

8.7 Occupied Bandwidth (99%)

Test Requirements

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured

Test Configuration

Refer to the APPENDIX I.

Test Procedure

RSS-Gen[6.7]

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

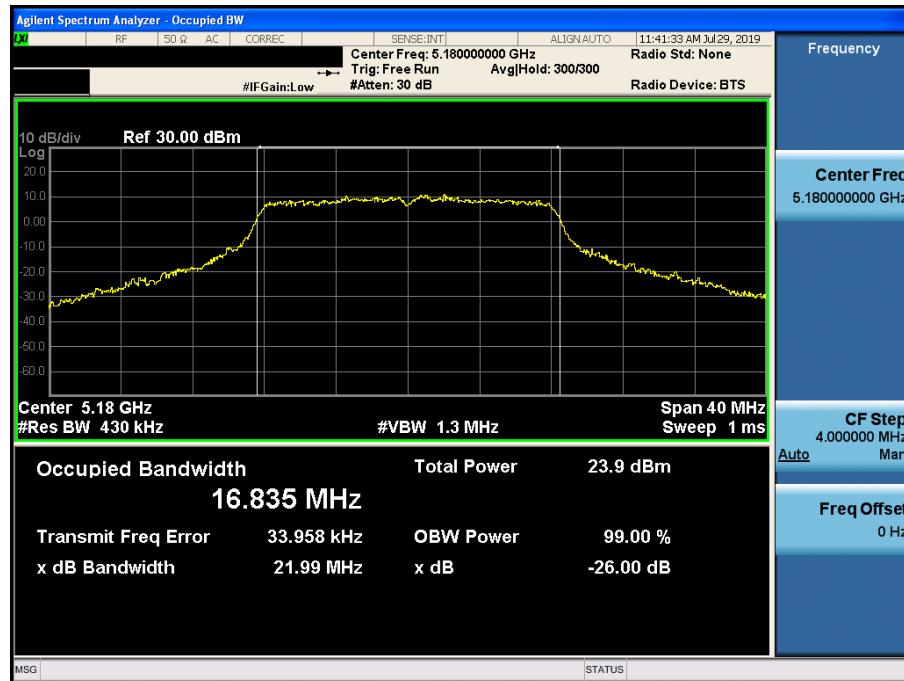
Test Results: Comply

Mode	Bands	Channel	Frequency [MHz]	Test Result [MHz]
802.11a	U-NII 1	36	5180	16.84
		40	5200	16.81
		48	5240	16.80
	U-NII 2A	52	5260	16.85
		60	5300	16.79
		64	5320	16.79
	U-NII 2C	100	5500	16.76
		116	5580	16.77
		144	5720	16.77
	U-NII 3	149	5745	16.76
		157	5785	16.76
		165	5825	16.77
802.11n(HT20)	U-NII 1	36	5180	18.03
		40	5200	18.02
		48	5240	17.98
	U-NII 2A	52	5260	17.99
		60	5300	18.00
		64	5320	18.00
	U-NII 2C	100	5500	18.01
		116	5580	17.97
		144	5720	17.98
	U-NII 3	149	5745	17.97
		157	5785	17.95
		165	5825	17.99
802.11n(HT40)	U-NII 1	38	5190	36.45
		46	5230	36.41
	U-NII 2A	54	5270	36.42
		62	5310	36.47
	U-NII 2C	102	5510	36.45
		110	5550	36.46
		142	5710	36.42
	U-NII 3	151	5755	36.39
		159	5795	36.37
802.11ac(VHT80)	U-NII 1	42	5210	75.95
	U-NII 2A	58	5290	75.76
	U-NII 2C	106	5530	76.10
		138	5690	75.87
	U-NII 3	155	5775	75.89

