

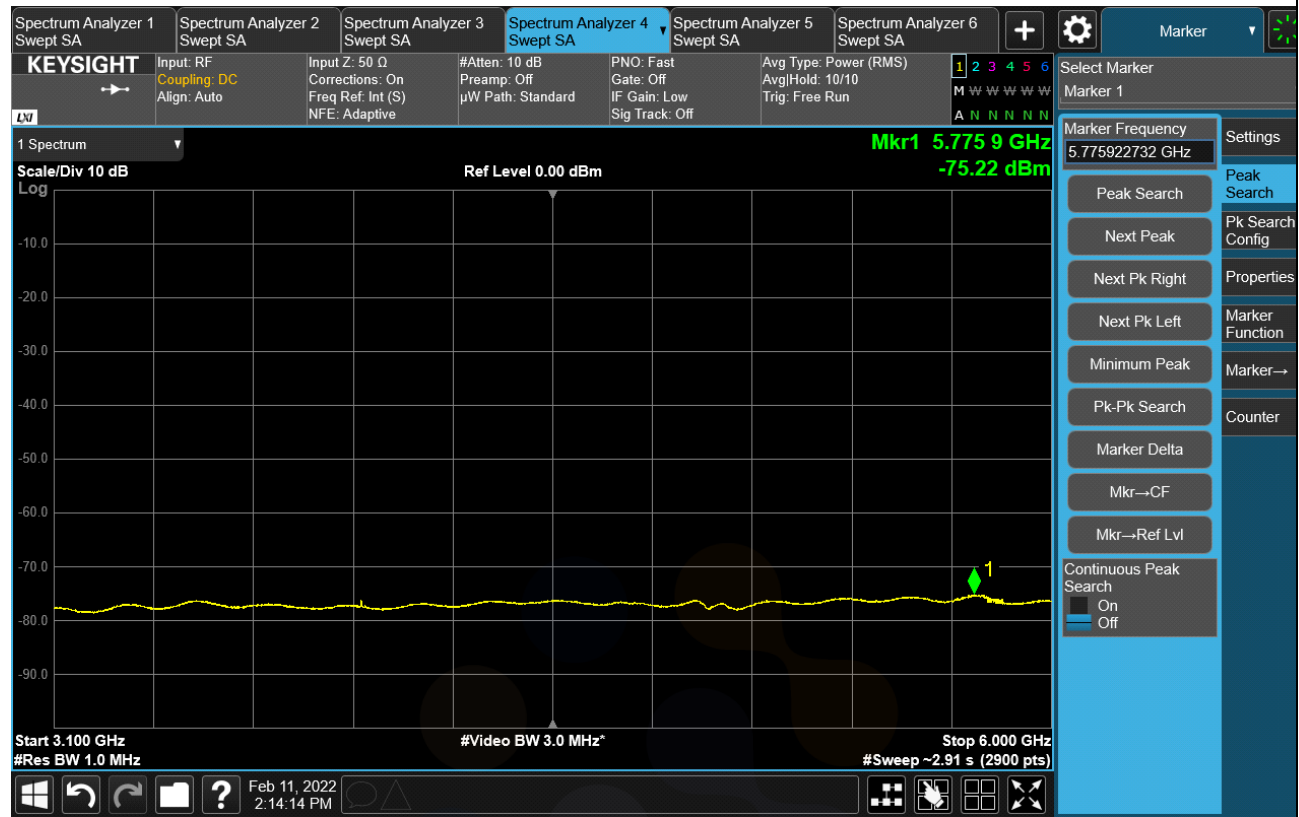
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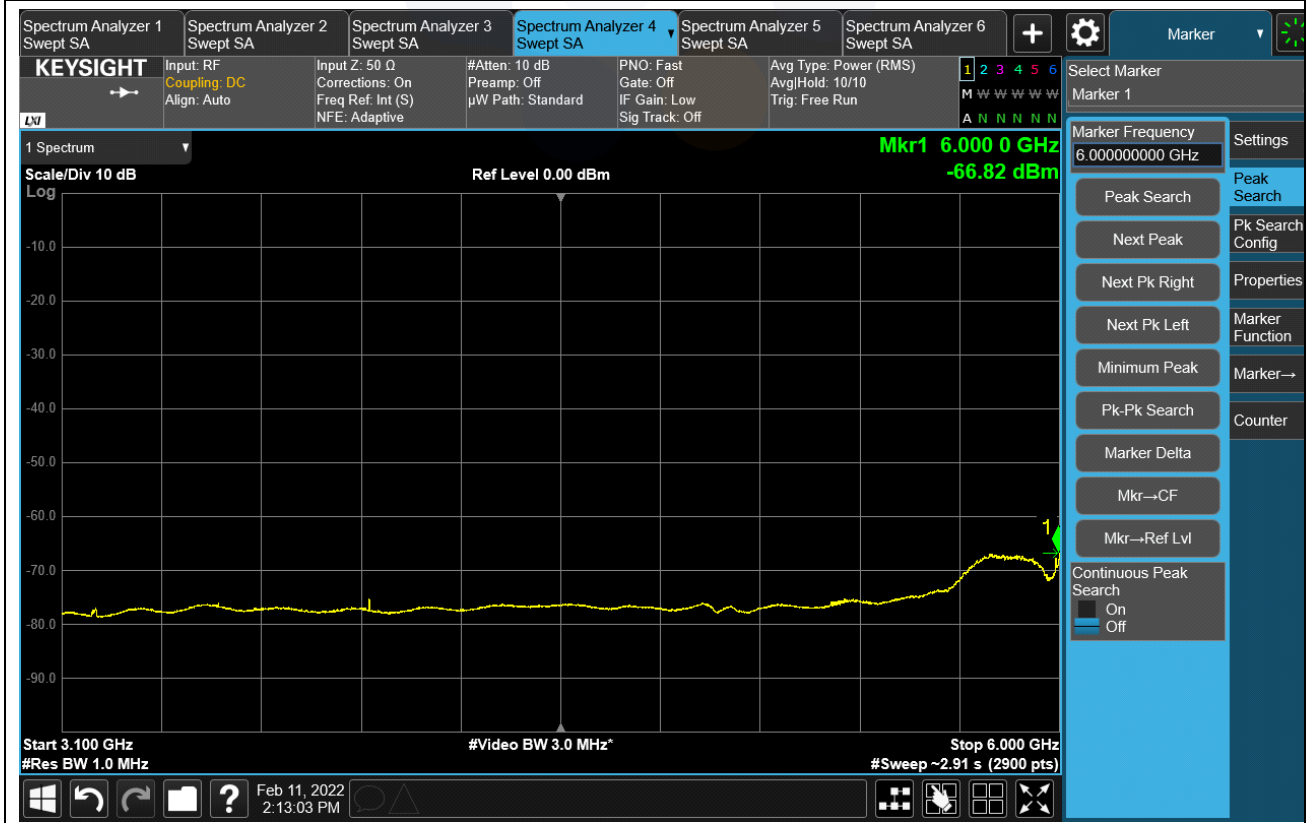
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3 100 MHz ~ 6 000 MHz Horizontal



3 100 MHz ~ 6 000 MHz Vertical



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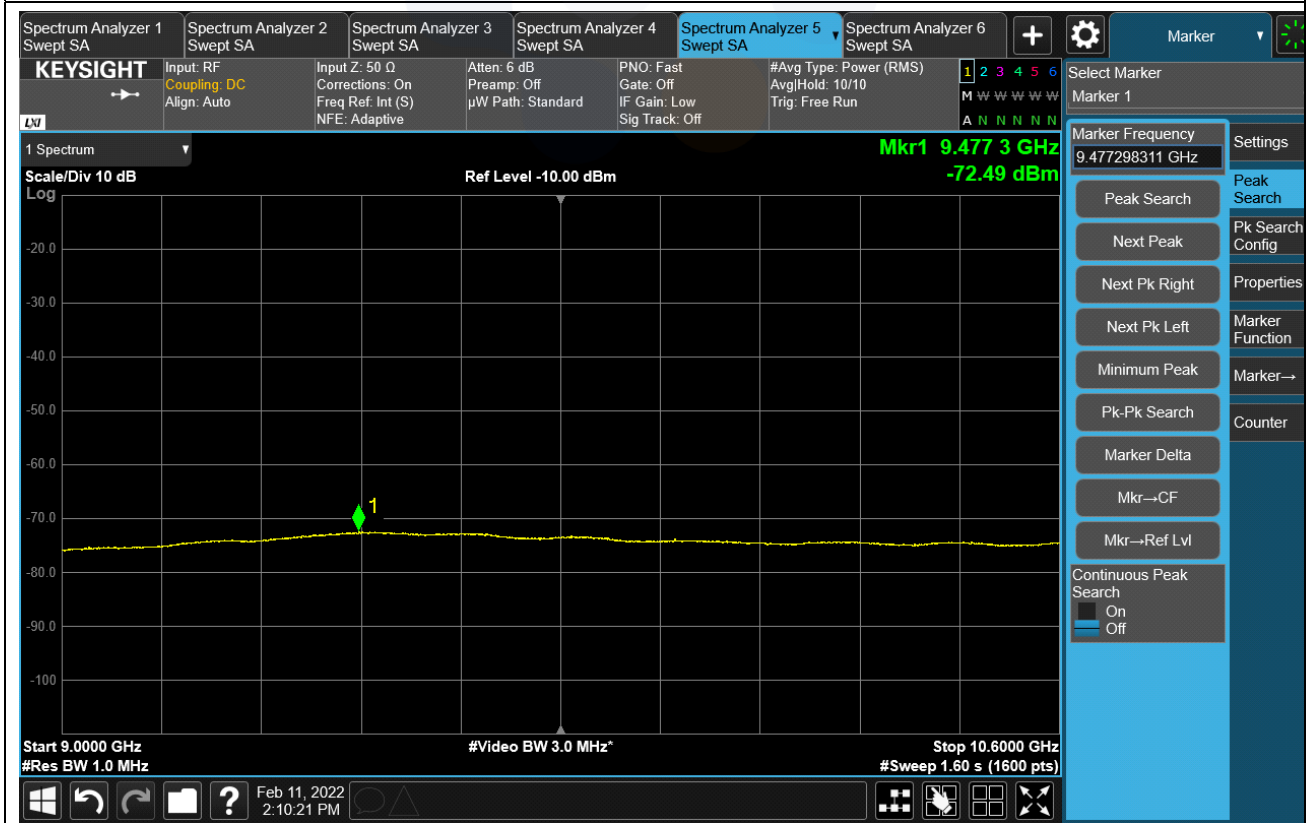
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9 000 MHz ~ 10 600 MHz Horizontal



