



FCC 47 CFR PART 15 SUBPART E

UNII

CERTIFICATION TEST REPORT

FOR

Bluetooth/BLE and DTS/UNII a/b/g/n/ac Tablet

MODEL NUMBER : SM-W620

FCC ID: A3LSMW620

REPORT NUMBER: 478783948-E4V1

ISSUE DATE: MAR 10 , 2017

Prepared for
SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 16677, KOREA

Prepared by
UL Korea, Ltd. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea
TEL: (031) 337-9902
FAX: (031) 213-5433



Revision History

Rev.	Issue Date	Revisions	Revised By
V1	03/10/17	Initial issue	Junwhan Lee

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS.....	6
2. TEST METHODOLOGY	7
3. FACILITIES AND ACCREDITATION.....	7
4. CALIBRATION AND UNCERTAINTY	7
4.1. MEASURING INSTRUMENT CALIBRATION	7
4.2. SAMPLE CALCULATION.....	7
4.3. MEASUREMENT UNCERTAINTY	8
5. EQUIPMENT UNDER TEST	9
5.1. DESCRIPTION OF EUT.....	9
5.2. MAXIMUM OUTPUT POWER.....	10
5.3. DESCRIPTION OF AVAILABLE ANTENNAS	11
5.4. List of test reduction and modes covering other modes:	11
5.5. WORST-CASE CONFIGURATION AND MODE.....	13
5.6. DESCRIPTION OF TEST SETUP	14
6. TEST AND MEASUREMENT EQUIPMENT	16
7. SUMMARY TABLE	17
8. REFERENCE MEASUREMENTS RESULTS	18
8.1. ON TIME AND DUTY CYCLE RESULTS.....	18
8.2. DUTY CYCLE PLOTS.....	18
8.3. 26 dB BANDWIDTH	21
8.3.1. 802.11a MODE IN THE 5.2 GHz BAND.....	21
8.3.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND	21
8.3.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND	21
8.3.4. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND.....	22
8.3.5. 802.11a MODE IN THE 5.3 GHz BAND.....	22
8.3.6. 802.11n HT20 MODE IN THE 5.3 GHz BAND	22
8.3.7. 802.11n HT40 MODE IN THE 5.3 GHz BAND	22
8.3.8. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND.....	22
8.3.1. 802.11a MODE IN THE 5.5 GHz BAND.....	23
8.3.2. 802.11n HT20 MODE IN THE 5.5 GHz BAND	23
8.3.3. 802.11n HT40 MODE IN THE 5.5 GHz BAND	23
8.3.4. 802.11ac VHT80 MODE IN THE 5.5 GHz BAND.....	23
8.3.5. 802.11a MODE IN THE 5.8 GHz BAND.....	24
8.3.6. 802.11n HT20 MODE IN THE 5.8 GHz BAND	24
8.3.7. 802.11n HT40 MODE IN THE 5.8 GHz BAND	24
8.3.8. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND.....	24
8.3.9. 26 dB BANDWIDTH PLOTS	25

8.4.	99% BANDWIDTH.....	38
8.4.1.	802.11a MODE IN THE 5.2 GHz BAND.....	38
8.4.2.	802.11n HT20 MODE IN THE 5.2 GHz BAND.....	38
8.4.3.	802.11n HT40 MODE IN THE 5.2 GHz BAND.....	38
8.4.4.	802.11ac VHT80 MODE IN THE 5.2 GHz BAND.....	39
8.4.5.	802.11a MODE IN THE 5.3 GHz BAND.....	39
8.4.6.	802.11n HT20 MODE IN THE 5.3 GHz BAND.....	39
8.4.7.	802.11n HT40 MODE IN THE 5.3 GHz BAND.....	39
8.4.8.	802.11ac VHT80 MODE IN THE 5.3 GHz BAND.....	39
8.4.9.	802.11a MODE IN THE 5.5 GHz BAND.....	40
8.4.10.	802.11n HT20 MODE IN THE 5.5 GHz BAND.....	40
8.4.11.	802.11n HT40 MODE IN THE 5.5 GHz BAND.....	40
8.4.12.	802.11ac VHT80 MODE IN THE 5.5 GHz BAND.....	40
8.4.13.	802.11a MODE IN THE 5.8 GHz BAND.....	41
8.4.14.	802.11n HT20 MODE IN THE 5.8 GHz BAND.....	41
8.4.15.	802.11n HT40 MODE IN THE 5.8 GHz BAND.....	41
8.4.16.	802.11ac VHT80 MODE IN THE 5.8 GHz BAND.....	41
8.4.17.	99% BANDWIDTH PLOTS.....	42
9.	ANTENNA PORT TEST RESULTS	55
9.1.	6 dB BANDWIDTH	55
9.1.1.	802.11a MODE IN THE 5.8 GHz BAND.....	56
9.1.2.	802.11n HT20 MODE IN THE 5.8 GHz BAND.....	56
9.1.3.	802.11n HT40 MODE IN THE 5.8 GHz BAND.....	56
9.1.4.	802.11n VHT80 MODE IN THE 5.8 GHz BAND.....	56
9.1.5.	6 dB BANDWIDTH PLOTS	57
9.2.	OUTPUT POWER AND PPSD.....	61
9.2.1.	802.11a MODE IN THE 5.2 GHz BAND.....	62
9.2.2.	802.11n HT20 MODE IN THE 5.2 GHz BAND.....	63
9.2.3.	802.11n HT40 MODE IN THE 5.2 GHz BAND.....	64
9.2.4.	802.11ac VHT80 MODE IN THE 5.2 GHz BAND.....	65
9.2.5.	802.11a MODE IN THE 5.3 GHz BAND.....	66
9.2.6.	802.11n HT20 MODE IN THE 5.3 GHz BAND.....	67
9.2.7.	802.11n HT40 MODE IN THE 5.3 GHz BAND.....	68
9.2.8.	802.11ac VHT80 MODE IN THE 5.3 GHz BAND.....	69
9.2.9.	802.11a MODE IN THE 5.5 GHz BAND.....	70
9.2.10.	802.11n HT20 MODE IN THE 5.5 GHz BAND.....	71
9.2.11.	802.11n HT40 MODE IN THE 5.5 GHz BAND.....	72
9.2.12.	802.11ac VHT80 MODE IN THE 5.5 GHz BAND.....	73
9.2.13.	802.11a MODE IN THE 5.8 GHz BAND.....	74
9.2.14.	802.11n HT20 MODE IN THE 5.8 GHz BAND.....	75
9.2.15.	802.11n HT40 MODE IN THE 5.8 GHz BAND.....	76
9.2.16.	802.11ac VHT80 MODE IN THE 5.8 GHz BAND.....	77
9.2.17.	PPSD PLOTS.....	78
10.	TRANSMITTER ABOVE 1 GHz.....	91
10.1.	5.2 GHz.....	94
10.1.1.	TX Above 1GHz 802.11a 2Tx CDD MODE IN THE 5.2GHz BAND	94
10.1.2.	TX Above 1GHz 802.11n HT20 2Tx CDD MODE IN THE 5.2GHz BAND.....	102
10.1.3.	TX Above 1GHz 802.11n HT40 2Tx CDD MODE IN THE 5.2GHz BAND.....	110

10.1.4.	TX ABOVE 1GHz 802.11ac VHT80 2Tx CDD MODE IN THE 5.2GHz BAND	116
10.2.	5.3 GHz.....	120
10.2.1.	TX ABOVE 1 GHz 802.11a 2Tx CDD MODE IN THE 5.3 GHz BAND	120
10.2.2.	TX ABOVE 1GHz 802.11n HT20 2Tx CDD MODE IN THE 5.3GHz BAND	128
10.2.3.	TX ABOVE 1GHz 802.11n HT40 2Tx CDD MODE IN THE 5.3GHz BAND	136
10.2.4.	TX ABOVE 1GHz 802.11ac VHT80 2Tx CDD MODE IN THE 5.3GHz BAND	142
	RESTRICTED BANDEDGE (High CHANNEL).....	142
10.3.	5.5-5.6 GHz.....	146
10.3.1.	TX ABOVE 1 GHz 802.11a 2Tx CDD MODE IN THE 5.5 GHz BAND	146
10.3.2.	TX ABOVE 1GHz 802.11n HT20 2Tx CDD MODE IN THE 5.5GHz BAND	156
10.3.3.	TX ABOVE 1GHz 802.11n HT40 2Tx CDD MODE IN THE 5.5GHz BAND	166
10.3.4.	TX ABOVE 1GHz 802.11ac VHT80 2Tx CDD MODE IN THE 5.5GHz BAND	176
10.4.	5.8 GHz.....	180
10.4.1.	TX ABOVE 1GHz 802.11a 2Tx CDD MODE IN THE 5.8GHz BAND	180
10.4.2.	TX ABOVE 1GHz 802.11n HT20 2Tx CDD MODE IN THE 5.8GHz BAND	190
10.4.3.	TX ABOVE 1GHz 802.11n HT40 2Tx CDD MODE IN THE 5.8GHz BAND	200
10.4.4.	TX ABOVE 1GHz 802.11ac VHT80 2Tx CDD MODE IN THE 5.8GHz BAND	208
11.	WORST-CASE BELOW 1 GHz (in the 5.3 GHz Band).....	218
12.	AC POWER LINE CONDUCTED EMISSIONS	222
13.	DYNAMIC FREQUENCY SELECTION	231
13.1.	OVERVIEW.....	231
13.1.1.	LIMITS.....	231
13.1.1.	TEST AND MEASUREMENT SYSTEM.....	235
13.1.2.	SETUP OF EUT	238
13.1.3.	DESCRIPTION OF EUT.....	239
13.2.	RESULTS FOR 20 MHz BANDWIDTH.....	240
13.2.1.	TEST CHANNEL	240
13.2.2.	RADAR WAVEFORM AND TRAFFIC	240
13.2.3.	OVERLAPPING CHANNEL TESTS	242
13.2.4.	MOVE AND CLOSING TIME	242
13.3.	RESULTS FOR 40 MHz BANDWIDTH.....	245
13.3.1.	TEST CHANNEL	245
13.3.2.	RADAR WAVEFORM AND TRAFFIC	245
13.3.3.	OVERLAPPING CHANNEL TESTS	247
13.3.4.	MOVE AND CLOSING TIME	247
13.4.	RESULTS FOR 80 MHz BANDWIDTH.....	250
13.4.1.	TEST CHANNEL	250
13.4.2.	RADAR WAVEFORM AND TRAFFIC	250
13.4.3.	OVERLAPPING CHANNEL TESTS	252
13.4.4.	MOVE AND CLOSING TIME	252
14.	SETUP PHOTOS.....	255

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: Bluetooth/BLE and DTS/UNII a/b/g/n/ac Tablet
MODEL NUMBER: SM-W620
SERIAL NUMBER: 9X8LR32J2000G8K, 9X8LR32J2000G1H (RADIATED);
9X8LR32J2000GY (CONDUCTED)
DATE TESTED: MAR 04, 2017 - MAR 10, 2017

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

UL Korea, Ltd. 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 Korea, Ltd. 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 Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. 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 IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Korea, Ltd. By:



SungGil Park
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 789033 D02 General UNII Test Procedures New Rules v01r03
4. KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02
5. KDB 905462 D03 UNII Clients Without Radar Detection New Rules v01r02
6. KDB 662911 D01 v02r01
7. ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 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.

218 Maeyeong-ro
☒ Chamber 1
☒ Chamber 2

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <http://www.iasonline.org/PDF/TL/TL-637.pdf>.

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:

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.32 dB
Radiated Disturbance, Below 1GHz	4.14 dB
Radiated Disturbance, Above 1 GHz	5.97 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth/BLE and DTS/UNII a/b/g/n/ac Tablet
This test report addresses the NII (UNII) operational mode.

