



FCC 47 CFR PART 15 SUBPART E

CERTIFICATION TEST REPORT

FOR

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

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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-N9208
SERIAL NUMBER: R38G50YGR2N (RADIATED); R38G50YGMJH (CONDUCTED)
DATE TESTED: JUN 21 - JUL 13, 2015

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

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 06-96, FCC KDB 789033 D02 v01, ANSI C63.10-2009.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-823, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro	
☒	Chamber 1
☒	Chamber 2

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

4.3. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a 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
	802.11n	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	12.53	13.31	17.91	21.43
	802.11a MIMO	15.87		38.64	
	802.11n HT20 SISO	11.58	12.15	14.38	16.39
	802.11n HT20 MIMO	14.83		30.41	
5190 - 5230	802.11n HT40 SISO	10.63	10.57	11.56	11.40
	802.11n HT40 MIMO	13.48		22.28	
5210	802.11ac VHT80 SISO	9.75	9.94	9.44	9.87
	802.11ac VHT80 MIMO	12.86		19.31	
5260 - 5320	802.11a SISO	12.62	12.31	18.27	17.02
	802.11a MIMO	15.45		35.08	
	802.11n HT20 SISO	11.68	12.17	14.71	16.47
	802.11n HT20 MIMO	14.94		31.18	
5270 - 5310	802.11n HT40 SISO	10.78	10.43	11.97	11.05
	802.11n HT40 MIMO	13.62		23.02	
5290	802.11ac VHT80 SISO	9.64	10.01	9.21	10.02
	802.11ac VHT80 MIMO	12.84		19.23	
5500 - 5720	802.11a SISO	11.95	13.37	15.68	21.71
	802.11a MIMO	15.69		37.07	
	802.11n HT20 SISO	11.25	12.39	13.34	17.35
	802.11n HT20 MIMO	14.87		30.69	
5510 - 5710	802.11n HT40 SISO	10.10	10.65	10.23	11.61
	802.11n HT40 MIMO	13.39		21.85	
5530 - 5690	802.11ac VHT80 SISO	8.94	9.62	7.83	9.17
	802.11ac VHT80 MIMO	12.30		17.00	
5745 - 5825	802.11a SISO	12.46	13.23	17.60	21.04
	802.11a MIMO	15.73		37.41	
	802.11n HT20 SISO	10.77	11.08	11.93	12.82
	802.11n HT20 MIMO	13.93		24.75	
5755 - 5795	802.11n HT40 SISO	10.97	10.87	12.50	12.21
	802.11n HT40 MIMO	13.93		24.70	
5775	802.11ac VHT80 SISO	8.82	9.66	7.62	9.25
	802.11ac VHT80 MIMO	12.27		16.87	

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	5150	2.18	-3.05
	5250	2.58	-4.15
UNII 2A 5250 – 5350	5250	2.58	-4.15
	5350	2.32	-3.08
UNII 2C 5470 – 5725	5470	2.51	-3.96
	5570	0.22	-4.75
	5725	0.30	-3.63
UNII 3 5725 – 5825	5725	0.30	-3.63

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 (Antenna port & 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 (Antenna port & 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 (Antenna port & Radiated Testing)		
Frequency Range [MHz]	Mode	Covered by
5500 - 5720	802.11a legacy 1TX/STBC 2TX	802.11a 2TX CDD
5500 - 5720	802.11HT20 1TX	802.11n HT20 2TX CDD
5500 - 5720	802.11HT20 2TX STBC/SDM	802.11n HT20 2TX CDD
5500 - 5720	802.11ac VHT20 1TX	802.11n HT20 2TX CDD
5500 - 5720	802.11ac VHT20 2TX STBC/SDM	802.11n HT20 2TX CDD
5500 - 5720	802.11ac VHT20 2TX CDD/Tx BF	802.11n HT20 2TX CDD
5510 - 5710	802.11n HT40 1TX	802.11n HT40 2TX CDD
5510 - 5710	802.11n HT40 2TX STBC/SDM	802.11n HT40 2TX CDD
5510 - 5710	802.11ac VHT40 1TX	802.11n HT40 2TX CDD
5510 - 5710	802.11ac VHT40 2TX STBC/SDM	802.11n HT40 2TX CDD
5510 - 5710	802.11ac VHT40 2TX CDD/Tx BF	802.11n HT40 2TX CDD
5530 - 5690	802.11ac VHT80 1TX	802.11ac VHT80 2TX CDD
5530 - 5690	802.11ac VHT80 2TX STBC/SDM/Tx BF	802.11ac VHT80 2TX CDD

UNII 3

5725 - 5850 MHz Authorized Frequency Band (Antenna port & 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
802.11n HT20mode: MCS0
802.11n HT40mode: MCS0
802.11ac VHT80mode: MCS0

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA20CBC	R37FCPc00R1DK3	N/A
Data Cable	SAMSUNG	EP-DG925UWE	N/A	N/A
Earphone	SAMSUNG	EO-EG920LW	N/A	N/A

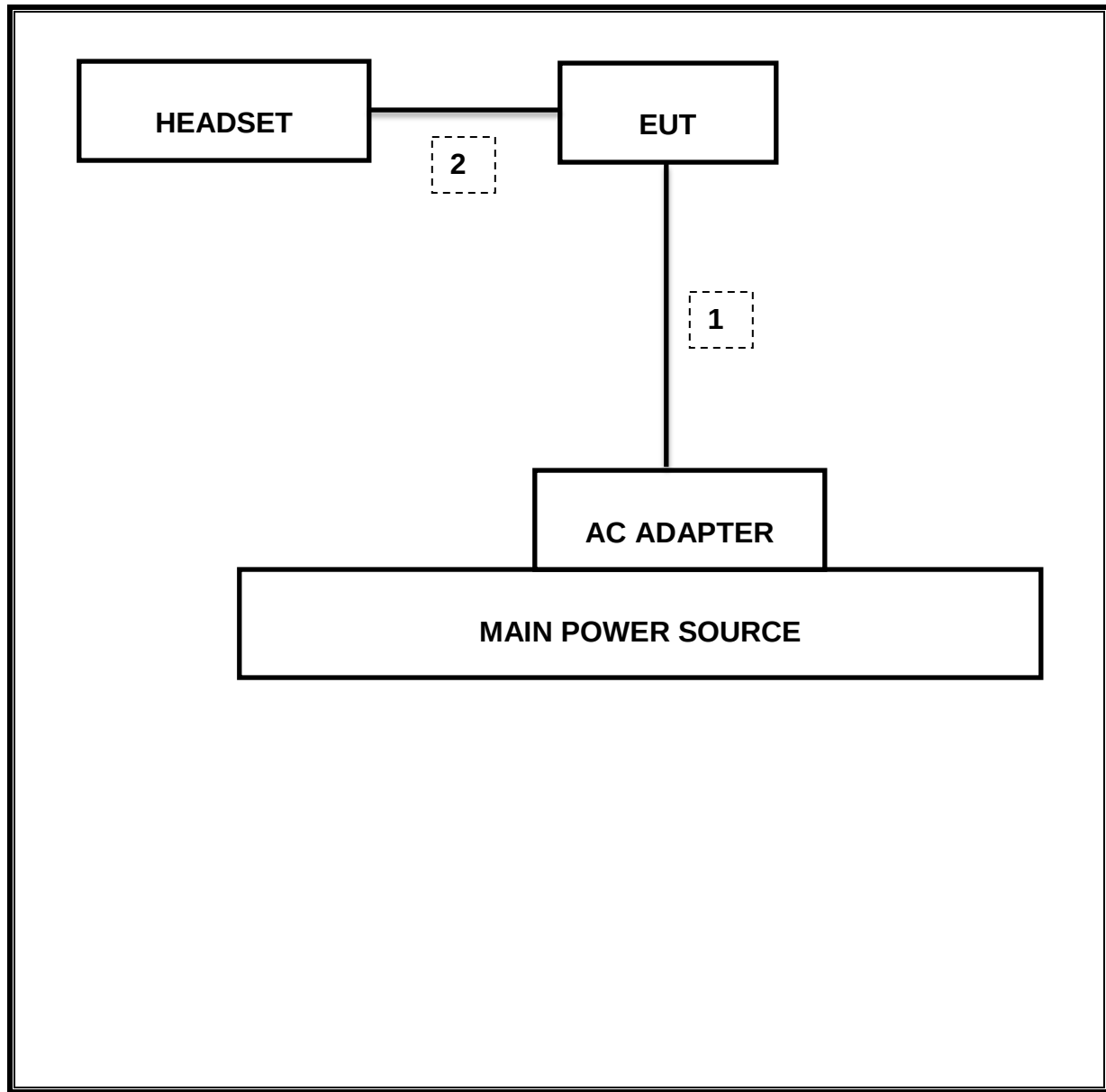
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	Mini-USB	Shielded	0.8m	N/A
2	Audio	1	Mini-Jack	Unshielded	1.0m	N/A

TEST SETUP

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

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

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	81.80 MHz
15.407	6dB Band width (5.8Ghz)	500KHz		Pass	2.65 MHz (Straddle)
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	15.95 dBm
15.407 (a)(3)	TX Cond. Power 5.725-5.825	< 30dBm or 17+10Log(OBW)		Pass	15.87 dBm
15.407 (a)(5)	PSD (5.2,5.3,5.5GHz)	<11dBm		Pass	2.62 dBm
15.407 (a)(5)	PSD (5.8GHz)	30dBm per 500kHz		Pass	2.14 dBm
15.207 (a)	AC Power Line conducted emissions	Section 10	Radiated	Pass	31.87 dBuV (AV)
15.407 (b) & 15.209	Radiated Spurious Emission	< 54dBuV/m		Pass	51.22 BuV/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.