9 000 MHz ~ 10 600 MHz Vertical



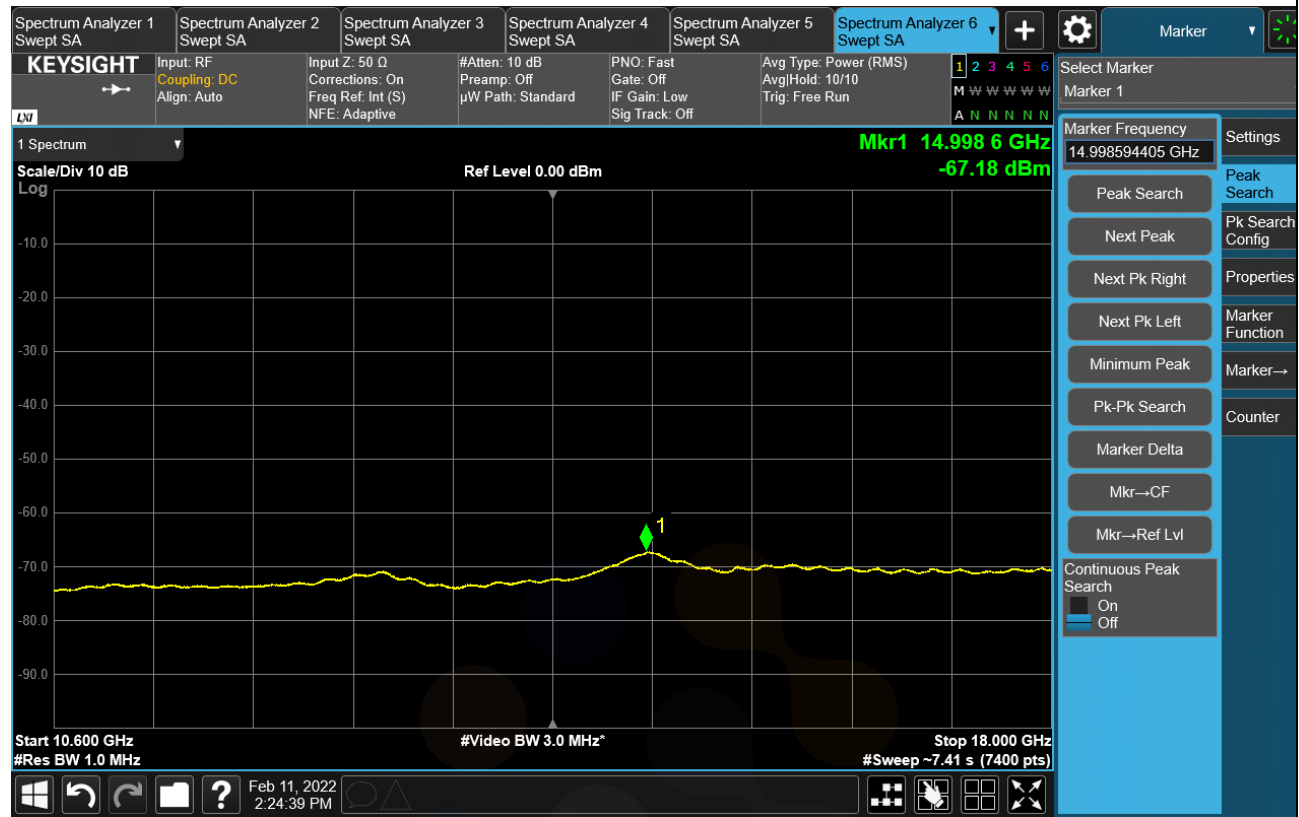
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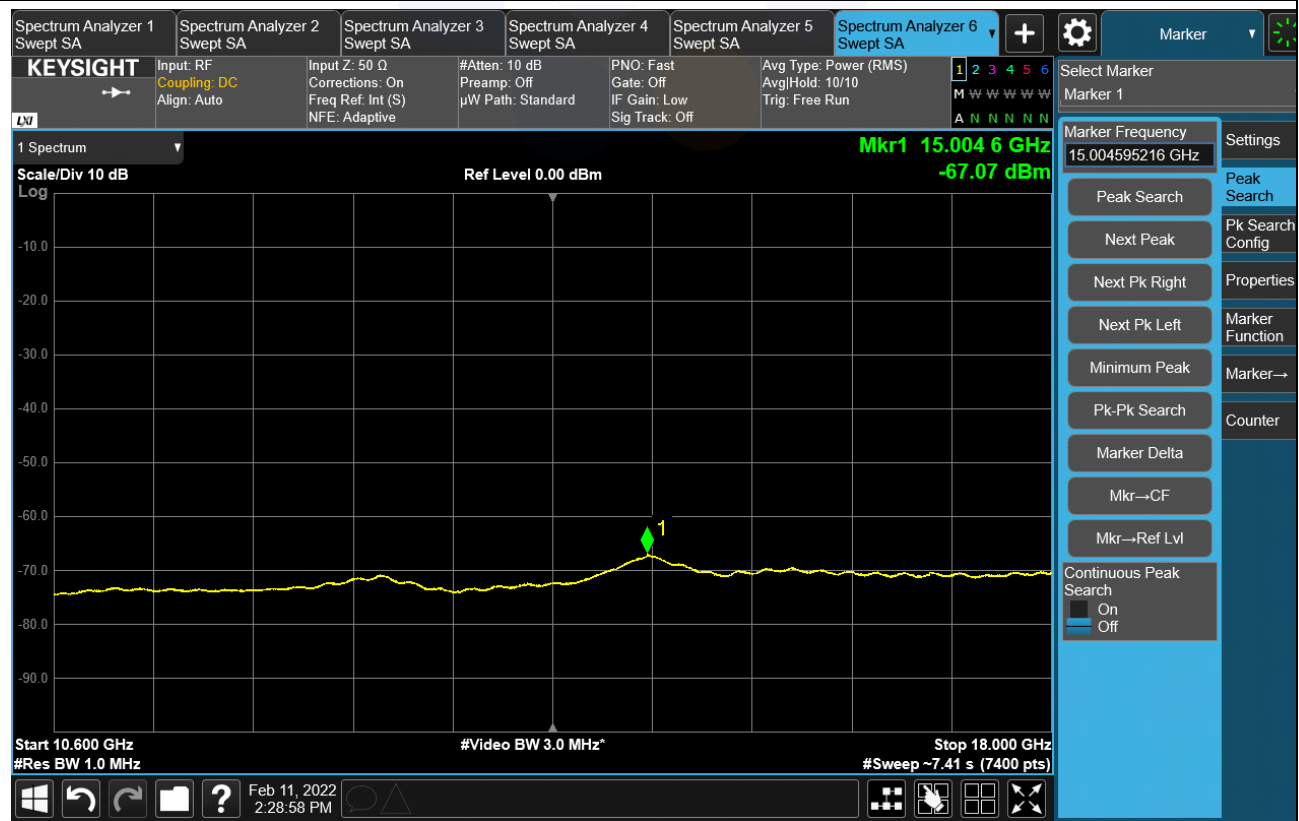
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10 600 MHz ~ 18 000 MHz Horizontal



10 600 MHz ~ 18 000 MHz Vertical



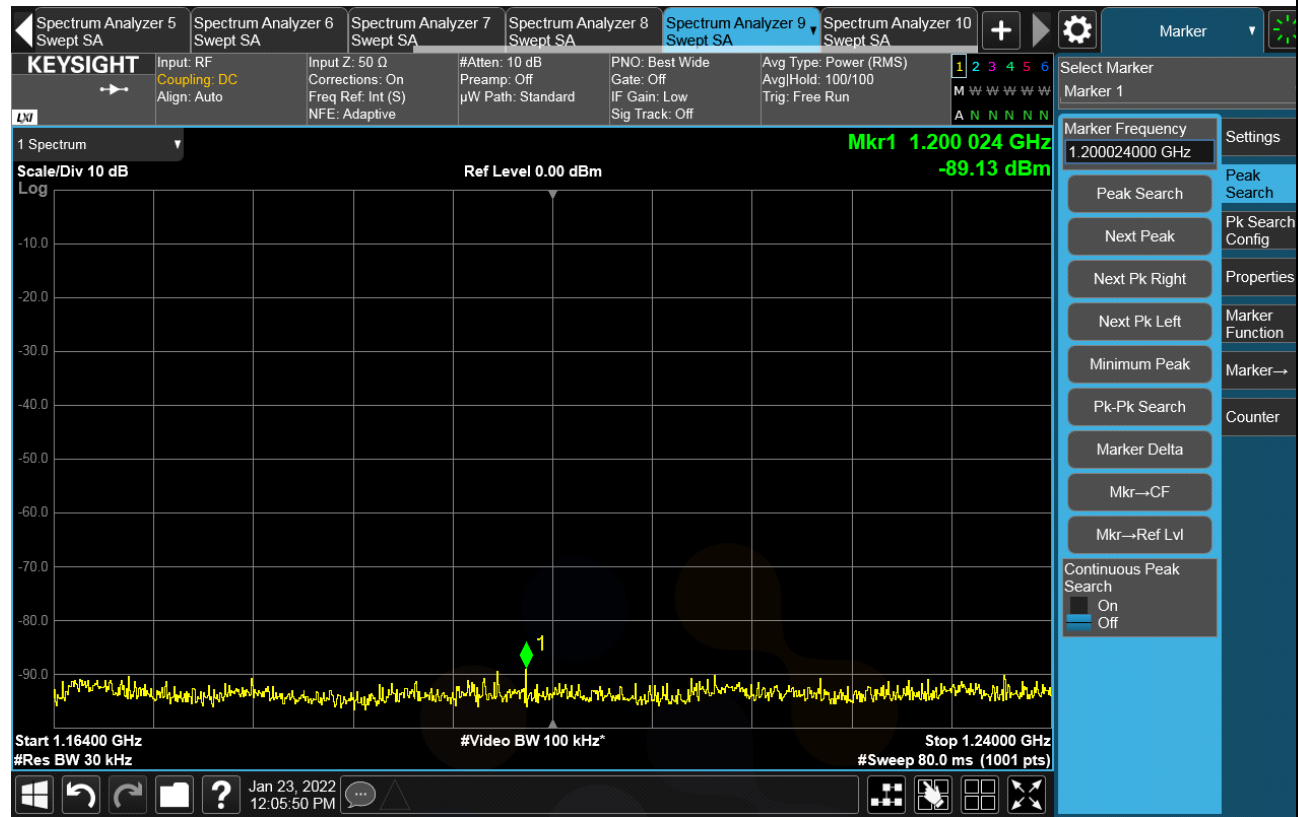
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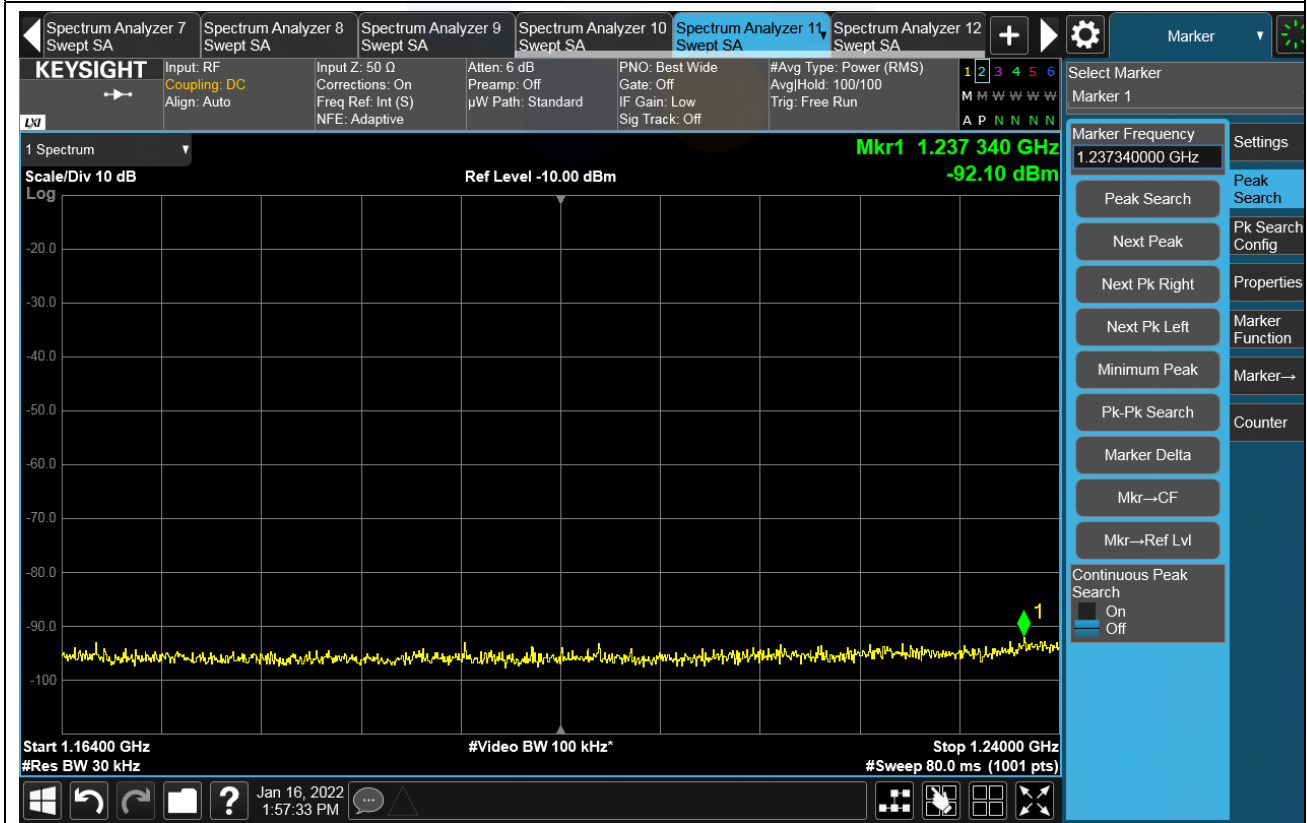
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1 164 MHz ~ 1 240 MHz Horizontal



