

NCC Test Report

Report No.: NCC_RF_SL20030301-SLX-015_Injector_Rev_2.5

Test Model: CENT-SYS-BAT

Received Date: 10/01/2020

Test Date: 10/13/2020-10/29/2020

Issued Date: 01/19/2022

Applicant: IMAXEON PTY LTD

Address: Unit 1, 38-46 South Street
Rydalmere NSW 2116, Australia

Manufacturer: IMAXEON PTY LTD

Address: Unit 1, 38-46 South Street
Rydalmere NSW 2116, Australia

Issued By: Bureau Veritas Consumer Products Services, Inc.

Lab Address: 775 Montague Expressway, Milpitas, CA 95035

Test Location (1): 775 Montague Expressway, Milpitas, CA 95035

**FCC Registration /
Designation Number:** 540430

ISED# / CAB identifier: 4842D



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Release Control Record

Issue No.	Description	Date Issued
NCC_RF_SL20030301-SLX-015_Injector	Original Release	11/06/2020
NCC_RF_SL20030301-SLX-015_Injector Rev_1.0	Update standard version	03/25/2021
NCC_RF_SL20030301-SLX-015_Injector Rev_2.0	Change product model name	06/23/2021
NCC_RF_SL20030301-SLX-015_Injector Rev_2.1	Change product model name	06/23/2021
NCC_RF_SL20030301-SLX-015_Injector Rev_2.2	Update manufacturer	10/20/2021
NCC_RF_SL20030301-SLX-015_Injector Rev_2.3	Updated antenna details, frequency range	12/22/2021
NCC_RF_SL20030301-SLX-015_Injector_Rev_2.4	Updated "General Description of EUT" table	01/17/2022
NCC_RF_SL20030301-SLX-015_Injector_Rev_2.5	Updated "Model of Antenna" in Table 3.1	01/19/2022

1 Certificate of Conformity

Product: MEDRAD Centargo

Brand: Bayer

Test Model: CENT-SYS-BAT

Sample Status: N/A

Applicant: IMAXEON PTY LTD

Test Date: 10/13/2020-10/29/2020

Standards: LP0002: 2020

The above equipment has been tested by **Bureau Veritas Consumer Products Services, Inc., Milpitas Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Deon , Date: 06/23/2021
Deon Dai / Test Engineer

Approved by : Gary Chou , Date: 06/23/2021
Gary Chou / Engineer Reviewer

2 Summary of Test Results

LP0002: 2020			
Standard	Test Item	Result	Remarks
3.3	AC Power Conducted Emission	PASS	Meet the requirement of limit.
4.10.1.5	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit.
4.10.1.6(2)(A)	6dB bandwidth	PASS	Meet the requirement of limit.
4.10.1.2(1)(C)	Conducted power	PASS	Meet the requirement of limit.
4.10.1.6(2)(B)	Power Spectral Density	PASS	Meet the requirement of limit.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	3.51dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	3.73dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	4.64dB
	6GHz ~ 18GHz	4.82dB
	18GHz ~ 40GHz	4.91dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	MEDRAD Centargo
Brand	Bayer
Test Model	CENT-SYS-BAT
Identification No. of EUT	13000035
Series Model	N/A
Model Difference	N/A
Status of EUT	Engineering Sample
Power Supply Rating	100-240 Vac, 2.5A (Input Power), 12 Vdc, 7A (Output Power)
Hardware Version	N/A
Firmware Version	N/A
Software Version	2020.0505
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11g: up to 54Mbps 802.11n: up to 300Mbps
Operating Frequency	2400 MHz~2483.5 MHz*
Number of Channels	Number of channels considered for testing: ** 11 channels for 802.11b, 802.11g, 802.11n (HT20) 7 channels for 802.11n (HT40)
Antenna Type	Wi-Fi Dual Band PCB Antenna
Brand of Antenna	Unictron
Model of Antenna	AA258
Peak Gain	1.8 dBi (typical from 2400 to 2500 MHz)
Frequency Range	2400 MHz~2483.5 MHz
Antenna Connector	Internal to the device (U.FL Connector)

*5GHz operation was disabled via the device application software. Therefore, 5GHz cannot be enabled. Therefore, the MEDRAD Centargo unit was only tested for 2.4GHz operation against NCC requirements.

**The SX-PCEAN2 module within the MEDRAD Centargo unit supports 2.4GHz channels 1-13 (13 channels). However, channels 12 and 13 cannot be enabled for testing. Therefore, only 11 channels were tested.

Note:

1. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

Channel	Frequency	Channel	Frequency
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

7 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

3.3 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where RE $\geq$ 1G: Radiated Emission above 1GHz & Bandedge Measurement

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.

NOTE: "-" means no effect.

Radiated Emission Test (Above 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Radiated Emission Test (Below 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (20MHz)	1 to 11	6	OFDM	BPSK	6.5

Power Line Conducted Emission Test:

- ☐ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☐ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5

Antenna Port Conducted Measurement:

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	25deg. C, 65%RH	120Vac, 60Hz	Deon Dai
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Deon Dai
PLC	25deg. C, 68%RH	120Vac, 60Hz	Deon Dai
APCM	21deg. C, 60%RH	120Vac, 60Hz	Deon Dai

3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Keyboard	Dell	KB2521	K0S00RUP	N/A	Provided by Lab
B.	Mouse	Labtec	M-BR91	851980	N/A	Provided by Lab
C.	Laptop	Dell	10954280119	GYXJ3 A00 JSD2	N/A	Provided by the client.
D.						
E.						

