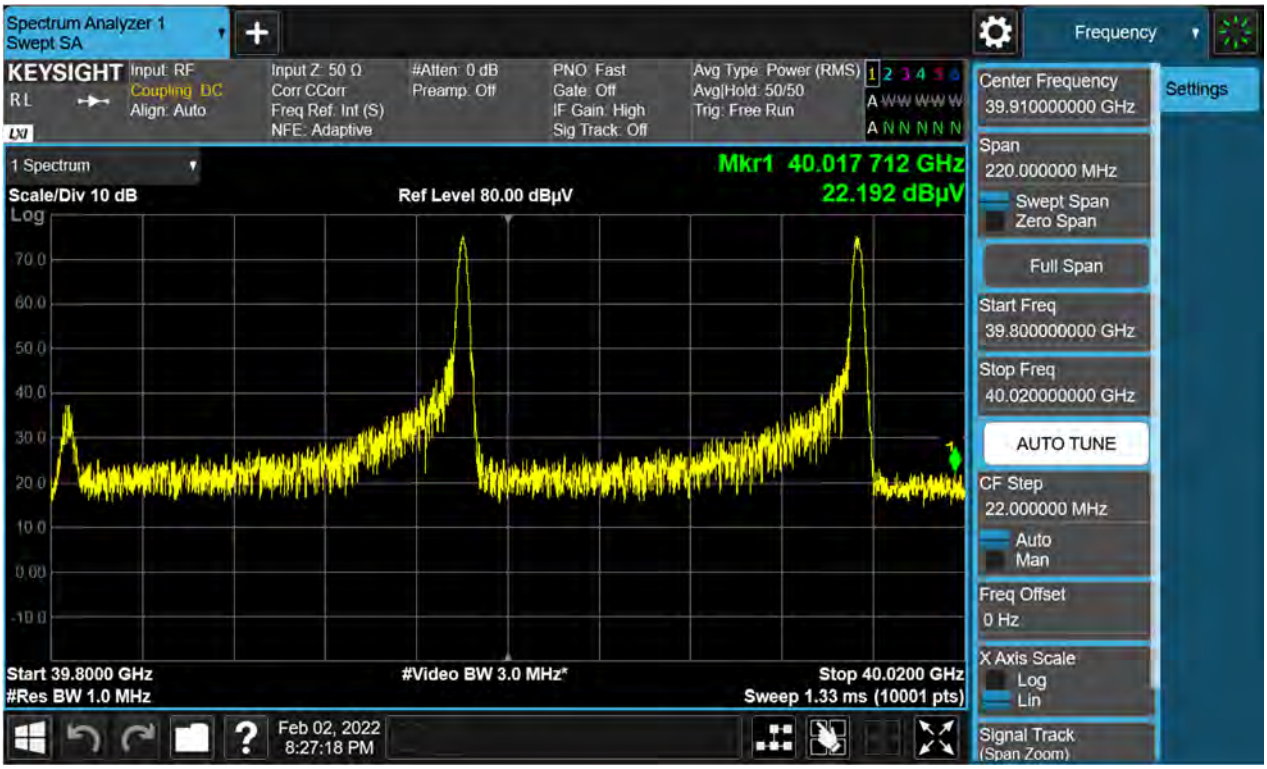
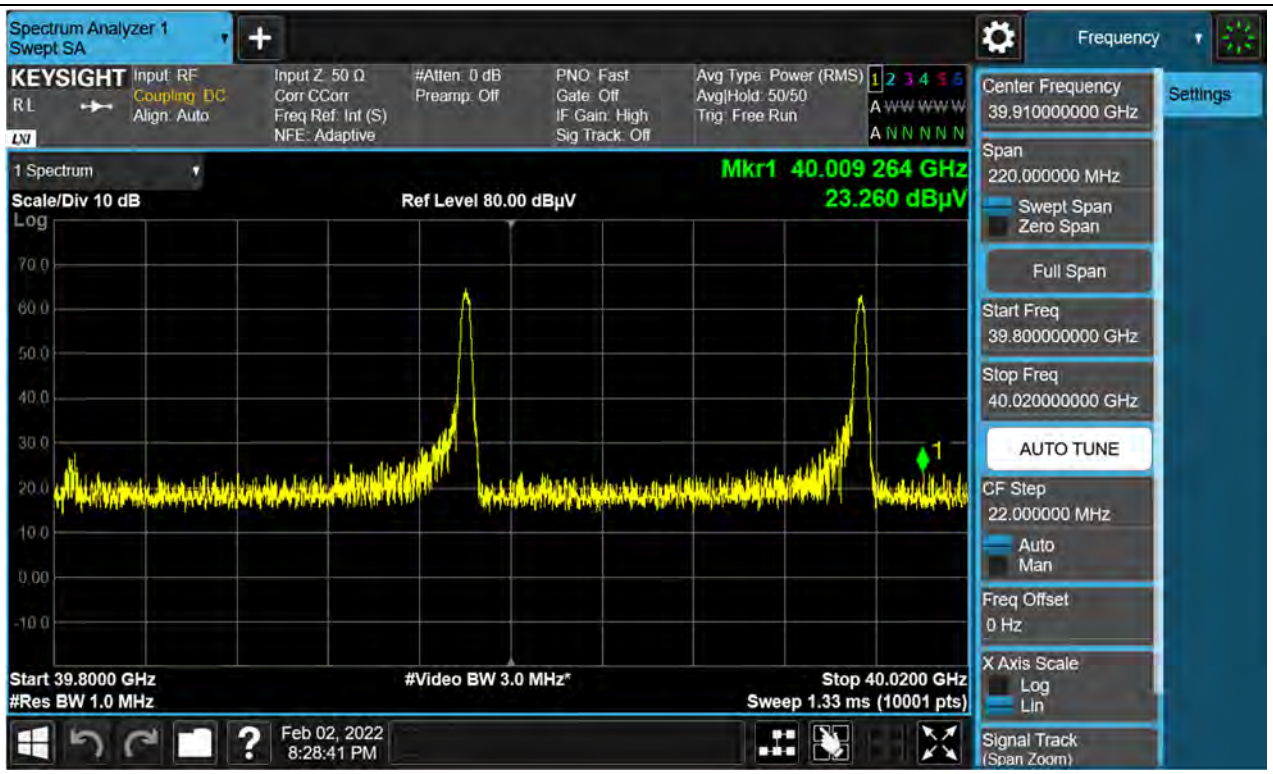
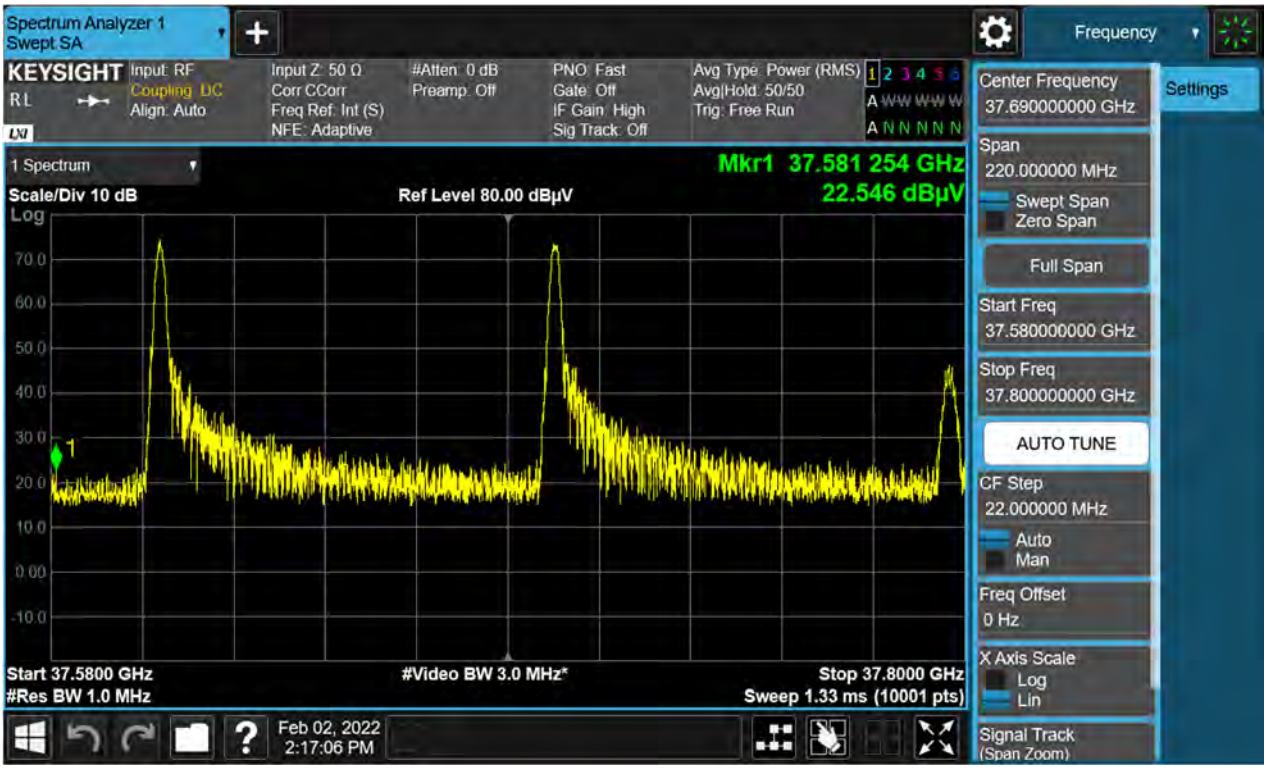
Two Adjacent Test Signal / MAX Ant. B Position / 1cc / High / Co-Pol.



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



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



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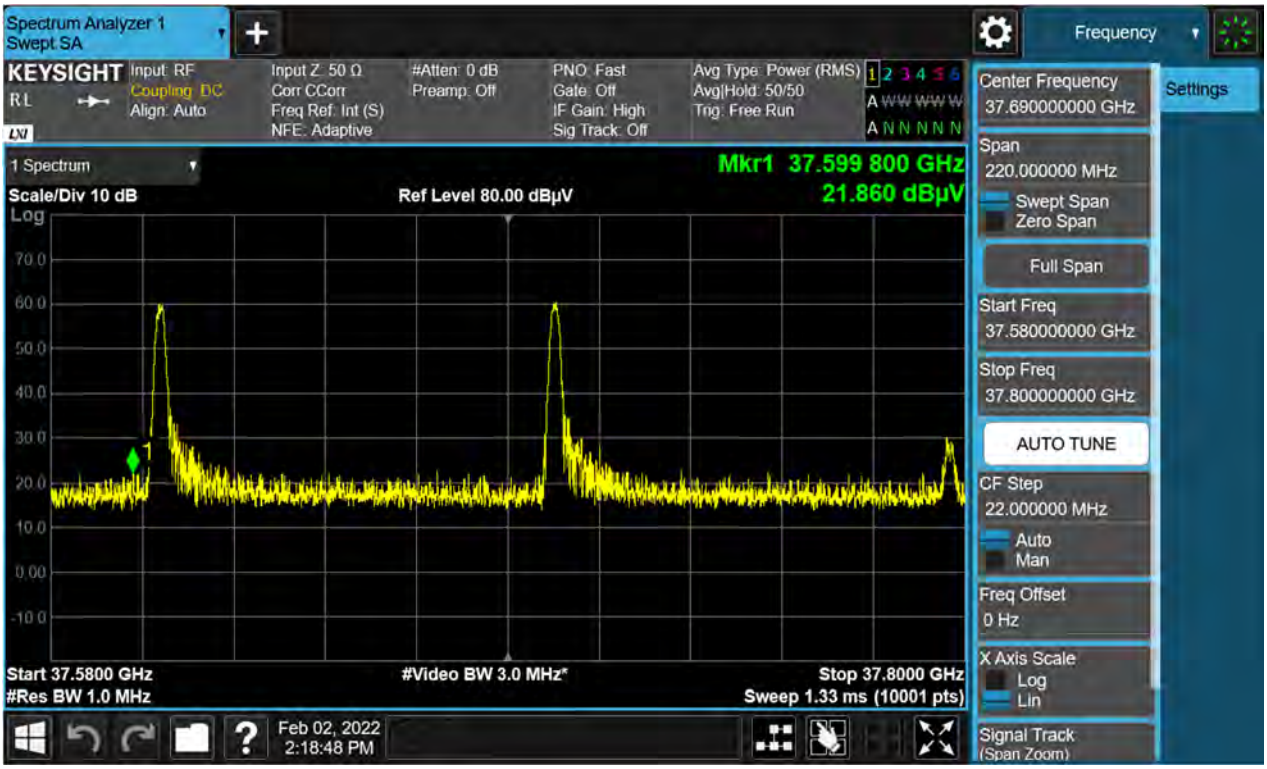

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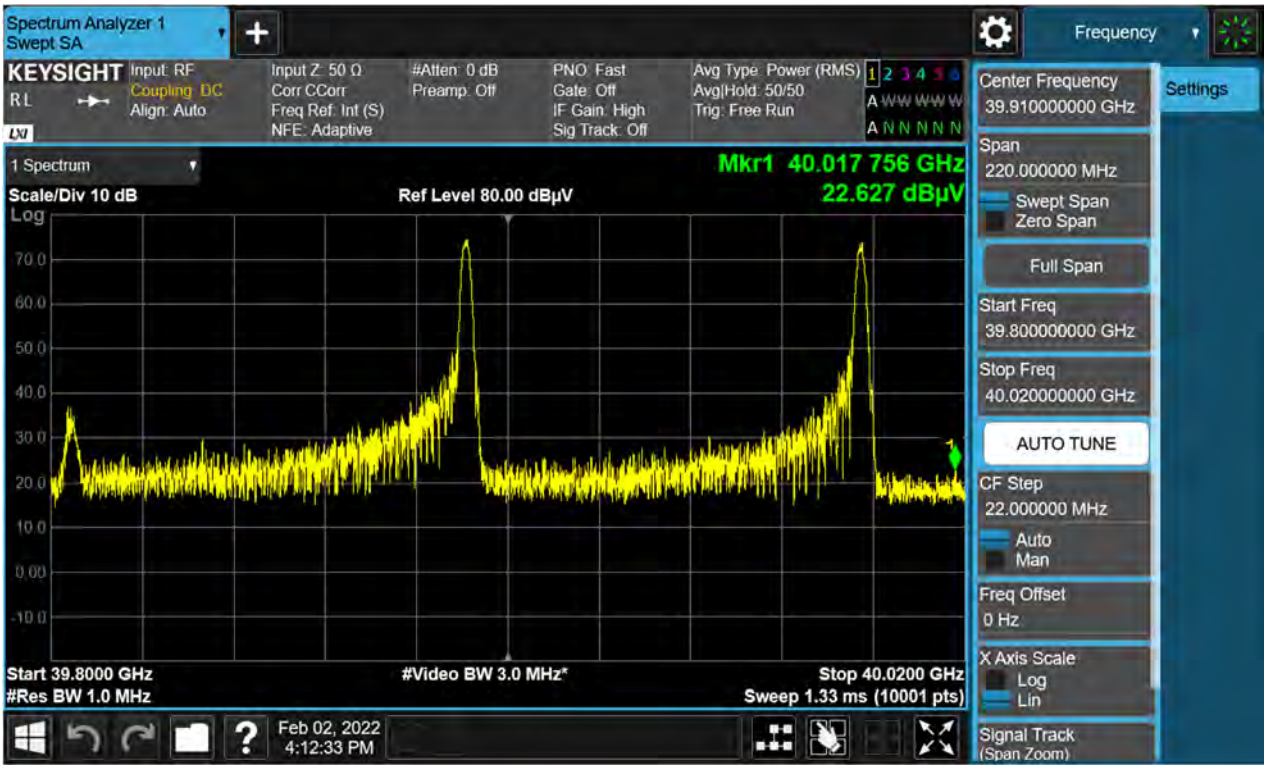

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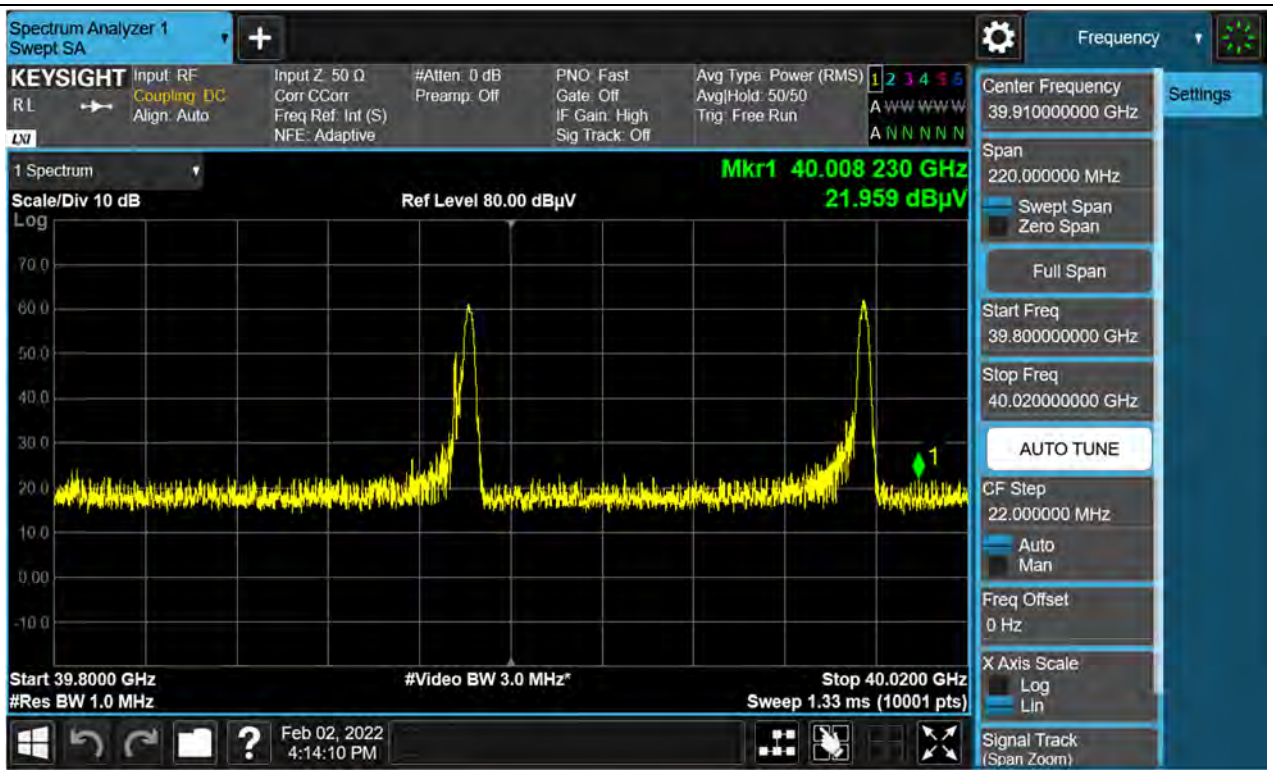

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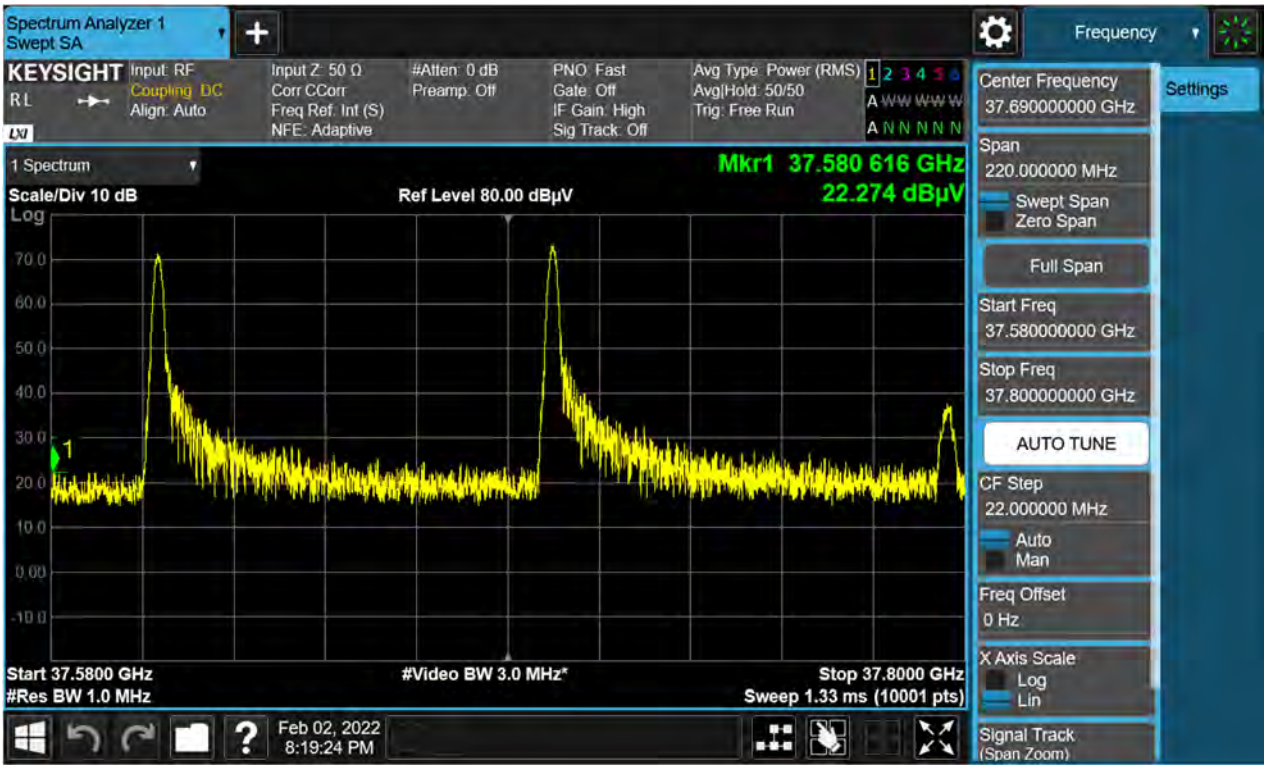

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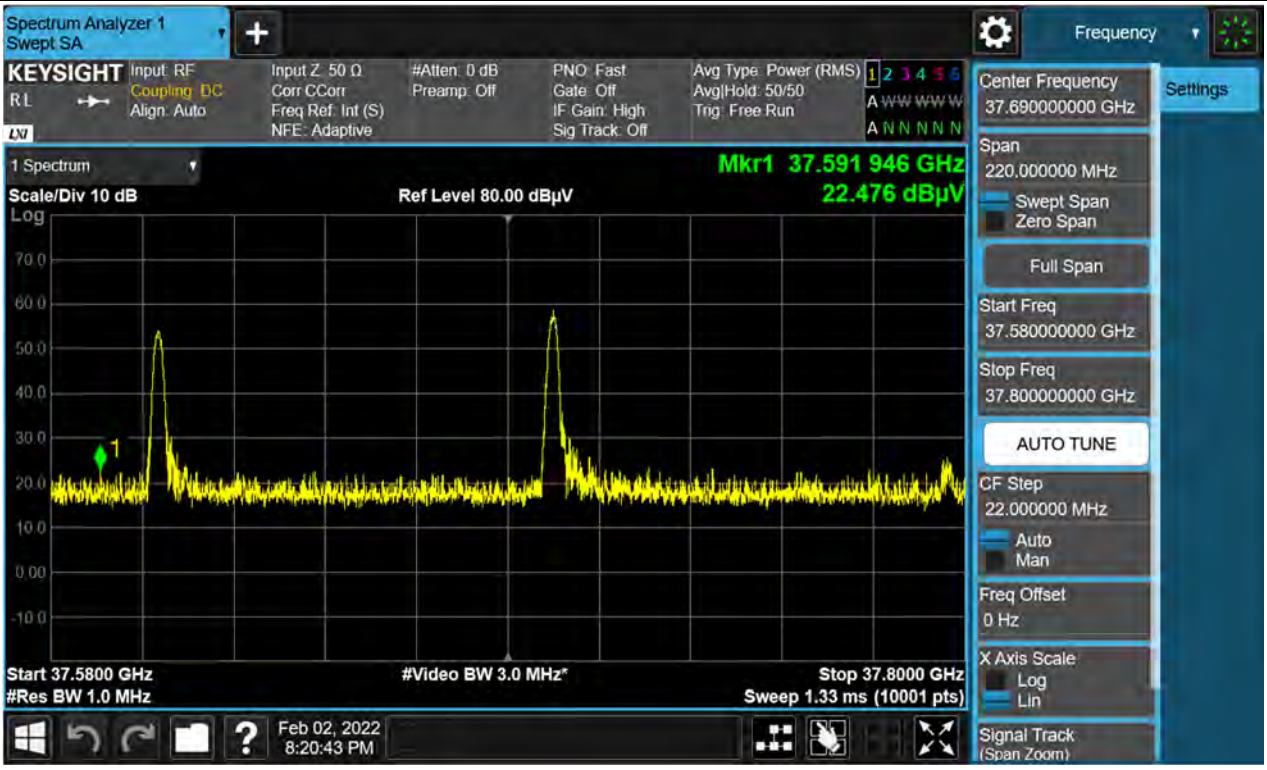

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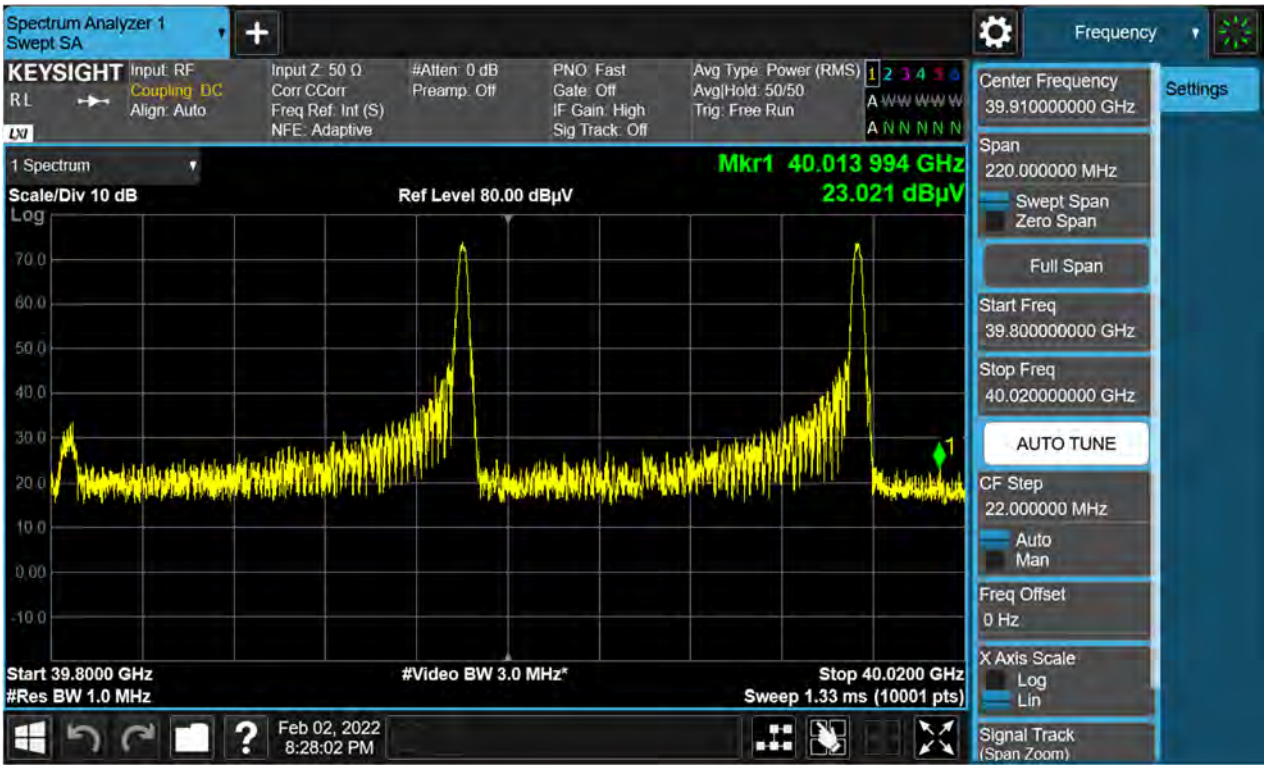