WiFi MIMO Condition

Frequency	Mode	Antenna 1	Antenna 2
2.4 GHz	802.11b	TX / RX	TX / RX
	802.11g	TX / RX	TX / RX
	802.11g MIMO	TX / RX	TX / RX
	802.11n	TX / RX	TX / RX
	802.11n MIMO	TX / RX	TX / RX
5 GHz	802.11a	TX / RX	TX / RX
	802.11a MIMO	TX / RX	TX / RX
	802.11n	TX / RX	TX / RX
	802.11n MIMO	TX / RX	TX / RX
	802.11ac	TX / RX	TX / RX
	802.11ac MIMO	TX / RX	TX / RX

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum total conducted average output power as follows:

Frequency Range [MHz]	Mode	Output Power [dBm]		Output Power [mW]	
		Antenna1	Antenna2	Antenna1	Antenna2
5180 - 5240	802.11a SISO	14.07	13.75	25.51	23.69
	802.11a MIMO	16.92		49.20	
	802.11n HT20 SISO	13.79	14.46	23.93	27.93
	802.11n HT20 MIMO	17.13		51.64	
5190 - 5230	802.11n HT40 SISO	11.44	11.24	13.92	13.30
	802.11n HT40 MIMO	14.35		27.23	
5210	802.11ac VHT80 SISO	11.07	10.76	12.80	11.92
	802.11ac VHT80 MIMO	13.93		24.72	
5260 - 5320	802.11a SISO	14.01	14.41	25.18	27.61
	802.11a MIMO	17.08		51.05	
	802.11n HT20 SISO	13.80	13.58	23.99	22.80
	802.11n HT20 MIMO	16.68		46.56	
5270 - 5310	802.11n HT40 SISO	10.53	11.31	11.30	13.52
	802.11n HT40 MIMO	13.94		24.77	
5290	802.11ac VHT80 SISO	11.22	11.03	13.25	12.69
	802.11ac VHT80 MIMO	14.14		25.94	
5500 - 5700	802.11a SISO	14.14	13.99	25.97	25.08
	802.11a MIMO	17.08		51.05	
	802.11n HT20 SISO	13.88	13.75	24.46	23.73
	802.11n HT20 MIMO	16.83		48.19	
5510 - 5670	802.11n HT40 SISO	11.42	11.34	13.87	13.61
	802.11n HT40 MIMO	14.39		27.48	
5530	802.11ac VHT80 SISO	11.24	10.94	13.29	12.41
	802.11ac VHT80 MIMO	14.10		25.70	
5745 - 5825	802.11a SISO	13.93	14.08	24.72	25.59
	802.11a MIMO	17.01		50.23	
	802.11n HT20 SISO	13.72	13.85	23.55	24.27
	802.11n HT20 MIMO	16.76		47.42	
5755 - 5795	802.11n HT40 SISO	11.29	11.45	13.46	13.96
	802.11n HT40 MIMO	14.38		27.42	
5775	802.11ac VHT80 SISO	10.95	11.01	12.45	12.62
	802.11ac VHT80 MIMO	13.99		25.06	

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a internal antenna, with a maximum gain of:

Frequency Range [MHz]	Antenna Gain [dBi]	
	Antenna 1	Antenna 2
UNII 1 5150 – 5250	-1.30	-4.10
UNII 2A 5250 – 5350	-2.40	-3.50
UNII 2C 5470 – 5725	0.50	1.30
UNII 3 5725 – 5850	0.60	1.30

5.4. List of test reduction and modes covering other modes:

The output power on covered modes is equal to or less than one referenced.

UNII 1

5150 - 5250 MHz Authorized Frequency Band (Radiated Testing)		
Frequency Range [MHz]	Mode	Covered by
5180 - 5240	802.11a legacy 1TX/CDD 2TX	802.11a 2TX CDD
5180 - 5240	802.11HT20 1TX	802.11n HT20 2TX CDD
5180 - 5240	802.11HT20 2TX STBC/SDM/CDD	802.11n HT20 2TX CDD
5180 - 5240	802.11ac VHT20 1TX	802.11n HT20 2TX CDD
5180 - 5240	802.11ac VHT20 2TX STBC/SDM/CDD	802.11n HT20 2TX CDD
5190 - 5230	802.11n HT40 1TX	802.11n HT40 2TX CDD
5190 - 5230	802.11n HT40 2TX STBC/SDM/CDD	802.11n HT40 2TX CDD
5190 - 5230	802.11ac VHT40 1TX	802.11n HT40 2TX CDD
5190 - 5230	802.11ac VHT40 2TX STBC/SDM/CDD	802.11n HT40 2TX CDD
5210	802.11ac VHT80 1TX	802.11ac VHT80 2TX CDD
5210	802.11ac VHT80 2TX STBC/SDM/CDD	802.11ac VHT80 2TX CDD

UNII 2A

5250 - 5350 MHz Authorized Frequency Band (Radiated Testing)		
Frequency Range [MHz]	Mode	Covered by
5260 - 5320	802.11a legacy 1TX/CDD 2TX	802.11a 2TX CDD
5260 - 5320	802.11HT20 1TX	802.11n HT20 2TX CDD
5260 - 5320	802.11HT20 2TX STBC/SDM/CDD	802.11n HT20 2TX CDD
5260 - 5320	802.11ac VHT20 1TX	802.11n HT20 2TX CDD
5260 - 5320	802.11ac VHT20 2TX STBC/SDM/CDD	802.11n HT20 2TX CDD
5270 - 5310	802.11n HT40 1TX	802.11n HT40 2TX CDD
5270 - 5310	802.11n HT40 2TX STBC/SDM/CDD	802.11n HT40 2TX CDD
5270 - 5310	802.11ac VHT40 1TX	802.11n HT40 2TX CDD
5270 - 5310	802.11ac VHT40 2TX STBC/SDM/CDD	802.11n HT40 2TX CDD
5290	802.11ac VHT80 1TX	802.11ac VHT80 2TX CDD
5290	802.11ac VHT80 2TX STBC/SDM/CDD	802.11ac VHT80 2TX CDD

UNII 2C

5470 - 5725 MHz Authorized Frequency Band (Radiated Testing)		
Frequency Range [MHz]	Mode	Covered by
5500 - 5700	802.11a legacy 1TX/CDD 2TX	802.11a 2TX CDD
5500 - 5700	802.11HT20 1TX	802.11n HT20 2TX CDD
5500 - 5700	802.11HT20 2TX STBC/SDM/CDD	802.11n HT20 2TX CDD
5500 - 5700	802.11ac VHT20 1TX	802.11n HT20 2TX CDD
5500 - 5700	802.11ac VHT20 2TX STBC/SDM/CDD	802.11n HT20 2TX CDD
5510 - 5670	802.11n HT40 1TX	802.11n HT40 2TX CDD
5510 - 5670	802.11n HT40 2TX STBC/SDM/CDD	802.11n HT40 2TX CDD
5510 - 5670	802.11ac VHT40 1TX	802.11n HT40 2TX CDD
5510 - 5670	802.11ac VHT40 2TX STBC/SDM/CDD	802.11n HT40 2TX CDD
5530	802.11ac VHT80 1TX	802.11ac VHT80 2TX CDD
5530	802.11ac VHT80 2TX STBC/SDM/CDD	802.11ac VHT80 2TX CDD

UNII 3

5725 - 5850 MHz Authorized Frequency Band (Radiated Testing)		
Frequency Range [MHz]	Mode	Covered by
5745 - 5825	802.11a legacy 1TX/CDD 2TX	802.11a 2TX CDD
5745 - 5825	802.11HT20 1TX	802.11n HT20 2TX CDD
5745 - 5825	802.11HT20 2TX STBC/SDM/CDD	802.11n HT20 2TX CDD
5745 - 5825	802.11ac VHT20 1TX	802.11n HT20 2TX CDD
5745 - 5825	802.11ac VHT20 2TX STBC/SDM/CDD	802.11n HT20 2TX CDD
5755 - 5795	802.11n HT40 1TX	802.11n HT40 2TX CDD
5755 - 5795	802.11n HT40 2TX STBC/SDM/CDD	802.11n HT40 2TX CDD
5755 - 5795	802.11ac VHT40 1TX	802.11n HT40 2TX CDD
5755 - 5795	802.11ac VHT40 2TX STBC/SDM/CDD	802.11n HT40 2TX CDD
5775	802.11ac VHT80 1TX	802.11ac VHT80 2TX CDD
5775	802.11ac VHT80 2TX STBC/SDM/CDD	802.11ac VHT80 2TX CDD

5.5. WORST-CASE CONFIGURATION AND MODE

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

Radiated emission above 1GHz was performed with the EUT set to transmit low/mid/high channels.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that the Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in the Z orientation.

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

802.11a mode: 6 Mbps (2Tx CDD)
802.11n HT20mode: MCS0 (2Tx CDD)
802.11n HT40mode: MCS0 (2Tx CDD)
802.11ac VHT80mode: MCS0 (2Tx CDD)

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Adapter	SAMSUNG	EP-TA600	R37HCEP01N1SE3	N/A
Data Cable	SAMSUNG	EP-DW720CWE	N/A	N/A
Earphone	SAMSUNG	EO-EG920BW	N/A	N/A

I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	C Type USB	Shielded	1.2m	N/A
2	Audio	2	Mini-Jack	Unshielded	1.1m	N/A

ADDITIONAL EQUIPMENT

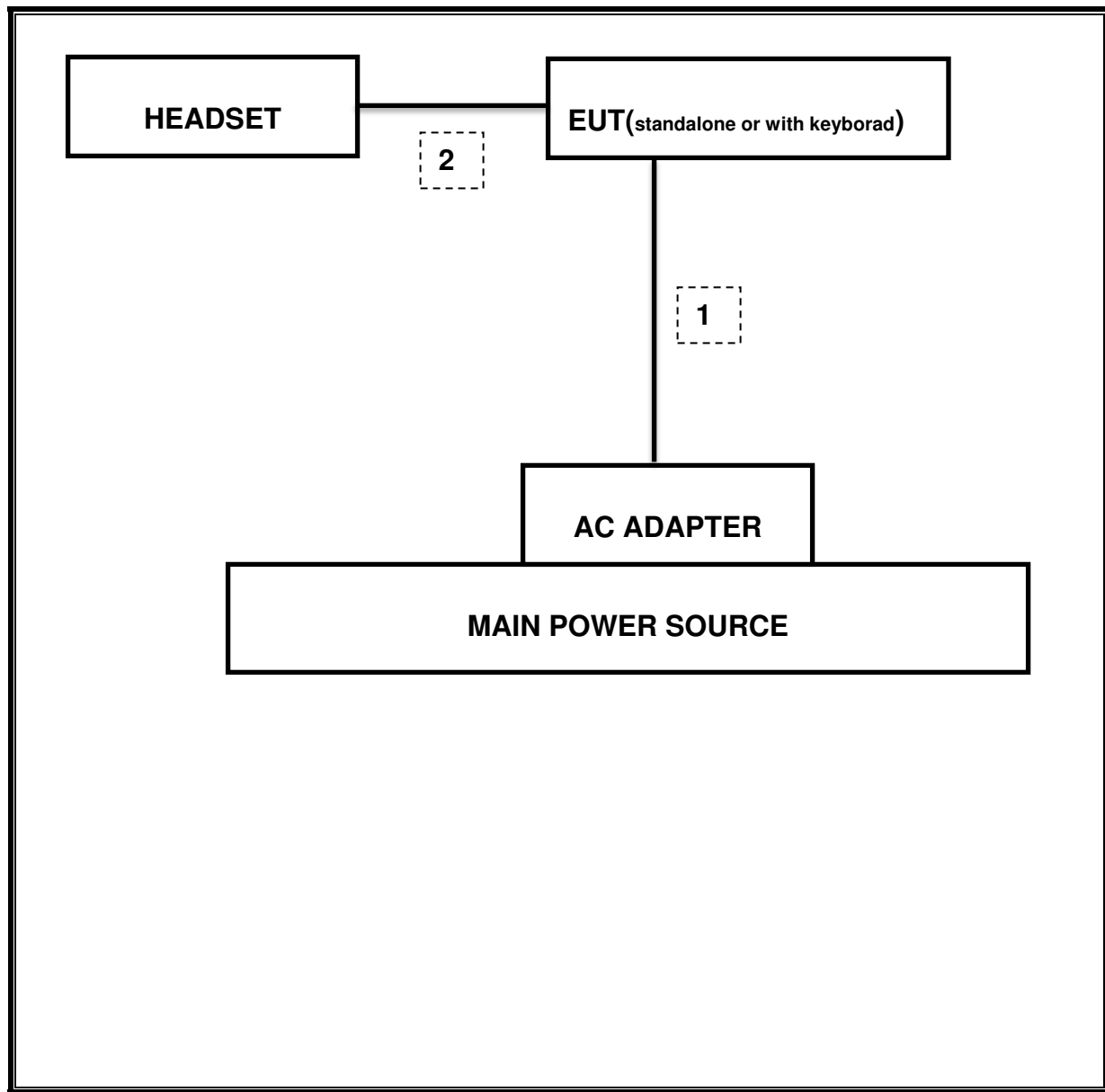
Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Keyboard	SAMSUNG	EJ-CW620	N/A	N/A

Additional radiated spurious emission measurements were performed on worst case condition(consider margin and power). Test data shown on section 10 and setup photo shown on section 14. Also radiated spurious emission below 1GHz and AC line conducted test were performed both condition(Stand-alone and equipped with keyboard).

TEST SETUP

The EUT is a stand-alone unit during the tests.
Test software exercised the EUT to enable NII mode.

