

TEST REPORT

Report No.: SHE20030018-02AE

Date: 2020-4-1

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Applicant : Shanghai Xiaoyi Technology Co., Ltd.
Address of Applicant : 6F,Building E,No.2889,Jinke Road,Shanghai,China

Product Name : kami Mini camera
Model No. : YYS.2919
Sample No. : E20030018-01#02
FCC ID : 2AFIB-YYS2919
ISED Number : 20436-YYS2919

Standards : FCC CFR47 Part 15, Subpart C
RSS-Gen (Issue 5, March 2019)
RSS-247 (Issue 2, February 2017)

Date of Receipt : 2020-3-9
Date of Test : 2020-3-9~2020-4-1
Date of Issue : 2020-4-1

Remark:

This report details the results of the testing carried out on one sample, the results contained in this report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

Prepared by: Jennifer Zhou
(Jennifer Zhou)

Reviewed by: jesse
(jesse)

Approved by: Guoyou Chi
(Authorized signatory: Guoyou Chi)

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Revision Record			
Version	Date	Revisions	Revised By
1.0	2019-10-31	Original	--

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1 General Information

4.1 Testing Laboratory

Company Name	ICAS Testing Technology Services (Shanghai) Co., Ltd.
Address	155 Pingbei Rd, Minhang District, Shanghai, China
Telephone	0086 21-51682999
Fax	0086 21-54711112
Homepage	www.icasiso.com

4.2 Details of Application

Company Name	Shanghai Xiaoyi Technology Co., Ltd.
Address	6F,Building E,No.2889,Jinke Road,Shanghai,China

4.3 Details of EUT

Product Name	kami Mini camera
Brand Name	kami
Model No.	YYS.2919
FCC ID	2AFIB-YY2919
ISED Number	20436-YWS1029
Mode of Operation	WLAN 802.11b/g/n(HT20/40)
Frequency Range	2400MHz ~ 2483.5MHz
Channel Separation	5 MHz
Modulation Type	DSSS, OFDM
Antenna Type	Internal Antenna
Antenna Gain	2 dBi

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4.4 Test Methodology

47 CFR Part 15, Subpart C (10-1-16 Edition)	Miscellaneous Wireless Communications Services
KDB Publication 558074 D01 v05r02	15.247 Meas Guidance.
KDB Publication 662911 D01 v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band (e.g., MIMO, Smart Antenna, etc)
RSS-Gen (Issue 5, March 2019)	General Requirements for Compliance of Radio Apparatus
RSS-247 (Issue 2, February 2017)	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Note(s):

All test items were verified and recorded according to the standards and without any addition/deviation/exclusion during the test.

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2 Test Condition

4.1 Test Facility

4.2 Environmental conditions

Temperature (°C)	18-25
Humidity (%RH)	40-65
Barometric Pressure (mbar)	960-1060

4.3 Equipment List

Name of Equipment	Manufacturer	Model	Serial No.	Cal. Due Date
Spectrum Analyzer	Keysight	N9020B	MY59260184	2020-07-28
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2020-06-24
EMI Test Receiver	Rohde & Schwarz	ESPI3	100173	2020-06-19
EMI Test Receiver	Rohde & Schwarz	ESR 7	101911	2020-06-19
V-network	SCHWARZBECK	NSLK 8127	8127-902	2021-02-20
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	100687	2020-08-22
Broadband Antenna	SCHWARZBECK	VULB9163	9163-1037	2020-06-06
Horn Antenna-18G	SCHWARZBECK	BBHA9120D	9120D-1775	2020-06-06
Loop Antenna	SCHWARZBECK	FMZB 1513	N/A	2021-03-19
Horn Antenna-40G	YINGLIAN	LB-180400-KF	N/A	2020-07-26
EMC chamber 9*6*6 (L*W*H)	CHANGNING	966	N/A	2020-06-26
Shielded Enclosure 8*5*4 (L*W*H)	CHANGNING	854	N/A	2020-08-28
Test Software	BL	BL410_E	N/A	N/A

4.4 Measurement Uncertainty

Parameter	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	± 1.5 dB
	> 1GHz	± 1.5 dB
Radiated Emission	30 MHz – 1 GHz	± 3 dB
	> 1GHz	± 3 dB

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3 Test Set-up and Operation Modes

4.1 Details of Test Mode

Using test software was control EUT work in continuous transmitter and receiver mode. Select test channel as below:

For 802.11b/g/n (HT20)

Channel	Frequency
The lowest channel(CH1)	2412MHz
The middle channel(CH6)	2437MHz
The Highest channel(CH11)	2462MHz

For 802.11n(HT40)

Channel	Frequency
The lowest channel(CH3)	2422MHz
The middle channel(CH6)	2437MHz
The Highest channel(CH9)	2452MHz

Through Pre-scan under all rate at lowest channel, the data rate as below table described is the worst case, so we choose these data rate for test.

Type	Data rate
802.11b	5.5Mbps
802.11g	48Mbps
802.11n(20M)	MCS5
802.11n(40M)	MCS5

The basic operation modes are:

- A. On
 - 1. WLAN mode
 - a. Transmitting
 - i. Low Channel
 - ii. Middle Channel
 - iii. High Channel
 - b. Receiving
- B. Standby
- C. Off

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4.2 Special Accessories and Auxiliary Equipment

Description	Manufacturer	Model No.	Serial No.
N/A	N/A	N/A	N/A

4.3 Support Software

Description	Manufacturer	Software Name
N/A	N/A	putty.exe

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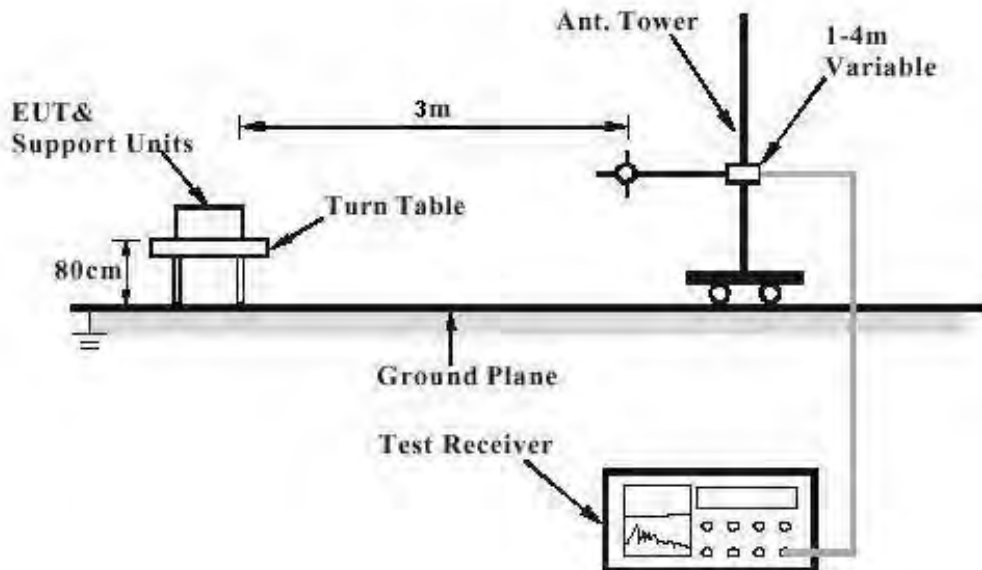
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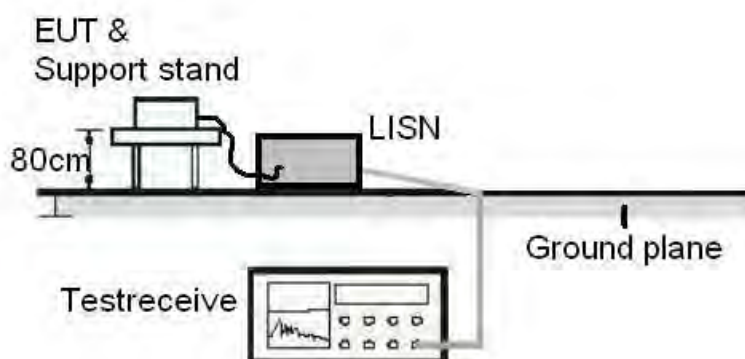
4.4 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Conduction Measurement



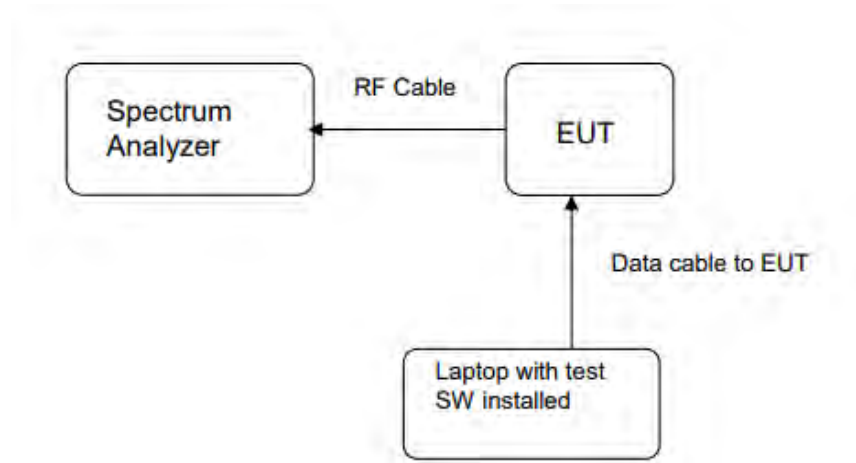
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Diagram of Measurement Equipment Configuration for Transmitter Measurement



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4 Test Results

4.1 Transmitter Requirement & Test Suites

4.1.1 Antenna Requirement

RESULT:

PASS

Test standard : FCC Part 15.247(b)(4), Part 15.203
RSS-247 5.4(6)

Requirement : The use of approved antennas only with directional
gains that do not exceed 6 dBi

According to the manufacturer declaration, the EUT has an antenna with a directional gain of **2** dBi. The antenna is an internal antenna with no possibility of replacement with a non-approved antenna by the end-user.

Therefore, the EUT is considered to comply with this provision.

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4.1.2 Peak Output Power and E.I.R.P

RESULT:

PASS

Test standard : FCC Part 15.247(b)(3)
RSS-247 5.4(4)
Requirement : ANSI C63.10-2013, KDB 558074
Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 52%

Table 1: Peak Output Power

Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(mW)	
802.11b	2412	7.33	5.41	< 1
	2437	8.77	7.53	
	2462	9.55	9.02	
802.11g	2412	11.10	12.88	
	2437	13.05	20.18	
	2462	13.43	22.03	
802.11n(HT20)	2412	11.07	12.79	
	2437	13.03	20.09	
	2462	13.77	23.82	
802.11n(HT40)	2422	12.31	17.02	
	2437	13.47	22.23	
	2452	13.70	23.44	

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Table 2: E.I.R.P

Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(mW)	
802.11b	2412	9.33	8.57	< 4
	2437	10.77	11.94	
	2462	11.55	14.29	
802.11g	2412	13.1	20.42	
	2437	15.05	31.99	
	2462	15.43	34.91	
802.11n(HT20)	2412	13.07	20.28	
	2437	15.03	31.84	
	2462	15.77	37.76	
802.11n(HT40)	2422	14.31	26.98	
	2437	15.47	35.24	
	2452	15.7	37.15	

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4.1.3 6dB Bandwidth and 99% Bandwidth

RESULT:

PASS

Test standard : FCC Part 15.247(a)(2)
RSS-247 5.2(1)
RSS-Gen 6.6
Requirement : ANSI C63.10-2013, KDB 558074
Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 52%

Table 3: 6dB Bandwidth and 99% Bandwidth

Test Mode	Test Channel (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limit (MHz)
802.11b	2412	7.12	13.34	>0.5
	2437	7.09	13.23	
	2462	8.11	13.27	
802.11g	2412	16.44	16.46	
	2437	16.46	16.51	
	2462	16.39	16.59	
802.11n(HT20)	2412	17.30	17.59	
	2437	17.49	17.70	
	2462	17.63	17.58	
802.11n(HT40)	2422	35.45	35.96	
	2437	35.67	36.26	
	2452	35.55	36.28	

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802.11b_20M_L_fcc

Center Frequency (MHz)	OBW Power (%)	XdB Down	RBW (MHz)	Detector	Limit (MHz)	OBW (MHz)	XdB BandWidth (MHz)	Verdict
2412	99.00	6	0.1	Peak	26	13.336214	7.117445	Pass



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802.11b_20M_M_fcc

Center Frequency (MHz)	OBW Power (%)	XdB Down	RBW (MHz)	Detector	Limit (MHz)	OBW (MHz)	XdB BandWidth (MHz)	Verdict
2437	99.00	6	0.1	Peak	26	13.22756	7.093402	Pass



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802.11b_20M_H_fcc

Center Frequency (MHz)	OBW Power (%)	XdB Down	RBW (MHz)	Detector	Limit (MHz)	OBW (MHz)	XdB BandWidth (MHz)	Verdict
2462	99.00	6	0.1	Peak	26	13.270625	8.108602	Pass



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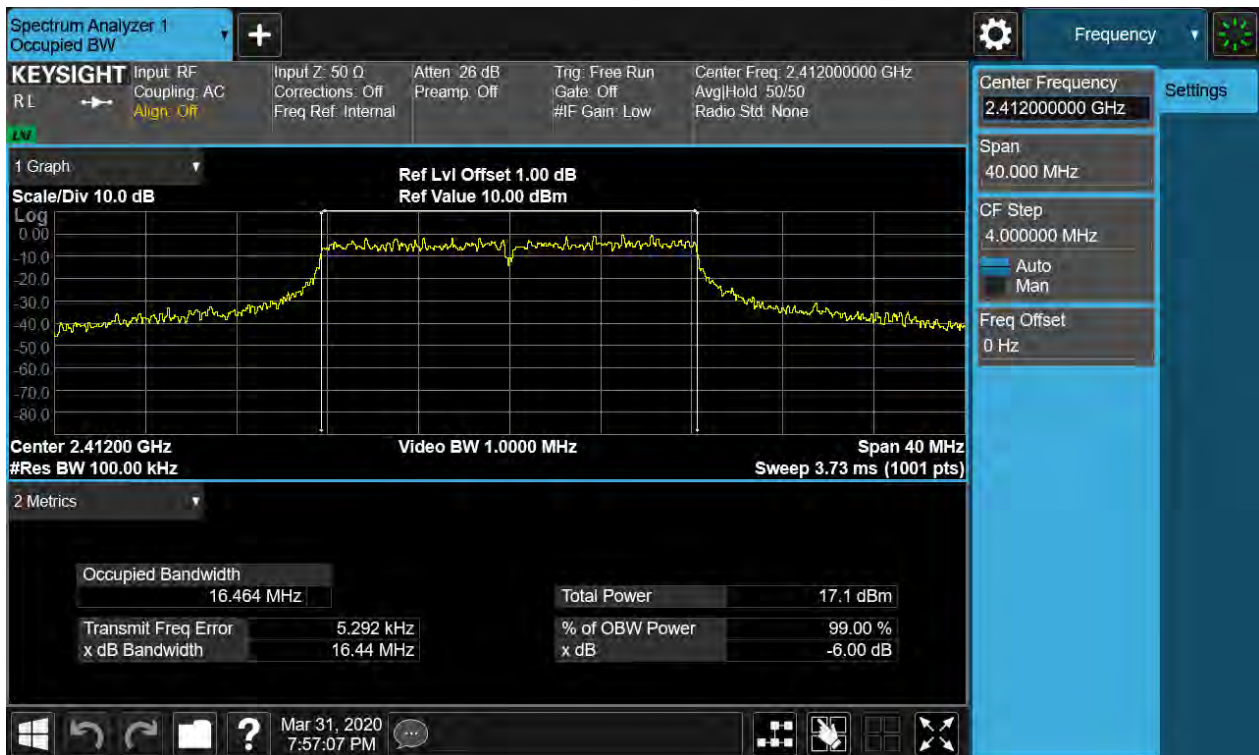
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Center Frequency (MHz)	OBW Power (%)	XdB Down	RBW (MHz)	Detector	Limit (MHz)	OBW (MHz)	XdB BandWidth (MHz)	Verdict
2412	99.00	6	0.1	Peak	26	16.463713	16.44184	Pass



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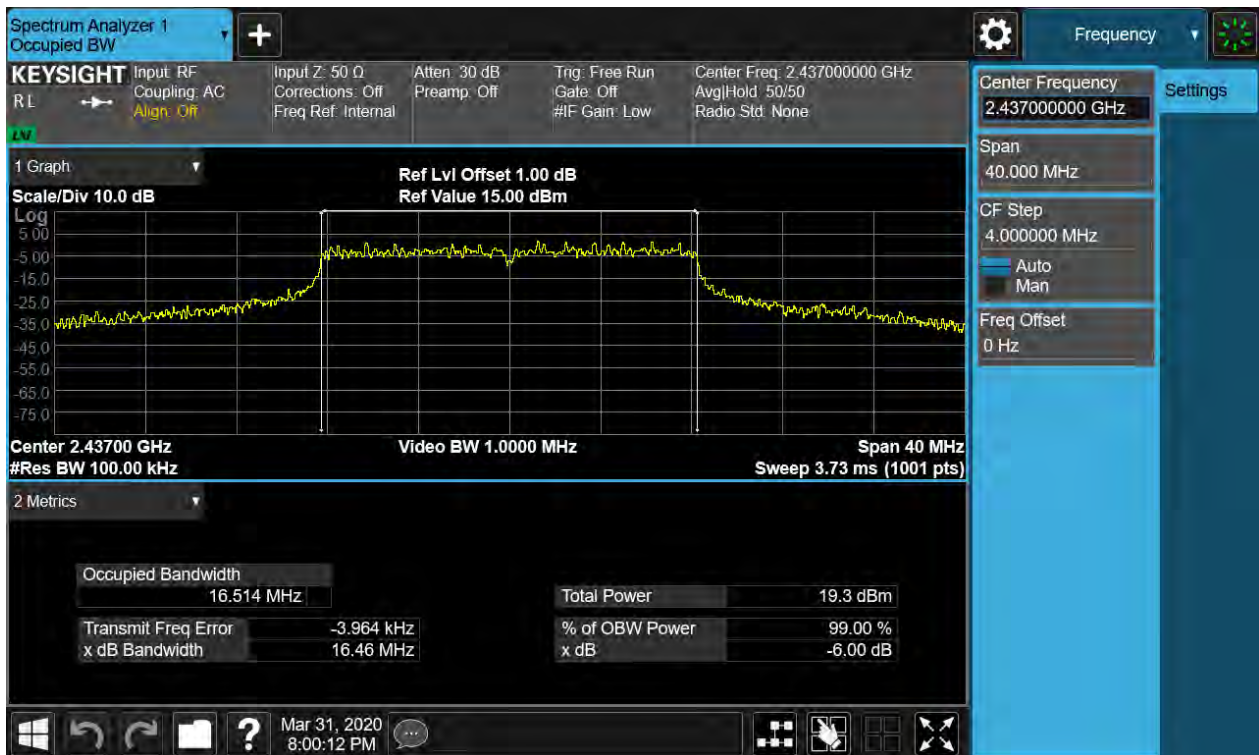
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802.11g_20M_M_fcc

Center Frequency (MHz)	OBW Power (%)	XdB Down	RBW (MHz)	Detector	Limit (MHz)	OBW (MHz)	XdB BandWidth (MHz)	Verdict
2437	99.00	6	0.1	Peak	26	16.513671	16.463523	Pass



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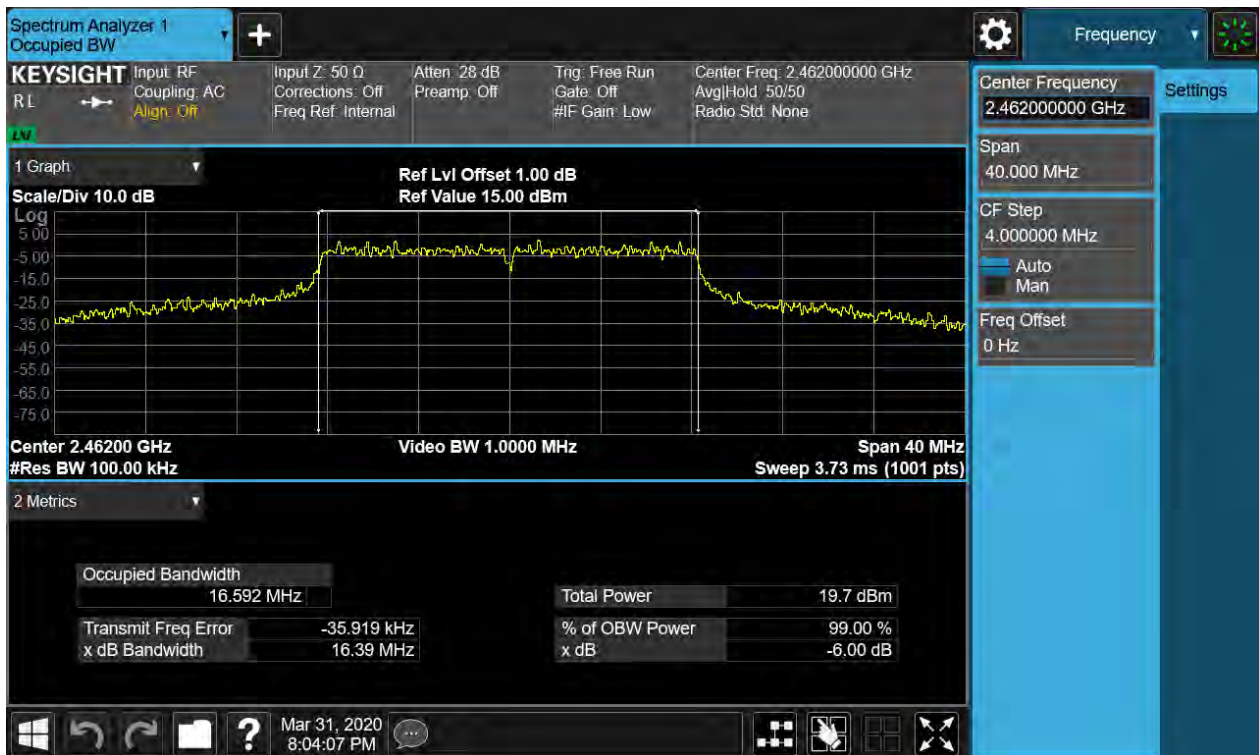
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Center Frequency (MHz)	OBW Power (%)	XdB Down	RBW (MHz)	Detector	Limit (MHz)	OBW (MHz)	XdB BandWidth (MHz)	Verdict
2462	99.00	6	0.1	Peak	26	16.591846	16.393392	Pass



TEST REPORT

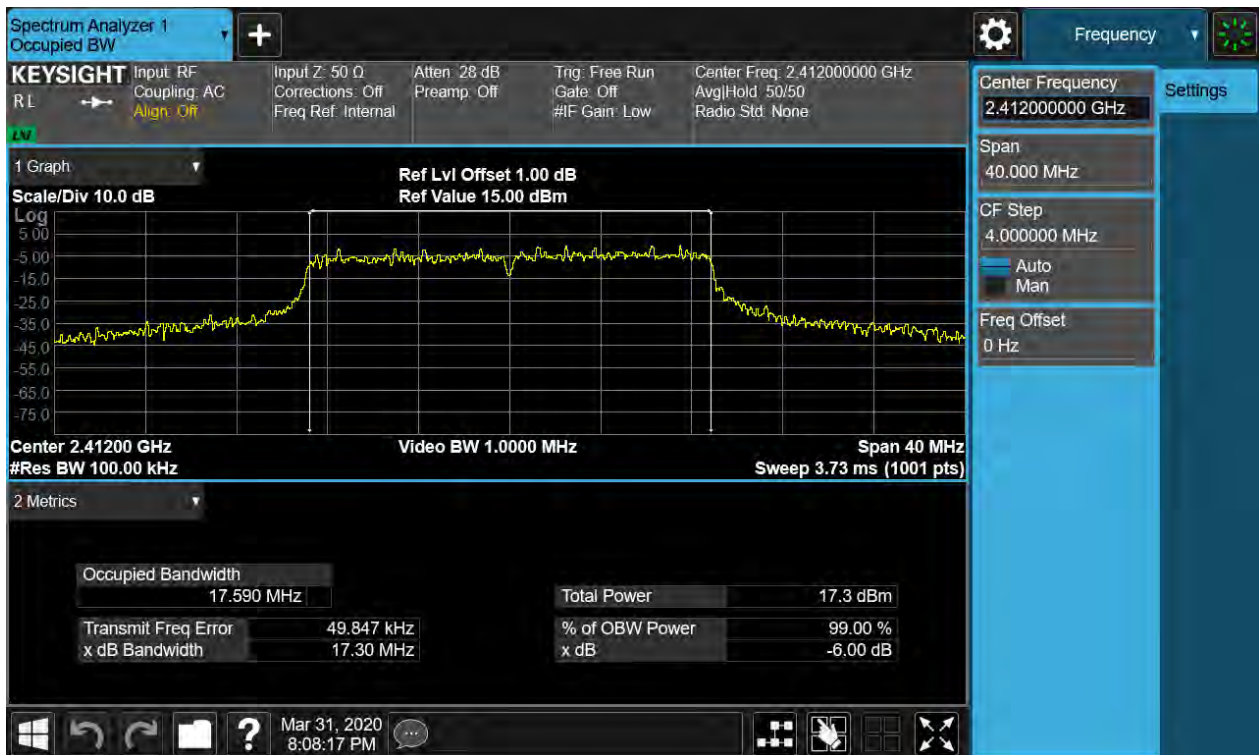
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802.11n_20M_L_fcc

