AC Line Conducted Emissions (Graph)

Test Mode: U-NII 2C & 802.11a & 5500 MHz

Results of Conducted Emission

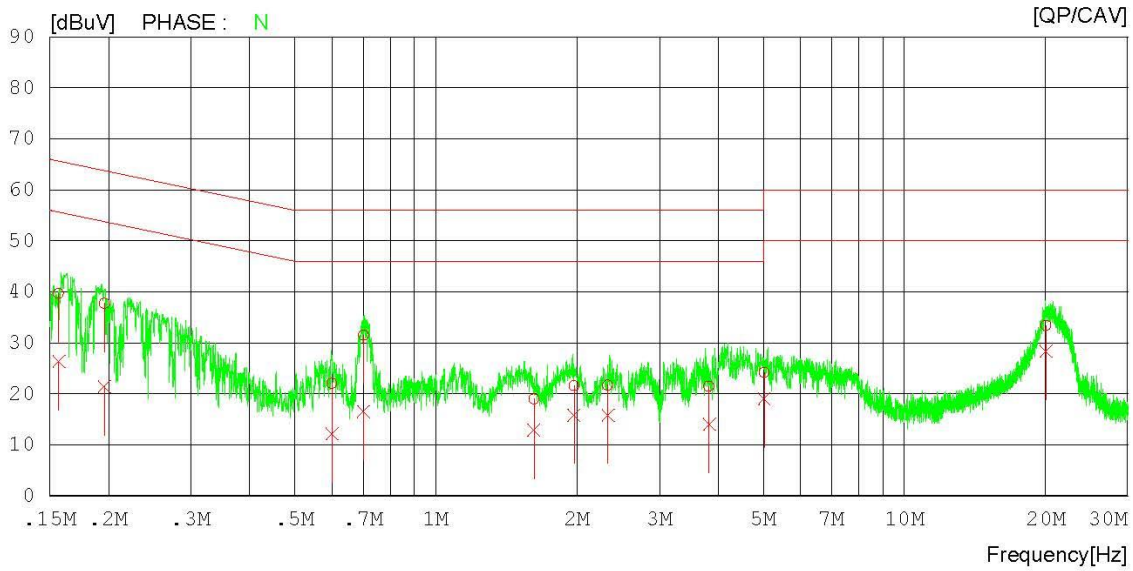
DTNC

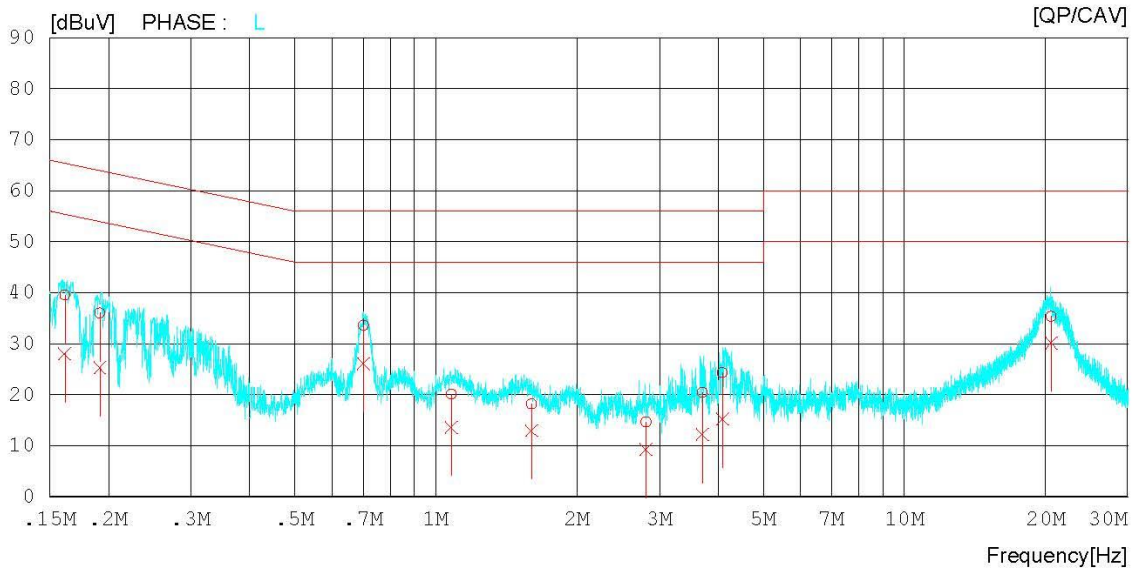
Date 2019-10-11

Order No.		Referrence No.	
Model No.	ST102	Power Supply	120 V, 60 Hz
Serial No.		Temp/Humi.	23 'C / 35 %
Test Condition	5.5G WLAN	Operator	InHee Bae

Memo

LIMIT : FCC P15.207 QP
FCC P15.207 AV





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 2C & 802.11a & 5500 MHz

Results of Conducted Emission

DTNC

Date 2019-10-11

Order No.		Referrence No.	
Model No.	ST102	Power Supply	120 V, 60 Hz
Serial No.		Temp/Humi.	23 'C / 35 %
Test Condition	5.5G WLAN	Operator	InHee Bae

Memo

LIMIT : FCC P15.207 QP
FCC P15.207 AV

NO	FREQ	READING QP	READING CAV	C.FACTOR	RESULT QP	RESULT CAV	LIMIT QP	LIMIT CAV	MARGIN QP	MARGIN CAV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.15678	29.71	16.38	9.94	39.65	26.32	65.63	55.63	25.98	29.31	N
2	0.19609	27.76	11.52	9.94	37.70	21.46	63.77	53.77	26.07	32.31	N
3	0.59962	12.09	2.31	9.95	22.04	12.26	56.00	46.00	33.96	33.74	N
4	0.70090	21.54	6.59	9.97	31.51	16.56	56.00	46.00	24.49	29.44	N
5	1.61820	8.91	2.88	10.01	18.92	12.89	56.00	46.00	37.08	33.11	N
6	1.97060	11.53	5.86	10.03	21.56	15.89	56.00	46.00	34.44	30.11	N
7	2.33000	11.65	5.80	10.05	21.70	15.85	56.00	46.00	34.30	30.15	N
8	3.82720	11.32	3.93	10.12	21.44	14.05	56.00	46.00	34.56	31.95	N
9	5.01780	14.03	8.91	10.16	24.19	19.07	60.00	50.00	35.81	30.93	N
10	20.06280	22.84	17.83	10.55	33.39	28.38	60.00	50.00	26.61	21.62	N
11	0.16145	29.61	18.05	9.94	39.55	27.99	65.39	55.39	25.84	27.40	L
12	0.19183	26.07	15.25	9.94	36.01	25.19	63.96	53.96	27.95	28.77	L
13	0.70076	23.68	16.11	9.96	33.64	26.07	56.00	46.00	22.36	19.93	L
14	1.07860	10.12	3.60	9.97	20.09	13.57	56.00	46.00	35.91	32.43	L
15	1.60040	8.08	2.91	10.01	18.09	12.92	56.00	46.00	37.91	33.08	L
16	2.80680	4.59	-0.90	10.06	14.65	9.16	56.00	46.00	41.35	36.84	L
17	3.70240	10.27	2.06	10.09	20.36	12.15	56.00	46.00	35.64	33.85	L
18	4.08700	14.16	5.14	10.11	24.27	15.25	56.00	46.00	31.73	30.75	L
19	20.56720	24.72	19.57	10.54	35.26	30.11	60.00	50.00	24.74	19.89	L

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 3 & 802.11a & 5745 MHz

Results of Conducted Emission

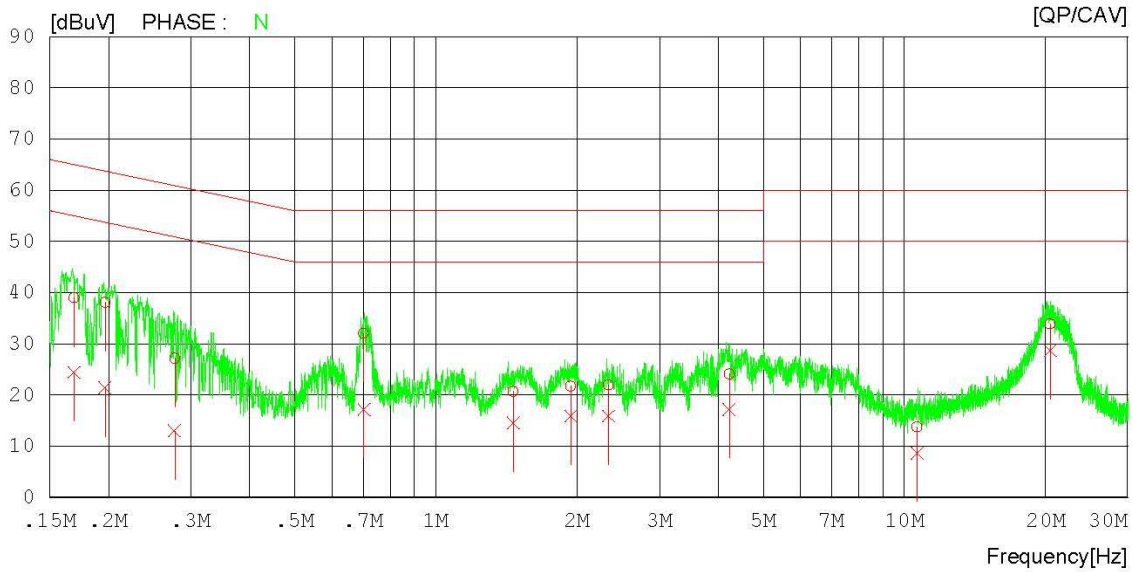
DTNC

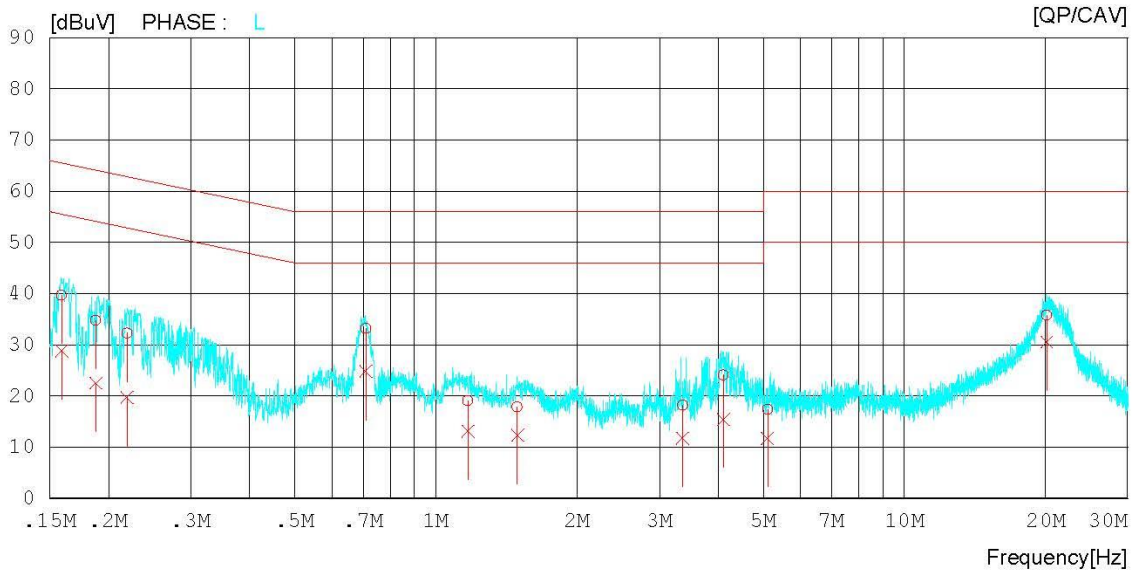
Date 2019-10-11

Order No.		Referrence No.	
Model No.	ST102	Power Supply	120 V, 60 Hz
Serial No.		Temp/Humi.	23 'C / 35 %
Test Condition	5.7G WLAN	Operator	InHee Bae

Memo

LIMIT : FCC P15.207 QP
FCC P15.207 AV





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 3 & 802.11a & 5745 MHz

Results of Conducted Emission

DTNC

Date 2019-10-11

Order No.		Referrence No.	
Model No.	ST102	Power Supply	120 V, 60 Hz
Serial No.		Temp/Humi.	23 'C / 35 %
Test Condition	5.7G WLAN	Operator	InHee Bae

Memo

LIMIT : FCC P15.207 QP
FCC P15.207 AV

NO	FREQ	READING		C.FACTOR	RESULT		LIMIT		MARGIN		PHASE
		QP	CAV		QP	CAV	QP	CAV	QP	CAV	
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.16898	28.99	14.51	9.94	38.93	24.45	65.01	55.01	26.08	30.56	N
2	0.19663	28.16	11.49	9.94	38.10	21.43	63.75	53.75	25.65	32.32	N
3	0.27709	17.27	3.06	9.94	27.21	13.00	60.90	50.90	33.69	37.90	N
4	0.70160	22.10	7.28	9.97	32.07	17.25	56.00	46.00	23.93	28.75	N
5	1.46160	10.73	4.58	9.99	20.72	14.57	56.00	46.00	35.28	31.43	N
6	1.94140	11.64	5.88	10.03	21.67	15.91	56.00	46.00	34.33	30.09	N
7	2.33720	11.83	5.88	10.05	21.88	15.93	56.00	46.00	34.12	30.07	N
8	4.22640	13.98	7.04	10.12	24.10	17.16	56.00	46.00	31.90	28.84	N
9	10.64480	3.41	-1.63	10.35	13.76	8.72	60.00	50.00	46.24	41.28	N
10	20.47560	23.27	18.13	10.56	33.83	28.69	60.00	50.00	26.17	21.31	N
11	0.15893	29.74	18.78	9.94	39.68	28.72	65.52	55.52	25.84	26.80	L
12	0.18814	24.81	12.52	9.94	34.75	22.46	64.12	54.12	29.37	31.66	L
13	0.21917	22.25	9.71	9.94	32.19	19.65	62.85	52.85	30.66	33.20	L
14	0.70840	23.16	14.84	9.96	33.12	24.80	56.00	46.00	22.88	21.20	L
15	1.16980	9.02	3.08	9.98	19.00	13.06	56.00	46.00	37.00	32.94	L
16	1.49280	7.79	2.29	9.99	17.78	12.28	56.00	46.00	38.22	33.72	L
17	3.36000	8.04	1.61	10.08	18.12	11.69	56.00	46.00	37.88	34.31	L
18	4.11180	13.89	5.27	10.11	24.00	15.38	56.00	46.00	32.00	30.62	L
19	5.10240	7.21	1.56	10.16	17.37	11.72	60.00	50.00	42.63	38.28	L
20	20.10800	25.21	20.01	10.53	35.74	30.54	60.00	50.00	24.26	19.46	L

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.

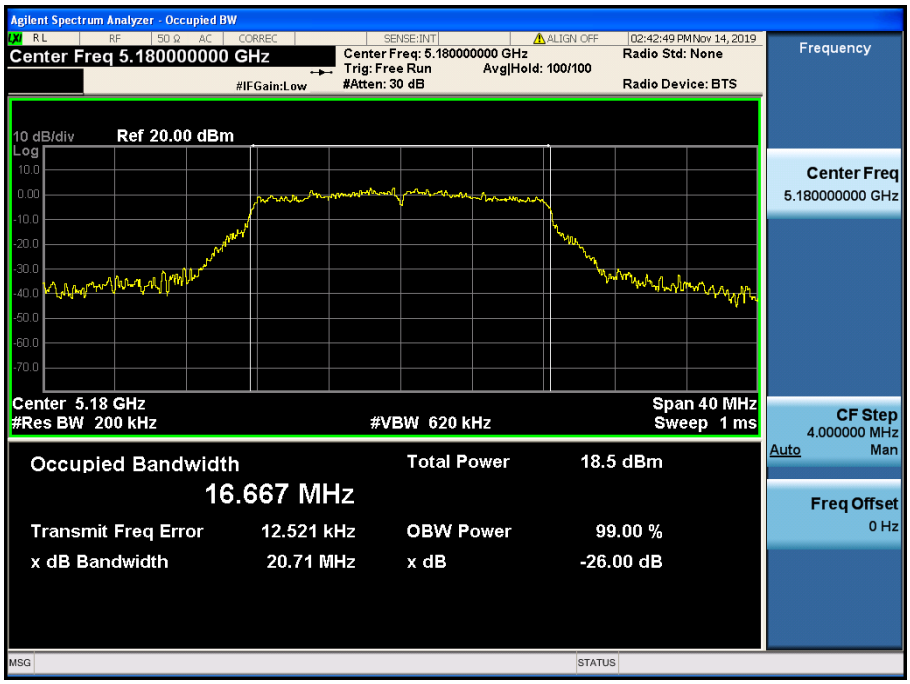
▣ Test Results: Comply

Mode	Bands	Channel	Frequency [MHz]	Test Result [MHz]
802.11a	U-NII 1	36	5180	16.67
		40	5200	16.64
		48	5240	16.63
	U-NII 2A	52	5260	16.66
		60	5300	16.60
		64	5320	16.62
	U-NII 2C	100	5500	16.62
		116	5580	16.64
		144	5720	16.70
	U-NII 3	149	5745	16.57
		157	5785	16.64
		165	5825	16.67
802.11n(HT20)	U-NII 1	36	5180	17.72
		40	5200	17.75
		48	5240	17.76
	U-NII 2A	52	5260	17.73
		60	5300	17.76
		64	5320	17.80
	U-NII 2C	100	5500	17.76
		116	5580	17.81
		144	5720	17.82
	U-NII 3	149	5745	17.77
		157	5785	17.74
		165	5825	17.73
802.11n(HT40)	U-NII 1	38	5190	36.24
		46	5230	36.19
	U-NII 2A	54	5270	36.19
		62	5310	36.19
	U-NII 2C	102	5510	36.28
		110	5550	36.25
		142	5710	36.22
	U-NII 3	151	5755	36.16
		159	5795	36.23