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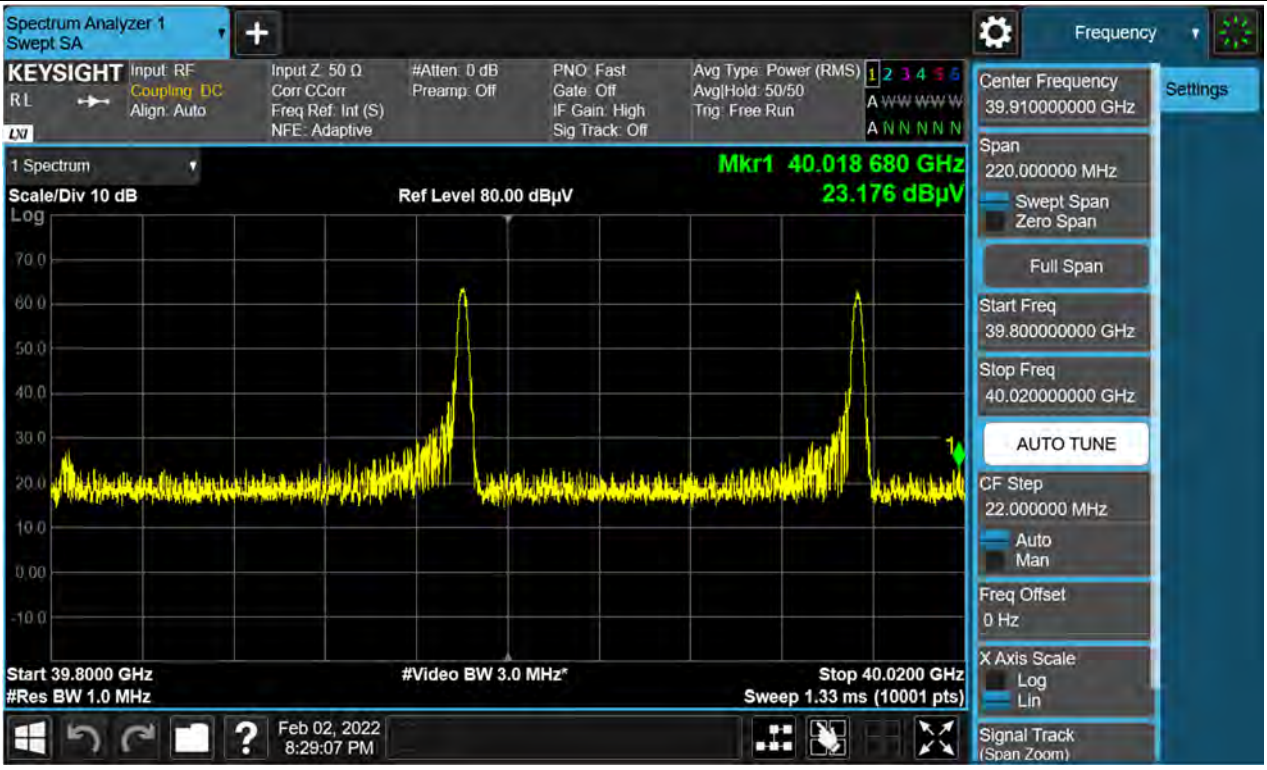
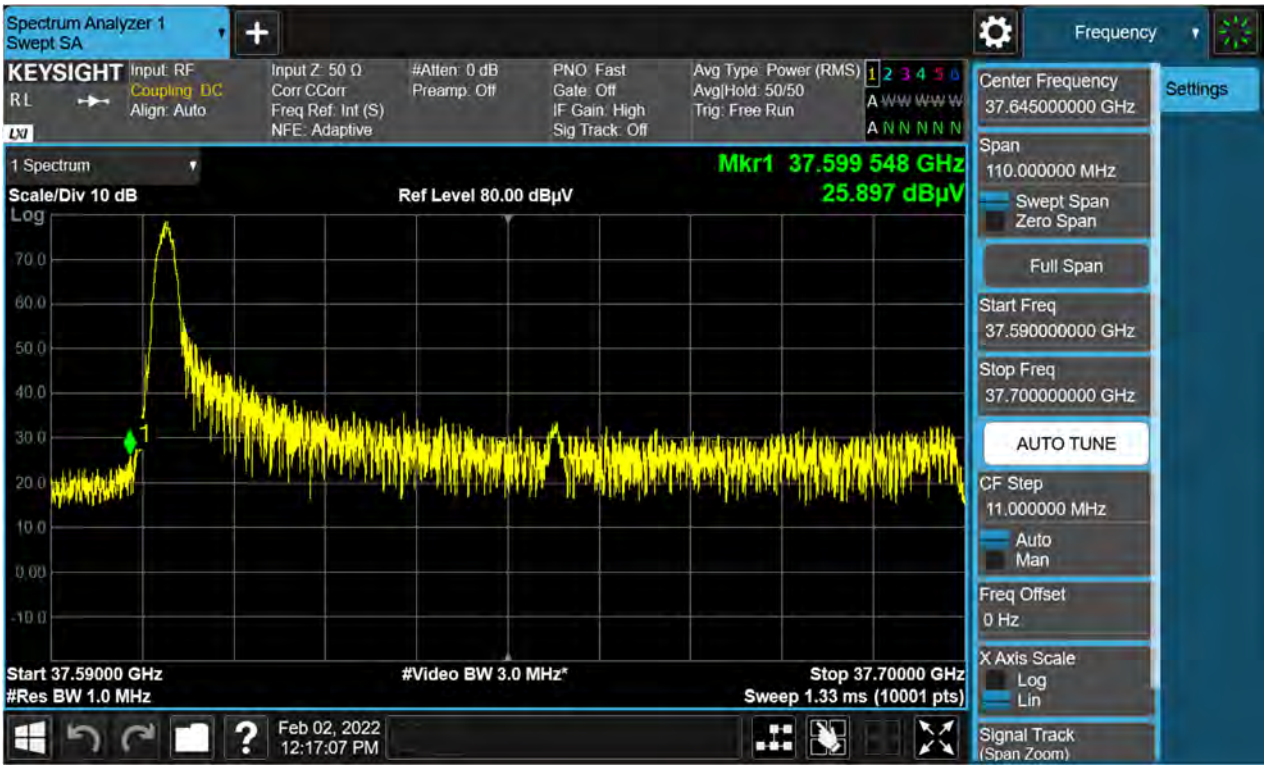


Single Test Signal / MAX Ant. A Position / 1cc / Low / Co-Pol.



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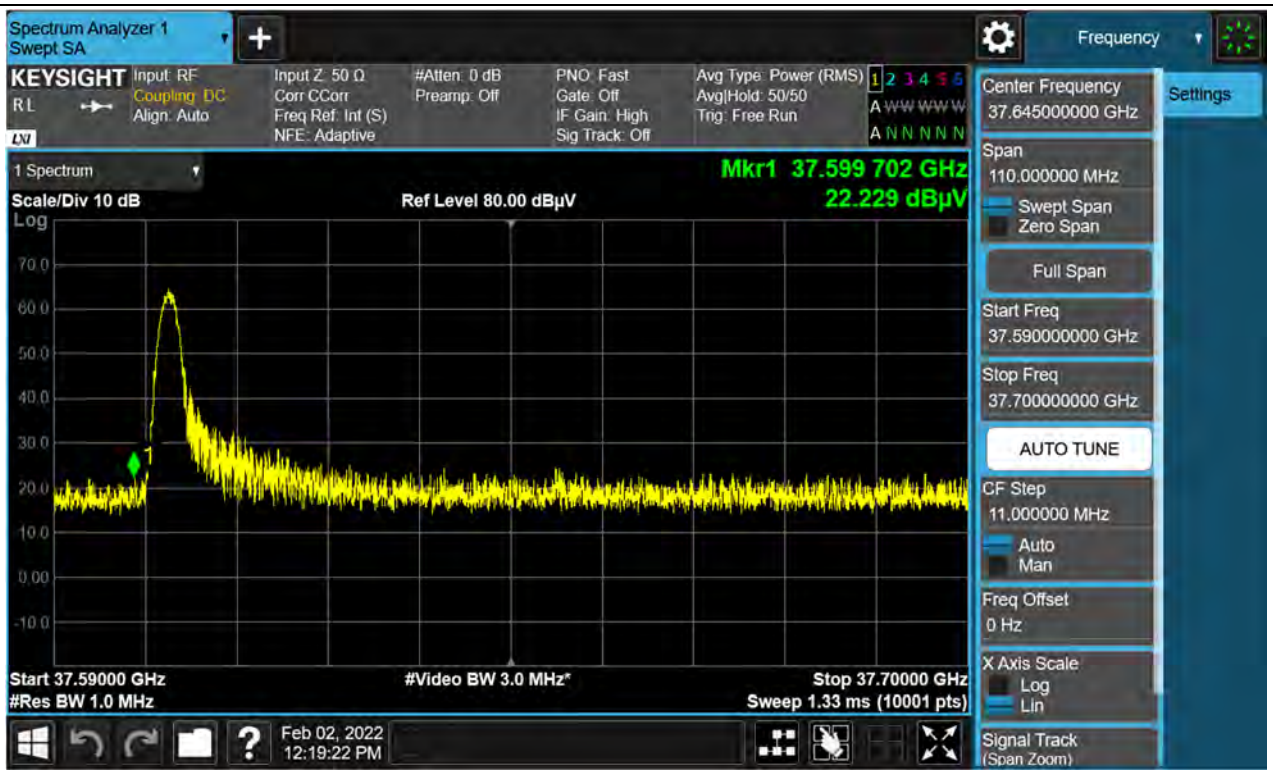

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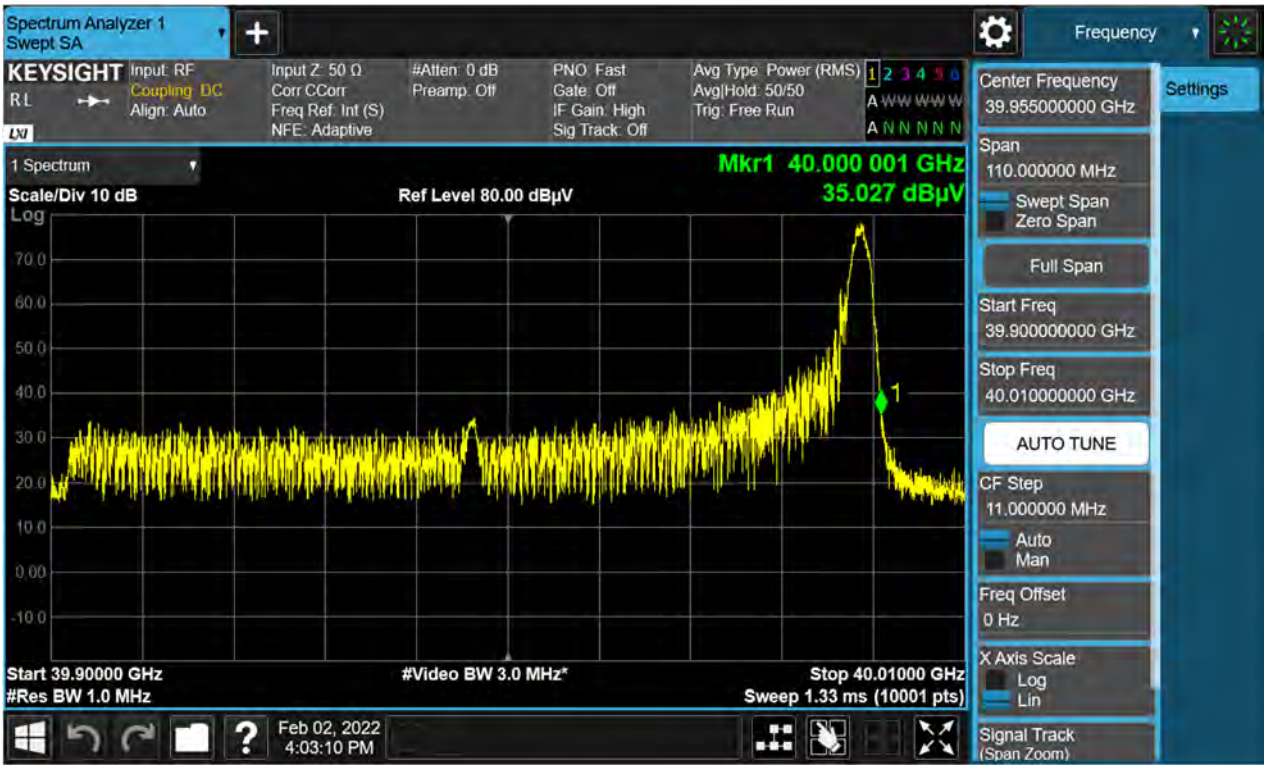

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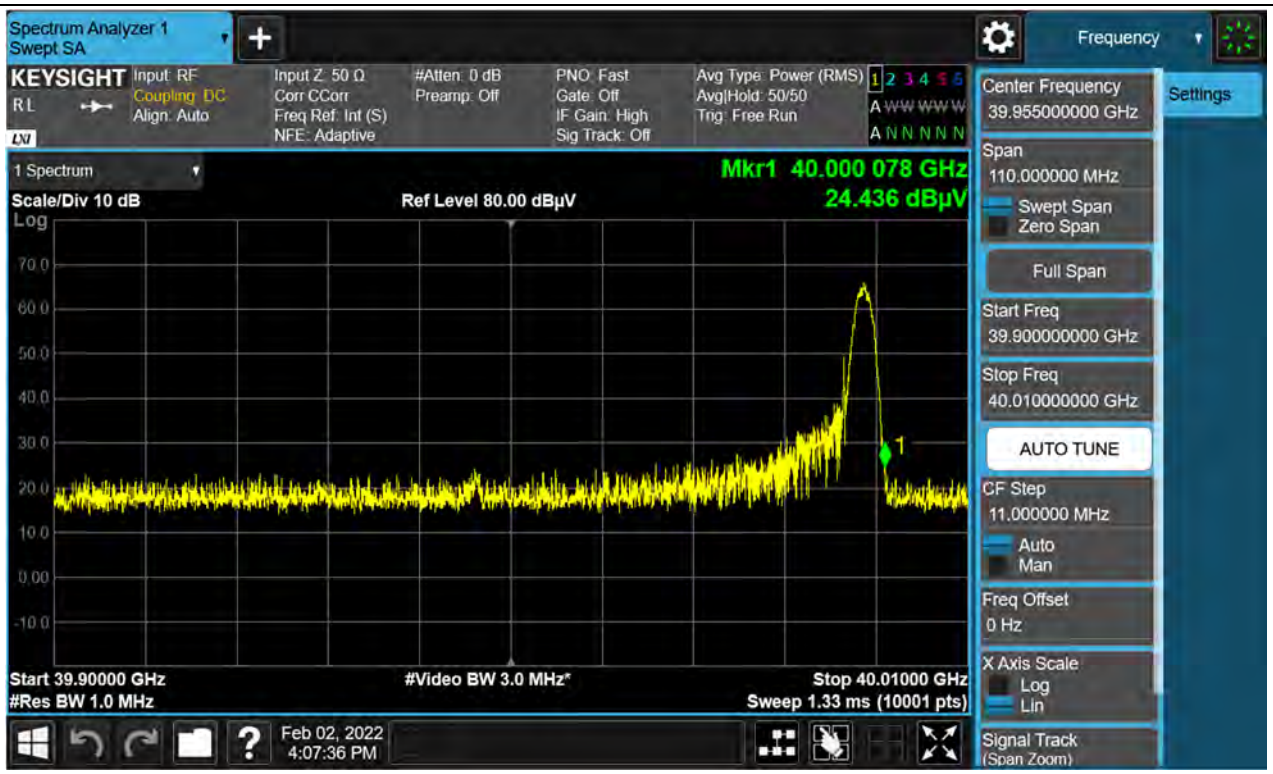
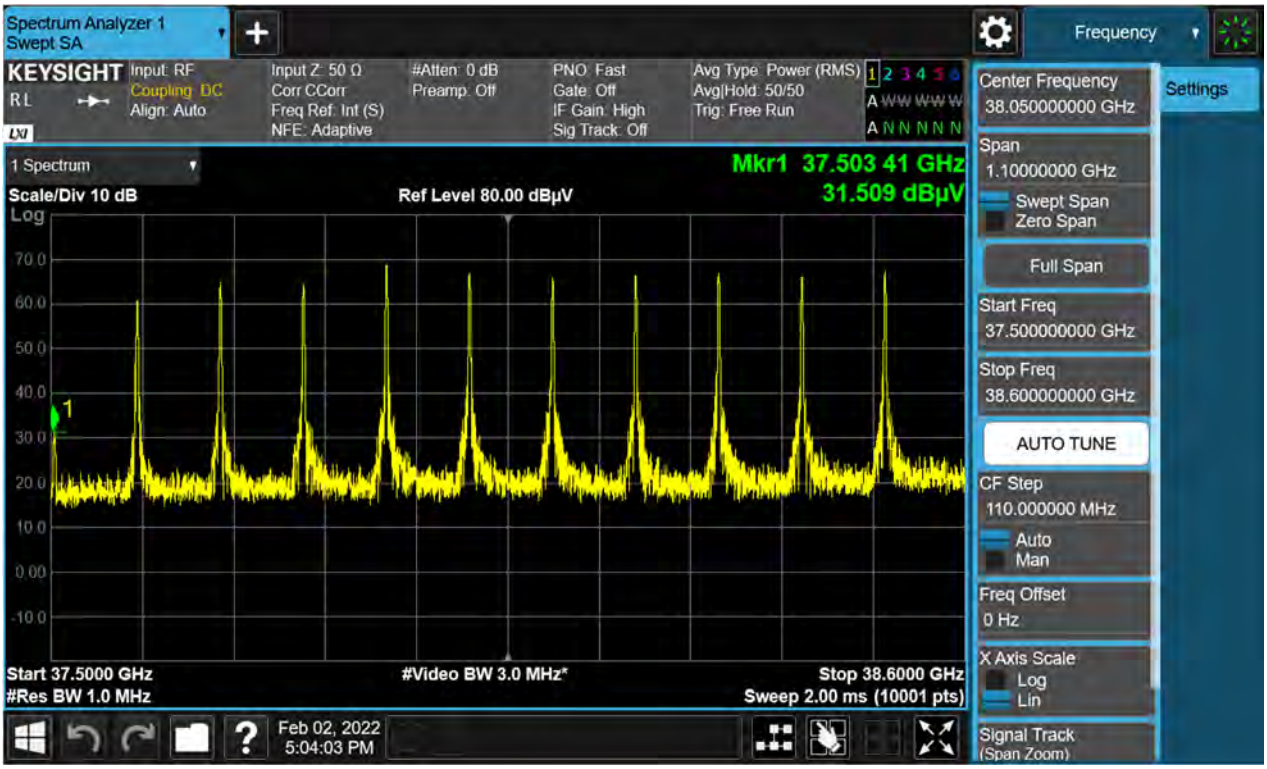
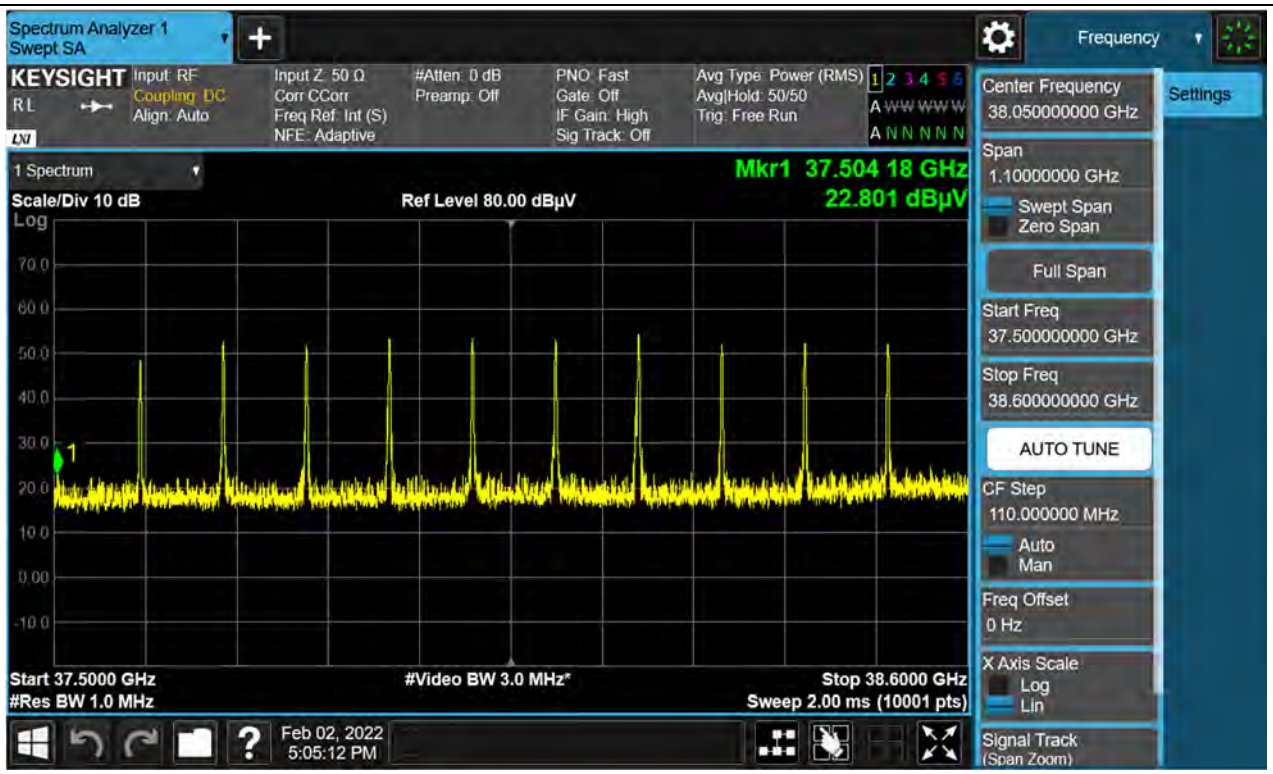


Single Test Signal / MAX Ant. A Position / 10cc / Low / Co-Pol.



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



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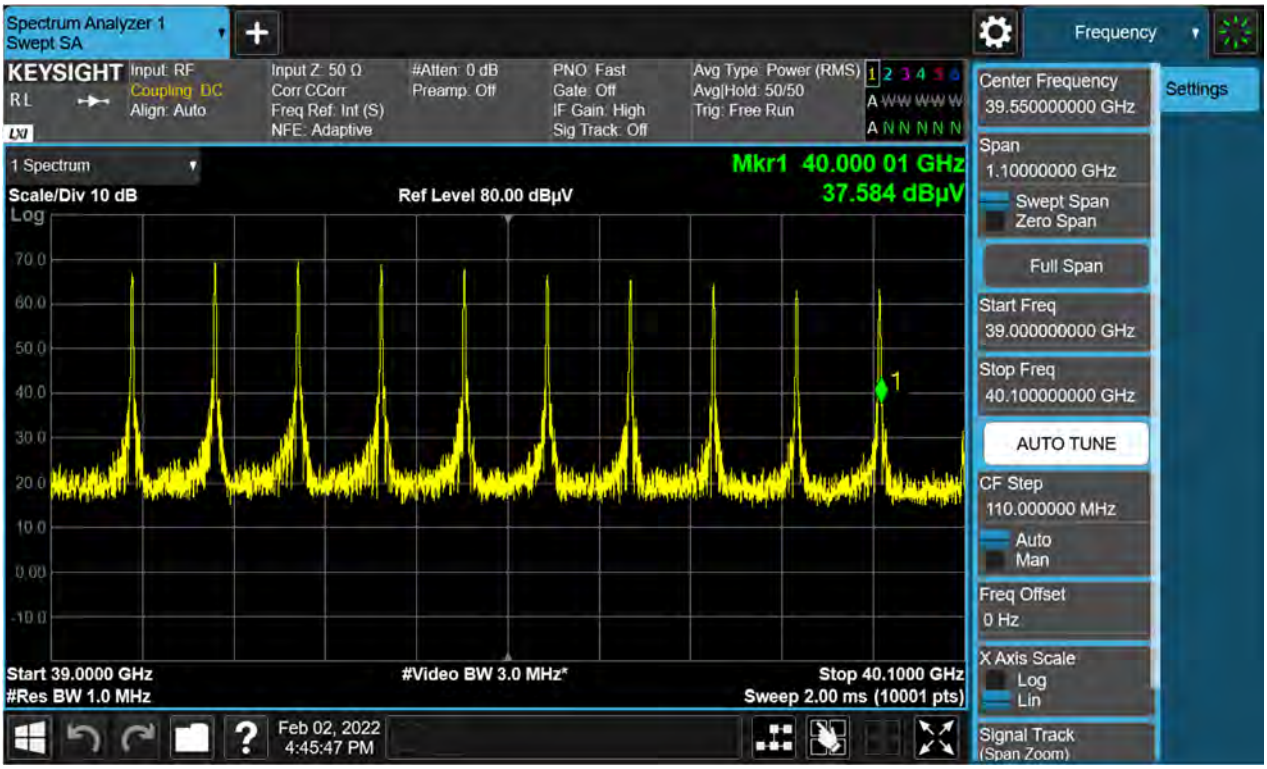
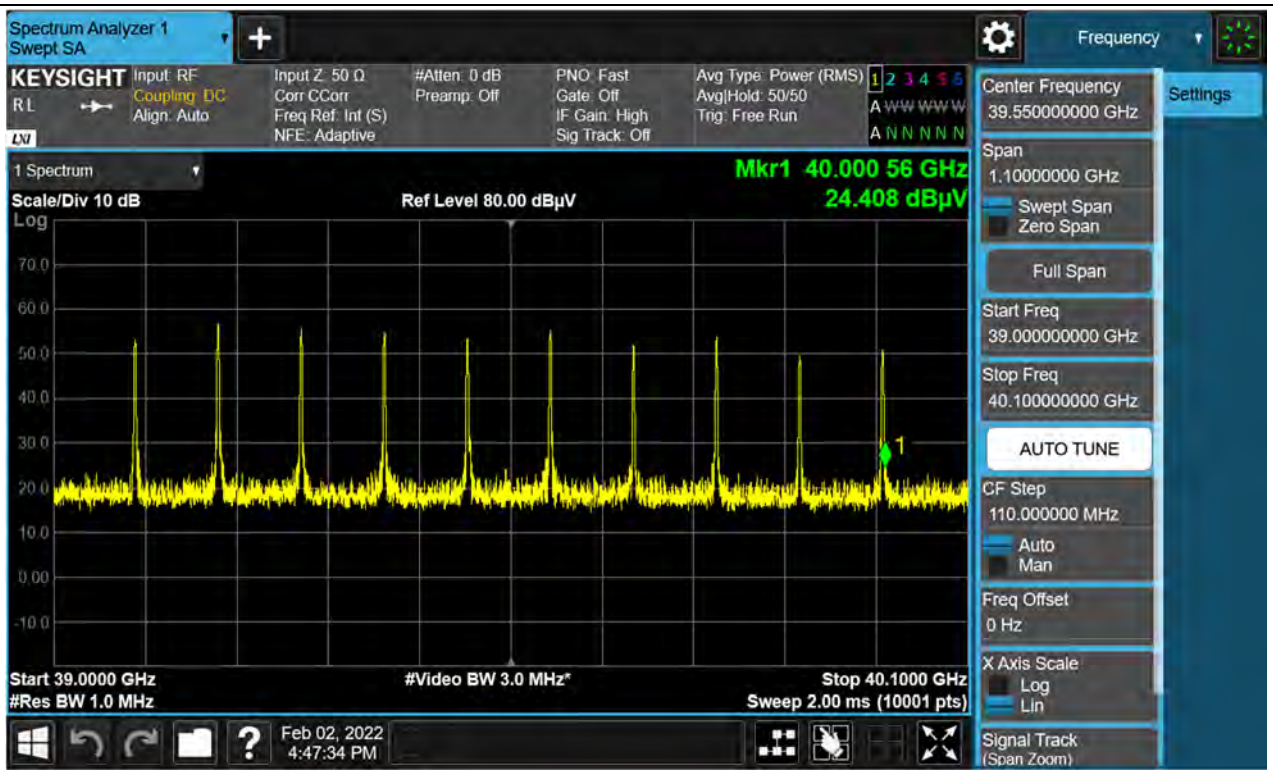
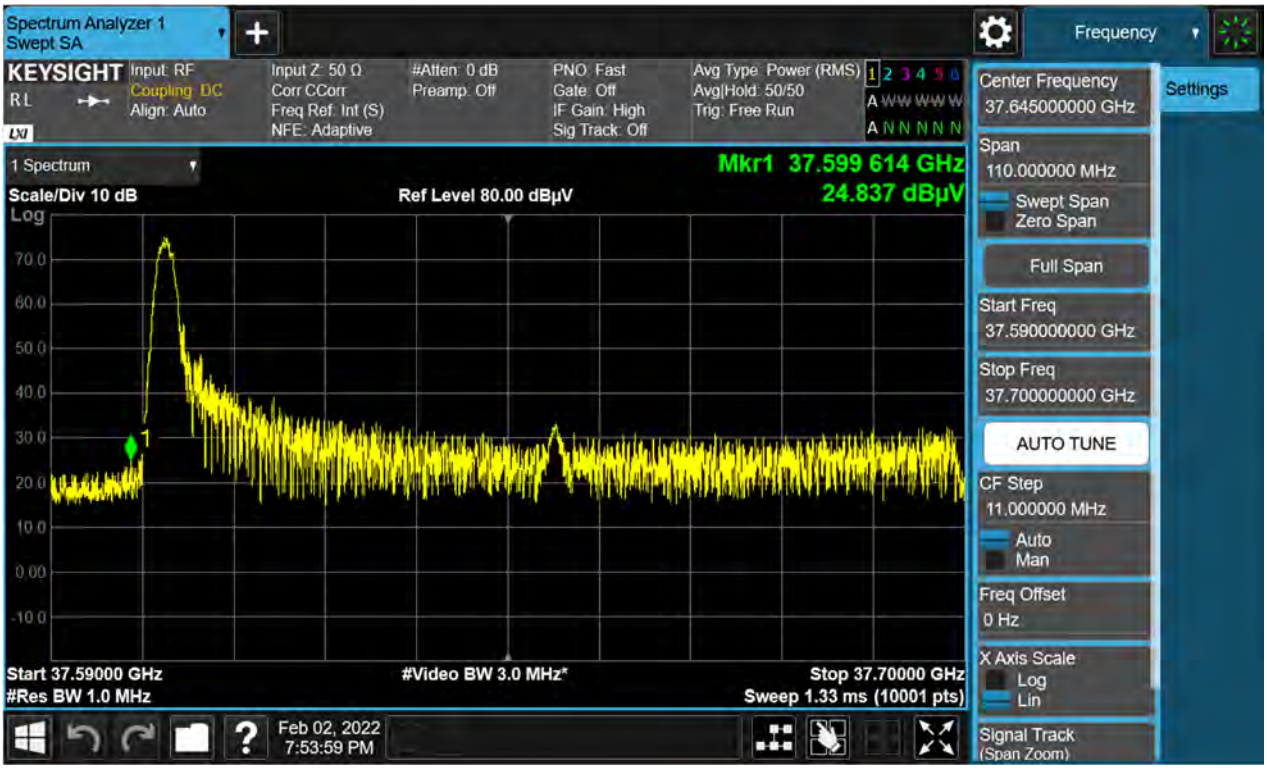


Single Test Signal / MAX Ant. A Position / 10cc / High / Cross-Pol.



