



CERTIFICATION TEST REPORT

Report Number. : 11934192-E1V4

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

Model : A1862

FCC ID : BCGA1862

IC : 579C-A1862

EUT Description : DESKTOP COMPUTER

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS - 247 ISSUE 2

Date Of Issue:

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Prepared by:

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	11/15/2017	Initial Issue	Francisco Guarnero
V2	11/28/2017	Address TCB Questions	Francisco Guarnero
V3	11/30/2017	Address TCB Questions	Tri Pham
V4	12/07/2017	Address TCB Questions	Chin Pang

TABLE OF CONTENTS

REPORT REVISION HISTORY	2
TABLE OF CONTENTS	3
1. ATTESTATION OF TEST RESULTS	5
2. SUMMARY OF TESTING	6
2.1. <i>FACILITIES AND ACCREDITATION</i>	6
2.2. <i>SUMMARY TABLE</i>	6
2.3. <i>TEST METHODOLOGY.....</i>	6
2.4. <i>CALIBRATION AND UNCERTAINTY</i>	7
2.4.1. <i>MEASURING INSTRUMENT CALIBRATION</i>	7
2.4.2. <i>SAMPLE CALCULATION</i>	7
2.4.3. <i>MEASUREMENT UNCERTAINTY</i>	7
2.5. <i>MEASUREMENT METHOD.....</i>	8
2.6. <i>TEST AND MEASUREMENT EQUIPMENT.....</i>	9
3. EQUIPMENT UNDER TEST	10
3.1. <i>DESCRIPTION OF EUT</i>	10
3.2. <i>MAXIMUM OUTPUT POWER.....</i>	10
3.3. <i>DESCRIPTION OF AVAILABLE ANTENNAS</i>	10
3.4. <i>SOFTWARE AND FIRMWARE.....</i>	10
3.5. <i>WORST-CASE CONFIGURATION AND MODE.....</i>	11
3.6. <i>DESCRIPTION OF TEST SETUP.....</i>	12
4. ANTENNA PORT TEST RESULTS	16
4.1. <i>ON TIME AND DUTY CYCLE RESULTS.....</i>	16
4.1.1. <i>802.11n HT20 CDD AND BF MODE</i>	18
4.2. <i>99% BANDWIDTH.....</i>	19
4.2.1. <i>802.11b MODE</i>	19
4.2.2. <i>802.11n HT20 MODE</i>	57
4.2.3. <i>802.11n HT20 CDD AND BF Mode.....</i>	69
4.3. <i>6 dB BANDWIDTH.....</i>	126
4.3.1. <i>802.11b MODE</i>	127
4.3.2. <i>802.11n HT20 MODE</i>	165
4.3.3. <i>802.11n HT20 CDD AND BF Mode.....</i>	177
4.4. <i>OUTPUT POWER.....</i>	234
4.4.1. <i>802.11b MODE</i>	237
4.4.2. <i>802.11n HT20 MODE</i>	244
4.4.3. <i>802.11n HT20 CDD AND BF MODE</i>	247
4.5. <i>AVERAGE POWER.....</i>	255
4.5.1. <i>802.11n HT20 MODE</i>	256
4.5.2. <i>802.11n HT20 CDD AND BF Mode.....</i>	258

4.6.	<i>POWER SPECTRAL DENSITY</i>	263
4.6.1.	802.11b MODE	264
4.6.2.	802.11n HT20 MODE	302
4.6.3.	802.11n HT20 CDD AND BF MODE	314
4.7.	<i>CONDUCTED SPURIOUS EMISSIONS</i>	371
4.7.1.	802.11b MODE	372
4.7.2.	802.11n HT20 MODE	421
4.7.3.	802.11n HT20 CDD AND BF MODE	436
5.	RADIATED TEST RESULTS	509
5.1.	<i>TRANSMITTER ABOVE 1 GHz</i> ,	510
5.1.1.	BANDEDGE, 1TX Antenna WF4, 802.11b Mode	510
5.1.2.	BANDEDGE, 1TX Antenna WF3, 802.11b Mode	526
5.1.3.	BANDEDGE, 1TX Antenna WF2, 802.11b Mode	542
5.1.4.	BANDEDGE, 2TX Antenna WF4 + Antenna WF3 CDD mode.....	558
5.1.5.	BANDEDGE, 2TX Antenna WF4 + Antenna WF2 CDD Mode.....	578
5.1.6.	BANDEDGE, 2TX Antenna WF3 + Antenna WF2 CDD mode.....	598
5.1.7.	BANDEDGE, 3TX Antenna WF4 + Antenna WF3 + Antenna WF2 CDD Mode ..	618
5.2.	<i>HARMONICS AND SPURIOUS EMISSIONS</i>	638
5.2.1.	b Mode, 3TX	638
5.3.	<i>BANDEDGE, 802.11n HT20 MODE</i>	644
5.3.1.	BANDEDGE, 1TX Antenna WF4.....	644
5.3.2.	BANDEDGE, 1TX Antenna WF3.....	664
5.3.3.	BANDEDGE, 1TX Antenna WF2.....	684
5.3.4.	BANDEDGE, 2TX Antenna WF4 + Antenna WF3 CDD mode.....	704
5.3.5.	BANDEDGE, 2TX Antenna WF4 + Antenna WF3 BF mode.....	724
5.3.6.	BANDEDGE, 2TX Antenna WF4 + Antenna WF2 CDD Mode.....	744
5.3.7.	BANDEDGE, 2TX Antenna WF4 + Antenna WF2 BF mode.....	764
5.3.8.	BANDEDGE, 2TX Antenna WF3 + Antenna WF2 CDD mode.....	784
5.3.9.	BANDEDGE, 2TX Antenna WF3 + Antenna WF2 BF mode.....	804
5.3.10.	BANDEDGE, 3TX Antenna WF4 + Antenna WF3 + Antenna WF2 CDD Mode ..	824
5.3.11.	BANDEDGE, 3TX Antenna WF4 + Antenna WF3 + Antenna WF2 BF Mode	844
5.4.	<i>HARMONICS AND SPURIOUS EMISSIONS</i>	864
5.4.1.	HT20 3TX	864
5.4.2.	BF 3TX	870
5.5.	<i>Worst Case Below 1 GHz</i>	876
5.6.	<i>Worst Case 18-26 GHz</i>	878
6.	AC POWER LINE CONDUCTED EMISSIONS	880

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) C02VJ009JH7L (RADIATED)

DATE TESTED: SEPTEMBER 14, 2017 – NOVEMBER 15, 2017

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 2	Pass
INDUSTRY CANADA RSS-GEN Issue 4	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	
<input type="checkbox"/>	Chamber A (IC:2324B-1)	<input checked="" type="checkbox"/>	Chamber D (IC:22541-1)
<input type="checkbox"/>	Chamber B (IC:2324B-2)	<input checked="" type="checkbox"/>	Chamber E (IC:22541-2)
<input type="checkbox"/>	Chamber C (IC:2324B-3)	<input type="checkbox"/>	Chamber F (IC:22541-3)
		<input type="checkbox"/>	Chamber G (IC:22541-4)
		<input type="checkbox"/>	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(s)	Test Description	Test Limit	Test Condition	Test Result	Worst Case
15.247 (a)(2)	RSS-247 5.2 (a)	Occupied Band width (6dB)	>500KHz	Conducted	Pass	MHz
15.247 (d)	RSS-247 5.5	Band Edge / Conducted Spurious Emission	-20dBc		Pass	dBm
15.247	RSS-247 5.4 (d)	TX conducted output power	<30dBm		Pass	dBm
15.247	RSS-247 5.2 (b)	PSD	<8dBm		Pass	dBm
15.207 (a)	RSS-GEN 8.8	AC Power Line conducted emissions	Section 10		Pass	dBuV(AV)
15.205, 15.209	RSS-GEN 8.9 and 8.10	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass	dBuV/m

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, KDB 558074 D01 v04, ANSI C63.10-2013, MIMO KDB 662911, RSS-GEN Issue 4, and RSS-247 Issue 2.

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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

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 %

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

2.5. MEASUREMENT METHOD

On Time and Duty Cycle: KDB 558074 D01 v04, Section 6.

6 dB Emission BW: KDB 558074 D01 v04, Section 8.

Conducted Output Power: KDB 558074 D01 v04, Section 9.1.2 (Method PKPM1), Section 9.2.3.2 (Method AVGPM-G)

Power Spectral Density: KDB 558074 D01 v04, Section 10.2 (Method PKPSD), Section 10.3 (Method AVGPSD-1)

Unwanted emissions in restricted bands: KDB 558074 D01 v04, Section 12.0, 12.2.

Unwanted emissions in non-restricted bands: KDB 558074 D01 v04, Section 11.1 (a) (b), 11.2, and 11.3

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

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
Power Meter, P-series single channel	Keysight	N1912A	T1245	1/05/2018
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
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T459	6/22/2018
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T342	2/23/2018
AC Line Conducted				
EMI Test Receiver 9KHz-7GHz	Rohde & Schwarz	ESCI7	T1436	01/06/2018
LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2-01	T1310	06/15/2018
Power Cable, Line Conducted Emissions	UL	PG1	T861	08/31/2018
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	

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:

2.4GHz BAND

Maximum average conducted power.

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2472	802.11b	22.97	198.15
2412 - 2472	802.11b 2Tx	25.86	385.48
2412 - 2472	802.11b 3Tx	27.55	568.85

Maximum peak conducted power.

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2472	802.11g 1Tx	COVERED BY 802.11n HT20 1TX	
2412 - 2472	802.11n HT20 1Tx	28.81	760.33
2412 - 2472	802.11g 2Tx	COVERED BY 802.11n HT20 2TX	
2412 - 2472	802.11n HT20 CDD 2Tx	29.36	862.98
2412 - 2472	802.11n HT20 BF 2Tx	27.1	512.86
2412 - 2472	802.11g 3Tx	COVERED BY 802.11n HT20 3TX	
2412 - 2472	802.11n HT20 CDD 3Tx	29.09	810.96
2412 - 2472	802.11n HT20 BF 3Tx	29.13	818.46

3.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	WF4 (dBi)	WF3 (dBi)	WF2 (dBi)
2.4	5.09	3.12	4.13

3.4. 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

3.5. WORST-CASE CONFIGURATION AND MODE

For below 1G, 18-26GHz radiated emission, and power line conducted emissions were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

For b, HT20 and Beamforming modes, radiated harmonics spurious were performed with the EUT set at the CDD mode at highest power setting among the CDD/STBC/SDM/Beamforming modes as worst-case scenario.

EUT was performed with AC Power in the normal use orientation as described by the manufacturer.

The following modes have the same target power and use the same modulation (OFDM). Therefore, 802.11g 1TX, 802.11g 2TX and 802.11g 3TX are covered by 802.11n HT20 1TX, 802.11n HT20 2TX CDD and 802.11n HT20 3TX CDD respectively.

- 802.11g and 802.11n HT20 1TX
- 802.11g 2TX and 802.11n HT20 2TX CDD
- 802.11g 3TX and 802.11n HT20 3TX CDD

Based on client provided and the baseline scan, the worst-case data rates were:

802.11b mode: 1 Mbps
802.11g mode: 6 Mbps
802.11n HT20mode: MCS0

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	CC23304069XDNYPAO	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

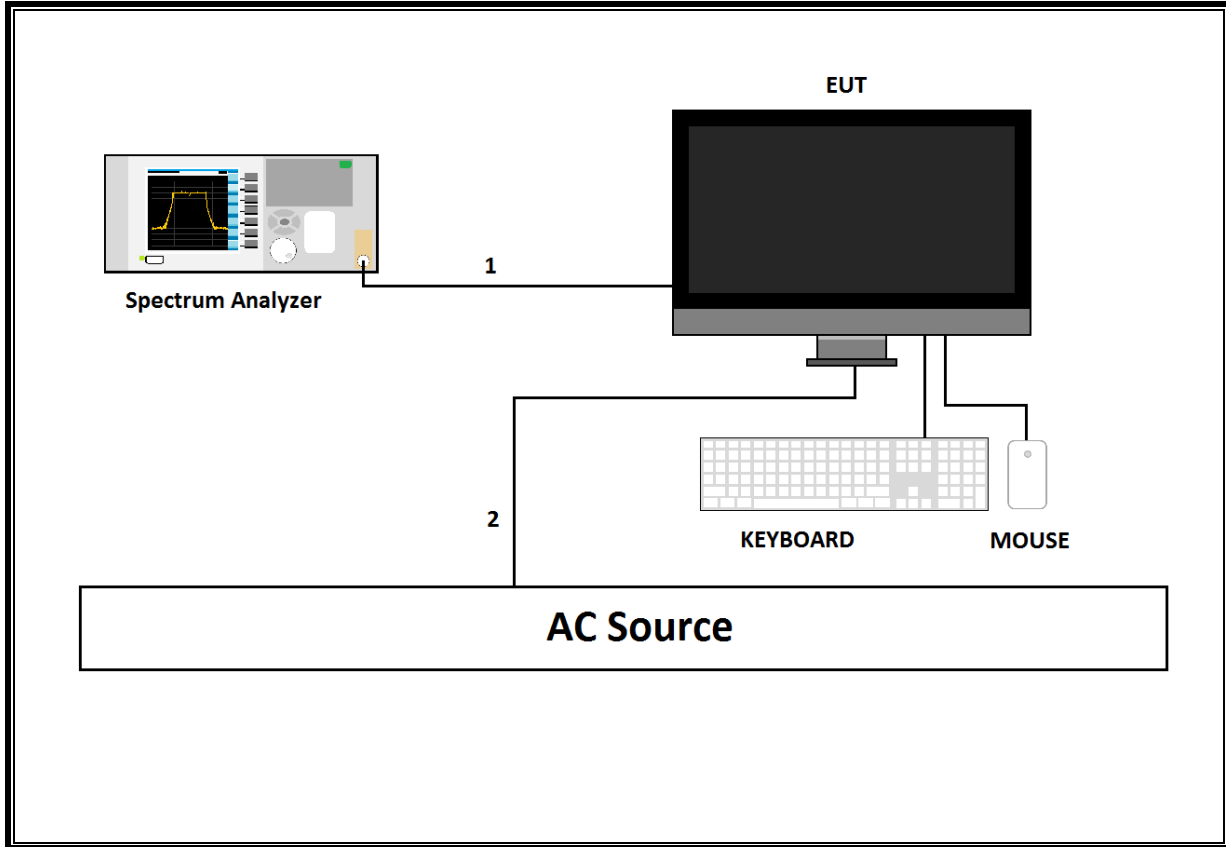
I/O CABLES (Radiated Test)

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

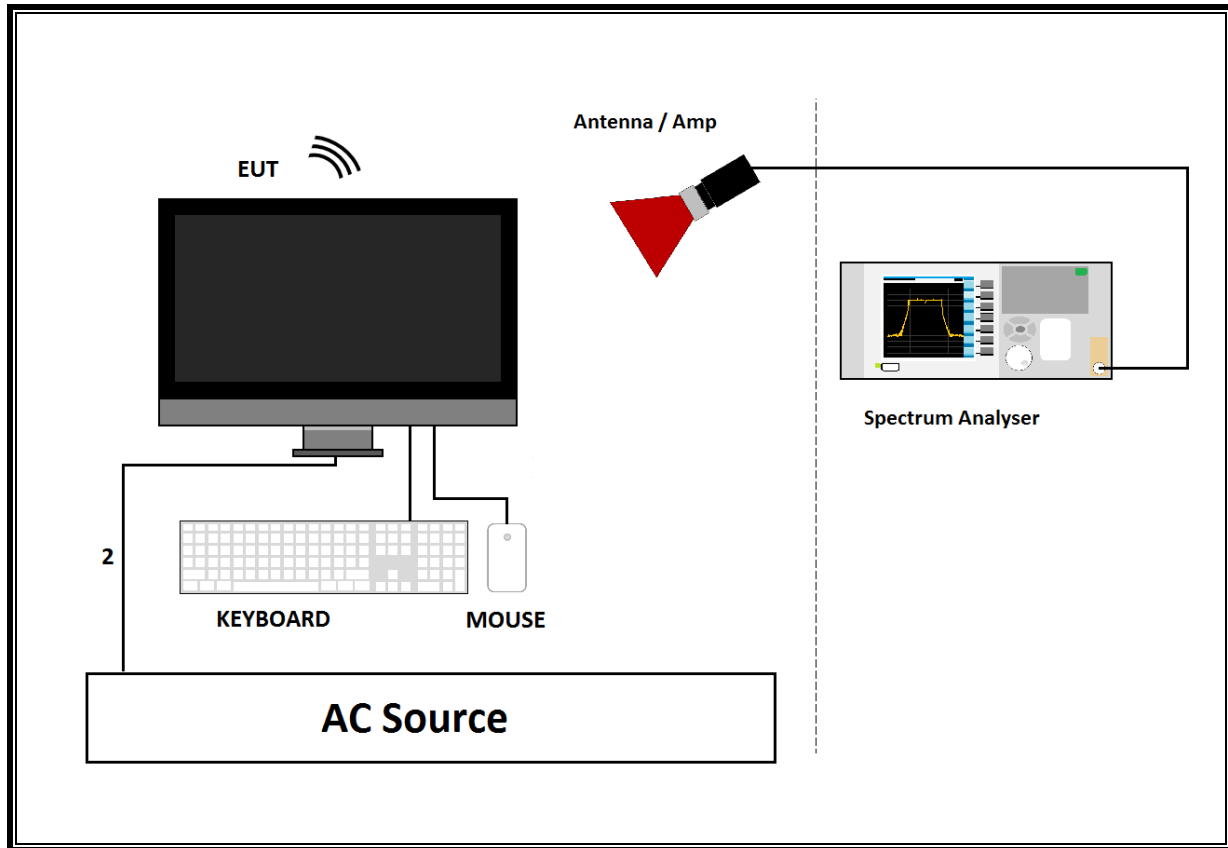
TEST SETUP

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

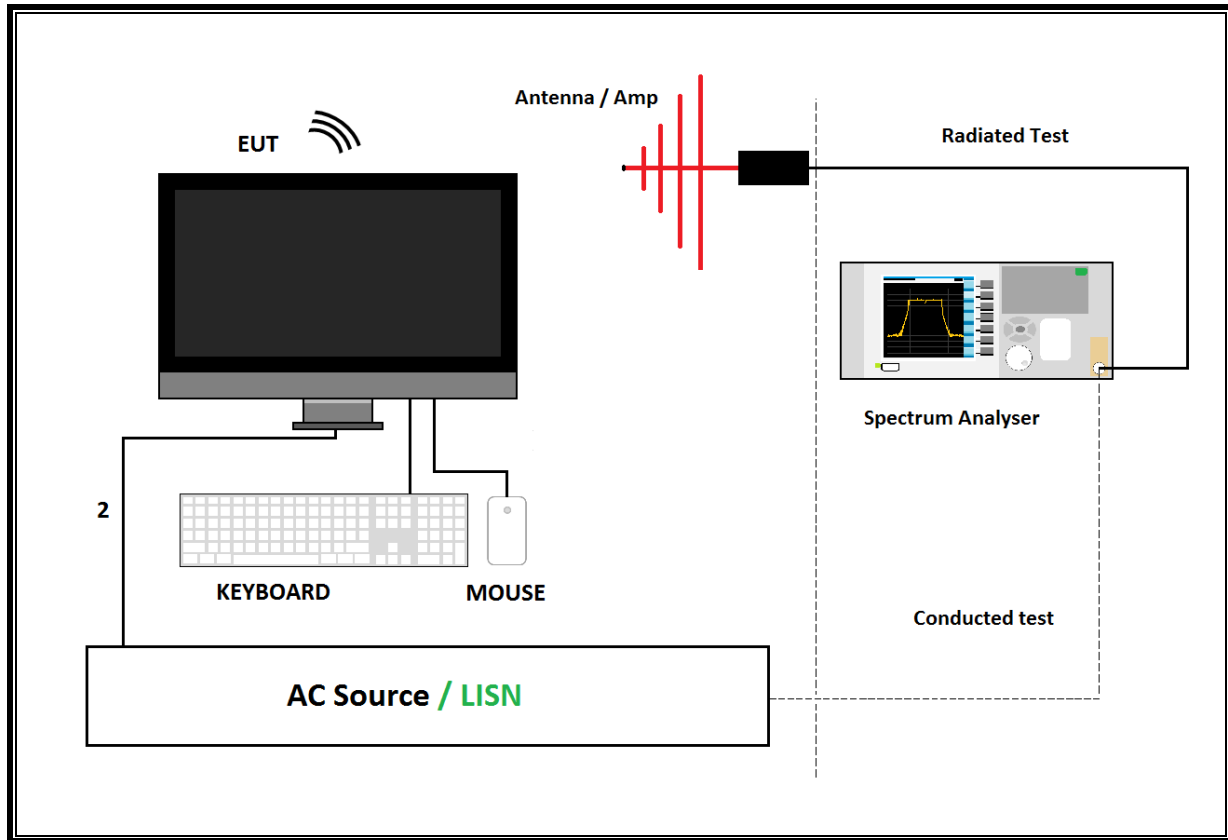
SETUP DIAGRAM FOR CONDUCTED TESTS



SETUP DIAGRAM FOR RADIATED TESTS



SETUP DIAGRAM FOR BELOW 1GHz AND LINE CONDUCTED TEST



4. ANTENNA PORT TEST RESULTS

DUTY CYCLE

LIMITS

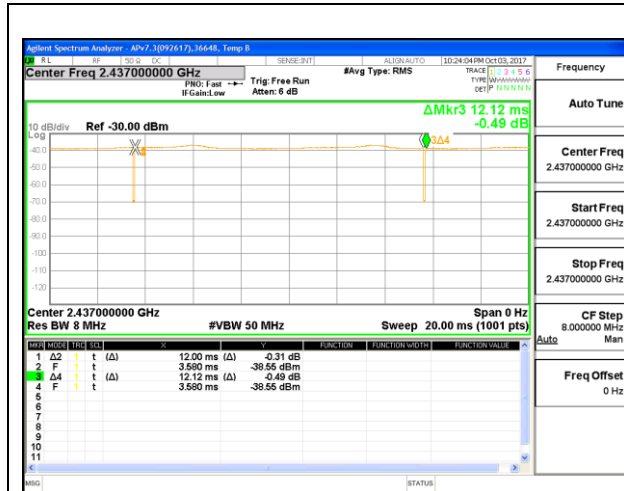
None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

4.1. ON TIME AND DUTY CYCLE RESULTS

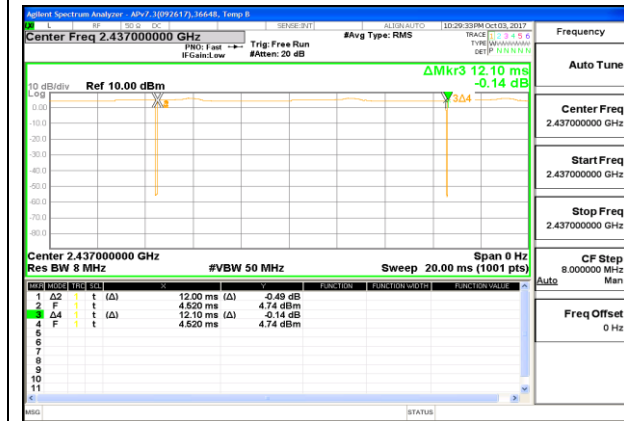
Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
802.11b 1TX	12.000	12.120	0.990	99.01%	0.00	0.010
802.11b 2TX	12.000	12.120	0.990	99.01%	0.00	0.010
802.11b 3TX	12.000	12.100	0.992	99.17%	0.00	0.010
802.11n HT20 1TX	1.860	1.962	0.948	94.80%	0.23	0.538
802.11n HT20 CDD 2TX	18.600	19.650	0.947	94.66%	0.24	0.054
802.11n HT20 CDD 3TX	18.600	19.600	0.949	94.90%	0.23	0.054
802.11ac VHT20 Beam Forming 2TX	2.770	2.845	0.974	97.36%	0.12	0.361
802.11ac VHT20 Beam Forming 3TX	3.067	3.175	0.966	96.60%	0.15	0.326



DUTY CYCLE 802.11b 1TX MODE

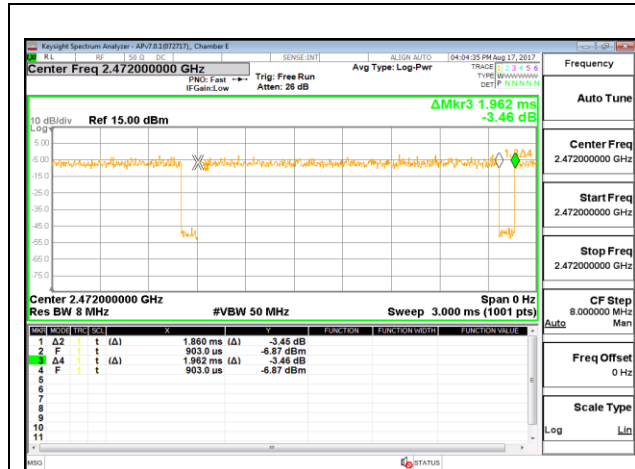


DUTY CYCLE 802.11b 2TX MODE

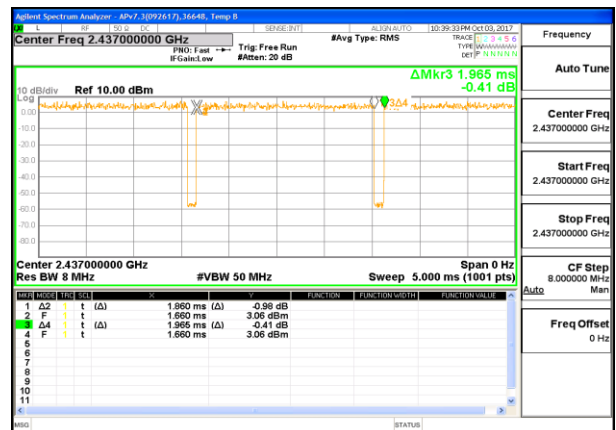


DUTY CYCLE 802.11b 3TX MODE

4.1.1. 802.11n HT20 CDD AND BF MODE



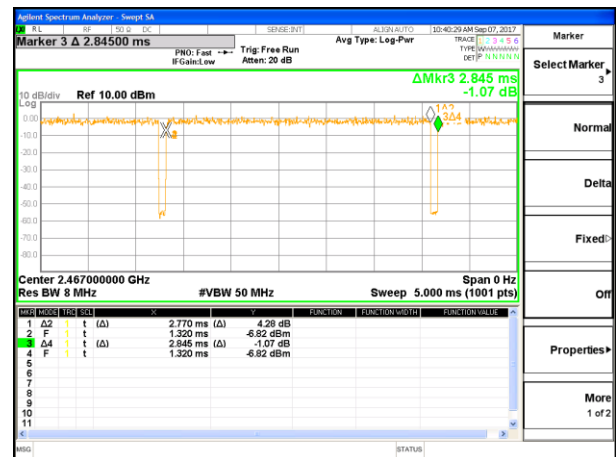
DUTY CYCLE 802.11n HT20



DUTY CYCLE 802.11n HT20 CDD 2TX



DUTY CYCLE 802.11n HT20 CDD 3TX



DUTY CYCLE 802.11n BF 2TX MODE



DUTY CYCLE 802.11n HT20 BF 3TX

4.2. 99% BANDWIDTH

LIMITS

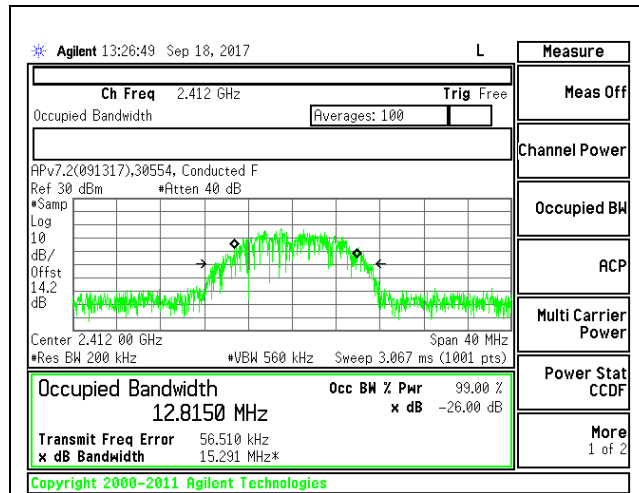
None; for reporting purposes only.

