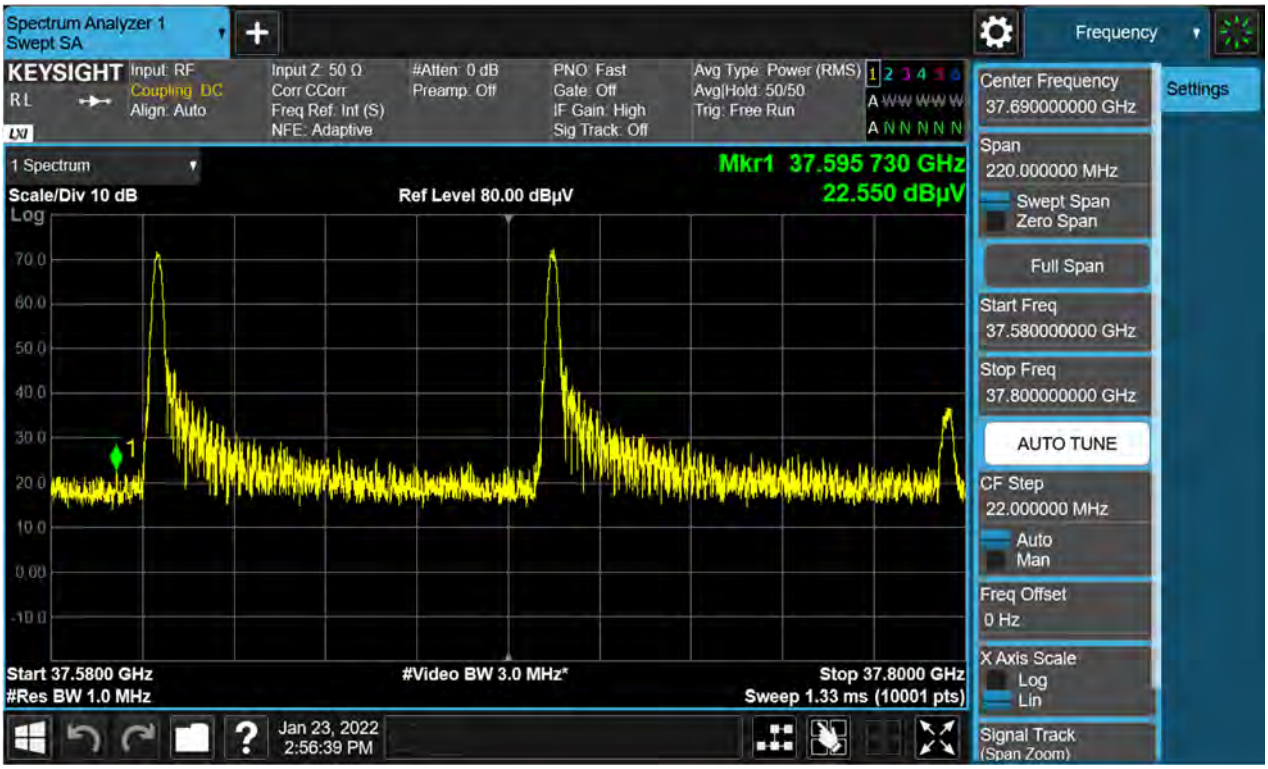
+3 dB above AGC threshold Two Adjacent Test Signal / MAX Ant. B Position / 1cc / Low / Co-Pol.



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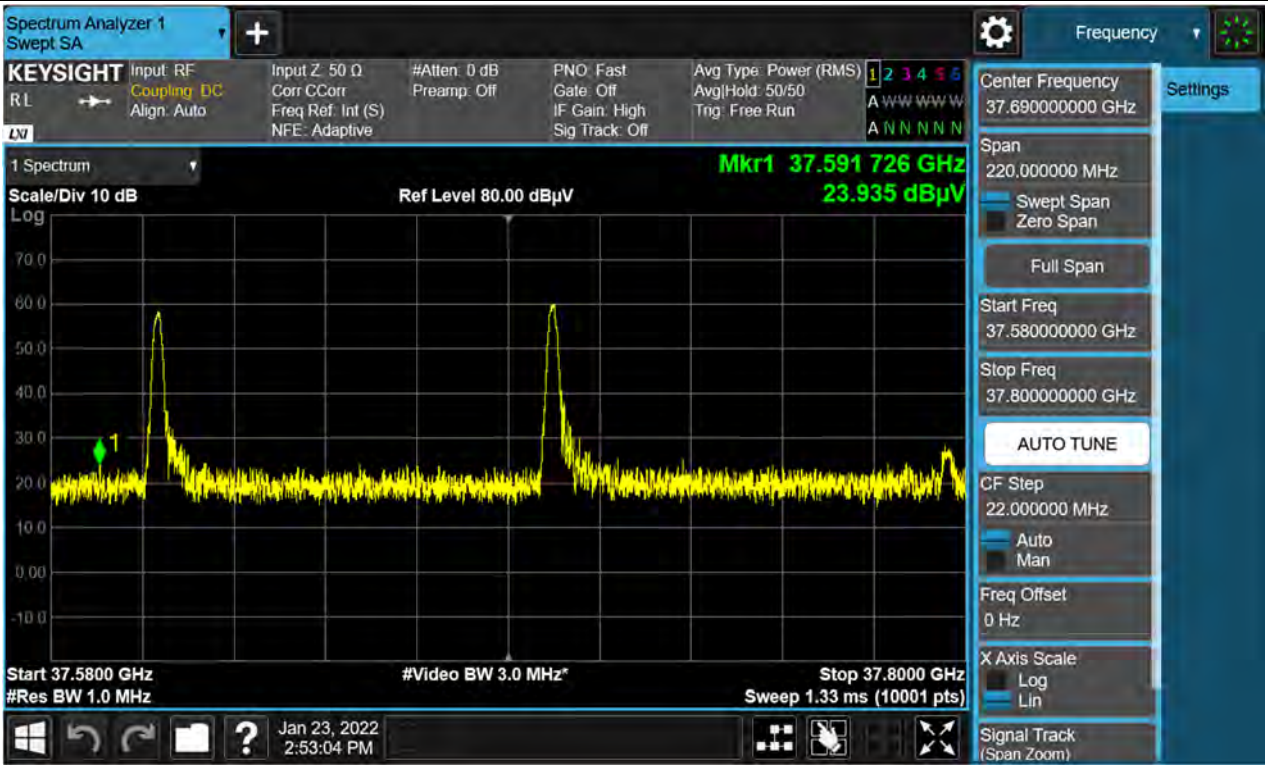

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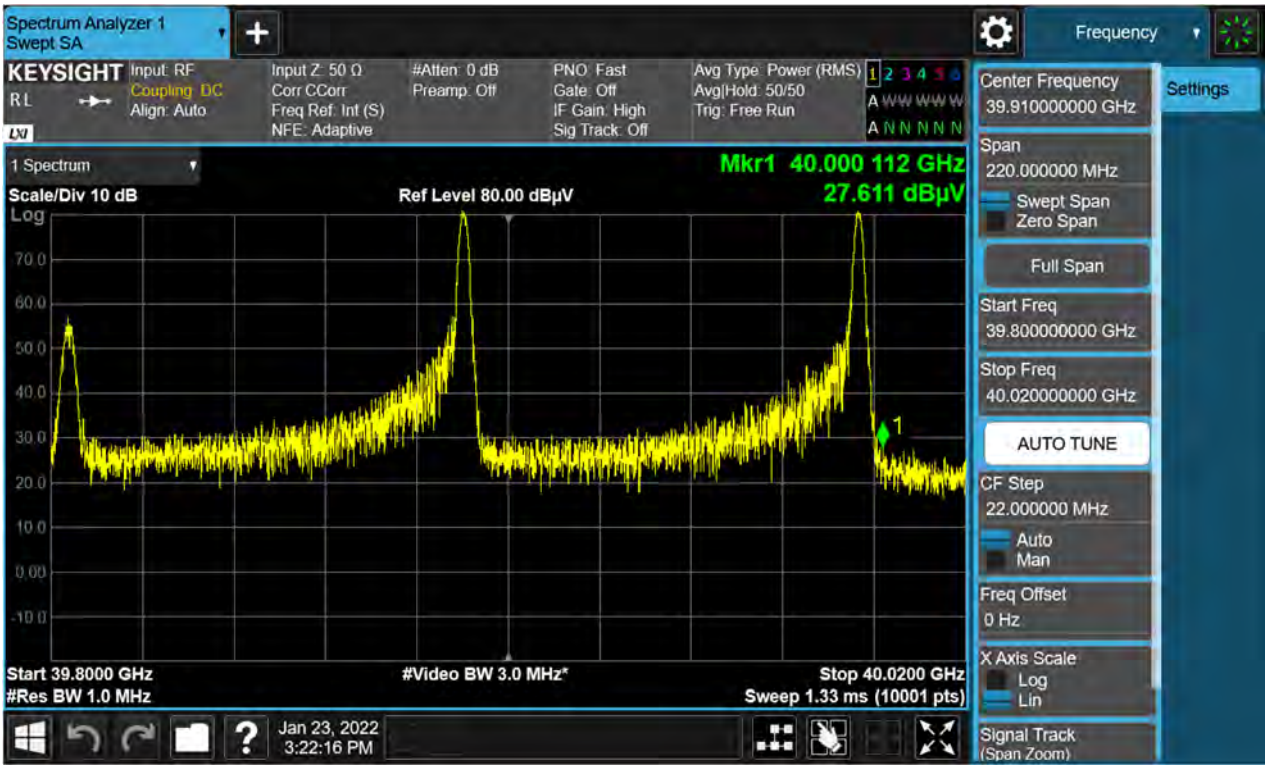

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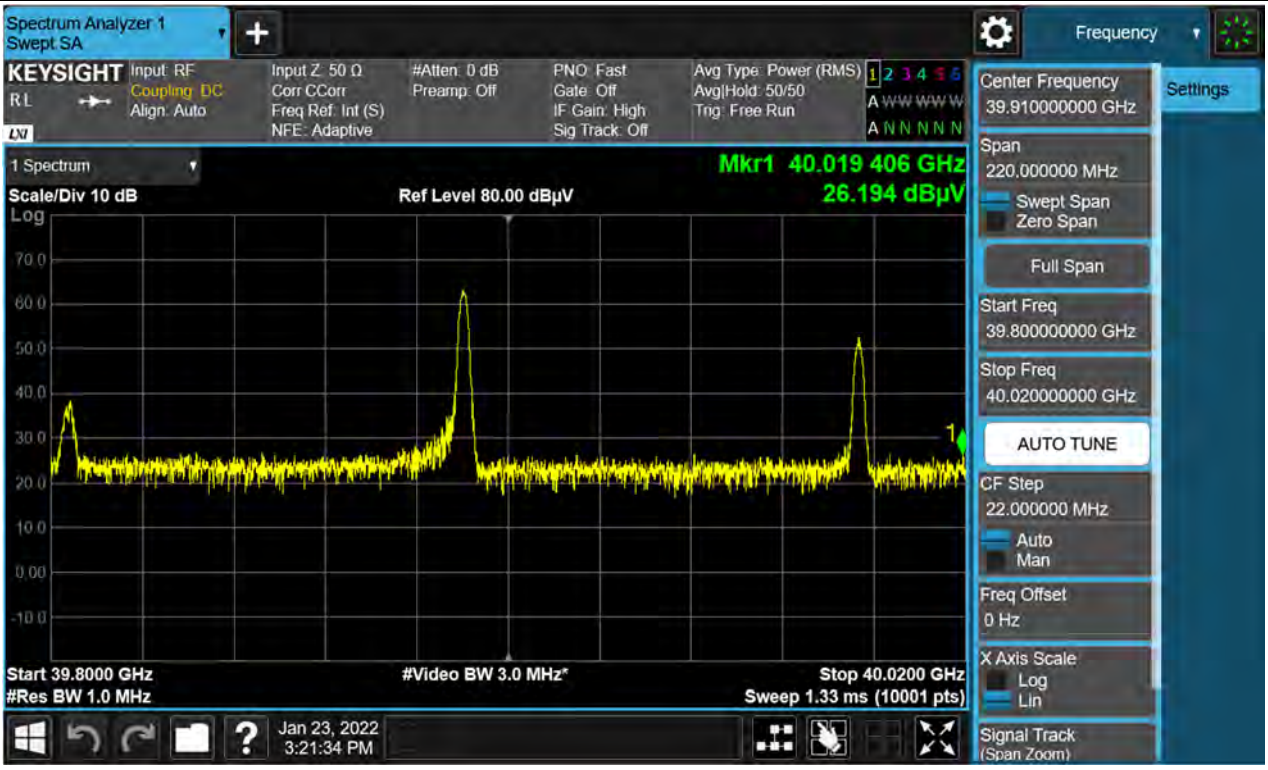
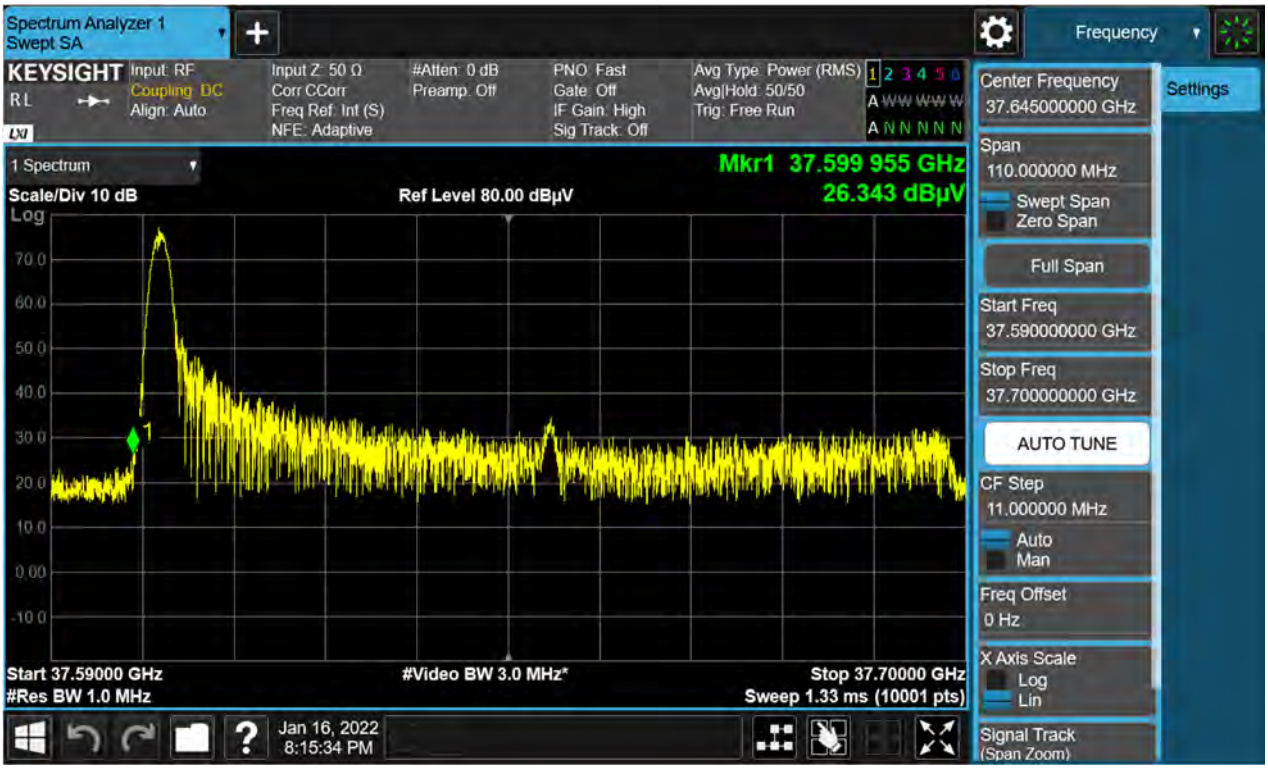
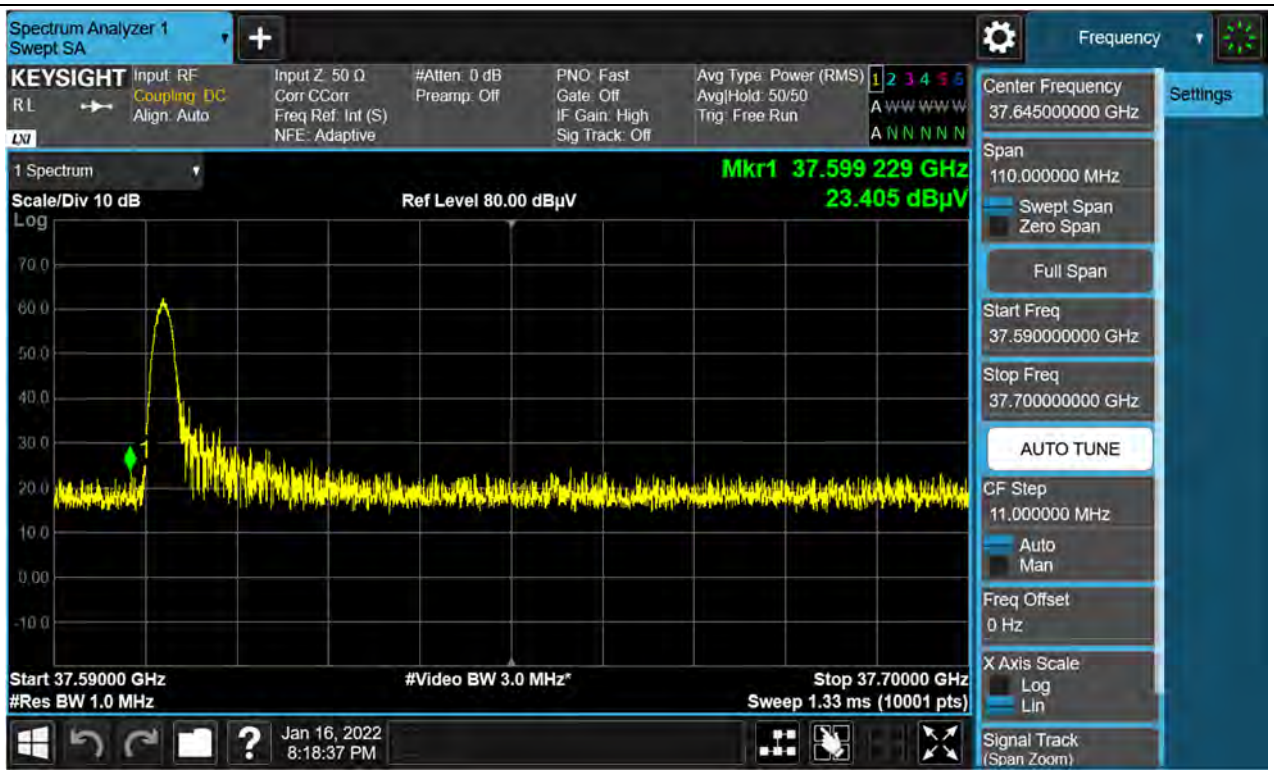


Single Test Signal / MAX Ant. A Position / 1cc / Low / Co-Pol.



Single Test Signal / MAX Ant. A Position / 1cc / Low / Cross-Pol.



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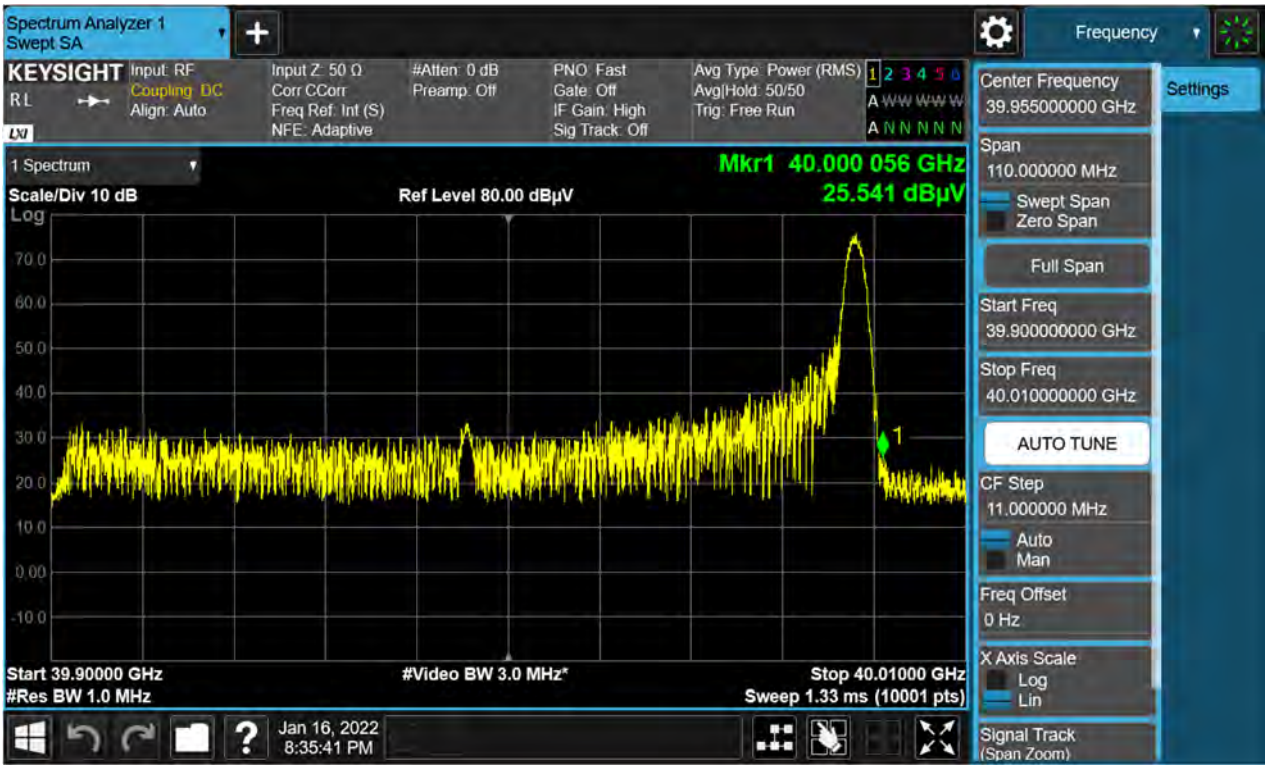

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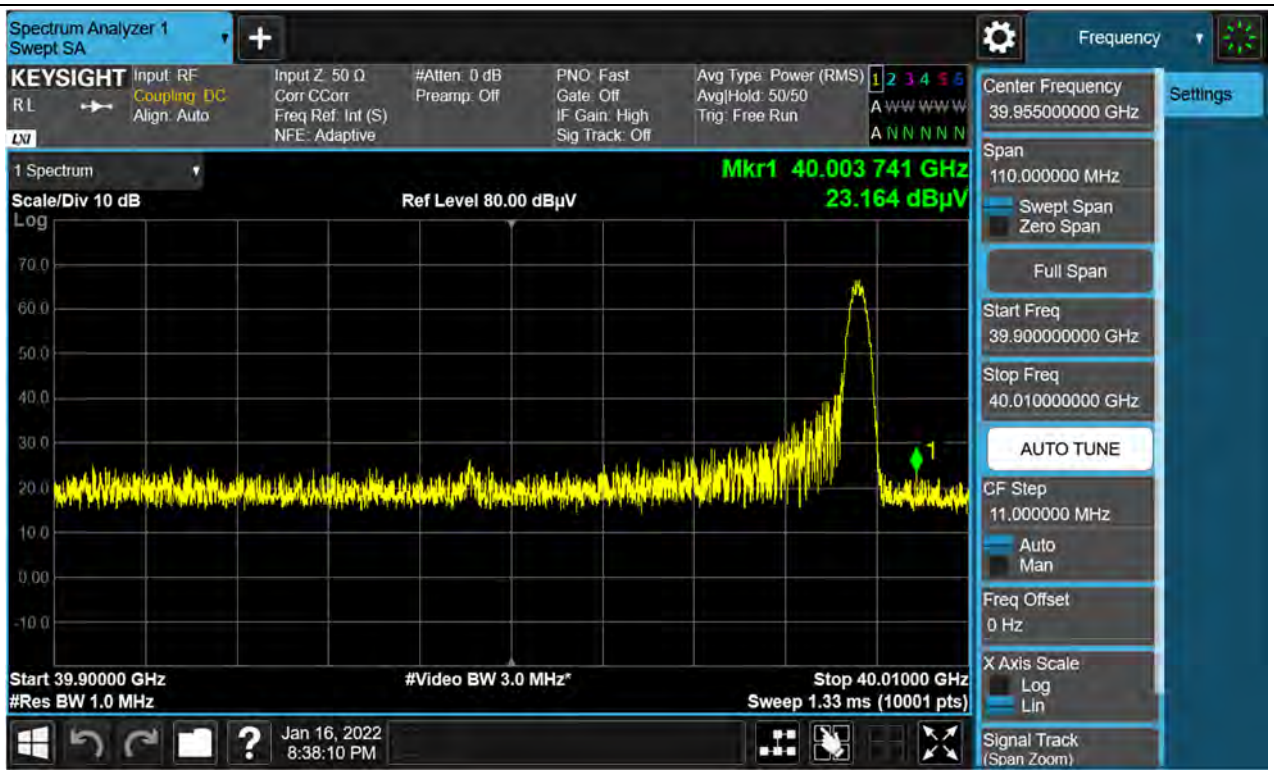

