CERTIFICATION TEST REPORT

Report Number. : 11934192-E2V3

Applicant	:	APPLE, INC. 1 INFINITE LOOP CUPERTINO, CA 95014, U.S.A.
Model	:	A1862
FCC ID	:	BCGA1862
EUT Description	:	DESKTOP COMPUTER
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART E

Date Of Issue:
December 07, 2017

Prepared by:
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NVLAP LAB CODE 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	11/15/2017	Initial Issue	Tri Pham
V2	11/28/2017	Addressed TCB questions	Tri Pham
V3	12/07/2017	Addressed TCB questions	Jin Li

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TABLE OF CONTENTS

REPORT REVISION HISTORY 2

TABLE OF CONTENTS 3

1. ATTESTATION OF TEST RESULTS 5

2. SUMMARY OF TESTING 6

2.1. FACILITIES AND ACCREDITATION 6

2.2. SUMMARY TABLE 6

2.3. TEST METHODOLOGY 6

2.4. CALIBRATION AND UNCERTAINTY 7
2.4.1. MEASURING INSTRUMENT CALIBRATION 7
2.4.2. SAMPLE CALCULATION 7
2.4.3. MEASUREMENT UNCERTAINTY 7

2.5. MEASUREMENT METHOD 8

2.6. TEST AND MEASUREMENT EQUIPMENT 9

3. EQUIPMENT UNDER TEST 10

3.1. DESCRIPTION OF EUT 10

3.2. MAXIMUM OUTPUT POWER 10

3.3. DESCRIPTION OF AVAILABLE ANTENNAS 14

3.4. WORST-CASE CONFIGURATION AND MODE 14

3.5. SOFTWARE AND FIRMWARE 14

3.6. DESCRIPTION OF TEST SETUP 15

4. ANTENNA PORT TEST RESULTS 19

4.1. ON TIME, DUTY CYCLE 19

4.2. 26 dB BANDWIDTH 31
4.2.1. 802.11n HT20 MODE IN THE 5.2 GHz BAND 31
4.2.2. 802.11n HT40 MODE IN THE 5.2 GHz BAND 61
4.2.3. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND 79
4.2.4. 802.11n HT20 MODE IN THE 5.3 GHz BAND 94
4.2.5. 802.11n HT40 MODE IN THE 5.3 GHz BAND 124
4.2.6. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND 142
4.2.7. 802.11n HT20 MODE IN THE 5.6 GHz BAND 157
4.2.8. 802.11n HT40 MODE IN THE 5.6 GHz BAND 190
4.2.9. 802.11ac VHT80 MODE IN THE 5.6 GHz BAND 223
4.2.10. 02.11n HT20 MODE IN THE 5.8 GHz BAND 253
4.2.11. 802.11n HT40 MODE IN THE 5.8 GHz BAND 283
4.2.12. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND 301

4.3. 99% BANDWIDTH 316
4.3.1. 802.11n HT20 MODE IN THE 5.2 GHz BAND 316
4.3.2. 802.11n HT40 MODE IN THE 5.2 GHz BAND 346
4.3.3. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND 364

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4.3.4. 802.11n HT20 MODE IN THE 5.3 GHz BAND 379
4.3.5. 802.11n HT40 MODE IN THE 5.3 GHz BAND 409
4.3.6. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND 427
4.3.7. 802.11n HT20 MODE IN THE 5.6 GHz BAND 442
4.3.8. 802.11n HT40 MODE IN THE 5.6 GHz BAND 475
4.3.9. 802.11ac VHT80 MODE IN THE 5.6 GHz BAND 508
4.3.10. 802.11n HT20 MODE IN THE 5.8 GHz BAND 538
4.3.11. 802.11n HT40 MODE IN THE 5.8 GHz BAND 568
4.3.12. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND 586

4.4. 6 dB BANDWIDTH 601
4.4.1. 802.11n HT20 MODE IN THE 5.8 GHz BAND 602
4.4.2. 802.11n HT40 MODE IN THE 5.8 GHz BAND 635
4.4.3. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND 665

4.5. OUTPUT POWER AND PSD 683
4.5.1. 802.11n HT20 MODE IN THE 5.2 GHz BAND 688
4.5.2. 802.11n HT40 MODE IN THE 5.2 GHz BAND 724
4.5.3. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND 757
4.5.4. 802.11n HT20 MODE IN THE 5.3 GHz BAND 787
4.5.5. 802.11n HT40 MODE IN THE 5.3 GHz BAND 825
4.5.6. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND 858
4.5.7. 802.11n HT20 MODE IN THE 5.6 GHz BAND 888
4.5.8. 802.11n HT40 MODE IN THE 5.6 GHz BAND 936
4.5.9. 802.11ac VHT80 MODE IN THE 5.6 GHz BAND 984
4.5.10. 802.11n HT20 MODE IN THE 5.8 GHz BAND 1021
4.5.11. 802.11n HT40 MODE IN THE 5.8 GHz BAND 1072
4.5.12. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND 1120

5. RADIATED TEST RESULTS 1156

5.1. TRANSMITTER ABOVE 1 GHz 1157
5.1.1. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.2 GHz BAND 1157
5.1.2. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.2 GHz BAND 1205
5.1.3. TX ABOVE 1 GHz 802.11ac VHT80 MODE IN THE 5.2 GHz BAND 1247
5.1.4. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.3 GHz BAND 1283
5.1.5. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.3 GHz BAND 1331
5.1.6. TX ABOVE 1 GHz 802.11ac VHT80 MODE IN THE 5.3 GHz BAND 1373
5.1.7. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.6 GHz BAND 1409
5.1.8. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.6 GHz BAND 1493
5.1.9. TX ABOVE 1 GHz 802.11ac VHT80 MODE IN THE 5.6 GHz BAND 1577
5.1.10. TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 5.8 GHz BAND 1655
5.1.11. TX ABOVE 1 GHz 802.11n HT40 MODE IN THE 5.8 GHz BAND 1733
5.1.12. TX ABOVE 1 GHz 802.11ac VHT80 MODE IN THE 5.8 GHz BAND 1805

5.2. Worst Case Below 1 GHz 1871

5.3. Worst Case 18-26 GHz 1873

5.4. Worst Case 26-40 GHz 1875

6. AC POWER LINE CONDUCTED EMISSIONS 1877

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE, INC.
1 INFINITE LOOP
CUPERTINO, CA 95014, U.S.A.

EUT DESCRIPTION: DESKTOP COMPUTER

MODEL: A1862

SERIAL NUMBER: C02TW087HR64 (CONDUCTED) C02VJ008GHVL (RADIATED)

DATE TESTED: AUGUST 17, 2017 – OCTOBER 10, 2017

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

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. 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 any government.

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2. SUMMARY OF TESTING

2.1. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, 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	47266 Benicia Street
☐ Chamber A (IC:2324B-1)	☒ Chamber D (IC: 22541-1)
☐ Chamber B (IC:2324B-2)	☒ Chamber E (IC: 22541-2)
☐ Chamber C (IC:2324B-3)	☐ Chamber F (IC: 22541-3)
	☐ Chamber G (IC: 22541-4)
	☐ Chamber H (IC: 22541-5)

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

2.2. SUMMARY TABLE

FCC Part Section	RSS Section	Test Description	Test Limit	Test Condition	Test Result
§15.407 (a)	RSS-247	Occupied Band width (26dB)	N/A	Conducted	Pass
§15.407	RSS-247 6.2.4	6dB Band width (5.8Ghz)	>500KHz		Pass
§15.407 (a)(1)	RSS-247 6.2	TX Cond. Power 5.15-5.25 GHz	<24dBm (FCC) / <23 dBm EIRP or <10+10Log(99% BW) EIRP (IC)		Pass
§15.407 (a)(2)	RSS-247 6.2	TX Cond. Power 5.25-5.35 & 5.47-5.725 GHz	<24dBm or <11+10log (OBW) (FCC) / <24 dBm or <11+10Log(99% BW) (IC)		Pass
§15.407 (a)(3)	RSS-247 6.2.4	TX Cond. Power 5.725-5.850 GHz	<30dBm		Pass
§15.407 (a)(1)	RSS-247 6.2	PSD (5.15-5.25 GHz)	<11dBm/MHz (FCC) <10 dBm/MHz EIRP (IC)		Pass
§15.407 (a)(2)	RSS-247 6.2	PSD (5.3,5.5GHz)	<11dBm/MHz		Pass
§15.407 (a)(3)	RSS-247 6.2.4	PSD (5.8GHz)	<30dBm per 500kHz		
§15.207 (a) §15.407(b) (6)	RSS-GEN 8.8	AC Power Line conducted emissions	Section 10		Pass
§15.407 (b) & 15.209	RSS-GEN 8.9/7	Radiated Spurious Emission	<54dBuV/m	Radiated	Pass

2.3. 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/D04 v01/D06 v02/ D07v02, FCC KDB 789033 D02 v01r04, FCC KDB 644545 D03 v01, ANSI C63.10-2013.

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2.4. CALIBRATION AND UNCERTAINTY

2.4.1. 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.

2.4.2. SAMPLE CALCULATION

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

2.4.3. 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	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB
Occupied Channel Bandwidth	±0.39 %
Time	±0.02 %

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

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2.5. MEASUREMENT METHOD

On Time and Duty Cycle: KDB 789033 D02 v01r04, Section B.

6 dB Emission BW: KDB 789033 D02 v01r04, Section C.

6 dB Emission BW: KDB 789033 D02 v01r04, Section C.

26 dB Emission BW: KDB 789033 D02 v01r04, Section C.

99% Occupied BW: KDB 789033 D02 v01r04, Section D.

Conducted Output Power: KDB 789033 D02 v01r04, Section E.3.b (Method PM-G).

Power Spectral Density: KDB 789033 D02 v01r04, Section F (Method SA-2).

Unwanted emissions in restricted bands: KDB 789033 D02 v01r04, Sections G.3, G.4, G.5, and G.6.

Unwanted emissions in non-restricted bands: KDB 789033 D02 v01r04, Sections G.3, G.4, and G.5.

Conducted line emissions: C63.10, Clause 6.2

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2.6. 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**	**Asset**	**Cal Due**
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T711	1/30/2018
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T740	11/29/17
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T340	12/14/2017
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T346	3/28/2018
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	T900	5/31/2018
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T741	11/29/2017
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T285	6/24/2018
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T906	2/14/2018
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T119	3/28/2018
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T742	11/29/2017
Spectrum Analyzer, PSA, 3Hz to 44GHz	Agilent (Keysight) Technologies	E4446A	T177	03/20/2018
Power Meter, P-series single channel	Keysight	N1912A	T1244	6/15/2018
Power Sensor	Keysight	N1921A	T1224	1/31/2018
Pre-Amp 18-26GHz	Agilent Technology	8449B	T404	7/23/2018
Antenna Horn, 18 to 26GHz	ARA	MWH-1826	T89	1/04/2018
Amplifier 26-40Ghz	Miteq	NSP 4000 SP2	T88	4/29/2018
Antenna Horn 26-40GHz	ARA	MWH-2640	T90	8/25/2018
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T459	6/22/2018
AC Line Conducted				
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	T1436	01/06/2018
Power Cable, Line Conducted Emissions	UL	PG1	T861	8/31/2018
LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2-01	T1310	06/15/2018
UL AUTOMATION SOFTWARE				
Radiated Software	UL	UL EMC	Ver 9.5, April 26, 2016	
Conducted Software	UL	UL EMC	Ver 5.4, October 13, 2016	
AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015	

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3. EQUIPMENT UNDER TEST

3.1. DESCRIPTION OF EUT

The Apple iMac Pro is a desktop computer, with 27-inch Retina display, storage media, multimedia functions, IEEE 802.11a/b/g/n/ac radio and Bluetooth radio.

3.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

5.2 GHz BAND

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.2 GHz band, 1TX			
5180-5240	802.11a	Covered by 802.11n HT20 SISO	
5180-5240	802.11n HT20	19.91	97.95
5190-5230	802.11n HT40	19.50	89.13
5180-5240	802.11ac VHT20	Covered by 802.11n HT20 SISO	
5190-5230	802.11ac VHT40	Covered by 802.11n HT40 SISO	
5210	802.11ac VHT80	10.45	11.09
5.2 GHz band, 2TX			
5180-5240	802.11n HT20 CDD	19.46	88.31
5180-5240	802.11n HT20 SDM	19.90	97.72
5180-5240	802.11n HT20 STBC	Covered by 802.11n HT20 2TX CDD	
5180-5240	802.11n HT20 TXBF	19.47	88.51
5190-5230	802.11n HT40 CDD	20.89	122.74
5190-5230	802.11n HT40 SDM	20.91	123.31
5190-5230	802.11n HT40 STBC	Covered by 802.11n HT40 2TX CDD	
5190-5230	802.11n HT40 TXBF	20.89	122.74
5180-5240	802.11ac VHT20 CDD	Covered by 802.11n HT20 2TX CDD	
5180-5240	802.11ac VHT20 SDM	Covered by 802.11n HT20 2TX CDD	
5180-5240	802.11ac VHT20 STBC	Covered by 802.11n HT20 2TX CDD	
5180-5240	802.11ac VHT20 TXBF	Covered by 802.11n HT20 2TX CDD	
5190-5230	802.11ac VHT40 CDD	Covered by 802.11n HT40 2TX CDD	
5190-5230	802.11ac VHT40 SDM	Covered by 802.11n HT40 2TX CDD	
5190-5230	802.11ac VHT40 STBC	Covered by 802.11n HT40 2TX CDD	
5190-5230	802.11ac VHT40 TXBF	Covered by 802.11n HT40 2TX CDD	
5210	802.11ac VHT80 CDD	12.45	17.58
5210	802.11ac VHT80 SDM	12.43	17.50
5210	802.11ac VHT80 STBC	Covered by 802.11n VHT80 2TX CDD	
5210	802.11ac VHT80 TXBF	10.95	12.45
5.2 GHz band, 3TX			
5180-5240	802.11n HT20 CDD	18.43	69.66
5180-5240	802.11n HT20 SDM	19.98	99.54
5180-5240	802.11n HT20 STBC	Covered by 802.11n HT20 3TX CDD	
5180-5240	802.11n HT20 TXBF	18.48	70.47
5190-5230	802.11n HT40 CDD	20.64	115.88
5190-5230	802.11n HT40 SDM	21.65	146.22
5190-5230	802.11n HT40 STBC	Covered by 802.11n HT40 3TX CDD	
5190-5230	802.11n HT40 TXBF	20.68	116.95
5180-5240	802.11ac VHT20 CDD	Covered by 802.11n HT20 3TX CDD	
5180-5240	802.11ac VHT20 SDM	Covered by 802.11n HT20 3TX CDD	
5180-5240	802.11ac VHT20 STBC	Covered by 802.11n HT20 3TX CDD	
5180-5240	802.11ac VHT20 TXBF	Covered by 802.11n HT20 3TX CDD	
5190-5230	802.11ac VHT40 CDD	Covered by 802.11n HT40 3TX CDD	
5190-5230	802.11ac VHT40 SDM	Covered by 802.11n HT40 3TX CDD	
5190-5230	802.11ac VHT40 STBC	Covered by 802.11n HT40 3TX CDD	
5190-5230	802.11ac VHT40 TXBF	Covered by 802.11n HT40 3TX CDD	
5210	802.11ac VHT80 CDD	13.62	23.01
5210	802.11ac VHT80 SDM	13.65	23.17
5210	802.11ac VHT80 STBC	Covered by 802.11n VHT80 3TX CDD	
5210	802.11ac VHT80 TXBF	12.63	18.32

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5.3 GHz BAND

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.3 GHz band, 1TX			
5260 - 5320	802.11a	Covered by 802.11n HT20 SISO	
5260 - 5320	802.11n HT20	19.88	97.27
5270 - 5310	802.11n HT40	19.43	87.70
5260 - 5320	802.11ac VHT20	Covered by 802.11n HT20 SISO	
5270 - 5310	802.11ac VHT40	Covered by 802.11n HT40 SISO	
5290	802.11ac VHT80	10.92	12.36
5.3 GHz band, 2TX			
5260 - 5320	802.11n HT20 CDD	19.98	99.54
5260 - 5320	802.11n HT20 SDM	19.91	97.95
5260 - 5320	802.11n HT20 STBC	Covered by 802.11n HT20 2TX CDD	
5260 - 5320	802.11n HT20 TXBF	19.98	99.54
5270 - 5310	802.11n HT40 CDD	20.90	123.03
5270 - 5310	802.11n HT40 SDM	20.89	122.74
5270 - 5310	802.11n HT40 STBC	Covered by 802.11n HT40 2TX CDD	
5270 - 5310	802.11n HT40 TXBF	20.93	123.88
5260 - 5320	802.11ac VHT20 CDD	Covered by 802.11n HT20 2TX CDD	
5260 - 5320	802.11ac VHT20 SDM	Covered by 802.11n HT20 2TX CDD	
5260 - 5320	802.11ac VHT20 STBC	Covered by 802.11n HT20 2TX CDD	
5260 - 5320	802.11ac VHT20 TXBF	Covered by 802.11n HT20 2TX CDD	
5270 - 5310	802.11ac VHT40 CDD	Covered by 802.11n HT40 2TX CDD	
5270 - 5310	802.11ac VHT40 SDM	Covered by 802.11n HT40 2TX CDD	
5270 - 5310	802.11ac VHT40 STBC	Covered by 802.11n HT40 2TX CDD	
5270 - 5310	802.11ac VHT40 TXBF	Covered by 802.11n HT40 2TX CDD	
5290	802.11ac VHT80 CDD	12.42	17.46
5290	802.11ac VHT80 SDM	12.42	17.46
5290	802.11ac VHT80 STBC	Covered by 802.11n VHT80 2TX CDD	
5290	802.11ac VHT80 TXBF	11.40	13.80
5.3 GHz band, 3TX			
5260 - 5320	802.11n HT20 CDD	18.47	70.31
5260 - 5320	802.11n HT20 SDM	19.98	99.54
5260 - 5320	802.11n HT20 STBC	Covered by 802.11n HT20 3TX CDD	
5260 - 5320	802.11n HT20 TXBF	18.45	69.98
5270 - 5310	802.11n HT40 CDD	20.54	113.24
5270 - 5310	802.11n HT40 SDM	21.60	144.54
5270 - 5310	802.11n HT40 STBC	Covered by 802.11n HT40 3TX CDD	
5270 - 5310	802.11n HT40 TXBF	20.72	118.03
5260 - 5320	802.11ac VHT20 CDD	Covered by 802.11n HT20 3TX CDD	
5260 - 5320	802.11ac VHT20 SDM	Covered by 802.11n HT20 3TX CDD	
5260 - 5320	802.11ac VHT20 STBC	Covered by 802.11n HT20 3TX CDD	
5260 - 5320	802.11ac VHT20 TXBF	Covered by 802.11n HT20 3TX CDD	
5270 - 5310	802.11ac VHT40 CDD	Covered by 802.11n HT40 3TX CDD	
5270 - 5310	802.11ac VHT40 SDM	Covered by 802.11n HT40 3TX CDD	
5270 - 5310	802.11ac VHT40 STBC	Covered by 802.11n HT40 3TX CDD	
5270 - 5310	802.11ac VHT40 TXBF	Covered by 802.11n HT40 3TX CDD	
5290	802.11ac VHT80 CDD	13.63	23.07
5290	802.11ac VHT80 SDM	13.67	23.28
5290	802.11ac VHT80 STBC	Covered by 802.11n VHT80 3TX CDD	
5290	802.11ac VHT80 TXBF	13.16	20.70

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5.6 GHz BAND

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.6 GHz band, 1TX			
5500-5720	802.11a	Covered by 802.11n HT20 SISO	
5500-5720	802.11n HT20	19.73	93.97
5510-5710	802.11n HT40	21.61	144.88
5500-5720	802.11ac VHT20	Covered by 802.11n HT20 SISO	
5510-5710	802.11ac VHT40	Covered by 802.11n HT40 SISO	
5530-5690	802.11ac VHT80	21.93	155.96
5.6 GHz band, 2TX			
5500-5720	802.11n HT20 CDD	19.72	93.76
5500-5720	802.11n HT20 SDM	19.74	94.19
5500-5720	802.11n HT20 STBC	Covered by 802.11n HT20 2TX CDD	
5500-5720	802.11n HT20 TXBF	19.71	93.54
5510-5710	802.11n HT40 CDD	21.63	145.55
5510-5710	802.11n HT40 SDM	22.36	172.19
5510-5710	802.11n HT40 STBC	Covered by 802.11n HT40 2TX CDD	
5510-5710	802.11n HT40 TXBF	21.56	143.22
5500-5720	802.11ac VHT20 CDD	Covered by 802.11n HT20 2TX CDD	
5500-5720	802.11ac VHT20 SDM	Covered by 802.11n HT20 2TX CDD	
5500-5720	802.11ac VHT20 STBC	Covered by 802.11n HT20 2TX CDD	
5500-5720	802.11ac VHT20 TXBF	Covered by 802.11n HT20 2TX CDD	
5510-5710	802.11ac VHT40 CDD	Covered by 802.11n HT40 2TX CDD	
5510-5710	802.11ac VHT40 SDM	Covered by 802.11n HT40 2TX CDD	
5510-5710	802.11ac VHT40 STBC	Covered by 802.11n HT40 2TX CDD	
5510-5710	802.11ac VHT40 TXBF	Covered by 802.11n HT40 2TX CDD	
5530-5690	802.11ac VHT80 CDD	23.85	242.66
5530-5690	802.11ac VHT80 SDM	23.95	248.31
5530-5690	802.11ac VHT80 STBC	Covered by 802.11n VHT80 2TX CDD	
5530-5690	802.11ac VHT80 TXBF	23.81	240.44
5.6 GHz band, 3TX			
5500-5720	802.11n HT20 CDD	18.47	70.31
5500-5720	802.11n HT20 SDM	19.71	93.54
5500-5720	802.11n HT20 STBC	Covered by 802.11n HT20 2TX CDD	
5500-5720	802.11n HT20 TXBF	18.46	70.15
5510-5710	802.11n HT40 CDD	21.20	131.83
5510-5710	802.11n HT40 SDM	22.09	161.81
5510-5710	802.11n HT40 STBC	Covered by 802.11n HT40 2TX CDD	
5510-5710	802.11n HT40 TXBF	21.20	131.83
5500-5720	802.11ac VHT20 CDD	Covered by 802.11n HT20 2TX CDD	
5500-5720	802.11ac VHT20 SDM	Covered by 802.11n HT20 2TX CDD	
5500-5720	802.11ac VHT20 STBC	Covered by 802.11n HT20 2TX CDD	
5500-5720	802.11ac VHT20 TXBF	Covered by 802.11n HT20 2TX CDD	
5510-5710	802.11ac VHT40 CDD	Covered by 802.11n HT40 2TX CDD	
5510-5710	802.11ac VHT40 SDM	Covered by 802.11n HT40 2TX CDD	
5510-5710	802.11ac VHT40 STBC	Covered by 802.11n HT40 2TX CDD	
5510-5710	802.11ac VHT40 TXBF	Covered by 802.11n HT40 2TX CDD	
5530-5690	802.11ac VHT80 CDD	23.95	248.31
5530-5690	802.11ac VHT80 SDM	23.58	228.03
5530-5690	802.11ac VHT80 STBC	Covered by 802.11n VHT80 2TX CDD	
5530-5690	802.11ac VHT80 TXBF	22.26	168.27

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5.8 GHz BAND

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.8 GHz band, 1TX			
5745-5825	802.11a	Covered by 802.11n HT20 SISO	
5745-5825	802.11n HT20	21.98	157.76
5755-5795	802.11n HT40	18.91	77.80
5745-5825	802.11ac VHT20	Covered by 802.11n HT20 SISO	
5755-5795	802.11ac VHT40	Covered by 802.11n HT40 SISO	
5775	802.11ac VHT80	21.96	157.04
5.8 GHz band, 2TX			
5745-5825	802.11n HT20 CDD	24.94	311.89
5745-5825	802.11n HT20 SDM	24.90	309.03
5745-5825	802.11n HT20 STBC	Covered by 802.11n HT20 2TX CDD	
5745-5825	802.11n HT20 TXBF	24.96	313.33
5755-5795	802.11n HT40 CDD	20.91	123.31
5755-5795	802.11n HT40 SDM	20.91	123.31
5755-5795	802.11n HT40 STBC	Covered by 802.11n HT40 2TX CDD	
5755-5795	802.11n HT40 TXBF	20.94	124.17
5745-5825	802.11ac VHT20 CDD	Covered by 802.11n HT20 2TX CDD	
5745-5825	802.11ac VHT20 SDM	Covered by 802.11n HT20 2TX CDD	
5745-5825	802.11ac VHT20 STBC	Covered by 802.11n HT20 2TX CDD	
5745-5825	802.11ac VHT20 TXBF	Covered by 802.11n HT20 2TX CDD	
5755-5795	802.11ac VHT40 CDD	Covered by 802.11n HT40 2TX CDD	
5755-5795	802.11ac VHT40 SDM	Covered by 802.11n HT40 2TX CDD	
5755-5795	802.11ac VHT40 STBC	Covered by 802.11n HT40 2TX CDD	
5755-5795	802.11ac VHT40 TXBF	Covered by 802.11n HT40 2TX CDD	
5775	802.11ac VHT80 CDD	24.40	275.42
5775	802.11ac VHT80 SDM	24.72	296.48
5775	802.11ac VHT80 STBC	Covered by 802.11n VHT80 2TX CDD	
5775	802.11ac VHT80 TXBF	24.44	277.97
5.8 GHz band, 3TX			
5745-5825	802.11n HT20 CDD	26.64	461.32
5745-5825	802.11n HT20 SDM	26.66	463.45
5745-5825	802.11n HT20 STBC	Covered by 802.11n HT20 3TX CDD	
5745-5825	802.11n HT20 TXBF	26.68	465.59
5755-5795	802.11n HT40 CDD	22.62	182.81
5755-5795	802.11n HT40 SDM	22.67	184.93
5755-5795	802.11n HT40 STBC	Covered by 802.11n HT40 3TX CDD	
5755-5795	802.11n HT40 TXBF	22.63	183.23
5745-5825	802.11ac VHT20 CDD	Covered by 802.11n HT20 3TX CDD	
5745-5825	802.11ac VHT20 SDM	Covered by 802.11n HT20 3TX CDD	
5745-5825	802.11ac VHT20 STBC	Covered by 802.11n HT20 3TX CDD	
5745-5825	802.11ac VHT20 TXBF	Covered by 802.11n HT20 3TX CDD	
5755-5795	802.11ac VHT40 CDD	Covered by 802.11n HT40 3TX CDD	
5755-5795	802.11ac VHT40 SDM	Covered by 802.11n HT40 3TX CDD	
5755-5795	802.11ac VHT40 STBC	Covered by 802.11n HT40 3TX CDD	
5755-5795	802.11ac VHT40 TXBF	Covered by 802.11n HT40 3TX CDD	
5775	802.11ac VHT80 CDD	23.47	222.33
5775	802.11ac VHT80 SDM	24.45	278.61
5775	802.11ac VHT80 STBC	Covered by 802.11n VHT80 3TX CDD	
5775	802.11ac VHT80 TXBF	23.62	230.14

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3.3. DESCRIPTION OF AVAILABLE ANTENNAS

Antenan Num	Peak Gain 5150-5250 MHz	Peak Gain 5250-5350 MHz	Peak Gain 5470-5725 MHz	Peak Gain 5725-5850 MHz
WF4	2.8	2.2	1.8	1.0
WF3	1.8	2.3	1.3	1.4
WF2	4.2	3.9	4.2	3.1

3.4. WORST-CASE CONFIGURATION AND MODE

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 CDD mode among the CDD/STBC/SDM/BF 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 set to transmit at highest power on Low/Middle/High channels.

Radiated emissions below 30MHz, below 1GHz, above 18GHz and power line conducted emissions were performed with the EUT transmits at the channel with the highest output power as worst-case scenario.

All radiated testing was performed with the EUT in normal use orientation.

Worst-case data rates as provided by the client were:

802.11a mode: 6 Mbps
802.11n HT20 mode: MCS0
802.11n HT40 mode: MCS0
802.11ac VHT20 mode: MCS0
802.11ac VHT40 mode: MCS0
802.11ac VHT80 mode: MCS0

3.5. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 9.30.121.47

The test utility software used during testing (r711441 WLTEST) FWID 01-f52a9c20

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701J
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
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3.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Keyboard	Apple	A1243	CC2420202BHDPQVAV	N/A
Mouse	Apple	A1152	CC23304069XDNYPA0	N/A

I/O CABLES (Conducted Test)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Antenna	4	SMA	Un-Shielded	0.2	N/A
2	AC	1	120Vac	Un-Shielded	3	N/A

I/O CABLES (Radiated Test)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
2	AC	1	120Vac	Un-Shielded	3	N/A

TEST SETUP

The EUT was power by AC Source. Test software exercised the EUT.

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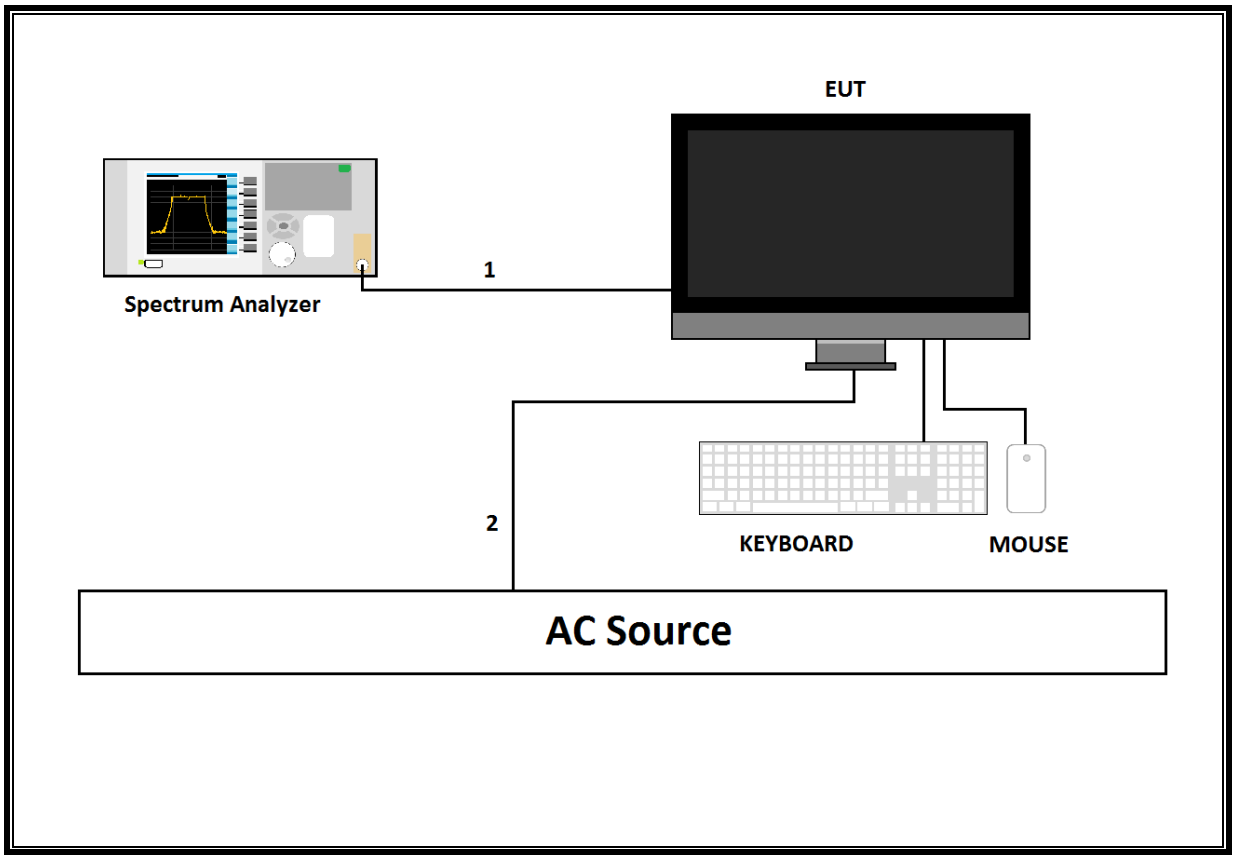
SETUP DIAGRAM FOR CONDUCTED TESTS



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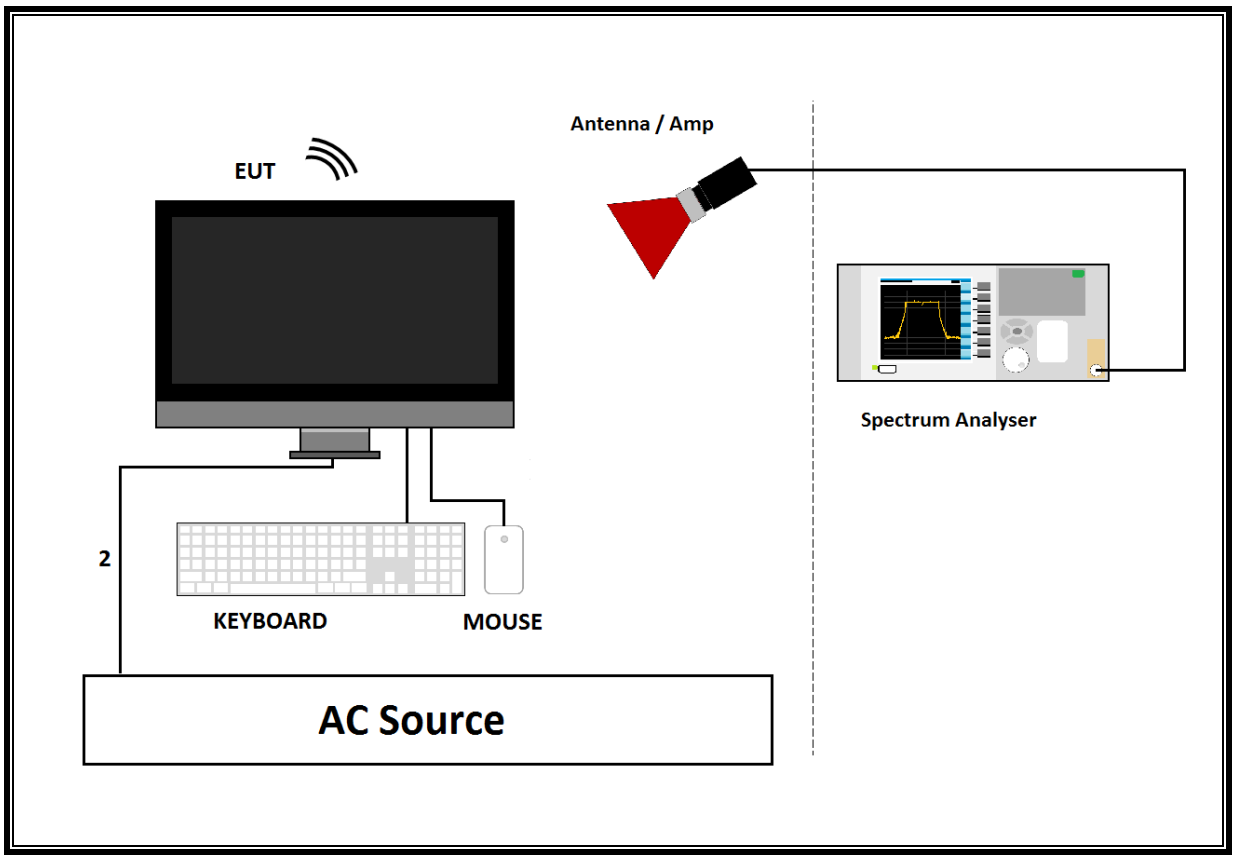
SETUP DIAGRAM FOR RADIATED TESTS



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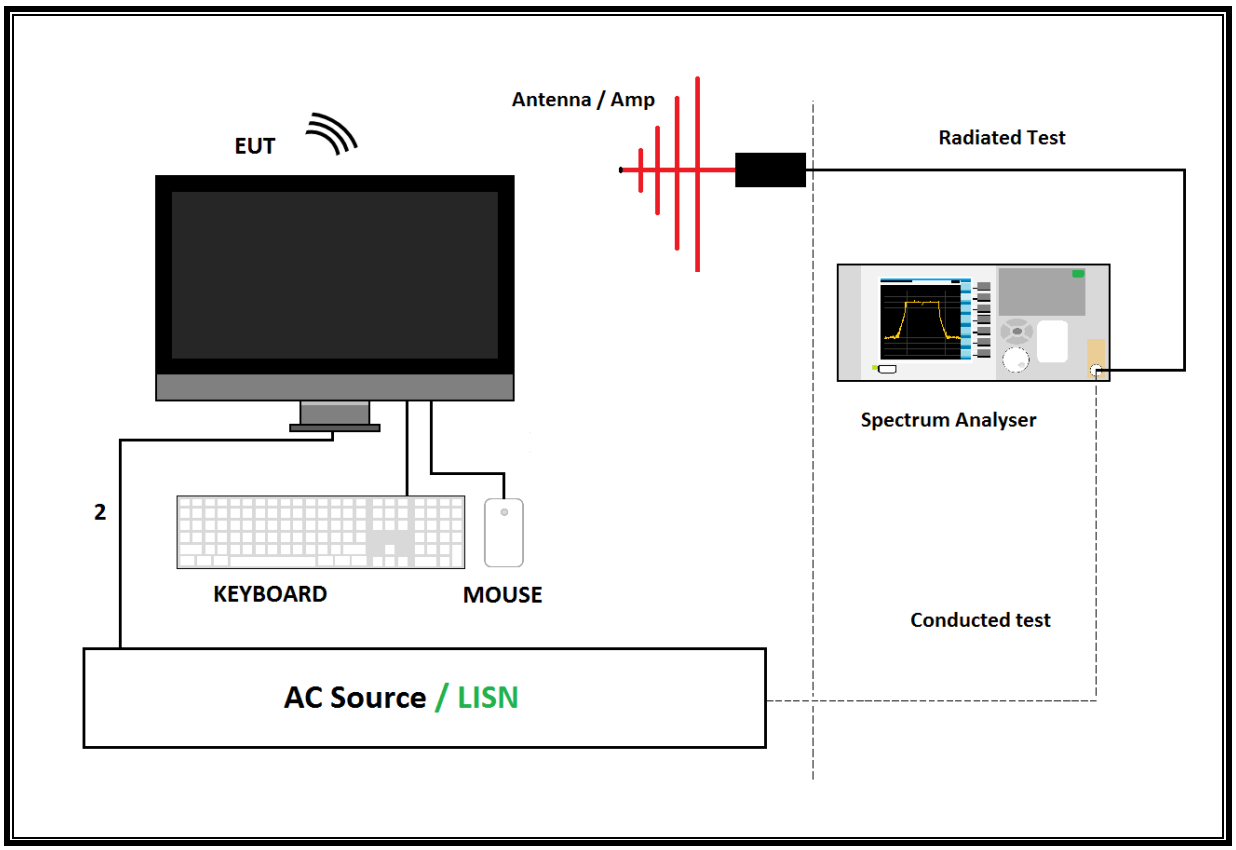
SETUP DIAGRAM FOR BELOW 1GHz AND LINE CONDUCTED TEST



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4. ANTENNA PORT TEST RESULTS

4.1. ON TIME, DUTY CYCLE

ON TIME AND DUTY CYCLE

PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

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	1.860	1.960	0.949	94.90%	0.23	0.538
802.11n HT20 CDD 2TX	1.860	1.960	0.949	94.90%	0.23	0.538
802.11n HT20 CDD 3TX	1.860	1.960	0.949	94.90%	0.23	0.538
802.11n HT40 1TX	0.944	0.964	0.979	97.93%	0.09	1.059
802.11n HT40 CDD 2TX	0.496	0.517	0.959	95.94%	0.18	2.016
802.11n HT40 CDD 3TX	0.353	0.373	0.945	94.50%	0.25	2.837
802.11ac VHT80 1TX	0.459	0.481	0.954	95.43%	0.20	2.179
802.11ac VHT80 CDD 2TX	0.256	0.277	0.926	92.59%	0.33	3.906
802.11ac VHT80 CDD 3TX	0.192	0.213	0.899	89.91%	0.46	5.222
802.11n HT20 SDM 2TX	1.860	1.960	0.949	94.90%	0.23	0.538
802.11n HT20 SDM 3TX	1.850	1.965	0.941	94.15%	0.26	0.541
802.11n HT40 SDM 2TX	0.495	0.529	0.936	93.57%	0.29	2.020
802.11n HT40 SDM 3TX	0.496	0.516	0.961	96.12%	0.17	2.016
802.11n VHT80 SDM 2TX	0.256	0.277	0.924	92.42%	0.34	3.906
802.11n VHT80 SDM 3TX	0.192	0.214	0.897	89.72%	0.47	5.208
802.11n HT20 BF 2TX	3.824	3.928	0.974	97.35%	0.12	0.262
802.11n HT20 BF 3TX	3.824	3.928	0.974	97.35%	0.12	0.262
802.11n HT40 BF 2TX	4.600	4.720	0.975	97.46%	0.11	0.217
802.11n HT40 BF 3TX	0.994	1.078	0.922	92.21%	0.35	1.006
802.11n VHT80 BF 2TX	5.050	5.400	0.935	93.52%	0.29	0.198
802.11n VHT80 BF 3TX	5.060	5.430	0.932	93.19%	0.31	0.198

