



FCC 47 CFR PART 15 SUBPART E

UNII

CERTIFICATION TEST REPORT

FOR

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

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: GSM/CDMA/WCDMA/LTE Tablet + BT/BLE, DTS/UNII a/b/g/n/ac and ANT+
MODEL NUMBER: SM-T819C
SERIAL NUMBER: R22H3017QQT (RADIATED); R22H301M62E (CONDUCTED)
DATE TESTED: APR 18, 2016 - MAY 05, 2016

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 v01r02, 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:

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

4.3. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is GSM/CDMA/WCDMA/LTE Tablet + BT/BLE, DTS/UNII a/b/g/n/ac and ANT+.
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
	802.11n	TX / RX	TX / RX
	802.11n MIMO	TX / RX	TX / RX
5 GHz	802.11a	TX / RX	TX / RX
	802.11n	TX / RX	TX / RX
	802.11ac	TX / RX	TX / RX
	802.11n/ac MIMO	TX / RX	TX / RX

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range [MHz]	Mode	Output Power [dBm]		Output Power [mW]	
		Antenna1	Antenna2	Antenna1	Antenna2
5180 - 5240	802.11a SISO	11.75	12.05	14.96	16.01
	802.11a MIMO	14.91		30.97	
	802.11n HT20 SISO	11.75	11.64	14.98	14.58
	802.11n HT20 MIMO	14.69		29.44	
5190 - 5230	802.11n HT40 SISO	10.48	10.26	11.16	10.62
	802.11n HT40 MIMO	13.32		21.48	
5210	802.11ac VHT80 SISO	11.99	11.83	15.80	15.25
	802.11ac VHT80 MIMO	14.92		31.05	
5260 - 5320	802.11a SISO	11.76	11.96	15.01	15.70
	802.11a MIMO	14.82		30.34	
	802.11n HT20 SISO	11.62	11.92	14.54	15.55
	802.11n HT20 MIMO	14.75		29.85	
5270 - 5310	802.11n HT40 SISO	10.42	10.48	11.02	11.17
	802.11n HT40 MIMO	13.45		22.13	
5290	802.11ac VHT80 SISO	12.14	12.16	16.37	16.44
	802.11ac VHT80 MIMO	15.16		32.81	
5500 - 5700	802.11a SISO	12.36	11.76	17.21	15.00
	802.11a MIMO	14.89		30.83	
	802.11n HT20 SISO	12.23	12.02	16.72	15.94
	802.11n HT20 MIMO	15.14		32.66	
5510 - 5670	802.11n HT40 SISO	10.43	10.37	11.04	10.89
	802.11n HT40 MIMO	13.41		21.93	
5530 - 5610	802.11ac VHT80 SISO	12.01	11.83	15.89	15.23
	802.11ac VHT80 MIMO	14.93		31.12	
5745 - 5825	802.11a SISO	12.31	11.57	17.04	14.37
	802.11a MIMO	14.97		31.41	
	802.11n HT20 SISO	12.08	11.45	16.16	13.97
	802.11n HT20 MIMO	14.79		30.13	
5755 - 5795	802.11n HT40 SISO	10.03	10.36	10.07	10.87
	802.11n HT40 MIMO	13.21		20.94	
5775	802.11ac VHT80 SISO	12.30	12.24	16.98	16.75
	802.11ac VHT80 MIMO	15.28		33.73	

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

Frequency Range [MHz]	Antenna Gain [dBi]	
	Antenna 1	Antenna 2
UNII 1 5150 – 5250	-3.08	-3.57
UNII 2A 5250 – 5350	-3.08	-3.57
UNII 2C 5470 – 5725	-3.08	-3.57
UNII 3 5725 – 5850	-3.08	-3.57

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/STBC 2TX	802.11a 2TX CDD
5180 - 5240	802.11HT20 1TX	802.11n HT20 2TX CDD
5180 - 5240	802.11HT20 2TX STBC/SDM	802.11n HT20 2TX CDD
5180 - 5240	802.11ac VHT20 1TX	802.11n HT20 2TX CDD
5180 - 5240	802.11ac VHT20 2TX STBC/SDM	802.11n HT20 2TX CDD
5180 - 5240	802.11ac VHT20 2TX CDD/Tx BF	802.11n HT20 2TX CDD
5190 - 5230	802.11n HT40 1TX	802.11n HT40 2TX CDD
5190 - 5230	802.11n HT40 2TX STBC/SDM	802.11n HT40 2TX CDD
5190 - 5230	802.11ac VHT40 1TX	802.11n HT40 2TX CDD
5190 - 5230	802.11ac VHT40 2TX STBC/SDM	802.11n HT40 2TX CDD
5190 - 5230	802.11ac VHT40 2TX CDD/Tx BF	802.11n HT40 2TX CDD
5210	802.11ac VHT80 1TX	802.11ac VHT80 2TX CDD
5210	802.11ac VHT80 2TX STBC/SDM/Tx BF	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/STBC 2TX	802.11a 2TX CDD
5260 - 5320	802.11HT20 1TX	802.11n HT20 2TX CDD
5260 - 5320	802.11HT20 2TX STBC/SDM	802.11n HT20 2TX CDD
5260 - 5320	802.11ac VHT20 1TX	802.11n HT20 2TX CDD
5260 - 5320	802.11ac VHT20 2TX STBC/SDM	802.11n HT20 2TX CDD
5260 - 5320	802.11ac VHT20 2TX CDD/Tx BF	802.11n HT20 2TX CDD
5270 - 5310	802.11n HT40 1TX	802.11n HT40 2TX CDD
5270 - 5310	802.11n HT40 2TX STBC/SDM	802.11n HT40 2TX CDD
5270 - 5310	802.11ac VHT40 1TX	802.11n HT40 2TX CDD
5270 - 5310	802.11ac VHT40 2TX STBC/SDM	802.11n HT40 2TX CDD
5270 - 5310	802.11ac VHT40 2TX CDD/Tx BF	802.11n HT40 2TX CDD
5290	802.11ac VHT80 1TX	802.11ac VHT80 2TX CDD
5290	802.11ac VHT80 2TX STBC/SDM/Tx BF	802.11ac VHT80 2TX CDD

UNII 2C

5470 - 5725 MHz Authorized Frequency Band (Radiated Testing)		
Frequency Range [MHz]	Mode	Covered by
5500 - 5700	802.11a legacy 1TX/STBC 2TX	802.11a 2TX CDD
5500 - 5700	802.11HT20 1TX	802.11n HT20 2TX CDD
5500 - 5700	802.11HT20 2TX STBC/SDM	802.11n HT20 2TX CDD
5500 - 5700	802.11ac VHT20 1TX	802.11n HT20 2TX CDD
5500 - 5700	802.11ac VHT20 2TX STBC/SDM	802.11n HT20 2TX CDD
5500 - 5700	802.11ac VHT20 2TX CDD/Tx BF	802.11n HT20 2TX CDD
5510 - 5690	802.11n HT40 1TX	802.11n HT40 2TX CDD
5510 - 5690	802.11n HT40 2TX STBC/SDM	802.11n HT40 2TX CDD
5510 - 5690	802.11ac VHT40 1TX	802.11n HT40 2TX CDD
5510 - 5690	802.11ac VHT40 2TX STBC/SDM	802.11n HT40 2TX CDD
5510 - 5690	802.11ac VHT40 2TX CDD/Tx BF	802.11n HT40 2TX CDD
5530 - 5610	802.11ac VHT80 1TX	802.11ac VHT80 2TX CDD
5530 - 5610	802.11ac VHT80 2TX STBC/SDM/Tx BF	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/STBC 2TX	802.11a 2TX CDD
5745 - 5825	802.11HT20 1TX	802.11n HT20 2TX CDD
5745 - 5825	802.11HT20 2TX STBC/SDM	802.11n HT20 2TX CDD
5745 - 5825	802.11ac VHT20 1TX	802.11n HT20 2TX CDD
5745 - 5825	802.11ac VHT20 2TX STBC/SDM	802.11n HT20 2TX CDD
5745 - 5825	802.11ac VHT20 2TX CDD/Tx BF	802.11n HT20 2TX CDD
5755 - 5795	802.11n HT40 1TX	802.11n HT40 2TX CDD
5755 - 5795	802.11n HT40 2TX STBC/SDM	802.11n HT40 2TX CDD
5755 - 5795	802.11ac VHT40 1TX	802.11n HT40 2TX CDD
5755 - 5795	802.11ac VHT40 2TX STBC/SDM	802.11n HT40 2TX CDD
5755 - 5795	802.11ac VHT40 2TX CDD/Tx BF	802.11n HT40 2TX CDD
5775	802.11ac VHT80 1TX	802.11ac VHT80 2TX CDD
5775	802.11ac VHT80 2TX STBC/SDM/Tx BF	802.11ac VHT80 2TX CDD

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

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

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

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA12CBC	DW2H229DS/B-E	N/A
Data Cable	SAMSUNG	EP-DG925UWE	N/A	N/A
Earphone	SAMSUNG	EO-EG900BW	N/A	N/A

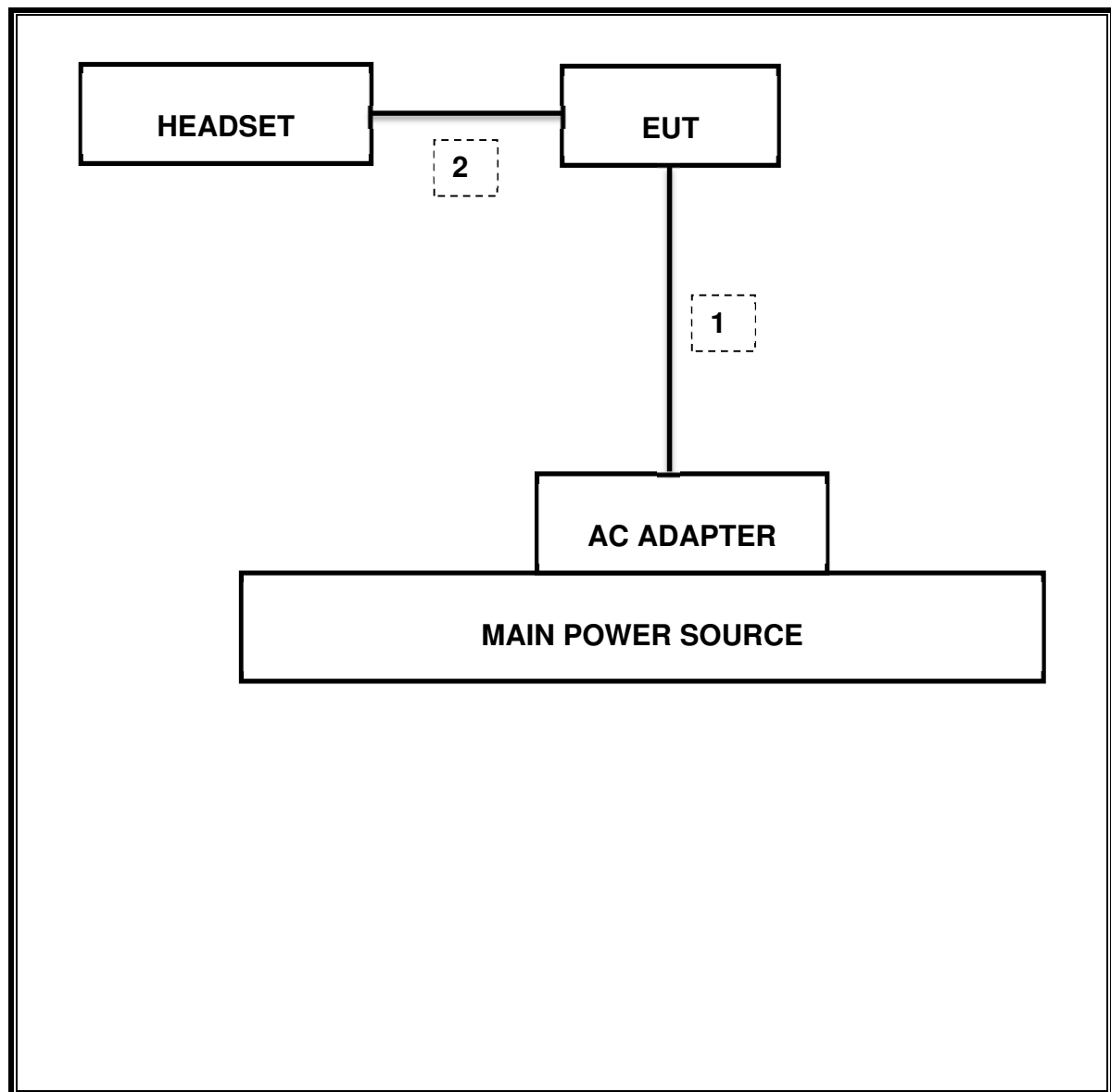
I/O CABLES

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 in hidden menu exercised the EUT to enable NII mode.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	Manufacturer	Model	S/N	Cal Due
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	11-17-16
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	04-25-17
Antenna, Horn, 18 GHz	ETS	3115	00167211	09-20-16
Antenna, Horn, 18 GHz	ETS	3115	00161451	05-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168724	06-17-17
Antenna, Horn, 18 GHz	ETS	3117	00168717	06-17-17
Antenna, Horn, 40 GHz	ETS	3116C	00166155	09-23-16
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	08-24-17
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-18-16
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-18-16
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-18-16
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-18-16
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-19-16
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-19-16
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	08-18-16
Average Power Sensor	R&S	NRZ-Z91	102681	08-18-16
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-18-16
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-19-16
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-19-16
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-19-16
Attenuator / Switch driver	HP	11713A	3748A04272	N/A
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	009	08-18-16
Low Pass Filter 3GHz	Micro-Tronics	LPS17541	015	08-18-16
High Pass Filter 5GHz	Micro-Tronics	HPS17542	009	08-18-16
High Pass Filter 6GHz	Micro-Tronics	HPM17543	010	08-18-16
High Pass Filter 5GHz	Micro-Tronics	HPS17542	016	08-18-16
High Pass Filter 6GHz	Micro-Tronics	HPM17543	015	08-18-16
LISN	R&S	ENV-216	101836	08-19-16
LISN	R&S	ENV-216	101837	08-19-16

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	82.60 MHz
15.407	6dB Band width (5.8Ghz)	500KHz		Pass	14.043 MHz
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	15.16 dBm
15.407 (a)(3)	TX Cond. Power 5.725-5.825	< 30dBm or 17+10Log(OBW)		Pass	15.28 dBm
15.407 (a)(5)	PSD (5.2,5.3,5.5GHz)	<11dBm		Pass	4.92 dBm
15.407 (a)(5)	PSD (5.8GHz)	30dBm per 500kHz		Pass	2.03 dBm
15.207 (a)	AC Power Line conducted emissions	Section 10	Radiated	Pass	43.49 dBuV (Pk)
15.407 (b) & 15.209	Radiated Spurious Emission	< 54dBuV/m		Pass	51.19 dBuV/m (Av)
15.407 (h)(2)	Dynamic Frequency Selection	N/A	Radiated / Conducted	Pass	N/A

8. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None; for reporting purposes only.

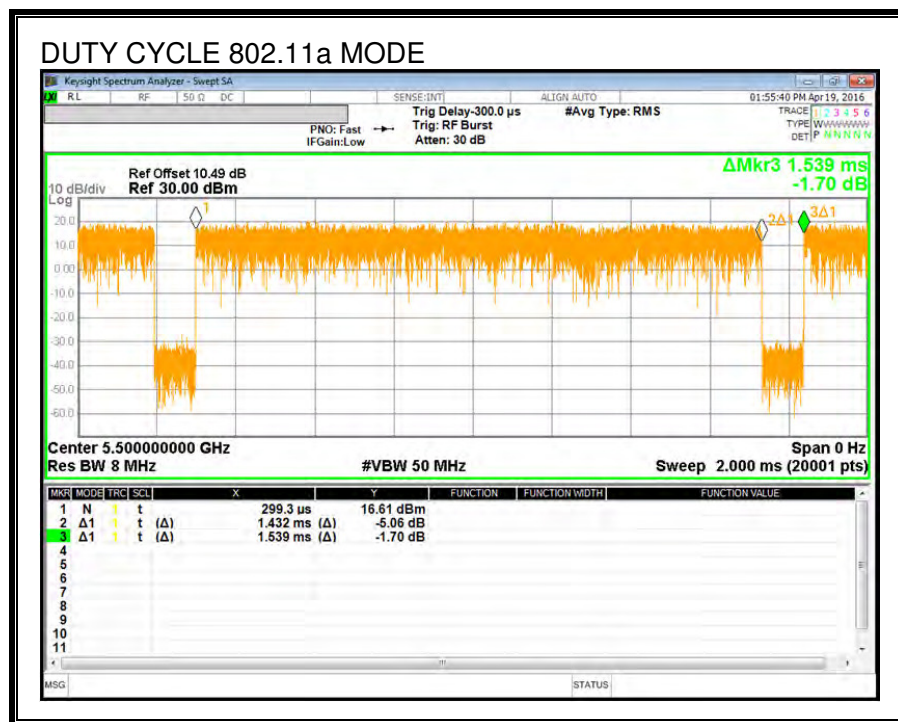
PROCEDURE

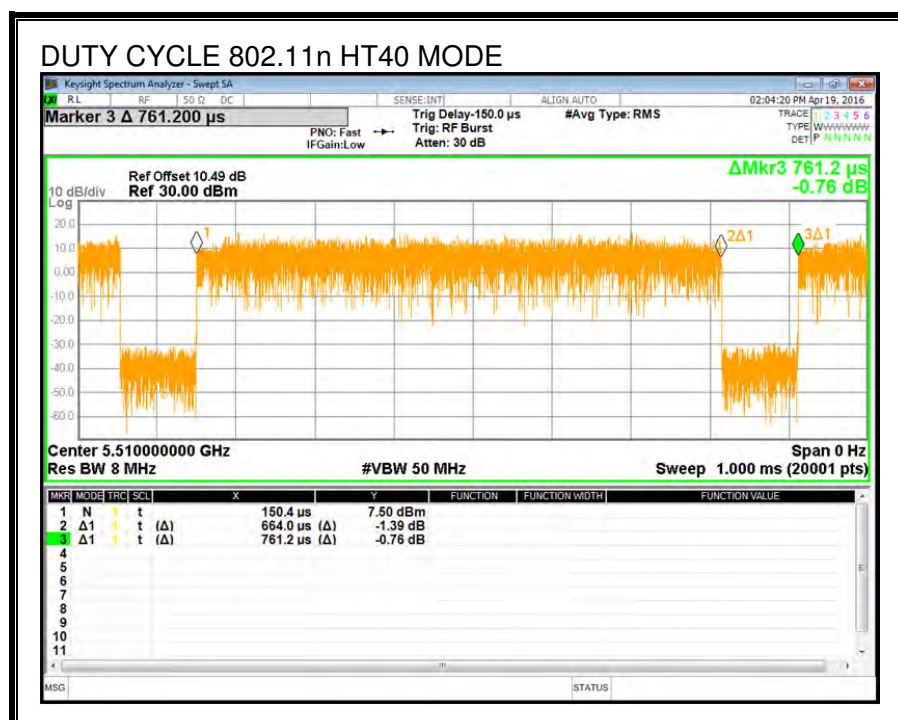
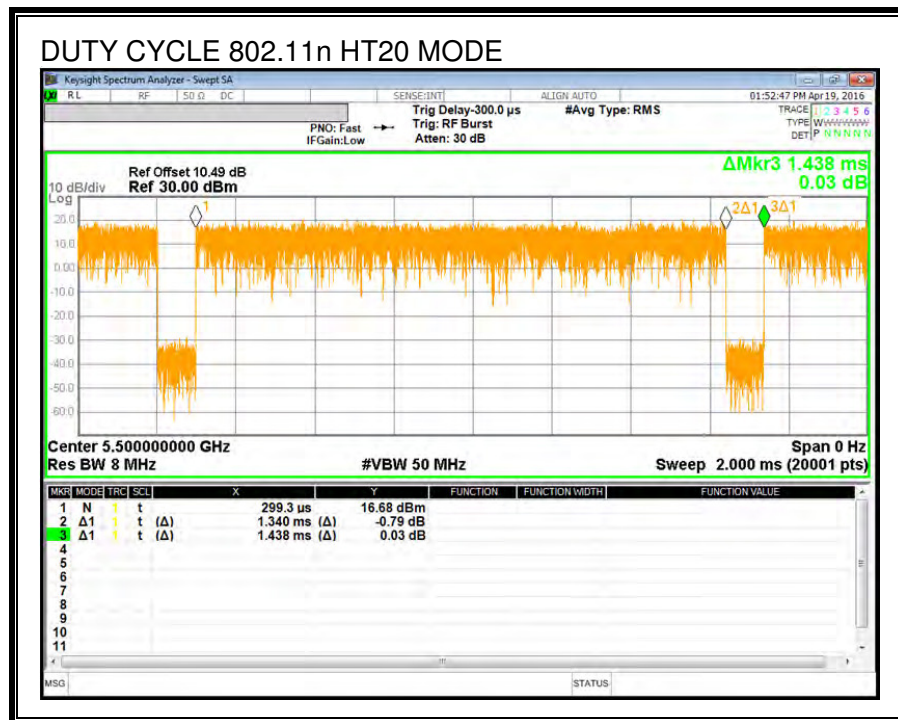
KDB 789033 D02 v01r02 Zero-Span Spectrum Analyzer Method.

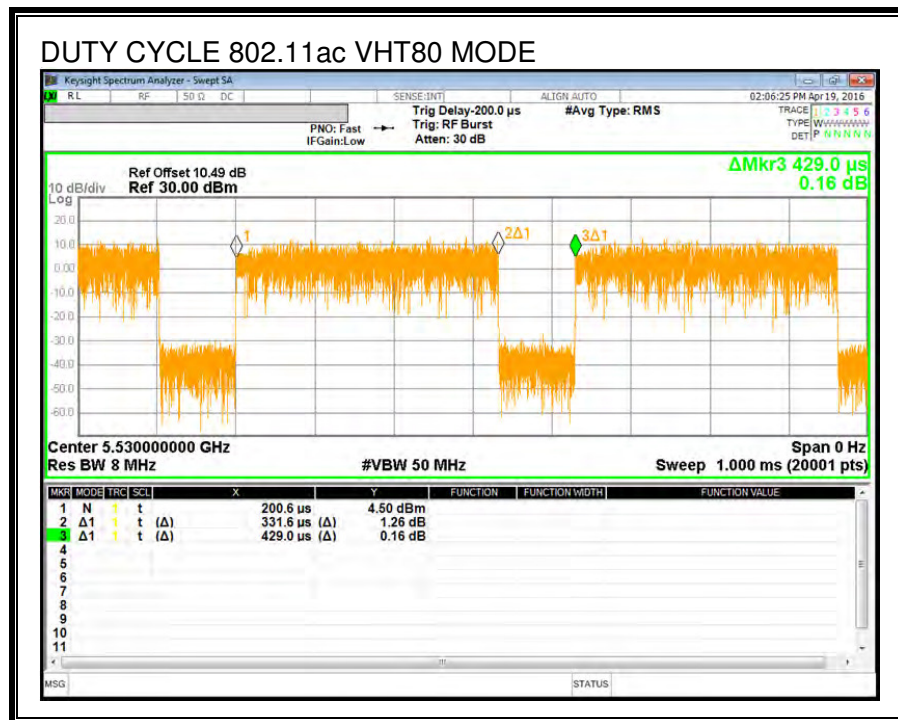
8.1. ON TIME AND DUTY CYCLE RESULTS

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	1.432	1.539	0.930	93.0%	0.31	0.698
802.11n HT20	1.340	1.438	0.932	93.2%	0.31	0.746
802.11n HT40	0.664	0.761	0.872	87.2%	0.59	1.506
802.11ac VHT80	0.332	0.429	0.773	77.3%	1.12	3.016

8.2. DUTY CYCLE PLOTS







9. MEASUREMENT METHOD

KDB 789033 D02 General UNII Test Procedures New Rules v01r02
KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02
KDB 905462 D03 UNII 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

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 v01r02: The transmitter output is connected to a spectrum analyzer with the RBW set to 100KHz, the VBW $\geq 3 \times$ RBW, peak detector and max hold.

