



TESTING LABORATORY
CERTIFICATE # 4821.01



FCC PART 15.407

TEST REPORT

For

Grandstream Networks, Inc.

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

FCC ID: YZZWP820

Report Type:

Original Report

Product Type:

Enterprise Portable Wi-Fi Phone

Report Number: RSZ180404001-00D

Report Date: 2018-07-03

Rocky Kang

Reviewed By: RF Engineer

Rocky Kang

Prepared By: 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
www.baclcorp.com.cn

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 “*”.

TABLE OF CONTENTS

GENERAL INFORMATION	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
OBJECTIVE	4
RELATED SUBMITTAL(S)/GRANT(S)	4
TEST METHODOLOGY	4
MEASUREMENT UNCERTAINTY	5
TEST FACILITY	5
SYSTEM TEST CONFIGURATION	6
DESCRIPTION OF TEST CONFIGURATION	6
EUT EXERCISE SOFTWARE	7
EQUIPMENT MODIFICATIONS	9
SUPPORT EQUIPMENT LIST AND DETAILS	9
EXTERNAL I/O CABLE	10
BLOCK DIAGRAM OF TEST SETUP	10
SUMMARY OF TEST RESULTS	11
TEST EQUIPMENT LIST	12
FCC §1.1307(b) & §2.1093 - RF EXPOSURE INFORMATION	14
APPLICABLE STANDARD	14
TEST RESULT	14
FCC §15.203 – ANTENNA REQUIREMENT	15
APPLICABLE STANDARD	15
ANTENNA CONNECTOR CONSTRUCTION	15
FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS	16
APPLICABLE STANDARD	16
EUT SETUP	16
EMI TEST RECEIVER SETUP	16
TEST PROCEDURE	16
TEST RESULTS SUMMARY	17
TEST DATA	17
§15.205 & §15.209 & §15.407(B) (1), (2), (3), (4), (6),(7) – UNDESIRABLE EMISSION	24
APPLICABLE STANDARD	24
EUT SETUP	25
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP	26
TEST PROCEDURE	26
CORRECTED AMPLITUDE & MARGIN CALCULATION	27
TEST RESULTS SUMMARY	27
TEST DATA	27
§15.407(B) (1), (2), (3), (4),–OUT OF BAND EMISSION	44
APPLICABLE STANDARD	44
TEST PROCEDURE	44
TEST DATA	44
FCC §15.407(a) (1) (5) – 26 dB EMISSION BANDWIDTH	61
APPLICABLE STANDARD	61

TEST PROCEDURE	61
TEST DATA	62
FCC §15.407(a) (1) (2) (3) – CONDUCTED TRANSMITTER OUTPUT POWER.....	87
APPLICABLE STANDARD	87
TEST PROCEDURE	87
TEST DATA	88
FCC §15.407(a) (1) (2) (3) - POWER SPECTRAL DENSITY	91
APPLICABLE STANDARD	91
TEST PROCEDURE	91
TEST DATA	92

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Grandstream Networks, Inc.*'s product, model number: *WP820 (FCC ID: YZZWP820)* in this report was a *Enterprise Portable Wi-Fi Phone*, which was measured approximately: 168.5 mm (L) * 52.5 mm (W) * 21.8 mm (H) for phone part, 76 mm (L) * 73 mm (W) * 81mm (H) for charger part, rated with input voltage: DC 3.8 V from rechargeable Li-ion battery or DC 5.0 V from adapter.

Adapter 1 Information (MASS POWER):

Model: NBS05B050100VU

Input: AC 100-240V, 50/60Hz, 0.2A

Output: DC 5.0 V, 1.0A

Adapter 2 Information (SHENZHEN FRECOM ELECTRONICS CO., LTD.):

Model: F05L5-050100SPAU

Input: AC 100-240V, 50/60Hz, 0.2A

Output: DC 5.0 V, 1.0A

Adapter 3 Information (Shenzhen Sunlight Electronic Technology Co., Ltd):

Model: F06US0500100A

Input: AC 100-240V, 50/60Hz, 0.2A

Output: DC 5.0 V, 1.0A

**All measurement and test data in this report was gathered from production sample serial number: 1800470 (Assigned by BACL, shenzhen). The EUT supplied by the applicant was received on 2018-04-04.*

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 15.247 DSS&DTS and Part 15B JBSubmissions with FCC ID: YZZWP820.

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		±0.5dB
RF conducted test with spectrum		±1.5dB
AC Power Lines Conducted Emissions		±1.95dB
Emissions, Radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB
Temperature		-30~60 °C
Humidity		±6%
Supply voltages		±0.4%

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)	Bandwidth (MHz)	Channel	Frequency (MHz)	Bandwidth (MHz)
36	5180	20	44	5220	20
38	5190	40	46	5230	40
40	5200	20	48	5240	20

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

Channel	Frequency (MHz)	Bandwidth (MHz)	Channel	Frequency (MHz)	Bandwidth (MHz)
52	5260	20	60	5300	20
54	5270	40	62	5310	40
56	5280	20	64	5320	20

For 5470-5725MHz Band, 18 channels are provided to testing:

Channel	Frequency (MHz)	Bandwidth (MHz)	Channel	Frequency (MHz)	Bandwidth (MHz)
100	5500	20	120	5600	20
102	5510	40	124	5620	20
104	5520	20	126	5630	40
108	5540	20	128	5640	20
110	5550	40	132	5660	20
112	5560	20	134	5670	40
116	5580	20	136	5680	20
118	5590	40	140	5700	20

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

Channel	Frequency (MHz)	Bandwidth (MHz)	Channel	Frequency (MHz)	Bandwidth (MHz)
149	5745	20	159	5795	40
151	5755	40	161	5805	20
153	5765	20	165	5825	20
157	5785	20	/	/	

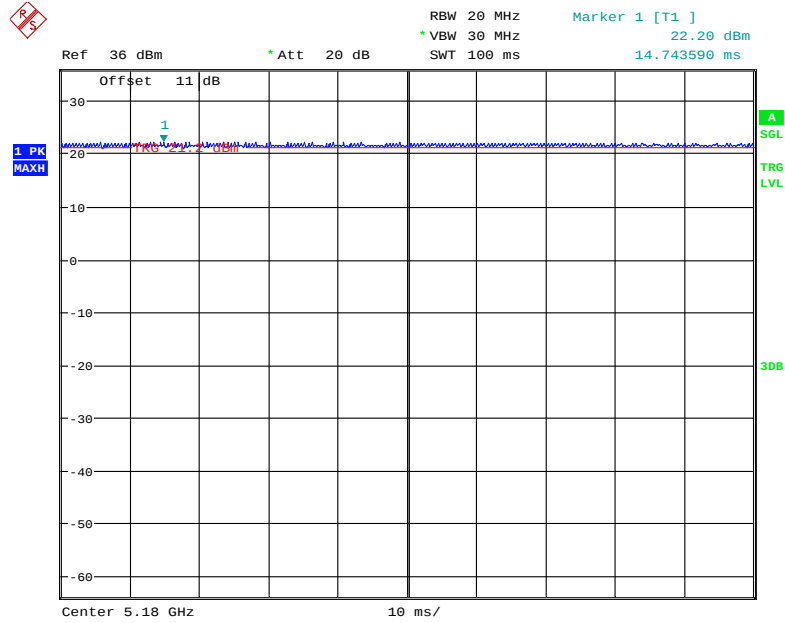
EUT Exercise Software

No 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	17
		CH40	5200	6	17
		CH48	5240	6	17
	802.11 n20	CH36	5180	MCS0	17
		CH40	5200	MCS0	17
		CH48	5240	MCS0	17
	802.11n40	CH38	5190	MCS0	16
		CH46	5230	MCS0	16
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
	802.11n40	CH54	5270	MCS0	16
		CH62	5310	MCS0	16
5470 – 5725MHz	802.11 a	CH100	5500	6	17
		CH120	5600	6	17
		CH140	5700	6	17
	802.11 n20	CH100	5500	MCS0	17
		CH120	5600	MCS0	17
		CH140	5700	MCS0	17
	802.11 n40	CH102	5510	MCS0	16
		CH118	5590	MCS0	16
		CH134	5670	MCS0	16
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	16
		CH159	5795	MCS0	16

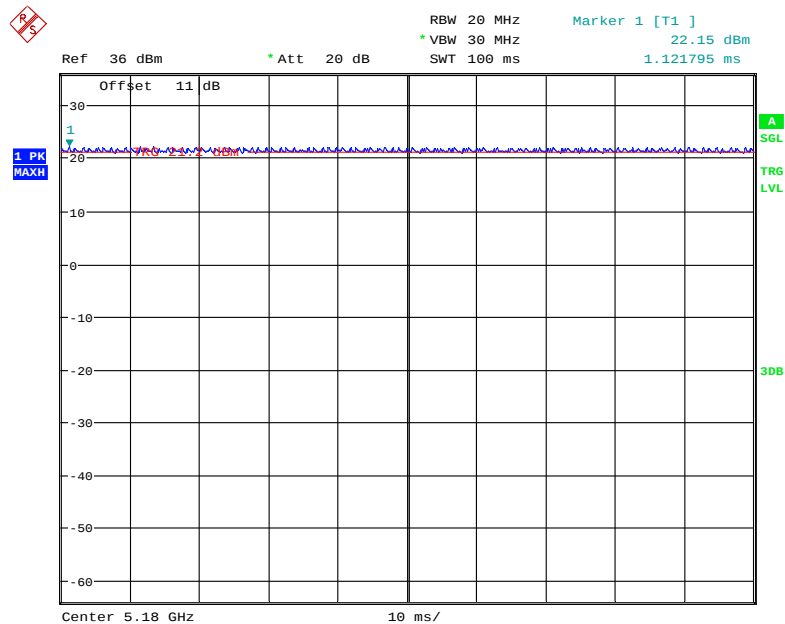
Duty cycle:
5150-5250 MHz

802.11a mode

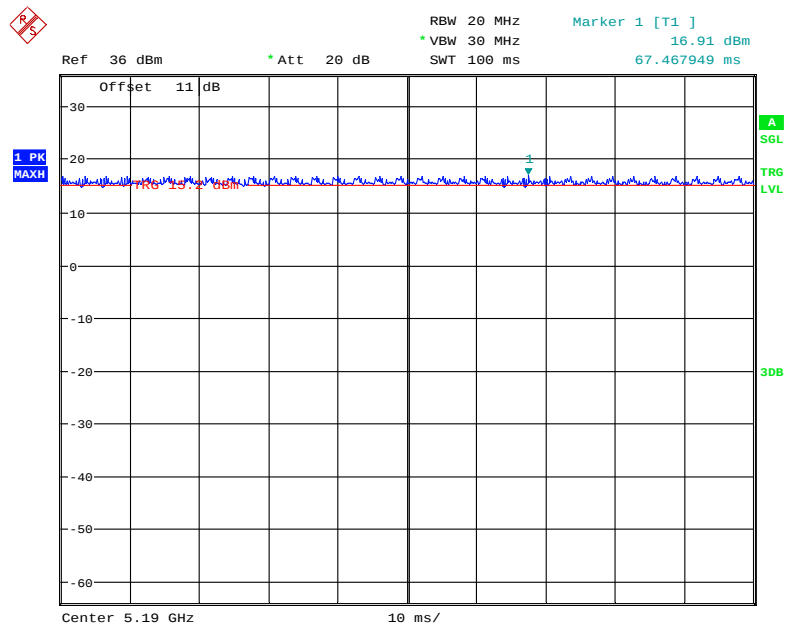


Date: 17.APR.2018 20:50:23

802.11n20 mode



Date: 17.APR.2018 20:51:21

802.11n40 Mode

Date: 17.APR.2018 20:52:22

Band	Duty Cycle (%)	T(ms)	1/T(kHz)	VBW Setting	10log(1/dutycycle)
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

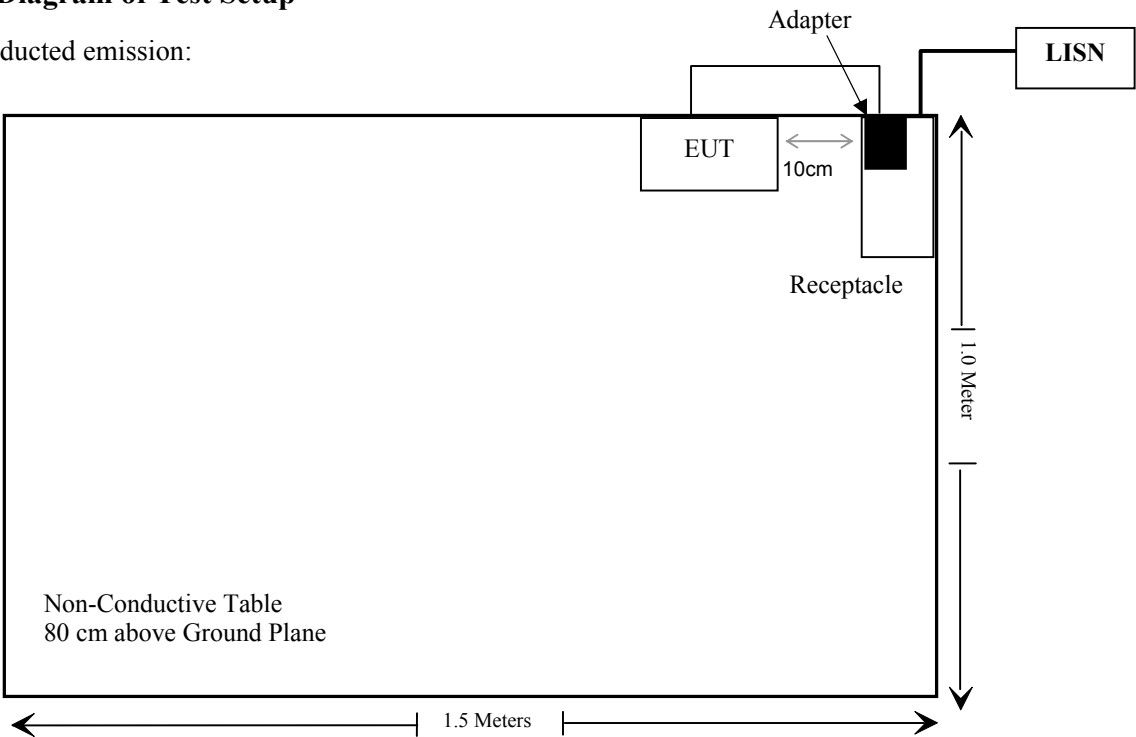
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

Cable Description	Length (m)	From Port	To
Un-Shielding Detachable USB Cable	1.0	EUT	Adapter

Block Diagram of Test Setup

For conducted emission:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.407, §1.1307 (b) (1)& §2.1093	RF Exposure	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(b) (1), (2), (3), (4)	Out Of Band Emission	Compliance
§15.407(a) (1), (5)	26 dB Emission 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 RSZ10404001-00 issued by Bay Area Compliance Laboratories Corp. (Dongguan).

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conducted test					
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2017-08-04	2018-08-04
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2017-12-21	2018-12-21
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2017-11-19	2018-05-21
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2018-05-21	2018-11-19
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
N/A	Conducted Emission Cable	N/A	UF A210B-1-0720-504504	2018-05-12	2018-11-12
Radiated Emission Test					
A.H.System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2017-04-24	2018-04-24
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2018-04-24	2019-04-24
Agilent	Spectrum Analyzer	8564E	3943A01781	2018-01-04	2019-01-04
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2017-12-17	2020-12-16
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2017-05-21	2018-05-21
HP	Amplifier	HP8447E	1937A01046	2017-11-19	2018-05-17
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2018-01-11	2019-01-11
UTiFLEX MICRO-C0AX	RF Cable	UFA147A-2362-100100	MFR64639 231029-003	2018-04-01	2018-10-01
Ducommun technologies	RF Cable	104PEA	218124002	2017-11-19	2018-05-17
Ducommun technologies	RF Cable	RG-214	1	2017-11-19	2018-05-17
Ducommun technologies	RF Cable	RG-214	2	2017-11-22	2018-05-22
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2017-12-29	2020-12-28
Ducommun Technologies	Horn Antenna	ARH-4823-02	1007726-04	2017-12-29	2020-12-28
Ducommun Technologies	Pre-amplifier	ALN-22093530-01	991373-01	2017-08-03	2018-08-03

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSU26	200120	2017-12-05	2018-12-05
Agilent	Power Meter	N1912A	MY5000492	2017-11-18	2018-11-17
Agilent	Power Sensor	N1921A	MY54210024	2017-11-18	2018-11-17
Ducommun technologies	RF Cable	RG-214	3	2017-11-22	2018-05-22
WEINSCHTEL	10dB Attenuator	5324	AU 3842	2017-11-22	2018-05-23

* **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).

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

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliance, please refer to the SAR report: RSZ180404002-20.

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 3.0 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

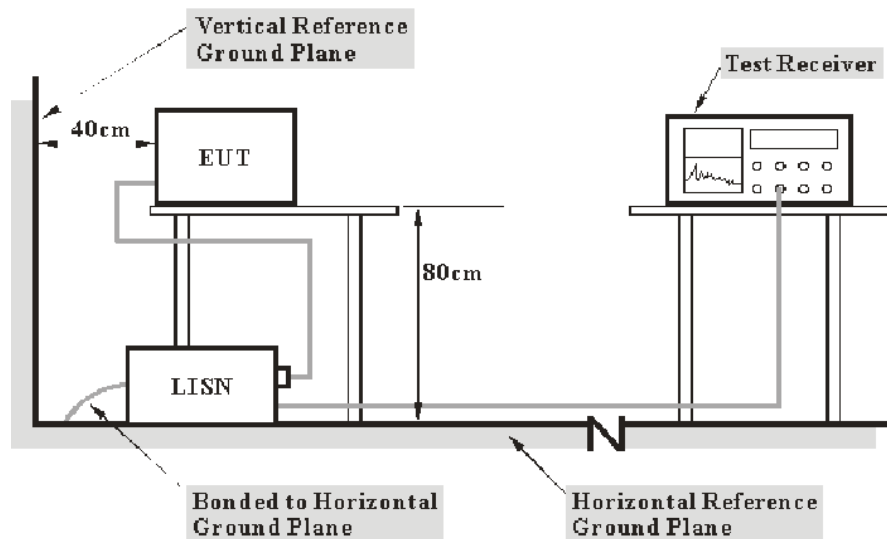
Result: Compliance.

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.

The adapter was connected to a 120VAC/60 Hz power source.

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

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

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

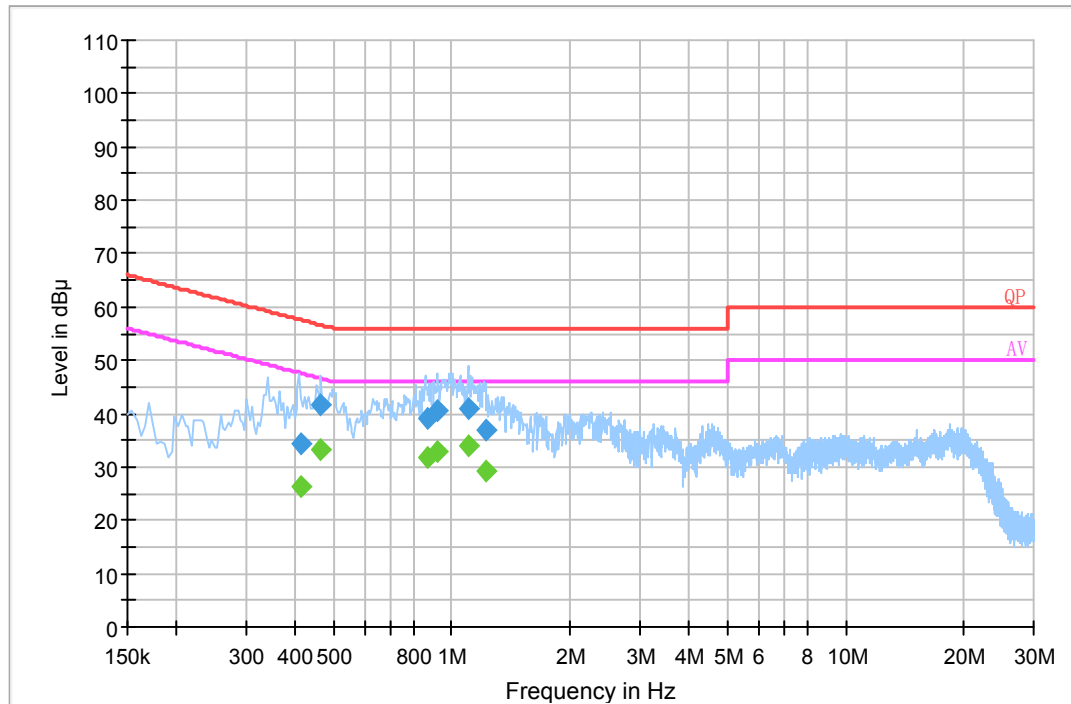
Test Data

Environmental Conditions

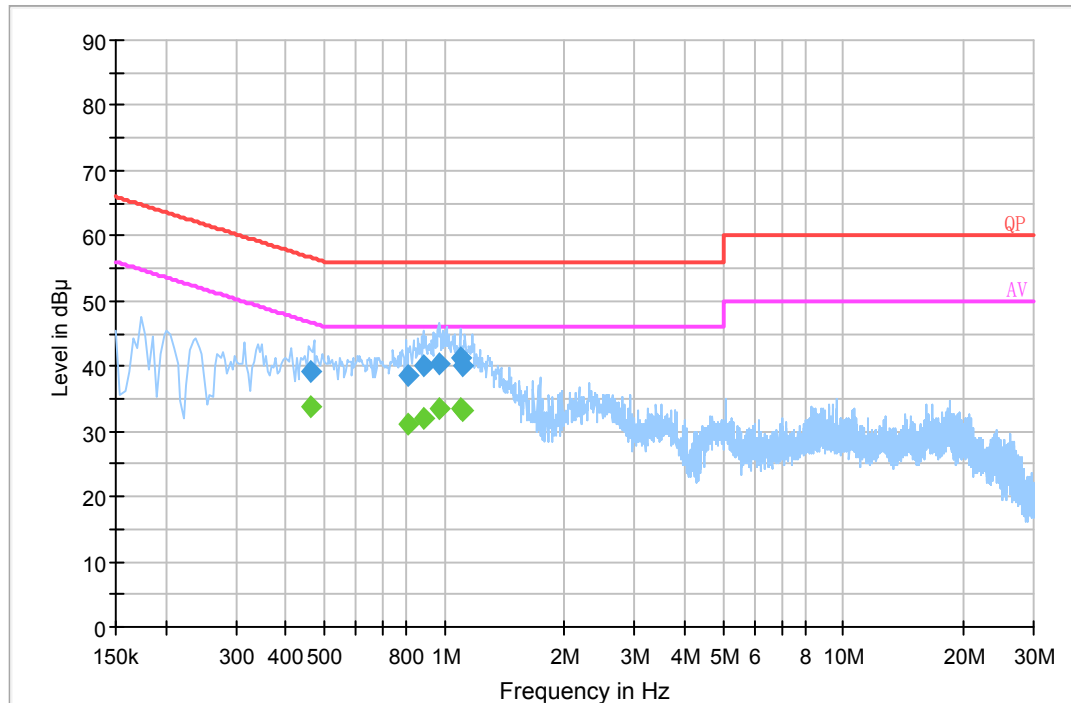
Temperature:	24~26 °C
Relative Humidity:	50~56 %
ATM Pressure:	101.0~100.9 kPa

The testing was performed by Jacob Kong from 2018-05-16 to 2018-07-02.

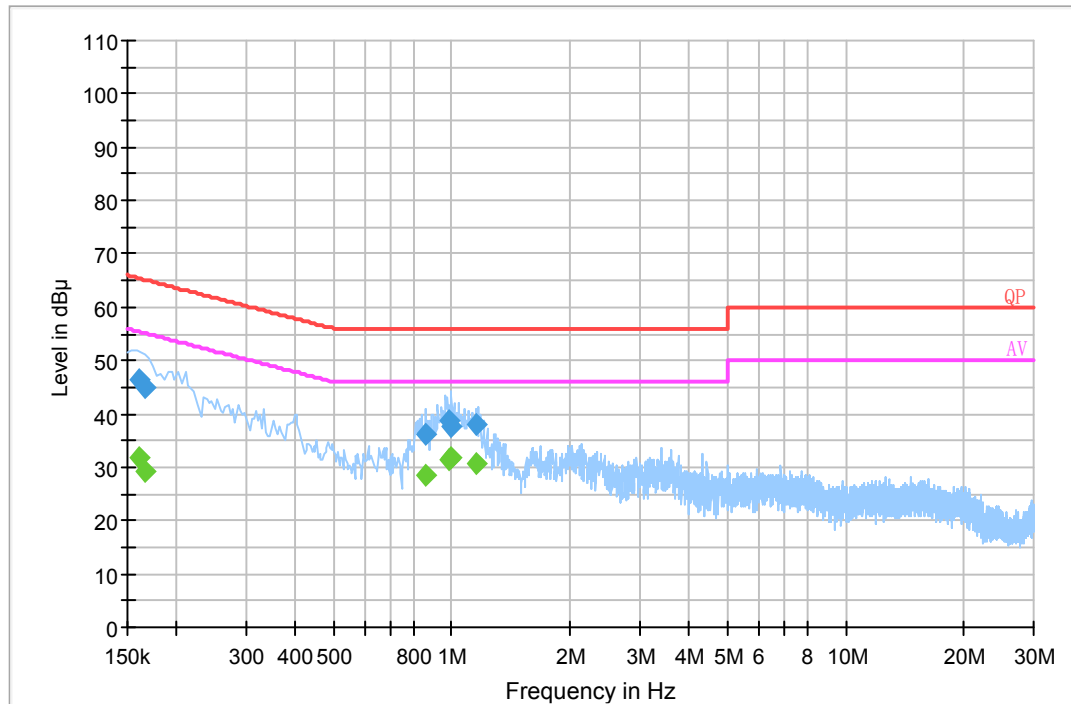
EUT operation mode: Transmitting (worst case)

For Adapter 1:**AC 120V/60 Hz, Line**

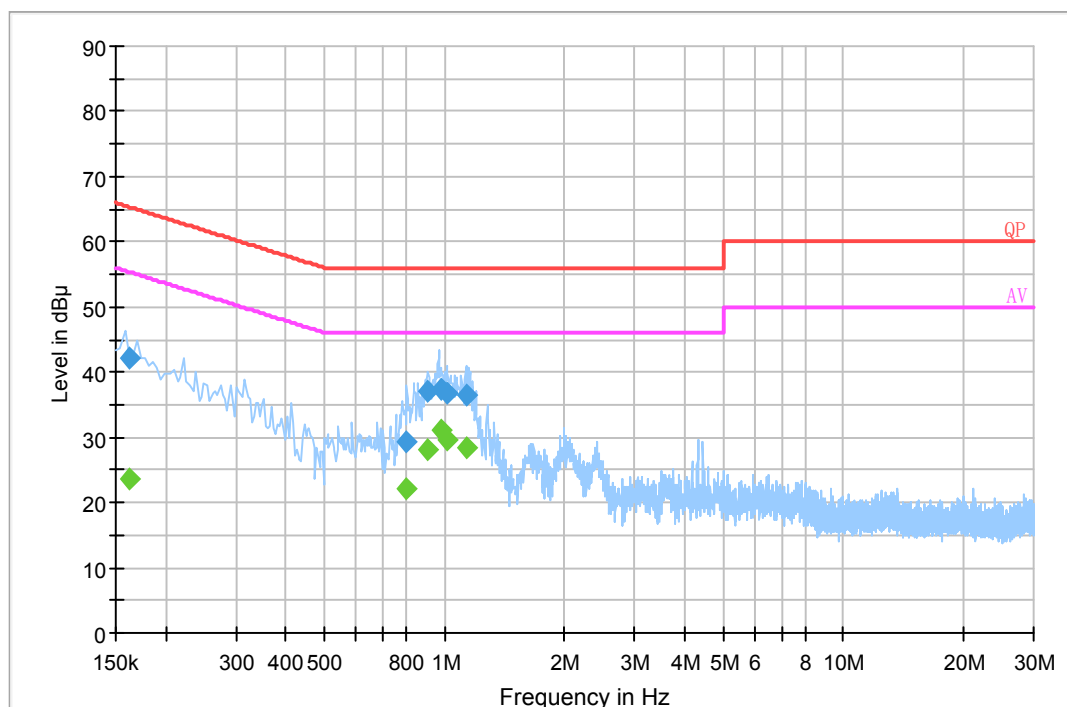
Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.411850	34.2	20.1	57.6	23.4	QP
0.463010	41.6	20.1	56.6	15.0	QP
0.865190	39.0	20.0	56.0	17.0	QP
0.920230	40.6	20.0	56.0	15.4	QP
1.097530	40.9	20.0	56.0	15.1	QP
1.215970	37.1	20.0	56.0	19.0	QP
0.411850	26.2	20.1	47.6	21.4	Ave.
0.463010	33.4	20.1	46.6	13.3	Ave.
0.865190	31.6	20.0	46.0	14.4	Ave.
0.920230	32.8	20.0	46.0	13.2	Ave.
1.097530	33.9	20.0	46.0	12.1	Ave.
1.215970	29.4	20.0	46.0	16.6	Ave.