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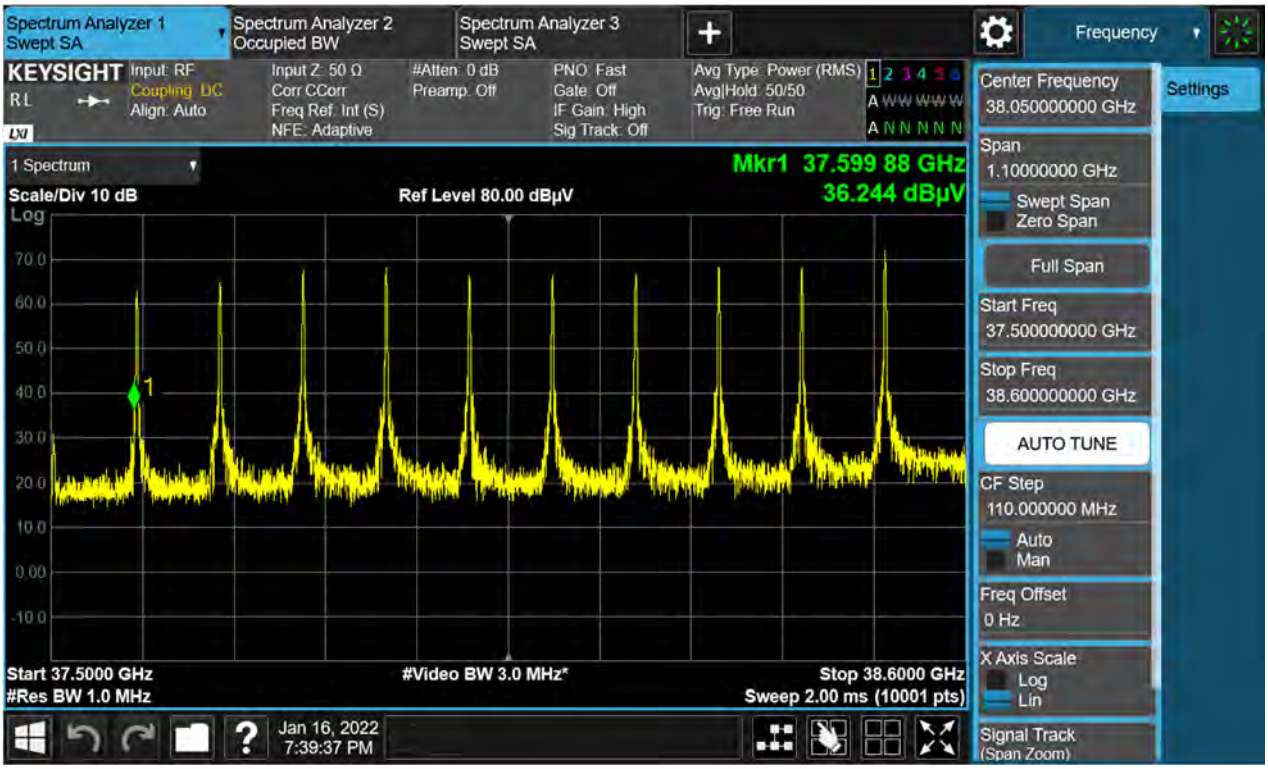
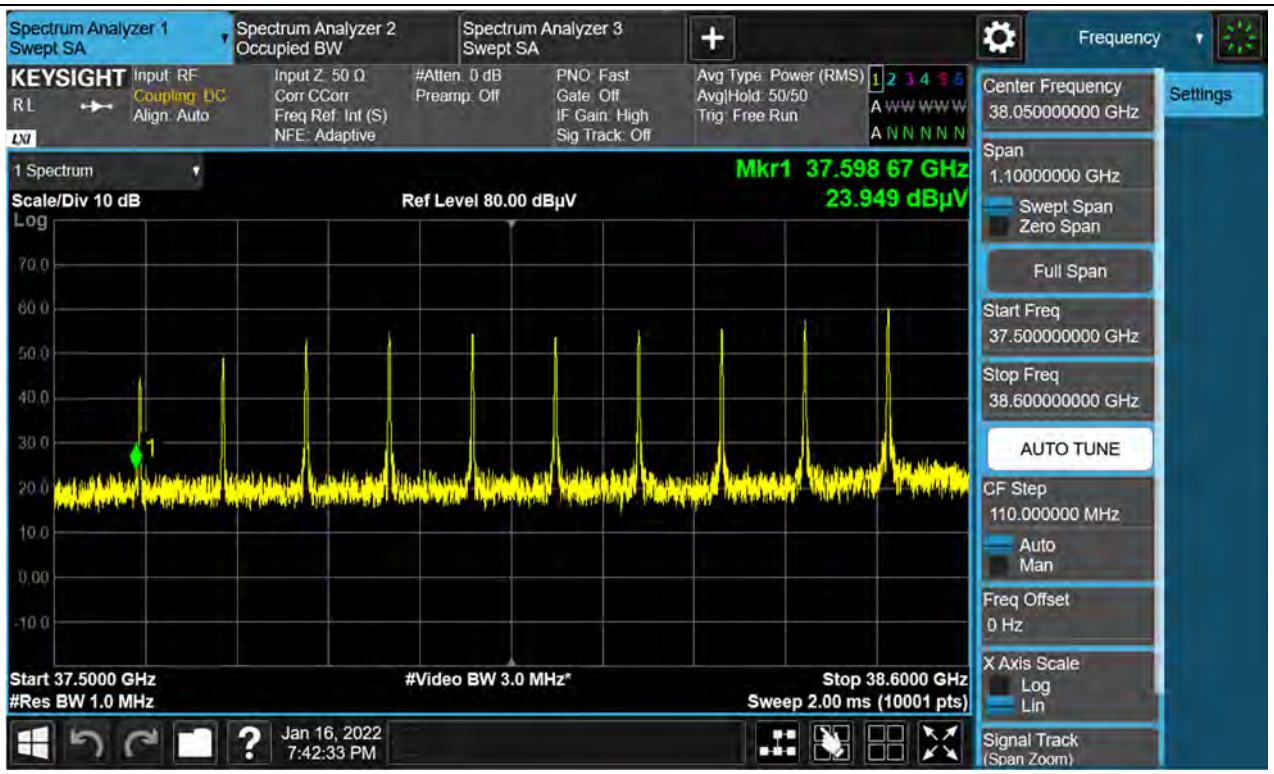
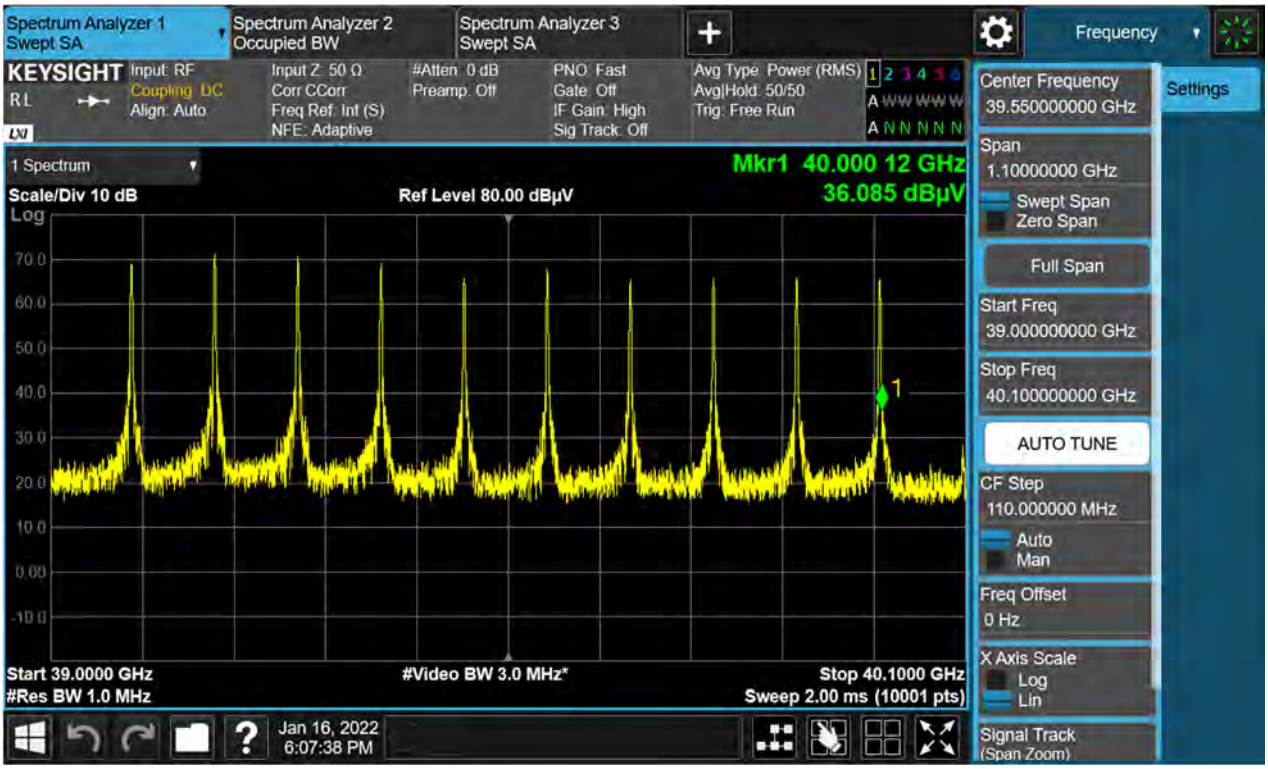


Single Test Signal / MAX Ant. A Position / 10cc / Low / Cross-Pol.



Single Test Signal / MAX Ant. A Position / 10cc / High / Co-Pol.



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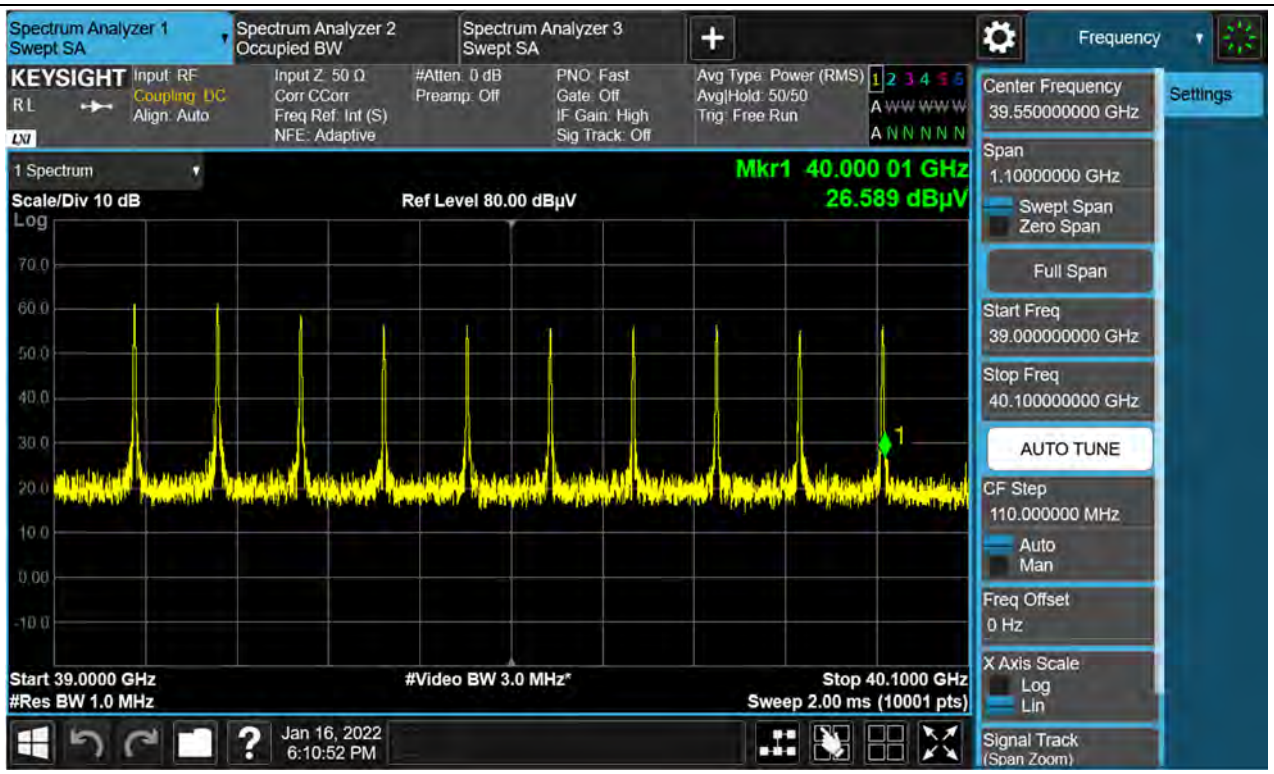
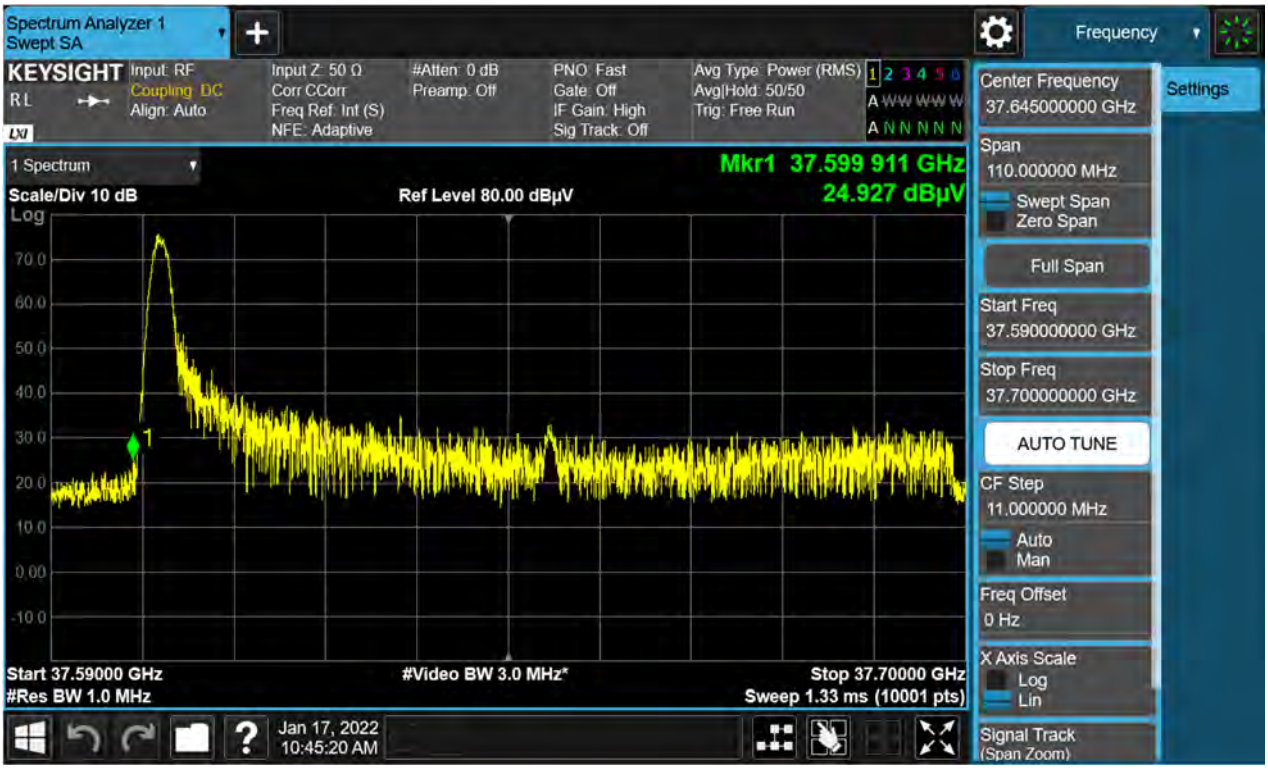


Single Test Signal / MAX Ant. B Position / 1cc / Low / Co-Pol.



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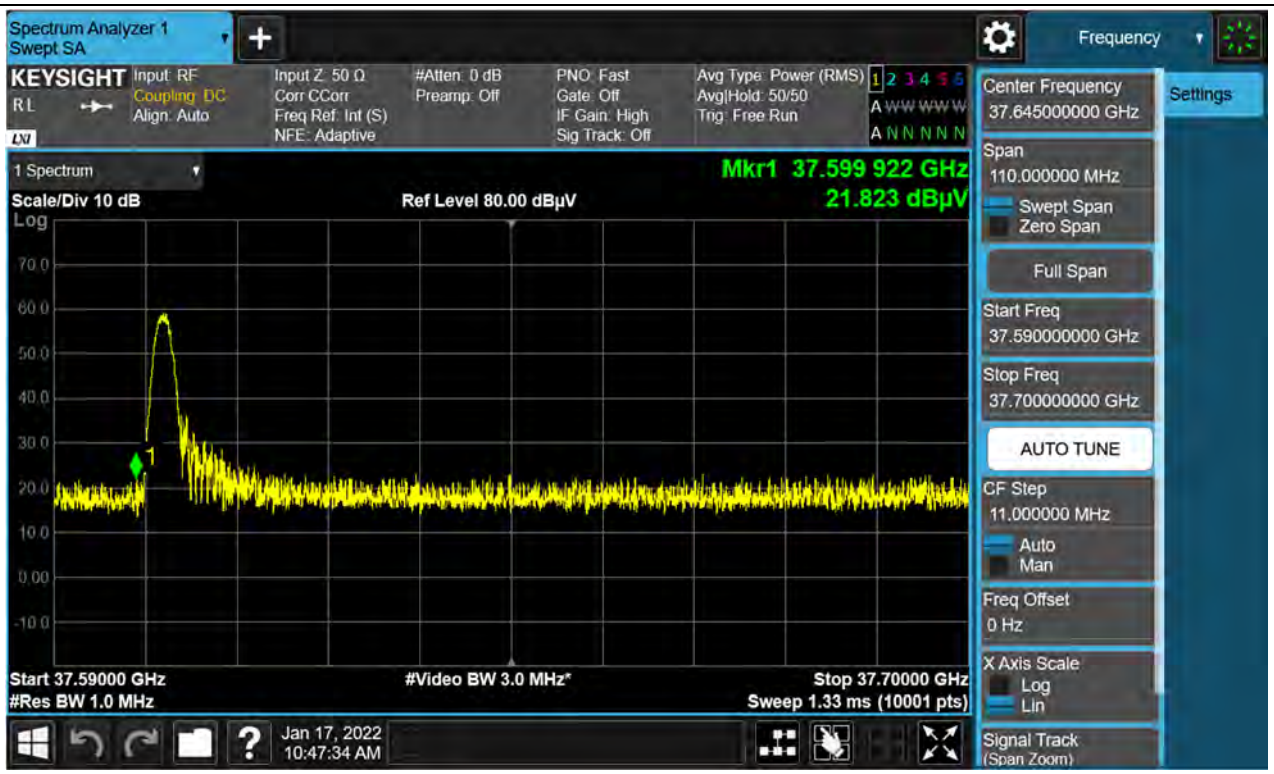
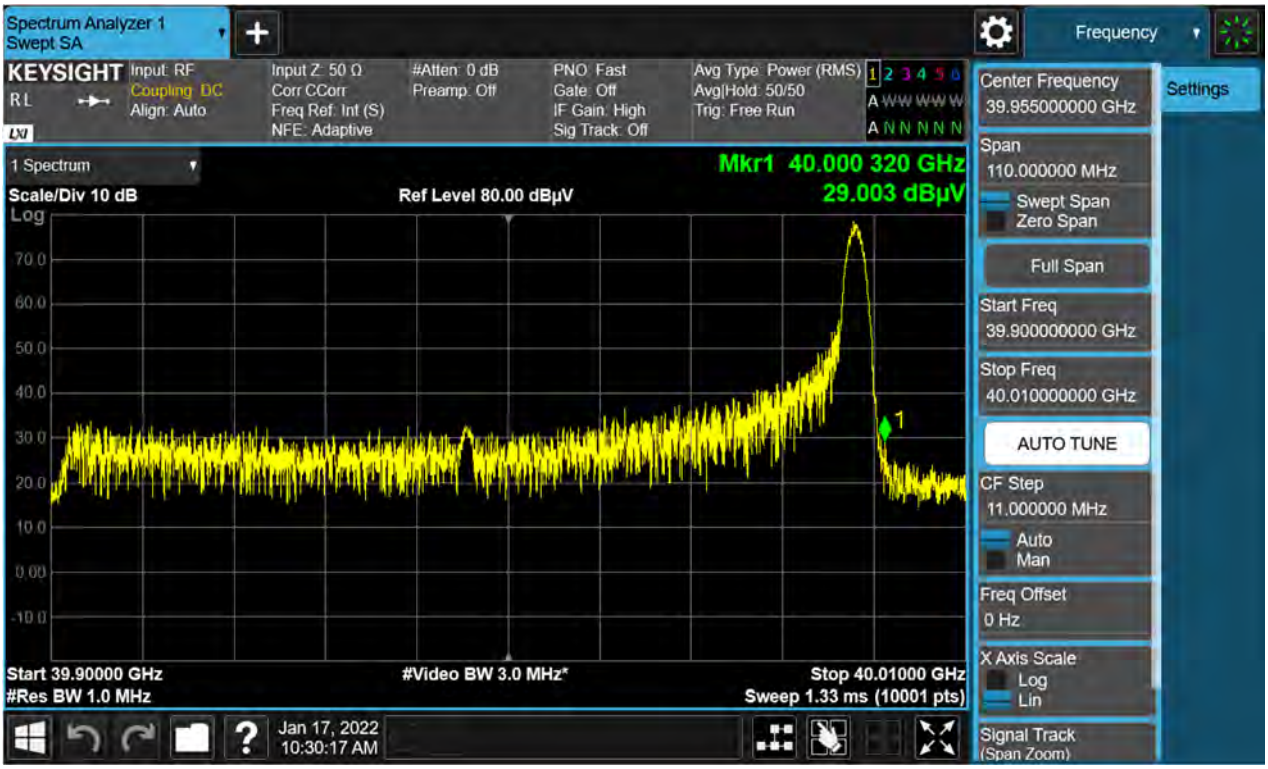
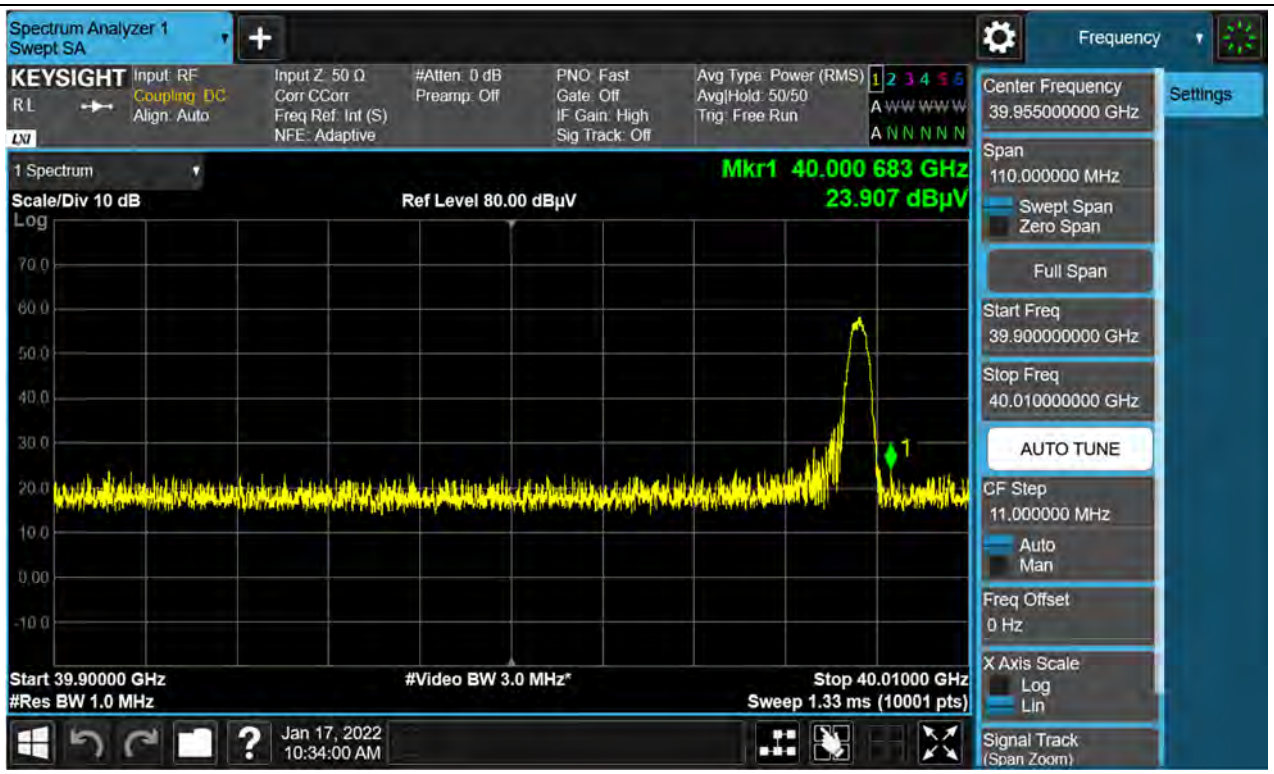


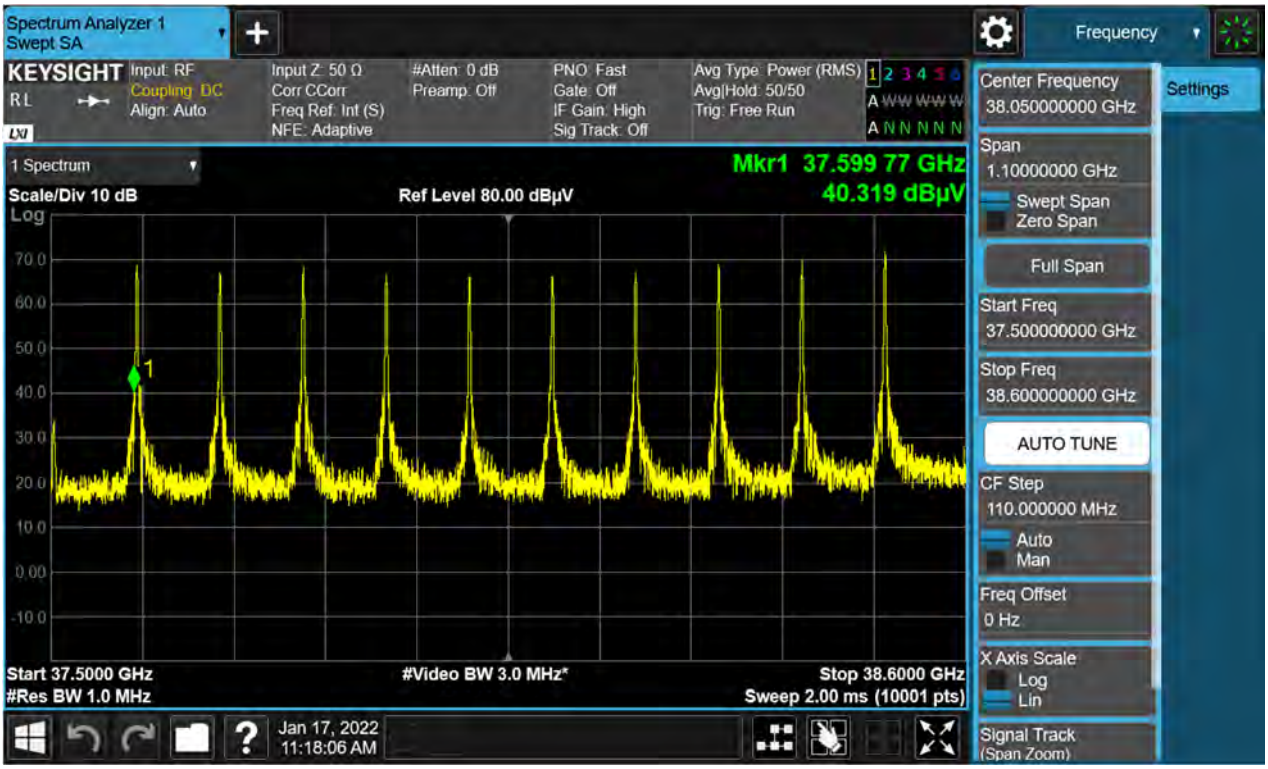
Single Test Signal / MAX Ant. B Position / 1cc / High / Co-Pol.



