Test Report No.:
FCC2021-0008-5

RF Test Report

EUT	**:**	**LC300 LTE CPE**
MODEL	**:**	**LC300,LC300SV,LC300CA，LC300A，LC300B，LC300C，LC300D**
BRAND NAME	**:**	**sunvot**
CLIENT	**:**	**Ningbo Sunvot Technology Co., Ltd**
Classification Of Test	**:**	**Commission Test**

Vkan Certification & Testing Co., Ltd.

Client	**Name : Ningbo Sunvot Technology Co., Ltd** **Address : Building 3,NO 55 Longtan Shan Road, Beilun Daqi, Ningbo, Zhejiang**
Manufacturer	**Name : Ningbo Sunvot Technology Co., Ltd** **Address : Building 3,NO 55 Longtan Shan Road, Beilun Daqi, Ningbo, Zhejiang**
Equipment Under Test	**Name : LC300 LTE CPE** **Model/Type: LC300,LC300SV,LC300CA，LC300A，LC300B，LC300C，LC300D** **Trade mark : sunvot** **Serial NO.:N/A** **Sample NO.:1-1**

Date of Receipt.	**2021.04.27**	Date of Testing	**2021.03.19～2021.04.27**

Test Specification	**Test Result**
FCC Part 15, Subpart E, Section 15.407	PASS

Evaluation of Test Result	The equipment under test was found to comply with the requirements of the standards applied. **Issue Date: 2021.04.27**

Tested by:	Reviewed by:	Approved by:
Zhu Cheng (zhu cheng)	Cheng Xiaochuan	Dong Sanbi
Name Signature	Cheng Xiao Chuan Name Signature	Dong San Bi Name Signature

Other Aspects: NONE.

Abbreviations:OK, Pass= passed Fail = failed N/A= not applicable EUT= equipment, sample(s) under tested

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
FCC2021-0008-5	Original release	2021.04.27

1 GENERAL INFORMATION

1.1 GENERAL PRODUCT INFORMATION

PRODUCT	LC300 LTE CPE
BRAND	sunvot
MODEL	LC300
ADDITIONAL MODEL	LC300SV,LC300CA，LC300A，LC300B，LC300C，LC300D
FCC ID	2AZGN-LC300-202103
POWER SUPPLY	DC 48V From Adapter input AC120V/60Hz
MODULATION TECHNOLOGY	OFDM
MODULATION TYPE	256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
TRANSFER RATE	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n up to 600Mbps 802.11ac up to 1733.3Mbps
OPERATING FREQUENCY	U-NII-1: 5150MHz ~ 5250MHz, U-NII-3: 5725MHz ~ 5850MHz
NUMBER OF CHANNEL	Refer to 1.3 section
MAX. CONDUCTED POWER	14.96 dBm for 5150 ~ 5250MHz (Maximum AVG Power) 15.57 dBm for 5725 ~ 5850MHz (Maximum AVG Power)
ANTENNA TYPE	External Antenna , 3dBi Gain
I/O PORTS	Refer to user’s manual
CABLE SUPPLIED	N/A

Remark:

1. For more detailed features description, please refer to the manufacturer’s specifications or the User's Manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
3. Additional models (see about table)are identical with the test model LC300SV,LC300CA，LC300A，LC300B，LC300C，LC300D except the color of the appearance and model name for trading purpose.
4. Please refer to the EUT photo document (Reference No.: FCC2021-0008) for detailed product photo.
5. The EUT have MIMO function, provides 2 completed transmitter and 2 receiver.

MODULATION MODE	TX FUNCTION
802.11a	2TX/2RX
802.11n (HT20)	2TX/2RX
802.11n (HT40)	2TX/2RX
802.11ac (VHT80)	2TX/2RX

1.2 Description of Accessories

Adapter	
BRAND	N/A
Model No.:	KT241480050US
Input:	100-240V~50/60Hz 0.8A
Output:	48V ⎓ 0.5A
AC Cable:	N/A
DC Cable:	1.40 Meter, Unshielded without ferrite

1.3 OTHER INFORMATION

Operating frequency of each channel

FOR U-NII-1: 5150MHz ~ 5250MHz,			
4 channels are provided for 802.11a, 802.11ac (20MHz), 802.11n (20MHz)			
CHANNEL	**FREQ. (MHz)**	**CHANNEL**	**FREQ. (MHz)**
36	**5180**	44	5220
40	**5200**	**48**	**5240**
2 channels are provided for 802.11ac (40MHz), 802.11n (40MHz)			
CHANNEL	**FREQ. (MHz)**	**CHANNEL**	**FREQ. (MHz)**
38	**5190**	**46**	**5230**
1 channel is provided for 802.11ac (80MHz)			
CHANNEL	**FREQ. (MHz)**	**CHANNEL**	**FREQ. (MHz)**
42	**5210**	--	--

FOR U-NII-3: 5725MHz ~ 5850MHz			
5 channels are provided for 802.11a, 802.11ac (20MHz), 802.11n (20MHz)			
CHANNEL	**FREQ. (MHz)**	**CHANNEL**	**FREQ. (MHz)**
149	**5745**	161	5805
153	5765	**165**	**5825**
157	**5785**	--	--
2 channels are provided for 802.11ac (40MHz), 802.11n (40MHz)			
CHANNEL	**FREQ. (MHz)**	**CHANNEL**	**FREQ. (MHz)**
151	**5755**	**159**	**5795**
1 channel is provided for 802.11ac (80MHz)			
CHANNEL	**FREQ. (MHz)**	**CHANNEL**	**FREQ. (MHz)**
155	**5775**	--	--

Note:

1. The channels which were indicated in bold type of the above channel list were selected as representative test channel. Therefore only the data of the test channels were recorded in this report.

1.4 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, xyz axis and antenna ports

EUT CONFIGURE MODE	APPLICABLE TEST ITEMS				DESCRIPTION
	RE<1G	RE≥1G	PLC	APCM	
A	√	√	√	√	5G WIFI Function

Where **RE<1G:** Radiated Emission below 1GHz **RE≥1G:** Radiated Emission above 1GHz
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

RADIATED EMISSION TEST (BELOW 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	FREQ. BAND	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	U-NII-1	802.11a	36 to 48	36	OFDM	BPSK	6.0
	U-NII-3		140 to 165				

For the test results, only the worst case was shown in test report.

RADIATED EMISSION TEST (ABOVE 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	FREQ. BAND	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	U-NII-1	802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6.0
A		802.11n (20MHz)	36 to 48	36, 40, 48	OFDM	BPSK	6.5
A		802.11n (40MHz)	38 to 46	38, 46	OFDM	BPSK	13.5
A		802.11ac 80MHz	42	42	OFDM	BPSK	29.3
A	U-NII-3	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
A		802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
A		802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	13.5
A		802.11ac 80MHz	155	155	OFDM	BPSK	29.3

POWER LINE CONDUCTED EMISSION TEST:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	TESTED CONDITION
-	WIFI (5G) Link

ANTENNA PORT CONDUCTED MEASUREMENT:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	FREQ. BAND	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	U-NII-1	802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6.0
A		802.11n (20MHz)	36 to 48	36, 40, 48	OFDM	BPSK	6.5
A		802.11n (40MHz)	38 to 46	38, 46	OFDM	BPSK	13.5
A		802.11ac 80MHz	42	42	OFDM	BPSK	29.3
A	U-NII-3	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
A		802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
A		802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	13.5
A		802.11ac 80MHz	155	155	OFDM	BPSK	29.3

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE (SYSTEM)	TESTED BY
RE<1G	25deg. C, 55%RH	AC 120V/60Hz	Zhu Yu Lin
RE≥1G	25deg. C, 55%RH	AC 120V/60Hz	Zhu Yu Lin
PLC	25deg. C, 55%RH	AC 120V/60Hz	Zhu Yu Lin
APCM	25deg. C, 60%RH	AC 120V/60Hz	Zhu Yu Lin

1.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product, according to the specifications of the manufacturers. It must comply with the requirements of the following standards:

FCC Part 15, Subpart E (15.407)
789033 D02 General UNII Test Procedures New Rules v01r03
ANSI C63.10-2013

All test items have been performed and recorded as per the above standards

1.6 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Support Equipment					
NO	Description	Brand	Model No.	Serial Number	Supplied by
N/A	N/A	N/A	N/A	N/A	N/A

Support Cable							
NO	Description	Quantity (Number)	Length (cm)	Detachable (Yes/ No)	Shielded (Yes/ No)	Cores (Number)	Supplied by
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

PPLIED STANDARD: FCC Part 15, Subpart C			
STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**	**REMARK**
15.407(b)(6)	AC Power Conducted Emissions	PASS	Meet the requirement of limit.
15.407(b) (1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit.
15.407(a)(1/2/3)	Max Average Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(1/2/3)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Meet the requirement of limit.

2.1 LIST OF TEST AND MEASUREMENT INSTRUMENTS

Test Equipment	Type/Mode	SERIAL NO.	Manufacturer	Cal. Due
EMI Test Receiver	ESCI	100857	R&S	2021-12-08
EMI Test Receiver	ESR3	102394	R&S	2022-03-05
LISN	NSLK 8127	8127644	SCHWARZBECK	2021-09-04
LISN	NSLK 8128	8128-316	SCHWARZBECK	2021-09-04
LISN	NSLK 8129	8129-268	SCHWARZBECK	2022-03-05
Plus Limiter（#1）	VTSD 9561 F-N	00515	SCHWARZBECK	2022-03-05
Plus Limiter（#2）	VTSD 9561	9561-F017	SCHWARZBECK	2021-10-09
Impedance Stabilization Network	ISN T800	27095	TESEQ	2021-09-04
Impedance Stabilization Network	NTFM8158	8158-0092	SCHWARZBECK	2021-06-09
ImpedanceStabilizationNetwork	NTFM8131	#184	SCHWARZBECK	2021-06-09
Voltage Probe	TK9420	9420-499	SCHWARZBECK	2022-03-05
Power Divider	4901.17.B	22643830	HUBER+SUHNER	2021-11-08
Video Signal Generator	GV-798+	151064920001	PROMAX	2021-07-21
AudioSignalGenerator	GAG-810	EK871591	GW	2021-12-11
Shielding Room(#1)	GP1A	002	LEINING	2024-08-08
Shielding Room(#2)	GP1A	/	LEINING	2024-08-08
EMI Test Receiver	N9038A-508	MY532290079	Agilent	2022-03-05
EMI Test Receiver	ESR7	102235	R&S	2022-03-05
EMI Test Receiver	N9038A-508	MY53290078	Agilent	2022-03-05
Spectrum Analyzer	N9010B	MY57470323	KEYSIGHT	2022-03-05
Radio Communication Test	CMW500	156686	R&S	2021-12-25
Broadband Antenna(3m)	VULB 9163	9163-530	SCHWARZBECK	2021-07-11
Loop Antenna	HLA 6121	540046	TESEQ	2021-06-28
Loop Antenna	FMZB1513	1513-170	SCHWARZBECK	2022-03-05
Monopole antenna	HFH2-Z6E	101317	R&S	2021-12-11
Waveguide Horn Antenna	BBHA9120B	602	SCHWARZBECK	2022-03-05
Waveguide Horn Antenna	HF906	360306/008	R&S	2022-03-05
Semi-Anechoic Chamber(3m)	FACT-4	ST08035	ETS	2024-12-12
Preamplifier	SCU-01F	100298	Rohde&Schwarz	2021.5.19
Preamplifier	SCU-18F	100799	Rohde&Schwarz	2021.5.19
Signal&Spectrum Analyzer	FSV 40	101898	Rohde&Schwarz	2021.5.19
Signal&Spectrum Analyzer	FSVA 3044	101013	Rohde&Schwarz	2021.5.19

2.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

No.	ITEM	FREQUENCY	UNCERTAINTY
1	Conducted emissions	9kHz~30MHz	2.7dB
2	Radiated emissions	9KHz ~ 30MHz	5.6dB
		30MHz ~ 1GMHz	4.6dB
		1GHz ~ 18GHz	4.4dB
		18GHz ~ 40GHz	4.6dB

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

2.3 TEST LOCATION

CVC Testing Technology Co., Ltd.
No.3, Tiantaiyi Road, Kaitai Avenue, Science City, Guangdong, China
Test Firm Registration Number: 937273

3 TEST TYPES AND RESULTS

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 Limit

Frequency (MHz)	Conducted Limits(dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46*
0.5 - 5	56	46
5 - 30	60	50
NOTE: 1. The lower limit shall apply at the transition frequencies. NOTE: 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.		

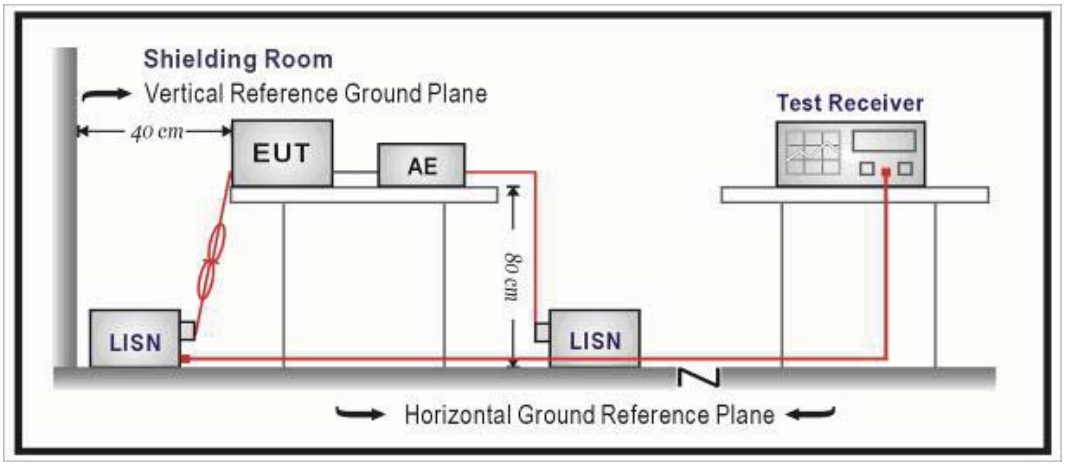
3.1.2 Measurement procedure

a. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the Test photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.The equipment under test shall be placed on a support of non-metallic material, the height of which shall be1.5m above the ground,

b. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

c. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

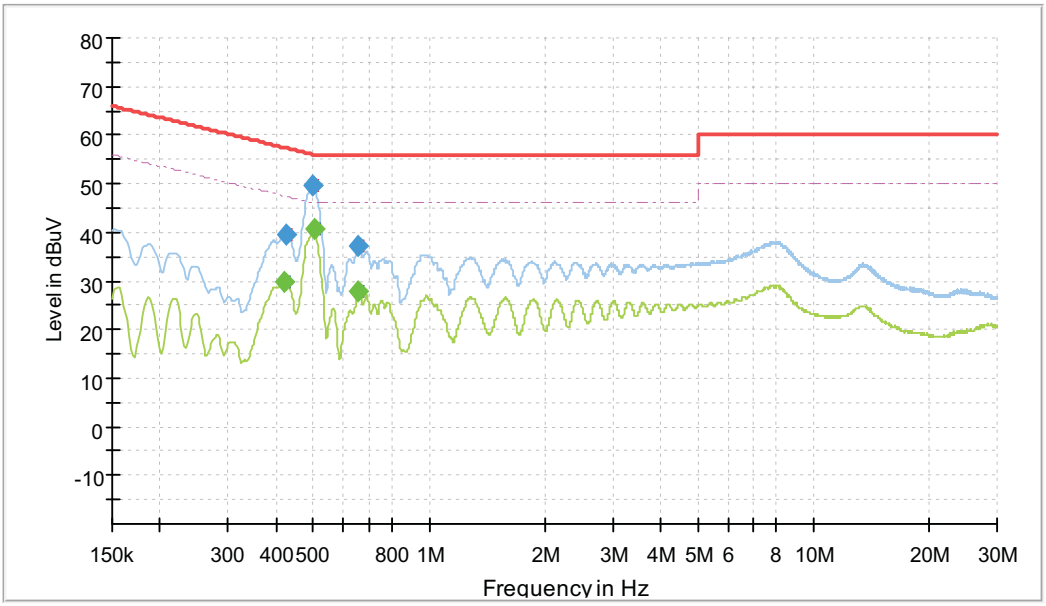
3.1.3 Test setup



3.1.4 Test results

CONDUCTED WORST-CASE DATA: WIFI (5G) Link

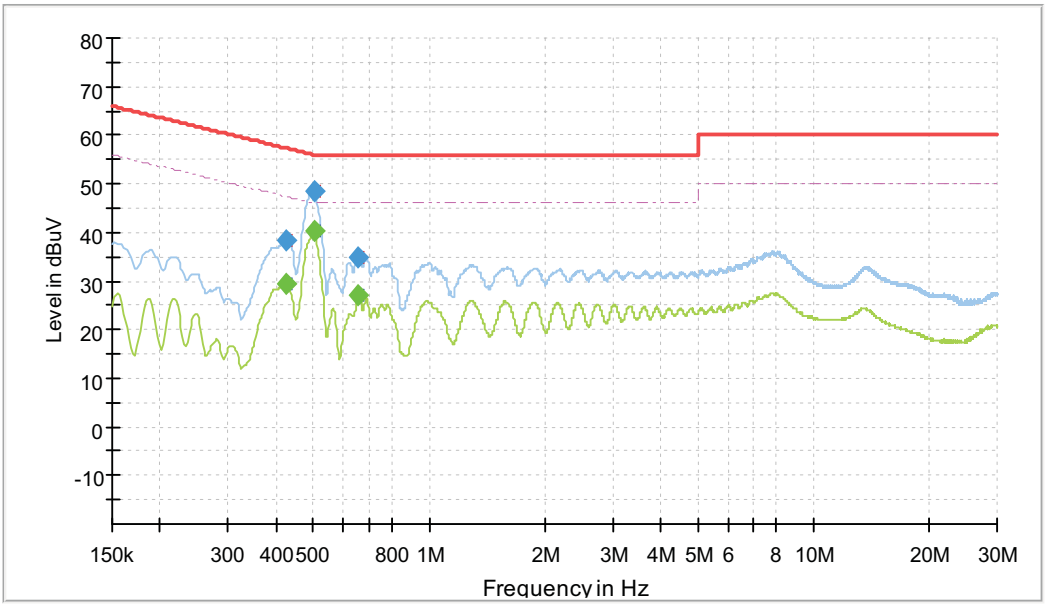
Test Mode	WIFI (5G) Link		
Frequency Range	150KHz ~ 30MHz	PHASE	Line (L)



NO.	Frequency (MHz)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Corr. (dB)	Remark
1	0.422	30.0	47.4	17.4	19.5	AVG
2	0.425	39.7	57.4	17.7	19.5	QP
3	0.499	49.5	56.0	6.5	19.5	QP
4	**0.506**	**40.5**	**46.0**	**5.5**	**19.5**	**AVG**
5	0.656	37.1	56.0	18.9	19.6	QP
6	0.656	27.9	46.0	18.1	19.6	AVG

Remark: The emission levels of other frequencies were very low against the limit.

Test Mode	WIFI (5G) Link		
Frequency Range	150KHz ~ 30MHz	PHASE	Line (N)



NO.	Frequency (MHz)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Corr. (dB)	Remark
1	0.425	29.3	47.4	18.0	19.6	AVG
2	0.427	38.5	57.3	18.8	19.6	QP
3	0.501	48.6	56.0	7.4	19.6	QP
4	**0.503**	**40.2**	**46.0**	**5.8**	**19.6**	**AVG**
5	0.654	35.0	56.0	21.0	19.6	QP
6	0.656	27.2	46.0	18.8	19.6	AVG

Remark: The emission levels of other frequencies were very low against the limit.

3.2 RADIATED EMISSION AND BANDEDGE MEASUREMENT

3.2.1 Limit

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

FREQUENCIES (MHz)	FIELD STRENGTH (Microvolts/Meter)	MEASUREMENT DISTANCE (Meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE: 1. The lower limit shall apply at the transition frequencies.
NOTE: 2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
NOTE: 3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

3.2.2 Measurement procedure

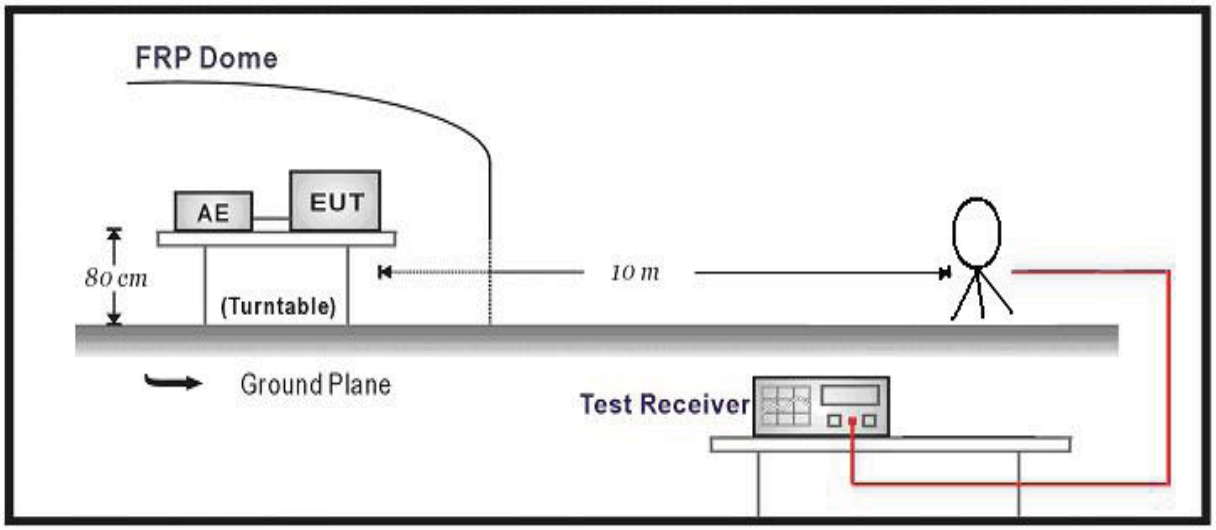
a. The EUT was placed on the top of a rotating table 1.5 meters(above 1GHz) and 0.8 meters(below 1GHz) above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. For below 1GHz was used bilog antenna, and above 1GHz was used horn antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. For below 30MHz, a loop antenna with its vertical plane is place 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1m above the ground.
g. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using fresh batteries. The turntable was rotated to maximize the emission level.