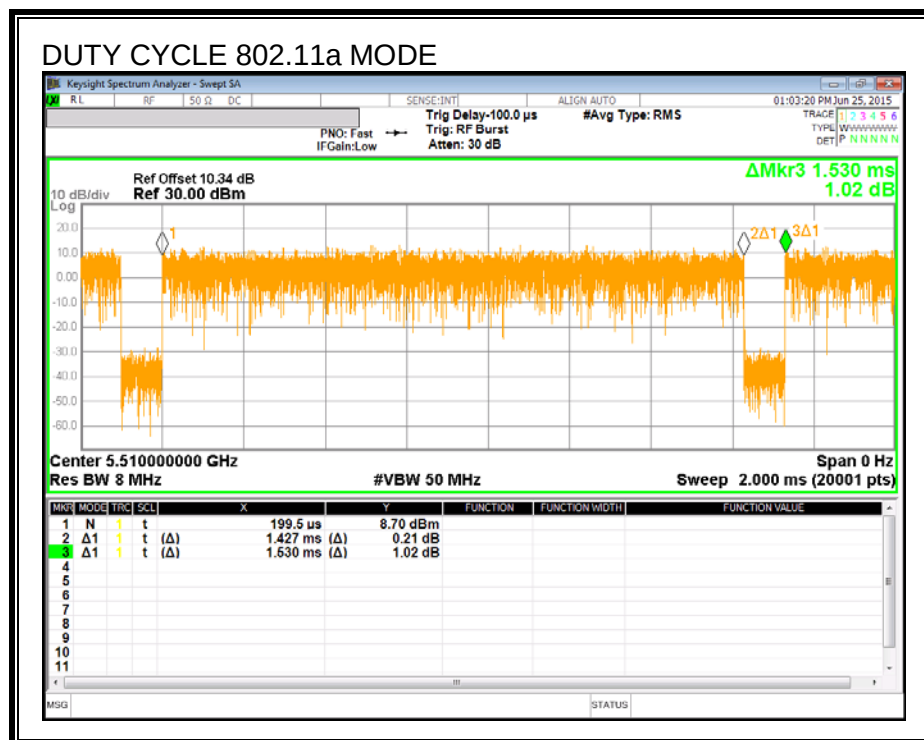
PROCEDURE

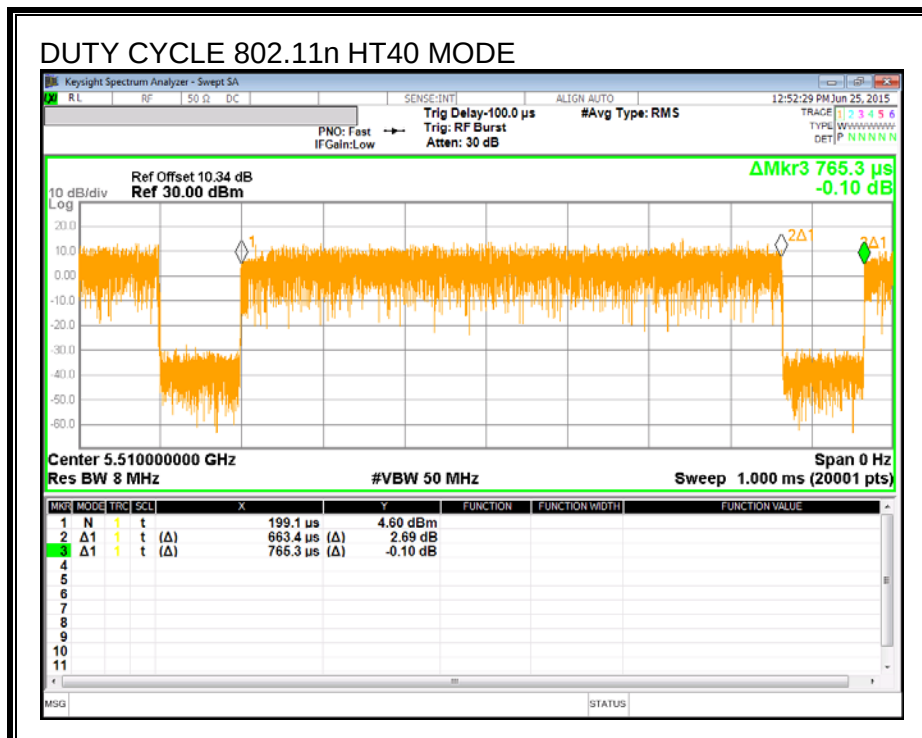
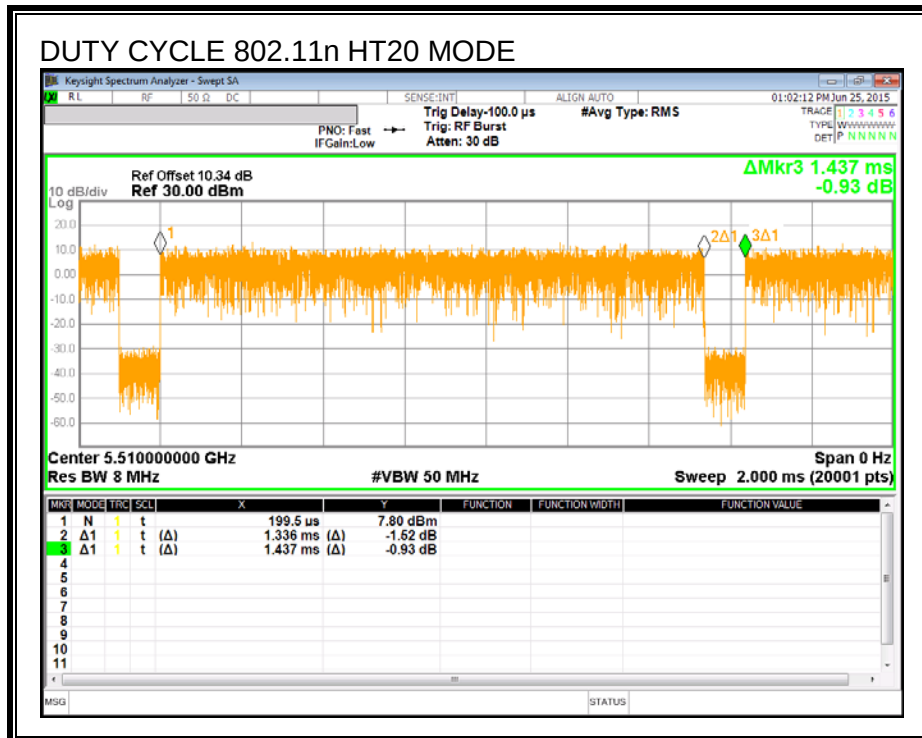
KDB 789033 Zero-Span Spectrum Analyzer Method.

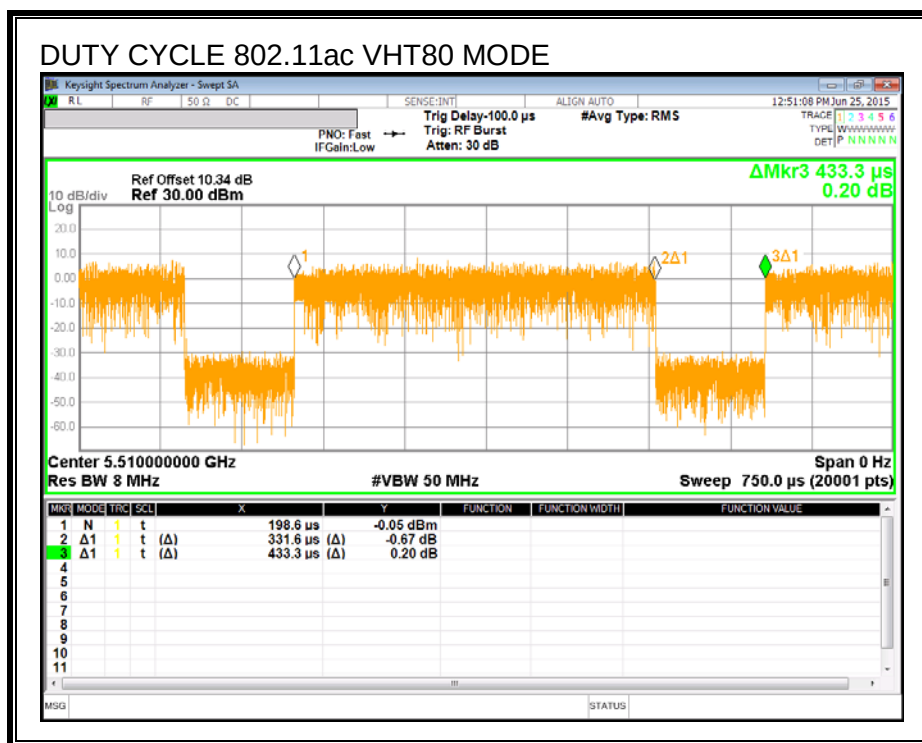
8.1. ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B [msec]	Period [msec]	Duty Cycle x [linear]	Duty Cycle [%]	Duty Cycle Correction Factor [dB]	1/T Minimum VBW [kHz]
802.11a	1.427	1.530	0.933	93.3%	0.30	0.701
802.11n HT20	1.336	1.437	0.930	93.0%	0.32	0.749
802.11n HT40	0.663	0.765	0.867	86.7%	0.62	1.507
802.11ac VHT80	0.332	0.433	0.765	76.5%	1.16	3.016

8.2. DUTY CYCLE PLOTS







9. MEASUREMENT METHOD

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

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

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

MIMO Device: KDB 662911 v02r01

Straddle Channels: KDB 644545 D03 v01

10. ANTENNA PORT TEST RESULTS

10.1. 6 dB BANDWIDTH

LIMITS

FCC §15.407

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

TEST PROCEDURE

Reference to 789033 D02 General UNII Test Procedures New Rules v01: The transmitter output is connected to a spectrum analyzer with the RBW set to 100 kHz, the VBW $\geq 3 \times$ RBW, peak detector and max hold.

RESULTS

- Calculation for 6dB Bandwidth of UNII-3 Straddle Channel

ex) 802.11a mode

- o Fundamental frequency : 5720 MHz
- o 6dB BW : 16.350 MHz
- o Starting Frequency of UNII-3 band : 5725 MHz
- o 6dB Bandwidth of UNII-3 band Portion
 $= (5720 + (16.350 / 2) - 5725) = 3.175 \text{ MHz}$

10.1.1. 802.11a MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]		Minimum Limit [MHz]
		Primary	Secondary	
Straddle	5720	3.175	3.1875	0.5
Low	5745	16.325	16.350	0.5
Mid	5785	16.375	16.375	0.5
High	5825	16.350	16.350	0.5
Worst		3.175		

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	
Straddle	5720	3.813	3.800	0.5
Low	5745	17.625	17.625	0.5
Mid	5785	17.625	17.625	0.5
High	5825	17.625	17.650	0.5
Worst		3.800		

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	
Straddle	5710	2.950	3.200	0.5
Low	5765	36.150	36.400	0.5
High	5795	36.150	36.150	0.5
Worst		2.950		

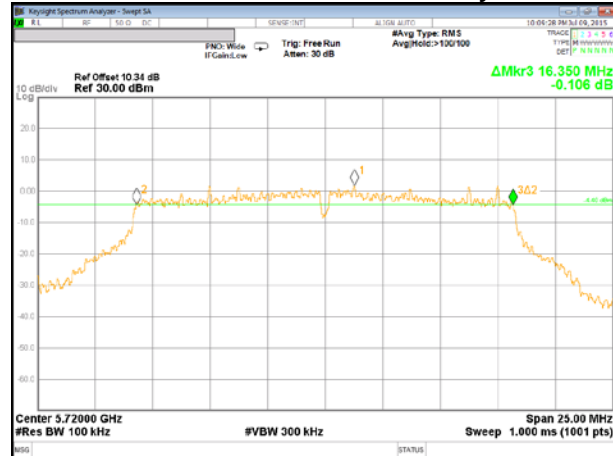
10.1.4. 802.11n VHT80 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]		Minimum Limit [MHz]
		Chain 0	Chain 1	
Straddle	5690	2.650	2.750	0.5
Middle	5775	75.400	75.900	0.5
Worst		2.650		