▣ Result Plots

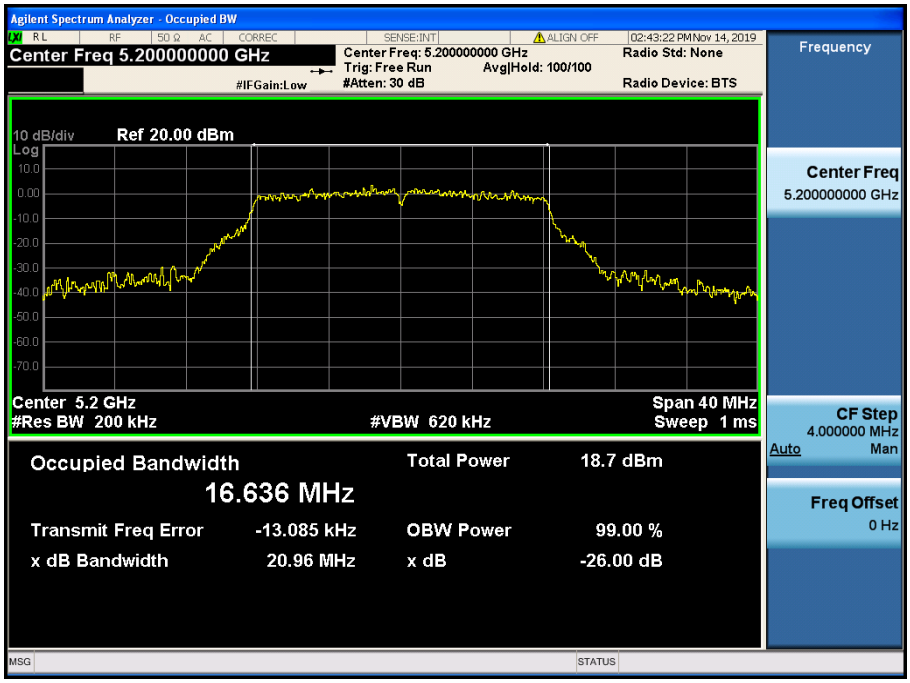
Occupied Bandwidth 99%

Test Mode: 802.11a & Ch.36

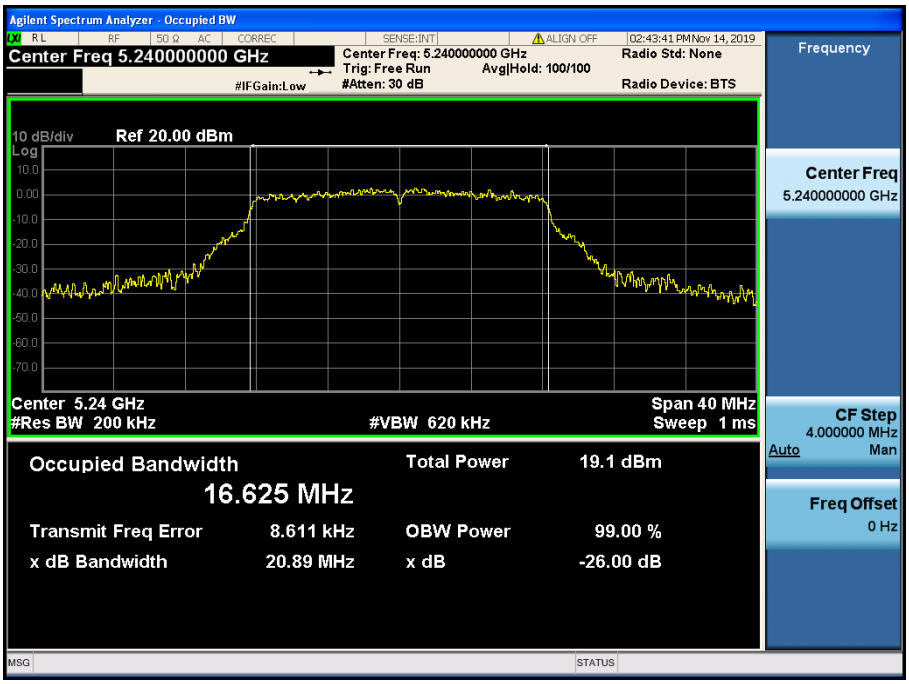


Occupied Bandwidth 99%

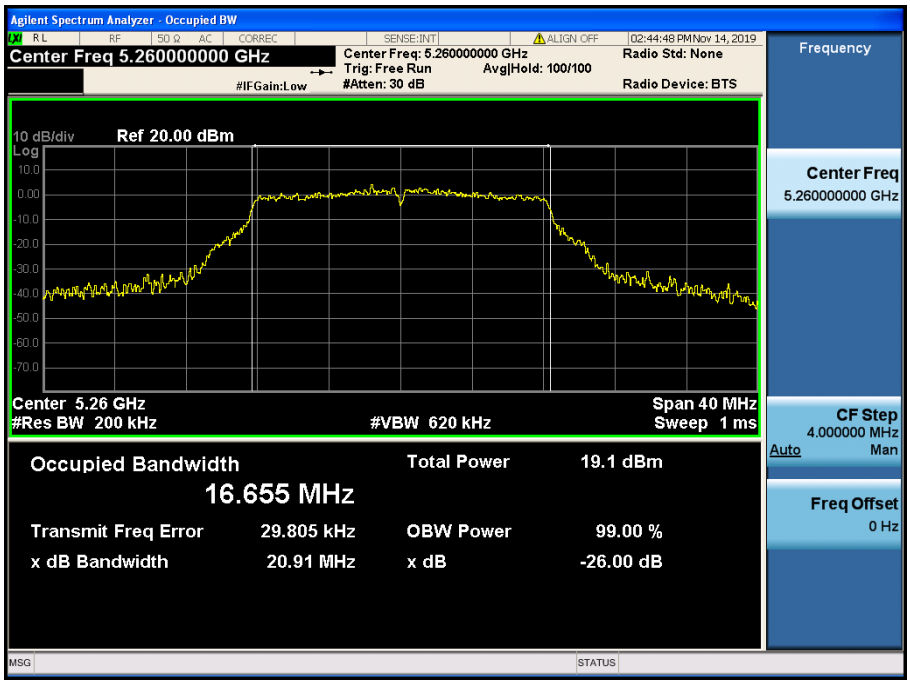
Test Mode: 802.11a & Ch.40



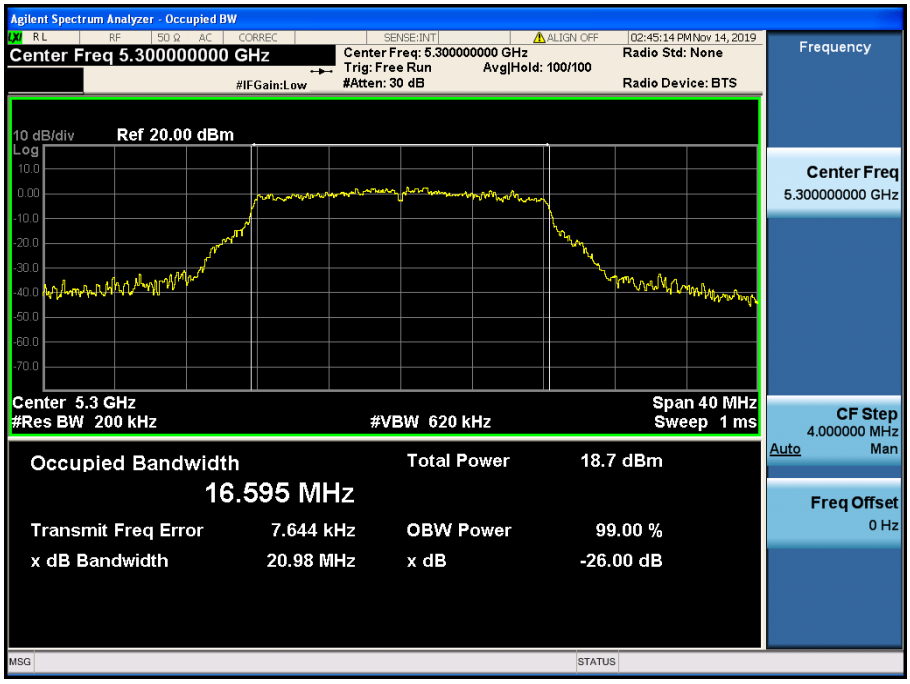
Occupied Bandwidth 99% Test Mode: 802.11a & Ch.48



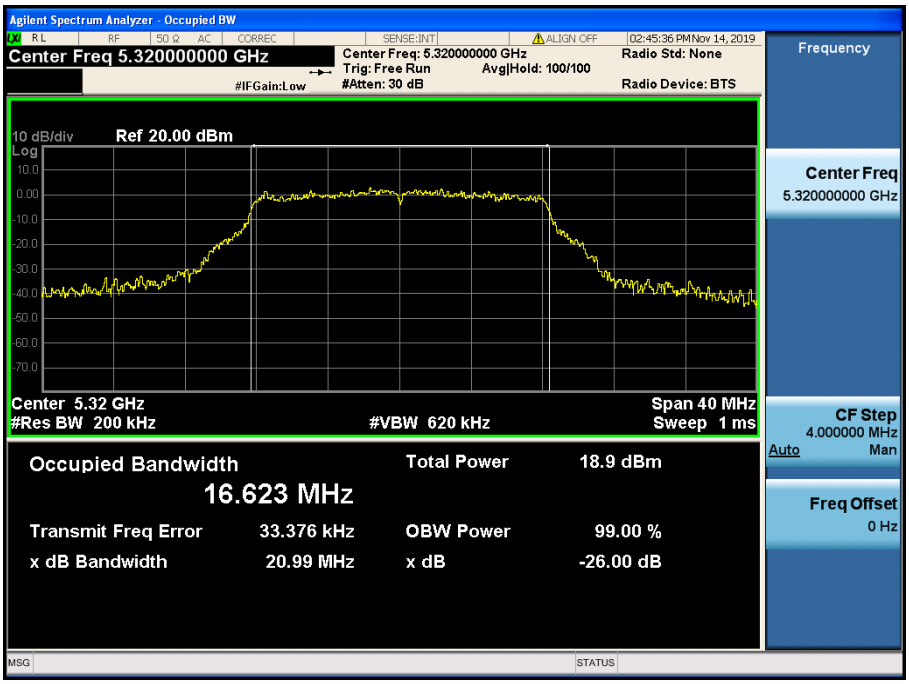
Occupied Bandwidth 99% Test Mode: 802.11a & Ch.52



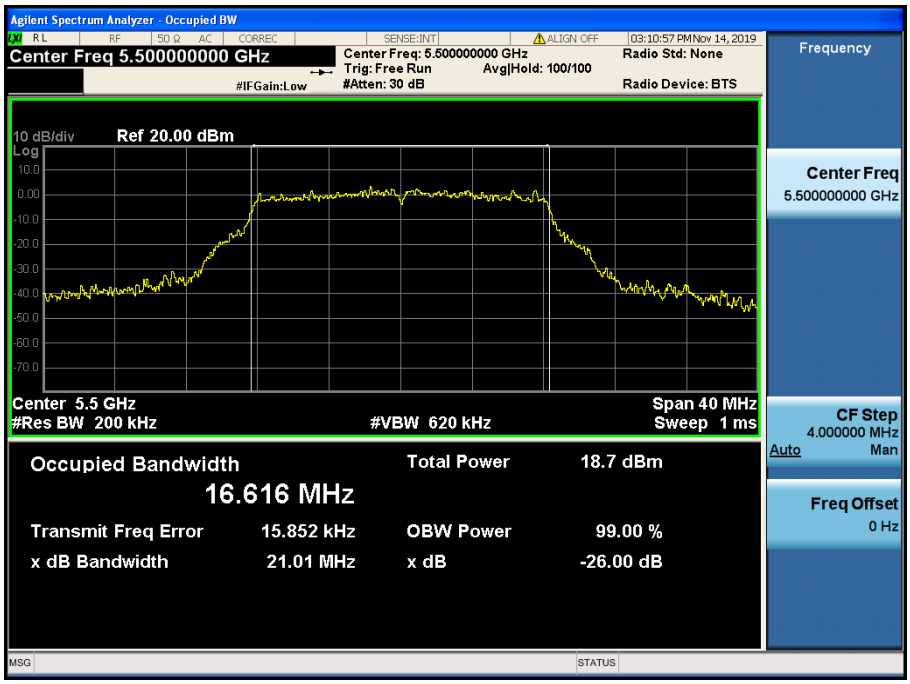
Occupied Bandwidth 99% Test Mode: 802.11a & Ch.60



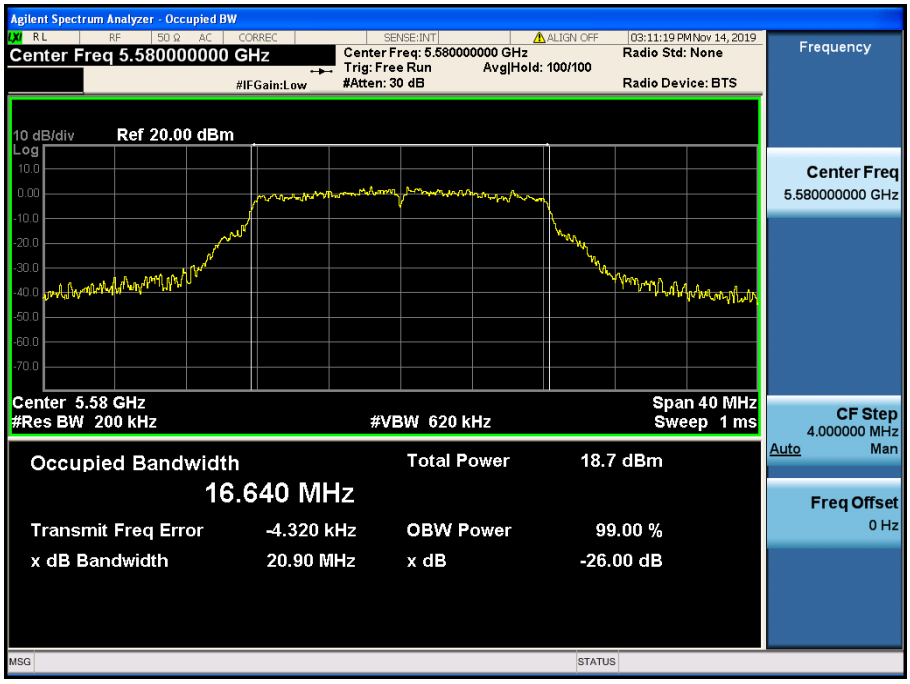
Occupied Bandwidth 99% Test Mode: 802.11a & Ch.64



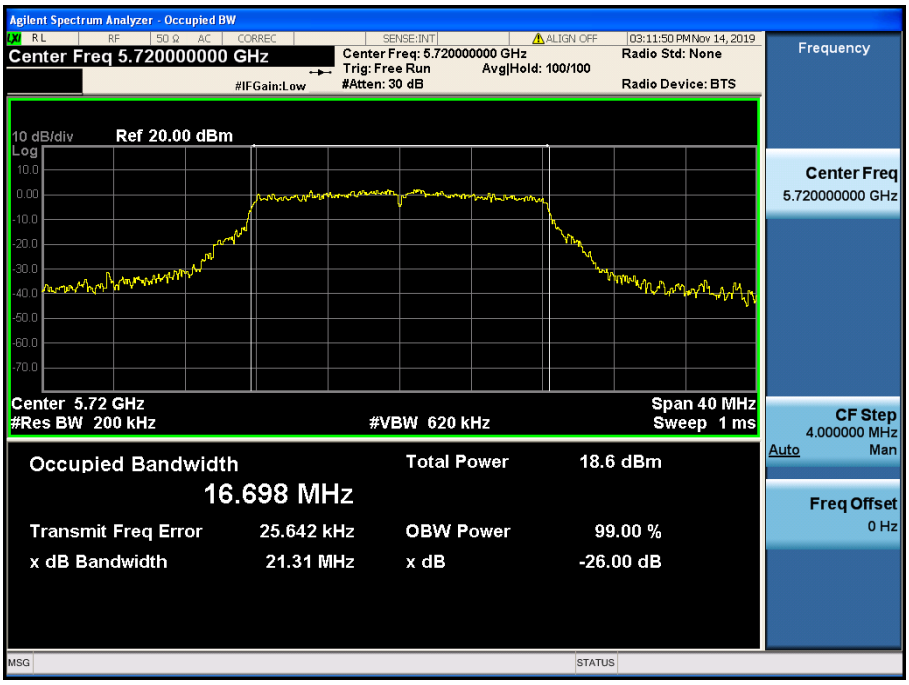
Occupied Bandwidth 99% Test Mode: 802.11a & Ch.100



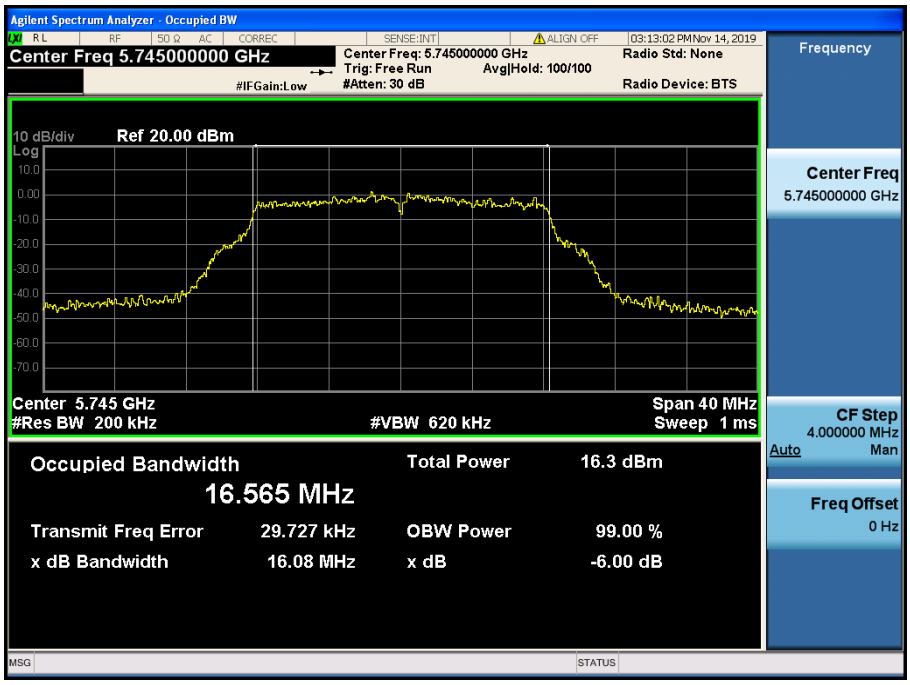
Occupied Bandwidth 99% Test Mode: 802.11a & Ch.116



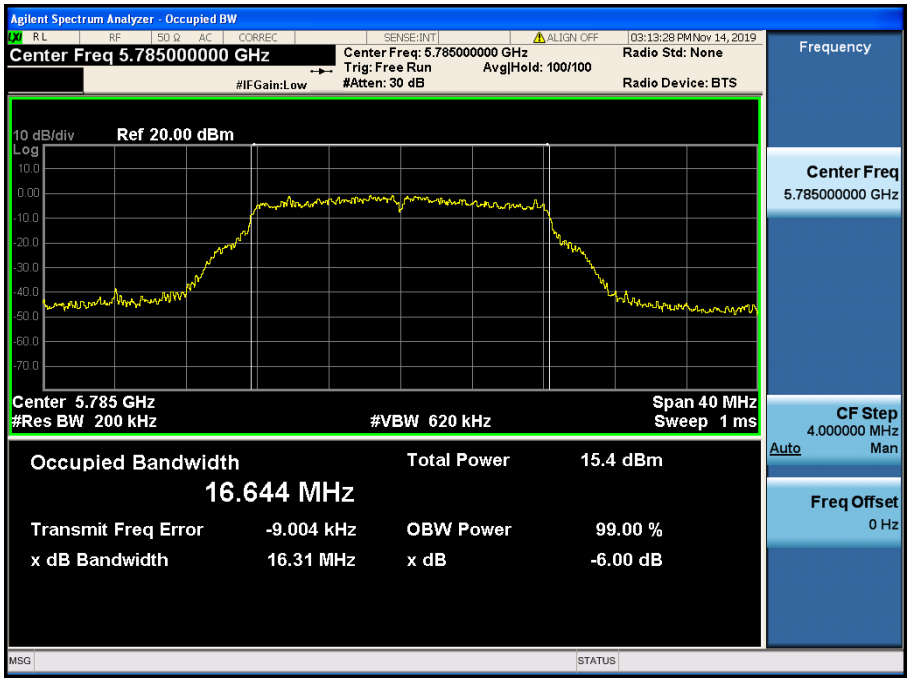
Occupied Bandwidth 99% Test Mode: 802.11a & Ch.144



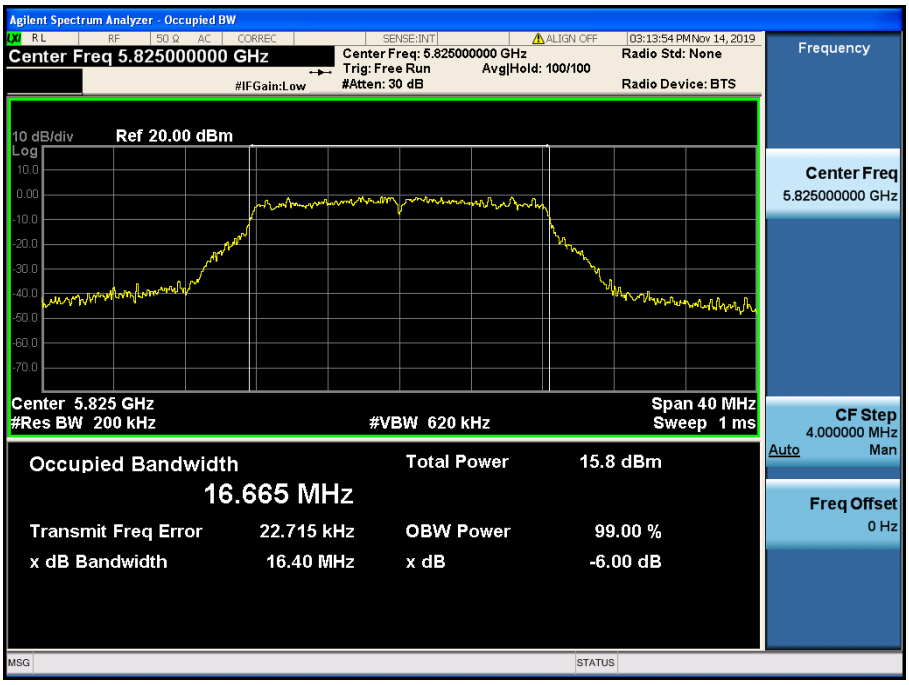
Occupied Bandwidth 99% Test Mode: 802.11a & Ch.149



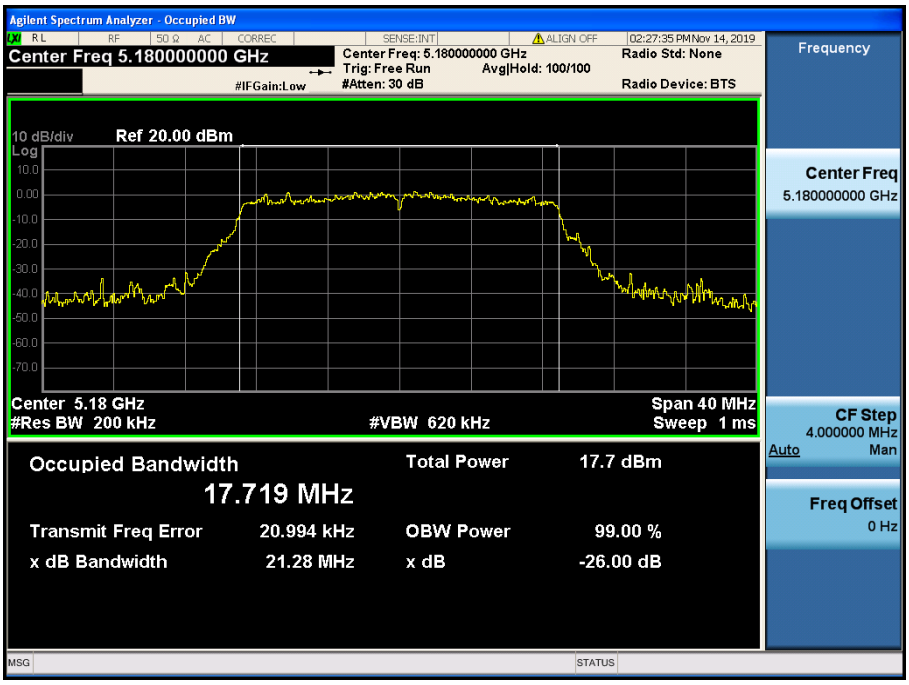
Occupied Bandwidth 99% Test Mode: 802.11a & Ch.157