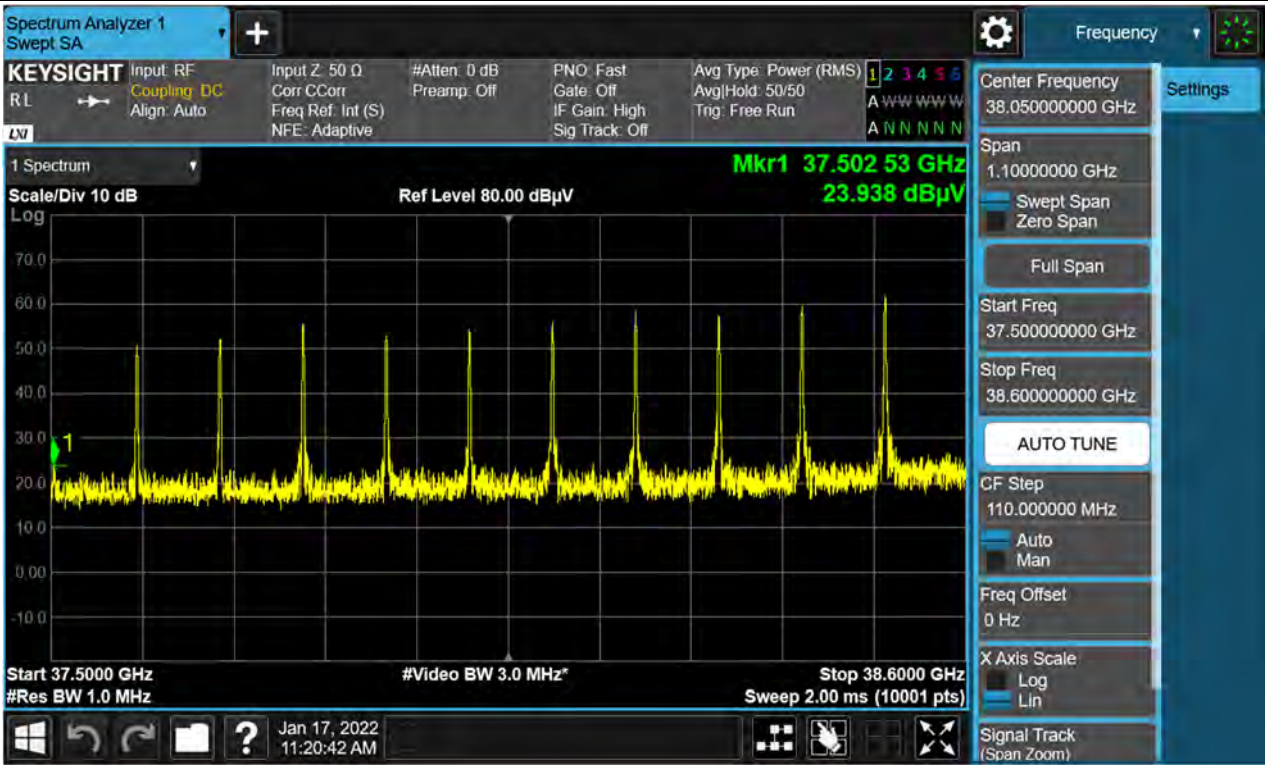
Single Test Signal / MAX Ant. B Position / 1cc / High / Cross-Pol.



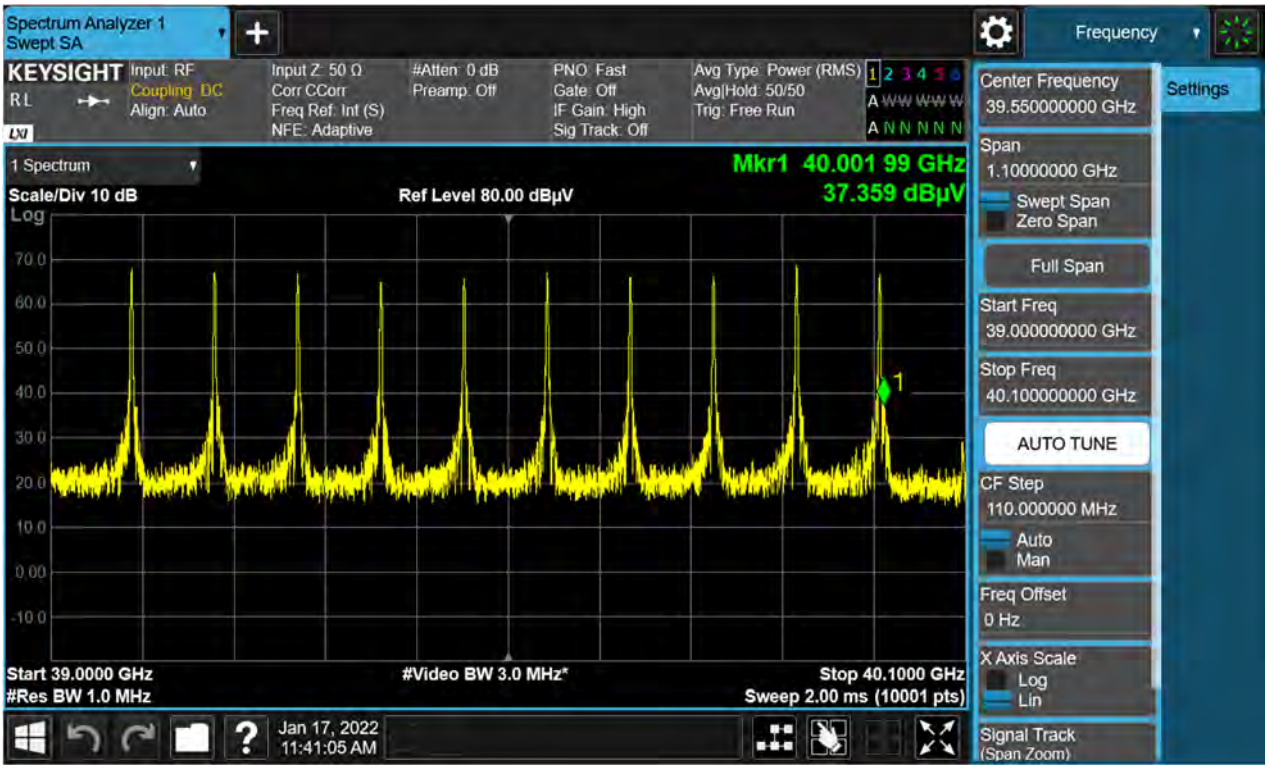
Single Test Signal / MAX Ant. B Position / 10cc / Low / Co-Pol.



Single Test Signal / MAX Ant. B Position / 10cc / Low / Cross-Pol.

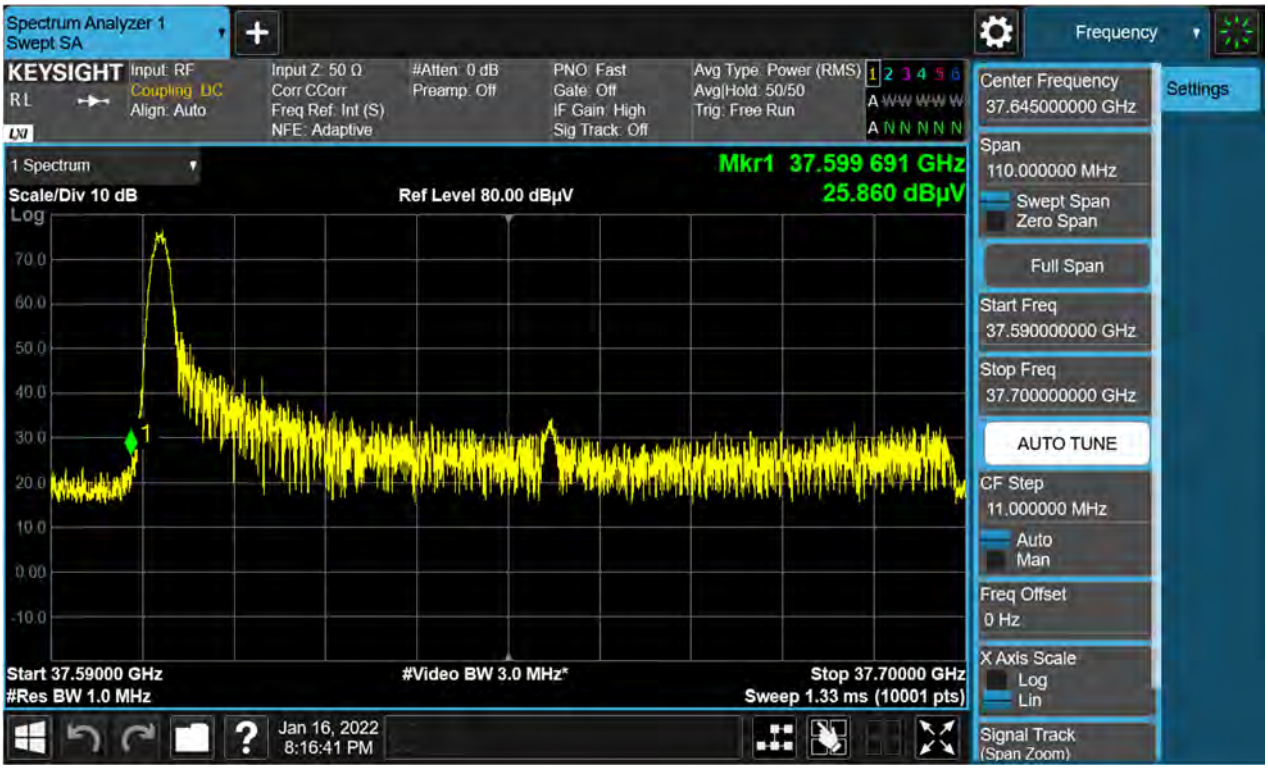


Single Test Signal / MAX Ant. B Position / 10cc / High / Co-Pol.

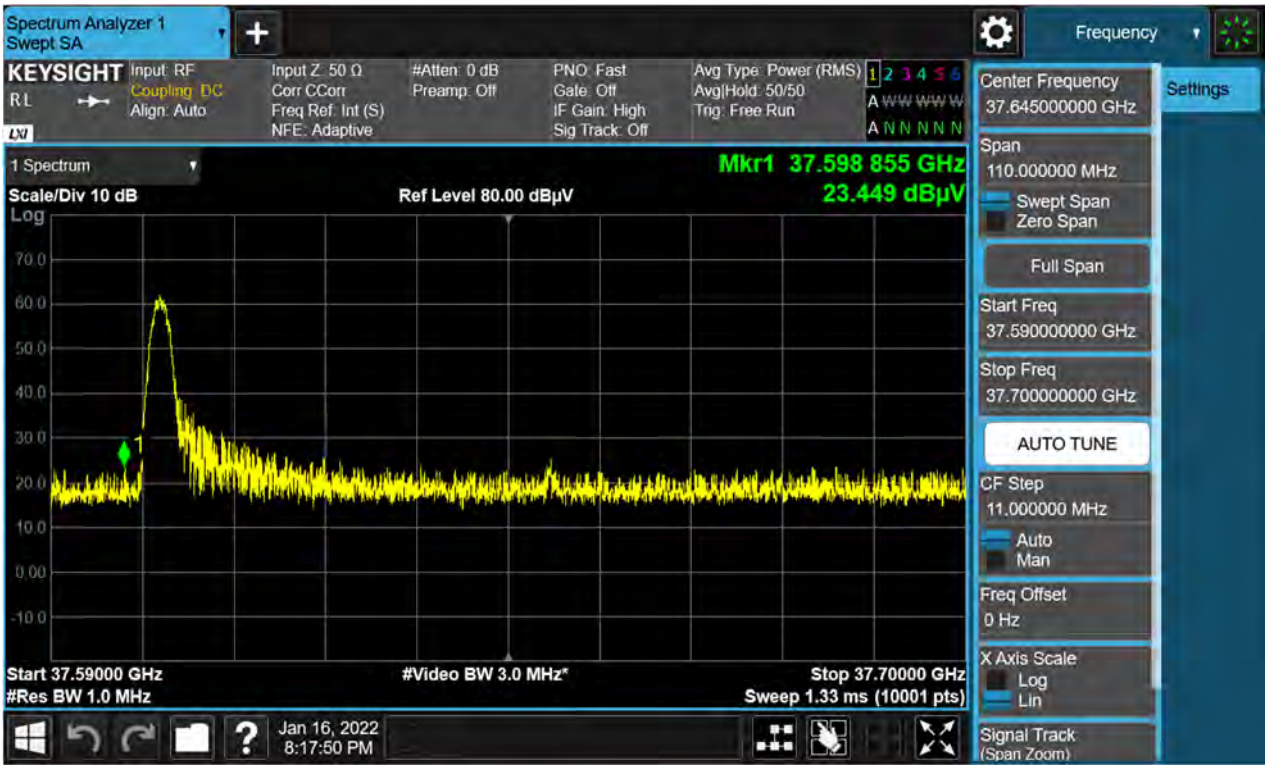


Single Test Signal / MAX Ant. B Position / 10cc / High / Cross-Pol.

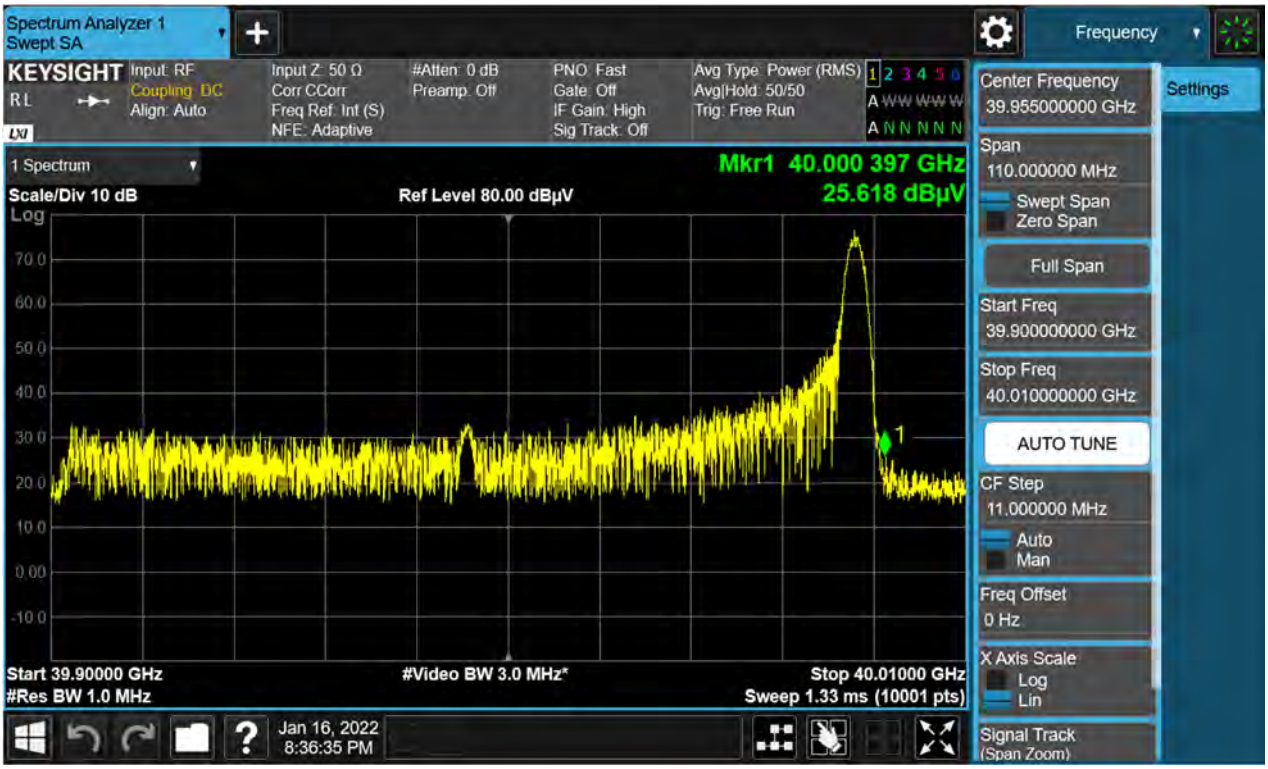
+3 dB above AGC threshold Single Test Signal / MAX Ant. A Position / 1cc / Low / Co-Pol.



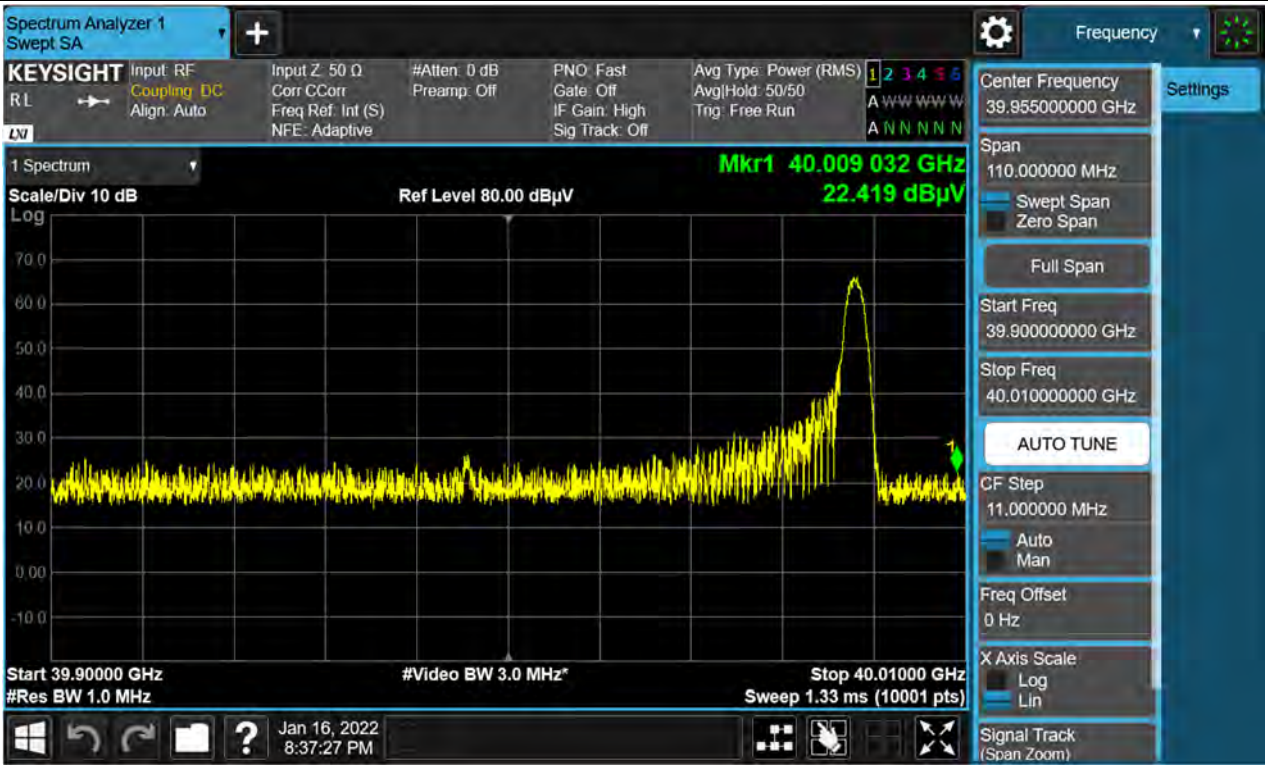
+3 dB above AGC threshold Single Test Signal / MAX Ant. A Position / 1cc / Low / Cross-Pol.



+3 dB above AGC threshold Single Test Signal / MAX Ant. A Position / 1cc / High / Co-Pol.



+3 dB above AGC threshold Single Test Signal / MAX Ant. A Position / 1cc / High / Cross-Pol.



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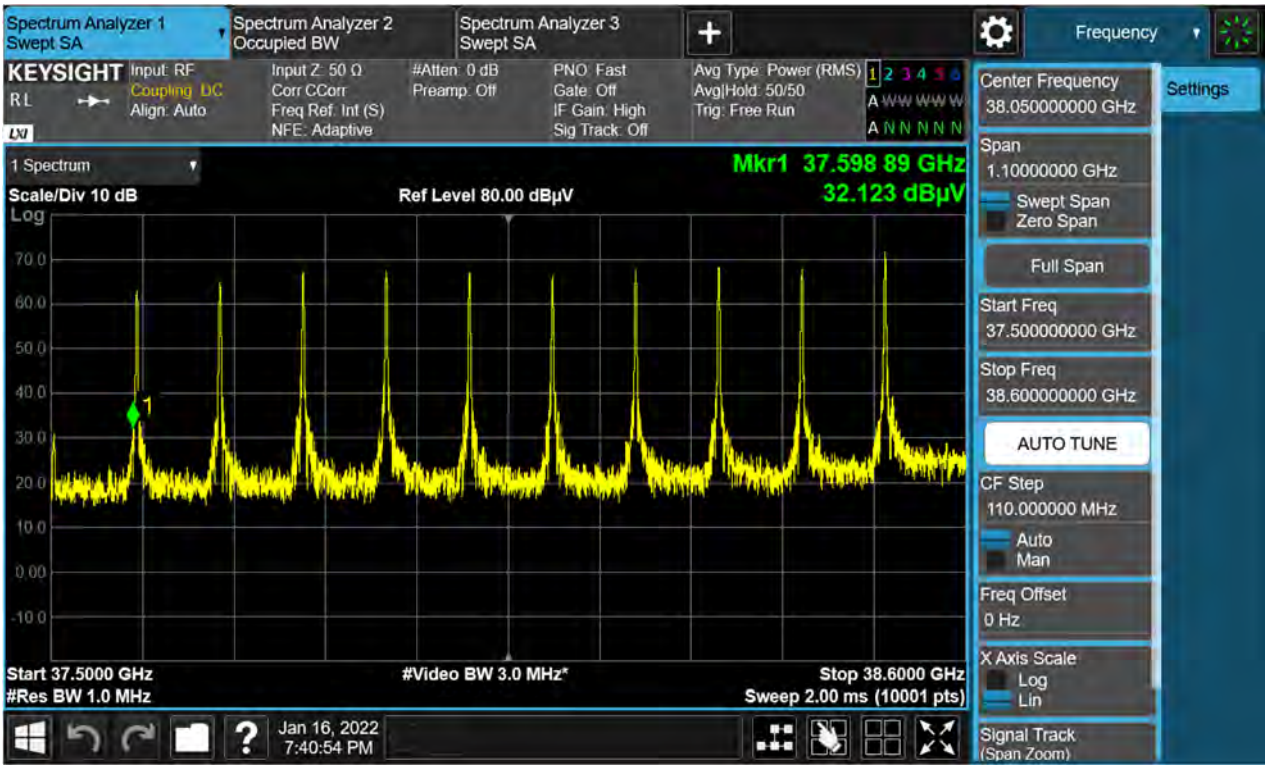
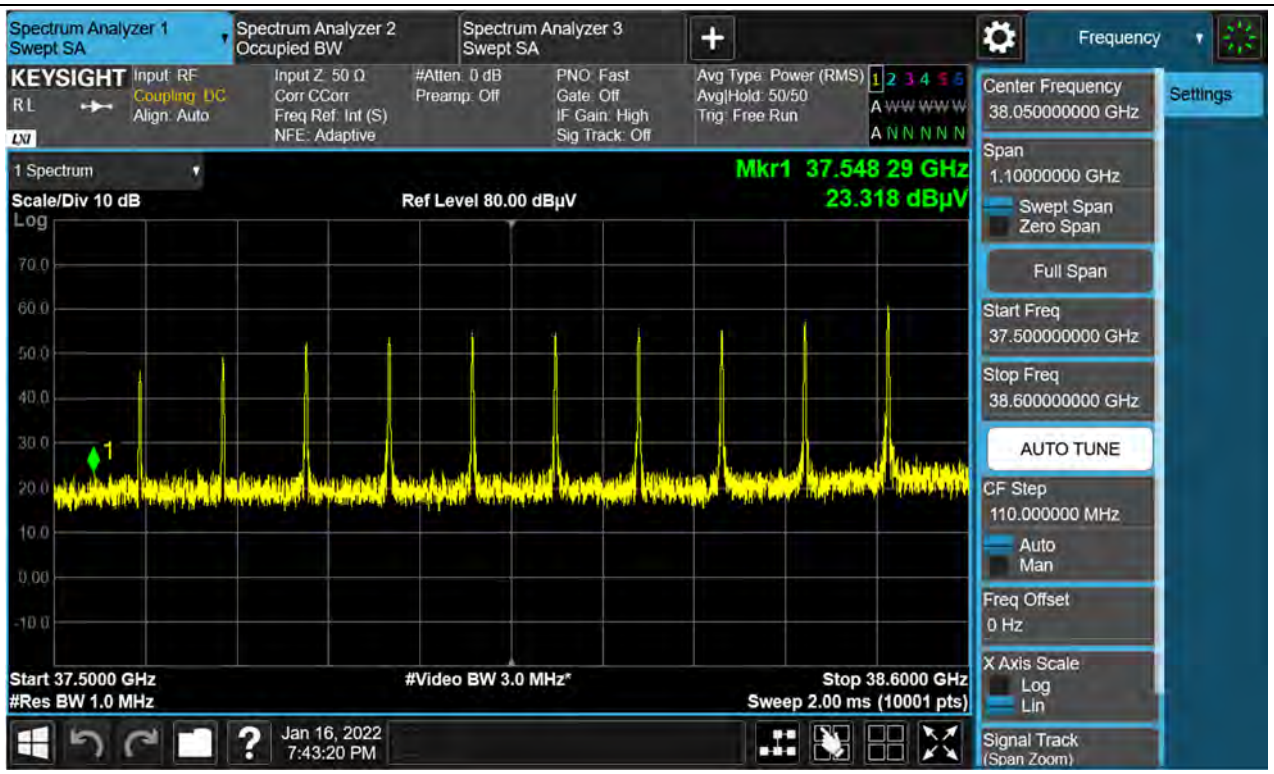
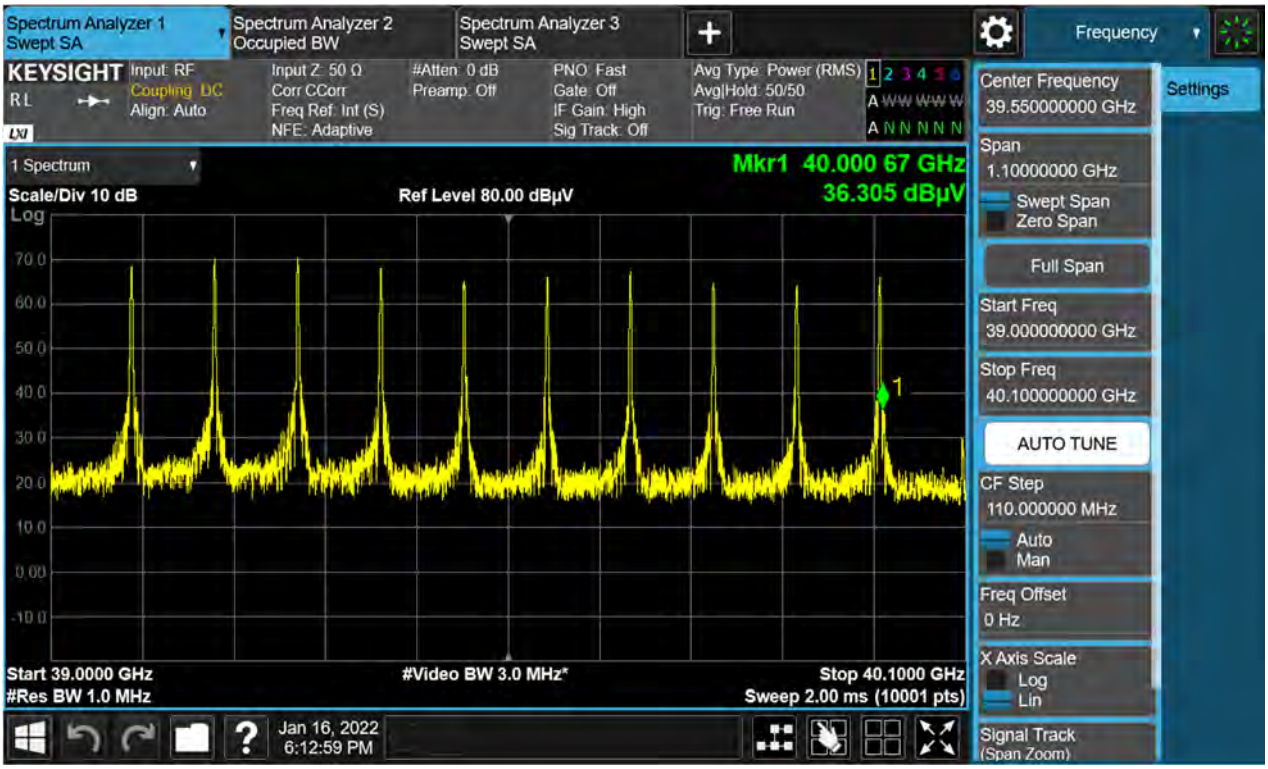