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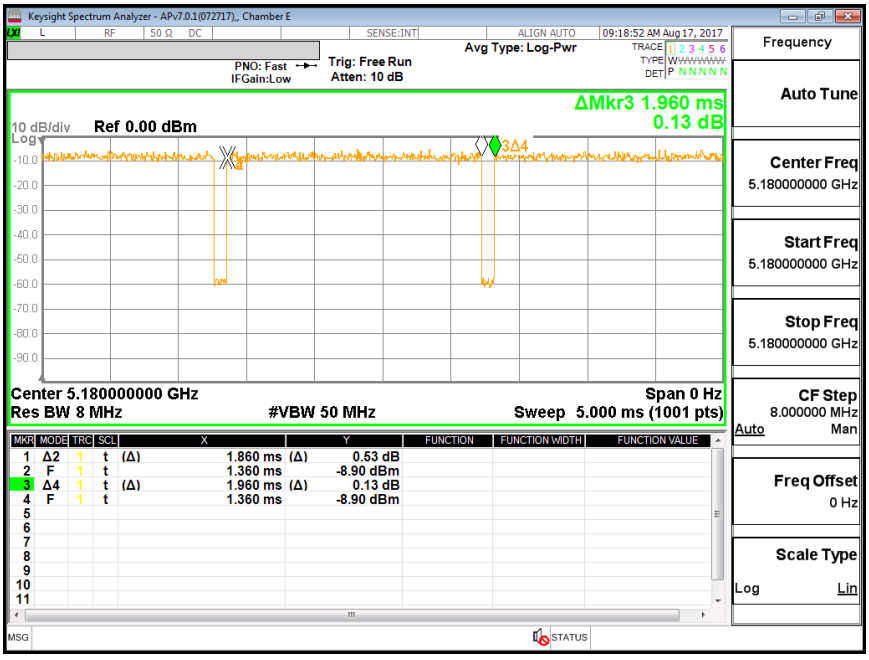
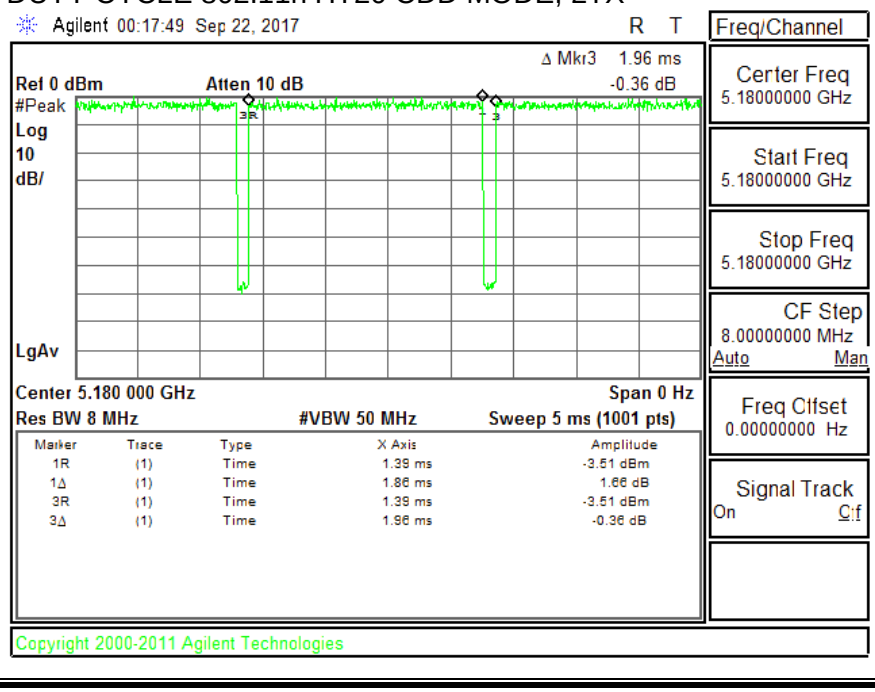
DUTY CYCLE PLOTS

DUTY CYCLE 802.11n HT20 1TX MODE



DUTY CYCLE 802.11n HT20 CDD MODE, 2TX



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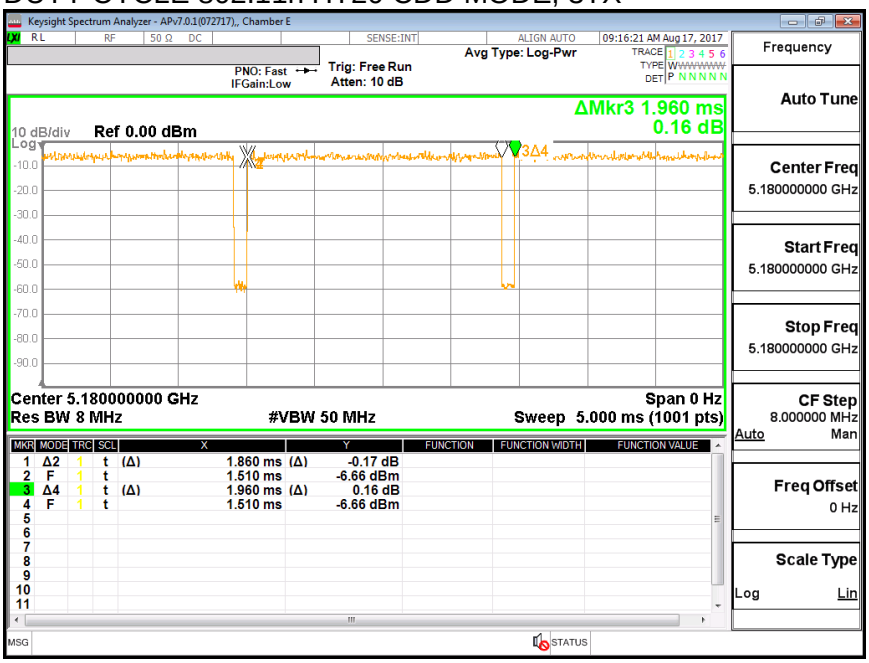
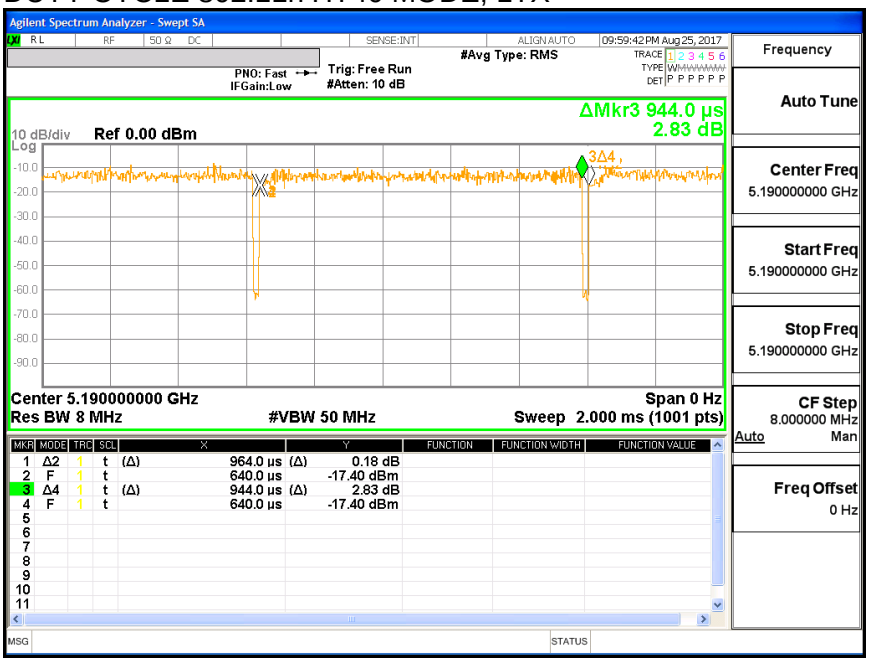
DUTY CYCLE 802.11n HT20 CDD MODE, 3TX



DUTY CYCLE 802.11n HT40 MODE, 1TX



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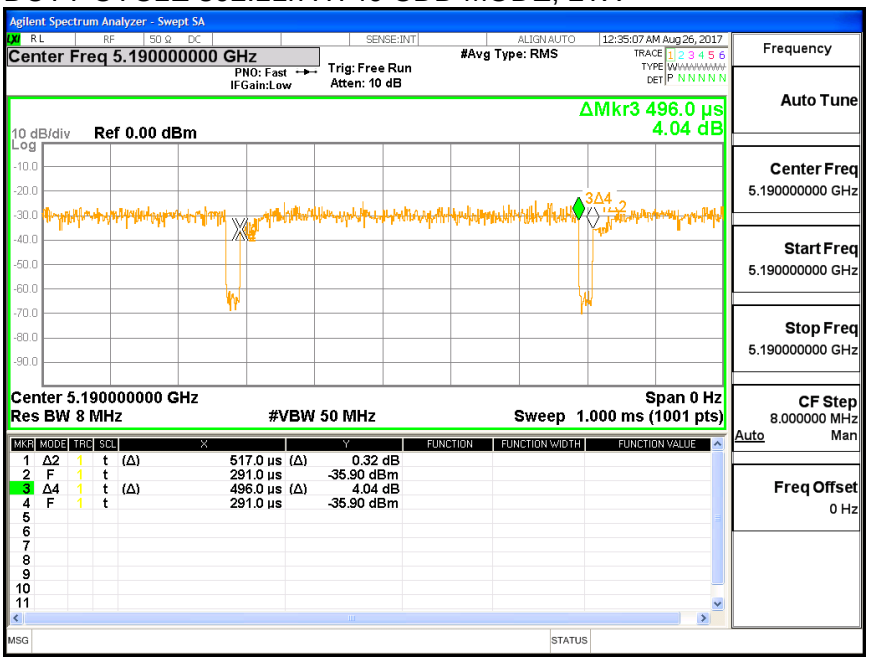
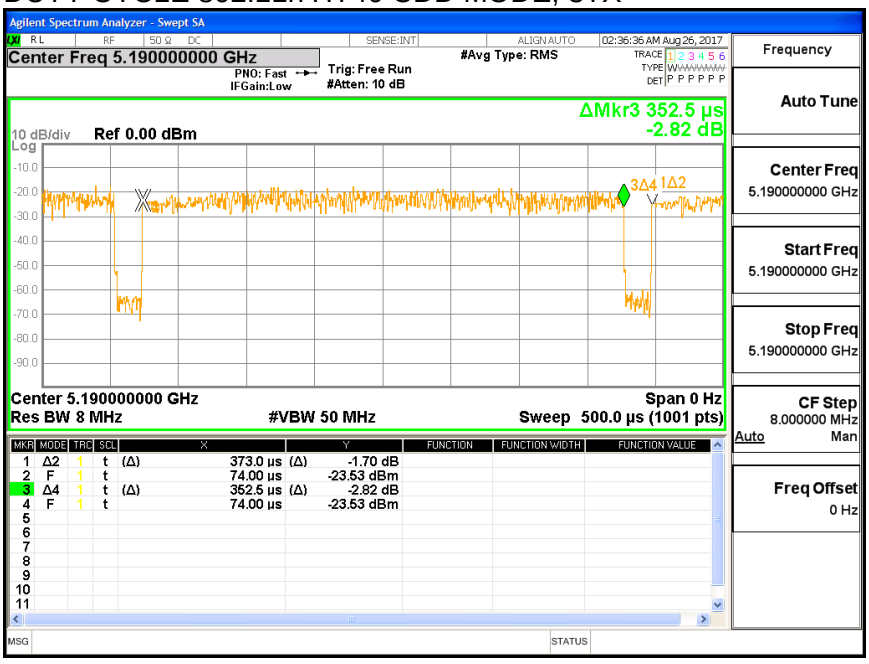
DUTY CYCLE 802.11n HT40 CDD MODE, 2TX



DUTY CYCLE 802.11n HT40 CDD MODE, 3TX



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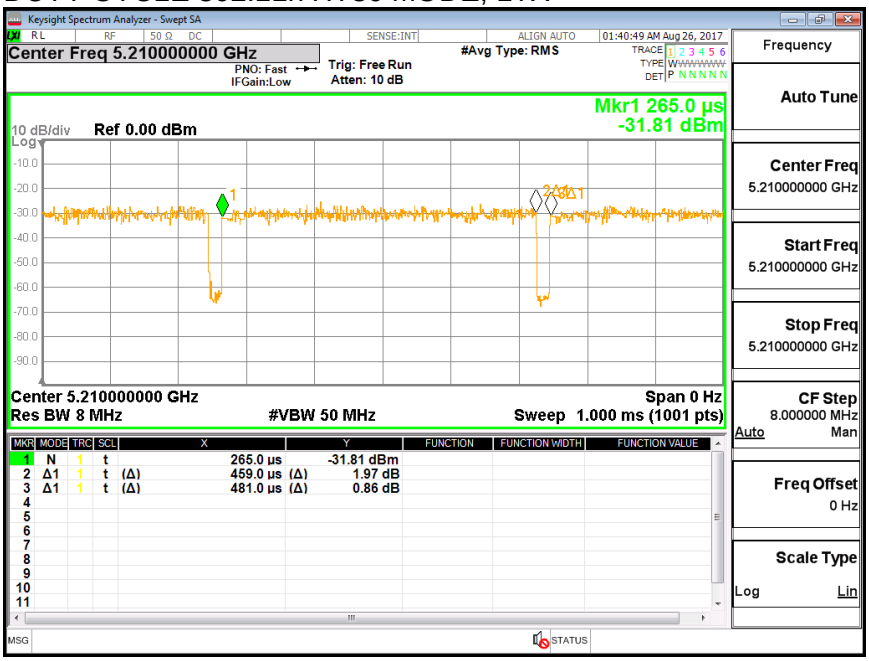
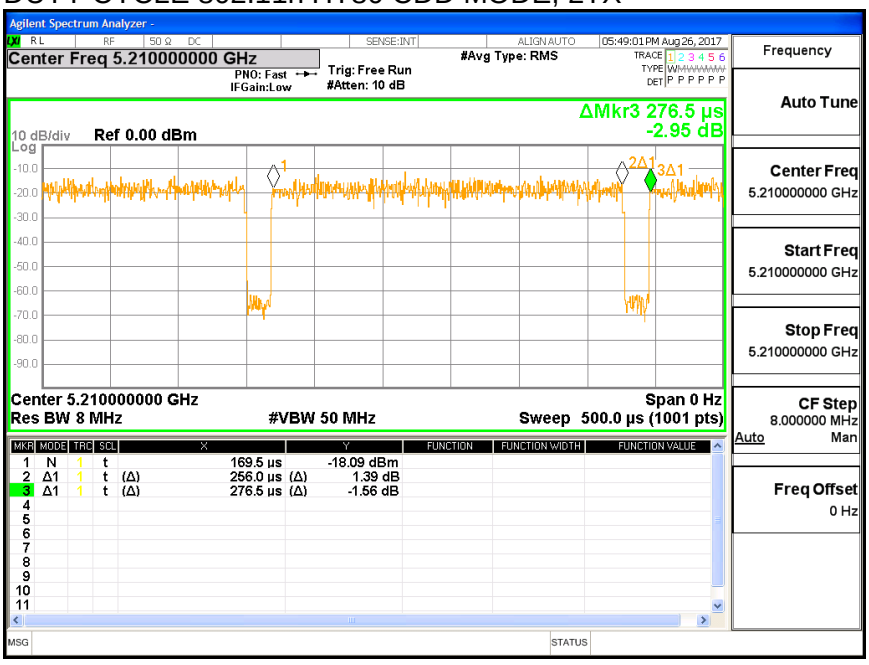
DUTY CYCLE 802.11n HT80 MODE, 1TX



DUTY CYCLE 802.11n HT80 CDD MODE, 2TX



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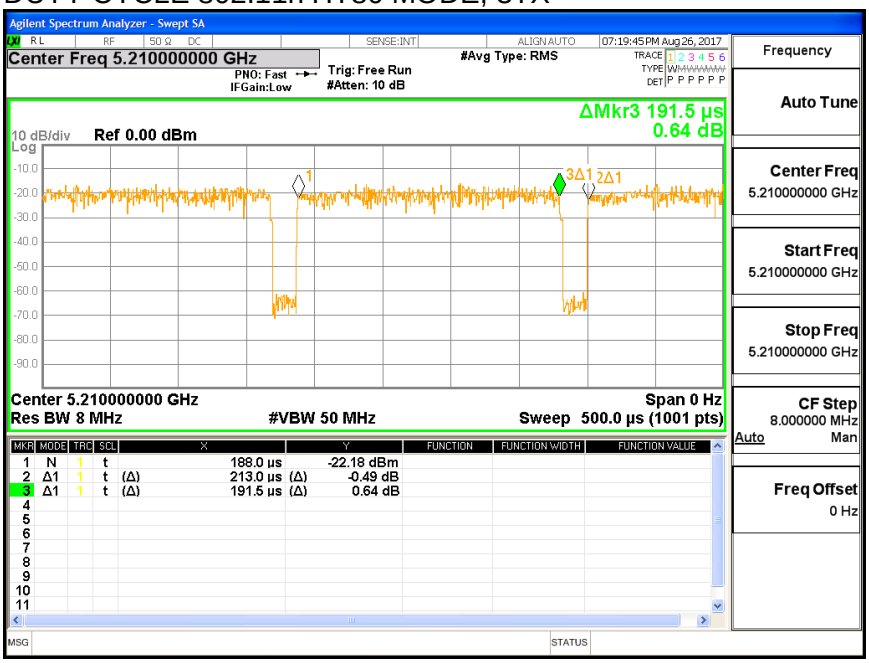
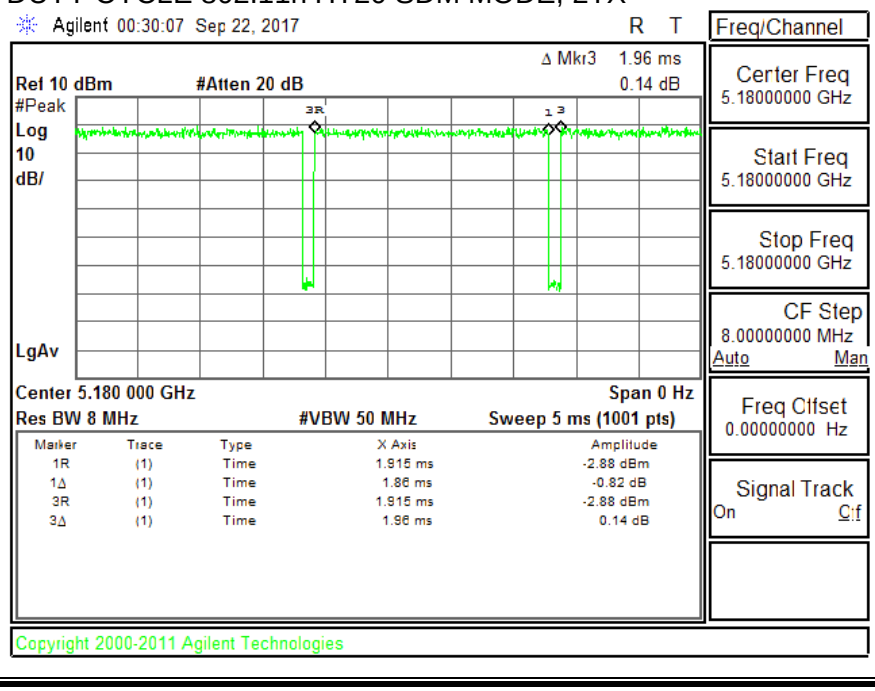
DUTY CYCLE 802.11n HT80 MODE, 3TX



DUTY CYCLE 802.11n HT20 SDM MODE, 2TX



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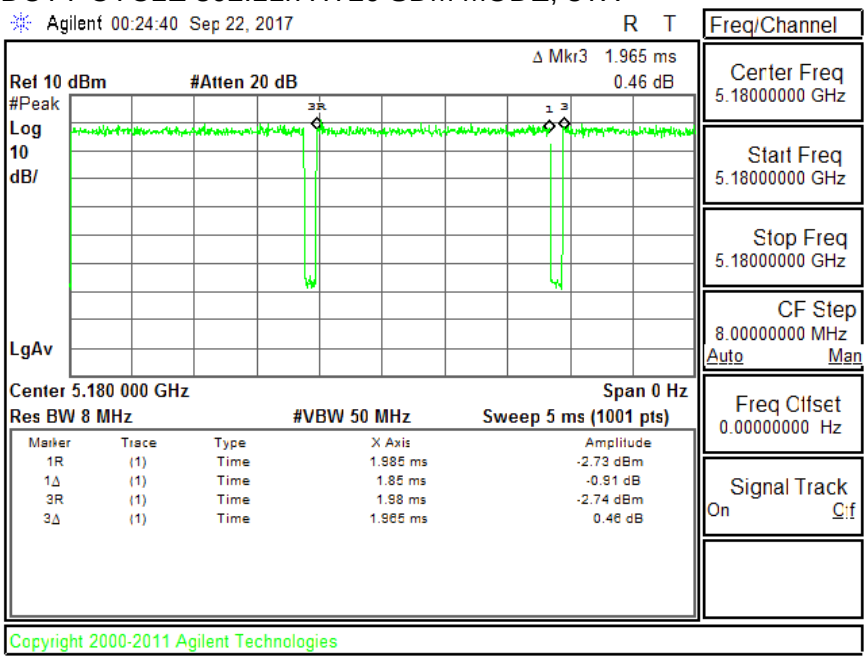
DUTY CYCLE 802.11n HT20 SDM MODE, 3TX



DUTY CYCLE 802.11n HT40 SDM MODE, 2TX

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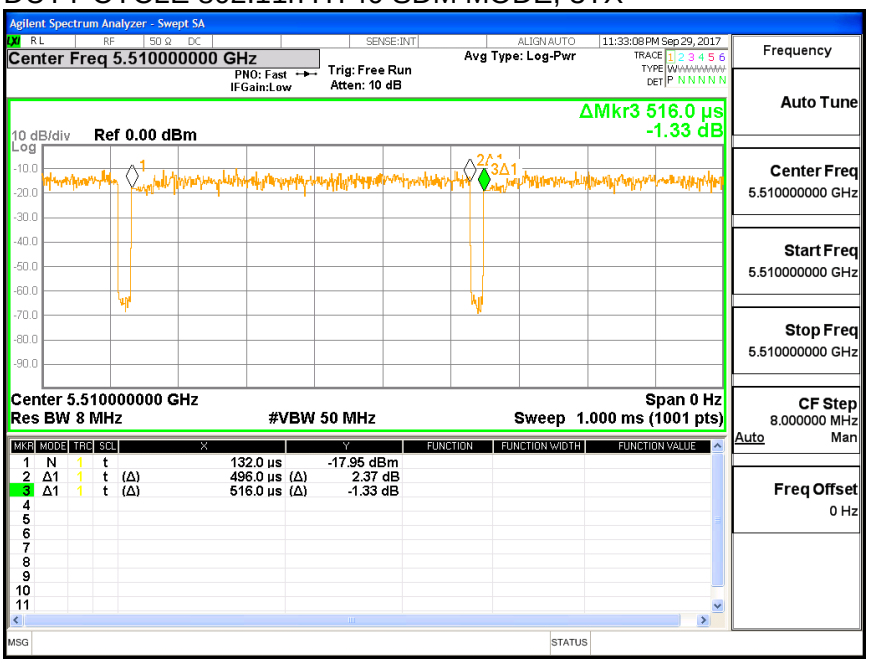
DUTY CYCLE 802.11n HT40 SDM MODE, 3TX



DUTY CYCLE 802.11n HT80 SDM MODE, 2TX

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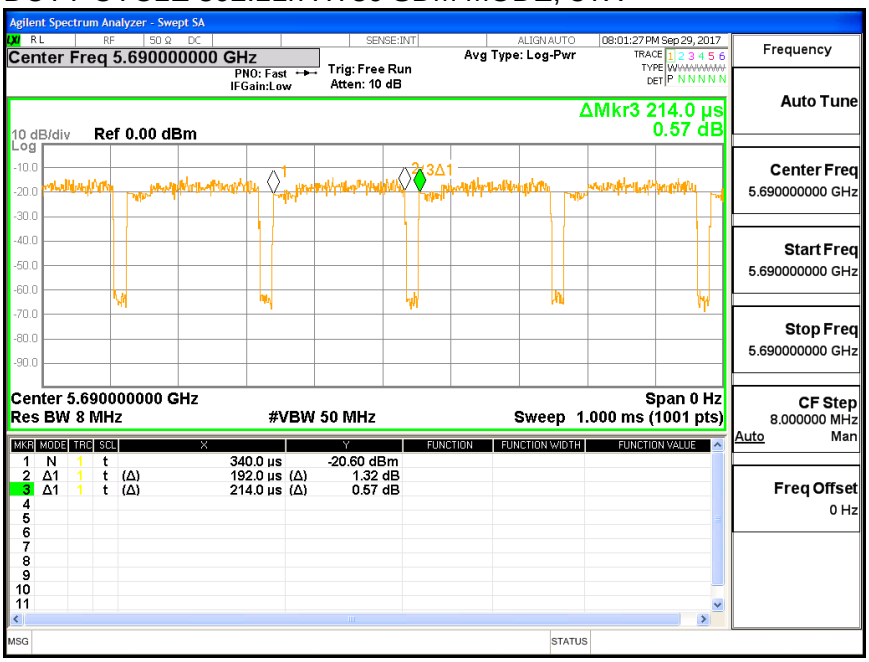
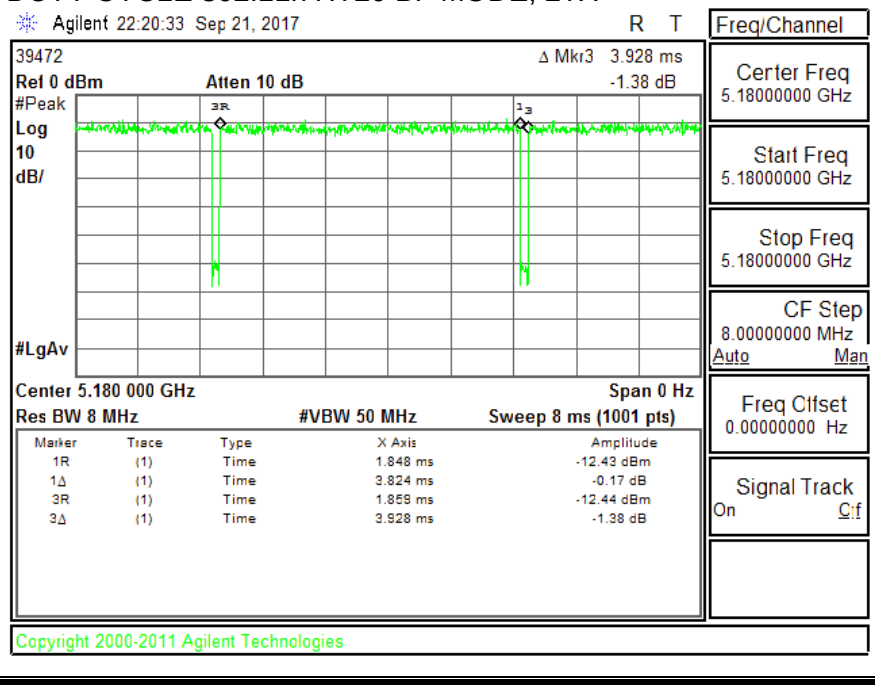
DUTY CYCLE 802.11n HT80 SDM MODE, 3TX



DUTY CYCLE 802.11n HT20 BF MODE, 2TX



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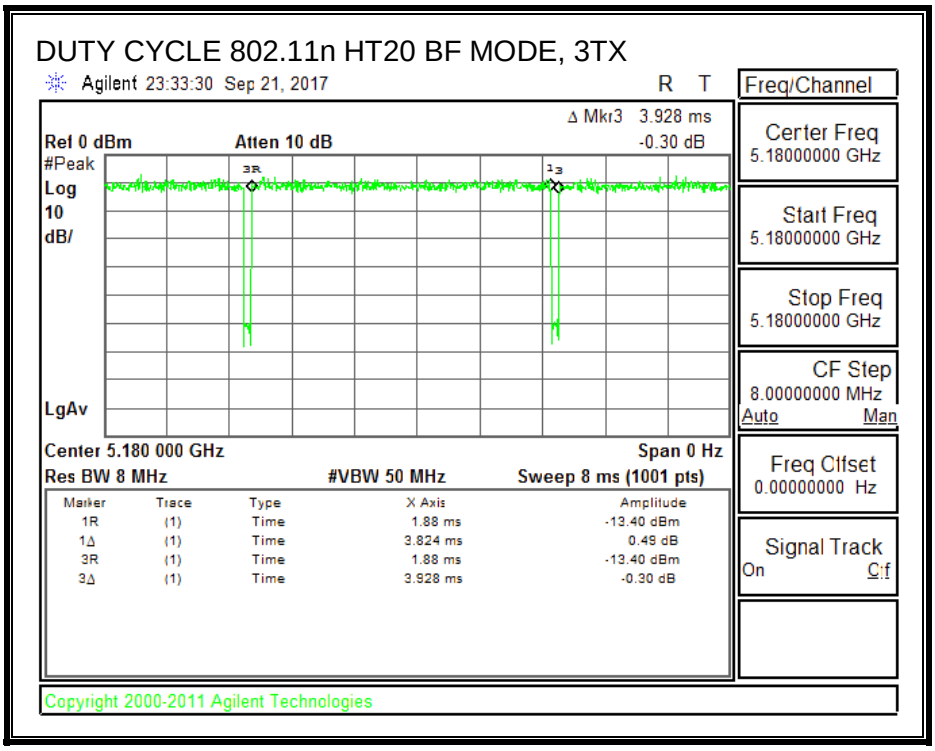
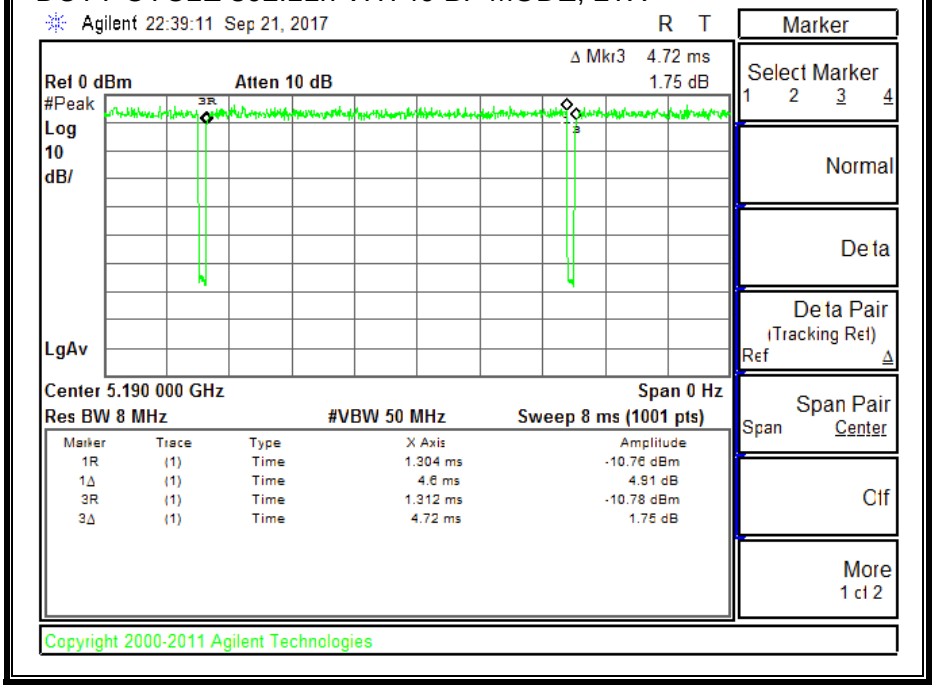
DUTY CYCLE 802.11n HT20 BF MODE, 3TX



DUTY CYCLE 802.11n VHT40 BF MODE, 2TX



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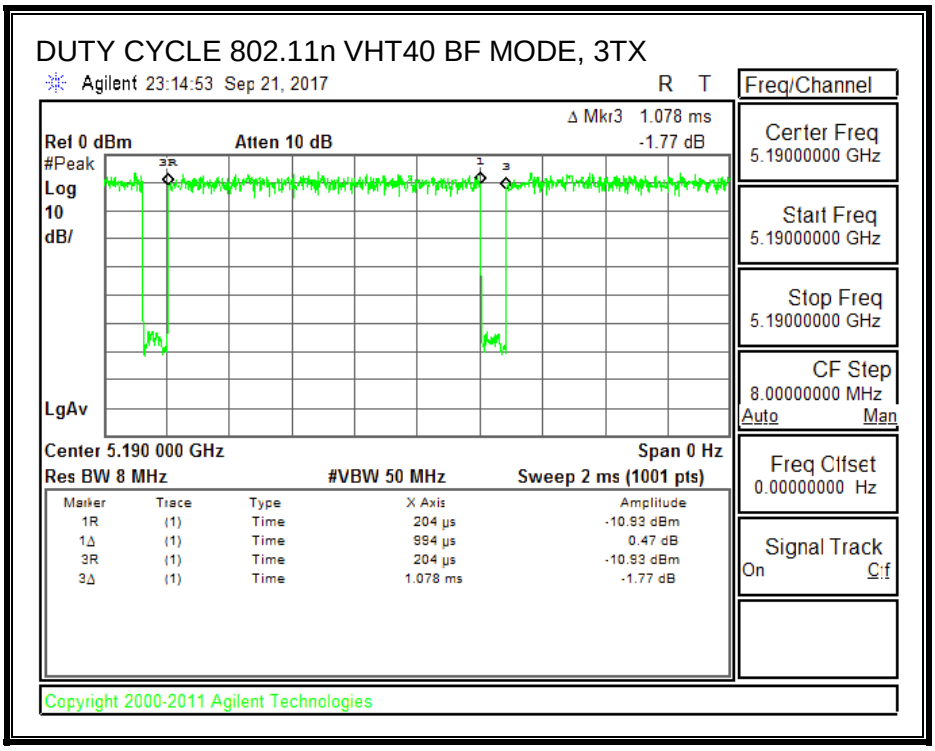
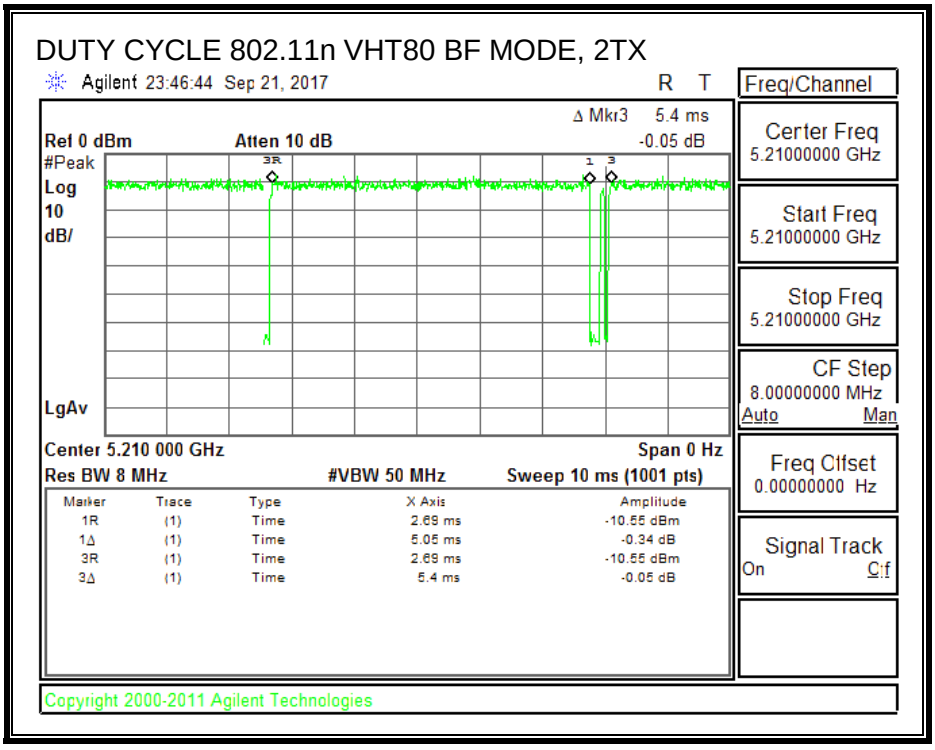
DUTY CYCLE 802.11n VHT40 BF MODE, 3TX



DUTY CYCLE 802.11n VHT80 BF MODE, 2TX



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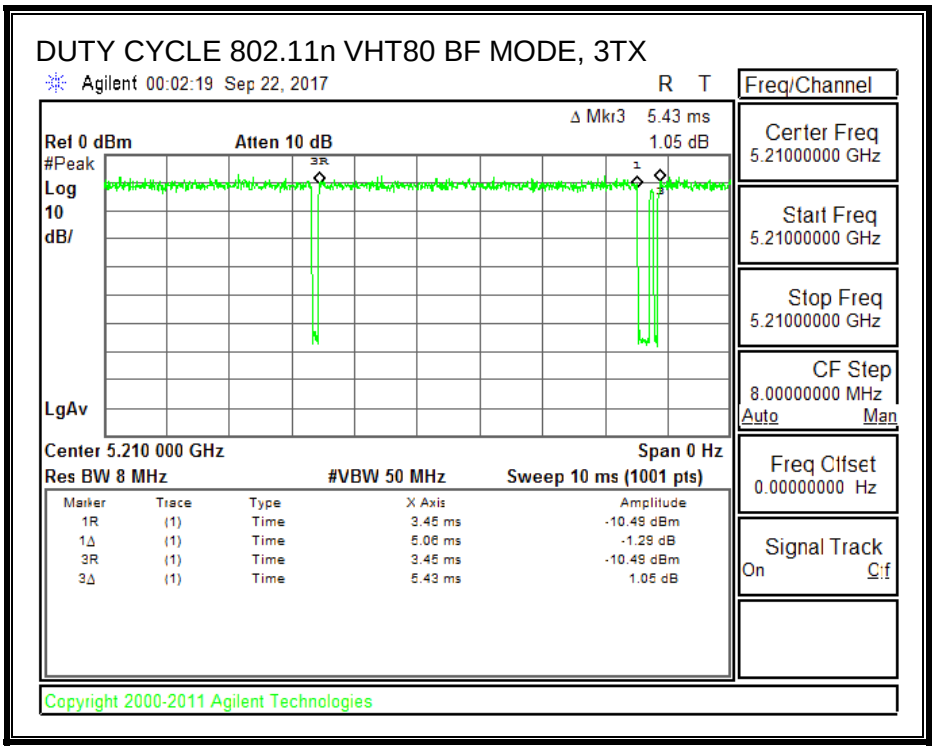
DUTY CYCLE 802.11n VHT80 BF MODE, 3TX



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4.2. 26 dB BANDWIDTH

LIMITS

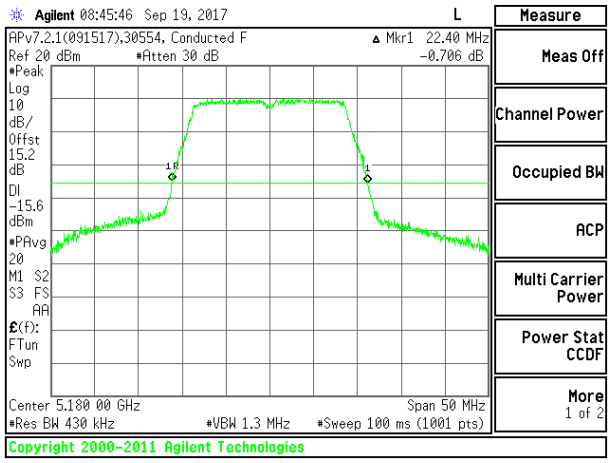
None; for reporting purposes only.