1 164 MHz ~ 1 240 MHz Vertical



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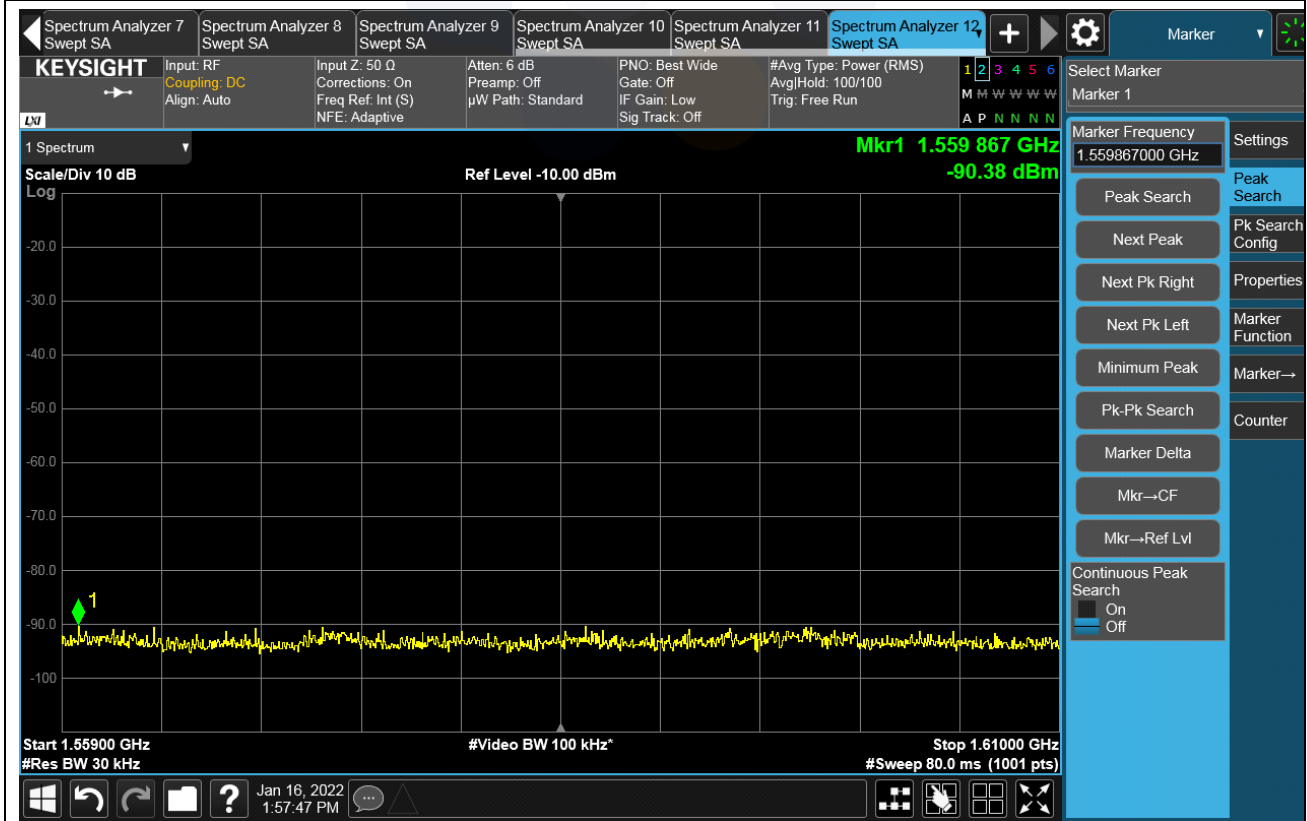
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1 559 MHz ~ 1 610 MHz Horizontal



1 559 MHz ~ 1 610 MHz Vertical



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**[CH 9]****960 MHz ~ 6 000 MHz**

Frequency [MHz]	Pol. [V/H]	Reading [dBm]	Ant. Factor [dB]	Amp. + Cable [dB]	Conv. Factor [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
1 594.40	H	-75.71	28.34	-47.00	-3.82	-79.53	-75.30	4.23
1 597.00	V	-77.15	28.36	-47.00	-3.82	-80.97	-75.30	5.67
1 980.88	H	-70.66	30.97	-46.23	-3.82	-74.48	-63.30	11.18
1 645.72	V	-77.55	28.69	-46.90	-3.82	-81.37	-63.30	18.07
2 103.10	H	-70.40	31.33	-45.96	-3.82	-74.22	-61.30	12.92
2 090.10	V	-74.78	31.30	-45.99	-3.82	-78.60	-61.30	17.30
5 589.90	H	-75.59	34.71	-41.91	-3.82	-79.41	-41.30	38.11
5 990.00	V	-70.54	35.19	-41.52	-3.82	-74.36	-41.30	33.06

9 000 MHz ~ 18 000 MHz

Frequency [MHz]	Pol. [V/H]	Reading [dBm]	Ant. Factor [dB]	Amp. + Cable [dB]	Conv. Factor [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
9 504.30	H	-72.42	36.41	-39.05	-3.82	-76.24	-41.30	34.94
9 496.30	V	-72.37	36.40	-39.05	-3.82	-76.19	-41.30	34.89
15 020.60	H	-67.25	40.12	-35.16	-3.82	-71.07	-61.30	9.77
14 993.60	V	-67.20	40.29	-35.17	-3.82	-71.02	-61.30	9.72

1 164 MHz ~ 1 240 MHz_(For GPS Band)

Frequency [MHz]	Pol. [V/H]	Reading [dBm]	Ant. Factor [dB]	Amp. + Cable [dB]	Conv. Factor [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
1 167.42	H	-90.23	27.77	-47.96	-3.82	-94.05	-85.3	8.75
1 166.81	V	-91.10	27.77	-47.96	-3.82	-94.92	-85.3	9.62

1 559 MHz ~ 1 610 MHz_(For GPS Band)

Frequency [MHz]	Pol. [V/H]	Reading [dBm]	Ant. Factor [dB]	Amp. + Cable [dB]	Conv. Factor [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
1 593.07	H	-83.50	28.33	-47.00	-3.82	-87.32	-85.3	2.02
1 607.65	V	-87.03	28.43	-46.98	-3.82	-90.85	-85.3	5.55

Notes:

Conversion Factor [dB] = 107 - 104.8 + 20*log(D_{Meas}) = -3.82 dB

D_{meas} = 0.5 m

Reading [dBm] = Analyzer Level + Ant. Factor + Amp. + Cable Loss

Result [dBm] = Reading + Conv. Factor

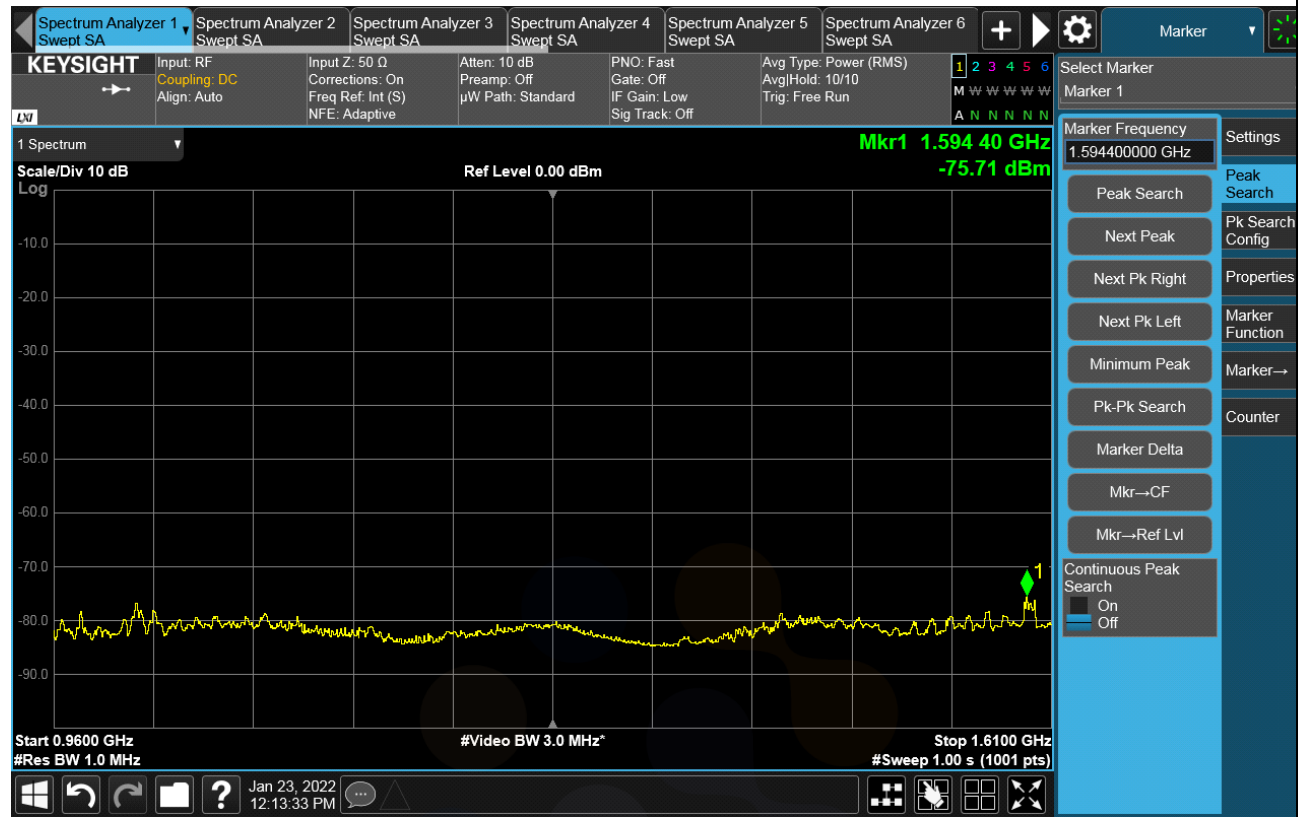
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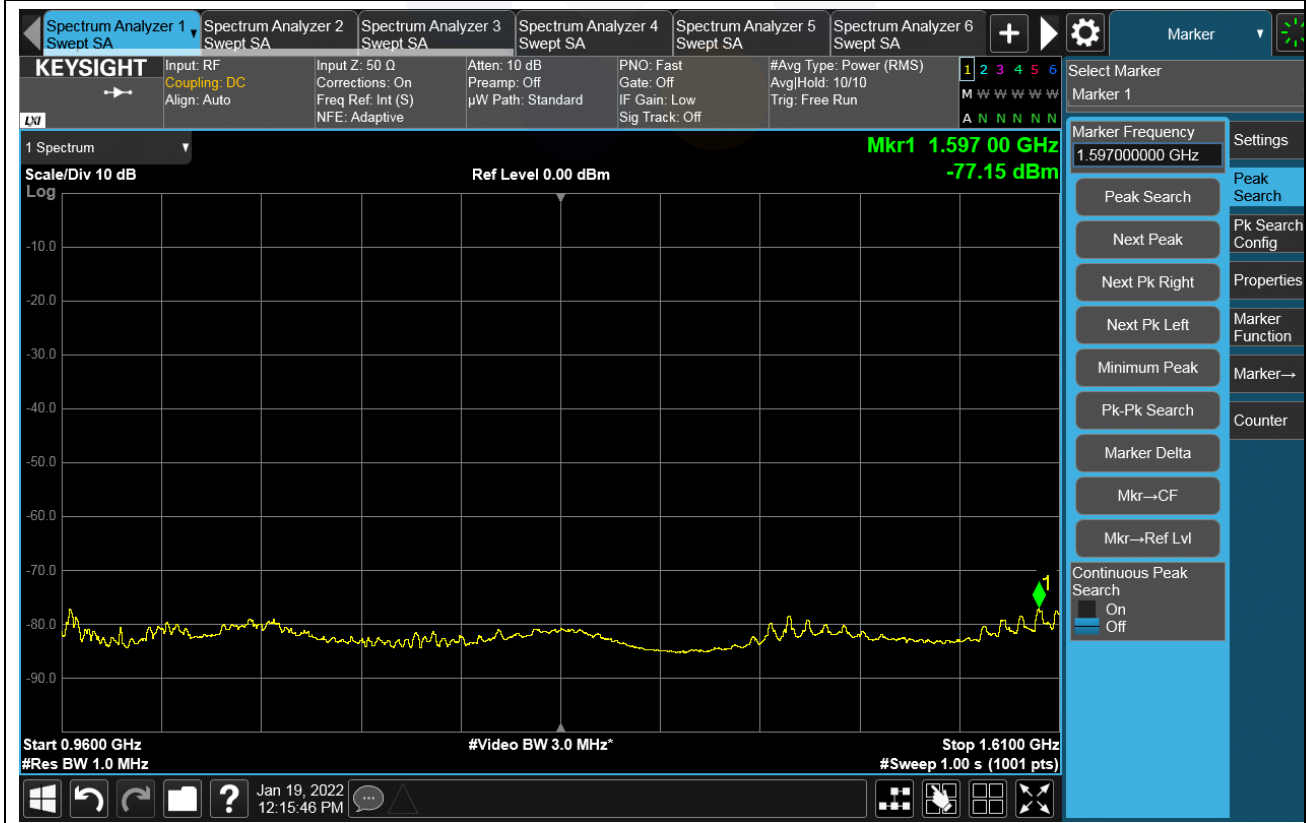
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960 MHz ~ 1 610 MHz Horizontal



960 MHz ~ 1 610 MHz Vertical



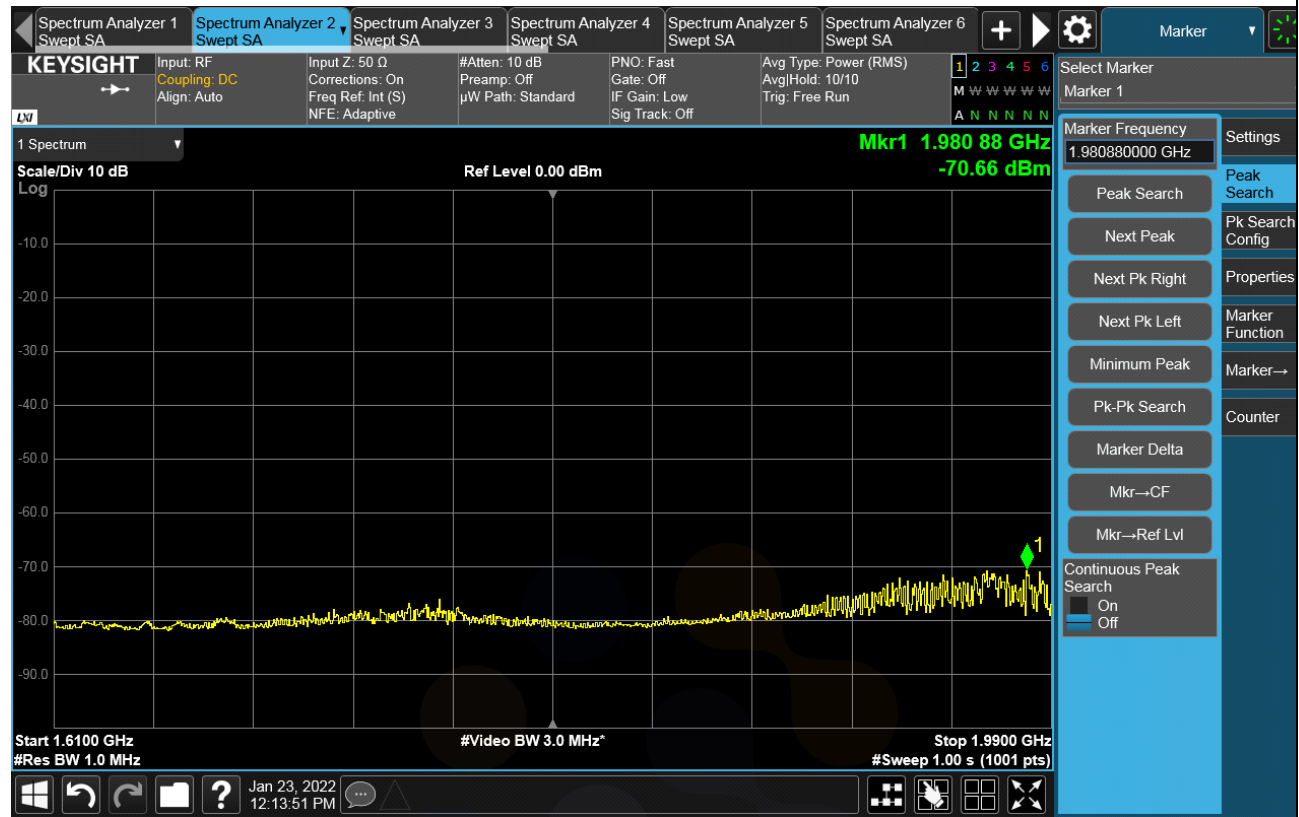
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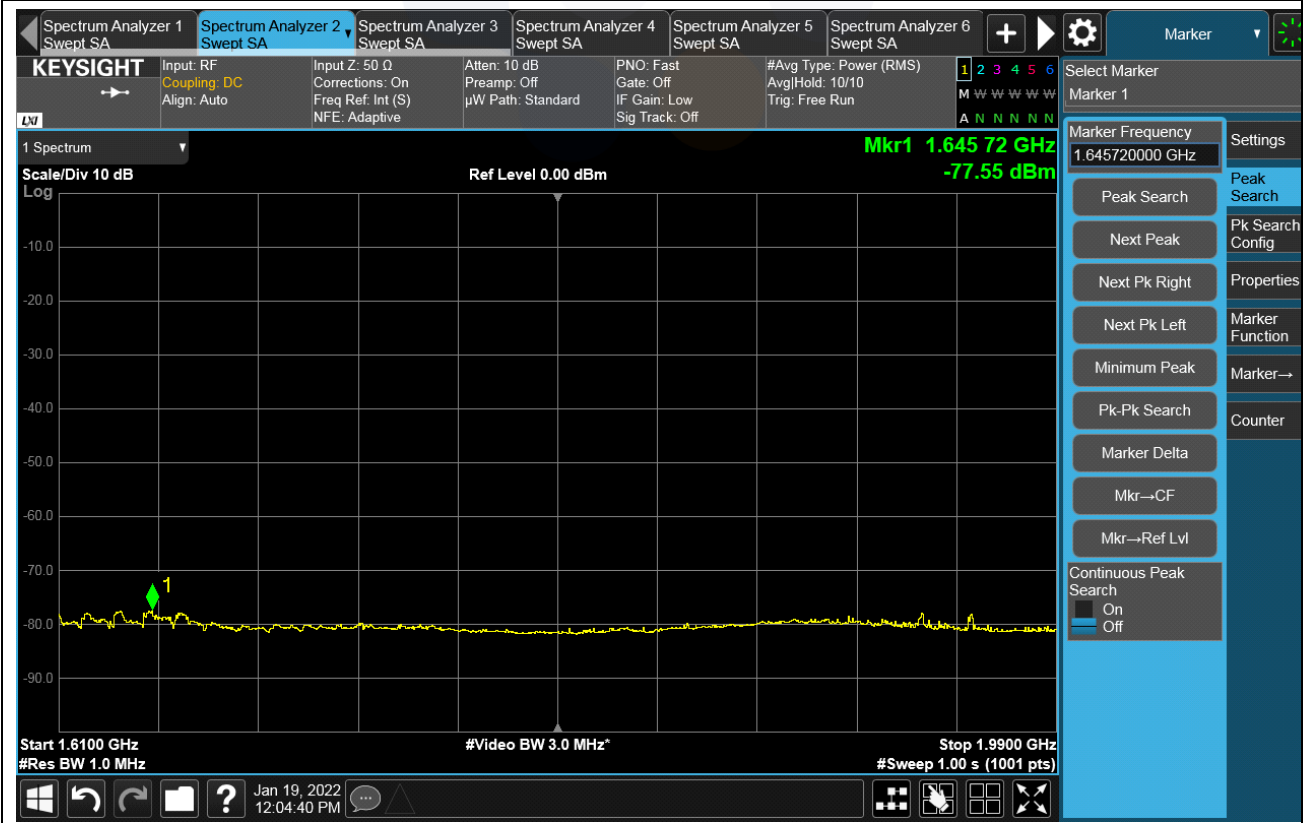
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1 610 MHz ~ 1 990 MHz Horizontal