Result Plots

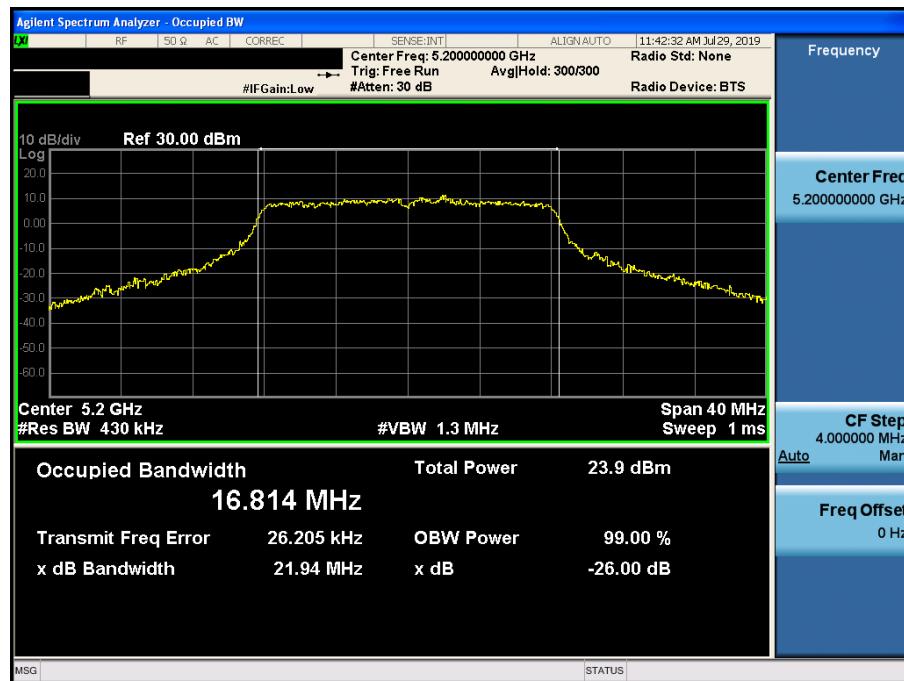
Occupied Bandwidth 99%

Test Mode: 802.11a & Ch.36



Occupied Bandwidth 99%

Test Mode: 802.11a & Ch.40



Occupied Bandwidth 99%

Test Mode: 802.11a & Ch.48



Occupied Bandwidth 99%

Test Mode: 802.11a & Ch.52


Occupied Bandwidth 99%

Test Mode: 802.11a & Ch.60



Occupied Bandwidth 99%

Test Mode: 802.11a & Ch.64



Occupied Bandwidth 99%

Test Mode: 802.11a & Ch.100


Occupied Bandwidth 99%

Test Mode: 802.11a & Ch.116



Occupied Bandwidth 99%

Test Mode: 802.11a & Ch.144



Occupied Bandwidth 99%

Test Mode: 802.11a & Ch.149

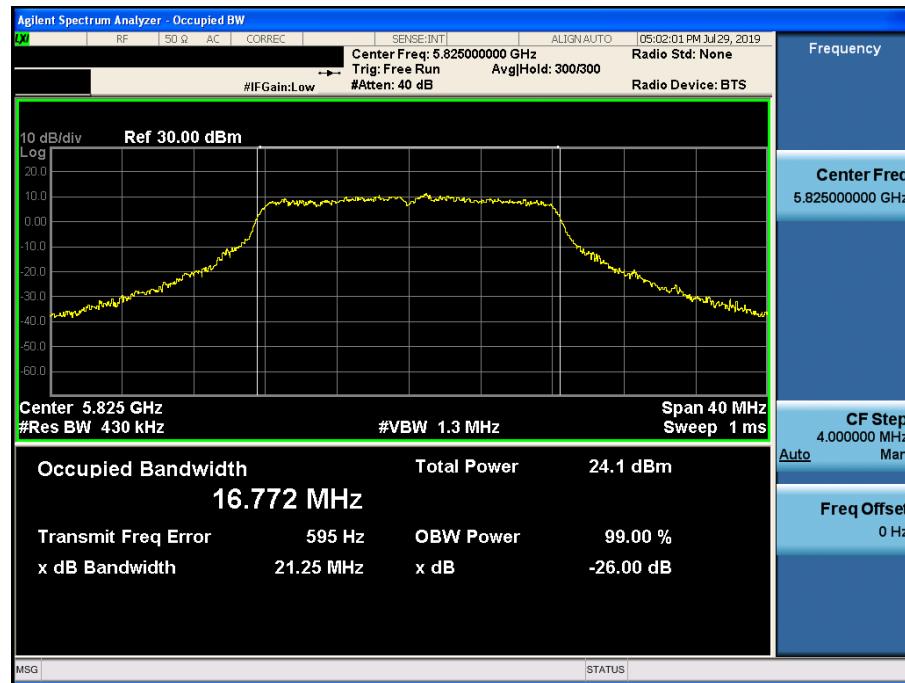

Occupied Bandwidth 99%

Test Mode: 802.11a & Ch.157



Occupied Bandwidth 99%

Test Mode: 802.11a & Ch.165



Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) & Ch.36


Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) & Ch.40



Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) & Ch.48



Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) & Ch.52


Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) & Ch.60



Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) & Ch.64



Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) & Ch.100


Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) & Ch.116



Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) & Ch.144



Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) & Ch.149


Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) & Ch.157



Occupied Bandwidth 99%

Test Mode: 802.11n(HT20) & Ch.165



Occupied Bandwidth 99%

Test Mode: 802.11n(HT40) & Ch.38

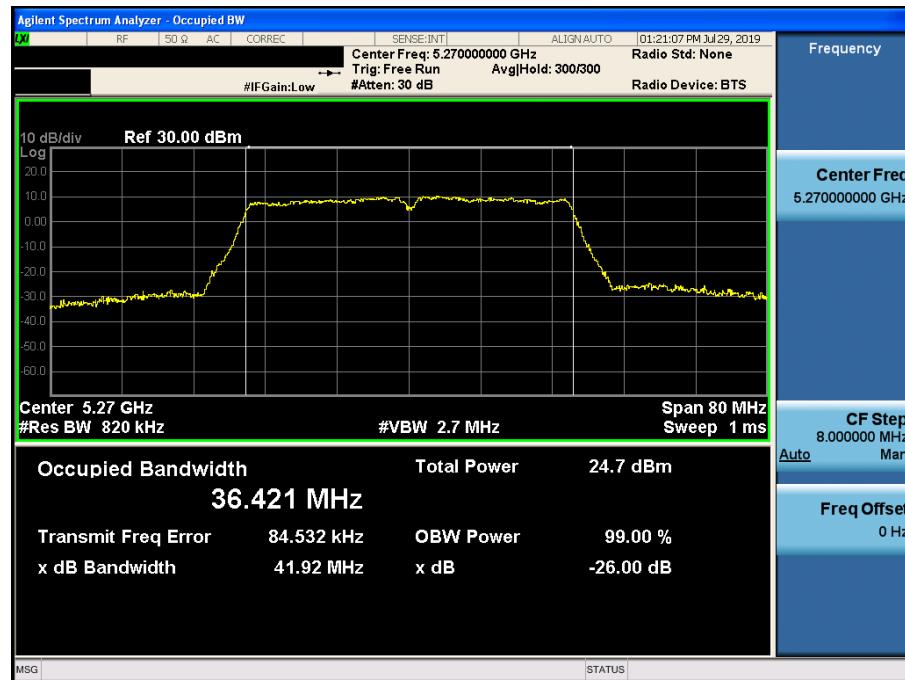

Occupied Bandwidth 99%

Test Mode: 802.11n(HT40) & Ch.46

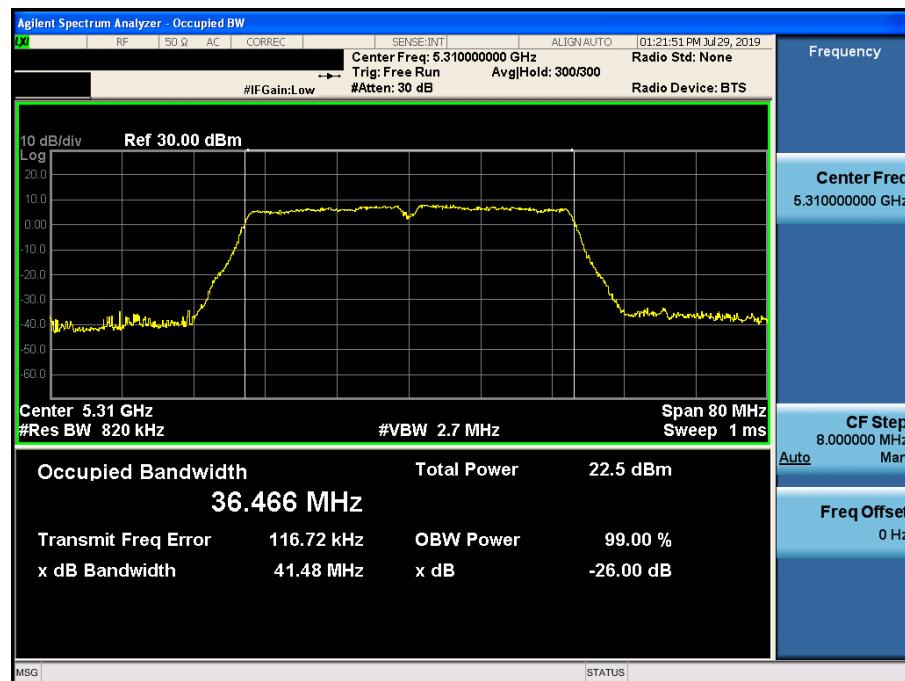


Occupied Bandwidth 99%

Test Mode: 802.11n(HT40) & Ch.54

**Occupied Bandwidth 99%**

Test Mode: 802.11n(HT40) & Ch.62

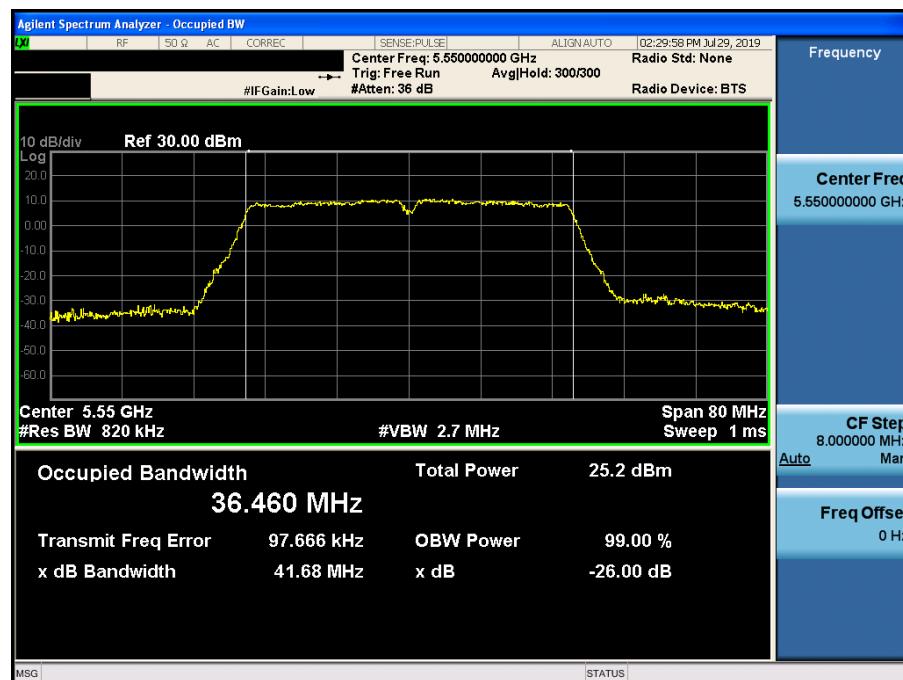


Occupied Bandwidth 99%

Test Mode: 802.11n(HT40) & Ch.102

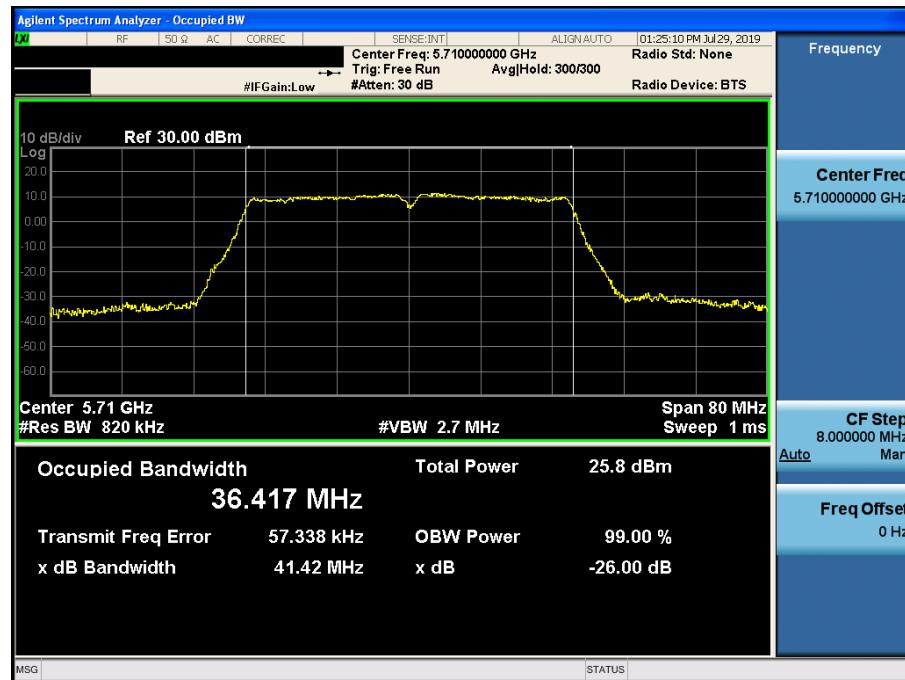

Occupied Bandwidth 99%

Test Mode: 802.11n(HT40) & Ch.110



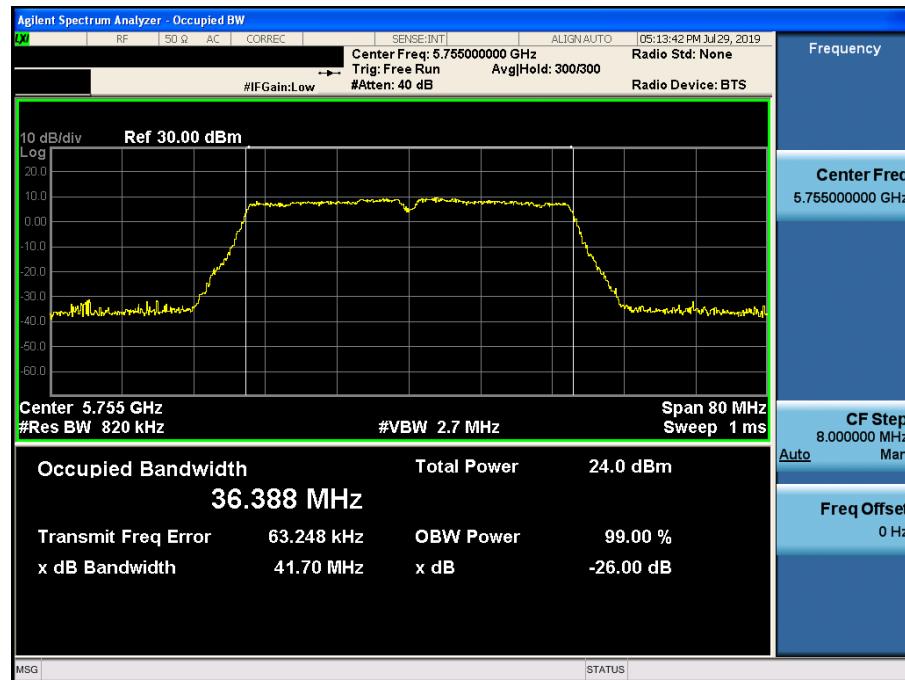
Occupied Bandwidth 99%

Test Mode: 802.11n(HT40) & Ch.142



Occupied Bandwidth 99%

Test Mode: 802.11n(HT40) & Ch.151

**Occupied Bandwidth 99%**

Test Mode: 802.11n(HT40) & Ch.159



Occupied Bandwidth 99%

Test Mode: 802.11ac(VHT80) & Ch.42


Occupied Bandwidth 99%

Test Mode: 802.11ac(VHT80) & Ch.58



Occupied Bandwidth 99%

Test Mode: 802.11ac(VHT80) & Ch.106

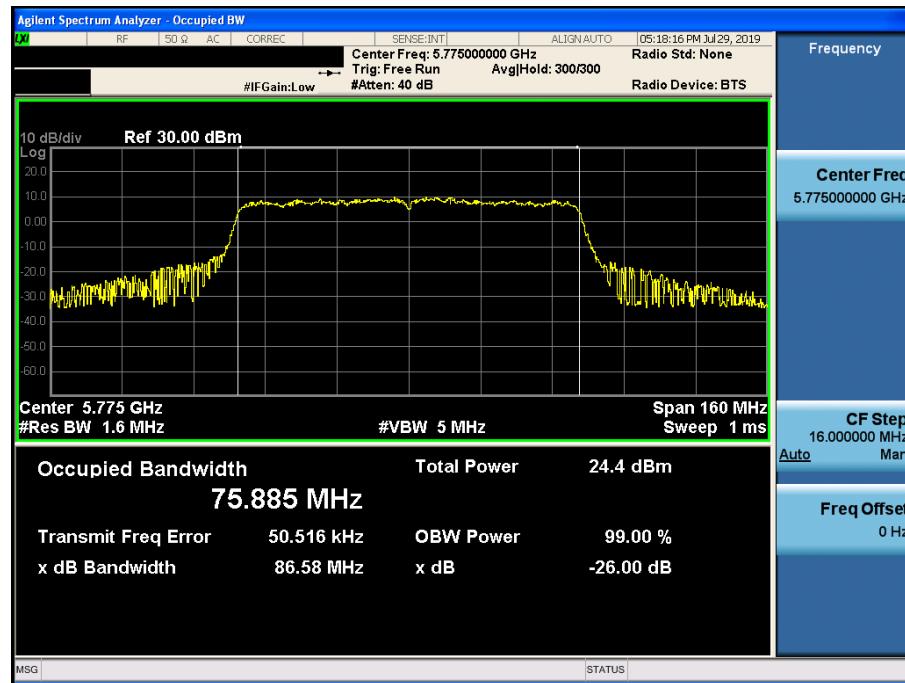

Occupied Bandwidth 99%

Test Mode: 802.11ac(VHT80) & Ch.138



Occupied Bandwidth 99%

Test Mode: 802.11ac(VHT80) & Ch.155



9. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	19/06/26	20/06/26	US47360812
Spectrum Analyzer	Agilent Technologies	N9020A	18/12/19	19/12/19	MY48011700
DC Power Supply	Agilent Technologies	66332A	18/12/18	19/12/18	US37473833
Multimeter	FLUKE	17B	18/12/18	19/12/18	26030065WS
Signal Generator	Rohde Schwarz	SMBV100A	18/12/19	19/12/19	255571
Signal Generator	ANRITSU	MG3695C	18/12/10	19/12/10	173501
Thermohygrometer	BODYCOM	BJ5478	18/12/27	19/12/27	120612-1
Thermohygrometer	SATO	PC-5000TRH-II	18/07/18	19/07/18	N/A
Thermohygrometer			19/07/18	20/07/18	
Thermohygrometer	BODYCOM	BJ5478	19/07/03	20/07/03	N/A
HYGROMETER	TESTO	608-H1	19/01/31	20/01/31	34862883
Loop Antenna	Schwarzbeck	FMZB1513	18/01/30	20/01/30	1513-128
BILOG ANTENNA	Schwarzbeck	VULB 9160	18/07/13	20/07/13	3359
Horn Antenna	ETS-Lindgren	3115	18/01/30	20/01/30	6419
Horn Antenna	A.H.Systems Inc.	SAS-574	17/07/31	19/07/31	155
PreAmplifier	tsj	MLA-0118-J01-45	18/12/19	19/12/19	17138
PreAmplifier	tsj	MLA-1840-J02-45	19/06/27	20/06/27	16966-10728
PreAmplifier	tsj	MLA-10K01-B01-27	18/10/31	19/10/31	2005354
Attenuator	SMAJK	SMAJK-2-3	19/06/25	20/06/25	4
Attenuator	SMAJK	SMAJK-2-3	18/07/02	19/07/02	3
Attenuator			19/06/27	20/06/27	
Attenuator	SRTechnology	F01-B0606-01	18/07/02	19/07/02	13092403
Attenuator			19/06/27	20/06/27	
Attenuator	Hefei Shunze	SS5T2.92-10-40	18/07/03	19/07/03	16012202
High Pass Filter	Wainwright Instruments	WHNX8.0/26.5-6SS	18/07/03	19/07/03	
High Pass Filter	Wainwright Instruments	WHKX12-935-1000-15000-40SS	18/07/02	19/07/02	8
High Pass Filter	Wainwright Instruments	WHKX10-2838-3300-18000-60SS	18/07/02	19/07/02	
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2496A MA2411B	18/12/19	19/12/19	1338004 1306053
Attenuator	Aeroflex/Weinschel	1986-10-11	19/06/27	20/06/27	408
Temp & Humi Test Chamber	SJ Science	SJ-TH-S50	18/12/20	19/12/20	SJ-TH-S50-140205
EMI Receiver	ROHDE&SCHWARZ	ESW44	18/08/06	19/08/06	101645
EMI Test Receiver	Rohde Schwarz	ESCI7	19/01/30	20/01/30	100910
PULSE LIMITER	Rohde Schwarz	ESH3-Z2	18/09/27	19/09/27	101333
LISN	SCHWARZBECK	NNLK 8121	19/03/19	20/03/19	06183
Cable	HUBER+SUHNER	SUCOFLEX	18/12/21	19/12/21	C-1
Cable	HUBER+SUHNER	SUCOFLEX	18/12/21	19/12/21	C-2
Cable	HUBER+SUHNER	SUCOFLEX	18/12/21	19/12/21	C-3
Cable	HUBER+SUHNER	SUCOFLEX	18/12/21	19/12/21	C-4
Cable	Junkosha	MWX241	19/01/14	20/01/14	G-04
Cable	Junkosha	MWX241	19/01/14	20/01/14	G-07
Cable	DT&C	Cable	19/01/14	20/01/14	G-13
Cable	DT&C	Cable	19/01/14	20/01/14	G-14
Cable	HUBER+SUHNER	SUCOFLEX 104	19/01/14	20/01/14	G-15
Test Software	tsj	Radiated EmissionMeasurement	NA	NA	Version 2.00.0177
Test Software	tsj	Noise Terminal VoltageMeasurement	NA	NA	Version 2.00.0170

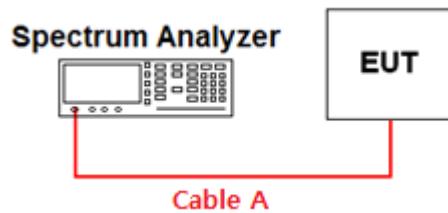
Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017

Note2: The cable is not a regular calibration item, so it has been calibrated by DT & C itself.

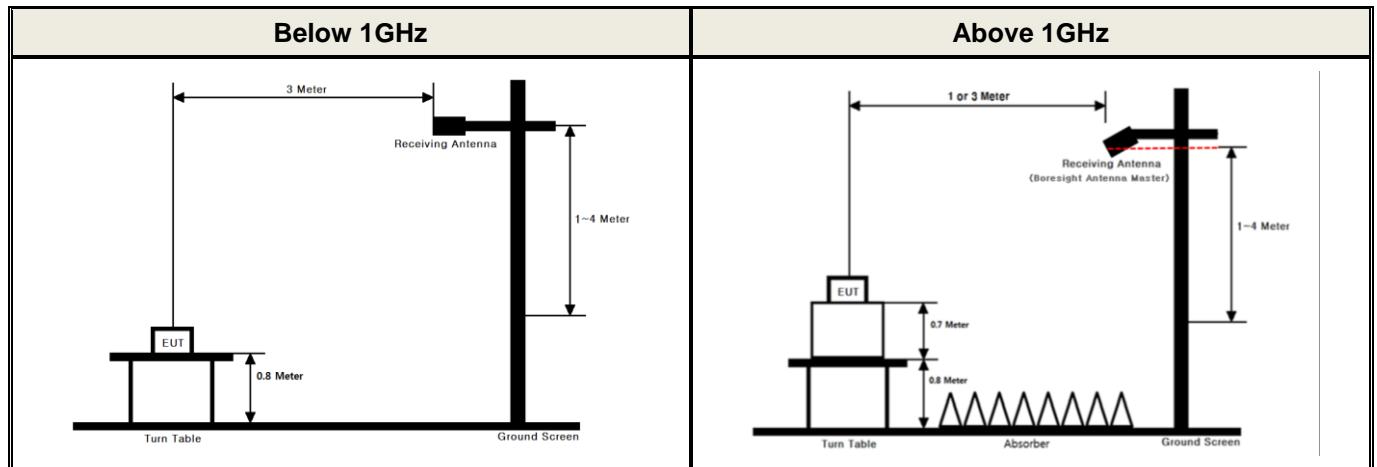
APPENDIX I

Test set up Diagram

- Conducted Measurement



- Radiated Measurement



APPENDIX II

Duty Cycle Information

■ Test Procedure

Duty Cycle [X = On Time / (On + Off time)] is measured using Measurement Procedure of **KDB789033 D02v02r01**

1. Set the center frequency of the spectrum analyzer to the center frequency of the transmission.
2. Set RBW \geq EBW if possible; otherwise, set RBW to the largest available value.
3. Set VBW \geq RBW. Set detector = peak.
4. Note : The zero-span measurement method shall not be used unless both **RBW and VBW are $> 50/T$** , where T is defined in section II.B.1.a), and **the number of sweep points across duration T exceeds 100**. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if $T \leq 16.7$ microseconds.)

