ACCREDITED
TESTING LABORATORY
CERTIFICATE # 4821.01

Bay Area Compliance Labs Corp.

FCC PART 15.407

TEST REPORT

For

GL Technologies (Hong Kong) Limited

FLAT/RM 203 2/F BUILDING 19W 19 SCIENCE PARK WEST AVENUE SHATIN NT,
Shatin, Hong Kong

FCC ID:2AFIW-AP1300C4

Report Type:	**Product Type:**
Original Report	AC1300 Wireless Access Point

Report Number:	RDG200416004-00B
Report Date:	2020-06-15
Reviewed By:	Jimmy Xiao RF Engineer
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

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	AC1300 Wireless Access Point
Tested Model	GL-AP1300LTEC4
Frequency Range	5G Wi-Fi: 5150-5250 MHz; 5725-5850 MHz
Maximum conducted output power	Wi-Fi: 5150-5250 MHz: 18.9dBm (802.11a), 19.7dBm(802.11n20/ac20) 20.0dBm(802.11n40/ac40), 19.7dBm(802.11 ac80) 5725-5850 MHz: 19.7dBm (802.11a), 19.6dBm(802.11n20/ac20) 20.0dBm(802.11n40/ac40), 19.7dBm(802.11 ac80)
Modulation Technique	OFDM
Antenna Specification	5.55dBi(5150-5250 MHz) 4.52dBi(5725-5850 MHz)
Voltage Range	DC 12V from adapter or DC48V from POE
Date of Test	2020-05-07 to 2020-06-15
Sample serial number	RDG200416004-RF-S1 (Assigned by BACL, Shenzhen)
Received date	2020-04-16
Sample/EUT Status	Good condition
Adapter 1 information	Model: ICP30A-120-2000 Input: AC 100-240V, 50/60Hz, 0.8A Output: DC 12.0V, 2.0A
Adapter 2 information	Model:KA2401A-1202000DE Input: AC 100-240V, 50/60Hz, 0.65A Output: DC 12.0V, 2.0A

Objective

This type approval report is prepared on behalf of *GL Technologies (Hong Kong) Limited* in accordance with Part 2-Subpart J, Part 15-Subparts A and E of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS submissions with FCC ID: 2AFIW-AP1300C4.

Test Methodology

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

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

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF Output Power with Power meter		±0.73dB
RF conducted test with spectrum		±1.6dB
AC Power Lines Conducted Emissions		±1.95dB
Emissions, Radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB
Temperature		±1℃
Humidity		±6%
Supply voltages		±0.4%

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

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

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

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The device supports Beamforming and non-beamforming mode for 5G Wi-Fi. And these two modes share the same power declared by the applicant.

The EUT has two antennas for 5G Wi-Fi, it can operate in 802.11a/n20/n40/ac20/ac40/ac80 modes.

As the 802.11ac20/ac40 are identical with 802.11n20/n40 modes, so only 802.11n20/n40 modes were tested.

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

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

For 802.11a, 802.11n20 mode: channel 36, 40, 48 were tested; For 802.11n40 mode: channel 38, 46 were tested; For 802.11ac80 mode, channel 42 was tested.

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

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

For 802.11a, 802.11n20 mode, channel 149, 157, 165 were tested; For 802.11n40 mode, channel 151, 159 were tested; For 802.11ac80 mode, channel 155 was tested.

EUT Exercise Software

"QRCT" software was used to test for Wi-Fi Mode.

Test frequencies and power level were configured as below:

U-NII	Mode	Frequency (MHz)	Rate (Mbps)	Power Level
5150 – 5250MHz	802.11 a	5180	6	18
		5200	6	18
		5240	6	18
	802.11 n20	5180	MCS0	18
		5200	MCS0	19
		5240	MCS0	19
	802.11 n40	5190	MCS0	17
		5230	MCS0	19
	802.11 ac80	5210	MCS0	17
5725 – 5850MHz	802.11 a	5745	6	20
		5785	6	20
		5825	6	20
	802.11 n20	5745	MCS0	20
		5785	MCS0	20
		5825	MCS0	20
	802.11 n40	5755	MCS0	20
		5795	MCS0	20
	802.11 ac80	5775	MCS0	20

Note 1: The two antenna ports share the same power level.
Note 2: The worse-case data rates are determined to be as follows for each mode based upon investigations by measuring the output power and PSD across all data rated bandwidths, and modulations.
The device supports SISO and MIMO in all modes, per pretest, the MIMO mode was the worst mode for all the modes.

Duty cycle

Please refer to the Appendix 5G Wifi.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

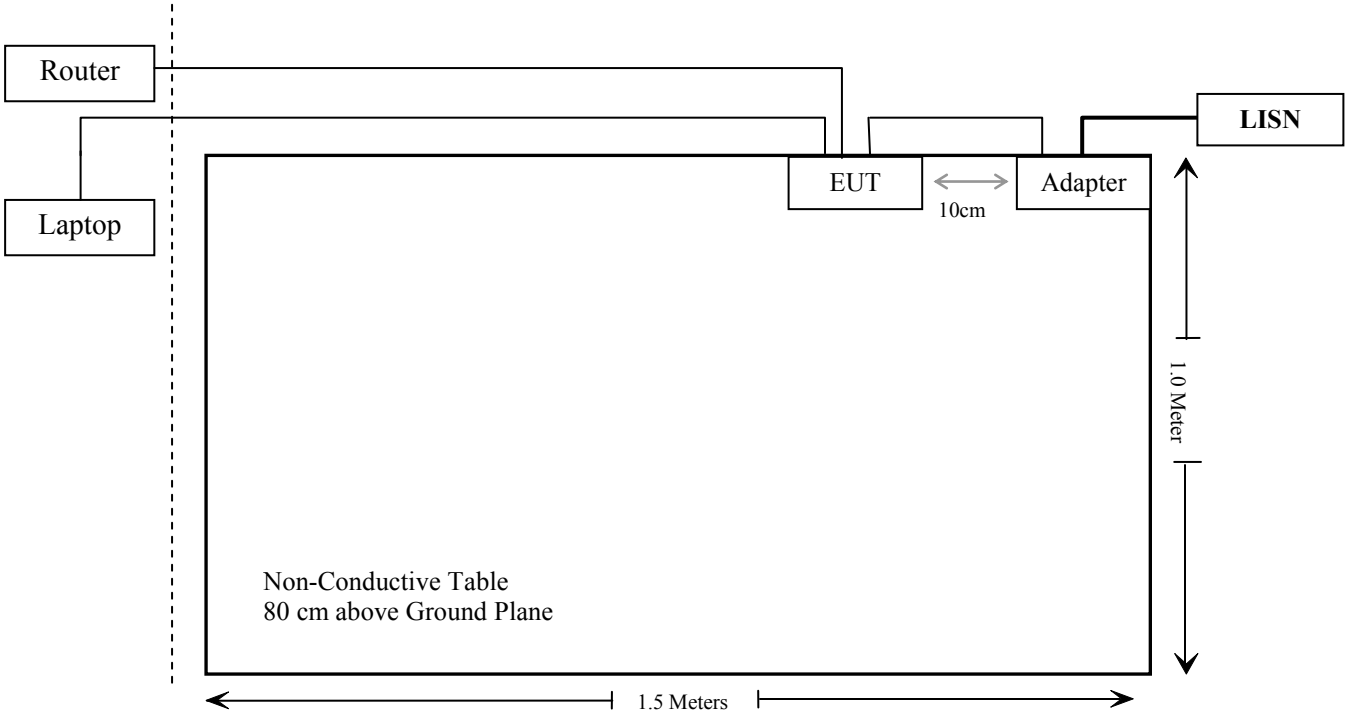
Manufacturer	Description	Model	Serial Number
GOSPELL	POE	G0720-480-050	G0720-480-050
Dell	PC	Latitude E5430	11429208685
Sagemcom	Wireless Router	1704N	3c81d839027c

External I/O Cable

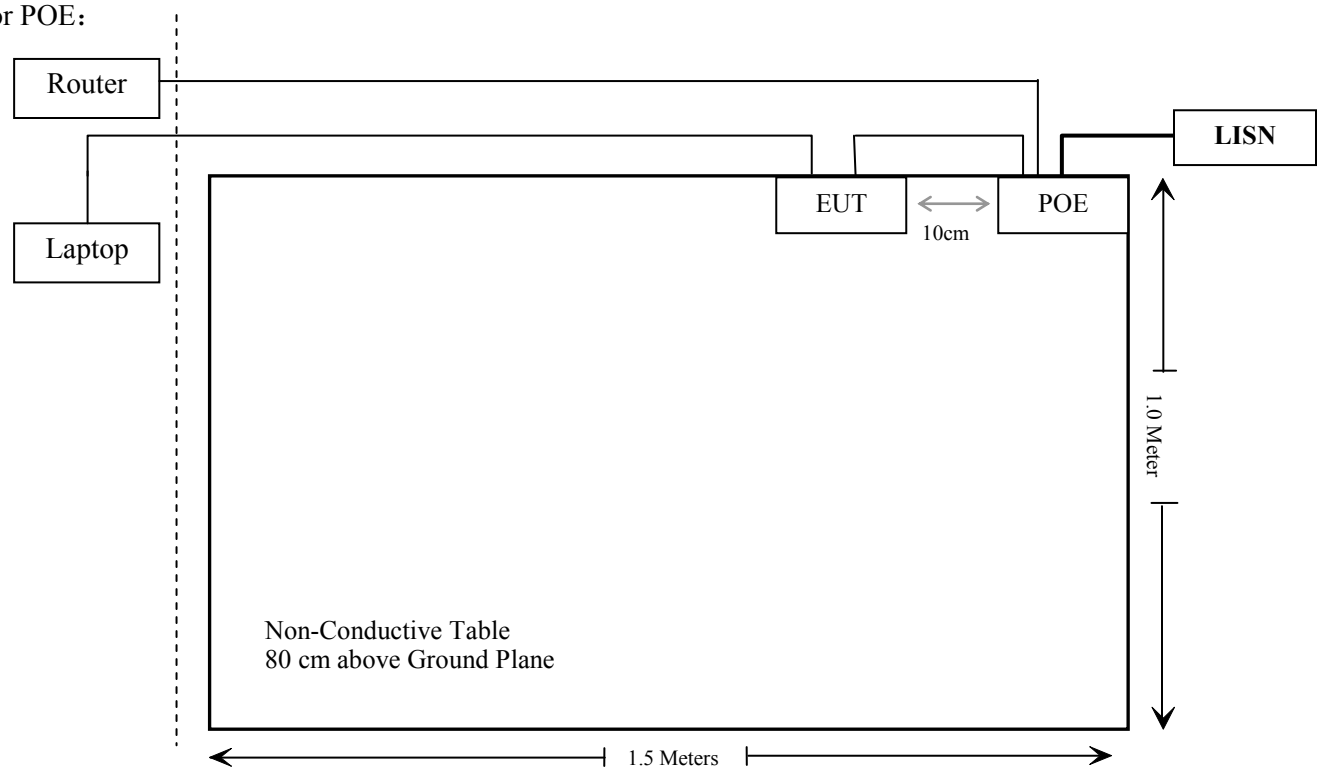
Cable Description	Length (m)	From/Port	To
Un-shielded Un-detachable DC Cable	1.0	EUT	Adapter
Un-shielded detachable AC Cable	1.0	LISN	POE
Un-shielded detachable RJ45 Cable	1.0	EUT	POE
Un-shielded detachable RJ45 Cable	10	EUT	PC
Un-shielded detachable RJ45 Cable	10	EUT	Router
Un-shielded detachable RJ45 Cable	10	POE	Router

Block Diagram of Test Setup

For conducted emissions
For Adapter：



For POE：



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), (4),(7)	Undesirable Emission& Restricted Bands	Compliance
§15.407(a) (1), (5),(e)	26 dB Emission Bandwidth & 6dB Bandwidth	Compliance
§15.407(a)(1),(3)	Conducted Transmitter Output Power	Compliance
§15.407 (a)(1),(3)	Power Spectral Density	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conducted test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2019/7/9	2020/7/8
Rohde & Schwarz	LISN	ENV216	101613	2020/1/22	2021/1/21
Rohde & Schwarz	Transient Limitor	ESH3Z2	DE25985	2019/11/29	2020/11/28
Unknown	CE Cable	CE Cable	UF A210B-1-0720-504504	2019/11/29	2020/11/28
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
Radiated Emission Test					
R&S	EMI Test Receiver	ESR3	102455	2019/7/9	2020/7/8
Sonoma instrument	Pre-amplifier	310 N	186238	2020/4/20	2021/4/20
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017/12/22	2020/12/21
Unknown	Cable	Chamber Cable 1	F-03-EM236	2019/11/29	2020/11/28
Unknown	Cable 2	RF Cable 2	F-03-EM197	2019/11/29	2020/11/28
Rohde & Schwarz	Auto test software	EMC 32	V9.10	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40-N	102259	2019/7/22	2020/07/21
COM-POWER	Pre-amplifier	PA-122	181919	2019/11/29	2020/11/28
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2019/11/29	2020/11/28
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017/12/22	2020/12/21
Insulted Wire Inc.	RF Cable	SPS-2503-3150	02222010	2019/11/29	2020/11/28
Unknown	RF Cable	W1101-EQ1 OUT	F-19-EM005	2019/11/29	2020/11/28
SNSD	Band Reject filter	BSF5150-5850MN-0899-004	5G filter	2020/4/20	2021/4/20
Ducommun Technolagies	Horn antenna	ARH-4223-02	1007726-02 1304	2017/12/6	2020/12/5
Ducommun Technolagies	Horn antenna	ARH-2823-02	1007726-02 1302	2017/12/6	2020/12/5

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Tonscend Corporation	RF control Unit	JS0806-2	19D8060154	2019/7/10	2020/7/9
Rohde & Schwarz	Signal and Spectrum Analyzer	FSV40	101473	2019/7/22	2020/7/21
Unknown	RF Cable	Unknown	2301 276	2019/11/29	

*** 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 §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

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

Limits for General Population/Uncontrolled Exposure

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

f = frequency in MHz
* = Plane-wave equivalent power density

Result

Calculated Formulary:

Predication of MPE limit at a given distance

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

S = power density (in appropriate units, e.g. mW/cm2)
P = power input to the antenna (in appropriate units, e.g., mW).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Mode	Frequency (MHz)	Antenna Gain		Max Tune Up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
2.4G Wi-Fi	2412-2472	6.93	4.93	21.0	125.89	20	0.124	1.0
BLE	2402-2480	-0.042	0.99	9.0	7.94	20	0.002	1.0
5G Wi-Fi	5150-5250	8.56	7.18	20.0	100.0	20	0.143	1.0
5G Wi-Fi	5725-5850	7.53	5.66	20.0	100.0	20	0.113	1.0
WCDMA Band 2	1850-1910	2.71	1.87	25.0	316.23	20	0.118	1.0
WCDMA Band 4	1710-1755	1.25	1.33	25.0	316.23	20	0.084	1.0
WCDMA Band 5	824-849	0.19	1.04	25.0	316.23	20	0.065	0.55
LTE Band 2	1850-1910	2.71	1.87	25.0	316.23	20	0.118	1.0
LTE Band 4	1710-1755	1.25	1.33	25.0	316.23	20	0.084	1.0
LTE Band 5	824-849	0.19	1.04	25.0	316.23	20	0.065	0.55
LTE Band 12	699-716	-1.55	0.70	25.0	316.23	20	0.044	0.466
LTE Band 13	777-787	-0.50	0.89	25.0	316.23	20	0.056	0.518
LTE Band 14	788-798	-0.50	0.89	25.0	316.23	20	0.056	0.525
LTE Band 66	1710-1780	1.25	1.33	25.0	316.23	20	0.084	1.0
LTE Band 71	663-698	-2.15	0.61	25.0	316.23	20	0.038	0.442

Note: 1. the tune up conducted power was declared by the applicant
2. the BLE, Wi-Fi function can transmit at the same time with the LTE.
3. For the Wi-Fi, as it can support the beam-forming function, so the antenna gain should add the 10lg2.
4. Please refer to the MPE report of the FCC ID: XMR201808EC25AF for the LTE output power.

So the worst simultaneous transmitting consideration:

The ratio=$MPE_{2.4GWi\text{-}Fi}$/limit + $MPE_{5GWi\text{-}Fi}$/limit + $MPE_{Band\ 5}$/limit =0.124/1.0+0.143/1.0+0.065/0.55 =0.385＜1.0

so simultaneous exposure is not required.

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 two internal antennas for Wi-Fi which were permanently attached. The antenna gain is 5.55dBi (5150-5250MHz) and 4.52dBi (5745-5850MHz), fulfill the requirement of this section. Please refer to the EUT photos.

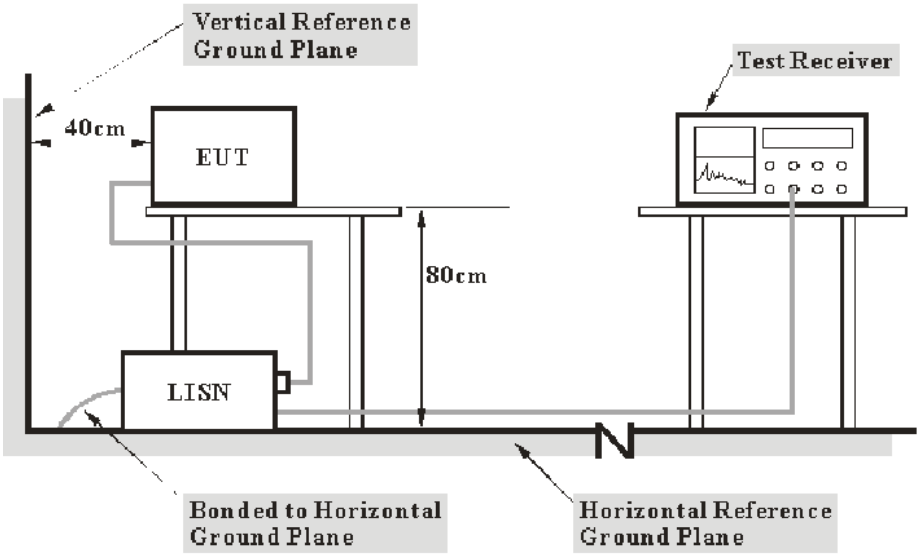
Result: Compliance.

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

Applicable Standard

FCC §15.207, §15.407(b) (6)

EUT Setup



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

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

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/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 EUT complied with the FCC Part 15.207.

Test Data

Environmental Conditions

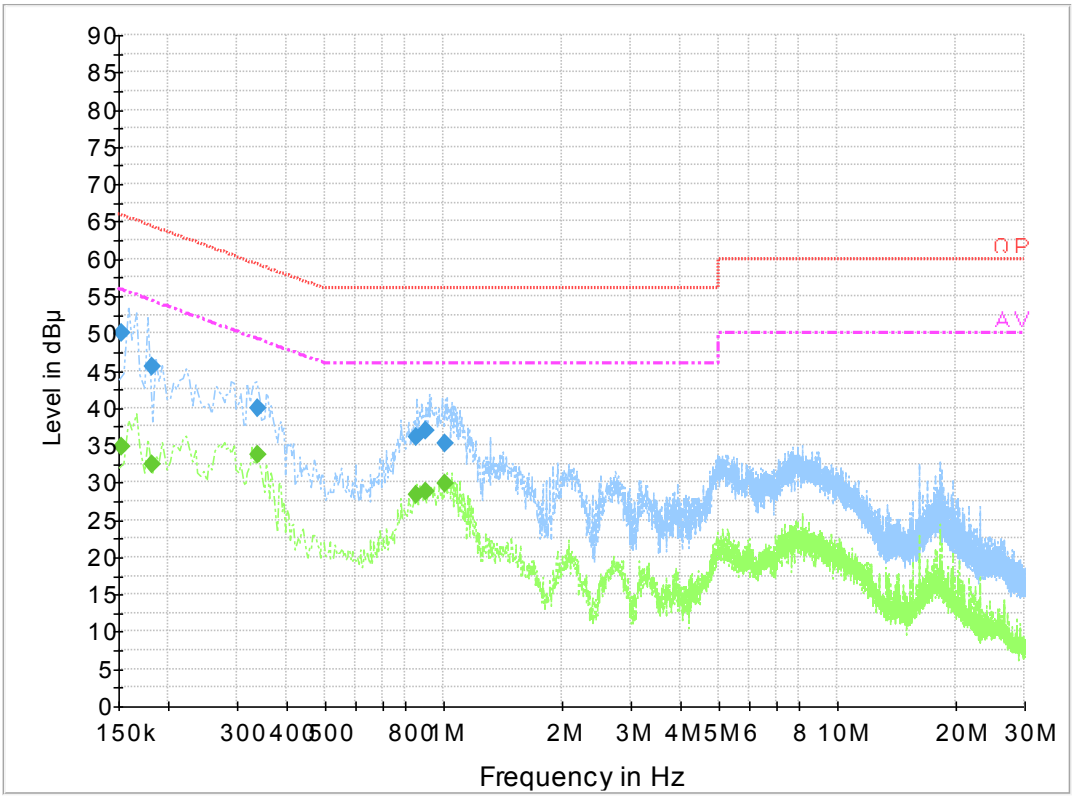
Temperature:	25 ℃
Relative Humidity:	65 %
ATM Pressure:	101.0 kPa

The testing was performed by Haiguo Li from 2020-05-07 to 2020-05-15.

EUT operation mode: Transmitting (worst case is 802.11n40 mode 5230 MHz)

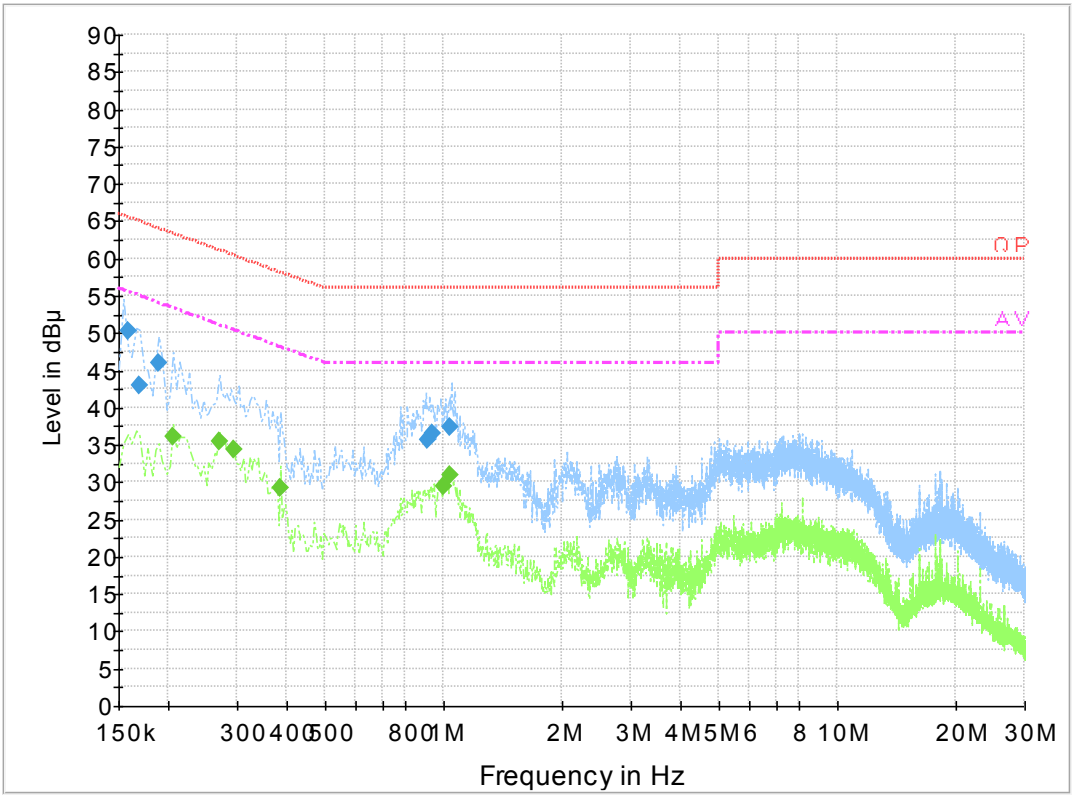
For Adapter 1

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.153500	50.1	19.8	65.8	15.7	QP
0.182500	45.4	19.8	64.4	19.0	QP
0.339010	40.0	19.9	59.2	19.2	QP
0.857130	36.1	19.8	56.0	19.9	QP
0.908170	36.9	19.8	56.0	19.1	QP
1.014670	35.2	19.9	56.0	20.8	QP
0.153500	34.8	19.8	55.8	21.0	Ave.
0.182500	32.5	19.8	54.4	21.9	Ave.
0.339010	33.7	19.9	49.2	15.5	Ave.
0.857130	28.3	19.8	46.0	17.7	Ave.
0.908170	28.8	19.8	46.0	17.2	Ave.
1.014670	29.9	19.9	46.0	16.1	Ave.

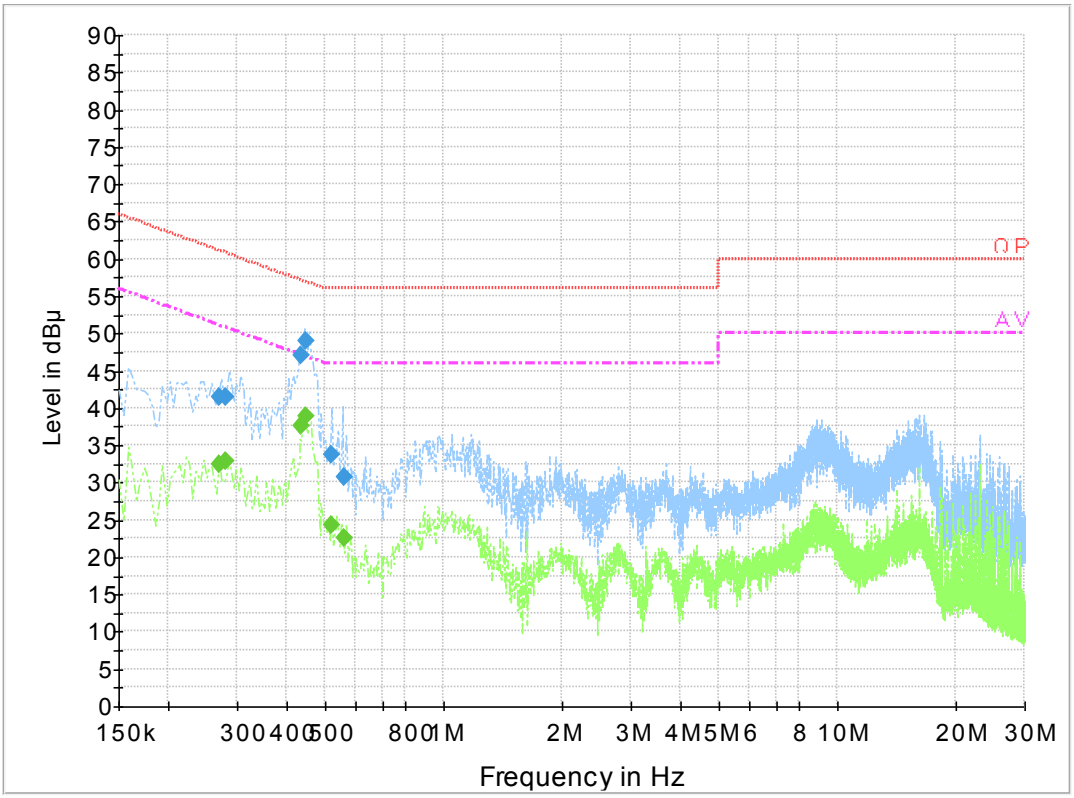
AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.158000	50.4	19.8	65.6	15.2	QP
0.169500	42.9	19.8	65.0	22.1	QP
0.189500	45.9	19.8	64.1	18.2	QP
0.915530	35.7	19.7	56.0	20.3	QP
0.936110	36.4	19.8	56.0	19.6	QP
1.046250	37.4	19.8	56.0	18.6	QP
0.206000	36.1	19.8	53.4	17.3	Ave.
0.270000	35.5	19.7	51.1	15.6	Ave.
0.294000	34.3	19.7	50.4	16.1	Ave.
0.386000	29.2	19.8	48.1	18.9	Ave.
1.002000	29.4	19.8	46.0	16.6	Ave.
1.046000	30.9	19.8	46.0	15.1	Ave.

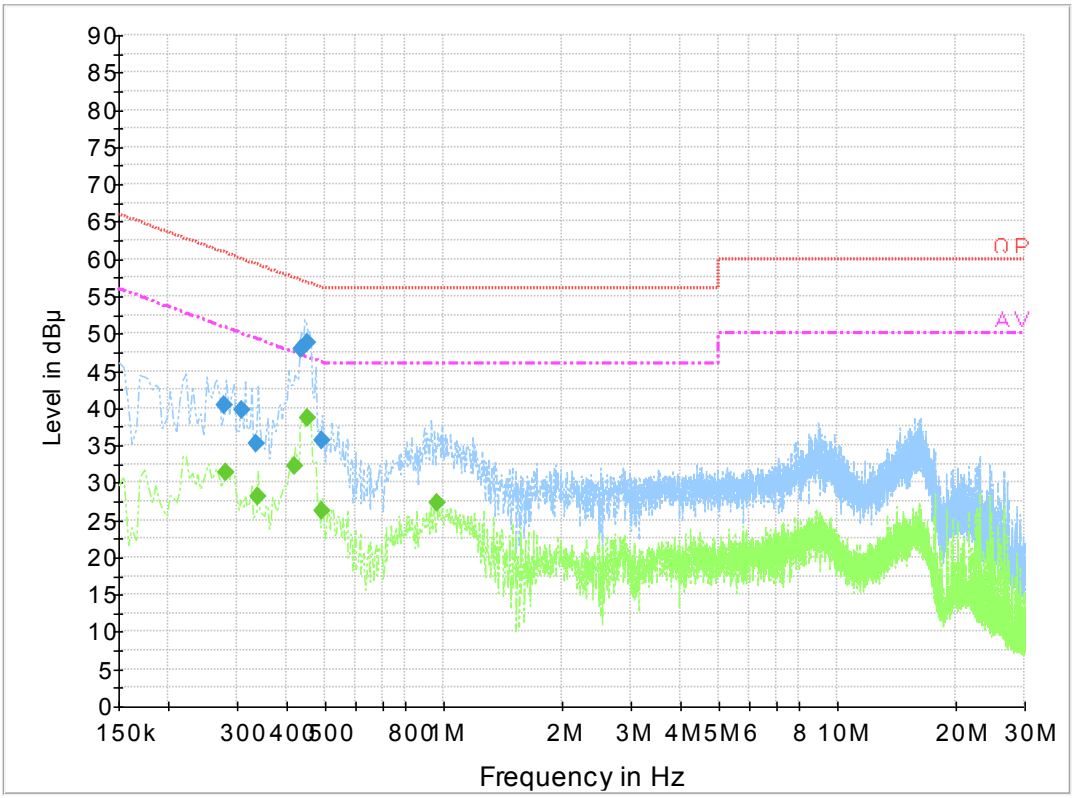
For Adapter 2

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.269500	41.5	19.8	61.1	19.6	QP
0.281500	41.5	19.7	60.8	19.3	QP
0.435550	47.1	19.8	57.1	10.0	QP
0.447310	49.0	19.8	56.9	8.0	QP
0.522170	33.8	19.8	56.0	22.2	QP
0.562310	30.7	19.8	56.0	25.3	QP
0.269500	32.4	19.8	51.1	18.8	Ave.
0.281500	32.8	19.7	50.8	17.9	Ave.
0.435550	37.7	19.8	47.1	9.5	Ave.
0.447310	38.8	19.8	46.9	8.1	Ave.
0.522170	24.3	19.8	46.0	21.7	Ave.
0.562310	22.5	19.8	46.0	23.5	Ave.

