



FCC 47 CFR PART 15 SUBPART E

UNII 802.11a/n/ac

CERTIFICATION TEST REPORT

FOR

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

MODEL NUMBER : SM-N975F/DS, SM-N975F, SM-N975X

FCC ID: A3LSMN975F

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

Prepared by
UL Korea, Ltd.
26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea

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



ACCREDITED*

Testing
Laboratory

TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	06/27/19	Initial issue	Hyunsik Yun
V2	06/28/19	Update to address TCB's question	Hyunsik Yun

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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/ax, ANT+, NFC and WPT

MODEL NUMBER: SM-N975F/DS, SM-N975F, SM-N975X

SERIAL NUMBER: R3CM506PPMB (CONDUCTED, Original);
R3CM506PPBA, R3CM506PPKV, cea741c773197e35, R3CM506Q9KN
R3CM506Q9KN, R3CM506Q9BW, R3CM506Q51T
(RADIATED, Original);
R38M50ASH5W, R38M50ASJ7A (Spot check);

DATE TESTED: MAY 13, 2019 – JUN 17, 2019(Original);
JUN 21, 2019 – JUN 26, 2019(Spot check);

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:

Tested By:



SungGil Park
Suwon Lab Engineer
UL Korea, Ltd.



HyunSik Yun
Suwon Lab Engineer
UL Korea, Ltd.

1.1. INTRODUCTION OF TEST DATA REUSE

This report referenced from the FCC ID: A3LSMN976B NII WLAN(FCC CFR 47 Part 15E). And the applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID.

1.2. DIFFERENCE

The FCC ID: A3LSMN975F shares the same enclosure and circuit board as FCC ID: A3LSMN976B. The WLAN antennas and surrounding circuitry and layout are identical between these two units.

After confirming through preliminary radiated emissions that the performance of the FCC ID: A3LSMN976B remains representative of FCC ID: A3LSMN975F. The test data of FCC ID: A3LSMN976B being submitted for this application to cover WLAN features.

1.3. SPOT CHECK VERIFICATION DATA (Worst case of the radiated spurious and band edge emissions)

Band	Test Item	Mode	Fundamental Frequency	Test Limit	Original model	Spot check model	Deviation	Remark
					SM-N976B	SM-N975F/DS		
					FCC ID : A3LSMN976B	FCC ID : A3LSMN975F		
UNII WLAN (5 GHz)	Band Edge	802.11n_HT40_ANT_ALL	5190 MHz	54 dBuV/m	46.38 dBuV/m	45.47 dBuV/m	-0.91 dB	
	RSE	802.11a_ANT_ALL	5240 MHz	68.2 dBuV/m	55.49 dBuV/m	56.82 dBuV/m	1.33 dB	2nd Harmonic
	Band Edge	802.11n_HT40_ANT_ALL	5310 MHz	54 dBuV/m	44.46 dBuV/m	47.15 dBuV/m	2.69 dB	
	RSE	802.11n_HT20_ANT_ALL	5320 MHz	54 dBuV/m	48.64 dBuV/m	47.59 dBuV/m	-1.05 dB	2nd Harmonic
	Band Edge	802.11n_HT20_ANT_ALL	5700 MHz	68.2 dBuV/m	60.76 dBuV/m	58.27 dBuV/m	-2.49 dB	
	RSE	802.11a_ANT_ALL	5500 MHz	54 dBuV/m	46.22 dBuV/m	45.04 dBuV/m	-1.18 dB	2nd Harmonic
	Band Edge	802.11n_HT40_ANT_ALL	5795 MHz	-27 dBm	-38.15 dBm	-32.63 dBm	5.52 dB	Noise Floor level
	RSE	802.11a_ANT_ALL	5745 MHz	54 dBuV/m	42.63 dBuV/m	40.89 dBuV/m	-1.74 dB	2nd Harmonic

Comparison of two models, upper deviation is within 3dB range and all test results are under FCC Technical Limits.

1.4. REFERENCE DETAIL

Reference application that contains the reused reference data in the individual test reports:

Equipment Class	Reference FCC ID (Parent)	Application Type	Reference Test report number	Exhibit Type	Variant Test Report Number	Data Re-used
PCE	A3LSMN976B	Original Grant	4789009800-E2	Test Report	4789067225-E2	All
			4789009800-E3	Test Report	4789067225-E3	All
DTS	A3LSMN976B	Original Grant	4789009800-E5 (802.11b/g/n)	Test Report	4789067225-E5 (802.11b/g/n)	All
			4789009800-E6 (802.11ax)	Test Report	4789067225-E6 (802.11ax)	All
			4789009800-E4 Bluetooth LE	Test Report	4789067225-E4 Bluetooth LE	All
DSS	A3LSMN976B	Original Grant	4789009800-E7 (Bluetooth)	Test Report	4789067225-E7 (Bluetooth)	All
NII	A3LSMN976B	Original Grant	4789009800-E8 (802.11a/n/ac)	Test Report	4789067225-E8 (802.11a/n/ac)	All
			4789009800-E9 (802.11ax)	Test Report	4789067225-E9 (802.11ax)	All
DXX	A3LSMN976B	Original Grant	4789009800-E10 (ANT+)	Test Report	4789067225-E10 (ANT+)	All
			4789009800-E11 (NFC)	Test Report	4789067225-E11 (NFC)	All
DCD	A3LSMN976B	Original Grant	4789009800-E12 (WPT)	Test Report	4789067225-E12 (WPT)	All

For this application the data reuse is summarized below for each equipment class:

Equipment Class	Reference FCC ID (Parent)	Application Type	Data Re-used
PCE	A3LSMN976B	Original Grant	All except SAR (full test), HAC (full test)
			All except SAR (full test), HAC (full test)
DTS	A3LSMN976B	Original Grant	All except SAR (full test), HAC (full test)
			All except SAR (full test), HAC (full test)
			All
DSS	A3LSMN976B	Original Grant	All except SAR (full test)
NII	A3LSMN976B	Original Grant	All except SAR (full test), HAC (full test)
			All except SAR (full test), HAC (full test)
DXX	A3LSMN976B	Original Grant	All
			All
DCD	A3LSMN976B	Original Grant	All except RF exposure

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.
8. KDB 484596 D01 Referencing Test Data v01

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, 30 MHz to 1 GHz	3.86 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.97 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.57 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/ax, ANT+, NFC and WPT. This test report addresses the NII (UNII 802.11a/n/ac) operational mode.

WiFi operating mode

Frequency Range	Mode	Antenna1	Antenna2
2.4GHz	802.11 b	TX/RX	TX/RX
	802.11 g	TX/RX	TX/RX
	802.11 g MIMO	TX/RX	TX/RX
	802.11 n	TX/RX	TX/RX
	802.11 n MIMO	TX/RX	TX/RX
	802.11 ax	TX/RX	TX/RX
	802.11 ax MIMO	TX/RX	TX/RX
5GHz	802.11 a	TX/RX	TX/RX
	802.11 a MIMO	TX/RX	TX/RX
	802.11 n	TX/RX	TX/RX
	802.11 n MIMO	TX/RX	TX/RX
	802.11 ac	TX/RX	TX/RX
	802.11 ac MIMO	TX/RX	TX/RX
	802.11 ax	TX/RX	TX/RX
	802.11 ax MIMO	TX/RX	TX/RX

Simultaneous TX Condition

Simultaneous Tx condition - **RSDB**

Mode	# of TX	5GHz		2.4GHz		Test Case
		Ant1	Ant2	Ant1	Ant2	
2.4GHz + 5GHz RSDB Only	2	A	-	-	B	V
	2	-	A	B	-	V
	2	A	-	B	-	-
	2	-	A	-	B	-
2.4GHz + 5GHz RSDB & MIMO	3	A	A	B	-	-
	3	A	A	-	B	-
	3	A	-	B	B	-
	3	-	A	B	B	-
2.4GHz + 5GHz RSDB MIMO	4	A	A	B	B	V

Simultaneous Tx condition - **Bluetooth with 5 GHz WLAN(not RSDB)**

Mode	# of TX	5GHz WLAN		2.4GHz Bluetooth	Test Case
		Ant1	Ant2	Ant1	
2.4GHz Bluetooth +5GHz WLAN (Not RSDB)	2	A	-	B	-
	2	-	A	B	-
	3	A		B	V

Spurious Emissions for Simultaneous Transmission were reported on the UNII 802.11ax test report(4789009800-E9) section 11.9.

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	18.75		74.99	
	802.11n HT20 MIMO	18.74		74.82	
5190 - 5230	802.11n HT40 MIMO	17.04		50.58	
5210	802.11ac VHT80 MIMO	16.47		44.36	
5260 - 5320	802.11a MIMO	18.85		76.74	
	802.11n HT20 MIMO	18.82		76.21	
5270 - 5310	802.11n HT40 MIMO	17.52		56.49	
5290	802.11ac VHT80 MIMO	16.44		44.06	
5500 - 5720	802.11a MIMO	18.52		71.12	
	802.11n HT20 MIMO	18.55		71.61	
5510 - 5710	802.11n HT40 MIMO	17.64		58.08	
5530 - 5690	802.11ac VHT80 MIMO	16.56		45.29	
5745 - 5825	802.11a MIMO	18.40		69.18	
	802.11n HT20 MIMO	18.42		69.50	
5755 - 5795	802.11n HT40 MIMO	17.64		58.08	
5775	802.11ac VHT80 MIMO	16.32		42.85	

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	-6.25	-6.21
UNII 2A 5250 ~ 5350	-6.44	-6.29
UNII 2C 5470 ~ 5725	-7.01	-6.15
UNII 3 5725 ~ 5850	-6.10	-6.32

WIFI1 and WIFI2 as indicated in antenna specification are written as ANT1 (Antenna 1) and ANT2 (Antenna 2) in this report.

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	802.11n HT20 1TX	802.11n HT20 2TX CDD
5180 - 5240	802.11n HT20 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 (Radiated Testing)		
Frequency Range [MHz]	Mode	Covered by
5260 - 5320	802.11a legacy 1TX/CDD 2TX	802.11a 2TX CDD
5260 - 5320	802.11n HT20 1TX	802.11n HT20 2TX CDD
5260 - 5320	802.11n HT20 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 (Radiated Testing)		
Frequency Range [MHz]	Mode	Covered by
5500 - 5720	802.11a legacy 1TX/CDD 2TX	802.11a 2TX CDD
5500 - 5720	802.11n HT20 1TX	802.11n HT20 2TX CDD
5500 - 5720	802.11n HT20 2TX SDM/CDD	802.11n HT20 2TX CDD
5500 - 5720	802.11ac VHT20 1TX	802.11n HT20 2TX CDD
5500 - 5720	802.11ac VHT20 2TX SDM/CDD	802.11n HT20 2TX CDD
5510 - 5710	802.11n HT40 1TX	802.11n HT40 2TX CDD
5510 - 5710	802.11n HT40 2TX SDM/CDD	802.11n HT40 2TX CDD
5510 - 5710	802.11ac VHT40 1TX	802.11n HT40 2TX CDD
5510 - 5710	802.11ac VHT40 2TX SDM/CDD	802.11n HT40 2TX CDD
5530 - 5690	802.11ac VHT80 1TX	802.11ac VHT80 2TX CDD
5530 - 5690	802.11ac VHT80 2TX 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	802.11n HT20 1TX	802.11n HT20 2TX CDD
5745 - 5825	802.11n HT20 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.