RESULTS

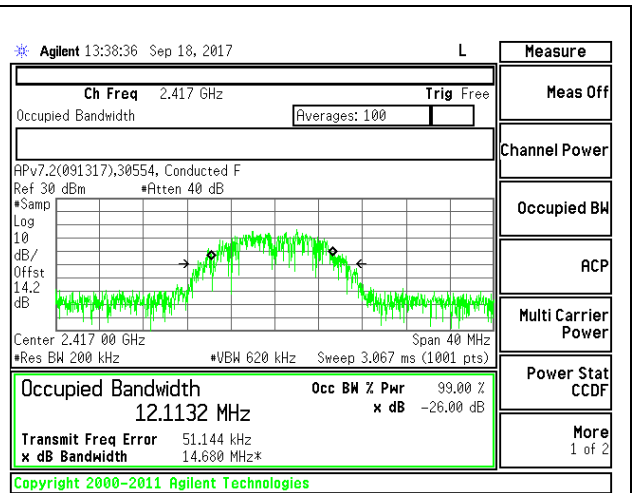
4.2.1. 802.11b MODE

1TX ANTENNA WF4

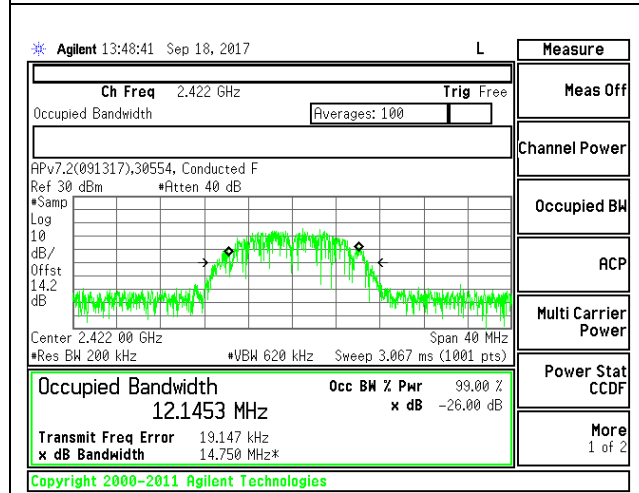
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	12.8150
Low 2	2417	12.1132
Low 3	2422	12.1453
Low 4	2427	12.1390
Mid 6	2437	12.1721
High 9	2452	12.5253
High 10	2457	12.3951
High 11	2462	11.4660
High 12	2467	12.0125
High 13	2472	11.7142



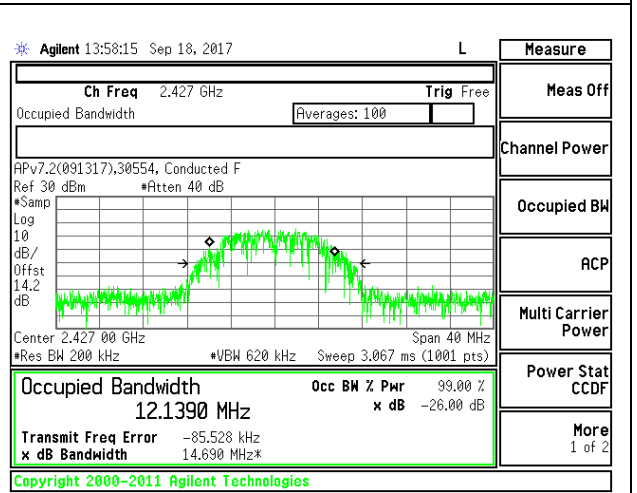
LOW CHANNEL 1



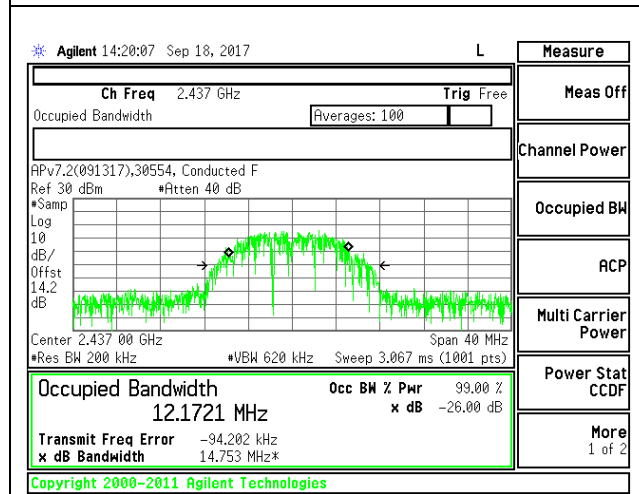
LOW CHANNEL 2



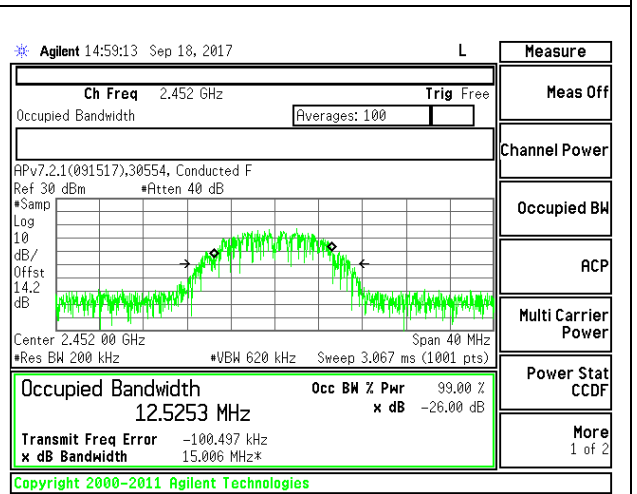
LOW CHANNEL 3



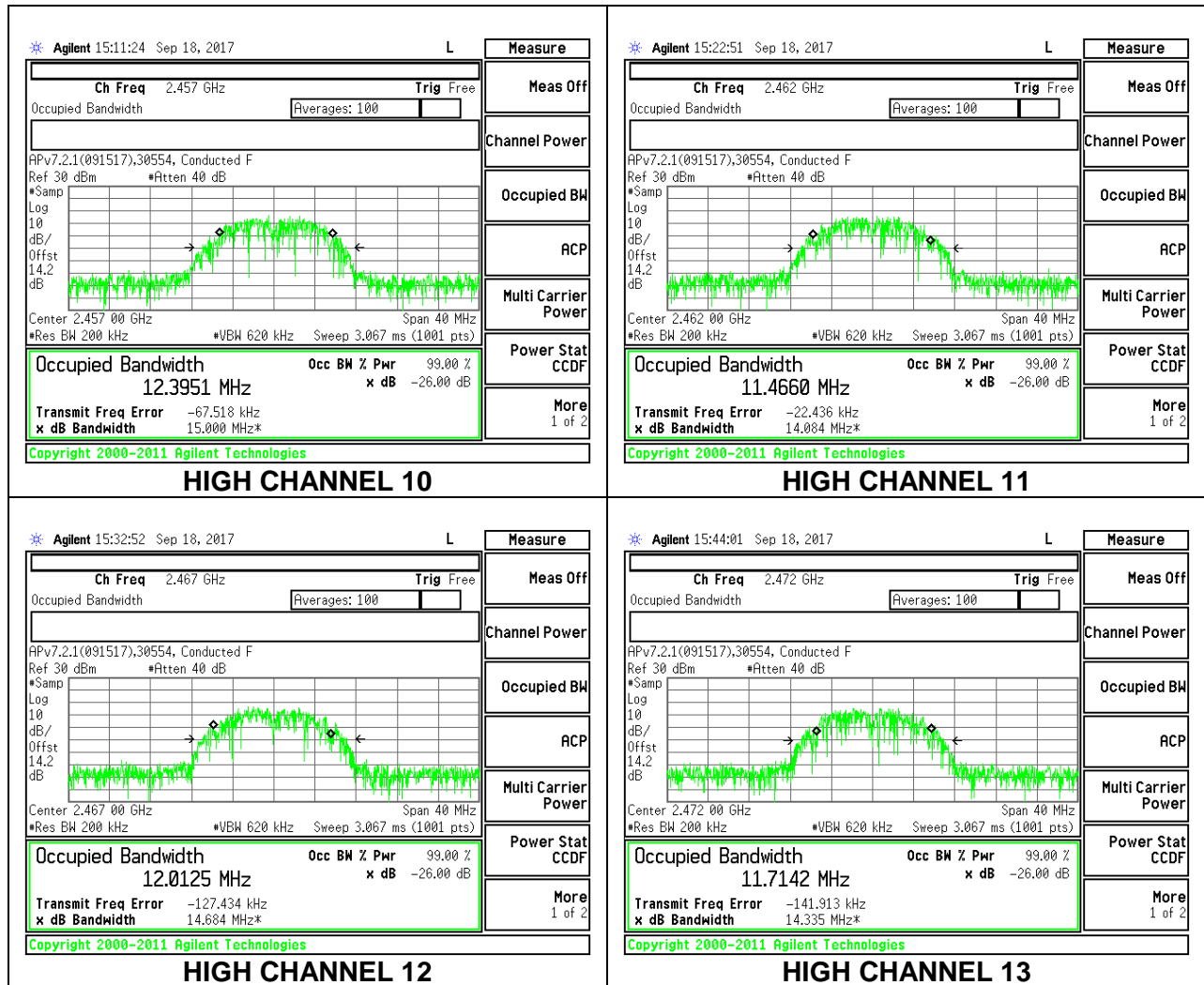
LOW CHANNEL 4



MID CHANNEL 6

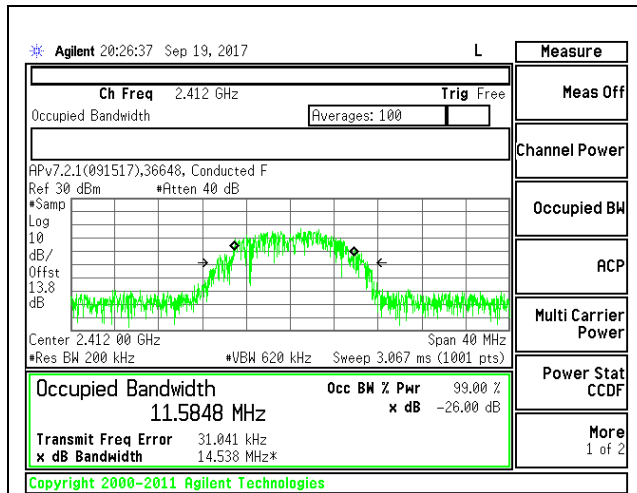


HIGH CHANNEL 9

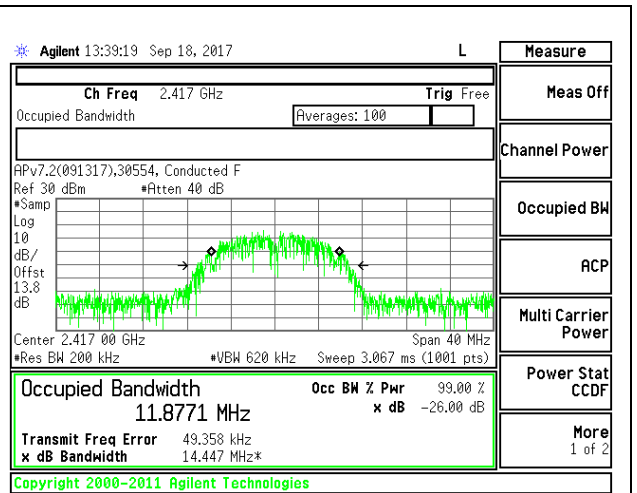


1TX Antenna WF3

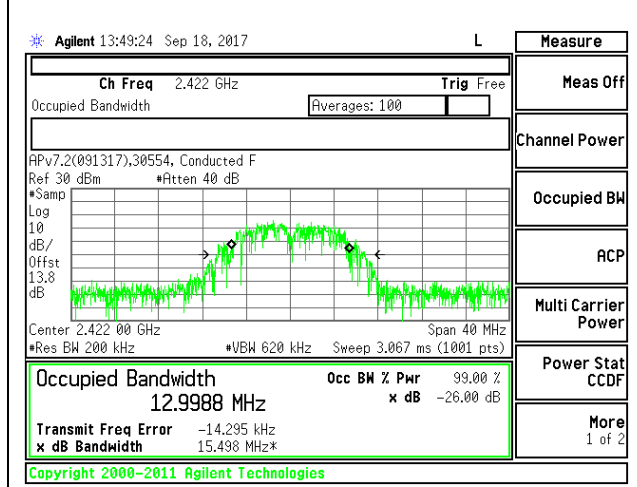
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	11.5848
Low 2	2417	11.8771
Low 3	2422	12.9988
Low 4	2427	12.0859
Mid 6	2437	12.1742
High 9	2452	12.1072
High 10	2457	12.2235
High 11	2462	12.1624
High 12	2467	12.3097
High 13	2472	11.7560



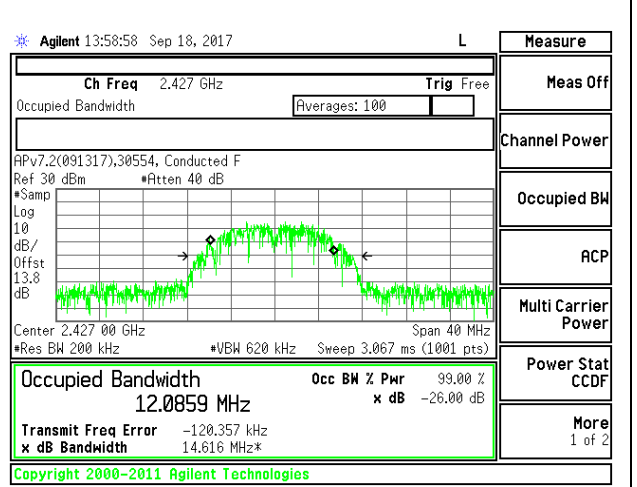
LOW CHANNEL 1



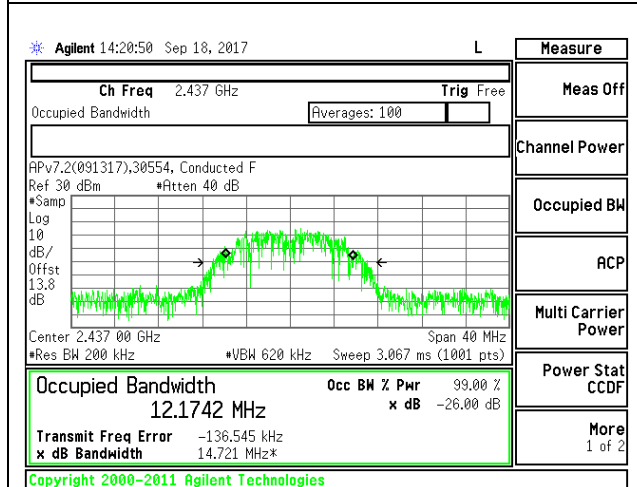
LOW CHANNEL 2



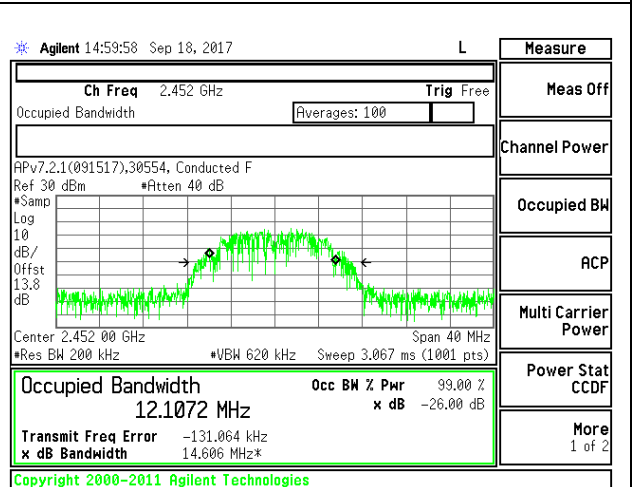
LOW CHANNEL 3



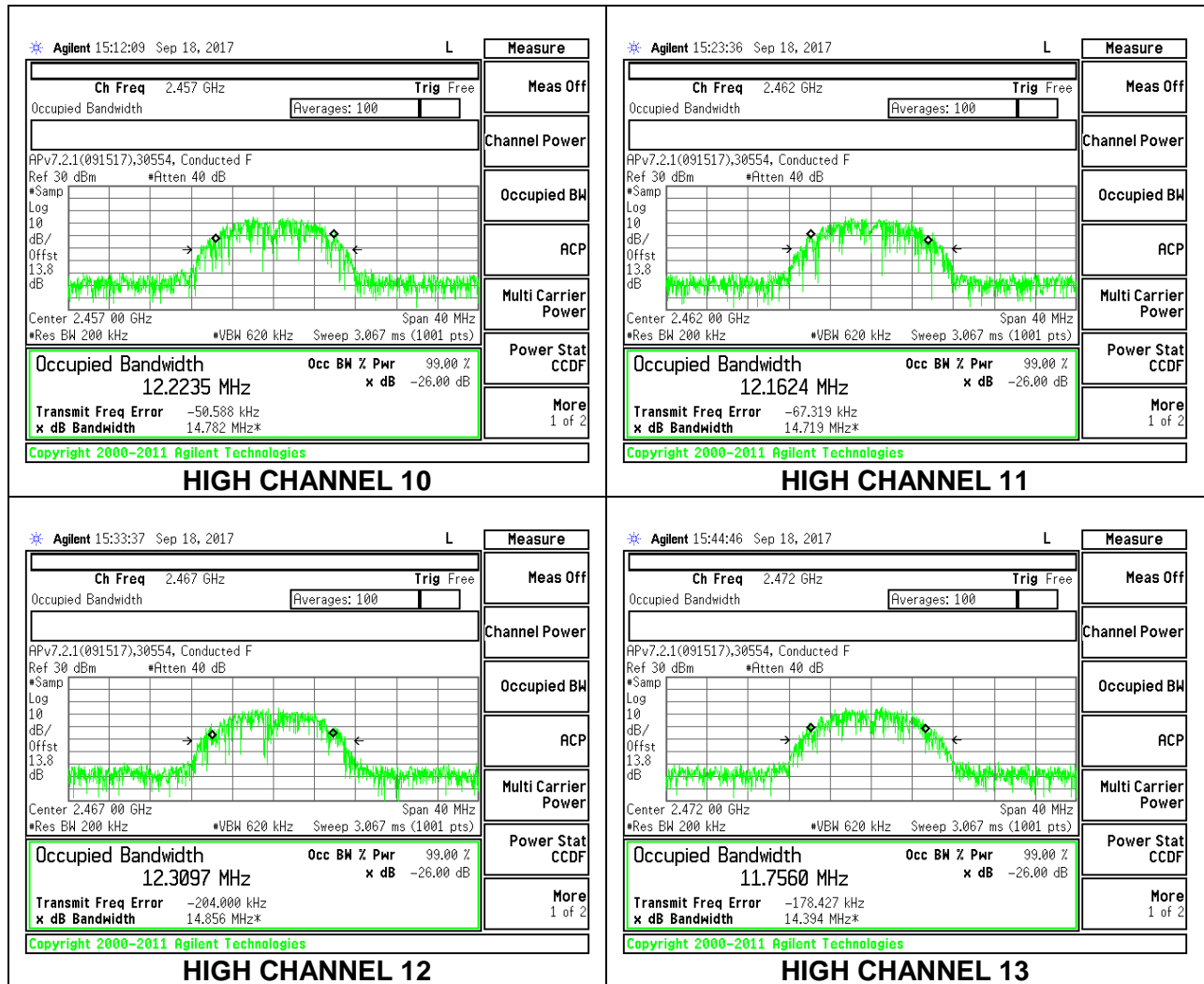
LOW CHANNEL 4



MID CHANNEL 6

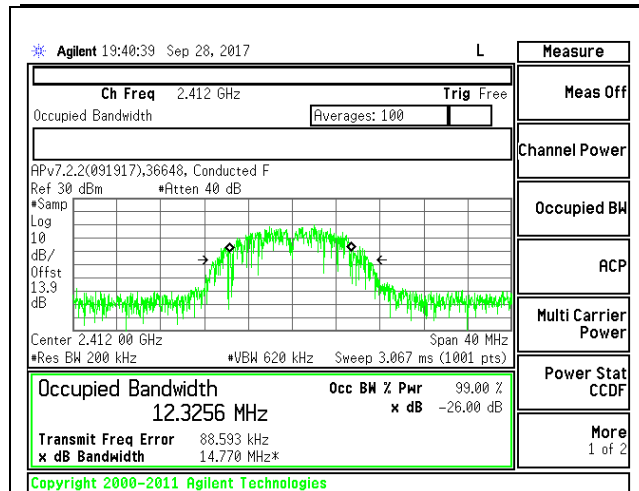


HIGH CHANNEL 9

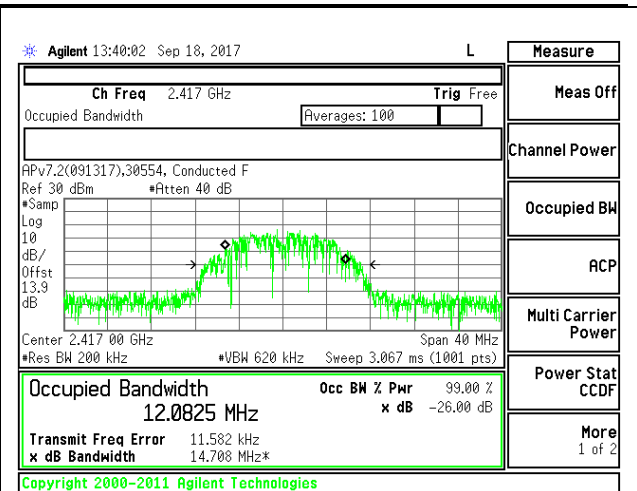


1TX Antenna WF2

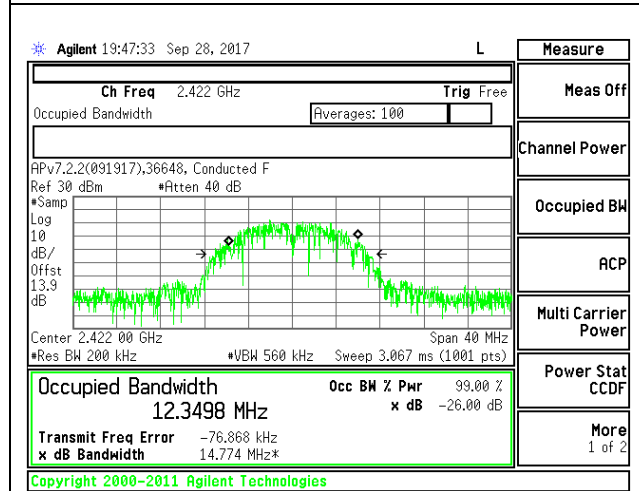
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	12.3256
Low 2	2417	12.0825
Low 3	2422	12.3498
Low 4	2427	12.7507
Mid 6	2437	11.9517
High 9	2452	12.5618
High 10	2457	12.5076
High 11	2462	12.4363
High 12	2467	12.7502
High 13	2472	11.9662



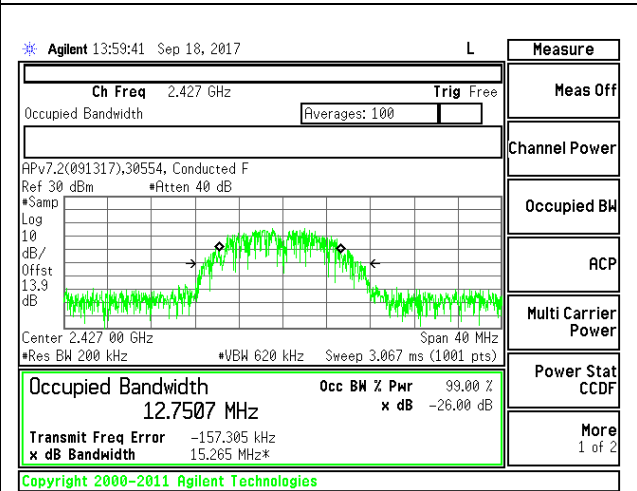
LOW CHANNEL 1



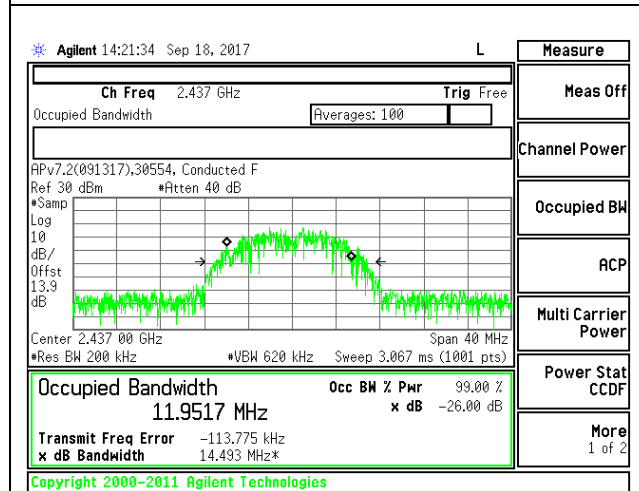
LOW CHANNEL 2



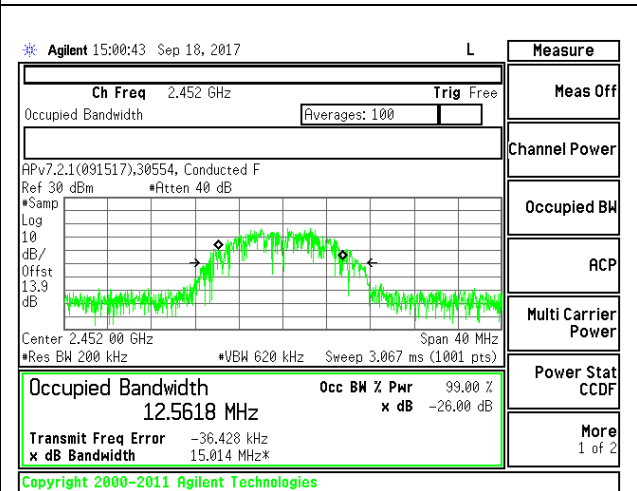
LOW CHANNEL 3



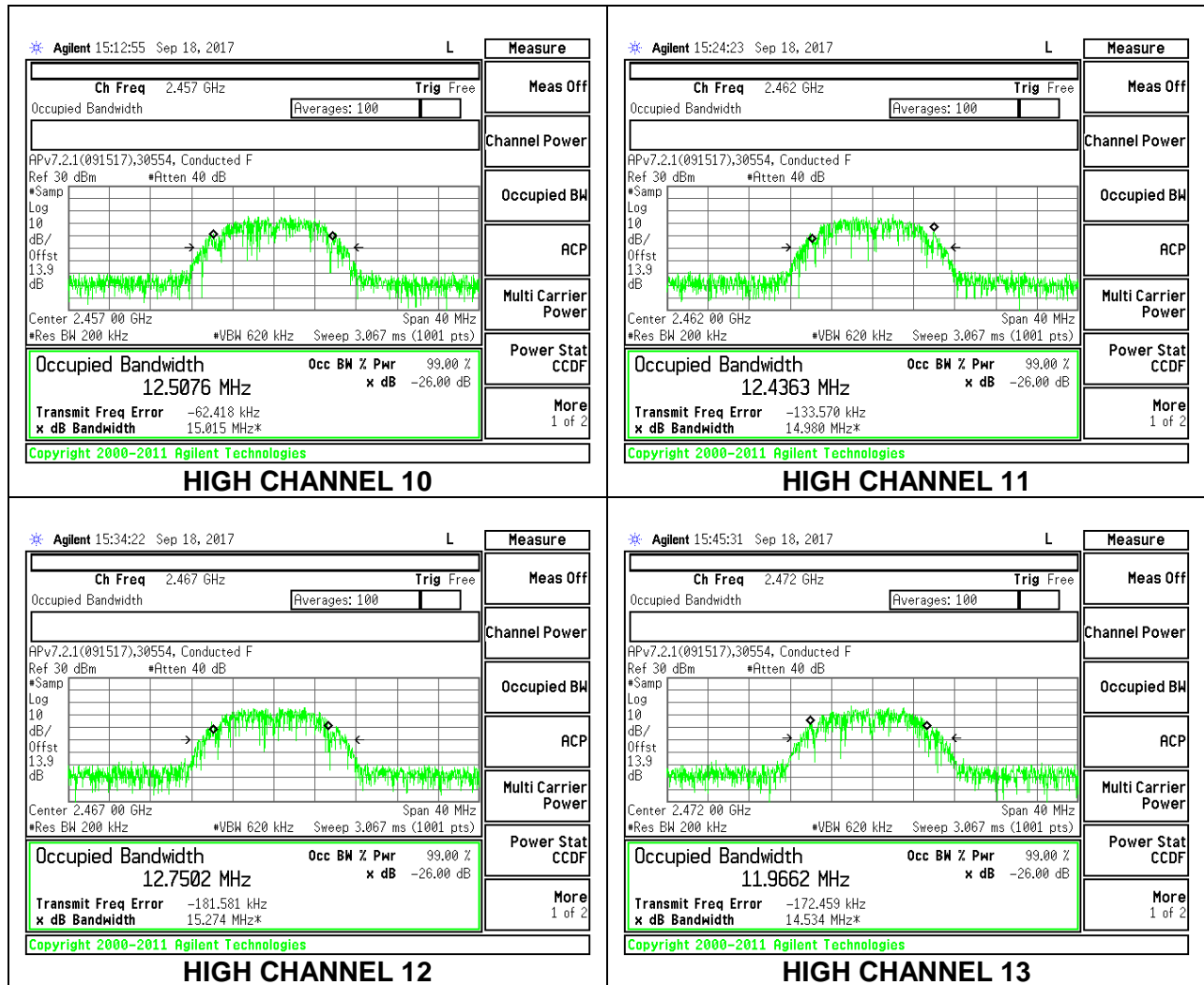
LOW CHANNEL 4



MID CHANNEL 6



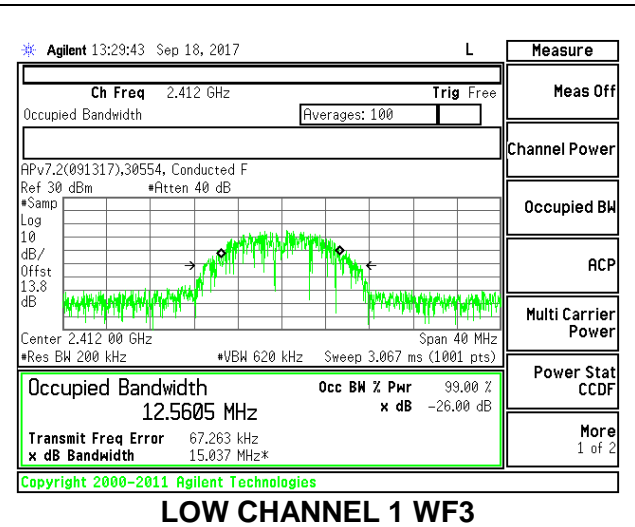
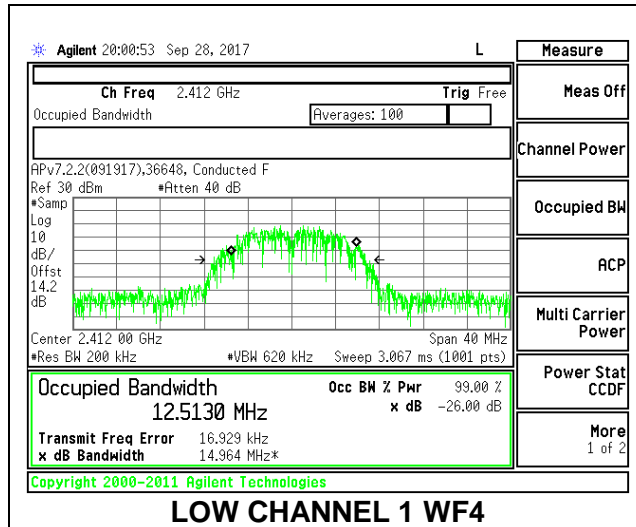
HIGH CHANNEL 9



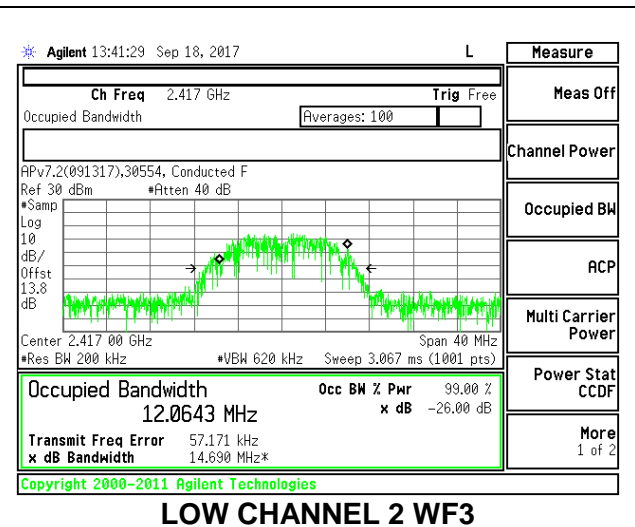
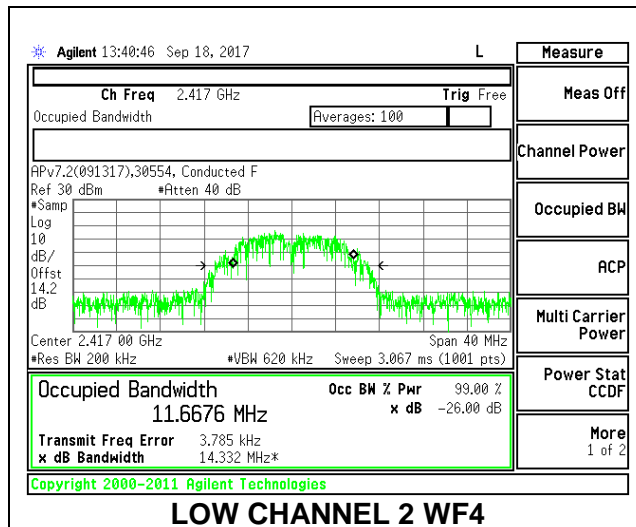
2TX Antenna WF4 + Antenna WF3 CDD MODE

Channel	Frequency (MHz)	99% Bandwidth WF4 (MHz)	99% Bandwidth WF3 (MHz)
Low 1	2412	12.5130	12.5605
Low 2	2417	11.6676	12.0643
Low 3	2422	12.1090	11.7769
Low 4	2427	12.5968	12.3633
Mid 6	2437	12.3861	12.1637
High 8	2447	12.4581	11.8929
High 9	2452	11.9599	12.8129
High 10	2457	12.2078	11.8987
High 11	2462	12.4151	12.0743
High 12	2467	12.0531	12.2910
High 13	2472	12.1326	11.8817