T : The minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

(T = **On time** of the above table since the EUT operates with above fixed Duty Cycle and it is the minimum On time)

■ Test Results:

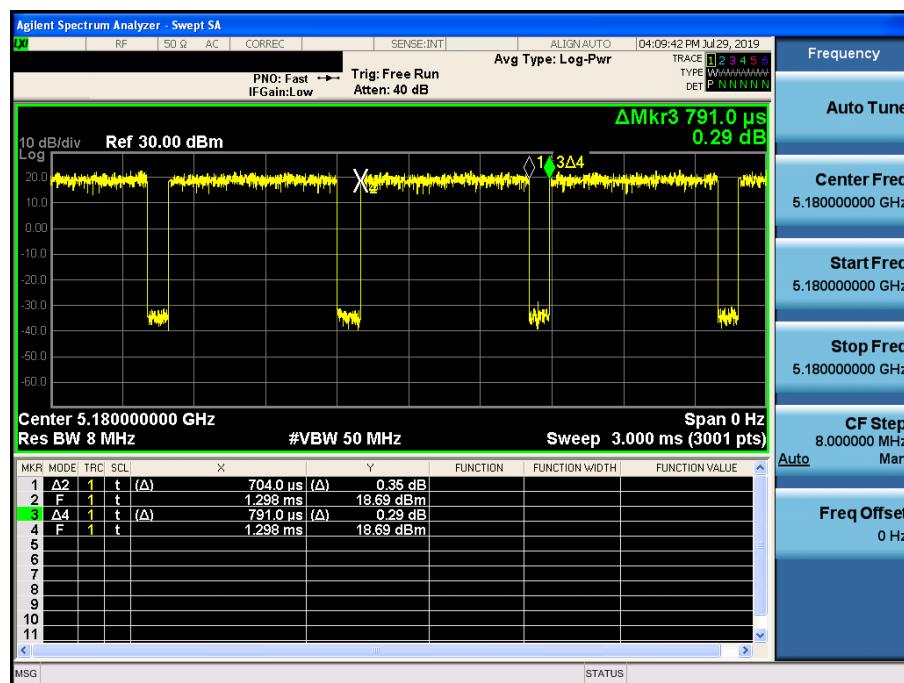
Duty cycle

Mode	Data Rate	Tested Frequency [MHz]	Maximum Achievable Duty Cycle (x) = On / (On+Off)			Duty Cycle Correction Factor [dB]	$50/T$ [kHz]
			On Time [ms]	(On+Off) Time [ms]	x		
802.11a	18Mbps	5180	0.704	0.791	0.8900	0.51	71.02
802.11n (HT20)	MCS2	5180	0.668	0.756	0.8836	0.54	74.85
802.11n (HT40)	MCS0	5190	0.948	1.038	0.9136	0.39	52.74
802.11ac (VHT80)	MCS1	5210	0.252	0.341	0.7390	1.31	198.41

Single Transmit

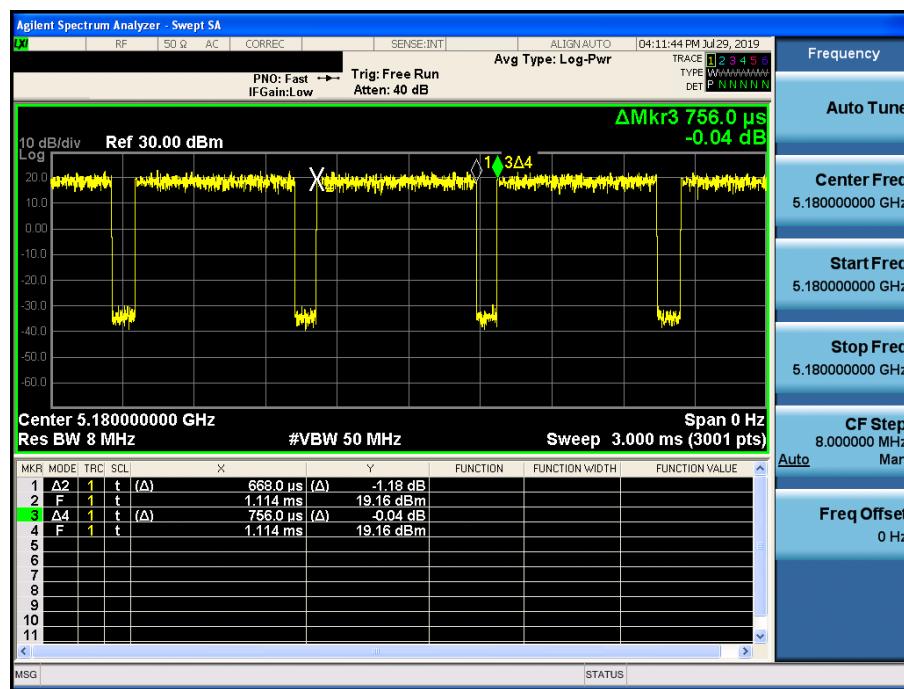
Duty Cycle

Test Mode: 802.11a & Ch.36



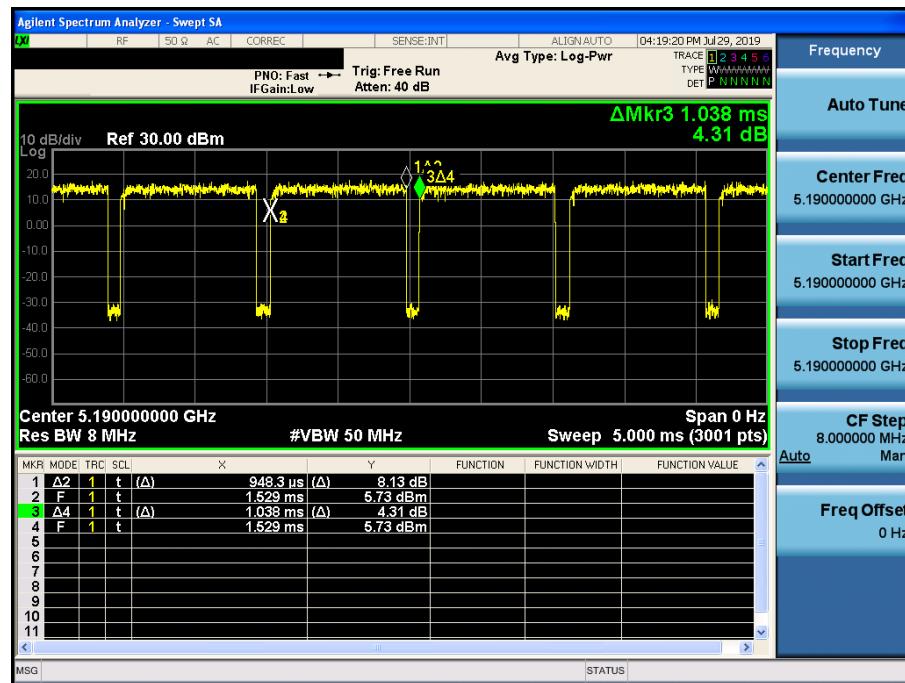
Duty Cycle

Test Mode: 802.11n HT20 & Ch.36

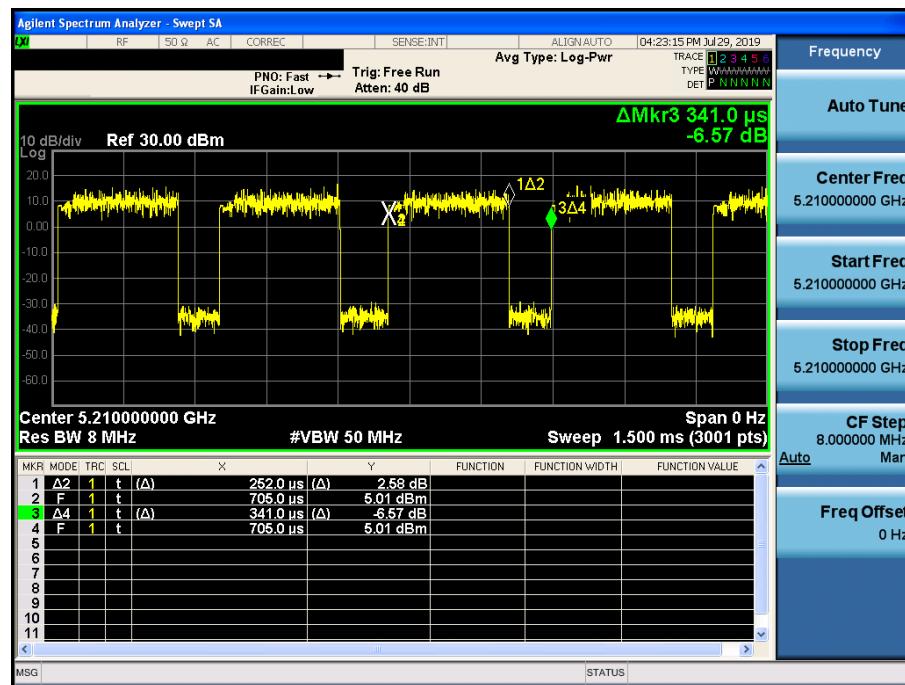


Duty Cycle

Test Mode: 802.11n HT40 & Ch.38


Duty Cycle

Test Mode: 802.11ac VHT80 & Ch.42

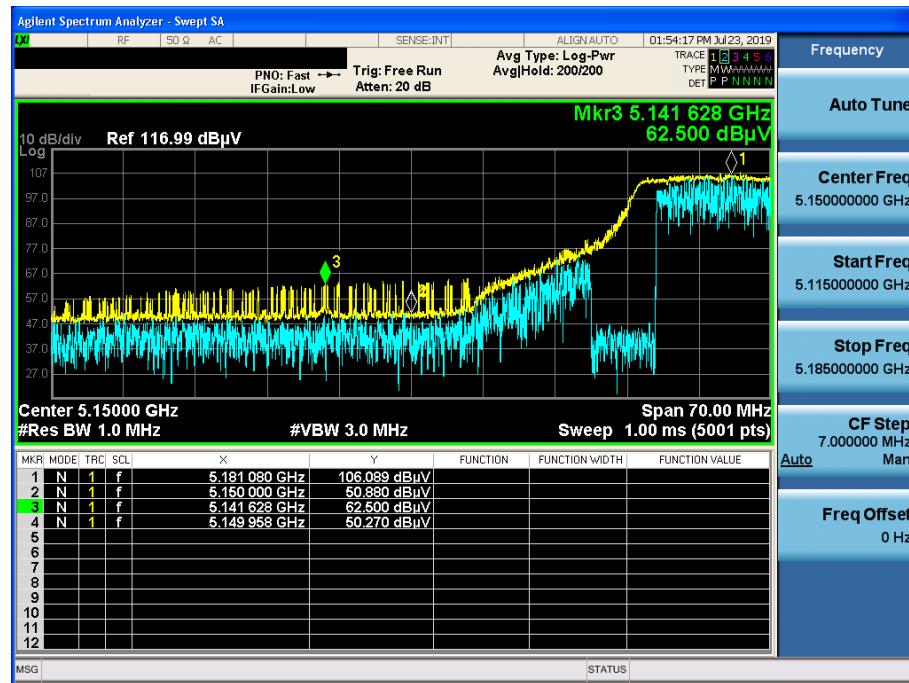


APPENDIX III

Unwanted Emissions (Radiated) Test Plot

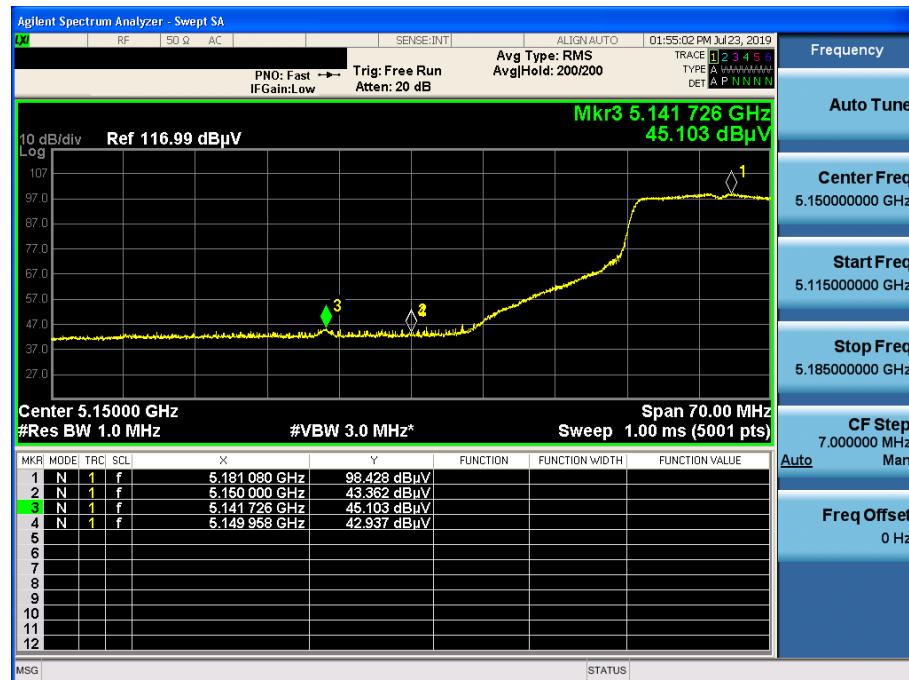
802.11a & U-NII 1 & Ch.36 & X axis & Hor

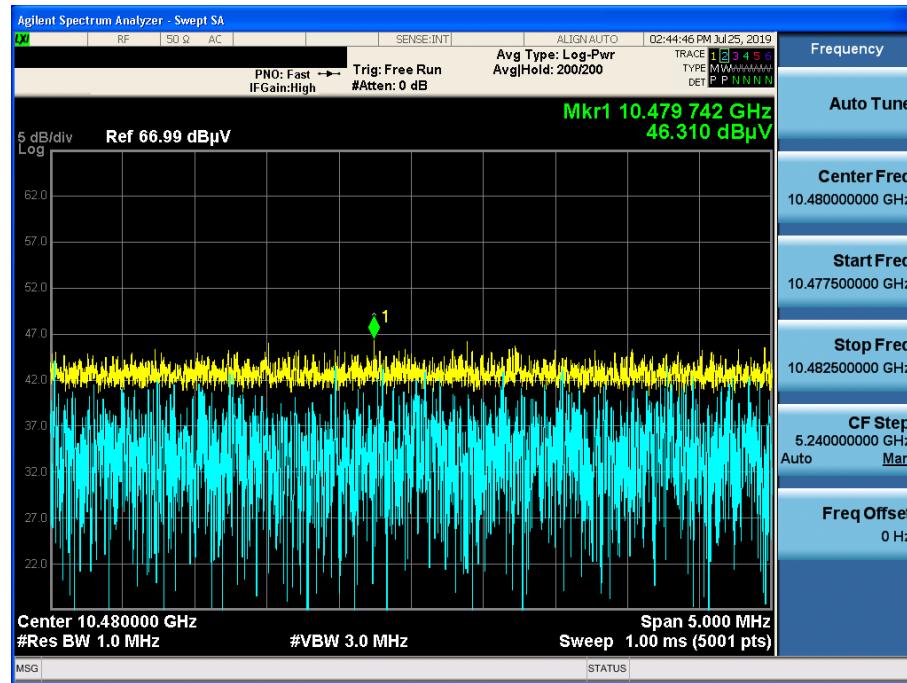
Detector Mode : PK



802.11a & U-NII 1 & Ch.36 & X axis & Hor

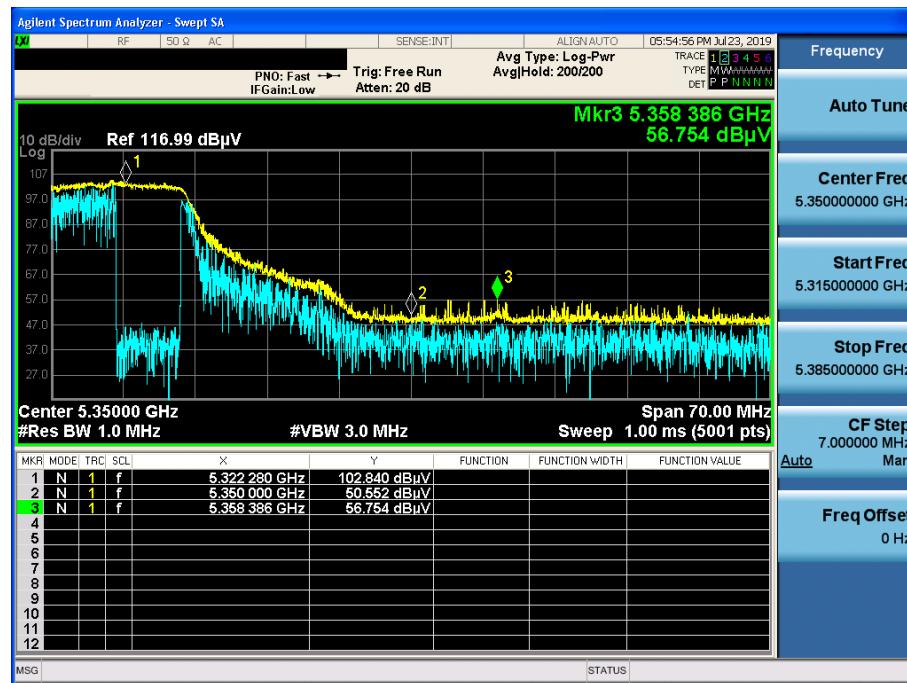
Detector Mode : AV



802.11a & U-NII 1 & Ch.48 & Z axis & Hor
Detector Mode : PK


802.11a & U-NII 2A & Ch.64 & X axis & Hor

Detector Mode : PK



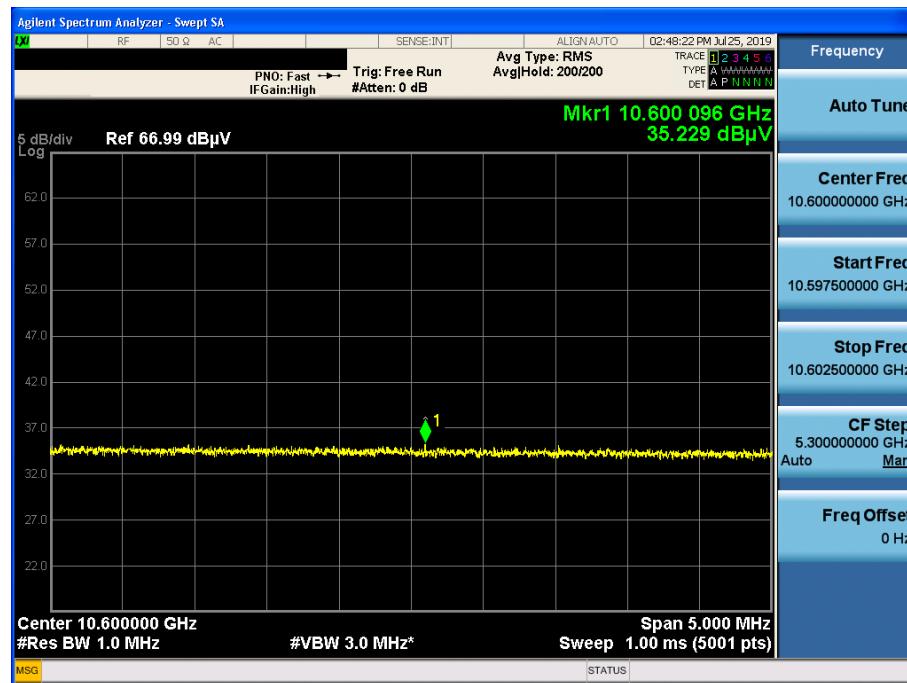
802.11a & U-NII 2A & Ch.64 & X axis & Hor

