode, 26 dB Emissions & 99% Occupied Bandwidth, 5240 MHz



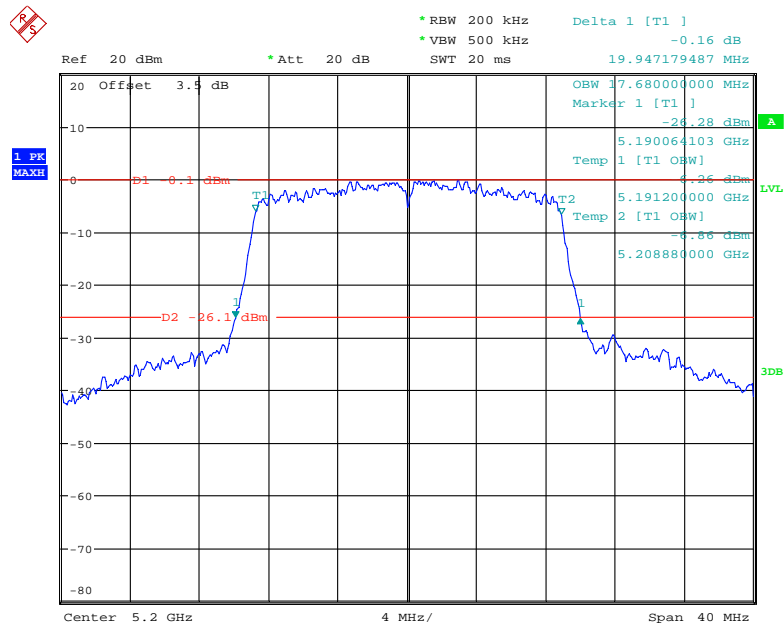
Date: 18.JUN.2019 11:46:17

### 802.11n20 mode, 26 dB Emissions & 99% Occupied Bandwidth, 5180 MHz



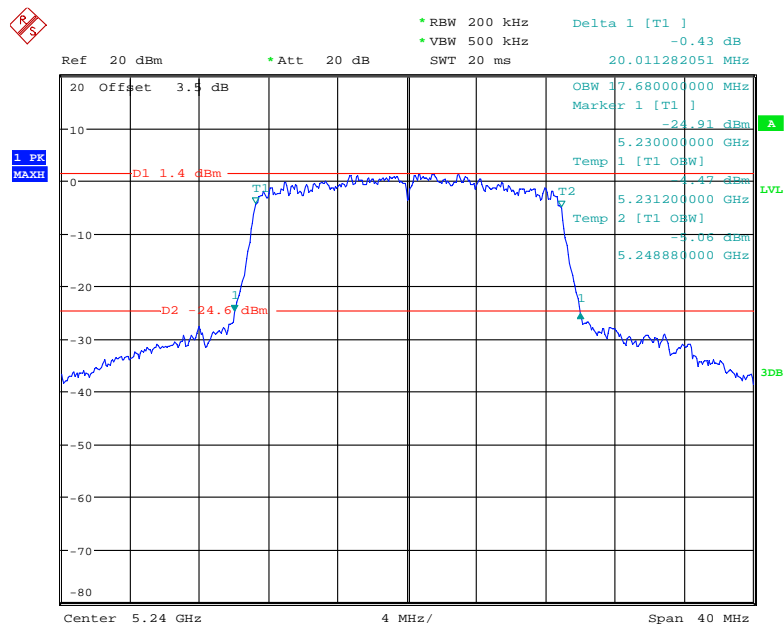
Date: 18.JUN.2019 11:15:22

### 802.11n20 mode, 26 dB Emissions & 99% Occupied Bandwidth, 5200 MHz



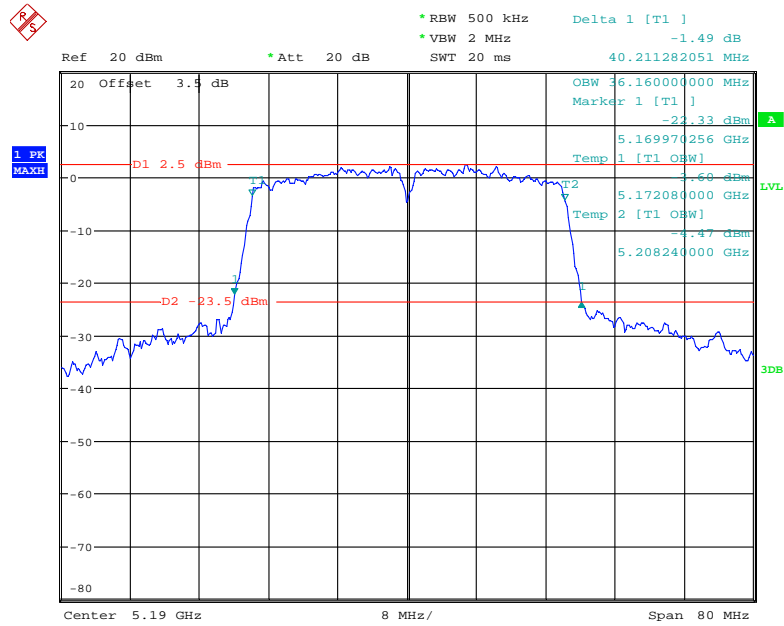
Date: 18.JUN.2019 11:16:59

### 802.11n20 mode, 26 dB Emissions & 99% Occupied Bandwidth, 5240 MHz



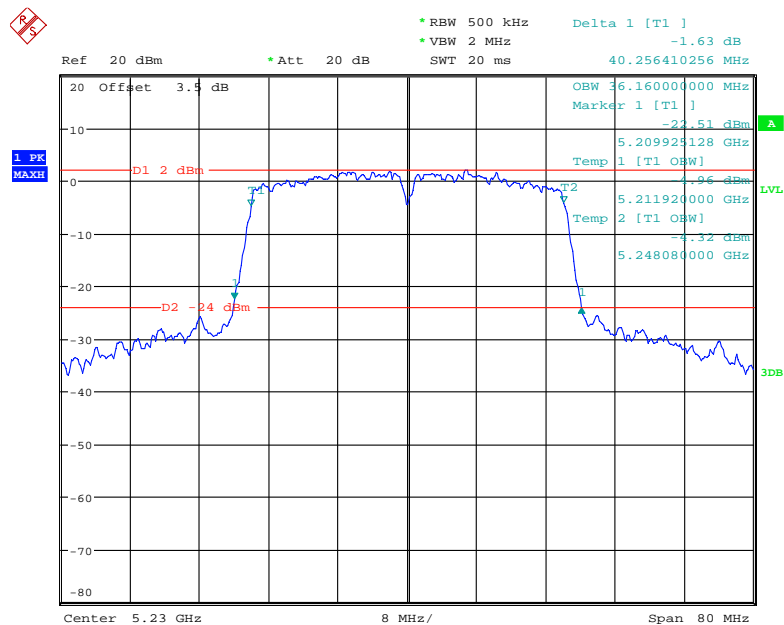
Date: 18.JUN.2019 11:40:59

### 802.11n40 mode, 26 dB Emissions & 99% Occupied Bandwidth, 5190 MHz



Date: 18.JUN.2019 11:13:37

### 802.11n40 mode, 26 dB Emissions & 99% Occupied Bandwidth, 5230 MHz

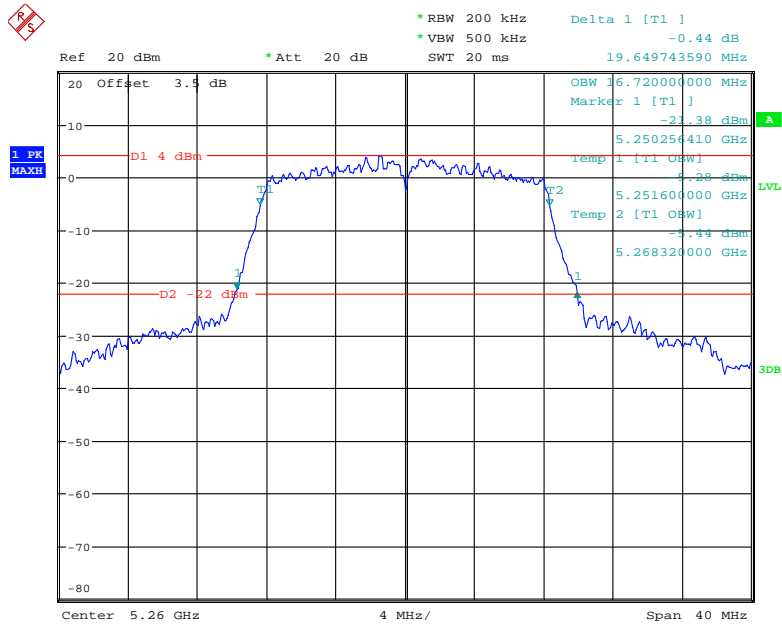


Date: 18.JUN.2019 11:02:24

**5250 MHz - 5350 MHz:**

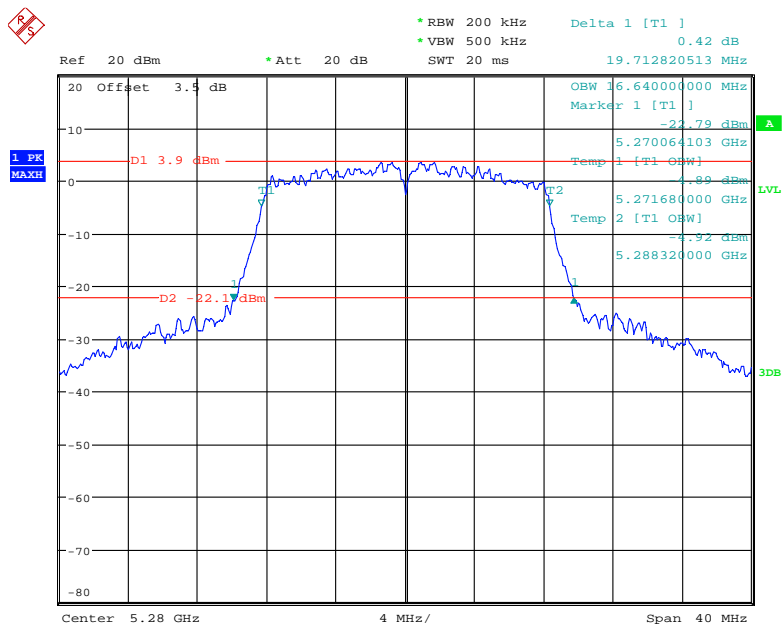
Frequency (MHz)	26dB bandwidth (MHz)	99% Bandwidth (MHz)
<b>802.11a</b>		
5260	19.65	16.72
5280	19.71	16.64
5320	19.85	16.72
<b>802.11n20</b>		
5260	20.01	17.68
5280	20.06	17.68
5320	20.00	17.68
<b>802.11n40</b>		
5270	40.67	36.32
5310	40.38	36.00