NOTE:

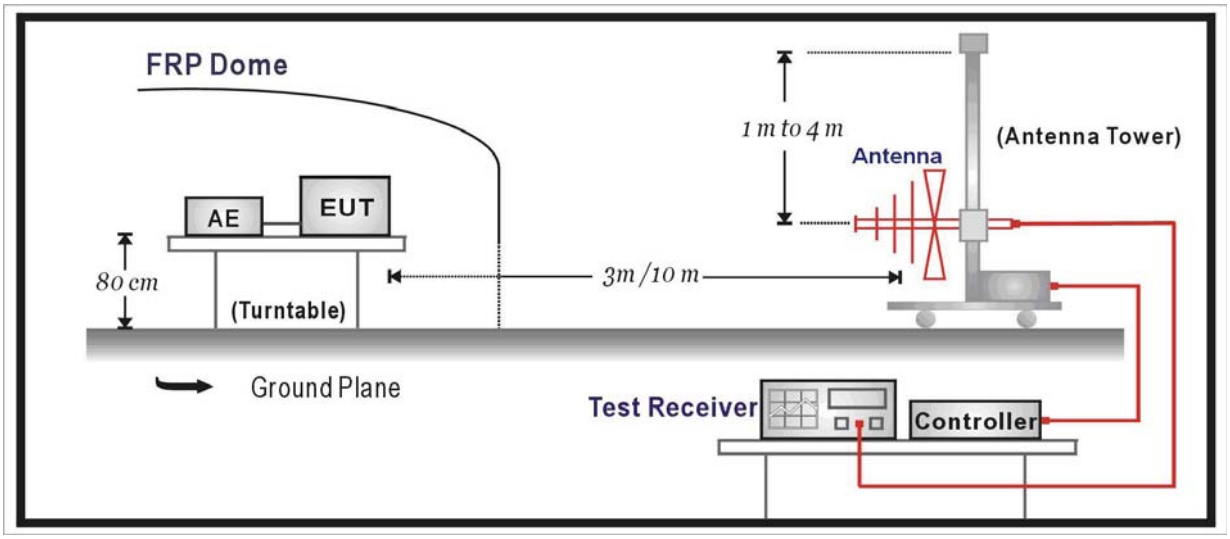
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ⩾ 1/T (Duty cycle < 98%) or 10Hz(Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.
5. The testing of the EUT was performed on all 3 orthogonal axes; the worst-case test configuration was reported on the file test setup photo.
6. For the test results, the EUT had been tested with all conditions. But only the worst case (MIMO Mode) was shown in test report.

3.2.3 Test setup

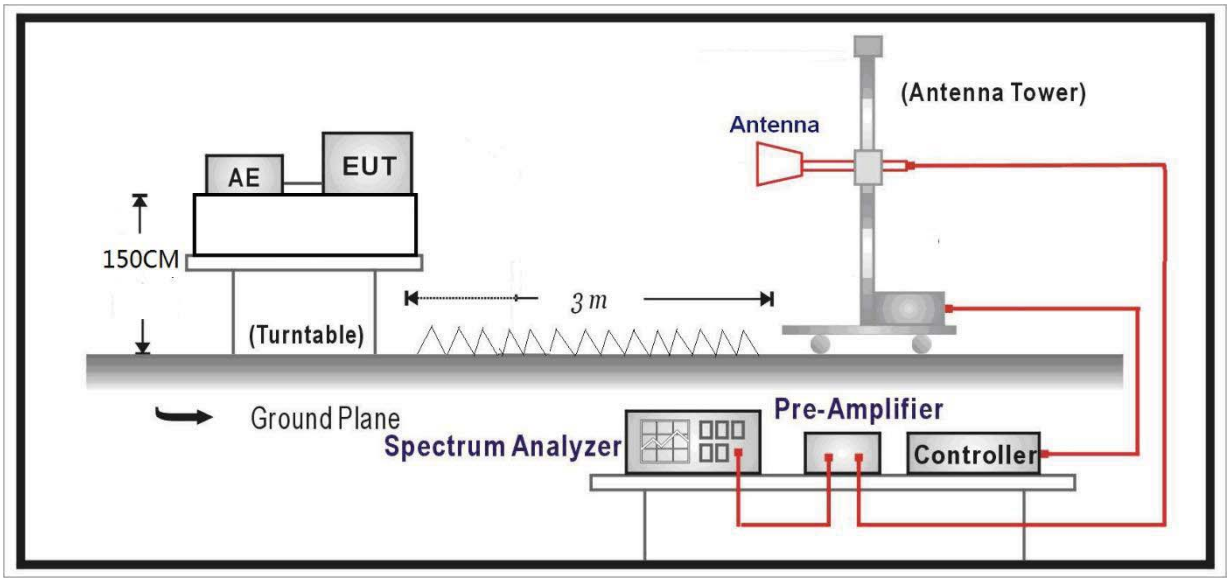
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



3.2.4 Test results

Please refer Annex B

3.3 TRANSMIT POWER MEASUREMENT

3.3.1 Limits

OPERATION BAND	EUT CATEGORY		LIMIT
U-NII-1	-	Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p ≦ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
	-	Fixed point-to-point Access Point	1 Watt (30 dBm)
		Indoor Access Point	1 Watt (30 dBm)
	√	Mobile and Portable client device	250mW (24 dBm)
U-NII-2A	-		250mW(24dBm) or 11 dBm+10LogB*
U-NII-2C	-		250mW(24dBm) or 11 dBm+10LogB*
U-NII-3	√		1 Watt (30 dBm)
NOTE: 1. Where B is the 26dB emission bandwidth in MHz			

3.3.2 Measurement procedure

FOR AVERAGE POWER MEASUREMENT

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

FOR 26dB BANDWIDTH

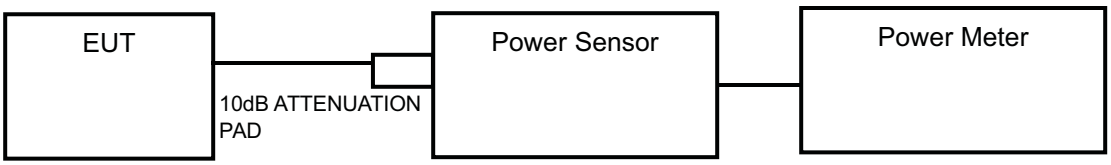
a. Set RBW = approximately 1% of the emission bandwidth.
b. Set the VBW > RBW.
c. Detector = RMS.
d. Trace mode = max hold.
e. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement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

FOR 6dB BANDWIDTH

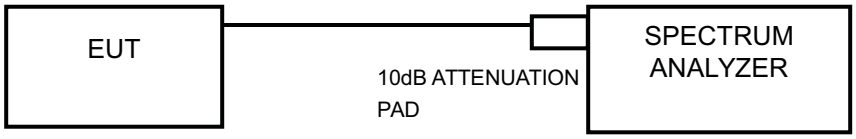
a. Set RBW = 100 kHz.
b. Set the video bandwidth (VBW) ≥ 3 RBW.
c. Detector = Peak.
d. Trace mode = max hold.
e. Sweep = auto couple.
f. Allow the trace to stabilize.
g. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points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

3.3.3 Test setup

FOR AVERAGE POWER MEASUREMENT



FOR 6/26dB BANDWIDTH



3.3.4 Test result

Refer to Appendix B for data on Average power, 6dB bandwidth, 26dB bandwidth and duty cycle.

3.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT

3.4.1 Limits

OPERATION BAND	EUT CATEGORY		LIMIT
U-NII-1	-	Outdoor Access Point	17dBm/ MHz
	-	Fixed point-to-point Access Point	
	-	Indoor Access Point	
	√	11dBm/ MHz	250mW (24 dBm)
U-NII-2A	-		11dBm/ MHz
U-NII-2C	-		11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

3.4.2 Measurement procedure

For U-NII-1, U-NII-2A, U-NII-2C band:

Using method SA-2

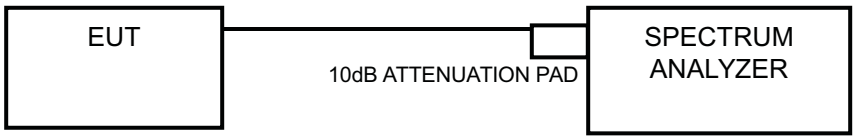
a. Set span to encompass the entire emission bandwidth (EBW) of the signal.
b. Set RBW = 1MHz, Set VBW =3 MHz, Detector = RMS
c. Set Channel power measure = 1MHz
d. Sweep time = auto, trigger set to “free run”.
e. Trace average at least 100 traces in power averaging mode.
f. Record the max value and add 10 log (1/duty cycle)

For U-NII-3 band:

Using method SA-2

a. Set span to encompass the entire emission bandwidth (EBW) of the signal.
b. Set RBW = 300 kHz, Set VBW =1 MHz, Detector = RMS
c. Set Channel power measure = 1MHz
d. Sweep time = auto, trigger set to “free run”.
e. Trace average at least 100 traces in power averaging mode.
f. Record the max value and add 10 log (1/duty cycle)

3.4.3 Test setup



3.4.4 Test result

Please refer Annex B

3.5 FREQUENCY STABILITY

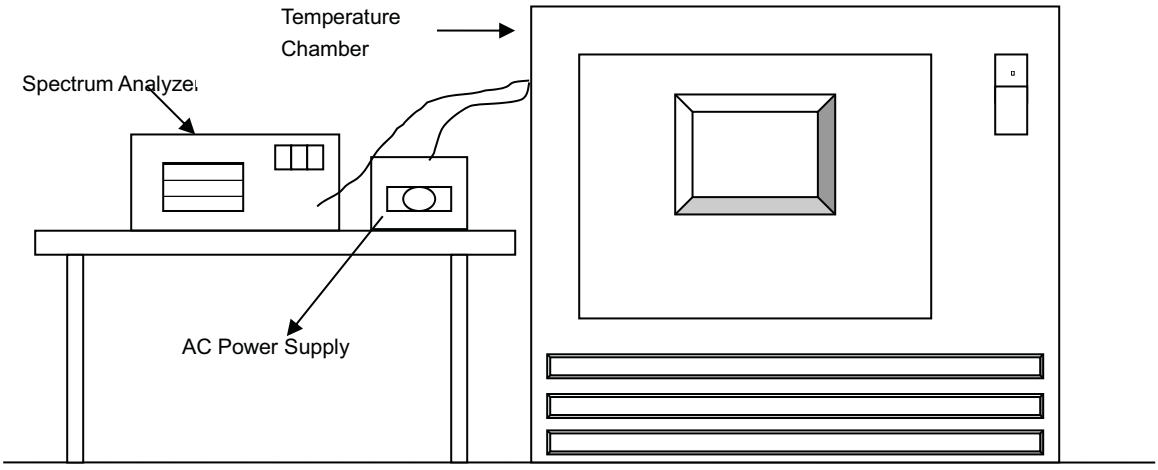
3.5.1 Limits

The frequency of the carrier signal shall be maintained within band of operation.

3.5.2 Measurement procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
b. Turn the EUT on and couple its output to a spectrum analyzer.
c. Turn the EUT off and set the chamber to the highest temperature specified.
d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

3.5.3 Test setup



3.5.4 Test result

Please refer Annex B

4 PHOTOGRAPHS OF TEST SETUP

Please refer to the attached file (Test Setup Photo).

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5 Appendix A Test Results

Please refer to the following pages for test results.

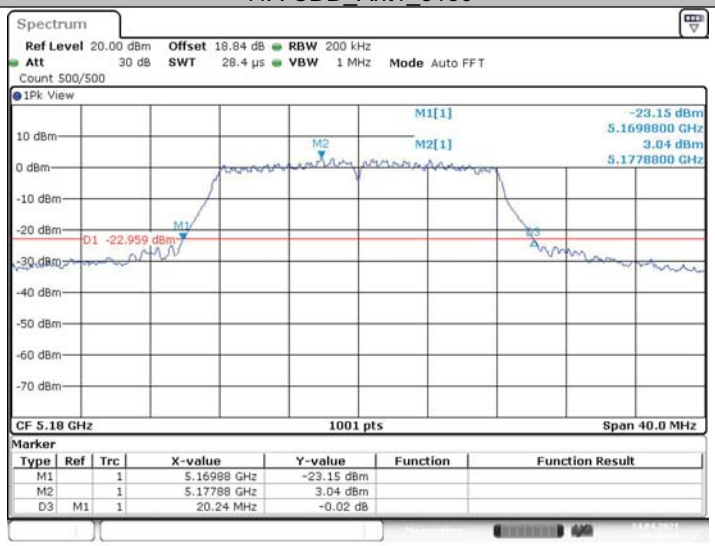
5.1 Emission Bandwidth

5.1.1 Test Result

TestMode	Antenna	Channel	26db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A-CDD	Ant1	5180	20.240	5169.880	5190.120	---	PASS
	Ant2	5180	20.320	5169.760	5190.080	---	PASS
	Ant1	5200	20.280	5189.680	5209.960	---	PASS
	Ant2	5200	20.280	5189.840	5210.120	---	PASS
	Ant1	5240	20.280	5229.760	5250.040	---	PASS
	Ant2	5240	20.240	5229.840	5250.080	---	PASS
	Ant1	5745	32.360	5728.320	5760.680	---	PASS
	Ant2	5745	20.280	5734.960	5755.240	---	PASS
	Ant1	5785	25.520	5772.120	5797.640	---	PASS
	Ant2	5785	25.040	5772.680	5797.720	---	PASS
	Ant1	5825	29.880	5810.160	5840.040	---	PASS
	Ant2	5825	28.920	5809.920	5838.840	---	PASS
11N20MIMO	Ant1	5180	20.440	5169.800	5190.240	---	PASS
	Ant2	5180	20.280	5169.880	5190.160	---	PASS
	Ant1	5200	20.440	5189.680	5210.120	---	PASS
	Ant2	5200	20.760	5189.800	5210.560	---	PASS
	Ant1	5240	20.640	5229.600	5250.240	---	PASS
	Ant2	5240	20.680	5229.560	5250.240	---	PASS
	Ant1	5745	20.760	5734.680	5755.440	---	PASS
	Ant2	5745	23.640	5733.040	5756.680	---	PASS
	Ant1	5785	21.280	5774.040	5795.320	---	PASS
	Ant2	5785	22.760	5772.720	5795.480	---	PASS
	Ant1	5825	28.840	5811.000	5839.840	---	PASS
	Ant2	5825	29.920	5810.080	5840.000	---	PASS
11N40MIMO	Ant1	5190	41.680	5169.040	5210.720	---	PASS
	Ant2	5190	41.280	5169.280	5210.560	---	PASS
	Ant1	5230	41.280	5209.280	5250.560	---	PASS
	Ant2	5230	43.120	5208.960	5252.080	---	PASS
	Ant1	5755	52.880	5725.320	5778.200	---	PASS
	Ant2	5755	61.440	5721.080	5782.520	---	PASS
	Ant1	5795	51.440	5765.880	5817.320	---	PASS
	Ant2	5795	61.520	5761.320	5822.840	---	PASS
11AC80MIMO	Ant1	5210	97.920	5168.880	5266.800	---	PASS
	Ant2	5210	159.200	5130.800	5290.000	---	PASS
	Ant1	5775	116.640	5713.720	5830.360	---	PASS
	Ant2	5775	138.080	5695.000	5833.080	---	PASS

5.1.2 Test Graphs

11A-CDD_Ant1_5180



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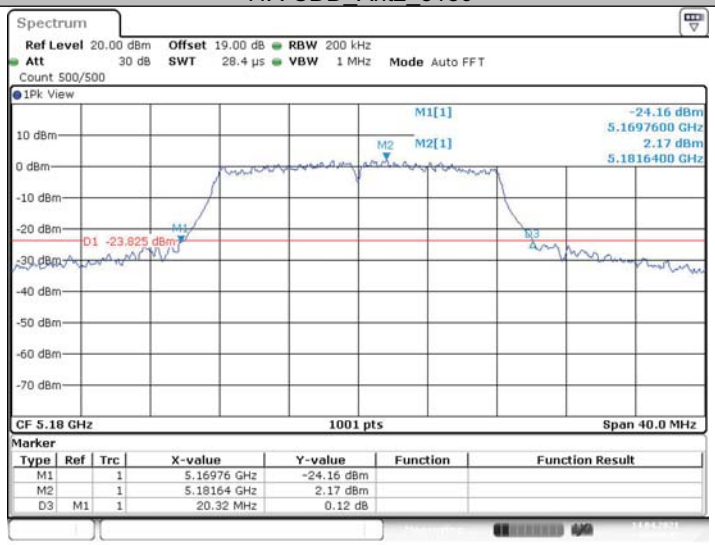

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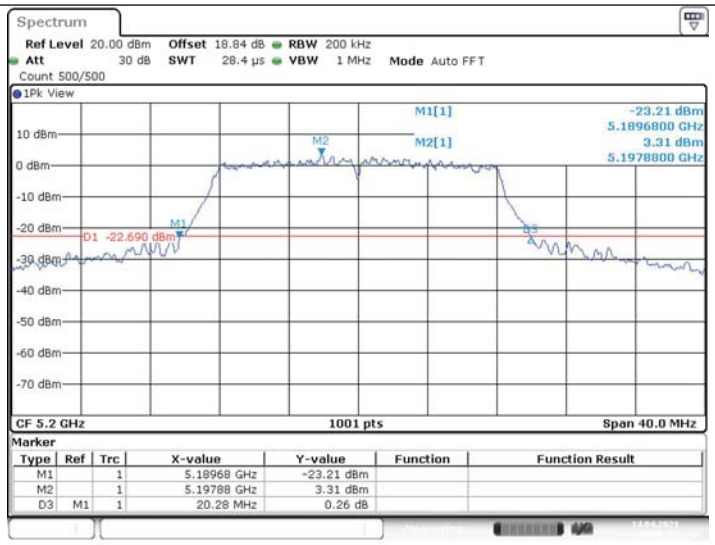

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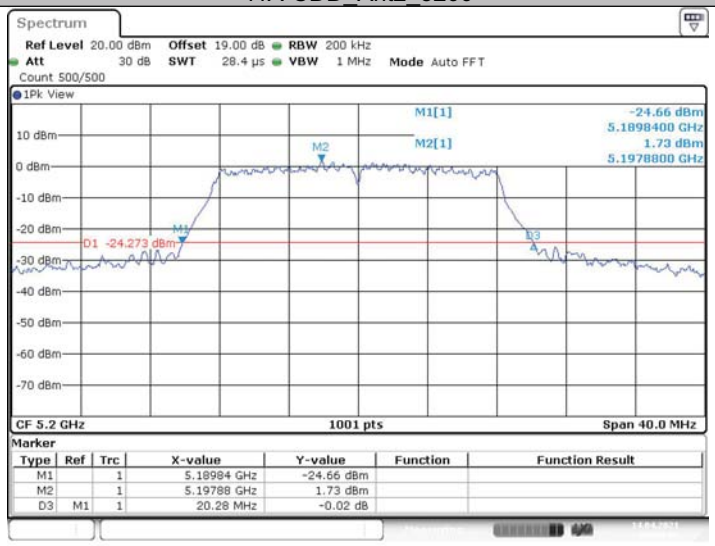

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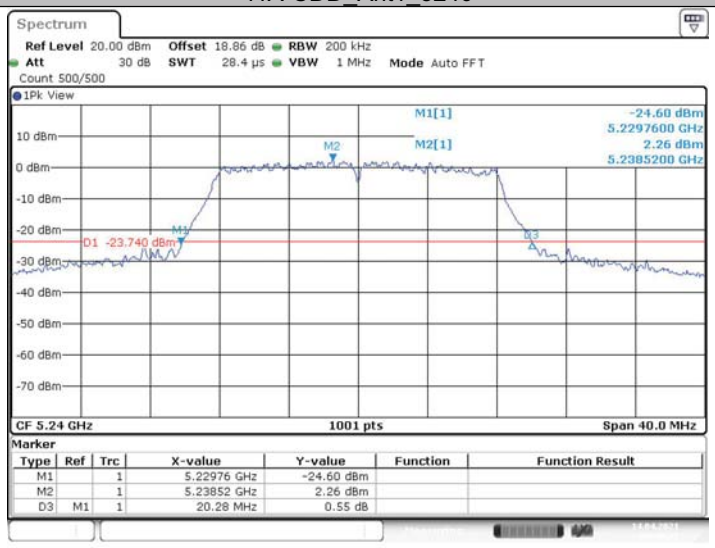