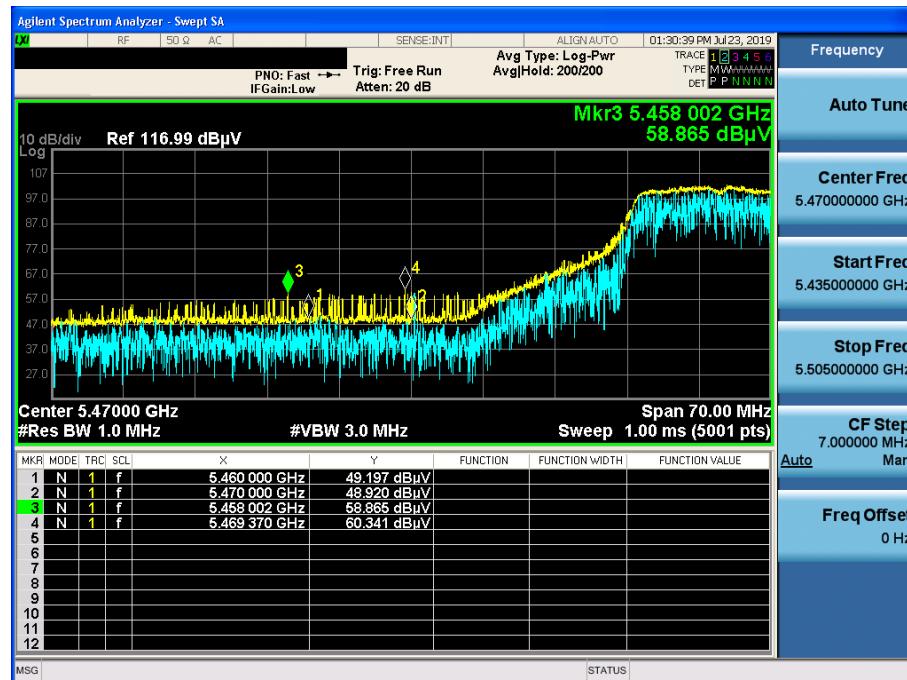
Detector Mode : AV



802.11a & U-NII 2A & Ch.60 & Z axis & Hor

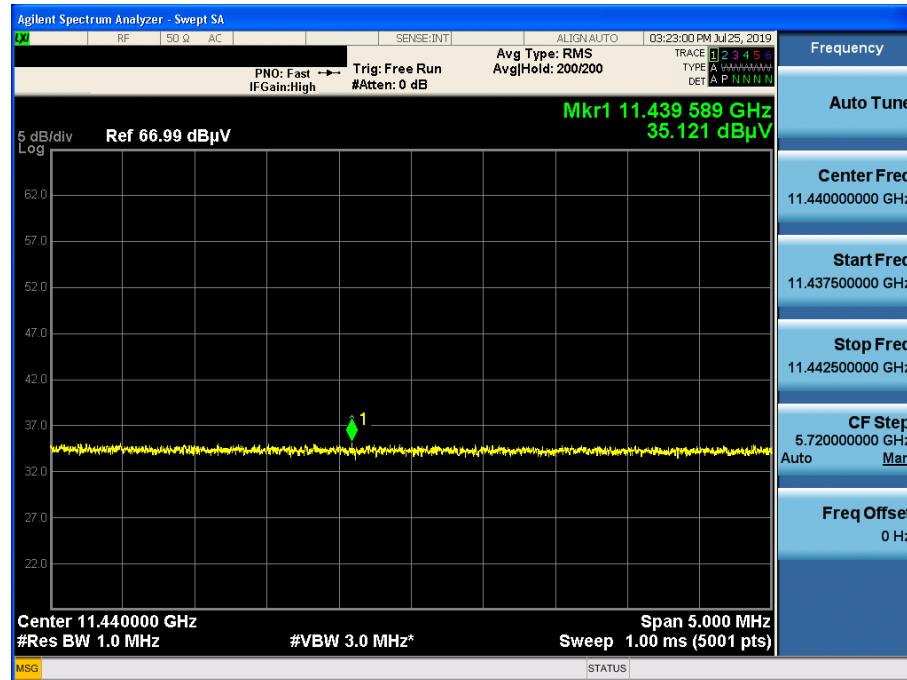
Detector Mode : AV

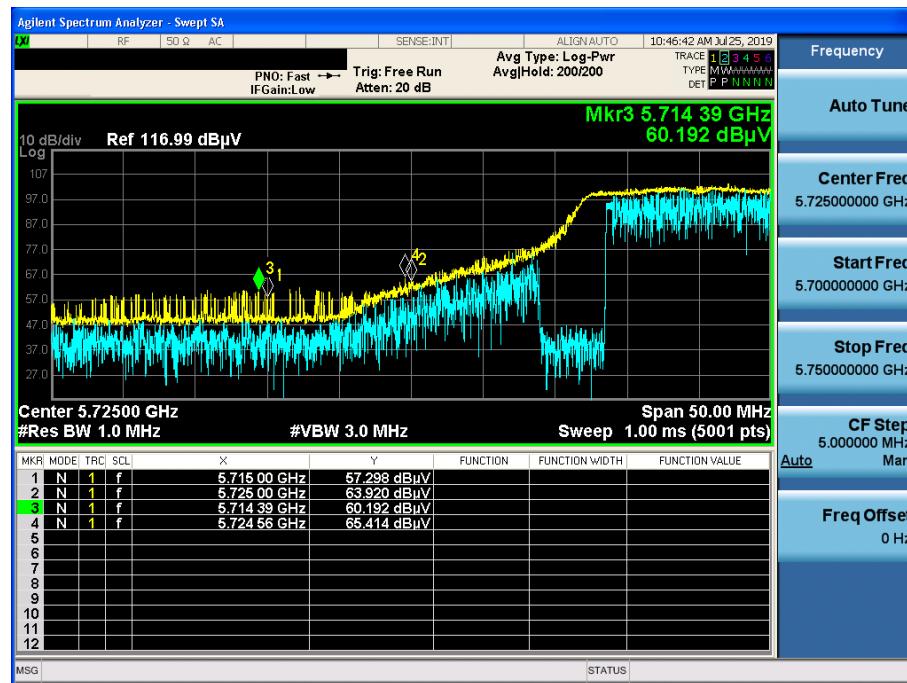
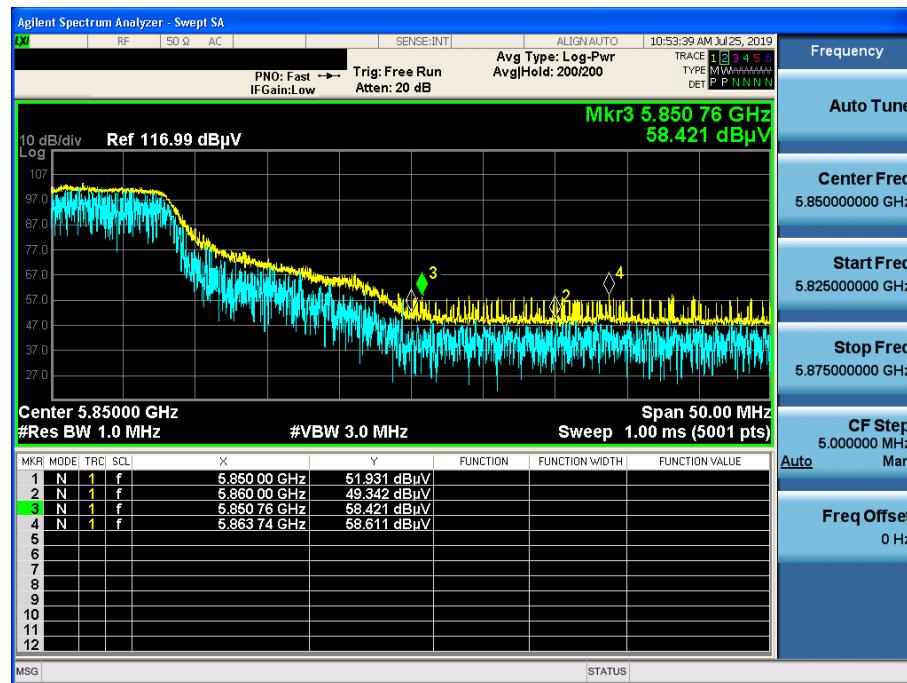


802.11a & U-NII 2C & Ch.100 & X axis & Hor
Detector Mode : PK

802.11a & U-NII 2C & Ch.100 & X axis & Hor
Detector Mode : AV


802.11a & U-NII 2C & Ch.144 & Z axis & Hor

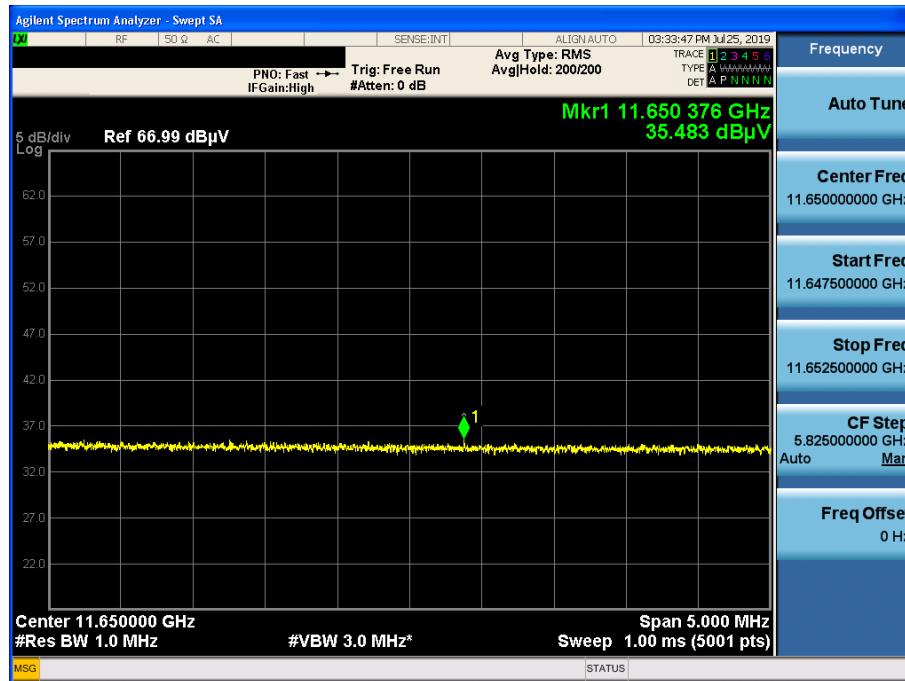
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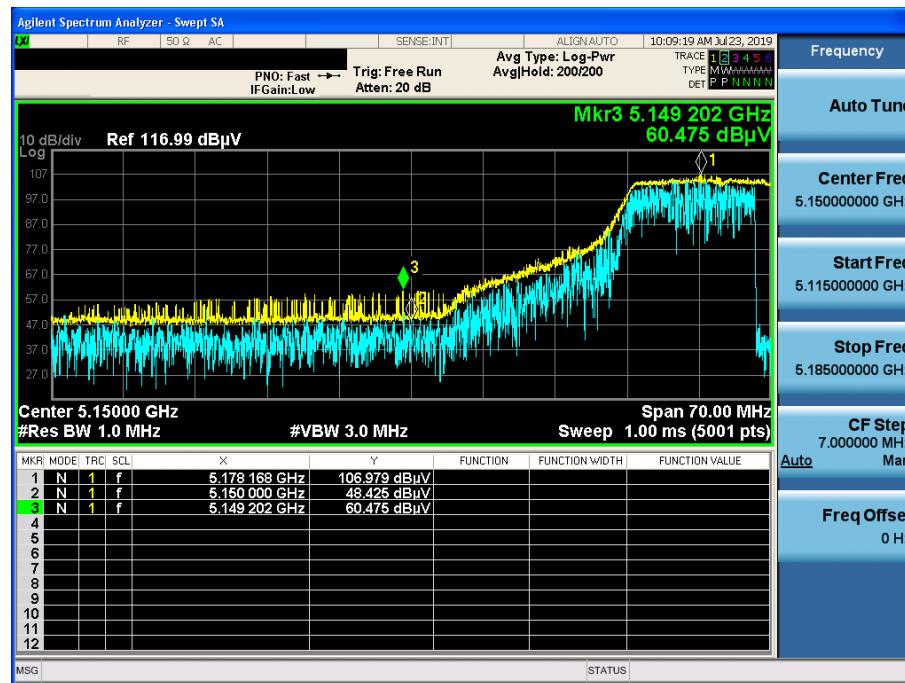
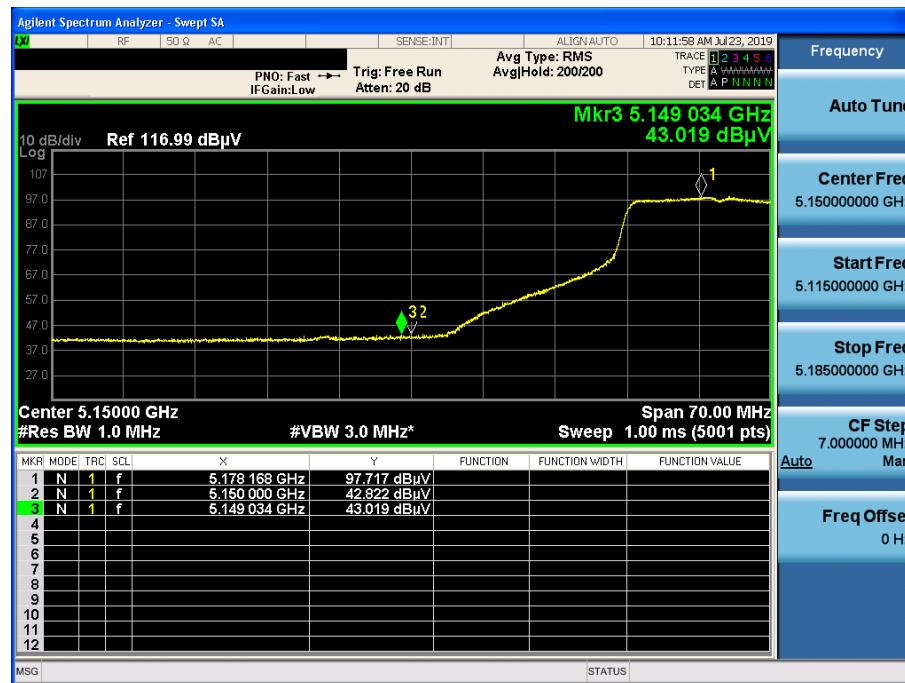


