► **Measurements below 1 000 MHz**

a) Follow the requirements in section II.G.3, “General Requirements for Unwanted Emissions Measurements”.

b) Compliance shall be demonstrated using **CISPR quasi-peak detection**; however, **peak detection** is permitted as an alternative to quasi-peak detection.

► Measurements Above 1 000 MHz (Peak)

a) Follow the requirements in section II.G.3, “General Requirements for Unwanted Emissions Measurements”.

b) Peak emission levels are measured by setting the analyzer as follows:

(i) **RBW = 1 MHz.**

(ii) **VBW ≥ 3 MHz.**

(iii) **Detector = Peak.**

(iv) Sweep time = Auto.

(v) Trace mode = Max hold.

(vi) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle. For example, at 50 percent duty cycle, the measurement time will increase by a factor of two relative to measurement time for continuous transmission.

► **Measurements Above 1 000 MHz (Method AD)**

(i) **RBW = 1 MHz.**

(ii) **VBW ≥ 3 MHz.**

(iii) **Detector = RMS**, if span / (# of points in sweep) ≤ RBW / 2. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, the detector mode shall be set to peak.

(iv) Averaging type = power (i.e., RMS)

- As an alternative, the detector and averaging type may be set for linear voltage averaging. Some analyzers require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.

(v) Sweep time = Auto.

(vi) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, the number of traces shall be increased by a factor of 1/x, where x is the duty cycle. For example, with 50 percent duty cycle, at least 200 traces shall be averaged.

(vii) If tests are performed with the EUT transmitting at a duty cycle less than 98 percent, a correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:

- **If power averaging (RMS) mode was used in step (iv) above, the correction factor is 10 log(1/x), where x is the duty cycle.** For example, if the transmit duty cycle was 50 percent, then 3 dB must be added to the measured emission levels.
- If linear voltage averaging mode was used in step (iv) above, the correction factor is 20 log (1/x), where x is the duty cycle. For example, if the transmit duty cycle was 50 percent, then 6 dB must be added to the measured emission levels.
- If a specific emission is demonstrated to be continuous (100 percent duty cycle) rather than turning on and off with the transmit cycle, no duty cycle correction is required for that emission.

Please refer to Appendix II for the duty correction factor

▣ Test Results: Comply

Test Notes

1. No other spurious and harmonic emissions were found greater than listed emissions on below table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Information of Distance Factor
   For finding emissions, the test distance might be reduced from 3m to 1m. In this case, the distance factor(-9.54dB) is applied to the result.
   - Calculation of distance factor = 20 log(applied distance / required distance) = 20 log(1 m / 3 m) = -9.54 dB
   When distance factor is "N/A", the distance is 3 m and distance factor is not applied.
4. The limit is converted to field strength.
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m

Radiated Spurious Emissions data(9 kHz ~ 40 GHz) : *TM1*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	36 (5 180 MHz)	5 132.27	V	Z	PK	51.30	1.72	N/A	N/A	53.02	74.00	20.98
		5 131.96	V	Z	AV	42.27	1.72	3.33	N/A	47.32	54.00	6.68
		10 359.73	V	X	PK	44.66	10.68	N/A	N/A	55.34	68.20	12.86
	40 (5 200 MHz)	10 399.72	V	X	PK	43.99	10.73	N/A	N/A	54.72	68.20	13.48
	48 (5 240 MHz)	10 480.09	V	X	PK	44.59	10.72	N/A	N/A	55.31	68.20	12.89
U-NII 2A	52 (5 260 MHz)	10 520.01	V	X	PK	44.55	10.78	N/A	N/A	55.33	68.20	12.87
	60 (5 300 MHz)	10 600.04	V	X	PK	44.82	8.64	N/A	N/A	53.46	74.00	20.54
		10 600.01	V	X	AV	37.20	8.64	3.33	N/A	49.17	54.00	4.83
	64 (5 320 MHz)	5 367.85	V	Z	PK	50.36	3.37	N/A	N/A	53.73	74.00	20.27
		5 368.43	V	Z	AV	41.91	3.37	3.33	N/A	48.61	54.00	5.39
		10 639.74	V	X	PK	45.09	8.88	N/A	N/A	53.97	74.00	20.03
		10 639.86	V	X	AV	35.86	8.88	3.33	N/A	48.07	54.00	5.93
U-NII 2C	100 (5 500 MHz)	5 451.36	V	Z	PK	51.58	3.43	N/A	N/A	55.01	74.00	18.99
		5 451.82	V	Z	AV	41.83	3.43	3.33	N/A	48.59	54.00	5.41
		5 468.93	V	Z	PK	49.94	3.43	N/A	N/A	53.37	68.20	14.83
		10 999.72	V	X	PK	45.06	9.65	N/A	N/A	54.71	74.00	19.29
		10 999.83	V	X	AV	36.34	9.65	3.33	N/A	49.32	54.00	4.68
	116 (5 580 MHz)	11 159.84	V	X	PK	45.32	9.21	N/A	N/A	54.53	74.00	19.47
		11 159.97	V	X	AV	37.09	9.21	3.33	N/A	49.63	54.00	4.37
	144 (5 720 MHz)	11 440.16	V	X	PK	45.08	9.08	N/A	N/A	54.16	74.00	19.84
		11 440.03	V	X	AV	36.61	9.08	3.33	N/A	49.02	54.00	4.98
U-NII 3	149 (5 745 MHz)	5 712.87	V	Z	PK	51.01	3.29	N/A	N/A	54.30	68.20	13.90
		5 723.88	V	Z	PK	52.19	3.14	N/A	N/A	55.33	78.20	22.87
		11 490.05	V	X	PK	45.44	9.06	N/A	N/A	54.50	74.00	19.50
		11 490.02	V	X	AV	36.43	9.06	3.33	N/A	48.82	54.00	5.18
	157 (5 785 MHz)	11 569.96	V	X	PK	45.45	9.09	N/A	N/A	54.54	74.00	19.46
		11 569.89	V	X	AV	36.54	9.09	3.33	N/A	48.96	54.00	5.04
	165 (5 825 MHz)	5 850.65	V	Z	PK	50.05	3.68	N/A	N/A	53.73	78.20	24.47
		5 861.08	V	Z	PK	50.11	3.74	N/A	N/A	53.85	68.20	14.35
		11 650.10	V	X	PK	45.85	9.36	N/A	N/A	55.21	74.00	18.79
		11 650.00	V	X	AV	36.28	9.36	3.33	N/A	48.97	54.00	5.03

Radiated Spurious Emissions data(9 kHz ~ 40 GHz) : *TM2*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	36 (5 180 MHz)	5 132.50	V	Z	PK	51.31	1.72	N/A	N/A	53.03	74.00	20.97
		5 131.82	V	Z	AV	42.18	1.72	3.50	N/A	47.40	54.00	6.60
		10 360.07	V	X	PK	44.14	10.68	N/A	N/A	54.82	68.20	13.38
	40 (5 200 MHz)	10 399.87	V	X	PK	43.76	10.73	N/A	N/A	54.49	68.20	13.71
	48 (5 240 MHz)	10 480.26	V	X	PK	44.08	10.72	N/A	N/A	54.80	68.2	13.40
U-NII 2A	52 (5 260 MHz)	10 519.90	V	X	PK	44.58	10.78	N/A	N/A	55.36	68.20	12.84
	60 (5 300 MHz)	10 600.05	V	X	PK	45.00	8.64	N/A	N/A	53.64	74.00	20.36
		10 600.05	V	X	AV	36.43	8.64	3.50	N/A	48.57	54.00	5.43
	64 (5 320 MHz)	5 368.18	V	Z	PK	51.62	3.37	N/A	N/A	54.99	74.00	19.01
		5 367.76	V	Z	AV	41.69	3.37	3.50	N/A	48.56	54.00	5.44
		10 639.82	V	X	PK	44.14	8.88	N/A	N/A	53.02	74.00	20.98
		10 639.86	V	X	AV	35.79	8.88	3.50	N/A	48.17	54.00	5.83
U-NII 2C	100 (5 500 MHz)	5 451.52	V	Z	PK	51.20	3.43	N/A	N/A	54.63	74.00	19.37
		5 451.80	V	Z	AV	41.71	3.43	3.50	N/A	48.64	54.00	5.36
		5 466.71	V	Z	PK	50.38	3.43	N/A	N/A	53.81	68.20	14.39
		10 999.93	V	X	PK	44.65	9.65	N/A	N/A	54.30	74.00	19.70
		10 999.98	V	X	AV	36.82	9.65	3.50	N/A	49.97	54.00	4.03
	116 (5 580 MHz)	11 159.83	V	X	PK	45.01	9.21	N/A	N/A	54.22	74.00	19.78
		11 159.90	V	X	AV	36.79	9.21	3.50	N/A	49.50	54.00	4.50
	144 (5 720 MHz)	11 440.07	V	X	PK	44.67	9.08	N/A	N/A	53.75	74.00	20.25
		11 439.80	V	X	AV	35.99	9.08	3.50	N/A	48.57	54.00	5.43
U-NII 3	149 (5 745 MHz)	5 712.98	V	Z	PK	51.02	3.29	N/A	N/A	54.31	68.20	13.89
		5 723.97	V	Z	PK	53.68	3.14	N/A	N/A	56.82	78.20	21.38
		11 490.06	V	X	PK	45.21	9.06	N/A	N/A	54.27	74.00	19.73
		11 490.14	V	X	AV	35.94	9.06	3.50	N/A	48.50	54.00	5.50
	157 (5 785 MHz)	11 570.00	V	X	PK	45.04	9.09	N/A	N/A	54.13	74.00	19.87
		11 569.91	V	X	AV	34.73	9.09	3.50	N/A	47.32	54.00	6.68
	165 (5 825 MHz)	5 852.52	V	Z	PK	49.66	3.70	N/A	N/A	53.36	78.20	24.84
		5 860.52	V	Z	PK	51.42	3.76	N/A	N/A	55.18	68.20	13.02
		11 650.06	V	X	PK	45.03	9.36	N/A	N/A	54.39	74.00	19.61
		11 650.17	V	X	AV	34.77	9.36	3.50	N/A	47.63	54.00	6.37

Radiated Spurious Emissions data(9 kHz ~ 40 GHz) : *TM3*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	38 (5 190 MHz)	5 141.86	V	Z	PK	52.12	1.76	N/A	N/A	53.88	74.00	20.12
		5 142.16	V	Z	AV	43.15	1.76	4.87	N/A	49.78	54.00	4.22
		10 380.00	V	X	PK	44.79	10.70	N/A	N/A	55.49	68.20	12.71
	46 (5 230 MHz)	10 460.25	V	X	PK	44.75	10.69	N/A	N/A	55.44	68.20	12.76
U-NII 2A	54 (5 270 MHz)	10 540.06	V	X	PK	45.44	10.82	N/A	N/A	56.26	68.20	11.94
	62 (5 310 MHz)	5 358.07	V	Z	PK	51.71	3.35	N/A	N/A	55.06	74.00	18.94
		5 358.21	V	Z	AV	41.95	3.35	4.87	N/A	50.17	54.00	3.83
		10 620.01	V	X	PK	44.26	8.76	N/A	N/A	53.02	74.00	20.98
		10 620.18	V	X	AV	35.97	8.76	4.87	N/A	49.60	54.00	4.40
U-NII 2C	102 (5 510 MHz)	5 459.31	V	Z	PK	48.23	3.43	N/A	N/A	51.66	74.00	22.34
		5 459.57	V	Z	AV	38.61	3.43	4.87	N/A	46.91	54.00	7.09
		5 462.11	V	Z	PK	57.81	3.43	N/A	N/A	61.24	68.20	6.96
		11 019.97	V	X	PK	45.72	9.60	N/A	N/A	55.32	74.00	18.68
		11 019.92	V	X	AV	36.08	9.60	4.87	N/A	50.55	54.00	3.45
	110 (5 550 MHz)	11 099.78	V	X	PK	45.18	9.41	N/A	N/A	54.59	74.00	19.41
		11 099.93	V	X	AV	36.46	9.41	4.87	N/A	50.74	54.00	3.26
	142 (5 710 MHz)	11 419.89	V	X	PK	45.26	9.09	N/A	N/A	54.35	74.00	19.65
		11 419.88	V	X	AV	36.57	9.09	4.87	N/A	50.53	54.00	3.47
U-NII 3	151 (5 755 MHz)	5 707.08	V	Z	PK	58.33	3.28	N/A	N/A	61.61	68.20	6.59
		5 722.95	V	Z	PK	53.17	3.16	N/A	N/A	56.33	78.20	21.87
		11 510.01	V	X	PK	45.34	9.05	N/A	N/A	54.39	74.00	19.61
		11 510.01	V	X	AV	36.12	9.05	4.87	N/A	50.04	54.00	3.96
	159 (5 795 MHz)	5 852.80	V	Z	PK	48.15	3.70	N/A	N/A	51.85	78.20	26.35
		5 861.30	V	Z	PK	48.48	3.74	N/A	N/A	52.22	68.20	15.98
		11 590.21	V	X	PK	45.17	9.16	N/A	N/A	54.33	74.00	19.67
		11 589.93	V	X	AV	36.19	9.16	4.87	N/A	50.22	54.00	3.78

Radiated Spurious Emissions data(9 kHz ~ 40 GHz) : *TM4*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	42 (5 210 MHz)	5 148.99	V	Z	PK	49.61	1.79	N/A	N/A	51.40	74.00	22.60
		5 149.20	V	Z	AV	39.41	1.79	6.59	N/A	47.79	54.00	6.21
		10 419.99	V	X	PK	44.62	10.71	N/A	N/A	55.33	68.20	12.87
U-NII 2A	58 (5 290 MHz)	5 350.65	V	Z	PK	49.64	3.33	N/A	N/A	52.97	74.00	21.03
		5 351.07	V	Z	AV	38.76	3.33	6.59	N/A	48.68	54.00	5.32
		10 579.92	V	X	PK	44.86	10.84	N/A	N/A	55.70	68.20	12.50
U-NII 2C	106 (5 530 MHz)	5 458.61	V	Z	PK	50.30	3.43	N/A	N/A	53.73	74.00	20.27
		5 458.92	V	Z	AV	38.55	3.43	6.59	N/A	48.57	54.00	5.43
		5 468.20	V	Z	PK	48.46	3.43	N/A	N/A	51.89	68.20	16.31
		11 059.69	V	X	PK	44.51	9.51	N/A	N/A	54.02	74.00	19.98
		11 059.88	V	X	AV	34.48	9.51	6.59	N/A	50.58	54.00	3.42
	138 (5 690 MHz)	11 380.21	V	X	PK	44.44	9.11	N/A	N/A	53.55	74.00	20.45
		11 379.97	V	X	AV	34.98	9.11	6.59	N/A	50.68	54.00	3.32
U-NII 3	155 (5 775 MHz)	5 714.15	V	Z	PK	48.75	3.30	N/A	N/A	52.05	68.20	16.15
		5 721.43	V	Z	PK	51.34	3.18	N/A	N/A	54.52	78.20	23.68
		5 851.77	V	Z	PK	48.68	3.69	N/A	N/A	52.37	78.20	25.83
		5 861.30	V	Z	PK	49.39	3.74	N/A	N/A	53.13	68.20	15.07
		11 549.71	V	X	PK	44.40	9.03	N/A	N/A	53.43	74.00	20.57
		11 549.88	V	X	AV	34.98	9.03	6.59	N/A	50.60	54.00	3.40

8.6 AC Conducted Emissions

▣ Test Requirements and limit, §15.207

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

▣ Test Configuration

See test photographs for the actual connections between EUT and support equipment.

▣ Test Procedure

Conducted emissions from the EUT were measured according to the ANSI C63.10-2013.

1. The test procedure is performed in a 6.5 m × 3.5 m × 3.5 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) × 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

▣ Test Results:

Note 1: See next pages for actual measured spectrum plots and data for worst case result.

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 1 & 802.11a & 5 180 MHz

Results of Conducted Emission

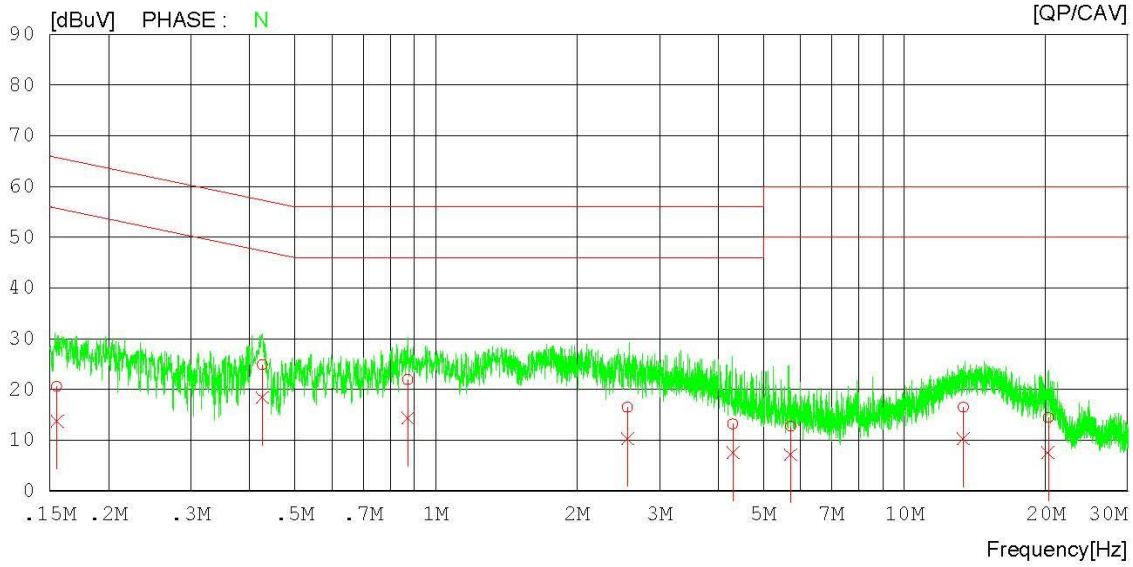
DTNC

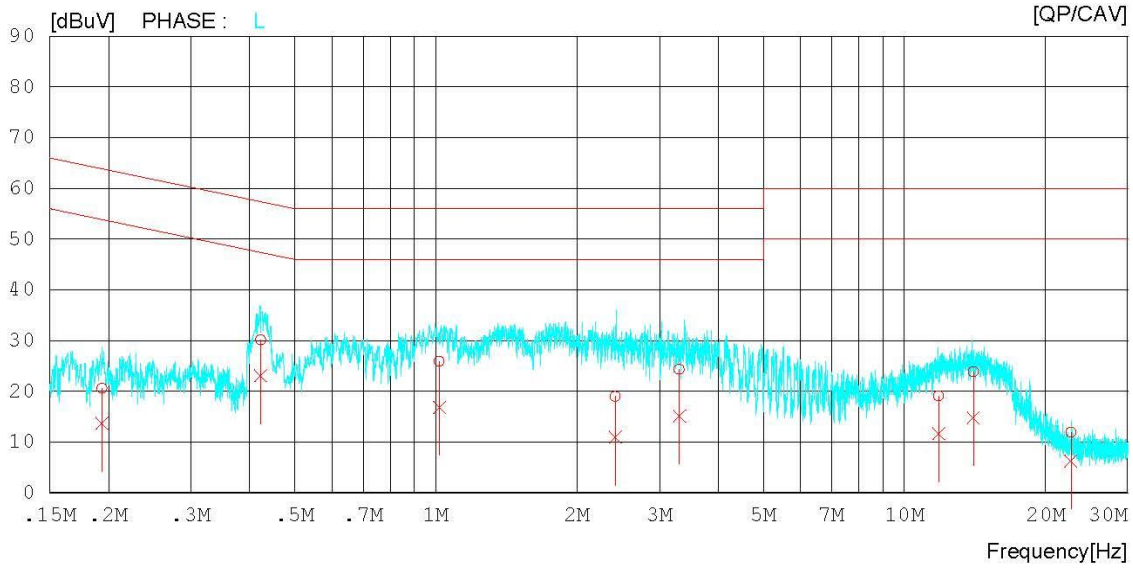
Date 2020-07-10

Order No.		Referrence No.	
Model No.	VF550	Power Supply	120 V, 60 Hz
Serial No.		Temp/Humi.	23 'C / 35 %
Test Condition	5.1G WLAN	Operator	J.H.Bang