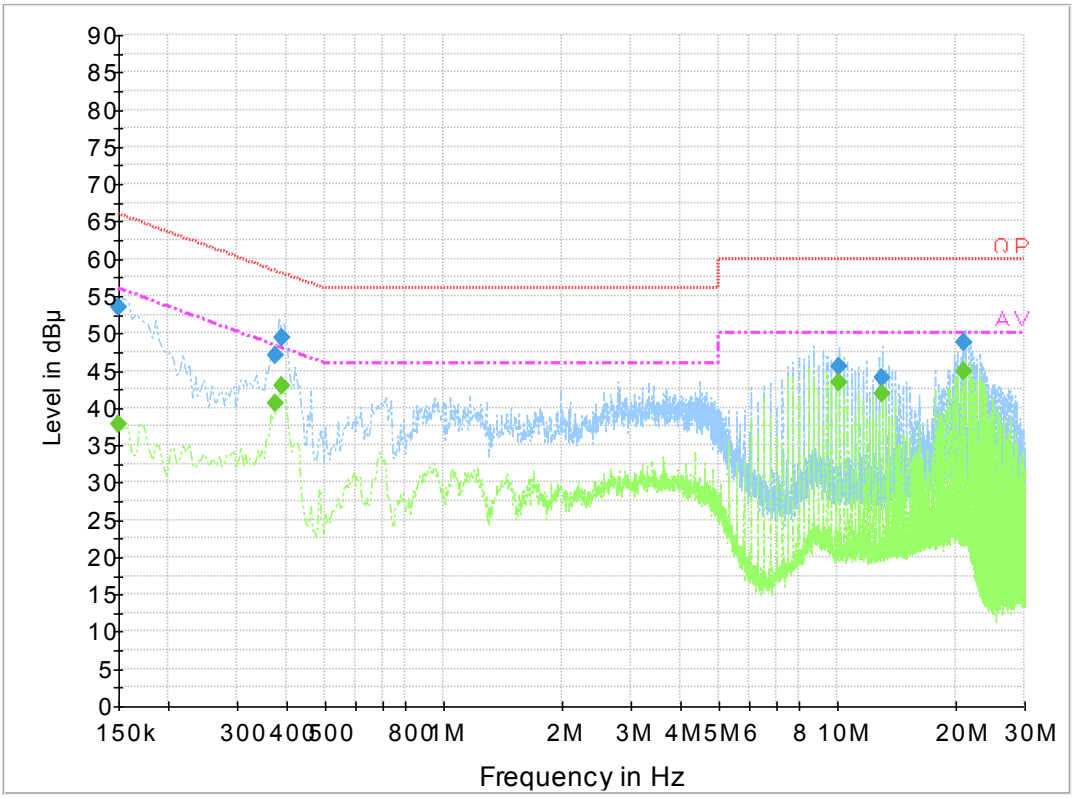
AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.277500	40.4	19.7	60.9	20.5	QP
0.309290	39.7	19.7	60.0	20.3	QP
0.336930	35.3	19.8	59.3	24.0	QP
0.436450	47.8	19.8	57.1	9.3	QP
0.452690	48.7	19.8	56.8	8.1	QP
0.490590	35.6	19.8	56.2	20.6	QP
0.282000	31.4	19.7	50.8	19.3	Ave.
0.338000	28.2	19.8	49.3	21.1	Ave.
0.422000	32.2	19.8	47.4	15.2	Ave.
0.454000	38.7	19.8	46.8	8.1	Ave.
0.494000	26.2	19.8	46.1	19.9	Ave.
0.970000	27.2	19.8	46.0	18.8	Ave.

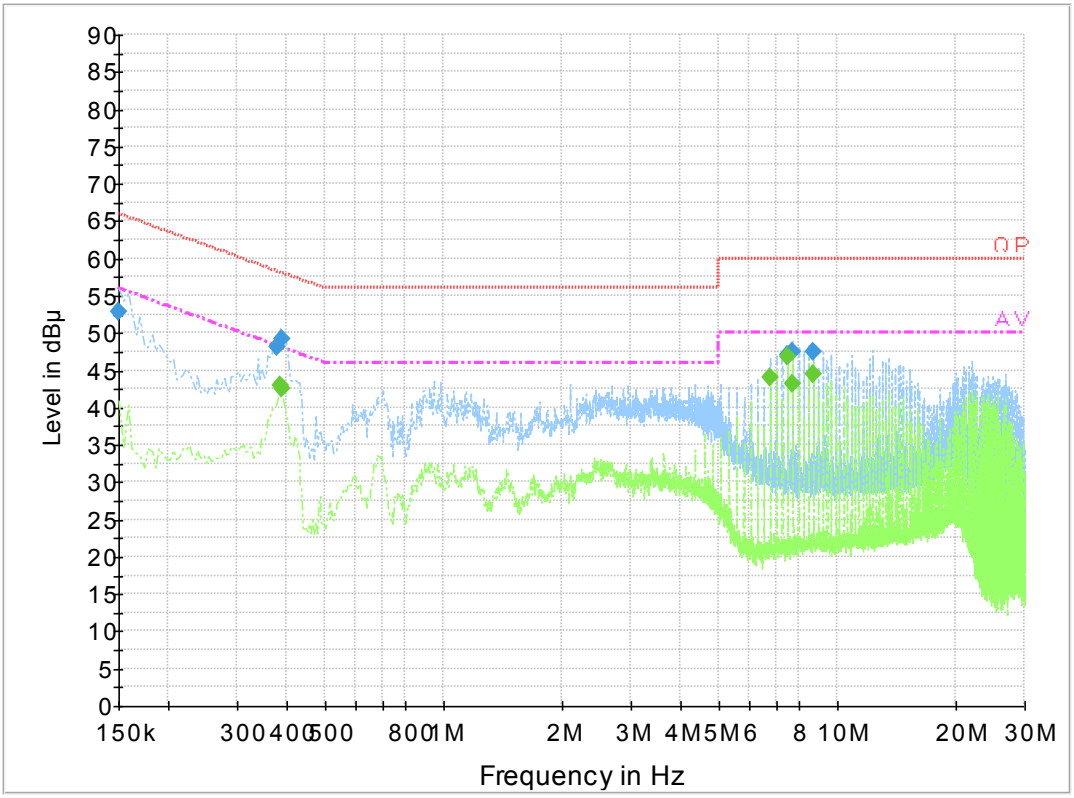
For POE:

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.150000	53.4	19.8	66.0	12.6	QP
0.376270	47.0	19.9	58.4	11.4	QP
0.388090	49.3	19.9	58.1	8.8	QP
10.165510	45.6	20.0	60.0	14.4	QP
13.069950	44.1	20.0	60.0	15.9	QP
21.054530	48.8	20.5	60.0	11.2	QP
0.150000	37.8	19.8	56.0	18.2	Ave.
0.376270	40.5	19.9	48.4	7.8	Ave.
0.388090	43.0	19.9	48.1	5.1	Ave.
10.165510	43.5	20.0	50.0	6.5	Ave.
13.069950	41.8	20.0	50.0	8.2	Ave.
21.054530	45.0	20.5	50.0	5.0	Ave.

AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/Ave./QP)
0.150000	52.9	19.8	66.0	13.1	QP
0.380210	48.1	19.8	58.3	10.1	QP
0.388150	49.2	19.8	58.1	8.9	QP
7.501470	47.0	19.9	60.0	13.0	QP
7.745810	47.5	19.9	60.0	12.5	QP
8.715290	47.5	19.9	60.0	12.5	QP
0.386000	42.9	19.8	48.1	5.2	Ave.
0.390000	42.5	19.8	48.1	5.6	Ave.
6.778000	44.0	19.9	50.0	6.0	Ave.
7.502000	46.7	19.9	50.0	3.3	Ave.
7.746000	43.2	19.9	50.0	6.8	Ave.
8.714000	44.6	19.9	50.0	5.4	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), (4), (6), (7) – UNDESIRABLE EMISSION

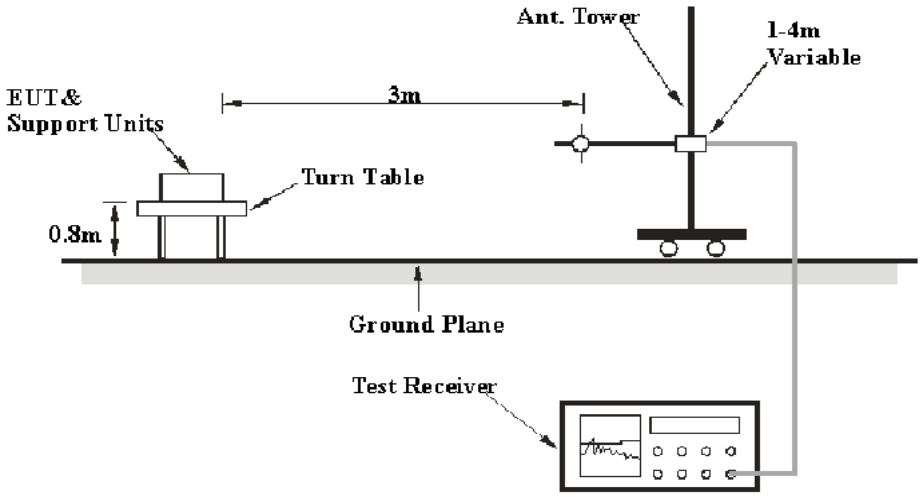
Applicable Standard

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

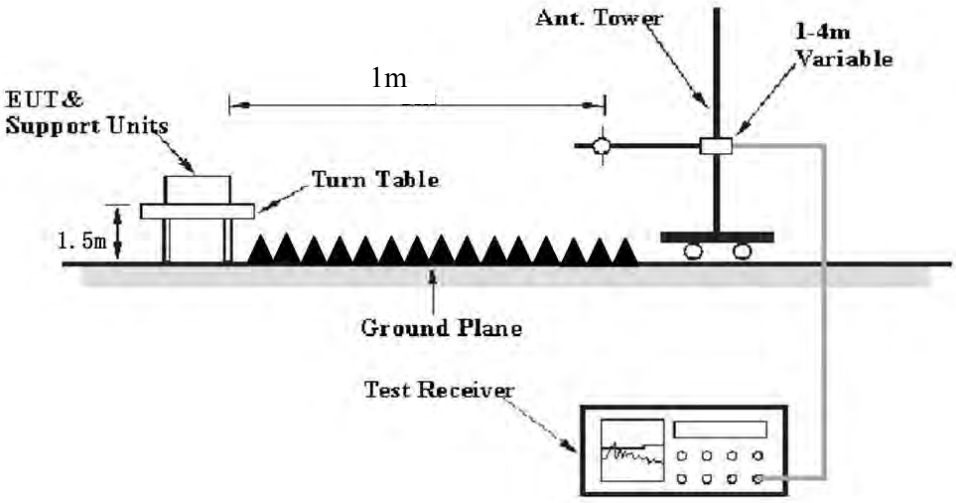
(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:
(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(4) For transmitters operating in the 5.725-5.85 GHz band:
(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

EUT Setup

Below 1 GHz:



Above 1 GHz:



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

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

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

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

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

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

Test Procedure

Radiated Spurious Emission

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

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

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

Corrected Amplitude & Margin Calculation

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

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - 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:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart E, section 15.205, 15.209 and 15.407 rules.

Test Data

Environmental Conditions

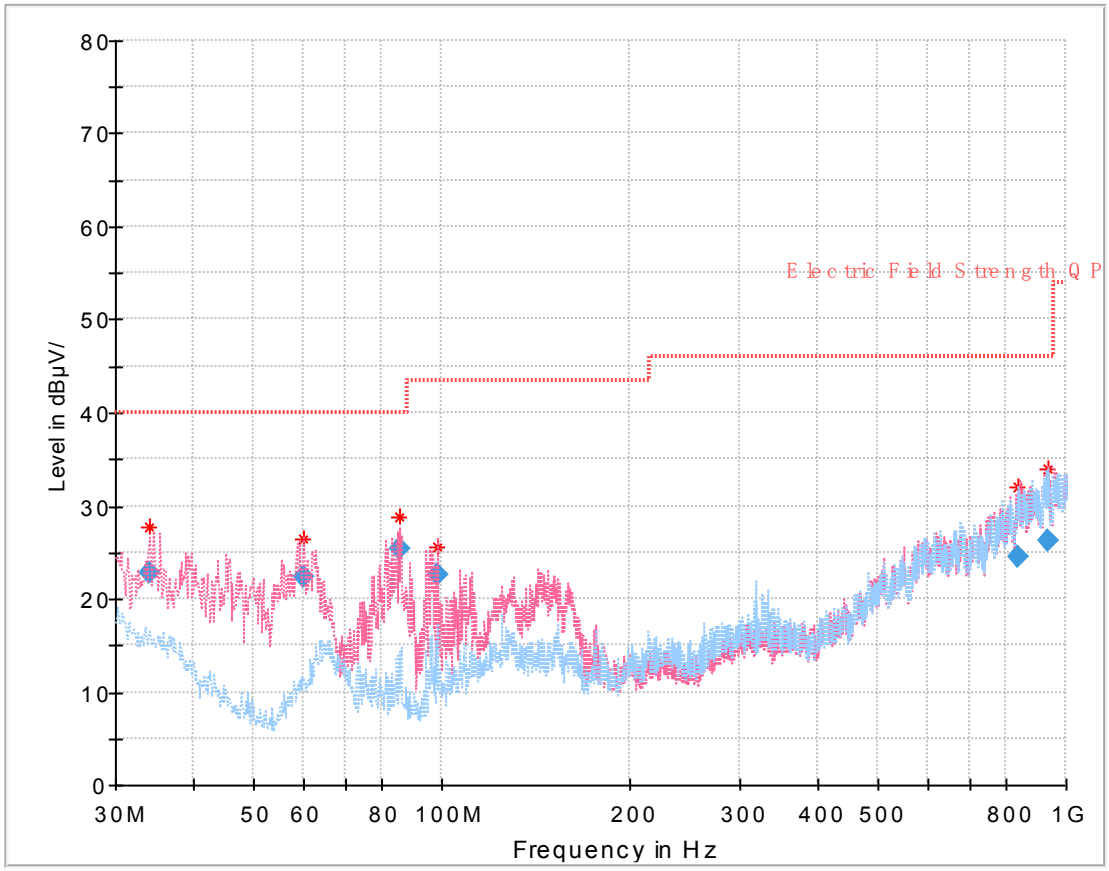
Temperature:	25 ℃
Relative Humidity:	60%
ATM Pressure:	101.0 kPa

The testing was performed by Zero Yan and Harris He from 2020-05-07 to 2020-05-17 for below 1G and Leo Huang on 2020-05-13 for above 1G.

EUT operation mode: Transmitting

For Adapter 1

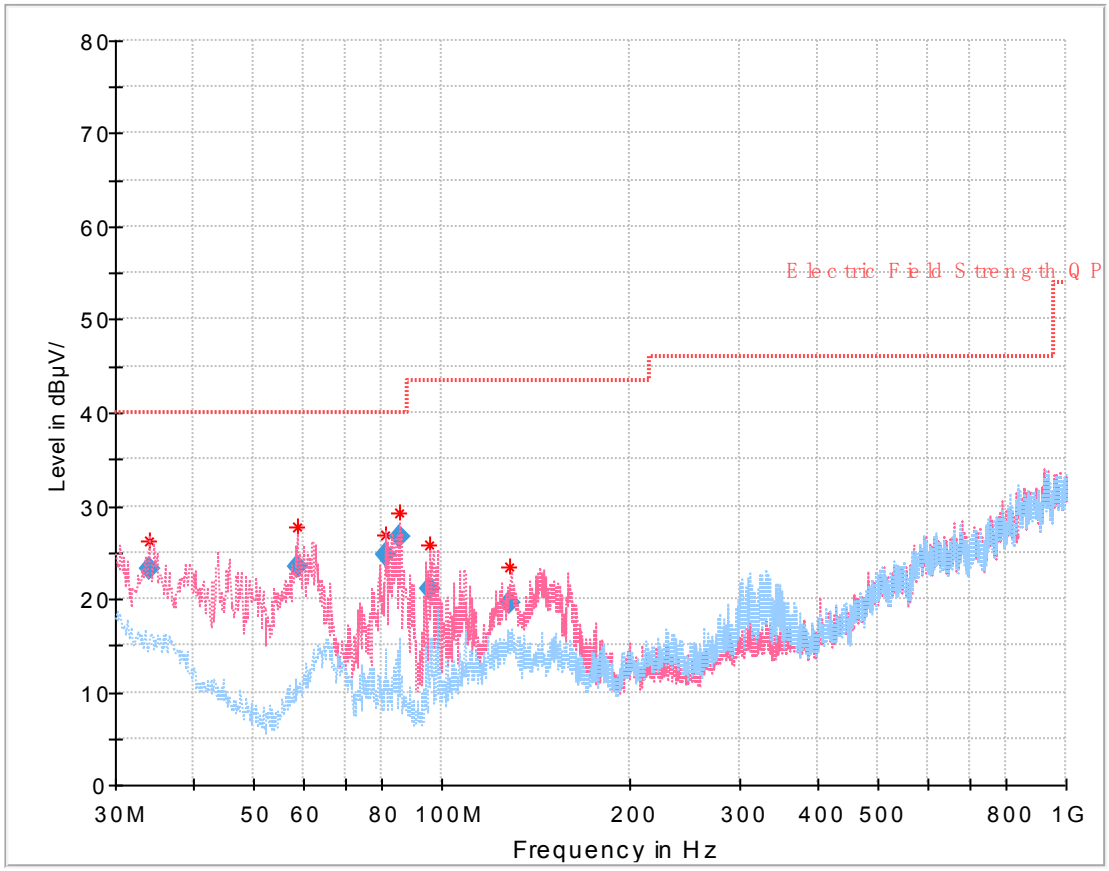
30 MHz – 1 GHz: *(worst case is 802.11n40 mode 5230 MHz)*



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
34.064250	22.75	127.0	V	203.0	-10.0	40.00	17.25
60.156500	22.32	109.0	V	212.0	-20.2	40.00	17.68
85.500875	25.29	103.0	V	109.0	-19.5	40.00	14.71
98.451375	22.55	118.0	V	200.0	-17.5	43.50	20.95
836.572500	24.61	331.0	V	130.0	2.7	46.00	21.39
933.309625	26.22	271.0	V	116.0	4.8	46.00	19.78

For Adapter 2

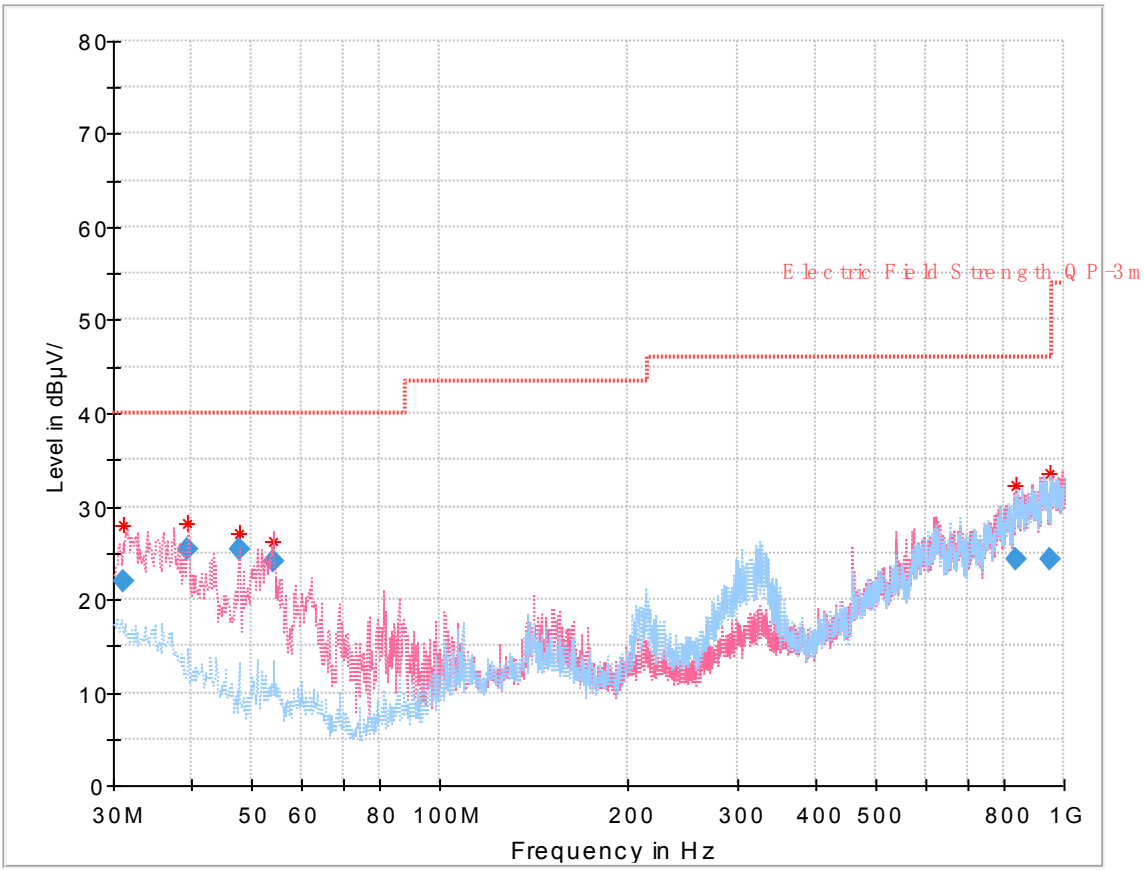
30 MHz – 1 GHz: *(worst case is 802.11n40 mode 5230 MHz)*



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
34.106625	23.13	108.0	V	145.0	-10.0	40.00	16.87
58.720000	23.54	109.0	V	135.0	-20.1	40.00	16.46
81.486375	24.78	110.0	V	120.0	-19.8	40.00	15.22
85.490125	26.68	112.0	V	104.0	-19.5	40.00	13.32
95.856250	21.01	103.0	V	189.0	-18.0	43.50	22.49
128.868250	19.64	110.0	V	297.0	-13.7	43.50	23.86

For POE:

30 MHz – 1 GHz: *(worst case is 802.11n40 mode 5230 MHz)*



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
31.180750	22.04	109.0	V	344.0	-8.3	40.00	17.96
39.495750	25.33	102.0	V	13.0	-13.4	40.00	14.67
47.809125	25.44	102.0	V	302.0	-18.6	40.00	14.56
54.133250	24.17	127.0	V	189.0	-19.9	40.00	15.83
838.465250	24.40	116.0	H	108.0	2.8	46.00	21.60
952.518125	24.24	249.0	H	47.0	5.1	46.00	21.76

1 GHz ~ 40 GHz:

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

5150-5250 MHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11a									
5180 MHz									
5149.46	39.61	PK	274	2.3	V	38.36	77.97	83.5	5.53
5149.46	18.37	Ave.	274	2.3	V	38.36	56.73	63.5	6.77
5352.29	29.62	PK	267	1.4	V	39.09	68.71	83.5	14.79
5352.29	16.85	Ave.	267	1.4	V	39.09	55.94	63.5	7.56
10360.00	41.11	PK	98	1.8	V	17.42	58.53	77.7	19.17
5200 MHz									
10400.00	41.37	PK	33	1.6	V	17.52	58.89	77.7	18.81
5240MHz									
5146.83	29.26	PK	66	1.3	V	38.36	67.62	83.5	15.88
5146.83	16.76	Ave.	66	1.3	V	38.36	55.12	63.5	8.38
5351.89	29.13	PK	132	2.3	V	39.09	68.22	83.5	15.28
5351.89	16.65	Ave.	132	2.3	V	39.09	55.74	63.5	7.76
10480.00	42.32	PK	290	1.2	V	17.25	59.57	77.7	18.13

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11n20									
5180 MHz									
5149.67	38.56	PK	114	1.2	V	38.36	76.92	83.5	6.58
5149.67	20.06	Ave.	114	1.2	V	38.36	58.42	63.5	5.08
5352.87	29.76	PK	139	1.1	V	39.09	68.85	83.5	14.65
5352.87	16.51	Ave.	139	1.1	V	39.09	55.60	63.5	7.90
10360.00	41.42	PK	155	1.0	V	17.42	58.84	77.7	18.86
5200MHz									
10400.00	41.26	PK	305	2.1	V	17.52	58.78	77.7	18.92
5240 MHz									
5145.89	29.62	PK	94	2.0	V	38.36	67.98	83.5	15.52
5145.89	16.73	Ave.	94	2.0	V	38.36	55.09	63.5	8.41
5352.66	29.73	PK	156	1.3	V	39.09	68.82	83.5	14.68
5352.66	16.59	Ave.	156	1.3	V	39.09	55.68	63.5	7.82
10480.00	41.82	PK	91	2.0	V	17.25	59.07	77.7	18.63

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11n40									
5190 MHz									
5149.89	41.36	PK	212	2.0	V	38.36	79.72	83.5	3.78
5149.89	23.46	Ave.	212	2.0	V	38.36	61.82	63.5	1.68
5351.76	28.69	PK	198	1.1	V	39.09	67.78	83.5	15.72
5351.76	16.43	Ave.	198	1.1	V	39.09	55.52	63.5	7.98
10380.00	41.48	PK	29	2.0	V	17.42	58.90	77.7	18.80
5230 MHz									
5147.86	29.35	PK	31	2.1	V	38.36	67.71	83.5	15.79
5147.86	16.43	Ave.	31	2.1	V	38.36	54.79	63.5	8.71
5352.19	29.31	PK	180	1.5	V	39.09	68.40	83.5	15.10
5352.19	16.39	Ave.	180	1.5	V	39.09	55.48	63.5	8.02
10460.00	41.82	PK	307	1.7	V	17.15	58.97	77.7	18.73
802.11ac80									
5210 MHz									
5149.02	41.55	PK	225	2.2	V	38.36	79.91	83.5	3.59
5149.02	23.26	Ave.	225	2.2	V	38.36	61.62	63.5	1.88
5351.43	29.52	PK	86	2.4	V	39.09	68.61	83.5	14.89
5351.43	16.37	Ave.	86	2.4	V	39.09	55.46	63.5	8.04
10420.00	40.49	PK	284	1.3	V	17.52	58.01	77.7	19.69

5725-5850 MHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m)	FCC Part 15.407/205/209	
	Reading (dBµV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBµV/m)	Margin (dB)
802.11a									
5745 MHz									
5643.87	30.46	PK	228	1.2	V	39.46	69.92	77.7	7.78
5667.26	31.87	PK	185	1.6	V	39.49	71.36	90.47	19.11
5719.15	39.65	PK	223	1.6	V	39.49	79.14	120.06	40.92
5724.60	44.87	PK	162	1.7	V	39.49	84.36	130.78	46.42
11490.00	42.55	PK	91	2.0	V	17.47	60.02	83.5	23.48
11490.00	26.64	Ave.	91	2.0	V	17.47	44.11	63.5	19.39
5785 MHz									
11570.00	41.91	PK	259	1.2	V	17.51	59.42	83.5	24.08
11570.00	27.24	Ave.	259	1.2	V	17.51	44.75	63.5	18.75
5825 MHz									
5850.44	40.27	PK	189	1.9	V	39.87	80.14	130.7	50.56
5855.56	38.13	PK	353	2.0	V	39.87	78.00	120.14	42.14
5890.59	33.99	PK	329	1.7	V	39.87	73.86	103.16	29.30
5926.32	30.57	PK	30	2.1	V	39.97	70.54	77.7	7.16
11650.00	42.62	PK	96	2.1	V	16.18	58.80	83.5	24.70
11650.00	27.69	Ave.	96	2.1	V	16.18	43.87	63.5	19.63

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11n20									
5745 MHz									
5639.56	30.49	PK	65	2.4	V	39.46	69.95	77.7	7.75
5681.44	32.23	PK	325	1.2	V	39.49	71.72	100.97	29.25
5719.78	40.39	PK	281	2.5	V	39.49	79.88	120.24	40.36
5723.69	45.07	PK	258	1.6	V	39.49	84.56	128.71	44.15
11490.00	41.63	PK	35	2.0	V	17.47	59.10	83.5	24.40
11490.00	27.04	Ave.	35	2.0	V	17.47	44.51	63.5	18.99
5785 MHz									
11570.00	42.15	PK	325	1.9	V	17.51	59.66	83.5	23.84
11570.00	27.42	Ave.	325	1.9	V	17.51	44.93	63.5	18.57
5825 MHz									
5850.04	40.10	PK	8	2.0	V	39.87	79.97	131.61	51.64
5855.51	36.84	PK	24	1.2	V	39.87	76.71	120.16	43.45
5912.23	33.85	PK	197	2.1	V	39.87	73.72	87.15	13.43
5927.48	30.62	PK	216	2.4	V	39.97	70.59	77.7	7.11
11650.00	41.68	PK	241	1.4	V	16.18	57.86	83.5	25.64
11650.00	26.40	Ave.	241	1.4	V	16.18	42.58	63.5	20.92

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15.407/205/209	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
802.11n40									
5755 MHz									
5646.37	30.23	PK	304	2.4	V	39.46	69.69	77.7	8.01
5695.48	35.86	PK	119	2.1	V	39.49	75.35	111.36	36.01
5719.55	45.76	PK	44	2.1	V	39.49	85.25	120.17	34.92
5720.24	46.11	PK	150	2.1	V	39.49	85.60	120.85	35.25
11510.00	42.57	PK	312	2.4	V	17.47	60.04	83.5	23.46
11510.00	28.40	Ave.	312	2.4	V	17.47	45.87	63.5	17.63
5795 MHz									
5853.44	36.88	PK	349	1.8	V	39.87	76.75	123.86	47.11
5858.72	35.54	PK	341	2.0	V	39.87	75.41	119.25	43.84
5875.33	33.55	PK	200	1.2	V	39.87	73.42	114.46	41.04
5927.43	30.35	PK	331	2.4	V	39.97	70.32	77.7	7.38
11590.00	42.41	PK	176	1.3	V	17.51	59.92	83.5	23.58
11590.00	27.25	Ave.	176	1.3	V	17.51	44.76	63.5	18.74
802.11ac80									
5775 MHz									
5648.97	30.56	PK	315	1.4	V	39.46	70.02	77.7	7.68
5699.75	38.80	PK	147	1.9	V	39.49	78.29	114.52	36.23
5719.47	43.90	PK	270	2.0	V	39.49	83.39	120.15	36.76
5724.76	44.63	PK	80	2.2	V	39.49	84.12	131.75	47.63
5853.11	43.37	PK	356	1.1	V	39.87	83.24	124.61	41.37
5855.56	43.43	PK	41	1.6	V	39.87	83.30	120.14	36.84
5877.14	38.04	PK	47	1.7	V	39.87	77.91	113.12	35.21
5931.25	30.23	PK	286	1.7	V	39.97	70.20	77.7	7.50
11550.00	40.65	PK	294	1.5	V	17.51	58.16	83.5	25.34
11550.00	27.43	Ave.	294	1.5	V	17.51	44.94	63.5	18.56

Co-location Transmitting (802.11b mode 2442MHz + 802.11a mode 5755MHz+LTE Band 5 mode 836.5MHz)

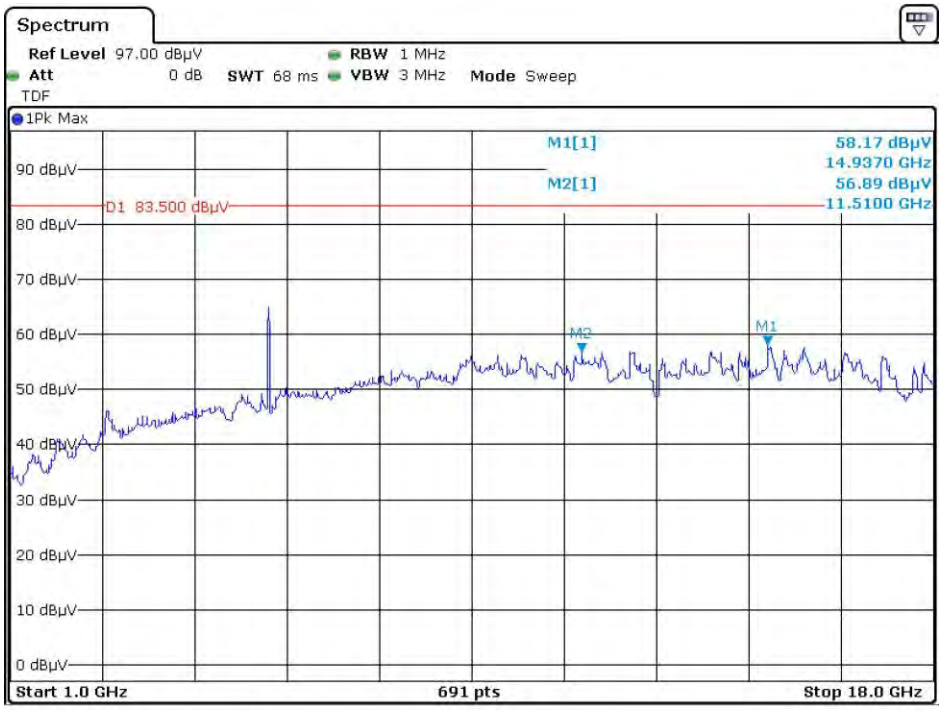
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Test Distance (m)
	Reading (dBµV)	PK/QP/Ave.		Height (m)	Polar (H/V)					
935.62	34.83	QP	310	1.5	H	4.8	39.63	46	6.37	3
935.62	33.27	QP	185	1.8	V	4.8	38.07	46	7.93	3
1673.00	55.69	PK	218	1.7	H	-2.06	53.63	74	20.37	3
1673.00	43.82	Ave.	218	1.7	H	-2.06	41.76	54	12.24	3
4884.00	46.53	PK	154	1.6	V	6.76	53.29	74	20.71	3
4884.00	35.16	Ave.	154	1.6	V	6.76	41.92	54	12.08	3
11510.00	41.62	PK	359	2.0	V	17.47	59.09	83.5	24.41	1
11510.00	27.54	Ave.	359	2.0	V	17.47	45.01	63.5	18.49	1

Note:
Corrected Amplitude = Corrected Factor + Reading
Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor
Margin = Limit- Corr. Amplitude
All other spurious emissions are 20 dB below the limit or are on the system noise floor level.

