



FCC 47 CFR PART 15 SUBPART E

UNII

CERTIFICATION TEST REPORT

FOR

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

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ACCREDITED*

Testing
Laboratory

TL-637

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC

MODEL NUMBER: SM-G889A

SERIAL NUMBER: R38M109WB4F, R38M109WC2T (RADIATED);
R38KC03K3LM (CONDUCTED)

DATE TESTED: FEB 28, 2019 - APR 30, 2019

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 following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 789033 D02 General UNII Test Procedures New Rules v02r01
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
☒ Chamber 3

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	3.86 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 GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC.
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

Simultaneous TX Condition

Frequency	Supported	Comments
2.4 GHz Antenna 1 + 5 GHz Antenna 2	No	
2.4 GHz Antenna 2 + 5 GHz Antenna 1	No	
2.4 GHz Antenna 1 + 5 GHz Antenna 1	No	
2.4 GHz Antenna 2 + 5 GHz Antenna 2	No	
2.4 GHz Antenna 1 + 5 GHz MIMO	Yes	802.11b Tx + 5GHz MIMO
2.4 GHz Antenna 2 + 5 GHz MIMO	Yes	802.11b Tx + 5GHz MIMO
2.4 GHz MIMO + 5 GHz Antenna 1	No	
2.4 GHz MIMO + 5 GHz Antenna 2	No	
2.4 GHz MIMO + 5 GHz MIMO	Yes	RSDB MIMO
2.4 GHz Bluetooth Antenna 2 + 5 GHz MIMO	Yes	

Spurious Emissions for Simultaneous Transmission results were reported on the section 11.5.

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 MIMO	20.75		118.85	
	802.11n HT20 MIMO	20.69		117.22	
5190 - 5230	802.11n HT40 MIMO	18.52		71.12	
5210	802.11ac VHT80 MIMO	18.15		65.31	
5260 - 5320	802.11a MIMO	20.90		123.03	
	802.11n HT20 MIMO	20.77		119.40	
5270 - 5310	802.11n HT40 MIMO	18.47		70.31	
5290	802.11ac VHT80 MIMO	18.10		64.57	
5500 - 5700	802.11a MIMO	20.80		120.23	
	802.11n HT20 MIMO	20.63		115.61	
5510 - 5670	802.11n HT40 MIMO	18.58		72.11	
5530 - 5610	802.11ac VHT80 MIMO	18.27		67.14	
5745 - 5825	802.11a MIMO	18.96		78.70	
	802.11n HT20 MIMO	18.95		78.52	
5755 - 5795	802.11n HT40 MIMO	18.65		73.28	
5775	802.11ac VHT80 MIMO	18.36		68.55	

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	-3.58	-4.17
UNII 2A 5250 – 5350	-4.42	-4.17
UNII 2C 5470 – 5725	-3.99	-3.55
UNII 3 5725 – 5850	-3.84	-3.93

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		
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 SDM/CDD	802.11n HT20 2TX CDD
5180 - 5240	802.11ac VHT20 1TX	802.11n HT20 2TX CDD
5180 - 5240	802.11ac VHT20 2TX SDM/CDD	802.11n HT20 2TX CDD
5190 - 5230	802.11n HT40 1TX	802.11n HT40 2TX CDD
5190 - 5230	802.11n HT40 2TX SDM/CDD	802.11n HT40 2TX CDD
5190 - 5230	802.11ac VHT40 1TX	802.11n HT40 2TX CDD
5190 - 5230	802.11ac VHT40 2TX SDM/CDD	802.11n HT40 2TX CDD
5210	802.11ac VHT80 1TX	802.11ac VHT80 2TX CDD
5210	802.11ac VHT80 2TX SDM/CDD	802.11ac VHT80 2TX CDD

UNII 2A

5250 - 5350 MHz Authorized Frequency Band		
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 SDM/CDD	802.11n HT20 2TX CDD
5260 - 5320	802.11ac VHT20 1TX	802.11n HT20 2TX CDD
5260 - 5320	802.11ac VHT20 2TX SDM/CDD	802.11n HT20 2TX CDD
5270 - 5310	802.11n HT40 1TX	802.11n HT40 2TX CDD
5270 - 5310	802.11n HT40 2TX SDM/CDD	802.11n HT40 2TX CDD
5270 - 5310	802.11ac VHT40 1TX	802.11n HT40 2TX CDD
5270 - 5310	802.11ac VHT40 2TX SDM/CDD	802.11n HT40 2TX CDD
5290	802.11ac VHT80 1TX	802.11ac VHT80 2TX CDD
5290	802.11ac VHT80 2TX SDM/CDD	802.11ac VHT80 2TX CDD

UNII 2C

5470 - 5725 MHz Authorized Frequency Band		
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 SDM/CDD	802.11n HT20 2TX CDD
5500 - 5700	802.11ac VHT20 1TX	802.11n HT20 2TX CDD
5500 - 5700	802.11ac VHT20 2TX SDM/CDD	802.11n HT20 2TX CDD
5510 - 5670	802.11n HT40 1TX	802.11n HT40 2TX CDD
5510 - 5670	802.11n HT40 2TX SDM/CDD	802.11n HT40 2TX CDD
5510 - 5670	802.11ac VHT40 1TX	802.11n HT40 2TX CDD
5510 - 5670	802.11ac VHT40 2TX SDM/CDD	802.11n HT40 2TX CDD
5530 - 5610	802.11ac VHT80 1TX	802.11ac VHT80 2TX CDD
5530 - 5610	802.11ac VHT80 2TX SDM/CDD	802.11ac VHT80 2TX CDD

UNII 3

5725 - 5850 MHz Authorized Frequency Band		
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 SDM/CDD	802.11n HT20 2TX CDD
5745 - 5825	802.11ac VHT20 1TX	802.11n HT20 2TX CDD
5745 - 5825	802.11ac VHT20 2TX SDM/CDD	802.11n HT20 2TX CDD
5755 - 5795	802.11n HT40 1TX	802.11n HT40 2TX CDD
5755 - 5795	802.11n HT40 2TX SDM/CDD	802.11n HT40 2TX CDD
5755 - 5795	802.11ac VHT40 1TX	802.11n HT40 2TX CDD
5755 - 5795	802.11ac VHT40 2TX SDM/CDD	802.11n HT40 2TX CDD
5775	802.11ac VHT80 1TX	802.11ac VHT80 2TX CDD
5775	802.11ac VHT80 2TX 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.

For test with ANT 2, the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

For test with ANT 1 & ALL, the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in 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)

Note 1 : All radiated and power line conducted tests were performed connected with earphone and charger for evaluation of worst case mode.

Note 2 : Some radiated test results performed on the 1Tx antenna condition is worst, so test report described all radiated test results.(Antenna 1-1Tx, Antenna 2-1Tx, Antenna ALL 2Tx CDD)

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA300	R37K3AD0AC3SE3	N/A
Data Cable	SAMSUNG	EP-DG915UWZ	N/A	N/A
Earphone	SAMSUNG	EP-DW720CWE	N/A	N/A