### 802.11a mode, 26 dB Emissions & 99% Occupied Bandwidth, 5260 MHz



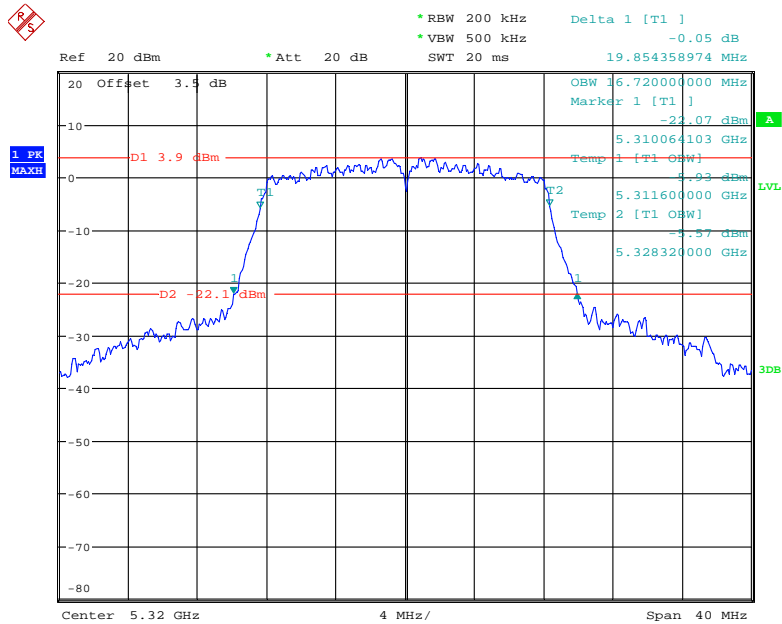
Date: 18.JUN.2019 12:08:49

### 802.11a mode, 26 dB Emissions & 99% Occupied Bandwidth, 5280 MHz



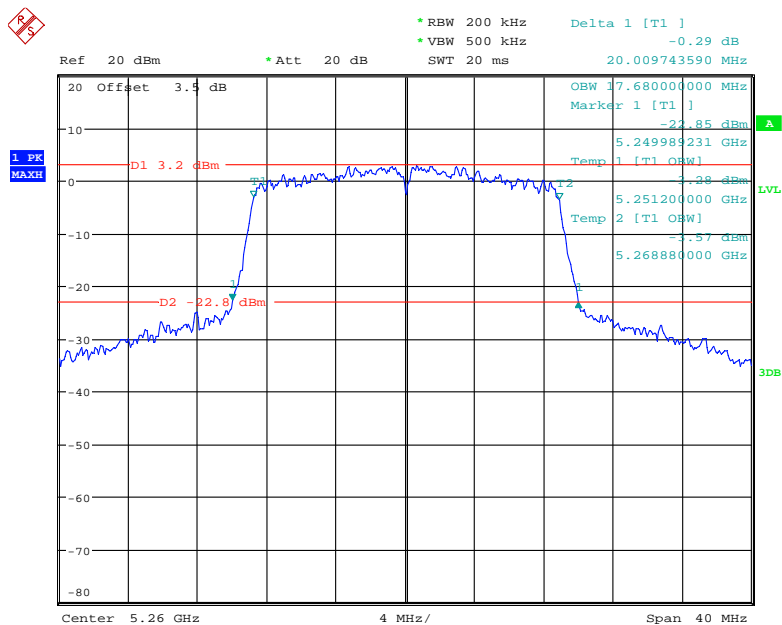
Date: 18.JUN.2019 12:09:25

### 802.11a mode, 26 dB Emissions & 99% Occupied Bandwidth, 5320 MHz



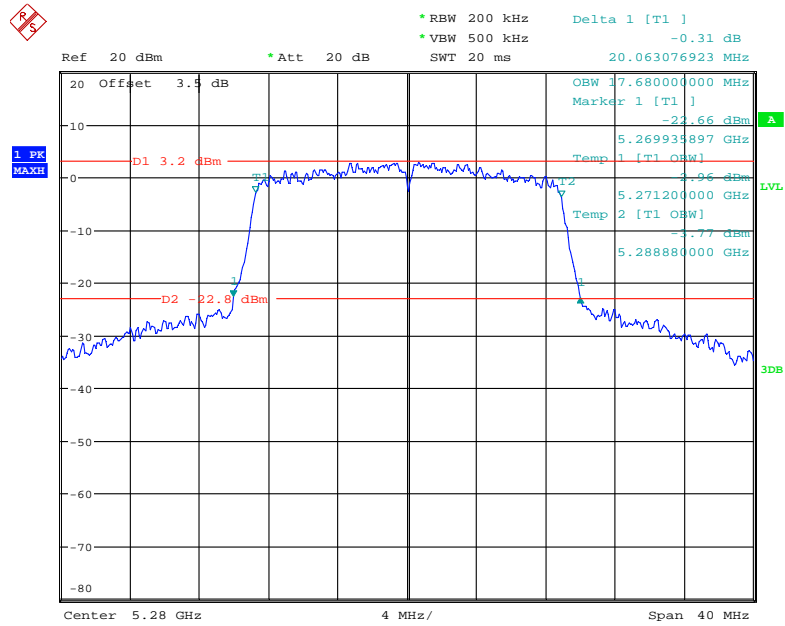
Date: 18.JUN.2019 12:09:57

### 802.11n20 mode, 26 dB Emissions & 99% Occupied Bandwidth, 5260 MHz



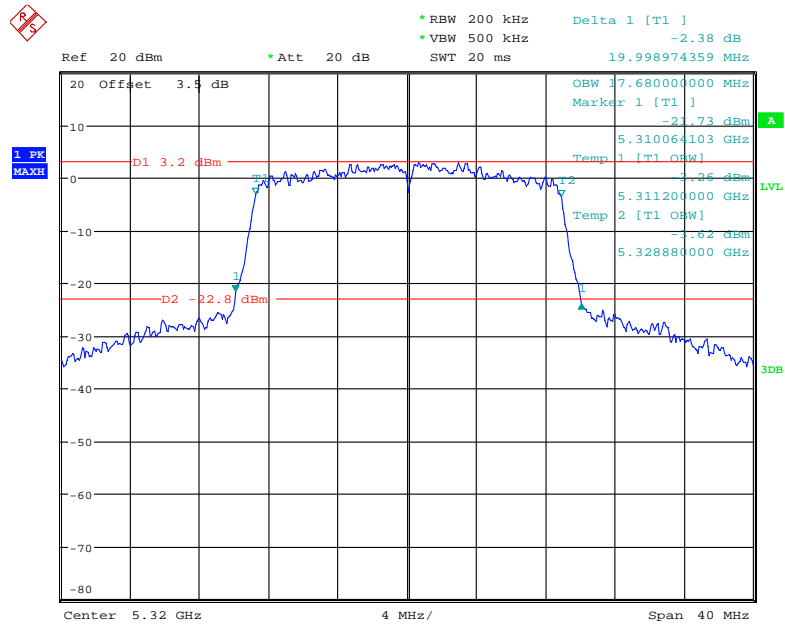
Date: 18.JUN.2019 12:04:04

### 802.11n20 mode, 26 dB Emissions & 99% Occupied Bandwidth, 5280 MHz



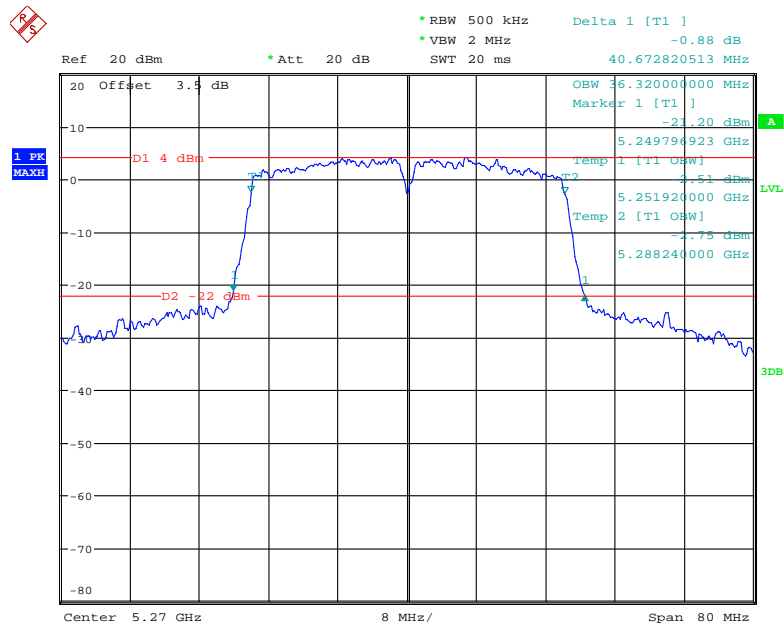
Date: 18.JUN.2019 12:04:42

### 802.11n20 mode, 26 dB Emissions & 99% Occupied Bandwidth, 5320 MHz



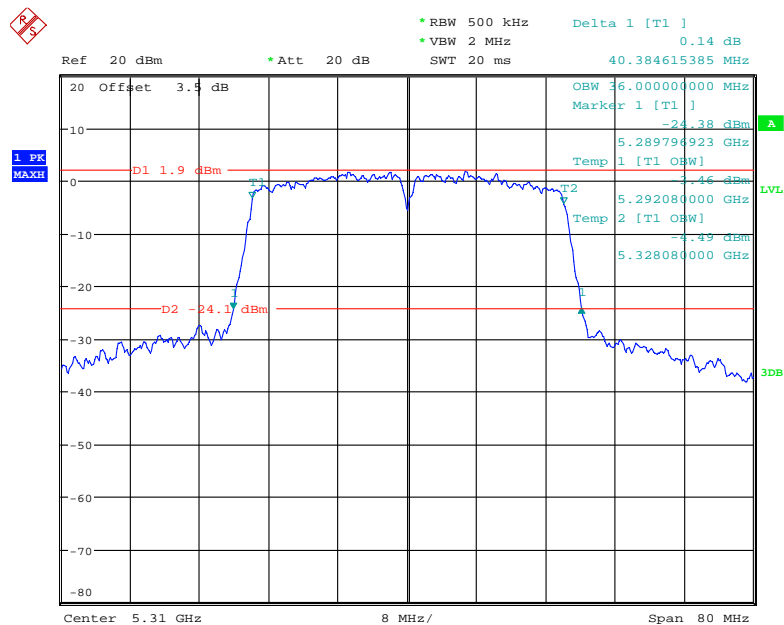
Date: 18.JUN.2019 12:05:58

### 802.11n40 mode, 26 dB Emissions & 99% Occupied Bandwidth, 5270 MHz



Date: 18.JUN.2019 12:02:16

### 802.11n40 mode, 26 dB Emissions & 99% Occupied Bandwidth, 5310 MHz



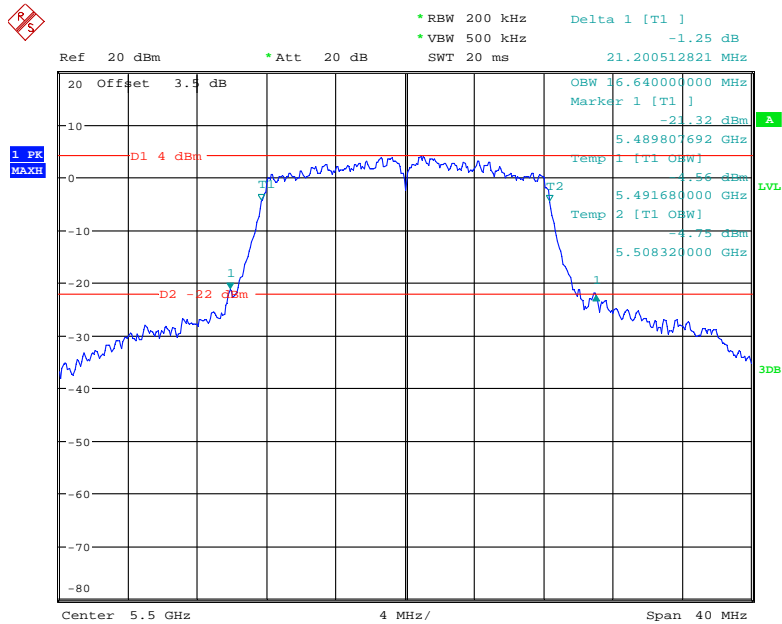
Date: 18.JUN.2019 12:00:58



**5470 MHz – 5725 MHz:**

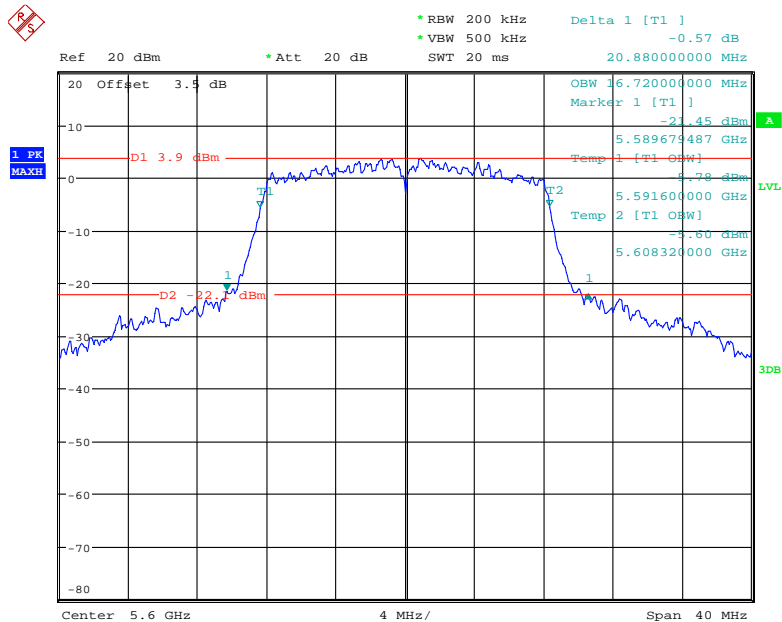
Frequency (MHz)	26dB bandwidth (MHz)	99% Bandwidth (MHz)
<b>802.11a</b>		
5500	21.20	16.64
5600	20.88	16.72
5700	20.03	16.56
<b>802.11n20</b>		
5500	21.41	17.68
5600	26.10	17.76
5700	20.06	17.68
<b>802.11n40</b>		
5510	40.44	36.16
5590	41.08	36.32
5670	40.64	36.32