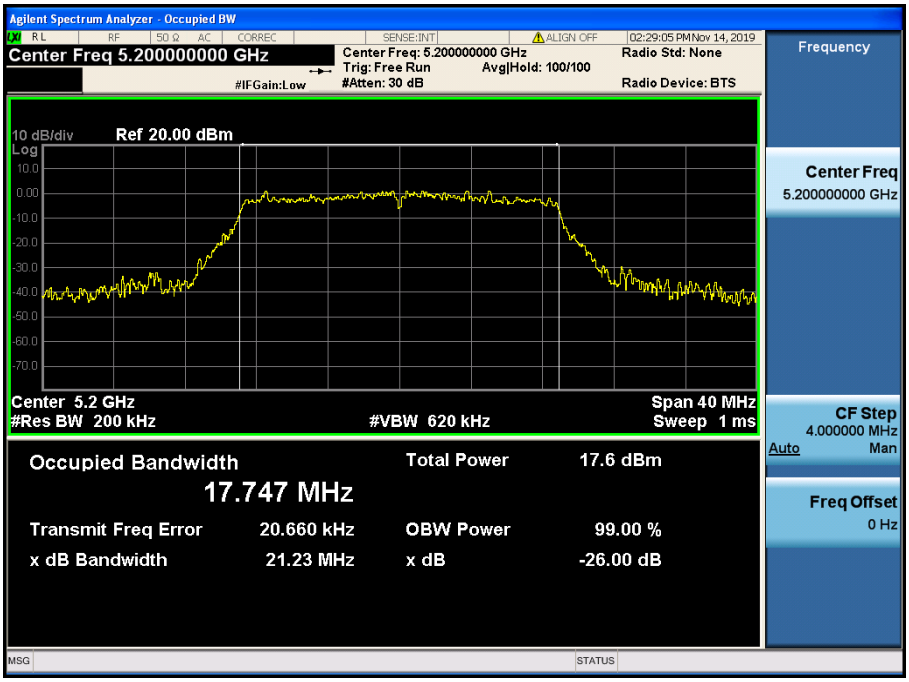
Occupied Bandwidth 99% Test Mode: 802.11a & Ch.165



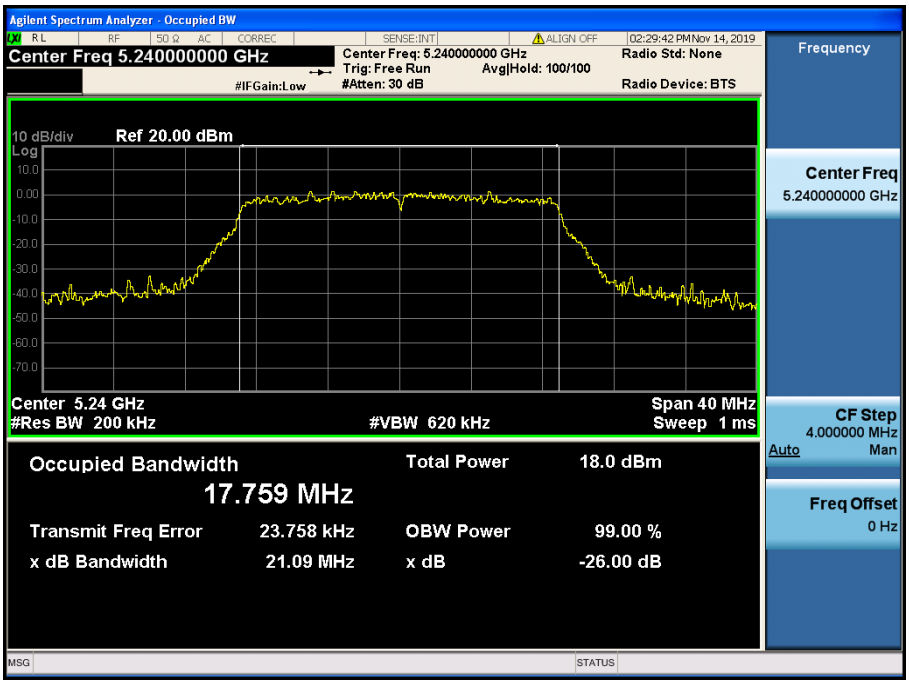
Occupied Bandwidth 99% Test Mode: 802.11n(HT20) & Ch.36



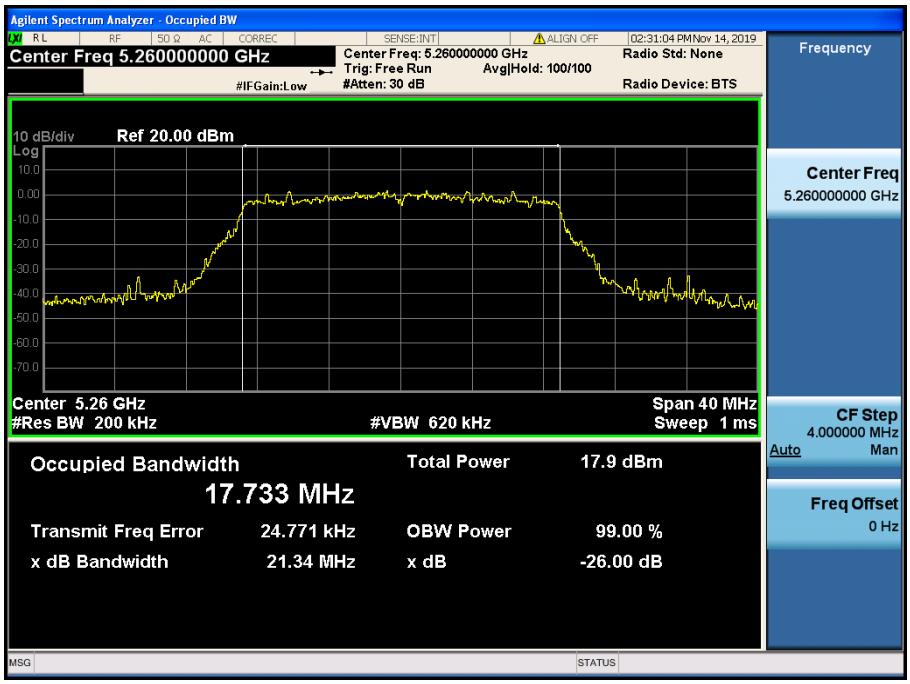
Occupied Bandwidth 99% Test Mode: 802.11n(HT20) & Ch.40



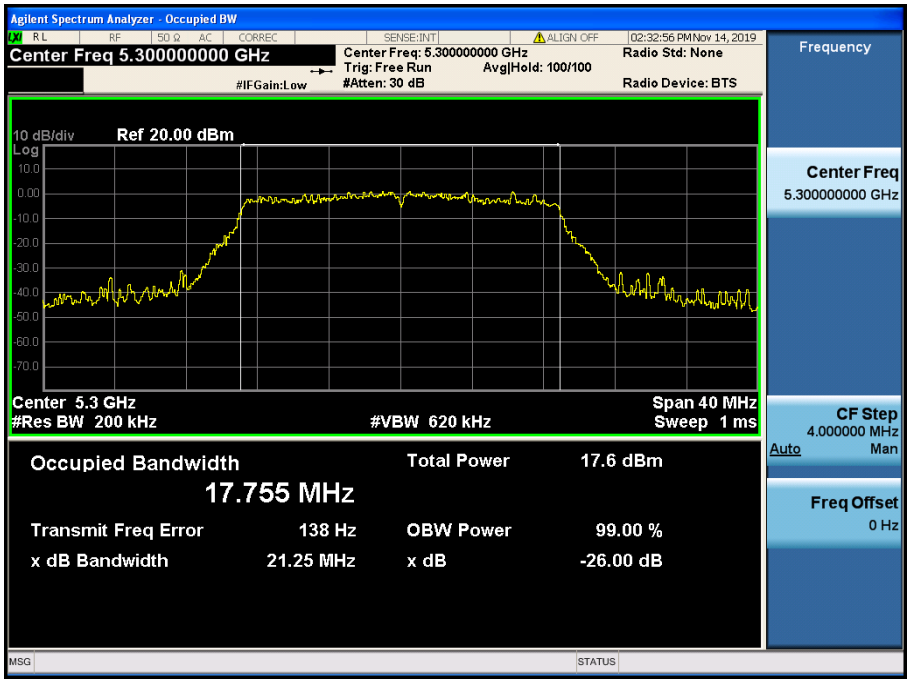
Occupied Bandwidth 99% Test Mode: 802.11n(HT20) & Ch.48



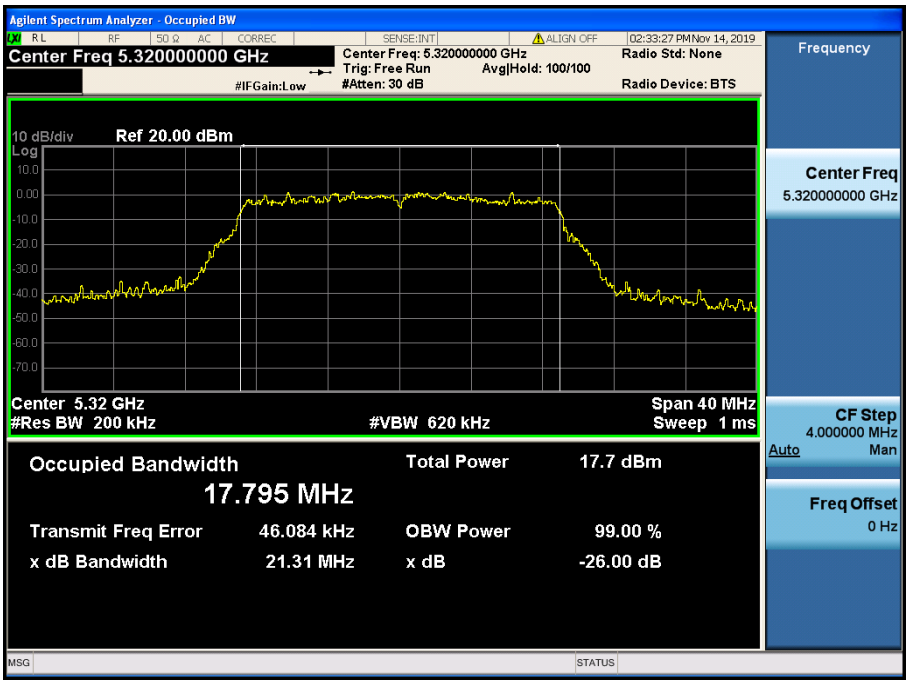
Occupied Bandwidth 99% Test Mode: 802.11n(HT20) & Ch.52



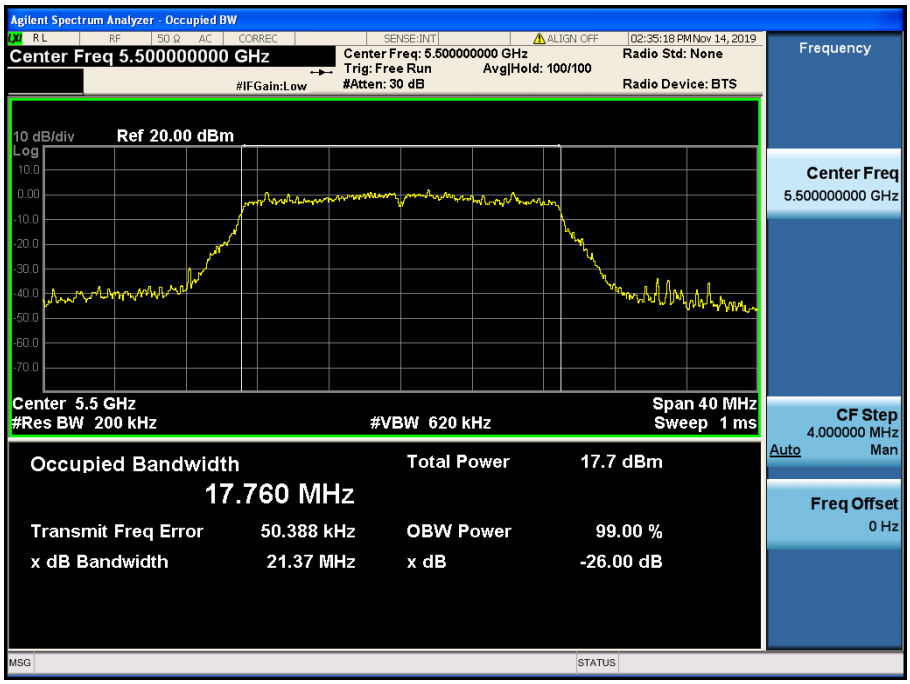
Occupied Bandwidth 99% Test Mode: 802.11n(HT20) & Ch.60



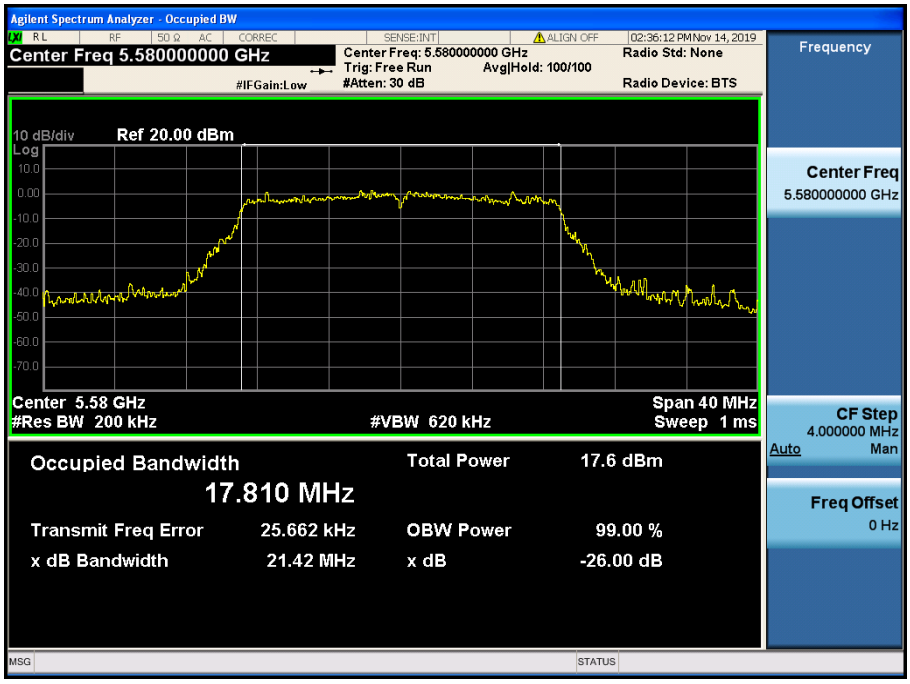
Occupied Bandwidth 99% Test Mode: 802.11n(HT20) & Ch.64



Occupied Bandwidth 99% Test Mode: 802.11n(HT20) & Ch.100



Occupied Bandwidth 99% Test Mode: 802.11n(HT20) & Ch.116



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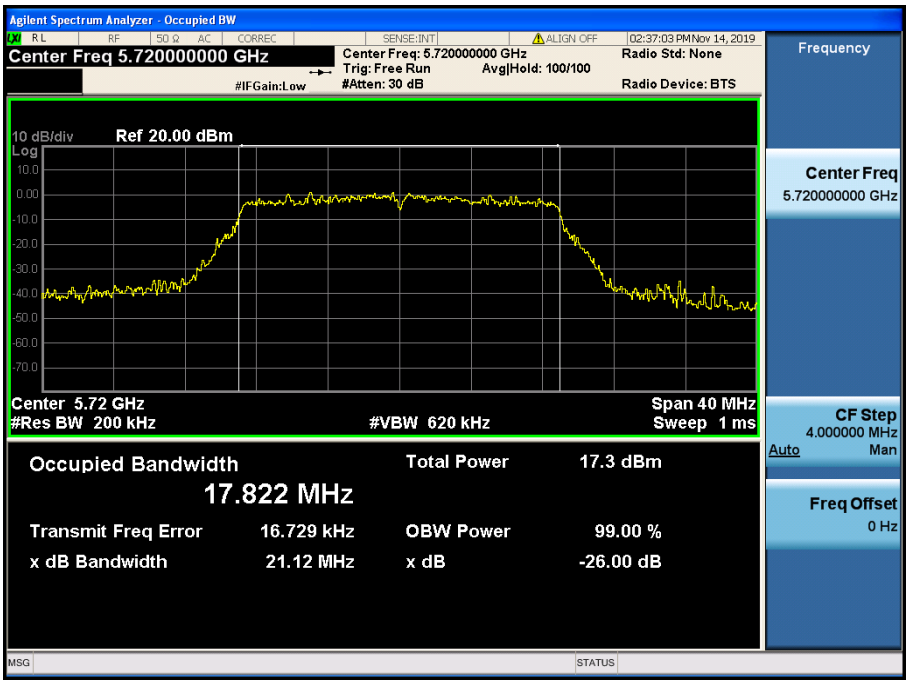
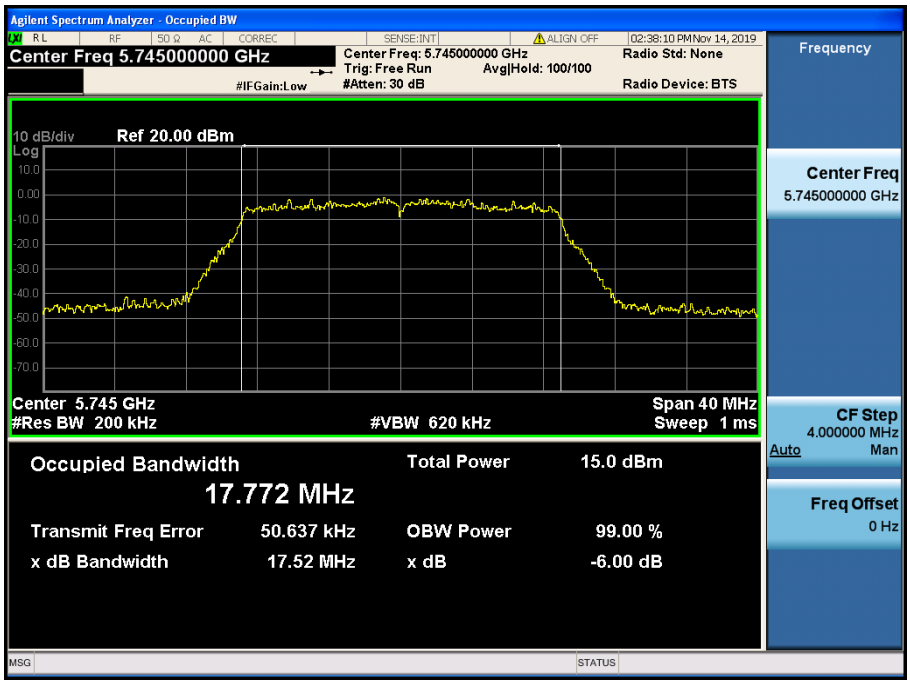
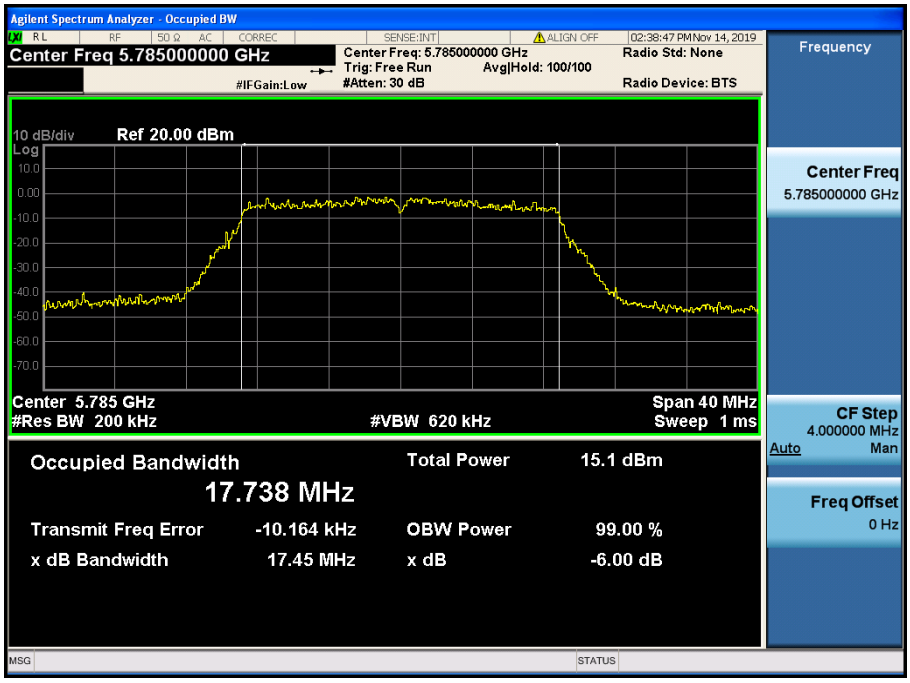