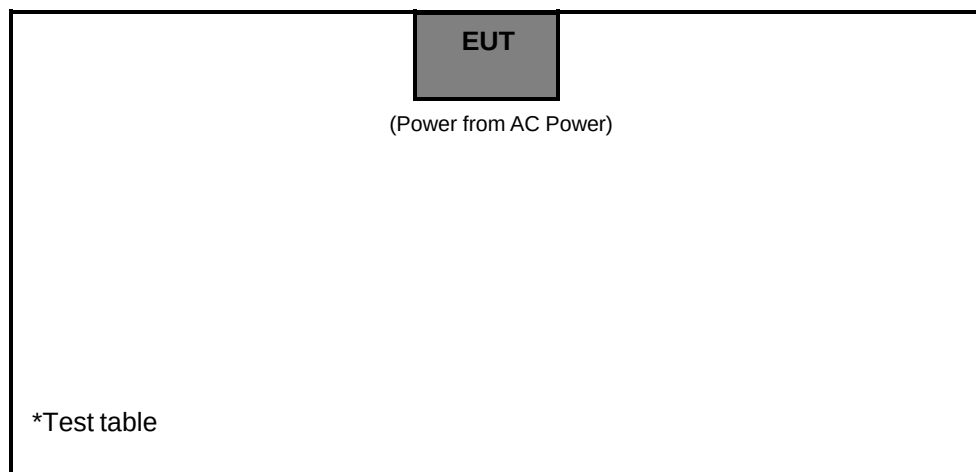
Note:

1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45	1	2	No	No	Provided by Lab
2.						
3.						

Note: The core(s) is(are) originally attached to the cable(s).

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

LP0002 : 2020

ANSI C63.10: 2013

558074 D01 15.247 Meas Guidance v05r02

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
50GHz Spectrum Analyzer	N9030B (PXA)	MY57140597	06/05/2020	06/05/2021
Biconilog Antenna Sunol	JB1	A030702	03/09/2020	03/09/2021
Pre-Amplifier RF Bay, Inc.	LPA-6-30	11170601	04/27/2020	04/27/2021
Horn Antenna ETS-Lindgren	3117	218554	11/22/2019	11/22/2020
Pre-Amplifier RF-Lambda	RAMP00M50GA	17032300048	06/18/2020	06/18/2021

4.1.3 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

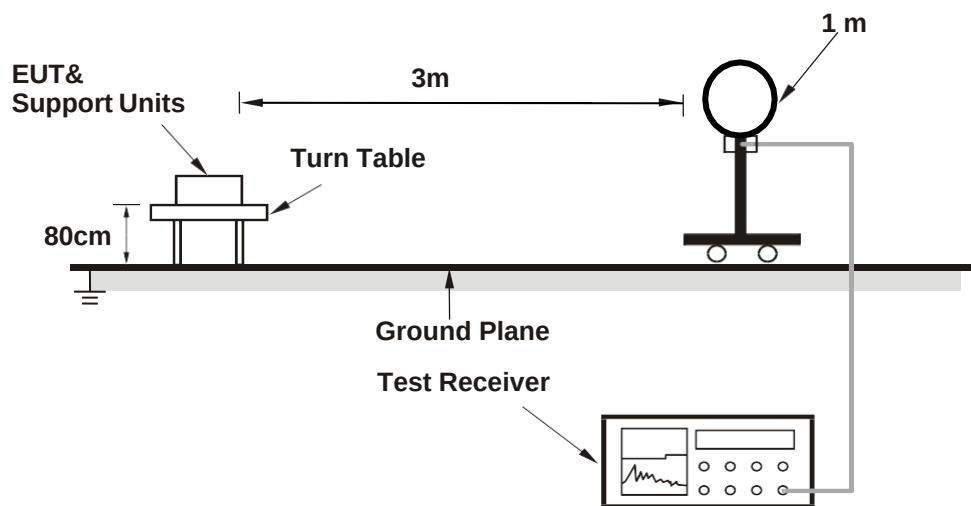
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

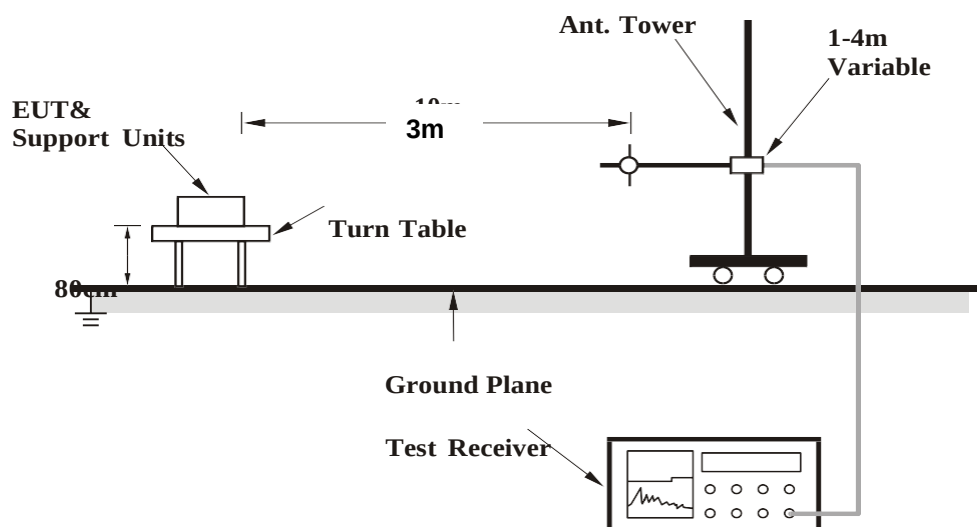
No deviation.