Memo

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





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 1 & 802.11a & 5 180 MHz

Results of Conducted Emission

DTNC

Date 2020-07-10

Order No.		Referrence No.	
Model No.	VF550	Power Supply	120 V, 60 Hz
Serial No.		Temp/Humi.	23 'C / 35 %
Test Condition	5.1G WLAN	Operator	J.H.Bang

Memo

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

NO	FREQ [MHz]	READING QP [dBuV]	READING CAV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT CAV [dBuV]	LIMIT QP [dBuV]	LIMIT CAV [dBuV]	MARGIN QP [dBuV]	MARGIN CAV [dBuV]	PHASE
1	0.15532	10.65	3.81	9.95	20.60	13.76	65.71	55.71	45.11	41.95	N
2	0.42632	14.97	8.43	9.97	24.94	18.40	57.32	47.32	32.38	28.92	N
3	0.87215	11.98	4.37	9.97	21.95	14.34	56.00	46.00	34.05	31.66	N
4	2.56124	6.41	0.26	10.06	16.47	10.32	56.00	46.00	39.53	35.68	N
5	4.30303	3.04	-2.59	10.13	13.17	7.54	56.00	46.00	42.83	38.46	N
6	5.71723	2.58	-3.02	10.18	12.76	7.16	60.00	50.00	47.24	42.84	N
7	13.36199	6.13	-0.11	10.41	16.54	10.30	60.00	50.00	43.46	39.70	N
8	20.26062	3.94	-3.00	10.50	14.44	7.50	60.00	50.00	45.56	42.50	N
9	0.19375	10.57	3.69	9.95	20.52	13.64	63.87	53.87	43.35	40.23	L
10	0.42266	20.13	13.12	9.95	30.08	23.07	57.40	47.40	27.32	24.33	L
11	1.01758	15.93	6.83	9.98	25.91	16.81	56.00	46.00	30.09	29.19	L
12	2.41286	8.82	0.88	10.05	18.87	10.93	56.00	46.00	37.13	35.07	L
13	3.31003	14.18	5.06	10.08	24.26	15.14	56.00	46.00	31.74	30.86	L
14	11.83000	8.73	1.20	10.37	19.10	11.57	60.00	50.00	40.90	38.43	L
15	14.03455	13.44	4.32	10.42	23.86	14.74	60.00	50.00	36.14	35.26	L
16	22.67409	1.33	-4.27	10.51	11.84	6.24	60.00	50.00	48.16	43.76	L

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 2A & 802.11a & 5 320 MHz

Results of Conducted Emission

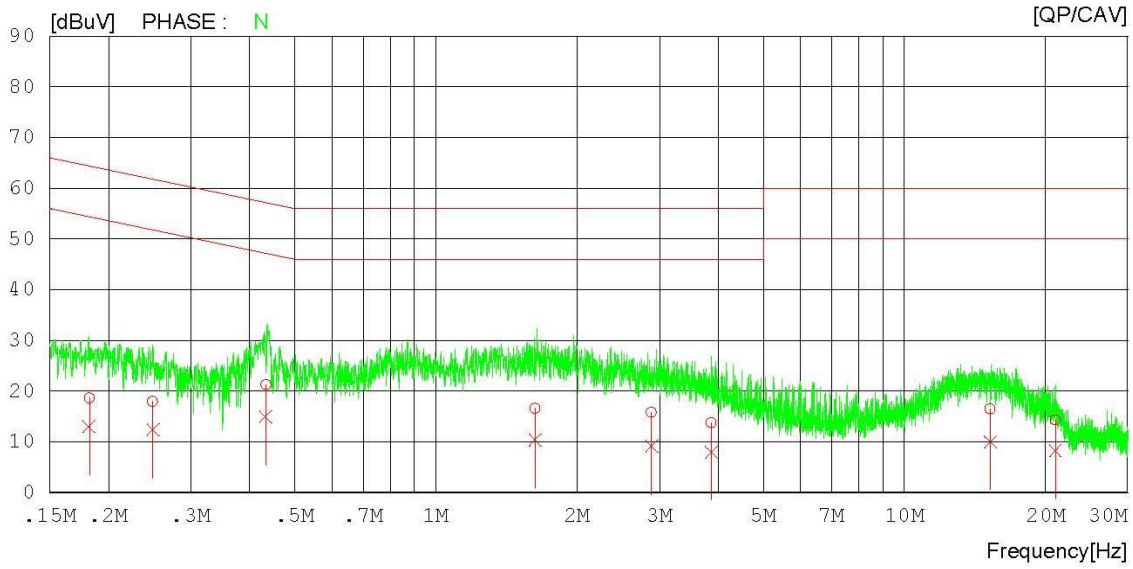
DTNC

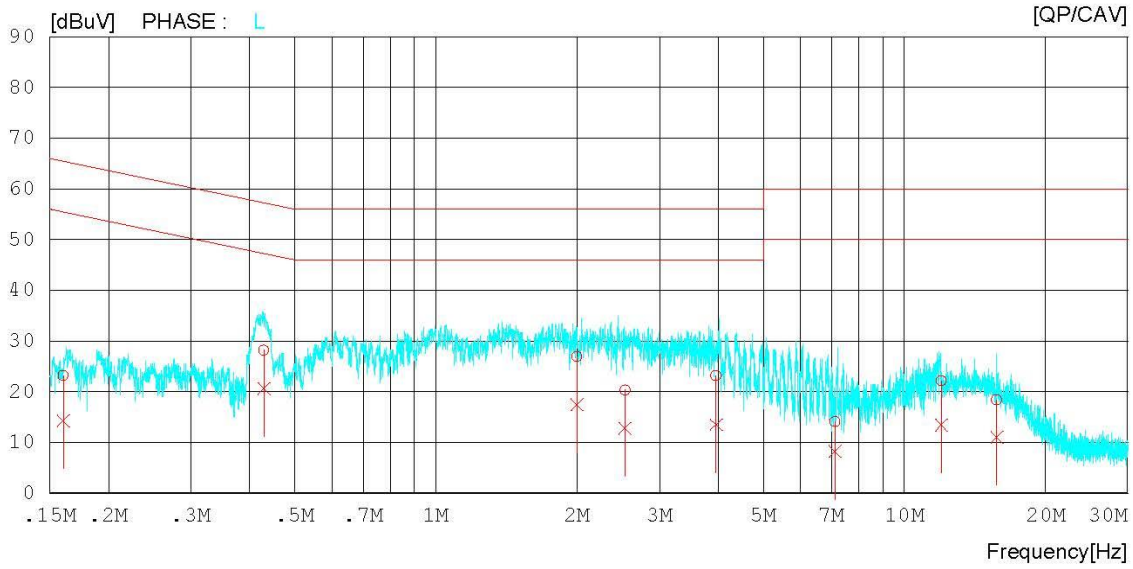
Date 2020-07-10

Order No.		Referrence No.	
Model No.	VF550	Power Supply	120 V, 60 Hz
Serial No.		Temp/Humi.	23 'C / 35 %
Test Condition	5.3G WLAN	Operator	J.H.Bang

Memo

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





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 2A & 802.11a & 5 320 MHz

Results of Conducted Emission

DTNC

Date 2020-07-10

Order No.		Referrence No.	
Model No.	VF550	Power Supply	120 V, 60 Hz
Serial No.		Temp/Humi.	23 'C / 35 %
Test Condition	5.3G WLAN	Operator	J.H.Bang

Memo

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

NO	FREQ [MHz]	READING QP [dBuV]	READING CAV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT CAV [dBuV]	LIMIT QP [dBuV]	LIMIT CAV [dBuV]	MARGIN QP [dBuV]	MARGIN CAV [dBuV]	PHASE
1	0.18199	8.72	3.01	9.96	18.68	12.97	64.39	54.39	45.71	41.42	N
2	0.24892	7.99	2.40	9.95	17.94	12.35	61.79	51.79	43.85	39.44	N
3	0.43361	11.25	4.92	9.97	21.22	14.89	57.18	47.18	35.96	32.29	N
4	1.62914	6.55	0.34	10.01	16.56	10.35	56.00	46.00	39.44	35.65	N
5	2.88724	5.68	-0.95	10.07	15.75	9.12	56.00	46.00	40.25	36.88	N
6	3.87481	3.59	-2.16	10.12	13.71	7.96	56.00	46.00	42.29	38.04	N
7	15.26006	6.09	-0.45	10.45	16.54	10.00	60.00	50.00	43.46	40.00	N
8	20.99001	3.76	-2.30	10.52	14.28	8.22	60.00	50.00	45.72	41.78	N
9	0.16034	13.16	4.31	9.95	23.11	14.26	65.45	55.45	42.34	41.19	L
10	0.42950	18.23	10.61	9.95	28.18	20.56	57.26	47.26	29.08	26.70	L
11	2.00241	16.90	7.31	10.04	26.94	17.35	56.00	46.00	29.06	28.65	L
12	2.53269	10.27	2.65	10.05	20.32	12.70	56.00	46.00	35.68	33.30	L
13	3.96539	13.08	3.36	10.11	23.19	13.47	56.00	46.00	32.81	32.53	L
14	7.10900	3.78	-2.06	10.21	13.99	8.15	60.00	50.00	46.01	41.85	L
15	11.99269	11.80	3.07	10.37	22.17	13.44	60.00	50.00	37.83	36.56	L
16	15.74583	7.93	0.58	10.44	18.37	11.02	60.00	50.00	41.63	38.98	L

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 2C & 802.11a & 5 500 MHz

Results of Conducted Emission

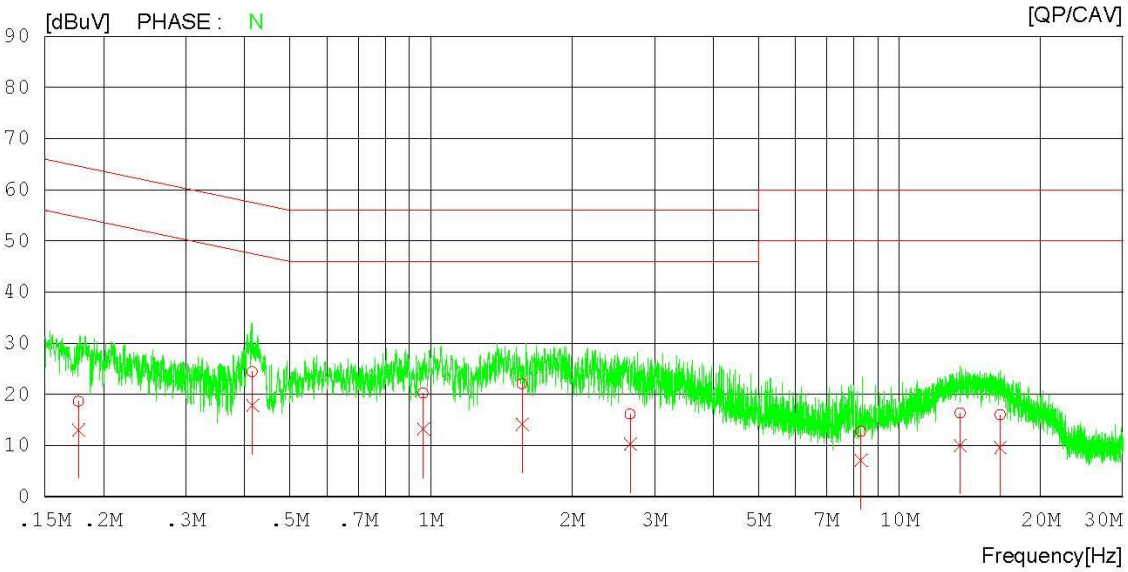
DTNC

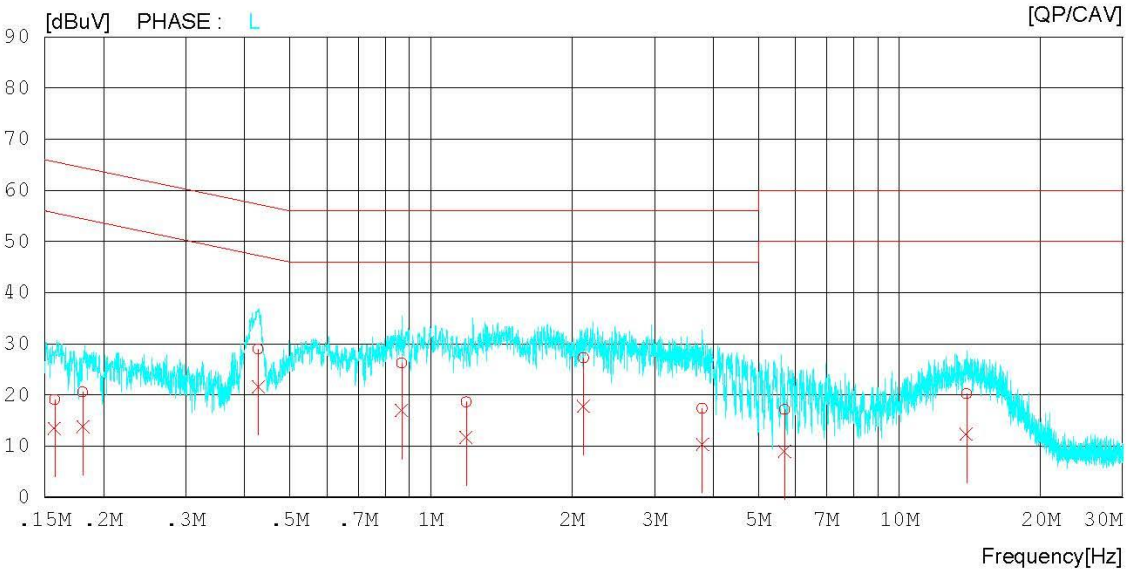
Date 2020-07-10

Order No.		Referrence No.	
Model No.	VF550	Power Supply	120 V, 60 Hz
Serial No.		Temp/Humi.	23 'C / 35 %
Test Condition	5.5G WLAN	Operator	J.H.Bang

Memo

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





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 2C & 802.11a & 5 500 MHz

Results of Conducted Emission

DTNC

Date 2020-07-10

Order No.		Referrence No.	
Model No.	VF550	Power Supply	120 V, 60 Hz
Serial No.		Temp/Humi.	23 'C / 35 %
Test Condition	5.5G WLAN	Operator	J.H.Bang

Memo

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

NO	FREQ [MHz]	READING QP [dBuV]	READING CAV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT CAV [dBuV]	LIMIT QP [dBuV]	LIMIT CAV [dBuV]	MARGIN QP [dBuV]	MARGIN CAV [dBuV]	PHASE
1	0.17697	8.69	3.09	9.96	18.65	13.05	64.63	54.63	45.98	41.58	N
2	0.41600	14.42	7.81	9.97	24.39	17.78	57.53	47.53	33.14	29.75	N
3	0.96418	10.25	3.29	9.98	20.23	13.27	56.00	46.00	35.77	32.73	N
4	1.56640	12.07	4.15	10.01	22.08	14.16	56.00	46.00	33.92	31.84	N
5	2.66424	6.12	0.20	10.06	16.18	10.26	56.00	46.00	39.82	35.74	N
6	8.28056	2.44	-3.17	10.27	12.71	7.10	60.00	50.00	47.29	42.90	N
7	13.48000	5.90	-0.35	10.41	16.31	10.06	60.00	50.00	43.69	39.94	N
8	16.42212	5.59	-0.84	10.47	16.06	9.63	60.00	50.00	43.94	40.37	N
9	0.15735	9.05	3.45	9.96	19.01	13.41	65.60	55.60	46.59	42.19	L
10	0.18072	10.58	3.76	9.95	20.53	13.71	64.45	54.45	43.92	40.74	L
11	0.42809	18.94	11.69	9.95	28.89	21.64	57.29	47.29	28.40	25.65	L
12	0.86529	16.22	6.96	9.97	26.19	16.93	56.00	46.00	29.81	29.07	L
13	1.18794	8.59	1.70	9.99	18.58	11.69	56.00	46.00	37.42	34.31	L
14	2.11800	17.15	7.64	10.04	27.19	17.68	56.00	46.00	28.81	28.32	L
15	3.79922	7.19	0.25	10.11	17.30	10.36	56.00	46.00	38.70	35.64	L
16	5.68367	6.96	-1.20	10.18	17.14	8.98	60.00	50.00	42.86	41.02	L
17	13.89571	9.76	1.83	10.41	20.17	12.24	60.00	50.00	39.83	37.76	L

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 3 & 802.11a & 5 745 MHz

Results of Conducted Emission

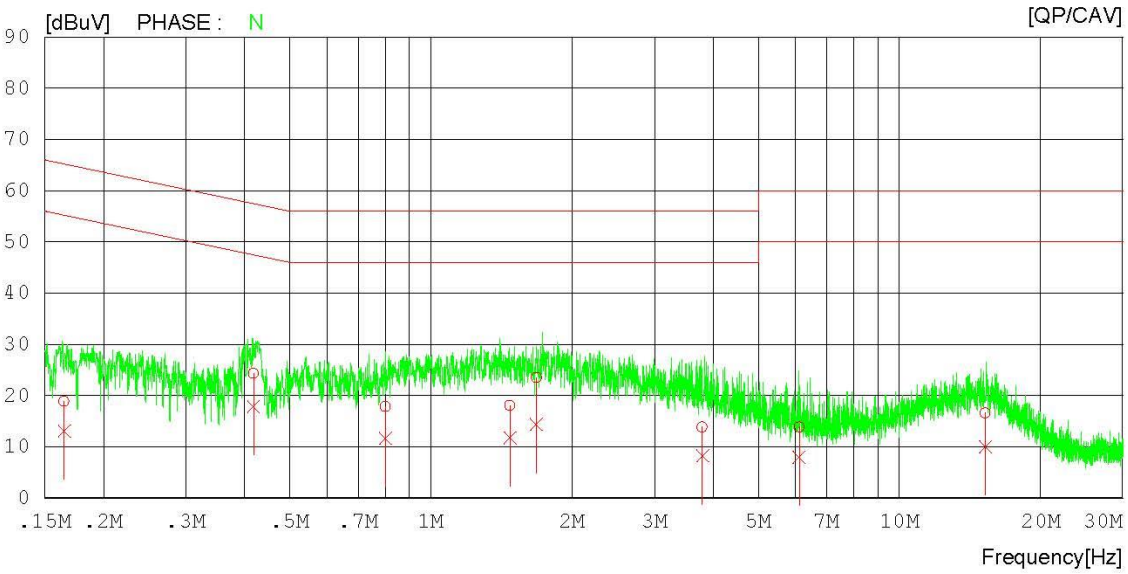
DTNC

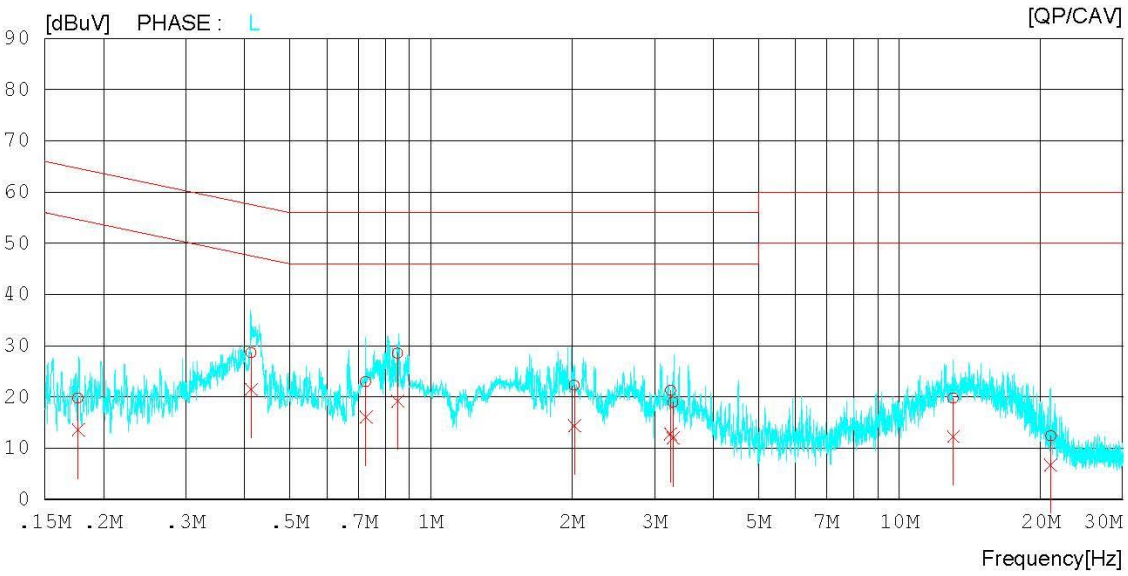
Date 2020-07-10

Order No.		Referrence No.	
Model No.	VF550	Power Supply	120 V, 60 Hz
Serial No.		Temp/Humi.	23 'C / 35 %
Test Condition	5.7G WLAN	Operator	J.H.Bang