1 610 MHz ~ 1 990 MHz Vertical



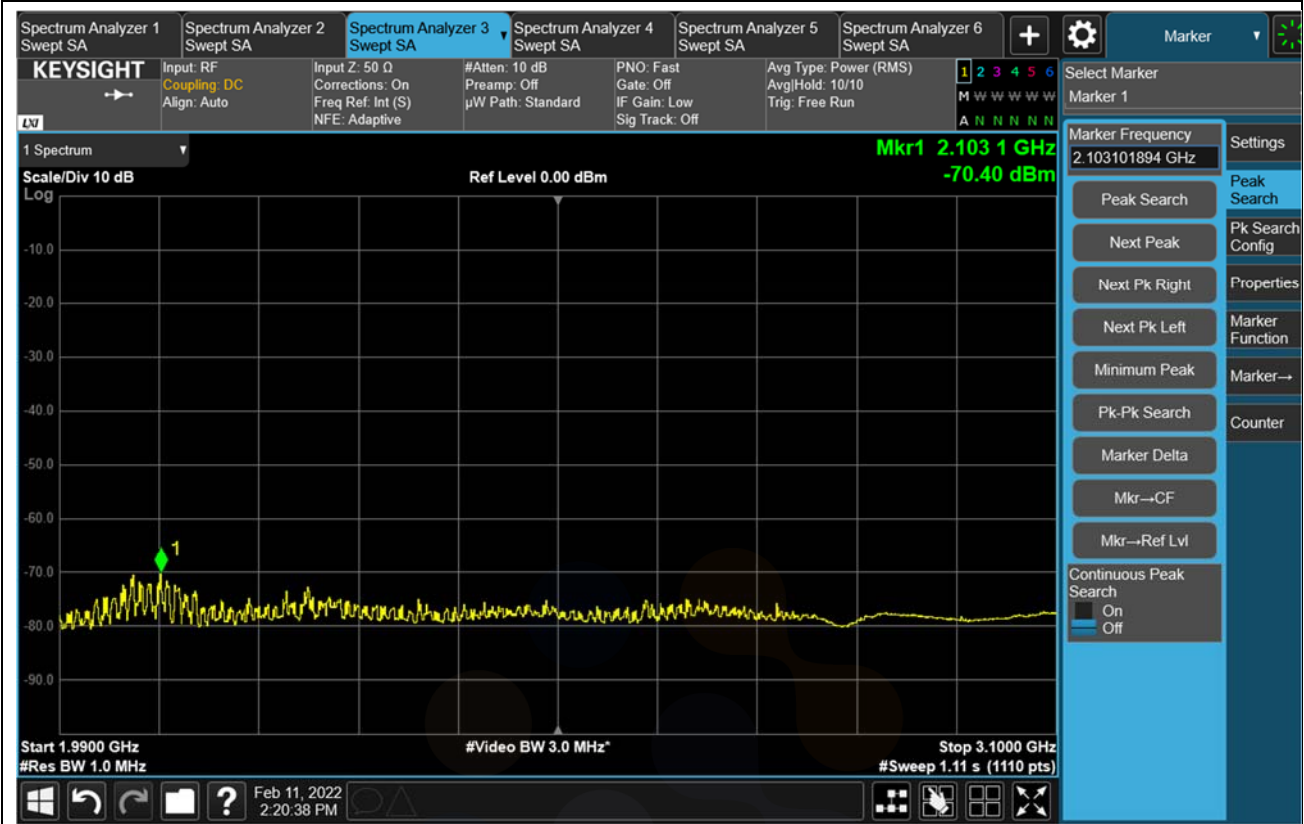
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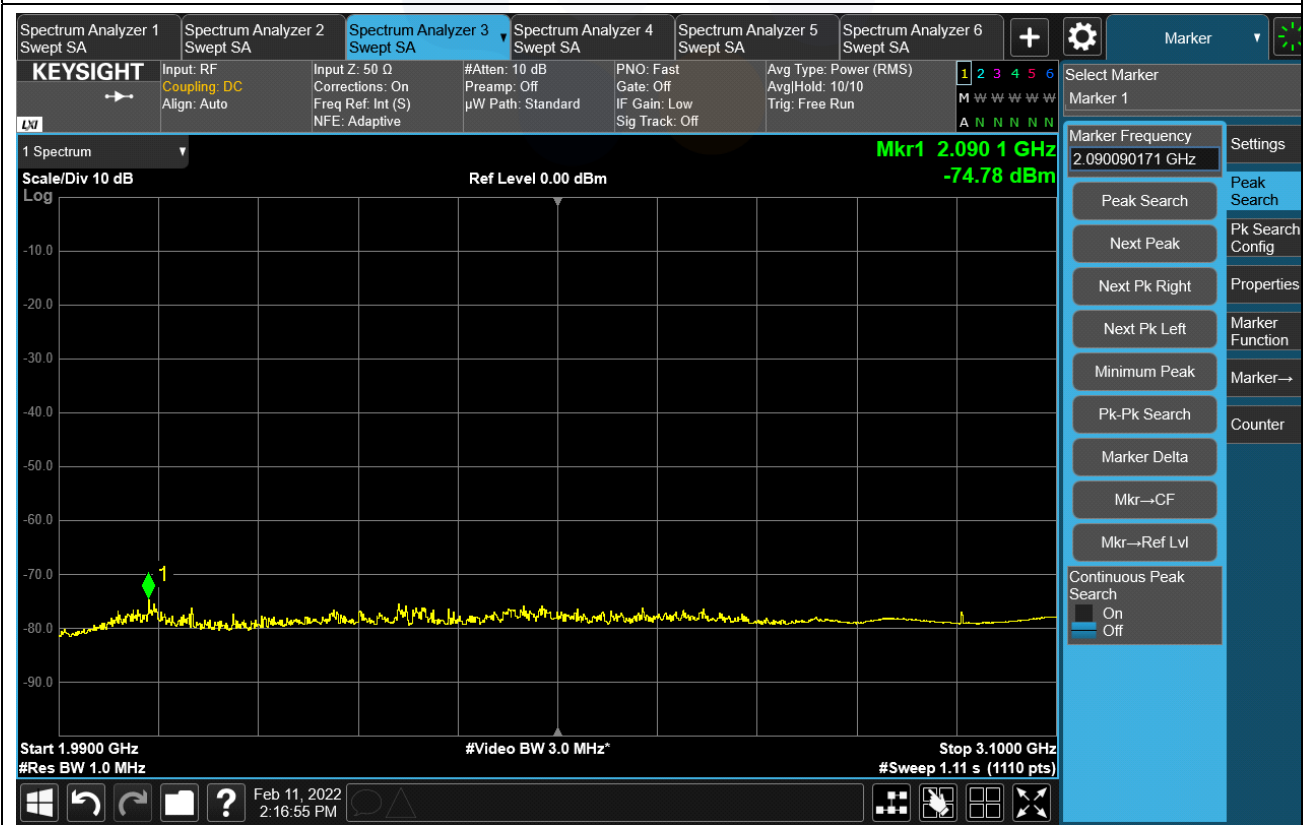
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1 990 MHz ~ 3 100 MHz Horizontal



1 990 MHz ~ 3 100 MHz Vertical



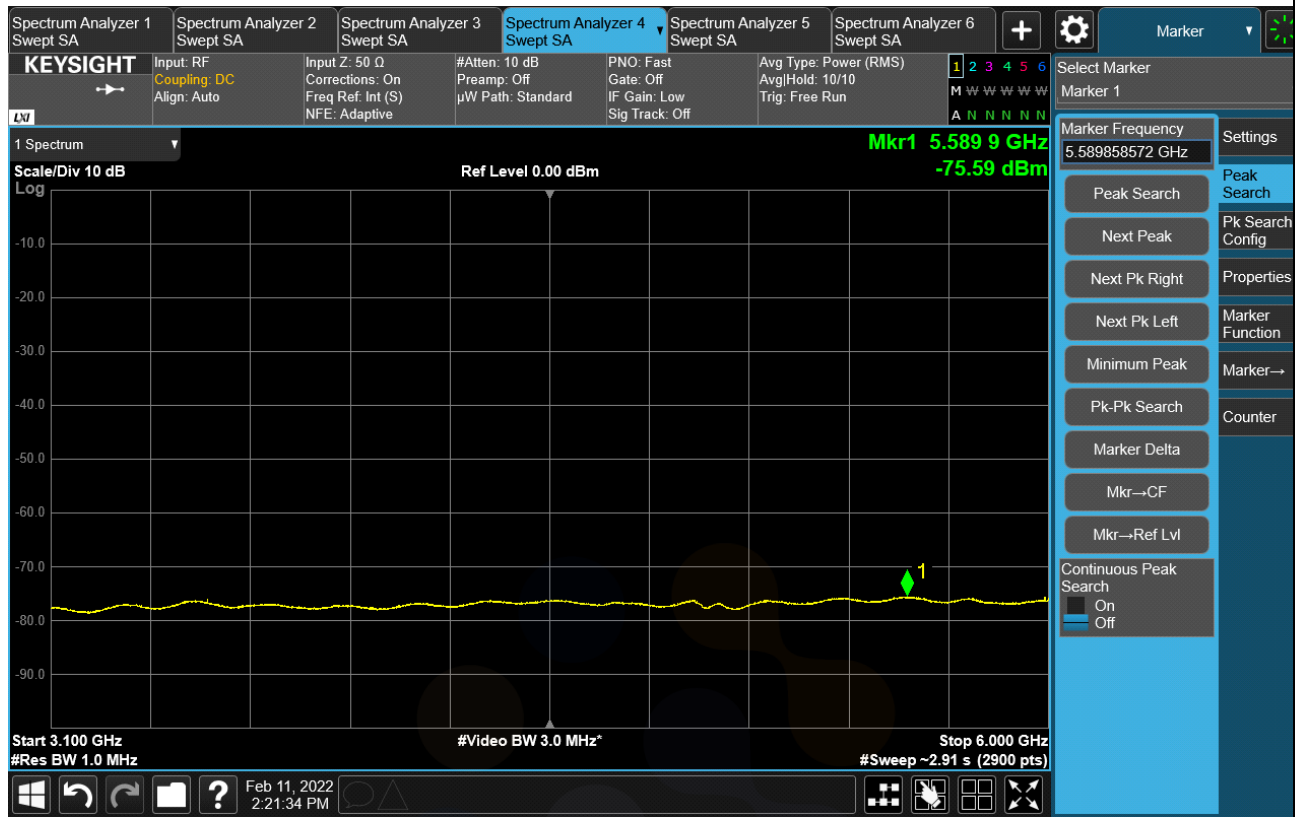
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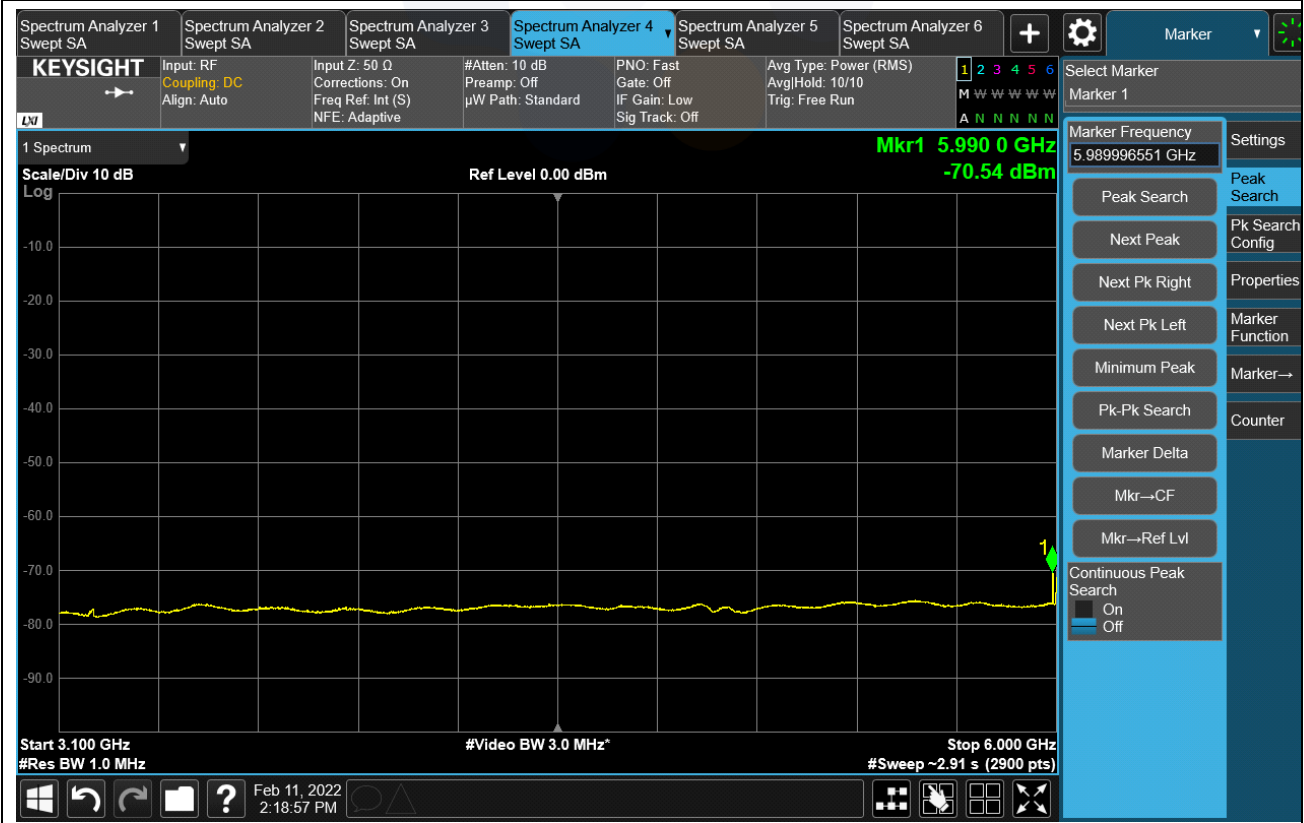
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3 100 MHz ~ 6 000 MHz Horizontal