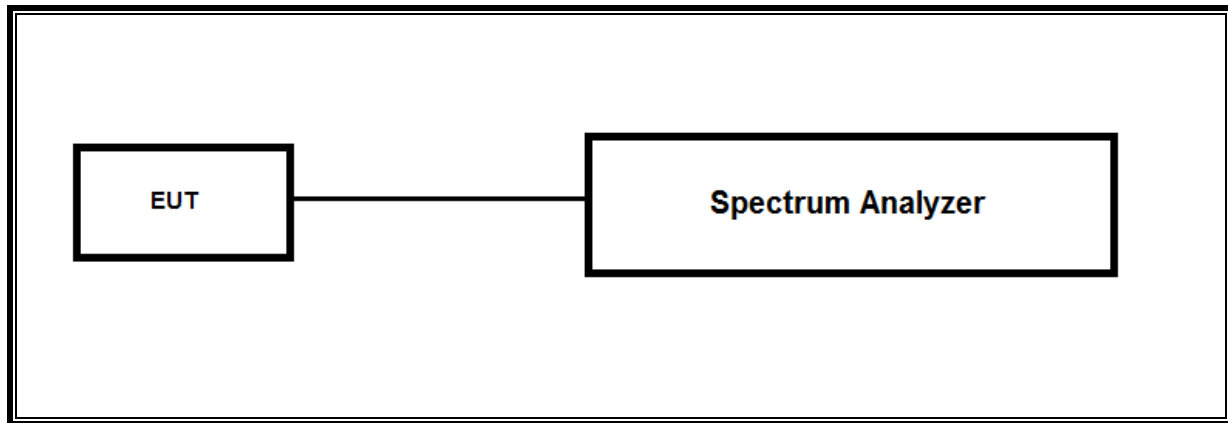
I/O CABLES

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

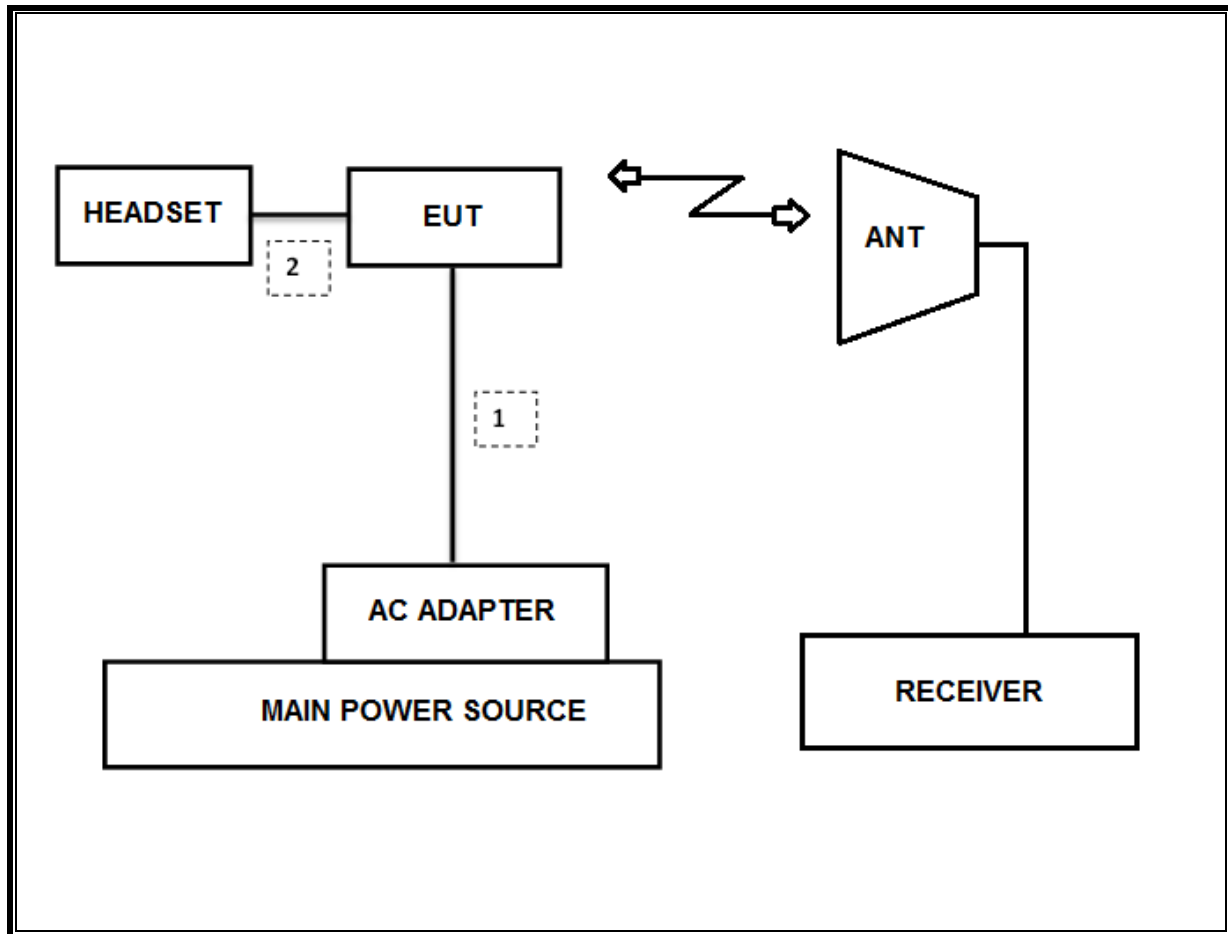
TEST SETUP

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

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



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	New Cal Due
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00167211	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00161451	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168724	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168717	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00205959	08-04-20
Antenna, Horn, 40 GHz	ETS	3116C	00166155	08-14-20
Antenna, Horn, 40 GHz	ETS	3116C	00168645	04-19-12
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	09-19-08
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-06-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-07-19
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-07-19
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-06-19
Spectrum Analyzer, 43.5 GHz	R&S	FSW43	104089	08-06-19
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-07-19
Attenuator	PASTERNAK	PE7087-10	A001	08-08-19
Attenuator	PASTERNAK	PE7087-10	A008	08-08-19
Attenuator	PASTERNAK	PE7004-10	2	08-07-19
Attenuator	PASTERNAK	PE7087-10	A009	08-08-19
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-06-19
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-06-19
EMI Test Receive, 44 GHz	R&S	ESW44	101590	08-06-19
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-06-19
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-07-19
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-07-19
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	08-06-19
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-07-19
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-07-19
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	08-06-19
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	08-07-19
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	08-07-19
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	08-06-19
LISN	R&S	ENV-216	101837	08-09-19
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
15.407(e)	6dB Band width (5.8Ghz)	500KHz	Condcuted	PASS
15.407 (a)(2)	TX Cond. Power 5.15-2.25, 5.25-5.35 & 5.47-5.725	<24dBm or 11+10Log(OBW)		PASS
15.407 (a)(3)	TX Cond. Power 5.725-5.825	< 30dBm or 17+10Log(OBW)		PASS
15.407 (a)(5)	PSD (5.2,5.3,5.5GHz)	<11dBm		PASS
15.407 (a)(5)	PSD (5.8GHz)	30dBm per 500kHz		PASS
15.207 (a)	AC Power Line conducted emissions	Section 10	Radiated	PASS
15.407 (b) & 15.209	Radiated Spurious Emission	< 54dBuV/m		PASS
15.407 (h)(2)	Dynamic Frequency Selection	N/A	Condcuted	PASS

8. MEASUREMENT METHODS

On-Time and Duty Cycle : KDB 789033 D02 v02r01, Section B.

6dB Emission BW : KDB 789033 D02 v02r01, Section C.2.

26dB Emission BW : KDB 789033 D02 v02r01, Section C.1.

99% Occupied BW : KDB 789033 D02 v02r01, Section D.

Conducted Output Power : KDB 789033 D02 v02r01, Section E.3.a(Method PM)

Power Spectral Density : KDB 789033 D02 v02r01, Section F.

Unwanted emissions in restricted bands : KDB 789033 D02 v02r01, Section G.

Unwanted emissions in non-restricted bands : KDB 789033 D02 v02r01, Section G.

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

9. REFERENCE MEASUREMENTS RESULTS

9.1. 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	4.996	5.096	0.980	98.0%	0.00	0.010
802.11n HT20	4.626	4.728	0.978	97.8%	0.09	0.216
802.11n HT40	2.247	2.348	0.957	95.7%	0.19	0.445
802.11ac VHT80	1.064	1.164	0.914	91.4%	0.39	0.940

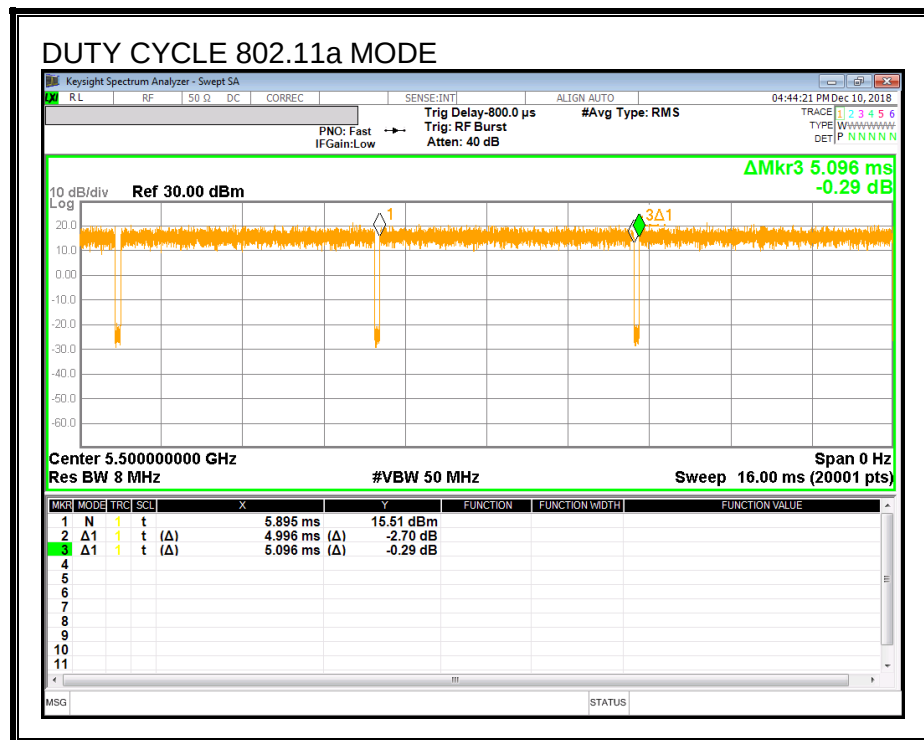
LIMITS

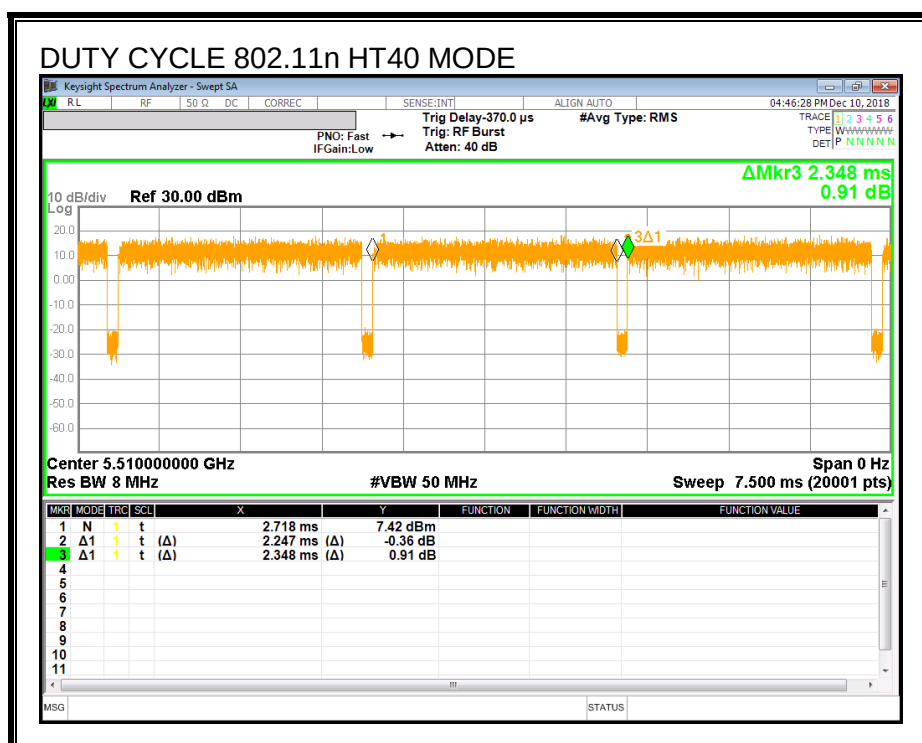
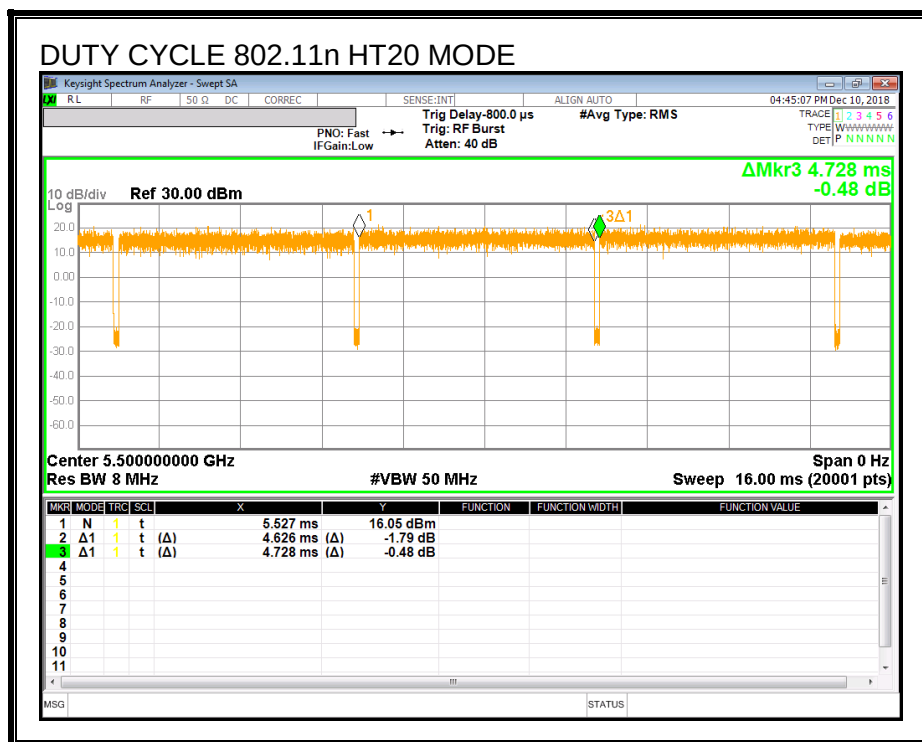
None; for reporting purposes only.

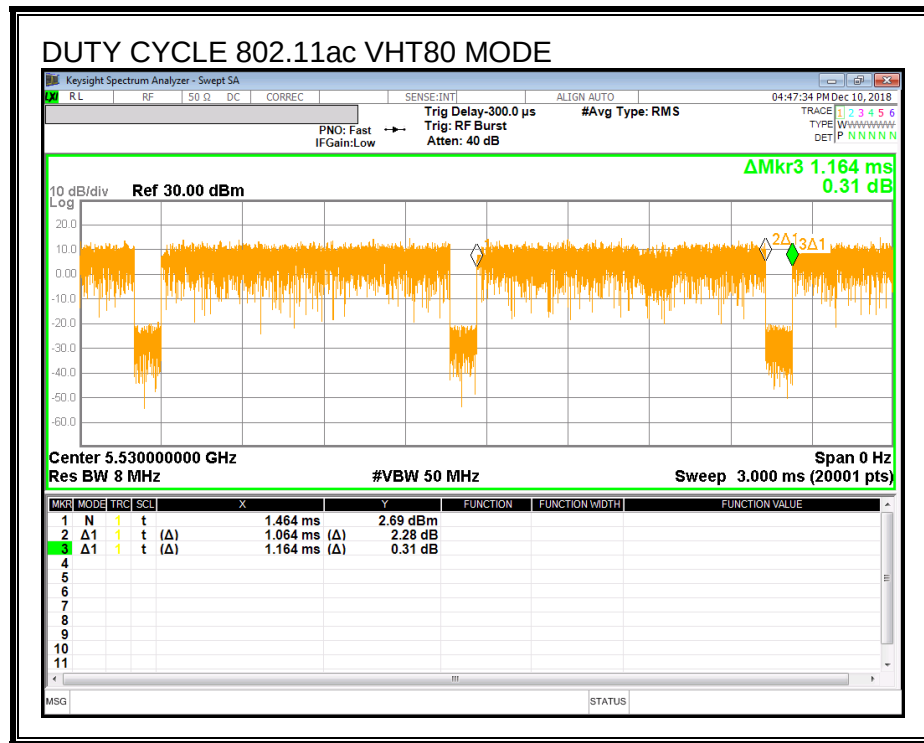
PROCEDURE

KDB 789033 D02 v02r01 Zero-Span Spectrum Analyzer Method.

