CERTIFICATION TEST REPORT

Report Number. : 11735596-E5V2

Applicant	:	MICROSOFT CORP ONE MICROSOFT WAY REDMOND, WA 98052, U.S.A.
Model	:	1807
FCC ID	:	C3K1807
IC	:	3048A-1807
EUT Description	:	PORTABLE COMPUTING DEVICE
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART E INDUSTRY CANADA RSS - 247 ISSUE 2

Date Of Issue:
October 02, 2017

Prepared by:
UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	09/18/17	Initial Release	--
V2	10/02/17	- Updated Chain 0 to reference Path A and Chain 1 to reference B - Updated section 2 - Updated section 12.1.6	C. Susa

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: MICROSOFT CORP
ONE MICROSOFT WAY
REDMOND, WA 98052, U.S.A.

EUT DESCRIPTION: PORTABLE COMPUTING DEVICE

MODEL: 1807

SERIAL NUMBER: RADIATED: 032012672953
CONDUCTED: 031936672953

DATE TESTED: August 7th, 2017 – August 30th, 2017

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	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 the U.S. government.

Approved & Released For
UL Verification Services Inc. By:

Francisco de Anda
CONSUMER TECHNOLOGY DIVISION
Program Manager
UL Verification Services Inc.

Prepared By:

Clifford Susa
CONSUMER TECHNOLOGY DIVISION
Engineer
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 14-30, FCC KDB 662911 D01 v02r01, FCC KDB 905462 D02 v02/D03 v01r02/D06 v02, FCC KDB 789033 D02 v01r04, FCC KDB 644545 D03 v01, ANSI C63.10-2013, RSS-GEN Issue 4, and RSS-247 Issue 2.

3. 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	☐ Chamber D
☒ Chamber B	☐ Chamber E
☐ Chamber C	☐ Chamber F
	☐ Chamber G
	☐ Chamber H

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through C are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-3, respectively. Chambers D through H are covered under Industry Canada company address code 22541 with site numbers 22541 -1 through 22541-5, respectively.

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.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

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

4.3. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a handheld computing device with 802.11 2x2, a/b/g/n/ac WLAN, Bluetooth, Bluetooth LE.

5.2. 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)
2TX			
5180 - 5240	802.11a	12.83	19.19
5180 - 5240	802.11n HT20	12.94	19.68
5190 - 5230	802.11n HT40	12.91	19.54
5210	802.11ac VHT80	9.70	9.33

5.3 GHz BAND

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2TX			
5260 - 5320	802.11a	16.65	46.24
5260 - 5320	802.11n HT20	16.75	47.32
5270 - 5310	802.11n HT40	13.65	23.17
5290	802.11ac VHT80	9.55	9.02

5.6 GHz BAND

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2TX			
5500 - 5700	802.11a	17.31	53.83
5500 - 5700	802.11n HT20	17.50	56.23
5510 - 5670	802.11n HT40	16.32	42.85
5530 - 5610	802.11ac VHT80	13.41	21.93

5.8 GHz BAND

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2TX			
5745 - 5825	802.11a	17.30	53.70
5745 - 5825	802.11n HT20	17.29	53.58
5755 - 5795	802.11n HT40	14.15	26.00
5775	802.11ac VHT80	10.59	11.46

STRADDLE CHANNELS

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2TX (Channels overlapping UNII-2C and UNII-3)			
5720 (Whole Fundamental)	802.11a	15.31	33.96
5720 (Whole Fundamental)	802.11n HT20	15.47	35.24
5710 (Whole Fundamental)	802.11n HT40	14.28	26.79
5690 (Whole Fundamental)	802.11ac VHT80	10.61	11.51

List of test reduction

Antenna Port Testing		
Band	**Mode**	**Covered by**
5 GHz band	802.11a 1TX	802.11a 2TX
5 GHz band	802.11n HT20 1TX	802.11n HT20 2TX
5 GHz band	802.11n HT40 1TX	802.11n HT40 2TX
5 GHz band	802.11ac VHT 80 1TX	802.11ac VHT 80 2TX

Note: 802.11n VHT20 and VHT40 modes are leveraged from 802.11n HT20 and HT40.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integrated antenna, with a maximum gain as follows:

Frequency Band (GHz)	Antenna Gain (dBi)	
	Path A	Path B
5.2	2.20	2.90
5.3	2.50	2.80
5.5	1.90	2.80
5.8	1.30	1.60

5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was 14.2.201.159

The test utility software used during testing was WIFI tool v2.0.0.77

5.5. WORST-CASE CONFIGURATION AND MODE

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

The fundamental of the EUT was investigated in three orthogonal orientations X/Y/Z, it was determined that Y orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in Y 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 VHT80 mode: MCS0

802.11ac VHT20 and VHT40 mode are different from 802.11nHT20 and HT40 only in control messages and have the same power settings.

For MIMO modes, the 2TX emission testing was considered as a worst case scenario and was performed at power levels, per transmit chain, greater than or equal to the maximum power in any 1TX mode.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop AC/DC adapter	Lenovo	ADLX45NCC2A	11S36200281ZZ20059W0H5	NA
Laptop	Lenovo	11e	LR-04N7BL	NA
USB Ethernet Adapter	Linksys	USB3GIGV1	15710S08406242	NA

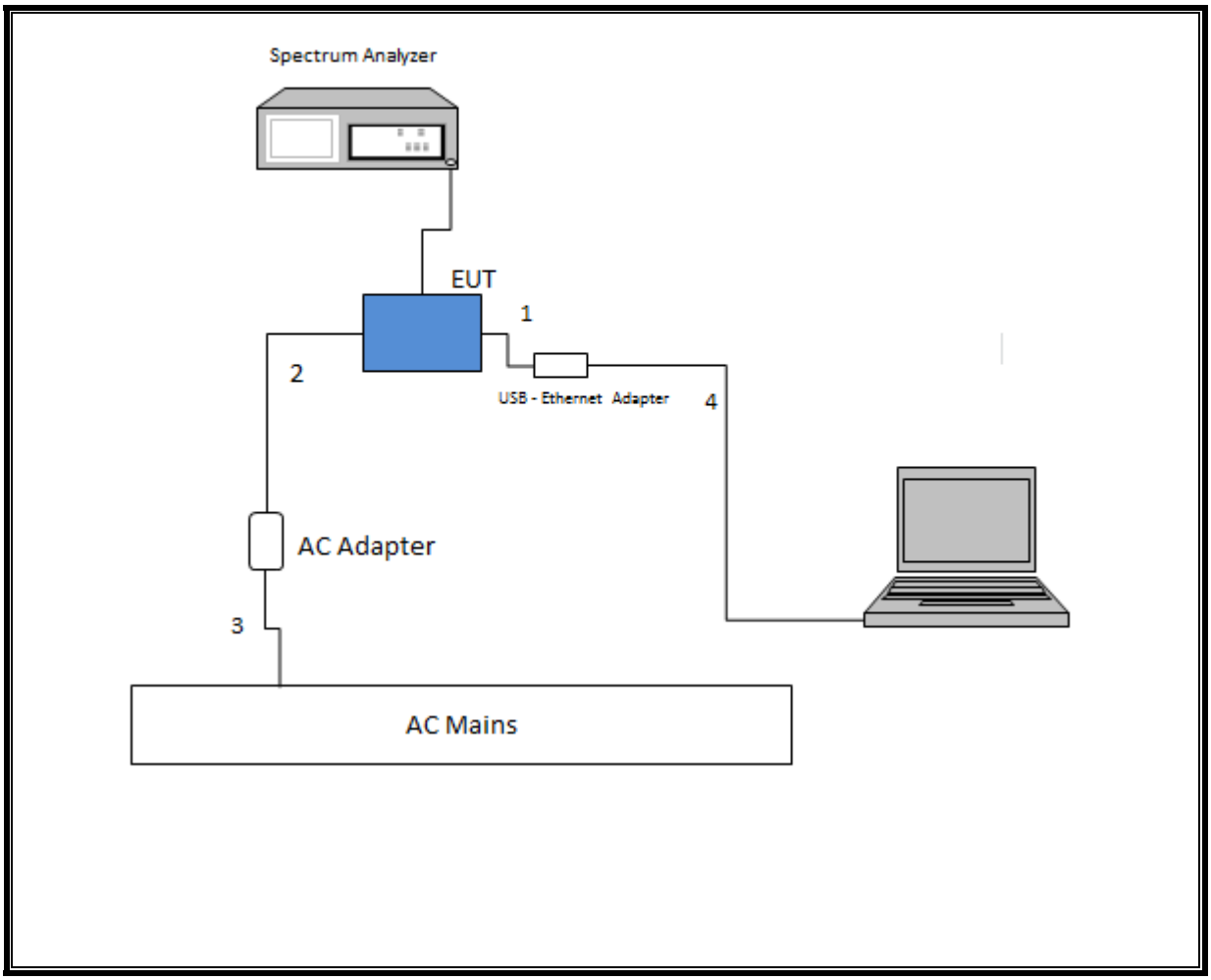
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	USB	Un-Shielded	0.17	
2	DC	1	Proprietary	Un-Shielded	1.75	
3	AC	1	2-prong	Un-Shielded	0.5	
4	Ethernet	1	RJ45	Un-Shielded	2	

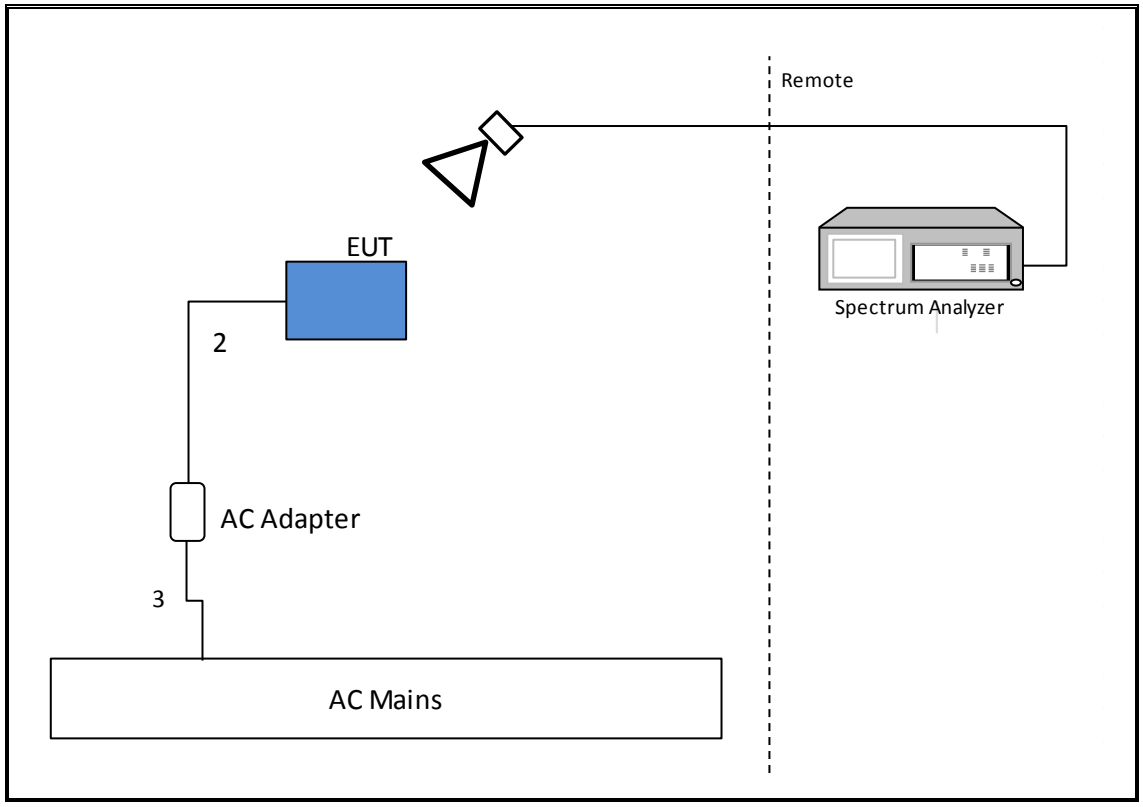
TEST SETUP

The EUT was tested connected to a host Laptop via RJ45/USB cable and AC adapter for antenna port. For radiated and AC line, tests were performed with EUT connected to AC adapter. Laptop was used to program settings then removed from setup.. Test software exercised the radio card.

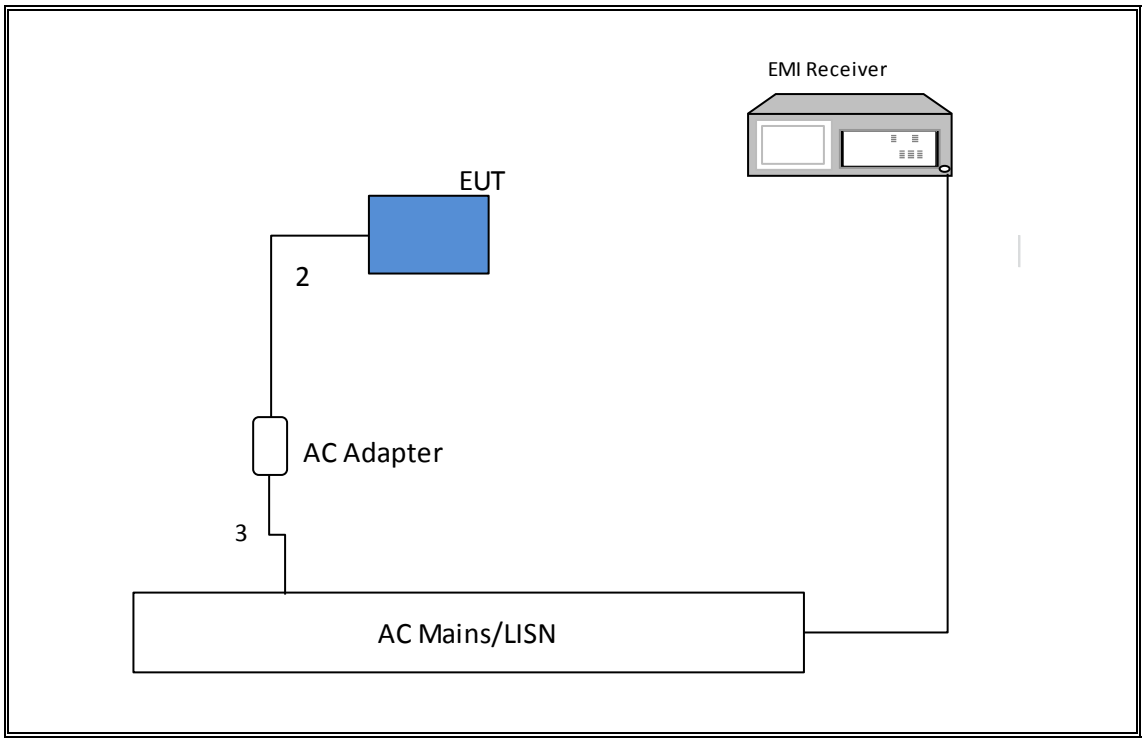
SETUP DIAGRAM FOR ANTENNA PORT CONDUCTED TESTS



SETUP DIAGRAM FOR RADIATED TESTS



SETUP DIAGRAM FOR ACLINE CONDUCTED TESTS



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**
Spectrum Analyzer	Keysight	E4440A	T199	07/22/2018
Power Meter	Keysight	N1911A	T1271	07/17/2018
Power Sensor, 50MHz to 18GHz	Keysight	N1921A	T1223	03/29/2018
Filter, LPF 5GHz	Micro-Tronics	LPS17541	T481	06/24/2018
Filter, HPF 6GHz	Micro-Tronics	HPS17542	T484	06/24/2018
Filter, HPF 3GHz	Micro-Tronics	HPM17543	T486	06/24/2018
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T711	01/30/2018
Antenna, Broadband Hybrid 30MHz-2000MHz	Sunol Sciences Corp.	JB1	T130	09/23/2017
PXA, Spectrum Analyzer	Keysight	N9090A	T1466	04/11/2018
Antenna Horn, 1-18GHz	ETS-Lindgren	3117	T346	03/28/2018
Amplifier, 1-18GHz	Miteq	AFS42-00101800-25-S-42	T493	03/23/2018
Filter, LPF 5GHz	Micro-Tronics	LPS17541	T482	06/24/2018
Filter, HPF 3GHz	Micro-Tronics	HPM17543	T485	06/24/2018
Spectrum Analyzer, PXA	Keysight	N93030A	T907	01/23/2018
Amplifier, 10KHz- 1GHz, 32dB	Keysight	8447D	T10	02/15/2018
Antenna Horn, 26.5 to 40GHz	ARA	MHW-2460/B	T446	06/12/2018
Antenna Horn, 18 to 26.5GHz	ARA	MHW-1826/B	T449	06/12/2018
Amplifier, 1-26.5GHz	Keysight	8449B	T404	07/23/018
Amplifier- 26.5-40GHz	MIteq	NSP 4000 SP2	T88	04/29/2018
EMI Test Receiver	Rohde & Schwarz	ESR	T1436	01/06/2018
LISN	Fishcer Custom Communications	FCC-LISN-50/250-25-2-01	T1310	06/15/2018

Test Software List			
Description	**Manufacturer**	**Model**	**Version**
Radiated Software	UL	UL EMC	9.5, 4/26/16
Antenna Port Software	UL	UL RF	6.1, 3/1/17
Conducted Emissions Software	UL	UL EMC	9.5, 5/26/15

7. MEASUREMENT METHODS

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

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) and KDB 789033 D02 v01r03, Section E.2.b (Method SA-1)

Power Spectral Density: KDB 789033 D02 v01r04, Section F

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.

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

8. ON TIME, DUTY CYCLE

LIMITS

None; for reporting purposes only.

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/T Minimum VBW (kHz)
802.11a 2Tx	3.145	3.170	0.992	99.2%	0.00	0.010
802.11n HT20 2Tx	9.912	9.936	0.998	99.8%	0.00	0.010
802.11n HT40 2Tx	4.795	4.816	0.996	99.6%	0.00	0.010
802.11ac HT80 2Tx	2.241	2.262	0.991	99.1%	0.00	0.010

DUTY CYCLE PLOTS

DUTY CYCLE 802.11a 2Tx MODE

DUTY CYCLE 802.11n HT20 2Tx MODE

DUTY CYCLE 802.11n HT40 2Tx MODE

DUTY CYCLE 802.11ac VHT80 2Tx MODE

9. ANTENNA PORT TEST RESULTS

9.1. 11a 2TX MODE IN THE 5.2GHz BAND

9.1.1. 26 dB BANDWIDTH

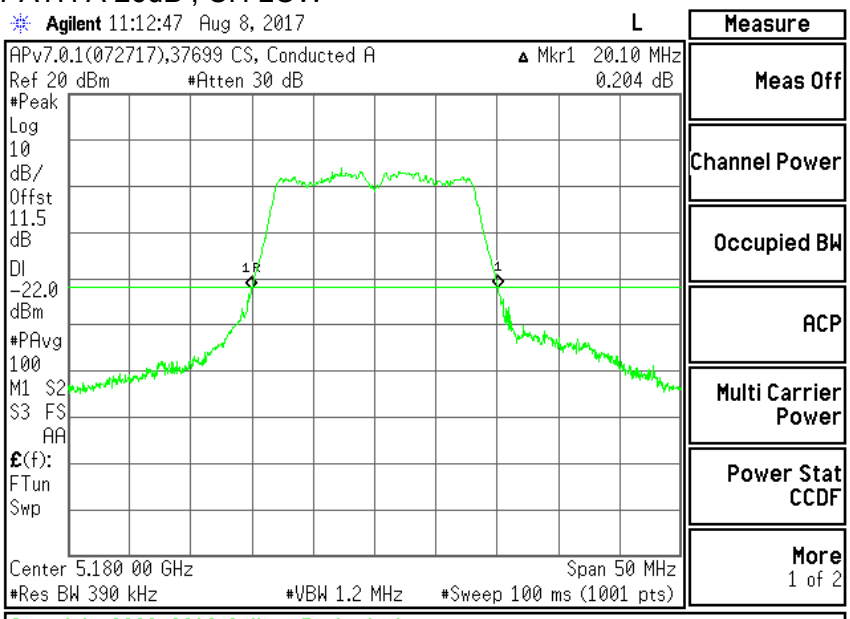
LIMITS

None; for reporting purposes only.

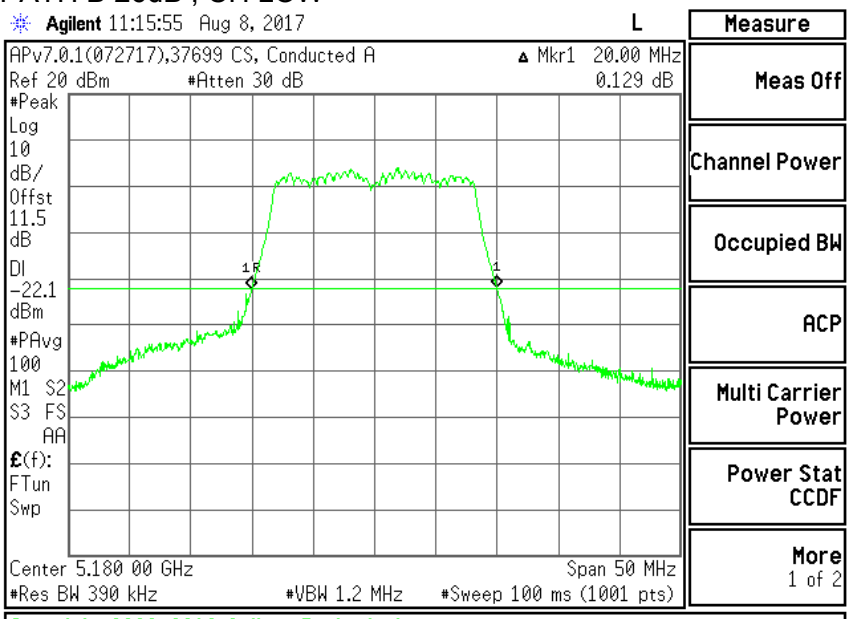
RESULTS

Channel	Frequency	26 dB BW PATH A (MHz)	26 dB BW PATH B (MHz)
Low	5180	20.1	20
Mid	5200	20.3	20
High	5240	20.35	20

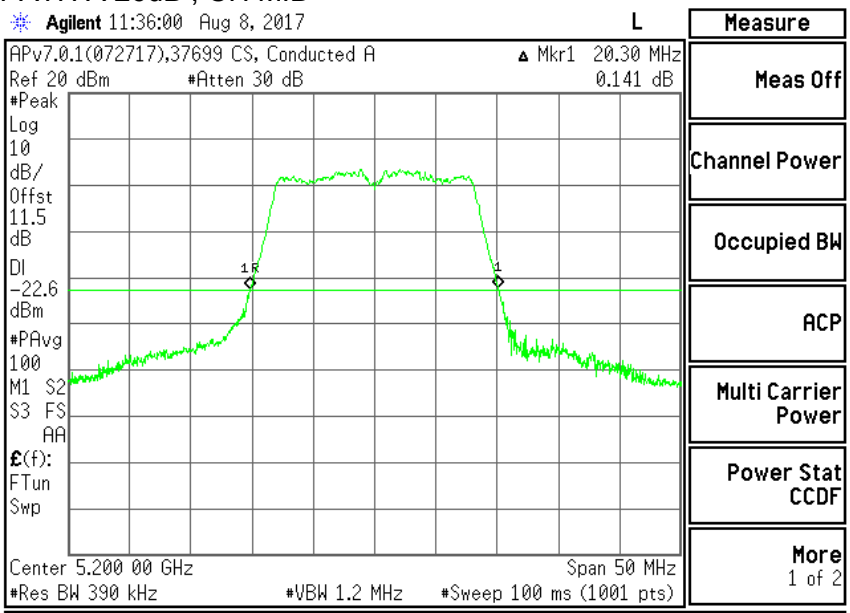
PATH A 26dB , CH LOW



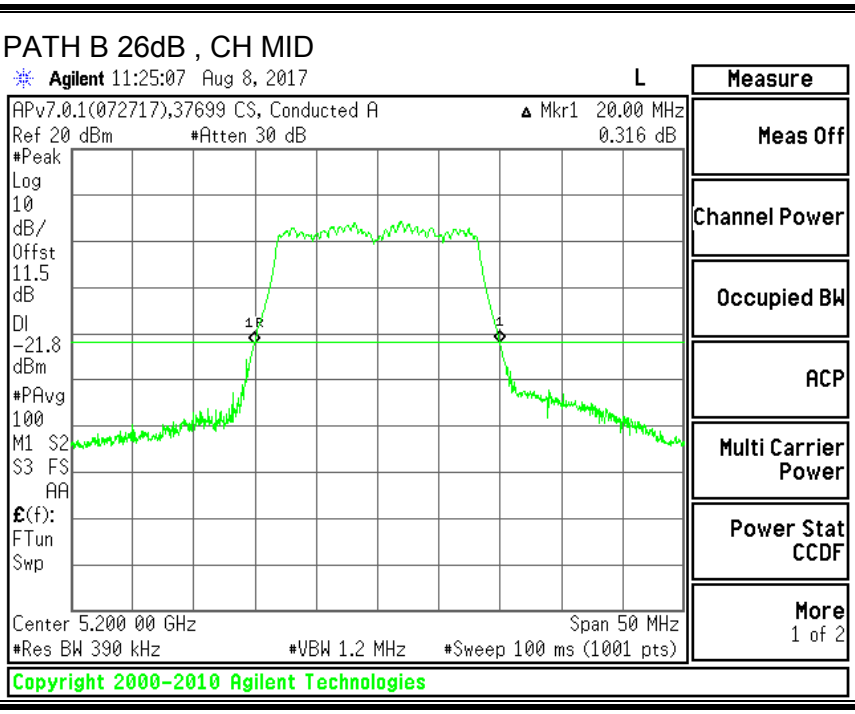
PATH B 26dB , CH LOW



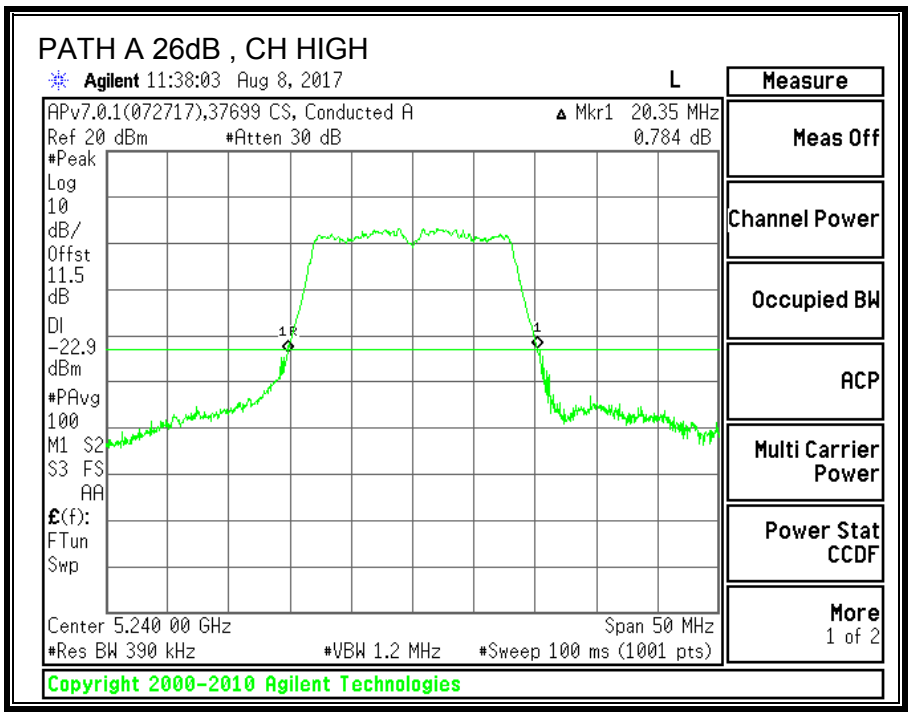
PATH A 26dB , CH MID



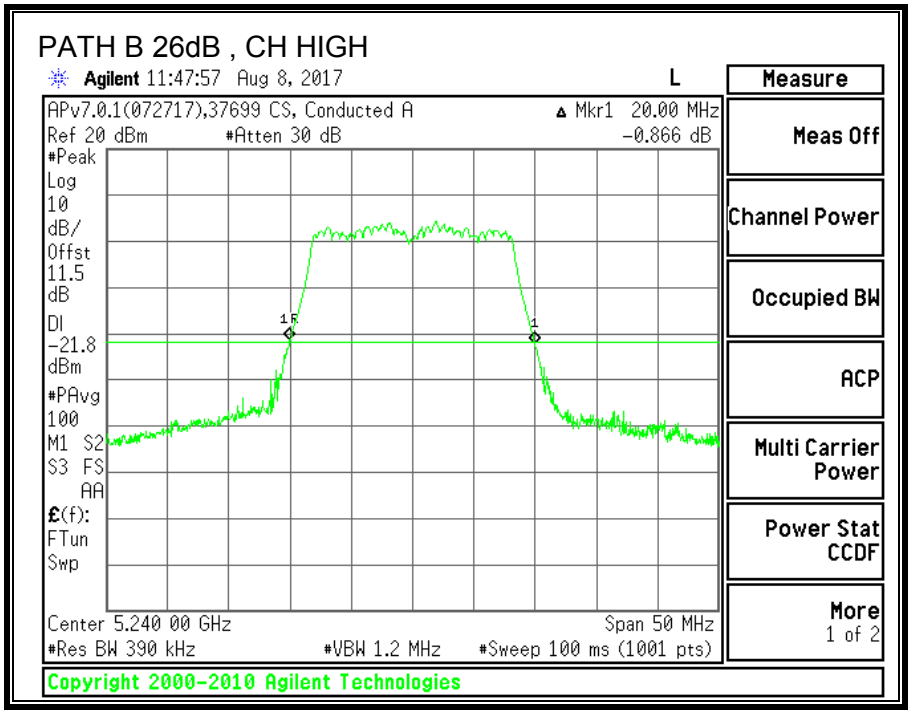
PATH B 26dB , CH MID



PATH A 26dB , CH HIGH



PATH B 26dB , CH HIGH



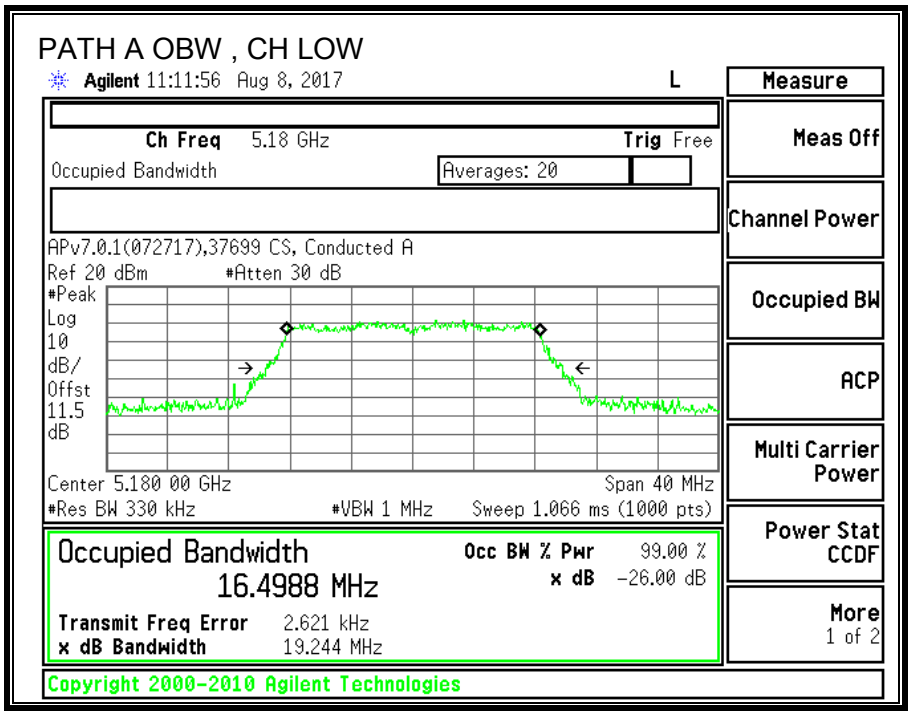
9.1.2. 99% BANDWIDTH

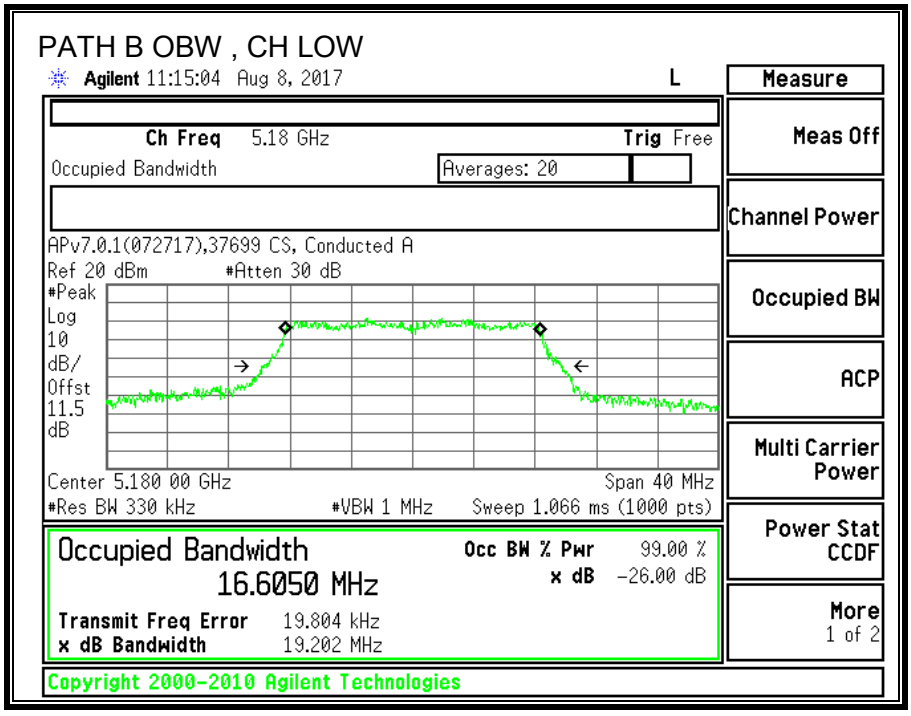
LIMITS

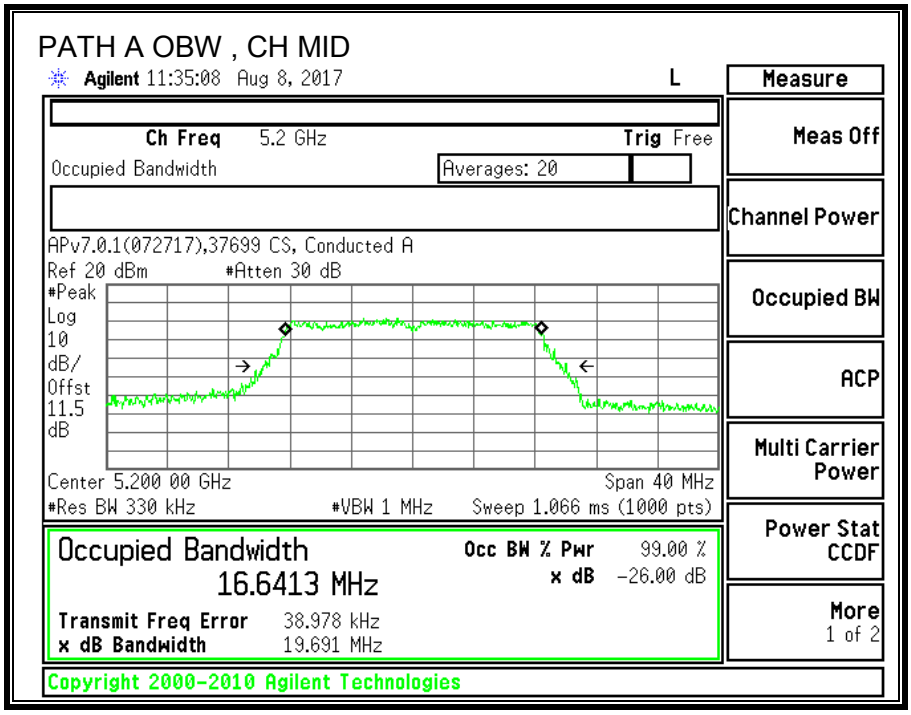
None; for reporting purposes only.

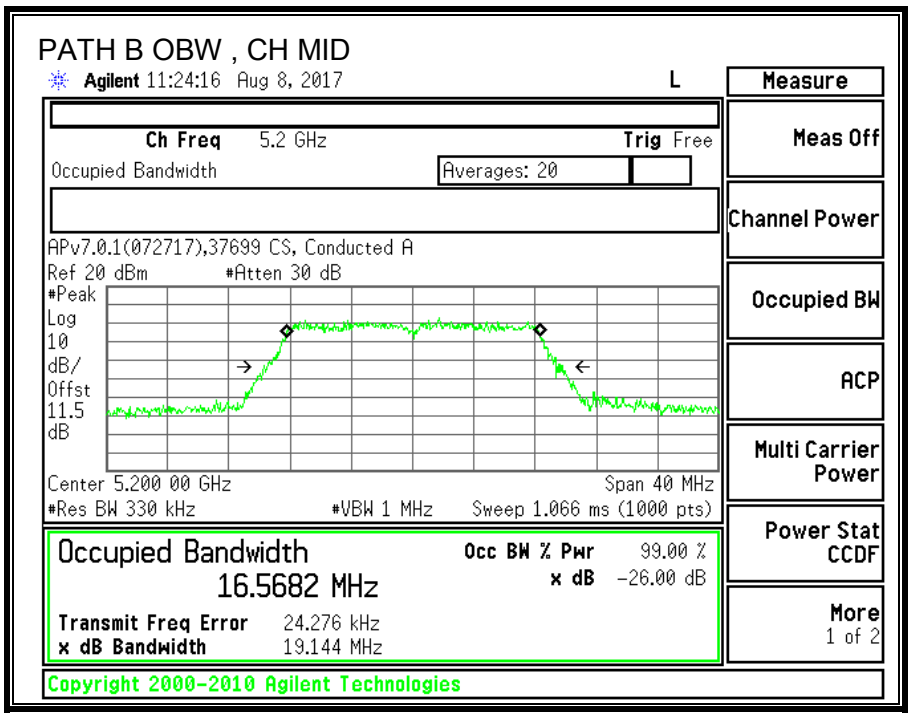
RESULTS

Channel	Frequency	99% BW PATH A (MHz)	99% BW PATH B (MHz)
Low	5180	16.4988	16.6050
Mid	5200	16.6413	16.5682
High	5240	16.5506	16.5851

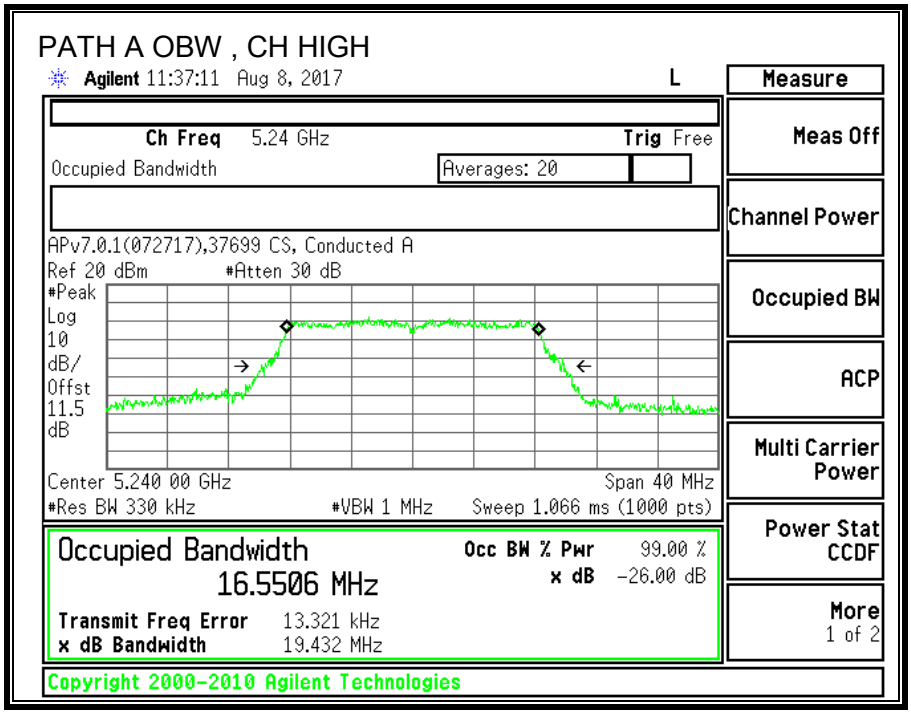




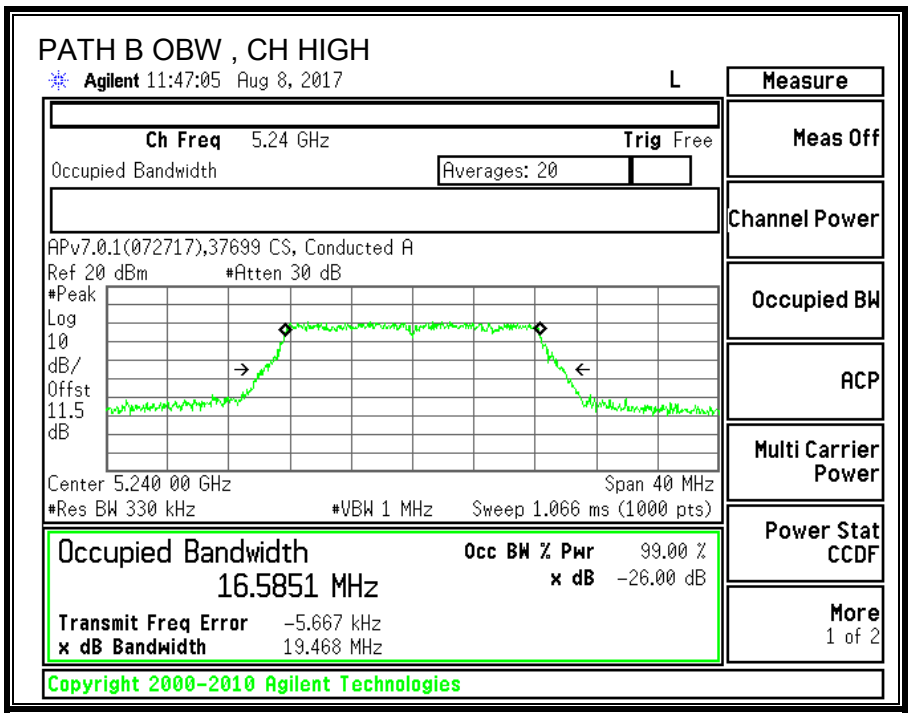




PATH A OBW , CH HIGH



PATH B OBW , CH HIGH



9.1.3. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-247 6.2.1(1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

Path A Antenna Gain (dBi)	Path B Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
2.20	2.90	2.56	5.57

RESULTS

ID:	37699 CS	Date:	8/8/2017

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
Low	5180	20.00	16.50	2.56	5.57
Mid	5200	20.00	16.57	2.56	5.57
High	5240	20.00	16.55	2.56	5.57

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max IC Power (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC eirp PSD Limit (dBm)	PPSD Limit (dBm)
Low	5180	24.00	22.17	19.61	19.61	11.00	10.00	4.43
Mid	5200	24.00	22.19	19.63	19.63	11.00	10.00	4.43
High	5240	24.00	22.19	19.63	19.63	11.00	10.00	4.43

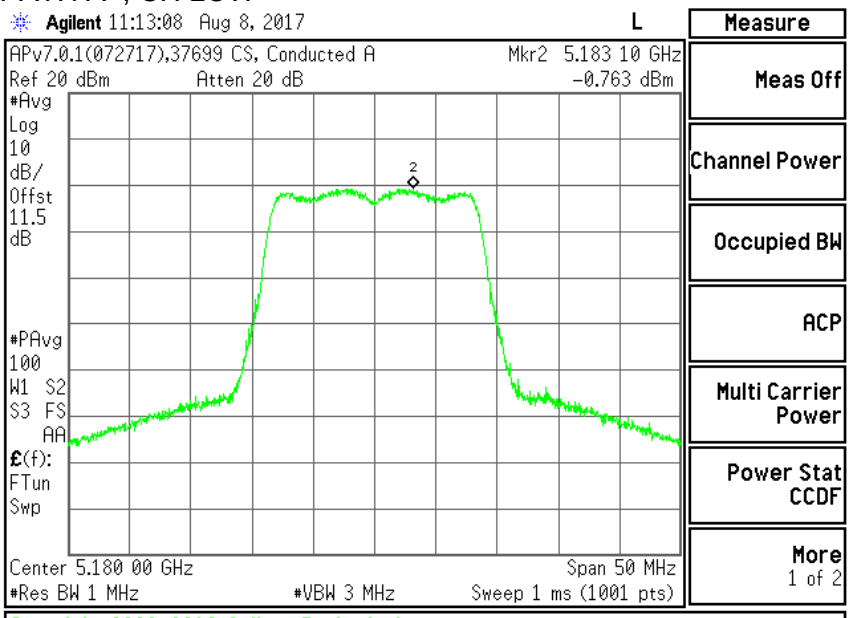
Output Power Results

Channel	Frequency (MHz)	Path A Meas Power (dBm)	Path B Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	9.87	9.76	12.83	19.61	-6.79
Mid	5200	9.77	9.81	12.80	19.63	-6.83
High	5240	9.84	9.57	12.72	19.63	-6.91

PPSD Results

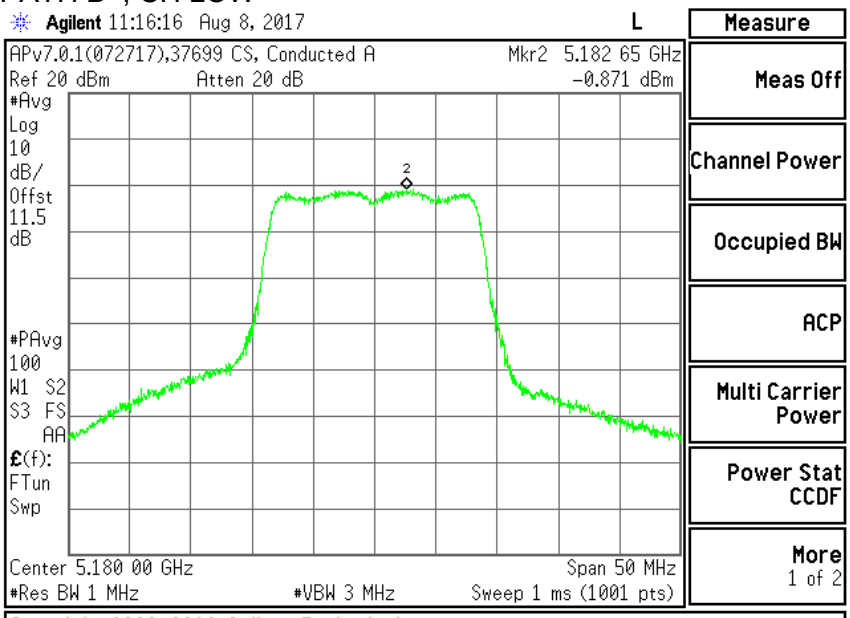
Channel	Frequency (MHz)	Path A Meas PPSD (dBm)	Path B Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5180	-0.76	-0.87	2.19	4.43	-2.24
Mid	5200	-0.48	-0.37	2.59	4.43	-1.84
High	5240	-0.69	-0.40	2.47	4.43	-1.96