Center Frequency (MHz)	OBW Power (%)	XdB Down	RBW (MHz)	Detector	Limit (MHz)	OBW (MHz)	XdB BandWidth (MHz)	Verdict
2412	99.00	6	0.1	Peak	26	17.590461	17.301919	Pass



TEST REPORT

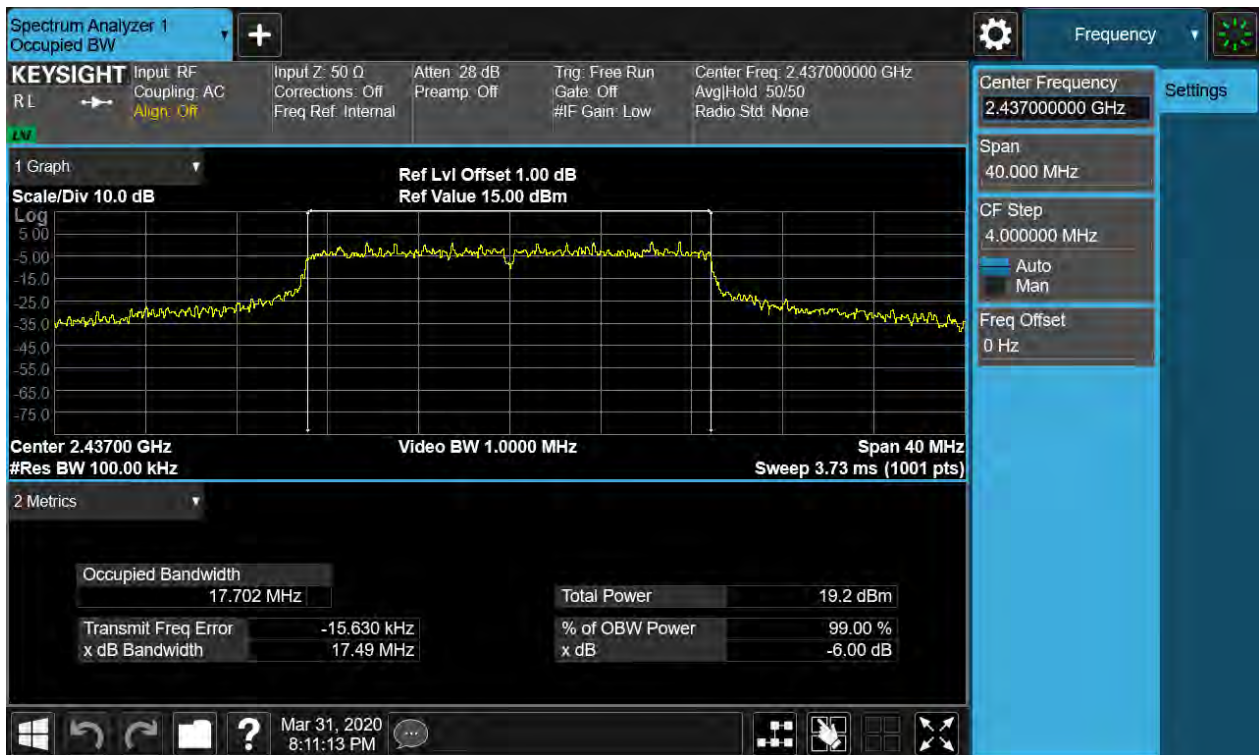
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802.11n_20M_M_fcc

Center Frequency (MHz)	OBW Power (%)	XdB Down	RBW (MHz)	Detector	Limit (MHz)	OBW (MHz)	XdB BandWidth (MHz)	Verdict
2437	99.00	6	0.1	Peak	26	17.702484	17.489309	Pass



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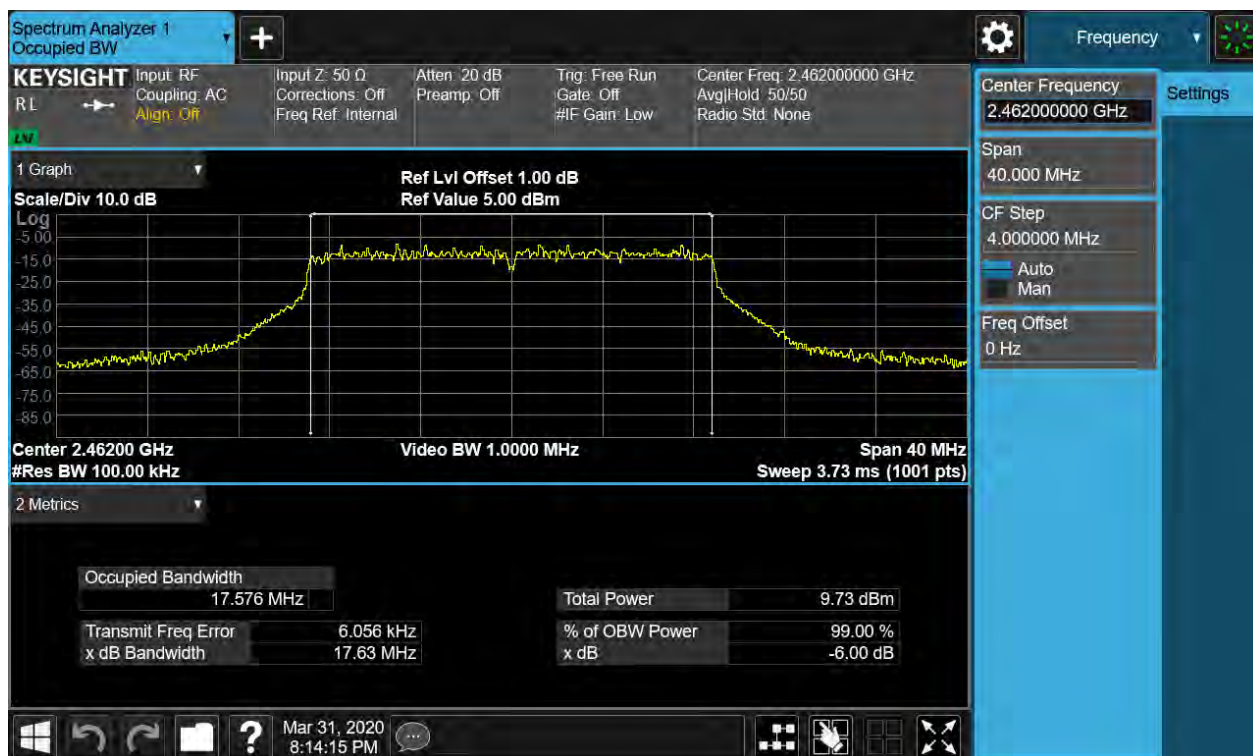
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802.11n_20M_H_fcc

Center Frequency (MHz)	OBW Power (%)	XdB Down	RBW (MHz)	Detector	Limit (MHz)	OBW (MHz)	XdB BandWidth (MHz)	Verdict
2462	99.00	6	0.1	Peak	26	17.575766	17.627129	Pass



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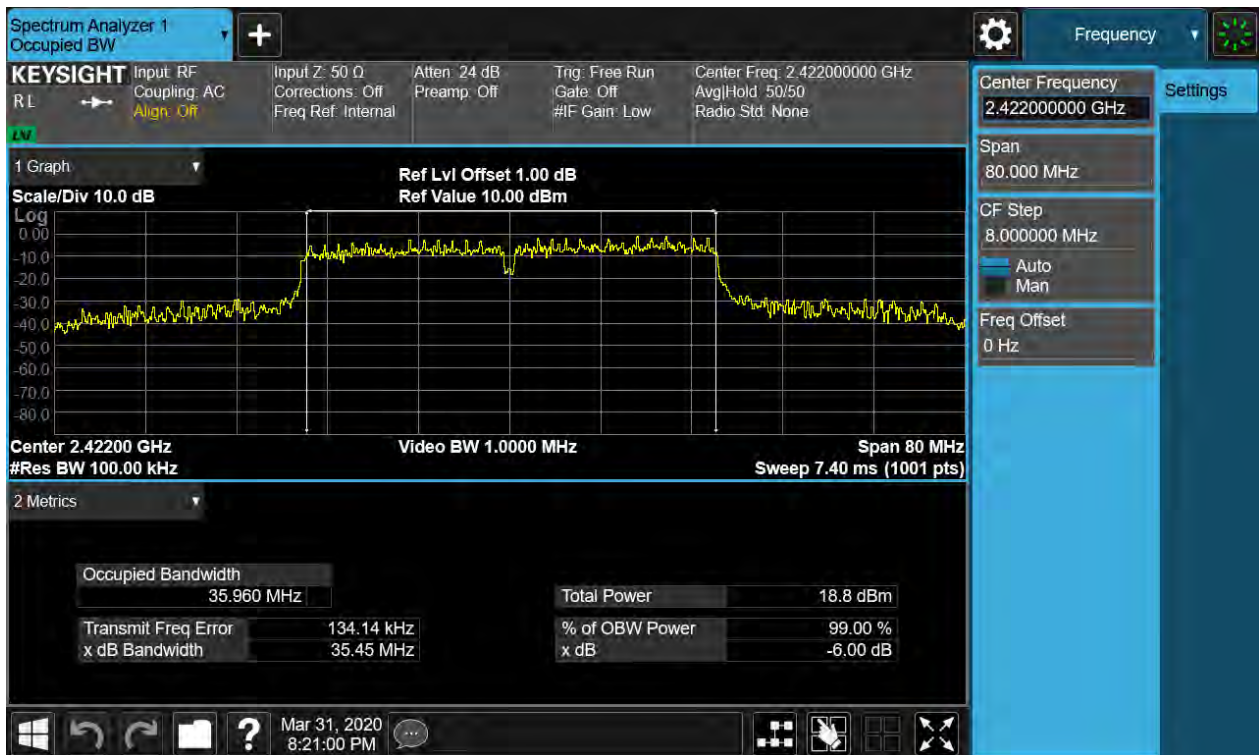
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802.11n_40M_L_fcc

Center Frequency (MHz)	OBW Power (%)	XdB Down	RBW (MHz)	Detector	Limit (MHz)	OBW (MHz)	XdB BandWidth (MHz)	Verdict
2422	99.00	6	0.1	Peak	46	35.959543	35.452281	Pass



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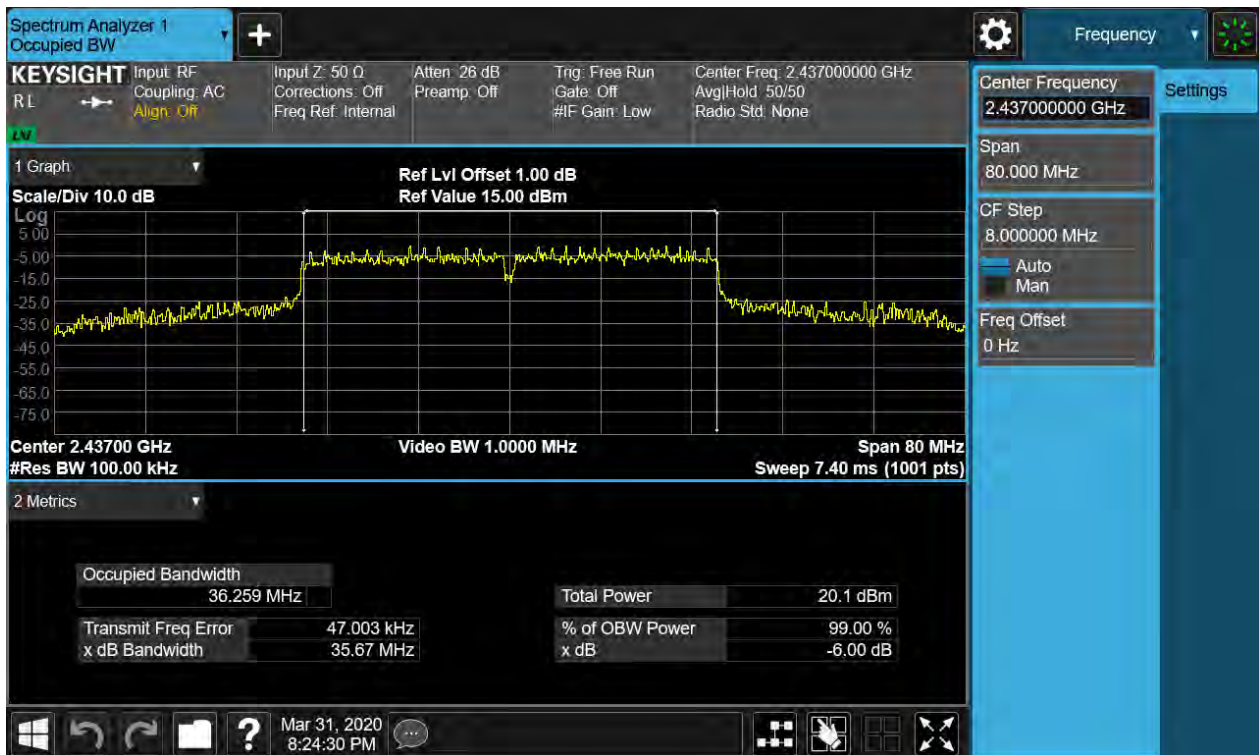
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802.11n_40M_M_fcc

Center Frequency (MHz)	OBW Power (%)	XdB Down	RBW (MHz)	Detector	Limit (MHz)	OBW (MHz)	XdB BandWidth (MHz)	Verdict
2437	99.00	6	0.1	Peak	46	36.258718	35.669913	Pass



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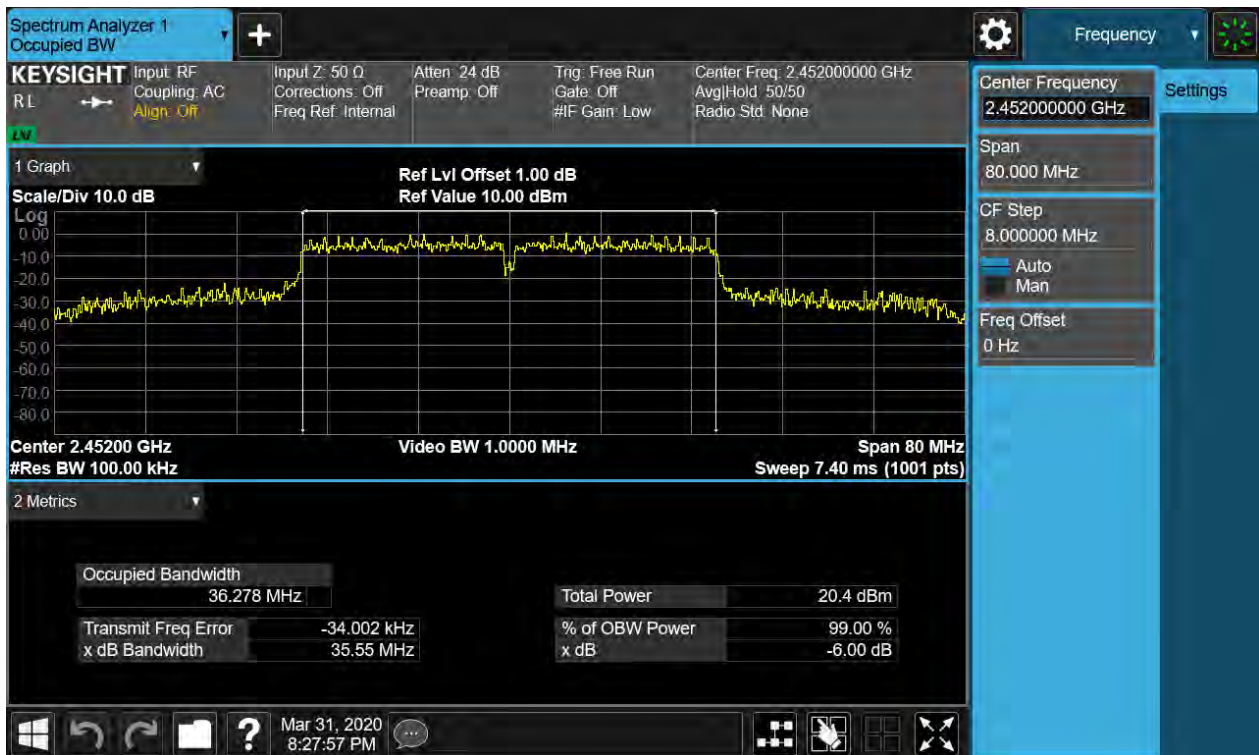
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802.11n_40M_H_fcc

Center Frequency (MHz)	OBW Power (%)	XdB Down	RBW (MHz)	Detector	Limit (MHz)	OBW (MHz)	XdB BandWidth (MHz)	Verdict
2452	99.00	6	0.1	Peak	46	36.278416	35.554659	Pass



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4.1.4 Power Spectral Density

RESULT:

PASS

Test standard : FCC Part 15.247(e)
RSS-247 5.2(2)
Requirement : ANSI C63.10-2013, KDB 558074
Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 52%

Table 4: Power Spectral Density

Test Mode	Test Channel (MHz)	Measured Result (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	2412	-19.74	8
	2437	-18.41	
	2462	-17.25	
802.11g	2412	-16.58	
	2437	-14.31	
	2462	-14.22	
802.11n(HT20)	2412	-16.14	
	2437	-14.82	
	2462	-13.66	
802.11n(HT40)	2422	-17.29	
	2437	-16.60	
	2452	-16.89	