### 802.11a mode, 26 dB Emissions & 99% Occupied Bandwidth, 5500 MHz



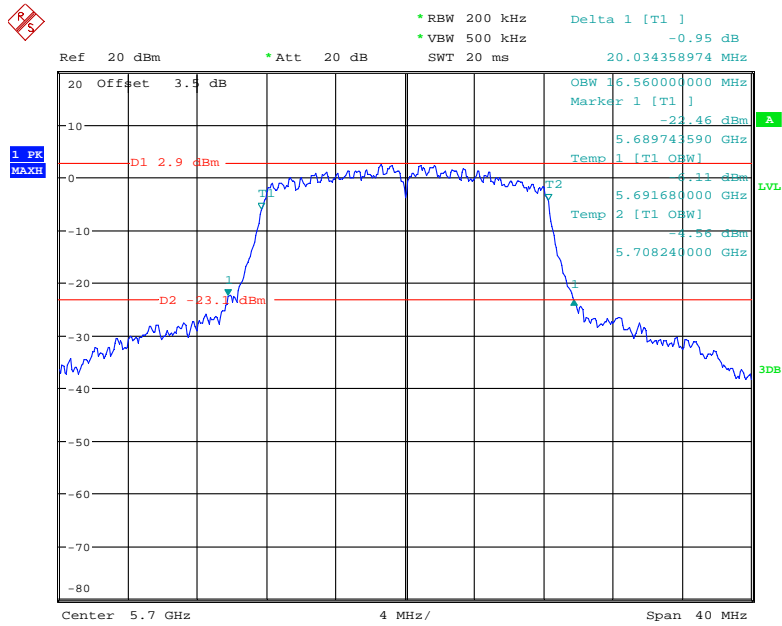
Date: 18.JUN.2019 14:05:14

### 802.11a mode, 26 dB Emissions & 99% Occupied Bandwidth, 5600 MHz



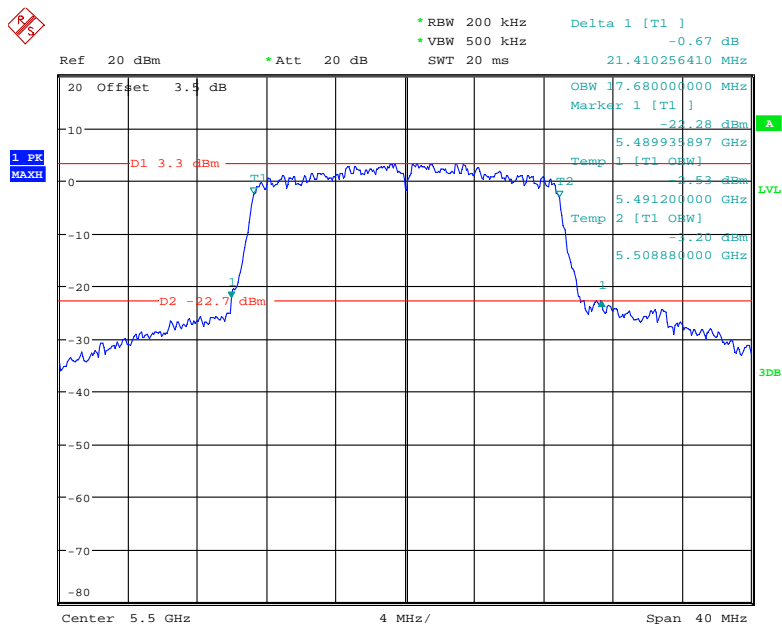
Date: 18.JUN.2019 14:05:56

### 802.11a mode, 26 dB Emissions & 99% Occupied Bandwidth, 5700 MHz



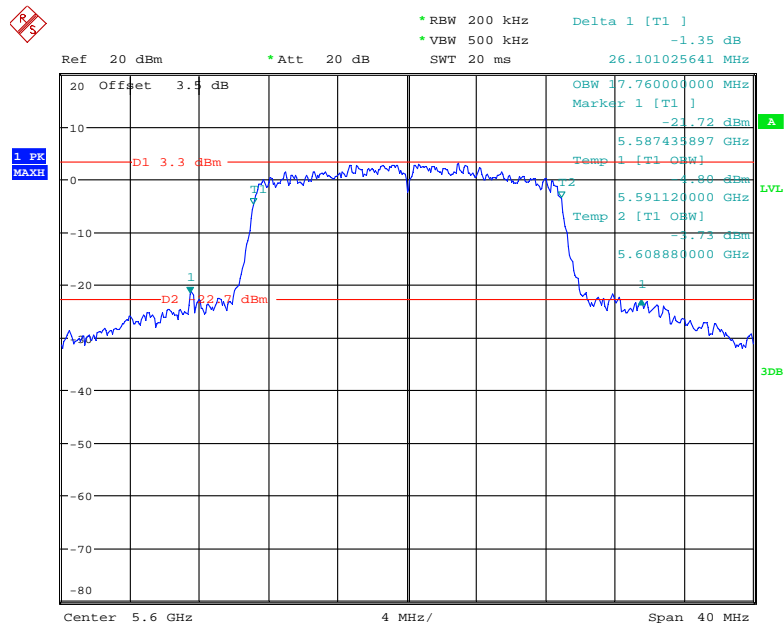
Date: 18.JUN.2019 14:06:54

### 802.11n20 mode, 26 dB Emissions & 99% Occupied Bandwidth, 5500 MHz



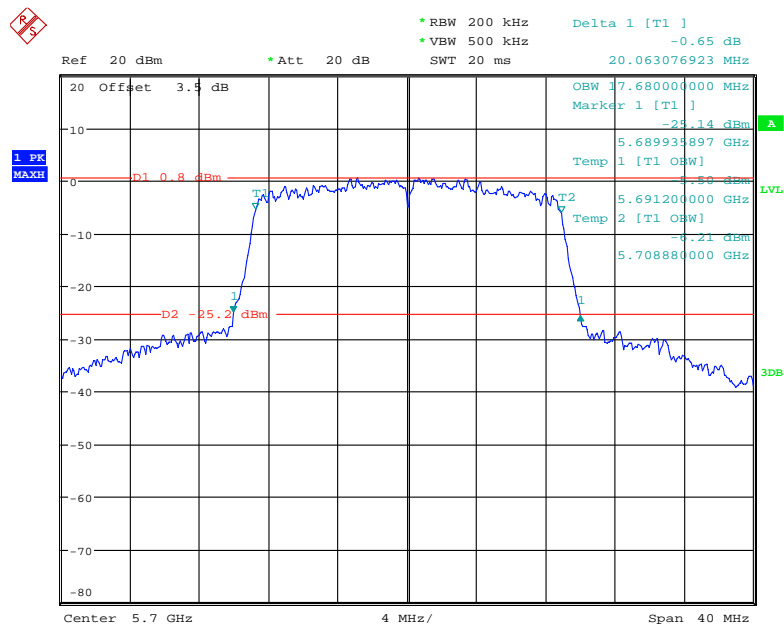
Date: 18.JUN.2019 14:01:53

### 802.11n20 mode, 26 dB Emissions & 99% Occupied Bandwidth, 5600 MHz



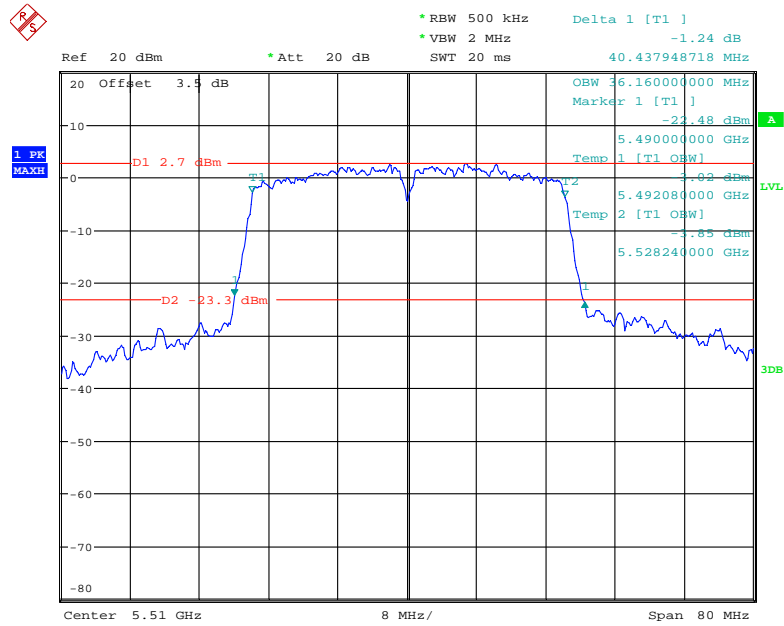
Date: 18.JUN.2019 14:03:00

### 802.11n20 mode, 26 dB Emissions & 99% Occupied Bandwidth, 5700 MHz



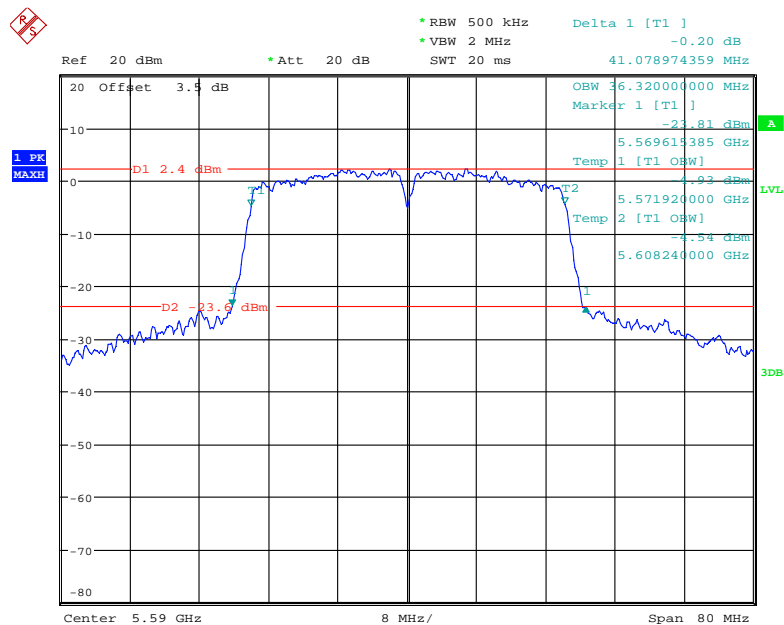
Date: 18.JUN.2019 14:04:20

### 802.11n40 mode, 26 dB Emissions & 99% Occupied Bandwidth, 5510 MHz



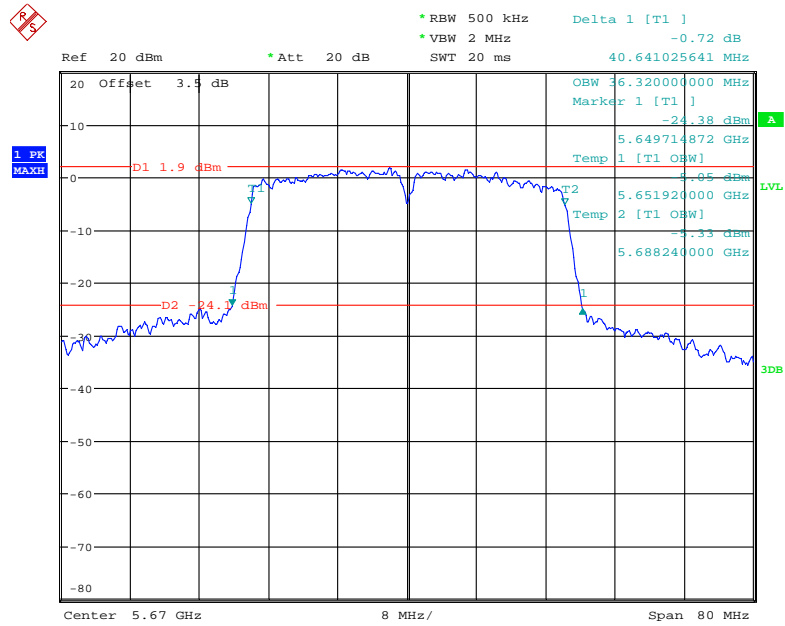
Date: 18.JUN.2019 14:00:19

### 802.11n40 mode, 26 dB Emissions & 99% Occupied Bandwidth, 5590 MHz



Date: 18.JUN.2019 13:59:11

# 802.11 n40 mode, 26 dB Emissions & 99% Occupied Bandwidth, 5670 MHz

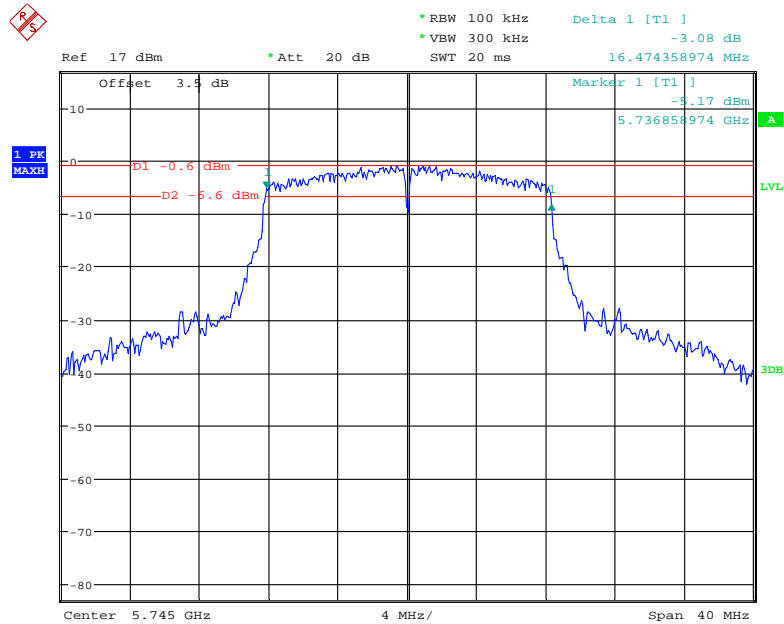


Date: 18.JUN.2019 13:57:35

**5725 MHz – 5850 MHz:**

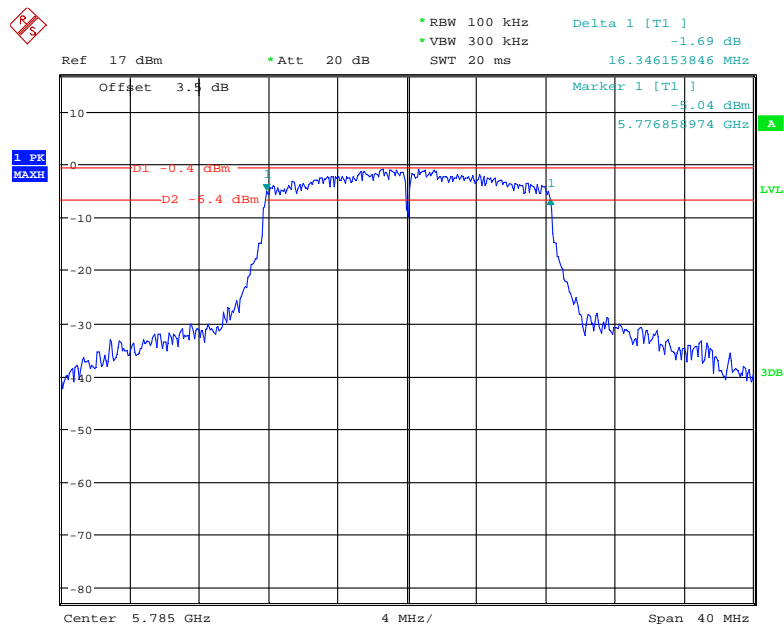
Frequency (MHz)	6dB bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)	Remark
802.11a				No transmitted signal in the 99% bandwidth extends into the U-NII-2C band
5745	16.47	16.72	0.5	
5785	16.35	16.72	0.5	
5825	16.35	16.64	0.5	
802.11n20				
5745	17.63	17.68	0.5	
5785	17.63	17.68	0.5	
5825	17.62	17.68	0.5	
802.11n40				
5755	36.70	36.32	0.5	
5795	36.60	36.32	0.5	

### 802.11a mode, 6dB Emission Bandwidth, 5745 MHz



Date: 18.JUN.2019 14:52:27

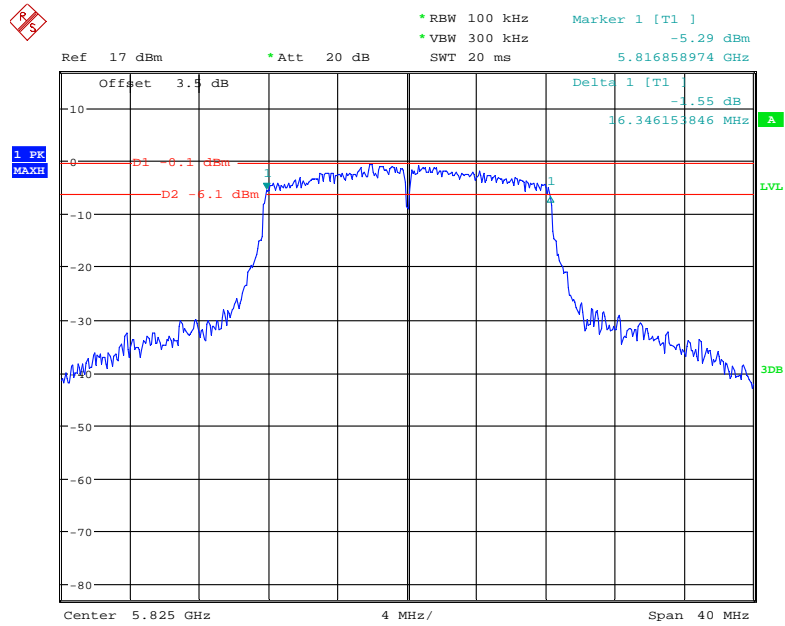
### 802.11a mode, 6dB Emission Bandwidth, 5785 MHz