AC 120V/60 Hz, Neutral

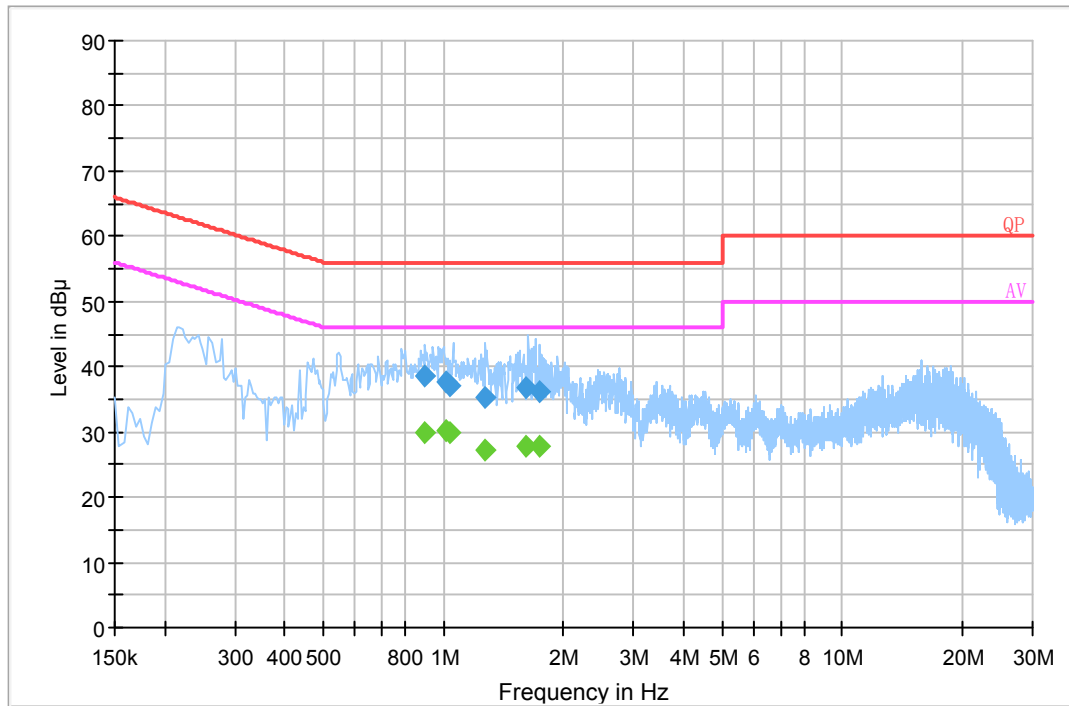
Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.462950	39.1	20.1	56.6	17.5	QP
0.814030	38.6	19.9	56.0	17.4	QP
0.884710	40.2	20.0	56.0	15.8	QP
0.975510	40.5	20.0	56.0	15.5	QP
1.101590	41.2	20.0	56.0	14.8	QP
1.113110	40.2	20.0	56.0	15.8	QP
0.462950	33.8	20.1	46.6	12.8	Ave.
0.814030	31.1	19.9	46.0	14.9	Ave.
0.884710	31.9	20.0	46.0	14.1	Ave.
0.975510	33.6	20.0	46.0	12.4	Ave.
1.101590	33.4	20.0	46.0	12.6	Ave.
1.113110	33.1	20.0	46.0	13.0	Ave.

For Adapter 2:**AC 120V/60 Hz, Line**

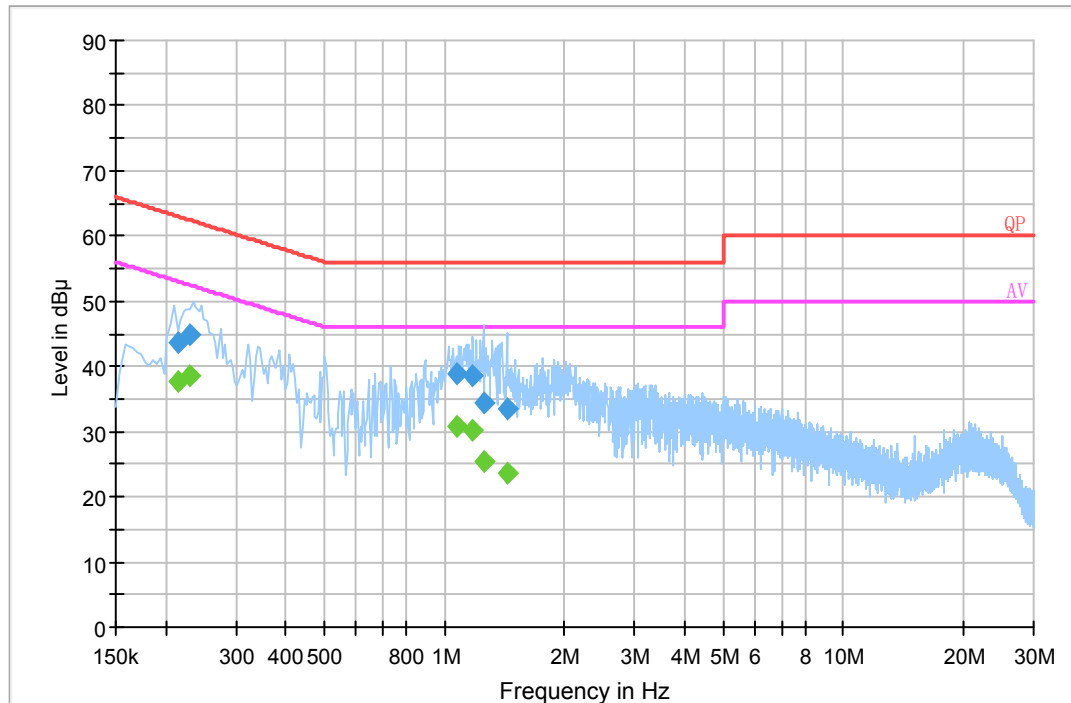
Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.161500	46.6	20.1	65.4	18.8	QP
0.165500	45.1	20.1	65.2	20.1	QP
0.861130	36.2	20.0	56.0	19.8	QP
0.983090	38.6	20.0	56.0	17.4	QP
0.998790	37.8	20.0	56.0	18.2	QP
1.152510	38.0	20.0	56.0	18.0	QP
0.161500	31.7	20.1	55.4	23.7	Ave.
0.165500	29.1	20.1	55.2	26.1	Ave.
0.861130	28.5	20.0	46.0	17.5	Ave.
0.983090	31.3	20.0	46.0	14.7	Ave.
0.998790	31.7	20.0	46.0	14.4	Ave.
1.152510	30.7	20.0	46.0	15.3	Ave.

AC 120V/60 Hz, Neutral

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.161500	42.1	20.1	65.4	23.3	QP
0.797910	29.4	19.9	56.0	26.6	QP
0.908410	37.0	20.0	56.0	19.0	QP
0.984550	37.5	20.0	56.0	18.5	QP
1.010730	36.7	20.0	56.0	19.4	QP
1.137050	36.4	20.0	56.0	19.6	QP
0.161500	23.5	20.1	55.4	31.8	Ave.
0.797910	22.0	19.9	46.0	24.0	Ave.
0.908410	28.0	20.0	46.0	18.0	Ave.
0.984550	31.1	20.0	46.0	14.9	Ave.
1.010730	29.6	20.0	46.0	16.4	Ave.
1.137050	28.4	20.0	46.0	17.6	Ave.

For Adapter 3:**AC 24V/60 Hz, Line:**

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.896470	38.7	20.0	56.0	17.3	QP
1.014970	37.6	20.0	56.0	18.4	QP
1.042130	37.1	20.0	56.0	18.9	QP
1.270830	35.3	20.0	56.0	20.7	QP
1.609490	36.7	20.0	56.0	19.3	QP
1.743930	36.2	20.0	56.0	19.8	QP
0.896470	29.9	20.0	46.0	16.1	Ave.
1.014970	30.1	20.0	46.0	15.9	Ave.
1.042130	29.9	20.0	46.0	16.1	Ave.
1.270830	27.2	20.0	46.0	18.8	Ave.
1.609490	27.8	20.0	46.0	18.2	Ave.
1.743930	27.7	20.0	46.0	18.3	Ave.

AC24V, 60 Hz, Neutral:

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.225500	45.1	20.1	62.6	17.5	QP
0.241500	42.9	20.1	62.0	19.1	QP
0.269500	40.8	20.1	61.1	20.3	QP
1.306110	35.5	20.0	56.0	20.5	QP
1.463890	35.2	20.0	56.0	20.8	QP
1.574630	35.2	20.0	56.0	20.8	QP
0.225500	39.8	20.1	52.6	12.8	Ave.
0.241500	37.6	20.1	52.0	14.4	Ave.
0.269500	33.1	20.1	51.1	18.0	Ave.
1.306110	26.6	20.0	46.0	19.4	Ave.
1.463890	26.6	20.0	46.0	19.4	Ave.
1.574630	26.9	20.0	46.0	19.1	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.

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

(7) The provisions of §15.205 apply to intentional radiators operating under this section.

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

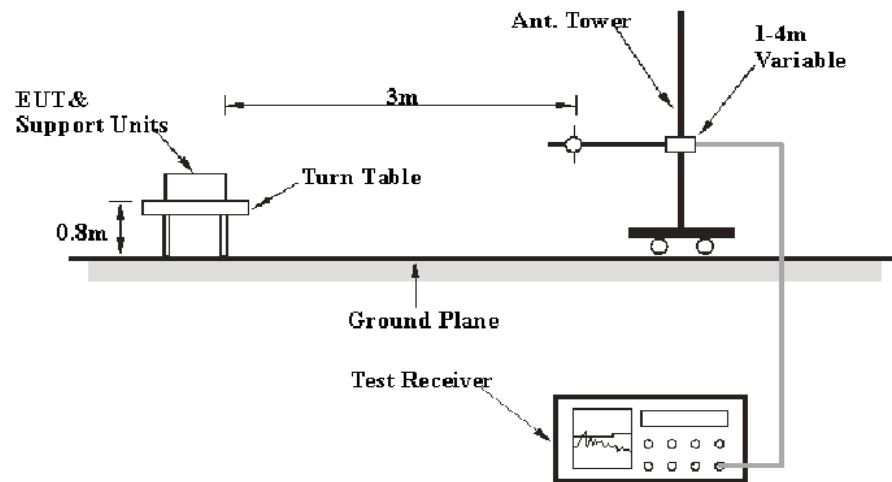
The general limit of -27 dBm EIRP ($= 68.2 \text{ dB}\mu V/m$) is applied for unwanted emission of U-NII devices.

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.

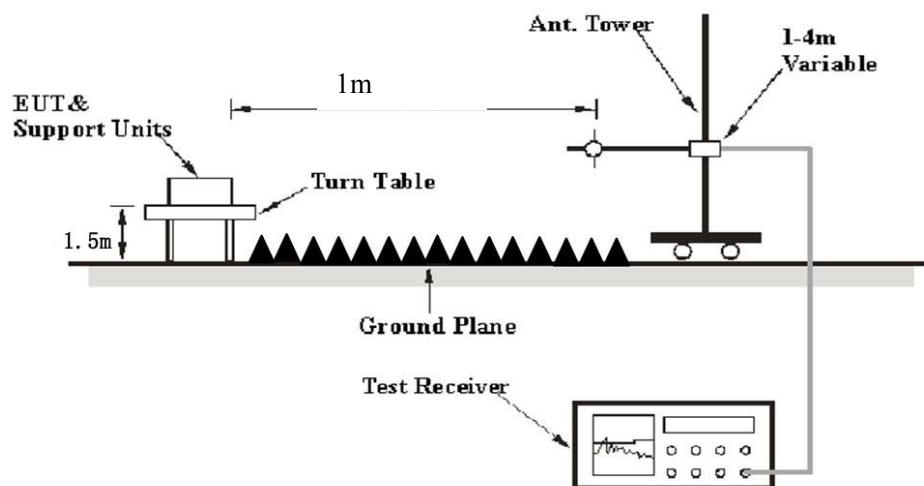
Although the peak limit of $74 \text{ dB}\mu V/m$ (20 dB above $54 \text{ dB}\mu V/m$) in the restricted band appears to be higher than $68.2 \text{ dB}\mu V/m$, the lower average limit of $54 \text{ dB}\mu V/m$ in the restricted bands needs to be complied to

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.

The adapter was connected to a 120VAC/60 Hz power source,

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 ^{Note 1}	/	Average
	1MHz	> 1/T ^{Note 2}	/	Average

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

Note 2: when duty cycle is less than 98%

Test Procedure

Radiated Spurious Emission

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

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

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

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

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

where

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

E_{Meas} is the field strength of the emission at the measurement distance, in dB μ V/m

d_{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.

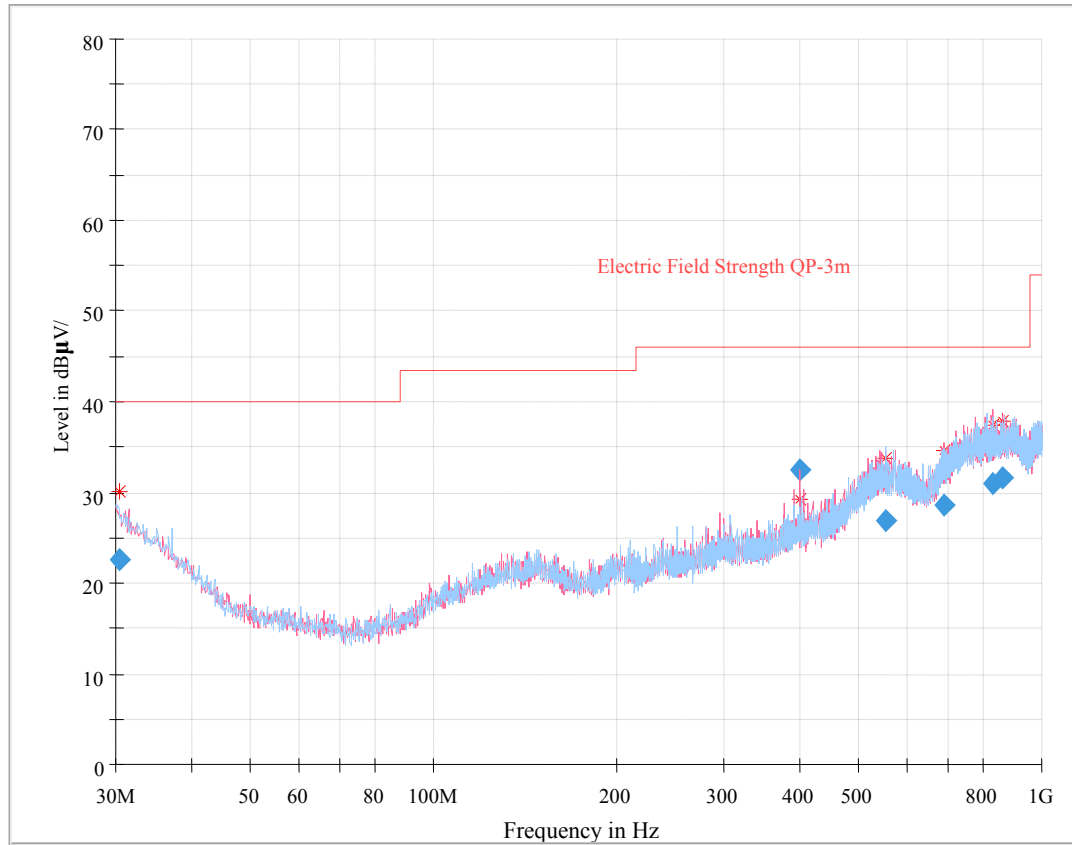
Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Jacob Kong on 2018-05-08.

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)
30.347119	22.61	337.0	H	0.0	0.5	40.00	17.39
399.982875	32.44	116.0	V	200.0	-0.2	46.00	13.56
553.475125	26.84	199.0	H	224.0	5.3	46.00	19.16
693.111875	28.63	229.0	V	52.0	6.5	46.00	17.37
828.695500	31.03	162.0	V	258.0	9.4	46.00	14.97
865.583625	31.51	108.0	V	110.0	9.8	46.00	14.49

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

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m) @1m	Corrected Amplitude (dBµV/m) @3m	FCC Part 15.407/205/209	
	Reading (dBµV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)				Limit (dBµV/m)	Margin (dB)
802.11a										
5180MHz										
5180.00	73.09	PK	293	1.3	H	41.80	114.89	105.39	/	/
5180.00	61.15	Ave.	293	1.3	H	41.80	102.95	93.45	/	/
5180.00	71.47	PK	238	1.3	V	41.80	113.27	103.77	/	/
5180.00	60.01	Ave.	238	1.3	V	41.80	101.81	92.31	/	/
5128.05	27.84	PK	268	2.4	H	41.80	69.64	60.14	74	13.86
5128.05	13.91	Ave.	268	2.4	H	41.80	55.71	46.21	54	7.79
5362.42	27.66	PK	119	1.7	H	41.83	69.49	59.99	74	14.01
5362.42	14.20	Ave.	119	1.7	H	41.83	56.03	46.53	54	7.47
10360.00	47.52	PK	103	2.2	H	15.66	63.18	53.68	74	20.32
10360.00	33.65	Ave.	103	2.2	H	15.66	49.31	39.81	54	14.19
5200MHz										
5200.00	73.81	PK	73	2.4	H	41.80	115.61	106.11	/	/
5200.00	61.39	Ave.	73	2.4	H	41.80	103.19	93.69	/	/
5200.00	70.52	PK	205	1.2	V	41.80	112.32	102.82	/	/
5200.00	59.18	Ave.	205	1.2	V	41.80	100.98	91.48	/	/
10400.00	46.23	PK	290	1.9	H	15.66	61.89	52.39	74	21.61
10400.00	32.58	Ave.	290	1.9	H	15.66	48.24	38.74	54	15.26
5240MHz										
5240.00	74.01	PK	276	2.1	H	41.80	115.81	106.31	/	/
5240.00	62.08	Ave.	276	2.1	H	41.80	103.88	94.38	/	/
5240.00	70.78	PK	285	1.7	V	41.80	112.58	103.08	/	/
5240.00	59.65	Ave.	285	1.7	V	41.80	101.45	91.95	/	/
5148.09	27.77	PK	48	1.1	H	41.80	69.57	60.07	74	13.93
5148.09	13.61	Ave.	48	1.1	H	41.80	55.41	45.91	54	8.09
5364.24	28.13	PK	185	2.1	H	41.83	69.96	60.46	74	13.54
5364.24	14.11	Ave.	185	2.1	H	41.83	55.94	46.44	54	7.56
10480.00	45.74	PK	236	1.1	H	16.56	62.30	52.8	74	21.2
10480.00	32.50	Ave.	236	1.1	H	16.56	49.06	39.56	54	14.44

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m) @1m	Corrected Amplitude (dBµV/m) @3m	FCC Part 15.407/205/209	
	Reading (dBµV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)				Limit (dBµV/m)	Margin (dB)
802.11n20										
5180MHz										
5180.00	73.67	PK	29	2.1	H	41.80	115.47	105.97	/	/
5180.00	60.85	Ave.	29	2.1	H	41.80	102.65	93.15	/	/
5180.00	71.35	PK	289	2.4	V	41.80	113.15	103.65	/	/
5180.00	60.69	Ave.	289	2.4	V	41.80	102.49	92.99	/	/
5124.2	27.25	PK	34	1.2	H	41.80	69.05	59.55	74	14.45
5124.2	13.62	Ave.	34	1.2	H	41.80	55.42	45.92	54	8.08
5369.18	28.42	PK	53	1.9	H	41.83	70.25	60.75	74	13.25
5369.18	14.15	Ave.	53	1.9	H	41.83	55.98	46.48	54	7.52
10360	47.06	PK	295	1.9	H	15.66	62.72	53.22	74	20.78
10360	32.98	Ave.	295	1.9	H	15.66	48.64	39.14	54	14.86
5200MHz										
5200.00	73.65	PK	328	1.0	H	41.80	115.45	105.95	/	/
5200.00	61.38	Ave.	328	1.0	H	41.80	103.18	93.68	/	/
5200.00	71.60	PK	203	1.0	V	41.80	113.40	103.9	/	/
5200.00	60.33	Ave.	203	1.0	V	41.80	102.13	92.63	/	/
10400.00	46.26	PK	241	1.5	H	15.66	61.92	52.42	74	21.58
10400.00	32.62	Ave.	241	1.5	H	15.66	48.28	38.78	54	15.22
5240 MHz										
5240.00	73.60	PK	153	1.9	H	41.80	115.40	105.9	/	/
5240.00	62.05	Ave.	153	1.9	H	41.80	103.85	94.35	/	/
5240.00	71.58	PK	186	1.1	V	41.80	113.38	103.88	/	/
5240.00	60.42	Ave.	186	1.1	V	41.80	102.22	92.72	/	/
5085.32	27.25	PK	93	1.4	H	41.80	69.05	59.55	74	14.45
5085.32	13.62	Ave.	93	1.4	H	41.80	55.42	45.92	54	8.08
5384.05	28.11	PK	249	1.5	H	41.83	69.94	60.44	74	13.56
5384.05	14.18	Ave.	249	1.5	H	41.83	56.01	46.51	54	7.49
10480	46.26	PK	230	2.1	H	16.56	62.82	53.32	74	20.68
10480	32.62	Ave.	230	2.1	H	16.56	49.18	39.68	54	14.32

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m) @1m	Corrected Amplitude (dBμV/m) @3m	FCC Part 15.407/205/209	
	Reading (dBμV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)				Limit (dBμV/m)	Margin (dB)
802.11n40										
5190MHz										
5190.00	70.91	PK	165	2.4	H	41.80	111.71	102.21	/	/
5190.00	55.99	Ave.	165	2.4	H	41.80	97.79	88.29	/	/
5190.00	67.86	PK	189	1.5	V	41.80	109.66	100.16	/	/
5190.00	55.94	Ave.	189	1.5	V	41.80	97.74	88.24	/	/
5123.74	27.68	PK	268	1.3	H	41.80	69.48	59.98	74	14.02
5123.74	13.62	Ave.	268	1.3	H	41.80	55.42	45.92	54	8.08
5367.11	27.62	PK	74	1.3	H	41.83	69.45	59.95	74	14.05
5367.11	14.21	Ave.	74	1.3	H	41.83	56.04	46.54	54	7.46
10380	47.60	PK	163	2.0	H	15.66	63.26	53.76	74	20.24
10380	32.77	Ave.	163	2.0	H	15.66	48.43	38.93	54	15.07
5230MHz										
5230.00	71.18	PK	100	1.2	H	41.80	112.98	103.48	/	/
5230.00	58.38	Ave.	100	1.2	H	41.80	100.18	90.68	/	/
5230.00	68.40	PK	153	1.6	V	41.80	110.20	100.7	/	/
5230.00	56.85	Ave.	153	1.6	V	41.80	98.65	89.15	/	/
5108.64	27.61	PK	272	1.9	H	41.80	69.41	59.91	74	14.09
5108.64	13.63	Ave.	272	1.9	H	41.80	55.43	45.93	54	8.07
5370.31	27.82	PK	202	2.2	H	41.83	69.65	60.15	74	13.85
5370.31	14.14	Ave.	202	2.2	H	41.83	55.97	46.47	54	7.53
10460	46.68	PK	11	2.4	H	16.56	63.24	53.74	74	20.26
10460	32.34	Ave.	11	2.4	H	16.56	48.90	39.4	54	14.6

5250-5350MHz:

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m) @1m	Corrected Amplitude (dBµV/m) @3m	FCC Part 15.407/205/209	
	Reading (dBµV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)				Limit (dBµV/m)	Margin (dB)
802.11a										
5260 MHz										
5260.00	74.91	PK	308	1.7	H	42.00	116.91	107.41	/	/
5260.00	63.10	Ave.	308	1.7	H	42.00	105.10	95.6	/	/
5260.00	69.72	PK	17	1.8	V	42.00	111.72	102.22	/	/
5260.00	58.63	Ave.	17	1.8	V	42.00	100.63	91.13	/	/
5143.21	27.83	PK	194	1.8	H	41.80	69.63	60.13	74	13.87
5143.21	13.61	Ave.	194	1.8	H	41.80	55.41	45.91	54	8.09
5362.12	28.02	PK	86	2.1	H	41.83	69.85	60.35	74	13.65
5362.12	14.20	Ave.	86	2.1	H	41.83	56.03	46.53	54	7.47
10520	45.95	PK	211	1.0	H	16.56	62.51	53.01	74	20.99
10520	31.99	Ave.	211	1.0	H	16.56	48.55	39.05	54	14.95
5280MHz										
5280.00	74.08	PK	56	1.5	H	42.00	116.08	106.58	/	/
5280.00	62.84	Ave.	56	1.5	H	42.00	104.84	95.34	/	/
5280.00	69.33	PK	195	1.6	V	42.00	111.33	101.83	/	/
5280.00	58.03	Ave.	195	1.6	V	42.00	100.03	90.53	/	/
10560	46.02	PK	163	1.0	H	17.97	63.99	54.49	74	19.51
10560	32.03	Ave.	163	1.0	H	17.97	50.00	40.5	54	13.5
5320MHz										
5320.00	73.89	PK	173	2.0	H	42.00	115.89	106.39	/	/
5320.00	63.26	Ave.	173	2.0	H	42.00	105.26	95.76	/	/
5320.00	69.58	PK	345	1.2	V	42.00	111.58	102.08	/	/
5320.00	58.51	Ave.	345	1.2	V	42.00	100.51	91.01	/	/
5130.15	27.40	PK	321	1.7	H	41.80	69.20	59.7	74	14.3
5130.15	13.63	Ave.	321	1.7	H	41.80	55.43	45.93	54	8.07
5358.9	28.13	PK	208	1.5	H	41.83	69.96	60.46	74	13.54
5358.9	14.12	Ave.	208	1.5	H	41.83	55.95	46.45	54	7.55
10640	46.85	PK	50	1.4	H	17.97	64.82	45.32	74	18.68
10640	32.84	Ave.	50	1.4	H	17.97	50.81	41.31	54	12.69

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m) @1m	Corrected Amplitude (dBμV/m) @3m	FCC Part 15.407/205/209	
	Reading (dBμV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)				Limit (dBμV/m)	Margin (dB)
802.11n20										
5260 MHz										
5260.00	72.14	PK	273	2.2	H	42.00	114.14	104.64	/	/
5260.00	61.09	Ave.	273	2.2	H	42.00	103.09	93.59	/	/
5260.00	68.59	PK	185	1.2	V	42.00	110.59	101.09	/	/
5260.00	57.29	Ave.	185	1.2	V	42.00	99.29	89.79	/	/
5127.36	27.60	PK	253	1.8	H	41.80	69.40	59.9	74	14.1
5127.36	13.65	Ave.	253	1.8	H	41.80	55.45	45.95	54	8.05
5353.42	27.61	PK	67	2.1	H	41.83	69.44	59.94	74	14.06
5353.42	14.09	Ave.	67	2.1	H	41.83	55.92	46.42	54	7.58
10520.00	46.35	PK	216	1.1	H	16.56	62.91	53.41	74	20.59
10520.00	32.26	Ave.	216	1.1	H	16.56	48.82	39.32	54	14.68
5280MHz										
5280.00	73.05	PK	356	1.9	H	42.00	115.05	105.55	/	/
5280.00	61.89	Ave.	356	1.9	H	42.00	103.89	94.39	/	/
5280.00	69.58	PK	47	2.5	V	42.00	111.58	102.08	/	/
5280.00	58.20	Ave.	47	2.5	V	42.00	100.20	90.7	/	/
10560	46.84	PK	201	1.0	H	17.97	64.81	55.31	74	18.69
10560	31.94	Ave.	201	1.0	H	17.97	49.91	40.41	54	13.59
5320MHz										
5320.00	72.72	PK	108	1.5	H	42.00	114.72	105.22	/	/
5320.00	61.37	Ave.	108	1.5	H	42.00	103.37	93.87	/	/
5320.00	69.62	PK	115	2.2	V	42.00	111.62	102.12	/	/
5320.00	58.37	Ave.	115	2.2	V	42.00	100.37	90.87	/	/
5106.69	27.82	PK	18	1.9	H	41.80	69.62	60.12	74	13.88
5106.69	13.67	Ave.	18	1.9	H	41.80	55.47	45.97	54	8.03
5373.88	28.02	PK	138	2.0	H	41.83	69.85	60.35	74	13.65
5373.88	14.13	Ave.	138	2.0	H	41.83	55.96	46.46	54	7.54
10640	46.63	PK	36	1.8	H	17.97	64.60	55.1	74	18.9
10640	32.50	Ave.	36	1.8	H	17.97	50.47	40.97	54	13.03

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m) @1m	Corrected Amplitude (dBμV/m) @3m	FCC Part 15.407/205/209	
	Reading (dBμV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)				Limit (dBμV/m)	Margin (dB)
802.11n40										
5270 MHz										
5270.00	70.28	PK	88	2.3	H	42.00	112.28	102.78	/	/
5270.00	59.08	Ave.	88	2.3	H	42.00	101.08	91.58	/	/
5270.00	66.62	PK	209	1.5	V	42.00	108.62	99.12	/	/
5270.00	55.66	Ave.	209	1.5	V	42.00	97.66	88.16	/	/
5086.21	27.51	PK	223	1.7	H	41.80	69.31	59.81	74	14.19
5086.21	13.68	Ave.	223	1.7	H	41.80	55.48	45.98	54	8.02
5377.73	27.80	PK	283	2.4	H	41.83	69.63	60.13	74	13.87
5377.73	14.15	Ave.	283	2.4	H	41.83	55.98	46.48	54	7.52
10540	46.17	PK	52	1.6	H	16.56	62.73	53.23	74	20.77
10540	31.59	Ave.	52	1.6	H	16.56	48.15	38.65	54	15.35
5310MHz										
5310.00	71.25	PK	244	1.6	H	42.00	113.25	103.75	/	/
5310.00	60.21	Ave.	244	1.6	H	42.00	102.21	92.71	/	/
5310.00	67.25	PK	175	2.3	V	42.00	109.25	99.75	/	/
5310.00	56.10	Ave.	175	2.3	V	42.00	98.10	88.6	/	/
5120.11	27.32	PK	79	1.2	H	41.80	69.12	59.62	74	14.38
5120.11	13.64	Ave.	79	1.2	H	41.80	55.44	45.94	54	8.06
5360.01	30.76	PK	252	2.5	H	41.83	72.59	63.09	74	10.91
5360.01	15.48	Ave.	252	2.5	H	41.83	57.31	47.81	54	6.19
10620	46.48	PK	177	2.2	H	17.97	64.45	54.95	74	19.05
10620	32.24	Ave.	177	2.2	H	17.97	50.21	40.71	54	13.29

5470-5725MHz:

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m) @1m	Corrected Amplitude (dBµV/m) @3m	FCC Part 15.407/205/209	
	Reading (dBµV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)				Limit (dBµV/m)	Margin (dB)
802.11a										
5500 MHz										
5500.00	73.01	PK	225	1.7	H	42.01	115.02	105.52	/	/
5500.00	62.27	Ave.	225	1.7	H	42.01	104.28	94.78	/	/
5500.00	69.81	PK	265	2.3	V	42.01	111.82	102.32	/	/
5500.00	59.14	Ave.	265	2.3	V	42.01	101.15	91.65	/	/
5446.43	27.76	PK	339	2.5	H	41.83	69.59	60.09	74	13.91
5446.43	14.41	Ave.	339	2.5	H	41.83	56.24	46.74	54	7.26
5731.25	27.61	PK	117	1.9	H	42.15	69.76	60.26	74	13.74
5731.25	14.24	Ave.	117	1.9	H	42.15	56.39	46.89	54	7.11
5600MHz										
5600.00	73.48	PK	5	1.2	H	42.07	115.55	106.05	/	/
5600.00	62.10	Ave.	5	1.2	H	42.07	104.17	94.67	/	/
5600.00	69.42	PK	71	1.5	V	42.07	111.49	101.99	/	/
5600.00	59.03	Ave.	71	1.5	V	42.07	101.10	91.6	/	/
11200	46.28	PK	265	2.4	H	20.10	66.38	56.88	74	17.12
11200	32.03	Ave.	265	2.4	H	20.10	52.13	42.63	54	11.37
5700MHz										
5700.00	73.12	PK	102	2.3	H	42.15	115.27	105.77	/	/
5700.00	62.26	Ave.	102	2.3	H	42.15	104.41	94.91	/	/
5700.00	69.42	PK	36	1.9	V	42.15	111.57	102.07	/	/
5700.00	58.22	Ave.	36	1.9	V	42.15	100.37	90.87	/	/
5442.38	27.86	PK	339	2.3	H	41.83	69.69	60.19	74	13.81
5442.38	14.38	Ave.	339	2.3	H	41.83	56.21	46.71	54	7.29
5737.2	27.59	PK	329	1.2	H	42.15	69.74	60.24	74	13.76
5737.2	14.32	Ave.	329	1.2	H	42.15	56.47	46.97	54	7.03
11400	46.82	PK	222	1.7	H	19.02	60.84	56.34	74	17.66
11400	32.42	Ave.	222	1.7	H	19.02	46.44	41.94	54	12.06