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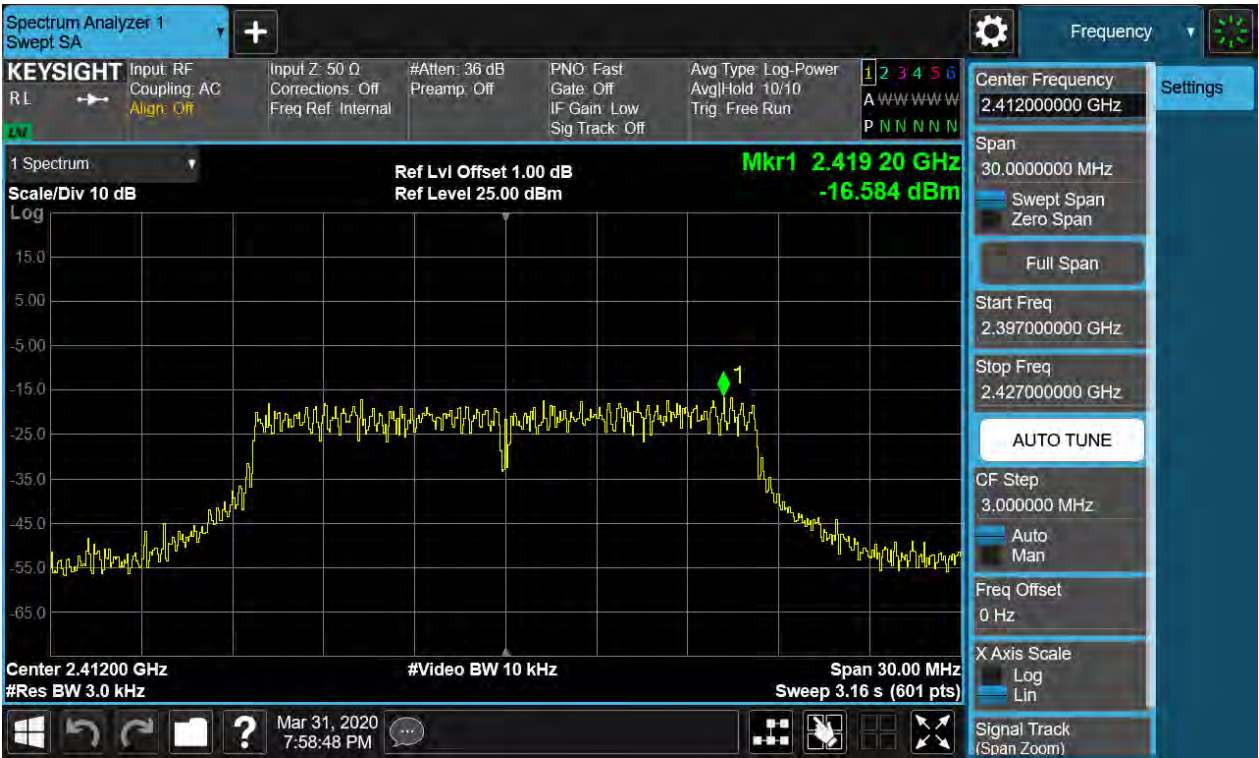
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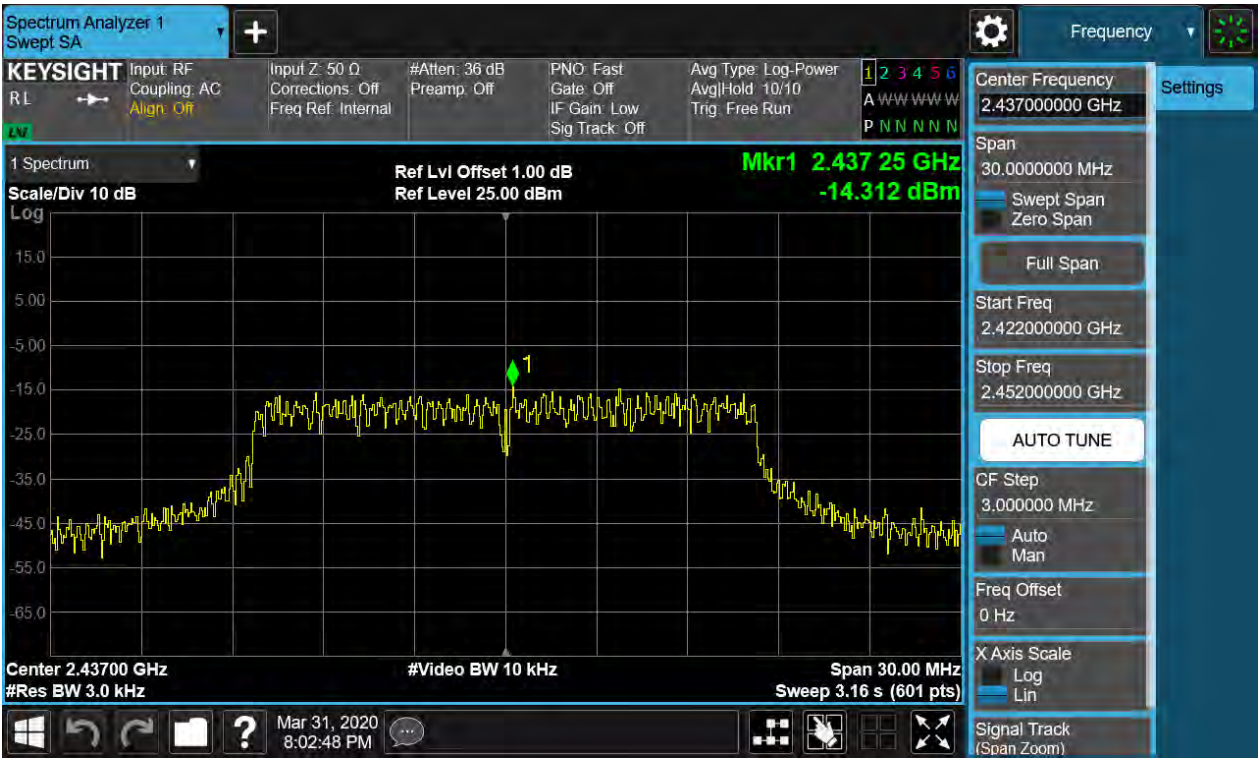
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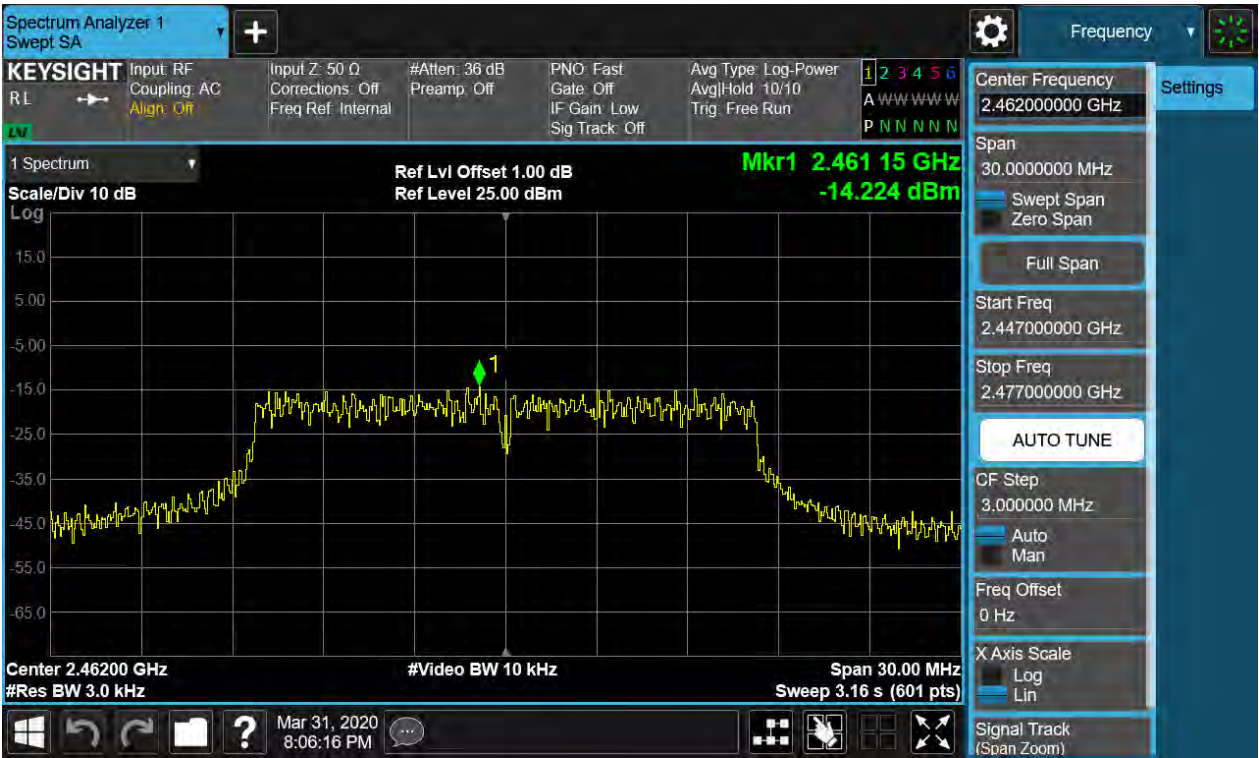
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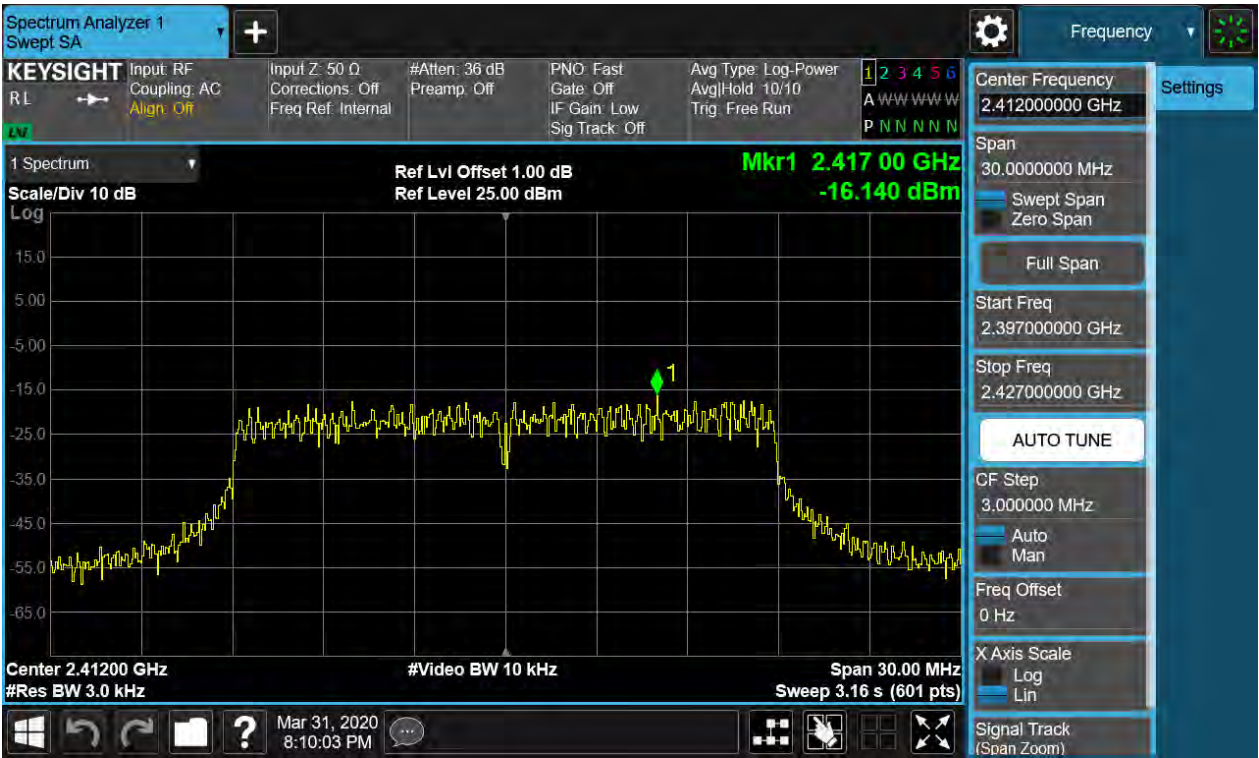
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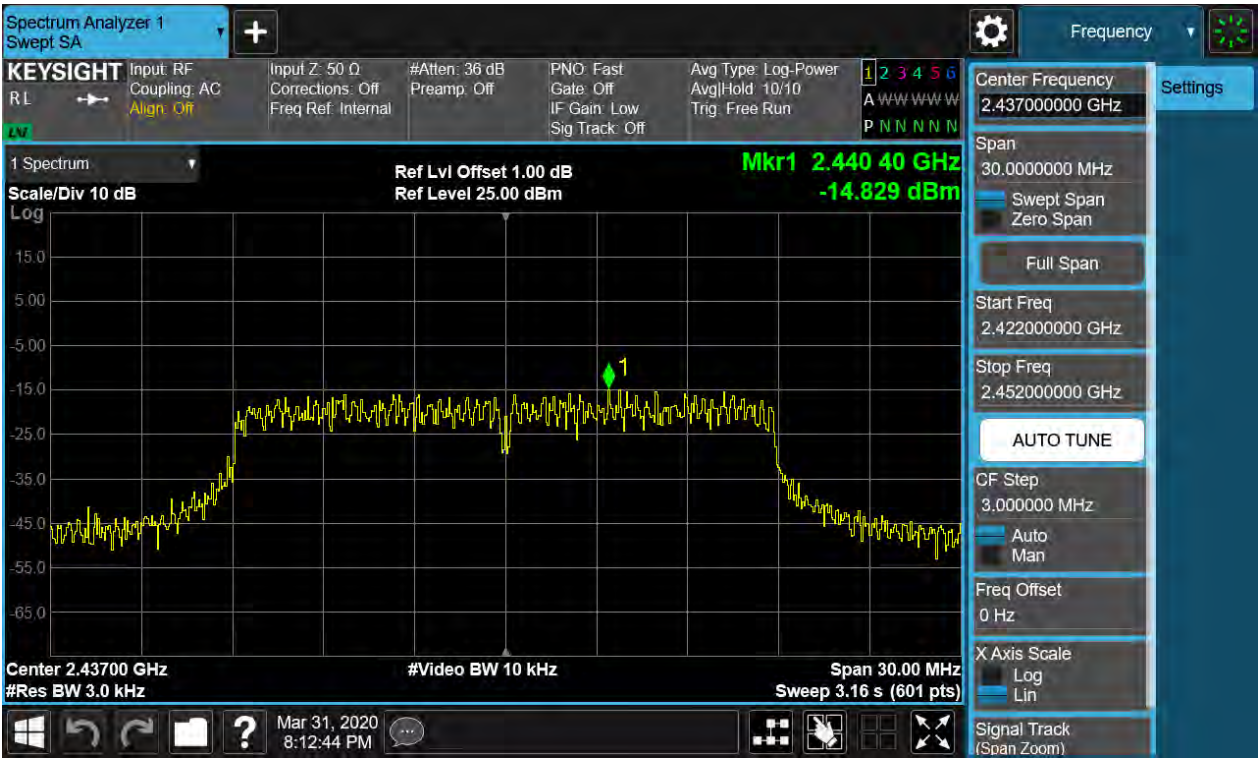
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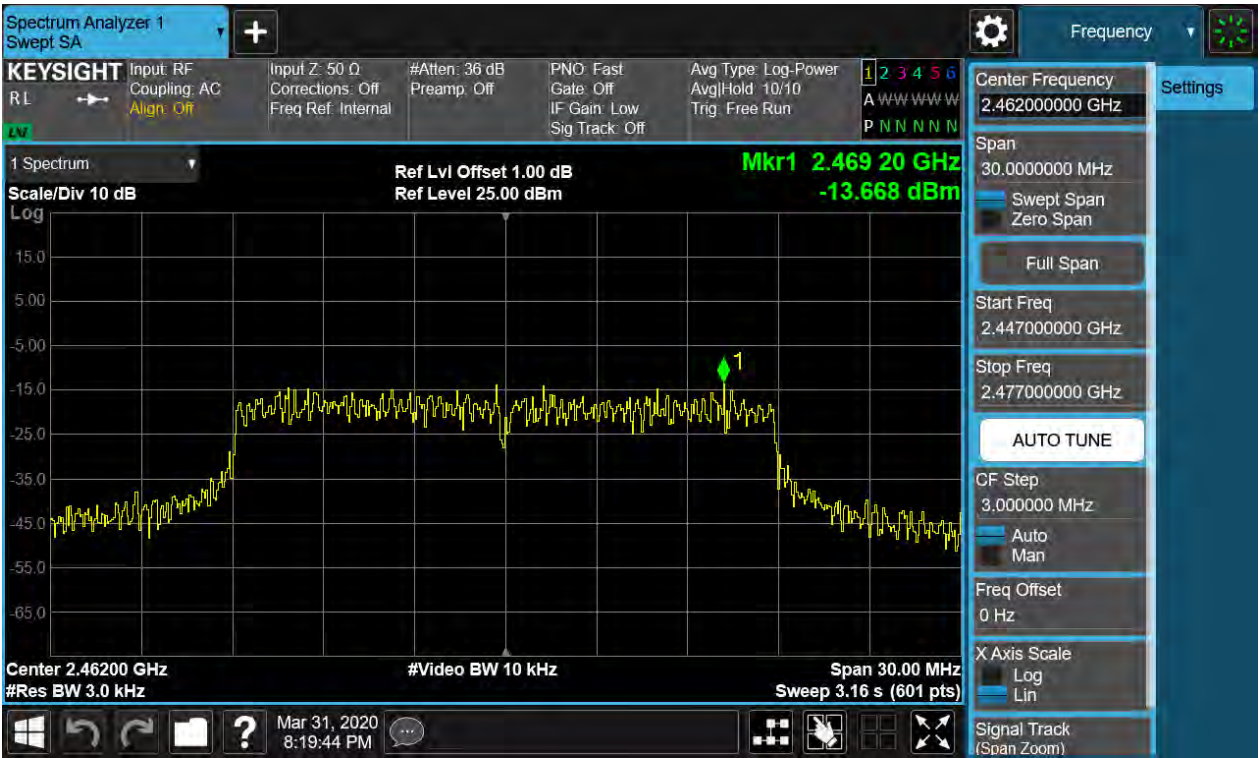
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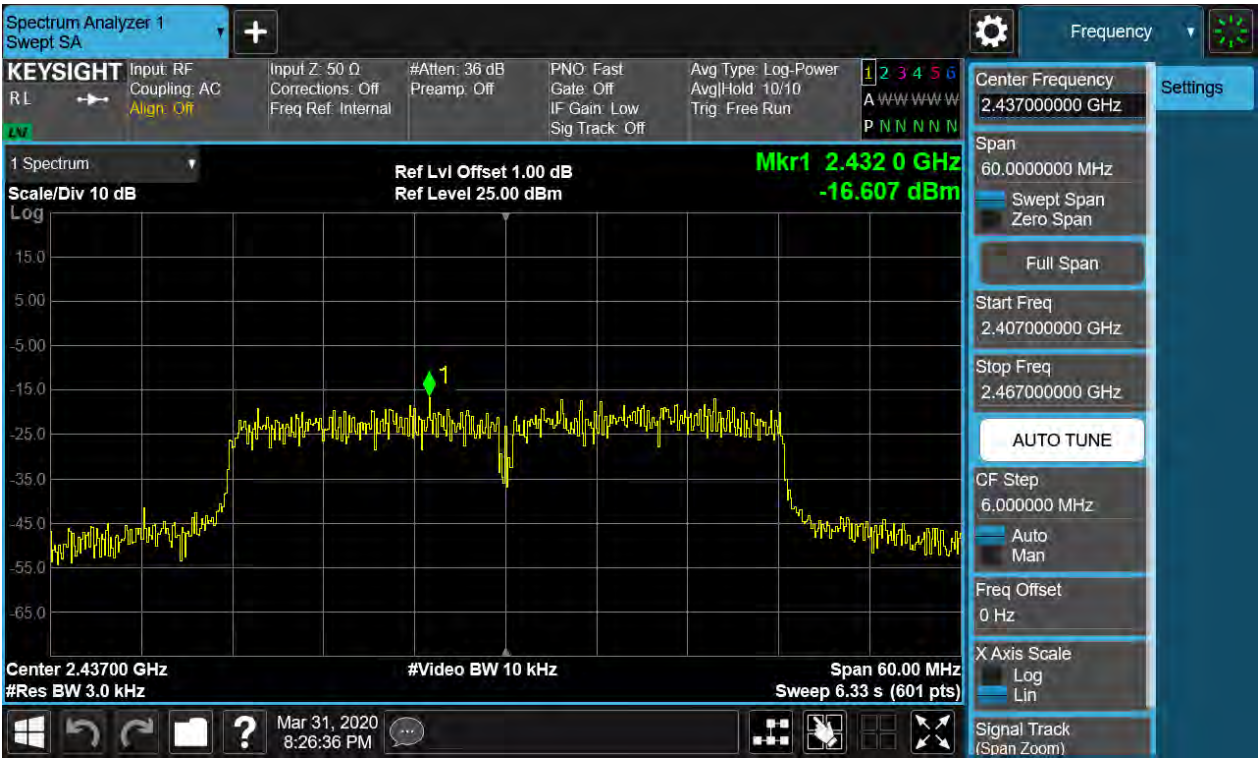
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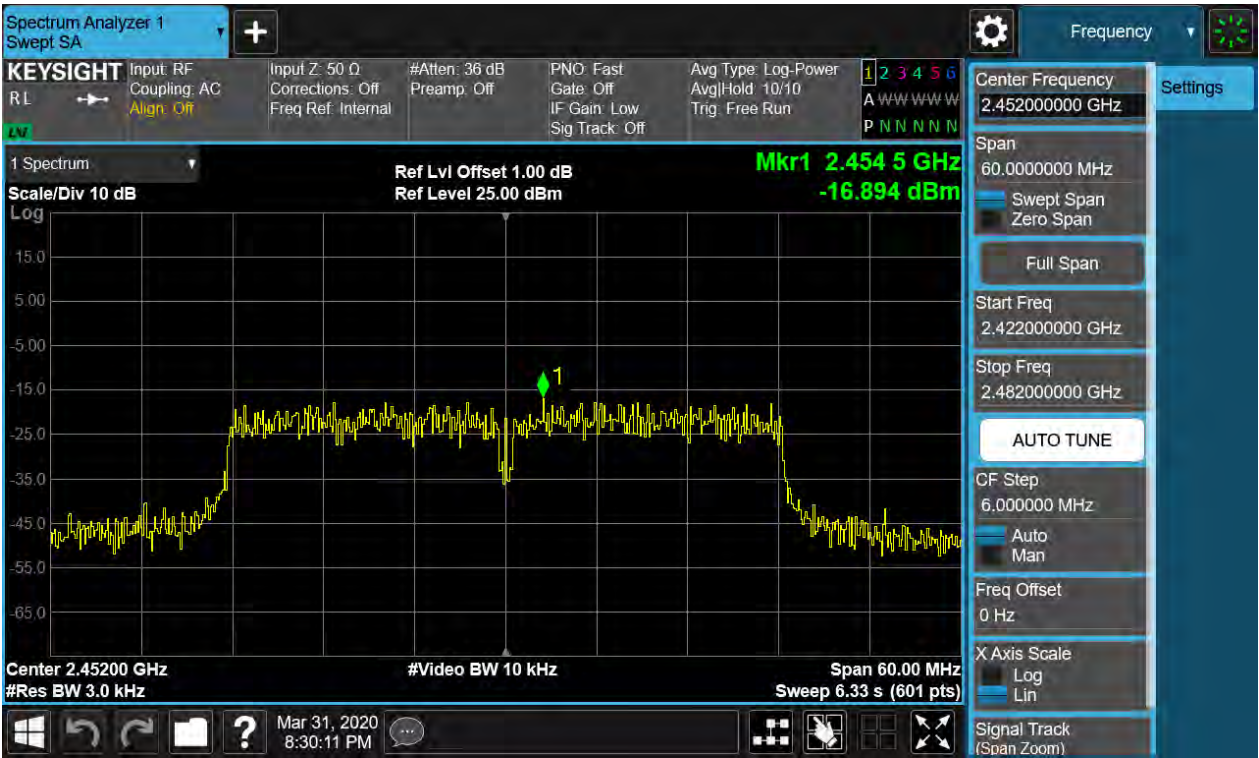
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4.1.5 Conducted Spurious Emission & Authorized-band band-edge

RESULT:

PASS

Test standard	: FCC Part 15.247(d), 15.209 RSS-247 5.5 RSS-Gen 8.9
Requirement	: ANSI C63.10-2013, KDB 558074
Kind of test site	: Shielded room

Test setup

Test Channel	: Low/Middle/High for spurious, Low/High for Band Edge
Operation Mode	: A.1.a
Ambient temperature	: 25°C
Relative humidity	: 52%

For details refer to following test plot.

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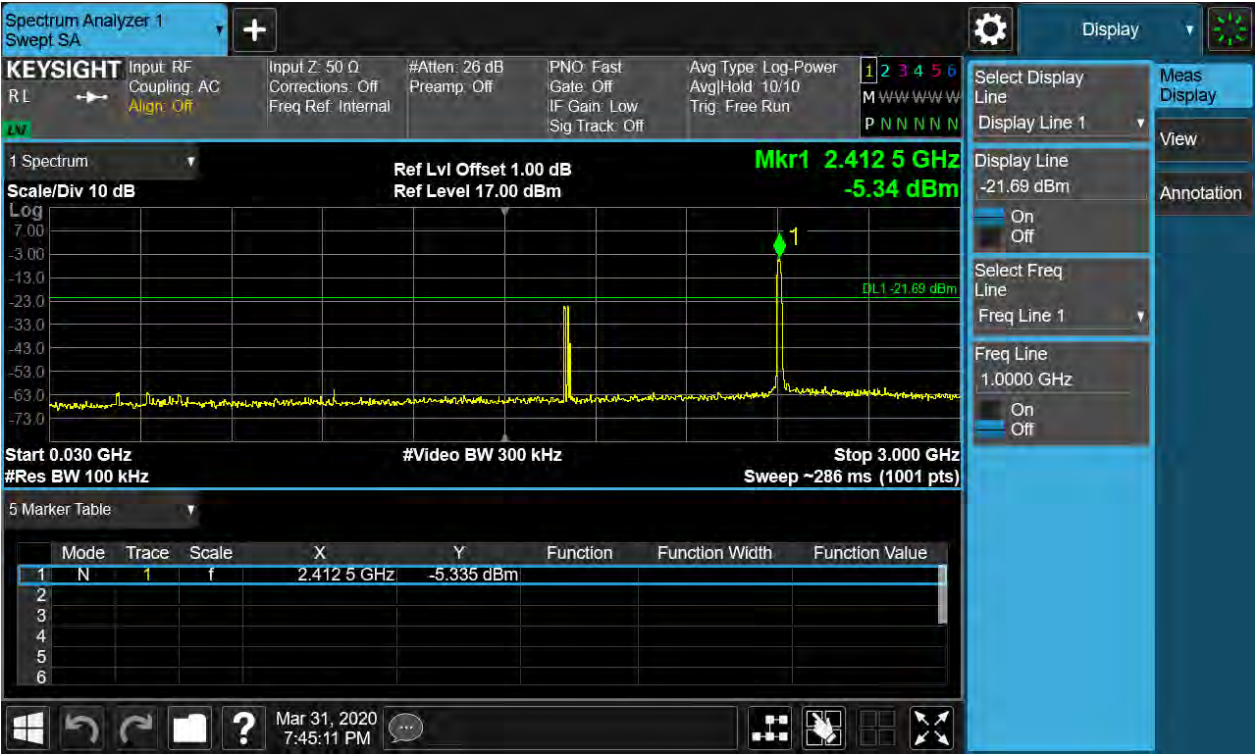


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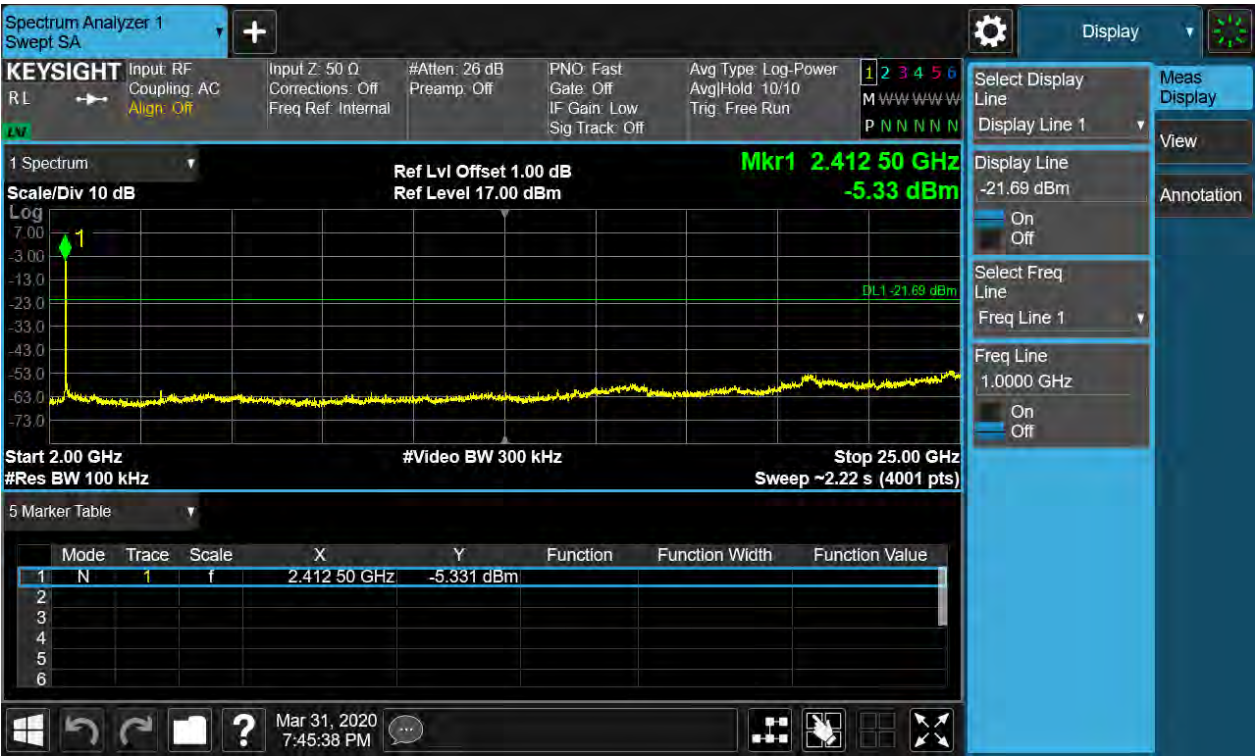