RESULTS

10.1.1. 802.11a MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]		Minimum Limit [MHz]
		Primary	Secondary	
Low	5745	14.475	15.300	0.5
Mid	5785	15.300	14.468	0.5
High	5825	15.053	14.043	0.5
Worst		14.043		

10.1.2. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]		Minimum Limit [MHz]
		Chain 0	Chain 1	
Low	5745	14.978	14.910	0.5
Mid	5785	15.118	15.325	0.5
High	5825	15.095	14.983	0.5
Worst		14.910		

10.1.3. 802.11n HT40 MODE IN THE 5.8 GHz BAND

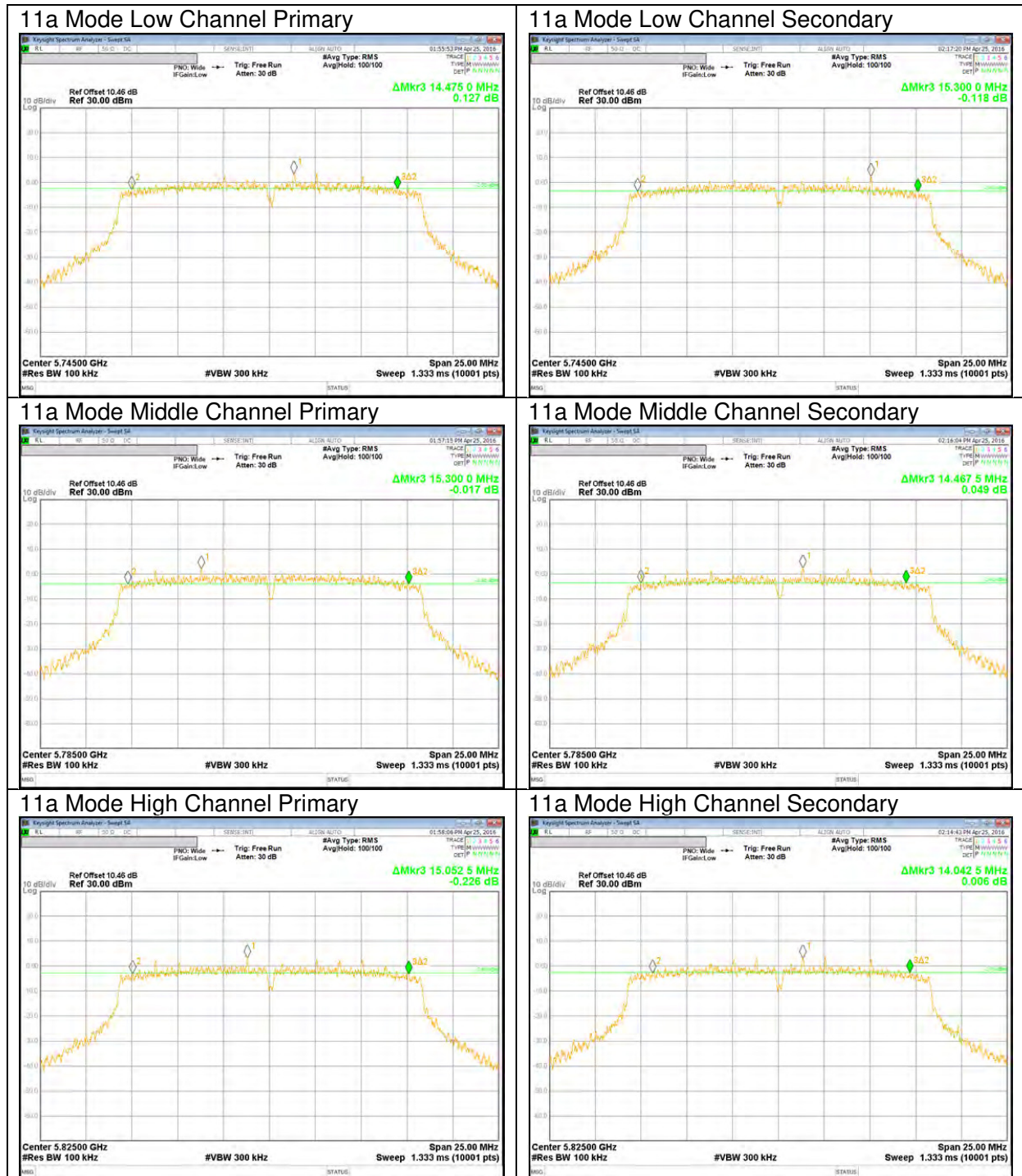
Channel	Frequency [MHz]	6 dB Bandwidth [MHz]		Minimum Limit [MHz]
		Chain 0	Chain 1	
Low	5755	35.050	33.820	0.5
High	5795	32.600	35.055	0.5
Worst		32.600		

10.1.4. 802.11n VHT80 MODE IN THE 5.8 GHz BAND

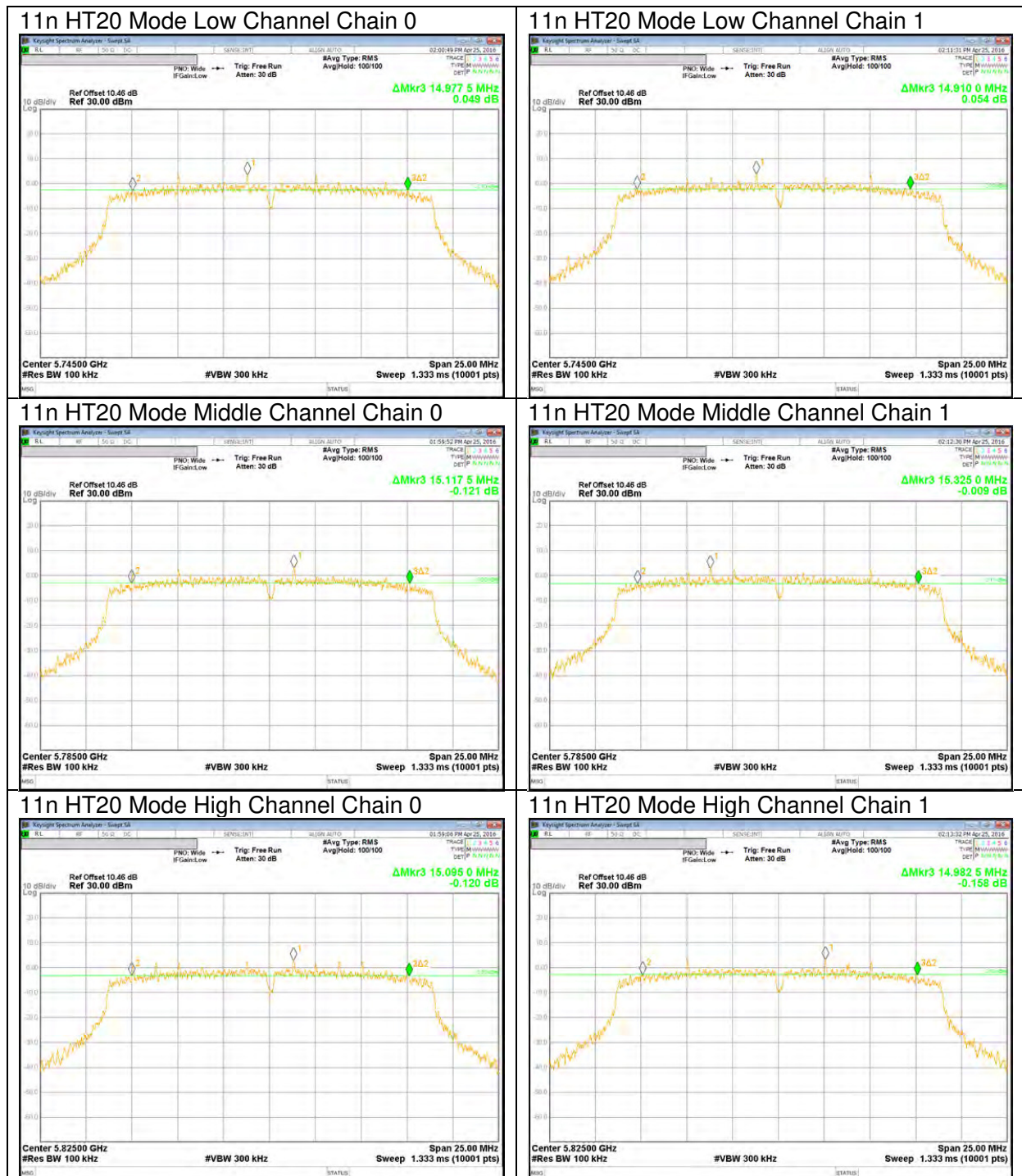
Channel	Frequency [MHz]	6 dB Bandwidth [MHz]		Minimum Limit [MHz]
		Chain 0	Chain 1	
Middle	5775	75.080	75.090	0.5
Worst		75.080		

10.1.5. 6 dB BANDWIDTH PLOTS

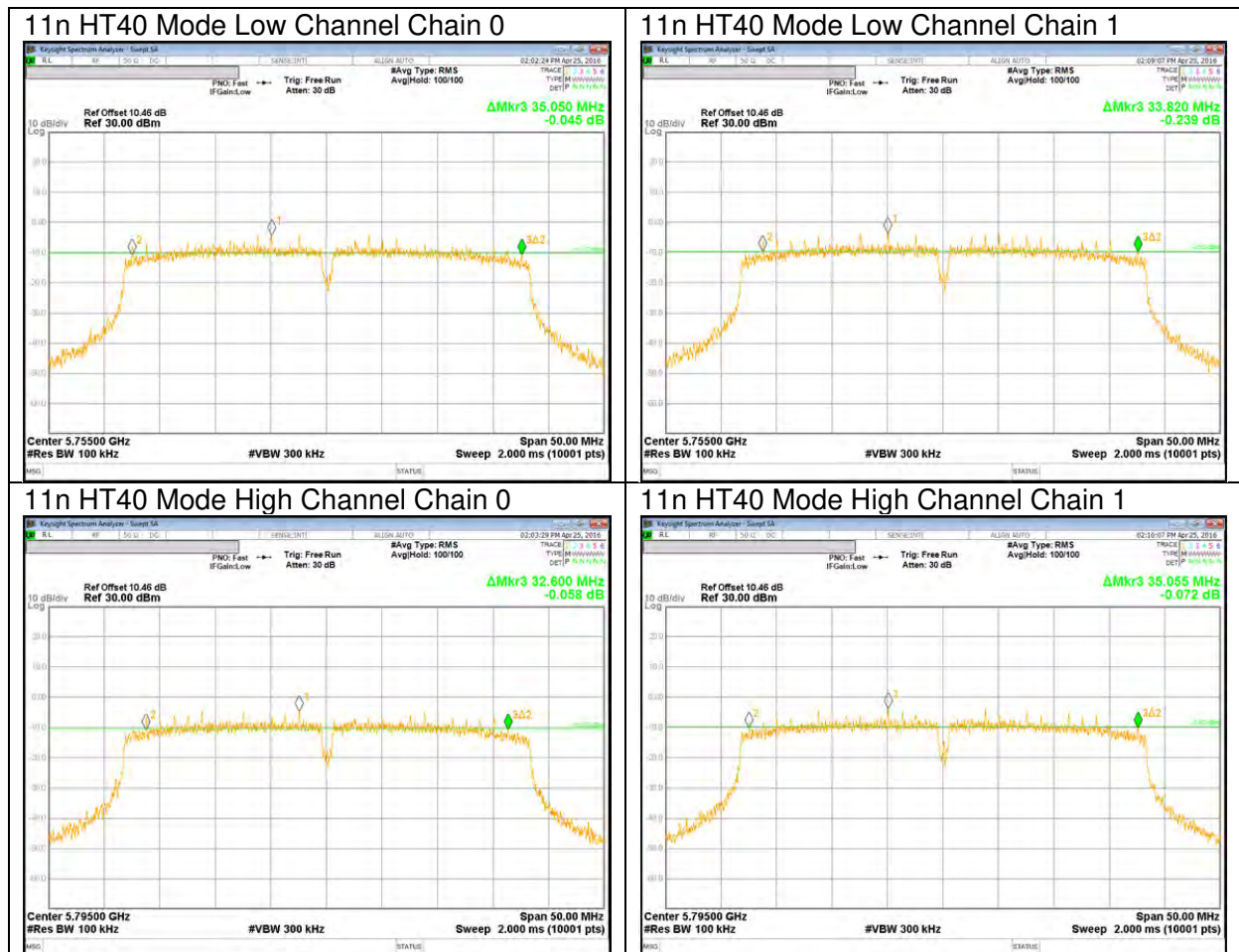
IEEE 802.11a mode



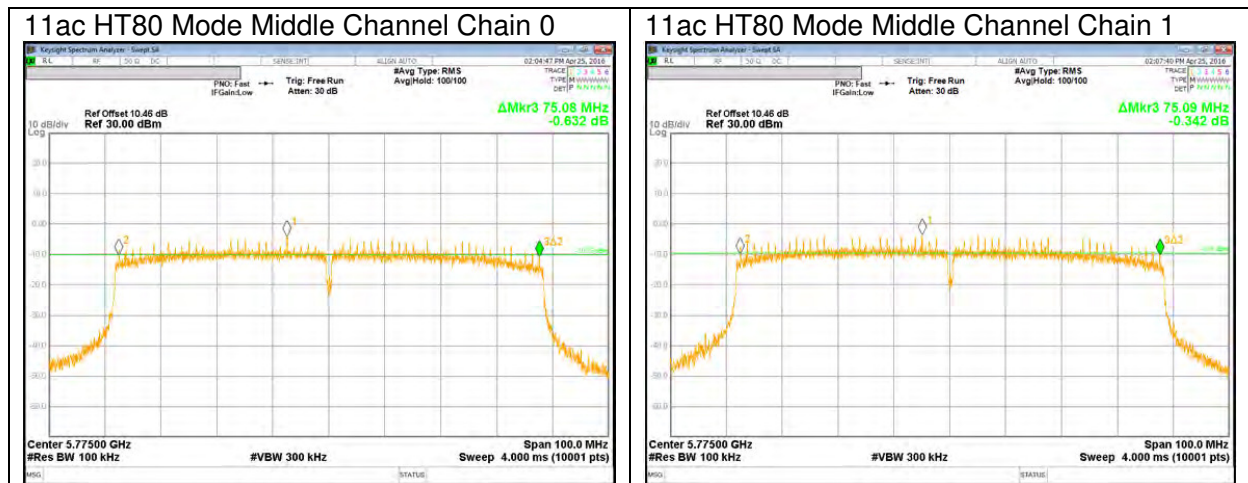
IEEE 802.11n HT20 mode



IEEE 802.11n HT40 mode



IEEE 802.11ac VHT80 mode



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]	
		Primary	Secondary
Low	5180	18.81	19.14
Mid	5200	18.72	19.07
High	5240	19.53	19.23
Worst		19.53	

10.2.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5180	19.72	19.70
Mid	5200	19.71	19.71
High	5240	19.83	19.83
Worst		19.83	

10.2.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5190	39.74	40.52
High	5230	40.33	39.82
Worst		40.52	

10.2.4. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Middle	5210	81.44	82.55
Worst		82.55	

10.2.5. 802.11a MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Primary	Secondary
Low	5260	19.55	19.34
Mid	5300	19.26	18.99
High	5320	18.66	18.60
Worst		19.55	

10.2.6. 802.11n HT20 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5260	19.78	19.45
Mid	5300	19.61	19.55
High	5320	19.77	19.46
Worst		19.78	

10.2.7. 802.11n HT40 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5270	39.80	39.94
High	5310	39.89	40.46
Worst		40.46	

10.2.8. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Middle	5290	81.97	80.93
Worst		81.97	

10.2.9. 802.11a MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Primary	Secondary
Low	5500	19.27	19.12
Mid	5580	18.76	19.15
High	5700	19.21	18.71
Worst		19.27	

10.2.10. 802.11n HT20 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5500	19.71	19.69
Mid	5580	19.77	19.87
High	5700	19.80	19.61
Worst		19.87	

10.2.11. 802.11n HT40 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5510	40.00	40.23
Mid	5550	40.18	40.05
High	5670	40.51	40.15
Worst		40.51	

10.2.12. 802.11ac VHT80 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5530	81.49	82.41
High	5610	82.21	81.30
Worst		82.41	

10.2.13. 802.11a MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Primary	Secondary
Low	5745	19.42	19.29
Mid	5785	18.75	19.20
High	5825	19.27	18.60
Worst		19.42	

10.2.14. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5745	19.82	19.71
Mid	5785	19.69	20.20
High	5825	19.72	19.70
Worst		20.20	

10.2.15. 802.11n HT40 MODE IN THE 5.8 GHz BAND

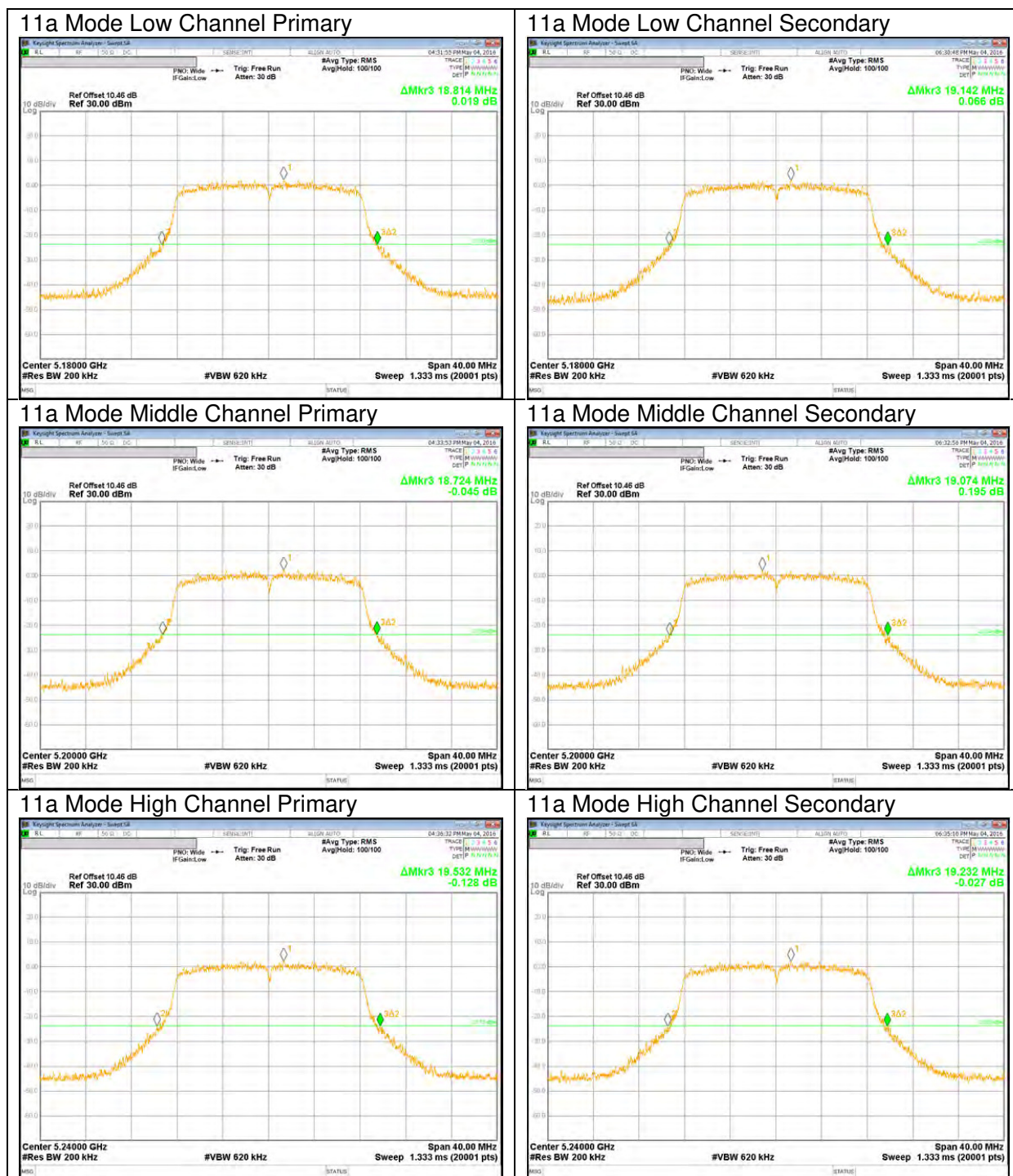
Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5755	40.16	40.14
High	5795	39.78	39.76
Worst		40.16	

10.2.16. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Middle	5775	82.60	81.28
Worst		82.60	