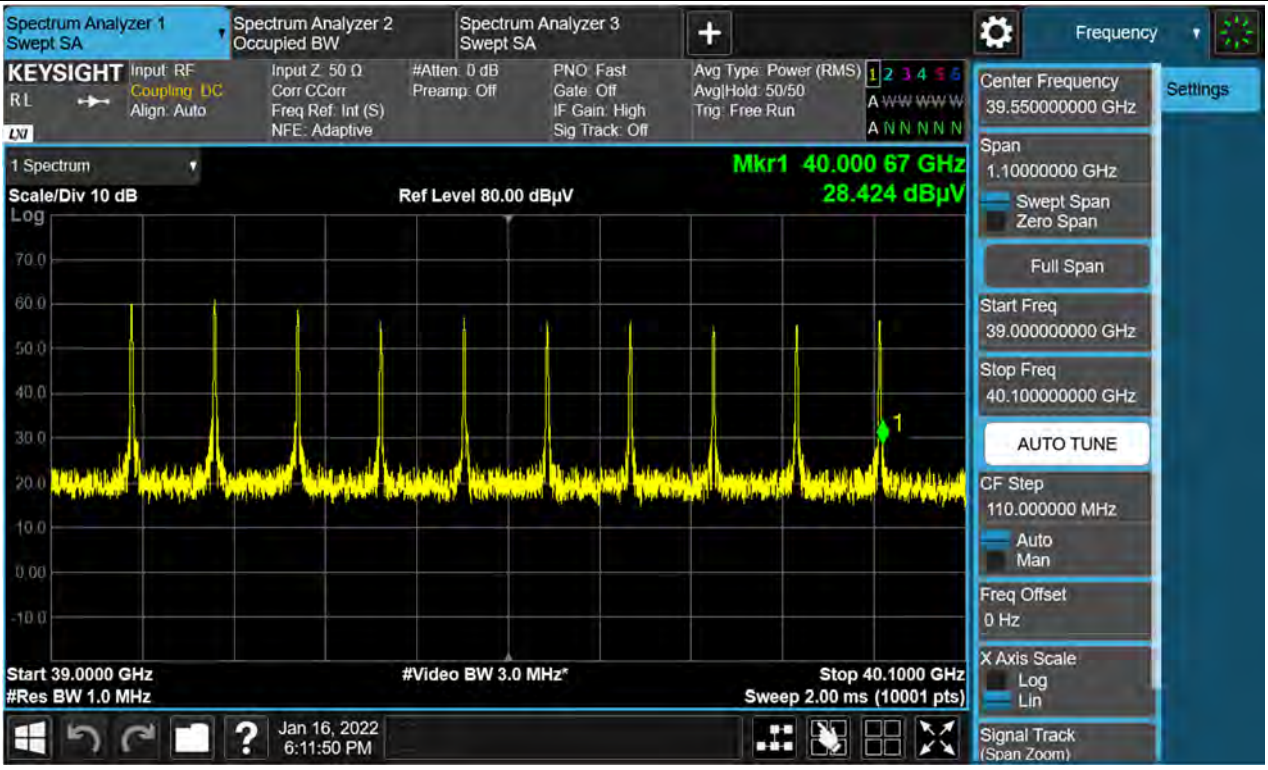
+3 dB above AGC threshold Single Test Signal / MAX Ant. A Position / 10cc / Low / Cross-Pol.



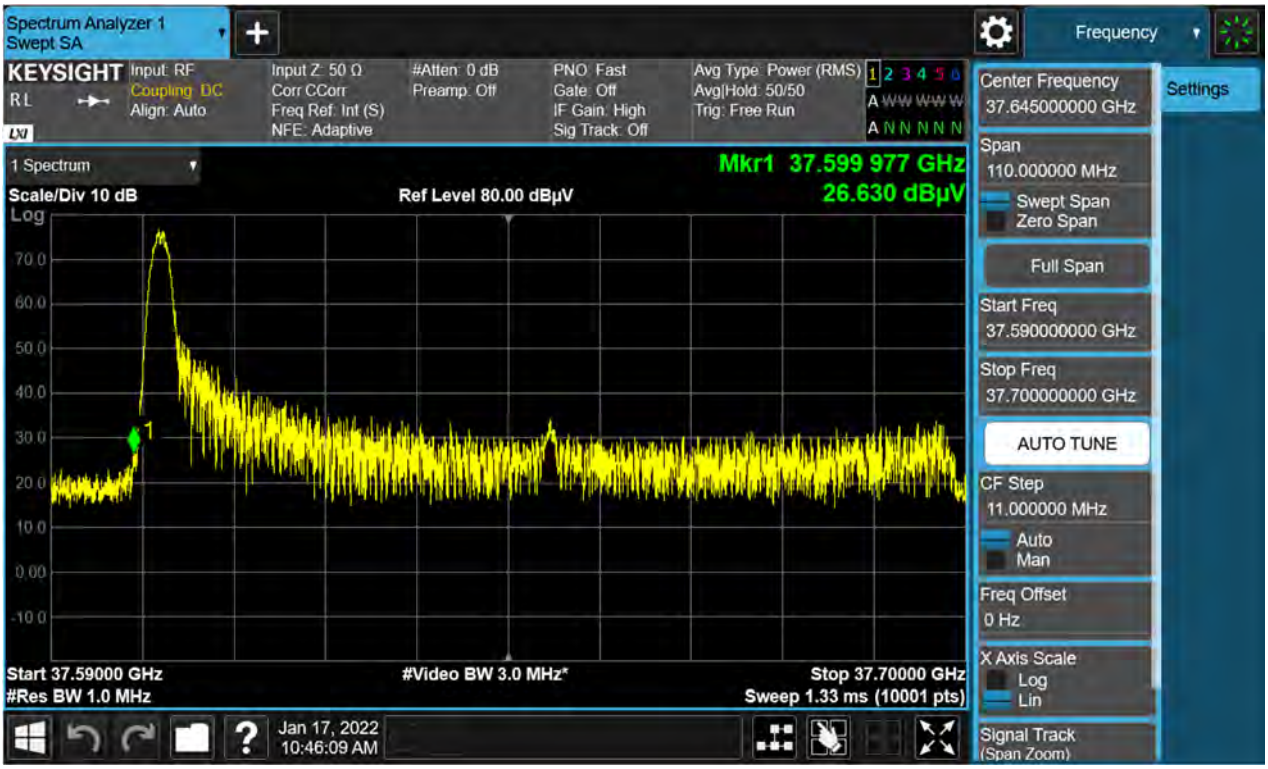
+3 dB above AGC threshold Single Test Signal / MAX Ant. A Position / 10cc / High / Co-Pol.



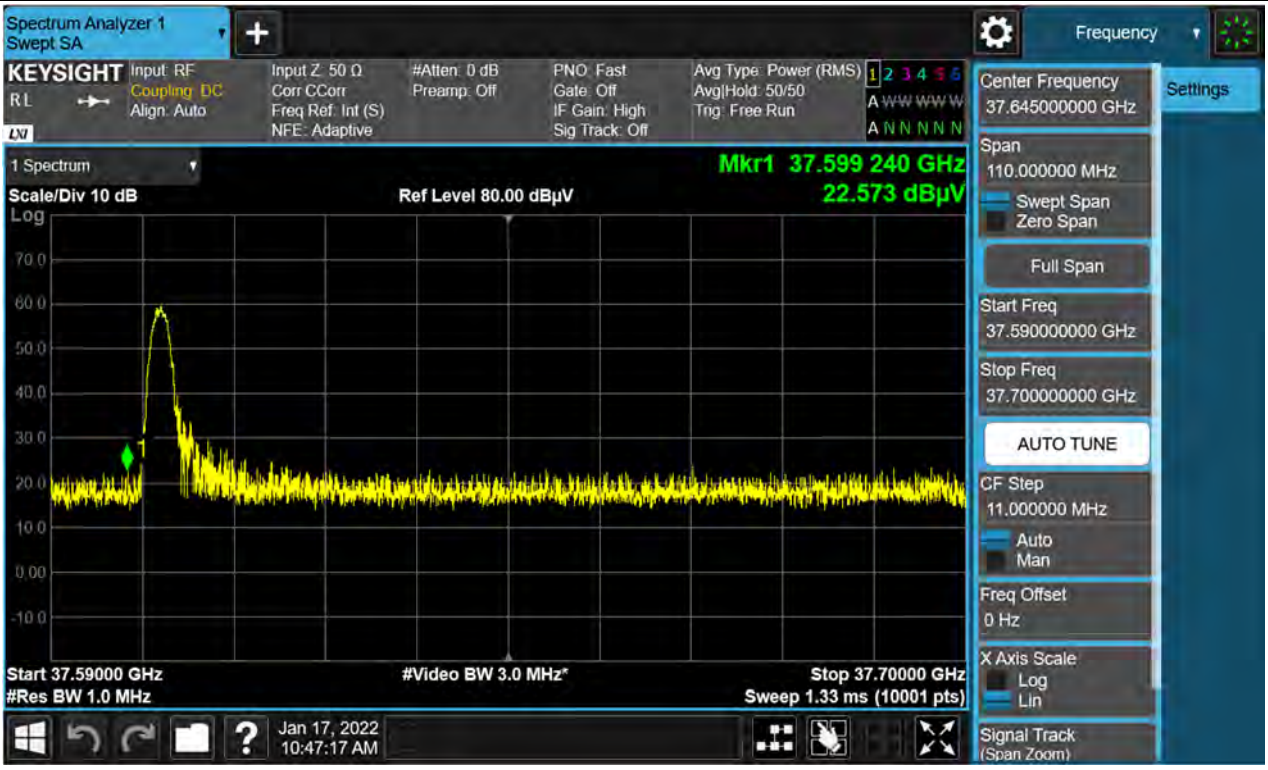
+3 dB above AGC threshold Single Test Signal / MAX Ant. A Position / 10cc / High / Cross-Pol.



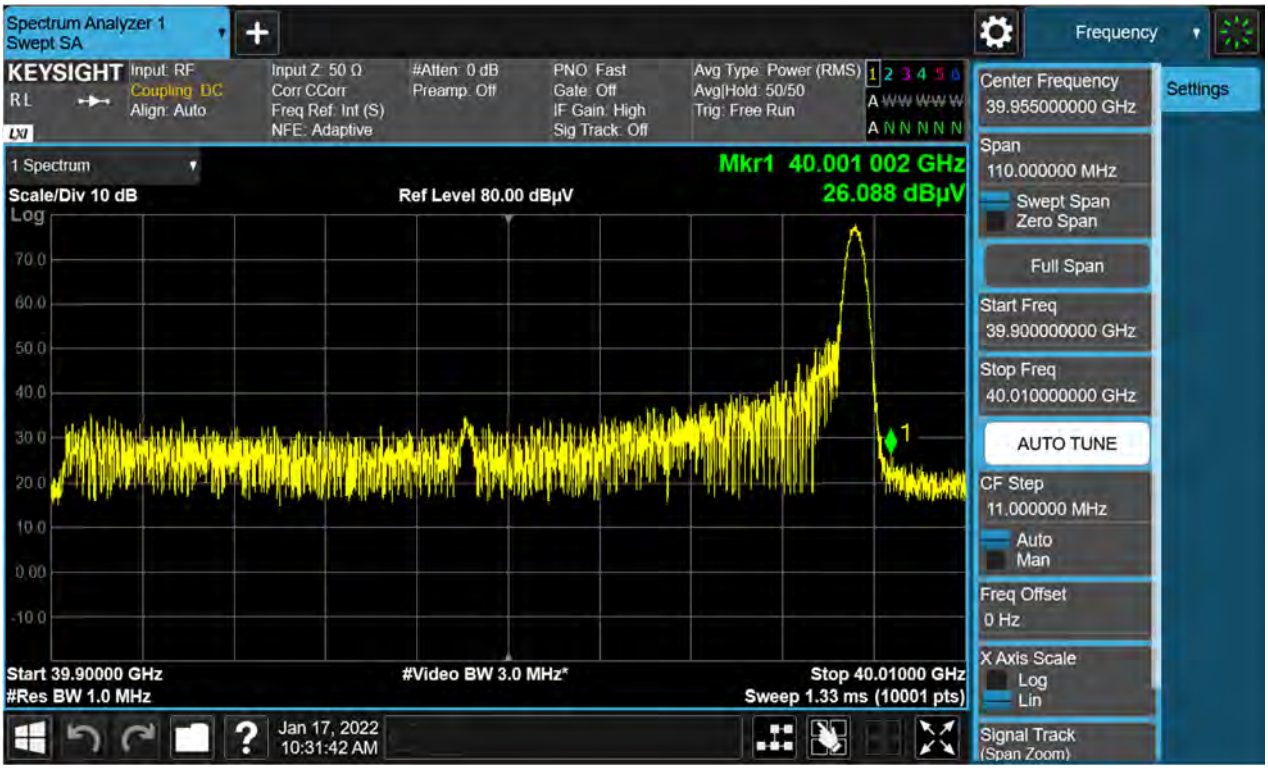
+3 dB above AGC threshold Single Test Signal / MAX Ant. B Position / 1cc / Low / Co-Pol.



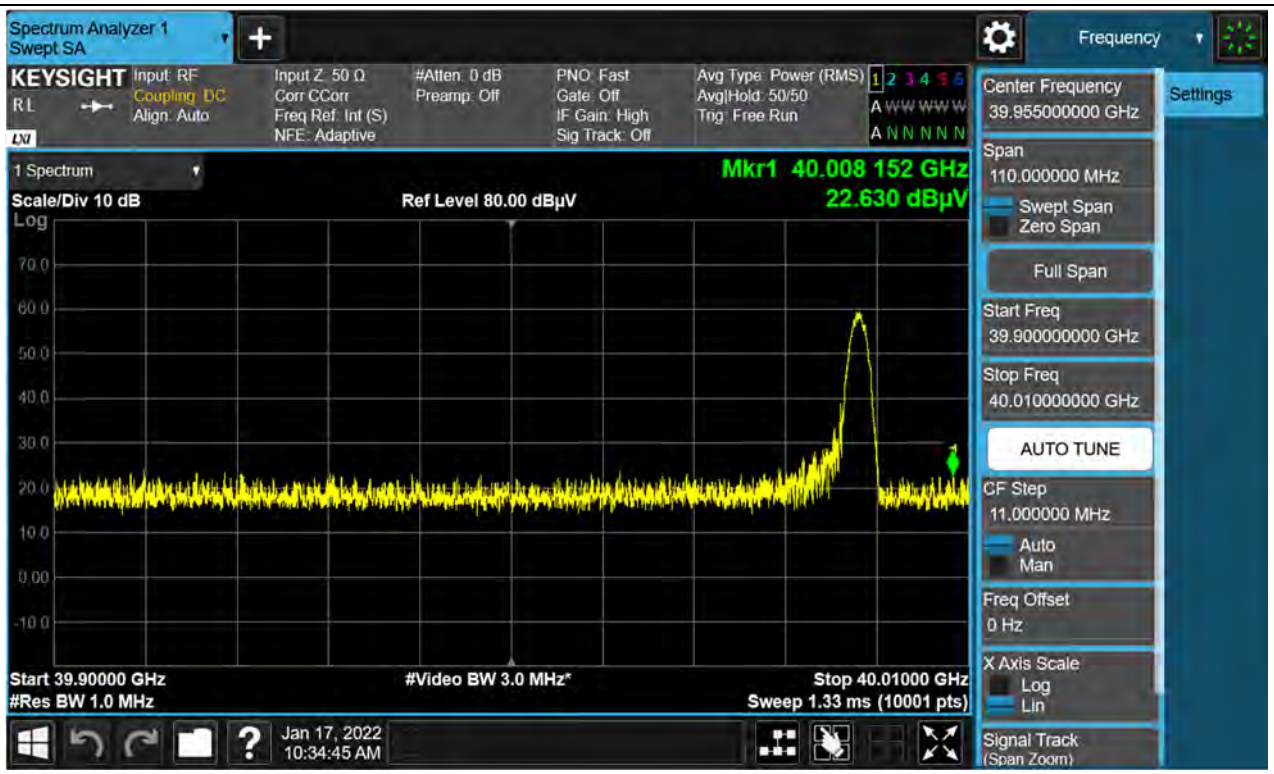
+3 dB above AGC threshold Single Test Signal / MAX Ant. B Position / 1cc / Low / Cross-Pol.



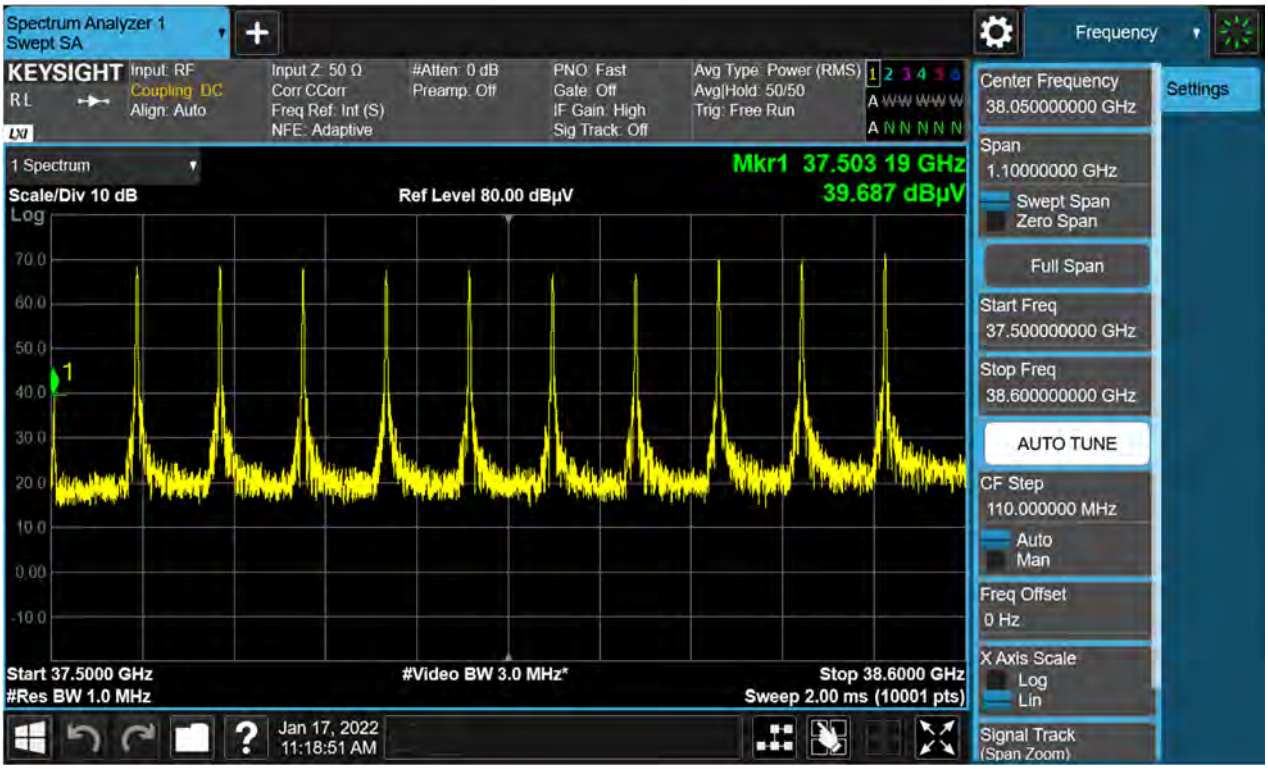
+3 dB above AGC threshold Single Test Signal / MAX Ant. B Position / 1cc / High / Co-Pol.



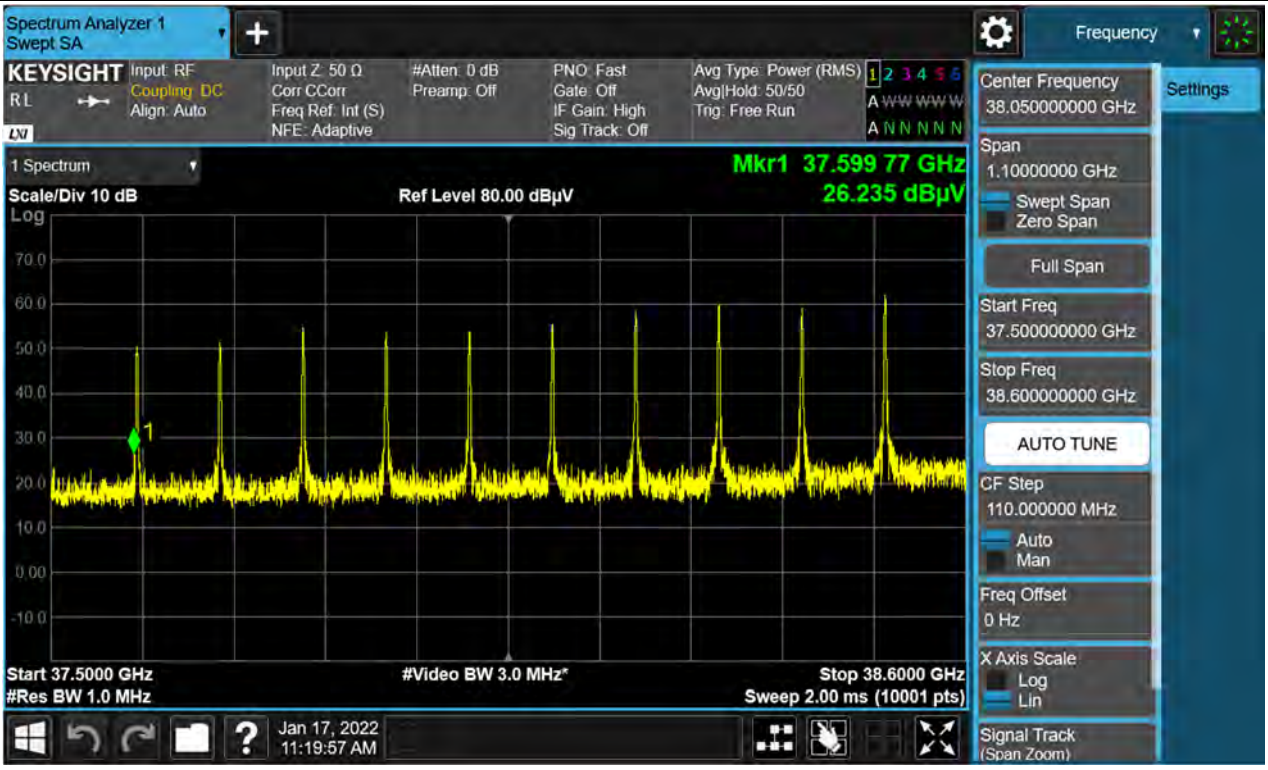
+3 dB above AGC threshold Single Test Signal / MAX Ant. B Position / 1cc / High / Cross-Pol.