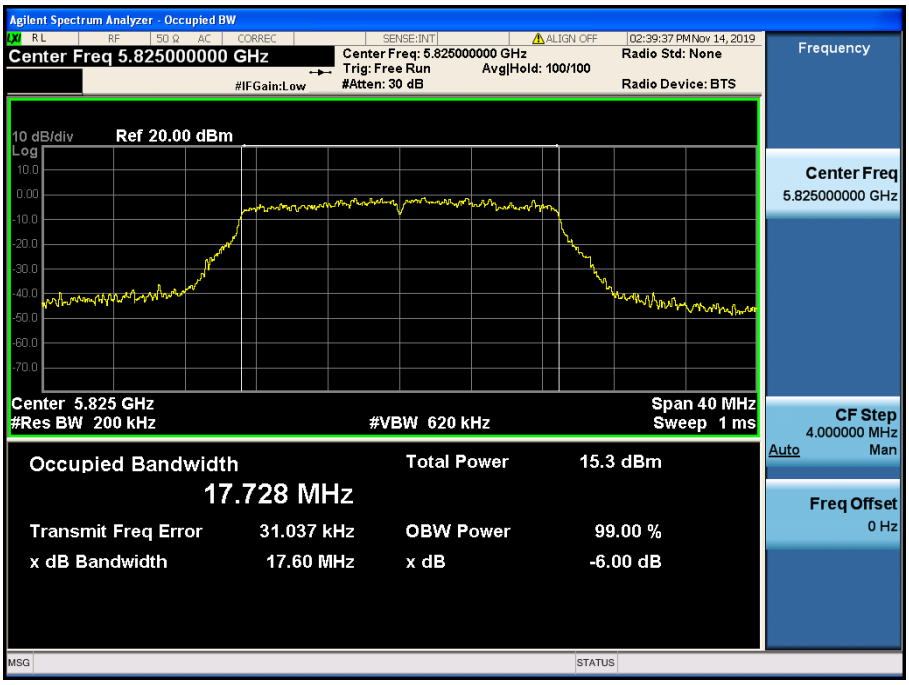
Occupied Bandwidth 99% Test Mode: 802.11n(HT20) & Ch.149



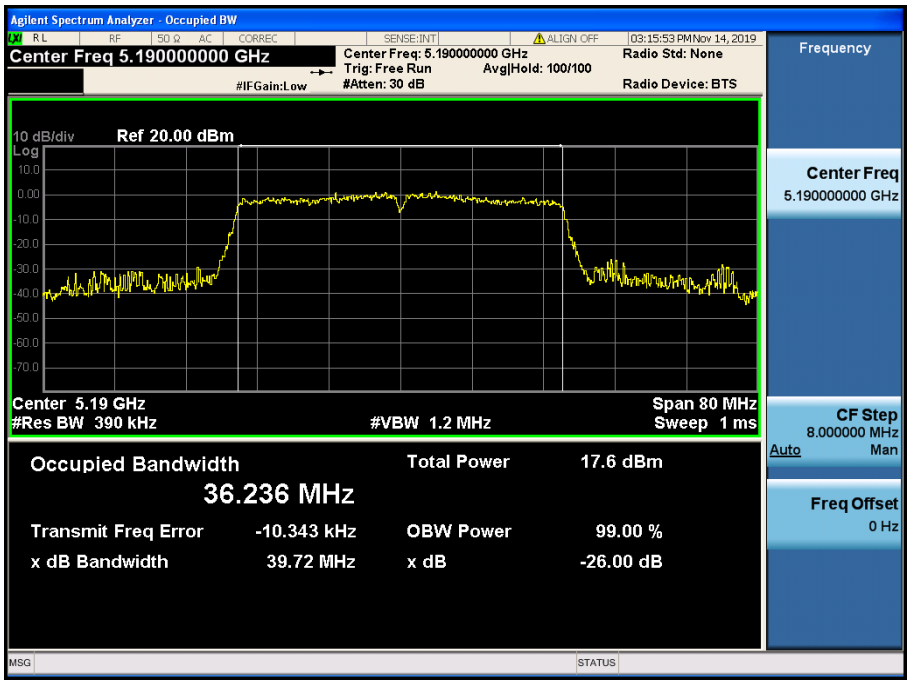
Occupied Bandwidth 99% Test Mode: 802.11n(HT20) & Ch.157



Occupied Bandwidth 99% Test Mode: 802.11n(HT20) & Ch.165



Occupied Bandwidth 99% Test Mode: 802.11n(HT40) & Ch.38



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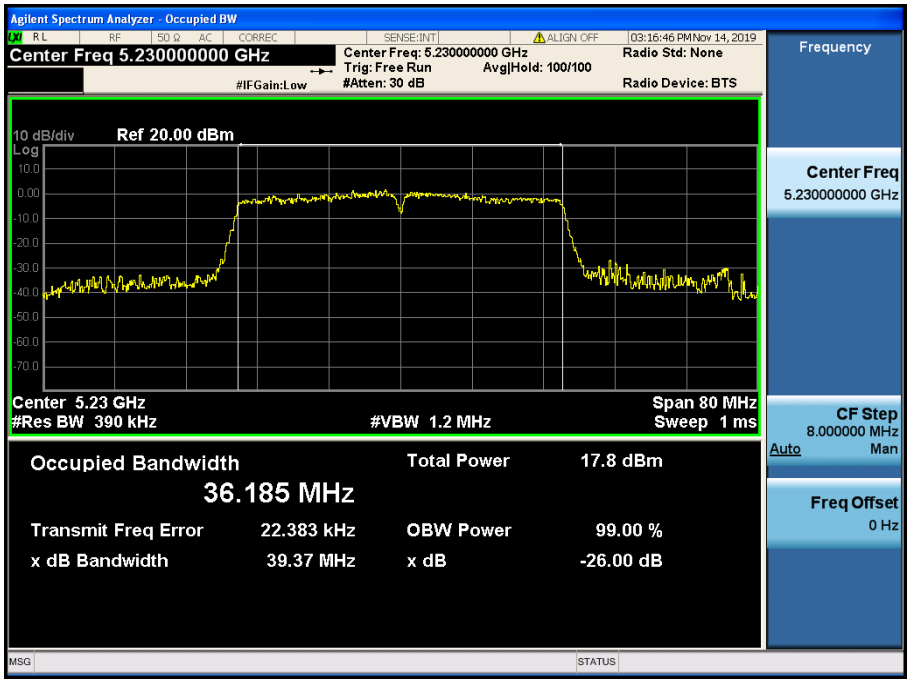

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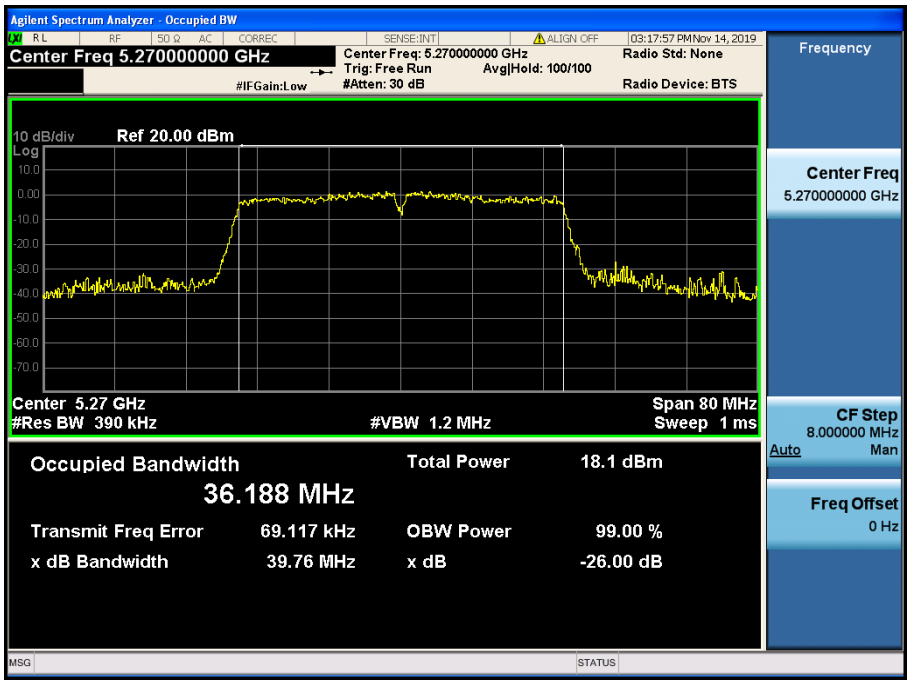

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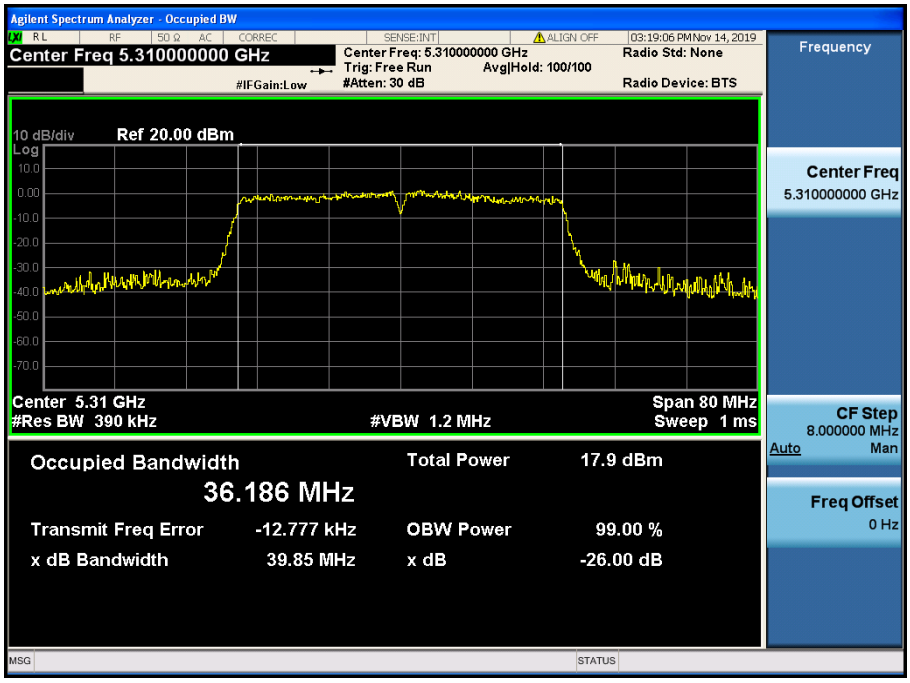
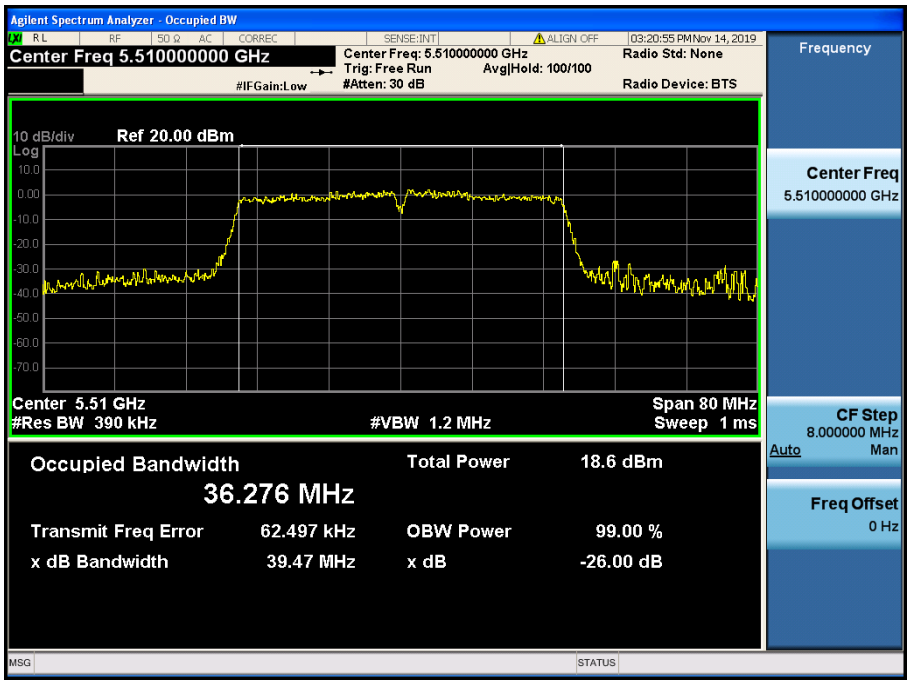
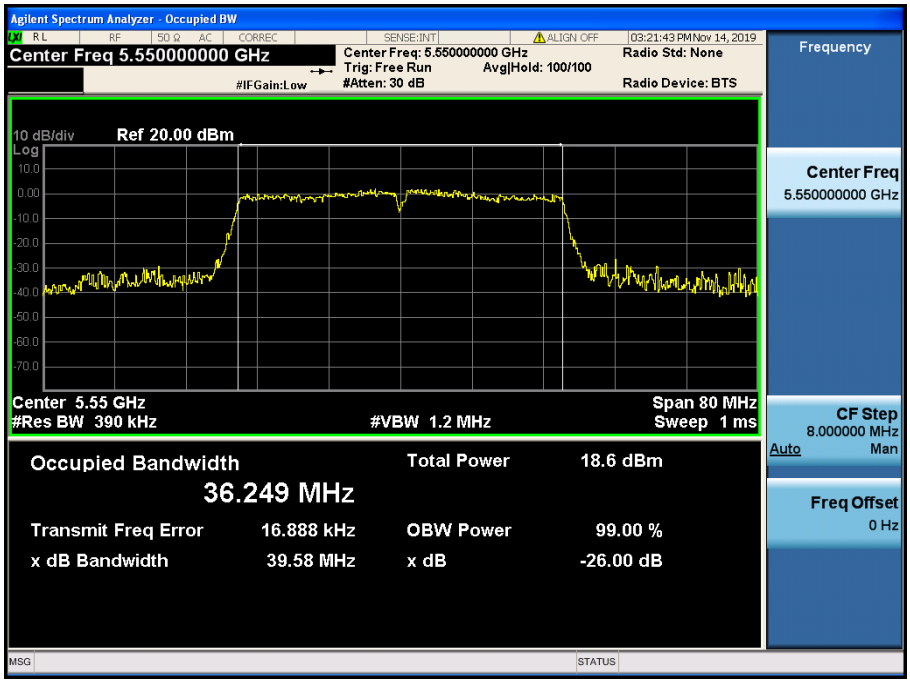


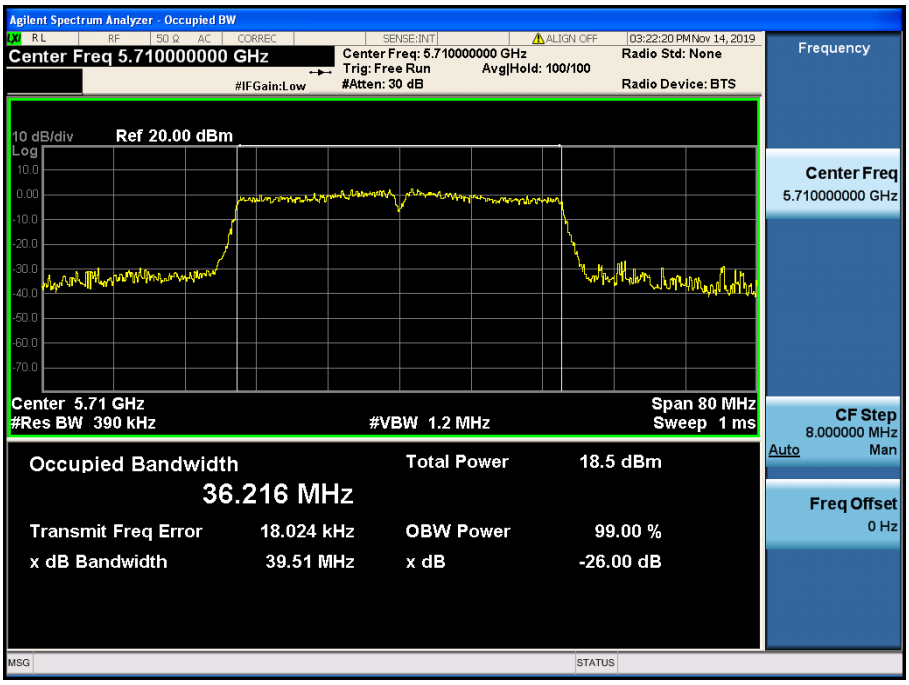
Occupied Bandwidth 99% Test Mode: 802.11n(HT40) & Ch.102



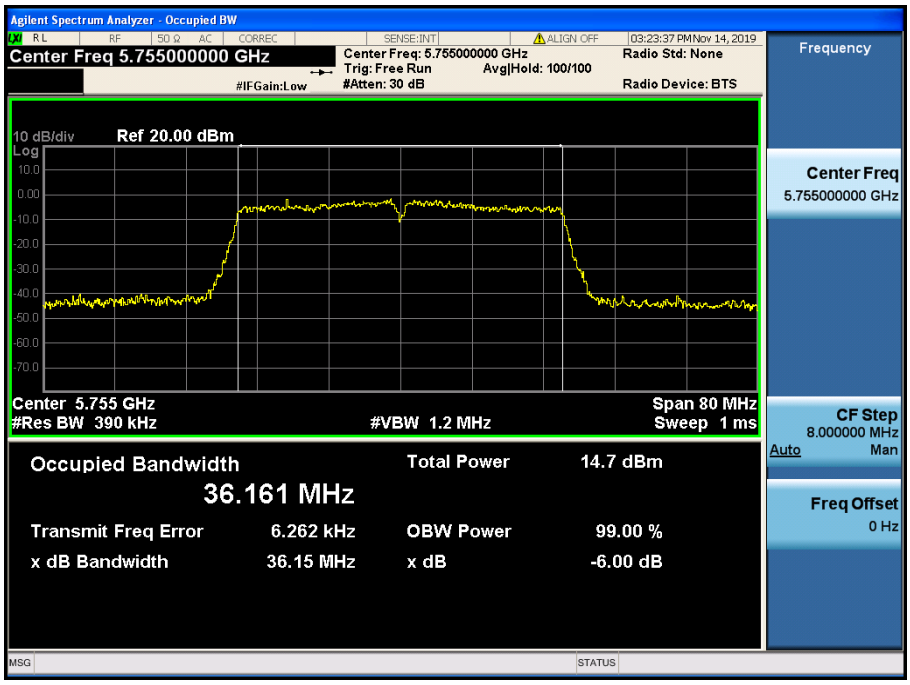
Occupied Bandwidth 99% Test Mode: 802.11n(HT40) & Ch.110



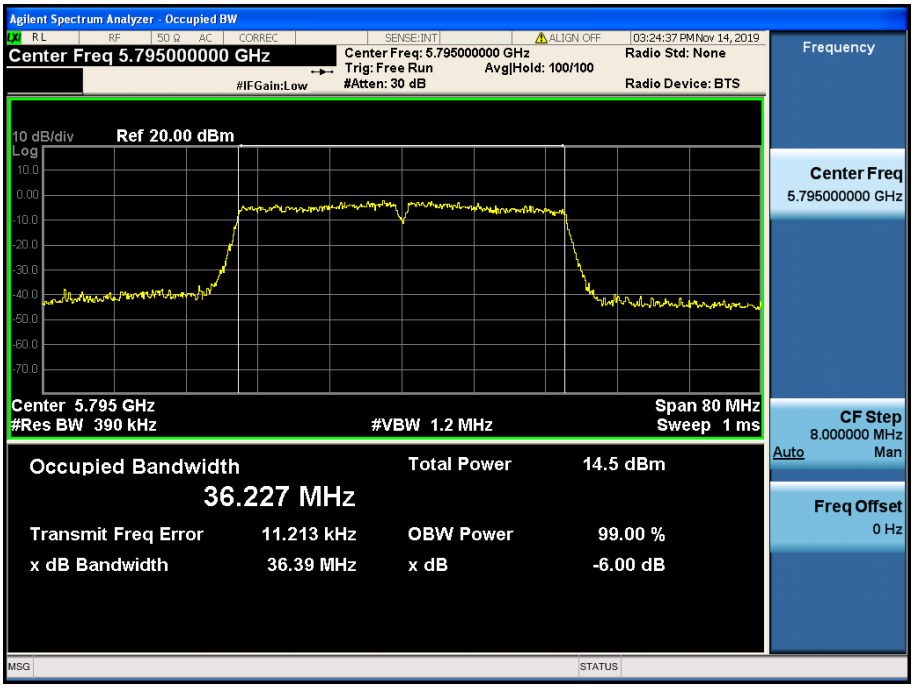
Occupied Bandwidth 99% Test Mode: 802.11n(HT40) & Ch.142