4.1.5 Test Setup

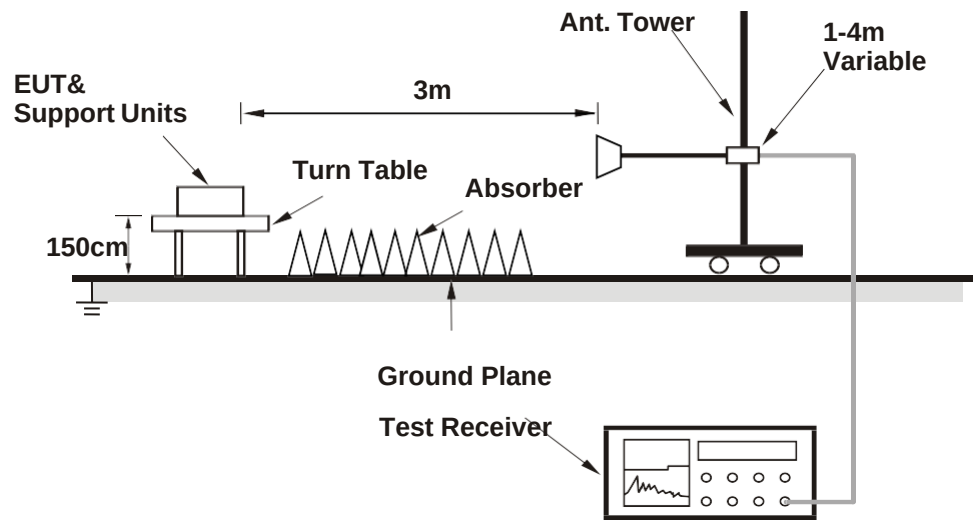
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

- Connected the EUT with the Notebook Computer which is placed on remote site.
- Controlling software has been activated to set the EUT on specific status.

4.1.7 Test Results

BELOW 1GHz WORST-CASE DATA:

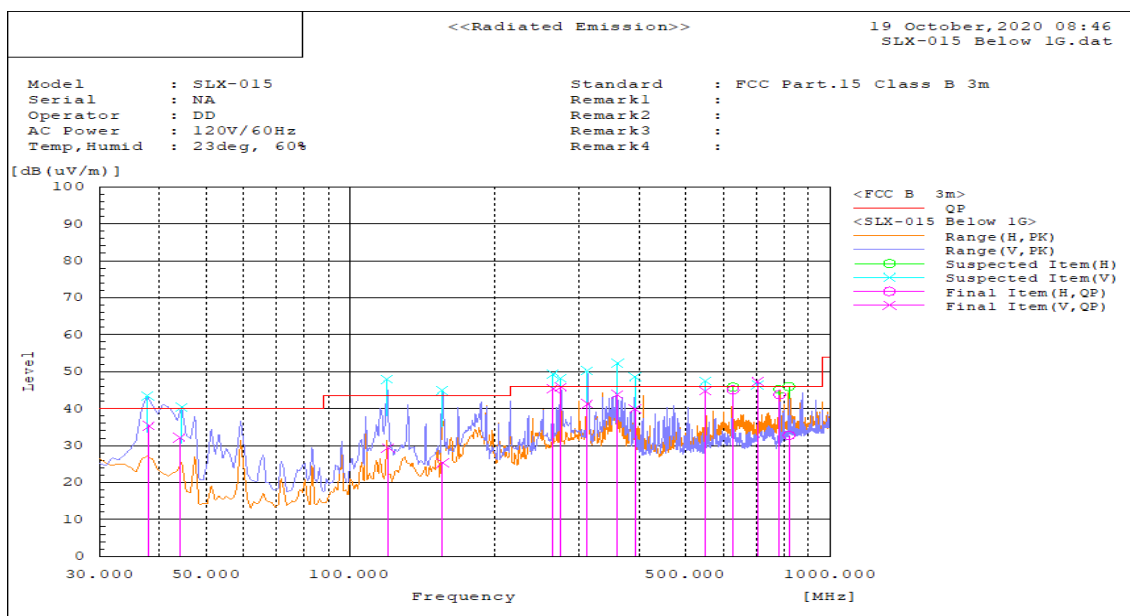
CHANNEL	802.11n Channel 7	DETECTOR FUNCTION	Quasi Peak
FREQUENCY RANGE	30MHz – 1GHz		

Antenna Polarity & Test Distance: Vertical and Horizontal at 3m

No.	Frequency (MHz)	Polarization (H/V)	Reading QP [dB(uV)]	Factor [dB(1/m)]	Level QP [dB(uV/m)]	Limit\QP dB(uV/m)	Margin QP [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	38.125	V	15.5	19.8	35.3	40	-4.7	143	327	Pass
2	44.102	V	16	16.1	32.1	40	-7.9	106	245	Pass
3	119.707	V	9.6	19.8	29.4	43.5	-14.1	100	358	Pass
4	155.63	V	6	19.3	25.3	43.5	-18.2	134	359	Pass
5	263.988	V	25.5	19.9	45.4	46	-0.6	181	346	Pass
6	274.259	V	25.8	20	45.8	46	-0.2	171	350	Pass
7	311.78	V	20.5	20.8	41.3	46	-4.7	152	349	Pass
8	359.985	V	21.9	21.9	43.8	46	-2.2	115	310	Pass
9	391.782	V	17.2	22.7	39.9	46	-6.1	115	0.1	Pass
10	548.54	V	19.3	25.5	44.8	46	-1.2	100	17	Pass
11	626.879	H	17.7	27.3	45	46	-1	106	147	Pass
12	783.527	H	14.6	29.6	44.2	46	-1.8	115	245	Pass
13	819.767	H	2.2	30.6	32.8	46	-13.2	100	83.5	Pass
14	705.234	V	16.8	28.5	45.3	46	-0.7	134	328	Pass

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB (1/m)).
2. Factor (dB (1/m)) = Antenna Factor (AF) (dB (1/m)) + Cable Loss (dB)
3. Margin = Level (dBuV/m) - Limit value (dBuV/m)



Above 1GHz Test Data:

Above 1GHz-25GHz – 802.11b – 2412MHz

Antenna Polarity & Test Distance: Vertical and Horizontal at 3m														
No	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	1306.538	H	56.5	69.4	-14.1	42.4	55.3	54	74	-11.6	-18.7	100	54.2	Pass
2	4824.938	H	35.3	48.4	-7.2	28.1	41.2	54	74	-25.9	-32.8	358	225.1	Pass
3	4825.646	V	36.3	49.8	-7.2	29.1	42.6	54	74	-24.9	-31.4	172	287.4	Pass

Above 1GHz-25GHz- 802.11b - 2437MHz

Antenna Polarity & Test Distance: Vertical and Horizontal at 3m														
No	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	4876.997	H	42.2	50.9	-7.2	35	43.7	54	74	-19	-30.3	129	316.1	Pass
2	2430.074	H	39.5	52.9	-10	29.5	42.9	54	74	-24.5	-31.1	222	173.2	Pass
3	1340.641	H	55.5	67.9	-14.1	41.4	53.8	54	74	-12.6	-20.2	100	58.1	Pass

Above 1GHz-25GHz – 802.11b – 2462MHz

Antenna Polarity & Test Distance: Vertical and Horizontal at 3m														
No	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	4925.977	H	35.3	48.8	-7.1	28.2	41.7	54	74	-25.8	-32.3	172	51.6	Pass
2	1985.763	H	39	56.3	-10.6	28.4	45.7	54	74	-25.6	-28.3	108	359.6	Pass
3	2462.051	V	40.9	53.8	-9.9	31	43.9	54	74	-23	-30.1	244	112.2	Pass

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) –Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value (dBuV/m)

Above 1GHz-25GHz- 802.11g - 2412MHz

Antenna Polarity & Test Distance: Vertical and Horizontal at 3m														
No	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK dB(uV/m)	Limit AV dB(uV/m)	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	1067.439	H	52.2	65.9	-15.5	36.7	50.4	54	74	-17.3	-23.6	201	0	Pass
2	4822.373	H	35	48.4	-7.2	27.8	41.2	54	74	-26.2	-32.8	115	338.8	Pass
3	5980.071	V	35.4	51.8	-4.3	31.1	47.5	54	74	-22.9	-26.5	100	26.9	Pass

Above 1GHz-25GHz – 802.11g – 2437MHz

Antenna Polarity & Test Distance: Vertical and Horizontal at 3m														
No	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK dB(uV/m)	Limit AV dB(uV/m)	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	1986.268	V	39.1	53.7	-10.6	28.5	43.1	54	74	-25.5	-30.9	144	287.3	Pass
2	2003.242	H	41.1	55.6	-10.5	30.6	45.1	54	74	-23.4	-28.9	122	355.2	Pass
3	4874.693	V	34.4	47.5	-7.2	27.2	40.3	54	74	-26.8	-33.7	215	210.7	Pass

Above 1GHz-25GHz- 802.11g - 2462MHz

Antenna Polarity & Test Distance: Vertical and Horizontal at 3m														
No	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK dB(uV/m)	Limit AV dB(uV/m)	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	1305.347	H	57.6	70.4	-14.1	43.5	56.3	54	74	-10.5	-17.7	108	43.6	Pass
2	4927.005	H	45.6	53	-7.1	38.5	45.9	54	74	-15.5	-28.1	102	132.2	Pass
3	7867.591	H	30.1	43.9	-0.2	29.9	43.7	54	74	-24.1	-30.3	294	125.8	Pass

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) –Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value (dBuV/m)

Above 1GHz-25GHz- 802.11n20 - 2412MHz

Antenna Polarity & Test Distance: Vertical and Horizontal at 3m														
No	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	2002.827	H	40.3	53.3	-10.5	29.8	42.8	54	74	-24.2	-31.2	115	237.9	Pass
2	4826.504	H	35	48.7	-7.2	27.8	41.5	54	74	-26.2	-32.5	144	0	Pass
3	5980.475	V	35.4	52.3	-4.3	31.1	48	54	74	-22.9	-26	100	34.8	Pass

Above 1GHz-25GHz – 802.11n20 – 2437MHz

Antenna Polarity & Test Distance: Vertical and Horizontal at 3m														
No	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	1288.234	H	56	69.1	-14.1	41.9	55	54	74	-12.1	-19	100	53.2	Pass
2	3736.219	V	38.1	52.5	-8.1	30	44.4	54	74	-24	-29.6	136	238.7	Pass
3	4873.219	H	34.5	48.4	-7.2	27.3	41.2	54	74	-26.7	-32.8	115	284.5	Pass

Above 1GHz-25GHz- 802.11n20 - 2462MHz

Antenna Polarity & Test Distance: Vertical and Horizontal at 3m														
No	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	1544.968	H	43.1	56.5	-15.1	28	41.4	54	74	-26	-32.6	194	65.3	Pass
2	2460.519	H	40.9	54.3	-9.9	31	44.4	54	74	-23	-29.6	165	211.5	Pass
3	4923.004	V	35.3	48.5	-7.1	28.2	41.4	54	74	25.8	-32.6	186	355.7	Pass

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) –Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value (dBuV/m)

Above 1GHz-25GHz- 802.11n40 - 2422MHz

Antenna Polarity & Test Distance: Vertical and Horizontal at 3m														
No	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	2002.002	H	40.9	57.2	-10.5	30.4	46.7	54	74	-23.6	-27.3	100	5.1	Pass
2	3736.192	H	39	55.4	-8.1	30.9	47.3	54	74	-23.1	-26.7	129	256.6	Pass
3	4843.612	H	34.7	47.8	-7.2	27.5	40.6	54	74	-26.5	-33.4	224	40.3	Pass

