FCC 47 CFR PART 15 SUBPART E

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone + Bluetooth/BLE, DTS/UNII a/b/g/n/ac and ANT+

MODEL NUMBER : SM-A800YZ

FCC ID: A3LSMA800YZ

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION:	GSM/WCDMA/LTE Phone+Bluetooth/BLE, DTS/UNII a/b/g/n/ac and ANT+
MODEL NUMBER:	SM-A800YZ
SERIAL NUMBER:	4100e2844799149 (RADIATED); 4100855ef27d91c3 (CONDUCTED)
DATE TESTED:	JUN 06 - JUN 23, 2015

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.

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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 06-96, FCC KDB 789033 D02 v01, ANSI C63.10-2009.

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, 443-823, 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:

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

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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%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone+Bluetooth/BLE, DTS/UNII a/b/g/n/ac and ANT+.

This test report addresses the NII (UNII) operational mode.

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	Antenna1
5180 - 5240	802.11a	14.42	27.67
	802.11n HT20	12.04	16.00
5190 - 5230	802.11n HT40	11.93	15.60
5210	802.11ac VHT80	11.96	15.70
5260 - 5320	802.11a	13.64	23.12
	802.11n HT20	12.37	17.26
5270 - 5310	802.11n HT40	12.15	16.41
5290	802.11ac VHT80	12.30	16.98
5500 - 5720	802.11a	14.35	27.23
	802.11n HT20	12.29	16.94
5510 - 5710	802.11n HT40	12.38	17.30
5530 - 5690	802.11ac VHT80	11.95	15.67
5745 - 5825	802.11a	14.36	27.29
	802.11n HT20	12.05	16.03
5755 - 5795	802.11n HT40	12.25	16.79
5775	802.11ac VHT80	14.40	27.54

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5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an FPCB antenna, with a maximum gain of:

Frequency Range [MHz]		Antenna Gain [dBi]
UNII 1 5150 – 5250	5150	-7.16
	5250	-3.60
UNII 2A 5250 – 5350	5250	-3.60
	5350	-3.37
UNII 2C 5470 – 5725	5500	-0.56
	5725	-1.48
UNII 3 5725 – 5825	5775	-2.10
	5825	-2.48

5.4. WORST-CASE CONFIGURATION AND MODE

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 the X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in the X orientation.

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

802.11a mode: 6 Mbps
802.11n HT20mode: MCS0
802.11n HT40mode: MCS0
802.11ac VHT80mode: MCS0

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5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA12JWS	N/A	N/A
Data Cable	SAMSUNG	EP-DG920UWE	N/A	N/A
Earphone	SAMSUNG	EHS64AVFWE	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	Mini-USB	Shielded	0.8m	N/A
2	Audio	1	Mini-Jack	Unshielded	1.0m	N/A

TEST SETUP

The EUT is a stand-alone unit during the tests. Test software exercised the radio card.

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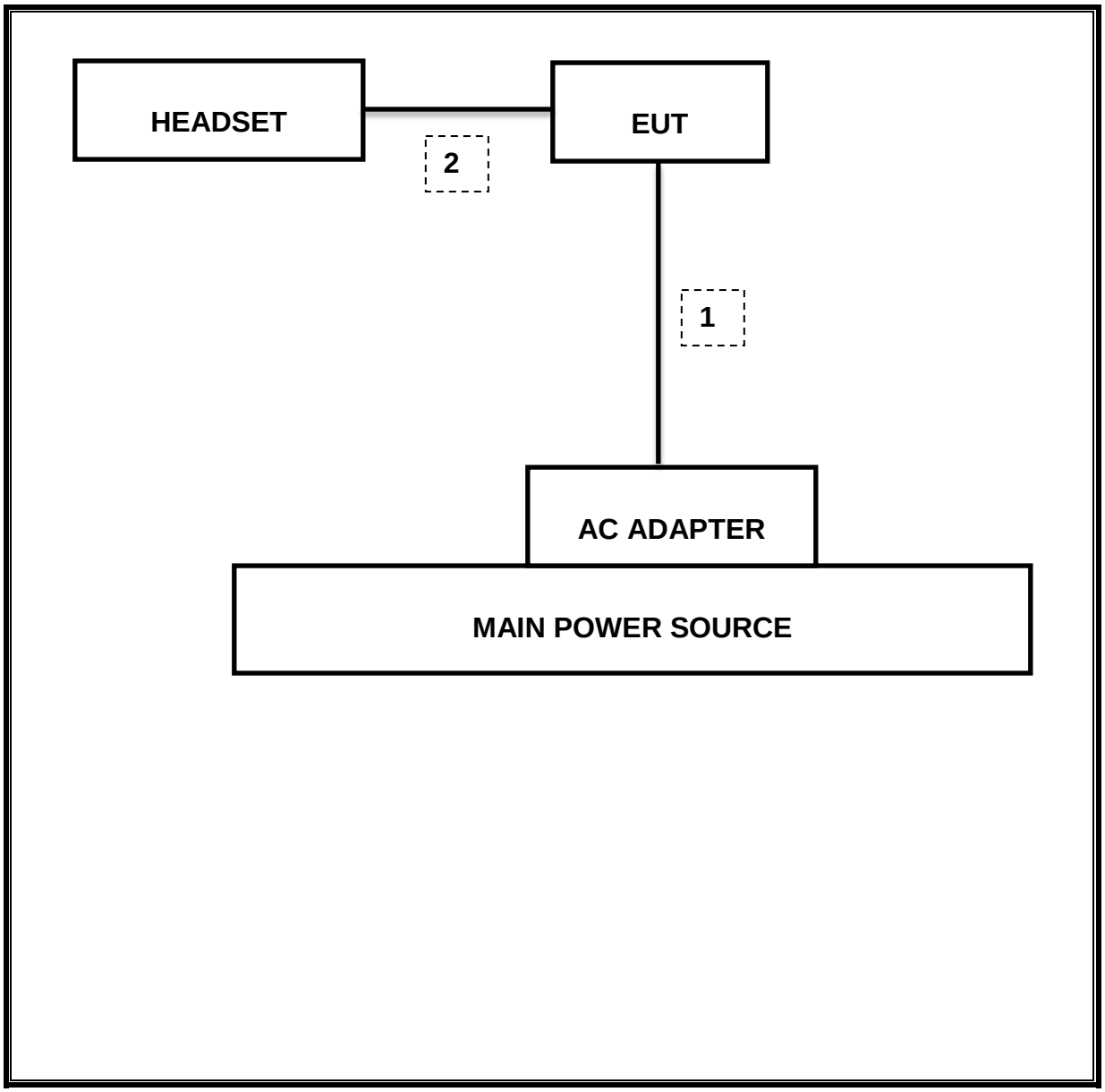
SETUP DIAGRAM FOR TESTS



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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	950	11-17-15
Antenna, Horn, 18 GHz	ETS	3115	00167211	09-20-15
Antenna, Horn, 40 GHz	ETS	3116C	00166255	09-23-15
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	09-29-15
Preamplifier, 1000 MHz	Sonoma	310N	341282	11-17-15
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	11-18-15
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	09-23-15
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	11-17-15
Average Power Sensor	R&S	NRZ-Z91	102681	11-17-15
Average Power Sensor	Agilent / HP	U2000	MY54270007	09-23-15
EMI Test Receive, 40 GHz	R&S	ESU40	100439	11-17-15
EMI Test Receive, 3 GHz	R&S	ESR3	101832	11-17-15
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	009	11-17-15
High Pass Filter 5GHz	Micro-Tronics	HPS17542	009	11-17-15
High Pass Filter 6GHz	Micro-Tronics	HPM17543	010	11-17-15
LISN	R&S	ENV-216	101836	04-09-16
LISN	R&S	ENV-216	101837	04-09-16