SETUP DIAGRAM FOR 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	S/N	Cal Due
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	10-14-18
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	04-25-17
Antenna, Horn, 18 GHz	ETS	3115	00167211	10-14-18
Antenna, Horn, 18 GHz	ETS	3117	00168724	06-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168717	06-17-17
Antenna, Horn, 40 GHz	ETS	3116C	00166155	11-30-17
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	12-15-17
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-17-17
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-16-17
Preamplifier	ETS	3115-PA	00167475	08-17-17
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-16-17
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-17-17
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	11-25-17
Average Power Sensor	R&S	NRP-Z91	102681	08-16-17
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-17-17
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-17-17
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-16-17
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-16-17
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-17-17
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-16-17
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-17-17
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-16-17
High Pass Filter 6GHz	Micro-Tronics	HPM17542	009	08-17-17
High Pass Filter 6GHz	Micro-Tronics	HPM17542	016	08-16-17
LISN	R&S	ENV-216	101836	08-16-17
LISN	R&S	ENV-216	101837	08-16-17
Attenuator	PASTERNAK	PE7087-10	A009	08-16-17
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

7. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result	Worst Case
15.407 (e)	6dB Band width (5.8Ghz)	500KHz		Pass	14.2 MHz
15.407 (a)(1)(2)	TX Cond. Power 5.15-2.25, 5.25-5.35 & 5.47-5.725	<24dBm or 11+10Log(OBW)		Pass	17.13 dBm
15.407 (a)(3)	TX Cond. Power 5.725-5.825	< 30dBm		Pass	17.01 dBm
15.407 (a)(5)	PSD (5.2,5.3,5.5GHz)	<11dBm		Pass	7.12 dBm
15.407 (a)(5)	PSD (5.8GHz)	30dBm per 500kHz		Pass	3.72 dBm
15.207 (a)	AC Power Line conducted emissions	Section 10	Radiated	Pass	48.9 dBuV (Qp)
15.407 (b) & 15.209	Radiated Spurious Emission	< 68.2dBuV/m		Pass	65.21 dBuV/m (Pk)
15.407 (h)(2)	Dynamic Frequency Selection	N/A	Radiated / Condcuted	Pass	N/A

8. REFERENCE MEASUREMENTS RESULTS

8.1. 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/T Minimum VBW [kHz]
802.11a	2.063	2.174	0.949	94.9%	0.23	0.485
802.11n HT20	1.924	2.033	0.946	94.6%	0.24	0.520
802.11n HT40	0.948	1.058	0.896	89.6%	0.48	1.055
802.11ac VHT80	0.464	0.568	0.816	81.6%	0.88	2.155

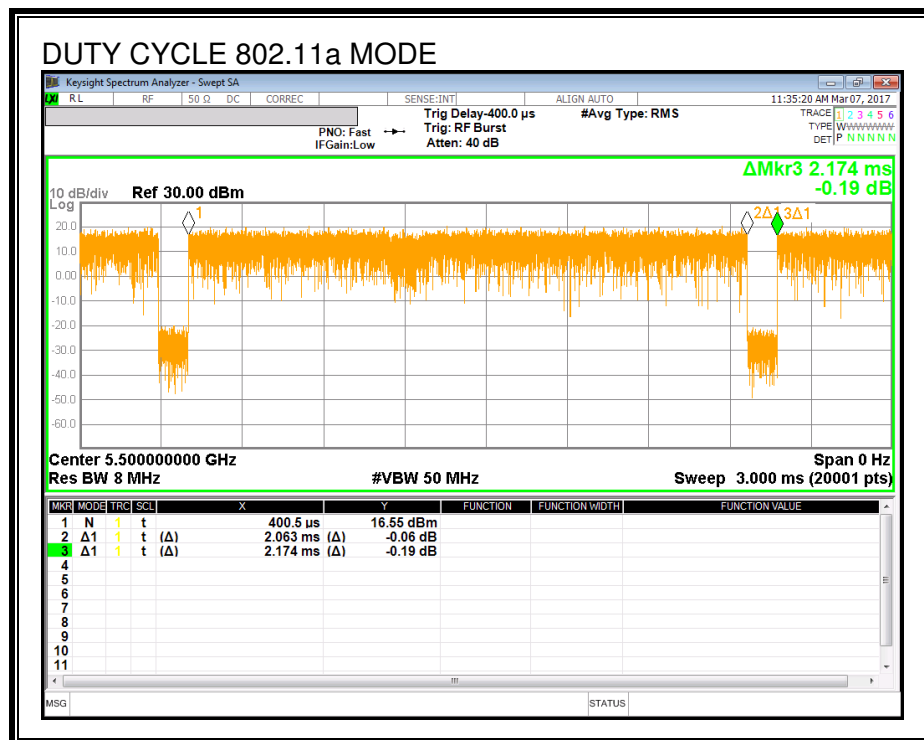
LIMITS

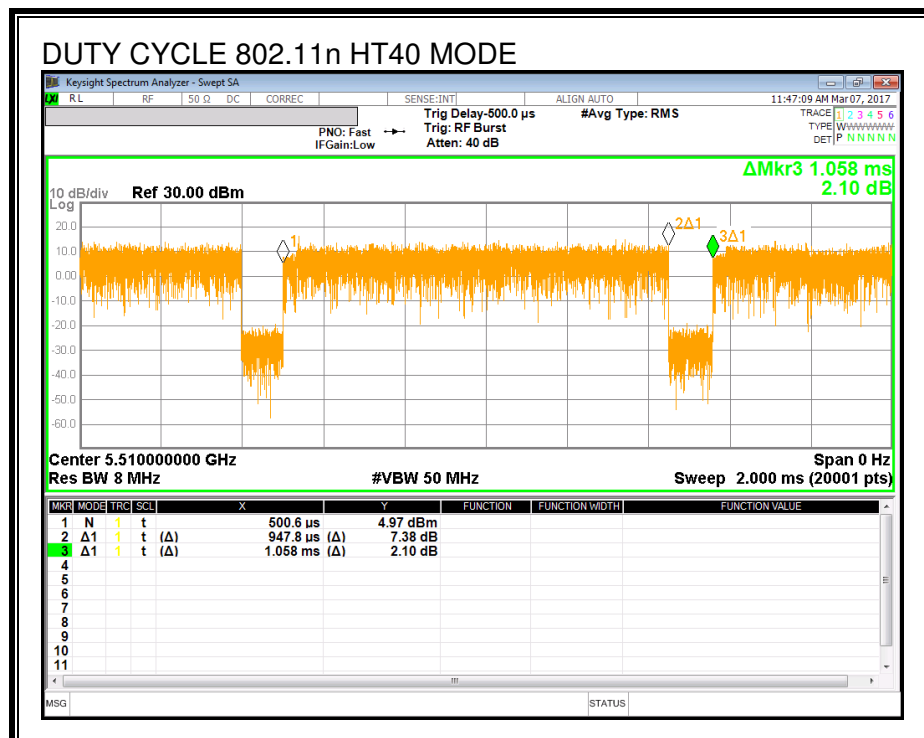
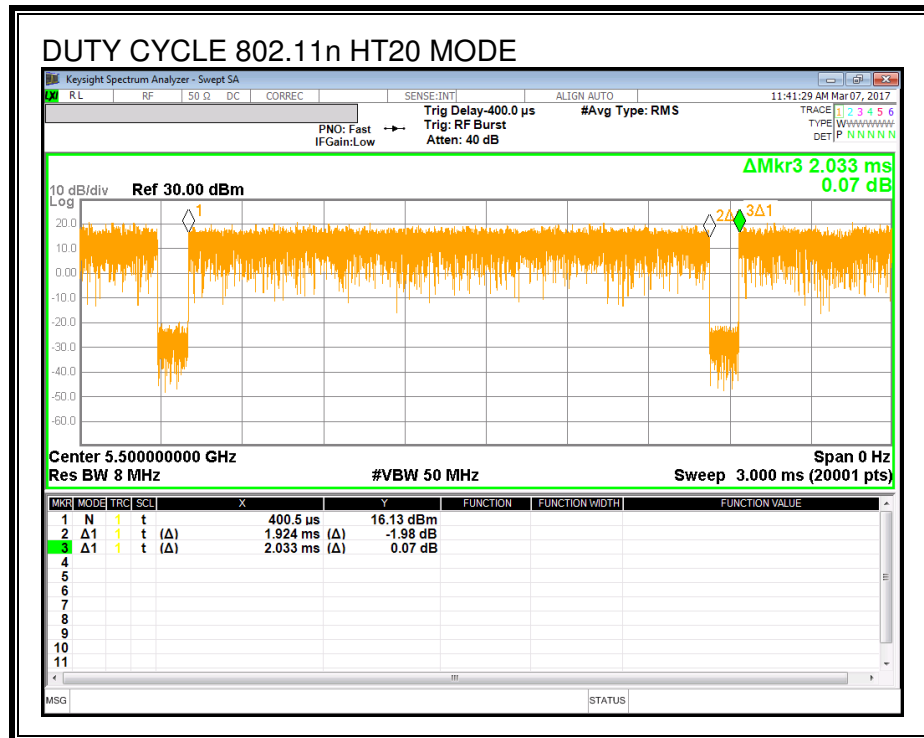
None; for reporting purposes only.

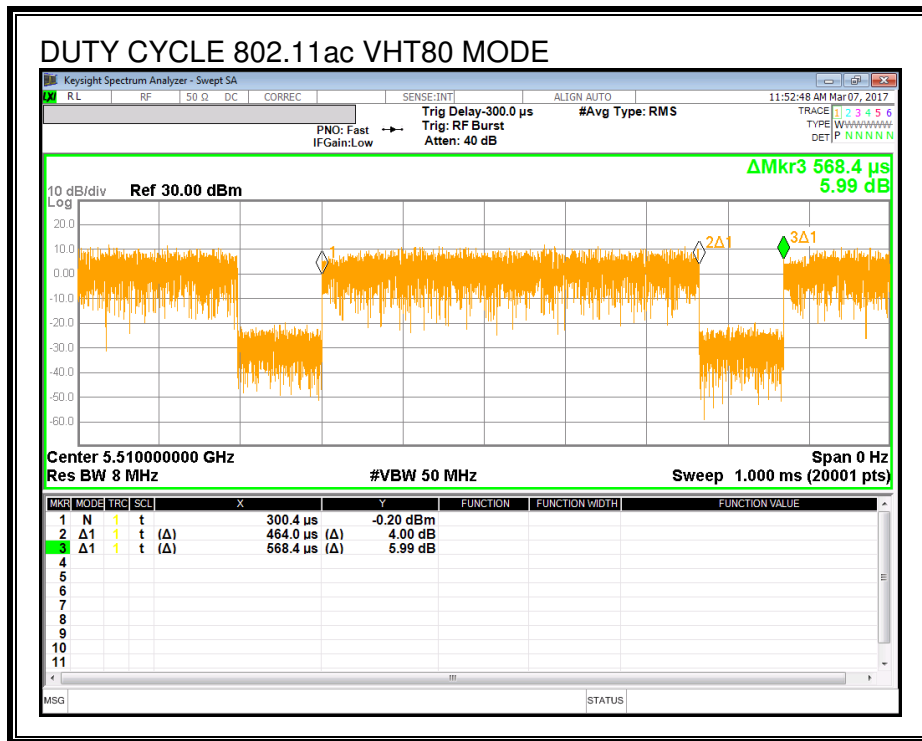
PROCEDURE

KDB 789033 D02 v01r03 Zero-Span Spectrum Analyzer Method.

8.2. DUTY CYCLE PLOTS







8.3. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Reference to 789033 D02 General UNII Test Procedures New Rules v01r03: The transmitter output is connected to a spectrum analyzer with the RBW set to approximately 1% of EBW, the VBW > RBW, peak detector and max hold.

