CERTIFICATION TEST REPORT

Report Number. : 12607346-E4V2

Applicant	:	APPLE, INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	:	A2160, A2216, A2217
FCC ID	:	BCG-E3305A
EUT Description	:	SMARTPHONE
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART E

Date Of Issue:
August 13, 2019

Prepared by:
UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538 U.S.A.
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NVLAP Lab code: 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	8/8/2019	Initial Issue	Francisco Guarnero
V2	8/13/2019	Addresss TCB Questions	Francisco Guarnero

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TABLE OF CONTENTS

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE, INC.
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A.

EUT DESCRIPTION: SMARTPHONE

MODEL: A2160, A2216 and A2217

SERIAL NUMBER: C39Y300CLTY4, C39YT03DN2R0

DATE TESTED: APRIL 5, 2019 – AUGUST 10, 2019

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
UL Verification Services Inc. By:

Chin Pang
Senior Egineer
Consumer Technology Division
UL Verification Services Inc.

Prepared By:

Francisco Guarnero
Test Engineer
Consumer Technology Division
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 14-30, FCC KDB 662911 D01 v02r01, FCC KDB 905462 D02 v02/D03 v01r02/D06 v02, FCC KDB 789033 D02 v02r01, ANSI C63.10-2013, FCC 06-96.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street ISED Site Code: 2324A	47266 Benicia Street ISED Site Code: XXXXX	47658 Kato Rd ISED Site Code: XXXXX
☐ Chamber A	☐ Chamber D	☐ Chamber I
☐ Chamber B	☒ Chamber E	☐ Chamber J
☐ Chamber C	☐ Chamber F	☒ Chamber K
	☒ Chamber G	☐ Chamber L
	☒ Chamber H	☐ Chamber M

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

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4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 dB

Uncertainty figures are valid to a confidence level of 95%.

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5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

EUT is a smartphone with multimedia functions (music, application support, and video), cellular GSM, GPRS, EGPRS, UMTS, LTE, TD-SCDMA, CDMA, IEEE 802.11a/b/g/n/ac/ax, Bluetooth, Ultra-Wide band, GPS and NFC. All models support at least one UICC based SIM. The second SIM, if present, is either UICC based pSIM (physical SIM) or e-SIM (electronic SIM). The device has a built-in inductive charging receiver. The rechargeable battery is also not user accessible

5.2. DIFFERENCE IN MODEL NUMBER

Model A2160, A2216 and A2217 is electrically identical to Model A2160. Three model numbers are allocated for marketing and logistic purposes only. A2160 was used to perform all final tests.

5.3. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

5.2 GHz BAND (FCC)

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.2 GHz band, 1TX			
5180-5240	802.11a	Covered by 802.11n HT20 1TX	
5180-5240	802.11n HT20	20.97	125.03
5190-5230	802.11n HT40	21.39	137.72
5180-5240	802.11ac VHT20	Covered by 802.11n HT20 1TX	
5190-5230	802.11ac VHT40	Covered by 802.11n HT40 1TX	
5210	802.11ac VHT80	17.47	55.85
5180-5240	802.11ax HE20	20.91	123.31
5190-5230	802.11ax HE40	21.45	139.64
5210	802.11ax HE80	15.96	39.45
5.2 GHz band, 2TX			
5180-5240	802.11n HT20 CDD	20.97	125.03
5180-5240	802.11n HT20 SDM/STBC	Covered by 802.11n HT20 2TX CDD	
5190-5230	802.11n HT40 CDD	22.95	197.24
5190-5230	802.11n HT40 SDM/STBC	Covered by 802.11n HT40 2TX CDD	
5180-5240	802.11ac VHT20 SDM/STBC/CDD	Covered by 802.11n HT20 2TX CDD	
5190-5230	802.11ac VHT40 SDM/STBC/CDD	Covered by 802.11n HT40 2TX CDD	
5210	802.11ac VHT80 CDD	19.42	87.50
5210	802.11ac VHT80 SDM/STBC	Covered by 802.11ac VHT80 2TX CDD	
5180-5240	802.11ax HE20 OFDMA	20.98	125.31
5190-5230	802.11ax HE40 OFDMA	22.94	196.79
5210	802.11ax HE80 OFDMA	17.97	62.66

5.3 GHz BAND (FCC)

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.3 GHz band, 1TX			
5260 - 5320	802.11a	Covered by 802.11n HT20 1TX	
5260 - 5320	802.11n HT20	20.89	122.74
5270 - 5310	802.11n HT40	21.42	138.68
5260 - 5320	802.11ac VHT20	Covered by 802.11n HT20 1TX	
5270 - 5310	802.11ac VHT40	Covered by 802.11n HT40 1TX	
5290	802.11ac VHT80	17.43	55.34
5260 - 5320	802.11ax HE20	20.91	123.31
5270 - 5310	802.11ax HE40	21.46	139.96
5290	802.11ax HE80	15.96	39.45
5.3 GHz band, 2TX			
5260 - 5320	802.11n HT20 CDD	20.92	123.59
5260 - 5320	802.11n HT20 SDM/STBC	Covered by 802.11n HT40 2TX CDD	
5270 - 5310	802.11n HT40 CDD	22.90	194.98
5270 - 5310	802.11n HT40 SDM/STBC	Covered by 802.11n HT40 2TX CDD	
5260 - 5320	802.11ac VHT20 SDM/STBC/CDD	Covered by 802.11n HT20 2TX CDD	
5270 - 5310	802.11ac VHT40 SDM/STBC/CDD	Covered by 802.11n HT40 2TX CDD	
5290	802.11ac VHT80 CDD	19.42	87.50
5290	802.11ac VHT80 SDM/STBC	Covered by 802.11ac VHT80 2TX CDD	
5260 - 5320	802.11ax HE20 OFDMA	20.96	124.74
5270 - 5310	802.11ax HE40 OFDMA	22.92	195.88
5290	802.11ax HE80 OFDMA	17.59	57.35

5.6 GHz BAND (FCC)

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.6 GHz band, 1TX			
5500-5720	802.11a	Covered by 802.11n HT20 1TX	
5500-5720	802.11n HT20	20.74	118.58
5510-5710	802.11n HT40	21.38	137.40
5500-5720	802.11ac VHT20	Covered by 802.11n HT20 1TX	
5510-5710	802.11ac VHT40	Covered by 802.11n HT40 1TX	
5530-5690	802.11ac VHT80	21.55	142.89
5500-5720	802.11ax HE20	20.90	123.03
5510-5710	802.11ax HE40	21.41	138.36
5530-5690	802.11ax HE80	21.38	137.40
5.6 GHz band, 2TX			
5500-5720	802.11n HT20 CDD	20.82	120.78
5500-5720	802.11n HT20 SDM/STBC	Covered by 802.11n HT40 2TX CDD	
5510-5710	802.11n HT40 CDD	22.77	189.23
5510-5710	802.11n HT40 SDM/STBC	Covered by 802.11n HT40 2TX CDD	
5500-5720	802.11ac VHT20 SDM/STBC/CDD	Covered by 802.11n HT20 2TX CDD	
5510-5710	802.11ac VHT40 SDM/STBC/CDD	Covered by 802.11n HT40 2TX CDD	
5530-5690	802.11ac VHT80 CDD	22.93	196.34
5530-5690	802.11ac VHT80 SDM/STBC	Covered by 802.11ac VHT80 2TX CDD	
5500-5720	802.11ax HE20 OFDMA	20.93	123.88
5510-5710	802.11ax HE40 OFDMA	22.74	187.93
5530-5690	802.11ax HE80 OFDMA	22.88	194.09

5.8 GHz BAND (FCC)

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.8 GHz band, 1TX			
5745-5825	802.11a	Covered by 802.11n HT20 1TX	
5745-5825	802.11n HT20	21.44	139.32
5755-5795	802.11n HT40	21.44	139.32
5745-5825	802.11ac VHT20	Covered by 802.11n HT20 1TX	
5755-5795	802.11ac VHT40	Covered by 802.11n HT40 1TX	
5775	802.11ac VHT80	21.30	134.90
5745-5825	802.11ax HE20	21.48	140.60
5755-5795	802.11ax HE40	21.34	136.14
5775	802.11ax HE80	21.41	138.36
5.8 GHz band, 2TX			
5745-5825	802.11n HT20 CDD	24.45	278.61
5745-5825	802.11n HT20 SDM/STBC	Covered by 802.11n HT40 2TX CDD	
5755-5795	802.11n HT40 CDD	24.46	279.25
5755-5795	802.11n HT40 SDM/STBC	Covered by 802.11n HT40 2TX CDD	
5745-5825	802.11ac VHT20 STM/STBC/CDD	Covered by 802.11n HT20 2TX CDD	
5755-5795	802.11ac VHT40 STM/STBC/CDD	Covered by 802.11n HT40 2TX CDD	
5775	802.11ac VHT80 CDD	24.30	269.15
5775	802.11ac VHT80 SDM/STBC	Covered by 802.11ac VHT80 2TX CDD	
5745-5825	802.11ax HE20 OFDMA	24.40	275.42
5755-5795	802.11ax HE40 OFDMA	24.37	273.53
5775	802.11ax HE80 OFDMA	22.93	196.34

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5.4. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Range	Antenna 6 (Core 0)	Antenna 5 (Core 1)
5180 - 5240	-4.2	-10.7
5260 – 5320	-4.0	-9.7
5500 - 5720	-1.6	-5.9
5745 - 5825	-2.3	-6.2

5.5. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was WiFi FW Version: 18_20_56_1

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5.6. WORST-CASE CONFIGURATION AND MODE

The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z on Ant 6 (Core 0) and Ant 5 (Core 1). It was determined that X (Flatbed) orientation was the worst-case orientation for Ant 6, Y (Landscape) orientation was the worst case for Ant 5, and X (Flatbed) for 2TX.

For radiated harmonics spurious below 1GHz, 1-18GHz L/M/H channels, 18-40GHz, and power line conducted emissions were performed with the EUT set at the 2TX CDD mode among the CDD/SDM modes with power setting equal or higher than SISO modes as worst-case scenario.

Radiated band edge, harmonic, and spurious emissions from 1GHz to 18GHz were performed with the EUT was set to transmit at highest power on Low/Middle/High channels.

Below 1GHz tests were performed with EUT connected to AC power adapter as the worst case; and for above 1GHz, the worst-case configuration reported was tested with EUT only. For AC line conducted emission, test was investigated with AC power adapter and with laptop.

There were no emissions found below 30MHz within 20dB of the limit.

The output power and psd for the 802.11 ax mode were investigated between all different tones, and we found that the highest tone had the highest output power and lowest tone had the highest PSD readings. Therefore, full testing was performed on both the highest and lowest tones.

For simultaneous transmission with the Bluetooth was investigated, no noticeable emission was found.

Investigated worst-case data rates as listed below were:

802.11n HT20mode: MCS0
802.11n HT40mode: MCS0
802.11ac VHT80 mode: MCS0
802.11ax HE20/HE40/HE80 FULL RU & RU26

There are two vendors of the WiFi/Bluetooth radio modules: variant 1 and variant 2. The Wi-Fi/Bluetooth radio modules have the same mechanical outline (e.g., the same package dimension and pin-out layout), use the same on-board antenna matching circuit, have an identical antenna structure, and are built and tested to conform to the same specifications and to operate within the same tolerances.

Baseline testing was performed on the two variants to determine the worst case on all conducted power and radiated emissions.