9.2. DUTY CYCLE PLOTS







9.3. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Reference to 789033 D02 General UNII Test Procedures New Rules v02r01: 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

9.3.1.802.11a MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5180	21.45	21.65
Mid	5200	21.56	21.30
High	5240	21.46	21.42
Worst		21.65	

9.3.2.802.11n HT20 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5180	21.75	24.05
Mid	5200	21.48	23.31
High	5240	21.70	21.87
Worst		24.05	

9.3.3.802.11n HT40 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5190	39.66	39.56
High	5230	39.54	39.55
Worst		39.66	

9.3.4. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Middle	5210	81.31	81.13
Worst		81.31	

9.3.5.802.11a MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5260	21.51	21.31
Mid	5300	21.39	21.46
High	5320	21.32	21.46
Worst		21.51	

9.3.6.802.11n HT20 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5260	21.98	21.79
Mid	5300	21.69	22.67
High	5320	21.42	21.52
Worst		22.67	

9.3.7.802.11n HT40 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5270	39.70	39.72
High	5310	39.90	39.51
Worst		39.90	

9.3.8. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Middle	5290	81.18	81.23
Worst		81.23	

9.3.9. 802.11a MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5500	21.72	21.29
Mid	5580	21.50	21.40
High	5700	21.28	21.30
Worst		21.72	

9.3.10. 802.11n HT20 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5500	21.56	21.55
Mid	5580	21.62	21.69
High	5700	21.29	21.52
Worst		21.69	

9.3.11. 802.11n HT40 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5510	39.44	39.73
Mid	5590	39.58	39.65
High	5670	39.90	39.92
Worst		39.92	

9.3.12. 802.11ac VHT80 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5530	81.52	82.25
High	5610	81.25	81.69
Worst		82.25	

9.3.13. 802.11a MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5745	21.31	21.24
Mid	5785	21.21	21.34
High	5825	21.08	21.32
Worst		21.34	

9.3.14. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5745	21.36	21.68
Mid	5785	21.36	21.63
High	5825	21.28	21.52
Worst		21.68	

9.3.15. 802.11n HT40 MODE IN THE 5.8 GHz BAND

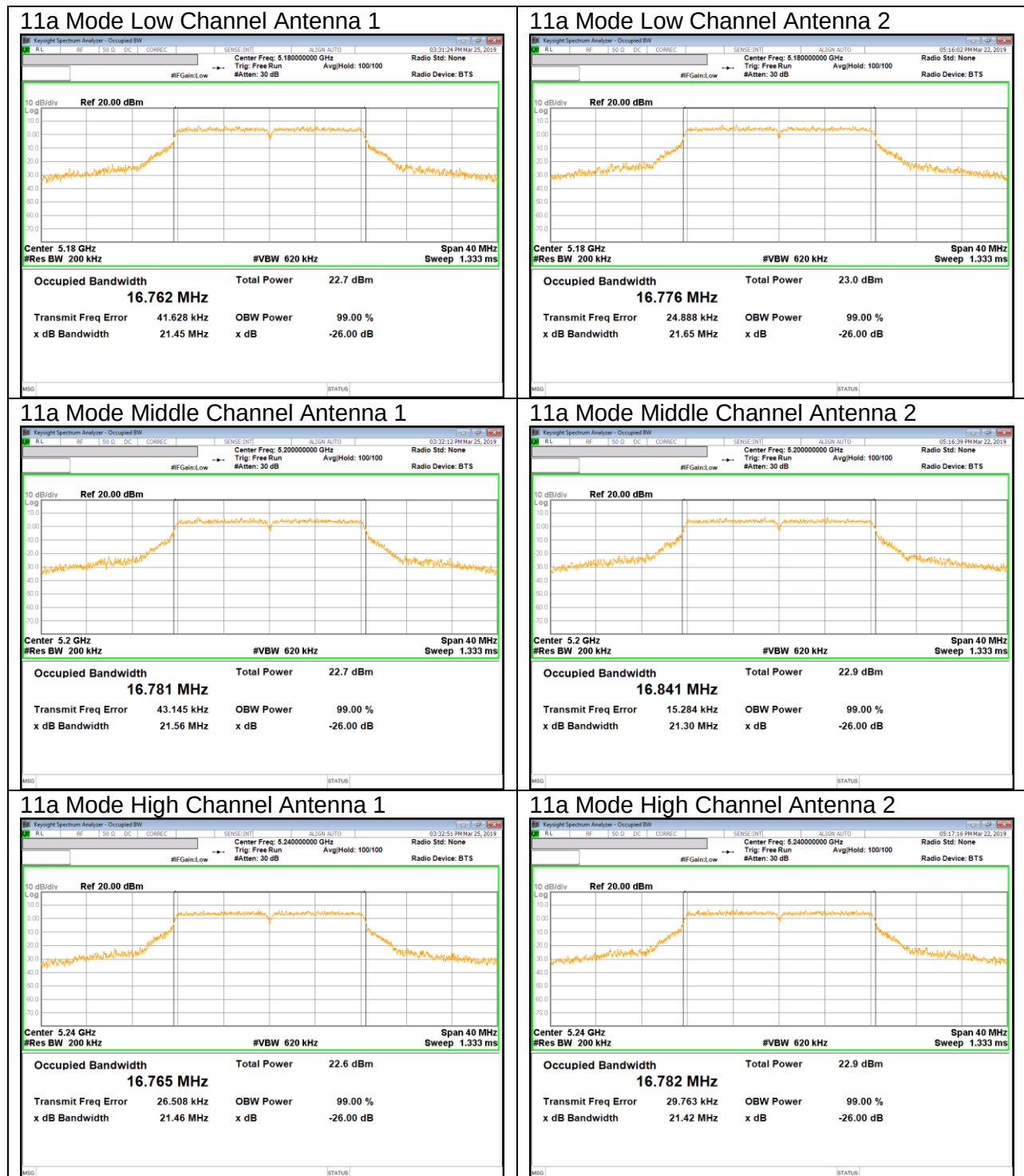
Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5755	39.39	39.82
High	5795	39.63	39.71
Worst		39.82	

9.3.16. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Middle	5775	81.50	82.16
Worst		82.16	

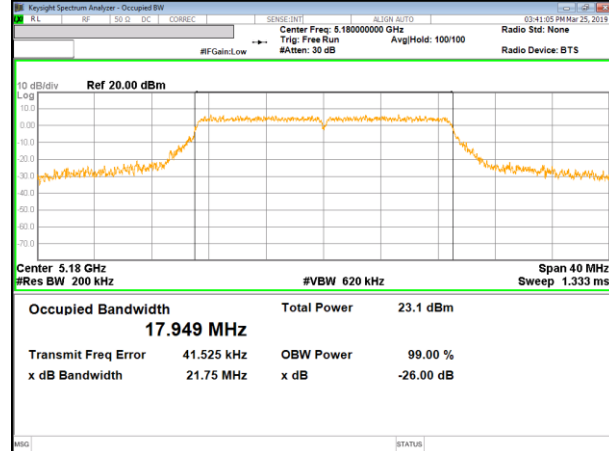
9.3.17. 26 dB BANDWIDTH PLOTS

UNII 5.2 GHz IEEE 802.11a mode

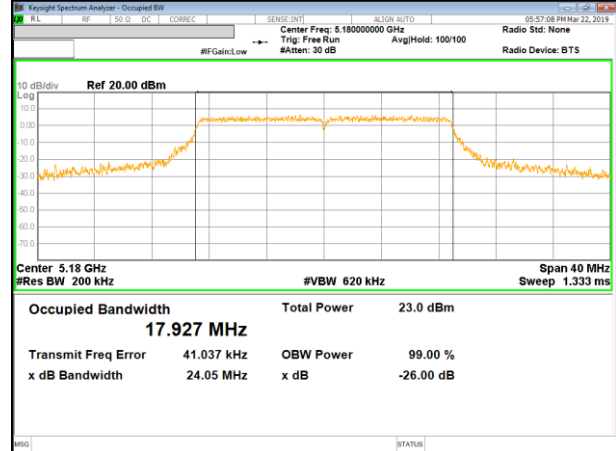


UNII 5.2 GHz IEEE 802.11n HT20 mode

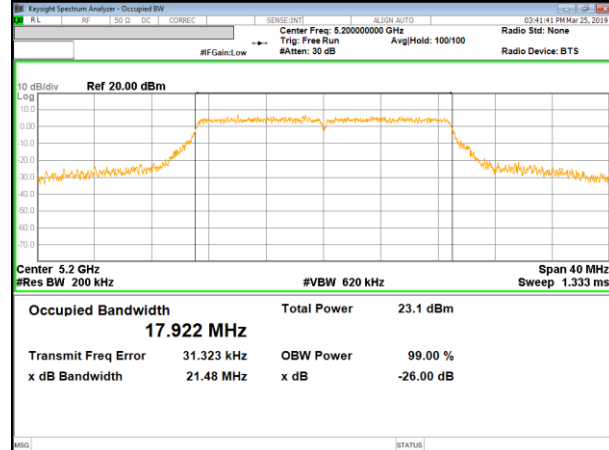
11n HT20 Mode Low Channel Antenna 1



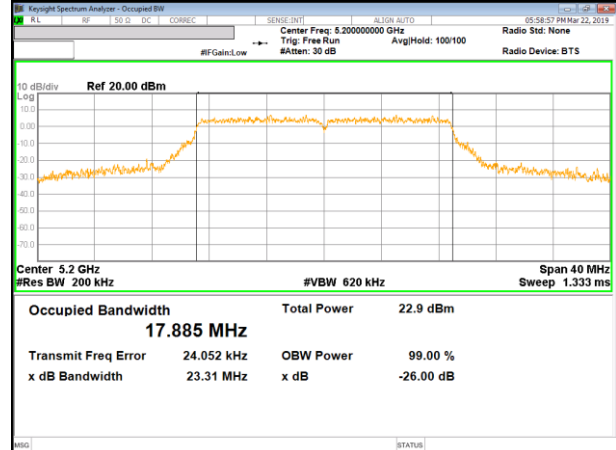
11n HT20 Mode Low Channel Antenna 2



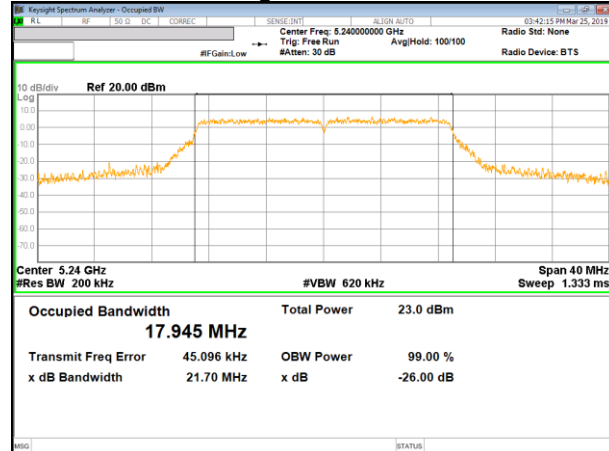
11n HT20 Mode Middle Channel Antenna 1



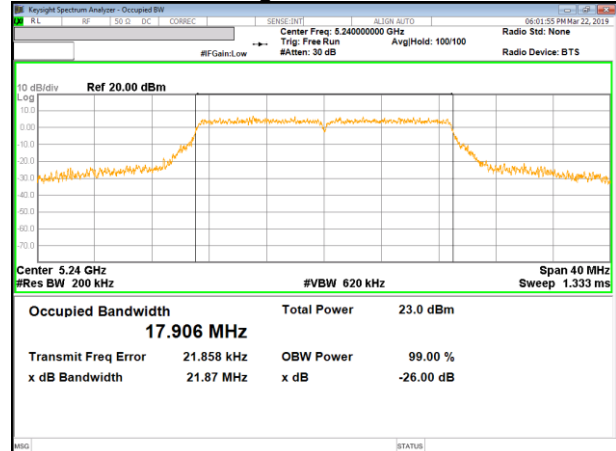
11n HT20 Mode Middle Channel Antenna 2



11n HT20 Mode High Channel Antenna 1

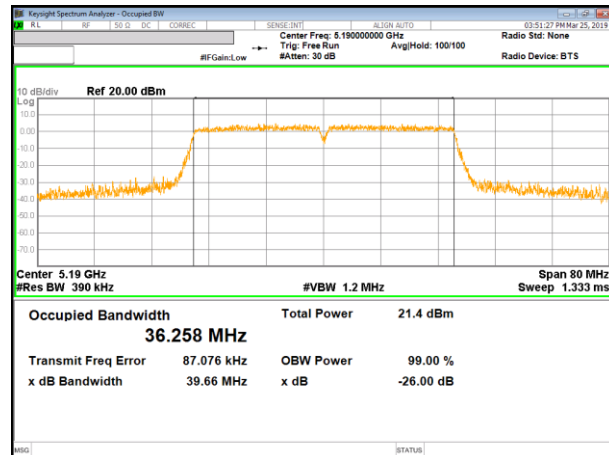


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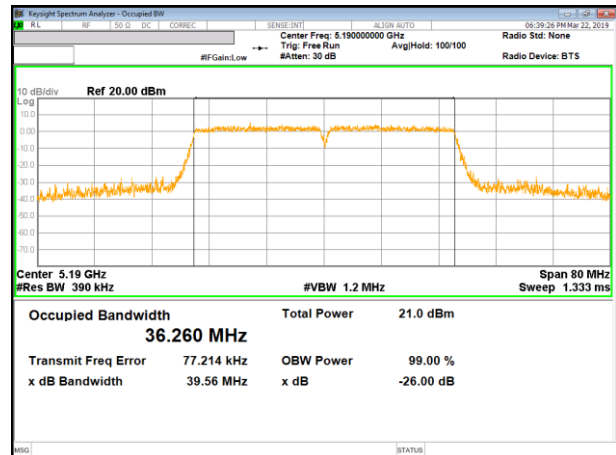