Memo

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





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 3 & 802.11a & 5 745 MHz

Results of Conducted Emission

DTNC

Date 2020-07-10

Order No.		Referrence No.	
Model No.	VF550	Power Supply	120 V, 60 Hz
Serial No.		Temp/Humi.	23 'C / 35 %
Test Condition	5.7G WLAN	Operator	J.H.Bang

Memo

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

NO	FREQ [MHz]	READING QP [dBuV]	READING CAV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT CAV [dBuV]	LIMIT QP [dBuV]	LIMIT CAV [dBuV]	MARGIN QP [dBuV]	MARGIN CAV [dBuV]	PHASE
1	0.16494	8.88	3.21	9.96	18.84	13.17	65.21	55.21	46.37	42.04	N
2	0.41822	14.31	7.87	9.97	24.28	17.84	57.48	47.48	33.20	29.64	N
3	0.79901	7.90	1.62	9.98	17.88	11.60	56.00	46.00	38.12	34.40	N
4	1.47487	8.08	1.79	9.99	18.07	11.78	56.00	46.00	37.93	34.22	N
5	1.68021	13.53	4.37	10.01	23.54	14.38	56.00	46.00	32.46	31.62	N
6	3.79553	3.72	-1.92	10.12	13.84	8.20	56.00	46.00	42.16	37.80	N
7	6.10449	3.66	-2.18	10.20	13.86	8.02	60.00	50.00	46.14	41.98	N
8	15.24974	6.12	-0.36	10.45	16.57	10.09	60.00	50.00	43.43	39.91	N
9	0.17670	9.82	3.58	9.95	19.77	13.53	64.64	54.64	44.87	41.11	L
10	0.41405	18.60	11.48	9.95	28.55	21.43	57.57	47.57	29.02	26.14	L
11	0.72598	12.96	6.09	9.97	22.93	16.06	56.00	46.00	33.07	29.94	L
12	0.84956	18.48	9.19	9.98	28.46	19.17	56.00	46.00	27.54	26.83	L
13	2.02595	12.20	4.32	10.04	22.24	14.36	56.00	46.00	33.76	31.64	L
14	3.25008	11.15	2.69	10.08	21.23	12.77	56.00	46.00	34.77	33.23	L
15	3.28553	8.83	1.85	10.08	18.91	11.93	56.00	46.00	37.09	34.07	L
16	13.02891	9.32	1.82	10.39	19.71	12.21	60.00	50.00	40.29	37.79	L
17	21.04805	1.88	-3.72	10.48	12.36	6.76	60.00	50.00	47.64	43.24	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 3 x RBW.

▣ Test Results: NA

9. LIST OF TEST EQUIPMENT

Date of Test(Original test): 2020.06.25 ~ 2020.07.28

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/16	20/12/16	MY50410357
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/16	20/12/16	MY48011700
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/16	20/12/16	MY48010133
Spectrum Analyzer	Agilent Technologies	N9030A	19/12/16	20/12/16	MY53310140
DC Power Supply	Agilent Technologies	66332A	19/06/25 20/06/24	20/06/25 21/06/24	MY43000211
Multimeter	FLUKE	17B	19/12/16	20/12/16	26030065WS
Signal Generator	Rohde Schwarz	SMBV100A	19/12/16	20/12/16	255571
Signal Generator	ANRITSU	MG3695C	19/12/16	20/12/16	173501
Thermohygrometer	BODYCOM	BJ5478	19/12/18	20/12/18	120612-1
Thermohygrometer	BODYCOM	BJ5478	19/12/18	20/12/18	120612-2
Thermohygrometer	BODYCOM	BJ5478	19/07/03 20/07/01	20/07/03 21/07/01	N/A
HYGROMETER	TESTO	608-H1	20/01/21	21/01/21	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	20/01/30	22/01/30	6419
Horn Antenna	Schwarzbeck	BBHA 9120C	19/12/04	21/12/04	9120C-561
Horn Antenna	A.H.Systems Inc.	SAS-574	19/07/03	21/07/03	155
PreAmplifier	tsj	MLA-0118-B01-40	19/12/16	20/12/16	1852267
PreAmplifier	tsj	MLA-1840-J02-45	19/06/27 20/06/24	20/06/27 21/06/24	16966-10728
PreAmplifier	H.P	8447D	19/12/16	20/12/16	2944A07774
High Pass Filter	Wainwright Instruments	WHKX12-935-1000-15000-40SS	19/06/26 20/06/24	20/06/26 21/06/24	8
High Pass Filter	Wainwright Instruments	WHKX10-2838-3300-18000-60SS	19/06/26 20/06/24	20/06/26 21/06/24	1
High Pass Filter	Wainwright Instruments	WHNX8.0/26.5-6SS	19/06/27 20/06/24	20/06/27 21/06/24	3
Attenuator	Hefei Shunze	SS5T2.92-10-40	19/06/27 20/06/24	20/06/27 21/06/24	16012202
Attenuator	SRTechnology	F01-B0606-01	19/06/27 20/06/24	20/06/27 21/06/24	13092403
Attenuator	Aeroflex/Weinschel	56-3	19/06/27 20/06/24	20/06/27 21/06/24	Y2370
Attenuator	SMAJK	SMAJK-2-3	19/06/27 20/06/24	20/06/27 21/06/24	2
Attenuator	SMAJK	SMAJK-50-10	19/06/25 20/06/24	20/06/25 21/06/24	15081901
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2488B MA2491A	20/01/02	21/01/02	0910025 0845333
EMI Test Receiver	ROHDE&SCHWARZ	ESR	19/12/17	20/12/17	101767
PULSE LIMITER	Rohde Schwarz	ESH3-Z2	19/09/17	20/09/17	101333
LISN	SCHWARZBECK	NSLK 8128 RC	19/11/04	20/11/04	8128 RC-387
Cable	Junkosha	MWX241	20/01/13	21/01/13	G-04
Cable	Junkosha	MWX241	20/01/13	21/01/13	G-07
Cable	DT&C	Cable	20/01/13	21/01/13	G-13
Cable	DT&C	Cable	20/01/13	21/01/13	G-14
Cable	HUBER+SUHNER	SUCOFLEX 104	20/01/13	21/01/13	G-15
Cable	Radiall	TESTPRO3	20/01/16	21/01/16	M-01
Cable	Junkosha	MWX315	20/01/16	21/01/16	M-05
Cable	Junkosha	MWX221	20/01/16	21/01/16	M-06
Cable	Radiall	TESTPRO3	20/01/16	21/01/16	RF-82
Test Software	tsj	Raidated Emission Measurement	NA	NA	Version 2.00.0177
Test Software	tsj	Noise Terminal Measurement	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.

Date of Test(original test): 2020-08-06 ~ 2020-08-10

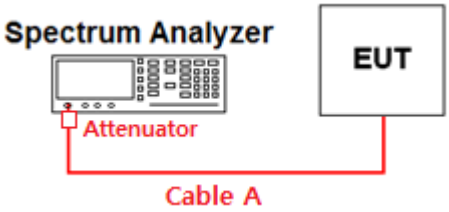
Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/16	20/12/16	MY48011700
DC Power Supply	Agilent Technologies	66332A	20/06/24	21/06/24	MY43000211
Multimeter	FLUKE	17B	19/12/16	20/12/16	26030065WS
Signal Generator	Rohde Schwarz	SMBV100A	19/12/16	20/12/16	255571
Signal Generator	ANRITSU	MG3695C	19/12/16	20/12/16	173501
Thermohygrometer	BODYCOM	BJ5478	20/07/01	21/07/01	N/A
Horn Antenna	ETS-Lindgren	3115	20/01/30	22/01/30	6419
PreAmplifier	tsj	MLA-0118-B01-40	19/12/16	20/12/16	1852267
High Pass Filter	Wainwright Instruments	WHKX12-935-1000-15000-40SS	20/06/24	21/06/24	8
High Pass Filter	Wainwright Instruments	WHKX10-2838-3300-18000-60SS	20/06/24	21/06/24	1
Attenuator	Hefei Shunze	SS5T2.92-10-40	20/06/24	21/06/24	16012202
Attenuator	SRTechnology	F01-B0606-01	20/06/24	21/06/24	13092403
Attenuator	Aeroflex/Weinschel	56-3	20/06/24	21/06/24	Y2370
Attenuator	SMAJK	SMAJK-2-3	20/06/24	21/06/24	2
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2488B MA2491A	20/01/02	21/01/02	0910025 0845333
Cable	Junkosha	MWX241	20/01/13	21/01/13	G-04
Cable	Junkosha	MWX241	20/01/13	21/01/13	G-07
Cable	DT&C	Cable	20/01/13	21/01/13	G-13
Cable	DT&C	Cable	20/01/13	21/01/13	G-14
Cable	HUBER+SUHNER	SUCOFLEX 104	20/01/13	21/01/13	G-15

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.

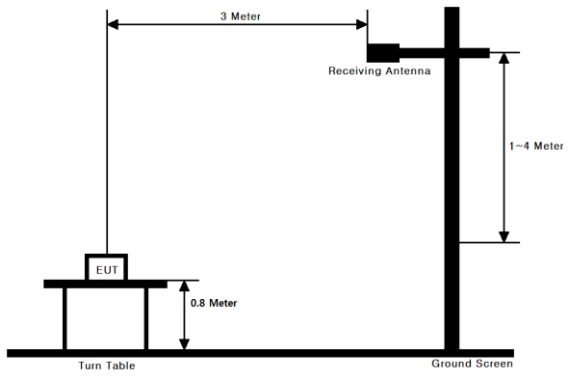
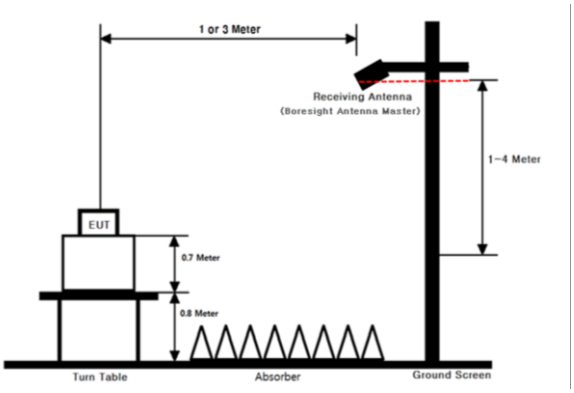
APPENDIX I

Test set up Diagram

▪ Conducted Measurement



▪ Radiated Measurement

Below 1 GHz	Above 1 GHz
	

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:

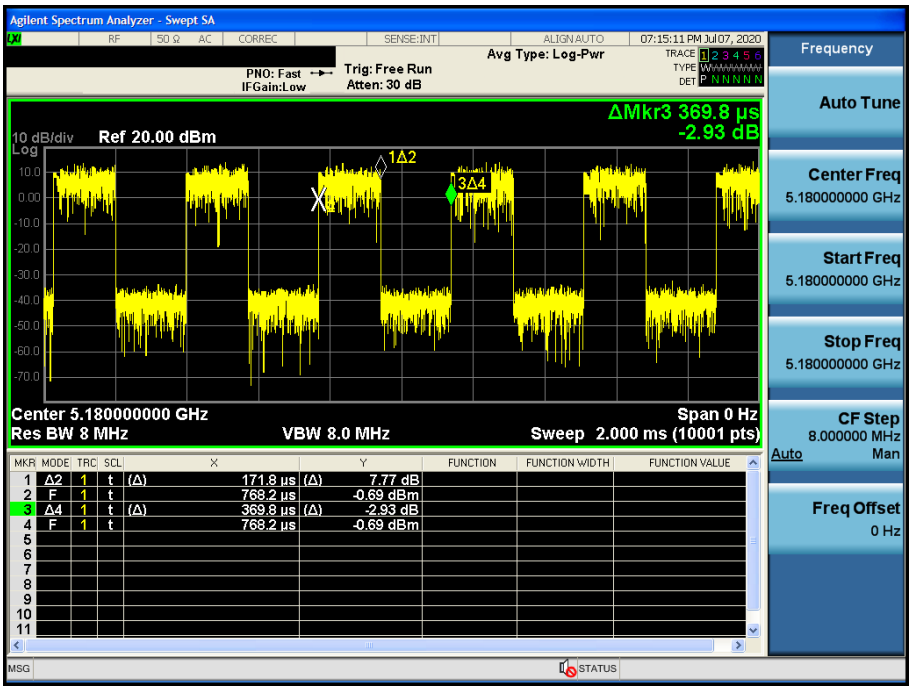
Duty cycle

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	54Mbps	5180	0.172	0.370	0.4646	3.33	291.04
802.11n (HT20)	MCS7	5180	0.160	0.358	0.4464	3.50	312.50
802.11n (HT40)	MCS7	5190	0.096	0.295	0.3257	4.87	519.75
802.11ac (VHT80)	MCS9	5210	0.056	0.256	0.2192	6.59	891.27

Single Transmit

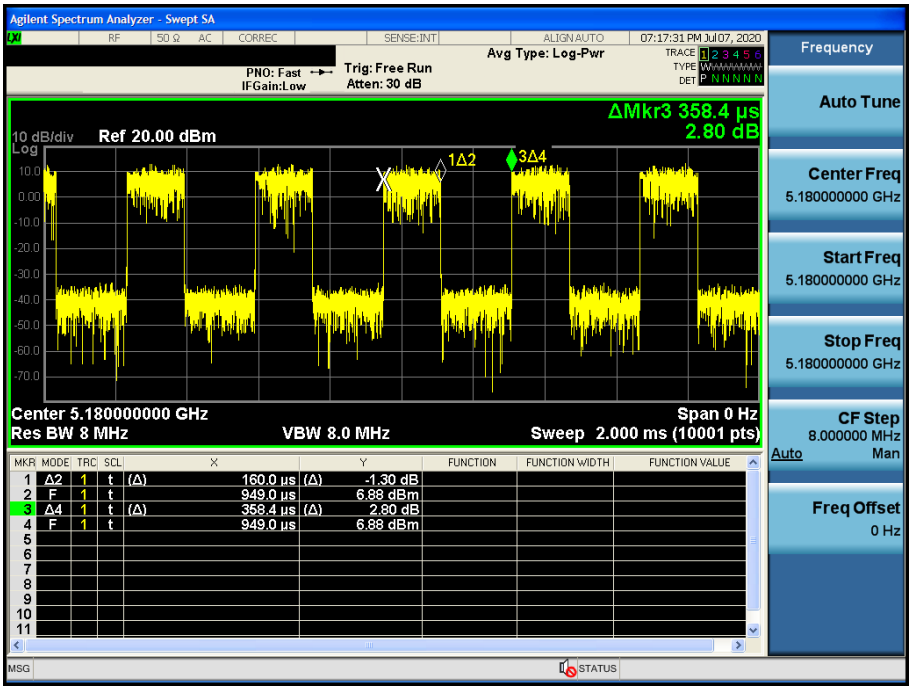
Duty Cycle

Test Mode: 802.11a & Ch.36

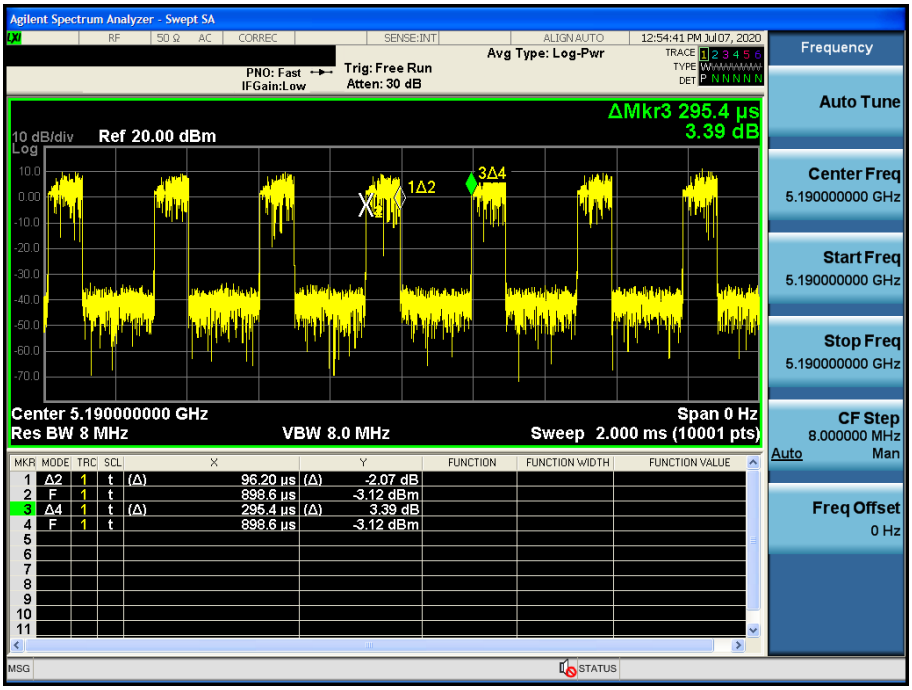


Duty Cycle

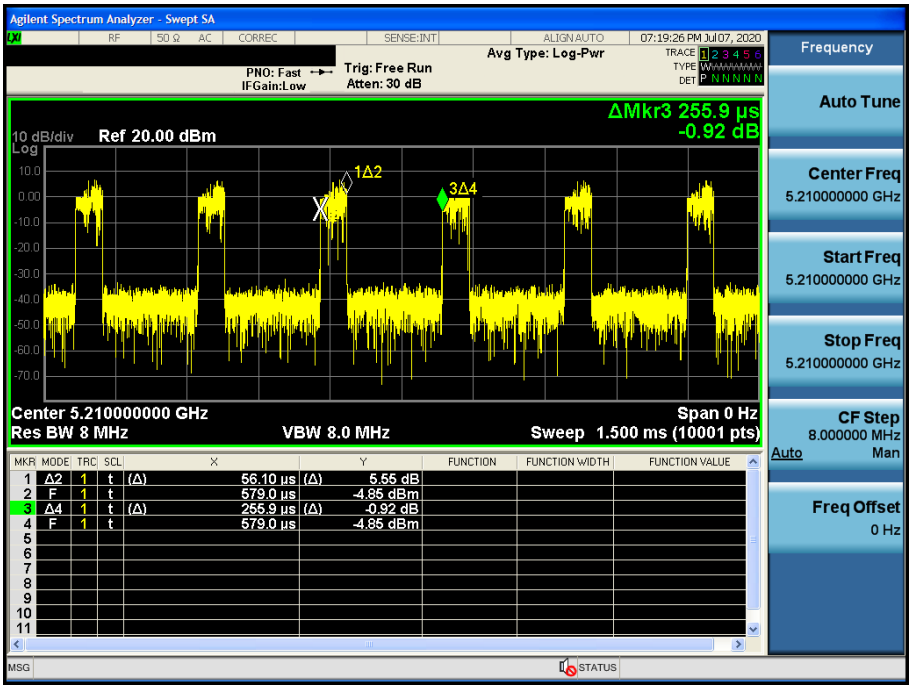
Test Mode: 802.11n HT20 & Ch.36



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



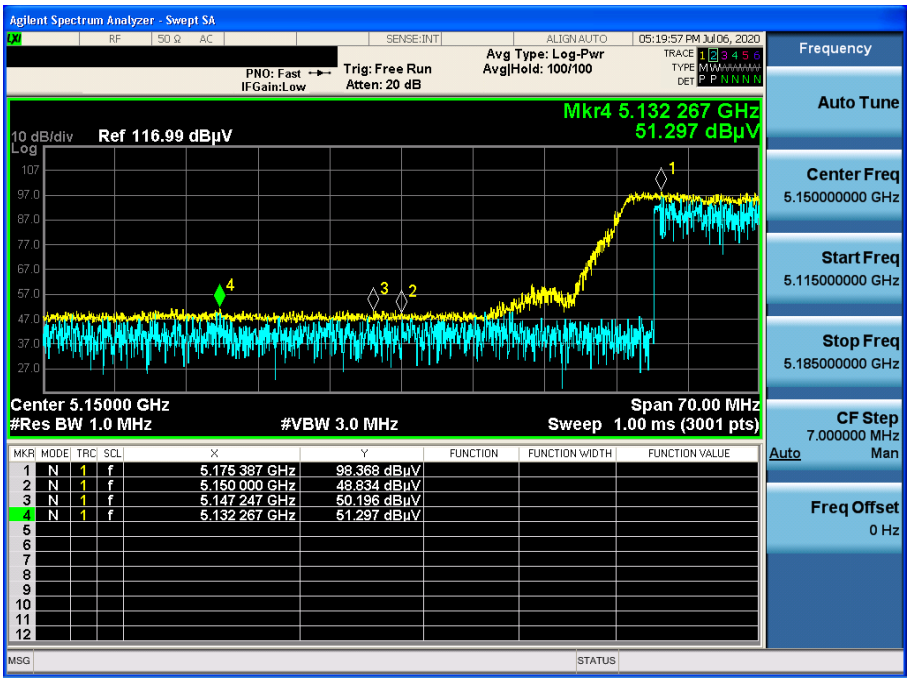
Duty Cycle Test Mode: 802.11ac VHT80 & Ch.42