RESULTS

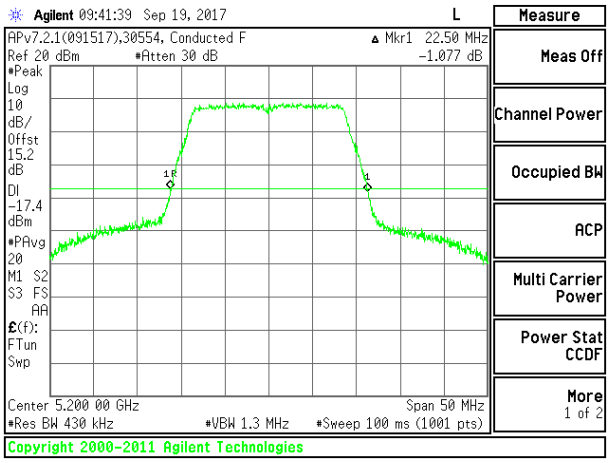
4.2.1. 802.11n HT20 MODE IN THE 5.2 GHz BAND

1TX Antenna WF4

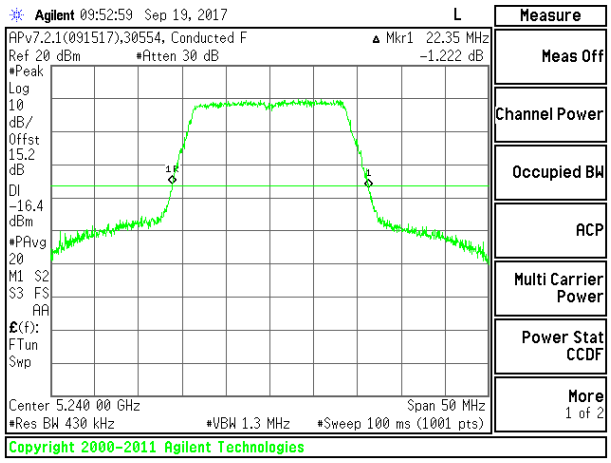
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	22.40
Mid	5200	22.50
High	5240	22.35



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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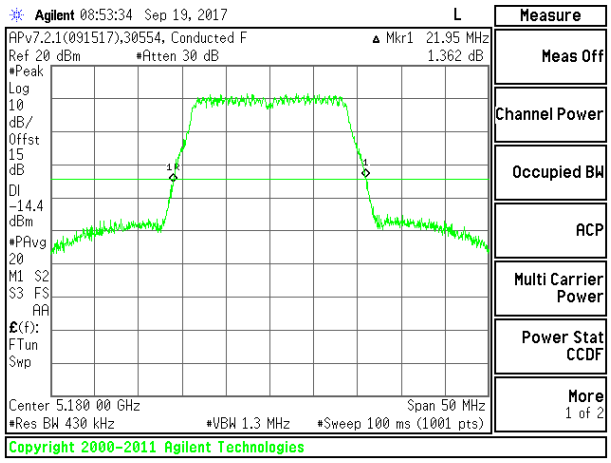
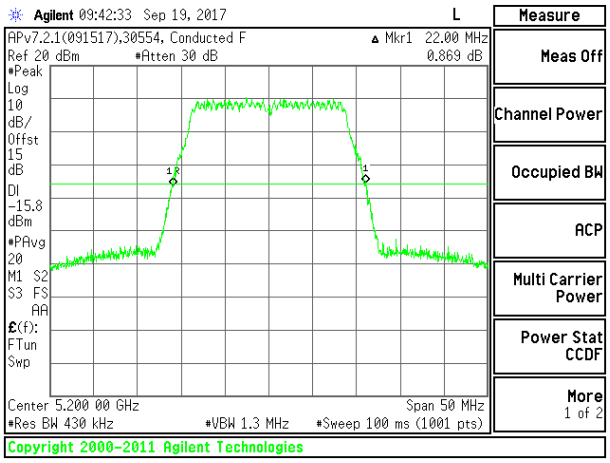
1TX Antenna WF3

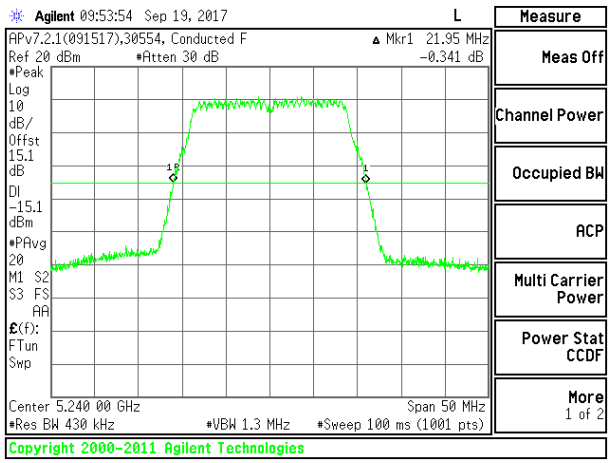
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	21.95
Mid	5200	22.00
High	5240	21.95



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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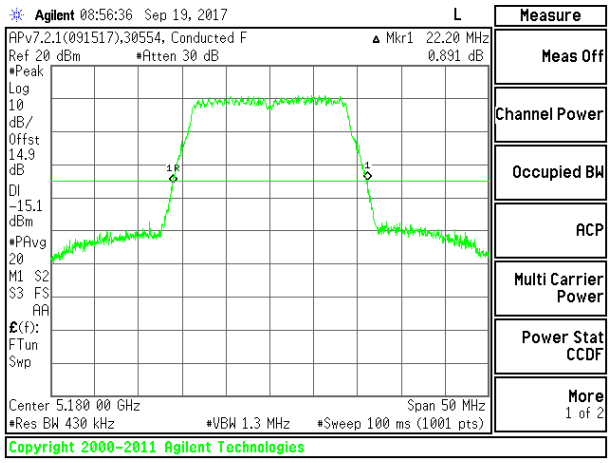
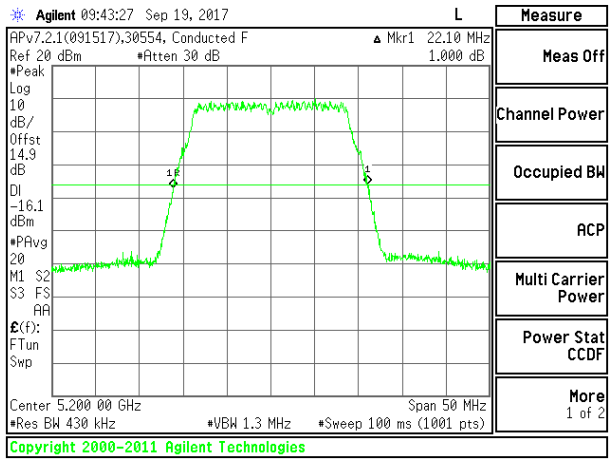
1TX Antenna WF2

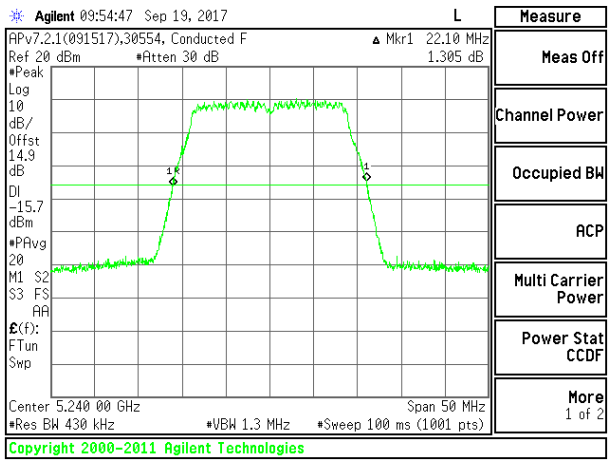
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	22.20
Mid	5200	22.10
High	5240	22.10



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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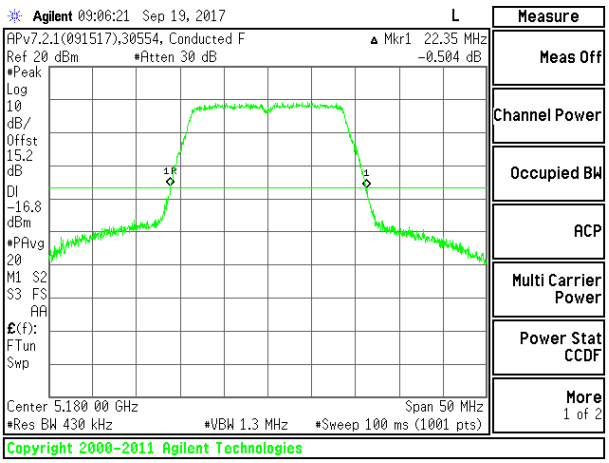
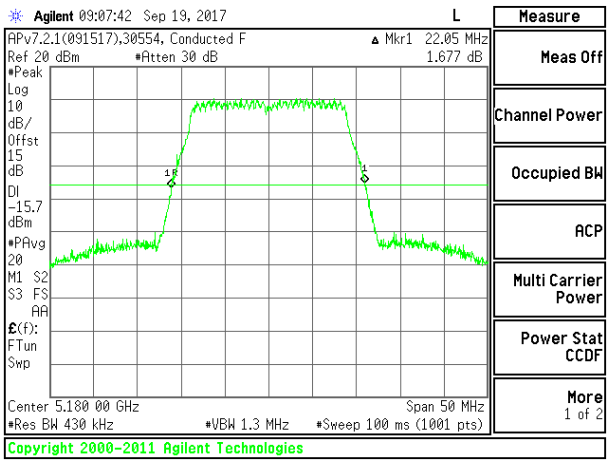
2TX Antenna WF4 + Antenna WF3 CDD Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)
Low	5180	22.35	22.05
Mid	5200	22.35	22.10
High	5240	22.45	21.95

LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF3

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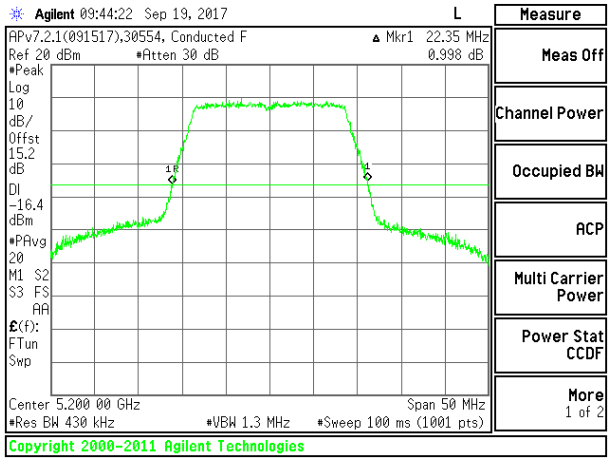
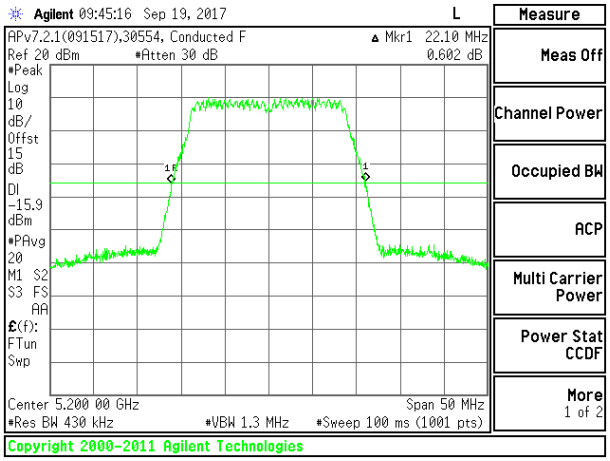
MID CHANNEL

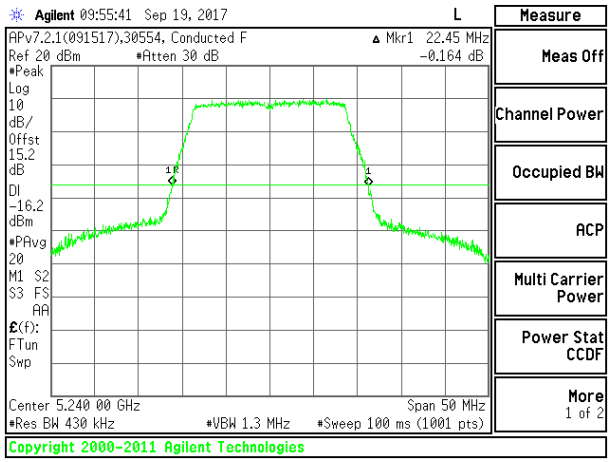


MID CHANNEL WF4

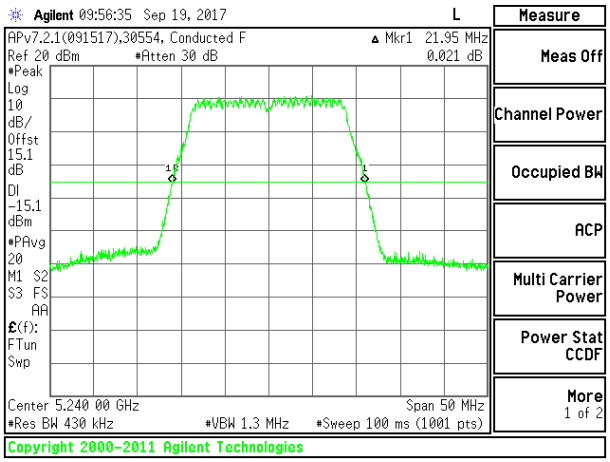


MID CHANNEL WF3

HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF3

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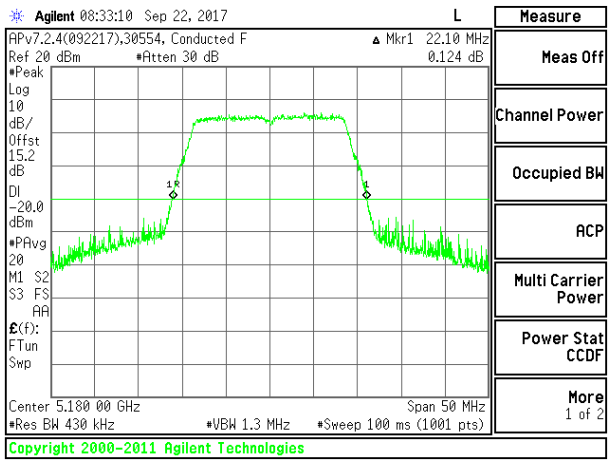
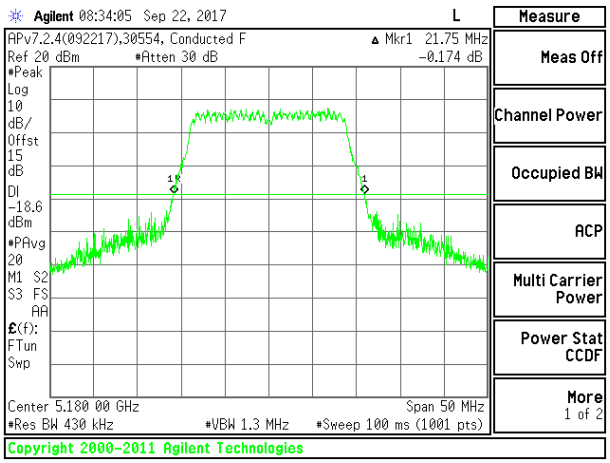
2TX Antenna WF4 + Antenna WF3 SDM Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)
Low	5180	22.10	21.75
Mid	5200	22.10	21.85
High	5240	22.40	21.80

LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF3

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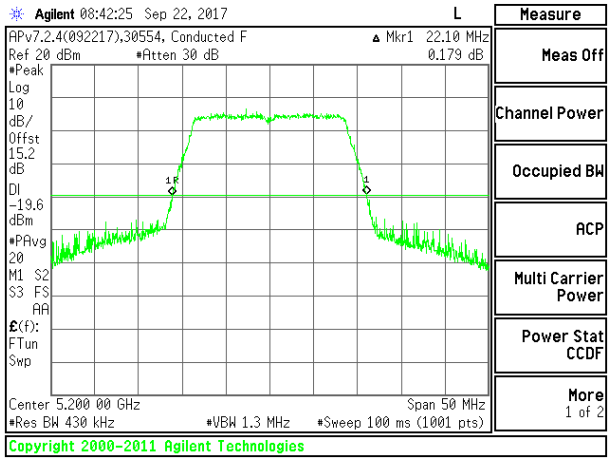
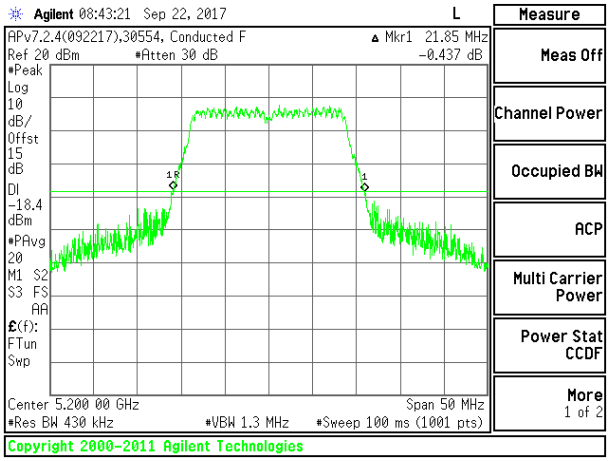
MID CHANNEL

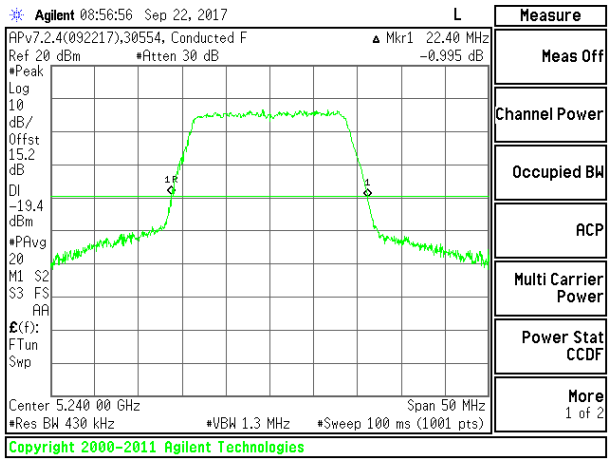


MID CHANNEL WF4

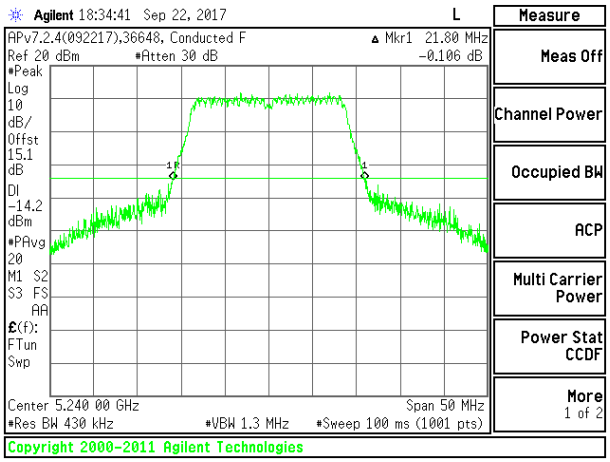


MID CHANNEL WF3

HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF3

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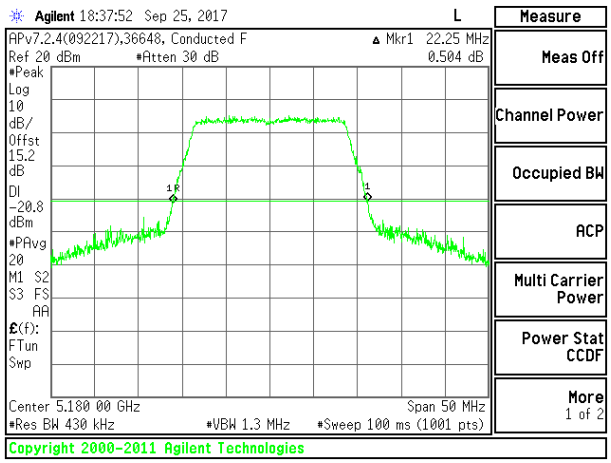
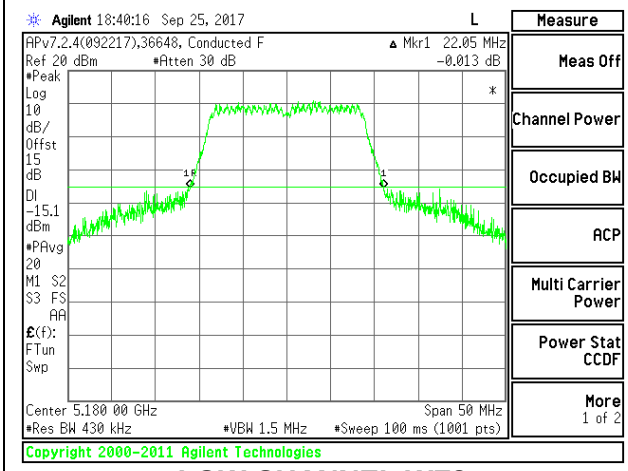
2TX Antenna WF4 + Antenna WF3 BF Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)
Low	5180	22.25	22.05
Mid	5200	22.20	22.05
High	5240	22.30	21.95

LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF3

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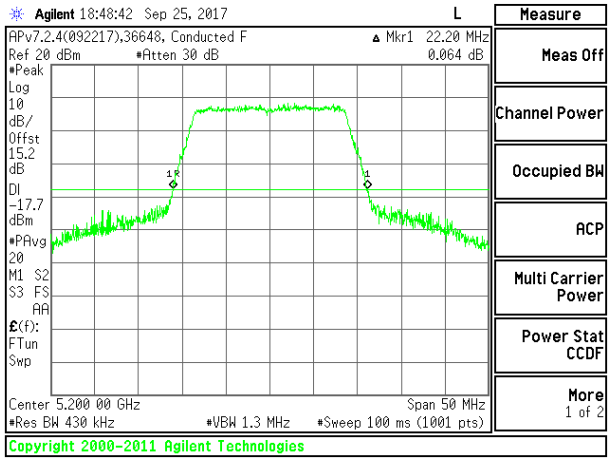
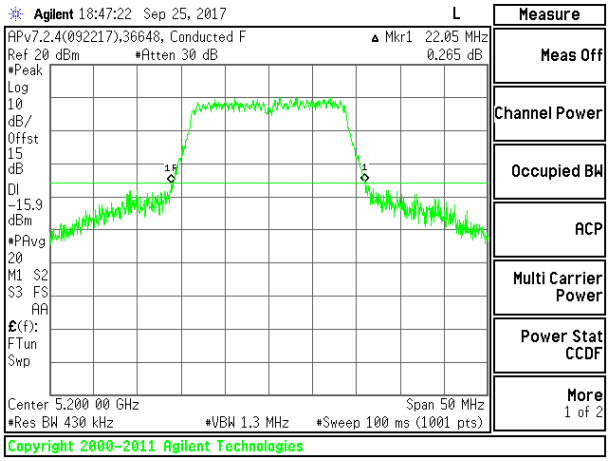
MID CHANNEL

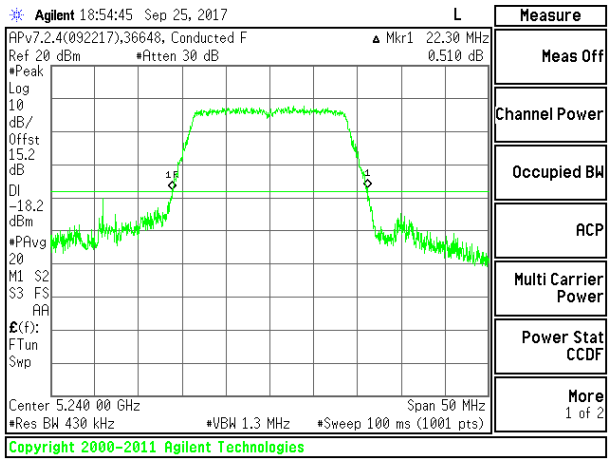


MID CHANNEL WF4

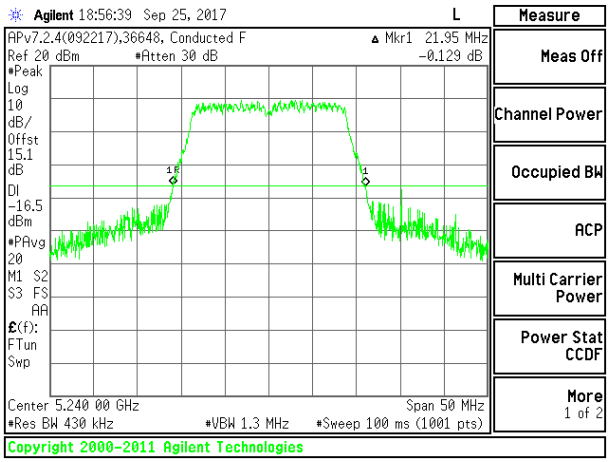


MID CHANNEL WF3

HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF3

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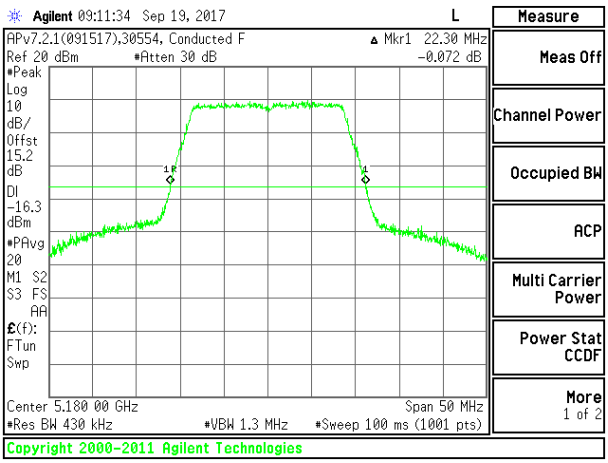
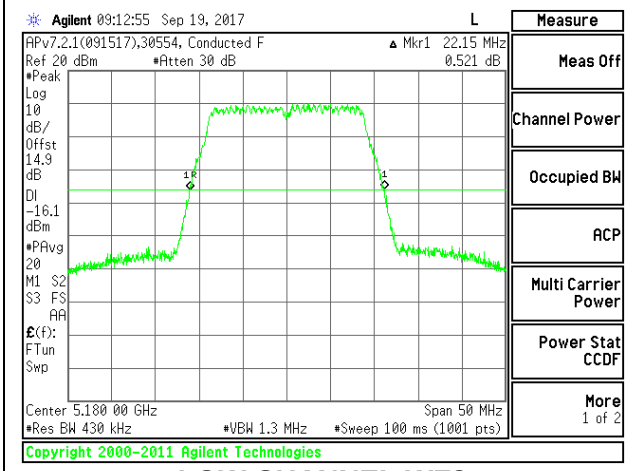
2TX Antenna WF4 + Antenna WF2 CDD Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5180	22.30	22.15
Mid	5200	22.35	22.30
High	5240	22.25	22.00

LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF2

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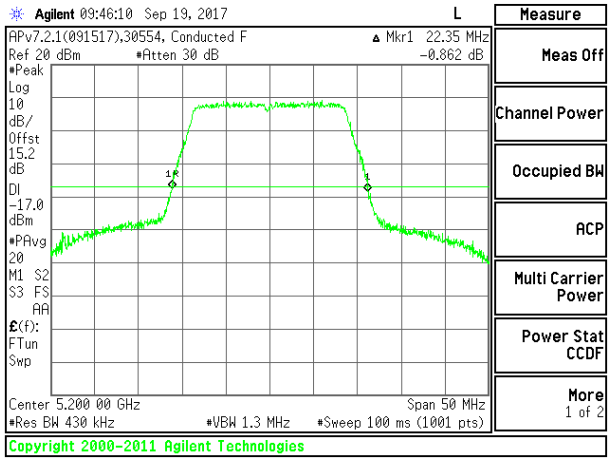
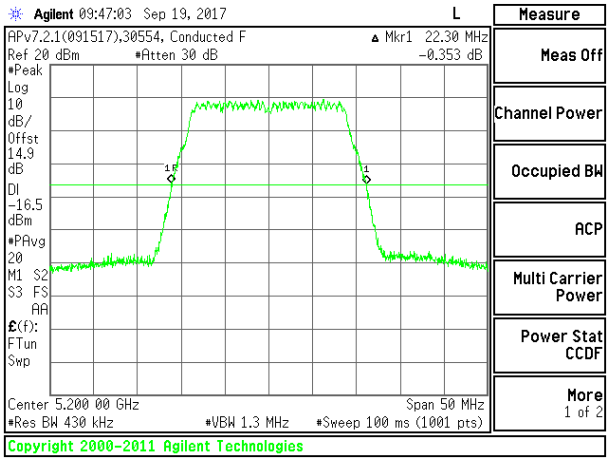
MID CHANNEL

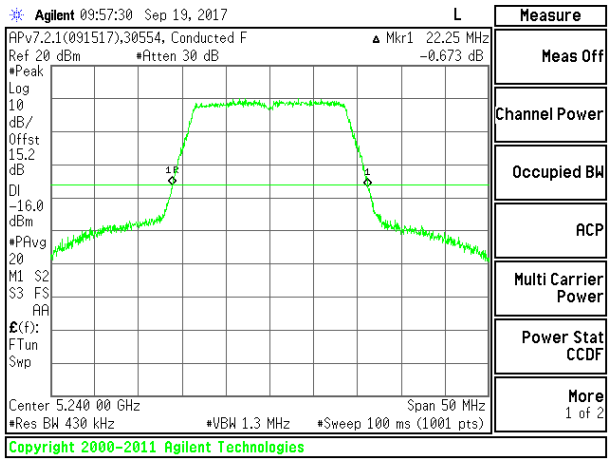


MID CHANNEL WF4

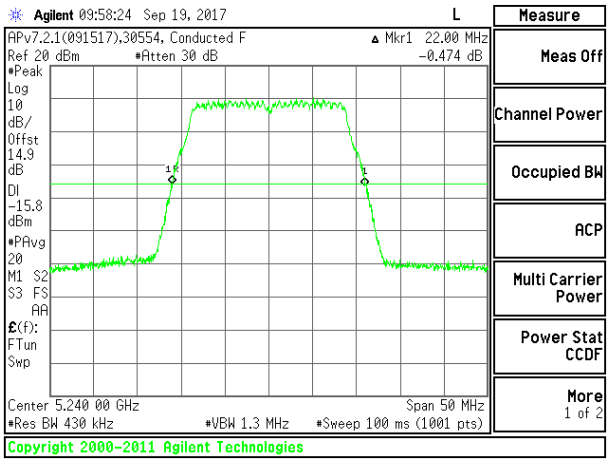


MID CHANNEL WF2

HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF2

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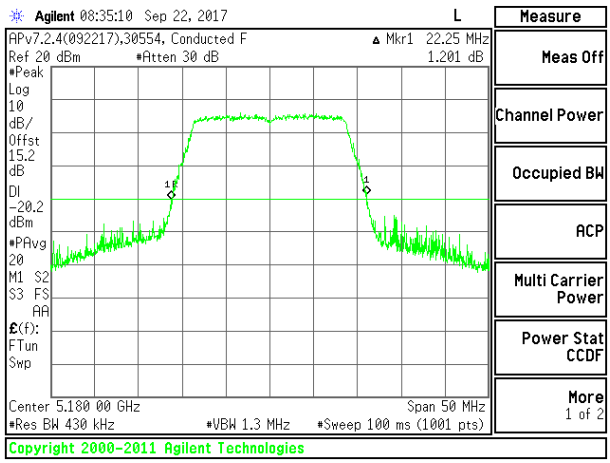
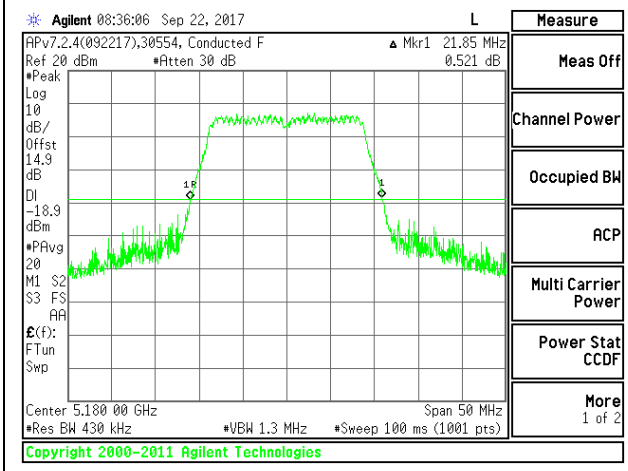
2TX Antenna WF4 + Antenna WF2 SDM Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5180	22.25	21.85
Mid	5200	22.25	22.10
High	5240	25.15	22.35

LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF2

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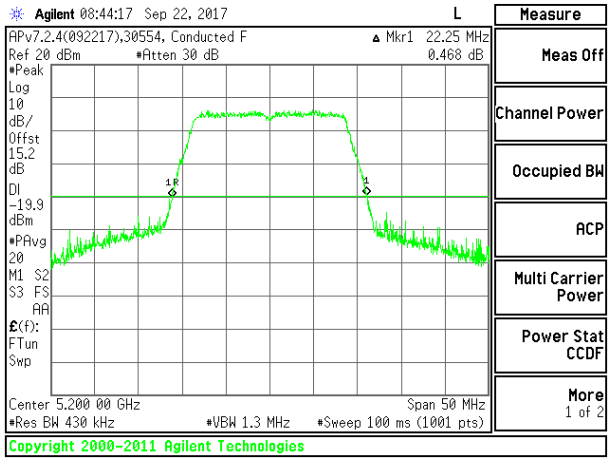
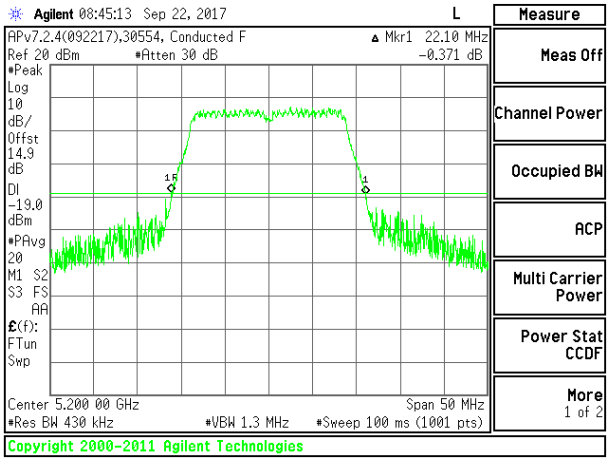
MID CHANNEL

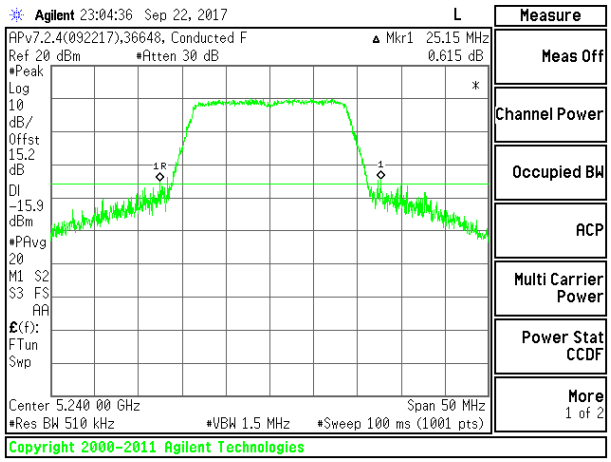


MID CHANNEL WF4

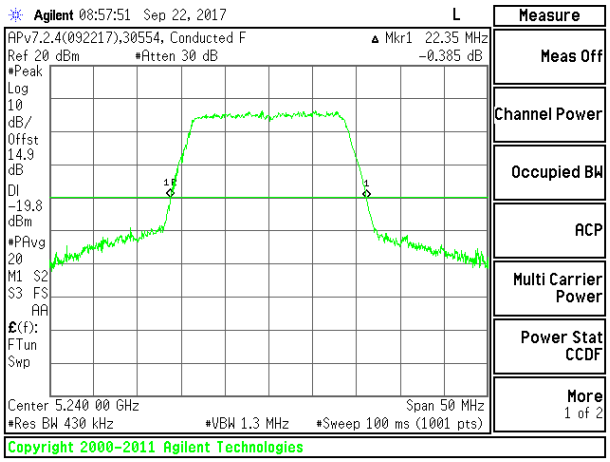


MID CHANNEL WF2

HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF2

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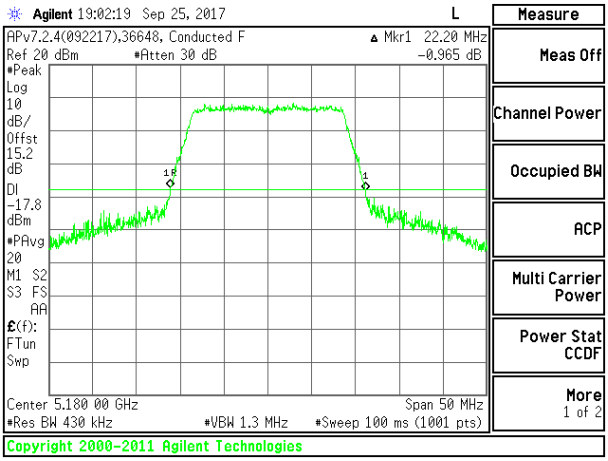
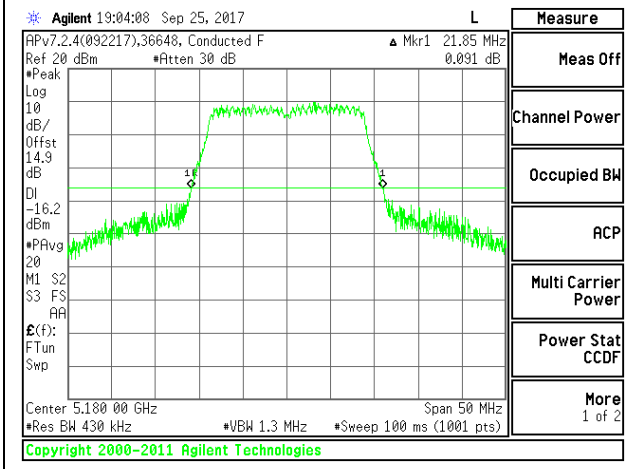
2TX Antenna WF4 + Antenna WF2 BF Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5180	22.20	21.85
Mid	5200	22.20	21.70
High	5240	22.20	21.90

LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF2

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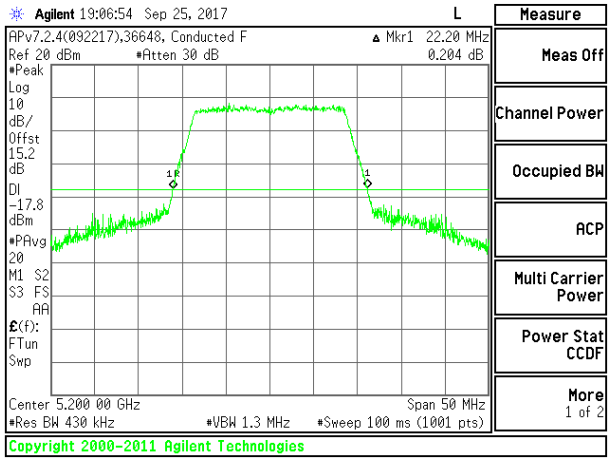
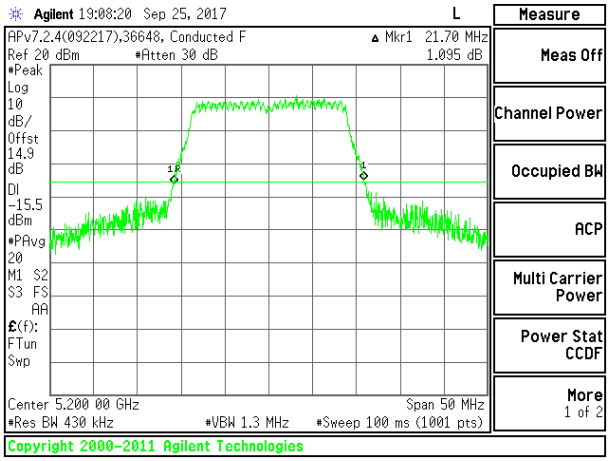
MID CHANNEL

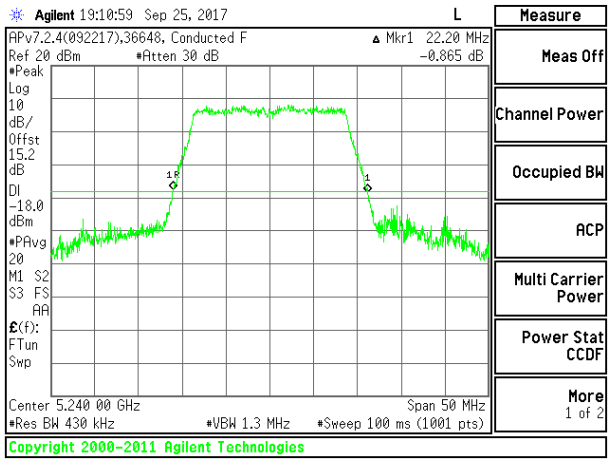


MID CHANNEL WF4

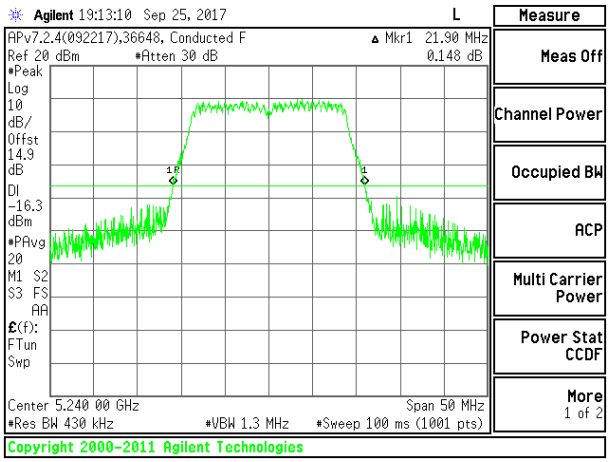


MID CHANNEL WF2

HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF2

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701J
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
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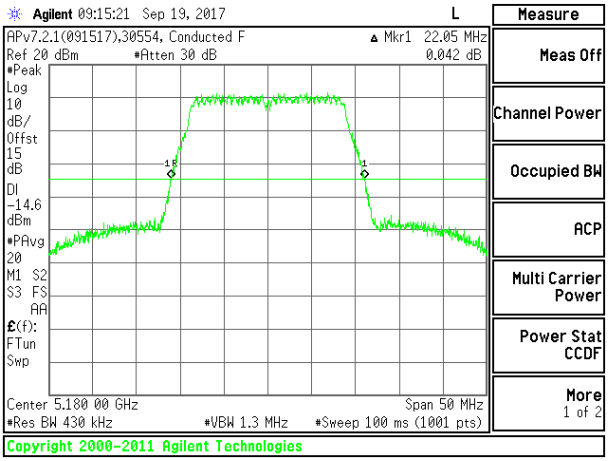
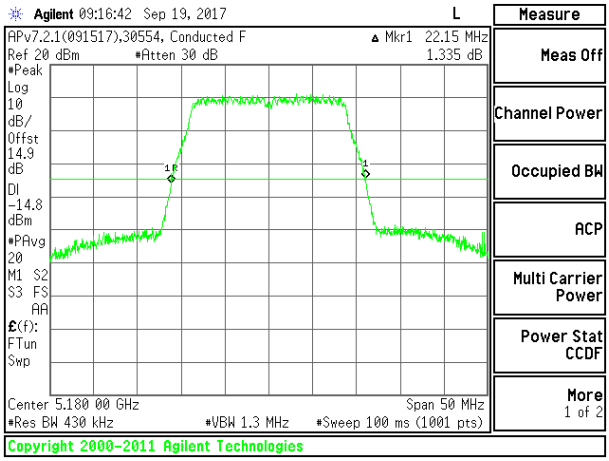
2TX Antenna WF3 + Antenna WF2 CDD Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5180	22.05	22.15
Mid	5200	22.10	22.20
High	5240	22.10	22.25