PATH A , CH LOW



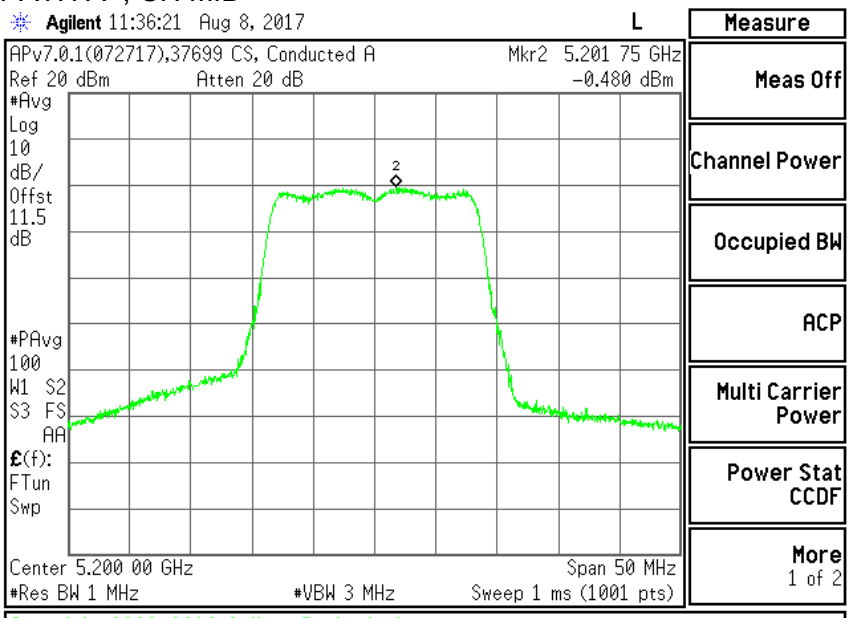
*Note:

PATH B , CH LOW



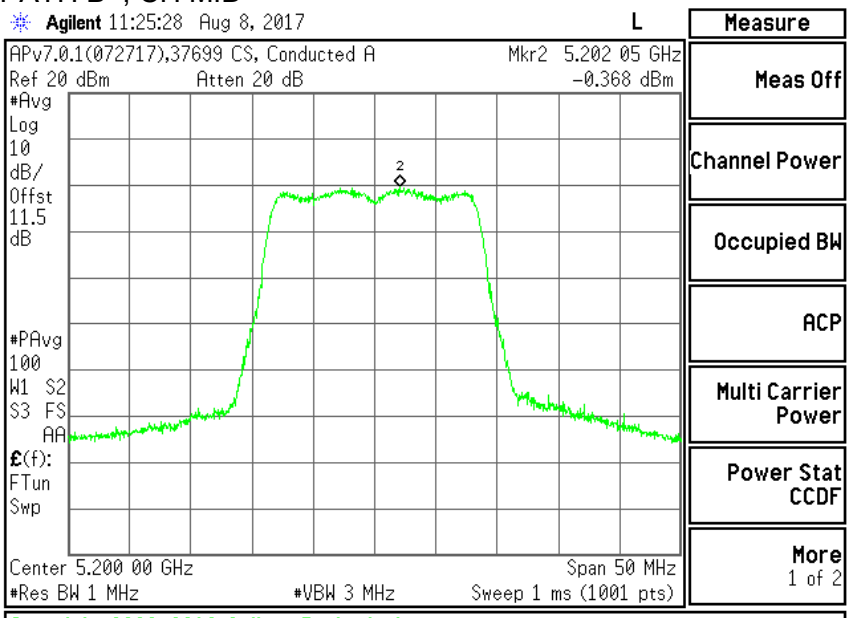
*Note:

PATH A , CH MID



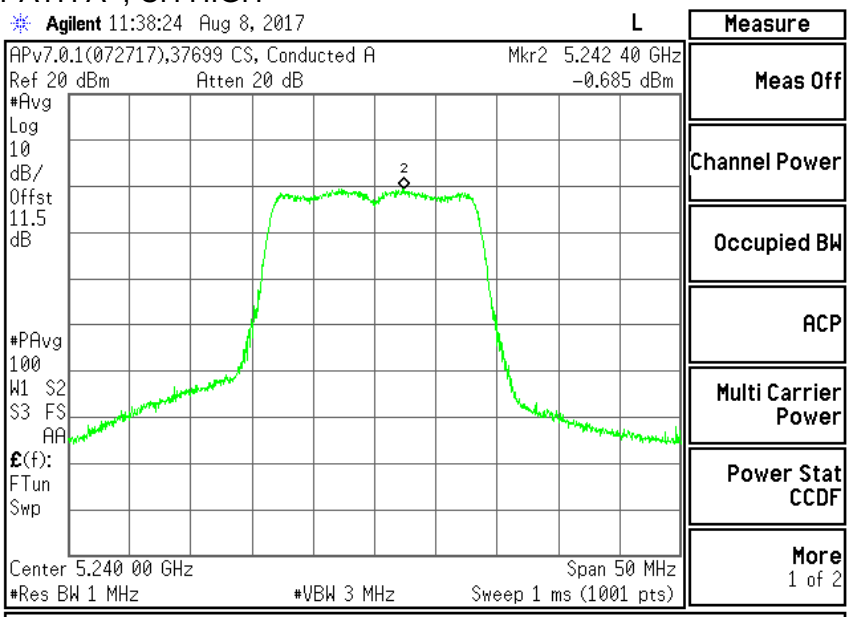
*Note:

PATH B , CH MID



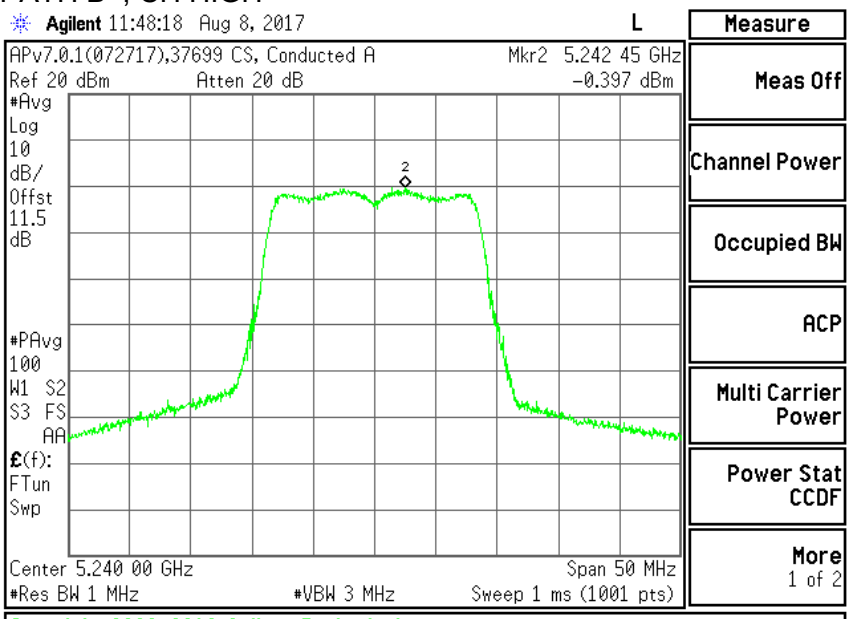
*Note:

PATH A , CH HIGH



*Note:

PATH B , CH HIGH



*Note:

9.2. 11n HT20 2TX MODE IN THE 5.2GHz BAND

9.2.1. 26 dB BANDWIDTH

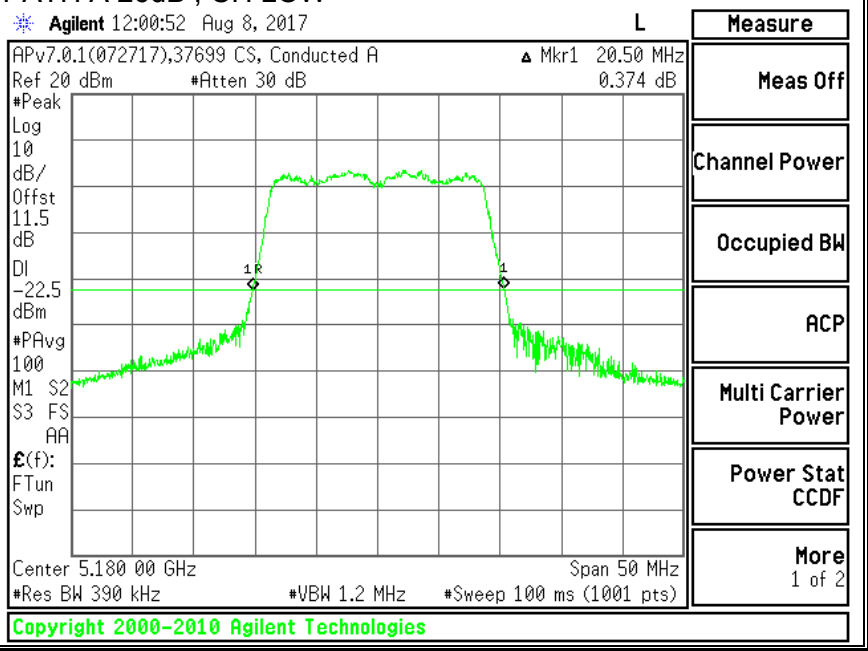
LIMITS

None; for reporting purposes only.

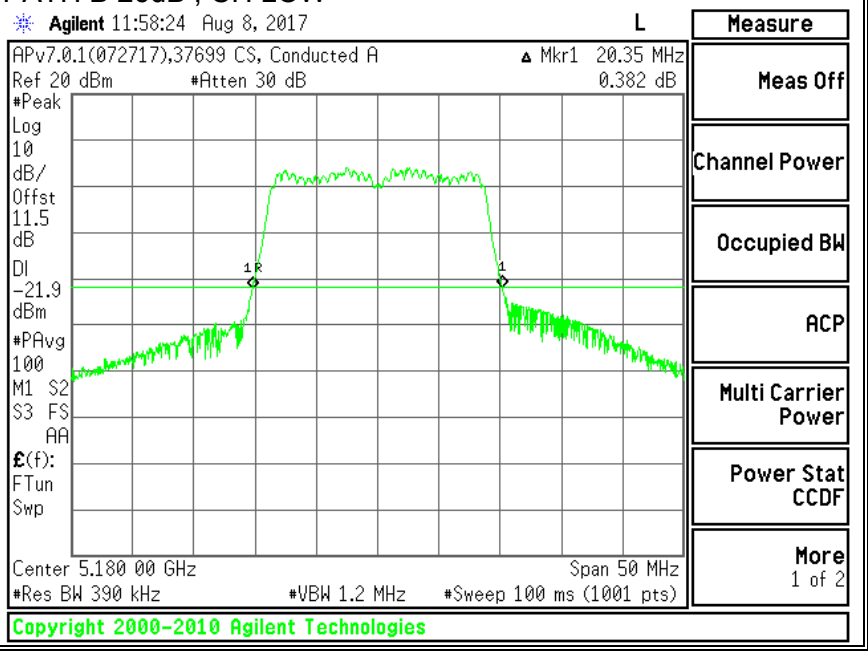
RESULTS

Channel	Frequency	26 dB BW PATH A (MHz)	26 dB BW PATH B (MHz)
Low	5180	20.5	20.35
Mid	5200	20.45	20.25
High	5240	20.65	20.30

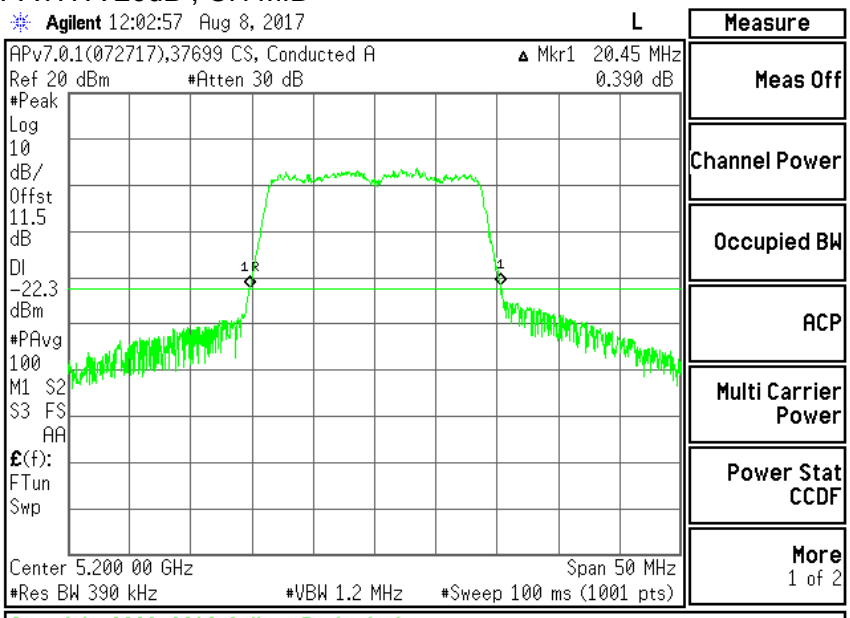
PATH A 26dB , CH LOW



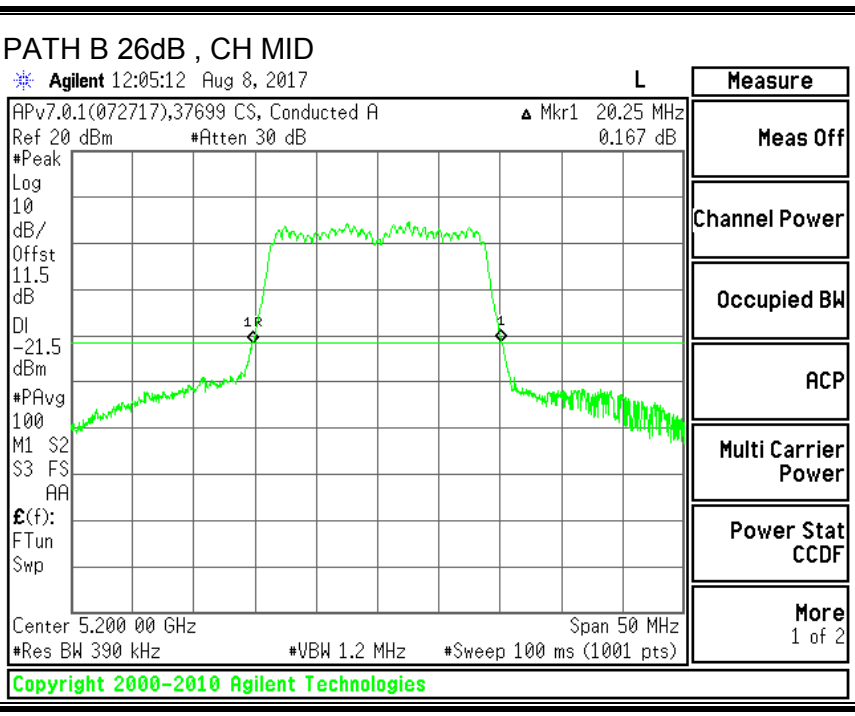
PATH B 26dB , CH LOW



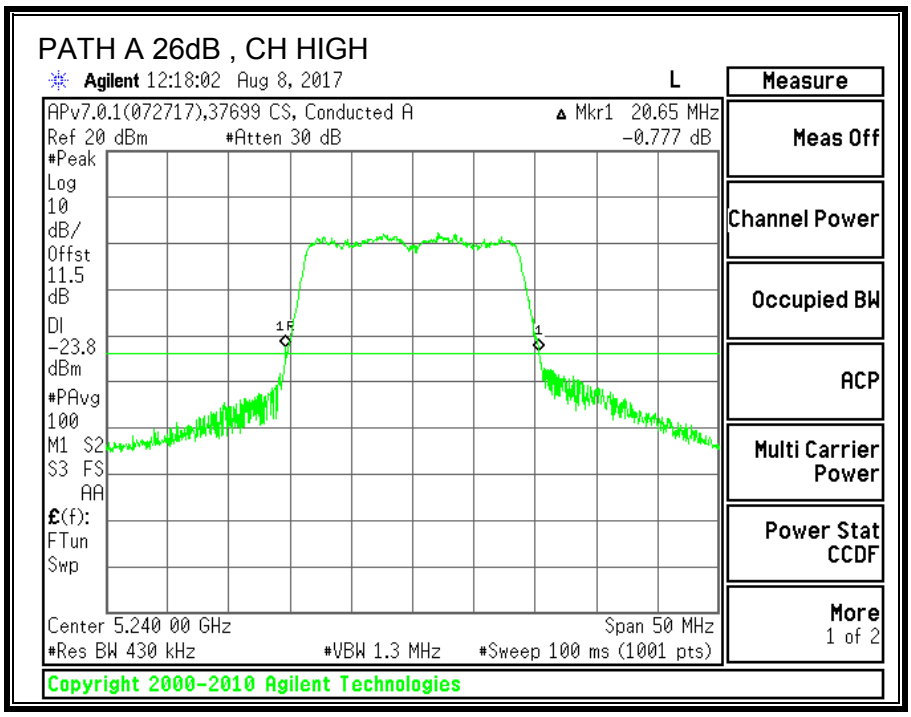
PATH A 26dB , CH MID



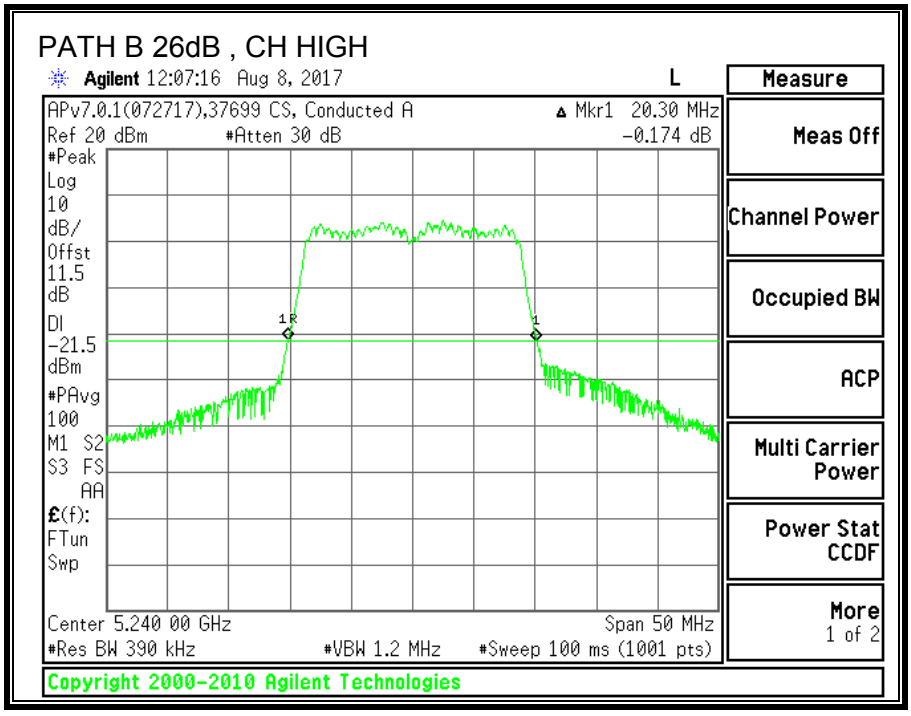
PATH B 26dB , CH MID



PATH A 26dB , CH HIGH



PATH B 26dB , CH HIGH



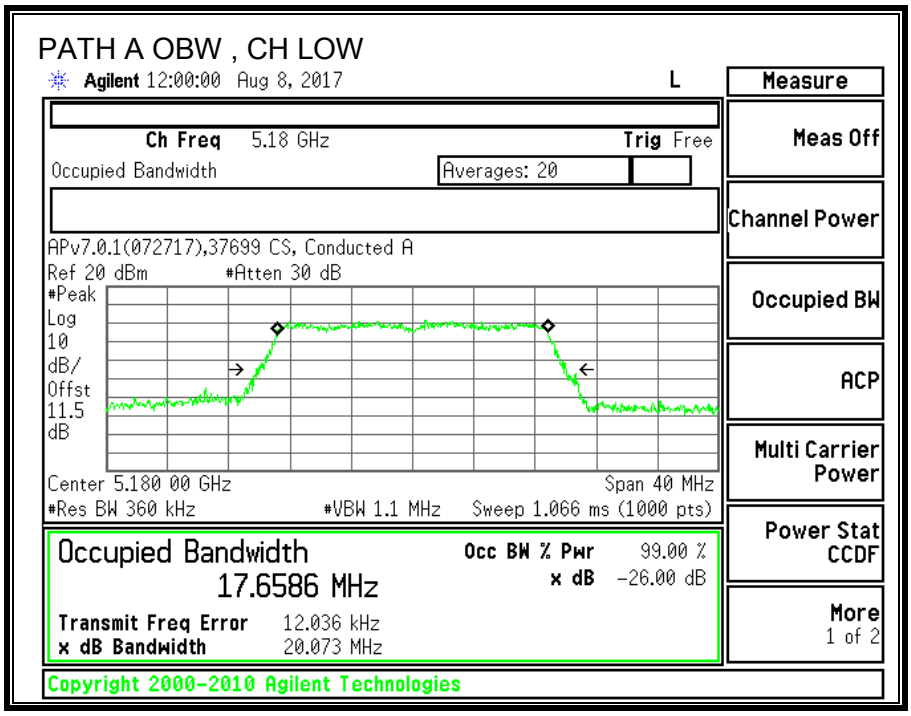
9.2.2. 99% BANDWIDTH

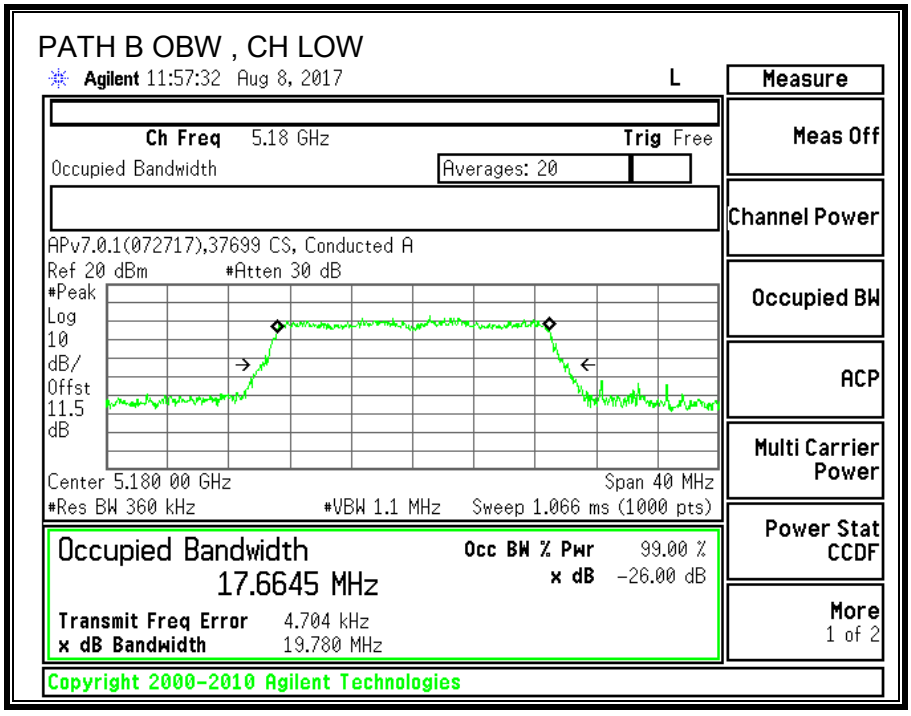
LIMITS

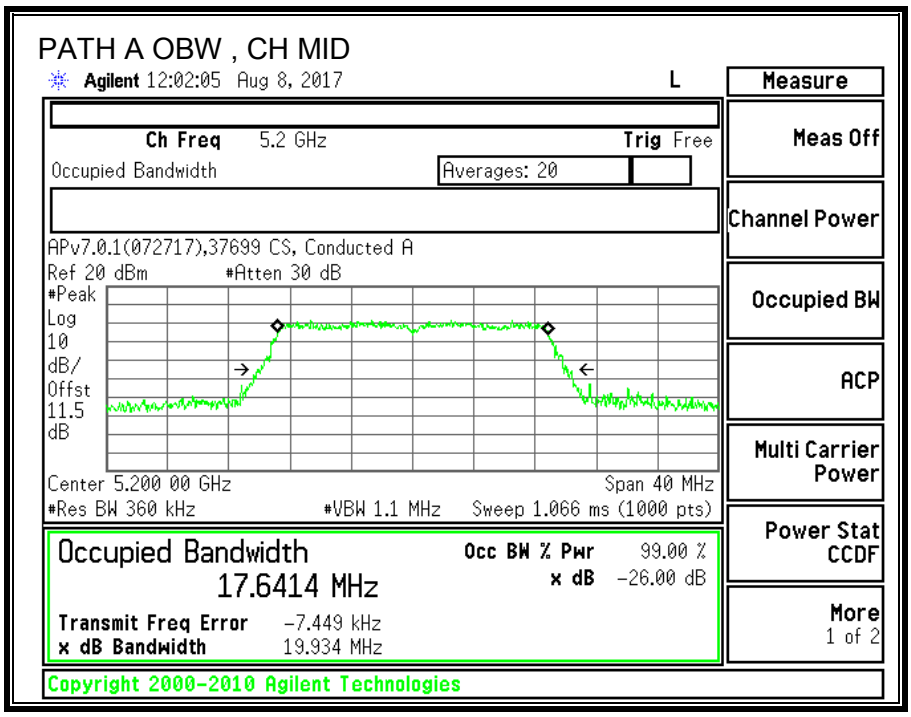
None; for reporting purposes only.

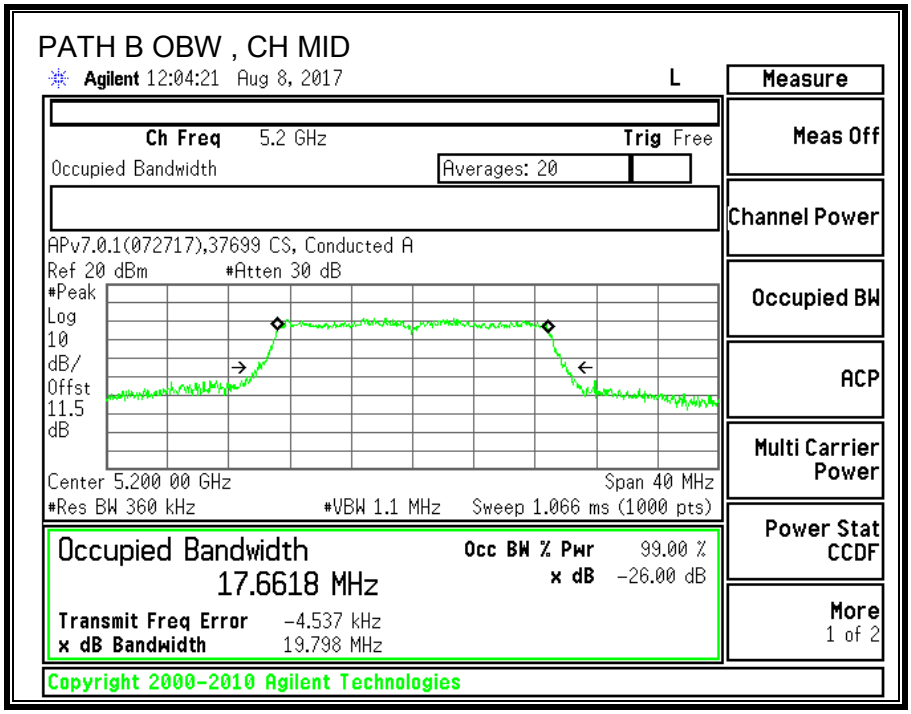
RESULTS

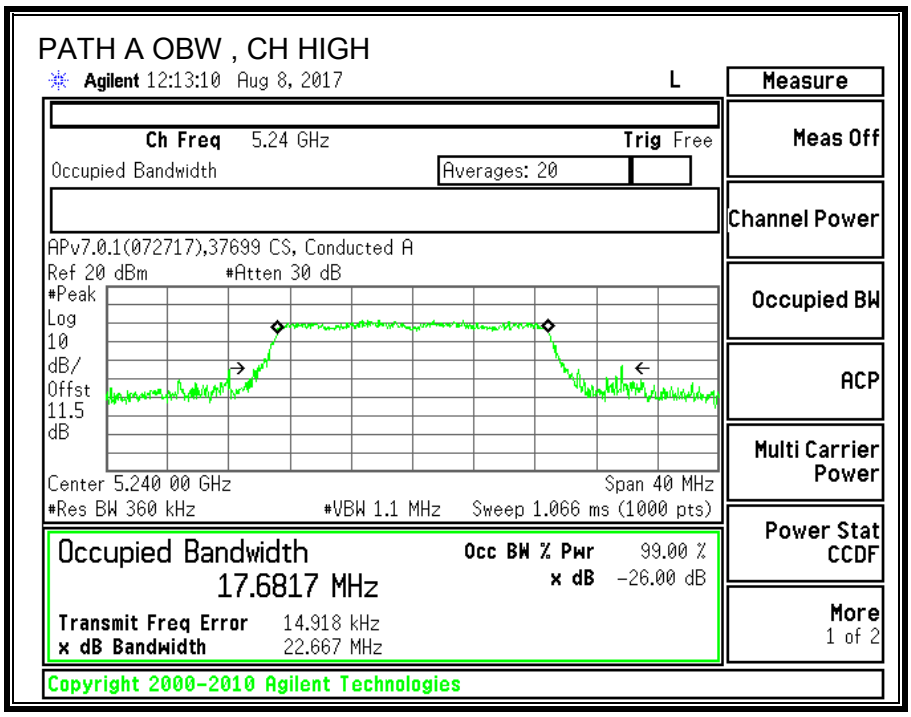
Channel	Frequency	99% BW PATH A (MHz)	99% BW PATH B (MHz)
Low	5180	17.6586	17.6645
Mid	5200	17.6414	17.6618
High	5240	17.6817	17.6179

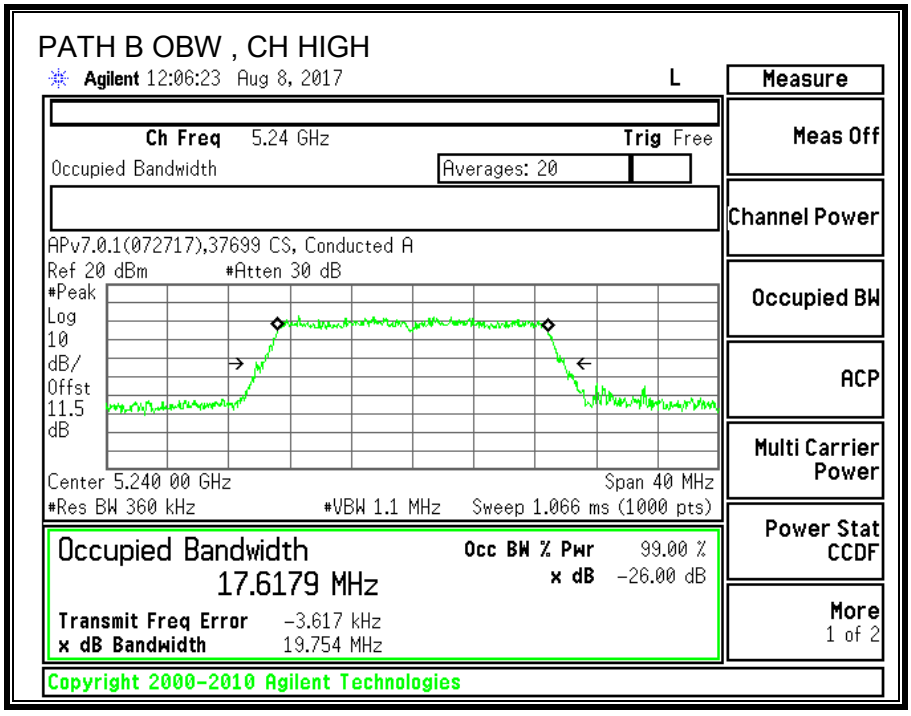












9.2.3. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-247 6.2.1(1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

Path A Antenna Gain (dBi)	Path B Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
2.20	2.90	2.56	5.57

RESULTS

ID:	37699 CS	Date:	8/8/2017

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
Low	5180	20.35	17.66	2.56	5.57
Mid	5200	20.25	17.64	2.56	5.57
High	5240	20.30	17.62	2.56	5.57

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max IC Power (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC eirp PSD Limit (dBm)	PPSD Limit (dBm)
Low	5180	24.00	22.47	19.91	19.91	11.00	10.00	4.43
Mid	5200	24.00	22.47	19.90	19.90	11.00	10.00	4.43
High	5240	24.00	22.46	19.90	19.90	11.00	10.00	4.43

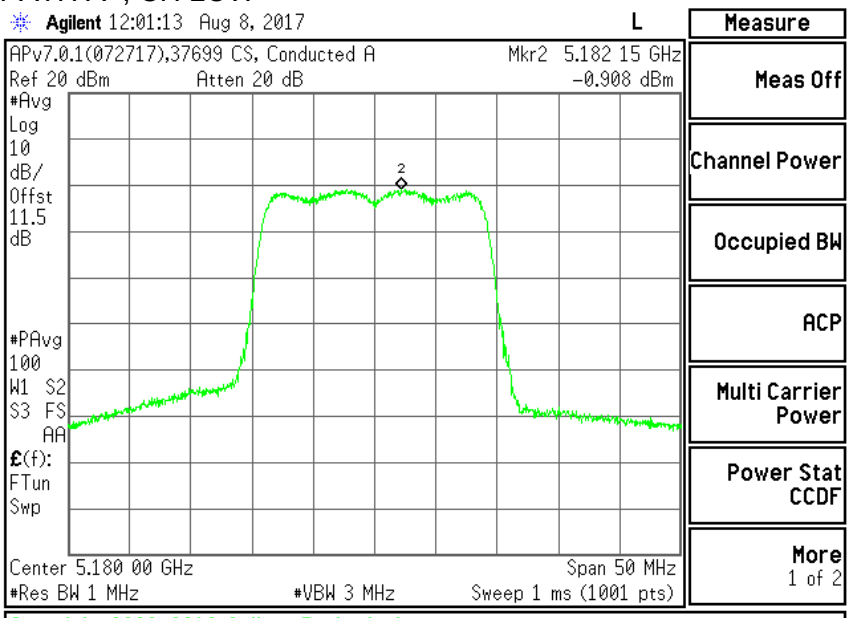
Output Power Results

Channel	Frequency (MHz)	Path A Meas Power (dBm)	Path B Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	9.72	9.96	12.85	19.91	-7.05
Mid	5200	9.98	9.87	12.94	19.90	-6.97
High	5240	9.83	9.42	12.64	19.90	-7.26

PPSD Results

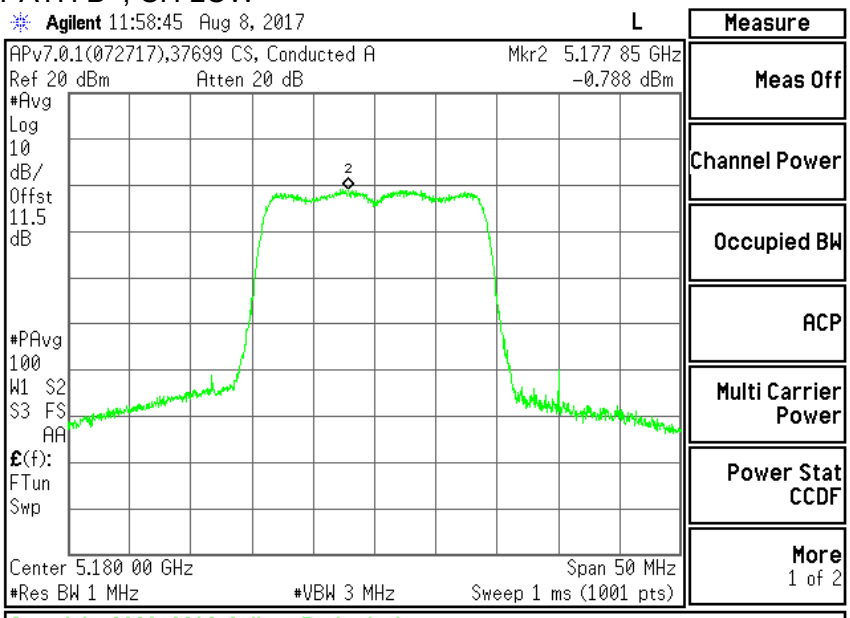
Channel	Frequency (MHz)	Path A Meas PPSD (dBm)	Path B Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5180	-0.91	-0.79	2.16	4.43	-2.27
Mid	5200	-0.52	-0.29	2.61	4.43	-1.83
High	5240	-0.62	-0.82	2.29	4.43	-2.14

PATH A , CH LOW



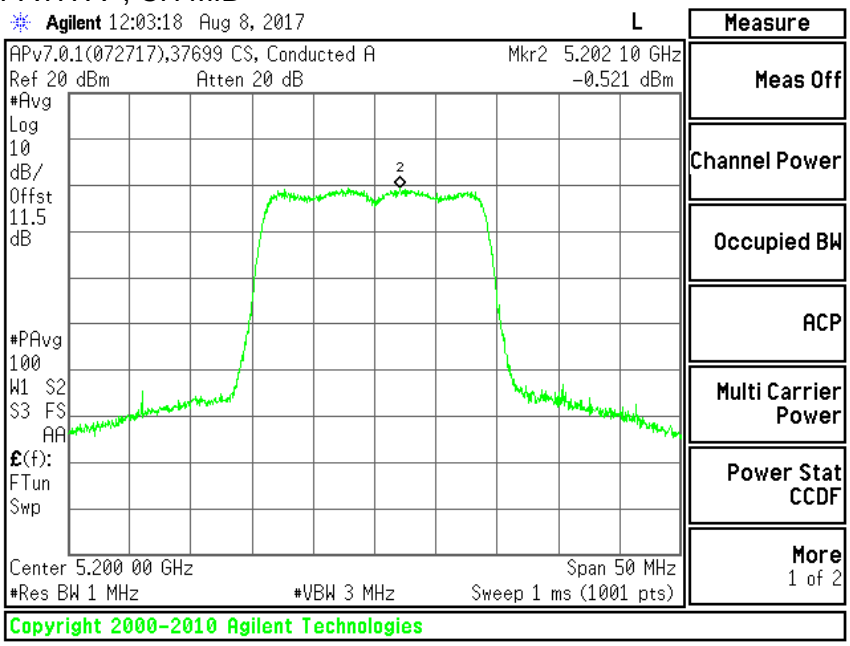
*Note:

PATH B , CH LOW



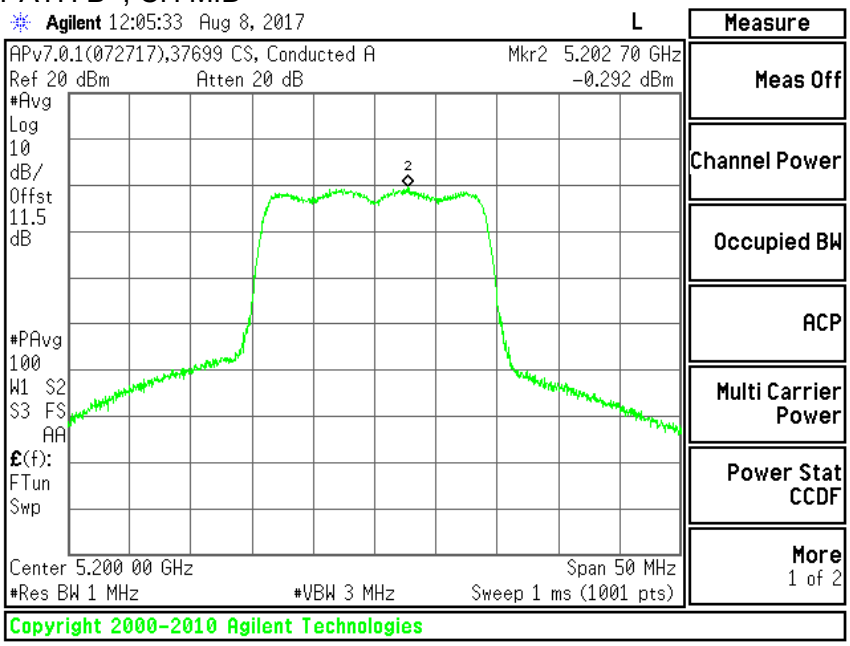
*Note:

PATH A , CH MID



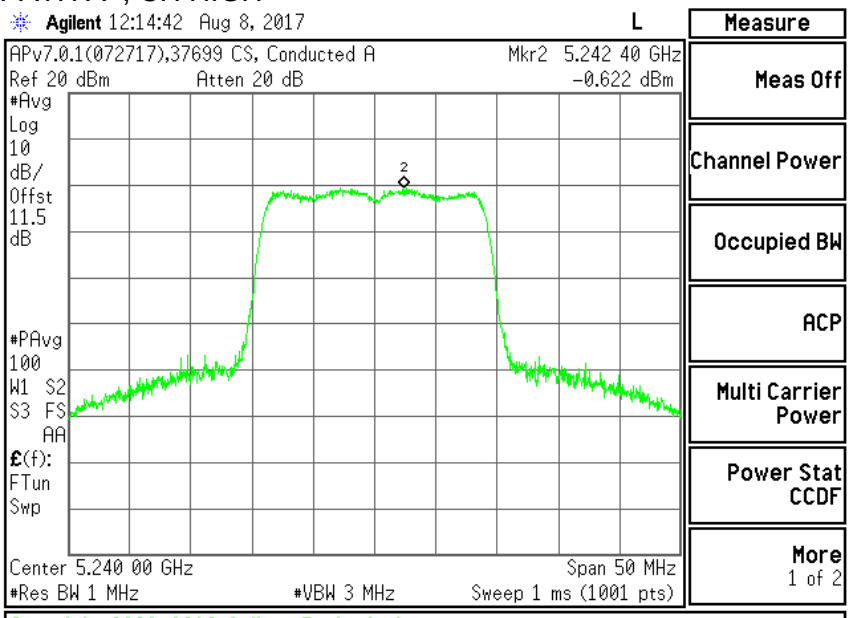
*Note:

PATH B , CH MID



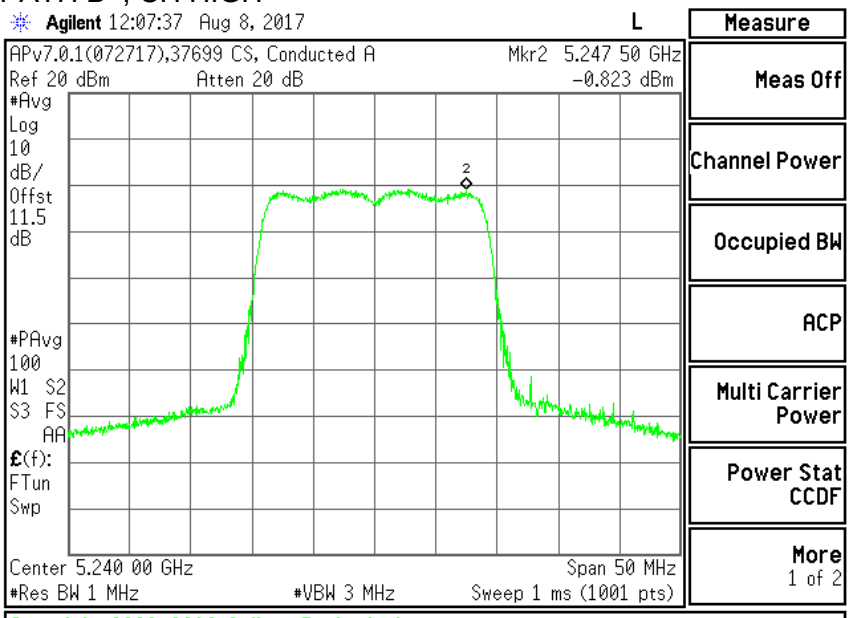
*Note:

PATH A , CH HIGH



*Note:

PATH B , CH HIGH



*Note:

9.3. 11n HT40 2TX MODE IN THE 5.2GHz BAND

9.3.1. 26 dB BANDWIDTH

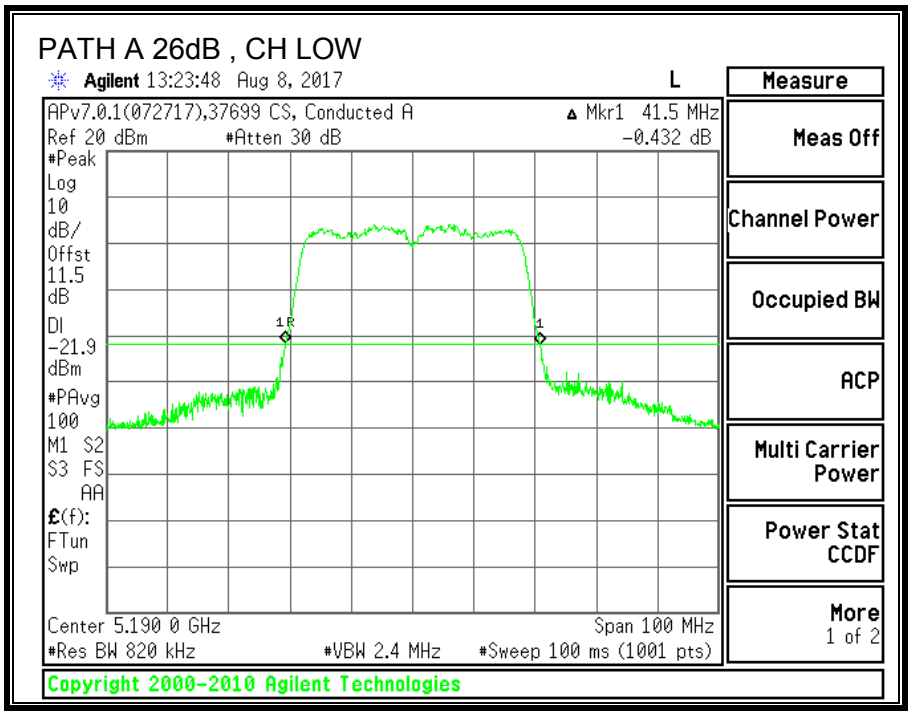
LIMITS

None; for reporting purposes only.