Date: 18.JUN.2019 14:51:23

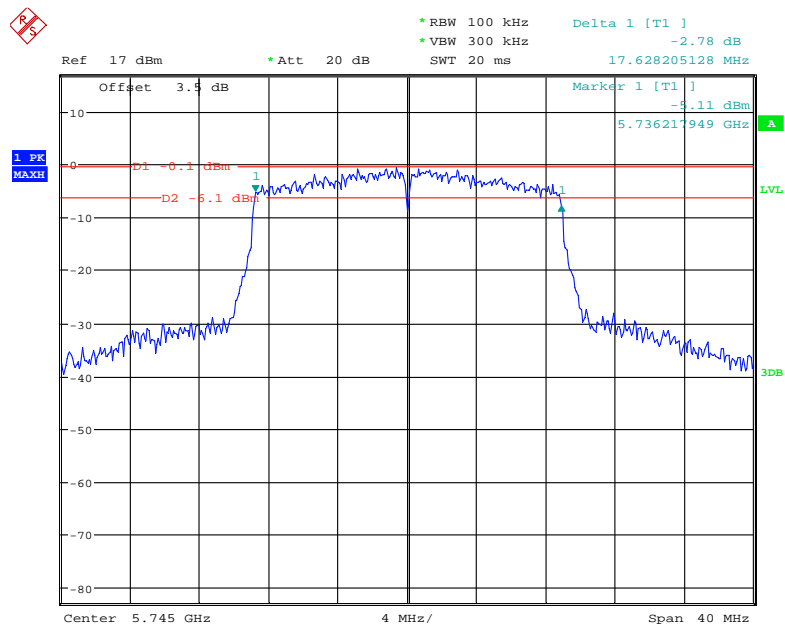


### 802.11a mode, 6dB Emission Bandwidth, 5825 MHz



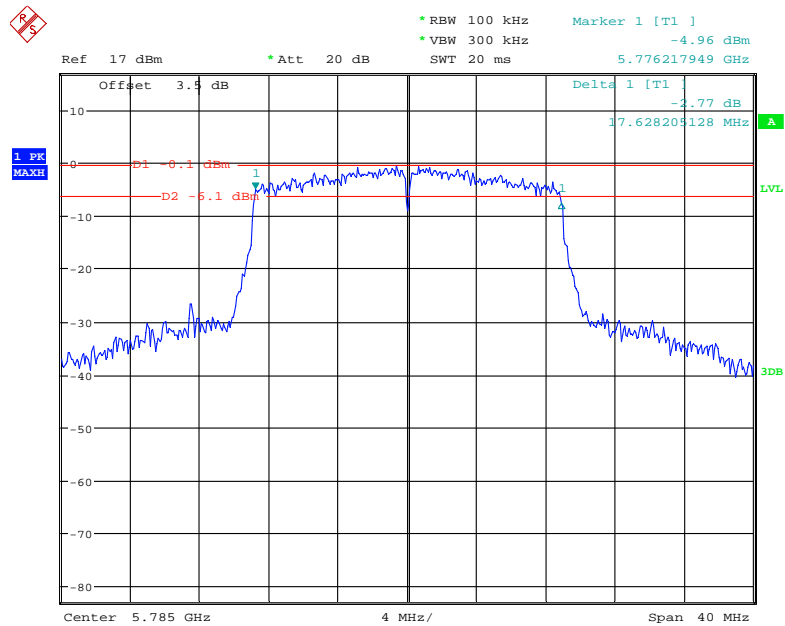
Date: 18.JUN.2019 14:50:30

### 802.11n20 mode, 6dB Emission Bandwidth, 5745 MHz



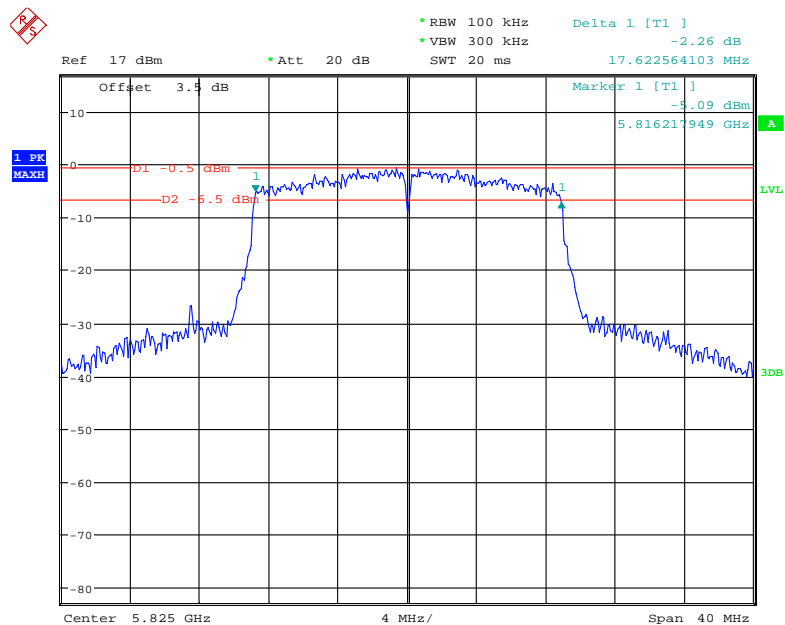
Date: 18.JUN.2019 14:46:06

### 802.11n20 mode, 6dB Emission Bandwidth, 5785 MHz



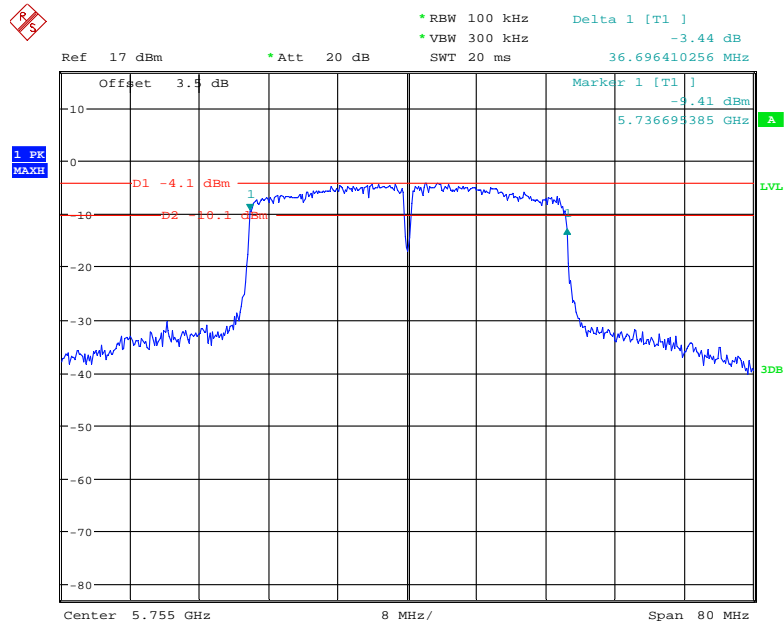
Date: 18.JUN.2019 14:45:06

### 802.11n20 mode, 6dB Emission Bandwidth, 5825 MHz



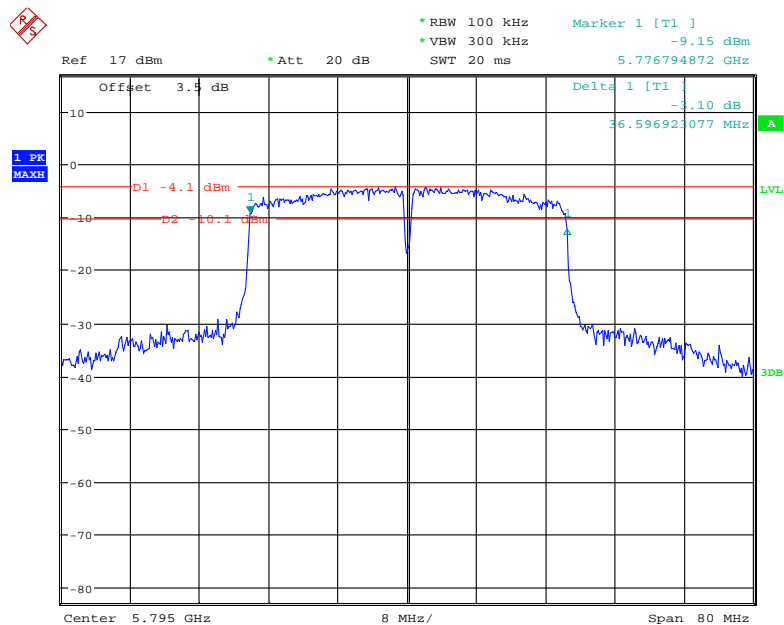
Date: 18.JUN.2019 14:44:03

### 802.11n40 mode, 6dB Emission Bandwidth, 5755 MHz



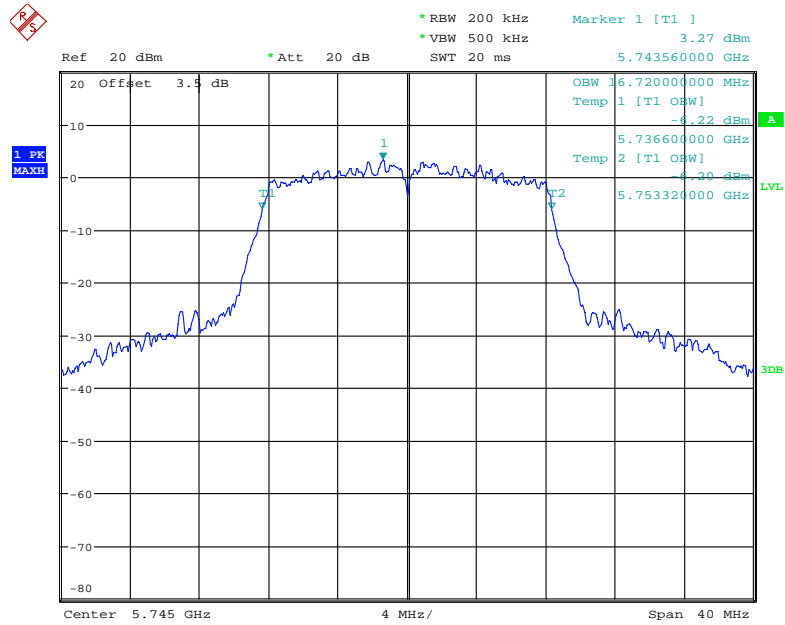
Date: 18.JUN.2019 14:41:59

### 802.11n40 mode, 6dB Emission Bandwidth, 5795 MHz



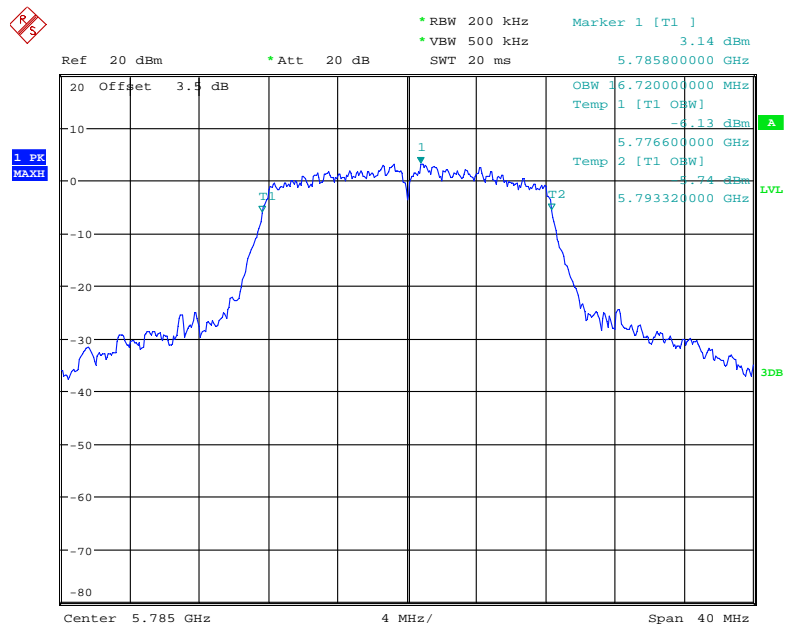
Date: 18.JUN.2019 14:42:44

### 802.11a mode, 99% Occupied Bandwidth, 5745 MHz



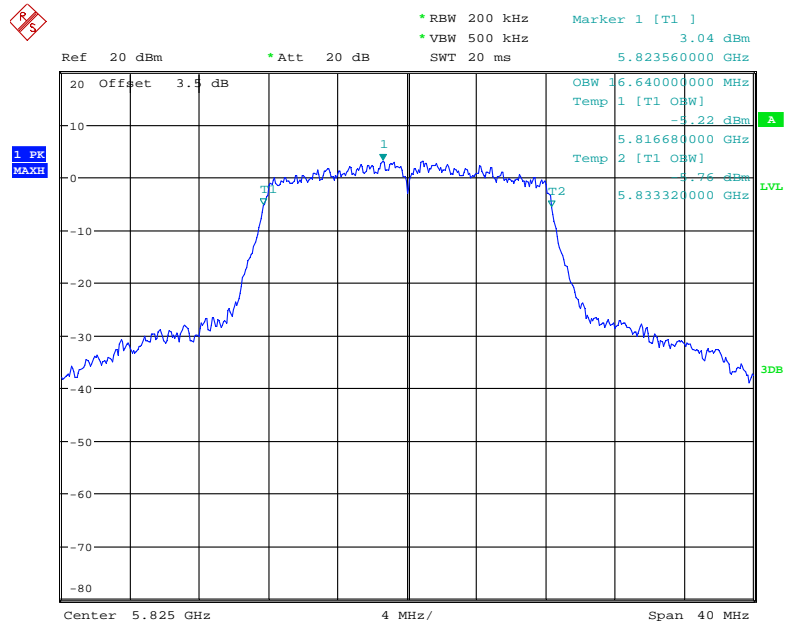
Date: 18.JUN.2019 14:36:48

### 802.11a mode, 99% Occupied Bandwidth, 5785 MHz



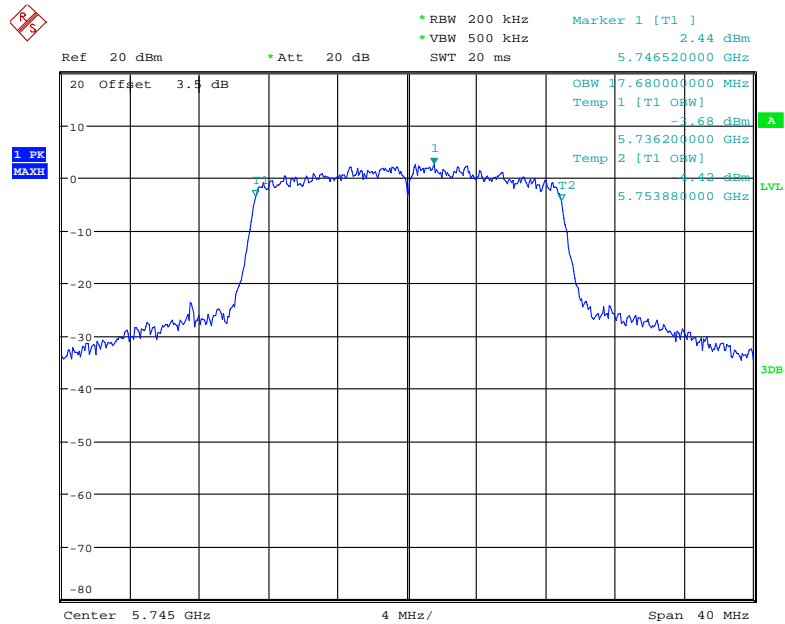
Date: 18.JUN.2019 14:37:21

### 802.11a mode, 99% Occupied Bandwidth, 5825 MHz



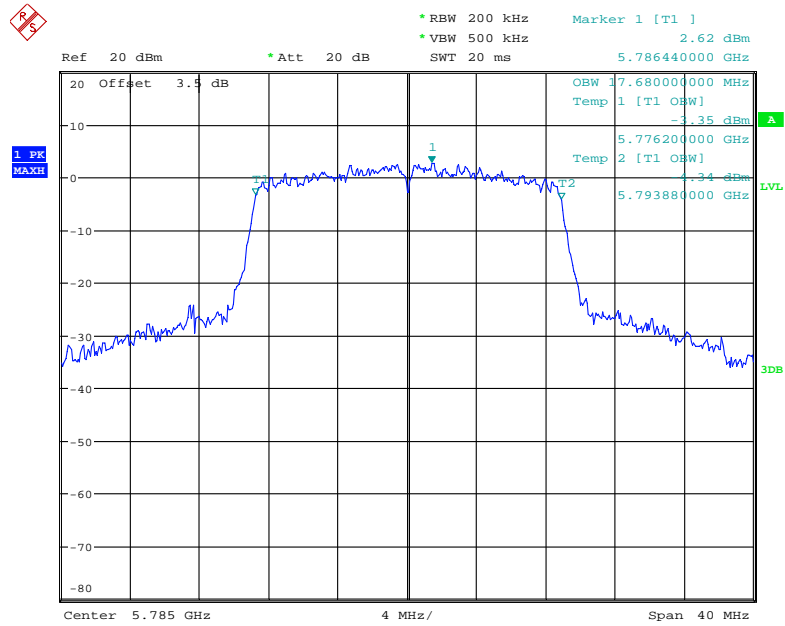
Date: 18.JUN.2019 14:38:02

### 802.11n20 mode, 99% Occupied Bandwidth, 5745 MHz



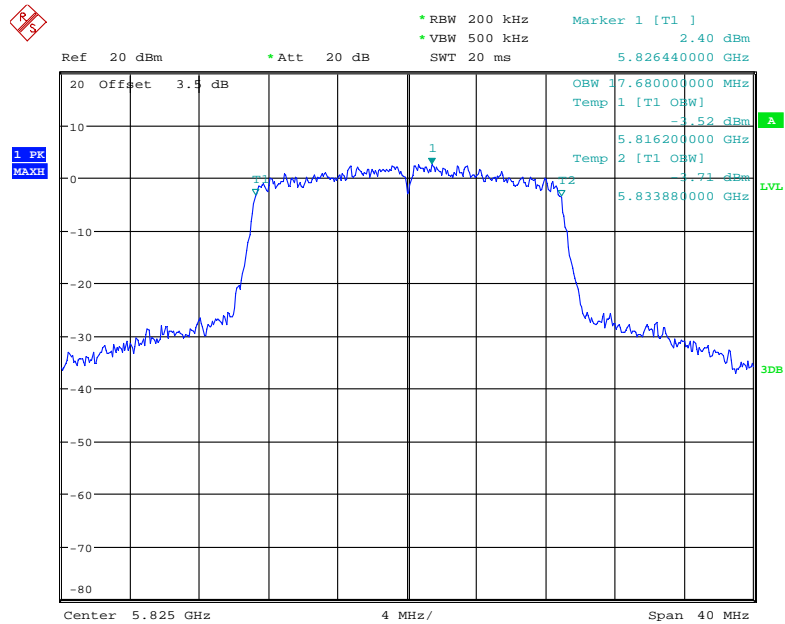
Date: 18.JUN.2019 14:39:12

### 802.11n20 mode, 99% Occupied Bandwidth, 5785 MHz



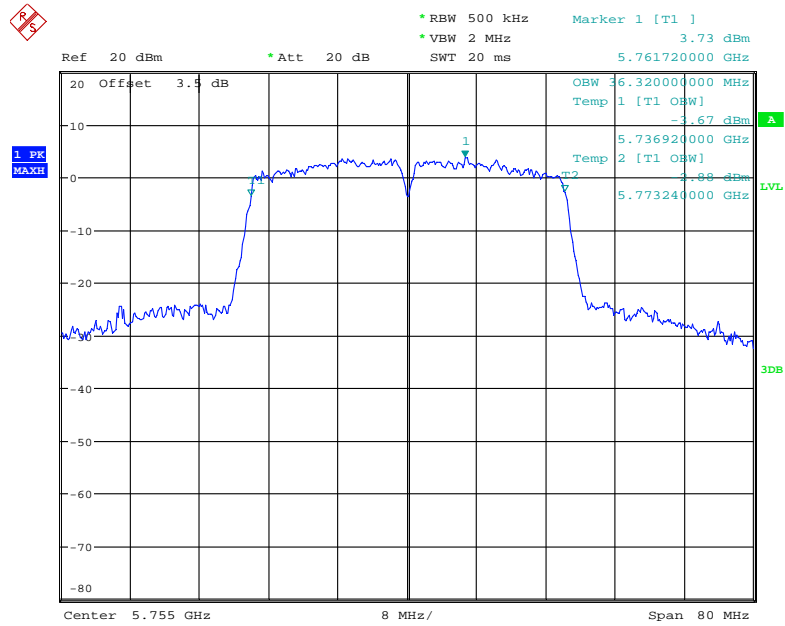
Date: 18.JUN.2019 14:38:51

### 802.11n20 mode, 99% Occupied Bandwidth, 5825 MHz



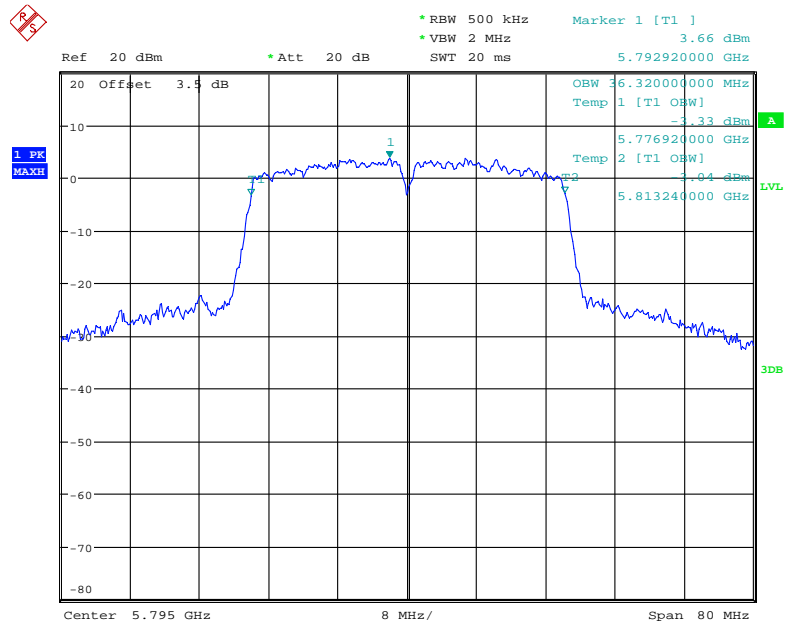
Date: 18.JUN.2019 14:38:32

802.11n40 mode, 99% Occupied Bandwidth, 5755 MHz



Date: 18.JUN.2019 14:40:20

802.11n40 mode, 99% Occupied Bandwidth, 5795 MHz



Date: 18.JUN.2019 14:39:56

## 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.

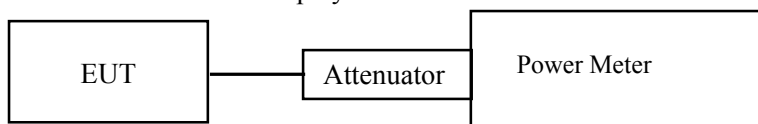
For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting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

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	101.0 kPa

The testing was performed by Kieron Luo on 2019-06-18.