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



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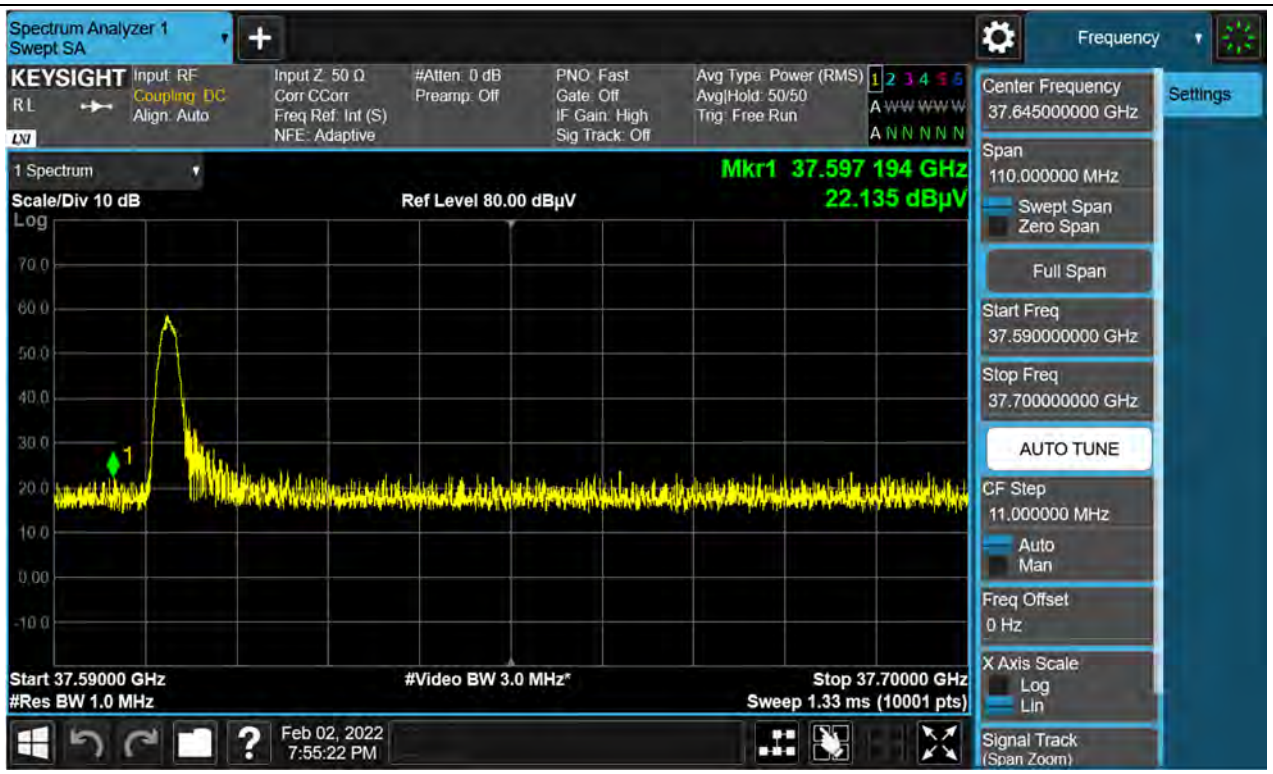
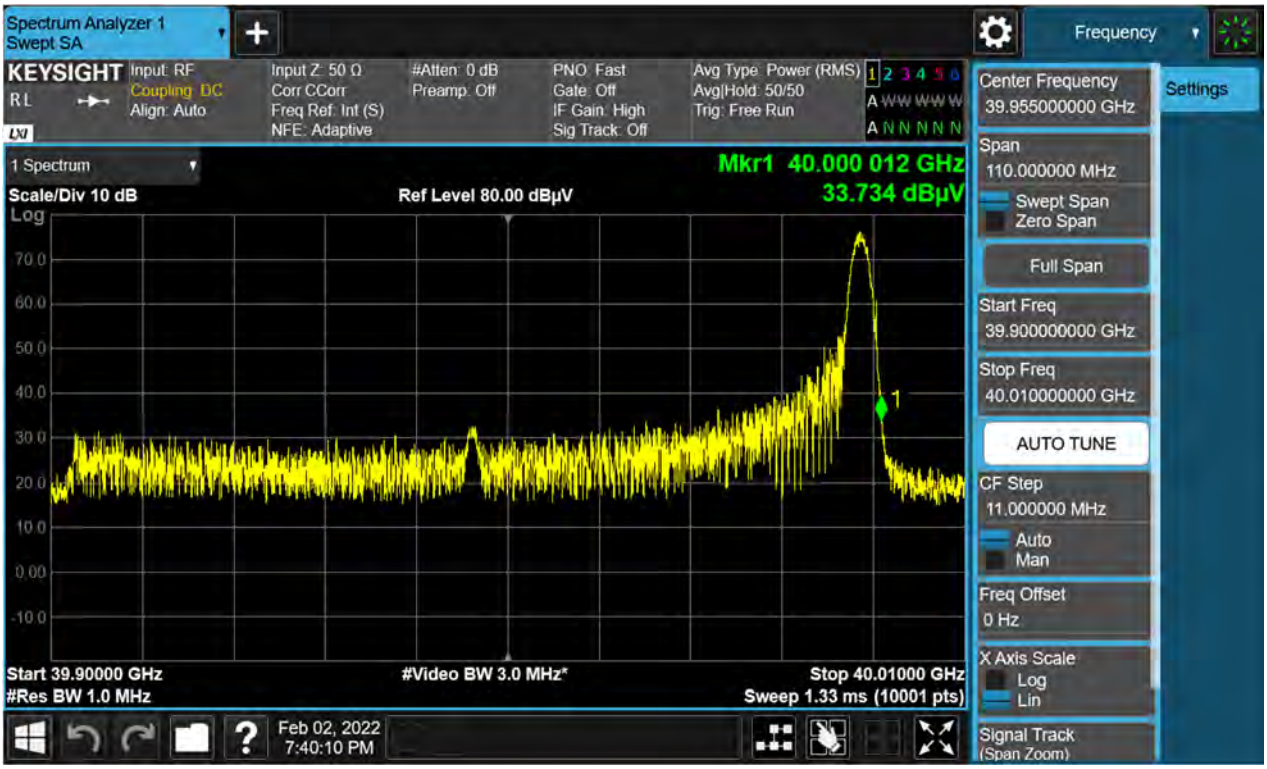
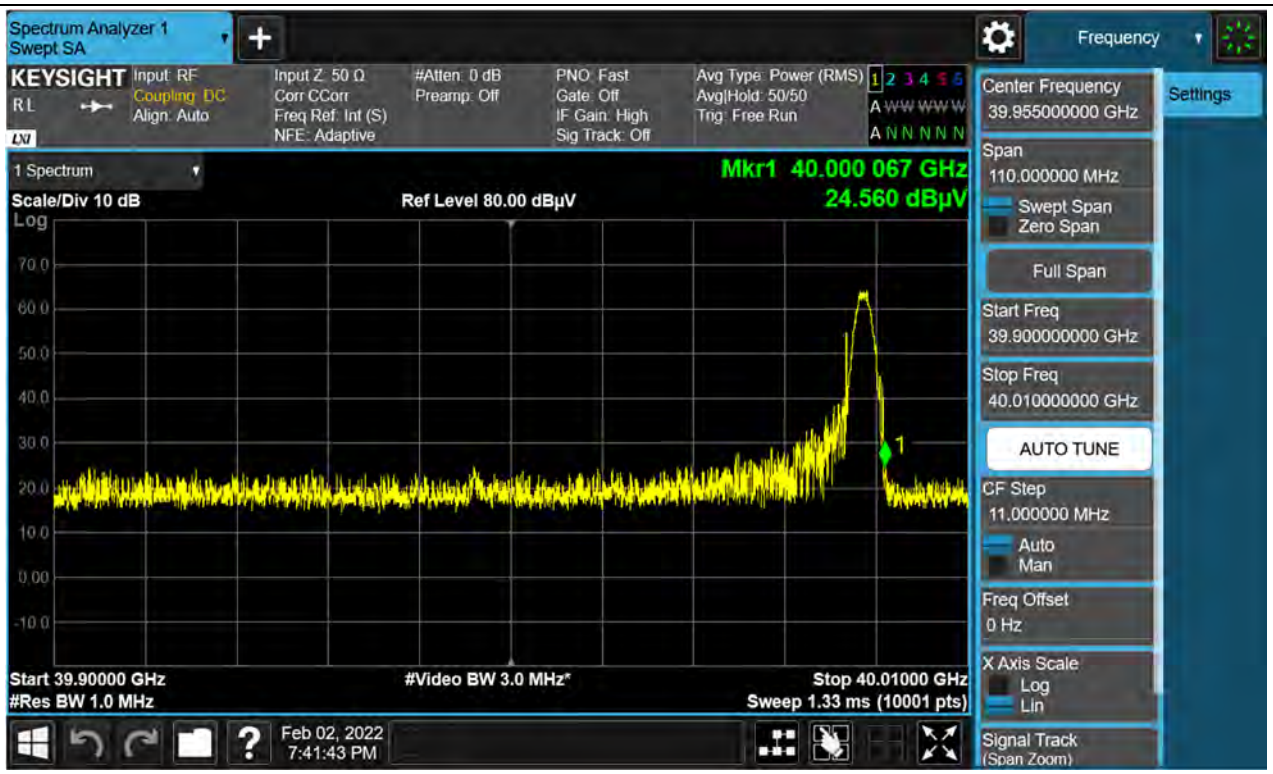


Single Test Signal / MAX Ant. B Position / 1cc / High / Co-Pol.



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



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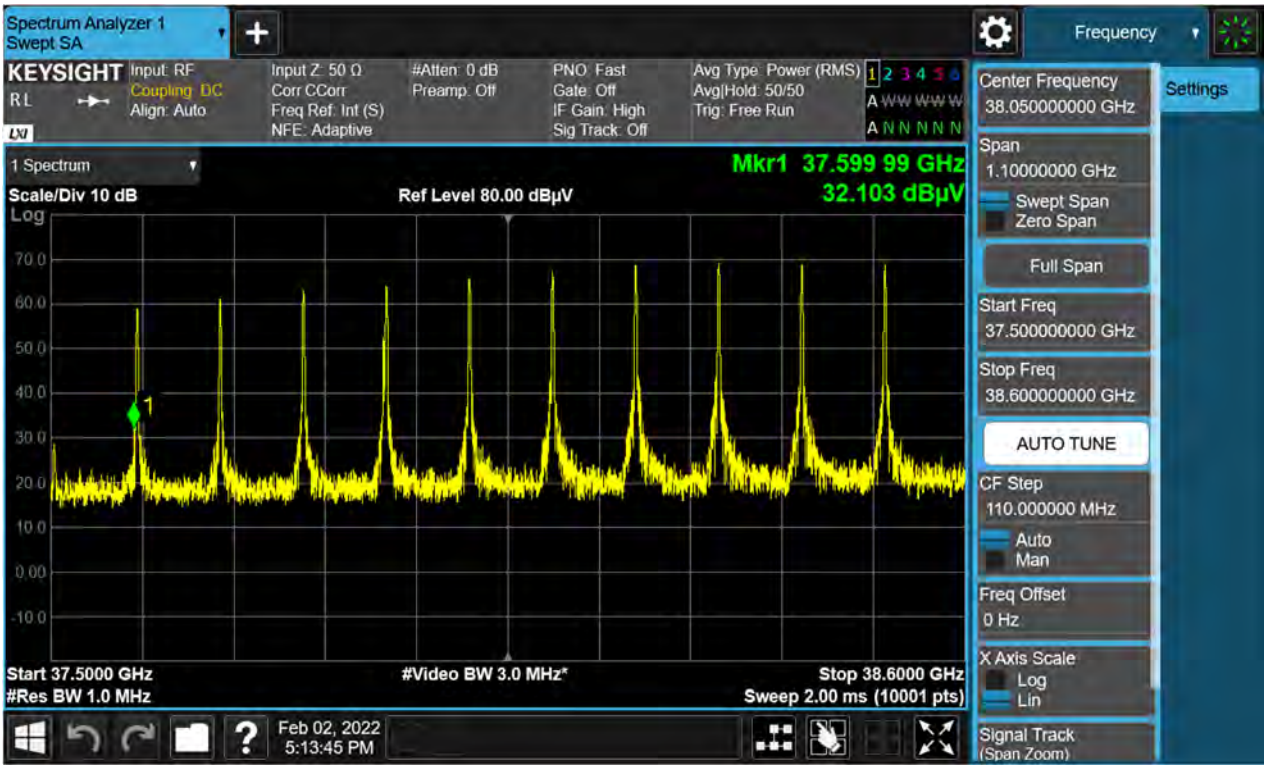
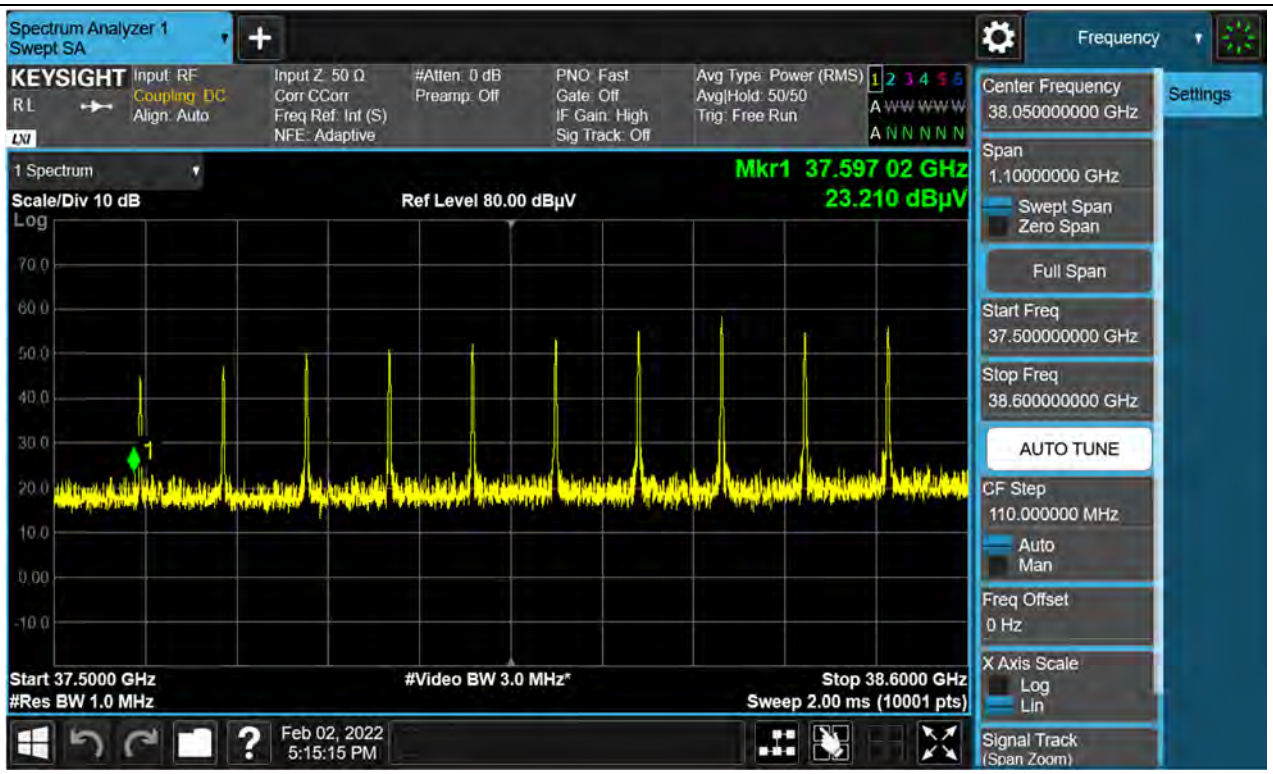


Single Test Signal / MAX Ant. B Position / 10cc / Low / Cross-Pol.



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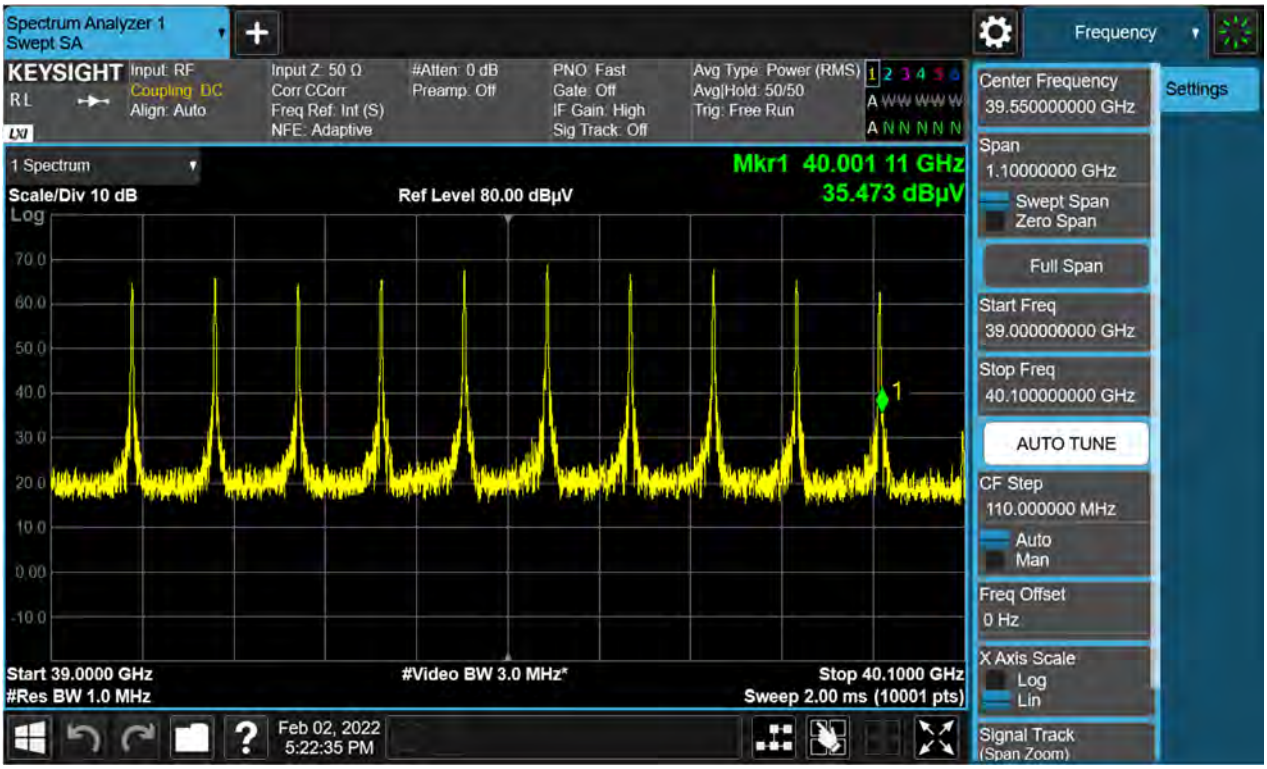
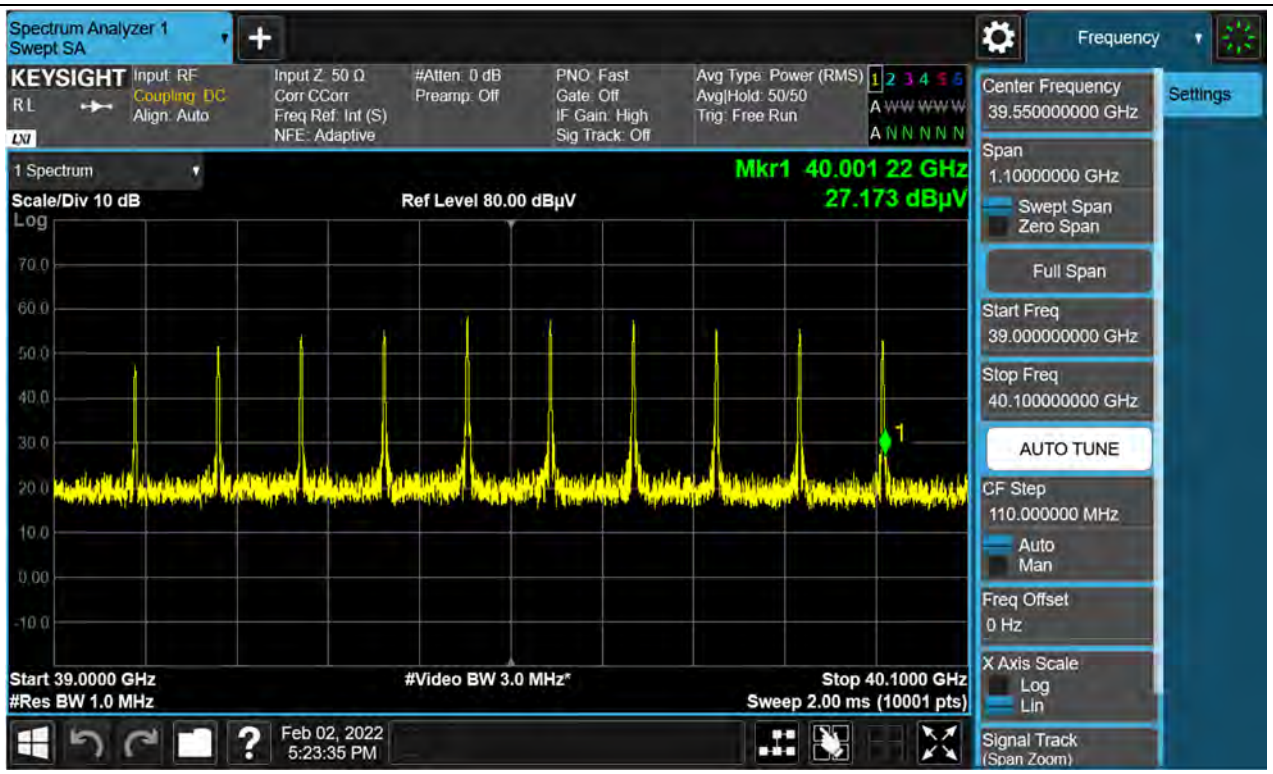
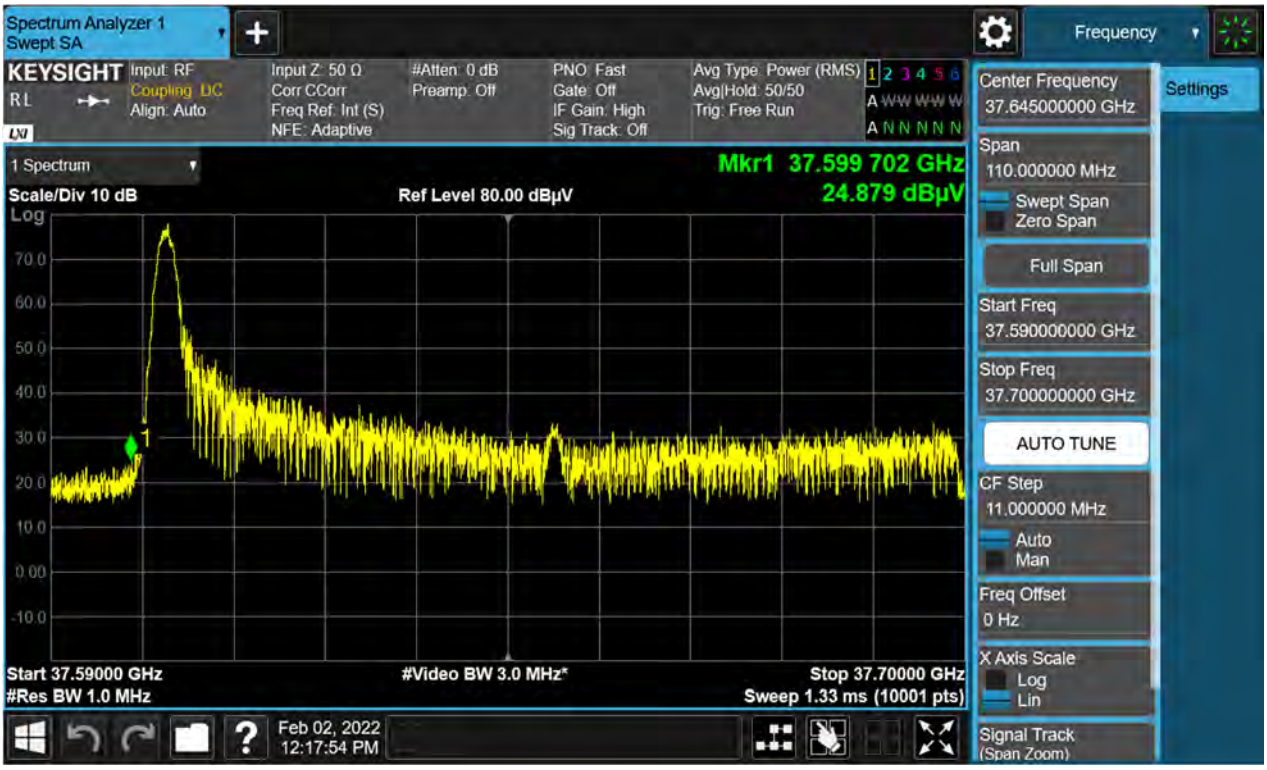