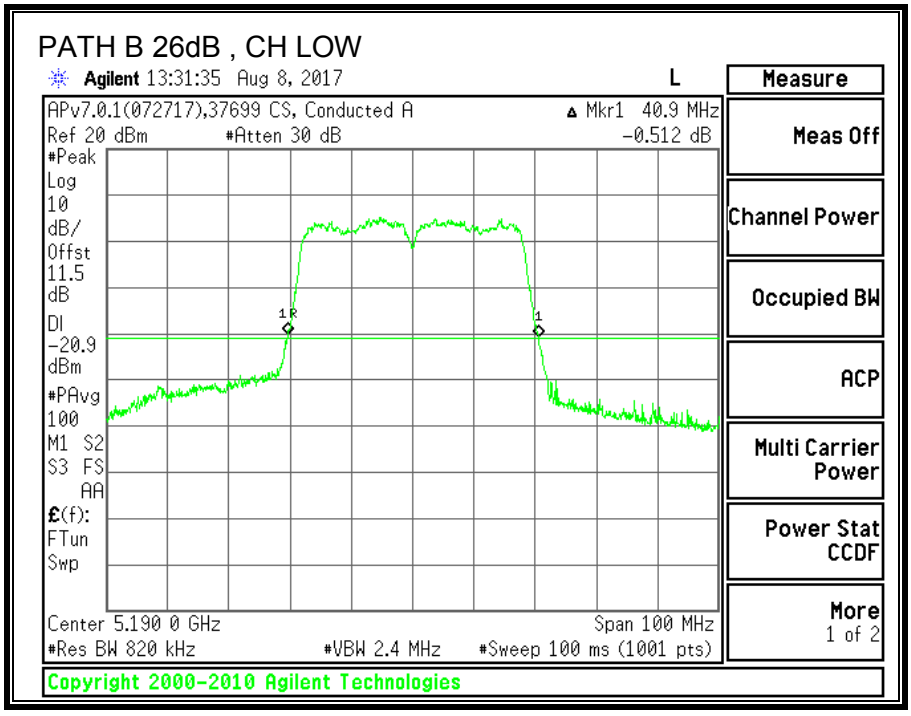
RESULTS

Channel	Frequency	26 dB BW PATH A (MHz)	26 dB BW PATH B (MHz)
Low	5190	41.5	40.9
High	5230	41.7	40.7

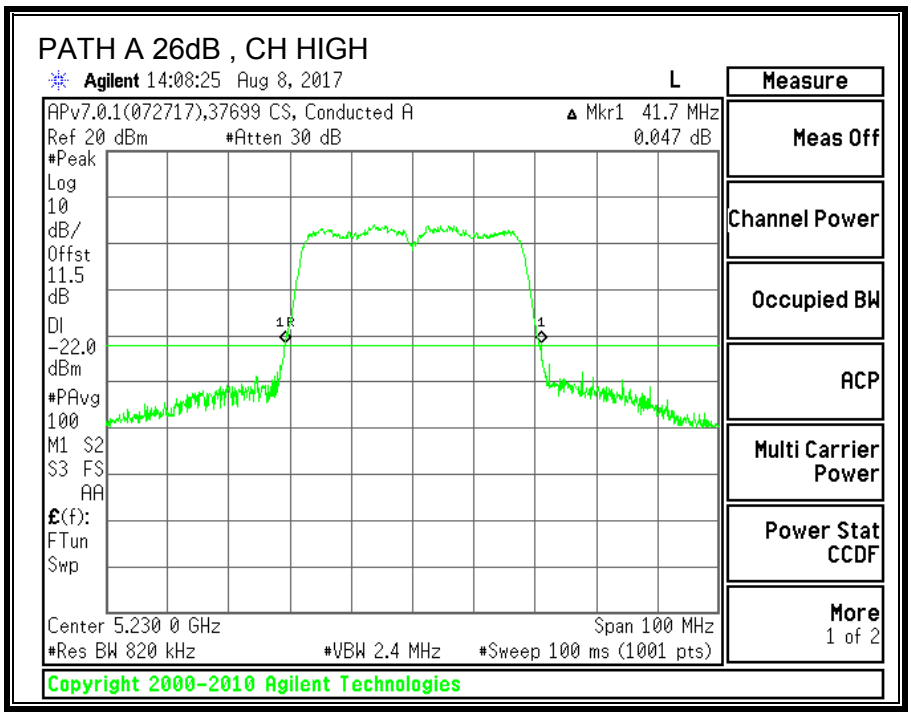
PATH A 26dB , CH LOW



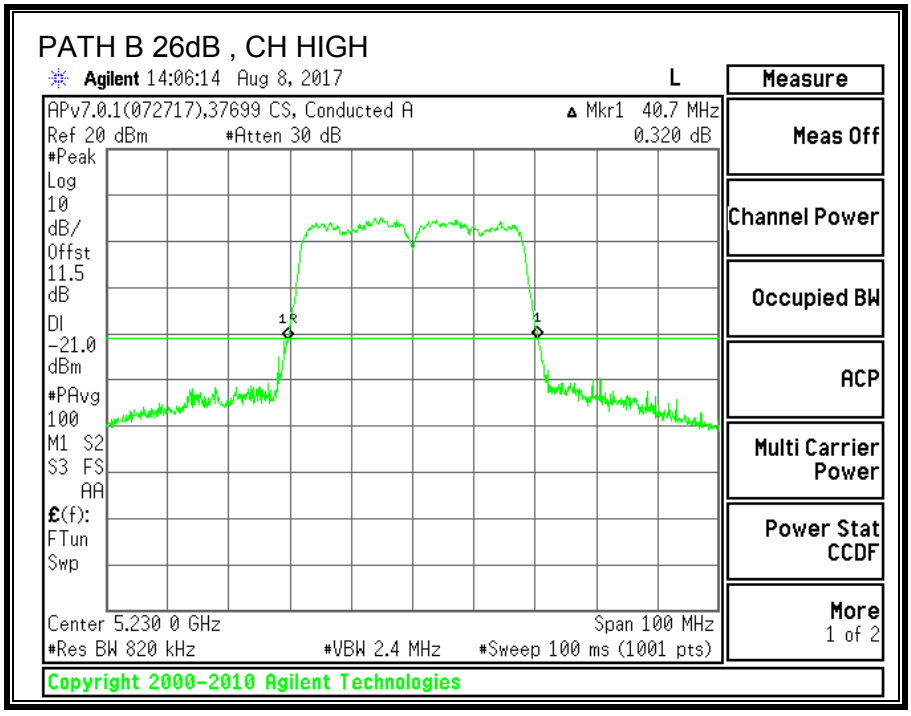
PATH B 26dB , CH LOW



PATH A 26dB , CH HIGH



PATH B 26dB , CH HIGH



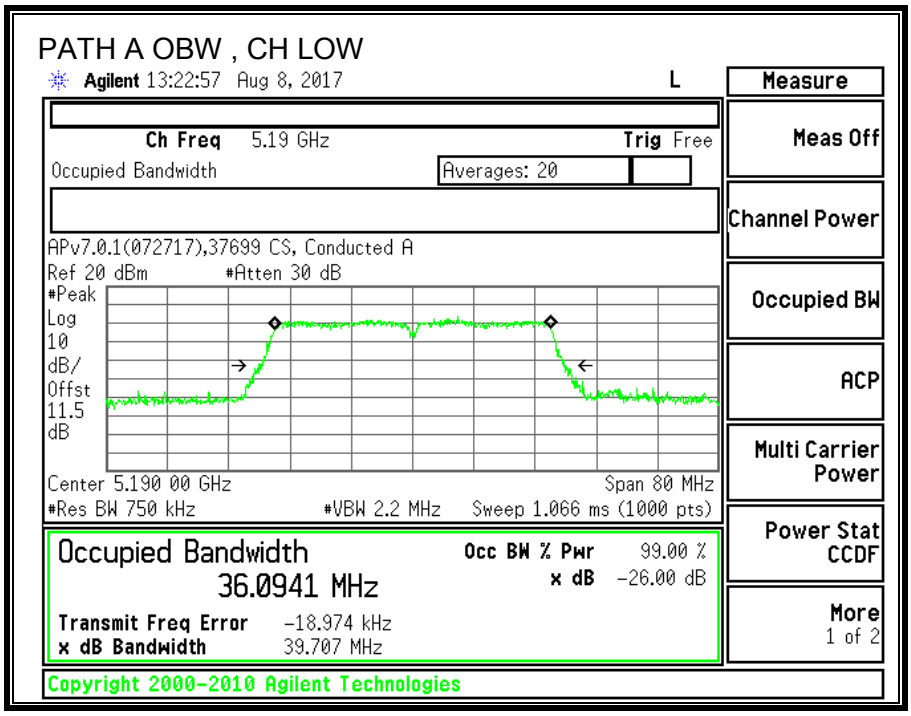
9.3.2. 99% BANDWIDTH

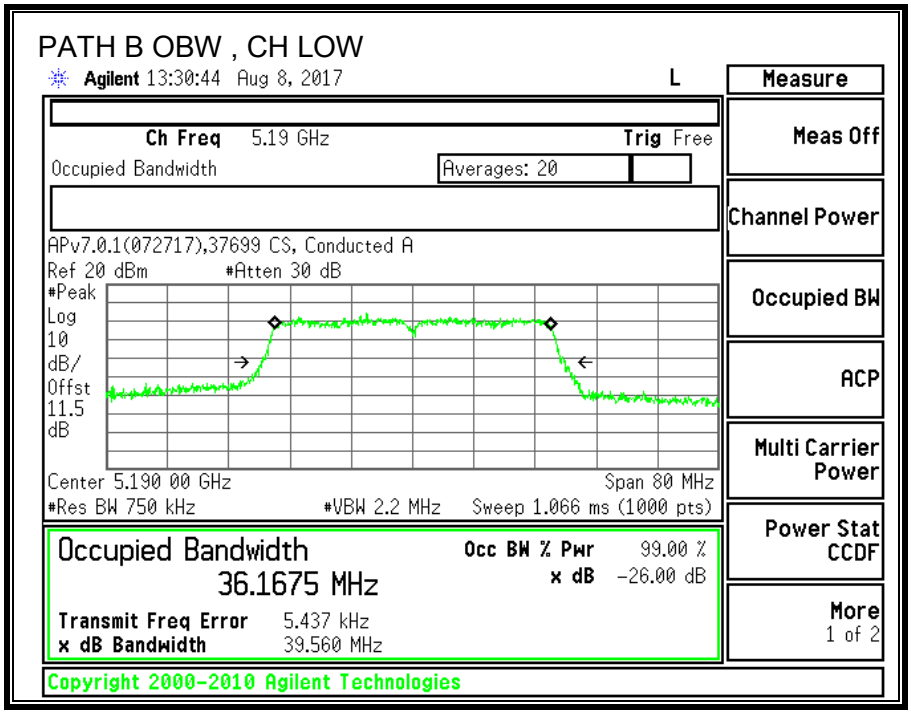
LIMITS

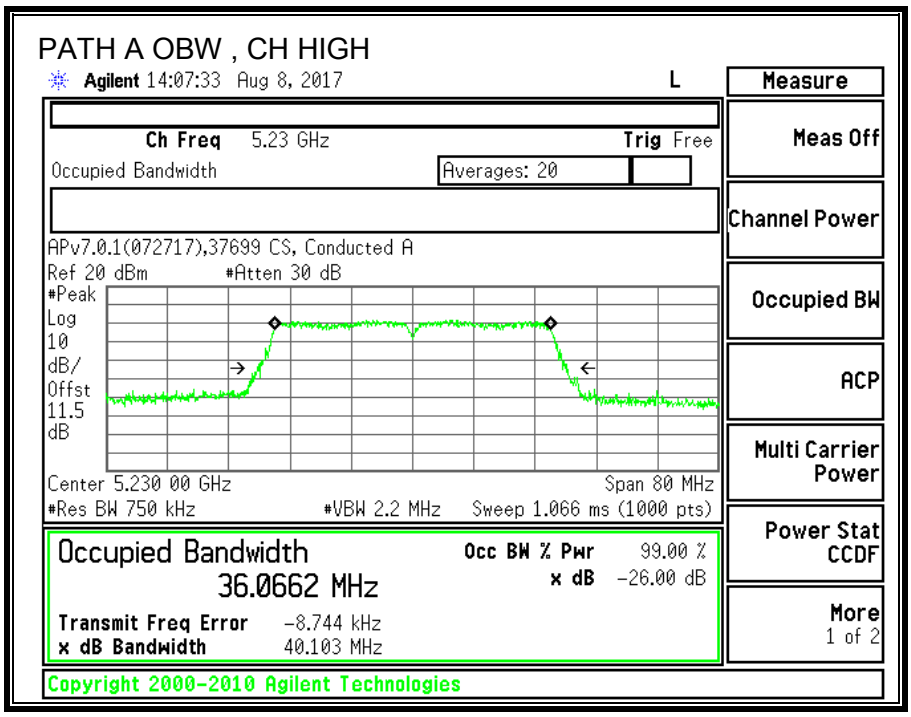
None; for reporting purposes only.

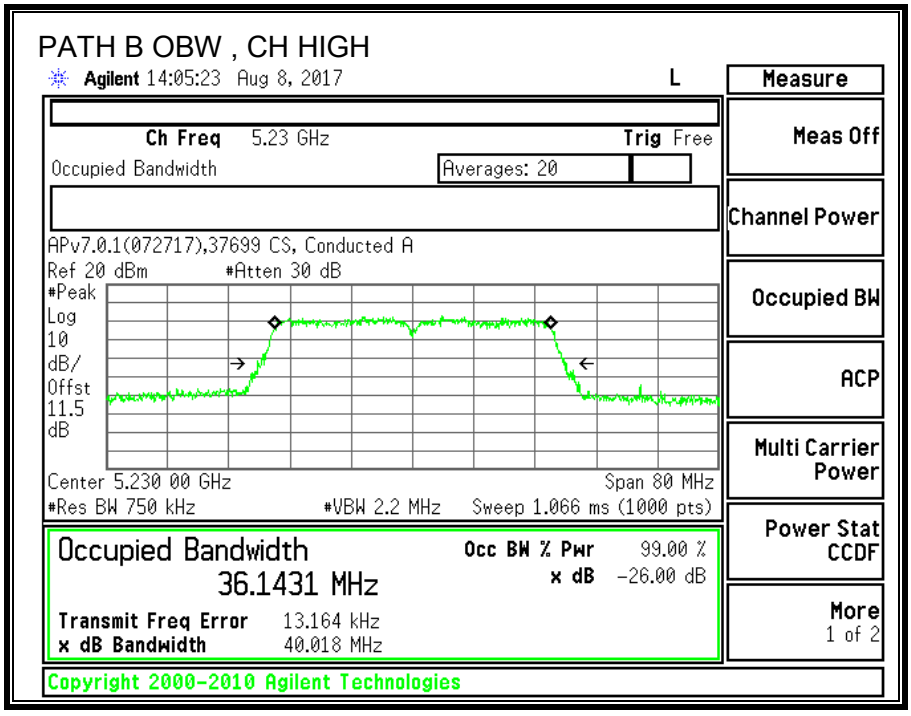
RESULTS

Channel	Frequency	99% BW PATH A (MHz)	99% BW PATH B (MHz)
Low	5190	36.0941	36.1675
High	5230	36.0662	36.1431









9.3.3. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-247 6.2.1(1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

Path A Antenna Gain (dBi)	Path B Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
2.20	2.90	2.56	5.57

RESULTS

ID:	37699	Date:	8/8/2017

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
Low	5190	40.9	36.0941	2.56	5.57
High	5230	40.7	36.0662	2.56	5.57

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max IC Power (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC eirp PSD Limit (dBm)	PPSD Limit (dBm)
Low	5190	24.00	23.00	20.44	20.44	11.00	10.00	4.43
High	5230	24.00	23.00	20.44	20.44	11.00	10.00	4.43

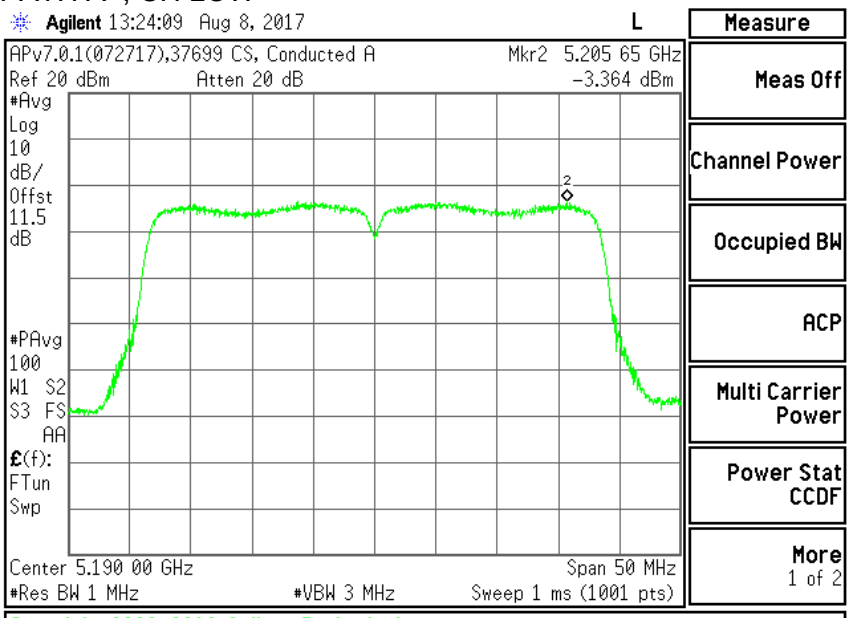
Output Power Results

Channel	Frequency (MHz)	Path A Meas Power (dBm)	Path B Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5190	9.77	10.02	12.91	20.44	-7.53
High	5230	9.64	9.44	12.55	20.44	-7.88

PPSD Results

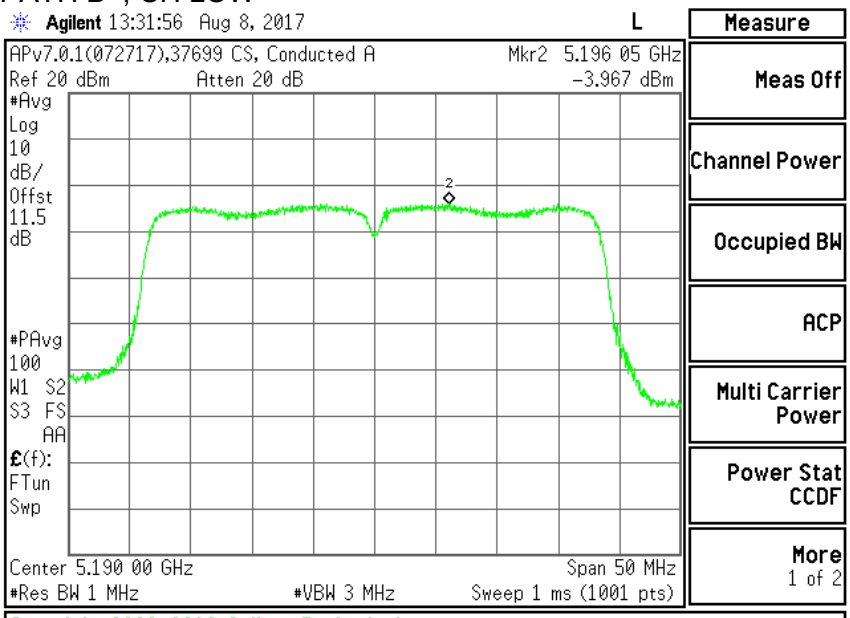
Channel	Frequency (MHz)	Path A Meas PPSD (dBm)	Path B Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5190	-3.36	-3.97	-0.64	4.43	-5.08
High	5230	-3.77	-3.95	-0.85	4.43	-5.28

PATH A , CH LOW



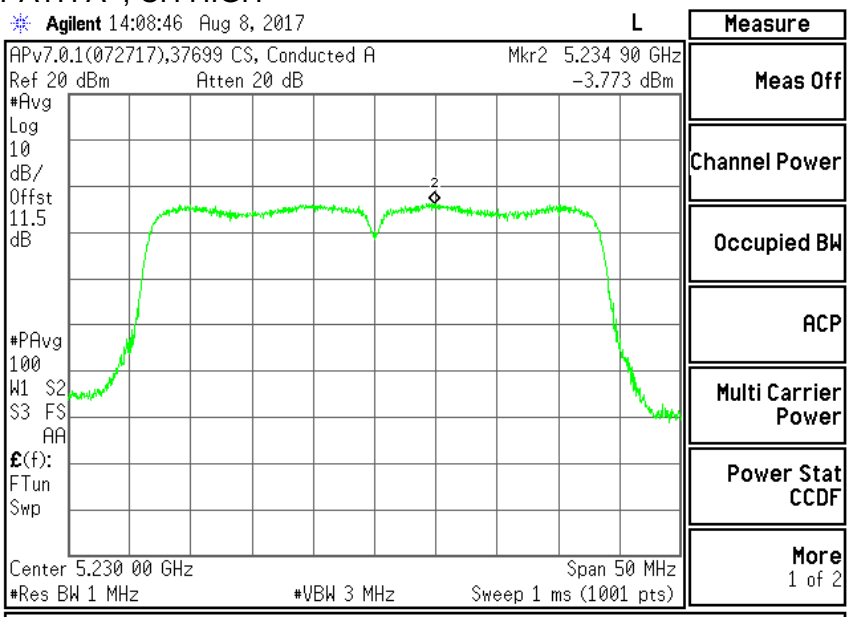
*Note:

PATH B , CH LOW



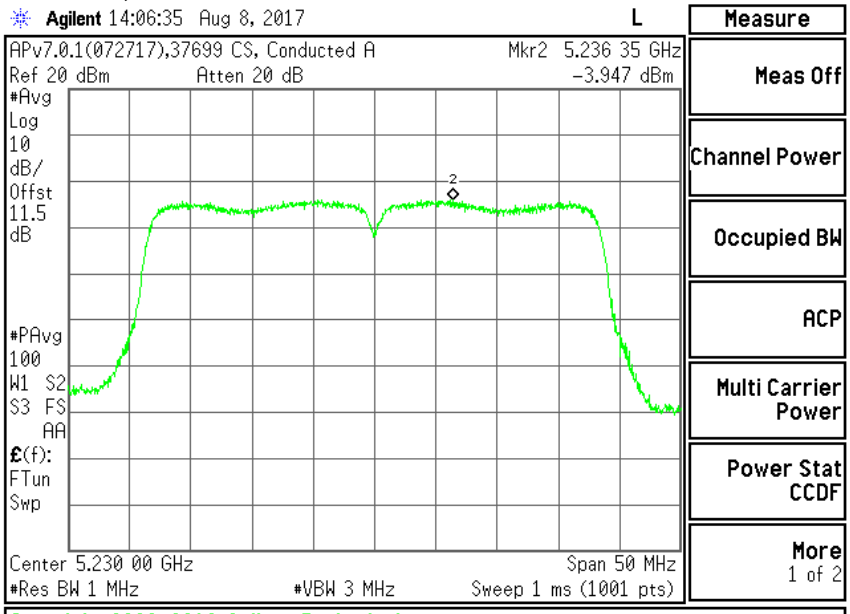
*Note:

PATH A , CH HIGH



*Note:

PATH B , CH HIGH



*Note:

9.4. 11ac VHT80 2TX MODE IN THE 5.2GHz BAND

9.4.1. 26 dB BANDWIDTH

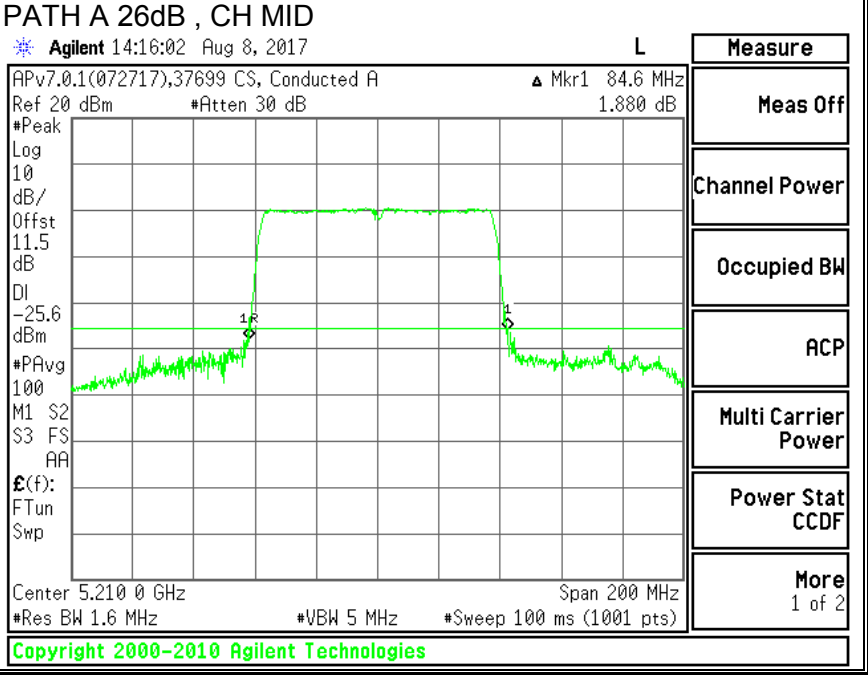
LIMITS

None; for reporting purposes only.

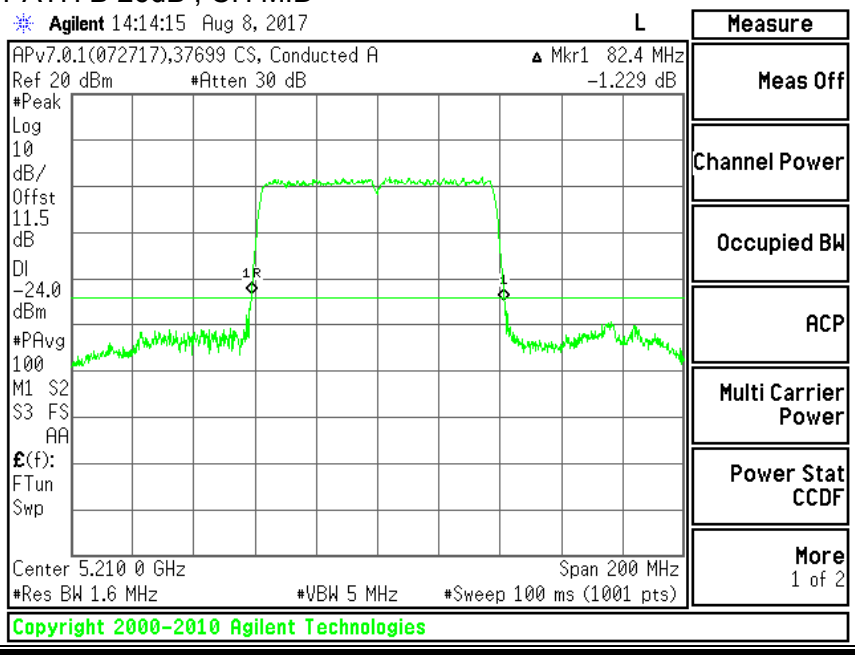
RESULTS

Channel	Frequency	26 dB BW PATH A (MHz)	26 dB BW PATH B (MHz)
Mid	5210	84.6	82.4

PATH A 26dB , CH MID



PATH B 26dB , CH MID



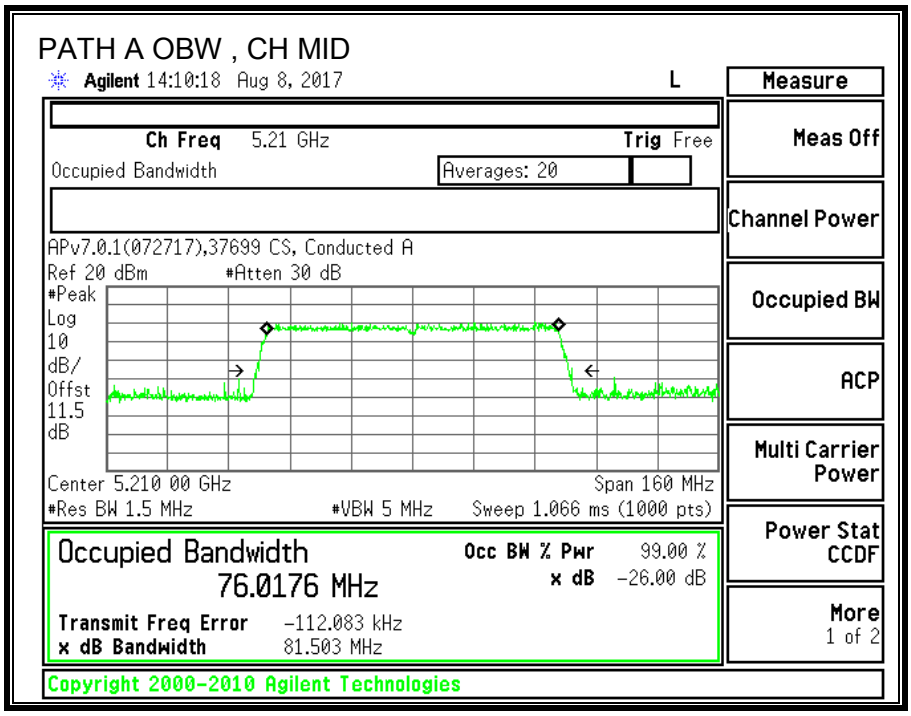
9.4.2. 99% BANDWIDTH

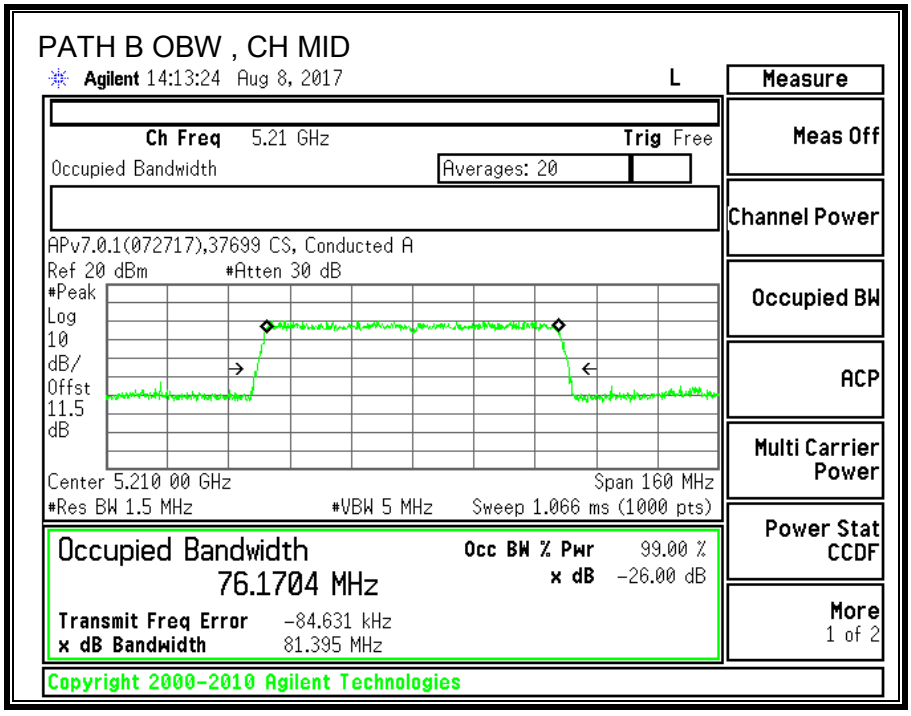
LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency	99% BW PATH A (MHz)	99% BW PATH B (MHz)
Mid	5210	76.0176	76.1704





9.4.3. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1)

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-247 6.2.1(1)

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

Path A Antenna Gain (dBi)	Path B Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
2.20	2.90	2.56	5.57

RESULTS

ID:	37699 CS	Date:	8/8/2017

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
Low	5210	82.40	76.01	2.56	5.57

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC EIRP Limit (dBm)	Max IC Power (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC eirp PSD Limit (dBm)	PPSD Limit (dBm)
Low	5210	24.00	23.00	20.44	20.44	11.00	10.00	4.43

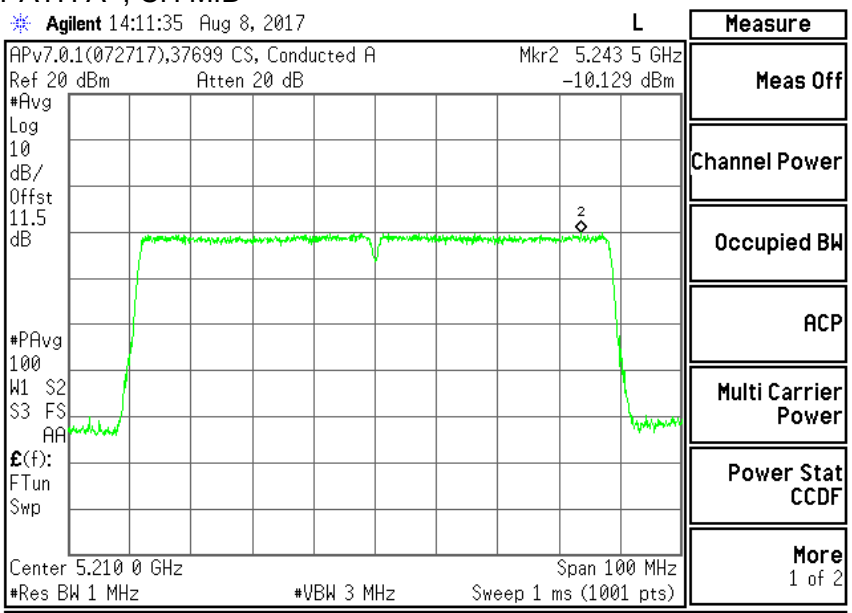
Output Power Results

Channel	Frequency (MHz)	Path A Meas Power (dBm)	Path B Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5210	6.78	6.59	9.70	20.44	-10.74

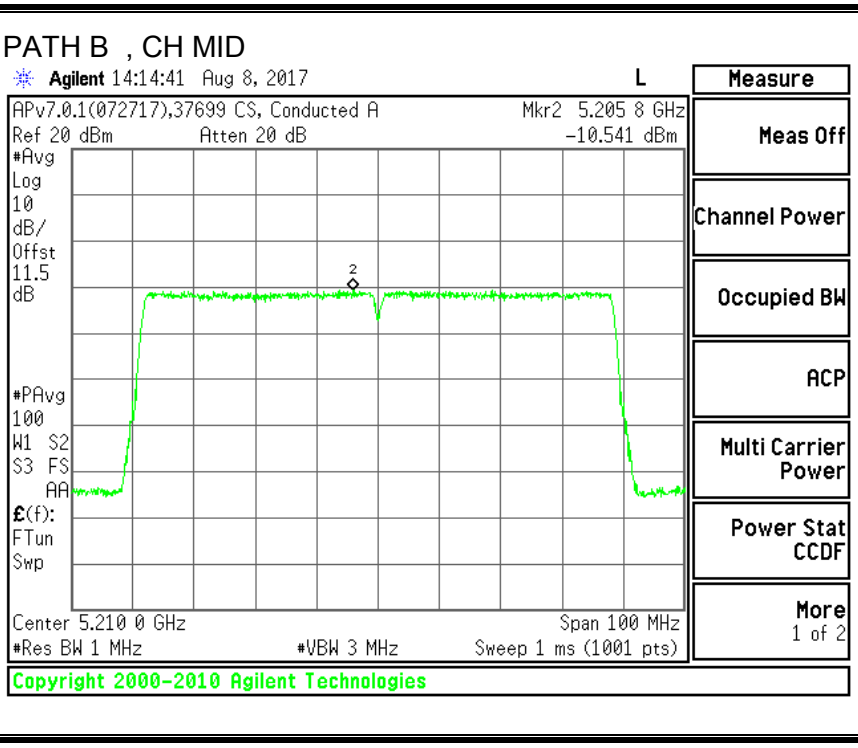
PPSD Results

Channel	Frequency (MHz)	Path A Meas PPSD (dBm)	Path B Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5210	-10.13	-10.54	-7.32	4.43	-11.75

PATH A , CH MID



PATH B , CH MID



9.5. 11a 2TX MODE IN THE 5.3GHz BAND

9.5.1. 26 dB BANDWIDTH

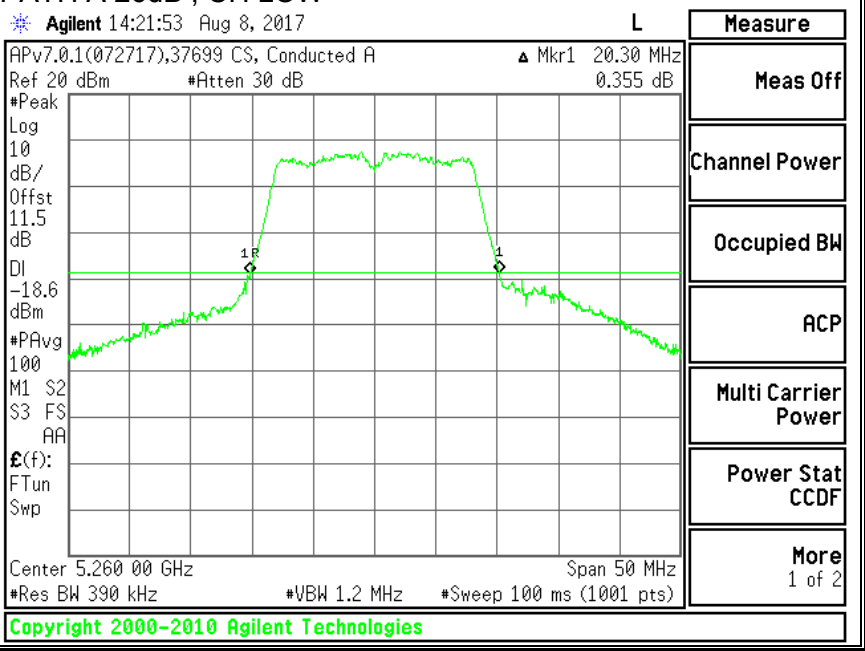
LIMITS

None; for reporting purposes only.

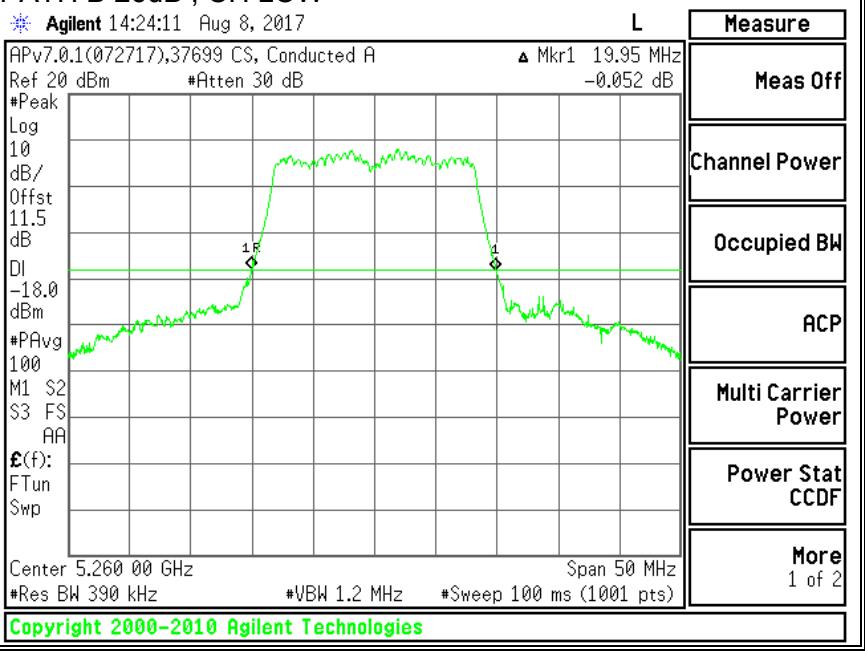
RESULTS

Channel	Frequency	26 dB BW PATH A (MHz)	26 dB BW PATH B (MHz)
Low	5260	20.3	19.95
Mid	5300	20.35	20
High	5320	20.35	20