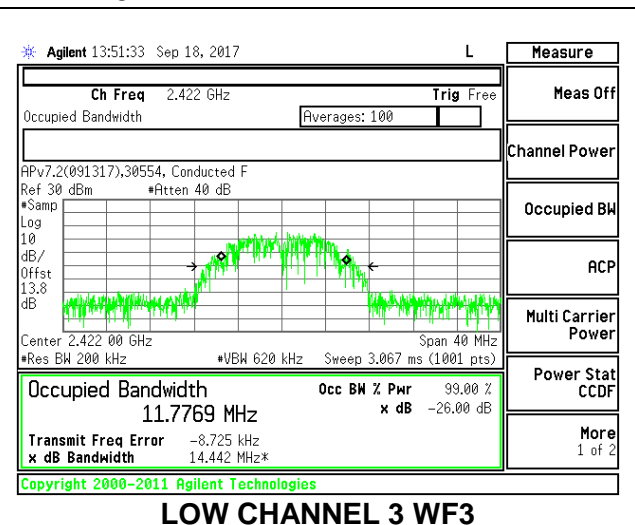
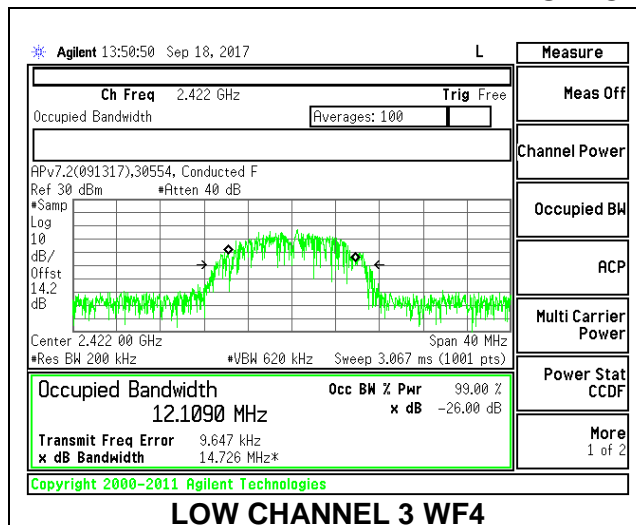
LOW CHANNEL 1



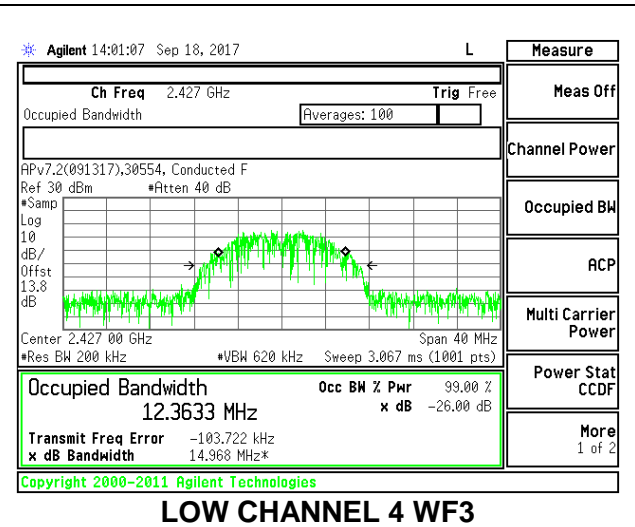
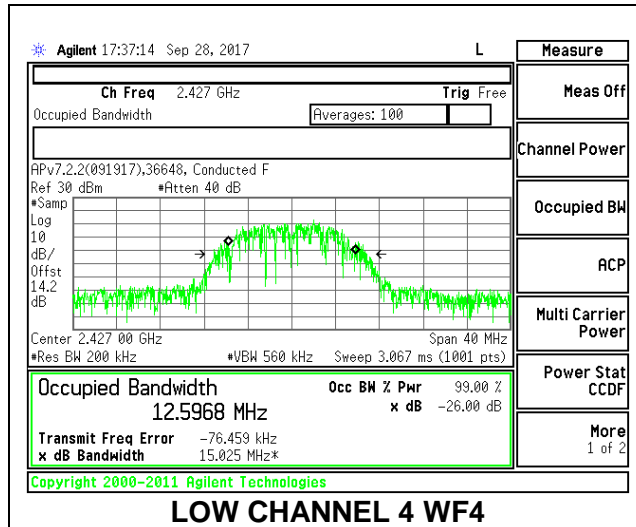
LOW CHANNEL 2



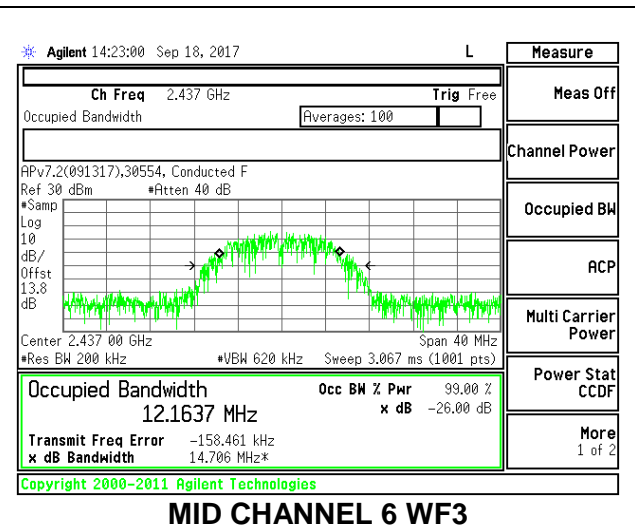
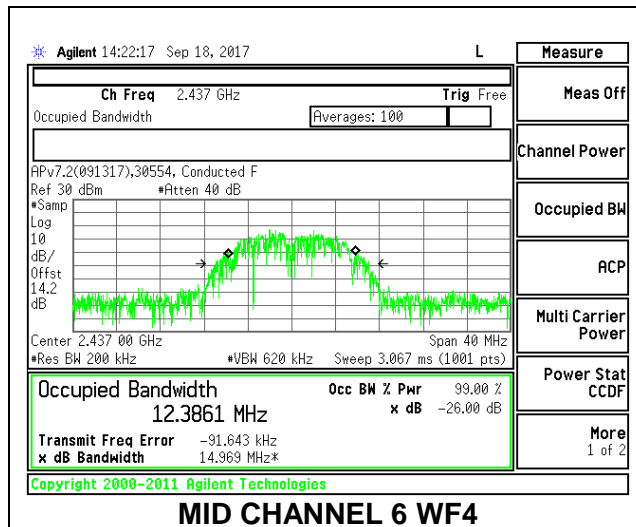
LOW CHANNEL 3



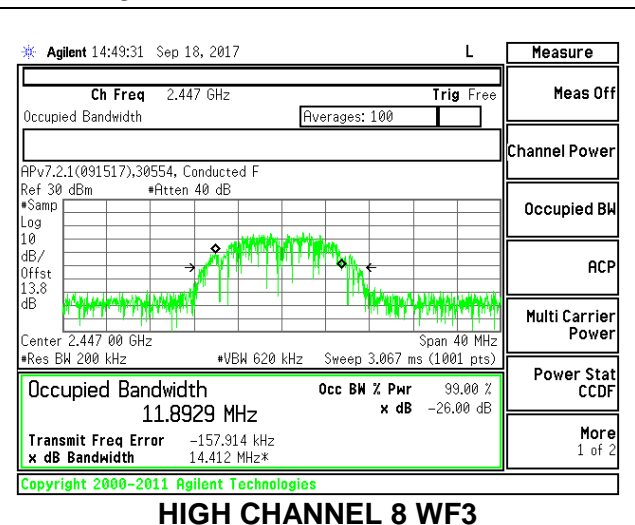
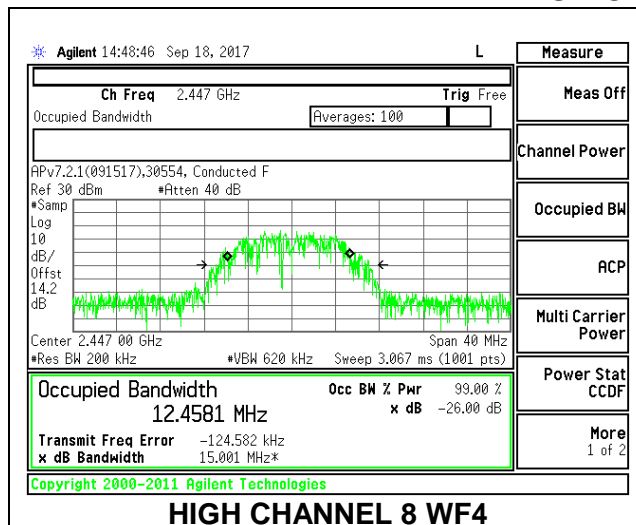
LOW CHANNEL 4



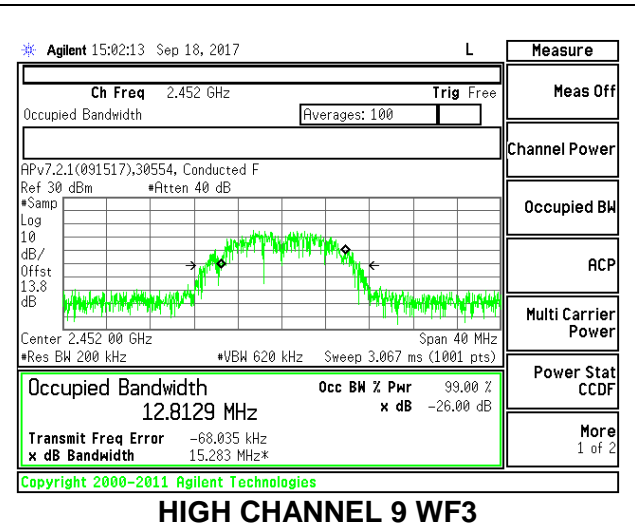
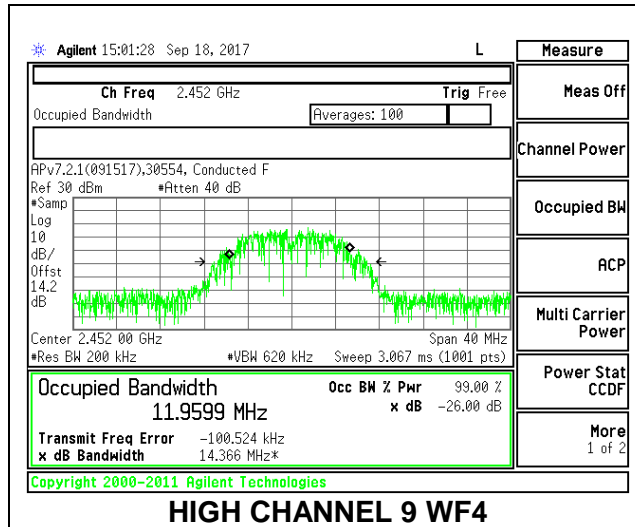
MID CHANNEL 6



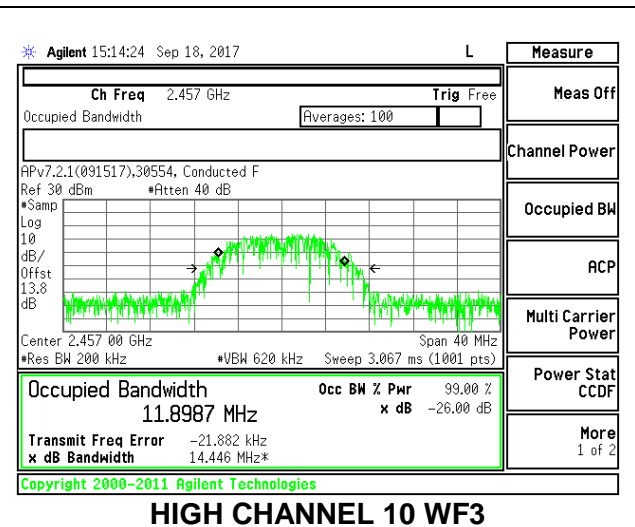
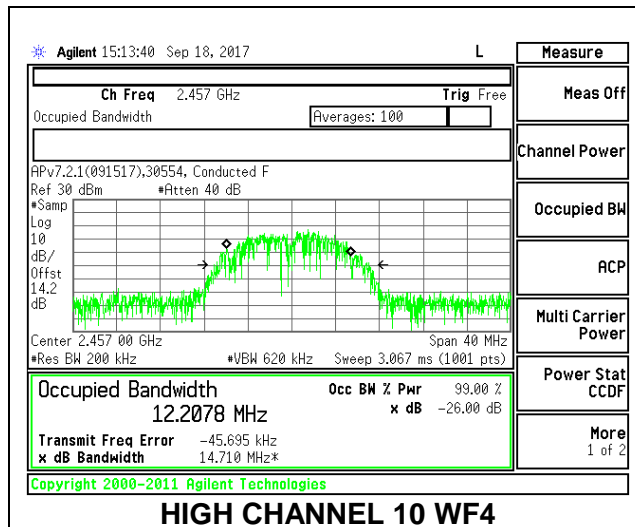
HIGH CHANNEL 8



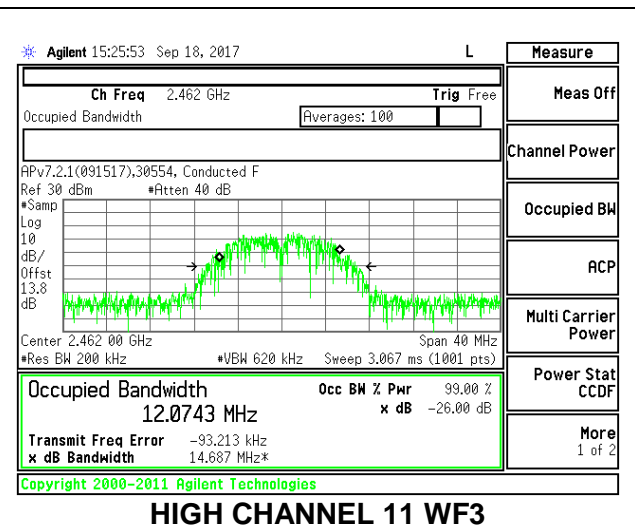
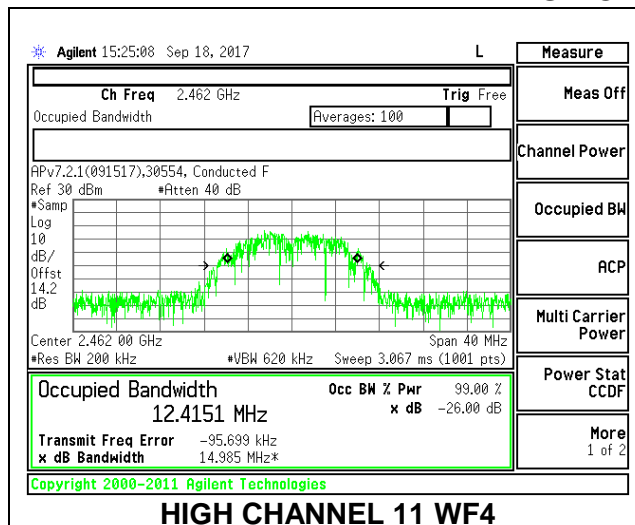
HIGH CHANNEL 9



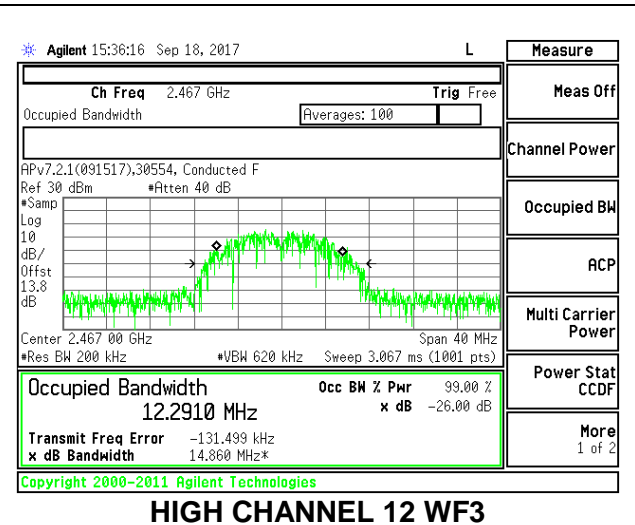
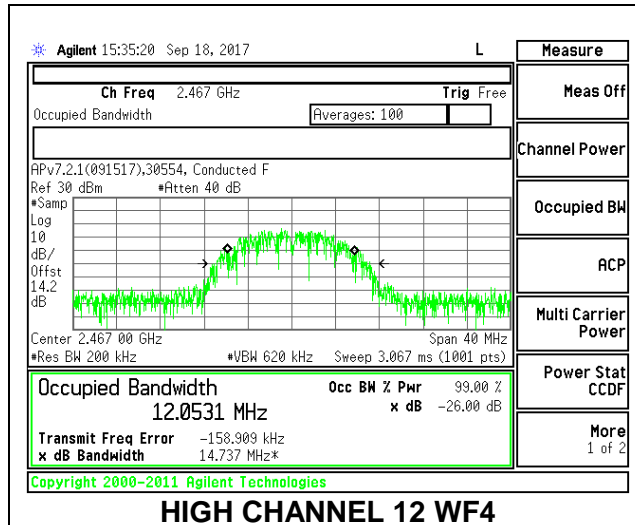
HIGH CHANNEL 10



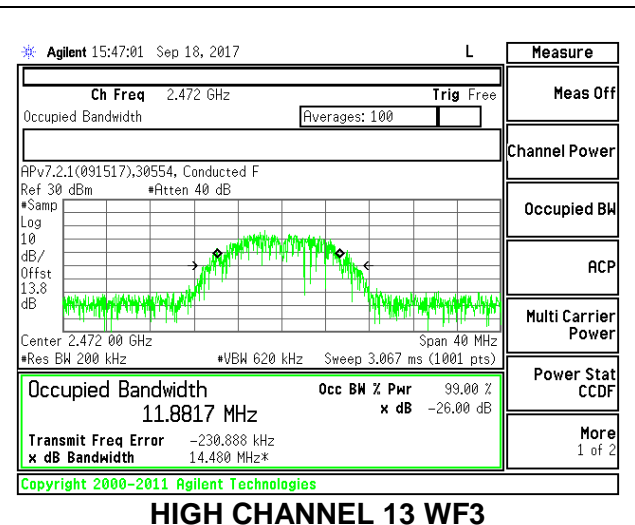
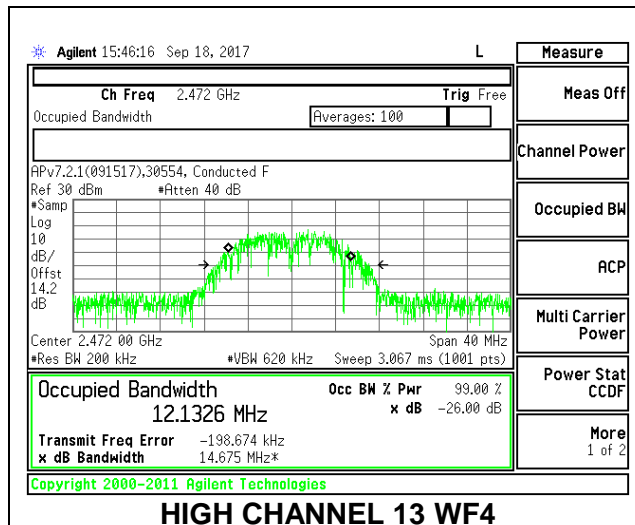
HIGH CHANNEL 11



HIGH CHANNEL 12



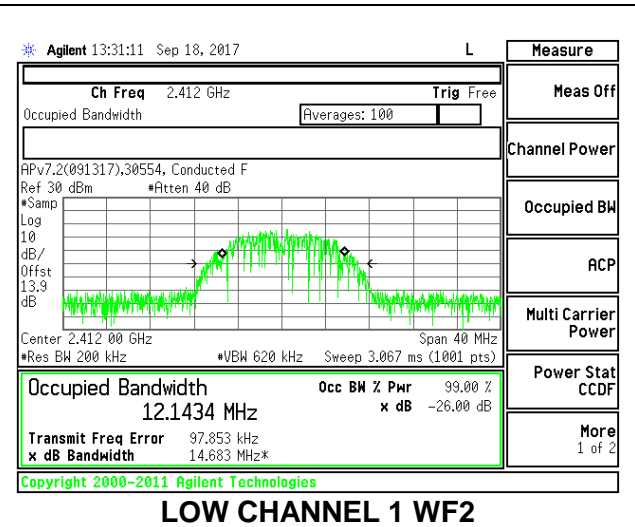
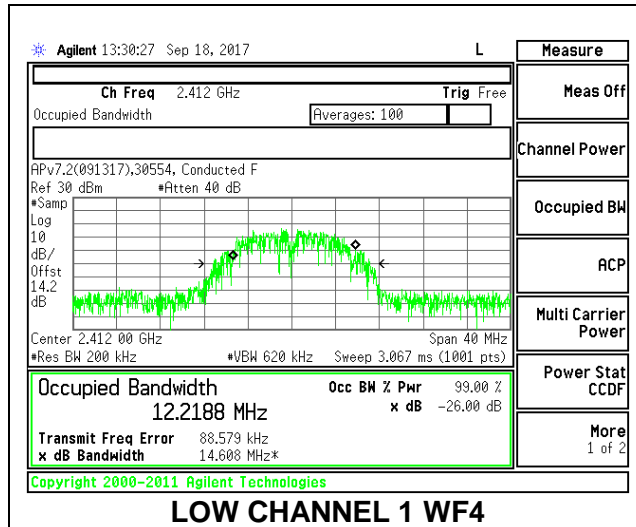
HIGH CHANNEL 13



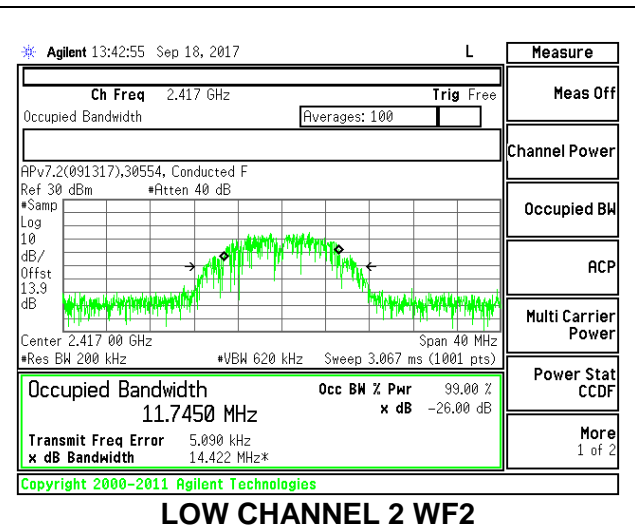
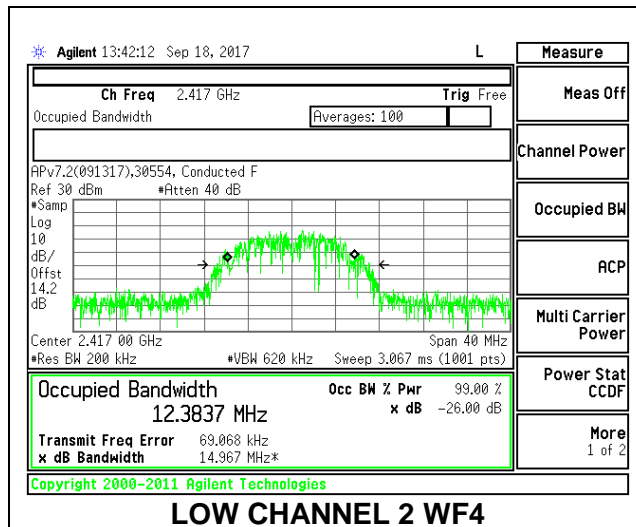
2TX Antenna WF4 + Antenna WF2 CDD MODE

Channel	Frequency (MHz)	99% Bandwidth WF4 (MHz)	99% Bandwidth WF2 (MHz)
Low 1	2412	12.2188	12.1434
Low 2	2417	12.3837	11.7450
Low 3	2422	11.8720	11.8490
Low 4	2427	12.0749	12.0551
Mid 6	2437	13.5556	12.4914
High 8	2447	12.1835	12.3134
High 9	2452	12.5638	12.0102
High 10	2457	11.8550	12.1521
High 11	2462	12.0338	12.1388
High 12	2467	11.9771	12.7211
High 13	2472	11.8493	12.3246

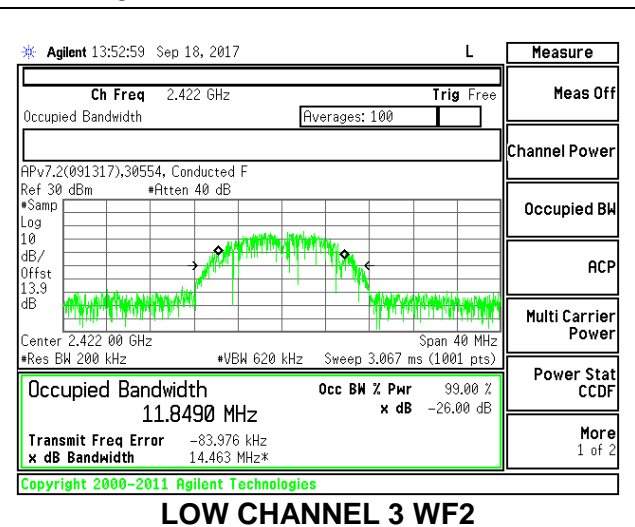
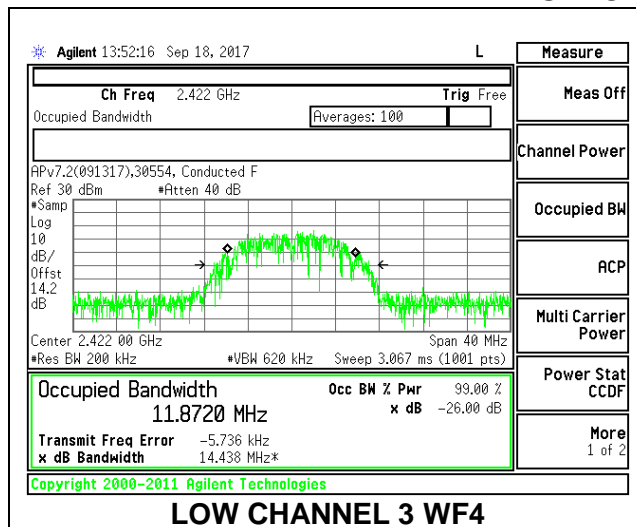
LOW CHANNEL 1



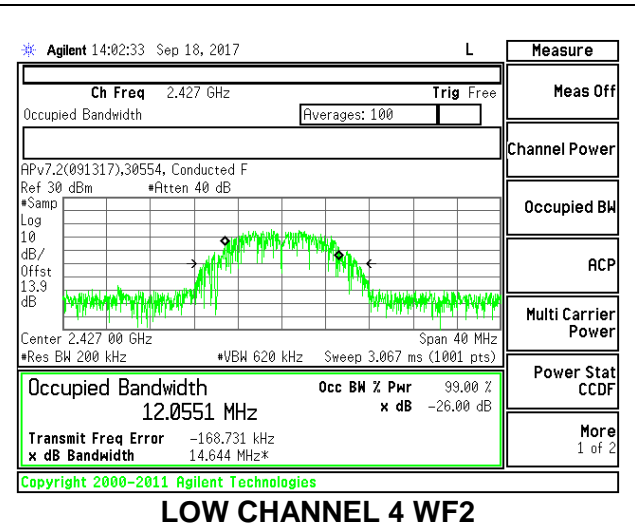
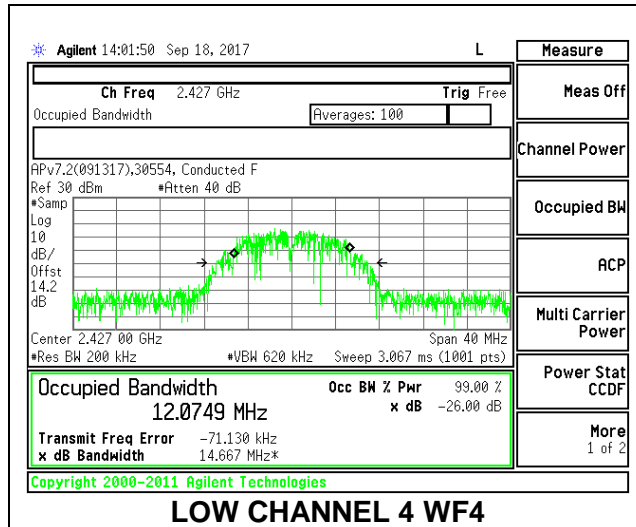
LOW CHANNEL 2



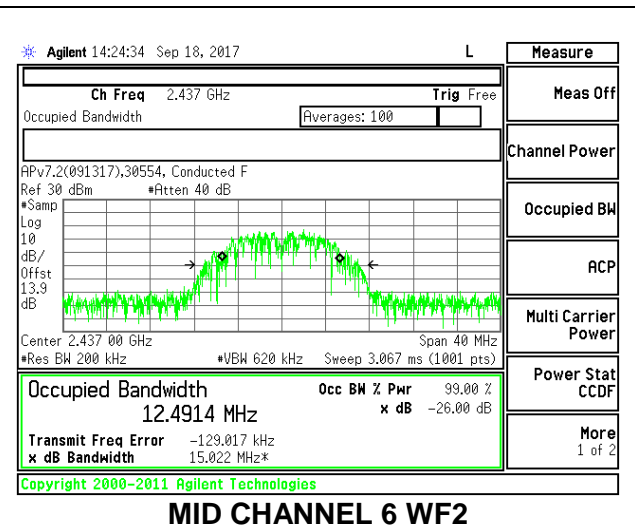
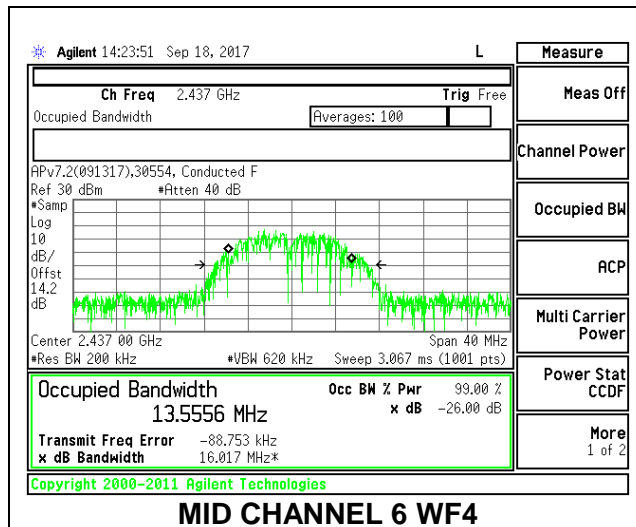
LOW CHANNEL 3