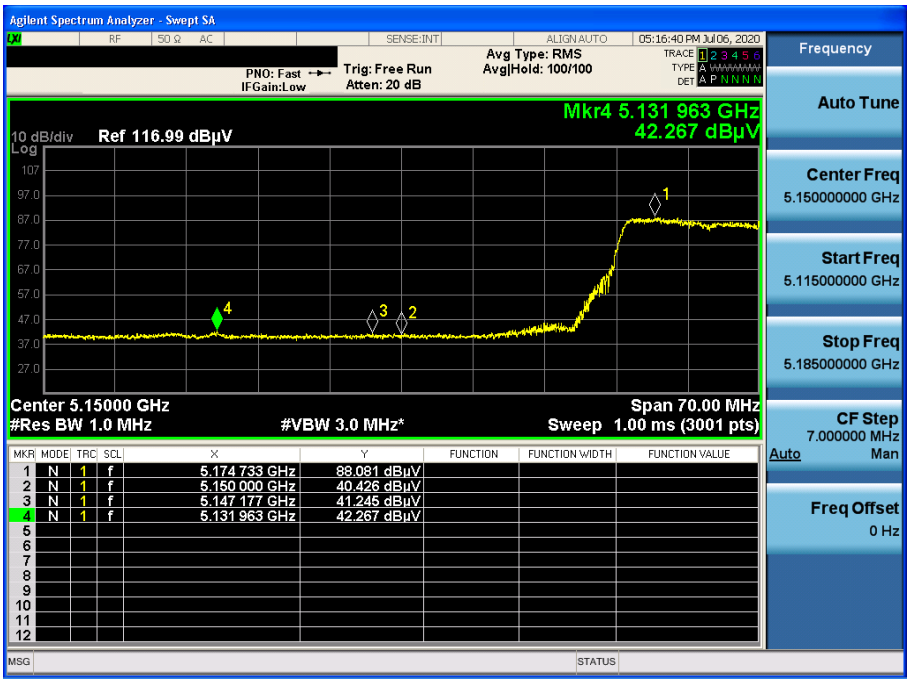
APPENDIX III

Unwanted Emissions (Radiated) Test Plot

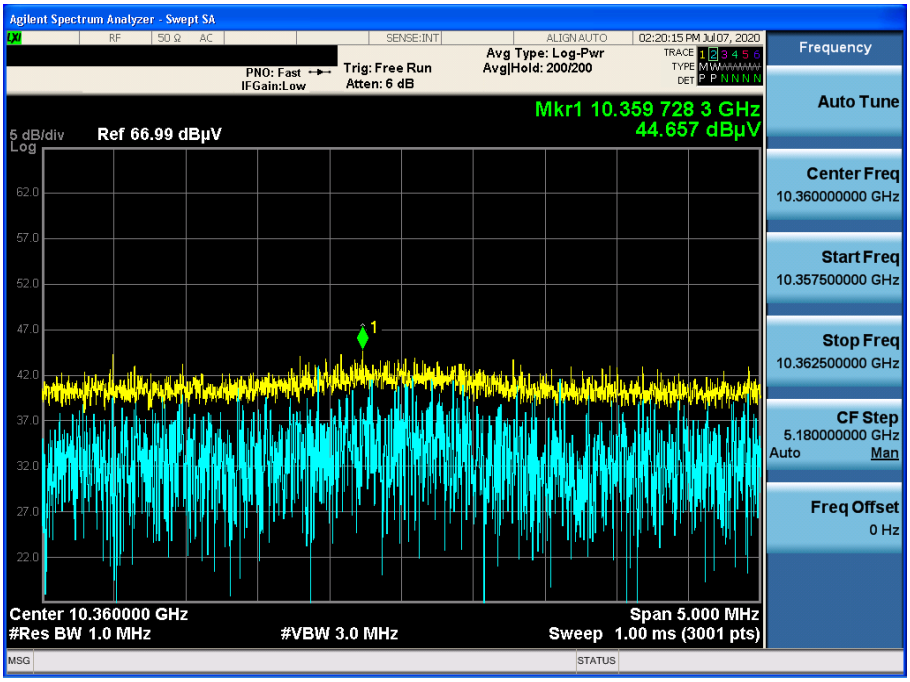
802.11a & U-NII 1 & Ch.36 & Z axis & Ver Detector Mode : PK



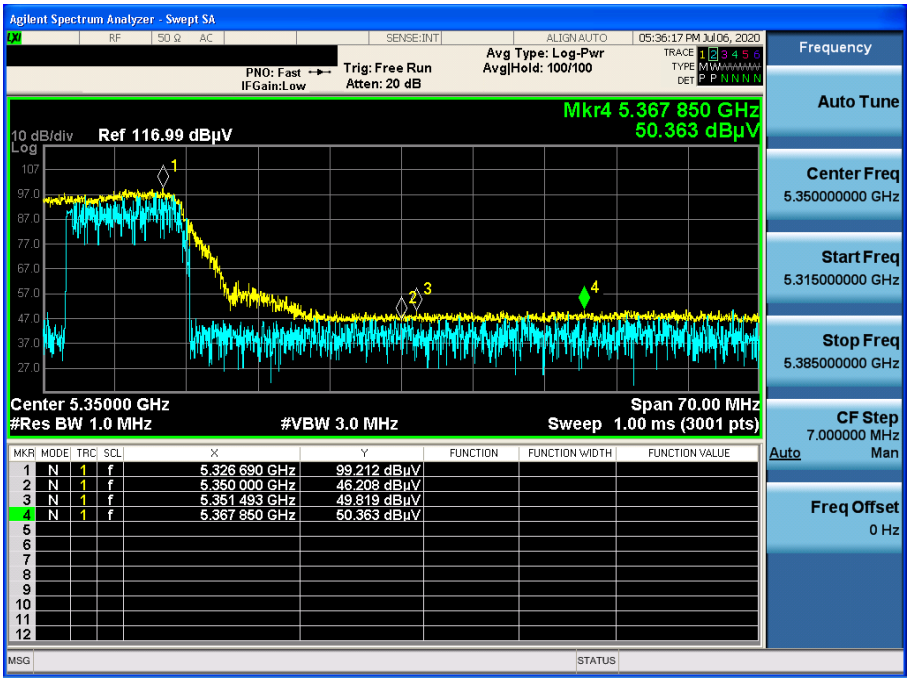
802.11a & U-NII 1 & Ch.36 & Z axis & Ver Detector Mode : AV



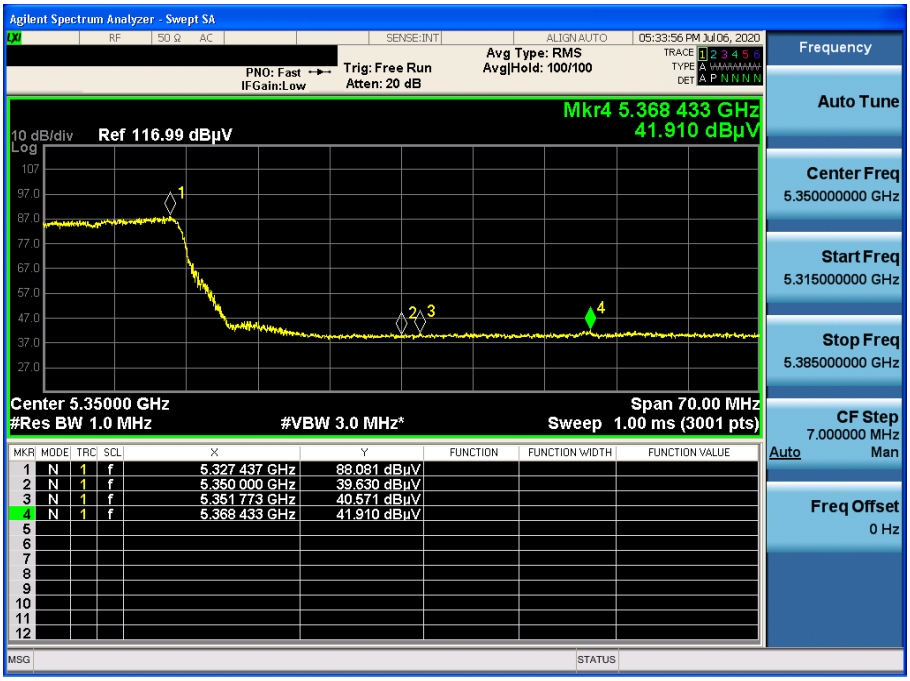
802.11a & U-NII 1 & Ch.36 & X axis & Ver **Detector Mode : PK**



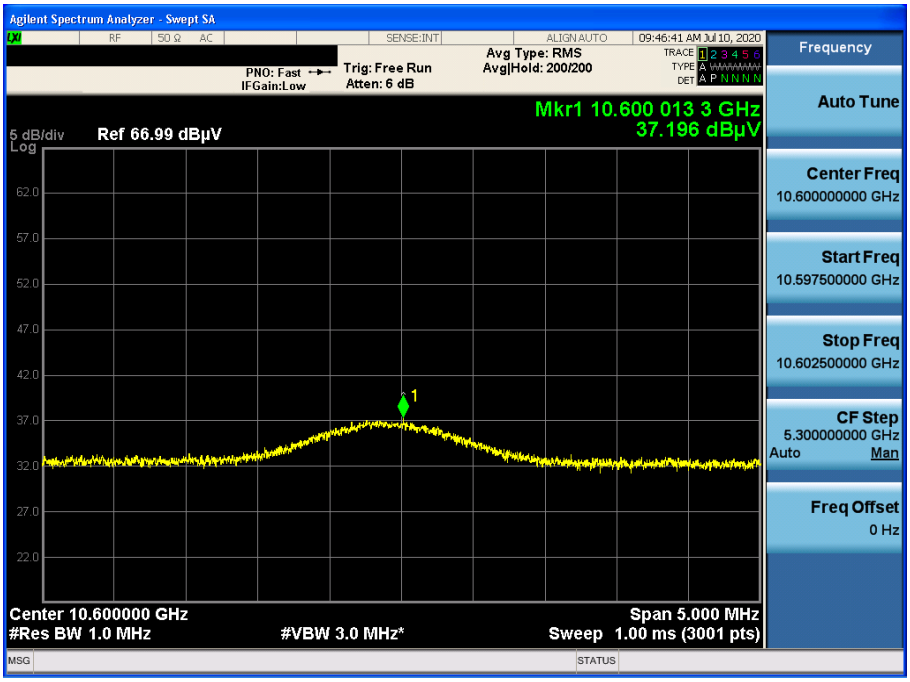
802.11a & U-NII 2A & Ch.64 & X axis & Ver Detector Mode : PK



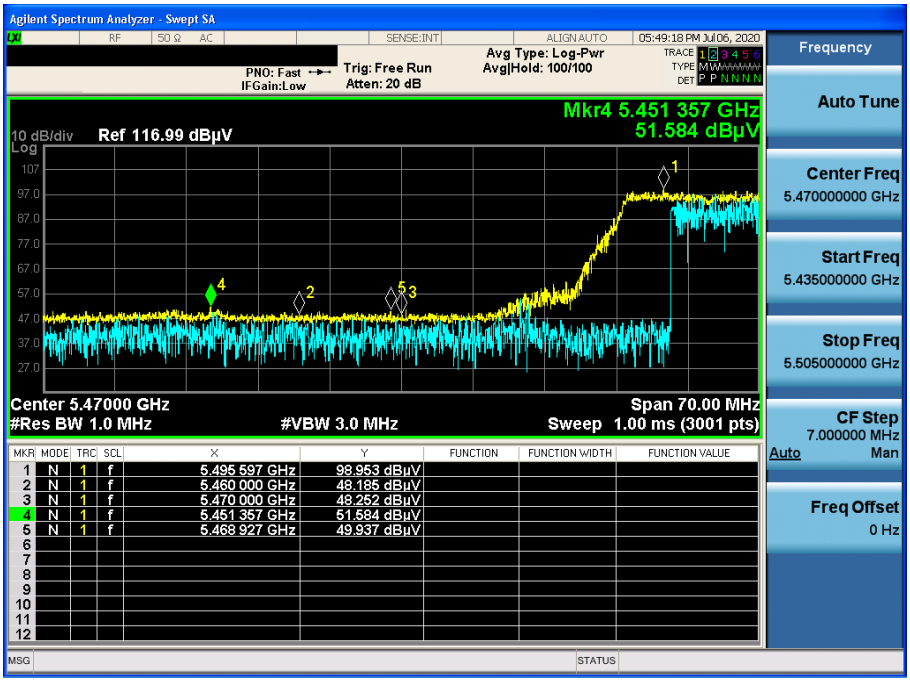
802.11a & U-NII 2A & Ch.64 & X axis & Ver Detector Mode : AV



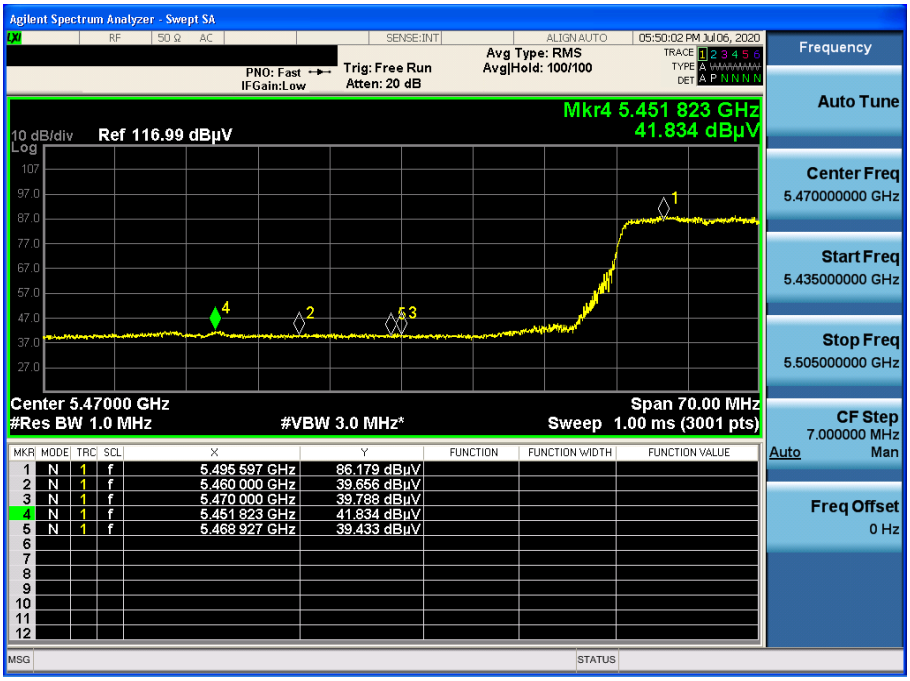
802.11a & U-NII 2A & Ch.60 & X axis & Ver **Detector Mode : AV**



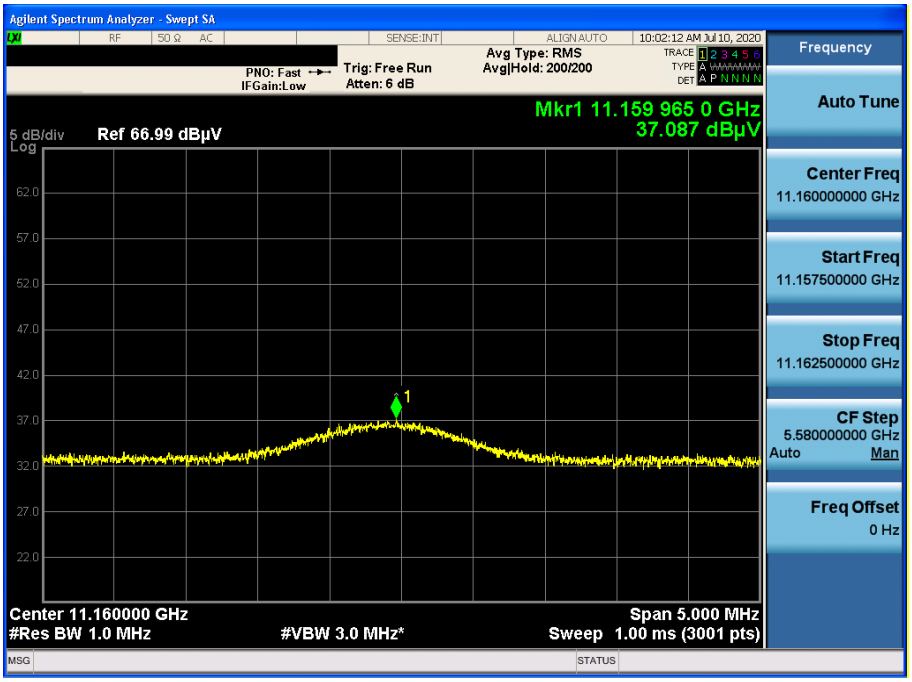
802.11a & U-NII 2C & Ch.100 & Z axis & Ver **Detector Mode : PK**



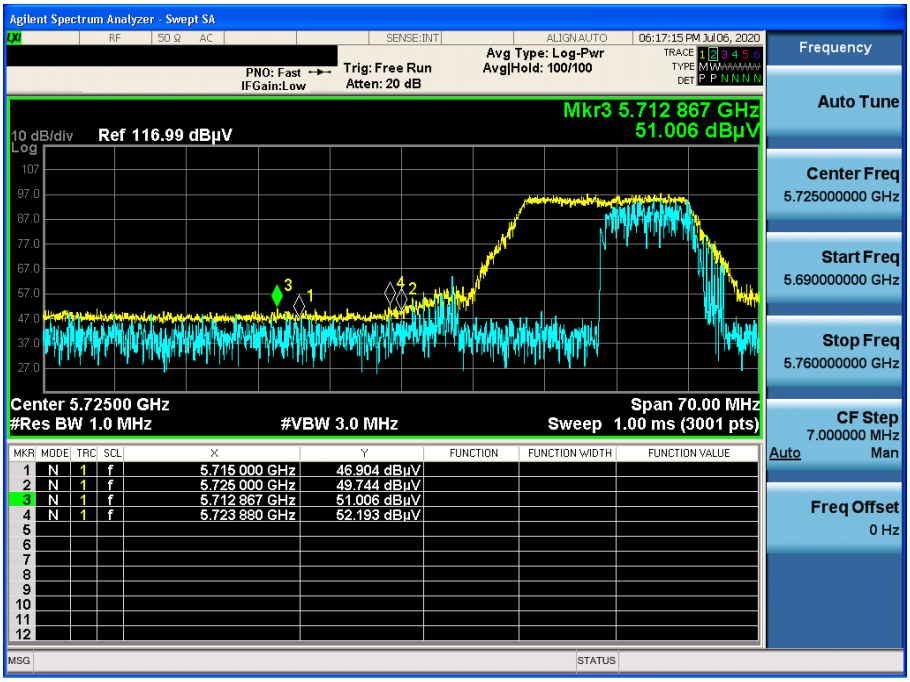
802.11a & U-NII 2C & Ch.100 & Z axis & Ver **Detector Mode : AV**