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

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

802.11a mode: 6 Mbps (1Tx)
802.11a mode: 6 Mbps (2Tx CDD)
802.11n HT20mode: MCS0 (1Tx)
802.11n HT20mode: MCS0 (2Tx CDD)
802.11n HT40mode: MCS0 (1Tx)
802.11n HT40mode: MCS0 (2Tx CDD)
802.11ac VHT80mode: MCS0 (1Tx)
802.11ac VHT80mode: MCS0 (2Tx CDD)

The spot-check was performed for both SISO and MIMO mode, and it was determined that the MIMO mode is worst than SISO mode. Therefore, all testing was performed with MIMO mode.

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

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	R37M55W0ZE1SE3	N/A
Data Cable	SAMSUNG	EP-DG977	N/A	N/A

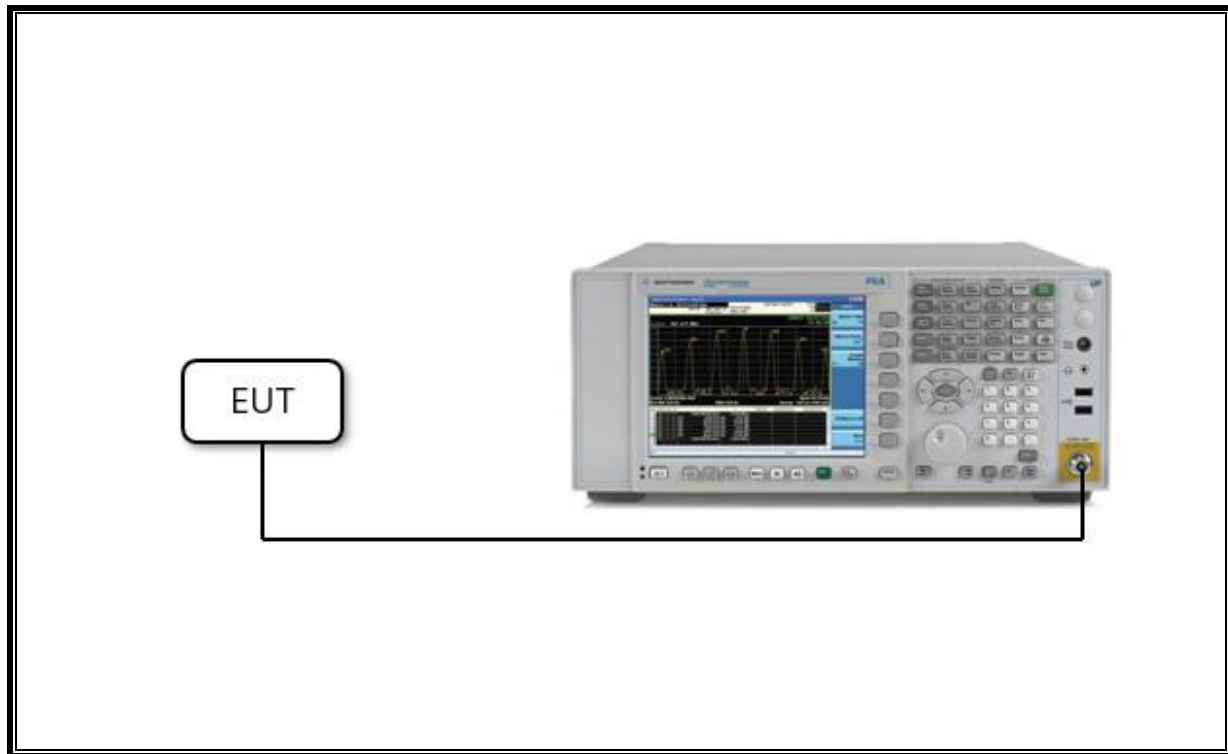
I/O CABLE

I/O Cable List						
Cable No.	Port	# of identical	Connector	Cable	Cable	Remarks
1	DC Power	1	C Type	Shielded	1.1m	N/A

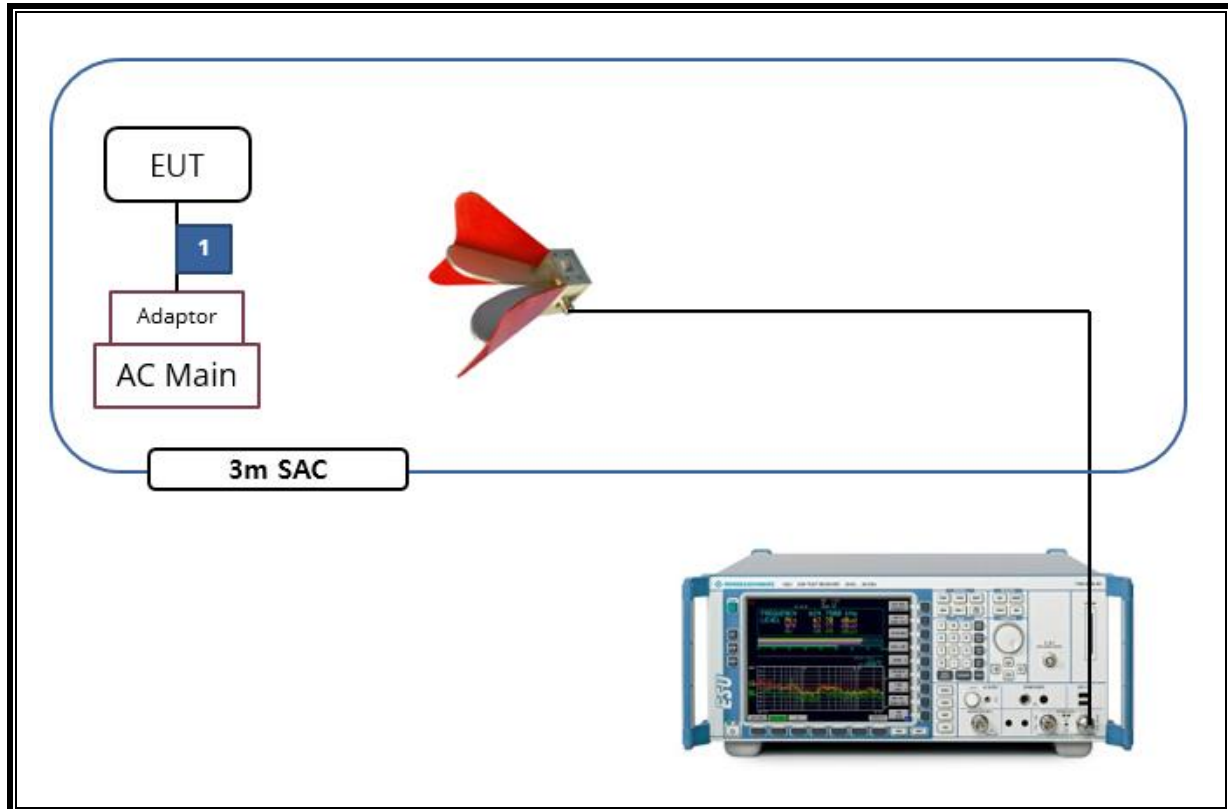
TEST SETUP

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	12-04-19
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	08-09-19
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(26dB BW)		PASS
15.407 (a)(3)	TX Cond. Power 5.725-5.825	< 30dBm		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 II.B.

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

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

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

Conducted Output Power : KDB 789033 D02 v02r01, Section II.E.3.b(Method PM-G)

Conducted Output Power for Straddle Channel (ch144/142/138 for 20/40/80MHz BW):

KDB 789033 D02 v02r01, Section II.E.2.b(Method SA-1)

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

Unwanted emissions in restricted bands : KDB 789033 D02 v02r01, Section II.G.3 – II.G.6.

Unwanted emissions in non-restricted bands : KDB 789033 D02 v02r01, Section II.G.3 – II.G.6.

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	5.483	5.582	0.982	98.2%	0.00	0.010
802.11n HT20	5.079	5.179	0.981	98.1%	0.00	0.010
802.11n HT40	5.480	5.579	0.982	98.2%	0.00	0.010
802.11ac VHT80	5.228	5.328	0.981	98.1%	0.00	0.010