Occupied Bandwidth 99% Test Mode: 802.11n(HT40) & Ch.151



Occupied Bandwidth 99% Test Mode: 802.11n(HT40) & Ch.159



9. LIST OF TEST EQUIPMENT

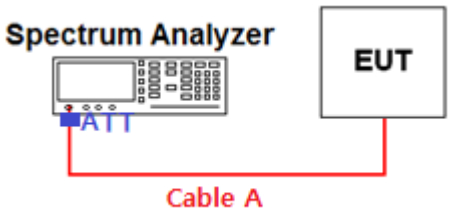
Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	18/12/19	19/12/19	MY50410357
Spectrum Analyzer	Agilent Technologies	N9020A	18/12/19	19/12/19	MY48011700
Spectrum Analyzer	Agilent Technologies	N9030A	19/03/15	20/03/15	MY53310140
DC Power Supply	Agilent Technologies	66332A	19/06/25	20/06/25	MY43000211
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	18/12/20	19/12/20	173501
Thermohygrometer	BODYCOM	BJ5478	18/12/27	19/12/27	120612-1
Thermohygrometer	BODYCOM	BJ5478	18/12/27	19/12/27	120612-2
Thermohygrometer	BODYCOM	BJ5478	19/07/03	20/07/03	N/A
HYGROMETER	TESTO	608-H1	19/01/31	20/01/31	34862883
Loop Antenna	ETS-Lindgren	6502	19/09/18	21/09/18	00226186
BILOG ANTENNA	Schwarzbeck	VULB 9160	19/04/23	21/04/23	9160-3362
Horn Antenna	ETS-Lindgren	3115	18/01/30	20/01/30	6419
Horn Antenna	Schwarzbeck	BBHA 9120C	17/12/04	19/12/04	9120C-561
Horn Antenna	A.H.Systems Inc.	SAS-574	19/07/03	21/07/03	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	H.P	8447D	18/12/18	19/12/18	2944A07774
Attenuator	Aeroflex/Weinschel	20515	19/0627	20/06/27	Y2370
Attenuator	SMAJK	SMAJK-2-3	19/06/27	20/06/27	2
Attenuator	SRTechnology	F01-B0606-01	19/0627	20/06/27	13092403
Attenuator	Hefei Shunze	SS5T2.92-10-40	19/06/27	20/06/27	16012202
Attenuator	SMAJK	SMAJK-50-10	19/06/25	20/06/25	15081903
High Pass Filter	Wainwright Instruments	WHNX8.0/26.5-6SS	19/06/27	20/06/27	3
High Pass Filter	Wainwright Instruments	WHKX12-935-1000-15000-40SS	19/06/26	20/06/26	8
High Pass Filter	Wainwright Instruments	WHKX10-2838-3300-18000-60SS	19/06/26	20/06/26	1
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2495A MA2490A	19/06/24	20/06/24	1306007 1249001
EMI Test Receiver	Rohde Schwarz	ESCI7	19/01/30	20/01/30	100910
PULSE LIMITER	Rohde Schwarz	ESH3-Z2	19/09/17	20/09/17	101333
LISN	SCHWARZBECK	NNLK 8121	19/03/19	20/03/19	06183
Cable	Radiall	TESTPRO3	19/01/16	20/01/16	M-01
Cable	Junkosha	MWX315	19/01/16	20/01/16	M-05
Cable	Junkosha	MWX315	19/01/16	20/01/16	M-06
Cable	Junkosha	MWX241	19/01/14	20/01/14	G-4
Cable	Junkosha	MWX241	19/01/14	20/01/14	G-7
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
Cable	DT&C	Cable	19/01/15	20/01/15	RF-18
Cable	DT&C	Cable	19/01/16	20/01/16	RF-82
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.

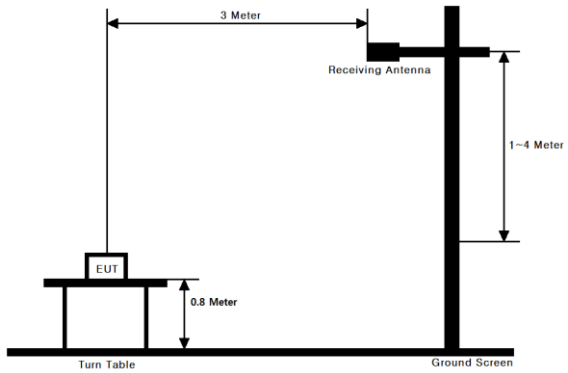
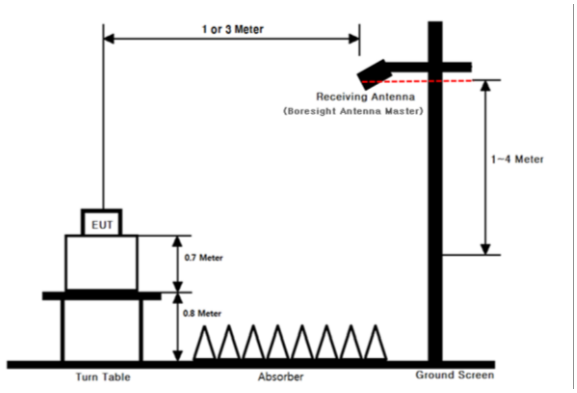
APPENDIX I

Test set up Diagram

▪ Conducted Measurement



▪ Radiated Measurement

Below 1GHz	Above 1GHz
	

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 ≥ EBW if possible; otherwise, set RBW to the largest available value.
3. Set VBW ≥ 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* ≤ 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:

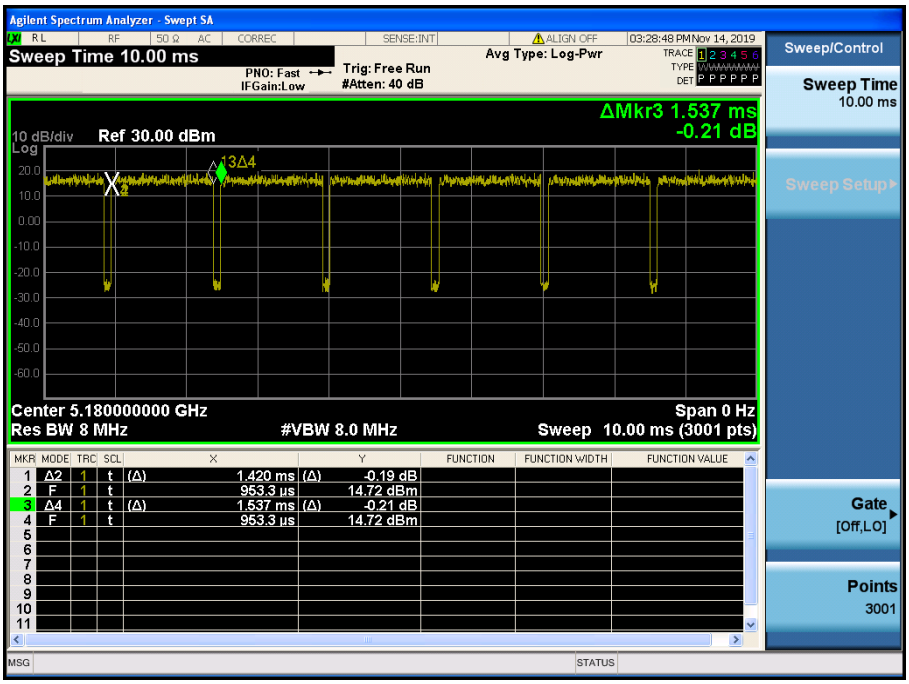
Duty cycle

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	6Mbps	5180	1.420	1.537	0.9239	0.34	35.21
802.11n (HT20)	MCS0	5180	1.327	1.443	0.9196	0.36	37.68
802.11n (HT40)	MCS0	5190	0.660	0.768	0.8590	0.66	75.76

Single Transmit

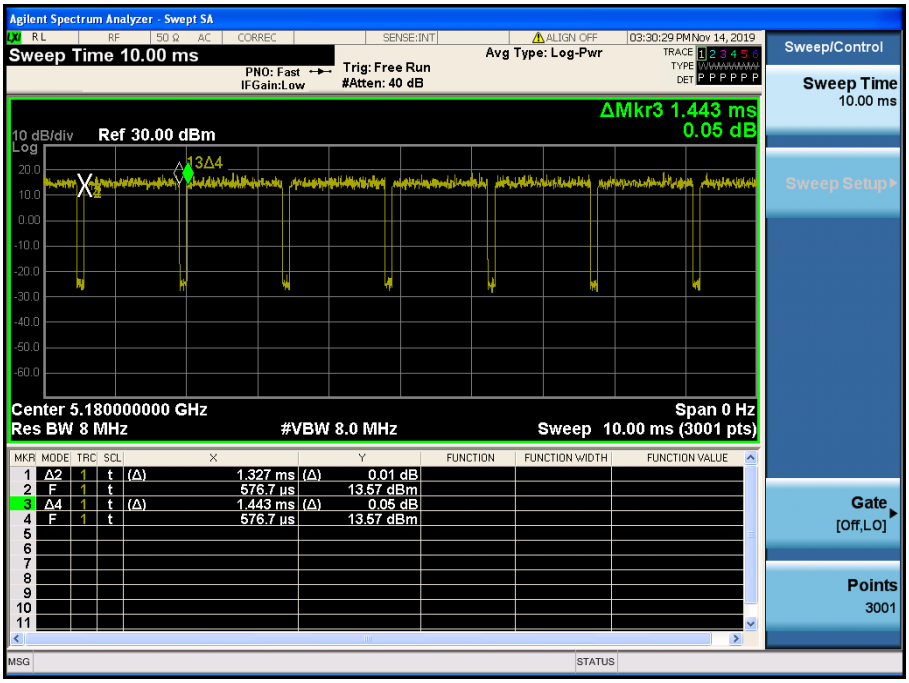
Duty Cycle

Test Mode: 802.11a & Ch.36

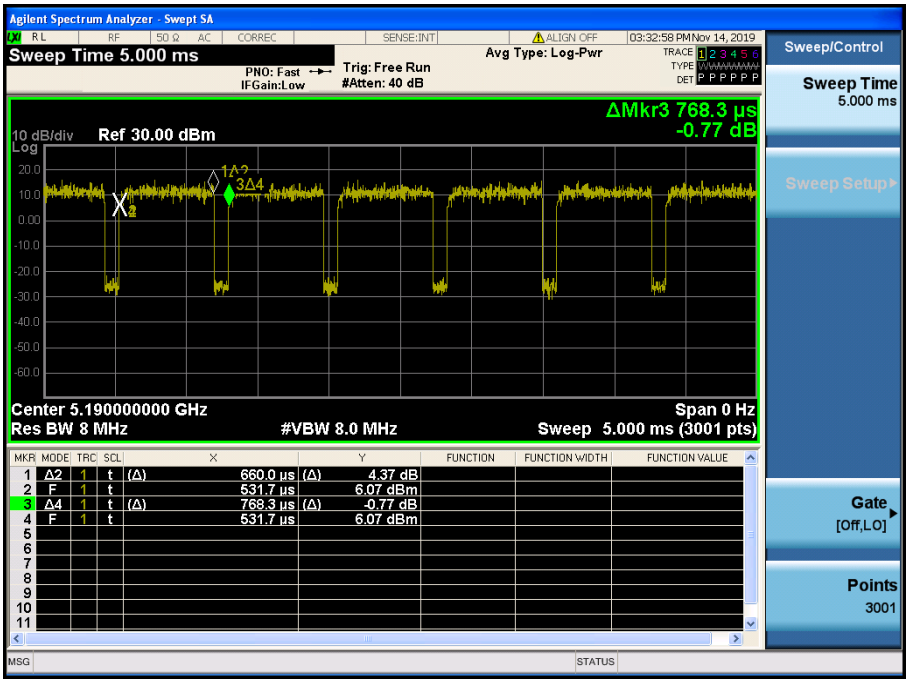


Duty Cycle

Test Mode: 802.11n HT20 & Ch.36



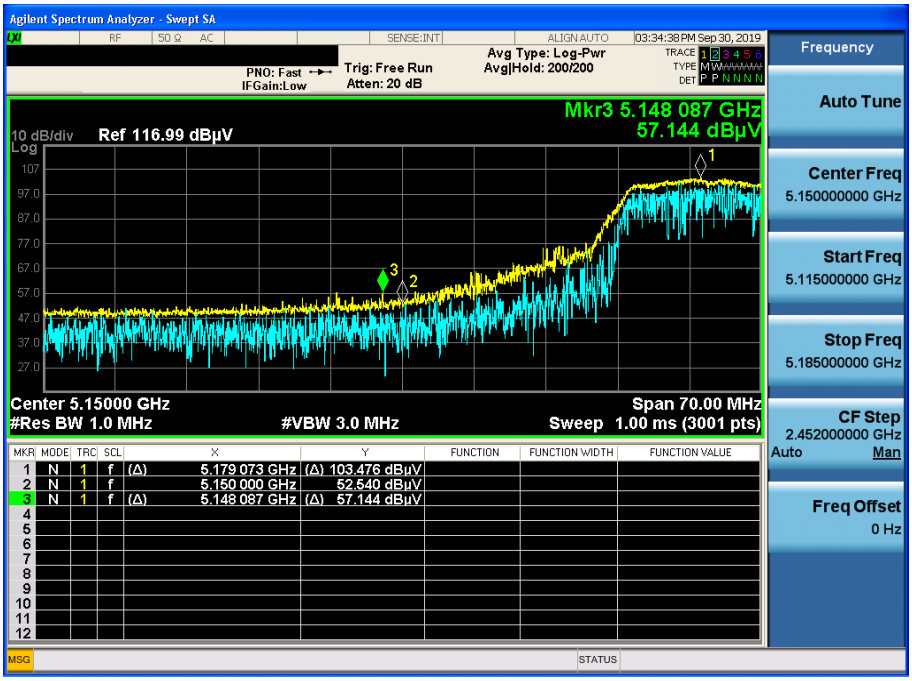
Duty Cycle Test Mode: 802.11n HT40 & Ch.38



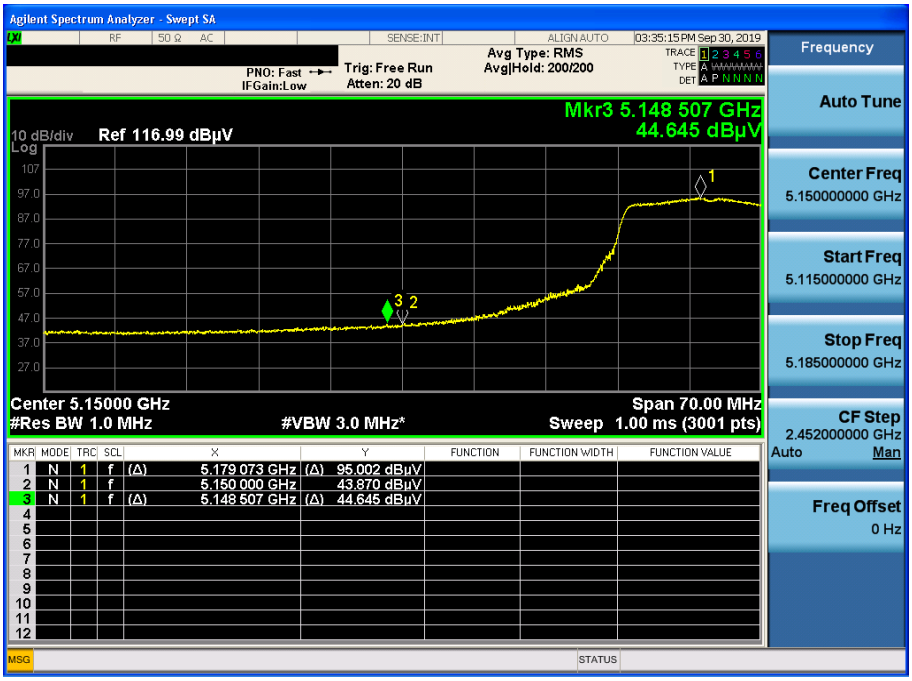
APPENDIX III

Unwanted Emissions (Radiated) Test Plot

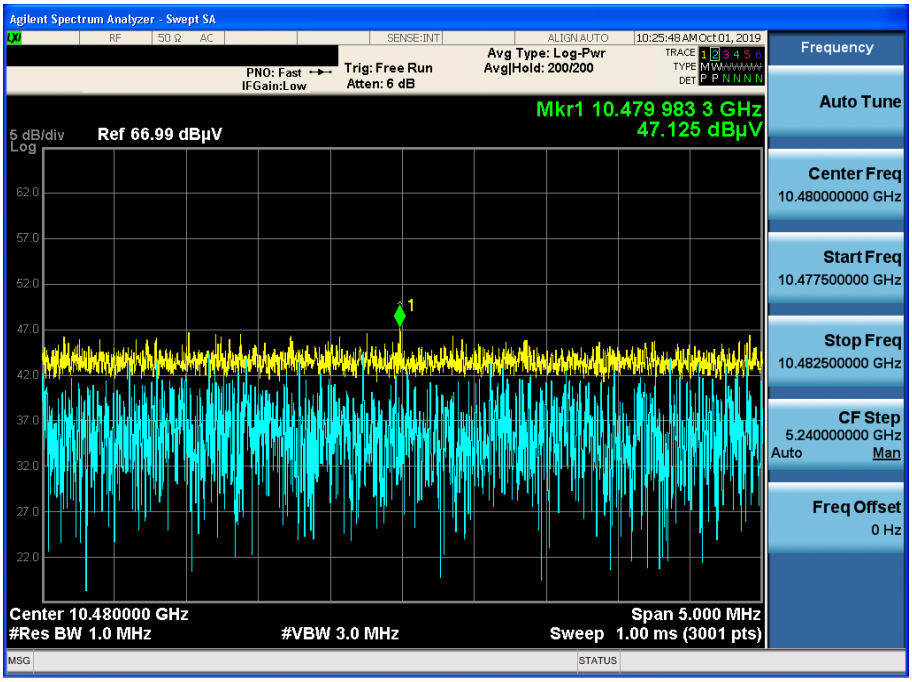
802.11a & U-NII 1 & Ch.36 & Z axis & Ver — Detector Mode : PK



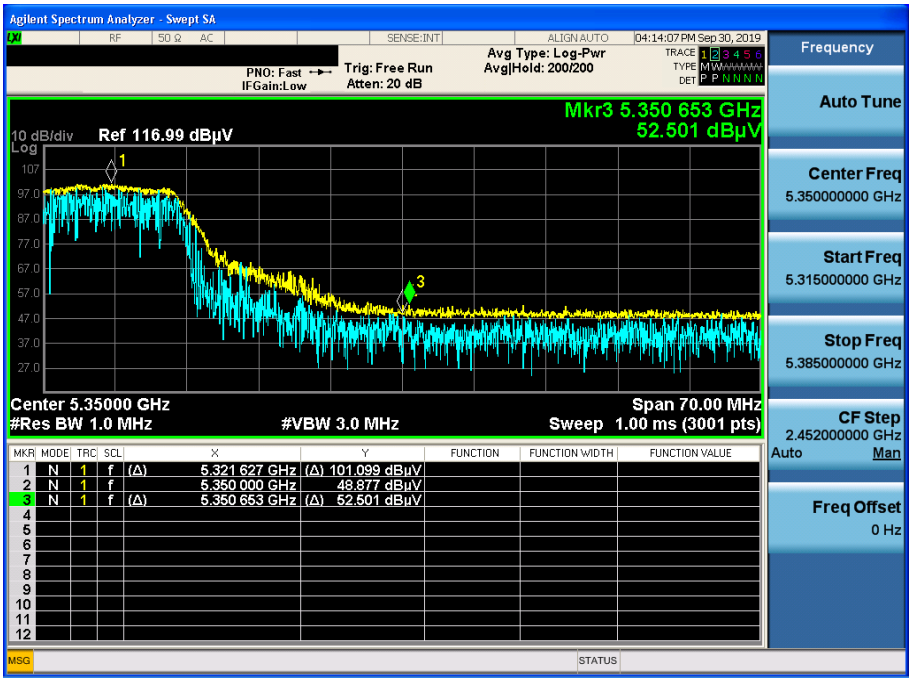
802.11a & U-NII 1 & Ch.36 & Z axis & Ver — Detector Mode : AV