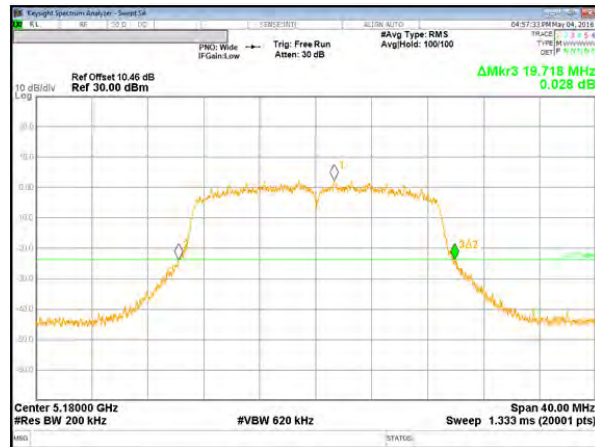
10.2.17. 26 dB BANDWIDTH PLOTS

UNII 5.2 GHz IEEE 802.11a mode

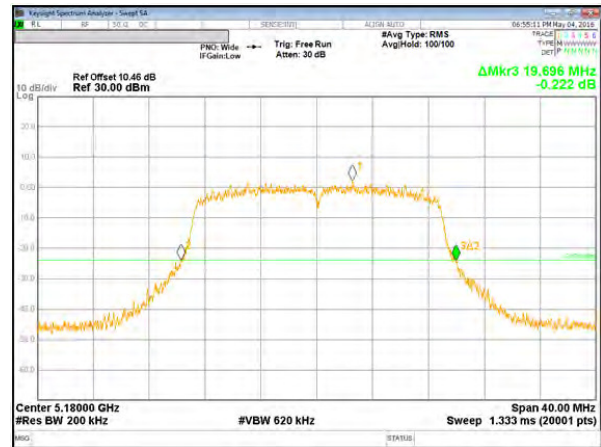


UNII 5.2 GHz IEEE 802.11n HT20 mode

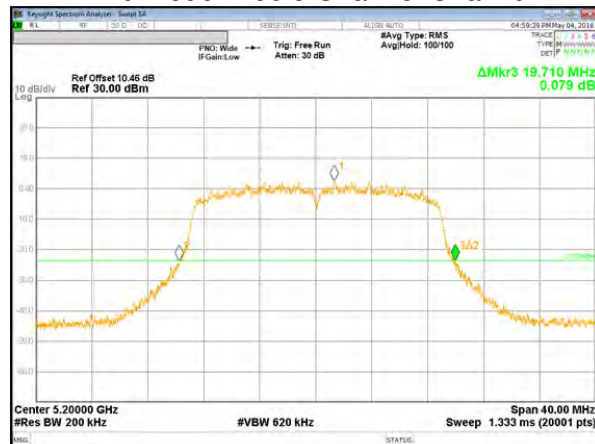
11n HT20 Mode Low Channel Chain 0



11n HT20 Mode Low Channel Chain 1



11n HT20 Mode Middle Channel Chain 0



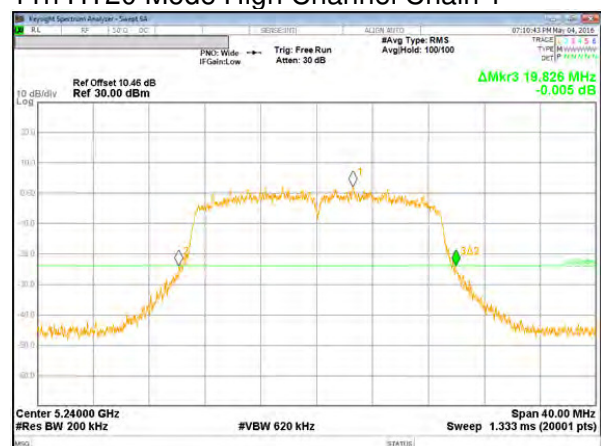
11n HT20 Mode Middle Channel Chain 1



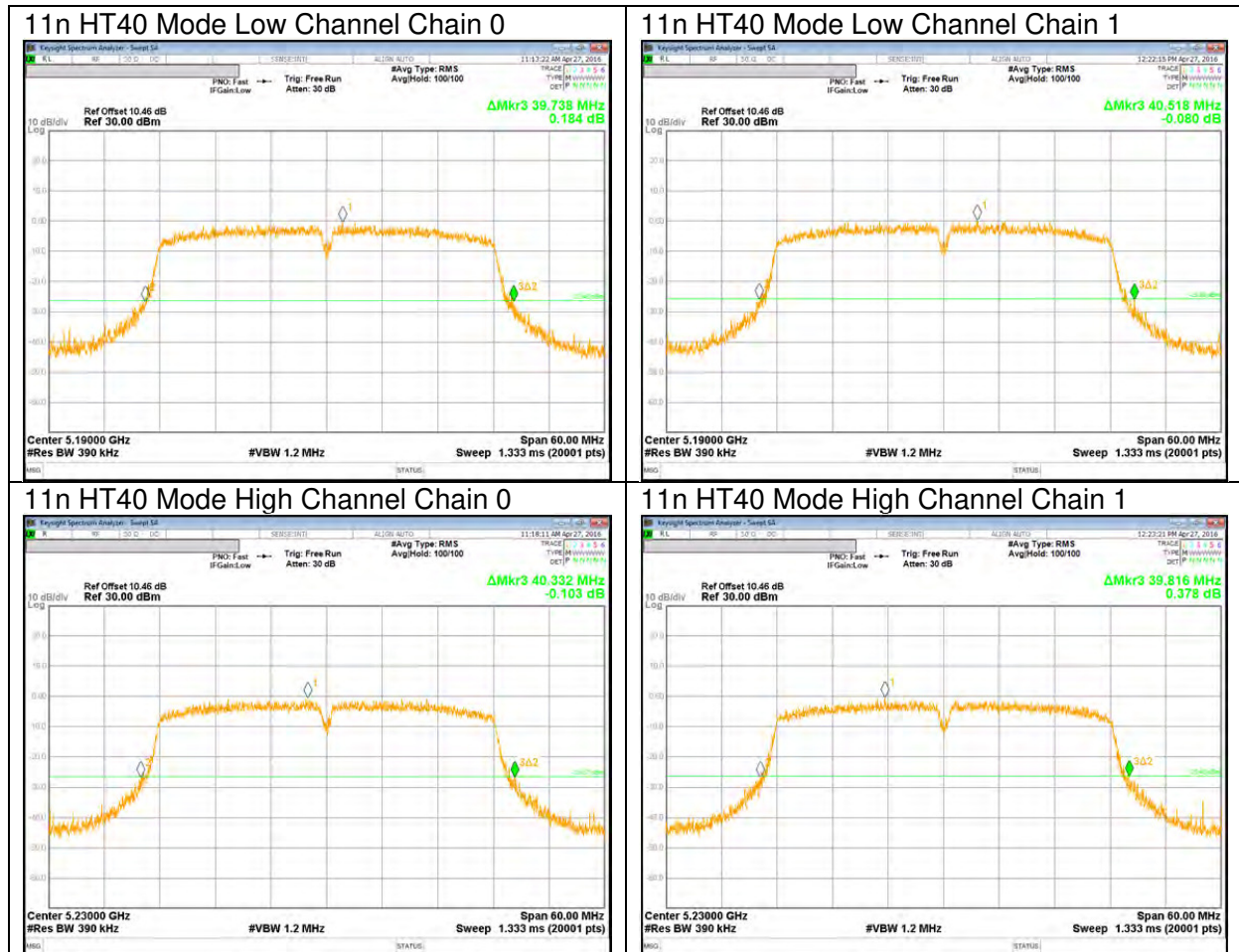
11n HT20 Mode High Channel Chain 0



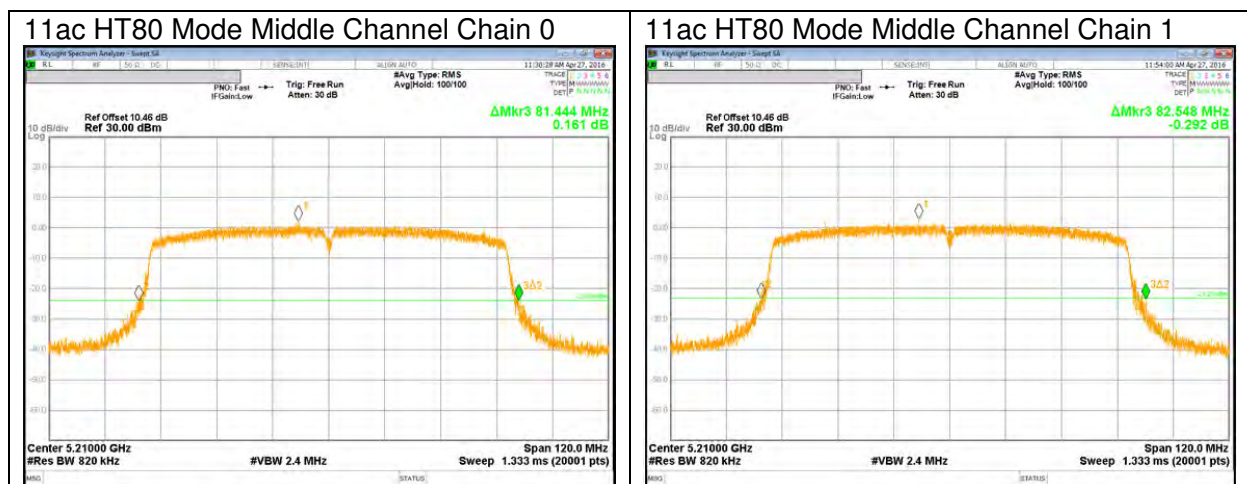
11n HT20 Mode High Channel Chain 1



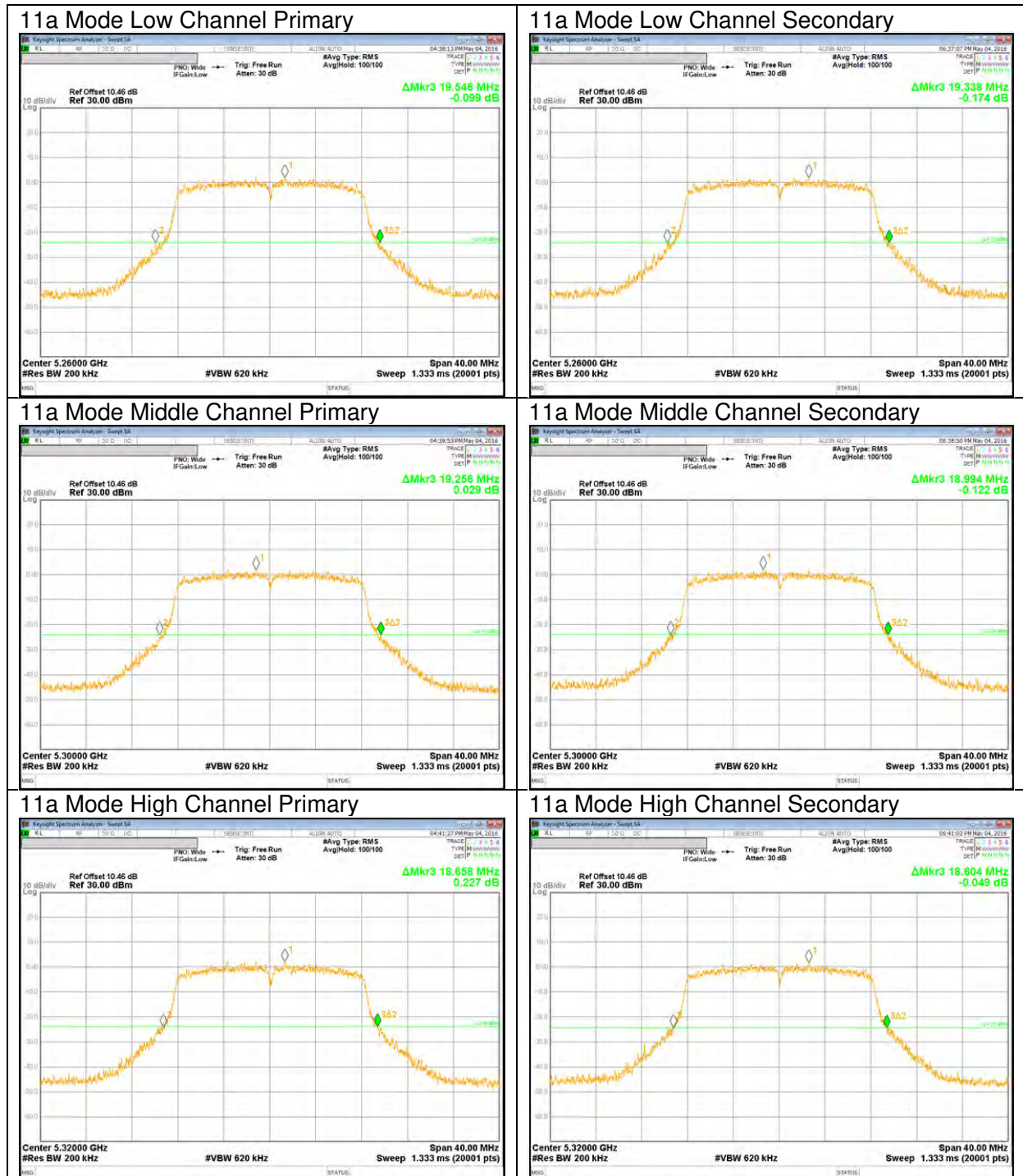
UNII 5.2 GHz IEEE 802.11n HT40 mode



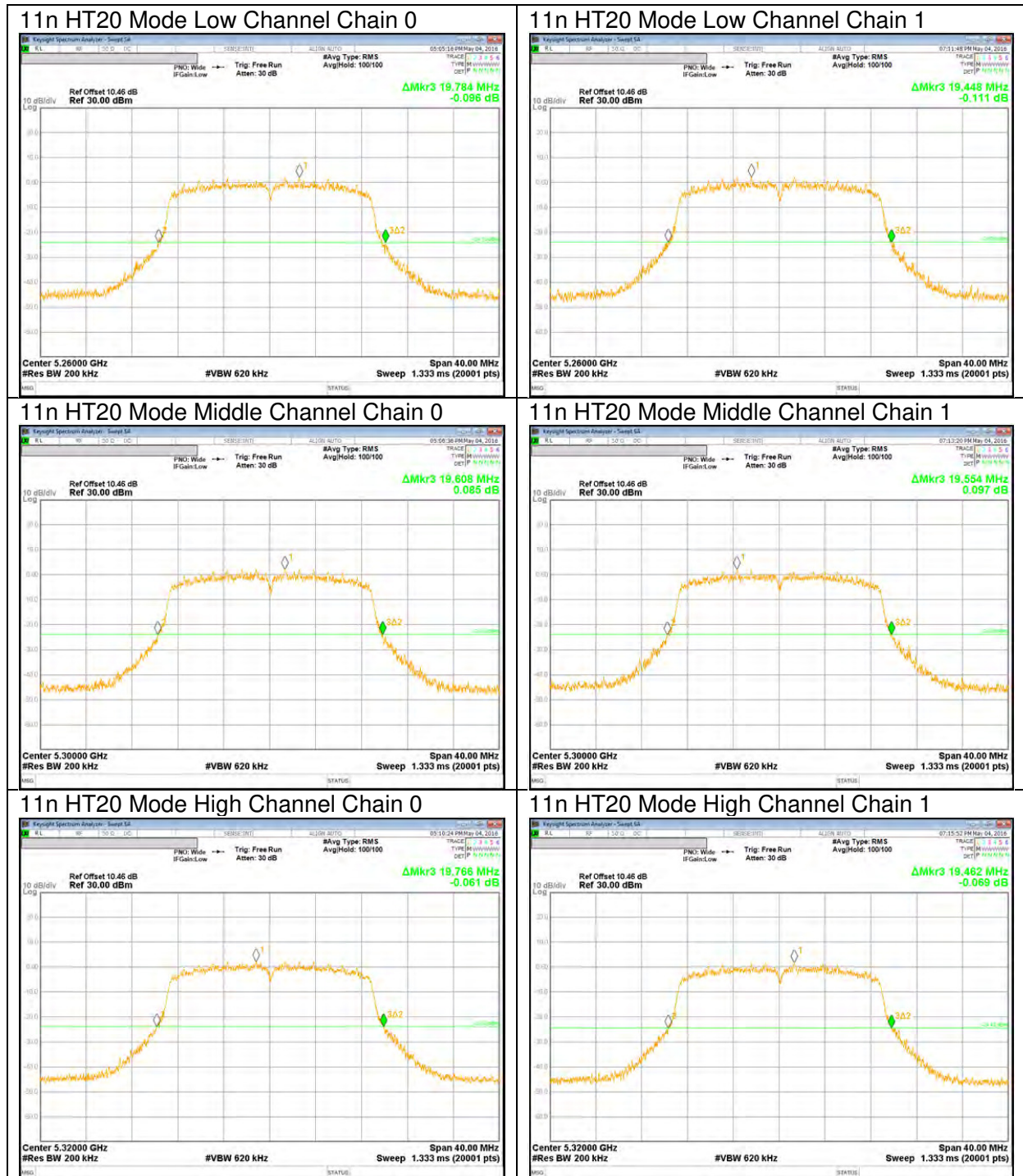
UNII 5.2 GHz IEEE 802.11ac VHT80 mode



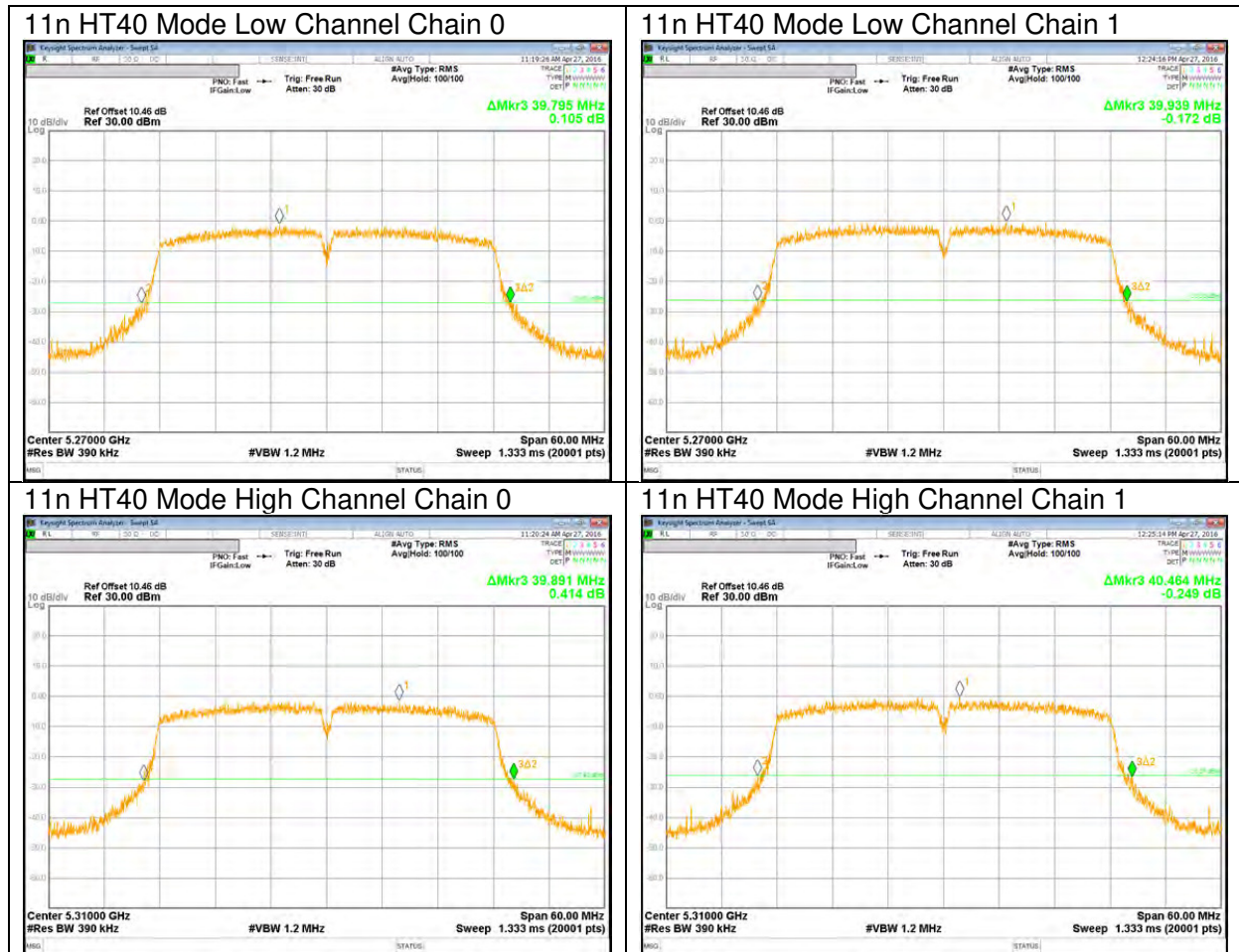
UNII 5.3 GHz IEEE 802.11a mode



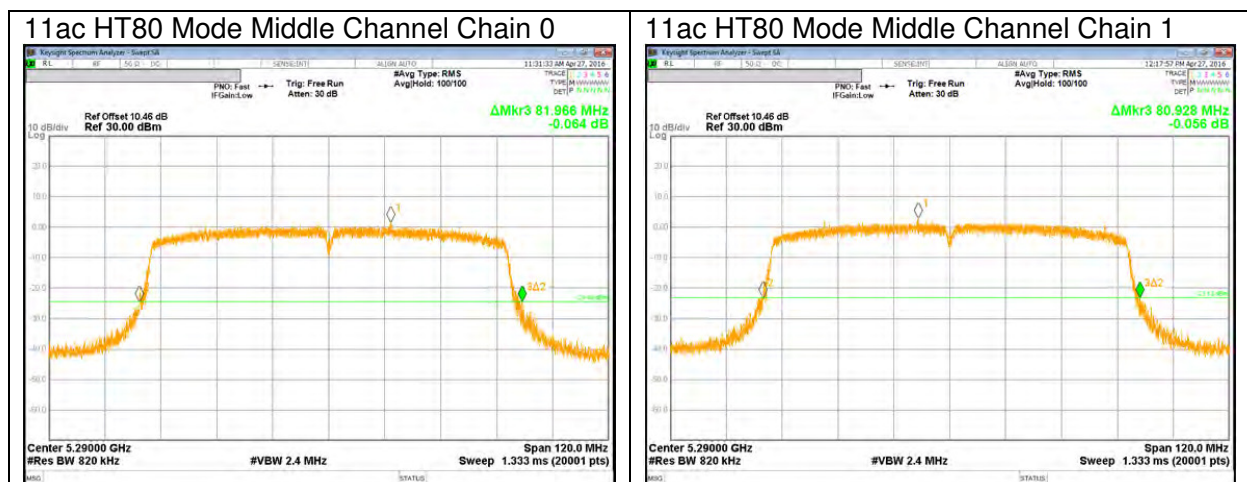
UNII 5.3 GHz IEEE 802.11n HT20 mode



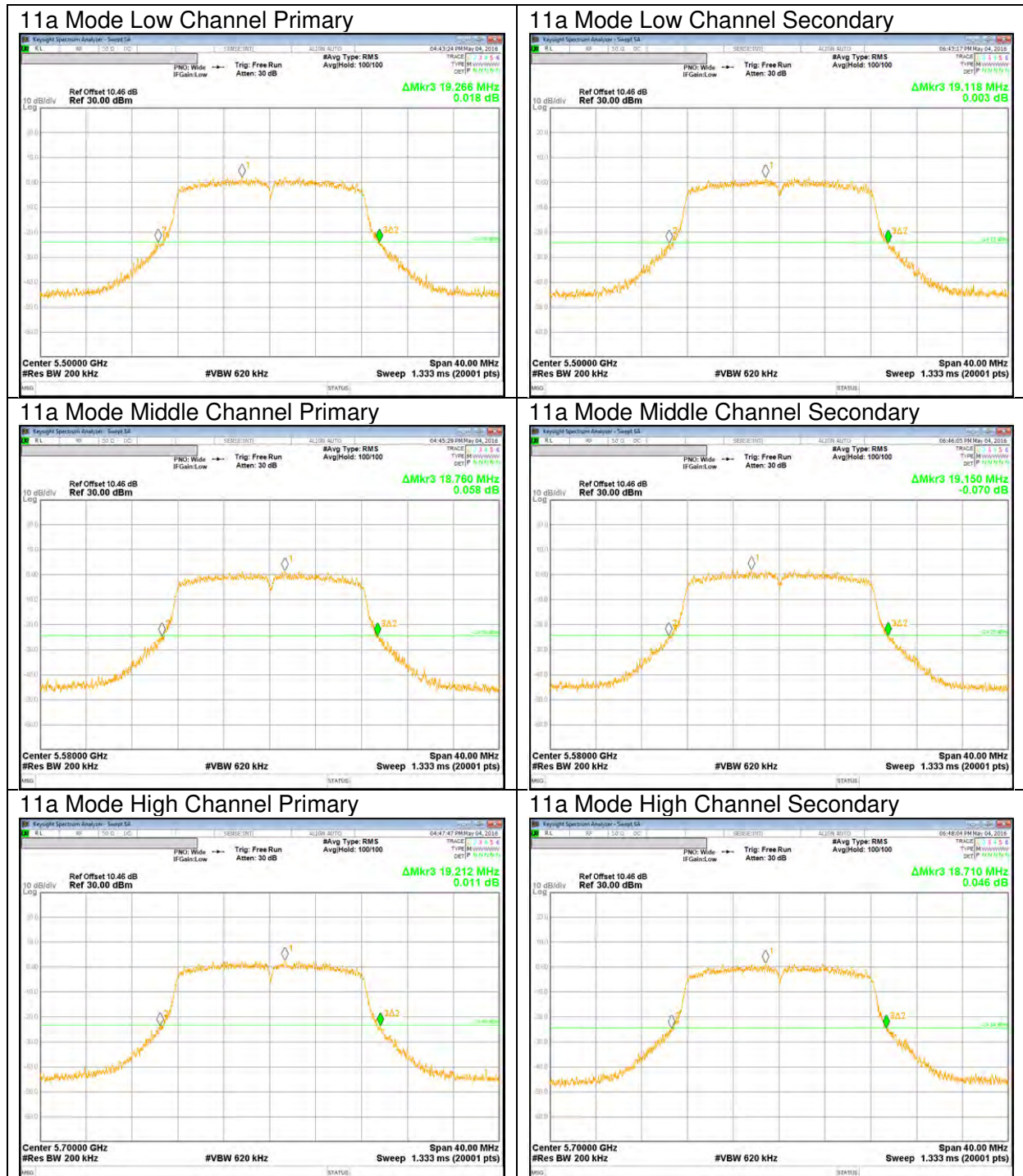
UNII 5.3 GHz IEEE 802.11n HT40 mode



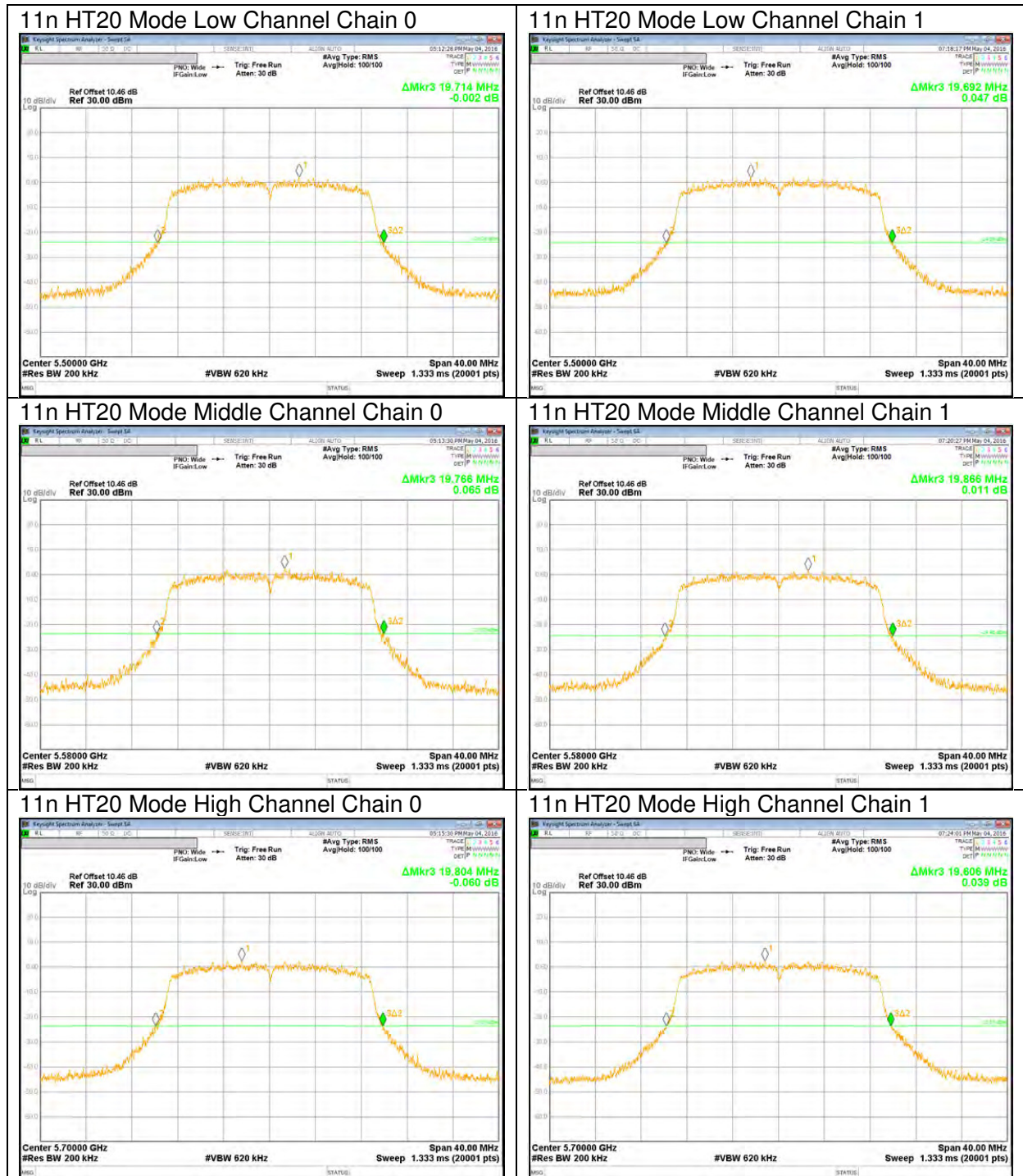
UNII 5.3 GHz IEEE 802.11ac VHT80 mode



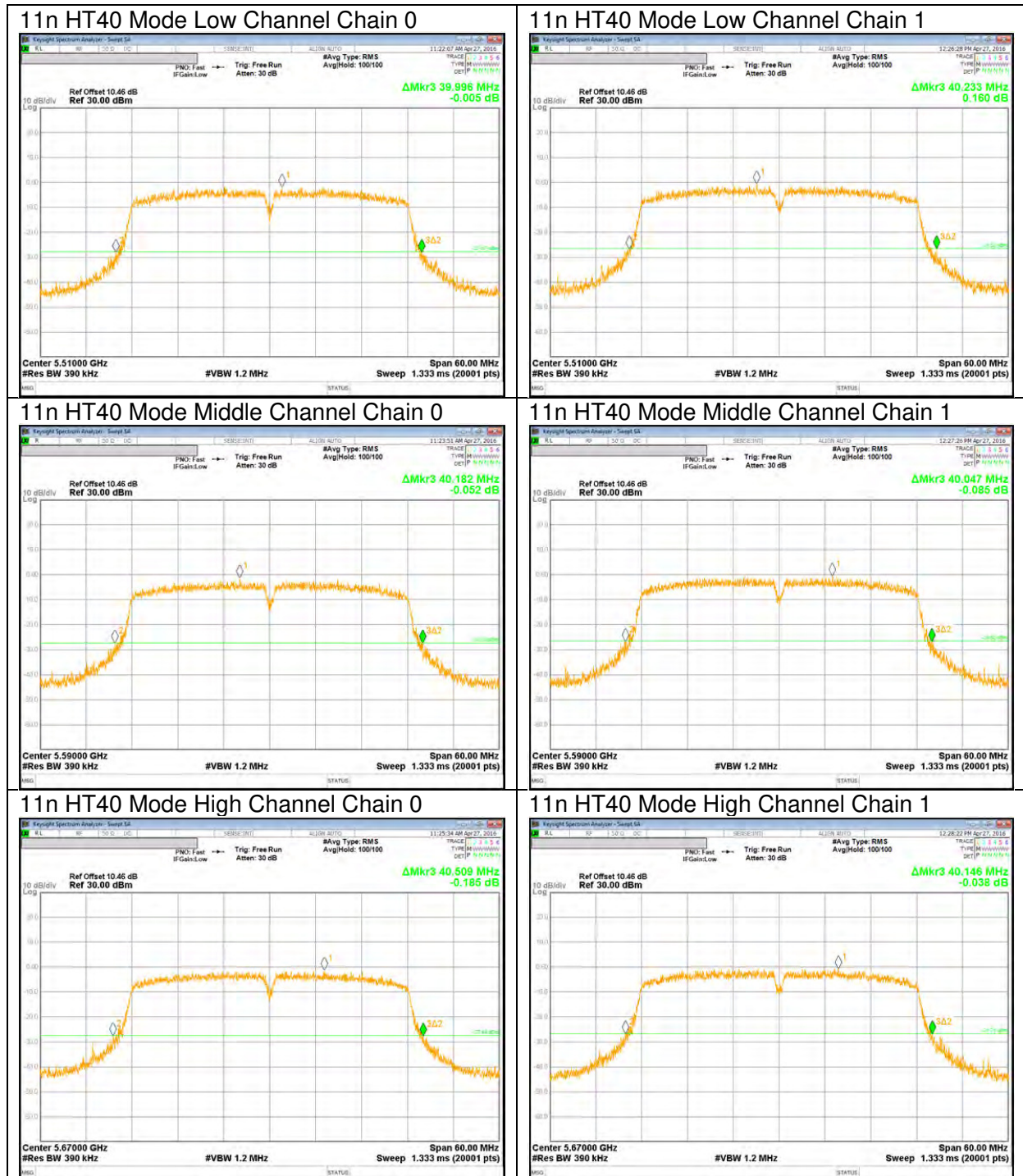
UNII 5.5 GHz IEEE 802.11a mode



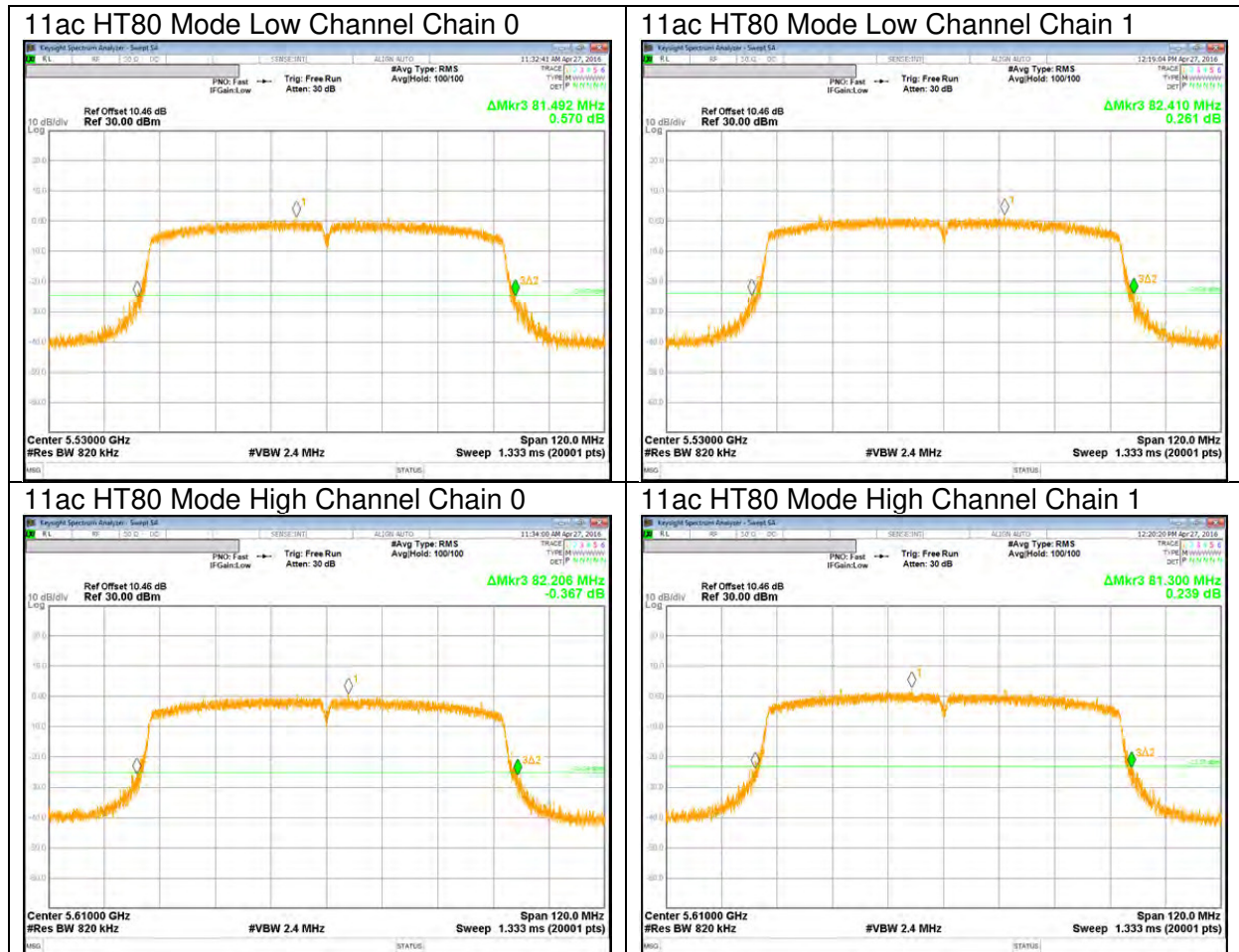
UNII 5.5 GHz IEEE 802.11n HT20 mode



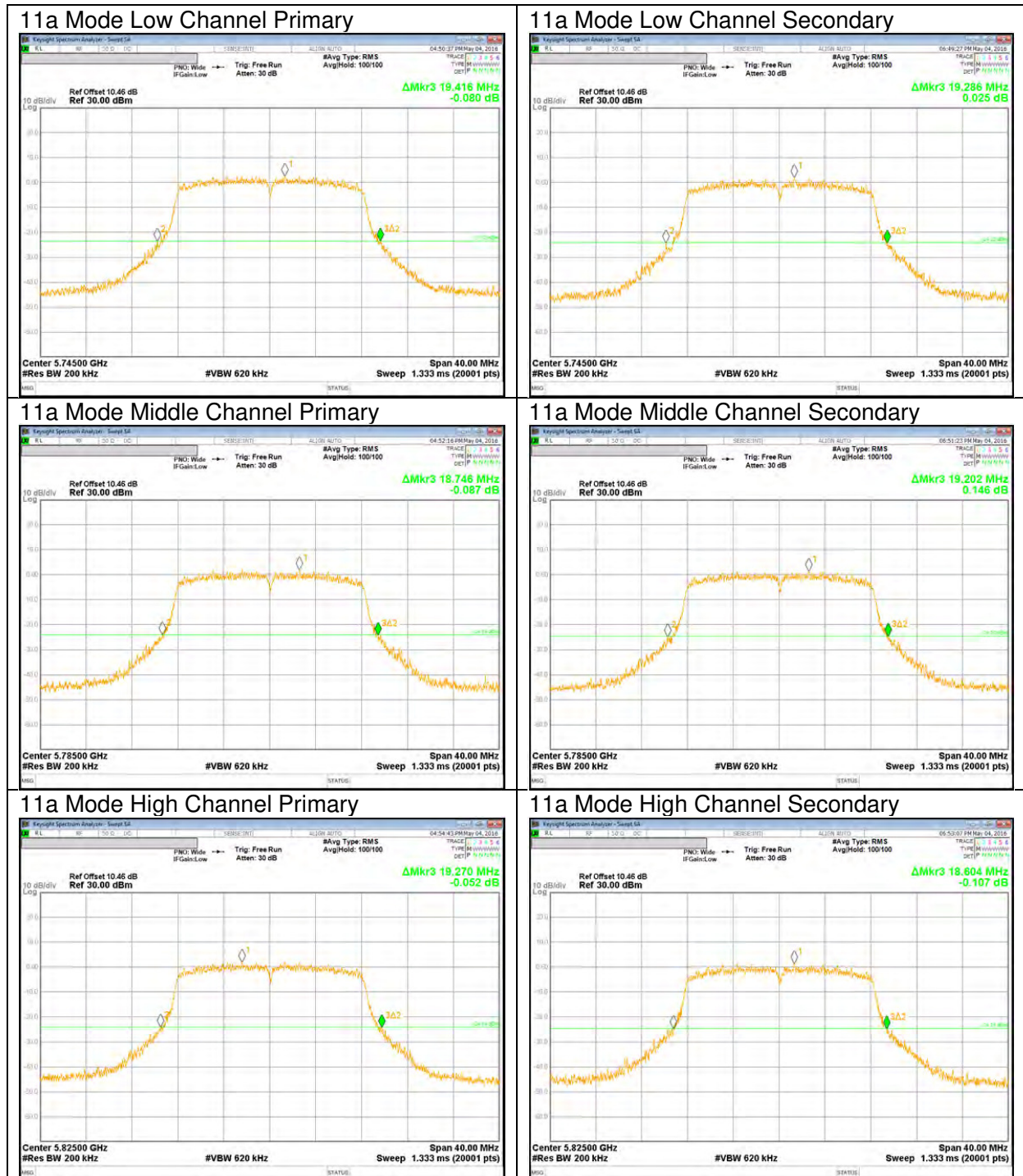
UNII 5.5 GHz IEEE 802.11n HT40 mode



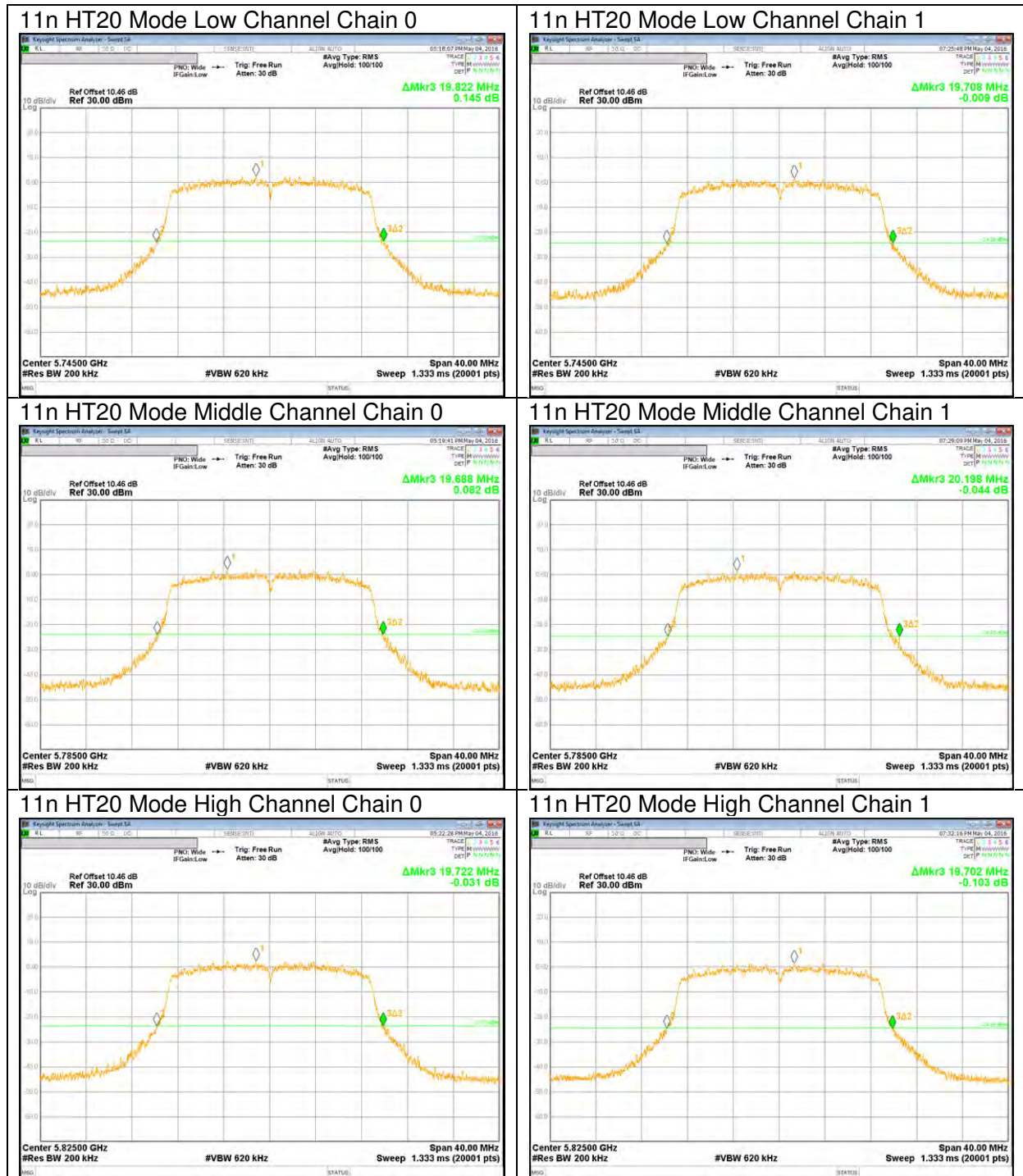
UNII 5.5 GHz IEEE 802.11ac VHT80 mode



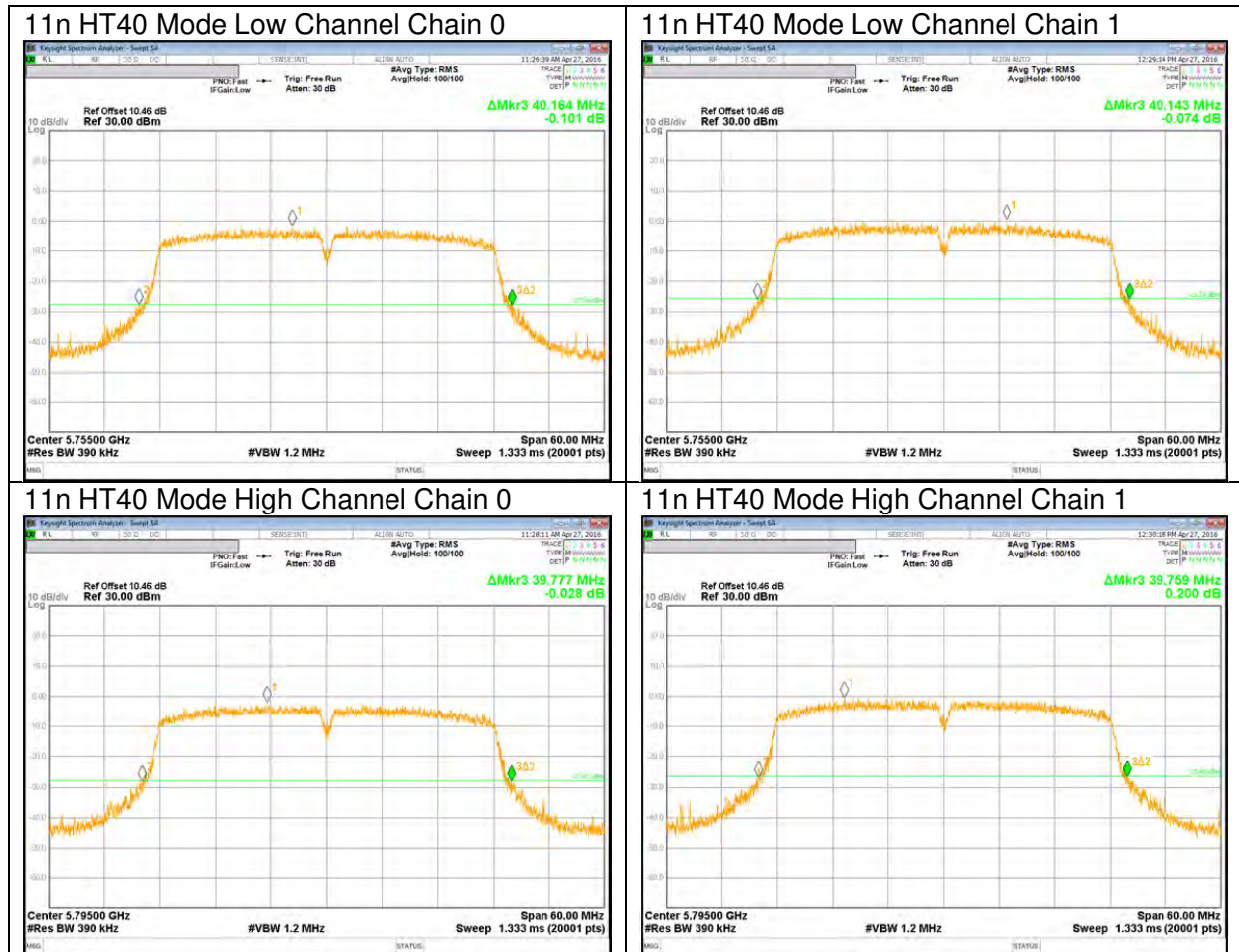
UNII 5.8 GHz IEEE 802.11a mode



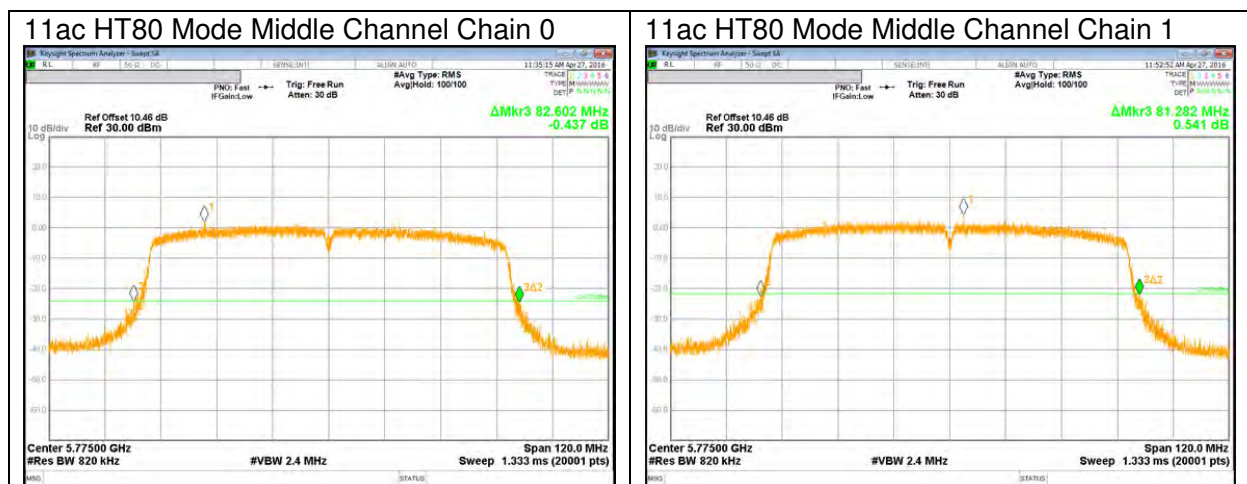
UNII 5.8 GHz IEEE 802.11n HT20 mode



UNII 5.8 GHz IEEE 802.11n HT40 mode



UNII 5.8 GHz IEEE 802.11ac VHT80 mode



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]	
		Primary	Secondary
Low	5180	16.268	16.318
Mid	5200	16.330	16.292
High	5240	16.320	16.326
Worst		16.330	

10.3.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5180	17.441	17.484
Mid	5200	17.511	17.407
High	5240	17.477	17.498
Worst		17.511	

10.3.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5190	35.808	35.773
High	5230	35.866	35.807
Worst		35.866	