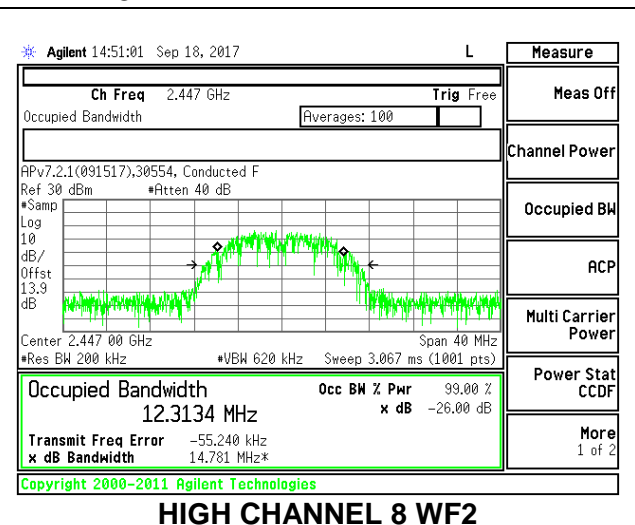
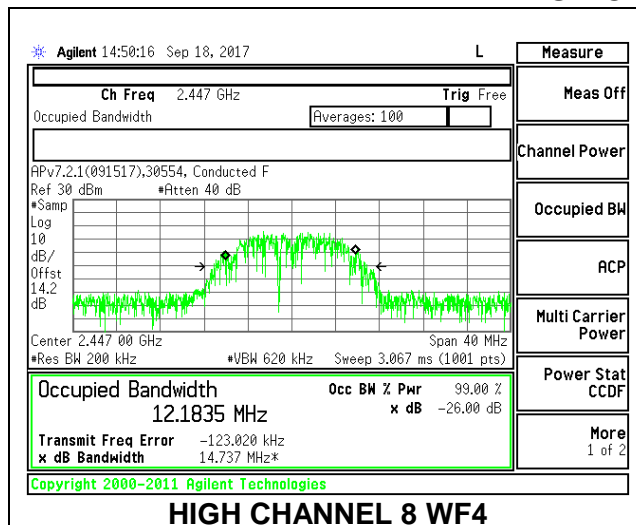
LOW CHANNEL 4



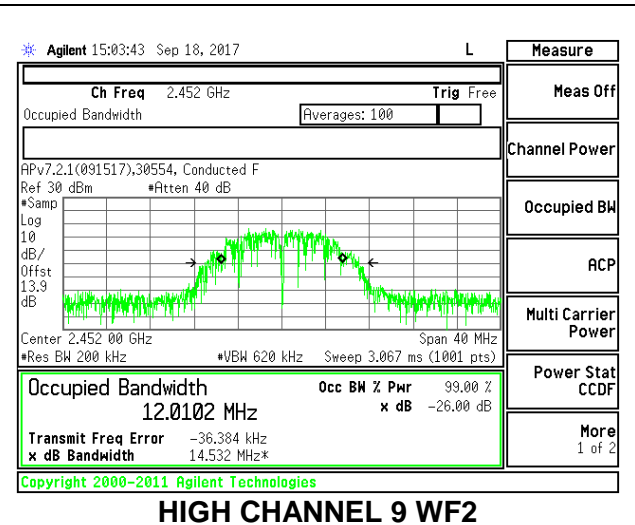
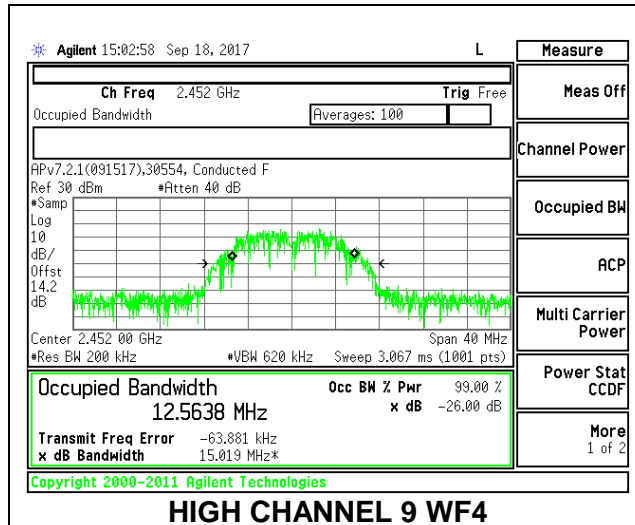
MID CHANNEL 6



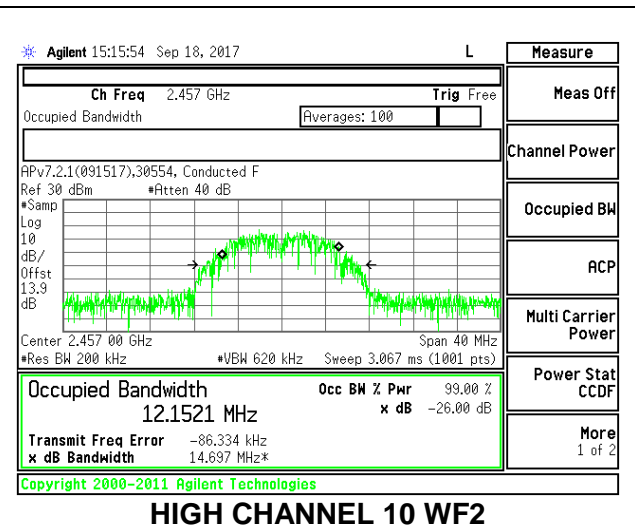
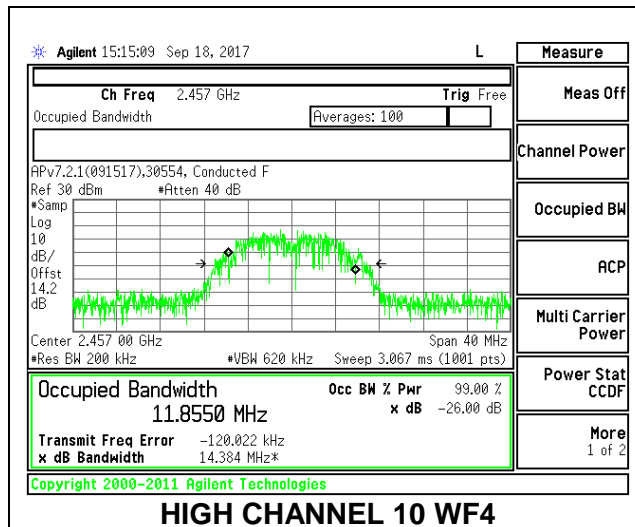
HIGH CHANNEL 8



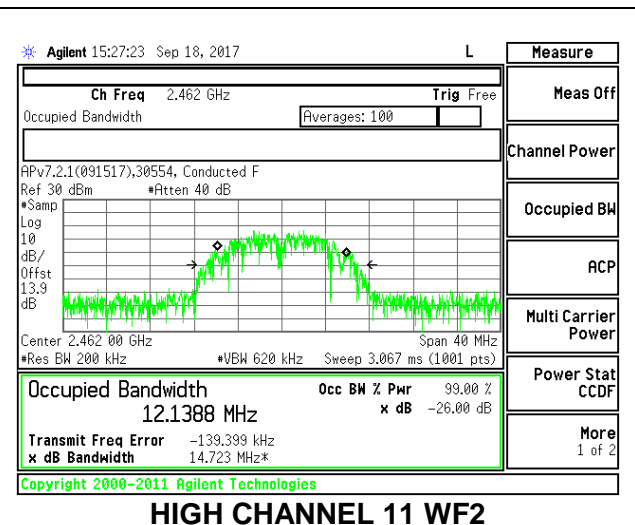
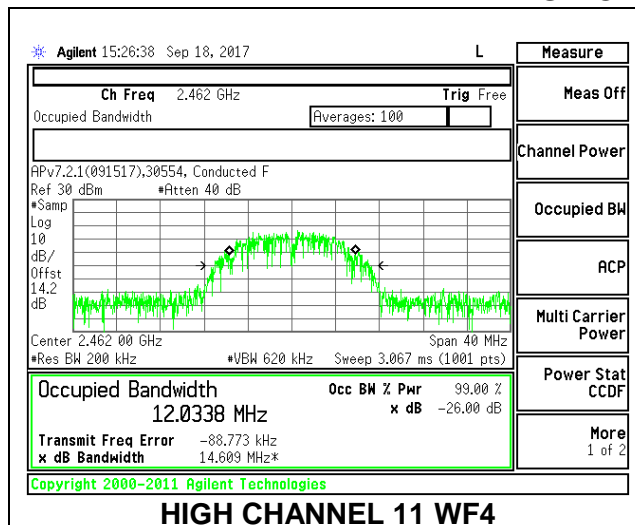
HIGH CHANNEL 9



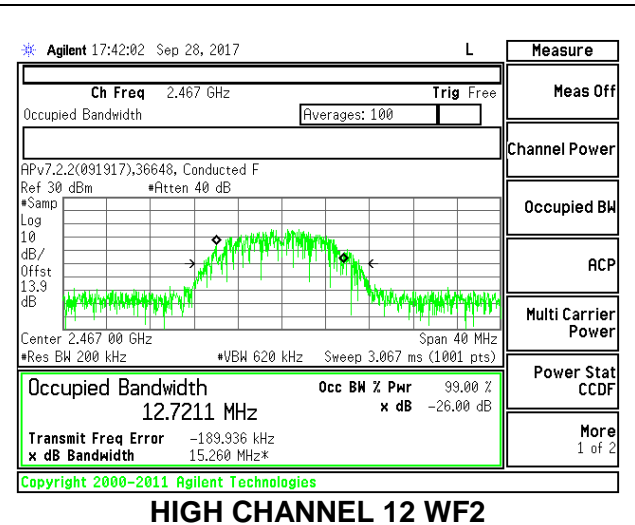
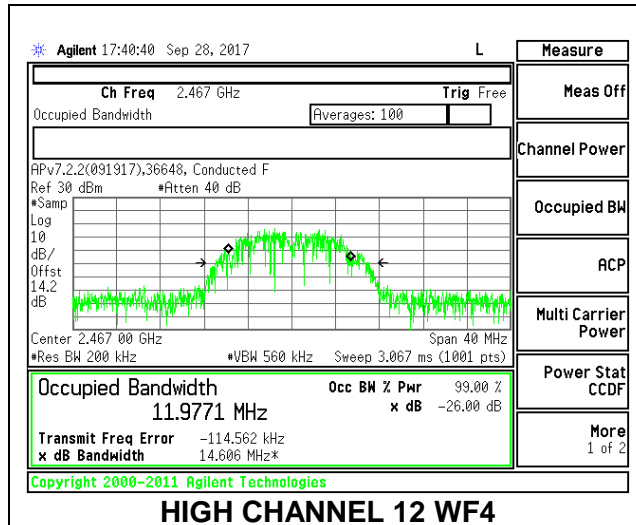
HIGH CHANNEL 10



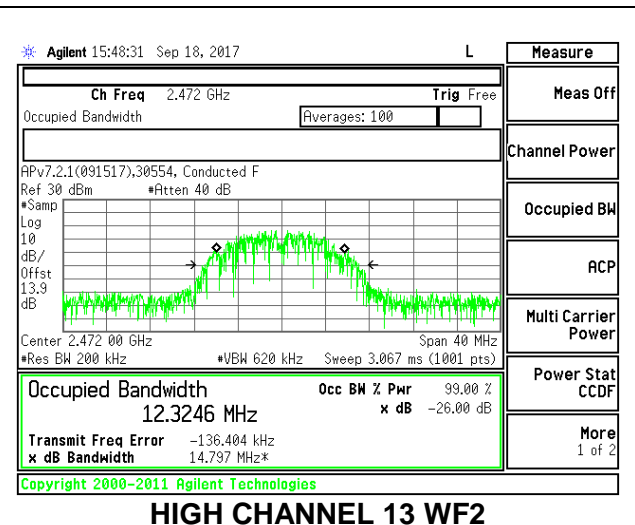
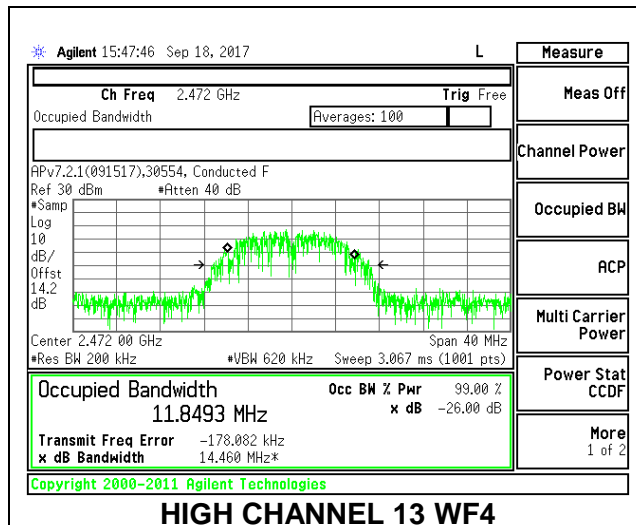
HIGH CHANNEL 11



HIGH CHANNEL 12



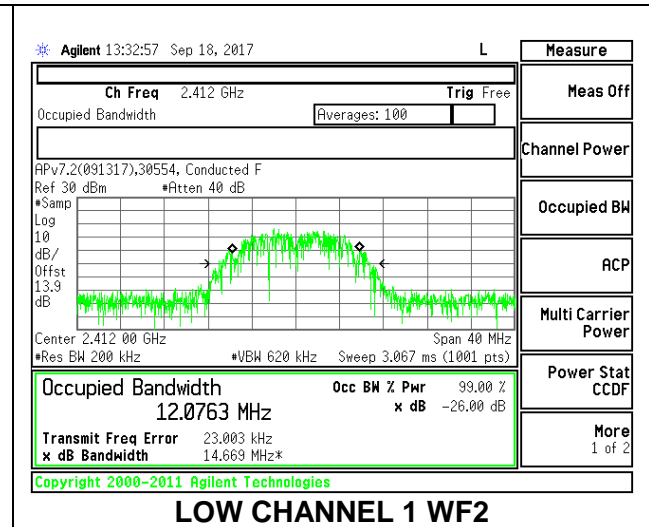
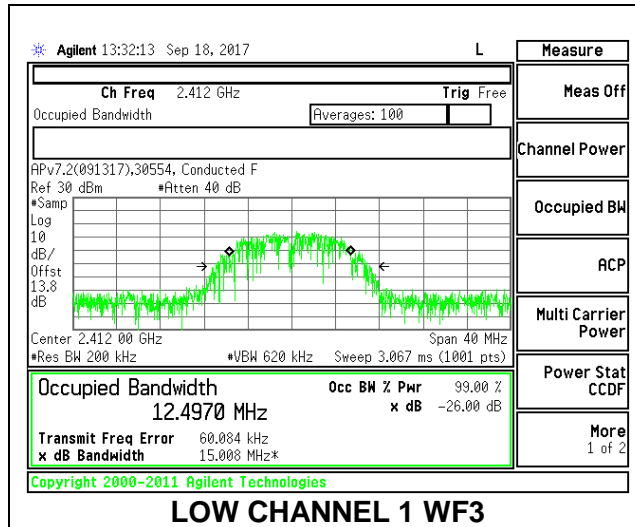
HIGH CHANNEL 13



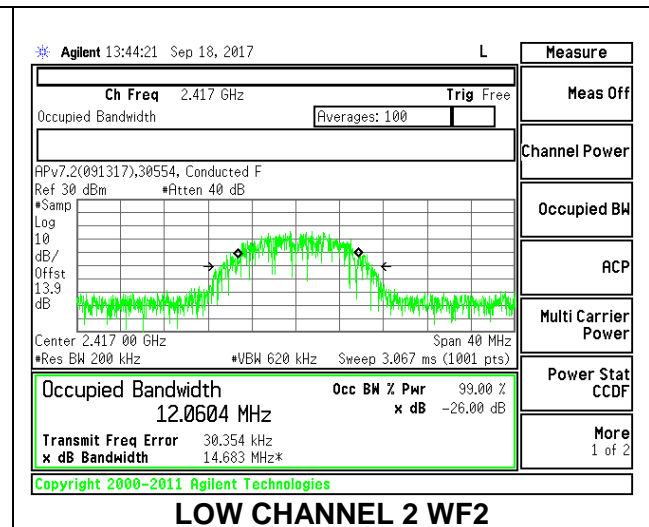
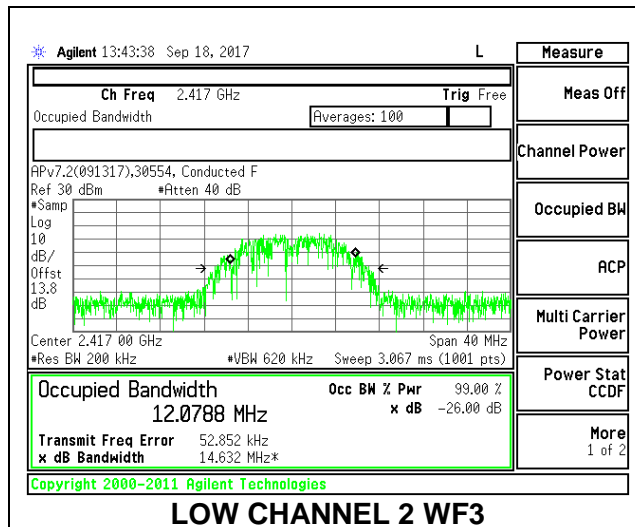
2TX Antenna WF3 + Antenna WF2 CDD mode

Channel	Frequency (MHz)	99% Bandwidth WF3 (MHz)	99% Bandwidth WF2 (MHz)
Low 1	2412	12.4970	12.0763
Low 2	2417	12.0788	12.0604
Low 3	2422	11.7460	11.8572
Low 4	2427	11.8700	11.8941
Mid 6	2437	11.5024	12.2349
High 8	2447	12.5301	12.0335
High 9	2452	12.5952	11.6751
High 10	2457	12.8149	12.4454
High 11	2462	12.1267	12.1761
High 12	2467	12.6267	11.8759
High 13	2472	12.4329	12.0078

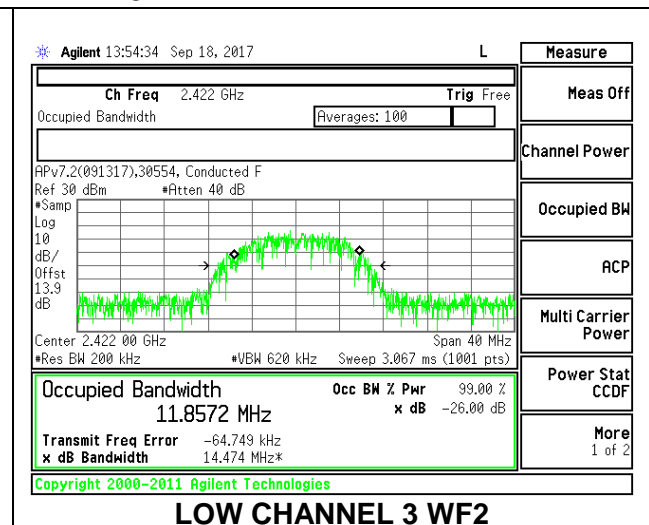
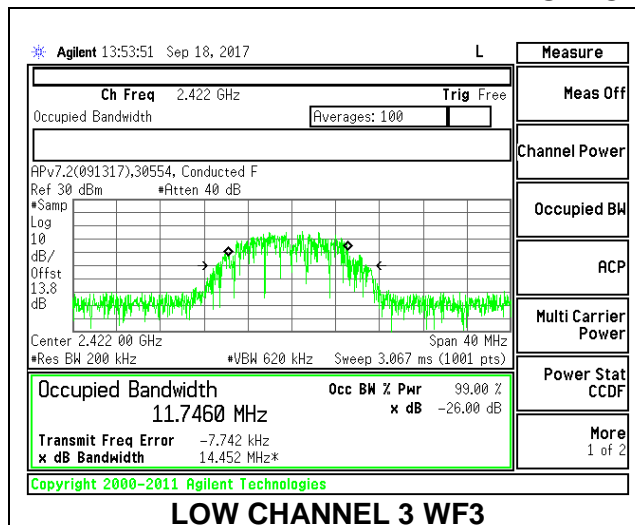
LOW CHANNEL 1



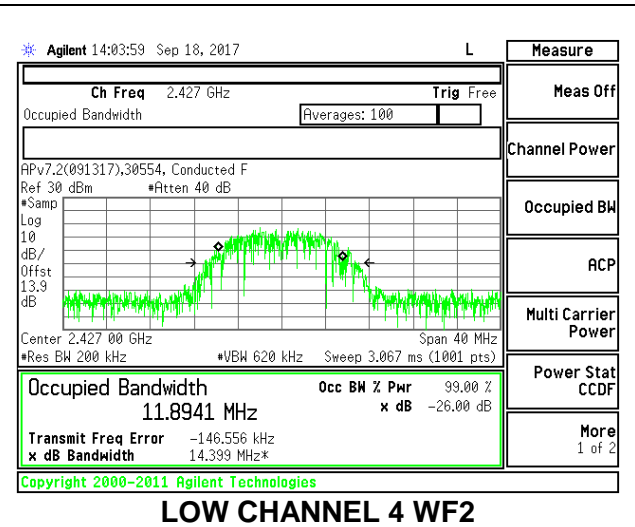
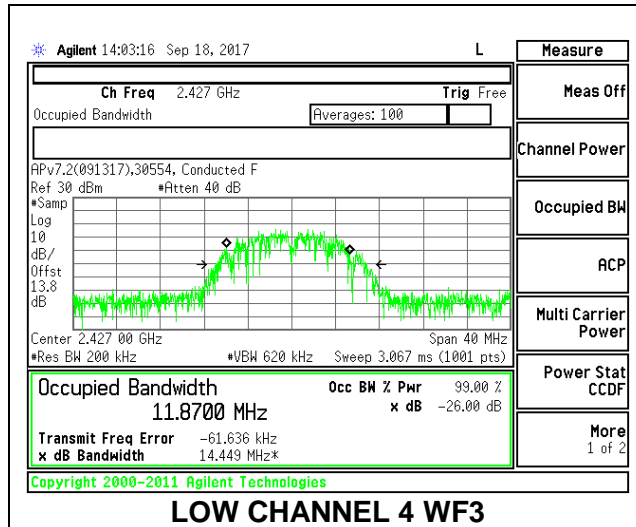
LOW CHANNEL 2



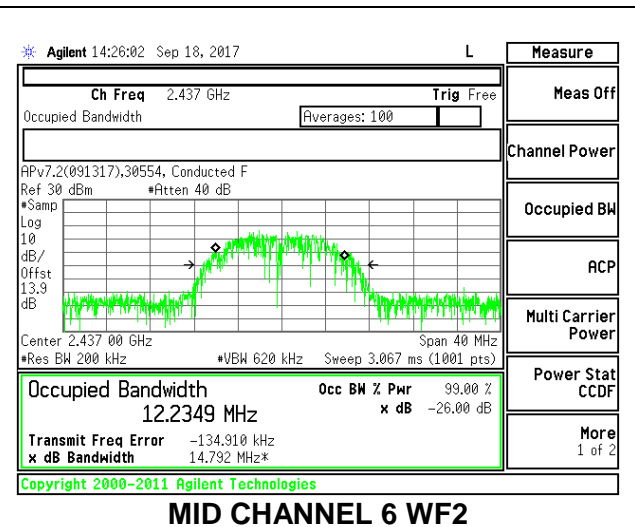
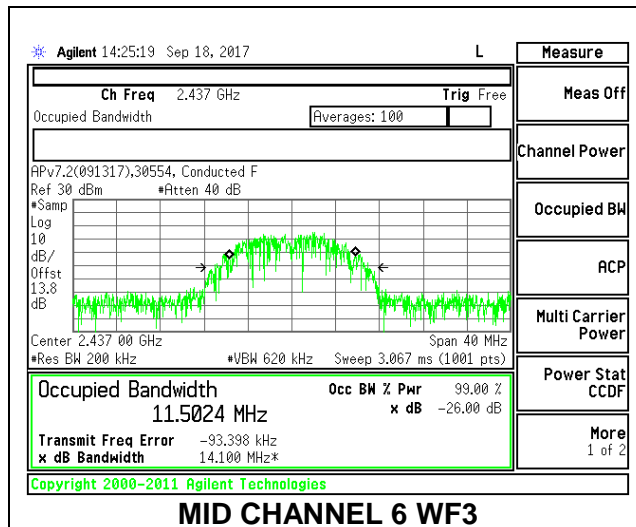
LOW CHANNEL 3



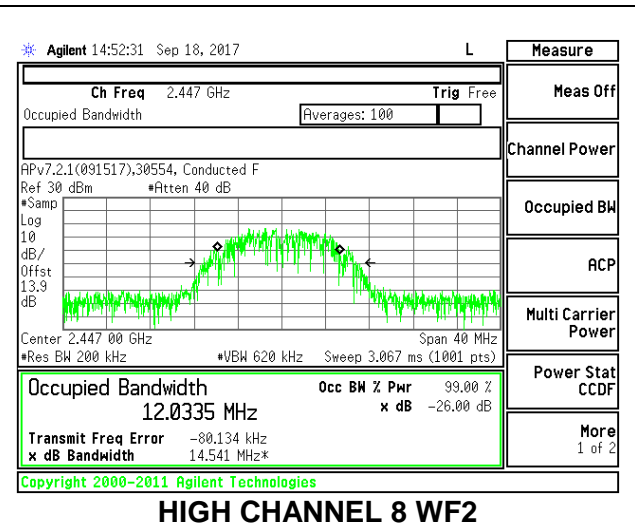
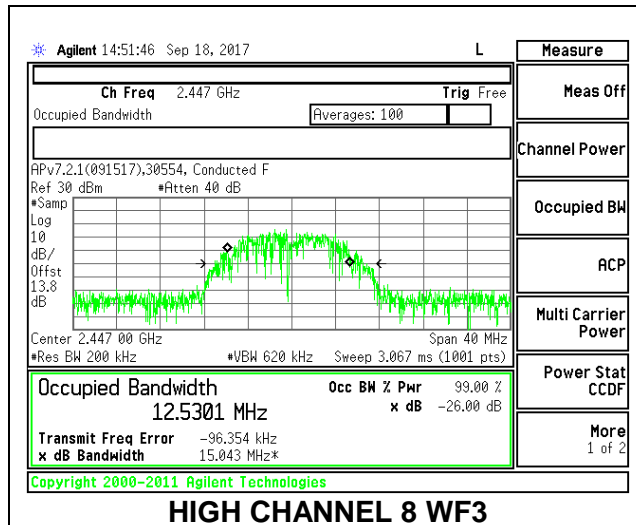
LOW CHANNEL 4



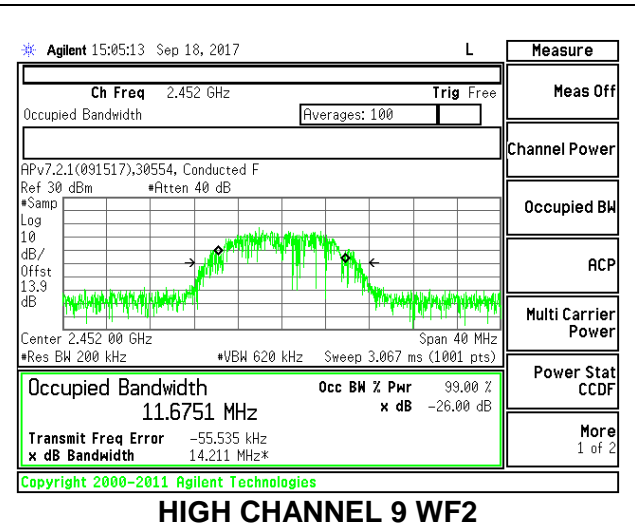
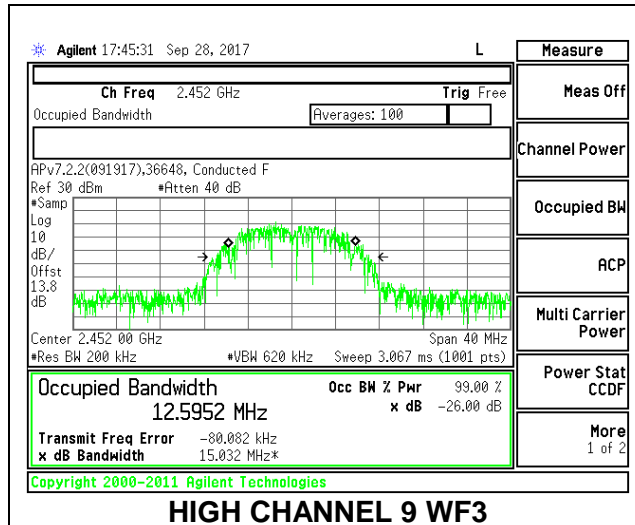
MID CHANNEL 6



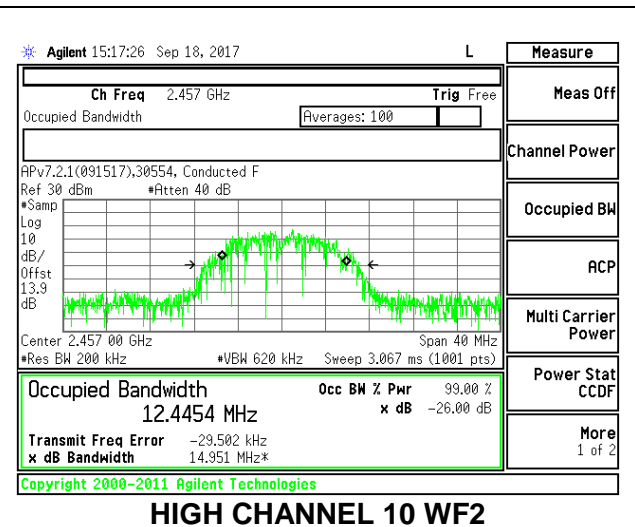
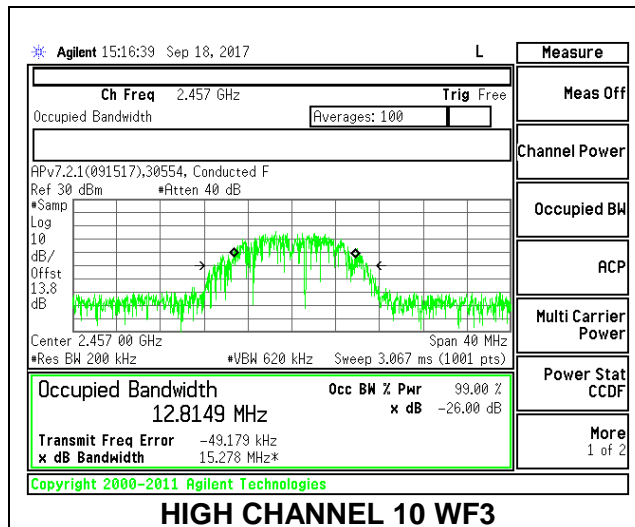
HIGH CHANNEL 8