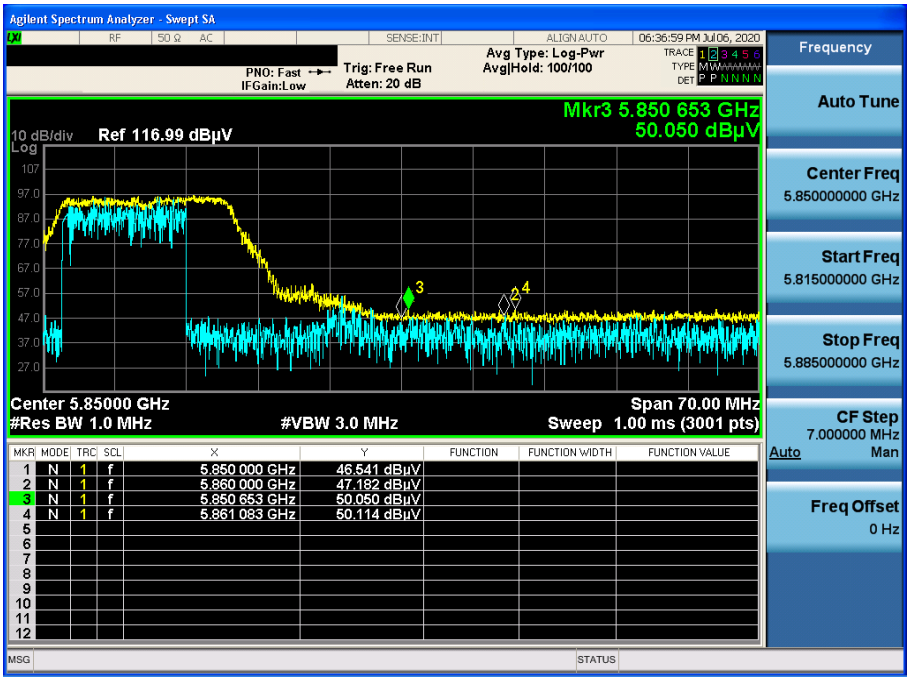
802.11a & U-NII 2C & Ch.116 & X axis & Ver **Detector Mode : AV**



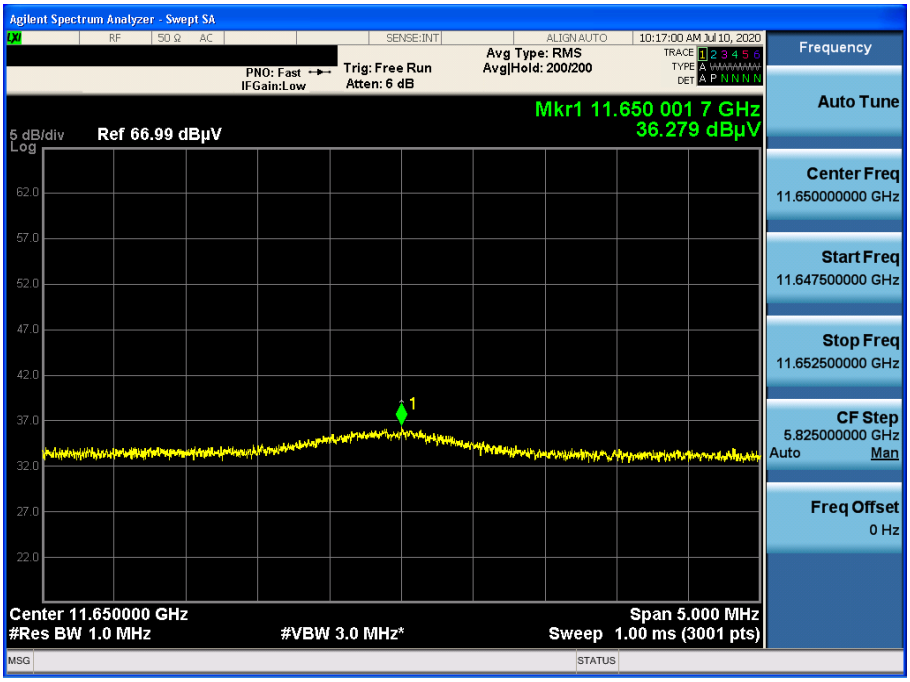
802.11a & U-NII 3 & Ch.149 & Z axis & Ver **Detector Mode : PK**



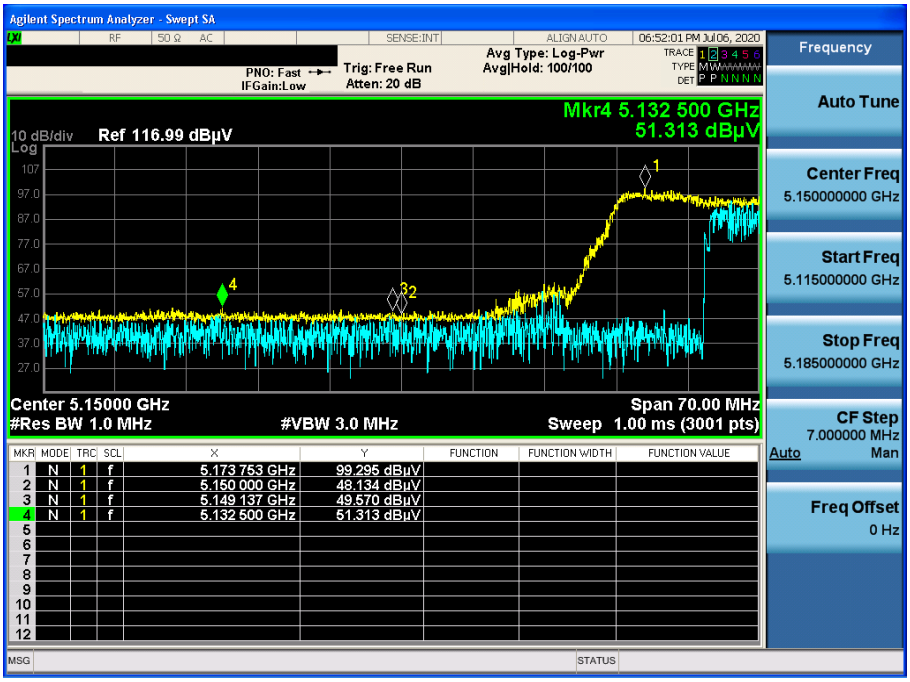
802.11a & U-NII 3 & Ch.165 & Z axis & Ver **Detector Mode : PK**



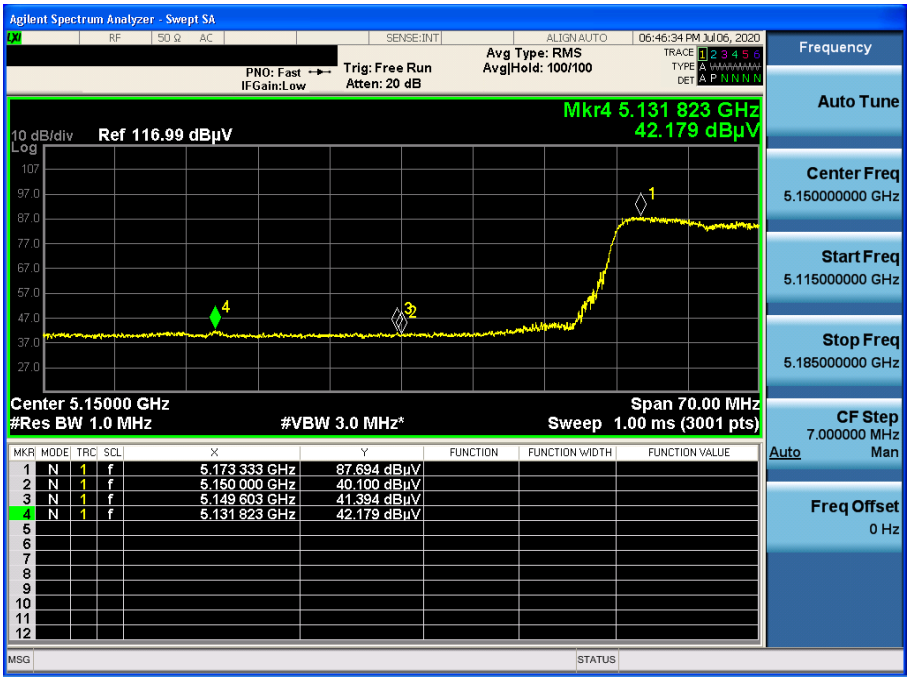
802.11a & U-NII 3 & Ch.165 & X axis & Ver **Detector Mode : AV**



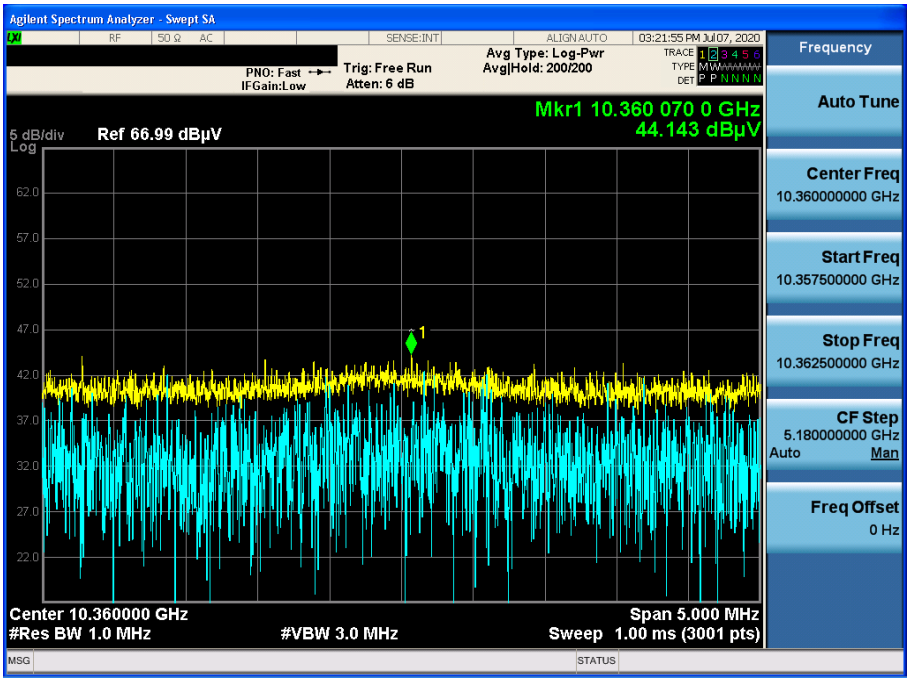
802.11n(HT20) & U-NII 1 & Ch.36 & X axis & Ver Detector Mode : PK



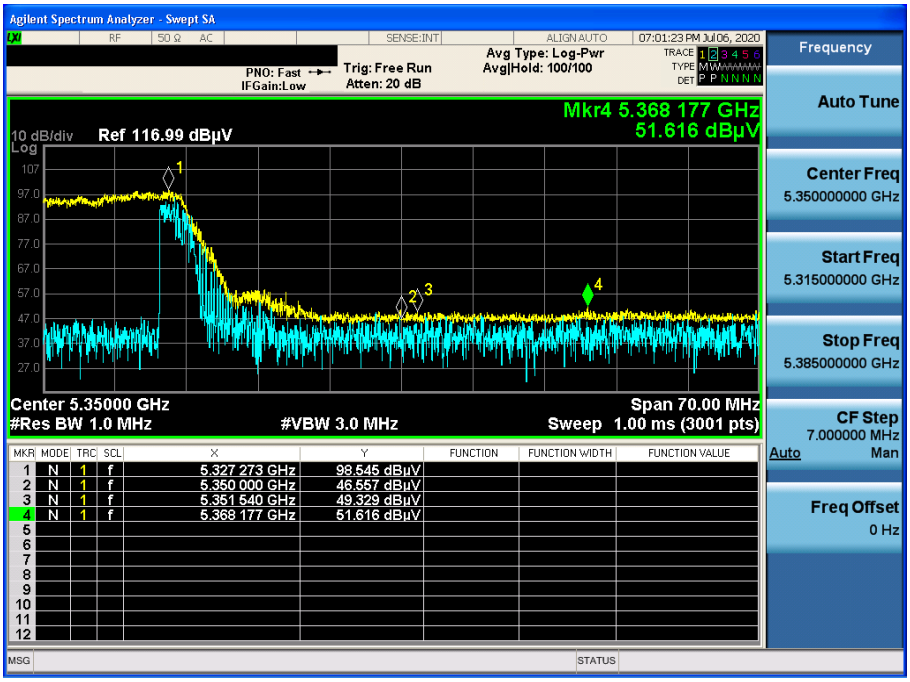
802.11n(HT20) & U-NII 1 & Ch.36 & X axis & Ver Detector Mode : AV



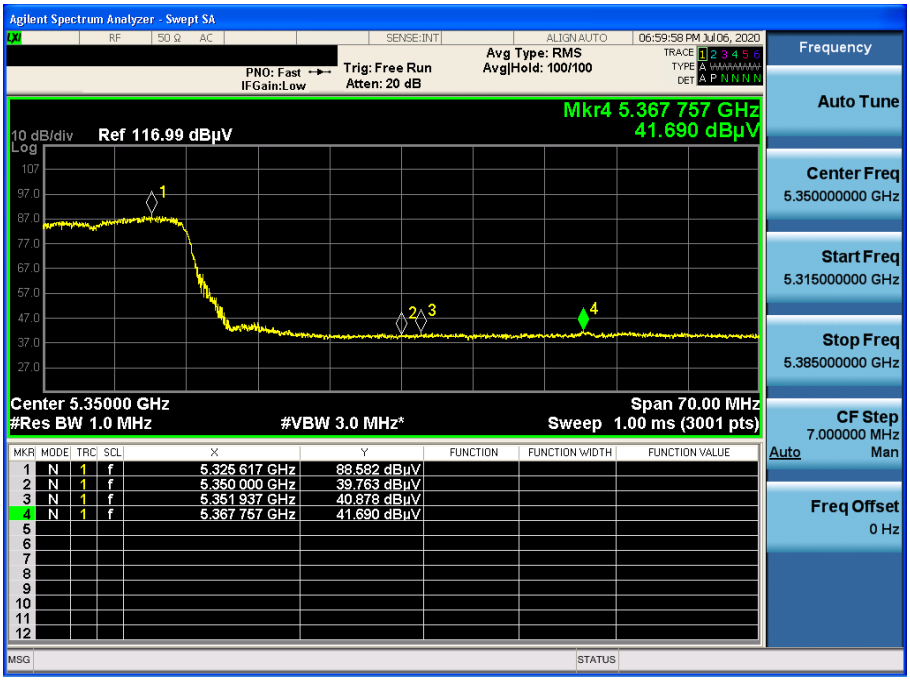
802.11n(HT20) & U-NII 1 & Ch.36 & X axis & Ver Detector Mode : PK



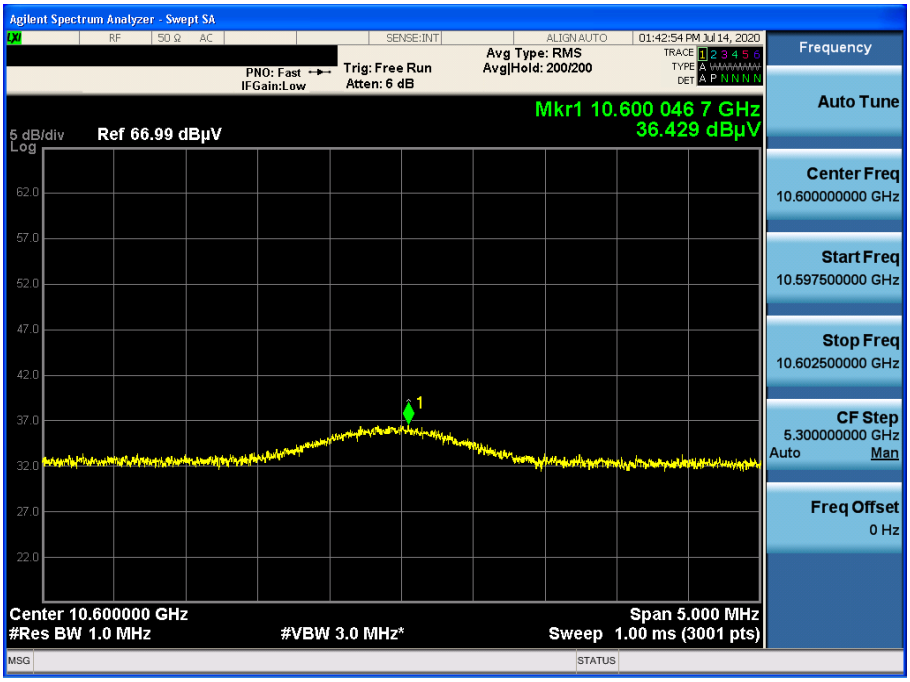
802.11n(HT20) & U-NII 2A & Ch.64 & Y axis & Hor Detector Mode : PK



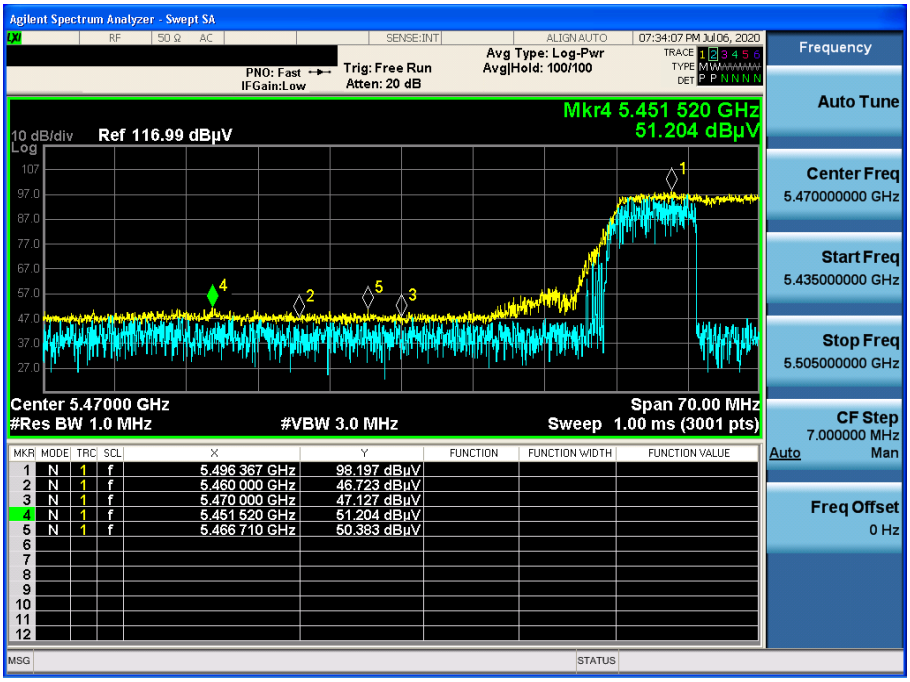
802.11n(HT20) & U-NII 2A & Ch.64 & Y axis & Hor Detector Mode : AV