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m) @1m	Corrected Amplitude (dBμV/m) @3m	FCC Part 15.407/205/209	
	Reading (dBμV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)				Limit (dBμV/m)	Margin (dB)
802.11n20										
5500MHz										
5500.00	72.70	PK	95	1.8	H	42.01	114.71	105.21	/	/
5500.00	62.37	Ave.	95	1.8	H	42.01	104.38	94.88	/	/
5500.00	68.48	PK	113	1.1	V	42.01	110.49	100.99	/	/
5500.00	58.12	Ave.	113	1.1	V	42.01	100.13	90.63	/	/
5430.18	27.46	PK	171	1.6	H	41.83	69.29	59.79	74	14.21
5430.18	14.32	Ave.	171	1.6	H	41.83	56.15	46.65	54	7.35
5750.24	27.63	PK	160	2.0	H	42.08	69.71	60.21	74	13.79
5750.24	14.30	Ave.	160	2.0	H	42.08	56.38	46.88	54	7.12
11000	46.28	PK	176	1.2	H	19.07	65.35	55.85	74	18.15
11000	32.32	Ave.	176	1.2	H	19.07	51.39	41.89	54	12.11
5600MHz										
5600.00	73.06	PK	282	1.3	H	42.07	115.13	105.63	/	/
5600.00	62.58	Ave.	282	1.3	H	42.07	104.65	95.15	/	/
5600.00	69.33	PK	93	1.4	V	42.07	111.40	101.9	/	/
5600.00	58.72	Ave.	93	1.4	V	42.07	100.79	91.29	/	/
11200	46.52	PK	195	2.2	H	20.10	66.62	57.12	74	16.88
11200	32.24	Ave.	195	2.2	H	20.10	52.34	42.84	54	11.16
5700MHz										
5700.00	73.16	PK	198	1.9	H	56.95	115.31	105.81	/	/
5700.00	62.42	Ave.	198	1.9	H	56.95	104.57	95.07	/	/
5700.00	69.05	PK	301	2.2	V	56.95	111.20	101.7	/	/
5700.00	58.21	Ave.	301	2.2	V	56.95	100.36	90.86	/	/
5445.26	27.39	PK	298	1.7	H	57.98	69.22	59.72	74	14.28
5445.26	14.25	Ave.	298	1.7	H	57.98	56.08	46.58	54	7.42
5731.25	27.62	PK	24	1.7	H	56.95	69.77	60.27	74	13.73
5731.25	14.32	Ave.	24	1.7	H	56.95	56.47	46.97	54	7.03
11400	46.14	PK	55	1.6	H	19.02	65.16	55.66	74	18.34
11400	32.03	Ave.	55	1.6	H	19.02	51.05	41.55	54	12.45

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m) @1m	Corrected Amplitude (dBμV/m) @3m	FCC Part 15.407/205/209	
	Reading (dBμV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)				Limit (dBμV/m)	Margin (dB)
802.11n40										
5510 MHz										
5510.00	68.87	PK	27	1.3	H	42.01	110.88	101.38	/	/
5510.00	57.42	Ave.	27	1.3	H	42.01	99.43	89.93	/	/
5510.00	64.54	PK	268	2.5	V	42.01	106.55	97.05	/	/
5510.00	53.02	Ave.	268	2.5	V	42.01	95.03	85.53	/	/
5365.12	27.62	PK	37	1.1	H	41.83	69.45	59.95	74	14.05
5365.12	14.28	Ave.	37	1.1	H	41.83	56.11	46.61	54	7.39
5726.39	26.98	PK	252	1.6	H	42.15	69.13	59.63	74	14.37
5726.39	14.23	Ave.	252	1.6	H	42.15	56.38	46.88	54	7.12
11020.00	44.03	PK	9	1.7	H	19.07	63.10	53.6	74	19.4
11020.00	31.17	Ave.	9	1.7	H	19.07	50.24	40.74	54	13.26
5590MHz										
5590.00	69.68	PK	269	1.3	H	42.07	111.75	102.25	/	/
5590.00	59.01	Ave.	269	1.3	H	42.07	101.08	91.58	/	/
5590.00	66.11	PK	26	1.6	V	42.07	108.18	98.68	/	/
5590.00	55.74	Ave.	26	1.6	V	42.07	97.81	88.31	/	/
11180.00	44.84	PK	1	2.3	H	20.10	64.94	55.44	74	18.56
11180.00	31.42	Ave.	1	2.3	H	20.10	51.52	52.02	54	11.98
5670MHz										
5670.00	69.51	PK	279	2.0	H	42.15	111.66	102.16	/	/
5670.00	58.20	Ave.	279	2.0	H	42.15	100.35	90.85	/	/
5670.00	65.23	PK	154	1.5	V	42.15	107.38	97.88	/	/
5670.00	54.10	Ave.	154	1.5	V	42.15	96.25	86.75	/	/
5348.32	27.62	PK	175	1.9	H	42.00	69.62	60.12	74	13.88
5348.32	14.28	Ave.	175	1.9	H	42.00	56.28	46.78	54	7.22
5732.11	27.63	PK	192	1.5	H	42.15	69.78	60.28	74	13.72
5732.11	14.24	Ave.	192	1.5	H	42.15	56.39	46.89	54	7.11
11340.00	45.12	PK	148	1.4	H	20.10	65.22	55.72	74	18.28
11340.00	31.57	Ave.	148	1.4	H	20.10	51.67	42.17	54	11.83

5725-5850 MHz:

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m) @1m	Corrected Amplitude (dBμV/m) @3m	FCC Part 15.407/205/209	
	Reading (dBμV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)				Limit (dBμV/m)	Margin (dB)
802.11a										
5745MHz										
5745.00	75.19	PK	184	1.1	H	42.15	117.34	107.84	/	/
5745.00	63.97	Ave.	184	1.1	H	42.15	106.12	96.62	/	/
5745.00	70.07	PK	336	1.4	V	42.15	112.22	102.72	/	/
5745.00	59.75	Ave.	336	1.4	V	42.15	101.9	92.40	/	/
5690.58	36.99	PK	155	2.3	H	42.15	79.14	69.64	98.23	28.59
5717.51	37.68	PK	155	2.3	H	42.15	79.83	70.33	110.1	39.77
5724.46	38.96	PK	245	2.4	H	42.15	81.11	71.61	120.97	49.36
5856.61	38.04	PK	245	2.4	H	42.55	80.59	71.09	110.35	39.26
11490	55.52	PK	261	1.3	H	18.92	74.44	64.94	74	9.06
11490	42.01	Ave.	261	1.3	H	18.92	60.93	51.43	54	2.57
5785MHz										
5785.00	72.57	PK	353	1.9	H	42.08	114.65	105.15	/	/
5785.00	62.51	Ave.	353	1.9	H	42.08	104.59	95.09	/	/
5785.00	72.87	PK	239	1.1	V	42.08	114.95	105.45	/	/
5785.00	62.77	Ave.	239	1.1	V	42.08	104.85	95.35	/	/
11570.00	52.17	PK	357	2.2	H	19.17	71.34	61.84	74	12.16
11570.00	38.56	Ave.	357	2.2	H	19.17	57.73	48.23	54	5.77
5825MHz										
5825.00	70.94	PK	243	1.1	H	42.08	113.02	103.52	/	/
5825.00	60.75	Ave.	243	1.1	H	42.08	102.83	93.33	/	/
5825.00	69.29	PK	4	1.6	V	42.08	111.37	101.87	/	/
5825.00	59.48	Ave.	4	1.6	V	42.08	101.56	92.06	/	/
5852.23	37.78	PK	215	1.2	H	42.55	80.33	70.83	117.12	46.29
5859.65	37.69	PK	215	1.2	H	42.55	80.24	70.74	109.5	38.76
5879.64	37.89	PK	2	2.0	H	42.55	80.44	70.94	101.77	30.83
5715.54	37.61	PK	2	2.0	H	42.15	79.76	70.26	109.55	39.29
11650	49.72	PK	328	2.3	H	19.17	68.89	59.39	74	14.61
11650	34.91	Ave.	328	2.3	H	19.17	54.08	44.58	54	9.42

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m) @1m	Corrected Amplitude (dBµV/m) @3m	FCC Part 15.407/205/209	
	Reading (dBµV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)				Limit (dBµV/m)	Margin (dB)
802.11n20										
5745MHz										
5745.00	75.39	PK	48	2.1	H	42.15	117.54	108.04	/	/
5745.00	64.86	Ave.	48	2.1	H	42.15	107.01	97.51	/	/
5745.00	73.08	PK	134	2.2	V	42.15	115.23	105.73	/	/
5745.00	63.14	Ave.	134	2.2	V	42.15	105.29	95.79	/	/
5722.44	40.78	PK	65	2.4	H	56.95	97.73	88.23	116.36	28.13
5709.62	37.81	PK	65	2.4	H	56.95	94.76	85.26	107.89	22.63
5684.49	38.45	PK	264	1.4	H	56.95	95.4	85.90	93.72	7.82
5865.54	37.97	PK	264	1.4	H	57.61	95.58	86.08	107.85	21.77
11490	51.27	PK	297	1.4	H	18.92	70.19	60.69	74	13.31
11490	36.19	Ave.	297	1.4	H	18.92	55.11	45.61	54	8.39
5785MHz										
5785.00	74.21	PK	317	2.4	H	42.08	116.29	106.79	/	/
5785.00	64.33	Ave.	317	2.4	H	42.08	106.41	96.91	/	/
5785.00	72.64	PK	358	1.5	V	42.08	114.72	105.22	/	/
5785.00	62.75	Ave.	358	1.5	V	42.08	104.83	95.33	/	/
11570	51.71	PK	230	2.0	H	19.17	70.88	61.38	74	12.62
11570	35.97	Ave.	230	2.0	H	19.17	55.14	45.64	54	8.36
5825 MHz										
5825.00	74.04	PK	354	1.9	H	42.08	116.12	106.62	/	/
5825.00	64.01	Ave.	354	1.9	H	42.08	106.09	96.59	/	/
5825.00	72.89	PK	9	1.6	V	42.08	114.97	105.47	/	/
5825.00	63.62	Ave.	9	1.6	V	42.08	105.7	96.20	/	/
5852.11	38.15	PK	328	2.4	H	57.61	95.76	86.26	117.39	31.13
5865.35	37.99	PK	328	2.4	H	57.61	95.6	86.10	107.9	21.80
5694.49	37.36	PK	186	1.8	H	56.95	94.31	84.81	101.12	16.31
5711.23	38.07	PK	246	1.1	H	56.95	95.02	85.52	108.34	22.82
11650	50.12	PK	209	1.1	H	19.17	69.29	59.79	74	14.21
11650	36.01	Ave.	209	1.1	H	19.17	55.18	45.68	54	8.32

Frequency (MHz)	Receiver		Turntable	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m) @1m	Corrected Amplitude (dBμV/m) @3m	FCC Part 15.407/205/209	
	Reading (dBμV) @1m	PK/QP/Ave.	Degree	Height (m)	Polar (H / V)				Limit (dBμV/m)	Margin (dB)
802.11n40										
5755MHz										
5755.00	68.84	PK	246	2.0	H	42.08	110.92	101.42	/	/
5755.00	58.42	Ave.	246	2.0	H	42.08	100.50	91.00	/	/
5755.00	63.32	PK	358	2.5	V	42.08	105.40	95.9	/	/
5755.00	52.75	Ave.	358	2.5	V	42.08	94.83	85.33	/	/
5724.01	29.01	PK	264	2.2	H	42.15	71.16	61.66	119.94	58.28
5714.22	28.56	PK	264	2.2	H	42.15	70.71	61.21	109.18	47.97
5687.69	28.49	PK	281	1.8	H	42.15	70.64	61.14	96.09	34.95
5865.32	28.55	PK	281	1.8	H	42.55	71.10	61.6	107.91	46.31
11510	47.00	PK	5	1.6	H	18.92	65.92	56.42	74	17.58
11510	32.15	Ave.	5	1.6	H	18.92	51.07	41.57	54	12.43
5795MHz										
5795.00	68.23	PK	76	1.9	H	42.08	110.31	100.81	/	/
5795.00	57.56	Ave.	76	1.9	H	42.08	99.64	90.14	/	/
5795.00	65.21	PK	13	2.1	V	42.08	107.29	97.79	/	/
5795.00	54.11	Ave.	13	2.1	V	42.08	96.19	86.69	/	/
5853.12	28.64	PK	332	2.3	H	42.55	71.19	61.69	115.09	53.4
5866.04	28.53	PK	332	2.3	H	42.55	71.08	61.58	107.71	46.13
5881.19	28.77	PK	278	2.2	H	42.55	71.32	61.82	100.62	38.8
5712.39	28.42	PK	278	2.2	H	42.15	70.57	61.07	108.67	47.6
11590	46.74	PK	343	2.1	H	19.17	65.91	56.41	74	17.59
11590	32.35	Ave.	343	2.1	H	19.17	51.52	42.02	54	11.98

Note:

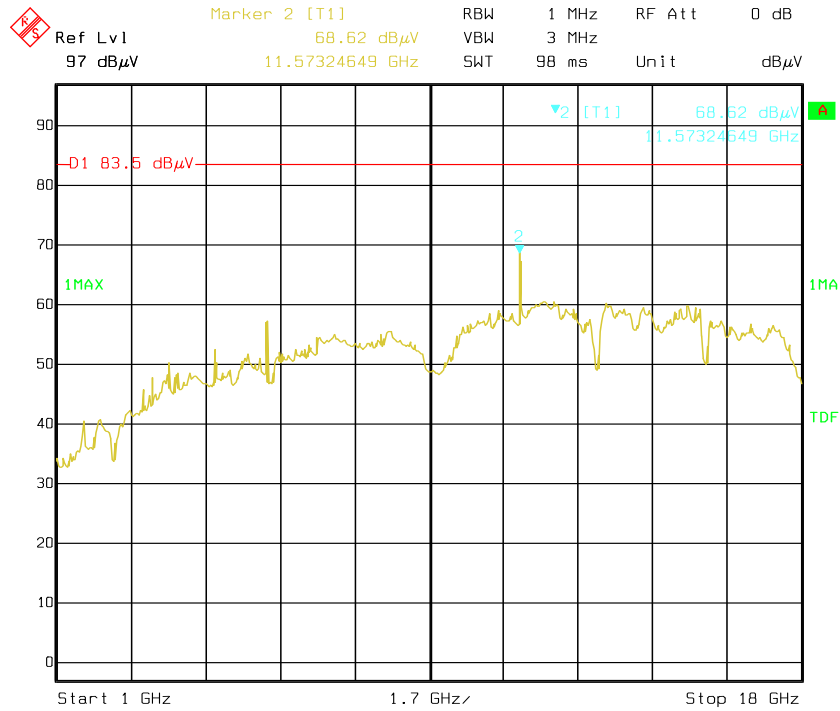
Corrected Amplitude = Corrected Factor + Reading

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

Margin = Limit- Corr. Amplitude

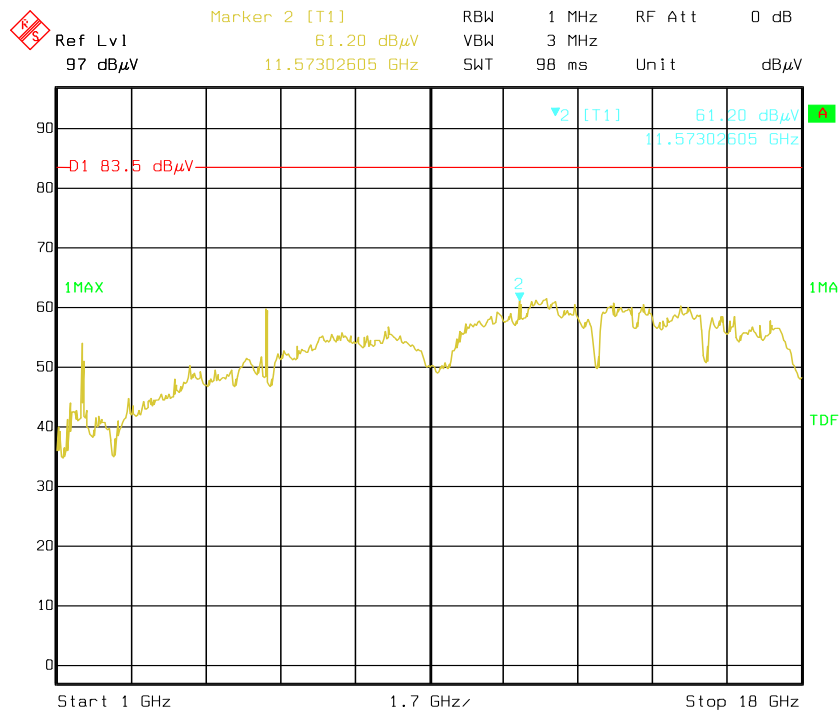
All other spurious emissions are 20 dB below the limit or are on the system noise floor level.

Pre-scan with 802.11n20 5785MHz, for Peak
Horizontal



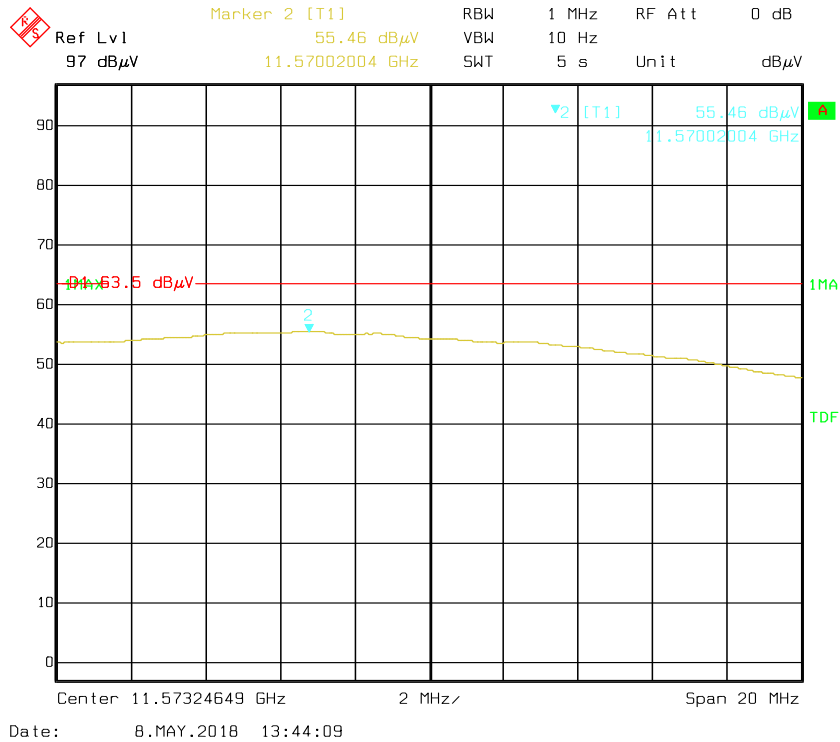
Date: 8.MAY.2018 13:42:05

Vertical

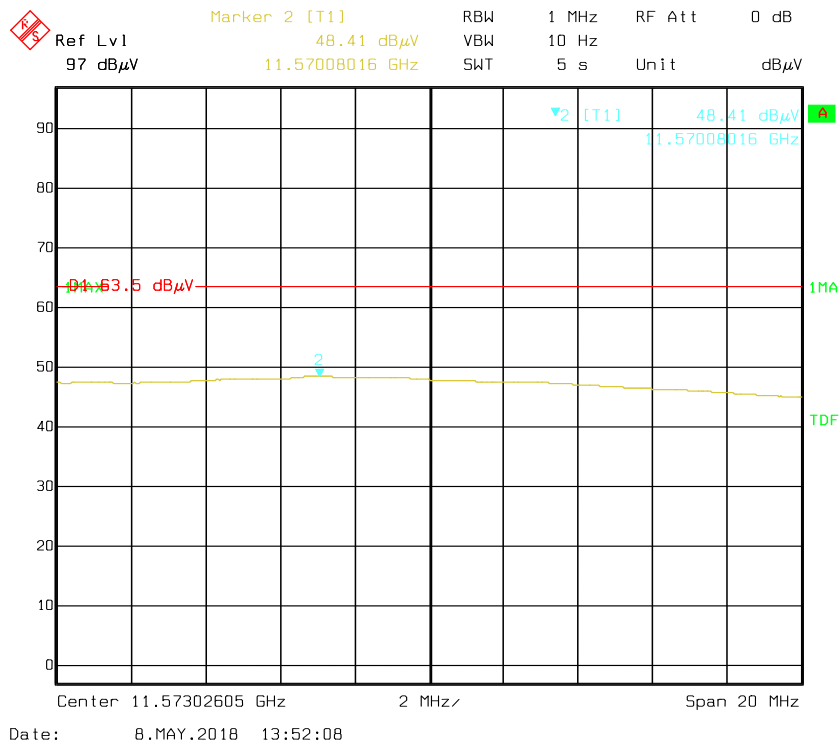


Date: 8.MAY.2018 13:49:04

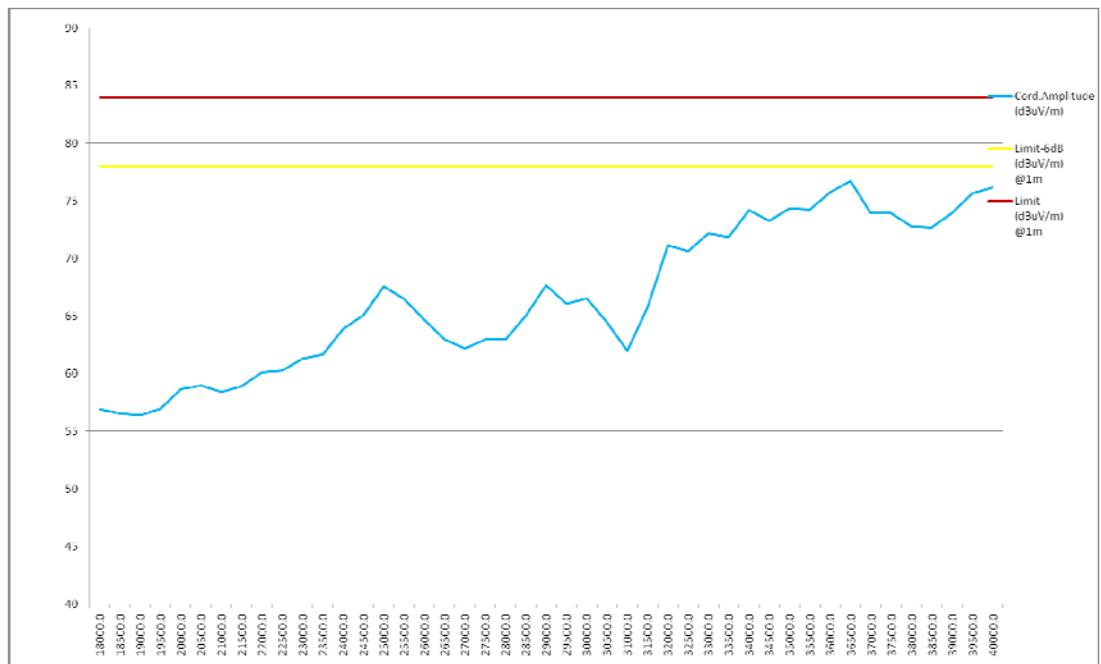
for Average Horizontal



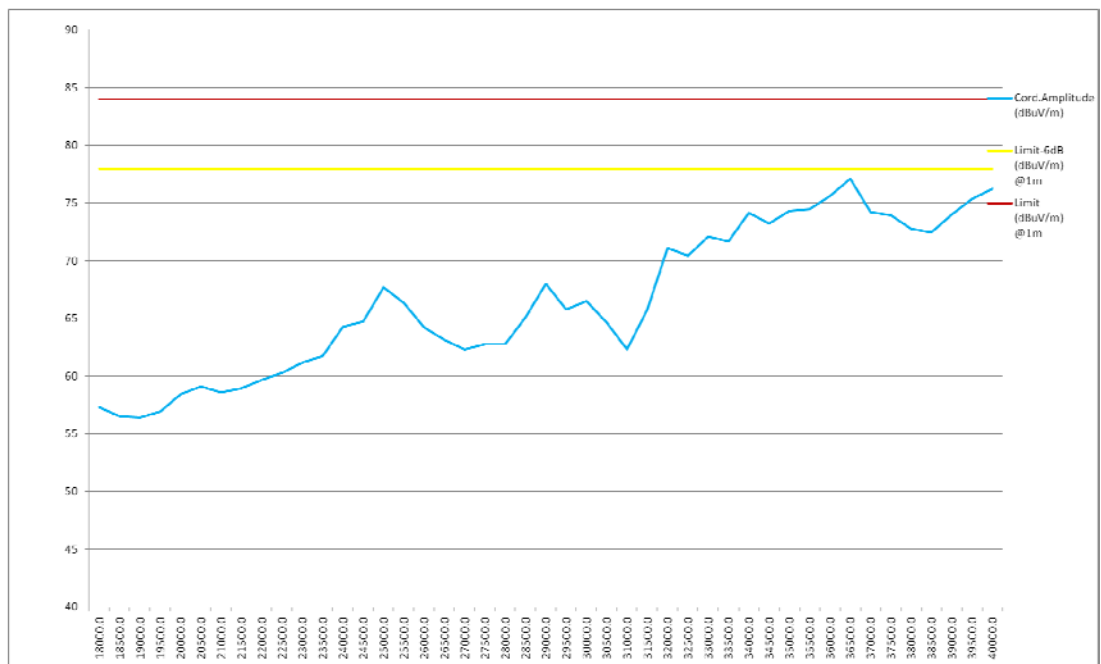
Vertical



Pre-scan for Above 18 GHz- Horizontal



Pre-scan for Above 18 GHz- Vertical



§15.407(B) (1), (2), (3), (4), –OUT OF BAND EMISSION**Applicable Standard**

FCC §15.407 (b) (1), (2), (3), (4);

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 EIRP of –27dBm/MHz.

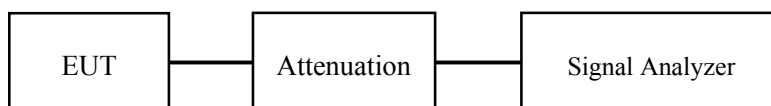
For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz.

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 EIRP of –27 dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band: 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.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Set RBW = 100 kHz
3. Set VBW $\geq 3 \times$ RBW
4. Perform a band-power integration across the 1 MHz bandwidth in which the band-edge emission level is to be measured. CAUTION: You must ensure that the spectrum analyzer or EMI receiver is set for peak-detection and max-hold for this measurement.

**Test Data****Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Jacob Kong on 2018-05-08.

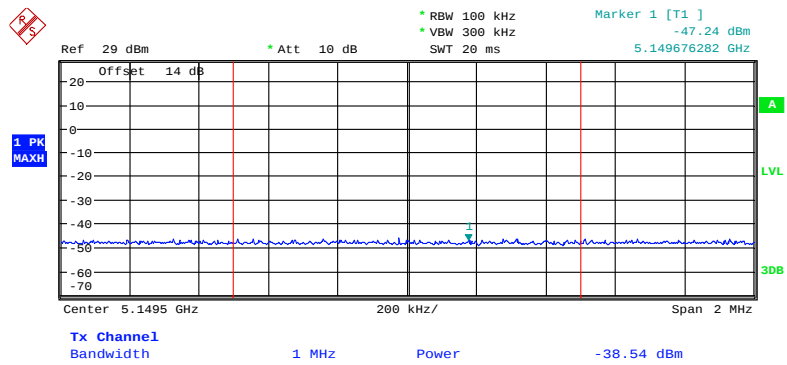
EUT operation mode: Transmitting

Note: Antenna gain was added into the test result.