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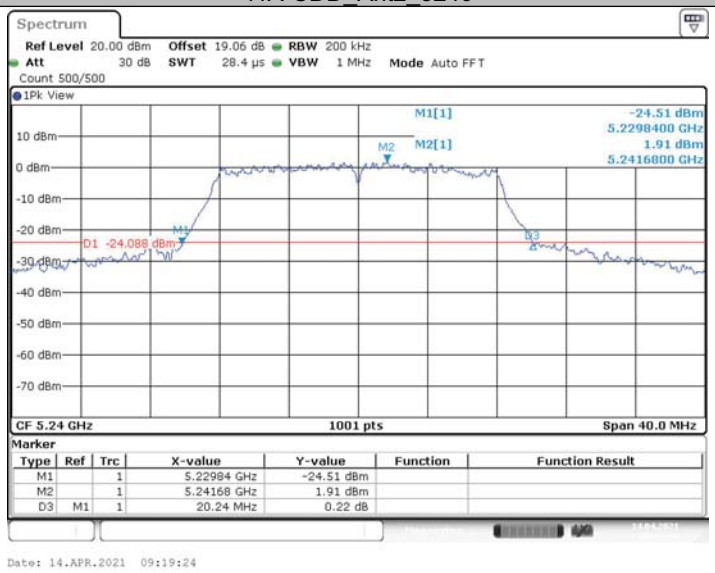

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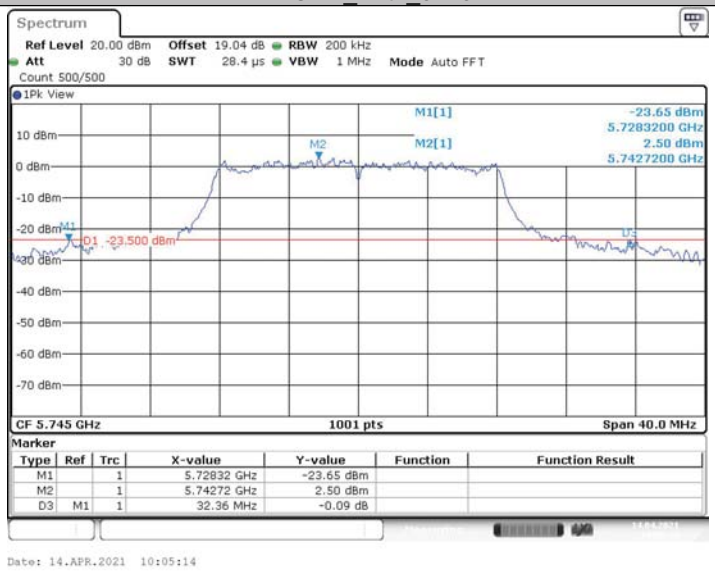

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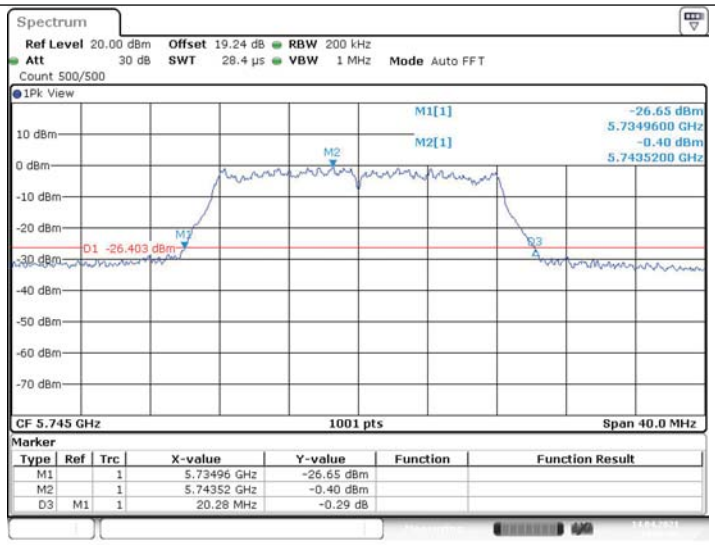

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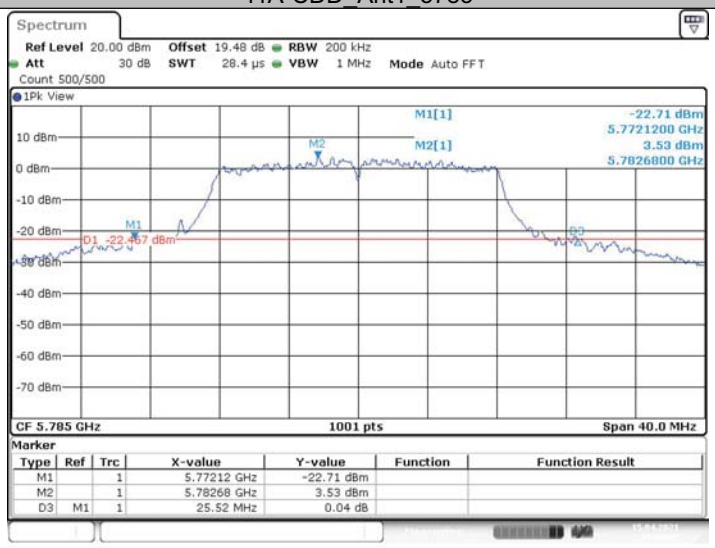

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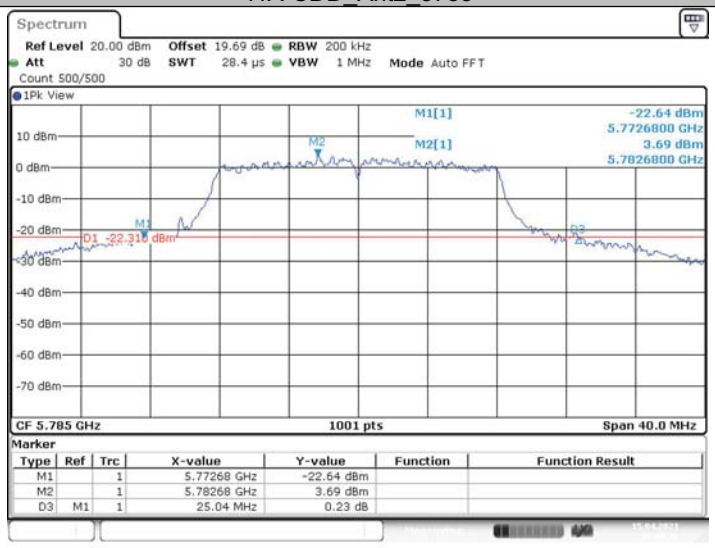

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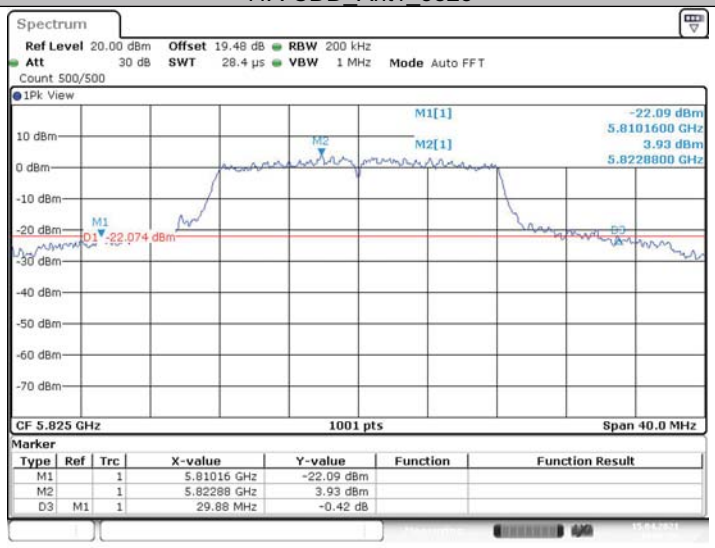

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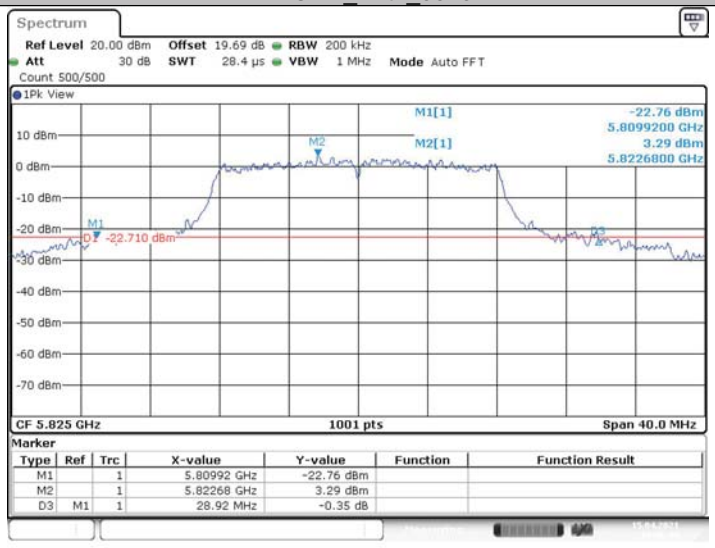

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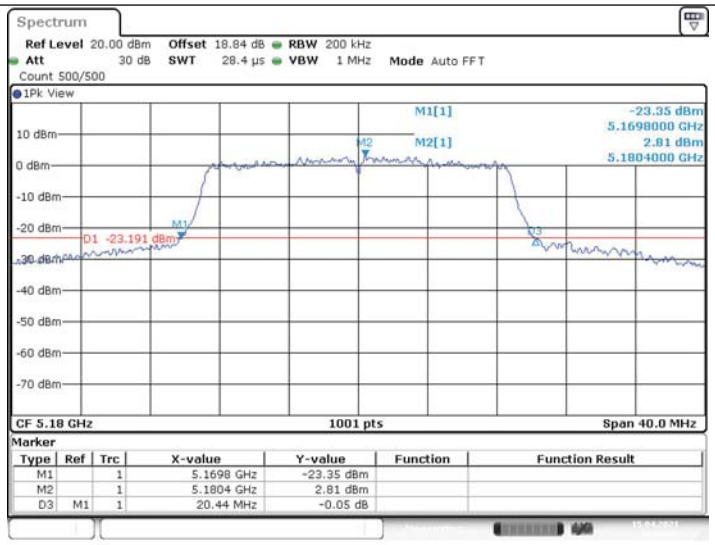

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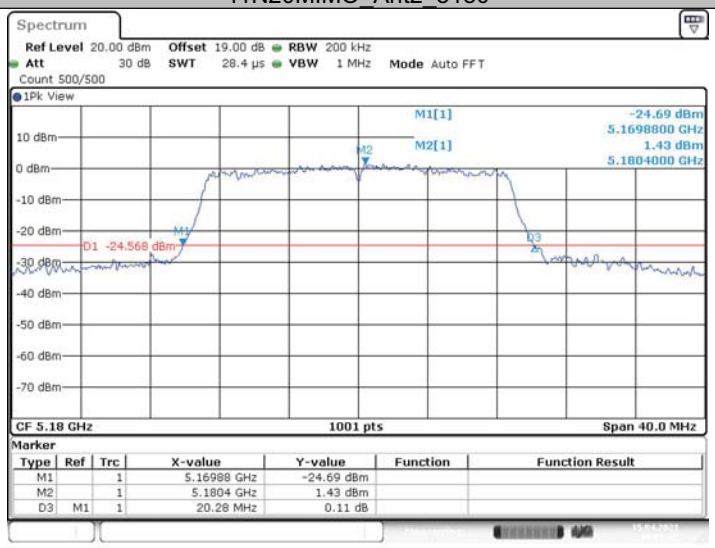

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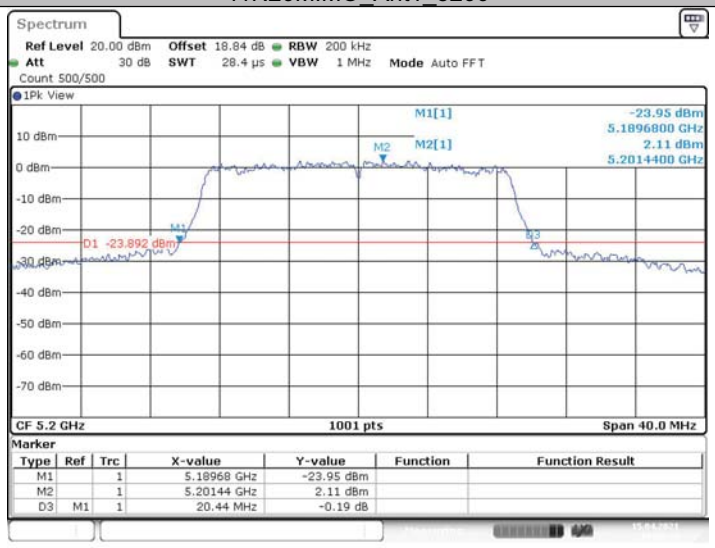

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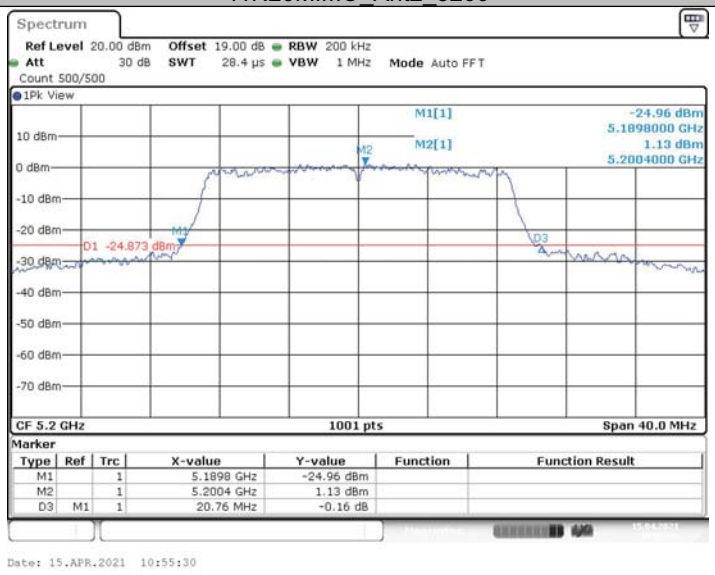

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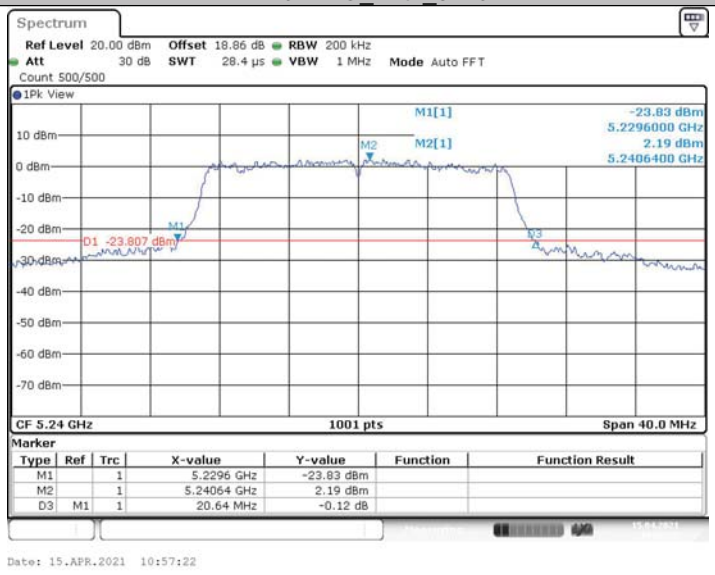

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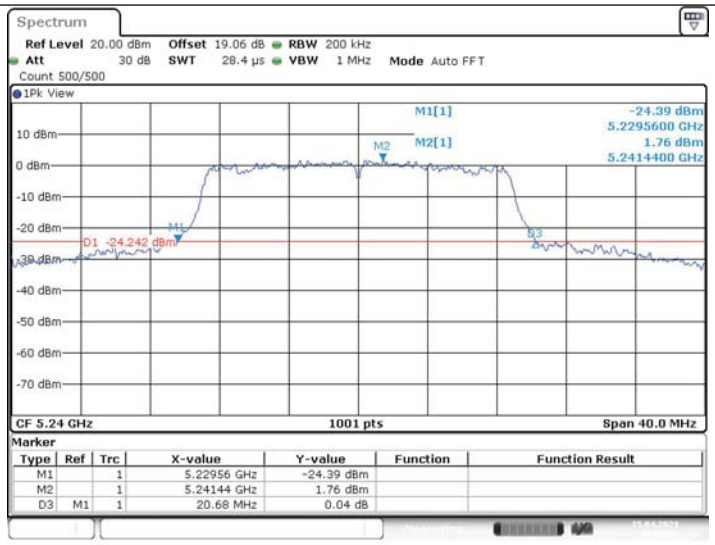

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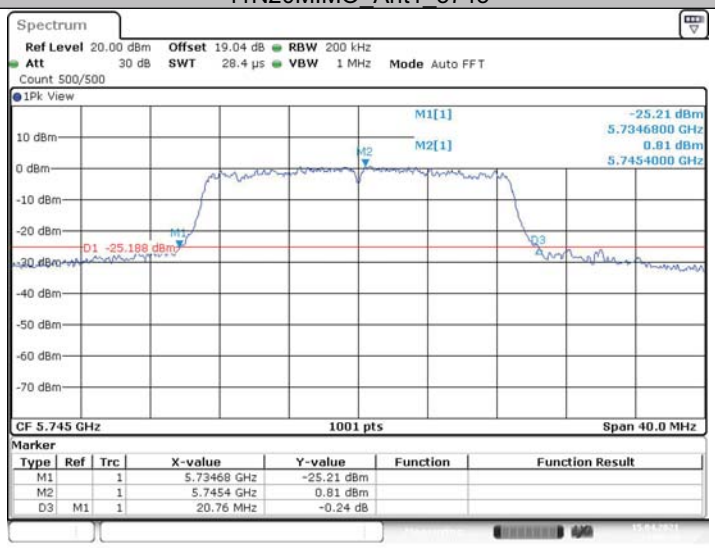

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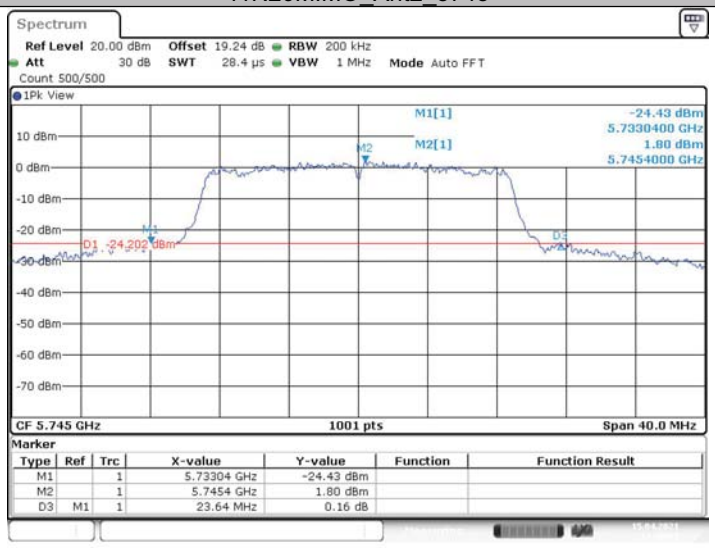

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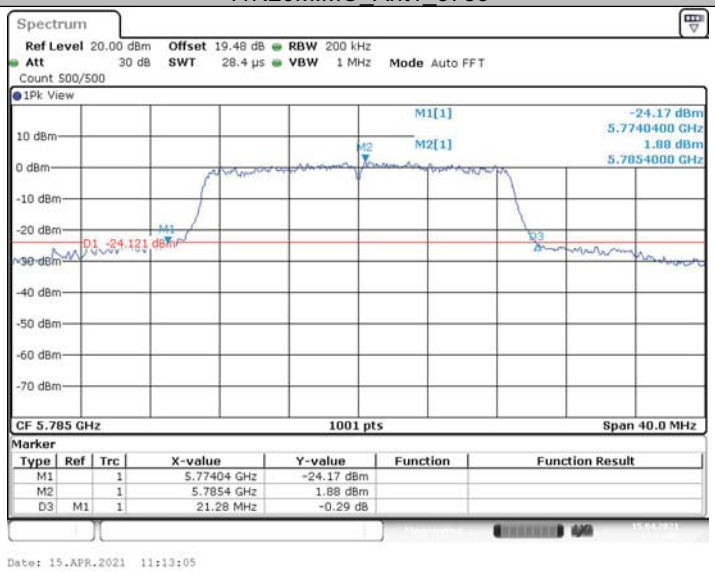