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5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
laptop	Apple	Macbook Pro	C02P41RZG086	FCC DoC
Laptop AC/DC adapter	Liteon Technology	PA-1450-BA1	B123	NA
EUT AC Adapter	Apple	A1385	D292365CDYADHLHC3	NA

I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Antenna	1	SMA	Un-Shielded	0.2	To spectrum Analyzer
2	USB	1	USB	Shielded	1	N/A
3	AC	1	AC	Un-shielded	2	N/A

I/O CABLES (RADIATED ABOVE 1 GHZ)

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
NA						

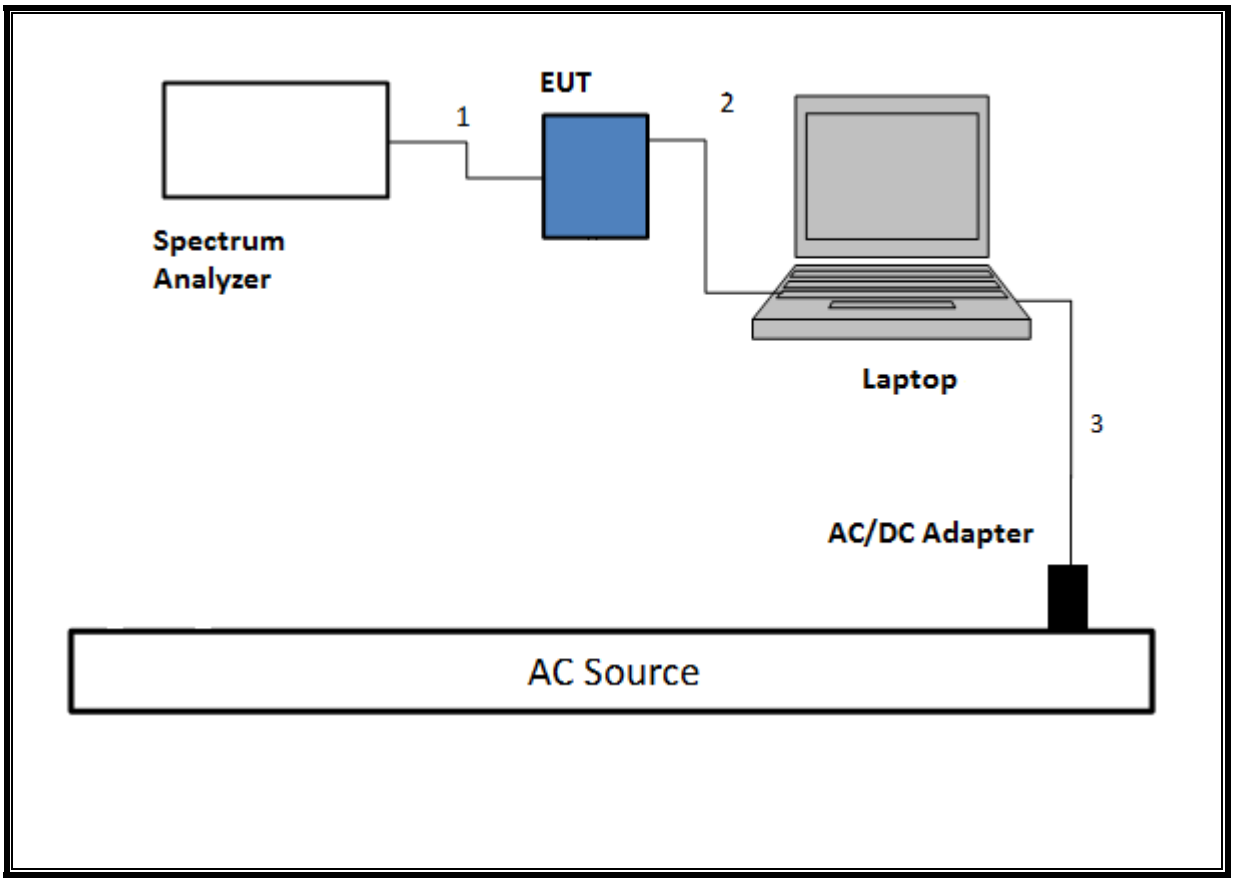
I/O CABLES (BELOW 1GHz AND AC POWER LINE TEST WITH ADAPTER AND LAPTOP

I/O Cable List						
Cable No	**Port**	**# of identical**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	AC	Un-shielded	2	N/A
2	USB	1	USB	Shielded	1	N/A

TEST SETUP

The EUT is installed in a host laptop computer during the tests. Test software exercised the radio card.

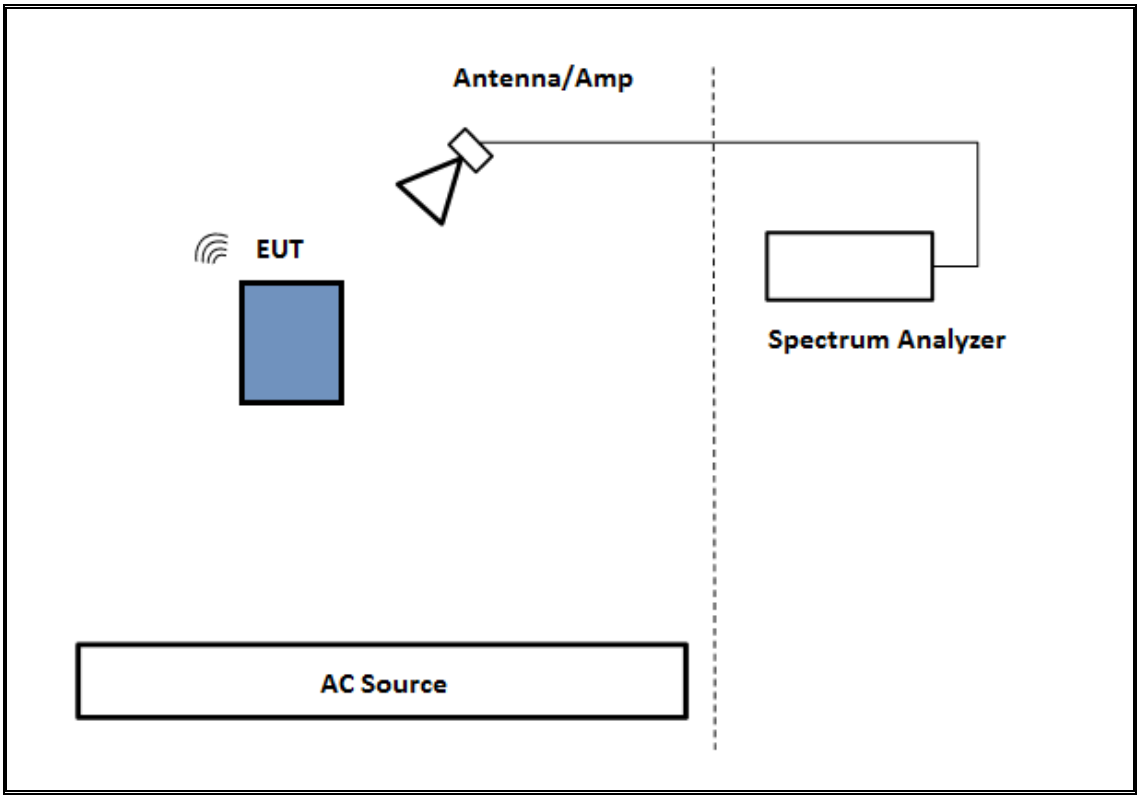
SETUP DIAGRAM FOR CONDUCTED TESTS



TEST SETUP- RADIATED-ABOVE 1 GHZ

The EUT was powered by Battery. Test software exercised the EUT.

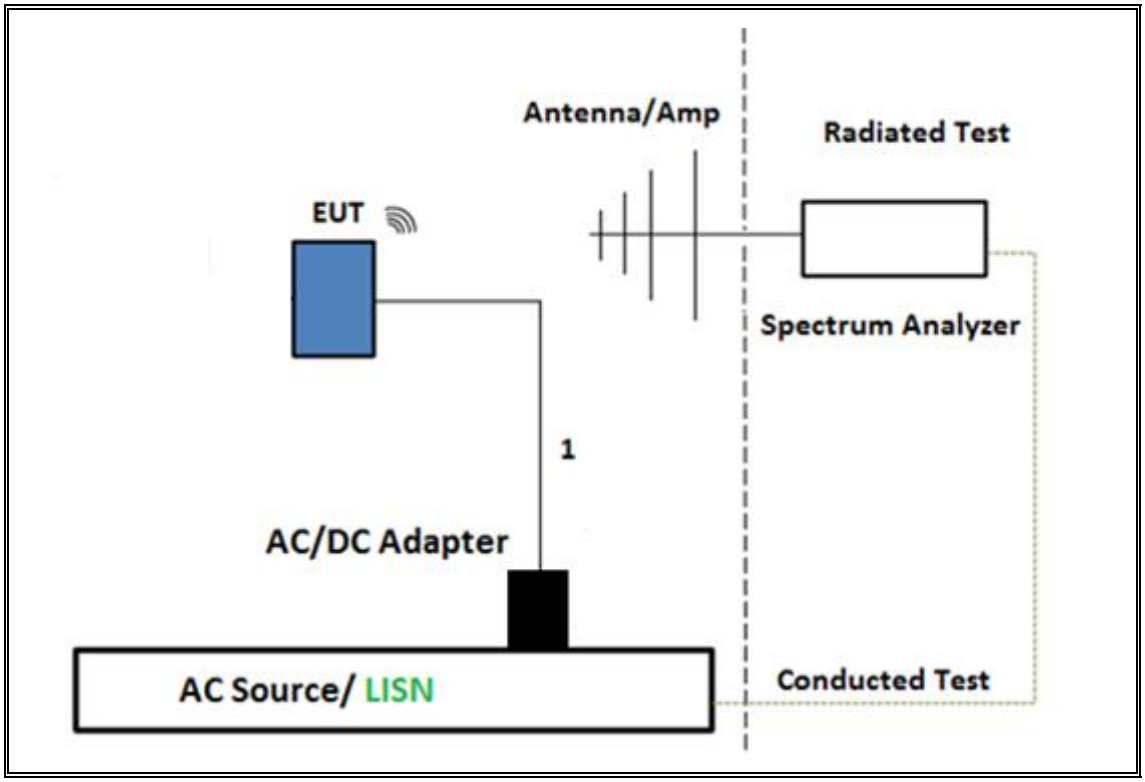
SETUP DIAGRAM



TEST SETUP- BELOW 1GHZ & AC LINE CONDUCTED TESTS

The EUT was powered by AC cord. Test software exercised the EUT.

SETUP DIAGRAM



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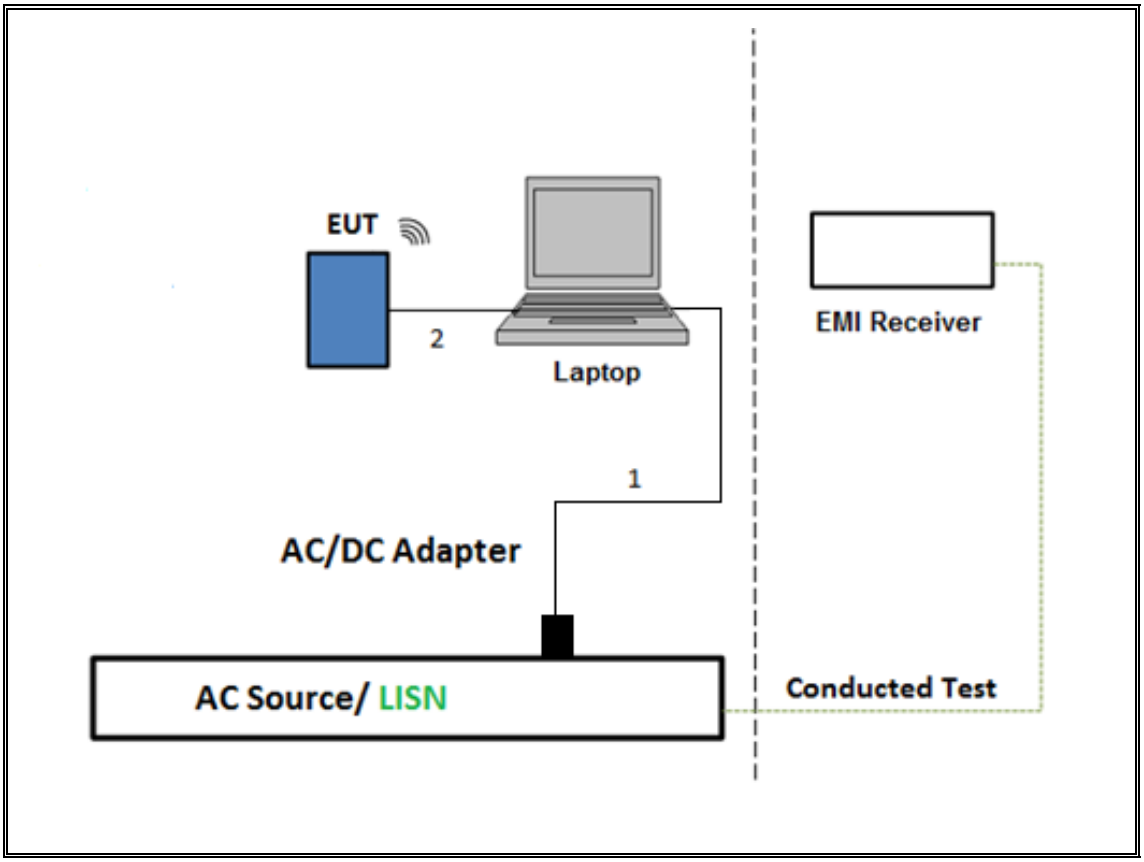
TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION



6. MEASUREMENT METHOD

On Time and Duty Cycle: KDB 789033 D02 v02r01, Section B.