UNII 5.2 GHz IEEE 802.11n HT40 mode

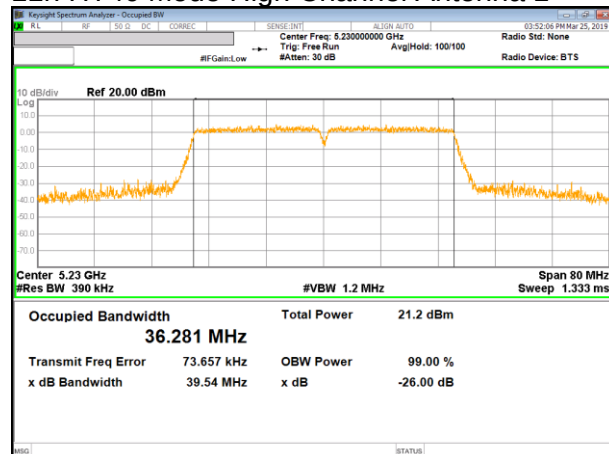
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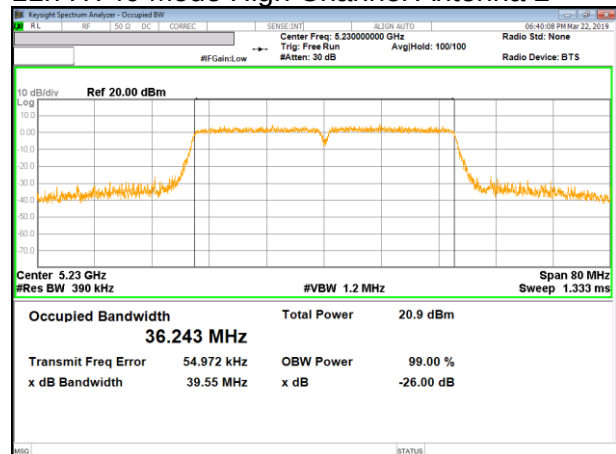
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11n HT40 Mode High Channel Antenna 1

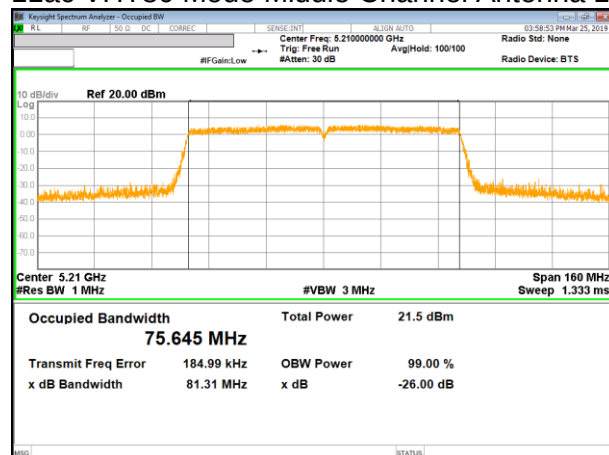


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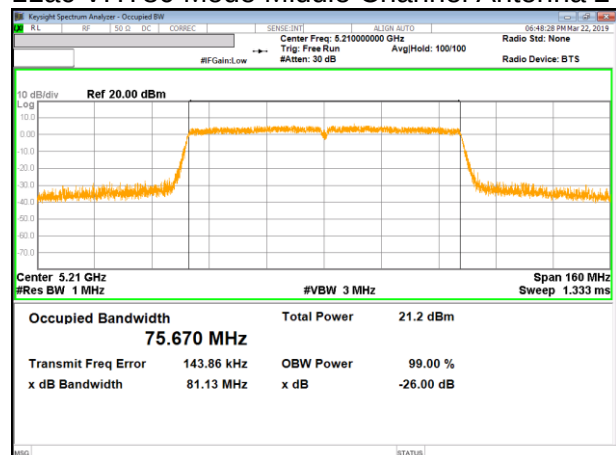