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7. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result	Worst Case
15.407 (a)	Occupied Band width (26dB)	N/A	Conducted	Pass	82.300 MHz
15.407	6dB Band width (5.8Ghz)	500KHz		Pass	2.95 MHz (Straddle)
15.407 (a)(2)	TX Cond. Power5.15-2.25, 5.25-5.35 & 5.47-5.725	<24dBm or 11+10Log(OBW)		Pass	14.42 dBm
15.407 (a)(3)	TX Cond. Power 5.725-5.825	< 30dBm or 17+10Log(OBW)		Pass	14.36 dBm
15.407 (a)(5)	PSD (5.2,5.3,5.5GHz)	<11dBm		Pass	4.731 dBm
15.407 (a)(5)	PSD (5.8GHz)	30dBm per 500kHz		Pass	4.589 dBm
15.207 (a)	AC Power Line conducted emissions	Section 10	Radiated	Pass	42.41 dBuV (AV)
15.407 (b) & 15.209	Radiated Spurious Emission	< 54dBuV/m		Pass	51.57dBuV/m (AV)
15.407 (h)(2)	Dynamic Frequency Selection	N/A	Radiated / Condcuted	Pass	N/A

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8. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

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	1.427	1.529	0.933	93.3%	0.30	0.701
802.11n HT20	1.335	1.437	0.929	92.9%	0.32	0.749
802.11n HT40	0.663	0.765	0.867	86.7%	0.62	1.508
802.11ac VHT80	0.330	0.433	0.762	76.2%	1.18	3.030

8.2. DUTY CYCLE PLOTS

DUTY CYCLE 802.11a MODE

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DUTY CYCLE 802.11n HT20 MODE

DUTY CYCLE 802.11n HT40 MODE

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DUTY CYCLE 802.11ac VHT80 MODE

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9. MEASUREMENT METHOD

KDB 789033 D02 General UNII Test Procedures New Rules v01
KDB 905462 D03 Clients Without Radar Detection New Rules v01r01

The Duty Cycle is less than 98% and consistent therefore KDB 789033 Method SA-2 is used for power and PPSD

The Duty Cycle is less than 98% and consistent, KDB 789033 Method AD with Power RMS Averaging and duty cycle correction is used.

MIMO Device: KDB 662911 v02r01

Straddle Channels: KDB 644545 D03 v01

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10. ANTENNA PORT TEST RESULTS

10.1. 6 dB BANDWIDTH

LIMITS

FCC §15.407

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

Reference to 789033 D02 General UNII Test Procedures New Rules v01: The transmitter output is connected to a spectrum analyzer with the RBW set to100KHz, the VBW >= 3 x RBW, peak detector and max hold.

RESULTS

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10.1.1. 802.11a MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Straddle	5720	3.075	0.5
Low	5745	16.050	0.5
Mid	5785	16.175	0.5
High	5825	16.075	0.5
Worst		3.075	

10.1.2. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Straddle	5720	3.738	0.5
Low	5745	17.550	0.5
Mid	5785	17.550	0.5
High	5825	17.375	0.5
Worst		3.738	

10.1.3. 802.11n HT40 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Straddle	5710	3.075	0.5
Low	5765	36.300	0.5
High	5795	35.800	0.5
Worst		3.075	

10.1.4. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
Starddle	5690	2.950	0.5
Middle	5775	76.100	0.5
Worst		2.950	

- **Straddle Channel**
  : the 6dB minimum bandwidth for the portion falling in the UNII-3 band.

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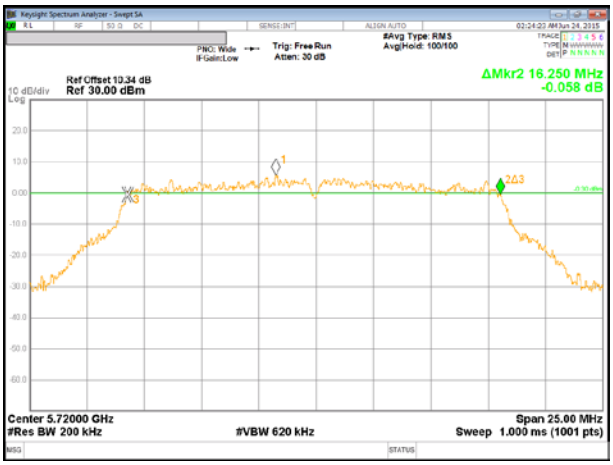
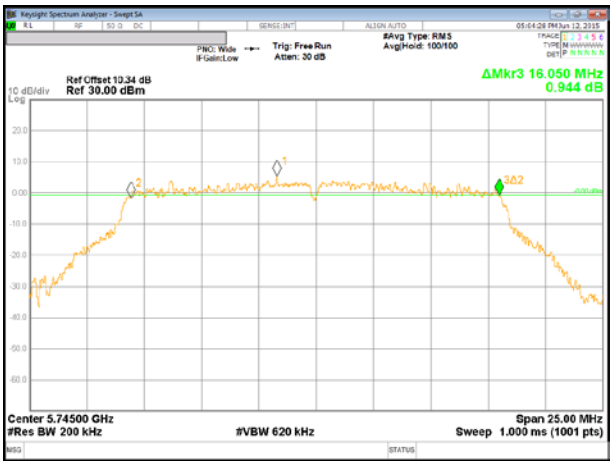
10.1.5. 6 dB BANDWIDTH PLOTS