10.3.4. 802.11ac VHT80 MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Middle	5210	74.961	74.963
Worst		74.963	

10.3.5. 802.11a MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Primary	Secondary
Low	5260	16.326	16.336
Mid	5300	16.342	16.338
High	5320	16.337	16.346
Worst		16.346	

10.3.6. 802.11n HT20 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5260	17.475	17.425
Mid	5300	17.489	17.498
High	5320	17.490	17.499
Worst		17.499	

10.3.7. 802.11n HT40 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5270	35.916	35.928
High	5310	35.861	35.802
Worst		35.928	

10.3.8. 802.11ac VHT80 MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Middle	5290	74.813	75.064
Worst		75.064	

10.3.9. 802.11a MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Primary	Secondary
Low	5500	16.339	16.293
Mid	5580	16.329	16.331
High	5700	16.329	16.341
Worst		16.341	

10.3.10. 802.11n HT20 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5500	17.472	17.487
Mid	5580	17.491	17.462
High	5700	17.442	17.464
Worst		17.491	

10.3.11. 802.11n HT40 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5510	35.854	35.784
Mid	5550	35.729	35.880
High	5670	35.876	35.891
Worst		35.891	

10.3.12. 802.11ac VHT80 MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5530	75.002	75.061
High	5610	75.075	74.954
Worst		75.075	

10.3.13. 802.11a MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Primary	Secondary
Low	5745	16.334	16.319
Mid	5785	16.326	16.350
High	5825	16.327	16.353
Worst		16.353	

10.3.14. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5745	17.480	17.457
Mid	5785	17.478	17.489
High	5825	17.414	17.491
Worst		17.491	

10.3.15. 802.11n HT40 MODE IN THE 5.8 GHz BAND

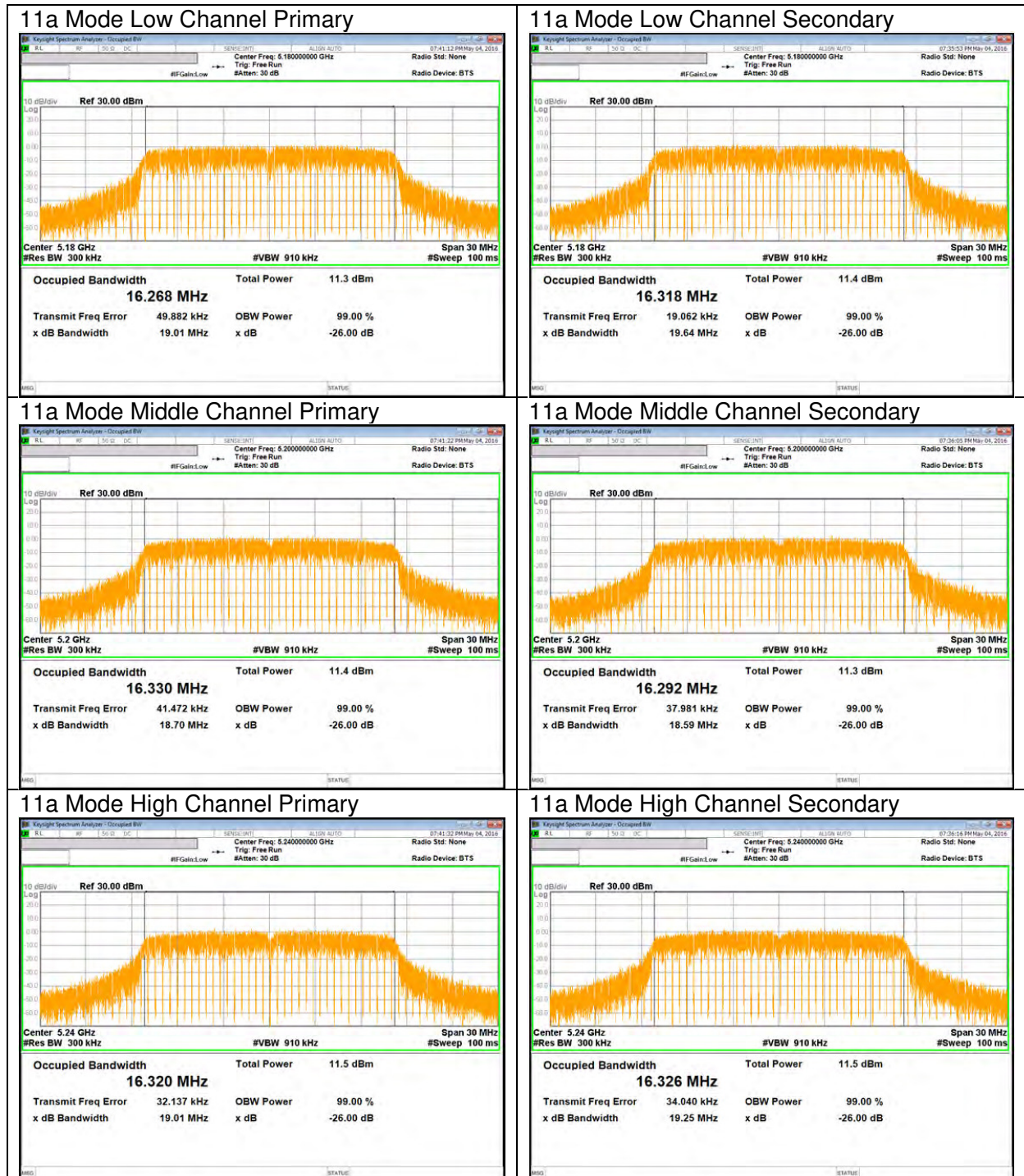
Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Low	5755	35.772	35.935
High	5795	35.846	35.829
Worst		35.935	

10.3.16. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

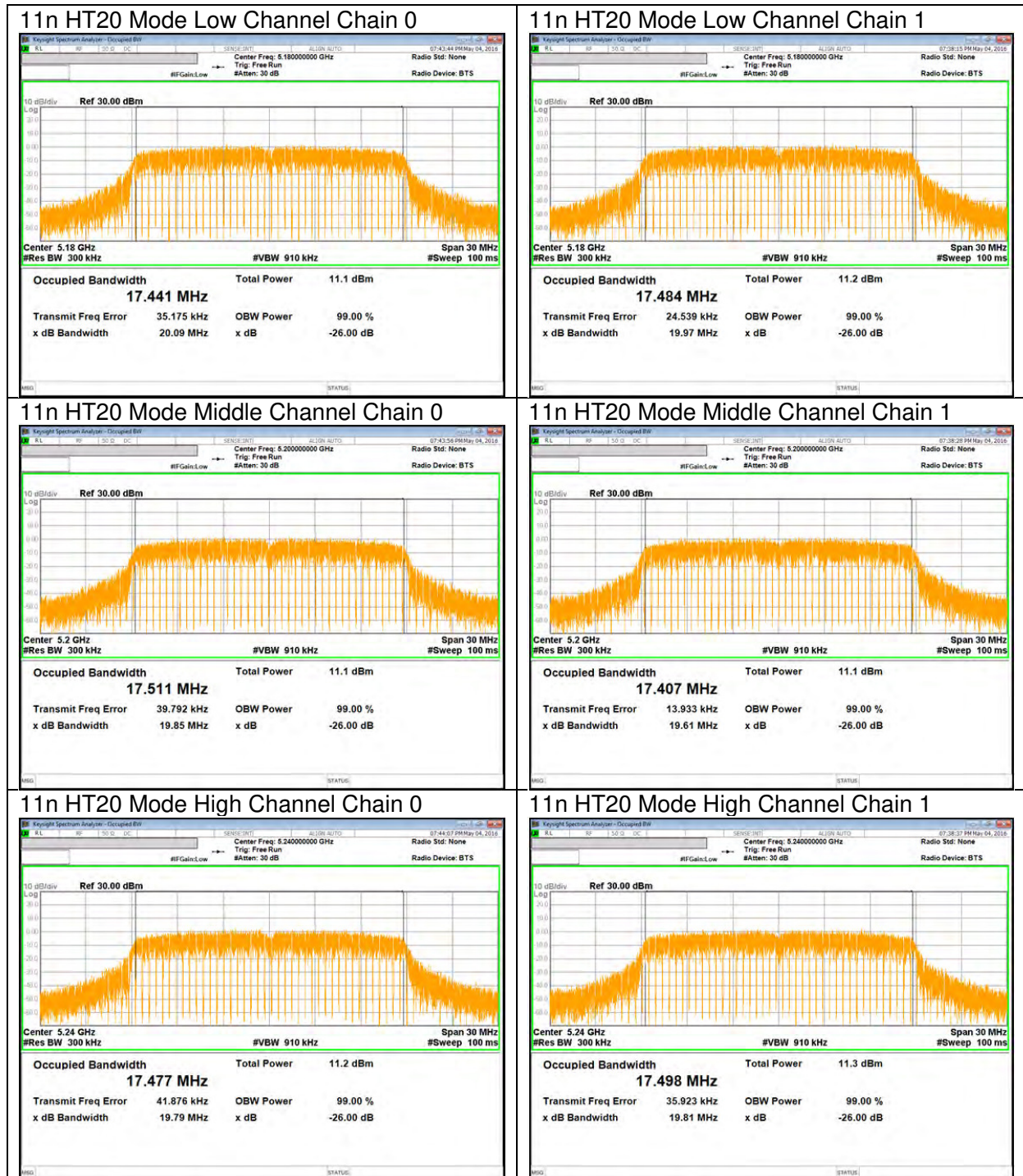
Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Chain 0	Chain 1
Middle	5775	75.042	75.006
Worst		75.042	