LOW CHANNEL



LOW CHANNEL WF3



LOW CHANNEL WF2

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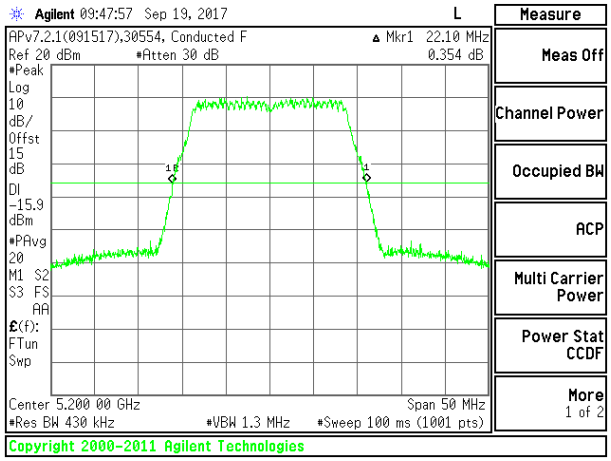
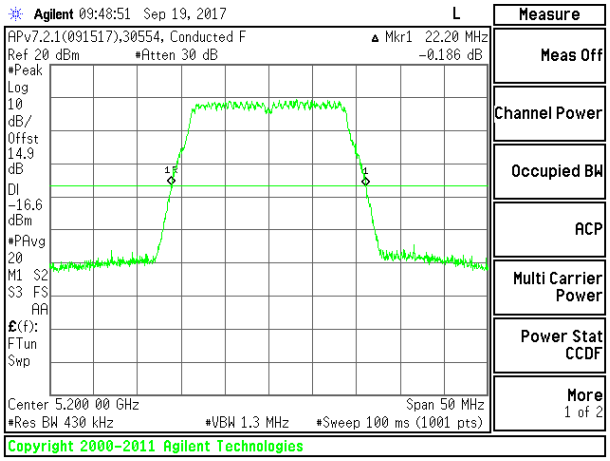
MID CHANNEL

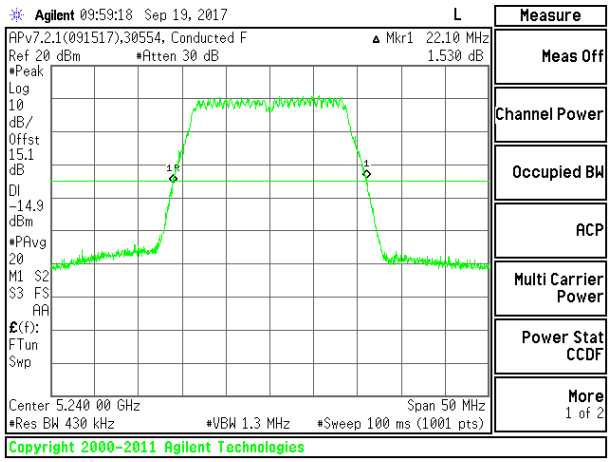


MID CHANNEL WF3

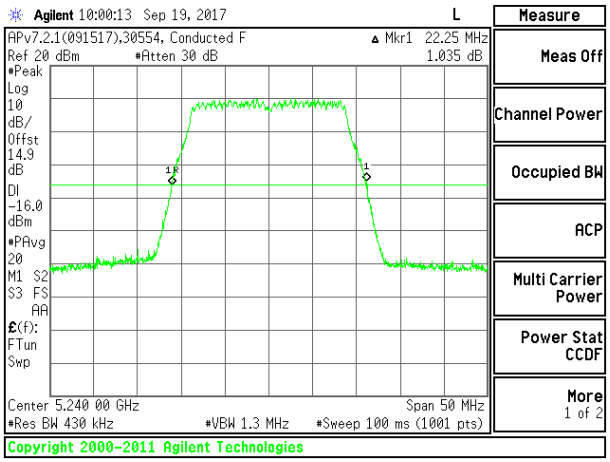


MID CHANNEL WF2

HIGH CHANNEL



HIGH CHANNEL WF3



HIGH CHANNEL WF2

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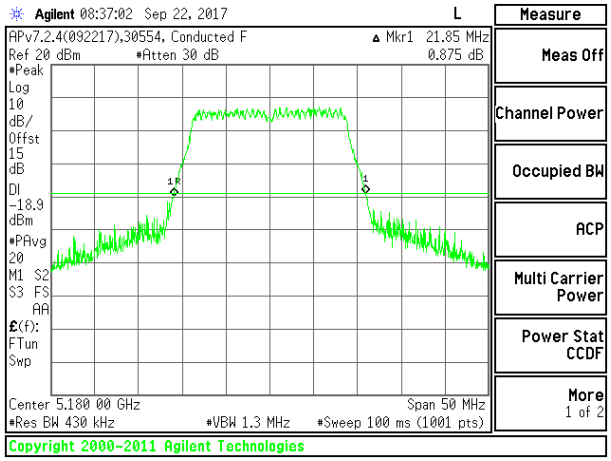
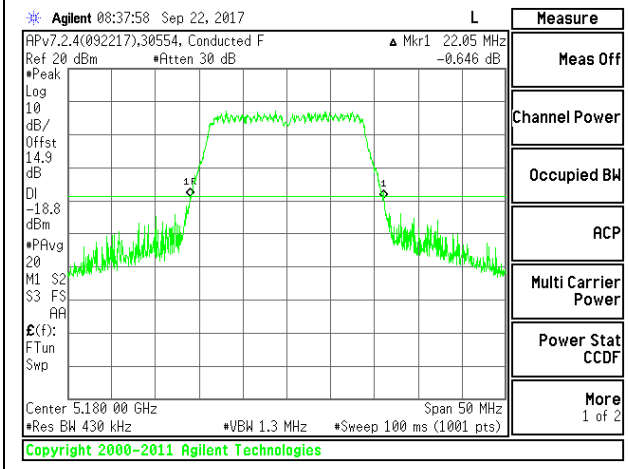
2TX Antenna WF3 + Antenna WF2 SDM Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5180	21.85	22.05
Mid	5200	21.90	22.00
High	5240	22.30	22.35

LOW CHANNEL



LOW CHANNEL WF3



LOW CHANNEL WF2

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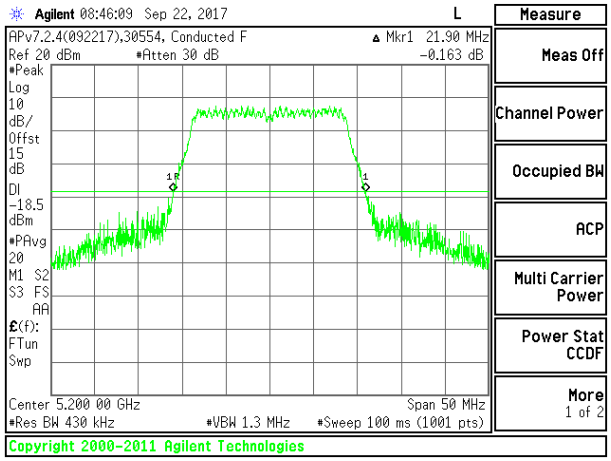
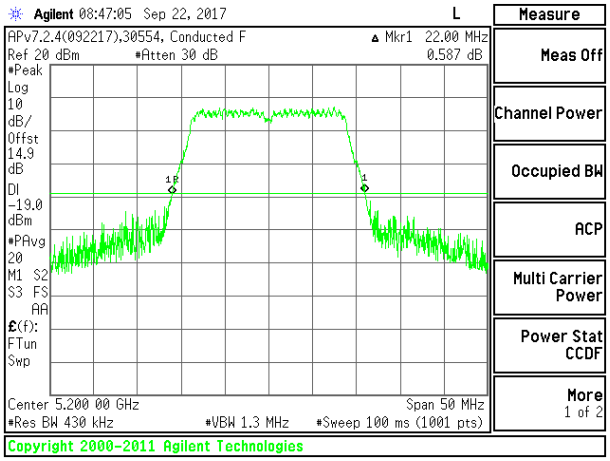
MID CHANNEL

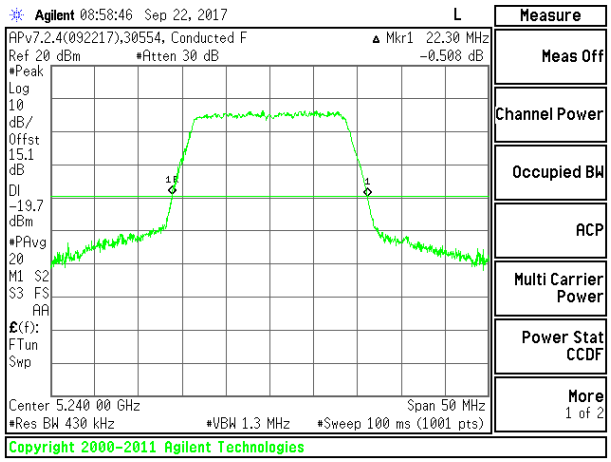


MID CHANNEL WF3

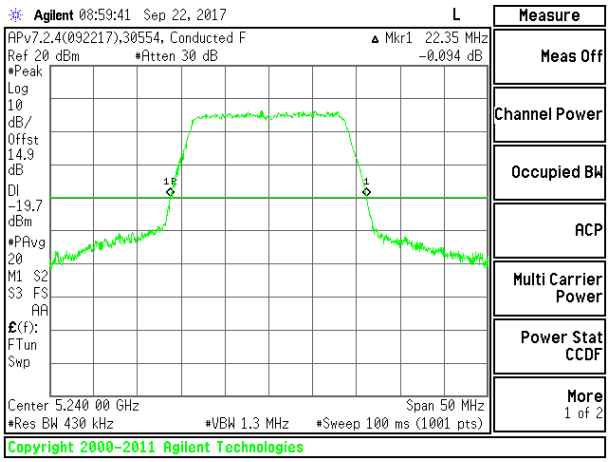


MID CHANNEL WF2

HIGH CHANNEL



HIGH CHANNEL WF3



HIGH CHANNEL WF2

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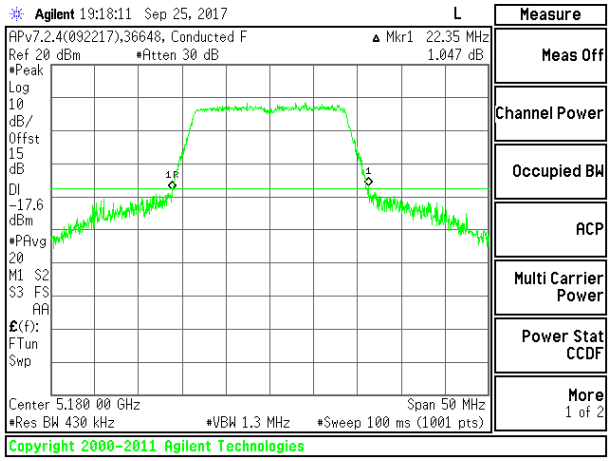
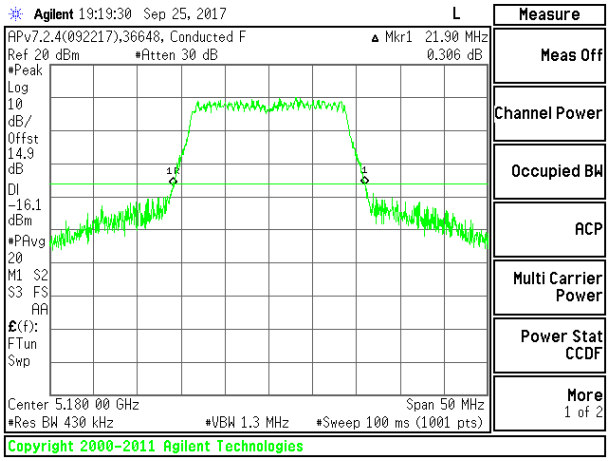
2TX Antenna WF3 + Antenna WF2 BF Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5180	22.35	21.90
Mid	5200	22.20	21.75
High	5240	21.70	21.85

LOW CHANNEL



LOW CHANNEL WF3



LOW CHANNEL WF2

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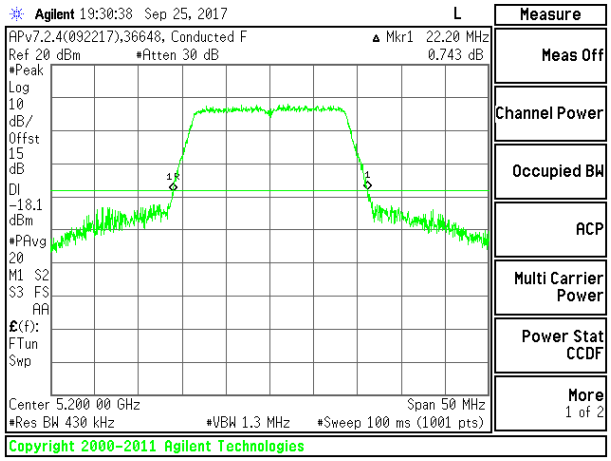
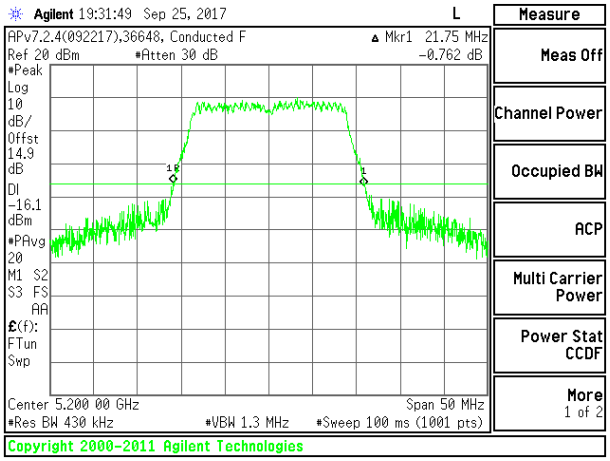
MID CHANNEL

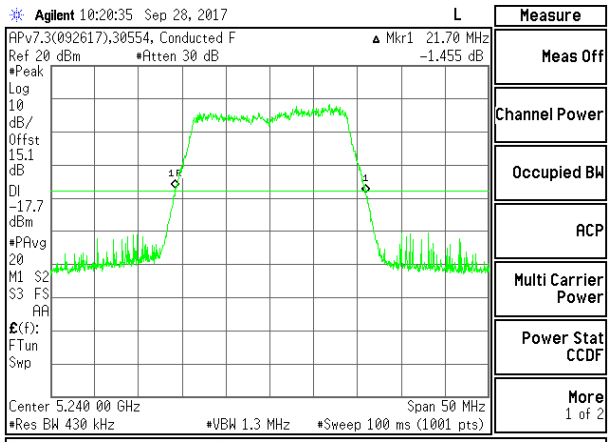


MID CHANNEL WF3

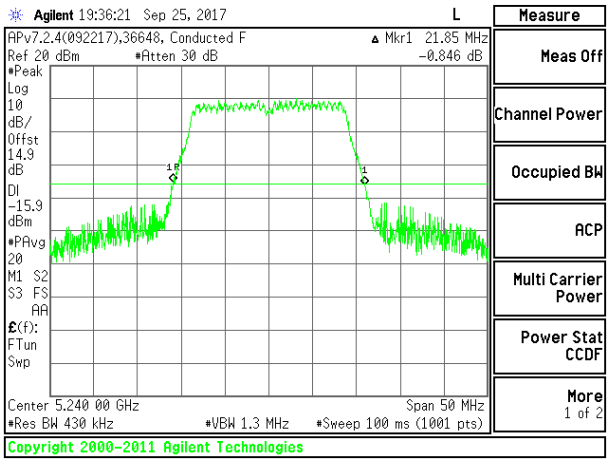


MID CHANNEL WF2

HIGH CHANNEL



HIGH CHANNEL WF3



HIGH CHANNEL WF2

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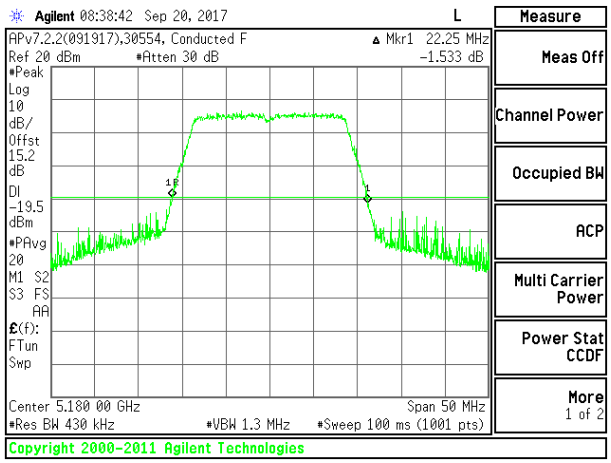
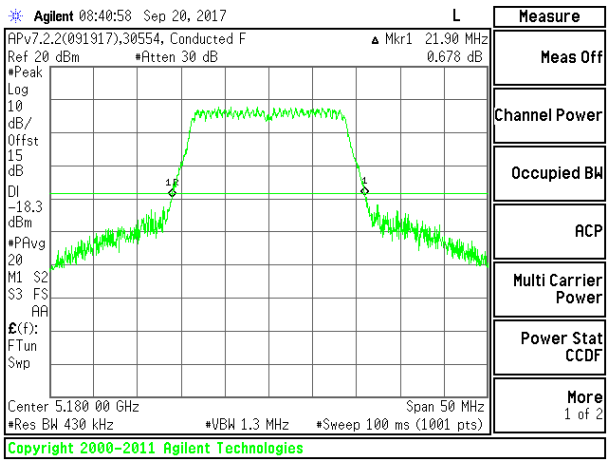
3TX Antenna WF4 + Antenna WF3 + Antenna WF2 CDD Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5180	22.25	21.90	21.95
Mid	5200	22.35	22.10	22.25
High	5240	22.25	21.95	22.25

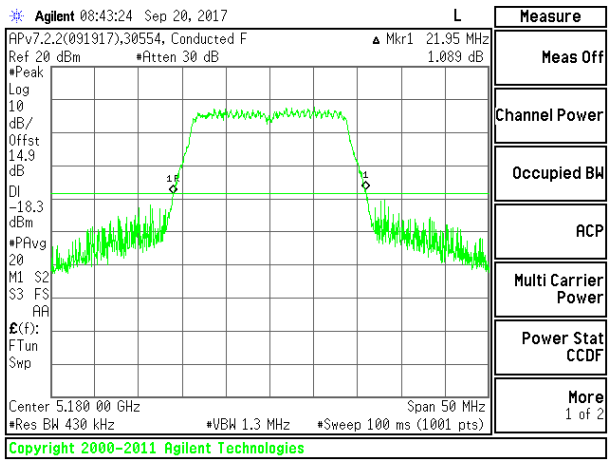
LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF3



LOW CHANNEL WF2

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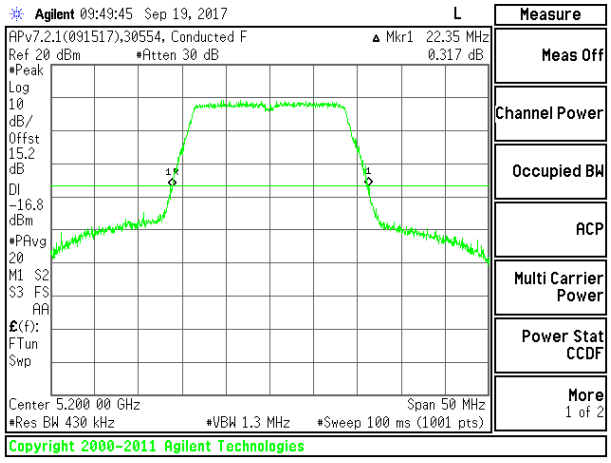
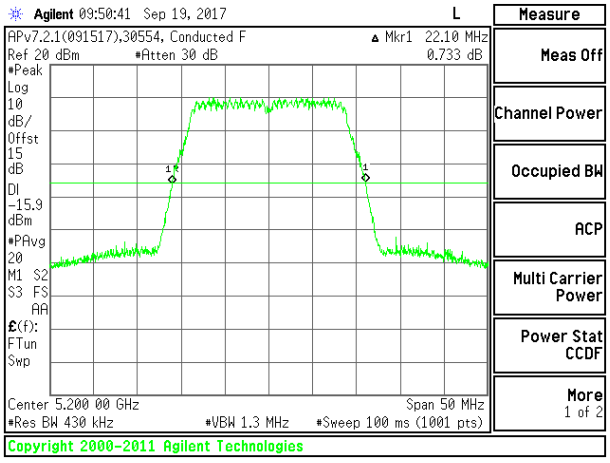
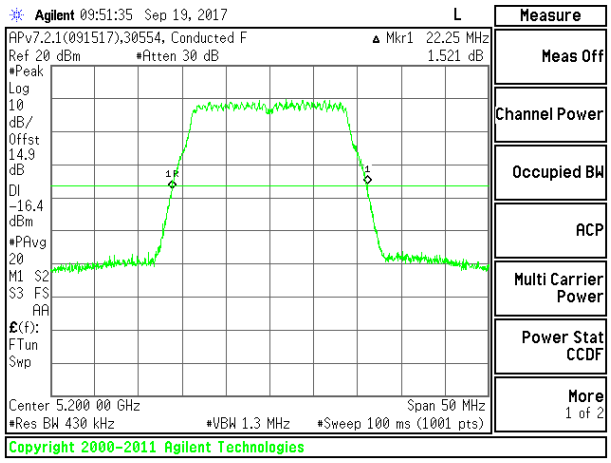
MID CHANNEL



MID CHANNEL WF4



MID CHANNEL WF3



MID CHANNEL WF2

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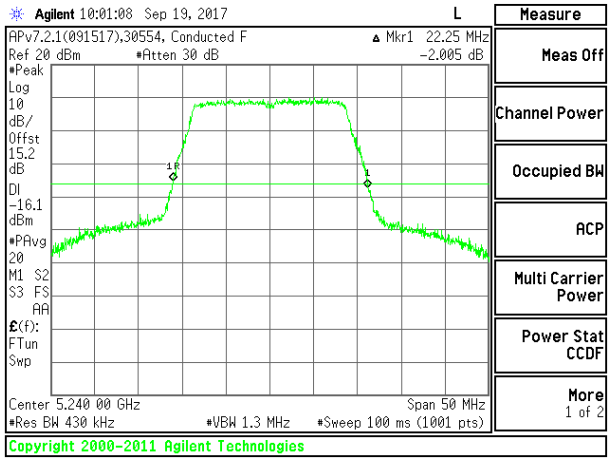
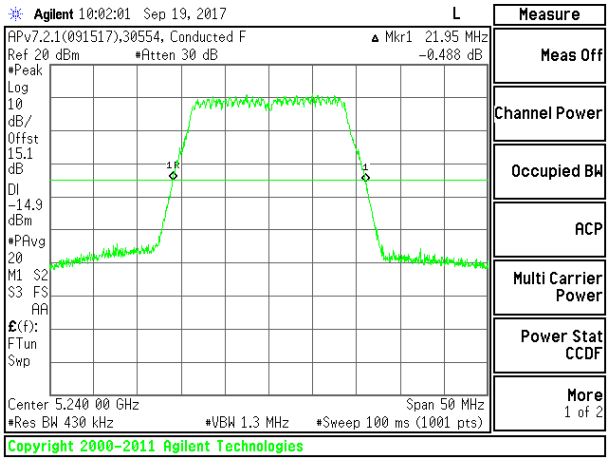
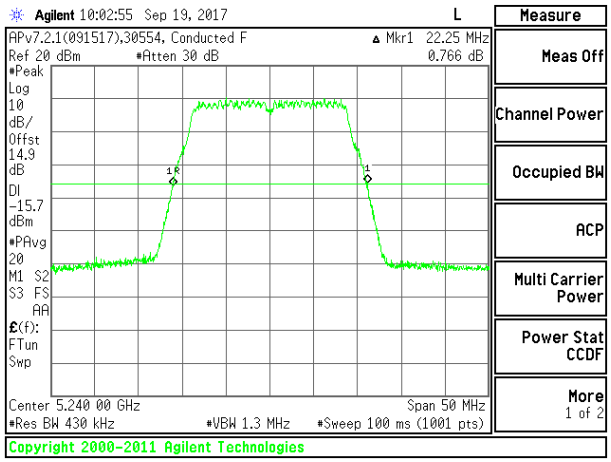
HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF3



HIGH CHANNEL WF2

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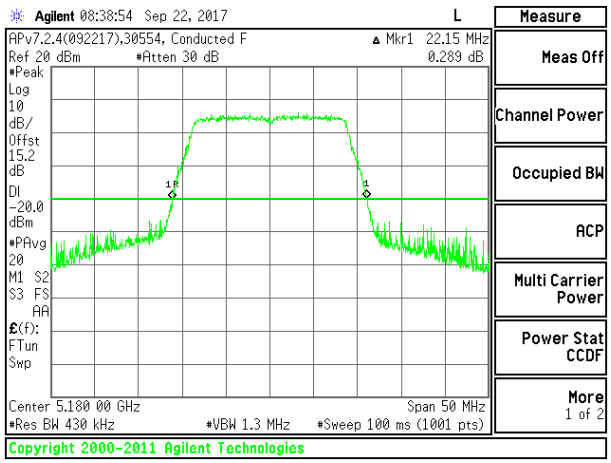
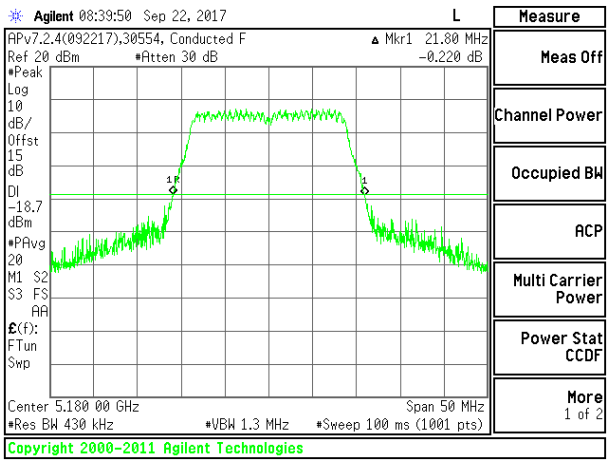
3TX Antenna WF4 + Antenna WF3 + Antenna WF2 SDM Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5180	22.15	21.80	22.00
Mid	5200	22.00	21.90	21.90
High	5240	22.35	22.35	22.40

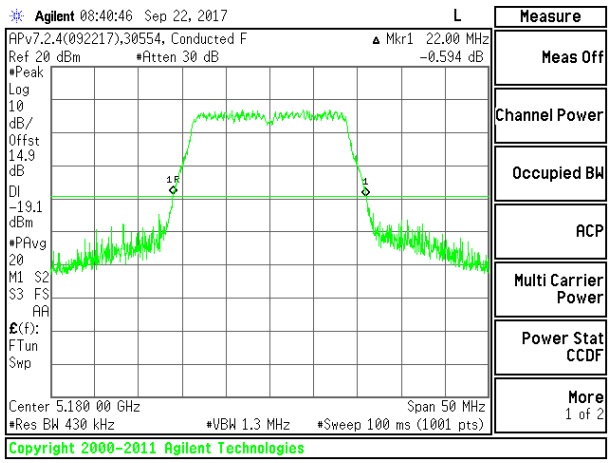
LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF3



LOW CHANNEL WF2

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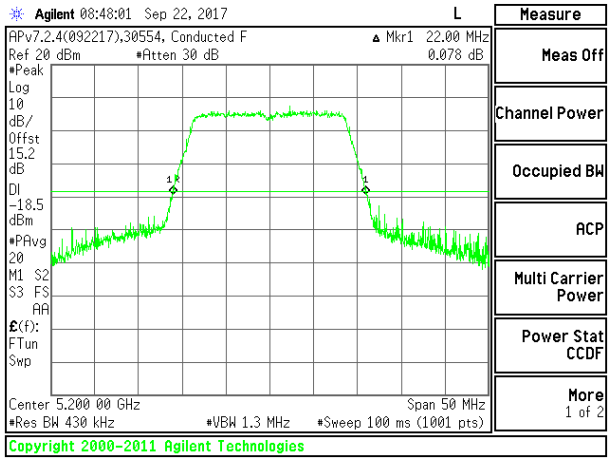
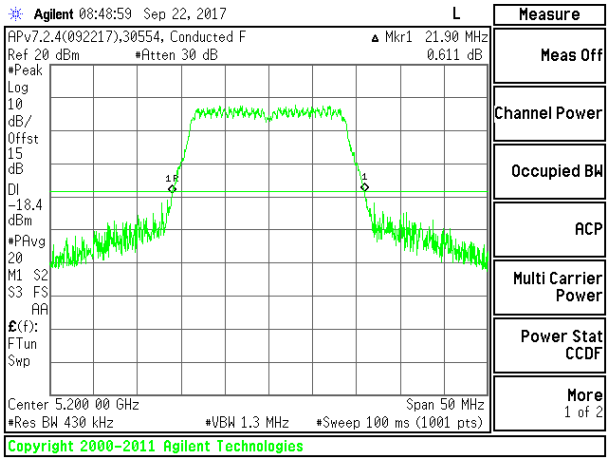
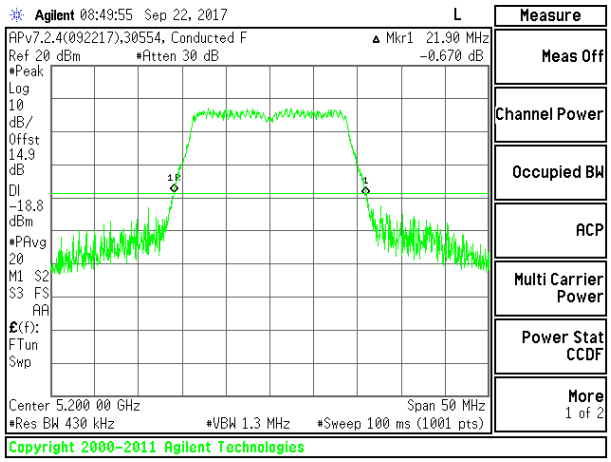
MID CHANNEL



MID CHANNEL WF4



MID CHANNEL WF3



MID CHANNEL WF2

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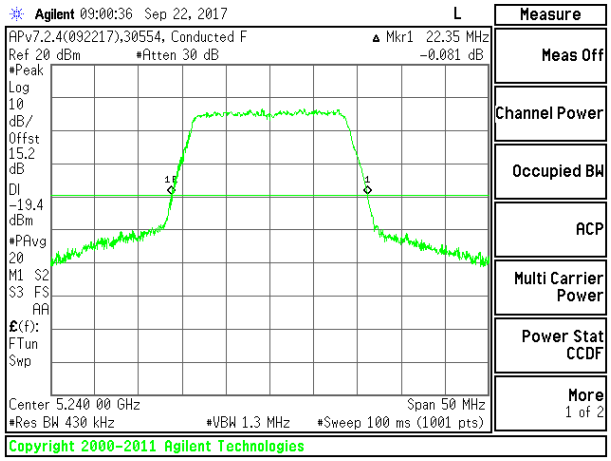
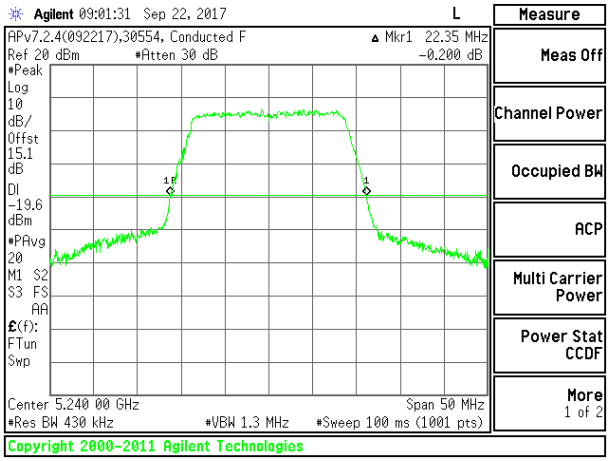
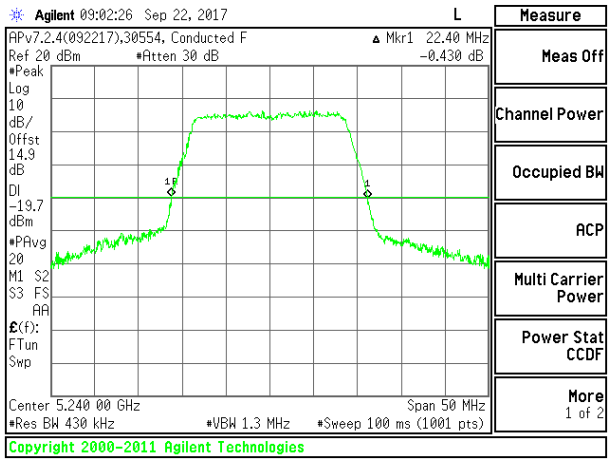
HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF3



HIGH CHANNEL WF2

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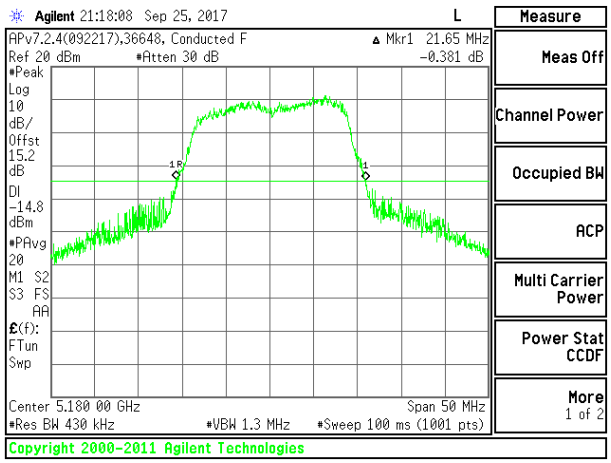
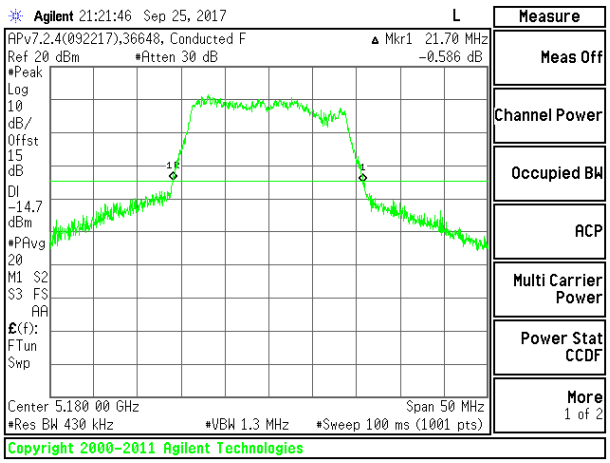
3TX Antenna WF4 + Antenna WF3 + Antenna WF2 BF Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5180	21.65	21.70	22.10
Mid	5200	21.50	21.85	22.05
High	5240	21.60	21.85	21.75

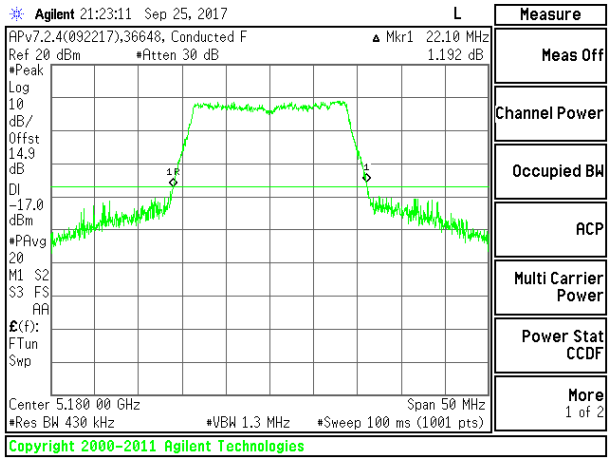
LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF3



LOW CHANNEL WF2

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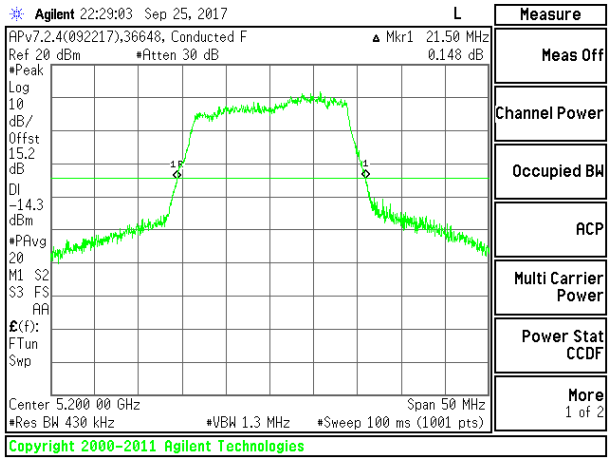
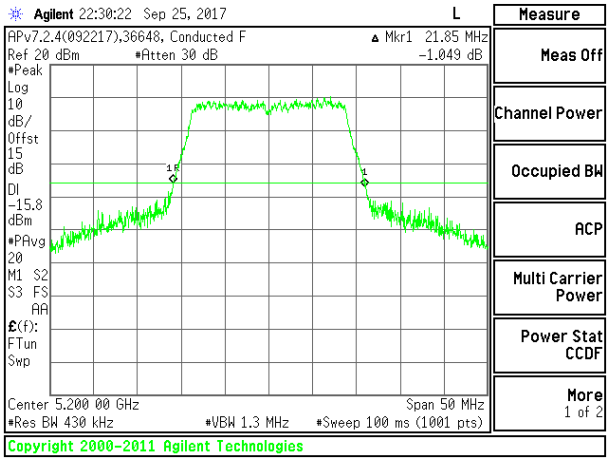
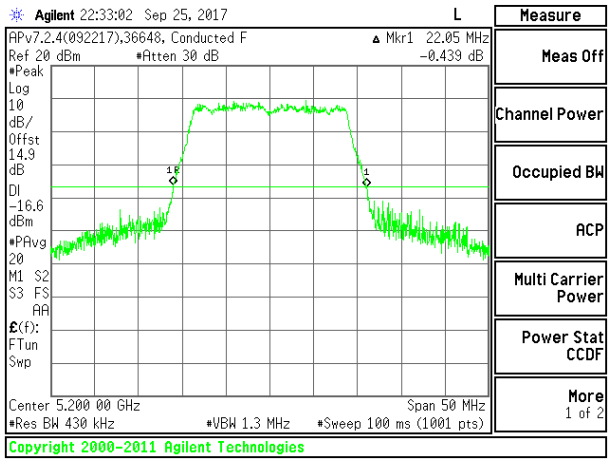
MID CHANNEL