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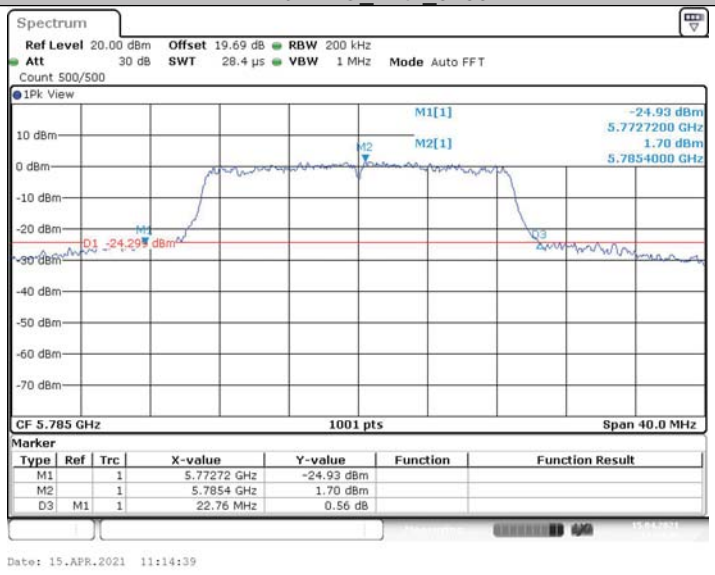

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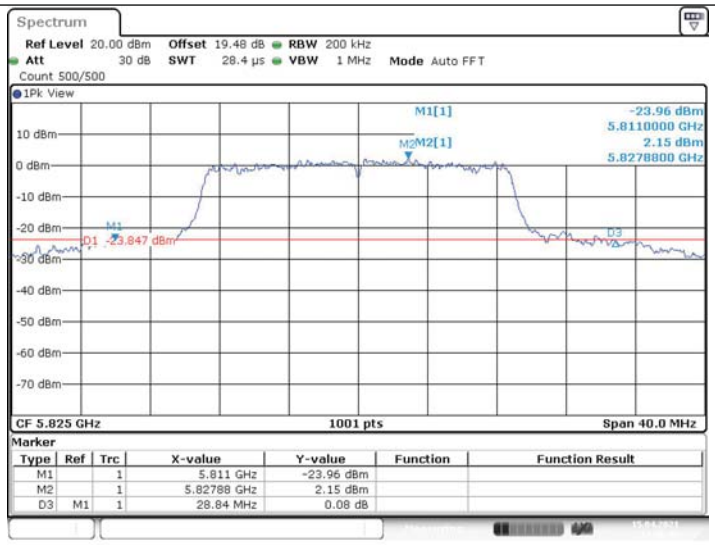

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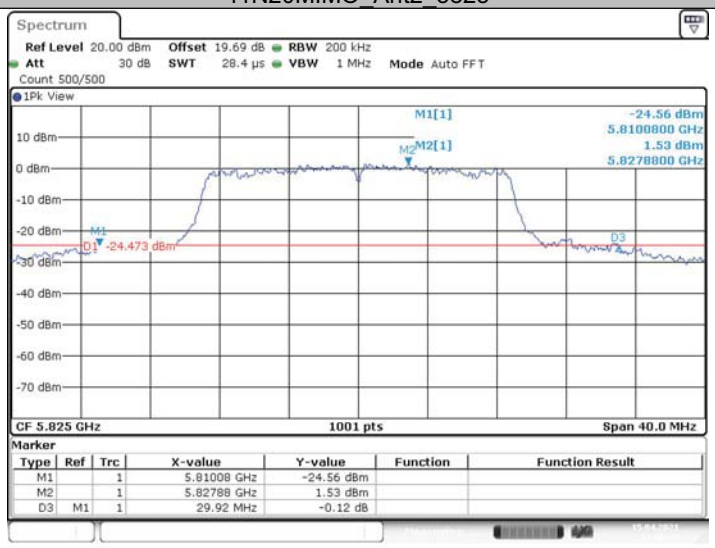

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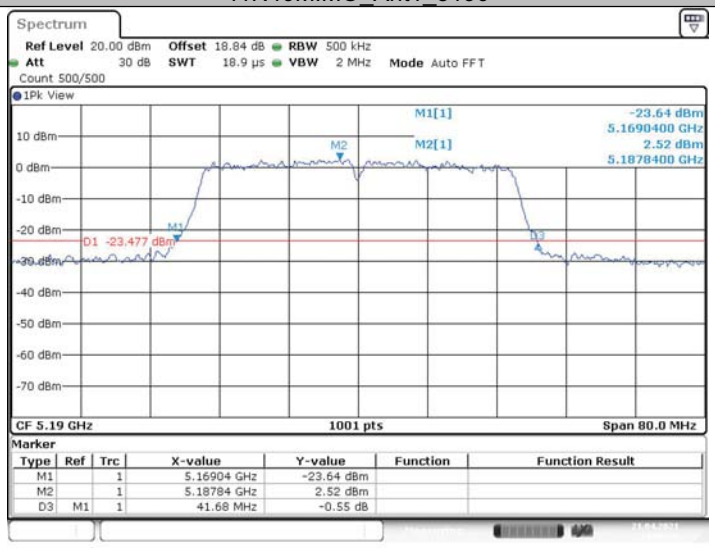

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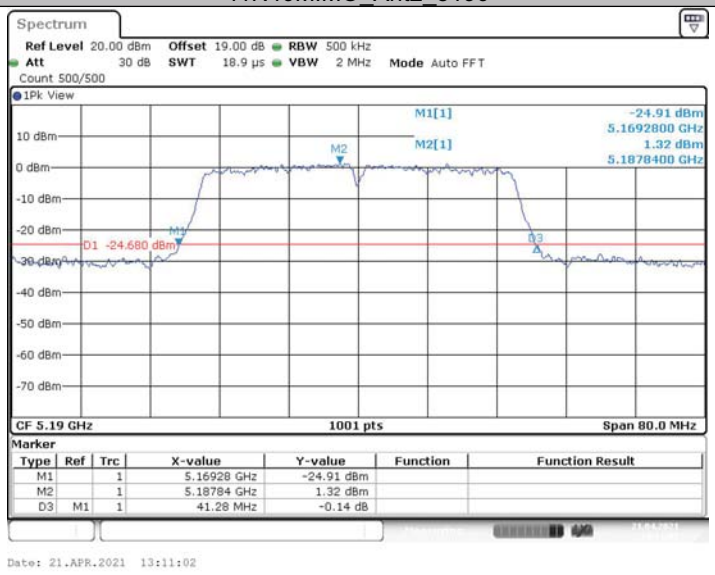

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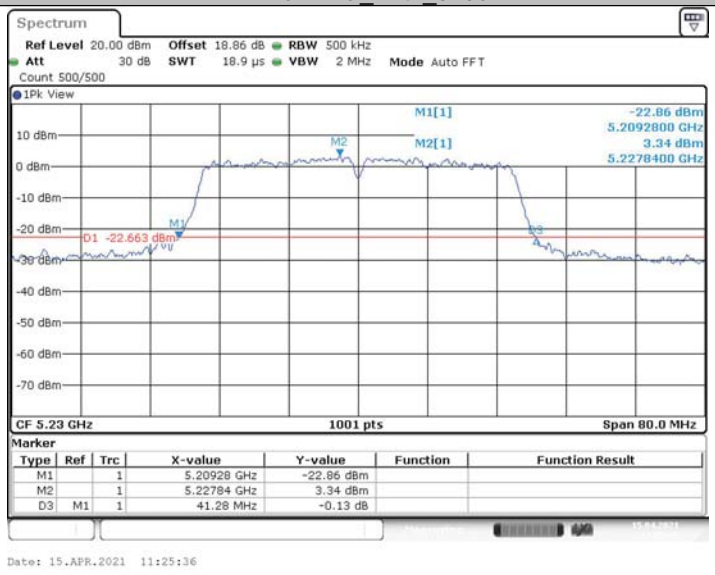

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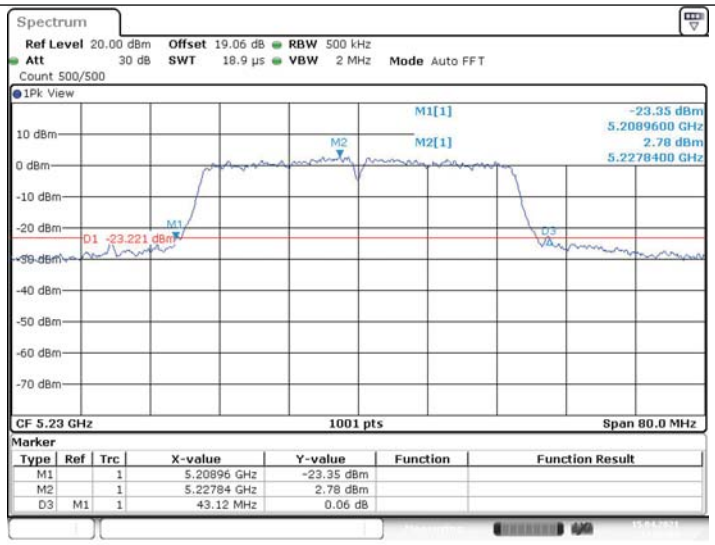

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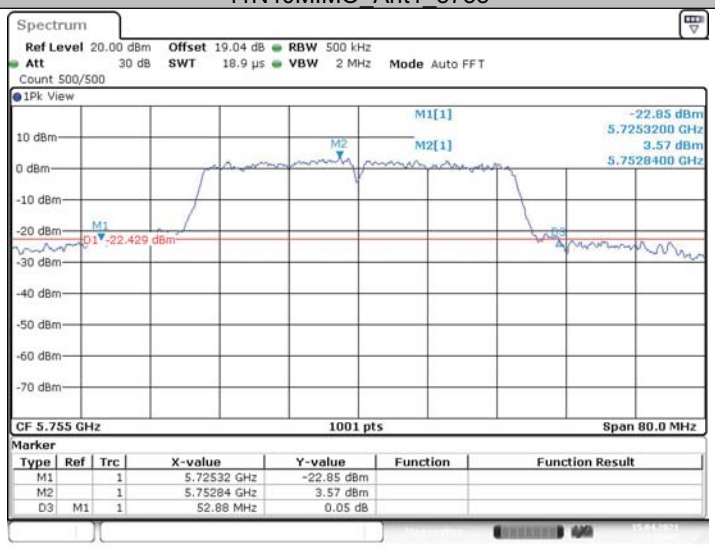

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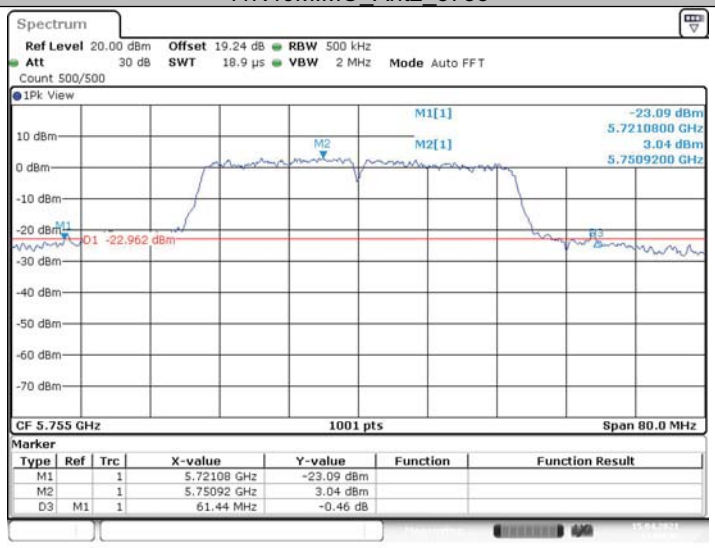

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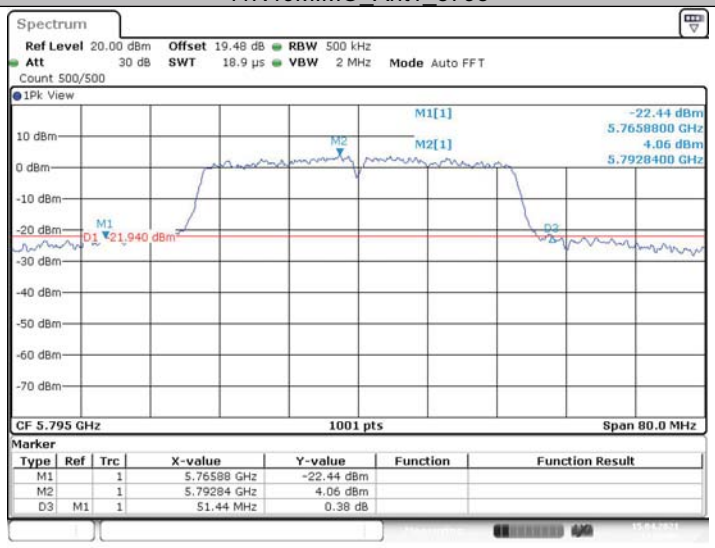
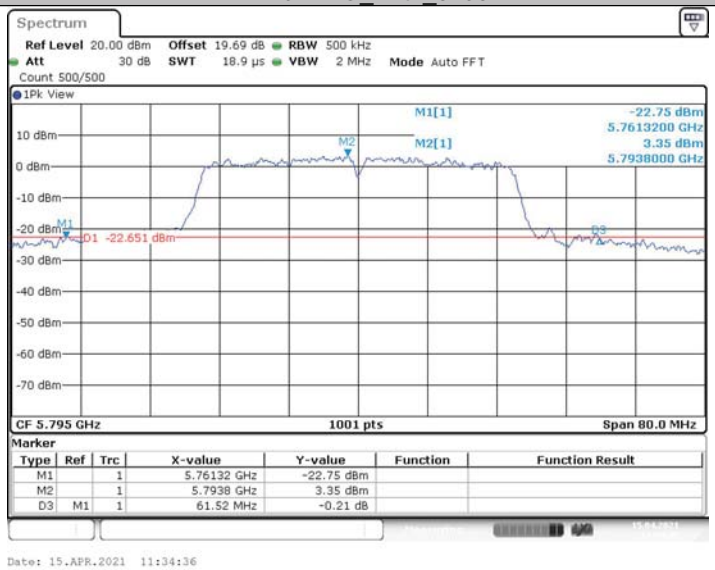


11N40MIMO_Ant2_5795



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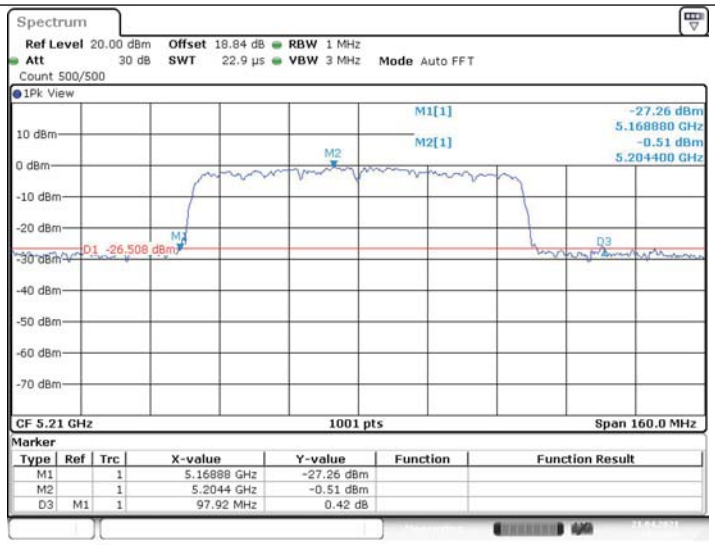

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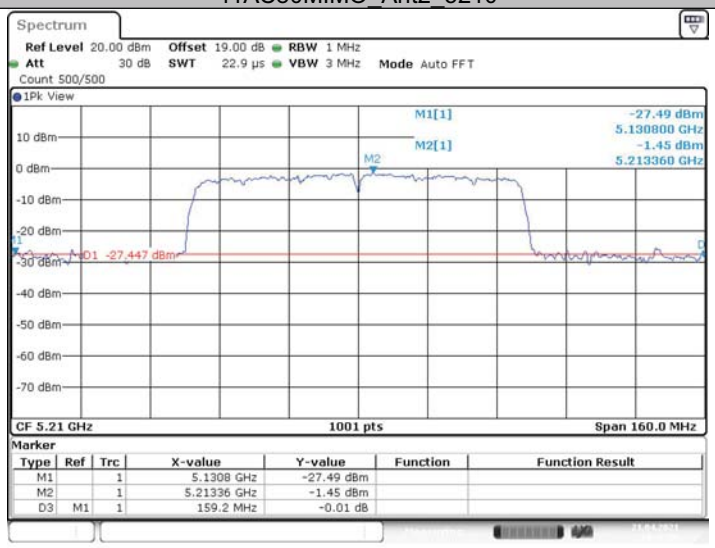
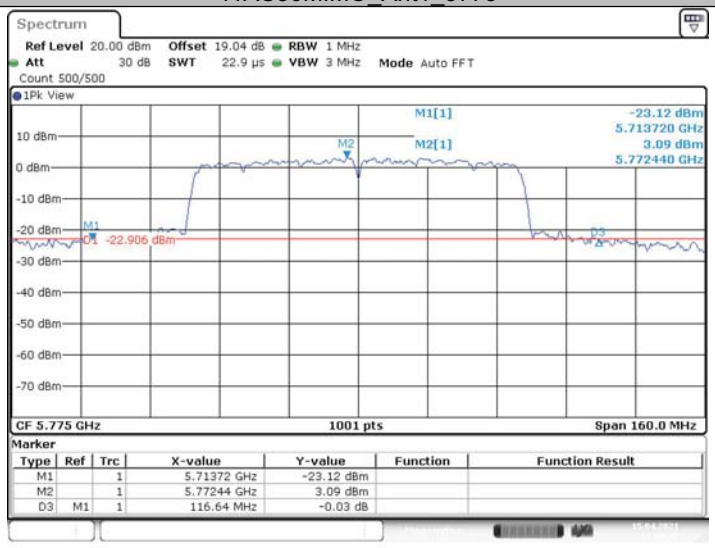
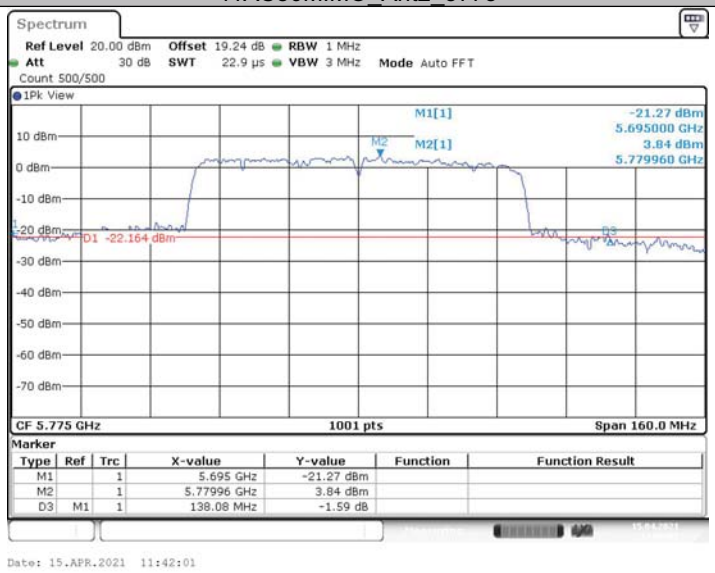