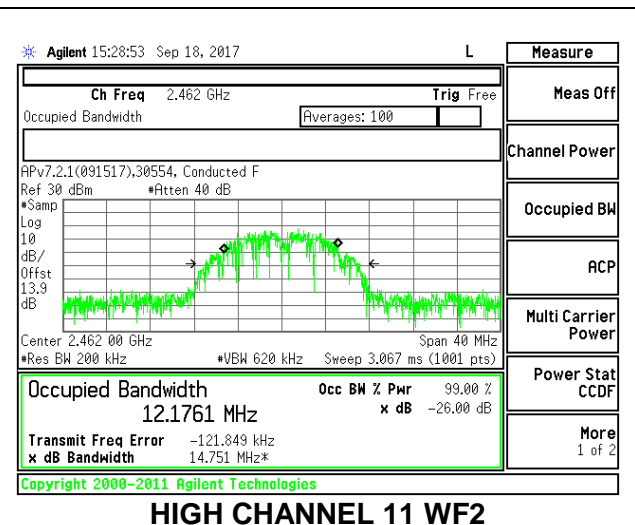
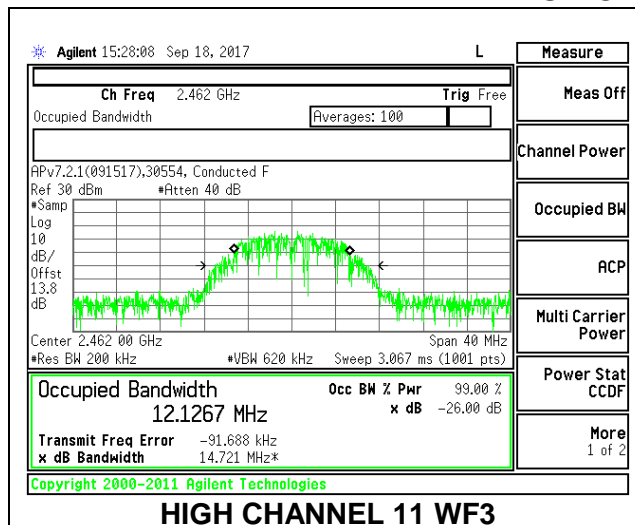
HIGH CHANNEL 9



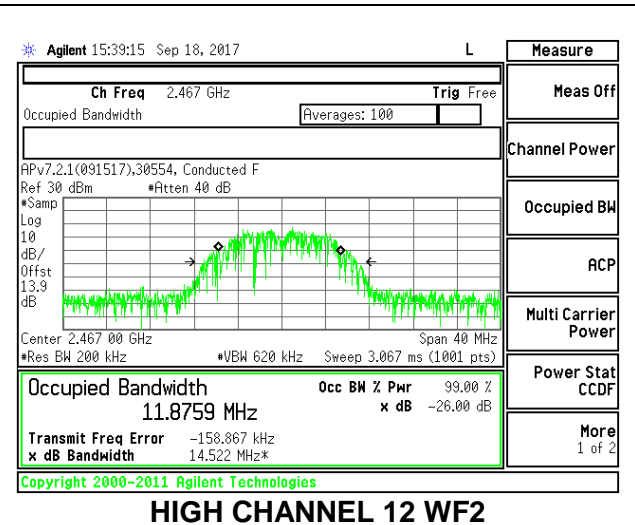
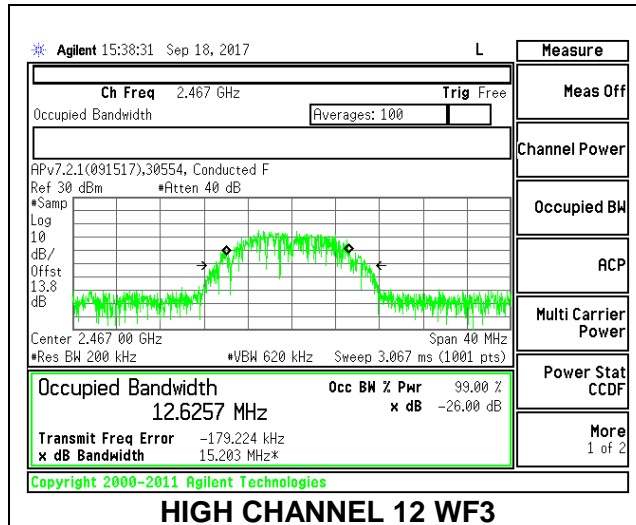
HIGH CHANNEL 10



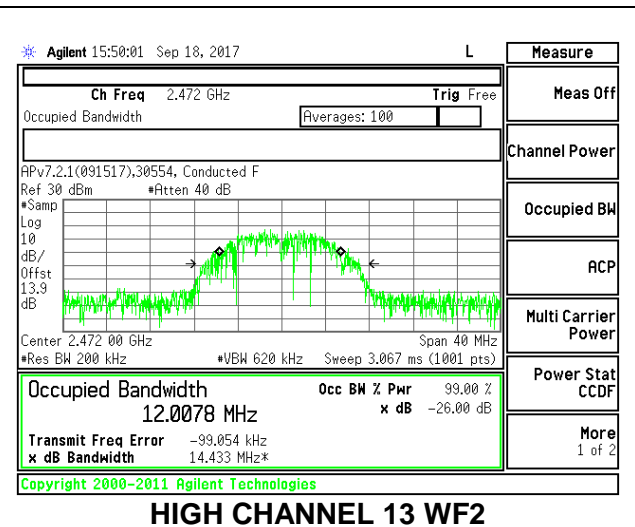
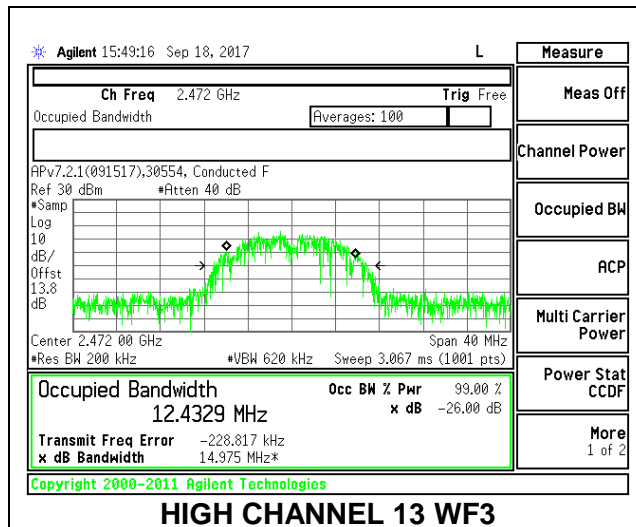
HIGH CHANNEL 11



HIGH CHANNEL 12



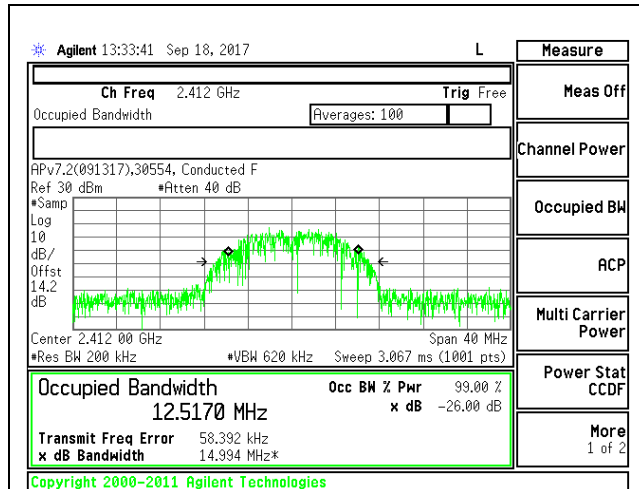
HIGH CHANNEL 13



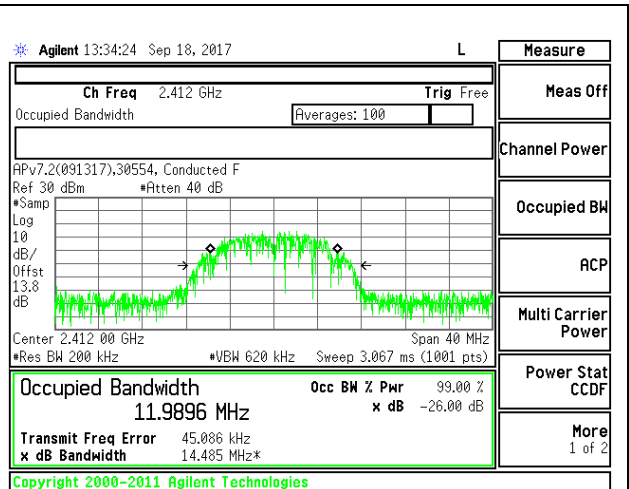
3TX Antenna WF4 + Antenna WF3 + Antenna WF2 CDD MODE

Channel	Frequency (MHz)	99% Bandwidth WF4 (MHz)	99% Bandwidth WF3 (MHz)	99% Bandwidth WF2 (MHz)
Low 1	2412	12.5170	11.9896	12.5315
Low 2	2417	12.6389	12.3297	12.2896
Low 3	2422	11.5331	11.7895	12.7261
Low 4	2427	12.7414	12.3631	11.8835
Low 5	2432	12.0389	12.6488	12.6624
Mid 6	2437	11.7798	11.7642	11.9172
High 7	2442	12.1681	12.2382	12.6142
High 8	2447	11.8939	12.4368	12.0059
High 9	2452	12.4151	11.9533	12.8533
High 10	2457	12.7626	13.3697	12.5259
High 11	2462	12.3700	11.9527	11.8670
High 12	2467	12.7314	11.9986	12.1701
High 13	2472	12.4426	12.1313	12.3477