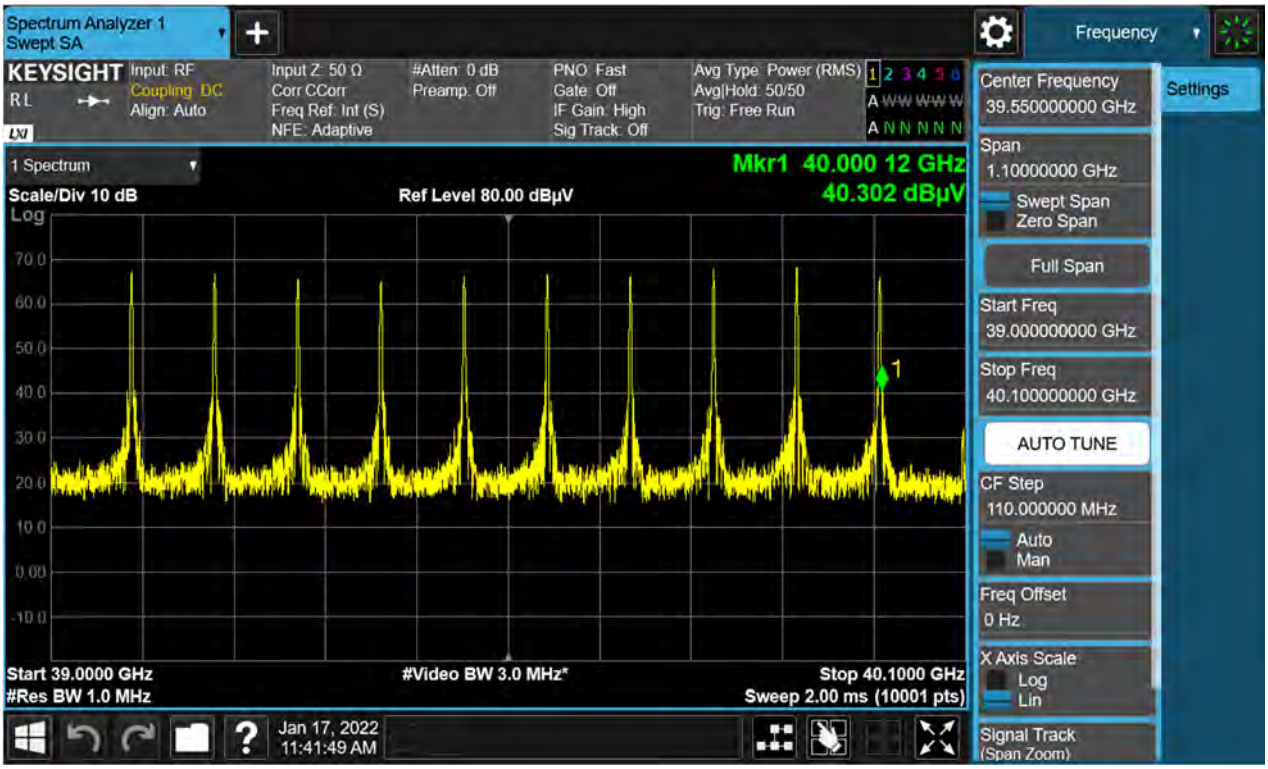
+3 dB above AGC threshold Single Test Signal / MAX Ant. B Position / 10cc / Low / Co-Pol.



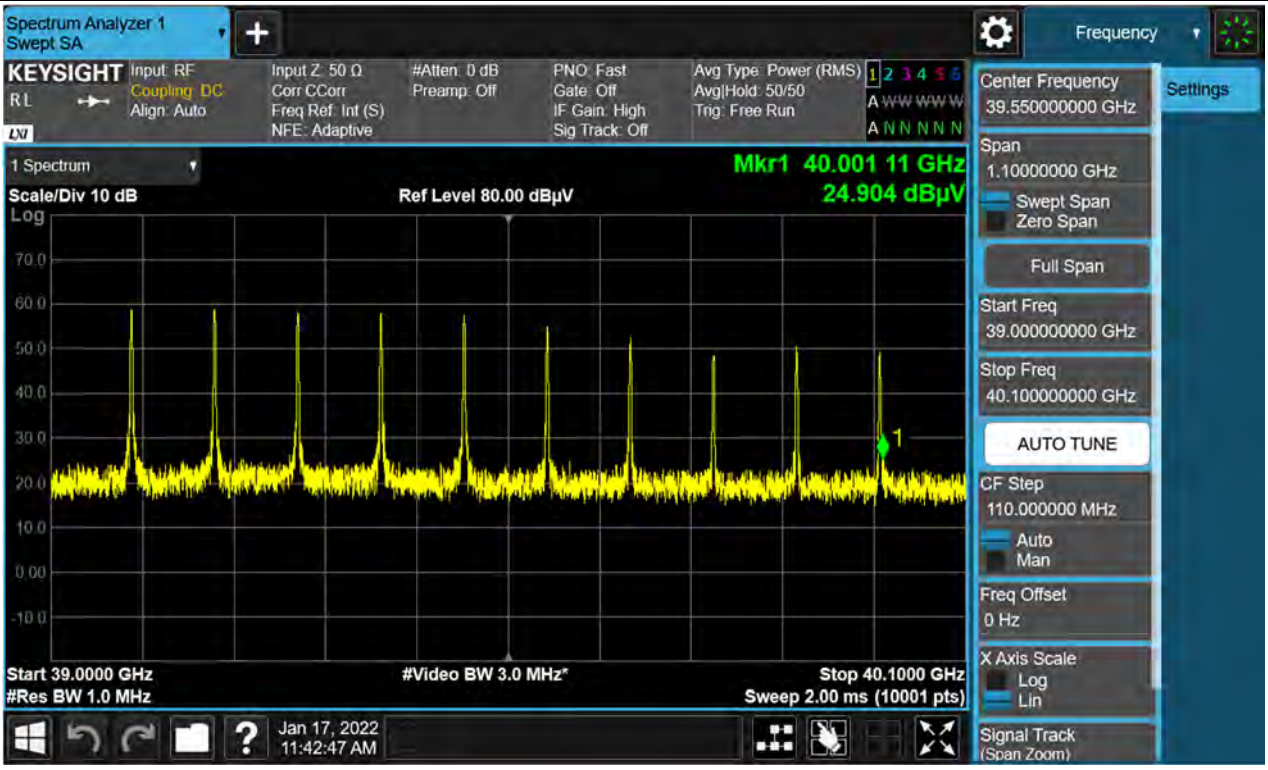
+3 dB above AGC threshold Single Test Signal / MAX Ant. B Position / 10cc / Low / Cross-Pol.



+3 dB above AGC threshold Single Test Signal / MAX Ant. B Position / 10cc / High / Co-Pol.



+3 dB above AGC threshold Single Test Signal / MAX Ant. B Position / 10cc / High / Cross-Pol.



5.7. RADIATED SPURIOUS EMISSIONS

FCC Rules

Test Requirements:

§ 2.1051 Measurements required: Spurious emissions at antenna terminals.

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 30.203 Emission limits.

(a) The conductive power or the total radiated power of any emission outside a licensee's frequency block shall be −13 dBm/MHz or lower. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be −5 dBm/MHz or lower.

(b) (1) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater.

(2) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges as the design permits.

(3) The measurements of emission power can be expressed in peak or average values.

Test Procedures:

The measurement is performed in accordance with Section 5.7.4 of ANSI C63.26.

5.7.4 Spurious unwanted emission measurements

a) Set the spectrum analyzer start frequency to the lowest frequency generated by the EUT, without going below 9 kHz, and the stop frequency to the lower frequency covered by the measurements previously performed in 5.7.3. As an alternative, the stop frequency can be set to the value specified in 5.1.1, depending on the EUT operating range, if the resulting plot can clearly demonstrate compliance for all frequencies not addressed by the out-of-band emissions measurements performed as per 5.7.3.

b) When using an average power (rms) detector, ensure that the number of points in the sweep ≥ 2 × (span / RBW). This may require that the measurement range defined by the start and stop frequencies be subdivided, depending on the spectrum analyzer capabilities. This requirement does not apply to peak-detected power measurements. When average power is specified by the applicable regulation, a peak-detector can be utilized for preliminary measurements to accommodate wider frequency spans. Any emissions found in the preliminary measurement to exceed the applicable limit(s) shall be further examined using a power averaging (rms) detector with the minimum number of measurement points as defined above.

c) The sweep time should be set to auto-couple for performing peak-detector measurements. For measurements that use a power averaging (rms) detector, the sweep time shall be set as described for out-of-band emissions measurements in item d) of 5.7.3.

d) Identify and measure the highest spurious emission levels in each frequency range. It is not necessary to re-measure the out-of-band emissions as a part of this test. Record the frequencies and amplitudes corresponding to the measured emissions and capture the data plots.

e) Repeat step b) through step d) for the upper spurious emission frequency range if not already captured by a wide span measurement performed as per the alternative provided in step a). The upper frequency for this measurement is defined in 5.1.1 as a function of the EUT operating range.

f) Compare the results with the corresponding limit in the applicable regulation.

g) The test report shall include the data plots of the measuring instrument display and the measured data.

TRP Test Procedures:

The measurement is performed in accordance with Section 4.4.3.3.2 of KDB 842590 v01 (2019-04).

a) Align the EUT with a chosen xy-plane and the xz-plane of the antenna measurement coordinate system.
NOTE 1: For harmonics and spurious emission frequencies which are beamforming as identified in exploratory scan, it may be required to align the orthogonal cuts to include the peak based on exploratory scans.

b) Measure the EUT dimensions, i.e., depth (d), width (w), and height (h); see Figure A.1 in Appendix A.

c) Calculate the spherical and cylindrical diameters (D and Dcyl) using Equations (A.1) and (A.2) (see Appendix A).

d) For the highest frequency (smallest wavelength) of the frequency band measured, calculate the reference angular steps $\Delta\theta$ref and $\Delta\phi$ref using Equations (A.3) and (A.4).

e) Set the grid spatial sampling step $\Delta\theta \leq \Delta\theta$ref for the vertical angle and $\Delta\phi \leq \Delta\phi$ref for the horizontal cut.

f) For each emission frequency, measure the EIRP (as a sum of two orthogonal polarizations) at each spatial sampling step on the selected grid.

g) For each emission frequency, calculate the average EIRP for both the cuts separately, and then take the average of these two average values.

h) Add 2 dB as a correction factor to the averaged value computed in step g).

i) If the TRP limit is exceeded, a third orthogonal cut in the yz-plane and using the $\Delta\theta$ angular step, can be added. Now, calculate the average values in all three cuts separately, and then take the average value of these three average values.

j) Add 1.5 dB as a correction factor to the averaged value computed in step i).

k) Evaluate the pass/fail decision by comparing TRP from step h) or step j) against the applicable TRP limit.

Note:

1. Spurious emission test is performed up to 200 GHz frequency according to section 5.1.1 of ANSI C63.26-2015.
2. Measurement distance is applied far field condition; see test descriptions on section 3.2.
3. In case of 9 kHz to 30 MHz and 30 MHz to 1 GHz, the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
4. Test plot(1 GHz ~ 40 GHz) doesn't include any factors and all factors such as AFCL is calculated in tabular data.
5. We were performed the test in MIMO mode.
6. In this test, AFCL factor consists of antenna factor, cable loss, and extension module.
7. Emissions value is first converted by distance factor as follow.

Converted value (dBm) = Measured Value (dBuV) + 20 LOG(D) - 104.77

8. Final spurious emissions result is calculated as follow.

Spurious Emissions = Converted Value (dBm) + AFCL

9. Sample calculation:

62.48 dBμV (measured Value) – 95.2 + 5.8(AFCL) = -26.92 dBm

10. we are attached only the worst case plot.

Test Results:

[Full RB] Tabular Data of Radiated Spurious Emissions

Freq.	Distance (m)	Ant. Path	Carrier	Channel	Frequency (GHz)	Measured (dBuV)	Result (dBm/MHz)	Limit (dBm/MHz)
9 kHz ~ 30 MHz	No critical peaks found							
30 MHz ~ 1 GHz	No critical peaks found							
1 GHz ~ 18 GHz	3.0	A	1	Middle	1228.650	64.660	-46.980	-13
					3071.875	60.090	-45.300	
					4986.925	53.030	-47.160	
					11266.725	62.480	-26.920	
					12549.800	49.370	-38.960	
			10	Low	1228.650	64.700	-46.940	
					3071.875	59.720	-45.670	
					11033.400	64.670	-24.980	
					12549.800	49.850	-38.480	
		B	1	Middle	1228.650	64.730	-46.910	
					3071.875	60.160	-45.230	
					4423.800	47.650	-54.210	
					11266.725	62.480	-26.920	
					12549.800	49.420	-38.910	
			10	Low	1228.650	64.660	-46.980	
					3071.875	59.810	-45.580	
					11033.400	64.670	-24.980	
					12549.800	49.240	-39.090	

Note: Only peak value is recorded in this report.

Freq.	Distance (m)	Ant. Path	Carrier	Channel	Frequency (GHz)	Measured (dBuV)	Result (dBm/MHz)	Limit (dBm/MHz)	TRP (dBm)
18 GHz ~ Low Edge	3.0	A	1	Low	37.59000	26.226	-16.072	-13	-
				Middle	34.51349	22.164	-26.312		-
				High	35.95458	22.312	-24.452		-
			10	Low	37.49610	23.557	-19.021		-
				Middle	35.64980	22.726	-24.225		-
				High	34.97899	22.337	-25.780		-
		B	1	Low	37.58900	26.130	-16.168		-
				Middle	35.04857	22.556	-25.017		-
				High	34.95008	23.164	-24.928		-
			10	Low	37.45950	23.348	-19.378		-
				Middle	35.46262	21.869	-25.483		-
				High	35.22350	22.950	-24.744		-
High Edge ~ 50 GHz	1.5	A	1	Low	49.87075	30.252	-19.706	-13	-
				Middle	49.89175	30.190	-19.688		-
				High	40.01325	39.325	-11.033 *		-16.127
			10	Low	49.24875	30.121	-19.837		-
				Middle	49.98650	30.447	-19.511		-
				High	49.43422	30.547	-19.801		-
		B	1	Low	49.54325	30.458	-19.420		-
				Middle	49.93575	30.331	-19.547		-
				High	40.01275	37.819	-12.539 *		-16.664
			10	Low	49.54800	30.533	-19.815		-
				Middle	49.52775	30.158	-19.720		-
				High	49.45624	30.309	-20.039		-
50 GHz ~ 60 GHz	1.5	A	1	Low	59.80563	30.160	-16.948	-13	-
				Middle	59.75863	30.160	-16.948		-
				High	59.79688	29.930	-17.178		-
			10	Low	59.77238	30.090	-17.018		-
				Middle	59.82788	30.250	-16.858		-
				High	59.80738	30.170	-16.938		-
		B	1	Low	59.78488	30.060	-17.048		-
				Middle	59.80138	30.320	-16.788		-
				High	59.77163	30.190	-16.918		-
			10	Low	59.75738	30.280	-16.828		-
				Middle	59.74113	30.250	-16.858		-
				High	59.79088	30.130	-16.978		-

60 GHz ~ 90 GHz	1.0	A	1	Low	75.30075	4.659	-30.125	-13	-
				Middle	75.30075	4.468	-30.316		-
				High	69.90075	6.300	-28.818		-
			10	Low	75.30075	4.897	-29.887		-
				Middle	75.30075	4.024	-30.760		-
				High	69.00075	2.936	-32.476		-
		B	1	Low	75.30075	5.520	-29.264		-
				Middle	75.30075	3.873	-30.911		-
				High	69.90075	4.659	-30.459		-
			10	Low	75.30075	4.278	-30.506		-
				Middle	75.30075	4.629	-30.155		-
				High	69.00075	3.310	-32.102		-
90 GHz ~ 140 GHz	1.0	A	1	Low	104.73650	5.777	-30.711	-13	-
				Middle	139.38400	5.951	-31.823		-
				High	139.37700	6.026	-31.748		-
			10	Low	139.36750	5.787	-31.987		-
				Middle	98.96700	5.514	-38.175		-
				High	139.37850	5.721	-32.053		-
		B	1	Low	104.58350	5.824	-30.664		-
				Middle	139.32300	6.908	-30.866		-
				High	98.94150	5.763	-37.926		-
			10	Low	139.99600	6.095	-30.850		-
				Middle	104.74300	5.387	-31.101		-
				High	139.99750	6.164	-30.781		-
140 GHz ~ 200 GHz	1.0	A	1	Low	185.34500	5.723	-34.321	-13	-
				Middle	184.78640	5.392	-34.693		-
				High	185.43740	5.647	-34.397		-
			10	Low	185.55620	5.702	-34.342		-
				Middle	185.55200	5.518	-34.526		-
				High	185.48360	5.700	-34.344		-
		B	1	Low	185.37980	5.588	-34.456		-
				Middle	185.41760	5.454	-34.590		-
				High	184.80560	5.472	-34.613		-
			10	Low	185.55380	5.180	-34.864		-
				Middle	184.90880	5.616	-34.469		-
				High	185.48720	5.384	-34.660		-

Note: '*' This checked frequency is measured by TRP, because Result value is fail or insufficient margin.

[1 RB] Tabular Data of Radiated Spurious Emissions

Freq.	Distance (m)	Ant. Path	Carrier	Channel	Frequency (GHz)	Measured (dBuV)	Result (dBm/MHz)	Limit (dBm/MHz)
9 kHz ~ 30 MHz	No critical peaks found							
30 MHz ~ 1 GHz	No critical peaks found							
1 GHz ~ 18 GHz	3.0	A	1	Middle	13.65800	47.350	-38.830	-13
					10.31250	60.740	-28.350	
					5.24900	50.310	-49.220	
					14.21200	47.220	-37.730	
					10.31250	59.110	-29.980	
			10	Low	17.42800	46.920	-27.620	
					17.49600	44.250	-32.360	
					10.31250	58.450	-30.640	
					17.51200	43.250	-33.360	
		B	1	Middle	13.65800	51.320	-34.860	
					10.31250	57.740	-31.350	
					17.47200	40.520	-36.090	
					13.65800	47.350	-38.830	
					10.31250	60.740	-28.350	
			10	Low	5.24900	50.310	-49.220	
					14.21200	47.220	-37.730	
					10.31250	59.110	-29.980	
					17.42800	46.920	-27.620	

Note: Only peak value is recorded in this report.

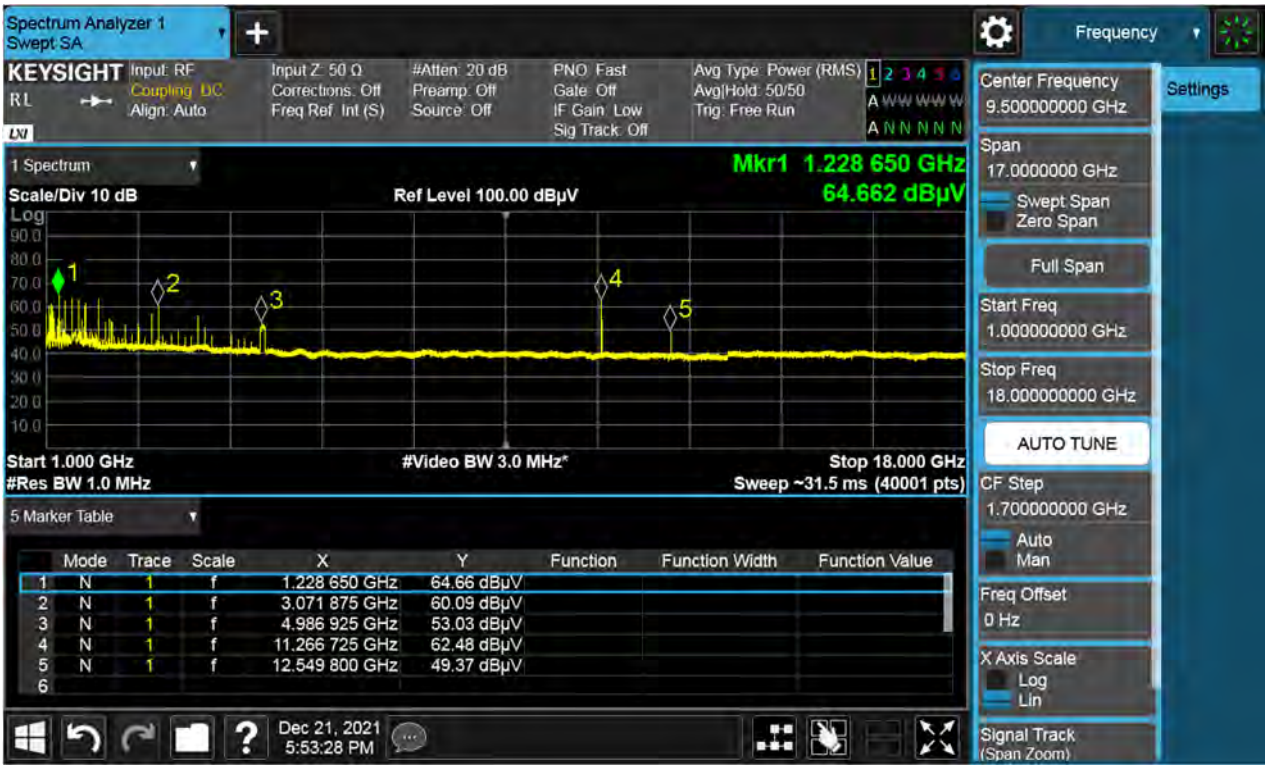
Freq.	Distance (m)	Ant. Path	Carrier	Channel	Frequency (GHz)	Measured (dBuV)	Result (dBm/MHz)	Limit (dBm/MHz)	TRP (dBm)
18 GHz ~ Low Edge	3.0	A	1	Low	35.24700	23.580	-18.718	-13	-
				Middle	35.19214	22.498	-25.978		-
				High	34.95008	32.469	-14.295*		-16.629
			10	Low	37.40300	29.038	-13.540*		-16.569
				Middle	35.74780	22.400	-24.551		-
				High	34.49977	25.913	-22.204		-
		B	1	Low	35.16920	22.588	-19.710		-
				Middle	37.36578	21.875	-25.698		-
				High	34.95008	24.456	-23.636		-
			10	Low	37.40350	31.294	-11.432*		-16.164
				Middle	37.54904	22.286	-25.066		-
				High	35.43469	22.326	-25.368		-
High Edge ~ 50 GHz	1.5	A	1	Low	49.21175	28.857	-21.541	-13	-
				Middle	40.04875	30.708	-19.650		-
				High	40.07169	30.705	-19.653		-
			10	Low	49.14625	28.826	-21.572		-
				Middle	49.19900	28.721	-21.677		-
				High	40.29652	33.767	-16.551		-
		B	1	Low	49.51850	28.742	-21.216		-
				Middle	40.23250	29.465	-20.853		-
				High	40.07144	31.592	-18.766		-
			10	Low	49.19925	28.672	-21.726		-
				Middle	40.04950	34.161	-16.197		-
				High	40.19702	38.236	-12.162*		-17.155
50 GHz ~ 60 GHz	1.5	A	1	Low	59.57832	30.116	-16.992	-13	-
				Middle	59.19687	30.061	-17.047		-
				High	59.27527	29.858	-17.251		-
			10	Low	58.87337	30.032	-17.076		-
				Middle	58.98373	30.171	-16.937		-
				High	59.43892	30.103	-17.006		-
		B	1	Low	59.14774	29.977	-17.131		-
				Middle	59.63274	30.294	-16.815		-
				High	59.63972	30.173	-16.935		-
			10	Low	59.70960	30.237	-16.871		-
				Middle	59.30163	30.233	-16.875		-
				High	59.09908	30.090	-17.018		-

60 GHz ~ 90 GHz	1.0	A	1	Low	74.31807	4.625	-30.159	-13	-
				Middle	74.85570	4.395	-30.389		-
				High	68.96325	6.291	-28.827		-
			10	Low	75.14774	4.830	-29.954		-
				Middle	74.32185	3.970	-30.814		-
				High	68.70191	2.931	-32.481		-
		B	1	Low	75.42621	5.514	-29.270		-
				Middle	76.28909	3.867	-30.917		-
				High	70.41747	4.609	-30.509		-
			10	Low	75.63526	4.217	-30.567		-
				Middle	75.88015	4.590	-30.194		-
				High	69.45674	3.242	-32.170		-
90 GHz ~ 140 GHz	1.0	A	1	Low	105.10631	5.723	-30.765	-13	-
				Middle	139.58042	5.923	-31.851		-
				High	139.55482	6.000	-31.774		-
			10	Low	140.09613	5.711	-32.063		-
				Middle	99.07303	5.501	-38.188		-
				High	139.59179	5.632	-32.142		-
		B	1	Low	105.35602	5.819	-30.669		-
				Middle	140.22069	6.827	-30.947		-
				High	99.16726	5.727	-37.962		-
			10	Low	140.01803	6.071	-30.874		-
				Middle	105.48915	5.375	-31.113		-
				High	140.11865	6.102	-30.843		-
140 GHz ~ 200 GHz	1.0	A	1	Low	185.97762	5.699	-34.345	-13	-
				Middle	185.15945	5.347	-34.738		-
				High	186.36762	5.639	-34.405		-
			10	Low	185.86777	5.675	-34.369		-
				Middle	185.91083	5.518	-34.526		-
				High	186.21832	5.691	-34.353		-
		B	1	Low	186.05756	5.533	-34.511		-
				Middle	185.70220	5.443	-34.601		-
				High	185.61812	5.377	-34.708		-
			10	Low	185.64742	5.171	-34.873		-
				Middle	185.76625	5.591	-34.494		-
				High	186.15884	5.348	-34.696		-

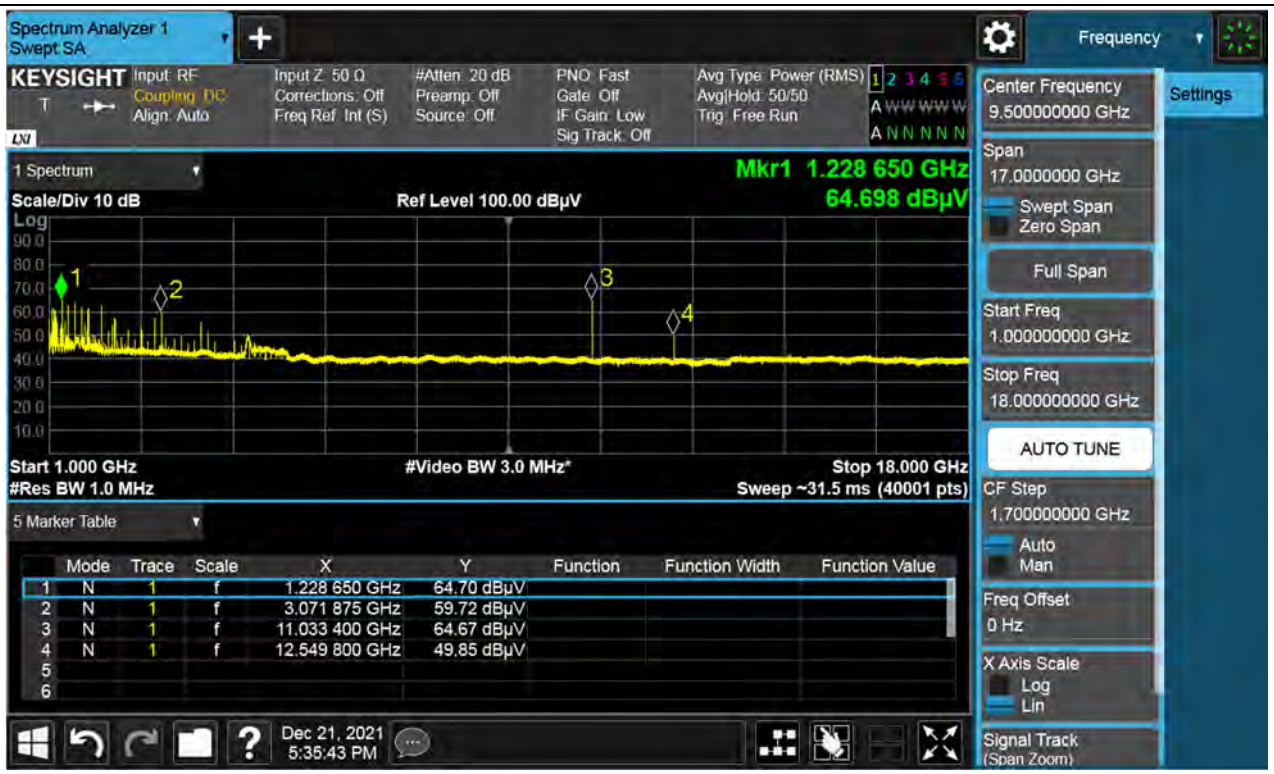
Note: '*' This checked frequency is measured by TRP, because Result value is fail or insufficient margin.