Peak

Pre-scan with 802.11n40 5755MHz

Horizontal



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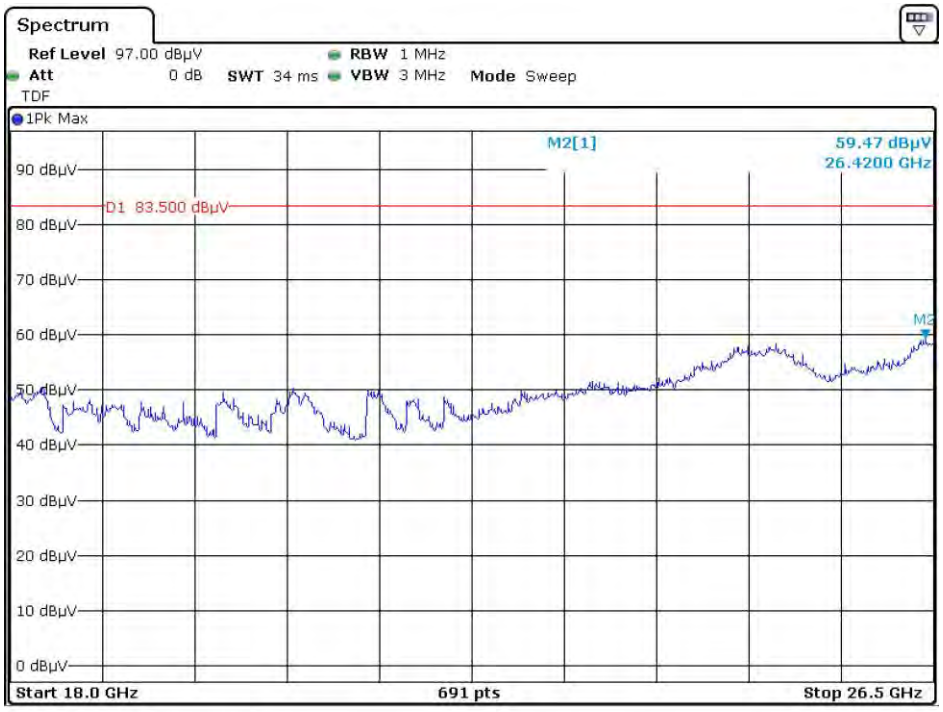

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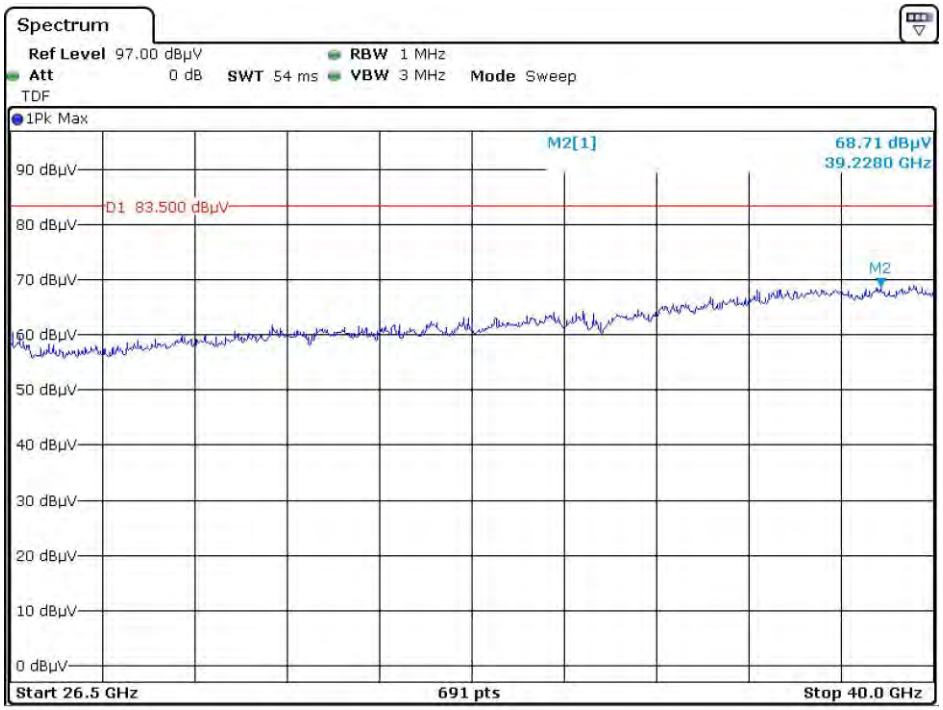

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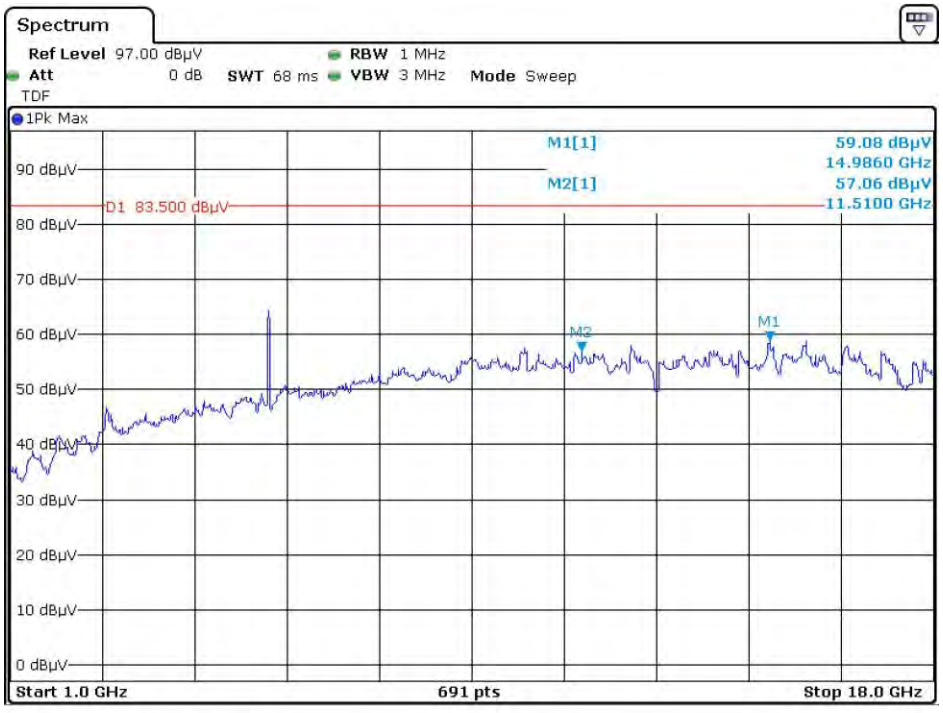
Vertical



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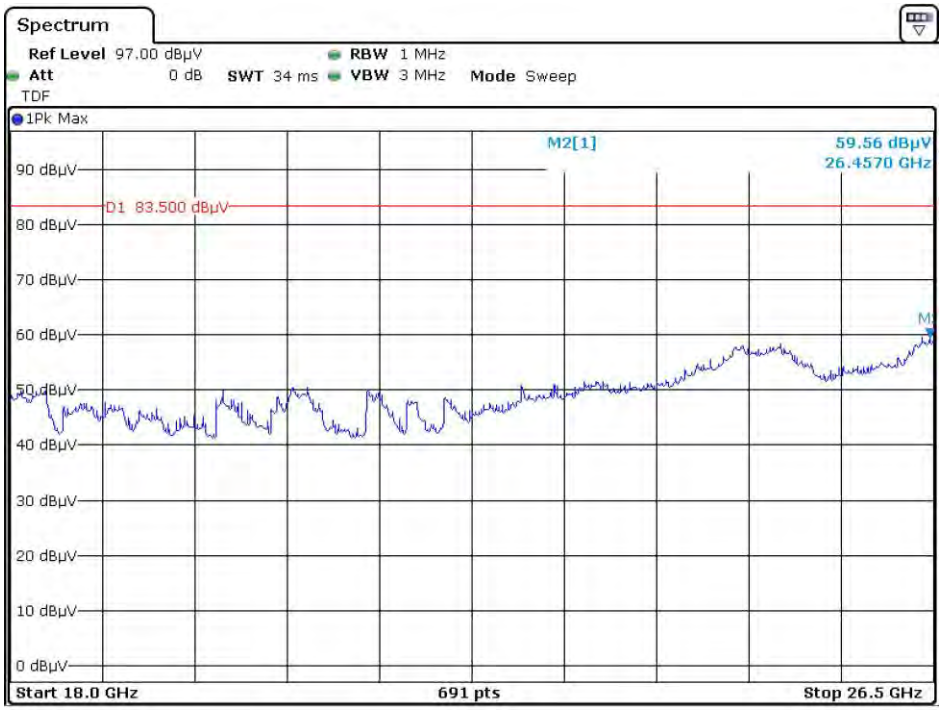

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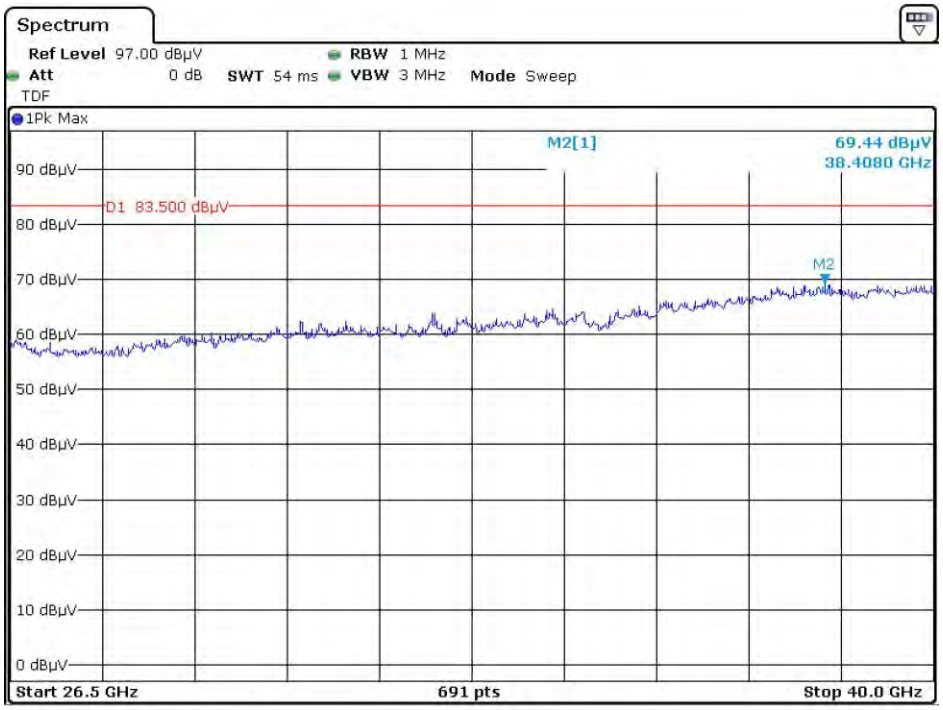

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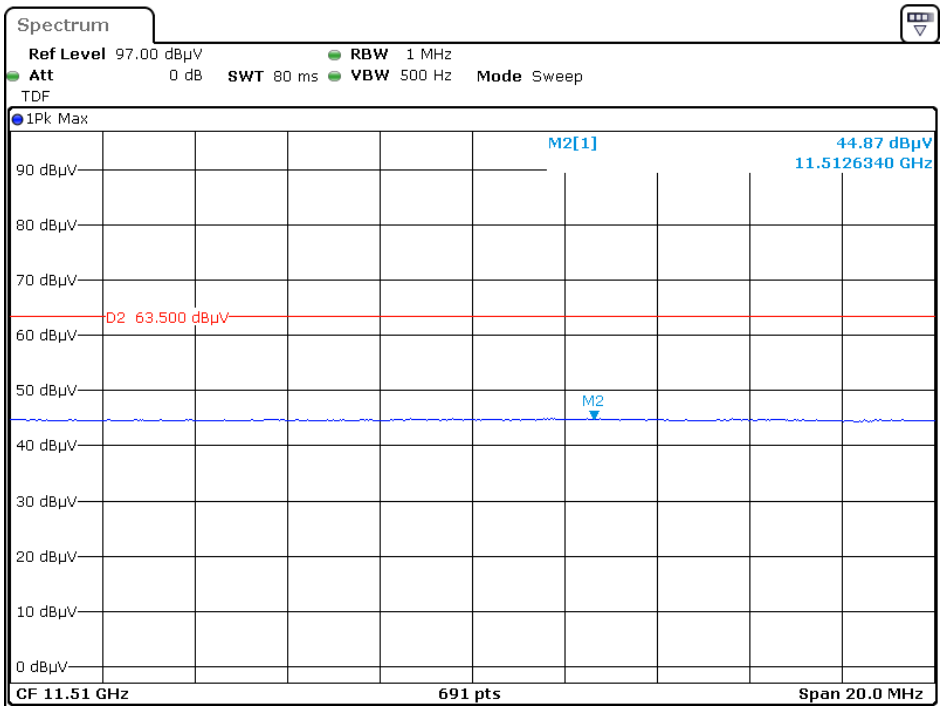
Average
Horizontal



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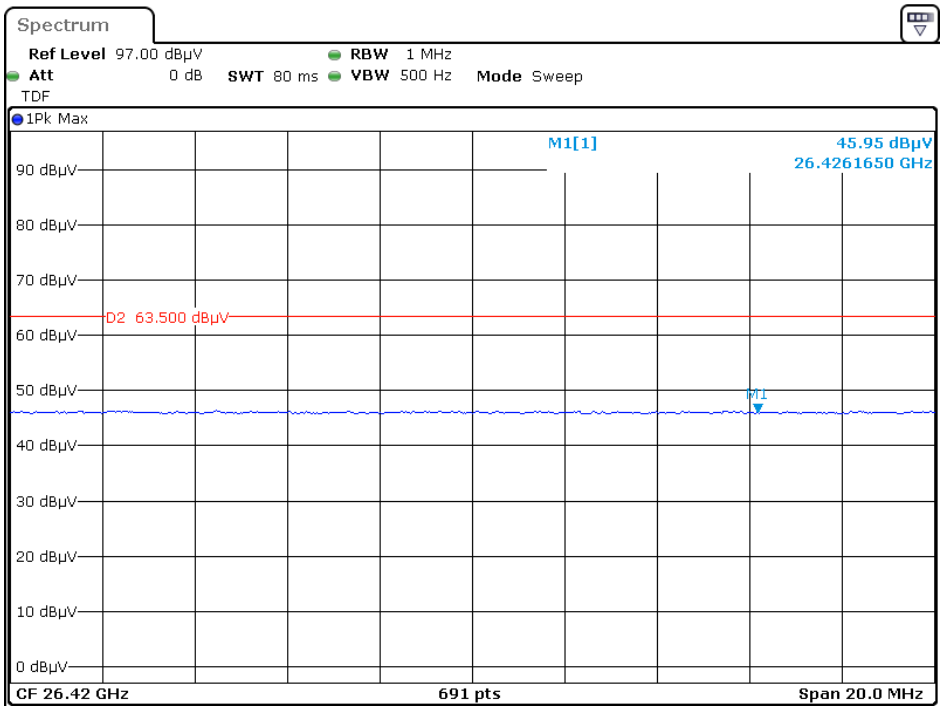

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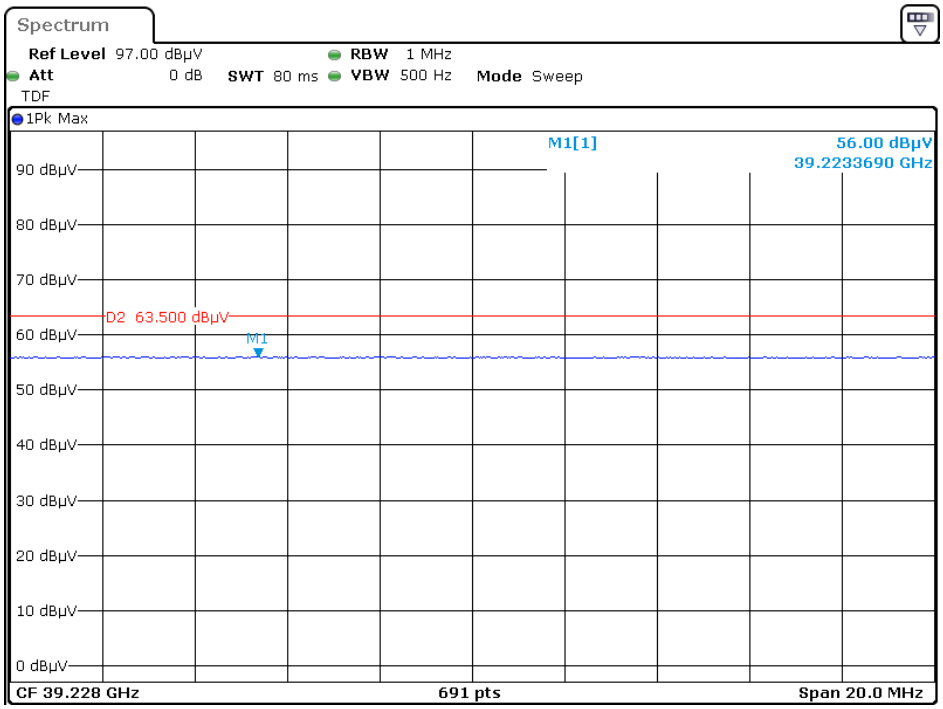

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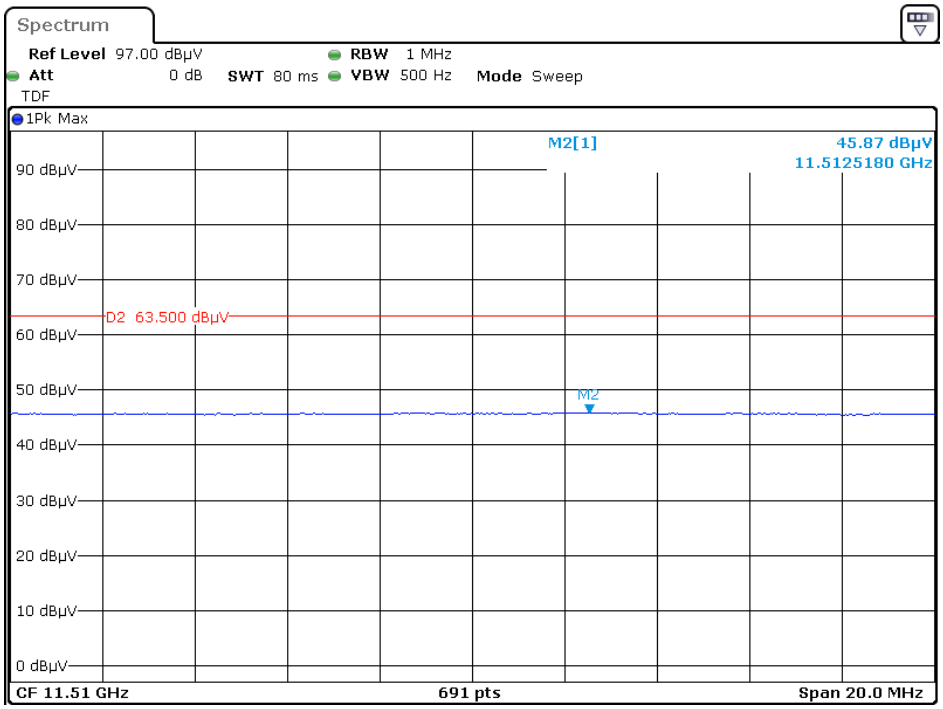
Vertical



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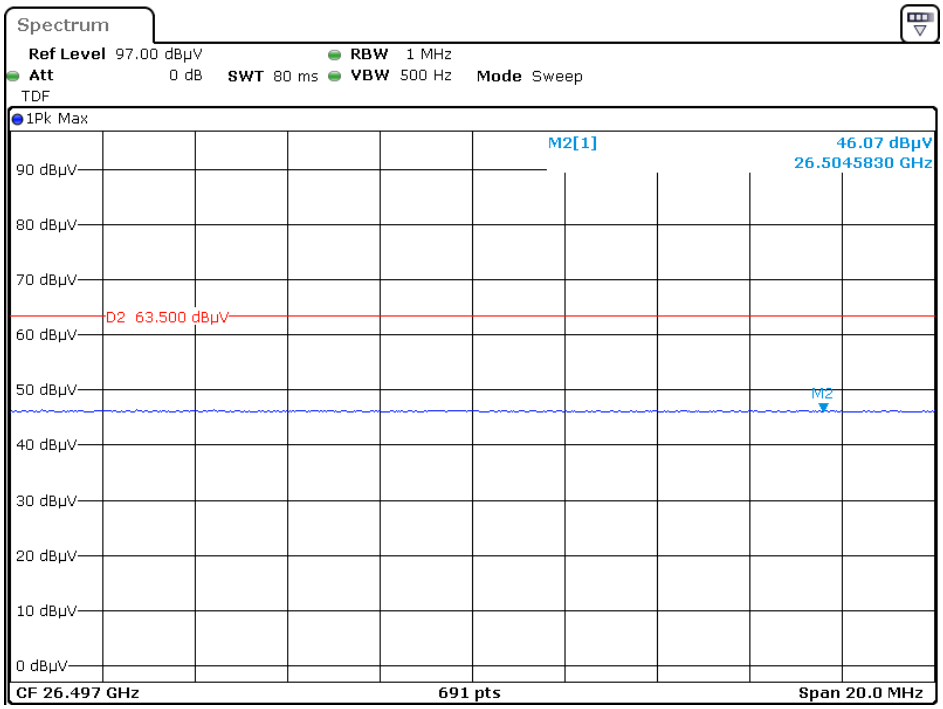

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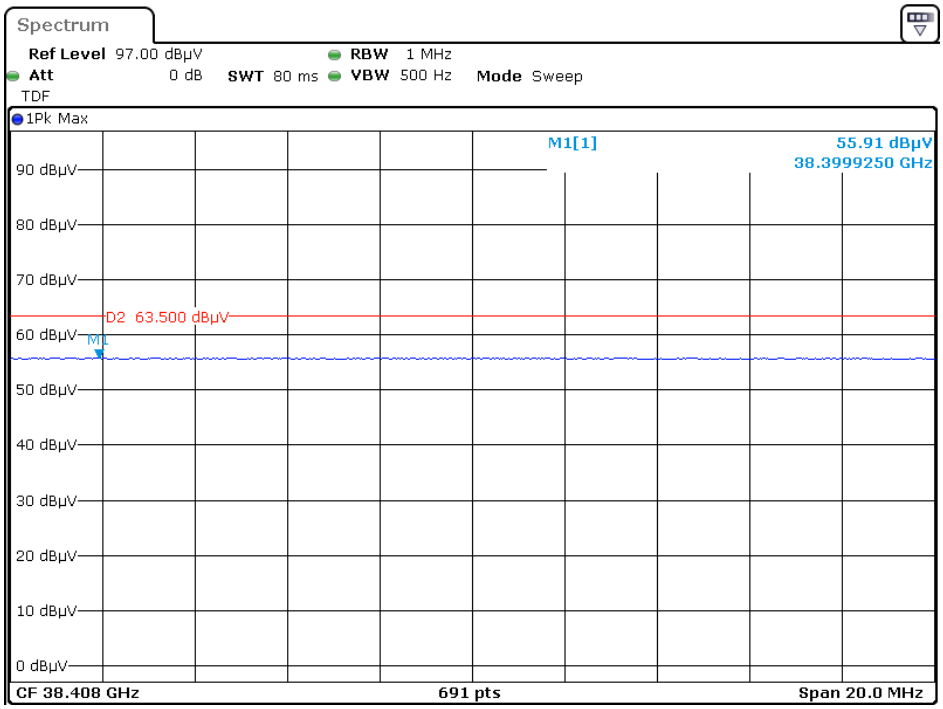


Date: 22.MAY.2020 12:07:59

FCC §15.407(a) (1) – 26 dB & 6dB EMISSION BANDWIDTH

Applicable Standard

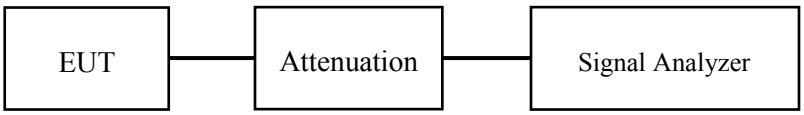
The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band 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)
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) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Data

Environmental Conditions

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

The testing was performed by Cary Guan from 2020-05-15 to 2020-06-15.

EUT operation mode: Transmitting

Test Result: Pass; please refer to the Appendix 5G Wifi.

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

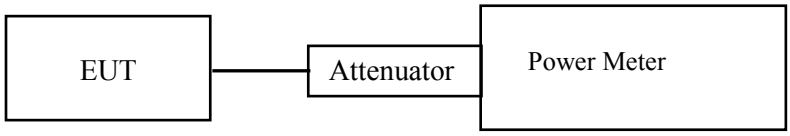
Applicable Standard

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 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:	24 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Cary Guan on 2020-05-15.

EUT operation mode: Transmitting

Test Result: Pass; please refer to the Appendix 5G Wifi.

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

Applicable Standard

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

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

Test Procedure

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

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

Test Data

Environmental Conditions

Temperature:	24 ℃
Relative Humidity:	52 %
ATM Pressure:	101 kPa

The testing was performed by Cary Guan on 2020-05-15.

EUT operation mode: Transmitting

Test Result: Pass; please refer to the Appendix 5G Wifi.