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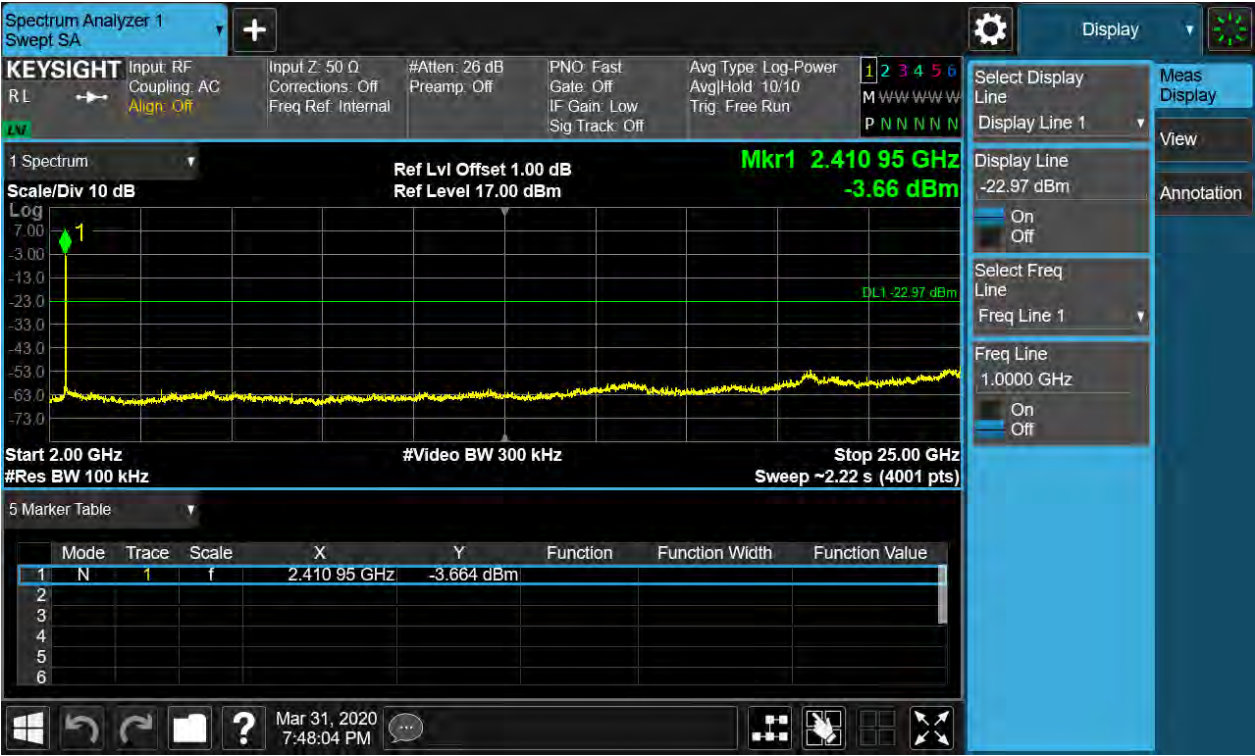


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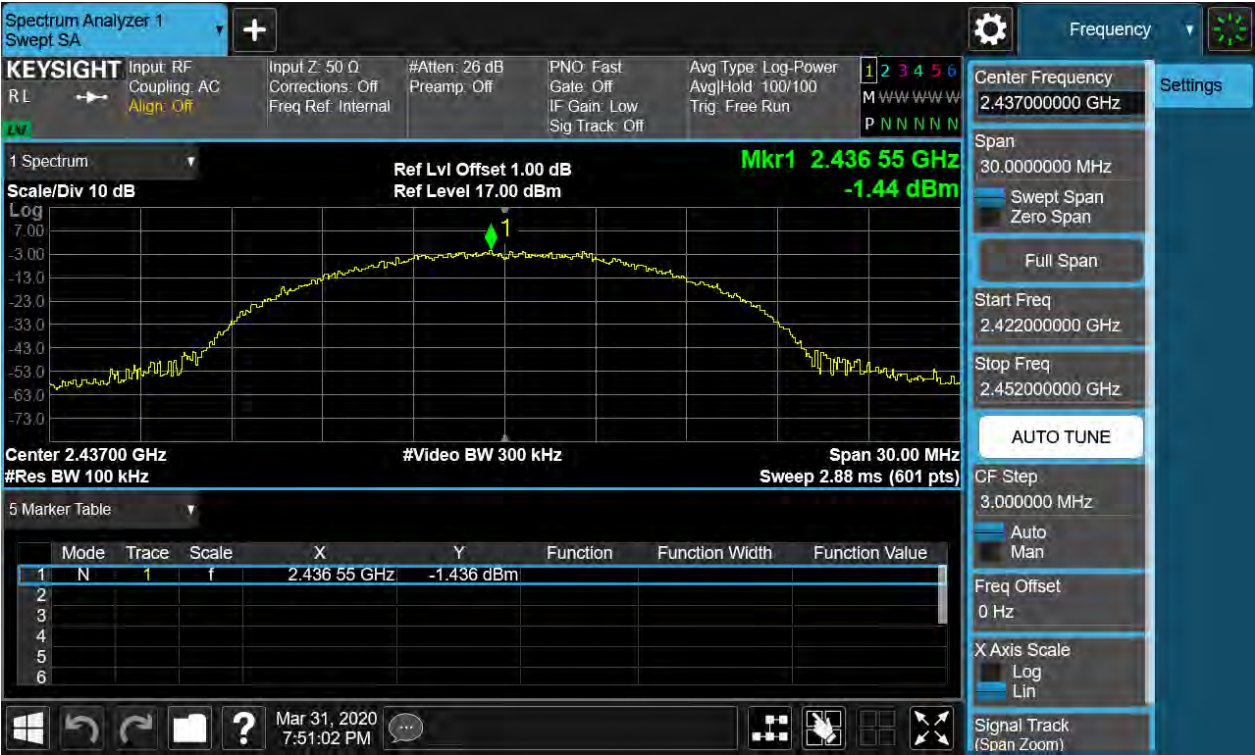
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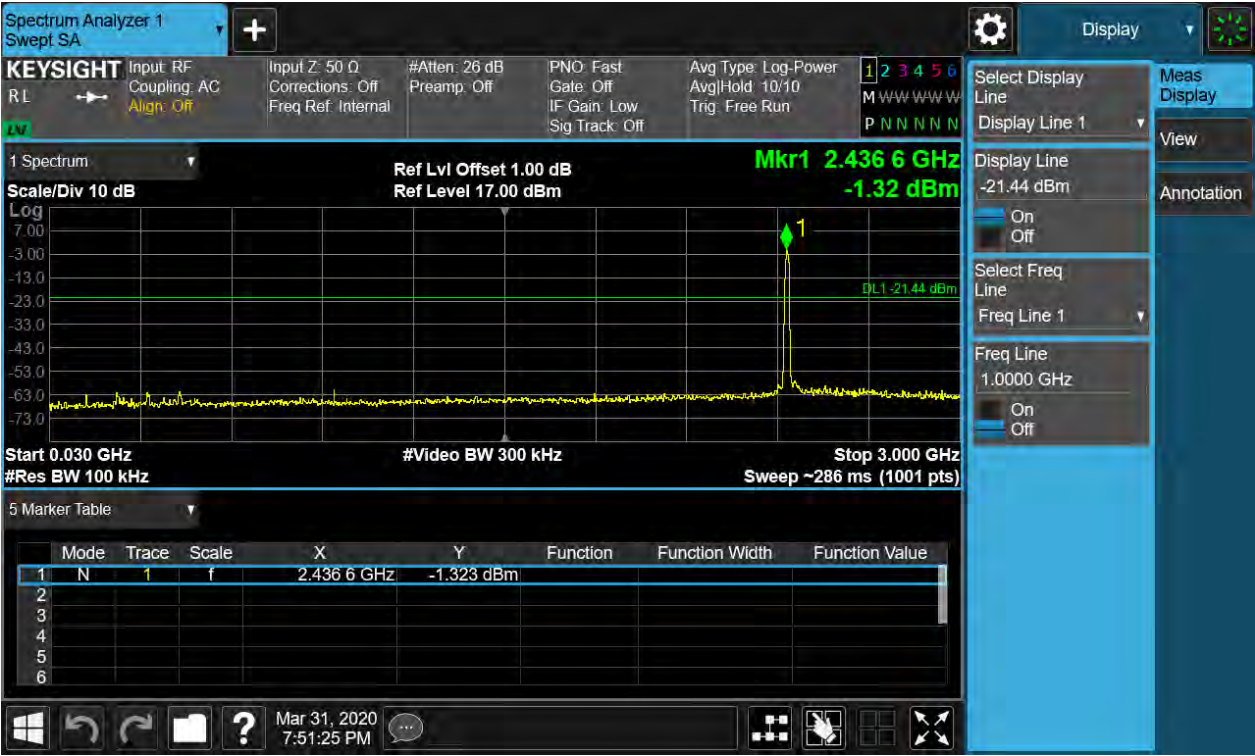


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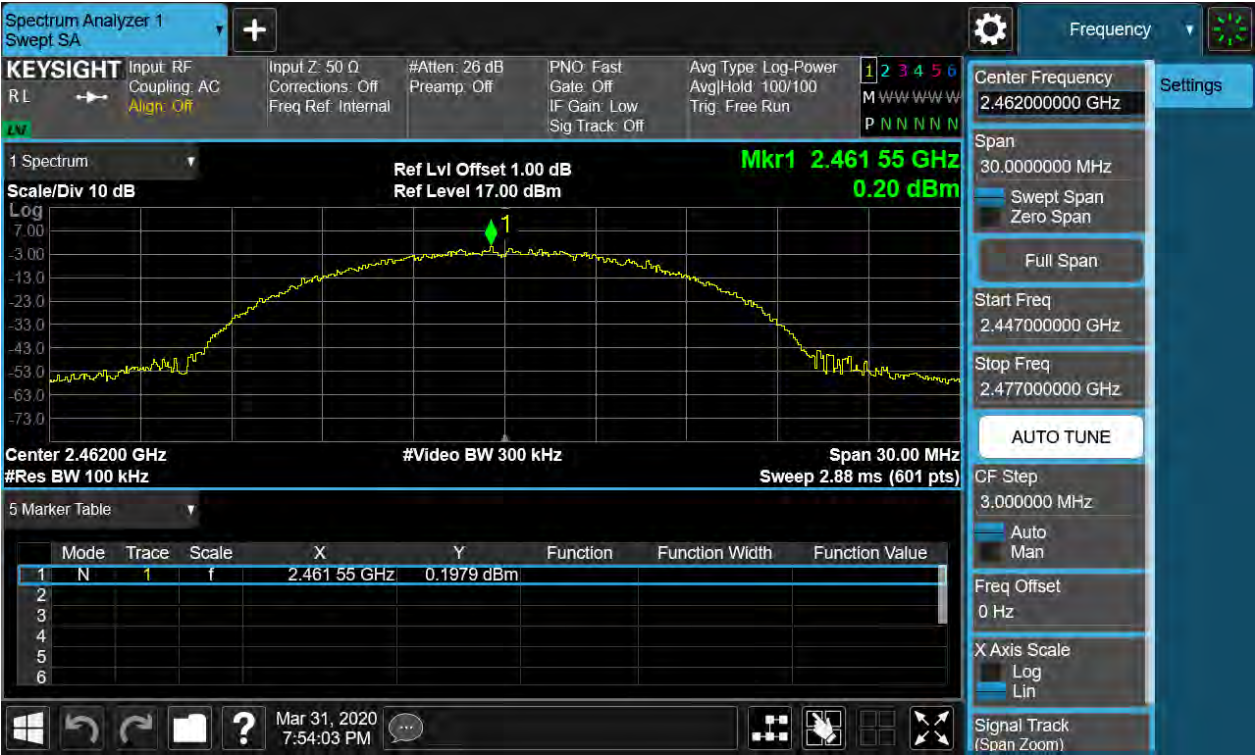
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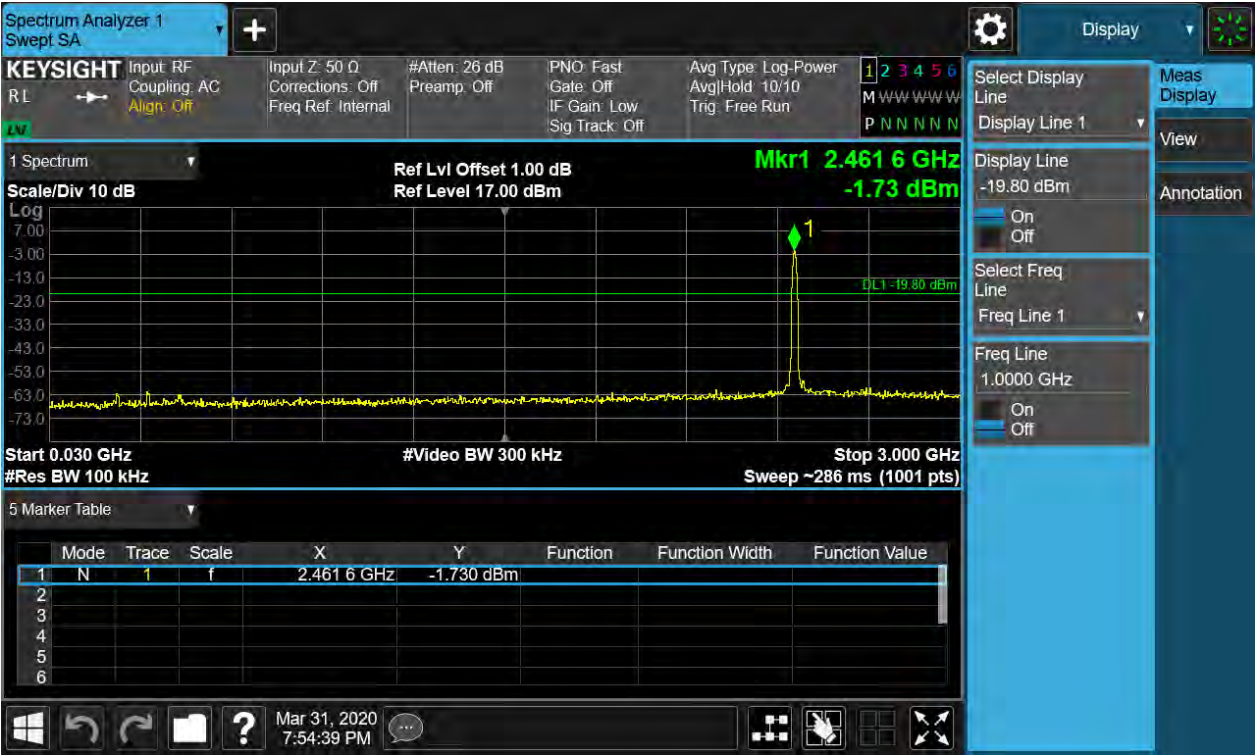


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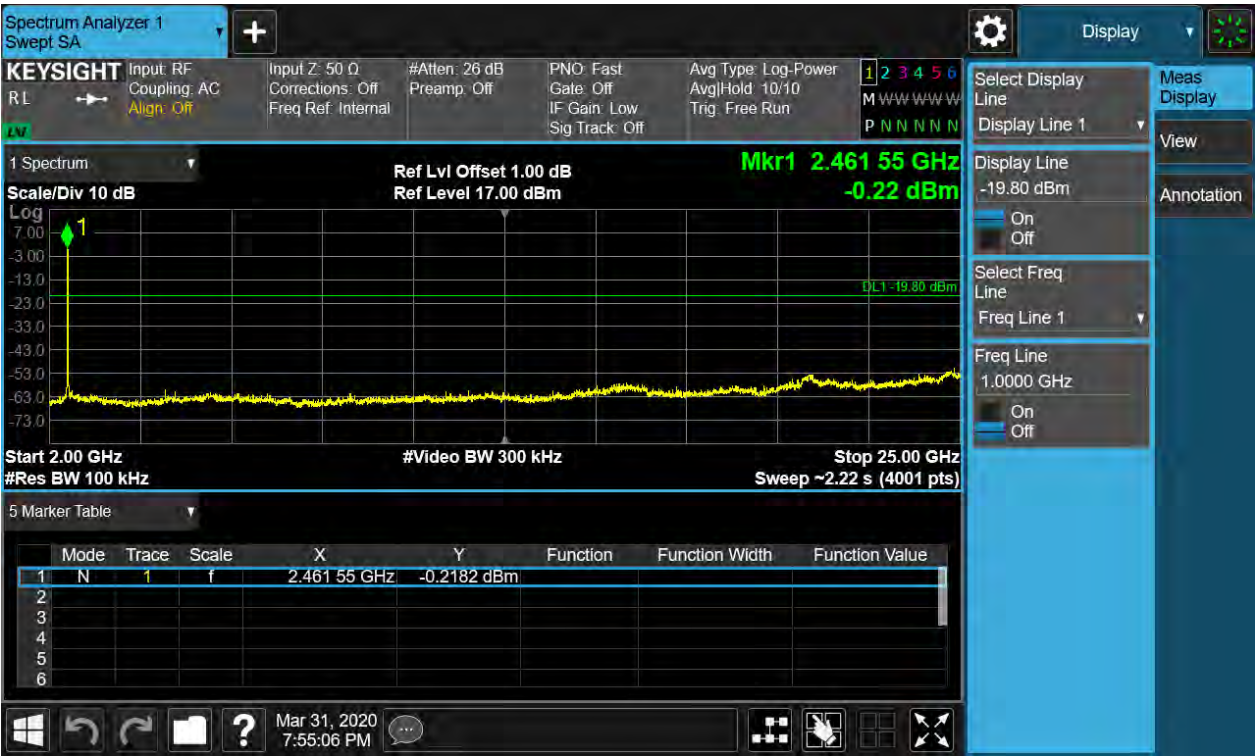


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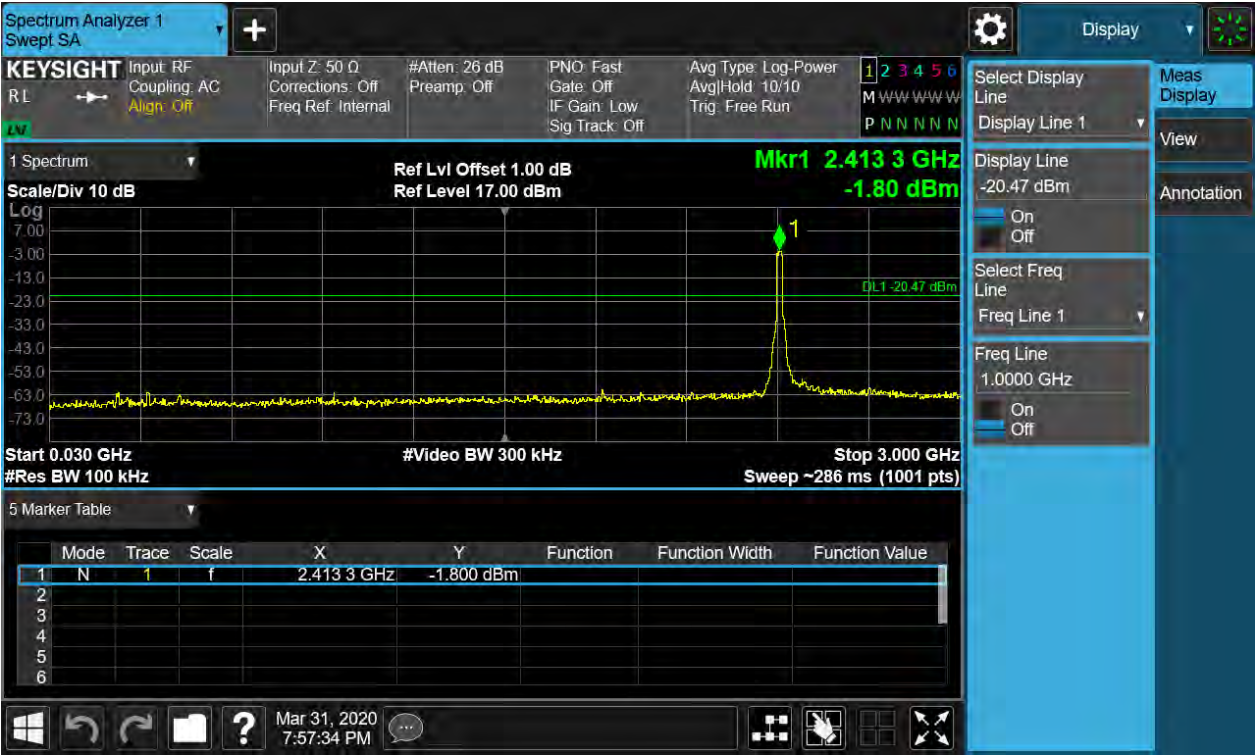


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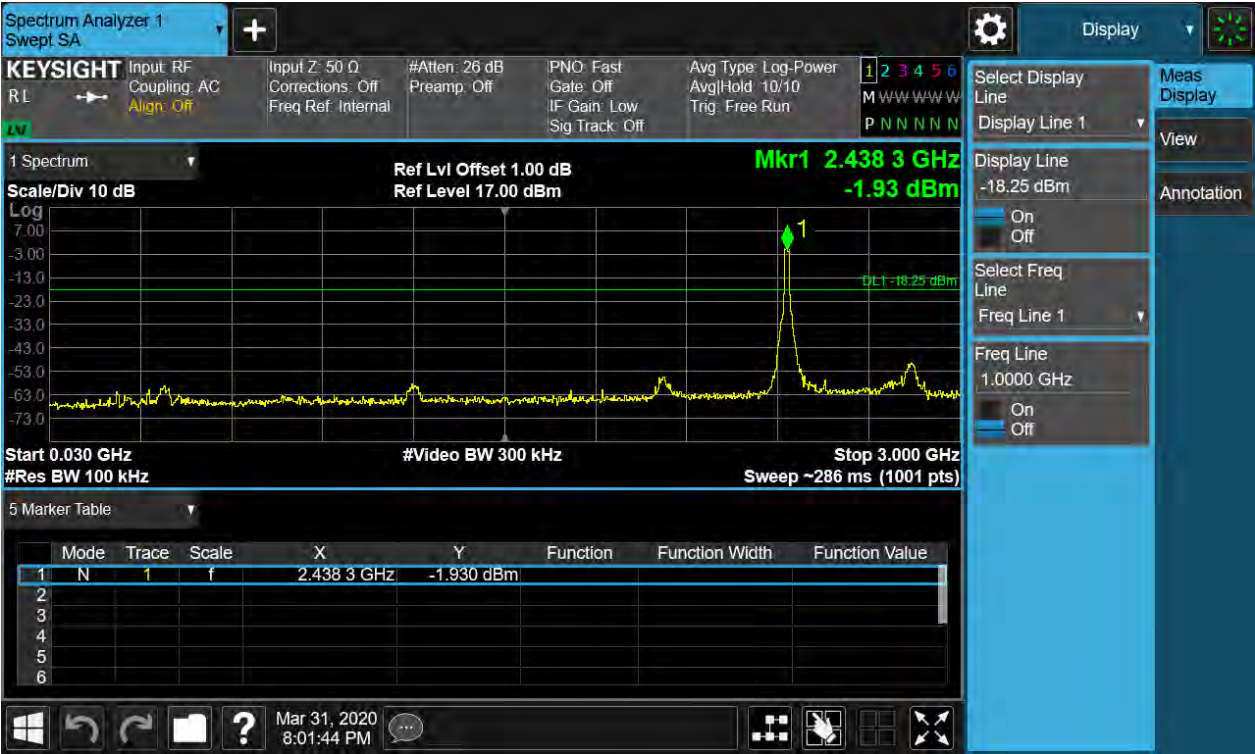