6 dB Emission BW: KDB 789033 D02 v02r01, Section C.2

26 dB Emission BW: KDB 789033 D02 v02r01, Section C.1

99% Occupied BW: KDB 789033 D02 v02r01, Section D.

Conducted Output Power: KDB 789033 D02 v02r01, Section E.3.b (Method PM-G) and Section E.2.d (Method SA-2)

Power Spectral Density: KDB 789033 D02 v02r01, Section F

Unwanted emissions in restricted bands: KDB 789033 D02 v02r01, Sections G.3, G.4, G.5, and G.6.

Unwanted emissions in non-restricted bands: KDB 789033 D02 v02r01, Sections G.3, G.4, and G.5.

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.

Radiated Spurious Emissions Below 30MHz: ANSI C63.10-2013 Section 6.4

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7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST					
Description	**Manufacturer**	**Model**	**ID Num**	**Cal Due**	**Last Cal**
Antenna, Active Loop 9KHz to 30MHz	ETS-Lindgren	6502	T1683	02/21/2019	02/21/2018
*Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB3	T407	05/10/2019	05/10/2018
*Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB3	T899	07/24/2019	07/24/2018
Antenna, Double Ridge Guide Horn Antenna 700MHz to 18GHz	A.H. SYSTEMS, INC.	SAS-571	T962	09/15/2017	09/15/2016
Antenna, Horn 1-18GHz	EMCO	3115	T60	01/18/2017	01/18/2016
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T119	03/22/2020	03/22/2019
*Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T136	07/02/2019	07/02/2018
*Hybrid Antenna, 30MHz to 3GHz	SunAR rf motion	JB3	PRE0181574	08/01/2019	08/01/2018
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T227	10/29/2019	10/29/2018
RF Amplifier	MITEQ	AFS42-00101800-25-S-42	T739	03/09/2017	03/09/2016
*RF Amplifier, 1-18GHz	MITEQ	AFS42-00101800-25-S-42	T1165	07/20/2016	07/20/2015
Semianechoic Chamber A	TDK RF SOLUTIONS INC.	N/A	T1199	01/18/2021	01/18/2019
Semianechoic Chamber A	TDK RF SOLUTIONS INC.	N/A	T1199	02/19/2020	02/19/2018
Spectrum Analyzer	Agilent (Keysight) Technologies	N9030A	T818	03/20/2015	03/21/2014
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T340	01/22/2020	01/22/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T908	01/24/2020	01/24/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1466	01/23/2020	01/23/2019
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1454	01/08/2019	01/08/2018
Thermometer	Control Company	14-650-118, 15557603	T1816	01/11/2019	01/11/2018
Thermometer - Digital	Control Company	14-650-118	PRE0177862	02/22/2019	02/22/2018

Test Software List			
Description	**Manufacturer**	**Model**	**Version**
Radiated Software	UL	UL EMC	Ver 9.5, June 24, 2015
Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015
Antenna Port Software	UL	UL RF	Ver 3.9.1, Dec 28, 2015

*Testing is completed before equipment expiration date.

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
802.11n HT20 1TX	1.920	1.941	0.989	98.92%	0.00	0.010
802.11n HT20 CDD	1.920	1.941	0.989	98.92%	0.00	0.010
802.11n HT40 1TX	0.944	0.964	0.979	97.93%	0.09	1.059
802.11n HT40 CDD	0.944	0.964	0.979	97.93%	0.09	1.059
802.11ac VHT80 1TX	0.459	0.479	0.958	95.82%	0.19	2.179
802.11ac VHT80 CDD	0.459	0.479	0.958	95.82%	0.19	2.179
802.11ax HE20 1Tx, 242-Tones	1.596	1.614	0.989	98.88%	0.00	0.010
802.11ax HE20 1Tx, 26-Tones	4.200	4.285	0.980	98.02%	0.00	0.010
802.11ax HE20 OFDMA, 242-Tones	1.593	1.611	0.989	98.88%	0.00	0.010
802.11ax HE20 OFDMA, 26-Tones	4.195	4.270	0.982	98.24%	0.00	0.010
802.11ax HE40 1TX, 484-Tones	1.584	1.604	0.988	98.75%	0.00	0.010
802.11ax HE40 1TX, 26-Tones	4.205	4.280	0.982	98.25%	0.00	0.010
802.11ax HE40 OFDMA, 484-Tones	1.584	1.602	0.989	98.88%	0.00	0.010
802.11ax HE40 OFDMA, 26-Tones	4.200	4.275	0.982	98.25%	0.00	0.010
802.11ax HE80 1TX, 996-Tones	1.494	1.515	0.986	98.61%	0.00	0.010
802.11ax HE80 1TX, 26-Tones	4.200	4.280	0.981	98.13%	0.00	0.010
802.11ax HE80 OFDMA, 996-Tones	1.494	1.515	0.986	98.61%	0.00	0.010
802.11ax HE80 OFDMA, 26-Tones	4.200	4.280	0.981	98.13%	0.00	0.010

UL VERIFICATION SERVICES INC.
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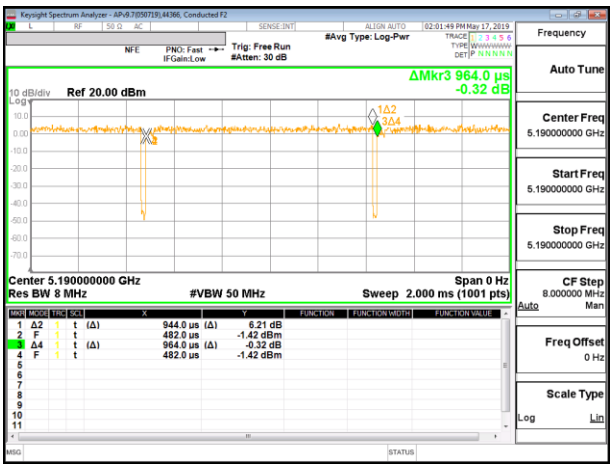
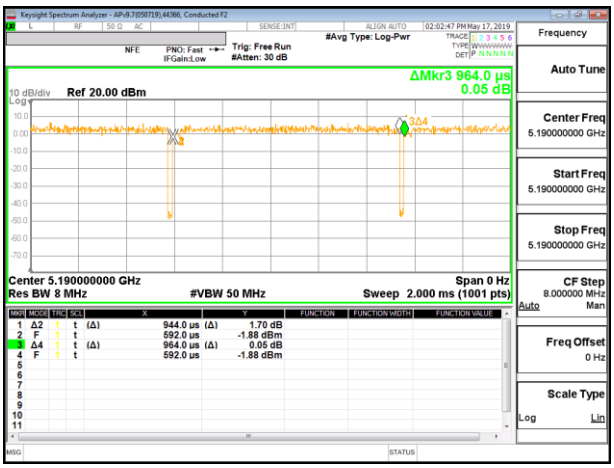
DUTY CYCLE PLOTS

802.11n HT20 1TX MODE

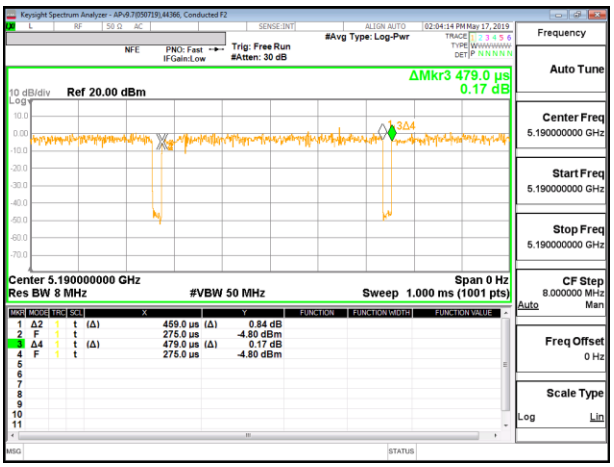
802.11n HT20 CDD MODE



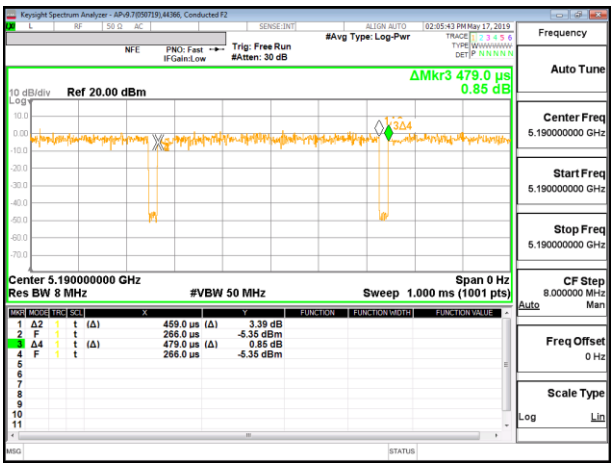
802.11n HT40 1TX MODE



802.11n HT40 CDD MODE



802.11ac VHT80 1TX MODE



802.11ac VHT80 CDD MODE

802.11ax HE20 1TX, 242-TONES

802.11ax HE20 1TX, 26-TONES

802.11ax HE20 OFDMA, 242-TONES

802.11ax HE20 OFDMA, 26-TONES

802.11ax HE40 1TX, 484-TONES

802.11ax HE40 1TX, 26-TONES

802.11ax HE40 OFDMA, 484-TONES

802.11ax HE40 OFDMA, 26-TONES

802.11ax HE80 1TX, 996-TONES

802.11ax HE80 1TX, 26-TONES

802.11ax HE80 OFDMA, 996-TONES

802.11ax HE80 OFDMA, 26-TONES

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8.2. 26 dB BANDWIDTH

LIMITS

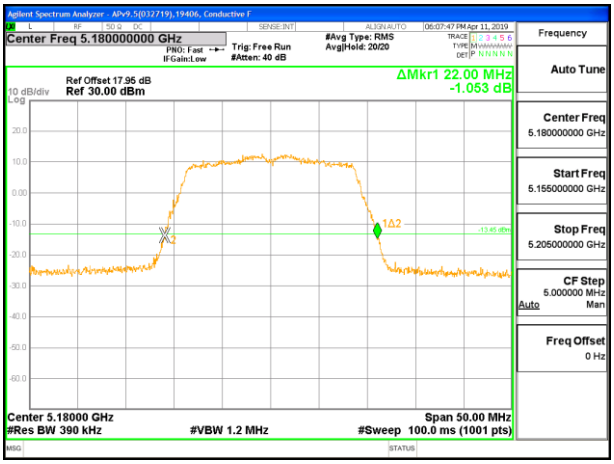
None; for reporting purposes only.