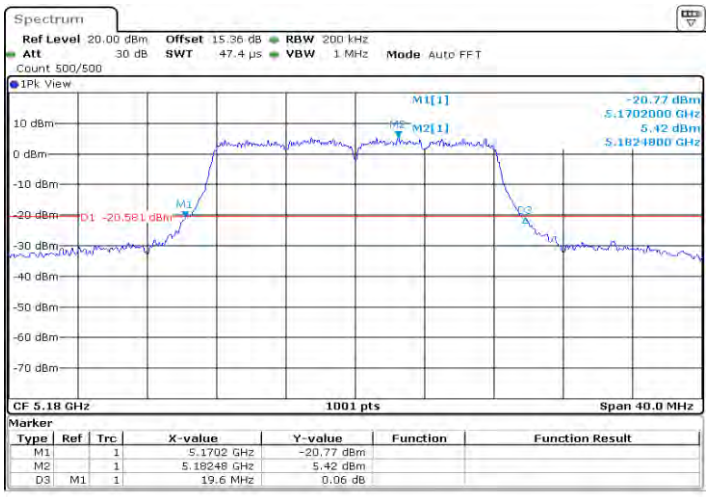
******* END OF REPORT *******

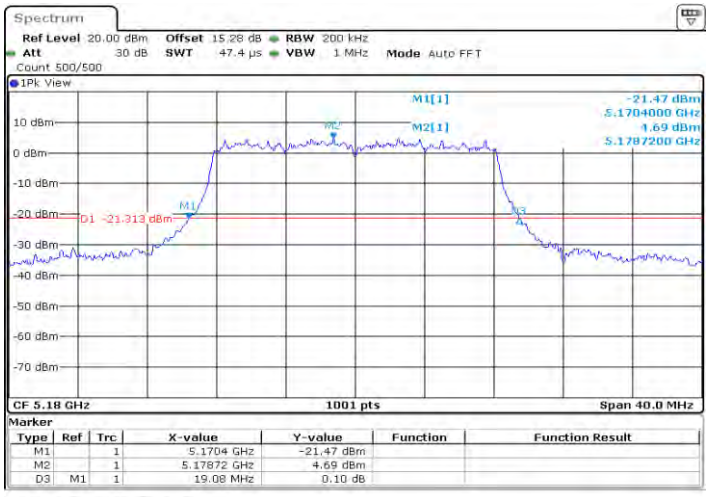
AppendixA1:EmissionBandwidth

Test Result

TestMode	Antenna	Channel	26db EBW [MHz]	Limit[MHz]	Verdict
11A-MIMO	Ant1	5180	19.600	---	PASS
	Ant2	5180	19.080	---	PASS
	Ant1	5200	19.360	---	PASS
	Ant2	5200	19.120	---	PASS
	Ant1	5240	19.320	---	PASS
	Ant2	5240	19.080	---	PASS
11N20MIMO	Ant1	5180	20.080	---	PASS
	Ant2	5180	19.960	---	PASS
	Ant1	5200	20.560	---	PASS
	Ant2	5200	20.360	---	PASS
	Ant1	5240	20.360	---	PASS
	Ant2	5240	20.600	---	PASS
11N40MIMO	Ant1	5190	39.840	---	PASS
	Ant2	5190	39.600	---	PASS
	Ant1	5230	40.240	---	PASS
	Ant2	5230	39.840	---	PASS
11AC80MIMO	Ant1	5210	87.200	---	PASS
	Ant2	5210	84.960	---	PASS

Test Graphs

11A-MIMO_Ant1_5180


11A-MIMO_Ant2_5180


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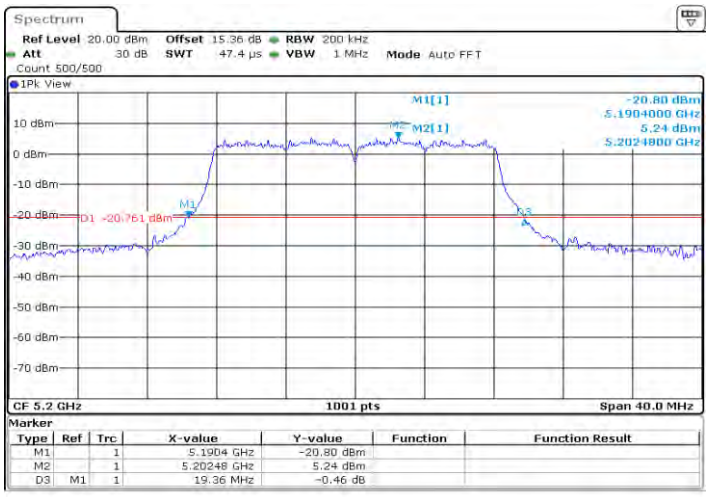
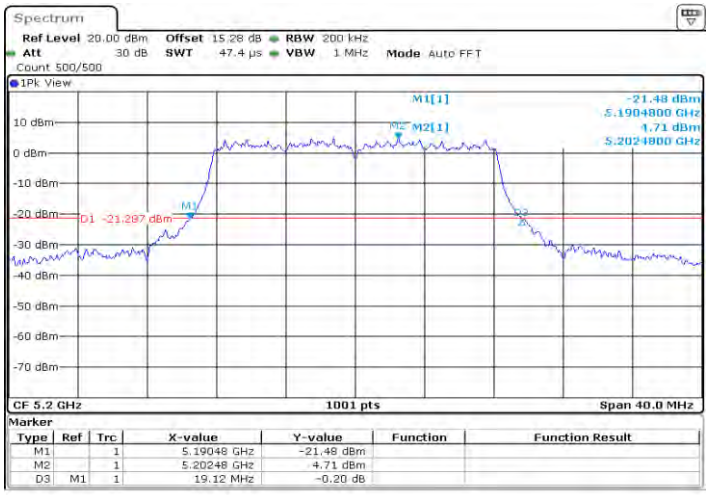


11A-MIMO_Ant2_5200



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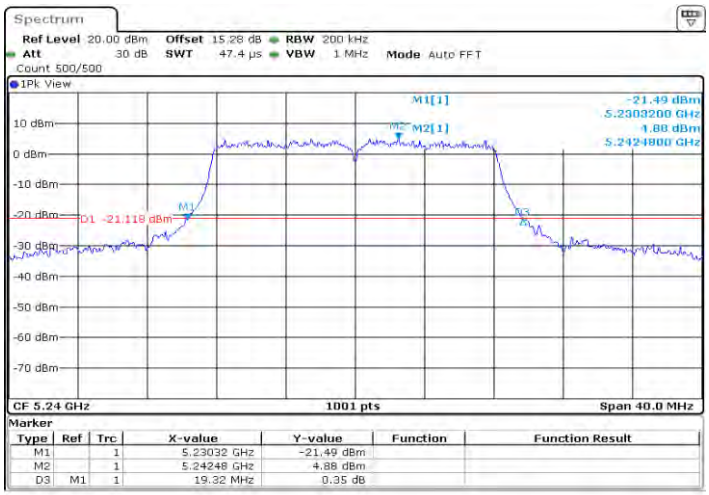

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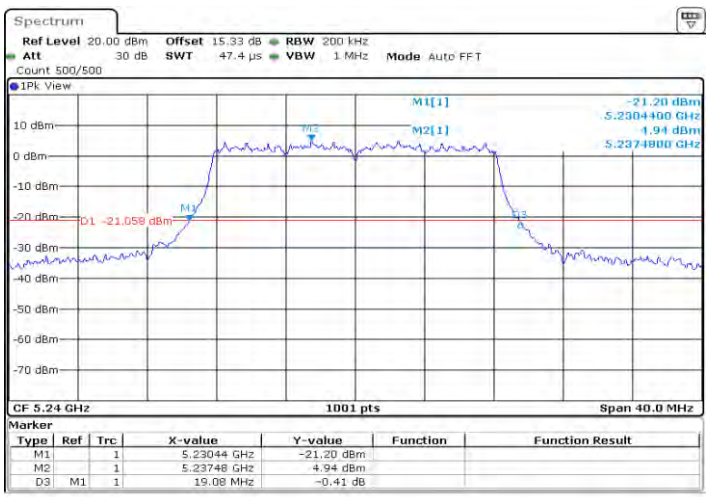
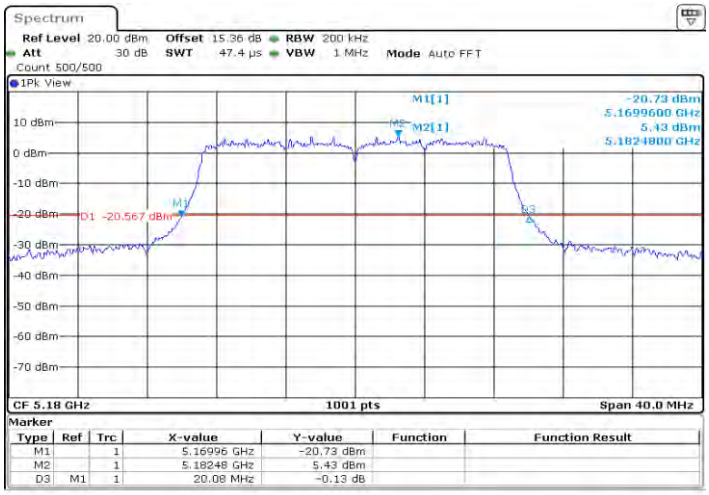
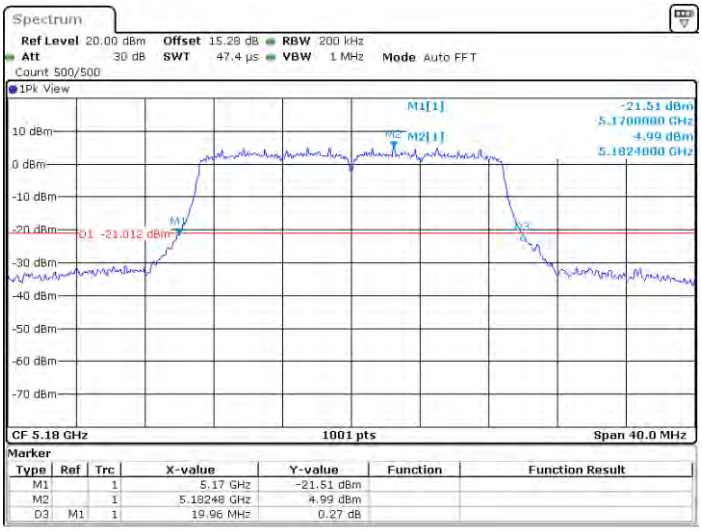


11N20MIMO_Ant1_5180



11N20MIMO_Ant2_5180



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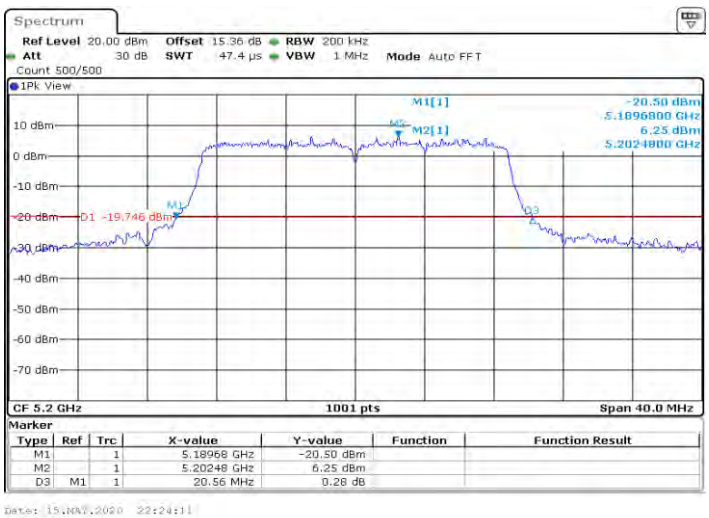

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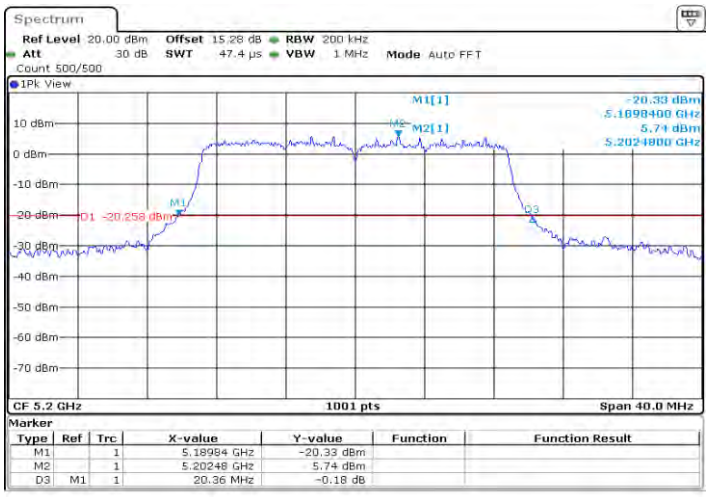

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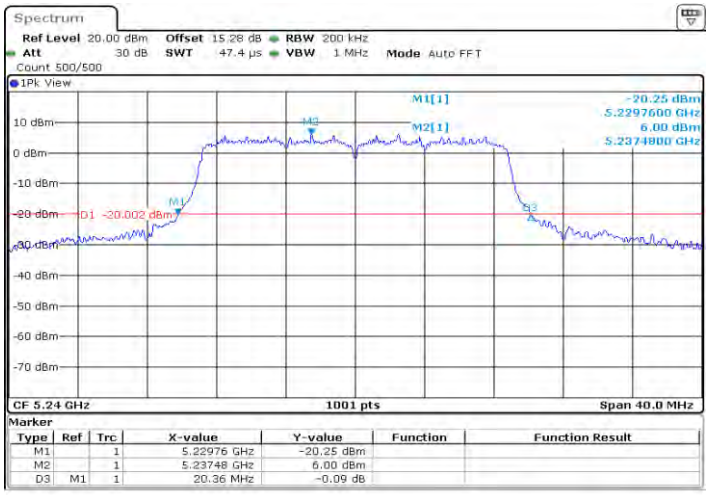
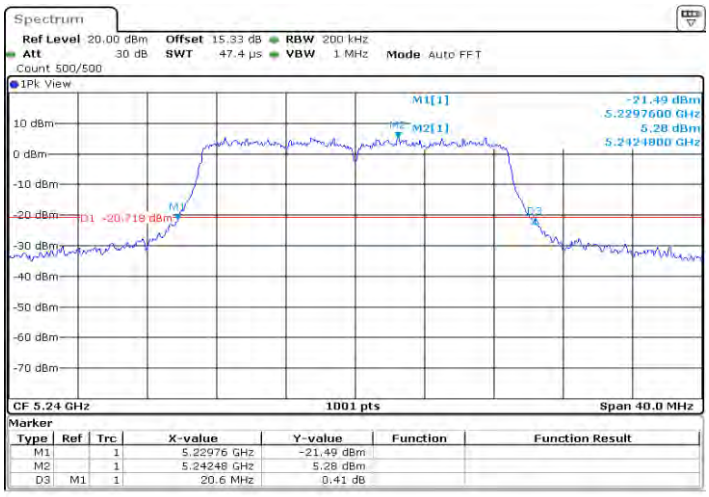
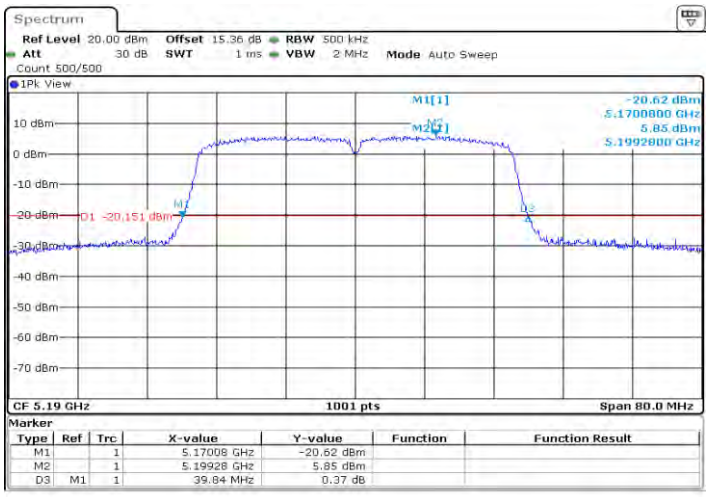


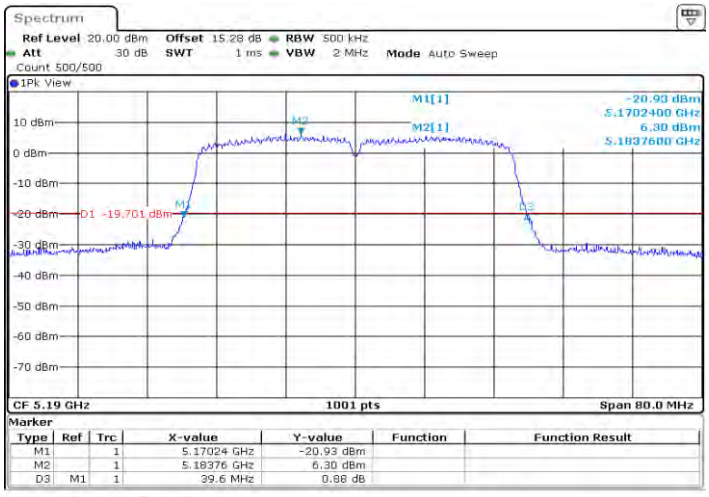
11N20MIMO_Ant2_5240



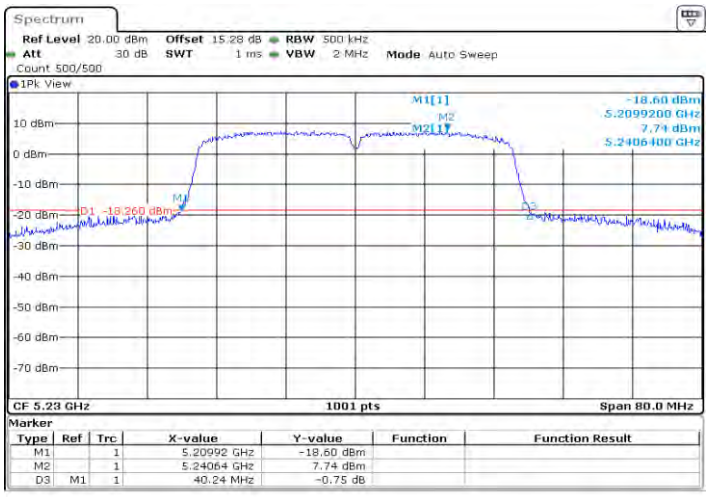
11N40MIMO_Ant1_5190

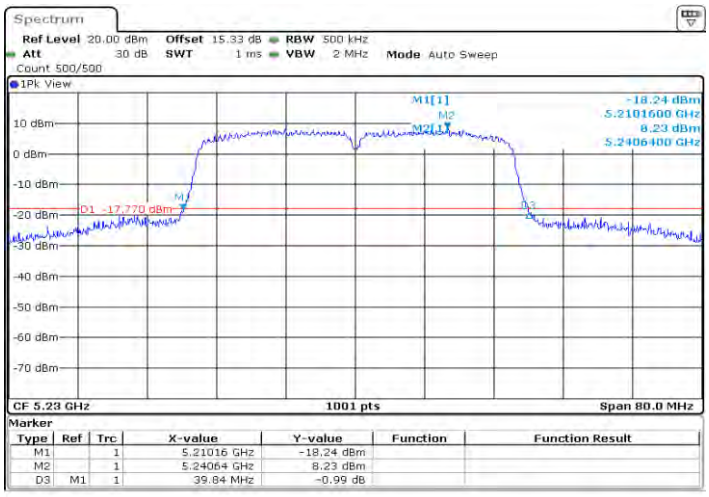


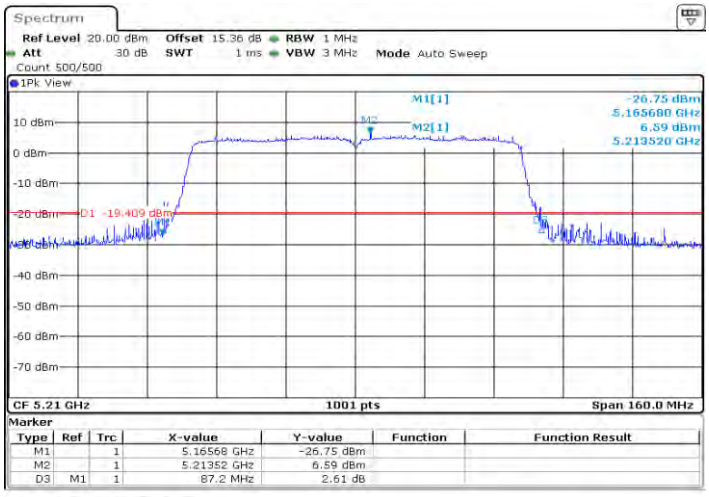
11N40MIMO_Ant2_5190

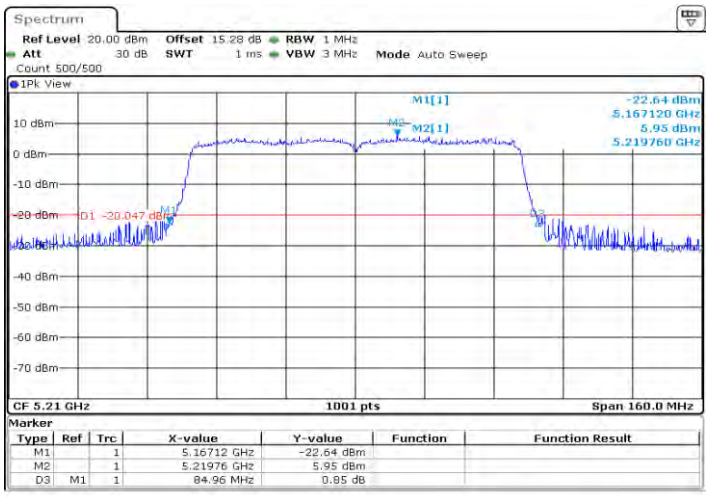


11N40MIMO_Ant1_5230



11N40MIMO_Ant2_5230


11AC80MIMO_Ant1_5210


11AC80MIMO_Ant2_5210


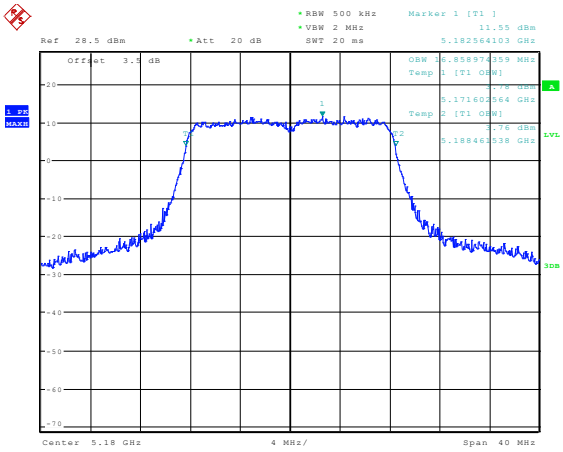
AppendixA2: Occupied channel bandwidth

Test Result

TestMode	Antenna	Channel	OCB [MHz]	Limit[MHz]	Verdict
11A-MIMO	Ant1	5180	16.859	---	PASS
	Ant2	5180	16.667	---	PASS
	Ant1	5200	16.795	---	PASS
	Ant2	5200	16.667	---	PASS
	Ant1	5240	16.859	---	PASS
	Ant2	5240	16.667	---	PASS
	Ant1	5745	17.692	---	PASS
	Ant2	5745	16.731	---	PASS
	Ant1	5785	18.141	---	PASS
	Ant2	5785	16.731	---	PASS
	Ant1	5825	18.333	---	PASS
	Ant2	5825	16.731	---	PASS
11N20MIMO	Ant1	5180	18.013	---	PASS
	Ant2	5180	17.885	---	PASS
	Ant1	5200	18.013	---	PASS
	Ant2	5200	17.949	---	PASS
	Ant1	5240	18.013	---	PASS
	Ant2	5240	17.885	---	PASS
	Ant1	5745	18.462	---	PASS
	Ant2	5745	17.885	---	PASS
	Ant1	5785	18.462	---	PASS
	Ant2	5785	17.949	---	PASS
	Ant1	5825	18.846	---	PASS
	Ant2	5825	17.949	---	PASS
11N40MIMO	Ant1	5190	36.154	---	PASS
	Ant2	5190	36.154	---	PASS
	Ant1	5230	36.410	---	PASS
	Ant2	5230	36.154	---	PASS
	Ant1	5755	37.308	---	PASS
	Ant2	5755	36.282	---	PASS
	Ant1	5795	37.436	---	PASS
	Ant2	5795	36.282	---	PASS
11AC80MIMO	Ant1	5210	76.923	---	PASS
	Ant2	5210	76.154	---	PASS
	Ant1	5775	77.436	---	PASS
	Ant2	5775	76.410	---	PASS

Note: No transmitted signal in the 99% bandwidth extends into the U-NII-2A band and U-NII-2C band.

Test Graphs

11A-MIMO_Ant1_5180

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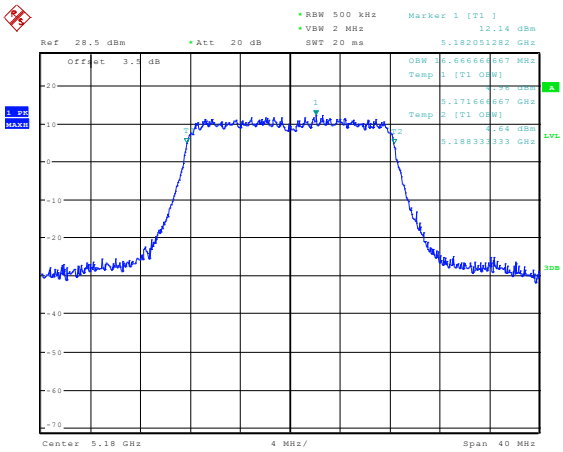
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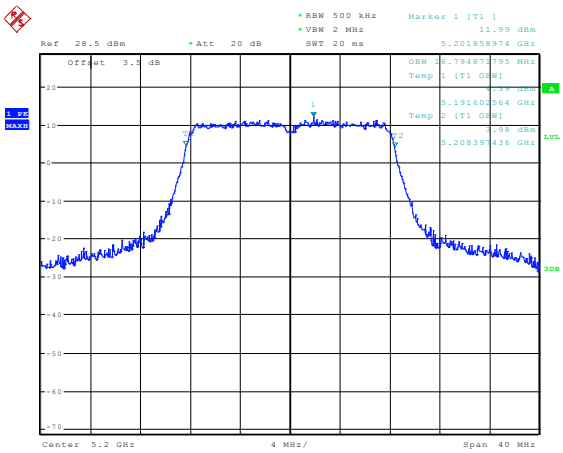
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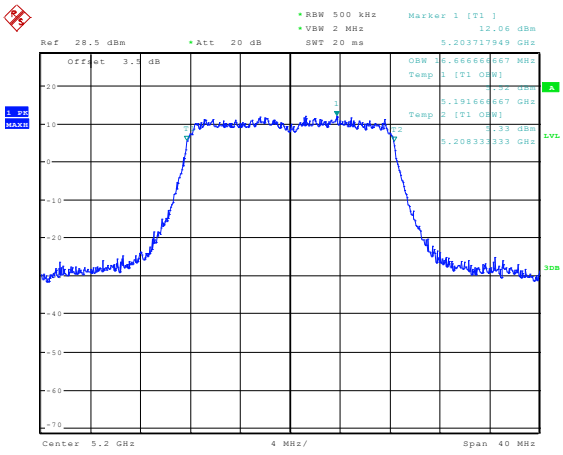
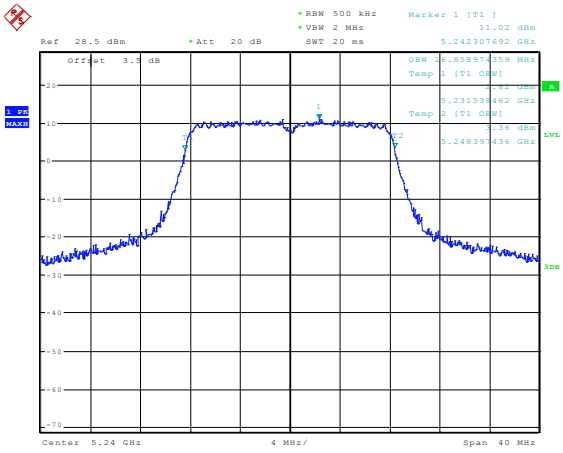
11A-MIMO_Ant2_5200



Date: 26.MAY.2020 19:02:34

11A-MIMO_Ant1_5240



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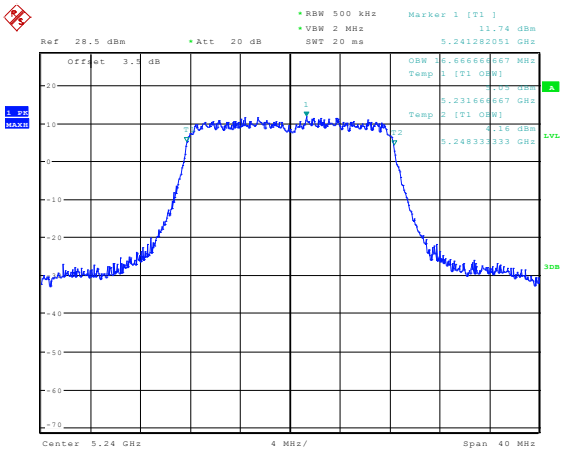
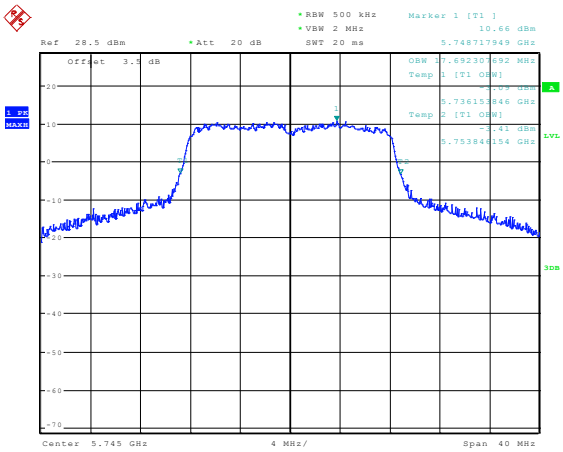
11A-MIMO_Ant2_5240



Date: 26.MAY.2020 19:02:54

11A-MIMO_Ant1_5745



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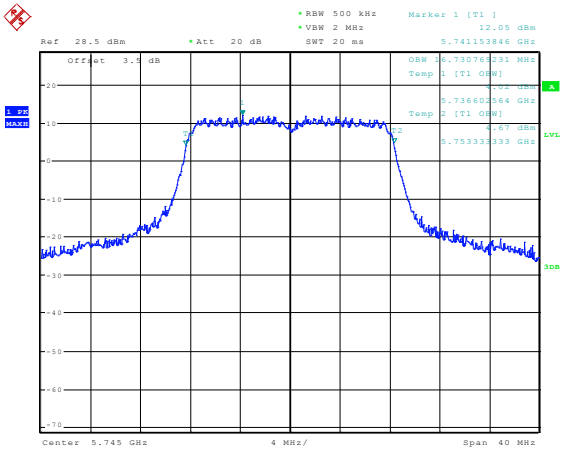
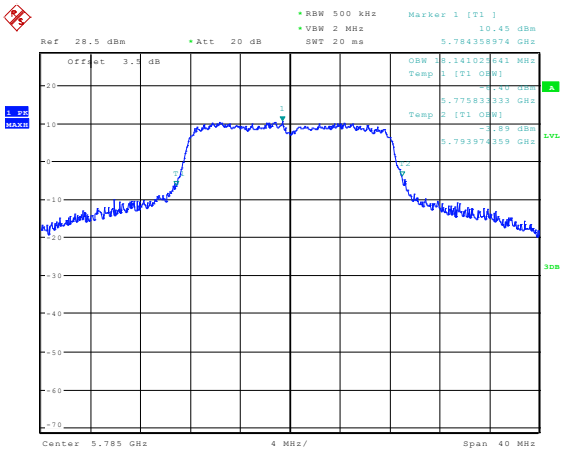


Date: 26.MAY.2020 19:01:45

11A-MIMO_Ant1_5785



Date: 26.MAY.2020 18:36:53

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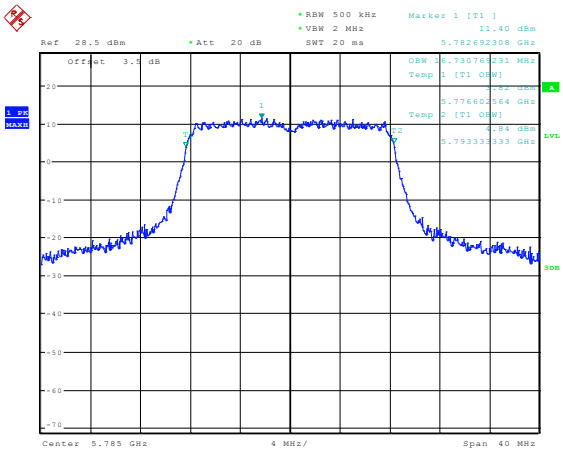

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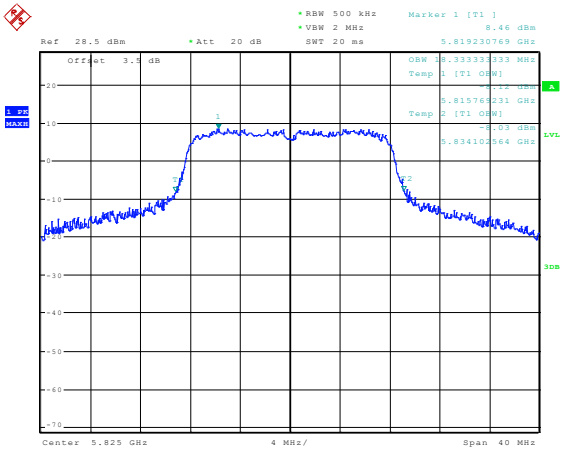
11A-MIMO_Ant1_5825