IEEE 802.11a mode

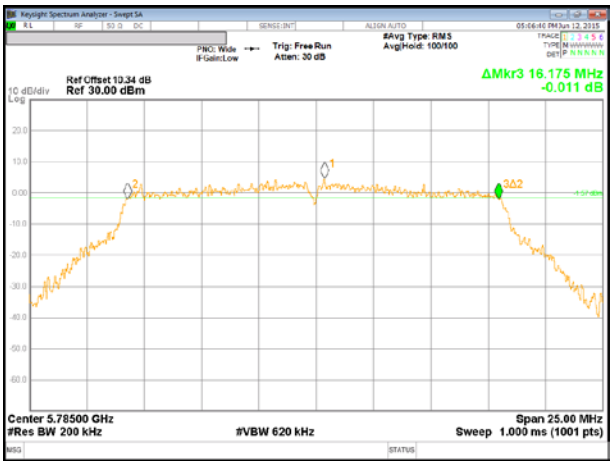
11a Mode Straddle Channel



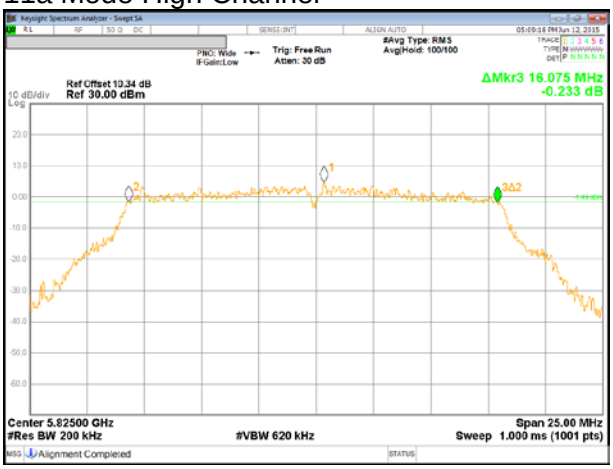
11a Mode Low Channel



11a Mode Middle Channel



11a Mode High Channel



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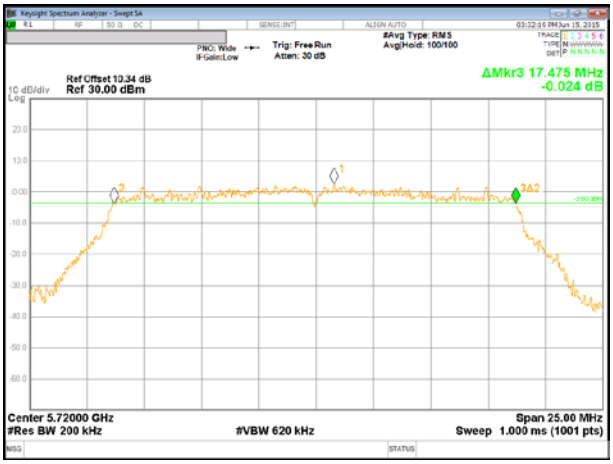
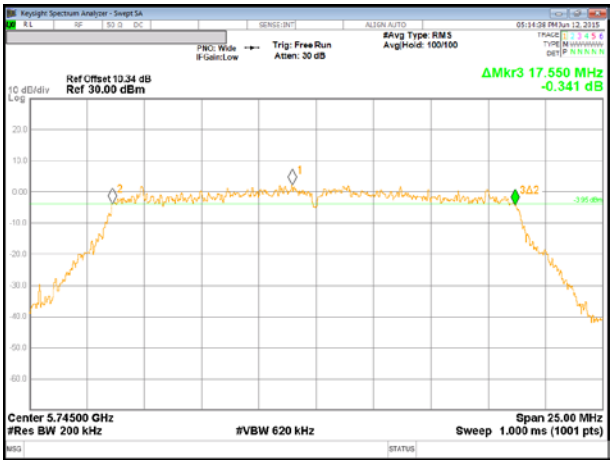
IEEE 802.11n HT20 mode

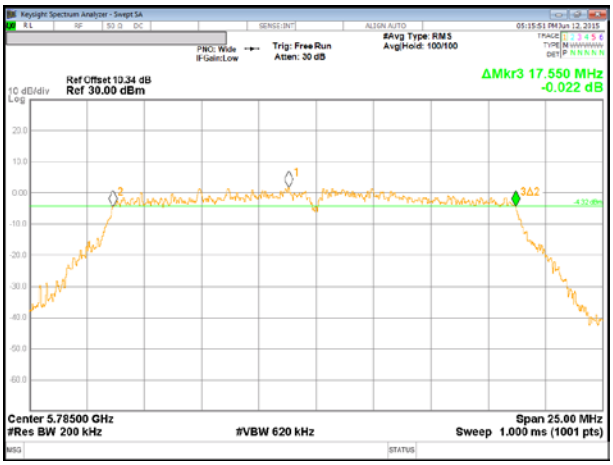
11n HT20 Mode Straddle Channel



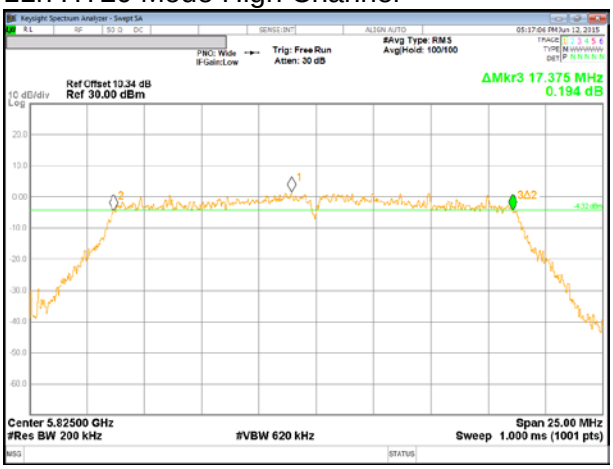
11n HT20 Mode Low Channel



11n HT20 Mode Middle Channel



11n HT20 Mode High Channel



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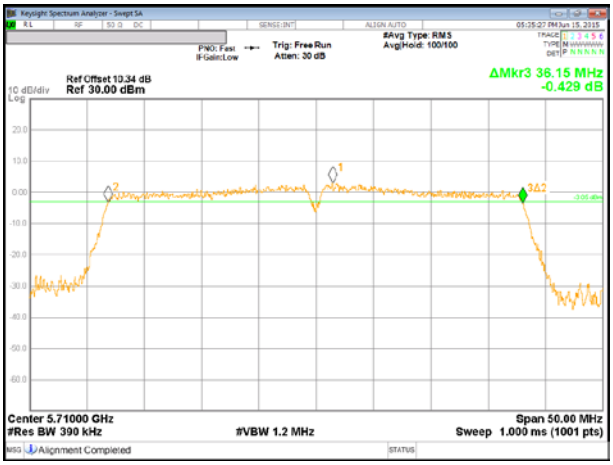
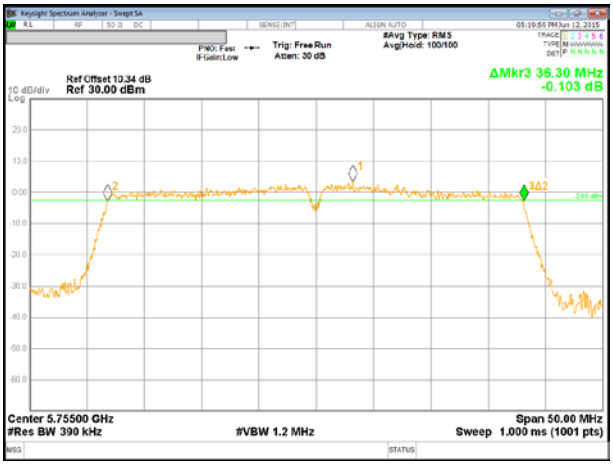
IEEE 802.11n HT40 mode

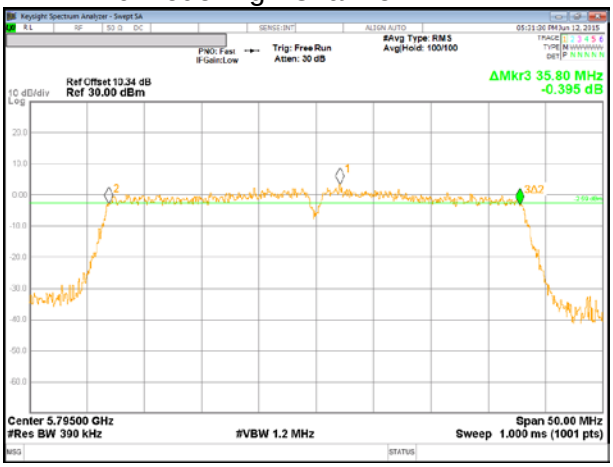
11n HT40 Mode Straddle Channel



11n HT40 Mode Low Channel



11n HT40 Mode High Channel



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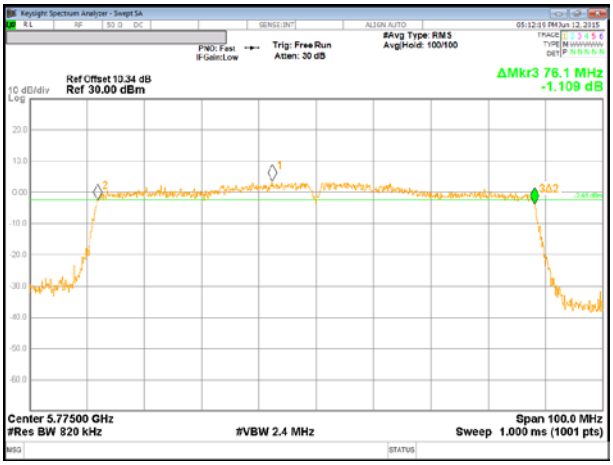
IEEE 802.11ac VHT80 mode

11ac HT80 Mode Straddle Channel	11ac HT80 Mode Middle Channel
	

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10.2. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

10.2.1. 802.11a MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5180	21.200
Mid	5200	21.200
High	5240	21.160
Worst		21.200

10.2.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5180	21.640
Mid	5200	21.560
High	5240	21.640
Worst		21.640

10.2.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5190	40.080
High	5230	40.080
Worst		40.080

10.2.4. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Middle	5210	81.900
Worst		81.900