EUT operation mode: Transmitting

**Test Result:** Pass

Please refer to the following tables.

**5150 MHz – 5250 MHz(this is a client devices)**

Frequency (MHz)	Reading Average Output Power (dBm)	Cable Loss (dB)	Average Output Power (dBm)	Limit (dBm)
802.11a				
5180	12.10	1	13.10	24
5200	11.36	1	12.36	
5240	12.34	1	13.34	
802.11n20				
5180	11.30	1	12.30	24
5200	10.44	1	11.44	
5240	11.45	1	12.45	
802.11n40				
5190	11.30	1	12.30	24
5230	11.45	1	12.45	

**5250 MHz – 5350 MHz:**

Frequency (MHz)	Reading Average Output Power (dBm)	Cable Loss (dB)	Average Output Power (dBm)	Limit (dBm)
802.11a				
5260	13.23	1	14.23	24
5280	13.27	1	14.27	
5320	13.29	1	14.29	
802.11n20				
5260	13.54	1	14.54	24
5280	13.32	1	14.32	
5320	13.33	1	14.33	
802.11n40				
5270	13.62	1	14.62	24
5310	11.16	1	12.16	

**5470 MHz – 5725 MHz:**

Frequency (MHz)	Reading Average Output Power (dBm)	Cable Loss (dB)	Average Output Power (dBm)	Limit (dBm)
802.11a				
5500	13.91	1	14.91	24
5600	13.30	1	14.30	
5700	12.05	1	13.05	
802.11n20				
5500	13.79	1	14.79	24
5600	13.54	1	14.54	
5700	11.05	1	12.05	
802.11n40				
5510	11.86	1	12.86	24
5590	11.55	1	12.55	
5670	11.15	1	12.15	

**5725 MHz – 5850 MHz:**

Frequency (MHz)	Reading Average Output Power (dBm)	Cable Loss (dB)	Average Output Power (dBm)	Limit (dBm)
802.11a				
5745	13.26	1	14.26	30
5785	13.41	1	14.41	
5825	13.35	1	14.35	
802.11n20				
5745	13.02	1	14.02	30
5785	13.09	1	14.09	
5825	13.00	1	14.00	
802.11n40				
5755	13.02	1	14.02	30
5795	13.15	1	14.15	

**FCC §15.407(a) (1) (2) (3) - POWER SPECTRAL DENSITY****Applicable Standard**

(ii) 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**

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**

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	52 %
<b>ATM Pressure:</b>	101.0 kPa

The testing was performed by Kieron Luo on 2019-06-18.

EUT operation mode: Transmitting

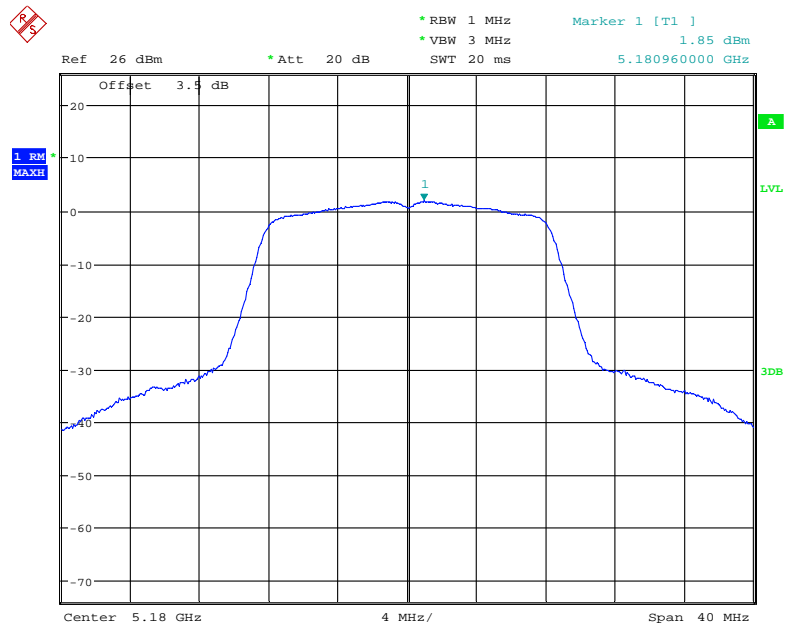
**Test Result:** Pass

Please refer to the following tables and plots.

**5150 MHz – 5250 MHz(this is a client devices):**

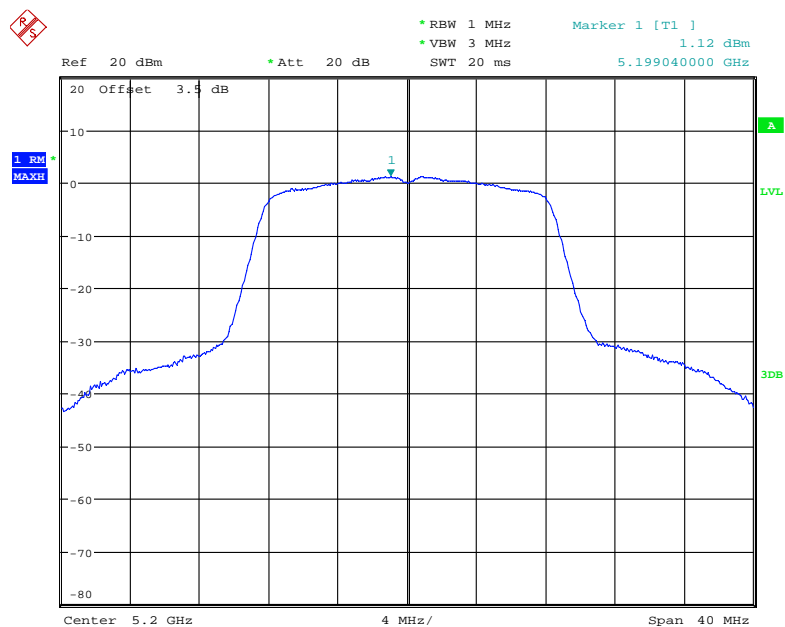
Frequency (MHz)	Reading Power Spectral Density(dBm/MHz)	Cable Loss (dB)	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)
802.11a				
5180	1.85	1	2.85	11
5200	1.12	1	2.12	
5240	2.03	1	3.03	
802.11n20				
5180	0.98	1	1.98	11
5200	-0.04	1	0.96	
5240	1.15	1	2.15	
802.11n40				
5190	-2.56	1	-1.56	11
5230	-2.42	1	-1.42	

### 802.11a mode, Power Spectral Density, 5180 MHz



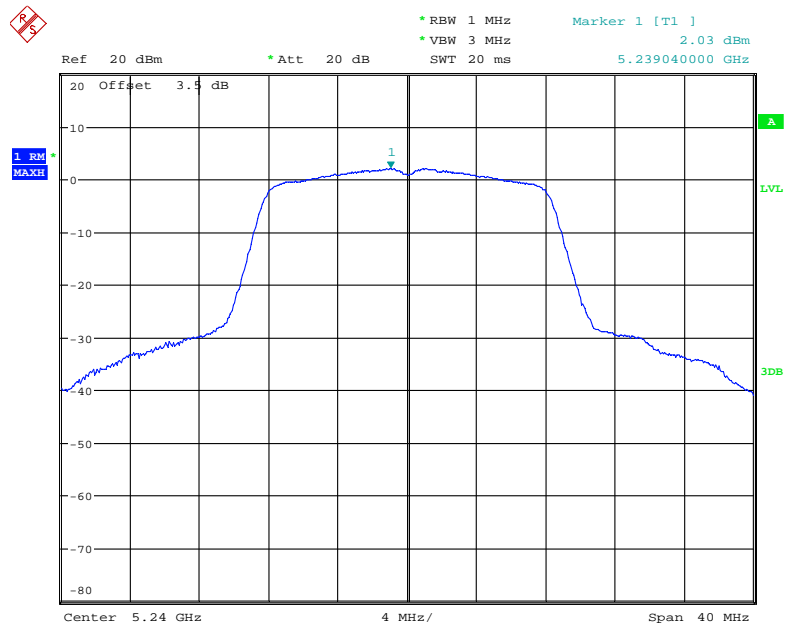
Date: 18.JUN.2019 10:50:50

### 802.11a mode, Power Spectral Density, 5200 MHz



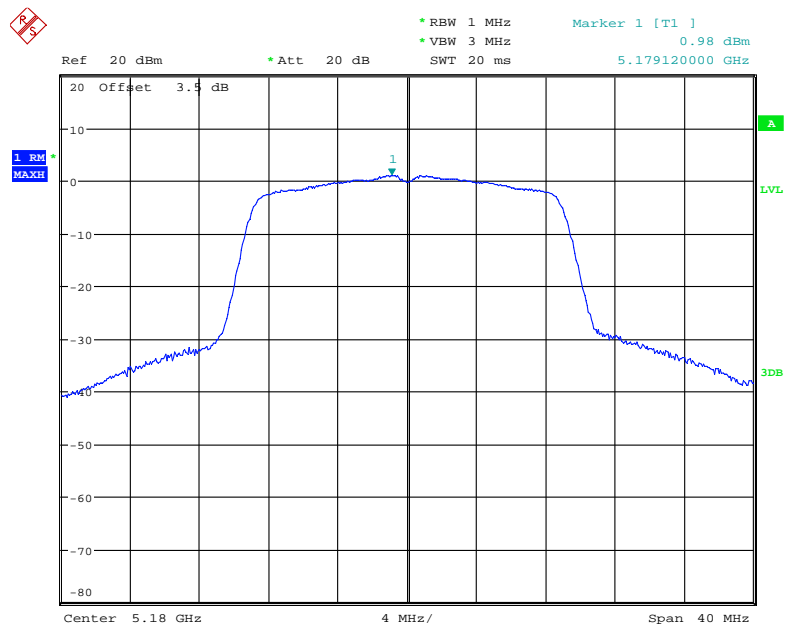
Date: 18.JUN.2019 10:53:00

### 802.11a mode, Power Spectral Density, 5240 MHz



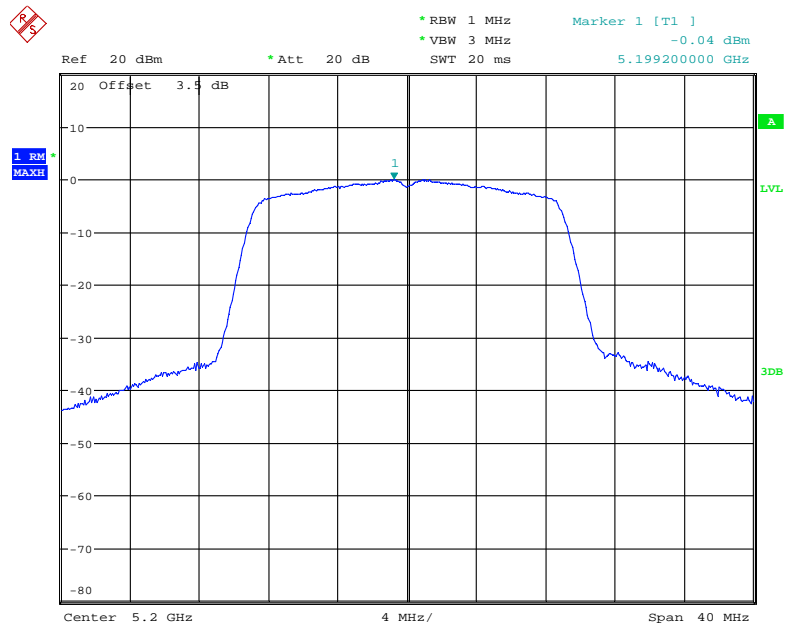
Date: 18.JUN.2019 10:54:21

### 802.11n20 mode, Power Spectral Density, 5180 MHz



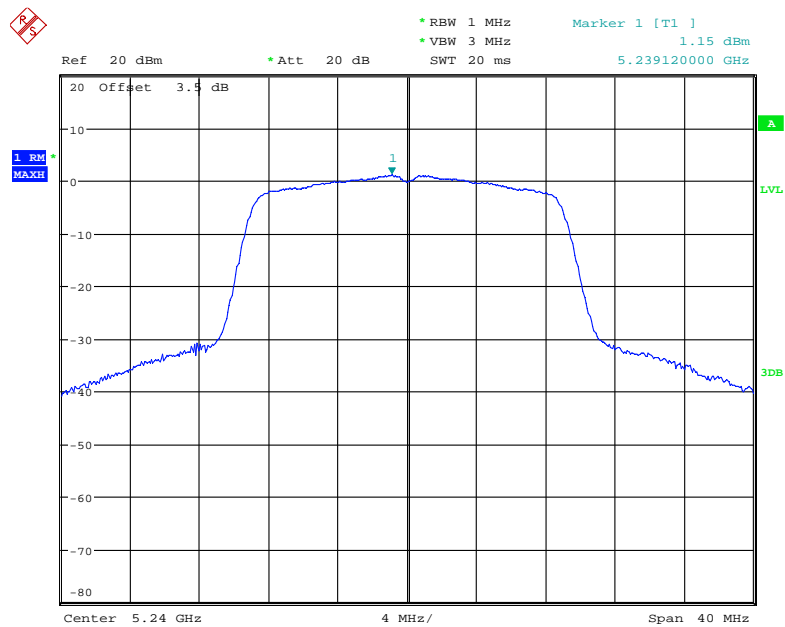
Date: 18.JUN.2019 10:55:37

### 802.11n20 mode, Power Spectral Density, 5200 MHz



Date: 18.JUN.2019 10:57:30

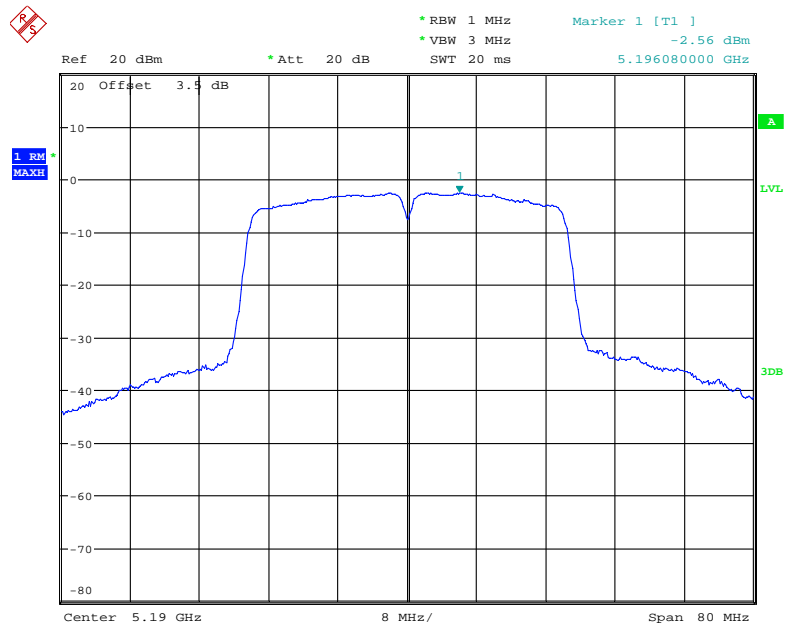
### 802.11n20 mode, Power Spectral Density, 5240 MHz