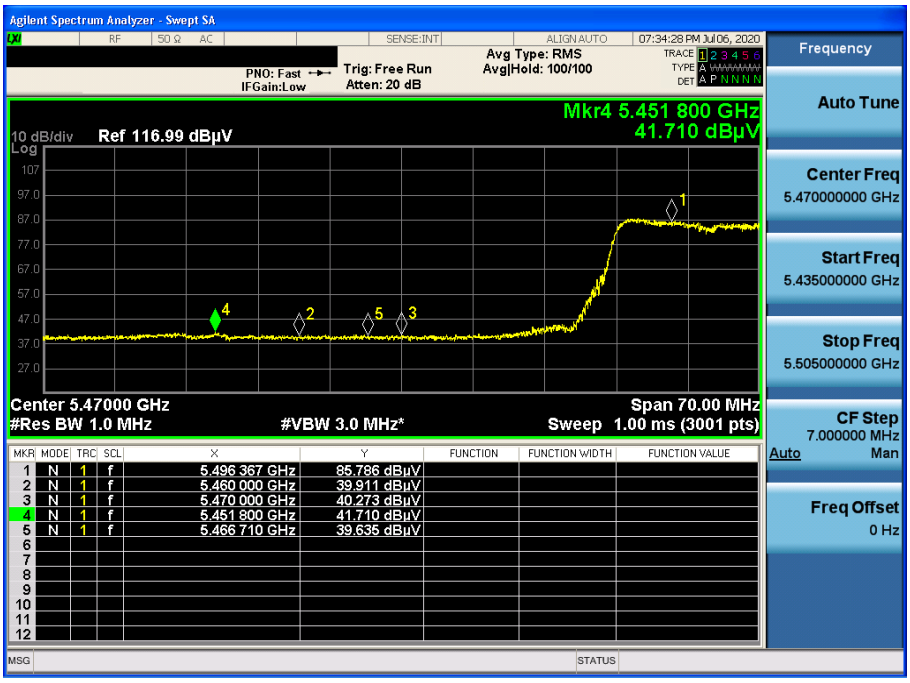
802.11n(HT20) & U-NII 2A & Ch.60 & X axis & Ver Detector Mode : AV



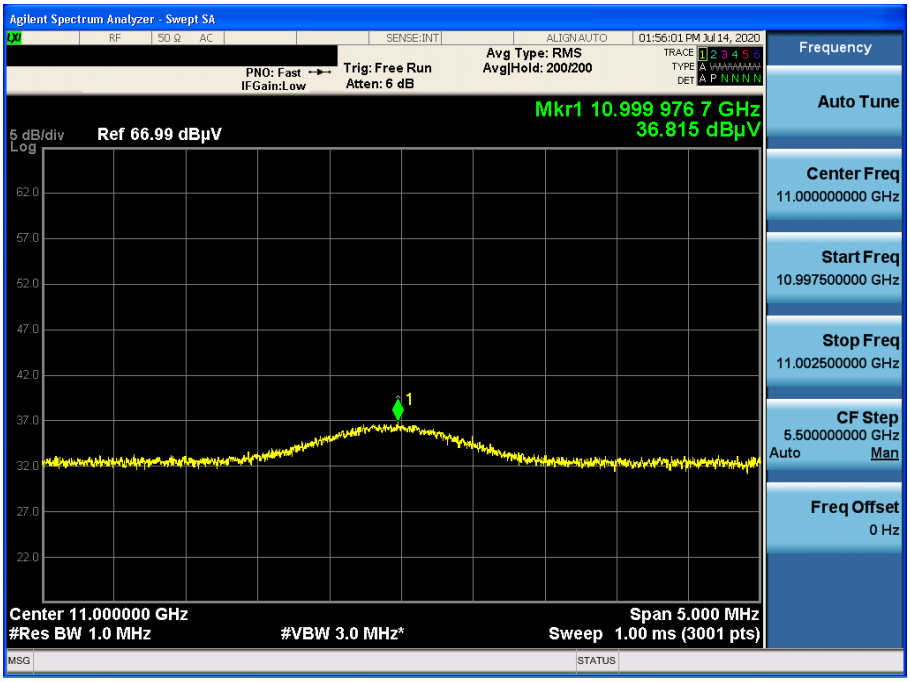
802.11n(HT20) & U-NII 2C & Ch.100 & Z axis & Ver Detector Mode : PK



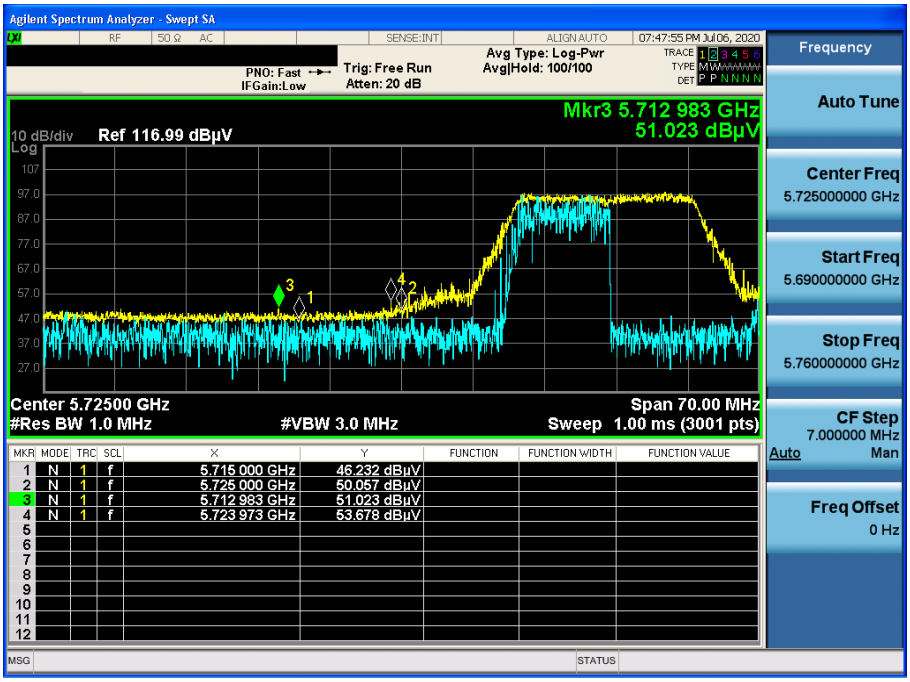
802.11n(HT20) & U-NII 2C & Ch.100 & Z axis & Ver Detector Mode : AV



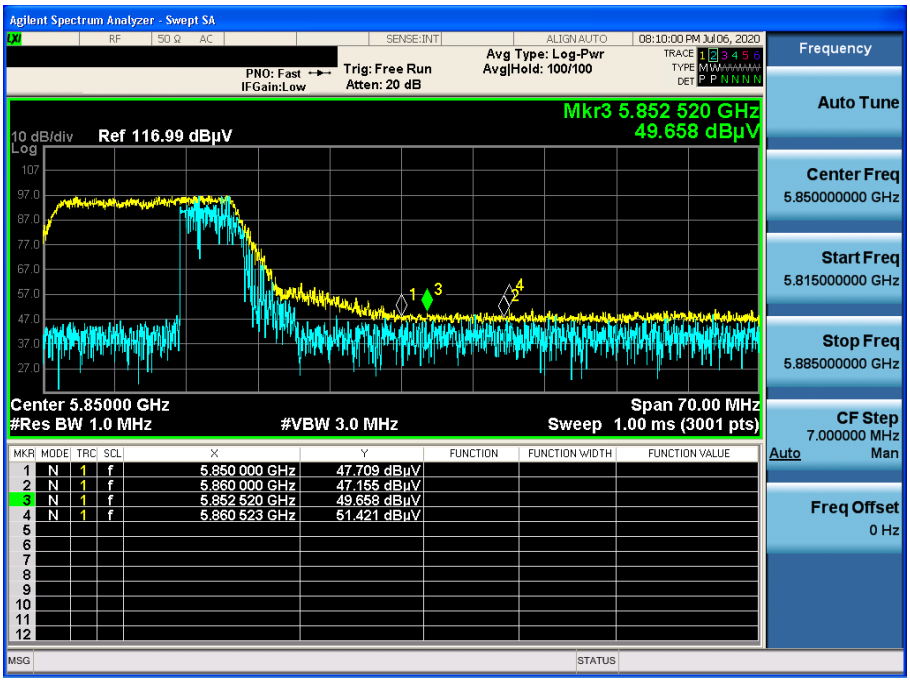
802.11n(HT20) & U-NII 2C & Ch.100 & X axis & Ver Detector Mode : AV



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



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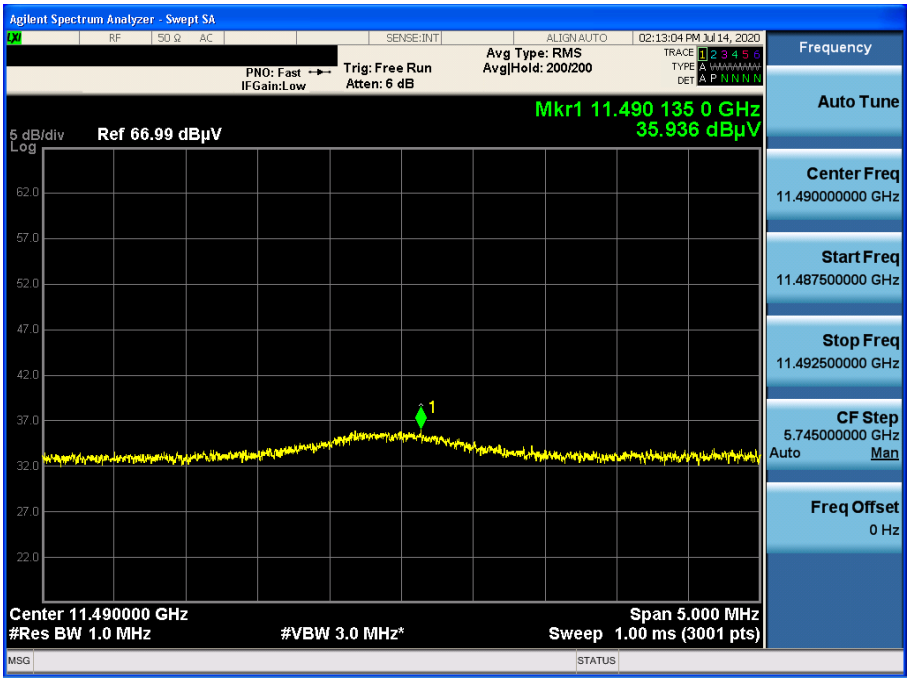
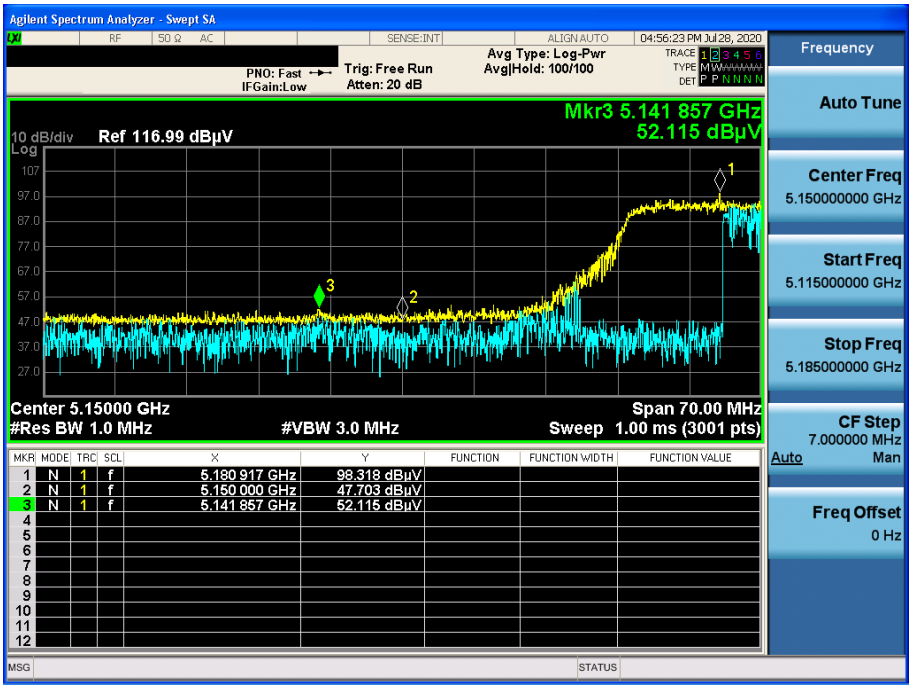
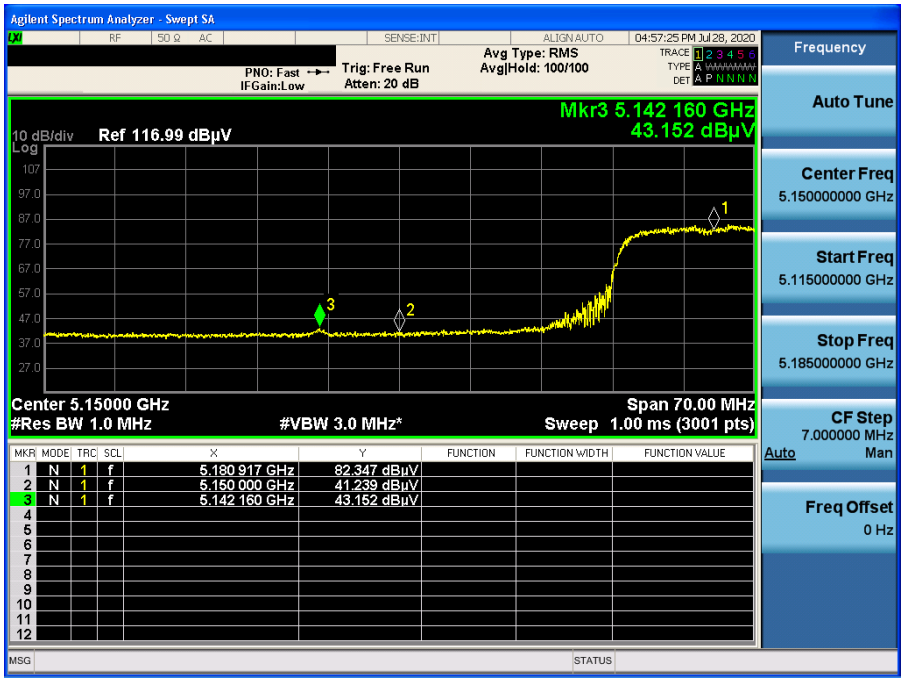


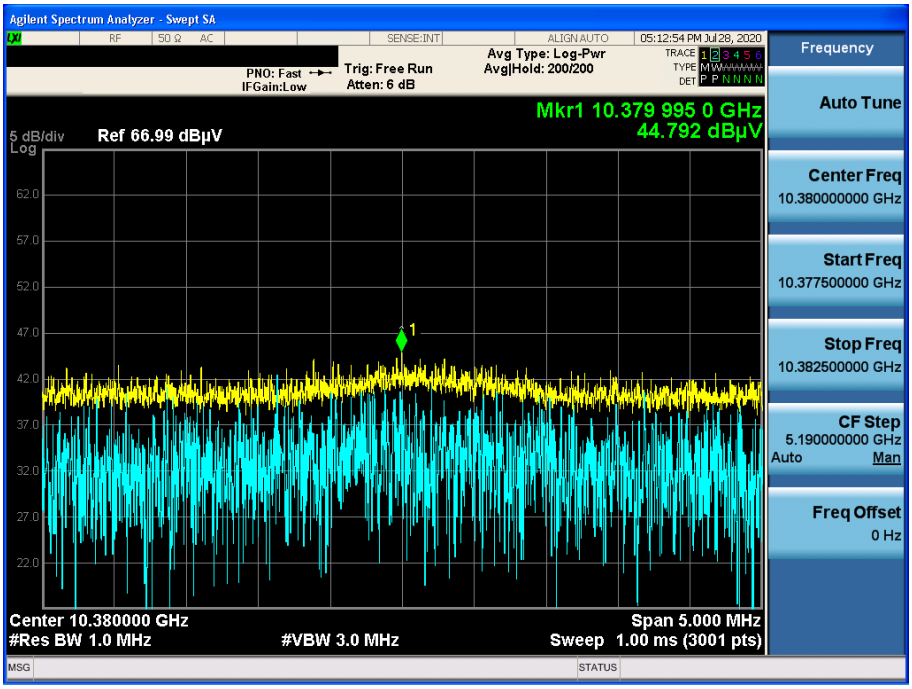
802.11n(HT40) & U-NII 1 & Ch.38 & Z axis & Ver **Detector Mode : PK**



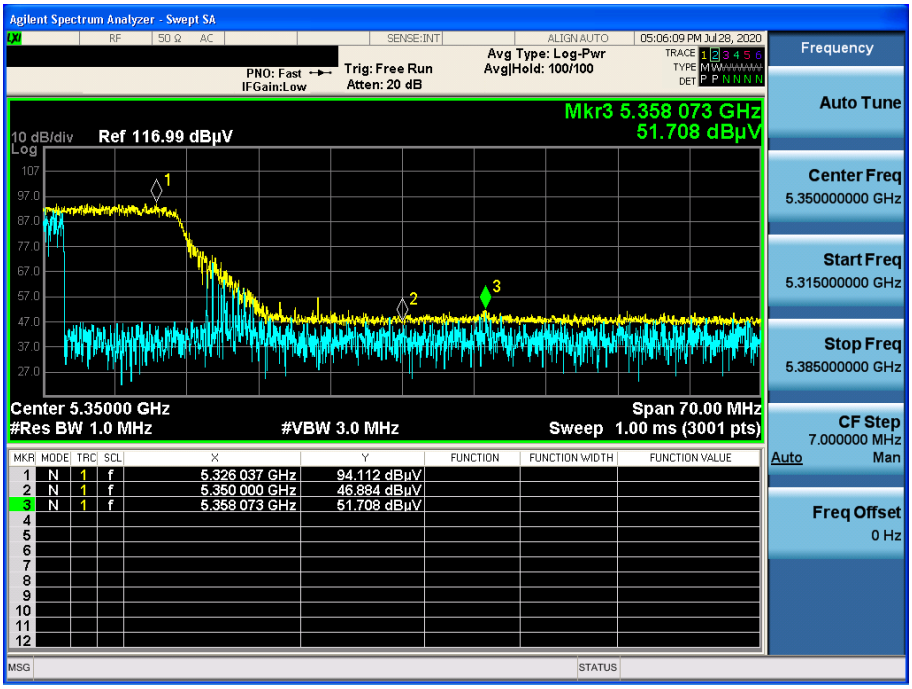
802.11n(HT40) & U-NII 1 & Ch.38 & Z axis & Ver **Detector Mode : AV**



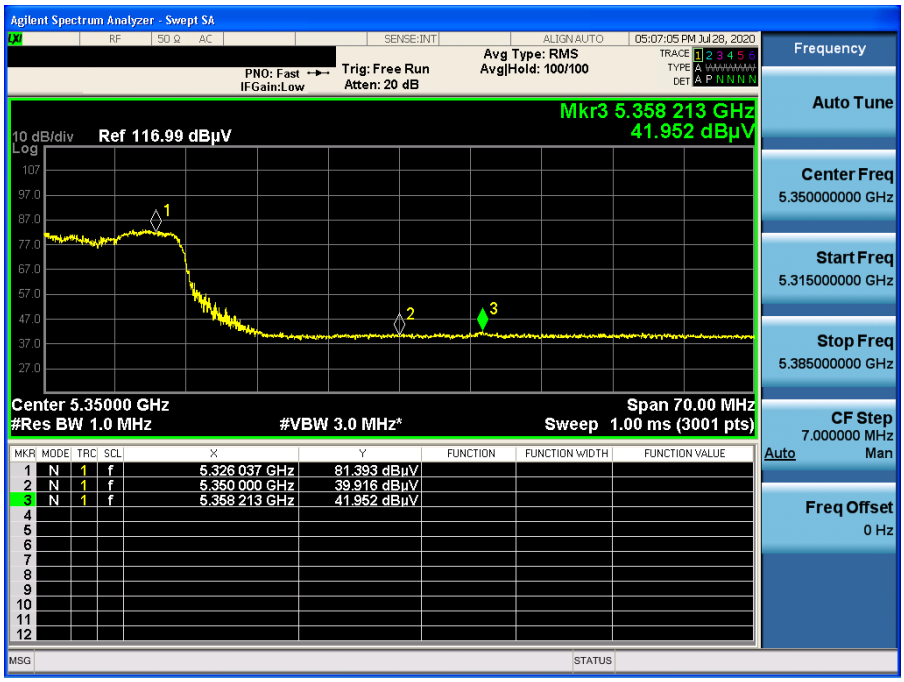
802.11n(HT40) & U-NII 1 & Ch.38 & X axis & Ver Detector Mode : PK