UNII 5.2 GHz IEEE 802.11ac VHT80 mode

11ac VHT80 Mode Middle Channel Antenna 1

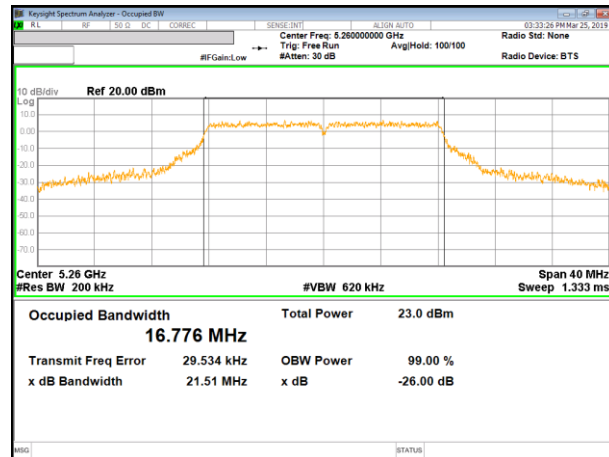


11ac VHT80 Mode Middle Channel Antenna 2

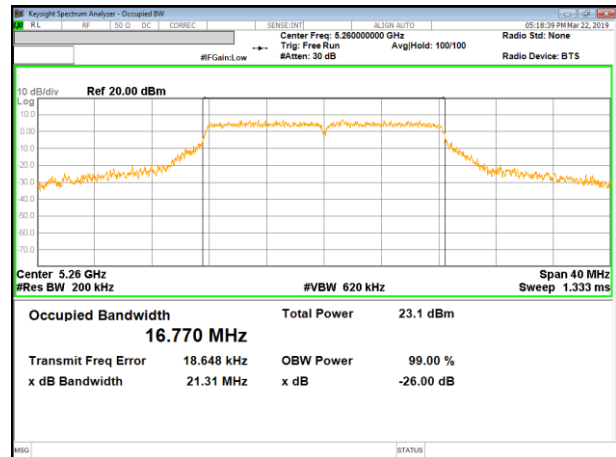


UNII 5.3 GHz IEEE 802.11a mode

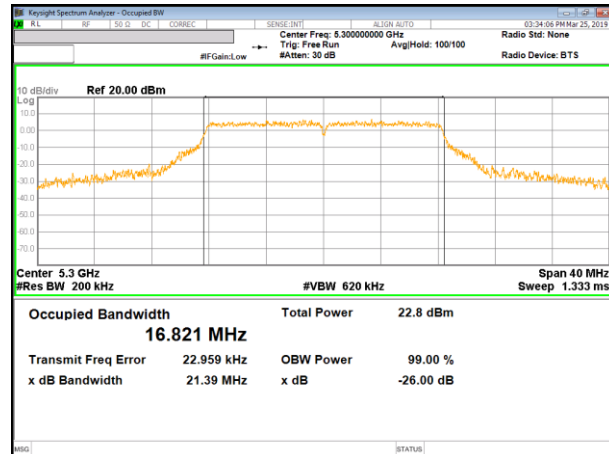
11a Mode Low Channel Antenna 1



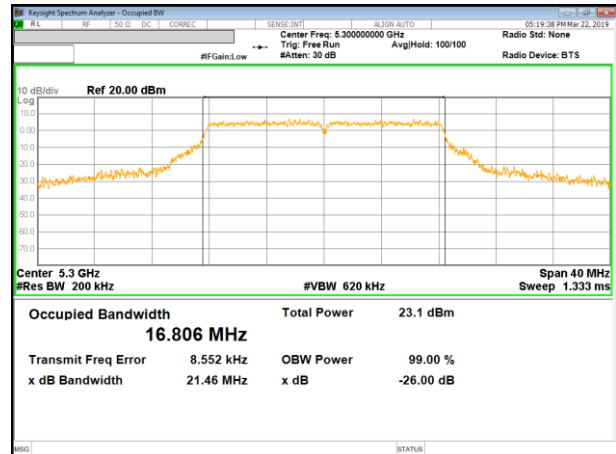
11a Mode Low Channel Antenna 2



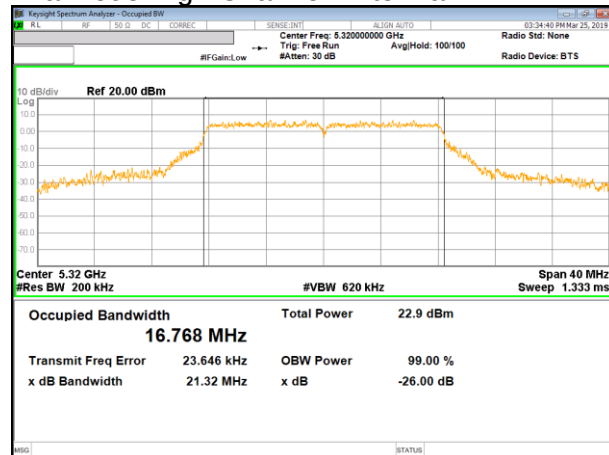
11a Mode Middle Channel Antenna 1



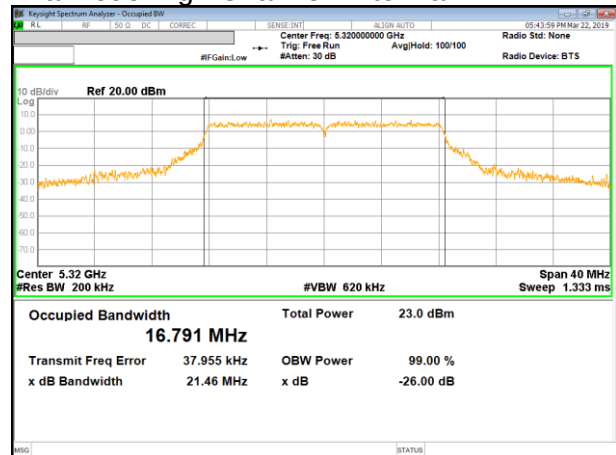
11a Mode Middle Channel Antenna 2



11a Mode High Channel Antenna 1

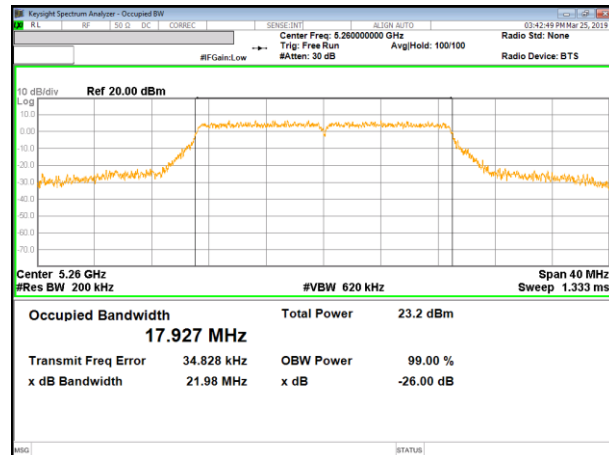


11a Mode High Channel Antenna 2

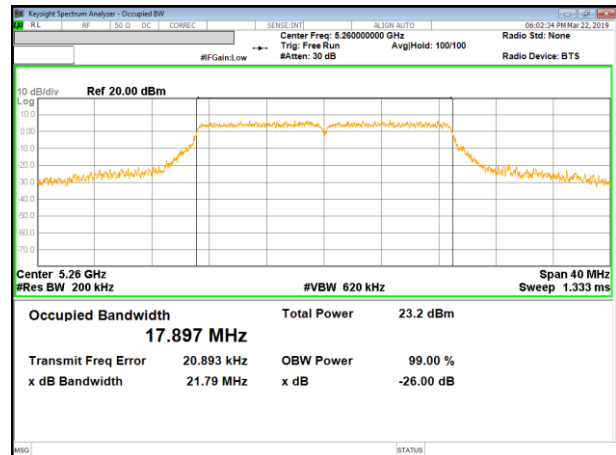


UNII 5.3 GHz IEEE 802.11n HT20 mode

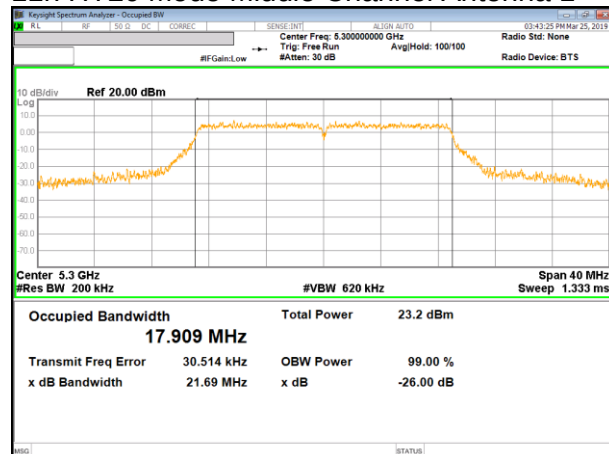
11n HT20 Mode Low Channel Antenna 1



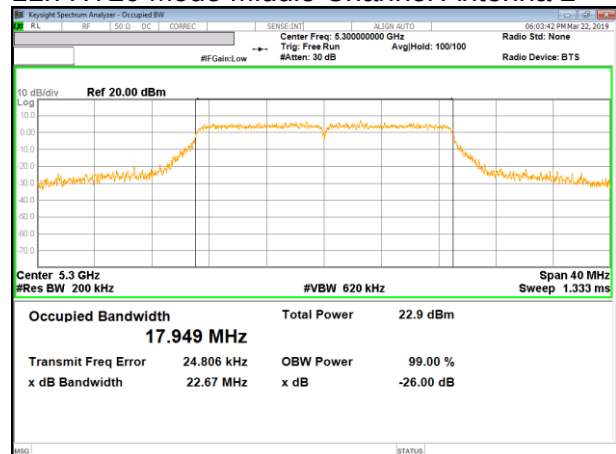
11n HT20 Mode Low Channel Antenna 2



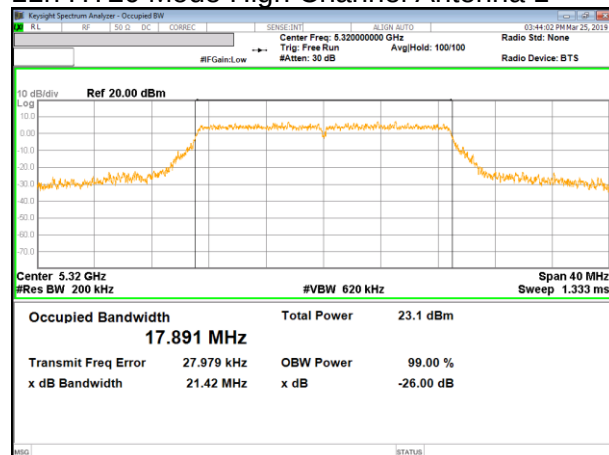
11n HT20 Mode Middle Channel Antenna 1



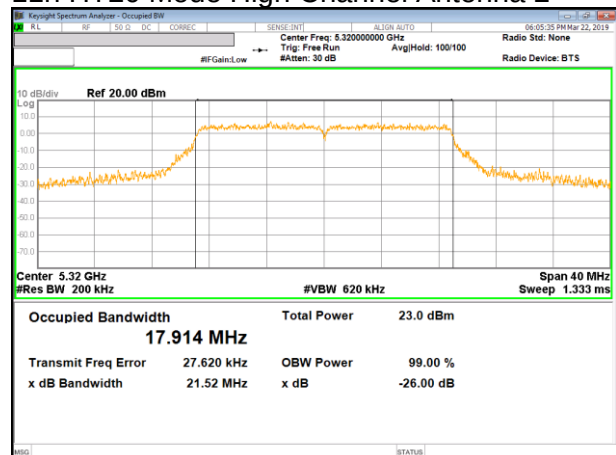
11n HT20 Mode Middle Channel Antenna 2



11n HT20 Mode High Channel Antenna 1

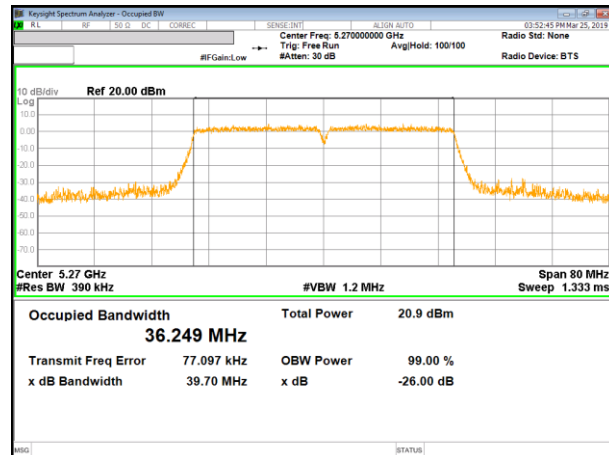


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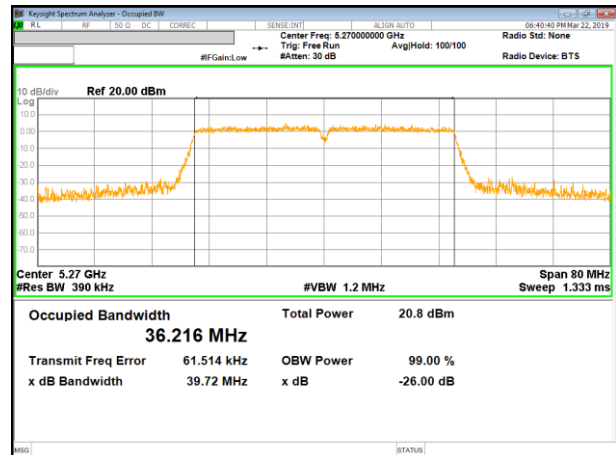