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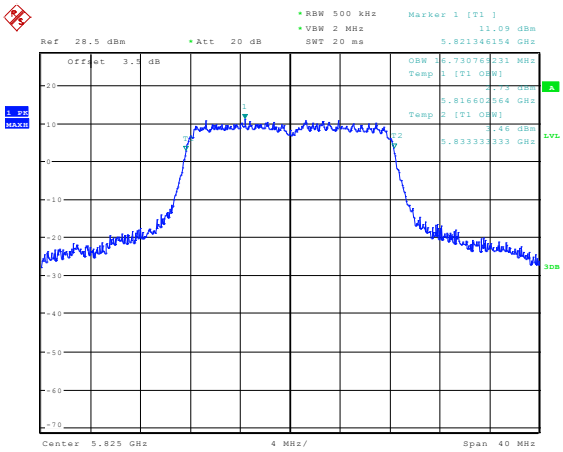

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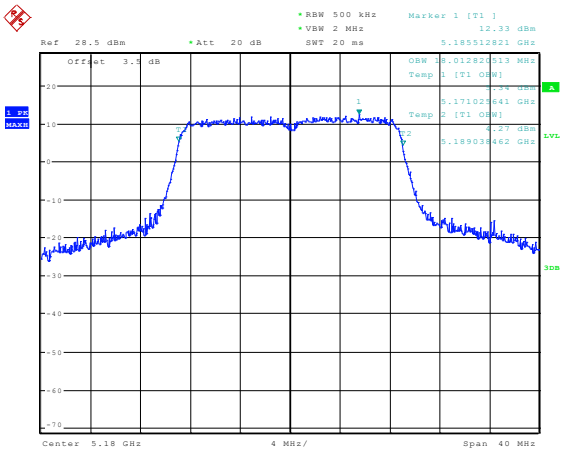
11N20MIMO_Ant1_5180



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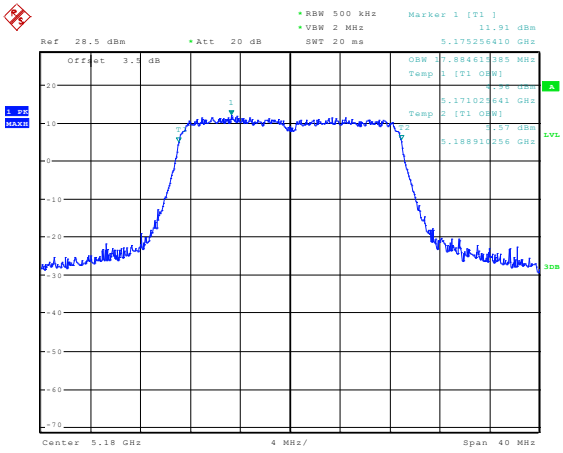

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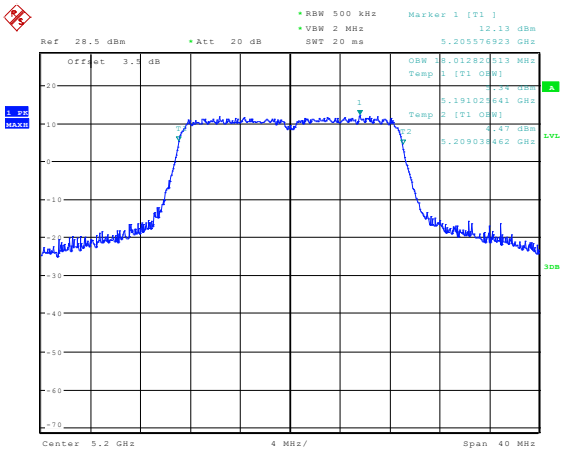

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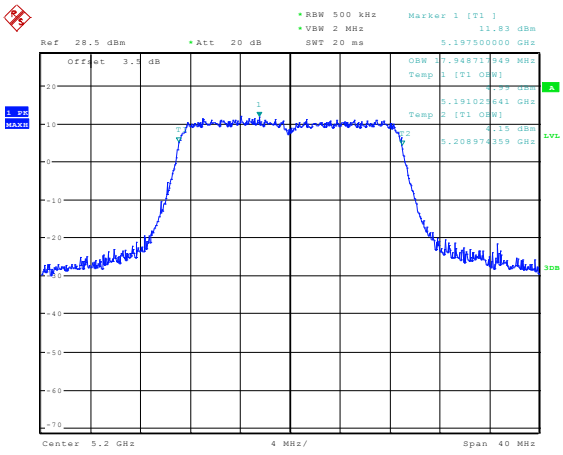

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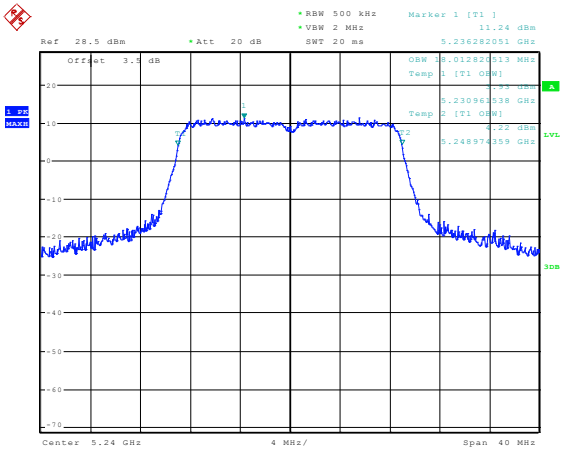

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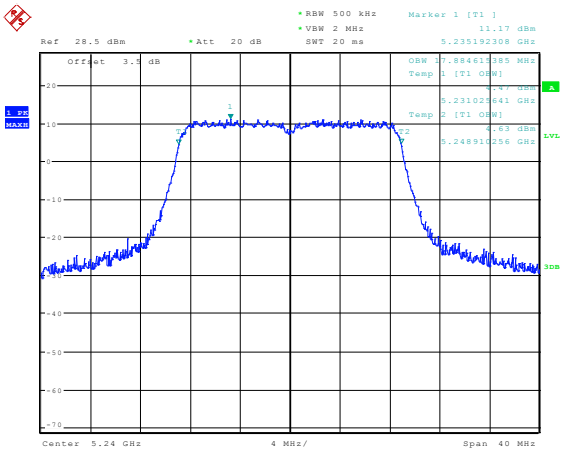

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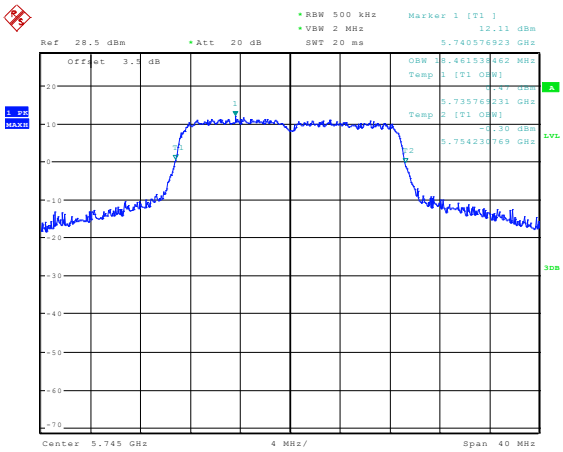

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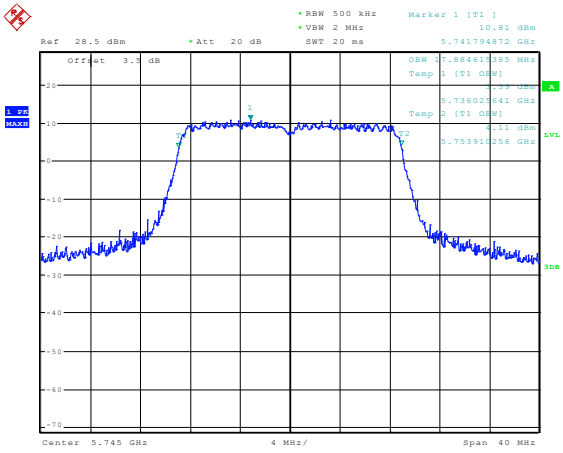
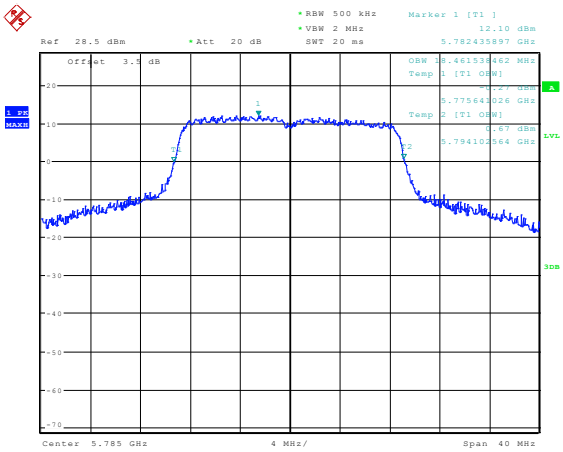


Date: 26.MAY.2020 18:59:10

11N20MIMO_Ant1_5785



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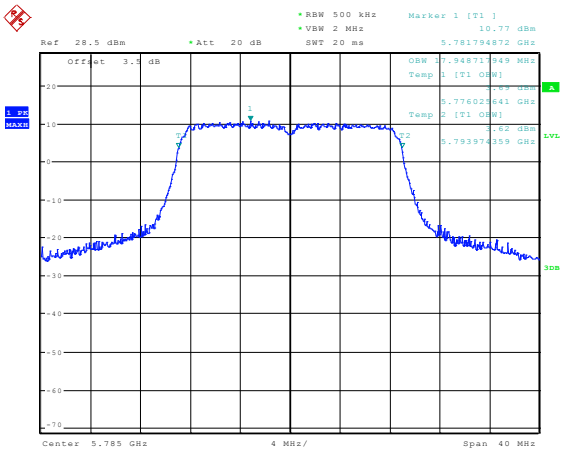
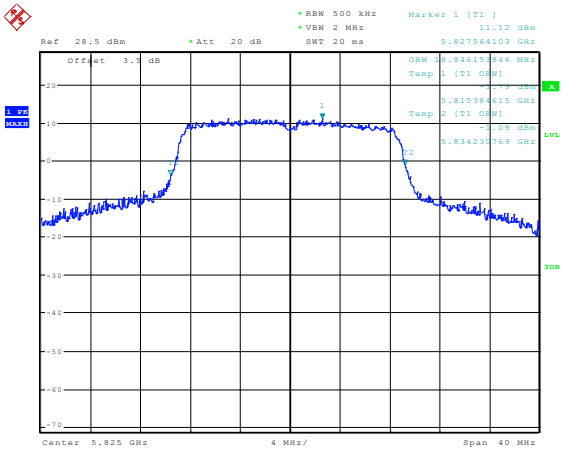
11N20MIMO_Ant2_5785



Date: 26.MAY.2020 18:59:54

11N20MIMO_Ant1_5825



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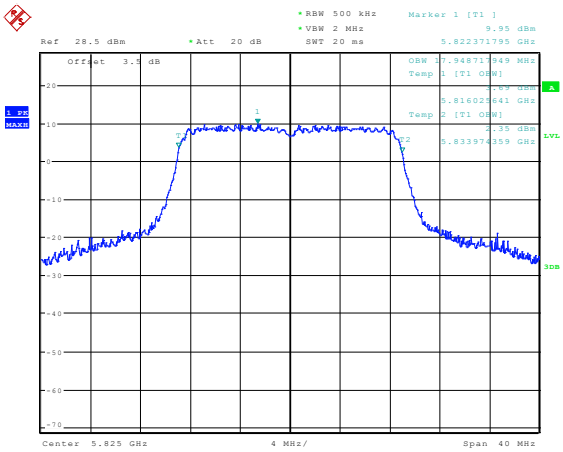
11N20MIMO_Ant2_5825



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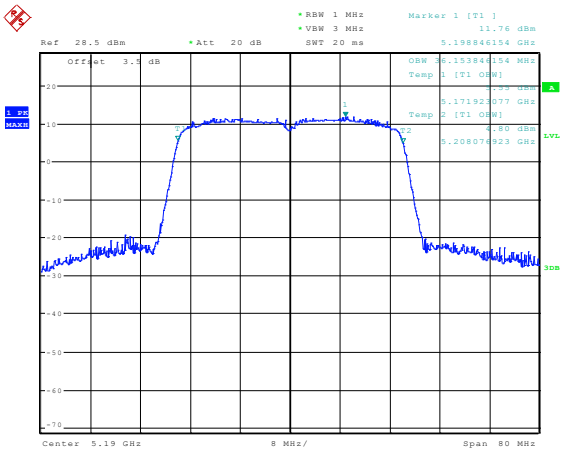
11N40MIMO_Ant1_5190



Date: 26.MAY.2020 18:43:32

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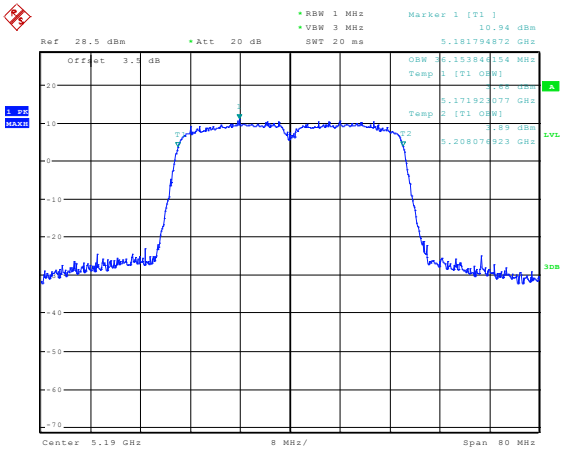

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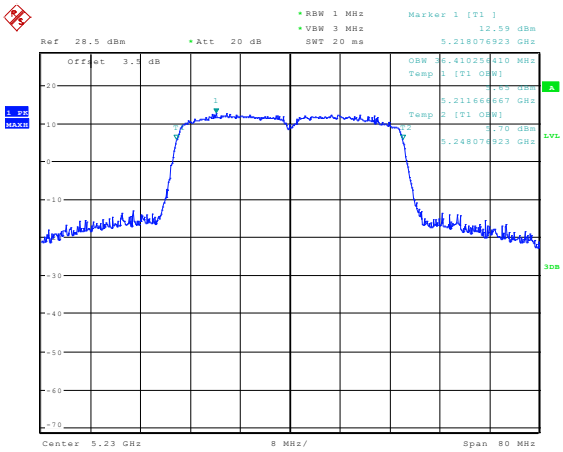

Date: 26.MAY.2020 18:45:58

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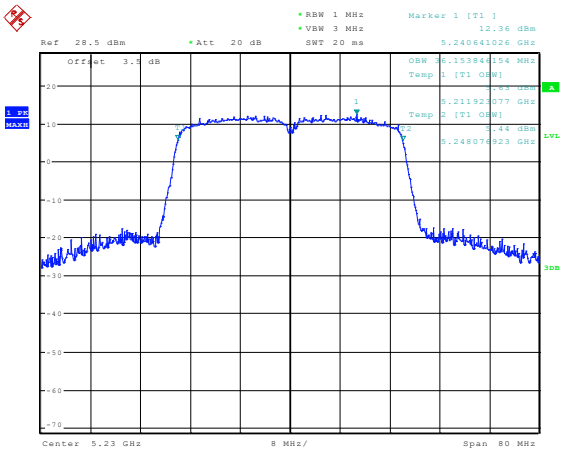
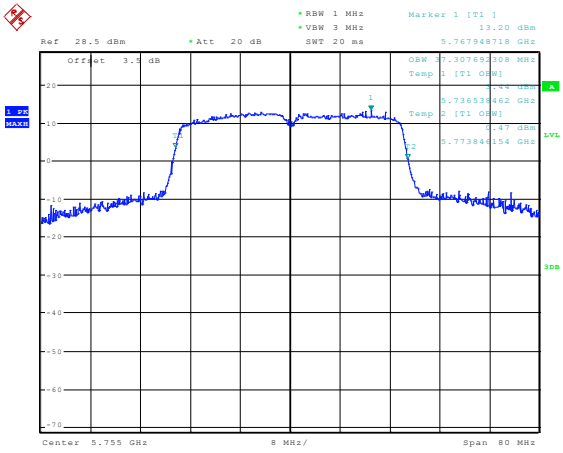


Date: 26.MAY.2020 18:56:06

11N40MIMO_Ant1_5755



Date: 26.MAY.2020 18:47:02

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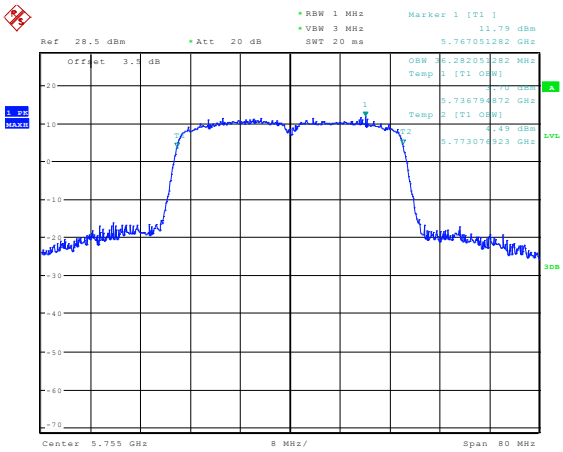
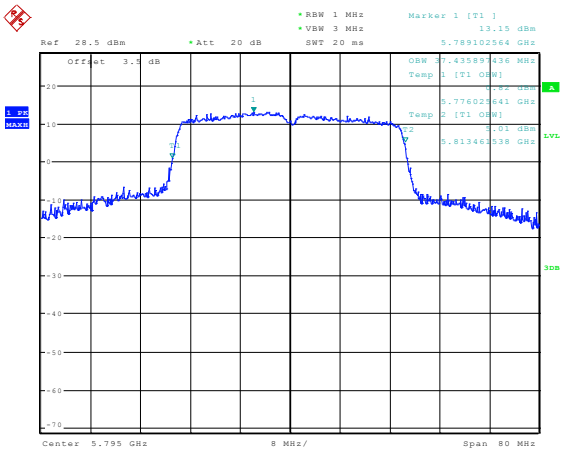


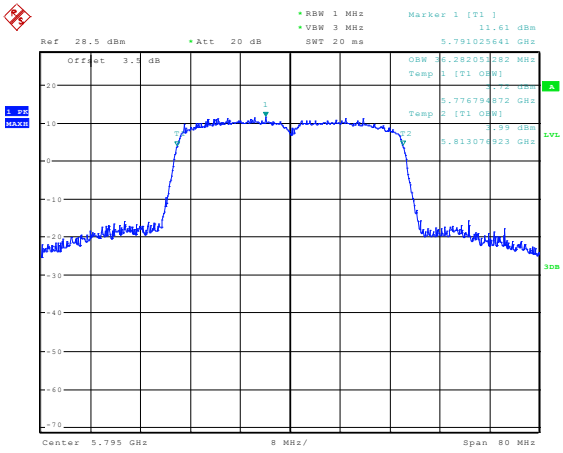
Date: 26.MAY.2020 18:56:31

11N40MIMO_Ant1_5795



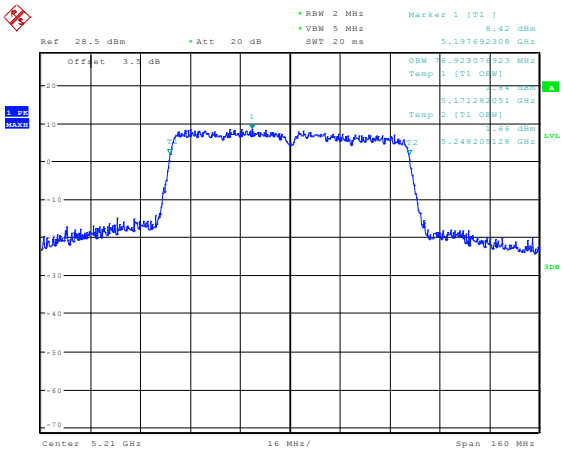
Date: 26.MAY.2020 18:48:02

11N40MIMO_Ant2_5795



Date: 26.MAY.2020 18:56:53

11AC80MIMO_Ant1_5210



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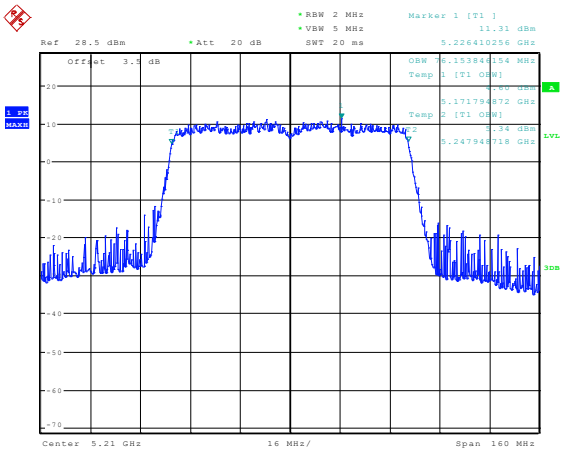
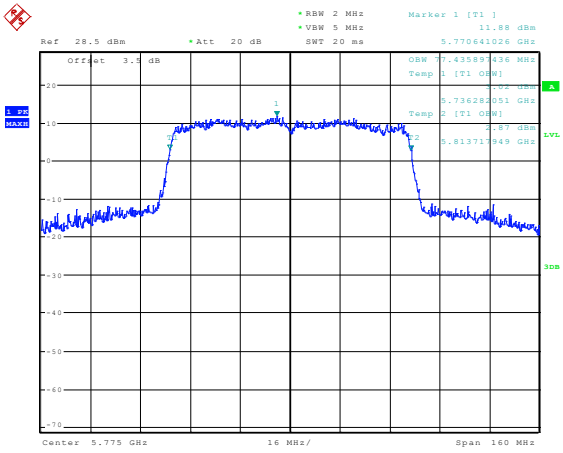


Date: 26.MAY.2020 18:54:31

11AC80MIMO_Ant1_5775



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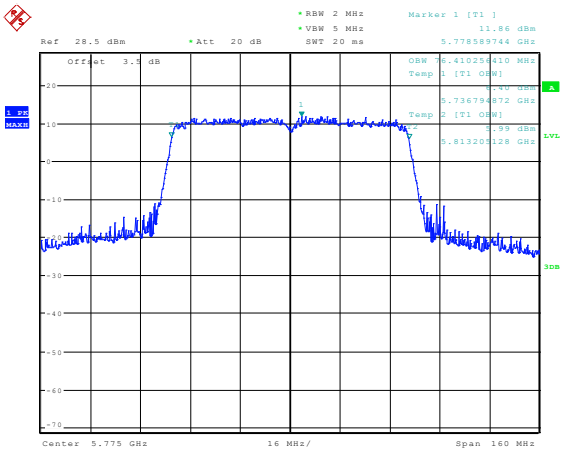
11AC80MIMO_Ant2_5775



Date: 26.MAY.2020 18:53:45

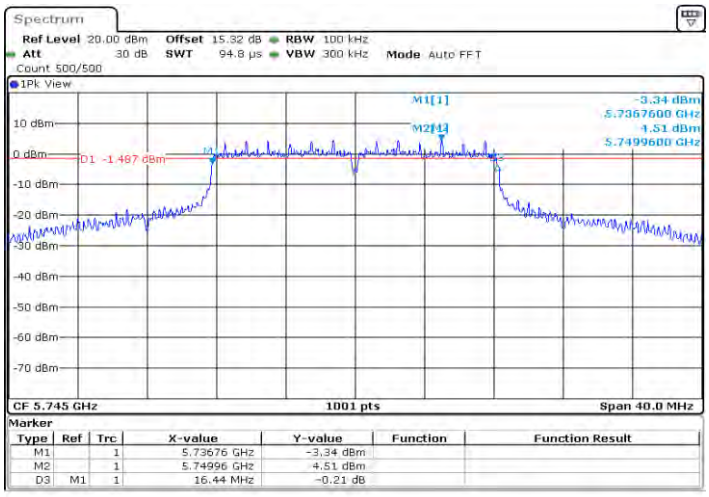
AppendixA3: Min emission bandwidth

Test Result

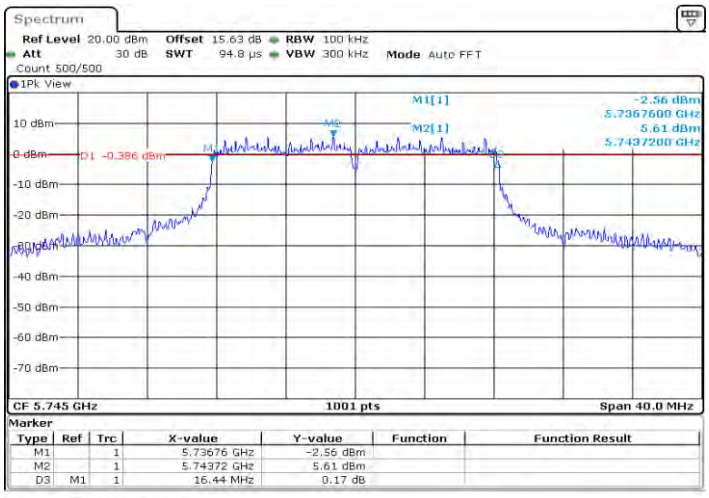
TestMode	Antenna	Channel	6db EBW [MHz]	Limit[MHz]	Verdict
11A-MIMO	Ant1	5745	16.440	0.5	PASS
	Ant2	5745	16.440	0.5	PASS
	Ant1	5785	16.440	0.5	PASS
	Ant2	5785	16.440	0.5	PASS
	Ant1	5825	16.400	0.5	PASS
	Ant2	5825	16.440	0.5	PASS
11N20MIMO	Ant1	5745	17.640	0.5	PASS
	Ant2	5745	17.640	0.5	PASS
	Ant1	5785	17.640	0.5	PASS
	Ant2	5785	17.640	0.5	PASS
	Ant1	5825	17.640	0.5	PASS
	Ant2	5825	17.640	0.5	PASS
11N40MIMO	Ant1	5755	36.080	0.5	PASS
	Ant2	5755	35.280	0.5	PASS
	Ant1	5795	35.280	0.5	PASS
	Ant2	5795	35.280	0.5	PASS
11AC80MIMO	Ant1	5775	75.520	0.5	PASS
	Ant2	5775	75.520	0.5	PASS

Test Graphs

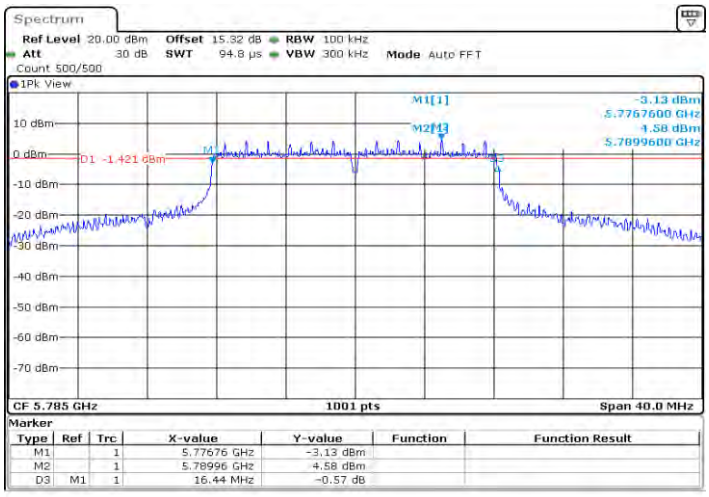
11A-MIMO_Ant1_5745



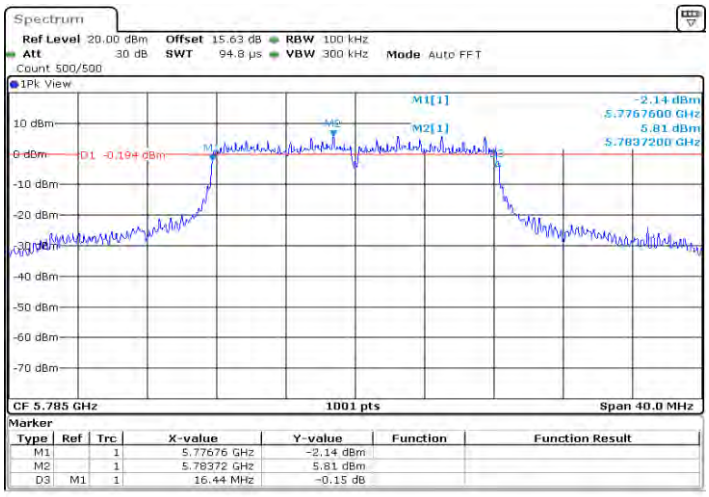
11A-MIMO_Ant2_5745



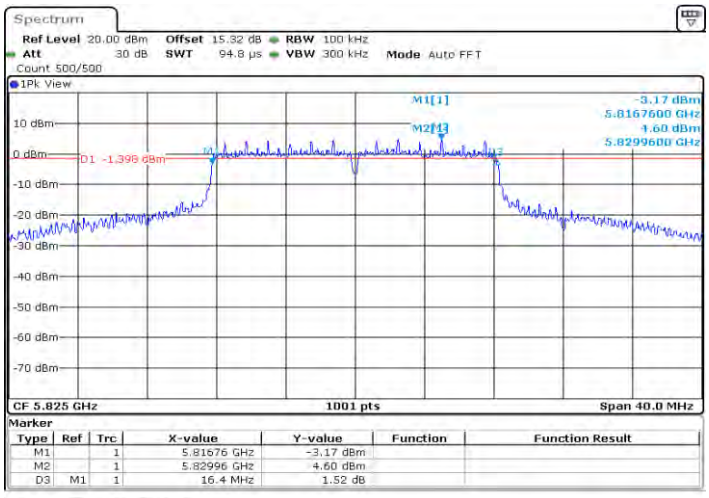
11A-MIMO_Ant1_5785



11A-MIMO_Ant2_5785



11A-MIMO_Ant1_5825



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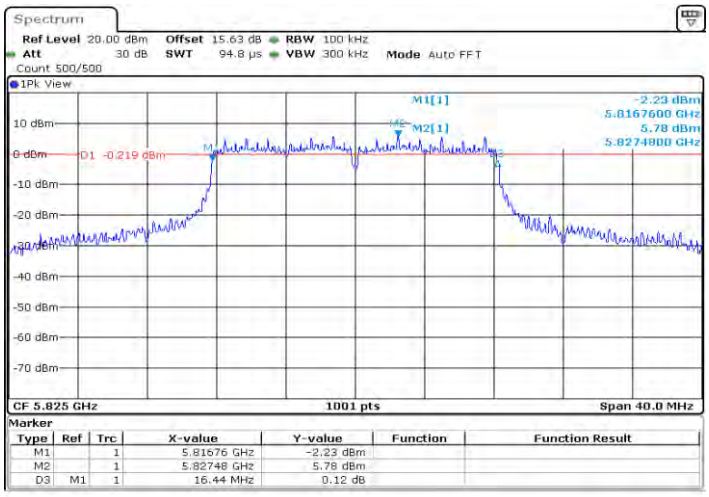