10.3.17. 99% BANDWIDTH PLOTS

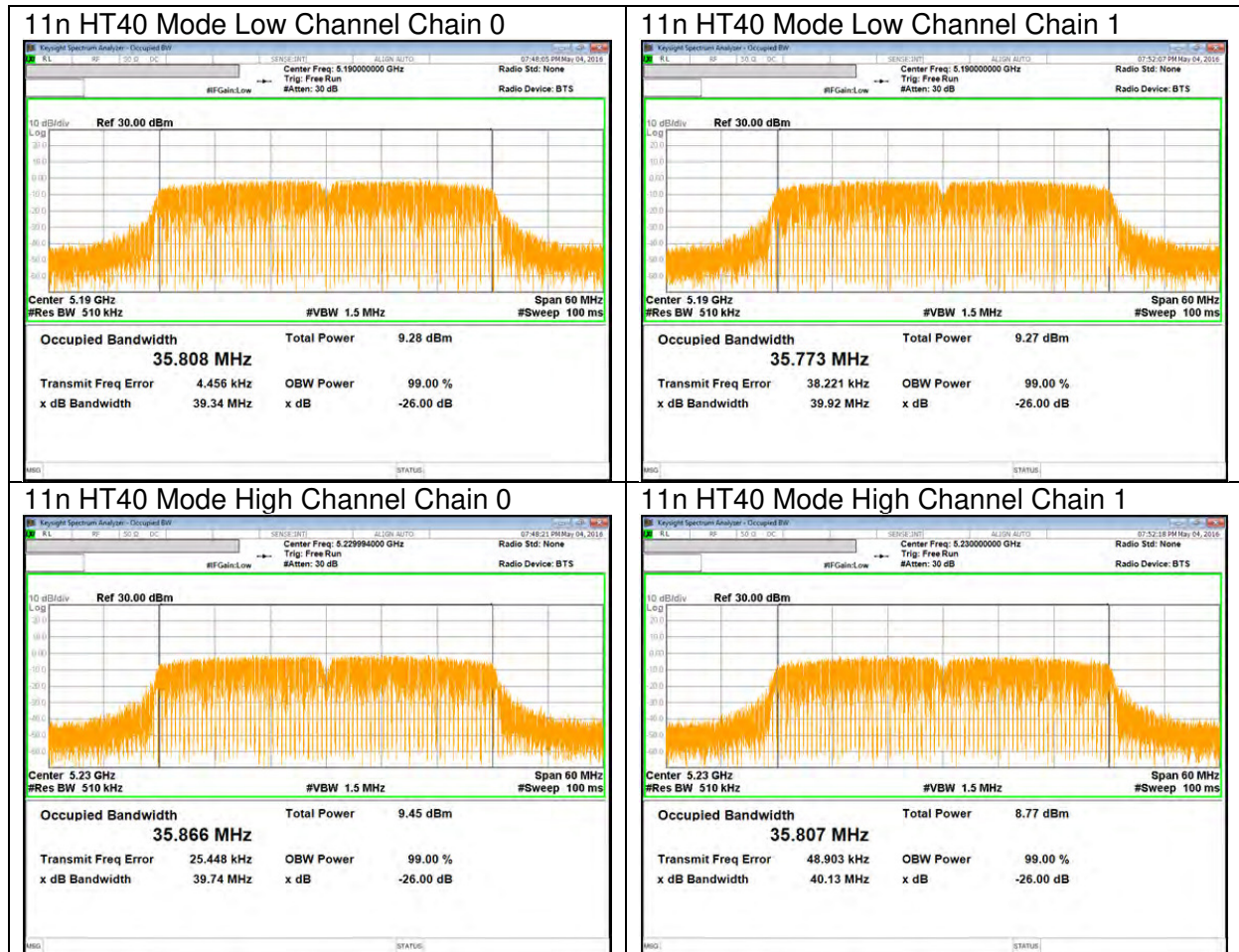
UNII 5.2 GHz IEEE 802.11a mode



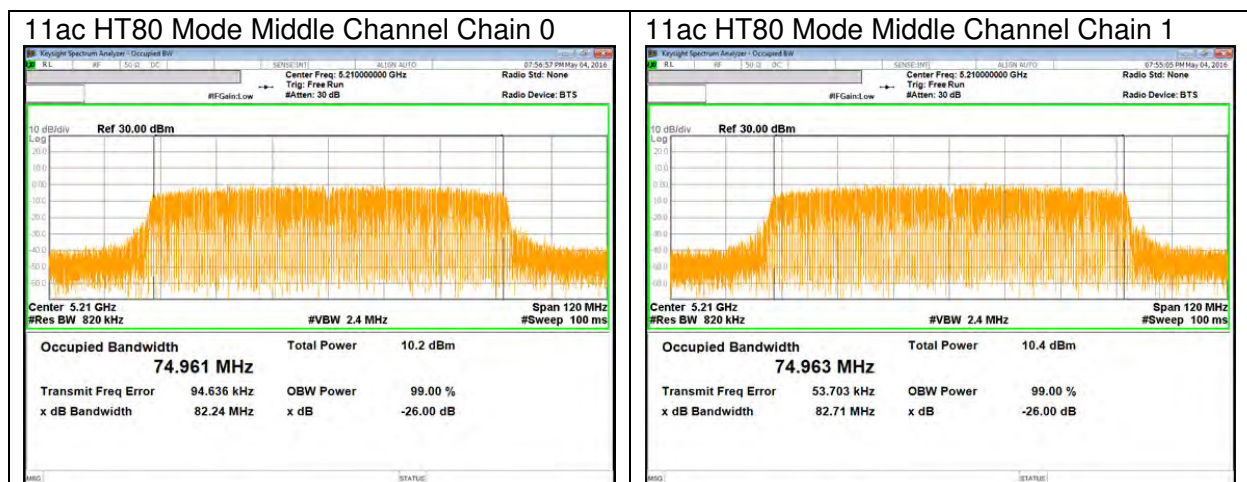
UNII 5.2 GHz IEEE 802.11n HT20 mode



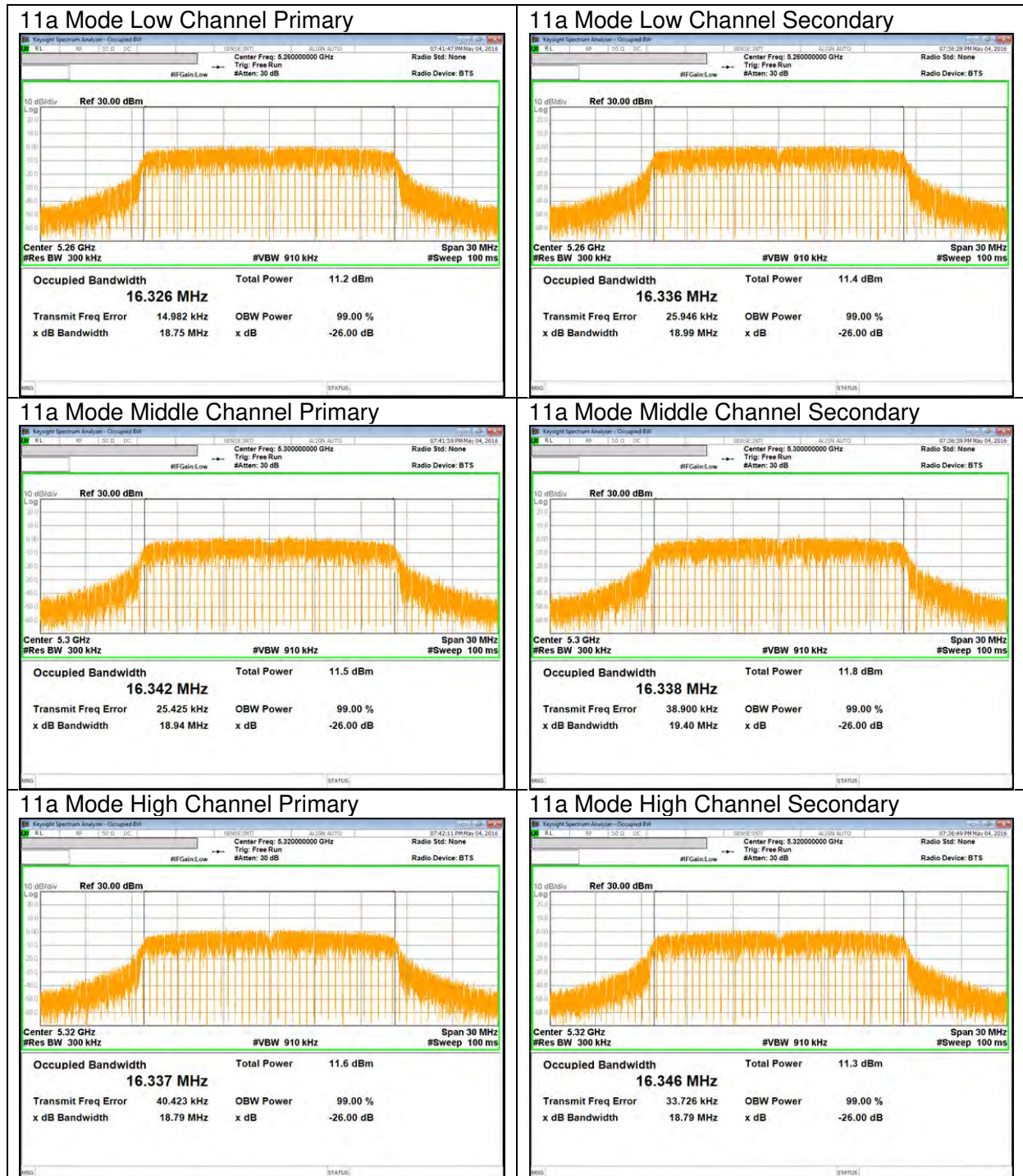
UNII 5.2 GHz IEEE 802.11n HT40 mode



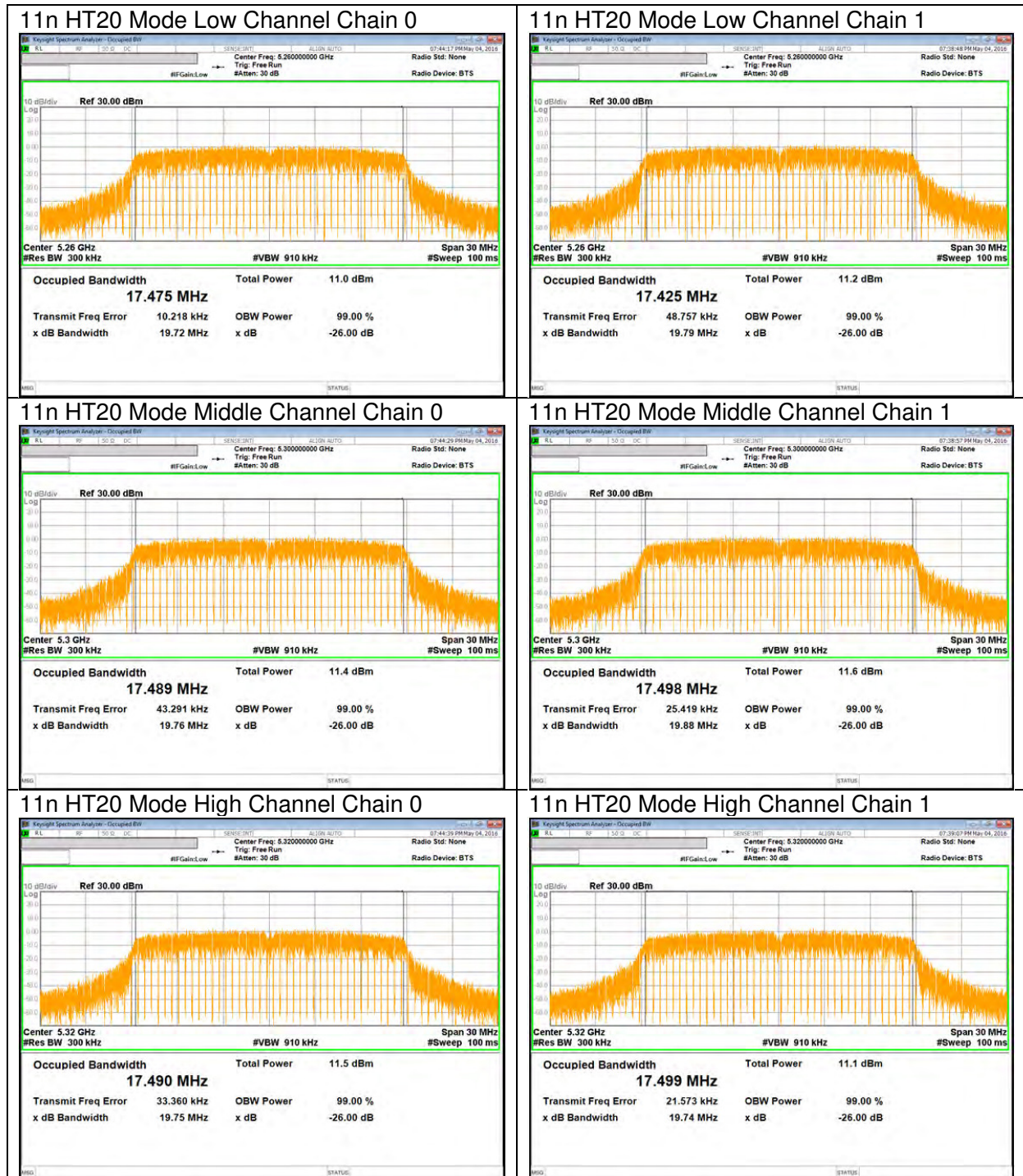
UNII 5.2 GHz IEEE 802.11ac VHT80 mode



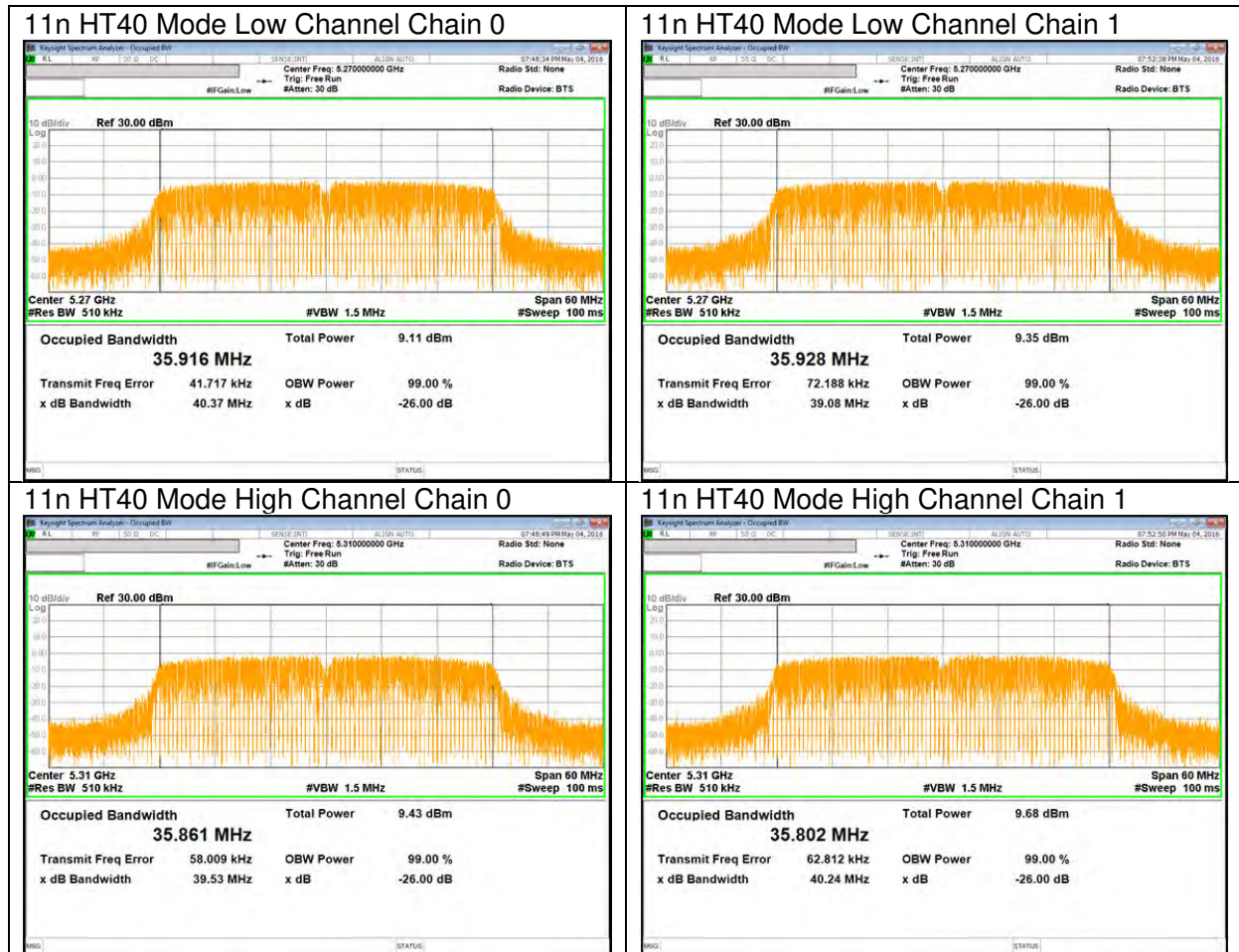
UNII 5.3 GHz IEEE 802.11a mode



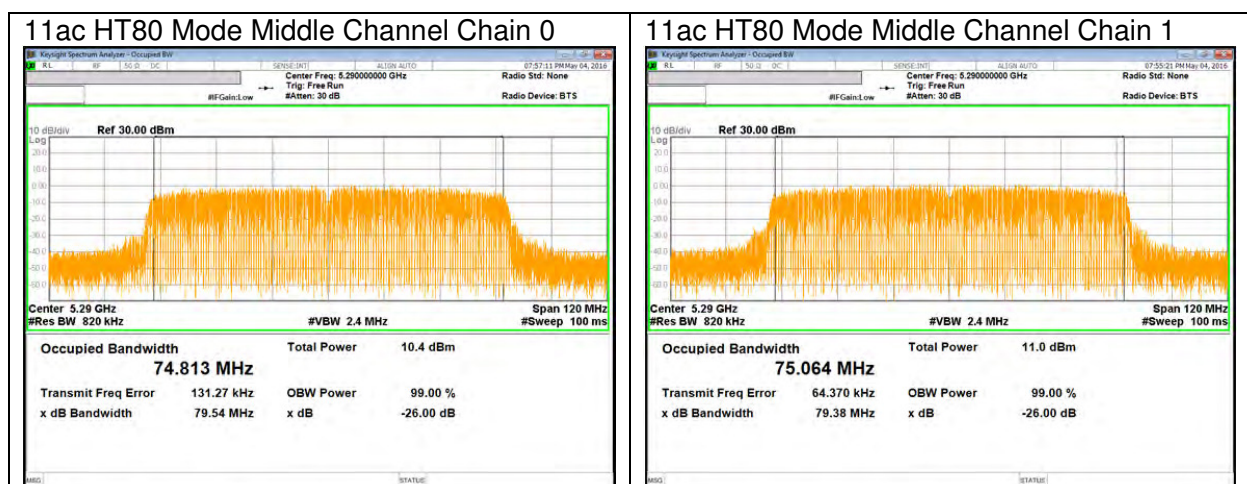
UNII 5.3 GHz IEEE 802.11n HT20 mode



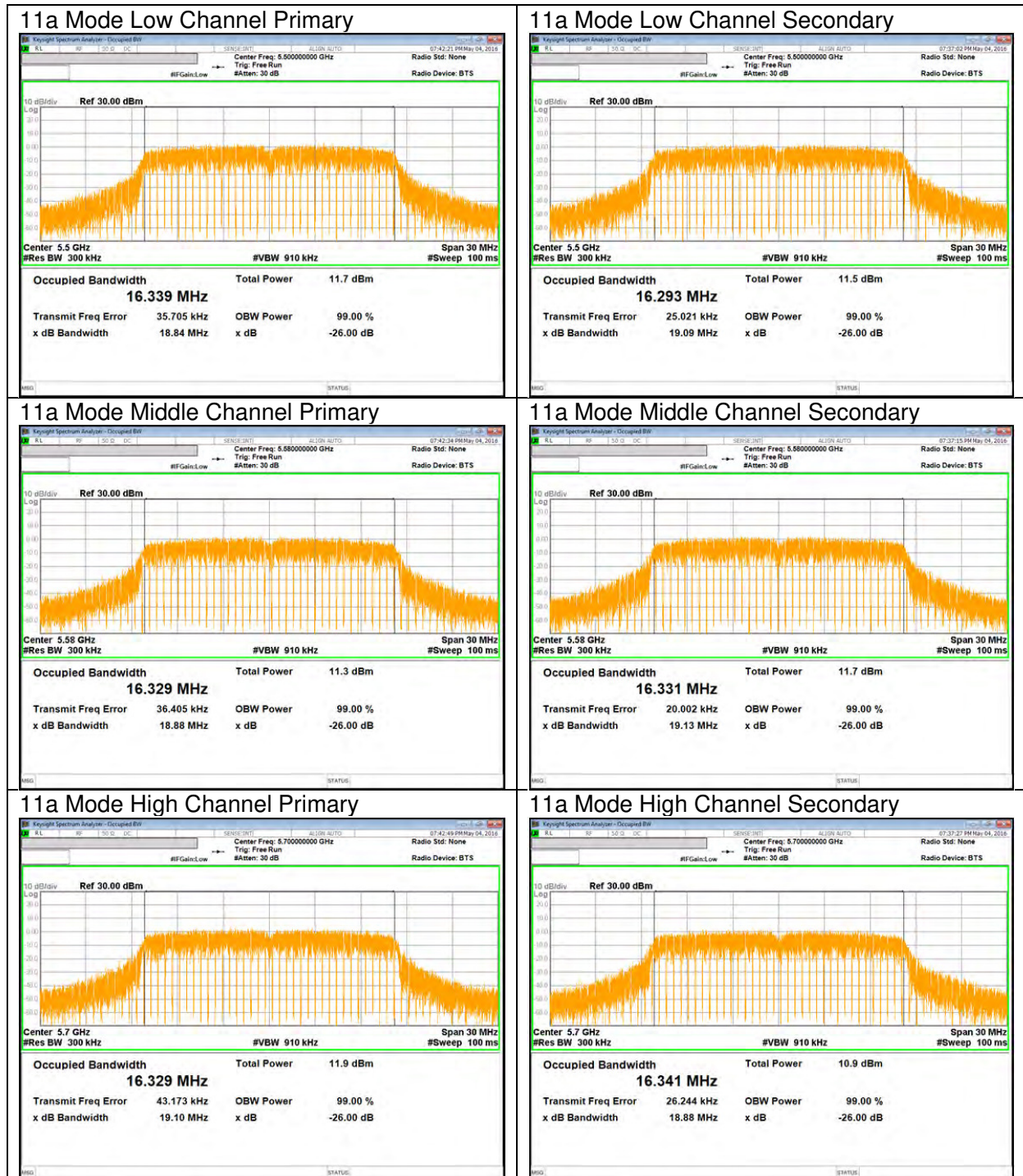
UNII 5.3 GHz IEEE 802.11n HT40 mode



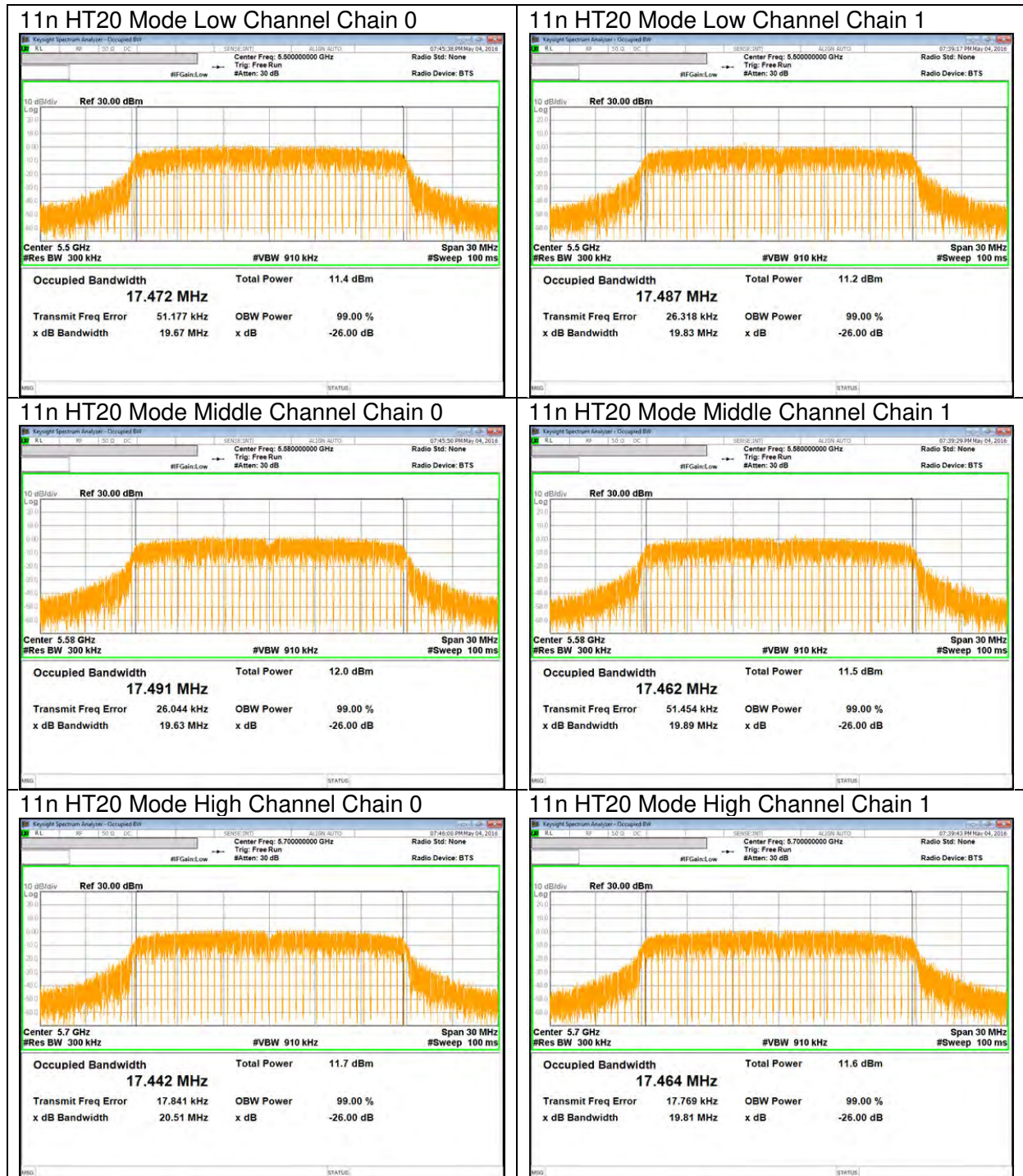
UNII 5.3 GHz IEEE 802.11ac VHT80 mode



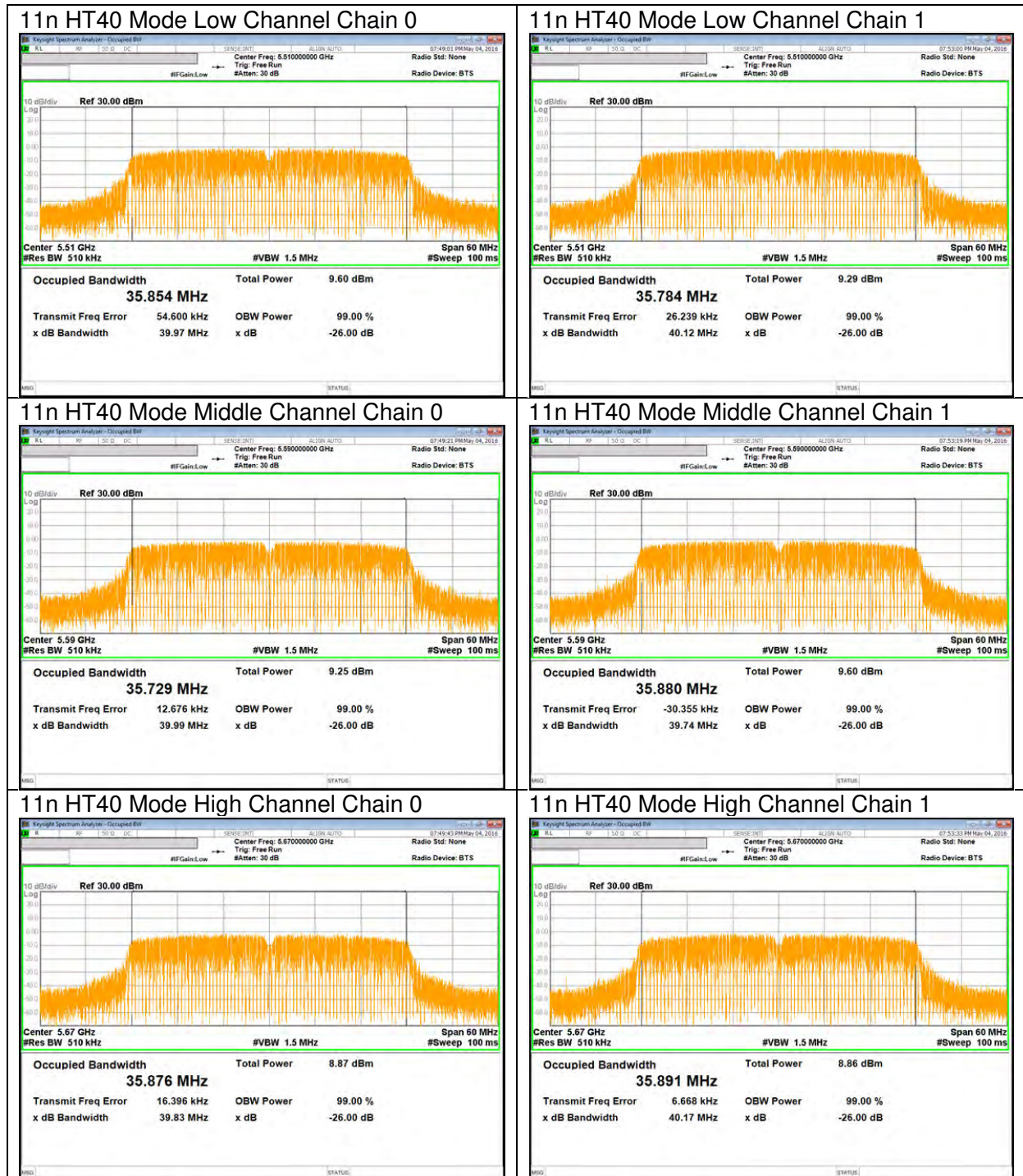
UNII 5.5 GHz IEEE 802.11a mode



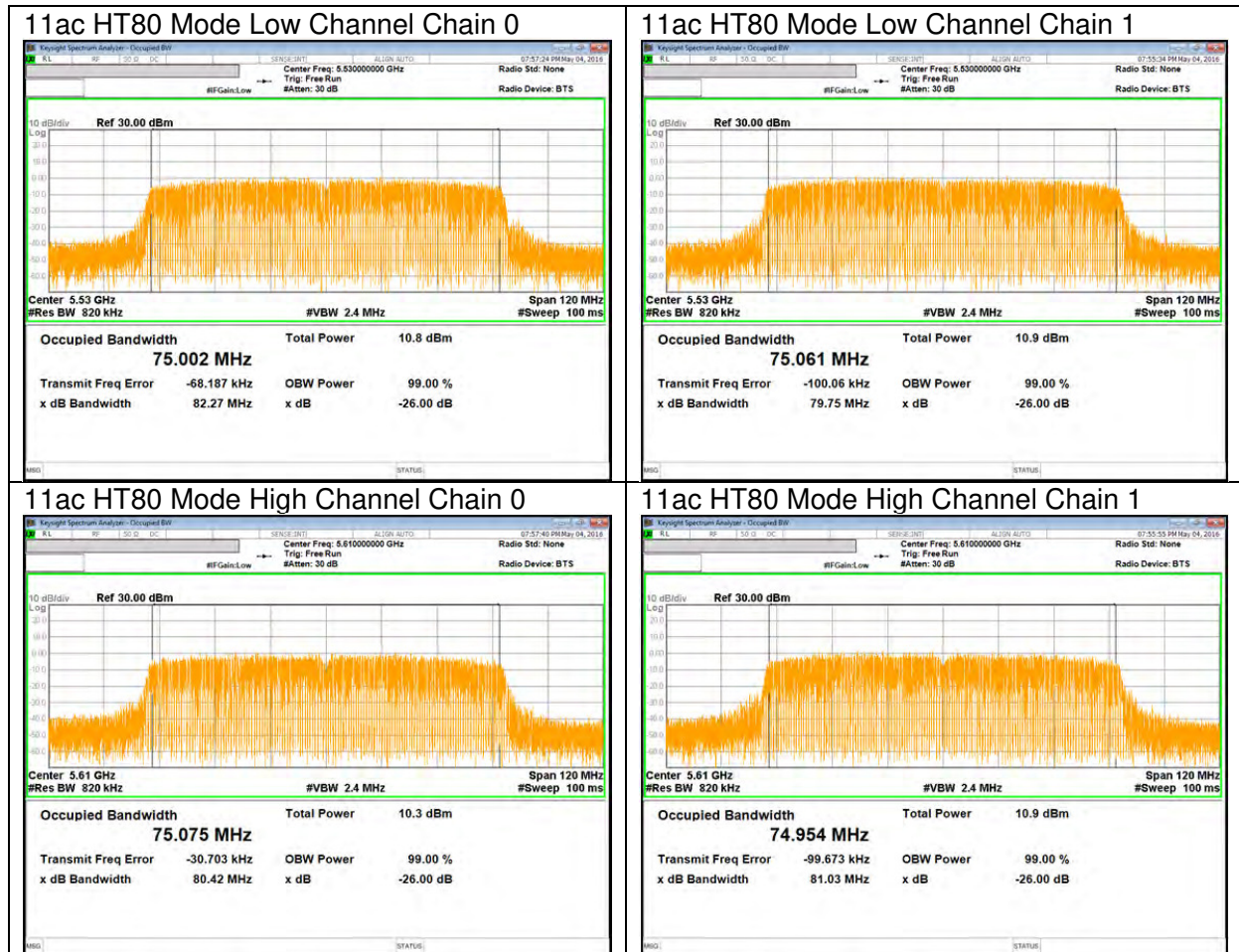
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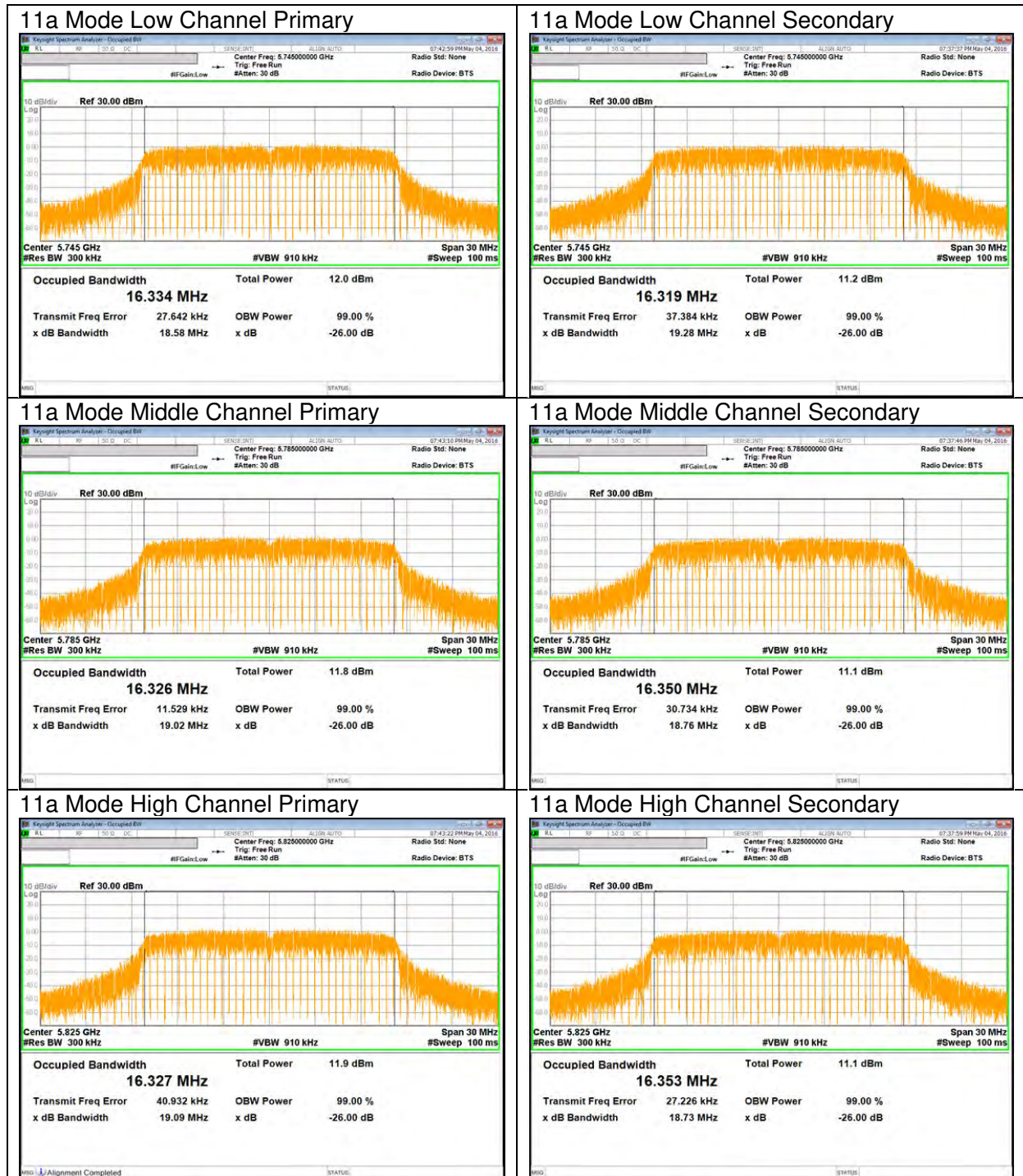
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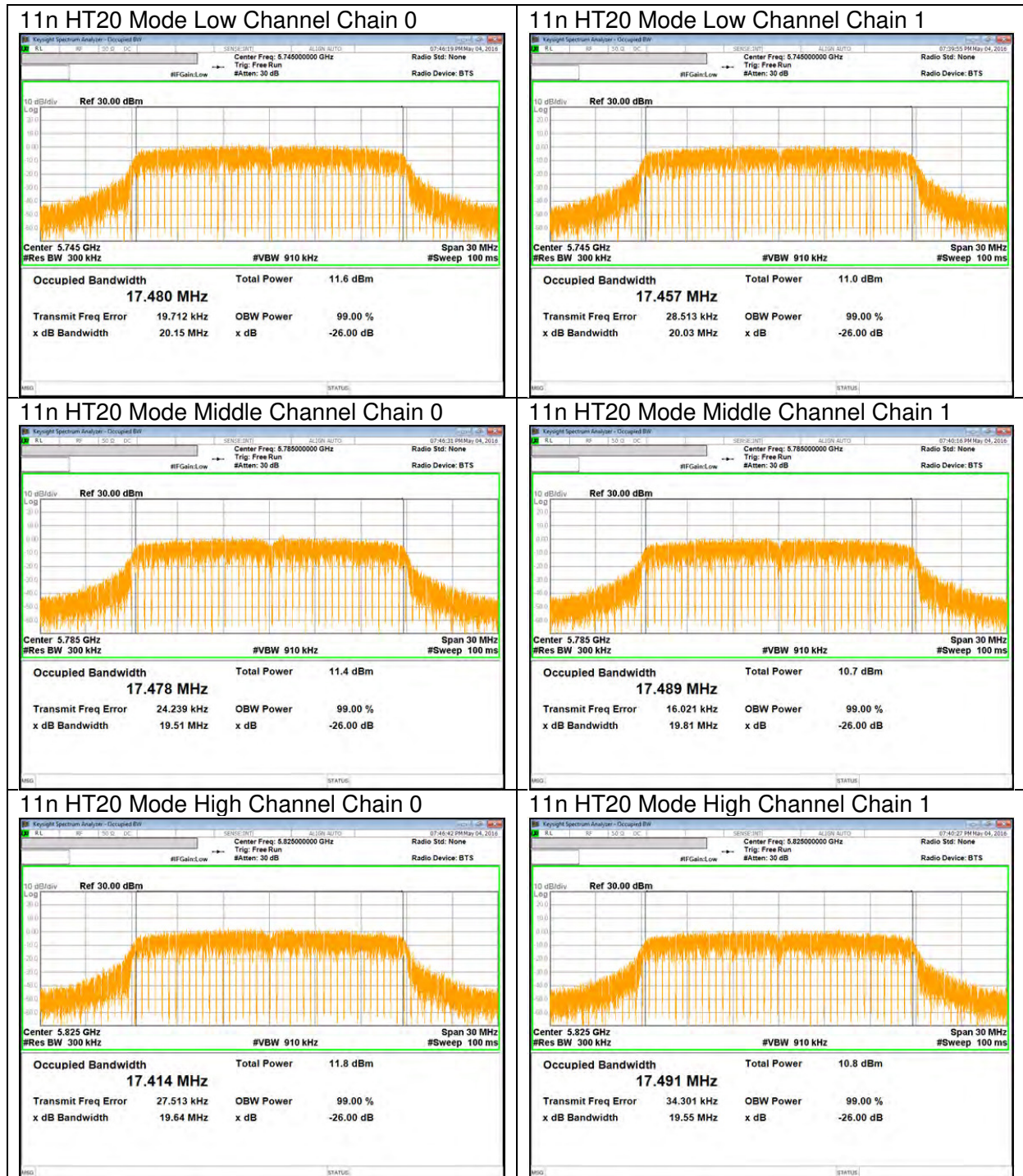
UNII 5.5 GHz IEEE 802.11ac VHT80 mode



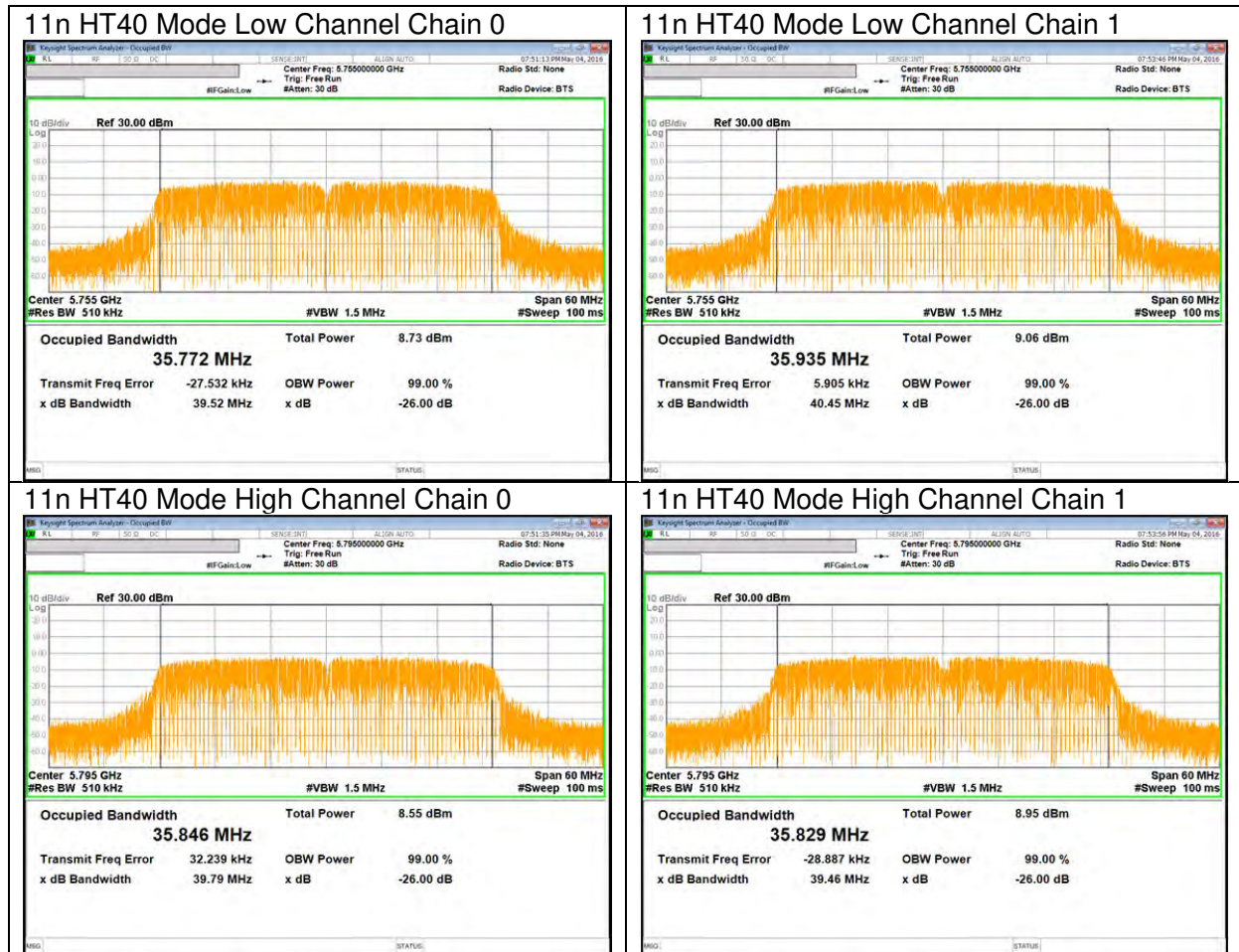
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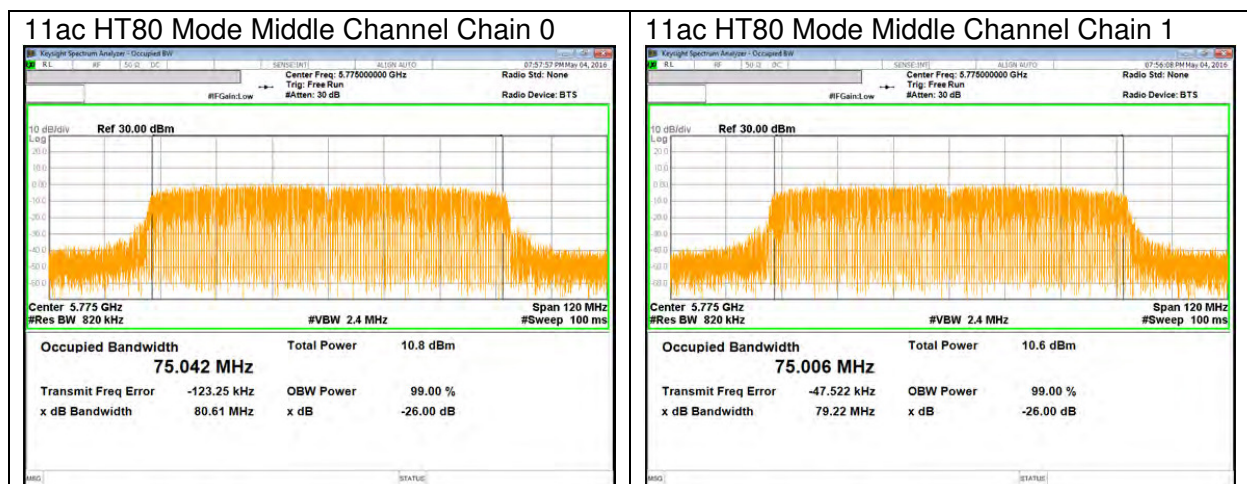
UNII 5.8 GHz IEEE 802.11n HT20 mode



UNII 5.8 GHz IEEE 802.11n HT40 mode



UNII 5.8 GHz IEEE 802.11ac VHT80 mode



10.4. OUTPUT POWER AND PPSD

LIMITS

FCC §15.407 (a) (1) (2) (3)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

DIRECTIONAL ANTENNA GAIN

For Power: The TX chains are uncorrelated and the antenna gains are unequal among the chains. The directional gain is:

Frequency Band [MHz]	Chain 0 Antenna Gain [dBi]	Chain 1 Antenna Gain [dBi]	Uncorrelated Chains Directional Gain [dBi]
5150 - 5250	-3.08	-3.57	-3.32
5250 - 5350	-3.08	-3.57	-3.32
5470 - 5725	-3.08	-3.57	-3.32
5725 - 5850	-3.08	-3.57	-3.32

For PSD: The TX chains are correlated and the antenna gains are unequal among the chains. The directional gain is:

Frequency Band [MHz]	Chain 0 Antenna Gain [dBi]	Chain 1 Antenna Gain [dBi]	Correlated Chains Directional Gain [dBi]
5150 - 5250	-3.08	-3.57	-0.31
5250 - 5350	-3.08	-3.57	-0.31
5470 - 5725	-3.08	-3.57	-0.31
5725 - 5850	-3.08	-3.57	-0.31

RESULTS

10.4.1. 802.11a MODE IN THE 5.2 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Min 99% BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5180	19.14	16.32	-3.32	-0.31
Mid	5200	19.07	16.33	-3.32	-0.31
High	5240	19.53	16.33	-3.32	-0.31

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5180	23.82	11.00
Mid	5200	23.80	11.00
High	5240	23.91	11.00

Duty Cycle CF [dB]	0.31	Included in Calculations of Corr'd Power & PPSD
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Output Power Results

Channel	Frequency [MHz]	Primary Antenna 1 Power [dBm]	Secondary Antenna 2 Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5180	11.27	11.58	14.75	23.82	-9.07
Mid	5200	11.22	11.53	14.70	23.80	-9.10
High	5240	11.44	11.74	14.91	23.91	-8.99

PPSD Results

Channel	Frequency [MHz]	Primary Antenna 1 PPSD [dBm]	Secondary Antenna 2 PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5180	1.34	1.53	4.76	11.00	-6.24
Mid	5200	0.98	1.74	4.70	11.00	-6.30
High	5240	1.25	1.92	4.92	11.00	-6.08

10.4.2. 802.11n HT20 MODE IN THE 5.2 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Min 99% BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSP [dBi]
Low	5180	19.72	17.48	-3.32	-0.31
Mid	5200	19.71	17.51	-3.32	-0.31
High	5240	19.83	17.50	-3.32	-0.31

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	FCC PPSP Limit [dBm]