3 100 MHz ~ 6 000 MHz Vertical



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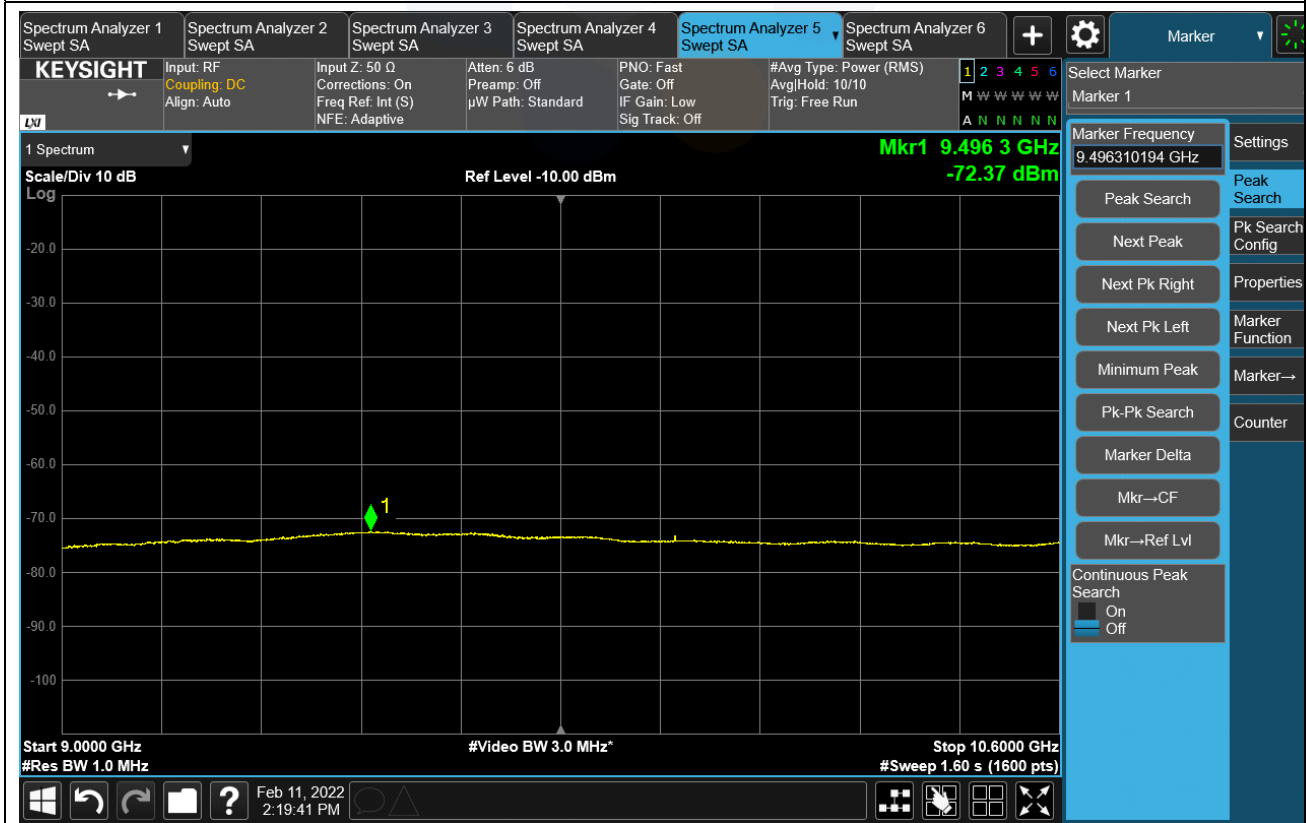
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9 000 MHz ~ 10 600 MHz Horizontal



9 000 MHz ~ 10 600 MHz Vertical



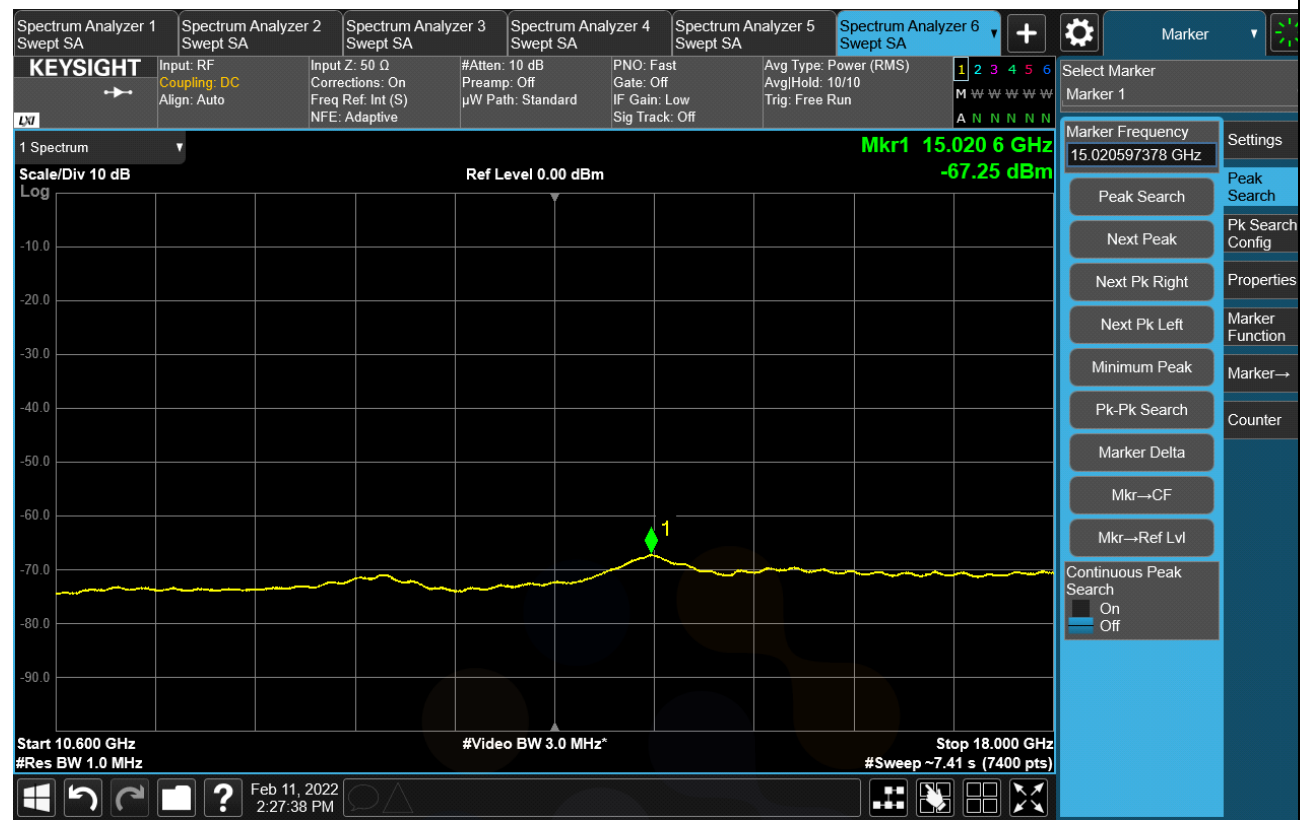
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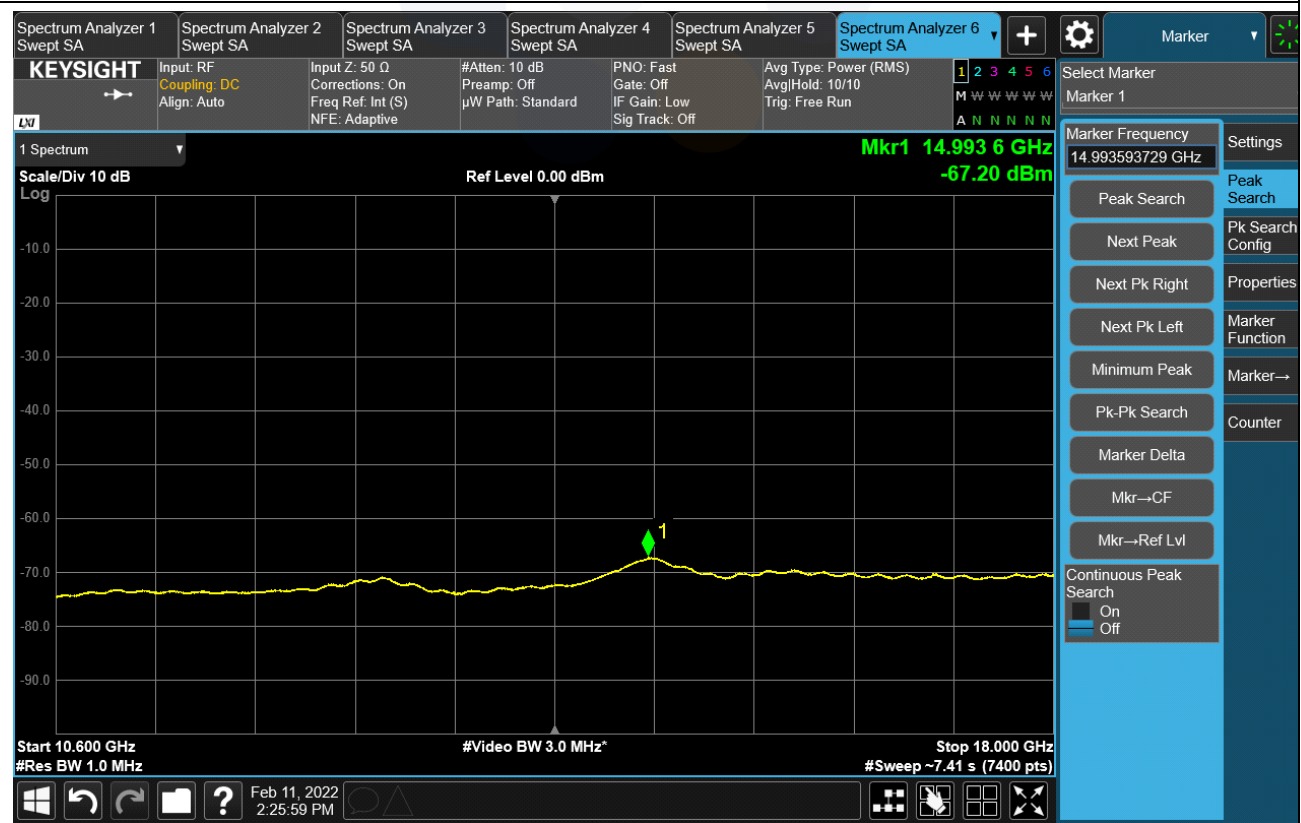
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10 600 MHz ~ 18 000 MHz Horizontal