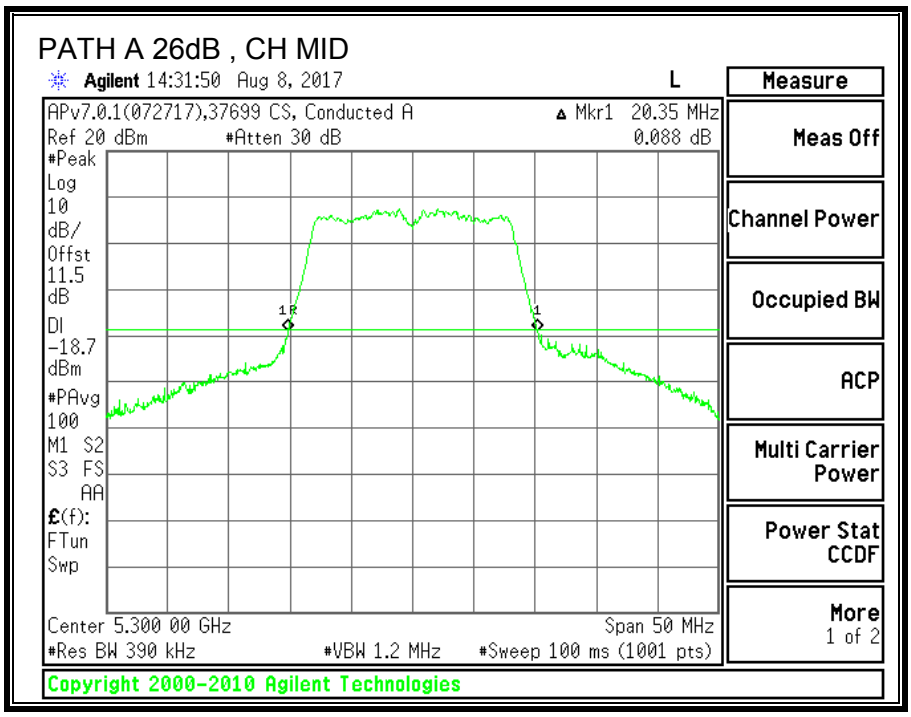
PATH A 26dB , CH LOW



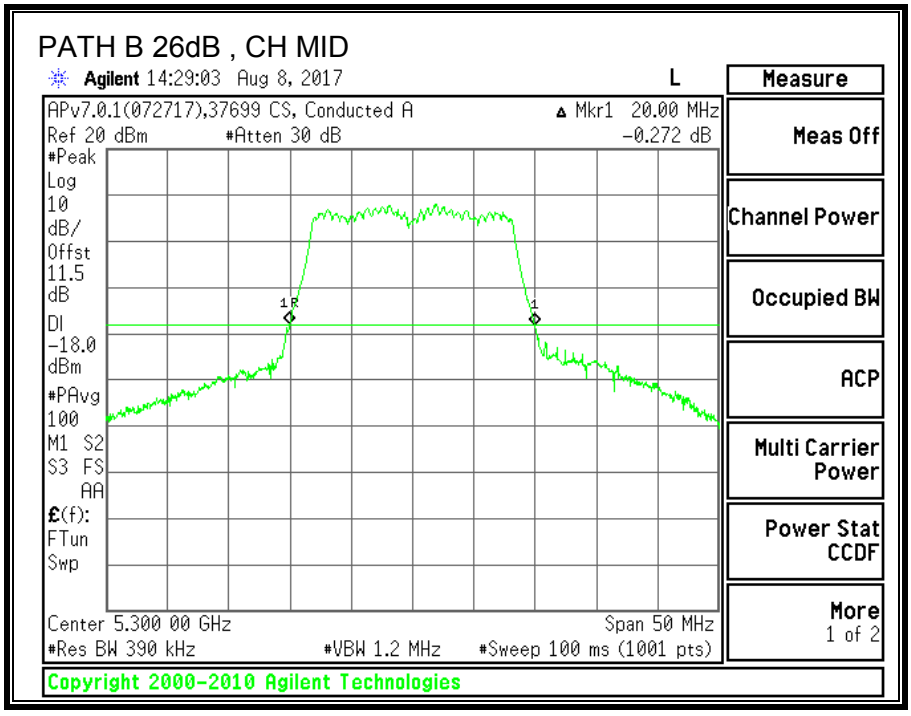
PATH B 26dB , CH LOW



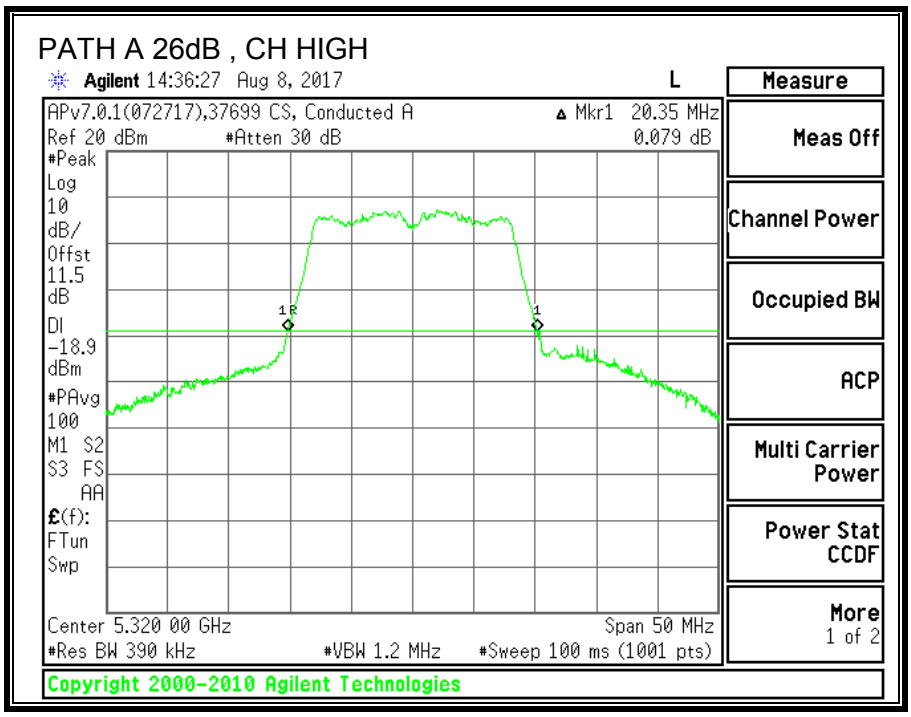
PATH A 26dB , CH MID



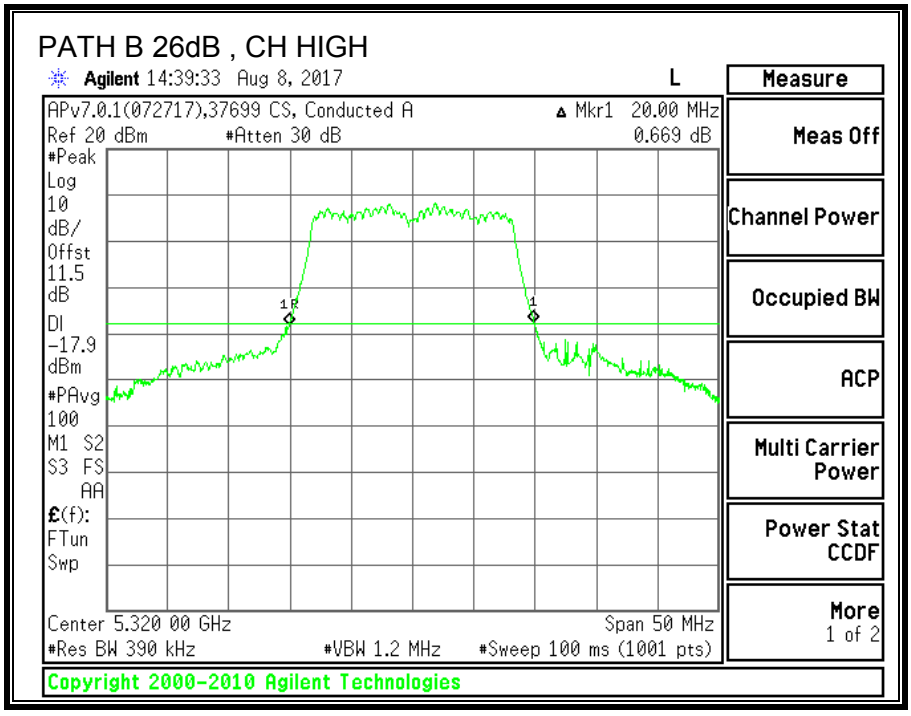
PATH B 26dB , CH MID



PATH A 26dB , CH HIGH



PATH B 26dB , CH HIGH



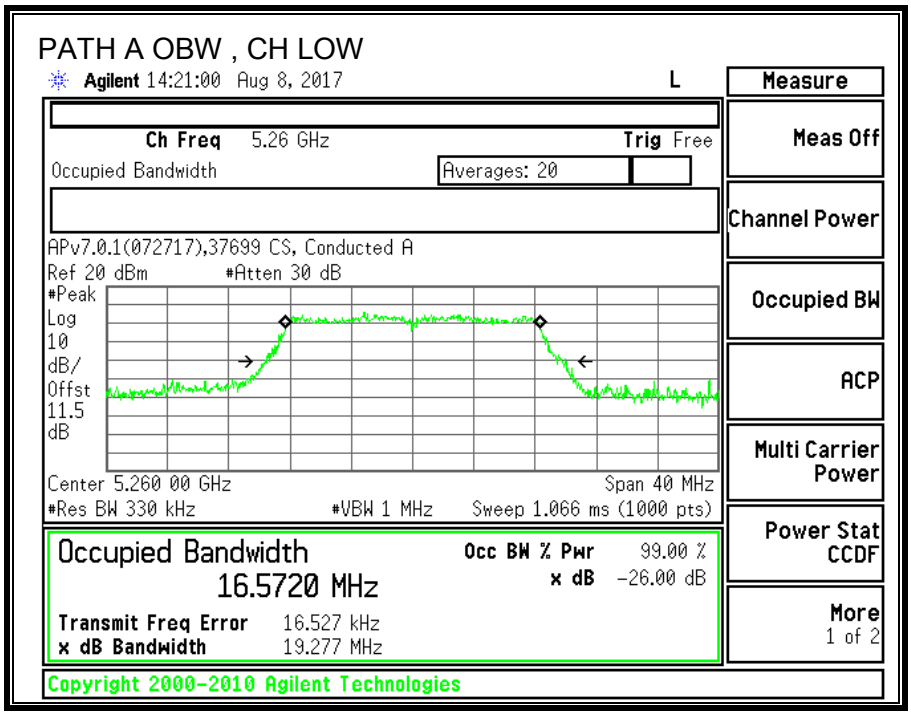
9.5.2. 99% BANDWIDTH

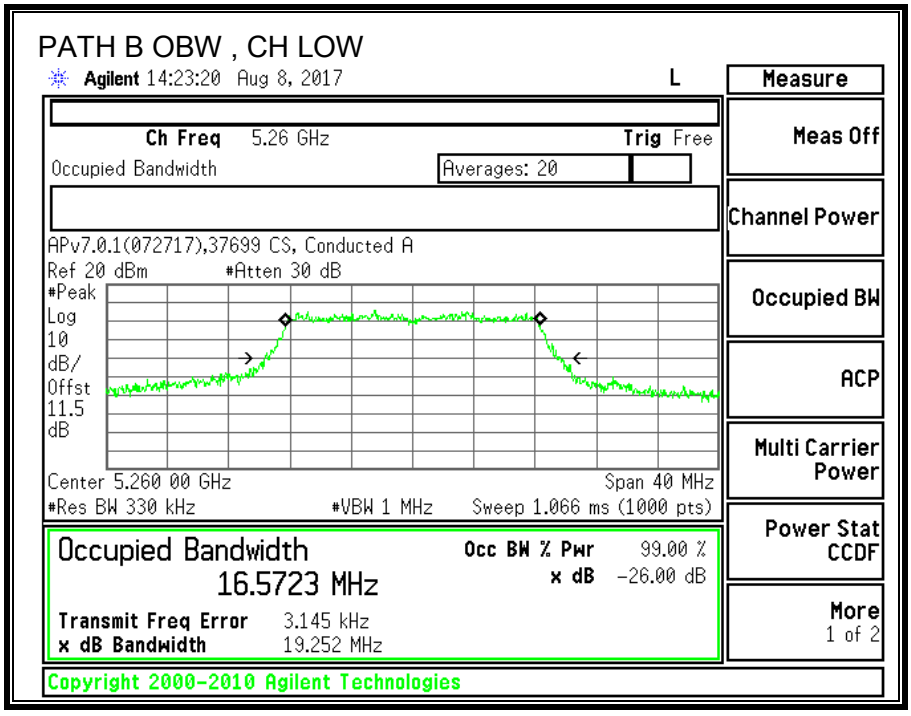
LIMITS

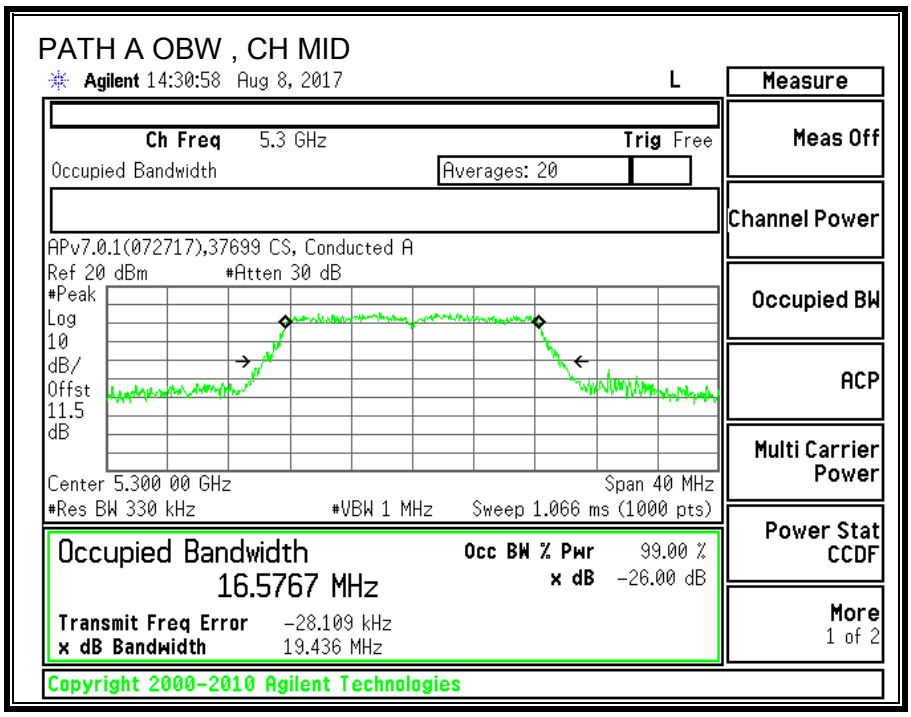
None; for reporting purposes only.

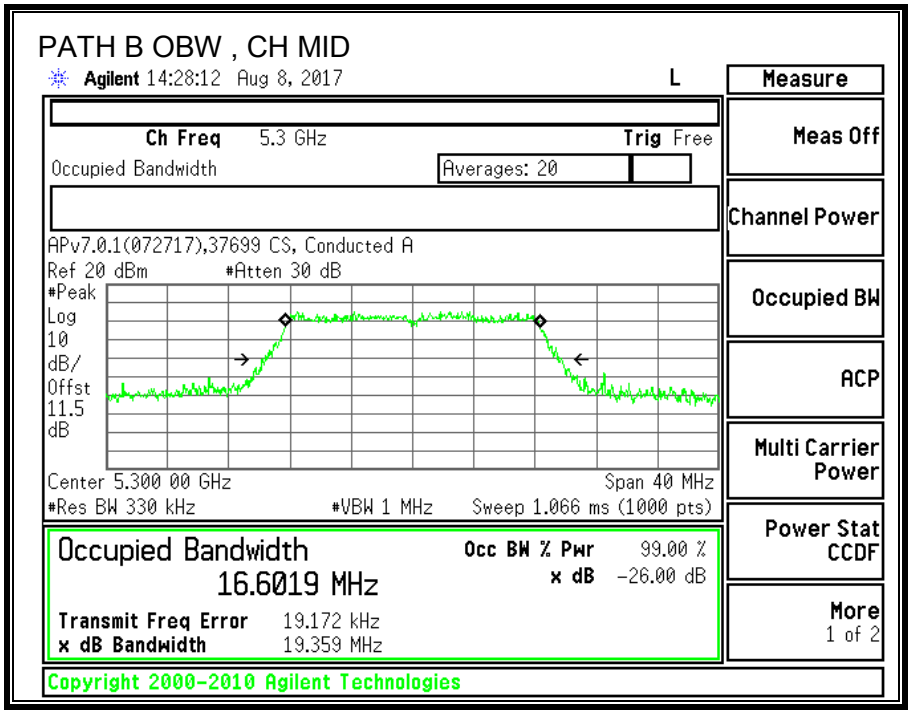
RESULTS

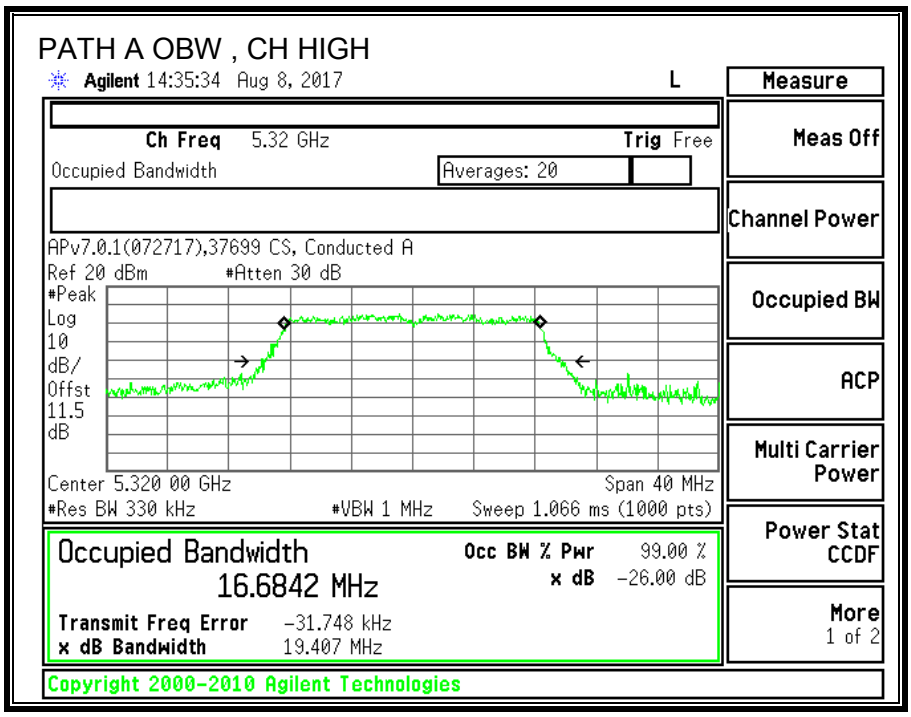
Channel	Frequency	99% BW PATH A (MHz)	99% BW PATH B (MHz)
Low	5260	16.5720	16.5723
Mid	5300	16.5767	16.6019
High	5320	16.6842	16.6398

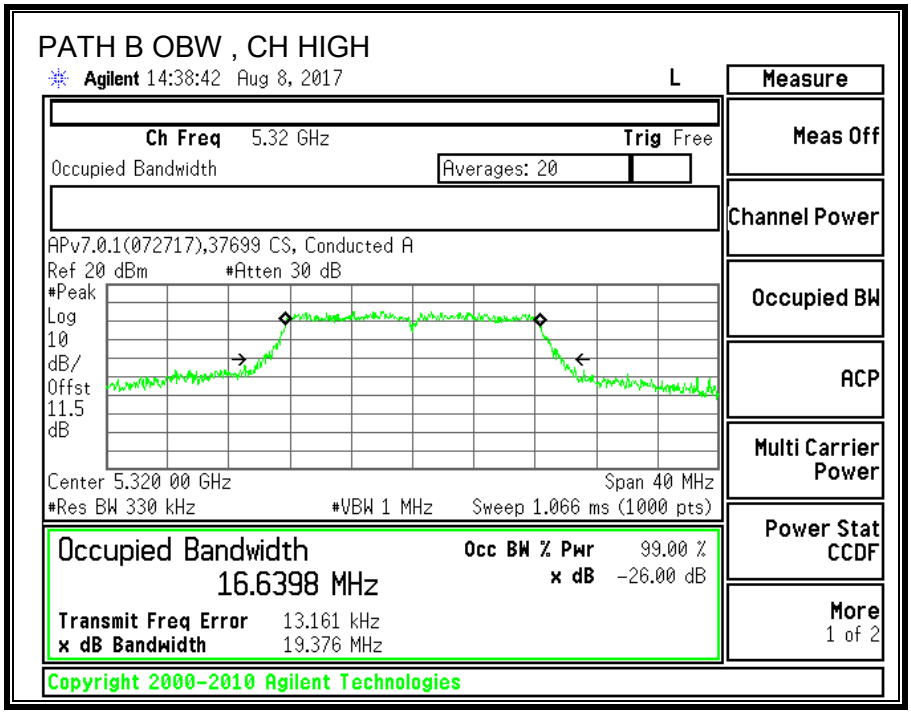












9.5.3. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (2)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-247 (6.2.2) (1)

The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

Path A Antenna Gain (dBi)	Path B Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
2.50	2.80	2.65	5.66

RESULTS

ID:	37699 CS	Date:	8/8/2017

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
Low	5260	19.95	16.572	2.65	5.66
Mid	5300	20	16.5767	2.65	5.66
High	5320	20	16.64	2.65	5.66

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC PSD Limit (dBm)	PPSD Limit (dBm)
Low	5260	24.00	23.19	27.00	23.19	11.00	11.00	11.00
Mid	5300	24.00	23.19	27.00	23.19	11.00	11.00	11.00
High	5320	24.00	23.21	27.00	23.21	11.00	11.00	11.00

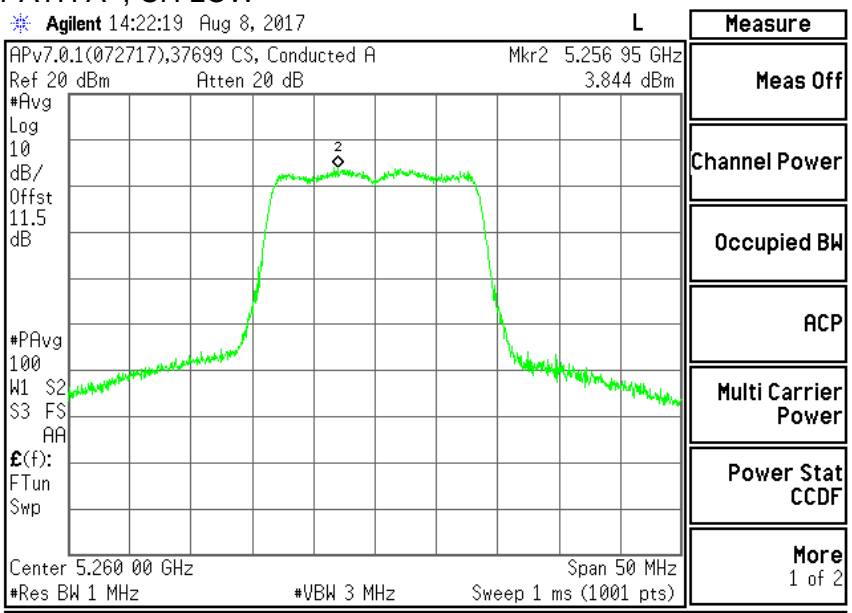
Output Power Results

Channel	Frequency (MHz)	Path A Meas Power (dBm)	Path B Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	13.61	13.57	16.60	23.19	-6.59
Mid	5300	13.67	13.61	16.65	23.19	-6.54
High	5320	13.57	13.67	16.63	23.21	-6.58

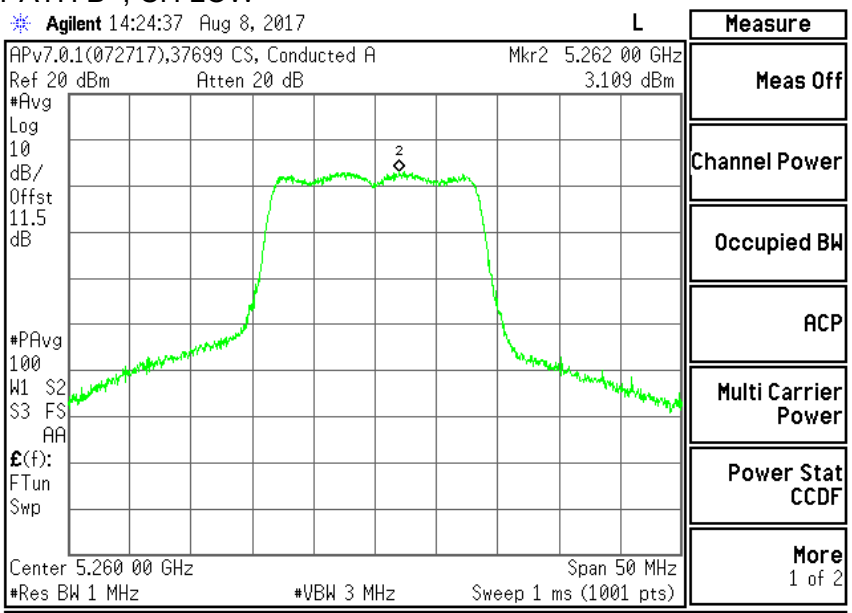
PPSD Results

Channel	Frequency (MHz)	Path A Meas PPSD (dBm)	Path B Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5260	3.84	3.11	6.50	11.00	-4.50
Mid	5300	3.50	3.17	6.35	11.00	-4.65
High	5320	3.27	3.53	6.41	11.00	-4.59

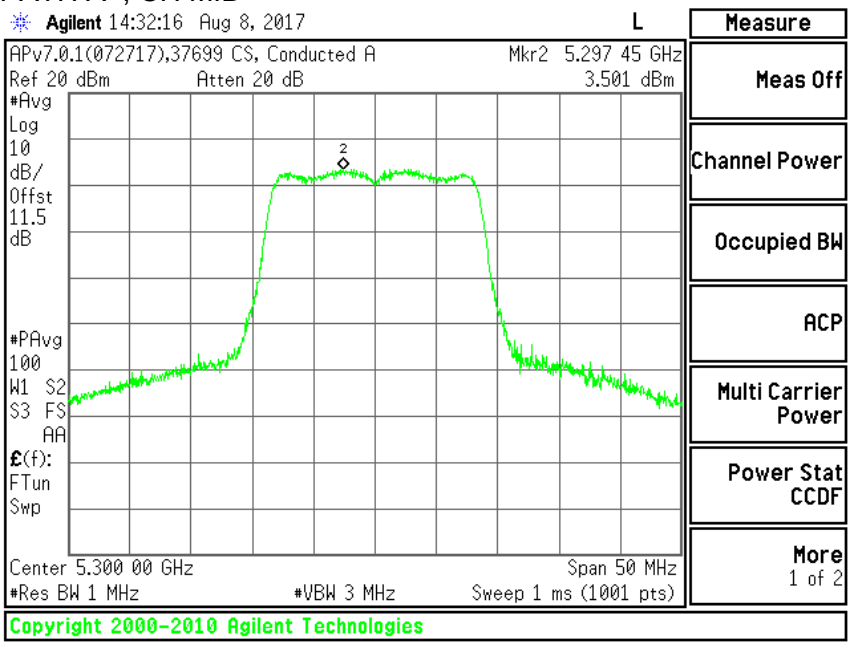
PATH A , CH LOW



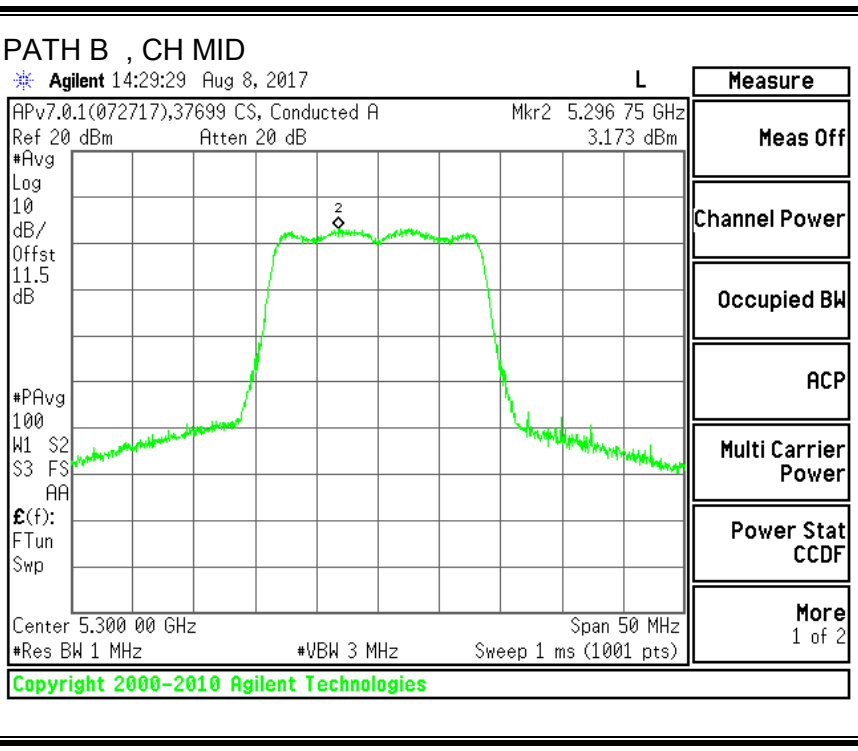
PATH B , CH LOW



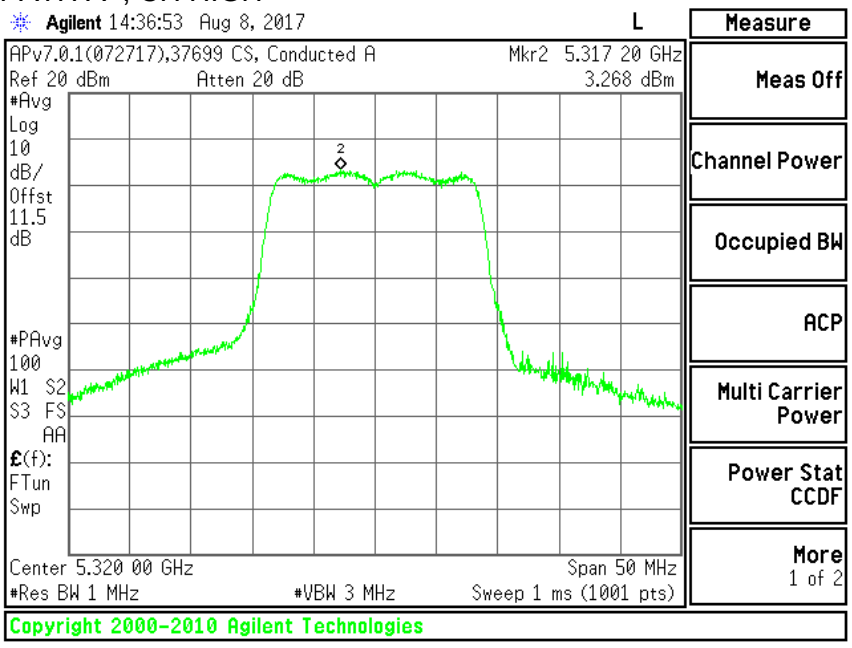
PATH A , CH MID



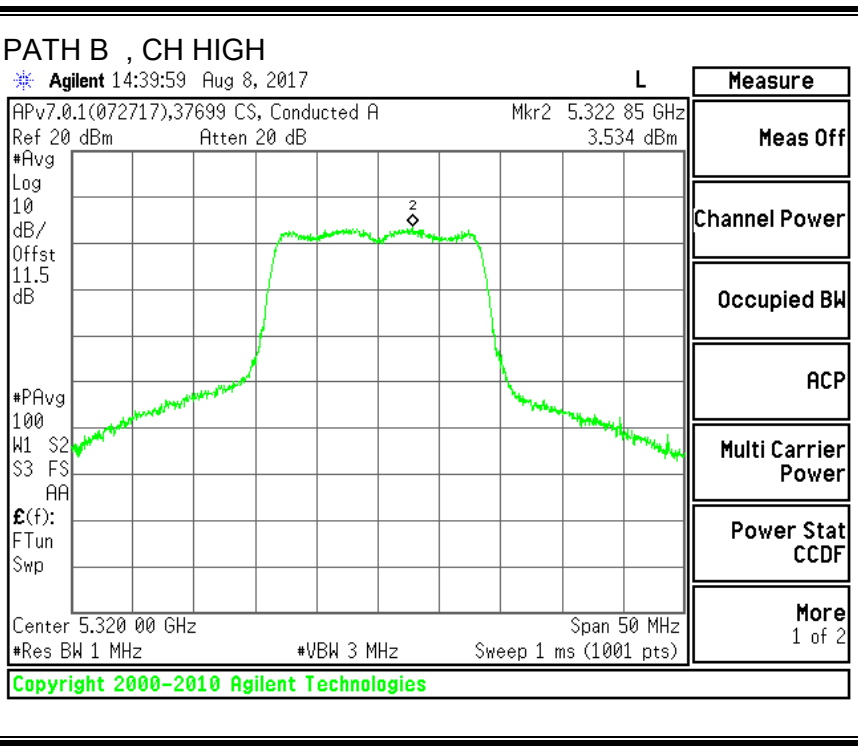
PATH B , CH MID



PATH A , CH HIGH



PATH B , CH HIGH



9.6. 11n HT20 2TX MODE IN THE 5.3GHz BAND

9.6.1. 26 dB BANDWIDTH

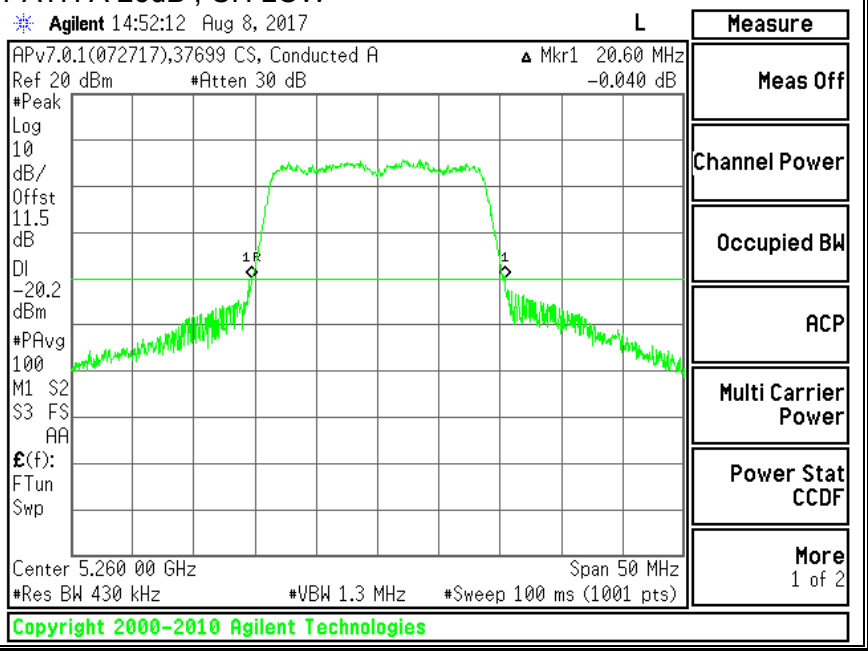
LIMITS

None; for reporting purposes only.

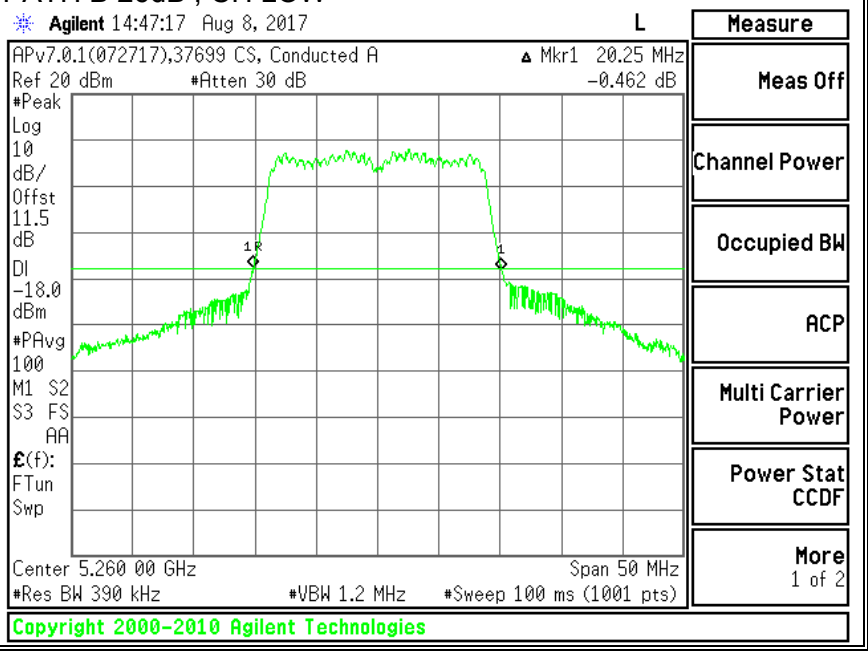
RESULTS

Channel	Frequency	26 dB BW PATH A (MHz)	26 dB BW PATH B (MHz)
Low	5260	20.6	20.25
Mid	5300	20.5	20.3
High	5320	20.6	20.3

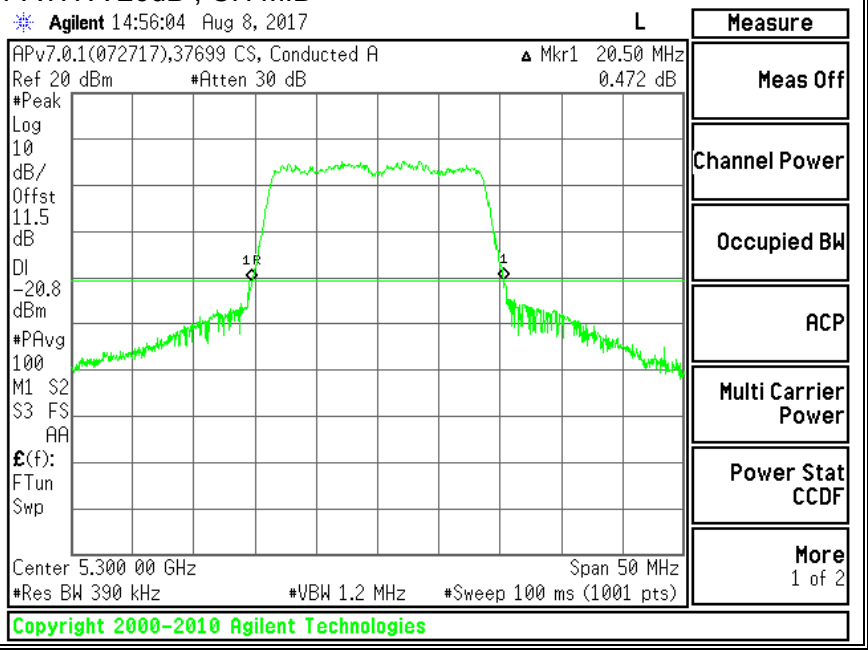
PATH A 26dB , CH LOW



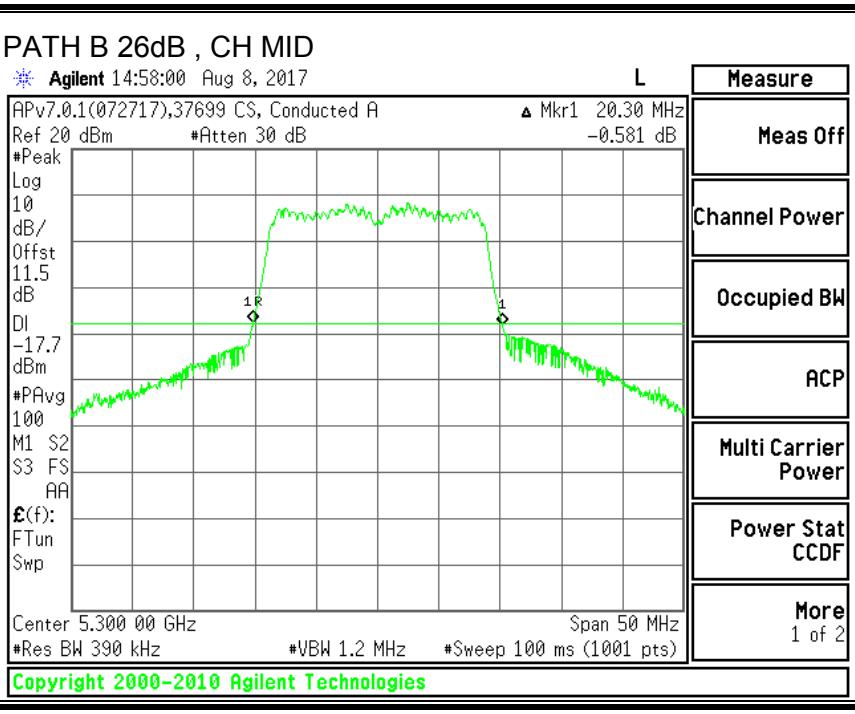
PATH B 26dB , CH LOW



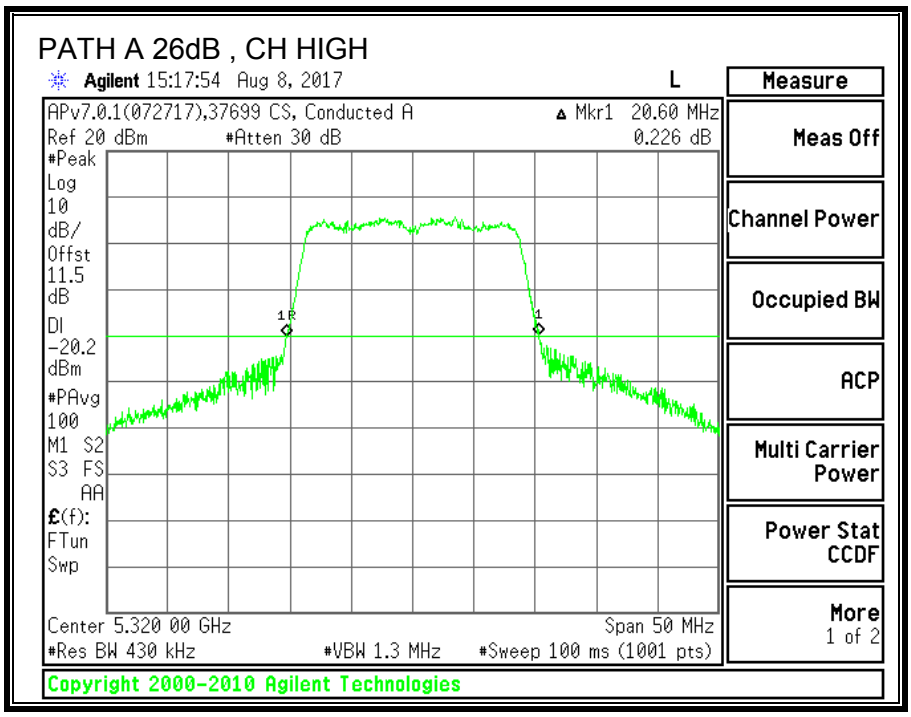
PATH A 26dB , CH MID



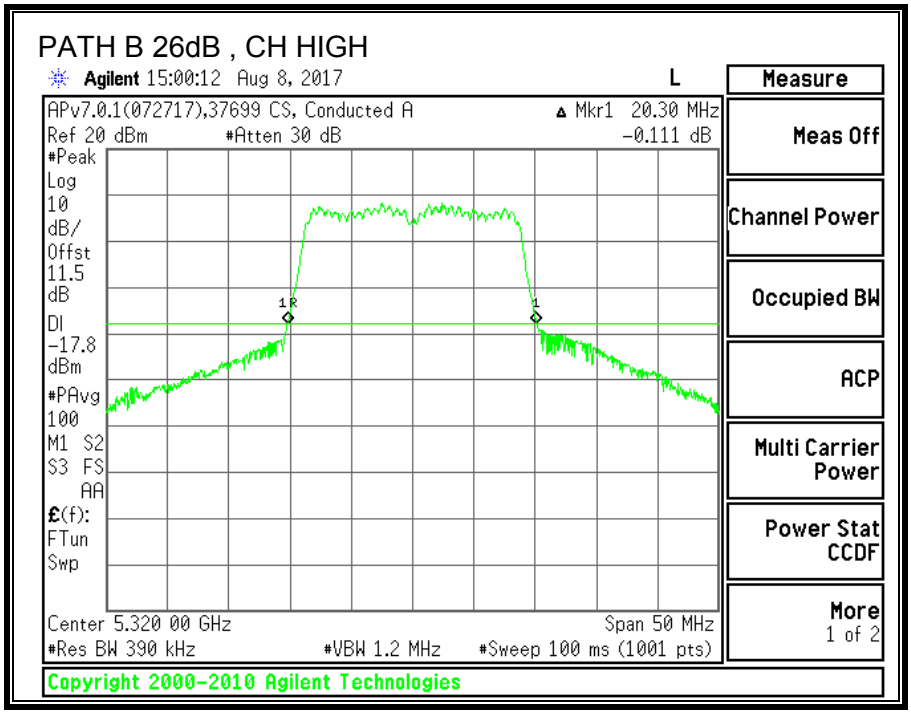
PATH B 26dB , CH MID



PATH A 26dB , CH HIGH



PATH B 26dB , CH HIGH



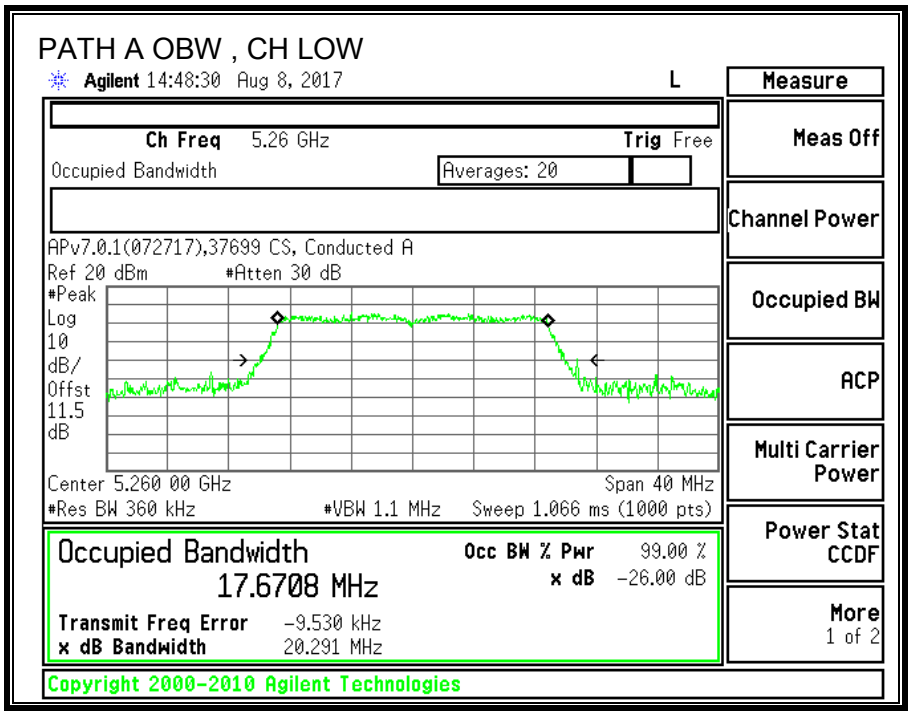
9.6.2. 99% BANDWIDTH

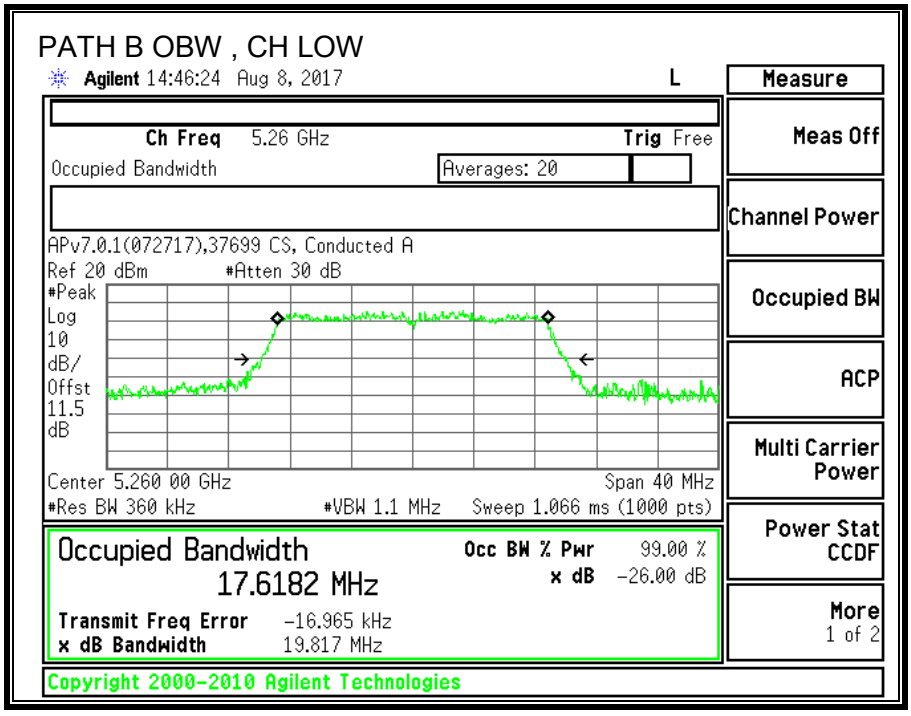
LIMITS

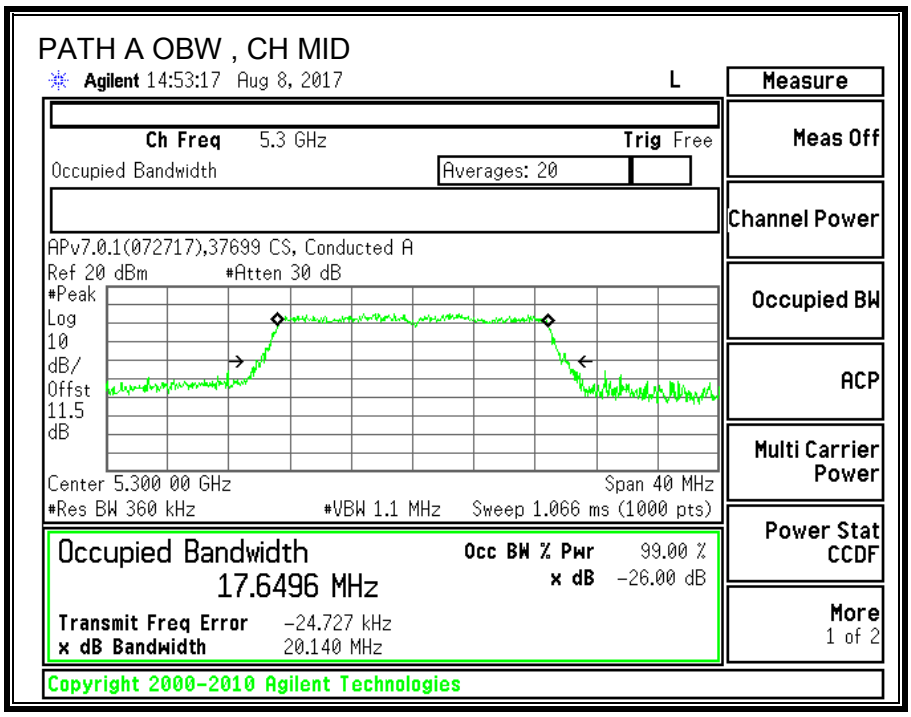
None; for reporting purposes only.