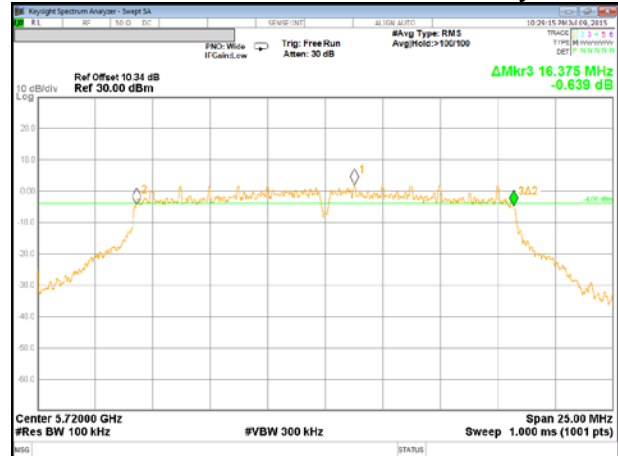
10.1.5. 6 dB BANDWIDTH PLOTS

IEEE 802.11a mode

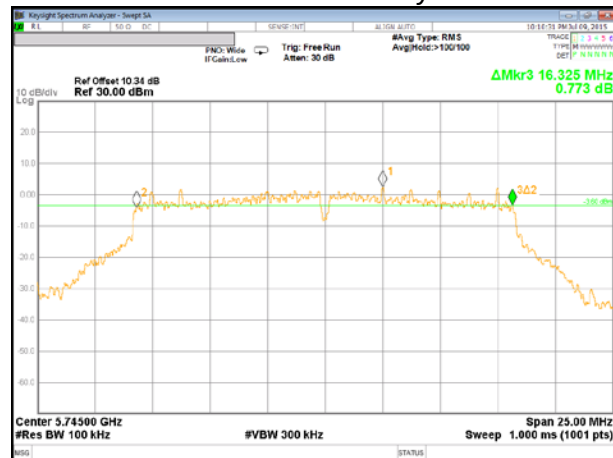
11a Mode Straddle Channel Primary



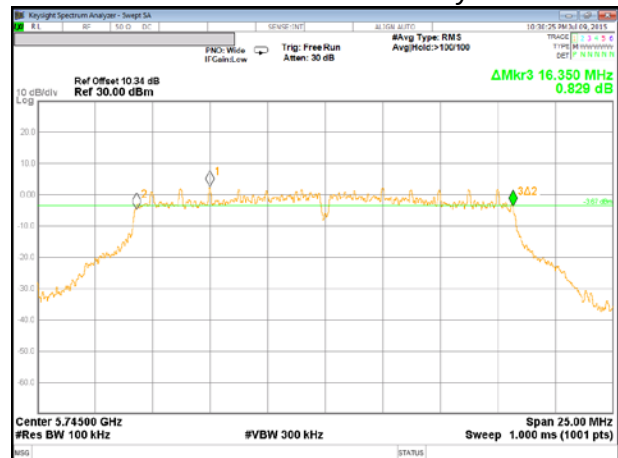
11a Mode Straddle Channel Secondary



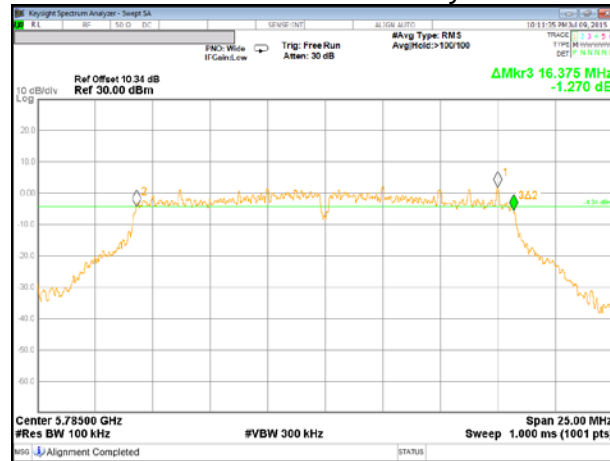
11a Mode Low Channel Primary



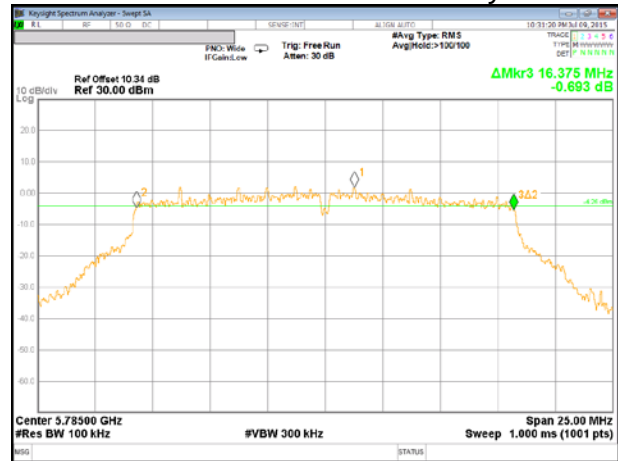
11a Mode Low Channel Secondary



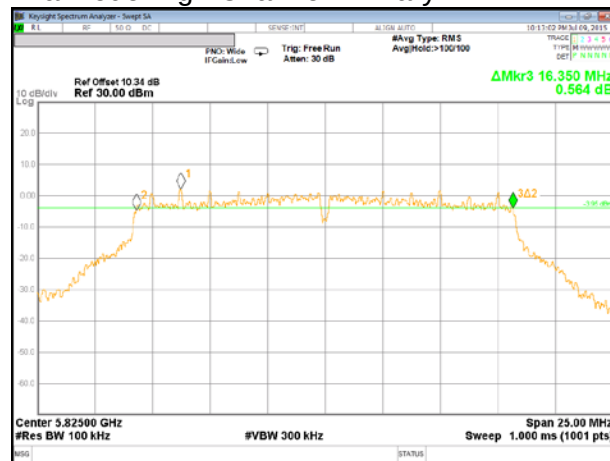
11a Mode Middle Channel Primary



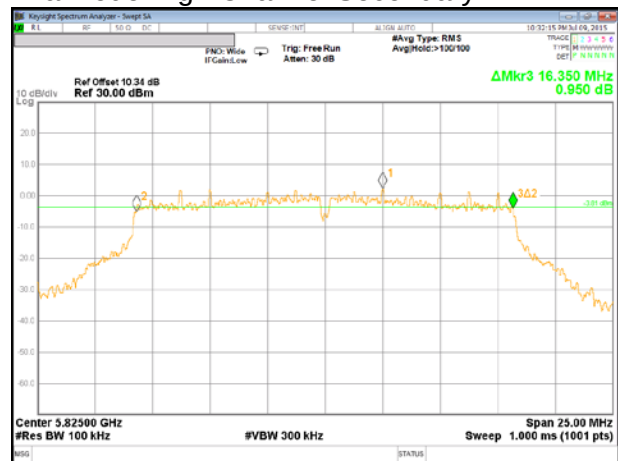
11a Mode Middle Channel Secondary



11a Mode High Channel Primary

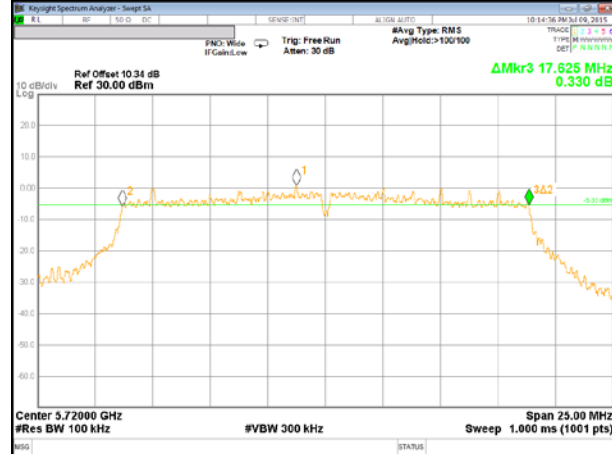


11a Mode High Channel Secondary

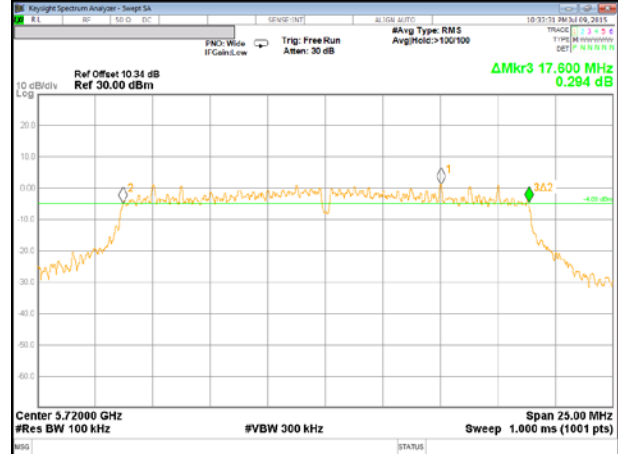


IEEE 802.11n HT20 mode

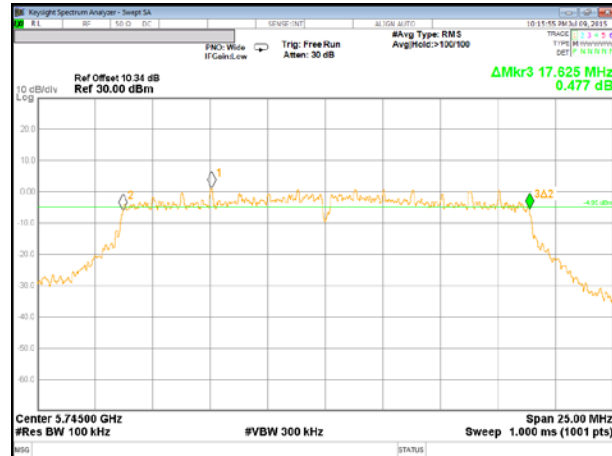
11n HT20 Mode Straddle Channel Chain 0



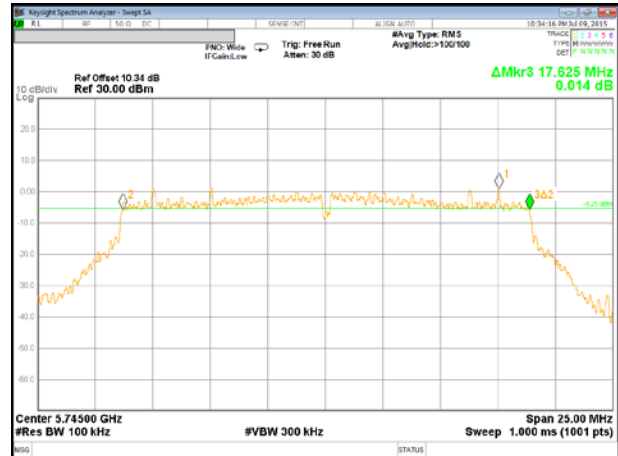
11n HT20 Mode Straddle Channel Chain 1



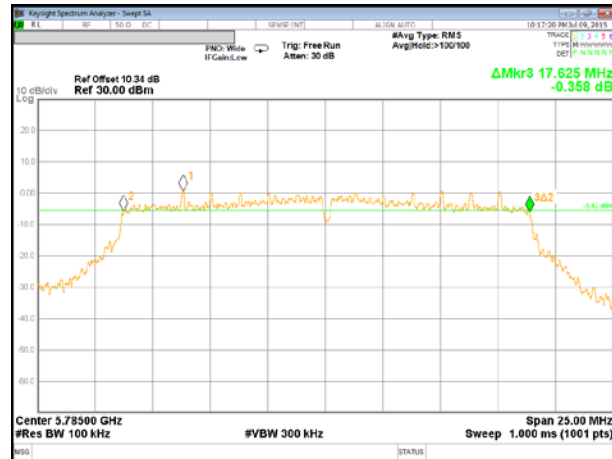
11n HT20 Mode Low Channel Chain 0



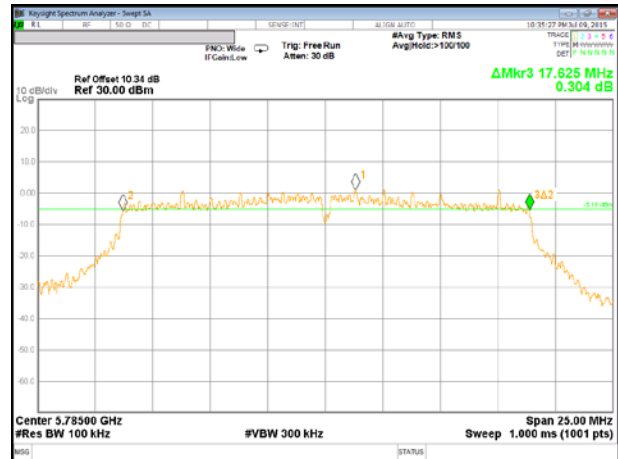
11n HT20 Mode Low Channel Chain 1



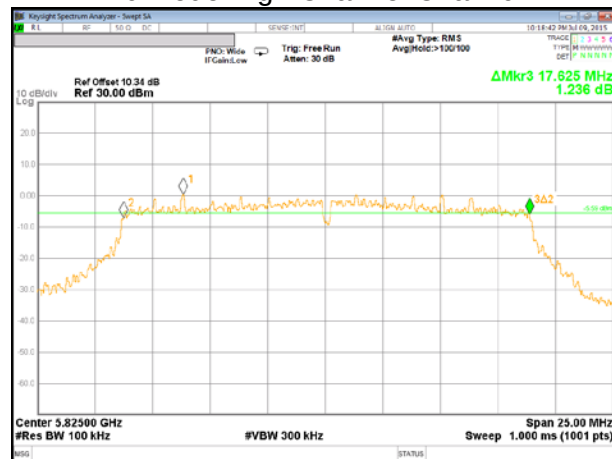
11n HT20 Mode Middle Channel Chain 0



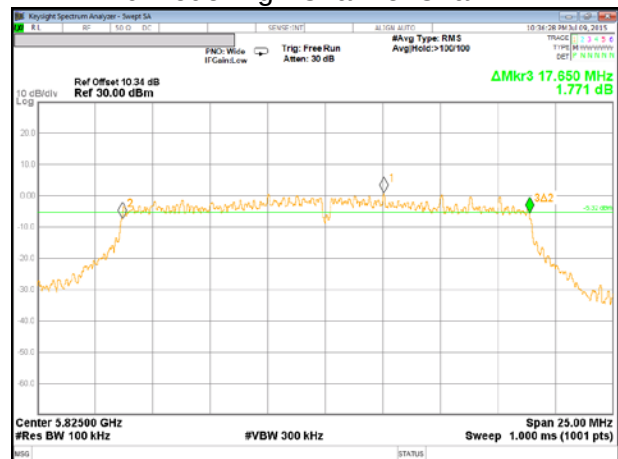
11n HT20 Mode Middle Channel Chain 1



11n HT20 Mode High Channel Chain 0

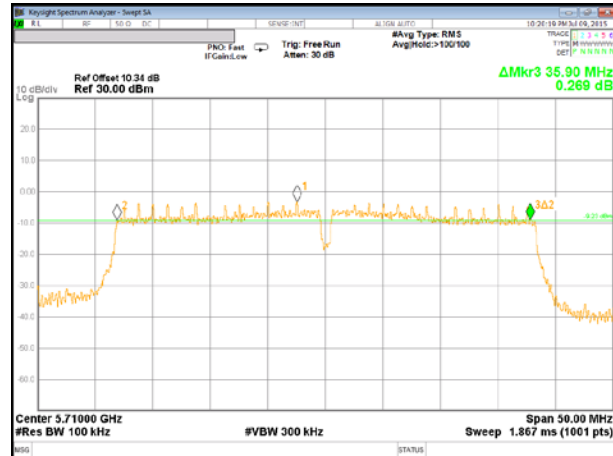


11n HT20 Mode High Channel Chain 1

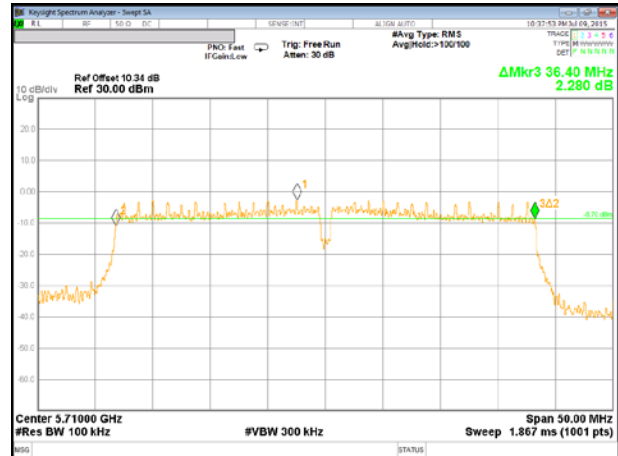


IEEE 802.11n HT40 mode

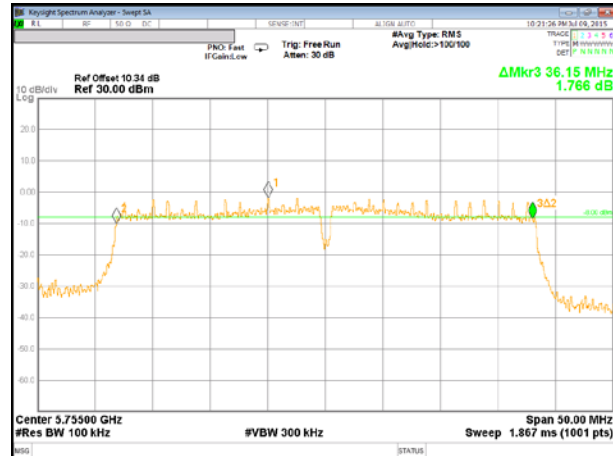
11n HT40 Mode Straddle Channel Chain 0



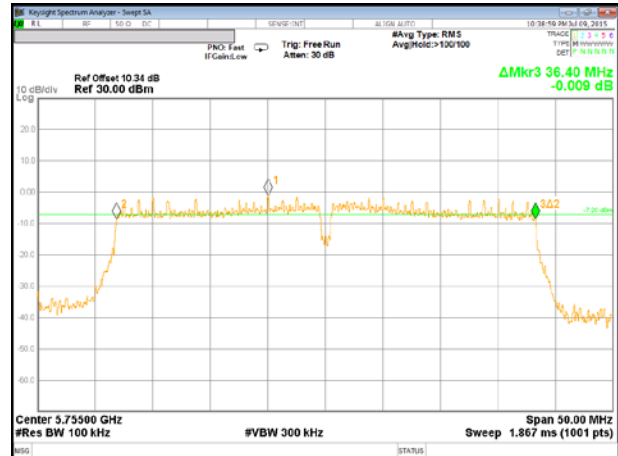
11n HT40 Mode Straddle Channel Chain 1



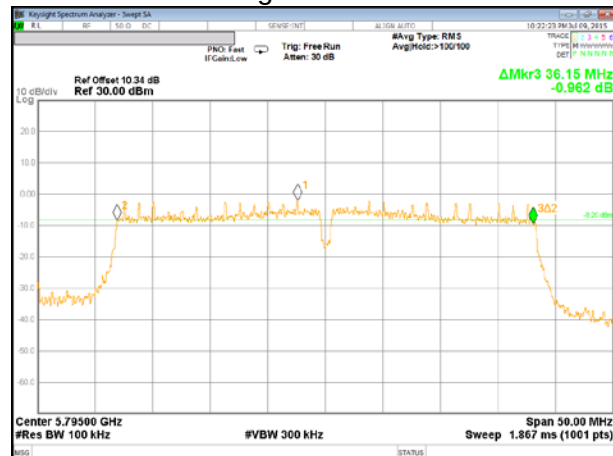
11n HT40 Mode Low Channel Chain 0