Date: 18.JUN.2019 10:58:10

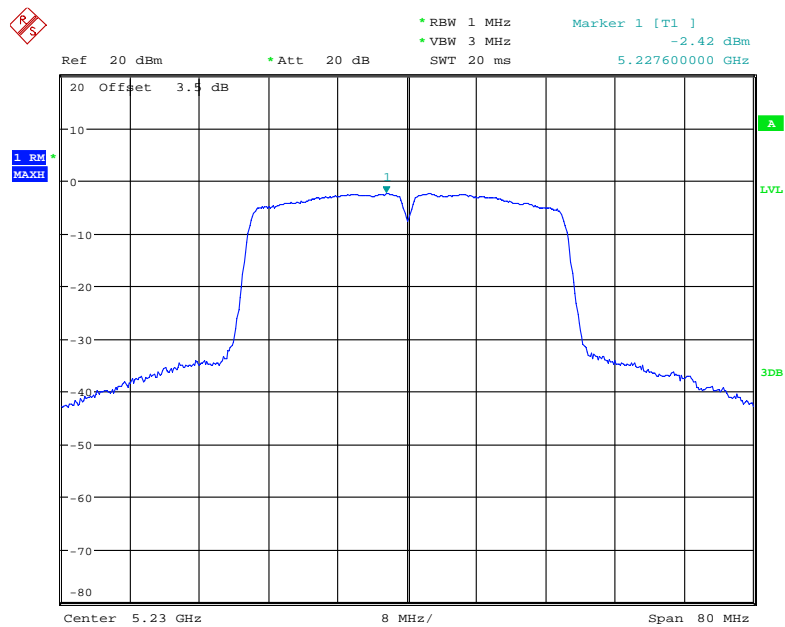


### 802.11n40 mode, Power Spectral Density, 5190 MHz



Date: 18.JUN.2019 10:59:45

### 802.11n40 mode, Power Spectral Density, 5230 MHz

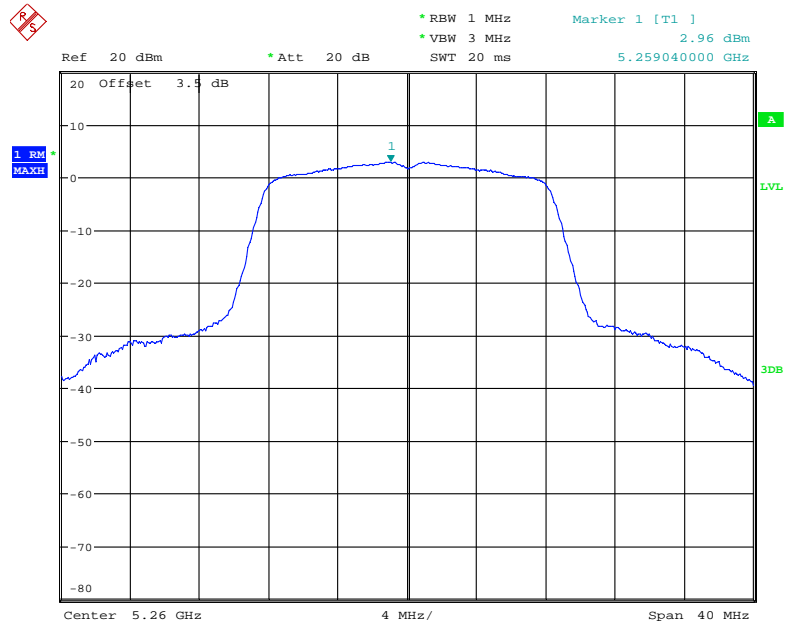


Date: 18.JUN.2019 11:00:23

**5250 MHz – 5350 MHz:**

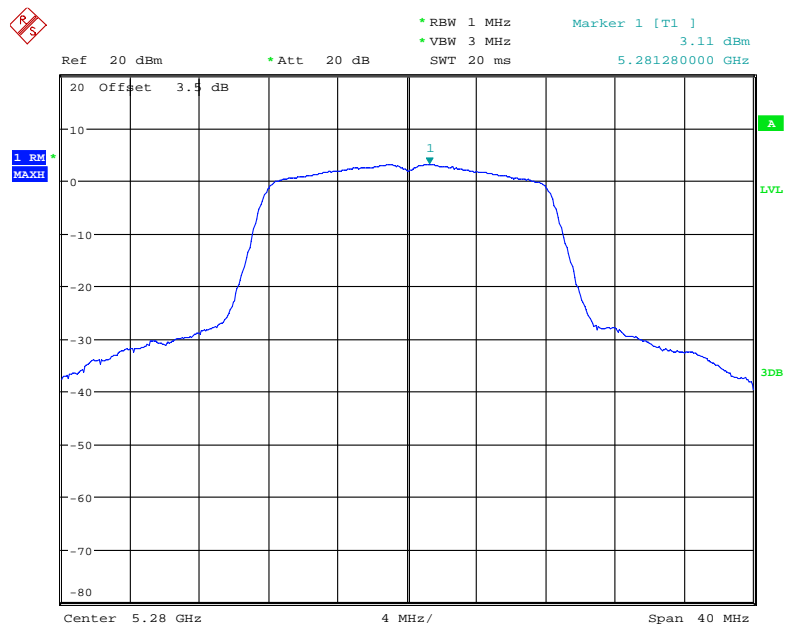
Frequency (MHz)	Reading Power Spectral Density(dBm/MHz)	Cable Loss (dB)	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)
802.11a				
5260	2.96	1	3.96	11
5280	3.11	1	4.11	
5320	3.09	1	4.09	
802.11n20				
5260	3.24	1	4.24	11
5280	2.88	1	3.88	
5320	3.01	1	4.01	
802.11n40				
5270	-0.15	1	0.85	11
5310	-2.62	1	-1.62	