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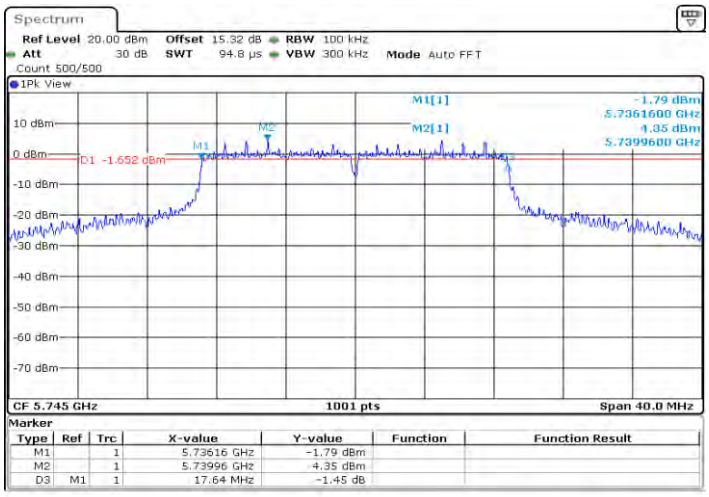

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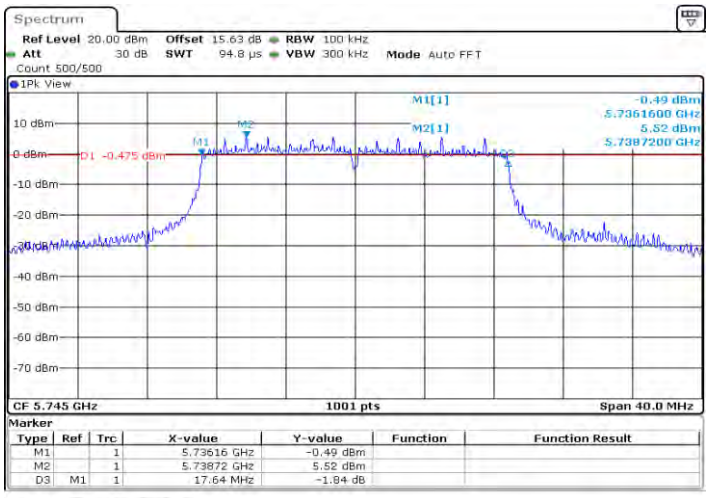
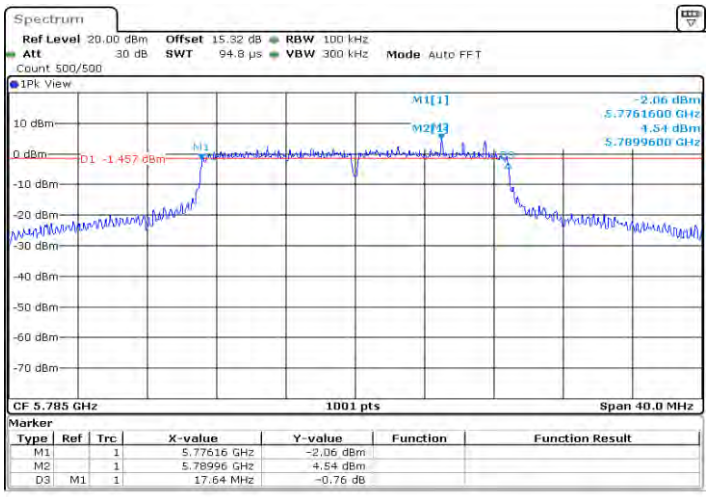


11N20MIMO_Ant1_5785



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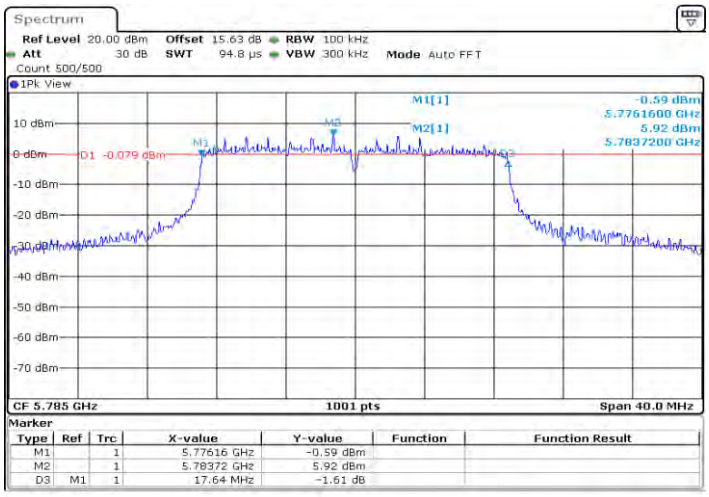

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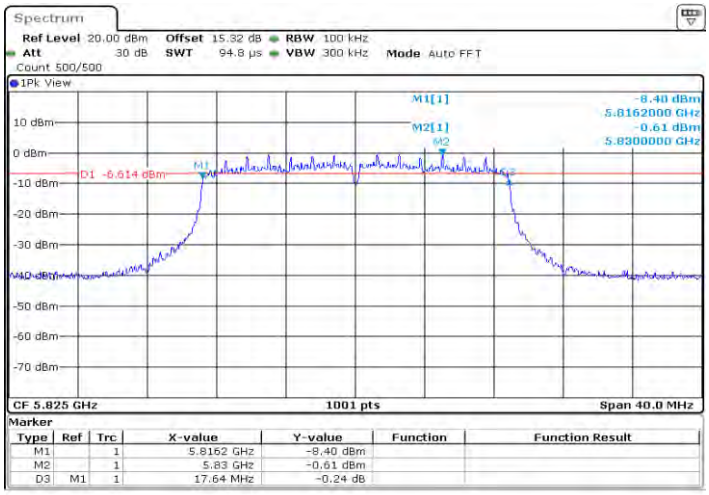

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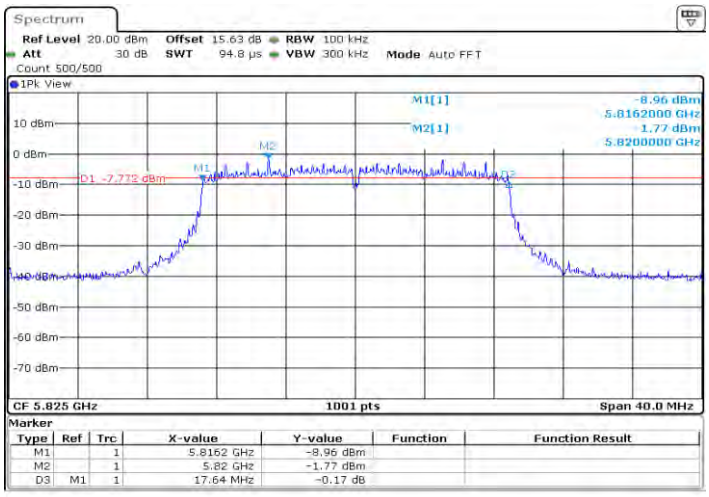

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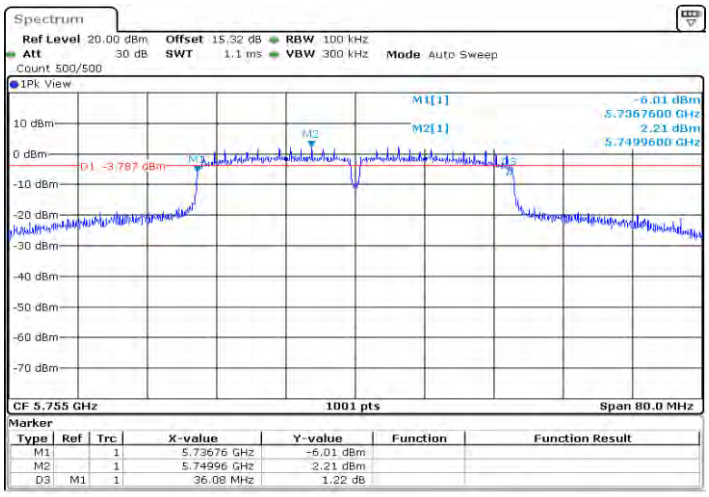

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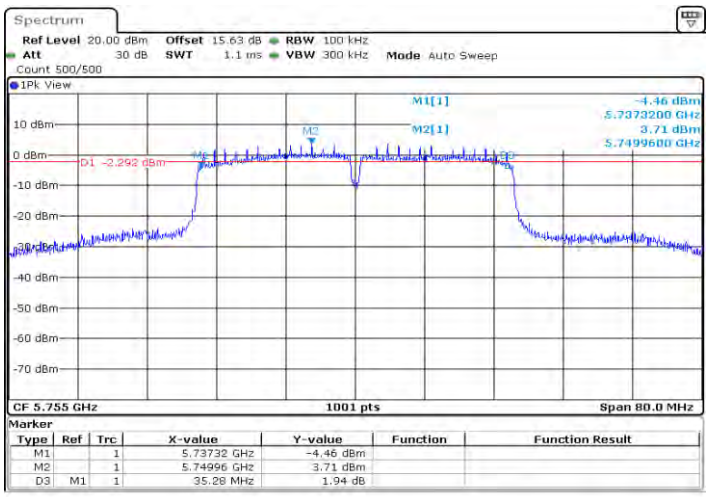
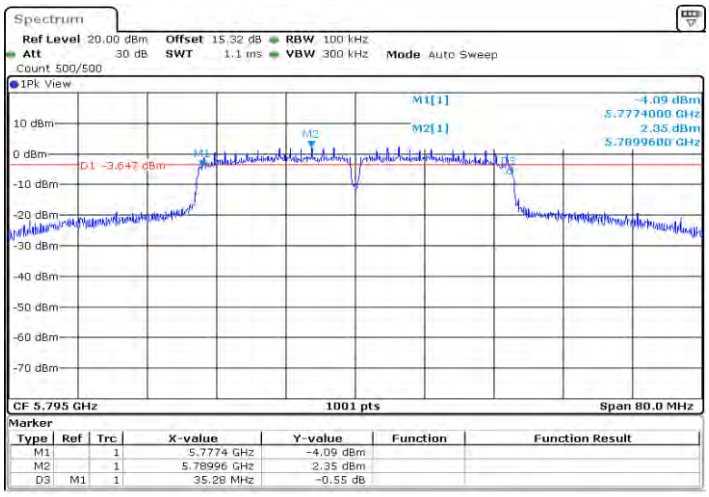


11N40MIMO_Ant1_5795



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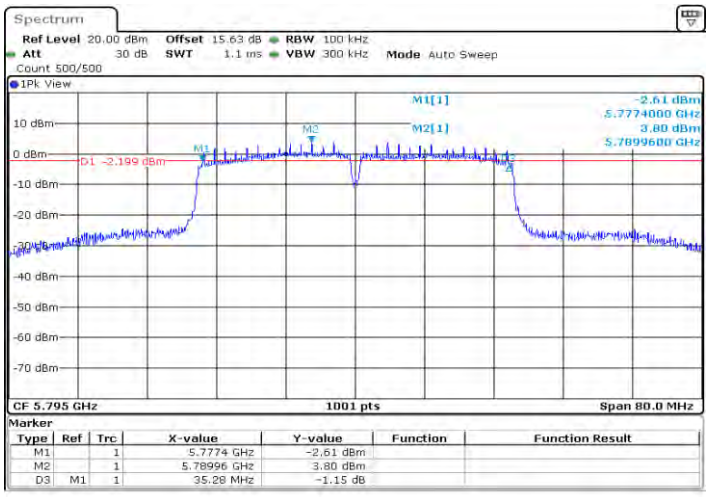
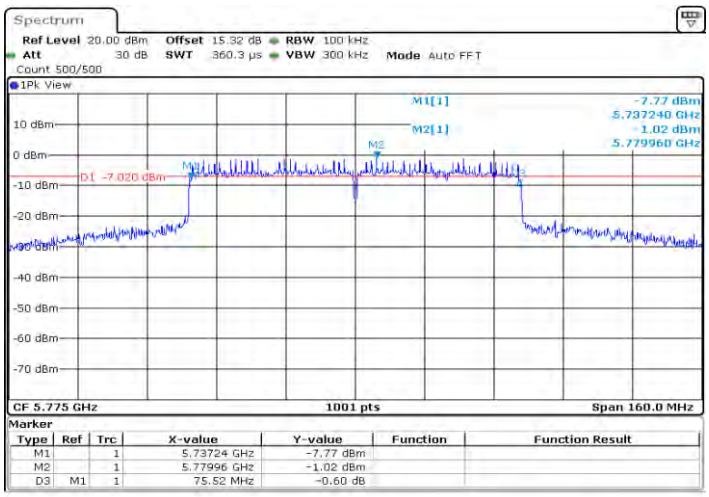
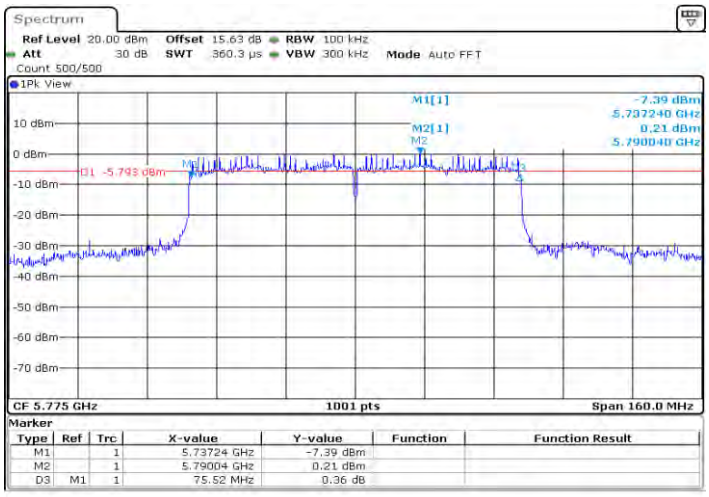


11AC80MIMO_Ant1_5775


11AC80MIMO_Ant2_5775


AppendixB: Maximum conducted output power

Test Result

TestMode	Antenna	Channel	Result [dBm]	Non_BF Limit [dBm]	BF Limit [dBm]	Verdict
11A-MIMO	Ant1	5180	15.10	<=30	<=27.44	PASS
	Ant2	5180	16.51			PASS
	total	5180	18.9			PASS
	Ant1	5200	15.04			PASS
	Ant2	5200	16.59			PASS
	total	5200	18.9			PASS
	Ant1	5240	14.76			PASS
	Ant2	5240	16.41			PASS
	total	5240	18.7			PASS
	Ant1	5745	14.68	<=30	<=28.47	PASS
	Ant2	5745	17.39			PASS
	total	5745	19.3			PASS
	Ant1	5785	15.09			PASS
	Ant2	5785	17.51			PASS
	total	5785	19.5			PASS
	Ant1	5825	15.39			PASS
	Ant2	5825	17.64			PASS
	total	5825	19.7			PASS
11N20MIMO	Ant1	5180	15.01	<=30	<=27.44	PASS
	Ant2	5180	16.35			PASS
	total	5180	18.7			PASS
	Ant1	5200	15.89			PASS
	Ant2	5200	17.32			PASS
	total	5200	19.7			PASS
	Ant1	5240	15.47			PASS
	Ant2	5240	17.20			PASS
	total	5240	19.4			PASS
	Ant1	5745	14.61	<=30	<=28.47	PASS
	Ant2	5745	17.32			PASS
	total	5745	19.2			PASS
	Ant1	5785	15.02			PASS
	Ant2	5785	17.45			PASS
	total	5785	19.4			PASS
	Ant1	5825	15.42			PASS
	Ant2	5825	17.46			PASS
	total	5825	19.6			PASS
11N40MIMO	Ant1	5190	14.48	<=30	<=27.44	PASS
	Ant2	5190	15.68			PASS

	total	5190	18.1			PASS
	Ant1	5230	15.99			PASS
	Ant2	5230	17.75			PASS
	total	5230	20.0			PASS
	Ant1	5755	15.40	<=30	<=28.47	PASS
	Ant2	5755	17.70			PASS
	total	5755	19.7			PASS
	Ant1	5795	15.78			PASS
	Ant2	5795	17.87			PASS
	total	5795	20.0			PASS
11AC80MIMO	Ant1	5210	14.16	<=30	<=27.44	PASS
	Ant2	5210	15.51			PASS
	total	5210	17.9			PASS
	Ant1	5775	15.37	<=30	<=28.47	PASS
	Ant2	5775	17.63			PASS
	total	5775	19.7			PASS

Note 1：The Duty Cycle Factor is compensated in the graph.

Note 2: The product is indoor access point device, which is declared by manufacturer.

Note 3:

For 5150-5250MHz Band: Maximum antenna gain is 5.55dBi.

1. Directional gain = array gain+Ant gain=$10*\lg(N_{ant}/N_{ss})$+5.55dBi=8.56dBi>6dBi, So $Limit_{BF}$=30-(8.56-6)=27.44dBm

2. Non-Beam Forming mode shares the same power with the Beam Forming mode.

For 5725-5850MHz Band: Maximum antenna gain is 4.52dBi.

1. Directional gain = array gain+Ant gain=$10*\lg(N_{ant}/N_{ss})$+4.52dBi=7.53dBi>6dBi, So $Limit_{BF}$=30-(7.53-6)=28.47dBm

2. Non-Beam Forming mode shares the same power with the Beam Forming mode.

AppendixC: Maximum power spectral density

Test Result

TestMode	Antenna	Channel	Result [dBm/MHz]	Non_BF Limit[dBm/MHz]	BF Limit[dBm/MHz]	Verdict
11A-MIMO	Ant1	5180	11	17	14.44	PASS
	Ant2	5180	11.03			PASS
	total	5180	14.03			PASS
	Ant1	5200	10.45			PASS
	Ant2	5200	10.76			PASS
	total	5200	13.62			PASS
	Ant1	5240	10.55			PASS
	Ant2	5240	11.63			PASS
	total	5240	14.13			PASS
	Ant1	5745	8.3	30	28.47	PASS
	Ant2	5745	10.15			PASS
	total	5745	12.33			PASS
	Ant1	5785	8.8			PASS
	Ant2	5785	9.87			PASS
	total	5785	12.38			PASS
	Ant1	5825	9.2			PASS
	Ant2	5825	10.98			PASS
	total	5825	13.19			PASS
11N20MIMO	Ant1	5180	9.9	17	14.44	PASS
	Ant2	5180	10.96			PASS
	total	5180	13.47			PASS
	Ant1	5200	10.93			PASS
	Ant2	5200	11.04			PASS
	total	5200	14.00			PASS
	Ant1	5240	11.12			PASS
	Ant2	5240	10.7			PASS
	total	5240	13.93			PASS
	Ant1	5745	7.86	30	28.47	PASS
	Ant2	5745	9.18			PASS
	total	5745	11.58			PASS
	Ant1	5785	8.44			PASS
	Ant2	5785	9.24			PASS
	total	5785	11.87			PASS
	Ant1	5825	8.49			PASS
	Ant2	5825	9.84			PASS
	total	5825	12.23			PASS
11N40MIMO	Ant1	5190	5.83	17	14.44	PASS
	Ant2	5190	5.97			PASS

	total	5190	8.91			PASS
	Ant1	5230	7.67			PASS
	Ant2	5230	8.15			PASS
	total	5230	10.93			PASS
	Ant1	5755	5.08	30	28.47	PASS
	Ant2	5755	6.2			PASS
	total	5755	8.69			PASS
	Ant1	5795	6.64			PASS
	Ant2	5795	6.32			PASS
	total	5795	9.49			PASS
11AC80MIMO	Ant1	5210	2.76	17	14.44	PASS
	Ant2	5210	1.97			PASS
	total	5210	5.39			PASS
	Ant1	5775	1.66	30	28.47	PASS
	Ant2	5775	2.49			PASS
	total	5775	5.11			PASS

Note1：1. The Result and Limit Unit is dBm/500 kHz for the band 5.725–5.85 GHz.

2. The Duty Cycle Factor is compensated in the graph.

Note 2:

For 5150-5250MHz Band: Maximum antenna gain is 5.55dBi.

1. Directional gain = array gain+Ant gain=$10*\log(N_{ant}/N_{ss})$+5.55dBi=8.56dBi>6dBi,

So $Limit_{BF}$=17-(8.56-6)dBm/MHz=14.44dBm/MHz

2. Non-Beam Forming mode shares the same power with the Beam Forming mode.

For 5725-5850MHz Band: Maximum antenna gain is 4.52dBi.

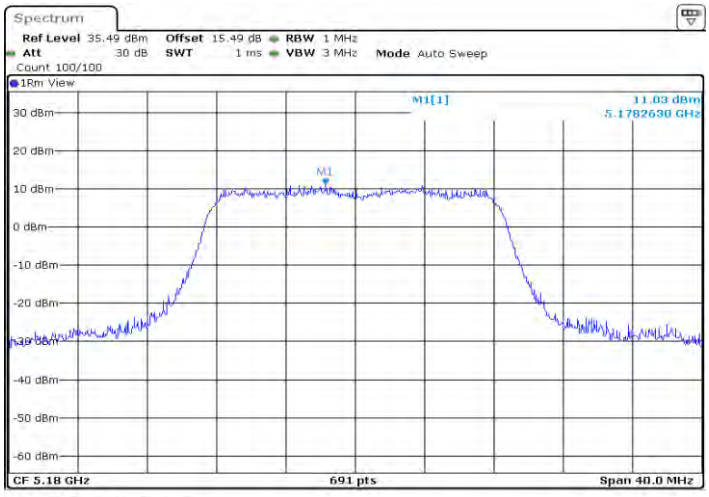
1. Directional gain = array gain+Ant gain=$10*\log(N_{ant}/N_{ss})$+4.52dBi=7.53dBi>6dBi,