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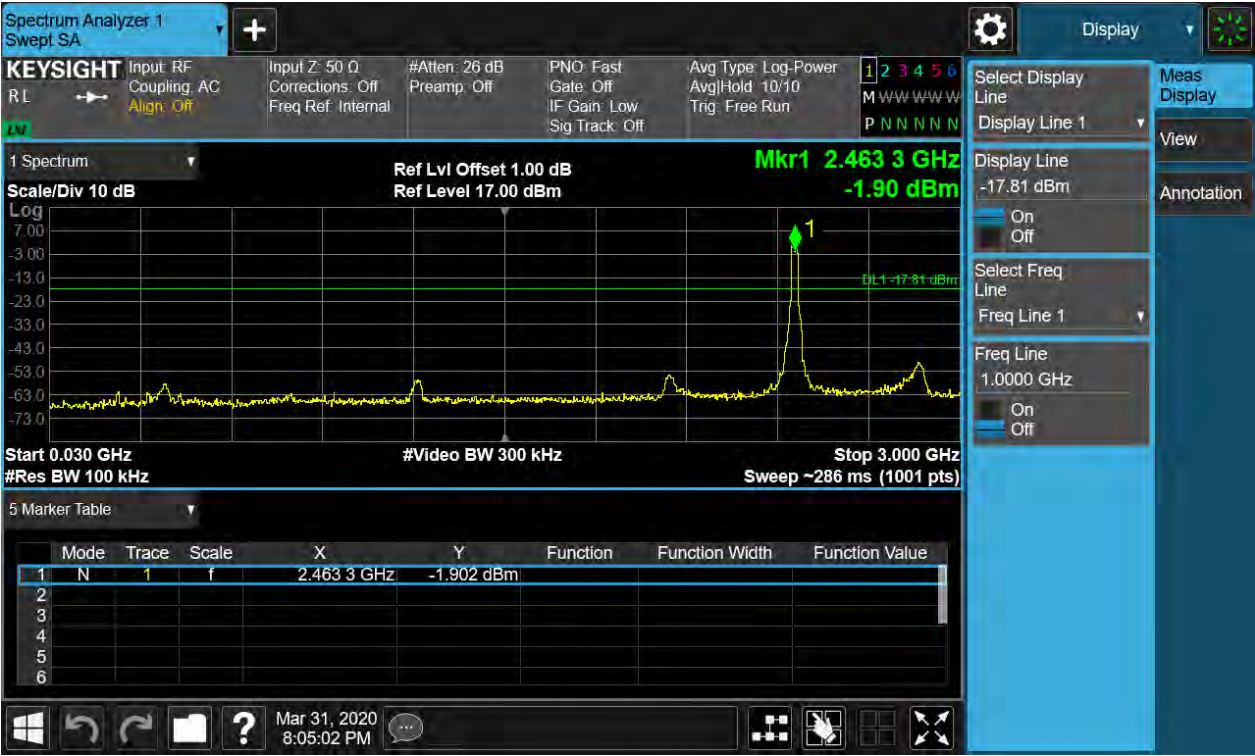


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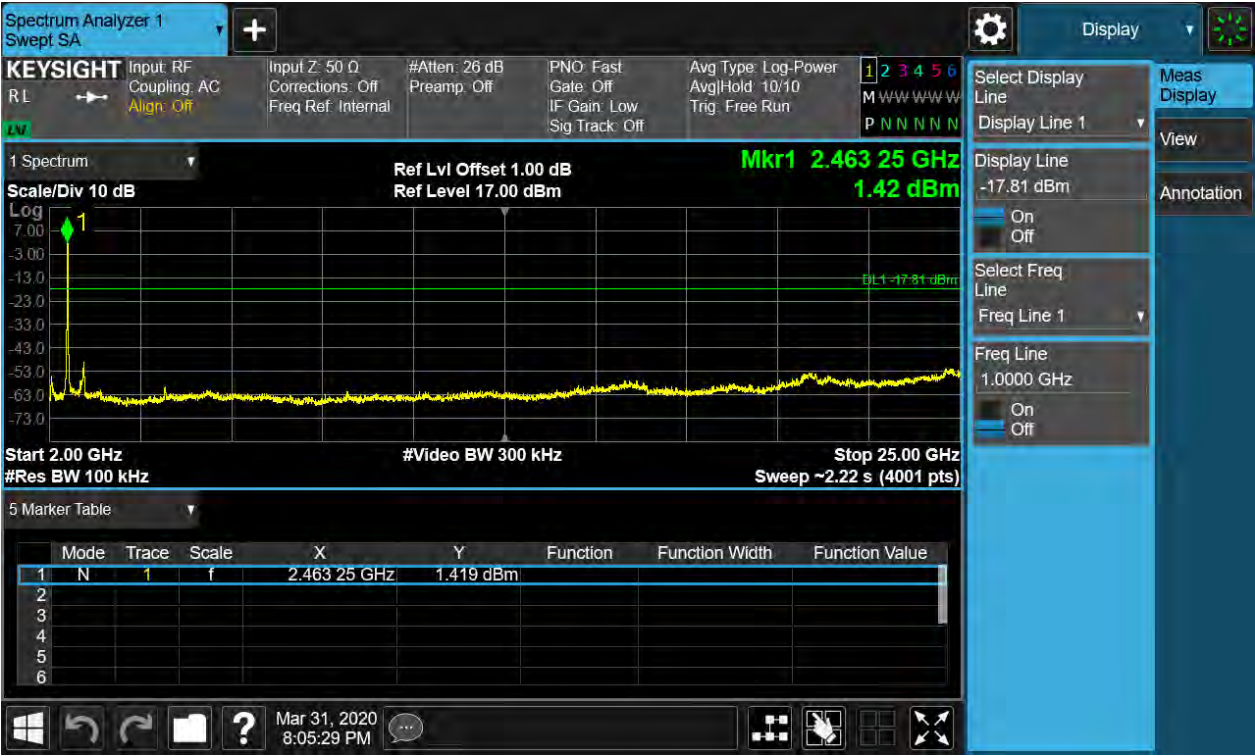


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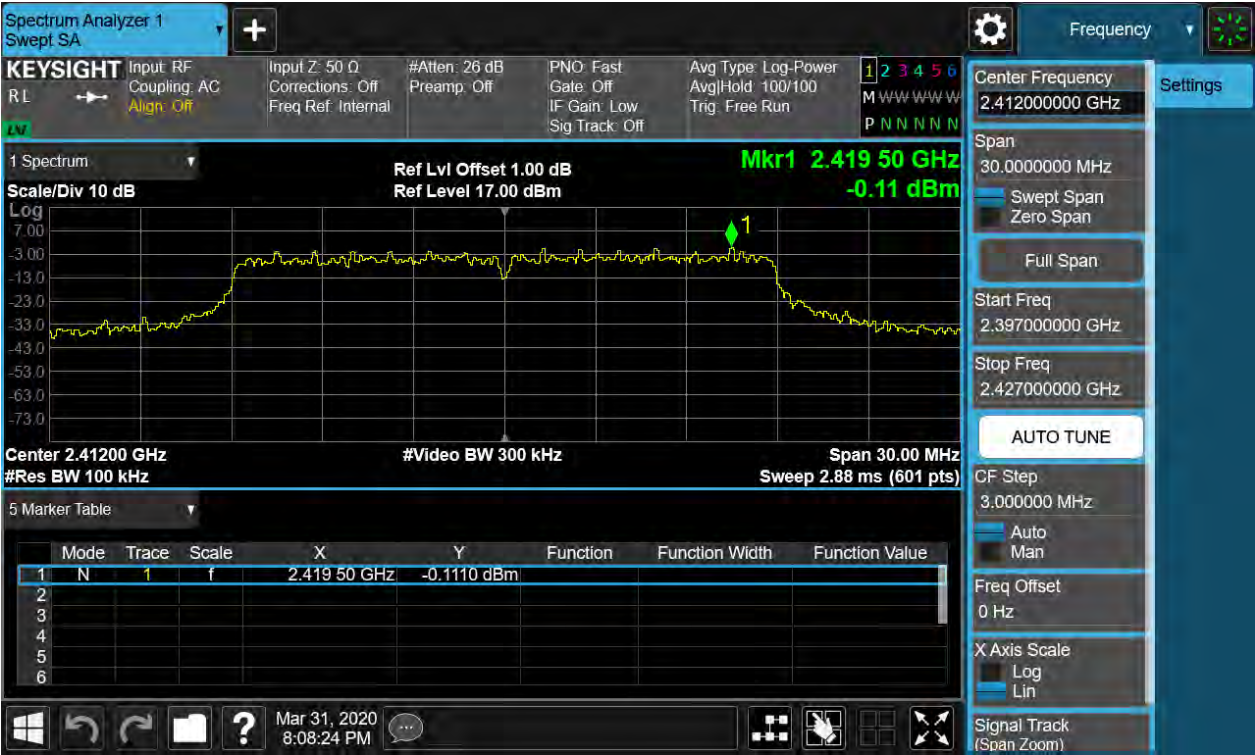
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802.11n_20M_L_fcc

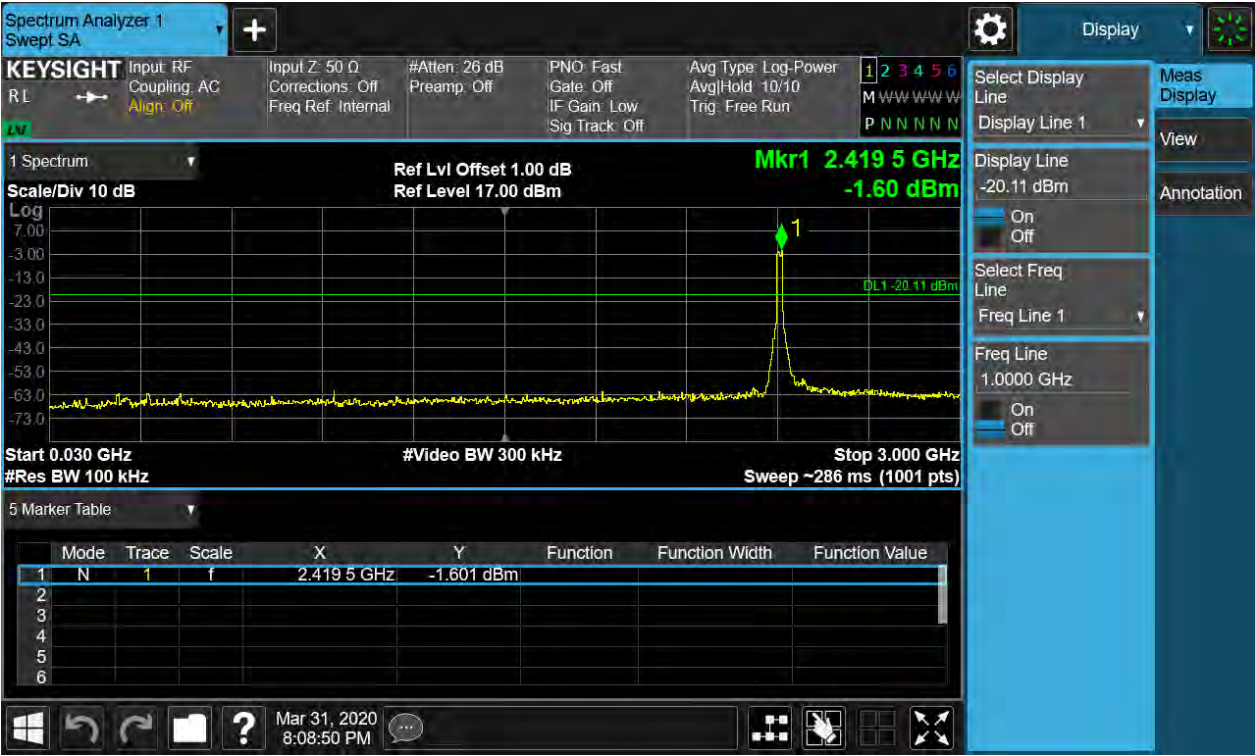


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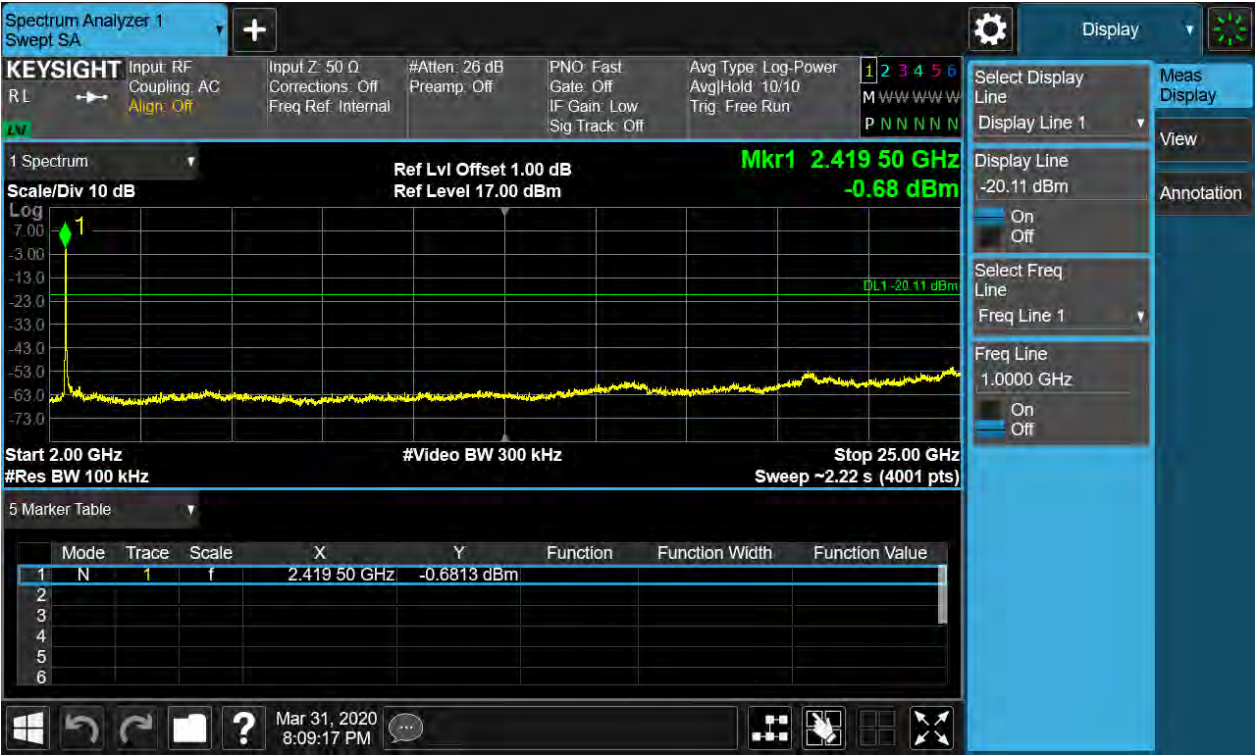


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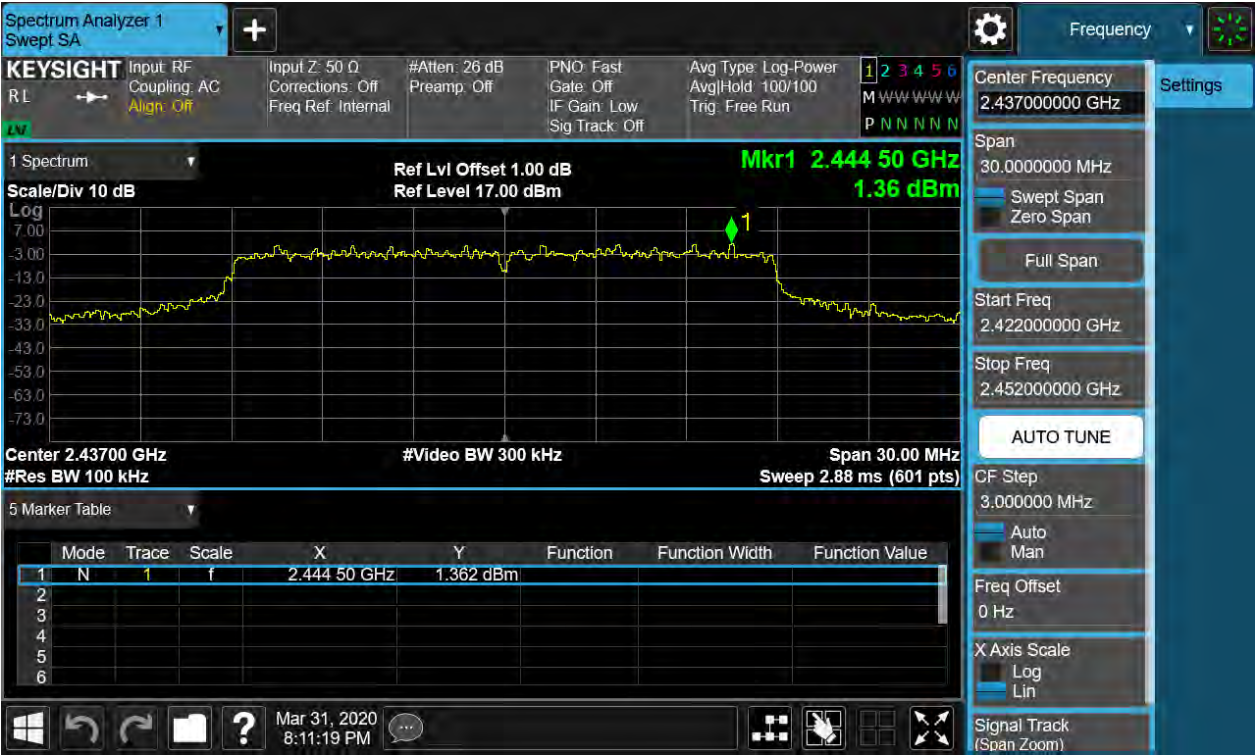
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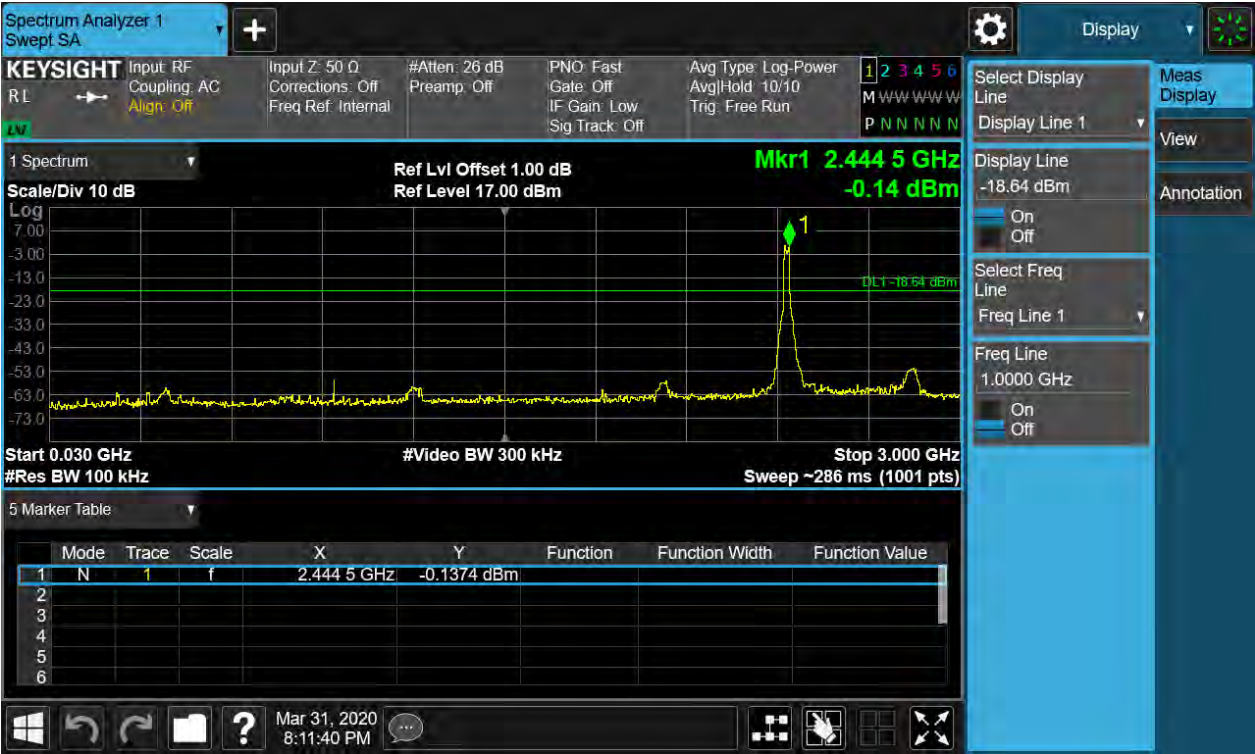


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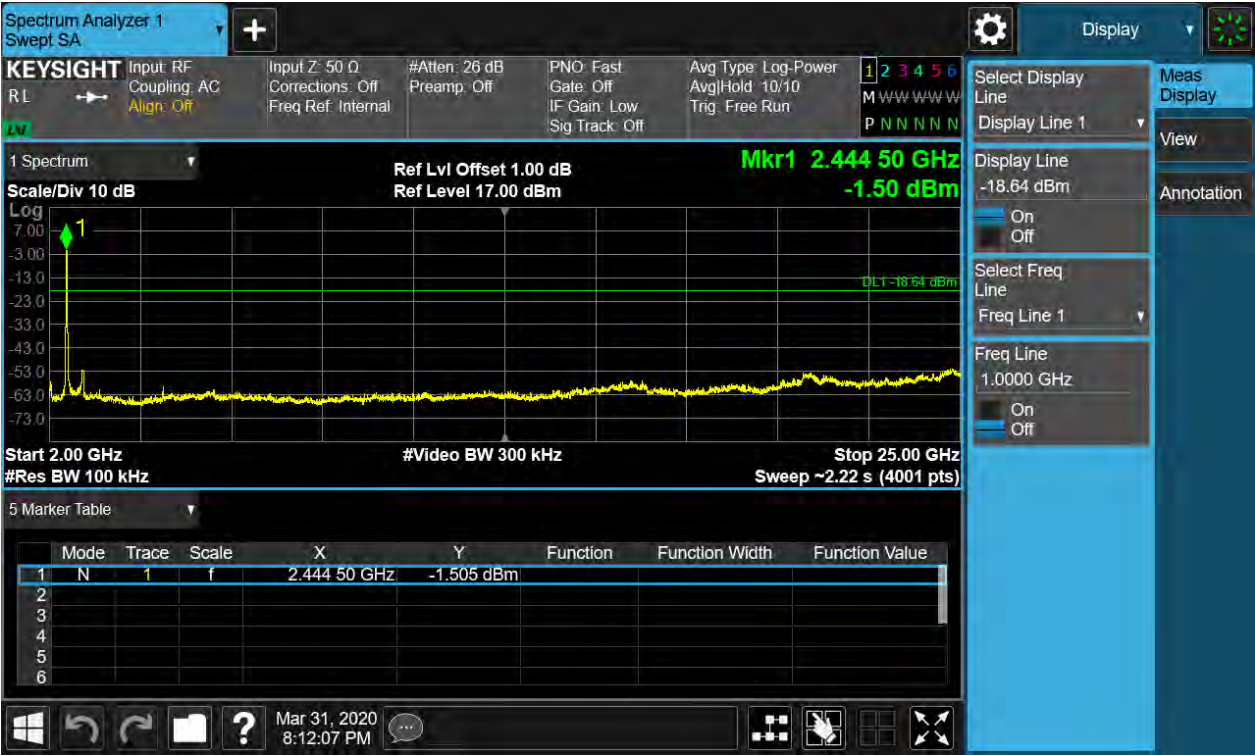