11AC80MIMO_Ant1_5775



11AC80MIMO_Ant2_5775



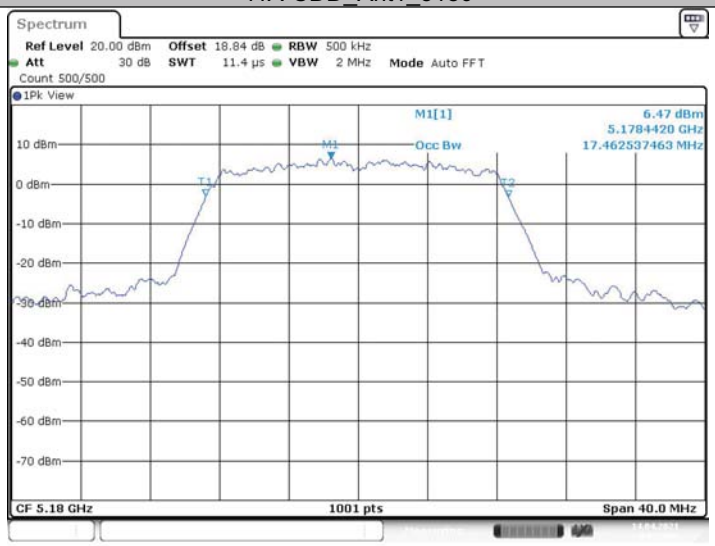
5.2 Occupied channel bandwidth

5.2.1 Test Result

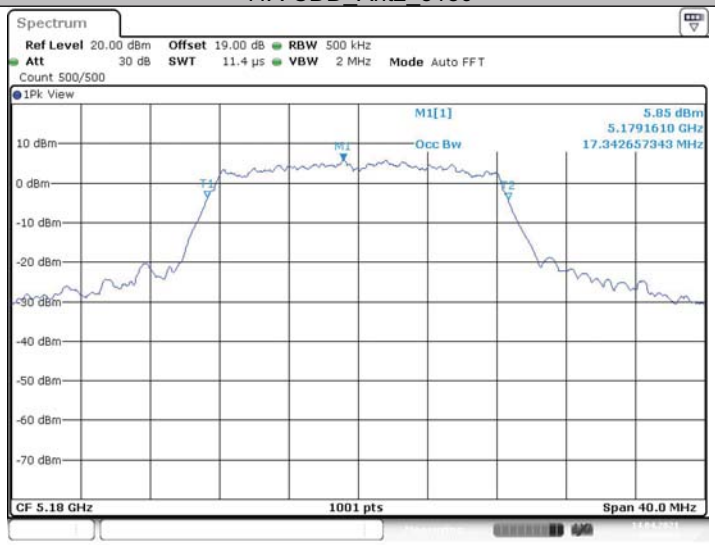
TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A-CDD	Ant1	5180	17.463	5171.209	5188.671	---	PASS
	Ant2	5180	17.343	5171.289	5188.631	---	PASS
	Ant1	5200	17.582	5191.089	5208.671	---	PASS
	Ant2	5200	17.463	5191.129	5208.591	---	PASS
	Ant1	5240	17.383	5231.129	5248.511	---	PASS
	Ant2	5240	17.383	5231.129	5248.511	---	PASS
	Ant1	5745	17.702	5736.129	5753.831	---	PASS
	Ant2	5745	17.423	5736.289	5753.711	---	PASS
	Ant1	5785	17.702	5776.089	5793.791	---	PASS
	Ant2	5785	17.702	5776.049	5793.751	---	PASS
	Ant1	5825	17.782	5816.089	5833.871	---	PASS
	Ant2	5825	17.782	5816.089	5833.871	---	PASS
11N20MIMO	Ant1	5180	17.942	5171.009	5188.951	---	PASS
	Ant2	5180	17.902	5171.049	5188.951	---	PASS
	Ant1	5200	18.022	5190.969	5208.991	---	PASS
	Ant2	5200	17.982	5190.969	5208.951	---	PASS
	Ant1	5240	17.942	5230.929	5248.871	---	PASS
	Ant2	5240	18.102	5230.929	5249.031	---	PASS
	Ant1	5745	17.942	5736.009	5753.951	---	PASS
	Ant2	5745	18.062	5735.929	5753.991	---	PASS
	Ant1	5785	18.062	5775.969	5794.031	---	PASS
	Ant2	5785	17.982	5776.009	5793.991	---	PASS
	Ant1	5825	18.262	5815.889	5834.151	---	PASS
	Ant2	5825	18.182	5815.889	5834.071	---	PASS
11N40MIMO	Ant1	5190	36.204	5171.858	5208.062	---	PASS
	Ant2	5190	36.204	5171.938	5208.142	---	PASS
	Ant1	5230	36.204	5211.858	5248.062	---	PASS
	Ant2	5230	36.444	5211.778	5248.222	---	PASS
	Ant1	5755	36.763	5736.538	5773.302	---	PASS
	Ant2	5755	36.603	5736.618	5773.222	---	PASS
	Ant1	5795	36.603	5776.778	5813.382	---	PASS
	Ant2	5795	36.523	5776.698	5813.222	---	PASS
11AC80MIMO	Ant1	5210	75.285	5172.278	5247.562	---	PASS
	Ant2	5210	75.445	5172.438	5247.882	---	PASS
	Ant1	5775	75.604	5737.118	5812.722	---	PASS
	Ant2	5775	76.084	5736.638	5812.722	---	PASS