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10.2.5. 802.11a MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5260	21.160
Mid	5300	21.160
High	5320	21.120
Worst		21.160

10.2.6. 802.11n HT20 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5260	21.760
Mid	5300	21.520
High	5320	21.600
Worst		21.760

10.2.7. 802.11n HT40 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5270	40.080
High	5310	39.960
Worst		40.080

10.2.8. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Middle	5290	81.800
Worst		81.800

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10.2.9. 802.11a MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5500	21.160
Mid	5580	21.160
High	5700	21.160
Straddle	5720	21.200
Worst		21.200

10.2.10. 802.11n HT20 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5500	21.680
Mid	5580	21.520
High	5700	21.520
Straddle	5720	21.240
Worst		21.680

10.2.11. 802.11n HT40 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5510	40.080
Mid	5550	40.020
High	5670	40.020
Straddle	5710	39.540
Worst		40.080

10.2.12. 802.11ac VHT80 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5530	82.000
High	5610	81.800
Straddle	5690	82.100
Worst		82.100

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10.2.13. 802.11a MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5745	21.160
Mid	5785	21.200
High	5825	21.200
Worst		21.200

10.2.14. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5745	21.600
Mid	5785	21.760
High	5825	21.720
Worst		21.760

10.2.15. 802.11n HT40 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Low	5755	40.020
High	5795	39.960
Worst		40.020

10.2.16. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]
Middle	5775	82.300
Worst		82.300

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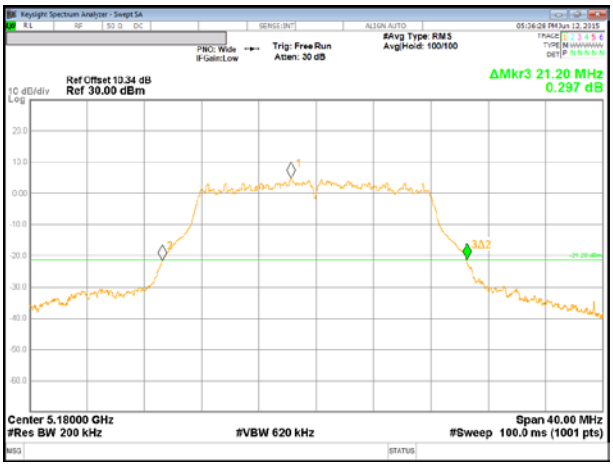
10.2.17. 26 dB BANDWIDTH PLOTS

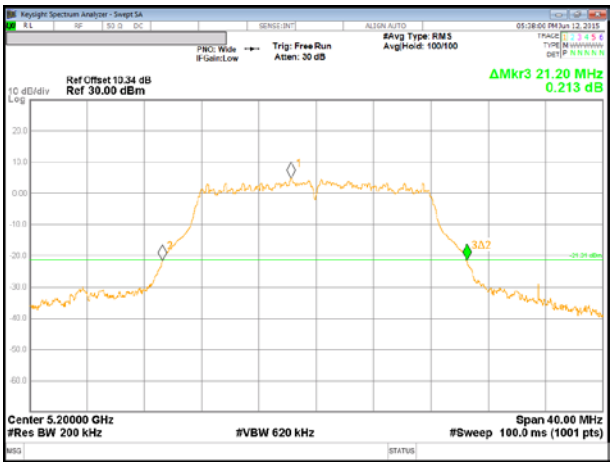
UNII 5.2 GHz

IEEE 802.11a mode

11a Mode Low Channel



11a Mode Middle Channel



11a Mode High Channel

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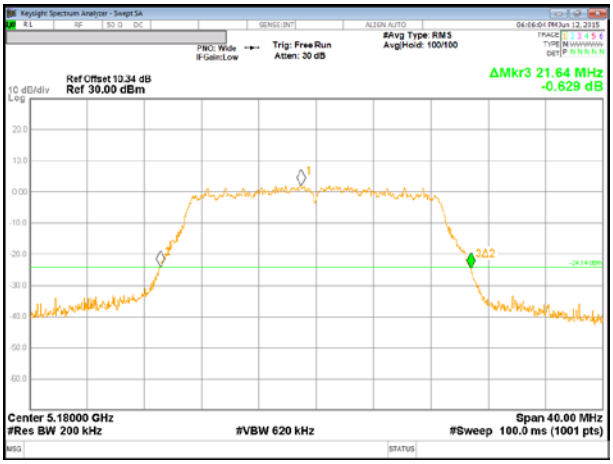
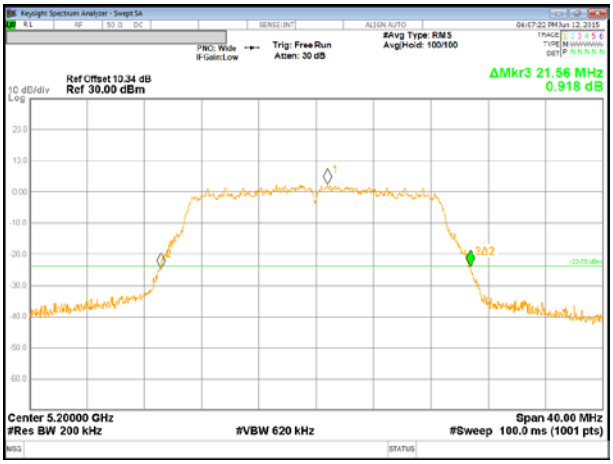
IEEE 802.11n HT20 mode

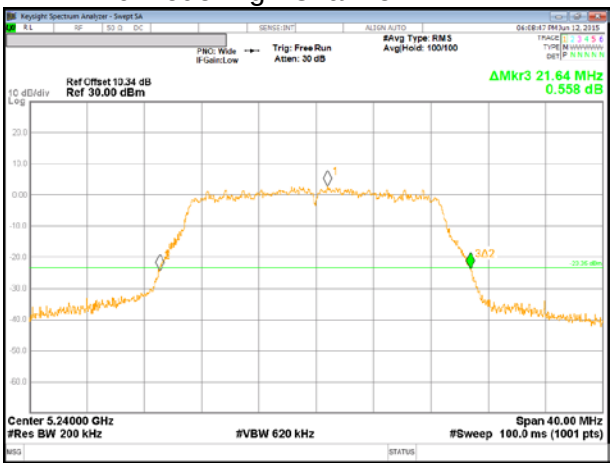
11n HT20 Mode Low Channel



11n HT20 Mode Middle Channel



11n HT20 Mode High Channel



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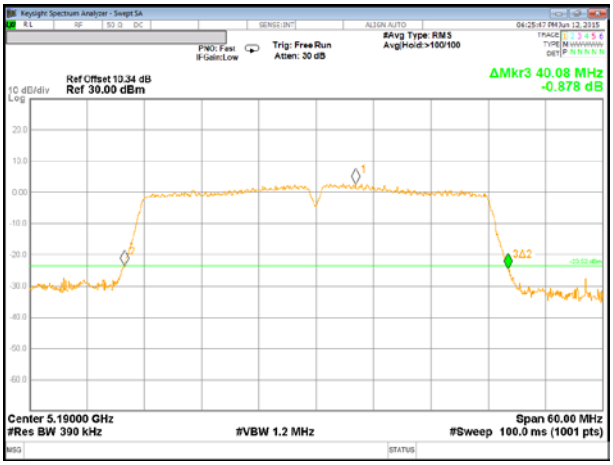
IEEE 802.11n HT40 mode