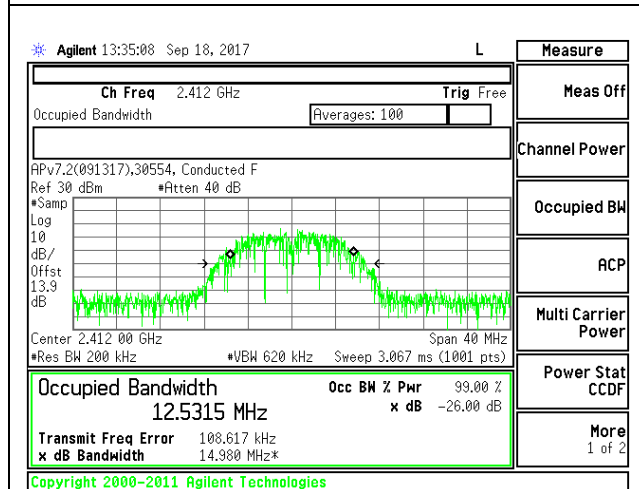
LOW CHANNEL 1



LOW CHANNEL 1 WF4

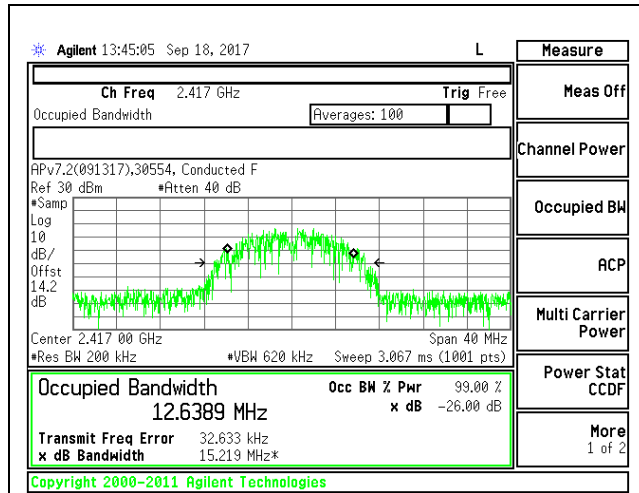


LOW CHANNEL 1 WF3

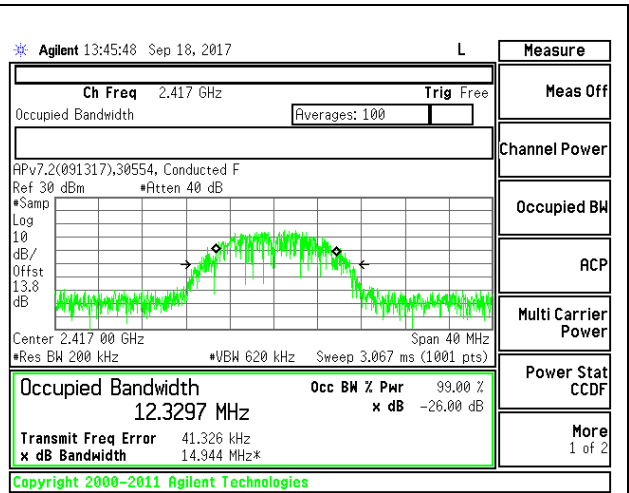


LOW CHANNEL 1 WF2

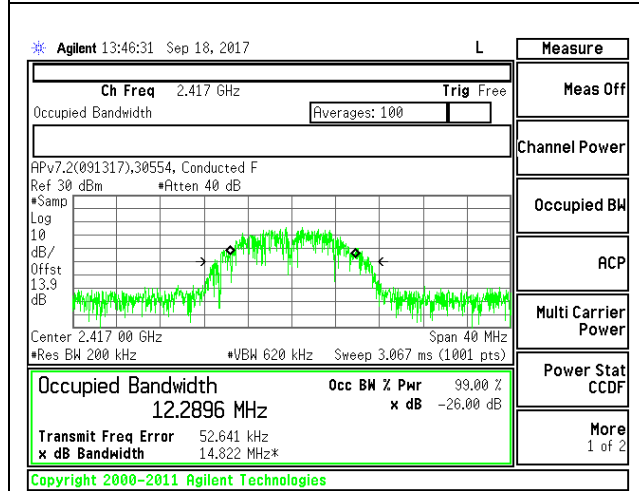
LOW CHANNEL 2



LOW CHANNEL 2 WF4

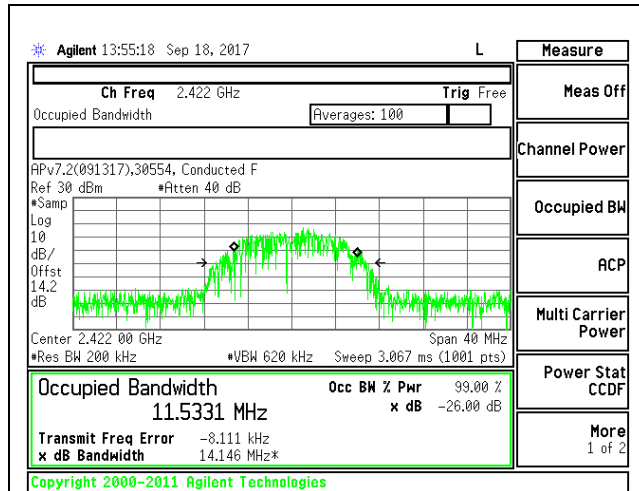


LOW CHANNEL 2 WF3

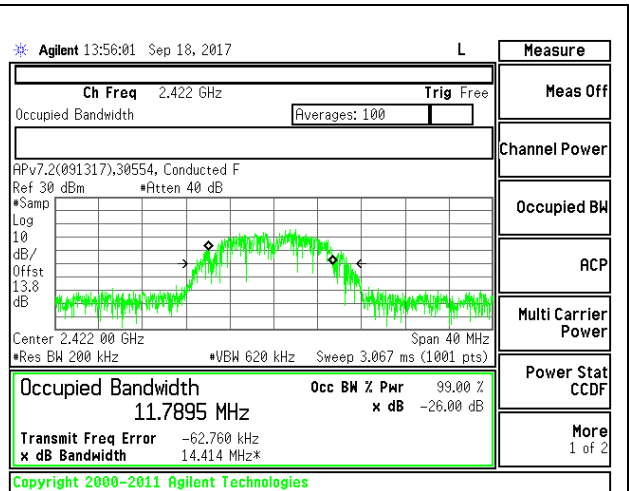


LOW CHANNEL 2 WF2

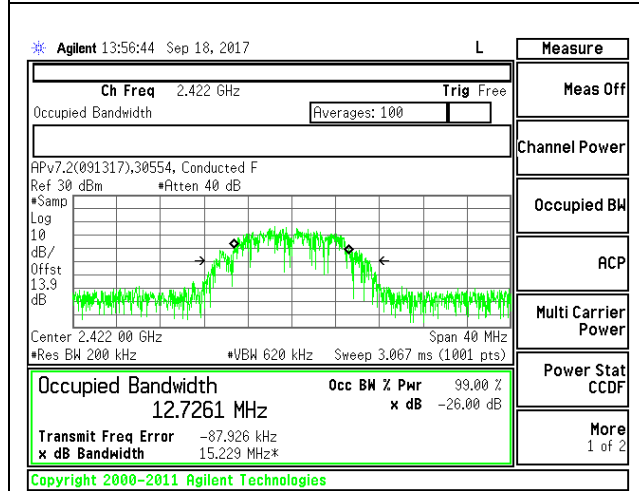
LOW CHANNEL 3



LOW CHANNEL 3 WF4

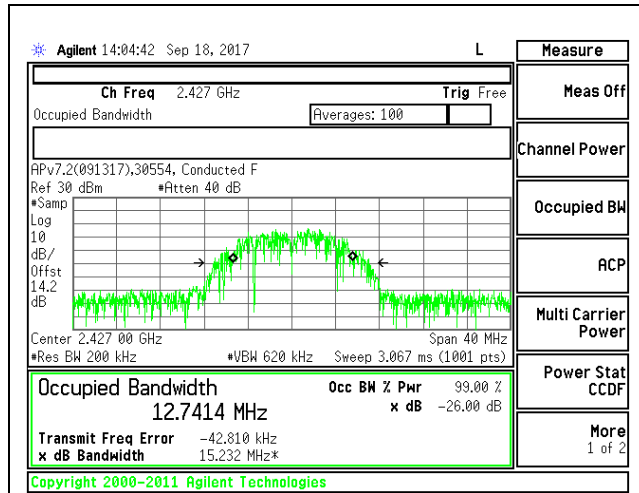


LOW CHANNEL 3 WF3

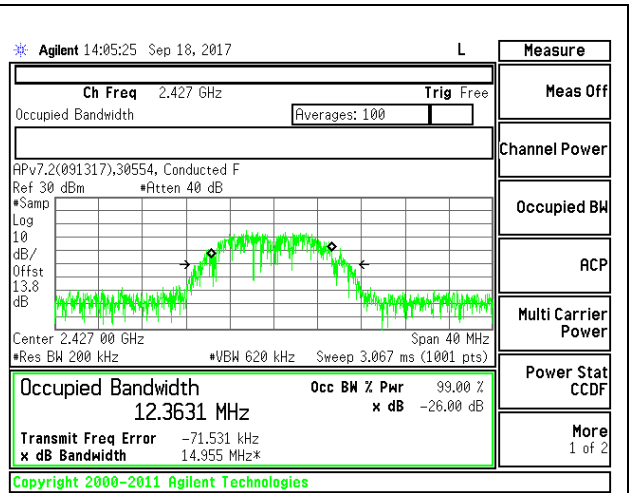


LOW CHANNEL 3 WF2

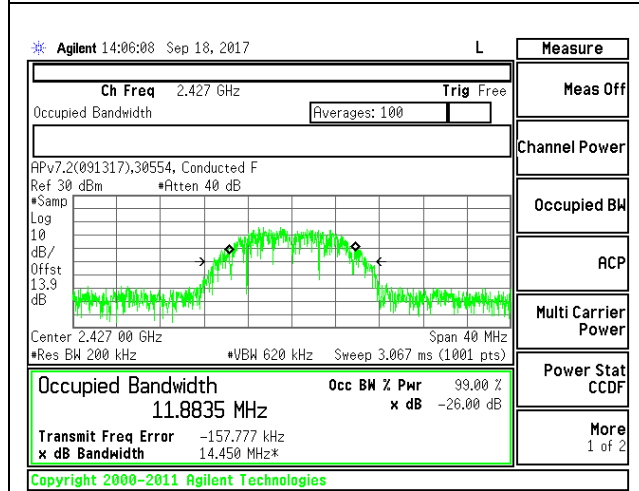
LOW CHANNEL 4



LOW CHANNEL 4 WF4

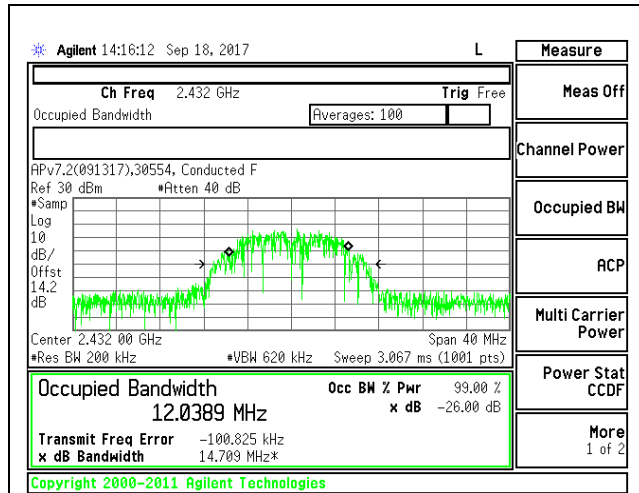


LOW CHANNEL 4 WF3

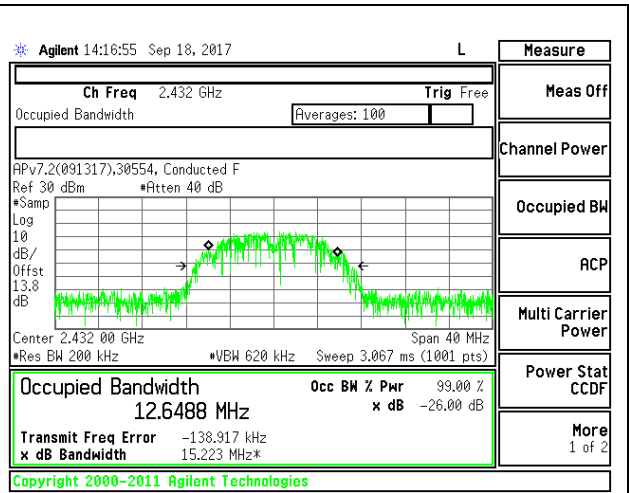


LOW CHANNEL 4 WF2

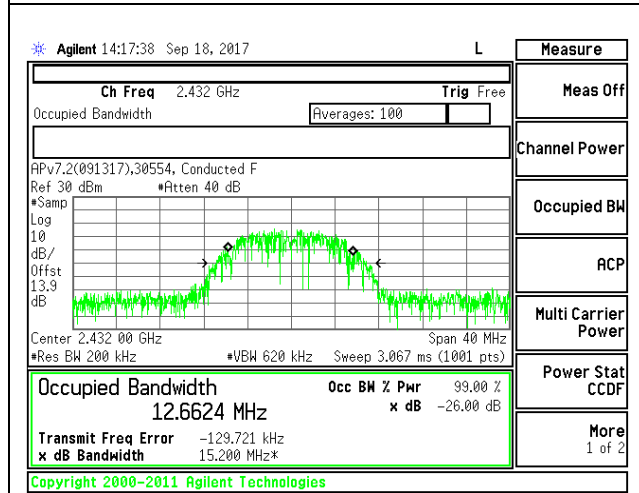
LOW CHANNEL 5



LOW CHANNEL 5 WF4

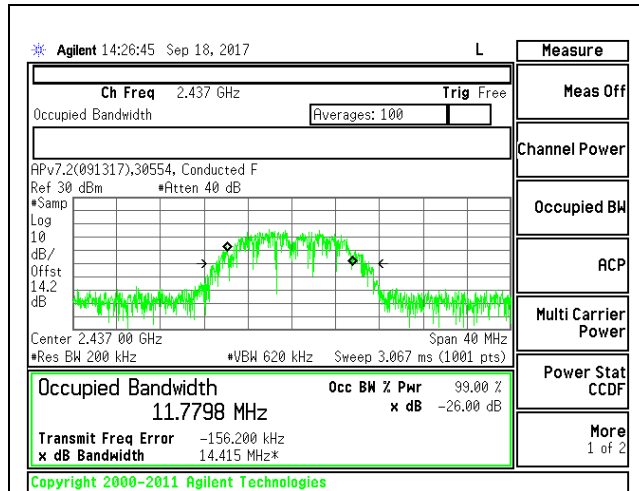


LOW CHANNEL 5 WF3

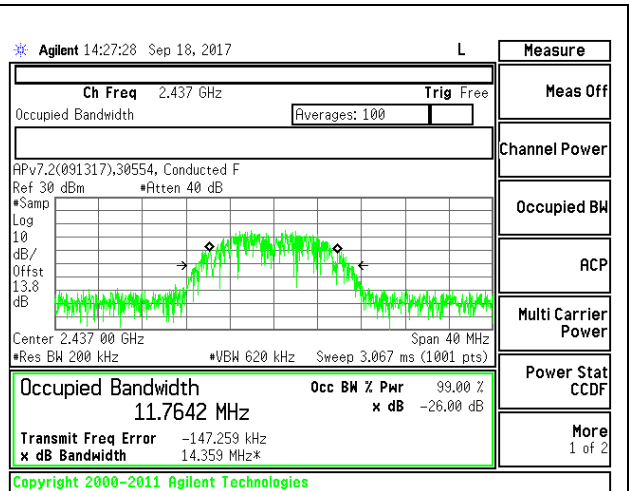


LOW CHANNEL 5 WF2

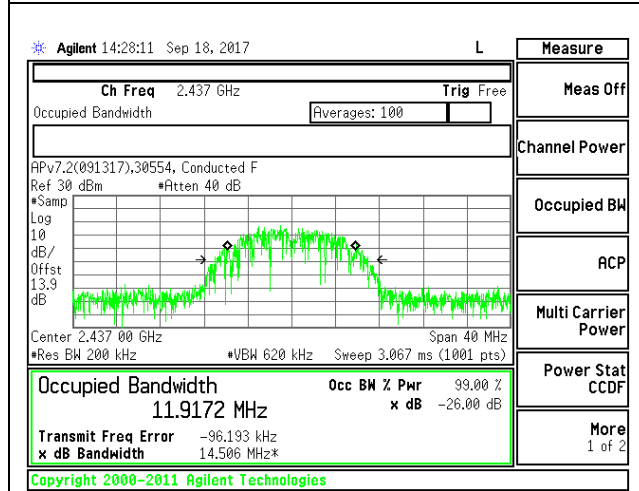
MID CHANNEL 6



MID CHANNEL 6 WF4

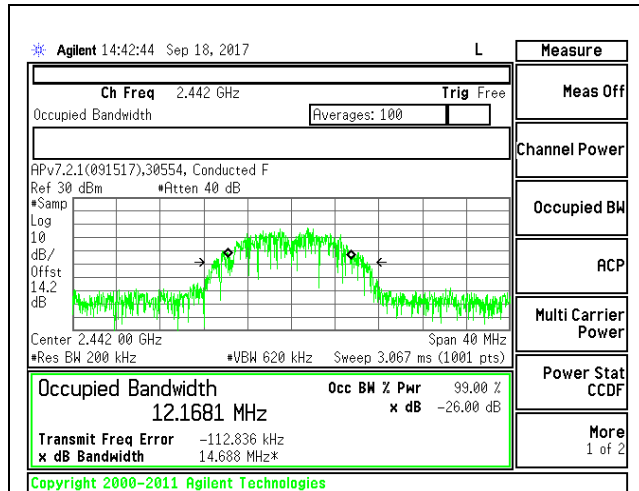


MID CHANNEL 6 WF3

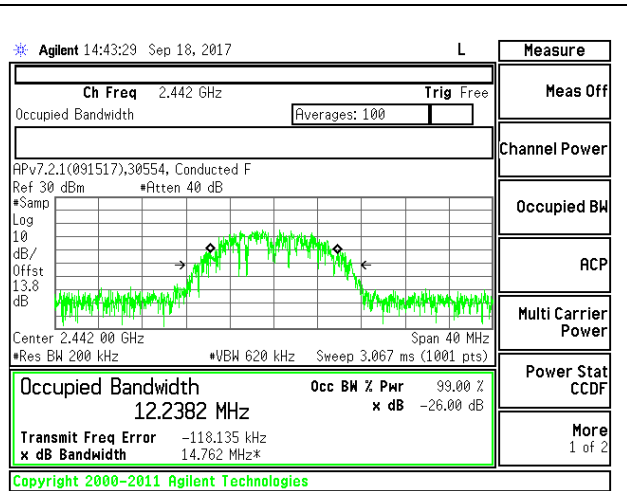


MID CHANNEL 6 WF2

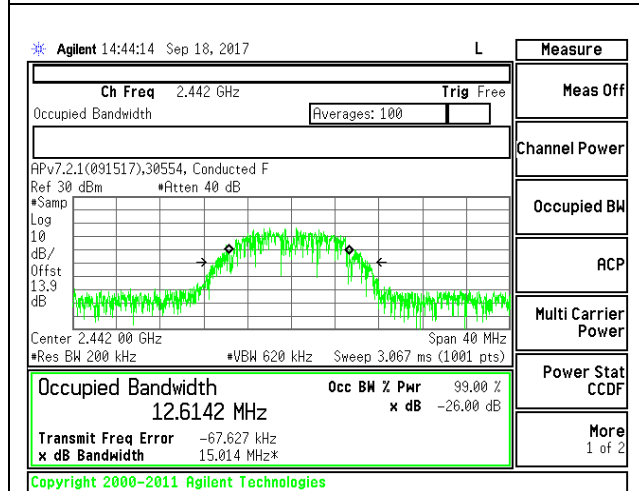
HIGH CHANNEL 7



HIGH CHANNEL 7 WF4

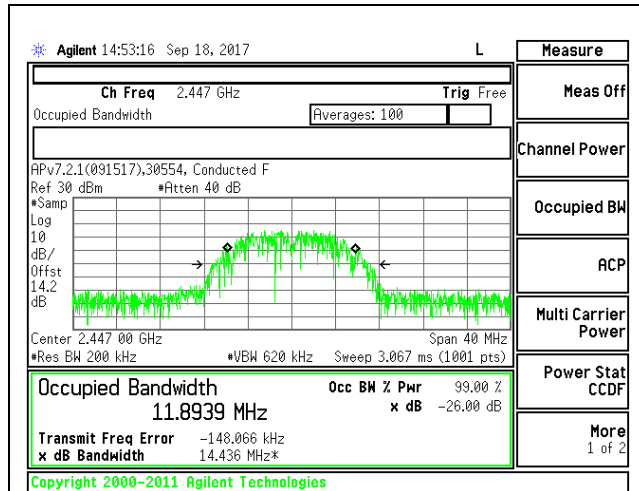


HIGH CHANNEL 7 WF3

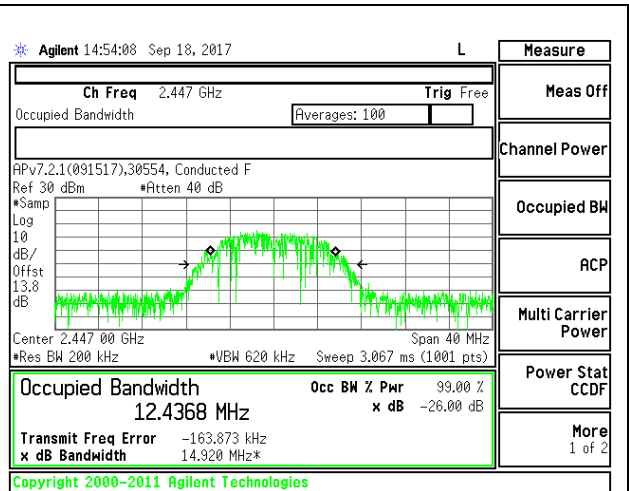


HIGH CHANNEL 7 WF2

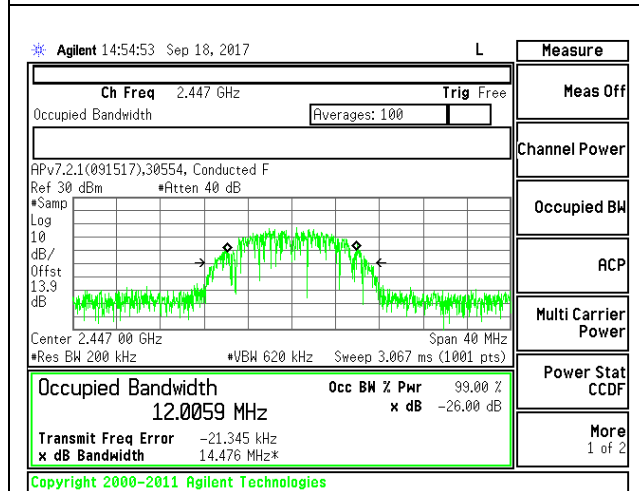
HIGH CHANNEL 8



HIGH CHANNEL 8 WF4

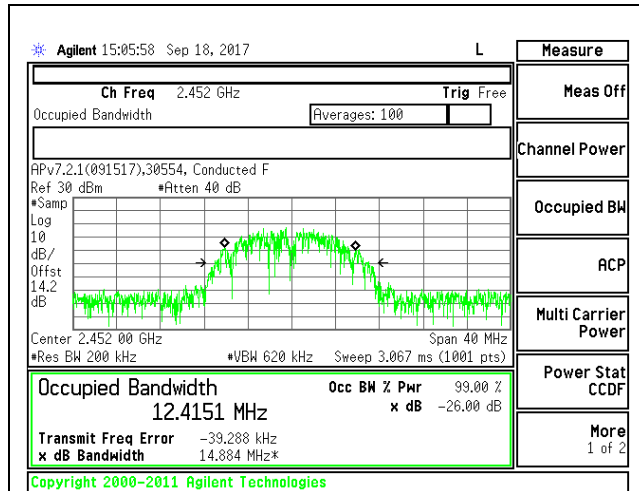


HIGH CHANNEL 8 WF3

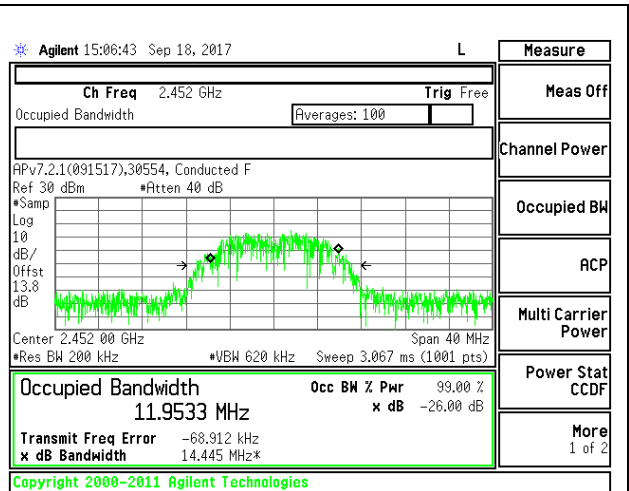


HIGH CHANNEL 8 WF2

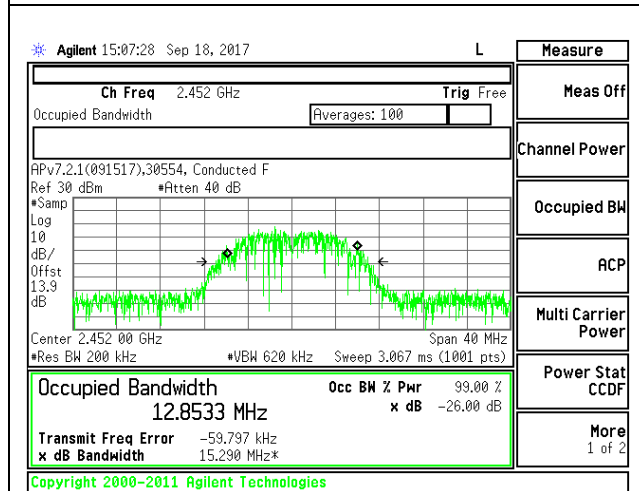
HIGH CHANNEL 9



HIGH CHANNEL 9 WF4

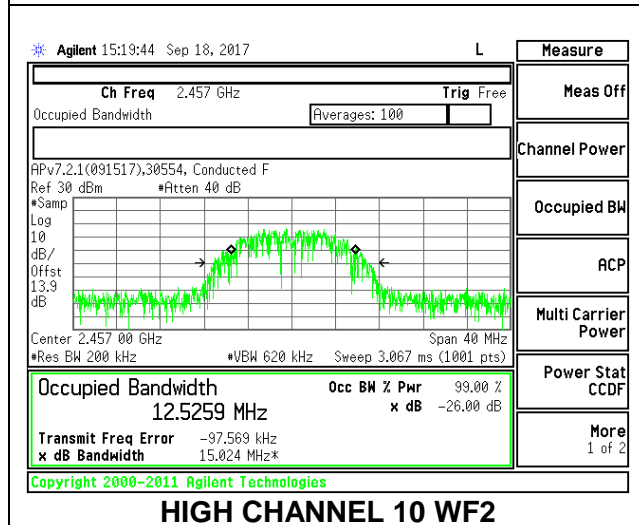
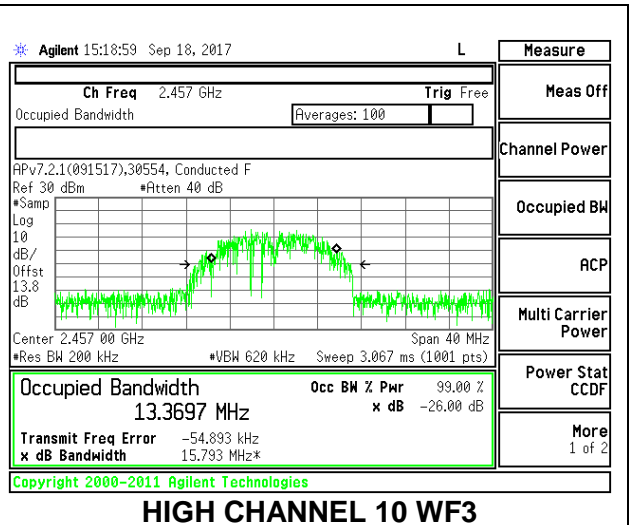
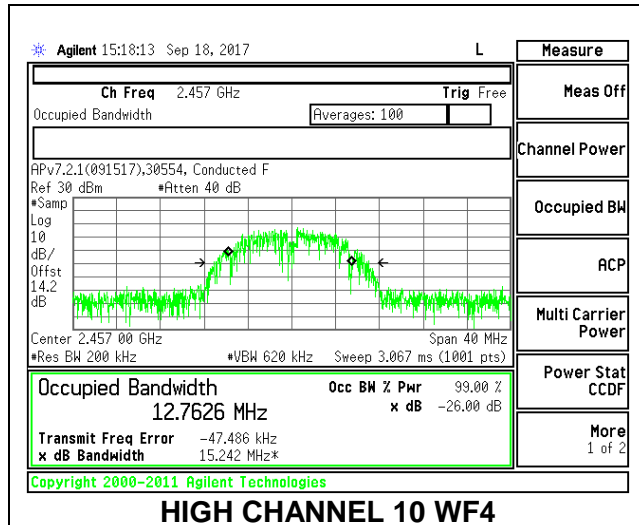


HIGH CHANNEL 9 WF3



HIGH CHANNEL 9 WF2

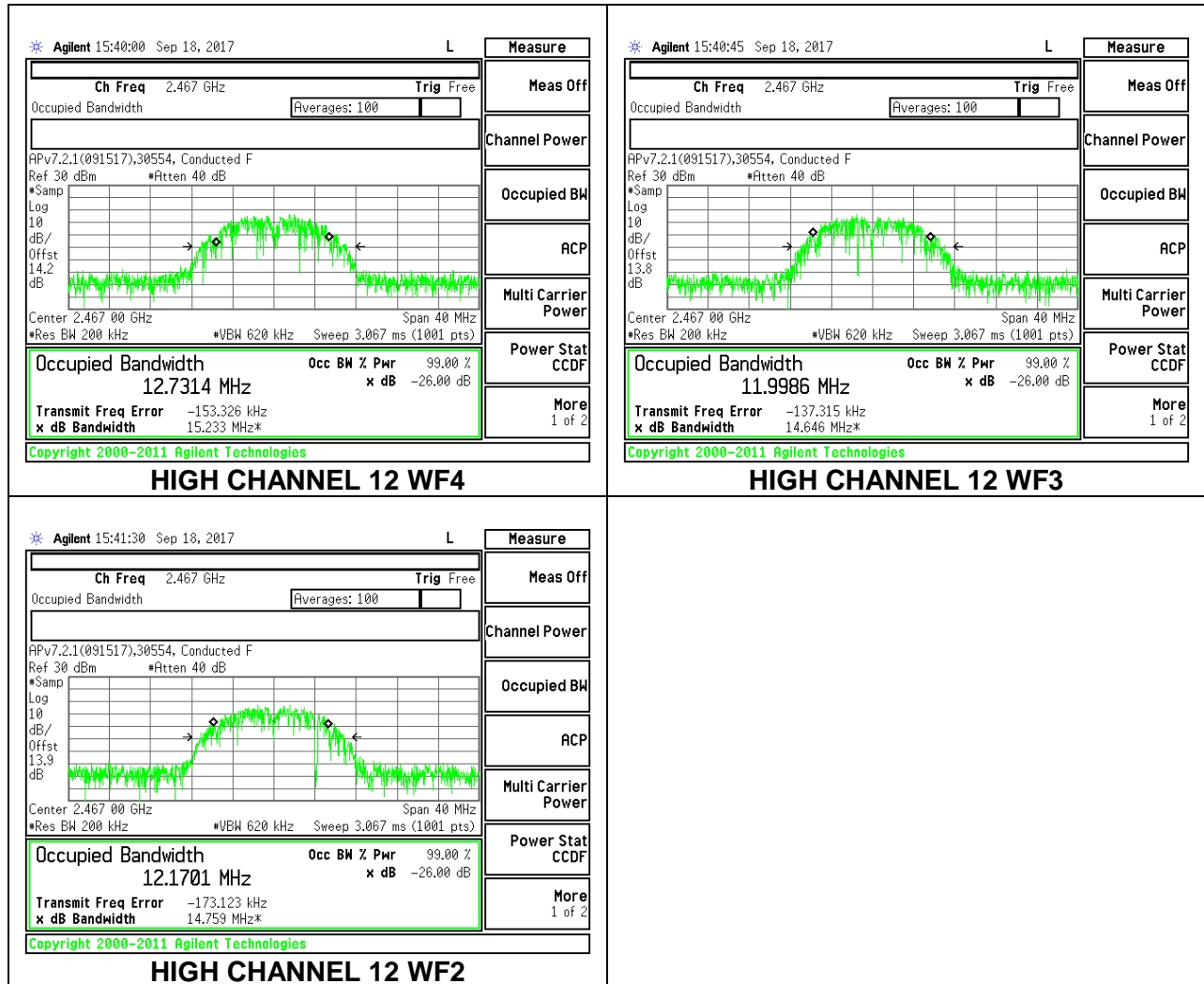
HIGH CHANNEL 10



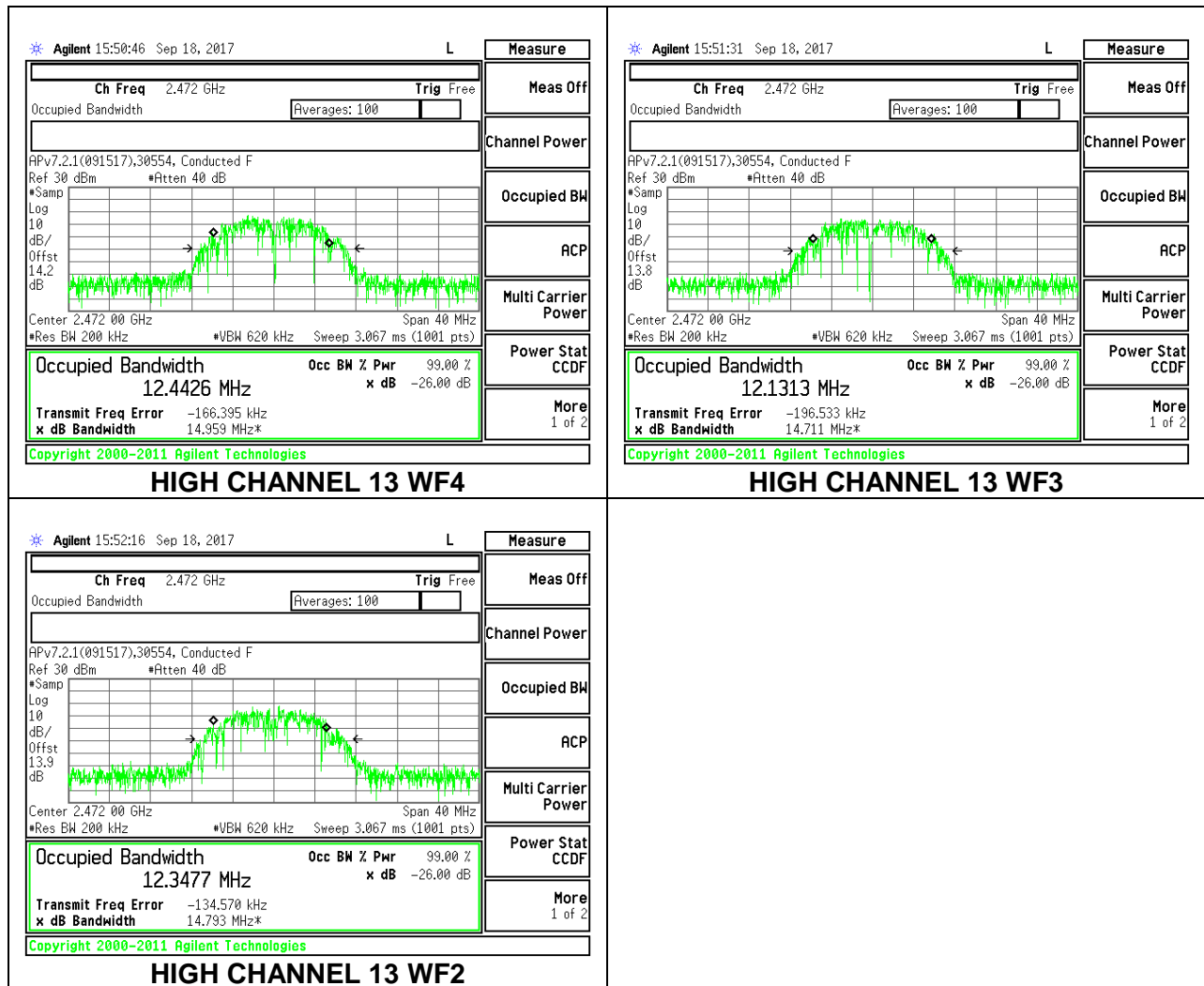
HIGH CHANNEL 11

<p>Agilent 15:29:38 Sep 18, 2017 L</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Ch Freq 2.462 GHz</td> <td style="text-align: center;">Trig Free</td> </tr> <tr> <td colspan="2">Occupied Bandwidth</td> </tr> <tr> <td colspan="2" style="text-align: center;">Averages: 100</td> </tr> </table> <p>HPv7.2.1(091517),30554, Conducted F Ref 30 dBm #Atten 40 dB</p> <p>Center 2.462 00 GHz Span 40 MHz #Res BW 200 kHz #VBW 620 kHz Sweep 3.067 ms (1001 pts)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Occupied Bandwidth</td> <td style="text-align: center;">Occ BW % Pwr</td> </tr> <tr> <td style="text-align: center;">12.3700 MHz</td> <td style="text-align: center;">99.00 %</td> </tr> <tr> <td style="text-align: center;">Transmit Freq Error</td> <td style="text-align: center;">x dB</td> </tr> <tr> <td style="text-align: center;">-100.168 kHz</td> <td style="text-align: center;">-26.00 dB</td> </tr> <tr> <td style="text-align: center;">x dB Bandwidth</td> <td style="text-align: center;">14.369 MHz*</td> </tr> </table> <p style="font-size: small;">Copyright 2000-2011 Agilent Technologies</p> <p style="text-align: center; font-weight: bold;">HIGH CHANNEL 11 WF4</p>	Ch Freq 2.462 GHz	Trig Free	Occupied Bandwidth		Averages: 100		Occupied Bandwidth	Occ BW % Pwr	12.3700 MHz	99.00 %	Transmit Freq Error	x dB	-100.168 kHz	-26.00 dB	x dB Bandwidth	14.369 MHz*	<p>Agilent 15:30:23 Sep 18, 2017 L</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Ch Freq 2.462 GHz</td> <td style="text-align: center;">Trig Free</td> </tr> <tr> <td colspan="2">Occupied Bandwidth</td> </tr> <tr> <td colspan="2" style="text-align: center;">Averages: 100</td> </tr> </table> <p>HPv7.2.1(091517),30554, Conducted F Ref 30 dBm #Atten 40 dB</p> <p>Center 2.462 00 GHz Span 40 MHz #Res BW 200 kHz #VBW 620 kHz Sweep 3.067 ms (1001 pts)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Occupied Bandwidth</td> <td style="text-align: center;">Occ BW % Pwr</td> </tr> <tr> <td style="text-align: center;">11.9527 MHz</td> <td style="text-align: center;">99.00 %</td> </tr> <tr> <td style="text-align: center;">Transmit Freq Error</td> <td style="text-align: center;">x dB</td> </tr> <tr> <td style="text-align: center;">-55.266 kHz</td> <td style="text-align: center;">-26.00 dB</td> </tr> <tr> <td style="text-align: center;">x dB Bandwidth</td> <td style="text-align: center;">14.240 MHz*</td> </tr> </table> <p style="font-size: small;">Copyright 2000-2011 Agilent Technologies</p> <p style="text-align: center; font-weight: bold;">HIGH CHANNEL 11 WF3</p>	Ch Freq 2.462 GHz	Trig Free	Occupied Bandwidth		Averages: 100		Occupied Bandwidth	Occ BW % Pwr	11.9527 MHz	99.00 %	Transmit Freq Error	x dB	-55.266 kHz	-26.00 dB	x dB Bandwidth	14.240 MHz*
Ch Freq 2.462 GHz	Trig Free																																
Occupied Bandwidth																																	
Averages: 100																																	
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Occupied Bandwidth	Occ BW % Pwr																																
11.9527 MHz	99.00 %																																
Transmit Freq Error	x dB																																
-55.266 kHz	-26.00 dB																																
x dB Bandwidth	14.240 MHz*																																
<p>Agilent 17:48:45 Sep 28, 2017 L</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Ch Freq 2.462 GHz</td> <td style="text-align: center;">Trig Free</td> </tr> <tr> <td colspan="2">Occupied Bandwidth</td> </tr> <tr> <td colspan="2" style="text-align: center;">Averages: 100</td> </tr> </table> <p>HPv7.2.2(091917),36648, Conducted F Ref 30 dBm #Atten 40 dB</p> <p>Center 2.462 00 GHz Span 40 MHz #Res BW 200 kHz #VBW 620 kHz Sweep 3.067 ms (1001 pts)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Occupied Bandwidth</td> <td style="text-align: center;">Occ BW % Pwr</td> </tr> <tr> <td style="text-align: center;">11.8670 MHz</td> <td style="text-align: center;">99.00 %</td> </tr> <tr> <td style="text-align: center;">Transmit Freq Error</td> <td style="text-align: center;">x dB</td> </tr> <tr> <td style="text-align: center;">-181.033 kHz</td> <td style="text-align: center;">-26.00 dB</td> </tr> <tr> <td style="text-align: center;">x dB Bandwidth</td> <td style="text-align: center;">14.497 MHz*</td> </tr> </table> <p style="font-size: small;">Copyright 2000-2011 Agilent Technologies</p> <p style="text-align: center; font-weight: bold;">HIGH CHANNEL 11 WF2</p>	Ch Freq 2.462 GHz	Trig Free	Occupied Bandwidth		Averages: 100		Occupied Bandwidth	Occ BW % Pwr	11.8670 MHz	99.00 %	Transmit Freq Error	x dB	-181.033 kHz	-26.00 dB	x dB Bandwidth	14.497 MHz*																	
Ch Freq 2.462 GHz	Trig Free																																
Occupied Bandwidth																																	
Averages: 100																																	
Occupied Bandwidth	Occ BW % Pwr																																
11.8670 MHz	99.00 %																																
Transmit Freq Error	x dB																																
-181.033 kHz	-26.00 dB																																
x dB Bandwidth	14.497 MHz*																																

HIGH CHANNEL 12



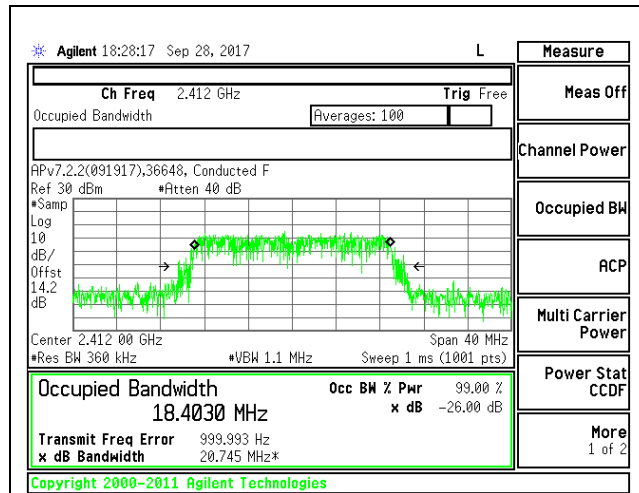
HIGH CHANNEL 13



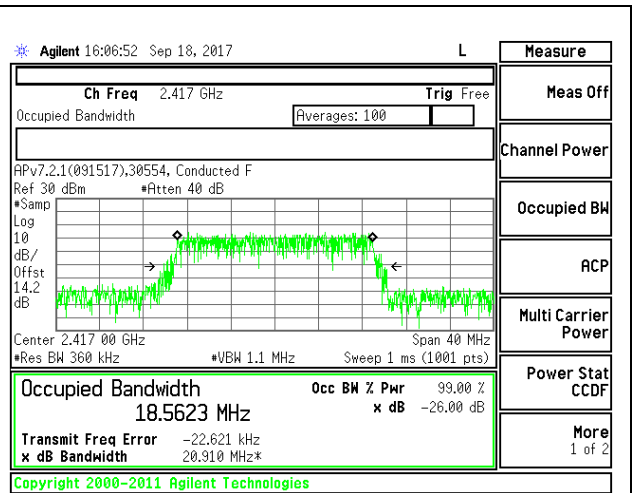
4.2.2. 802.11n HT20 MODE

1TX Antenna WF4

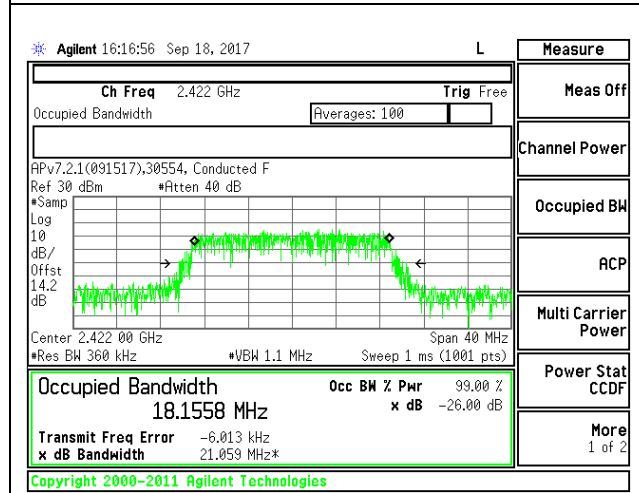
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	18.4030
Low 2	2417	18.5623
Low 3	2422	18.1558
Low 4	2427	18.2948
Low 5	2432	18.4158
Mid 6	2437	18.6811
High 7	2442	17.8996
High 8	2447	18.1715
High 9	2452	17.8356
High 10	2457	18.1679
High 11	2462	18.3267
High 12	2467	17.7183
High 13	2472	18.1896