UNII 5.3 GHz IEEE 802.11n HT40 mode

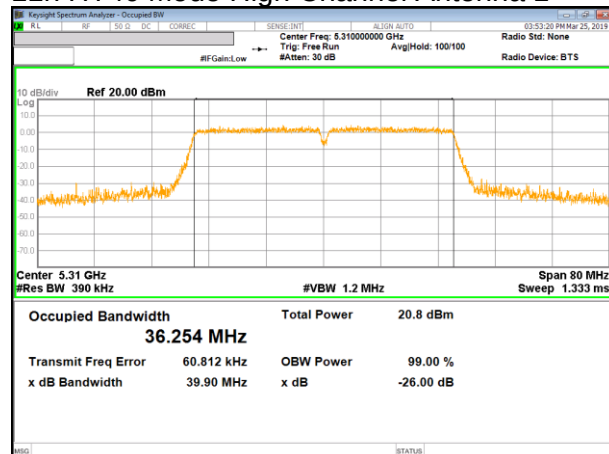
11n HT40 Mode Low Channel Antenna 1



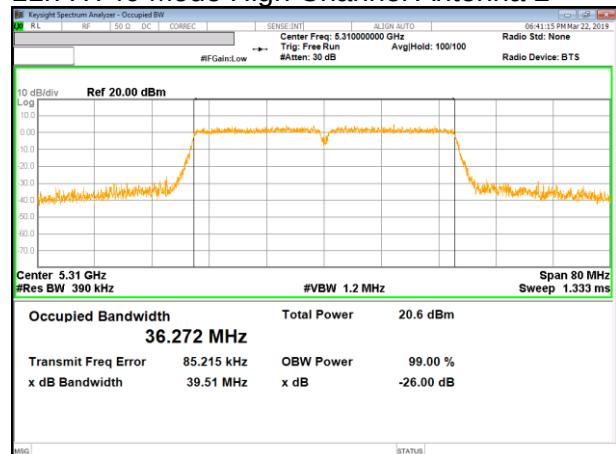
11n HT40 Mode Low Channel Antenna 2



11n HT40 Mode High Channel Antenna 1

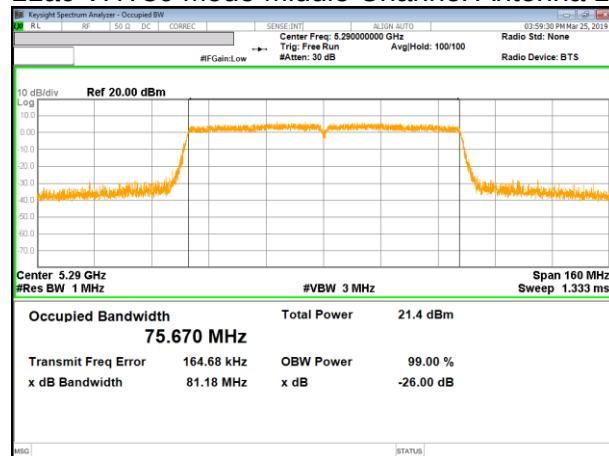


11n HT40 Mode High Channel Antenna 2

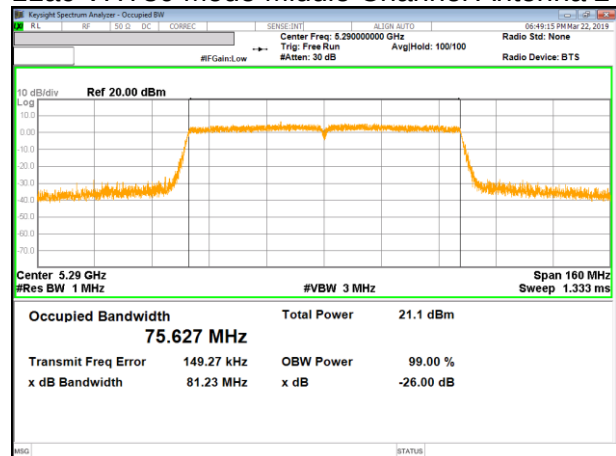


UNII 5.3 GHz IEEE 802.11ac VHT80 mode

11ac VHT80 Mode Middle Channel Antenna 1

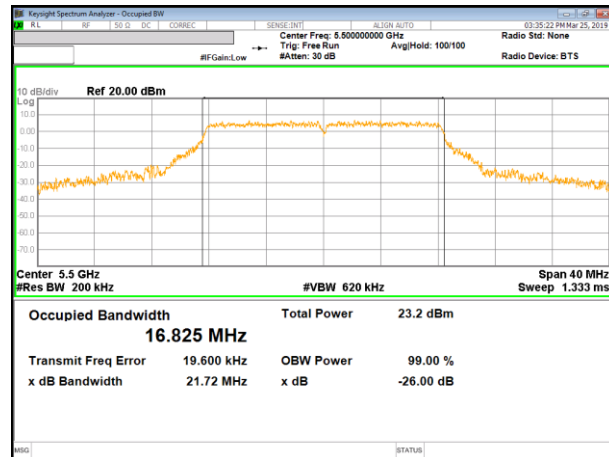


11ac VHT80 Mode Middle Channel Antenna 2

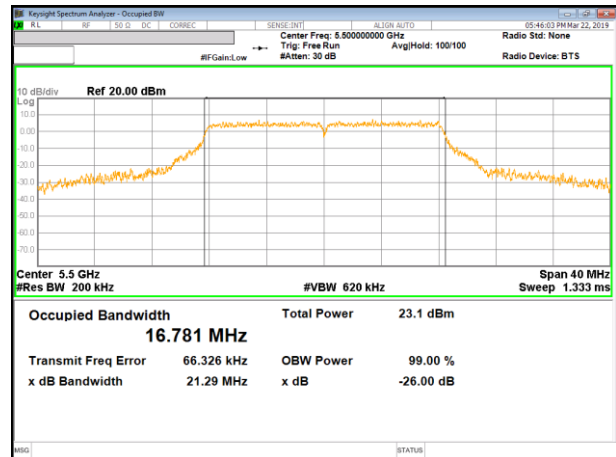


UNII 5.5 GHz IEEE 802.11a mode

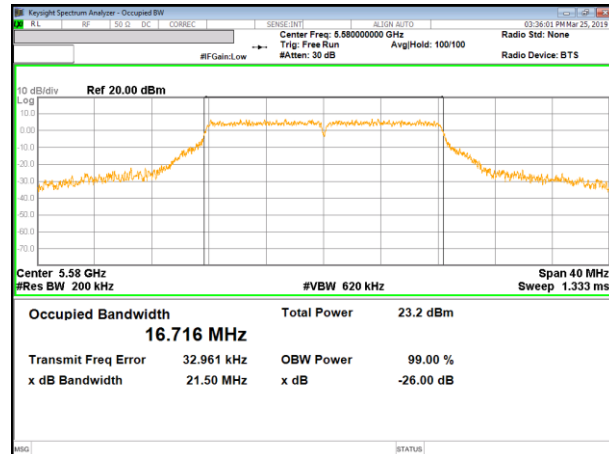
11a Mode Low Channel Antenna 1



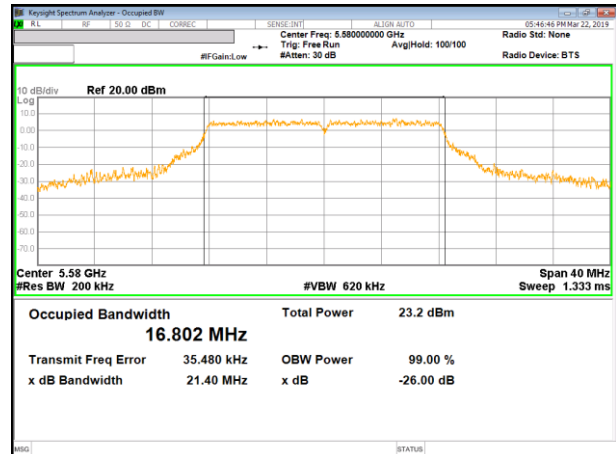
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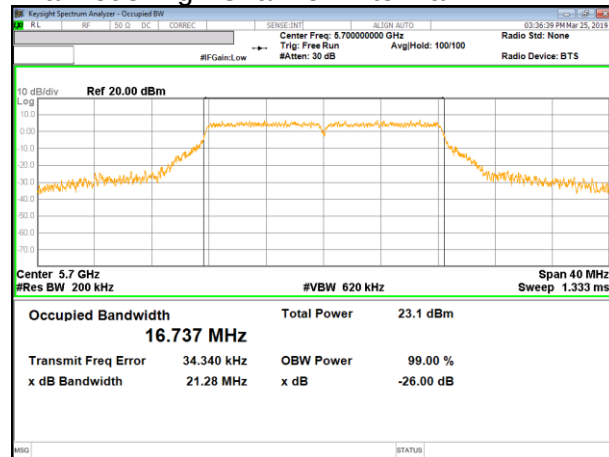
11a Mode Middle Channel Antenna 1



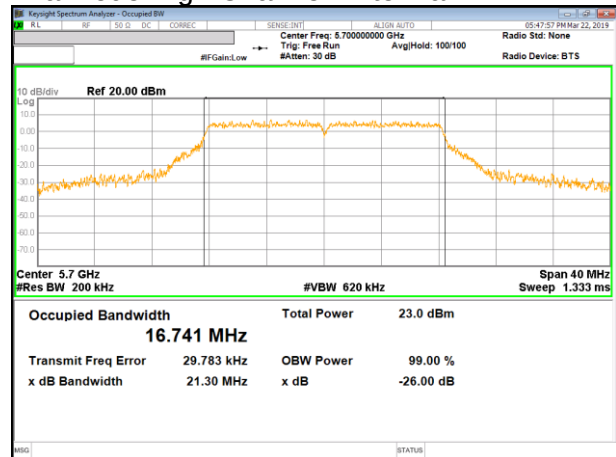
11a Mode Middle Channel Antenna 2



11a Mode High Channel Antenna 1

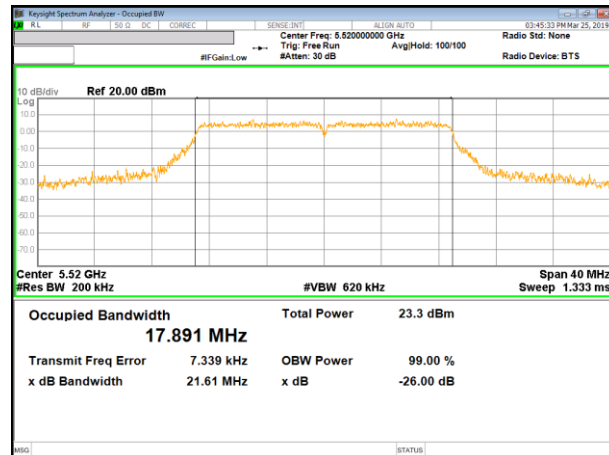


11a Mode High Channel Antenna 2

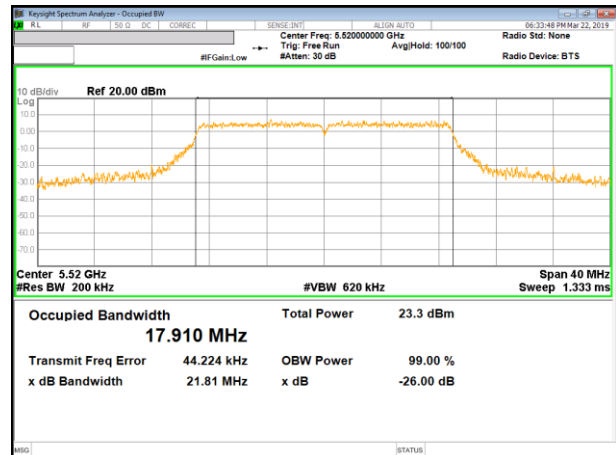


UNII 5.5 GHz IEEE 802.11n HT20 mode

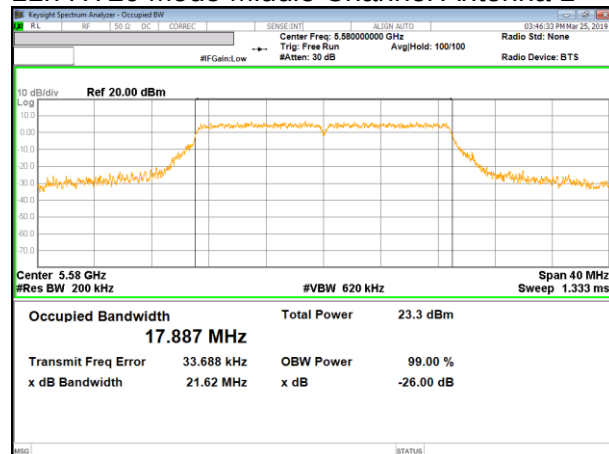
11n HT20 Mode Low Channel Antenna 1



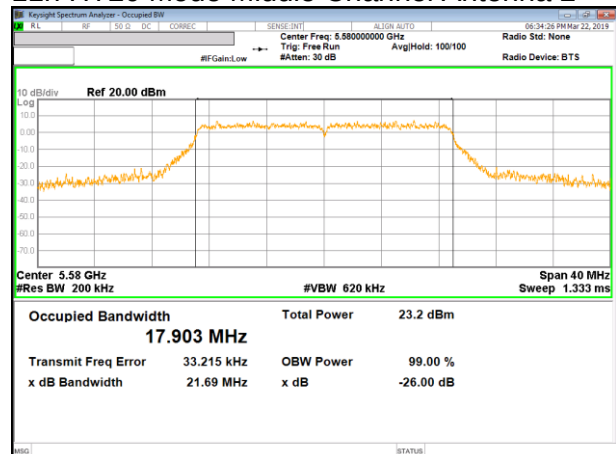
11n HT20 Mode Low Channel Antenna 2



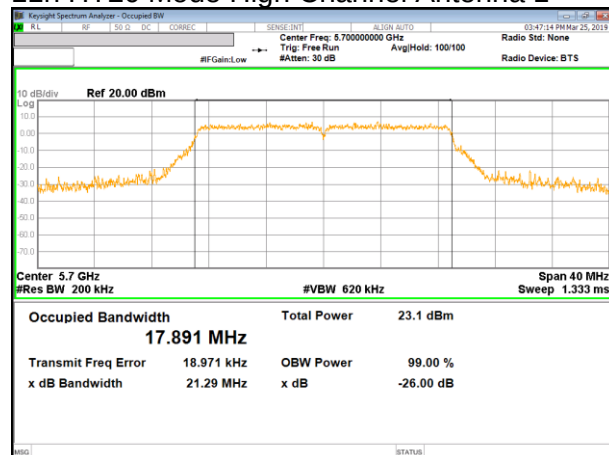
11n HT20 Mode Middle Channel Antenna 1



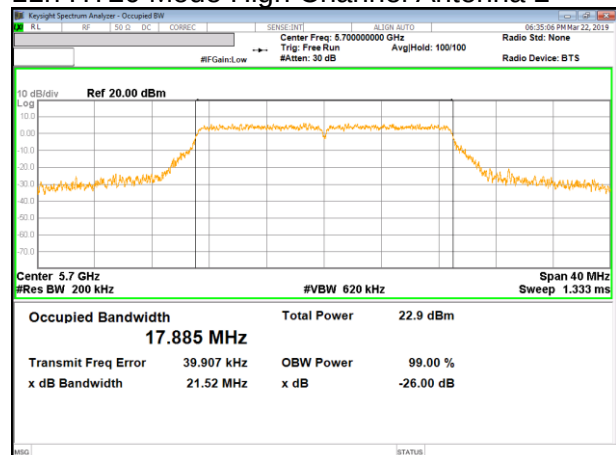
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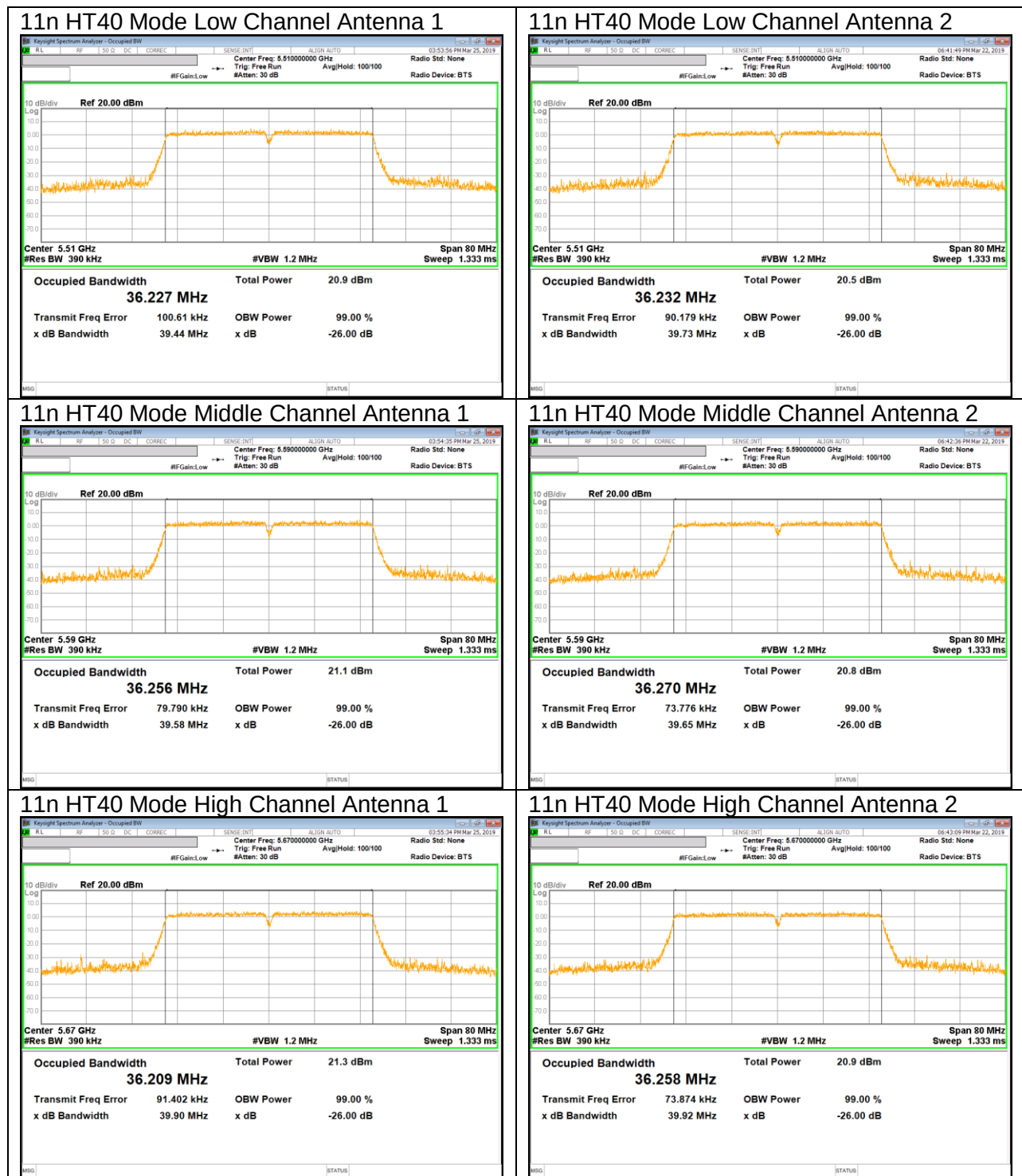
11n HT20 Mode High Channel Antenna 1