RESULTS

8.3.1.802.11a MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Primary	Secondary
Low	5180	18.28	18.61
Mid	5200	18.78	18.63
High	5240	18.65	18.53
Worst		18.78	

8.3.2.802.11n HT20 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5180	19.63	19.49
Mid	5200	19.31	19.16
High	5240	19.32	19.59
Worst		19.63	

8.3.3.802.11n HT40 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5190	39.87	39.78
High	5230	39.95	39.86
Worst		39.95	

8.3.4. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Middle	5210	81.75	81.40
Worst		81.75	

8.3.5.802.11a MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Primary	Secondary
Low	5260	18.51	18.85
Mid	5300	18.48	18.43
High	5320	18.40	18.37
Worst		18.85	

8.3.6.802.11n HT20 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5260	19.61	19.46
Mid	5300	19.55	19.56
High	5320	19.55	19.17
Worst		19.61	

8.3.7.802.11n HT40 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5270	39.85	39.69
High	5310	39.59	39.98
Worst		39.98	

8.3.8. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Middle	5290	81.57	81.86
Worst		81.86	

8.3.1. 802.11a MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Primary	Secondary
Low	5500	18.77	18.61
Mid	5580	18.58	18.37
High	5700	18.40	18.35
Worst		18.77	

8.3.2.802.11n HT20 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5500	19.39	19.45
Mid	5580	19.31	19.51
High	5700	19.62	19.61
Worst		19.62	

8.3.3.802.11n HT40 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5510	39.85	39.41
Mid	5550	39.98	39.74
High	5670	39.52	39.74
Worst		39.98	

8.3.4. 802.11ac VHT80 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5530	81.41	82.05
Worst		82.05	

8.3.5.802.11a MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Primary	Secondary
Low	5745	18.29	18.30
Mid	5785	18.47	18.65
High	5825	18.49	18.53
Worst		18.65	

8.3.6.802.11n HT20 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5745	19.58	19.64
Mid	5785	19.62	19.41
High	5825	19.36	19.37
Worst		19.64	

8.3.7.802.11n HT40 MODE IN THE 5.8 GHz BAND

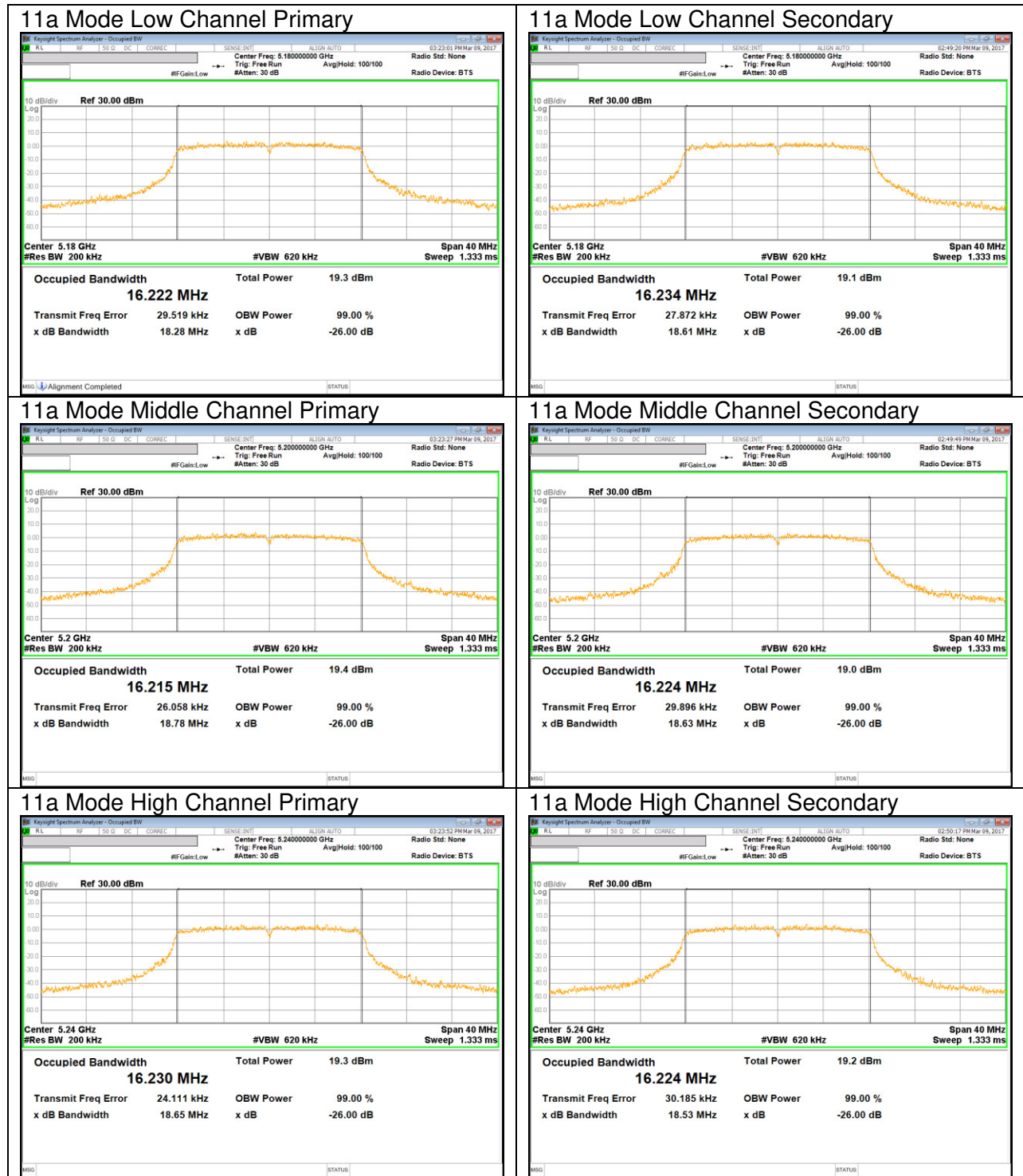
Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5755	39.93	39.69
High	5795	40.18	39.53
Worst		40.18	

8.3.8. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Middle	5775	82.14	81.85
Worst		82.14	