11n HT40 Mode Low Channel	11n HT40 Mode High Channel
	

IEEE 802.11ac VHT80 mode

11ac HT80 Mode Middle Channel	

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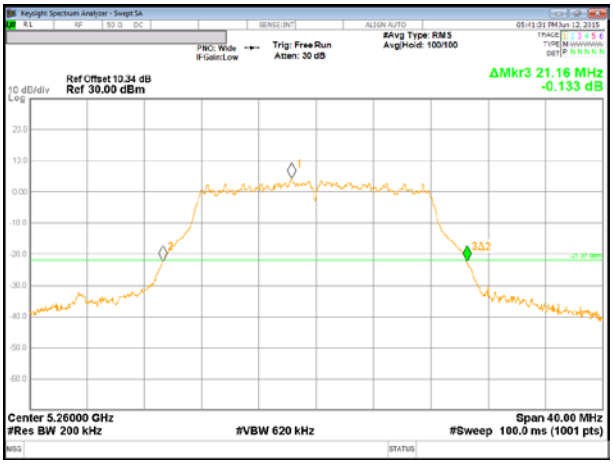
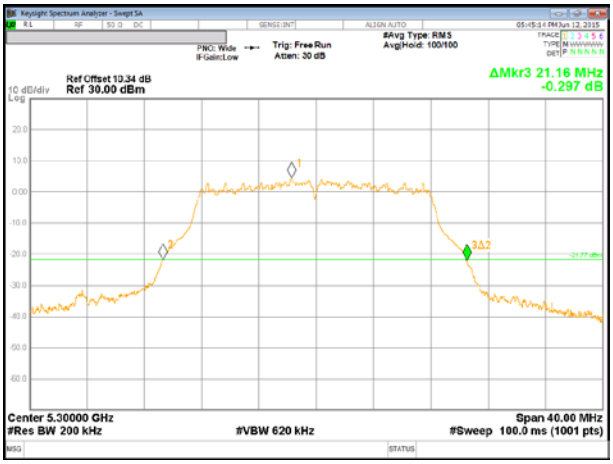
UNII 5.3 GHz

IEEE 802.11a mode

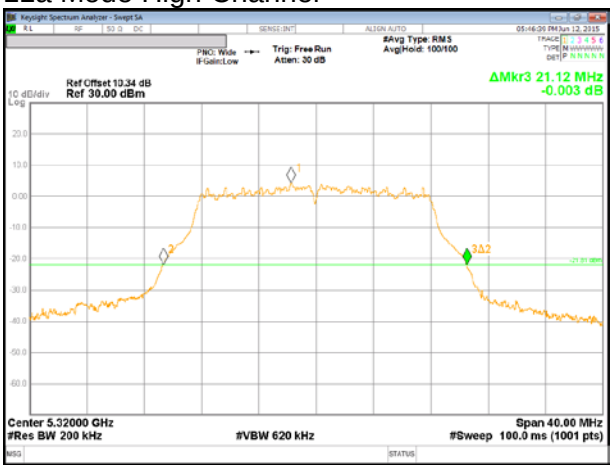
11a Mode Low Channel



11a Mode Middle Channel



11a Mode High Channel



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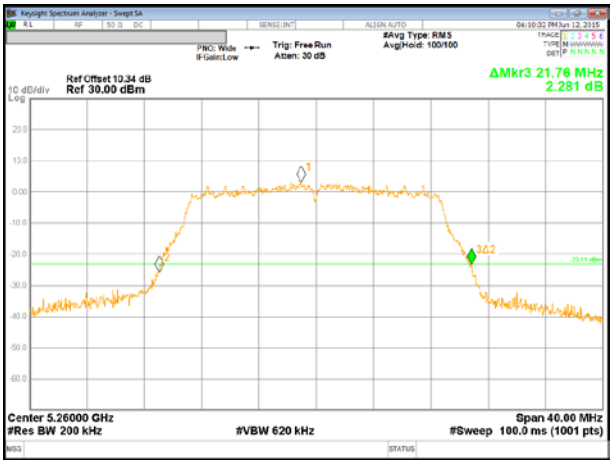
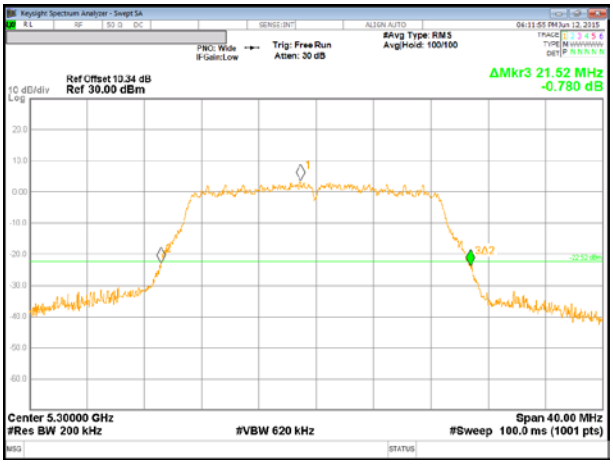
IEEE 802.11n HT20 mode

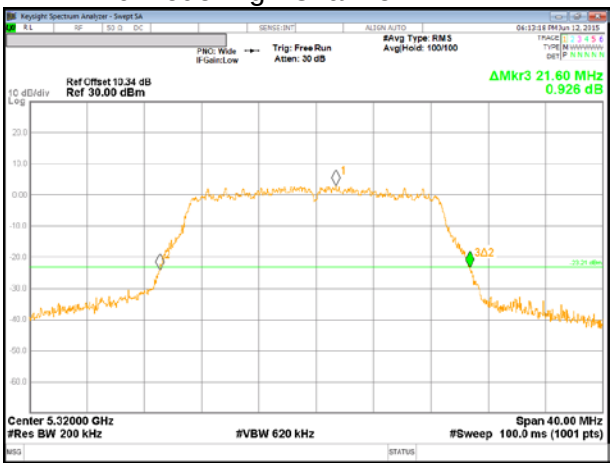
11n HT20 Mode Low Channel



11n HT20 Mode Middle Channel



11n HT20 Mode High Channel



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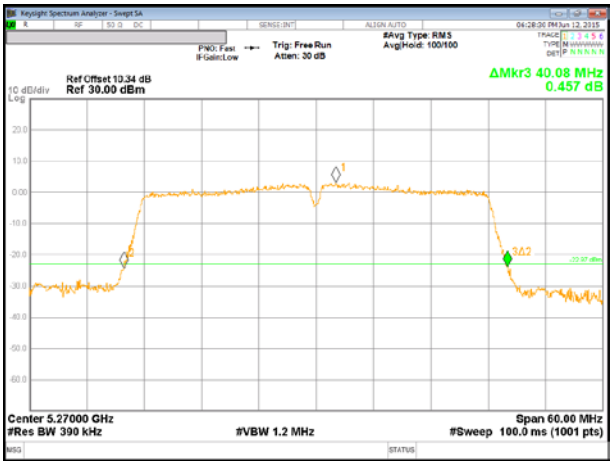
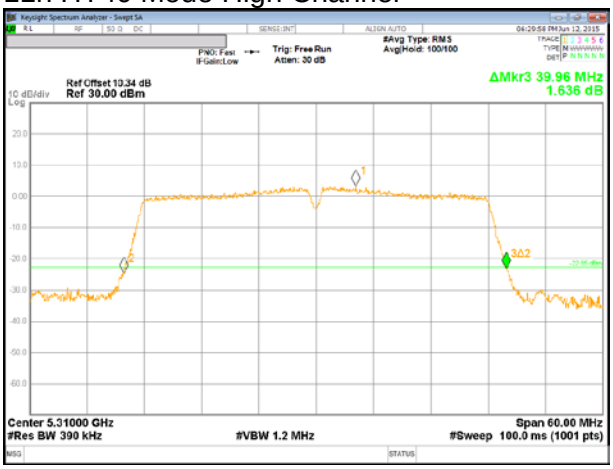
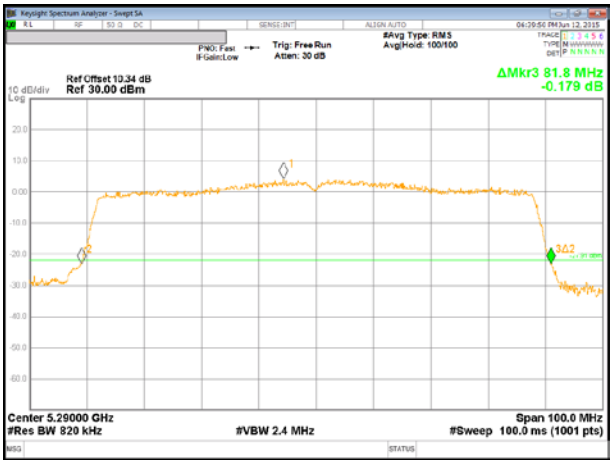
IEEE 802.11n HT40 mode