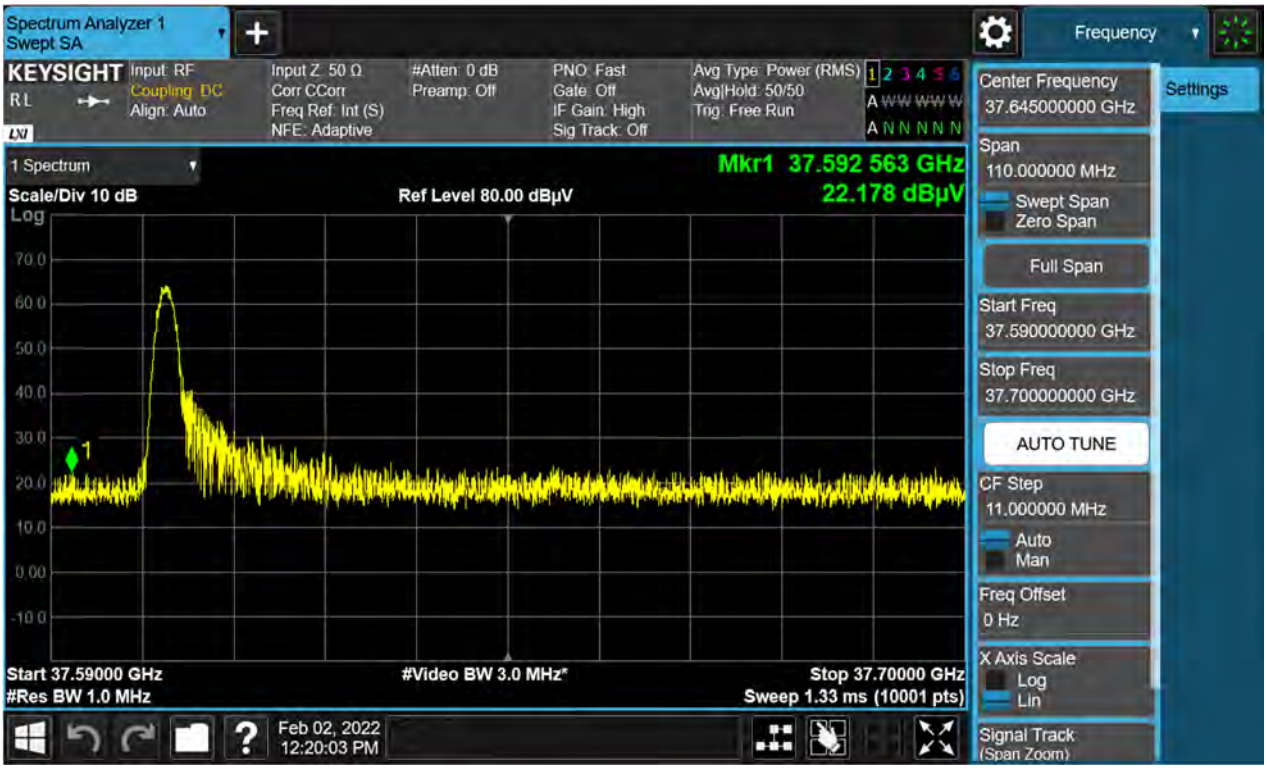
Single Test Signal / MAX Ant. B Position / 10cc / High / Cross-Pol.



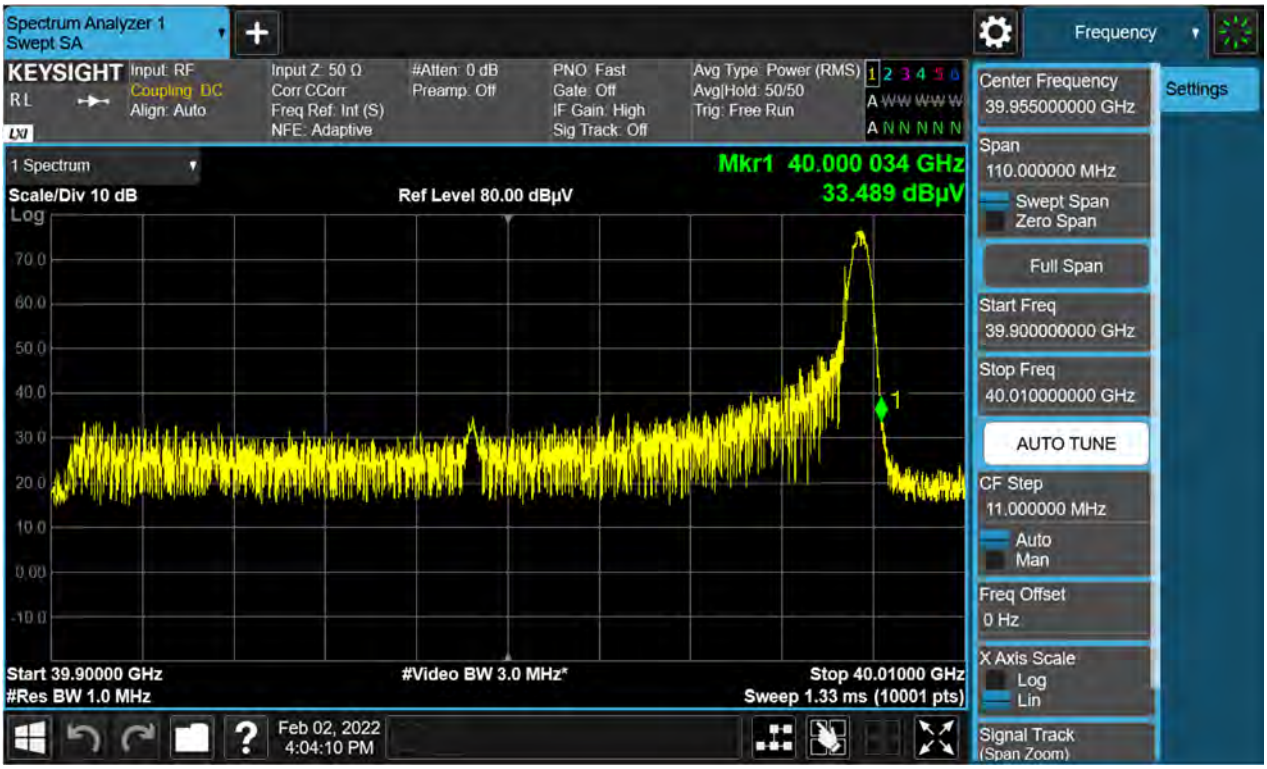
+3 dB above AGC threshold Single Test Signal / MAX Ant. A Position / 1cc / Low / Co-Pol.



+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.



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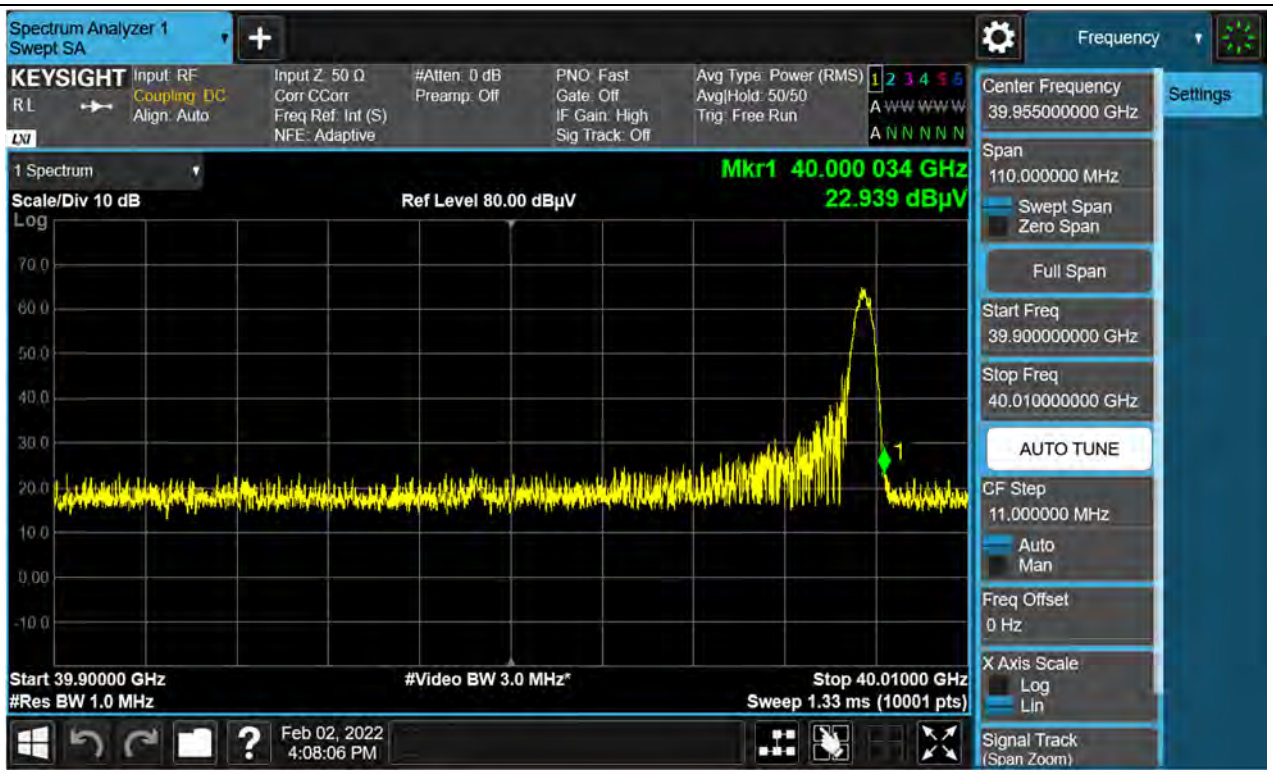
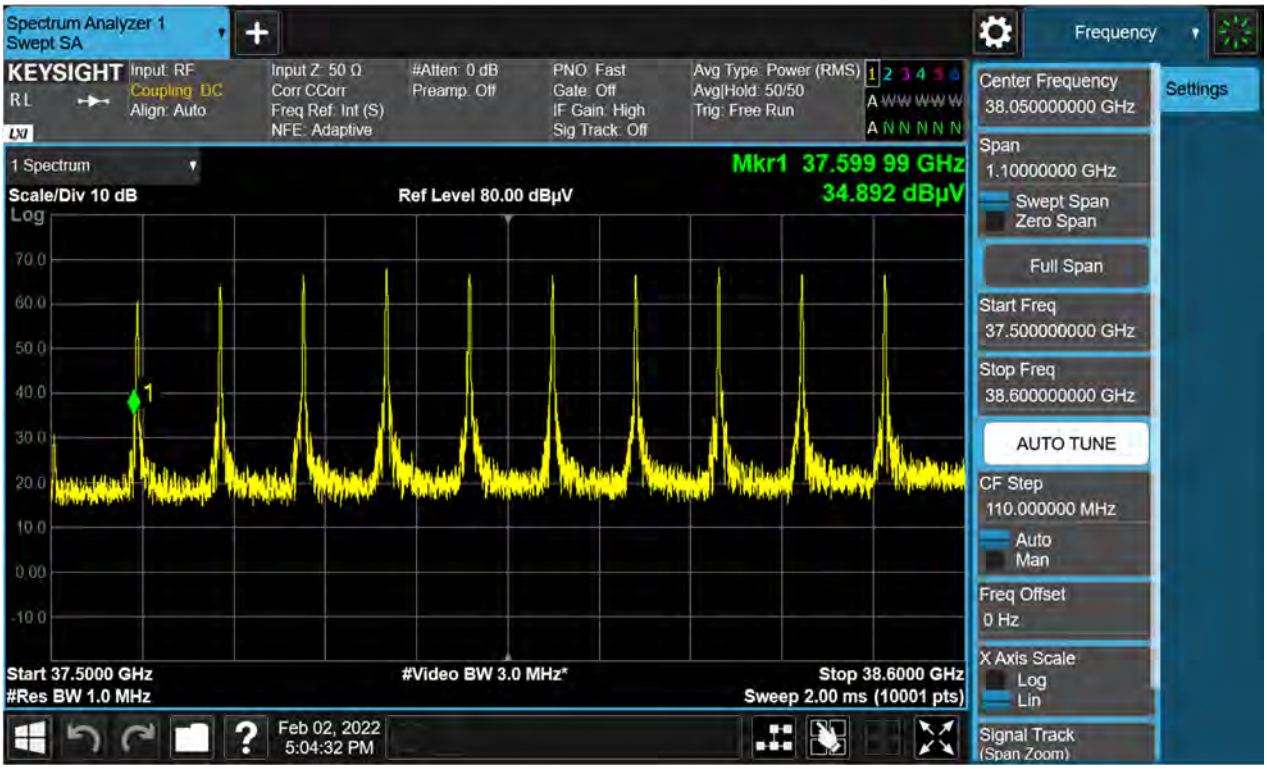
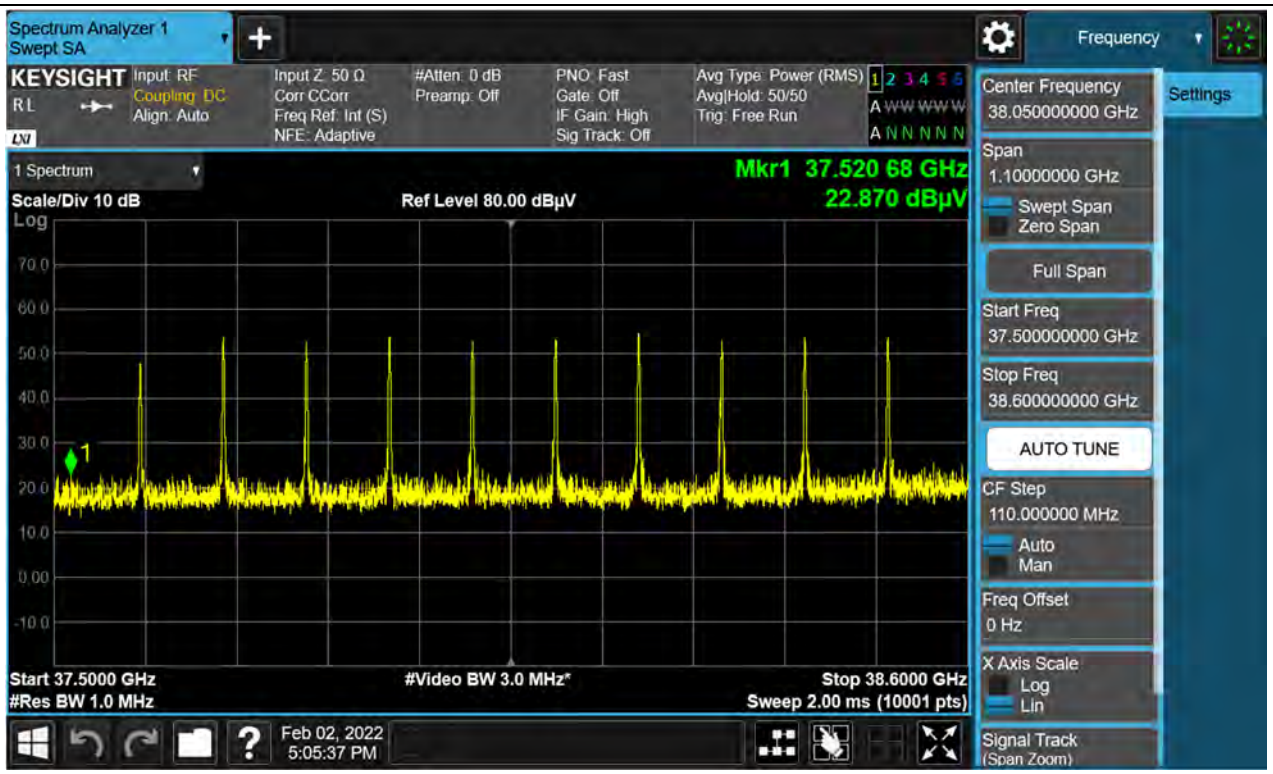


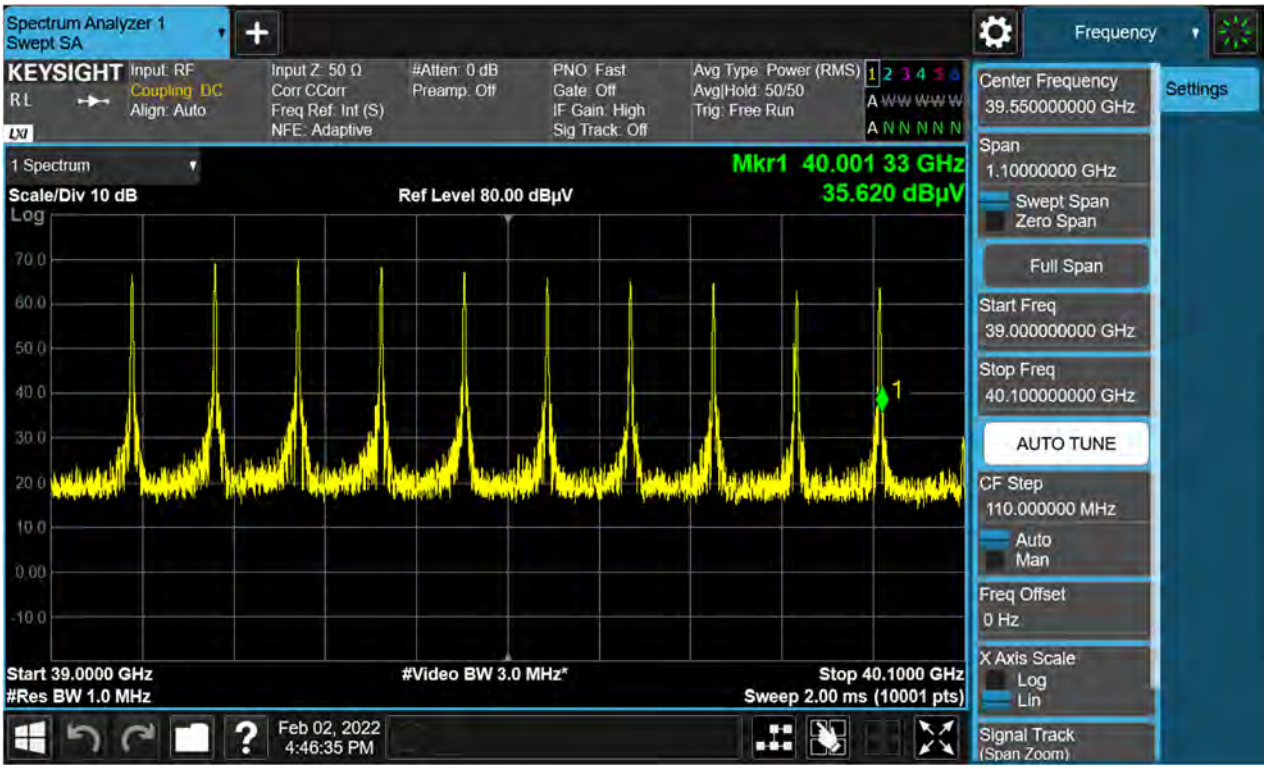
+3 dB above AGC threshold Single Test Signal / MAX Ant. A Position / 10cc / Low / Co-Pol.



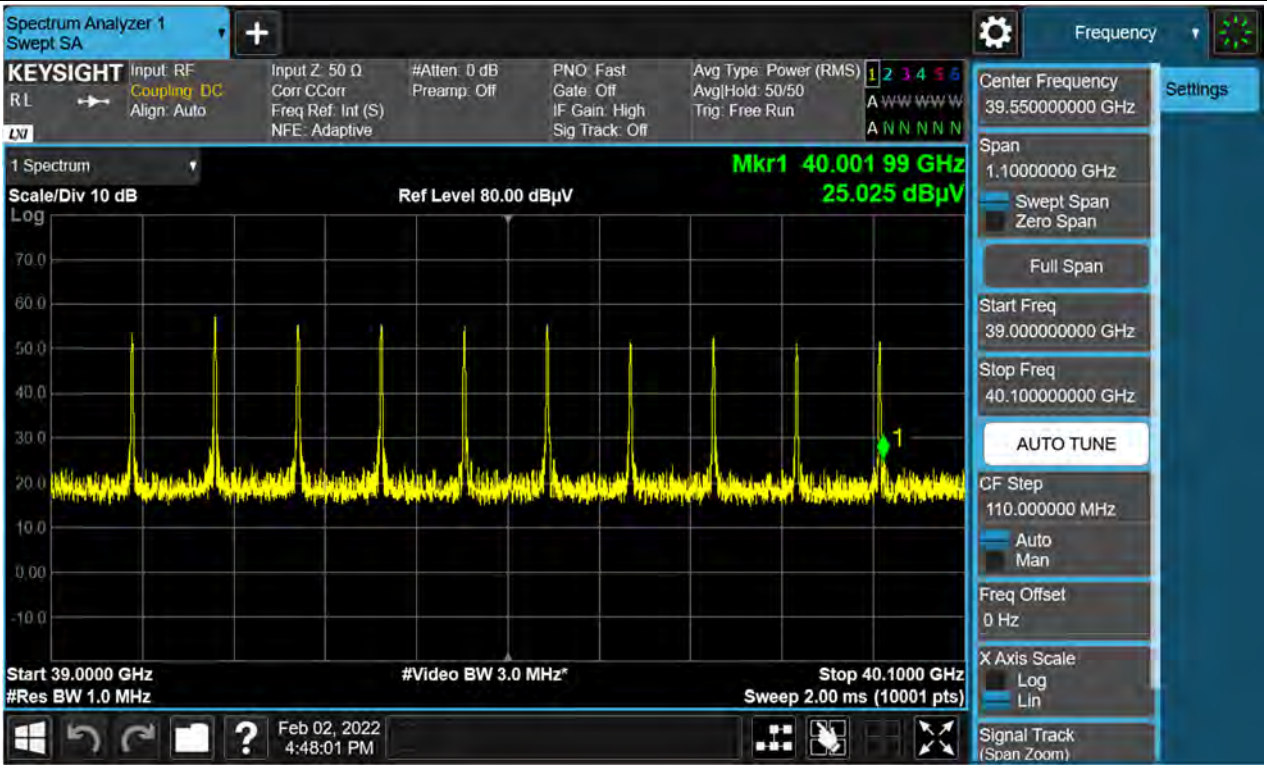
+3 dB above AGC threshold Single Test Signal / MAX Ant. A Position / 10cc / Low / Cross-Pol.



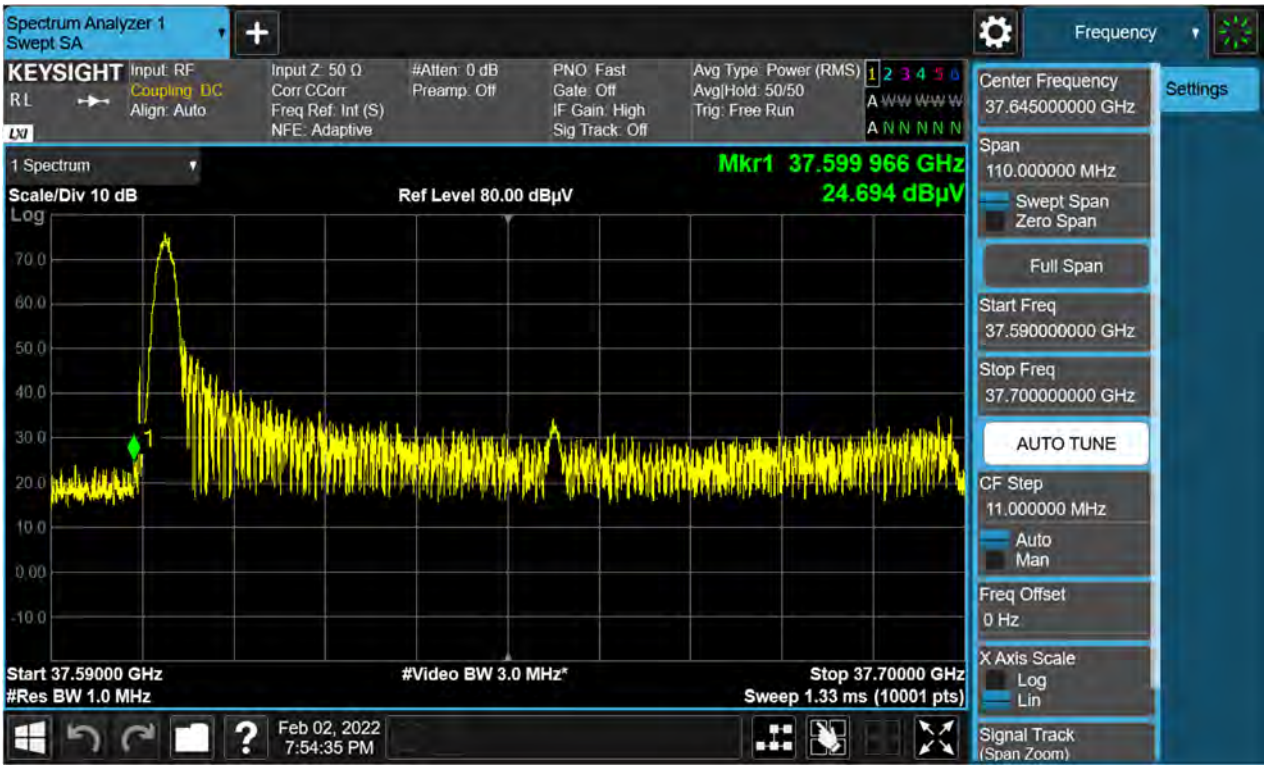
+3 dB above AGC threshold Single Test Signal / MAX Ant. A Position / 10cc / High / Co-Pol.