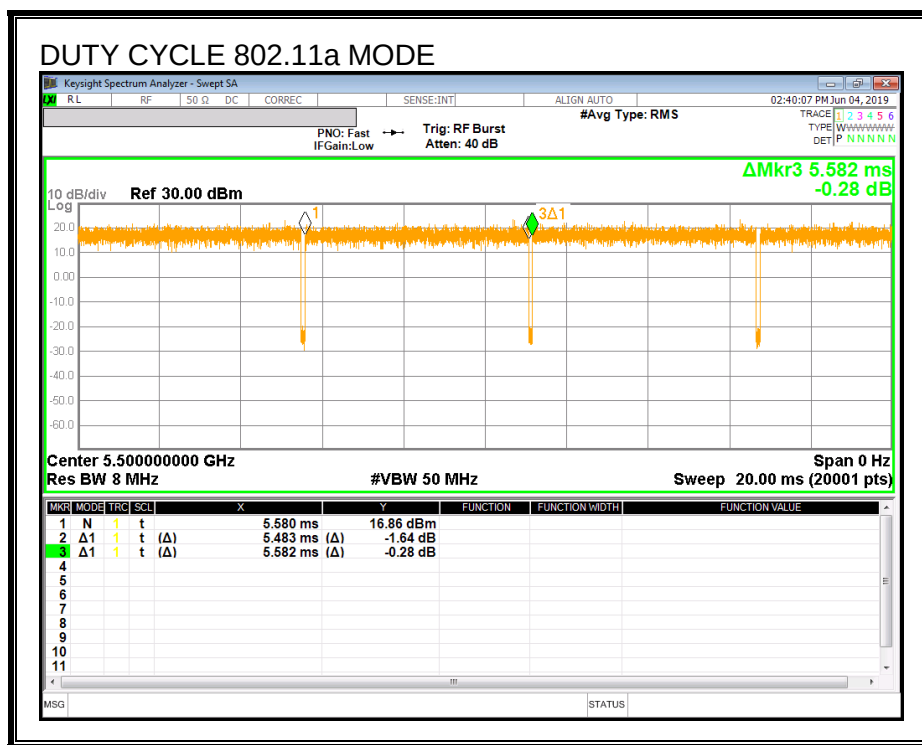
LIMITS

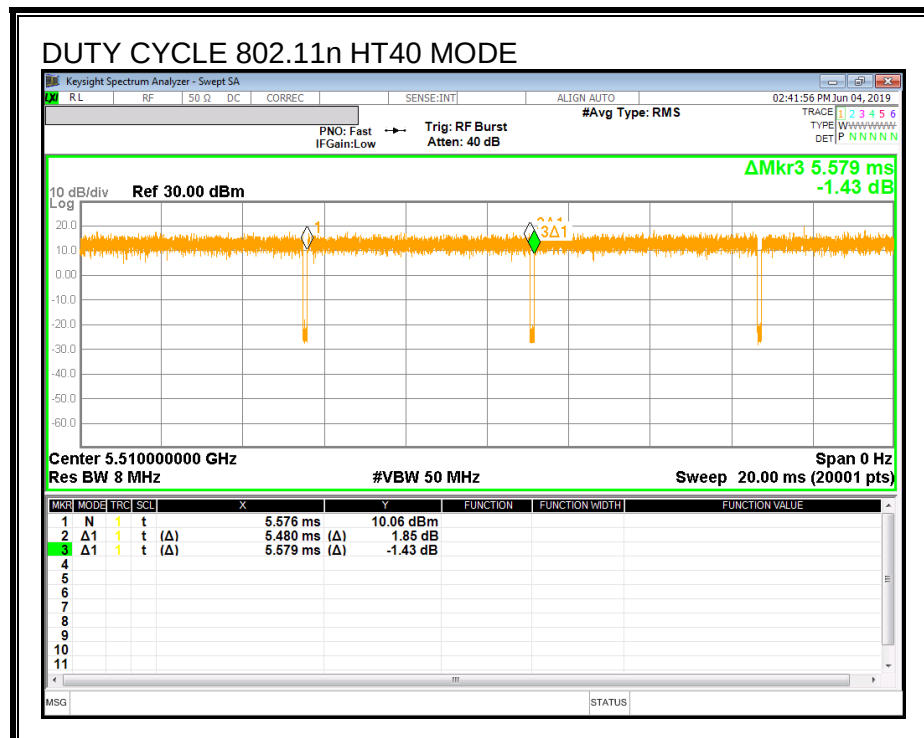
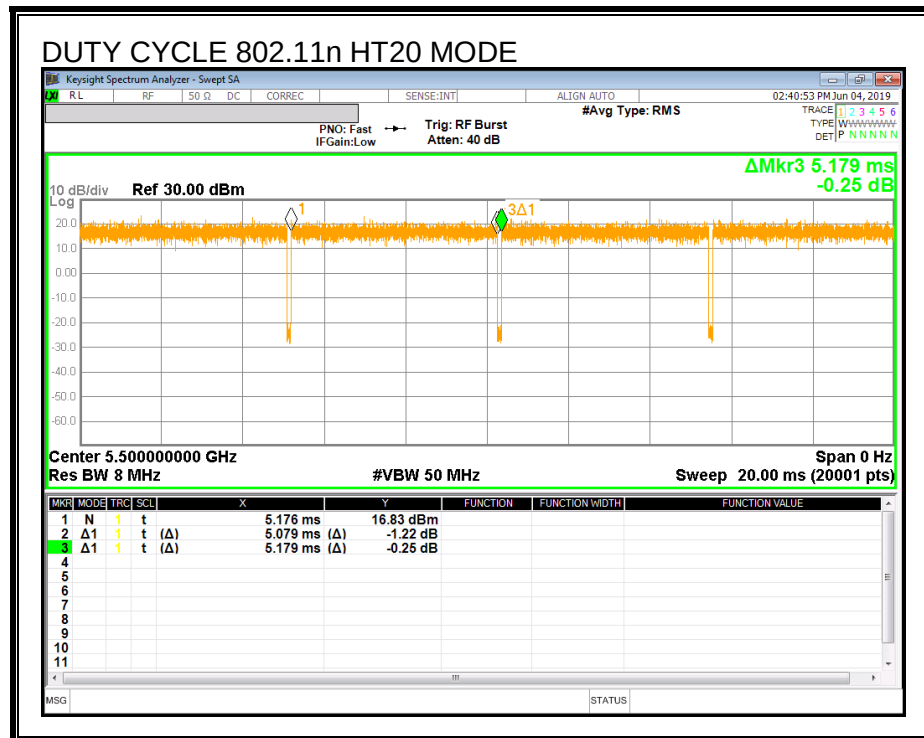
None; for reporting purposes only.

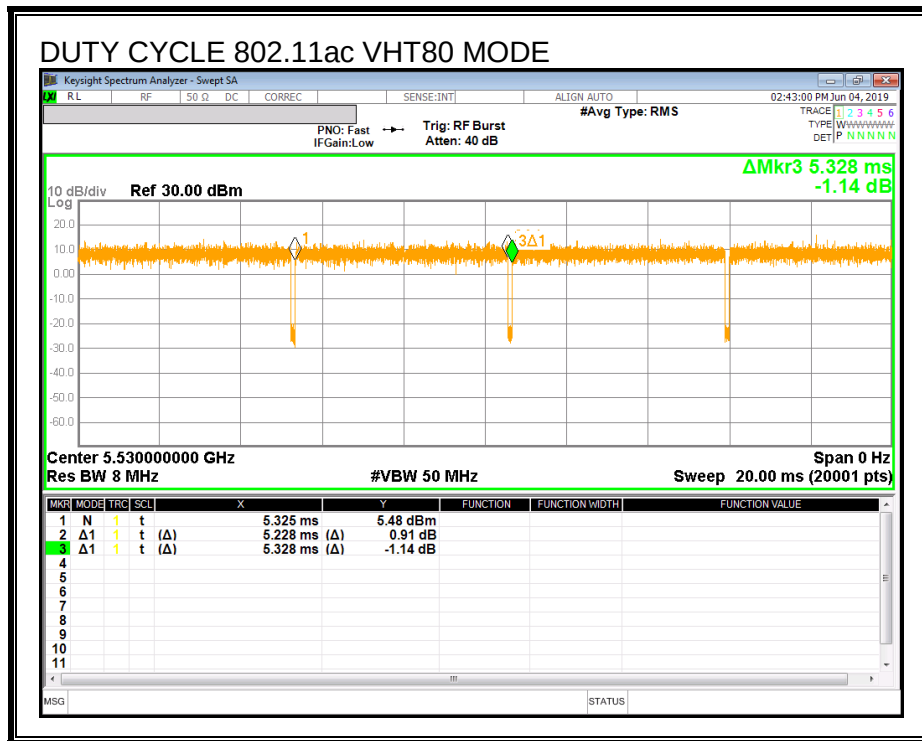
PROCEDURE

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.

NOTE

- Calculation for 26dB Bandwidth of UNII-2C and UNII-3 Straddle Channel

ex) Fundamental frequency : 5720MHz

- 26dB BW : 20.58MHz
- Turning Frequency : 5725MHz
- 26dB Bandwidth of UNII-2C band Portion
 $= (5725 - (5720 - (20.58 / 2))) = 15.29 \text{ MHz}$
- 26dB Bandwidth of UNII-3 band Portion
 $= (5720 + (20.58 / 2) - 5725) = 5.29 \text{ MHz}$

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	21.39	21.28
Mid	5200	21.21	21.33
High	5240	21.29	21.05
Worst		21.39	

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	21.33	21.43
Mid	5200	21.40	21.60
High	5240	21.44	21.41
Worst		21.60	

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	39.35	39.91
High	5230	39.63	39.98
Worst		39.98	

9.3.4. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Mid	5210	81.63	82.09
Worst		82.09	

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	21.20	21.23
Mid	5300	21.18	21.38
High	5320	21.24	21.37
Worst		21.38	

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	21.51	21.27
Mid	5300	21.34	21.41
High	5320	21.33	21.53
Worst		21.53	

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	40.01	39.69
High	5310	40.11	39.80
Worst		40.11	

9.3.8. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Mid	5290	81.78	81.06
Worst		81.78	

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	21.20	21.39
Mid	5580	21.26	21.26
High	5700	21.12	21.21
Straddle	5720	15.63	15.62
Worst		21.39	

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	21.34	21.37
Mid	5580	21.60	21.40
High	5700	21.36	21.35
Straddle	5720	15.78	15.73
Worst		21.60	

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	39.67	39.89
Mid	5590	39.52	39.86
High	5670	39.65	39.60
Straddle	5710	34.93	34.78
Worst		39.89	

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	81.35	81.25
High	5610	81.88	81.45
Straddle	5690	75.96	75.69
Worst		81.88	

9.3.13. 802.11a MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Straddle	5720	5.63	5.62
Low	5745	21.46	21.29
Mid	5785	21.32	21.09
High	5825	21.30	21.08
Worst		21.46	

9.3.14. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Straddle	5720	5.78	5.73
Low	5745	21.56	21.53
Mid	5785	21.58	21.23
High	5825	21.36	21.60
Worst		21.60	

9.3.15. 802.11n HT40 MODE IN THE 5.8 GHz BAND

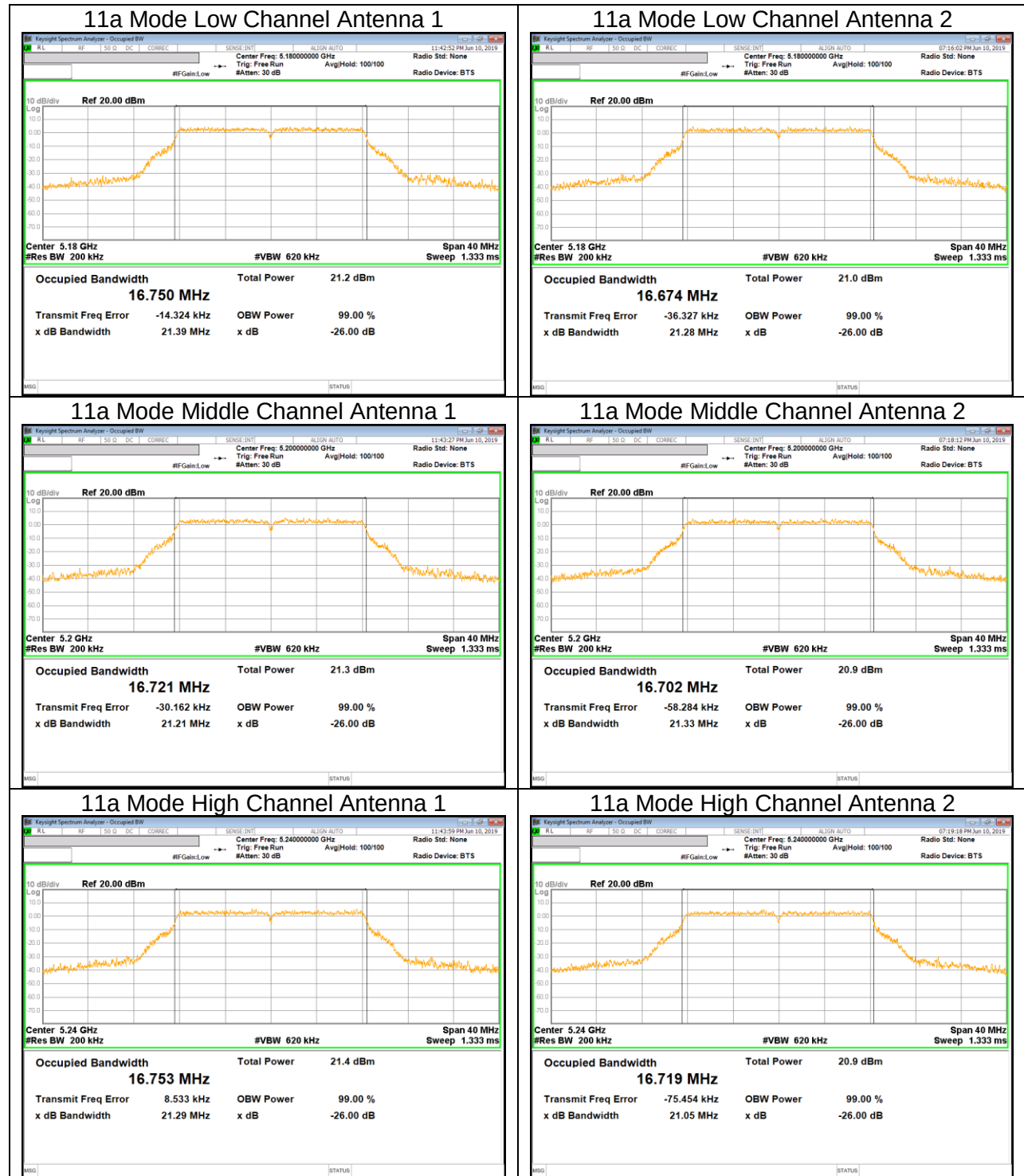
Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Straddle	5710	4.93	4.78
Low	5755	39.81	39.73
High	5795	39.89	39.35
Worst		39.89	