RESULTS

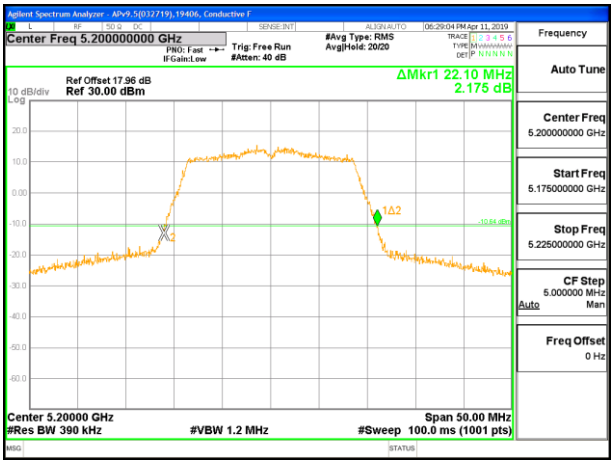
8.2.1. 802.11n HT20 MODE IN THE 5.2 GHz BAND

1TX Antenna 6 MODE

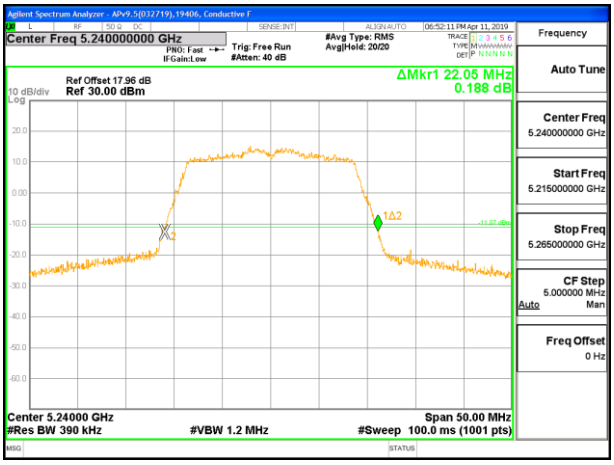
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	22.00
Mid	5200	22.10
High	5240	22.05



LOW CHANNEL



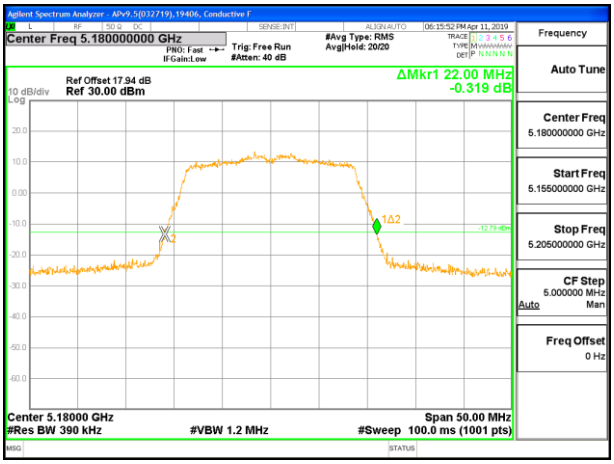
MID CHANNEL



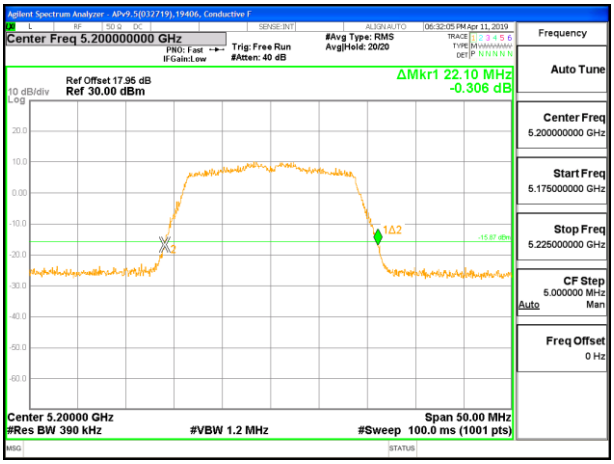
HIGH CHANNEL

1TX Antenna 5 MODE

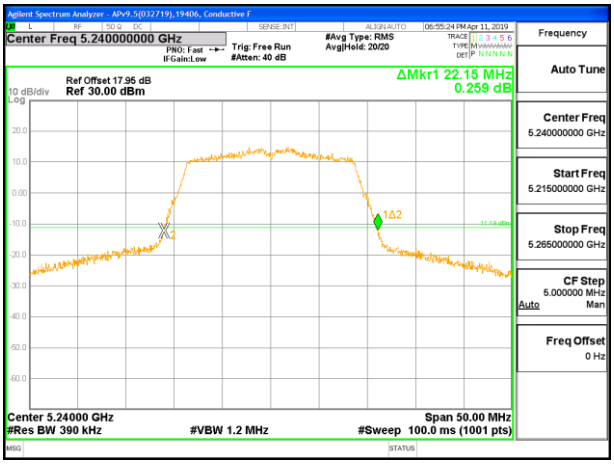
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	22.00
Mid	5200	22.10
High	5240	22.15



LOW CHANNEL



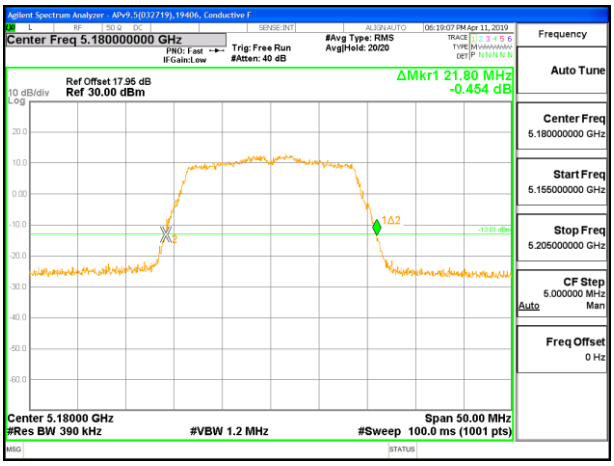
MID CHANNEL



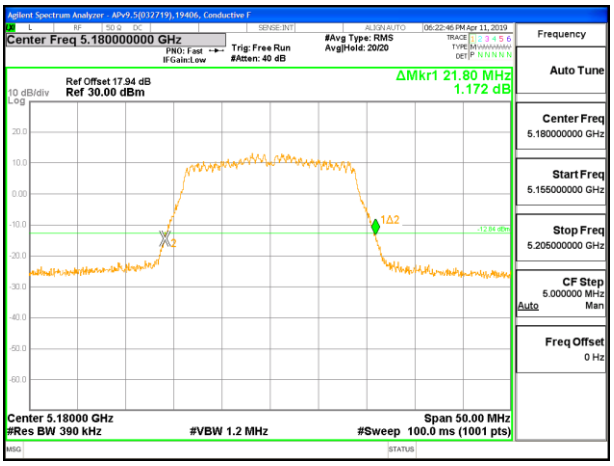
HIGH CHANNEL

2TX Antenna 6 + Antenna 5 CDD MODE

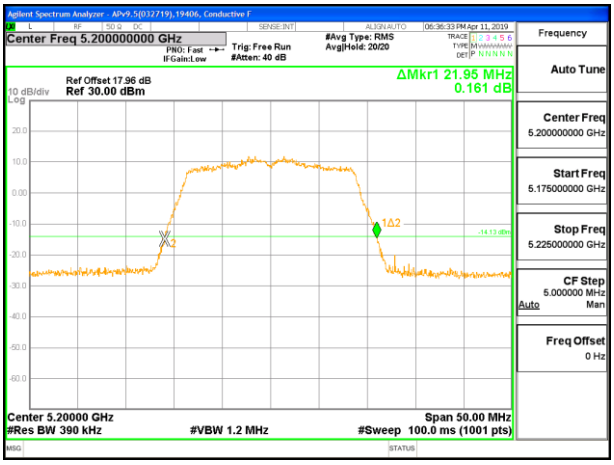
Channel	Frequency (MHz)	26 dB Bandwidth ANT 6 (MHz)	26 dB Bandwidth ANT 5 (MHz)
Low	5180	21.80	21.80
Mid	5200	21.95	21.80
High	5240	21.95	21.60



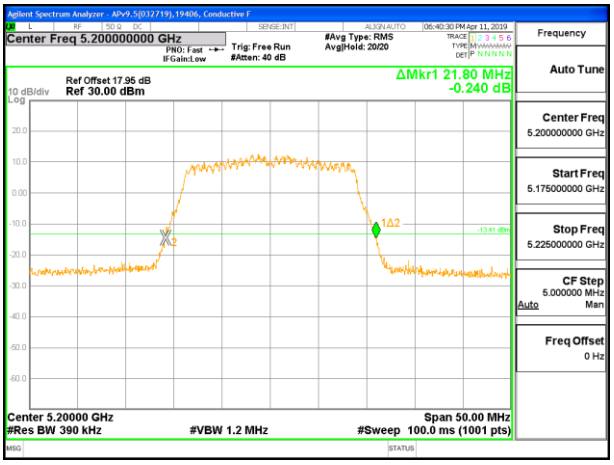
LOW CHANNEL ANTENNA 6



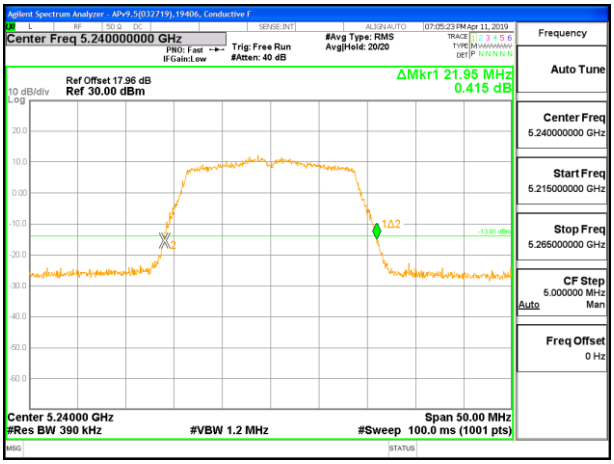
LOW CHANNEL ANTENNA 5



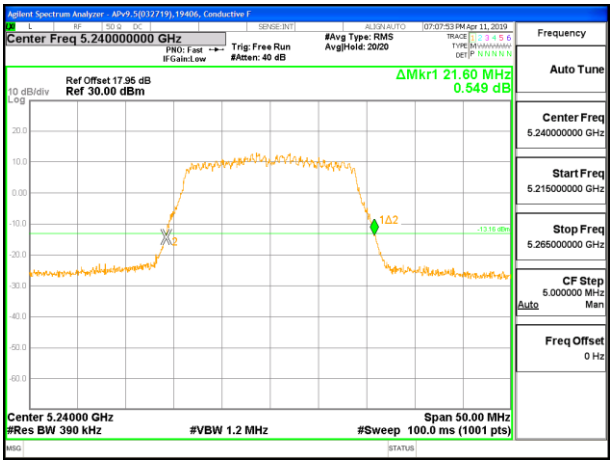
MID CHANNEL ANTENNA 6



MID CHANNEL ANTENNA 5



HIGH CHANNEL ANTENNA 6

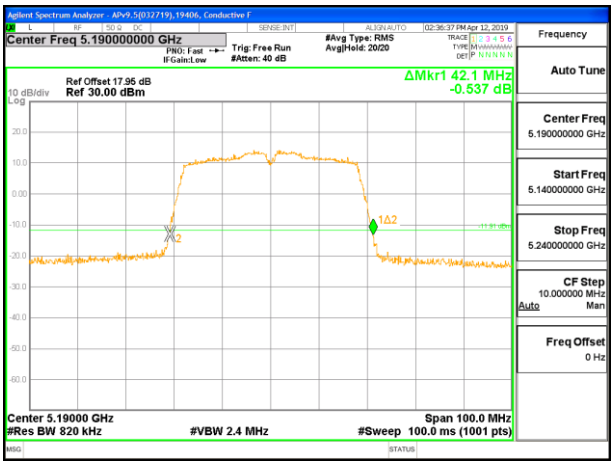


HIGH CHANNEL ANTENNA 5

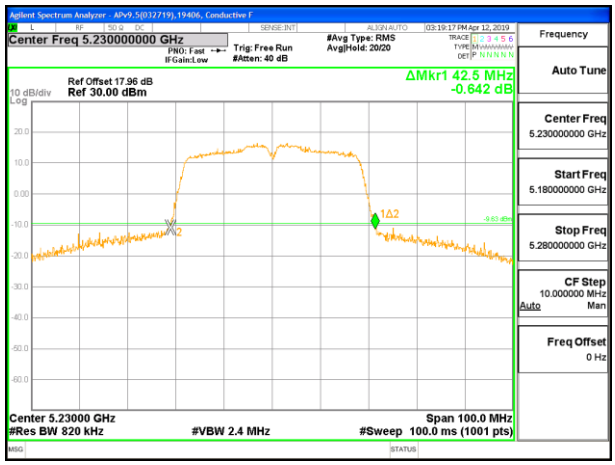
8.2.2. 802.11n HT40 MODE IN THE 5.2 GHz BAND