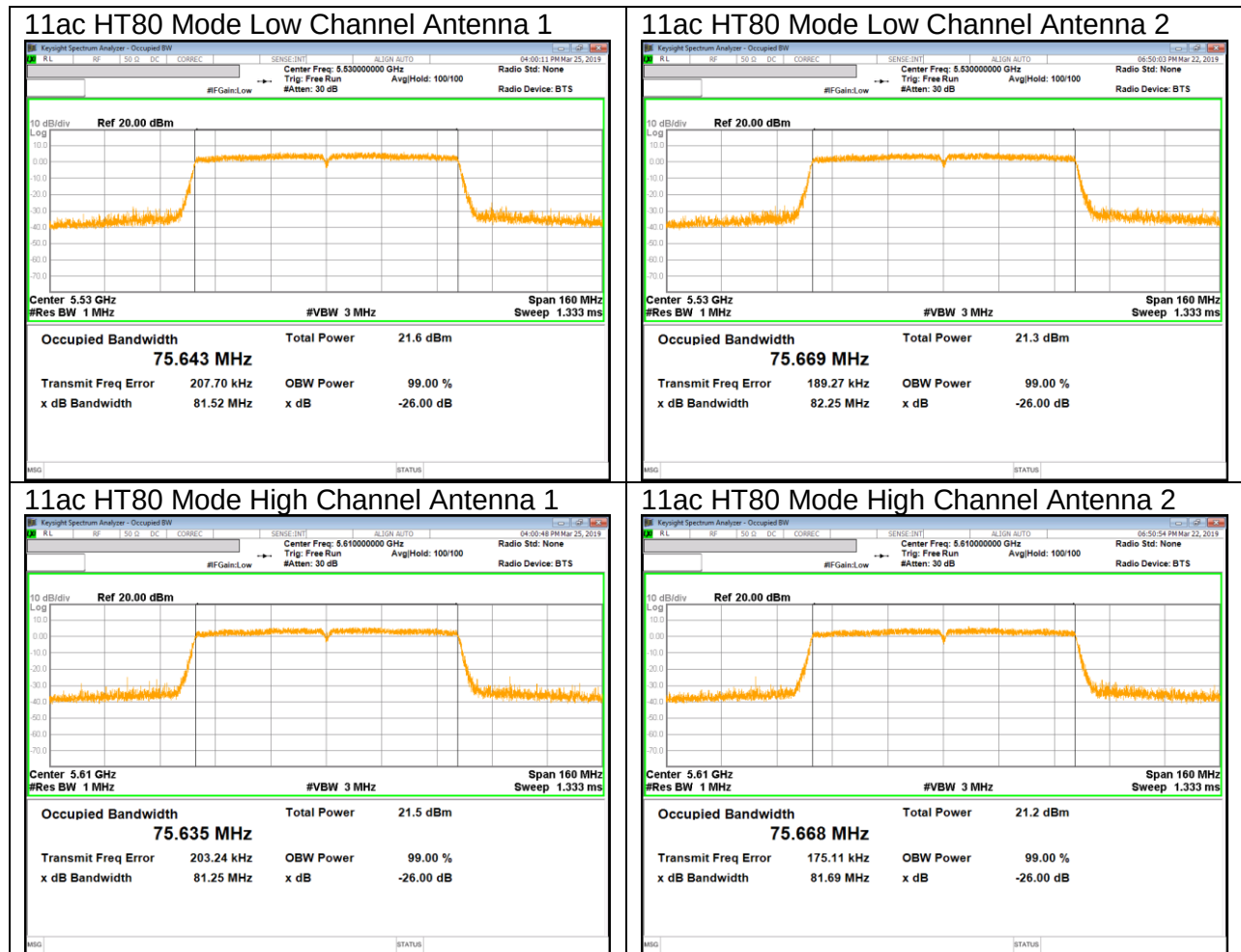
11n HT20 Mode High Channel Antenna 2



UNII 5.5 GHz IEEE 802.11n HT40 mode

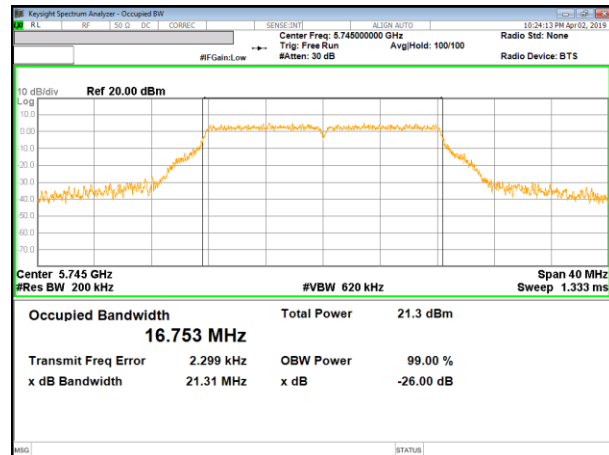


UNII 5.5 GHz IEEE 802.11ac VHT80 mode

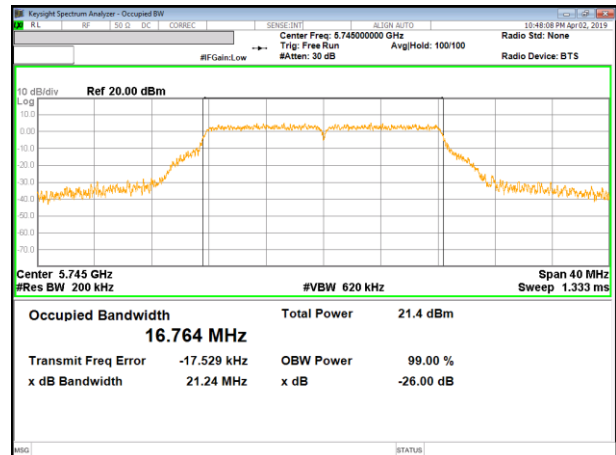


UNII 5.8 GHz IEEE 802.11a mode

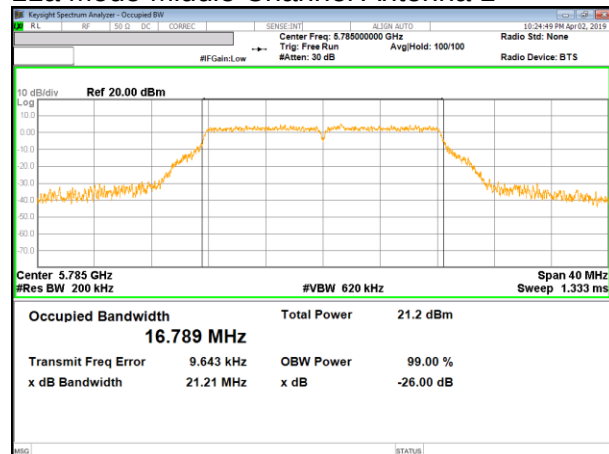
11a Mode Low Channel Antenna 1



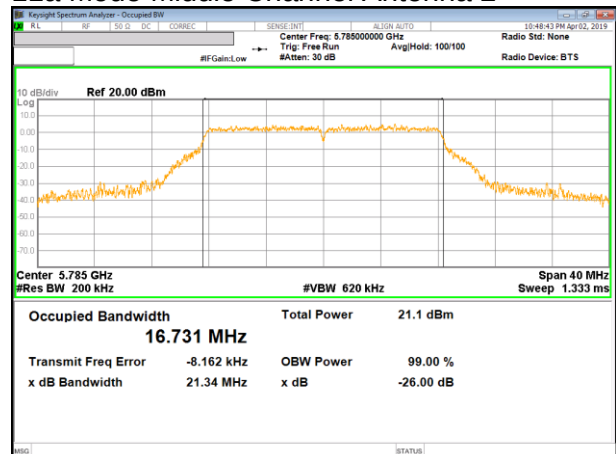
11a Mode Low Channel Antenna 2



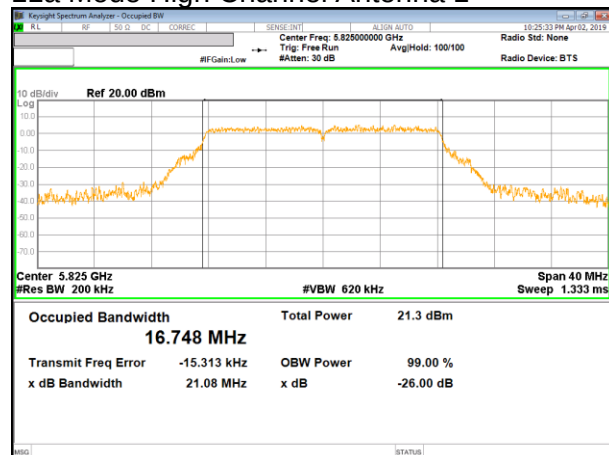
11a Mode Middle Channel Antenna 1



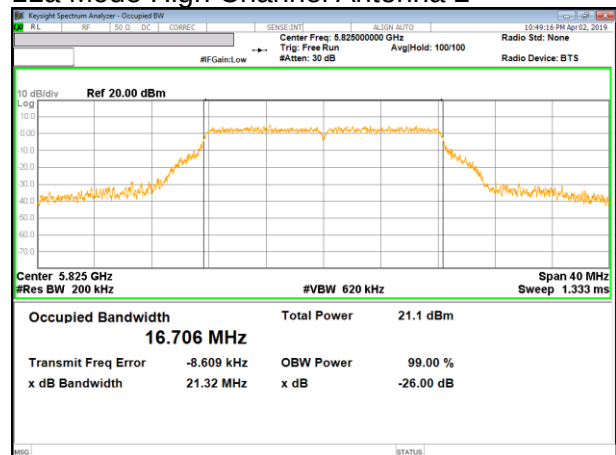
11a Mode Middle Channel Antenna 2



11a Mode High Channel Antenna 1

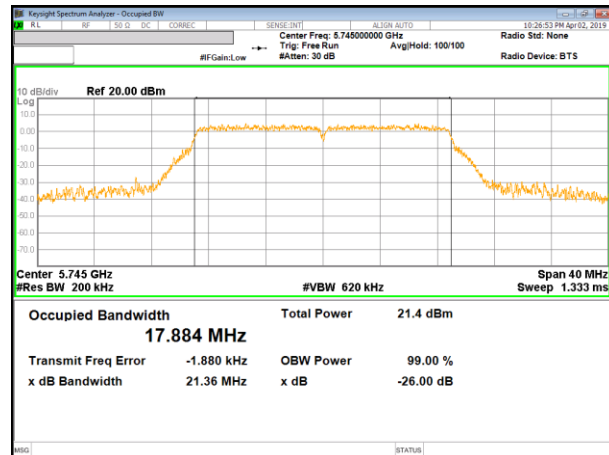


11a Mode High Channel Antenna 2

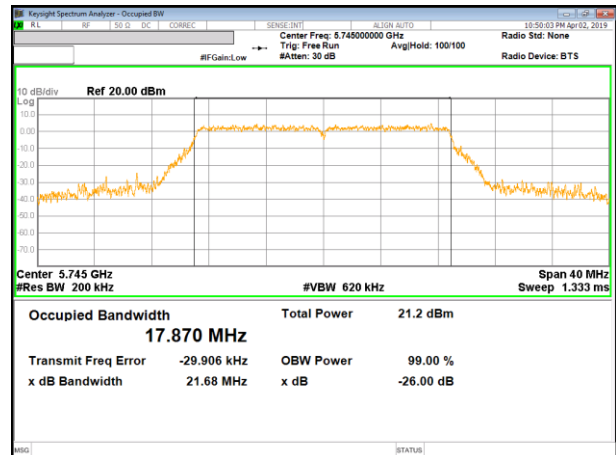


UNII 5.8 GHz IEEE 802.11n HT20 mode

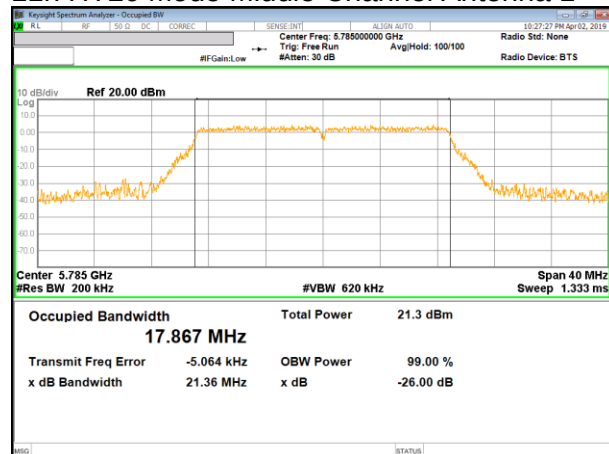
11n HT20 Mode Low Channel Antenna 1



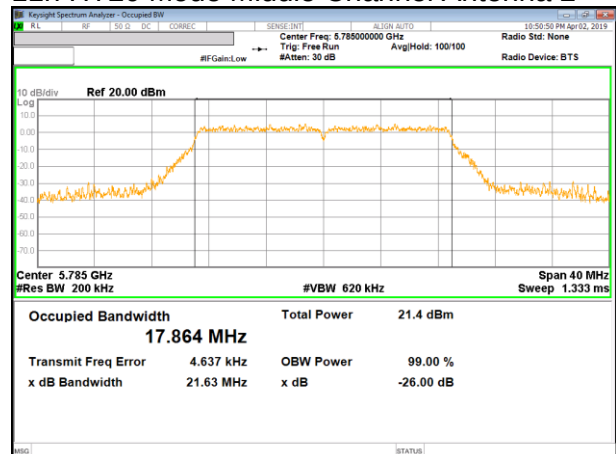
11n HT20 Mode Low Channel Antenna 2



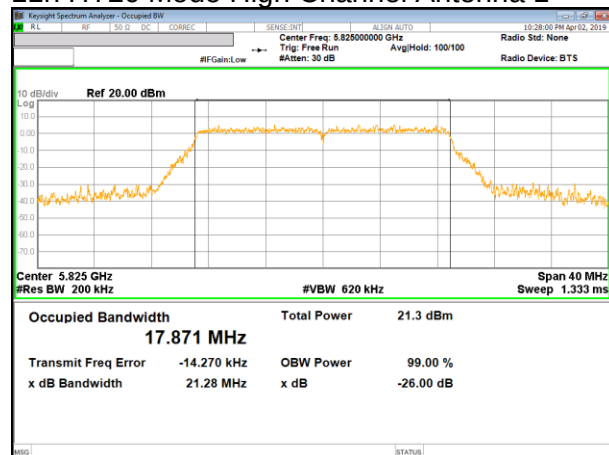
11n HT20 Mode Middle Channel Antenna 1



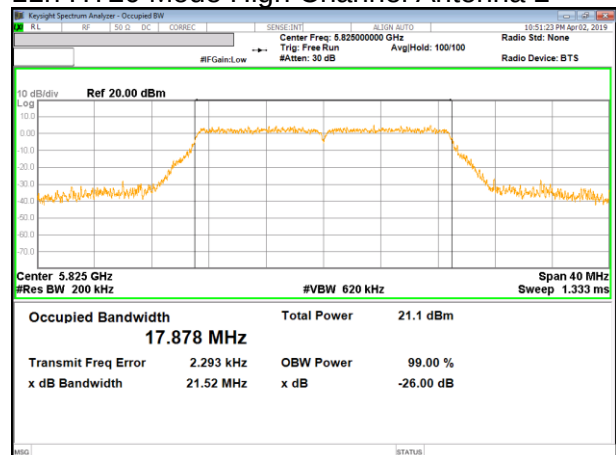
11n HT20 Mode Middle Channel Antenna 2



11n HT20 Mode High Channel Antenna 1

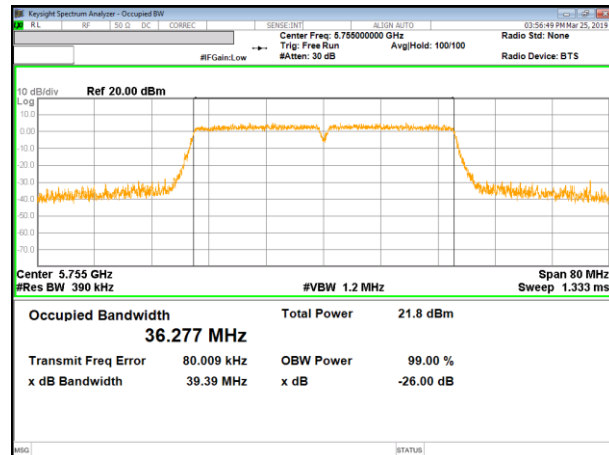


11n HT20 Mode High Channel Antenna 2

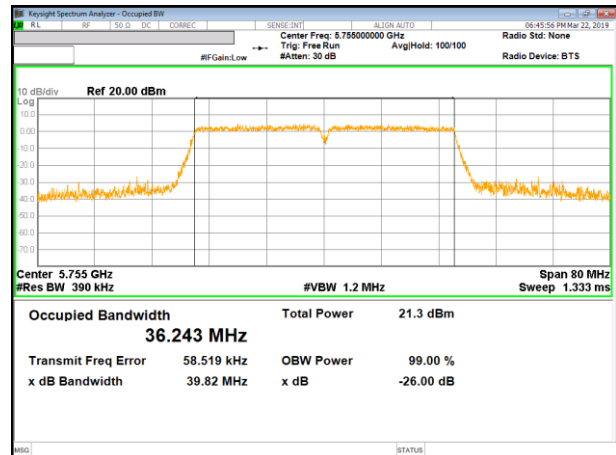


UNII 5.8 GHz IEEE 802.11n HT40 mode

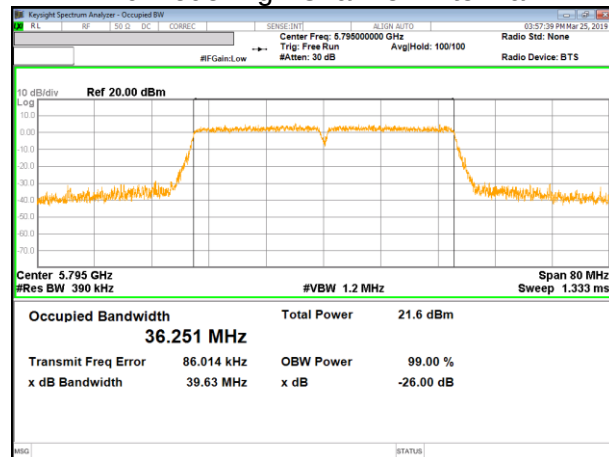
11n HT40 Mode Low Channel Antenna 1



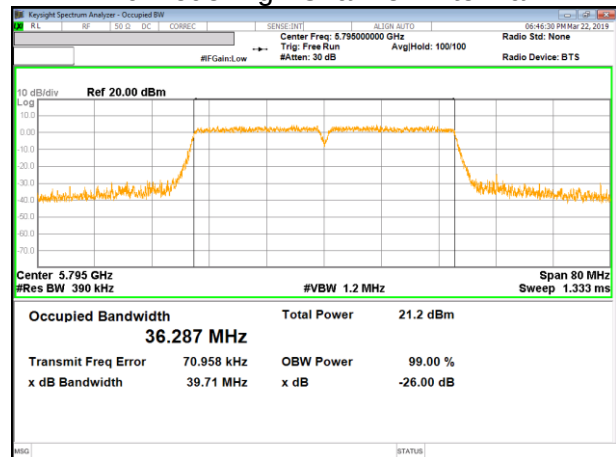
11n HT40 Mode Low Channel Antenna 2



11n HT40 Mode High Channel Antenna 1

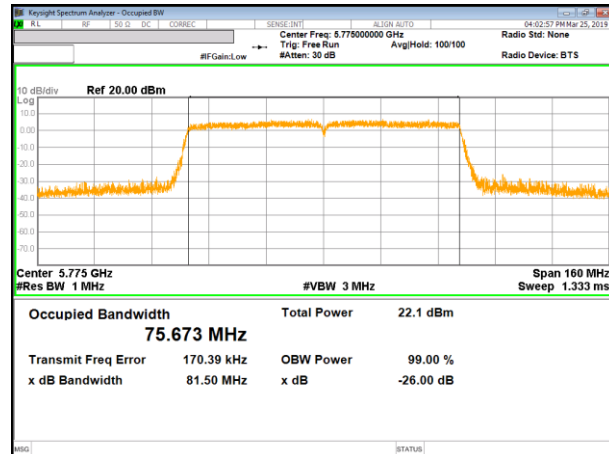


11n HT40 Mode High Channel Antenna 2

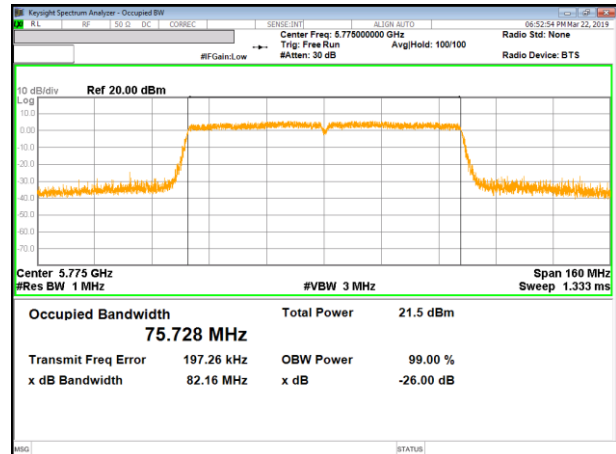


UNII 5.8 GHz IEEE 802.11ac VHT80 mode

11ac VHT80 Mode Middle Channel Antenna 1



11ac VHT80 Mode Middle Channel Antenna 2



9.4. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Reference to 789033 D02 General UNII Test Procedures New Rules v01r04: 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

9.4.1.802.11a MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5180	16.582	16.568
Mid	5200	16.590	16.571
High	5240	16.562	16.563
Worst		16.590	