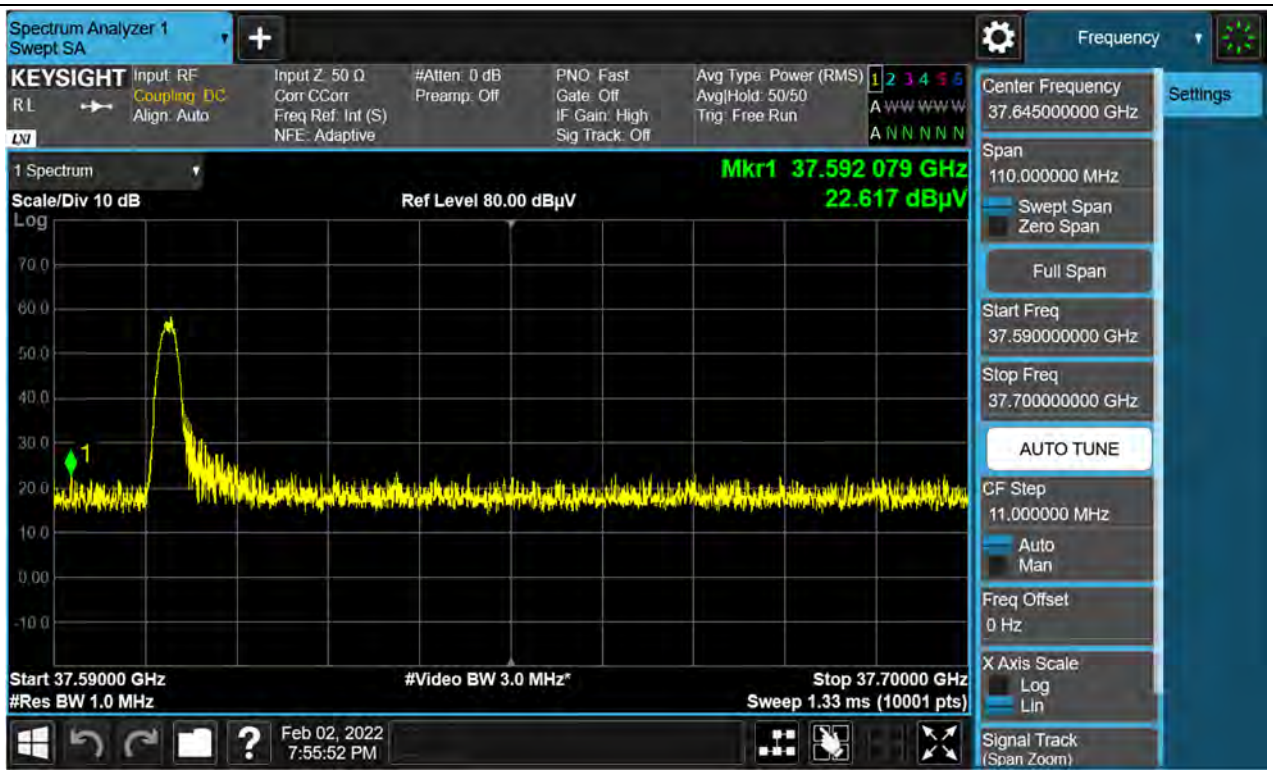
+3 dB above AGC threshold Single Test Signal / MAX Ant. A Position / 10cc / High / Cross-Pol.



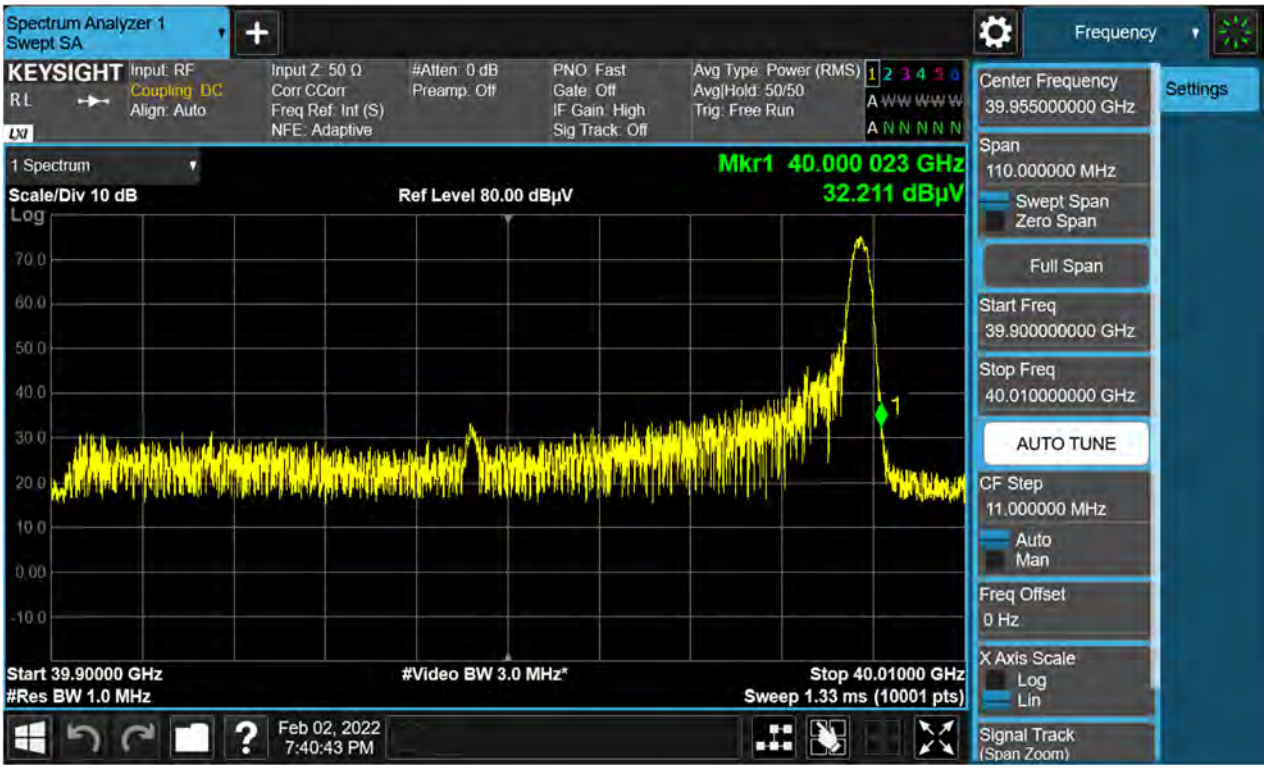
+3 dB above AGC threshold Single Test Signal / MAX Ant. B Position / 1cc / Low / Co-Pol.



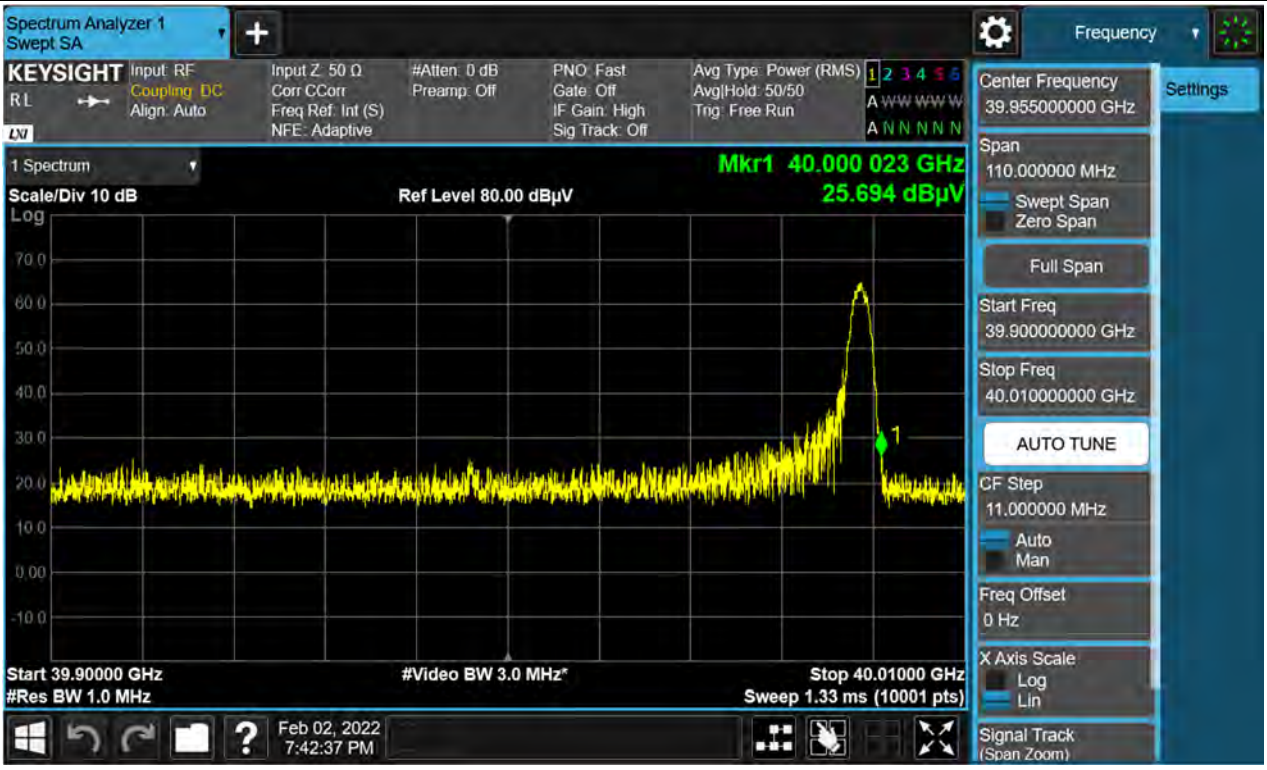
+3 dB above AGC threshold Single Test Signal / MAX Ant. B Position / 1cc / Low / Cross-Pol.



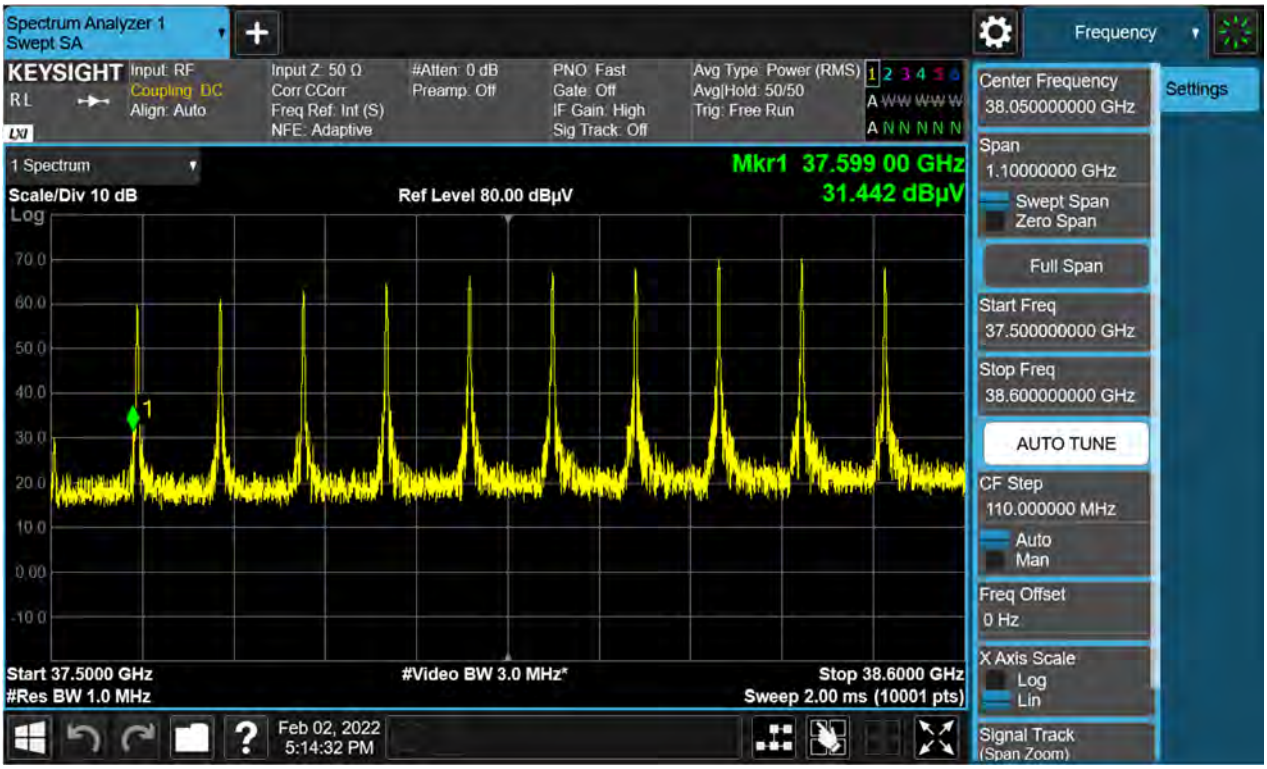
+3 dB above AGC threshold Single Test Signal / MAX Ant. B Position / 1cc / High / Co-Pol.



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

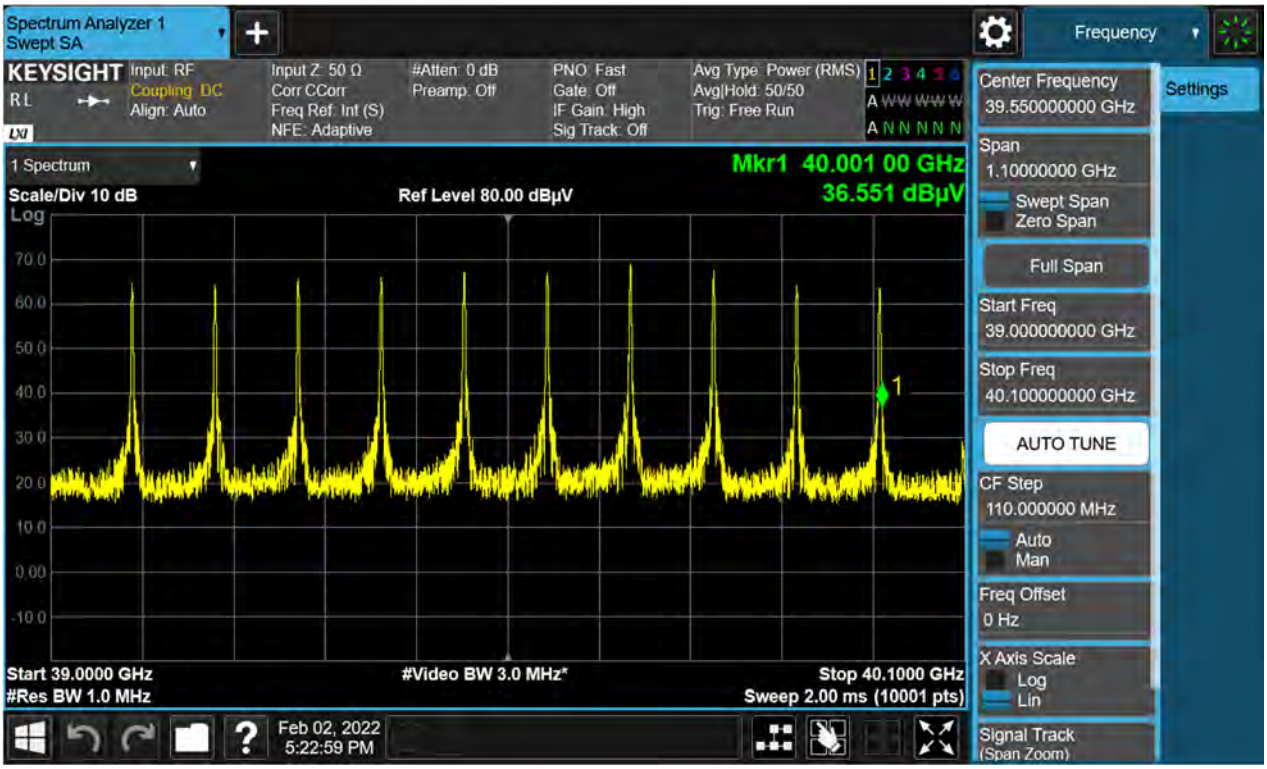


+3 dB above AGC threshold Single Test Signal / MAX Ant. B Position / 10cc / Low / Co-Pol.



+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.



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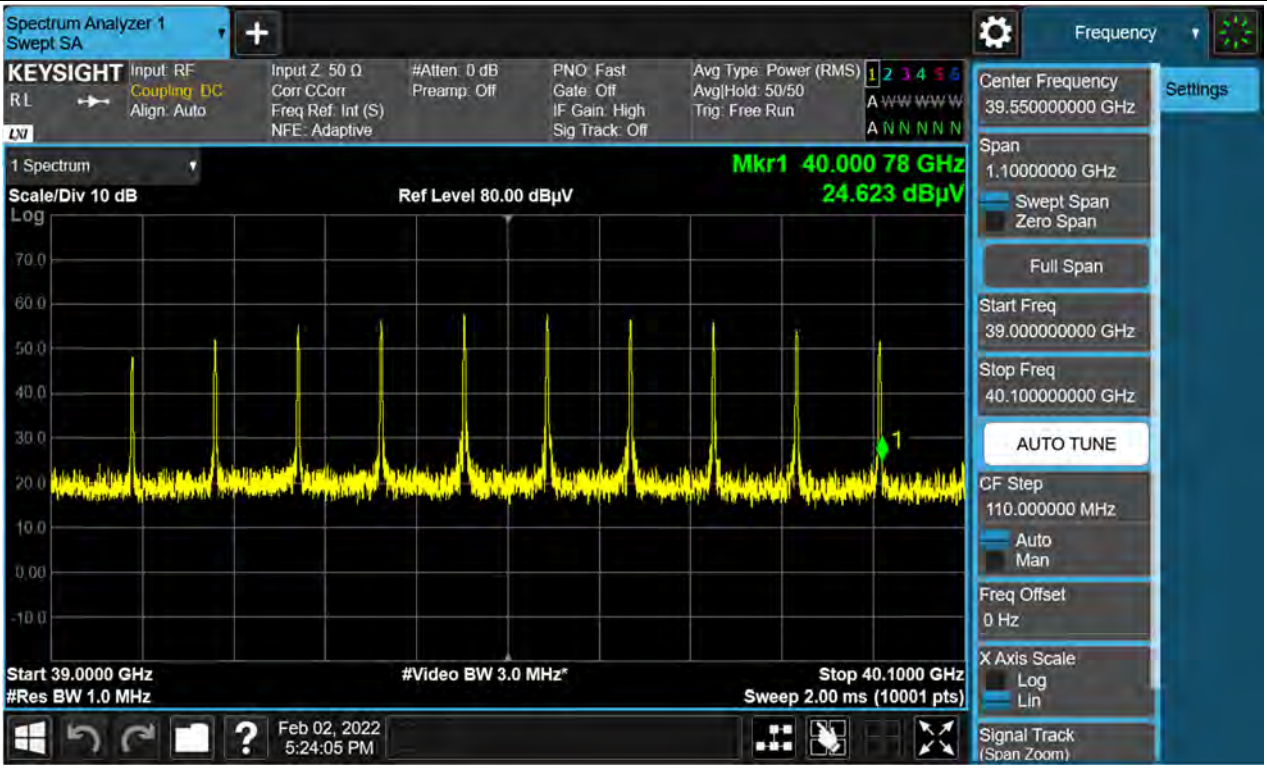


5.7. RADIATED SPURIOUS EMISSIONS

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 (2021-04).

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 100 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 plots 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, mixer loss, and amplifier gain.
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:

   58.74 dBμV (measured Value) - 95.2 + 5.8(AFCL) = -30.66 dBm

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	High	1105.825	60.12	-52.02	-13
					1228.650	58.30	-53.34	
					11268.000	58.74	-30.66	
			10	Middle	1106.675	60.12	-52.02	
					1229.500	58.37	-53.27	
					11268.850	58.72	-30.68	
		B	1	Low	1105.825	60.39	-51.75	
					1228.650	58.44	-53.20	
					11268.000	58.89	-30.51	
			10	Middle	1106.675	60.42	-51.72	
					1229.500	58.85	-52.79	
					11268.850	58.77	-30.63	

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	37.590	30.067	-12.231 *	-13	-16.647
				Middle	35.903	23.005	-23.847		-
				High	34.951	27.960	-20.132		-
			10	Low	37.496	23.557	-19.021		-
				Middle	35.077	21.832	-25.662		-
				High	34.501	24.564	-23.912		-
		B	1	Low	37.588	26.200	-16.098		-
				Middle	36.321	22.281	-23.970		-
				High	34.950	31.814	-16.278		-
			10	Low	34.676	21.948	-25.929		-
				Middle	35.601	22.026	-20.272		-
				High	34.501	23.739	-24.737		-
High Edge ~ 50 GHz	1.5	A	1	Low	49.528	30.317	-19.607	-13	-
				Middle	49.451	30.043	-20.264		-
				High	40.013	39.357	-10.960 *		-16.125
			10	Low	49.966	29.945	-19.912		-
				Middle	49.450	29.634	-20.673		-
				High	40.109	33.245	-17.051		-
		B	1	Low	49.547	30.421	-19.869		-
				Middle	49.285	29.954	-19.982		-
				High	40.011	39.306	-11.011 *		-16.660
			10	Low	49.241	30.019	-19.925		-
				Middle	49.482	29.945	-20.357		-
				High	40.262	30.575	-19.718		-
50 GHz ~ 60 GHz	1.5	A	1	Low	59.772	30.090	-16.981	-13	-
				Middle	59.781	30.170	-16.899		-
				High	59.798	29.960	-17.107		-
			10	Low	59.811	30.320	-16.745		-
				Middle	59.765	29.920	-17.152		-
				High	59.920	30.310	-16.739		-
		B	1	Low	59.890	29.980	-17.073		-
				Middle	59.830	30.350	-16.712		-
				High	59.788	30.580	-16.488		-
			10	Low	59.802	30.320	-16.746		-
				Middle	59.849	30.120	-16.939		-
				High	59.804	30.070	-16.996		-

60 GHz ~ 90 GHz	1.0	A	1	Low	75.250	4.777	-36.955	-13	-
				Middle	77.573	5.229	-36.259		-
				High	69.910	4.795	-39.945		-
			10	Low	76.371	3.189	-35.225		-
				Middle	78.126	3.722	-40.245		-
				High	78.840	3.942	-40.885		-
		B	1	Low	65.310	7.412	-38.661		-
				Middle	71.592	3.288	-42.317		-
				High	69.910	6.464	-38.276		-
			10	Low	66.210	5.204	-41.430		-
				Middle	76.321	3.430	-34.990		-
				High	69.010	5.918	-39.666		-
90 GHz ~ 140 GHz	1.0	A	1	Low	99.574	5.760	-37.250	-13	-
				Middle	98.926	5.684	-37.942		-
				High	99.461	5.700	-37.959		-
			10	Low	139.391	5.790	-31.962		-
				Middle	139.392	6.190	-31.562		-
				High	139.393	6.028	-31.724		-
		B	1	Low	139.998	5.941	-30.994		-
				Middle	139.996	6.163	-30.772		-
				High	139.362	5.483	-32.271		-
			10	Low	139.331	5.958	-31.797		-
				Middle	139.965	6.196	-30.741		-
				High	139.952	5.913	-31.025		-
140 GHz ~ 200 GHz	1.0	A	1	Low	185.506	5.700	-34.299	-13	-
				Middle	186.027	5.442	-34.733		-
				High	184.878	5.591	-34.479		-
			10	Low	185.494	5.346	-34.654		-
				Middle	184.806	5.507	-34.566		-
				High	185.431	5.478	-34.525		-
		B	1	Low	184.894	5.440	-34.629		-
				Middle	184.885	5.431	-34.638		-
				High	185.522	5.471	-34.528		-
			10	Low	184.905	5.307	-34.761		-
				Middle	186.064	5.184	-35.009		-
				High	186.699	5.276	-34.929		-

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	1105.825	60.19	-51.95	-13
					1228.650	58.49	-53.15	
					11268.000	58.71	-30.69	
			10	Low	1105.825	60.54	-51.60	
					1228.650	58.48	-53.16	
					11268.000	58.58	-30.82	
		B	1	High	1105.825	60.17	-51.97	
					1228.650	58.50	-53.14	
					11268.000	58.73	-30.67	
			10	Low	1105.825	60.55	-51.59	
					1228.650	58.35	-53.29	
					11268.000	58.58	-30.82	

Note: Only peak value is recorded in this report.

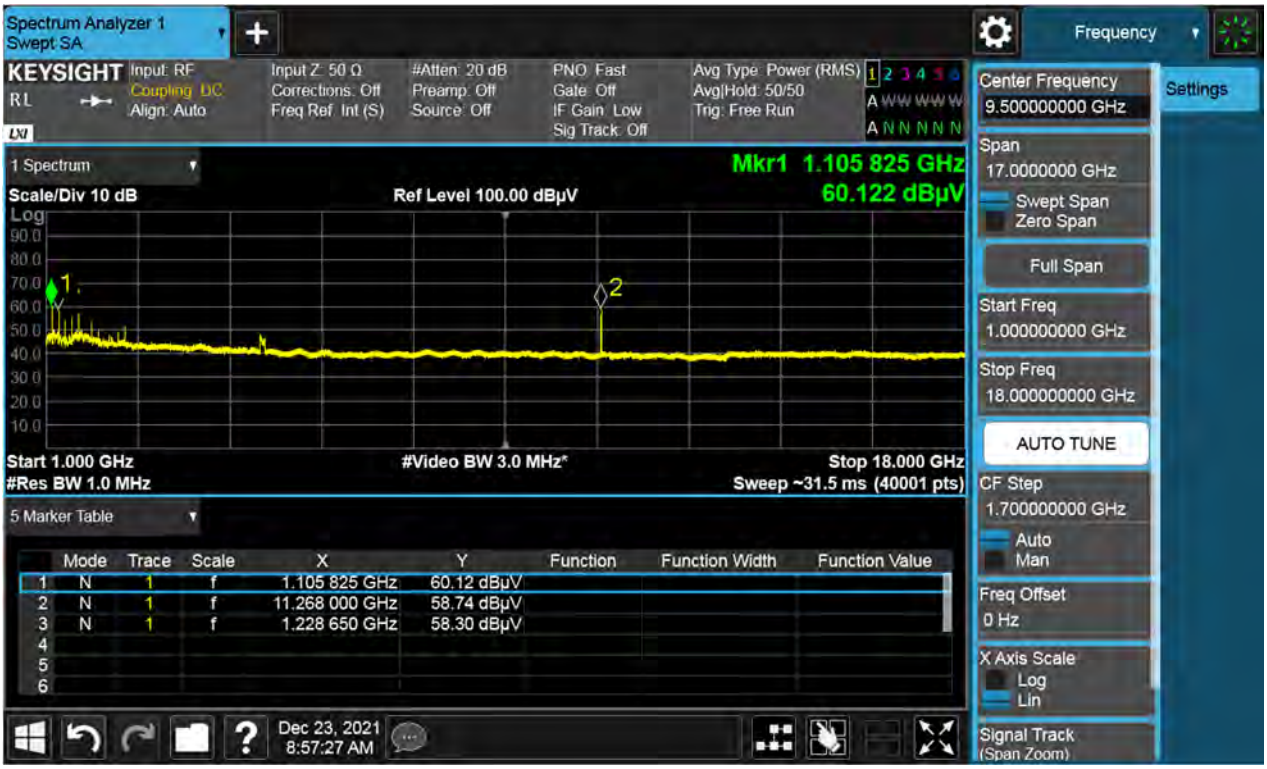
Freq.	Distance (m)	Ant. Path	Carrier	Channel	Frequency (GHz)	Measured (dBuV)	Result (dBm/MHz)	Limit (dBm/MHz)	TRP (dBm)
18 GHz ~ Low Edge	3.0	A	1	Low	37.55380	24.172	-18.533	-13	-
				Middle	35.60619	22.164	-24.958		-
				High	35.53612	22.200	-24.922		-
			10	Low	37.40450	30.286	-12.411*		-16.479
				Middle	36.64989	22.454	-22.605		-
				High	35.18185	21.715	-25.814		-
		B	1	Low	37.55380	24.227	-18.478		-
				Middle	35.58169	22.705	-24.417		-
				High	34.96057	27.742	-20.375		-
			10	Low	37.40350	27.626	-15.071*		-18.310
				Middle	34.52427	23.151	-25.473		-
				High	34.52721	22.306	-26.318		-
High Edge ~ 50 GHz	1.5	A	1	Low	49.20950	24.182	-26.213	-13	-
				Middle	49.16875	23.912	-26.483		-
				High	40.01350	28.875	-21.483		-
			10	Low	49.16075	24.039	-26.356		-
				Middle	40.05000	26.733	-23.625		-
				High	40.19776	35.434	-14.884*		-17.820
		B	1	Low	49.15675	24.447	-25.948		-
				Middle	48.76425	23.998	-26.430		-
				High	40.01574	30.031	-20.327		-
			10	Low	49.30375	24.638	-25.712		-
				Middle	40.05000	29.500	-20.858		-
				High	40.39750	37.116	-13.202*		-17.546
50 GHz ~ 60 GHz	1.5	A	1	Low	59.73643	28.710	-18.399	-13	-
				Middle	59.78388	28.508	-18.600		-
				High	59.85543	28.373	-18.735		-
			10	Low	59.80217	28.364	-18.744		-
				Middle	59.79838	28.570	-18.538		-
				High	59.78178	28.911	-18.198		-
		B	1	Low	59.83928	28.521	-18.587		-
				Middle	59.77677	28.665	-18.443		-
				High	59.77338	28.860	-18.248		-
			10	Low	59.79682	28.826	-18.282		-
				Middle	59.74436	28.171	-18.937		-
				High	59.78561	29.054	-18.054		-