9.3.16. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

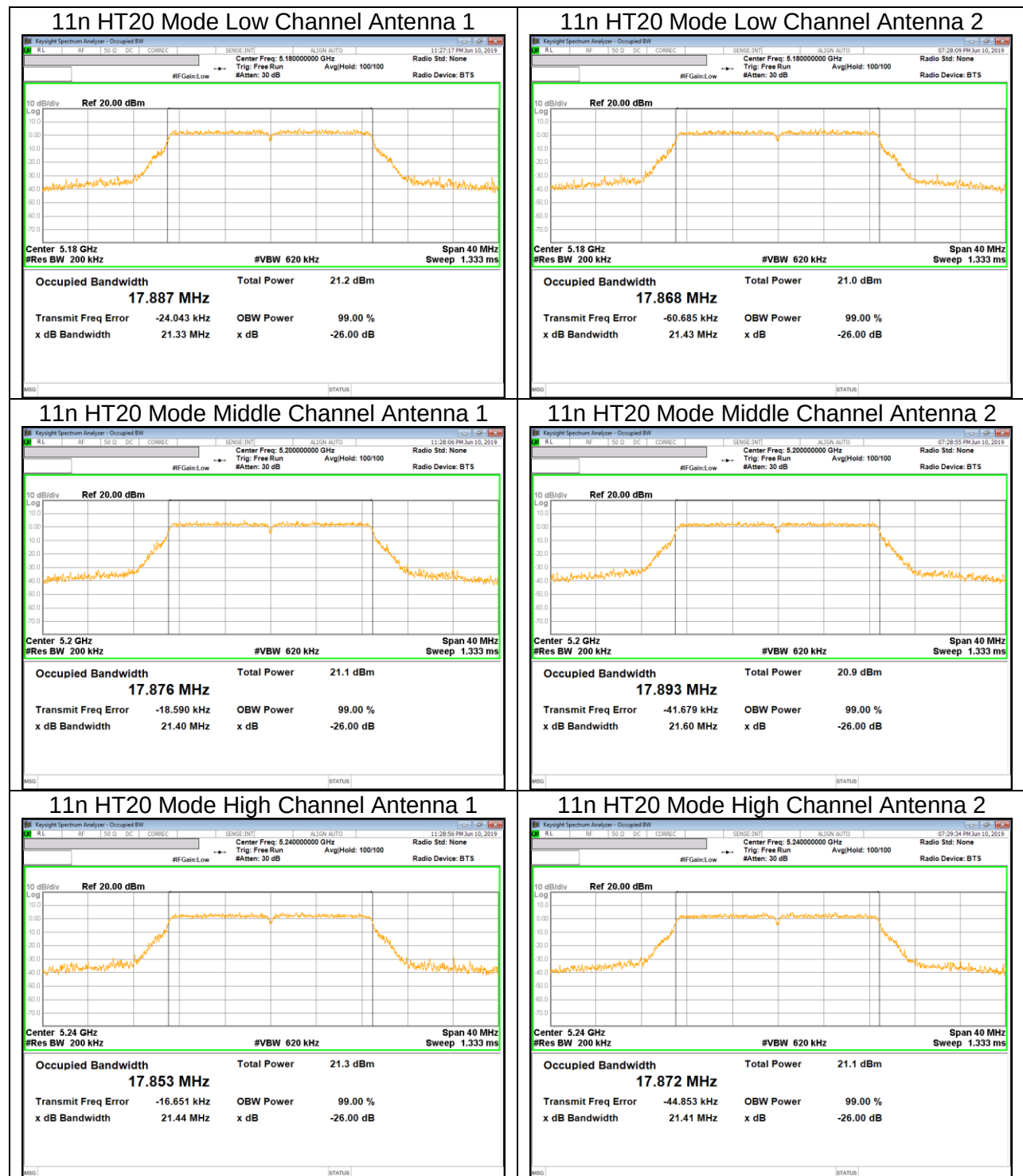
Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Antenna 1	Antenna 2
Straddle	5690	5.96	5.69
Middle	5775	81.81	82.42
Worst		82.42	