5150 – 5250 MHz:

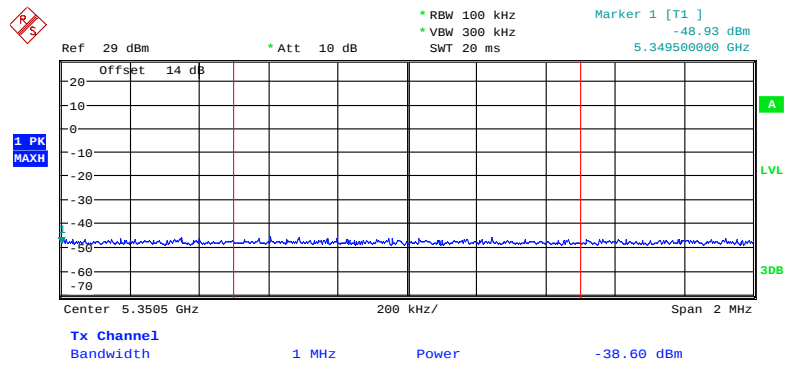
Mode	Channel	Frequency (MHz)	Band Edge (dBm/MHz)	Limit (dBm/MHz)
802.11 a	36	5180	-38.54	-27
	48	5240	-38.60	-27
802.11 n20	36	5180	-38.67	-27
	48	5240	-38.03	-27
802.11 n40	38	5190	-30.73	-27
	46	5230	-38.21	-27

802.11a mode, Band Edge, Left Side



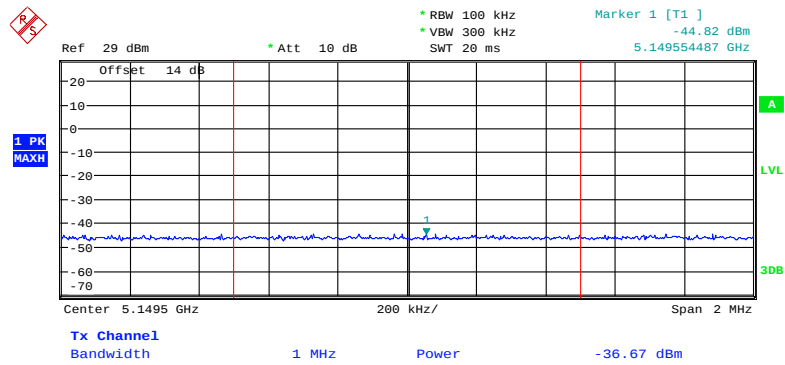
Date: 8.MAY.2018 20:26:30

802.11a mode, Band Edge, Right Side



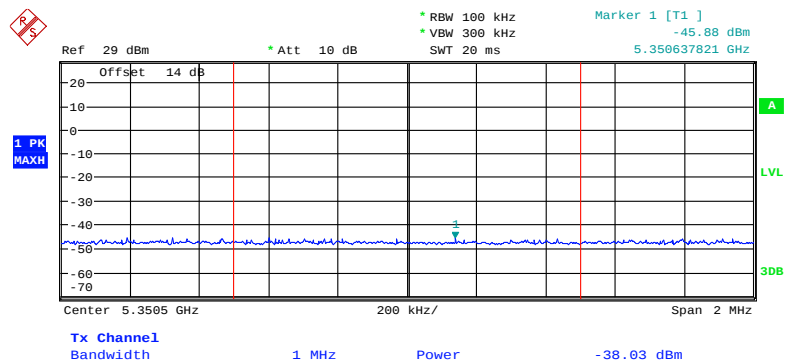
Date: 8.MAY.2018 20:30:18

802.11n20 mode, Band Edge, Left Side



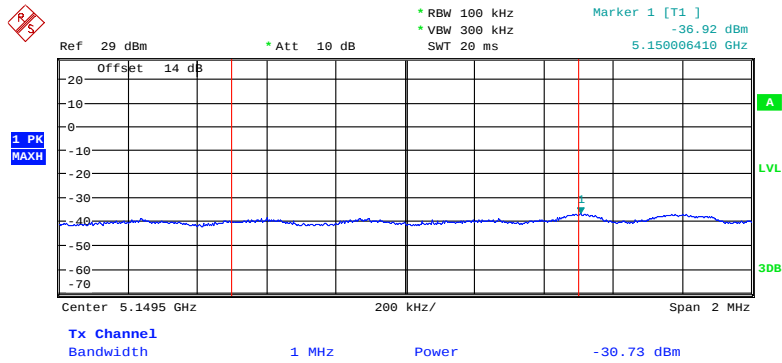
Date: 8.MAY.2018 21:47:35

802.11n20 mode, Band Edge, Right Side



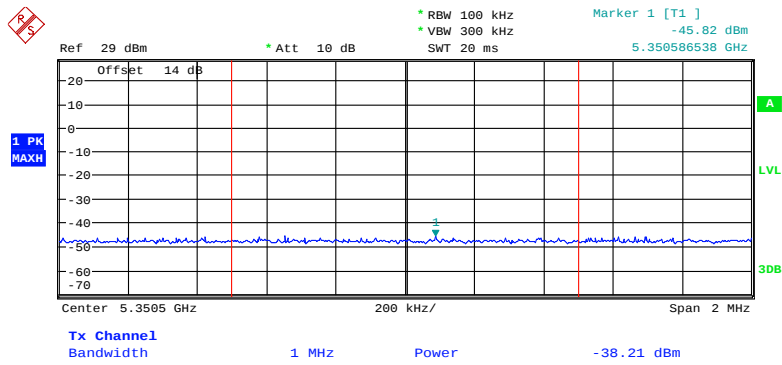
Date: 8.MAY.2018 21:50:17

802.11n40 mode, Band Edge, Left Side



Date: 8.MAY.2018 21:53:30

802.11 n40 mode, Band Edge, Right Side

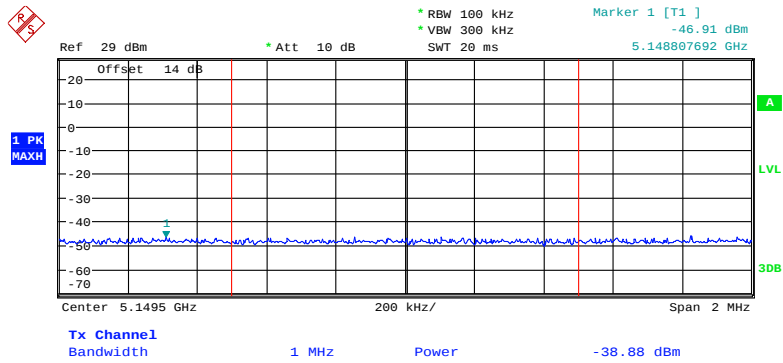


Date: 8.MAY.2018 21:55:34

5250 – 5350 MHz:

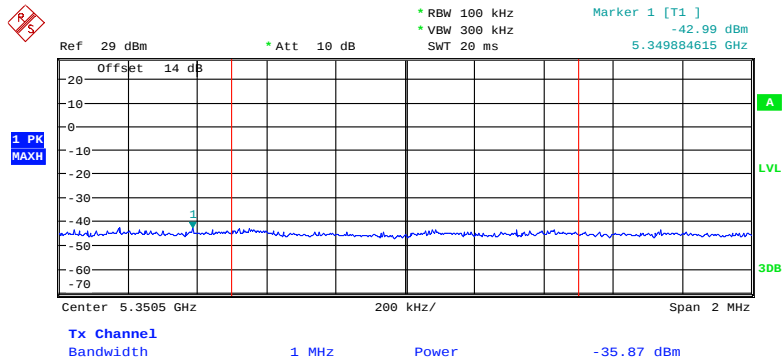
Mode	Channel	Frequency (MHz)	Band Edge (dBm/MHz)	Limit (dBm/MHz)
802.11 a	52	5260	-38.88	-27
	64	5320	-35.87	-27
802.11 n20	52	5260	-37.97	-27
	64	5320	-36.37	-27
802.11 n40	54	5270	-38.24	-27
	62	5310	-32.56	-27

802.11a mode, Band Edge, Left Side



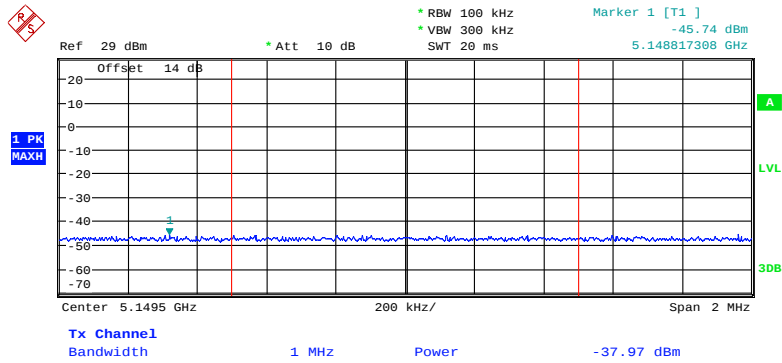
Date: 8.MAY.2018 20:34:24

802.11a mode, Band Edge, Right Side



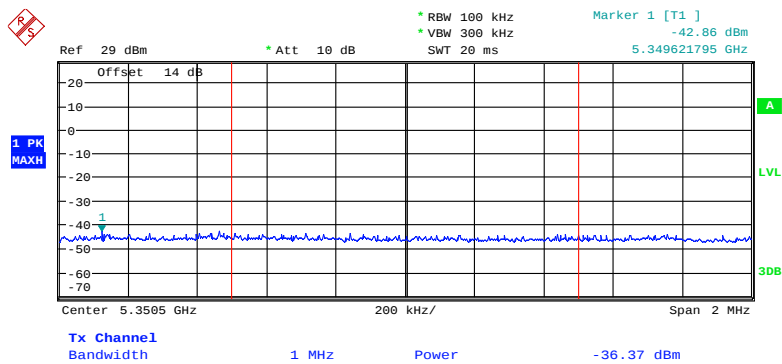
Date: 8.MAY.2018 20:35:32

802.11n20 mode, Band Edge, Left Side



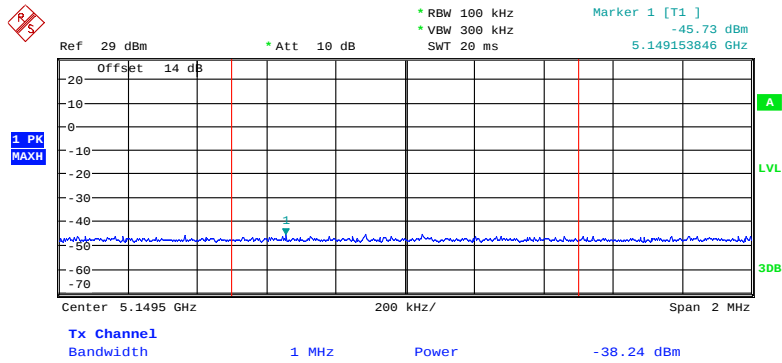
Date: 8.MAY.2018 21:41:12

802.11n20 mode, Band Edge, Right Side



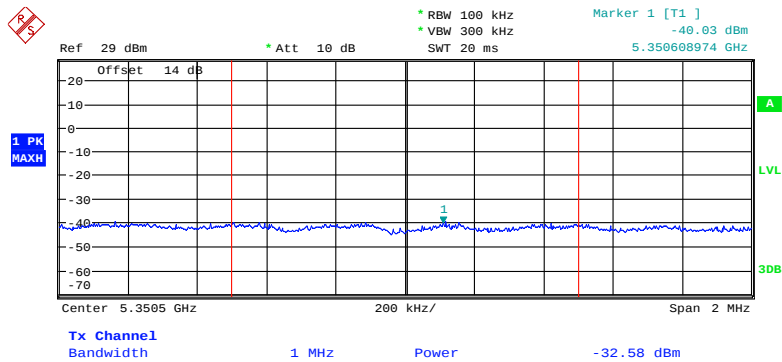
Date: 8.MAY.2018 21:44:26

802.11n40 mode, Band Edge, Left Side



Date: 8.MAY.2018 21:59:54

802.11 n40 mode, Band Edge, Right Side

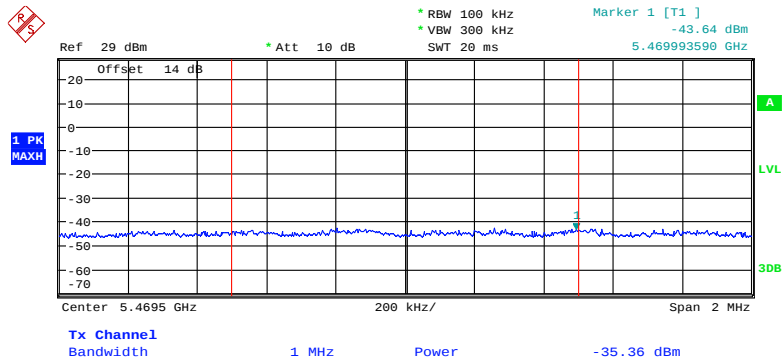


Date: 8.MAY.2018 21:57:57

5470 – 5725 MHz:

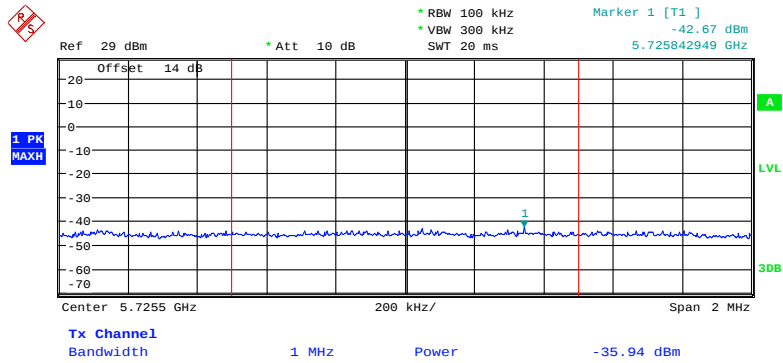
Mode	Channel	Frequency (MHz)	Band Edge (dBm/MHz)	Limit (dBm/MHz)
802.11 a	100	5500	-35.36	-27
	140	5700	-35.94	-27
802.11 n20	100	5500	-37.23	-27
	140	5700	-36.61	-27
802.11 n40	102	5510	-29.86	-27
	134	5670	-37.89	-27

802.11a mode, Band Edge, Left Side



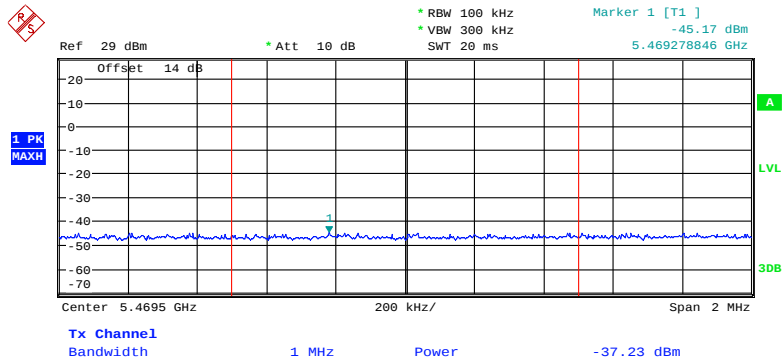
Date: 8.MAY.2018 20:48:38

802.11a mode, Band Edge, Right Side



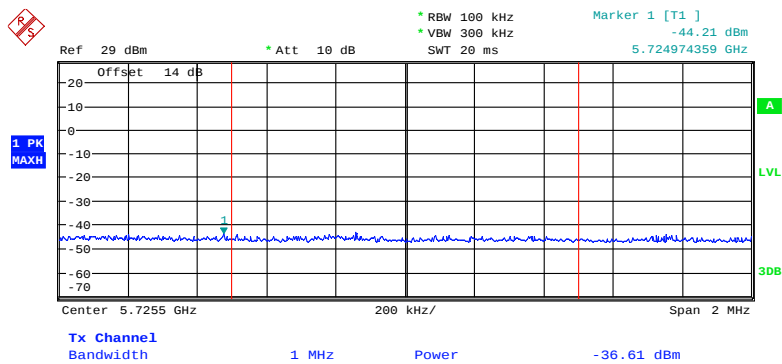
Date: 8.MAY.2018 20:51:04

802.11n20 mode, Band Edge, Left Side



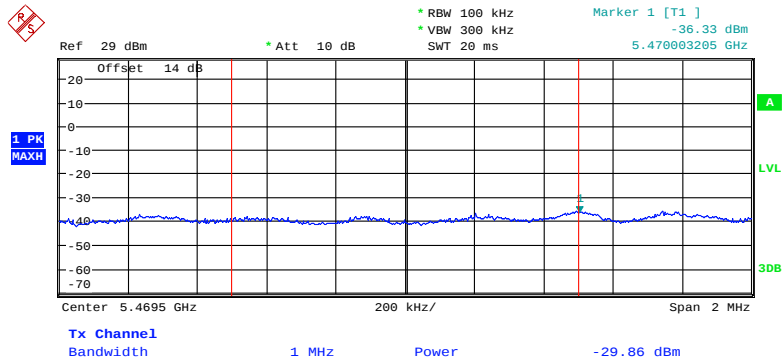
Date: 8.MAY.2018 21:38:12

802.11n20 mode, Band Edge, Right Side



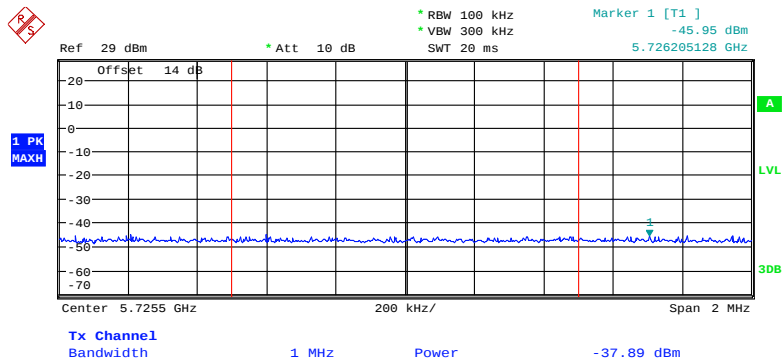
Date: 8.MAY.2018 21:29:22

802.11n40 mode, Band Edge, Left Side



Date: 8.MAY.2018 22:28:11

802.11 n40 mode, Band Edge, Right Side

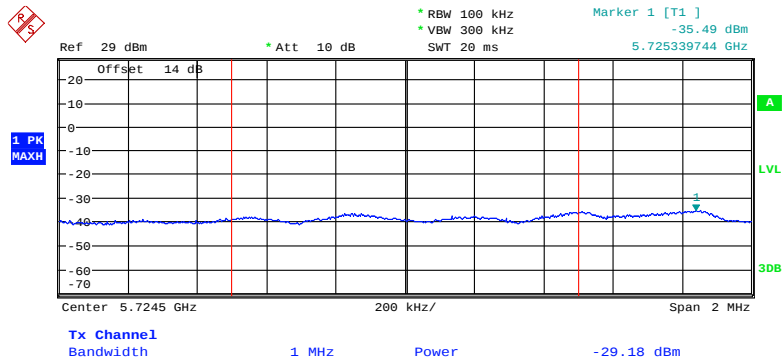


Date: 8.MAY.2018 22:29:24

5725-5850MHz:

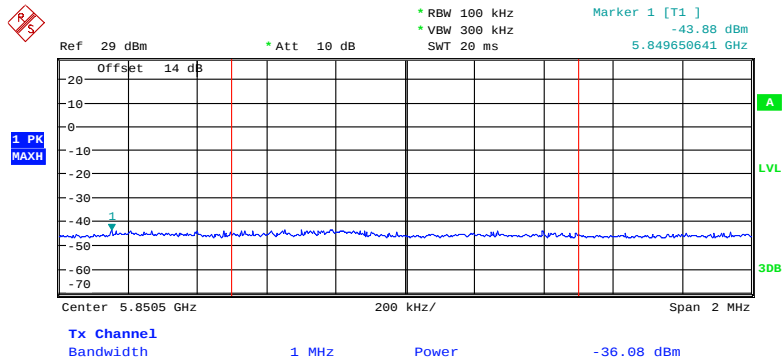
Mode	Channel	Frequency (MHz)	Band Edge (dBm/MHz)	Limit (dBm/MHz)
802.11 a	149	5745	-29.18	-27
	165	5825	-36.08	-27
802.11 n20	149	5745	-34.02	-27
	165	5825	-37.48	-27
802.11 n40	151	5755	-28.57	-27
	159	5795	-38.65	-27

802.11a mode, Band Edge, Left Side



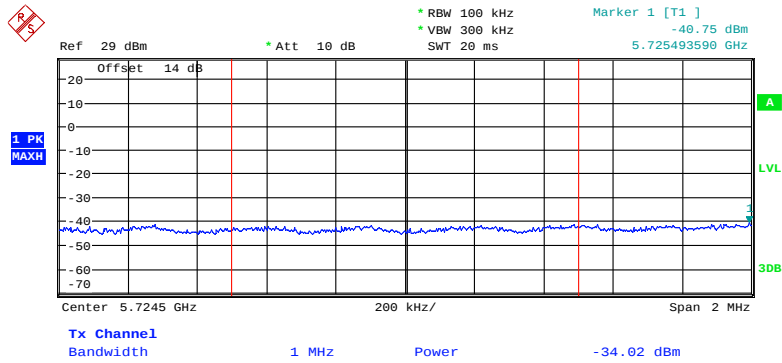
Date: 8.MAY.2018 21:22:26

802.11a mode, Band Edge, Right Side



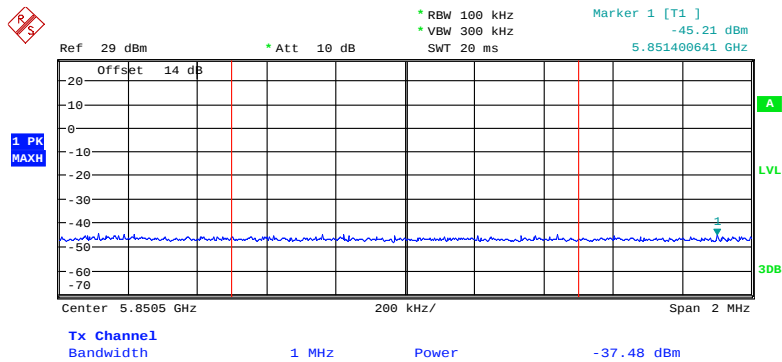
Date: 8.MAY.2018 21:24:03

802.11n20 mode, Band Edge, Left Side



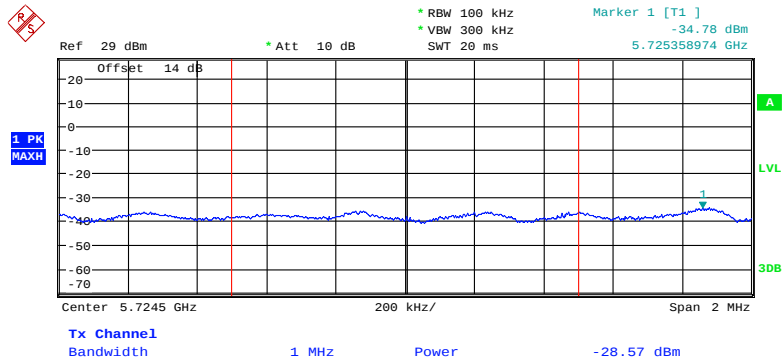
Date: 8.MAY.2018 21:27:09

802.11n20 mode, Band Edge, Right Side



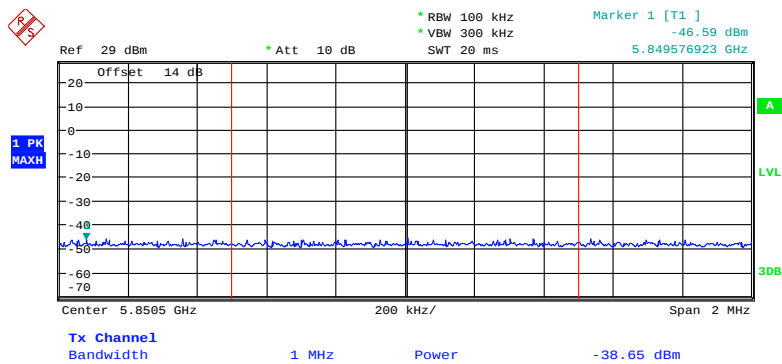
Date: 8.MAY.2018 21:25:26

802.11n40 mode, Band Edge, Left Side



Date: 8.MAY.2018 22:31:46

802.11n40 mode, Band Edge, Right Side



Date: 8.MAY.2018 22:33:31

FCC §15.407(a) (1) (5) – 26 dB EMISSION BANDWIDTH

Applicable Standard

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

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

Test Procedure

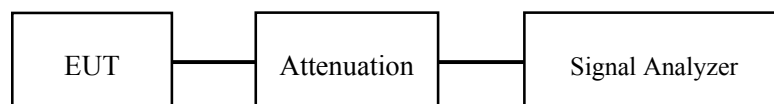
1. Emission Bandwidth (EBW)

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

2. Minimum Emission Bandwidth for the band 5.725-5.85 GHz

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Data**Environmental Conditions**

Temperature:	23.5~25 °C
Relative Humidity:	49~56 %
ATM Pressure:	109.0~101.0 kPa

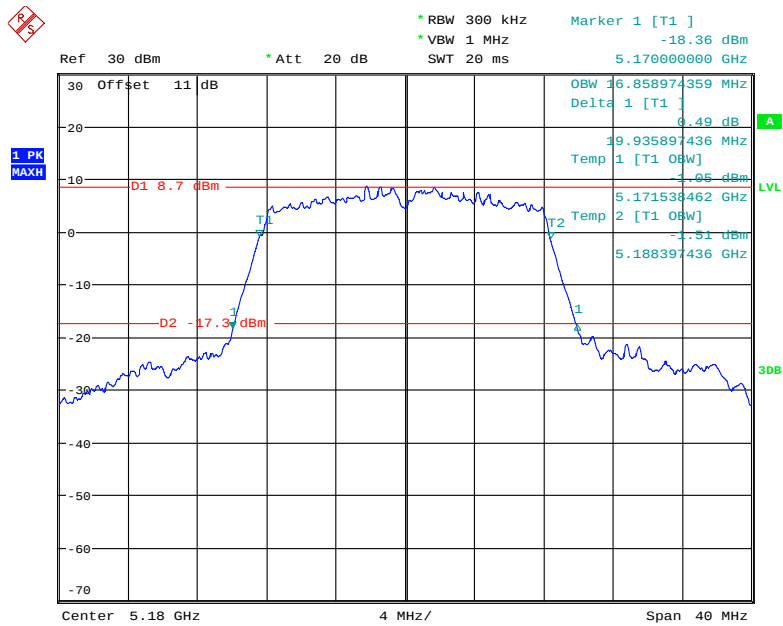
The testing was performed by Jacob Kong from 2018-04-16 to 2018-05-04.

EUT operation mode: Transmitting

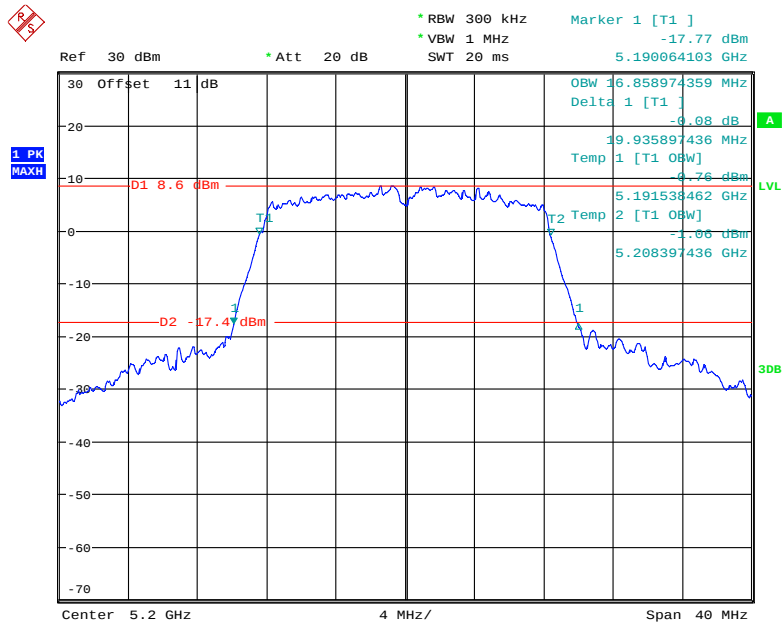
Test Result: Pass; please refer to the following tables and plots.