### 802.11a mode, Power Spectral Density, 5260 MHz



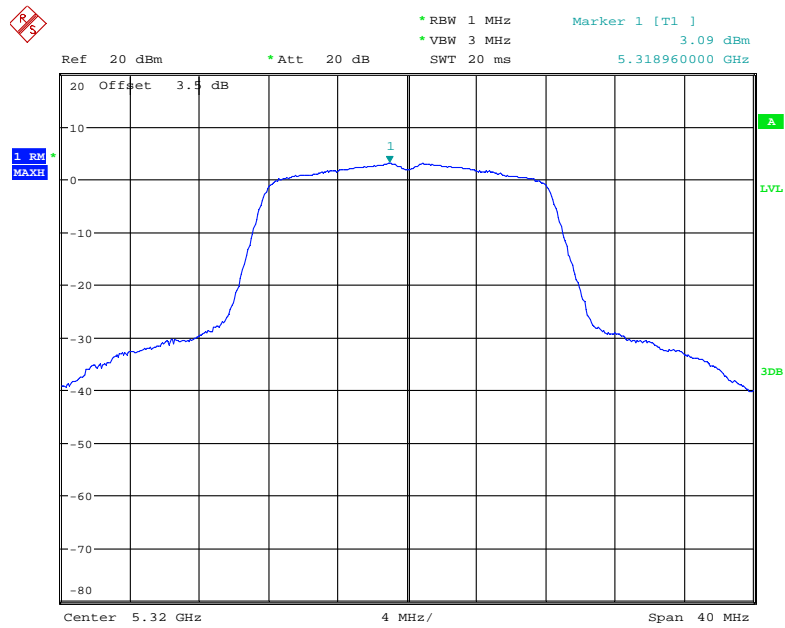
Date: 18.JUN.2019 11:49:52

### 802.11a mode, Power Spectral Density, 5280 MHz



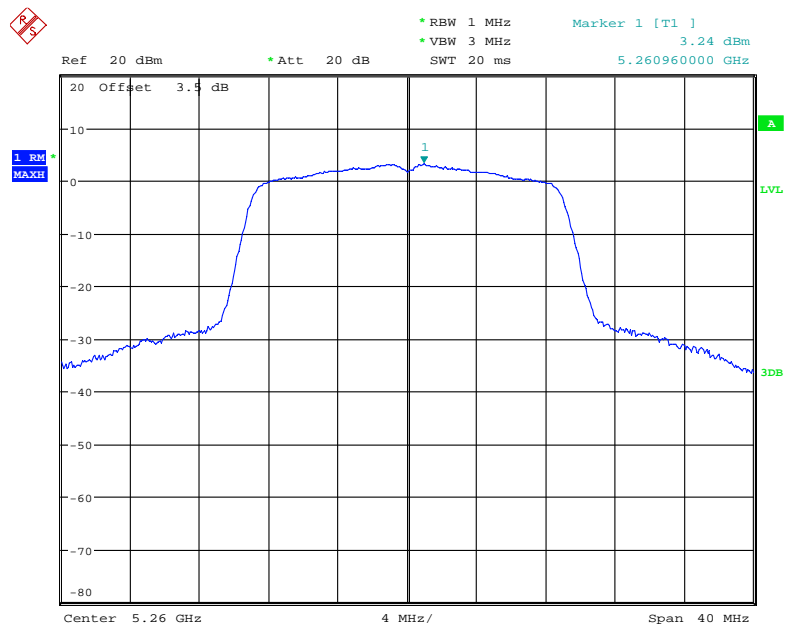
Date: 18.JUN.2019 11:50:43

### 802.11a mode, Power Spectral Density, 5320 MHz



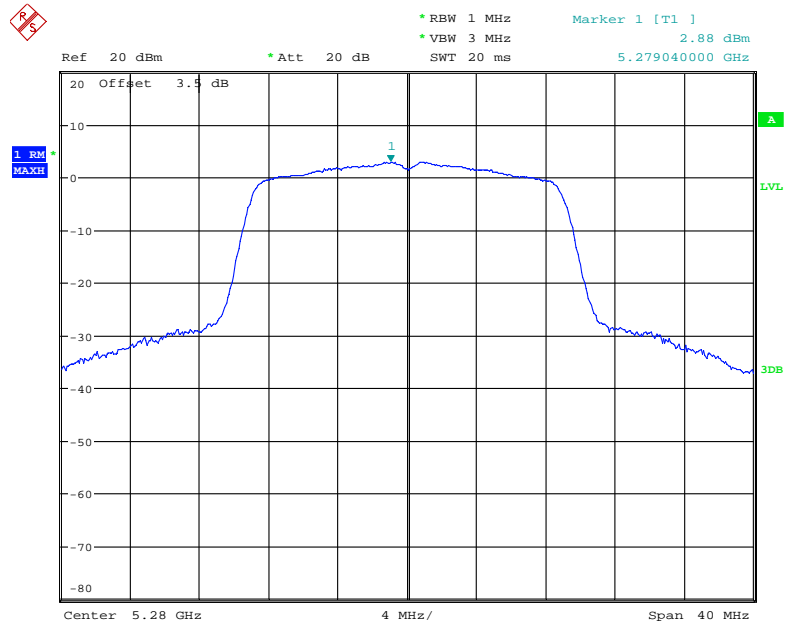
Date: 18.JUN.2019 11:52:58

### 802.11n20 mode, Power Spectral Density, 5260 MHz



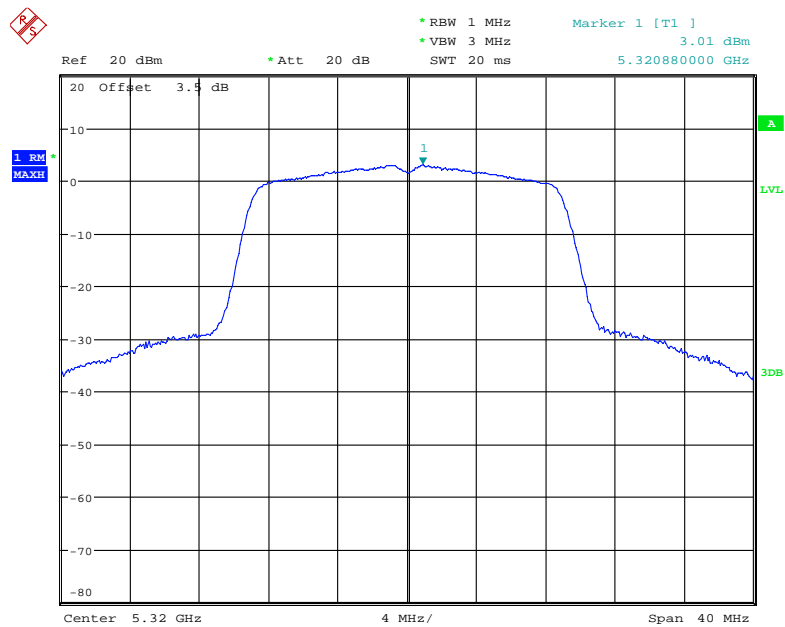
Date: 18.JUN.2019 11:53:42

### 802.11n20 mode, Power Spectral Density, 5280 MHz



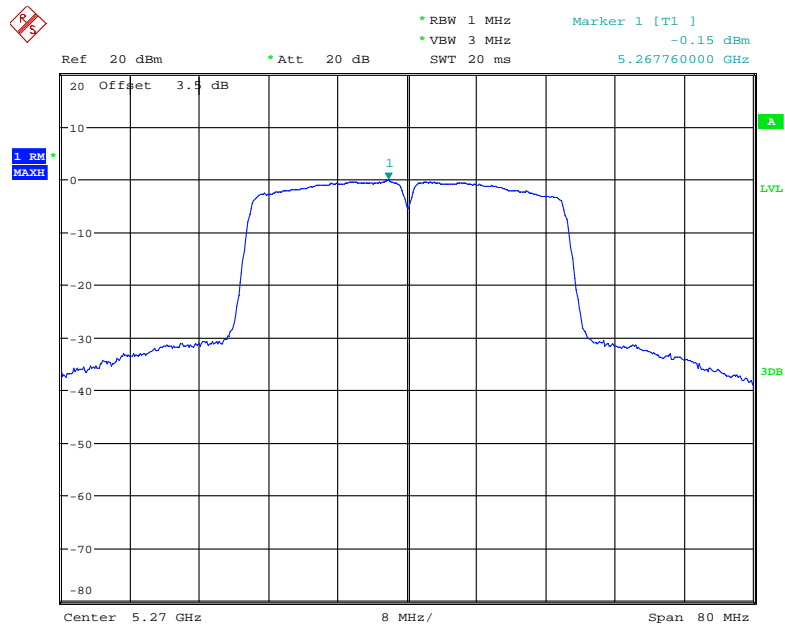
Date: 18.JUN.2019 11:55:23

### 802.11n20 mode, Power Spectral Density, 5320 MHz



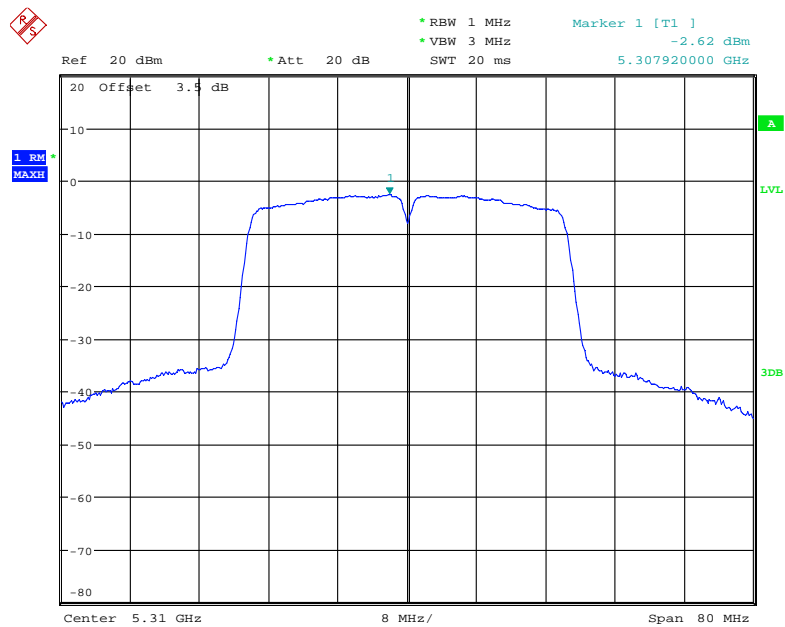
Date: 18.JUN.2019 11:55:56

### 802.11n40 mode, Power Spectral Density, 5270 MHz



Date: 18.JUN.2019 11:57:58

### 802.11n40 mode, Power Spectral Density, 5310 MHz

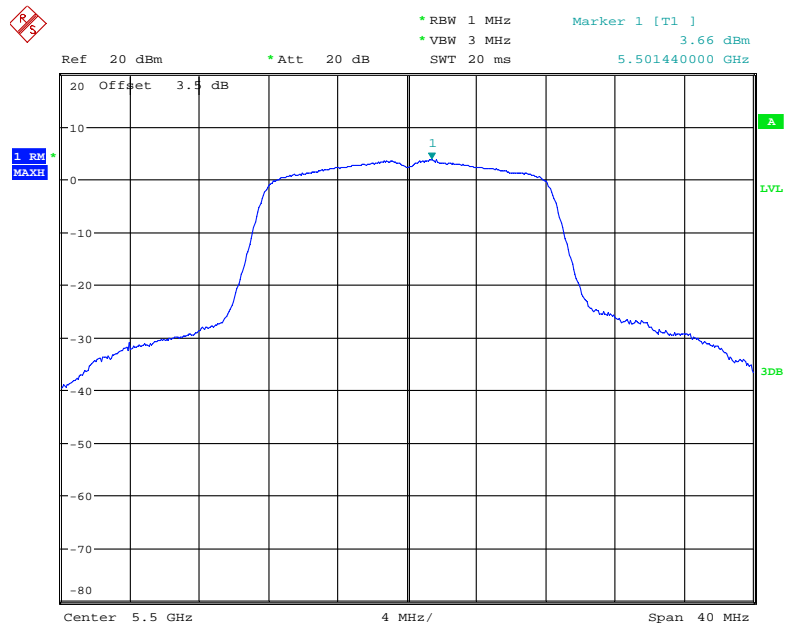


Date: 18.JUN.2019 11:58:49

**5470 MHz – 5725 MHz:**

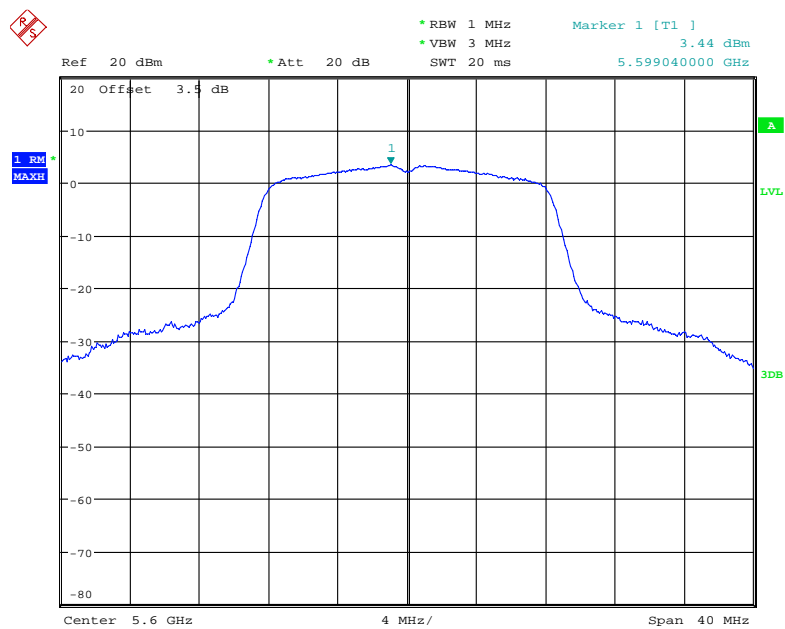
Frequency (MHz)	Reading Power Spectral Density(dBm/MHz)	Cable Loss (dB)	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)
802.11a				
5500	3.66	1	4.66	11
5600	3.44	1	4.44	
5700	1.68	1	2.68	
802.11n20				
5500	3.42	1	4.42	11
5600	3.04	1	4.04	
5700	0.64	1	1.64	
802.11n40				
5510	-2.04	1	-1.04	11
5590	-2.14	1	-1.14	
5670	-2.73	1	-1.73	

### 802.11a mode, Power Spectral Density, 5500 MHz



Date: 18.JUN.2019 13:29:06

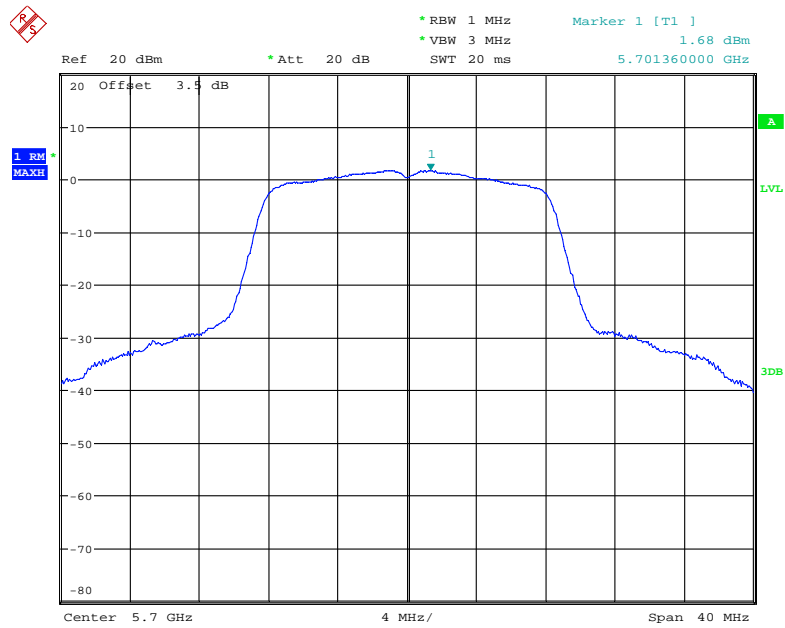
### 802.11a mode, Power Spectral Density, 5600 MHz