9.3.17. 26 dB BANDWIDTH PLOTS

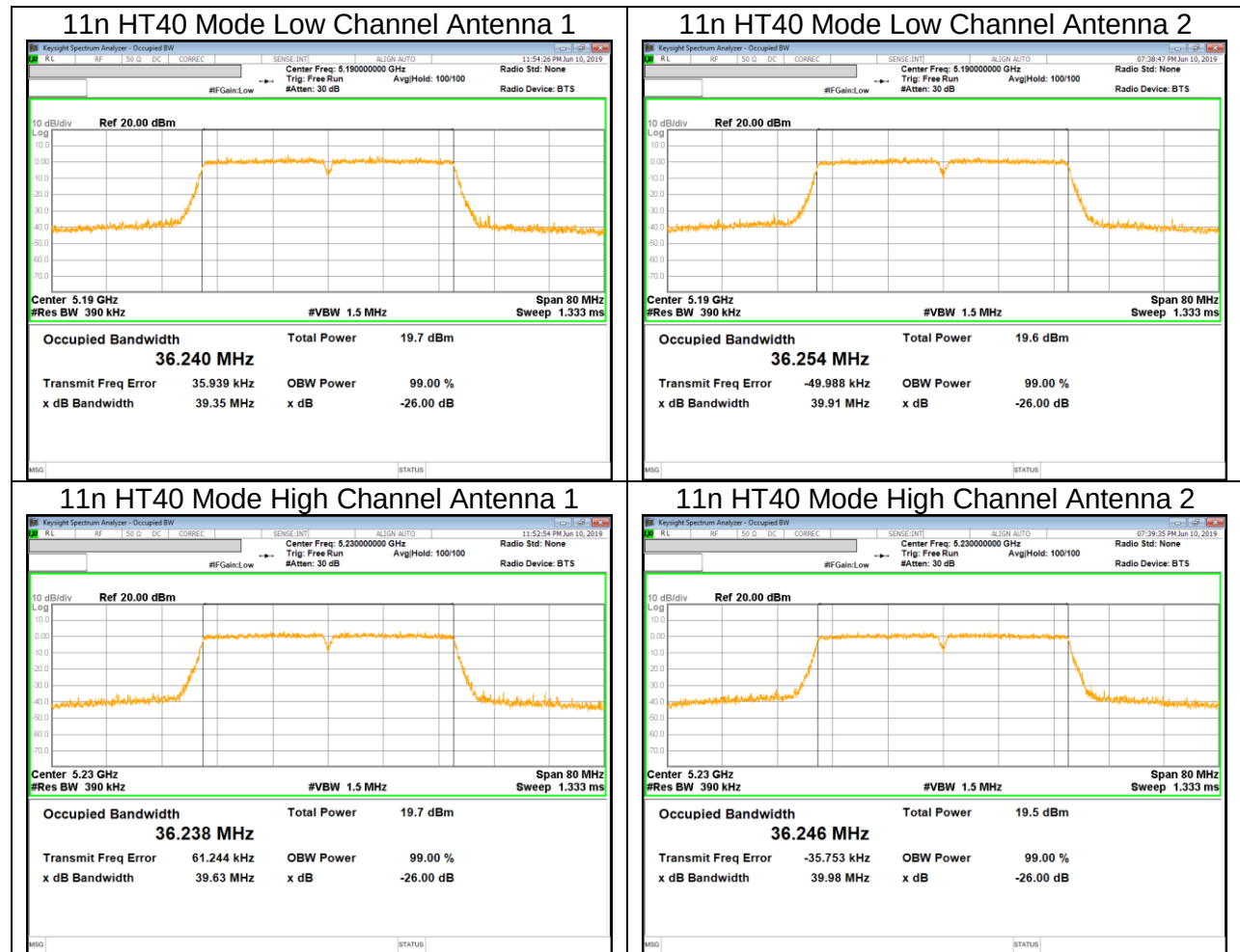
UNII 5.2 GHz IEEE 802.11a mode



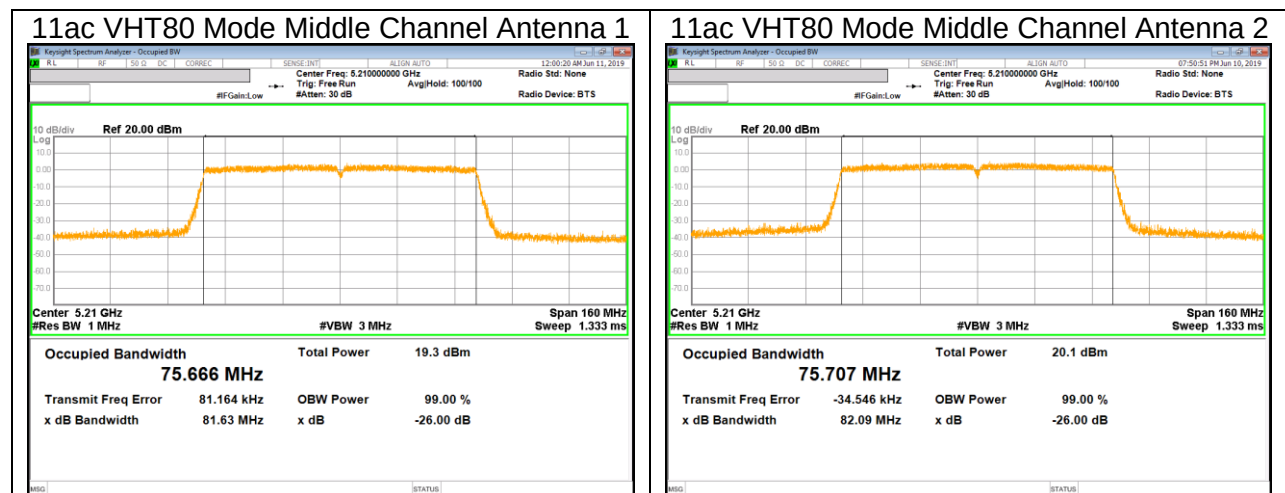
UNII 5.2 GHz IEEE 802.11n HT20 mode



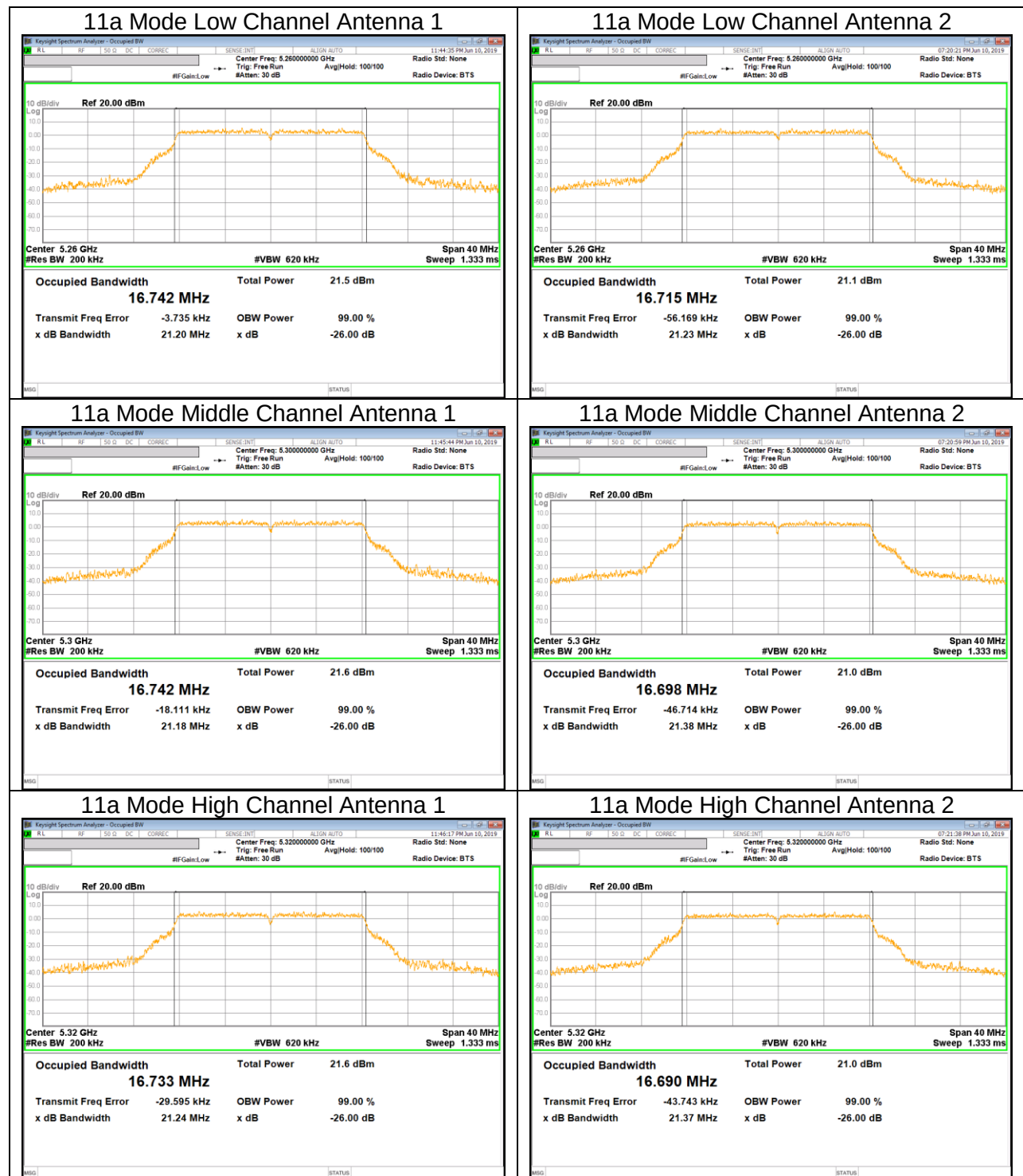
UNII 5.2 GHz IEEE 802.11n HT40 mode



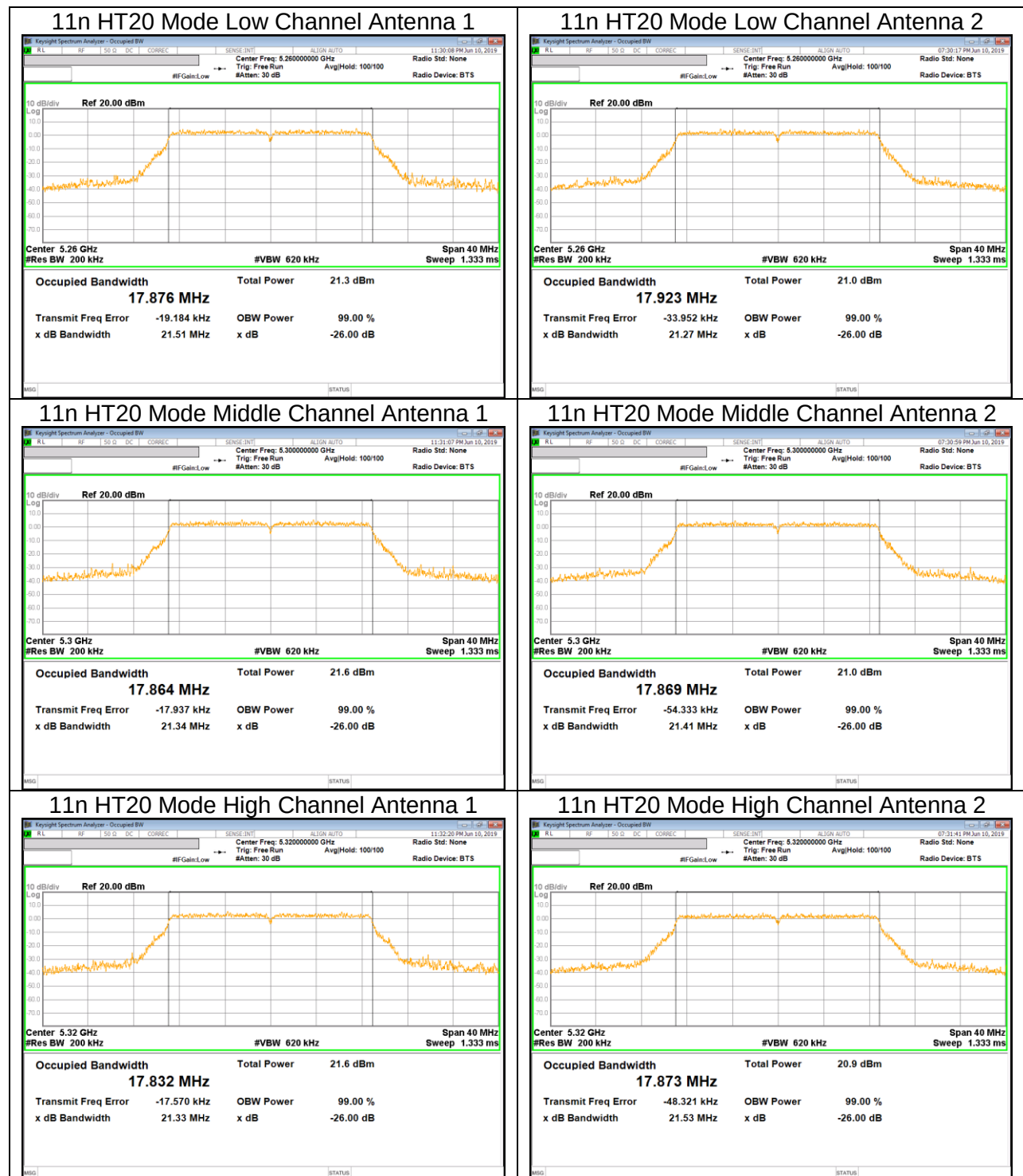