5120 MHz - 5250 MHz:

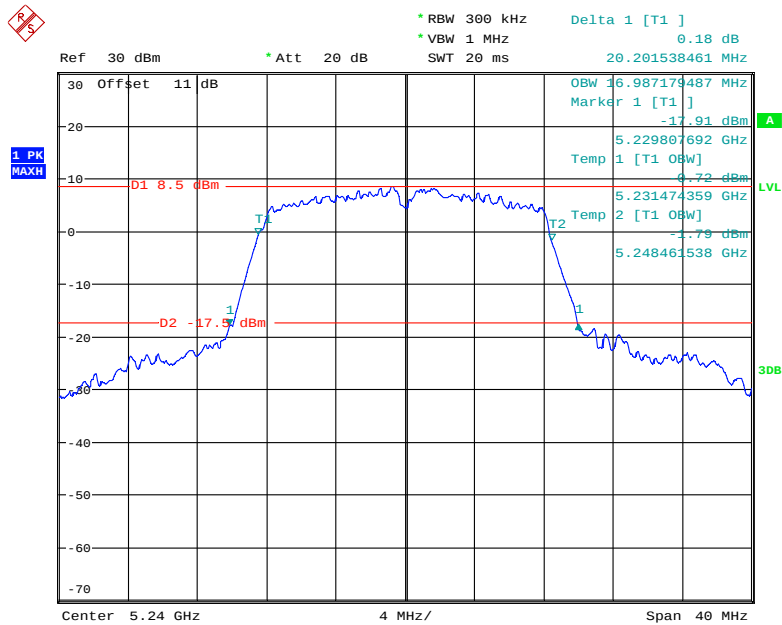
Frequency (MHz)	26dB bandwidth (MHz)	99% Bandwidth (MHz)	Remark
802.11a			No transmitted signal in the 99% bandwidth extends into the U-NII-2A band
5180	19.94	16.86	
5200	19.94	16.86	
5240	20.20	16.99	
802.11n20			
5180	20.19	17.82	
5200	20.27	17.76	
5240	20.45	17.76	
802.11n40			
5190	40.51	36.15	
5230	40.26	36.03	

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

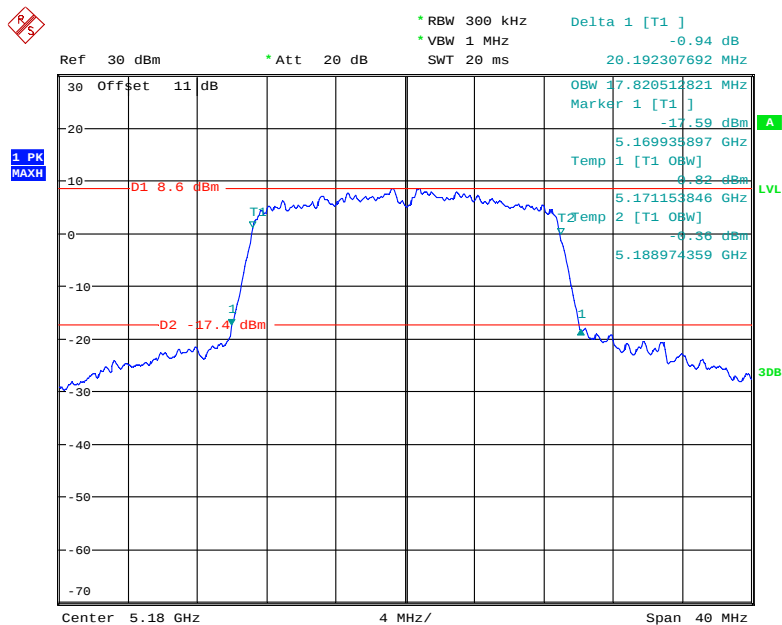
Date: 16.APR.2018 23:26:52

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

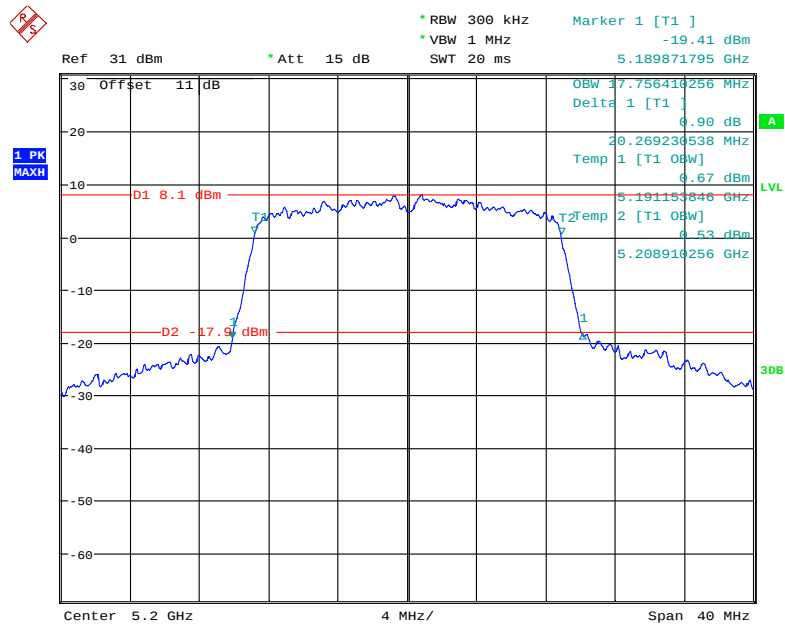
Date: 16.APR.2018 23:31:00

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

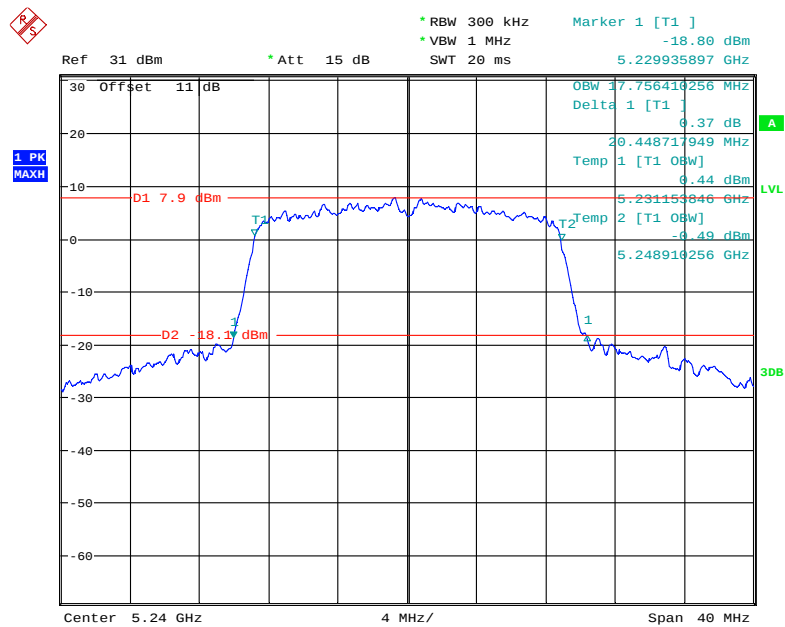
Date: 16.APR.2018 23:33:20

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

Date: 16.APR.2018 23:37:45

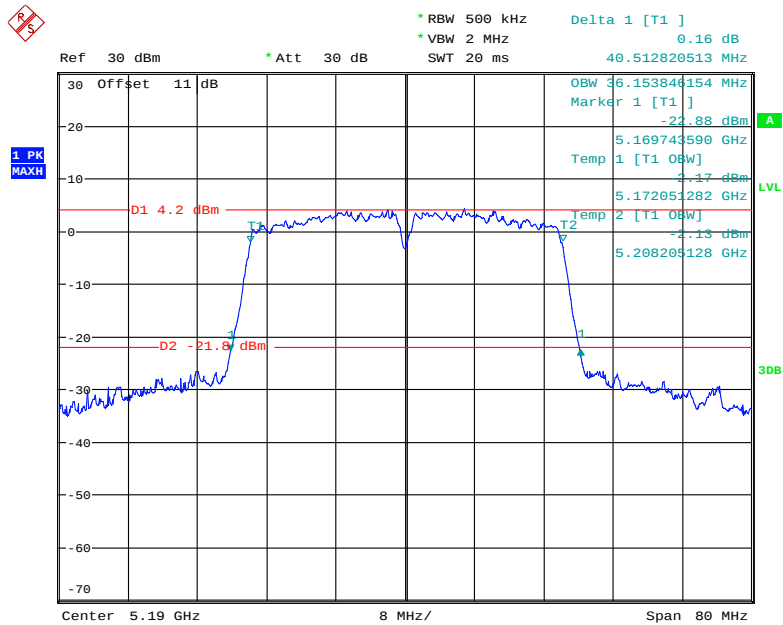
802.11n20 mode, 26 dB Emissions & 99% Occupied Bandwidth, 5200 MHz

Date: 4.MAY.2018 00:50:41

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

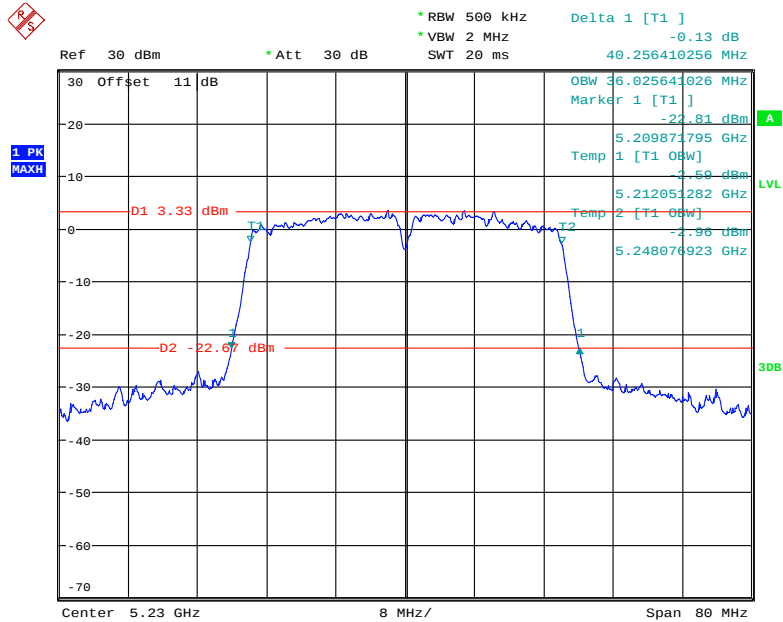
Date: 4.MAY.2018 00:52:13

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



Date: 18.APR.2018 20:39:00

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

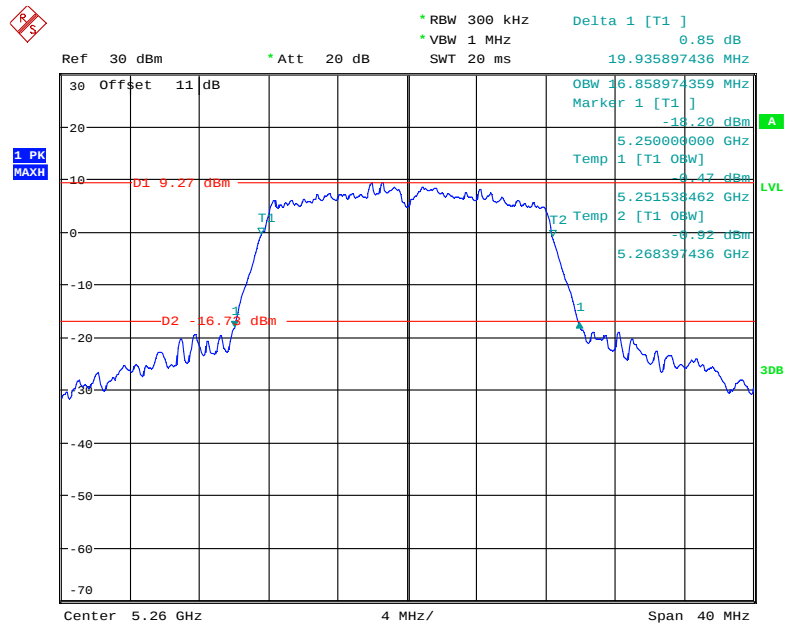


Date: 18.APR.2018 20:41:38

5250 MHz - 5350 MHz:

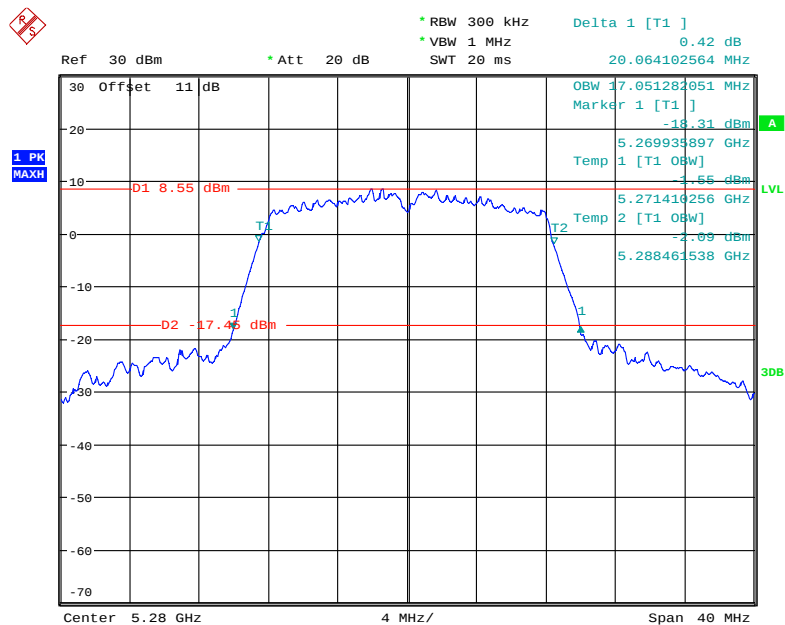
Frequency (MHz)	26dB bandwidth (MHz)	99% Bandwidth (MHz)
802.11a		
5260	19.94	16.86
5280	20.06	17.05
5320	20.13	17.05
802.11n20		
5260	20.19	17.76
5280	20.26	17.76
5320	20.45	17.76
802.11n40		
5270	40.38	36.15
5310	40.38	36.03

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



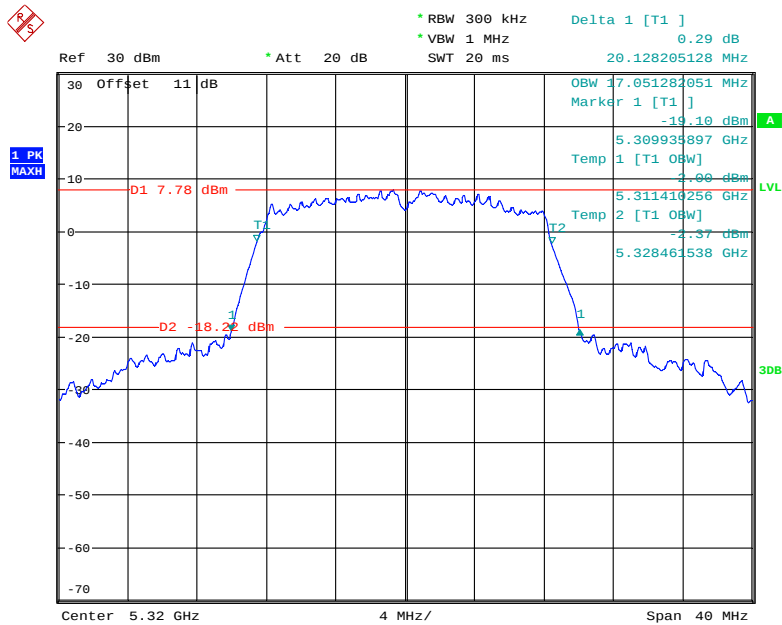
Date: 17.APR.2018 00:08:46

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



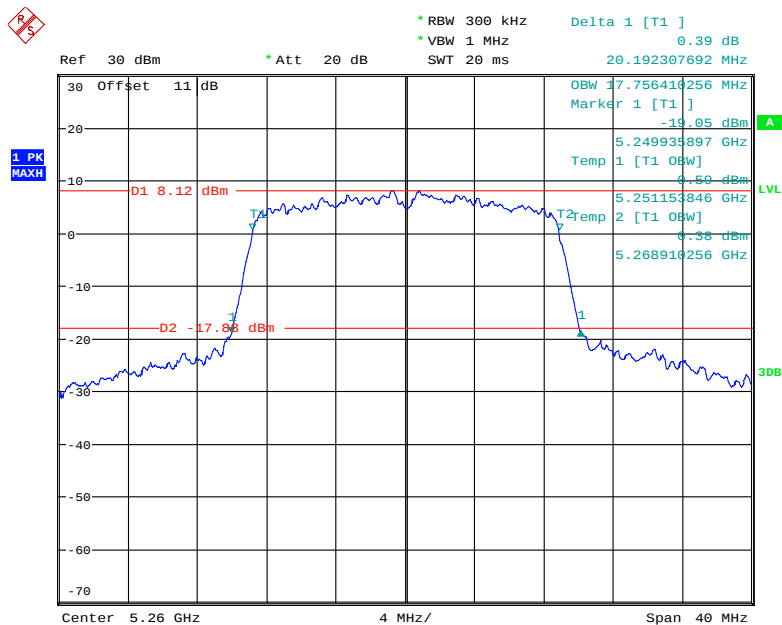
Date: 17.APR.2018 00:12:43

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



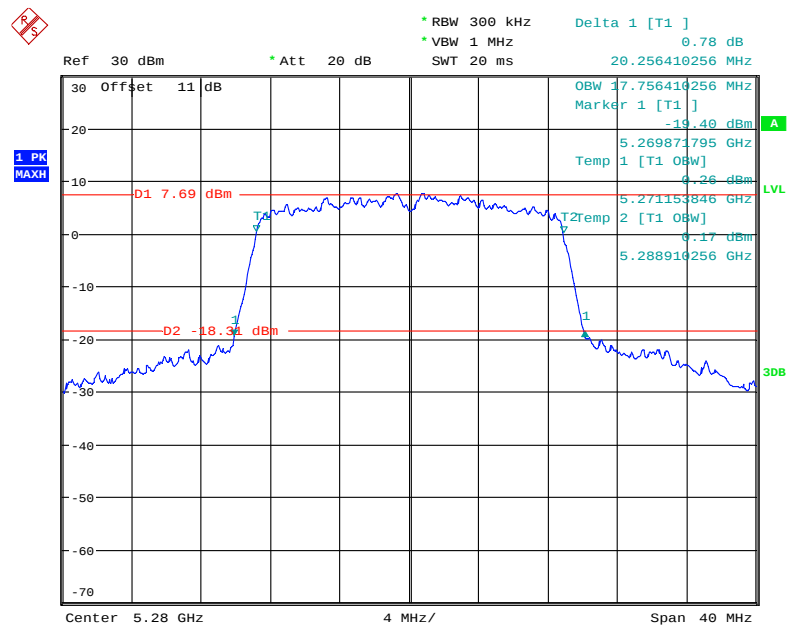
Date: 17.APR.2018 00:15:12

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



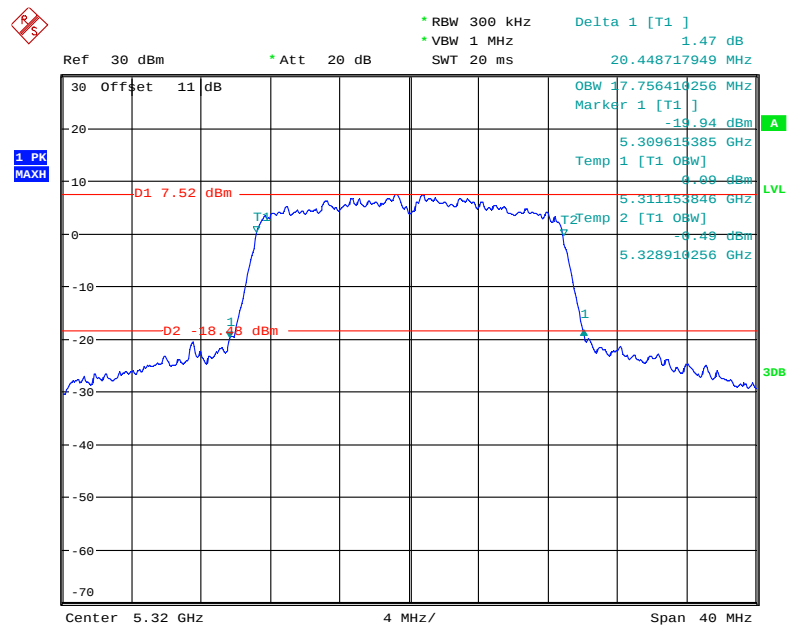
Date: 17.APR.2018 00:17:49

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



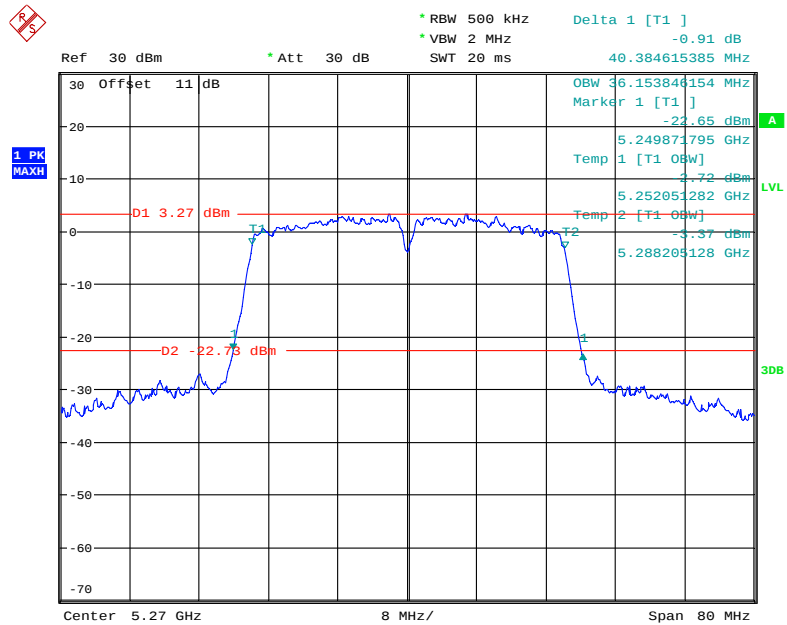
Date: 17.APR.2018 00:20:05

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



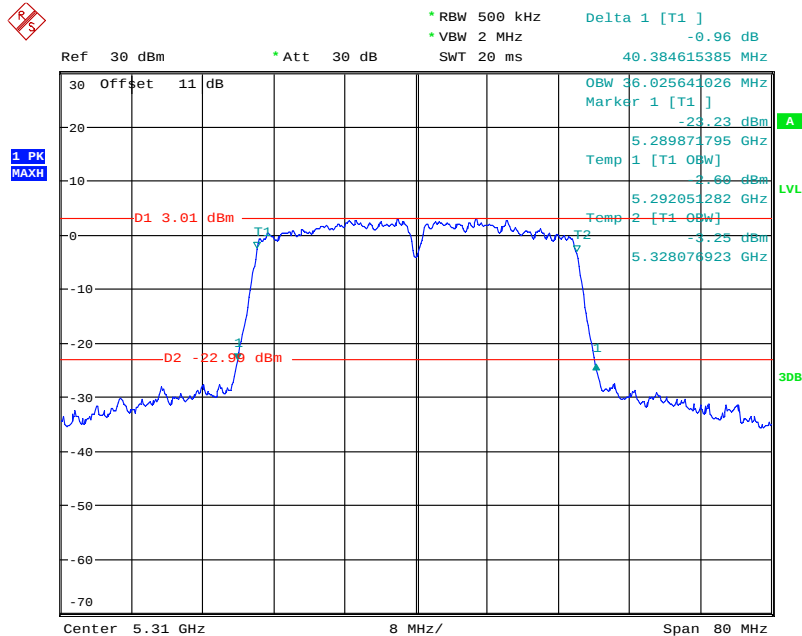
Date: 17.APR.2018 00:32:07

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



Date: 18.APR.2018 20:44:17

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

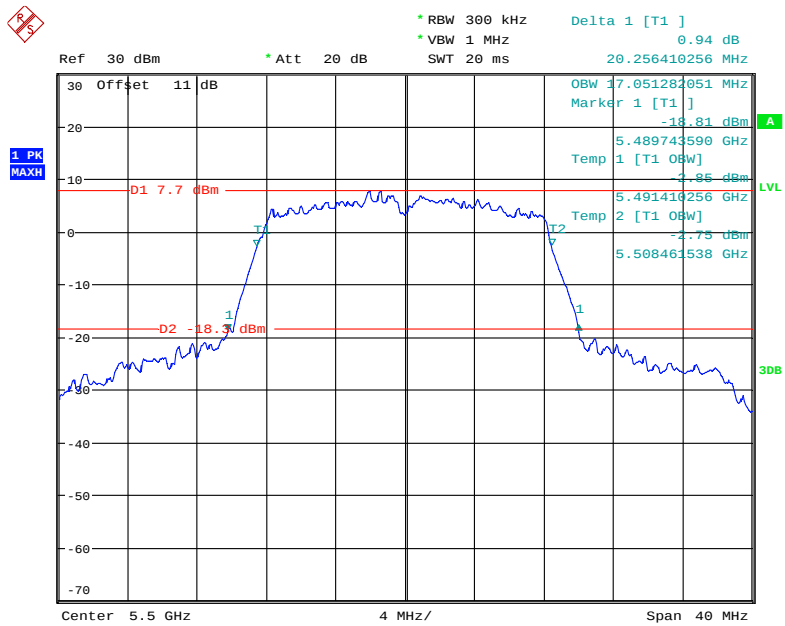


Date: 18.APR.2018 20:46:26

5470 MHz – 5725 MHz:

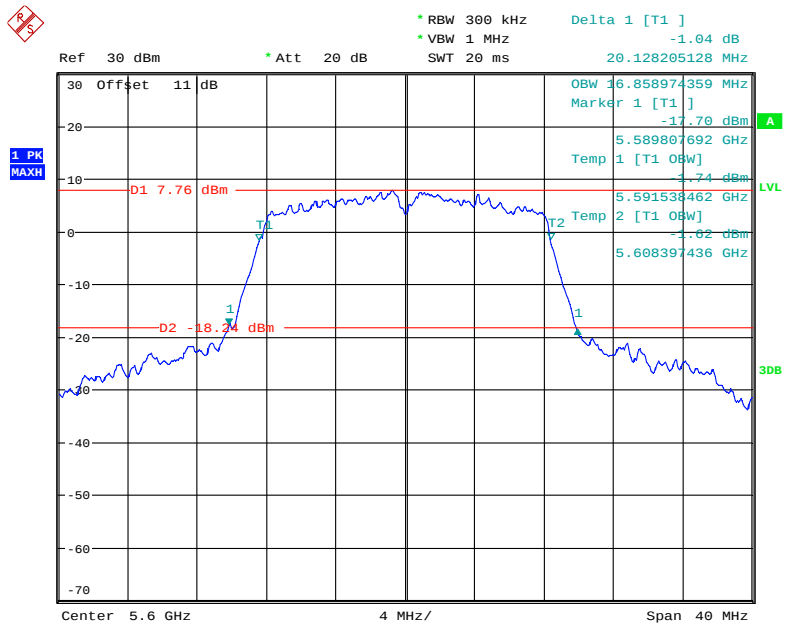
Frequency (MHz)	26dB bandwidth (MHz)	99% Bandwidth (MHz)
802.11a		
5500	20.26	17.05
5600	20.13	16.86
5700	20.32	16.86
802.11n20		
5500	20.26	17.76
5600	20.26	17.76
5700	20.26	17.76
802.11n40		
5510	40.38	36.15
5590	40.26	36.15
5670	40.26	36.16