11n HT40 Mode Low Channel	11n HT40 Mode High Channel
	

IEEE 802.11ac VHT80 mode

11ac HT80 Mode Middle Channel	
	

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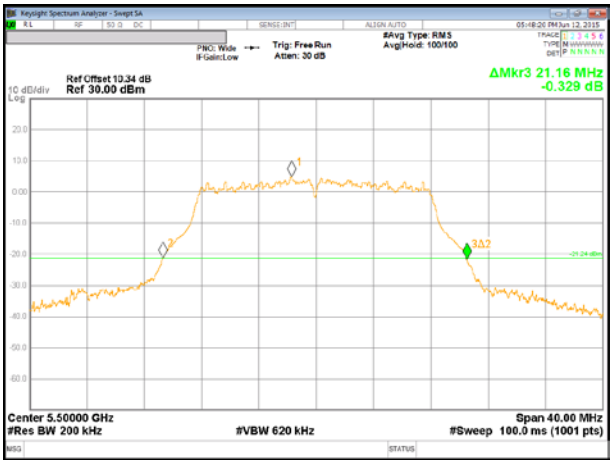
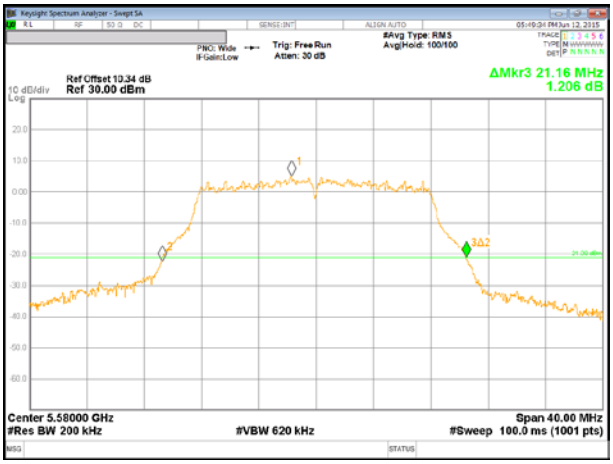
UNII 5.5 GHz

IEEE 802.11a mode

11a Mode Low Channel

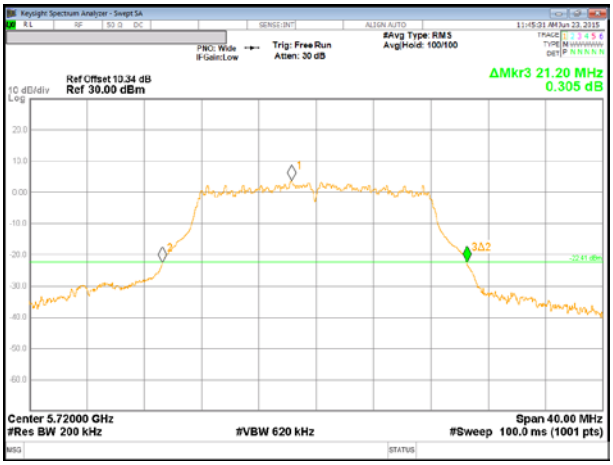


11a Mode Middle Channel



11a Mode High Channel

11a Mode Straddle Channel



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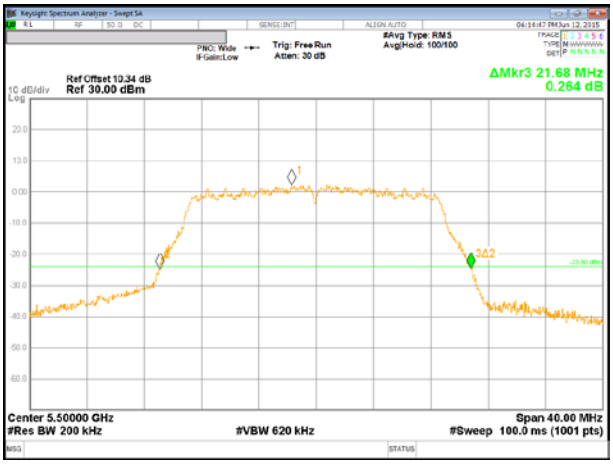
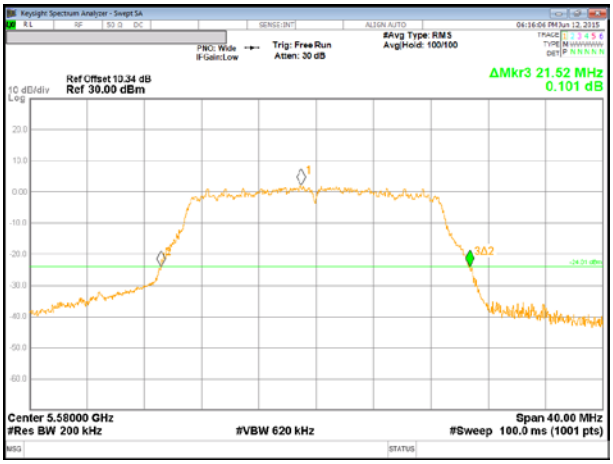
IEEE 802.11n HT20 mode