1TX Antenna 6 MODE

Channel	Frequency (MHz)	26dB Bandwidth (MHz)
Low	5190	42.10
High	5230	42.50



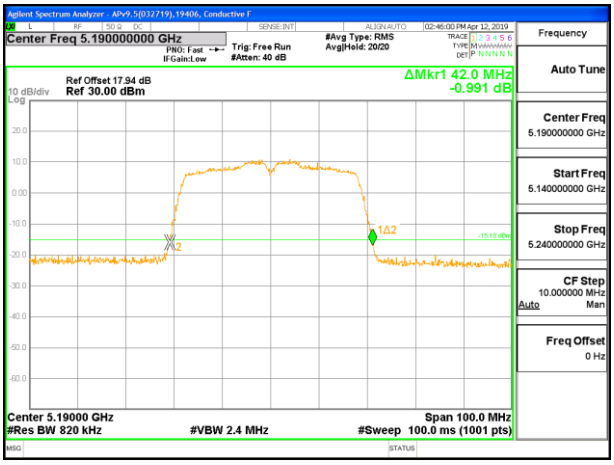
LOW CHANNEL



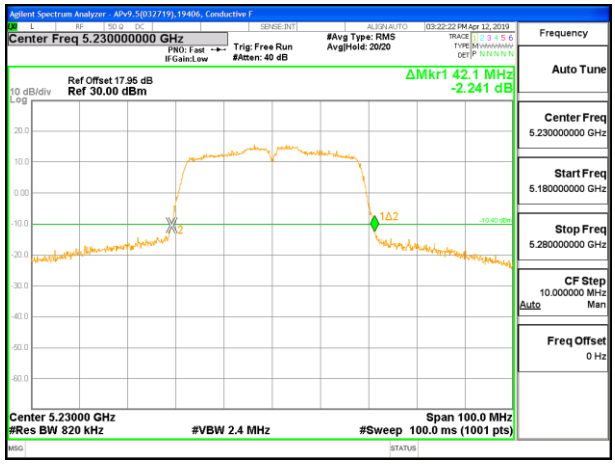
HIGH CHANNEL

1TX Antenna 5 MODE

Channel	Frequency (MHz)	26dB Bandwidth (MHz)
Low	5190	42.00
High	5230	42.10



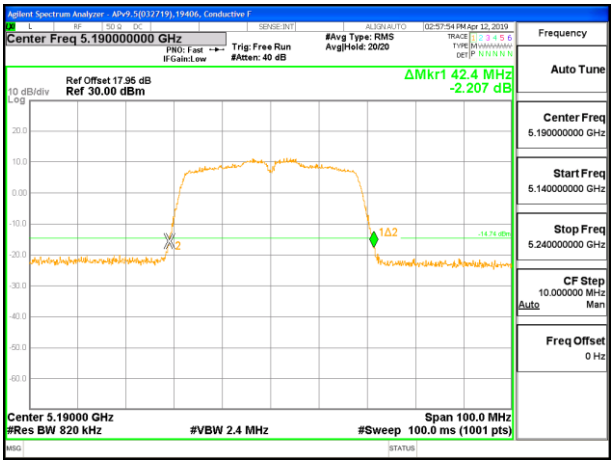
LOW CHANNEL



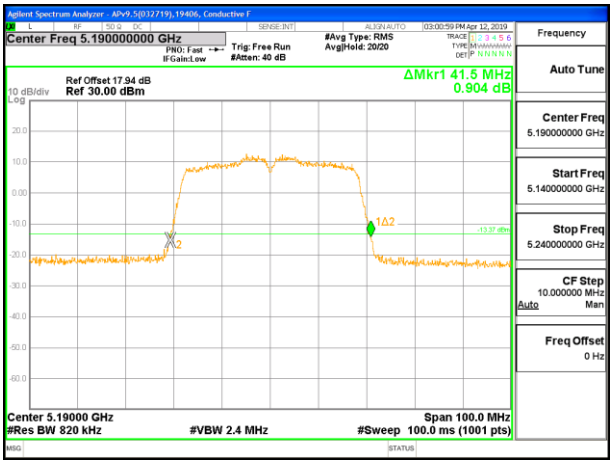
HIGH CHANNEL

2TX Antenna 6 + Antenna 5 CDD MODE

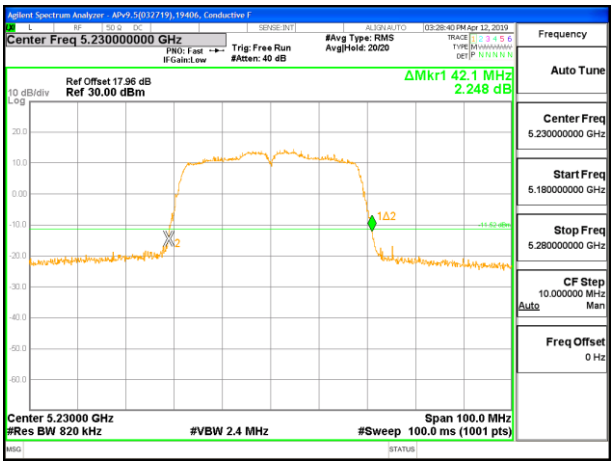
Channel	Frequency (MHz)	26 dB Bandwidth ANT 6 (MHz)	26 dB Bandwidth ANT 5 (MHz)
Low	5190	42.40	41.50
High	5230	42.10	41.70



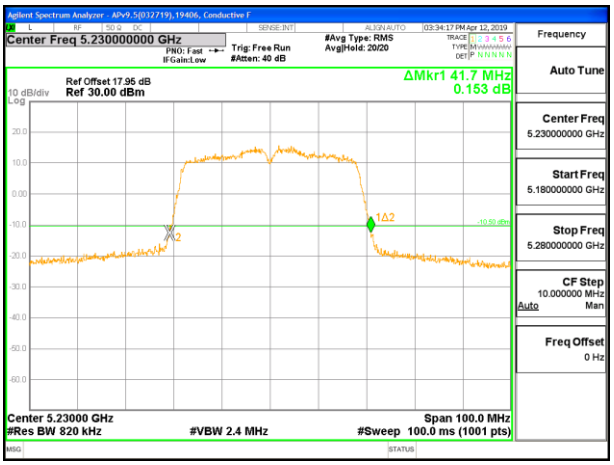
LOW CHANNEL ANT 6



LOW CHANNEL ANT 5



HIGH CHANNEL ANT 6

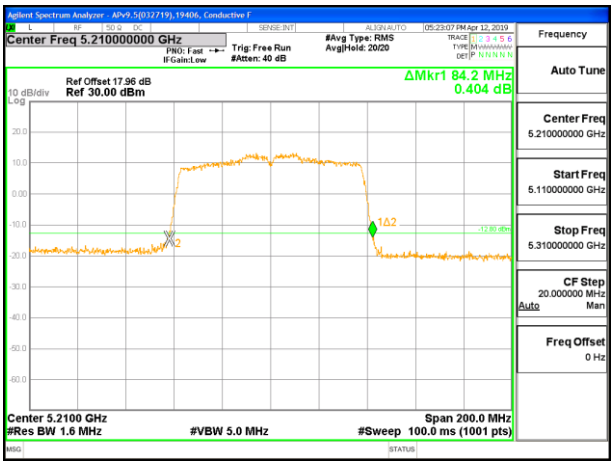


HIGH CHANNEL ANT 5

8.2.3. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND

1TX Antenna 6 MODE

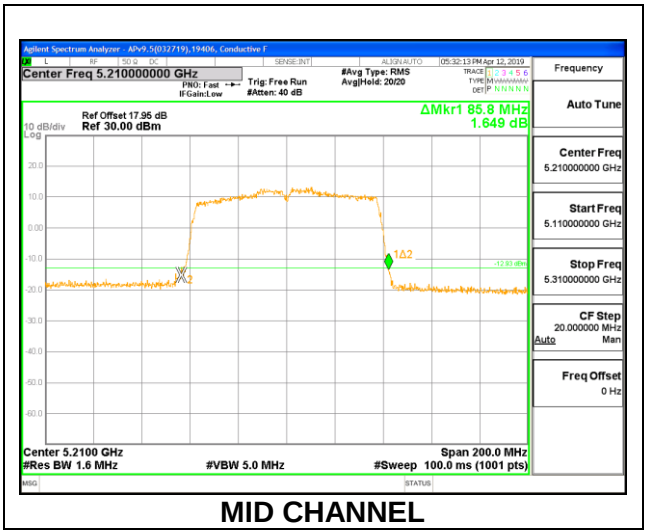
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Mid	5210	84.20



MID CHANNEL

1TX Antenna 5 MODE

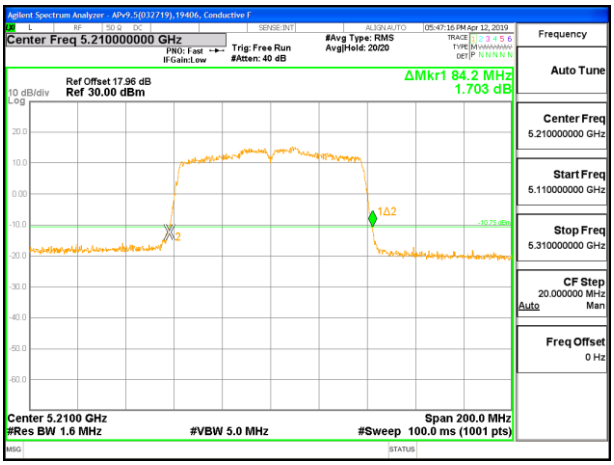
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Mid	5210	85.80



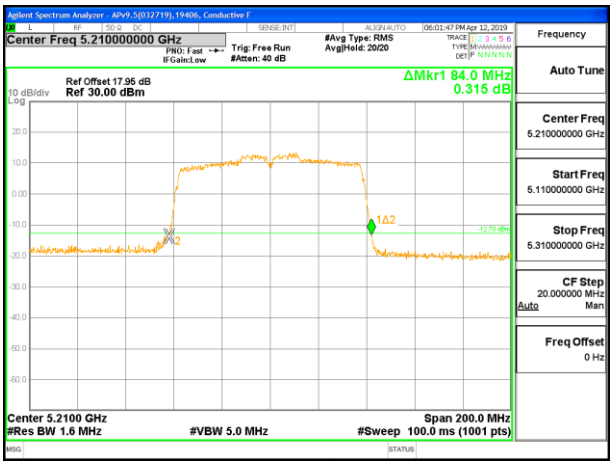
MID CHANNEL

2TX Antenna 6 + Antenna 5 CDD MODE

Channel	Frequency (MHz)	26 dB Bandwidth ANT 6 (MHz)	26 dB Bandwidth ANT 5 (MHz)
Mid	5210	84.20	84.00



MID CHANNEL ANT 6

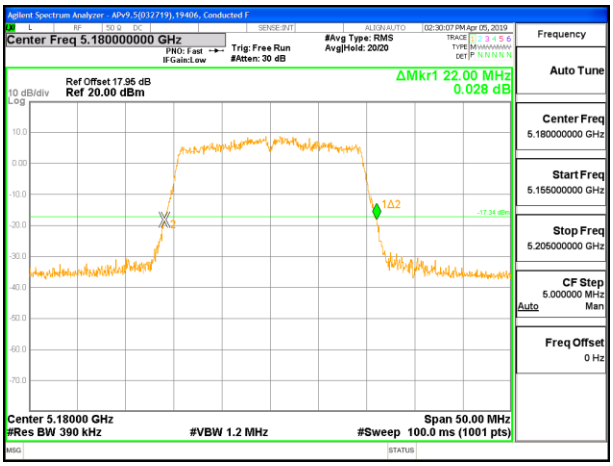


MID CHANNEL ANT 5

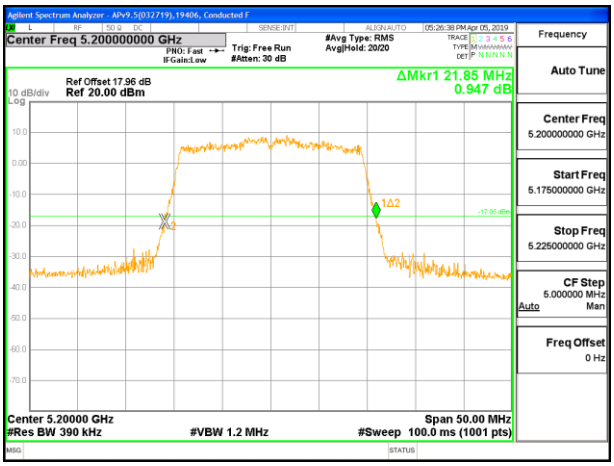
8.2.4. 802.11ax HE20 MODE IN THE 5.2 GHz BAND