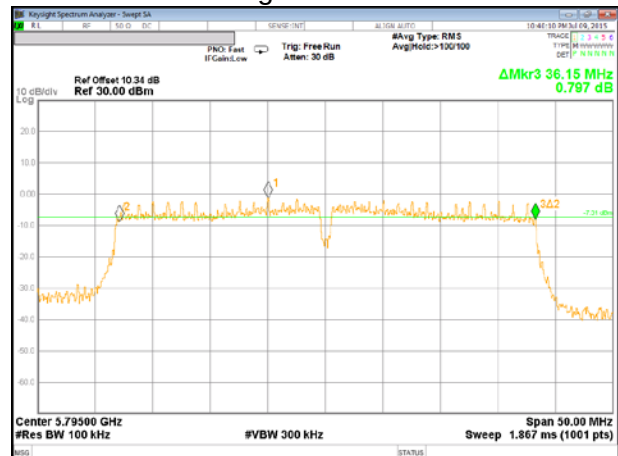
11n HT40 Mode Low Channel Chain 1



11n HT40 Mode High Channel Chain 0

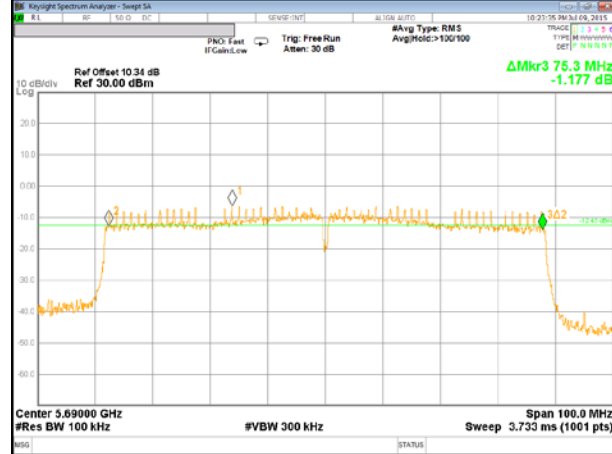


11n HT40 Mode High Channel Chain 1

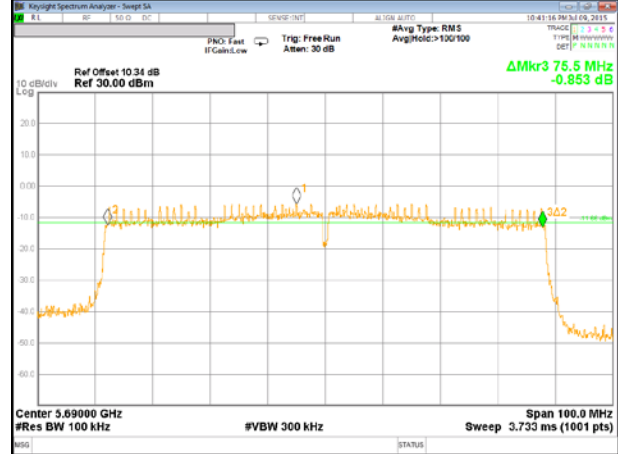


IEEE 802.11ac VHT80 mode

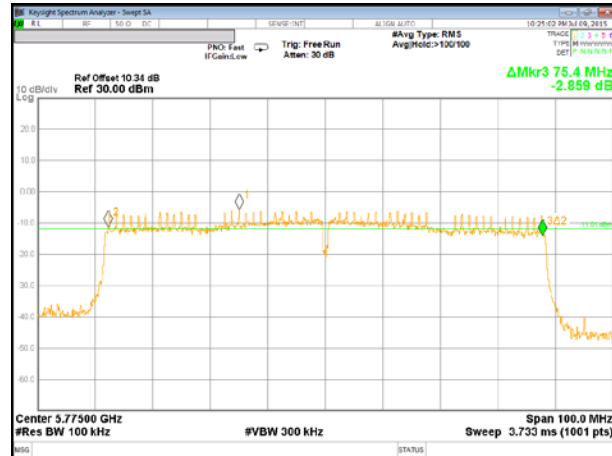
11ac HT80 Mode Straddle Channel Chain 0



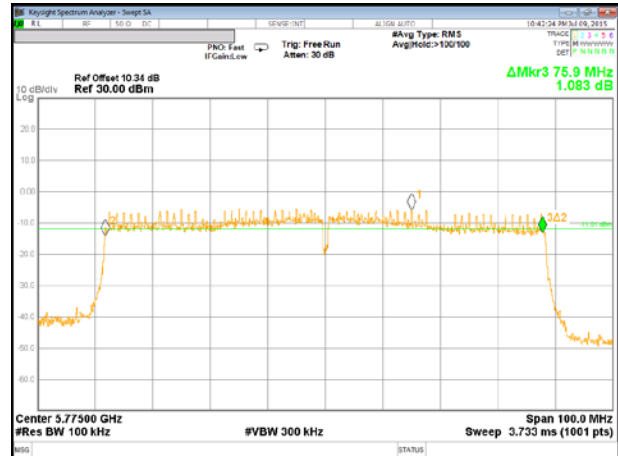
11ac HT80 Mode Straddle Channel Chain 1



11ac HT80 Mode Middle Channel Chain 0



11ac HT80 Mode Middle Channel Chain 1



10.2. 26 dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

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

ex) 802.11a mode

- o Fundamental frequency : 5720MHz
- o 26dB BW : 21.00MHz
- o Turning Frequency : 5725MHz
- o 26dB Bandwidth of UNII-2C band Portion
= $(5725 - (5720 - (21.00 / 2))) = 15.50 \text{ MHz}$
- o 26dB Bandwidth of UNII-3 band Portion
= $(5720 + (21.00 / 2) - 5725) = 5.50 \text{ MHz}$

10.2.1. 802.11a MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Primary	Secondary
Low	5180	20.96	20.96
Mid	5200	20.88	21.16
High	5240	21.28	21.04
Worst		21.28	

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	21.40	21.24
Mid	5200	21.36	21.36
High	5240	21.40	21.24
Worst		21.40	

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	39.48	39.00
High	5230	39.54	39.18
Worst		39.54	

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	81.10	80.30
Worst		81.10	

10.2.5. 802.11a MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Primary	Secondary
Low	5260	21.16	21.24
Mid	5300	20.76	21.24
High	5320	21.08	21.08
Worst		21.24	

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	21.12	21.32
Mid	5300	21.20	21.20