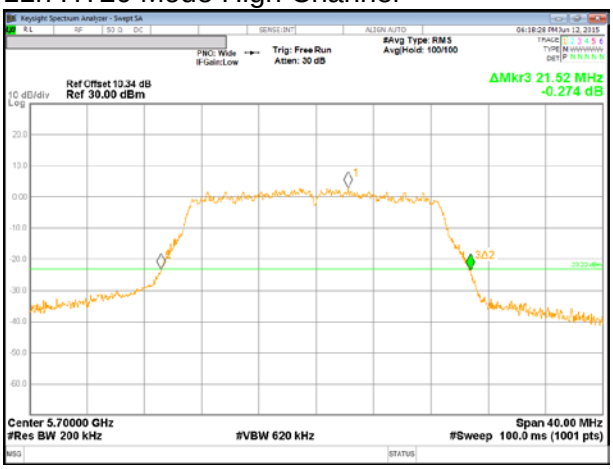
11n HT20 Mode Low Channel



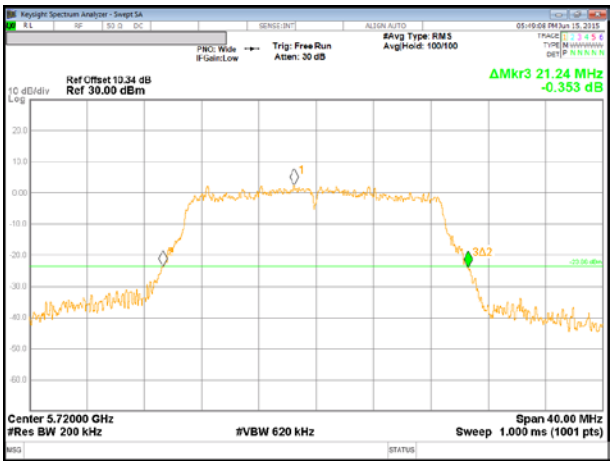
11n HT20 Mode Middle Channel



11n HT20 Mode High Channel



11n Mode Straddle Channel



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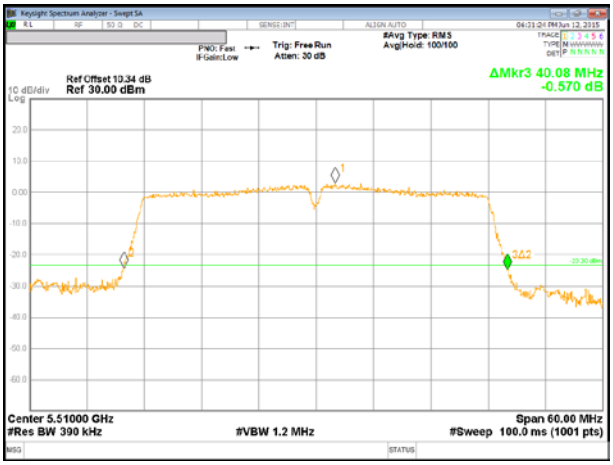
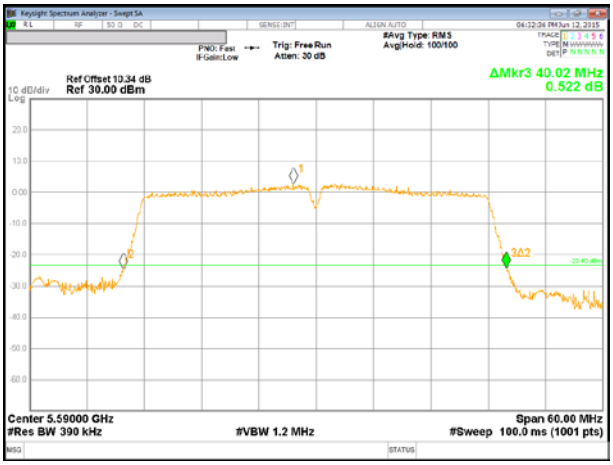
IEEE 802.11n HT40 mode

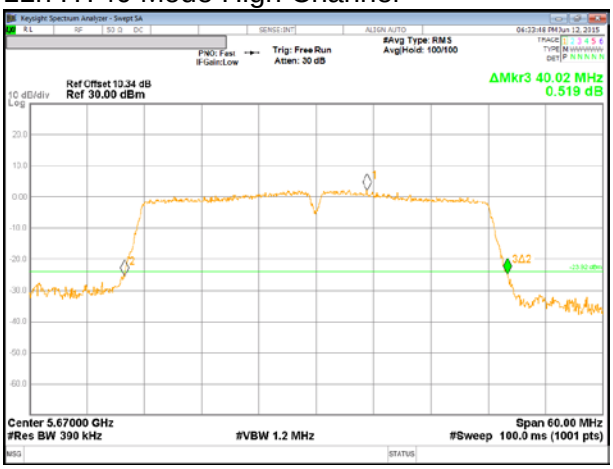
11n HT40 Mode Low Channel



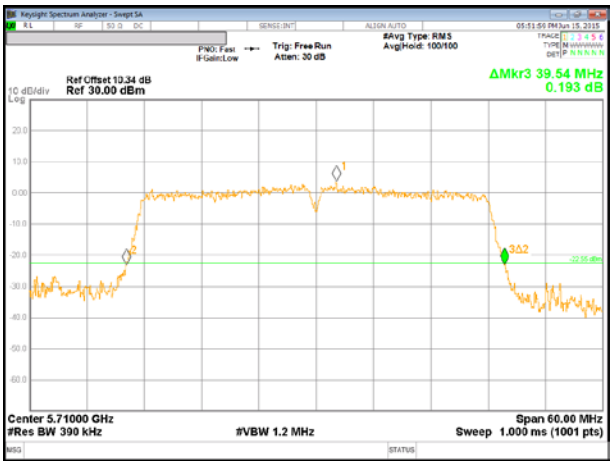
11n HT40 Mode Middle Channel



11n HT40 Mode High Channel



11n HT40 Mode Straddle Channel



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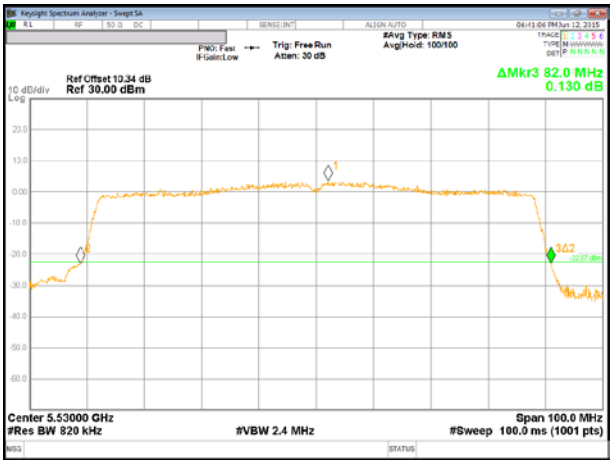
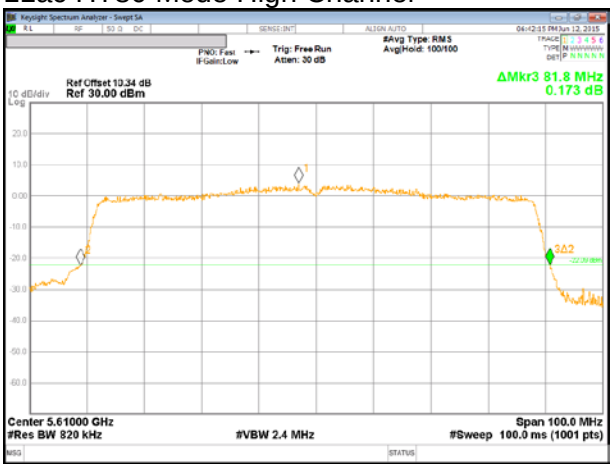
IEEE 802.11ac VHT80 mode

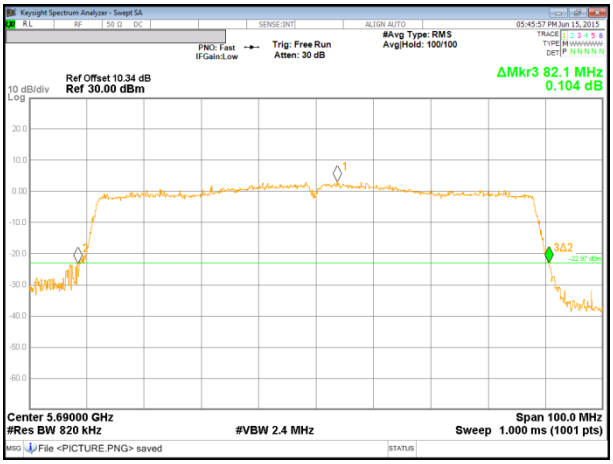
11ac HT80 Mode Low Channel



11ac HT80 Mode High Channel



11ac HT80 Mode Straddle Channel



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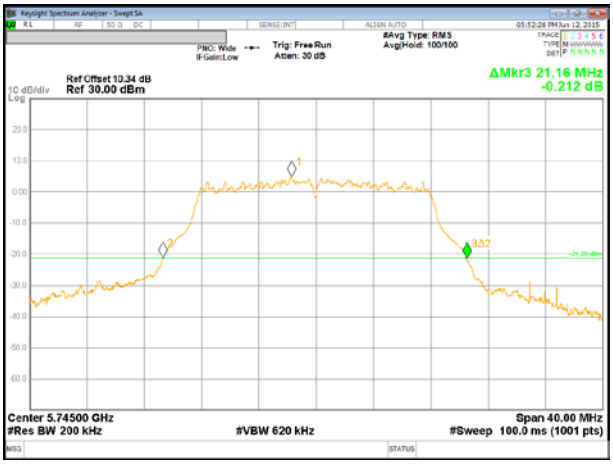
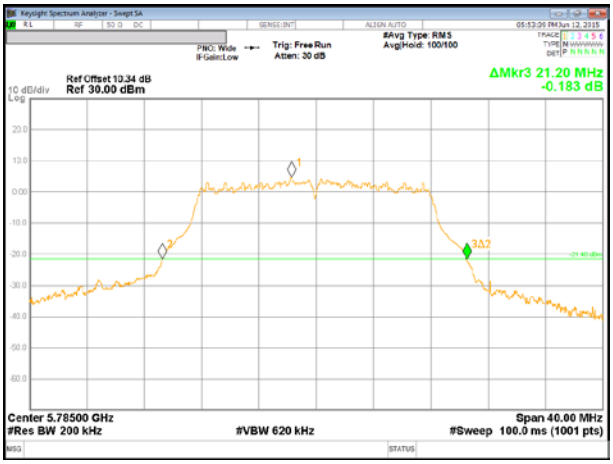
UNII 5.8 GHz