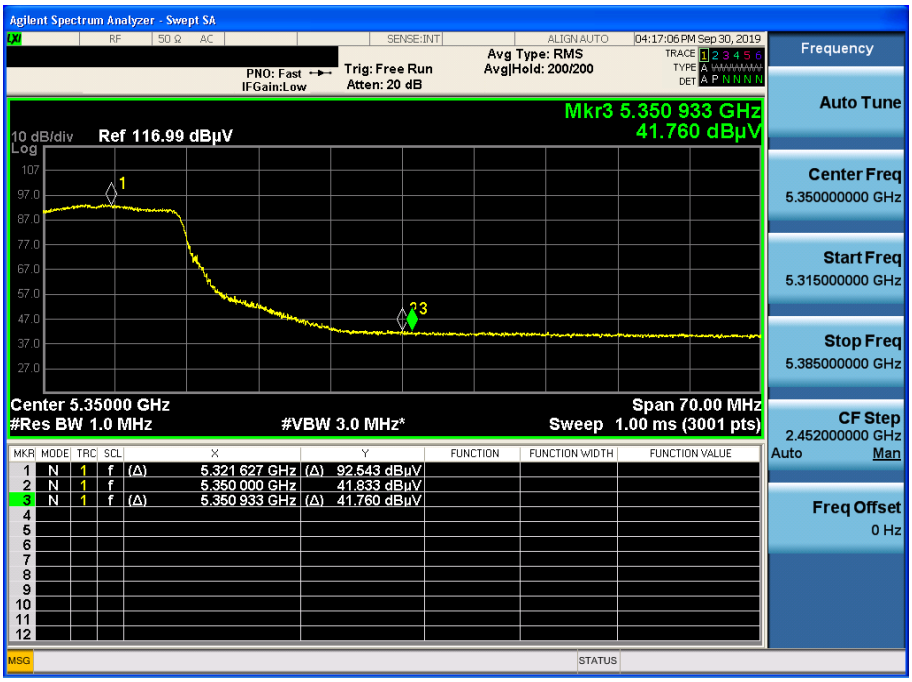
802.11a & U-NII 1 & Ch.48 & Z axis & Ver **Detector Mode : PK**



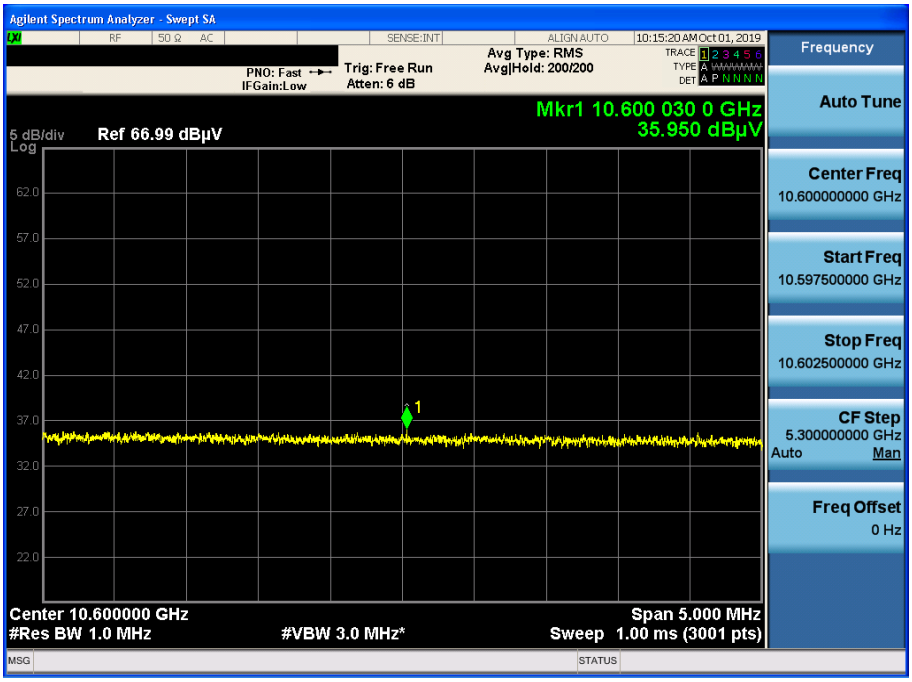
802.11a & U-NII 2A & Ch.64 & Z axis & Ver **Detector Mode : PK**



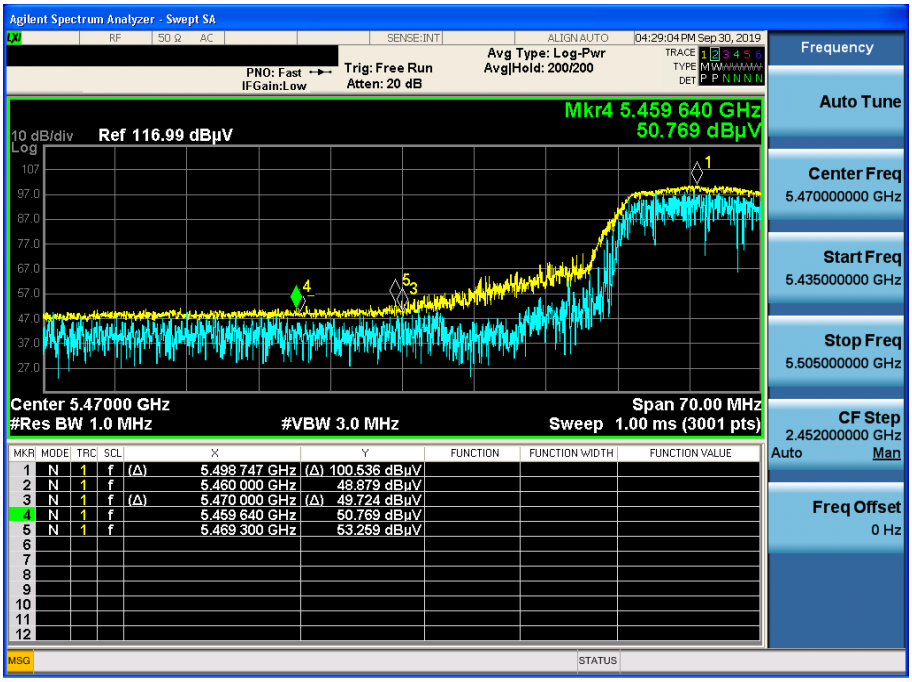
802.11a & U-NII 2A & Ch.64 & Z axis & Ver **Detector Mode : AV**



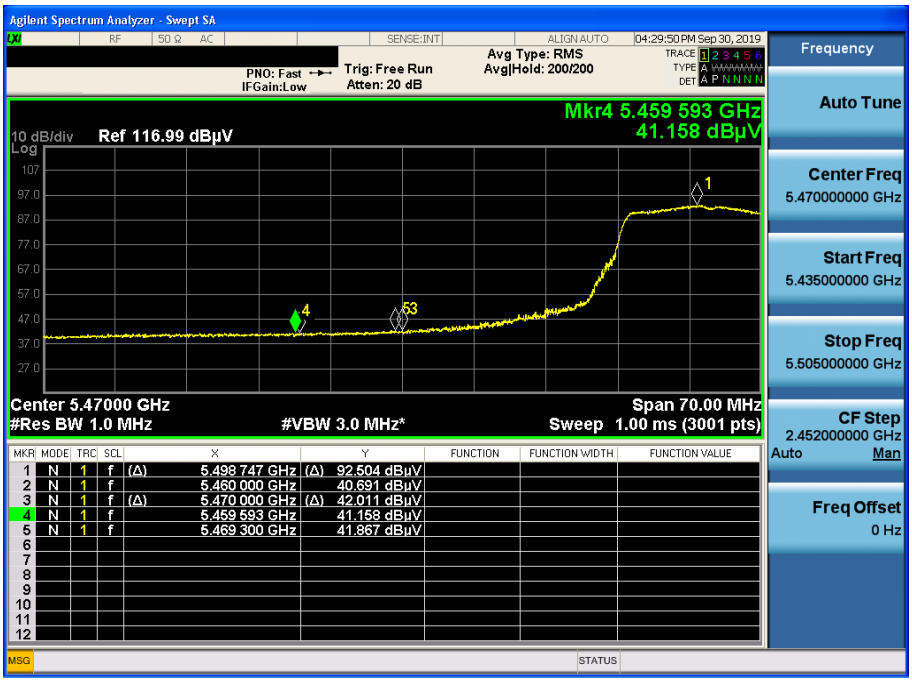
802.11a & U-NII 2A & Ch.60 & Z axis & Ver **Detector Mode : AV**



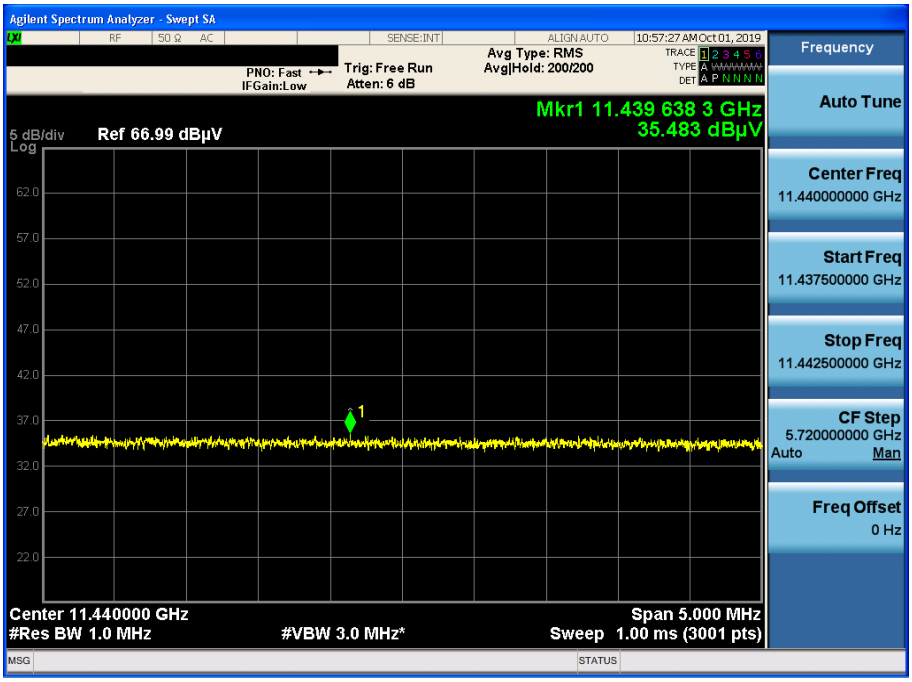
802.11a & U-NII 2C & Ch.100 & Z axis & Ver **Detector Mode : PK**



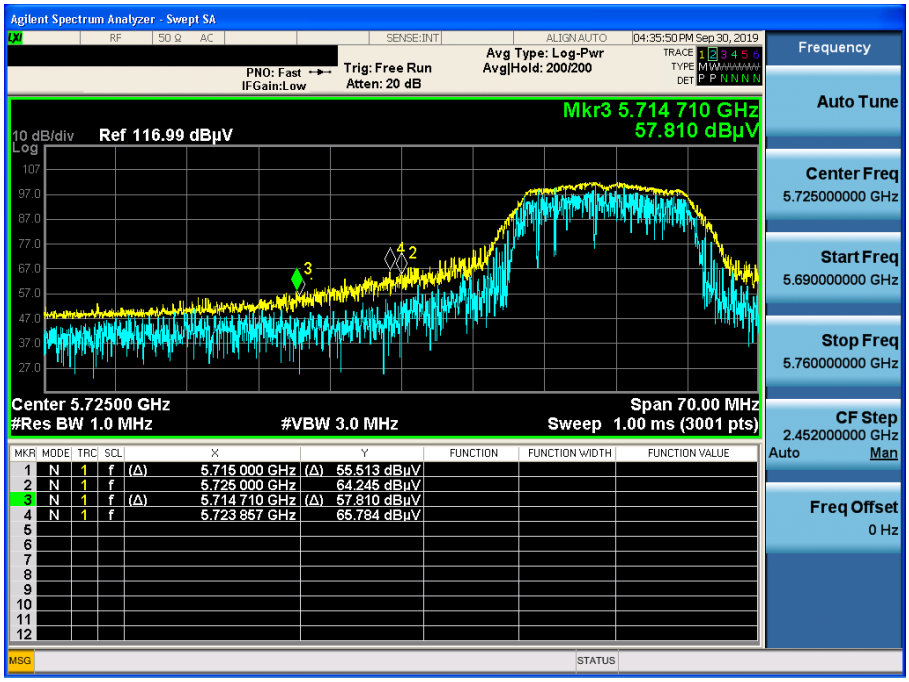
802.11a & U-NII 2C & Ch.100 & Z axis & Ver **Detector Mode : AV**



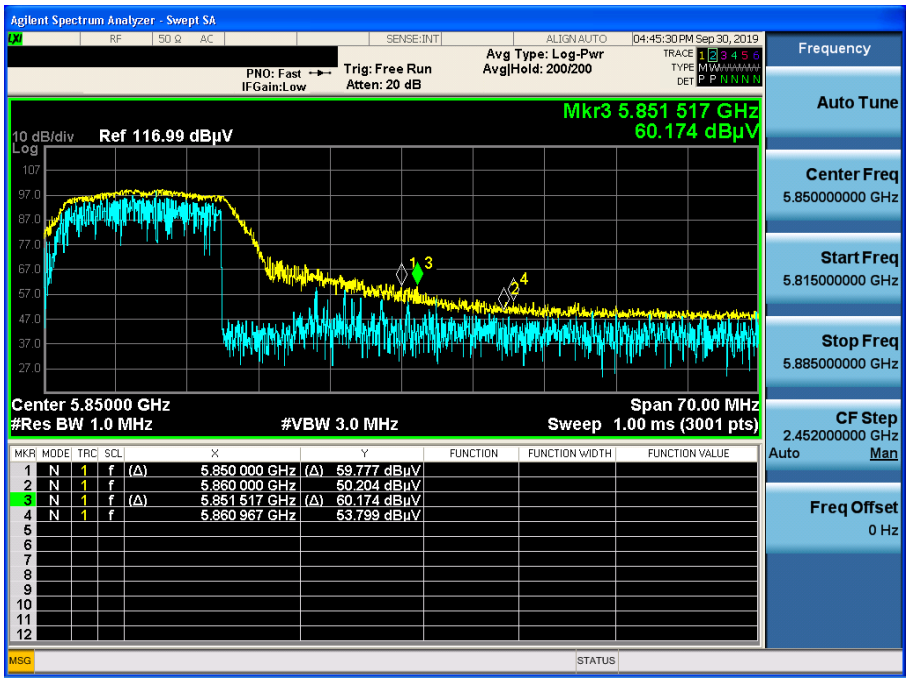
802.11a & U-NII 2C & Ch.144 & Z axis & Ver **Detector Mode : AV**



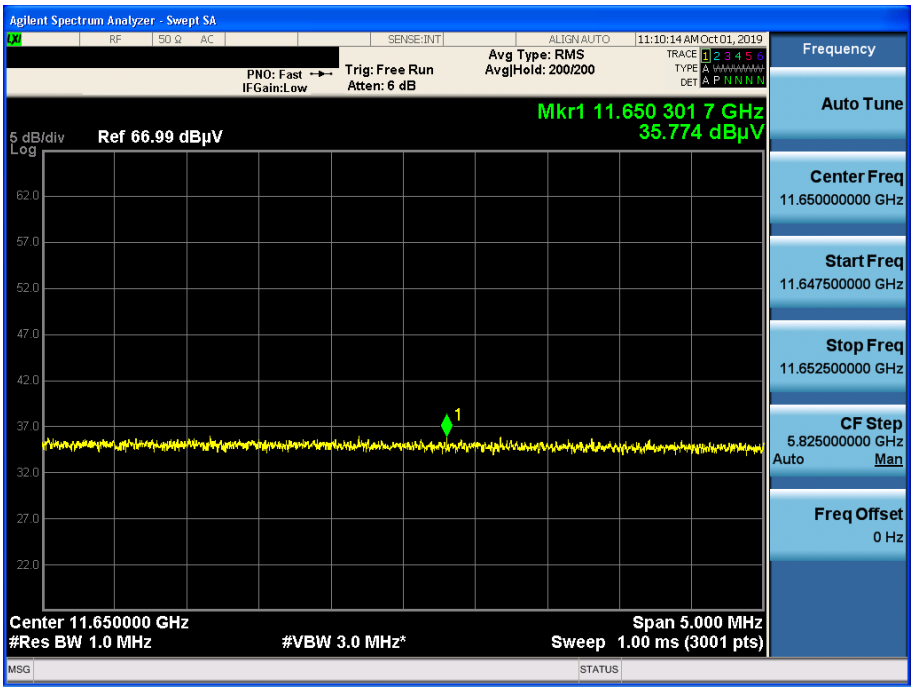
802.11a & U-NII 3 & Ch.149 & Z axis & Ver **Detector Mode : PK**



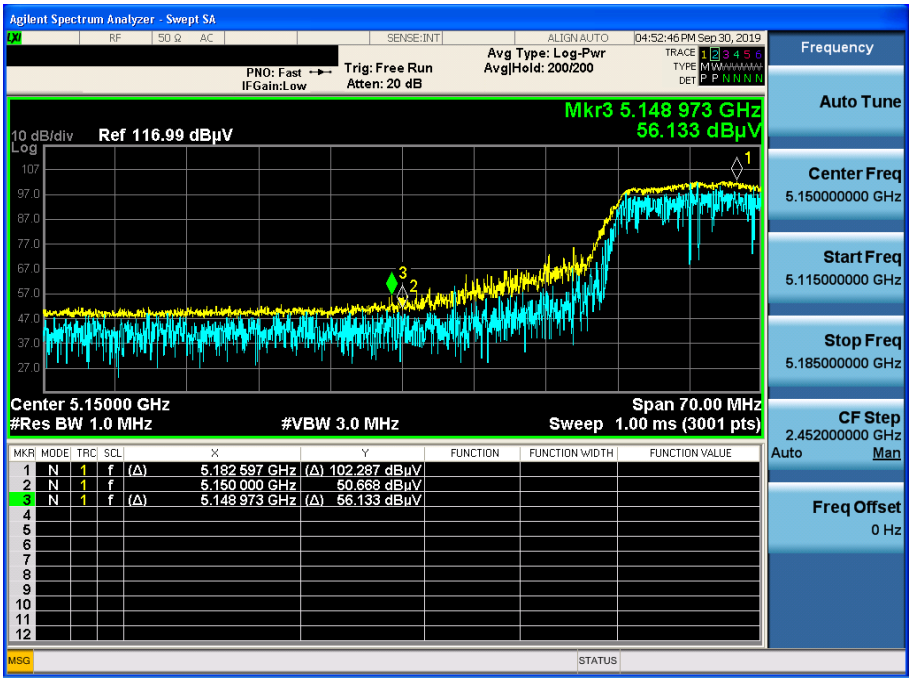
802.11a & U-NII 3 & Ch.165 & Z axis & Ver **Detector Mode : PK**



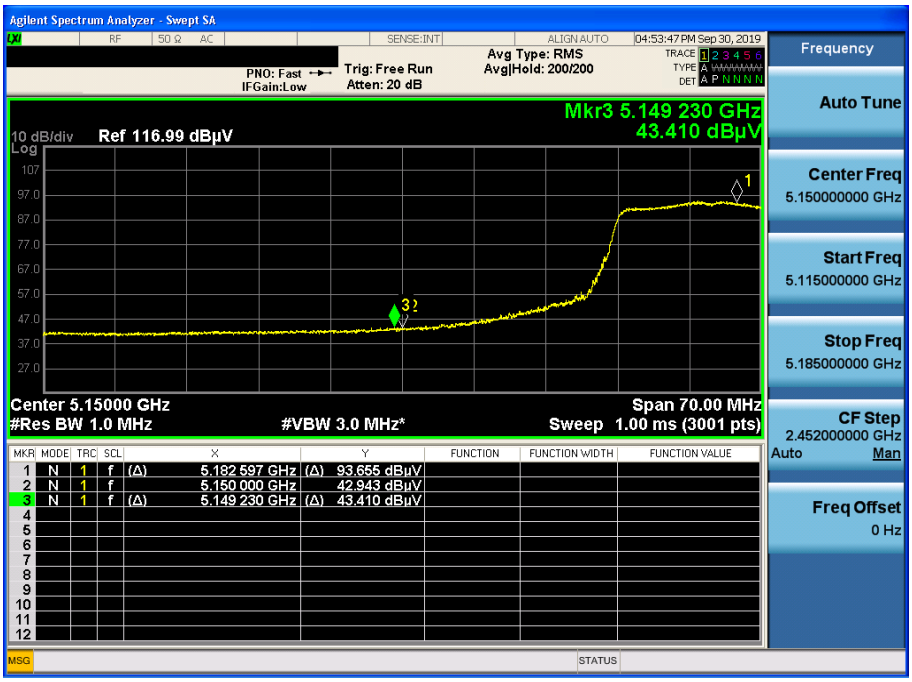
802.11a & U-NII 3 & Ch.165 & Z axis & Ver **Detector Mode : AV**