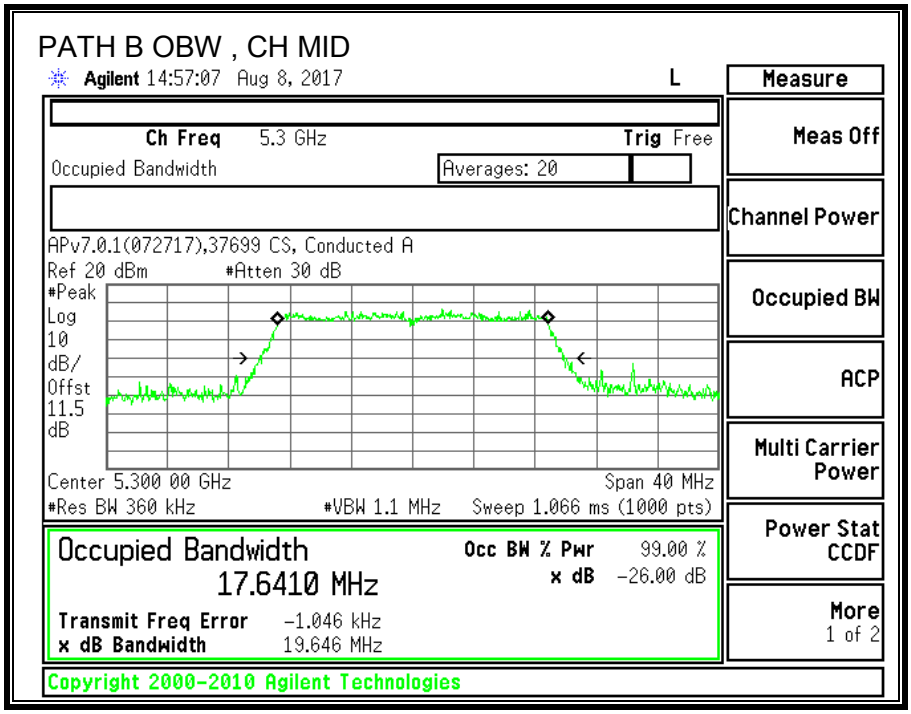
RESULTS

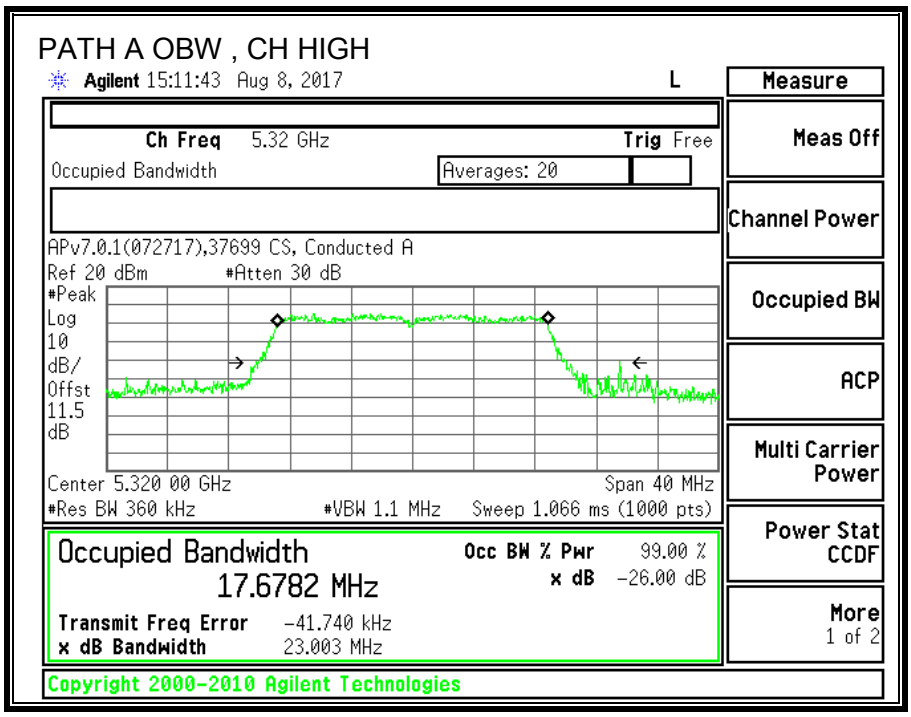
Channel	Frequency	99% BW PATH A (MHz)	99% BW PATH B (MHz)
Low	5260	17.6708	17.6182
Mid	5300	17.6496	17.6410
High	5320	17.6782	17.6386

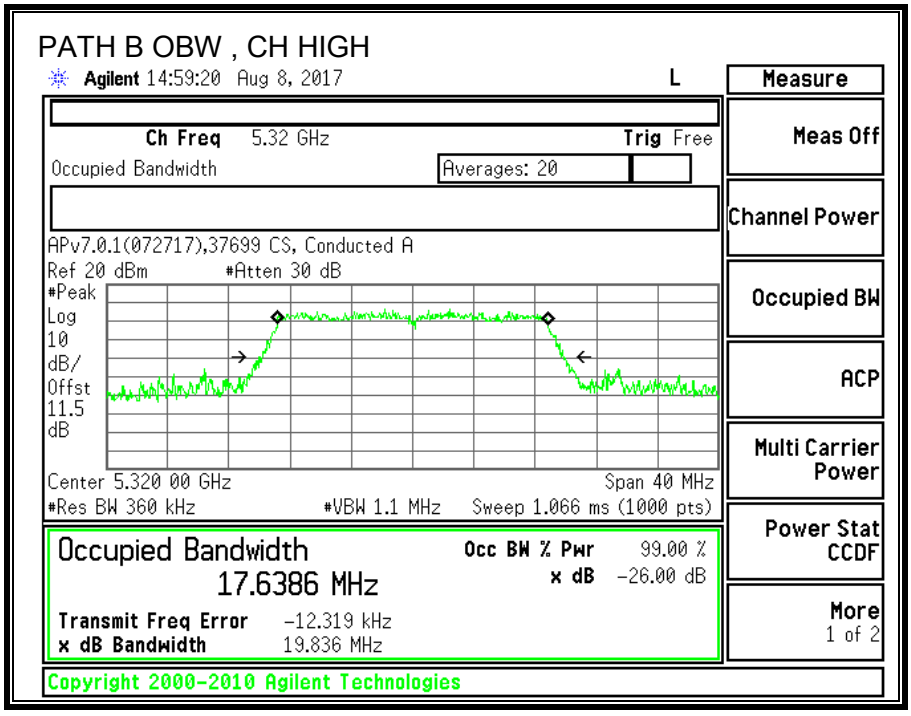












9.6.3. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (2)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-247 (6.2.2) (1)

The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

Path A Antenna Gain (dBi)	Path B Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
2.50	2.80	2.65	5.66

RESULTS

ID:	37699 CS	Date:	8/8/2017

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
Low	5260	20.25	17.6182	2.65	5.66
Mid	5300	20.3	17.641	2.65	5.66
High	5320	20.3	17.6386	2.65	5.66

Limits

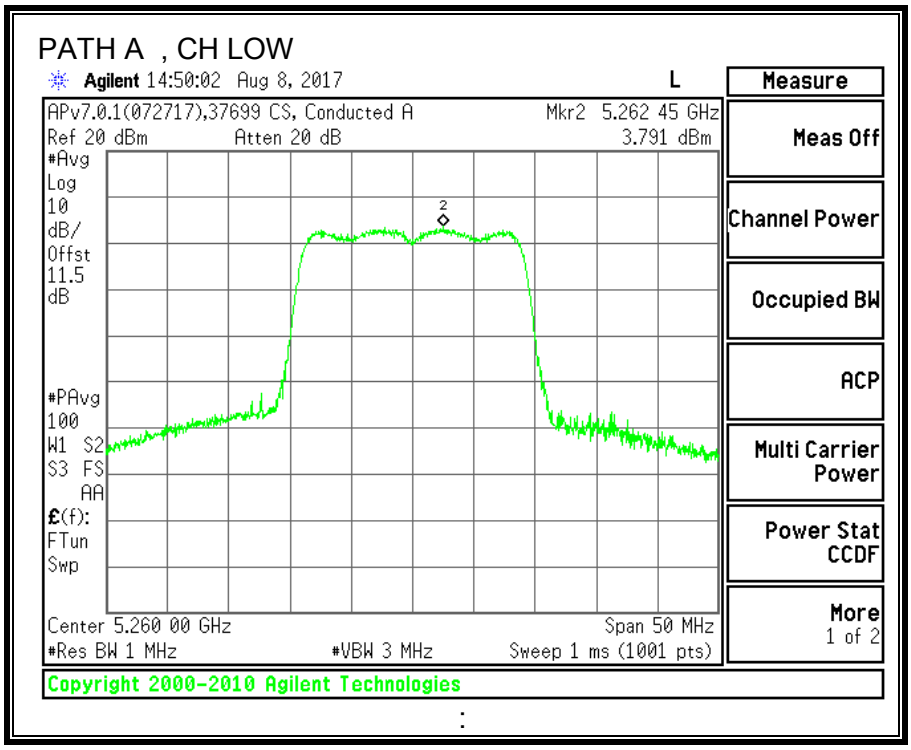
Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC PSD Limit (dBm)	PPSD Limit (dBm)
Low	5260	24.00	23.46	27.00	23.46	11.00	11.00	11.00
Mid	5300	24.00	23.47	27.00	23.47	11.00	11.00	11.00
High	5320	24.00	23.46	27.00	23.46	11.00	11.00	11.00

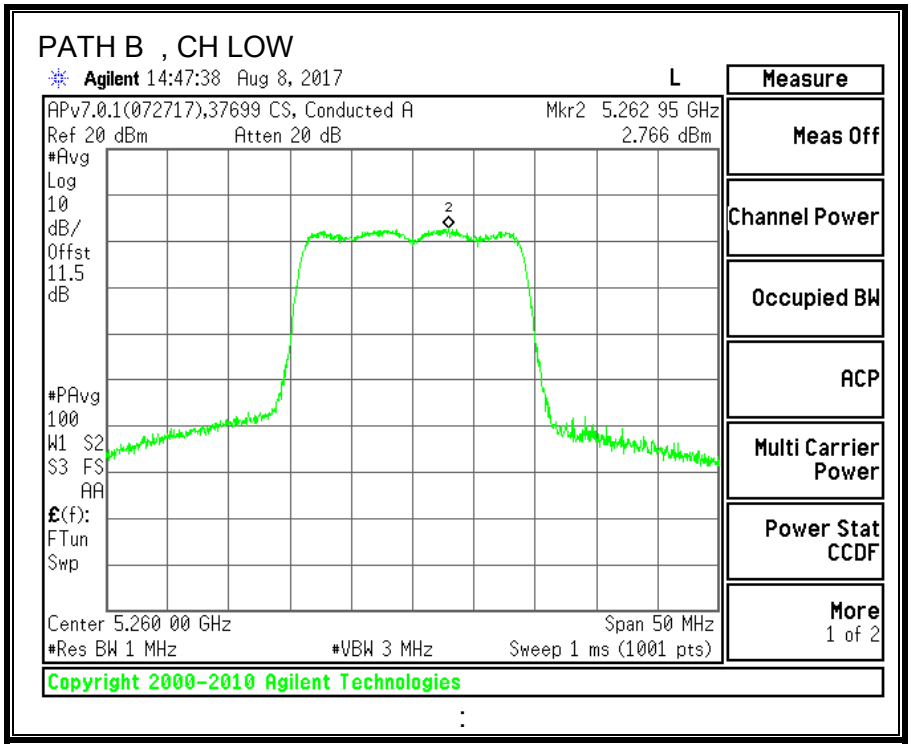
Output Power Results

Channel	Frequency (MHz)	Path A Meas Power (dBm)	Path B Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	13.87	13.61	16.75	23.46	-6.71
Mid	5300	13.67	13.74	16.72	23.47	-6.75
High	5320	13.76	13.65	16.72	23.46	-6.75

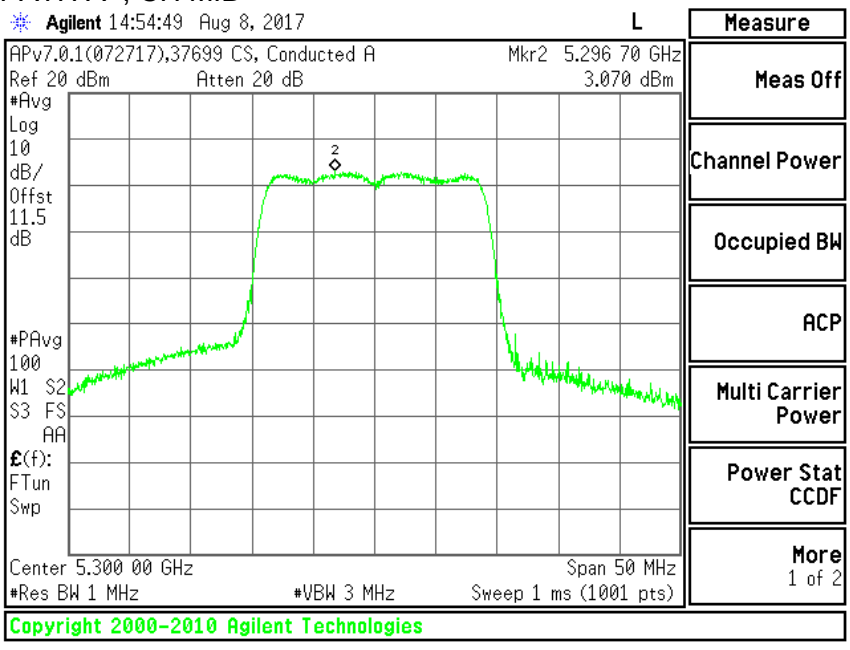
PPSD Results

Channel	Frequency (MHz)	Path A Meas PPSD (dBm)	Path B Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5260	3.79	2.77	6.32	11.00	-4.68
Mid	5300	3.07	2.97	6.03	11.00	-4.97
High	5320	3.23	2.94	6.10	11.00	-4.90

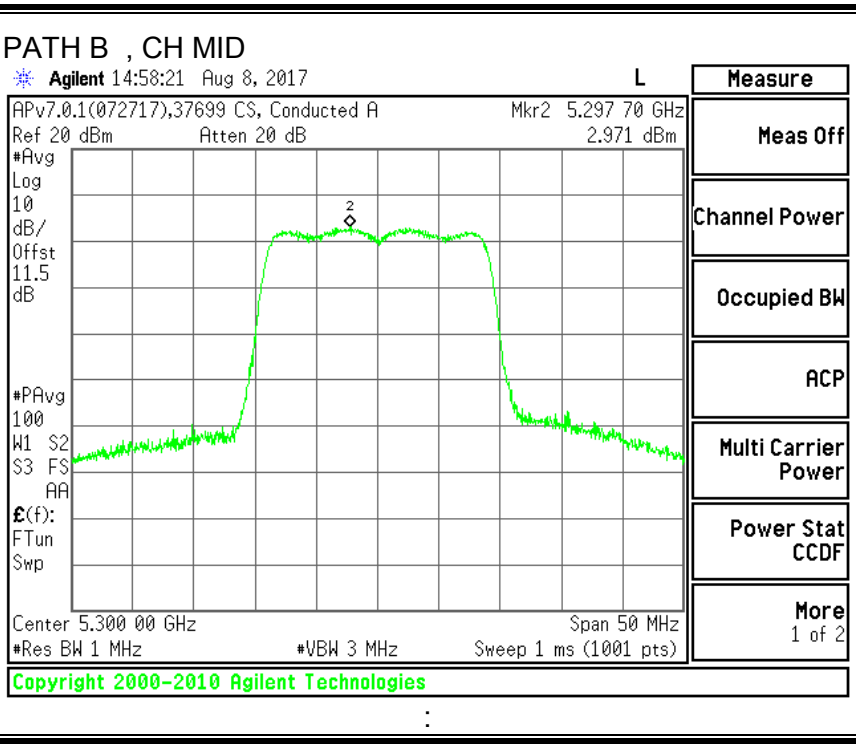




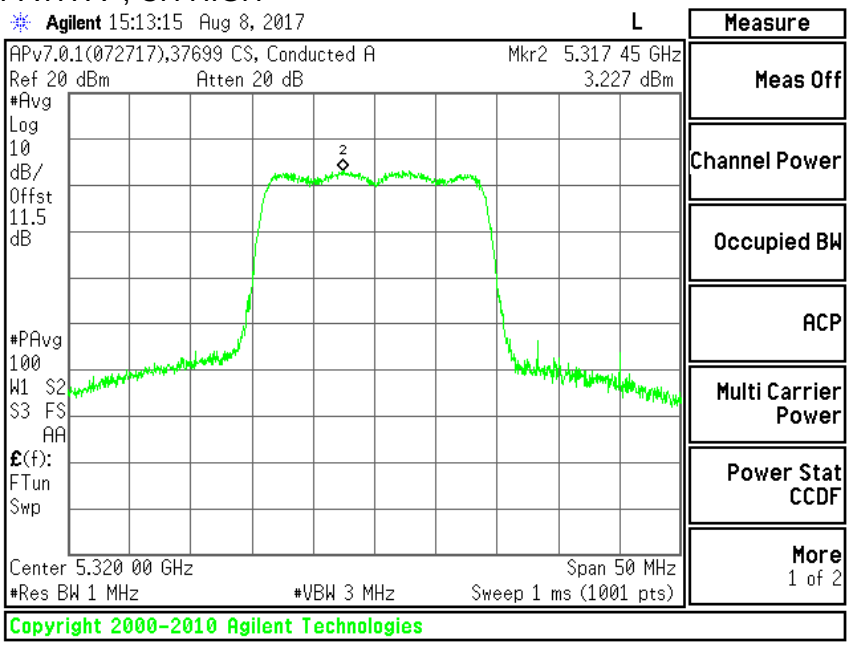
PATH A , CH MID



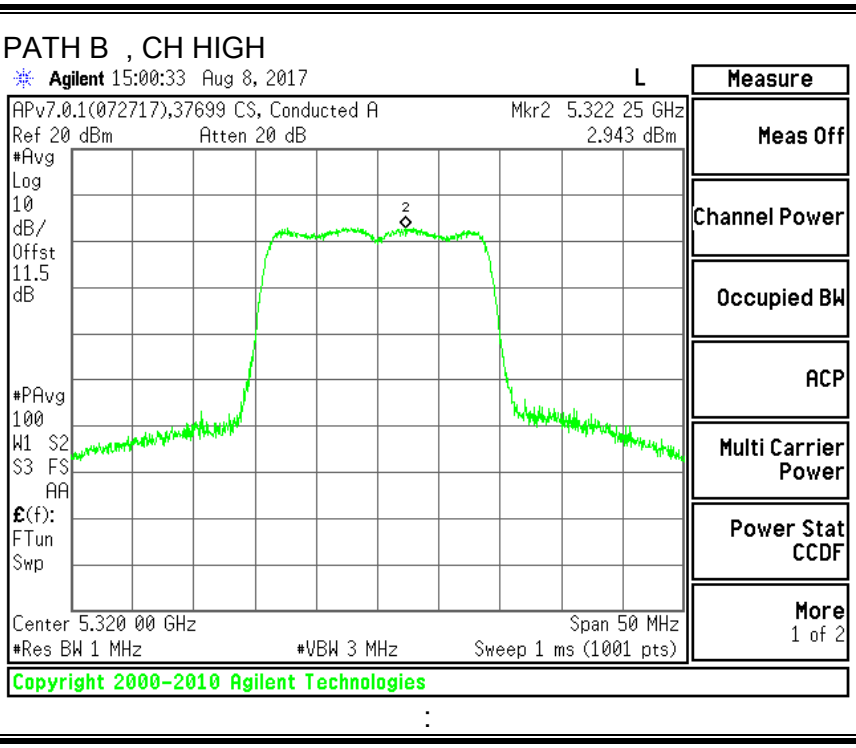
PATH B , CH MID



PATH A , CH HIGH



PATH B , CH HIGH



9.7. 11n HT40 2TX MODE IN THE 5.3GHz BAND

9.7.1. 26 dB BANDWIDTH

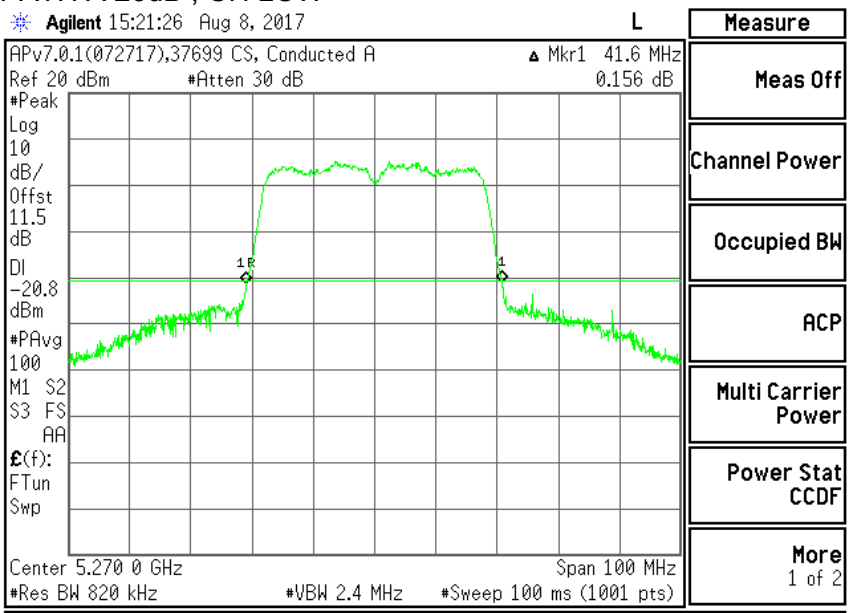
LIMITS

None; for reporting purposes only.

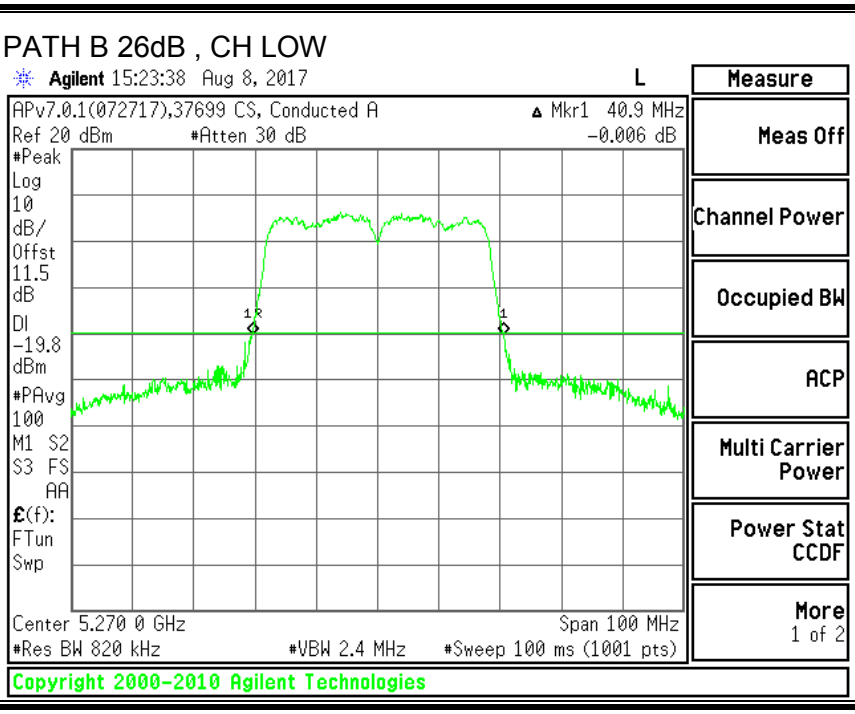
RESULTS

Channel	Frequency	26 dB BW PATH A (MHz)	26 dB BW PATH B (MHz)
Low	5270	41.6	40.9
High	5310	41.7	40.8

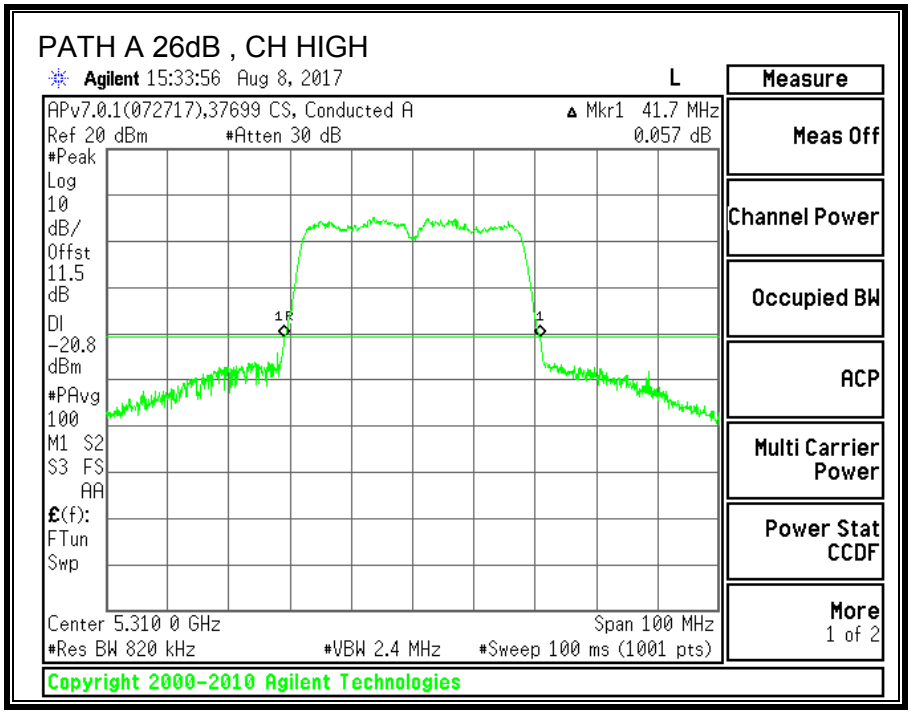
PATH A 26dB , CH LOW



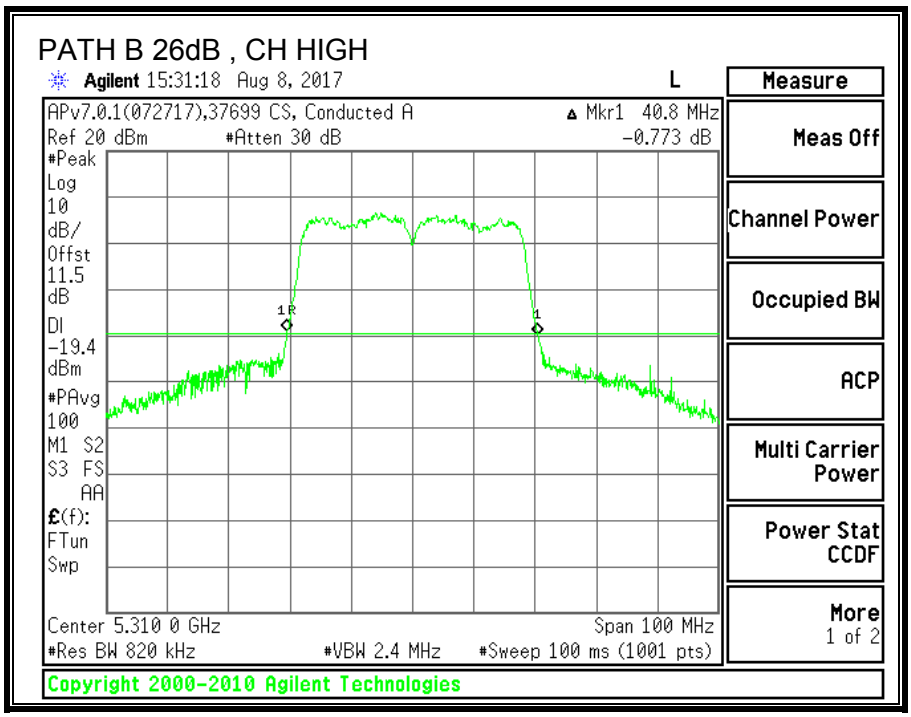
PATH B 26dB , CH LOW



PATH A 26dB , CH HIGH



PATH B 26dB , CH HIGH



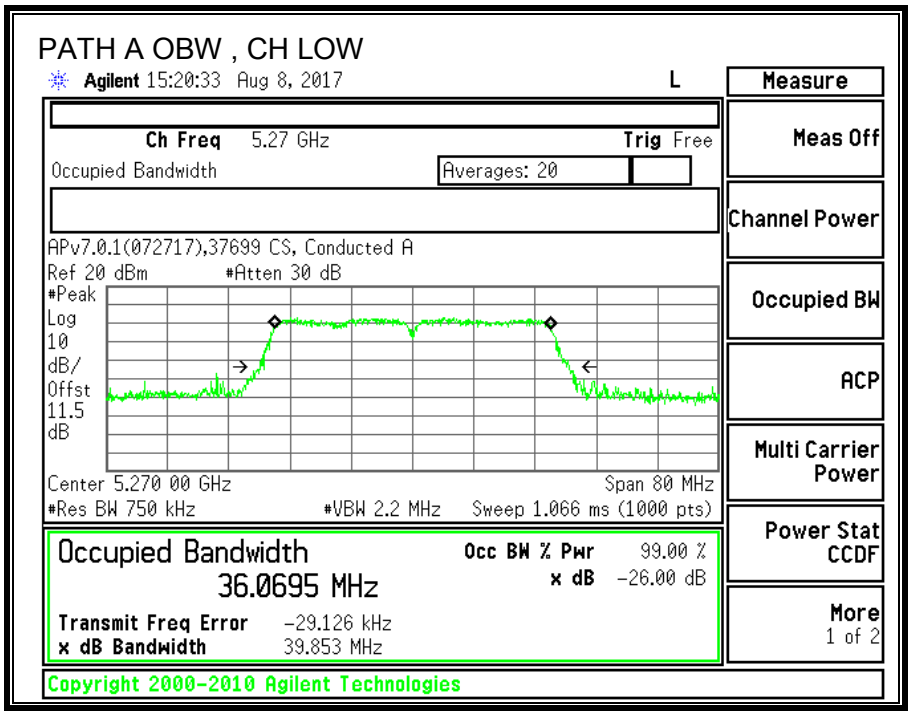
9.7.2. 99% BANDWIDTH

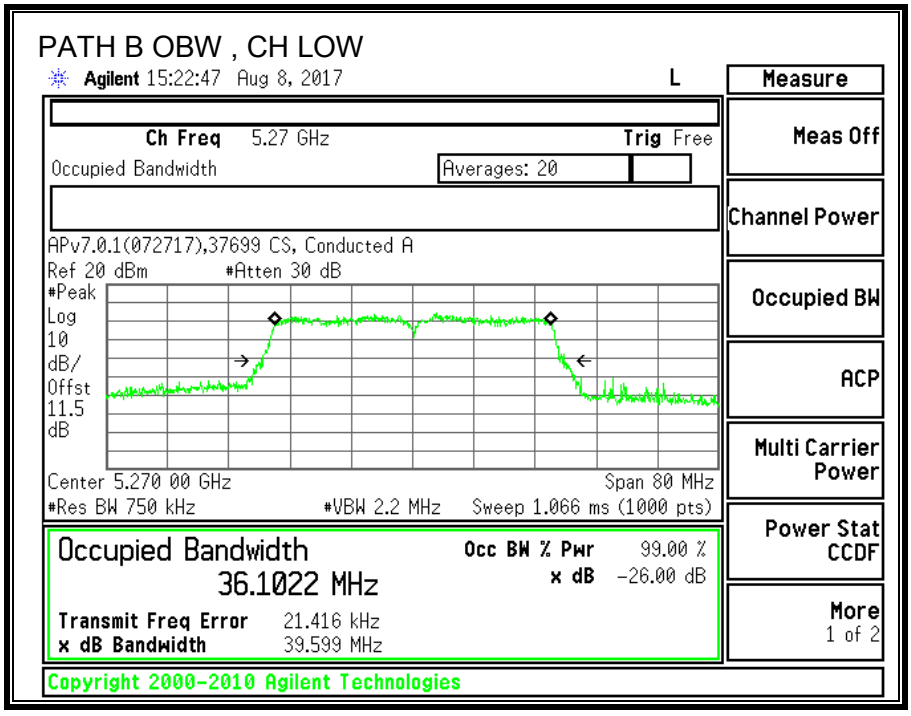
LIMITS

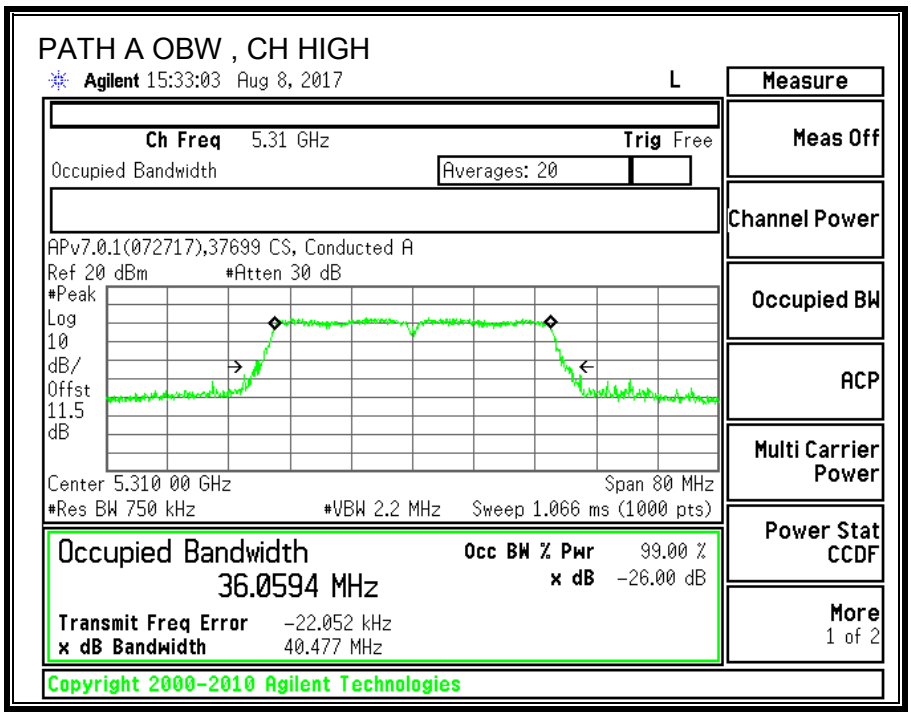
None; for reporting purposes only.

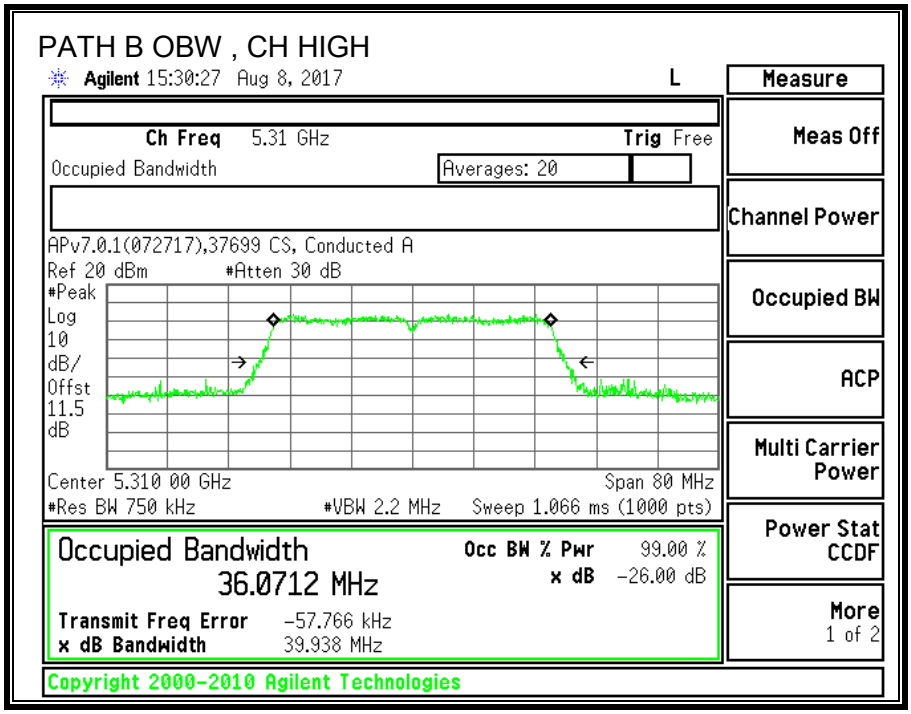
RESULTS

Channel	Frequency	99% BW PATH A (MHz)	99% BW PATH B (MHz)
Low	5270	36.0695	36.1022
High	5310	36.0594	36.0712









9.7.3. OUTPUT POWER AND PPSD

FCC §15.407 (a) (2)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-247 (6.2.2) (1)

The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

Path A Antenna Gain (dBi)	Path B Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
2.50	2.80	2.65	5.66

RESULTS

ID:	37699	Date:	8/8/2017

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
Low	5270	40.9	36.0695	2.65	5.66
High	5310	40.8	36.0594	2.65	5.66

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC PSD Limit (dBm)	PPSD Limit (dBm)
Low	5270	24.00	24.00	30.00	24.00	11.00	11.00	11.00
High	5310	24.00	24.00	30.00	24.00	11.00	11.00	11.00

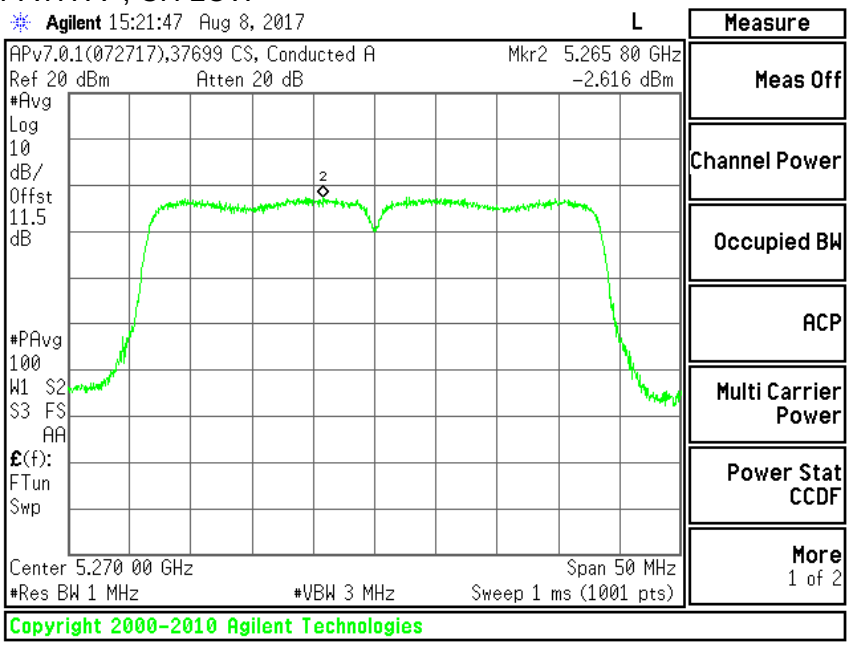
Output Power Results

Channel	Frequency (MHz)	Path A Meas Power (dBm)	Path B Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5270	10.81	10.46	13.65	24.00	-10.35
High	5310	9.51	9.77	12.65	24.00	-11.35

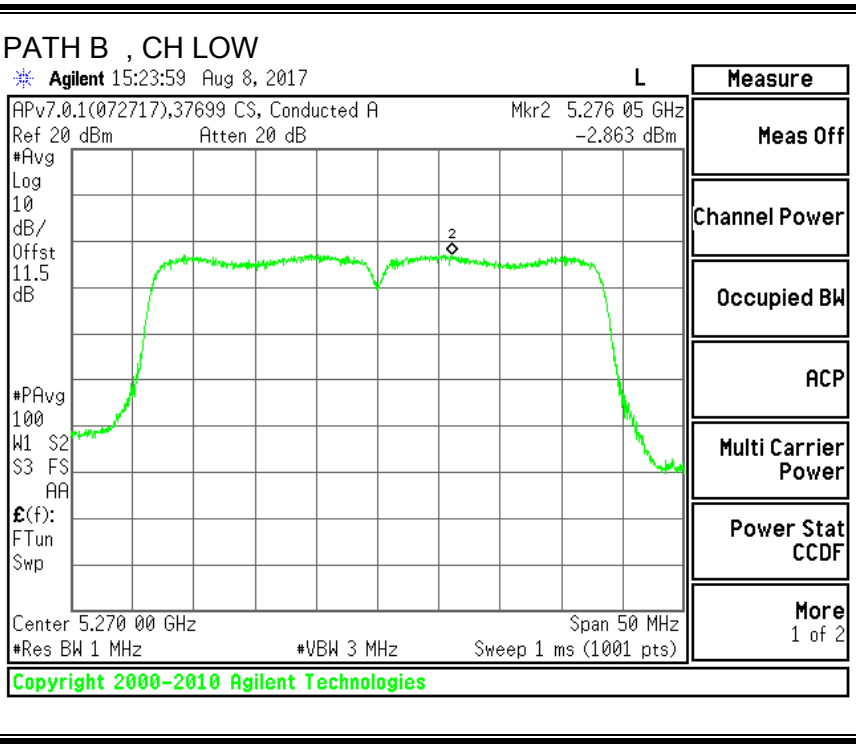
PPSD Results

Channel	Frequency (MHz)	Path A Meas PPSD (dBm)	Path B Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5270	-2.62	-2.86	0.27	11.00	-10.73
High	5310	-3.74	-3.54	-0.63	11.00	-11.63

PATH A , CH LOW

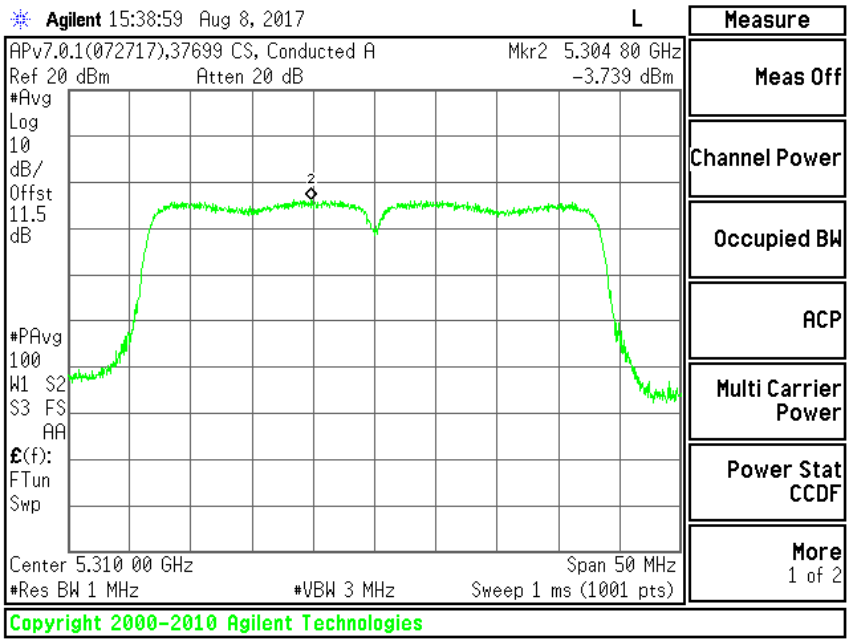


PATH B , CH LOW

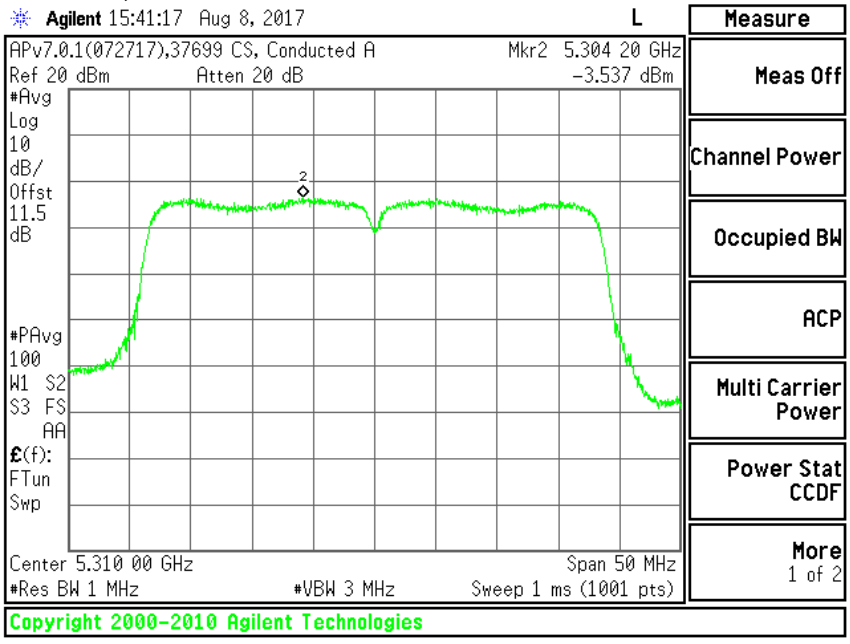


PATH A , CH HIGH

*Note:



PATH B , CH HIGH



9.8. 11ac VHT80 2TX MODE IN THE 5.3GHz BAND

9.8.1. 26 dB BANDWIDTH

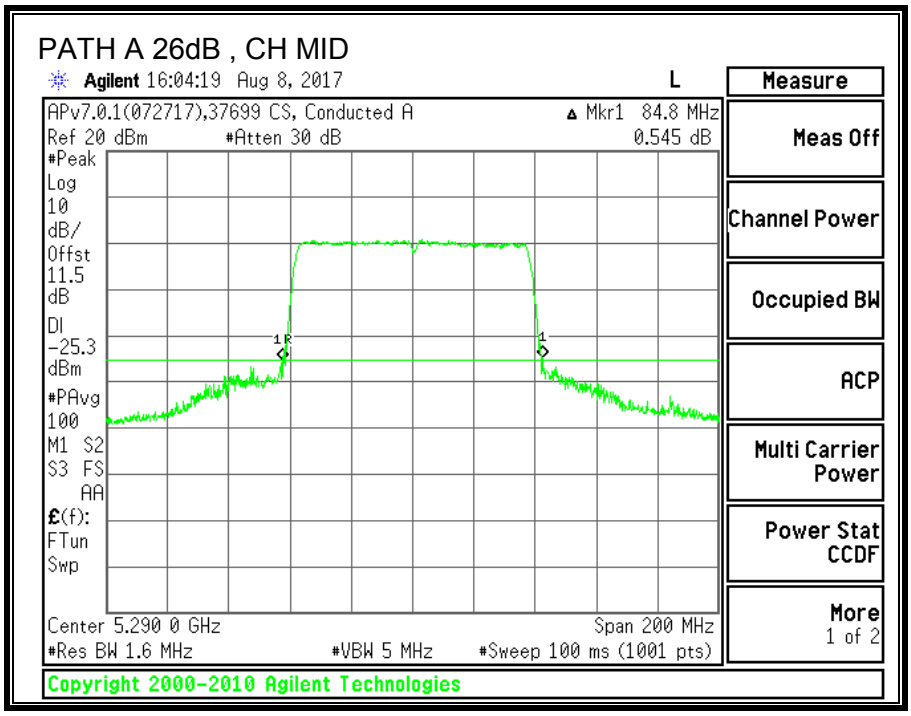
LIMITS

None; for reporting purposes only.