Plot data of Radiated Spurious Emissions

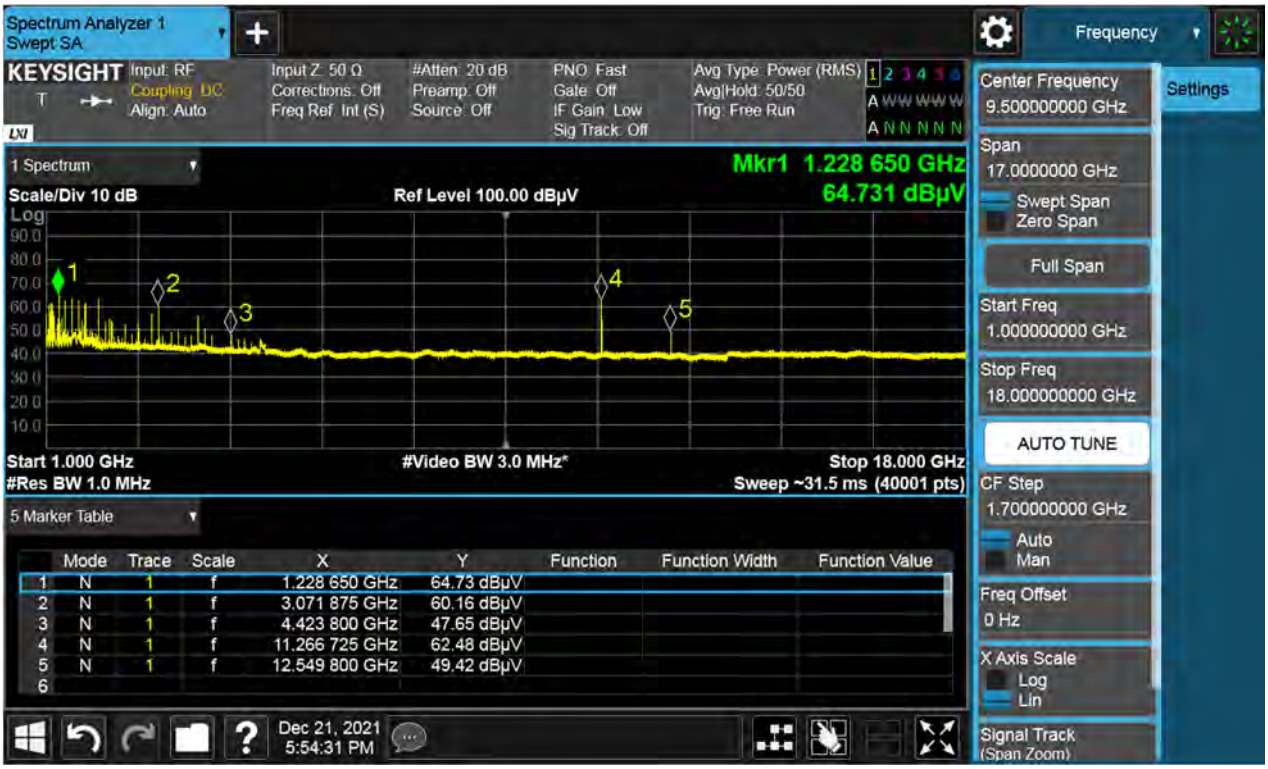
Path A / 1 GHz ~ 18 GHz / 1CC / Middle / V



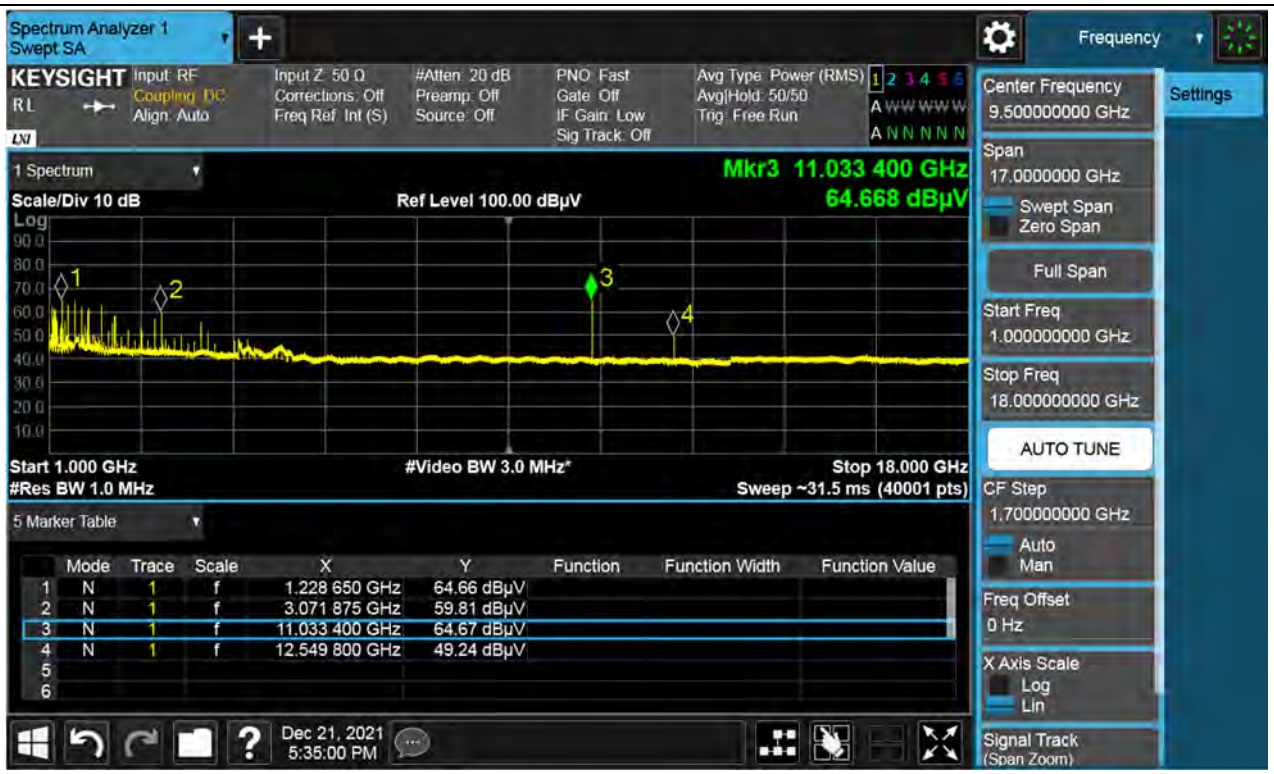
Path A / 1 GHz ~ 18 GHz / 10CC / Low / V



Path B / 1 GHz ~ 18 GHz / 1CC / Middle / V

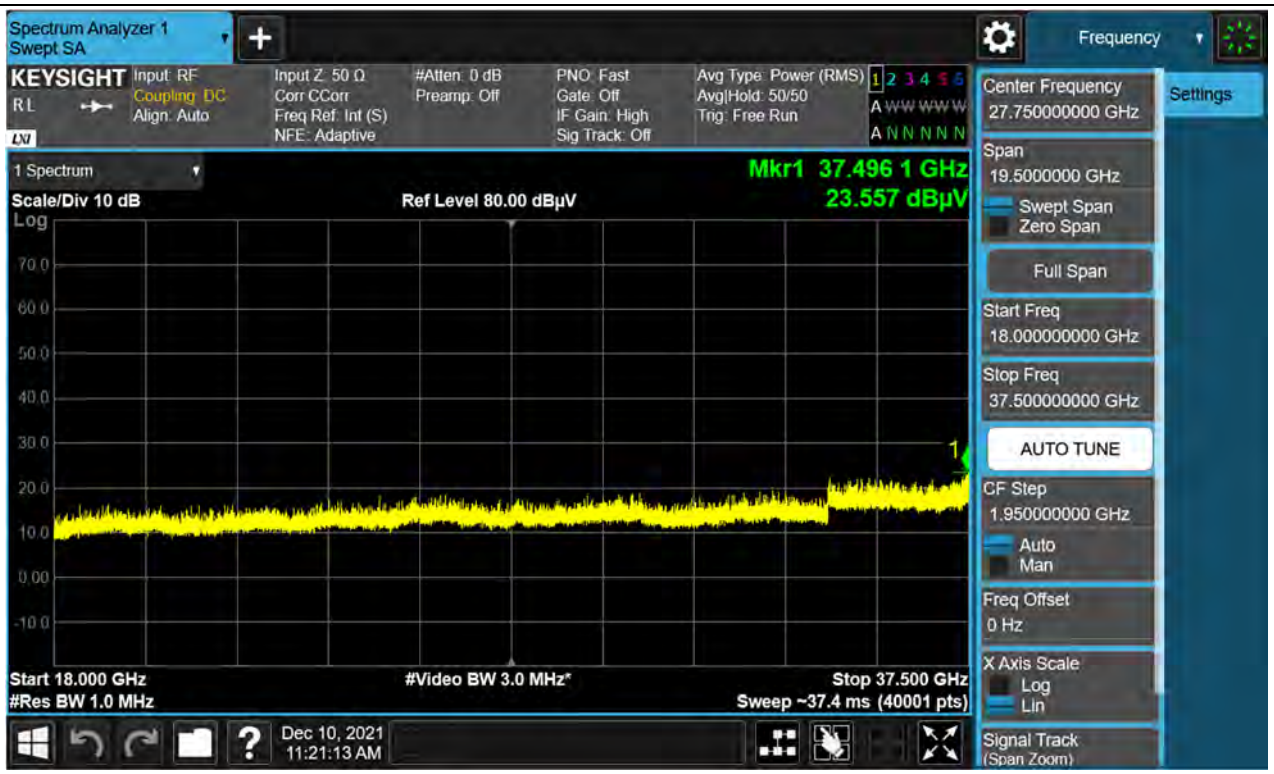


Path B / 1 GHz ~ 18 GHz / 10CC / Low / V



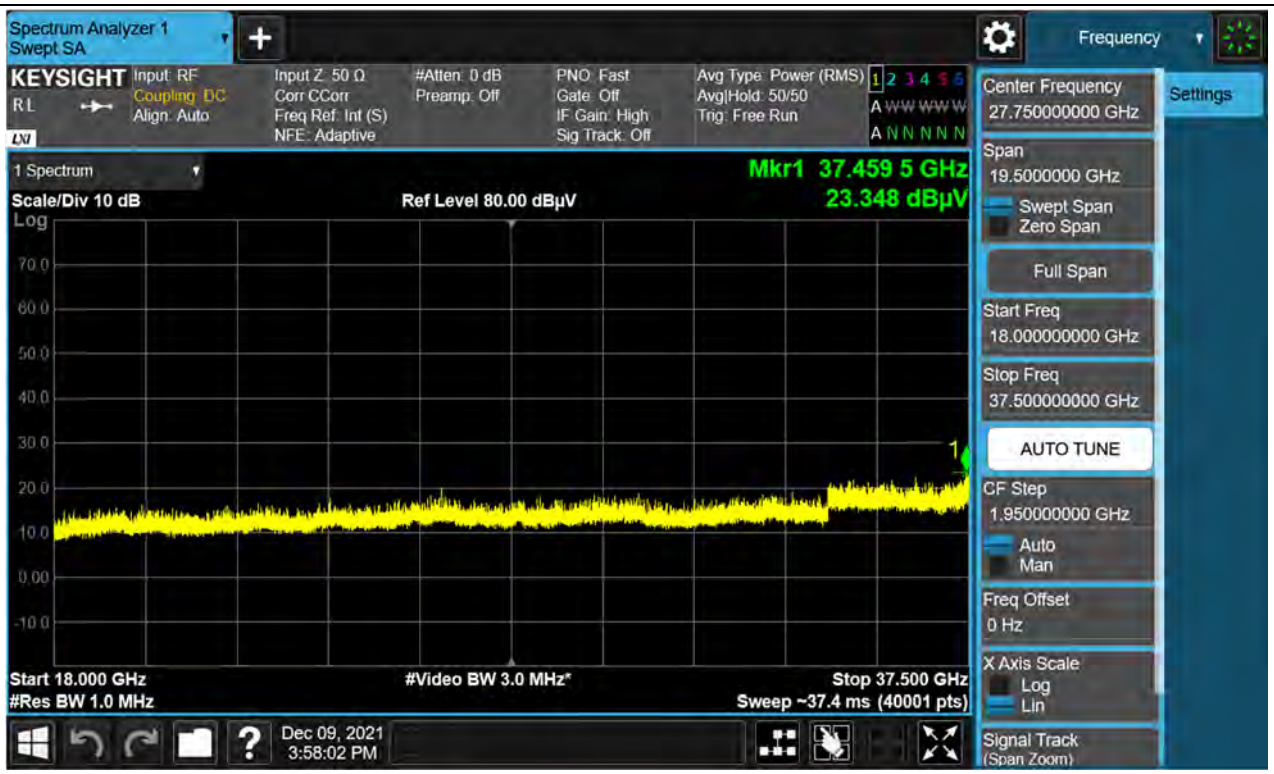
Path A / 18 GHz ~ Low Edge / 1cc / Low

Path A / 18 GHz ~ Low Edge / 10cc / Low



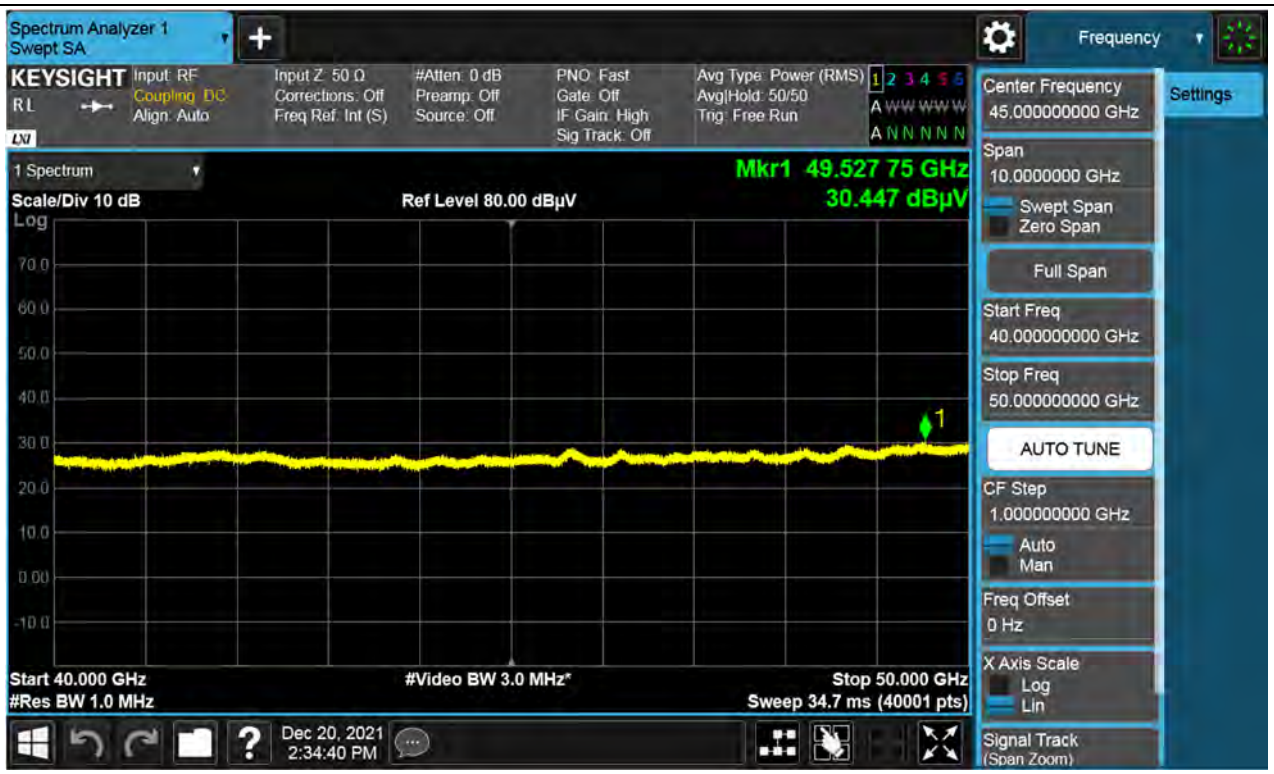
Path B / 18 GHz ~ Low Edge / 1cc / Low

Path B / 18 GHz ~ Low Edge / 10cc / Low



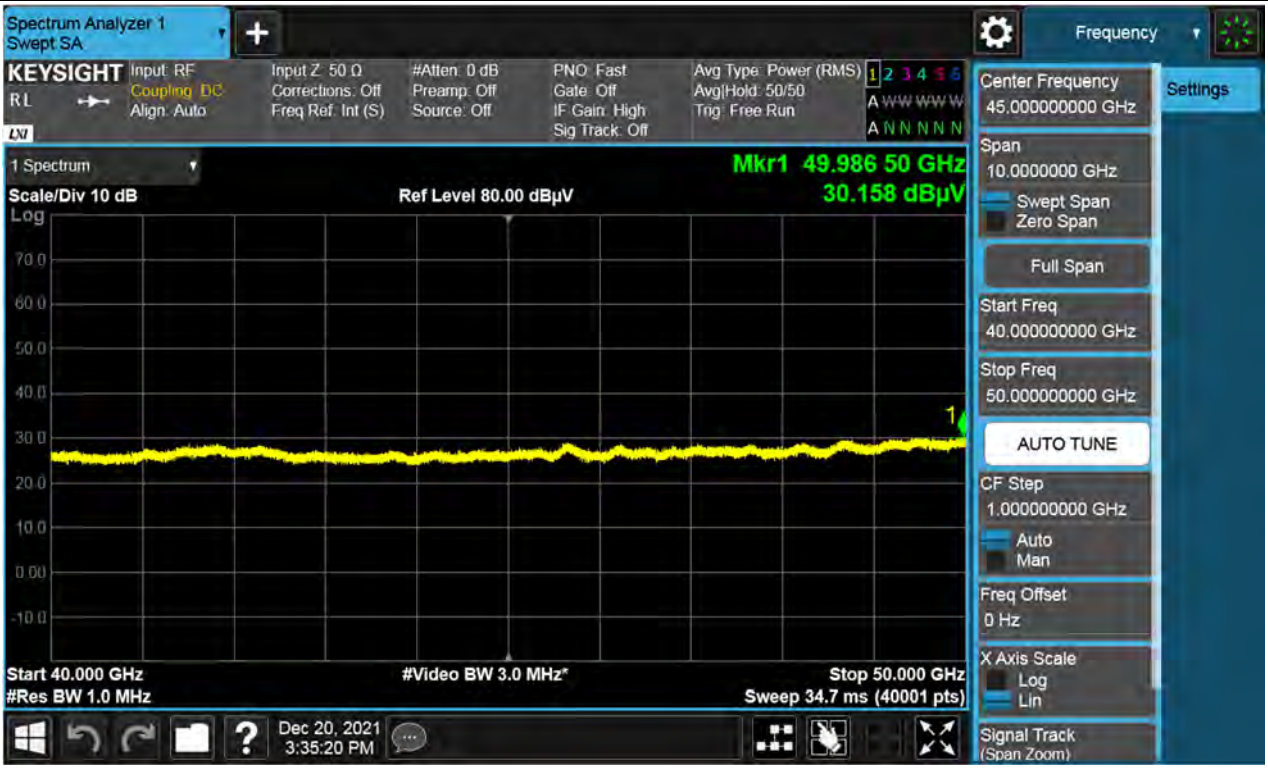
Path A / High Edge ~ 50 GHz / 1cc / High

Path A / High Edge ~ 50 GHz / 10cc / Middle

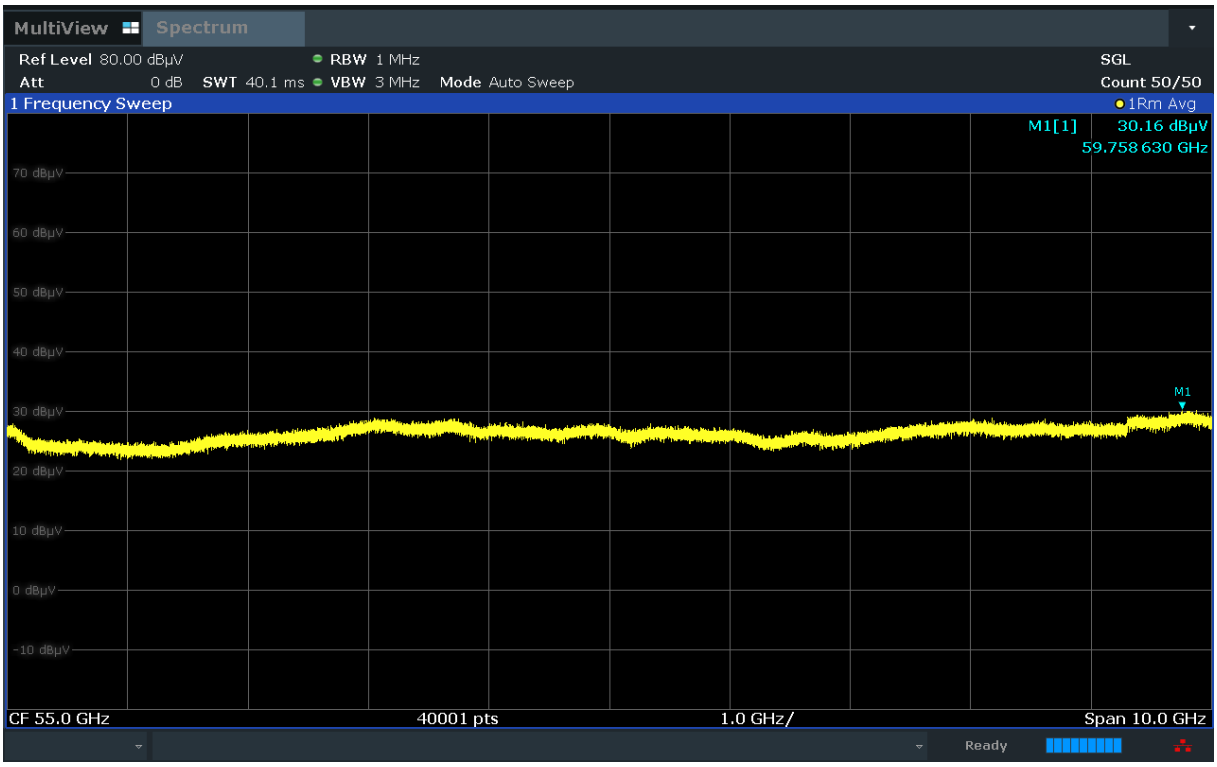


Path B / High Edge ~ 50 GHz / 1cc / High

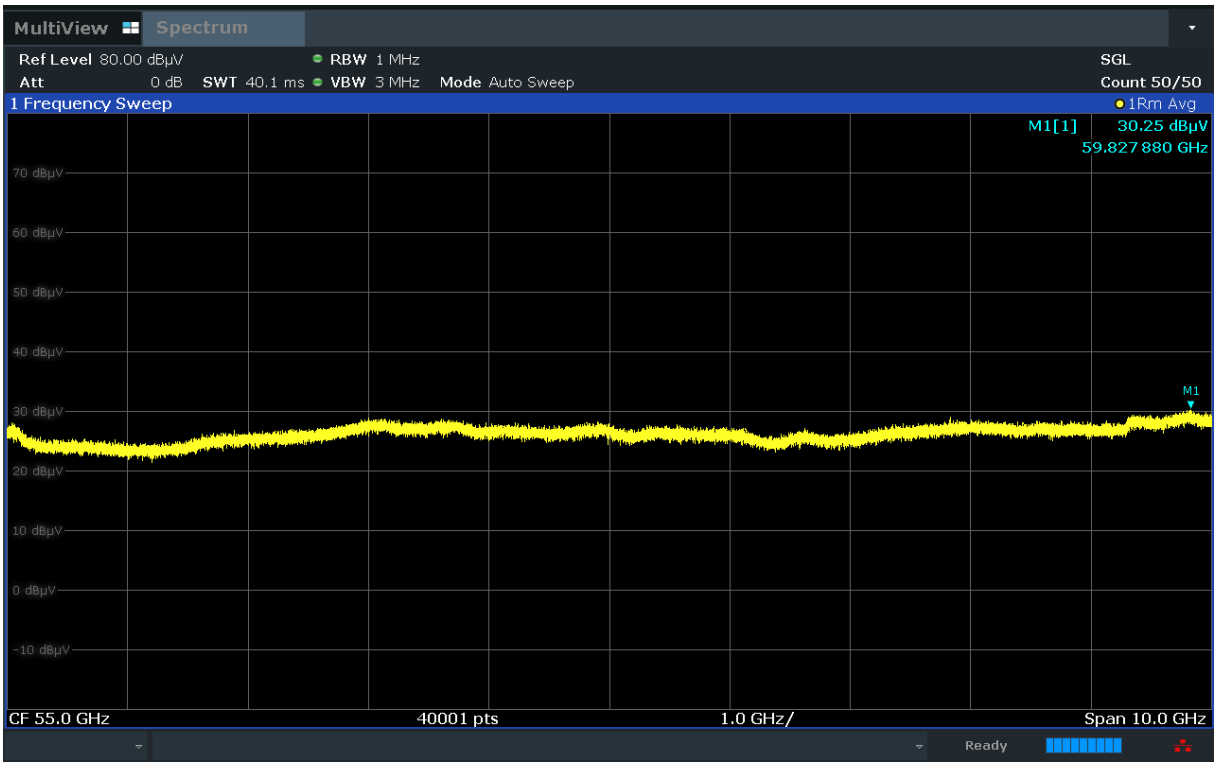
Path B / High Edge ~ 50 GHz / 10cc / Middle