Above 1GHz-25GHz – 802.11n40 – 2437MHz

Antenna Polarity & Test Distance: Vertical and Horizontal at 3m														
No	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	1986.731	H	39.4	55.4	-10.6	28.8	44.8	54	74	-25.2	-29.2	100	4.2	Pass
2	4872.955	V	34.7	47.9	-7.2	27.5	40.7	54	74	-26.5	-33.3	373	273.7	Pass
3	6506.891	H	32.9	46.1	-3.1	29.8	43	54	74	-24.2	-31	372	186.6	Pass

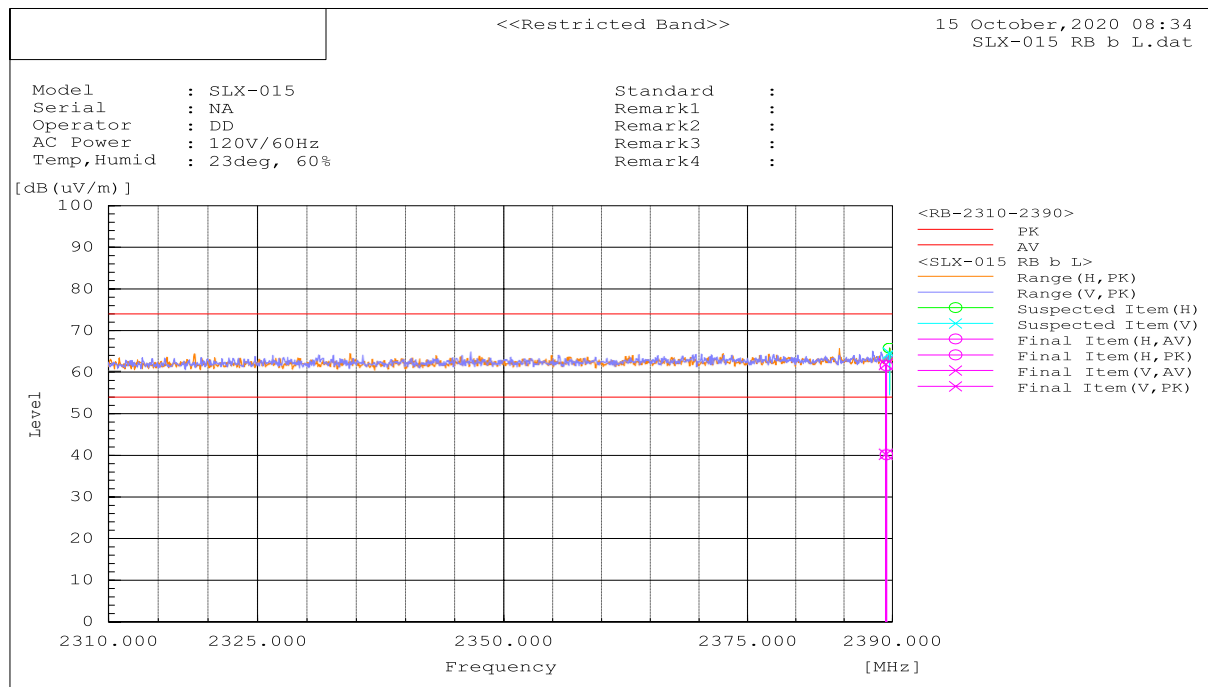
Above 1GHz-25GHz- 802.11n40 - 2452MHz

Antenna Polarity & Test Distance: Vertical and Horizontal at 3m														
No	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	2002.721	H	40.6	56.7	-10.5	30.1	46.2	54	74	-23.9	-27.8	102	1.3	Pass
2	4904.229	V	35.1	48.1	-7.1	28	41	54	74	-26	-33	337	0	Pass
3	8173.052	H	29.3	42.5	0.1	29.4	42.6	54	74	-24.6	-31.4	265	221.1	Pass

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) –Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value (dBuV/m)

Restricted Band (802.11b_Low Channel)



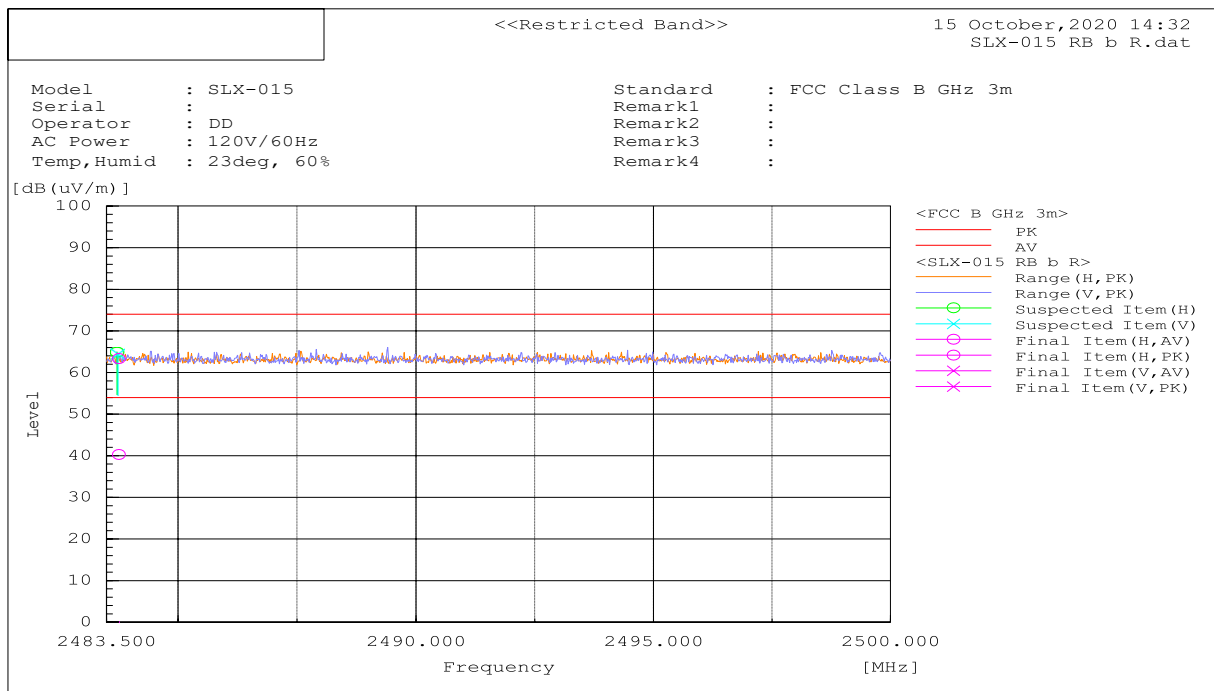
Antenna Polarity & Test Distance: Vertical and Horizontal at 3m