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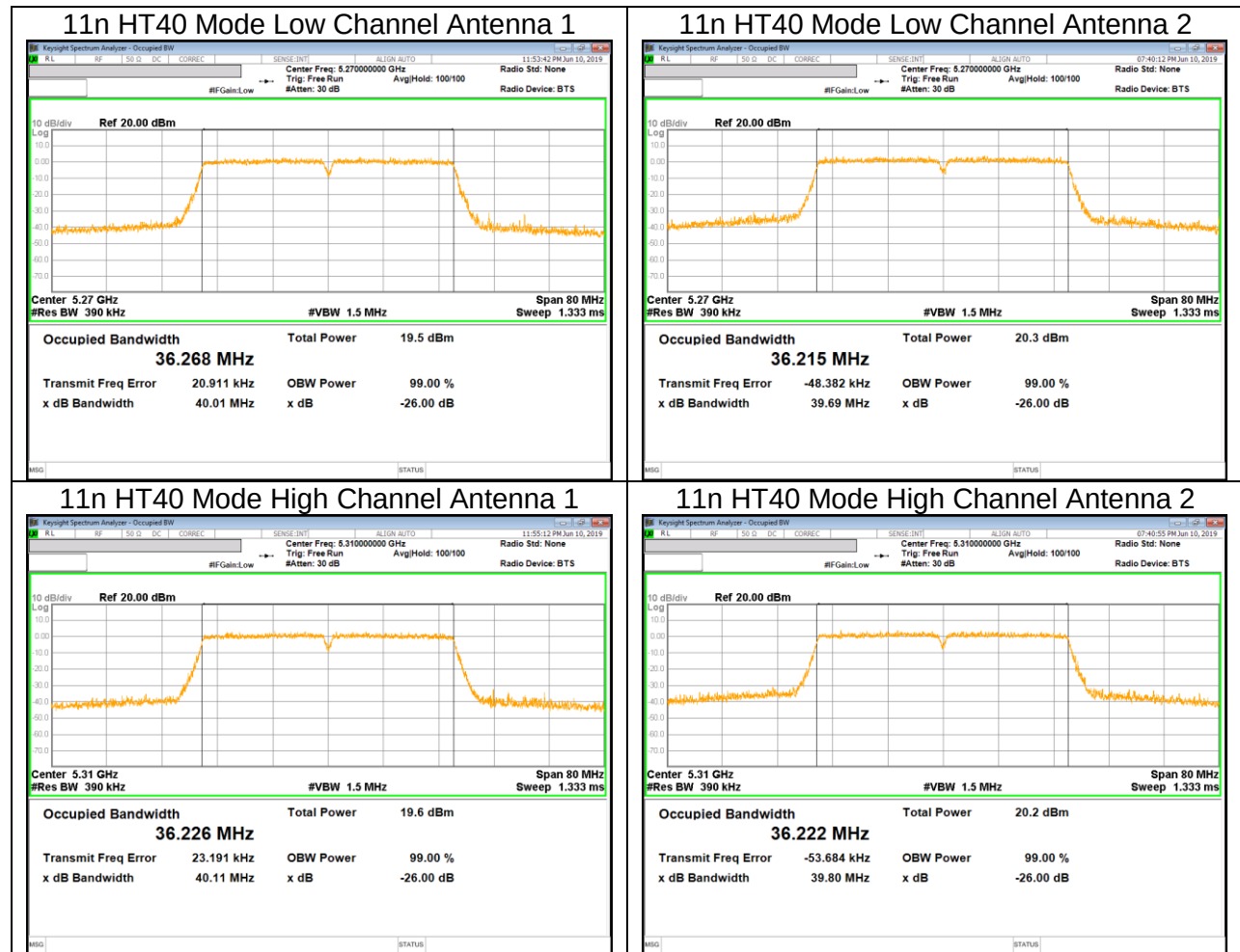
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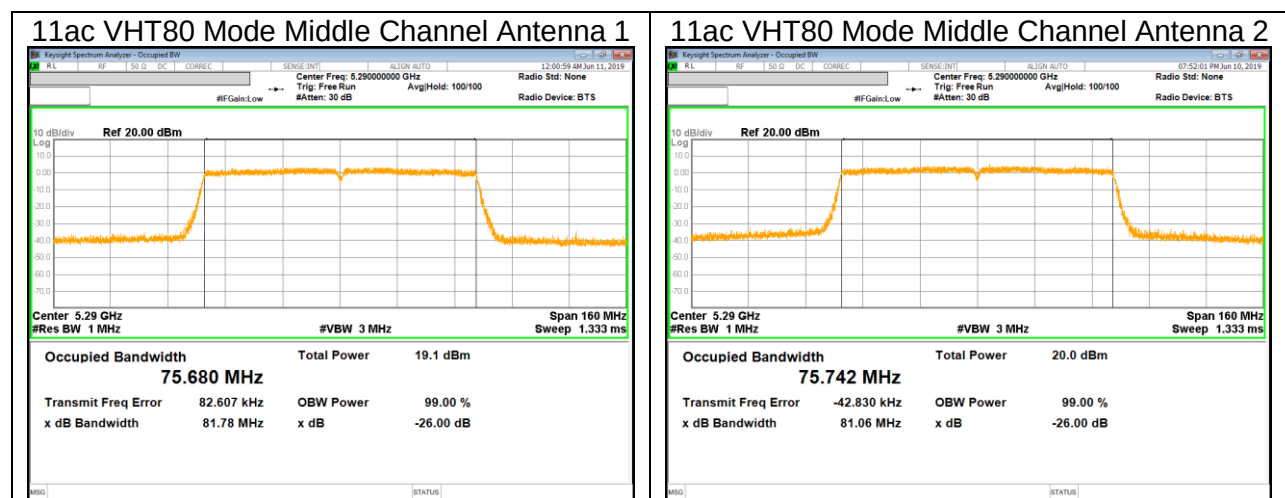
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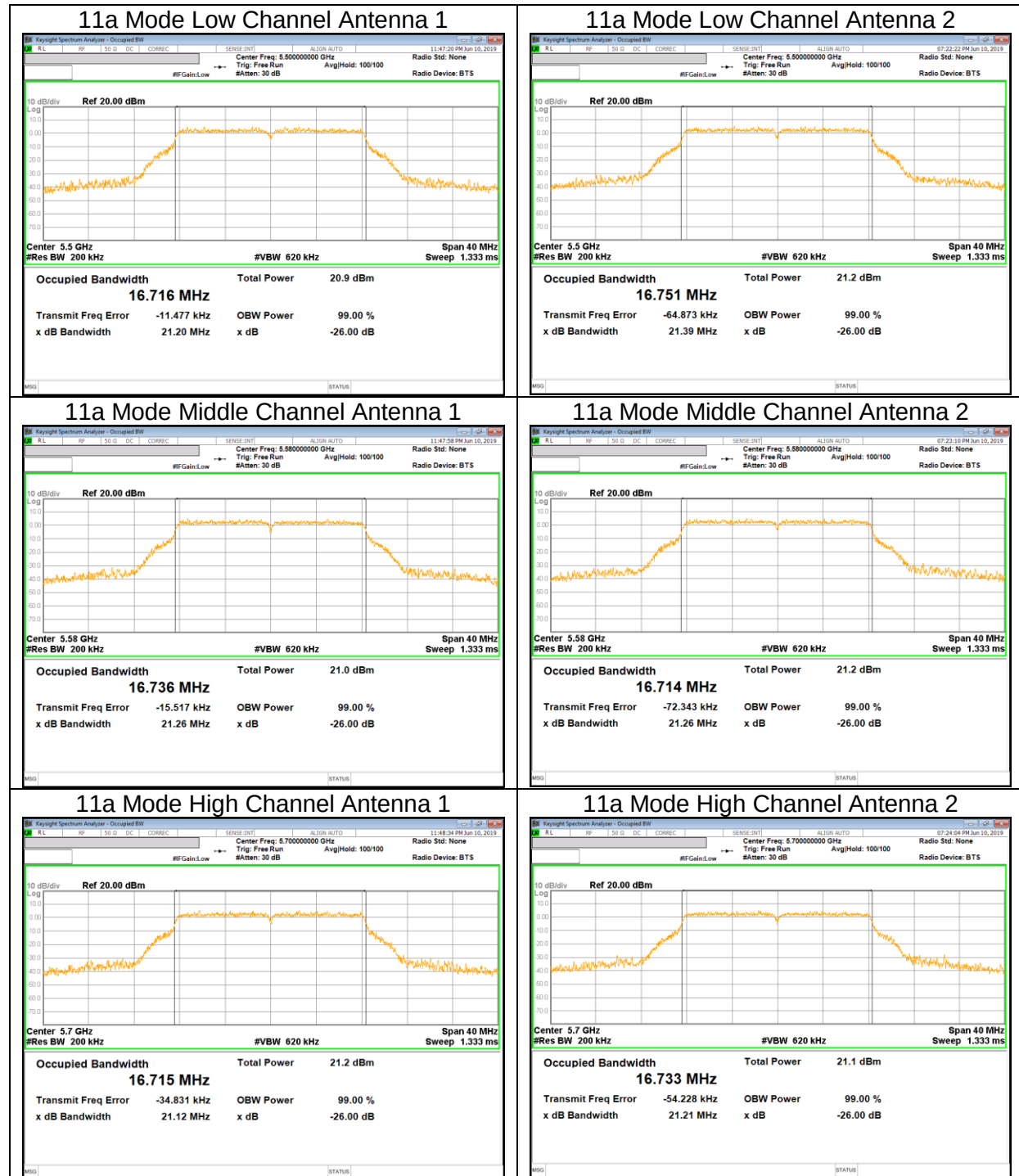
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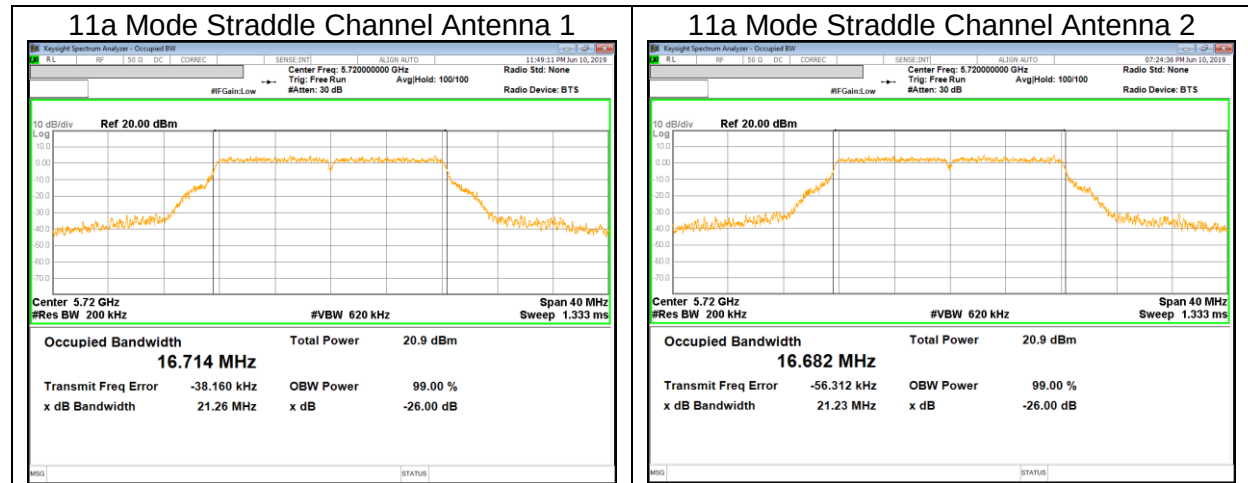