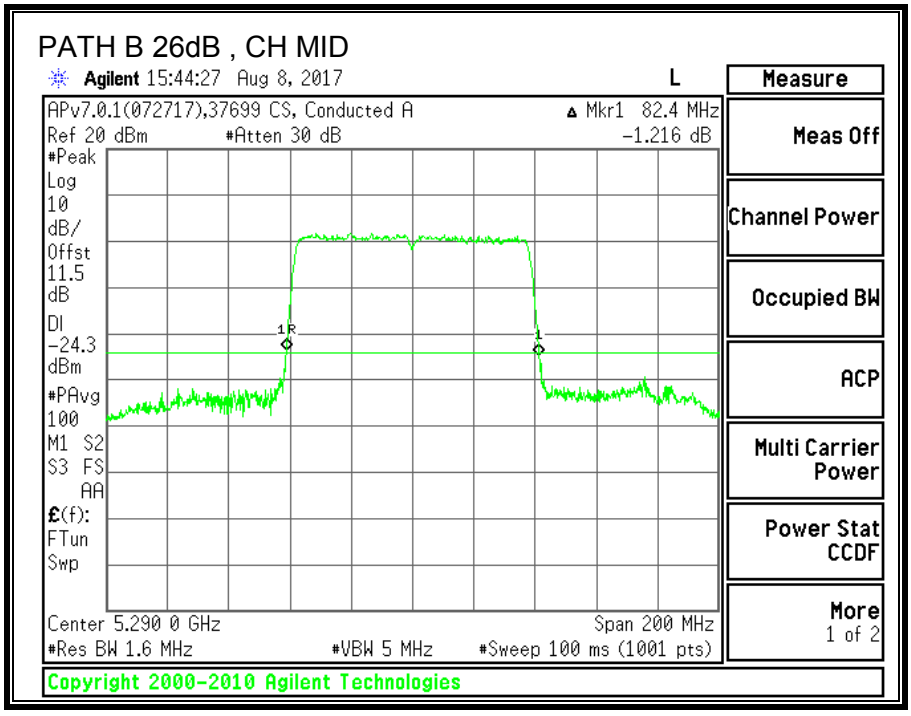
RESULTS

Channel	Frequency	26 dB BW PATH A (MHz)	26 dB BW PATH B (MHz)
Mid	5290	84.8	82.4

PATH A 26dB , CH MID



PATH B 26dB , CH MID



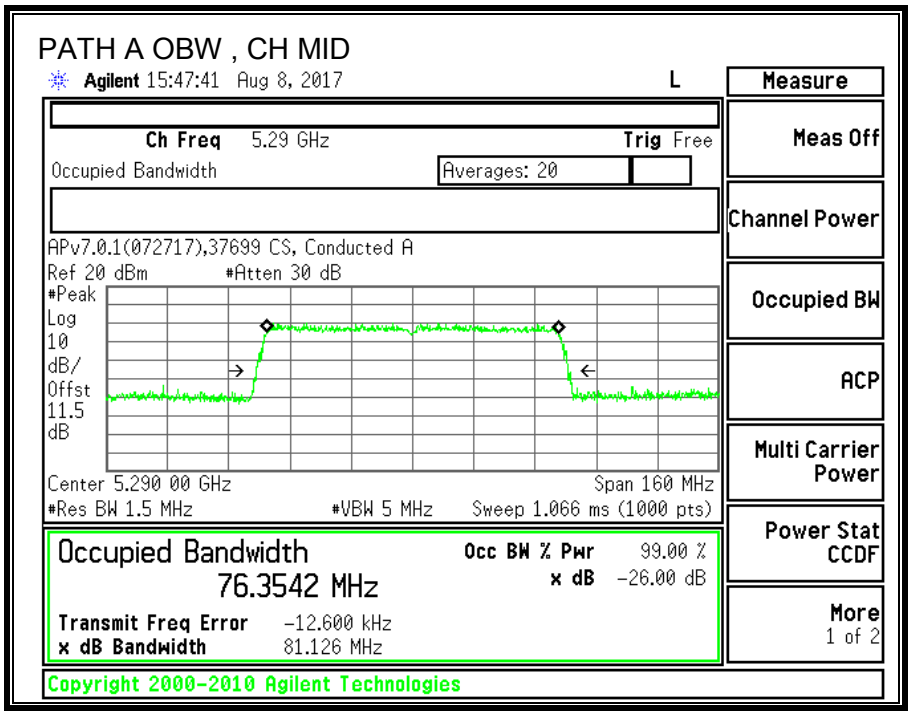
9.8.2. 99% BANDWIDTH

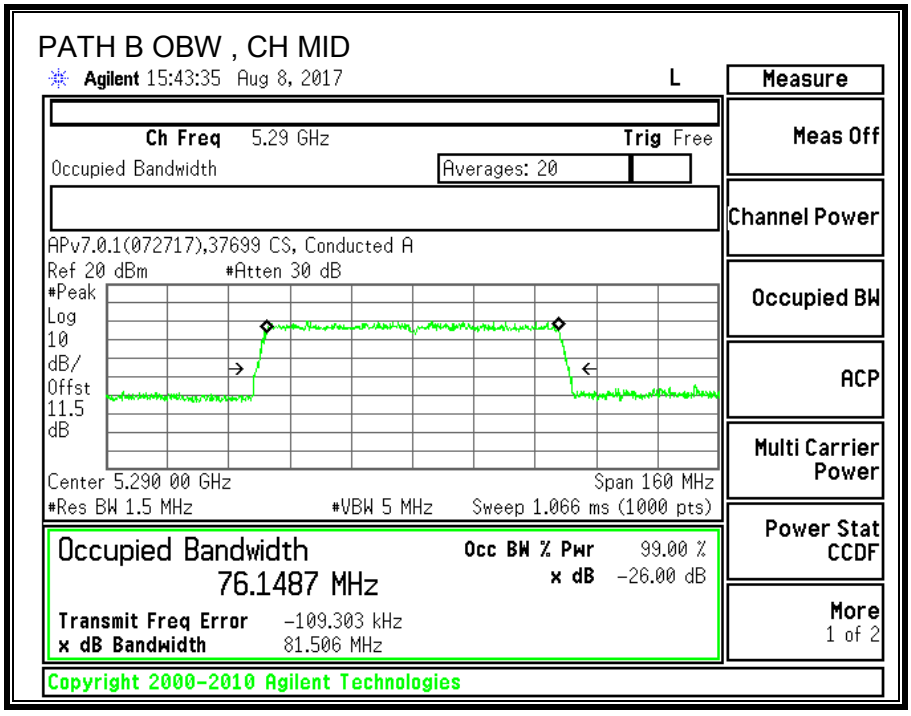
LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency	99% BW PATH A (MHz)	99% BW PATH B (MHz)
Mid	5290	76.3542	76.1487





9.8.3. OUTPUT POWER AND PPSD

FCC §15.407 (a) (2)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-247 (6.2.2) (1)

The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

Path A Antenna Gain (dBi)	Path B Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
2.50	2.80	2.65	5.66

RESULTS

ID:	37699 CS	Date:	8/8/2017

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
Low	5530	82.40	76.15	2.65	5.66

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC PSD Limit (dBm)	PPSD Limit (dBm)
Low	5530	24.00	24.00	30.00	24.00	11.00	11.00	11.00

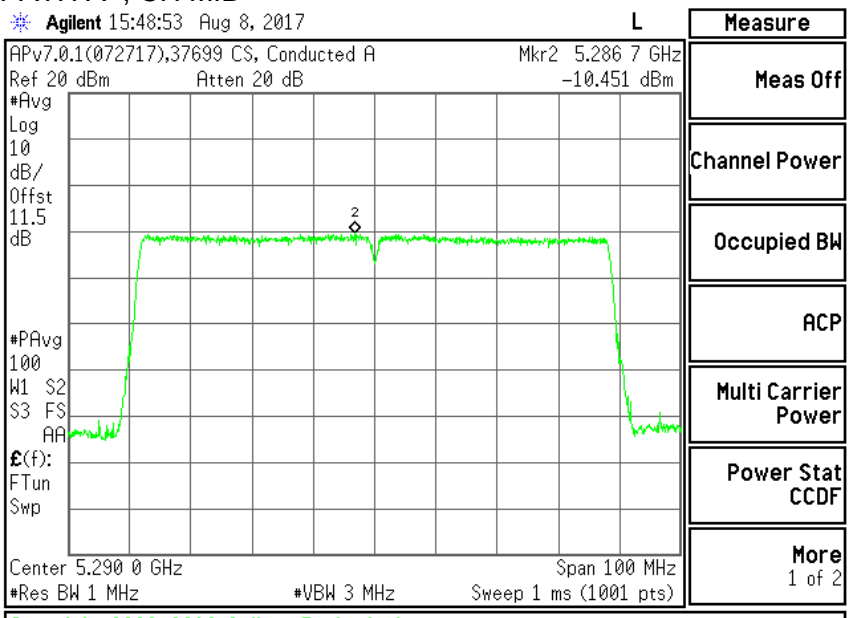
Output Power Results

Channel	Frequency (MHz)	Path A Meas Power (dBm)	Path B Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5530	6.71	6.37	9.55	24.00	-14.45

PPSD Results

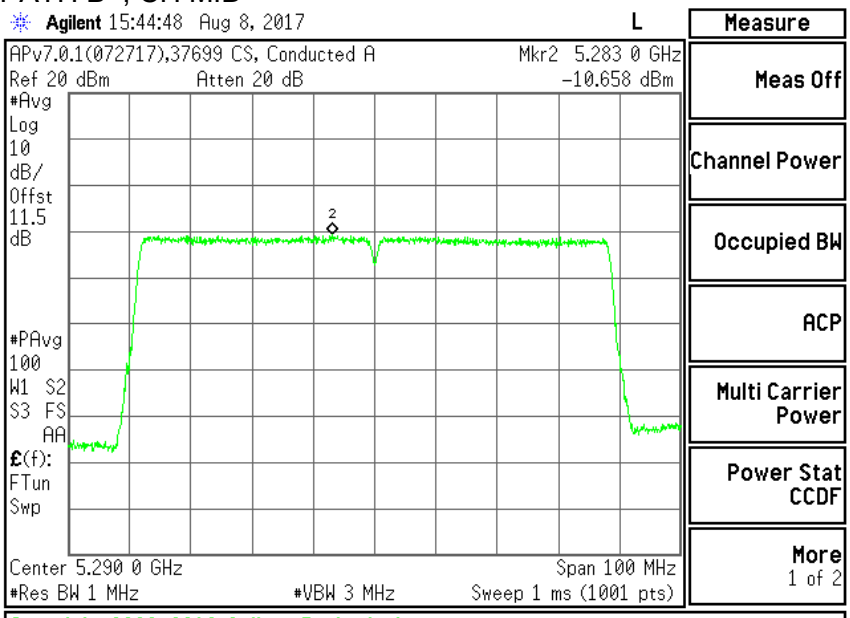
Channel	Frequency (MHz)	Path A Meas PPSD (dBm)	Path B Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5530	-10.451	-10.658	-7.54	11.00	-18.54

PATH A , CH MID



*Note:

PATH B , CH MID



*Note:

9.9. 11a 2TX MODE IN THE 5.6GHz BAND

9.9.1. 26 dB BANDWIDTH

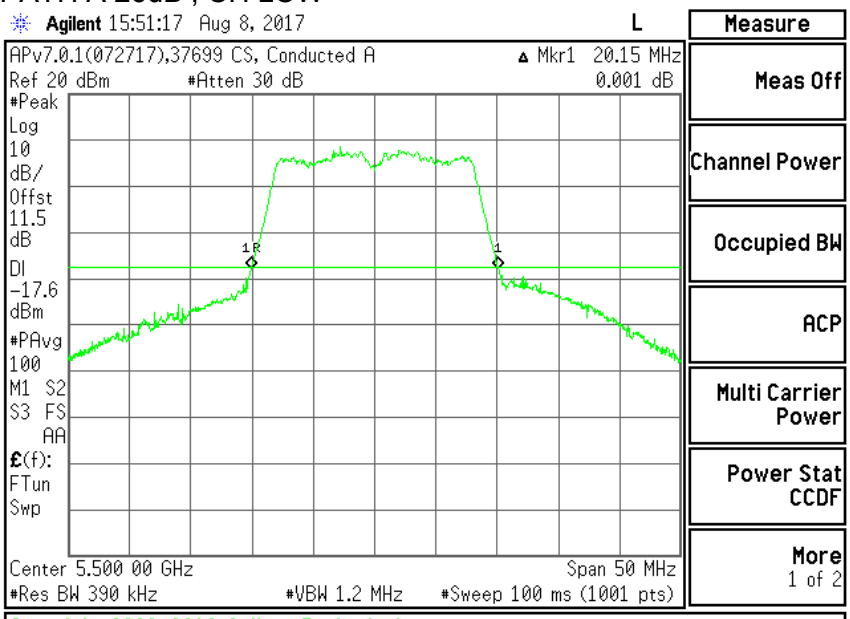
LIMITS

None; for reporting purposes only.

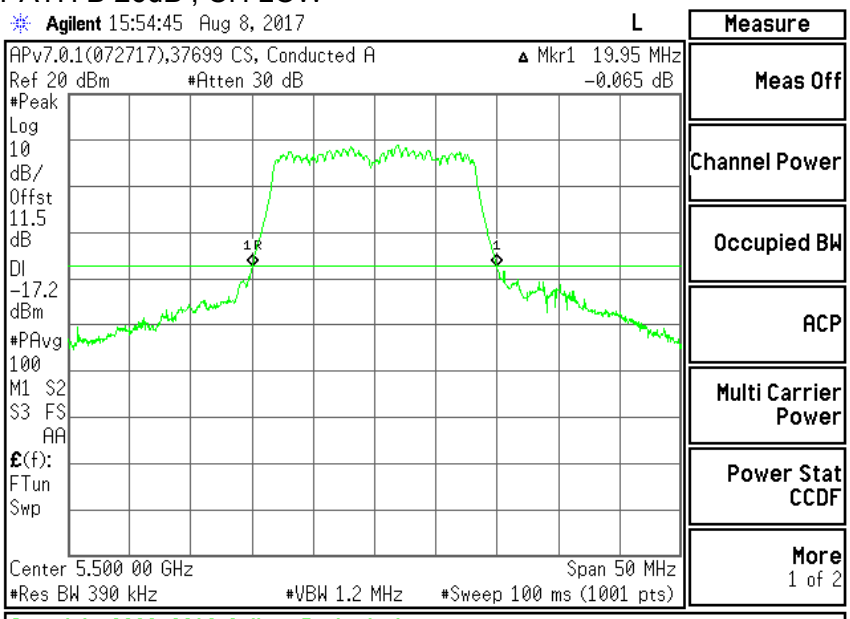
RESULTS

Channel	Frequency	26 dB BW PATH A (MHz)	26 dB BW PATH B (MHz)
Low	5500	20.15	19.95
Mid	5580	20.25	20.05
High	5700	20.45	20
144	5720	20.35	20

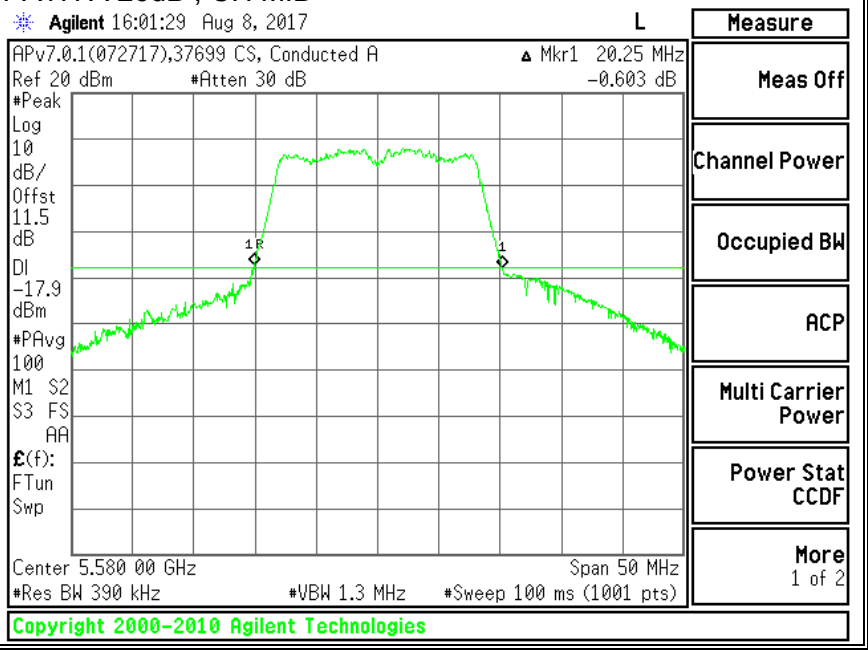
PATH A 26dB , CH LOW



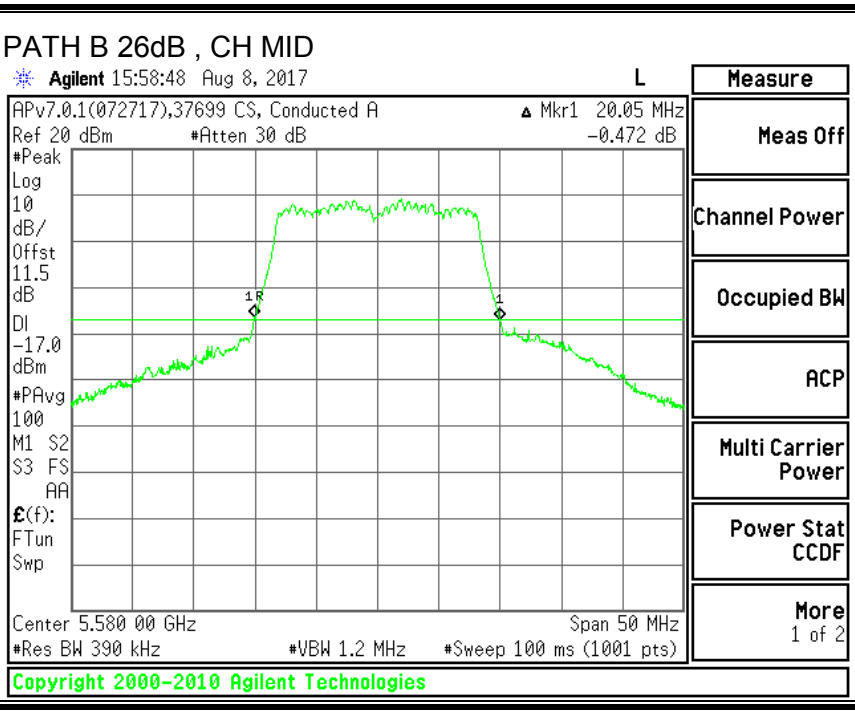
PATH B 26dB , CH LOW



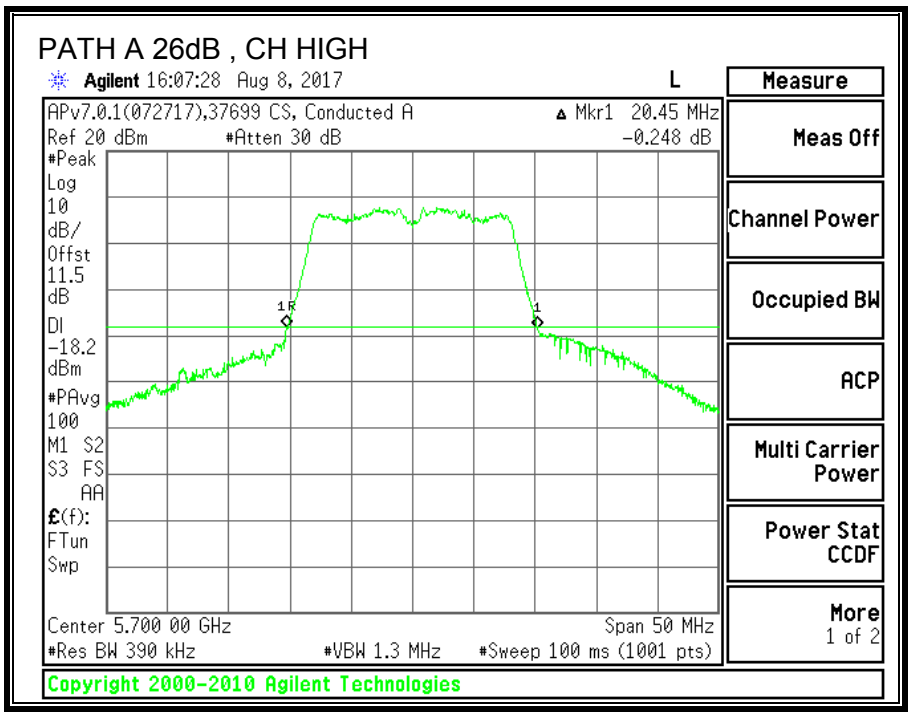
PATH A 26dB , CH MID



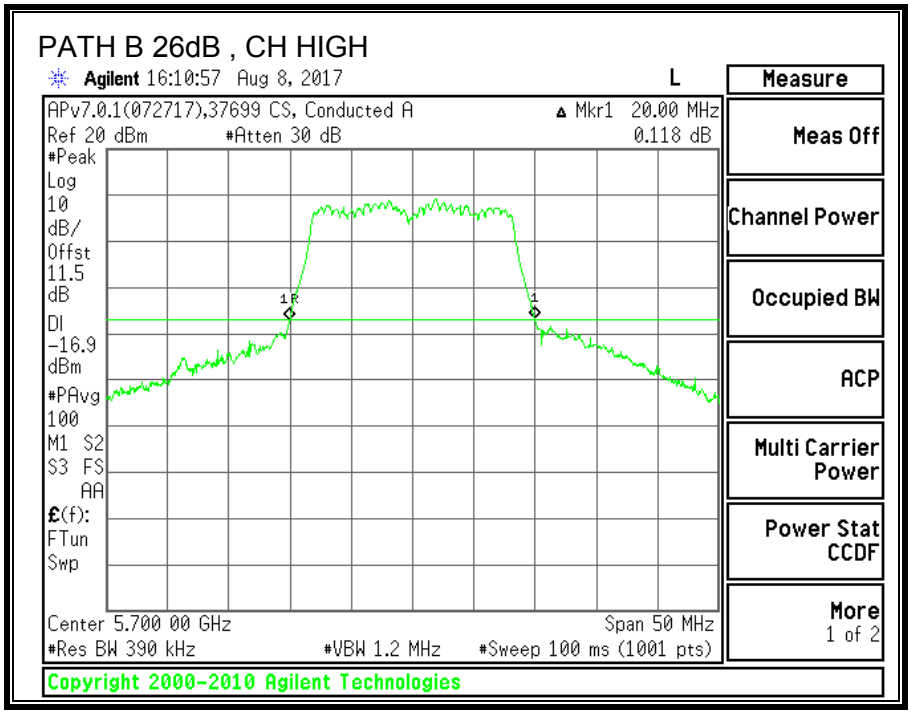
PATH B 26dB , CH MID



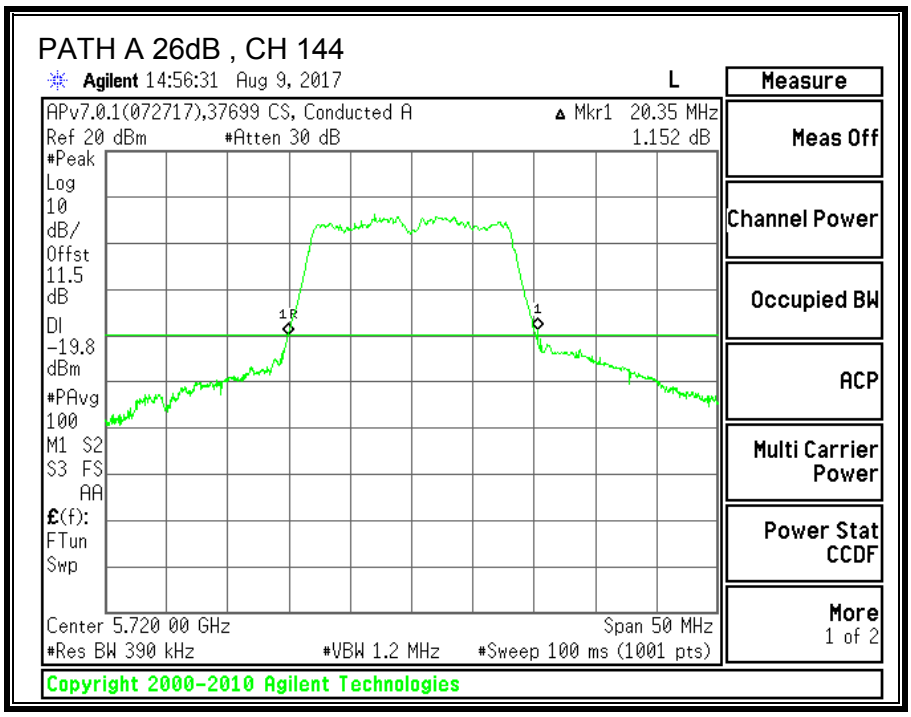
PATH A 26dB , CH HIGH



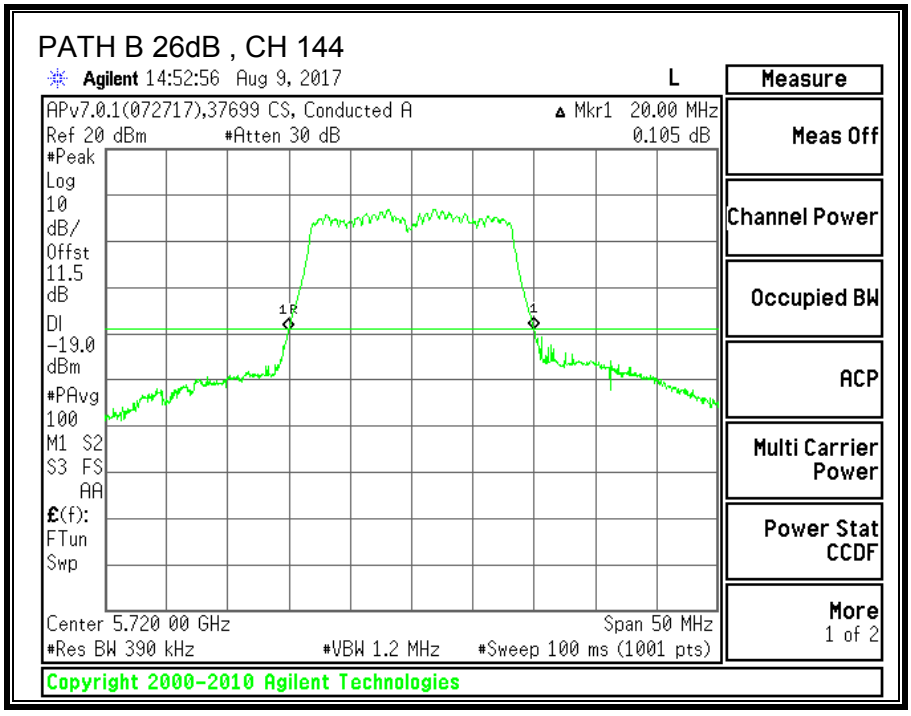
PATH B 26dB , CH HIGH



PATH A 26dB , CH 144



PATH B 26dB , CH 144



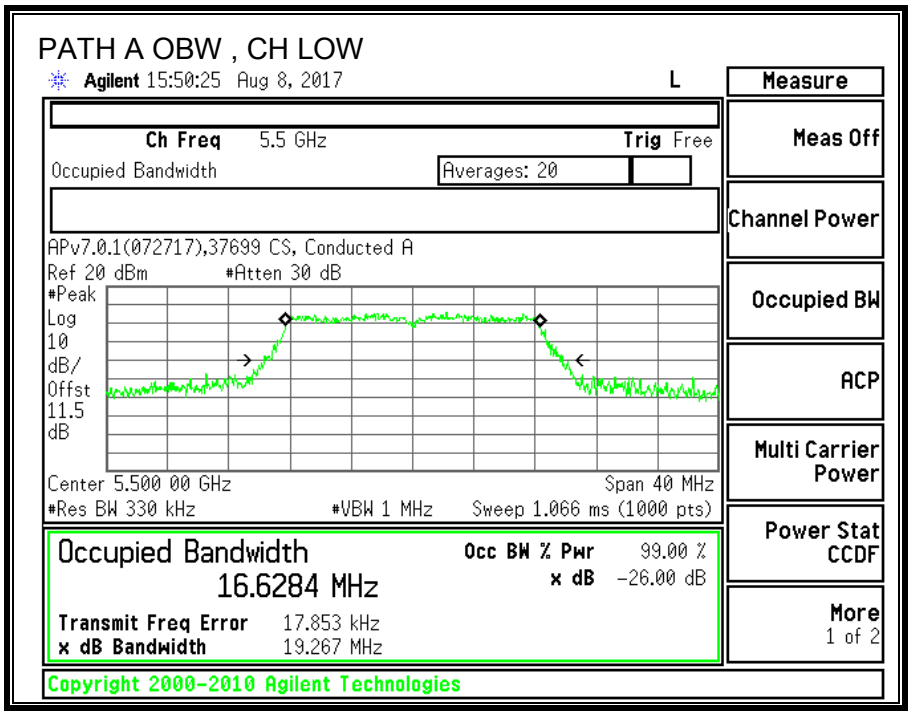
9.9.2. 99% BANDWIDTH

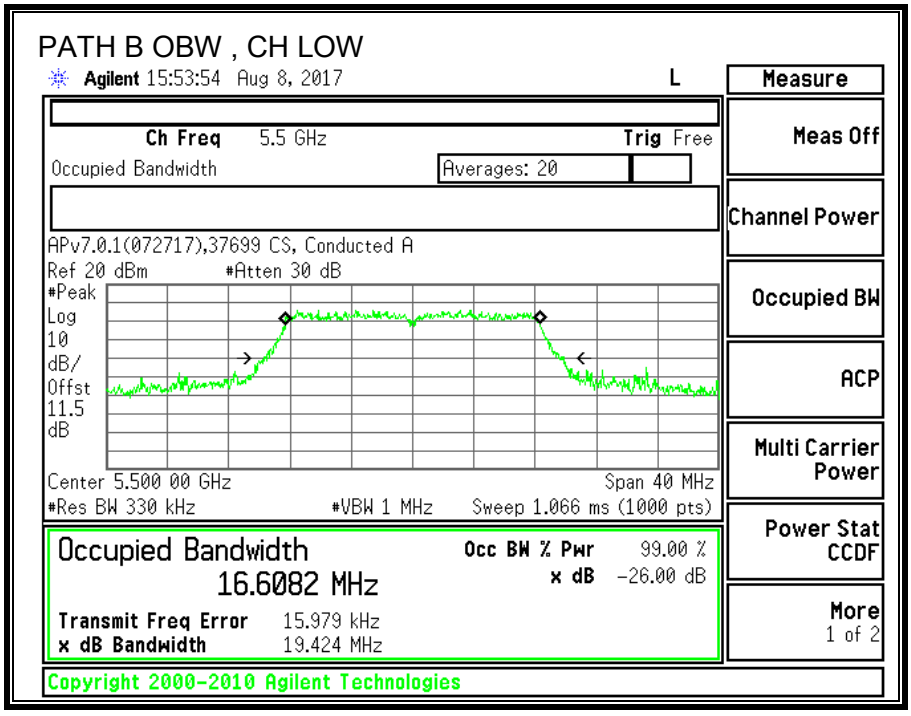
LIMITS

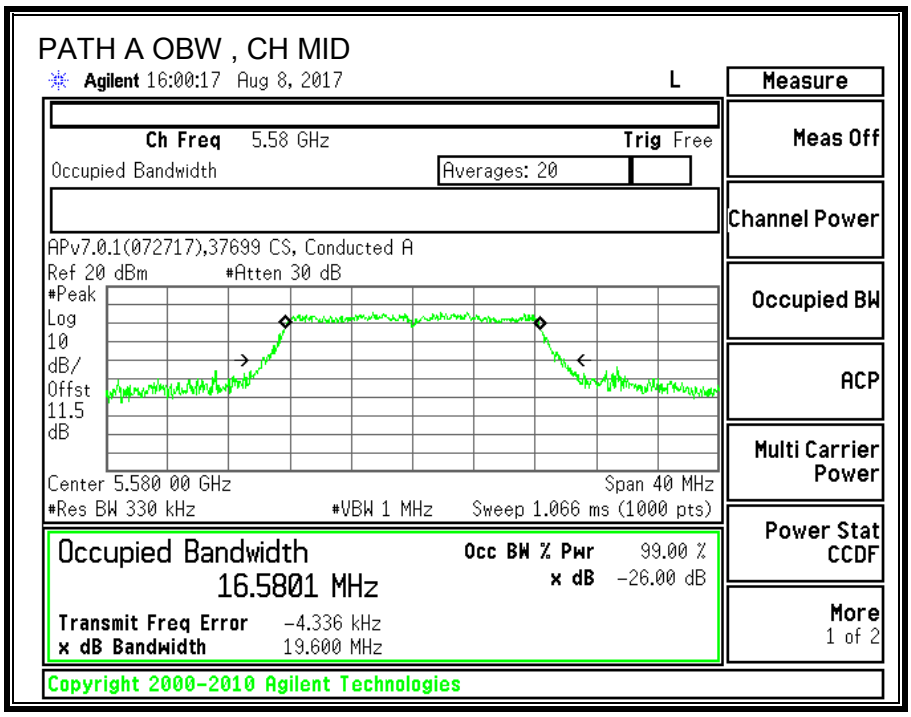
None; for reporting purposes only.

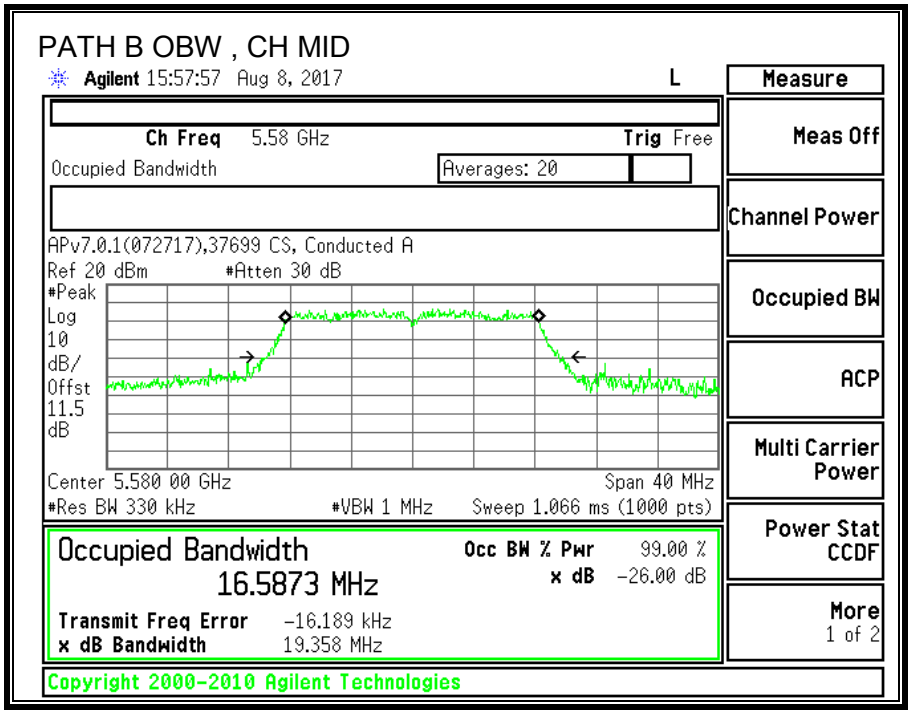
RESULTS

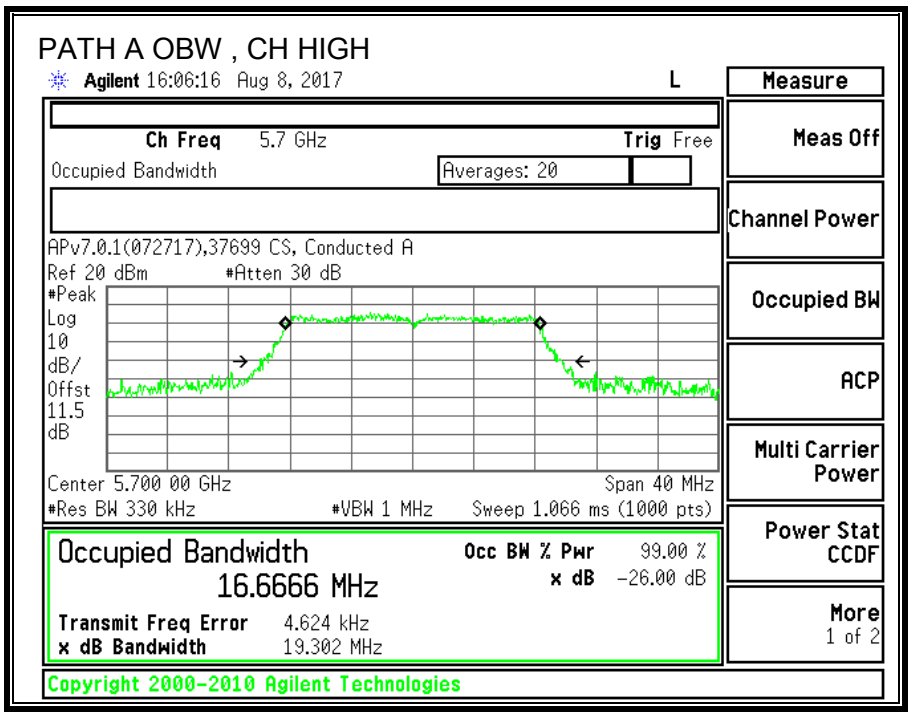
Channel	Frequency	99% BW PATH A (MHz)	99% BW PATH B (MHz)
Low	5500	16.6284	16.6082
Mid	5580	16.5801	16.5873
High	5700	16.6666	16.5653
144	5720	16.5848	16.6055

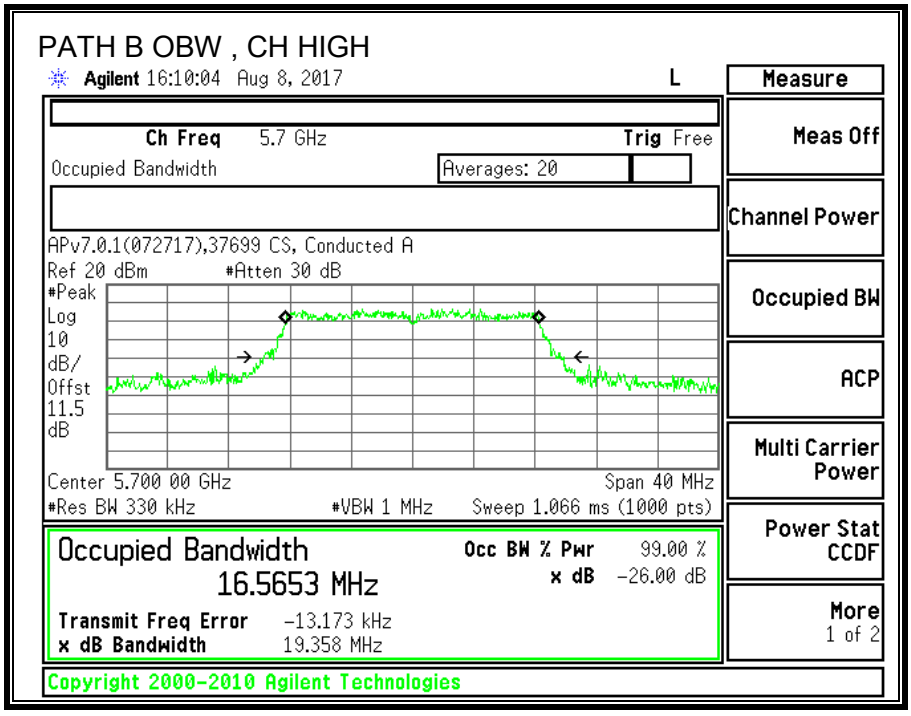


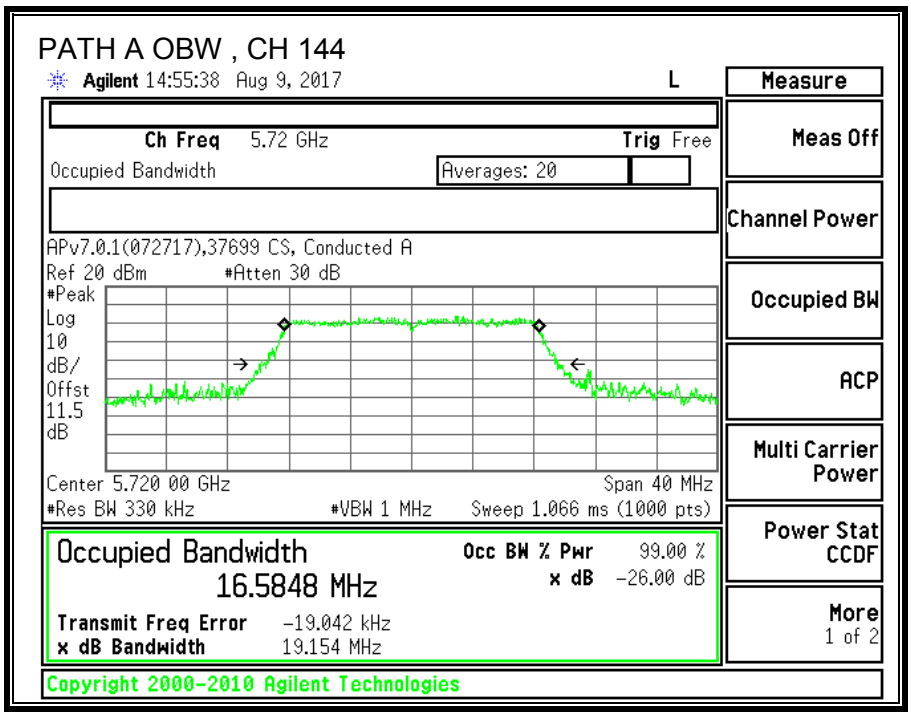


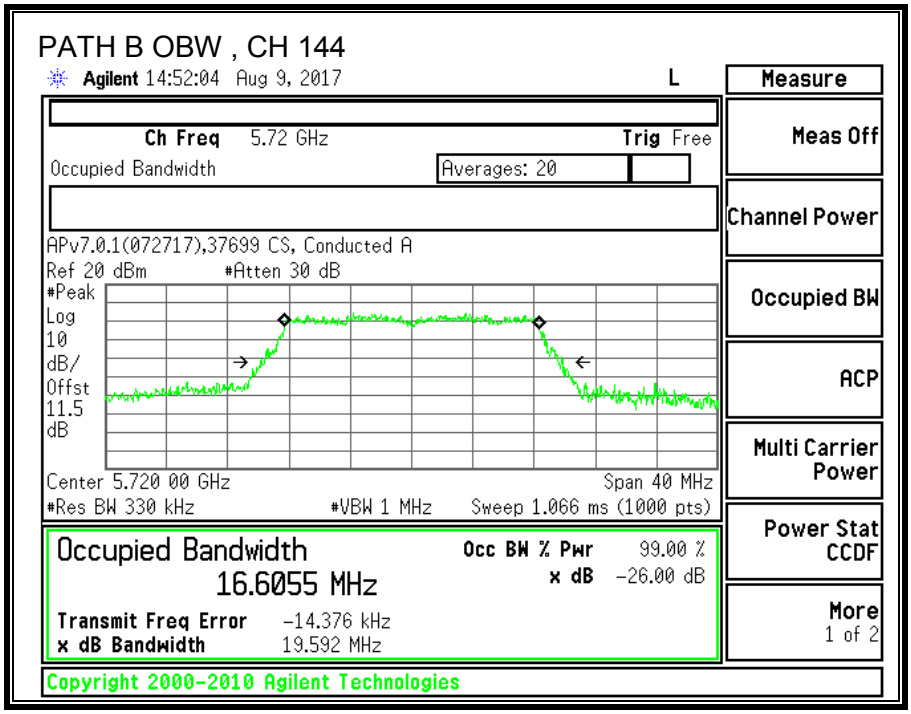












9.9.3. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (2)

For the band 5.47–5.725 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-247 (6.2.3) (1)

The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.Straddle channel power is measured using PXA spectrum analyzer, duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

Path A Antenna Gain (dBi)	Path B Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
1.90	2.80	2.37	5.37

RESULTS

ID:	37699 CS	Date:	8/8/2017

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
Low	5500	19.95	16.81	2.37	5.37
Mid	5580	20.05	16.58	2.37	5.37
High	5700	20	16.57	2.37	5.37
144	5720	20	16.58	2.37	5.37

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC PSD Limit (dBm)	PPSD Limit (dBm)
Low	5500	24.00	23.26	27.00	23.26	11.00	11.00	11.00
Mid	5580	24.00	23.20	27.00	23.20	11.00	11.00	11.00
High	5700	24.00	23.19	27.00	23.19	11.00	11.00	11.00
144	5720	24.00	23.20	27.00	23.20	11.00	11.00	11.00

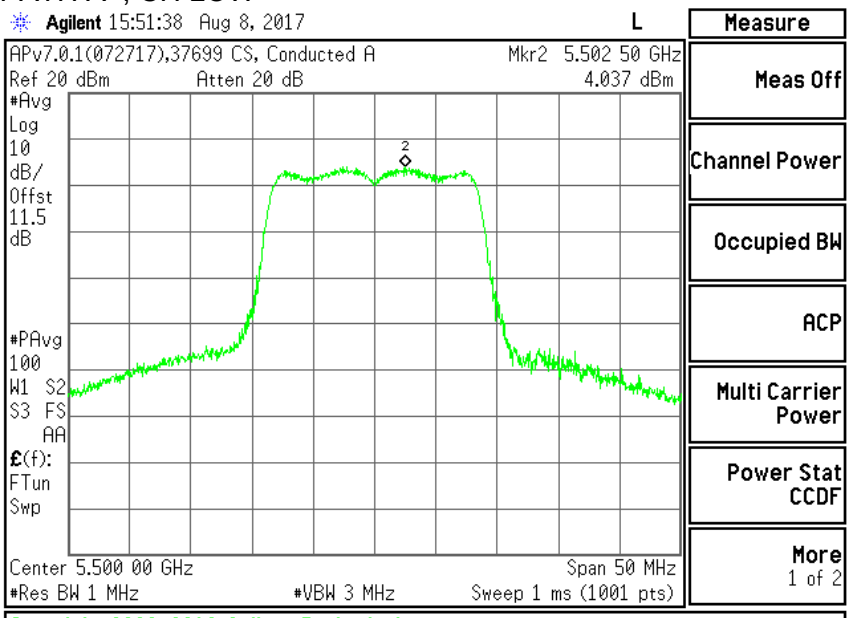
Output Power Results

Channel	Frequency (MHz)	Path A Meas Power (dBm)	Path B Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5500	13.94	14.61	17.30	23.26	-5.96
Mid	5580	14.22	14.37	17.31	23.20	-5.89
High	5700	13.27	13.57	16.43	23.19	-6.76
144	5720	12.32	12.27	15.31	23.20	-7.89

PPSD Results

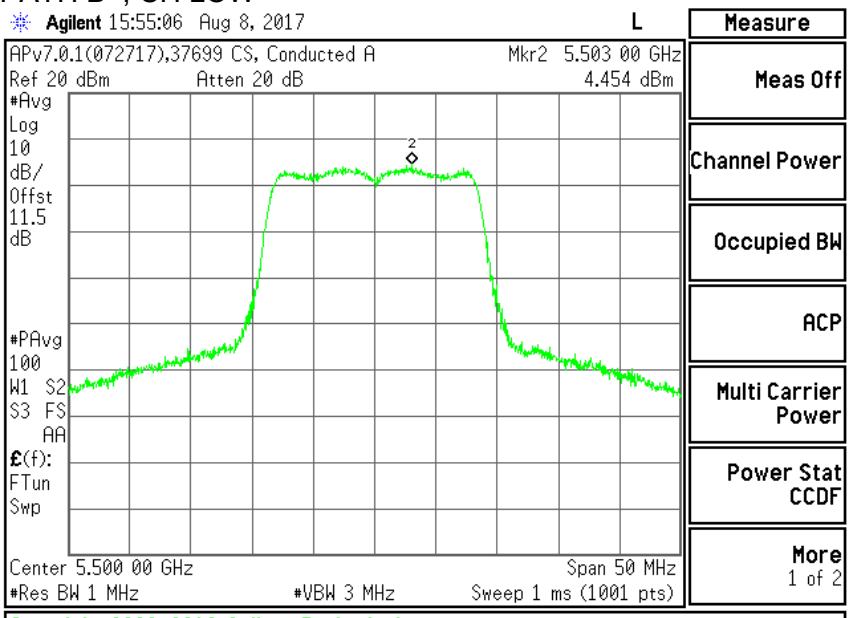
Channel	Frequency (MHz)	Path A Meas PPSD (dBm)	Path B Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5500	4.04	4.45	7.26	11.00	-3.74
Mid	5580	3.83	4.18	7.02	11.00	-3.98
High	5700	2.86	3.30	6.09	11.00	-4.91
144	5720	2.32	2.15	5.24	11.00	-5.76