9.4.2.802.11n HT20 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5180	17.780	17.780
Mid	5200	17.775	17.793
High	5240	17.786	17.755
Worst		17.793	

9.4.3.802.11n HT40 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5190	36.271	36.259
High	5230	36.192	36.212
Worst		36.271	

9.4.4. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Antenna 1	Antenna 2
Middle	5210	75.652	75.741
Worst		75.741	

9.4.5.802.11a MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5260	16.587	16.587
Mid	5300	16.560	16.595
High	5320	16.576	16.588
Worst		16.595	

9.4.6.802.11n HT20 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5260	17.786	17.788
Mid	5300	17.777	17.782
High	5320	17.774	17.756
Worst		17.788	

9.4.7.802.11n HT40 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5270	36.298	36.256
High	5310	36.254	36.272
Worst		36.298	

9.4.8. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Antenna 1	Antenna 2
Middle	5290	75.630	75.614
Worst		75.630	

9.4.9. 802.11a MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5500	16.565	16.586
Mid	5580	16.571	16.596
High	5700	16.558	16.586
Worst		16.596	

9.4.10. 802.11n HT20 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5500	17.765	17.778
Mid	5580	17.799	17.766
High	5700	17.782	17.726
Worst		17.799	

9.4.11. 802.11n HT40 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5510	36.276	36.192
Mid	5550	36.254	36.253
High	5670	36.248	36.182
Worst		36.276	

9.4.12. 802.11ac VHT80 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5530	75.633	75.650
High	5610	75.645	75.649
Worst		75.650	

9.4.13. 802.11a MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5745	16.541	16.580
Mid	5785	16.568	16.567
High	5825	16.567	16.573
Worst		16.580	

9.4.14. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5745	17.776	17.765
Mid	5785	17.767	17.783
High	5825	17.760	17.764
Worst		17.783	

9.4.15. 802.11n HT40 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Antenna 1	Antenna 2
Low	5755	36.286	36.255
High	5795	36.270	36.280
Worst		36.286	

9.4.16. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Antenna 1	Antenna 2
Middle	5775	75.639	75.577
Worst		75.639	