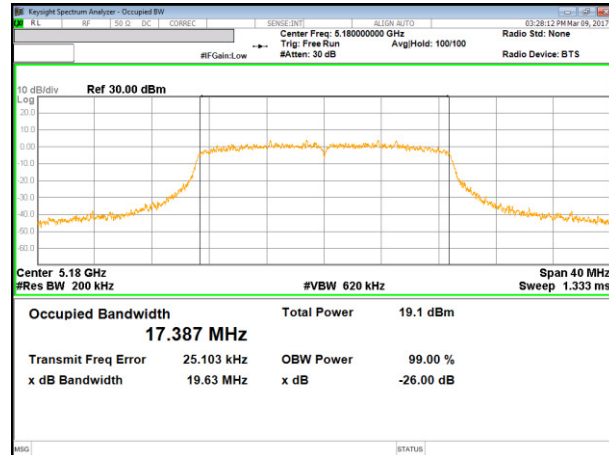
8.3.9.26 dB BANDWIDTH PLOTS

UNII 5.2 GHz IEEE 802.11a mode

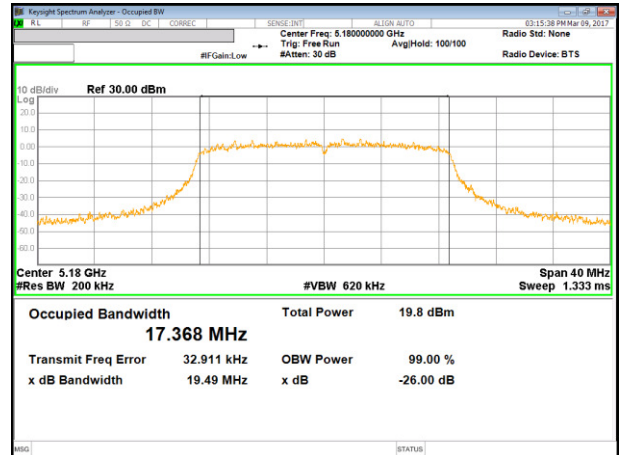


UNII 5.2 GHz IEEE 802.11n HT20 mode

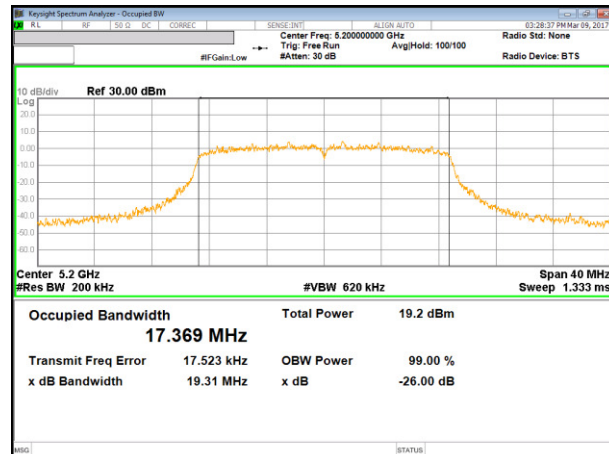
11n HT20 Mode Low Channel Chain 0



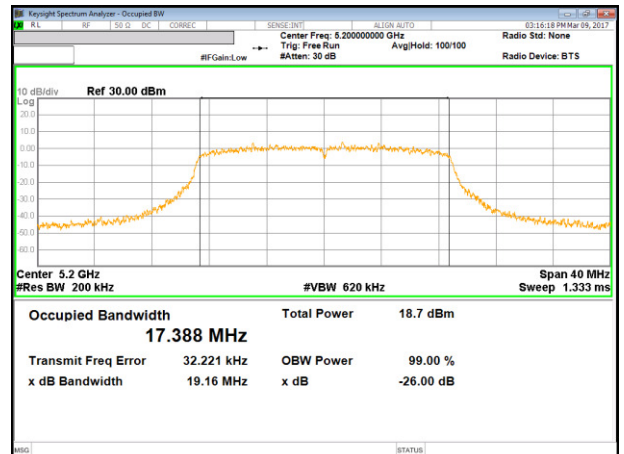
11n HT20 Mode Low Channel Chain 1



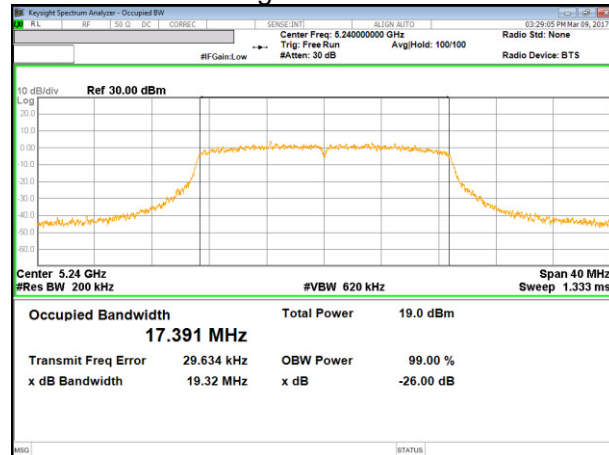
11n HT20 Mode Middle Channel Chain 0



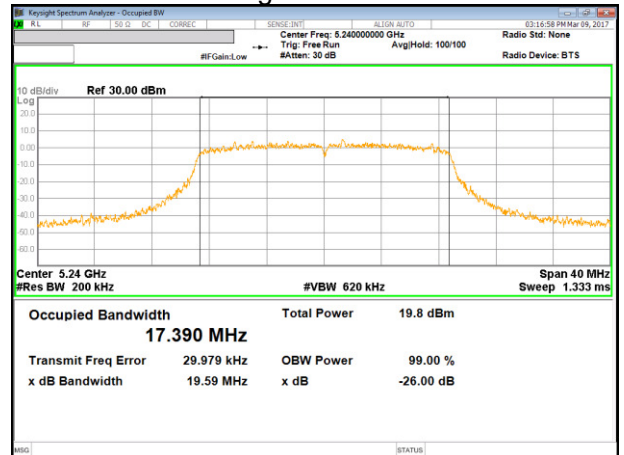
11n HT20 Mode Middle Channel Chain 1



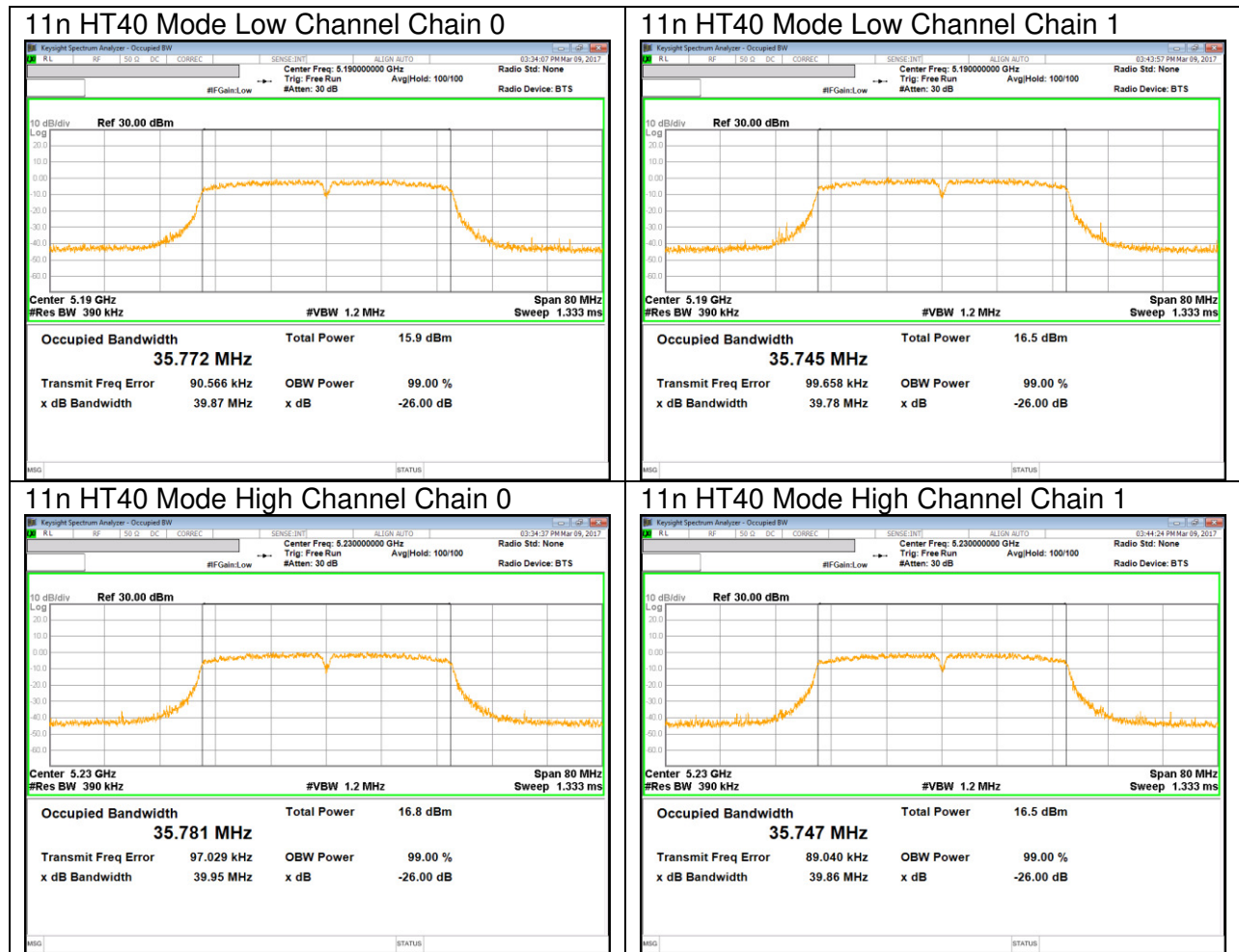
11n HT20 Mode High Channel Chain 0



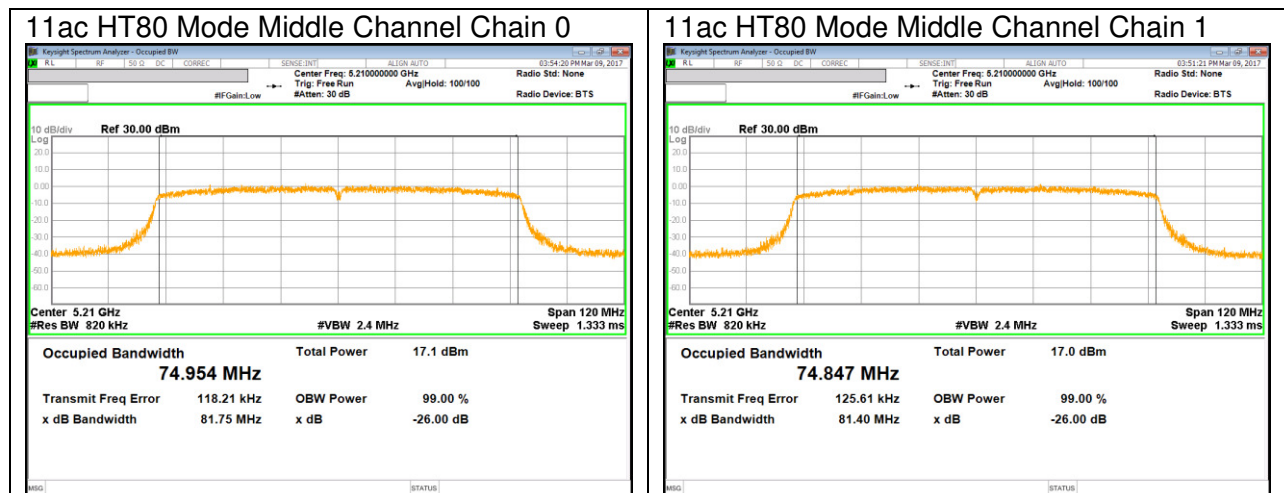
11n HT20 Mode High Channel Chain 1



UNII 5.2 GHz IEEE 802.11n HT40 mode

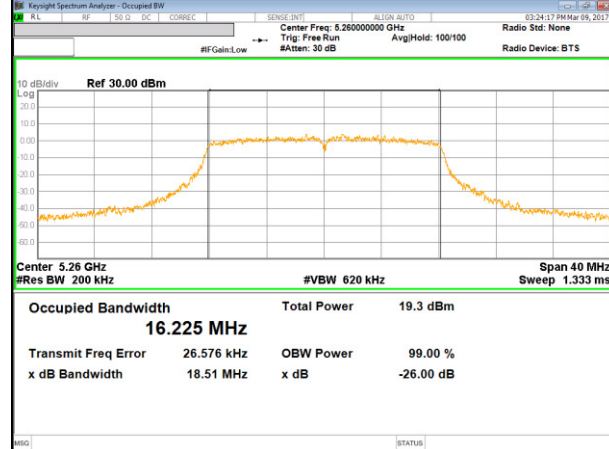


UNII 5.2 GHz IEEE 802.11ac VHT80 mode

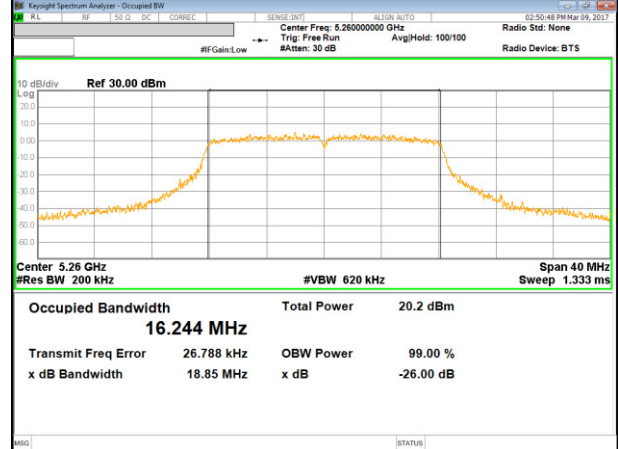


UNII 5.3 GHz IEEE 802.11a mode

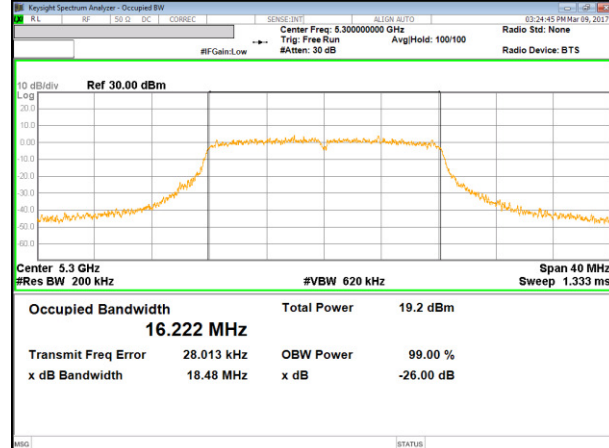
11a Mode Low Channel Primary



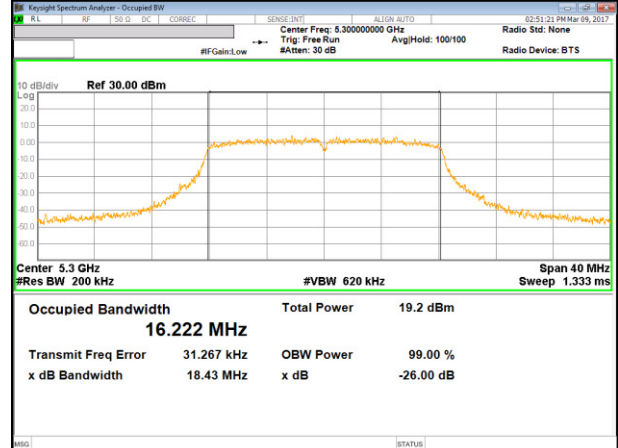
11a Mode Low Channel Secondary



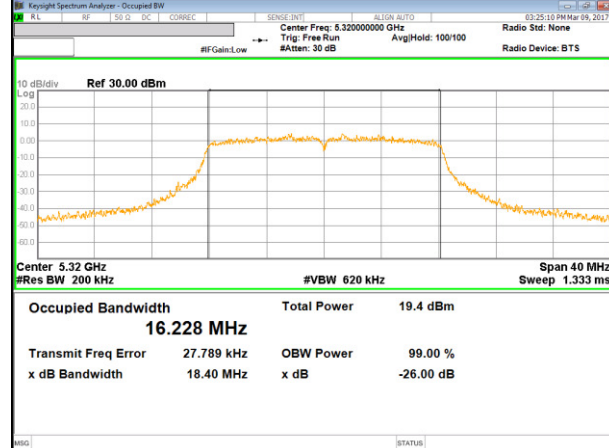
11a Mode Middle Channel Primary



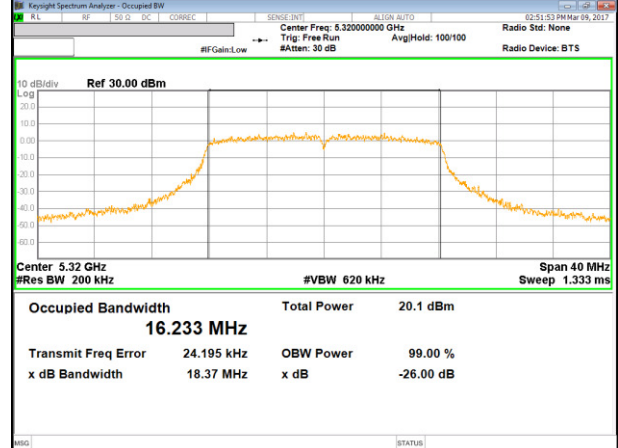
11a Mode Middle Channel Secondary



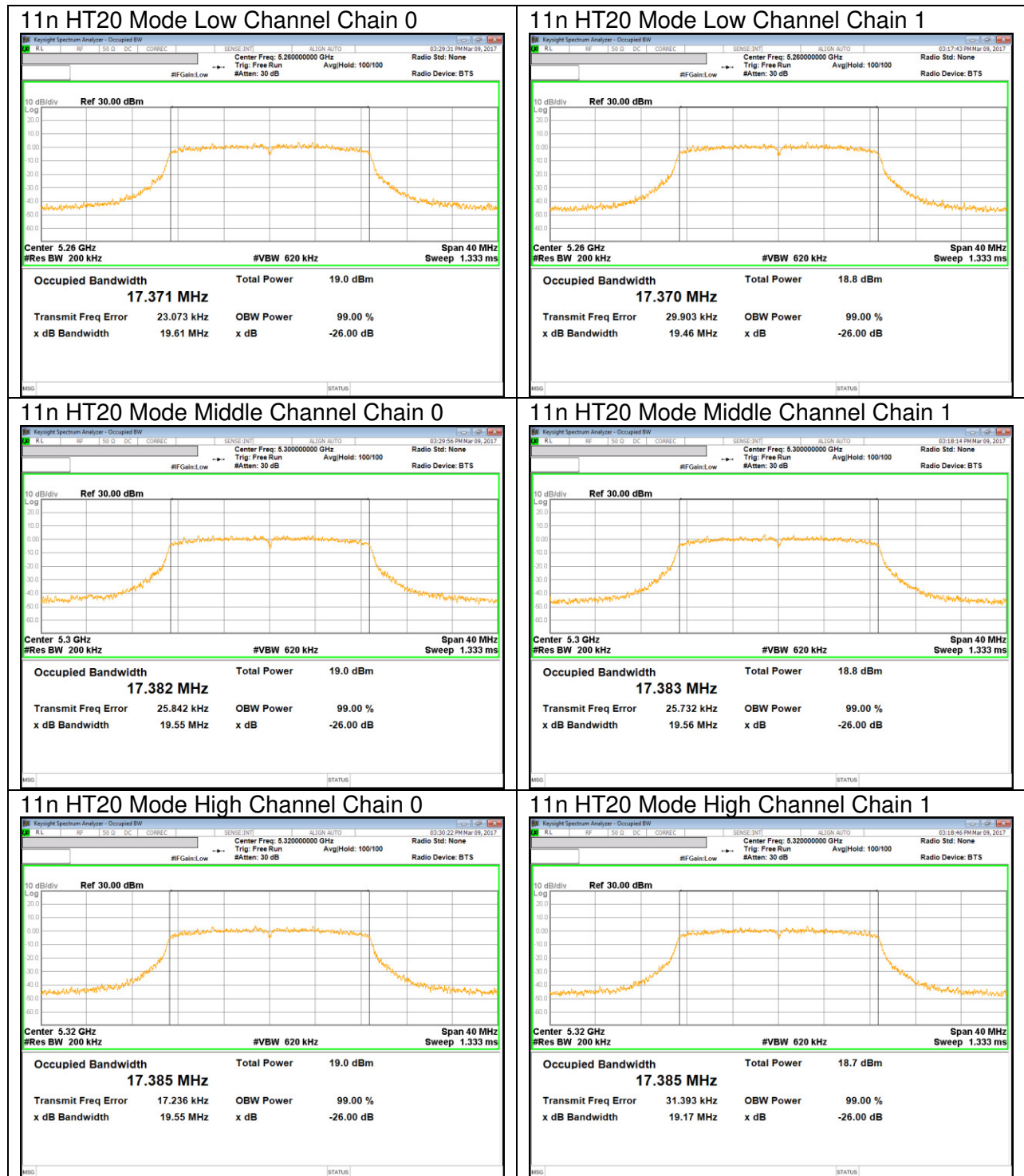
11a Mode High Channel Primary



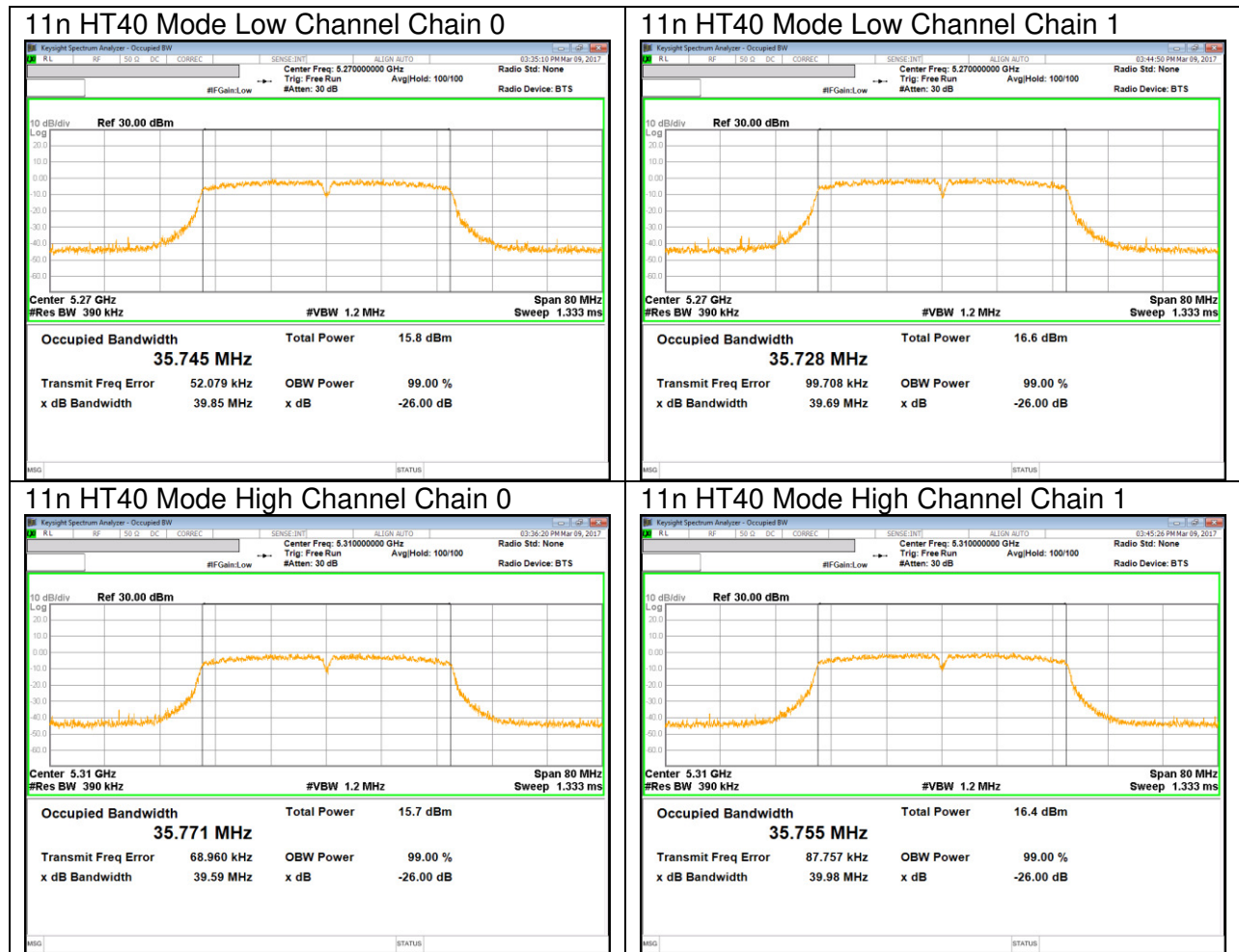
11a Mode High Channel Secondary



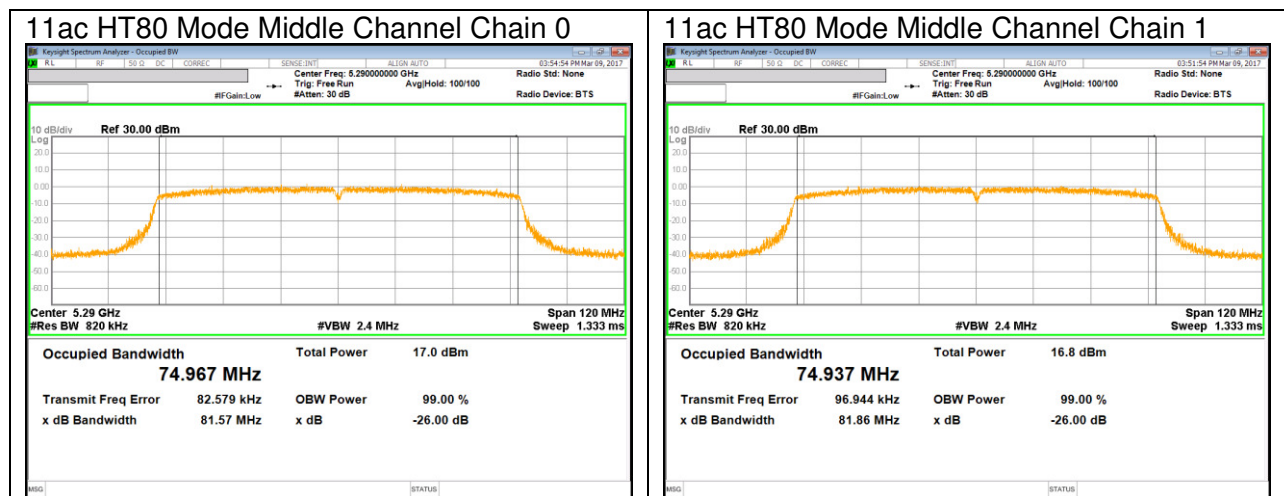
UNII 5.3 GHz IEEE 802.11n HT20 mode