High	5320	21.24	21.36
Worst		21.36	

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	39.66	39.24
High	5310	39.48	39.18
Worst		39.66	

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	81.20	80.30
Worst		81.20	

10.2.9. 802.11a MODE IN THE 5.5 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Primary	Secondary
Low	5500	20.96	21.16
Mid	5580	20.84	21.08
High	5700	20.88	20.72
Straddle	5720	15.50	15.58
Worst		21.16	

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	21.16	21.24
Mid	5580	21.48	21.36
High	5700	21.16	21.32
Straddle	5720	15.74	15.56
Worst		21.48	

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	39.60	39.24
Mid	5550	39.72	39.30
High	5670	39.72	39.18
Straddle	5710	34.86	34.50
Worst		39.72	

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	81.40	80.60
High	5610	80.80	80.00
Straddle	5690	75.40	75.30
Worst		81.40	

10.2.13. 802.11a MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Primary	Secondary
Straddle	5720	5.50	5.58
Low	5745	20.92	21.16
Mid	5785	21.12	21.00
High	5825	21.44	20.80
Worst		21.44	

10.2.14. 802.11n HT20 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Straddle	5720	5.74	5.56
Low	5745	21.40	21.28
Mid	5785	21.48	21.04
High	5825	21.24	21.24
Worst		21.48	

10.2.15. 802.11n HT40 MODE IN THE 5.8 GHz BAND

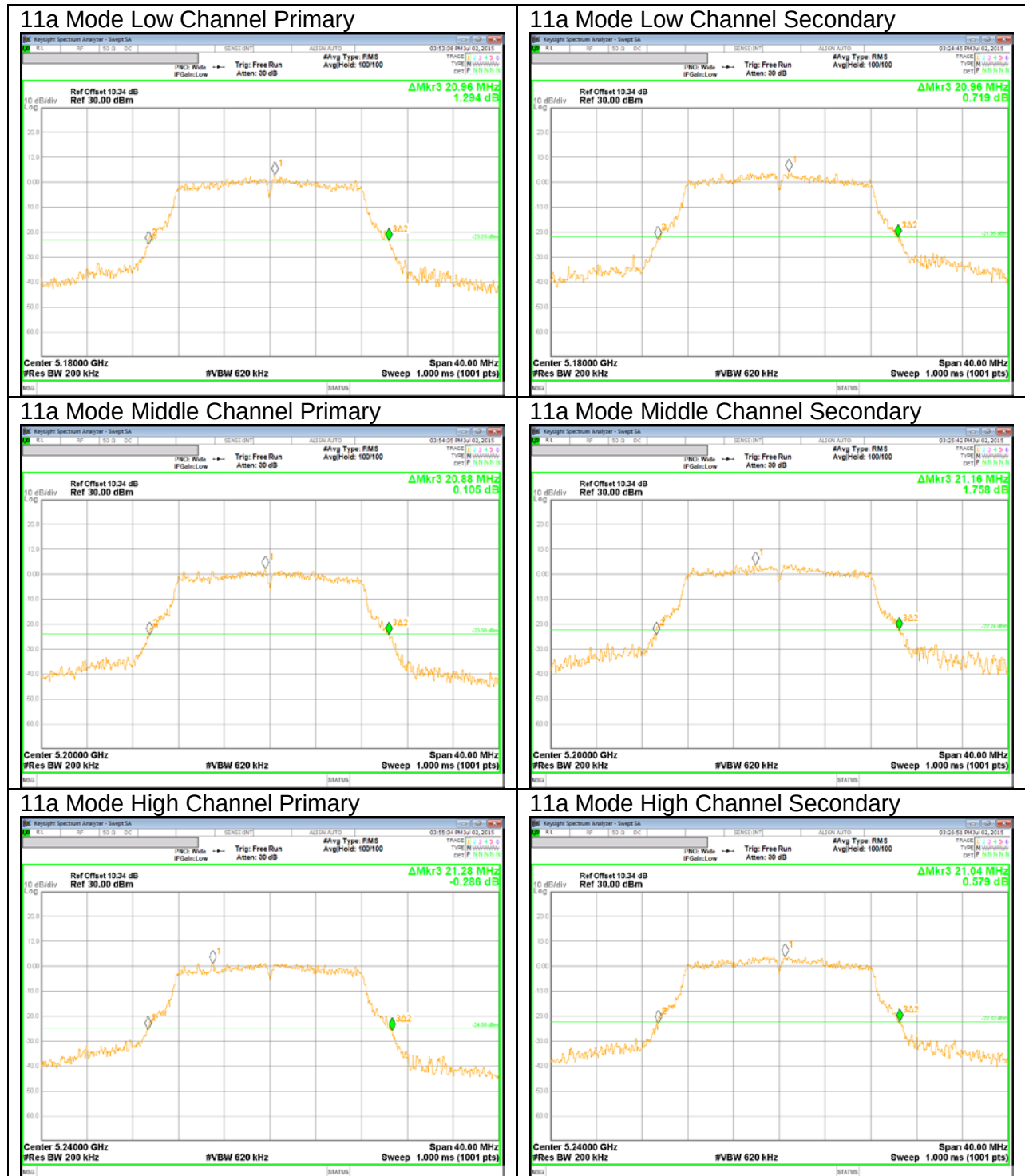
Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Straddle	5710	4.86	4.50
Low	5755	39.60	39.54
High	5795	40.74	38.94
Worst		40.74	

10.2.16. 802.11ac VHT80 MODE IN THE 5.8 GHz BAND

Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	
		Chain 0	Chain 1
Straddle	5690	5.40	5.30
Middle	5775	81.10	80.40
Worst		81.10	