Low	5180	23.95	11.00
Mid	5200	23.95	11.00
High	5240	23.97	11.00

Duty Cycle CF [dB]	0.31	Included in Calculations of Corr'd Power & PPSP
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Output Power Results

Channel	Frequency [MHz]	Chain 0 Meas Power [dBm]	Chain 1 Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5180	11.27	11.21	14.56	23.95	-9.39
Mid	5200	11.45	11.21	14.65	23.95	-9.30
High	5240	11.42	11.33	14.69	23.97	-9.28

PPSP Results

Channel	Frequency [MHz]	Chain 0 Meas PPSP [dBm]	Chain 1 Meas PPSP [dBm]	Total Corr'd PPSP [dBm]	PPSP Limit [dBm]	PPSP Margin [dB]
Low	5180	1.16	1.09	4.44	11.00	-6.56
Mid	5200	1.36	1.24	4.62	11.00	-6.38
High	5240	1.34	1.30	4.64	11.00	-6.36

10.4.3. 802.11n HT40 MODE IN THE 5.2 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Min 99% BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSP [dBi]
Low	5190	40.52	35.81	-3.32	-0.31
High	5230	40.33	35.87	-3.32	-0.31

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	FCC PPSP Limit [dBm]
Low	5190	24.00	11.00
High	5230	24.00	11.00

Duty Cycle CF [dB]	0.59	Included in Calculations of Corr'd Power & PPSP
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Output Power Results

Channel	Frequency [MHz]	Chain 0 Meas Power [dBm]	Chain 1 Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5190	9.39	9.67	13.13	24.00	-10.87
High	5230	9.88	9.54	13.32	24.00	-10.68

PPSP Results

Channel	Frequency [MHz]	Chain 0 Meas PPSP [dBm]	Chain 1 Meas PPSP [dBm]	Total Corr'd PPSP [dBm]	PPSP Limit [dBm]	PPSP Margin [dB]
Low	5190	-3.93	-3.44	-0.07	11.00	-11.07
High	5230	-3.28	-3.44	0.24	11.00	-10.76

10.4.4. 802.11ac HT80 MODE IN THE 5.2 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Min 99% BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Middle	5210	82.55	74.96	-3.32	-0.31

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	FCC PPSD Limit [dBm]
Middle	5210	24.00	11.00

Duty Cycle CF [dB]	1.12	Included in Calculations of Corr'd Power & PPSP
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Output Power Results

Channel	Frequency [MHz]	Chain 0 Meas Power [dBm]	Chain 1 Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Middle	5210	10.87	10.71	14.92	24.00	-9.08

PPSD Results

Channel	Frequency [MHz]	Chain 0 Meas PPSD [dBm]	Chain 1 Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Middle	5210	-4.94	-5.09	-0.89	11.00	-11.89

10.4.5. 802.11a MODE IN THE 5.3 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Min 99% BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSP [dBi]
Low	5260	19.55	16.34	-3.32	-0.31
Mid	5300	19.26	16.34	-3.32	-0.31
High	5320	18.66	16.35	-3.32	-0.31

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	FCC PPSP Limit [dBm]
Low	5260	23.91	11.00
Mid	5300	23.85	11.00
High	5320	23.71	11.00

Duty Cycle CF [dB]	0.31	Included in Calculations of Corr'd Power & PPSP
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Output Power Results

Channel	Frequency [MHz]	Primary Antenna 1 Power [dBm]	Secondary Antenna 2 Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5260	11.32	11.65	14.81	23.91	-9.10
Mid	5300	11.43	11.56	14.82	23.85	-9.03
High	5320	11.45	11.01	14.56	23.71	-9.15

PPSP Results

Channel	Frequency [MHz]	Primary Antenna 1 PPSP [dBm]	Secondary Antenna 2 PPSP [dBm]	Total Corr'd PPSP [dBm]	PPSP Limit [dBm]	PPSP Margin [dB]
Low	5260	1.34	1.84	4.92	11.00	-6.08
Mid	5300	1.47	1.59	4.85	11.00	-6.15
High	5320	1.40	0.99	4.52	11.00	-6.48