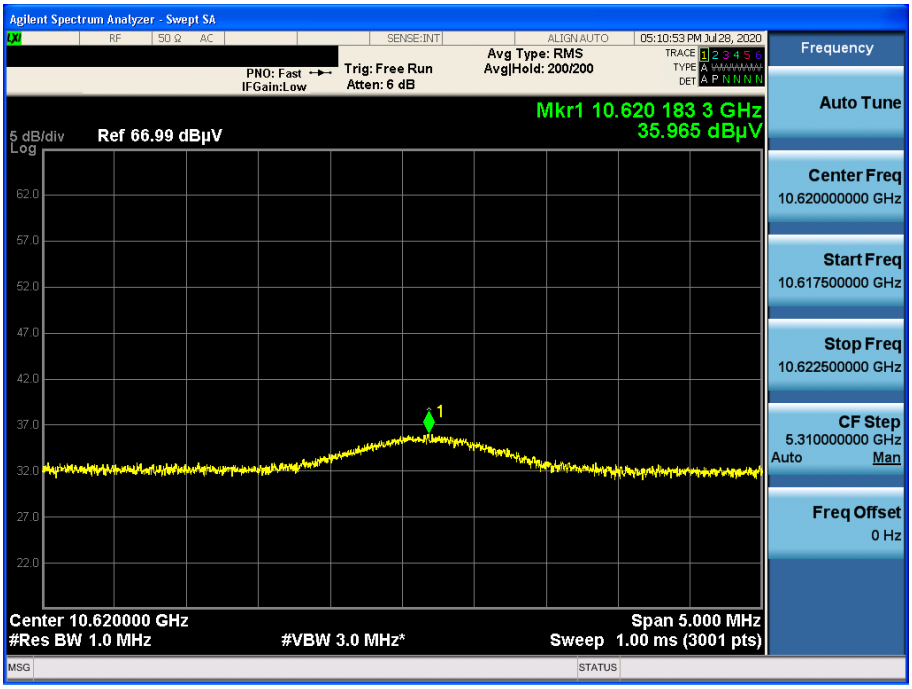
802.11n(HT40) & U-NII 2A & Ch.62 & Z axis & Ver Detector Mode : PK



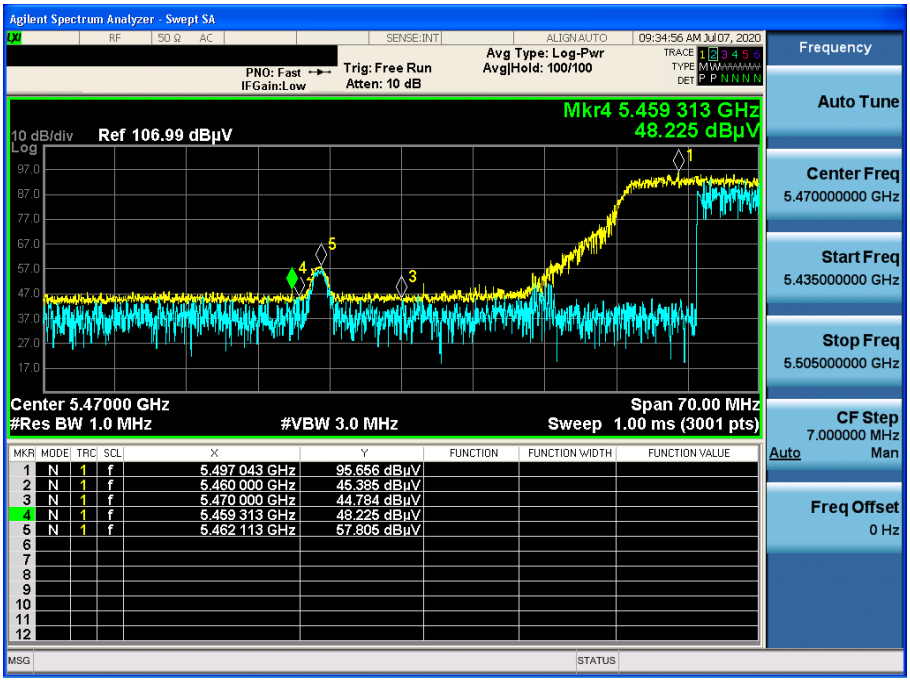
802.11n(HT40) & U-NII 2A & Ch.62 & Z axis & Ver Detector Mode : AV



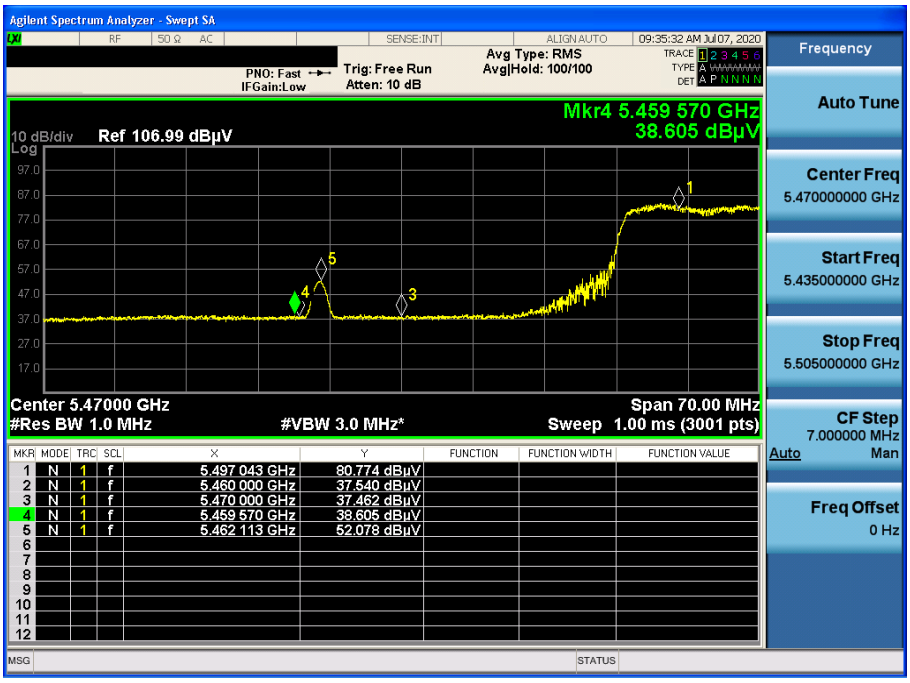
802.11n(HT40) & U-NII 2A & Ch.62 & X axis & Ver Detector Mode : AV



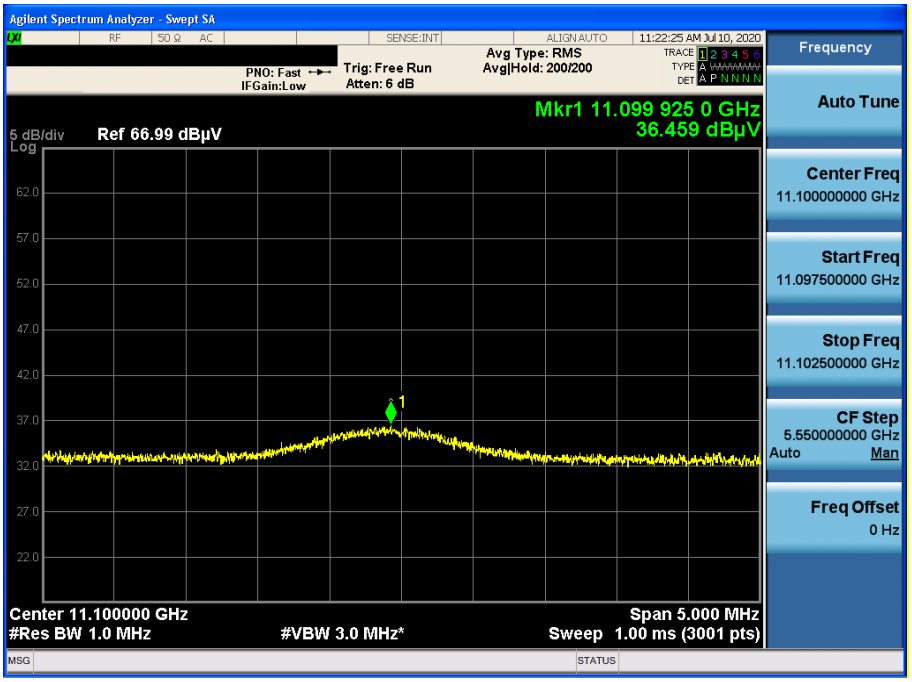
802.11n(HT40) & U-NII 2C & Ch.102 & Z axis & Ver Detector Mode : PK



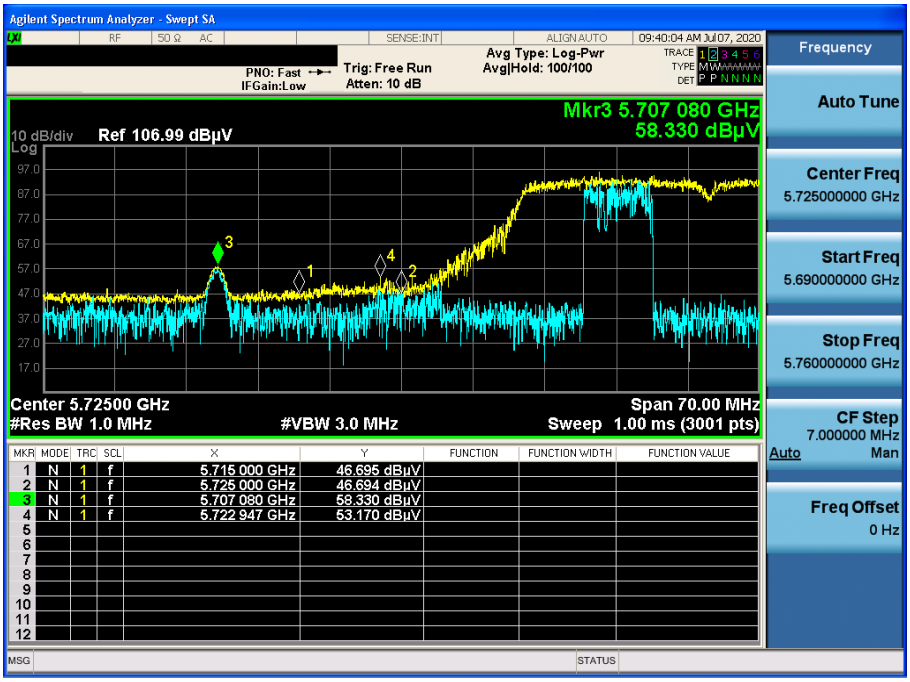
802.11n(HT40) & U-NII 2C & Ch.102 & Z axis & Ver Detector Mode : AV



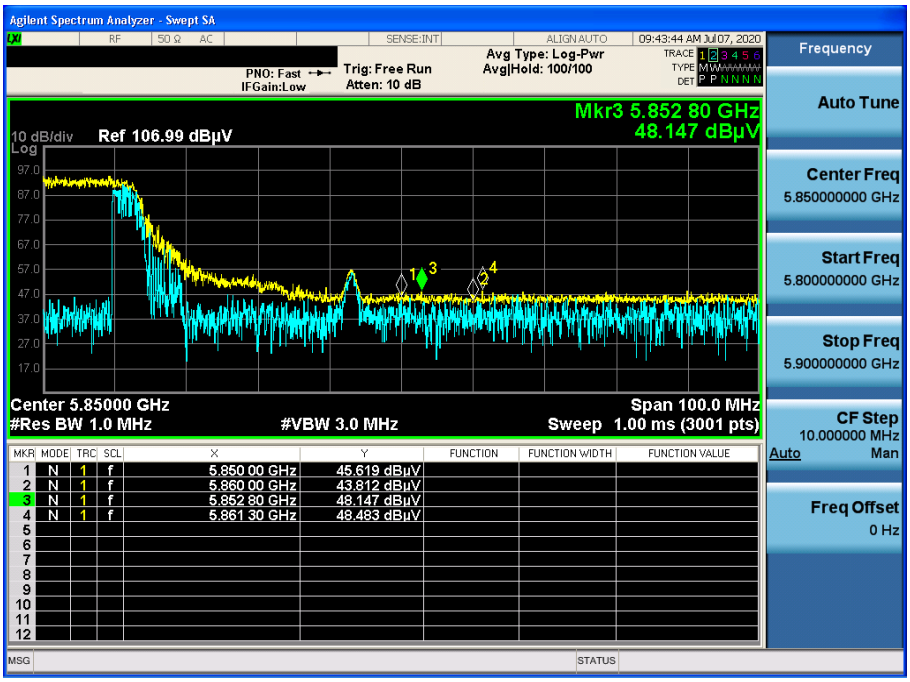
802.11n(HT40) & U-NII 2C & Ch.110 & X axis & Ver Detector Mode : AV



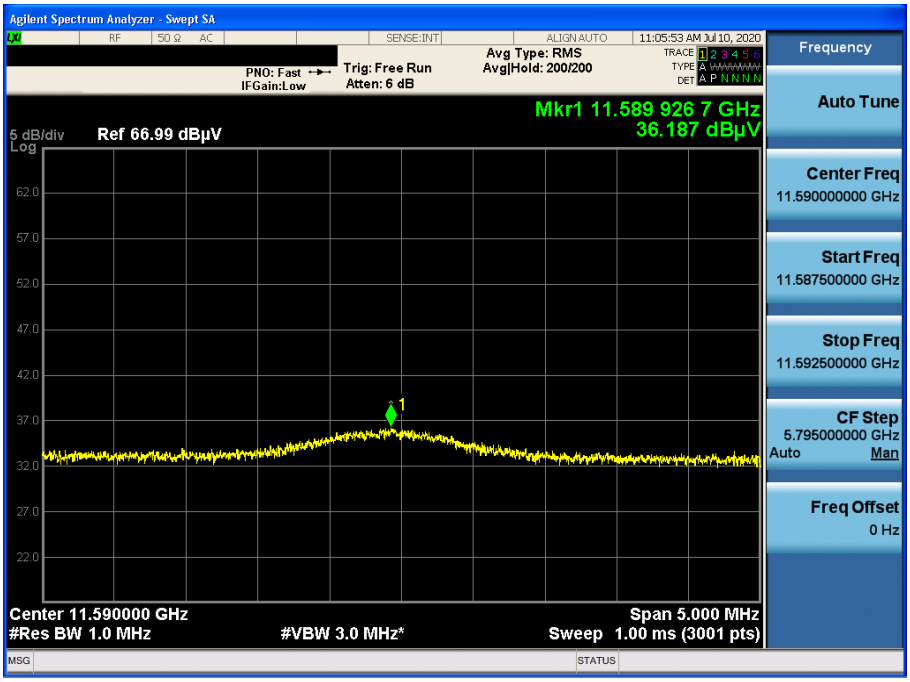
802.11n(HT40) & U-NII 3 & Ch.151 & Z axis & Ver Detector Mode : PK



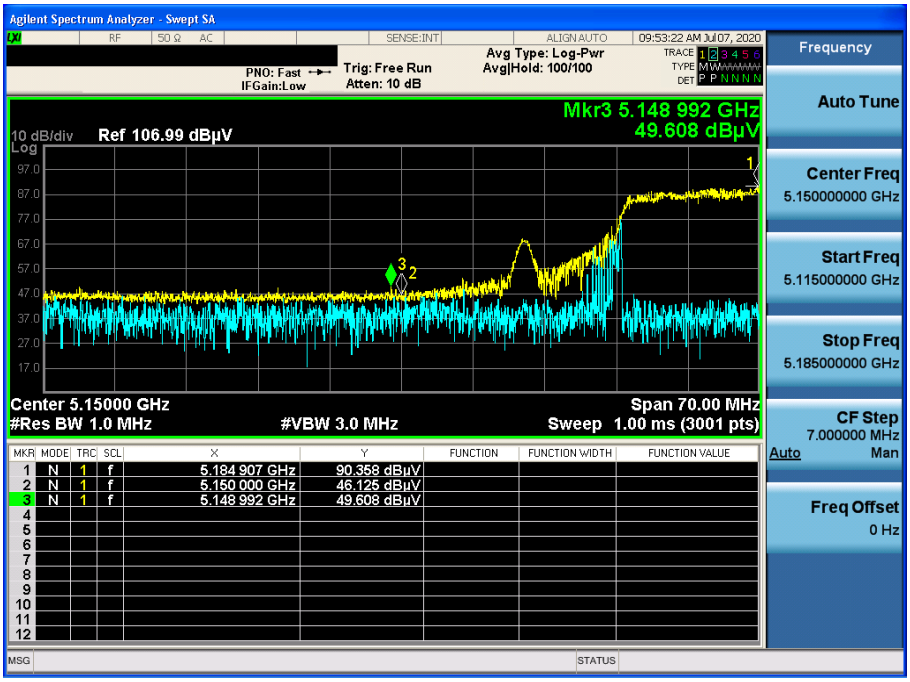
802.11n(HT40) & U-NII 3 & Ch.159 & Z axis & Ver Detector Mode : PK



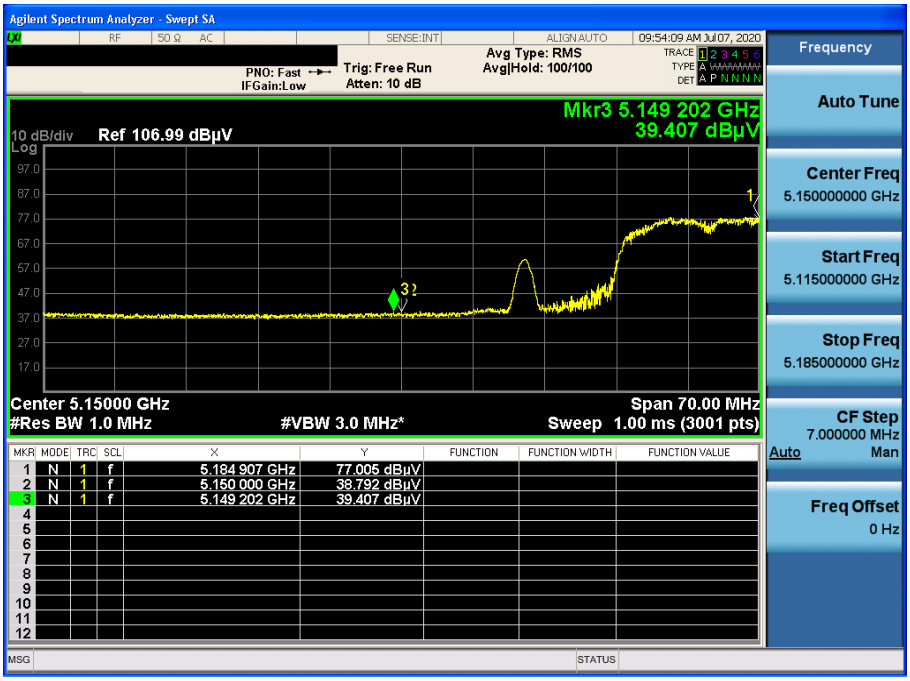
802.11n(HT40) & U-NII 3 & Ch.159 & X axis & Ver Detector Mode : AV



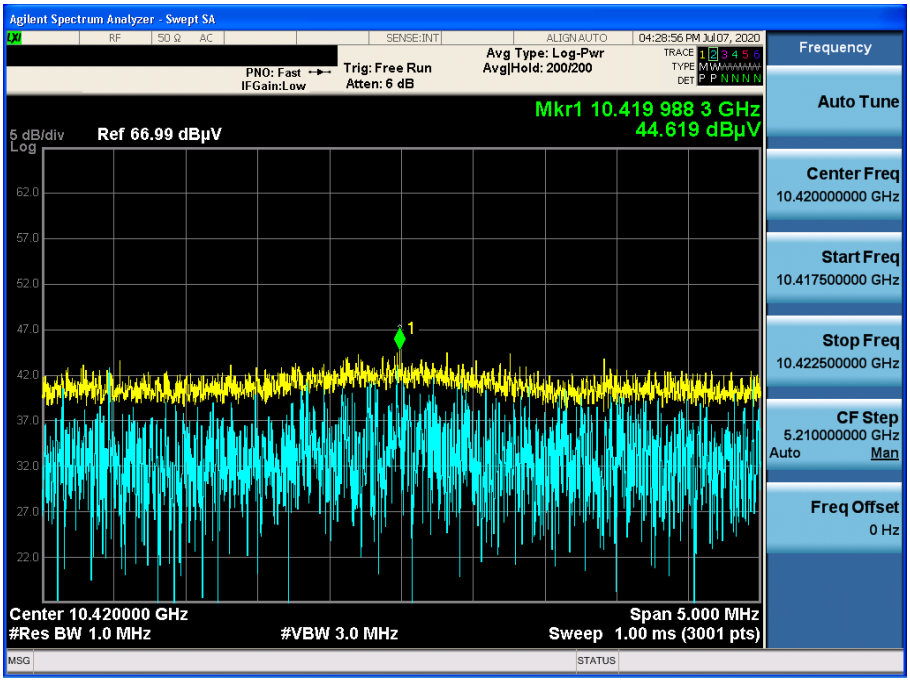
802.11ac(VHT80) & U-NII 1 & Ch.42 & Z axis & Ver Detector Mode : PK