So $Limit_{BF}$=30-(7.53-6)dBm/500kHz=28.47dBm/500kHz

2. Non-Beam Forming mode shares the same power with the Beam Forming mode.

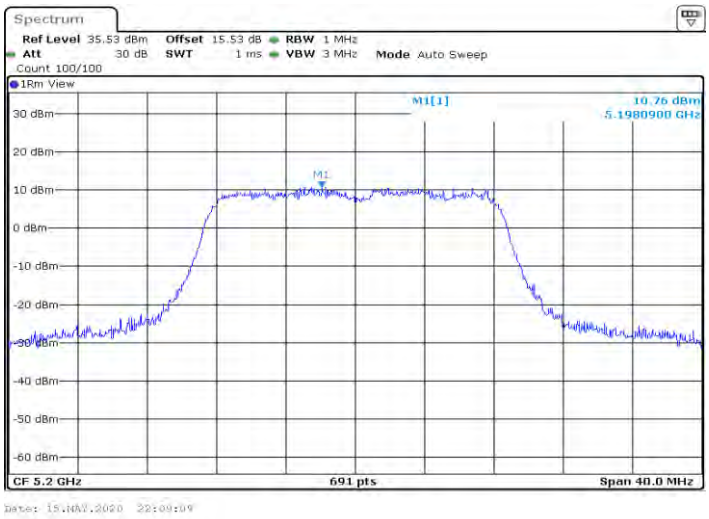
Test Graphs

11A-MIMO_Ant1_5180


11A-MIMO_Ant2_5180


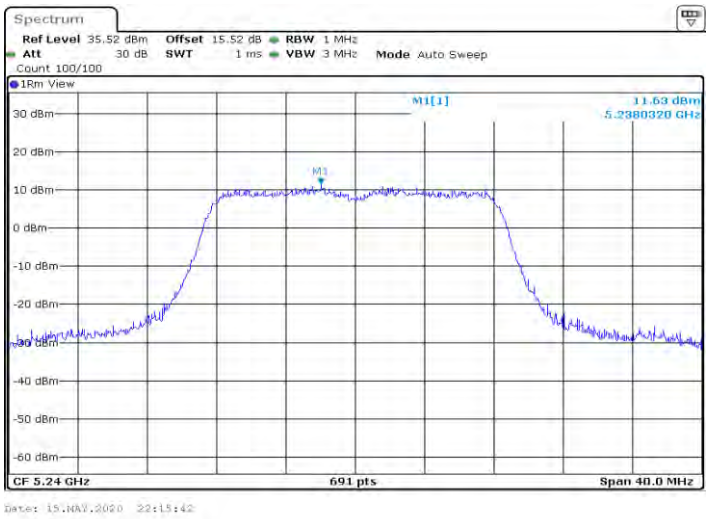
11A-MIMO_Ant1_5200


11A-MIMO_Ant2_5200

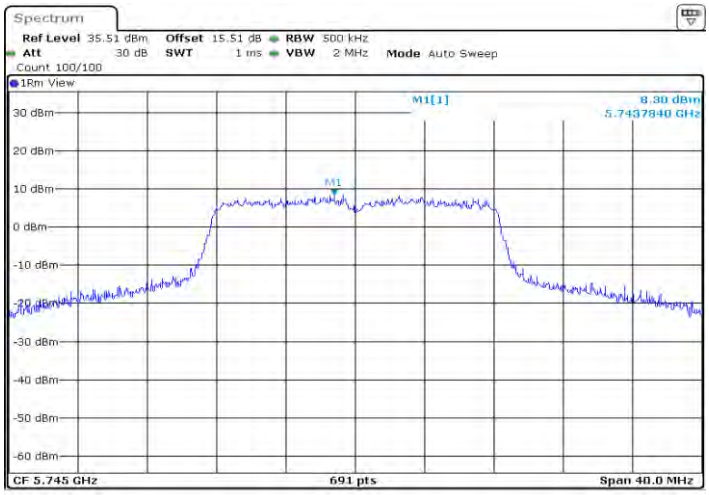


11A-MIMO_Ant1_5240

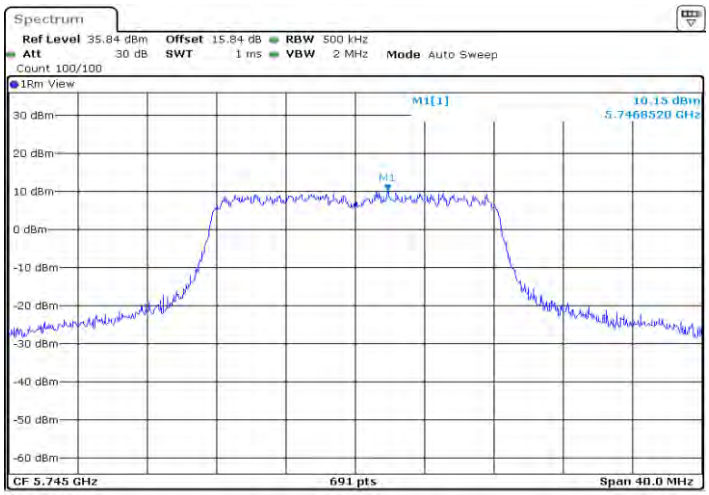
11A-MIMO_Ant2_5240



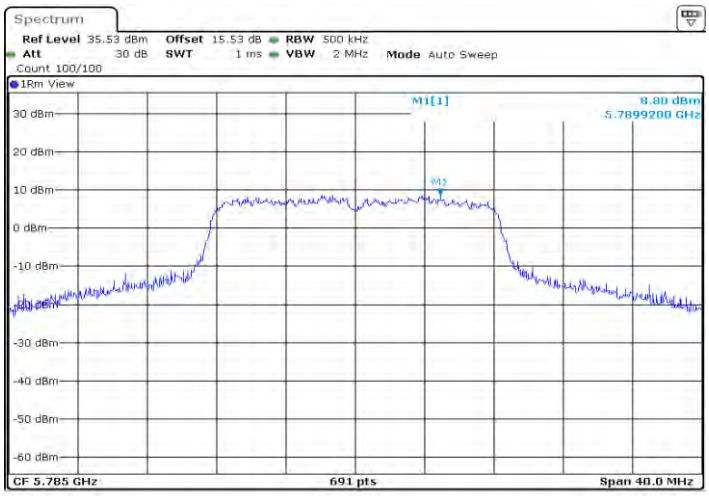
11A-MIMO_Ant1_5745



11A-MIMO_Ant2_5745

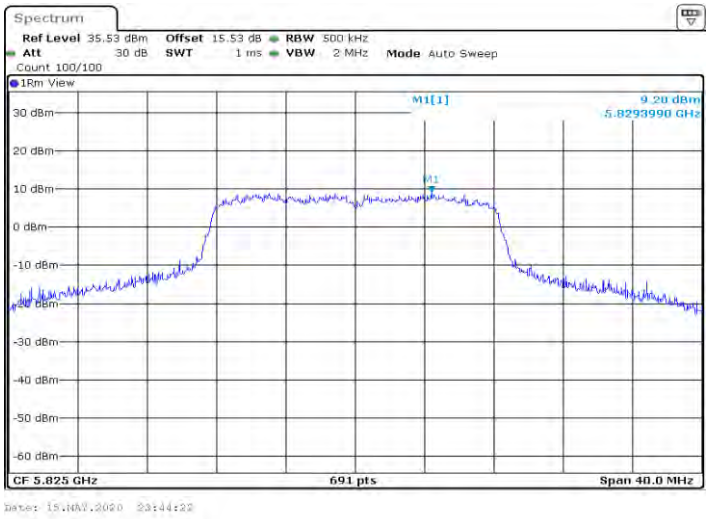


11A-MIMO_Ant1_5785



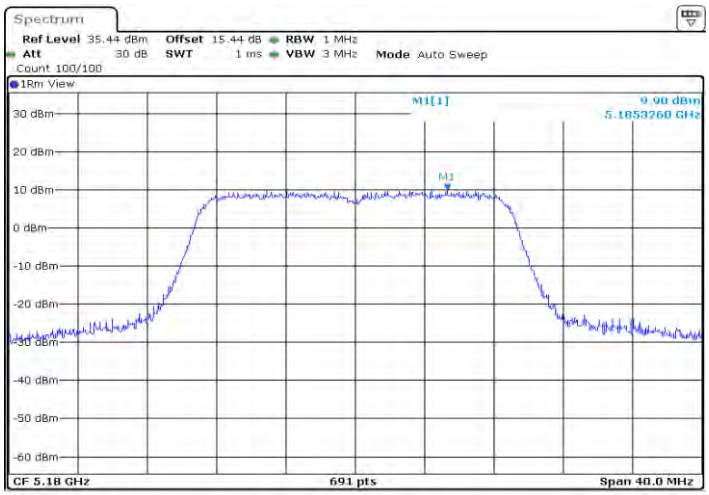
11A-MIMO_Ant2_5785

11A-MIMO_Ant1_5825

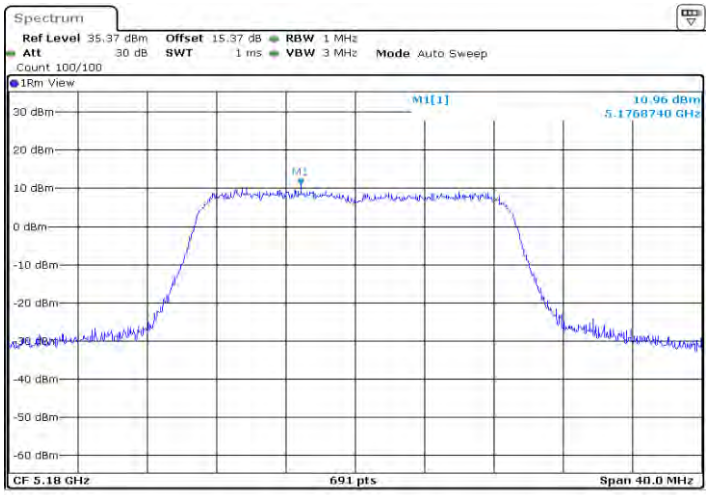


11A-MIMO_Ant2_5825

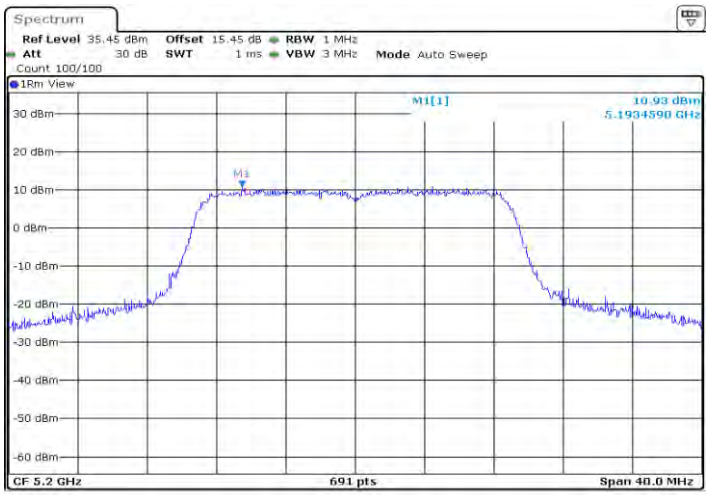
11N20MIMO_Ant1_5180



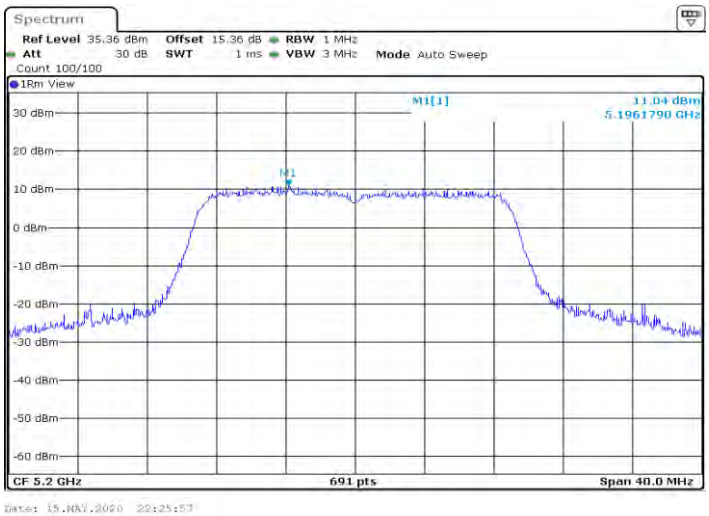
11N20MIMO_Ant2_5180



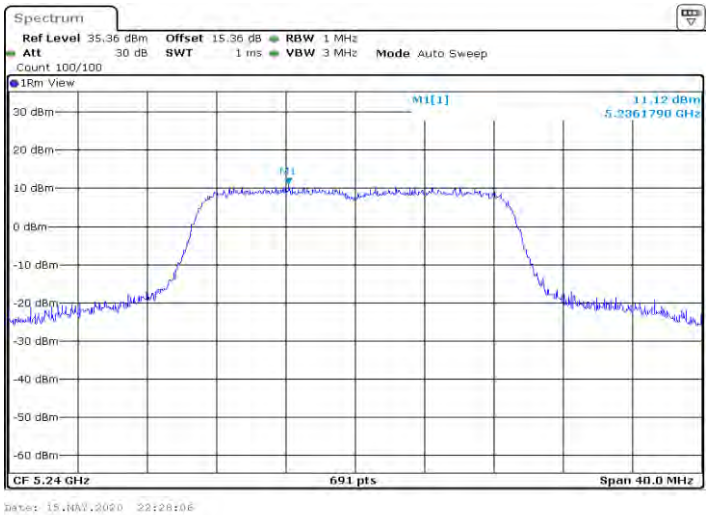
11N20MIMO_Ant1_5200



11N20MIMO_Ant2_5200

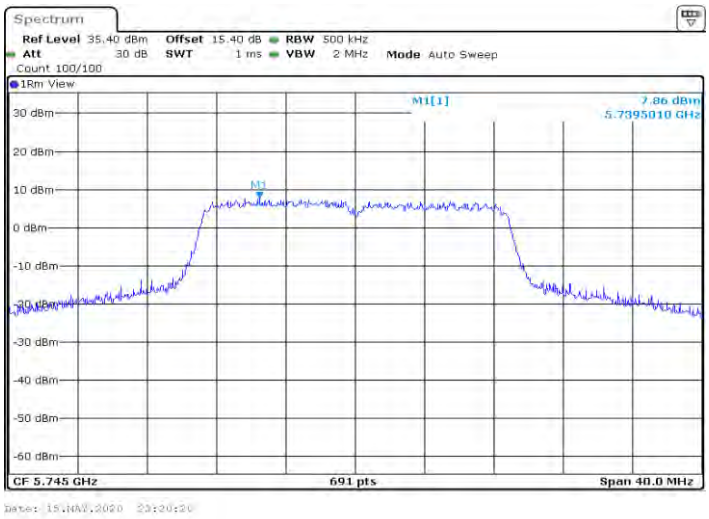


11N20MIMO_Ant1_5240

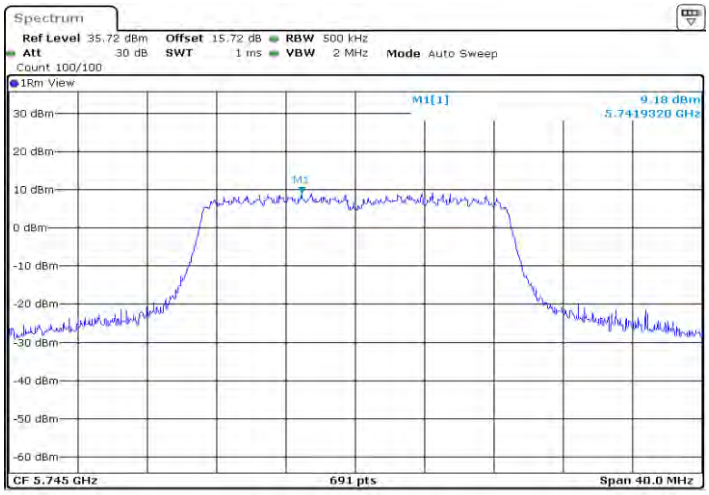


11N20MIMO_Ant2_5240

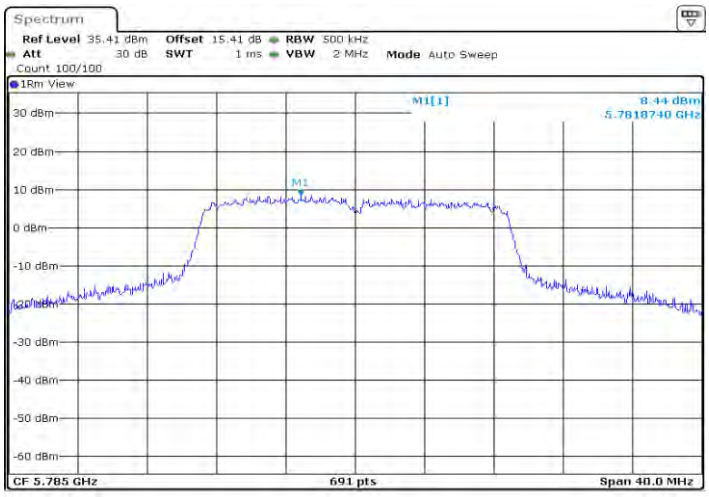
11N20MIMO_Ant1_5745



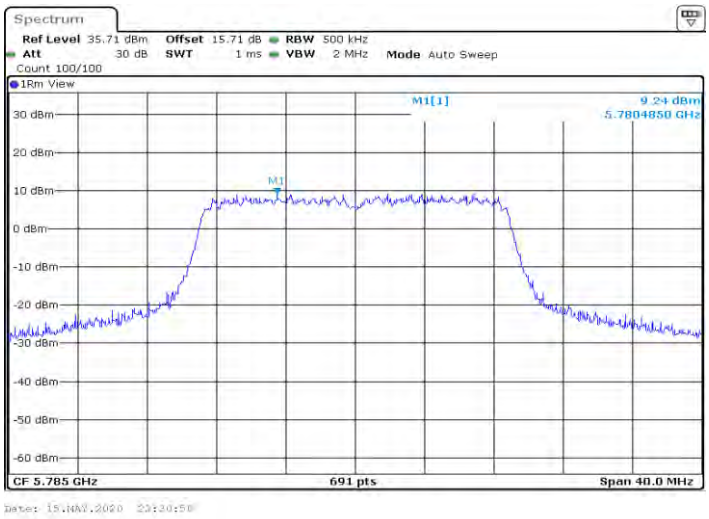
11N20MIMO_Ant2_5745



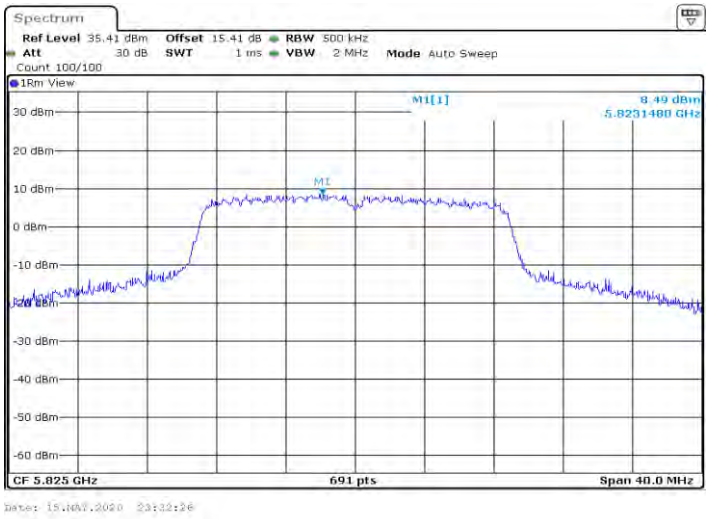
11N20MIMO_Ant1_5785



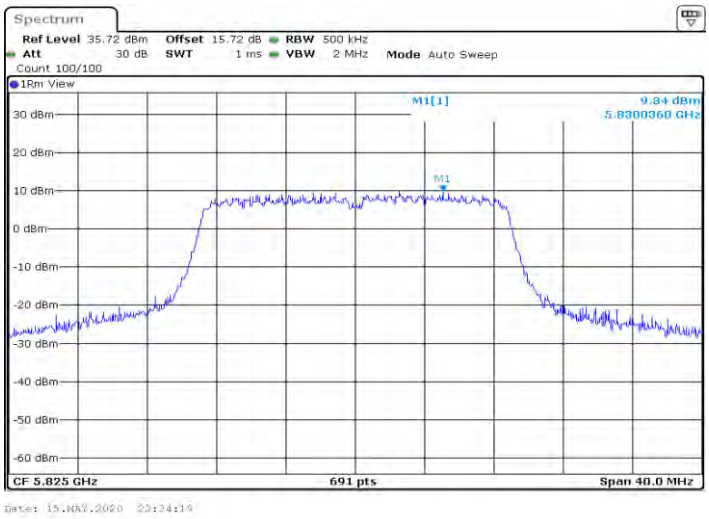
11N20MIMO_Ant2_5785



11N20MIMO_Ant1_5825



11N20MIMO_Ant2_5825



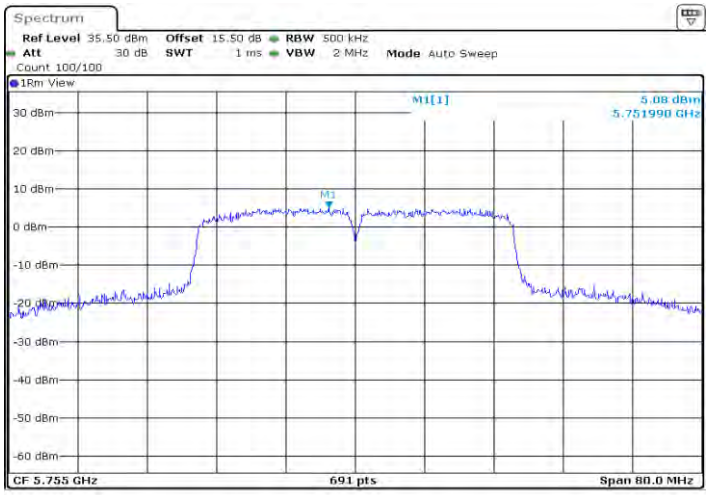
11N40MIMO_Ant1_5190

11N40MIMO_Ant2_5190

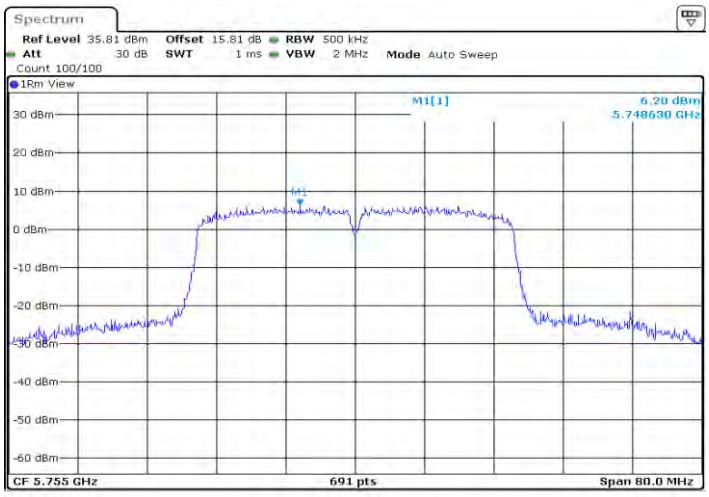
11N40MIMO_Ant1_5230

11N40MIMO_Ant2_5230

11N40MIMO_Ant1_5755

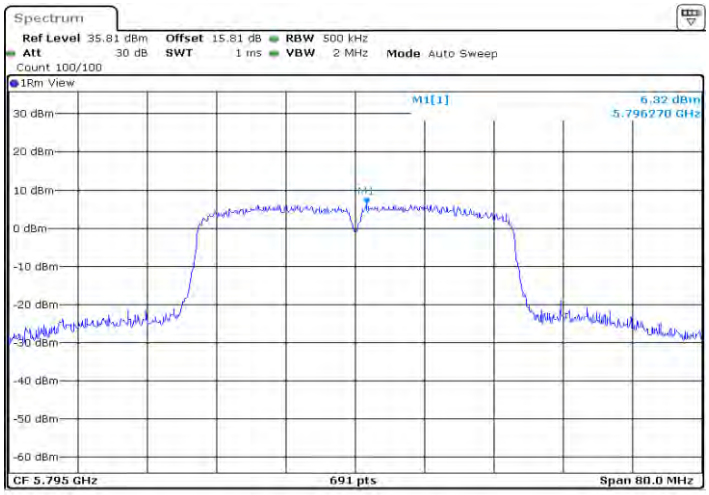


11N40MIMO_Ant2_5755

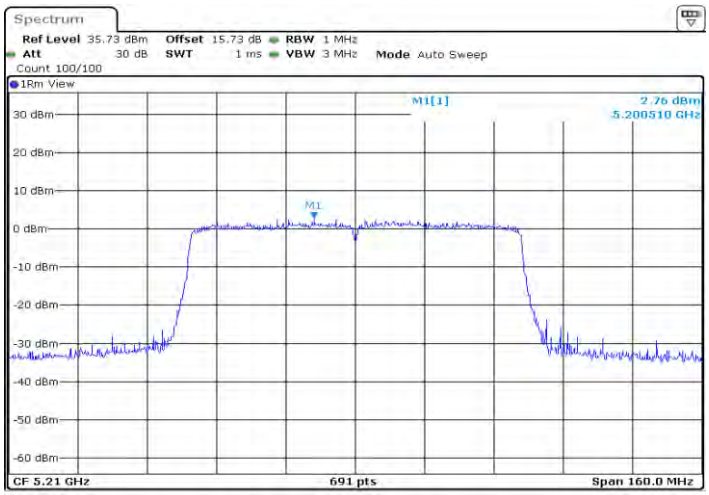


11N40MIMO_Ant1_5795

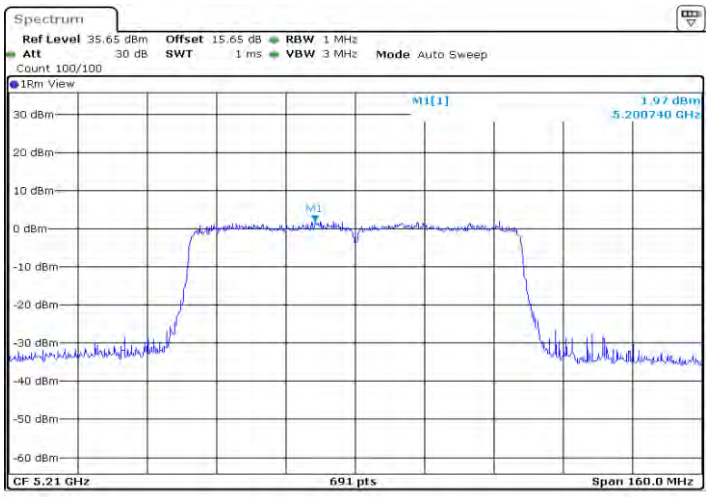
11N40MIMO_Ant2_5795



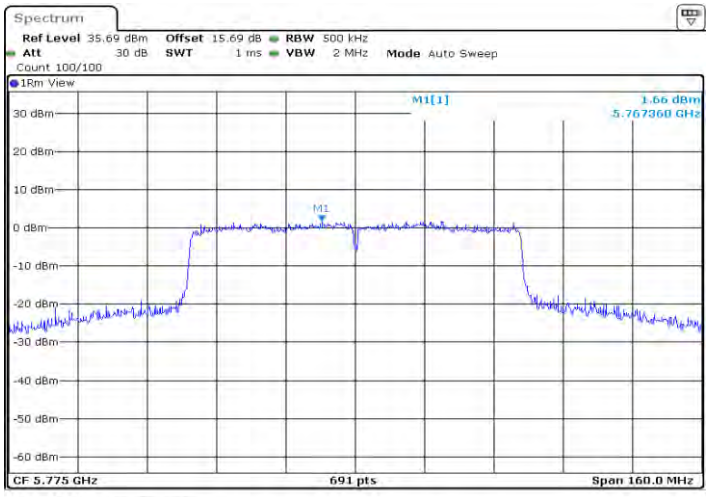
11AC80MIMO_Ant1_5210



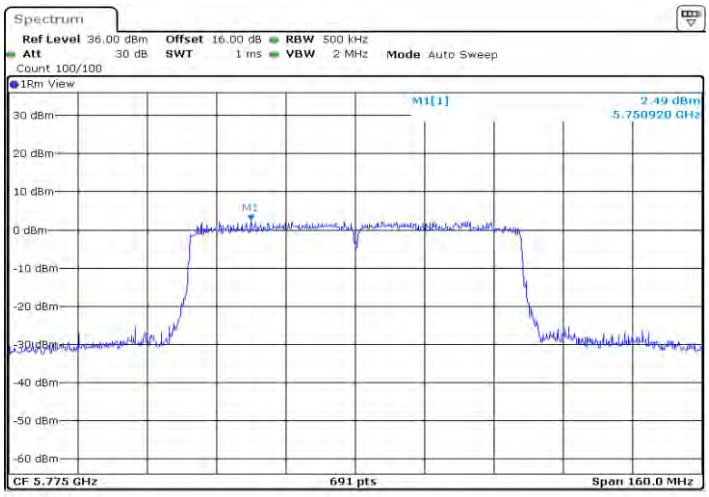
11AC80MIMO_Ant2_5210



11AC80MIMO_Ant1_5775



11AC80MIMO_Ant2_5775



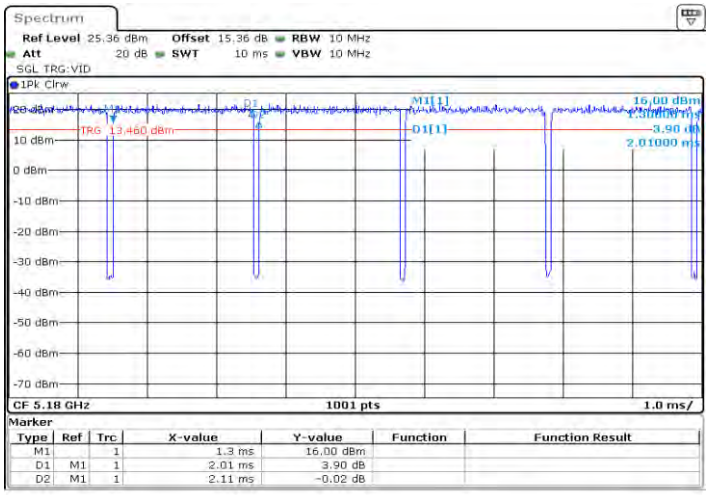
AppendixH: DutyCycle

Test Result

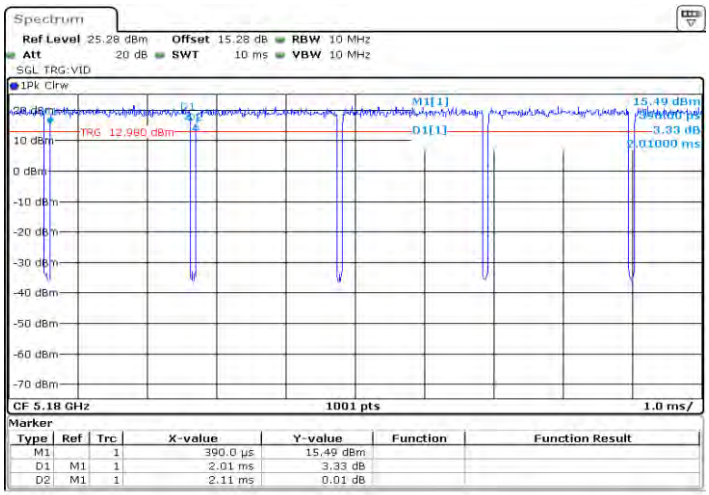
TestMode	Antenna	Channel	TransmissionDuration [ms]	Transmission Period [ms]	Duty Cycle [%]
11A-MIMO	Ant1	5180	2.01	2.11	95.26
	Ant2	5180	2.01	2.11	95.26
	Ant1	5200	2.01	2.10	95.71
	Ant2	5200	2.01	2.10	95.71
	Ant1	5240	2.01	2.11	95.26
	Ant2	5240	2.01	2.10	95.71
	Ant1	5745	2.01	2.11	95.26
	Ant2	5745	2.01	2.10	95.71
	Ant1	5785	2.01	2.11	95.26
	Ant2	5785	2.01	2.11	95.26
	Ant1	5825	2.01	2.11	95.26
	Ant2	5825	2.01	2.11	95.26
11N20MIMO	Ant1	5180	4.94	5.04	98.02
	Ant2	5180	4.95	5.04	98.21
	Ant1	5200	4.95	5.04	98.21
	Ant2	5200	4.94	5.04	98.02
	Ant1	5240	4.94	5.04	98.02
	Ant2	5240	4.94	5.04	98.02
	Ant1	5745	4.94	5.04	98.02
	Ant2	5745	4.94	5.04	98.02
	Ant1	5785	4.95	5.04	98.21
	Ant2	5785	4.95	5.04	98.21
	Ant1	5825	4.95	5.04	98.21
	Ant2	5825	4.94	5.04	98.02
11N40MIMO	Ant1	5190	2.39	2.50	95.60
	Ant2	5190	2.39	2.49	95.98
	Ant1	5230	2.39	2.49	95.98
	Ant2	5230	2.39	2.49	95.98
	Ant1	5755	2.40	2.50	96.00
	Ant2	5755	2.40	2.50	96.00
	Ant1	5795	2.40	2.50	96.00
	Ant2	5795	2.40	2.50	96.00
11AC80MIMO	Ant1	5210	1.12	1.22	91.80
	Ant2	5210	1.11	1.21	91.74
	Ant1	5775	1.11	1.21	91.74
	Ant2	5775	1.12	1.22	91.80