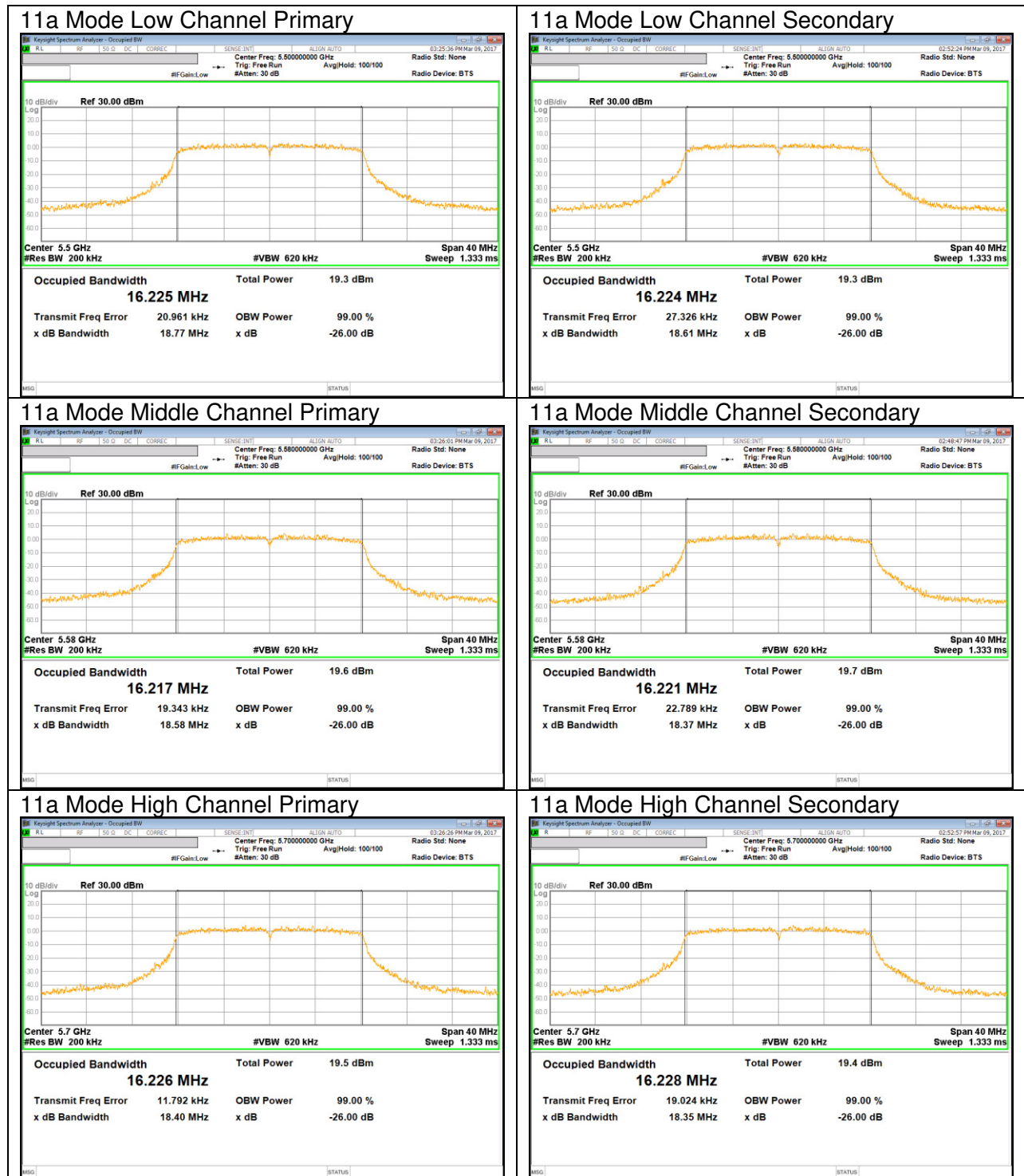
UNII 5.3 GHz IEEE 802.11n HT40 mode



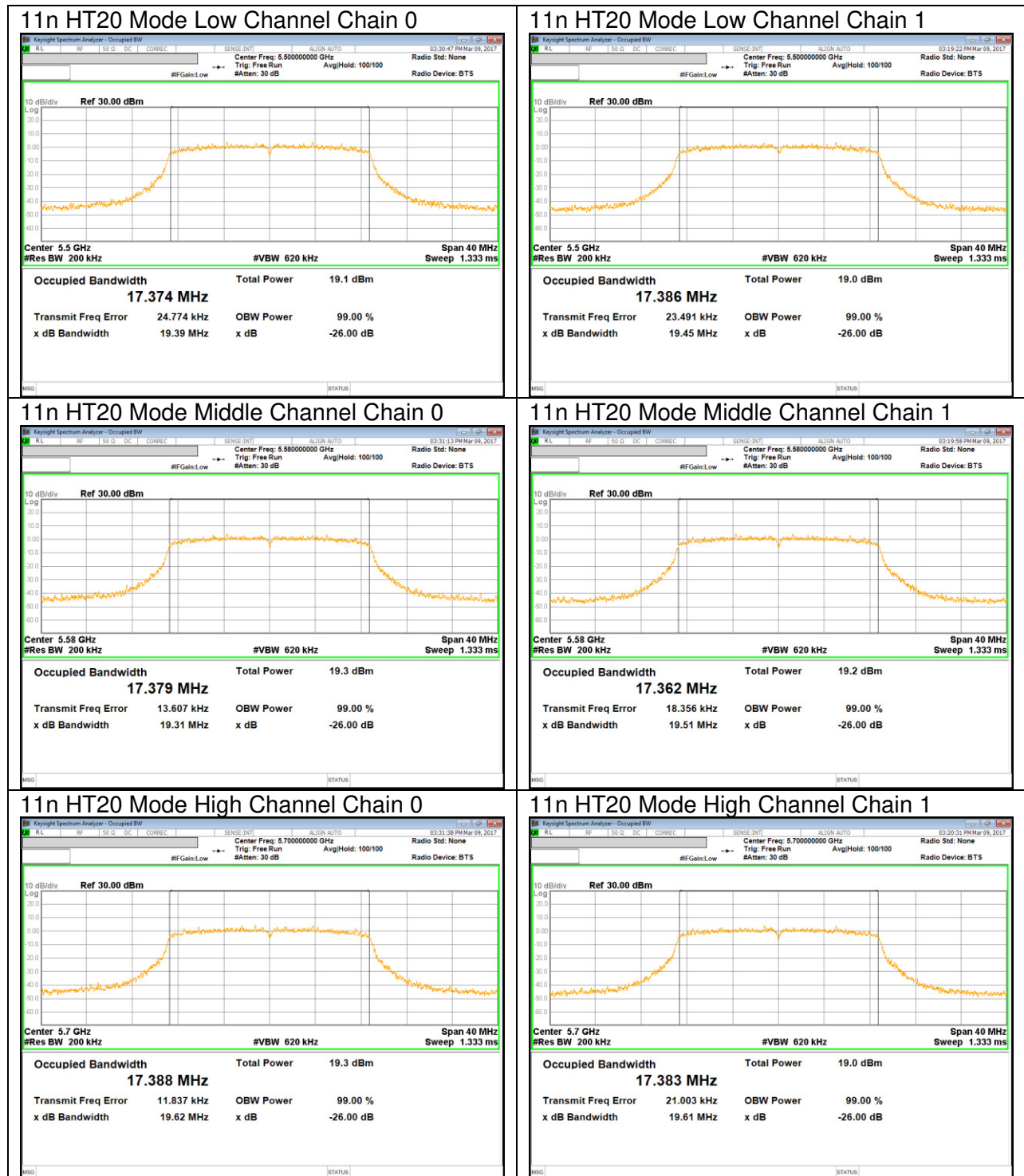
UNII 5.3 GHz IEEE 802.11ac VHT80 mode



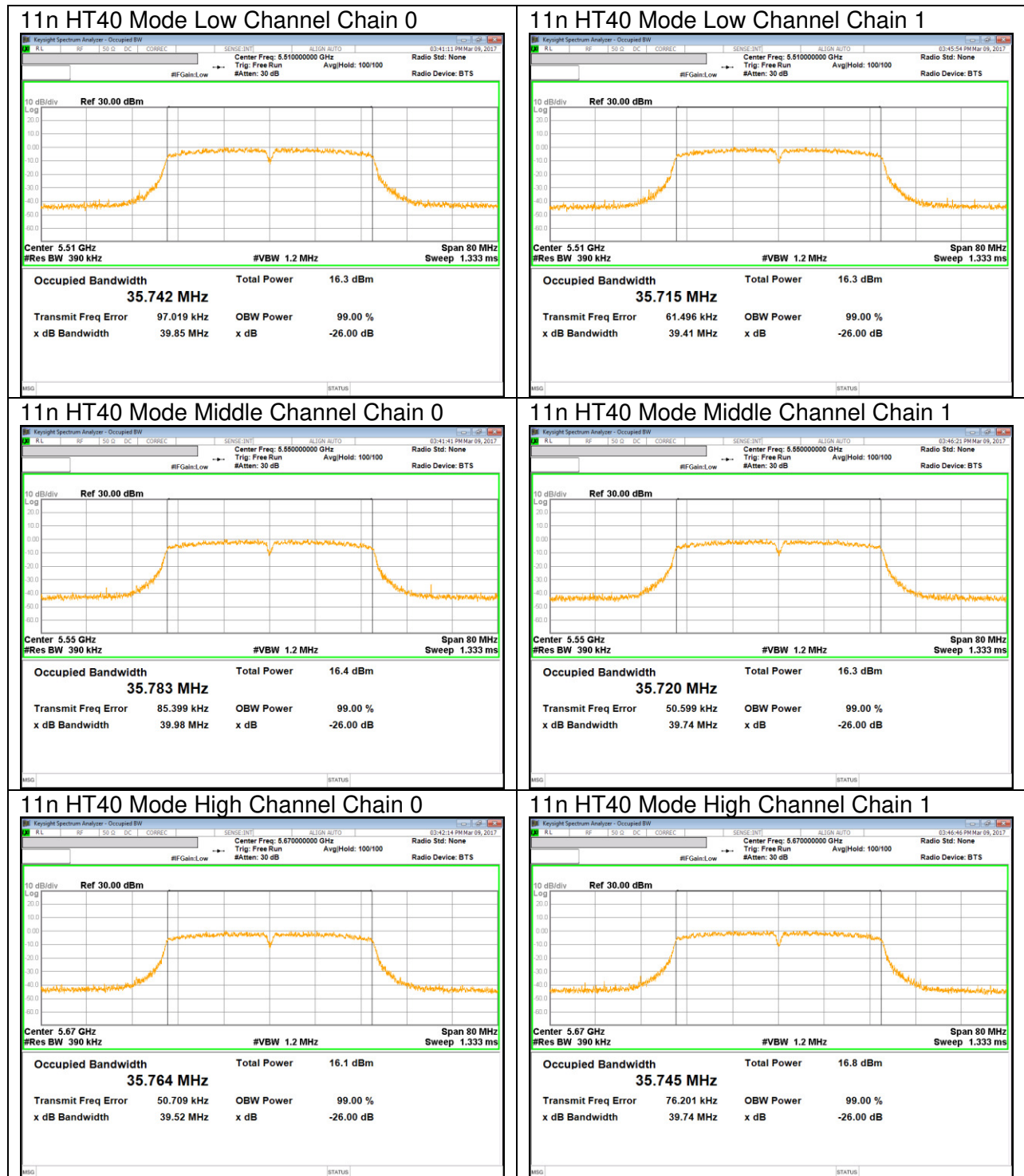
UNII 5.5 GHz IEEE 802.11a mode



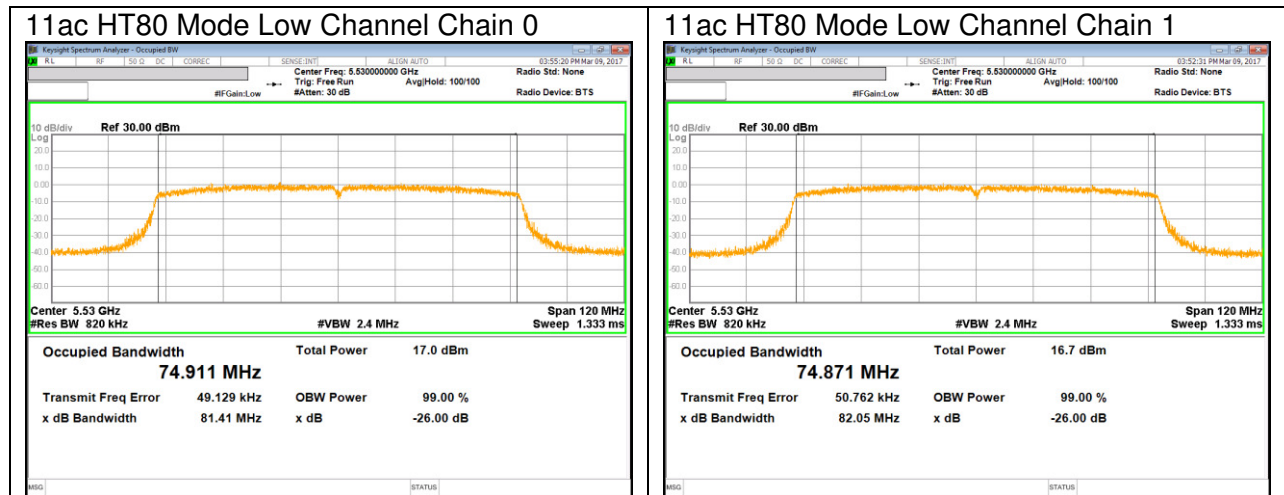
UNII 5.5 GHz IEEE 802.11n HT20 mode



UNII 5.5 GHz IEEE 802.11n HT40 mode

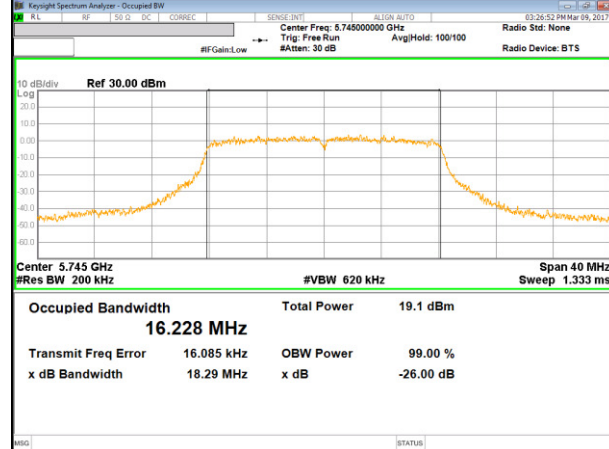


UNII 5.5 GHz IEEE 802.11ac VHT80 mode

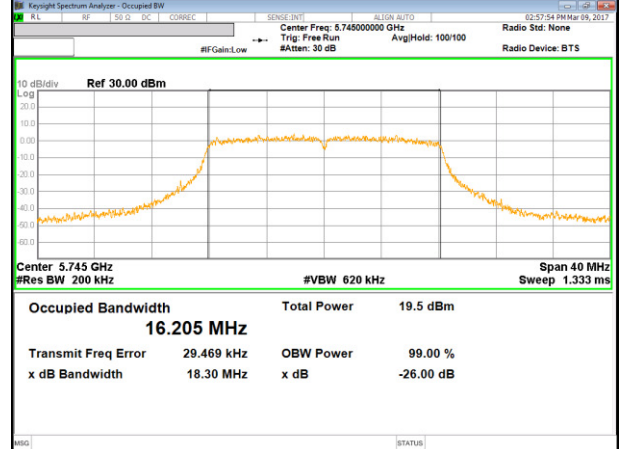


UNII 5.8 GHz IEEE 802.11a mode

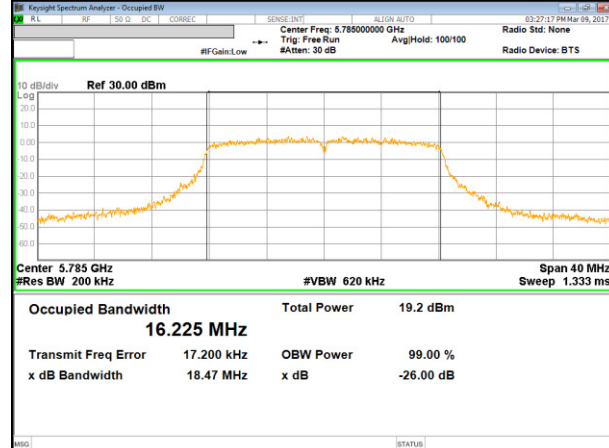
11a Mode Low Channel Primary



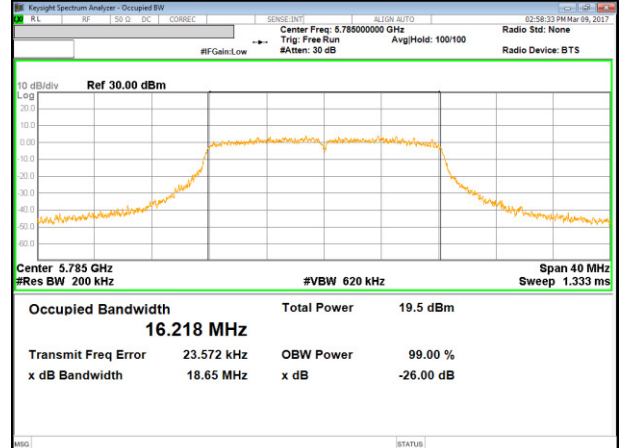
11a Mode Low Channel Secondary



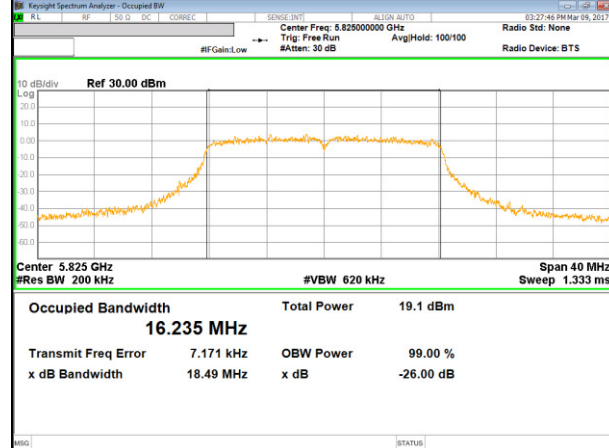
11a Mode Middle Channel Primary



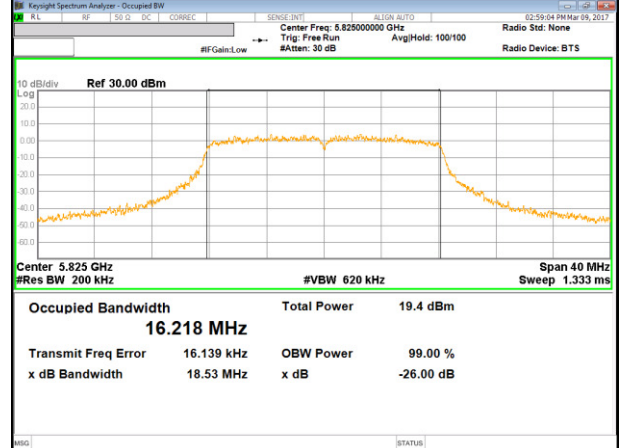
11a Mode Middle Channel Secondary



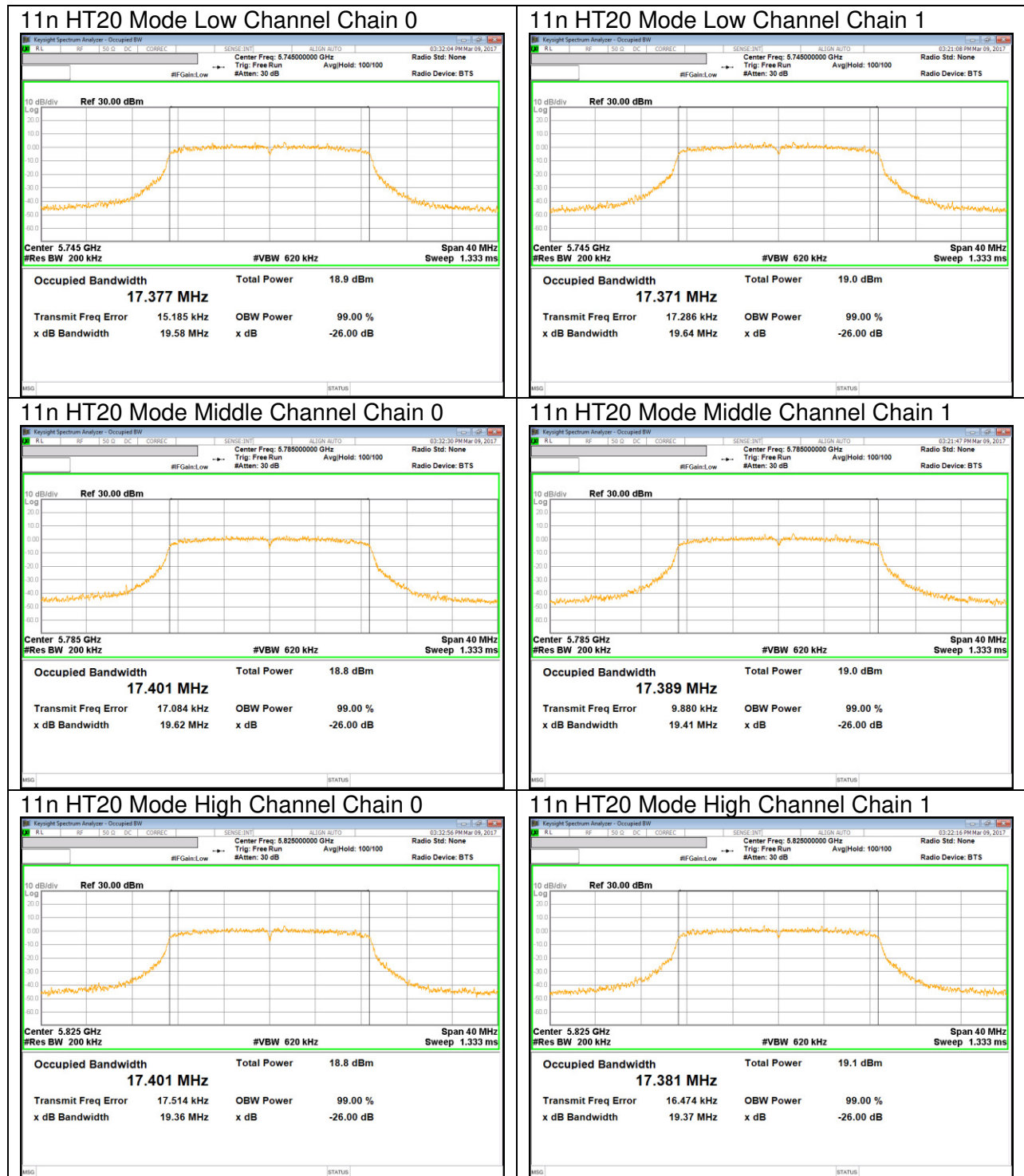
11a Mode High Channel Primary



11a Mode High Channel Secondary

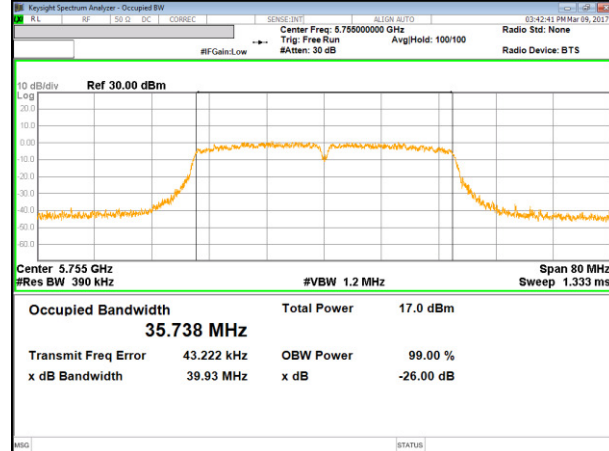


UNII 5.8 GHz IEEE 802.11n HT20 mode

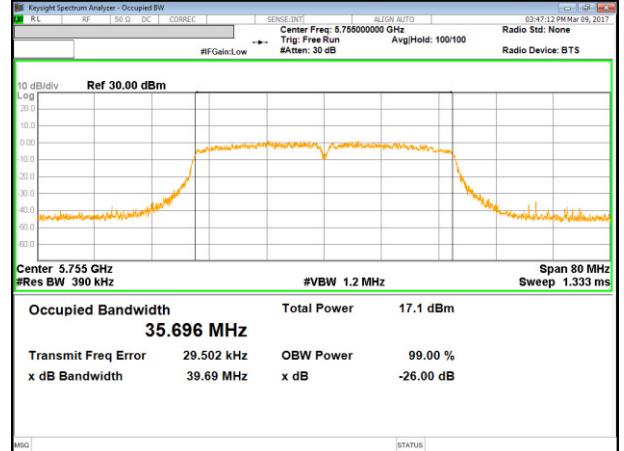


UNII 5.8 GHz IEEE 802.11n HT40 mode

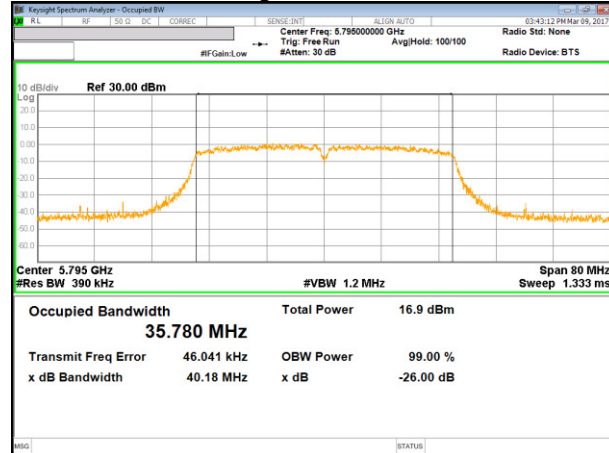
11n HT40 Mode Low Channel Chain 0



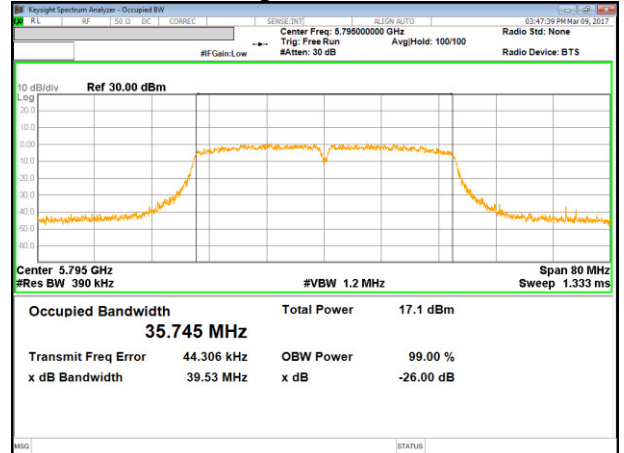
11n HT40 Mode Low Channel Chain 1



11n HT40 Mode High Channel Chain 0

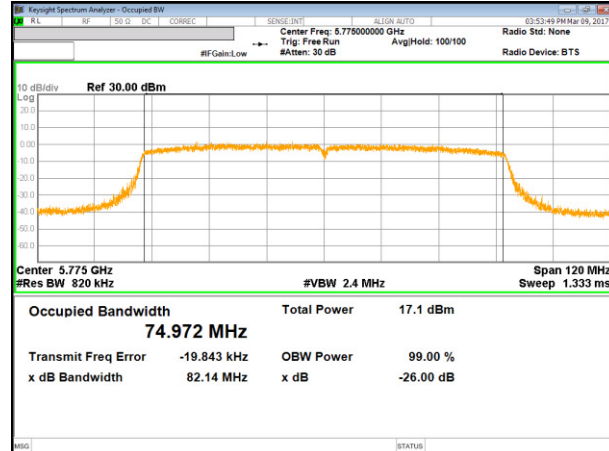


11n HT40 Mode High Channel Chain 1

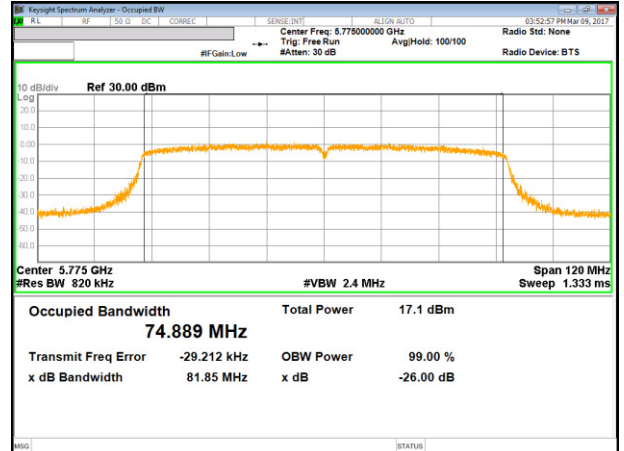