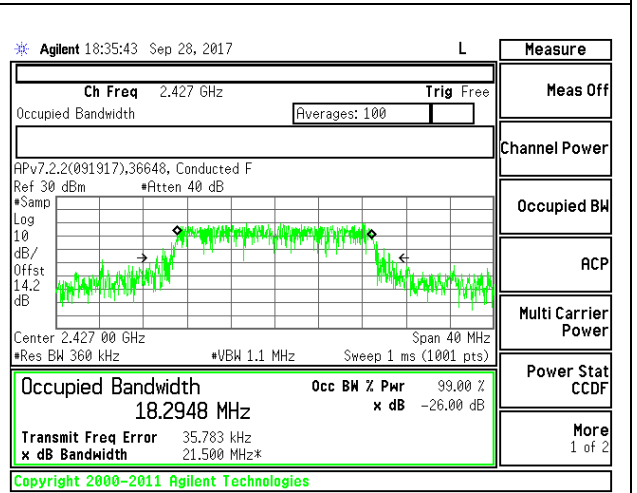
LOW CHANNEL 1



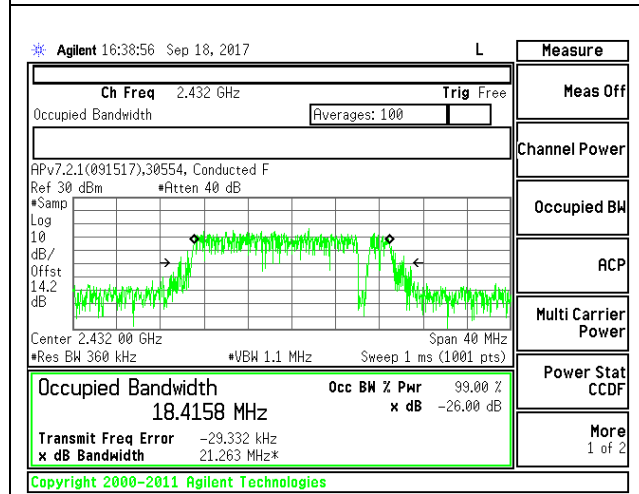
LOW CHANNEL 2



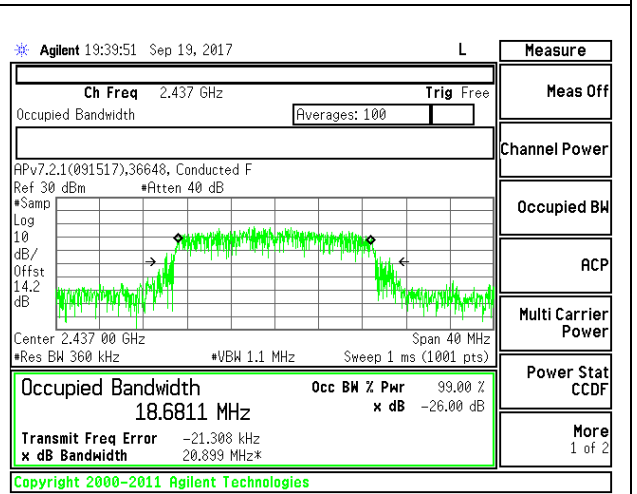
LOW CHANNEL 3



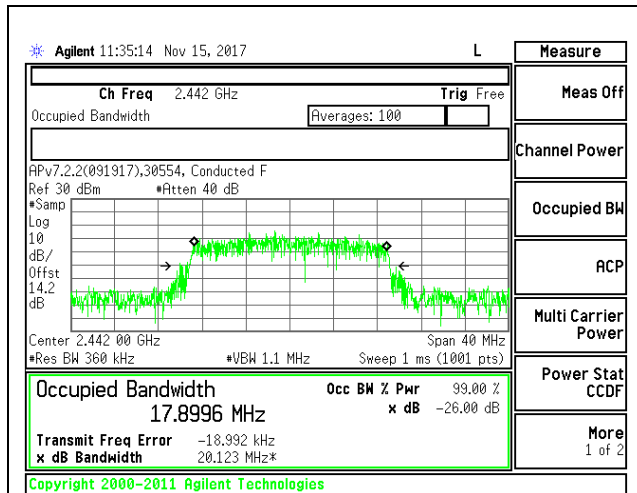
LOW CHANNEL 4



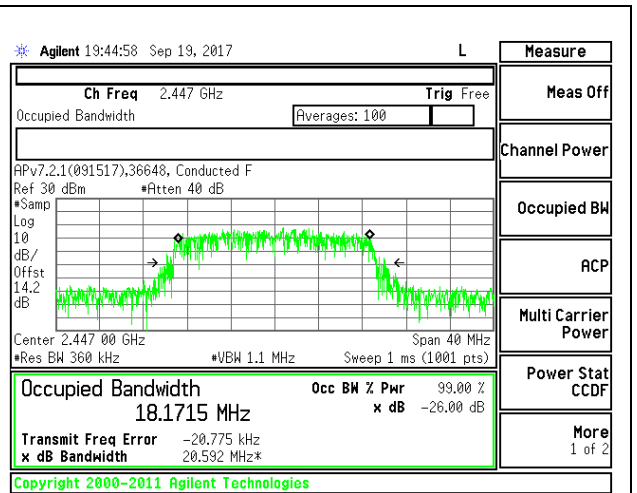
LOW CHANNEL 5



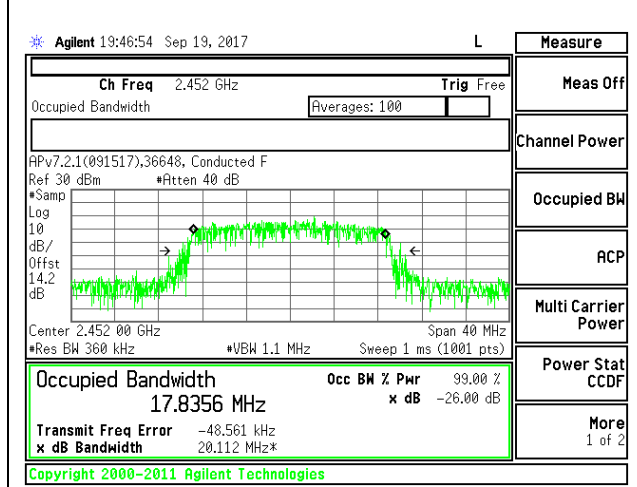
MID CHANNEL 6



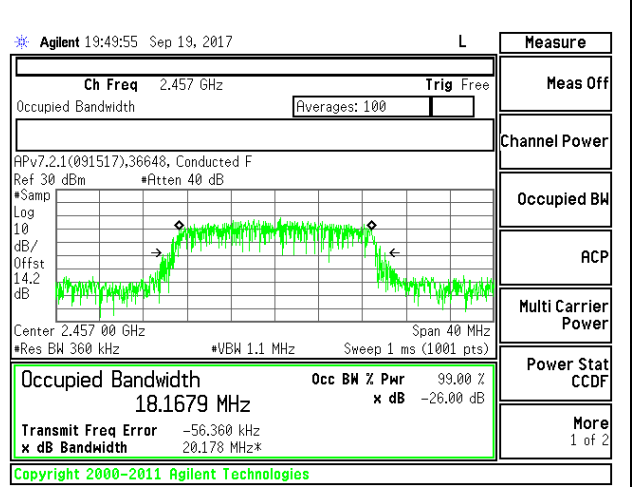
HIGH CHANNEL 7



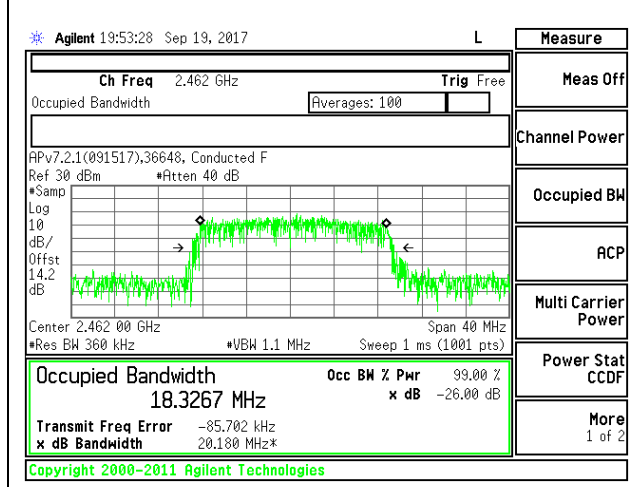
HIGH CHANNEL 8



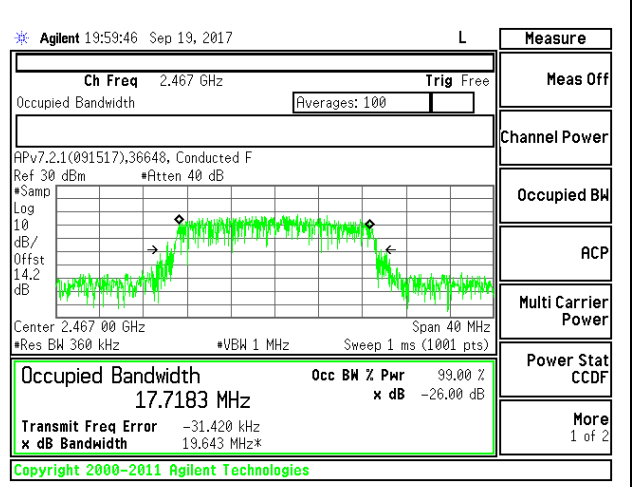
HIGH CHANNEL 9



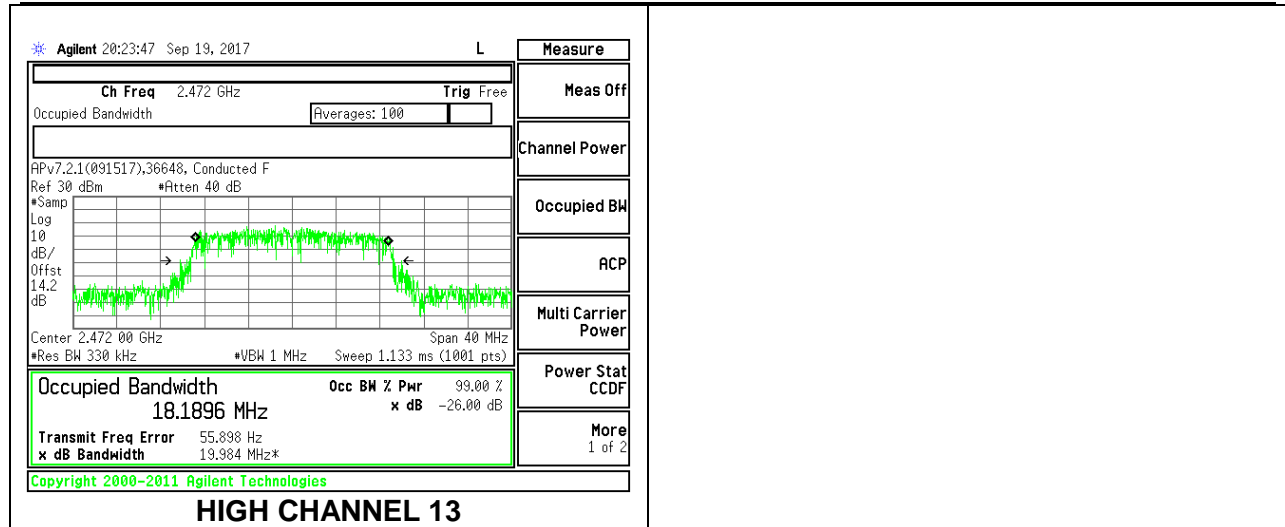
HIGH CHANNEL 10



HIGH CHANNEL 11

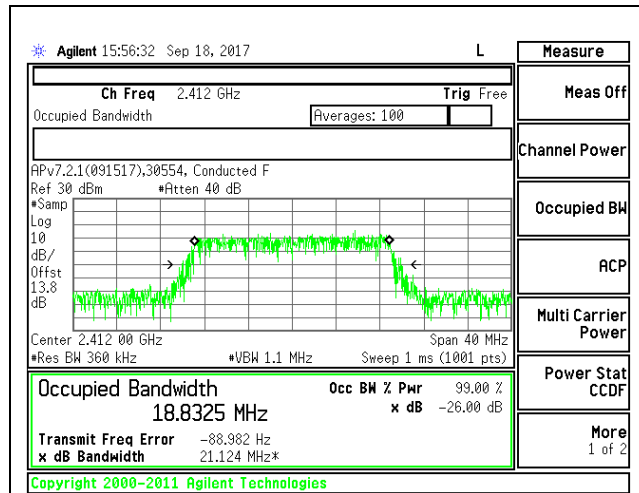


HIGH CHANNEL 12

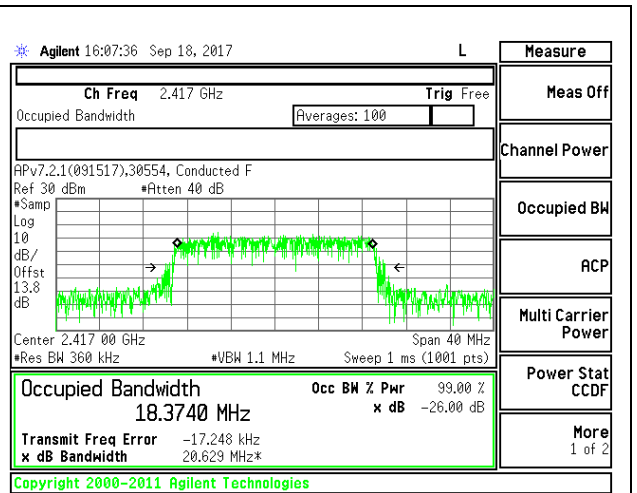


1TX Antenna WF3

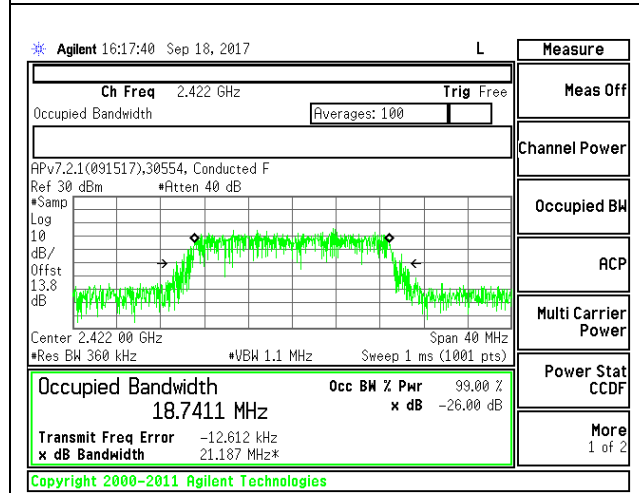
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	18.8325
Low 2	2417	18.3740
Low 3	2422	18.7411
Low 4	2427	18.3217
Low 5	2432	18.8145
Mid 6	2437	18.3013
High 7	2442	17.8544
High 8	2447	17.8708
High 9	2452	18.0667
High 10	2457	17.8880
High 11	2462	17.7468
High 12	2467	18.1222
High 13	2472	18.0562



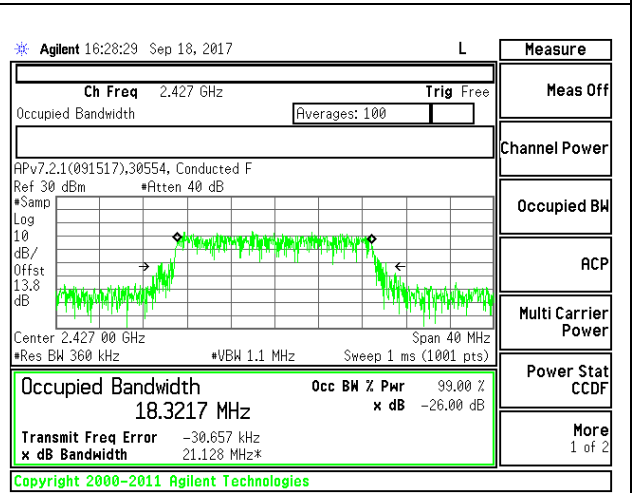
LOW CHANNEL 1



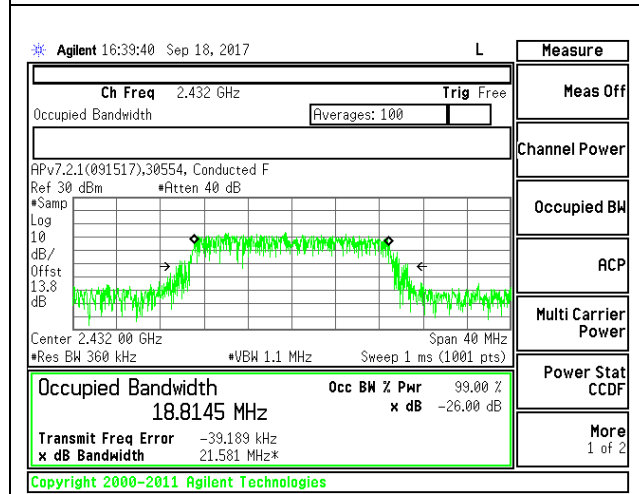
LOW CHANNEL 2



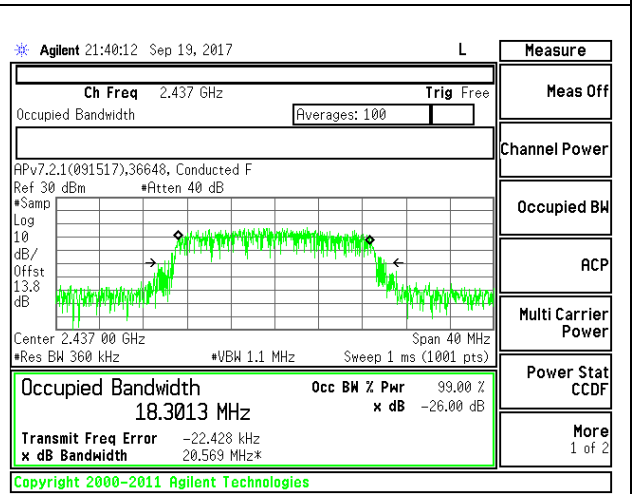
LOW CHANNEL 3



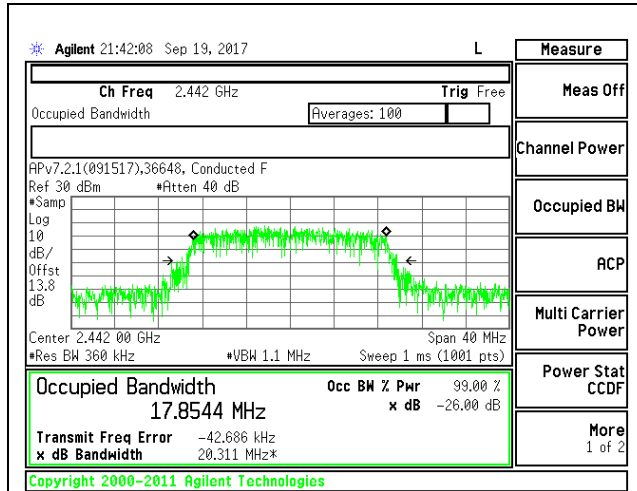
LOW CHANNEL 4



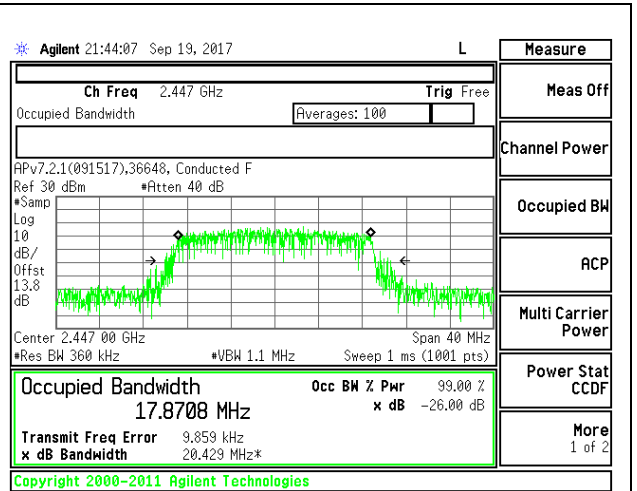
LOW CHANNEL 5



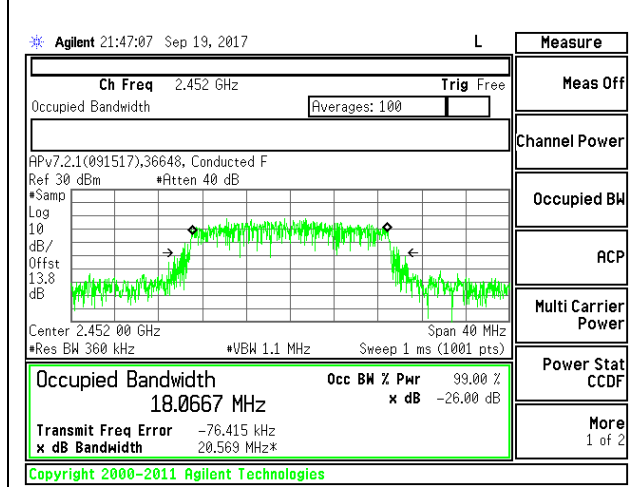
MID CHANNEL 6



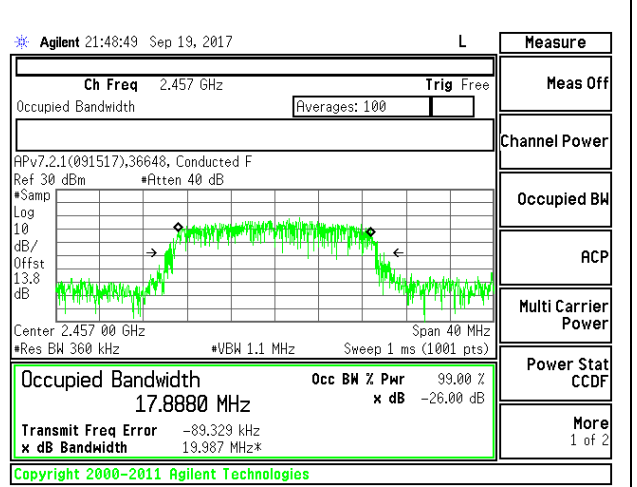
HIGH CHANNEL 7



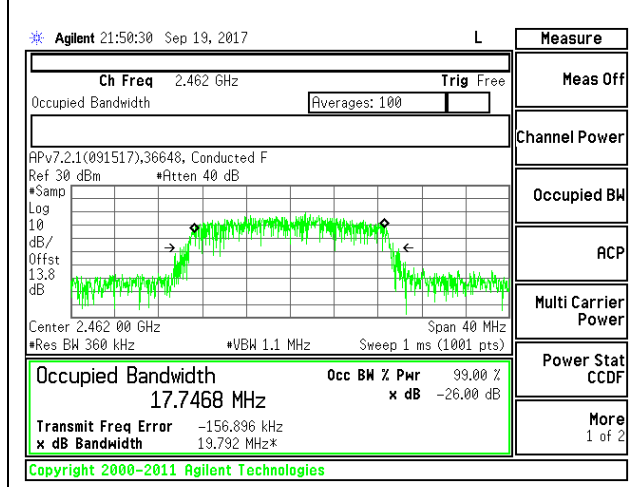
HIGH CHANNEL 8



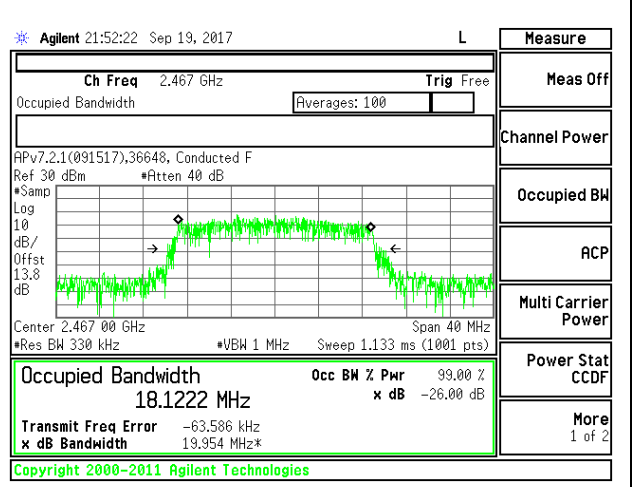
HIGH CHANNEL 9



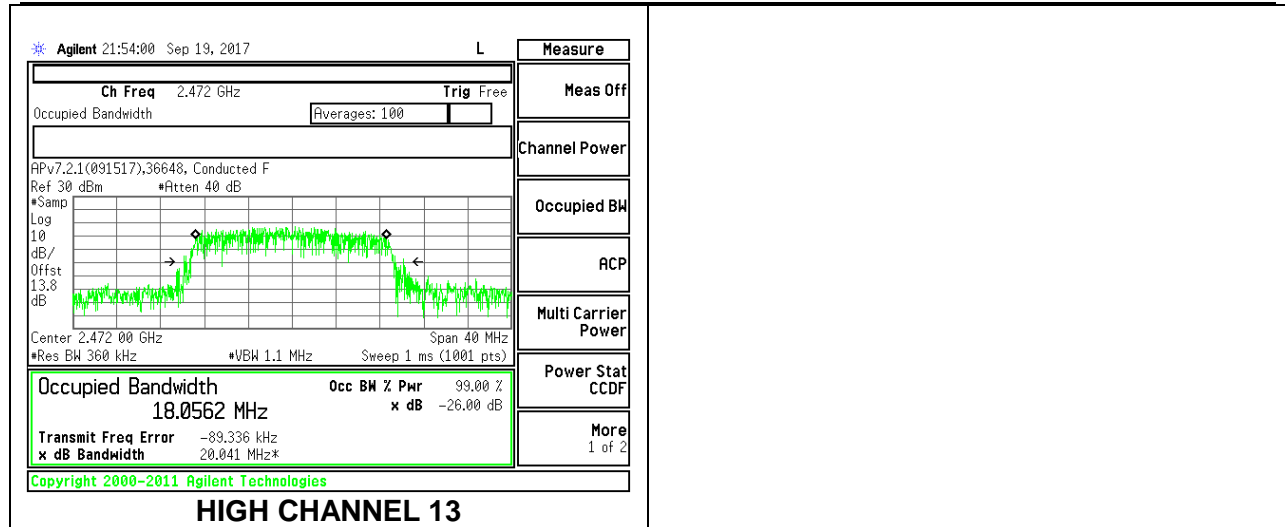
HIGH CHANNEL 10



HIGH CHANNEL 11

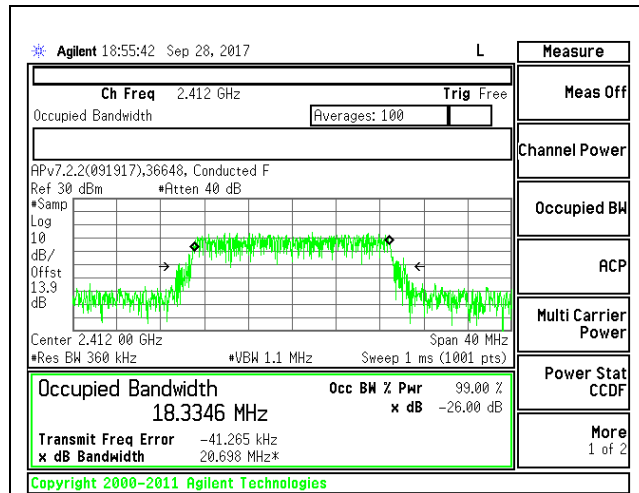


HIGH CHANNEL 12

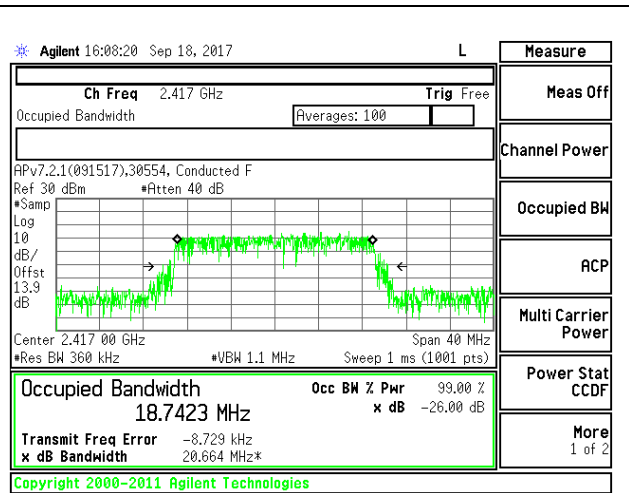


1TX Antenna WF2

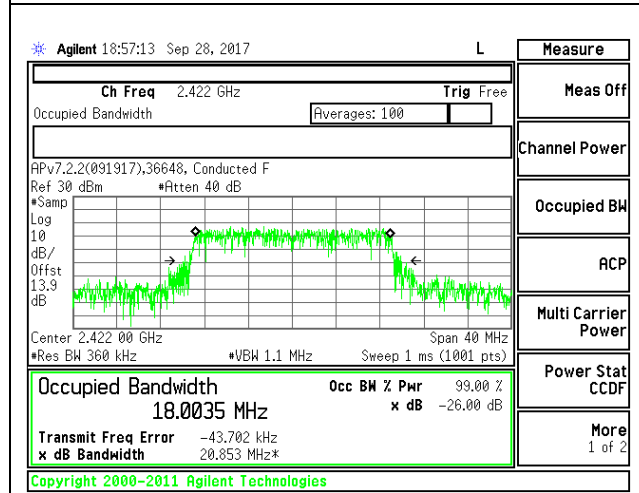
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	18.3346
Low 2	2417	18.7423
Low 3	2422	18.0035
Low 4	2427	18.8329
Low 5	2432	18.6112
Mid 6	2437	18.1058
High 7	2442	18.3890
High 8	2447	17.9614
High 9	2452	17.8903
High 10	2457	18.1495
High 11	2462	18.4322
High 12	2467	18.1193
High 13	2472	17.9504



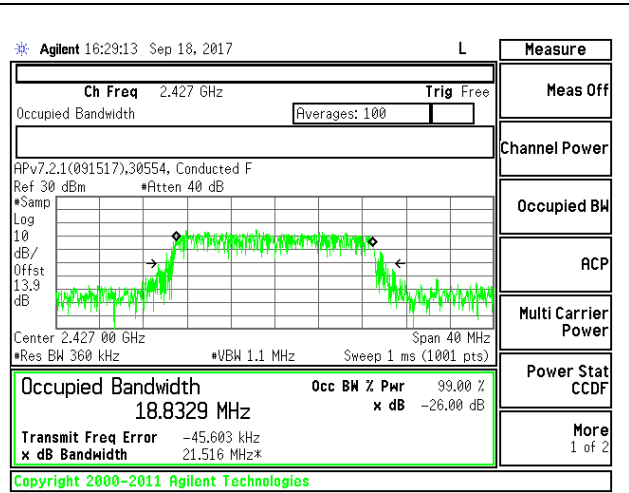
LOW CHANNEL 1



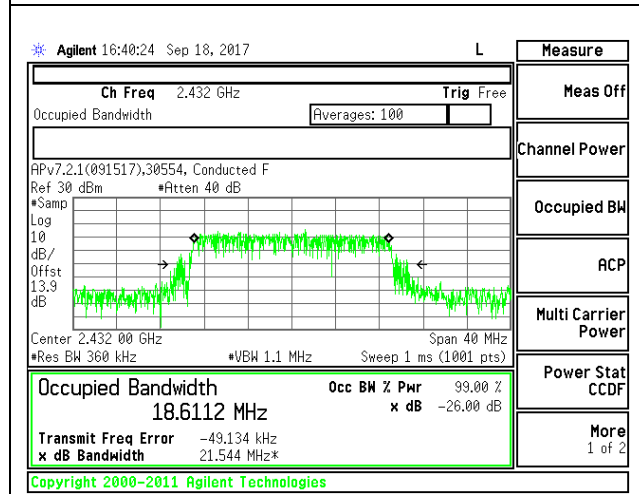
LOW CHANNEL 2



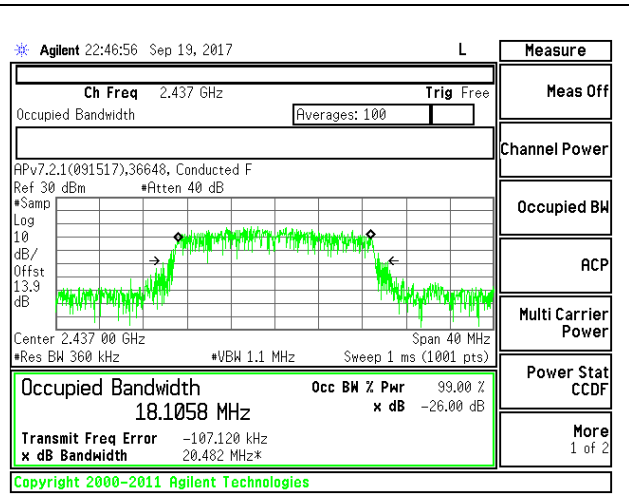
LOW CHANNEL 3



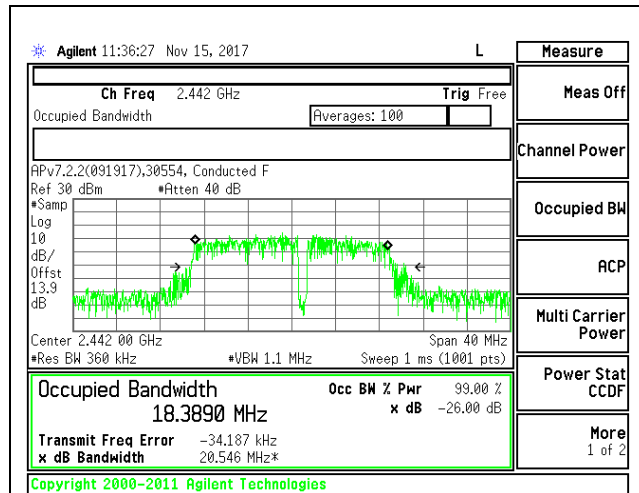
LOW CHANNEL 4



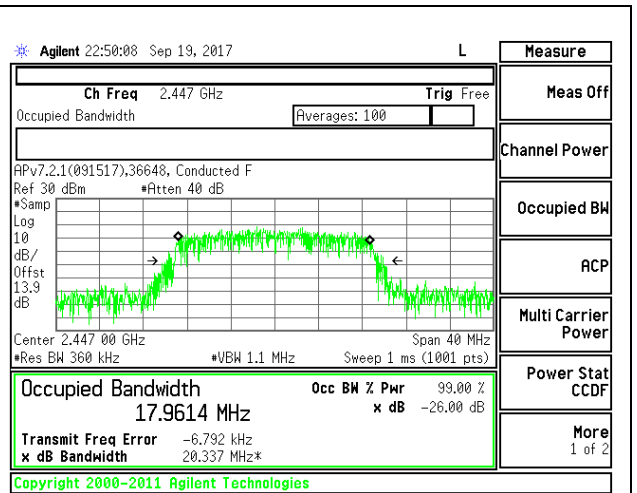
LOW CHANNEL 5



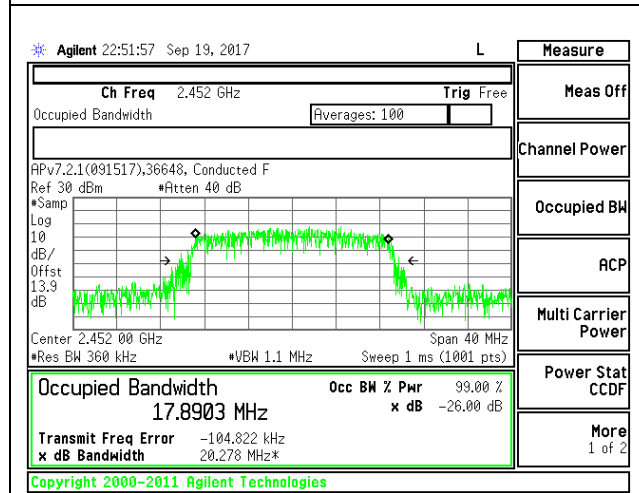
MID CHANNEL 6



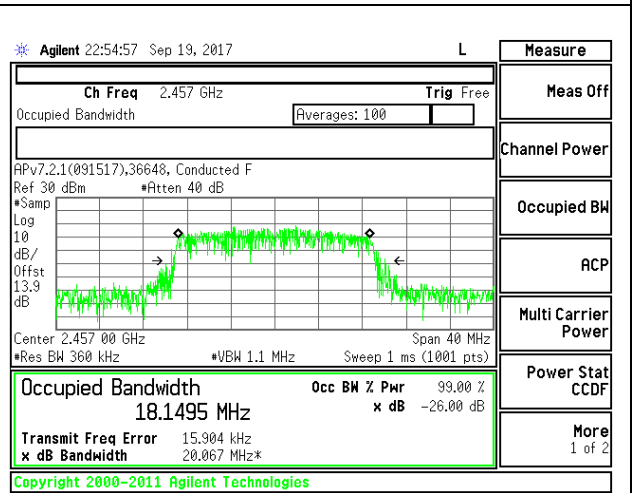
HIGH CHANNEL 7



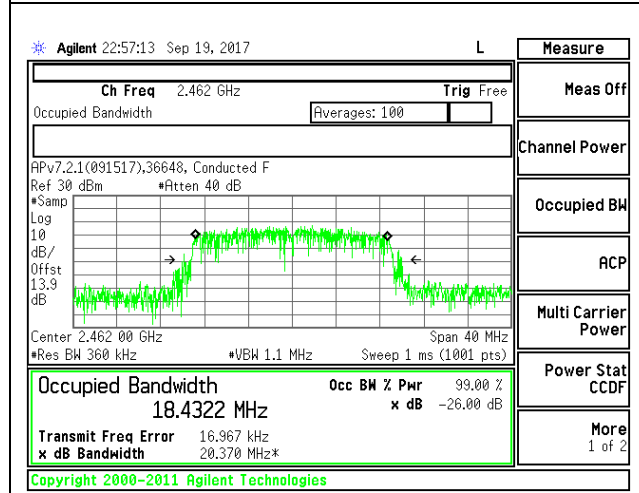
HIGH CHANNEL 8



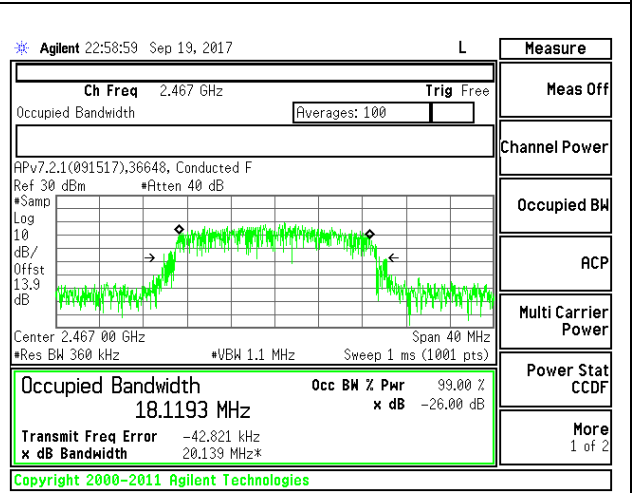
HIGH CHANNEL 9



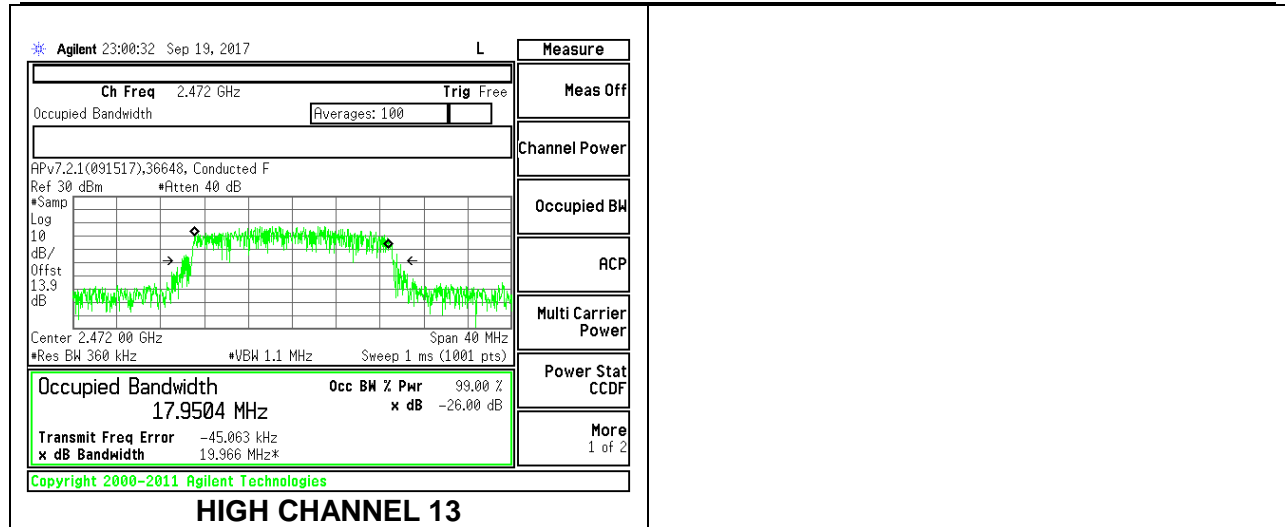
HIGH CHANNEL 10



HIGH CHANNEL 11



HIGH CHANNEL 12

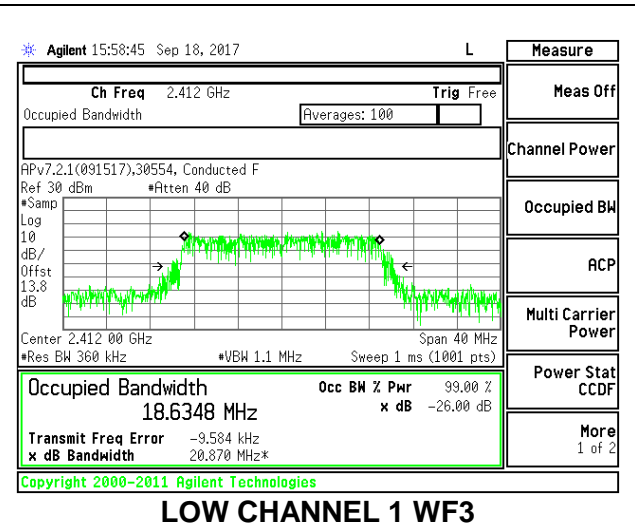
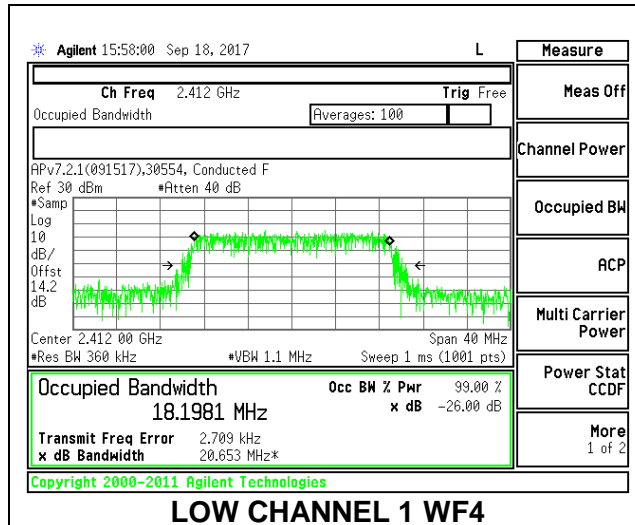