10.4.6. 802.11n HT20 MODE IN THE 5.3 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Min 99% BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5260	19.78	17.48	-3.32	-0.31
Mid	5300	19.61	17.50	-3.32	-0.31
High	5320	19.77	17.50	-3.32	-0.31

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5260	23.96	11.00
Mid	5300	23.92	11.00
High	5320	23.96	11.00

Duty Cycle CF [dB]	0.31	Included in Calculations of Corr'd Power & PPSP
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Output Power Results

Channel	Frequency [MHz]	Chain 0 Meas Power [dBm]	Chain 1 Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5260	11.20	11.27	14.55	23.96	-9.41
Mid	5300	11.32	11.11	14.53	23.92	-9.39
High	5320	11.25	11.61	14.75	23.96	-9.21

PPSD Results

Channel	Frequency [MHz]	Chain 0 Meas PPSD [dBm]	Chain 1 Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5260	1.47	1.12	4.62	11.00	-6.38
Mid	5300	1.24	1.08	4.47	11.00	-6.53
High	5320	1.32	1.42	4.68	11.00	-6.32

10.4.7. 802.11n HT40 MODE IN THE 5.3 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Min 99% BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5270	39.94	35.93	-3.32	-0.31
High	5310	40.46	35.86	-3.32	-0.31

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5270	24.00	11.00
High	5310	24.00	11.00

Duty Cycle CF [dB]	0.59	Included in Calculations of Corr'd Power & PPSD
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Output Power Results

Channel	Frequency [MHz]	Chain 0 Meas Power [dBm]	Chain 1 Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5270	9.81	9.89	13.45	24.00	-10.55
High	5310	9.83	9.87	13.45	24.00	-10.55

PPSD Results

Channel	Frequency [MHz]	Chain 0 Meas PPSD [dBm]	Chain 1 Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5270	-3.30	-2.98	0.47	11.00	-10.53
High	5310	-3.23	-3.53	0.23	11.00	-10.77

10.4.8. 802.11ac HT80 MODE IN THE 5.3 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Min 99% BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSP [dBi]
Middle	5290	81.97	75.06	-3.32	-0.31

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	FCC PPSP Limit [dBm]
Middle	5290	24.00	11.00

Duty Cycle CF [dB]	1.12	Included in Calculations of Corr'd Power & PPSP
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Output Power Results

Channel	Frequency [MHz]	Chain 0 Meas Power [dBm]	Chain 1 Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Middle	5290	11.03	11.04	15.16	24.00	-8.84

PPSP Results

Channel	Frequency [MHz]	Chain 0 Meas PPSP [dBm]	Chain 1 Meas PPSP [dBm]	Total Corr'd PPSP [dBm]	PPSP Limit [dBm]	PPSP Margin [dB]
Middle	5290	-5.11	-4.87	-0.86	11.00	-11.86

10.4.9. 802.11a MODE IN THE 5.5 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Min 99% BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSP [dBi]
Low	5500	19.27	16.34	-3.32	-0.31
Mid	5580	19.15	16.33	-3.32	-0.31
High	5700	19.21	16.34	-3.32	-0.31

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	FCC PPSP Limit [dBm]
Low	5500	23.85	11.00
Mid	5580	23.82	11.00
High	5700	23.84	11.00

Duty Cycle CF [dB]	0.31	Included in Calculations of Corr'd Power & PPSP
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Output Power Results

Channel	Frequency [MHz]	Primary Antenna 1 Power [dBm]	Secondary Antenna 2 Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5500	11.46	11.45	14.78	23.85	-9.07
Mid	5580	11.86	11.10	14.82	23.82	-9.00
High	5700	12.05	11.04	14.89	23.84	-8.94

PPSP Results

Channel	Frequency [MHz]	Primary Antenna 1 PPSP [dBm]	Secondary Antenna 2 PPSP [dBm]	Total Corr'd PPSP [dBm]	PPSP Limit [dBm]	PPSP Margin [dB]
Low	5500	1.64	1.36	4.83	11.00	-6.17
Mid	5580	1.87	1.14	4.84	11.00	-6.16
High	5700	2.01	0.99	4.85	11.00	-6.15

10.4.10. 802.11n HT20 MODE IN THE 5.5 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Min 99% BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5500	19.71	17.49	-3.32	-0.31
Mid	5580	19.87	17.49	-3.32	-0.31
High	5700	19.80	17.46	-3.32	-0.31

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5500	23.95	11.00
Mid	5580	23.98	11.00
High	5700	23.97	11.00

Duty Cycle CF [dB]	0.31	Included in Calculations of Corr'd Power & PPSP
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Output Power Results

Channel	Frequency [MHz]	Chain 0 Meas Power [dBm]	Chain 1 Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5500	11.35	11.03	14.51	23.95	-9.44
Mid	5580	11.60	11.01	14.63	23.98	-9.35
High	5700	11.93	11.71	15.14	23.97	-8.83

PPSD Results

Channel	Frequency [MHz]	Chain 0 Meas PPSD [dBm]	Chain 1 Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5500	1.30	0.76	4.35	11.00	-6.65
Mid	5580	1.82	0.66	4.60	11.00	-6.40
High	5700	1.66	1.50	4.90	11.00	-6.10

10.4.11. 802.11n HT40 MODE IN THE 5.5 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Min 99% BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5510	40.23	35.85	-3.32	-0.31
Mid	5550	40.18	35.88	-3.32	-0.31
High	5670	40.51	35.89	-3.32	-0.31

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5510	24.00	11.00
Mid	5550	24.00	11.00
High	5670	24.00	11.00

Duty Cycle CF [dB]	0.59	Included in Calculations of Corr'd Power & PPSD
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Output Power Results

Channel	Frequency [MHz]	Chain 0 Meas Power [dBm]	Chain 1 Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5510	9.84	9.77	13.41	24.00	-10.59
Mid	5550	9.16	9.35	12.86	24.00	-11.14
High	5670	9.13	8.86	12.60	24.00	-11.40

PPSD Results

Channel	Frequency [MHz]	Chain 0 Meas PPSD [dBm]	Chain 1 Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5510	-3.30	-3.09	0.41	11.00	-10.59
Mid	5550	-4.21	-3.73	-0.36	11.00	-11.36
High	5670	-4.26	-4.02	-0.53	11.00	-11.53

10.4.12. 802.11ac HT80 MODE IN THE 5.5 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Min 99% BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSP [dBi]
Low	5530	82.41	75.06	-3.32	-0.31
High	5610	82.21	75.08	-3.32	-0.31

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	FCC PPSP Limit [dBm]
Low	5530	24.00	11.00
High	5610	24.00	11.00

Duty Cycle CF [dB]	1.12	Included in Calculations of Corr'd Power & PPSP
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Output Power Results

Channel	Frequency [MHz]	Chain 0 Meas Power [dBm]	Chain 1 Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5530	10.89	10.71	14.93	24.00	-9.07
High	5610	10.24	10.40	14.45	24.00	-9.55

PPSP Results

Channel	Frequency [MHz]	Chain 0 Meas PPSP [dBm]	Chain 1 Meas PPSP [dBm]	Total Corr'd PPSP [dBm]	PPSP Limit [dBm]	PPSP Margin [dB]
Low	5530	-5.17	-5.25	-1.08	11.00	-12.08
High	5610	-5.78	-5.81	-1.67	11.00	-12.67

10.4.13. 802.11a MODE IN THE 5.8 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Min 99% BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5745	19.42	16.33	-3.32	-0.31
Mid	5785	19.20	16.35	-3.32	-0.31
High	5825	19.27	16.35	-3.32	-0.31

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5745	30.00	30.00
Mid	5785	30.00	30.00
High	5825	30.00	30.00

Duty Cycle CF [dB]	0.31	Included in Calculations of Corr'd Power & PPSD
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Output Power Results

Channel	Frequency [MHz]	Primary Antenna 1 Power [dBm]	Secondary Antenna 2 Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5745	12.00	11.26	14.97	30.00	-15.03
Mid	5785	11.67	11.07	14.70	30.00	-15.30
High	5825	12.00	11.08	14.89	30.00	-15.11

PPSD Results

Channel	Frequency [MHz]	Primary Antenna 1 PPSD [dBm]	Secondary Antenna 2 PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5745	-0.87	-1.77	2.03	30.00	-27.97
Mid	5785	-1.31	-1.93	1.72	30.00	-28.28
High	5825	-0.81	-2.14	1.90	30.00	-28.10

10.4.14. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Min 99% BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5745	19.82	17.48	-3.32	-0.31
Mid	5785	20.20	17.49	-3.32	-0.31
High	5825	19.72	17.49	-3.32	-0.31

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5745	30.00	30.00
Mid	5785	30.00	30.00
High	5825	30.00	30.00

Duty Cycle CF [dB]	0.31	Included in Calculations of Corr'd Power & PPSD
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Output Power Results

Channel	Frequency [MHz]	Chain 0 Meas Power [dBm]	Chain 1 Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5745	11.72	11.11	14.74	30.00	-15.26
Mid	5785	11.37	11.11	14.56	30.00	-15.44
High	5825	11.78	11.14	14.79	30.00	-15.21

PPSD Results

Channel	Frequency [MHz]	Chain 0 Meas PPSD [dBm]	Chain 1 Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5745	-1.49	-1.80	1.68	30.00	-28.32
Mid	5785	-1.73	-2.03	1.44	30.00	-28.56
High	5825	-1.56	-2.11	1.49	30.00	-28.51

10.4.15. 802.11n HT40 MODE IN THE 5.8 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency [MHz]	Min 26 dB BW [MHz]	Min 99% BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Low	5755	40.16	35.94	-3.32	-0.31
High	5795	39.78	35.85	-3.32	-0.31

Limits

Channel	Frequency [MHz]	FCC Power Limit [dBm]	FCC PPSD Limit [dBm]
Low	5755	30.00	30.00
High	5795	30.00	30.00

Duty Cycle CF [dB]	0.59	Included in Calculations of Corr'd Power & PPSD
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Output Power Results

Channel	Frequency [MHz]	Chain 0 Meas Power [dBm]	Chain 1 Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Low	5755	9.43	9.77	13.21	30.00	-16.79
High	5795	9.17	9.45	12.91	30.00	-17.09

PPSD Results

Channel	Frequency [MHz]	Chain 0 Meas PPSD [dBm]	Chain 1 Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Low	5755	-6.77	-6.18	-2.86	30.00	-32.86
High	5795	-7.17	-6.69	-3.32	30.00	-33.32

10.4.16. 802.11ac HT80 MODE IN THE 5.8 GHz BAND

Bandwidth and Antenna Gain

Channel	Frequency	Min 26 dB BW [MHz]	Min 99% BW [MHz]	Directional Gain for Power [dBi]	Directional Gain for PPSD [dBi]
Middle	5775	82.60	75.04	-3.32	-0.31

Limits

Channel	Frequency	FCC Power Limit [dBm]	FCC PPSD Limit [dBm]
Middle	5775	30.00	30.00

Duty Cycle CF [dB]	1.12	Included in Calculations of Corr'd Power & PPSP
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Output Power Results

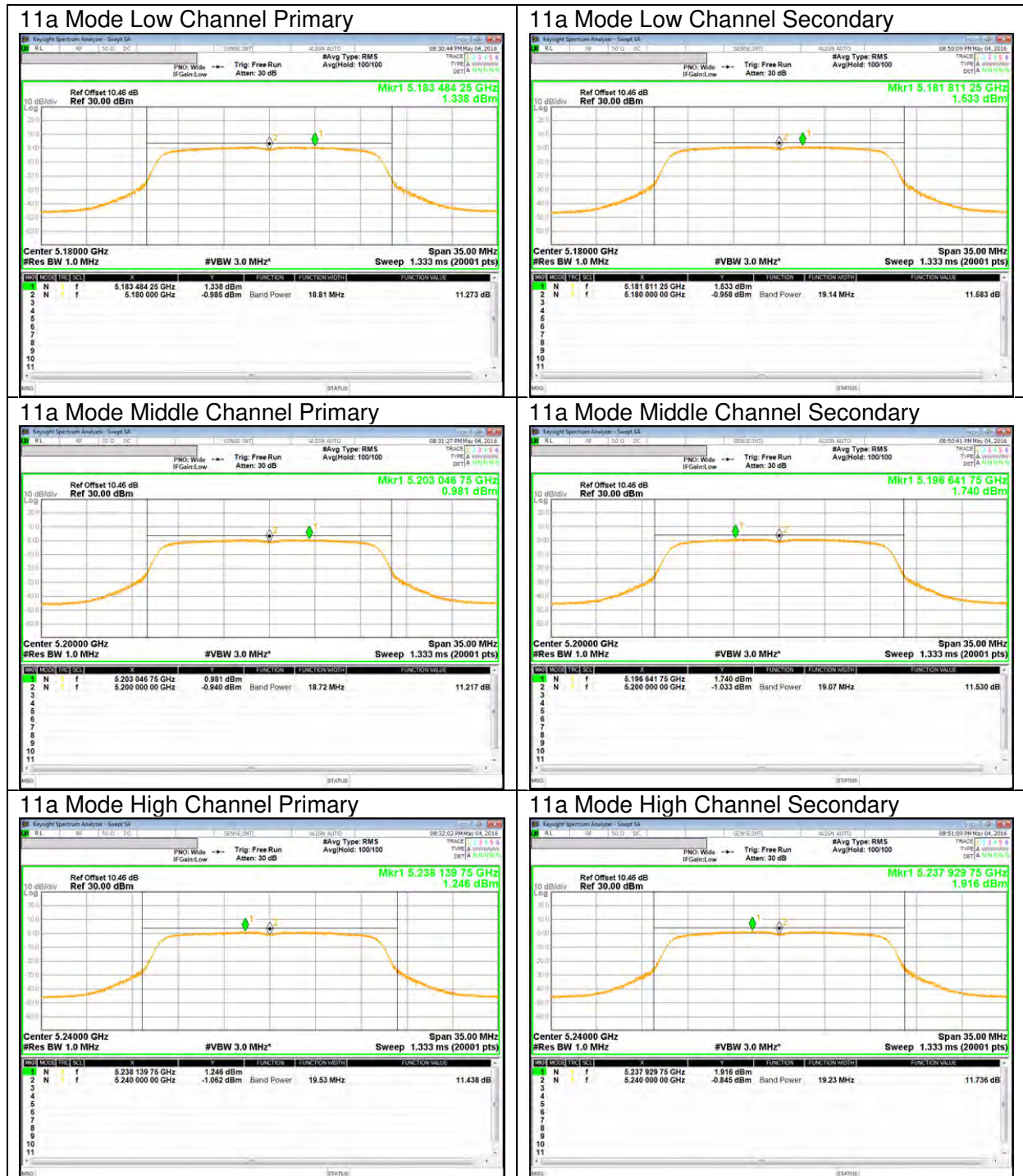
Channel	Frequency	Chain 0 Meas Power [dBm]	Chain 1 Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Power Margin [dB]
Middle	5775	11.19	11.13	15.28	30.00	-14.72

PPSD Results

Channel	Frequency	Chain 0 Meas PPSD [dBm]	Chain 1 Meas PPSD [dBm]	Total Corr'd PPSD [dBm]	PPSD Limit [dBm]	PPSD Margin [dB]
Middle	5775	-7.87	-8.20	-3.90	30.00	-33.90