802.11a & U-NII 3 & Ch.149 & X axis & Hor
Detector Mode : PK

802.11a & U-NII 3 & Ch.165 & X axis & Hor
Detector Mode : PK


802.11a & U-NII 3 & Ch.165 & Z axis & Hor

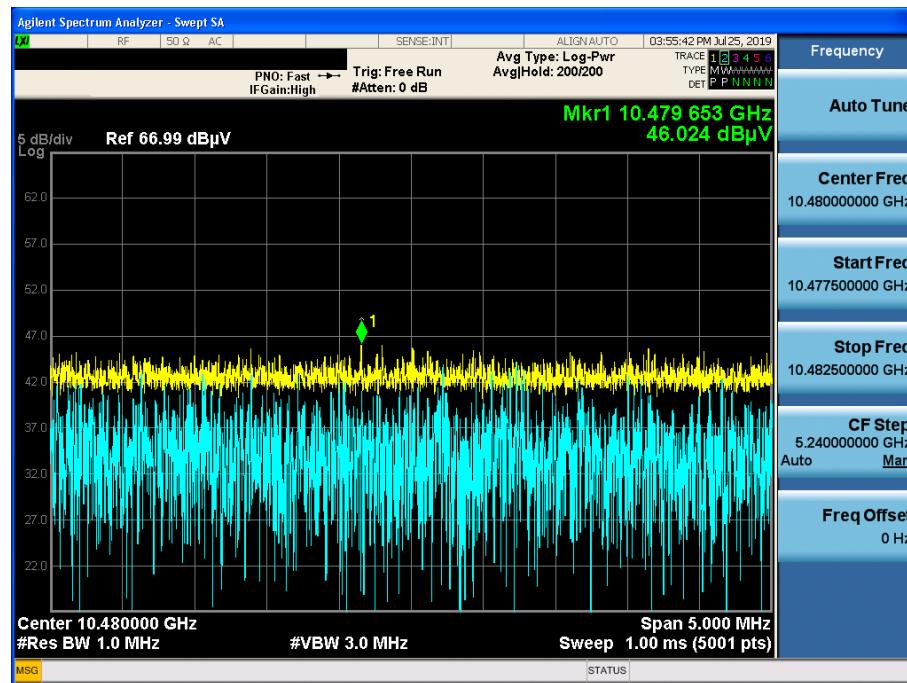
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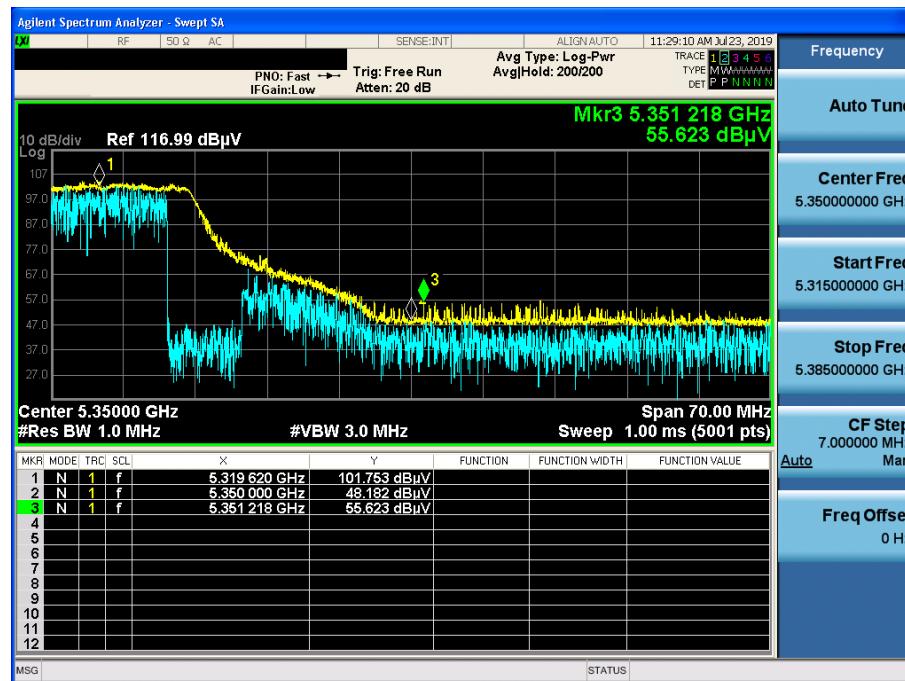


802.11n(HT20) & U-NII 1 & Ch.36 & X axis & Hor
Detector Mode : PK

802.11n(HT20) & U-NII 1 & Ch.36 & X axis & Hor
Detector Mode : AV


802.11n(VHT20) & U-NII 1 & Ch.48 & Z axis & Hor

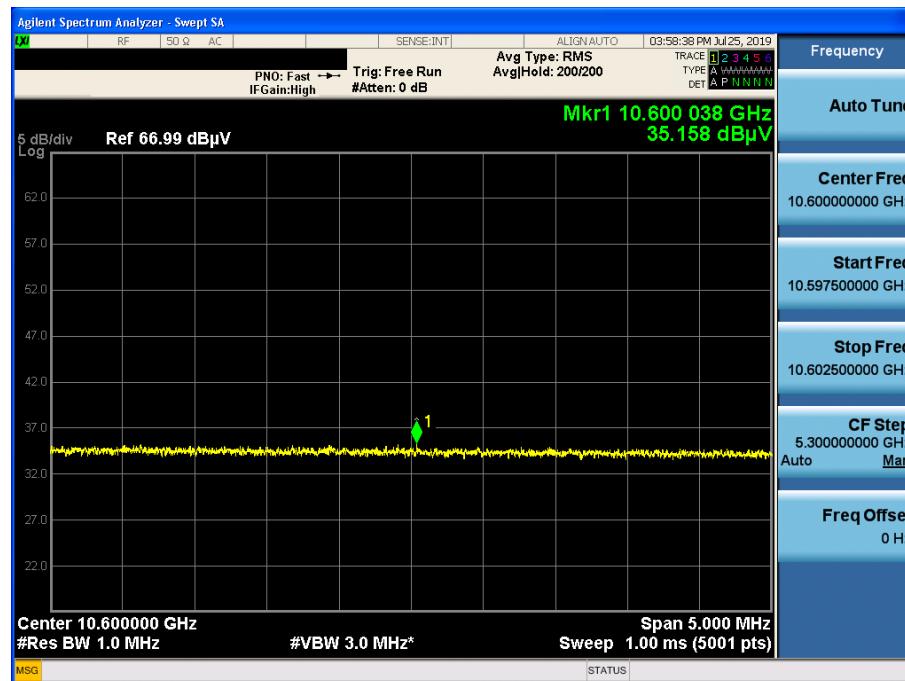
Detector Mode : PK

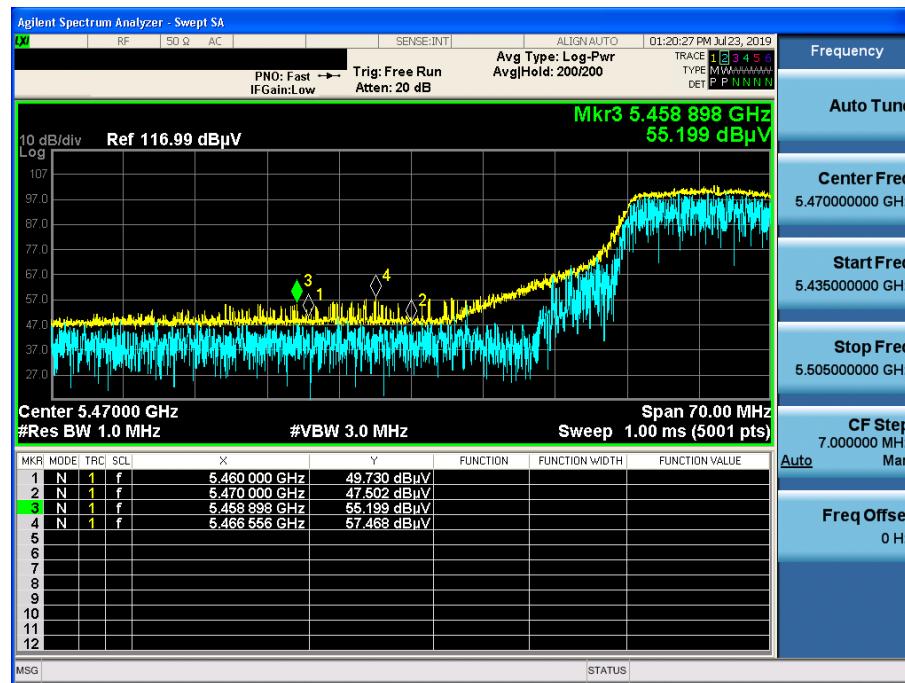
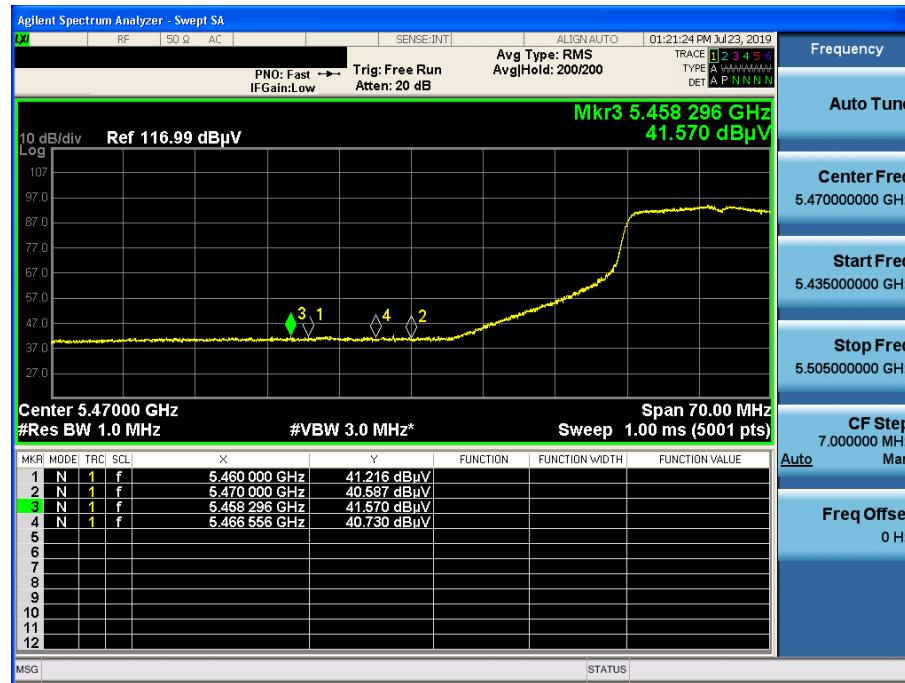


802.11n(VHT20) & U-NII 2A & Ch.64 & X axis & Hor
Detector Mode : PK

802.11n(VHT20) & U-NII 2A & Ch.64 & X axis & Hor
Detector Mode : AV


802.11n(HT20) & U-NII 2A & Ch.60 & Z axis & Hor

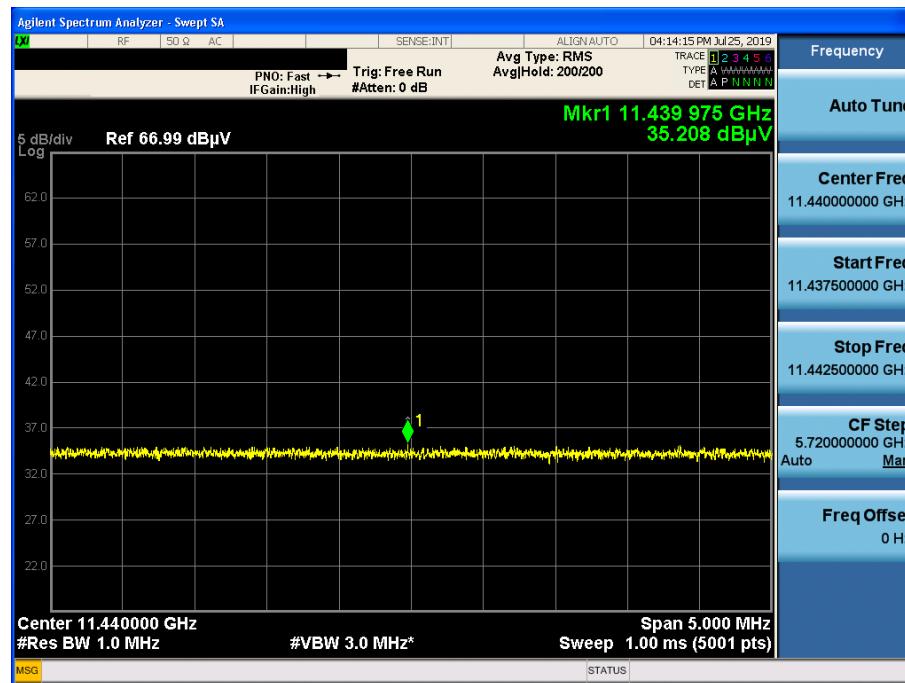
Detector Mode : AV

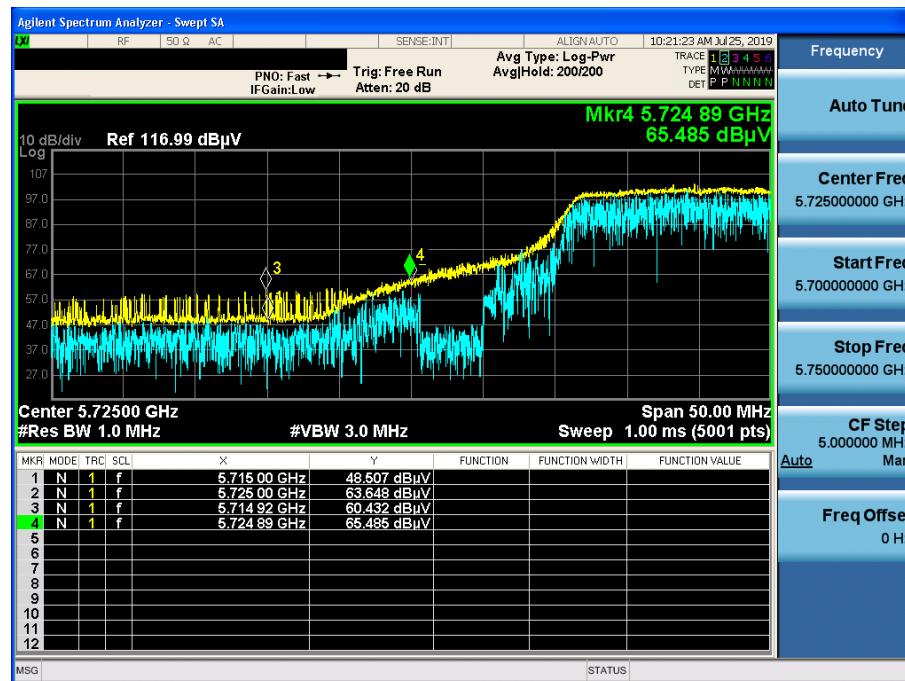
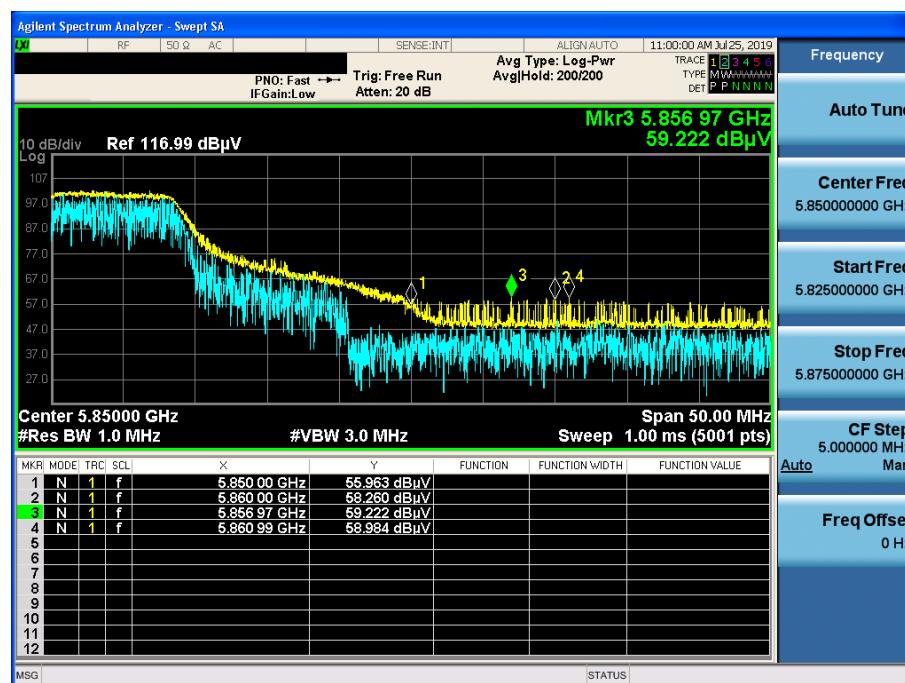