10.2.17. 26 dB BANDWIDTH PLOTS

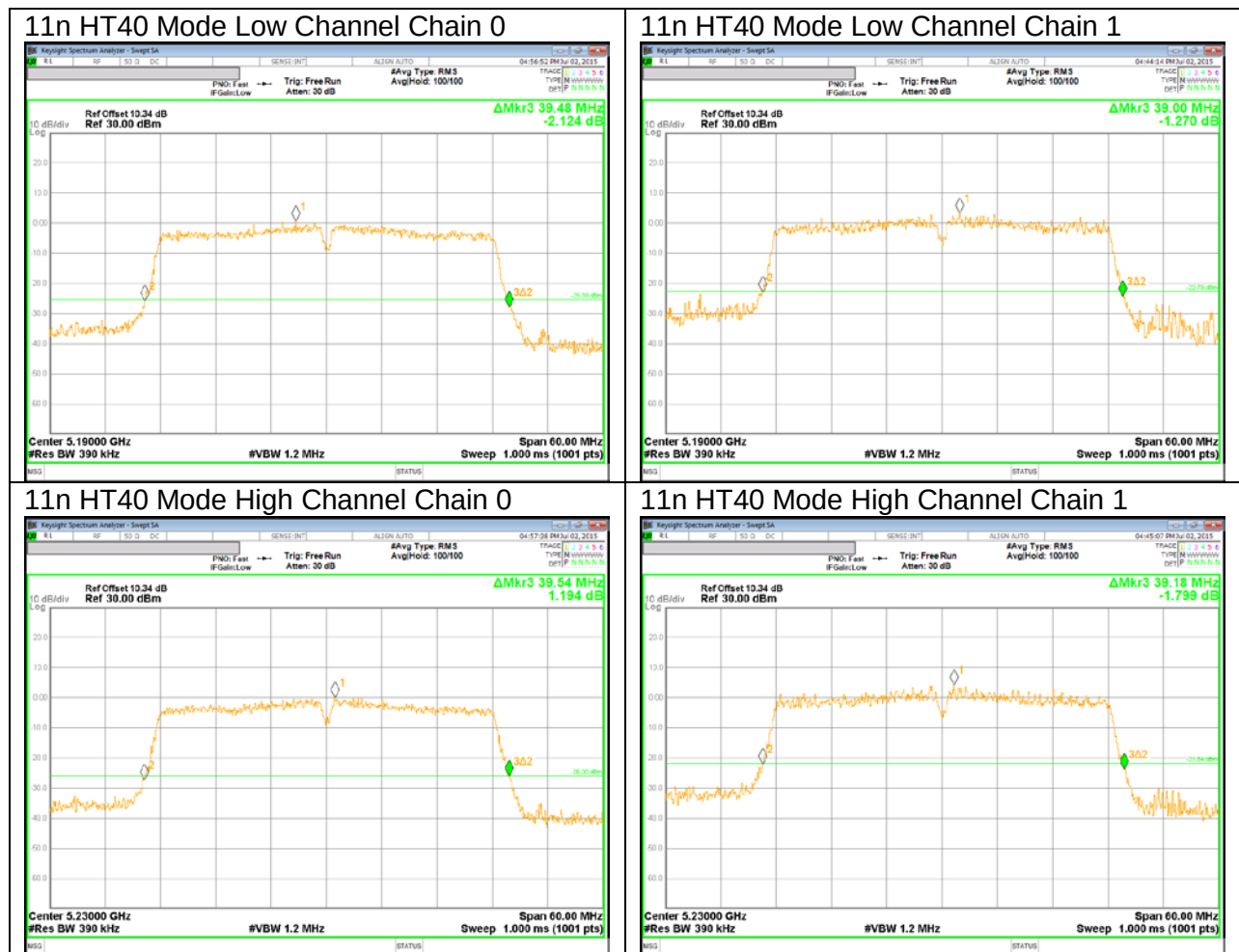
UNII 5.2 GHz IEEE 802.11a mode



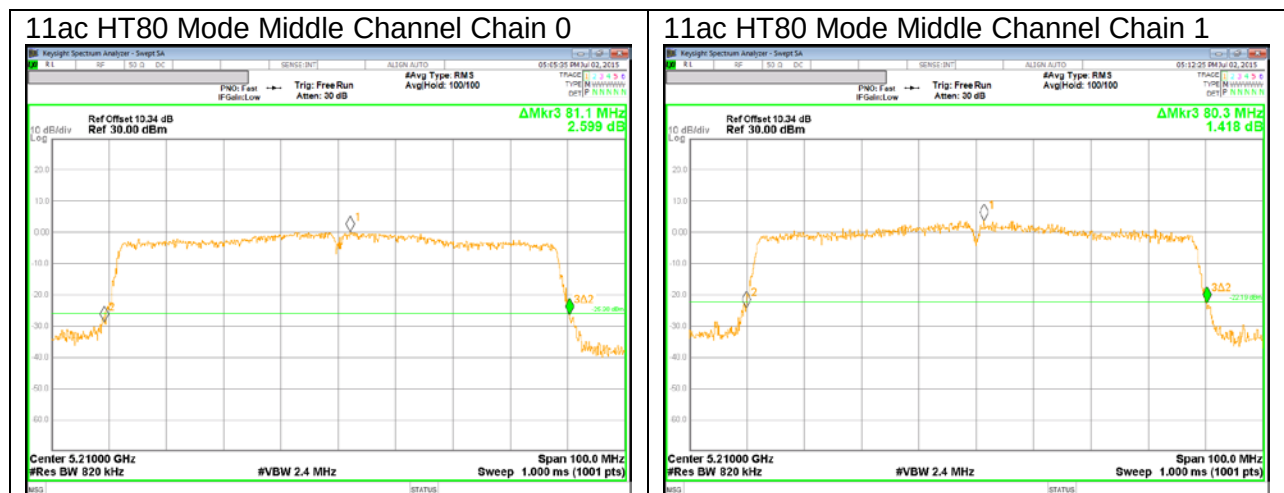
UNII 5.2 GHz IEEE 802.11n HT20 mode



UNII 5.2 GHz IEEE 802.11n HT40 mode



UNII 5.2 GHz IEEE 802.11ac VHT80 mode



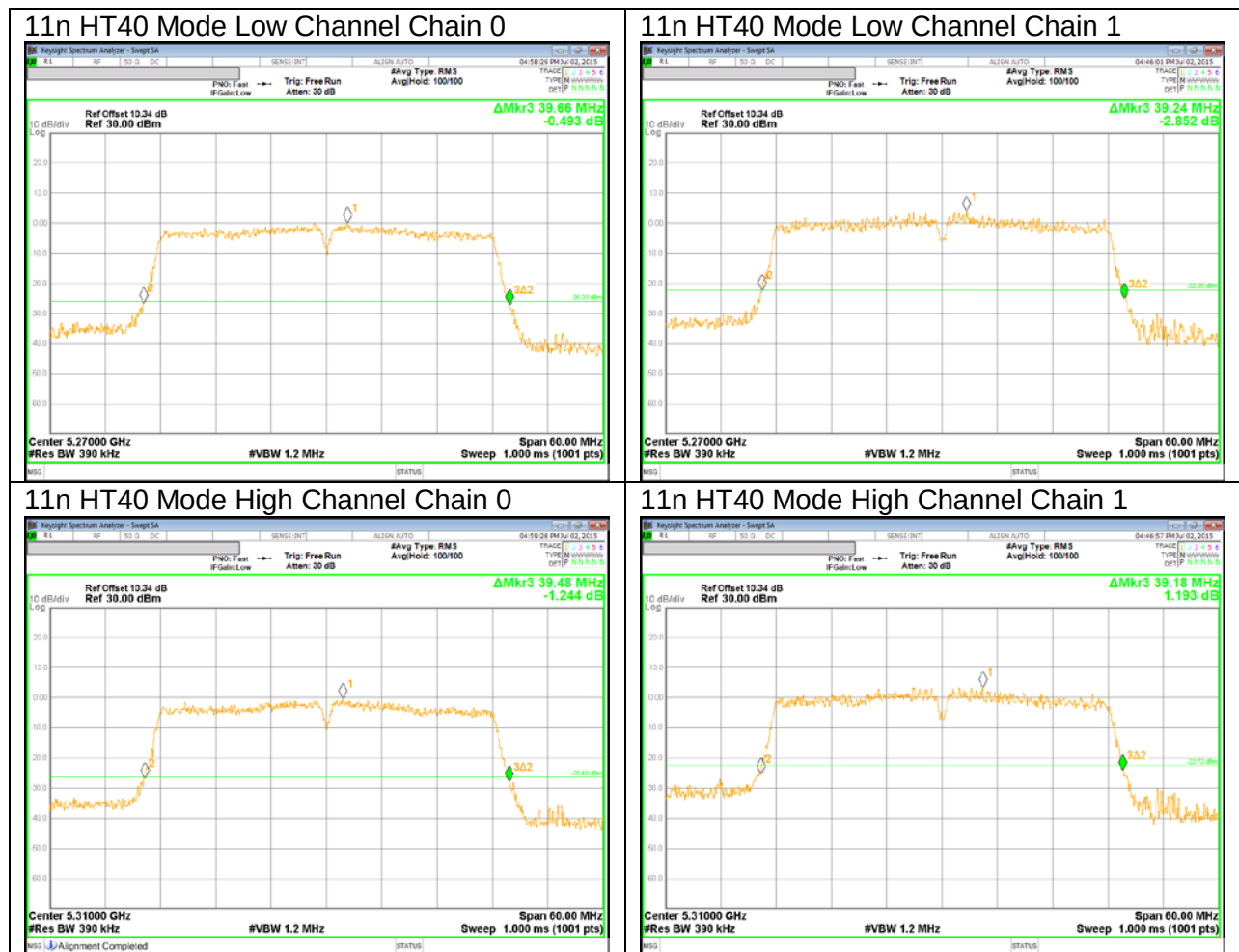
UNII 5.3 GHz IEEE 802.11a mode



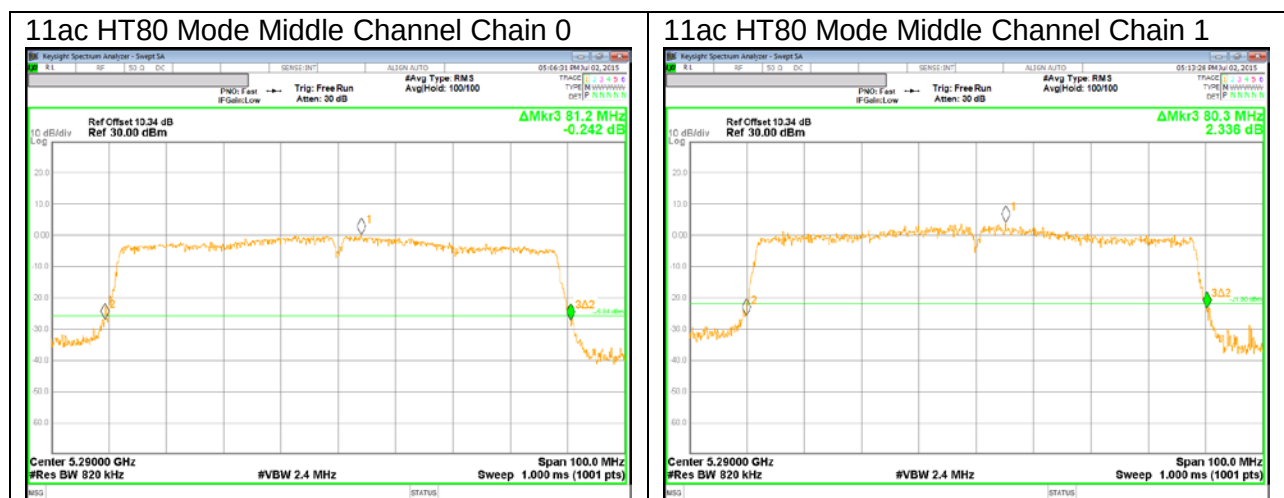
UNII 5.3 GHz IEEE 802.11n HT20 mode



UNII 5.3 GHz IEEE 802.11n HT40 mode



UNII 5.3 GHz IEEE 802.11ac VHT80 mode



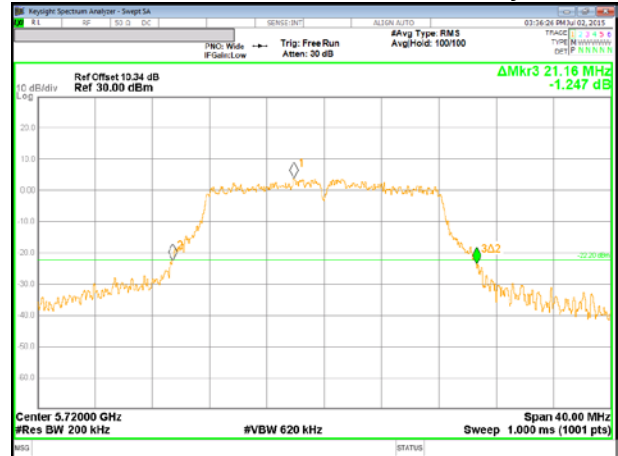
UNII 5.5 GHz IEEE 802.11a mode



11a Mode Straddle Channel Primary

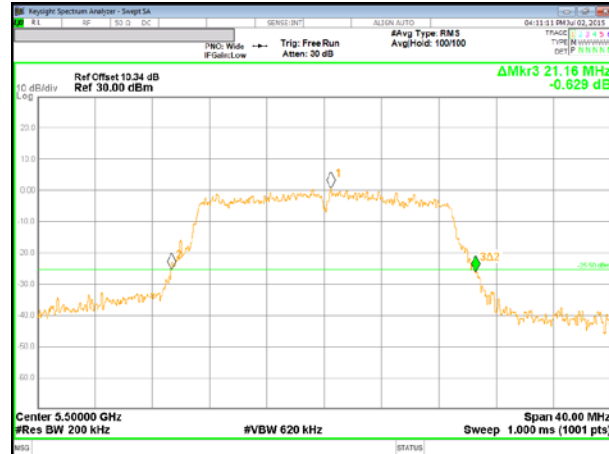


11a Mode Straddle Channel Secondary



UNII 5.5 GHz IEEE 802.11n HT20 mode

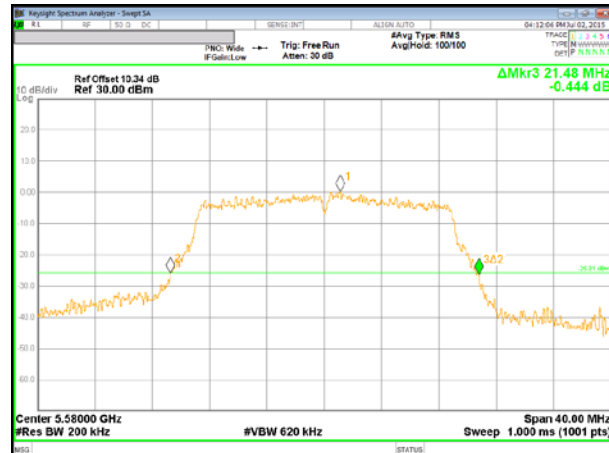
11n HT20 Mode Low Channel Chain 0



11n HT20 Mode Low Channel Chain 1



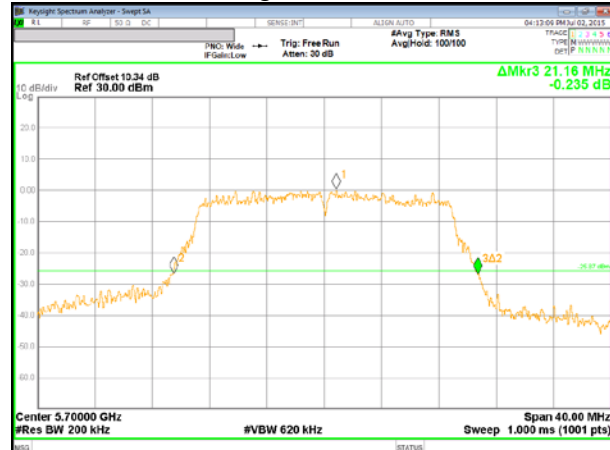
11n HT20 Mode Middle Channel Chain 0



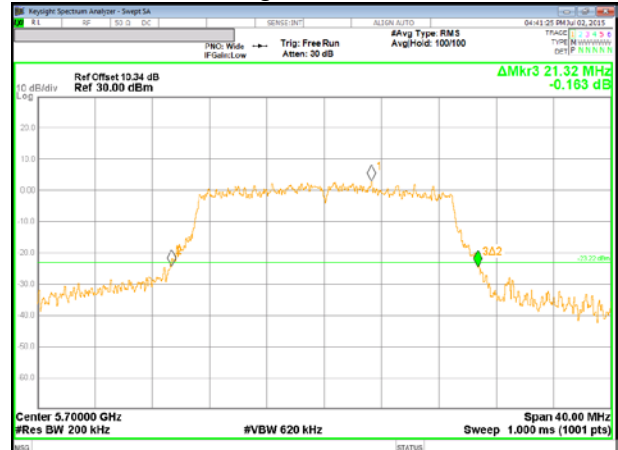
11n HT20 Mode Middle Channel Chain 1



11n HT20 Mode High Channel Chain 0



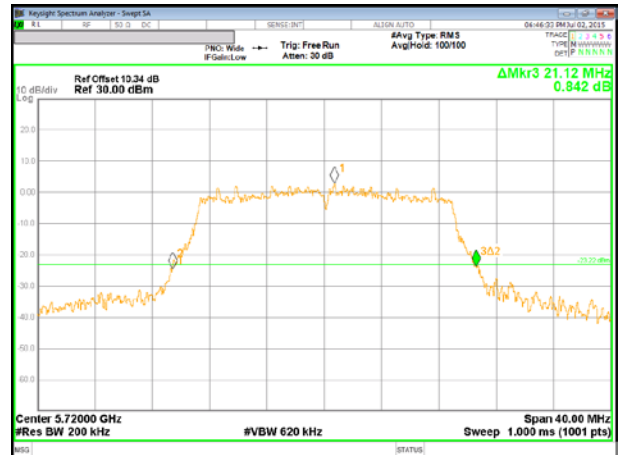
11n HT20 Mode High Channel Chain 1



11n HT20 Mode Straddle Channel Chain 0