PATH A , CH LOW



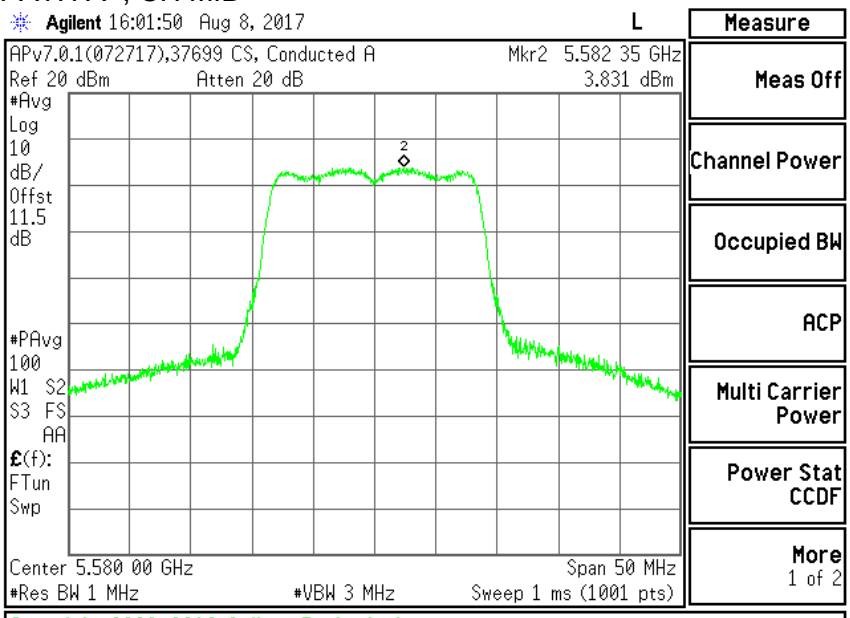
*Note:

PATH B , CH LOW



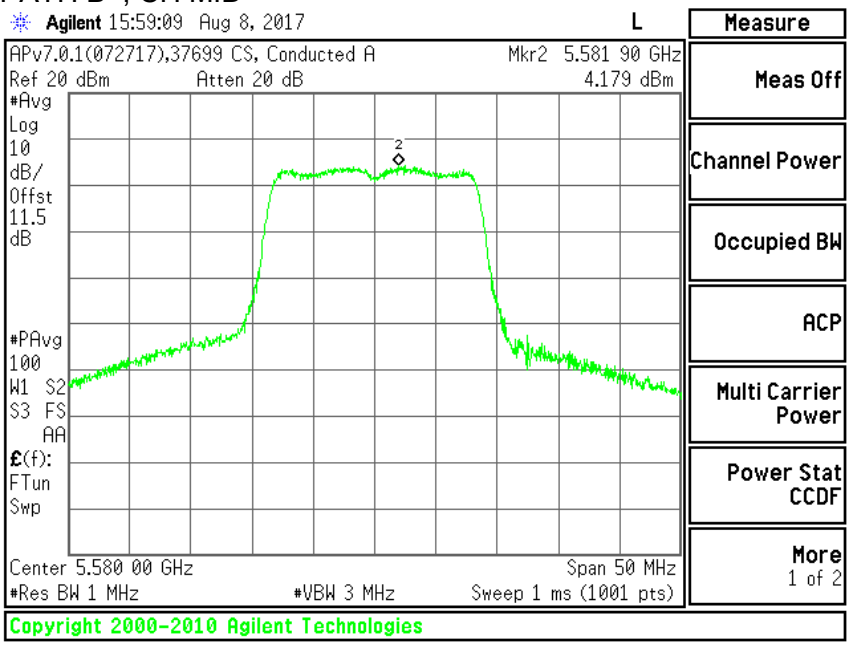
*Note:

PATH A , CH MID



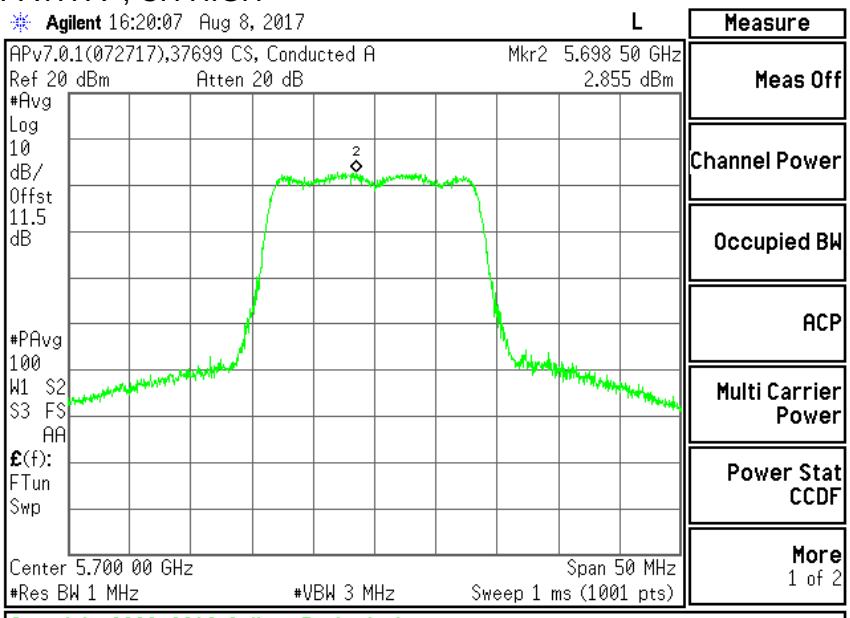
*Note:

PATH B , CH MID



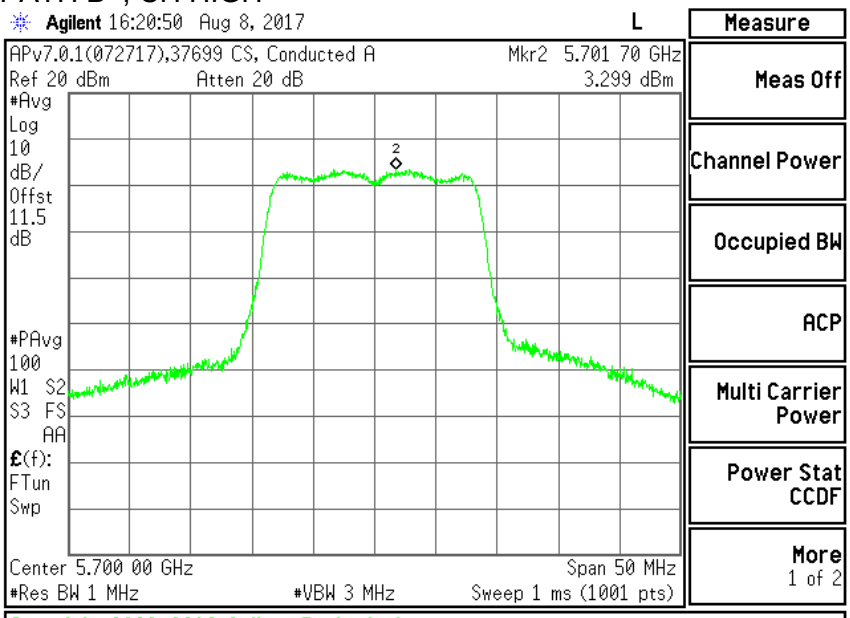
*Note:

PATH A , CH HIGH



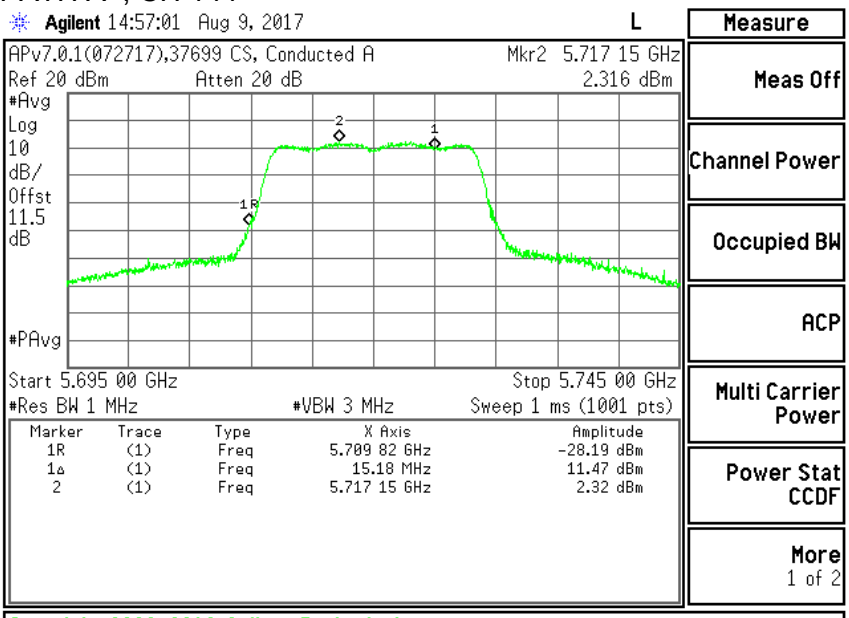
*Note:

PATH B , CH HIGH



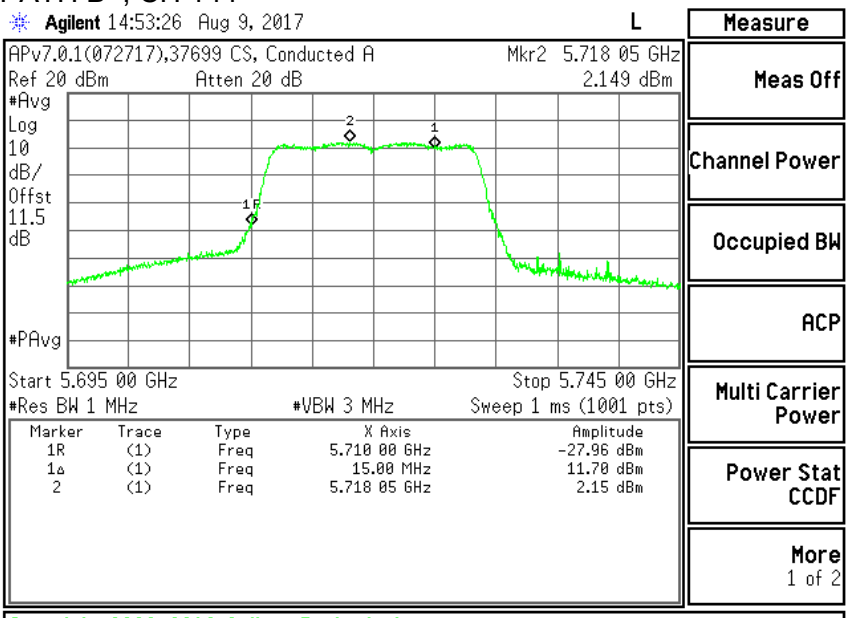
*Note:

PATH A , CH 144



*Note:

PATH B , CH 144



*Note:

9.10. 11n HT20 2TX MODE IN THE 5.6GHz BAND

9.10.1. 26 dB BANDWIDTH

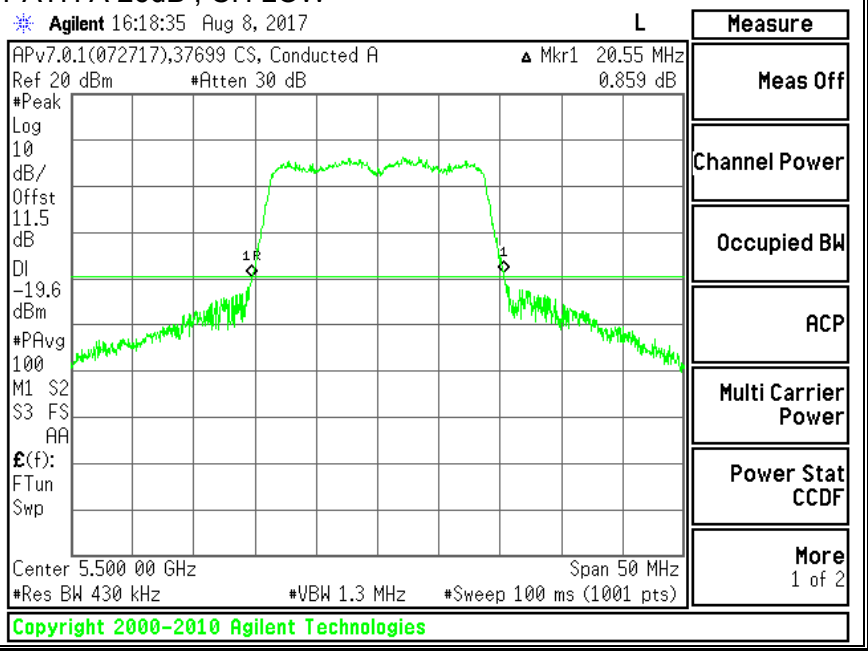
LIMITS

None; for reporting purposes only.

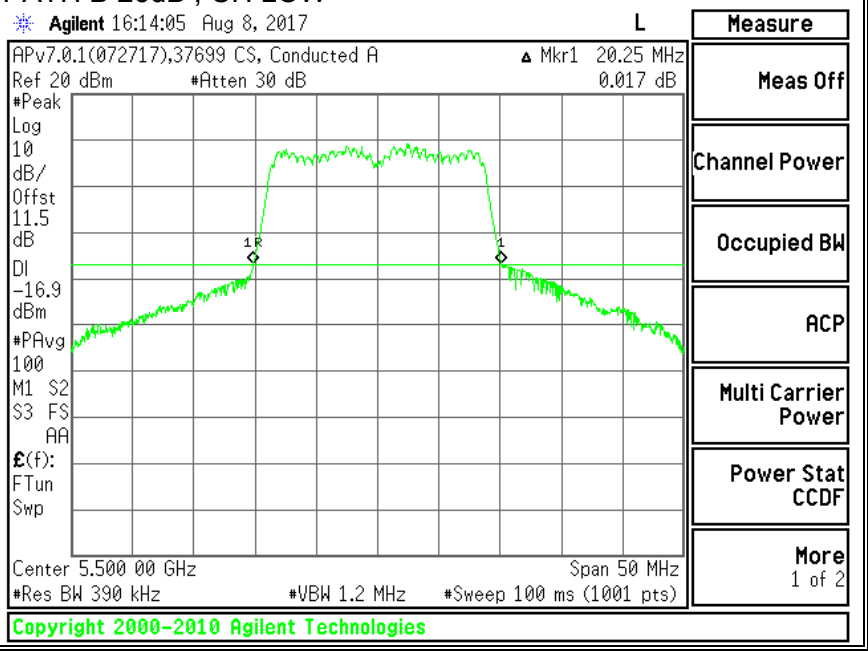
RESULTS

Channel	Frequency	26 dB BW PATH A (MHz)	26 dB BW PATH B (MHz)
Low	5500	20.55	20.25
Mid	5580	20.25	20
High	5700	20.30	19.95
144	5720	20.65	20.35

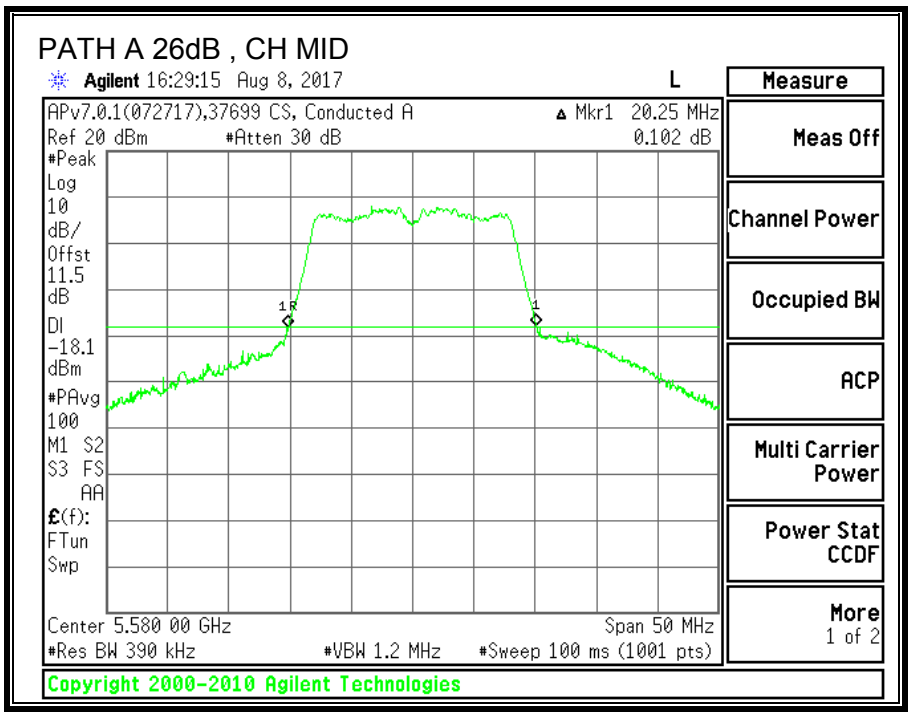
PATH A 26dB , CH LOW



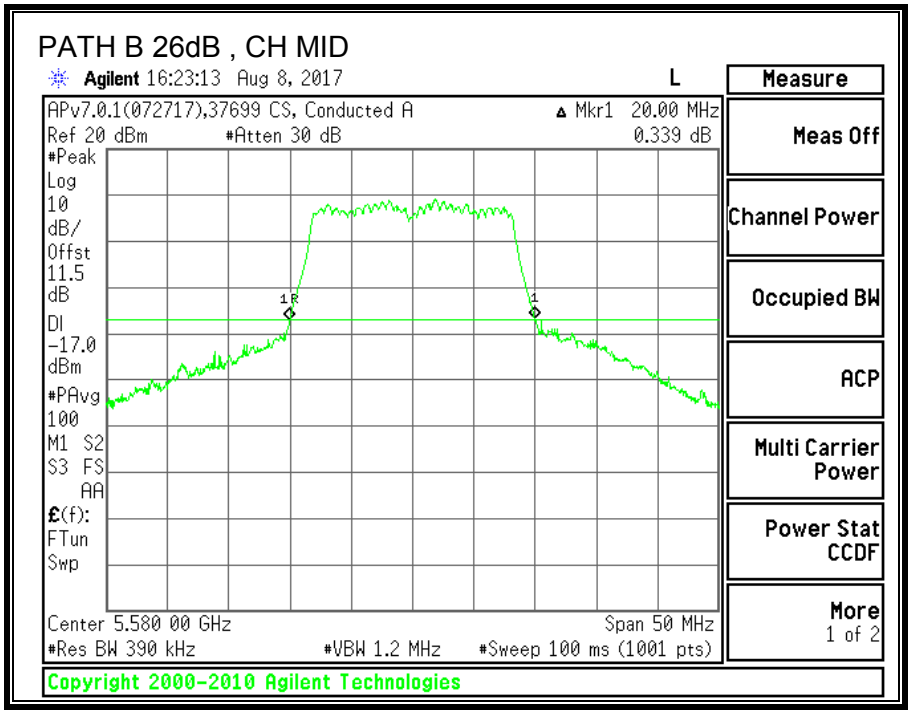
PATH B 26dB , CH LOW



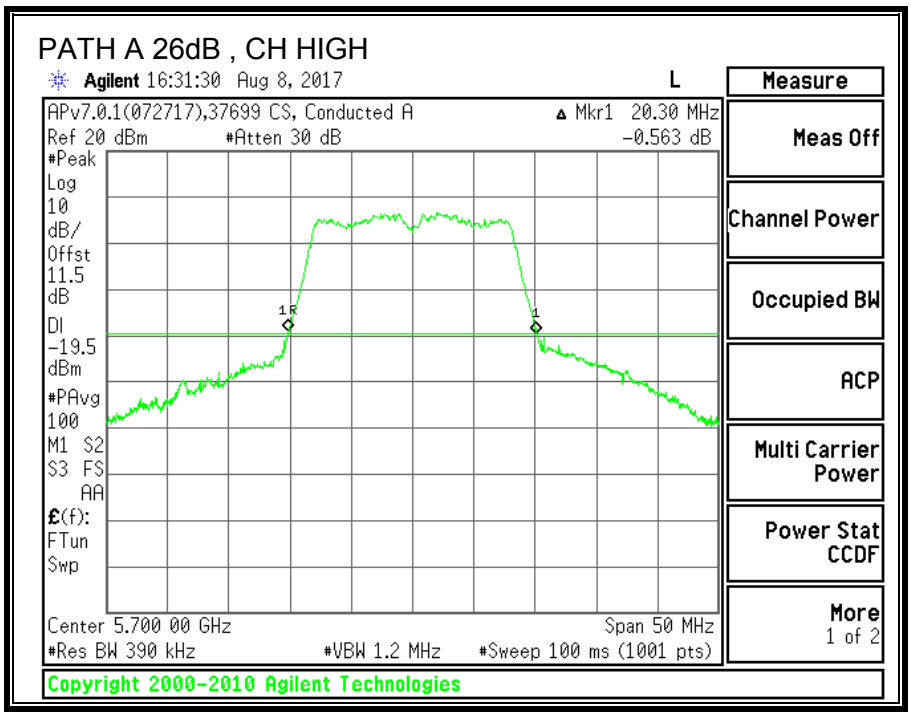
PATH A 26dB , CH MID



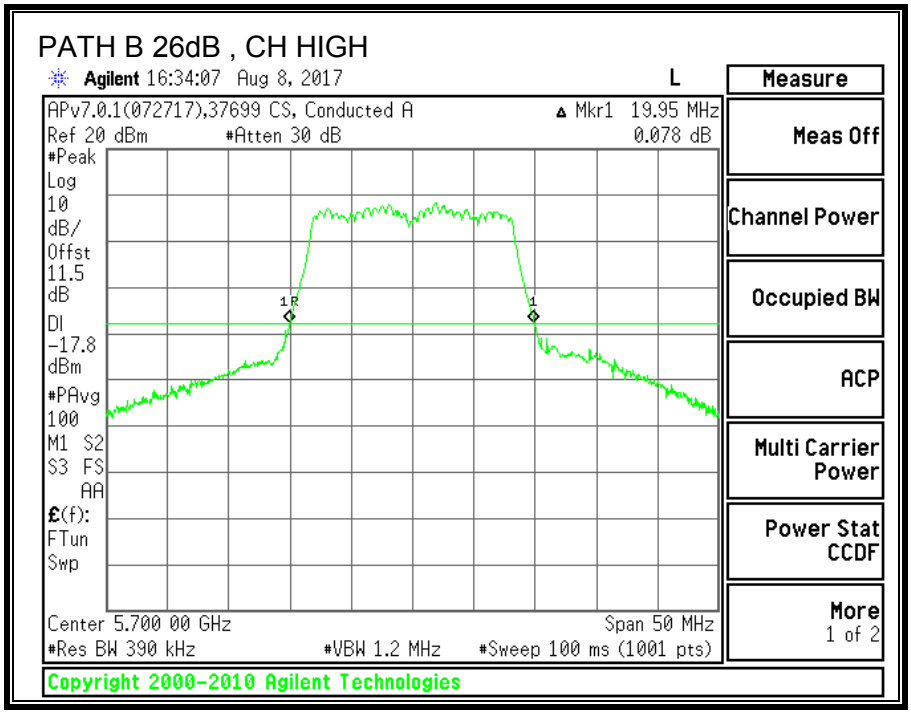
PATH B 26dB , CH MID



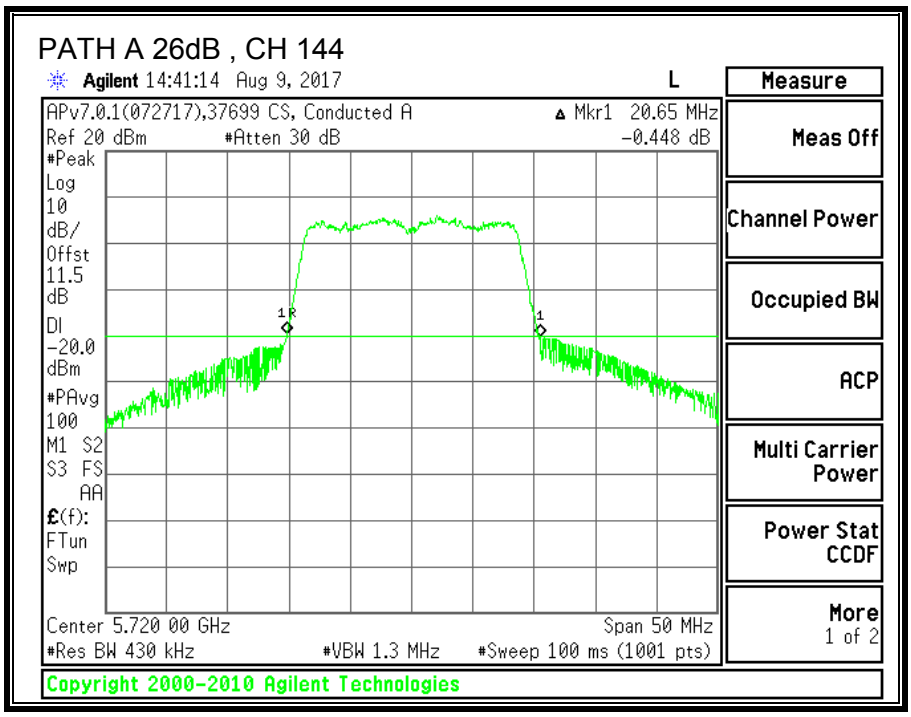
PATH A 26dB , CH HIGH



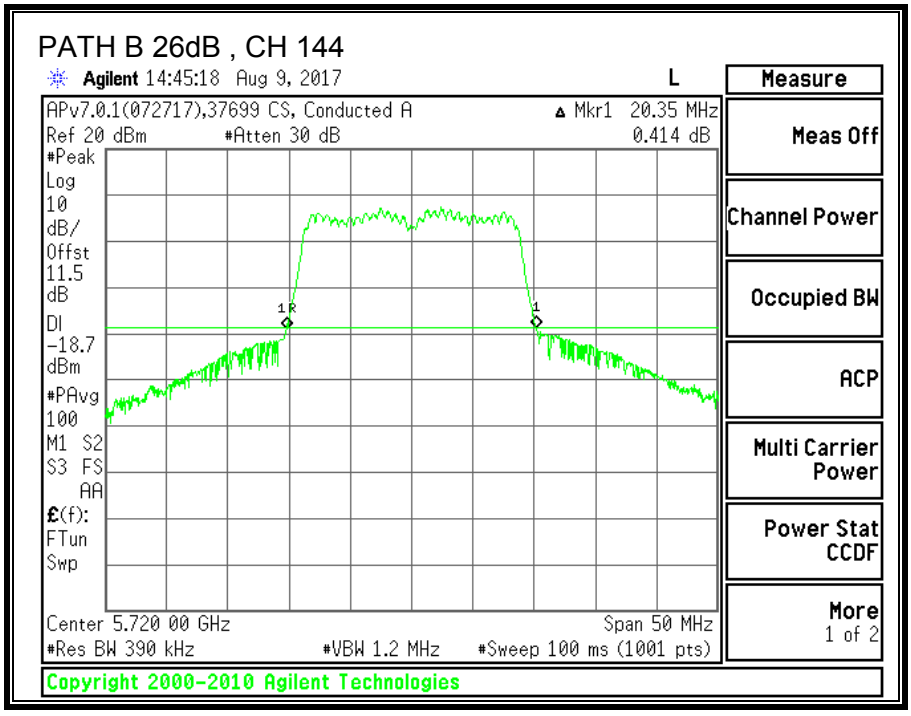
PATH B 26dB , CH HIGH



PATH A 26dB , CH 144



PATH B 26dB , CH 144



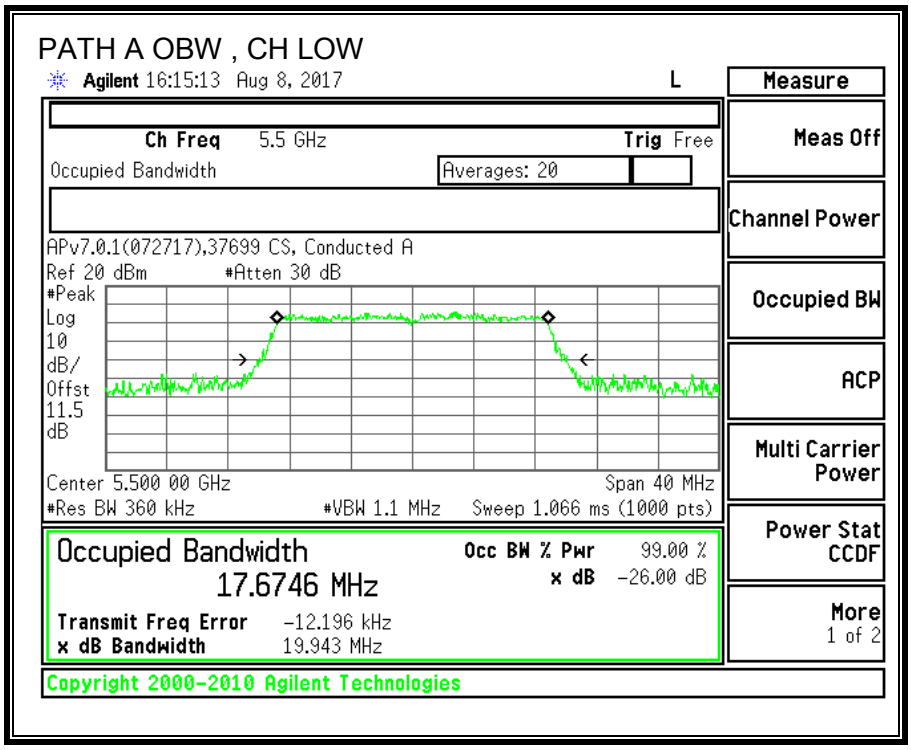
9.10.2. 99% BANDWIDTH

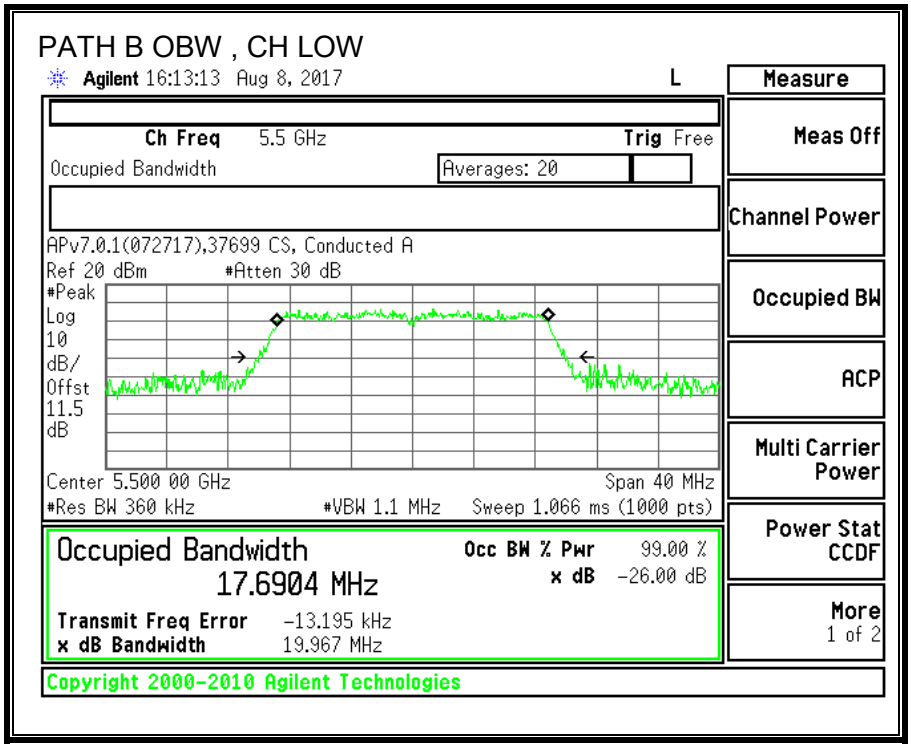
LIMITS

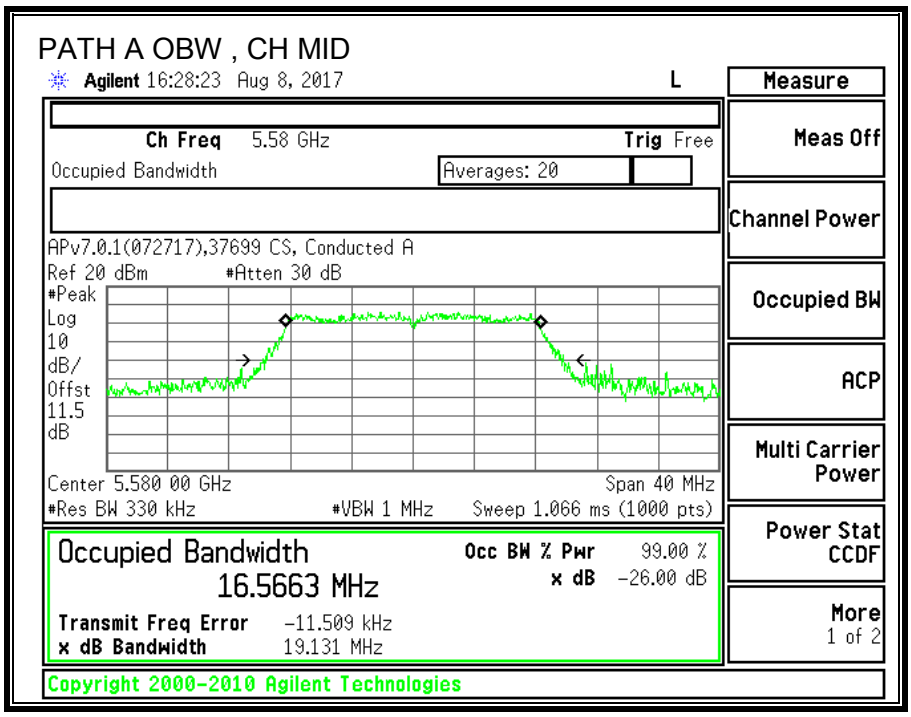
None; for reporting purposes only.

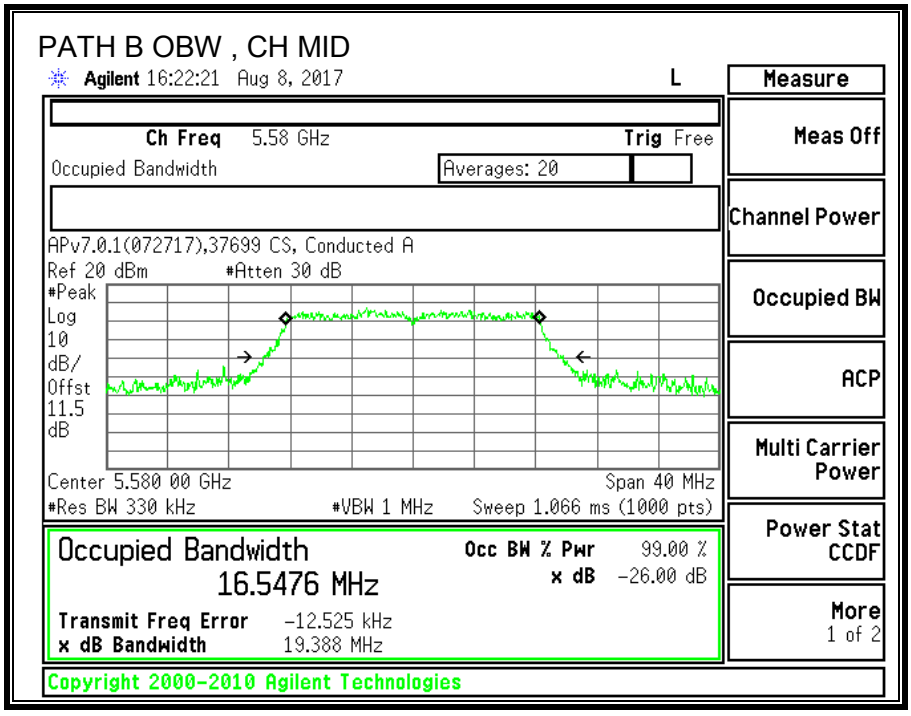
RESULTS

Channel	Frequency	99% BW PATH A (MHz)	99% BW PATH B (MHz)
Low	5500	17.6746	17.6904
Mid	5580	16.5663	16.5476
High	5700	16.6105	16.5720
144	5720	17.6543	17.6318

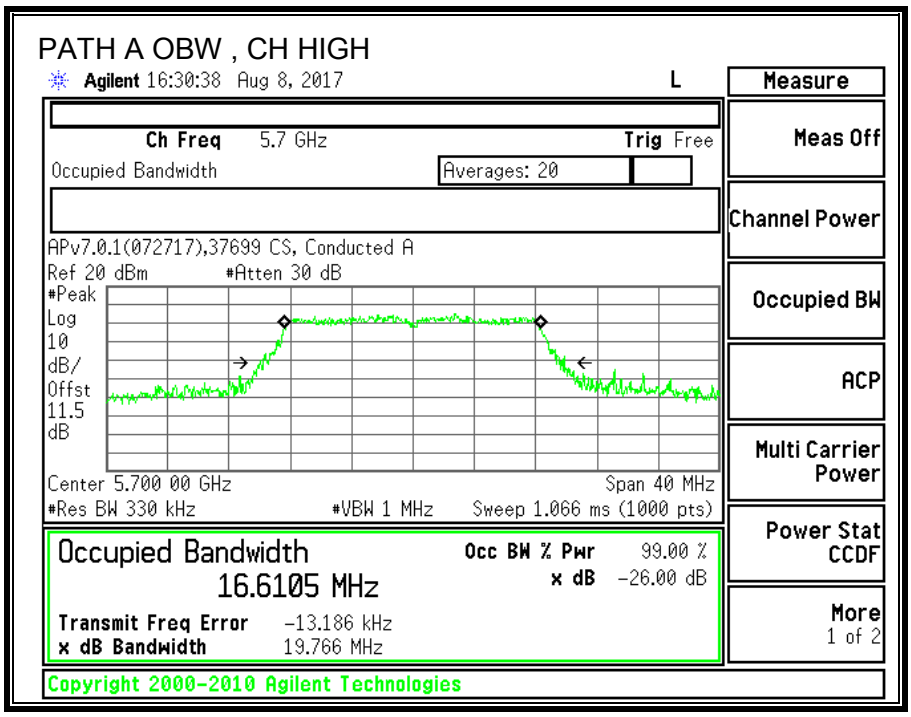




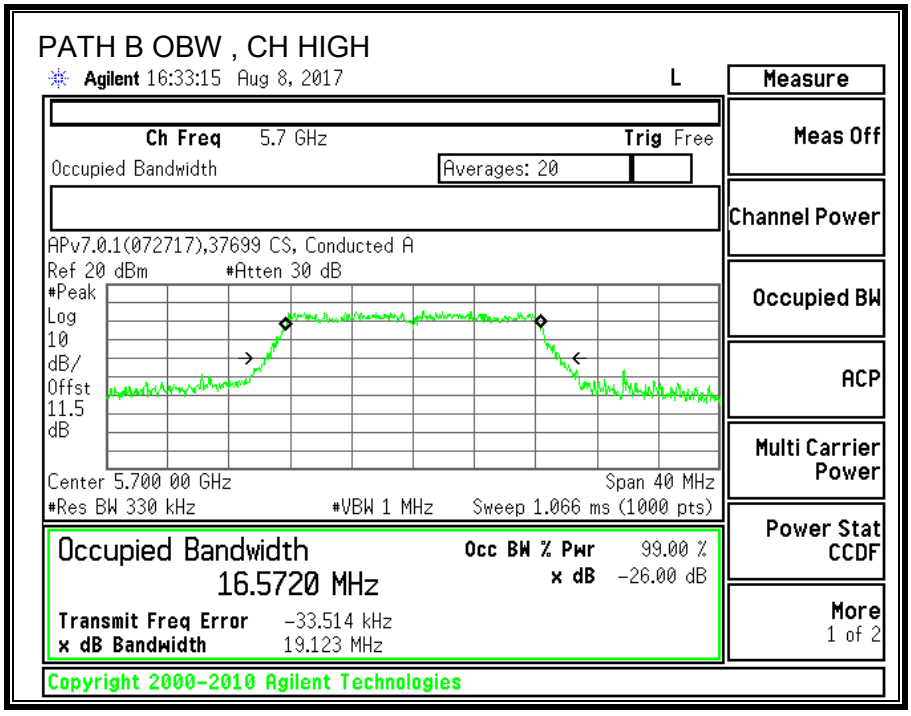


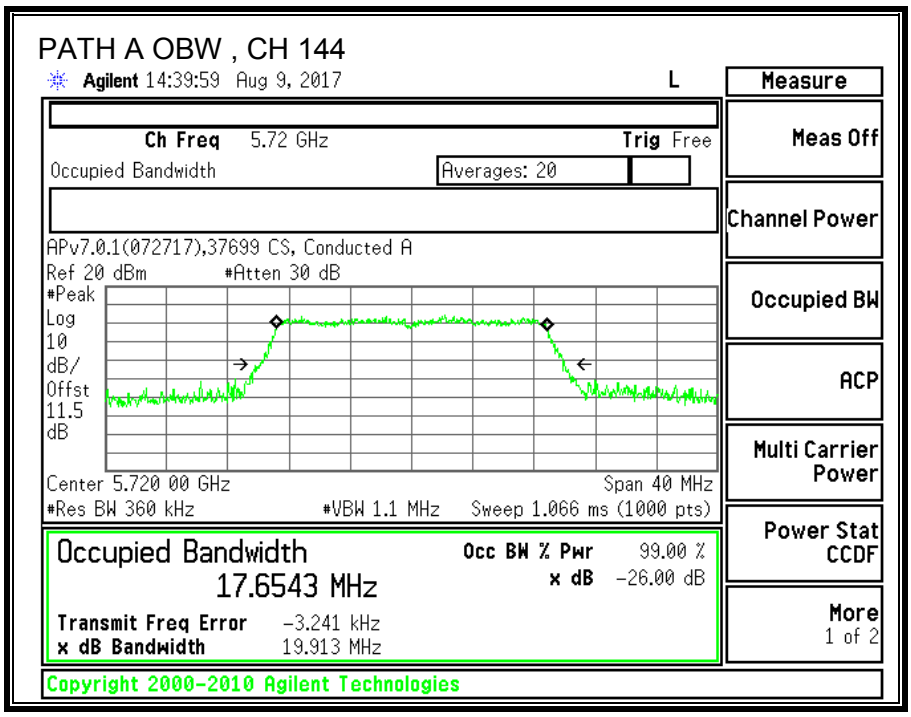


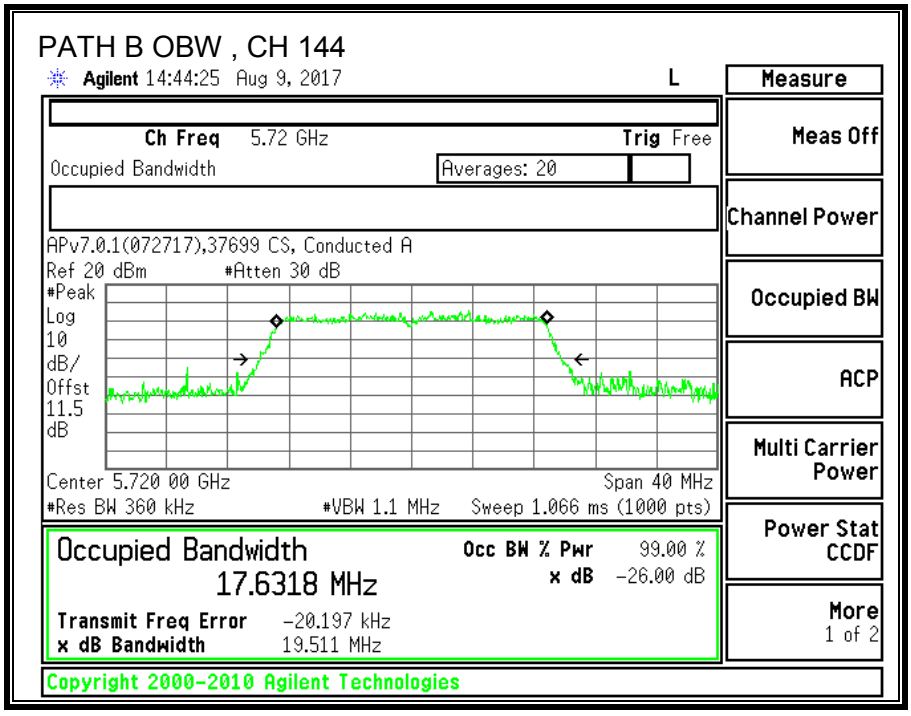
PATH A OBW , CH HIGH



PATH B OBW , CH HIGH







9.10.3. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (2)

For the band 5.47–5.725 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-247 (6.2.3) (1)

The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.Straddle channel power is measured using PXA spectrum analyzer, duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

Path A Antenna Gain (dBi)	Path B Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
1.90	2.80	2.37	5.37

RESULTS

ID:	37699 CS	Date:	8/8/2017

Bandwidth and Antenna Gain

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
Low	5500	20.25	17.67	2.37	5.37
Mid	5580	20	16.55	2.37	5.37
High	5700	19.95	16.57	2.37	5.37
144	5720	20.35	17.63	2.37	5.37

Limits

Channel	Frequency (MHz)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Power Limit (dBm)	FCC PPSD Limit (dBm)	IC PSD Limit (dBm)	PPSD Limit (dBm)
Low	5500	24.00	23.47	27.00	23.47	11.00	11.00	11.00
Mid	5580	24.00	23.19	27.00	23.19	11.00	11.00	11.00
High	5700	24.00	23.19	27.00	23.19	11.00	11.00	11.00
144	5720	24.00	23.46	27.00	23.46	11.00	11.00	11.00

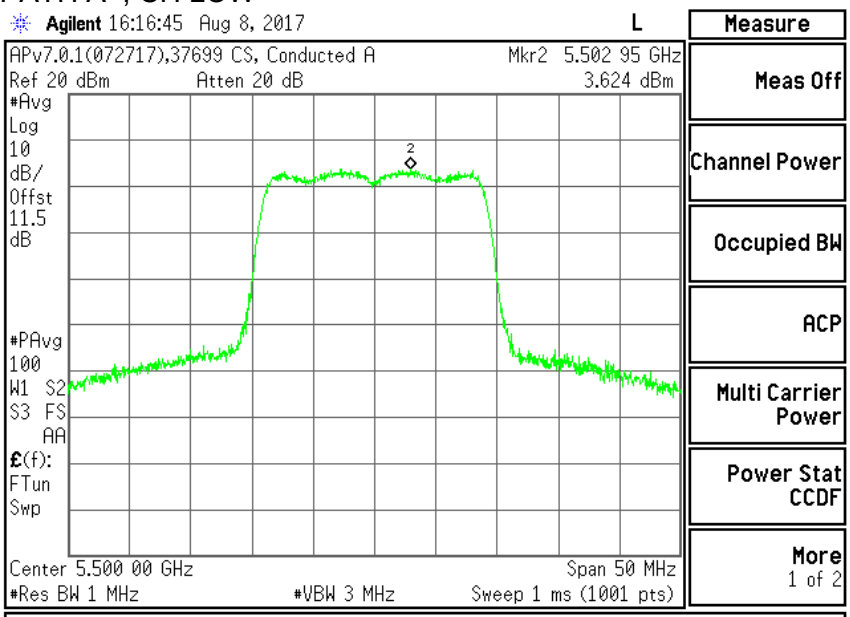
Output Power Results

Channel	Frequency (MHz)	Path A Meas Power (dBm)	Path B Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5500	13.87	14.56	17.24	23.47	-6.23
Mid	5580	14.32	14.66	17.50	23.19	-5.68
High	5700	13.39	13.69	16.55	23.19	-6.64
144	5720	12.13	12.76	15.47	23.46	-8.00