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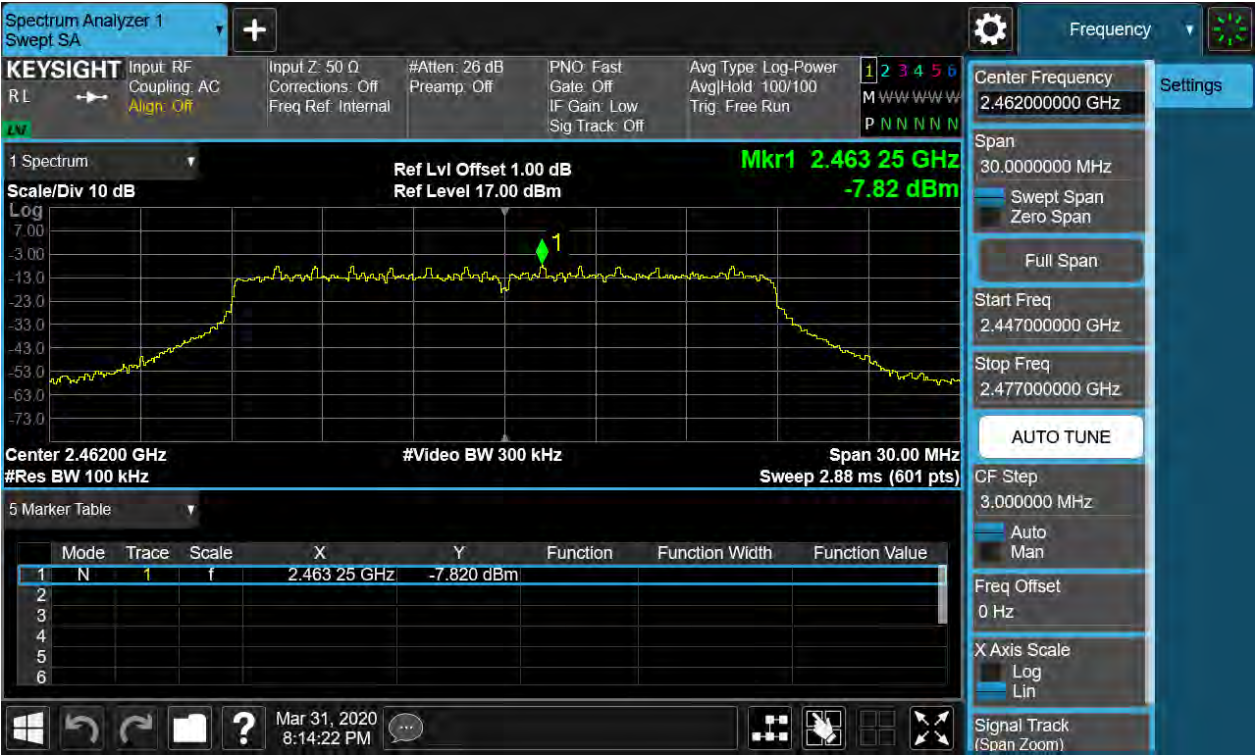
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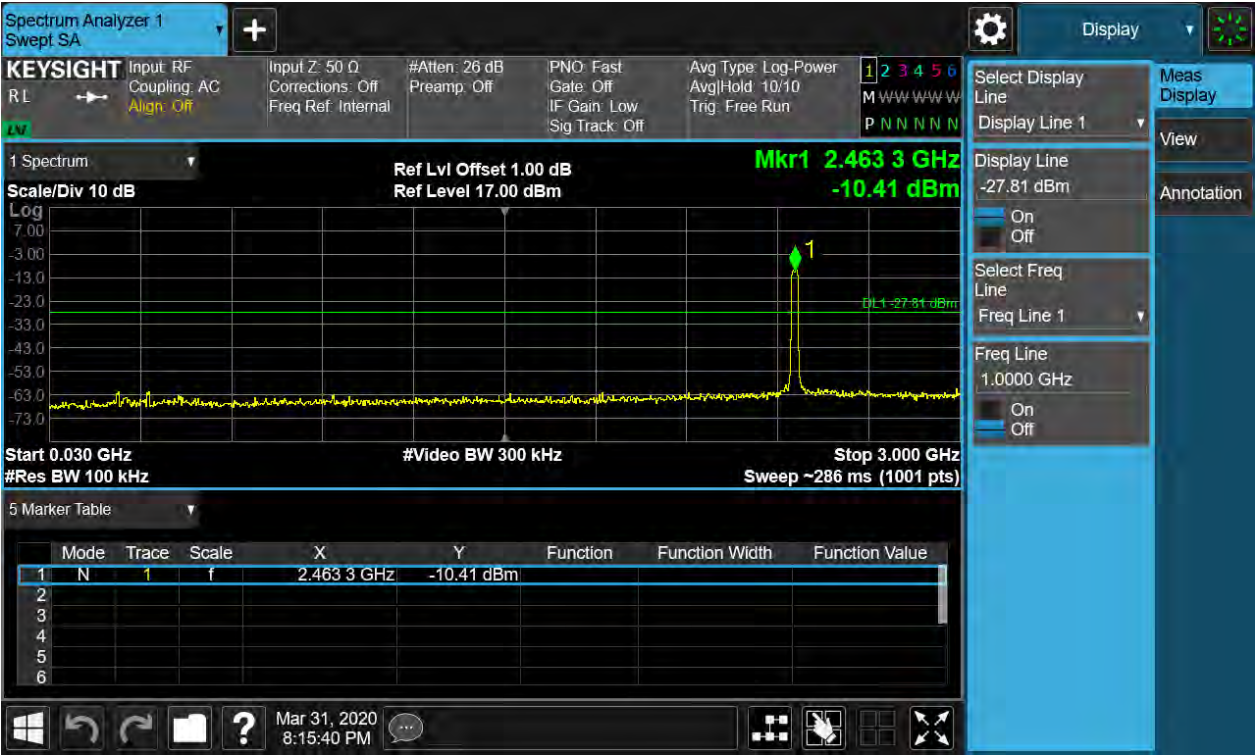


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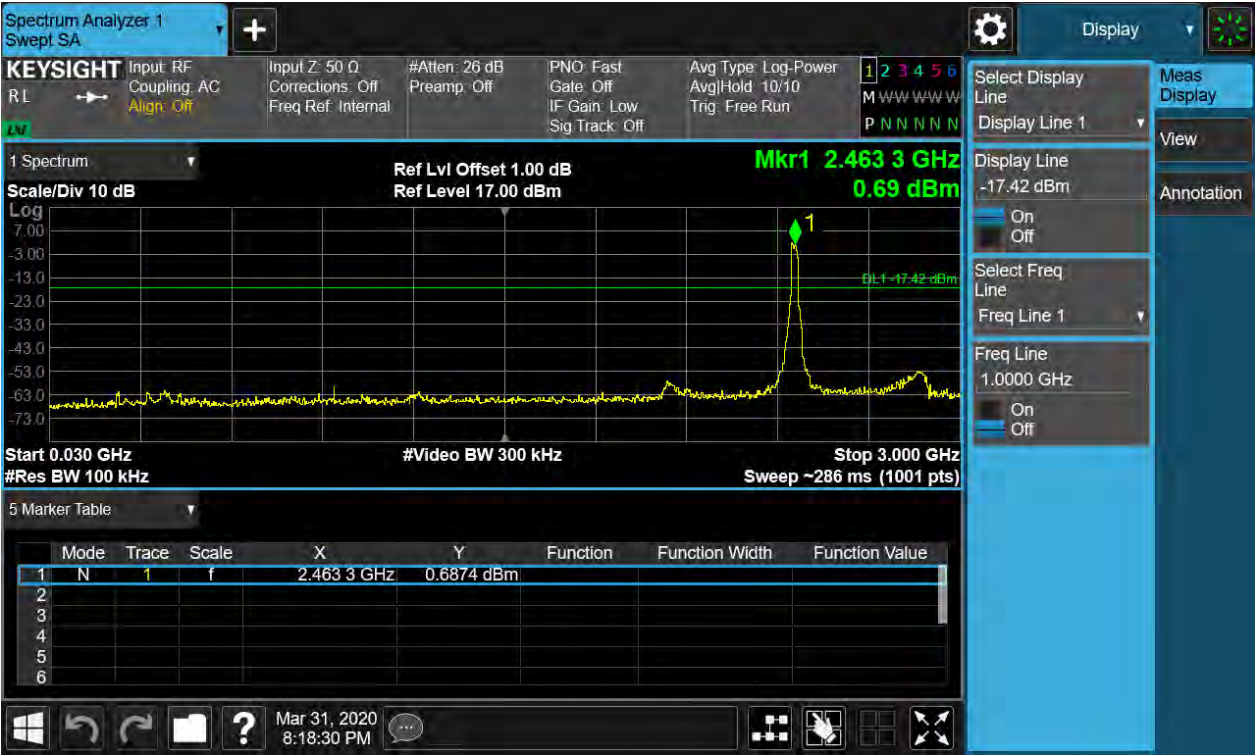


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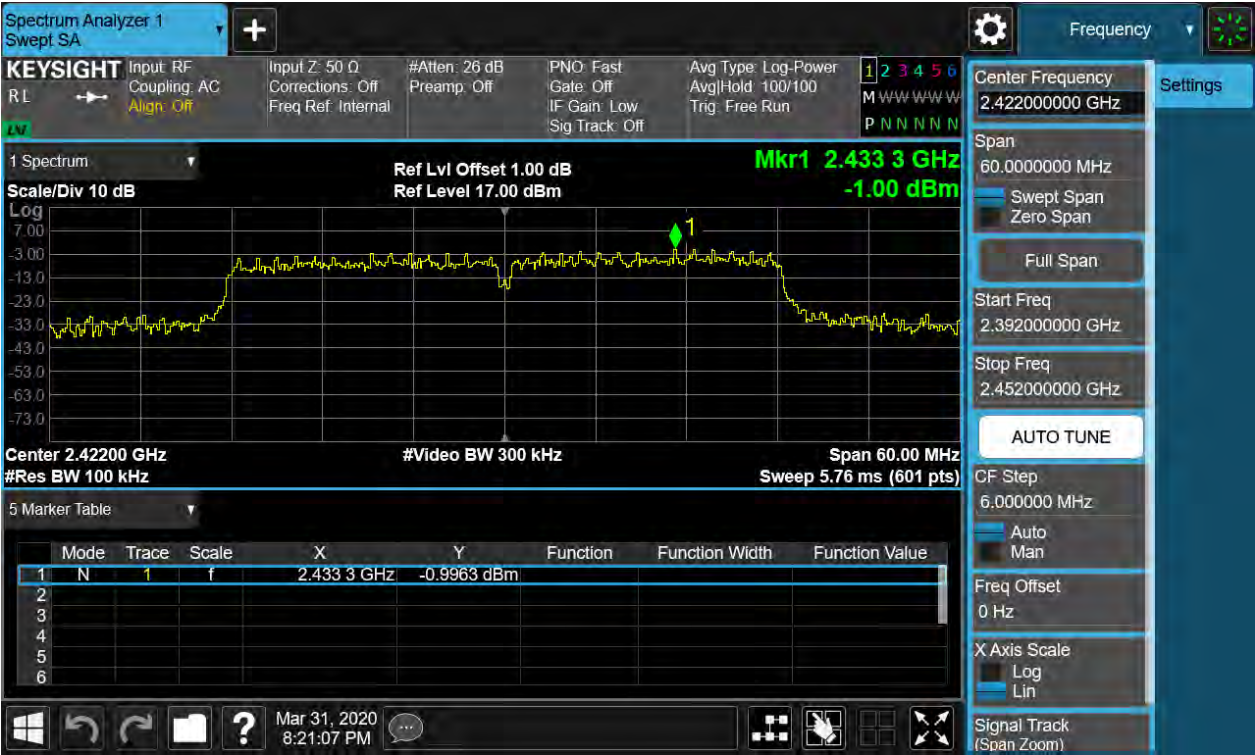
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802.11n_40M_L_fcc

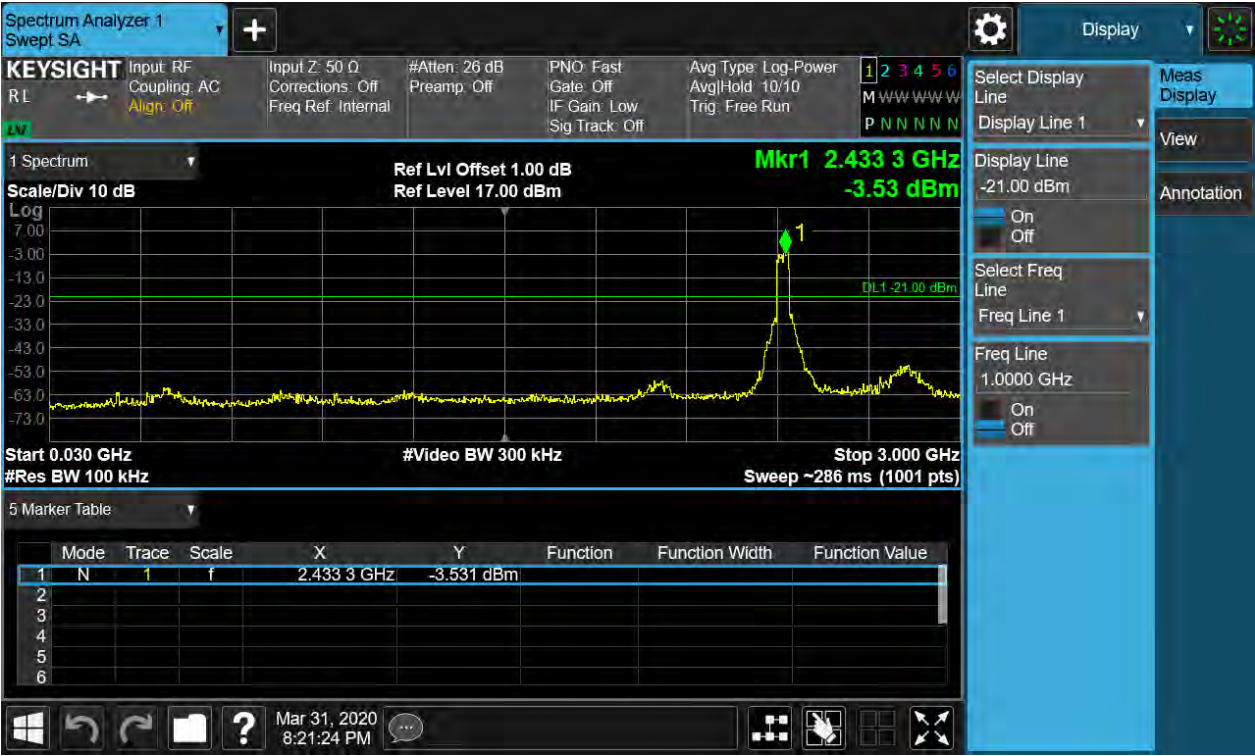


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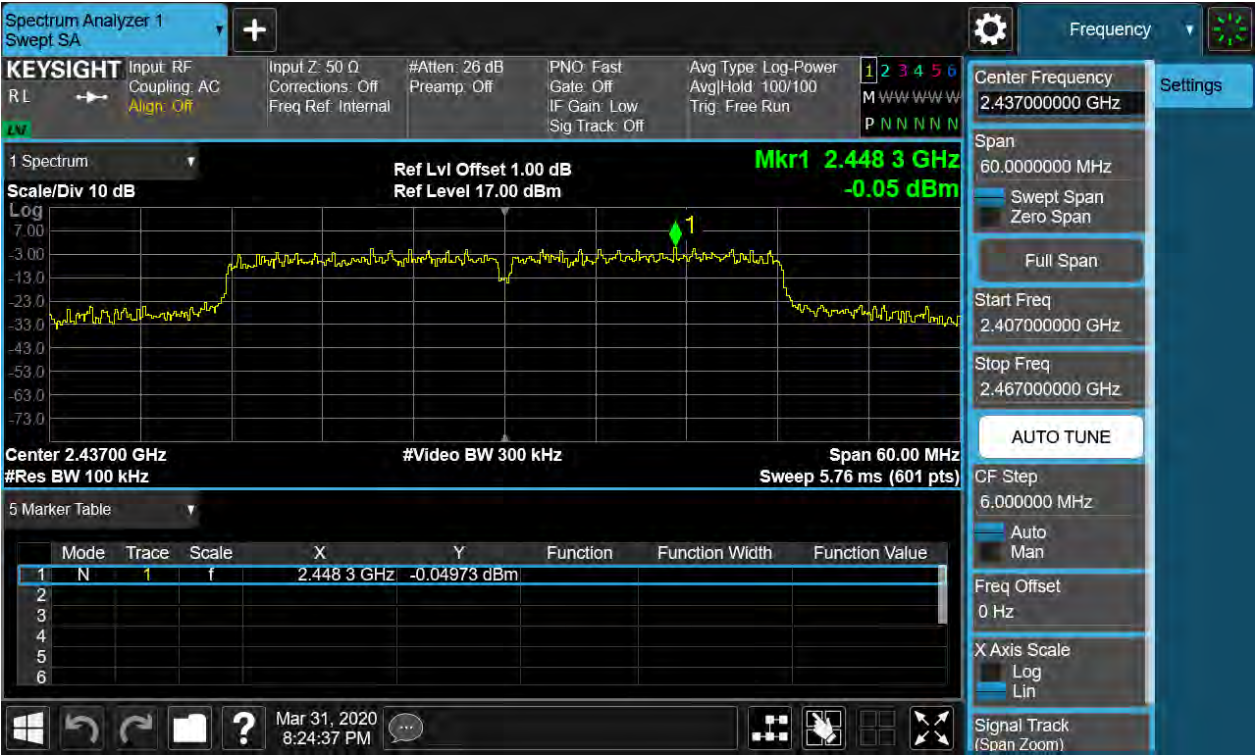
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802.11n_40M_M_fcc

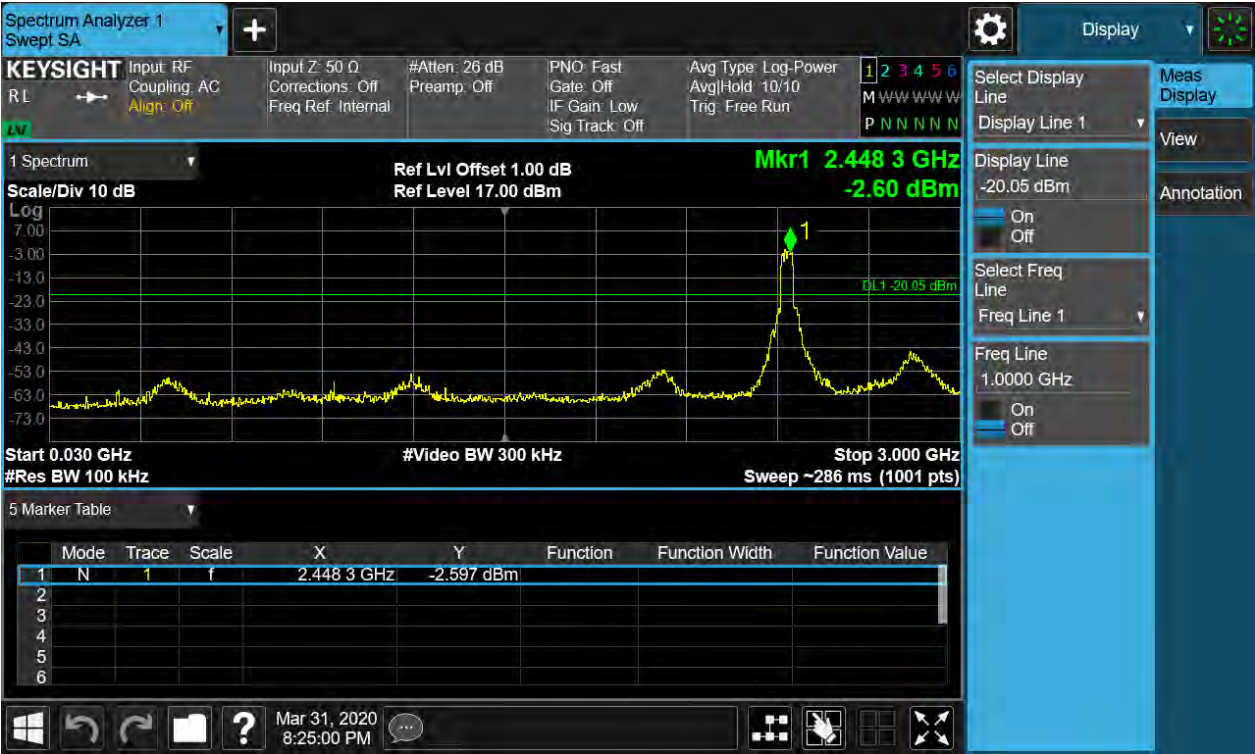


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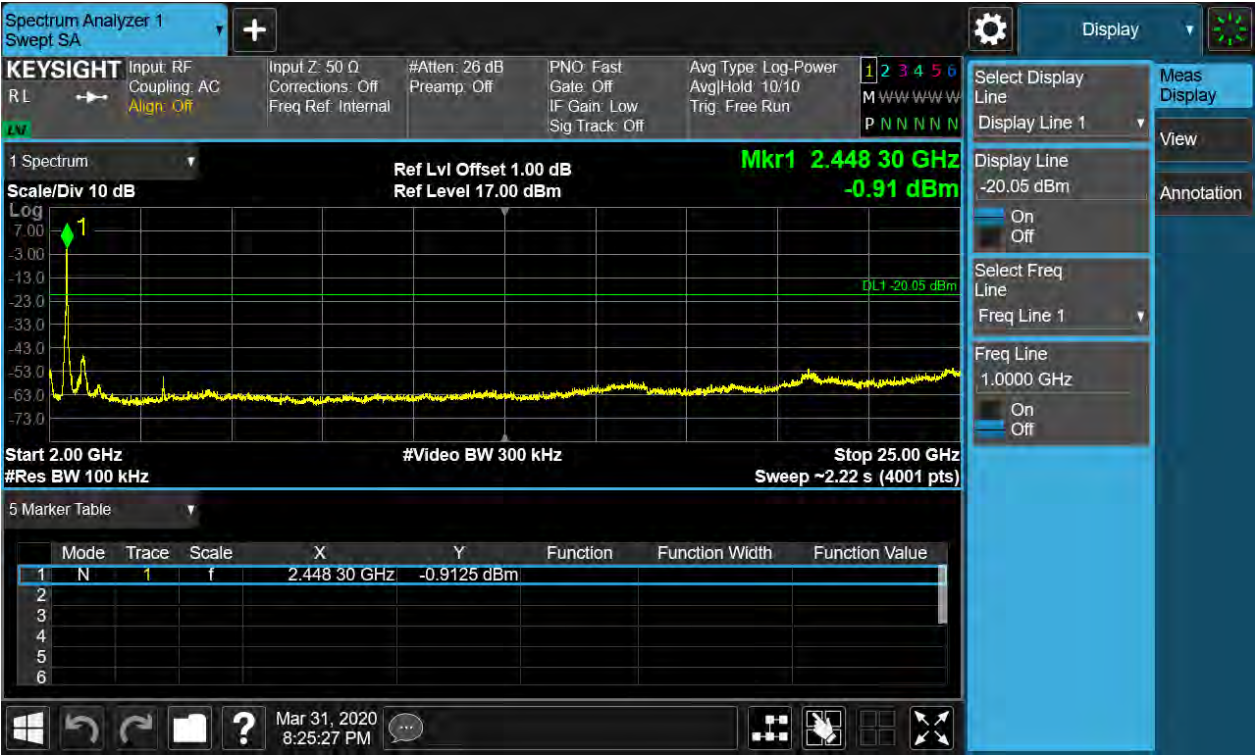