MID CHANNEL WF4



MID CHANNEL WF3



MID CHANNEL WF2

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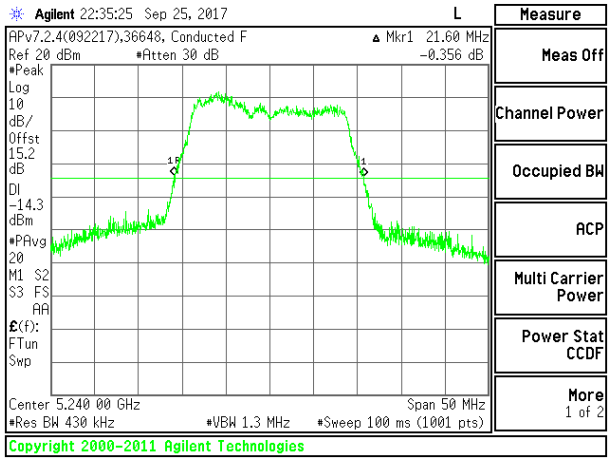
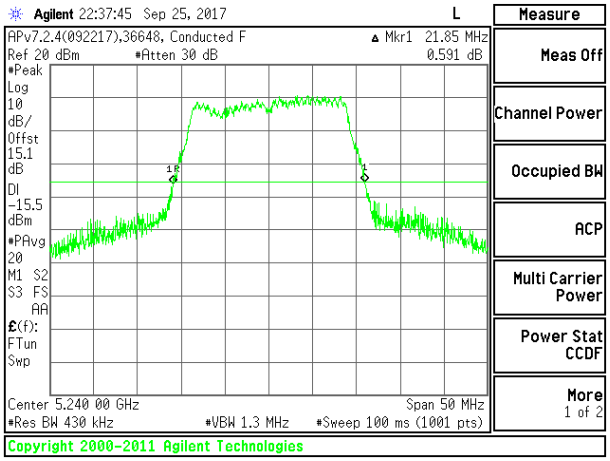
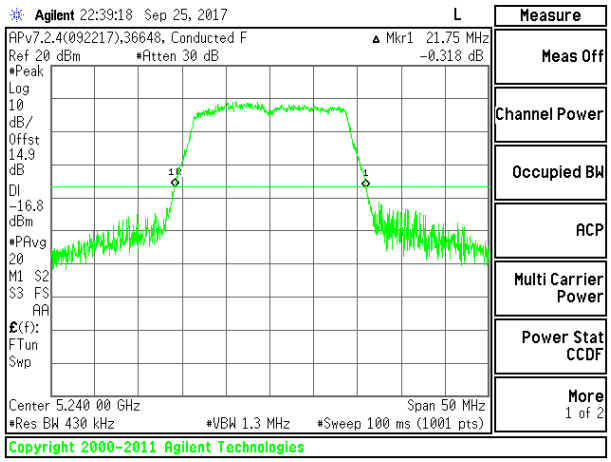
HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF3



HIGH CHANNEL WF2

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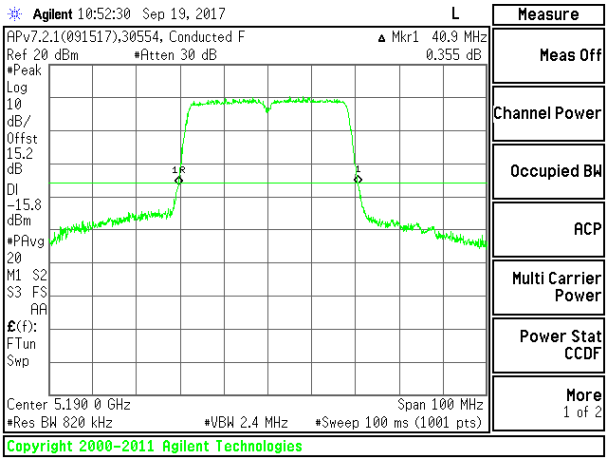
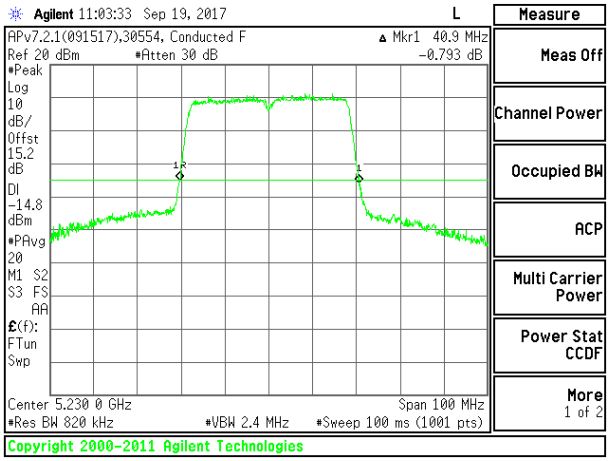
4.2.2. 802.11n HT40 MODE IN THE 5.2 GHz BAND

1TX Antenna WF4

Channel	Frequency (MHz)	26dB Bandwidth (MHz)
Low	5190	40.90
High	5230	40.90



LOW CHANNEL



HIGH CHANNEL

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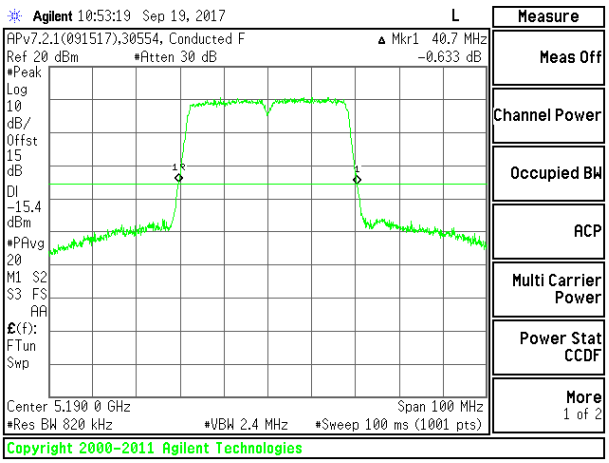
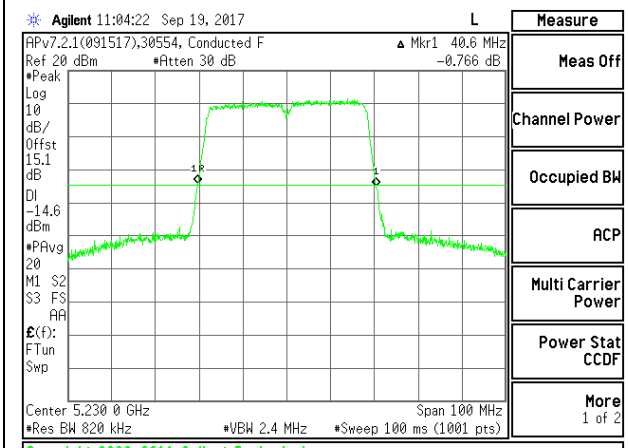
1TX Antenna WF3

Channel	Frequency (MHz)	26dB Bandwidth (MHz)
Low	5190	40.70
High	5230	40.60



LOW CHANNEL



HIGH CHANNEL

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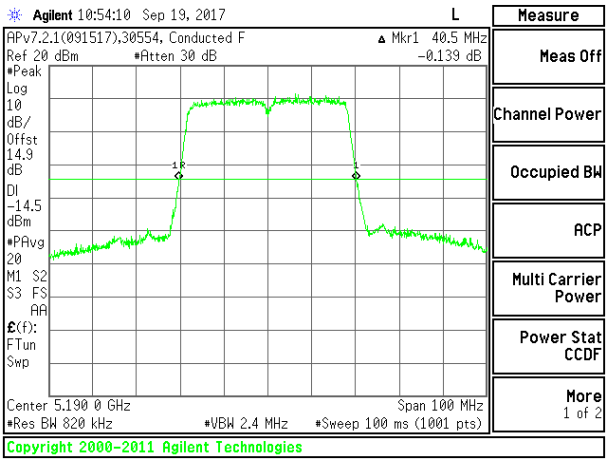
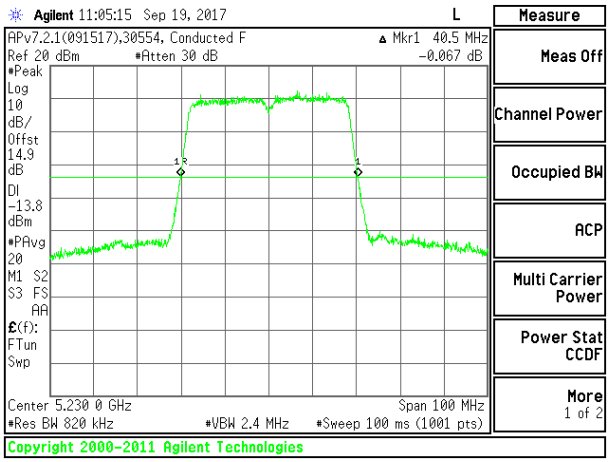
1TX Antenna WF2

Channel	Frequency (MHz)	26dB Bandwidth (MHz)
Low	5190	40.50
High	5230	40.50



LOW CHANNEL



HIGH CHANNEL

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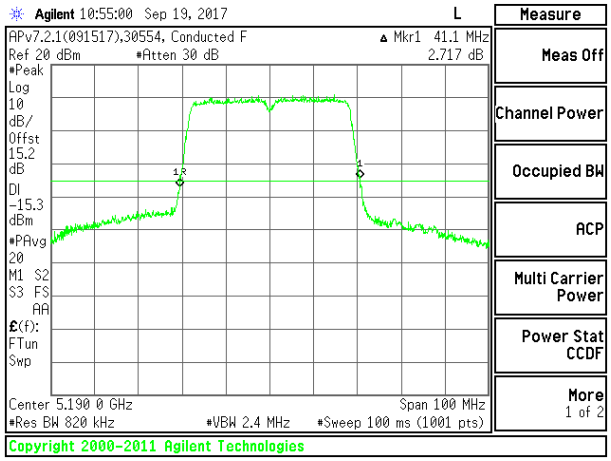
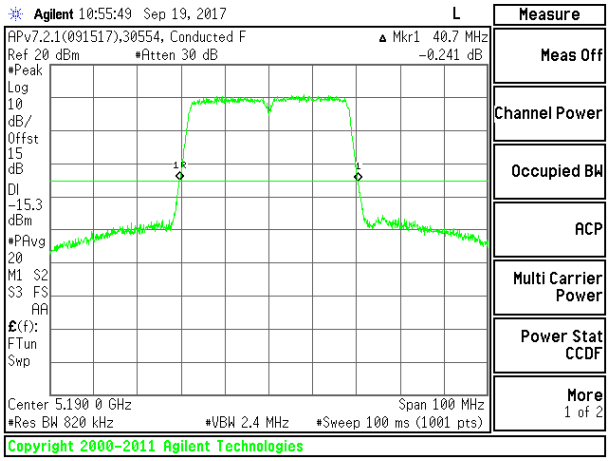
2TX Antenna WF4 + Antenna WF3 CDD Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)
Low	5190	41.10	40.70
High	5230	40.80	40.60

LOW CHANNEL

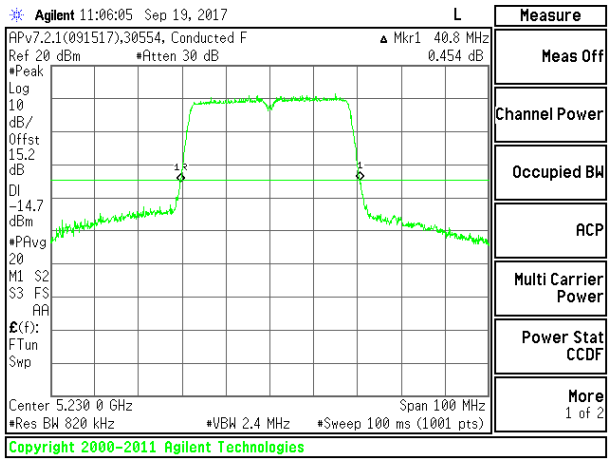


LOW CHANNEL WF4

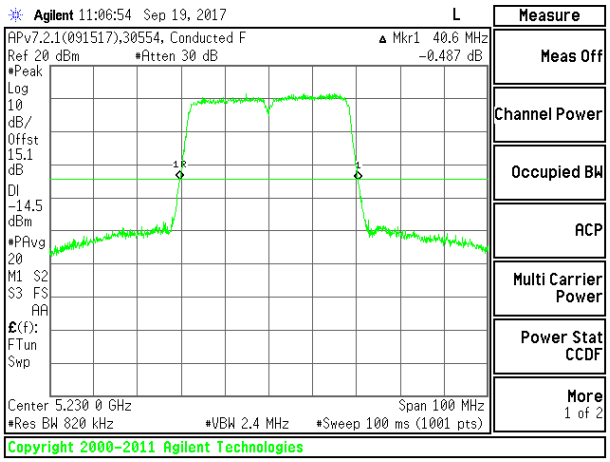


LOW CHANNEL WF3

HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF3

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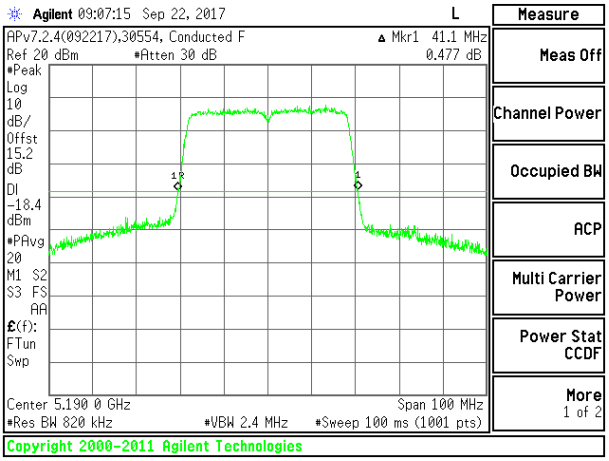
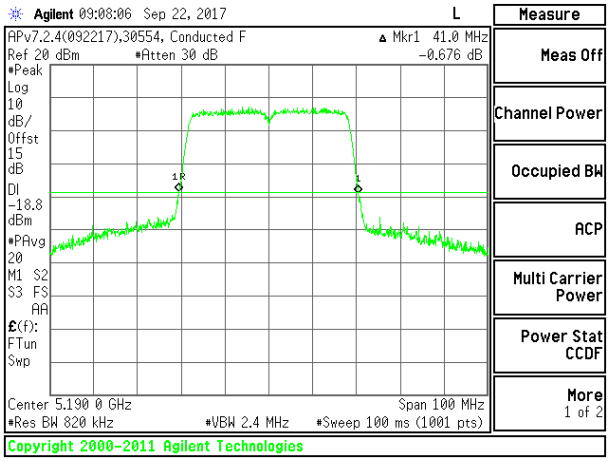
2TX Antenna WF4 + Antenna WF3 SDM Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)
Low	5190	41.10	41.00
High	5230	40.90	40.60

LOW CHANNEL

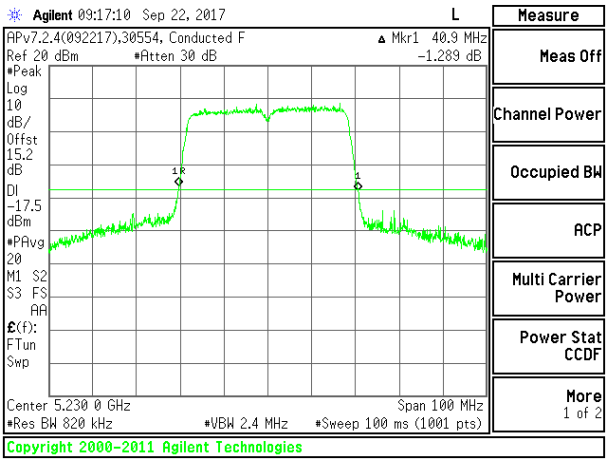


LOW CHANNEL WF4

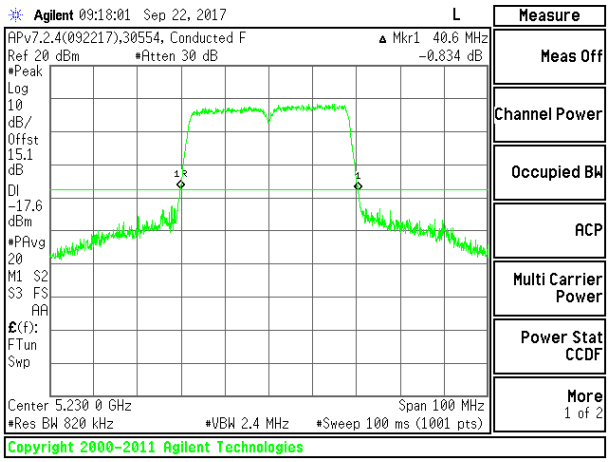


LOW CHANNEL WF3

HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF3

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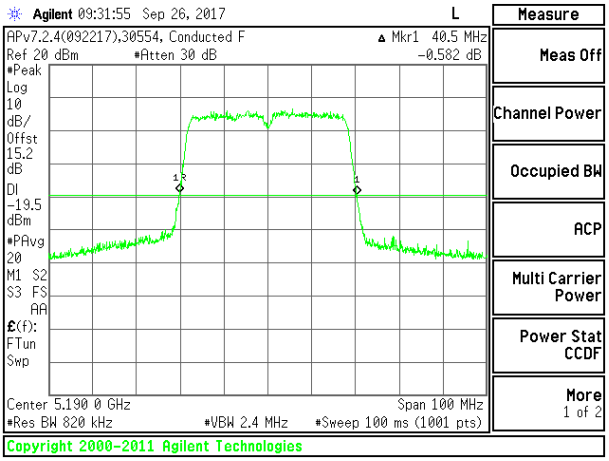
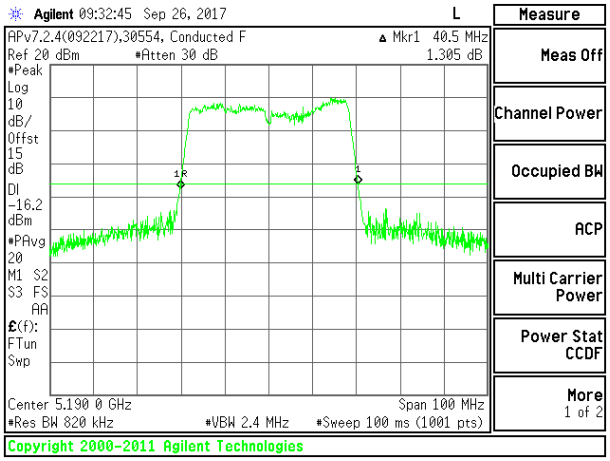
2TX Antenna WF4 + Antenna WF3 BF Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)
Low	5190	40.50	40.50
High	5230	40.60	39.70

LOW CHANNEL

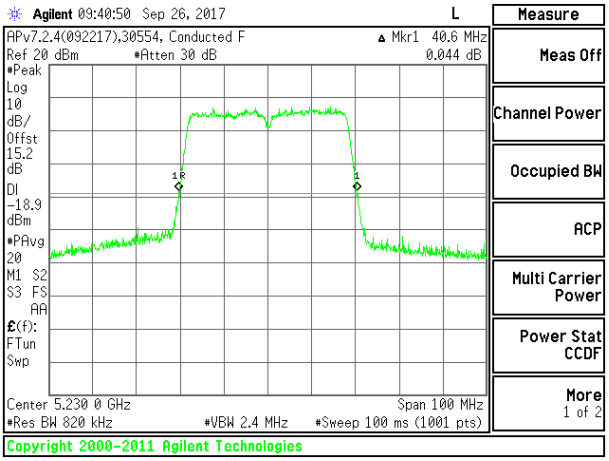


LOW CHANNEL WF4

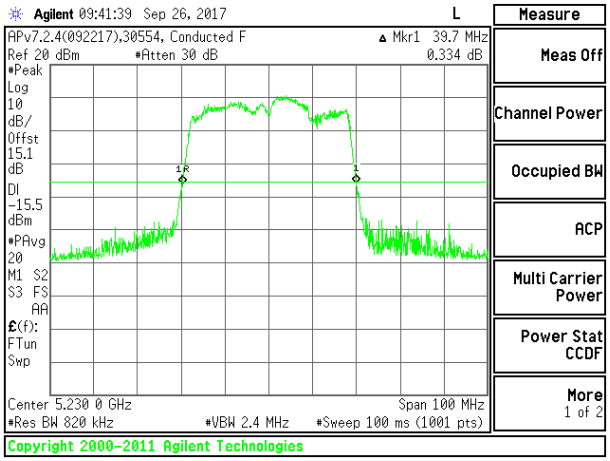


LOW CHANNEL WF3

HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF3

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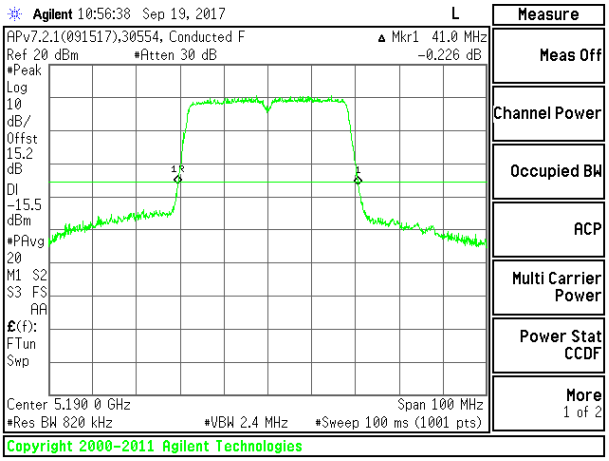
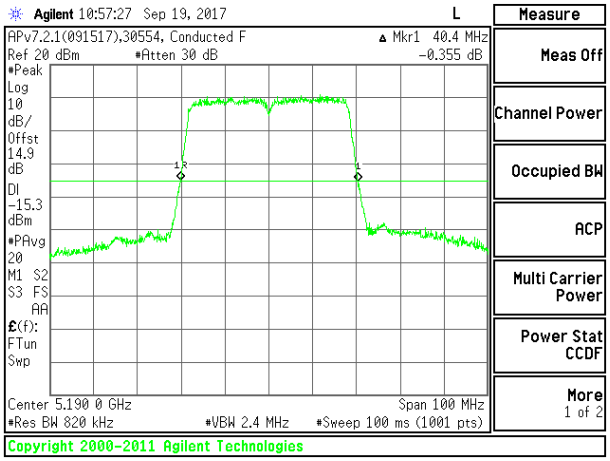
2TX Antenna WF4 + Antenna WF2 CDD Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5190	41.00	40.40
High	5230	41.20	40.60

LOW CHANNEL

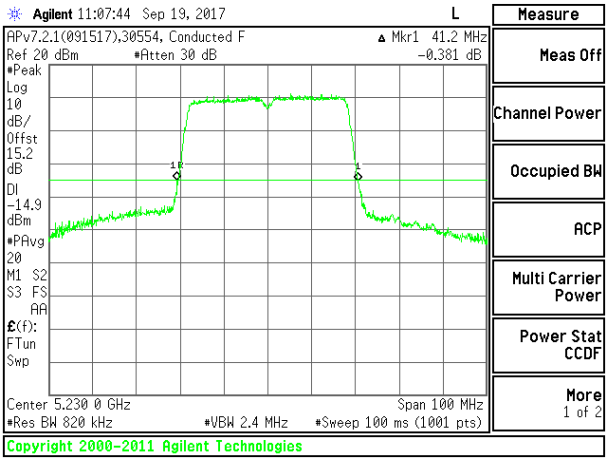


LOW CHANNEL WF4

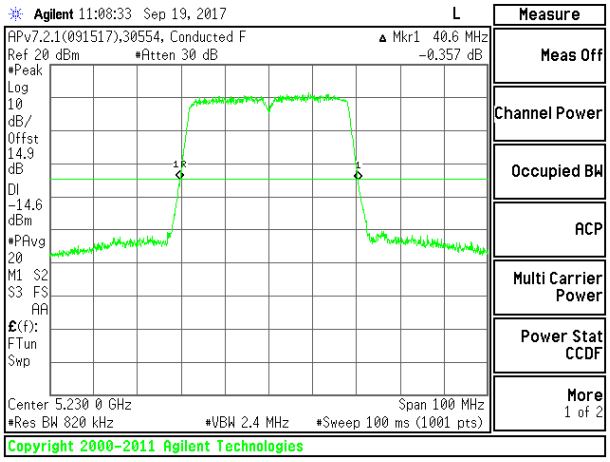


LOW CHANNEL WF2

HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF2

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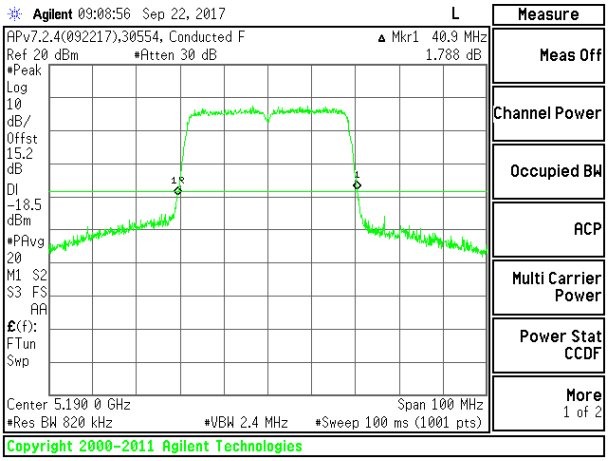
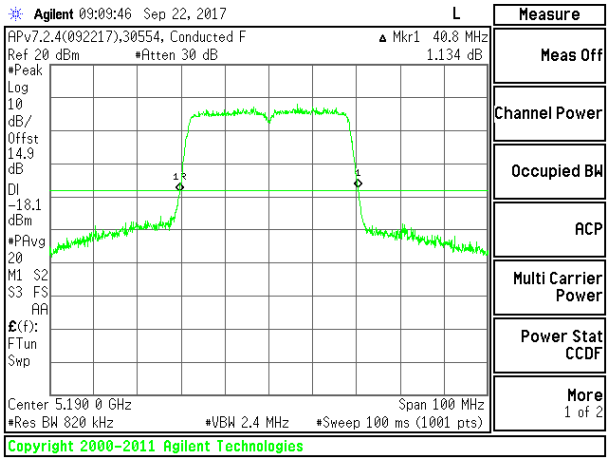
2TX Antenna WF4 + Antenna WF2 SDM Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5190	40.90	40.80
High	5230	40.80	40.40

LOW CHANNEL

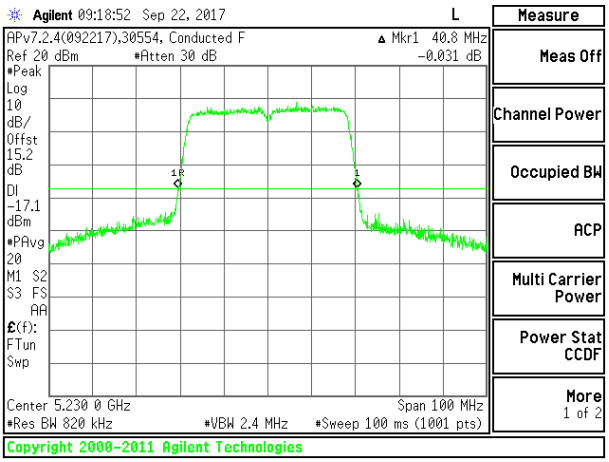


LOW CHANNEL WF4

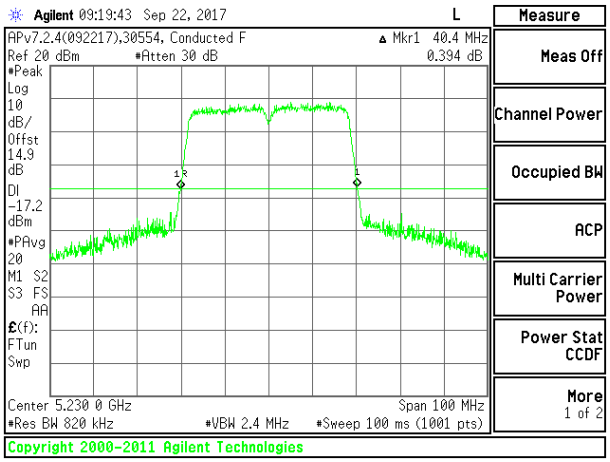


LOW CHANNEL WF2

HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF2

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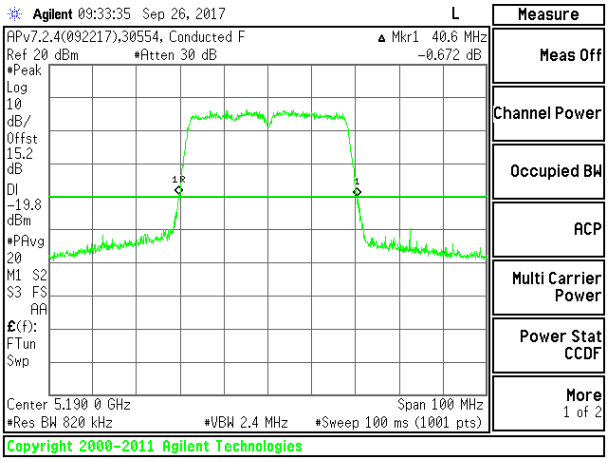
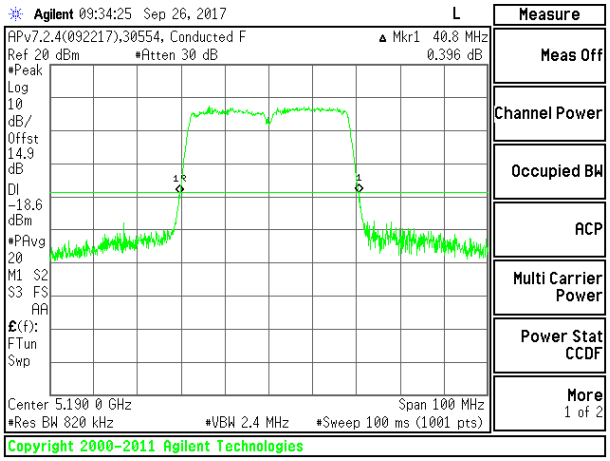
2TX Antenna WF4 + Antenna WF2 BF Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5190	40.60	40.80
High	5230	40.50	40.30

LOW CHANNEL

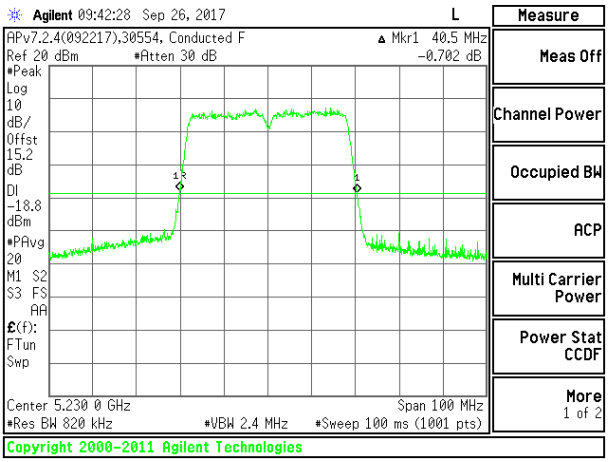


LOW CHANNEL WF4

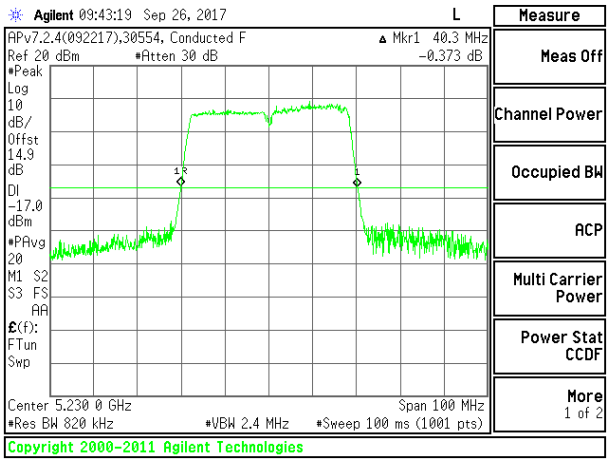


LOW CHANNEL WF2

HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF2

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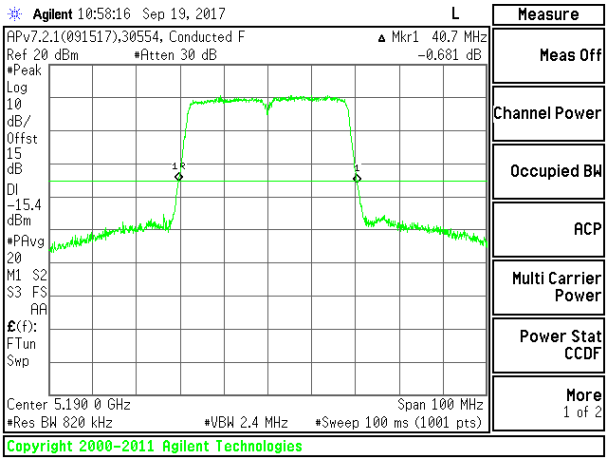
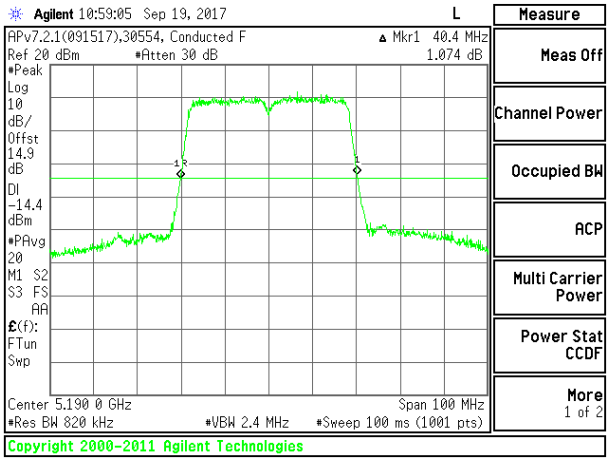
2TX Antenna WF3 + Antenna WF2 CDD Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5190	40.70	40.40
High	5230	40.50	40.30

LOW CHANNEL

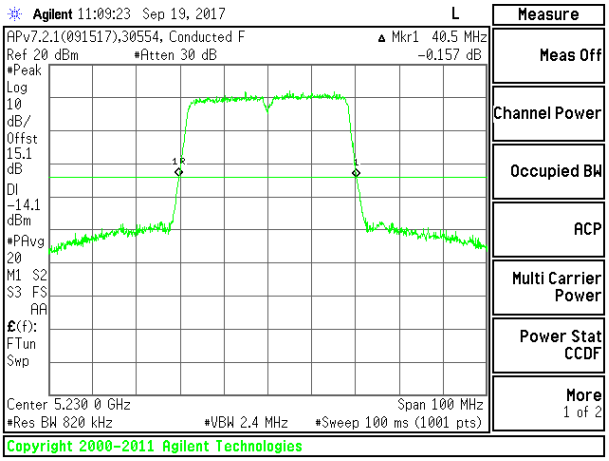


LOW CHANNEL WF3

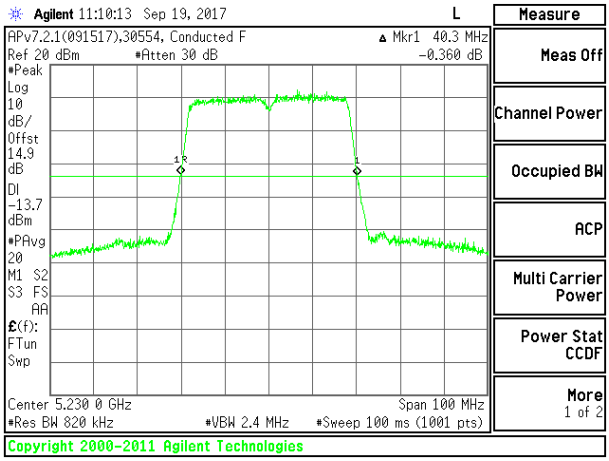


LOW CHANNEL WF2

HIGH CHANNEL



HIGH CHANNEL WF3



HIGH CHANNEL WF2

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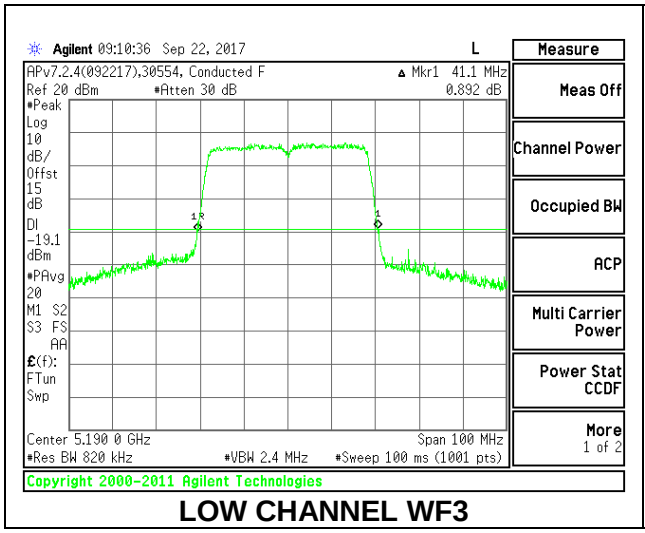
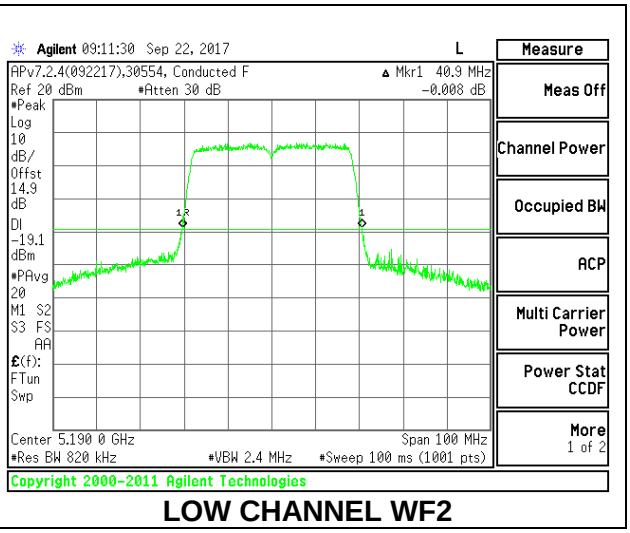
2TX Antenna WF3 + Antenna WF2 SDM Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5190	41.10	40.90
High	5230	40.40	40.60

LOW CHANNEL

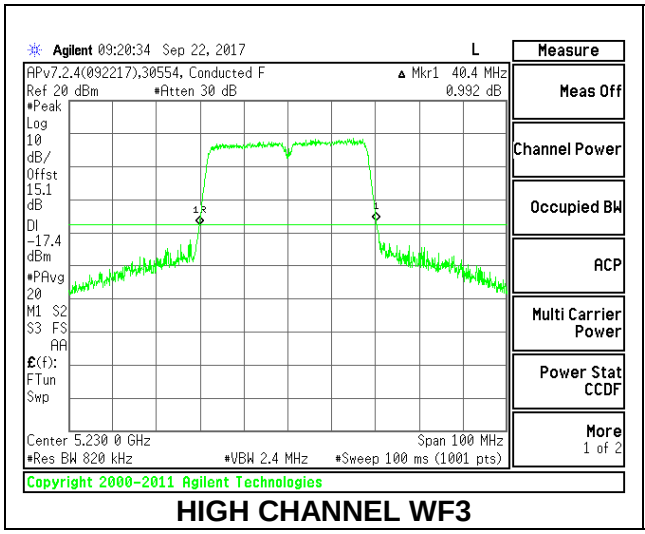


LOW CHANNEL WF3

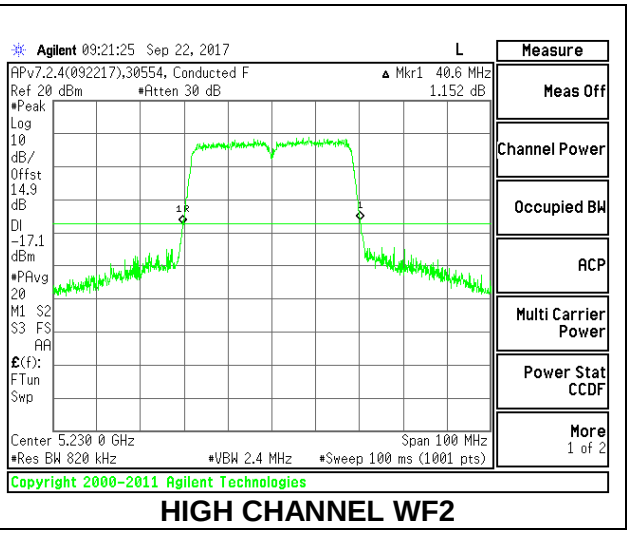


LOW CHANNEL WF2

HIGH CHANNEL



HIGH CHANNEL WF3



HIGH CHANNEL WF2

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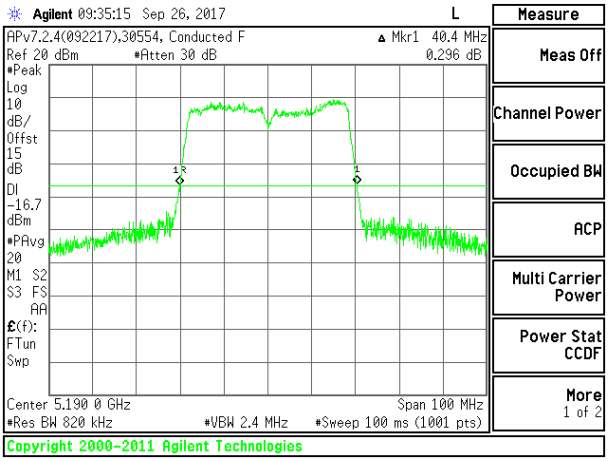
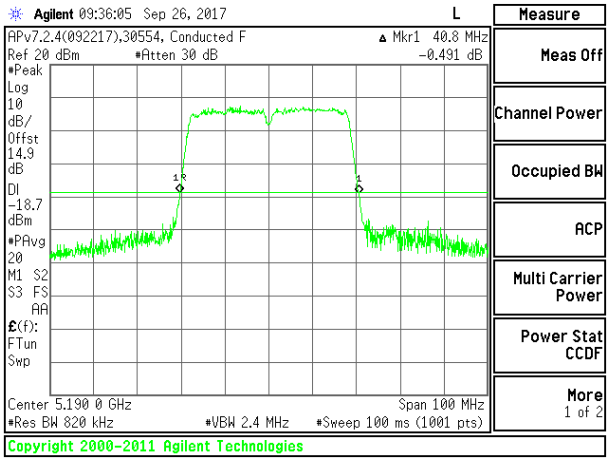
2TX Antenna WF3 + Antenna WF2 BF Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5190	40.40	40.80
High	5230	39.90	40.50