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



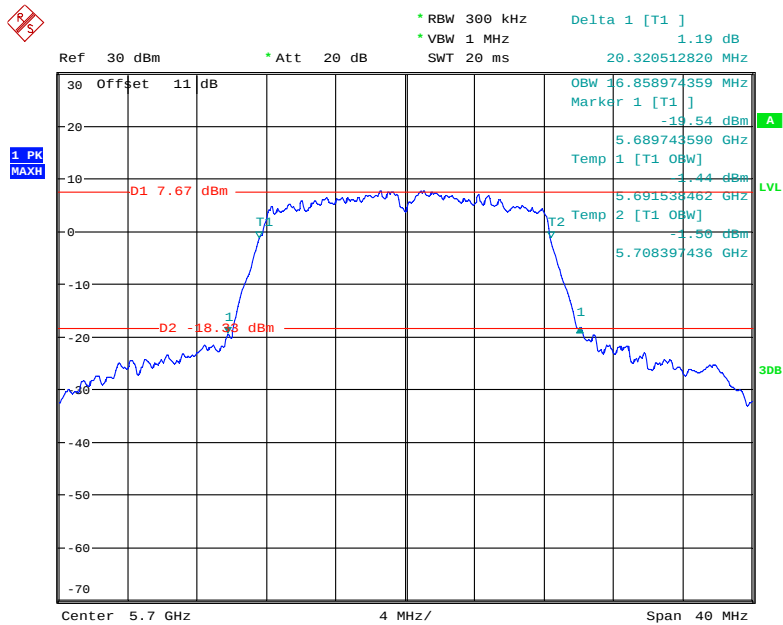
Date: 17.APR.2018 00:39:43

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



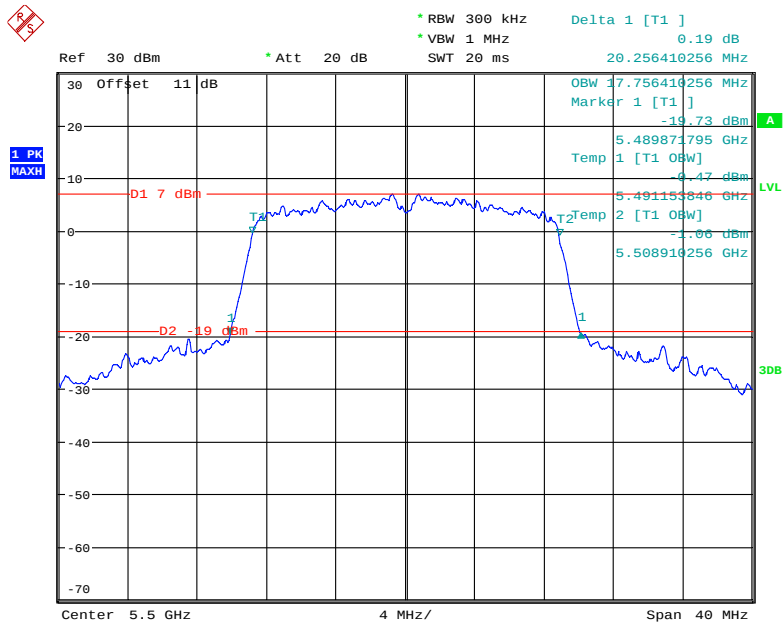
Date: 17.APR.2018 00:41:23

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



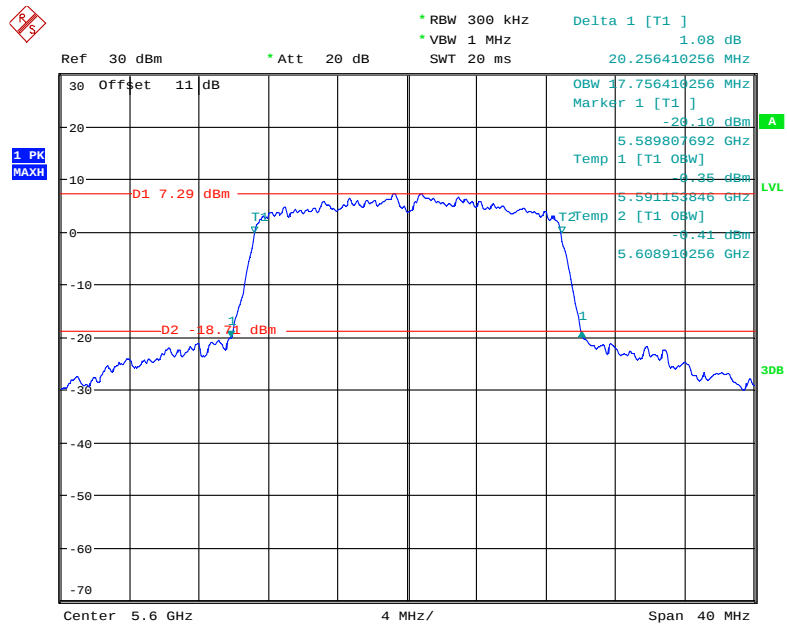
Date: 17.APR.2018 00:43:08

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



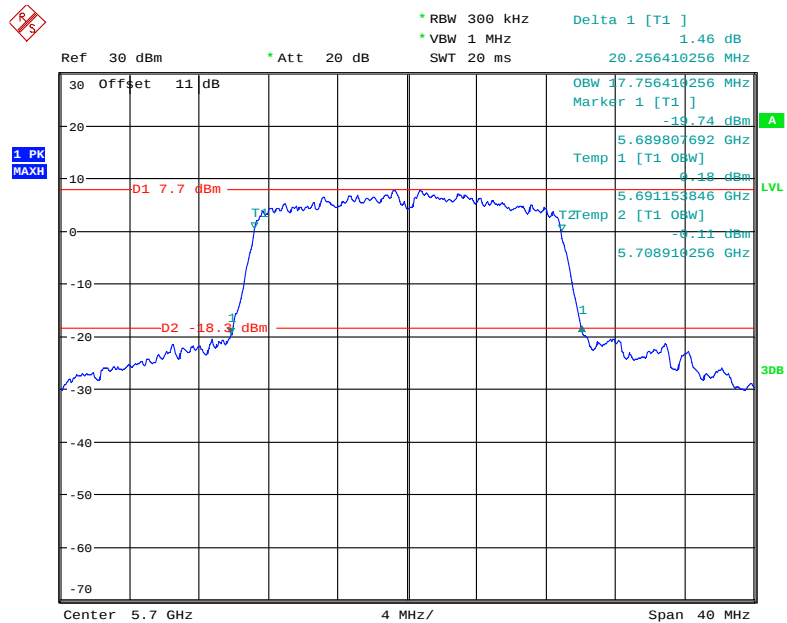
Date: 17.APR.2018 00:34:24

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



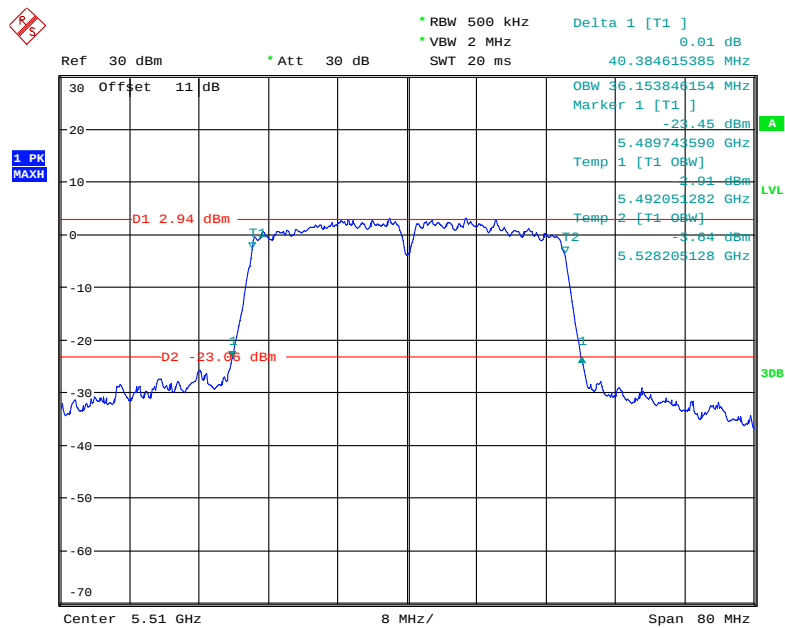
Date: 17.APR.2018 00:36:26

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



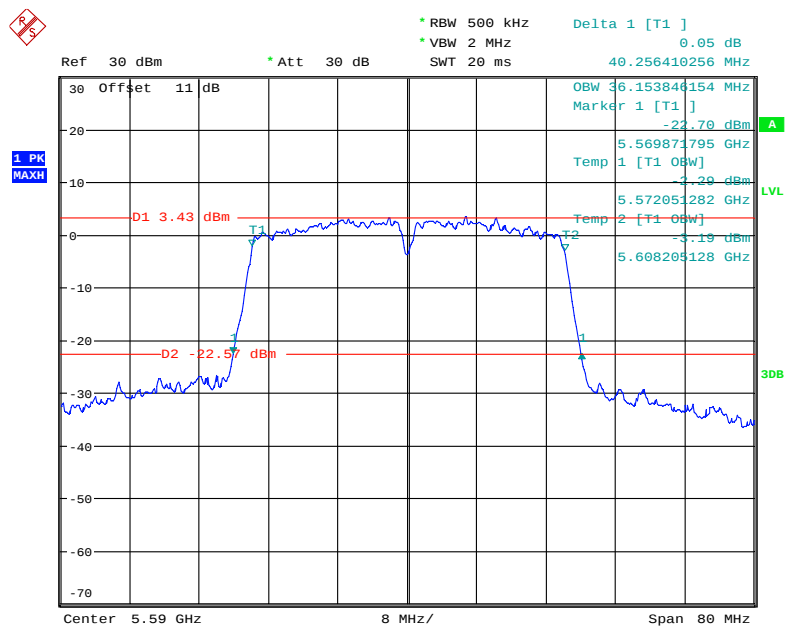
Date: 17.APR.2018 00:37:59

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



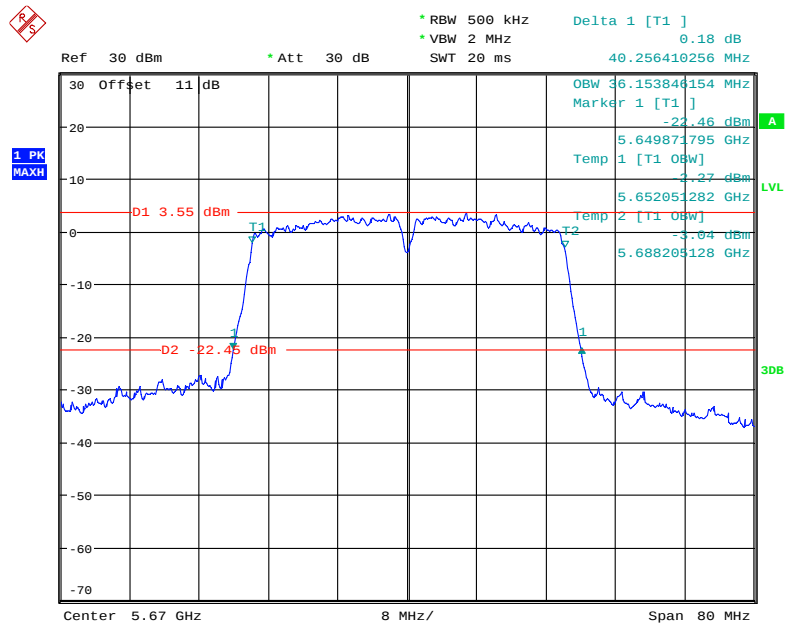
Date: 18.APR.2018 20:47:46

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



Date: 18.APR.2018 20:50:03

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

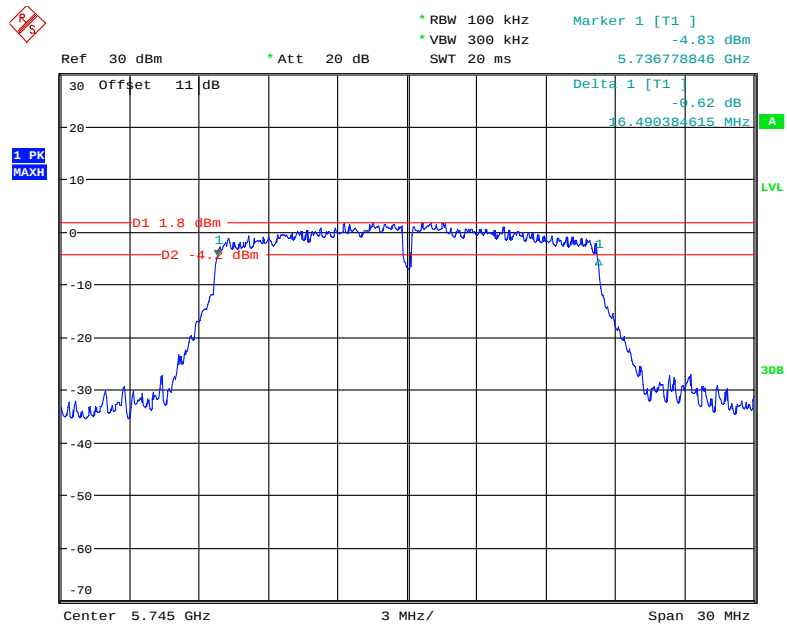


Date: 18.APR.2018 20:51:50

5725 MHz – 5850MHz:

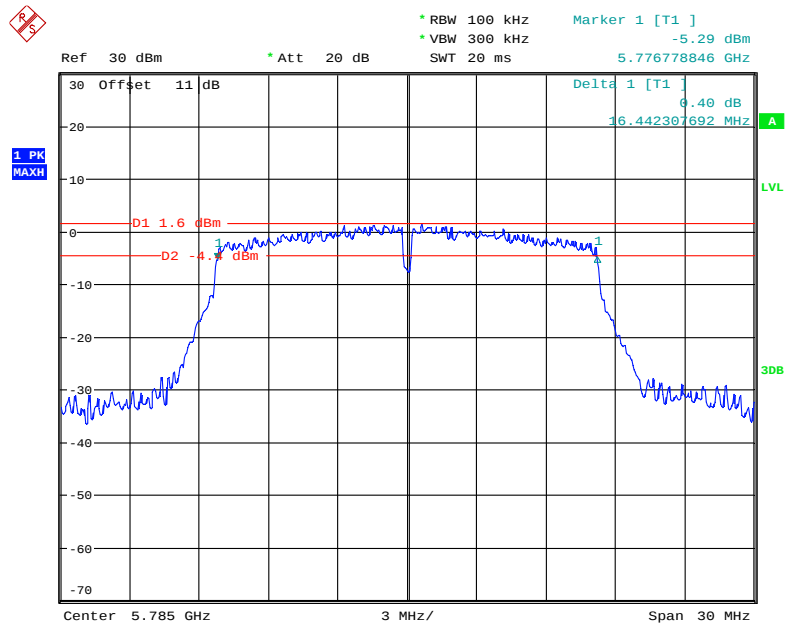
Frequency (MHz)	99% bandwidth (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Remark
802.11a				No transmitted signal in the 99% bandwidth extends into the U-NII-2C band
5745	16.49	16.86	0.5	
5785	16.44	16.86	0.5	
5825	16.44	16.79	0.5	
802.11n20				
5745	17.69	17.69	0.5	
5785	17.69	17.76	0.5	
5825	17.69	17.76	0.5	
802.11n40				
5755	36.54	36.15	0.5	
5795	36.54	36.03	0.5	

802.11a mode, 6dB Emission Bandwidth, 5745 MHz



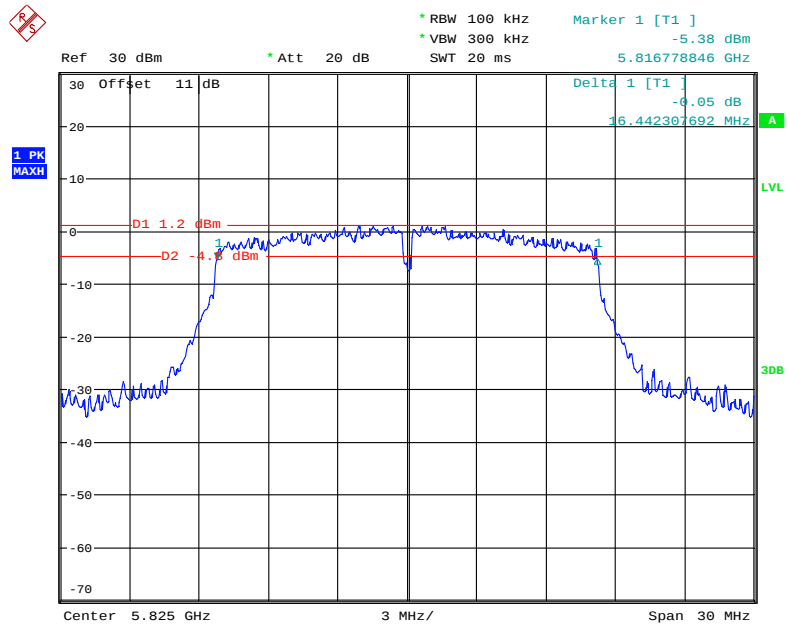
Date: 17.APR.2018 19:49:37

802.11a mode, 6dB Emission Bandwidth, 5785 MHz



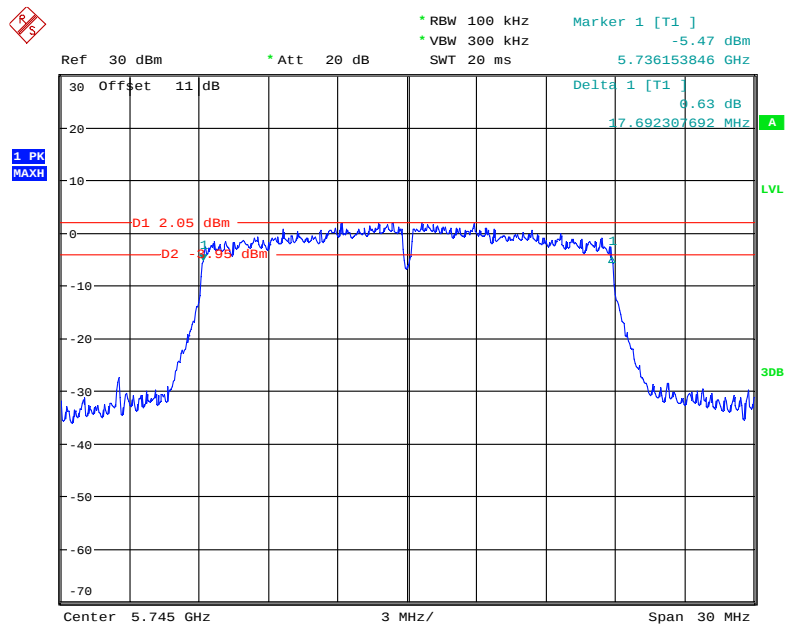
Date: 17.APR.2018 19:50:57

802.11a mode, 6dB Emission Bandwidth, 5825 MHz



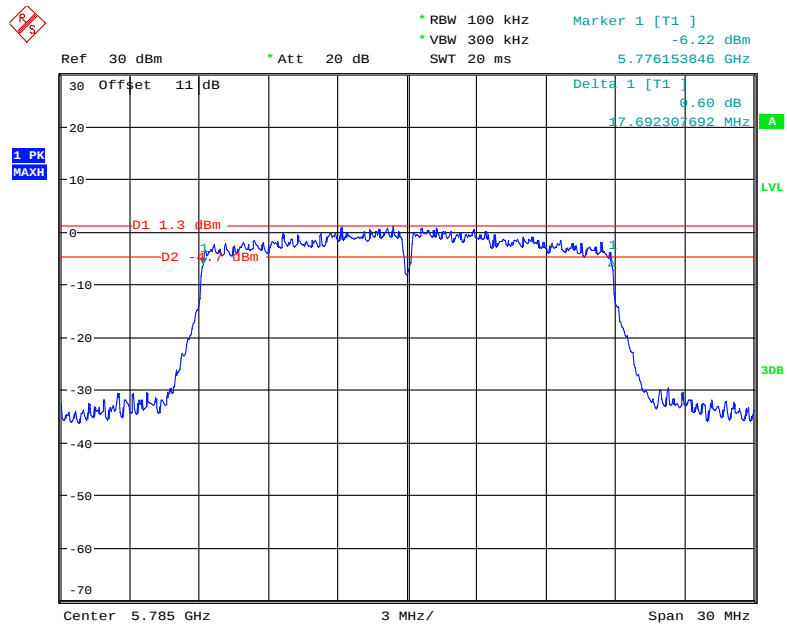
Date: 17.APR.2018 19:51:56

802.11n20 mode, 6dB Emission Bandwidth, 5745 MHz



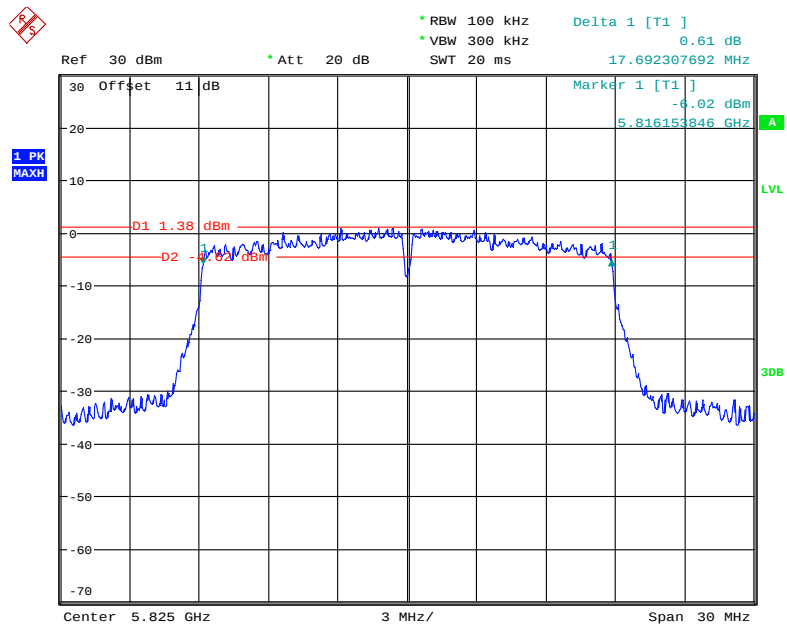
Date: 17.APR.2018 19:47:23

802.11n20 mode, 6dB Emission Bandwidth, 5785 MHz



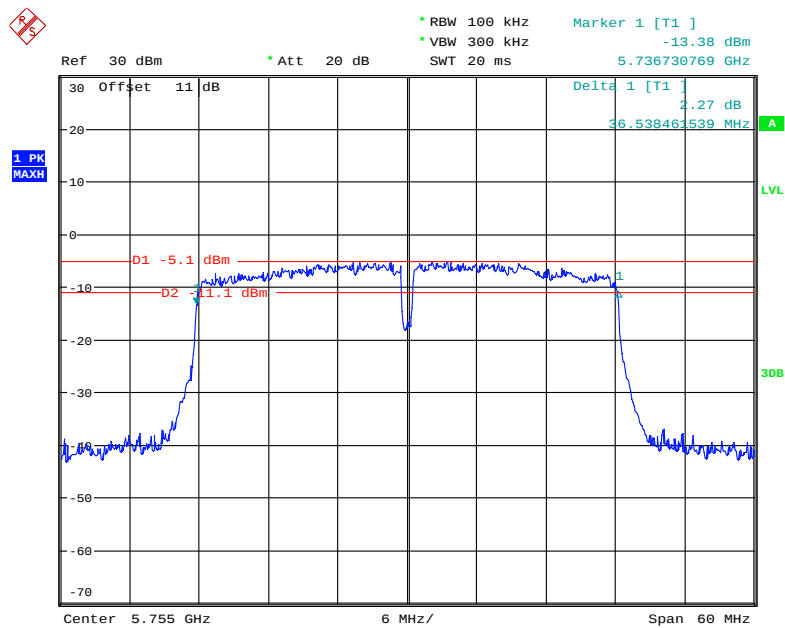
Date: 17.APR.2018 19:42:28

802.11n20 mode, 6dB Emission Bandwidth, 5825 MHz



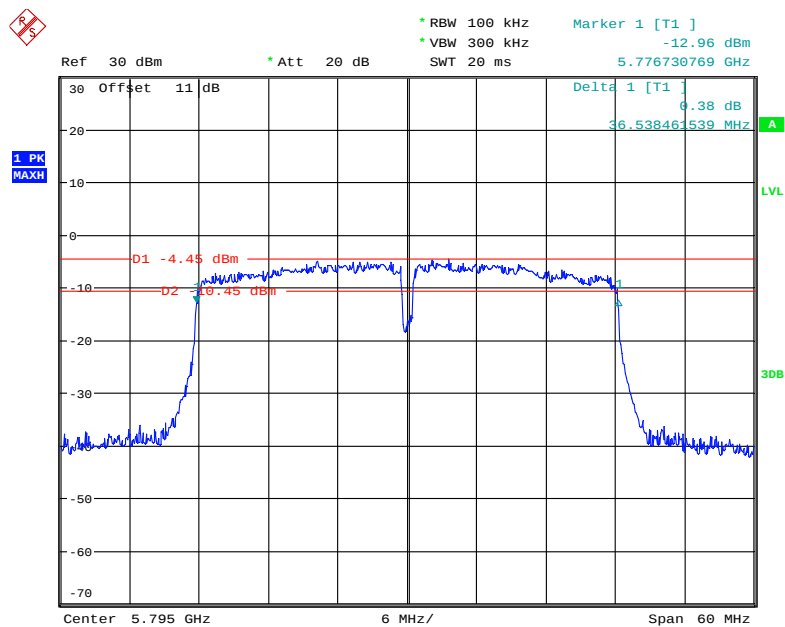
Date: 17.APR.2018 01:03:09

802.11n40 mode, 6dB Emission Bandwidth, 5755 MHz



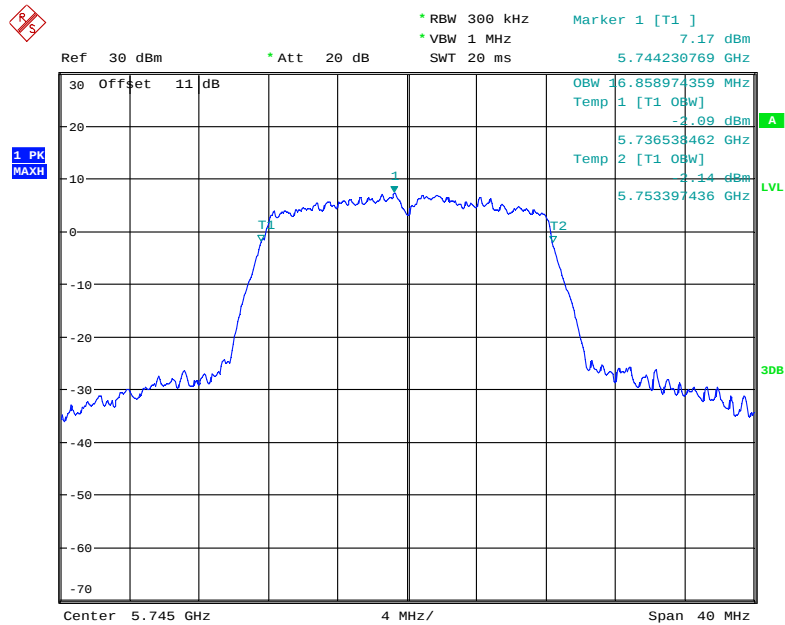
Date: 17.APR.2018 19:54:36

802.11n40 mode, 6dB Emission Bandwidth, 5795 MHz



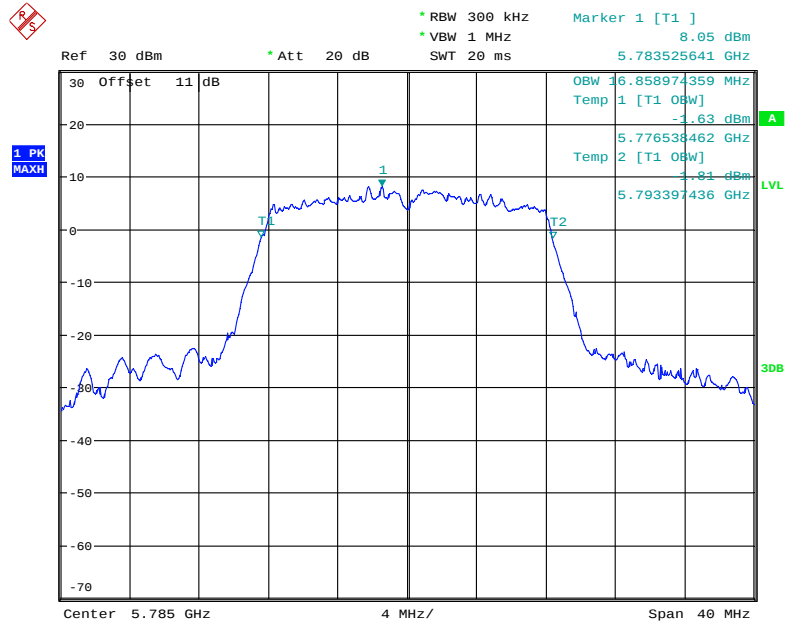
Date: 17.APR.2018 19:56:23

802.11a mode, 99% Occupied Bandwidth, 5745 MHz



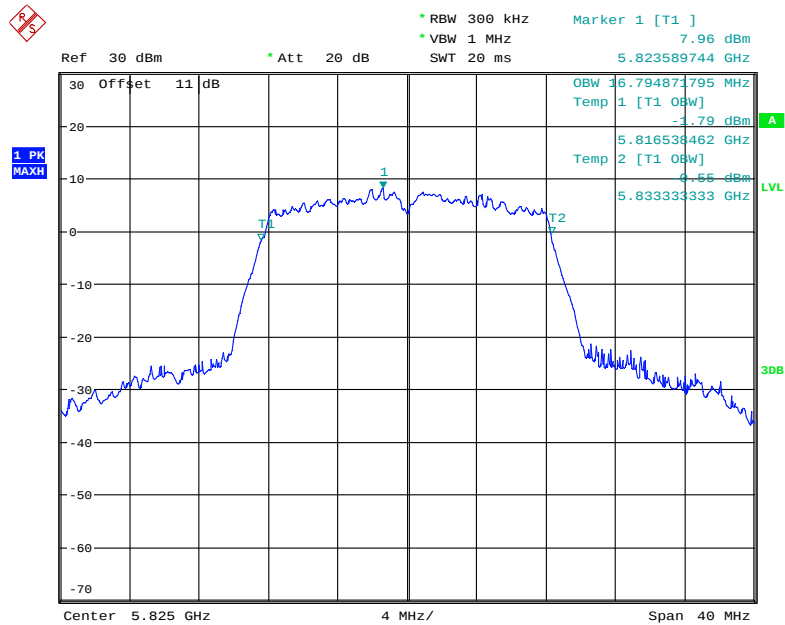
Date: 17.APR.2018 00:55:28

802.11a mode, 99% Occupied Bandwidth, 5785 MHz



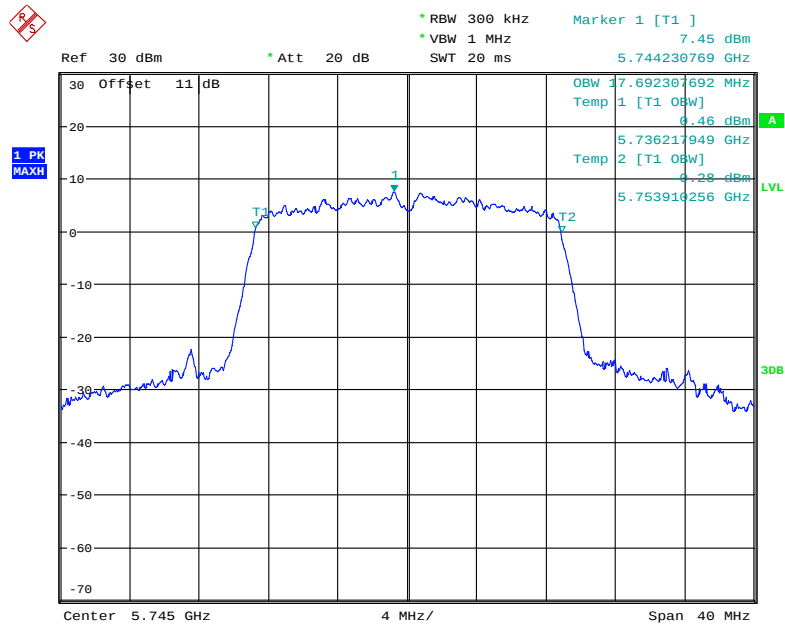
Date: 17.APR.2018 00:56:14

802.11a mode, 99% Occupied Bandwidth, 5825 MHz



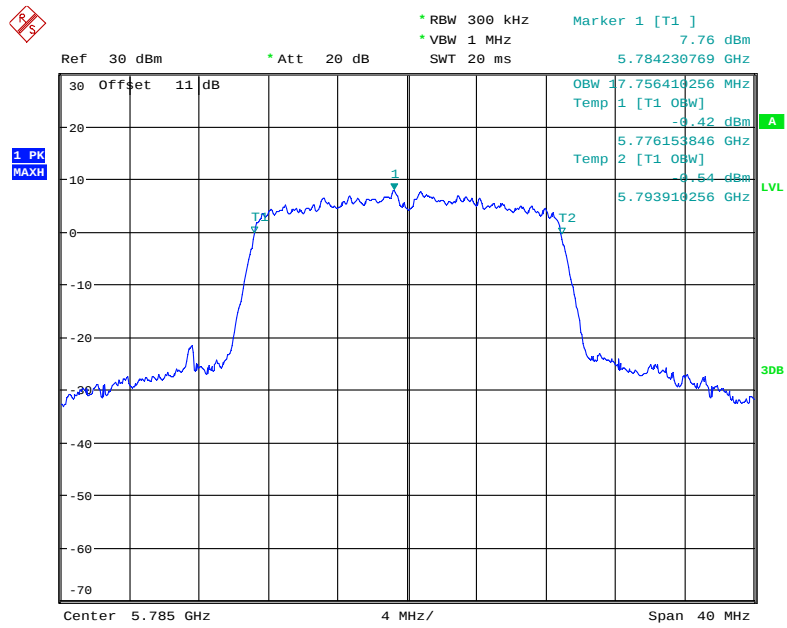
Date: 17.APR.2018 00:56:49

802.11n20 mode, 99% Occupied Bandwidth, 5745 MHz



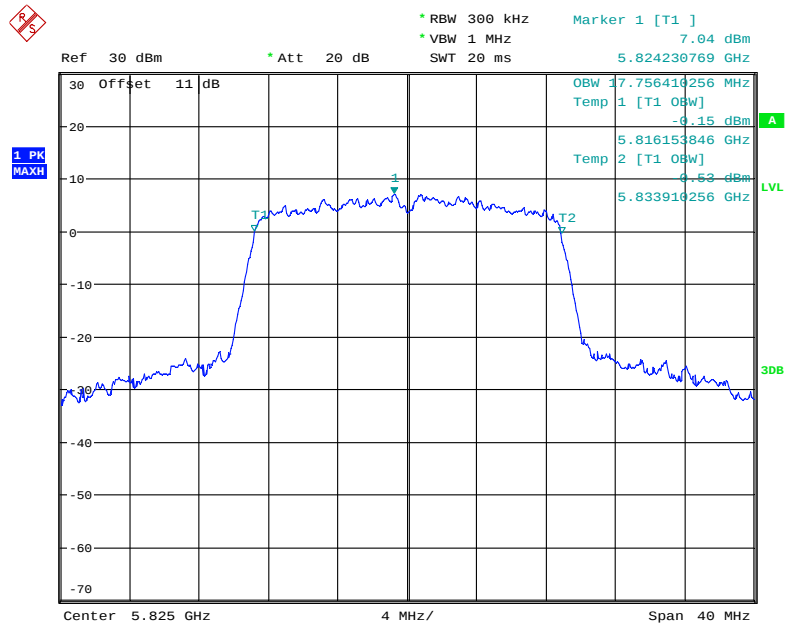
Date: 17.APR.2018 00:57:43

802.11n20 mode, 99% Occupied Bandwidth, 5785 MHz



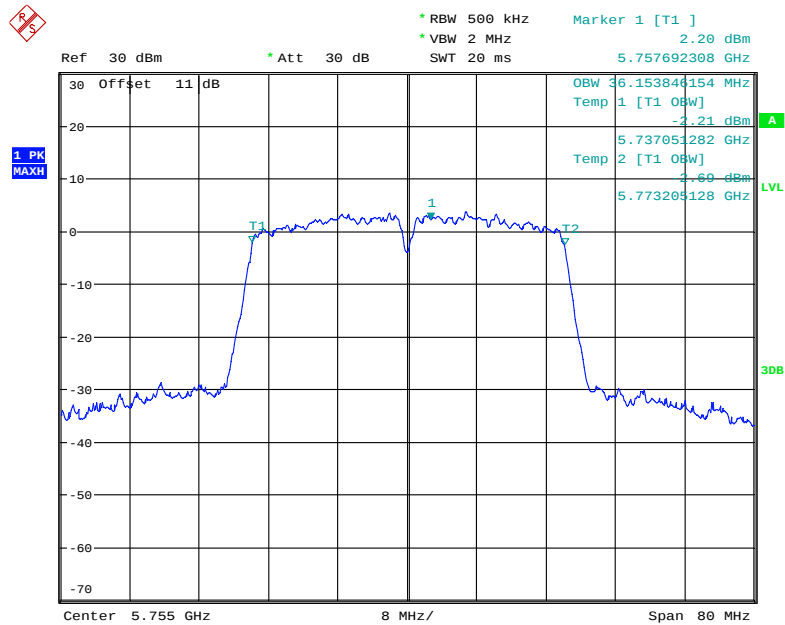
Date: 17.APR.2018 00:59:15

802.11n20 mode, 99% Occupied Bandwidth, 5825 MHz



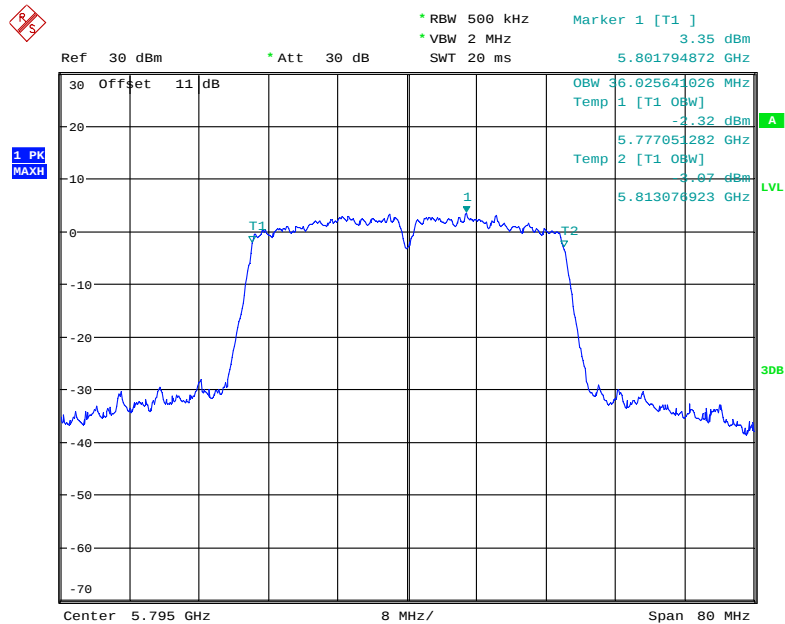
Date: 17.APR.2018 01:00:06

802.11n40 mode, 99% Occupied Bandwidth, 5755 MHz



Date: 18.APR.2018 23:14:02

802.11n40 mode, 99% Occupied Bandwidth, 5795 MHz



Date: 18.APR.2018 23:15:38

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.