60 GHz ~ 90 GHz	1.0	A	1	Low	76.00755	3.864	-37.868	-13	-
				Middle	70.84380	4.888	-36.600		-
				High	78.12356	3.891	-40.849		-
			10	Low	76.97762	2.548	-35.866		-
				Middle	69.72112	3.065	-40.902		-
				High	79.58229	3.024	-41.803		-
		B	1	Low	65.71121	6.654	-39.419		-
				Middle	78.19005	3.043	-42.562		-
				High	70.47539	5.684	-39.056		-
			10	Low	76.59369	5.161	-41.473		-
				Middle	66.97006	2.936	-35.484		-
				High	72.04307	5.444	-40.140		-
90 GHz ~ 140 GHz	1.0	A	1	Low	98.61677	5.002	-38.008	-13	-
				Middle	98.57582	5.434	-38.193		-
				High	98.58454	4.998	-38.661		-
			10	Low	138.80728	5.638	-32.114		-
				Middle	139.38504	5.243	-32.508		-
				High	139.27140	5.256	-32.496		-
		B	1	Low	139.98743	5.552	-31.383		-
				Middle	139.45058	5.377	-31.558		-
				High	138.78991	5.291	-32.462		-
			10	Low	139.94203	5.438	-32.317		-
				Middle	139.93588	5.579	-31.358		-
				High	139.91176	5.122	-31.816		-
140 GHz ~ 200 GHz	1.0	A	1	Low	184.64485	5.199	-34.845	-13	-
				Middle	186.23544	4.833	-35.252		-
				High	184.80115	4.776	-35.268		-
			10	Low	185.68755	4.756	-35.288		-
				Middle	184.03363	5.407	-34.637		-
				High	185.70077	4.858	-35.186		-
		B	1	Low	185.62694	5.249	-34.795		-
				Middle	184.77966	4.665	-35.379		-
				High	184.71398	4.658	-35.427		-
			10	Low	185.33076	4.884	-35.160		-
				Middle	185.65796	5.053	-35.032		-
				High	187.29467	4.384	-35.660		-

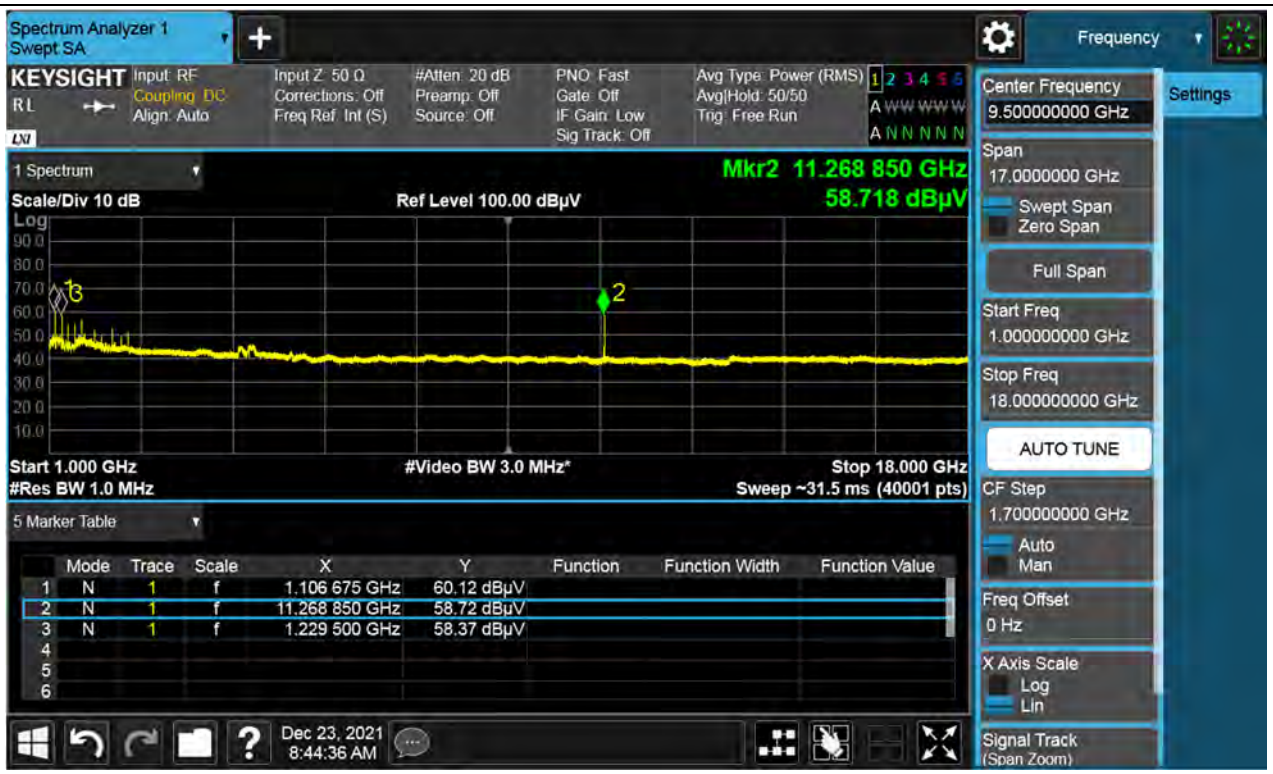
Note: '*' This checked frequency is measured by TRP, because Result value is fail or insufficient margin.

Plot data of Radiated Spurious Emissions

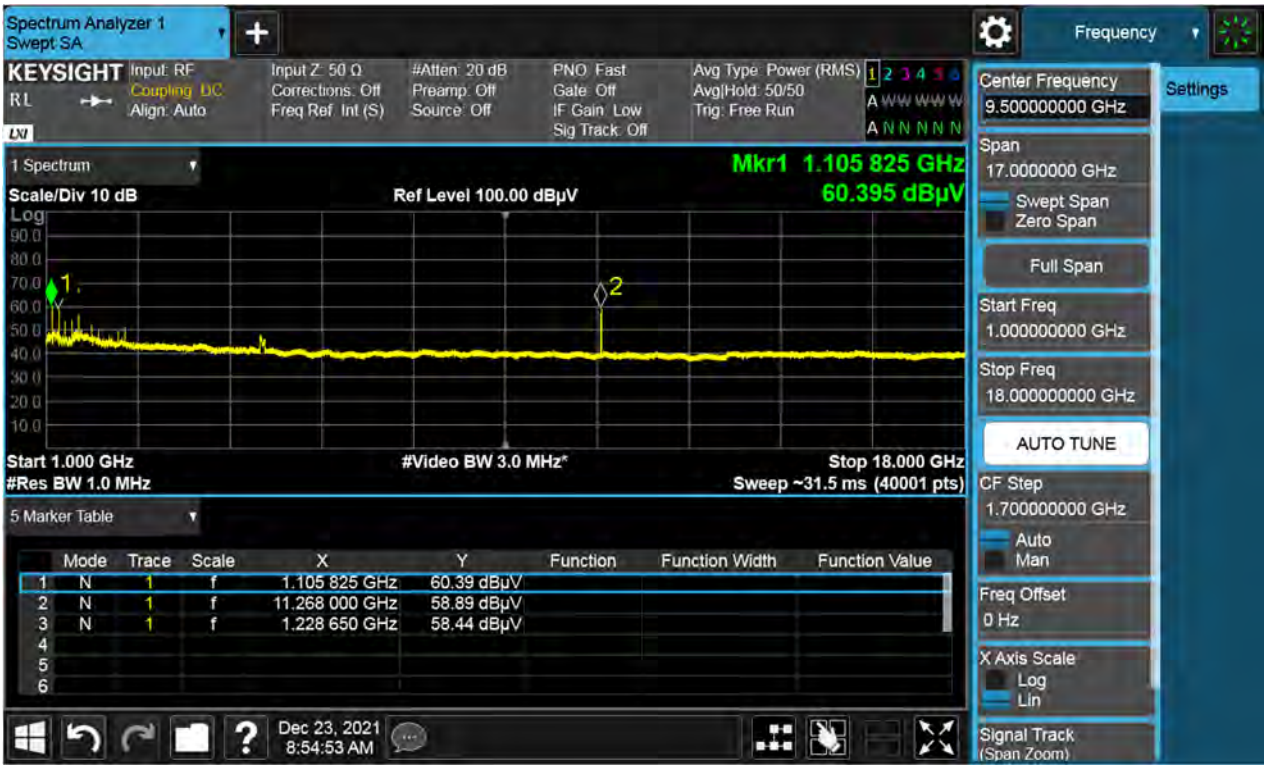
Path A / 1 GHz ~ 18 GHz / 1CC / High / H



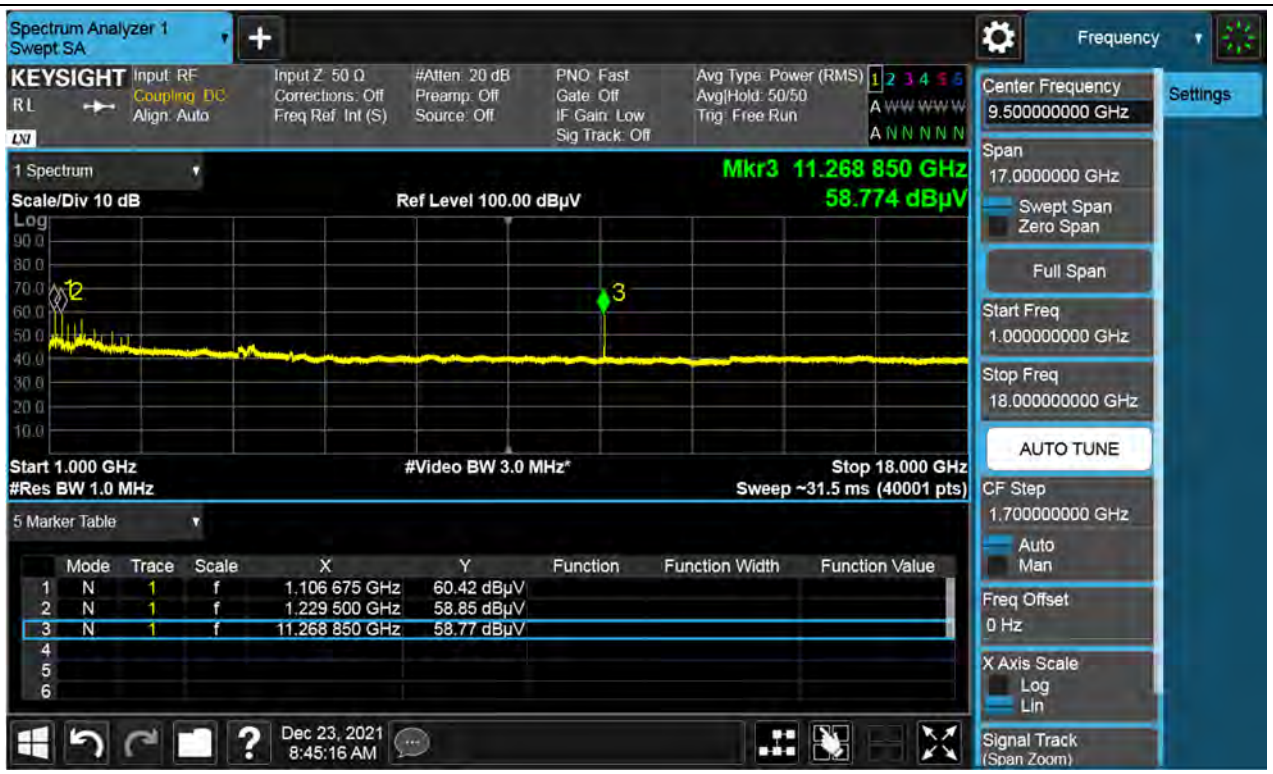
Path A / 1 GHz ~ 18 GHz / 10CC / Middle / H



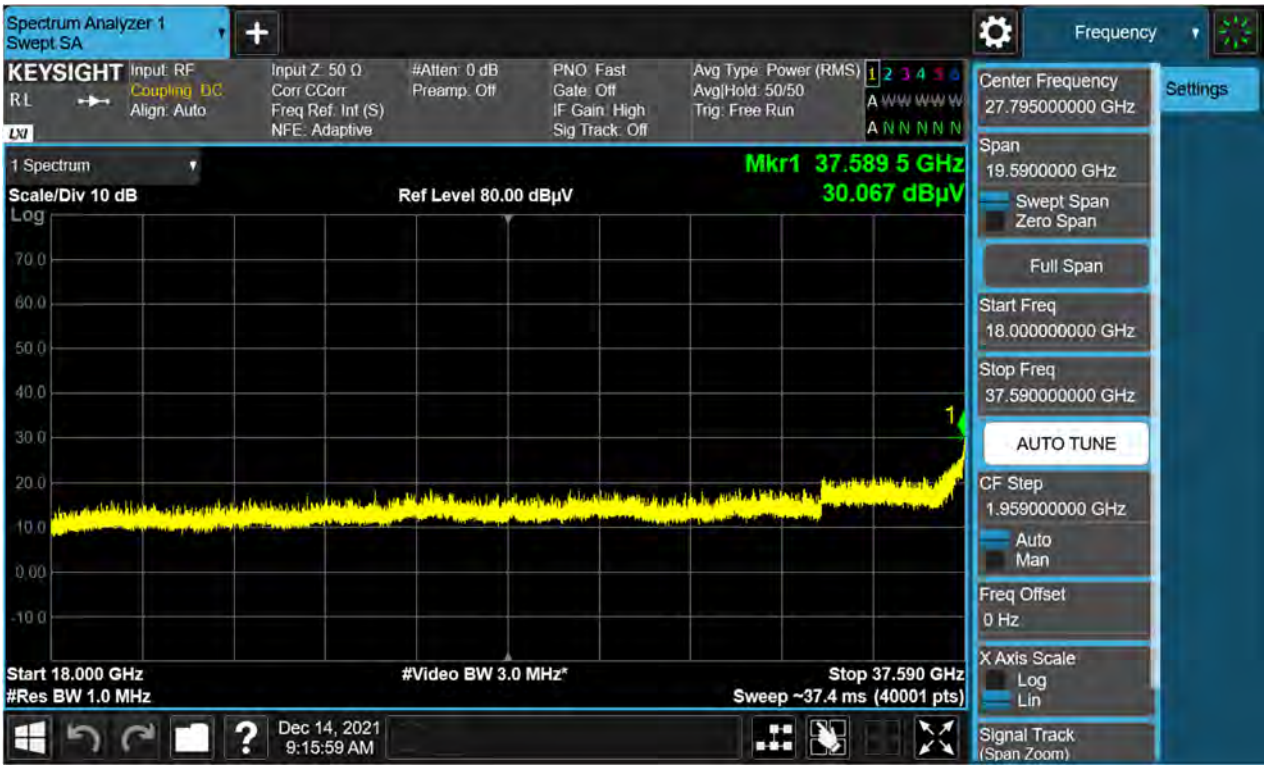
Path B / 1 GHz ~ 18 GHz / 1CC / Low / H



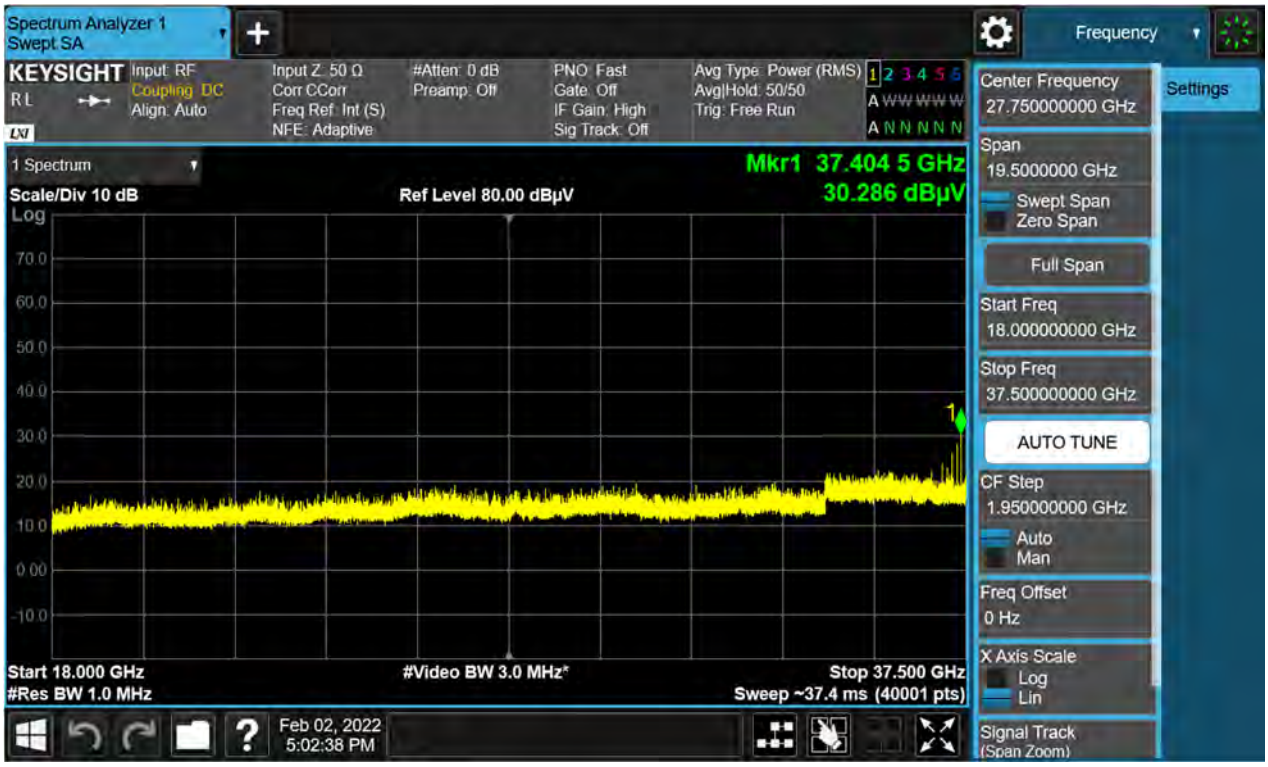
Path B / 1 GHz ~ 18 GHz / 10CC / Middle / H