No.	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	2389.34	H	1	22.2	39.1	40.1	61.3	54	74	-13.9	-12.7	247	76.8	Pass
2	2389.26	V	1.1	22.6	39.1	40.2	61.7	54	74	-13.8	-12.3	137	52.8	Pass

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) –Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value (dBuV/m)

Restricted Band (802.11b_High Channel)



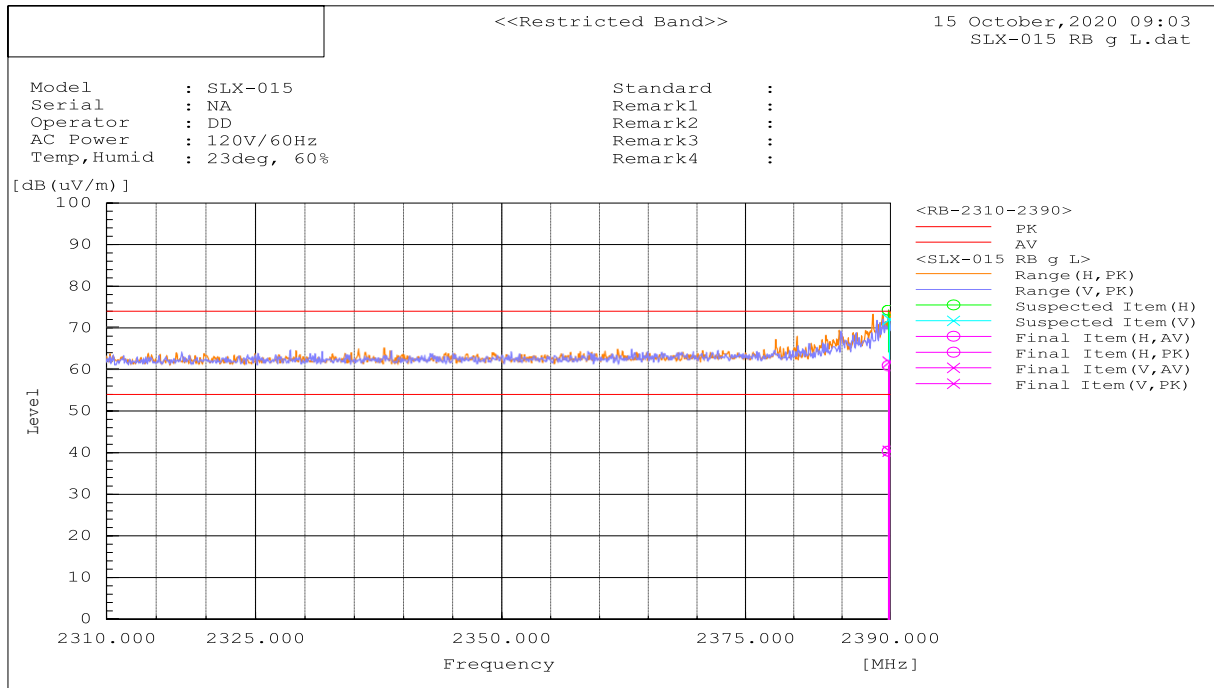
Antenna Polarity & Test Distance: Vertical and Horizontal at 3m

No.	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	2483.76	H	0.7	23.8	39.6	40.3	63.4	54	74	-13.7	-10.6	188	51.4	Pass
2	2483.30	V	0.6	22.1	39.6	40.2	61.7	54	74	-13.8	-12.3	230	159.2	Pass

REMARKS:

- Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
- Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) - Preamplifier Gain (dB)
- Margin = Level (dBuV/m) - Limit value (dBuV/m)

Restricted Band (802.11g_Low Channel)



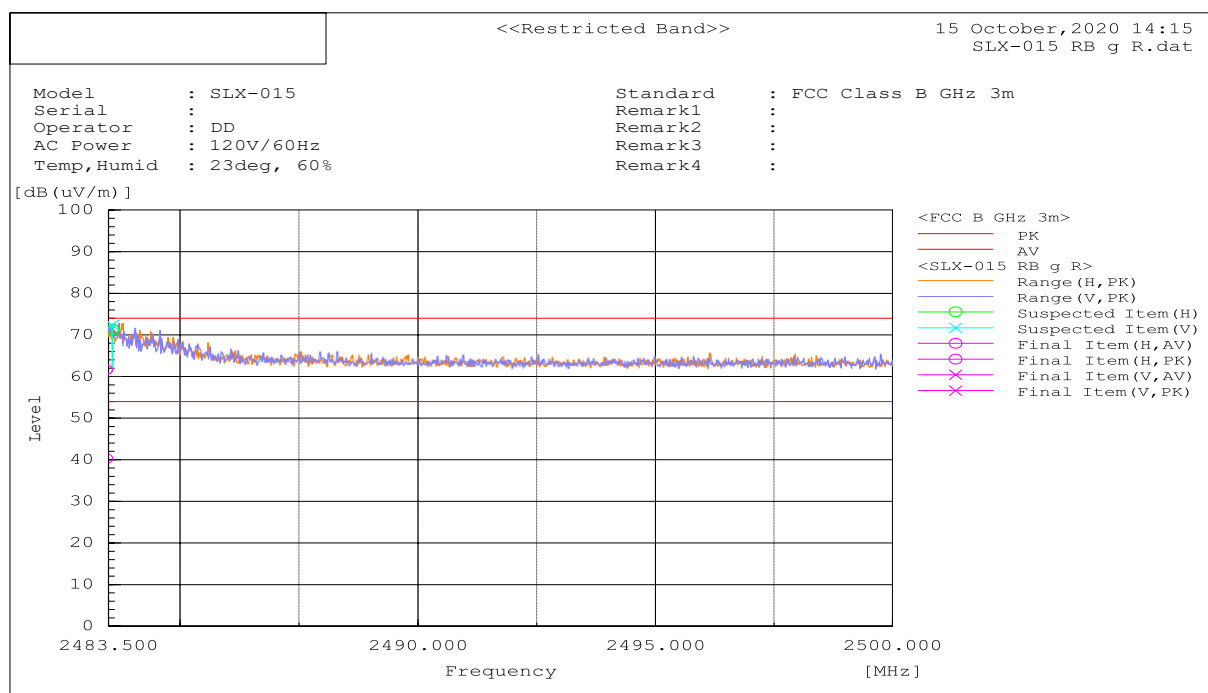
Antenna Polarity & Test Distance: Vertical and Horizontal at 3m