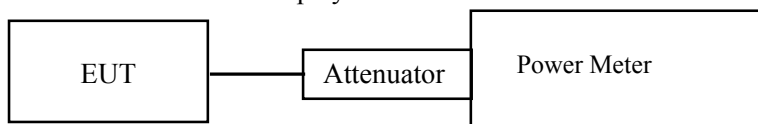
For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting 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:	23 °C
Relative Humidity:	54 %
ATM Pressure:	101.0 kPa

The testing was performed by Jacob Kong on 2018-05-16.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to the following tables.

5150 MHz – 5250 MHz(this is a client device)

Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
802.11a		
5180	15.83	24
5200	16.56	
5240	16.70	
802.11n20		
5180	16.83	24
5200	16.86	
5240	16.66	
802.11n40		
5190	14.52	24
5230	14.31	

5250 MHz – 5350 MHz

Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
802.11a		
5260	16.16	24
5280	16.08	
5320	15.91	
802.11n20		
5260	16.16	24
5280	16.02	
5320	16.55	
802.11n40		
5270	14.18	24
5310	14.27	

5470 MHz – 5725 MHz:

Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
802.11a		
5500	15.29	24
5600	15.80	
5700	14.89	
802.11n20		
5500	15.21	24
5600	15.66	
5700	15.16	
802.11n40		
5510	14.44	24
5590	14.21	
5670	14.34	

5725 MHz – 5850 MHz:

Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
802.11a		
5745	15.43	30
5785	15.77	
5825	15.64	
802.11n20		
5745	15.27	30
5785	15.84	
5825	15.57	
802.11n40		
5755	14.62	30
5795	14.35	

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

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:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Jacob Kong on 2018-04-17.

EUT operation mode: Transmitting

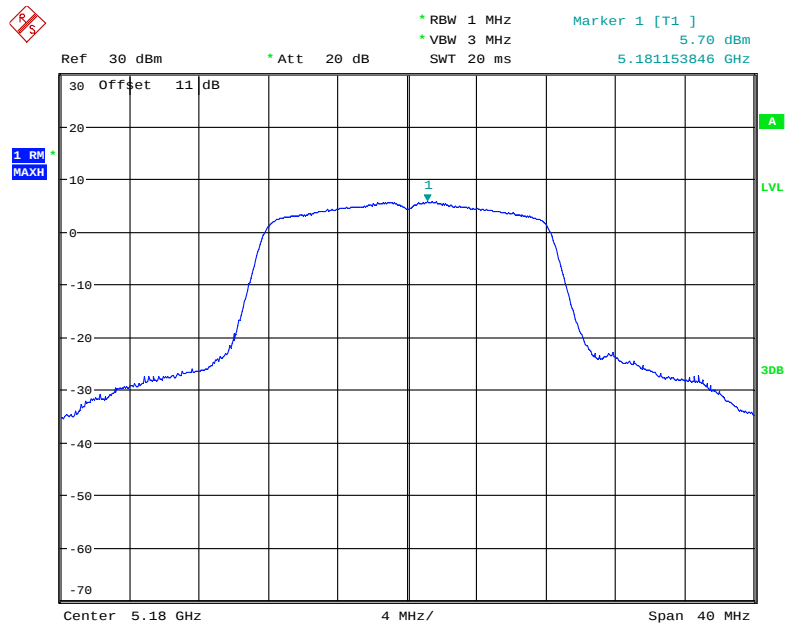
Test Result: Pass

Please refer to the following tables and plots.

5150 MHz – 5250 MHz(this is a client device):

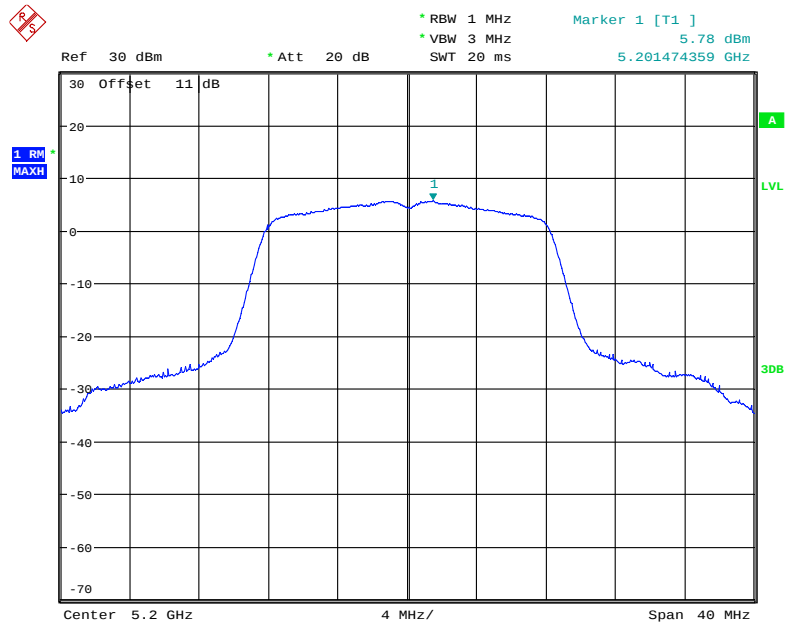
Frequency (MHz)	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)
802.11a		
5180	5.70	11
5200	5.78	
5240	5.40	
802.11n20		
5180	5.78	11
5200	5.41	
5240	5.18	
802. 11n40		
5190	-0.99	11
5230	-1.24	

802.11a mode, Power Spectral Density, 5180 MHz



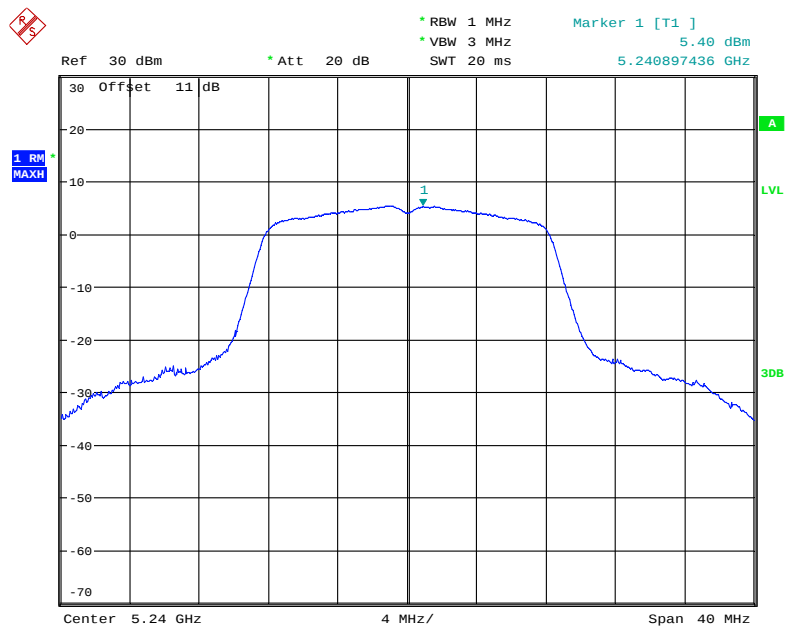
Date: 17.APR.2018 20:09:43

802.11a mode, Power Spectral Density, 5200 MHz



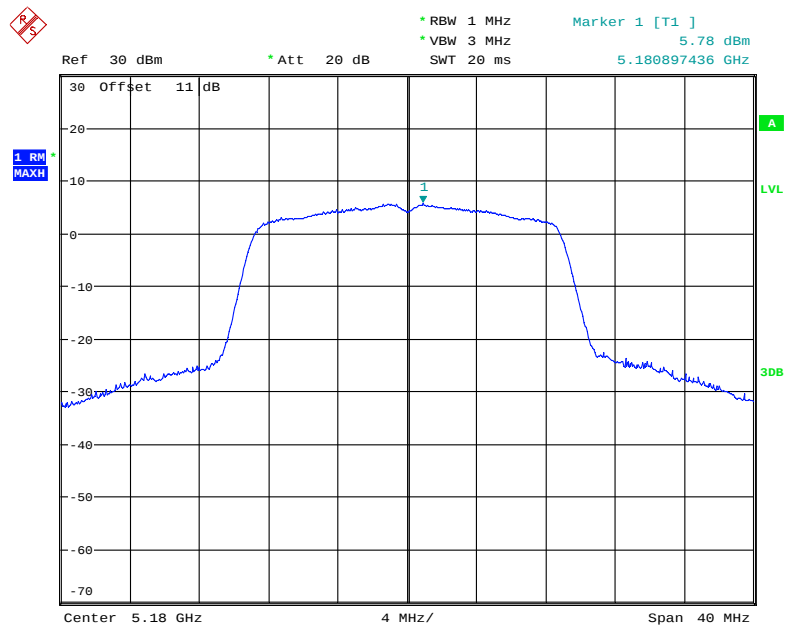
Date: 17.APR.2018 20:12:32

802.11a mode, Power Spectral Density, 5240 MHz



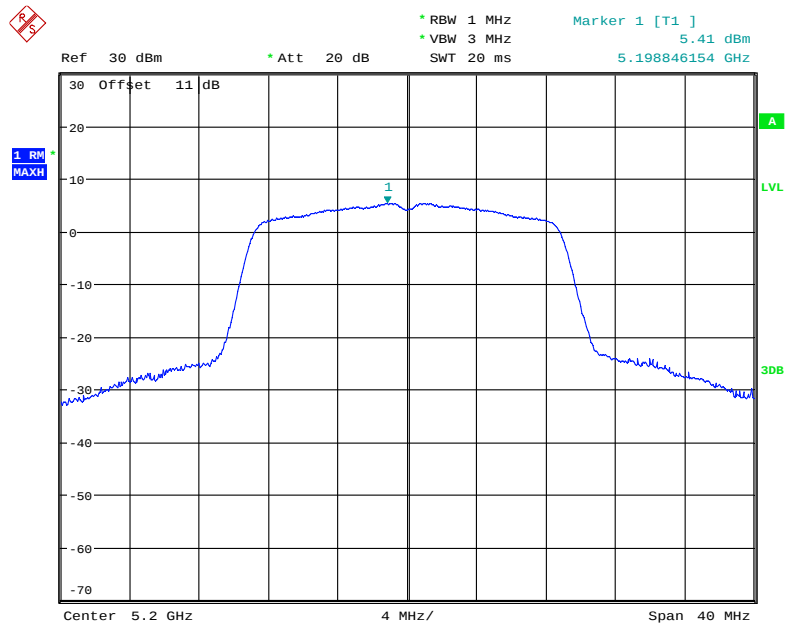
Date: 17.APR.2018 20:12:48

802.11n20 mode, Power Spectral Density, 5180 MHz



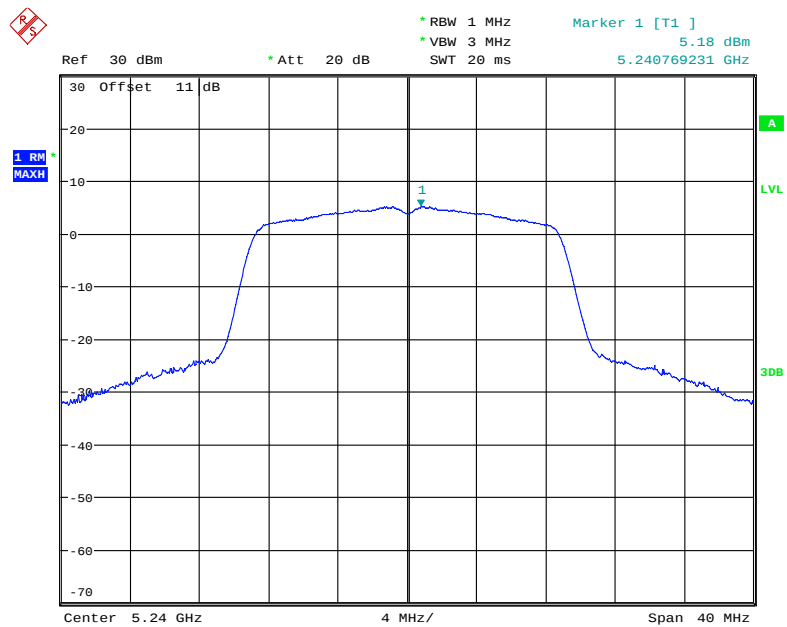
Date: 17.APR.2018 20:16:02

802.11n20 mode, Power Spectral Density, 5200 MHz



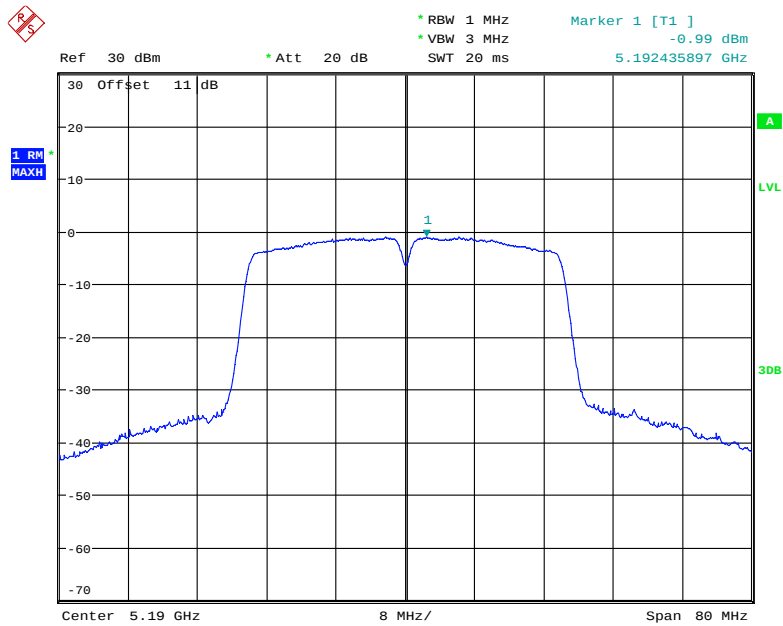
Date: 17.APR.2018 20:16:30

802.11n20 mode, Power Spectral Density, 5240 MHz



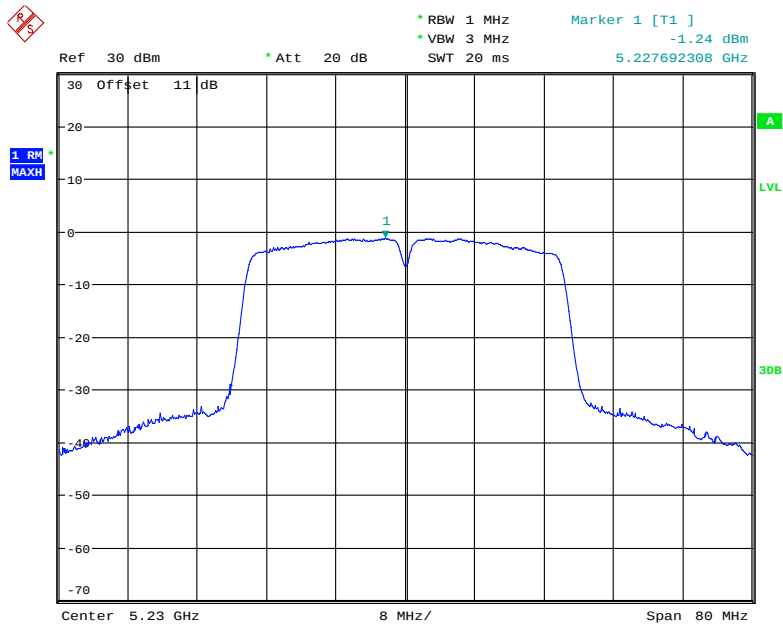
Date: 17.APR.2018 20:16:57

802.11n40 mode, Power Spectral Density, 5190 MHz



Date: 17.APR.2018 20:24:03

802.11n40 mode, Power Spectral Density, 5230 MHz

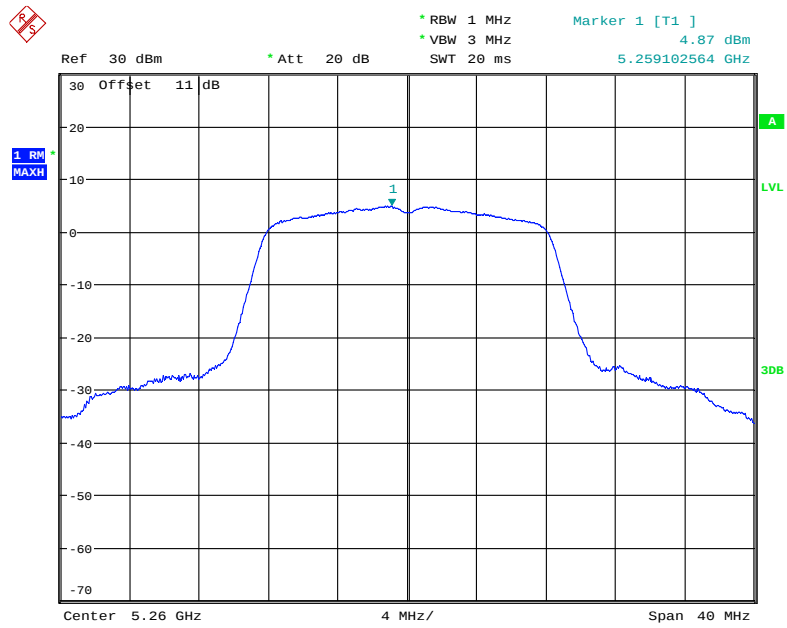


Date: 17.APR.2018 20:24:20

5250-5350MHz:

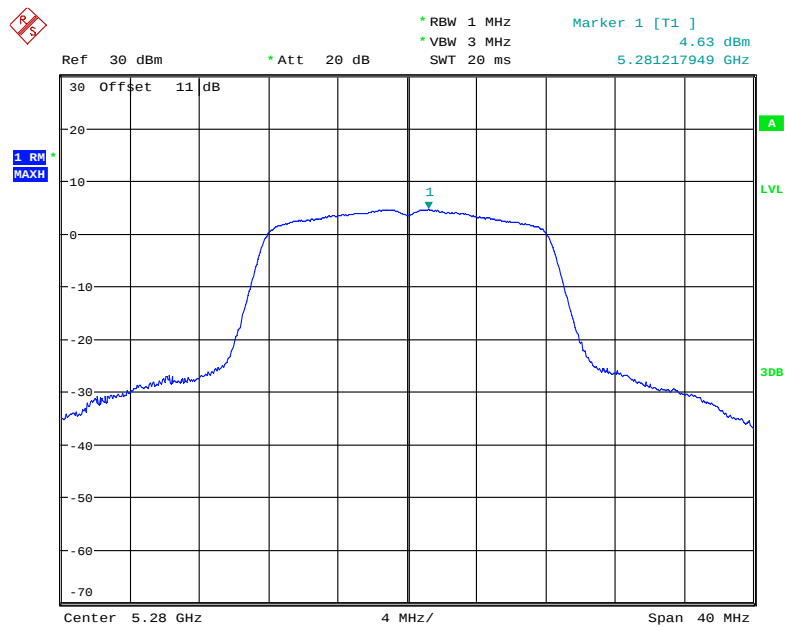
Frequency (MHz)	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)
802.11a		
5260	4.87	11
5280	4.63	
5320	4.40	
802.11n20		
5260	4.81	11
5280	4.64	
5320	4.13	
802. 11n40		
5270	-1.67	11
5310	-2.24	

802.11a mode, Power Spectral Density, 5260 MHz

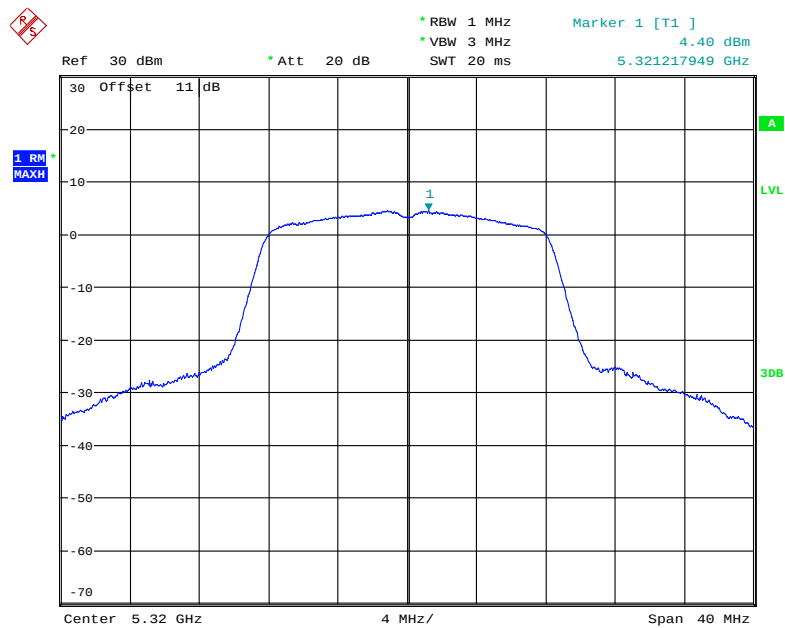


Date: 17.APR.2018 20:13:20

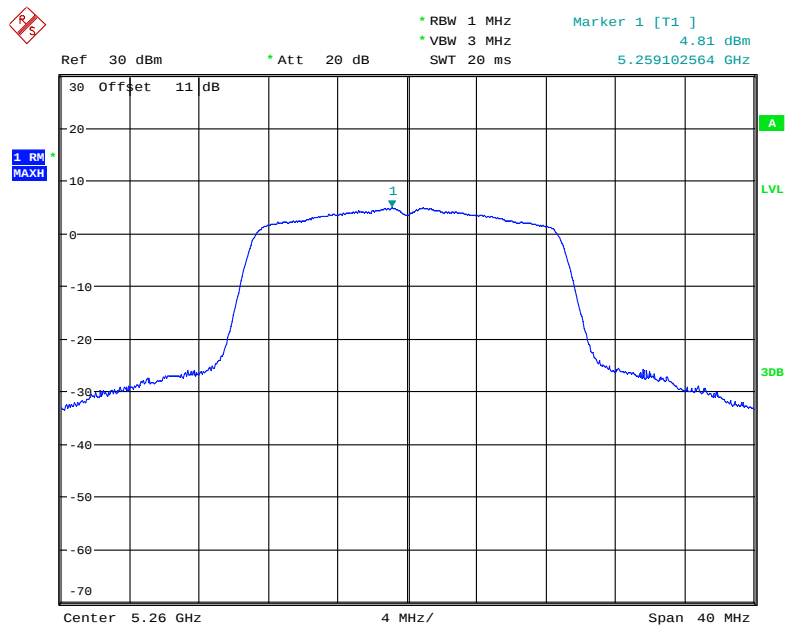
802.11a mode, Power Spectral Density, 5280 MHz



Date: 17.APR.2018 20:13:38

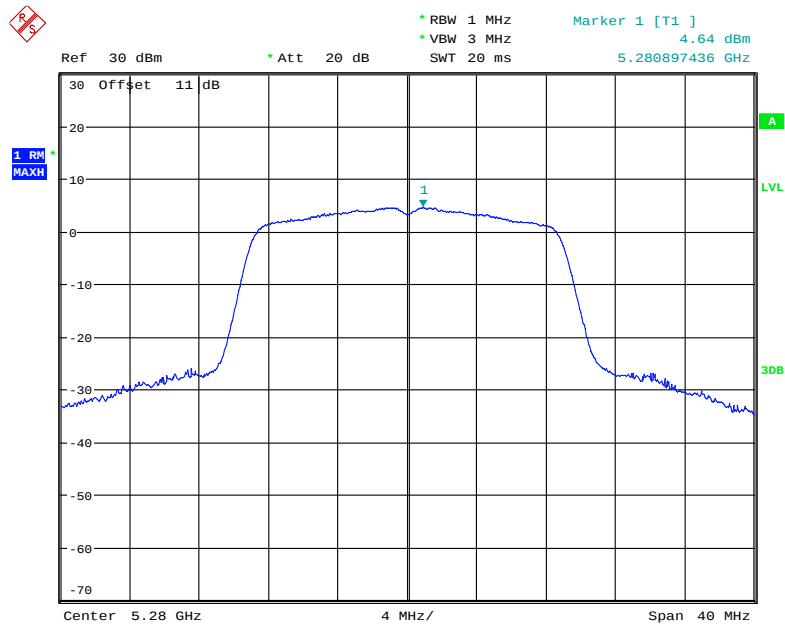
802.11a mode, Power Spectral Density, 5320 MHz

Date: 17.APR.2018 20:13:54

802.11n20 mode, Power Spectral Density, 5260 MHz

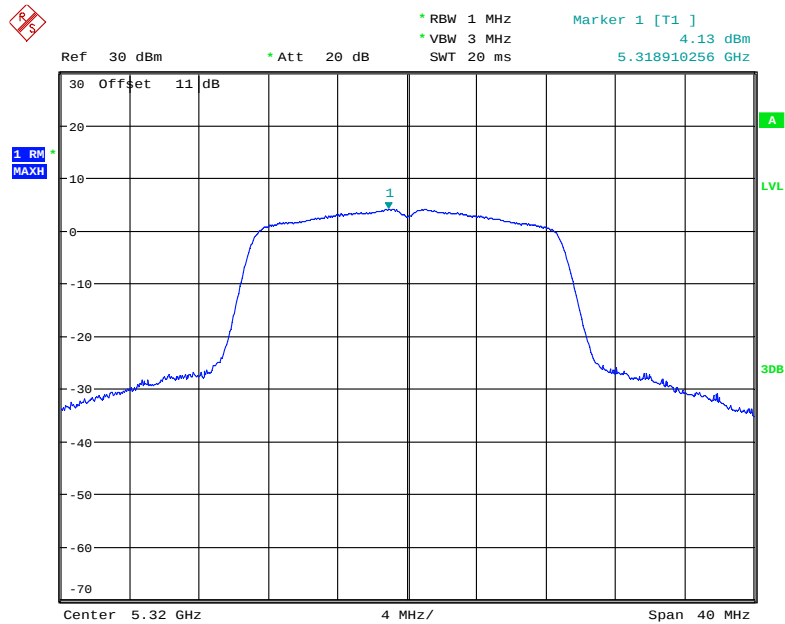
Date: 17.APR.2018 20:17:20

802.11n20 mode, Power Spectral Density, 5280 MHz



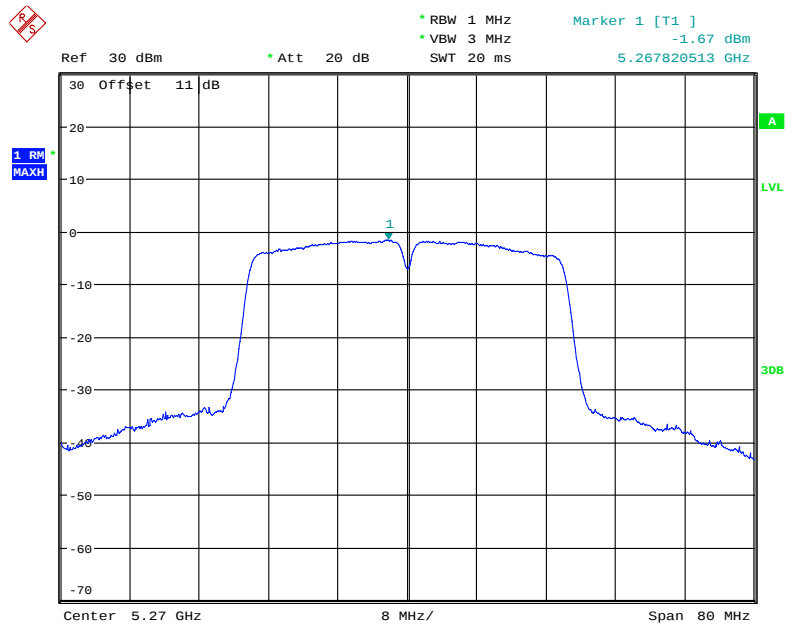
Date: 17.APR.2018 20:17:45

802.11n20 mode, Power Spectral Density, 5320 MHz



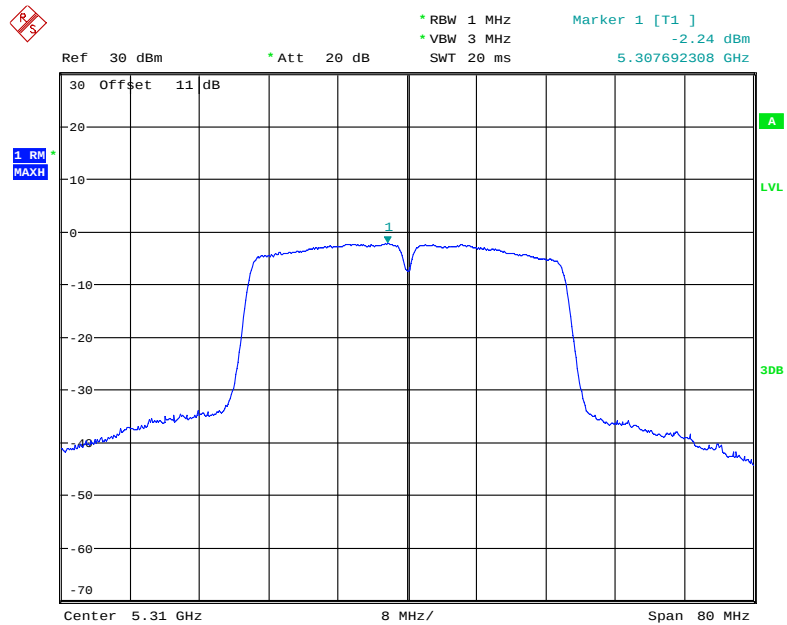
Date: 17.APR.2018 20:18:12

802.11n40 mode, Power Spectral Density, 5270 MHz



Date: 17.APR.2018 20:23:11

802.11n40 mode, Power Spectral Density, 5310 MHz

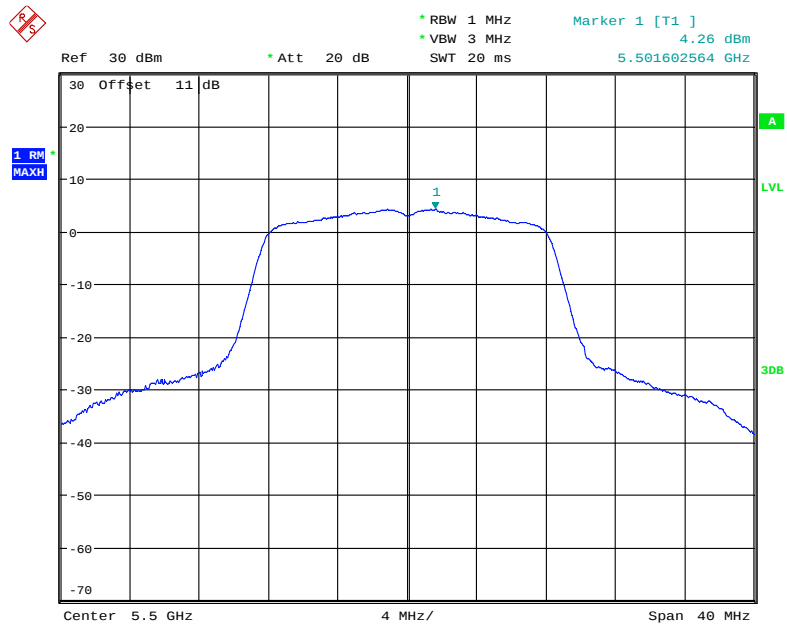


Date: 17.APR.2018 20:23:28

5470-5725MHz:

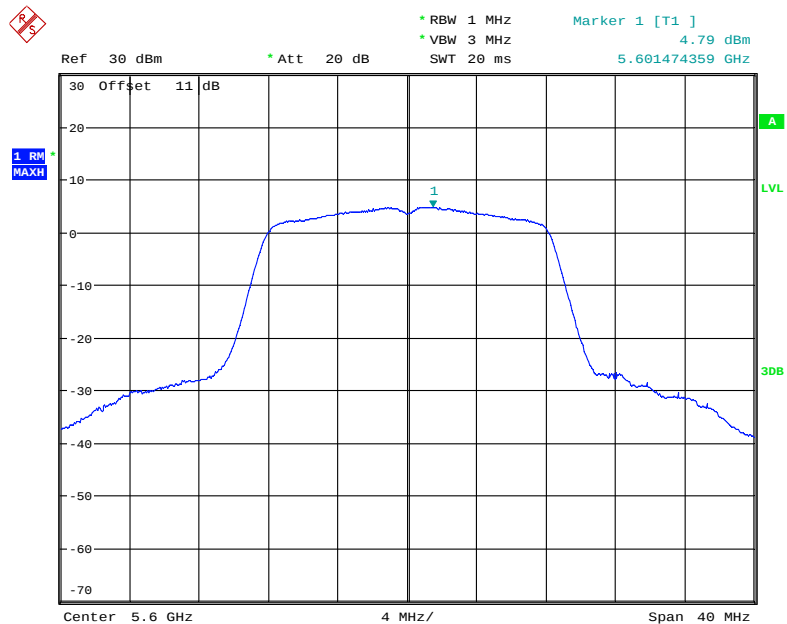
Frequency (MHz)	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)
802.11a		
5500	4.26	11
5600	4.79	
5700	5.78	
802.11n20		
5500	4.11	11
5600	4.70	
5700	3.80	
802. 11n40		
5510	-2.06	11
5590	-1.69	
5670	-0.77	

802.11a mode, Power Spectral Density, 5500MHz



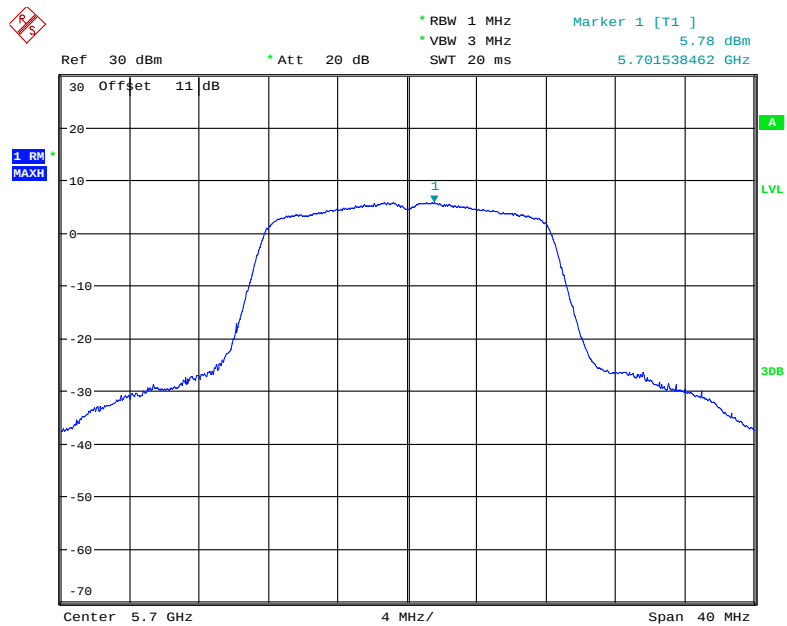
Date: 17.APR.2018 20:14:31

802.11a mode, Power Spectral Density, 5600 MHz



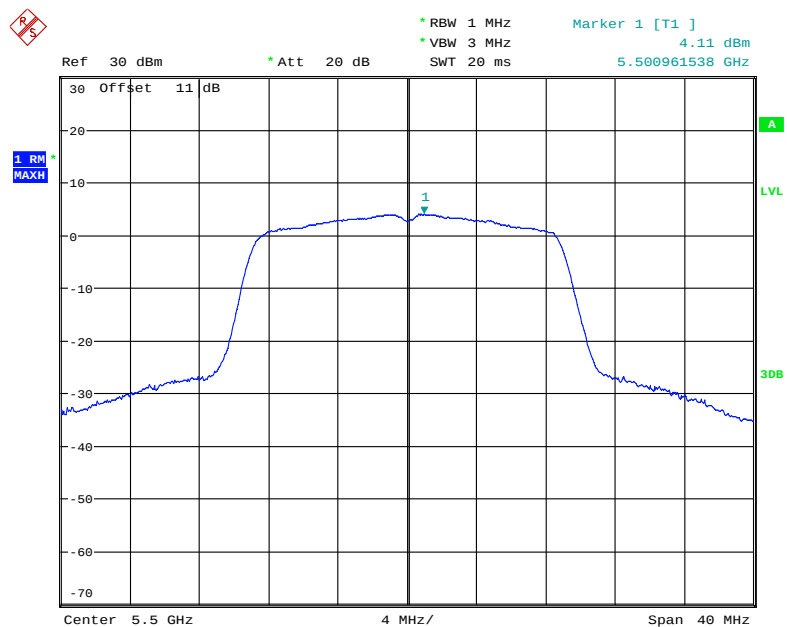
Date: 17.APR.2018 20:14:50

802.11a mode, Power Spectral Density, 5700 MHz



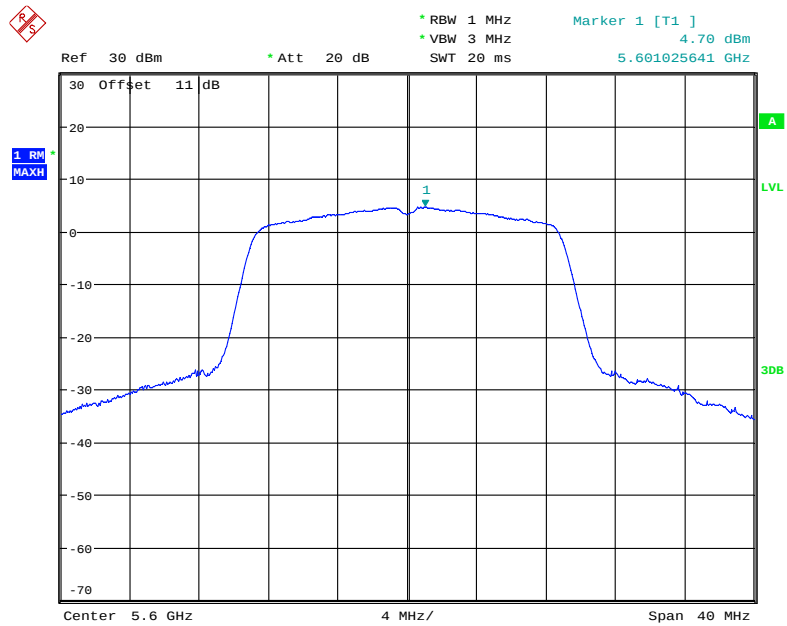
Date: 17.APR.2018 20:15:07

802.11n20 mode, Power Spectral Density, 5500 MHz



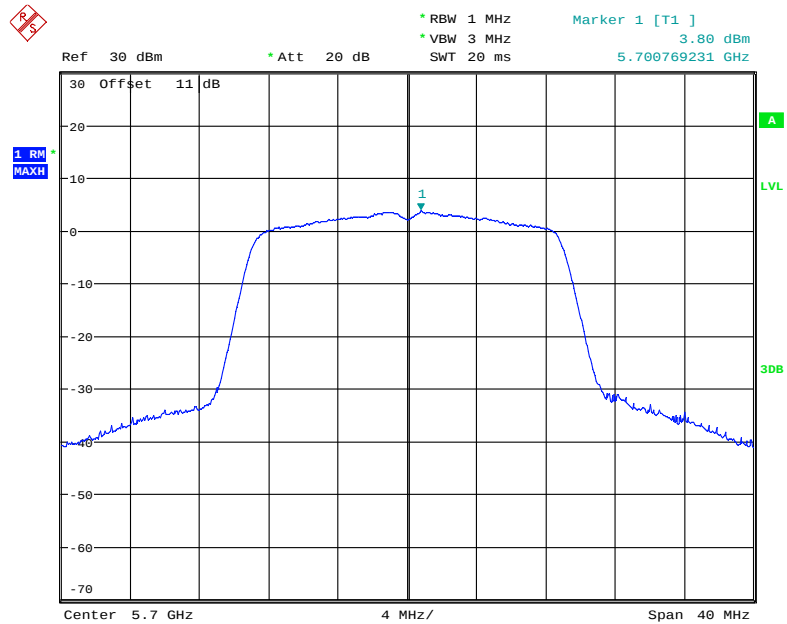
Date: 17.APR.2018 20:18:46

802.11n20 mode, Power Spectral Density, 5600 MHz



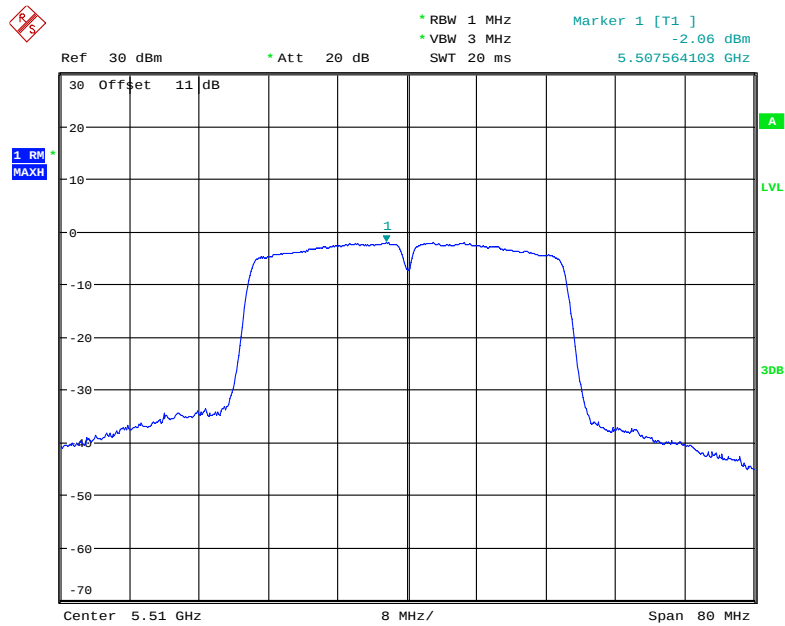
Date: 17.APR.2018 20:19:26

802.11n20 mode, Power Spectral Density, 5700 MHz



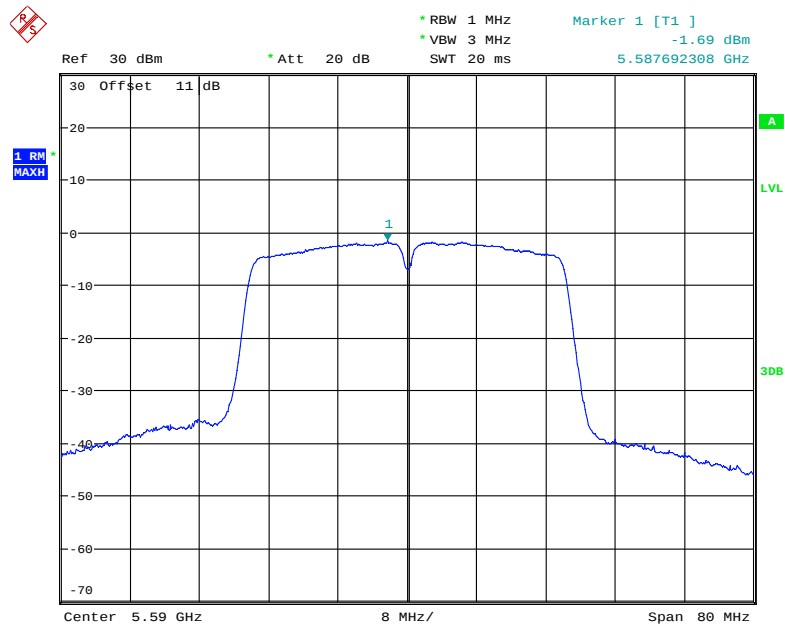
Date: 17.APR.2018 20:19:47

802.11n40 mode, Power Spectral Density, 5510 MHz



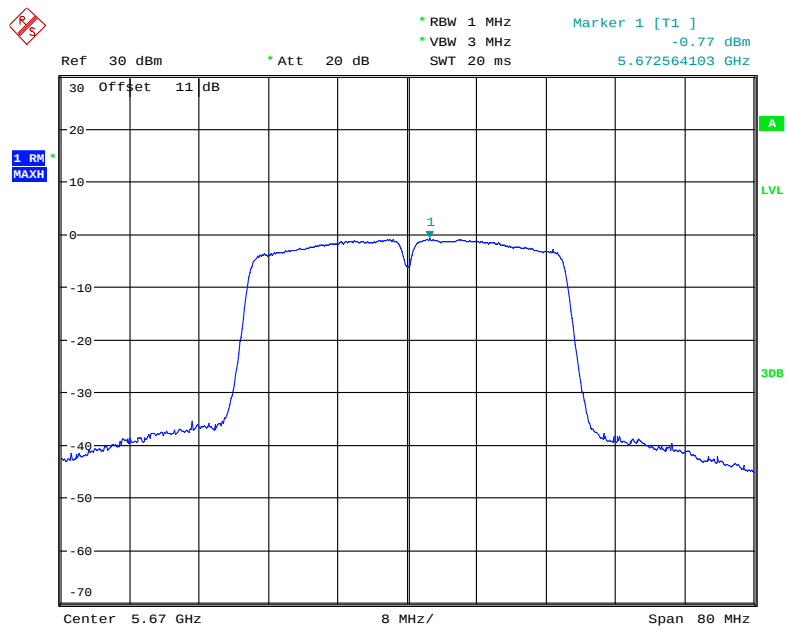
Date: 17.APR.2018 20:21:56

802.11n40 mode, Power Spectral Density, 5590 MHz



Date: 17.APR.2018 20:22:16

802.11n40 mode, Power Spectral Density, 5670MHz

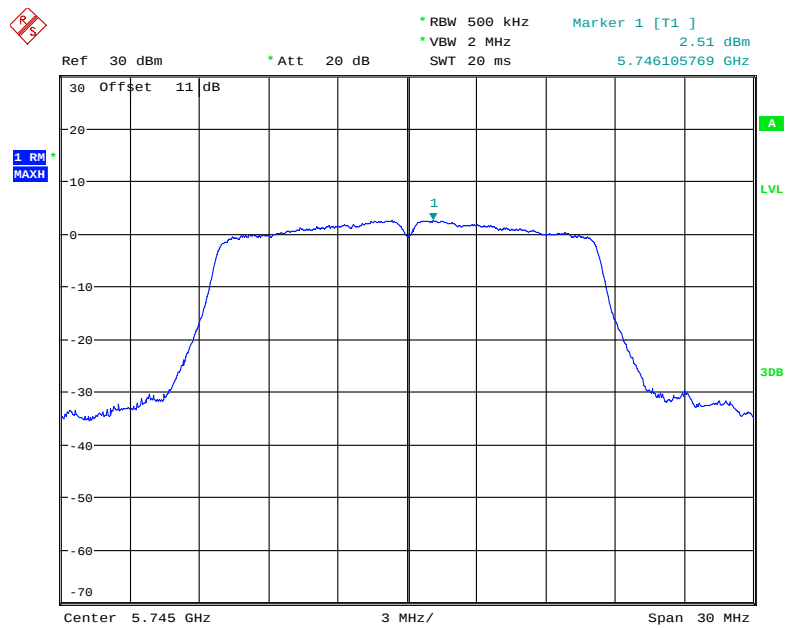


Date: 17.APR.2018 20:22:33

5725 MHz – 5850 MHz:

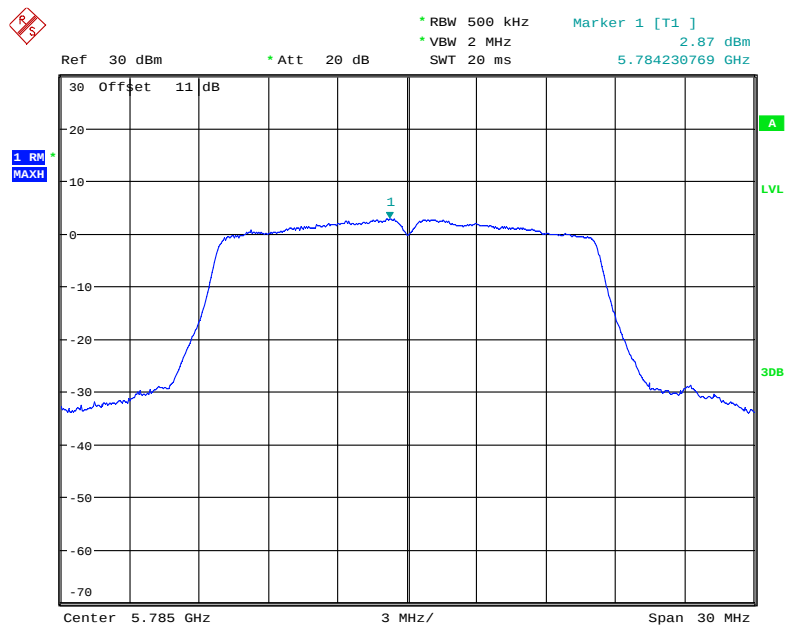
Frequency (MHz)	Power Spectral Density (dBm/500kHz)	Limit (dBm/500kHz)
802.11a		
5745	2.51	30
5785	2.87	
5825	2.73	
802.11n20		
5745	3.67	30
5785	3.01	
5825	2.69	
802. 11n40		
5755	-4.12	30
5795	-3.99	

802.11a mode, Power Spectral Density, 5745 MHz



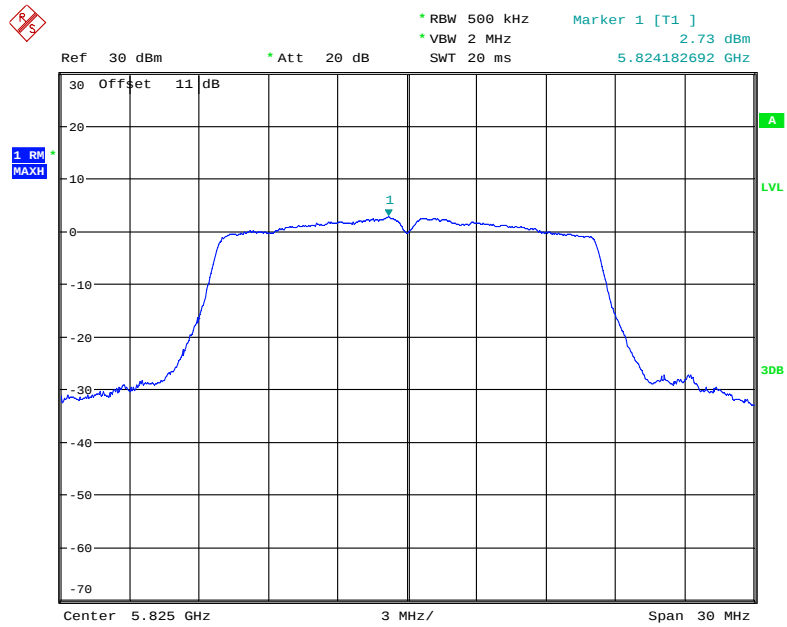
Date: 17.APR.2018 20:06:51

802.11a mode, Power Spectral Density, 5785MHz



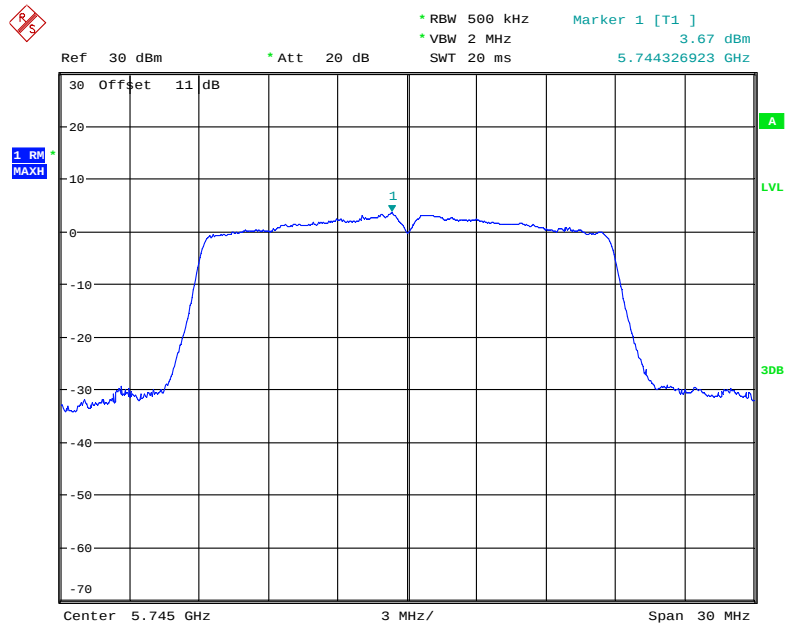
Date: 17.APR.2018 20:07:16

802.11a mode, Power Spectral Density, 5825 MHz



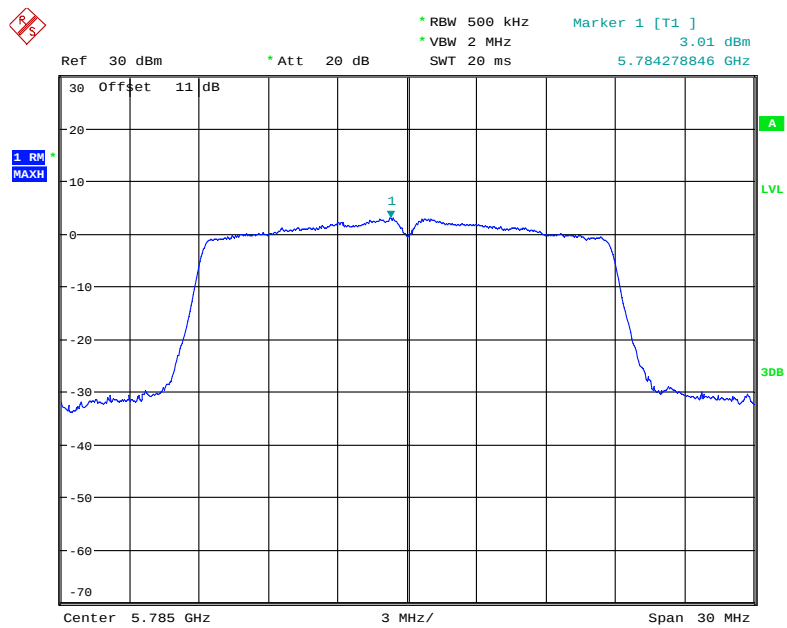
Date: 17.APR.2018 20:07:47

802.11n20 mode, Power Spectral Density, 5745 MHz



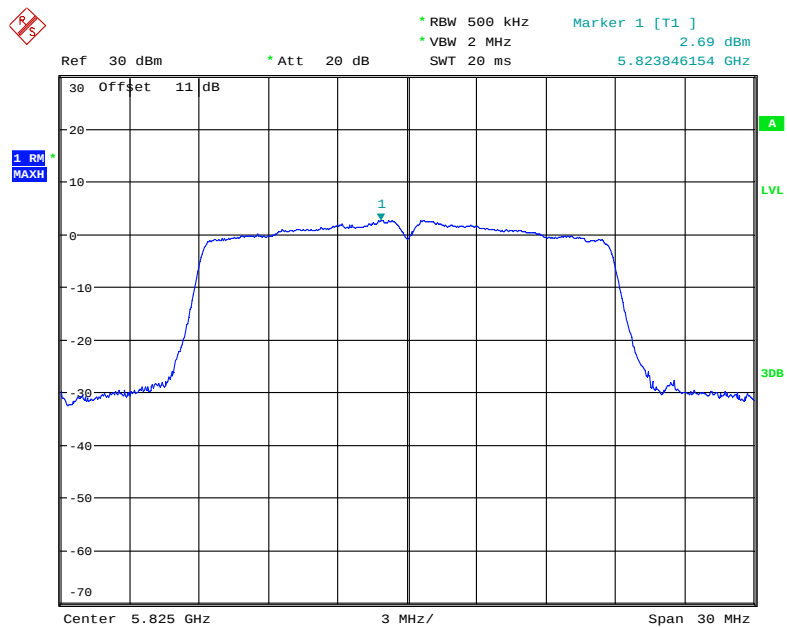
Date: 17.APR.2018 20:04:37

802.11n20 mode, Power Spectral Density, 5785 MHz

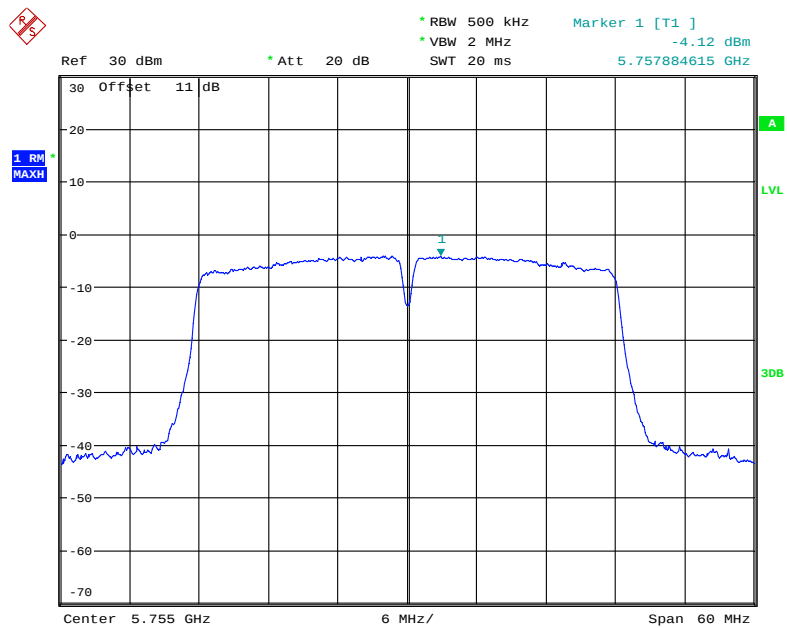


Date: 17.APR.2018 20:05:31

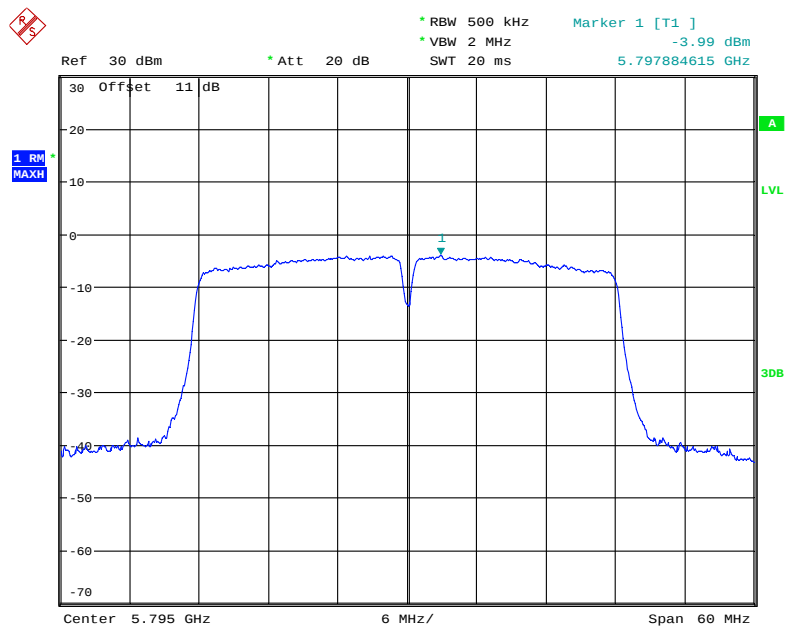
802.11n20 mode, Power Spectral Density, 5825 MHz



Date: 17.APR.2018 20:06:03

802.11n40 mode, Power Spectral Density, 5755 MHz

Date: 17.APR.2018 20:03:45

802.11n40 mode, Power Spectral Density, 5795 MHz

Date: 17.APR.2018 20:02:56

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