Date: 18.JUN.2019 13:29:33

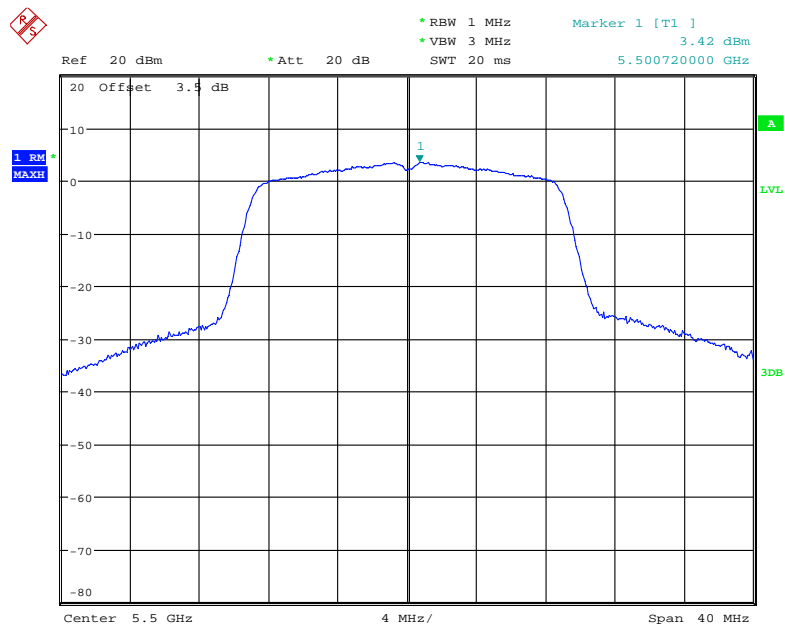


### 802.11a mode, Power Spectral Density, 5700 MHz



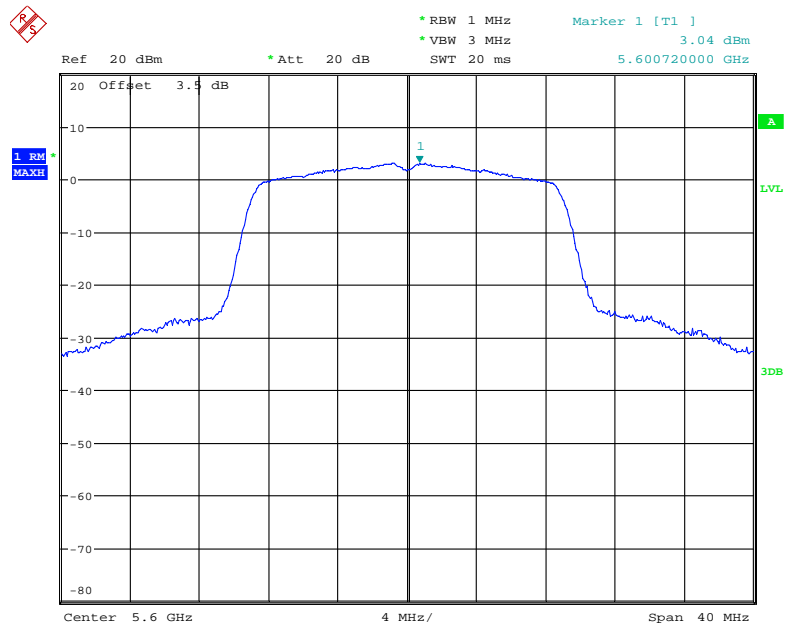
Date: 18.JUN.2019 13:48:28

### 802.11n20 mode, Power Spectral Density, 5500 MHz



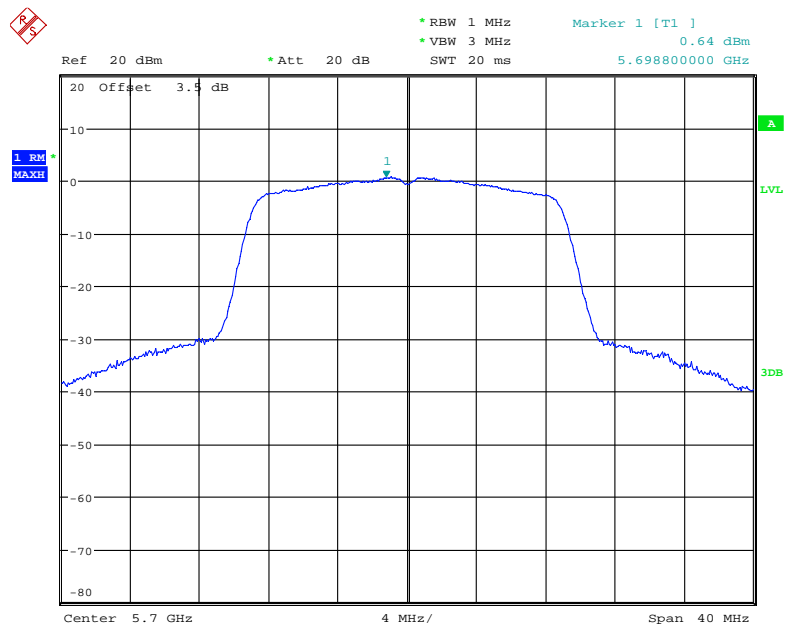
Date: 18.JUN.2019 13:49:09

### 802.11n20 mode, Power Spectral Density, 5600 MHz



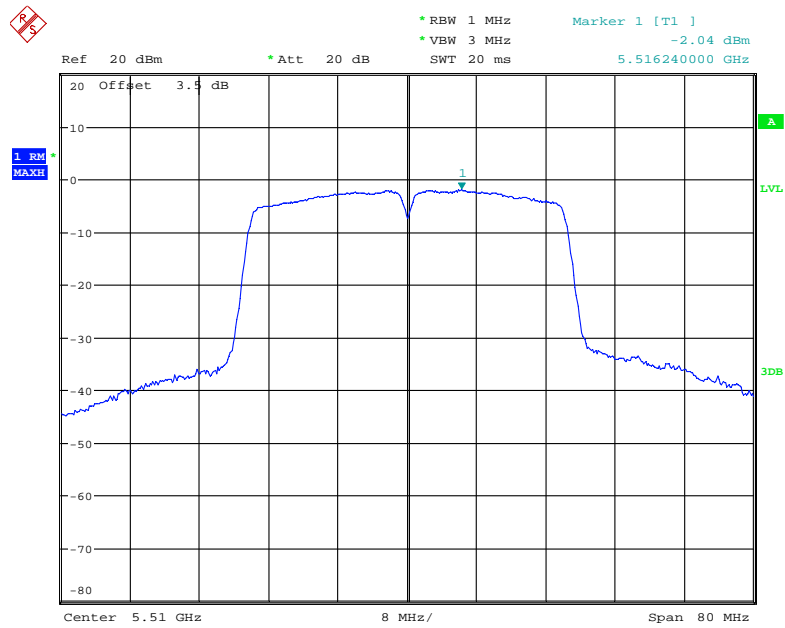
Date: 18.JUN.2019 13:50:07

### 802.11n20 mode, Power Spectral Density, 5700 MHz



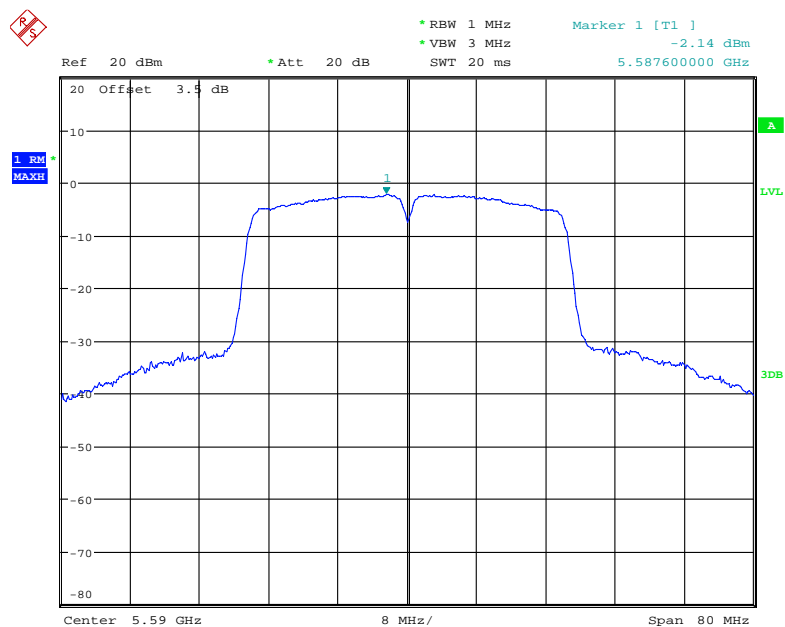
Date: 18.JUN.2019 13:50:41

### 802.11n40 mode, Power Spectral Density, 5510 MHz



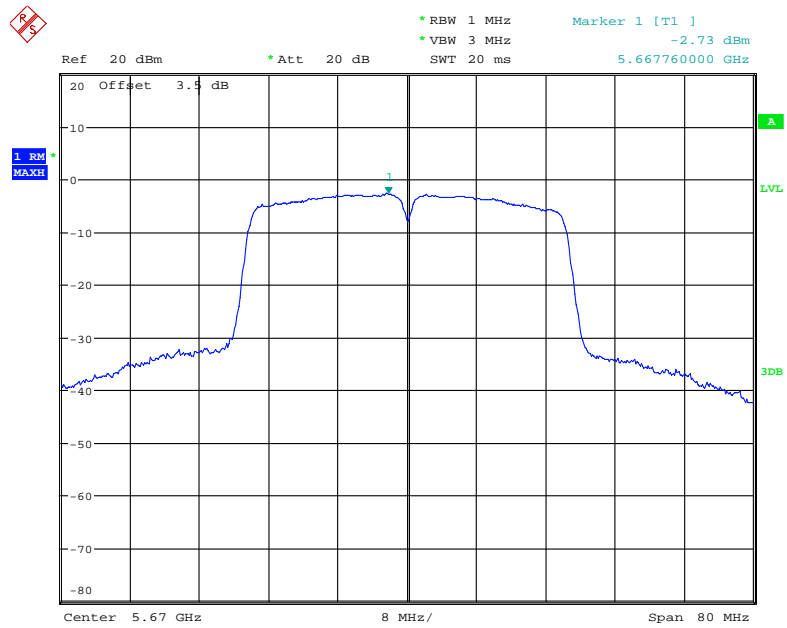
Date: 18.JUN.2019 13:53:10

### 802.11n40 mode, Power Spectral Density, 5590 MHz



Date: 18.JUN.2019 13:53:43

### 802.11n40 mode, Power Spectral Density, 5670 MHz

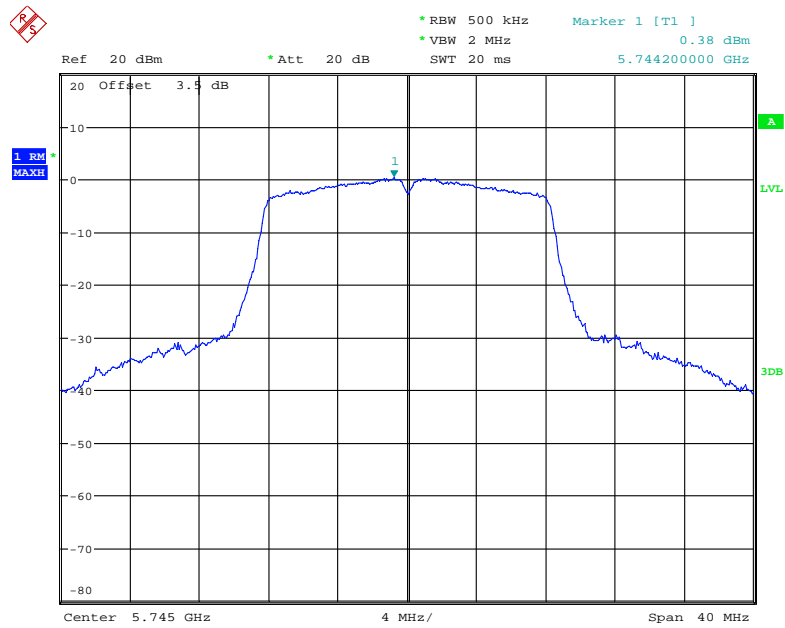


Date: 18.JUN.2019 13:54:40

**5725 MHz – 5850 MHz:**

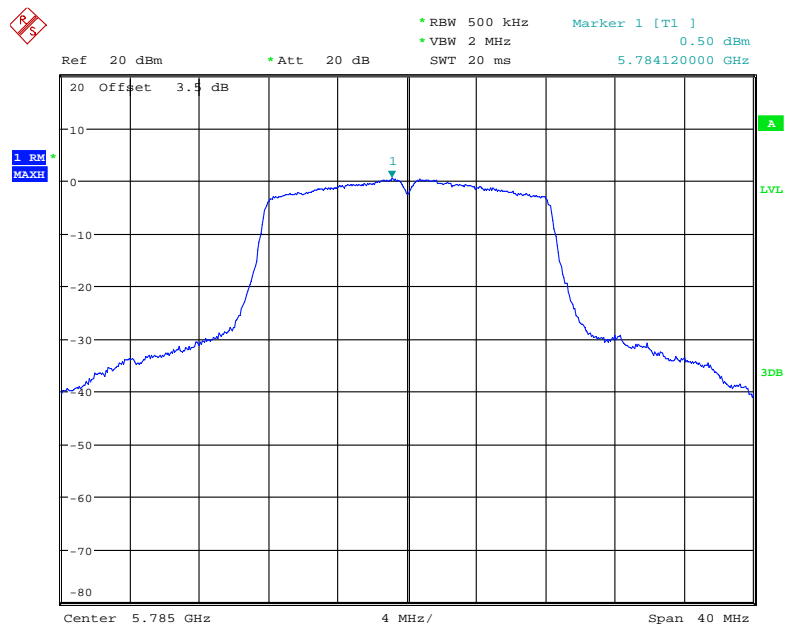
Frequency (MHz)	Reading Power Spectral Density(dBm/500kHz)	Cable Loss (dB)	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)
802.11a				
5745	0.38	1	1.38	30
5785	0.50	1	1.50	
5825	0.22	1	1.22	
802.11n20				
5745	0.62	1	1.62	30
5785	0.42	1	1.42	
5825	0.26	1	1.26	
802.11n40				
5755	-3.15	1	-2.15	30
5795	-3.44	1	-2.44	

### 802.11a mode, Power Spectral Density, 5745 MHz



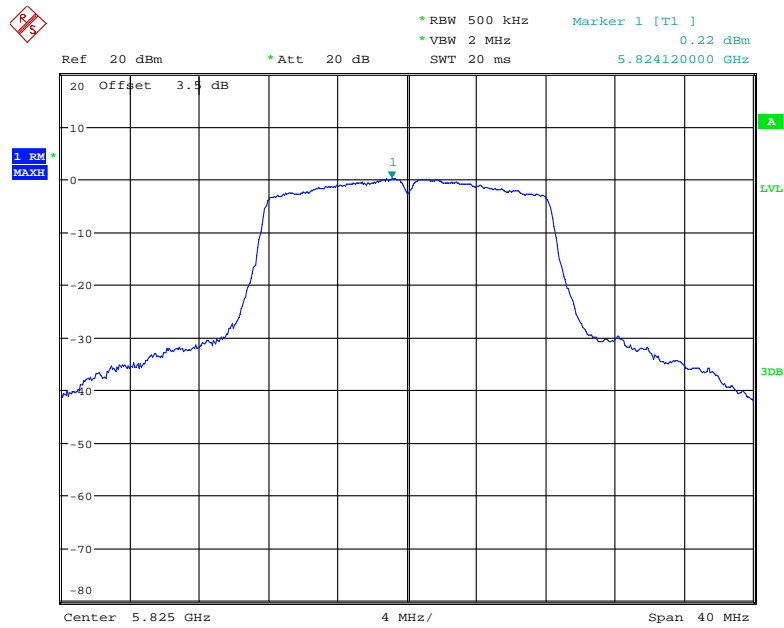
Date: 18.JUN.2019 14:23:42

### 802.11a mode, Power Spectral Density, 5785 MHz



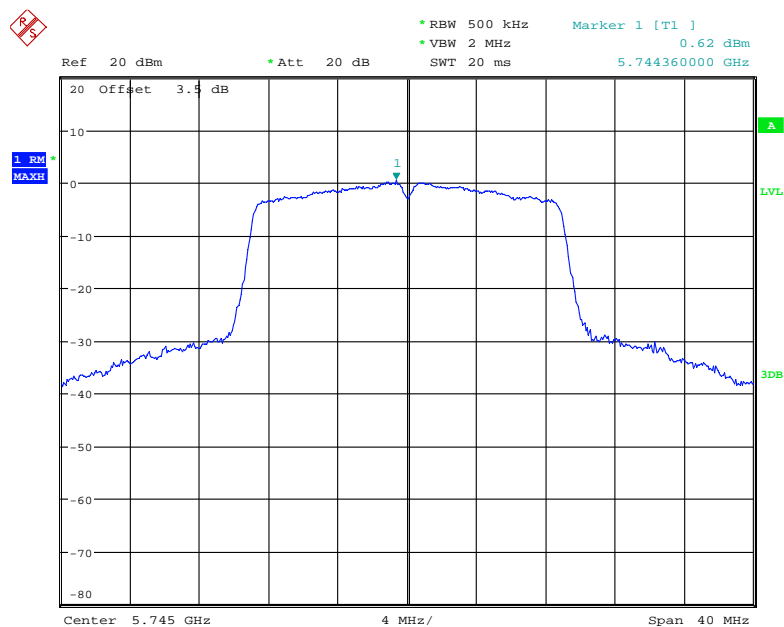
Date: 18.JUN.2019 14:23:21

### 802.11a mode, Power Spectral Density, 5825 MHz



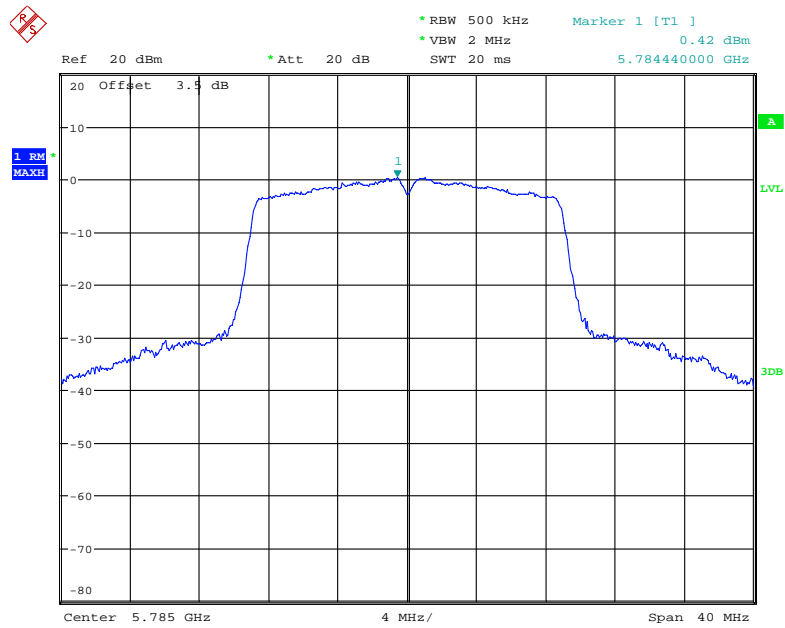
Date: 18.JUN.2019 14:22:57

### 802.11n20 mode, Power Spectral Density, 5745 MHz



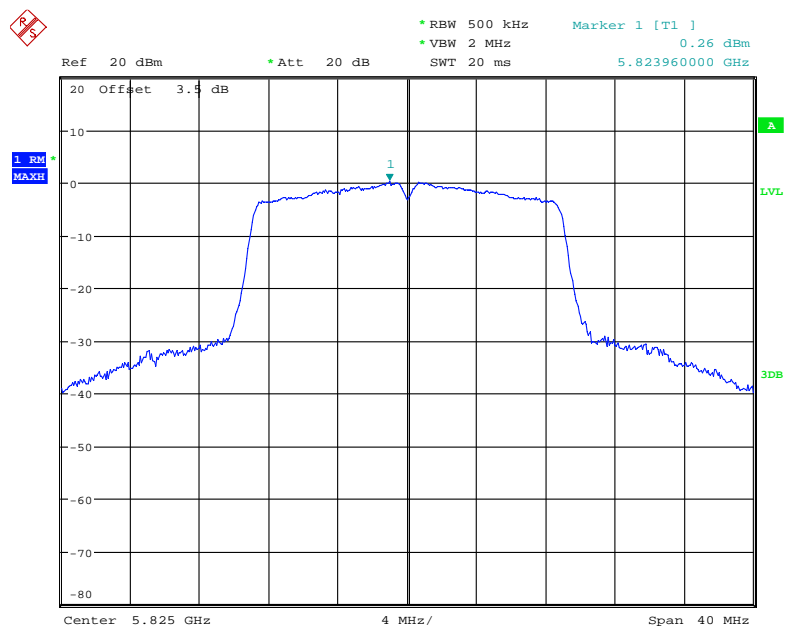
Date: 18.JUN.2019 14:22:05

### 802.11n20 mode, Power Spectral Density, 5785 MHz



Date: 18.JUN.2019 14:21:42

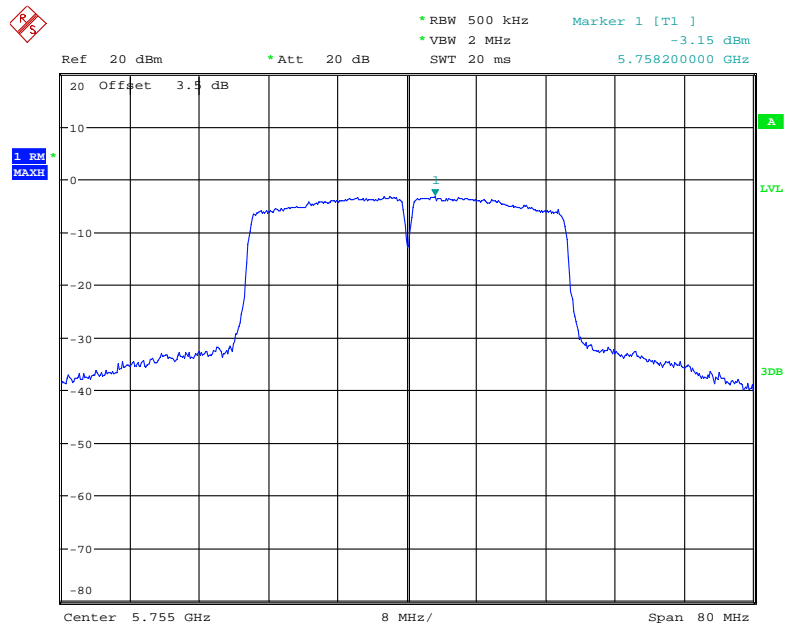
### 802.11n20 mode, Power Spectral Density, 5825 MHz



Date: 18.JUN.2019 14:21:18

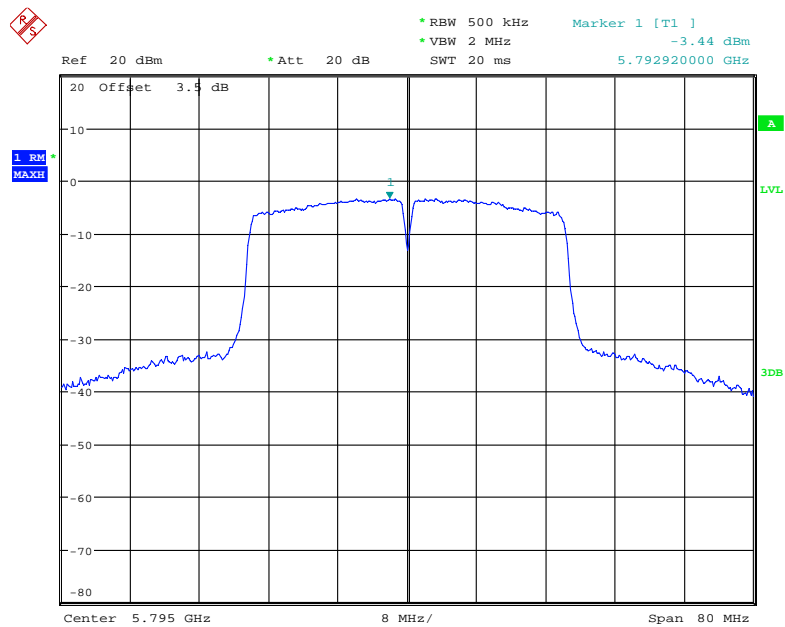


### 802.11n40 mode, Power Spectral Density, 5755 MHz



Date: 18.JUN.2019 14:20:48

### 802.11n40 mode, Power Spectral Density, 5795 MHz



Date: 18.JUN.2019 14:20:29

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