PPSD Results

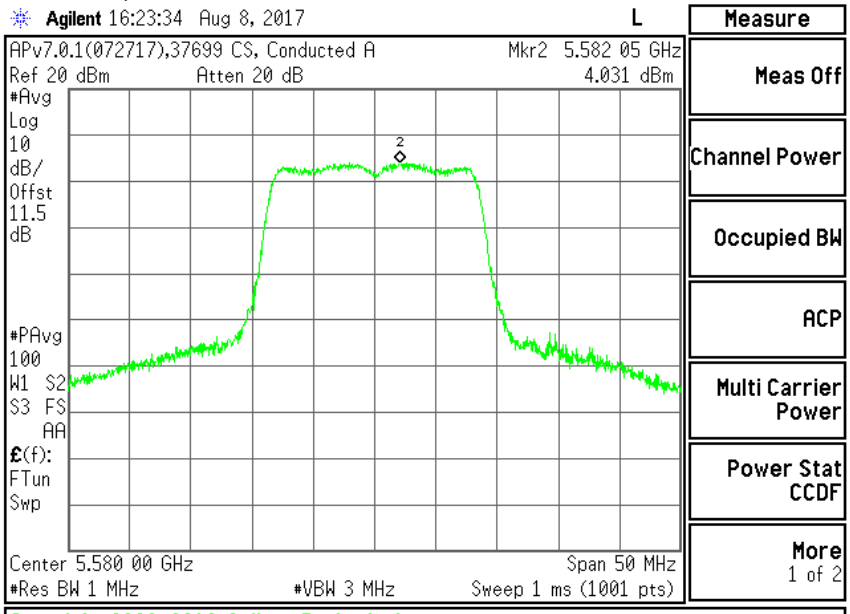
Channel	Frequency (MHz)	Path A Meas PPSD (dBm)	Path B Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
Low	5500	3.62	4.00	6.83	11.00	-4.17
Mid	5580	4.28	4.03	7.17	11.00	-3.83
High	5700	2.85	3.70	6.31	11.00	-4.69
144	5720	1.88	1.99	4.95	11.00	-6.05

PATH A , CH LOW



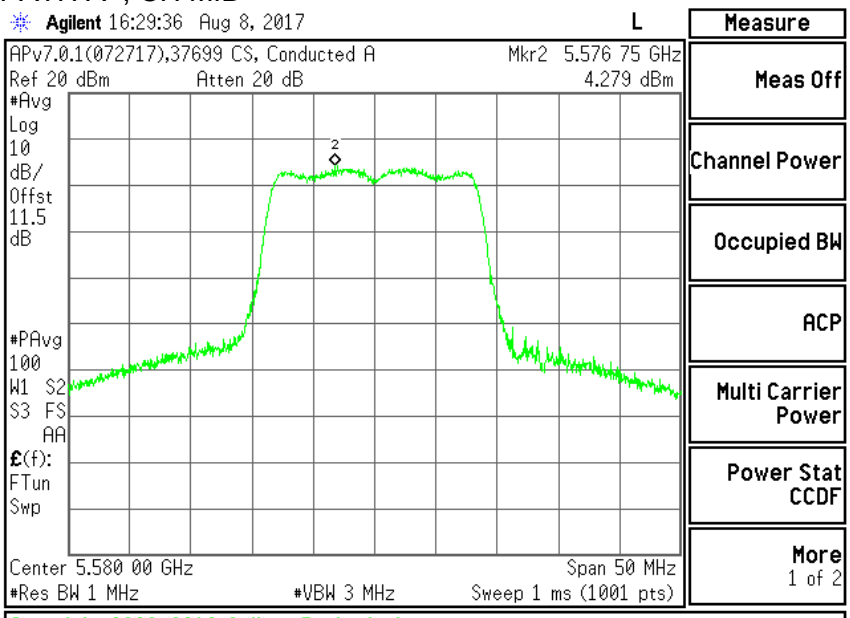
*Note:

PATH B , CH LOW



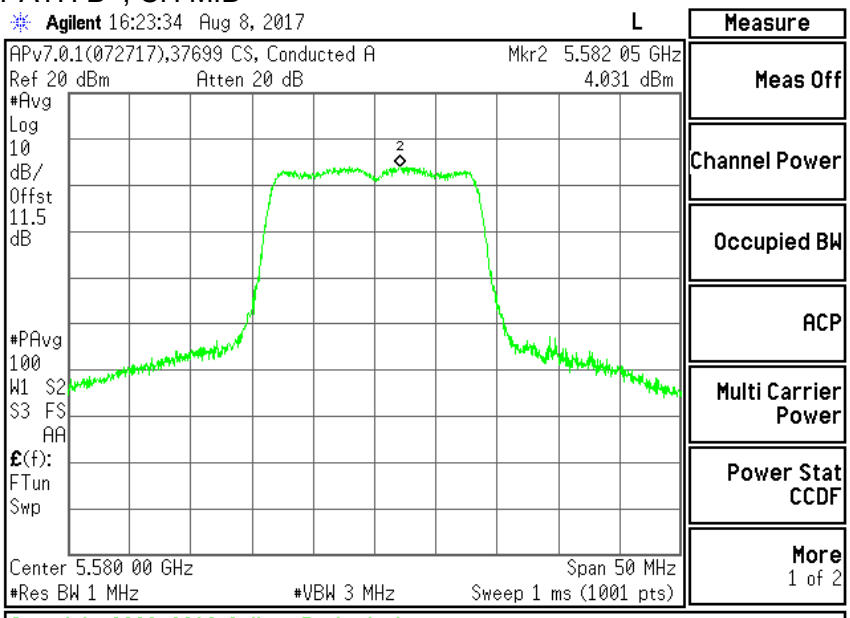
*Note:

PATH A , CH MID



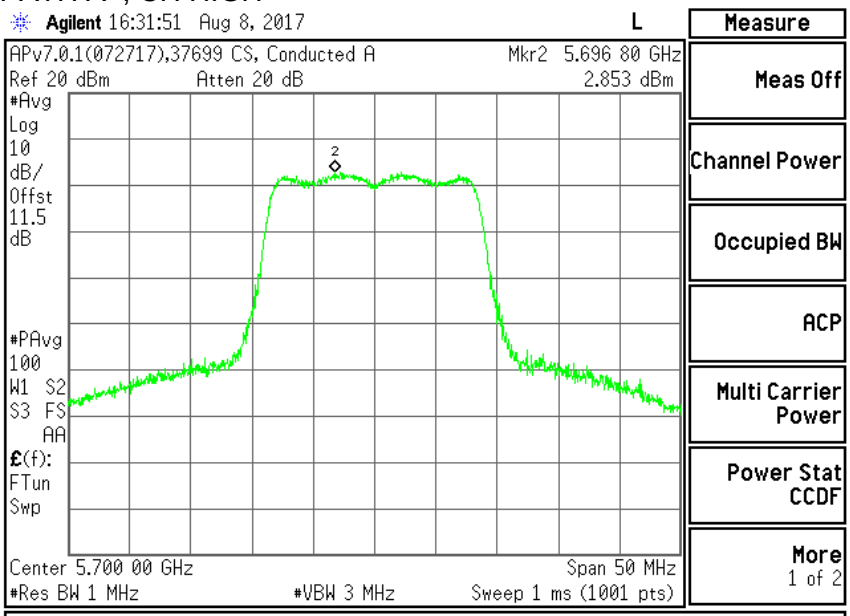
*Note:

PATH B , CH MID



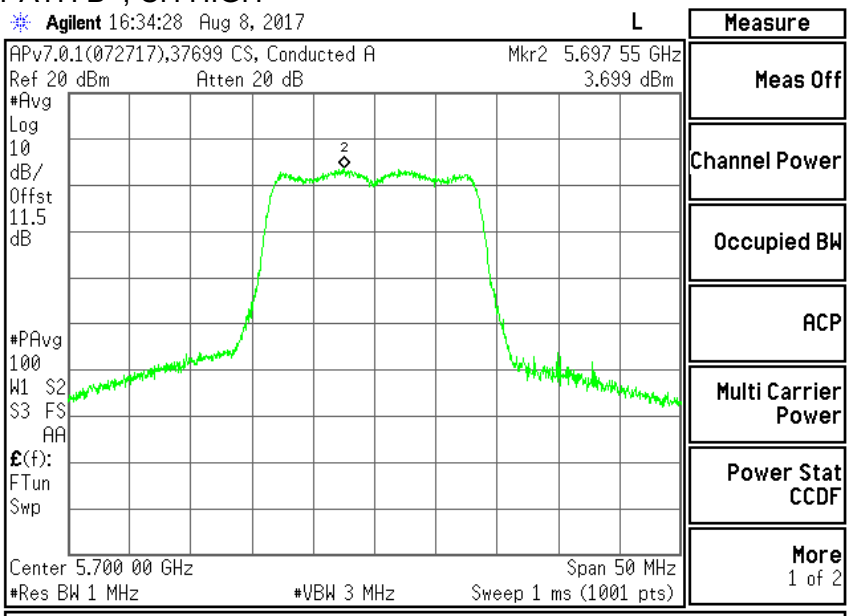
*Note:

PATH A , CH HIGH



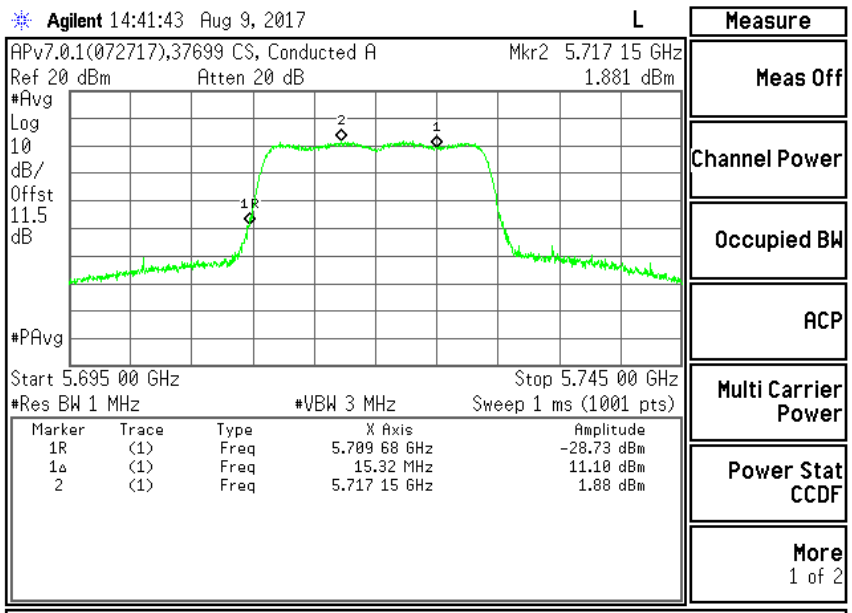
*Note:

PATH B , CH HIGH



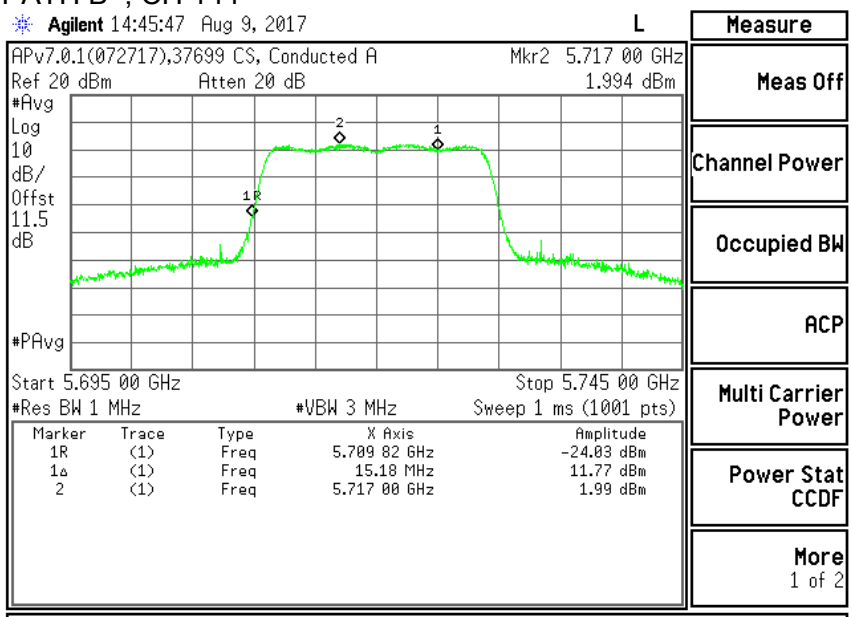
*Note:

PATH A , CH 144



*Note:

PATH B , CH 144



*Note:

9.11. 11n HT40 2TX MODE IN THE 5.6GHz BAND

9.11.1. 26 dB BANDWIDTH

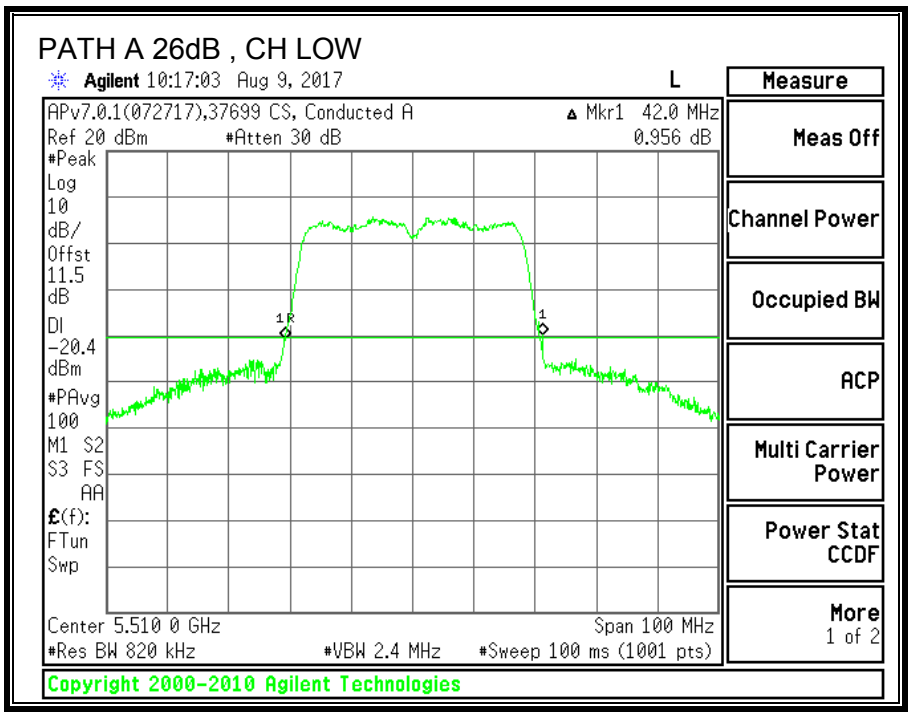
LIMITS

None; for reporting purposes only.

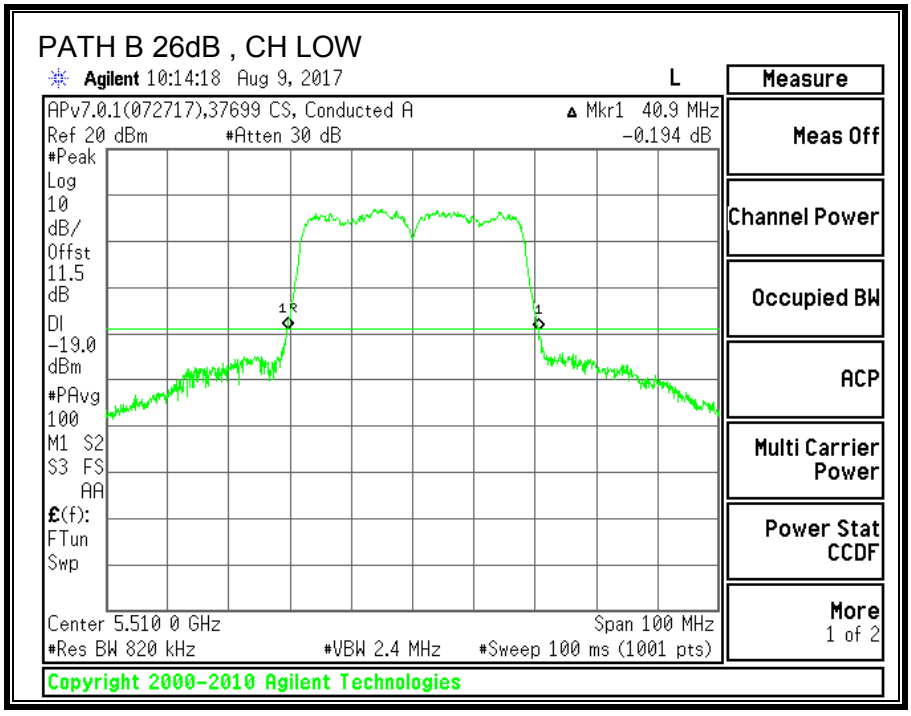
RESULTS

Channel	Frequency	26 dB BW PATH A (MHz)	26 dB BW PATH B (MHz)
Low	5510	42	40.9
Mid	5550	42	40.9
High	5670	41.6	41.3
142	5710	41.5	40.7

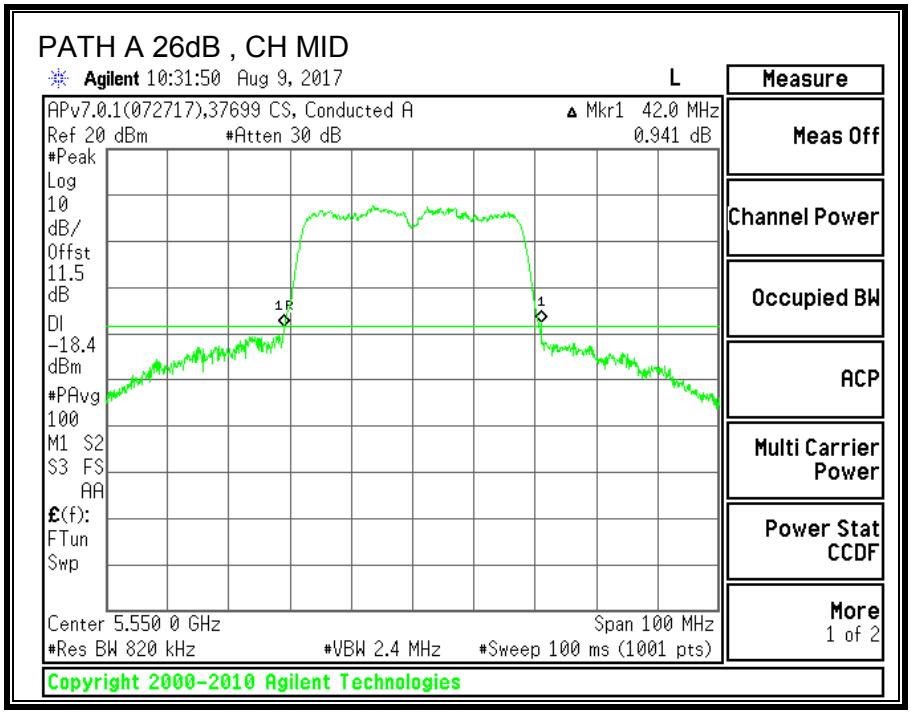
PATH A 26dB , CH LOW



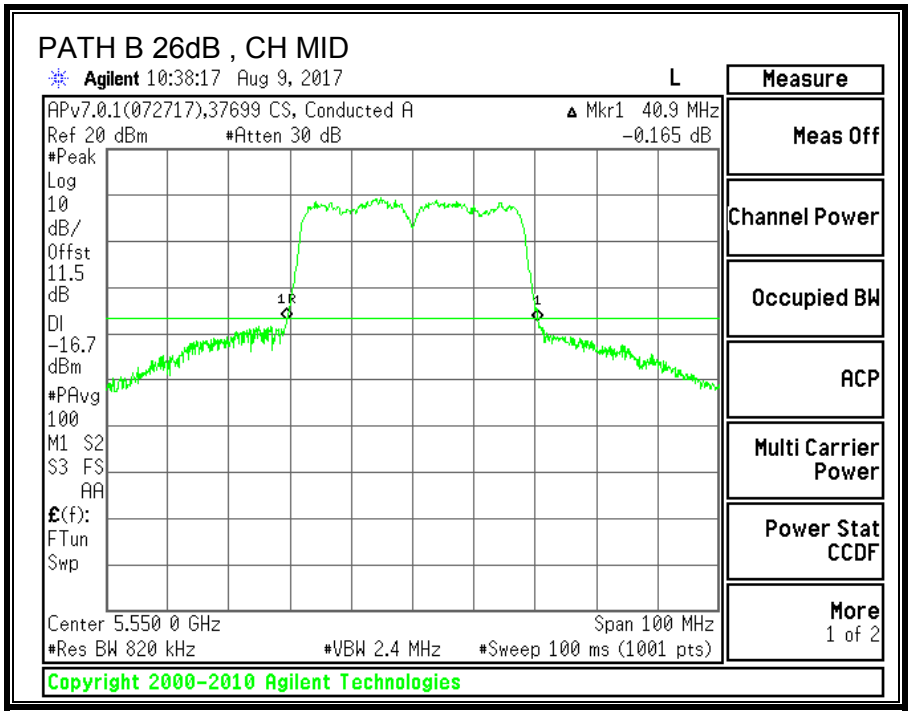
PATH B 26dB , CH LOW



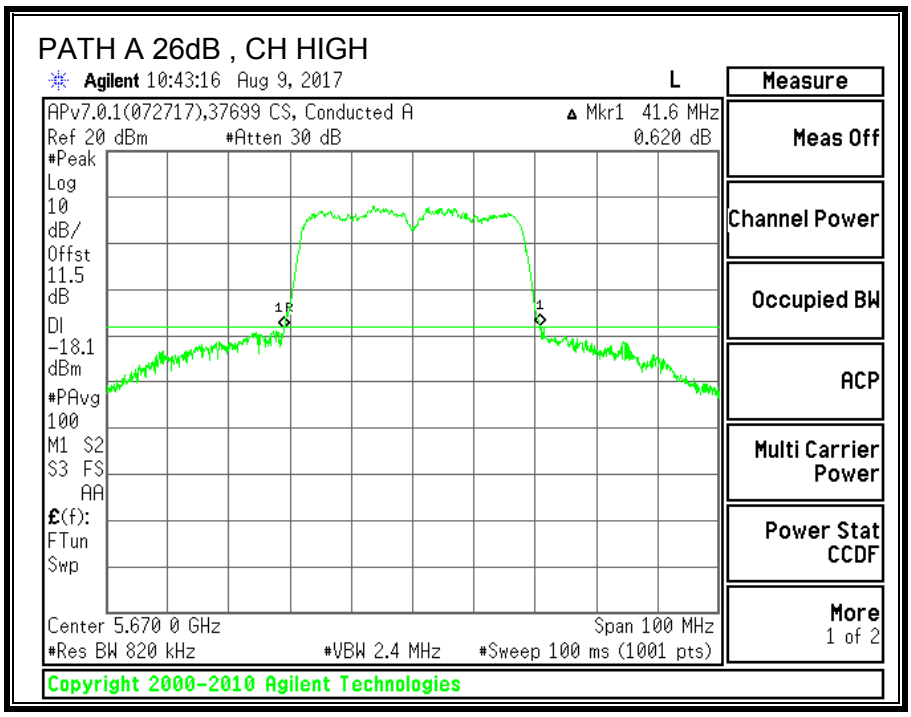
PATH A 26dB , CH MID



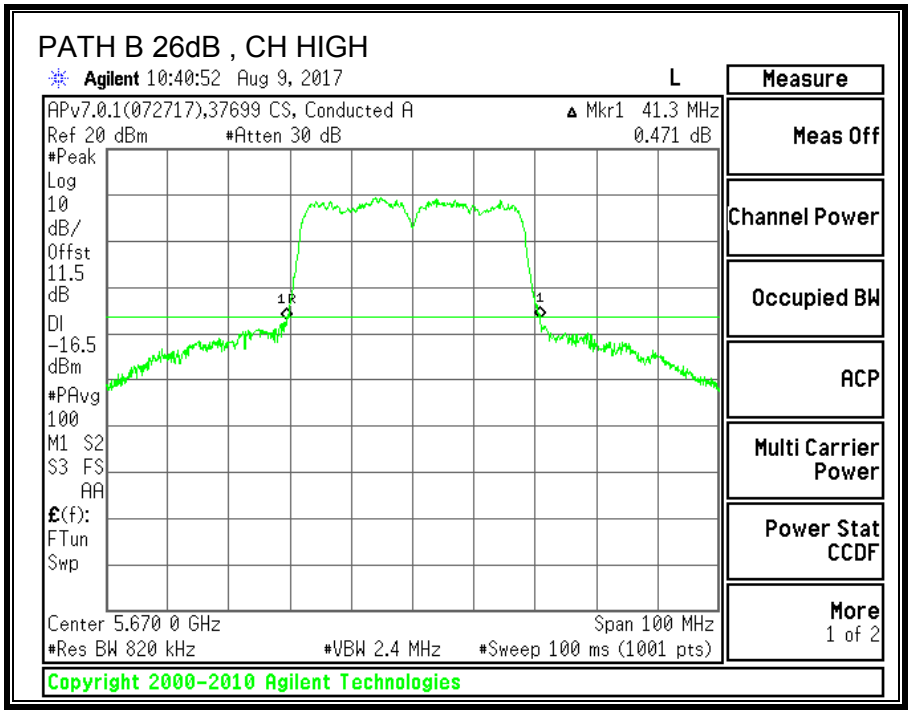
PATH B 26dB , CH MID



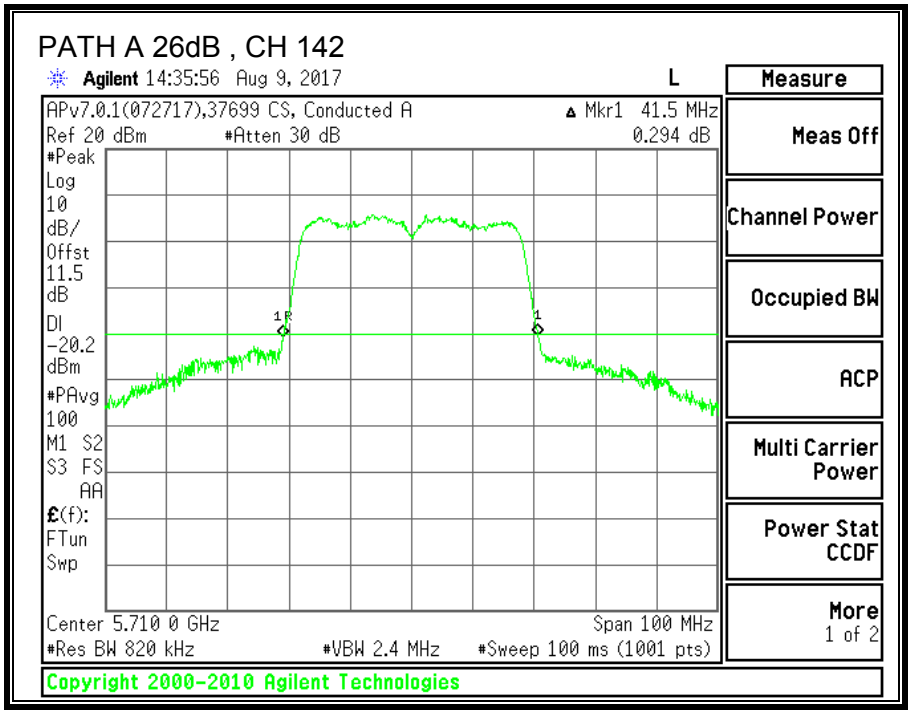
PATH A 26dB , CH HIGH



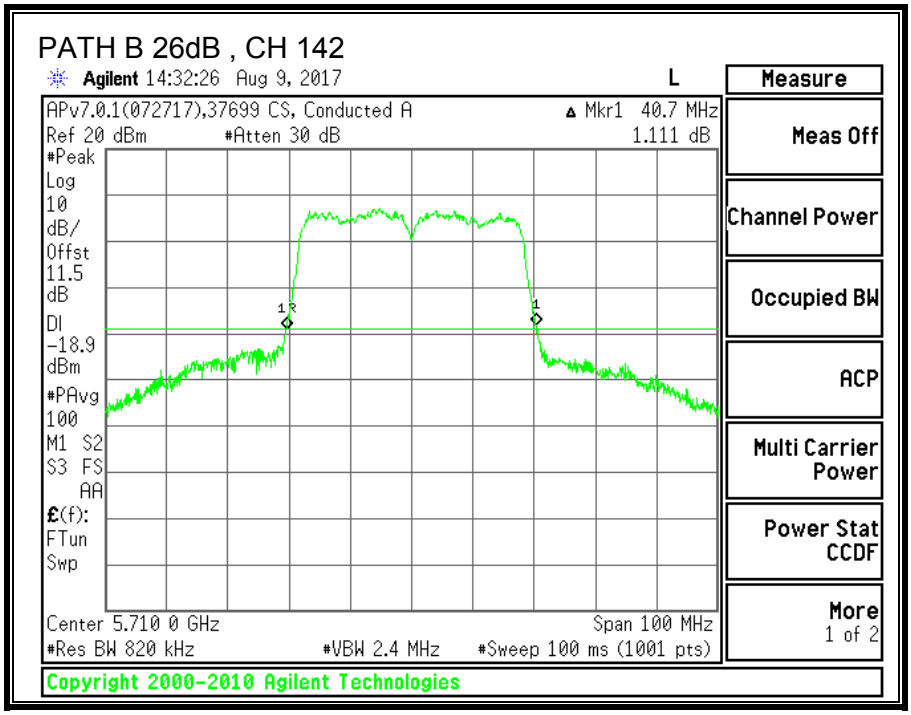
PATH B 26dB , CH HIGH



PATH A 26dB , CH 142



PATH B 26dB , CH 142



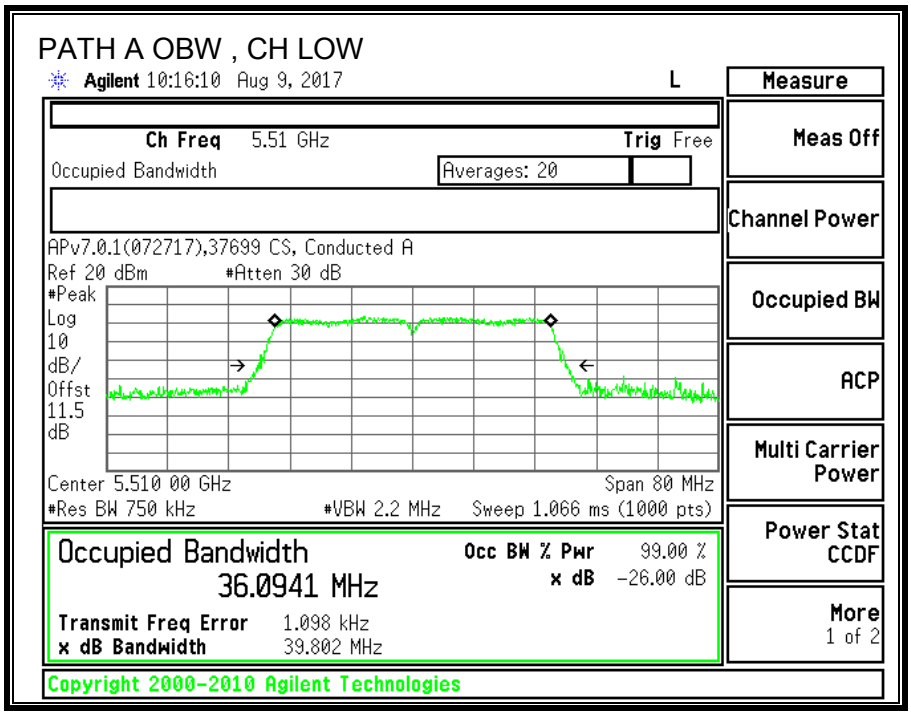
9.11.2. 99% BANDWIDTH

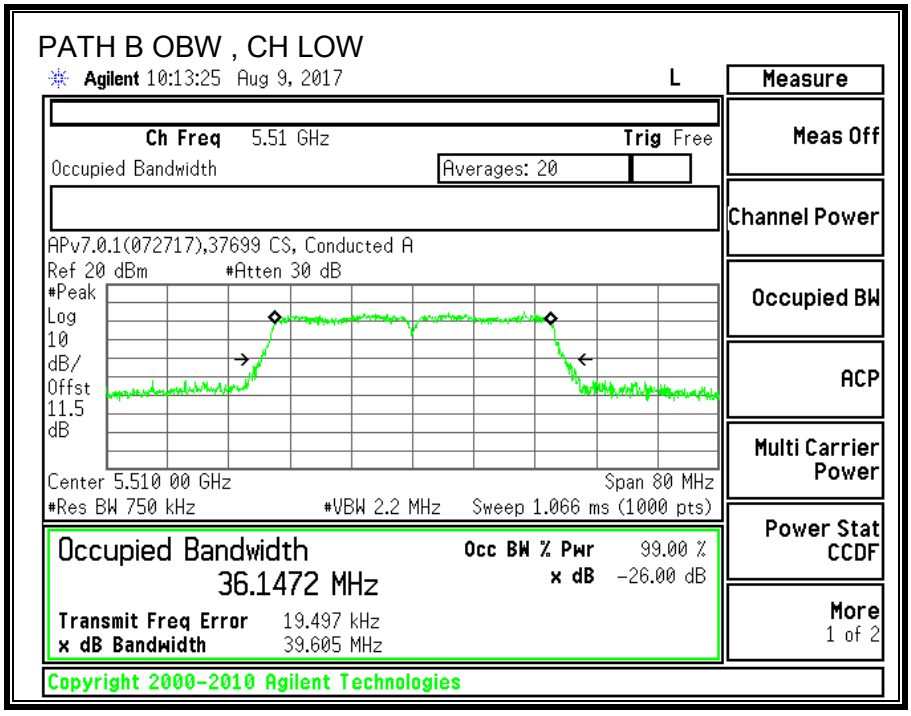
LIMITS

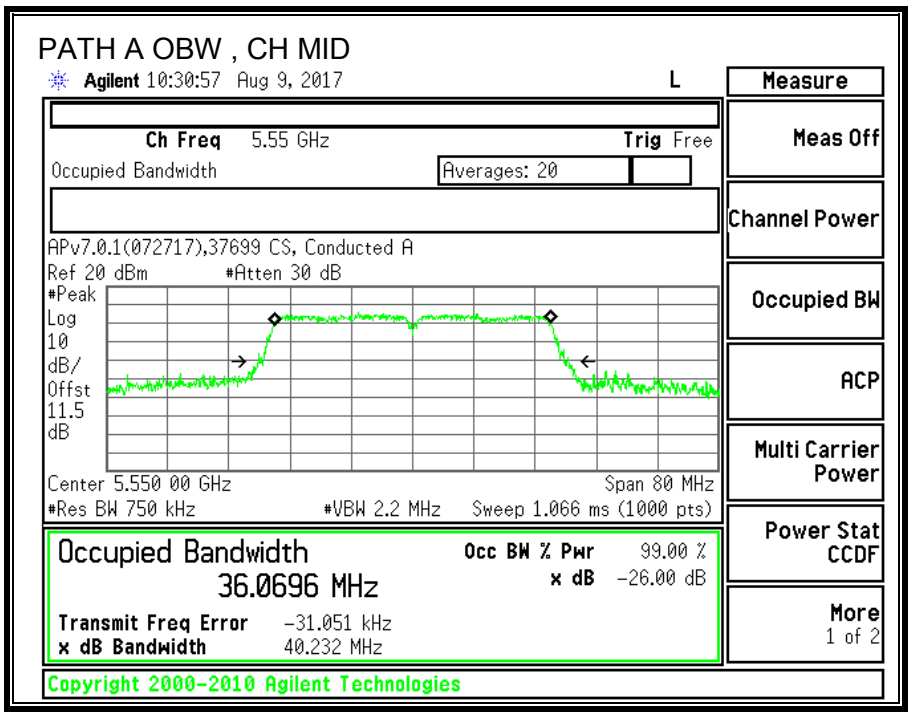
None; for reporting purposes only.

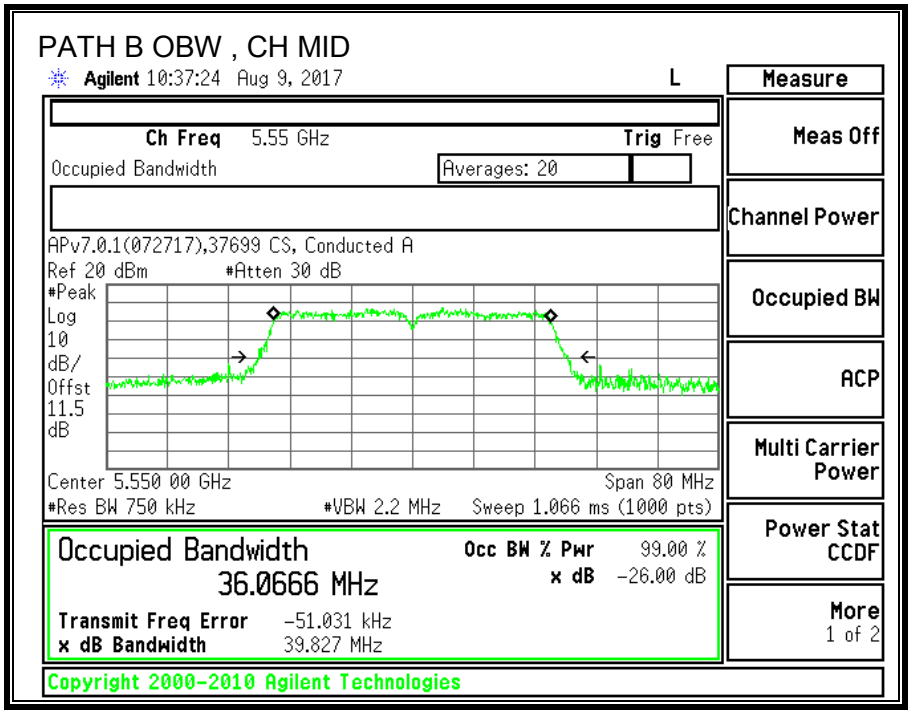
RESULTS

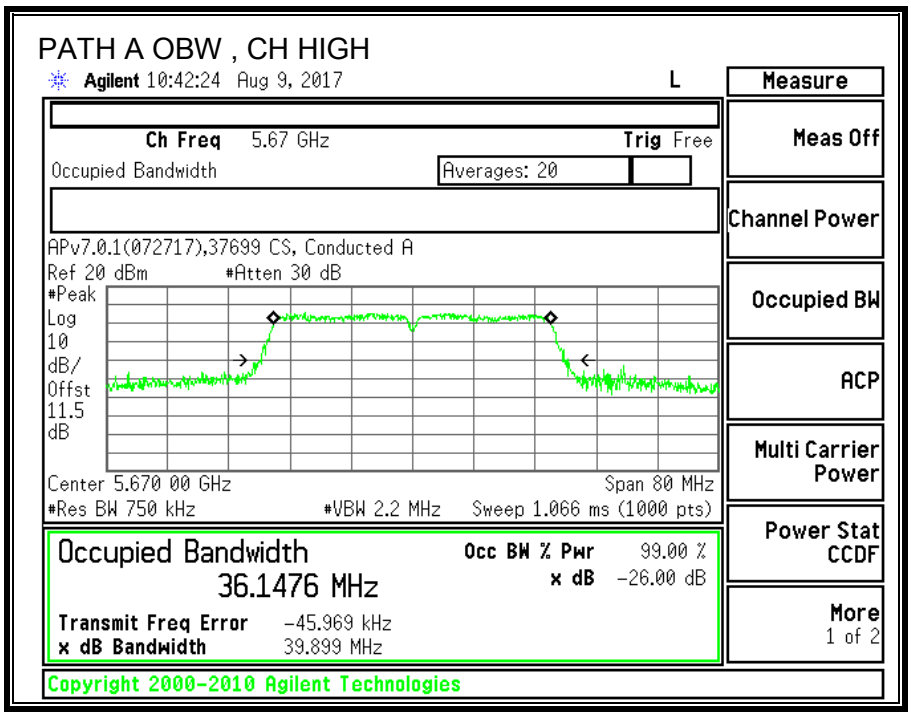
Channel	Frequency	99% BW PATH A (MHz)	99% BW PATH B (MHz)
Low	5510	36.0941	36.1472
Mid	5550	36.0696	36.0666
High	5670	36.1476	36.1608
142	5710	36.0836	36.1161

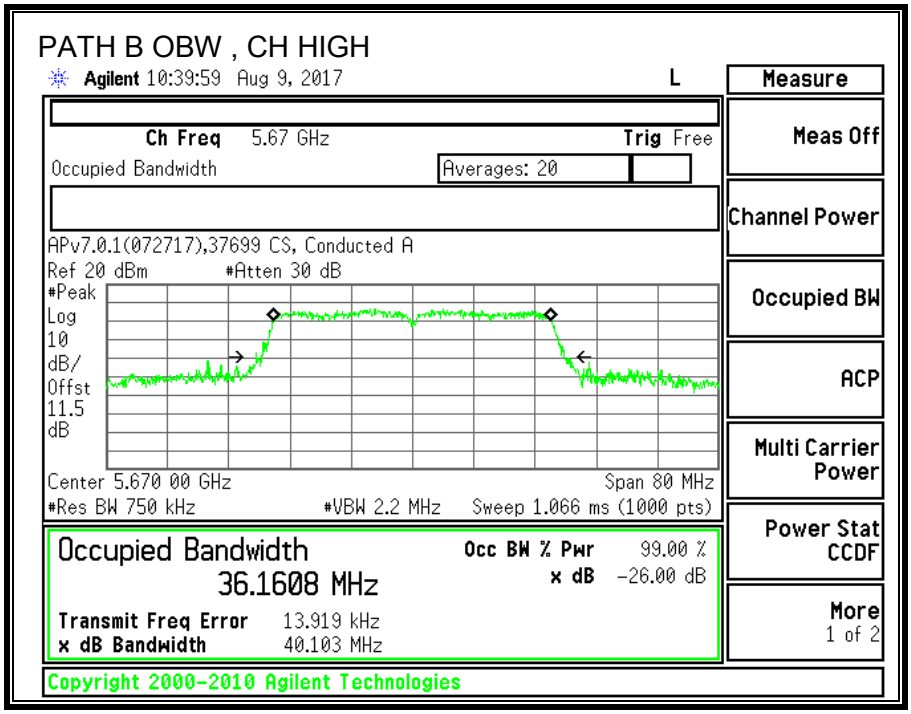


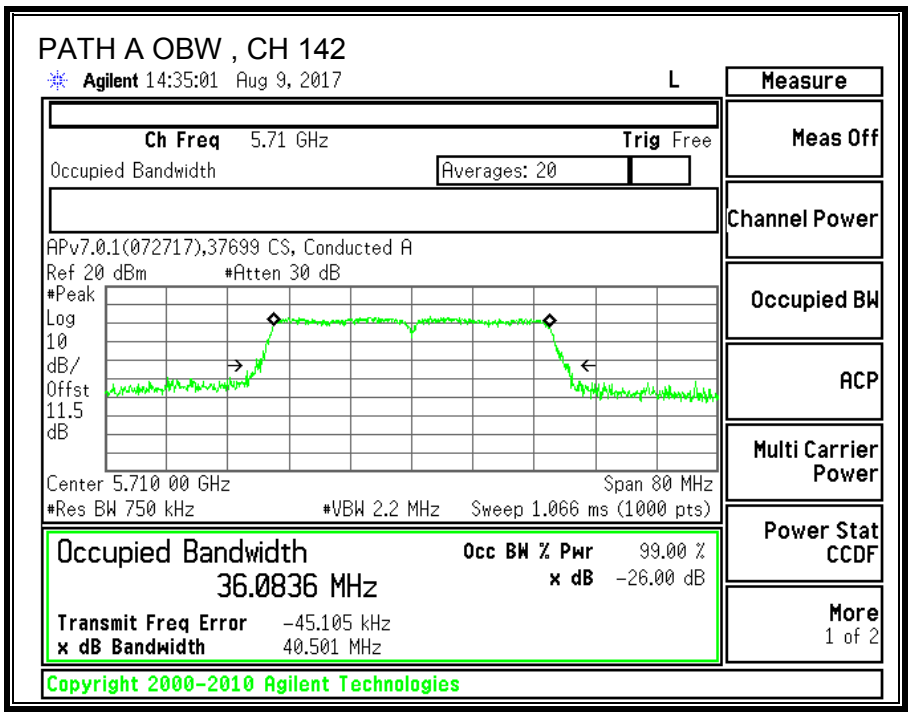


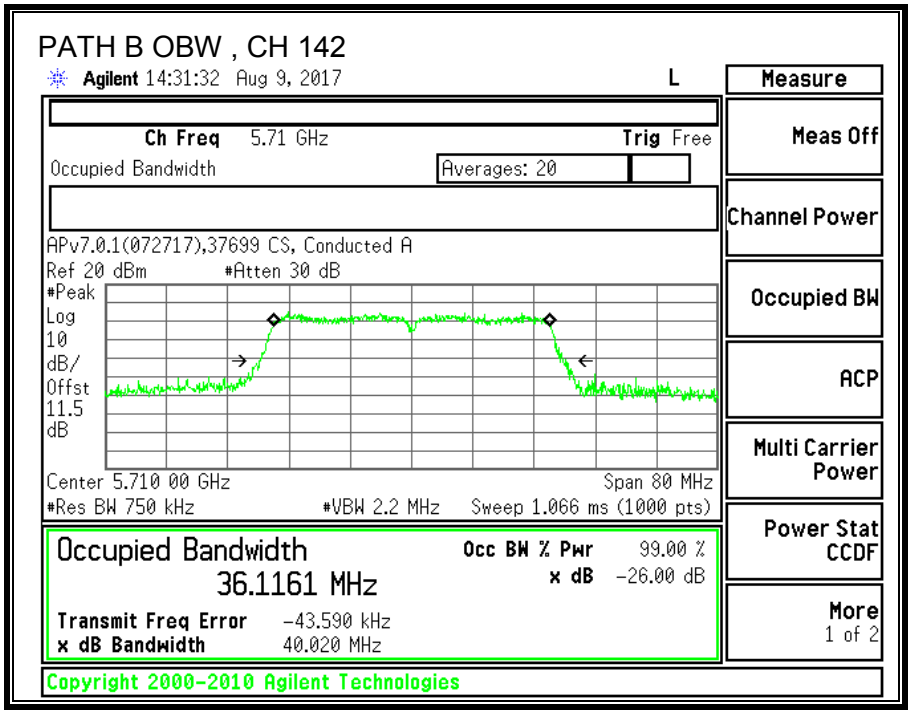












9.11.3. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (2)

For the band 5.47–5.725 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26–dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC RSS-247 (6.2.3) (1)

The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.Straddle channel power is measured using PXA spectrum analyzer, duty cycle correction factor is required.

DIRECTIONAL ANTENNA GAIN

Path A Antenna Gain (dBi)	Path B Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
1.90	2.80	2.37	5.37