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

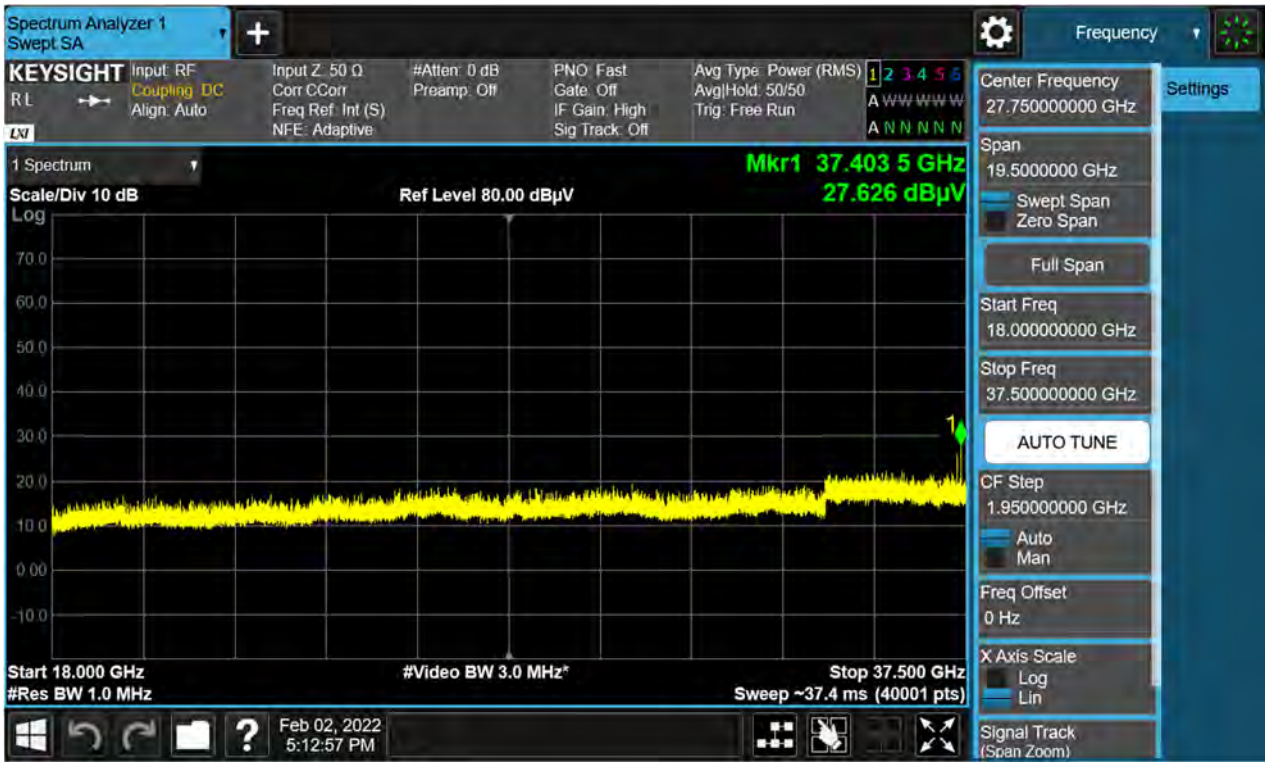


Path A / 18 GHz ~ Low Edge / 10cc / Low

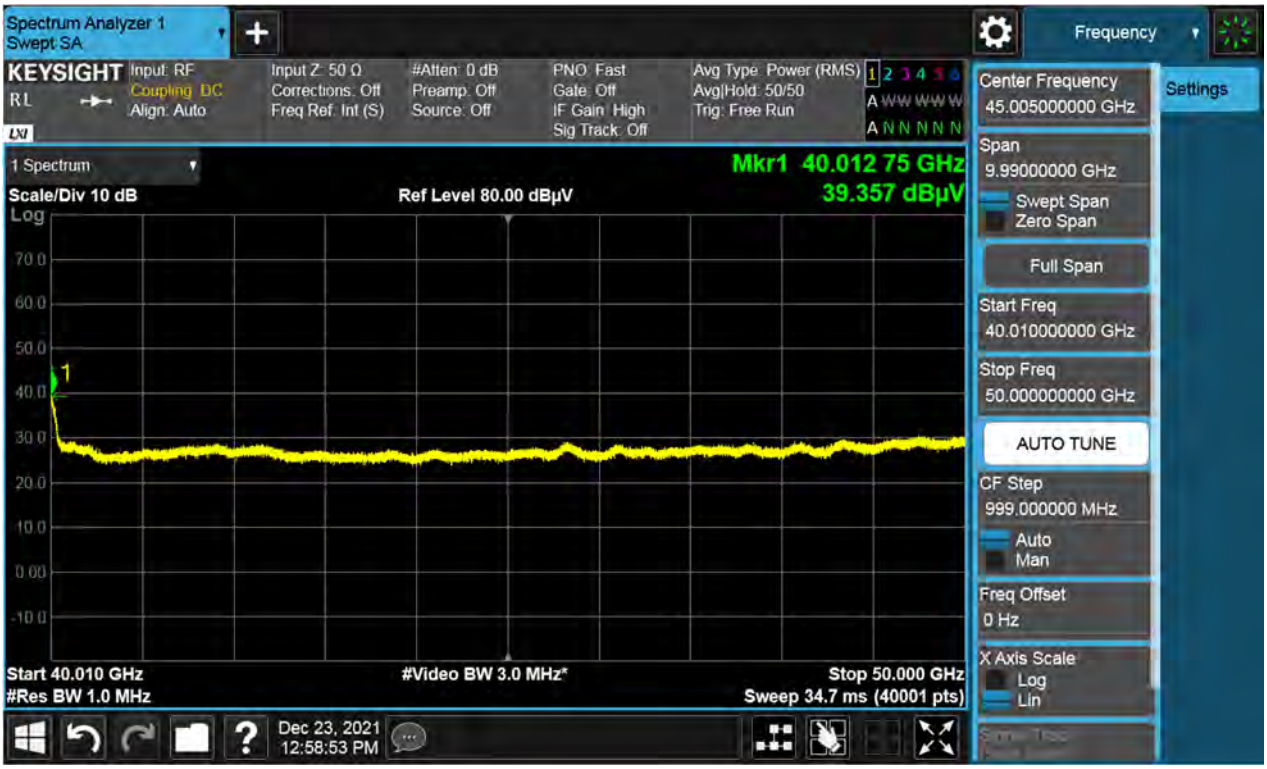


Path B / 18 GHz ~ Low Edge / 1cc / Low

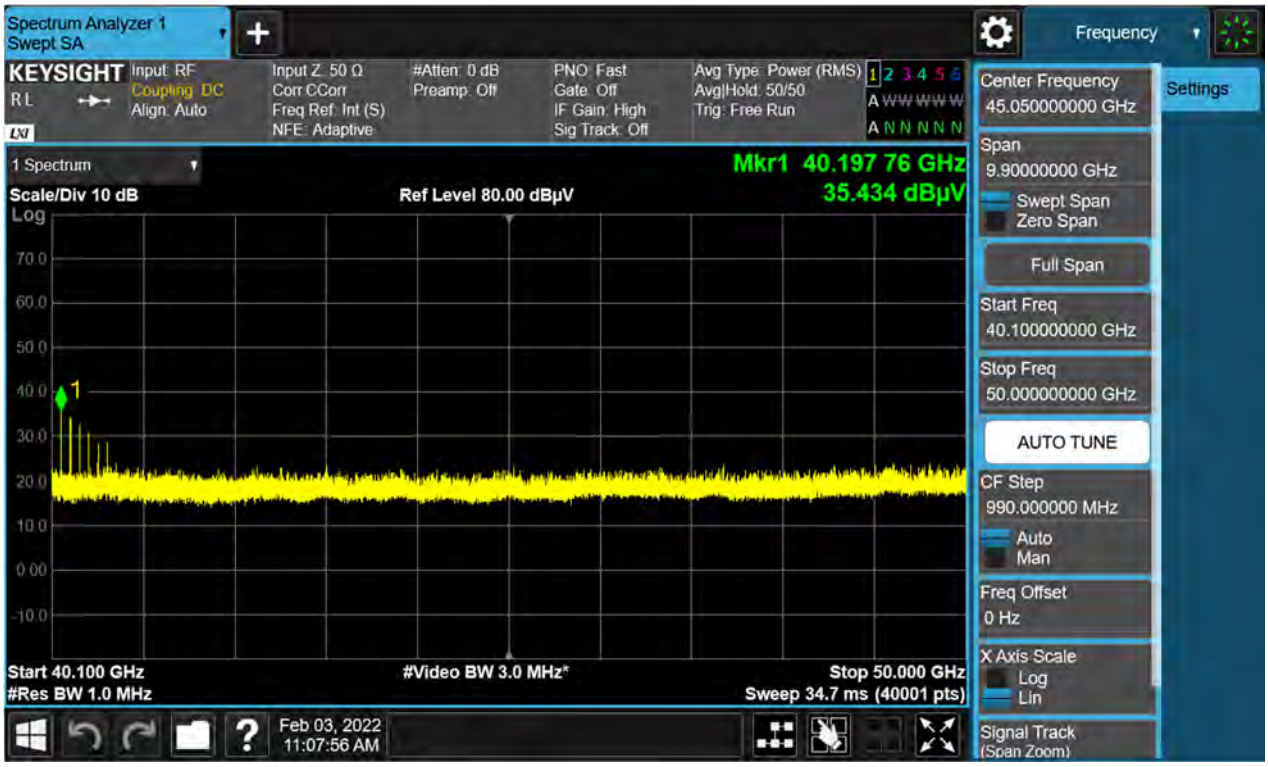
Path B / 18 GHz ~ Low Edge / 10cc / Low



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

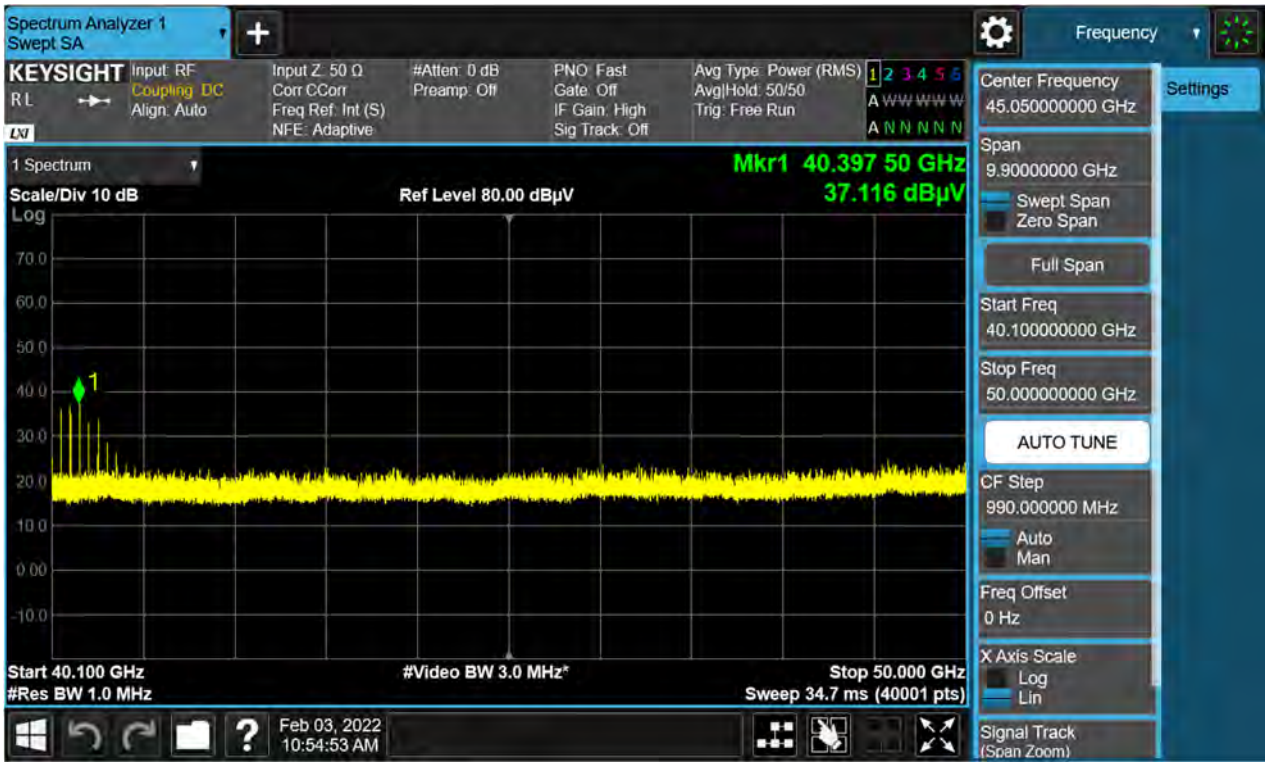


Path A / High Edge ~ 50 GHz / 10cc / High

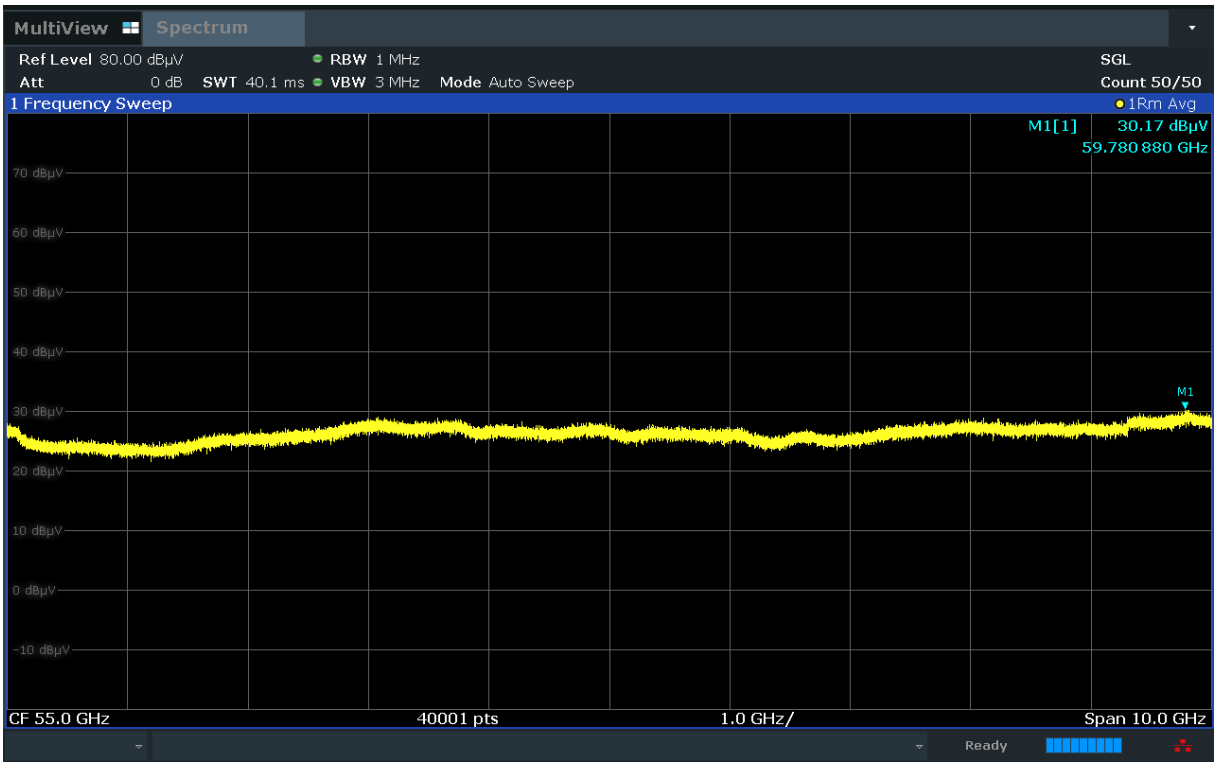


Path B / High Edge ~ 50 GHz / 1cc / High

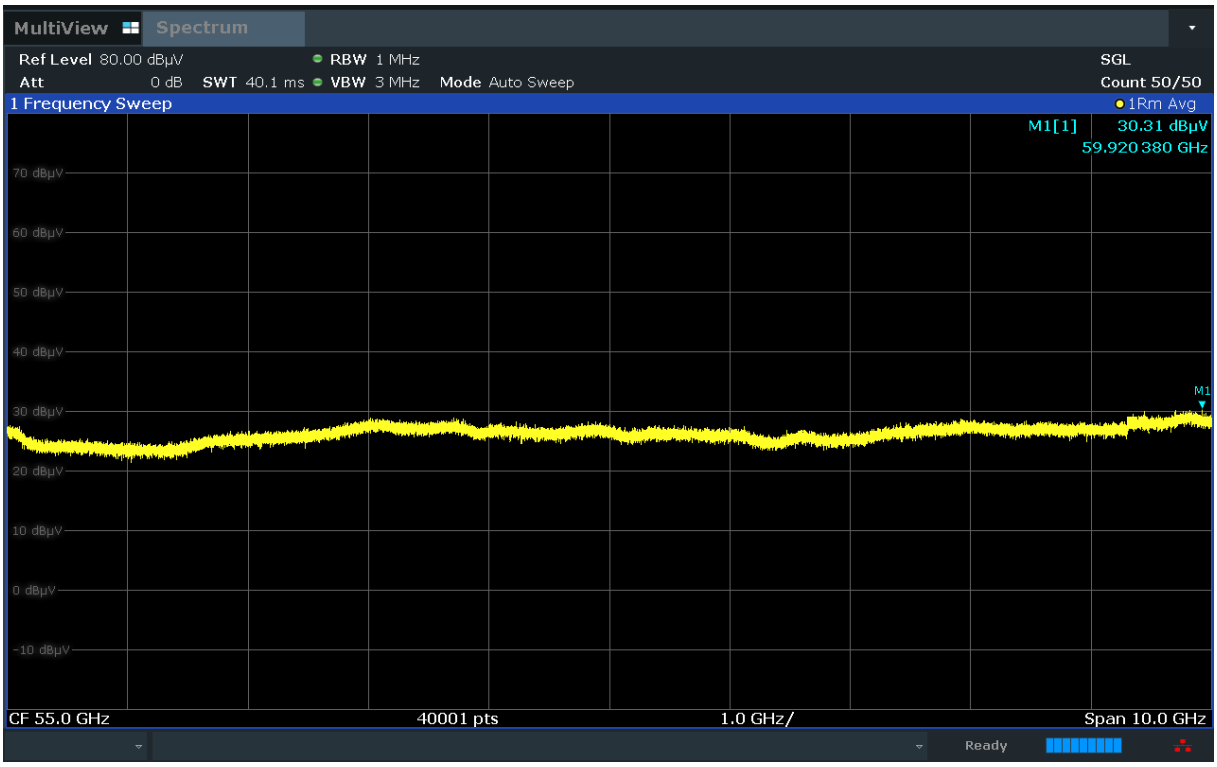
Path B / High Edge ~ 50 GHz / 10cc / High



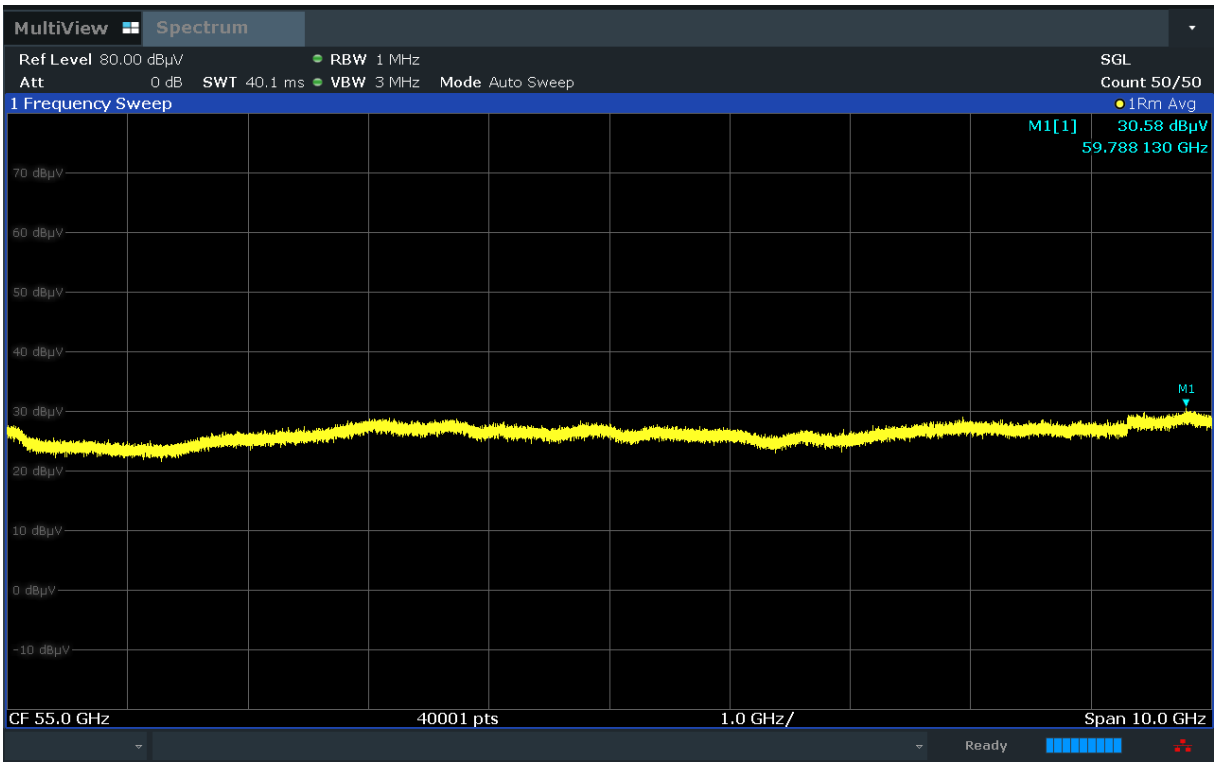
Path A / 50 GHz ~ 60 GHz / 1cc / Middle



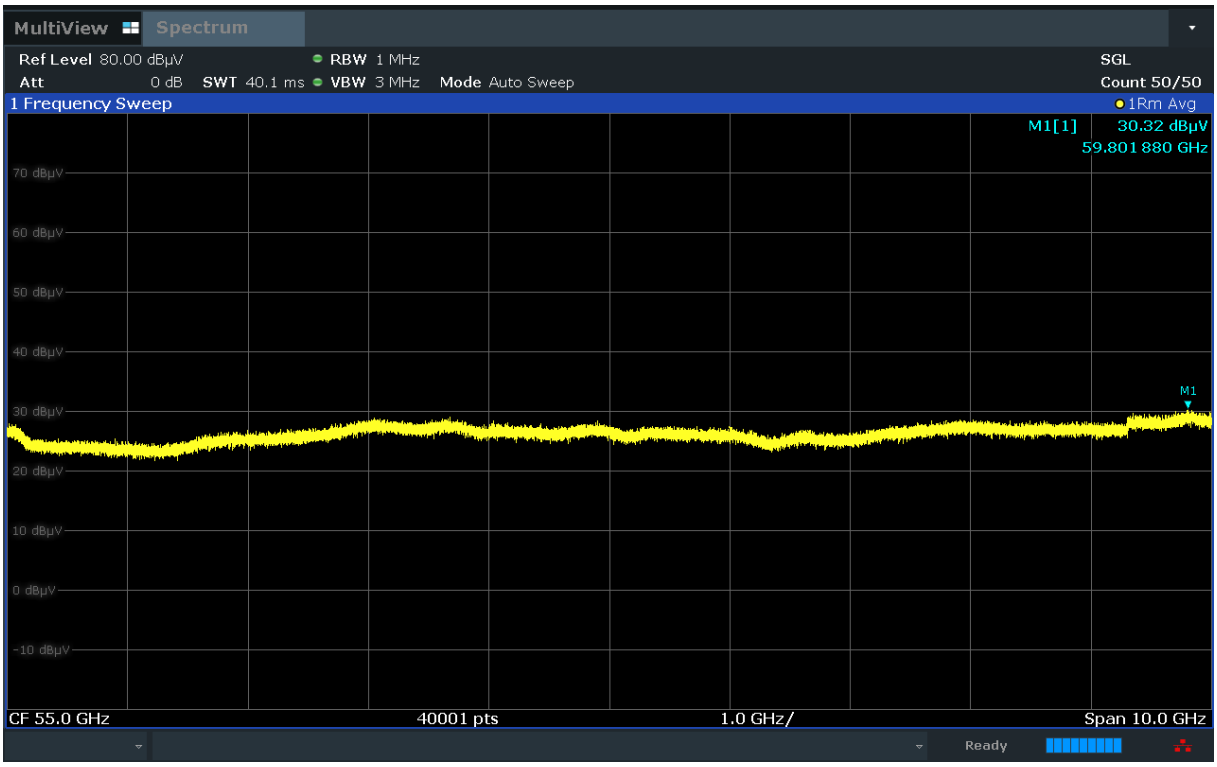
Path A / 50 GHz ~ 60 GHz / 10cc / High



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

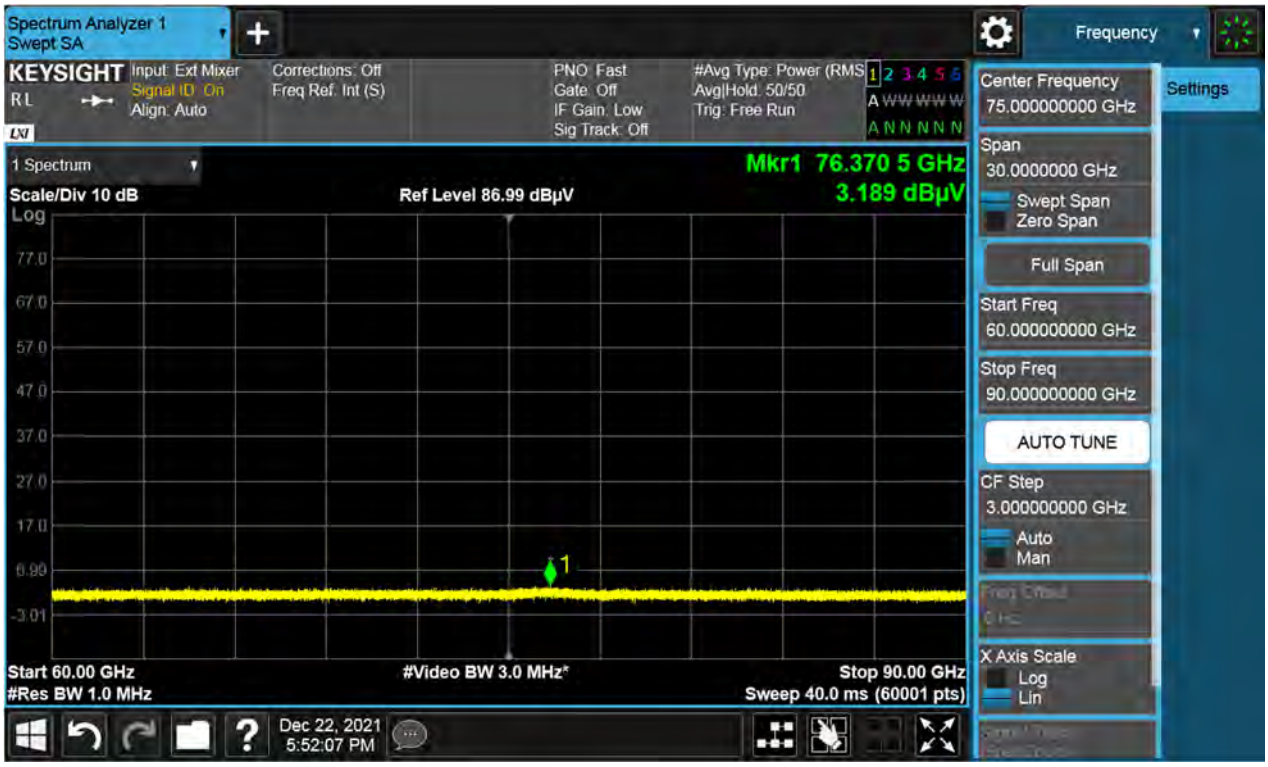


Path B / 50 GHz ~ 60 GHz / 10cc / Low

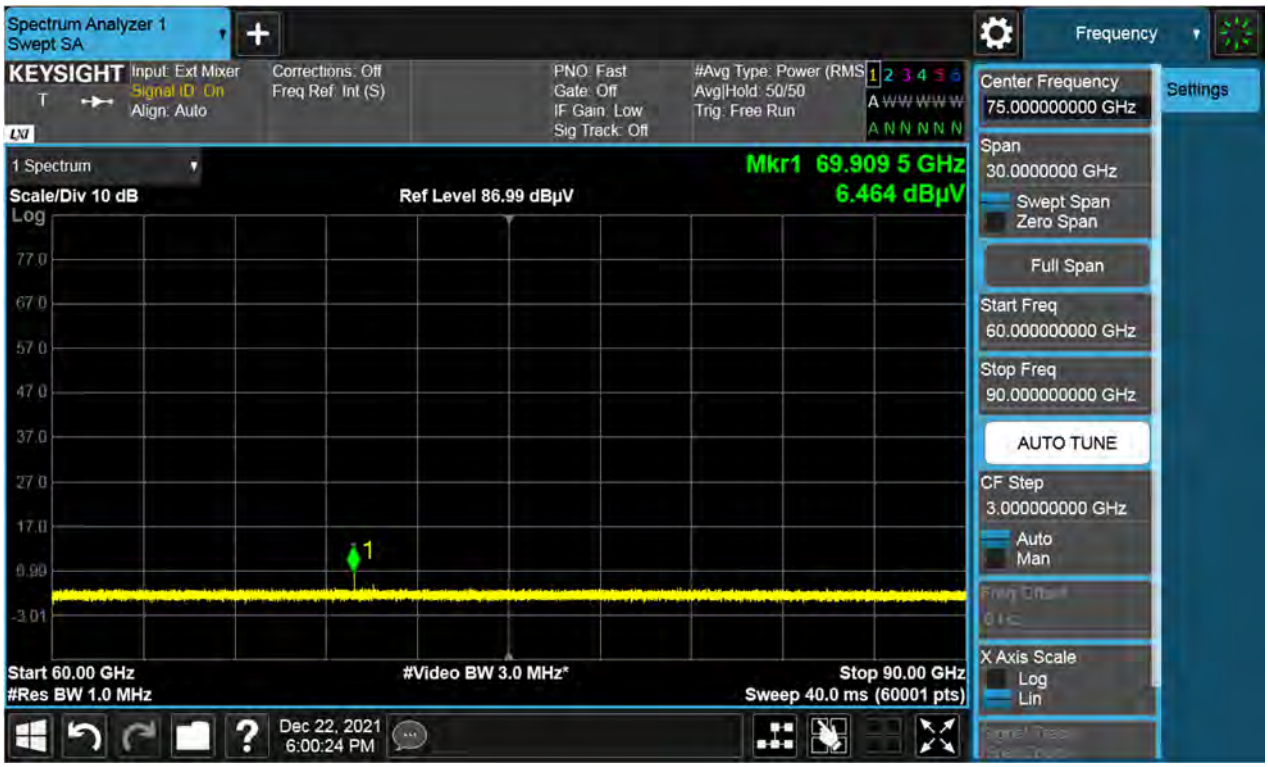


Path A / 60 GHz ~ 90 GHz / 1cc / Middle

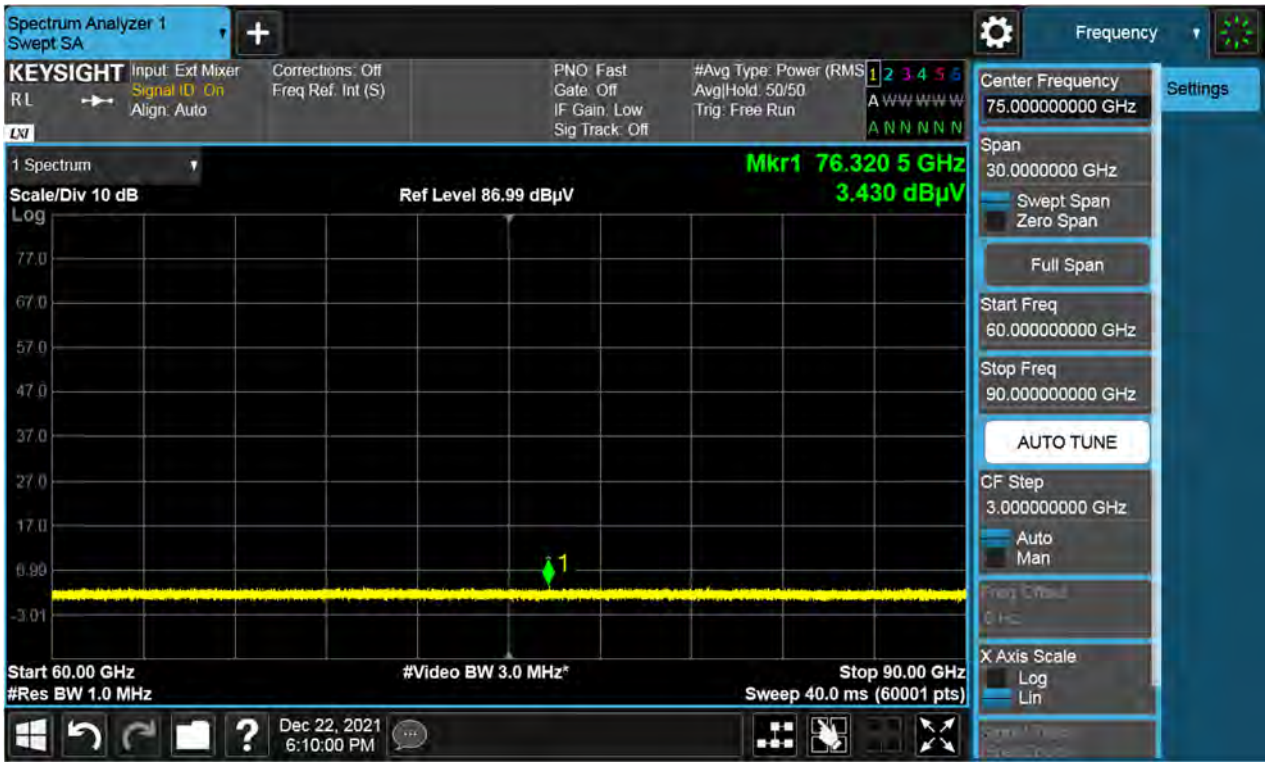
Path A / 60 GHz ~ 90 GHz / 10cc / Low



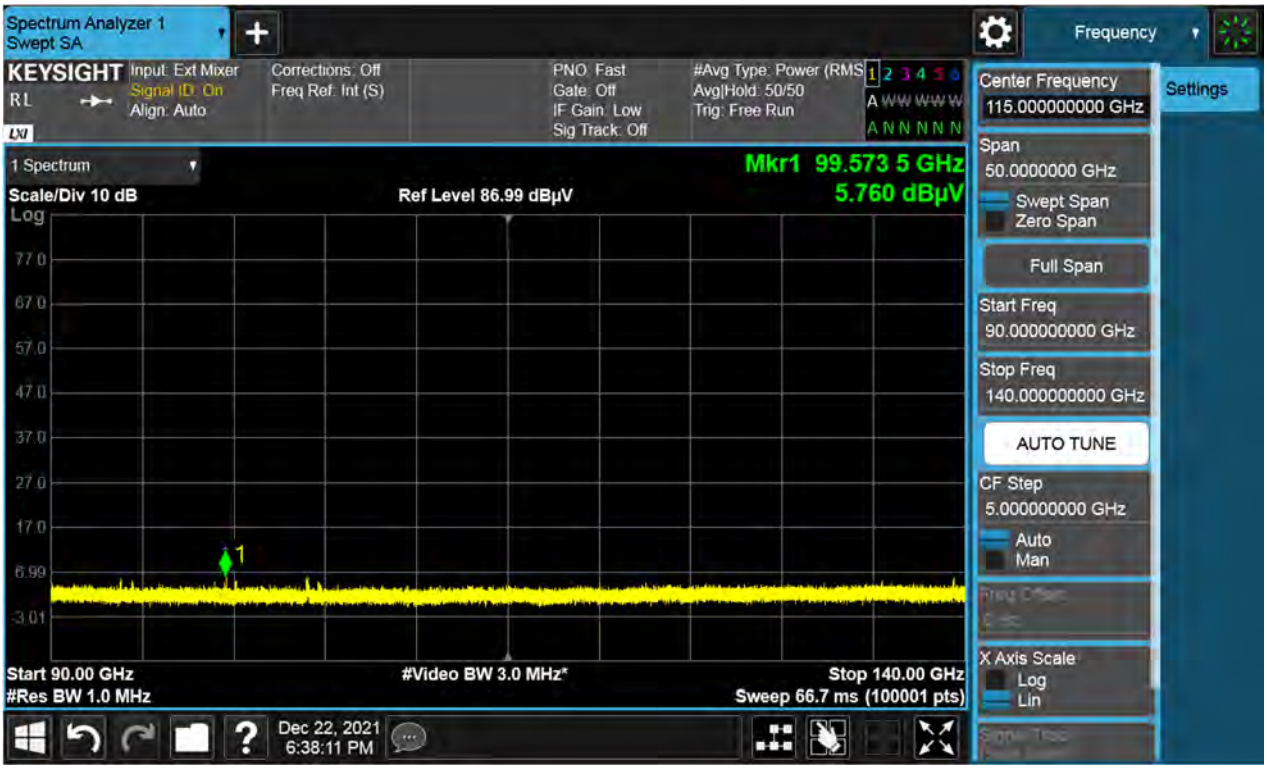
Path B / 60 GHz ~ 90 GHz / 1cc / High



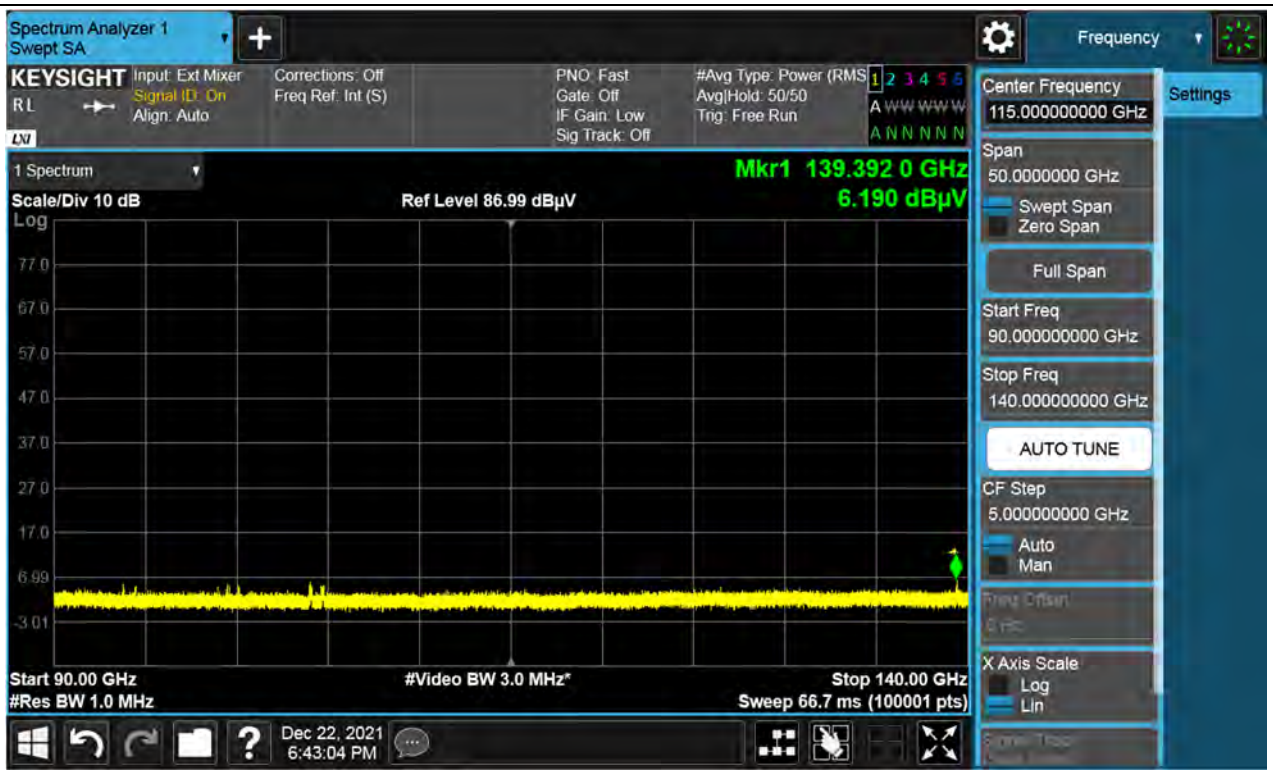
Path B / 60 GHz ~ 90 GHz / 10cc / Middle