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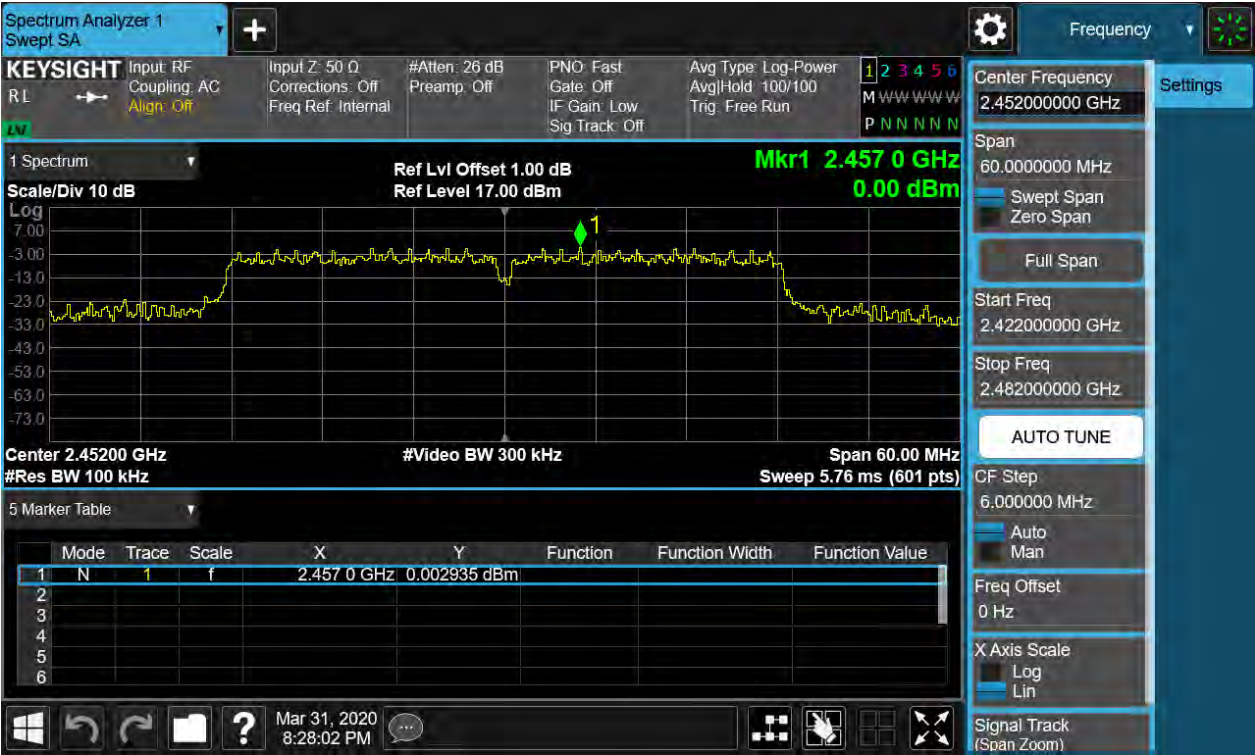
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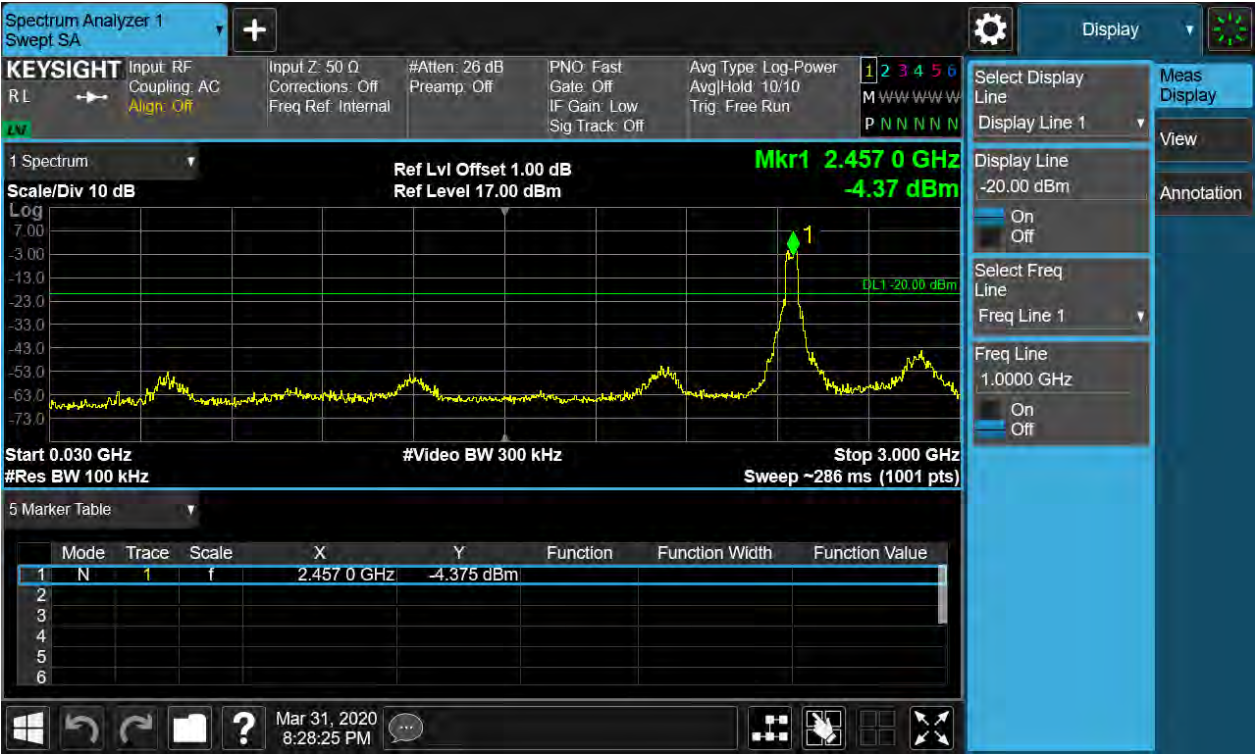


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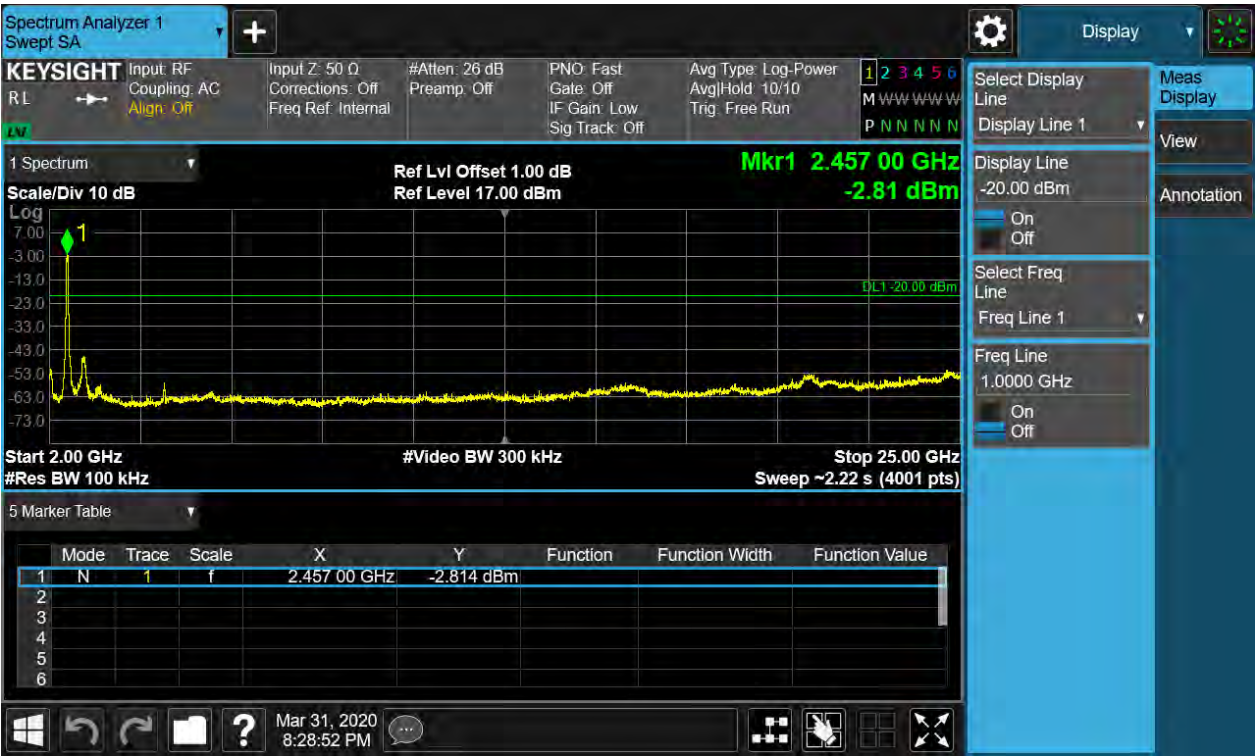


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Bandedge(H)--CSE(NTNV)



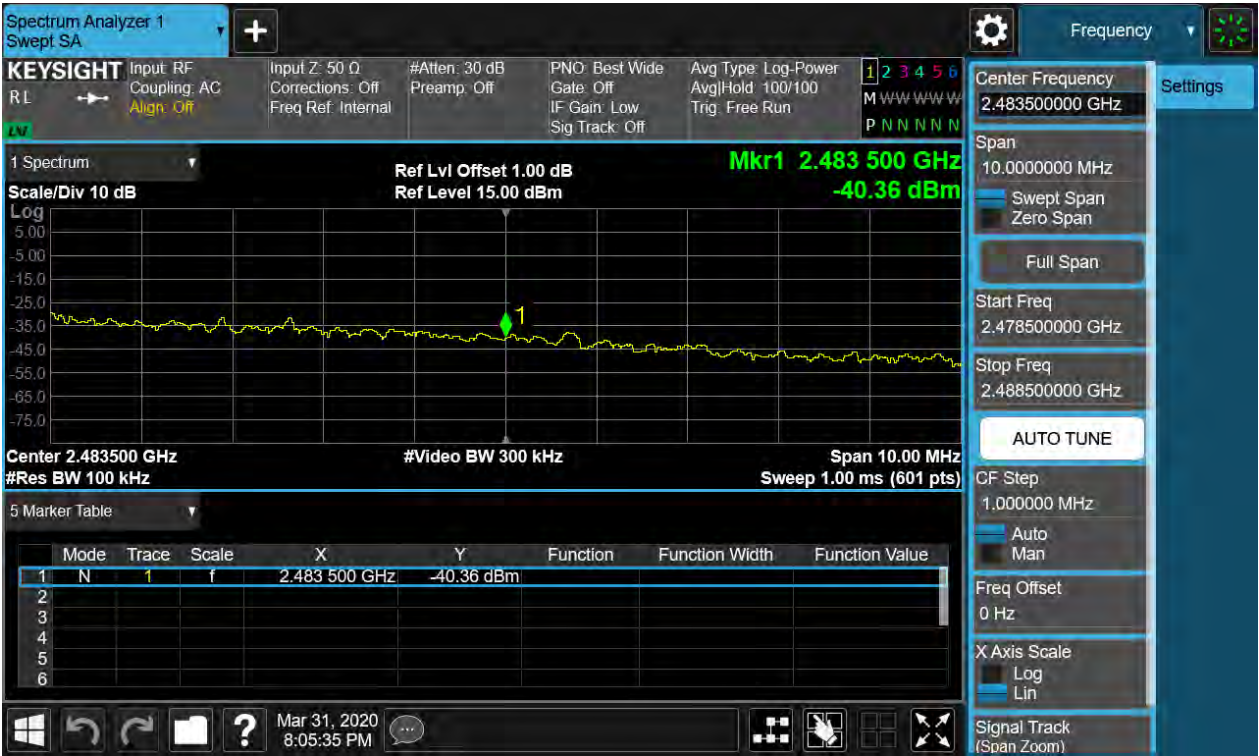
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Bandedge(H)--CSE(NTNV)



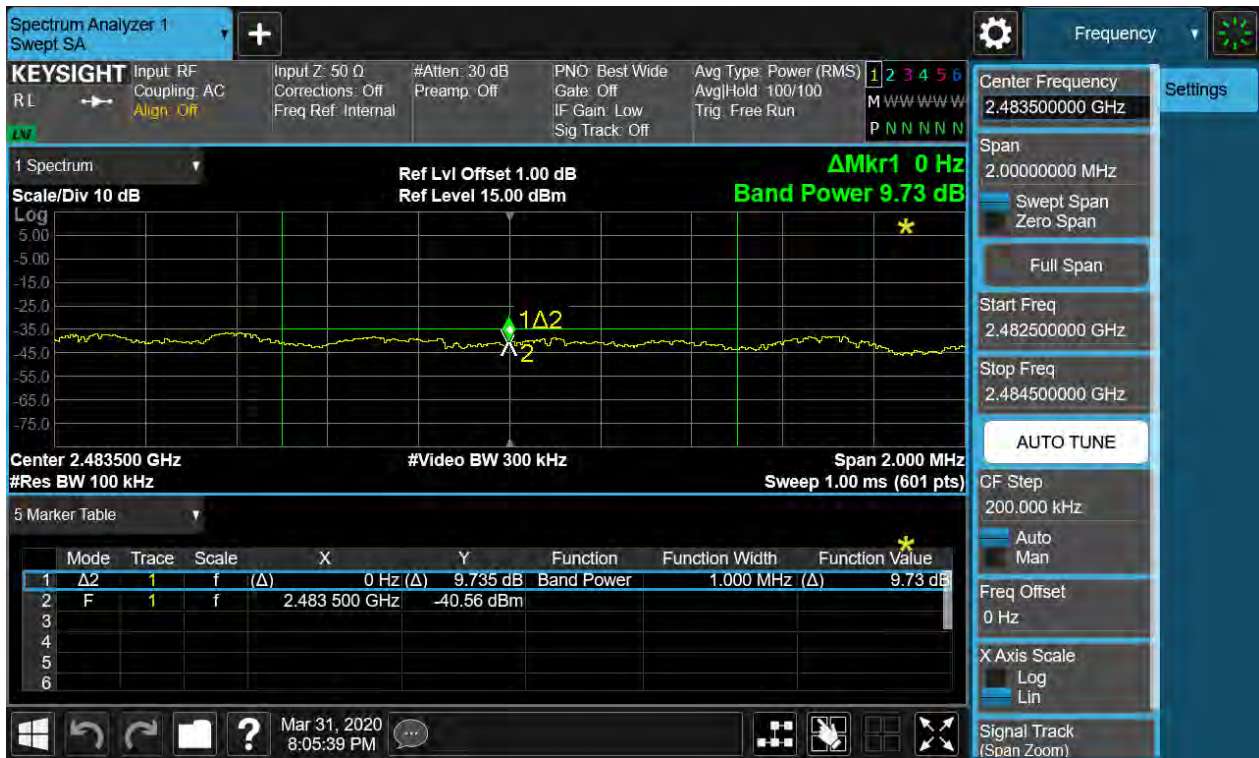
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Bandedge(H)--CSE(NTNV)



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Bandedge(H)--CSE(NTNV)



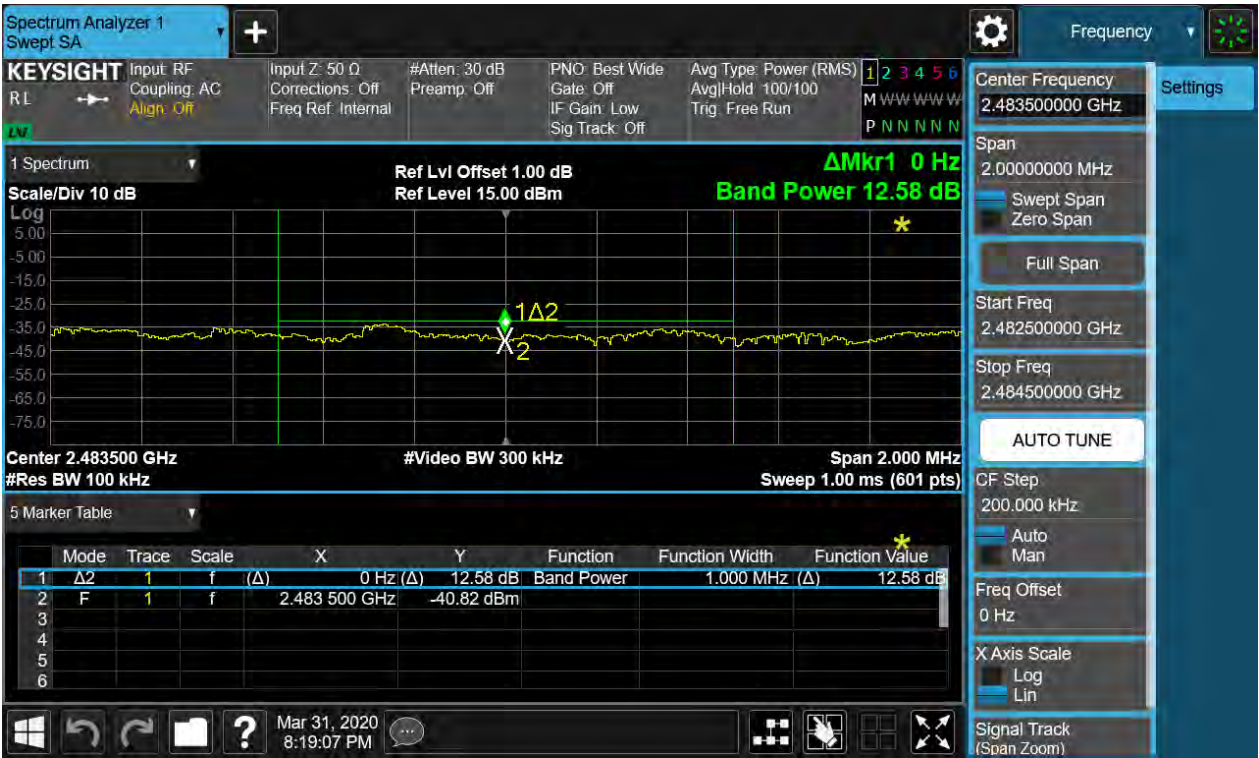
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Bandedge(H)--CSE(NTNV)



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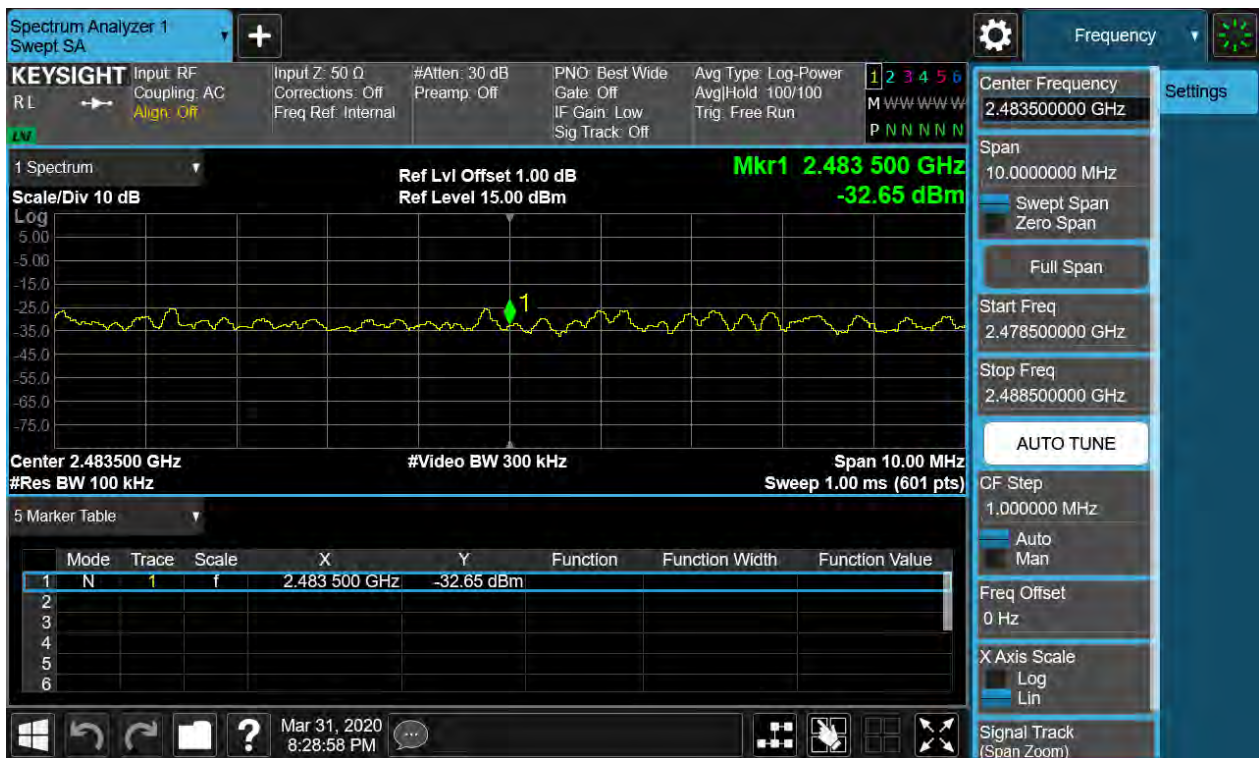
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Bandedge(H)--CSE(NTNV)



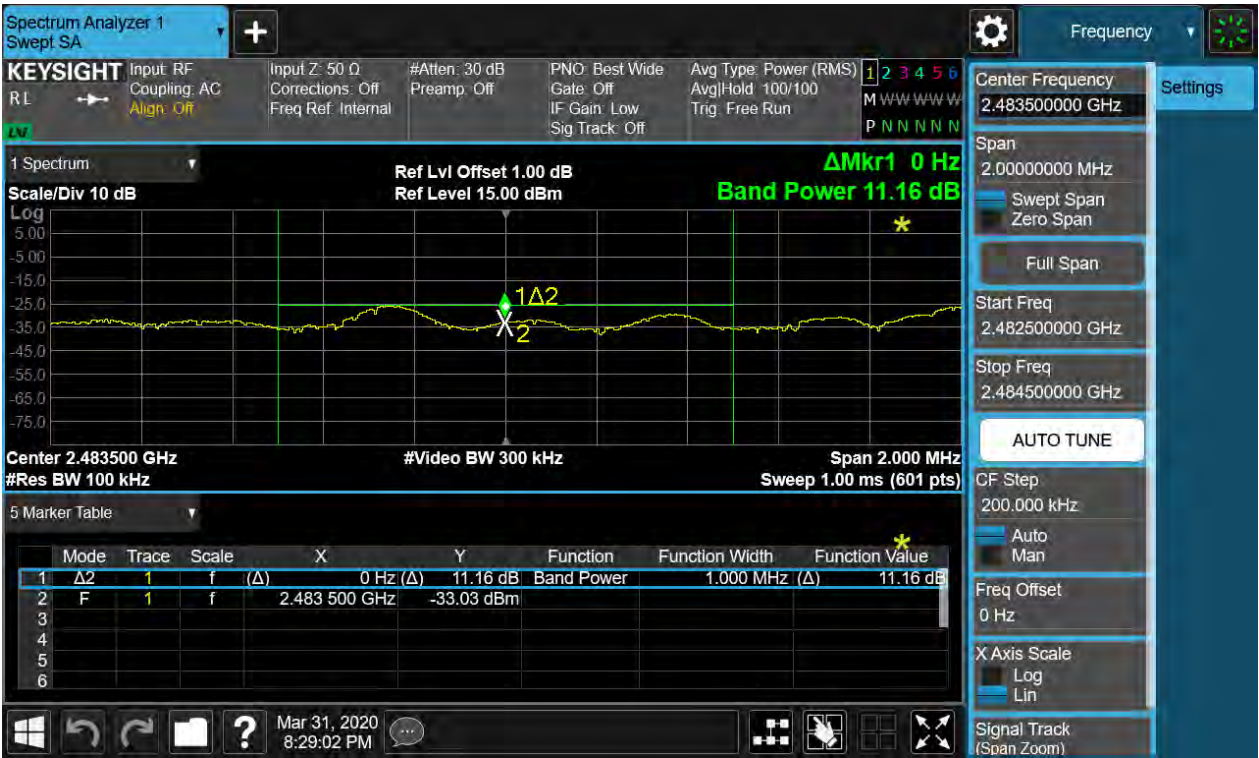
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Bandedge(H)--CSE(NTNV)



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Bandedge(L)--CSE(NTNV)



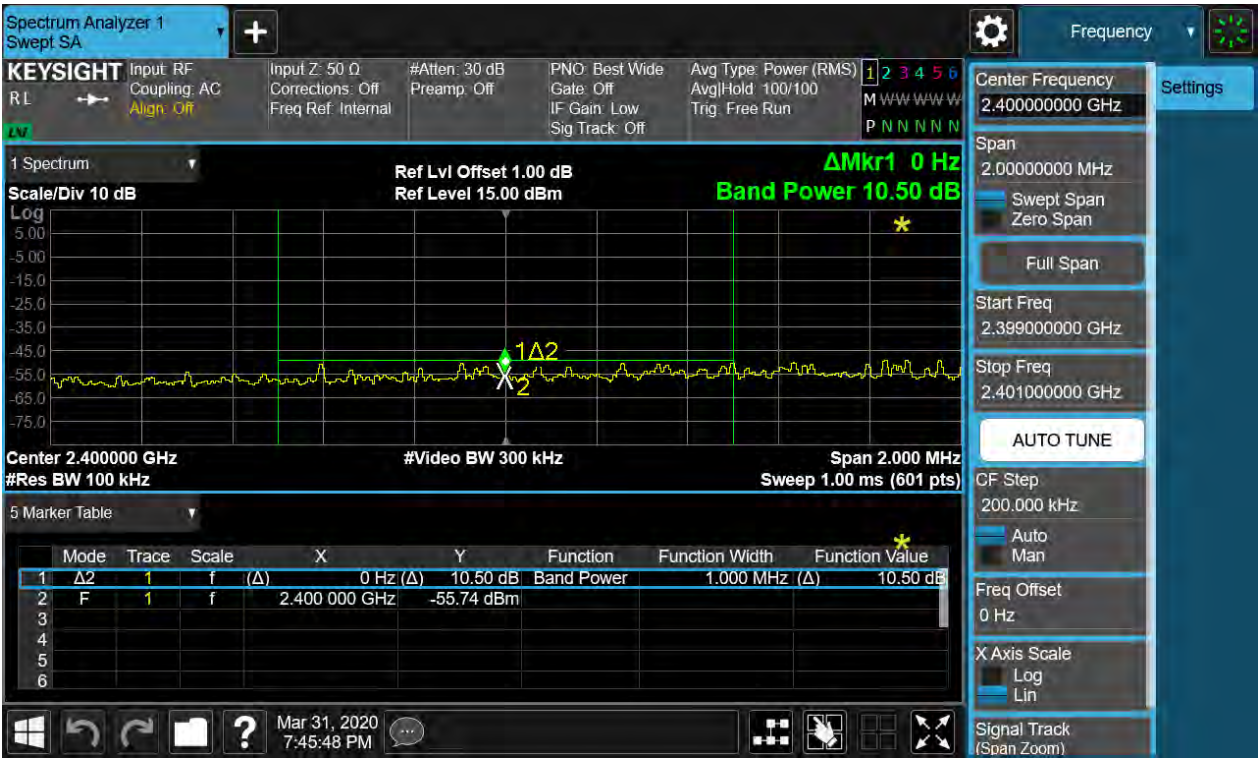
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Bandedge(L)--CSE(NTNV)