10.4.17. OUTPUT POWER AND PPSD PLOTS

UNII 5.2 GHz IEEE 802.11a mode

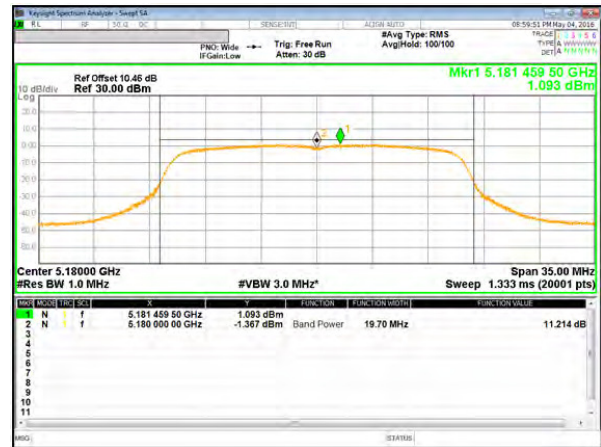


UNII 5.2 GHz IEEE 802.11n HT20 mode

11n HT20 Mode Low Channel Chain 0



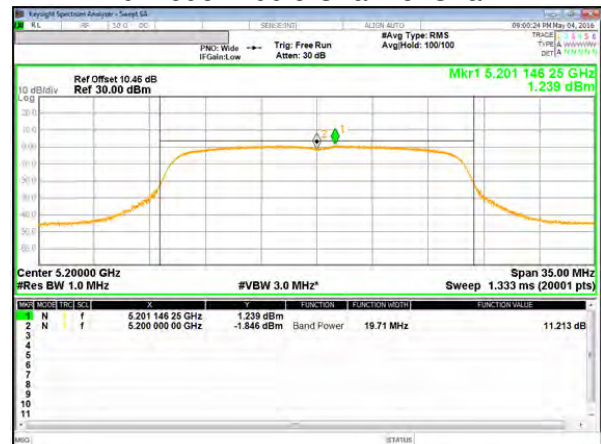
11n HT20 Mode Low Channel Chain 1



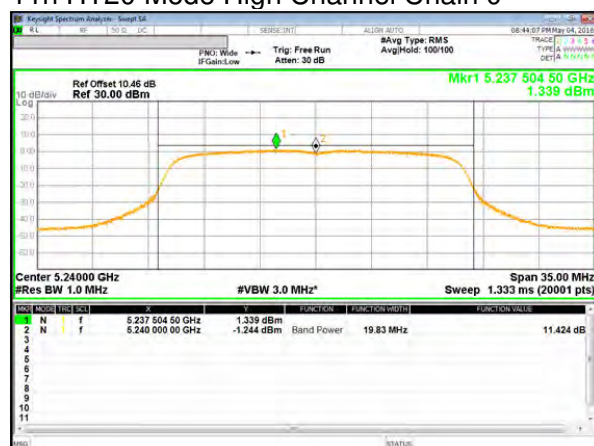
11n HT20 Mode Middle Channel Chain 0



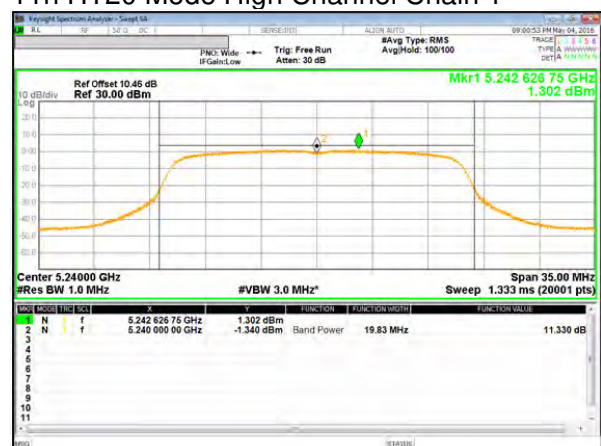
11n HT20 Mode Middle Channel Chain 1



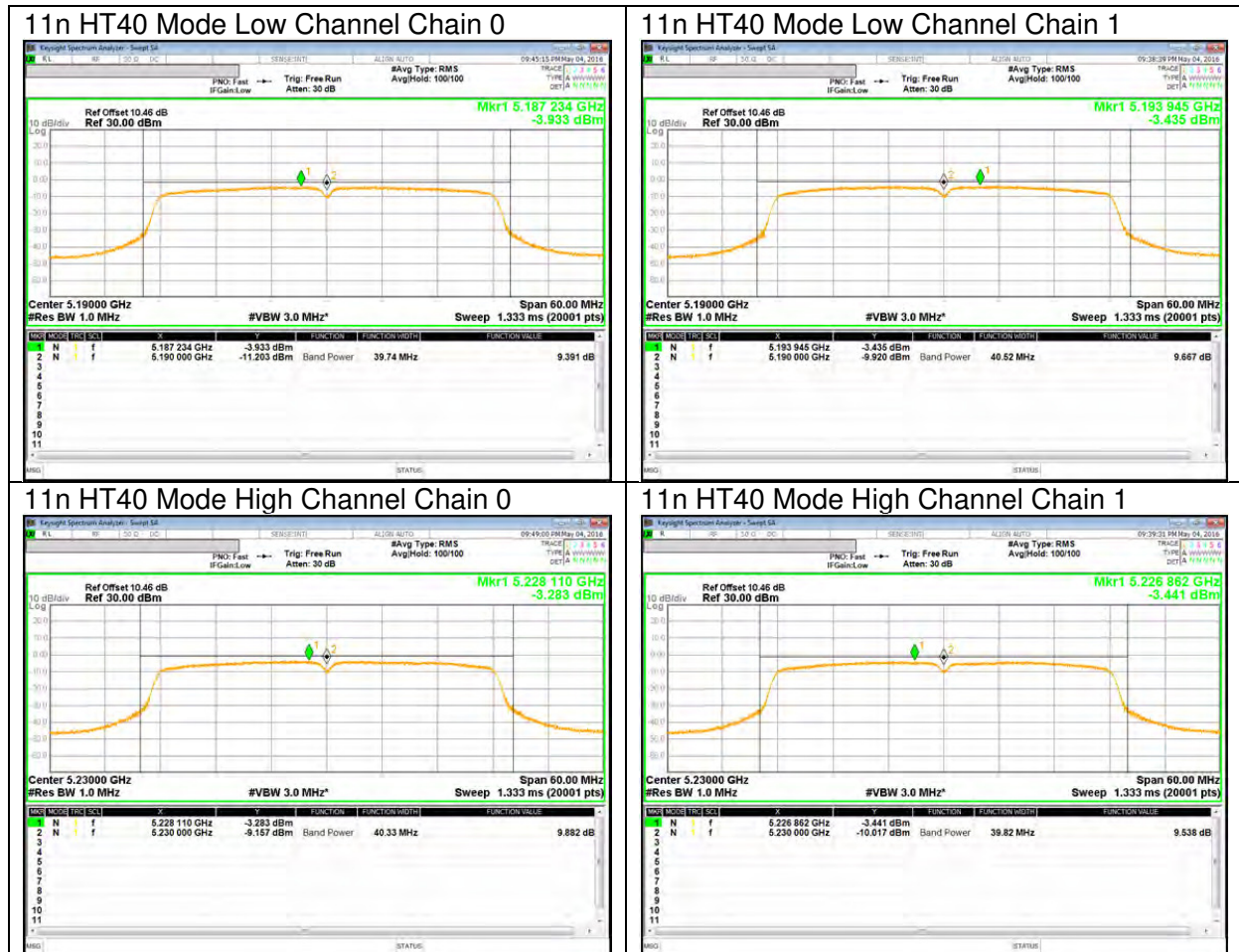
11n HT20 Mode High Channel Chain 0



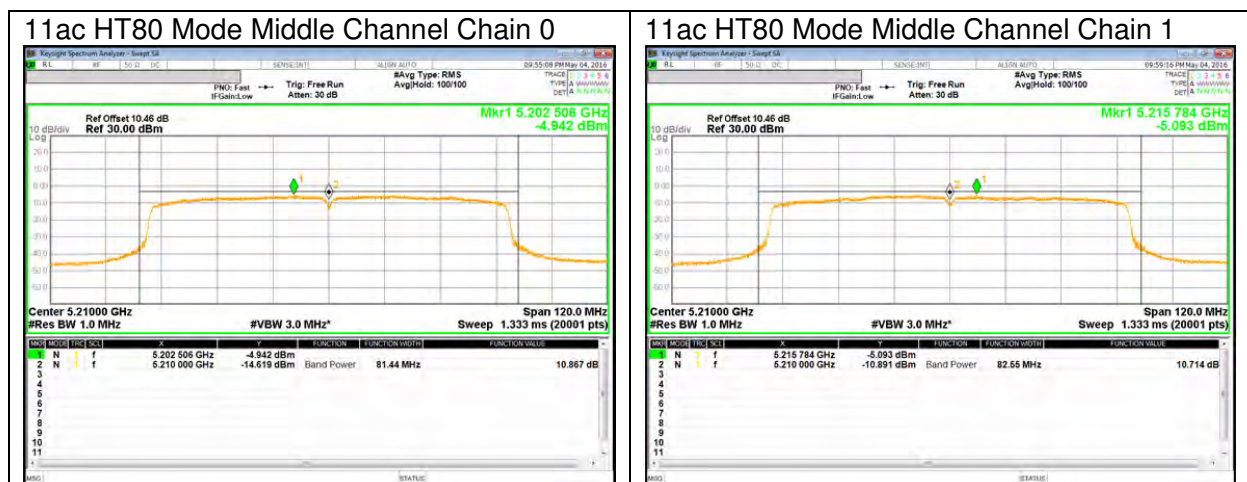
11n HT20 Mode High Channel Chain 1



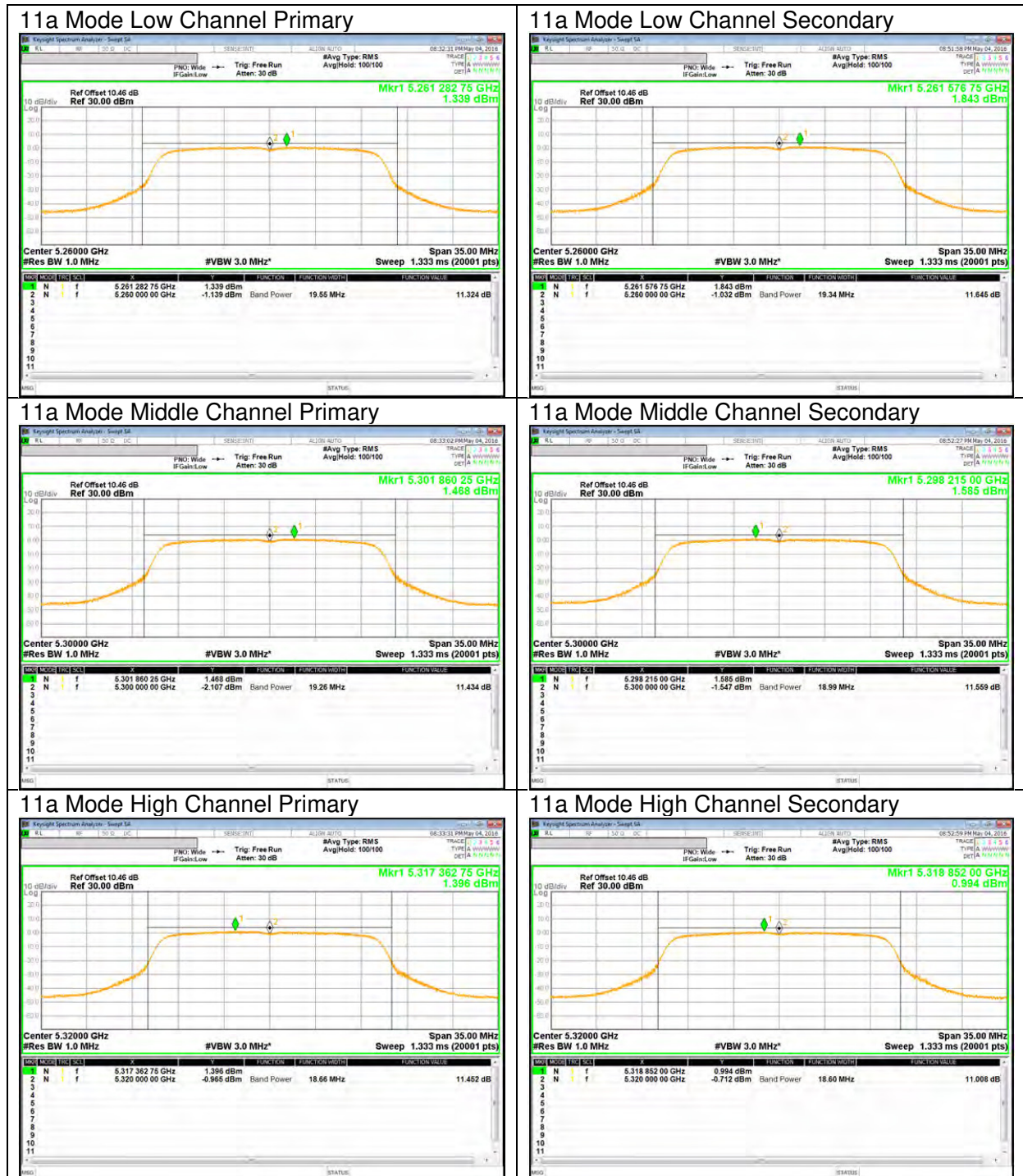
UNII 5.2 GHz IEEE 802.11n HT40 mode



UNII 5.2 GHz IEEE 802.11ac VHT80 mode



UNII 5.3 GHz IEEE 802.11a mode



UNII 5.3 GHz IEEE 802.11n HT20 mode

11n HT20 Mode Low Channel Chain 0



11n HT20 Mode Low Channel Chain 1



11n HT20 Mode Middle Channel Chain 0



11n HT20 Mode Middle Channel Chain 1



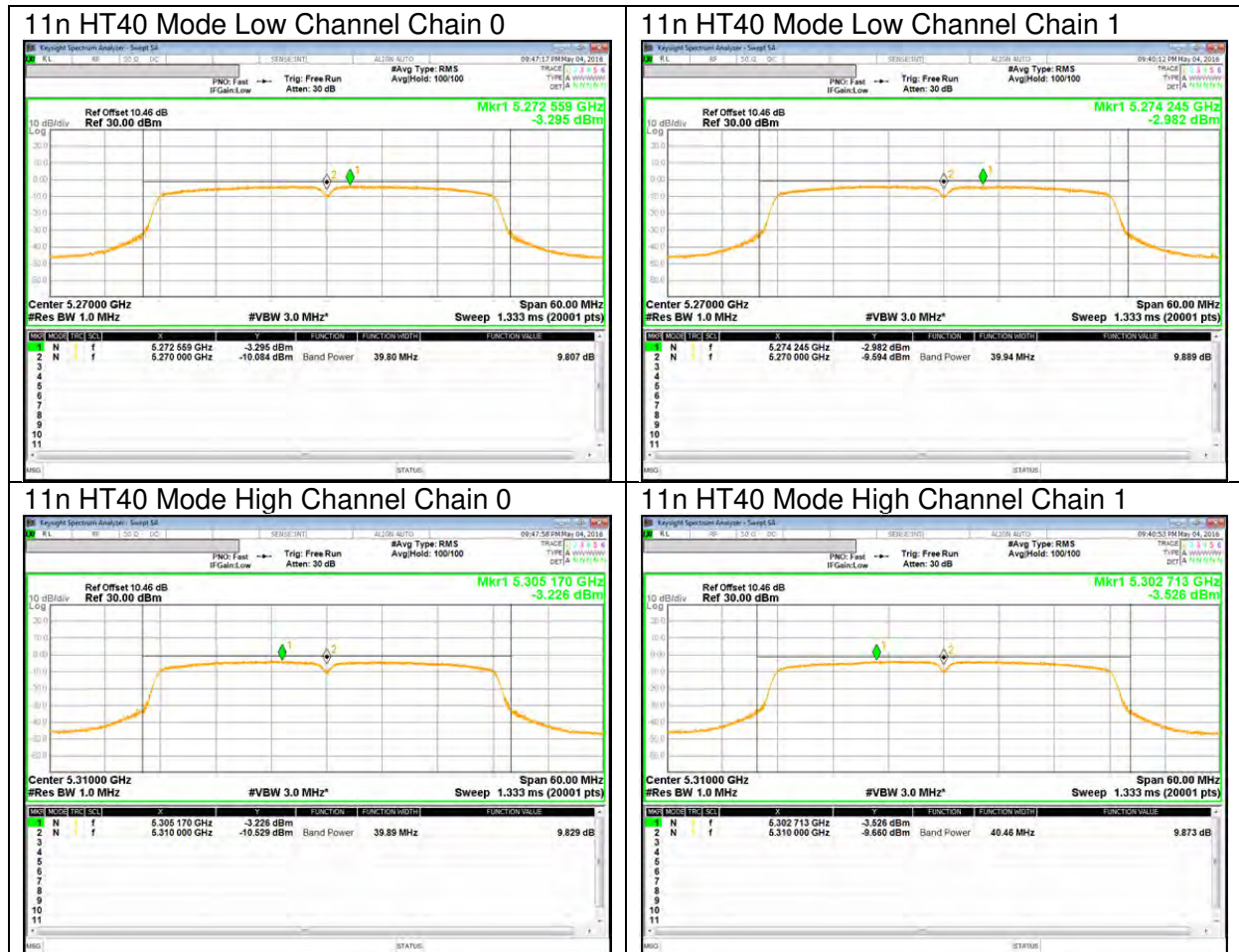
11n HT20 Mode High Channel Chain 0



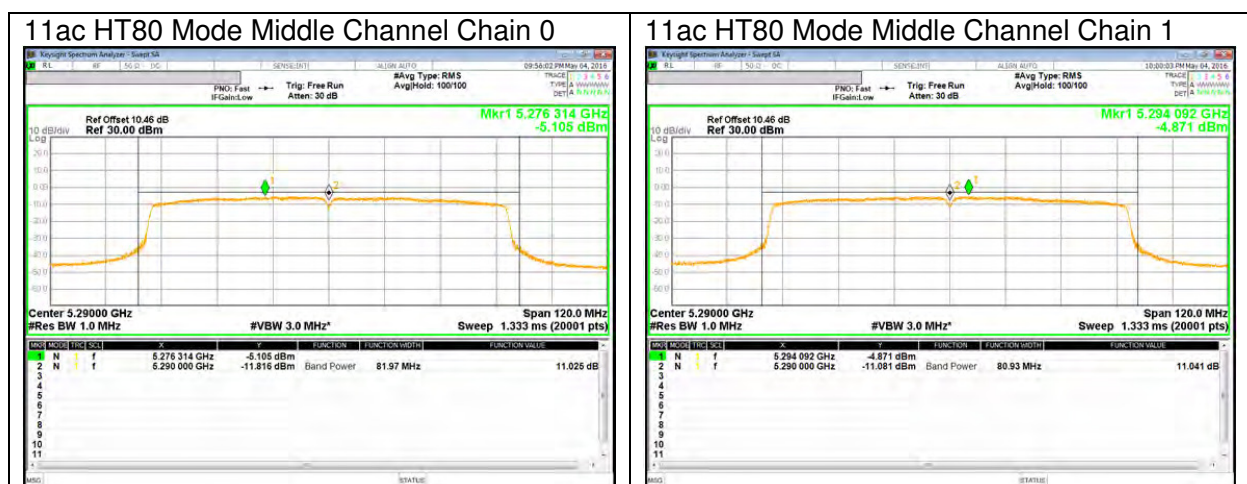
11n HT20 Mode High Channel Chain 1



UNII 5.3 GHz IEEE 802.11n HT40 mode



UNII 5.3 GHz IEEE 802.11ac VHT80 mode

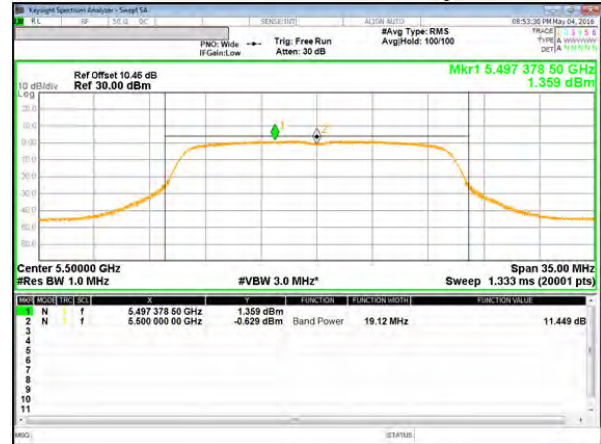


UNII 5.5 GHz IEEE 802.11a mode

11a Mode Low Channel Primary



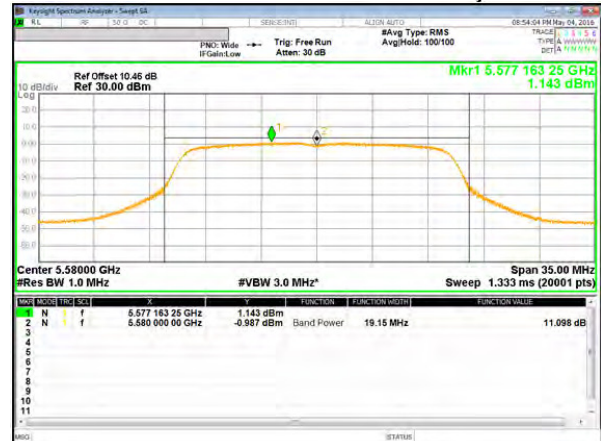
11a Mode Low Channel Secondary



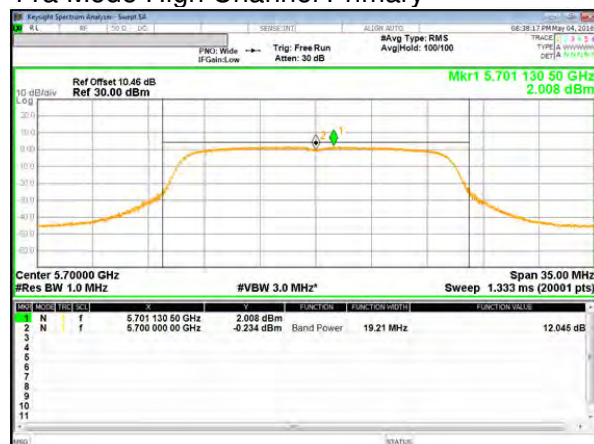
11a Mode Middle Channel Primary



11a Mode Middle Channel Secondary



11a Mode High Channel Primary



11a Mode High Channel Secondary



UNII 5.5 GHz IEEE 802.11n HT20 mode

11n HT20 Mode Low Channel Chain 0



11n HT20 Mode Low Channel Chain 1



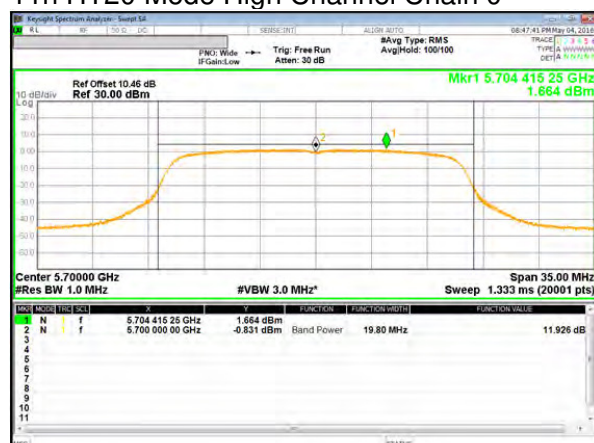
11n HT20 Mode Middle Channel Chain 0



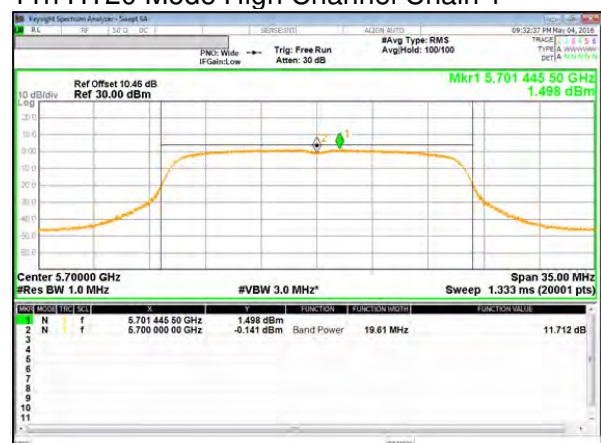
11n HT20 Mode Middle Channel Chain 1



11n HT20 Mode High Channel Chain 0



11n HT20 Mode High Channel Chain 1



UNII 5.5 GHz IEEE 802.11n HT40 mode

11n HT40 Mode Low Channel Chain 0



11n HT40 Mode Low Channel Chain 1



11n HT40 Mode Middle Channel Chain 0



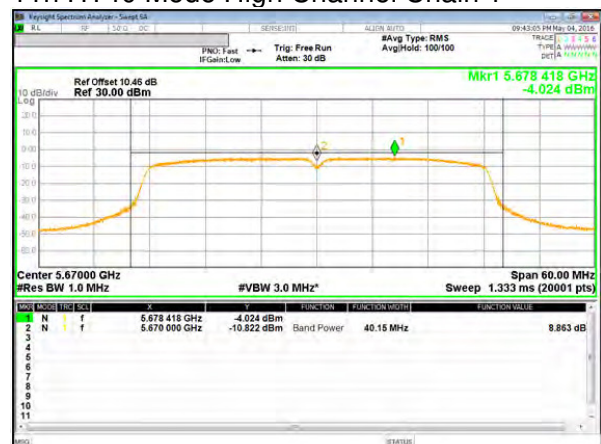
11n HT40 Mode Middle Channel Chain 1



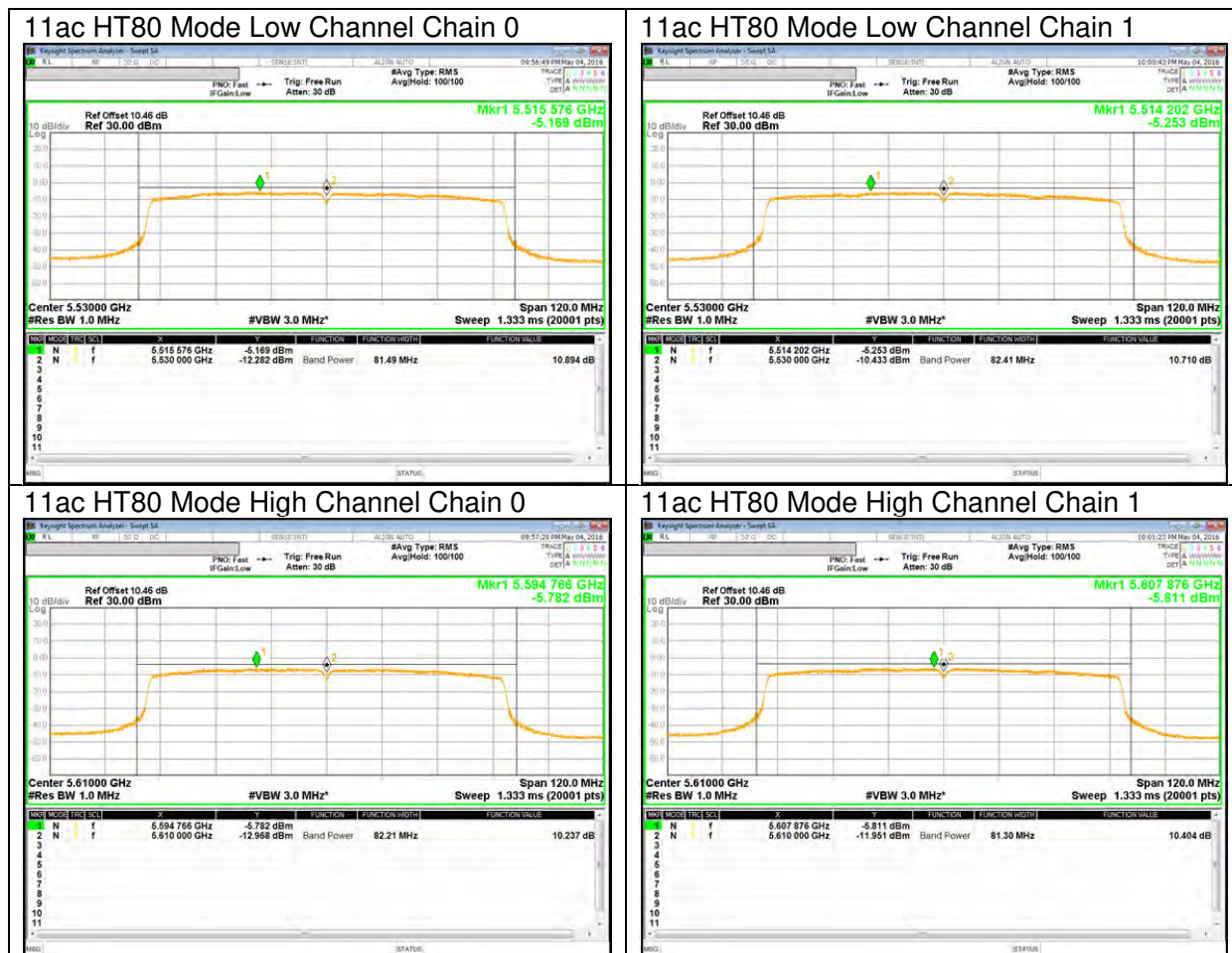
11n HT40 Mode High Channel Chain 0



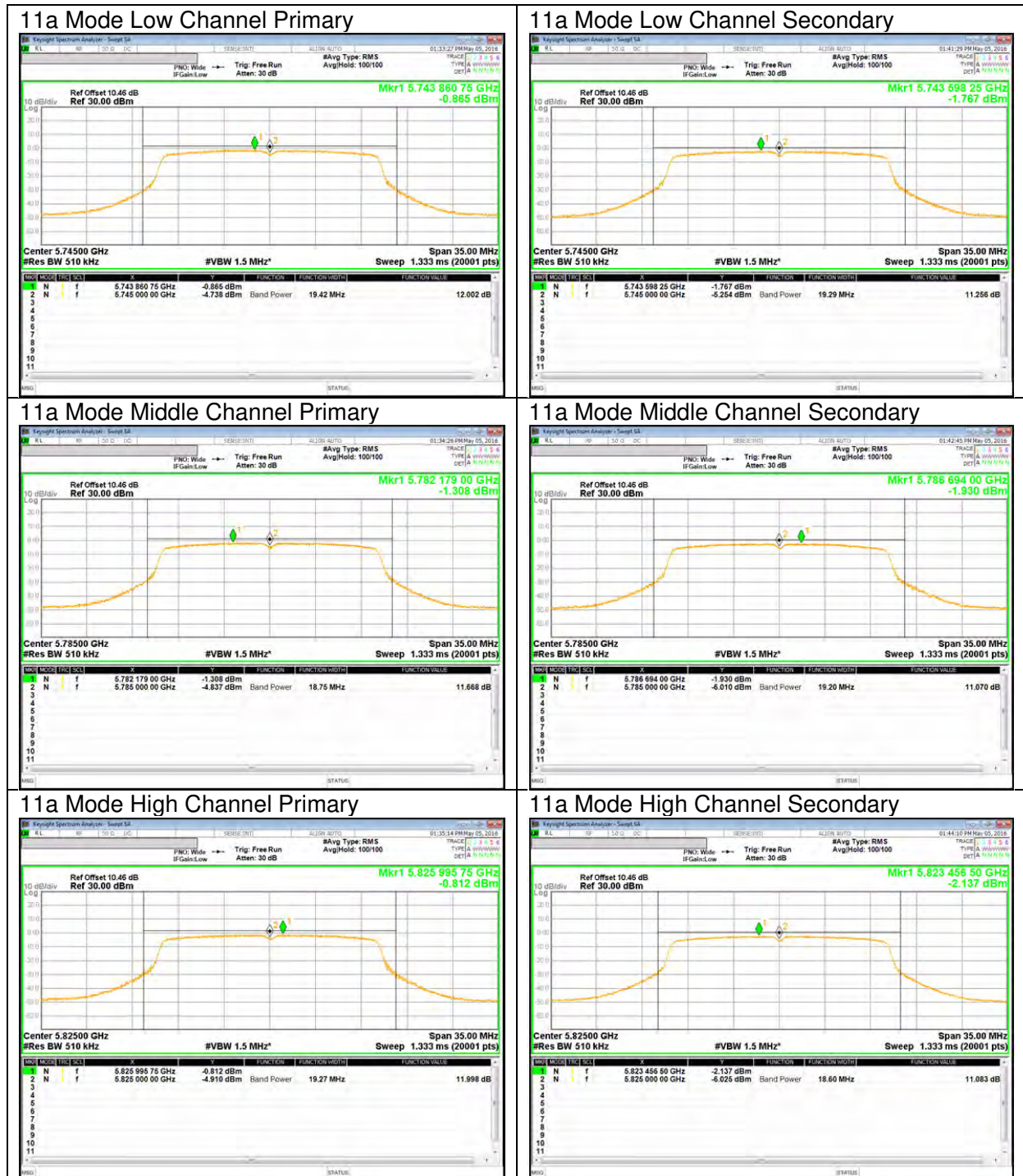
11n HT40 Mode High Channel Chain 1



UNII 5.5 GHz IEEE 802.11ac VHT80 mode



UNII 5.8 GHz IEEE 802.11a mode

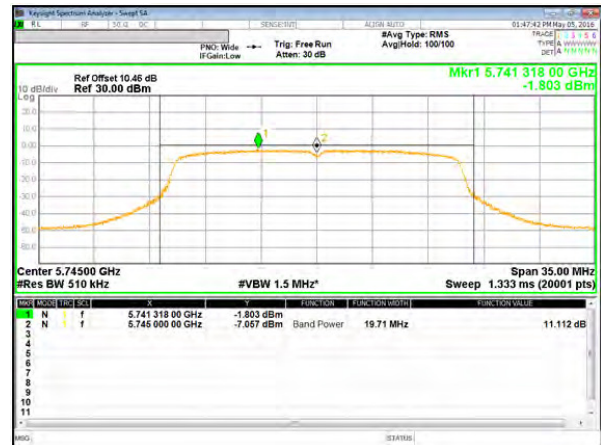


UNII 5.8 GHz IEEE 802.11n HT20 mode

11n HT20 Mode Low Channel Chain 0



11n HT20 Mode Low Channel Chain 1



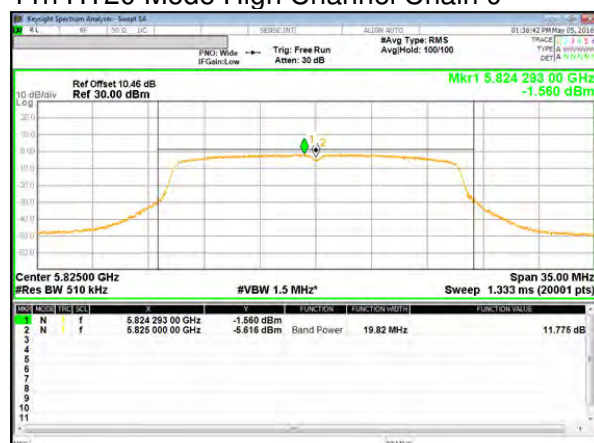
11n HT20 Mode Middle Channel Chain 0



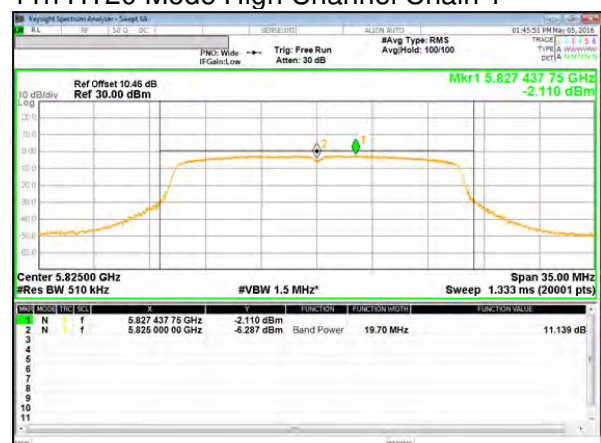
11n HT20 Mode Middle Channel Chain 1



11n HT20 Mode High Channel Chain 0



11n HT20 Mode High Channel Chain 1



UNII 5.8 GHz IEEE 802.11n HT40 mode

11n HT40 Mode Low Channel Chain 0



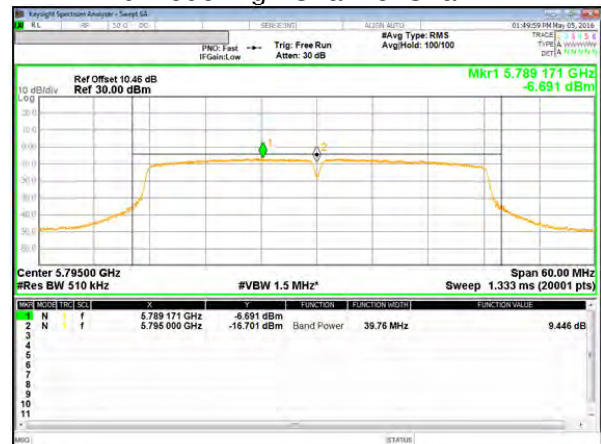
11n HT40 Mode Low Channel Chain 1



11n HT40 Mode High Channel Chain 0



11n HT40 Mode High Channel Chain 1



UNII 5.8 GHz IEEE 802.11ac VHT80 mode

11ac HT80 Mode Middle Channel Chain 0



11ac HT80 Mode Middle Channel Chain 1



11. TRANSMITTER ABOVE 1 GHz

LIMITS

FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

FCC §15.407 (b)

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band:
 - (i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
- (5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.
- (7) The provisions of §15.205 apply to intentional radiators operating under this section.
- (8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

Note

- Limit translation to field strength level (FCC §15.407)

$$E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2 = -27\text{dBm} + 95.2 = 68.2\text{dBuV/m}$$

$$E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2 = -17\text{dBm} + 95.2 = 78.2\text{dBuV/m}$$

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Reference to KDB 789033 D02 v01r02 UNII part G) 6) c) Method AD:

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor to the reading offset for average measurements.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

Note : Emission was pre-scanned from 9KHz to 30MHz; No emissions were detected which was at least 20dB below the specification limit. Per FCC part 15.31(o), test results were not reported.