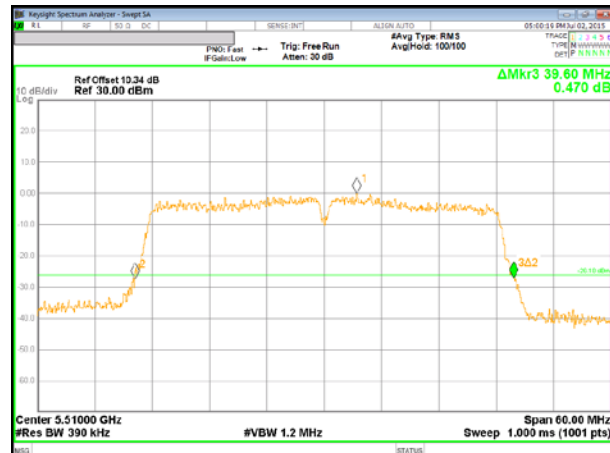


11n HT20 Mode Straddle Channel Chain 1

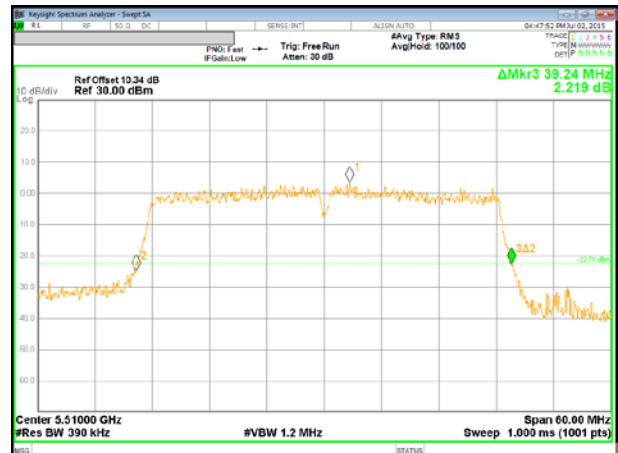


UNII 5.5 GHz IEEE 802.11n HT40 mode

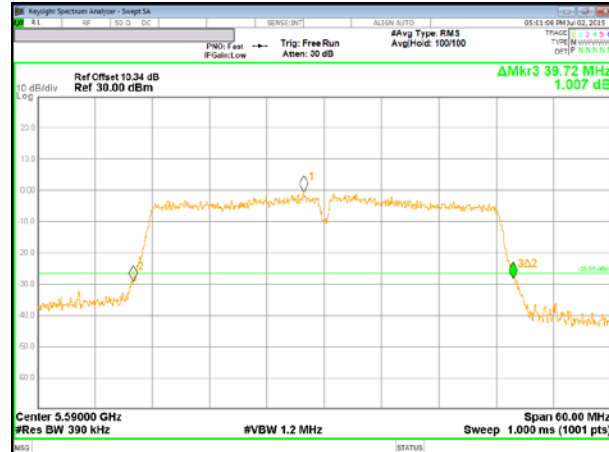
11n HT40 Mode Low Channel Chain 0



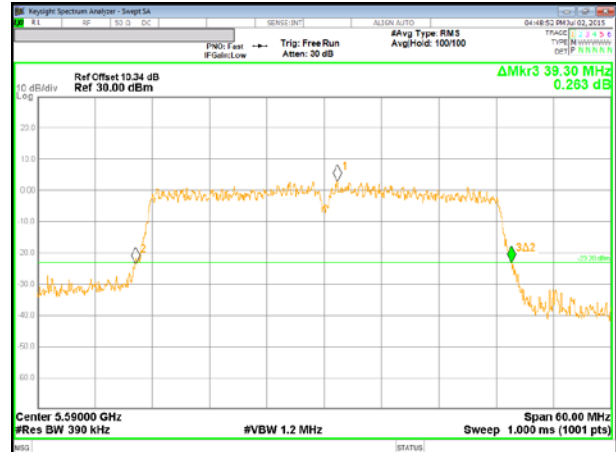
11n HT40 Mode Low Channel Chain 1



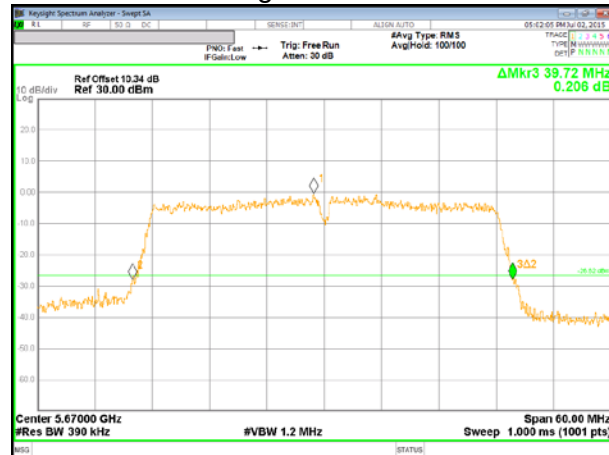
11n HT40 Mode Middle Channel Chain 0



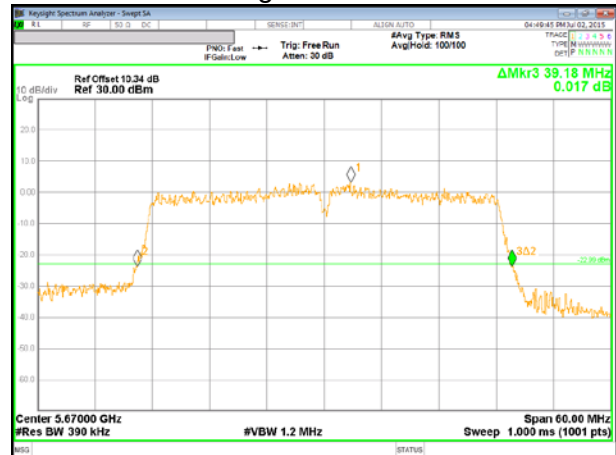
11n HT40 Mode Middle Channel Chain 1



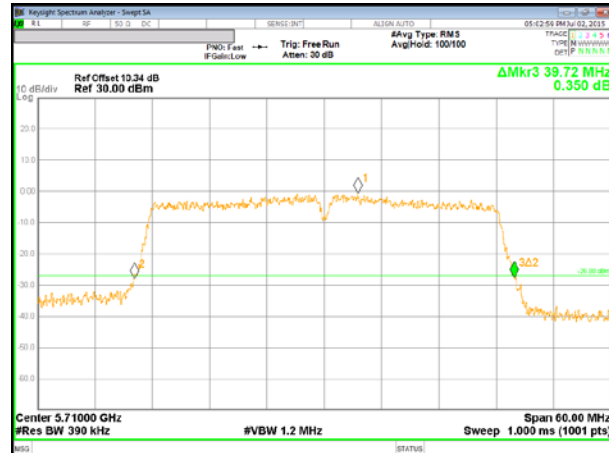
11n HT40 Mode High Channel Chain 0



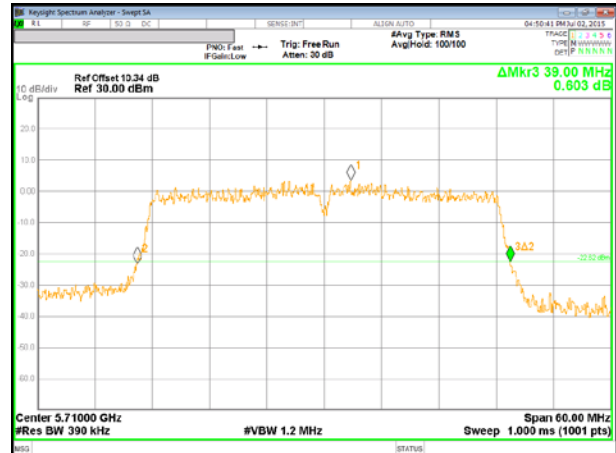
11n HT40 Mode High Channel Chain 1



11n HT40 Mode Straddle Channel Chain 0



11n HT40 Mode Straddle Channel Chain 1



UNII 5.5 GHz IEEE 802.11ac VHT80 mode



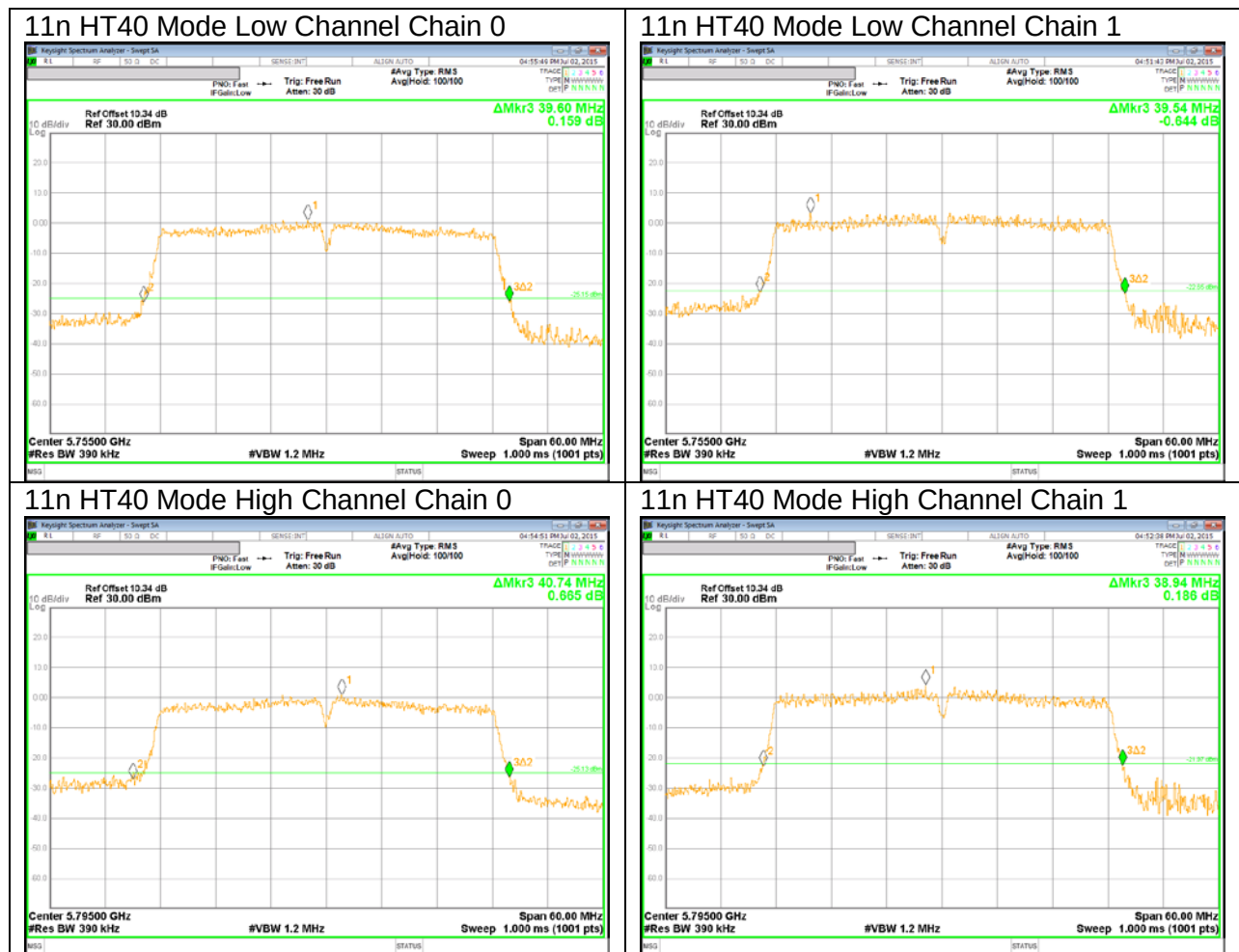
UNII 5.8 GHz IEEE 802.11a mode



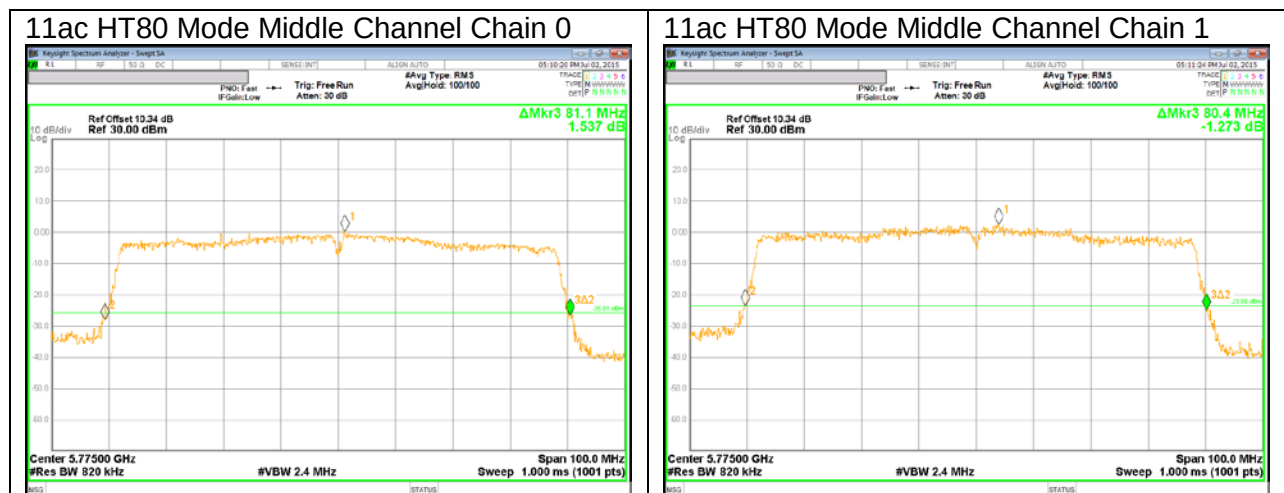
UNII 5.8 GHz IEEE 802.11n HT20 mode



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

- Calculation for 99% Bandwidth of UNII-2C and UNII-3 Straddle Channel

ex) 802.11a mode

- o Fundamental frequency : 5720MHz
- o 99% BW : 16.459MHz
- o Turning Frequency : 5725MHz
- o 99% Bandwidth of UNII-2C band Portion
= $(5725 - (5720 - (16.459 / 2))) = 13.229 \text{ MHz}$
- o 99% Bandwidth of UNII-3 band Portion
= $(5720 + (16.459 / 2) - 5725) = 3.230 \text{ MHz}$

10.3.1. 802.11a MODE IN THE 5.2 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Primary	Secondary
Low	5180	16.595	16.476
Mid	5200	16.414	16.429
High	5240	16.310	16.403
Worst		16.595	

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	17.642	17.643
Mid	5200	17.664	17.692
High	5240	17.730	17.611
Worst		17.730	

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	36.351	36.079
High	5230	36.098	36.160
Worst		36.351	

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	75.001	75.047
Worst		75.047	

10.3.5. 802.11a MODE IN THE 5.3 GHz BAND

Channel	Frequency [MHz]	99% Bandwidth [MHz]	
		Primary	Secondary
Low	5260	16.419	16.549
Mid	5300	16.388	16.444
High	5320	16.477	16.521
Worst		16.549	

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	17.685	17.694
Mid	5300	17.719	17.671
High	5320	17.630	17.695
Worst		17.719	

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	36.224	36.240
High	5310	36.137	36.282
Worst		36.282	

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	75.663	75.476
Worst		75.663	