802.11n(HT20) & U-NII 2C & Ch.100 & X axis & Hor
Detector Mode : PK

802.11n(HT20) & U-NII 2C & Ch.100 & X axis & Hor
Detector Mode : AV


802.11n(VHT20) & U-NII 2C & Ch.144 & Z axis & Hor

Detector Mode : PK

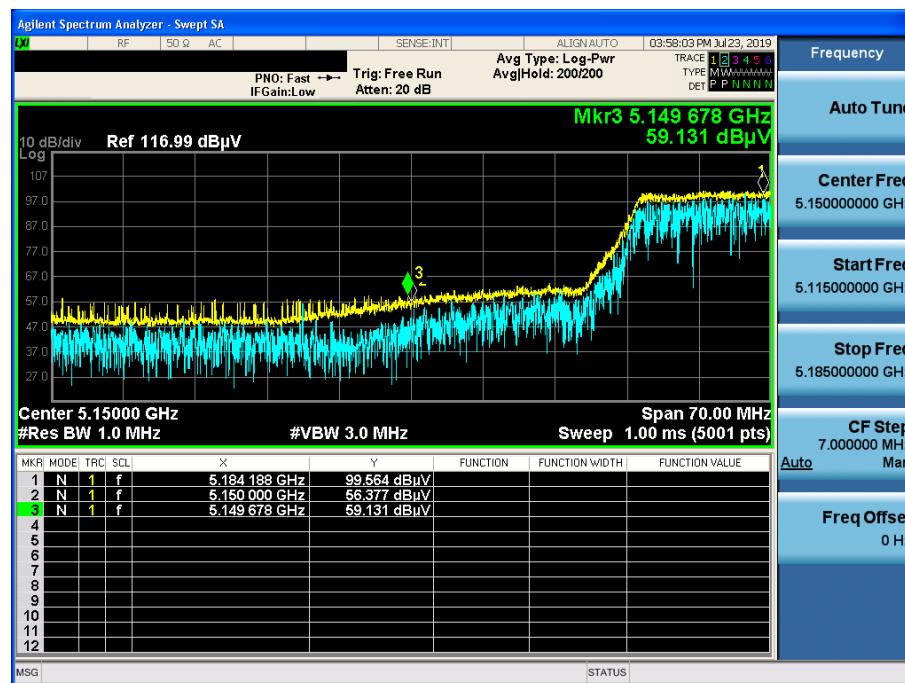
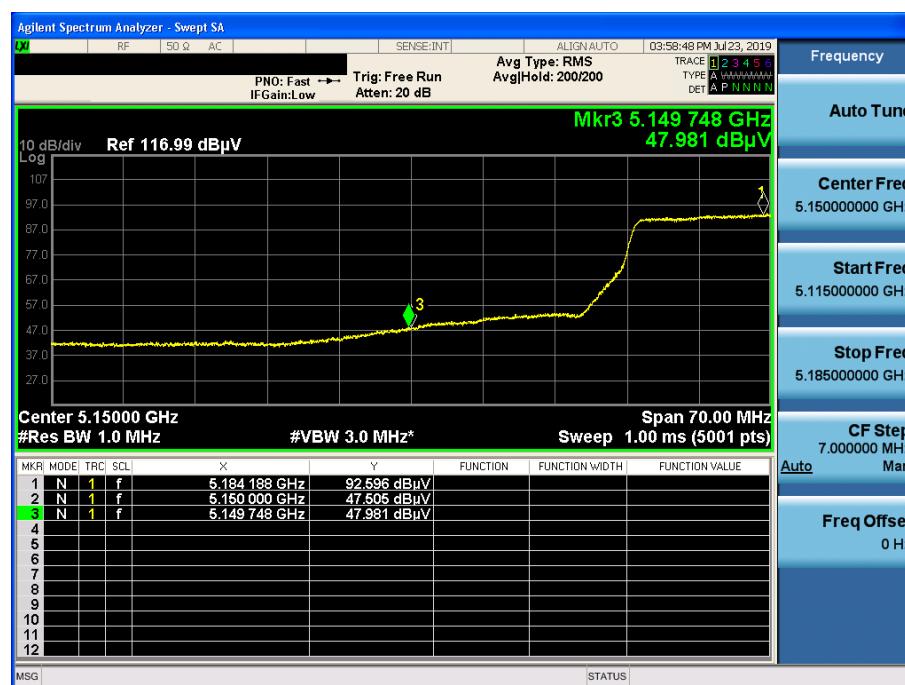


802.11n(HT20) & U-NII 3 & Ch.149 & X axis & Hor
Detector Mode : PK

802.11n(HT20) & U-NII 3 & Ch.165 & X axis & Hor
Detector Mode : PK


802.11n(HT20) & U-NII 3 & Ch.165 & Z axis & Hor

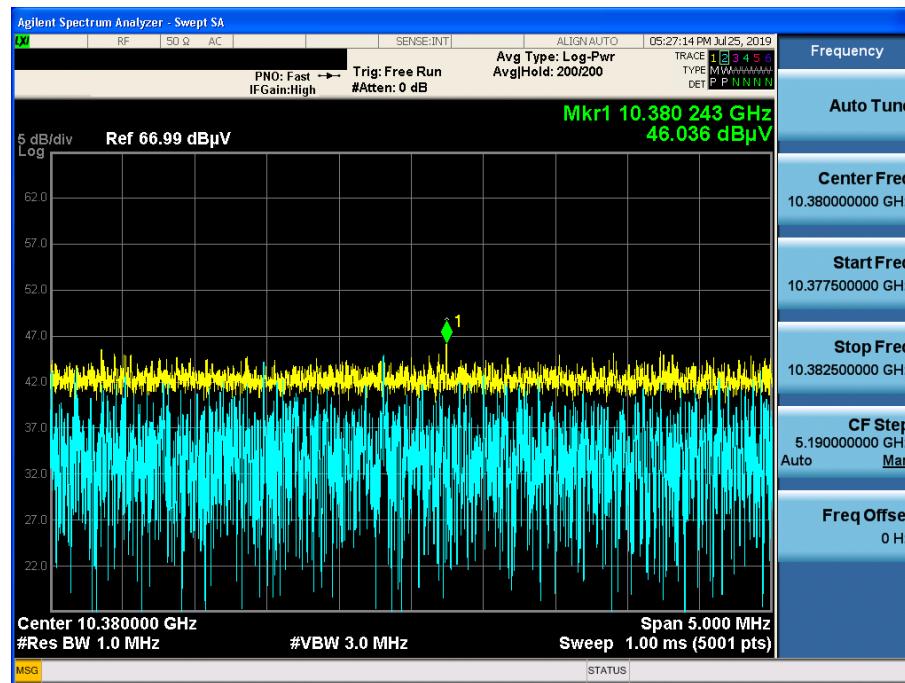
Detector Mode : AV

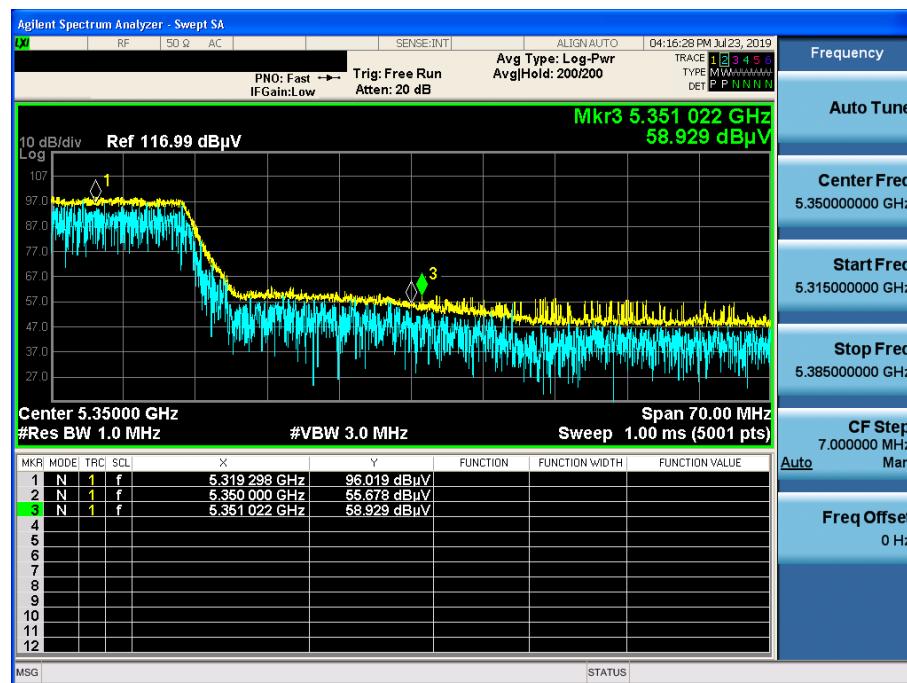


802.11n(HT40) & U-NII 1 & Ch.38 & X axis & Hor
Detector Mode : PK

802.11n(HT40) & U-NII 1 & Ch.38 & X axis & Hor
Detector Mode : AV


802.11n(HT40) & U-NII 1 & Ch.38 & Z axis & Hor

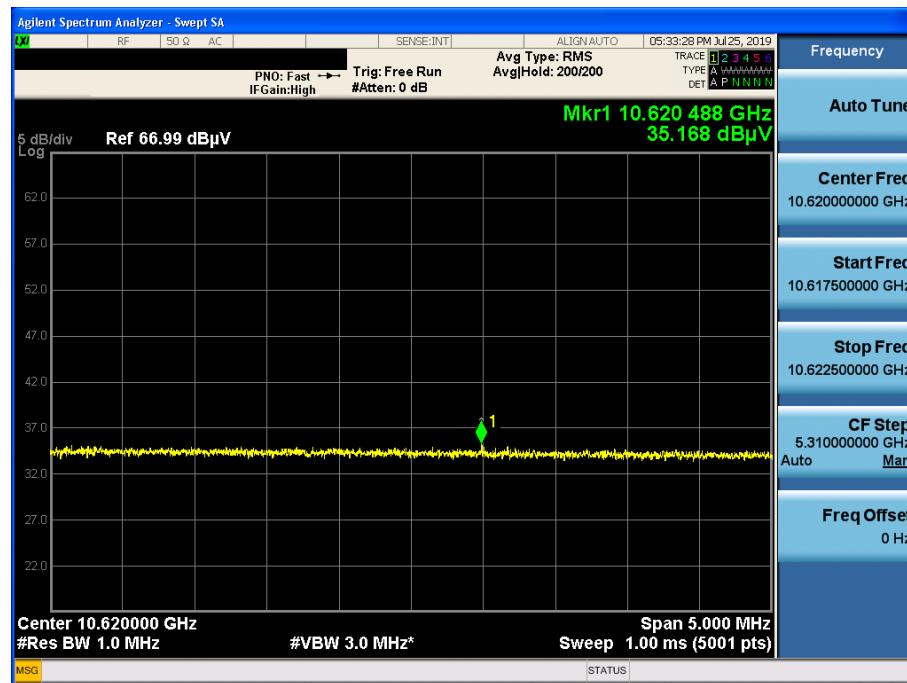
Detector Mode : PK

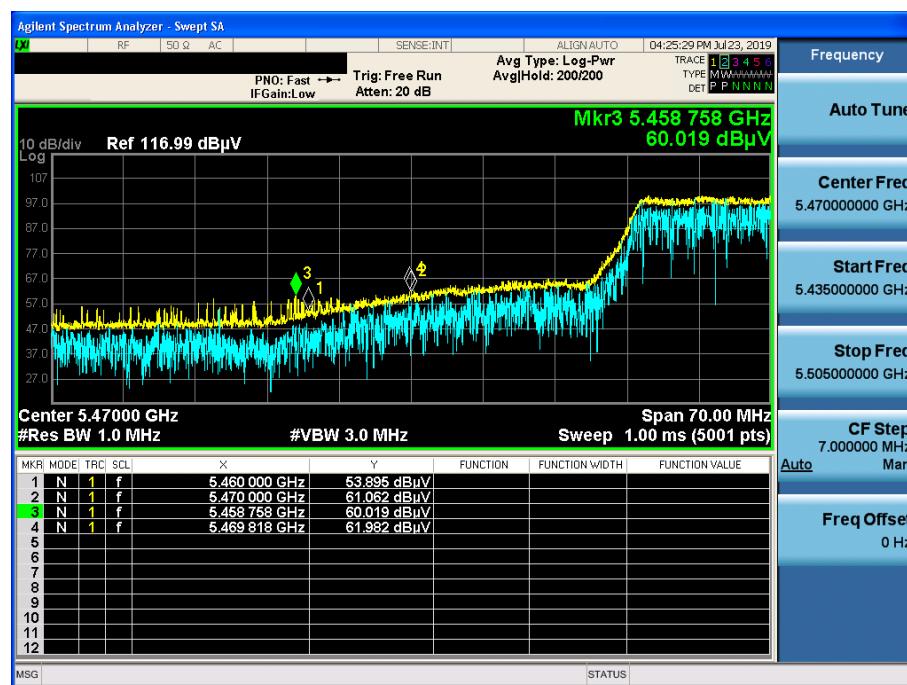
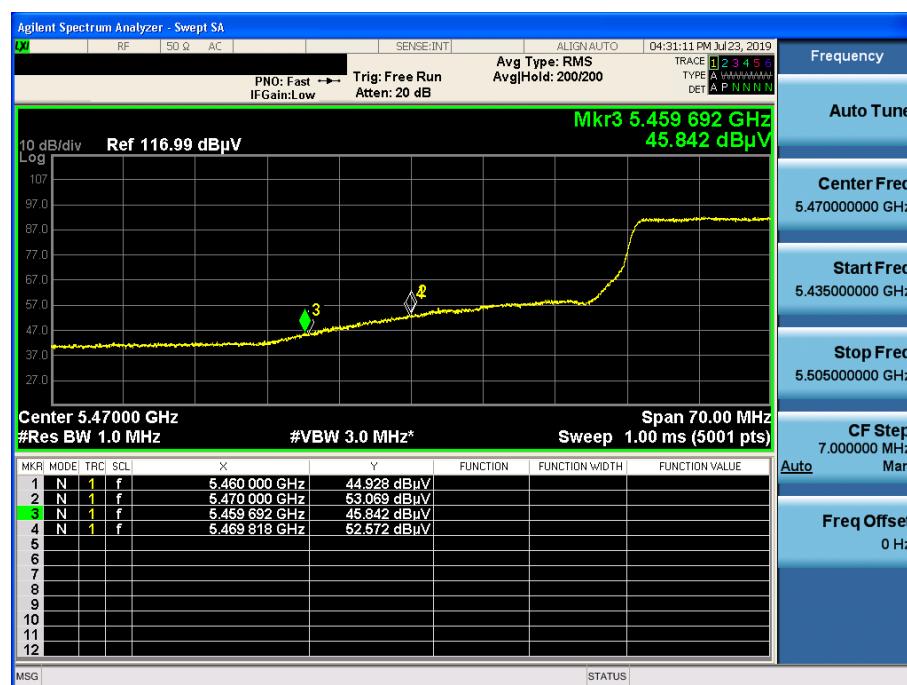