UNII 5.3 GHz IEEE 802.11ac VHT80 mode

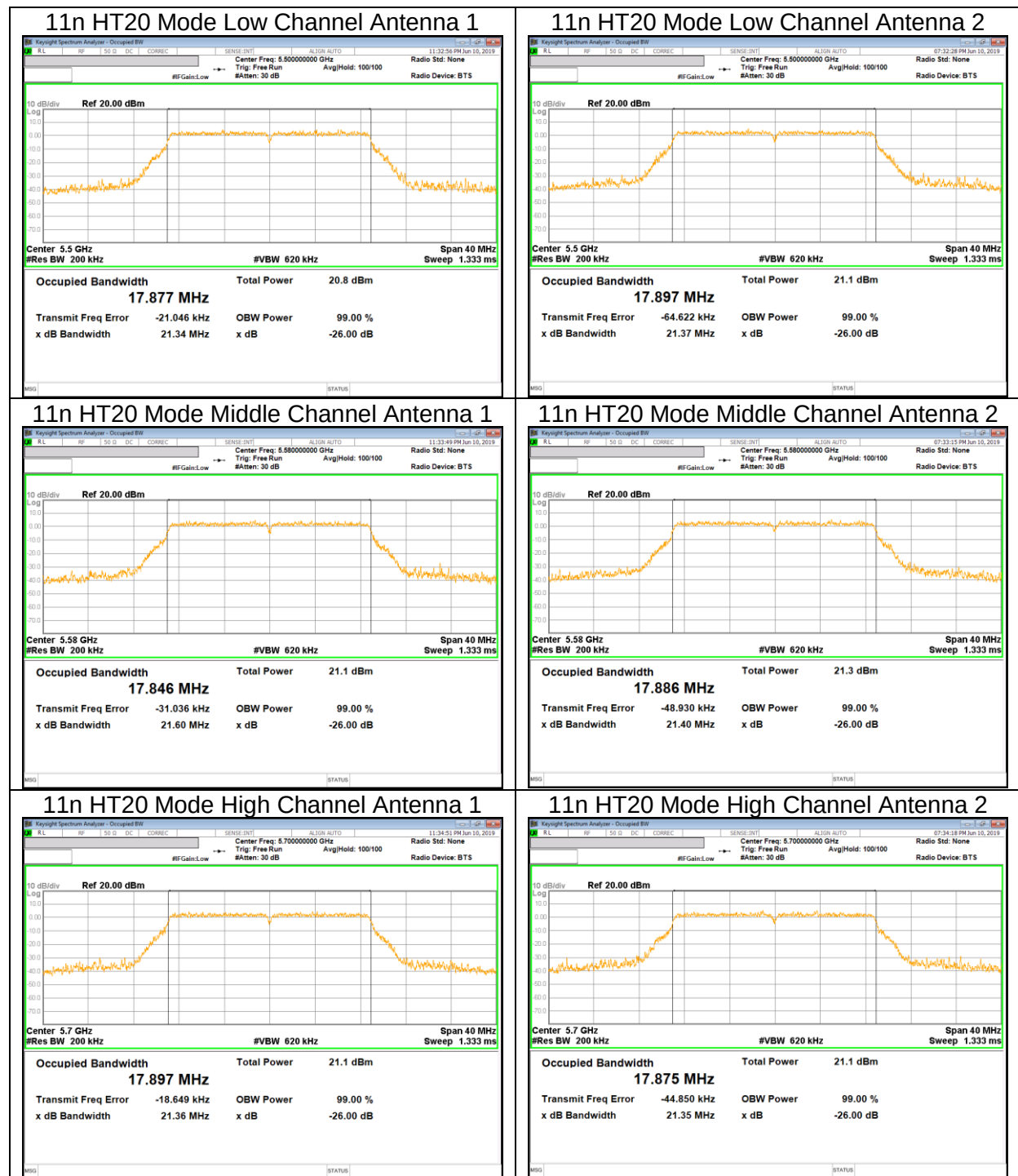


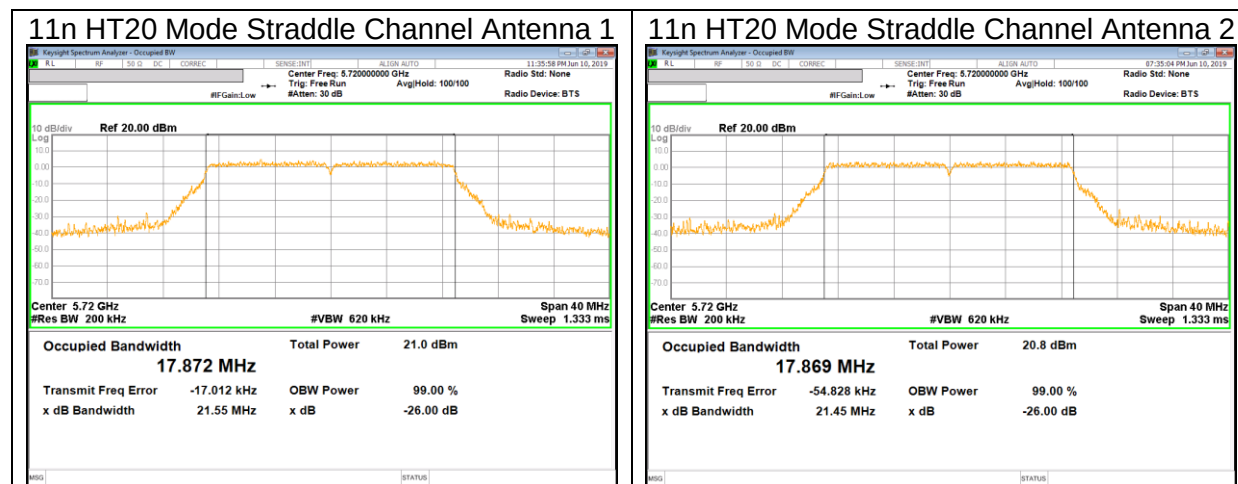
UNII 5.5 GHz IEEE 802.11a mode



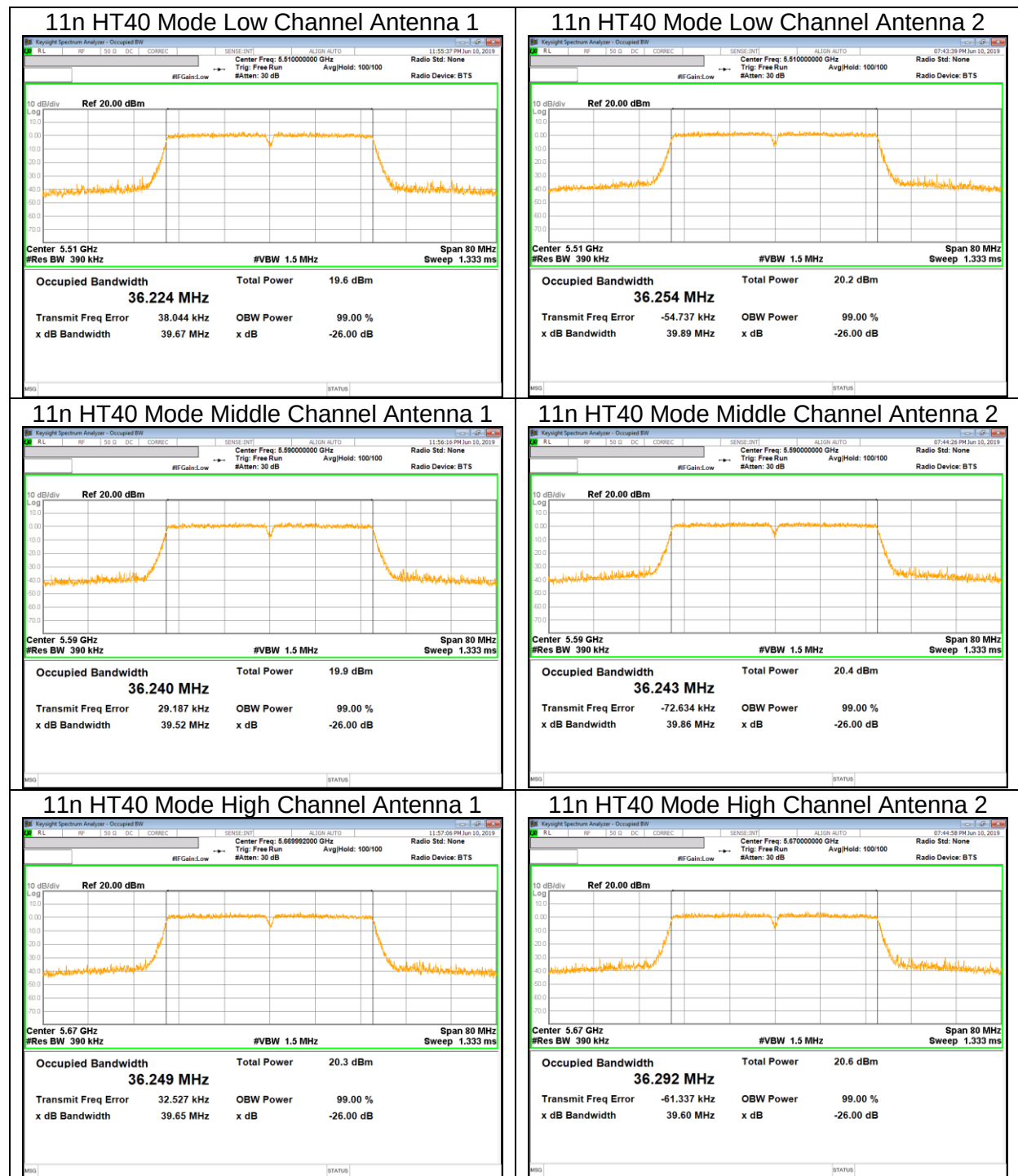


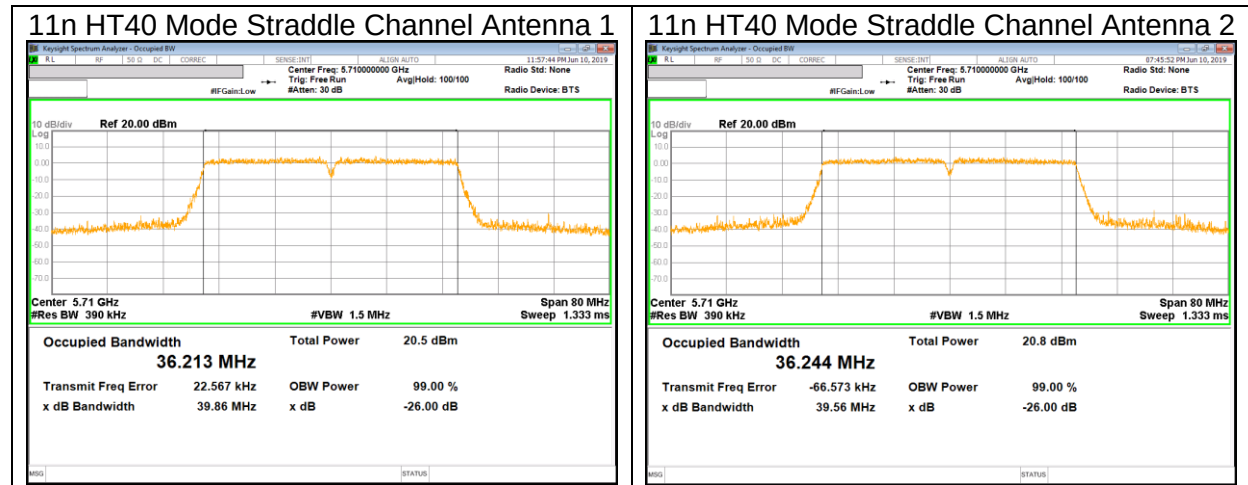
UNII 5.5 GHz IEEE 802.11n HT20 mode