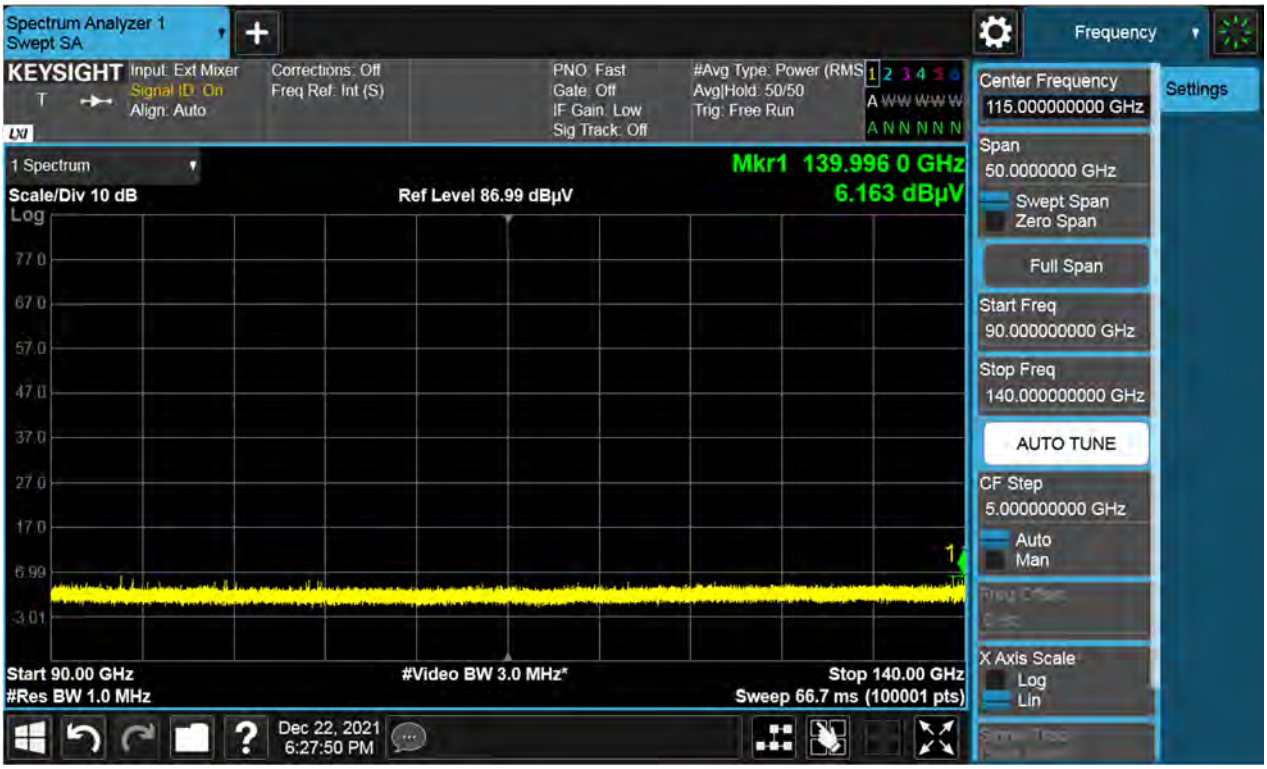
Path A / 90 GHz ~ 140 GHz / 1cc / Low



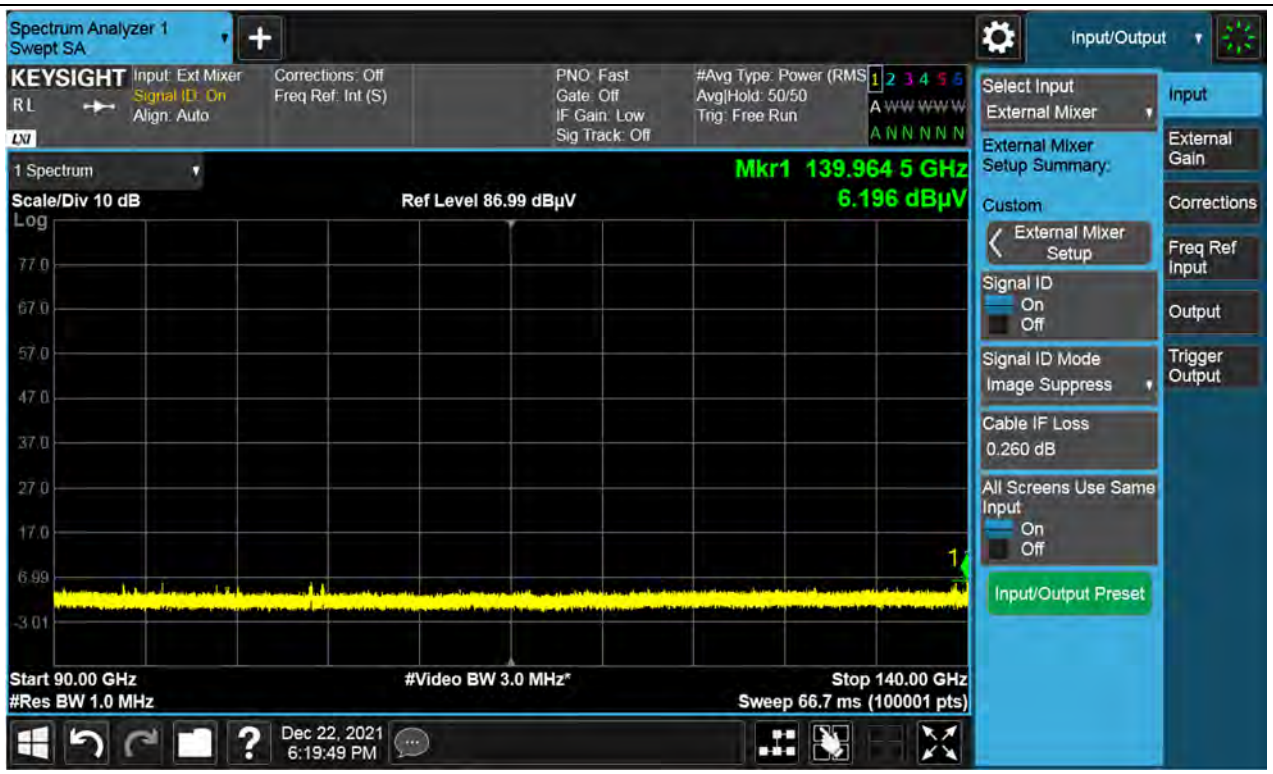
Path A / 90 GHz ~ 140 GHz / 10cc / Middle



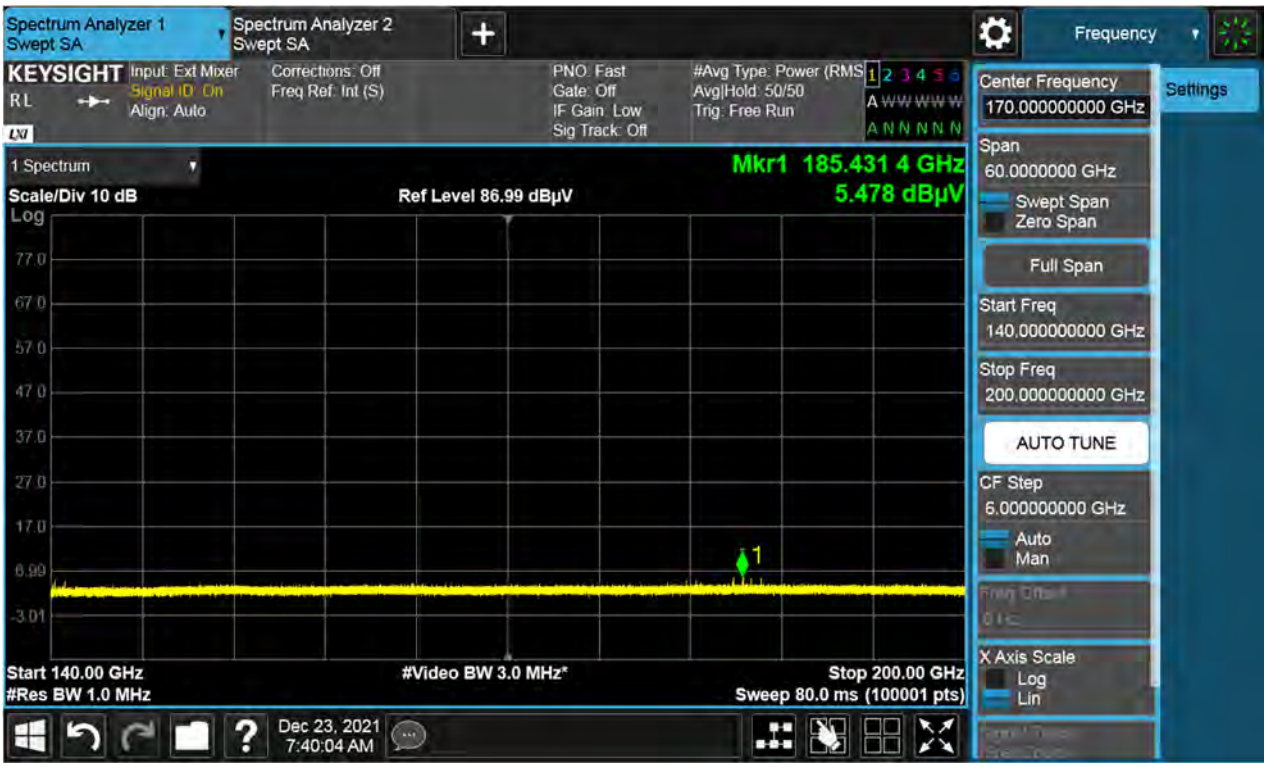
Path B / 90 GHz ~ 140 GHz / 1cc / Middle



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

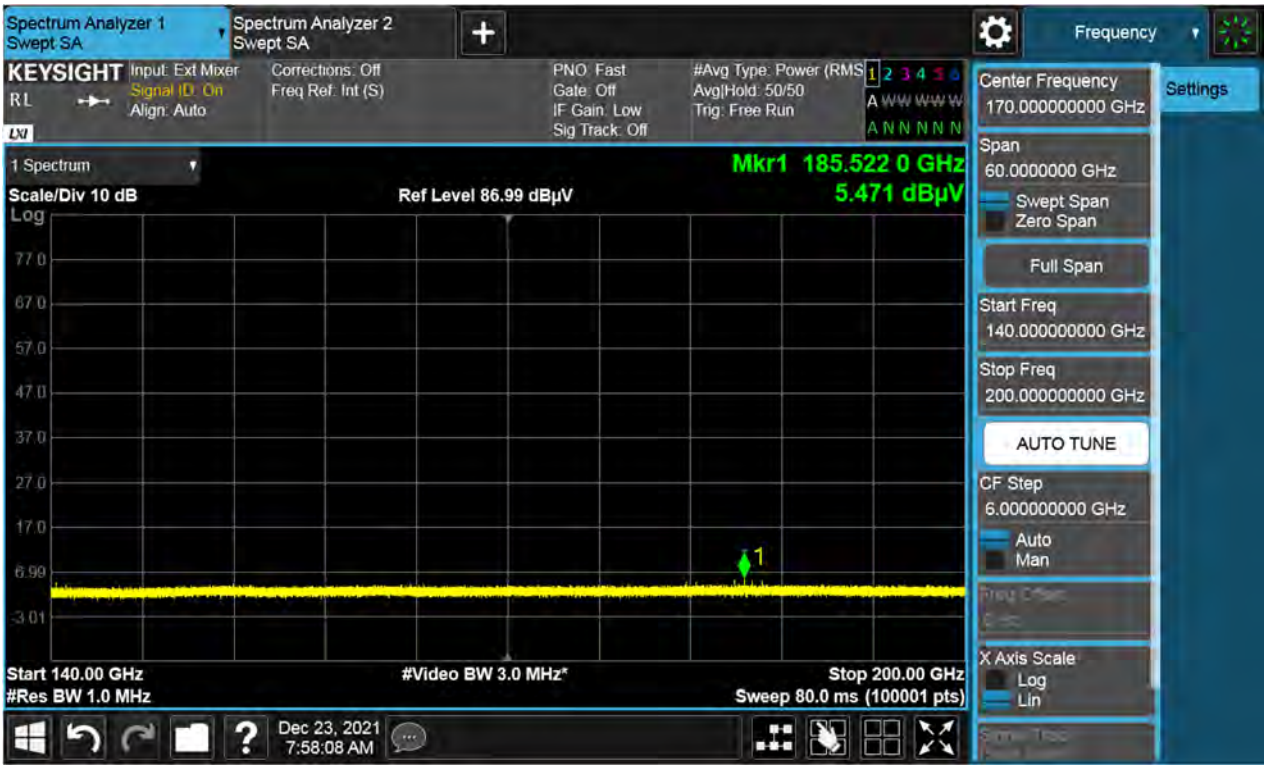


Path A / 140 GHz ~ 200 GHz / 1cc / High



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

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



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

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.** = 38,799,986,201 Hz

Voltage	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(°C)	(Hz)	Error (Hz)	(Hz)	
100%	+20(Ref)	38799 986 104	-96.944	0.000	0.00000
	-30	38799 985 983	-121.609	-24.665	-0.00064
	-20	38799 986 073	-31.410	65.534	0.00169
	-10	38799 986 006	-98.821	-1.877	-0.00005
	0	38799 986 107	3.003	99.946	0.00258
	+10	38799 986 184	79.655	176.599	0.00455
	+30	38799 986 180	75.791	172.735	0.00445
	+40	38799 986 041	-63.638	33.306	0.00086
	+50	38799 985 937	-167.116	-70.172	-0.00181
115%	+20	38799 985 913	-191.030	-94.086	-0.00242

6. EXTENSION MODULE VERIFICATION CERTIFICATE & CHECK

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
Accredited by KOLAS, Republic of KOREA

㈜에이치시티 대표이사
President, HCT Co., Ltd.

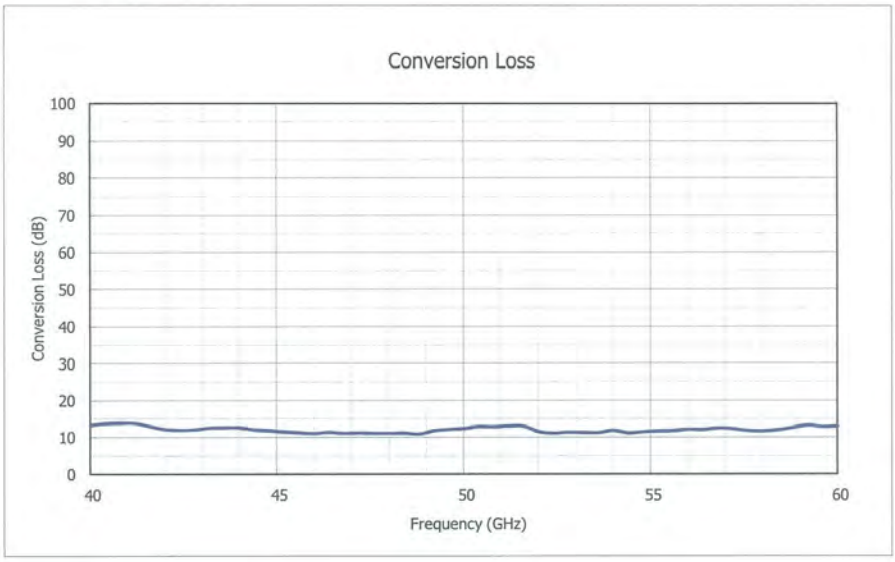
㈜ 이 성적서는 측정기의 정밀정확도에 영향을 미치는 요소(과부하, 온도, 습도 등)의 급격한 변화가 발생한 경우에는 무효가 됩니다.
※ 고객전용사이트(http://www.callab.co.kr)에서 성적서의 진위여부 확인이 가능합니다.
※ 성적서의 원본은 상단에 HCT로고그램이 들어간 위변조 방지 용지에 인쇄되어 발급되며, 원본 복사시에는 복사본이라는 표시가 처리됩니다.

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

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

2021. 04. 02

한국인정기구 인정
Accredited by KOLAS, Republic of KOREA

㈜에이치시티 대표이사
President, HCT Co., Ltd.

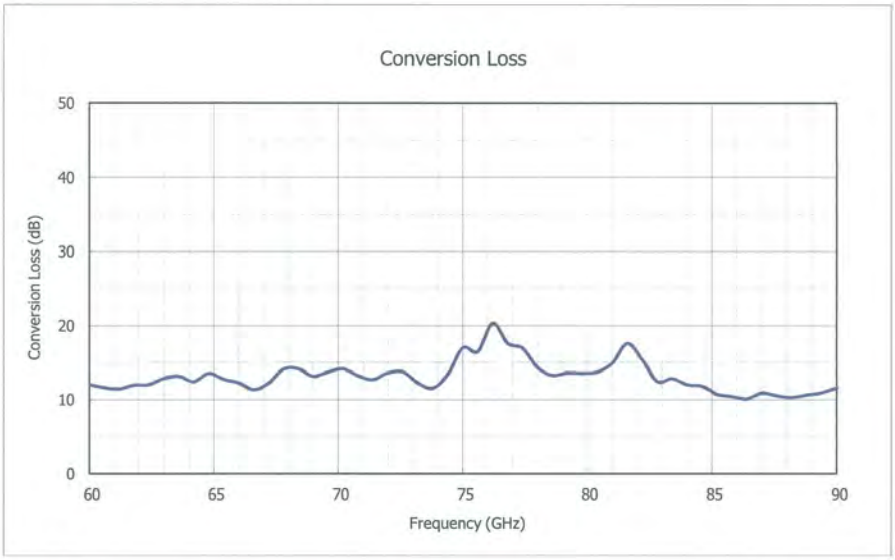
㈜ 이 성적서는 측정기의 정밀정확도에 영향을 미치는 요소(과부하, 온도, 습도 등)의 급격한 변화가 발생한 경우에는 무효가 됩니다.
※ 고객전용사이트(http://www.callab.co.kr)에서 성적서의 진위여부 확인이 가능합니다.
※ 성적서의 원본은 상단에 HCT홀로그램이 들어간 위변조 방지 용지에 인쇄되어 발급되며, 원본 복사시에는 복사본이라는 표시가 저리됩니다.

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

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

2021. 04. 02

한국인정기구 인정
Accredited by KOLAS, Republic of KOREA

㈜에이치시티 대표이사
President, HCT Co., Ltd.

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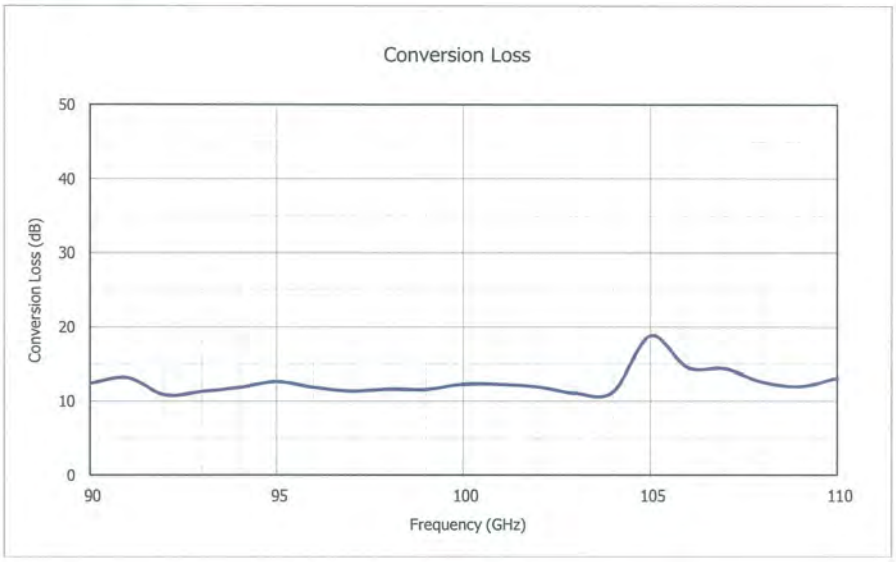
※ 성적서의 원본은 상단에 HCT홀로그램이 들어간 위변조 방지 용지에 인쇄되어 발급되며, 원본 복사시에는 복사본이라는 표시가 처리됩니다.

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)

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2021. 04. 02

㈜에이치시티 대표이사
President, HCT Co., Ltd.

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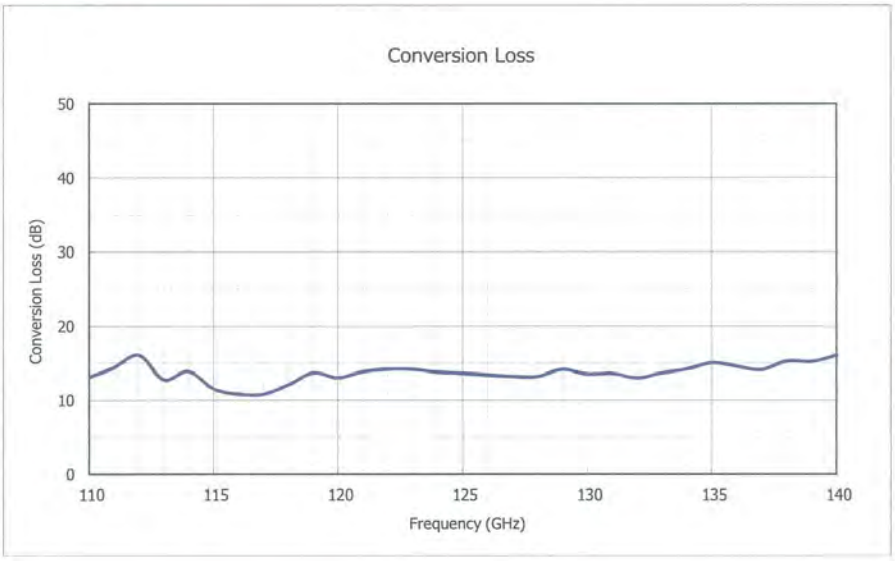
F-02P-02-010 (Rev.01)

MEASUREMENT RESULT

보고서번호(Report No) : IC-2021-27675 페이지(page) : 2 of 3
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

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)

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

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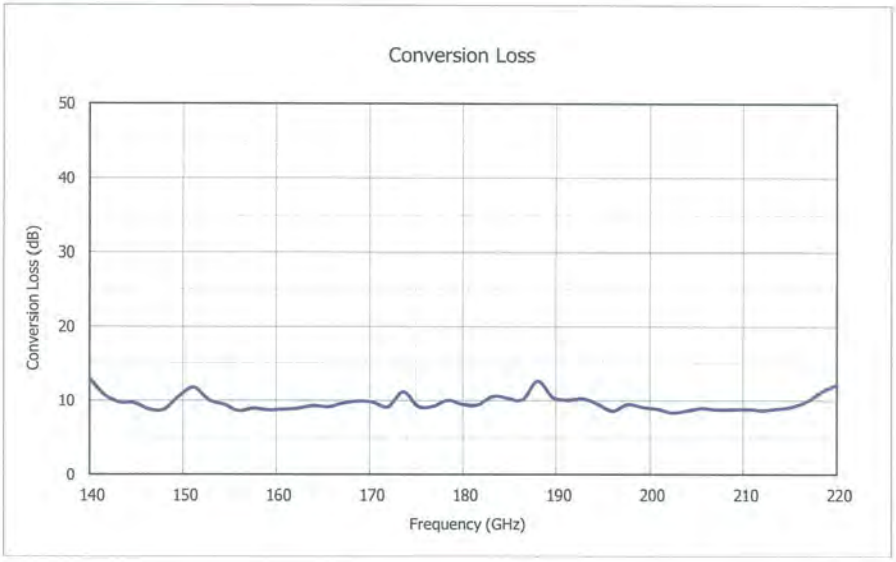
F-02P-02-010 (Rev.01)

MEASUREMENT RESULT

보고서번호(Report No) : IC-2021-24399
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

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-2201-FC108-P