No.	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	2389.76	H	1.2	21.7	39.1	40.3	60.8	54	74	-13.7	-13.2	154	1.1	Pass
2	2389.84	V	1.3	22.6	39.1	40.4	61.7	54	74	-13.6	-12.3	171	59.3	Pass

REMARKS:

- Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
- Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) –Preamplifier Gain (dB)
- Margin = Level (dBuV/m) - Limit value (dBuV/m)

Restricted Band (802.11g_High Channel)



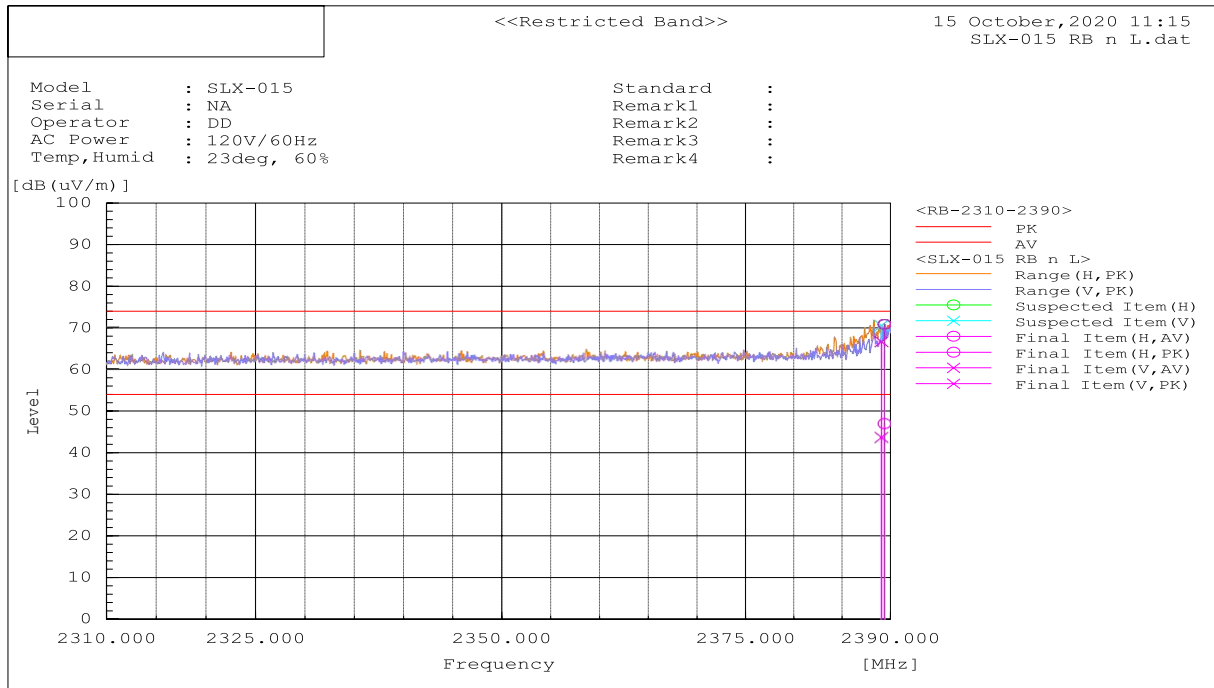
Antenna Polarity & Test Distance: Vertical and Horizontal at 3m

No.	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	2483.28	V	0.7	21.6	39.6	40.3	61.2	54	74	-13.7	-12.8	196	54.5	Pass
2	2483.45	H	0.7	22.1	39.6	40.3	61.7	54	74	-13.7	-12.3	112	316.4	Pass

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value (dBuV/m)

Restricted Band (802.11n_Low Channel)