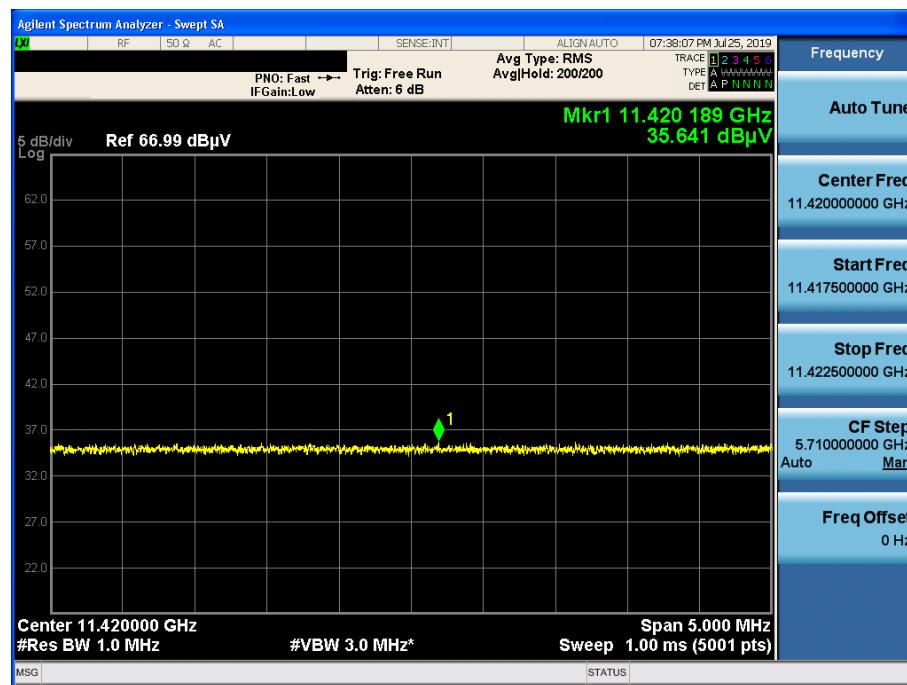
802.11n(HT40) & U-NII 2A & Ch.62 & X axis & Hor
Detector Mode : PK

802.11n(HT40) & U-NII 2A & Ch.62 & X axis & Hor
Detector Mode : AV

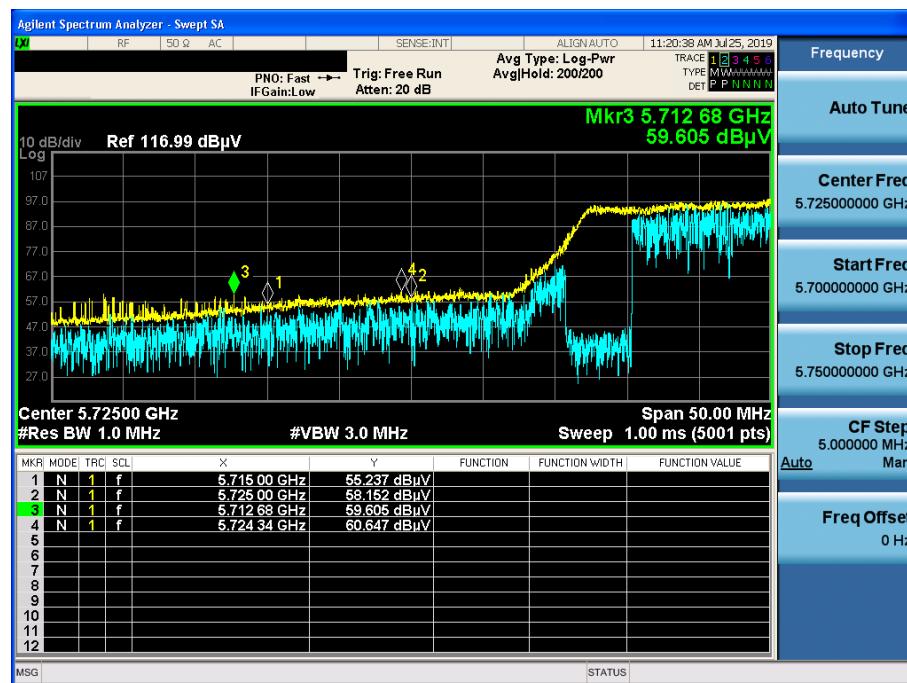
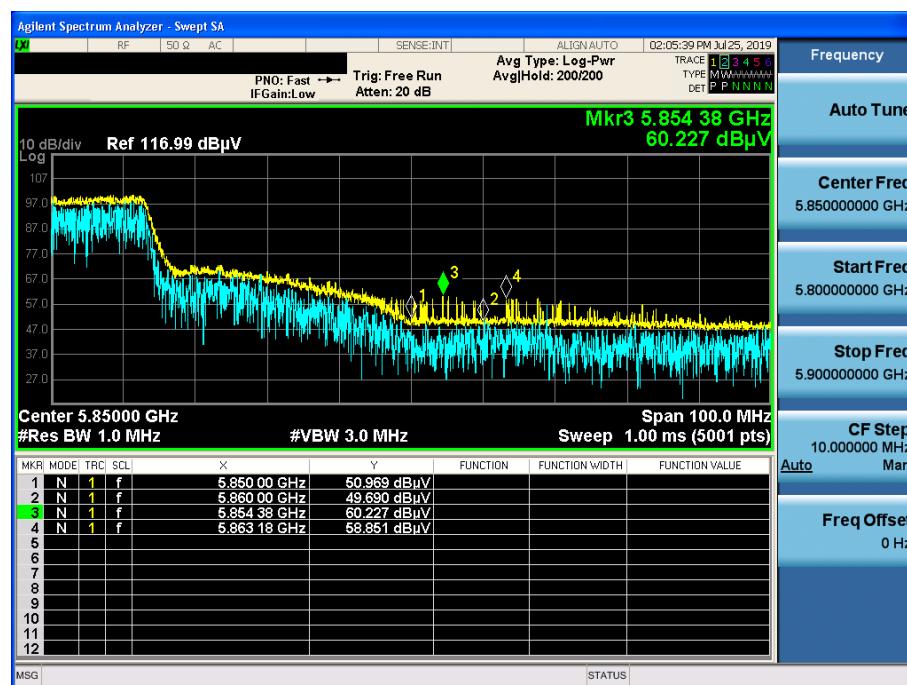

802.11n(HT40) & U-NII 2A & Ch.62 & Z axis & Hor

Detector Mode : AV



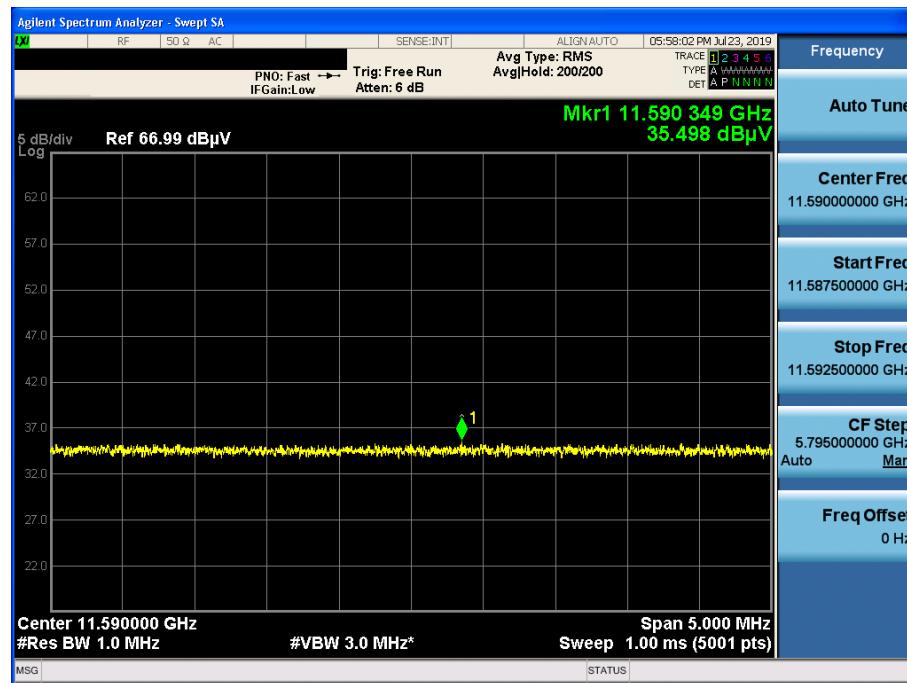
802.11n(HT40) & U-NII 2C & Ch.102 & X axis & Hor
Detector Mode : PK

802.11n(HT40) & U-NII 2C & Ch.102 & X axis & Hor
Detector Mode : AV


802.11n(HT40) & U-NII 2C & Ch.142 & Z axis & Hor
Detector Mode : AV


802.11n(HT40) & U-NII 3 & Ch.151 & X axis & Hor
Detector Mode : PK

802.11n(HT40) & U-NII 3 & Ch.159 & X axis & Hor
Detector Mode : PK


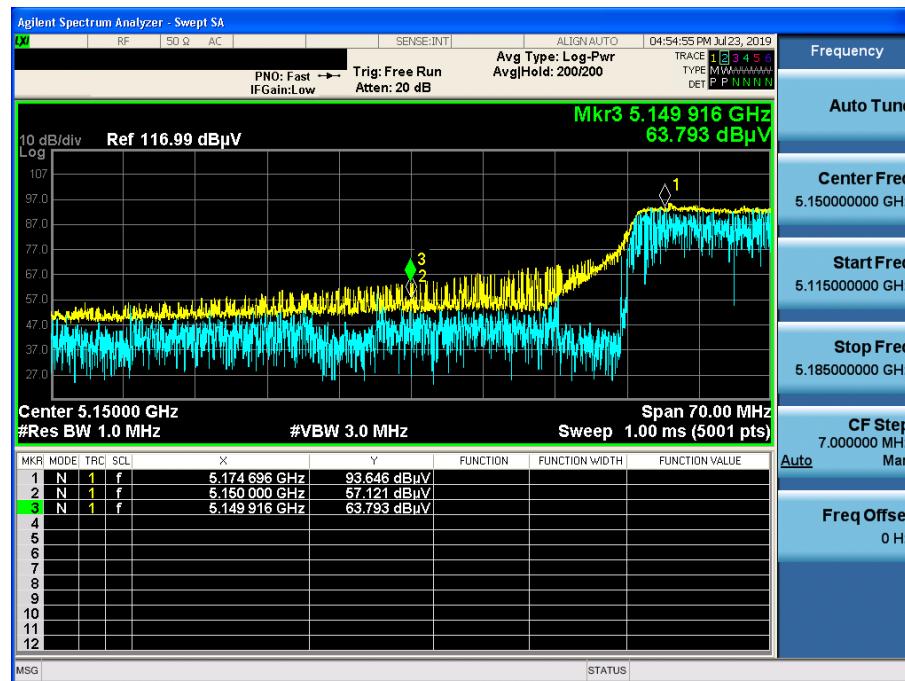
802.11n(HT40) & U-NII 3 & Ch.159 & X axis & Hor

Detector Mode : AV



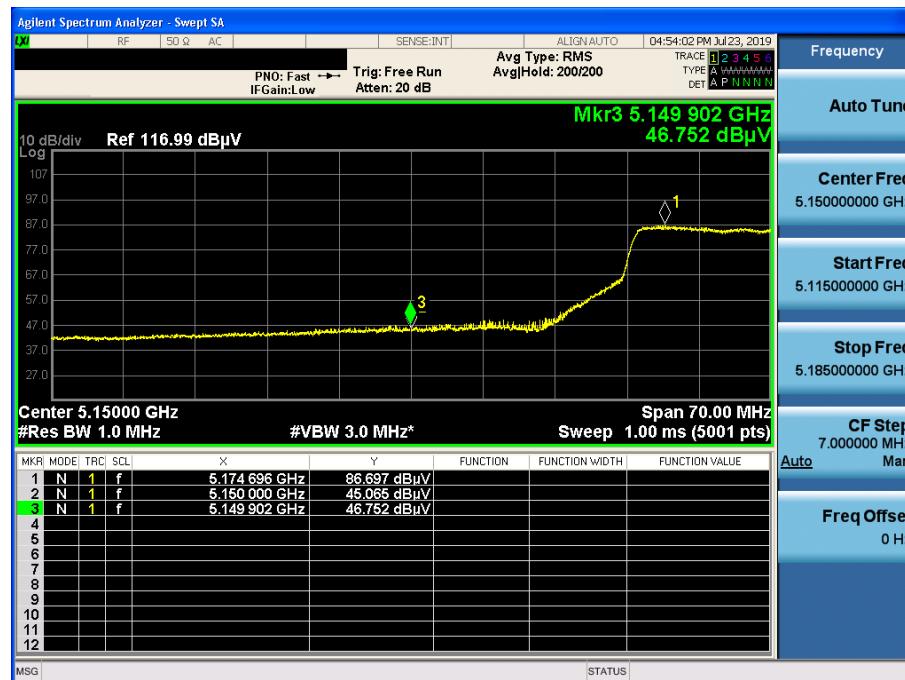
802.11ac(VHT80) & U-NII 1 & Ch.42 & Z axis & Hor