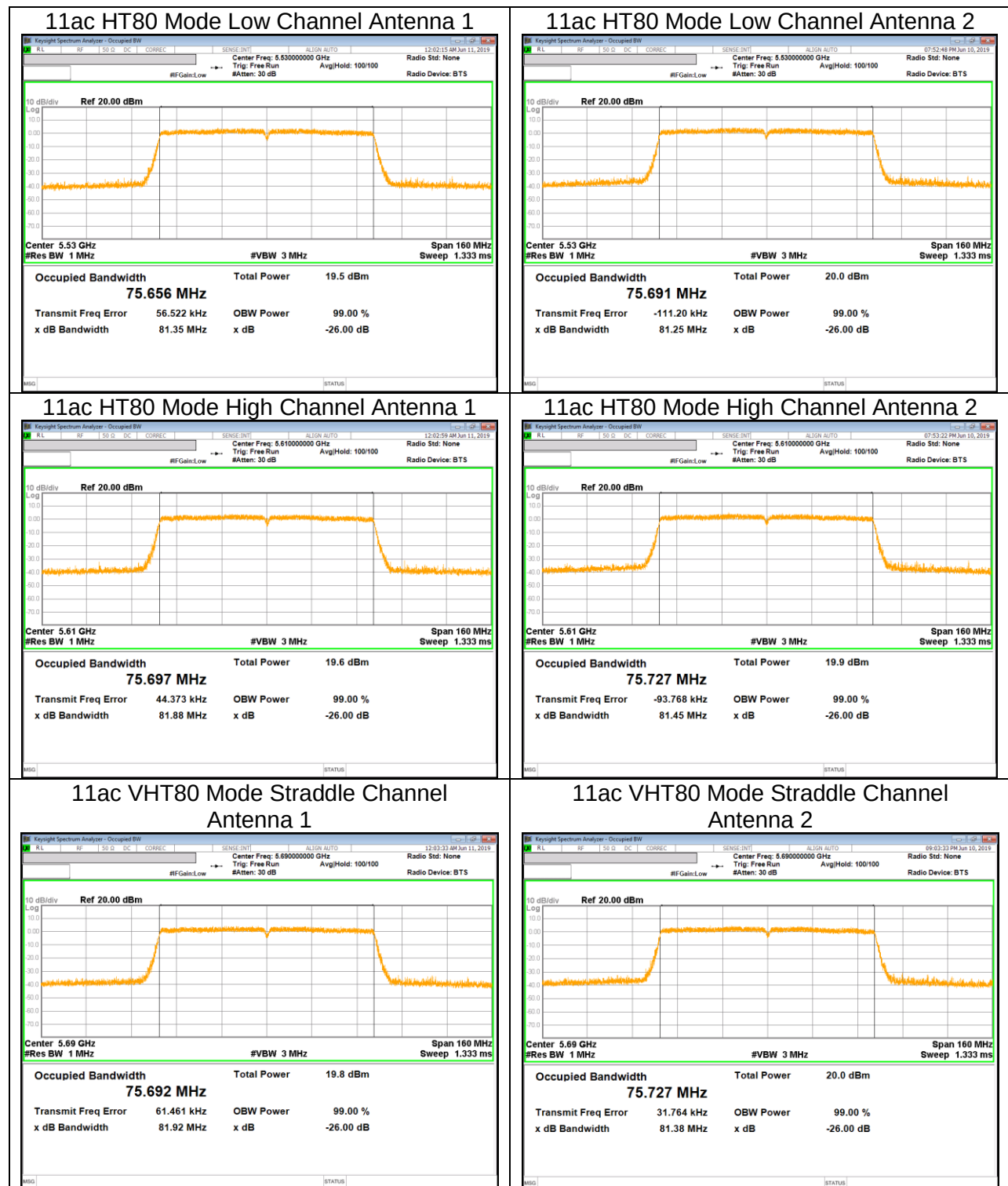


UNII 5.5 GHz IEEE 802.11n HT40 mode

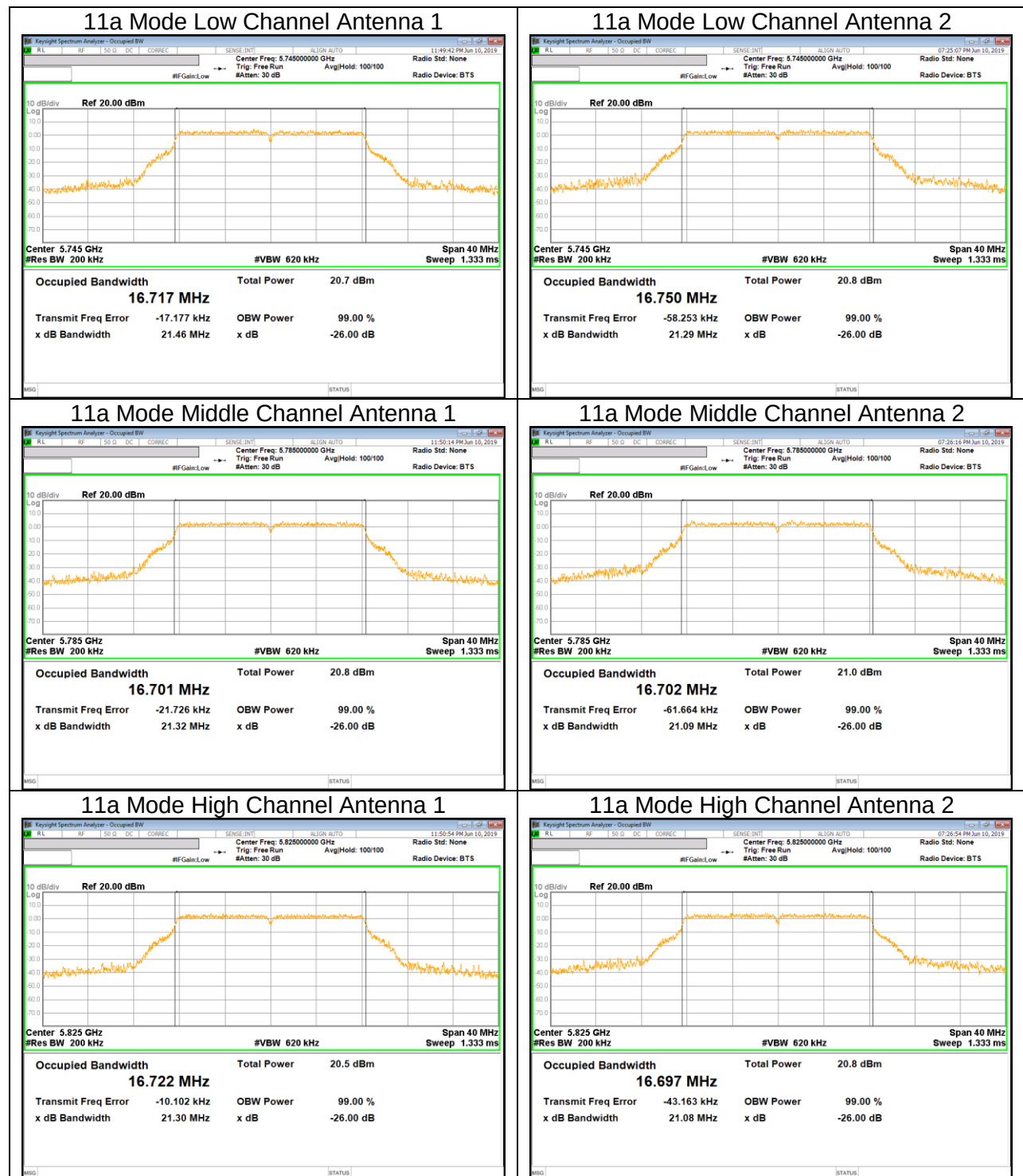




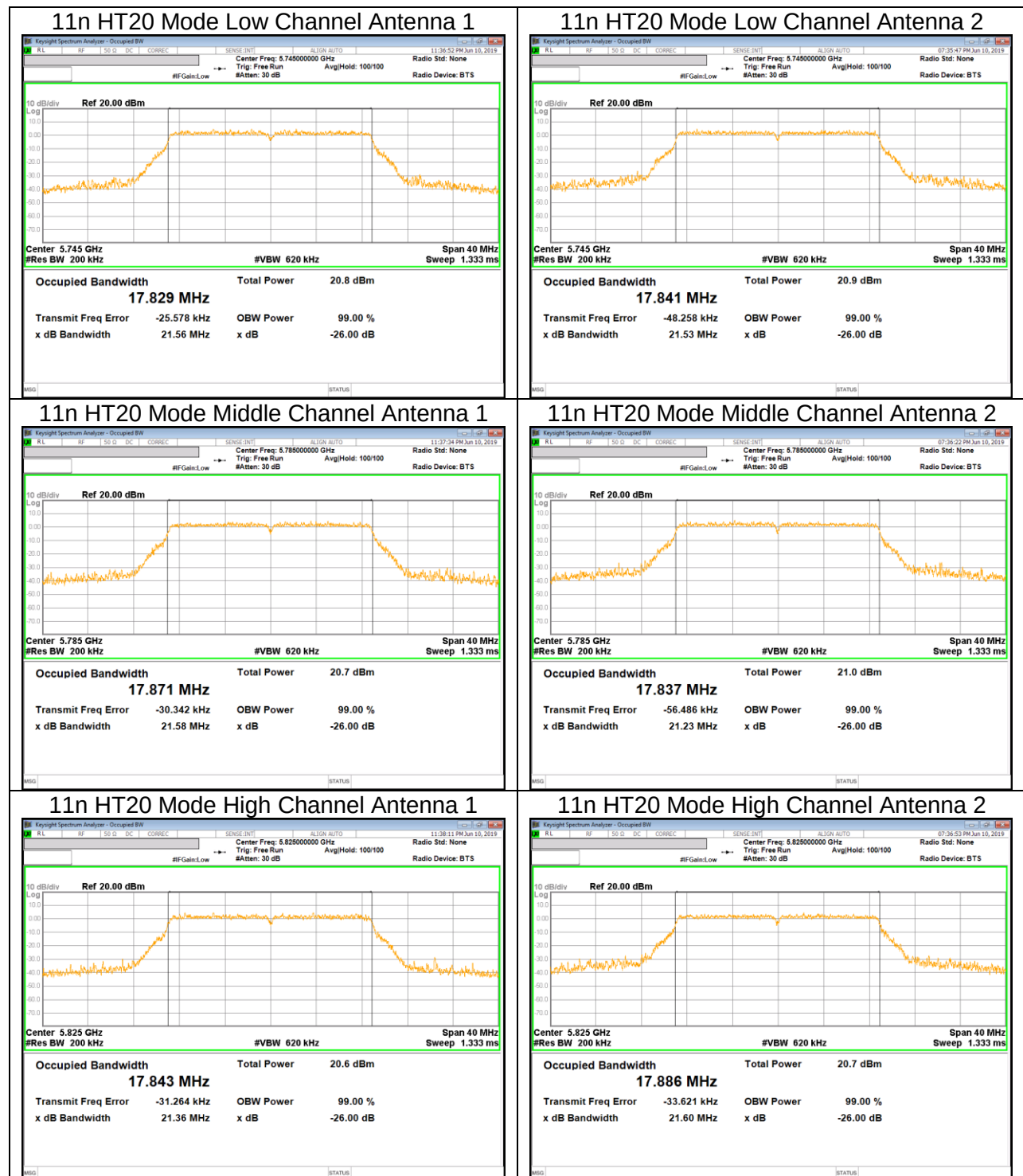
UNII 5.5 GHz IEEE 802.11ac VHT80 mode



UNII 5.8 GHz IEEE 802.11a mode



UNII 5.8 GHz IEEE 802.11n HT20 mode



UNII 5.8 GHz IEEE 802.11n HT40 mode