10 600 MHz ~ 18 000 MHz Vertical



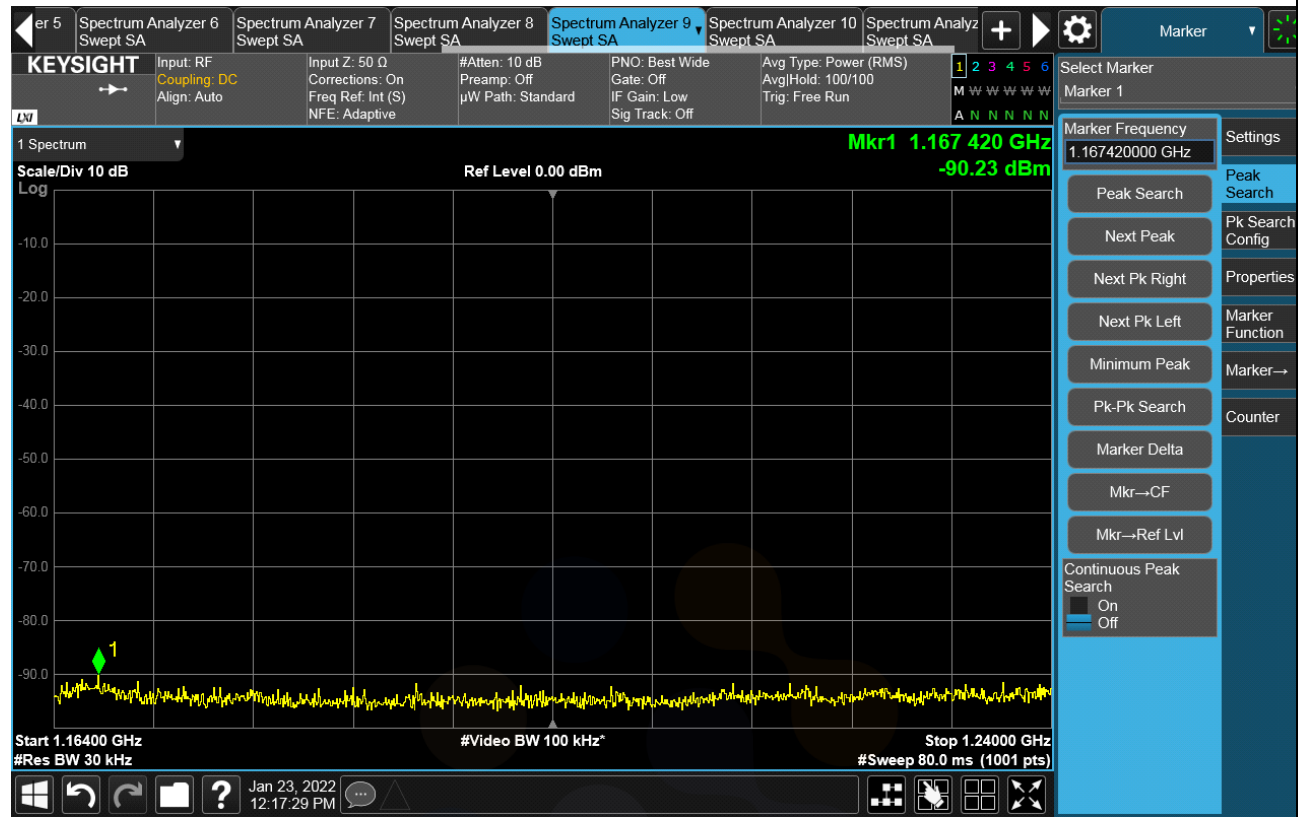
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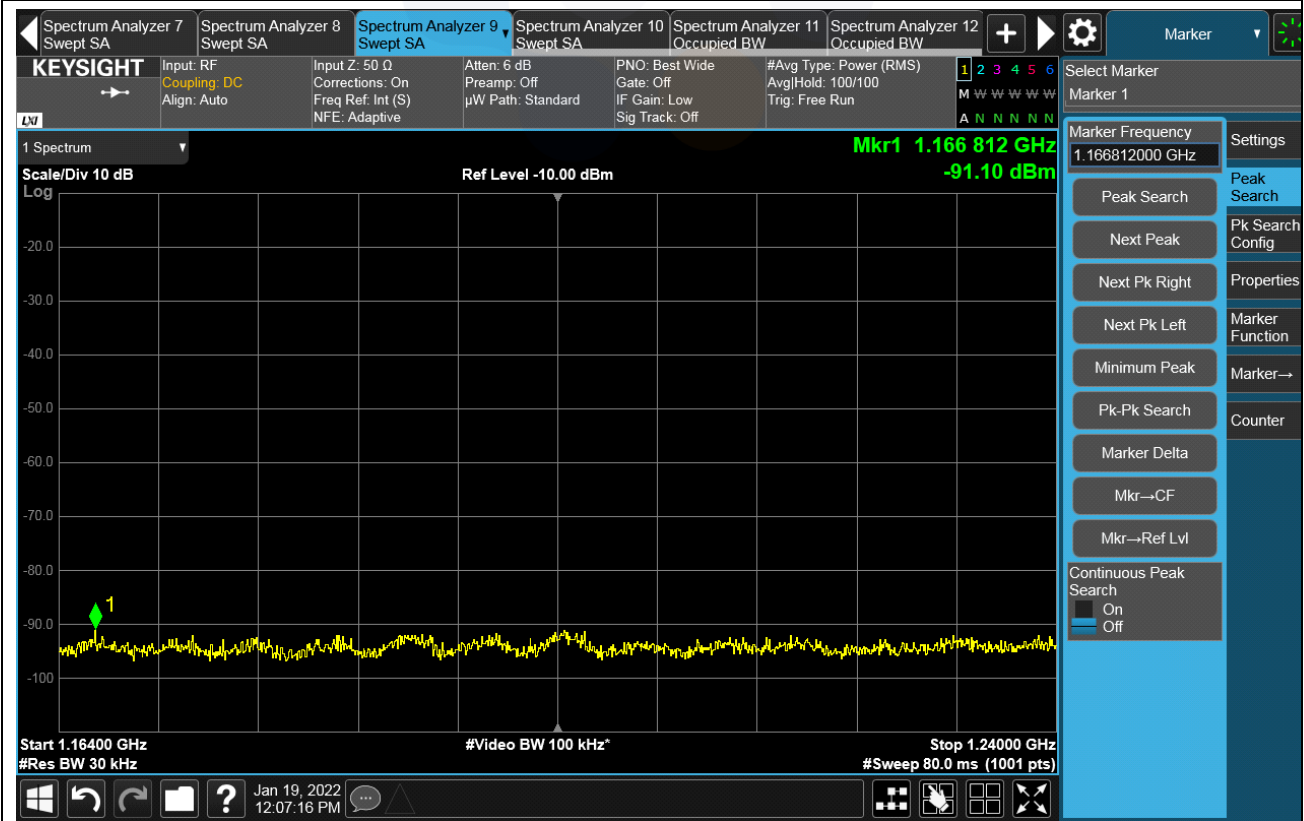
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1 164 MHz ~ 1 240 MHz Horizontal



1 164 MHz ~ 1 240 MHz Vertical



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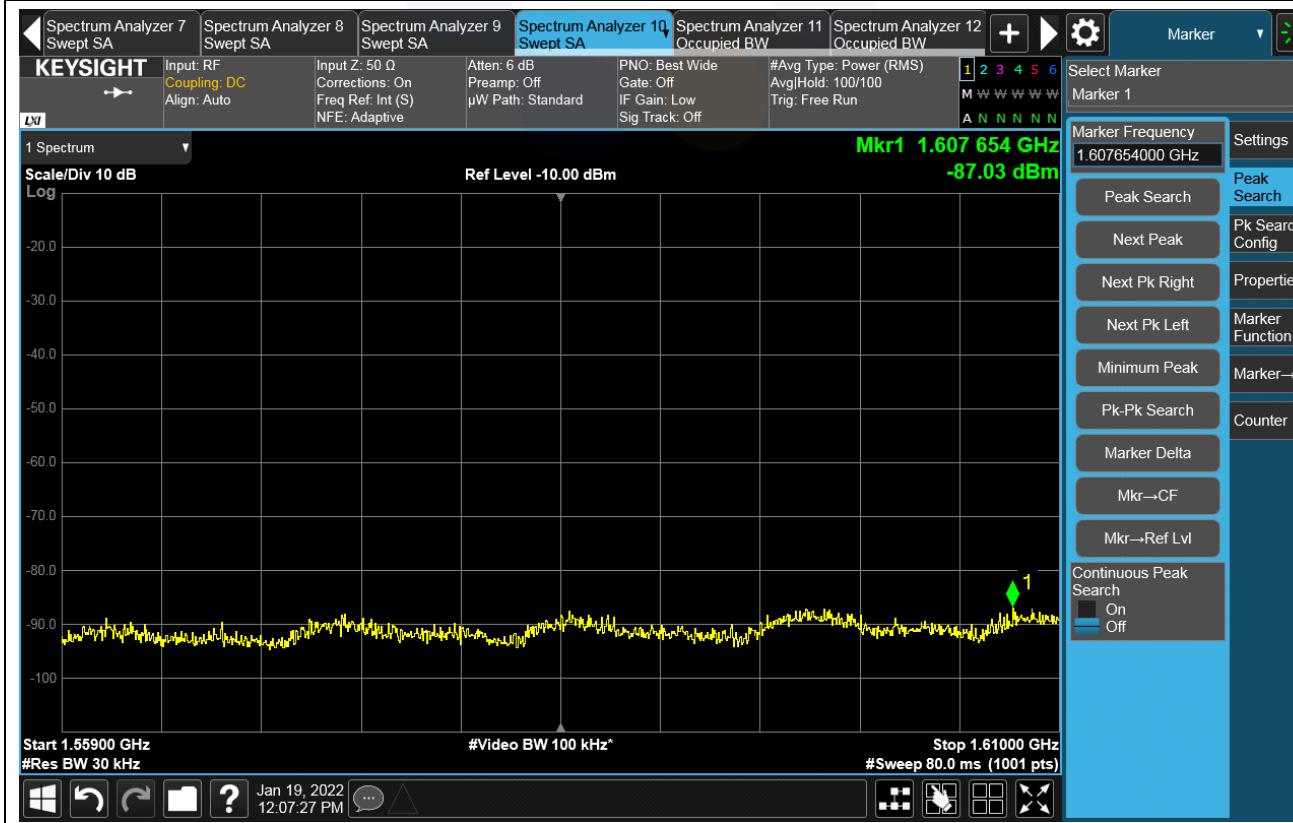