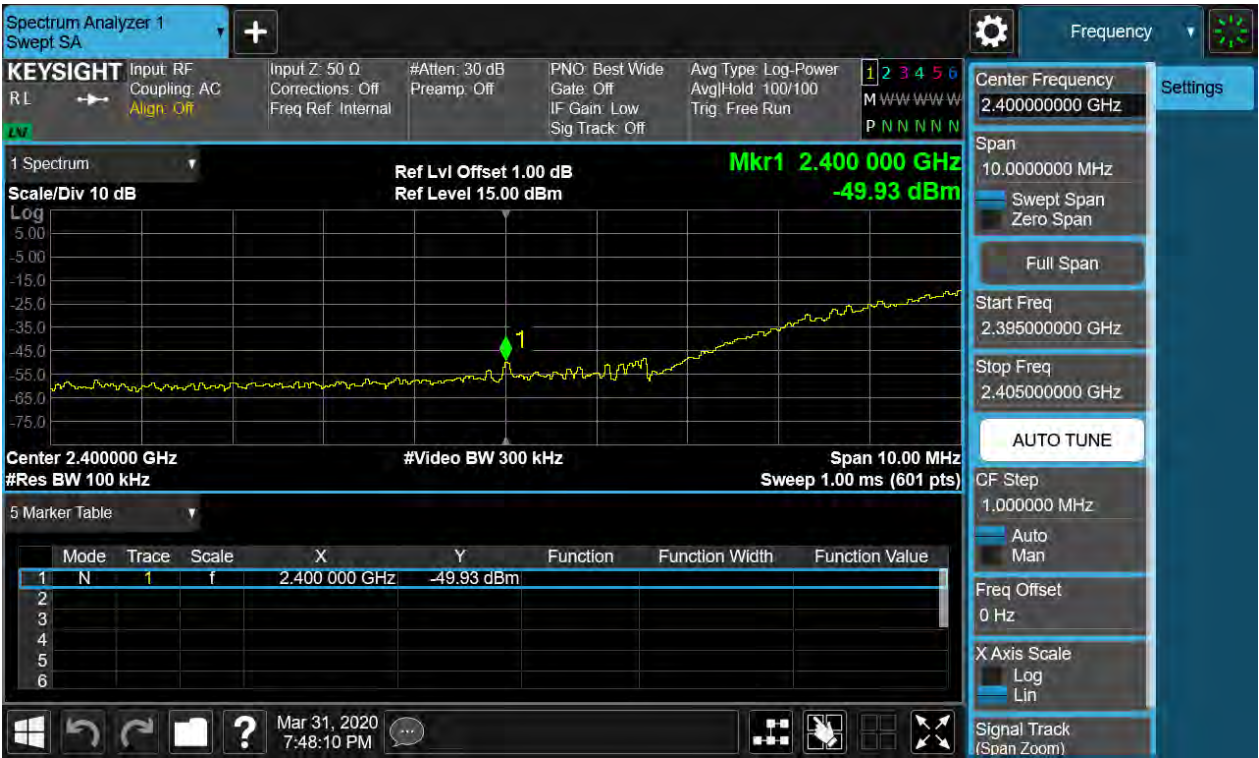
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Bandedge(L)--CSE(NTNV)



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Bandedge(L)--CSE(NTNV)



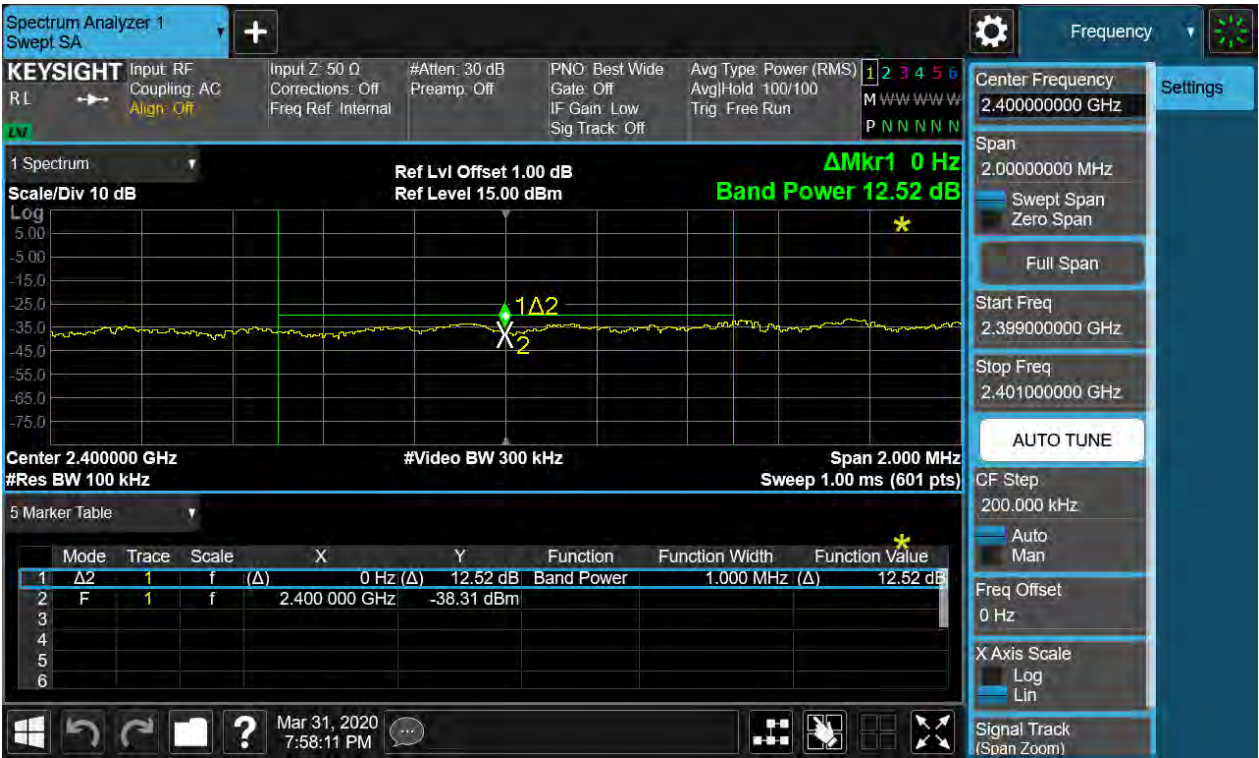
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Bandedge(L)--CSE(NTNV)



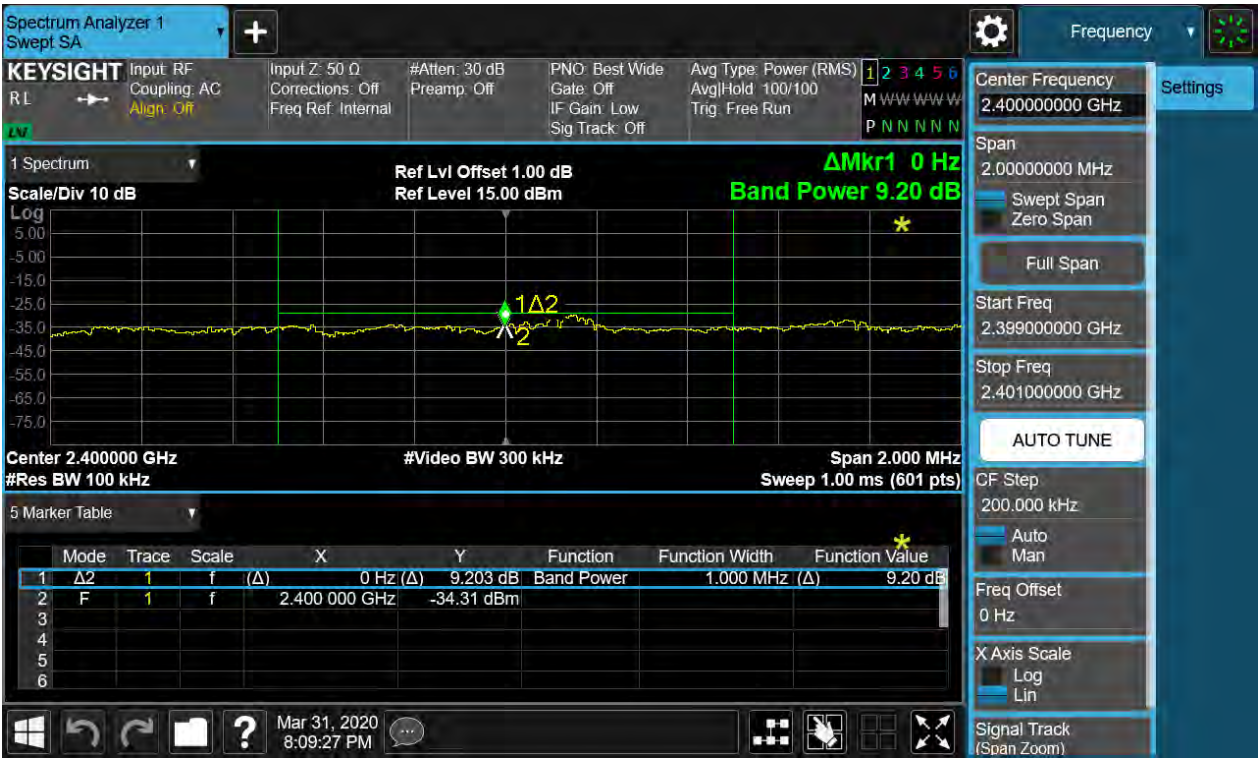
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Bandedge(L)--CSE(NTNV)



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Bandedge(L)--CSE(NTNV)



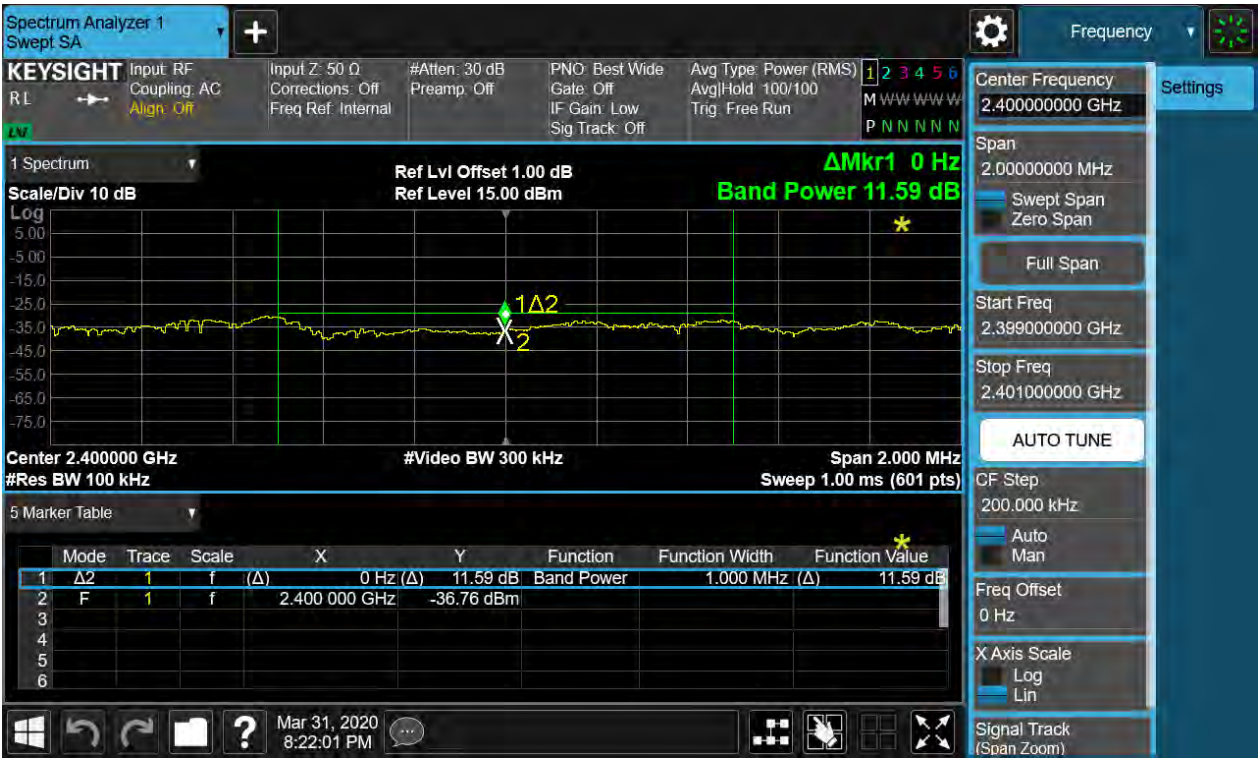
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Bandedge(L)--CSE(NTNV)



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4.1.6 Spurious Emission

RESULT:

PASS

Test standard	: FCC Part 15.247(d), 15.205, 15.209 RSS-247 5.5
Requirement	: ANSI C63.10-2013, KDB 558074
Kind of test site	: 3m Semi-Anechoic Chamber

Test setup

Test Channel	: Low/Middle/High
Operation Mode	: A
Ambient temperature	: 20°C
Relative humidity	: 54%

For details refer to following test plot.

Notes:

1. For 9 kHz ~ 30 MHz, the amplitude of spurious emissions that are attenuated by more than 20dB below the permissible. The value has no need to be reported.
2. The spurious above 18GHz is noise only and 20dB below the limit. The value has no need to be reported.
3. The EUT is working in the Normal link mode below 1 GHz.
4. Test plots please refer to the document "EXHIBIT A of SHE20030018-02AE" .

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4.1.7 Band Edge (Restricted-band band-edge)

RESULT:

PASS

Test standard	: FCC Part 15.247(d), 15.205, 15.209 RSS-247 5.5
Requirement	: ANSI C63.10-2013, KDB 558074
Kind of test site	: 3m Semi-Anechoic Chamber

Test setup

Test Channel	: Low/Middle/High
Operation Mode	: A.1
Ambient temperature	: 20°C
Relative humidity	: 54%

For details refer to following test plot.

Test plots please refer to the document “EXHIBIT A of SHE20030018-02AE” .

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4.2 Mains Emissions

4.2.1 Conducted Emission on AC Mains

RESULT:

PASS

Test standard : FCC Part 15.207(a)
RSS-Gen 8.8
Requirement : ANSI C63.10-2013
Kind of test site : Shielded room

Test setup

Input Voltage : AC 120V, 60Hz; AC 240V, 50Hz
Operation Mode : A
Earthing : Not Connected
Ambient temperature : 25°C
Relative humidity : 52%

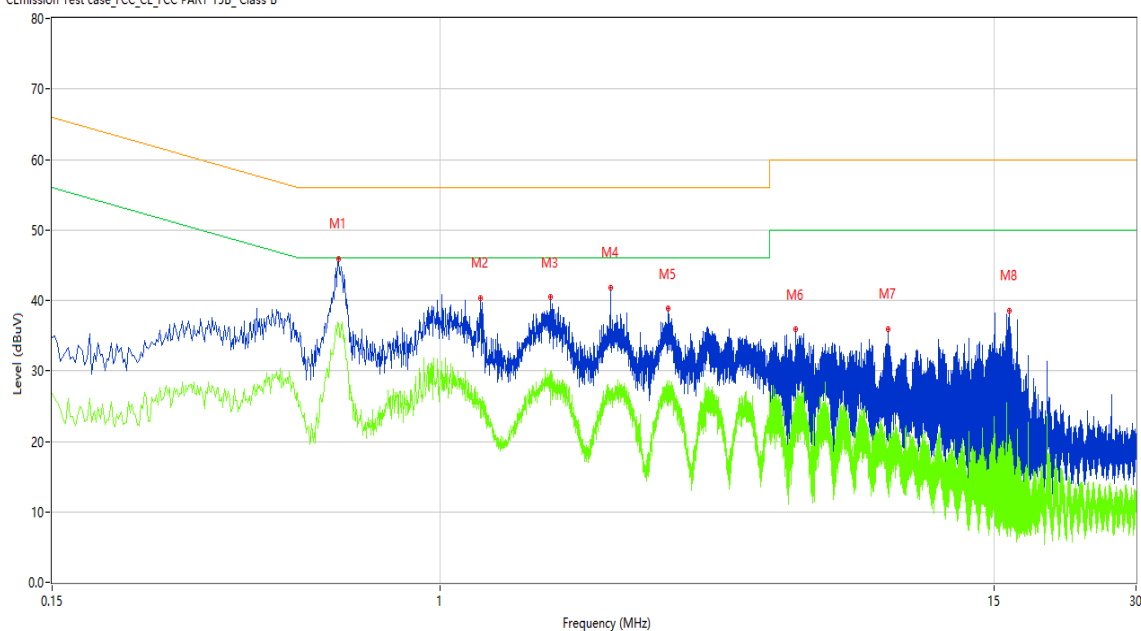
For details refer to following test plot.

Note:

The all configurations were tested respectively, but only the worst configuration shown here.

Figure 1: Conducted Emission on AC Mains, L Phase

CEmission Test case_FCC_CE_FCC PART 15B_Class B



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No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.608	46.48	10.15	56.00	-9.52	Peak	L	Pass
1*	0.608	42.25	10.15	56.00	-13.75	QP	L	Pass
1**	0.608	36.72	10.15	46.00	-9.28	AV	L	Pass
2	1.216	41.36	10.16	56.00	-14.64	Peak	L	Pass
2*	1.216	32.58	10.16	56.00	-23.42	QP	L	Pass
2**	1.216	25.99	10.16	46.00	-20.01	AV	L	Pass
3	1.718	40.61	10.17	56.00	-15.39	Peak	L	Pass
3*	1.718	34.27	10.17	56.00	-21.73	QP	L	Pass
3**	1.718	29.66	10.17	46.00	-16.34	AV	L	Pass
4	2.296	39.95	10.19	56.00	-16.05	Peak	L	Pass
4*	2.296	33.14	10.19	56.00	-22.86	QP	L	Pass
4**	2.296	27.07	10.19	46.00	-18.93	AV	L	Pass
5	3.050	40.89	10.22	56.00	-15.11	Peak	L	Pass
5*	3.050	33.41	10.22	56.00	-22.59	QP	L	Pass
5**	3.050	27.43	10.22	46.00	-18.57	AV	L	Pass
6	5.694	35.35	10.27	60.00	-24.65	Peak	L	Pass
6*	5.694	29.45	10.27	60.00	-30.55	QP	L	Pass
6**	5.694	24.39	10.27	50.00	-25.61	AV	L	Pass
7	8.916	34.97	10.36	60.00	-25.03	Peak	L	Pass
7*	8.916	27.79	10.36	60.00	-32.21	QP	L	Pass
7**	8.916	17.96	10.36	50.00	-32.04	AV	L	Pass
8	16.138	38.88	10.44	60.00	-21.12	Peak	L	Pass
8*	16.138	31.45	10.44	60.00	-28.55	QP	L	Pass
8**	16.138	20.95	10.44	50.00	-29.05	AV	L	Pass

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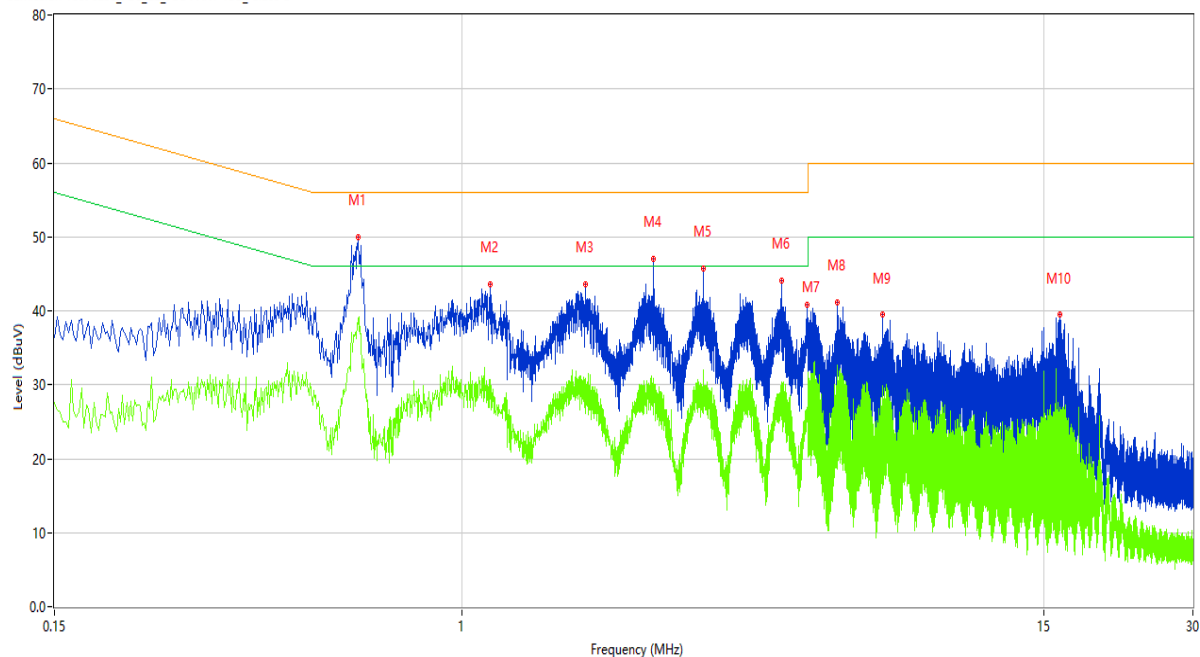
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Figure 2: Conducted Emission on AC Mains, N Phase

CEmission Test case_FCC_CE_FCC PART 15B_Class B



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.616	51.00	10.15	56.00	-5.00	Peak	N	Pass
1*	0.616	45.95	10.15	56.00	-10.05	QP	N	Pass
1**	0.616	39.08	10.15	46.00	-6.92	AV	N	Pass
2	1.140	43.92	10.16	56.00	-12.08	Peak	N	Pass
2*	1.140	38.40	10.16	56.00	-17.60	QP	N	Pass
2**	1.140	30.71	10.16	46.00	-15.29	AV	N	Pass
3	1.776	44.52	10.17	56.00	-11.48	Peak	N	Pass
3*	1.776	38.16	10.17	56.00	-17.84	QP	N	Pass
3**	1.776	30.53	10.17	46.00	-15.47	AV	N	Pass
4	2.440	46.12	10.19	56.00	-9.88	Peak	N	Pass
4*	2.440	37.59	10.19	56.00	-18.41	QP	N	Pass
4**	2.440	30.90	10.19	46.00	-15.10	AV	N	Pass
5	3.080	45.63	10.22	56.00	-10.37	Peak	N	Pass
5*	3.080	38.06	10.22	56.00	-17.94	QP	N	Pass
5**	3.080	31.96	10.22	46.00	-14.04	AV	N	Pass
6	4.420	43.22	10.25	56.00	-12.78	Peak	N	Pass
6*	4.420	37.72	10.25	56.00	-18.28	QP	N	Pass
6**	4.420	28.64	10.25	46.00	-17.36	AV	N	Pass
7	4.990	40.87	10.25	56.00	-15.13	Peak	N	Pass
7*	4.990	34.64	10.25	56.00	-21.36	QP	N	Pass

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7**	4.990	26.87	10.25	46.00	-19.13	AV	N	Pass
8	5.722	41.14	10.27	60.00	-18.86	Peak	N	Pass
8*	5.722	34.41	10.27	60.00	-25.59	QP	N	Pass
8**	5.722	32.70	10.27	50.00	-17.30	AV	N	Pass
9	7.072	38.64	10.31	60.00	-21.36	Peak	N	Pass
9*	7.072	32.75	10.31	60.00	-27.25	QP	N	Pass
9**	7.072	29.71	10.31	50.00	-20.29	AV	N	Pass
10	16.168	41.54	10.44	60.00	-18.46	Peak	N	Pass
10*	16.168	33.27	10.44	60.00	-26.73	QP	N	Pass
10**	16.168	26.88	10.44	50.00	-23.12	AV	N	Pass

End of the report