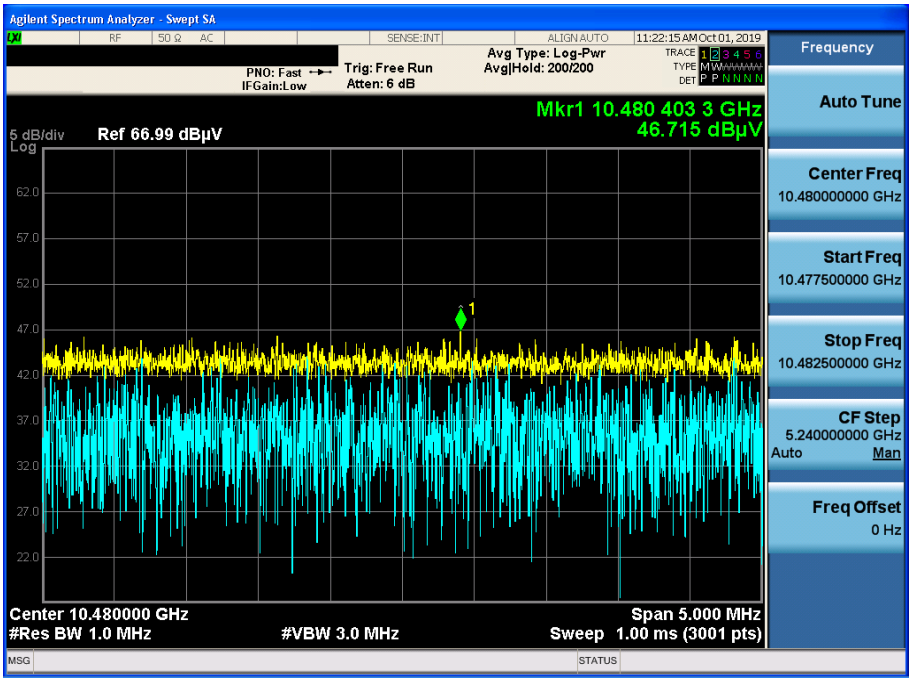
802.11n(HT20) & U-NII 1 & Ch.36 & Z axis & Ver **Detector Mode : PK**



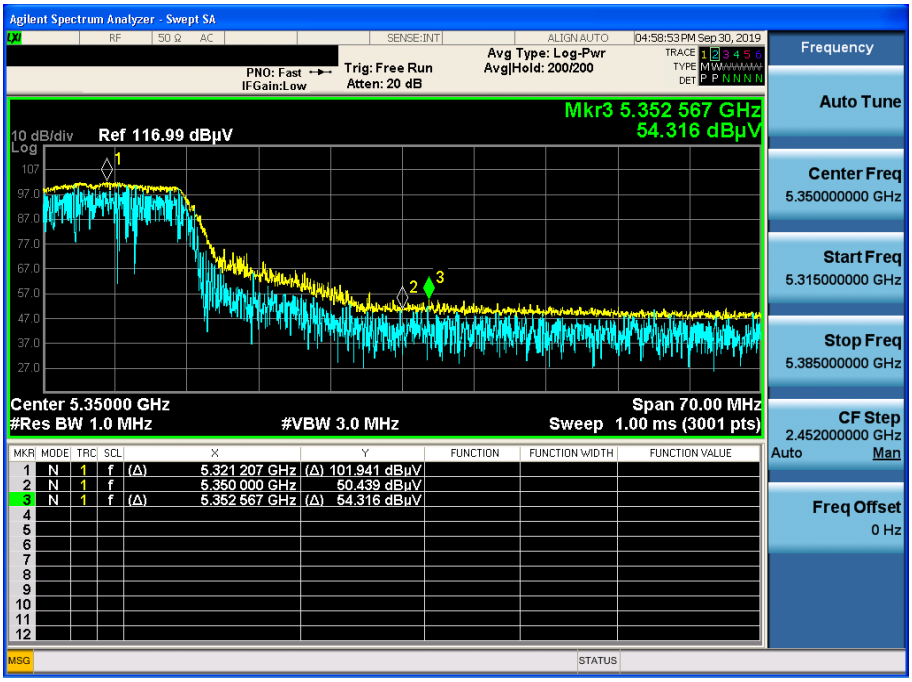
802.11n(HT20) & U-NII 1 & Ch.36 & Z axis & Ver **Detector Mode : AV**



802.11n(HT20) & U-NII 1 & Ch.48 & Z axis & Hor **Detector Mode : PK**

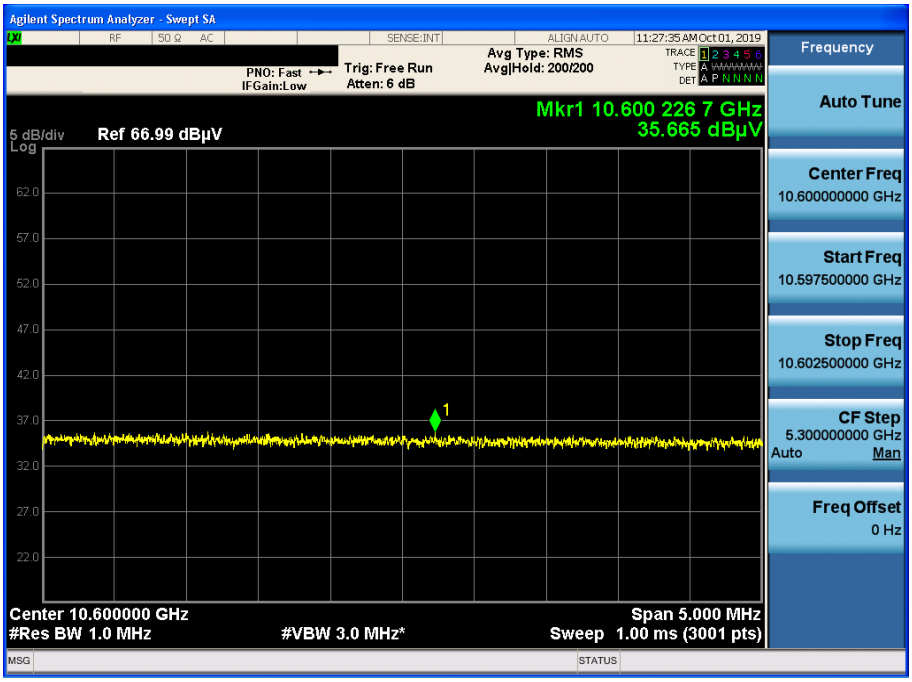


802.11n(HT20) & U-NII 2A & Ch.64 & Z axis & Ver **Detector Mode : PK**

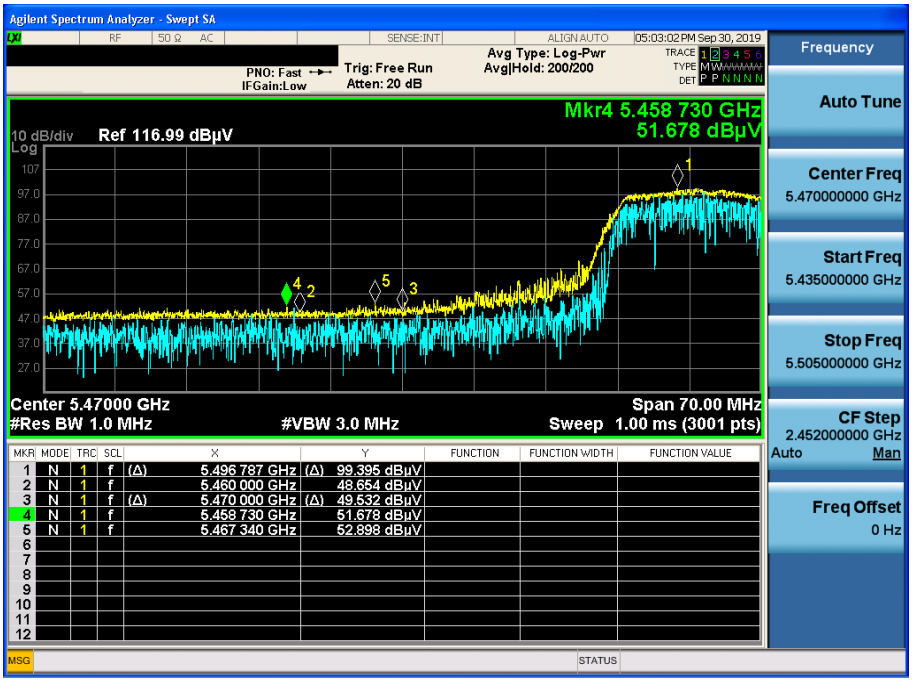


802.11n(HT20) & U-NII 2A & Ch.64 & Z axis & Ver **Detector Mode : AV**

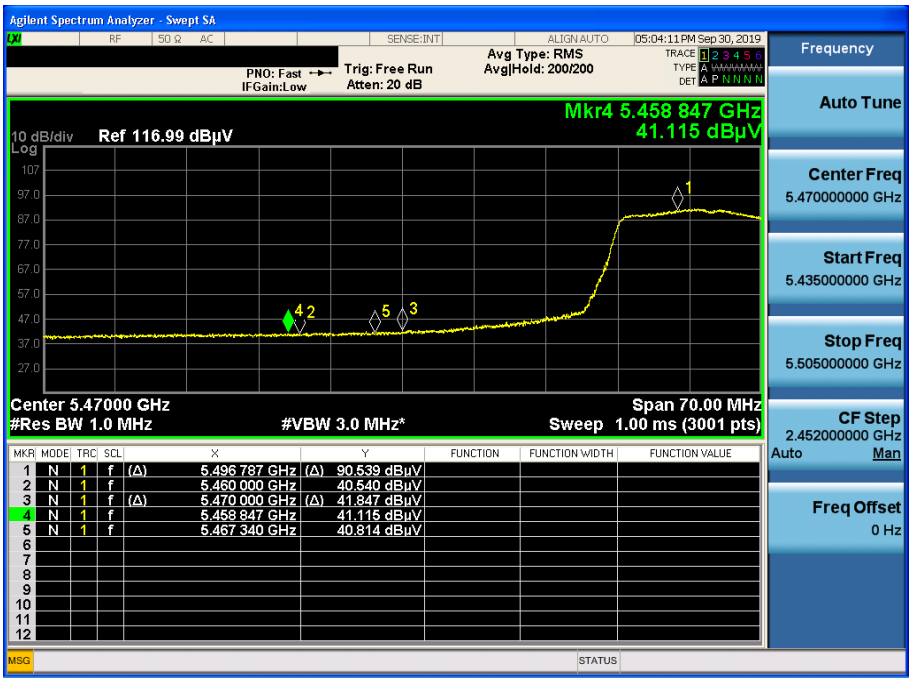
802.11n(HT20) & U-NII 2A & Ch.60 & Z axis & Ver **Detector Mode : AV**



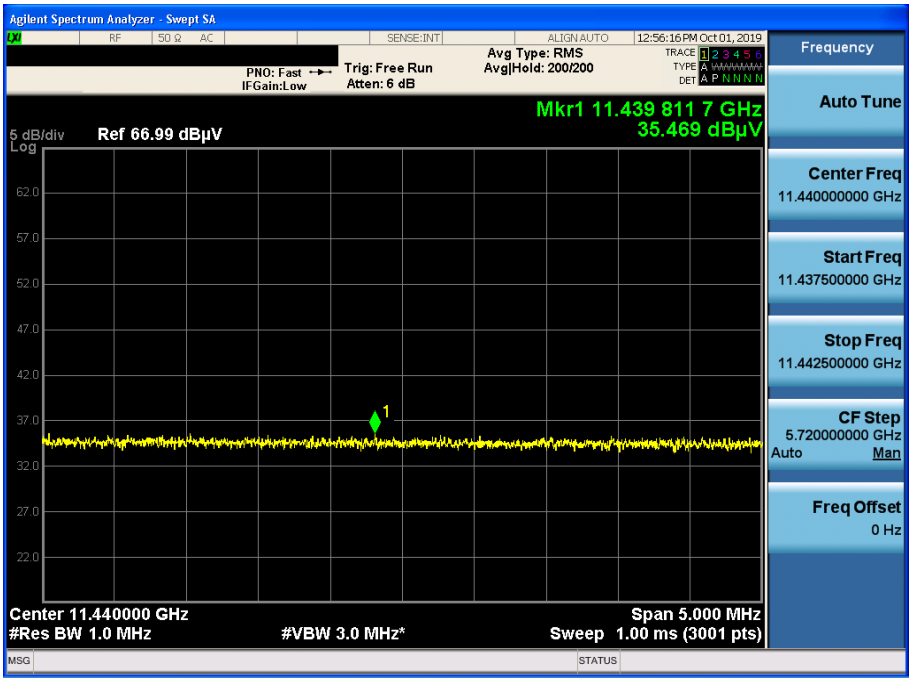
802.11n(HT20) & U-NII 2C & Ch.100 & Z axis & Ver **Detector Mode : PK**



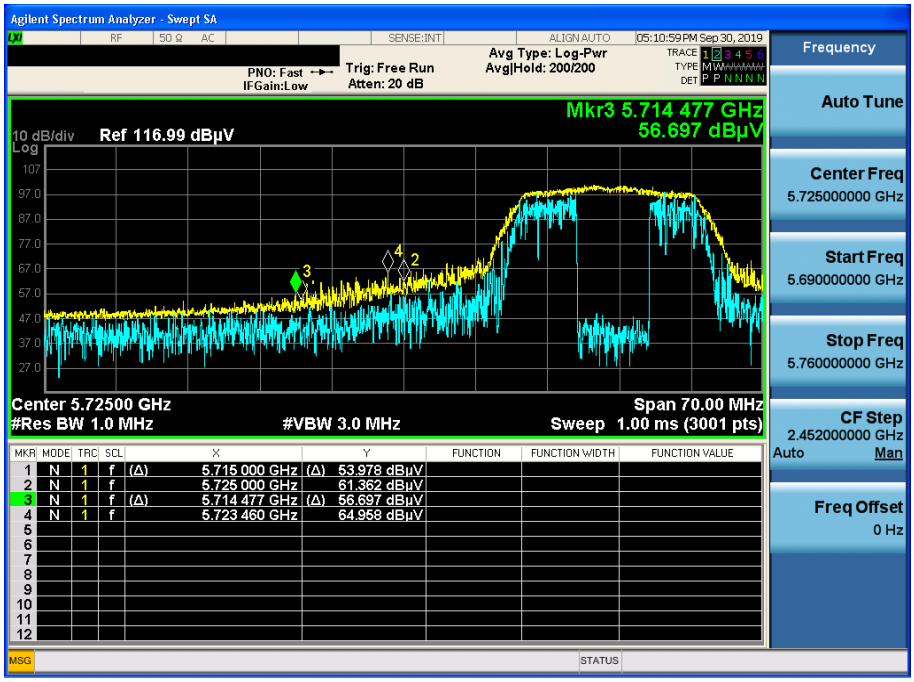
802.11n(HT20) & U-NII 2C & Ch.100 & Z axis & Ver **Detector Mode : AV**



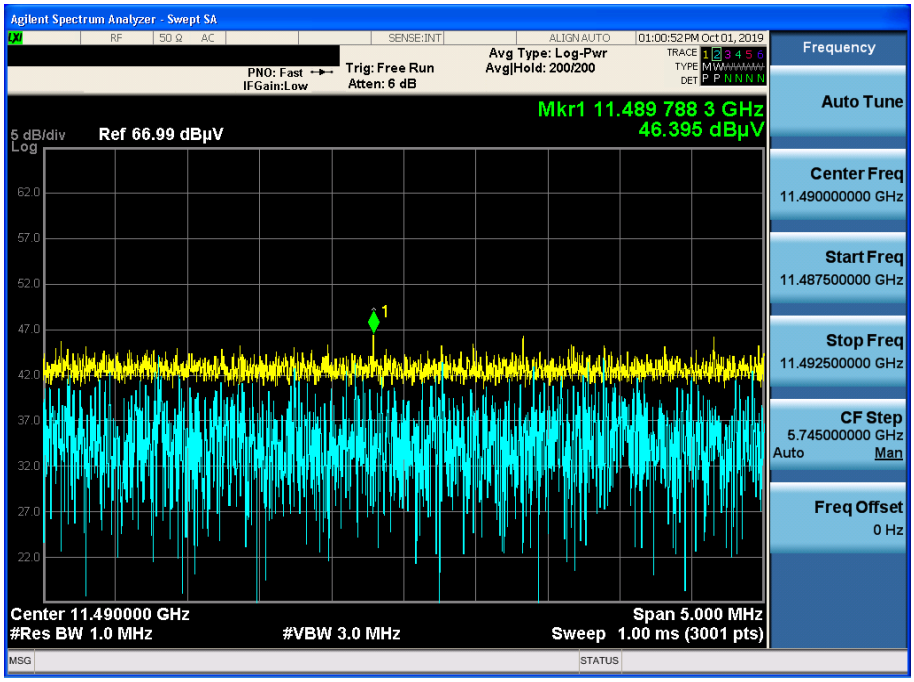
802.11n(HT20) & U-NII 2C & Ch.144 & Z axis & Ver Detector Mode : PK



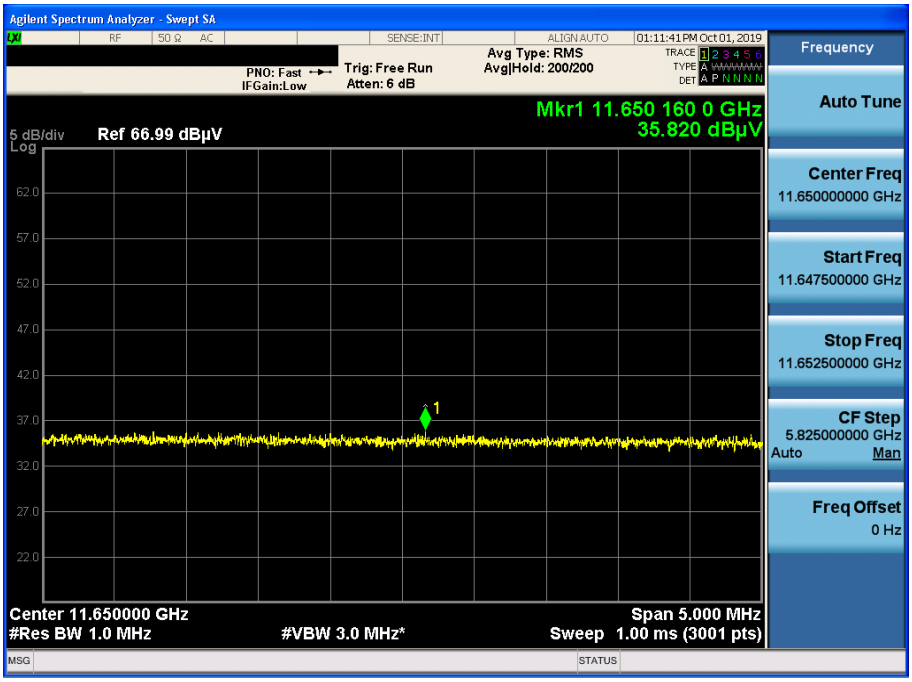
802.11n(HT20) & U-NII 3 & Ch.149 & Z axis & Ver **Detector Mode : PK**



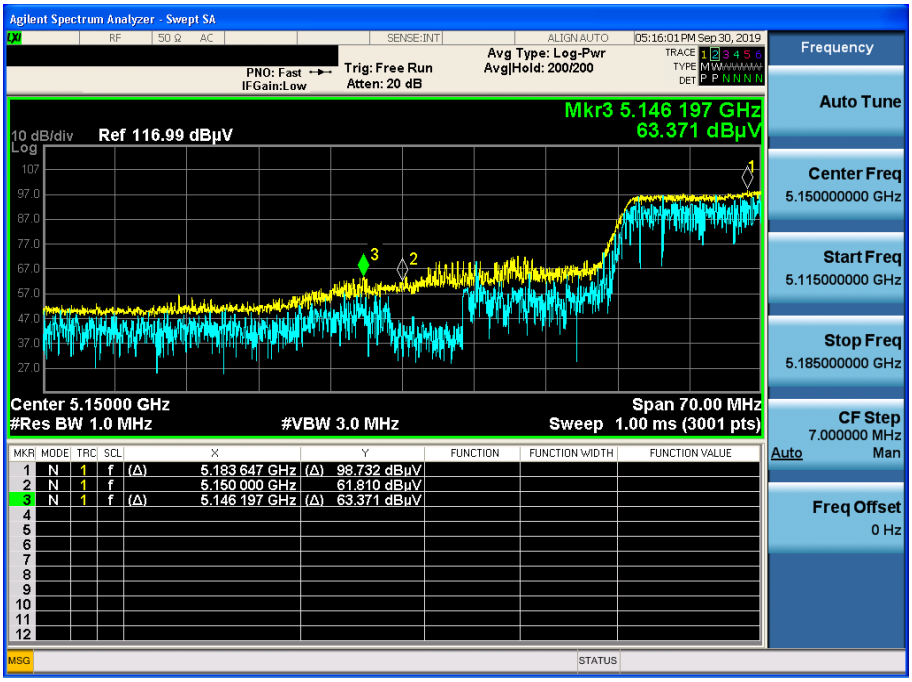
802.11n(HT20) & U-NII 3 & Ch.165 & Z axis & Ver **Detector Mode : PK**