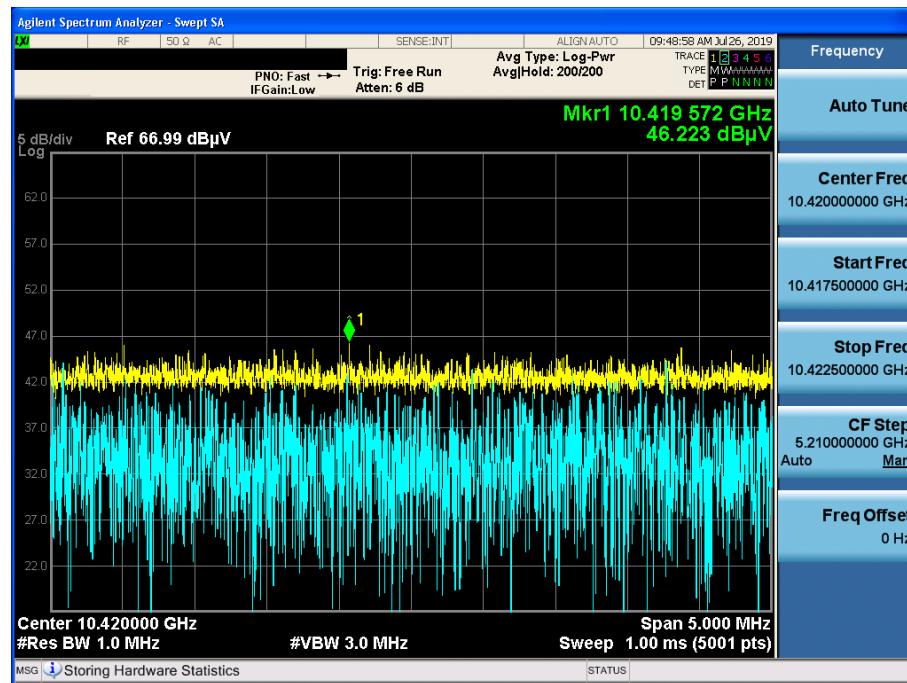
Detector Mode : PK

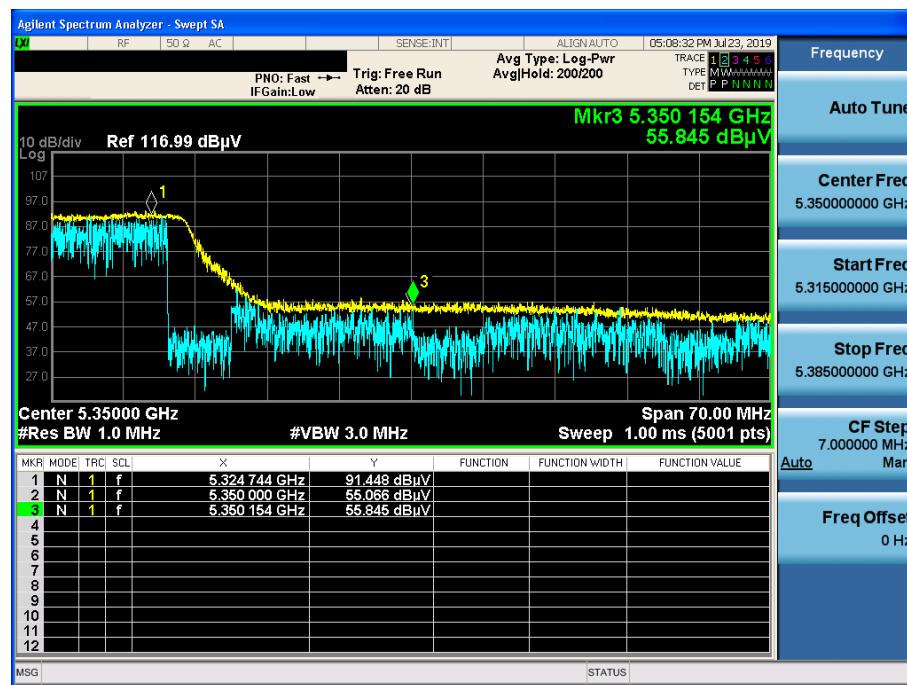
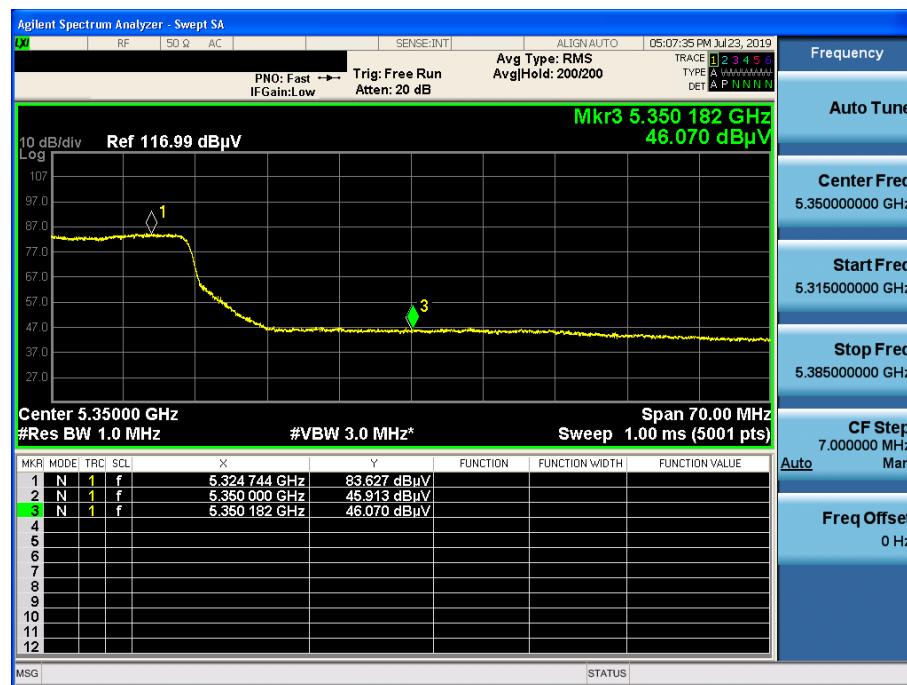


802.11ac(VHT80) & U-NII 1 & Ch.42 & Z axis & Hor

Detector Mode : AV

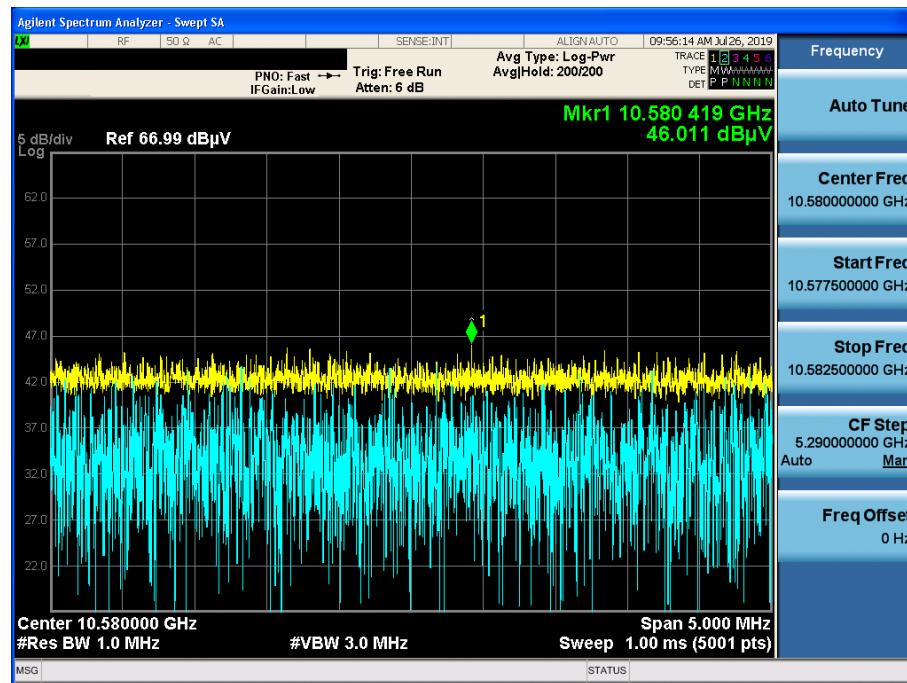


802.11ac(VHT80) & U-NII 1 & Ch.42 & Z axis & Hor
Detector Mode : PK


802.11ac(VHT80) & U-NII 2A & Ch.58 & X axis & Hor
Detector Mode : PK

802.11ac(VHT80) & U-NII 2A & Ch.58 & Z axis & Hor
Detector Mode : AV


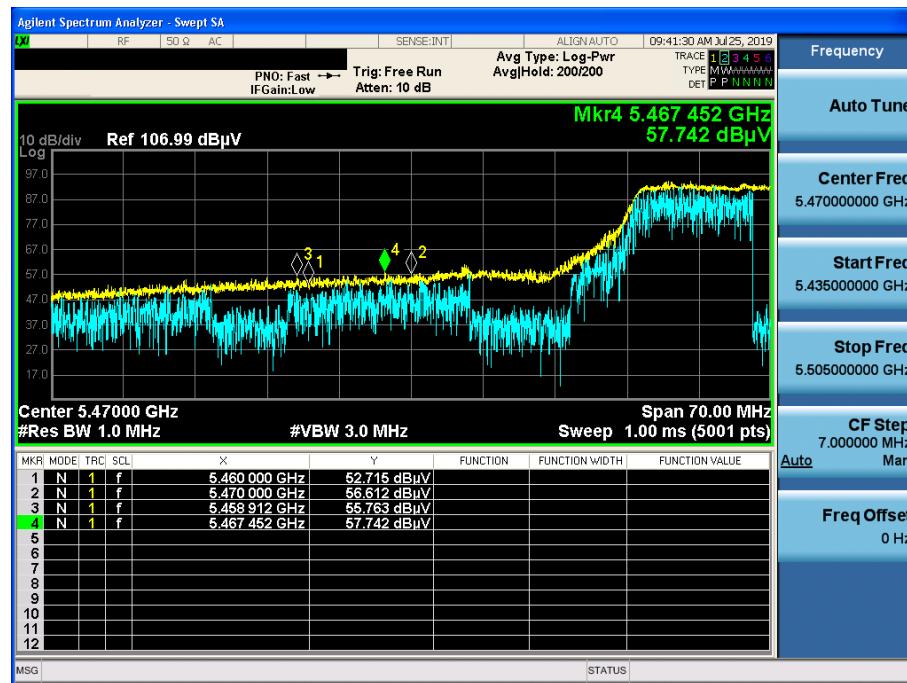
802.11ac(VHT80) & U-NII 2A & Ch.58 & Z axis & Hor

Detector Mode : PK



802.11ac(VHT80) & U-NII 2C & Ch.106 & X axis & Hor

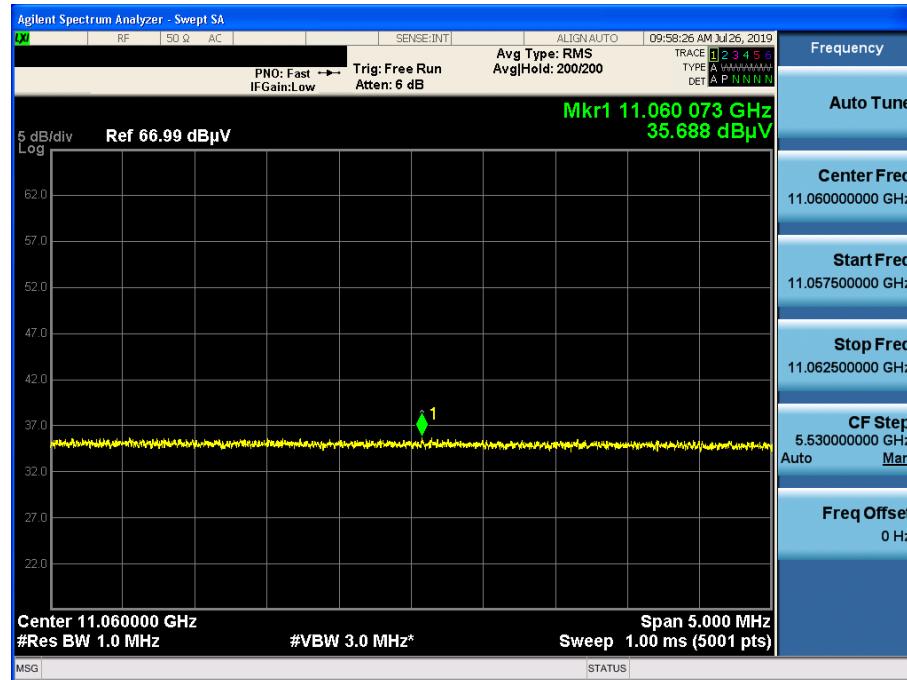
Detector Mode : PK



802.11ac(VHT80) & U-NII 2C & Ch.106 & X axis & Hor

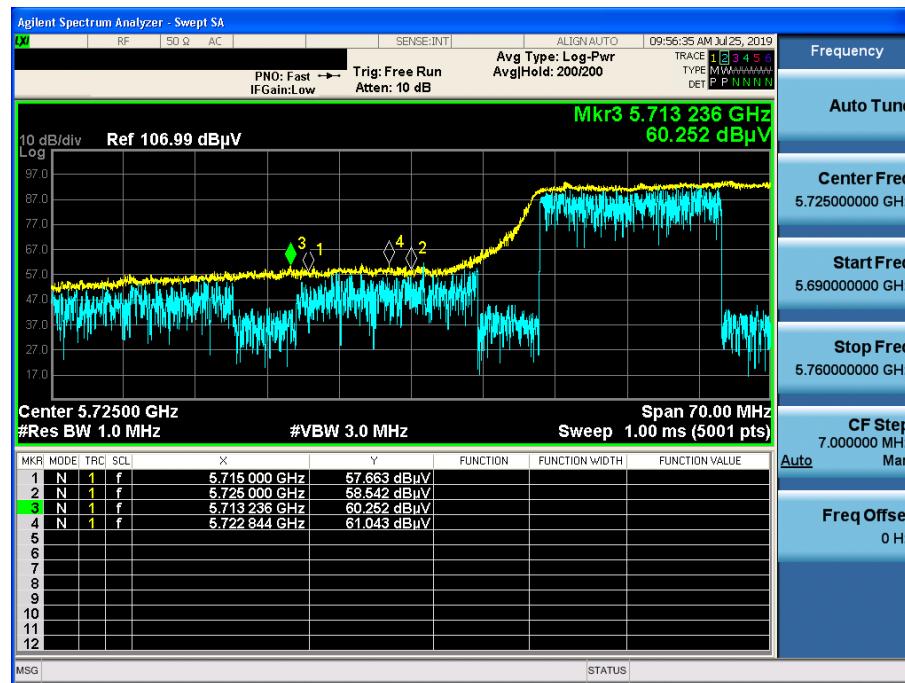
Detector Mode : AV



802.11ac(VHT80) & U-NII 2C & Ch.106 & Z axis & Hor
Detector Mode : AV


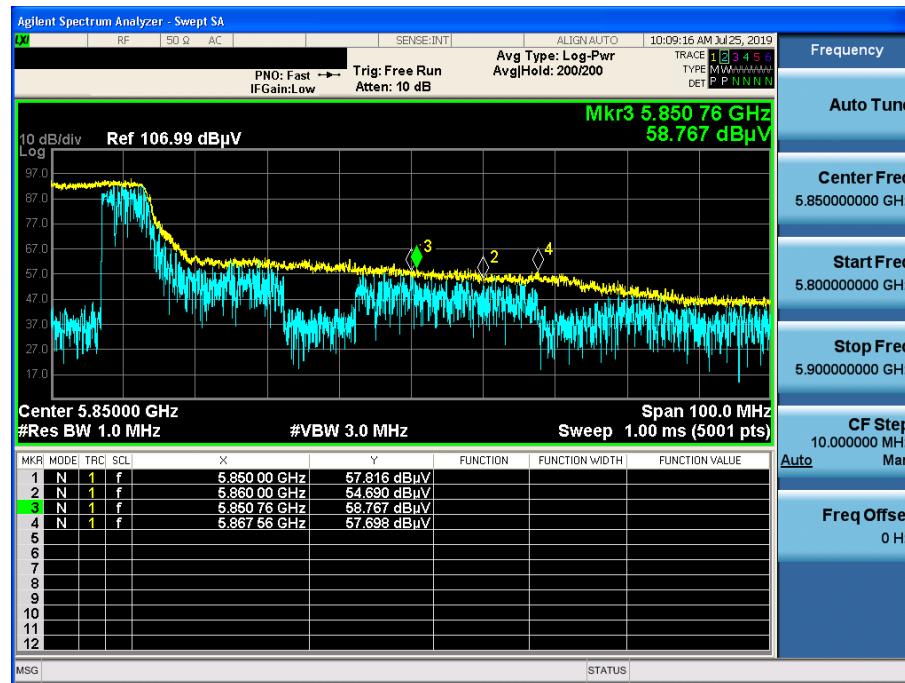
802.11ac(VHT80) & U-NII 3 & Ch.155 & X axis & Hor

Detector Mode : PK



802.11ac(VHT80) & U-NII 3 & Ch.155 & X axis & Hor

Detector Mode : PK



802.11ac(VHT80) & U-NII 3 & Ch.155 & Z axis & Hor

Detector Mode : AV