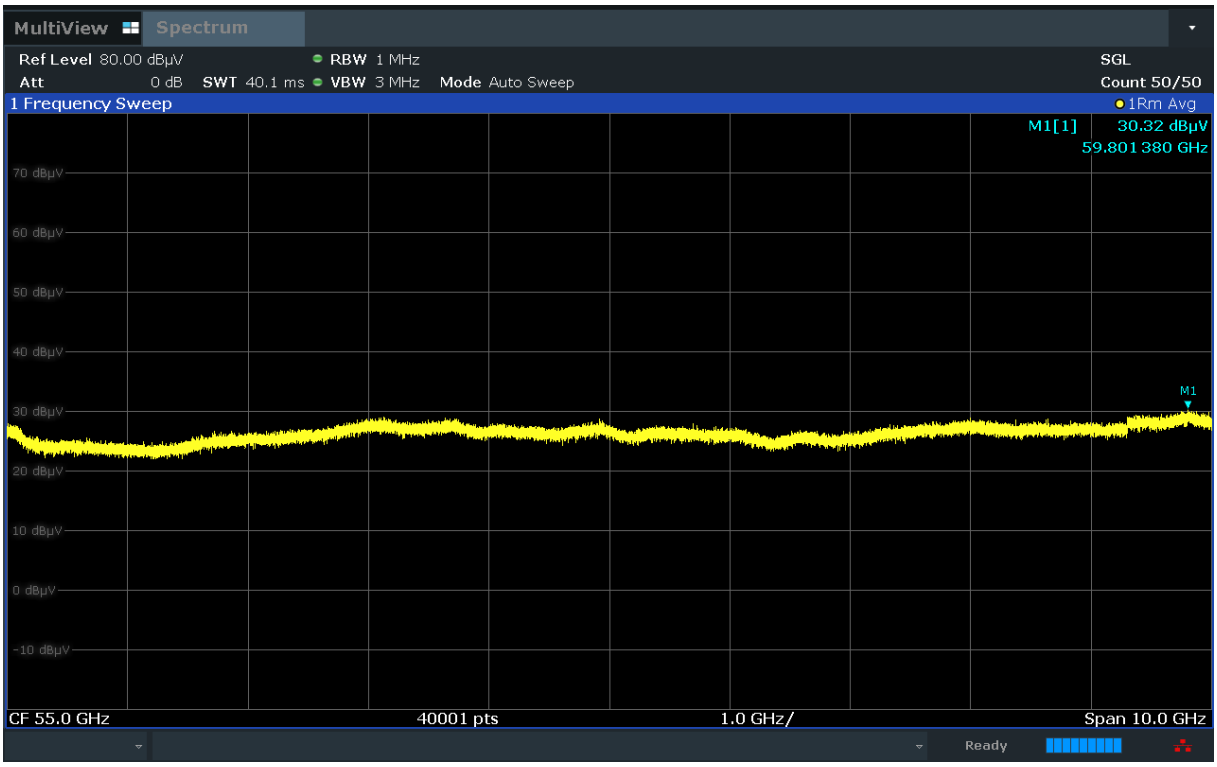
Path A / 50 GHz ~ 60 GHz / 1cc / Middle



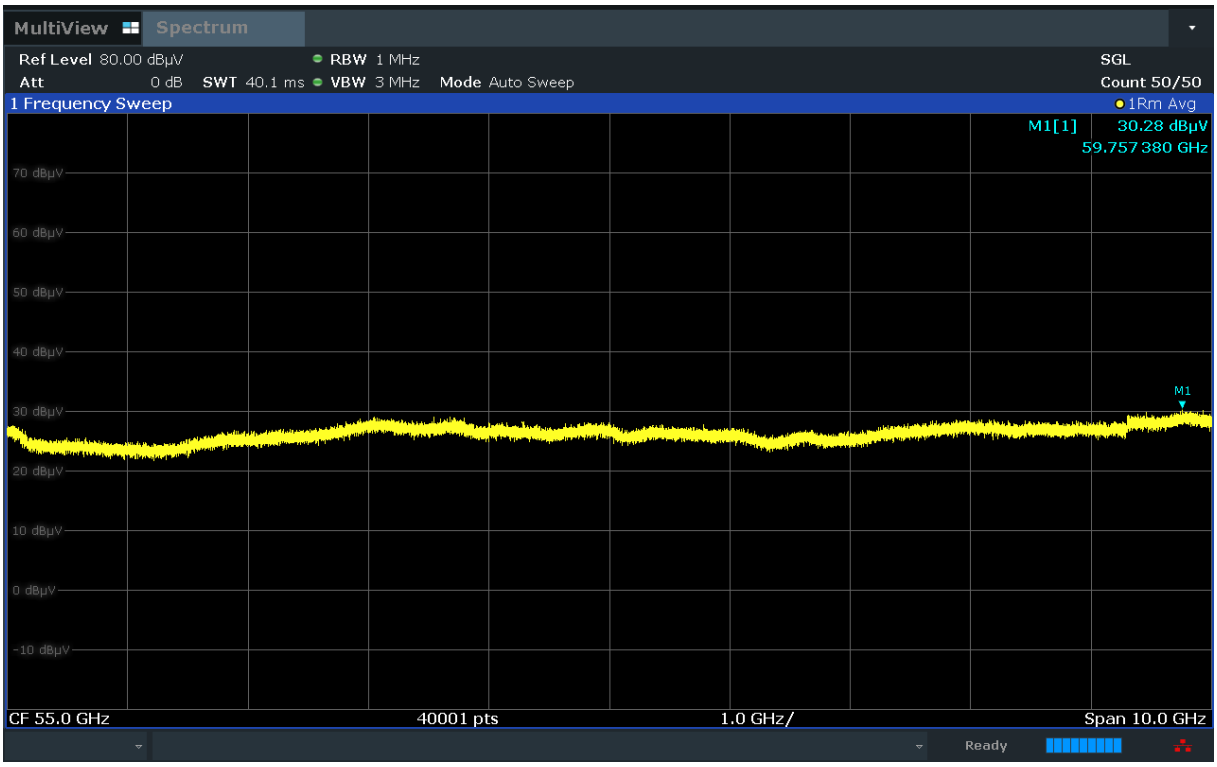
Path A / 50 GHz ~ 60 GHz / 10cc / Middle



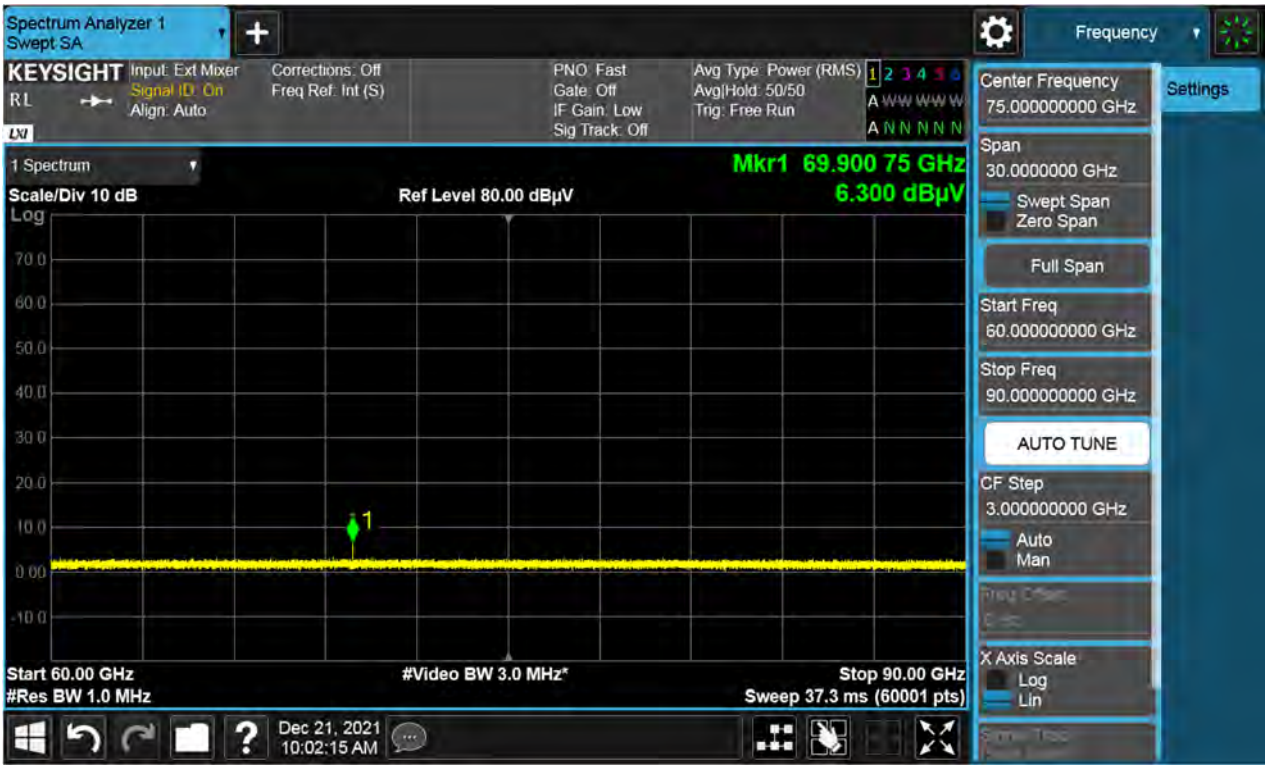
Path B / 50 GHz ~ 60 GHz / 1cc / Middle



Path B / 50 GHz ~ 60 GHz / 10cc / Low



Path A / 60 GHz ~ 90 GHz / 1cc / High

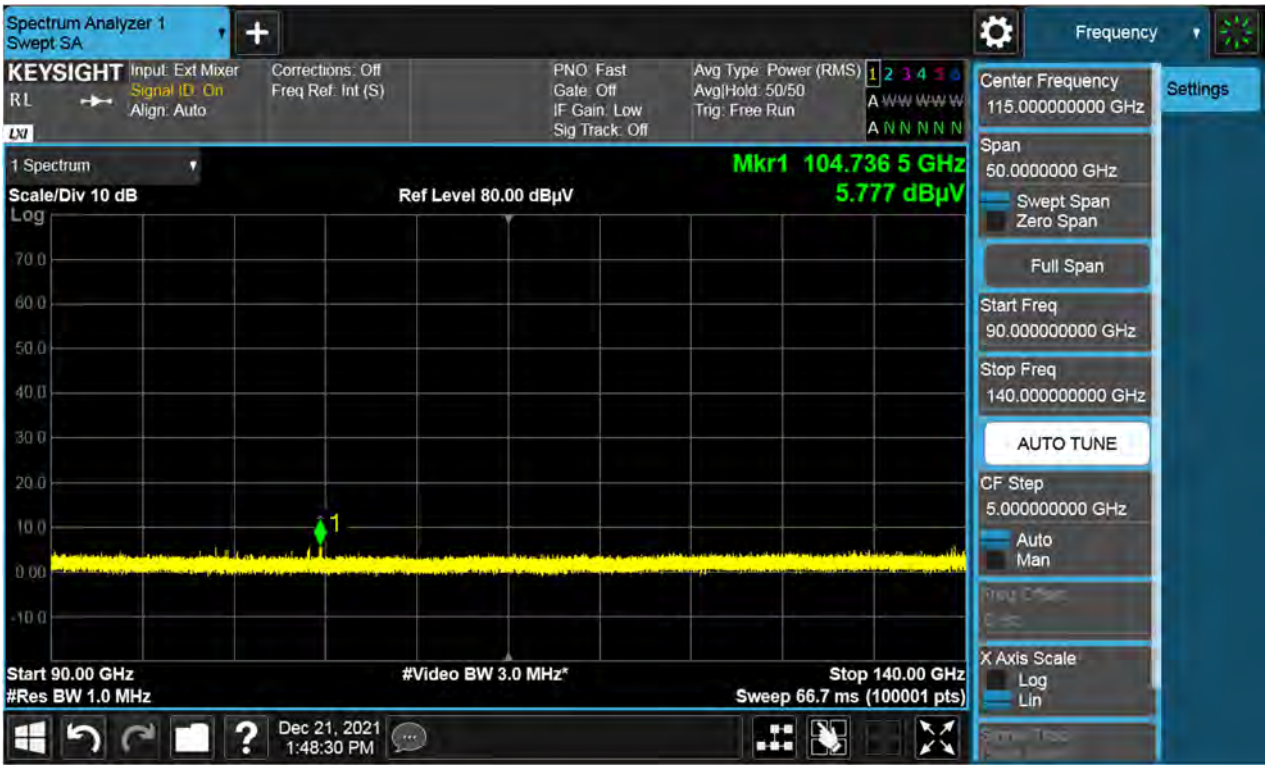


Path A / 60 GHz ~ 90 GHz / 10cc / Low

Path B / 60 GHz ~ 90 GHz / 1cc / Low

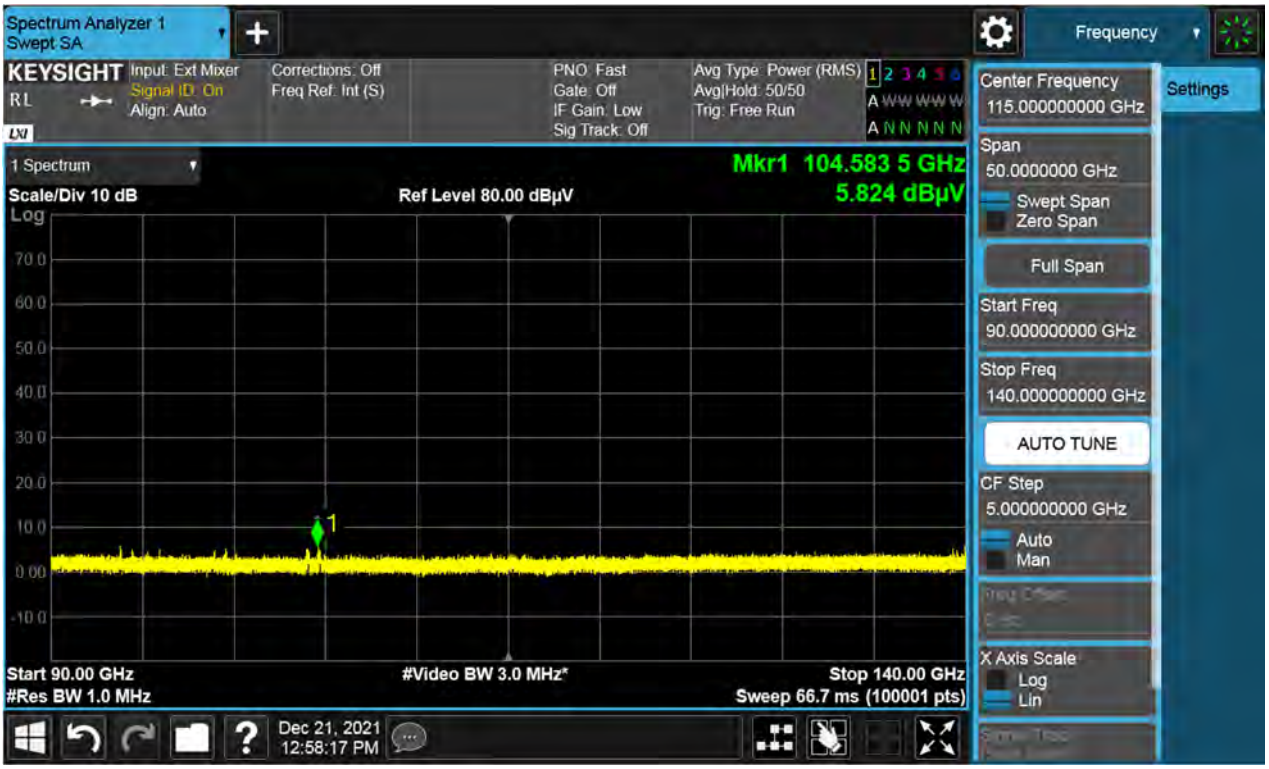
Path B / 60 GHz ~ 90 GHz / 10cc / Middle

Path A / 90 GHz ~ 140 GHz / 1cc / Low



Path A / 90 GHz ~ 140 GHz / 10cc / Low

Path B / 90 GHz ~ 140 GHz / 1cc / Low



Path B / 90 GHz ~ 140 GHz / 10cc / High

Path A / 140 GHz ~ 200 GHz / 1cc / Low

Path A / 140 GHz ~ 200 GHz / 10cc / Low

Path B / 140 GHz ~ 200 GHz / 1cc / Low

Path B / 140 GHz ~ 200 GHz / 10cc / Middle

5.8. FREQUENCY STABILITY

FCC Rules

Test Requirements:

§ 2.1055 Measurements required: Frequency stability.

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From −30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

Test Procedures:

The measurement is performed in accordance with Section 5.6.3, 5.6.4 and 5.6.5 of ANSI C63.26.

5.6.3 Procedure for frequency stability testing

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage.

The operating carrier frequency shall be set up in accordance with the manufacturer's published operation and instruction manual prior to the commencement of these tests. No adjustment of any frequency determining circuit element shall be made subsequent to this initial set-up. Frequency stability is tested:

a) At 10 °C intervals of temperatures between −30 °C and +50 °C at the manufacturer's rated supply voltage, and

b) At +20 °C temperature and ±15% supply voltage variations. If a product is specified to operate over a range of input voltage then the −15% variation is applied to the lowermost voltage and the +15% is applied to the uppermost voltage.

During the test all necessary settings, adjustments and control of the EUT have to be performed without disturbing the test environment, i.e., without opening the environmental chamber. The frequency stabilities can be maintained to a lesser temperature range provided that the transmitter is automatically inhibited from operating outside the lesser temperature range. For handheld equipment that is only capable of operating from internal batteries and the supply voltage cannot be varied, the frequency stability tests shall be performed at the nominal battery voltage and the battery end point voltage specified by the manufacturer. An external supply voltage can be used and set at the internal battery nominal voltage, and again at the battery operating end point voltage which shall be specified by the equipment manufacturer.

If an unmodulated carrier is not available, the mean frequency of a modulated carrier can be obtained by using a frequency counter with gating time set to an appropriately large multiple of bit periods (gating time depending on the required accuracy). Full details on the choice of values shall be included in the test report.

5.6.4 Frequency stability over variations in temperature

a) Supply the EUT with a nominal 60 Hz ac voltage, dc voltage, or install a new or fully charged battery in the EUT.

b) If possible a dummy load should be connected to the EUT because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, the EUT should be placed in the center of the chamber with the antenna adjusted to the shortest length possible.

c) Turn on the EUT, and tune it to the center frequency of the operating band.

d) Couple the transmitter output to the measuring instrument through a suitable attenuator and coaxial cable. If connection

to the EUT output is not possible, make the measurement by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away).

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory authority is the recommended measuring instrument.

e) Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument, but is strong enough to allow measurement of the operating or fundamental frequency of the EUT). Adjust the detector bandwidth and span settings to achieve a resolution capable of accurate frequency measurements over the applicable frequency stability limits.

f) Turn the EUT off, and place it inside the environmental temperature chamber. For devices that have oscillator heaters, energize only the heater circuit.

g) Set the temperature control on the chamber to the Highest temperature specified in the regulatory requirements for the type of device, and allow the oscillator heater and the chamber temperature to stabilize. Unless otherwise instructed by the regulatory authority, this temperature should be 50 °C.

h) While maintaining a constant temperature inside the environmental chamber, turn on the EUT and allow sufficient time for the EUT temperature to stabilize.

i) Measure the frequency.

j) Switch off the EUT, but do not switch off the oscillator heater.

k) Lower the chamber temperature to the next level that is required by the standard and allow the temperature inside the chamber to stabilize. Unless otherwise instructed by the regulators, this temperature step should be 10 °C.

l) Repeat step h) through step k) down to the lowest specified temperature. Unless otherwise instructed by the regulators, this temperature should be −30 °C. When the frequency stability limit is stated as being sufficient such that the fundamental emissions stay within the authorized bands of operation, a reference point shall be established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and Highest channel of operation shall be identified as f_L and f_H respectively. The worst-case frequency offset determined in the above methods shall be added or subtracted from the values of f_L and f_H and the resulting frequencies must remain within the band.

m) Omitted

5.6.5 Frequency stability when varying supply voltage

a) Couple the transmitter output to the measuring instrument through a suitable attenuator and coaxial cable. If connection to the EUT output is not possible make the measurement by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away)

b) Supply the EUT with nominal ac or dc voltage. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

c) Turn on the EUT, and couple its output to a frequency counter or other frequency-measuring instrument.

d) Tune the EUT to the center frequency of the operating band. Adjust the location of the measurement antenna and the

controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument, but is strong enough to allow measurement of the operating or fundamental frequency of the EUT). Adjust the detector bandwidth and span settings to achieve a resolution capable of accurate frequency measurements over the applicable frequency stability limits.

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory authority is the recommended measuring instrument.

e) Measure the frequency.

f) Unless otherwise specified, vary primary supply voltage from 85% to 115% of the nominal value for other than hand carried battery equipment.

g) For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.

h) Repeat the frequency measurement.

NOTE—For band-edge compliance, it can be required to make these measurements at the low and High channel of the operating band.

Note:

1. The results of the frequency stability test shown above the frequency deviation measured values are very small and similar trend for each path, so we are attached only the worst case data.
2. Test signal is CW signal for frequency stability.

Test Results:

Reference: - 53.3 Vdc at 20°C **Freq.** = 38,799,986,173 Hz

Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(°C)	(Hz)	Error (Hz)	(Hz)	
100%	+20(Ref)	38799 986 061	-112.116	0.000	0.00000
	-30	38799 986 065	3.215	115.331	0.00297
	-20	38799 985 884	-177.356	-65.240	-0.00168
	-10	38799 986 030	-31.676	80.440	0.00207
	0	38799 985 892	-169.440	-57.324	-0.00148
	+10	38799 985 890	-171.301	-59.185	-0.00153
	+30	38799 985 868	-193.451	-81.335	-0.00210
	+40	38799 985 967	-94.704	17.412	0.00045
115%	+50	38799 986 052	-9.748	102.368	0.00264
85%	+20	38799 986 057	-4.716	107.400	0.00277

6. EXTENSION MODULE VERIFICATION CERTIFICATE & CHECK

열 람 용
This certificate may not be reproduced other than in full except with permission of the issuing laboratory.

교 정 성 적 서
CALIBRATION CERTIFICATE

경기도 이천시 마장면 서이천로 578번길 74
TEL : 031-645-6900, FAX : 031-645-6969

성적서발급번호(Certificate No) : IC-2021-22854
교 정 번 호(Calibration No) : C-2021-028508

1. 의뢰자 (Client)
- 기관명 (Name) : (주)에이치시티
- 주소 (Address) : 경기도 이천시 마장면 서이천로 578번길 74

2. 측정기 (Calibration Subject) ◇ 등록번호 : 415233
- 기기명 (Description) : SA EXTENSION MODULE
- 제작회사 및 형식(Manufacturer and Model Name) : VDI / SAX WR19
- 기기번호 (Serial Number) : SAX 771

3. 교정일자 (Date of Calibration) : 2021.03.17 **차기교정예정일자** : 2022.03.17
(The due date of next Calibration)

4. 교정환경 (Environment)
- 온도(Temperature) : (22.8 ± 0.1) ℃ - 습도(Humidity) : (48 ± 1) % R.H.
- 교정장소 (Location) : 고정표준실(Permanent Calibration Lab)
(주소: 경기도 이천시 마장면 서이천로 578번길 74)

5. 측정표준의 소급성 (Traceability) ◇Field code : 40641(RF SPECTRUM ANALYZER)

교정방법 및 소급성 서술 (Calibration method and/or brief description)

상기 기기는 고주파 스펙트럼 분석기의 교정절차(HCT-CS-125-40641)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 표준장비를 이용하여 교정 되었음.

교정에 사용한 표준장비 명세 (List of used standards/specifications)

기기명 (Description)	제작회사 및 형식 (Manufacturer and Model Name)	기기번호 (Serial Number)	차기교정예정일자 (The due date of next Calibration)	교정기관 (Calibration laboratory)
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT N5173B	MY53270544	2021/06/23	(주)에이치시티
EPM SERIES POWER METER	AGILENT E4419B	GB42420565	2021/11/02	(주)에이치시티
POWER SENSOR	AGILENT 8487A	MY41092450	2022/01/11	(주)에이치시티
POWER SENSOR	KEYSIGHT V8486A	MY56330017	2022/01/25	Keysight Technologies
WR-19 MULTIPLIER SOURCE MODULE	OML S19MS-A	160516-1	2021/09/09	(주)에이치시티

6. 교정결과 (Calibration result) : **교정결과 참조** (Refer to attachment)

7. 측정불확도 (Measurement uncertainty) : **교정결과 참조** (Refer to attachment)
신뢰수준 약 95 %, k = 2 (Confidence level about 95 %, k = 2)

확 인 (affirmation)	작성자 (Measurements performed by)	승인자 (Approved by)
	성명 (Name) 박 민 지	직위 (Title) 기술책임자(Technical Cal. Manager) (서명)
		성명 (Name) 이 승 찬

위 성적서는 국제시험기관인정협력체(International Laboratory Accreditation Cooperation) 상호인정협정(Mutual Recognition Arrangement)에 서명한 한국인정기구(KOLAS)로부터 공인 받은 분야의 교정결과입니다.

2021. 03. 17

한국인정기구 인정
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㈜에이치시티 대표이사
President, HCT Co., Ltd.

㈜ 이 성적서는 측정기의 정밀정확도에 영향을 미치는 요소(과부하, 온도, 습도 등)의 급격한 변화가 발생한 경우에는 무효가 됩니다.
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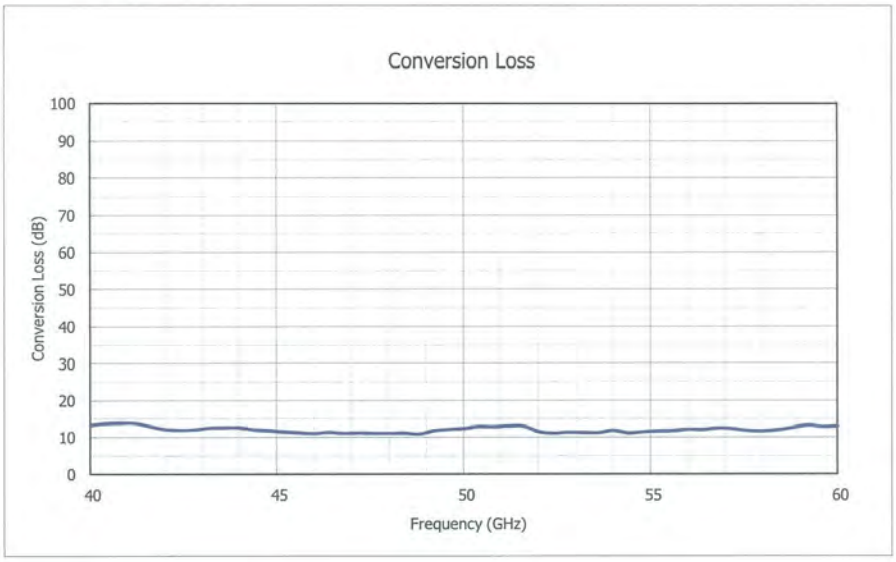
F-02P-02-008 (Rev.02)

교 정 결 과
CALIBRATION RESULT

성적서발급번호(Certificate No) : IC-2021-22854
교 정 번 호(Calibration No) : C-2021-028508

1. Conversion Loss Graph



Note 1) Keysight N9030B (SN MY55480167)와 함께 교정된 결과임.