UNII 5.8 GHz IEEE 802.11ac VHT80 mode

11ac HT80 Mode Middle Channel Chain 0



11ac HT80 Mode Middle Channel Chain 1



8.4. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Reference to 789033 D02 General UNII Test Procedures New Rules v01r03: The transmitter output is connected to a spectrum analyzer with the RBW set to approximately 1% to 5% of OBW, the VBW $\geq 3 \times$ RBW, single sweep.

RESULTS

8.4.1.802.11a MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Primary	Secondary
Low	5180	16.314	16.321
Mid	5200	16.318	16.327
High	5240	16.320	16.312
Worst		16.327	

8.4.2.802.11n HT20 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5180	17.488	17.426
Mid	5200	17.493	17.439
High	5240	17.446	17.494
Worst		17.494	

8.4.3.802.11n HT40 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5190	35.848	35.769
High	5230	35.871	35.858
Worst		35.871	

8.4.4. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Middle	5210	74.814	74.867
Worst		74.867	

8.4.5.802.11a MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Primary	Secondary
Low	5260	16.315	16.314
Mid	5300	16.314	16.297
High	5320	16.316	16.310
Worst		16.316	

8.4.6.802.11n HT20 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5260	17.482	17.491
Mid	5300	17.477	17.492
High	5320	17.495	17.497
Worst		17.497	

8.4.7.802.11n HT40 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5270	35.808	35.845