LOW CHANNEL

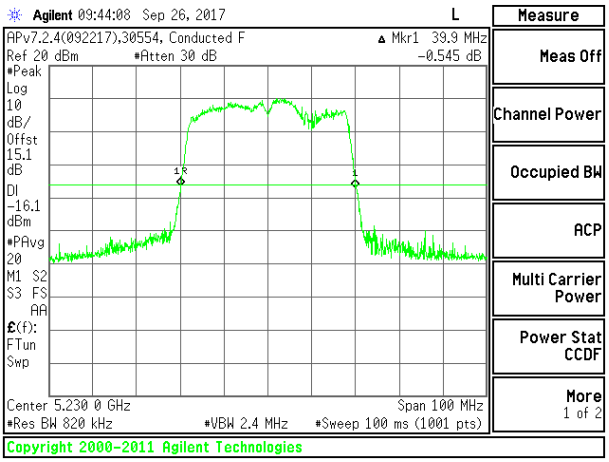


LOW CHANNEL WF3

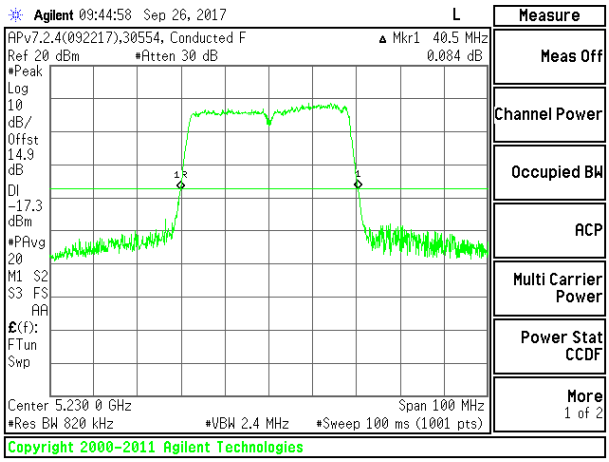


LOW CHANNEL WF2

HIGH CHANNEL



HIGH CHANNEL WF3



HIGH CHANNEL WF2

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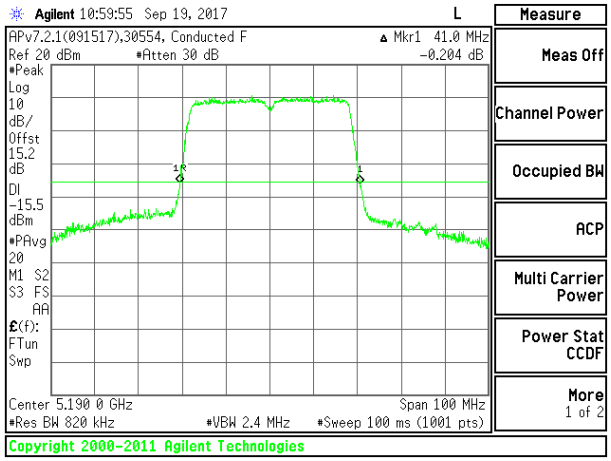
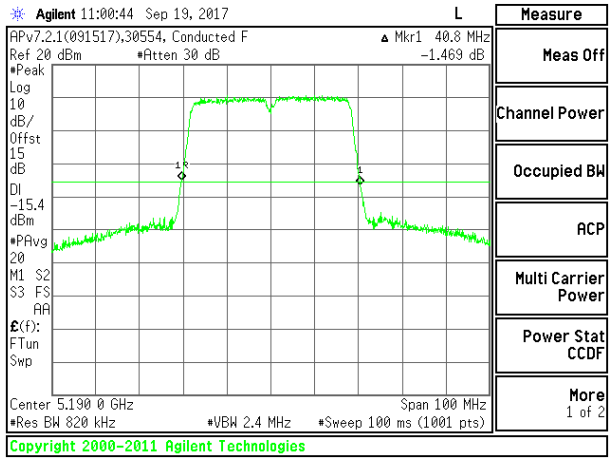
3TX Antenna WF4 + Antenna WF3 + Antenna WF2 CDD Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5190	41.00	40.80	40.30
High	5230	41.40	40.60	40.30

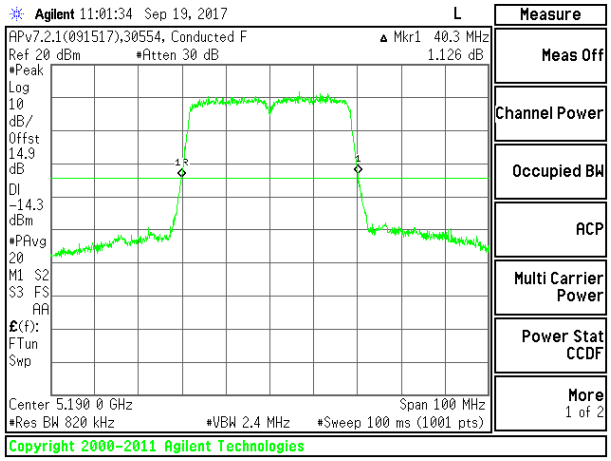
LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF3



LOW CHANNEL WF2

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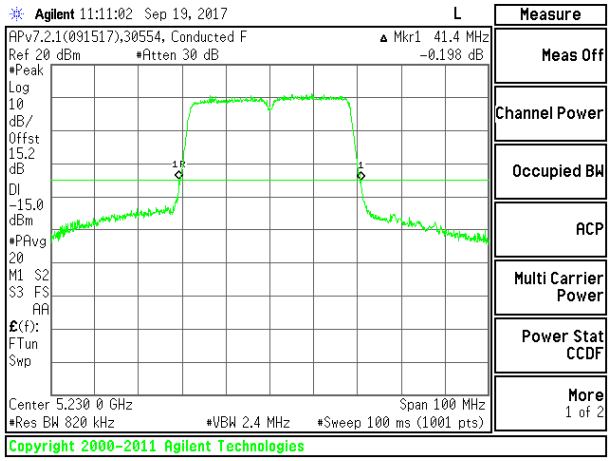
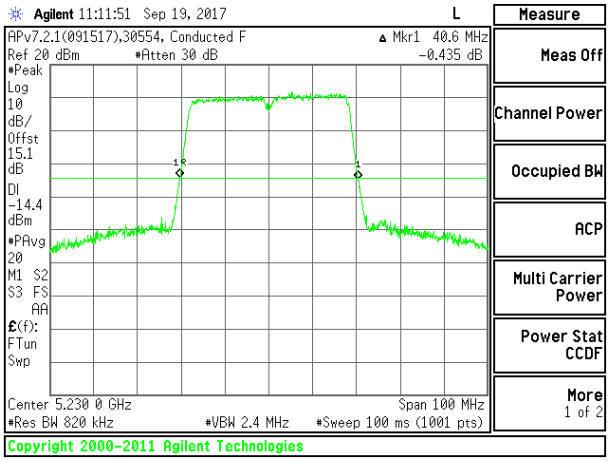
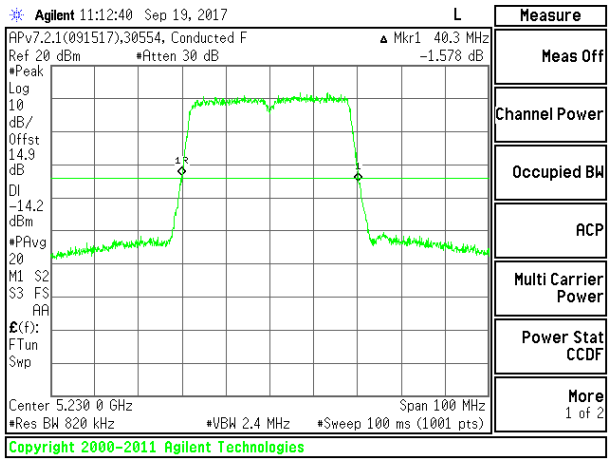
HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF3



HIGH CHANNEL WF2

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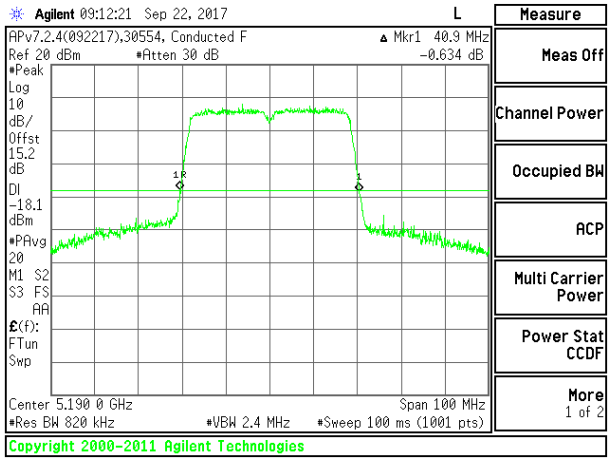
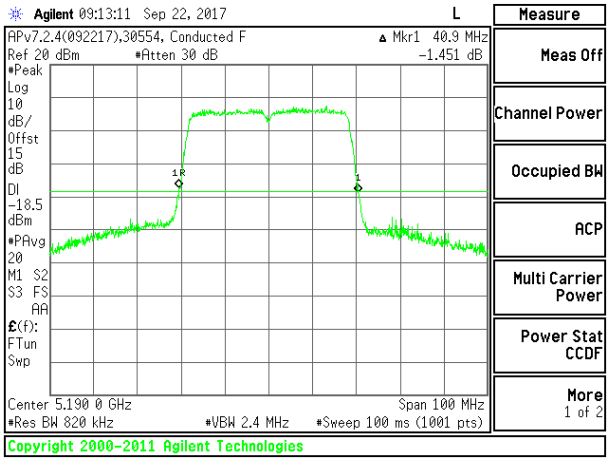
3TX Antenna WF4 + Antenna WF3 + Antenna WF2 SDM Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5190	40.90	40.90	41.10
High	5230	41.30	40.50	40.20

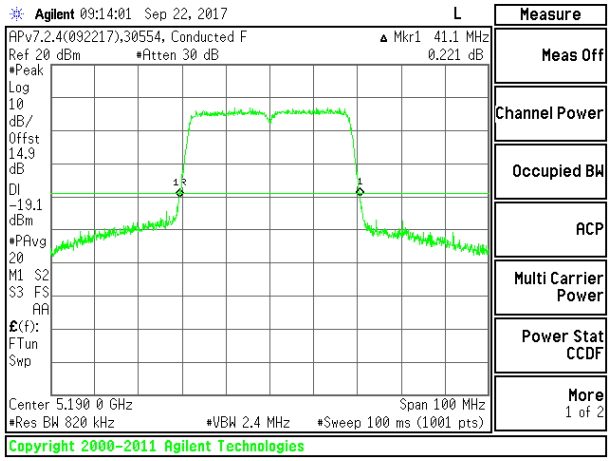
LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF3



LOW CHANNEL WF2

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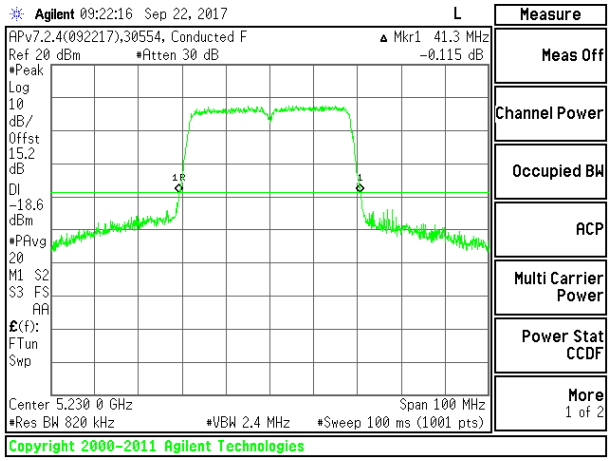
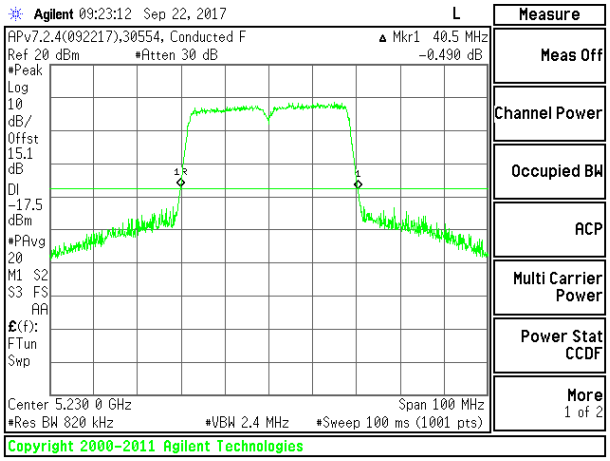
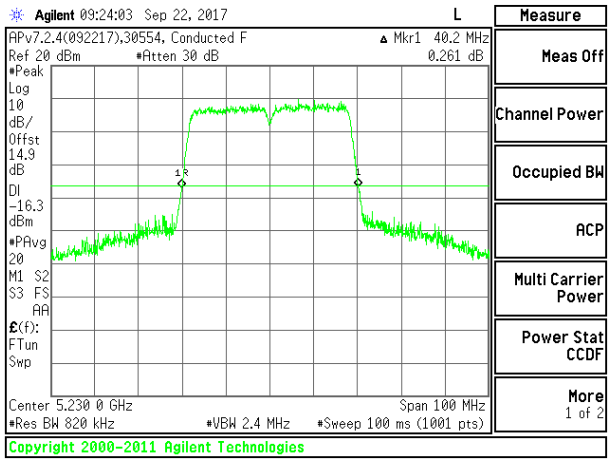
HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF3



HIGH CHANNEL WF2

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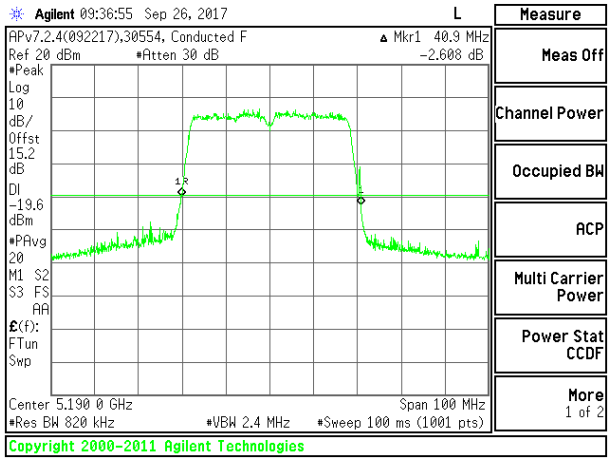
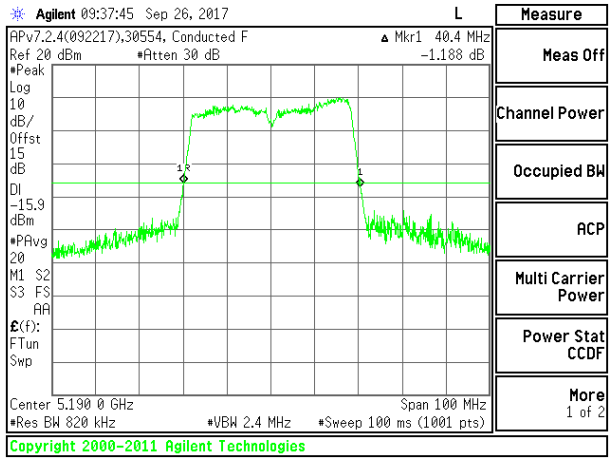
3TX Antenna WF4 + Antenna WF3 + Antenna WF2 BF Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5190	40.90	40.40	40.60
High	5230	40.50	39.50	40.50

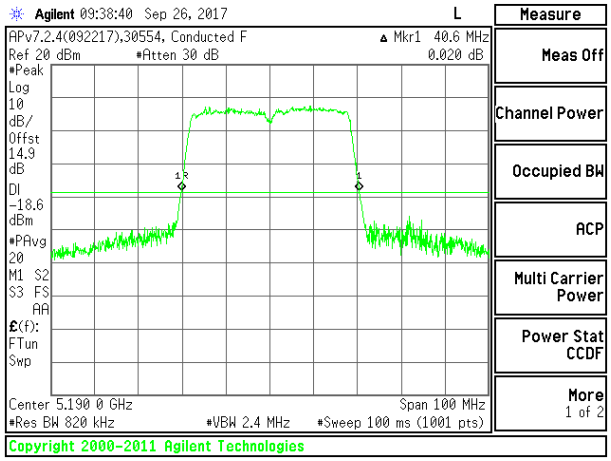
LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF3



LOW CHANNEL WF2

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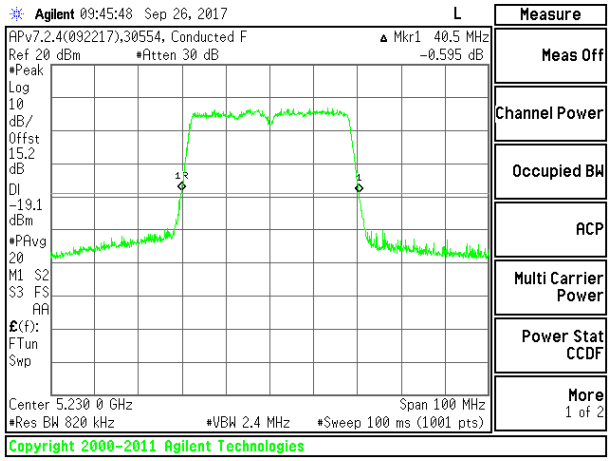
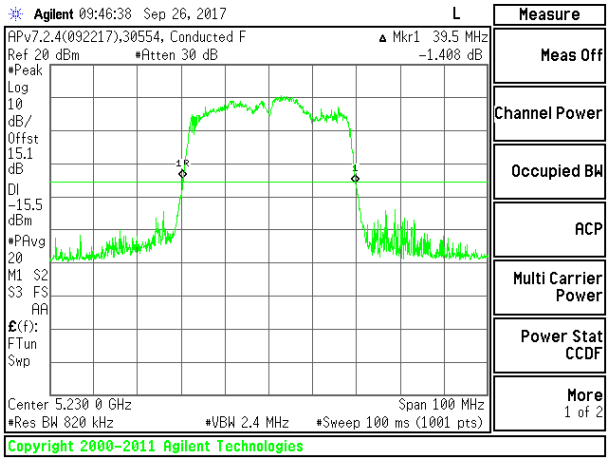
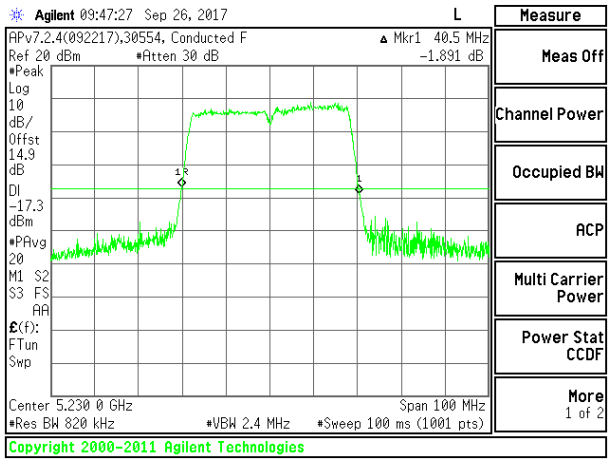
HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF3



HIGH CHANNEL WF2

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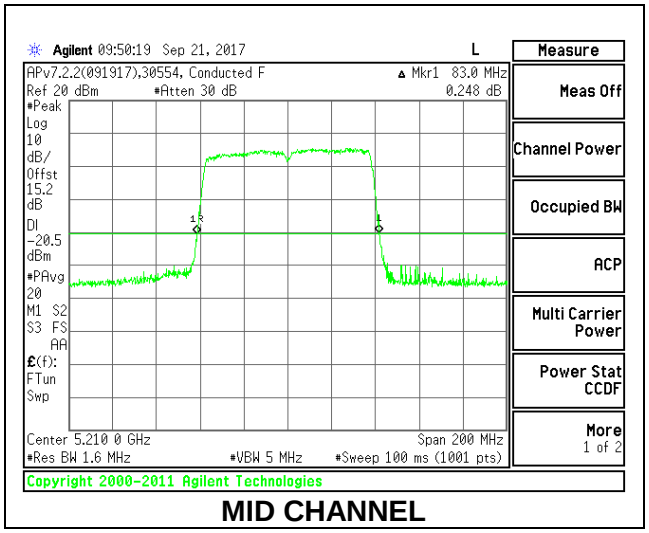
4.2.3. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND

1TX Antenna WF4

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Mid	5210	83.00



MID CHANNEL

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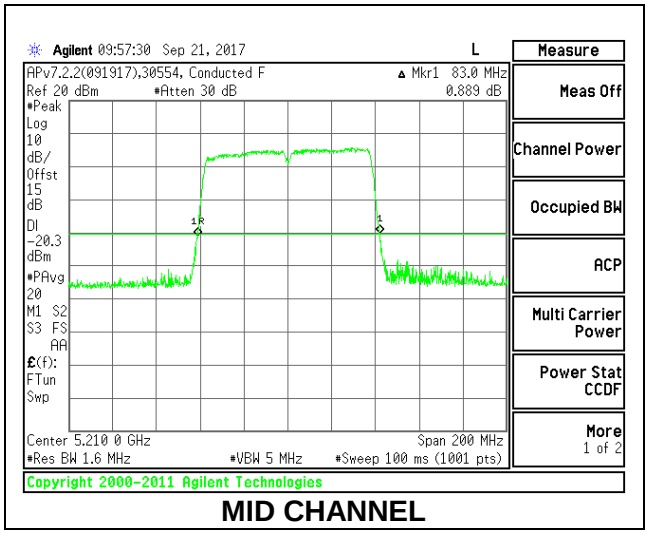
1TX Antenna WF3

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Mid	5210	83.00



MID CHANNEL

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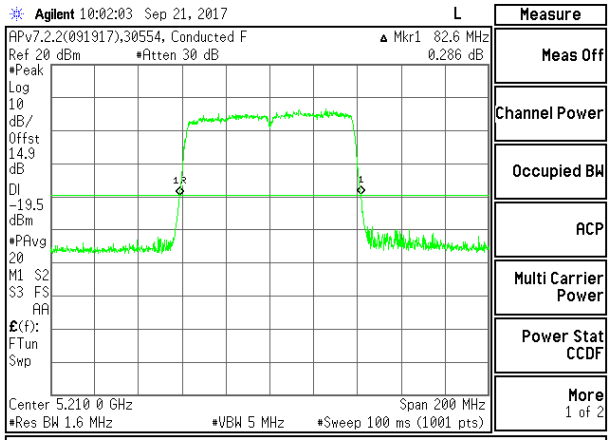
1TX Antenna WF2

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Mid	5210	82.60



MID CHANNEL

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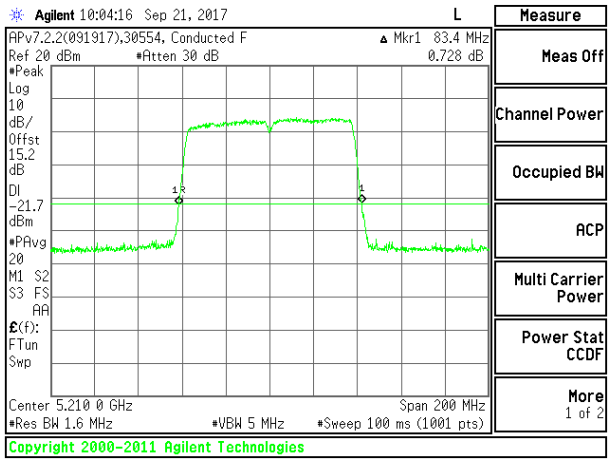
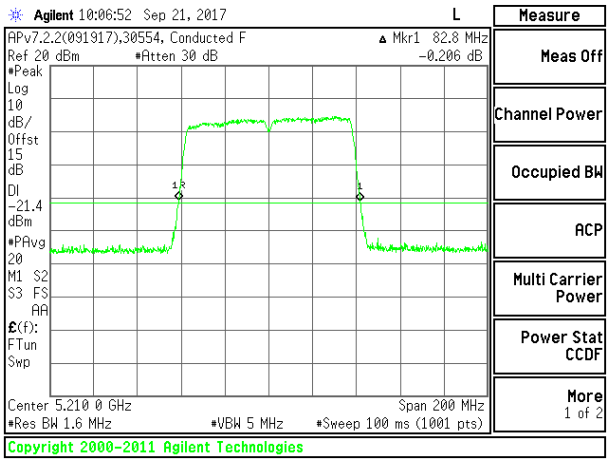
2TX Antenna WF4 + Antenna WF3 CDD Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)
Mid	5210	83.40	82.80

MID CHANNEL



MID CHANNEL WF4



MID CHANNEL WF3

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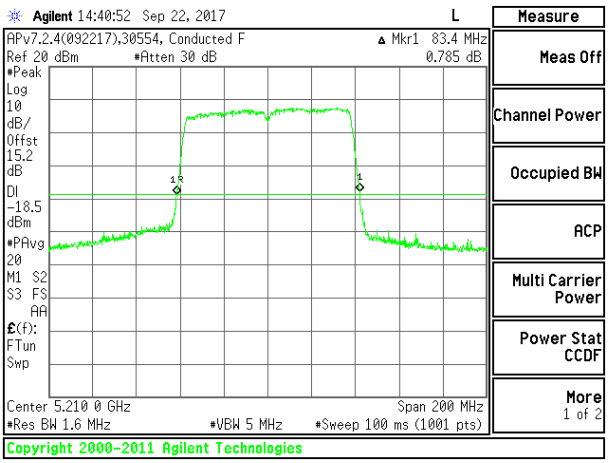
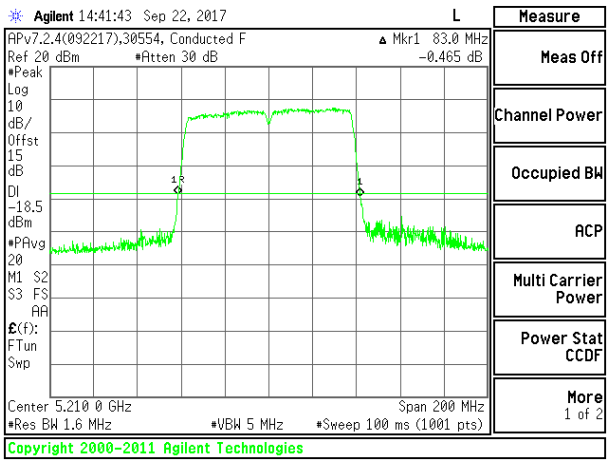
2TX Antenna WF4 + Antenna WF3 SDM Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)
Mid	5210	83.40	83.00

MID CHANNEL



MID CHANNEL WF4



MID CHANNEL WF3

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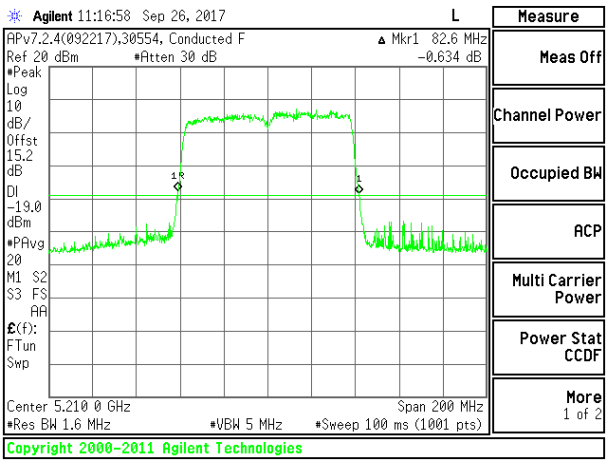
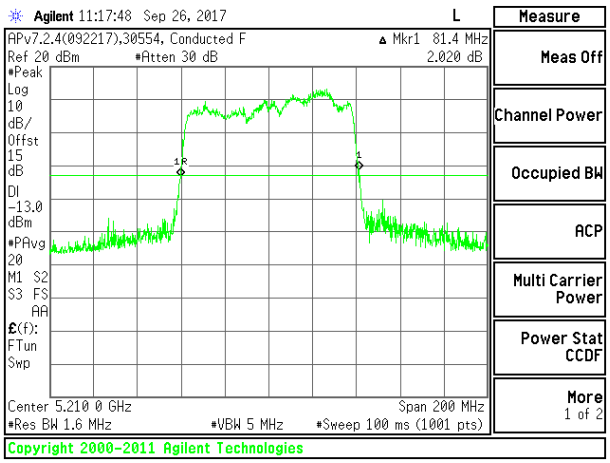
2TX Antenna WF4 + Antenna WF3 BF Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)
Mid	5210	82.60	81.40

MID CHANNEL



MID CHANNEL WF4



MID CHANNEL WF3

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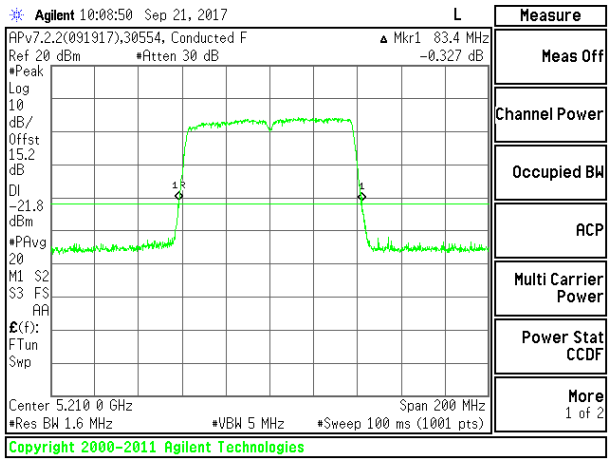
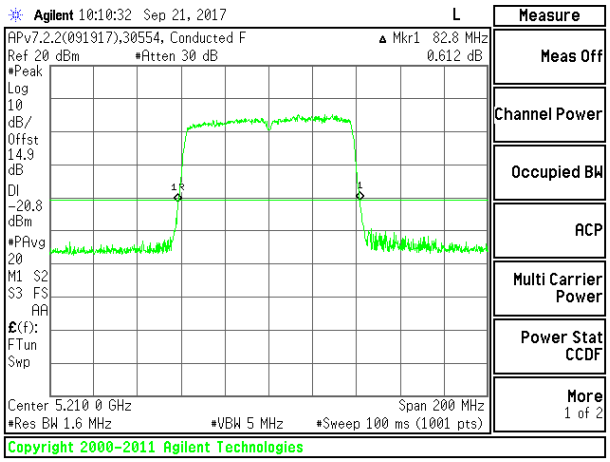
2TX Antenna WF4 + Antenna WF2 CDD Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF2 (MHz)
Mid	5210	83.40	82.80

MID CHANNEL



MID CHANNEL WF4



MID CHANNEL WF2

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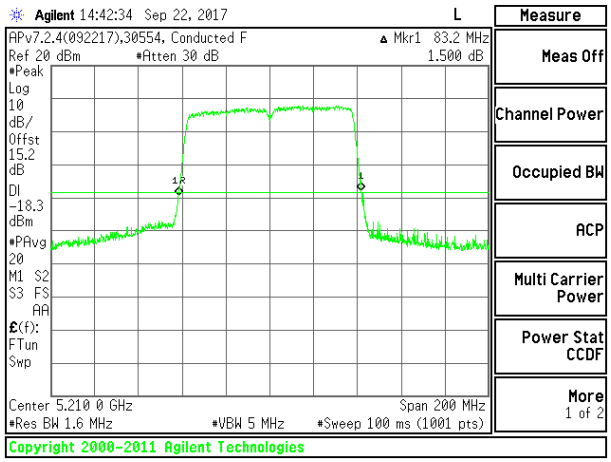
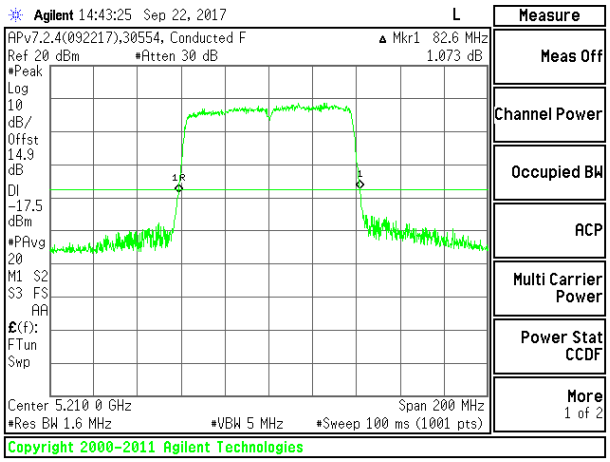
2TX Antenna WF4 + Antenna WF2 SDM Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF2 (MHz)
Mid	5210	83.20	82.60

MID CHANNEL



MID CHANNEL WF4



MID CHANNEL WF2

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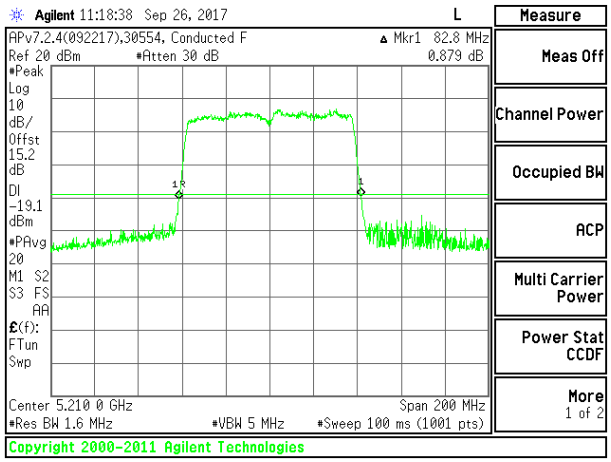
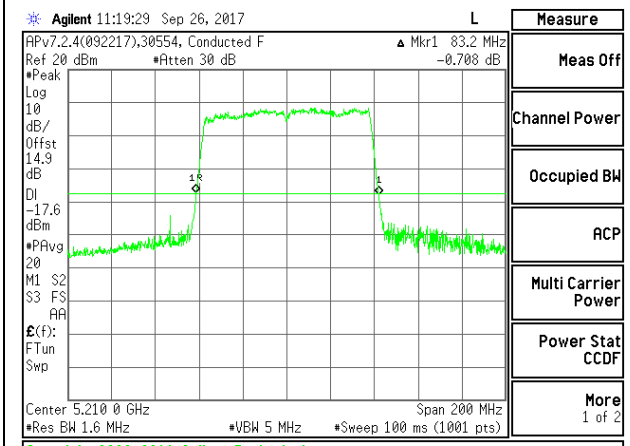
2TX Antenna WF4 + Antenna WF2 BF Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF2 (MHz)
Mid	5210	82.80	83.20

MID CHANNEL



MID CHANNEL WF4



MID CHANNEL WF2

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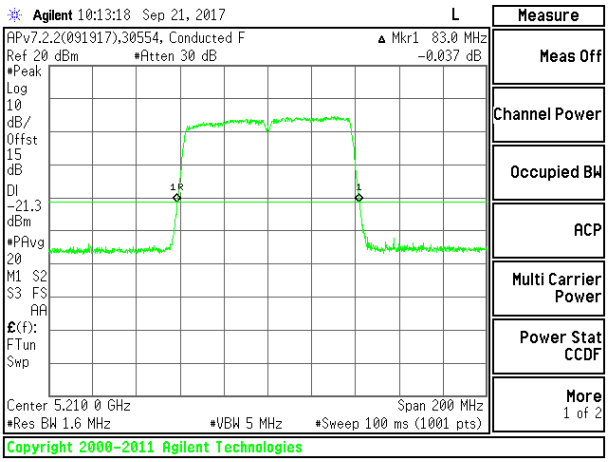
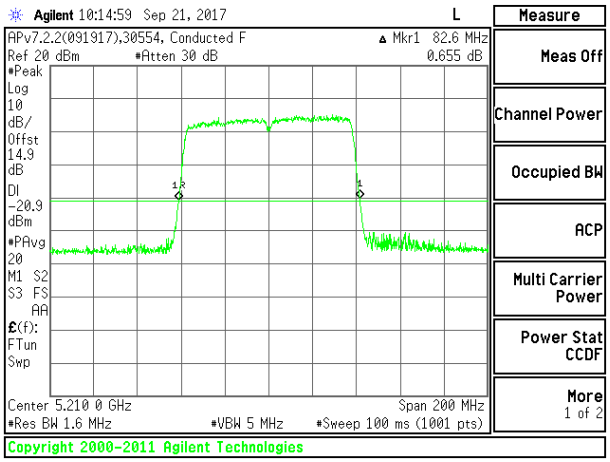
2TX Antenna WF3 + Antenna WF2 CDD Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Mid	5210	83.00	82.60

MID CHANNEL



MID CHANNEL WF3



MID CHANNEL WF2

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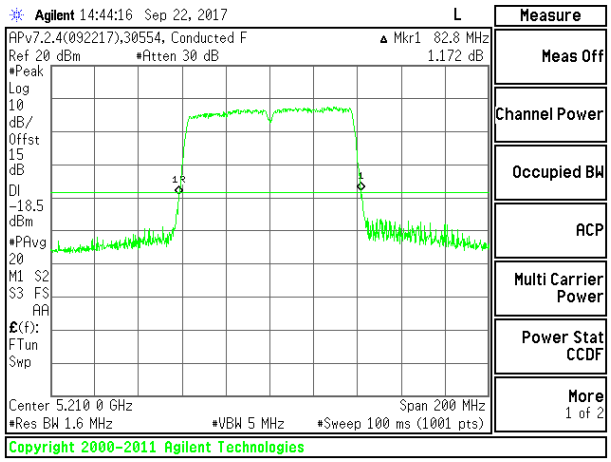
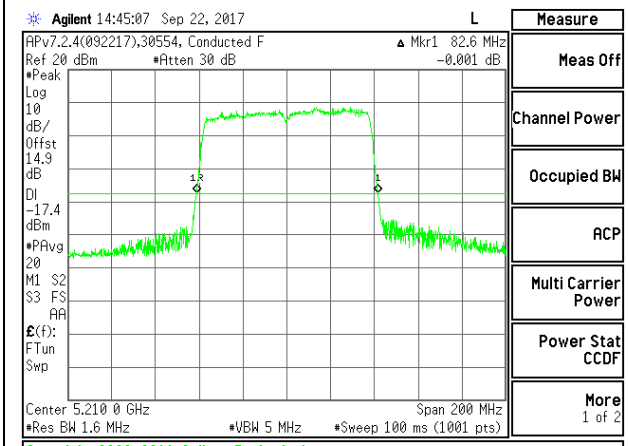
2TX Antenna WF3 + Antenna WF2 SDM Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Mid	5210	82.80	82.60

MID CHANNEL



MID CHANNEL WF3



MID CHANNEL WF2

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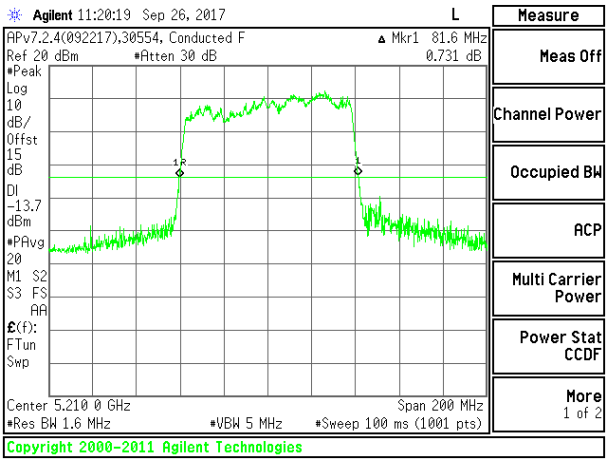
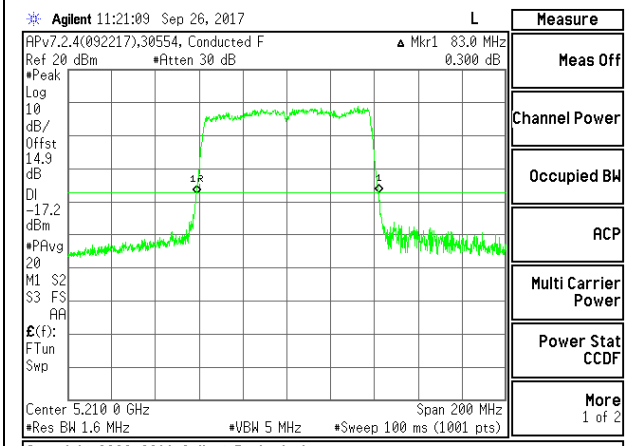
2TX Antenna WF3 + Antenna WF2 BF Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Mid	5210	81.60	83.00