IEEE 802.11a mode

11a Mode Low Channel



11a Mode Middle Channel



11a Mode High Channel

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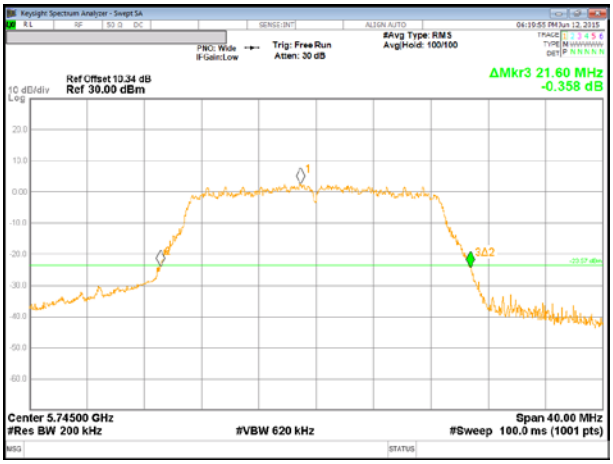
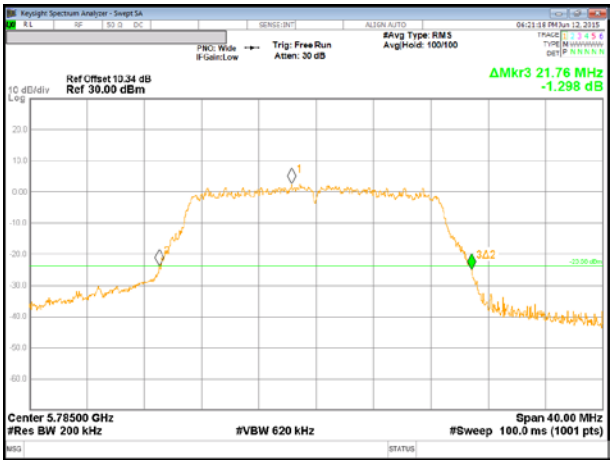
IEEE 802.11n HT20 mode

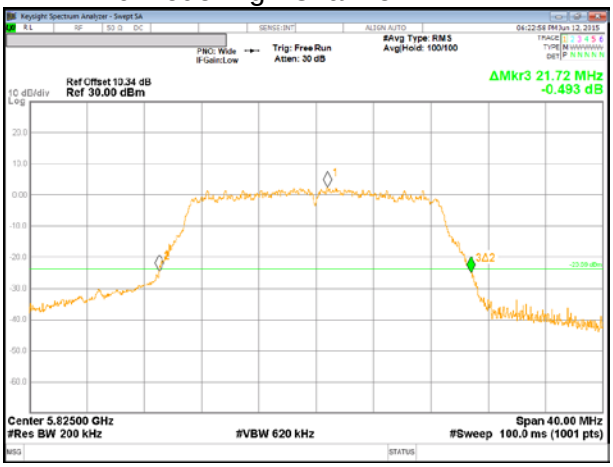
11n HT20 Mode Low Channel



11n HT20 Mode Middle Channel



11n HT20 Mode High Channel



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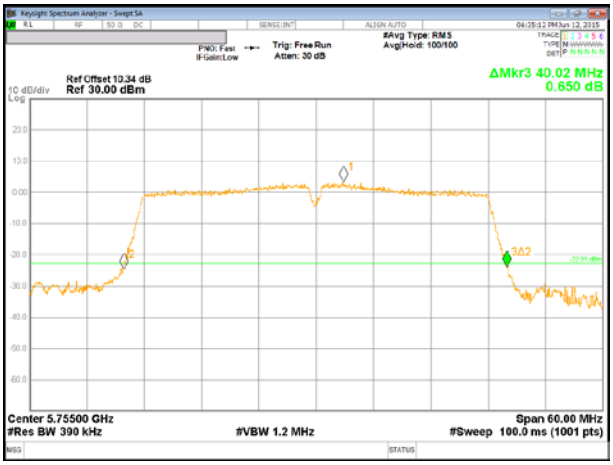
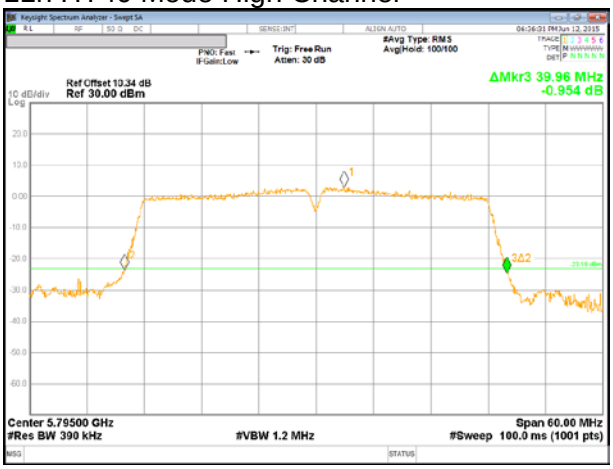
IEEE 802.11n HT40 mode

11n HT40 Mode Low Channel	11n HT40 Mode High Channel
	

IEEE 802.11ac VHT80 mode

11ac HT80 Mode Middle Channel	

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10.3. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

10.3.1. 802.11a MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	5180	16.467
Mid	5200	16.512
High	5240	16.482
Worst		16.512

10.3.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	5180	17.755
Mid	5200	17.729
High	5240	17.758
Worst		17.758

10.3.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	5190	36.241
High	5230	36.224
Worst		36.241

10.3.4. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Middle	5210	75.852
Worst		75.852

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10.3.5. 802.11a MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	5260	16.504
Mid	5300	16.469
High	5320	16.575
Worst		16.575

10.3.6. 802.11n HT20 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	5260	17.724
Mid	5300	17.755
High	5320	17.714
Worst		17.755

10.3.7. 802.11n HT40 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	5270	36.362
High	5310	36.233
Worst		36.362

10.3.8. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Middle	5290	75.954
Worst		75.954

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10.3.9. 802.11a MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	5500	16.498
Mid	5580	16.498
High	5700	16.459
Straddle	5720	16.440
Worst		16.498

10.3.10. 802.11n HT20 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	5500	17.720
Mid	5580	17.769
High	5700	17.726
Straddle	5720	17.694
Worst		17.769

10.3.11. 802.11n HT40 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	5510	36.298
Mid	5550	36.399
High	5670	36.228
Straddle	5710	36.225
Worst		36.399

10.3.12. 802.11ac VHT80 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	5530	75.774
High	5610	75.622
Straddle	5690	75.781
Worst		75.781

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10.3.13. 802.11a MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	5745	16.516
Mid	5785	16.514
High	5825	16.587
Worst		16.587

10.3.14. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	5745	17.750
Mid	5785	17.712
High	5825	17.728
Worst		17.750

10.3.15. 802.11n HT40 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Low	5755	36.325
High	5795	36.268
Worst		36.325

10.3.16. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]
Middle	5775	75.695
Worst		75.695

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