1TX Antenna 6 MODE – 242-Tones, RU Index 61

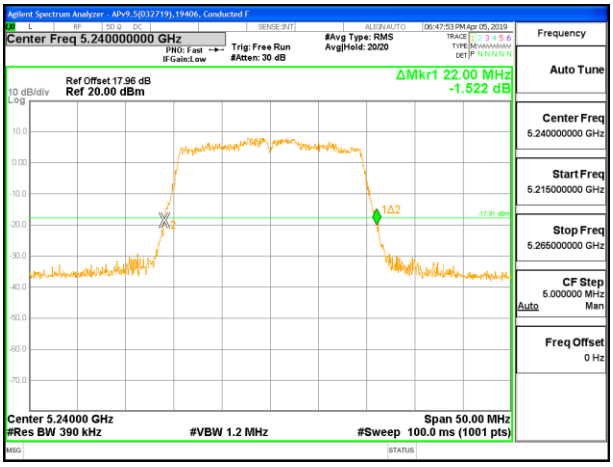
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	22.00
Mid	5200	21.85
High	5240	22.00



LOW CHANNEL



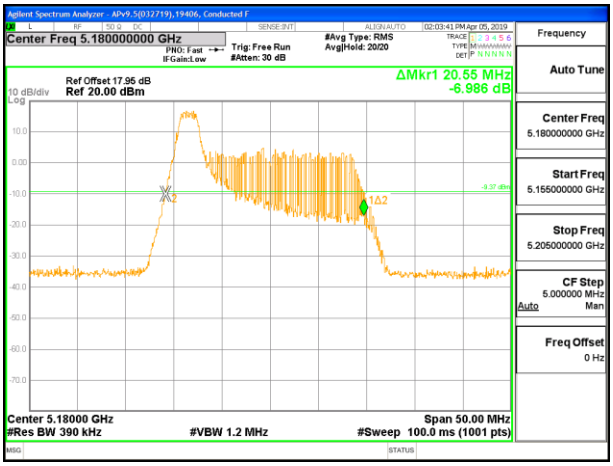
MID CHANNEL



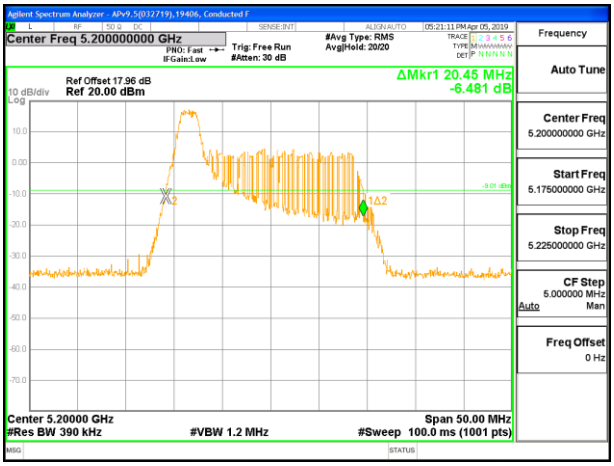
HIGH CHANNEL

1TX Antenna 6 MODE – 26-Tones, RU Index 0

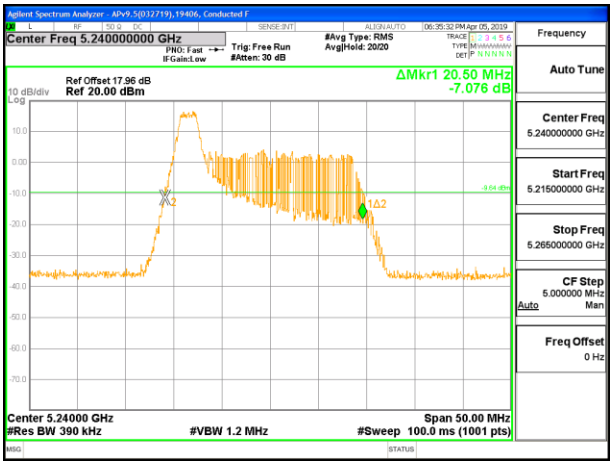
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	20.55
Mid	5200	20.45
High	5240	20.50



LOW CHANNEL



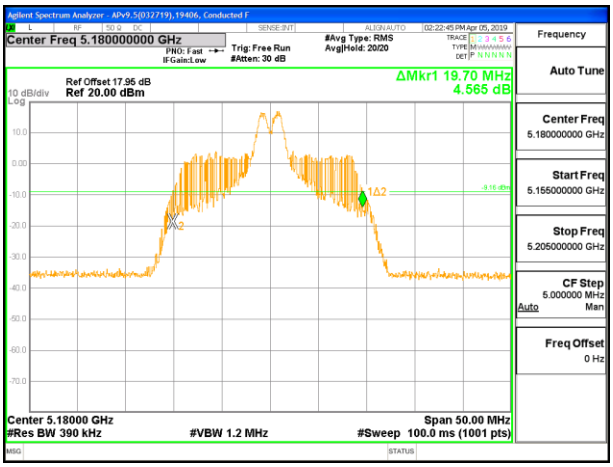
MID CHANNEL



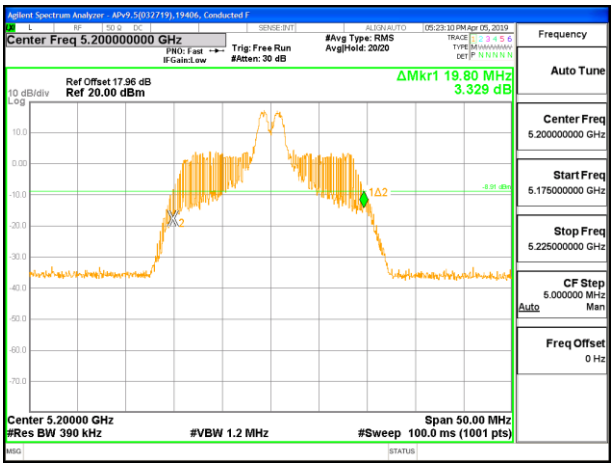
HIGH CHANNEL

1TX Antenna 6 MODE – 26-Tones, RU Index 4

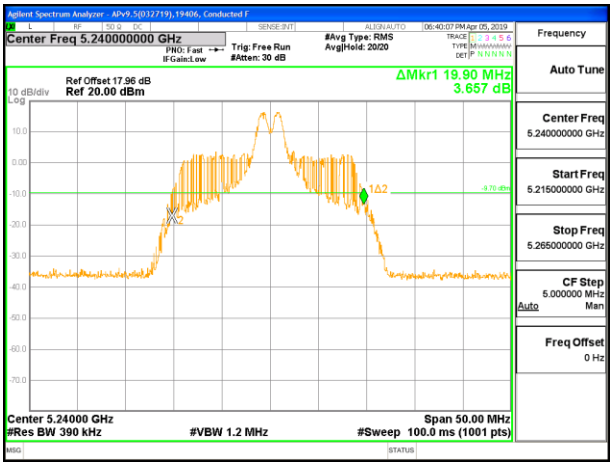
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	19.70
Mid	5200	19.80
High	5240	19.90



LOW CHANNEL



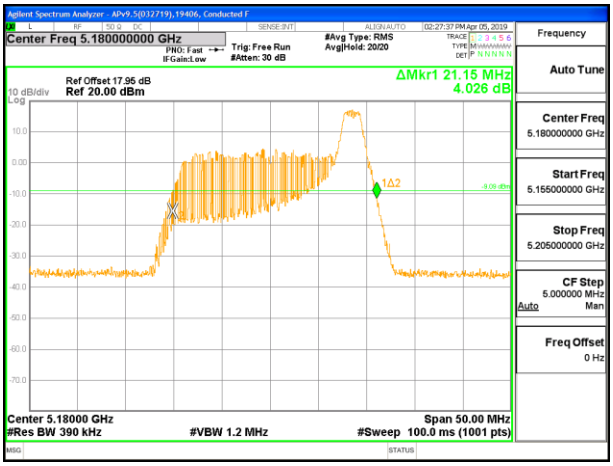
MID CHANNEL



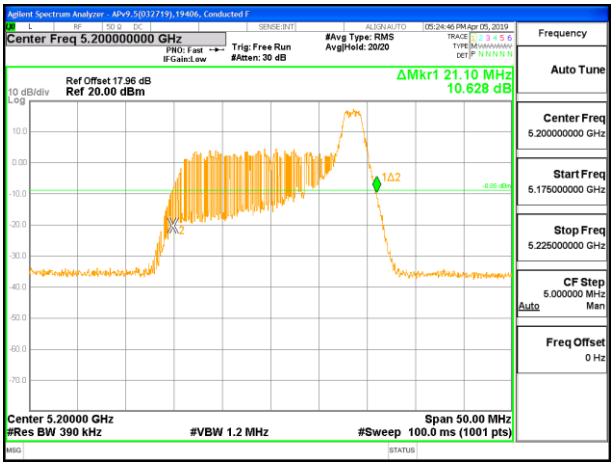
HIGH CHANNEL

1TX Antenna 6 MODE – 26-Tones, RU Index 8

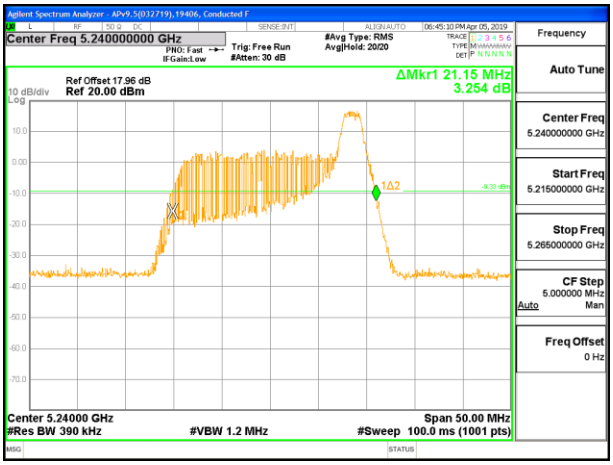
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	21.15
Mid	5200	21.10
High	5240	21.15



LOW CHANNEL



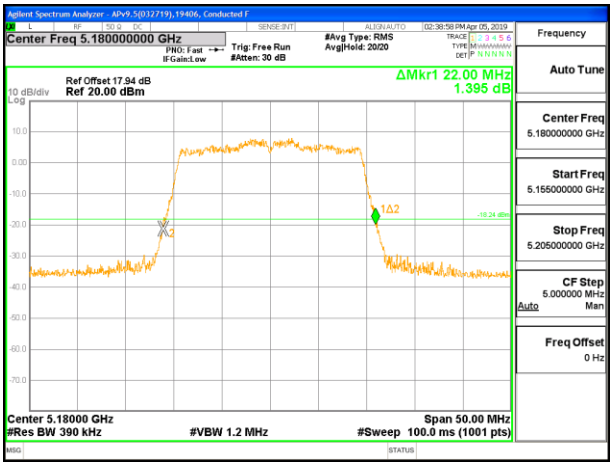
MID CHANNEL



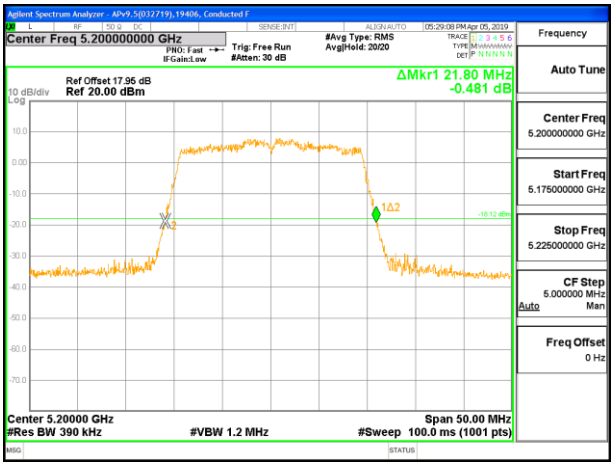
HIGH CHANNEL

1TX Antenna 5 MODE – 242-Tones, RU Index 61

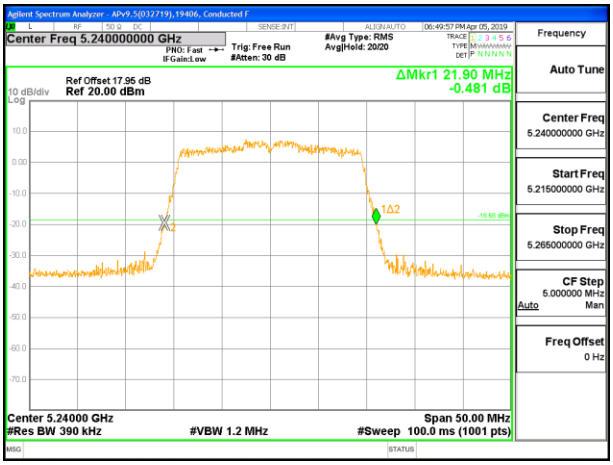
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	22.00
Mid	5200	21.80
High	5240	21.90