MID CHANNEL



MID CHANNEL WF3



MID CHANNEL WF2

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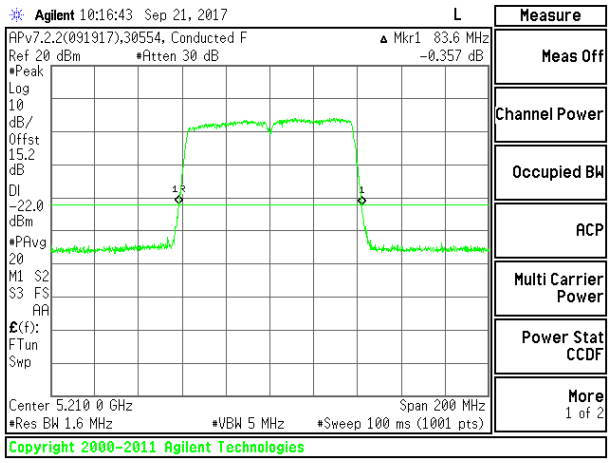
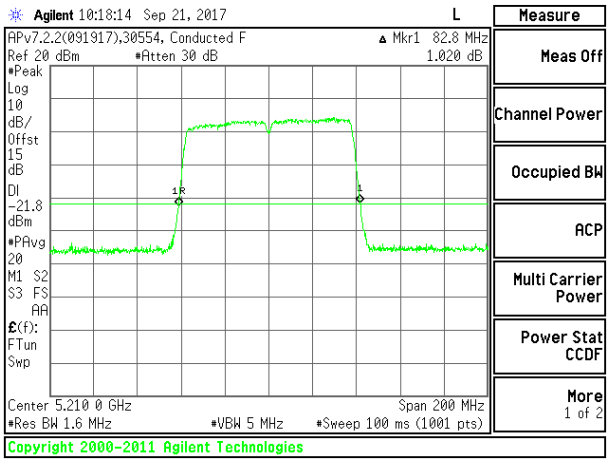
3TX Antenna WF4 + Antenna WF3 + Antenna WF2 CDD Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Mid	5210	83.60	82.80	82.80

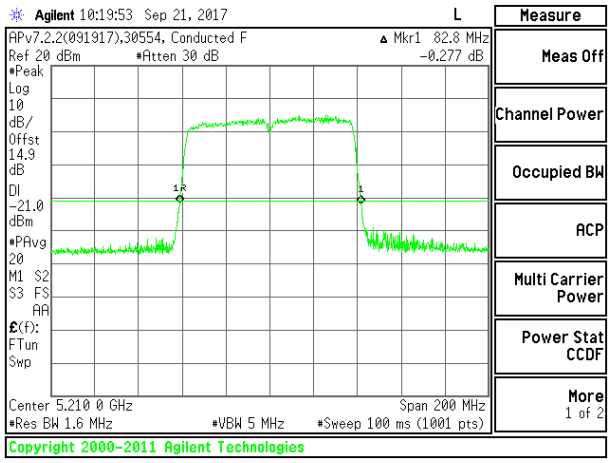
MID CHANNEL



MID CHANNEL WF4



MID CHANNEL WF3



MID CHANNEL WF2

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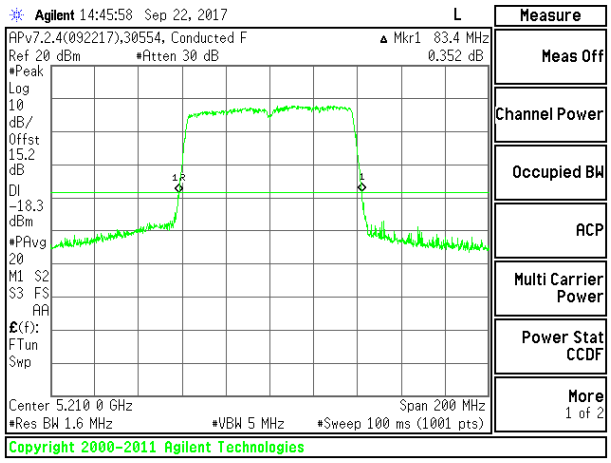
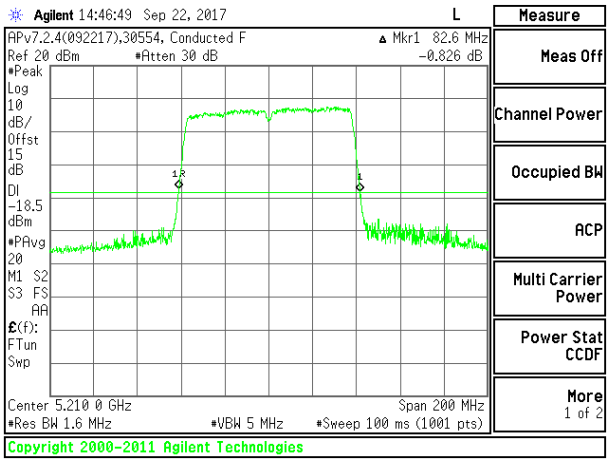
3TX Antenna WF4 + Antenna WF3 + Antenna WF2 SDM Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Mid	5210	83.40	82.60	82.40

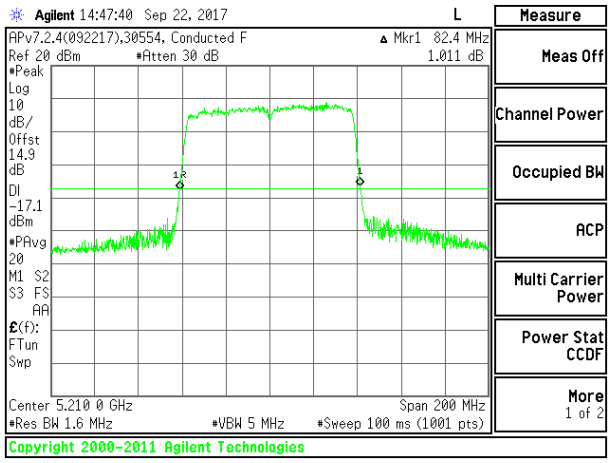
MID CHANNEL



MID CHANNEL WF4



MID CHANNEL WF3



MID CHANNEL WF2

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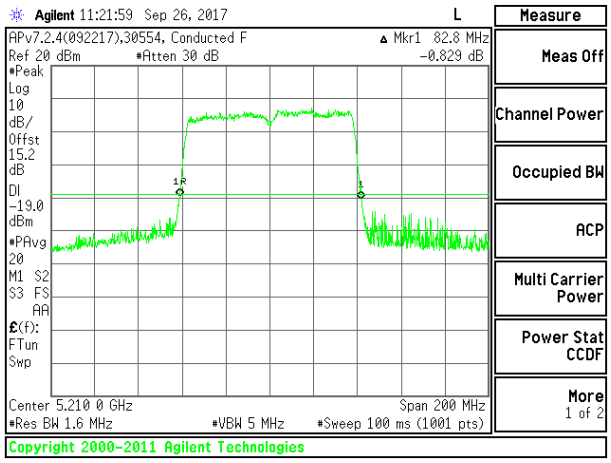
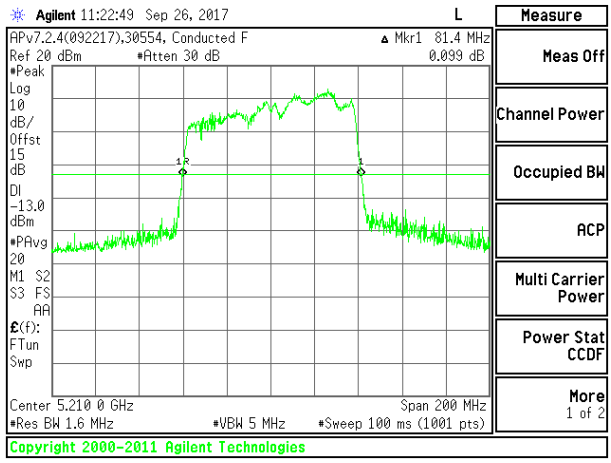
3TX Antenna WF4 + Antenna WF3 + Antenna WF2 BF Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Mid	5210	82.80	81.40	83.00

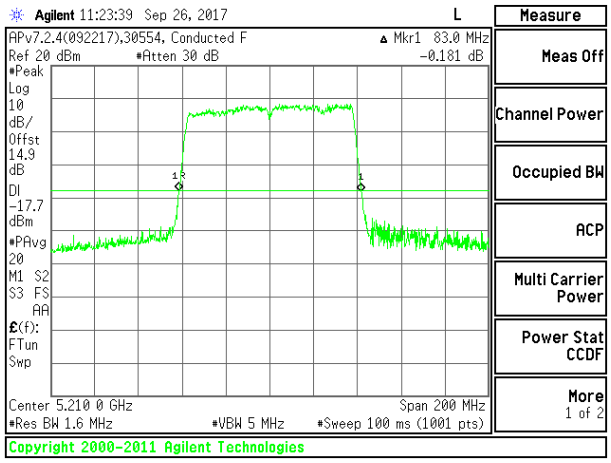
MID CHANNEL



MID CHANNEL WF4



MID CHANNEL WF3



MID CHANNEL WF2

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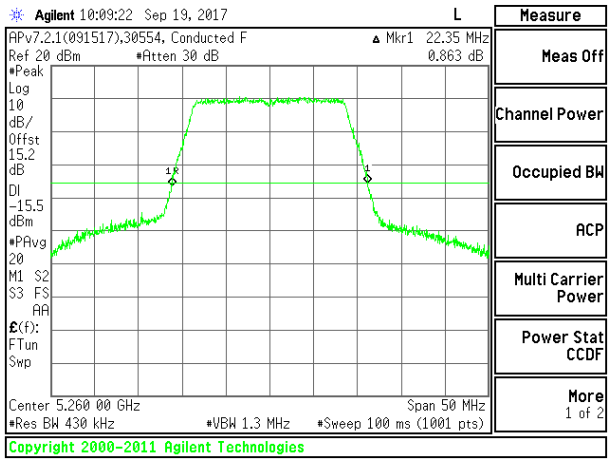
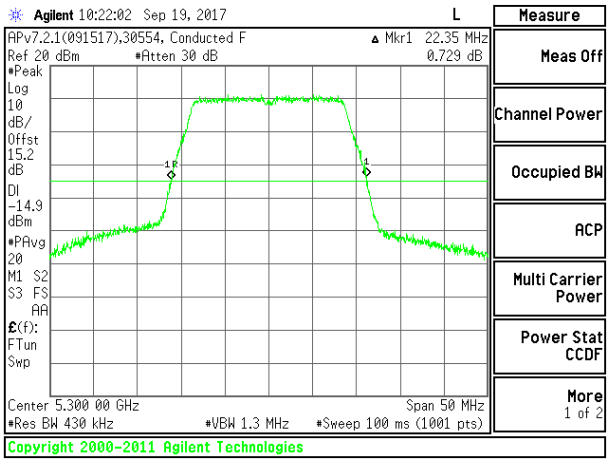
4.2.4. 802.11n HT20 MODE IN THE 5.3 GHz BAND

1TX Antenna WF4

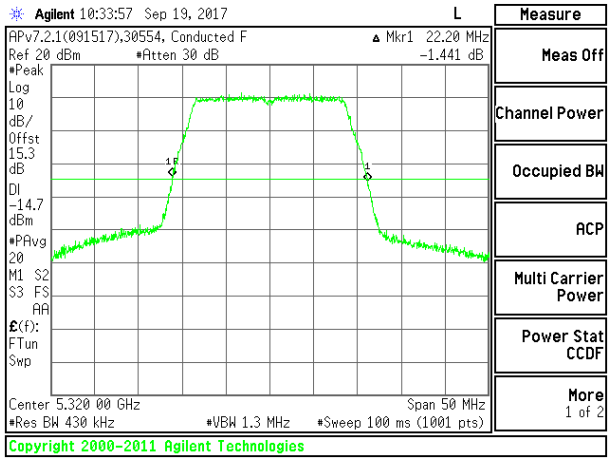
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5260	22.35
Mid	5300	22.35
High	5320	22.20



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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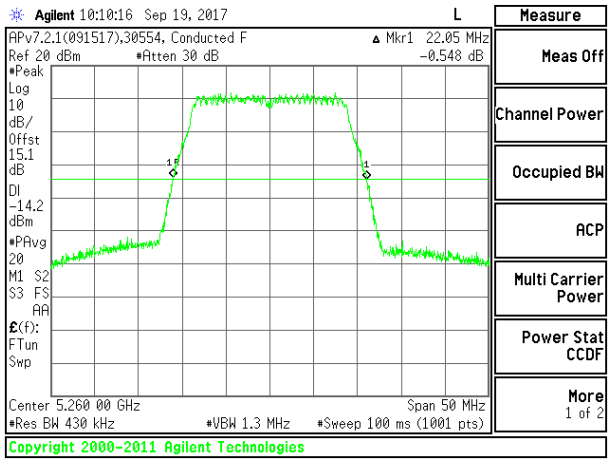
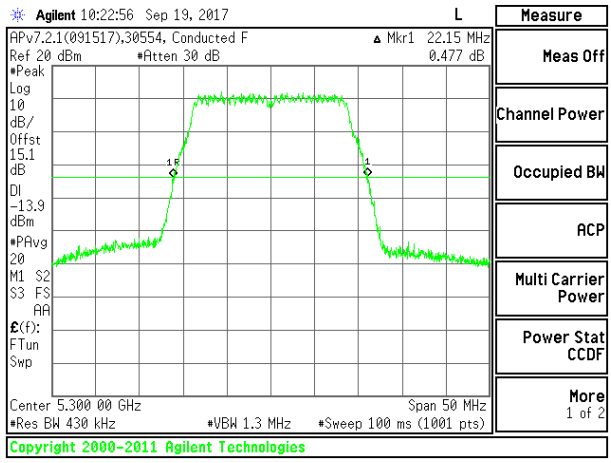
1TX Antenna WF3

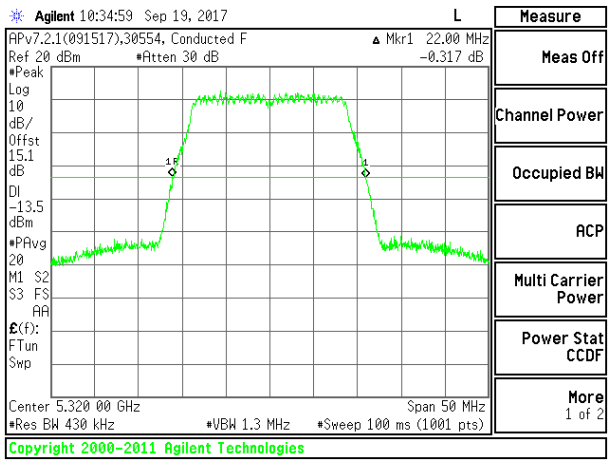
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5260	22.05
Mid	5300	22.15
High	5320	22.00



LOW CHANNEL



MID CHANNEL

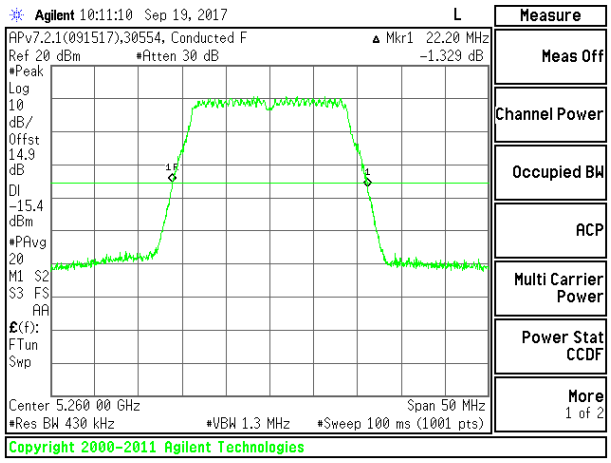


HIGH CHANNEL

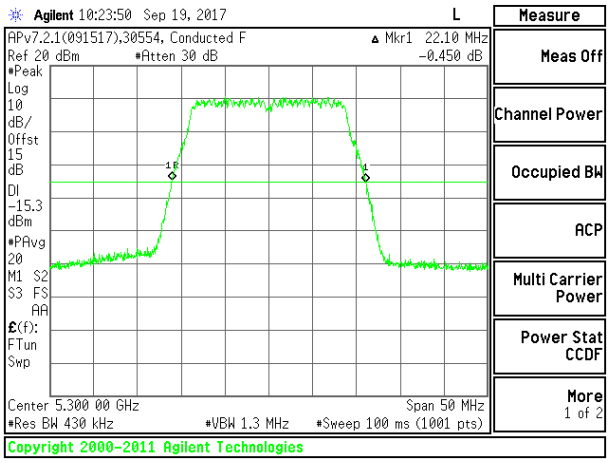
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

1TX Antenna WF2

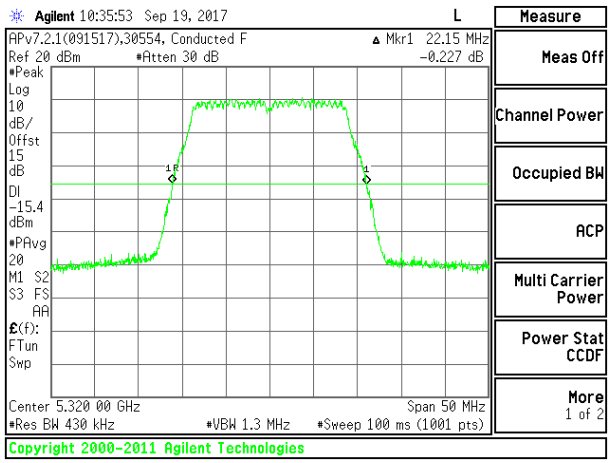
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5260	22.20
Mid	5300	22.10
High	5320	22.15



LOW CHANNEL



MID CHANNEL



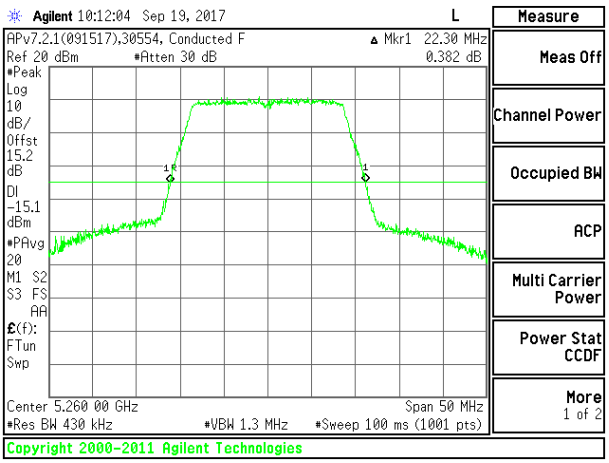
HIGH CHANNEL

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

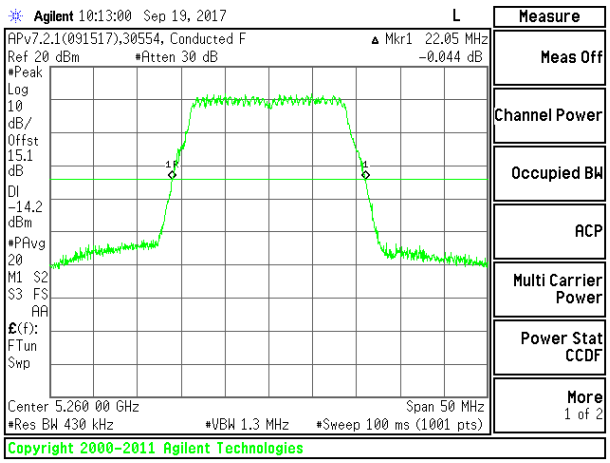
2TX Antenna WF4 + Antenna WF3 CDD Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)
Low	5260	22.30	22.05
Mid	5300	22.30	22.00
High	5320	22.40	21.95

LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF3

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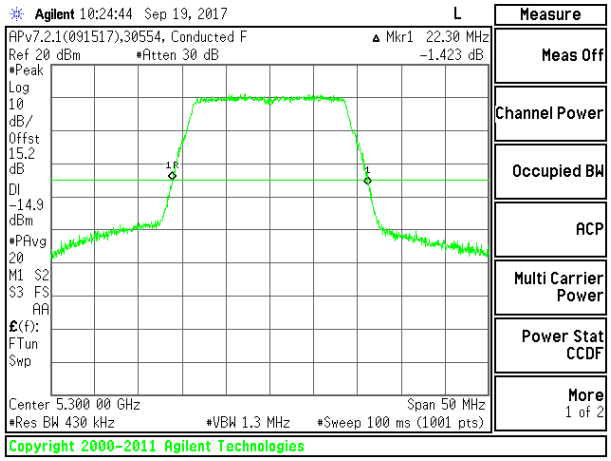
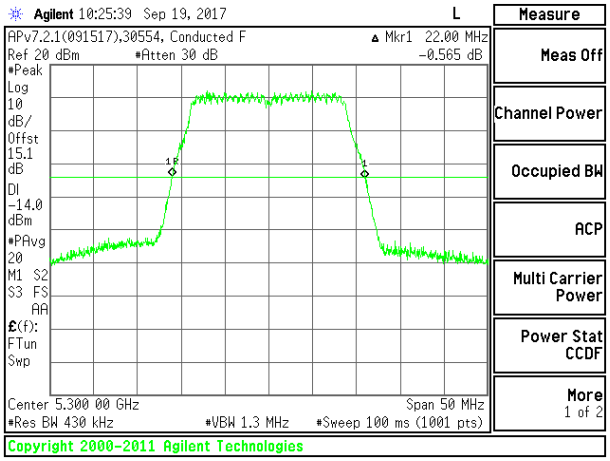
MID CHANNEL

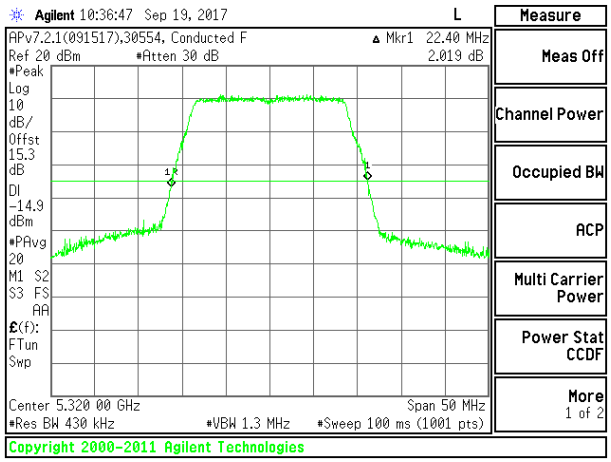


MID CHANNEL WF4

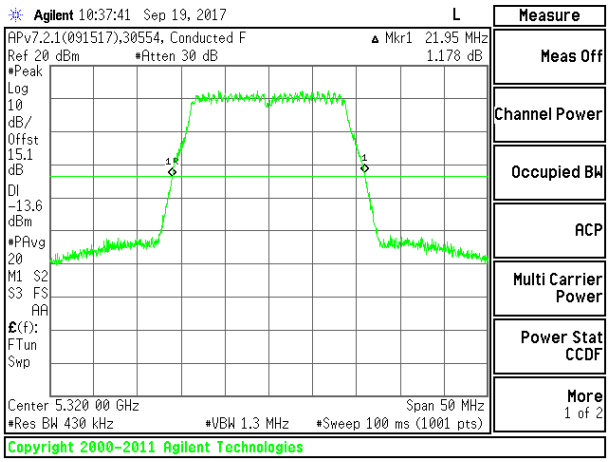


MID CHANNEL WF3

HIGH CHANNEL



HIGH CHANNEL WF4



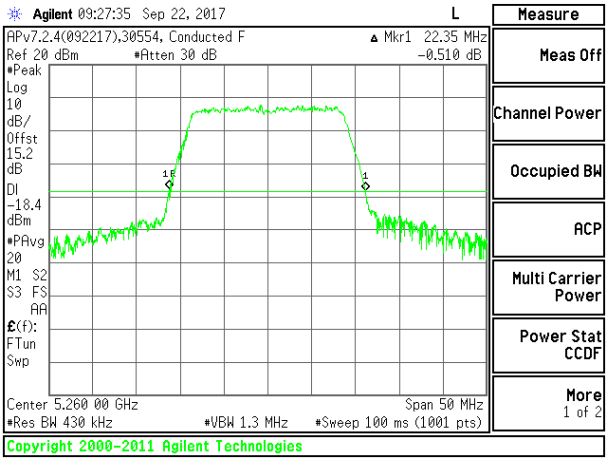
HIGH CHANNEL WF3

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

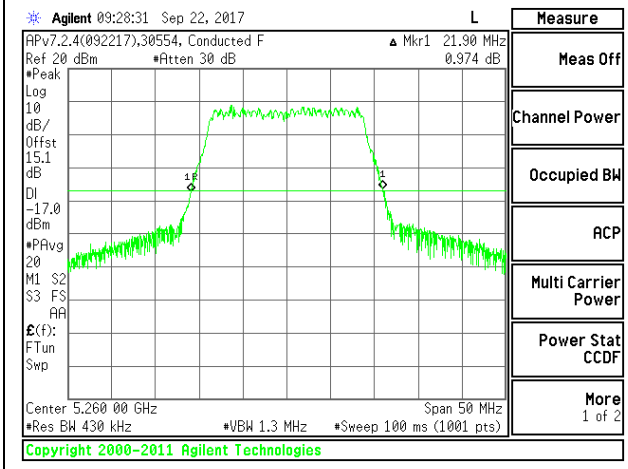
2TX Antenna WF4 + Antenna WF3 SDM Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)
Low	5260	22.35	21.90
Mid	5300	22.10	21.80
High	5320	22.20	21.85

LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF3

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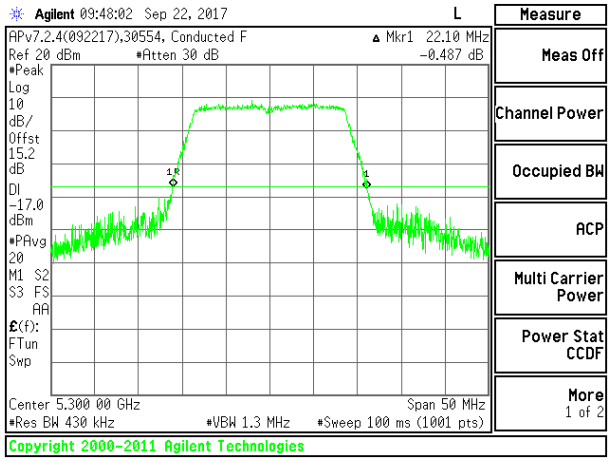
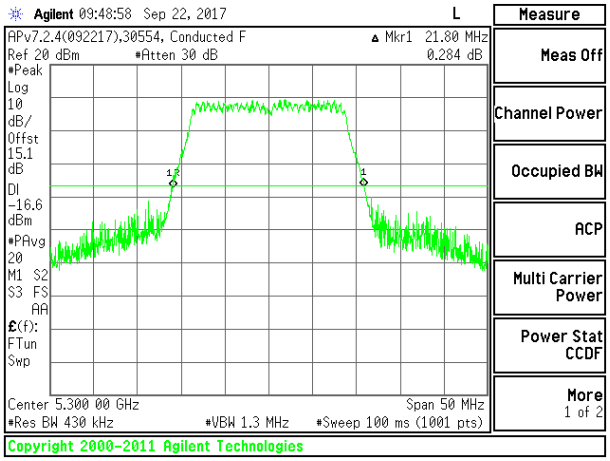
MID CHANNEL

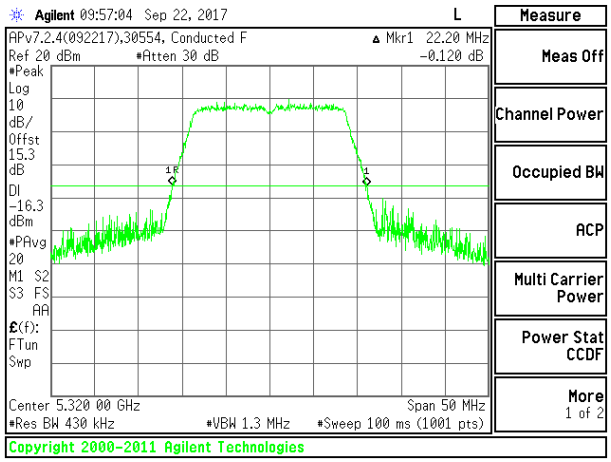


MID CHANNEL WF4

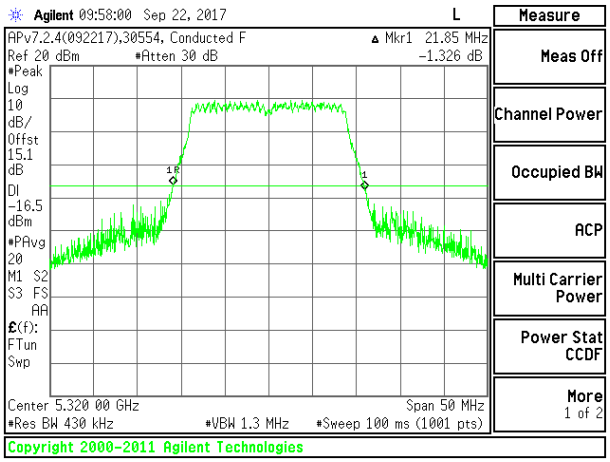


MID CHANNEL WF3

HIGH CHANNEL



HIGH CHANNEL WF4



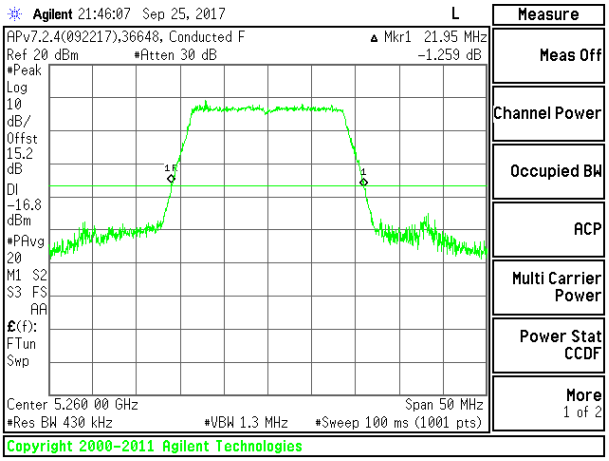
HIGH CHANNEL WF3

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

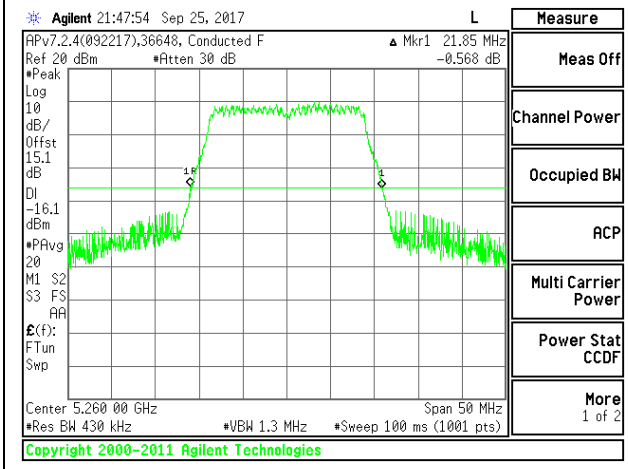
2TX Antenna WF4 + Antenna WF3 BF Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)
Low	5260	21.95	21.85
Mid	5300	22.05	21.85
High	5320	21.90	21.90

LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF3

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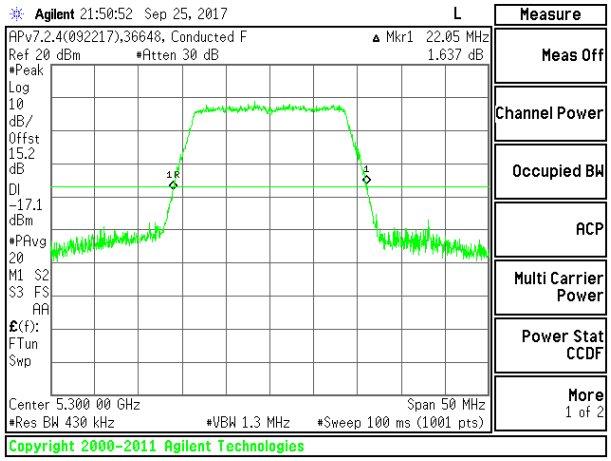
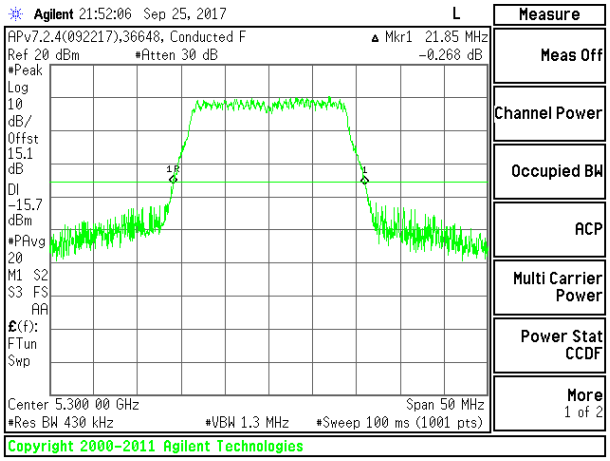
MID CHANNEL

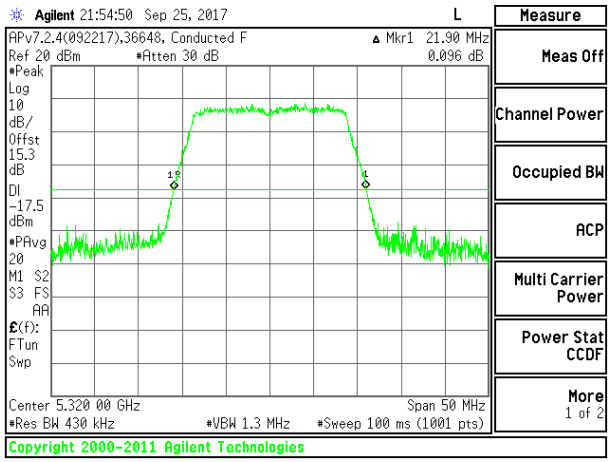


MID CHANNEL WF4

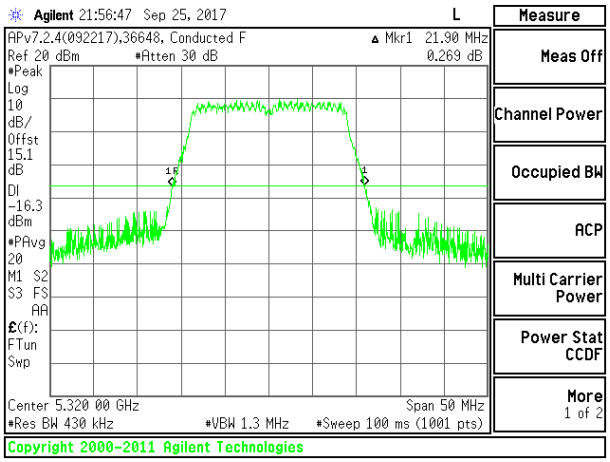


MID CHANNEL WF3

HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF3

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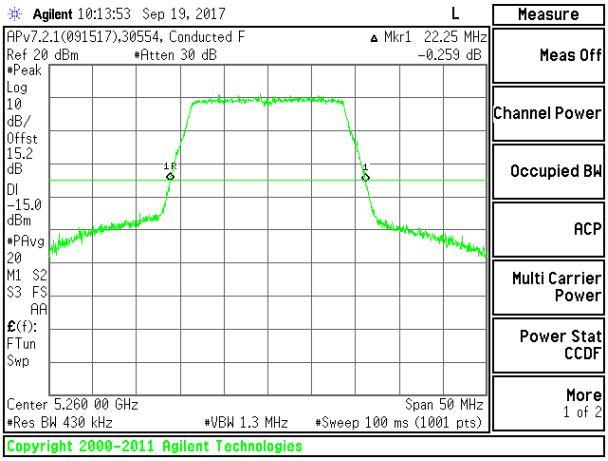
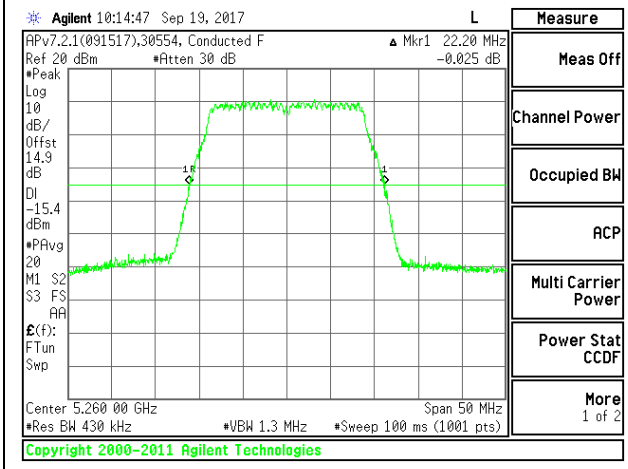
2TX Antenna WF4 + Antenna WF2 CDD Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5260	22.25	22.20
Mid	5300	22.15	22.15
High	5320	22.25	22.15

LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF2

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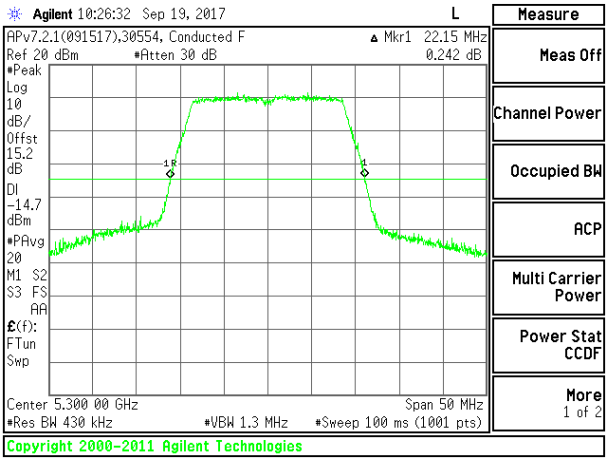
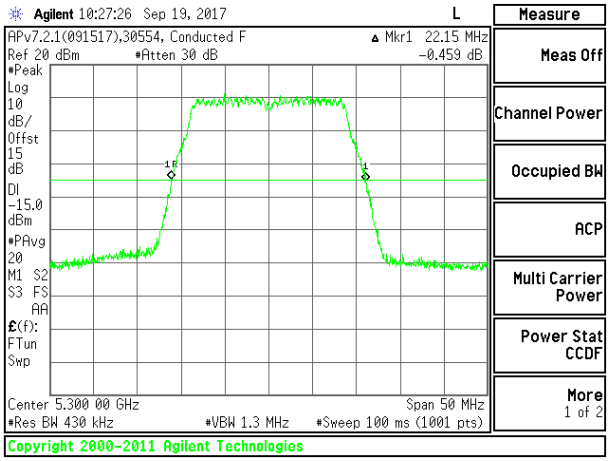
MID CHANNEL

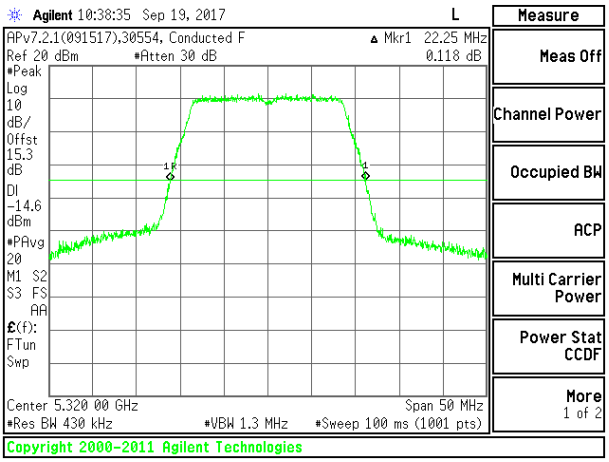


MID CHANNEL WF4

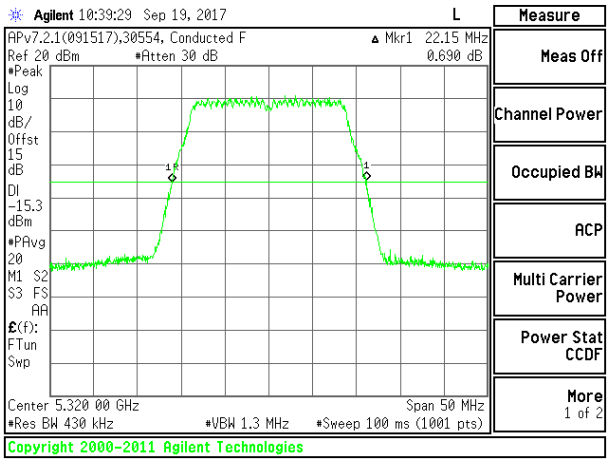


MID CHANNEL WF2

HIGH CHANNEL



HIGH CHANNEL WF4



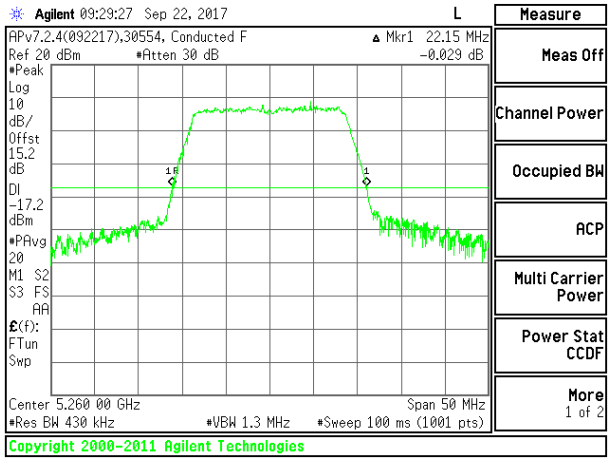
HIGH CHANNEL WF2

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

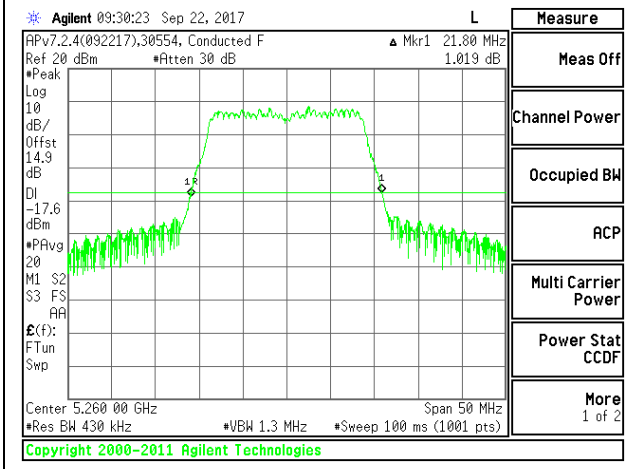
2TX Antenna WF4 + Antenna WF2 SDM Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5260	22.15	21.80
Mid	5300	22.30	21.90
High	5320	22.25	21.95

LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF2

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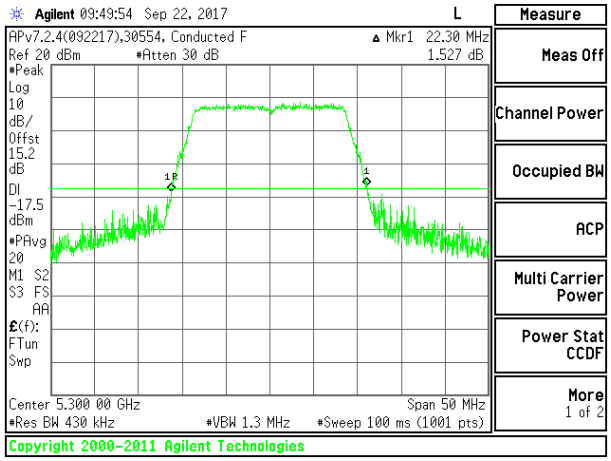
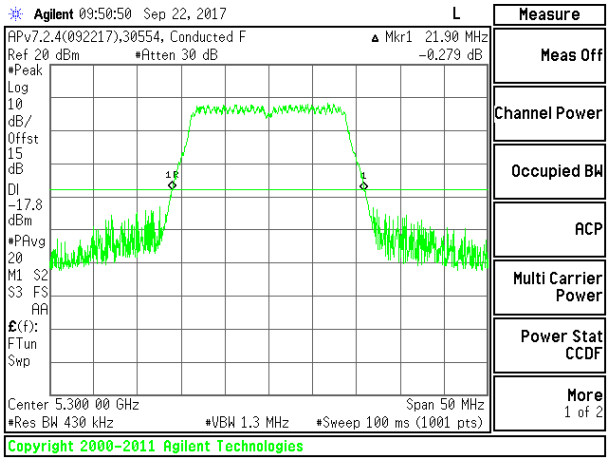
MID CHANNEL

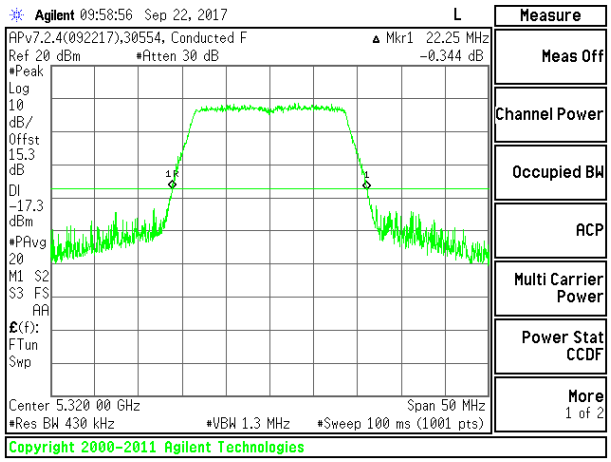


MID CHANNEL WF4

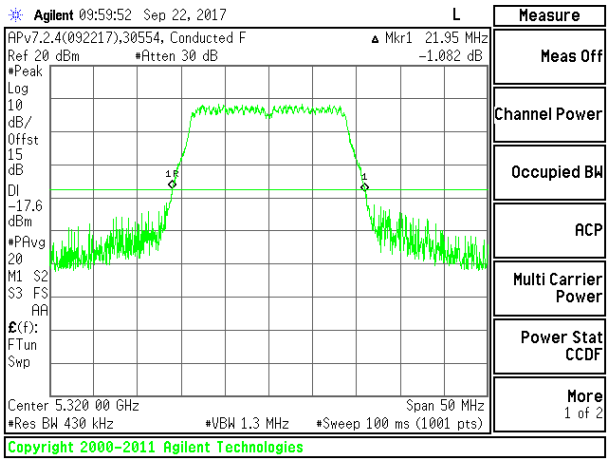


MID CHANNEL WF2

HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF2

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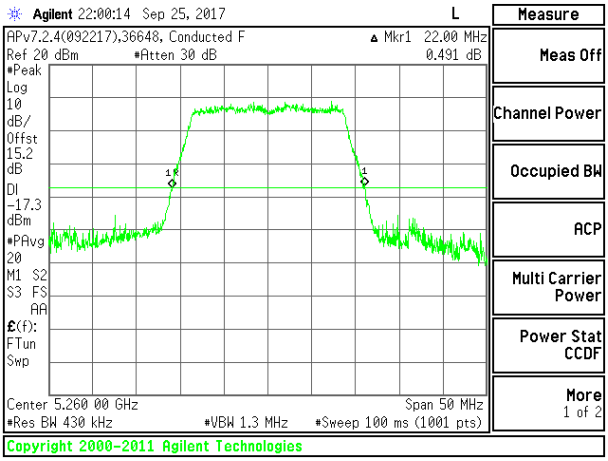
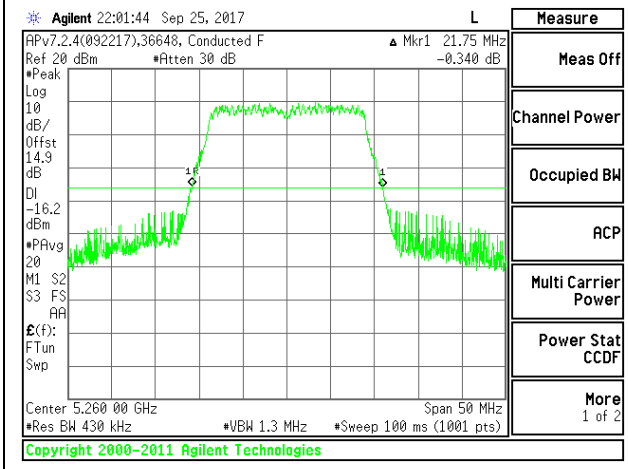
2TX Antenna WF4 + Antenna WF2 BF Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5260	22.00	21.75
Mid	5300	21.95	21.85
High	5320	22.25	21.80

LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF2

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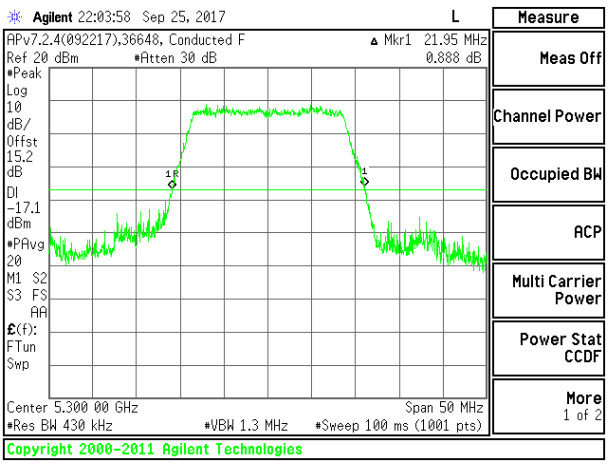
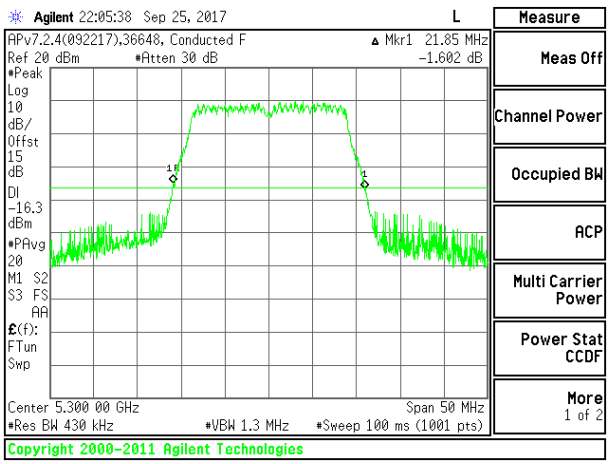
MID CHANNEL

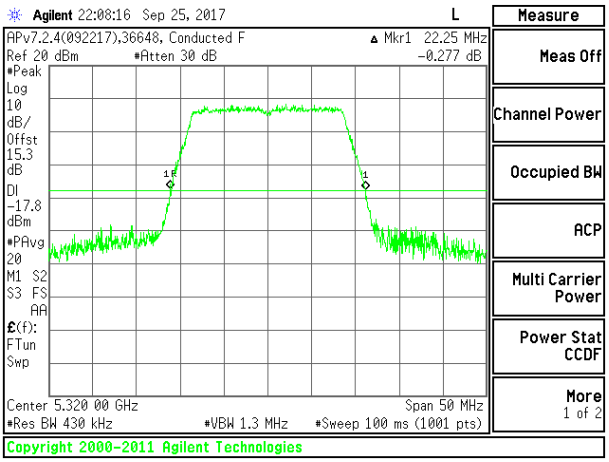


MID CHANNEL WF4

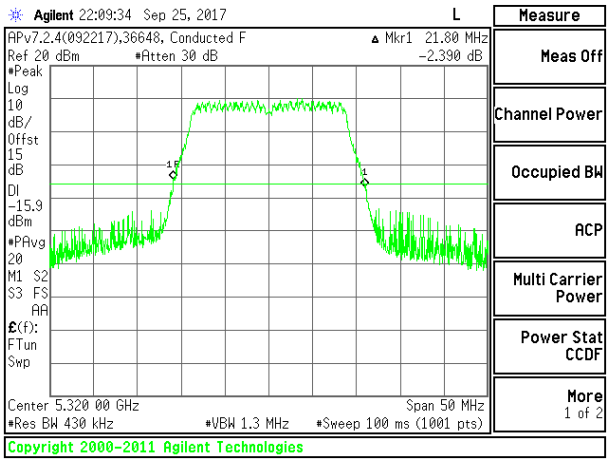


MID CHANNEL WF2

HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF2

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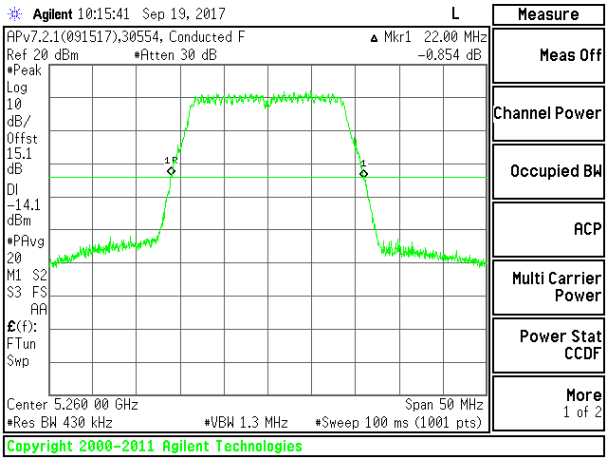
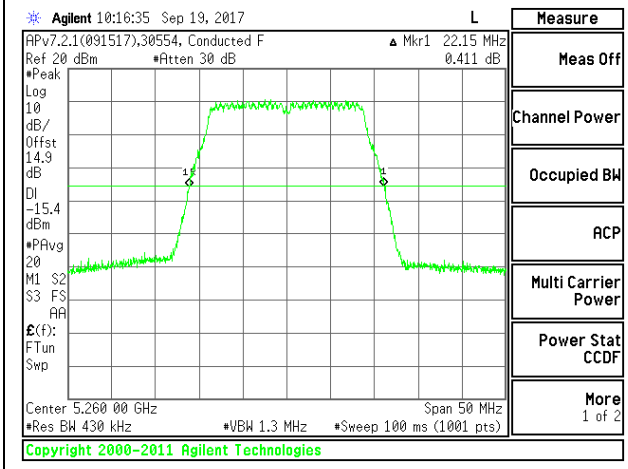
2TX Antenna WF3 + Antenna WF2 CDD Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5260	22.00	22.15
Mid	5300	22.05	22.25
High	5320	21.90	22.20

LOW CHANNEL



LOW CHANNEL WF3



LOW CHANNEL WF2

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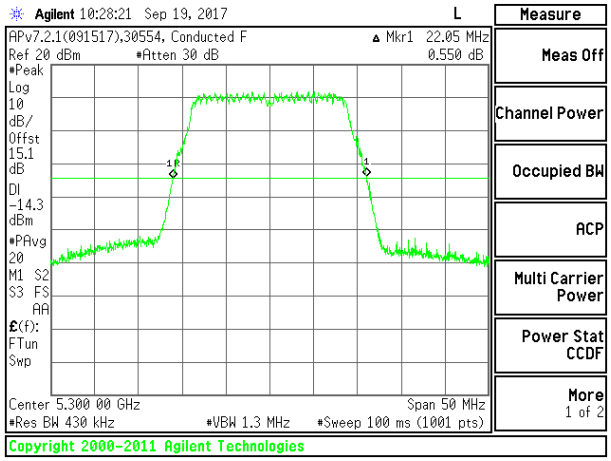
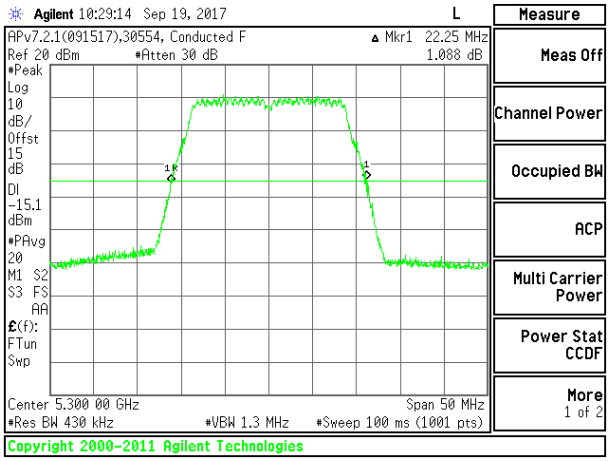
MID CHANNEL

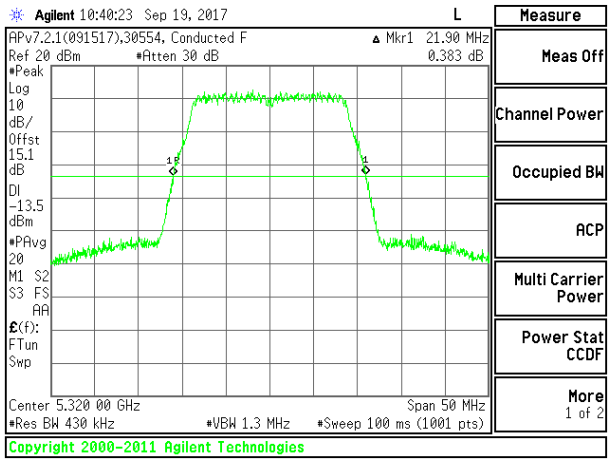


MID CHANNEL WF3

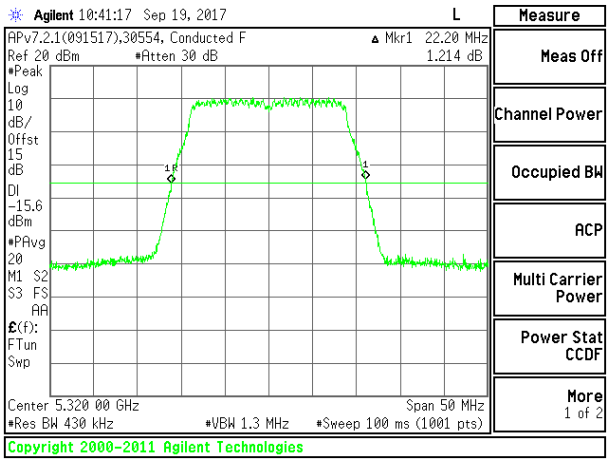


MID CHANNEL WF2

HIGH CHANNEL



HIGH CHANNEL WF3



HIGH CHANNEL WF2

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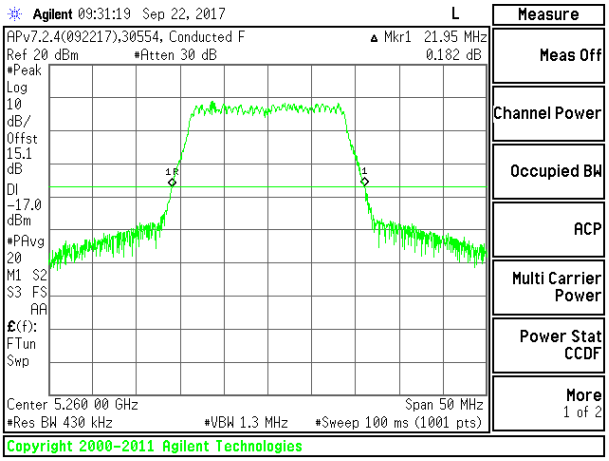
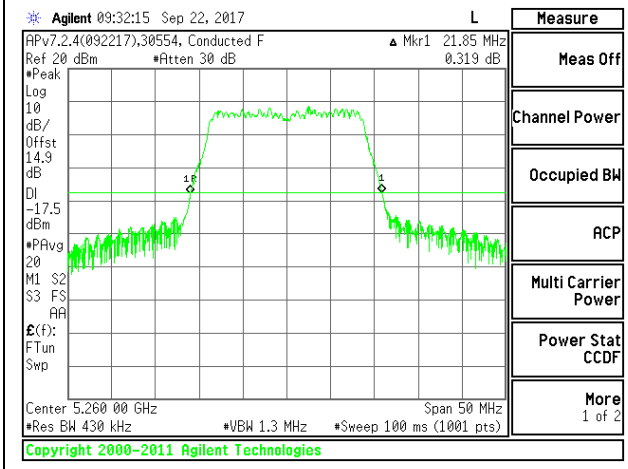
2TX Antenna WF3 + Antenna WF2 SDM Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5260	21.95	21.85
Mid	5300	21.90	21.90
High	5320	21.85	21.85

LOW CHANNEL



LOW CHANNEL WF3



LOW CHANNEL WF2

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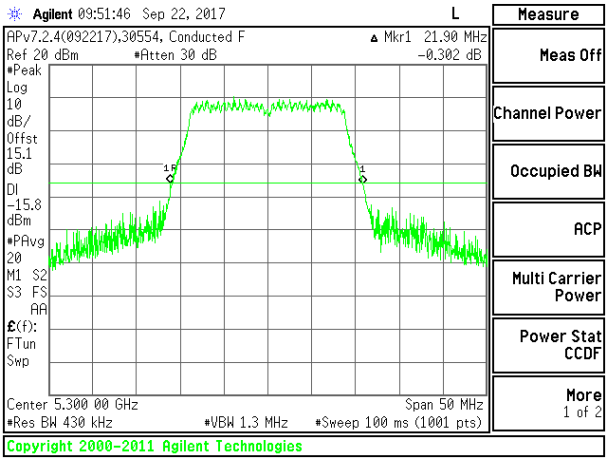
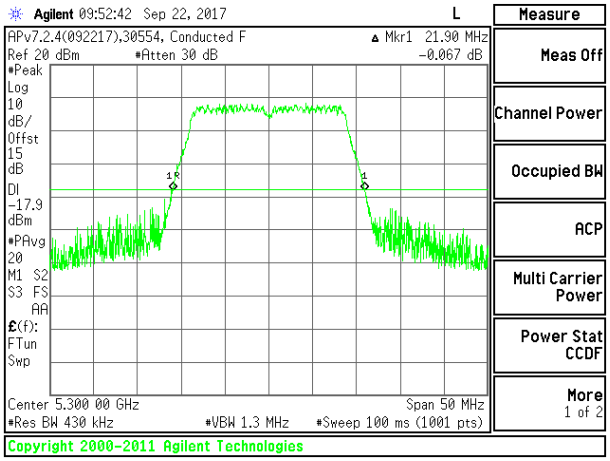
MID CHANNEL

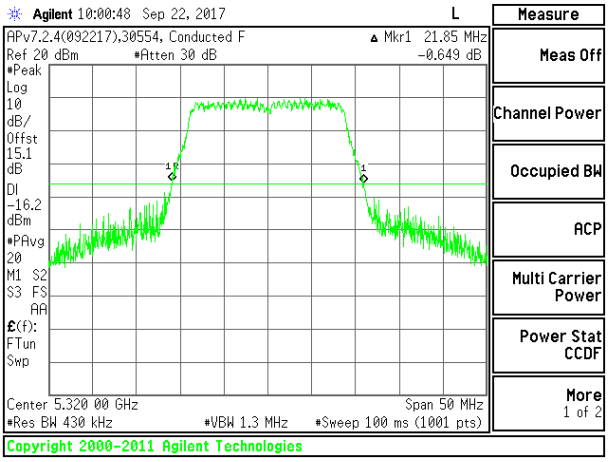


MID CHANNEL WF3

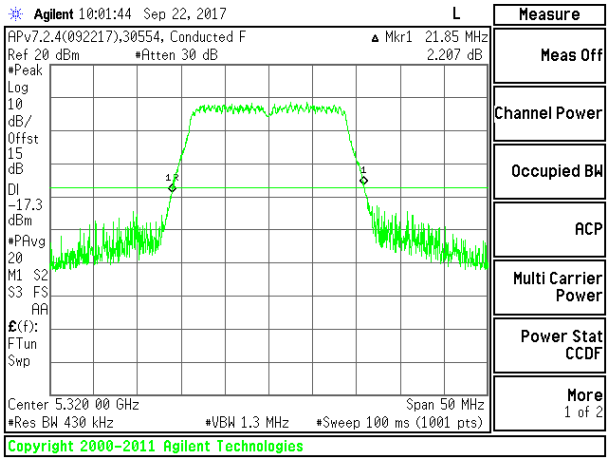


MID CHANNEL WF2

HIGH CHANNEL



HIGH CHANNEL WF3



HIGH CHANNEL WF2

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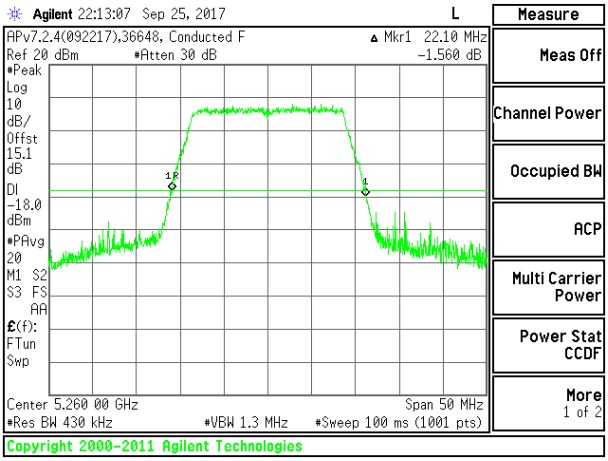
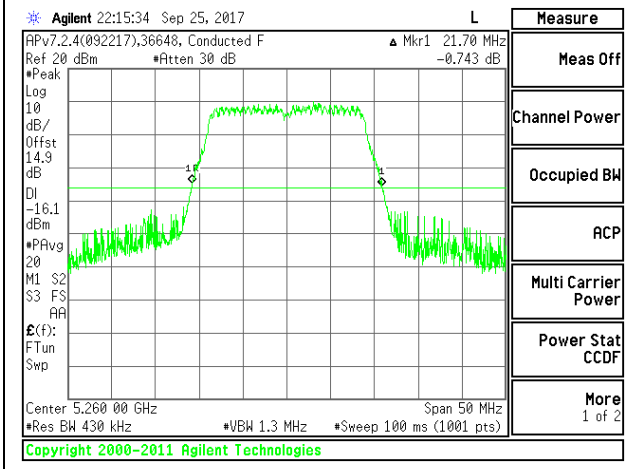
2TX Antenna WF3 + Antenna WF2 BF Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5260	22.10	21.70
Mid	5300	22.15	21.80
High	5320	22.15	21.80

LOW CHANNEL



LOW CHANNEL WF3



LOW CHANNEL WF2

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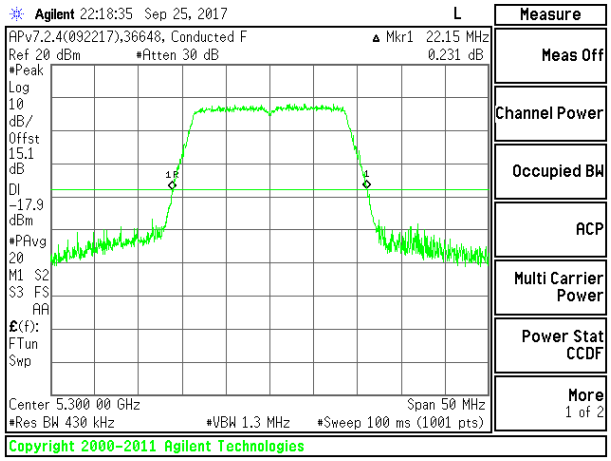
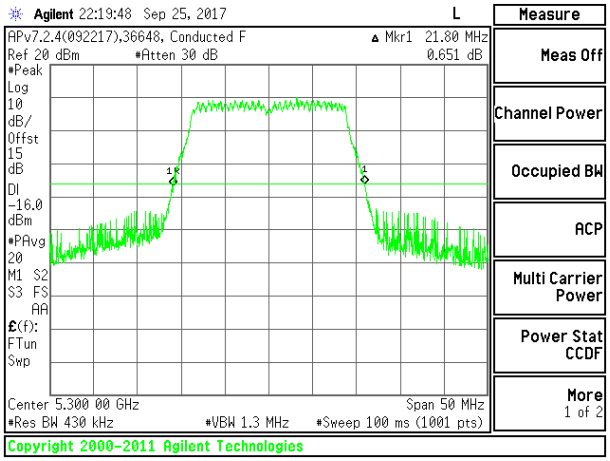
MID CHANNEL

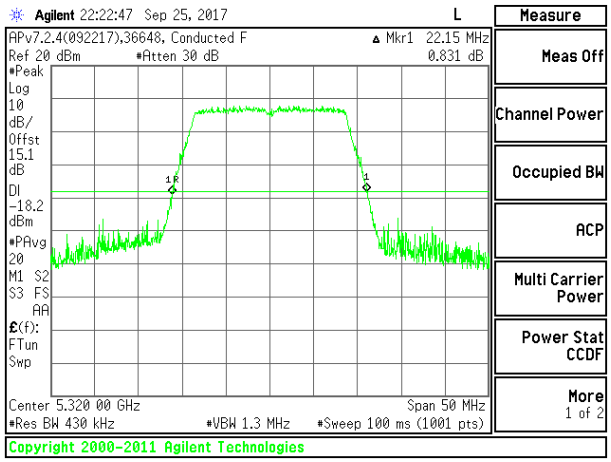


MID CHANNEL WF3

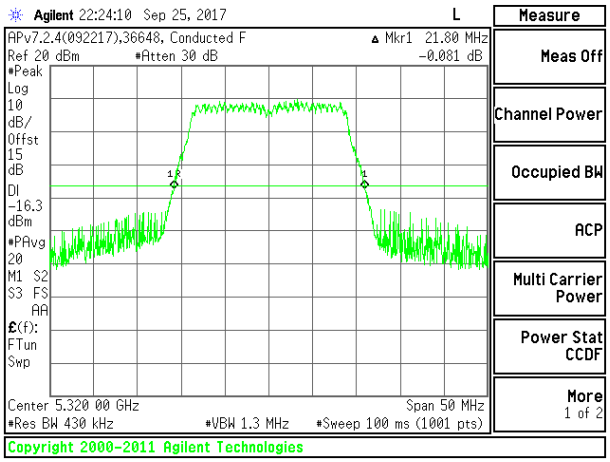


MID CHANNEL WF2

HIGH CHANNEL



HIGH CHANNEL WF3



HIGH CHANNEL WF2

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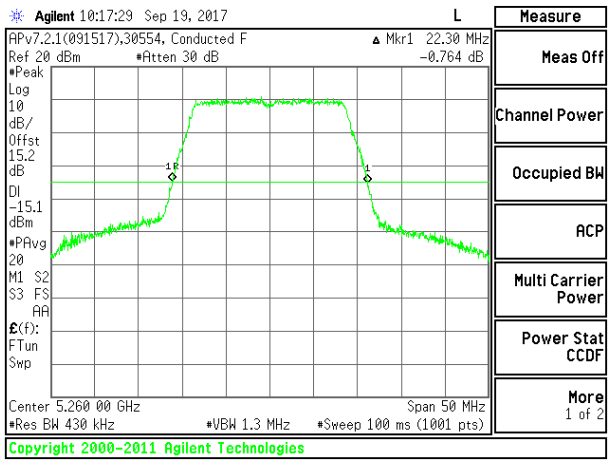
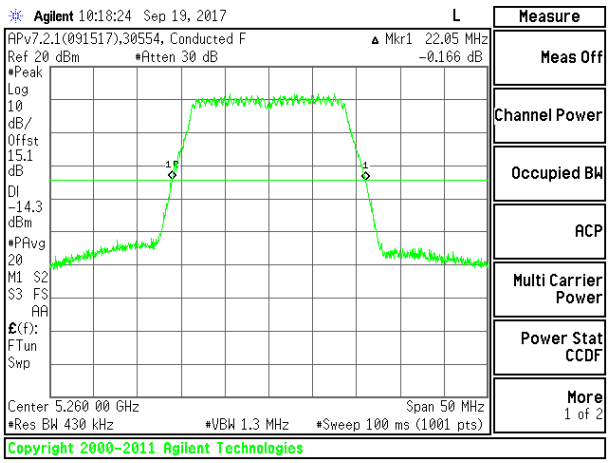
3TX Antenna WF4 + Antenna WF3 + Antenna WF2 CDD Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5260	22.30	22.05	22.10
Mid	5300	22.50	22.20	22.25
High	5320	22.35	22.00	22.10

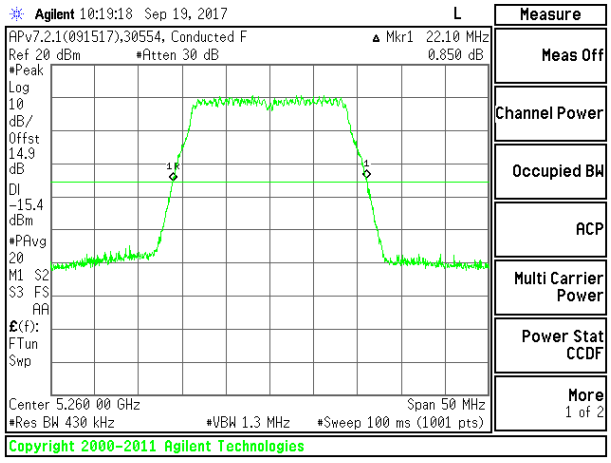
LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF3



LOW CHANNEL WF2

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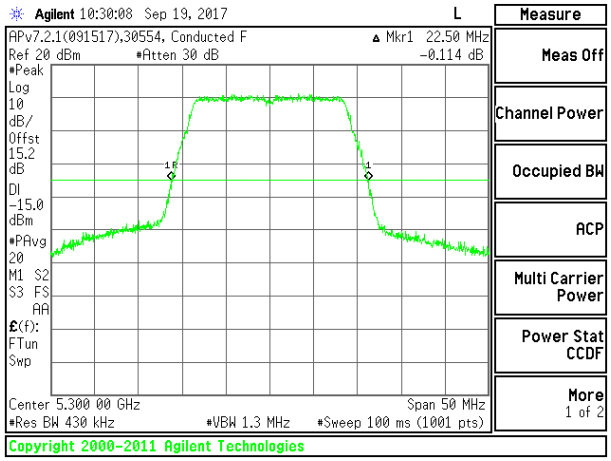
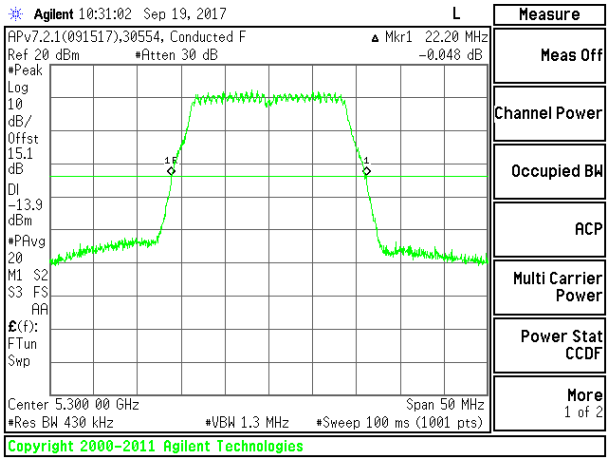
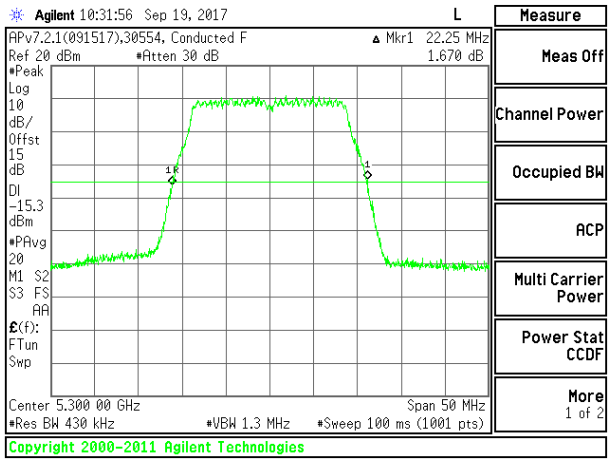
MID CHANNEL



MID CHANNEL WF4



MID CHANNEL WF3



MID CHANNEL WF2

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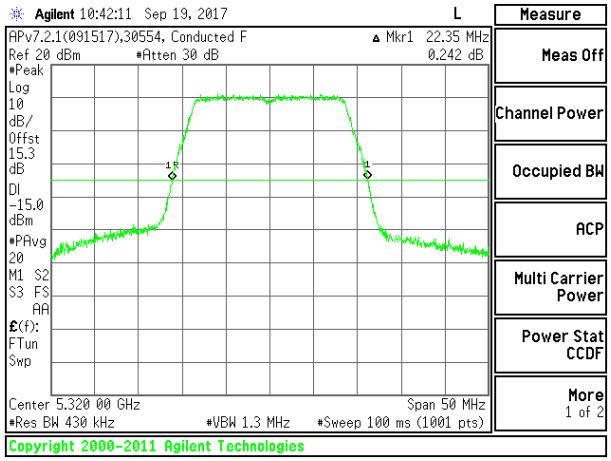
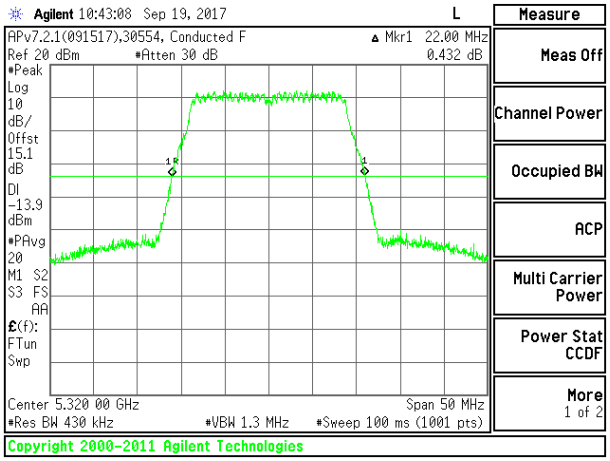
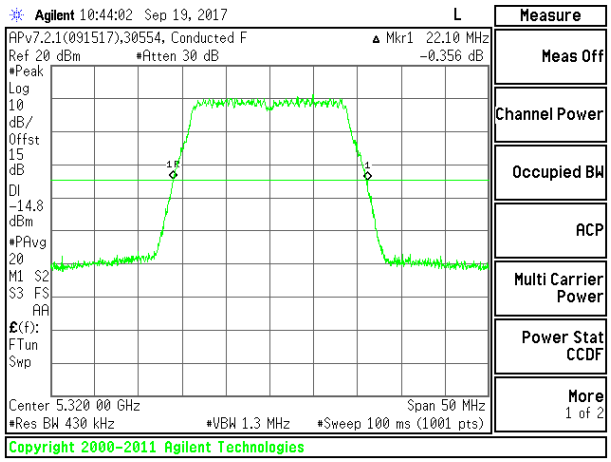
HIGH CHANNEL



HIGH CHANNEL WF4



HIGH CHANNEL WF3



HIGH CHANNEL WF2

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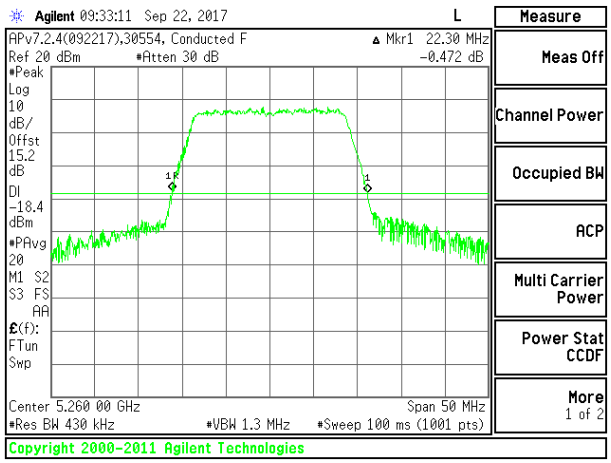
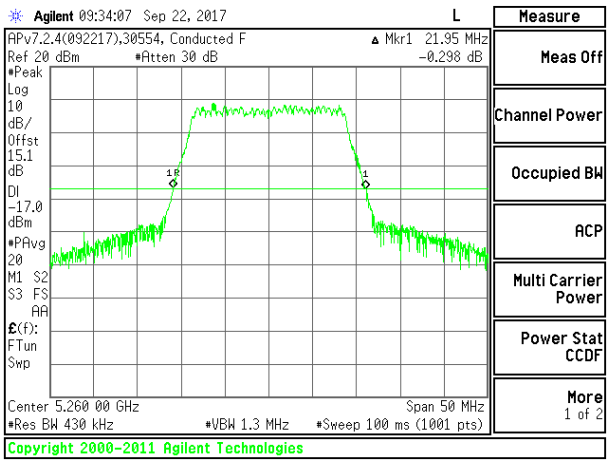
3TX Antenna WF4 + Antenna WF3 + Antenna WF2 SDM Mode

Channel	Frequency (MHz)	26 dB Bandwidth WF4 (MHz)	26 dB Bandwidth WF3 (MHz)	26 dB Bandwidth WF2 (MHz)
Low	5260	22.30	21.95	21.85
Mid	5300	22.30	21.95	21.90
High	5320	22.10	21.85	22.00

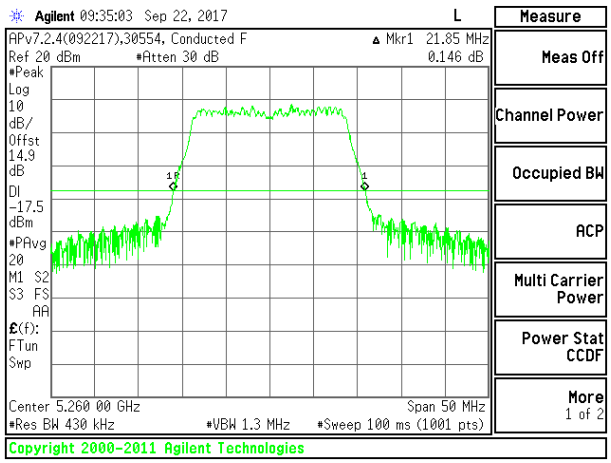
LOW CHANNEL



LOW CHANNEL WF4



LOW CHANNEL WF3



LOW CHANNEL WF2

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