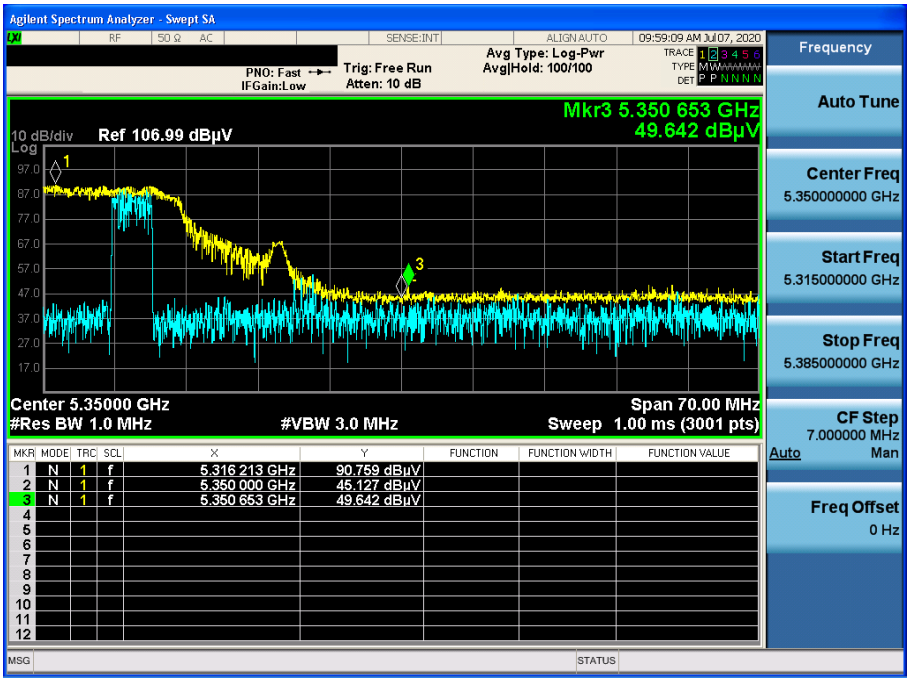
802.11ac(VHT80) & U-NII 1 & Ch.42 & Z axis & Ver Detector Mode : AV



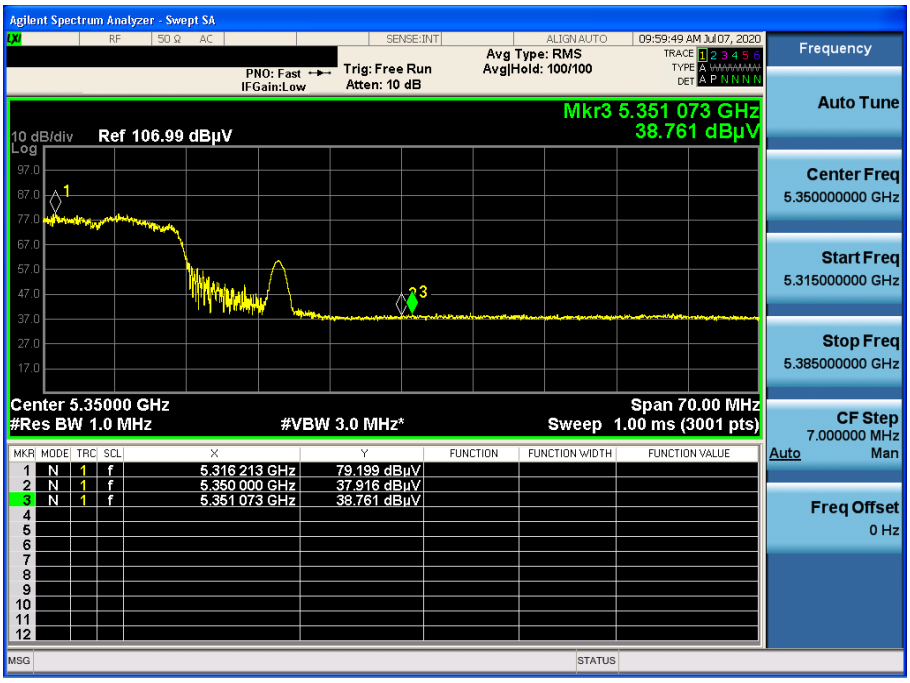
802.11ac(VHT80) & U-NII 1 & Ch.42 & X axis & Ver Detector Mode : PK



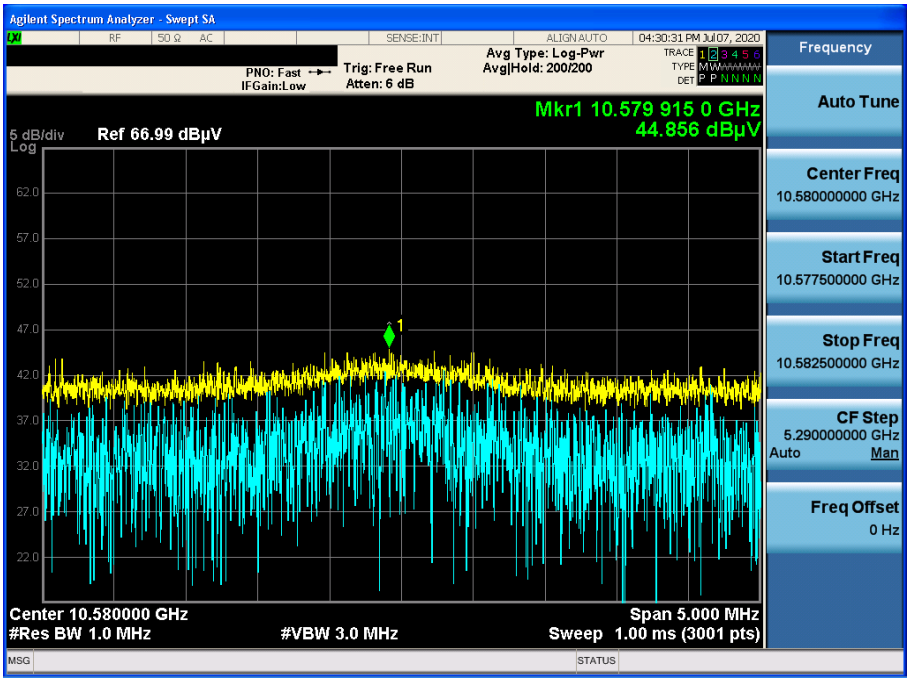
802.11ac(VHT80) & U-NII 3 & Ch.58 & Z axis & Ver Detector Mode : PK



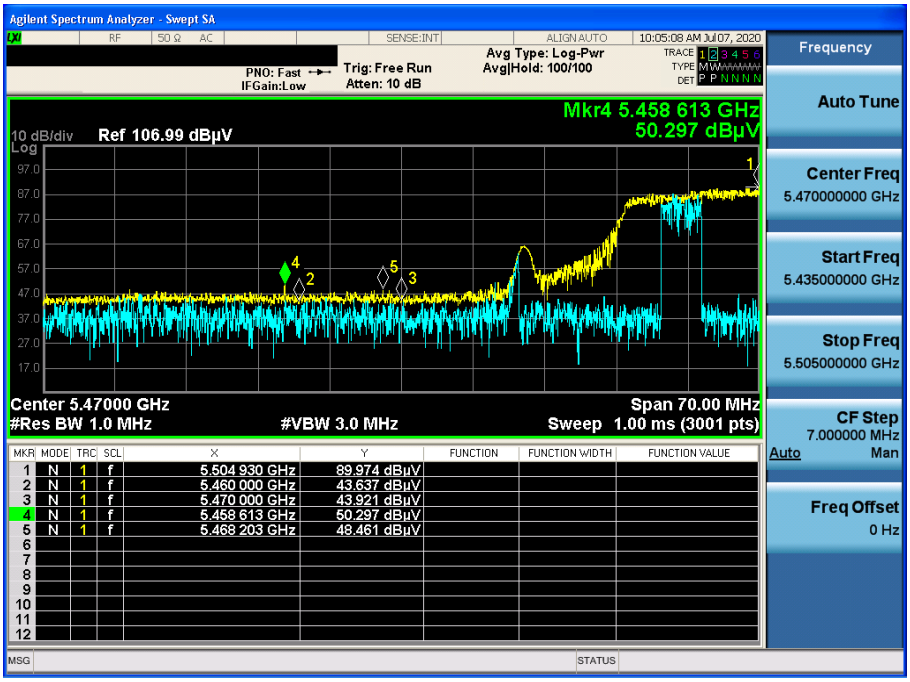
802.11ac(VHT80) & U-NII 3 & Ch.58 & Z axis & Ver Detector Mode : PK



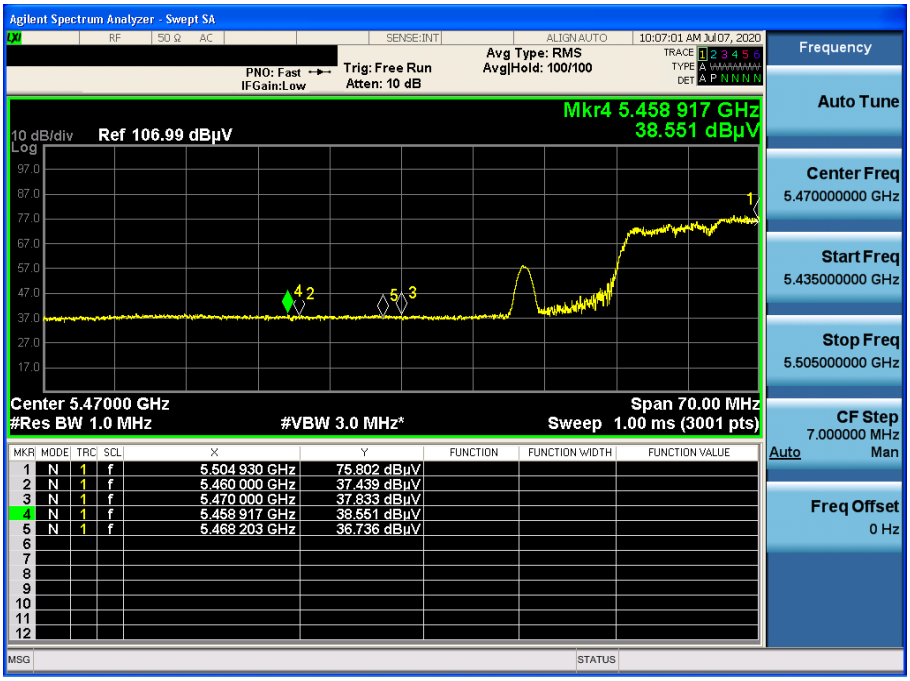
802.11ac(VHT80) & U-NII 3 & Ch.58 & X axis & Ver Detector Mode : PK



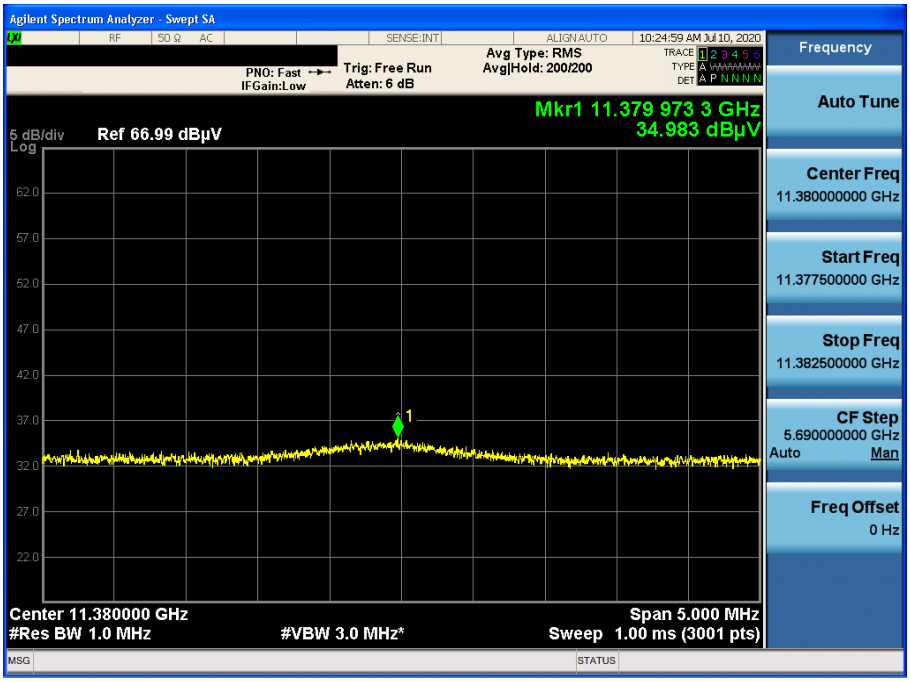
802.11ac(VHT80) & U-NII 2A & Ch.106 & Z axis & Ver Detector Mode : PK



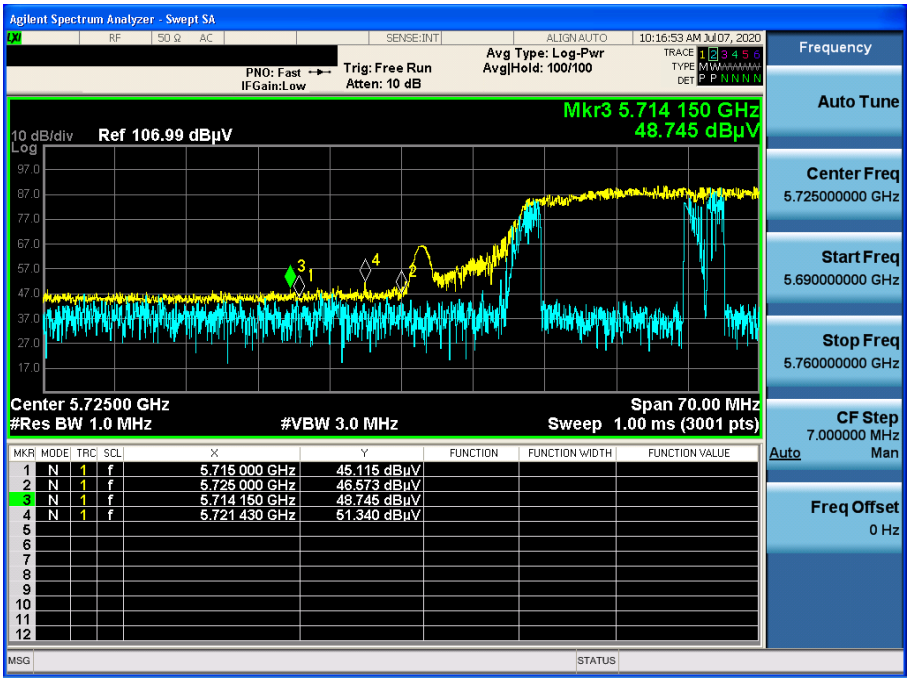
802.11ac(VHT80) & U-NII 2A & Ch.106 & Z axis & Ver Detector Mode : AV



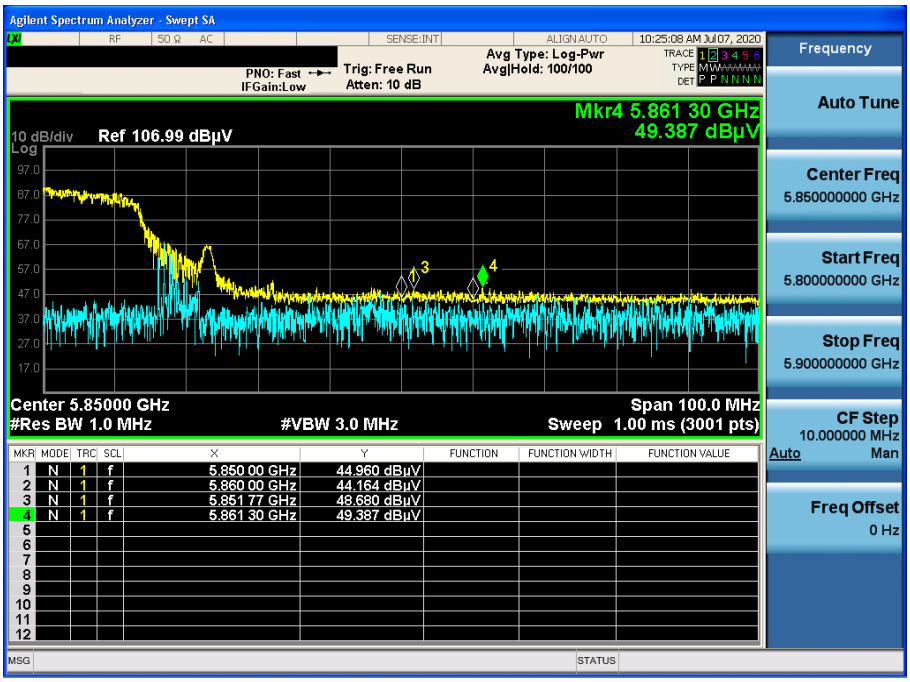
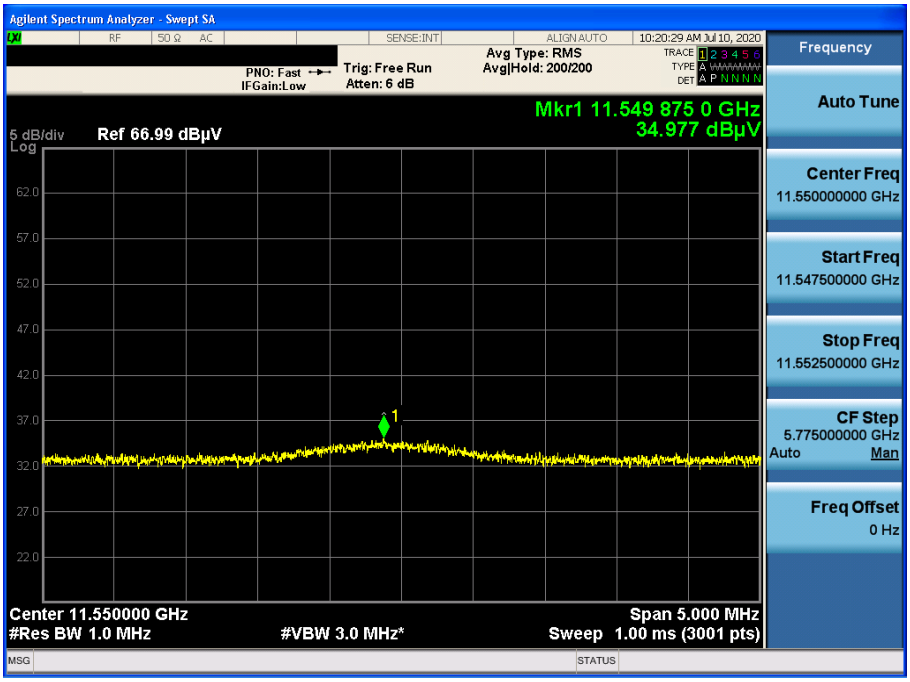
802.11ac(VHT80) & U-NII 2A & Ch.138 & X axis & Ver Detector Mode : AV



802.11ac(VHT80) & U-NII 2C & Ch.155 & Z axis & Ver Detector Mode : PK



802.11ac(VHT80) & U-NII 2C & Ch.155 & Z axis & Ver Detector Mode : PK



802.11ac(VHT80) & U-NII 2C & Ch.155 & X axis & Ver Detector Mode : AV