High	5310	35.790	35.849
Worst		35.849	

8.4.8. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Middle	5290	74.824	75.026
Worst		75.026	

8.4.9. 802.11a MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Primary	Secondary
Low	5500	16.315	16.336
Mid	5580	16.324	16.324
High	5700	16.313	16.306
Worst		16.336	

8.4.10.8

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5500	17.484	17.431
Mid	5580	17.437	17.436
High	5700	17.484	17.434
Worst		17.484	

02.1
1n
HT2
0
MOD
E IN
THE

5.5 GHz BAND

8.4.11.802.11n HT40 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5510	35.854	35.862
Mid	5550	35.855	35.778
High	5670	35.875	35.776
Worst		35.875	

8.4.12. 802.11ac VHT80 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5530	75.035	74.974
Worst		75.035	

8.4.13.802.11a MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Primary	Secondary
Low	5745	16.313	16.324
Mid	5785	16.325	16.321
High	5825	16.312	16.325
Worst		16.325	

8.4.14.802.11n HT20 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5745	17.487	17.501
Mid	5785	17.470	17.444
High	5825	17.496	17.445
Worst		17.501	

8.4.15.802.11n HT40 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5755	35.916	35.875
High	5795	35.918	35.869
Worst		35.918	

8.4.16. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Middle	5775	75.197	74.931
Worst		75.197	

8.4.17.99% BANDWIDTH PLOTS

UNII 5.2 GHz IEEE 802.11a mode