5.2.2 Test Graphs

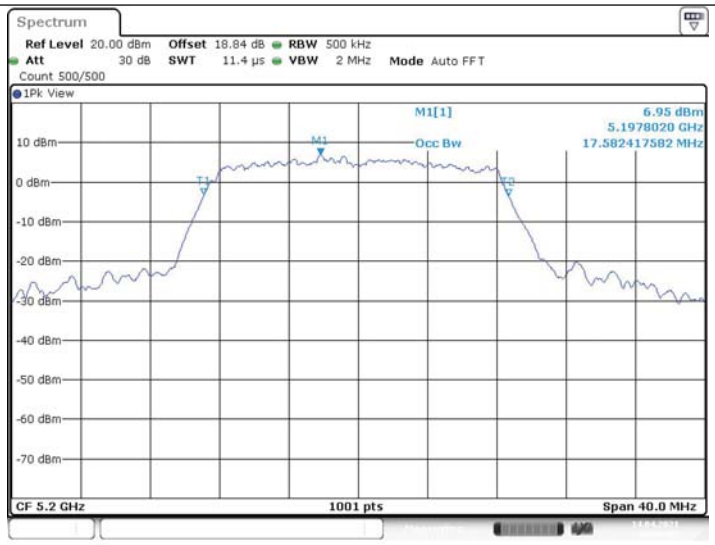
11A-CDD_Ant1_5180



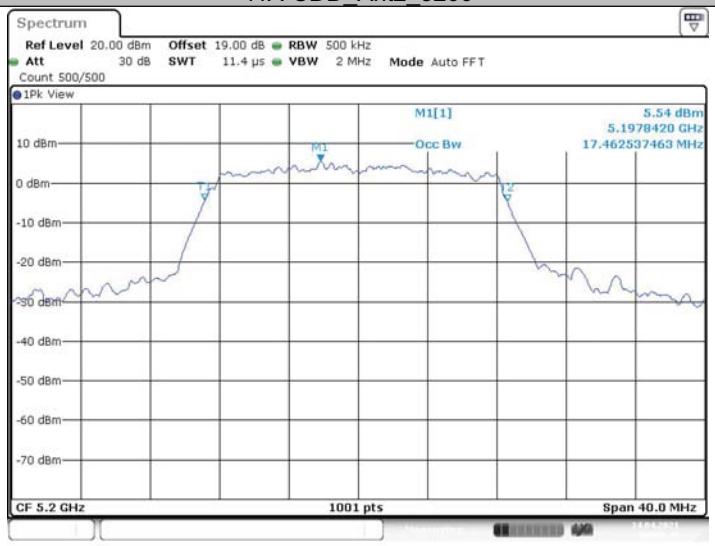
11A-CDD_Ant2_5180



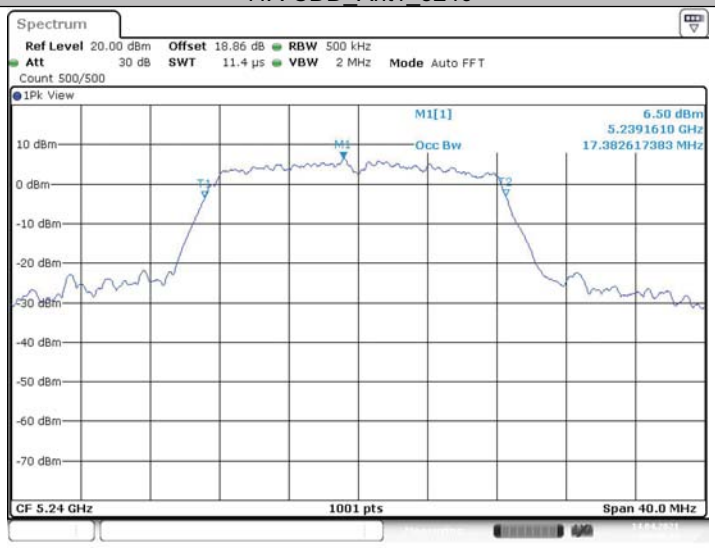
11A-CDD_Ant1_5200



11A-CDD_Ant2_5200

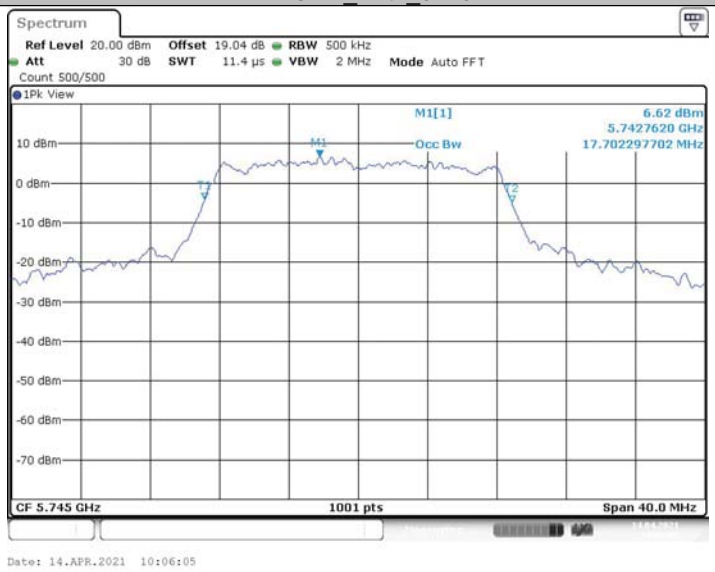


11A-CDD_Ant1_5240

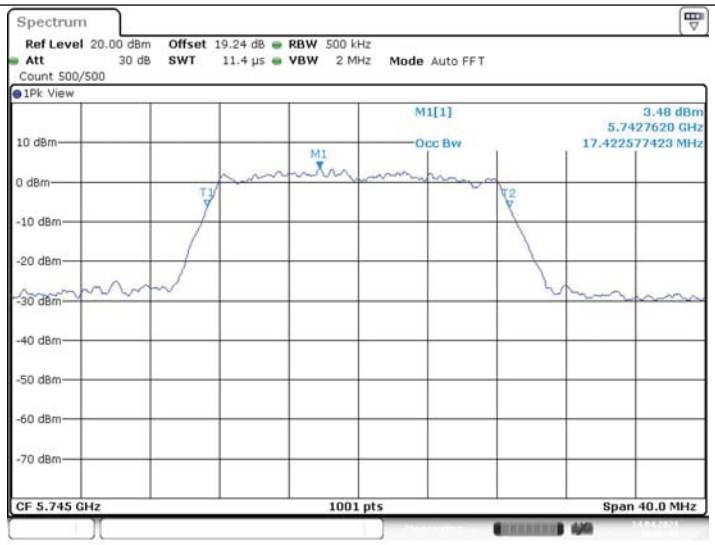


11A-CDD_Ant2_5240

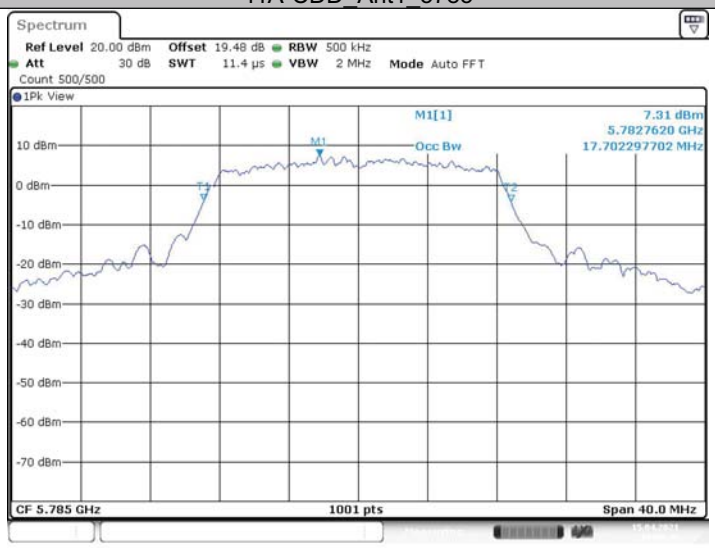
11A-CDD_Ant1_5745



11A-CDD_Ant2_5745



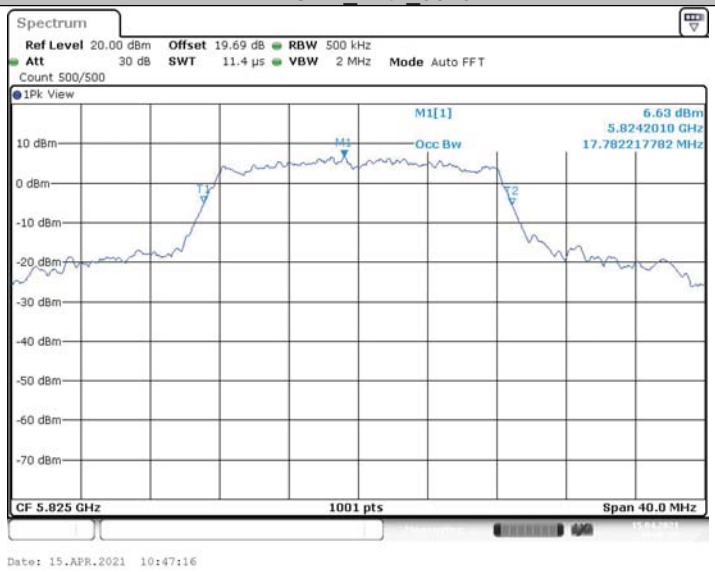
11A-CDD_Ant1_5785



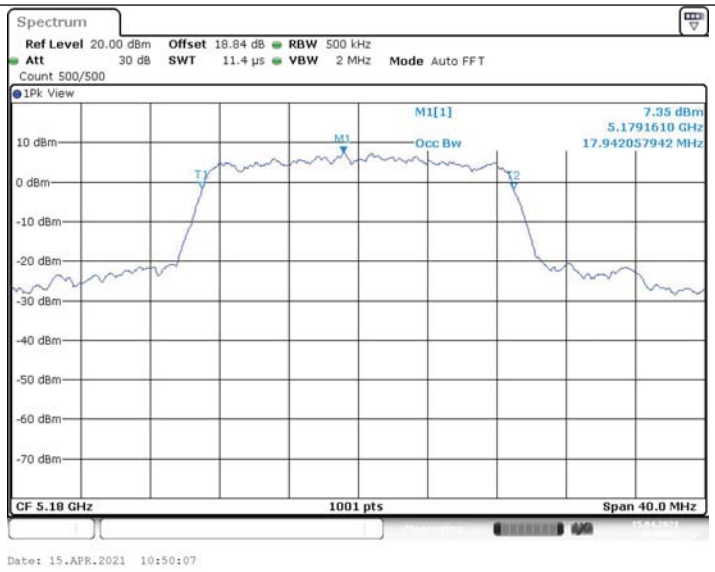
11A-CDD_Ant2_5785

11A-CDD_Ant1_5825

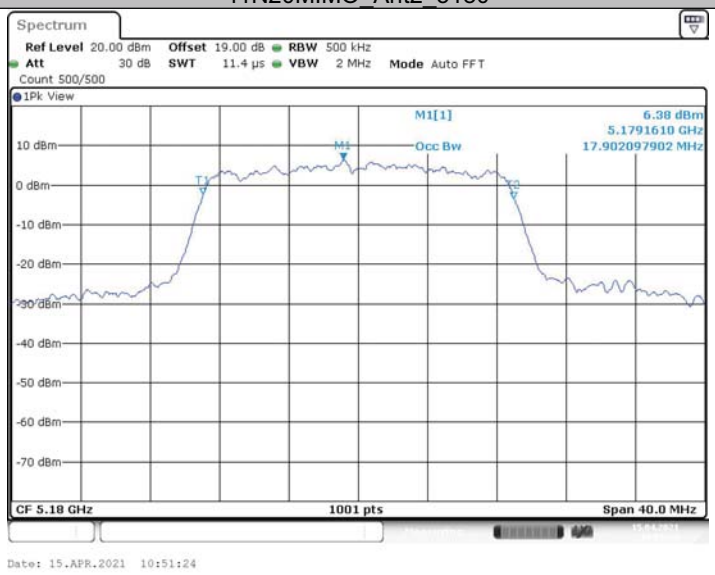
11A-CDD_Ant2_5825



11N20MIMO_Ant1_5180

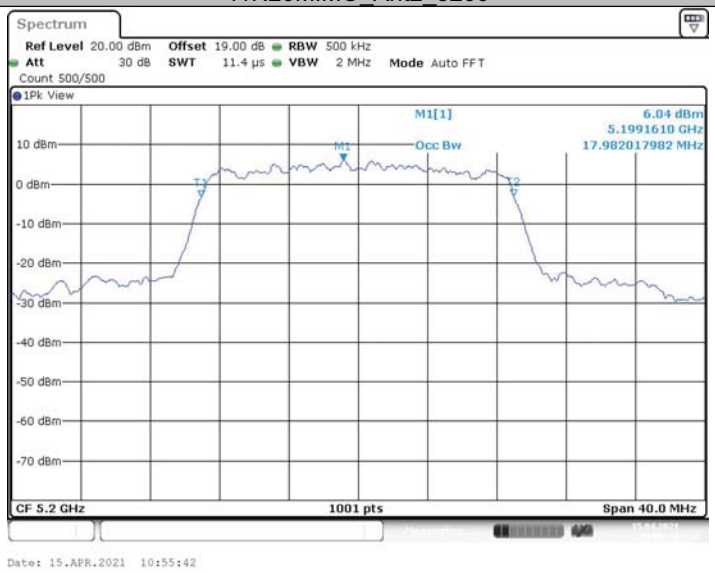


11N20MIMO_Ant2_5180



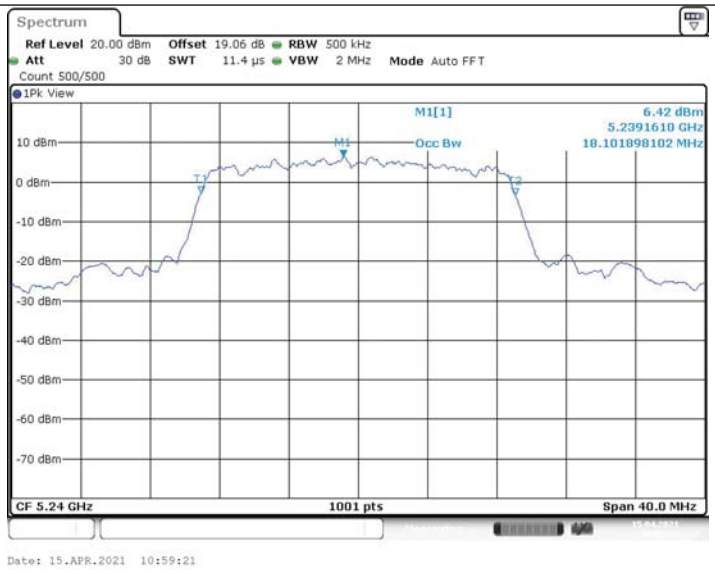
11N20MIMO_Ant1_5200

11N20MIMO_Ant2_5200

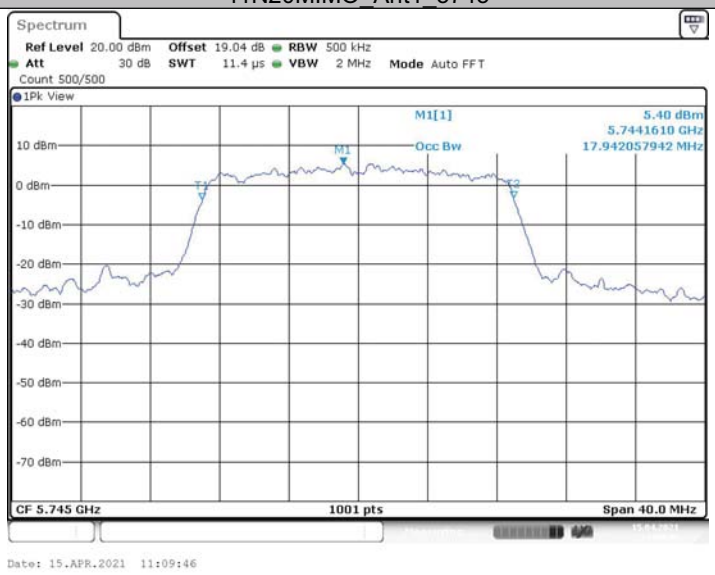


11N20MIMO_Ant1_5240

11N20MIMO_Ant2_5240

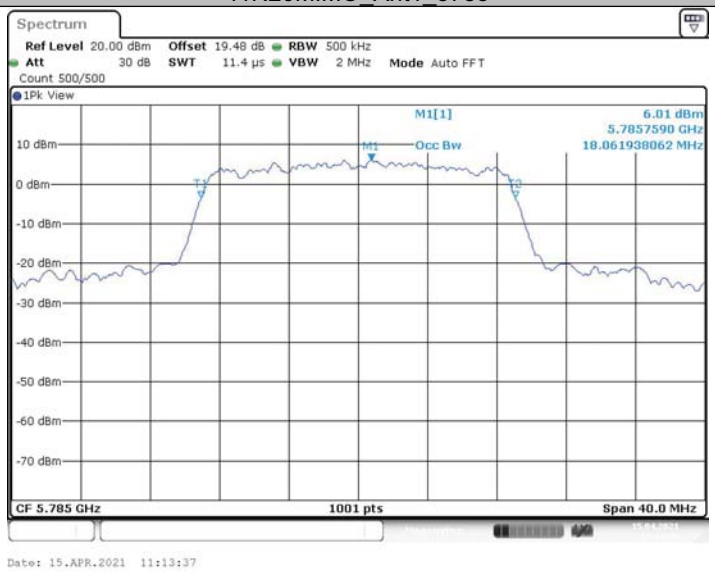


11N20MIMO_Ant1_5745



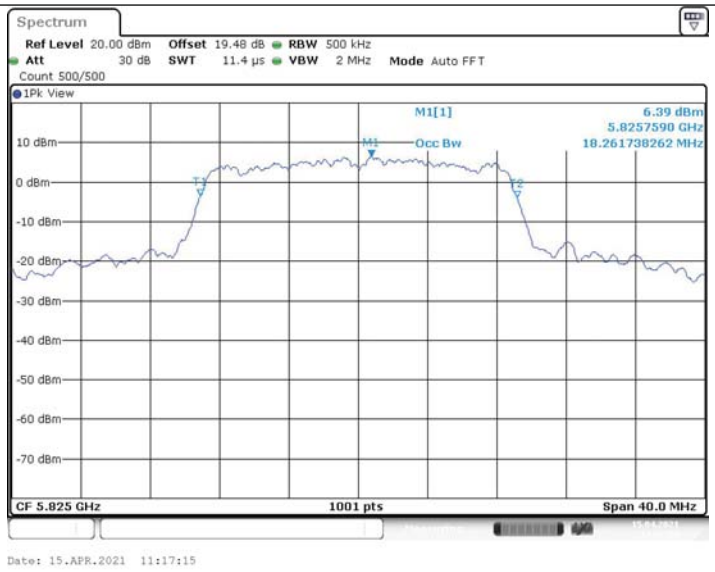
11N20MIMO_Ant2_5745

11N20MIMO_Ant1_5785

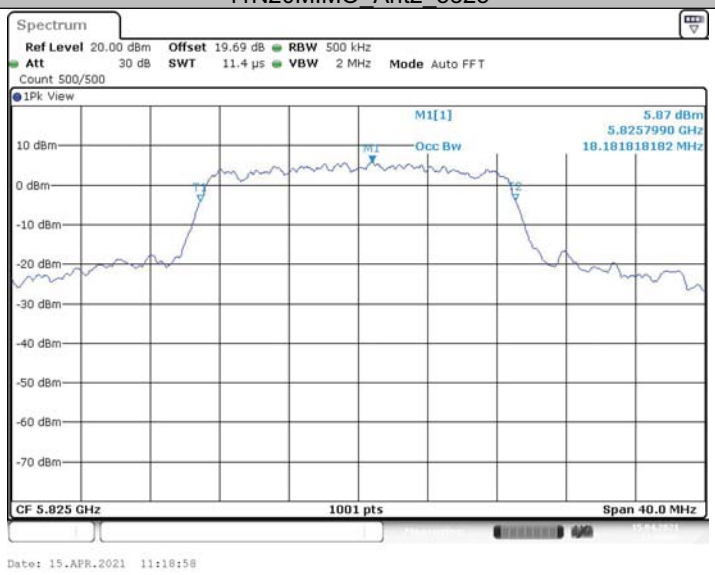


11N20MIMO_Ant2_5785

11N20MIMO_Ant1_5825

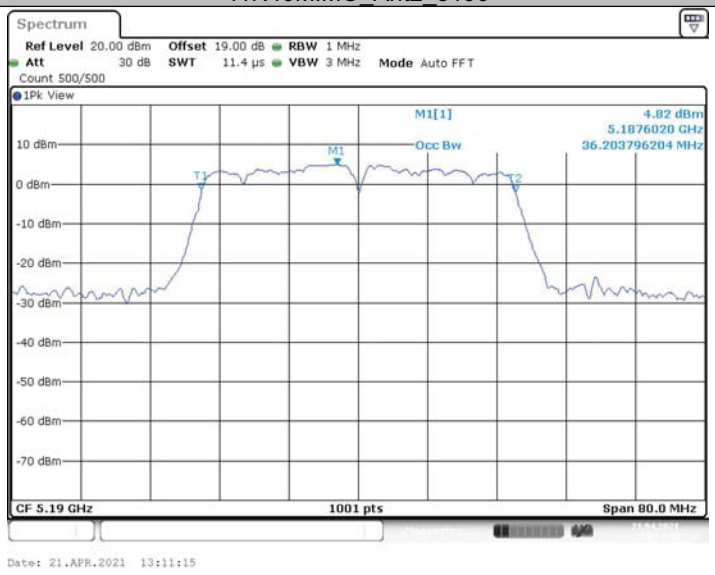


11N20MIMO_Ant2_5825

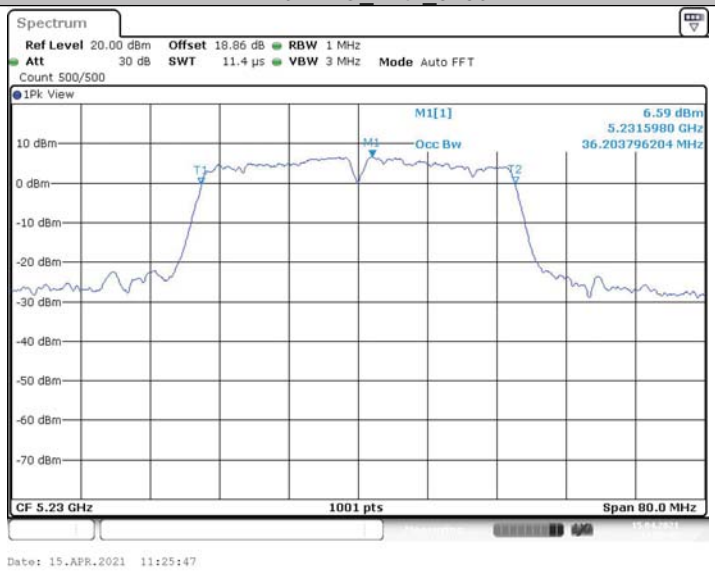


11N40MIMO_Ant1_5190

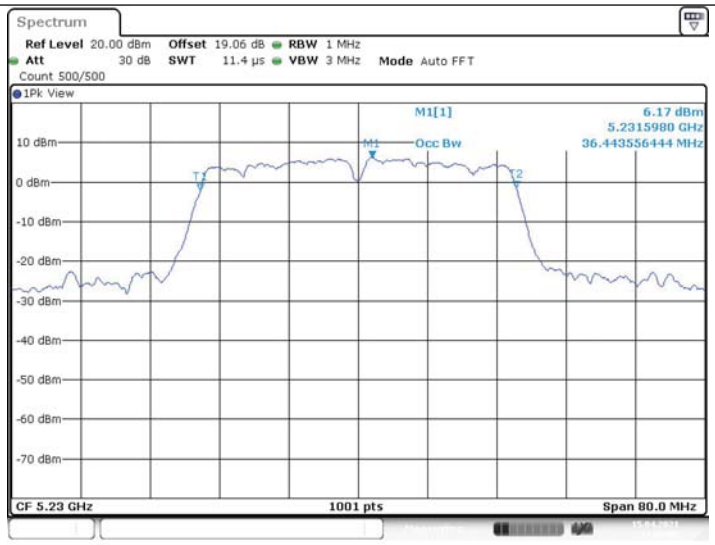
11N40MIMO_Ant2_5190



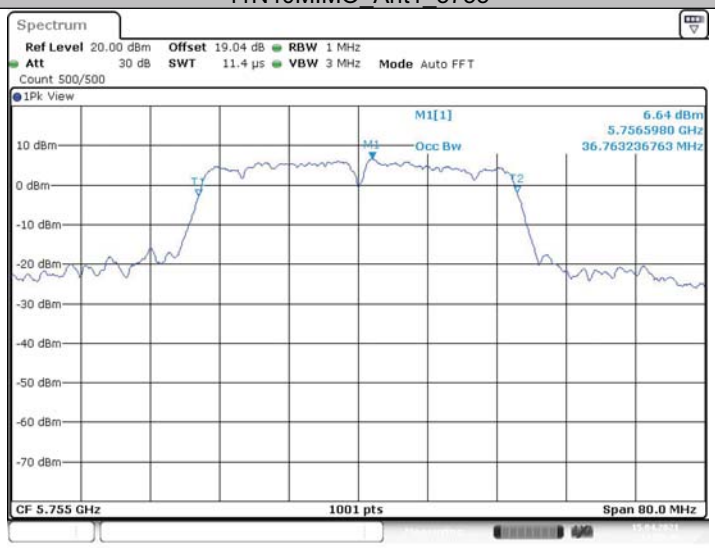
11N40MIMO_Ant1_5230



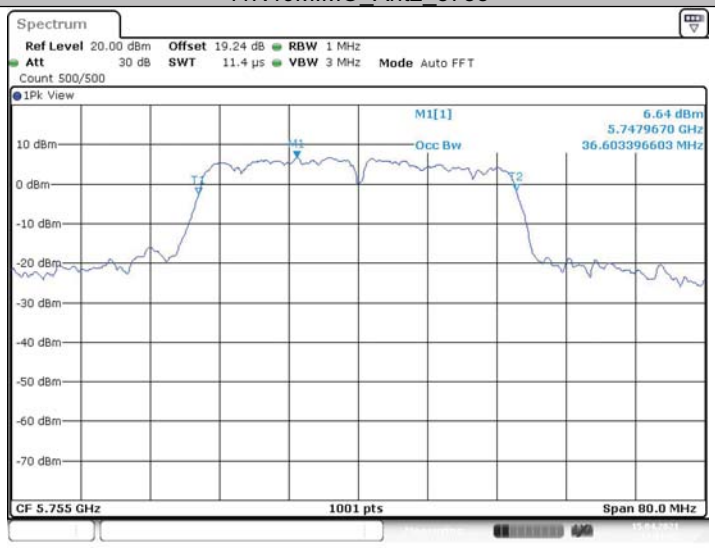
11N40MIMO_Ant2_5230



11N40MIMO_Ant1_5755

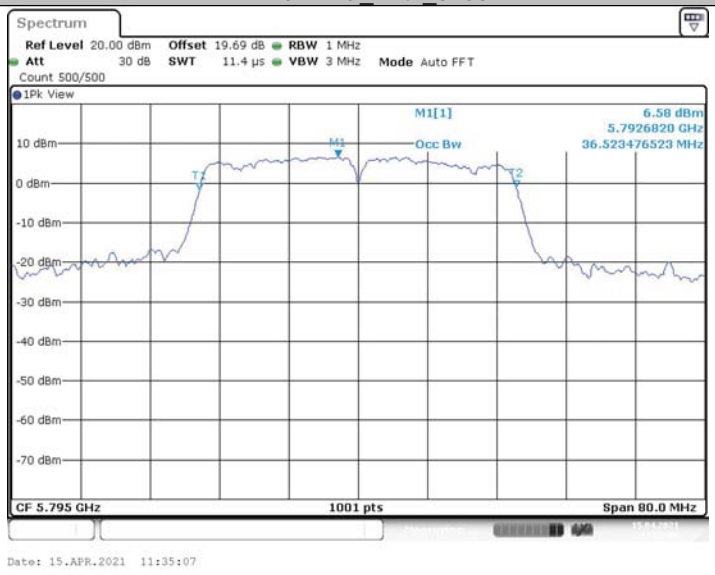


11N40MIMO_Ant2_5755

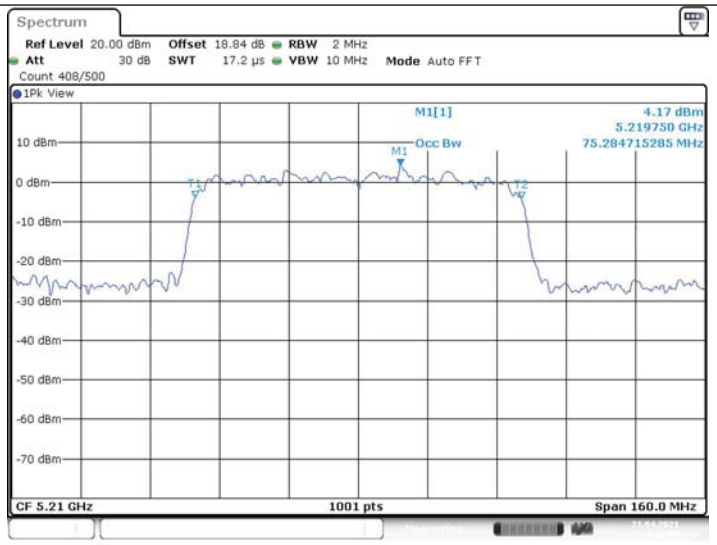


11N40MIMO_Ant1_5795

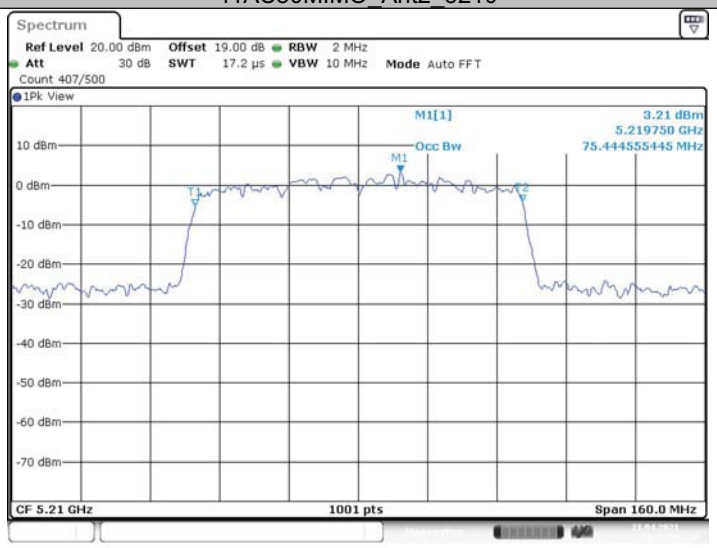
11N40MIMO_Ant2_5795



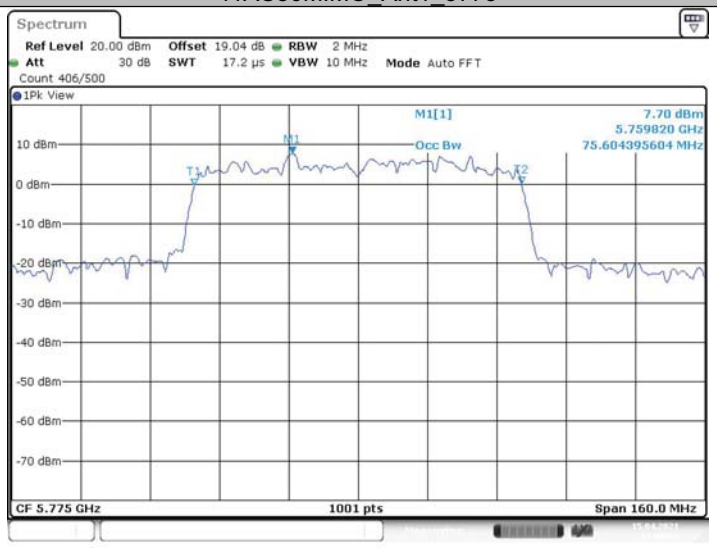
11AC80MIMO_Ant1_5210



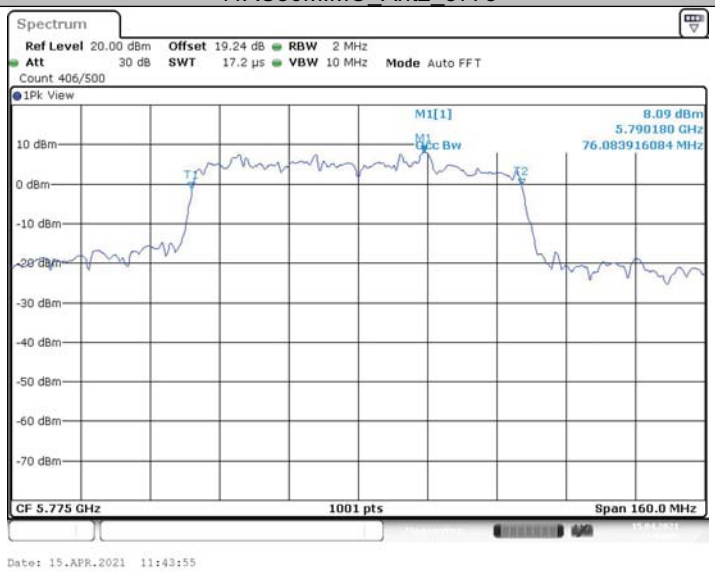
11AC80MIMO_Ant2_5210



11AC80MIMO_Ant1_5775



11AC80MIMO_Ant2_5775



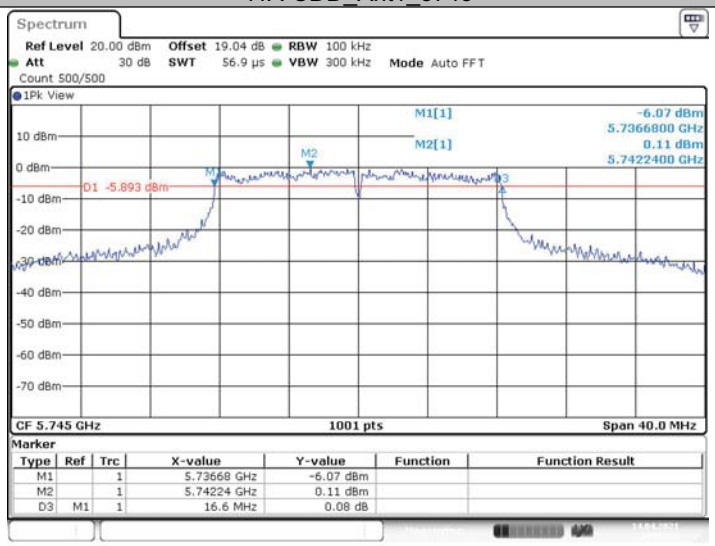
5.3 Min emission bandwidth

5.3.1 Test Result

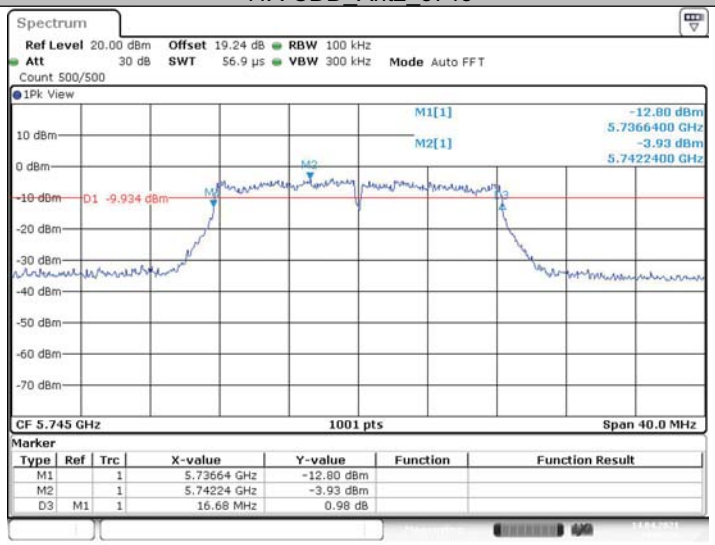
TestMode	Antenna	Channel	6db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A-CDD	Ant1	5745	16.600	5736.680	5753.280	0.5	PASS
	Ant2	5745	16.680	5736.640	5753.320	0.5	PASS
	Ant1	5785	16.600	5776.640	5793.240	0.5	PASS
	Ant2	5785	16.600	5776.640	5793.240	0.5	PASS
	Ant1	5825	16.440	5816.760	5833.200	0.5	PASS
	Ant2	5825	16.560	5816.680	5833.240	0.5	PASS
11N20MIMO	Ant1	5745	17.720	5736.120	5753.840	0.5	PASS
	Ant2	5745	17.680	5736.120	5753.800	0.5	PASS
	Ant1	5785	17.720	5776.120	5793.840	0.5	PASS
	Ant2	5785	17.720	5776.120	5793.840	0.5	PASS
	Ant1	5825	17.720	5816.120	5833.840	0.5	PASS
	Ant2	5825	17.720	5816.120	5833.840	0.5	PASS
11N40MIMO	Ant1	5755	36.560	5736.680	5773.240	0.5	PASS
	Ant2	5755	36.560	5736.680	5773.240	0.5	PASS
	Ant1	5795	36.560	5776.680	5813.240	0.5	PASS
	Ant2	5795	36.560	5776.680	5813.240	0.5	PASS
11AC80MIMO	Ant1	5775	76.000	5736.920	5812.920	0.5	PASS
	Ant2	5775	76.160	5736.600	5812.760	0.5	PASS