LOW CHANNEL



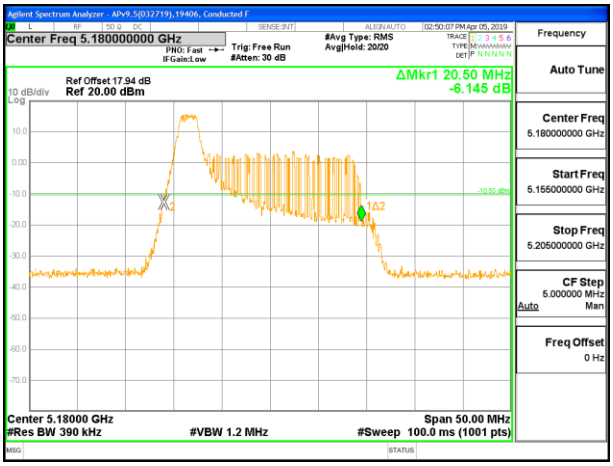
MID CHANNEL



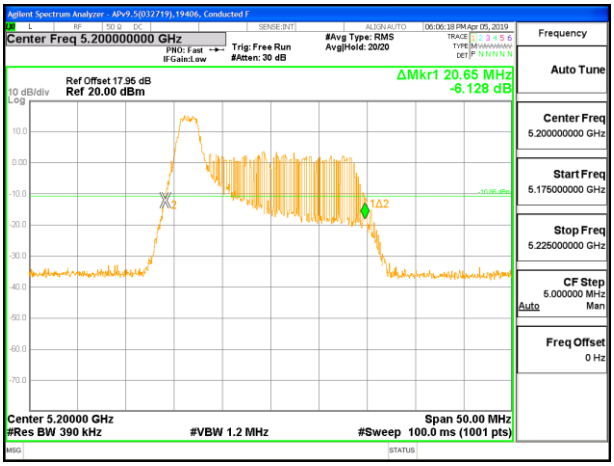
HIGH CHANNEL

1TX Antenna 5 MODE – 26-Tones, RU Index 0

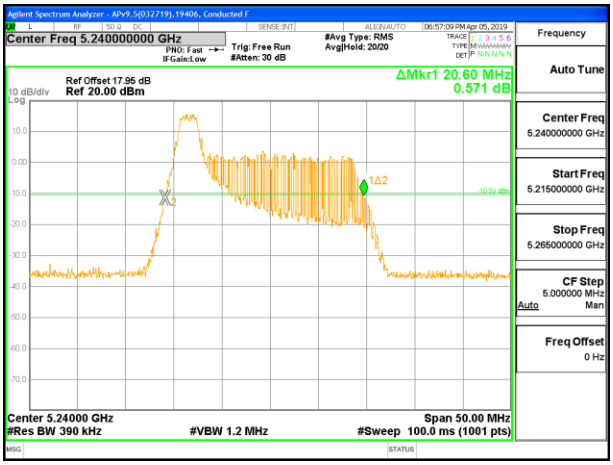
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	20.50
Mid	5200	20.65
High	5240	20.60



LOW CHANNEL



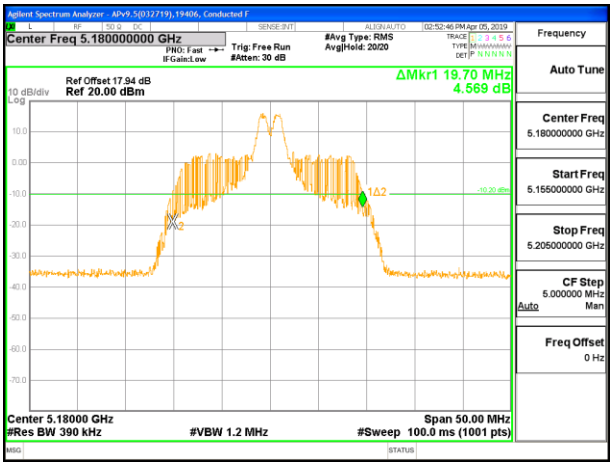
MID CHANNEL



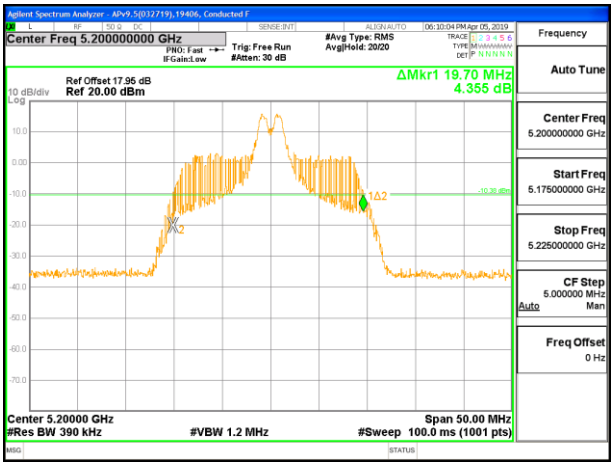
HIGH CHANNEL

1TX Antenna 5 MODE – 26-Tones, RU Index 4

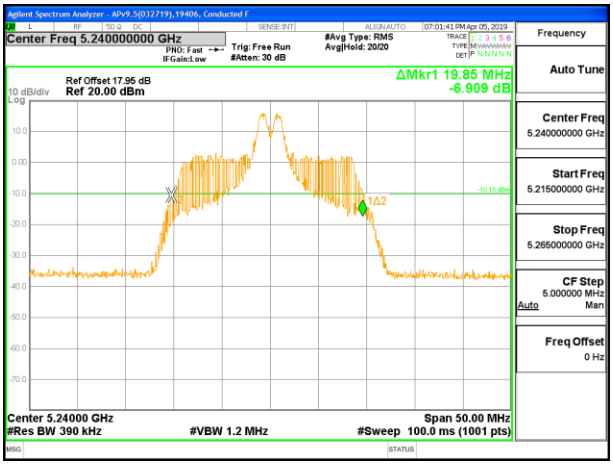
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	19.70
Mid	5200	19.70
High	5240	19.85



LOW CHANNEL



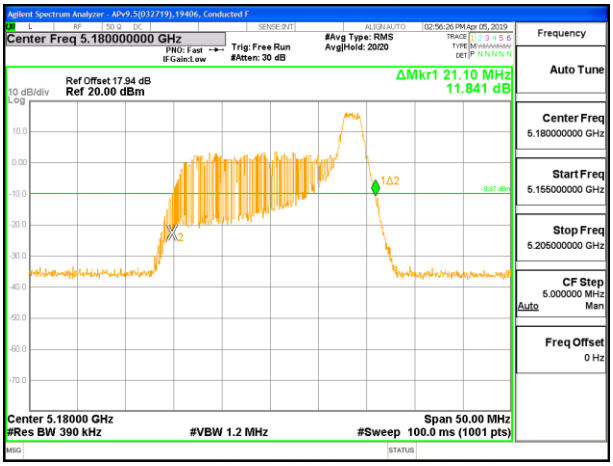
MID CHANNEL



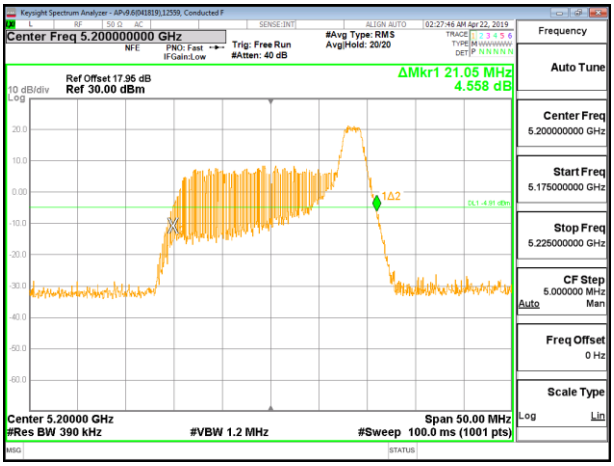
HIGH CHANNEL

1TX Antenna 5 MODE – 26-Tones, RU Index 8

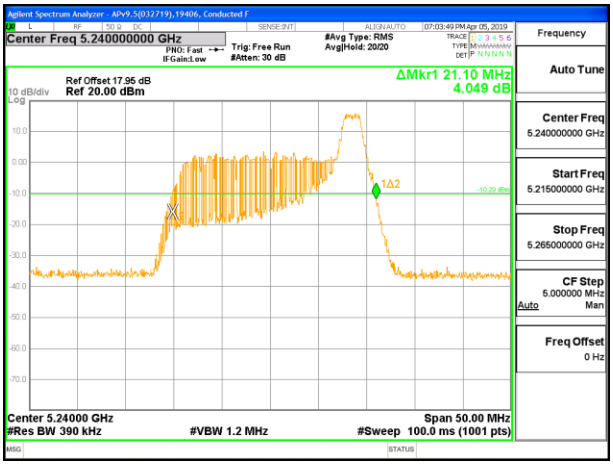
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	21.10
Mid	5200	21.05
High	5240	21.10



LOW CHANNEL



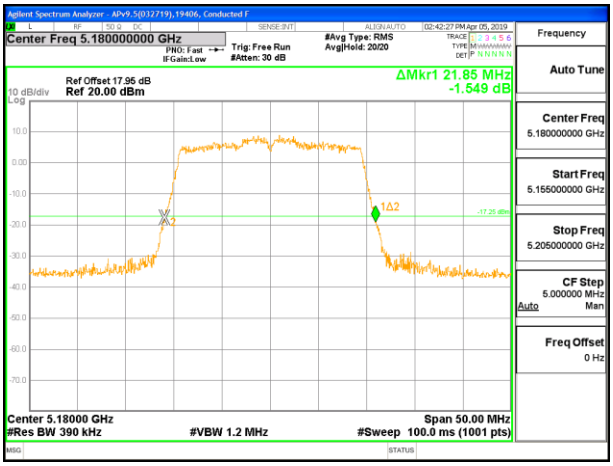
MID CHANNEL



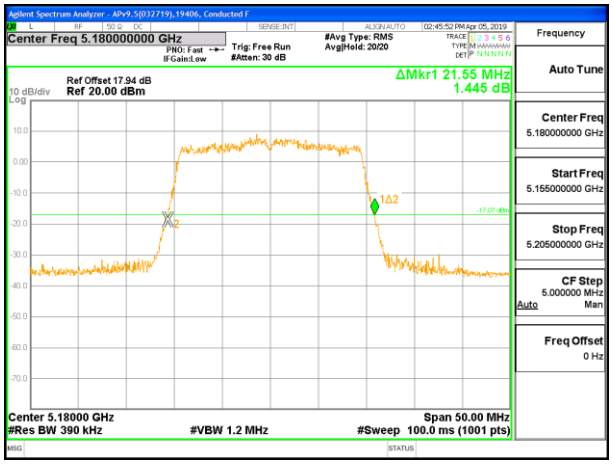
HIGH CHANNEL

2TX Antenna 6 + Antenna 5 OFDMA MODE – 242 Tones, RU Index 61

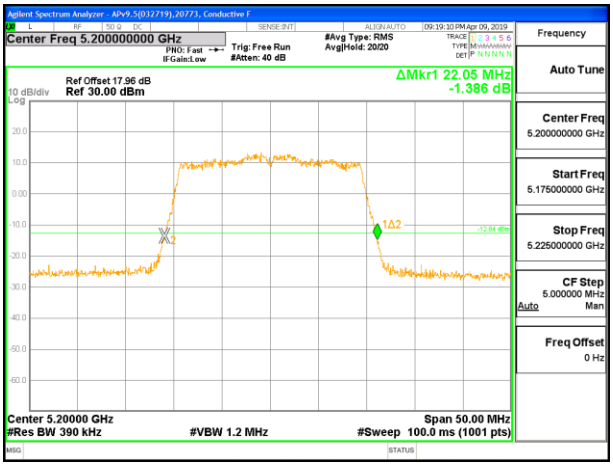
Channel	Frequency (MHz)	26 dB Bandwidth ANT 6 (MHz)	26 dB Bandwidth ANT 5 (MHz)
Low	5180	21.85	21.55
Mid	5200	22.05	21.60
High	5240	22.00	21.85