F-02P-02-008 (Rev.02)

교 정 결 과
CALIBRATION RESULT

성적서발급번호(Certificate No) : IC-2021-22854
교 정 번 호(Calibration No) : C-2021-028508

2. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
40.0	13.2	2.4	50.4	12.8	2.4
40.4	13.7	2.4	50.8	12.7	2.4
40.8	13.8	2.4	51.2	13.0	2.4
41.2	13.8	2.4	51.6	12.9	2.4
41.6	13.0	2.4	52.0	11.5	2.4
42.0	12.1	2.4	52.4	11.1	2.4
42.4	12.0	2.4	52.8	11.3	2.4
42.8	12.0	2.4	53.2	11.2	2.4
43.2	12.5	2.4	53.6	11.2	2.4
43.6	12.6	2.4	54.0	11.8	2.4
44.0	12.6	2.4	54.4	11.1	2.4
44.4	12.0	2.4	54.8	11.4	2.4
44.8	11.8	2.4	55.2	11.6	2.4
45.2	11.5	2.4	55.6	11.7	2.4
45.6	11.2	2.4	56.0	12.1	2.4
46.0	11.0	2.4	56.4	12.0	2.4
46.4	11.3	2.4	56.8	12.4	2.4
46.8	11.1	2.4	57.2	12.2	2.4
47.2	11.1	2.4	57.6	11.7	2.4
47.6	11.1	2.4	58.0	11.6	2.4
48.0	11.0	2.4	58.4	11.9	2.4
48.4	11.1	2.4	58.8	12.5	2.4
48.8	10.8	2.4	59.2	13.2	2.4
49.2	11.7	2.4	59.6	12.7	2.4
49.6	12.1	2.4	60.0	13.0	2.4
50.0	12.3	2.4	-	-	-

끝.

F-02P-02-008 (Rev.02)

교 정 성 적 서
CALIBRATION CERTIFICATE

경기도 이천시 마장면 서이천로 578번길 74
TEL : 031-645-6900, FAX : 031-645-6969

성적서발급번호(Certificate No) : IC-2021-26221
교 정 번 호(Calibration No) : C-2021-031387

1. 의뢰자 (Client)
- 기관명 (Name) : (주)에이치시티
- 주소 (Address) : 경기도 이천시 마장면 서이천로 578번길 74

2. 측정기 (Calibration Subject) ◇ 등록번호 : 415873
- 기기명 (Description) : SA EXTENSION MODULE
- 제작회사 및 형식(Manufacturer and Model Name) : VDI / SAX WR12
- 기기번호 (Serial Number) : SAX773

3. 교정일자 (Date of Calibration) : 2021.04.02 **차기교정예정일자** : 2022.04.02 (The due date of next Calibration)

4. 교정환경 (Environment)
- 온도(Temperature) : (22.5 ± 0.5) ℃ - 습도(Humidity) : (46 ± 4) % R.H.
- 교정장소 (Location) : 고정표준실(Permanent Calibration Lab) (주소: 경기도 이천시 마장면 서이천로 578번길 74)

5. 측정표준의 소급성 (Traceability) ◇Field code : 40641(RF SPECTRUM ANALYZER)

교정방법 및 소급성 서술 (Calibration method and/or brief description)

상기 기기는 고주파 스펙트럼 분석기의 교정절차(HCT-CS-125-40641)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 표준장비를 이용하여 교정 되었음.

교정에 사용한 표준장비 명세 (List of used standards/specifications)

기기명 (Description)	제작회사 및 형식 (Manufacturer and Model Name)	기기번호 (Serial Number)	차기교정예정일자 (The due date of next Calibration)	교정기관 (Calibration laboratory)
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT N5173B	MY53270544	2021/06/23	(주)에이치시티
EPM SERIES POWER METER	AGILENT E4419B	GB42420565	2021/11/02	(주)에이치시티
POWER SENSOR	KEYSIGHT V8486A	MY56330017	2022/01/25	Keysight Technologies
POWER SENSOR	KEYSIGHT W8486A	MY56370005	2022/01/20	Keysight Technologies
WR-12 MULTIPLIER SOURCE MODULE	OML S12MS-A	160419-1	2021/09/09	(주)에이치시티

6. 교정결과 (Calibration result) : **교정결과 참조** (Refer to attachment)

7. 측정불확도 (Measurement uncertainty) : **교정결과 참조** (Refer to attachment)
신뢰수준 약 95 %, k = 2 (Confidence level about 95 %, k = 2)

확 인 (affirmation)	작성자 (Measurements performed by)	승인자 (Approved by)
	성명 (Name) 박 민 지	직위 (Title) 기술책임자(Technical Cal. Manager) (서명)
		성명 (Name) 이 승 찬

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2021. 04. 02

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㈜에이치시티 대표이사
President, HCT Co., Ltd.

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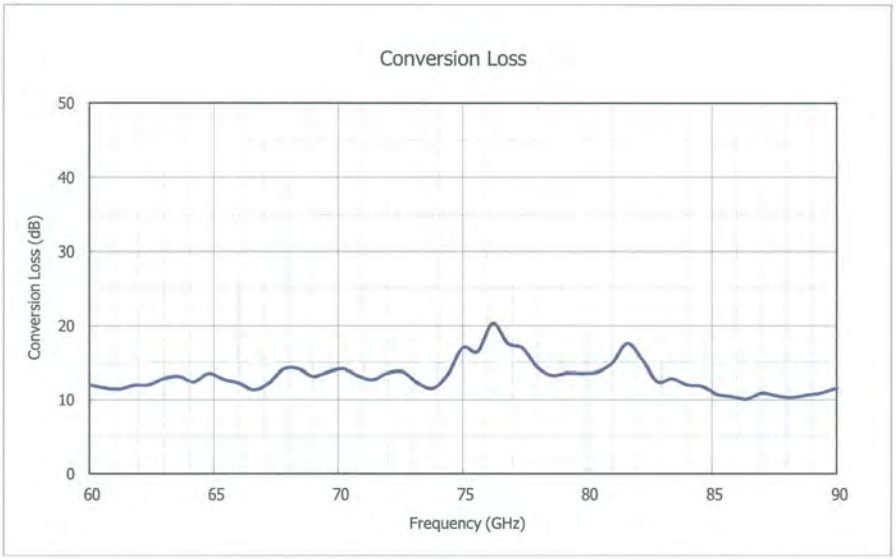
F-02P-02-008 (Rev.02)

교 정 결 과
CALIBRATION RESULT

성적서발급번호(Certificate No) : IC-2021-26221
교 정 번 호(Calibration No) : C-2021-031387

1. Conversion Loss Graph



Note 1) Keysight N9030B (SN MY55480167) 와 함께 교정된 결과임.

F-02P-02-008 (Rev.02)

교 정 결 과
CALIBRATION RESULT

성적서발급번호(Certificate No) : IC-2021-26221
교 정 번 호(Calibration No) : C-2021-031387

2. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
60.0	12.04	0.89	75.6	16.47	0.82
60.6	11.61	0.89	76.2	20.31	0.82
61.2	11.44	0.89	76.8	17.58	0.82
61.8	11.94	0.89	77.4	16.92	0.82
62.4	12.02	0.89	78.0	14.33	0.82
63.0	12.86	0.89	78.6	13.25	0.82
63.6	13.15	0.89	79.2	13.59	0.82
64.2	12.42	0.89	79.8	13.51	0.82
64.8	13.51	0.89	80.4	13.71	0.82
65.4	12.73	0.89	81.0	14.94	0.82
66.0	12.25	0.89	81.6	17.55	0.82
66.6	11.34	0.89	82.2	15.37	0.82
67.2	12.19	0.89	82.8	12.44	0.82
67.8	14.11	0.89	83.4	12.81	0.82
68.4	14.15	0.89	84.0	11.99	0.82
69.0	13.13	0.89	84.6	11.79	0.82
69.6	13.71	0.89	85.2	10.69	0.82
70.2	14.14	0.89	85.8	10.41	0.82
70.8	13.20	0.89	86.4	10.08	0.82
71.4	12.69	0.89	87.0	10.86	0.82
72.0	13.58	0.89	87.6	10.49	0.82
72.6	13.73	0.89	88.2	10.28	0.82
73.2	12.23	0.89	88.8	10.62	0.82
73.8	11.53	0.89	89.4	10.90	0.82
74.4	13.38	0.89	90.0	11.58	0.82
75.0	16.97	0.82	-	-	-

끝.

F-02P-02-008 (Rev.02)

교 정 성 적 서
CALIBRATION CERTIFICATE

경기도 이천시 마장면 서이천로 578번길 74
TEL : 031-645-6900, FAX : 031-645-6969

성적서발급번호(Certificate No) : IC-2021-24401
교 정 번 호(Calibration No) : C-2021-030478

1. 의뢰자 (Client)
- 기관명 (Name) : (주)에이치시티
- 주소 (Address) : 경기도 이천시 마장면 서이천로 578번길 74

2. 측정기 (Calibration Subject) ◇ 등록번호 : 415877
- 기기명 (Description) : SA EXTENSION MODULE
- 제작회사 및 형식(Manufacturer and Model Name) : VDI / SAX WR8.0
- 기기번호 (Serial Number) : SAX779

3. 교정일자 (Date of Calibration) : 2021.04.02 **차기교정예정일자** : 2022.04.02 (The due date of next Calibration)

4. 교정환경 (Environment)
- 온도(Temperature) : (22.5 ± 0.5) ℃ - 습도(Humidity) : (46 ± 4) % R.H.
- 교정장소 (Location) : 고정표준실(Permanent Calibration Lab) (주소: 경기도 이천시 마장면 서이천로 578번길 74)

5. 측정표준의 소급성 (Traceability) ◇Field code : 40641(RF SPECTRUM ANALYZER)

교정방법 및 소급성 서술 (Calibration method and/or brief description)

상기 기기는 고주파 스펙트럼 분석기의 교정절차(HCT-CS-125-40641)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 표준장비를 이용하여 교정 되었음.

교정에 사용한 표준장비 명세 (List of used standards/specifications)

기기명 (Description)	제작회사 및 형식 (Manufacturer and Model Name)	기기번호 (Serial Number)	차기교정예정일자 (The due date of next Calibration)	교정기관 (Calibration laboratory)
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT N5173B	MY53270544	2021/06/23	(주)에이치시티
EPM SERIES POWER METER	AGILENT E4419B	GB42420565	2021/11/02	(주)에이치시티
POWER SENSOR	KEYSIGHT W8486A	MY56370005	2022/01/20	Keysight Technologies
WR-08 MULTIPLIER SOURCE MODULE	OML S08MS-A	164019-1	2021/09/09	(주)에이치시티

6. 교정결과 (Calibration result) : **교정결과 참조** (Refer to attachment)

7. 측정불확도 (Measurement uncertainty) : **교정결과 참조** (Refer to attachment)
신뢰수준 약 95 %, $k = 2$ (Confidence level about 95 %, $k = 2$)

확 인 (affirmation)	작성자 (Measurements performed by)	승인자 (Approved by)
	성명 (Name) 박 민 지	직위 (Title) 기술책임자(Technical Cal. Manager) (서명)
		성명 (Name) 이 승 찬

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2021. 04. 02

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㈜에이치시티 대표이사
President, HCT Co., Ltd.

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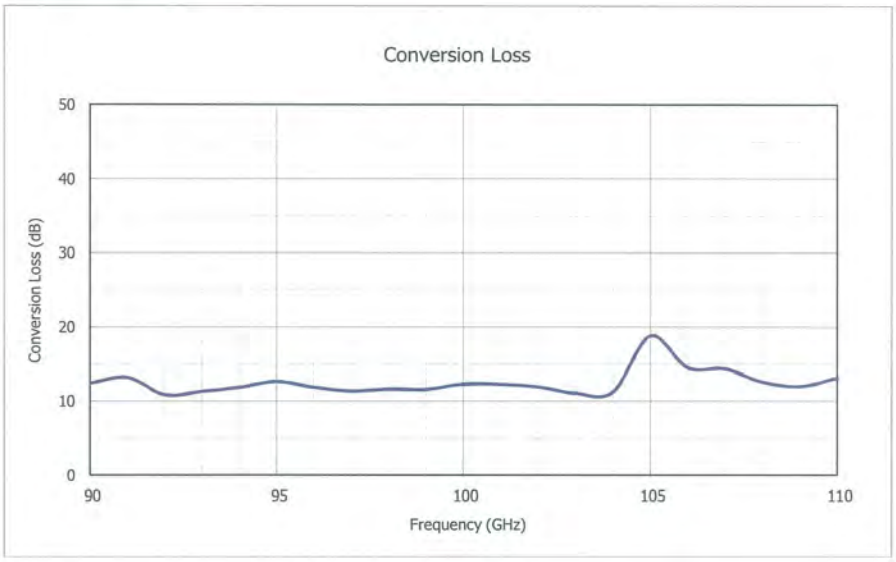
F-02P-02-008 (Rev.02)

교 정 결 과
CALIBRATION RESULT

성적서발급번호(Certificate No) : IC-2021-24401
교 정 번 호(Calibration No) : C-2021-030478

1. Conversion Loss Graph



Note 1) Keysight N9030B (SN MY55480167) 와 함께 교정된 결과임.

F-02P-02-008 (Rev.02)

교 정 결 과
CALIBRATION RESULT

성적서발급번호(Certificate No) : IC-2021-24401
교 정 번 호(Calibration No) : C-2021-030478

2. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
90.0	12.39	0.89	101.0	12.24	0.89
91.0	13.17	0.89	102.0	11.89	0.89
92.0	10.84	0.89	103.0	11.03	0.89
93.0	11.28	0.89	104.0	11.20	0.89
94.0	11.83	0.89	105.0	18.77	0.89
95.0	12.63	0.89	106.0	14.50	0.89
96.0	11.83	0.89	107.0	14.34	0.89
97.0	11.32	0.89	108.0	12.59	0.89
98.0	11.60	0.89	109.0	11.97	0.89
99.0	11.55	0.89	110.0	13.10	0.89
100.0	12.26	0.89	-	-	-

끝.

열 람 용
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Measurement Report

74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, Korea 17383
Tel :82-31-645-6900, www.hct.co.kr

보고서번호(Report No) : IC-2021-27675
측 정 번 호(Measurement No) : C-2021-033180

1. 의뢰자 (Client)
- 기관명 (Name) : (주)에이치시티
- 주소 (Address) : 경기도 이천시 마장면 서이천로 578번길 74

2. 대상품목 (Measurement Item) ◇ HCT 등록번호 : 416612
- 기기명 (Description) : SA EXTENSION MODULE
- 제작회사 및 형식(Manufacturer and Model Name) : VDI / SAX WR8.0
- 기기번호 (Serial Number) : SAX779

3. 측정일자 (Measurement date) : 2021.04.02

4. 측정환경 (Environment)
- 온도(Temperature) : (22.5 ± 0.5) ℃ - 습도(Humidity) : (46 ± 4) % R.H.

5. 측정방법 (Measurement method used)

상기 기기는 고주파 스펙트럼 분석기의 교정절차(HCT-CS-125-40641)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 표준장비를 이용하여 교정 되었음.

측정에 사용한 표준장비 명세 (List of used standards/specifications)

기기명 (Description)	제작회사 및 형식 (Manufacturer and Model Name)	기기번호 (Serial Number)	차기교정예정일자 (The due date of next Calibration)	교정기관 (Calibration laboratory)
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT N5173B	MY53270544	2021/06/23	(주)에이치시티
ERICKSON POWER METER	VDI PM5	394V	측정	(주)에이치시티
WR-08 MULTIPLIER SOURCE MODULE	OML S08MS-A	160419-1	측정	(주)에이치시티

6. 측정결과 (Messurement result) : **측정결과 참조** (Refer to attachment)

㈜ 이 측정결과는 의뢰자가 제시한 시료 및 시료명에만 한정됩니다.
The messuremen results shown in this report refer only to the sample(s) measured unless otherwise stated.

확 인 (Affirmation)	작성자 (Tested by) 성명 (Name) : 박 민 지	승인자 (Approved by) 직위 (Title) 기술책임자(Technical Manager) 성명 (Name) 이 승 찬 (서명)

이 성적서는 ILAC MRA 서명 기관인 KOLAS(Korea Laboratory Accreditation Scheme)와 A2LA (American Laboratory for Laboratory Accreditation)의 인정과 무관합니다. This calibration certificate is Not an accredited report by KOLAS(Korea Laboratory Accreditation Scheme) and A2LA(American Association for Laboratory Accreditation), a ILAC MRA signatory.

2021. 04. 02

㈜에이치시티 대표이사
President, HCT Co., Ltd.

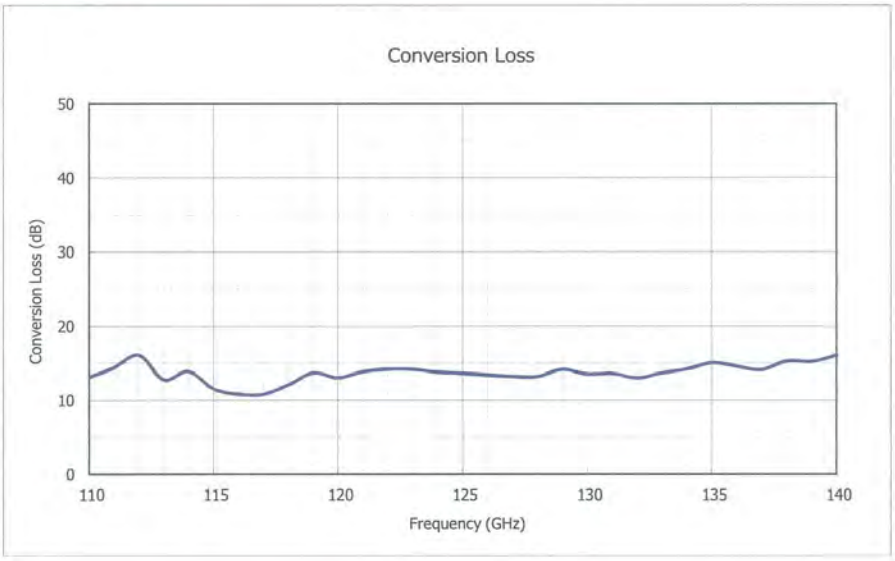
㈜ 측정결과는 측정기의 정밀정확도에 영향을 미치는 요소(과부하, 온도, 습도 등)의 급격한 변화가 발생한 경우에는 무효가 됩니다. If any significant instability or other adverse factor(overload, temperature, humidity etc.) manifests itself before, during or after calibration, and is likely to affect the validity of the calibration.

F-02P-02-010 (Rev.01)

MEASUREMENT RESULT

보고서번호(Report No) : IC-2021-27675
측 정 번 호(Measurement No) : C-2021-033180

1. Conversion Loss Graph



Note 1) Keysight N9030B (SN MY55480167) 와 함께 교정된 결과임.
Note 2) 110 GHz 초과 대역의 전력에 대해 국제적인 소급표준이 없으므로 HCT에서 자체 점검된 기준기로 점검되었음.
- In the absence of power standards above 110 GHz, power measurements above 110 GHz are to confirm operation functionality and traceable only to HCT.

F-02P-02-010 (Rev.01)

MEASUREMENT RESULT

보고서번호(Report No) : IC-2021-27675 페이지(page) : 3 of 3
측 정 번 호(Measurement No) : C-2021-033180

2. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
110.0	13.1	0.82	126.0	13.4	0.82
111.0	14.4	0.82	127.0	13.2	0.82
112.0	16.1	0.82	128.0	13.2	0.82
113.0	12.8	0.82	129.0	14.1	0.82
114.0	13.9	0.82	130.0	13.5	0.82
115.0	11.5	0.82	131.0	13.6	0.82
116.0	10.8	0.82	132.0	13.0	0.82
117.0	10.8	0.82	133.0	13.6	0.82
118.0	12.0	0.82	134.0	14.2	0.82
119.0	13.7	0.82	135.0	15.0	0.82
120.0	13.0	0.82	136.0	14.5	0.82
121.0	13.8	0.82	137.0	14.1	0.82
122.0	14.2	0.82	138.0	15.2	0.82
123.0	14.1	0.82	139.0	15.2	0.82
124.0	13.8	0.82	140.0	16.0	0.82
125.0	13.6	0.82	-	-	-

끝.

F-02P-02-010 (Rev.01)

Measurement Report

74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, Korea 17383
Tel :82-31-645-6900, www.hct.co.kr

보고서번호(Report No) : IC-2021-24399
측 정 번 호(Measurement No) : C-2021-030476

1. 의뢰자 (Client)
- 기관명 (Name) : (주)에이치시티
- 주소 (Address) : 경기도 이천시 마장면 서이천로 578번길 74

2. 대상품목 (Measurement Item) ◇ HCT 등록번호 : 415876
- 기기명 (Description) : SA EXTENSION MODULE
- 제작회사 및 형식(Manufacturer and Model Name) : VDI / SAX WR5.1
- 기기번호 (Serial Number) : SAX774

3. 측정일자 (Measurement date) : 2021.04.02

4. 측정환경 (Environment)
- 온도(Temperature) : (22.5 ± 0.5) ℃ - 습도(Humidity) : (46 ± 4) % R.H.

5. 측정방법 (Measurement method used)

상기 기기는 고주파 스펙트럼 분석기의 교정절차(HCT-CS-125-40641)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 표준장비를 이용하여 교정 되었음.

측정에 사용한 표준장비 명세 (List of used standards/specifications)

기기명 (Description)	제작회사 및 형식 (Manufacturer and Model Name)	기기번호 (Serial Number)	차기교정예정일자 (The due date of next Calibration)	교정기관 (Calibration laboratory)
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT N5173B	MY53270544	2021/06/23	(주)에이치시티
ERICKSON POWER METER	VDI PM5	394V	측정	(주)에이치시티
WR-05 MULTIPLIER SOURCE MODULE	OML S05MS-A	160419-1	측정	(주)에이치시티

6. 측정결과 (Messurement result) : **측정결과 참조** (Refer to attachment)

㈜ 이 측정결과는 의뢰자가 제시한 시료 및 시료명에만 한정됩니다.
The messuremen results shown in this report refer only to the sample(s) measured unless otherwise stated.

확 인 (Affirmation)	작성자 (Tested by) 성명 (Name) : 박 민 지	승인자 (Approved by) 직위 (Title) 기술책임자(Technical Manager) 성명 (Name) 이 승 찬 (서명)

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2021. 04. 02

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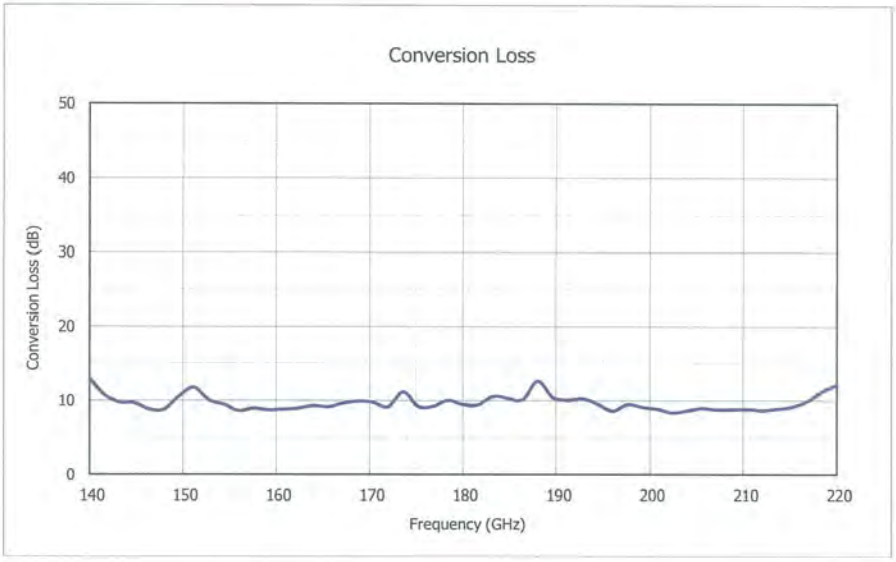
F-02P-02-010 (Rev.01)

MEASUREMENT RESULT

보고서번호(Report No) : IC-2021-24399 페이지(page) : 2 of 3
측 정 번 호(Measurement No) : C-2021-030476

1. Conversion Loss Graph



Note 1) Keysight N9030B (SN MY55480167) 와 함께 교정된 결과임.
Note 2) 110 GHz 초과 대역의 전력에 대해 국제적인 소급표준이 없으므로 HCT에서 자체 점검된 기준기로 점검되었음.
- In the absence of power standards above 110 GHz, power measurements above 110 GHz are to confirm operation functionality and traceable only to HCT.

F-02P-02-010 (Rev.01)

MEASUREMENT RESULT

보고서번호(Report No) : IC-2021-24399
측 정 번 호(Measurement No) : C-2021-030476

2. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
140.0	12.9	0.86	181.6	9.4	0.86
141.6	10.7	0.86	183.2	10.5	0.86
143.2	9.7	0.86	184.8	10.3	0.86
144.8	9.6	0.86	186.4	10.1	0.86
146.4	8.8	0.86	188.0	12.6	0.86
148.0	8.8	0.86	189.6	10.4	0.86
149.6	10.6	0.86	191.2	10.0	0.86
151.2	11.7	0.86	192.8	10.2	0.86
152.8	10.0	0.86	194.4	9.5	0.86
154.4	9.4	0.86	196.0	8.5	0.86
156.0	8.6	0.86	197.6	9.4	0.86
157.6	8.9	0.86	199.2	9.1	0.86
159.2	8.7	0.86	200.8	8.8	0.86
160.8	8.8	0.86	202.4	8.3	0.86
162.4	8.9	0.86	204.0	8.6	0.86
164.0	9.3	0.86	205.6	8.9	0.86
165.6	9.1	0.86	207.2	8.7	0.86
167.2	9.6	0.86	208.8	8.7	0.86
168.8	9.9	0.86	210.4	8.8	0.86
170.4	9.7	0.86	212.0	8.6	0.86
172.0	9.1	0.86	213.6	8.8	0.86
173.6	11.2	0.86	215.2	9.1	0.86
175.2	9.2	0.86	216.8	9.9	0.86
176.8	9.2	0.86	218.4	11.2	0.86
178.4	10.0	0.86	220.0	12.1	0.86
180.0	9.4	0.86	-	-	-

끝.

F-02P-02-010 (Rev.01)

7. Annex B_EUT AND TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2112-FC042-P