5.3.2 Test Graphs

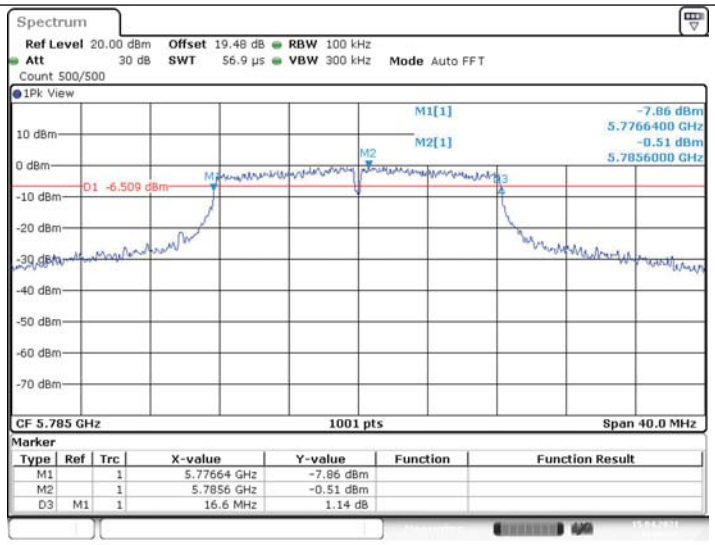
11A-CDD_Ant1_5745



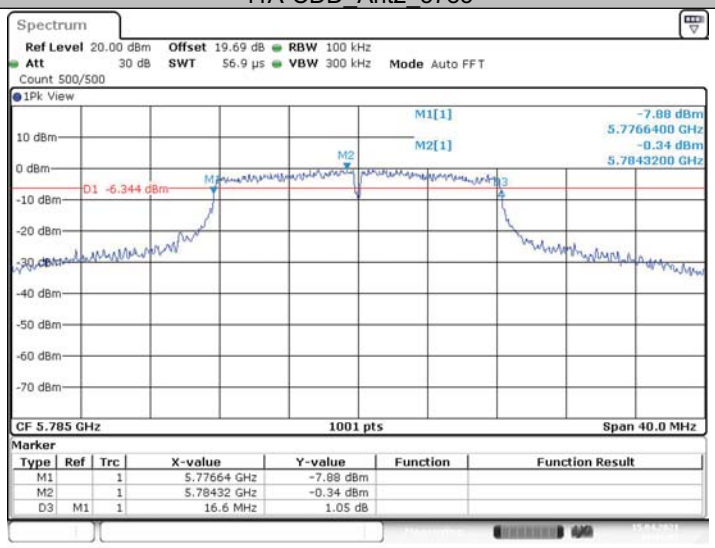
11A-CDD_Ant2_5745



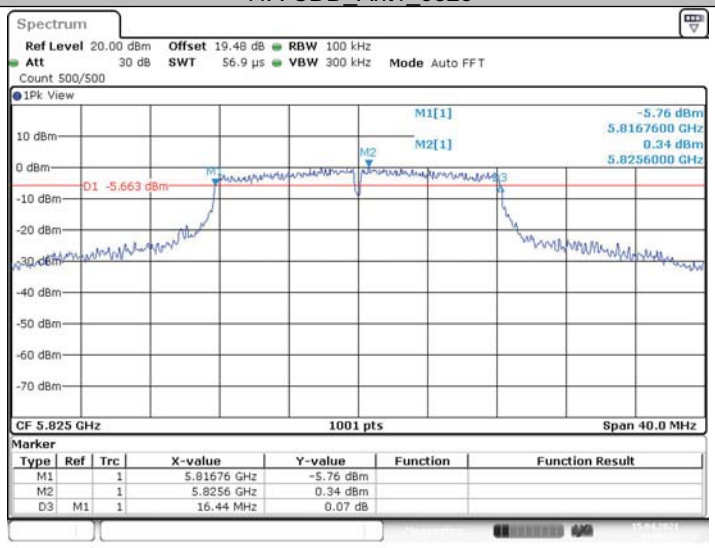
11A-CDD_Ant1_5785



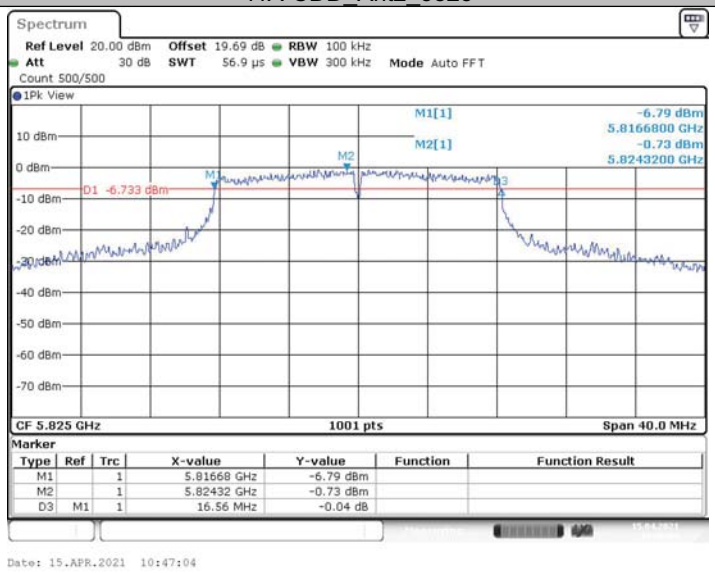
11A-CDD_Ant2_5785



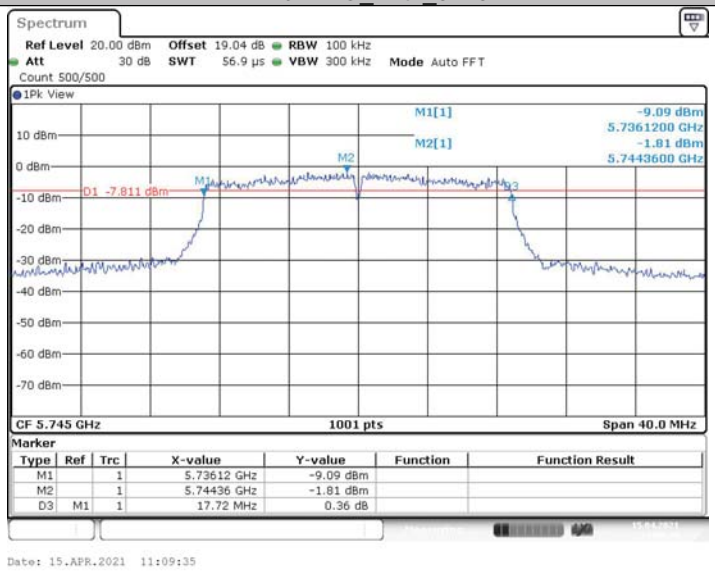
11A-CDD_Ant1_5825



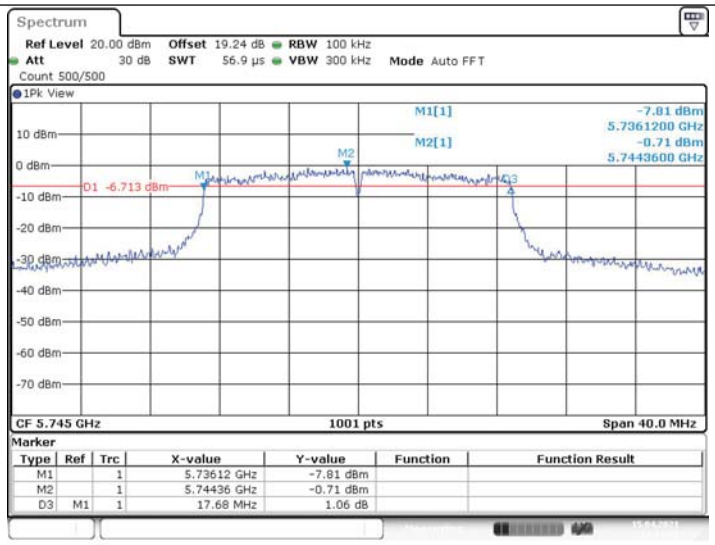
11A-CDD_Ant2_5825



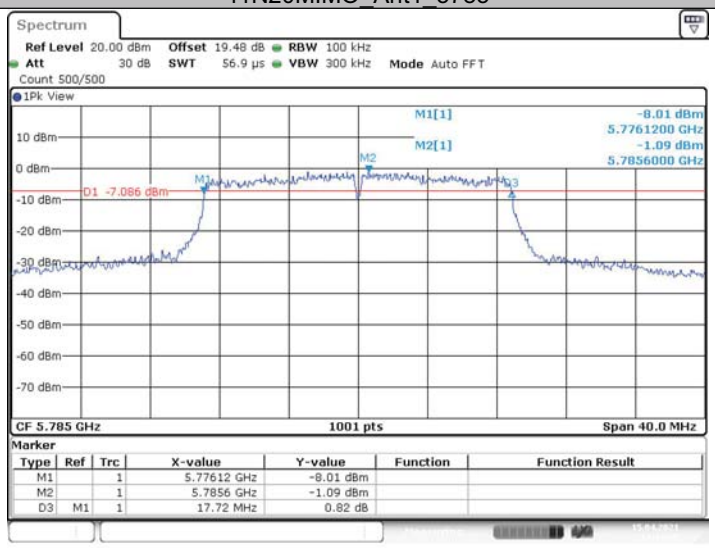
11N20MIMO_Ant1_5745



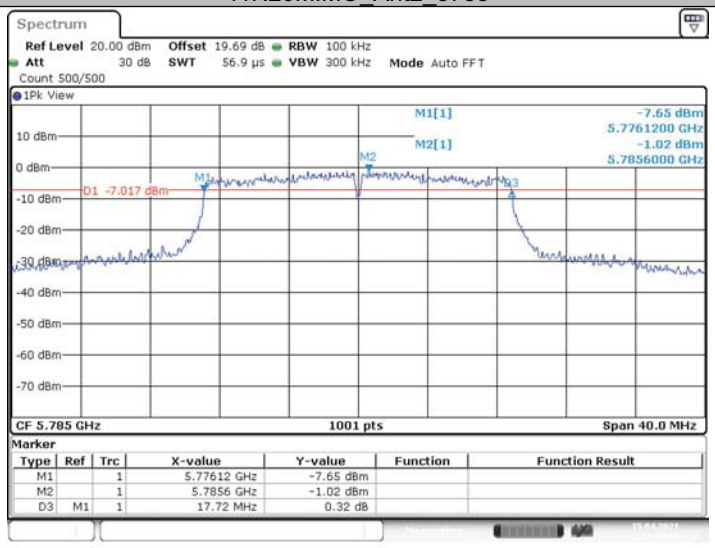
11N20MIMO_Ant2_5745



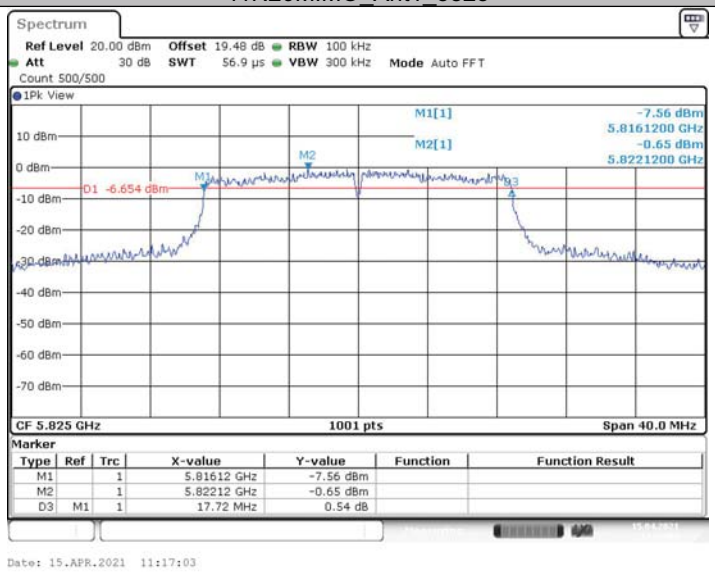
11N20MIMO_Ant1_5785



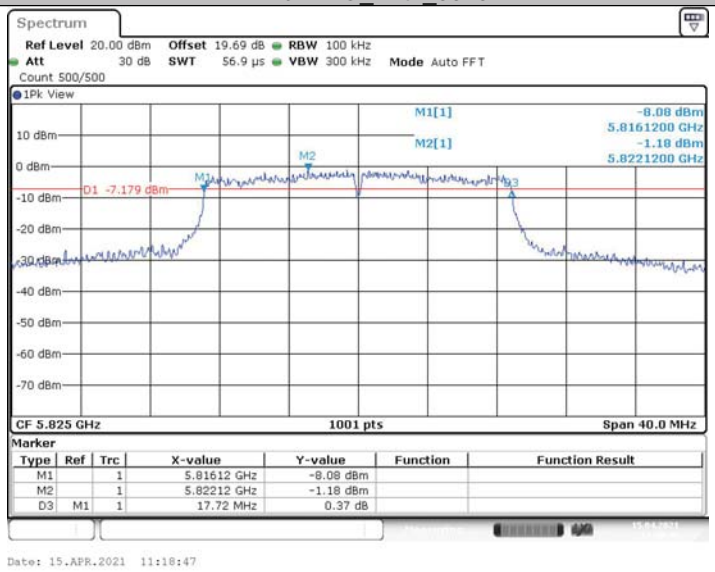
11N20MIMO_Ant2_5785



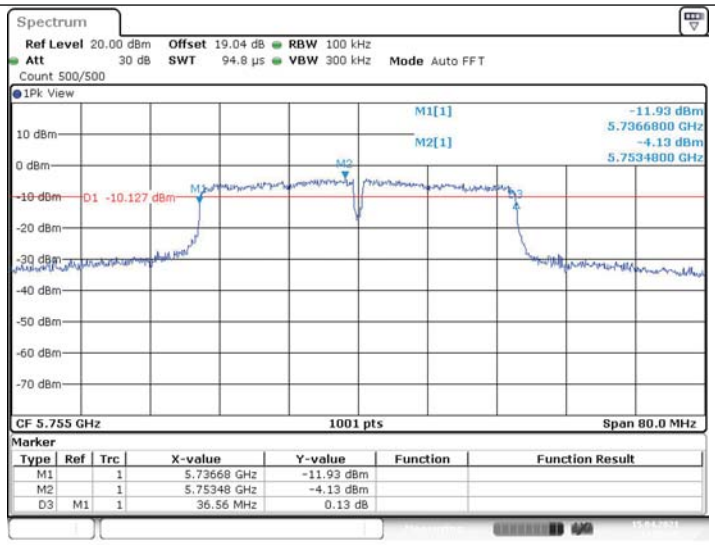
11N20MIMO_Ant1_5825



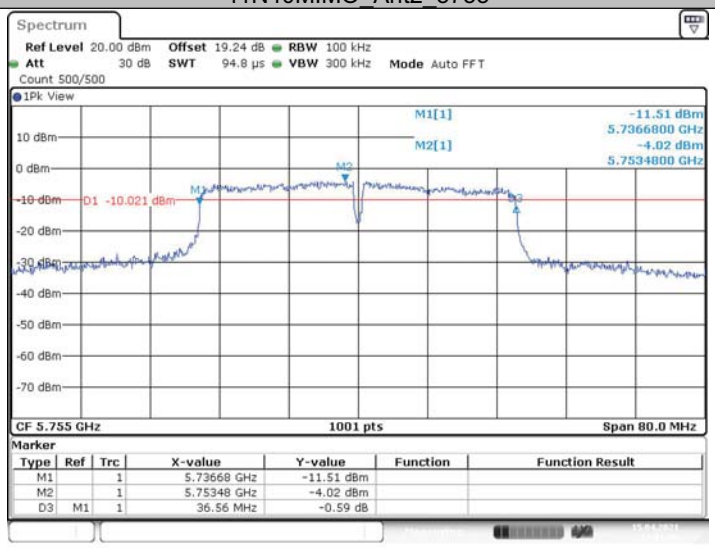
11N20MIMO_Ant2_5825



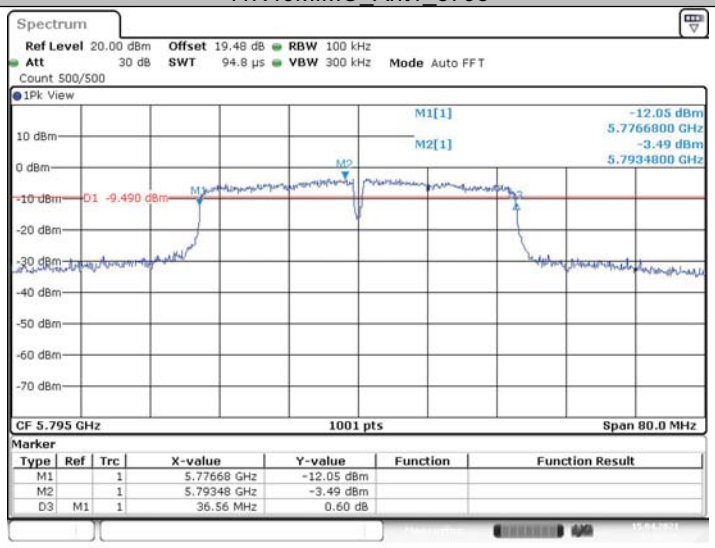
11N40MIMO_Ant1_5755



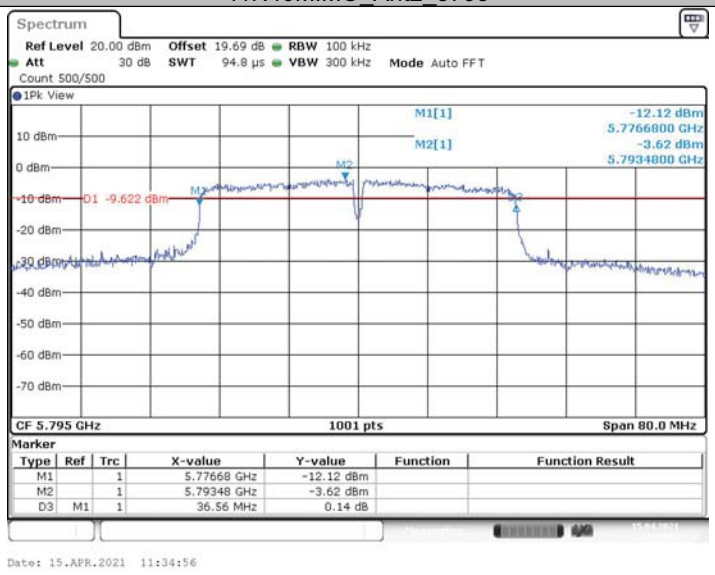
11N40MIMO_Ant2_5755



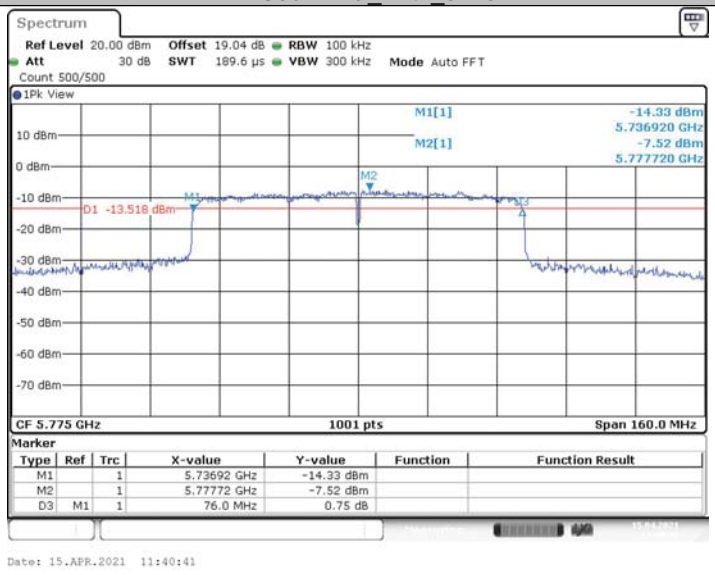
11N40MIMO_Ant1_5795



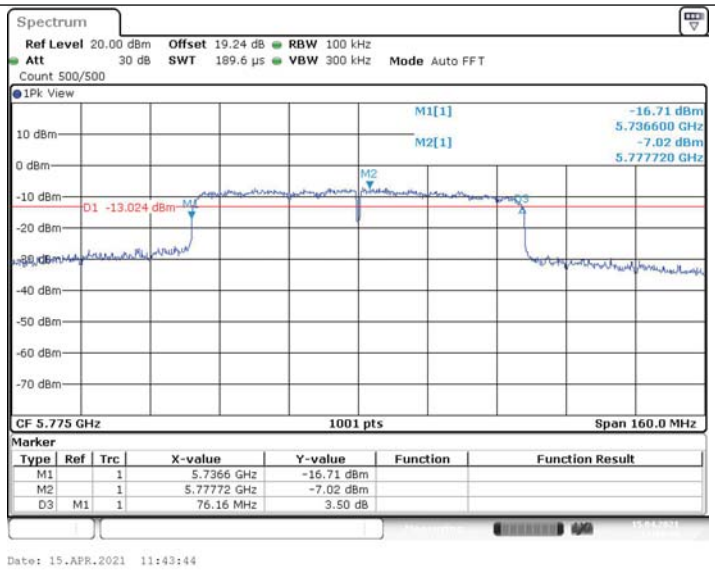
11N40MIMO_Ant2_5795



11AC80MIMO_Ant1_5775



11AC80MIMO_Ant2_5775


Spectrum
Ref Level 20.00 dBm Offset 19.24 dB RBW 100 kHz
Att 30 dB SWT 189.6 µs VBW 300 kHz Mode Auto FFT
Count 500/500
1Pk View
M1[1] -16.71 dBm
5.736600 GHz
M2[1] -7.02 dBm
5.777720 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
D1 -13.024 dBm
CF 5.775 GHz
1001 pts
Span 160.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.7366 GHz -16.71 dBm
M2 1 5.77772 GHz -7.02 dBm
D3 M1 1 76.16 MHz 3.50 dB
Date: 15.APR.2021 11:43:44