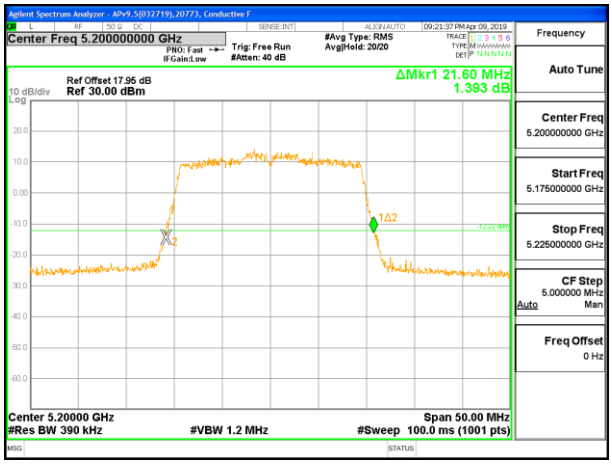
LOW CHANNEL ANT 6



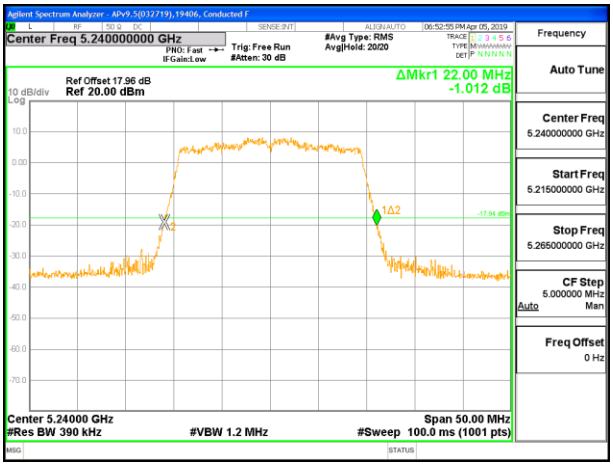
LOW CHANNEL ANT 5



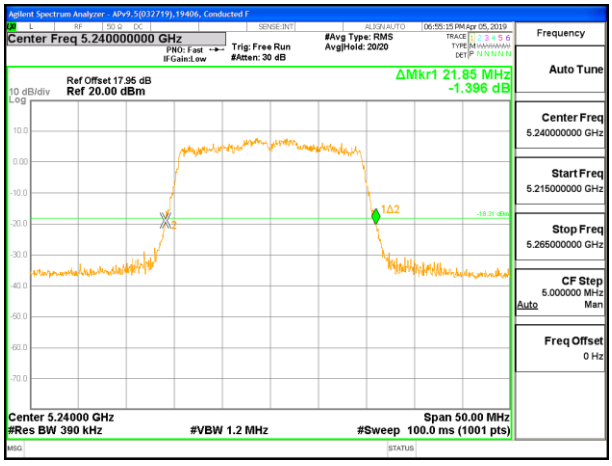
MID CHANNEL ANT 6



MID CHANNEL ANT 5



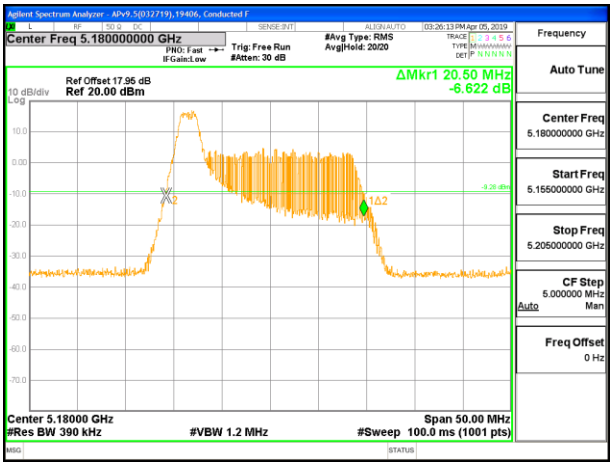
HIGH CHANNEL ANT 6



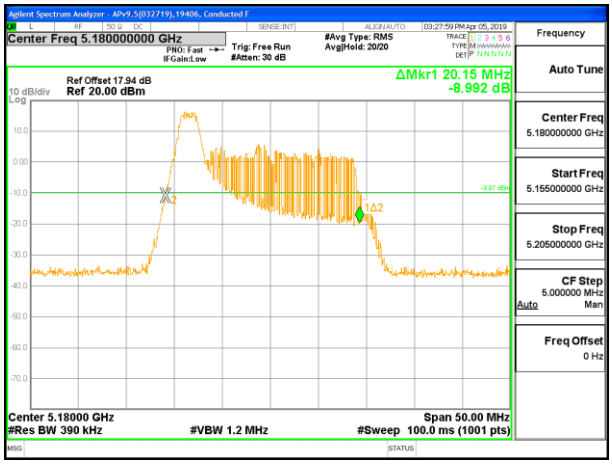
HIGH CHANNEL ANT 5

2TX Antenna 6 + Antenna 5 OFDMA MODE – 26 Tones, RU Index 0

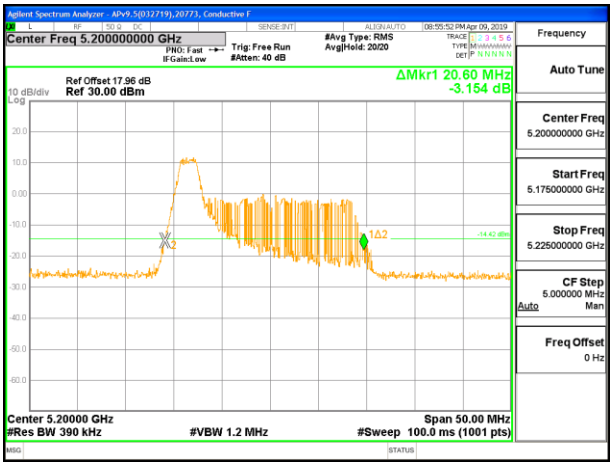
Channel	Frequency (MHz)	26 dB Bandwidth ANT 6 (MHz)	26 dB Bandwidth ANT 5 (MHz)
Low	5180	20.50	20.15
Mid	5200	20.60	20.05
High	5240	20.45	20.20



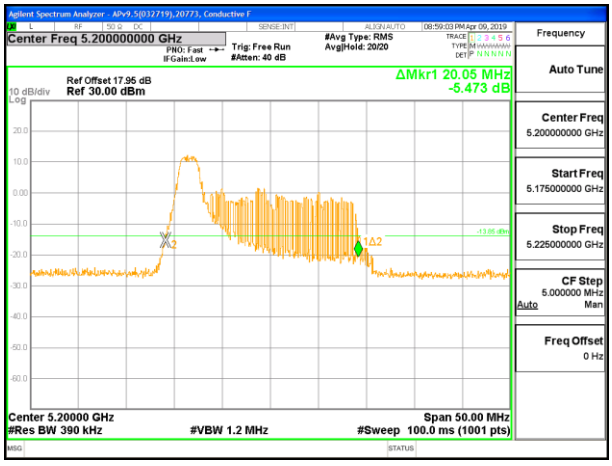
LOW CHANNEL ANT 6



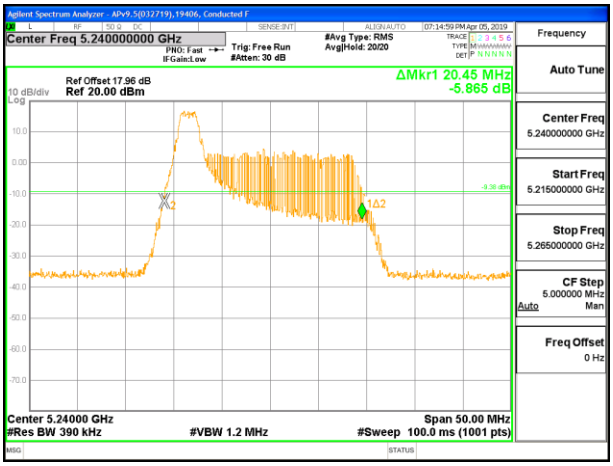
LOW CHANNEL ANT 5



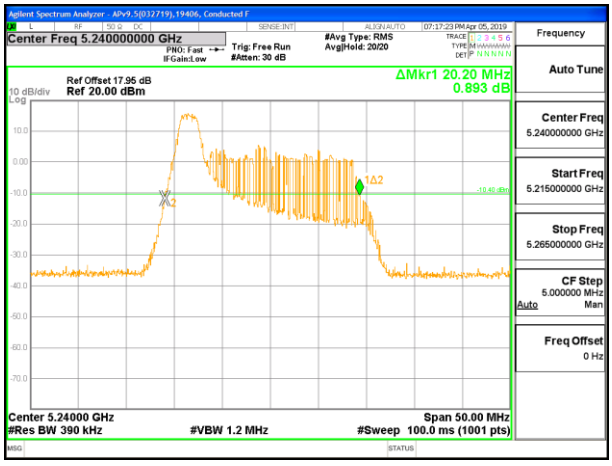
MID CHANNEL ANT 6



MID CHANNEL ANT 5



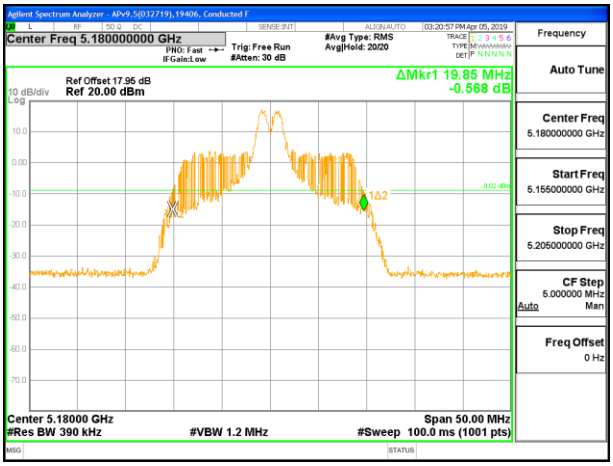
HIGH CHANNEL ANT 6



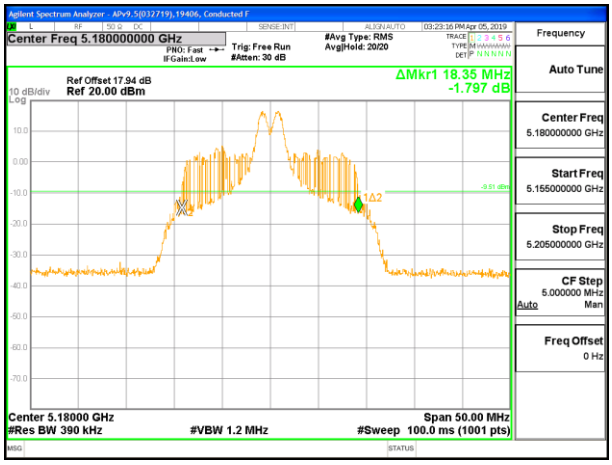
HIGH CHANNEL ANT 5

2TX Antenna 6 + Antenna 5 OFDMA MODE – 26 Tones, RU Index 4

Channel	Frequency (MHz)	26 dB Bandwidth ANT 6 (MHz)	26 dB Bandwidth ANT 5 (MHz)
Low	5180	19.85	18.35
Mid	5200	19.80	18.50
High	5240	19.60	18.35



LOW CHANNEL ANT 6



LOW CHANNEL ANT 5

MID CHANNEL ANT 6

MID CHANNEL ANT 5