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1 559 MHz ~ 1 610 MHz Horizontal



1 559 MHz ~ 1 610 MHz Vertical



6.5. Radiated Spurious Emission – Below 960 MHz

Limit

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency[MHz]	Field strength [$\mu\text{V}/\text{m}$]	Measurement distance[m]
0.009-0.490	2400/F	300
0.490-1.705	24000/F	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

*Radiated Limit

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

Test procedure

ANSI C63.10-2013

Test settings

Below 30 MHz

RBW 120 kHz (for emissions from 30 MHz – 1 GHz)
 Detector Quasi-peak
 Trace mode Max-hold
 Sweep time Auto couple
 The trace was allowed to stabilize

Below 960 MHz

RBW 120 kHz (for emissions from 30 MHz – 1 GHz)
 VBW 300 kHz
 Detector Peak
 Trace mode Max-hold
 Sweep time Auto couple
 The trace was allowed to stabilize

*The Limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field Strength levels (as reported in the table) using the free space impedance of 377Ω . For example, the measurement frequency X kHz resulted in a level of Y dB($\mu\text{V}/\text{m}$), which is equivalent to $Y-51.5 = Z$ dB($\mu\text{A}/\text{m}$), which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to the 15.209(a) limit

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Test results

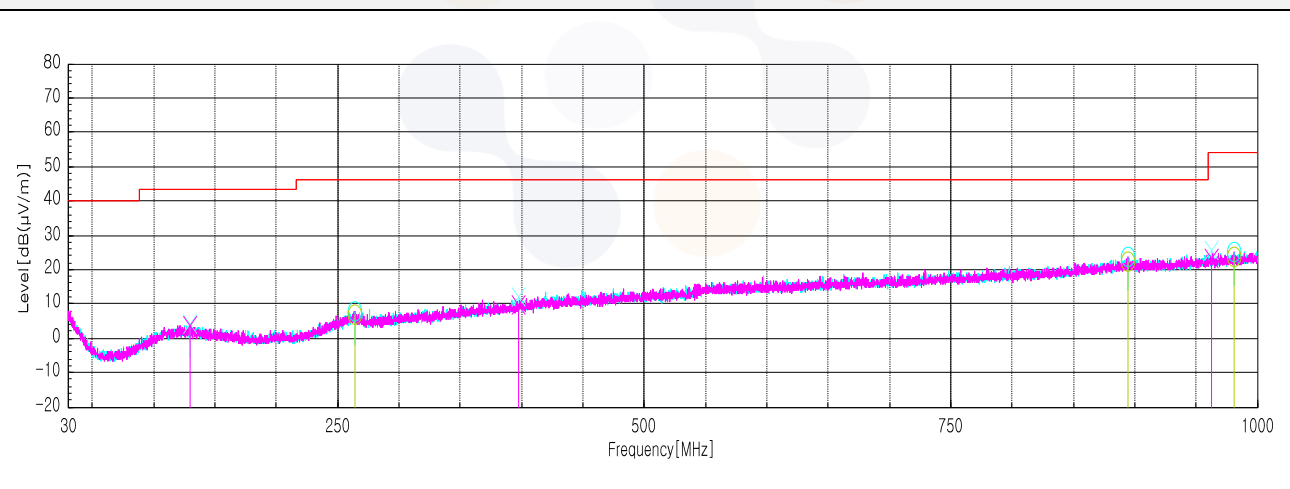
Worst case(Below 30 MHz) : CH5 SP0 BPRF125 Preamble 10

Frequency [MHz]	Pol. [V/H]	Reading [dB(μ V)]	Ant. Factor [dB]	Amp. + Cable [dB]	Conv. Factor [dB]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]
No spurious emissions were detected within 20 dB of the limit.								

Worst case(Below 960 MHz) : CH5 SP0 BPRF125 Preamble 10

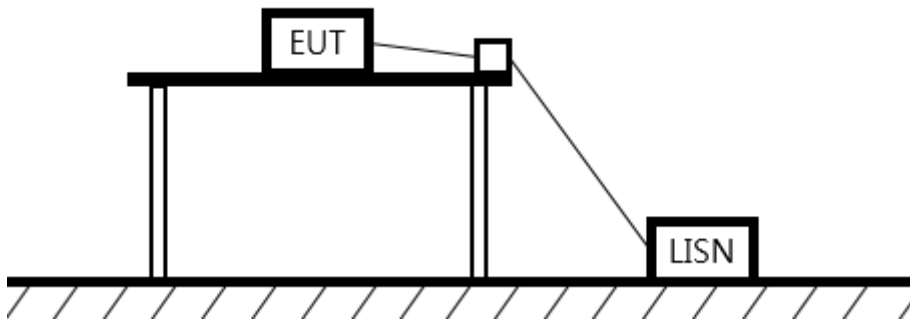
Frequency [MHz]	Pol. [V/H]	Reading [dB(μ V)]	Ant. Factor [dB]	Amp. + Cable [dB]	Conv. Factor [dB]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]
130.27	V	13.90	17.80	-28.10	3.60	43.50	39.90	13.90
263.89	H	13.50	19.74	-26.22	7.02	46.00	38.98	13.50
397.99	V	12.90	21.58	-24.66	9.82	46.00	36.18	12.90
894.88	H	15.10	26.89	-19.66	22.33	46.00	23.67	15.10
962.41	V	15.30	26.85	-18.71	23.44	54.00	30.56	15.30
981.21	H	15.10	27.02	-18.36	23.76	54.00	30.24	15.10

Horizontal/Vertical



6.6. AC Conducted emission

Test setup



Limit

According to 15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted limit (dB μ V/m)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

Measurement procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50 Ω /50 μ H LISN, which is an input transducer to a spectrum analyzer or an EMI/Field Intensity — Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
5. The measurements were made with the detector set to peak amplitude within a bandwidth of 10 kHz or to quasi-peak and average within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

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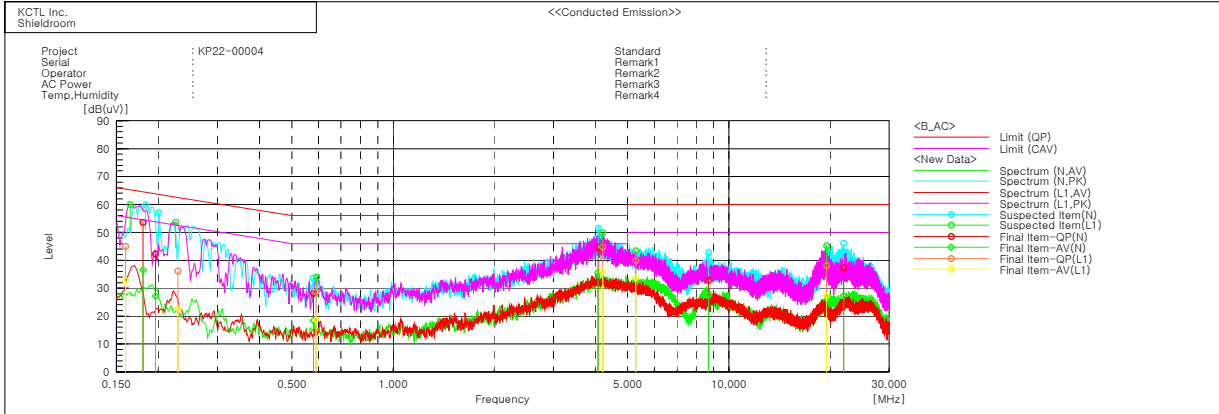
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Test results

Worst case: CH5_SP0 BPRF125 Preamble10



Final Result

--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.180	43.2	26.2	10.4	53.6	36.6	64.5	54.5	10.9	17.9
2	0.19591	32.0	17.0	10.3	42.3	27.3	63.8	53.8	21.5	26.5
3	0.58027	18.2	8.5	9.9	28.1	18.4	56.0	46.0	27.9	27.6
4	4.06228	34.2	25.3	10.3	44.5	35.6	56.0	46.0	11.5	10.4
5	8.70597	22.2	16.6	10.7	32.9	27.3	60.0	50.0	27.1	22.7
6	21.94825	26.1	16.1	11.2	37.3	27.3	60.0	50.0	22.7	22.7

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.15982	34.5	22.4	10.4	44.9	32.8	65.5	55.5	20.6	22.7
2	0.22856	25.9	12.4	10.2	36.1	22.6	62.5	52.5	26.4	29.9
3	0.58914	18.7	8.8	9.9	28.6	18.7	56.0	46.0	27.4	27.3
4	4.20973	34.4	25.6	10.4	44.8	36.0	56.0	46.0	11.2	10.0
5	5.26202	29.4	23.1	10.5	39.9	33.6	60.0	50.0	20.1	16.4
6	19.55766	26.9	16.1	11.2	38.1	27.3	60.0	50.0	21.9	22.7

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**7. Measurement equipment**

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
UXA Signal Analyzer	KEYSIGHT	N9040B	US56050101	22.07.28
Signal Generator	R&S	SMB100A	176206	23.01.19
Temp & Humid Chamber	Myeongseong R&P	CTHC-50P-DT	20150824-2	22.07.27
DC Power Supply	AGILENT	E3632A	MY40027567	22.05.10
EMI TEST RECEIVER	R&S	ESCI3	101408	22.03.05
Bi-Log Antenna	AMETEK	CBL 6112D	55545	23.01.14
Amplifier	SONOMA INSTRUMENT	310N	284608	22.08.19
COAXIAL FIXED ATTENUATOR	Agilent	8491B-003	2708A18758	22.04.23
Horn antenna	ETS.lindgren	3117	155787	22.10.05
Horn antenna	ETS.lindgren	3116	86635	22.05.17
Attenuator	API Inmet	40AH2W-10	12	22.05.11
Broadband PreAmplifier	SCHWARZBECK	BBV9718	216	22.07.27
AMPLIFIER	L-3 Narda-MITEQ	AMF-7D-01001800-22-10P	2003683	22.08.19
LOOP Antenna	R&S	HFH2-Z2	100355	22.08.21
Antenna Mast	Innco Systems	MA4640-XP-ET	-	-
Turn Table	Innco Systems	DT2000	79	-
Antenna Mast	Innco Systems	MA4000-EP	303	-
Turn Table	Innco Systems	DT2000	79	-
High Pass Filter	Wainwright Inst.	WHW2-8165-11500-21000-40CD	11	23.01.11
High Pass Filter	QOTANA TECHNOLOGIES	DBHF0508004000A	20070100016	22.07.09
Highpass Filter	WT	WT-A1698-HS	WT160411001	22.05.10
TWO-LINE V - NETWORK	R&S	ENV216	101358	22.04.05
EMI TEST RECEIVER	R&S	ESCI	100001	22.04.14
Vector Signal Generator	R&S	SMBV100A	257566	22.07.09

End of test report