5.4 Maximum conducted output power

5.4.1 Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
11A-CDD	Ant1	5180	12.22	<=30	PASS
	Ant2	5180	11.33	<=30	PASS
	total	5180	14.81	<=30	PASS
	Ant1	5200	12.08	<=30	PASS
	Ant2	5200	11.20	<=30	PASS
	total	5200	14.67	<=30	PASS
	Ant1	5240	12.03	<=30	PASS
	Ant2	5240	11.63	<=30	PASS
	total	5240	14.84	<=30	PASS
	Ant1	5745	12.05	<=30	PASS
	Ant2	5745	11.89	<=30	PASS
	total	5745	14.98	<=30	PASS
	Ant1	5785	12.53	<=30	PASS
	Ant2	5785	12.59	<=30	PASS
	total	5785	15.57	<=30	PASS
	Ant1	5825	12.30	<=30	PASS
	Ant2	5825	12.22	<=30	PASS
	total	5825	15.27	<=30	PASS
11N20MIMO	Ant1	5180	12.47	<=30	PASS
	Ant2	5180	11.19	<=30	PASS
	total	5180	14.89	<=30	PASS
	Ant1	5200	12.01	<=30	PASS
	Ant2	5200	11.16	<=30	PASS
	total	5200	14.62	<=30	PASS
	Ant1	5240	12.23	<=30	PASS
	Ant2	5240	11.66	<=30	PASS
	total	5240	14.96	<=30	PASS
	Ant1	5745	10.59	<=30	PASS
	Ant2	5745	11.61	<=30	PASS
	total	5745	14.14	<=30	PASS
	Ant1	5785	11.59	<=30	PASS
	Ant2	5785	11.54	<=30	PASS
	total	5785	14.58	<=30	PASS
	Ant1	5825	11.94	<=30	PASS
	Ant2	5825	11.40	<=30	PASS
	total	5825	14.69	<=30	PASS
11N40MIMO	Ant1	5190	11.32	<=30	PASS
	Ant2	5190	10.16	<=30	PASS
	total	5190	13.79	<=30	PASS
	Ant1	5230	11.81	<=30	PASS
	Ant2	5230	11.42	<=30	PASS
	total	5230	14.63	<=30	PASS
	Ant1	5755	11.71	<=30	PASS
	Ant2	5755	11.88	<=30	PASS
	total	5755	14.81	<=30	PASS
	Ant1	5795	12.28	<=30	PASS
	Ant2	5795	12.10	<=30	PASS
	total	5795	15.20	<=30	PASS
11AC80MIMO	Ant1	5210	7.82	<=30	PASS
	Ant2	5210	7.02	<=30	PASS

	total	5210	10.45	<=30	PASS
	Ant1	5775	8.52	<=30	PASS
	Ant2	5775	8.78	<=30	PASS
	total	5775	11.66	<=30	PASS

5.5 Maximum power spectral density

5.5.1 Test Result

TestMode	Antenna	Channel	Result [dBm/MHz]	Limit[dBm/MHz]	Verdict
11A-CDD	Ant1	5180	10.04	<=17	PASS
	Ant2	5180	9.27	<=17	PASS
	total	5180	12.68	<=17	PASS
	Ant1	5200	10.02	<=17	PASS
	Ant2	5200	8.63	<=17	PASS
	total	5200	12.39	<=17	PASS
	Ant1	5240	9.84	<=17	PASS
	Ant2	5240	9.28	<=17	PASS
	total	5240	12.58	<=17	PASS
	Ant1	5745	6.38	<=30	PASS
	Ant2	5745	6.21	<=30	PASS
	total	5745	9.31	<=30	PASS
	Ant1	5785	7.04	<=30	PASS
	Ant2	5785	7.2	<=30	PASS
	total	5785	10.13	<=30	PASS
	Ant1	5825	6.89	<=30	PASS
	Ant2	5825	6.94	<=30	PASS
	total	5825	9.93	<=30	PASS
11N20MIMO	Ant1	5180	10.44	<=17	PASS
	Ant2	5180	9.31	<=17	PASS
	total	5180	12.92	<=17	PASS
	Ant1	5200	9.88	<=17	PASS
	Ant2	5200	9.05	<=17	PASS
	total	5200	12.50	<=17	PASS
	Ant1	5240	10.01	<=17	PASS
	Ant2	5240	9.58	<=17	PASS
	total	5240	12.81	<=17	PASS
	Ant1	5745	5.23	<=30	PASS
	Ant2	5745	6.13	<=30	PASS
	total	5745	8.71	<=30	PASS
	Ant1	5785	6.23	<=30	PASS
	Ant2	5785	6.52	<=30	PASS
	total	5785	9.39	<=30	PASS
	Ant1	5825	6.44	<=30	PASS
	Ant2	5825	5.53	<=30	PASS
	total	5825	9.02	<=30	PASS
11N40MIMO	Ant1	5190	6.15	<=17	PASS
	Ant2	5190	4.66	<=17	PASS
	total	5190	8.48	<=17	PASS
	Ant1	5230	6.32	<=17	PASS
	Ant2	5230	5.96	<=17	PASS
	total	5230	9.15	<=17	PASS
	Ant1	5755	3.15	<=30	PASS
	Ant2	5755	2.71	<=30	PASS
	total	5755	5.95	<=30	PASS
	Ant1	5795	3.84	<=30	PASS
	Ant2	5795	3.12	<=30	PASS
	total	5795	6.51	<=30	PASS
11AC80MIMO	Ant1	5210	-0.79	<=17	PASS
	Ant2	5210	-1.65	<=17	PASS

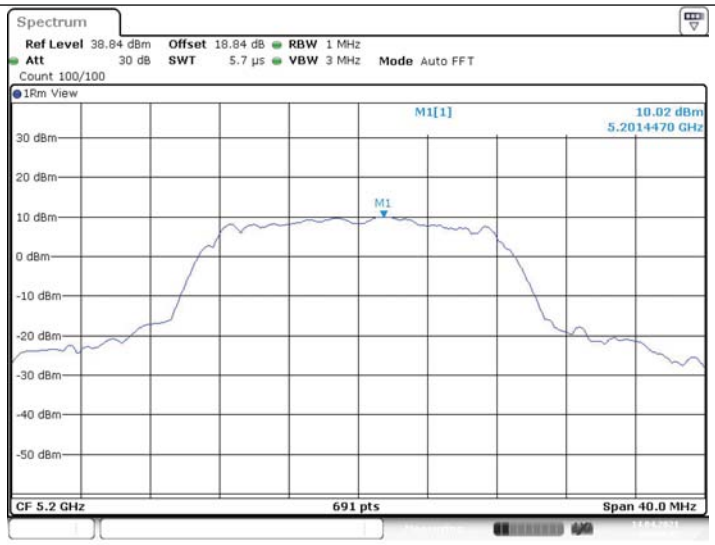
	total	5210	1.81	<=17	PASS
	Ant1	5775	-1.07	<=30	PASS
	Ant2	5775	-0.07	<=30	PASS
	total	5775	2.47	<=30	PASS

5.5.2 Test Graphs

11A-CDD_Ant1_5180

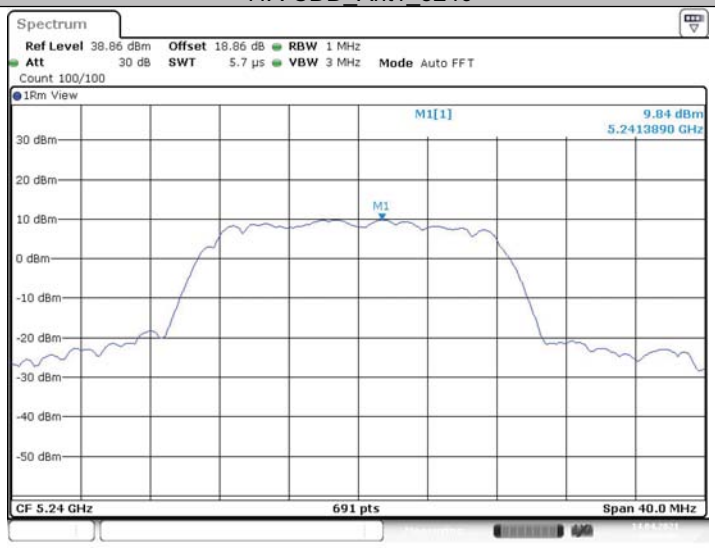
11A-CDD_Ant2_5180

11A-CDD_Ant1_5200



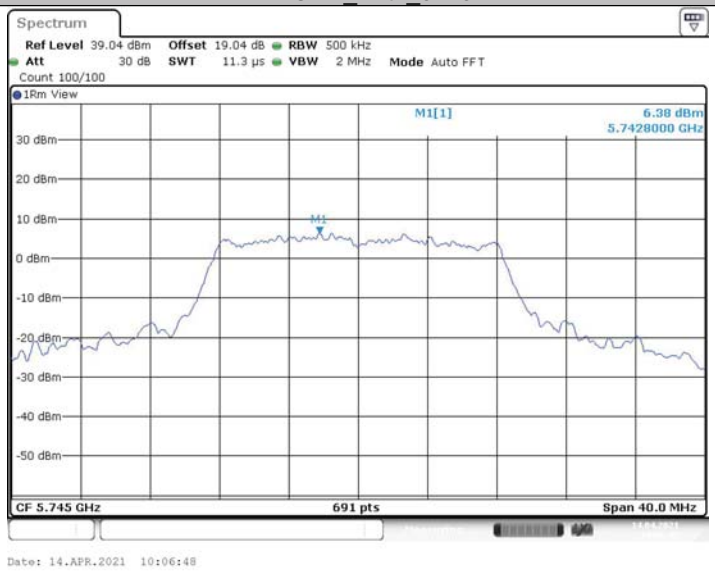
11A-CDD_Ant2_5200

11A-CDD_Ant1_5240

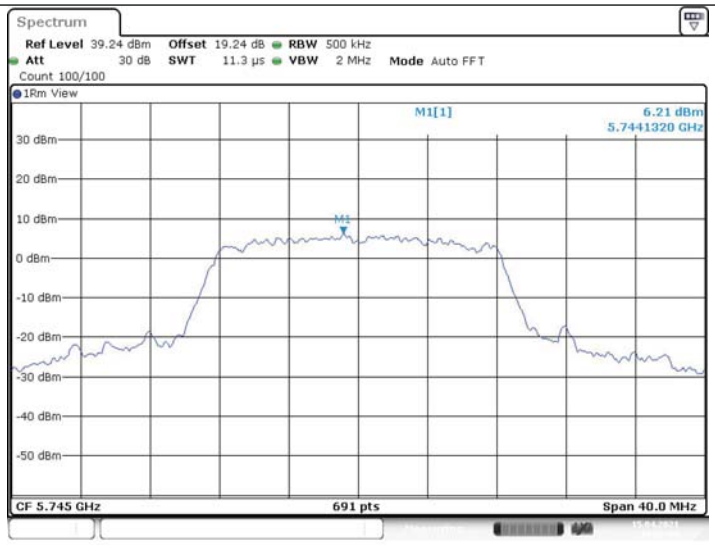


11A-CDD_Ant2_5240

11A-CDD_Ant1_5745



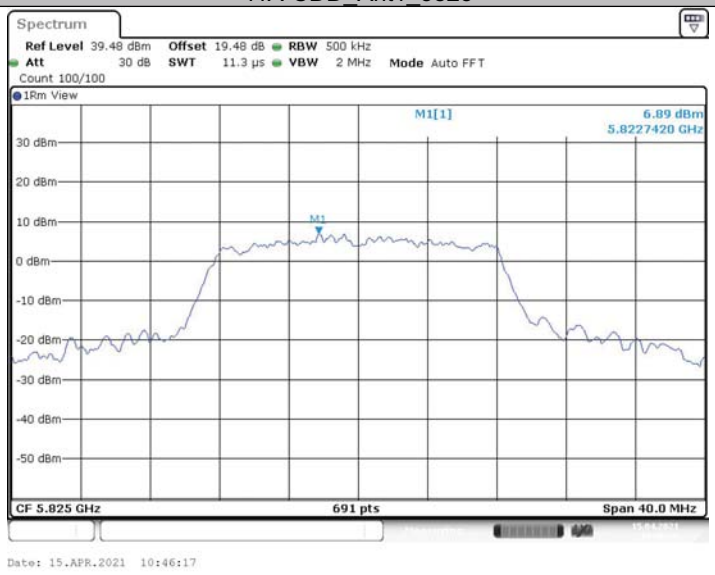
11A-CDD_Ant2_5745



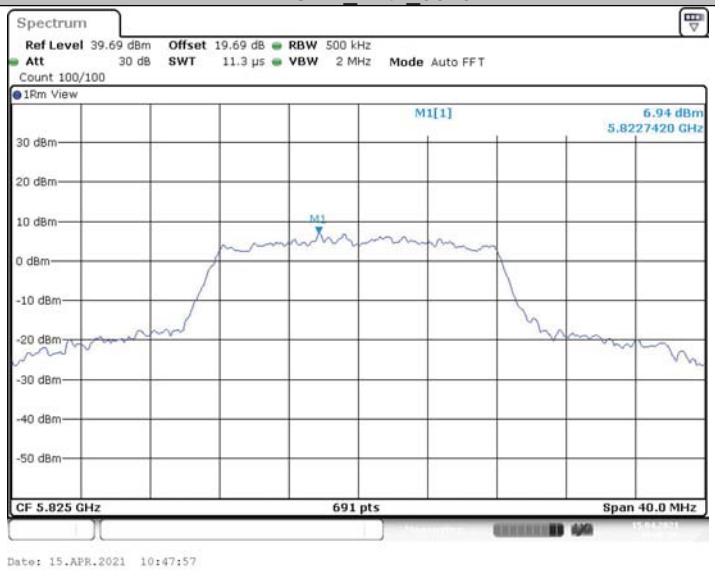
11A-CDD_Ant1_5785

11A-CDD_Ant2_5785

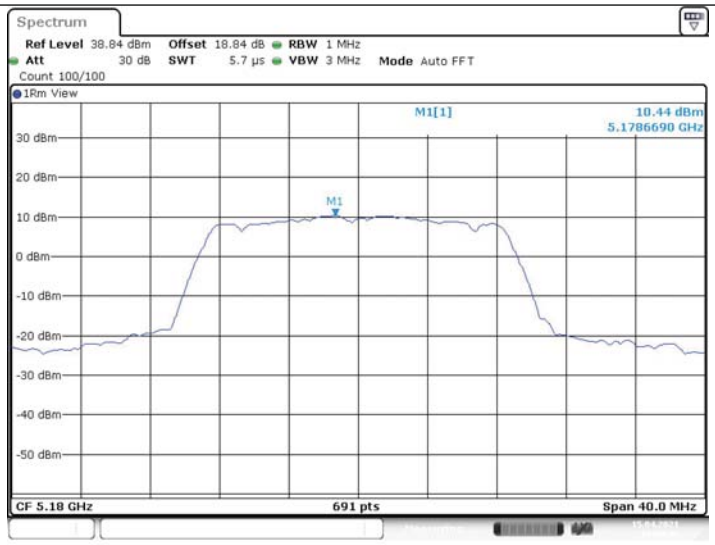
11A-CDD_Ant1_5825



11A-CDD_Ant2_5825



11N20MIMO_Ant1_5180

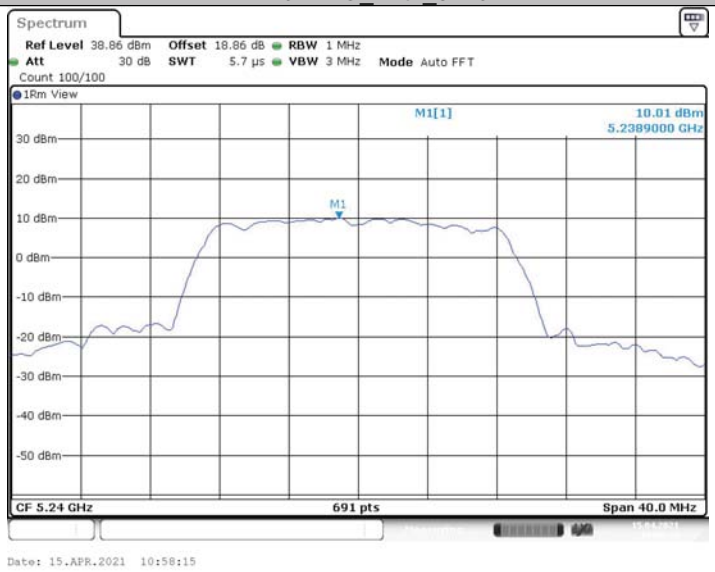


11N20MIMO_Ant2_5180

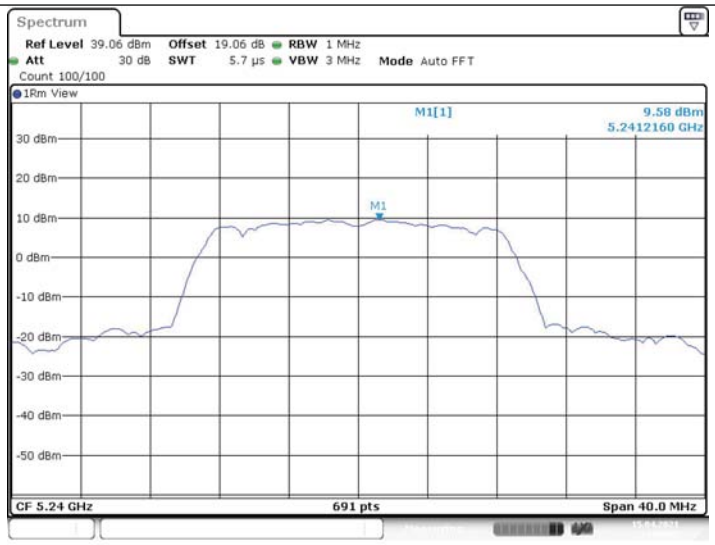
11N20MIMO_Ant1_5200

11N20MIMO_Ant2_5200

11N20MIMO_Ant1_5240

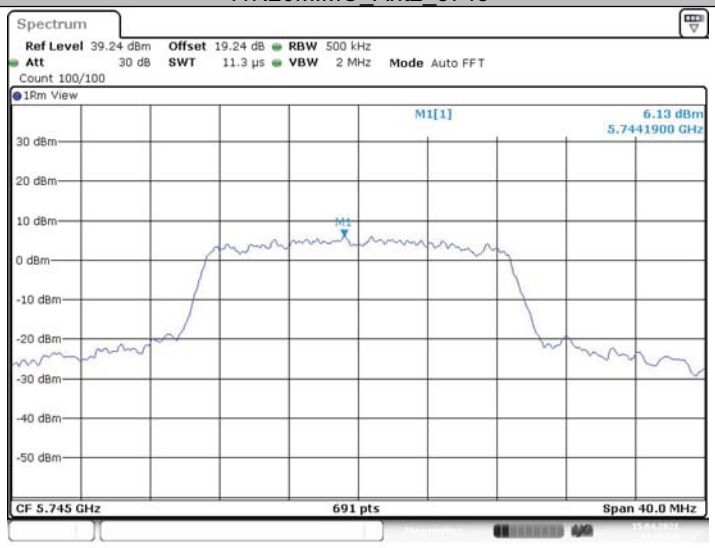


11N20MIMO_Ant2_5240

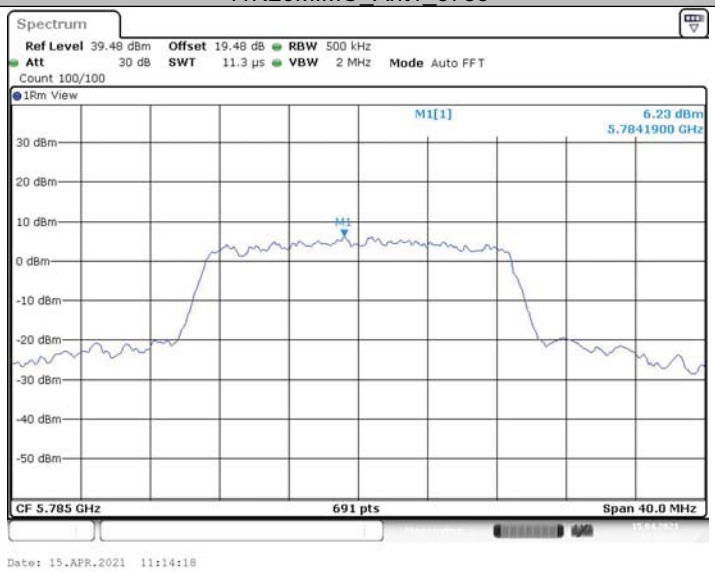


11N20MIMO_Ant1_5745

11N20MIMO_Ant2_5745



11N20MIMO_Ant1_5785



11N20MIMO_Ant2_5785

11N20MIMO_Ant1_5825