Test Graphs

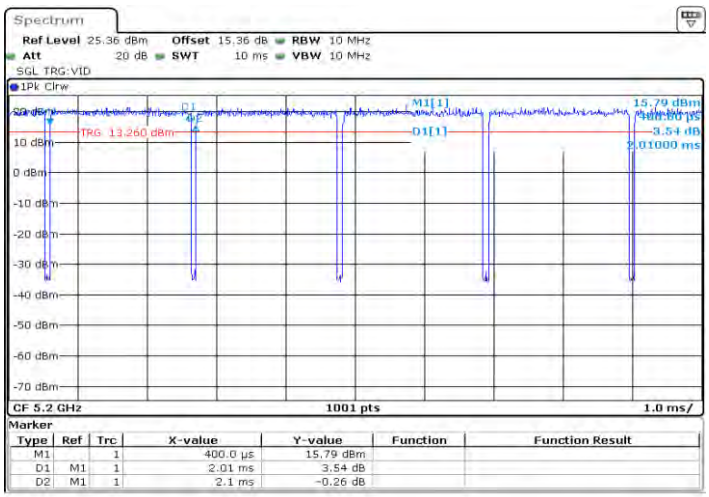
11A-MIMO_Ant1_5180



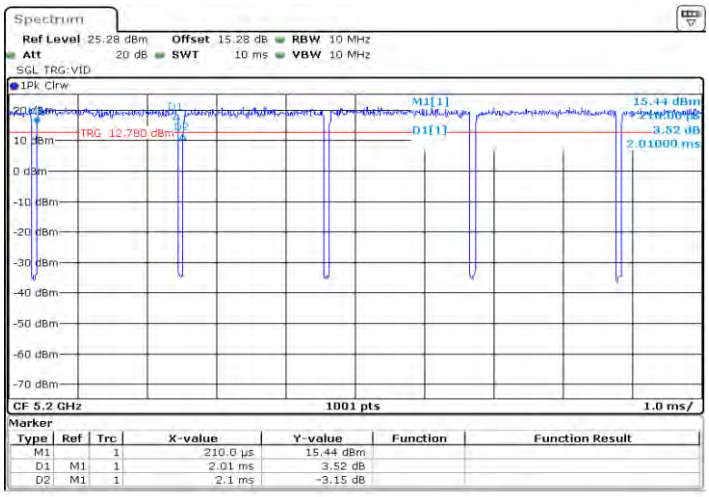
11A-MIMO_Ant2_5180



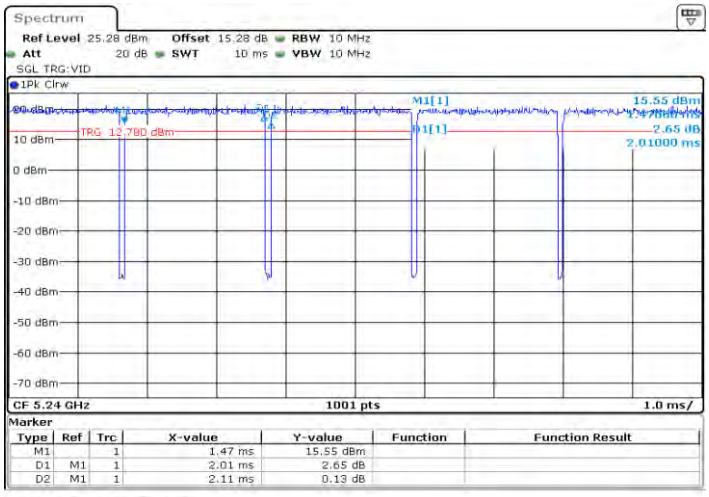
11A-MIMO_Ant1_5200



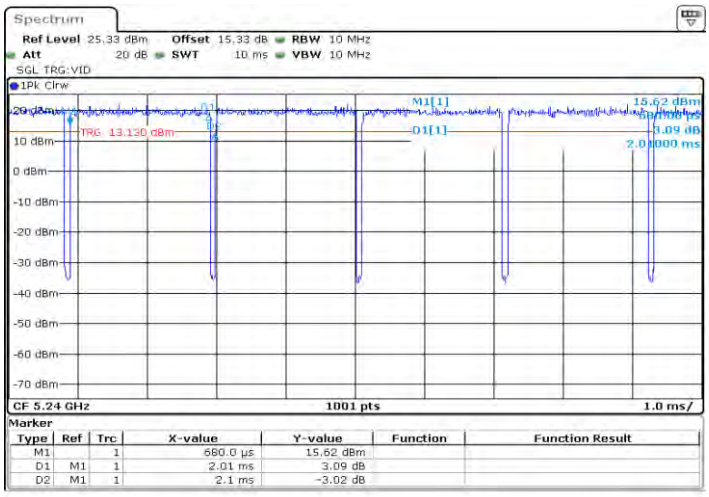
11A-MIMO_Ant2_5200



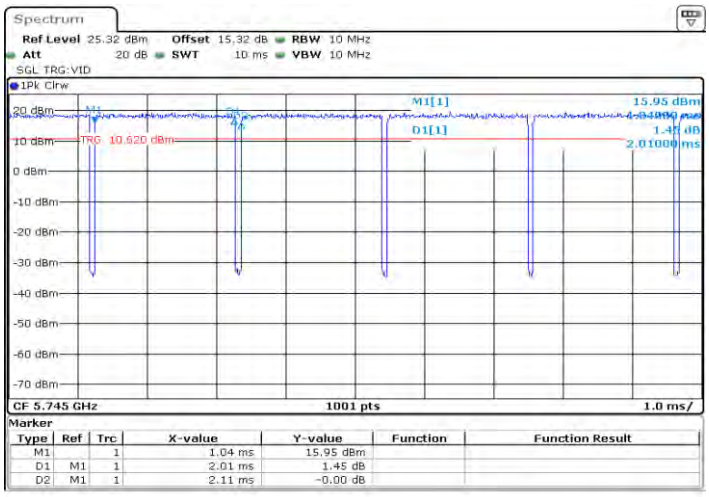
11A-MIMO_Ant1_5240



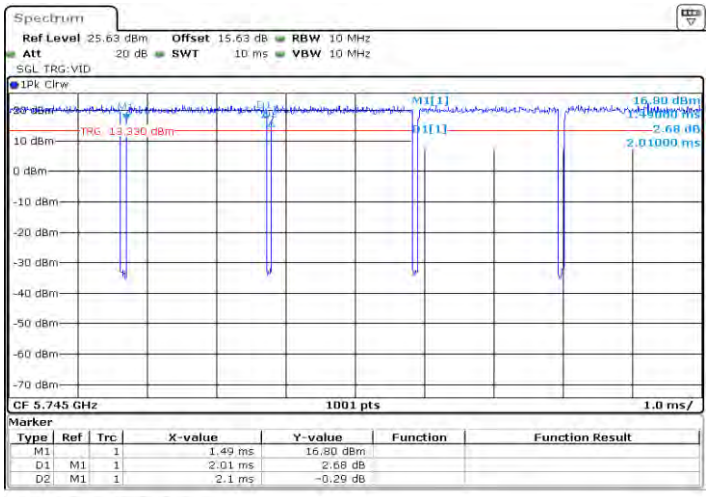
11A-MIMO_Ant2_5240



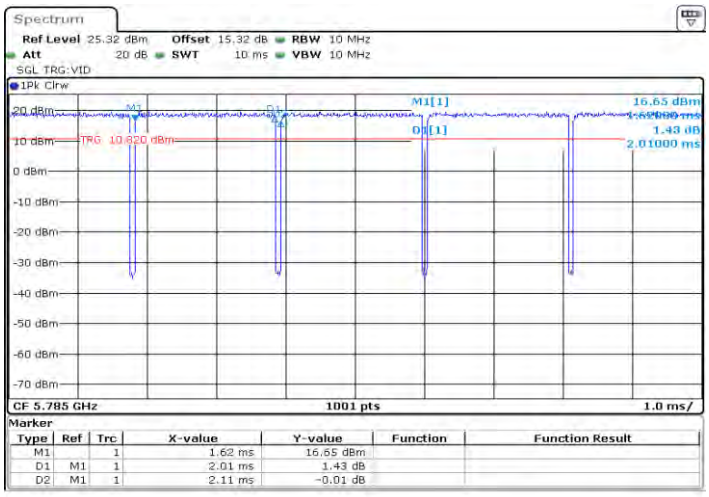
11A-MIMO_Ant1_5745



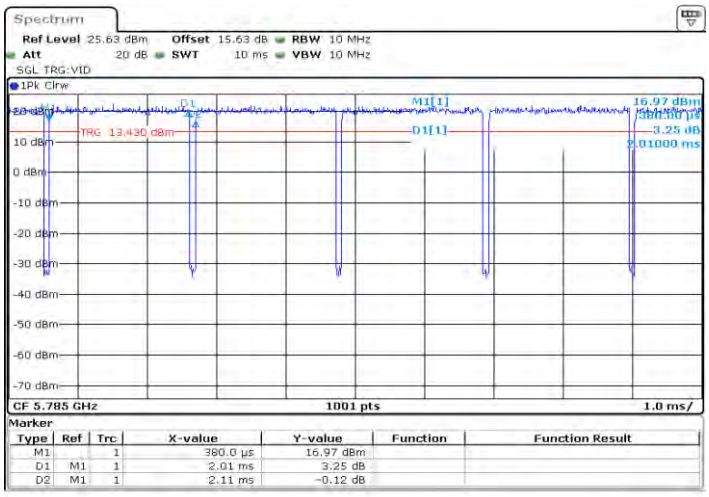
11A-MIMO_Ant2_5745



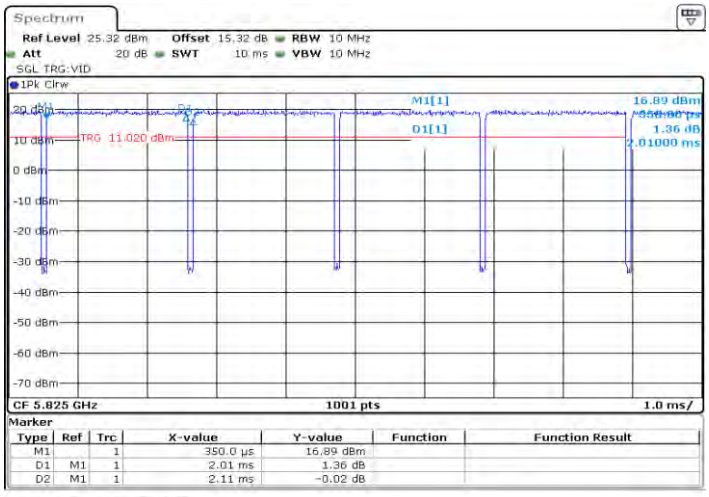
11A-MIMO_Ant1_5785



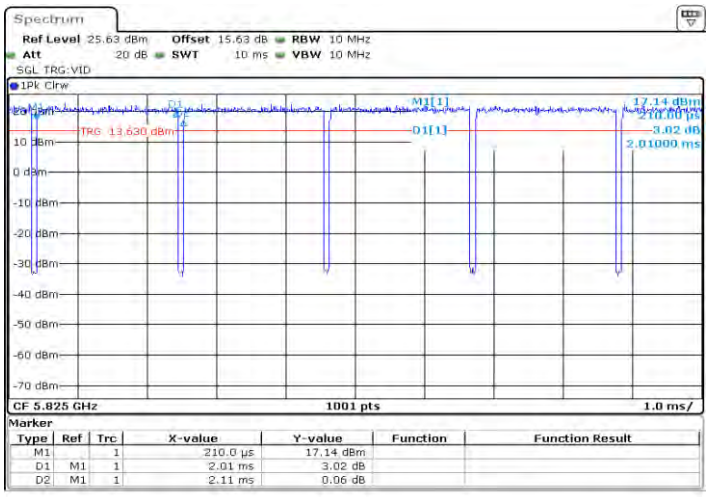
11A-MIMO_Ant2_5785



11A-MIMO_Ant1_5825



11A-MIMO_Ant2_5825



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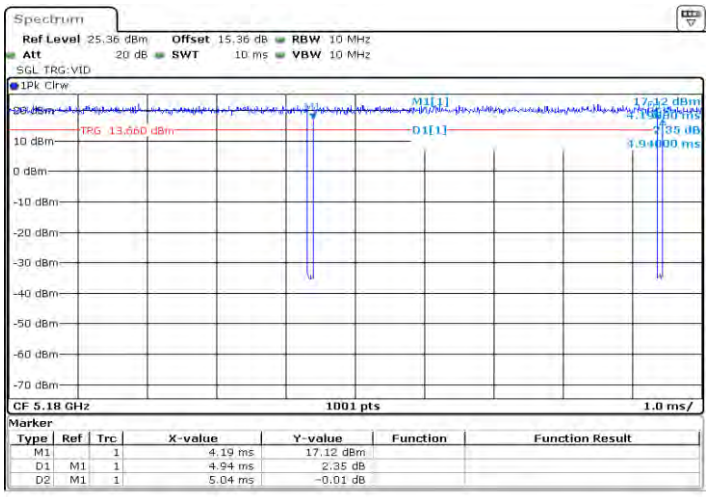

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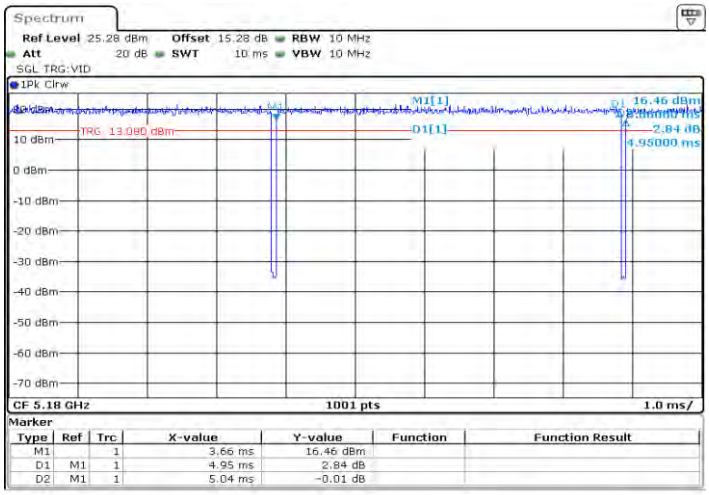

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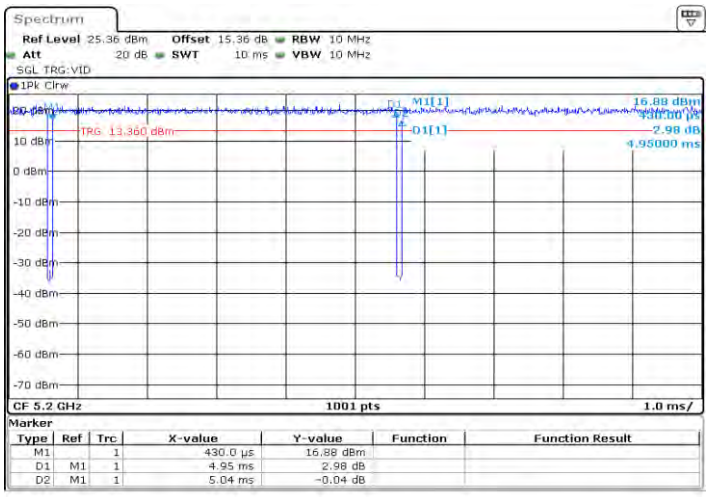

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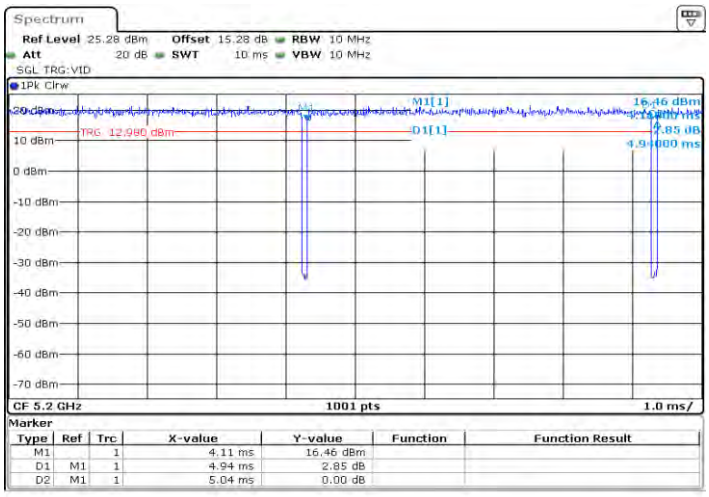

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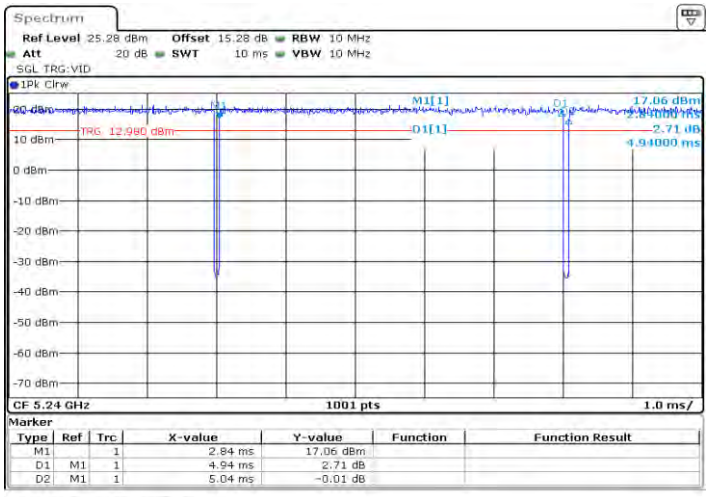

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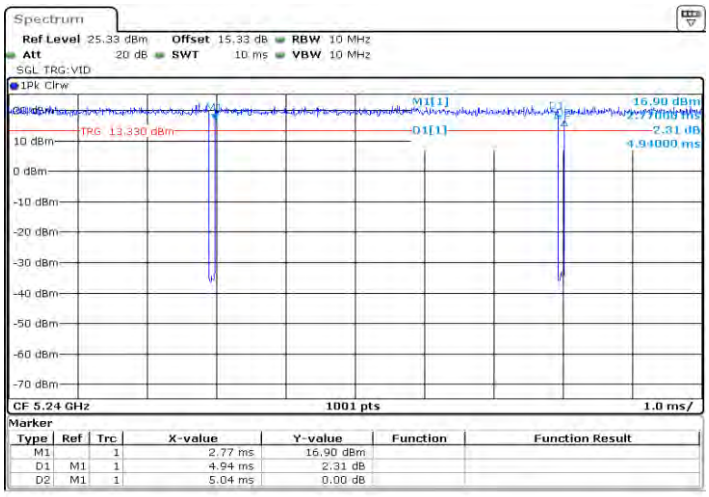
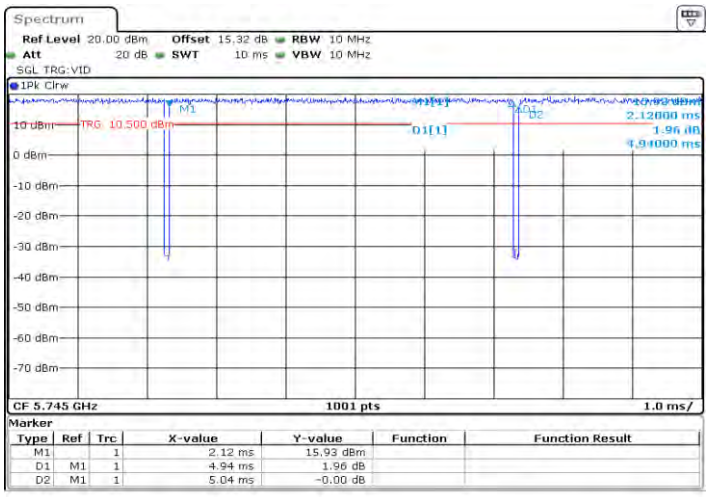
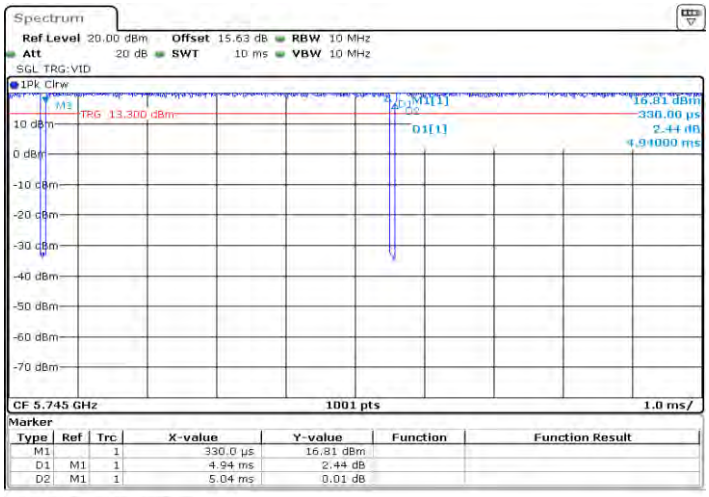


11N20MIMO_Ant1_5745



11N20MIMO_Ant2_5745



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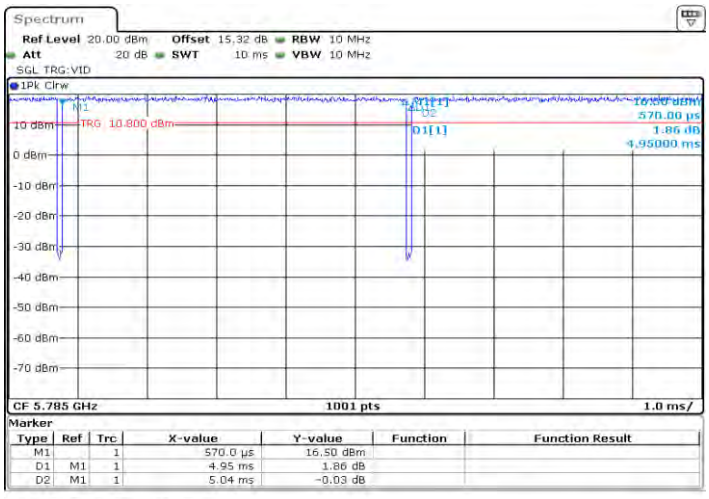
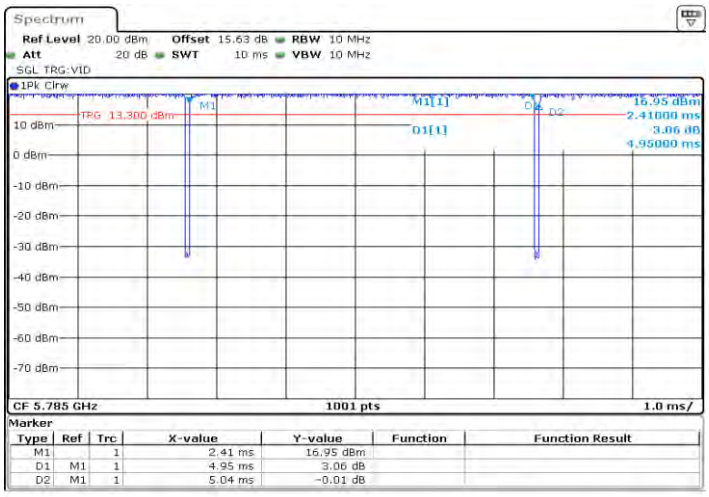


11N20MIMO_Ant2_5785



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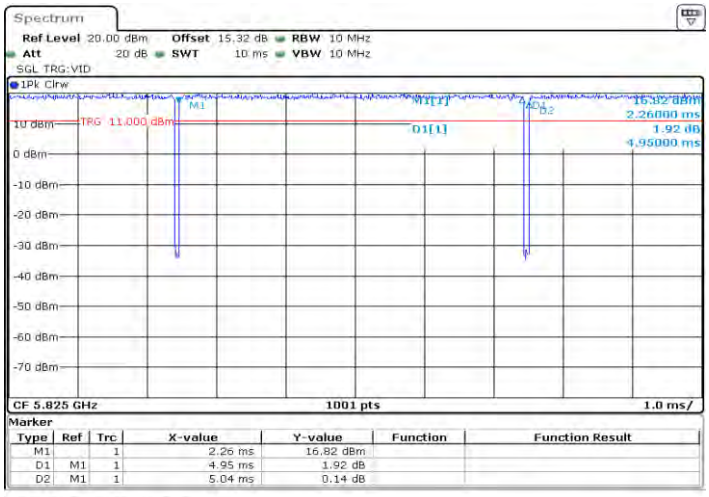

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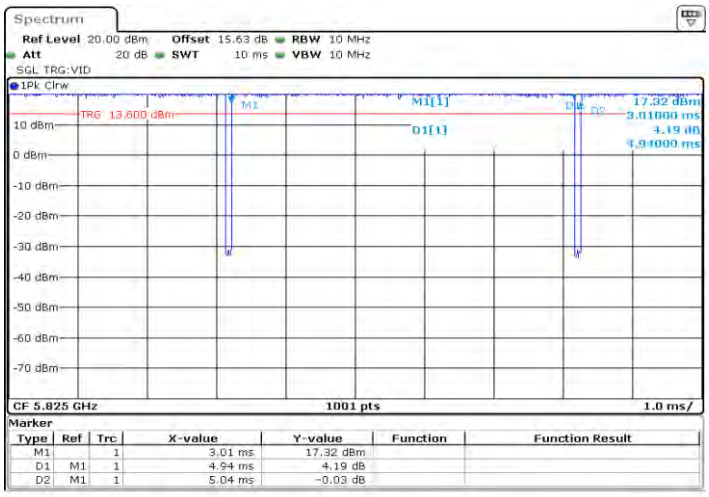
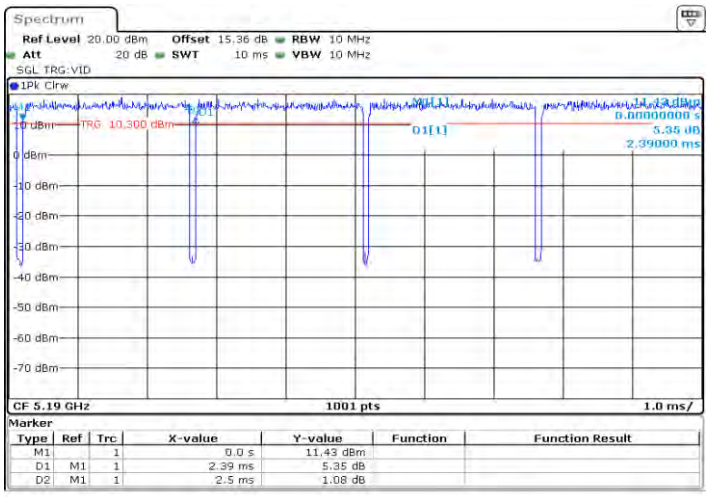


11N40MIMO_Ant1_5190



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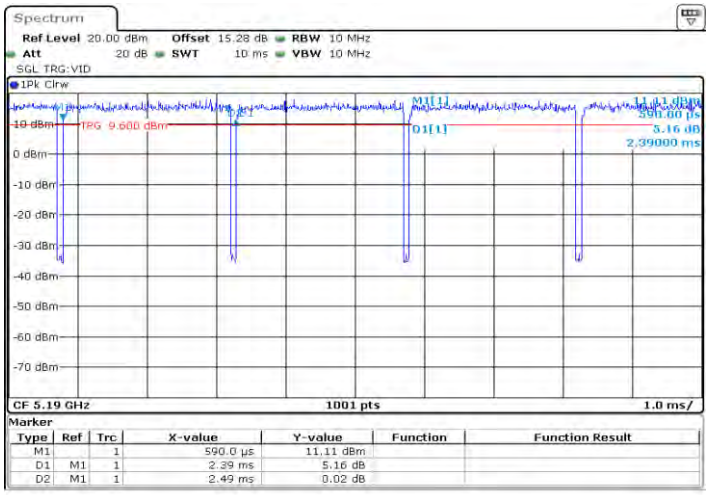

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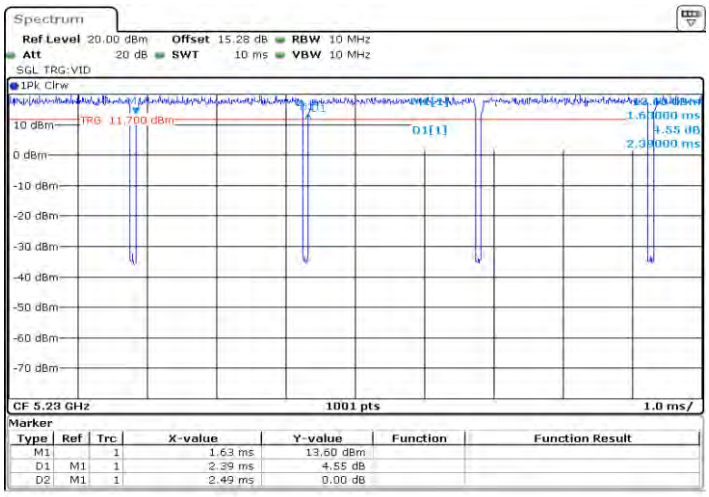

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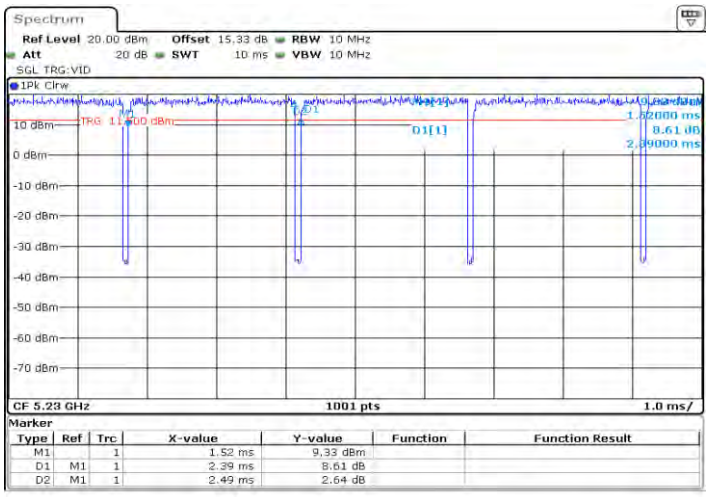

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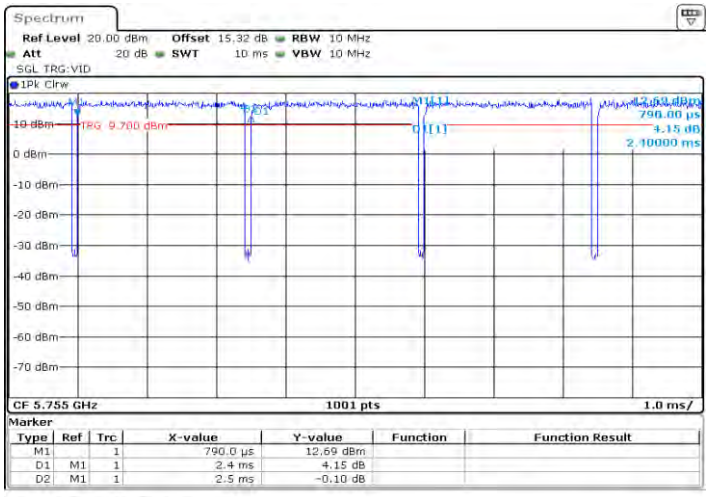

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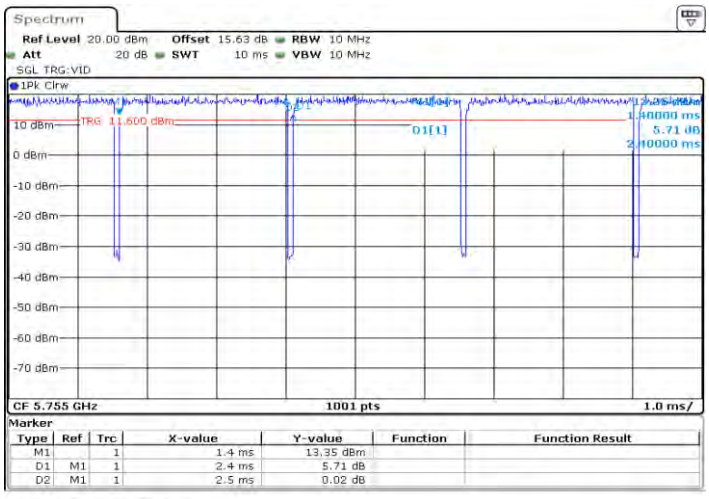

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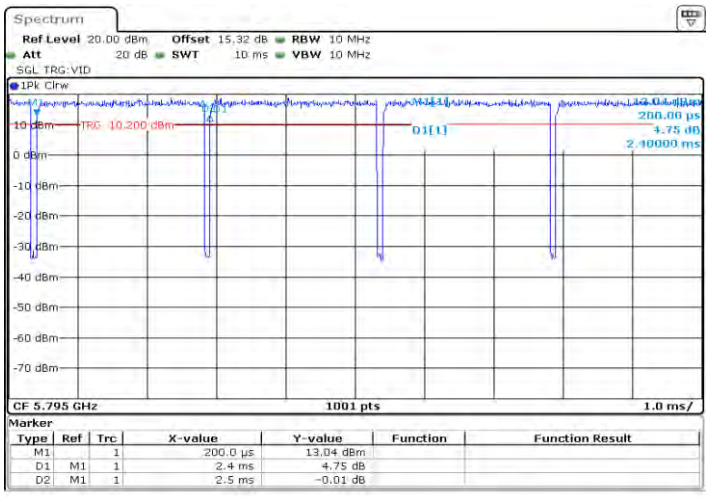

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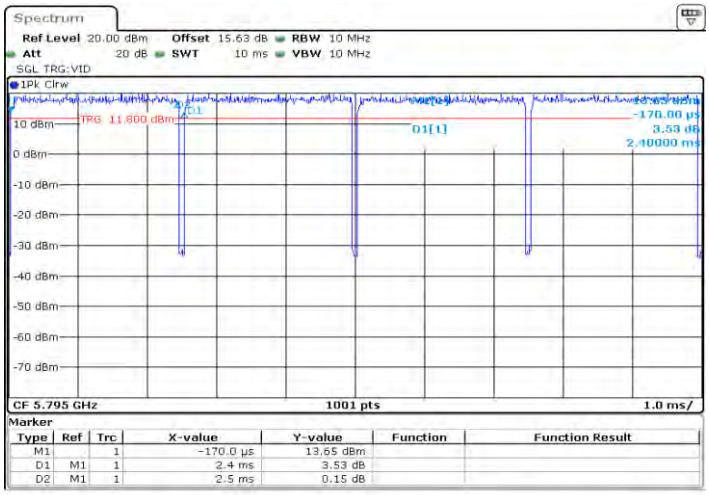
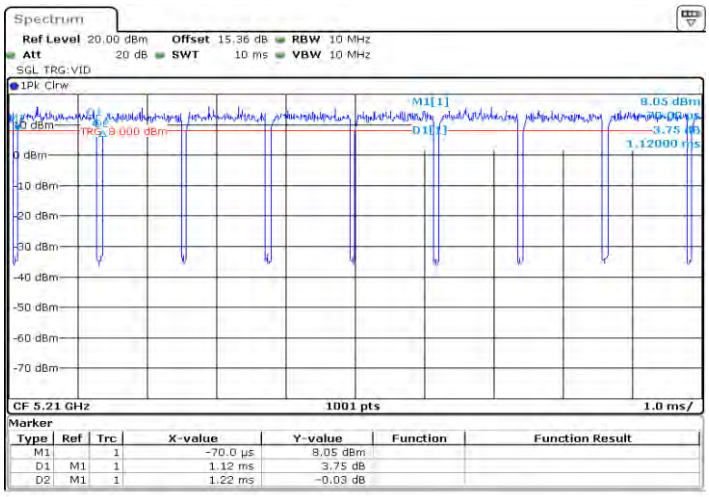


11AC80MIMO_Ant1_5210



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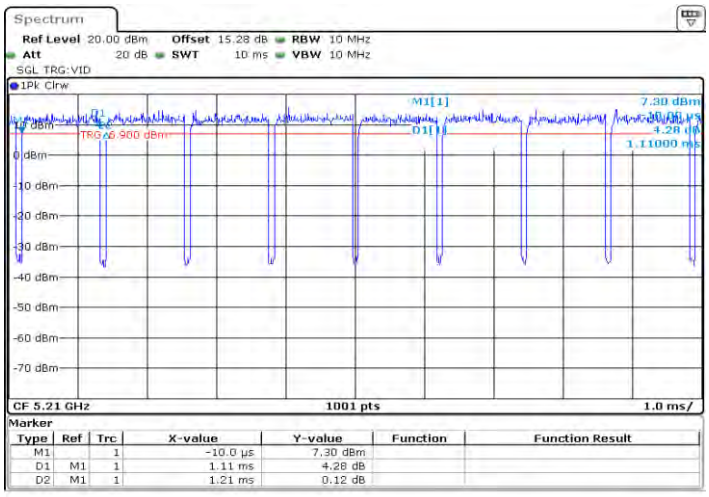
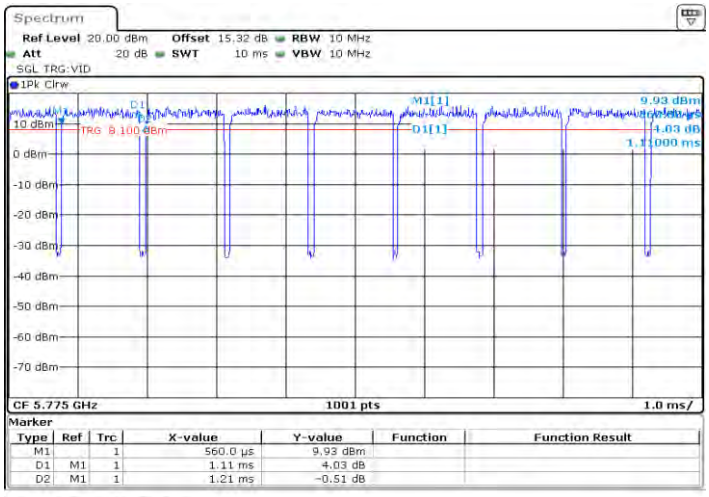


11AC80MIMO_Ant1_5775



11AC80MIMO_Ant2_5775