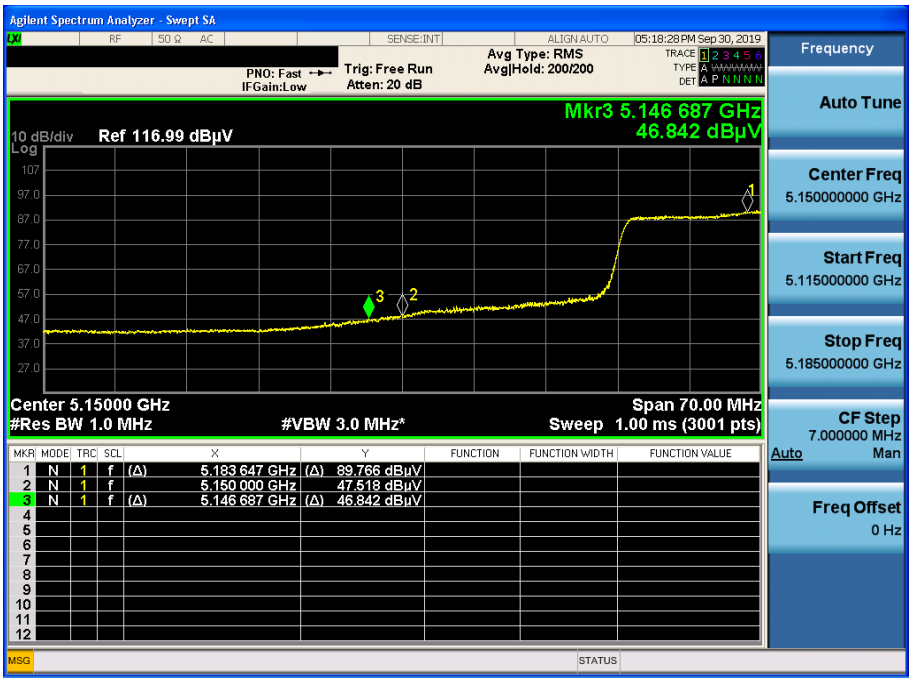
802.11n(HT20) & U-NII 3 & Ch.165 & Z axis & Ver Detector Mode : AV



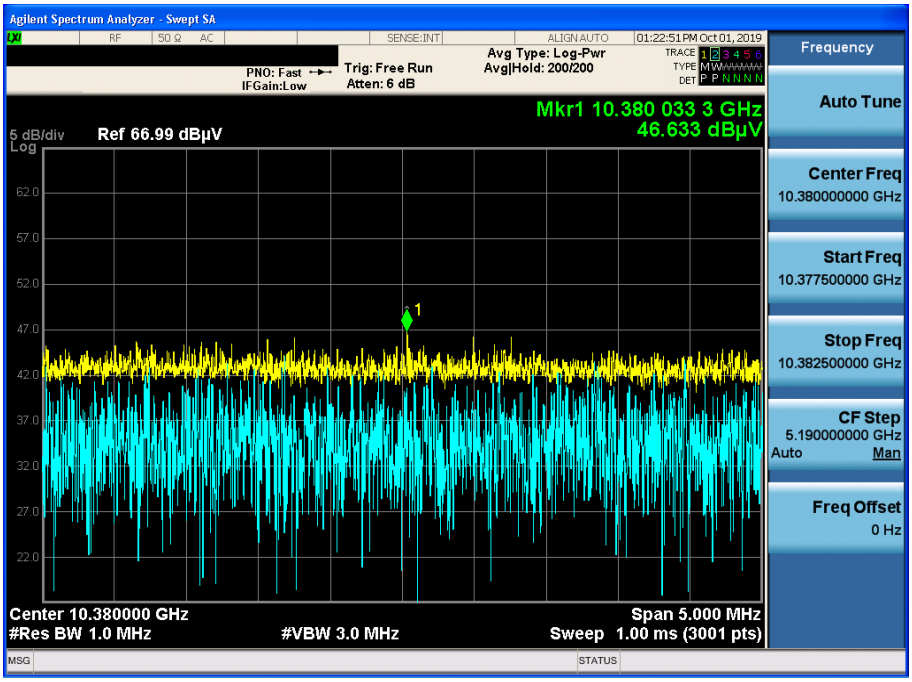
802.11n(HT40) & U-NII 1 & Ch.38 & Z axis & Ver **Detector Mode : PK**



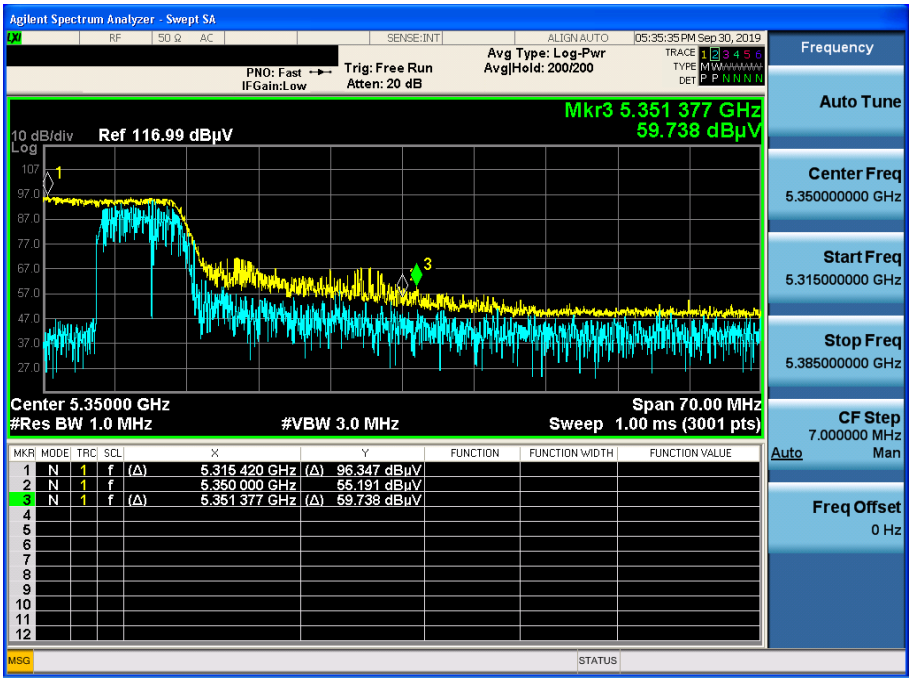
802.11n(HT40) & U-NII 1 & Ch.38 & Z axis & Ver **Detector Mode : AV**



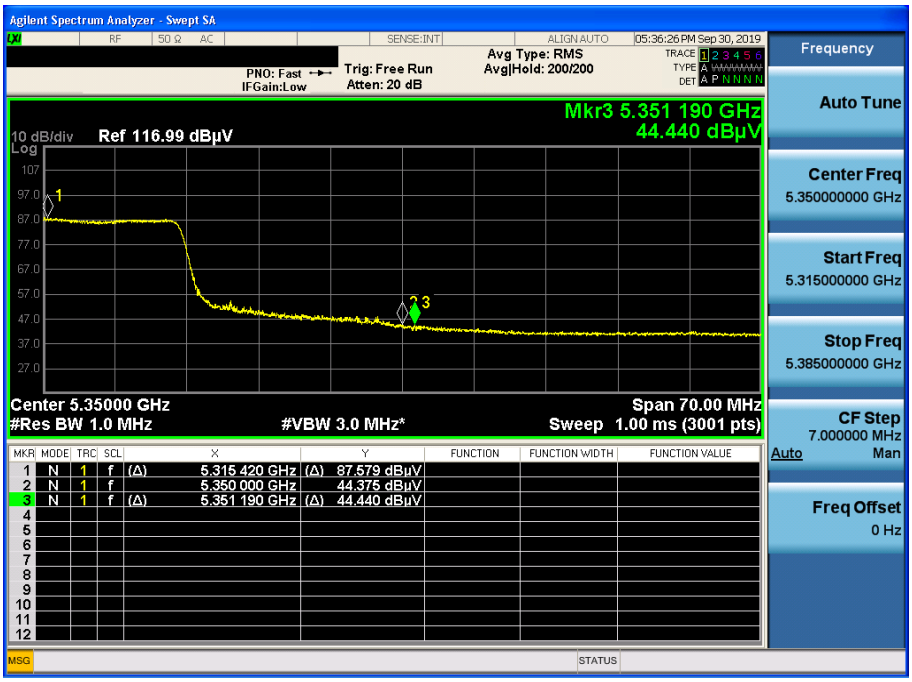
802.11n(HT40) & U-NII 1 & Ch.38 & Z axis & Ver **Detector Mode : PK**



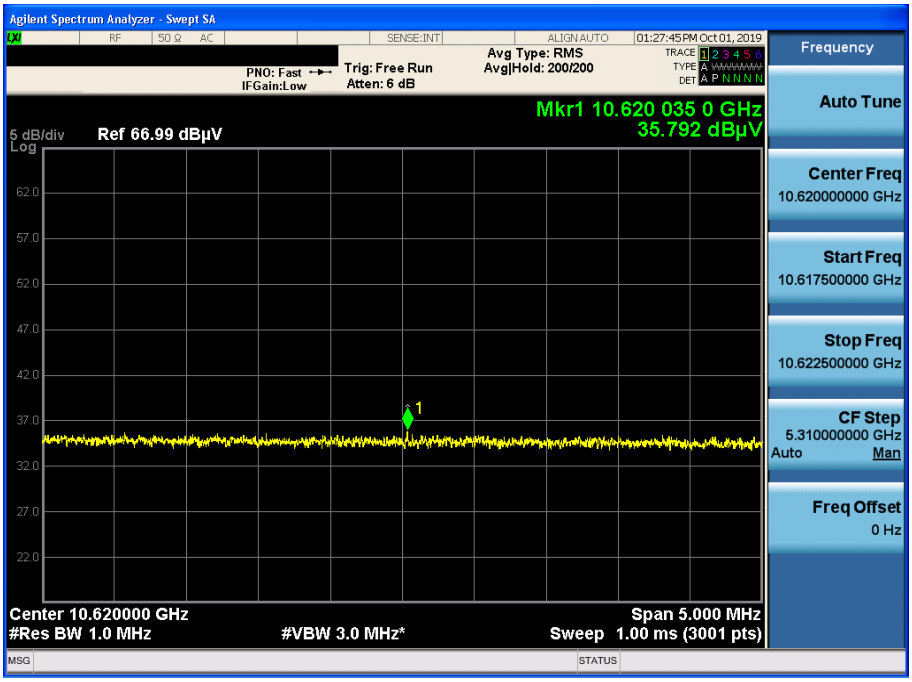
802.11n(HT40) & U-NII 2A & Ch.62 & Z axis & Ver Detector Mode : PK



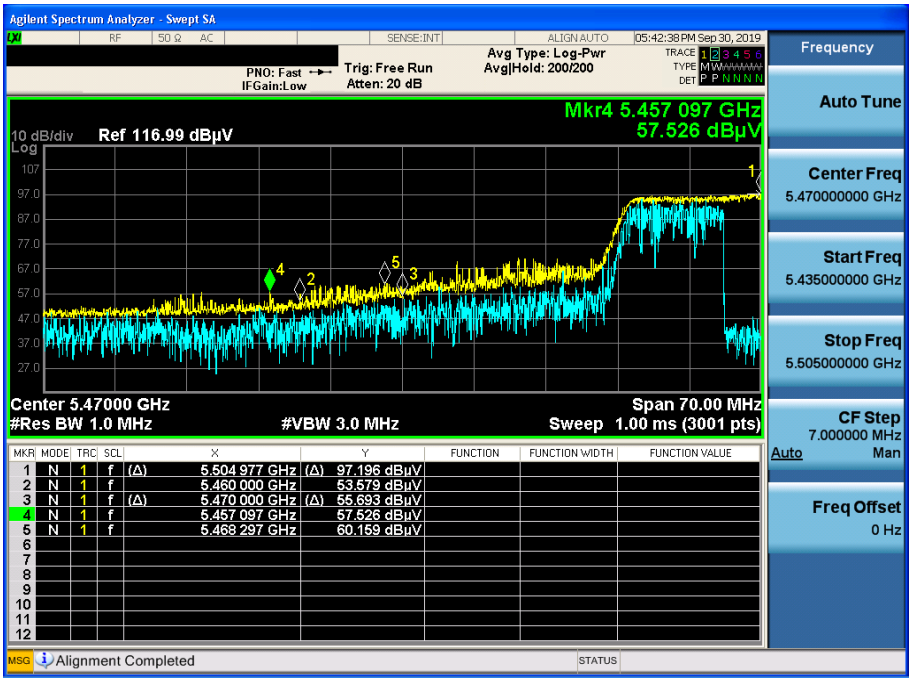
802.11n(HT40) & U-NII 2A & Ch.62 & Z axis & Ver Detector Mode : AV



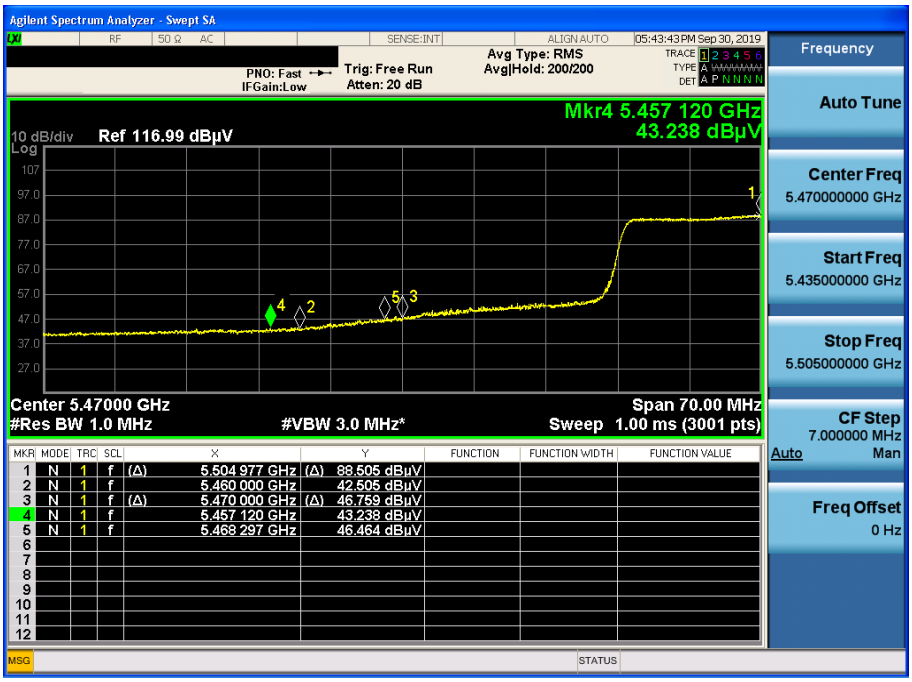
802.11n(HT40) & U-NII 2A & Ch.62 & Z axis & Ver Detector Mode : AV



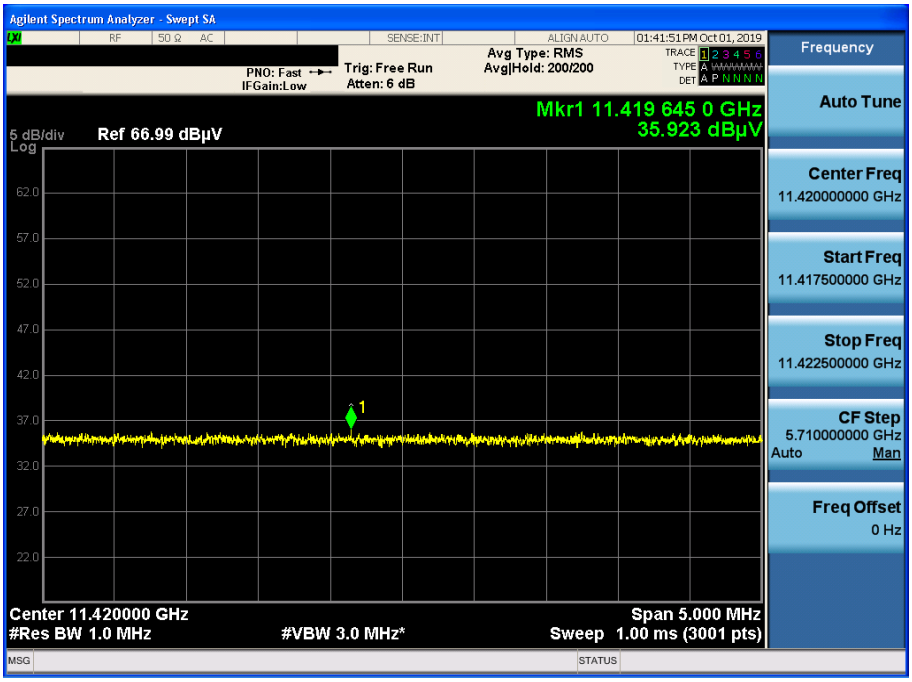
802.11n(HT40) & U-NII 2C & Ch.102 & Z axis & Ver Detector Mode : PK



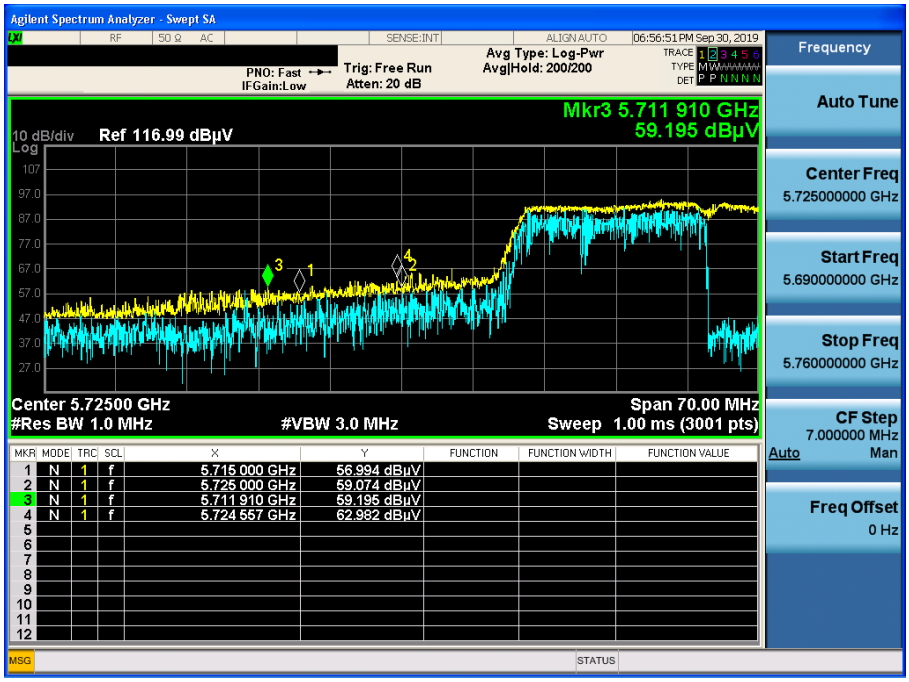
802.11n(HT40) & U-NII 2C & Ch.102 & Z axis & Ver Detector Mode : AV



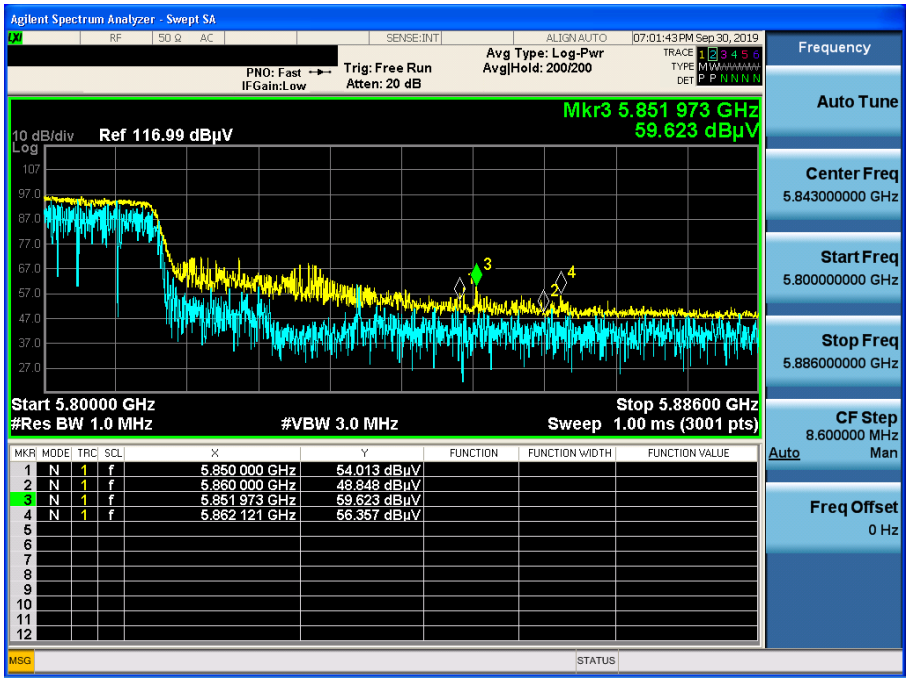
802.11n(HT40) & U-NII 2C & Ch.142 & Z axis & Ver Detector Mode : AV



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



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



802.11n(HT40) & U-NII 3 & Ch.159 & Z axis & Ver Detector Mode : AV