4.2.3. 802.11n HT20 CDD AND BF Mode

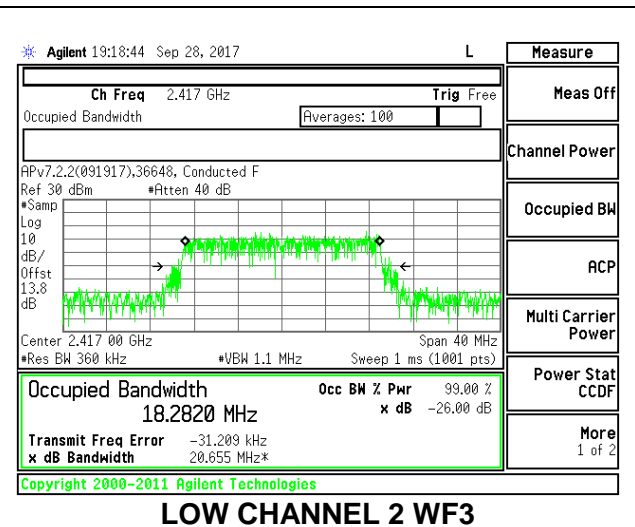
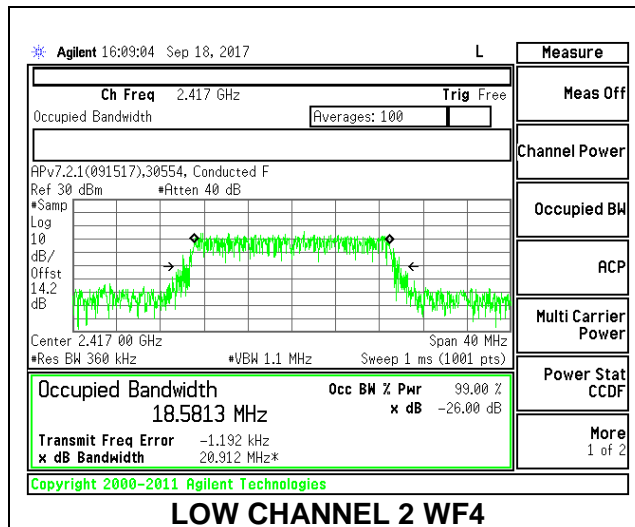
2TX Antenna WF4 + Antenna WF3 CDD mode

Channel	Frequency (MHz)	99% Bandwidth WF4 (MHz)	99% Bandwidth WF3 (MHz)
Low 1	2412	18.1981	18.6348
Low 2	2417	18.5813	18.2820
Low 3	2422	18.2303	18.7827
Low 4	2427	18.4716	18.6008
Mid 6	2437	18.1326	17.9820
High 8	2447	17.9816	18.2208
High 9	2452	18.6032	18.0730
High 10	2457	18.4080	18.1829
High 11	2462	17.9859	17.9692
High 12	2467	18.0416	18.2493
High 13	2472	18.3261	17.9579

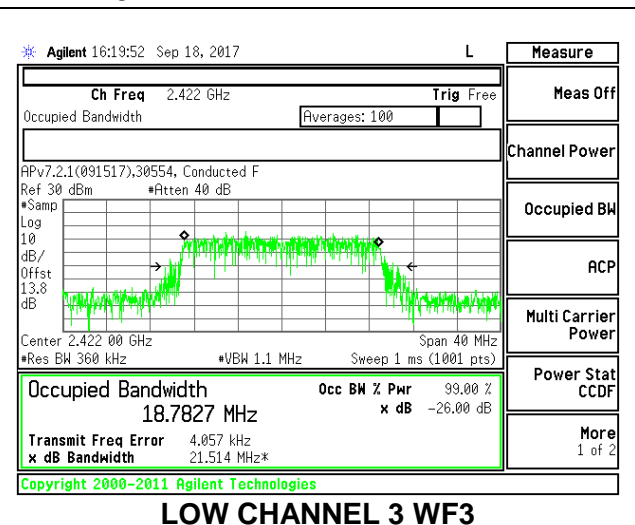
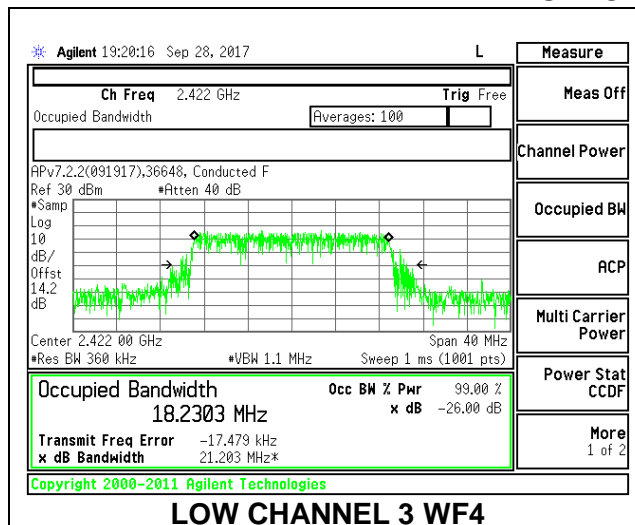
LOW CHANNEL 1



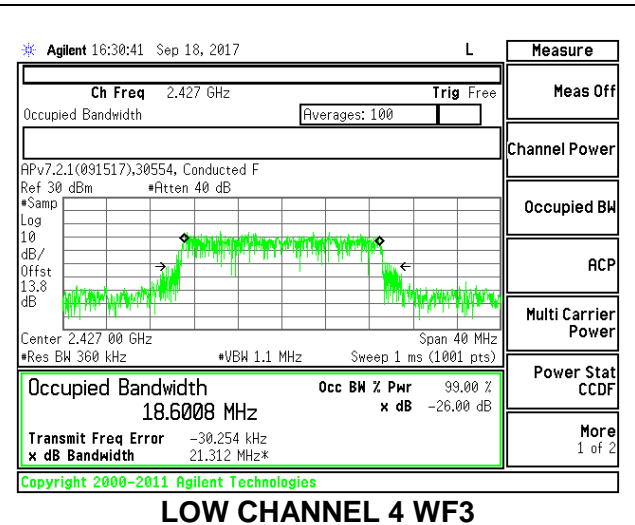
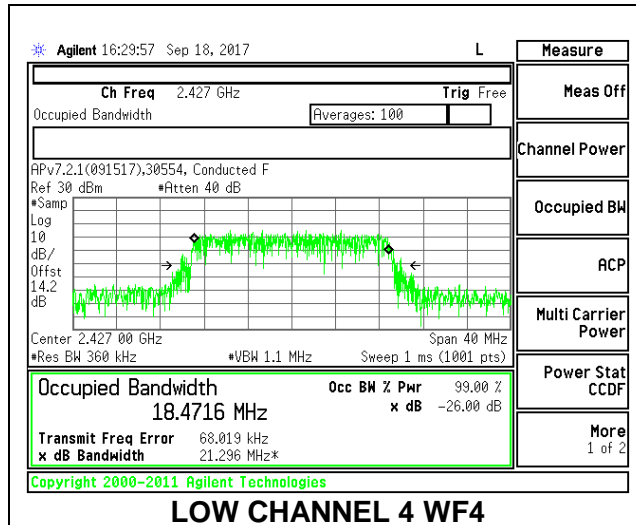
LOW CHANNEL 2



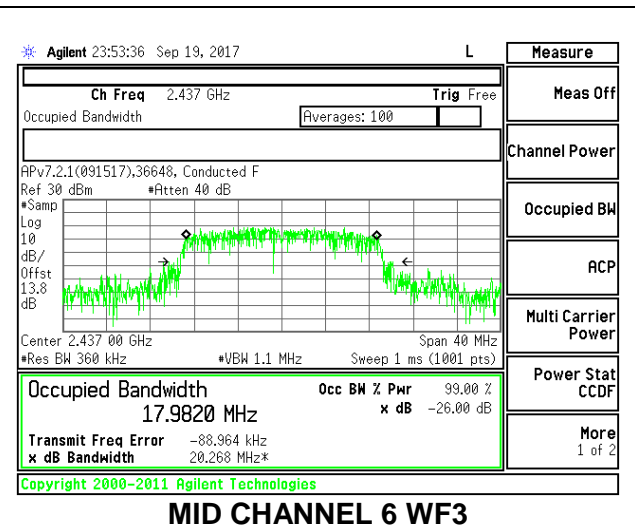
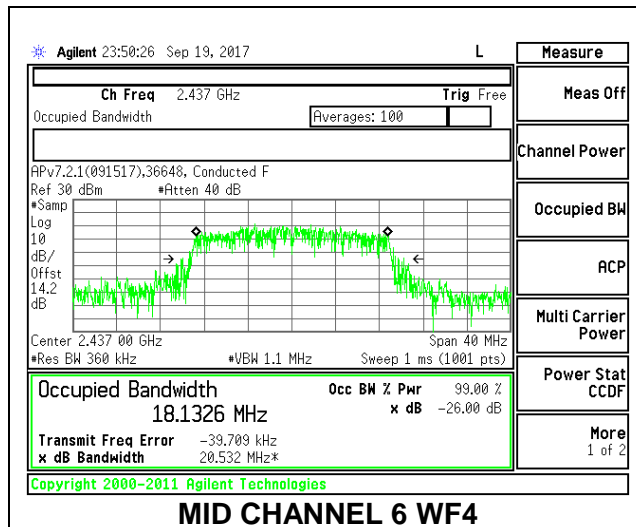
LOW CHANNEL 3



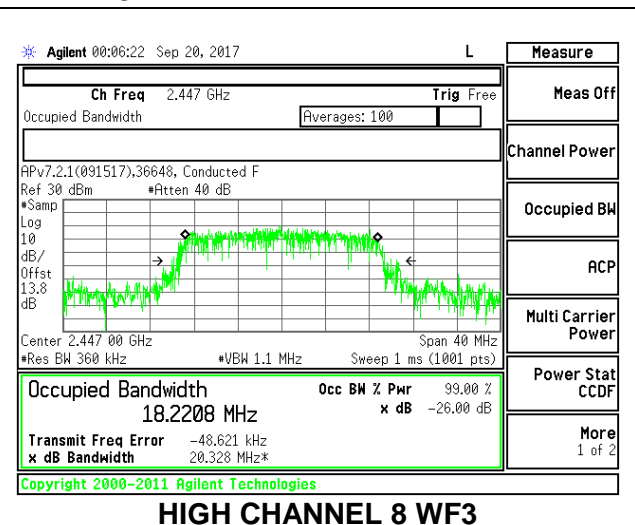
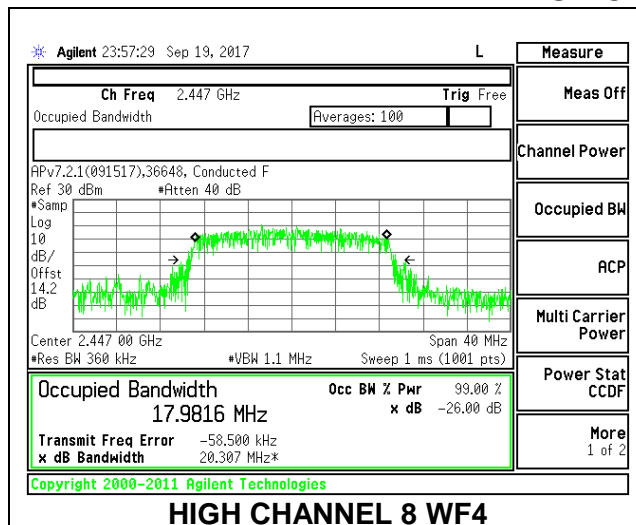
LOW CHANNEL 4



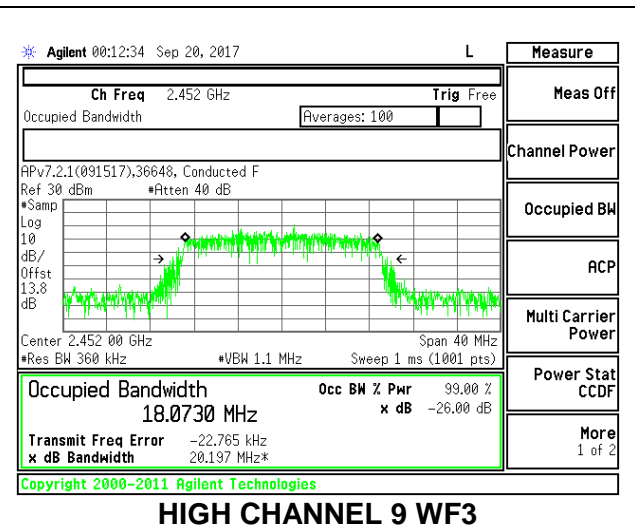
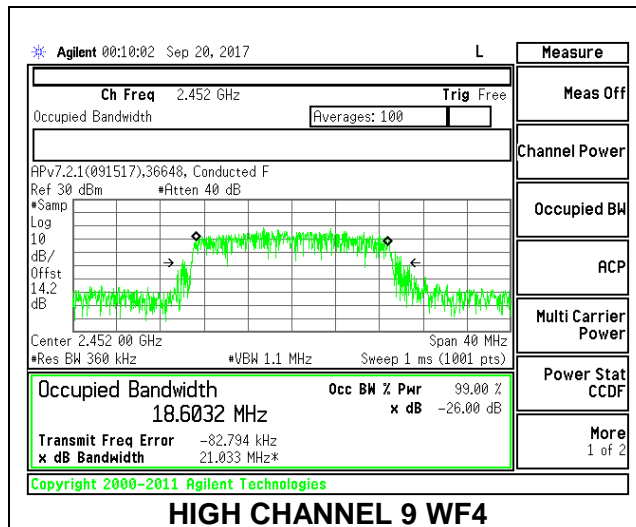
MID CHANNEL 6



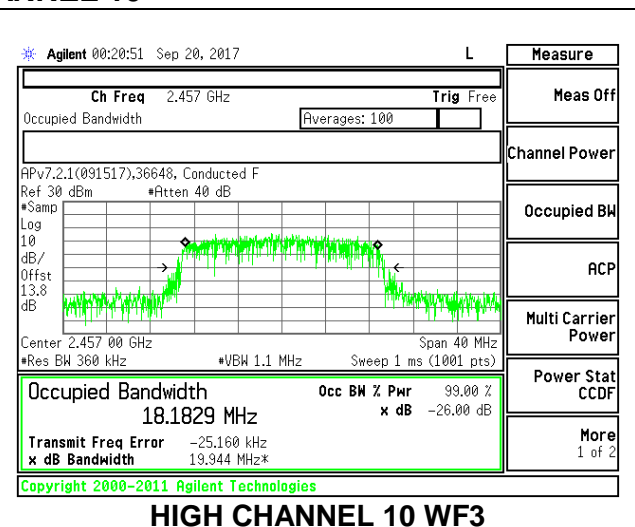
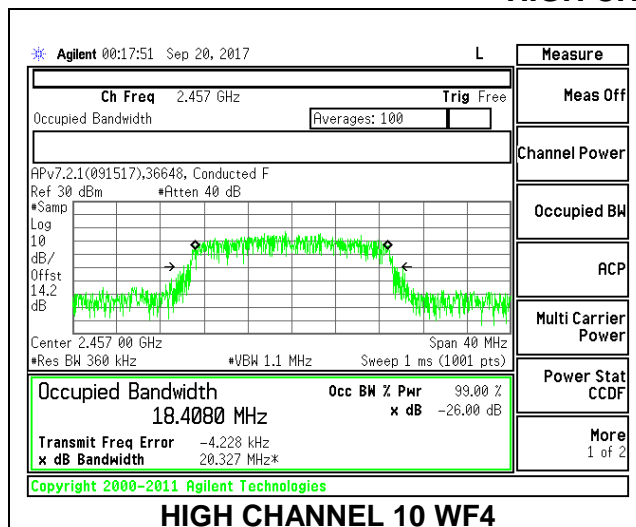
HIGH CHANNEL 8



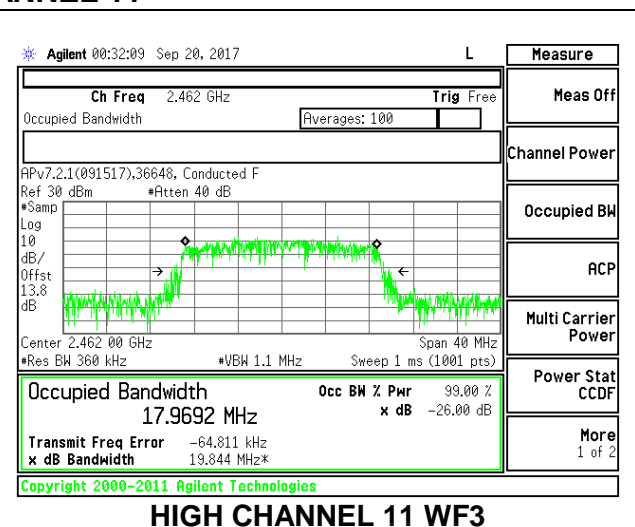
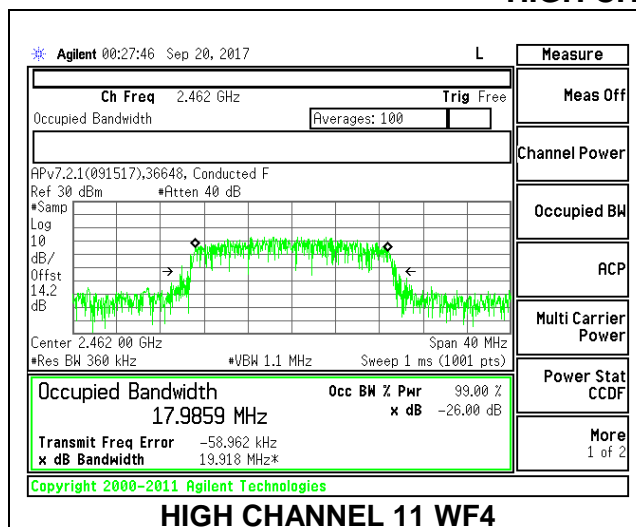
HIGH CHANNEL 9



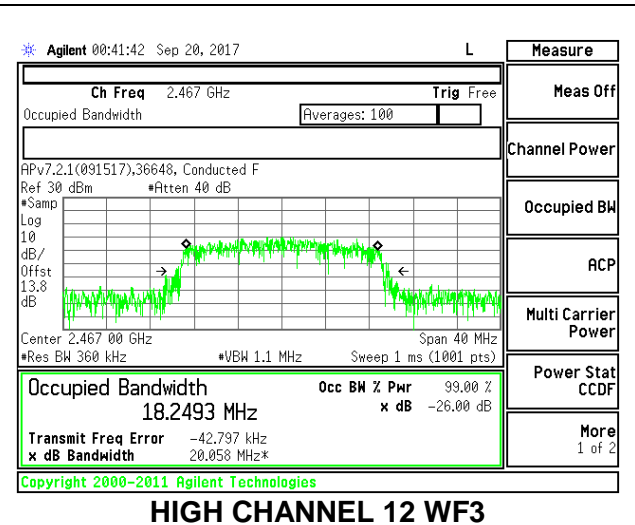
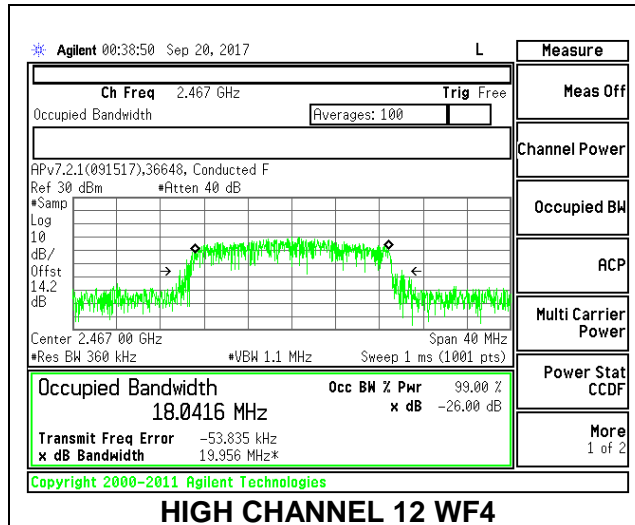
HIGH CHANNEL 10



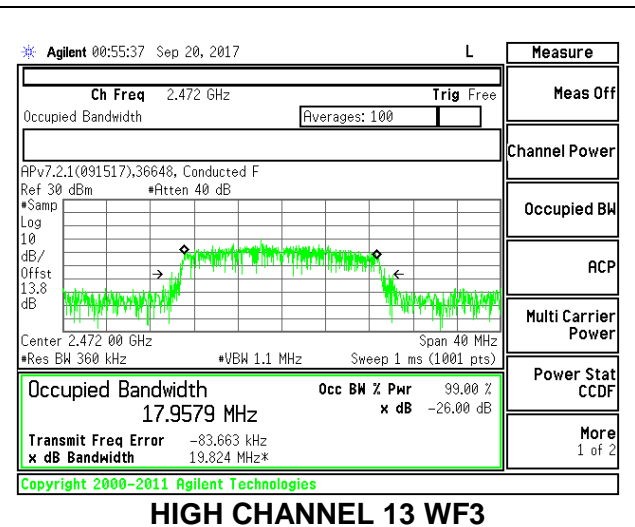
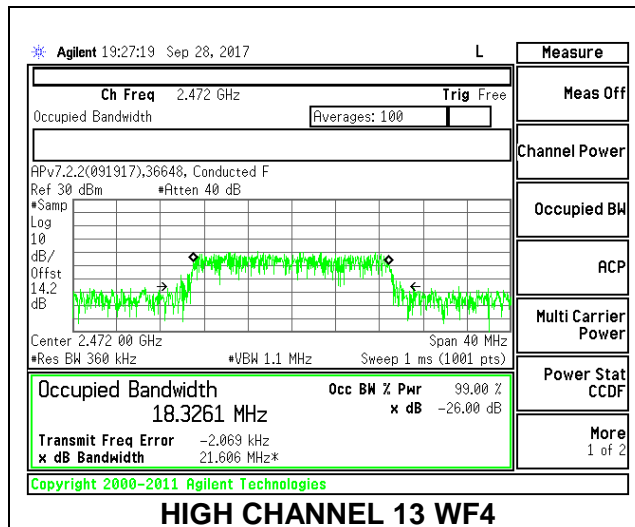
HIGH CHANNEL 11



HIGH CHANNEL 12



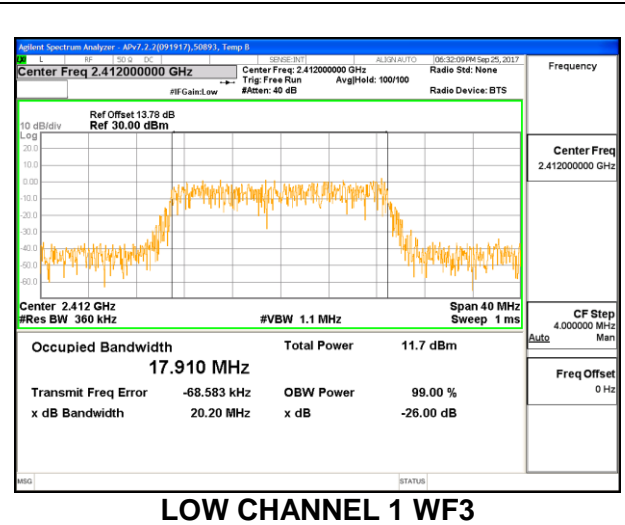
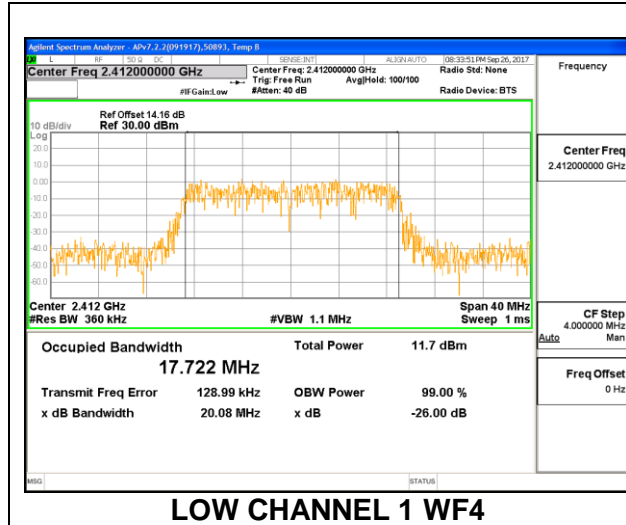
HIGH CHANNEL 13



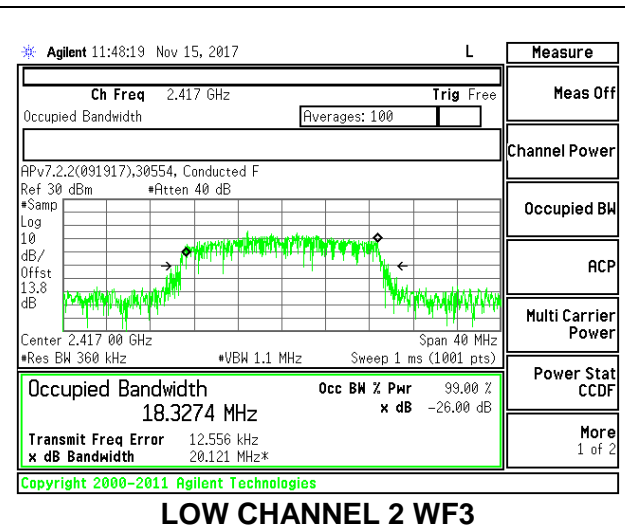
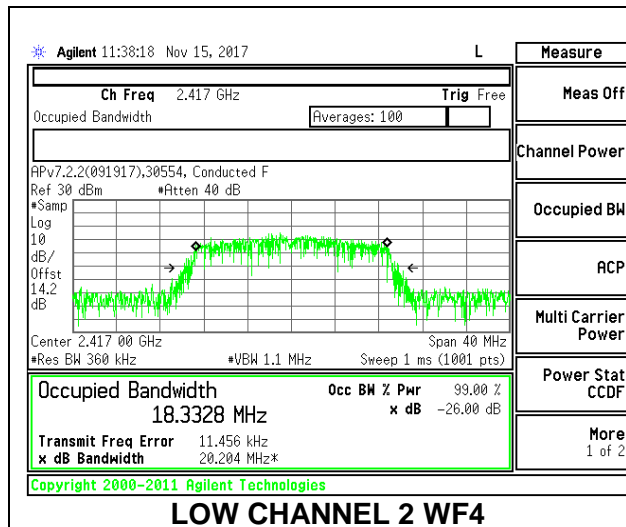
2TX Antenna WF4 + Antenna WF3 BF mode

Channel	Frequency (MHz)	99% Bandwidth WF4 (MHz)	99% Bandwidth WF3 (MHz)
Low 1	2412	17.7220	17.9100
Low 2	2417	18.3328	18.3274
Low 3	2422	17.6900	17.6860
Low 4	2427	17.9790	17.8670
Low 5	2432	17.7580	17.8130
Mid 6	2437	18.0490	17.8900
High 7	2442	17.7640	18.0470
High 8	2447	17.9200	17.8860
High 9	2452	17.6720	17.8650
High 10	2457	17.8930	17.7780
High 11	2462	17.7130	17.7180
High 12	2467	18.1059	17.7560
High 13	2472	18.0420	17.7820

LOW CHANNEL 1



LOW CHANNEL 2



LOW CHANNEL 3