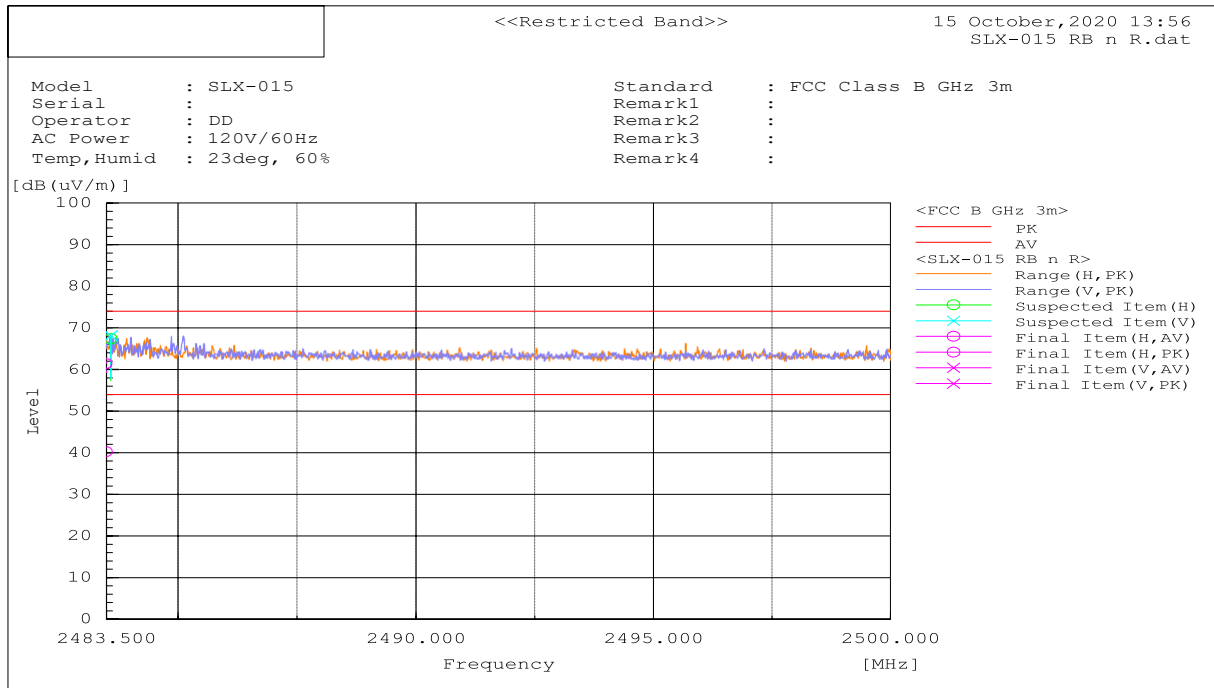
Antenna Polarity & Test Distance: Vertical and Horizontal at 3m

No.	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	2389.04	V	4.6	27.4	39.1	43.7	66.5	54	74	-10.3	-7.5	146	28.7	Pass
2	2389.36	H	7.8	31.6	39.1	46.9	70.7	54	74	-7.1	-3.3	188	96.2	Pass

REMARKS:

- Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
- Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) –Preamplifier Gain (dB)
- Margin = Level (dBuV/m) - Limit value (dBuV/m)

Restricted Band (802.11n_High Channel)



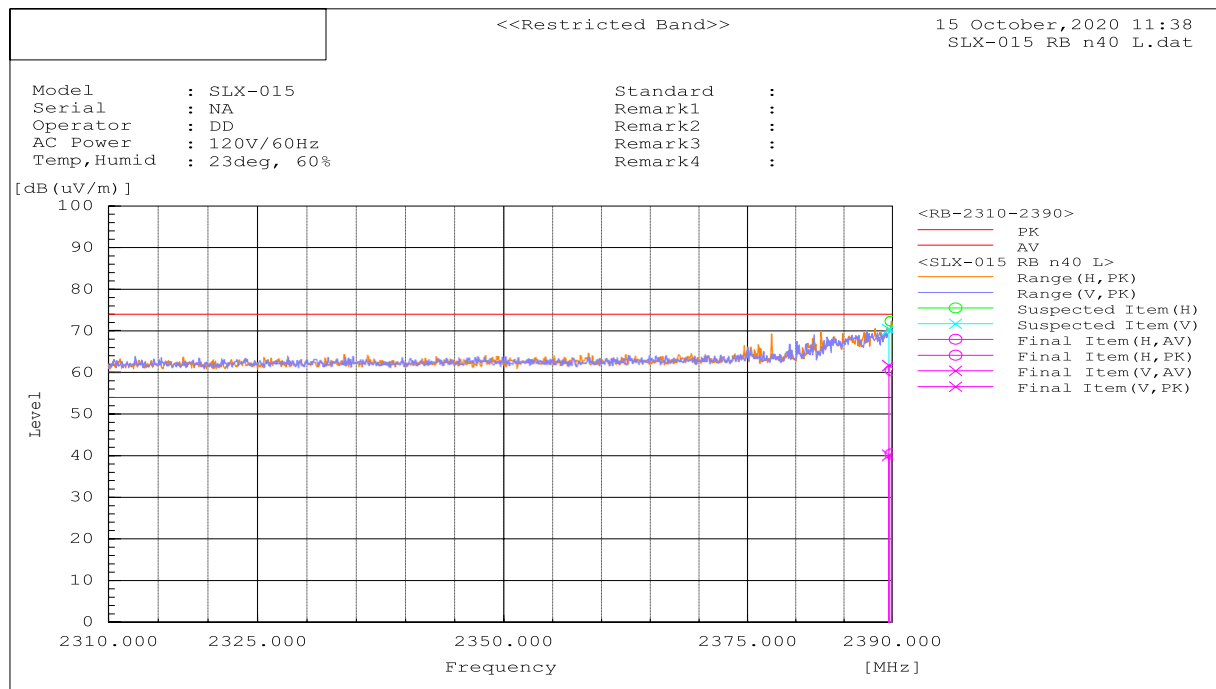
Antenna Polarity & Test Distance: Vertical and Horizontal at 3m

No.	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	2483.38	V	0.7	21	39.6	40.3	60.6	54	74	-13.7	-13.4	171	63.8	Pass
2	2483.49	H	0.7	21.8	39.6	40.3	61.4	54	74	-13.7	-12.6	188	18.4	Pass

REMARKS:

- Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
- Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) –Preamplifier Gain (dB)
- Margin = Level (dBuV/m) - Limit value (dBuV/m)

Restricted Band (802.11n40_Low Channel)



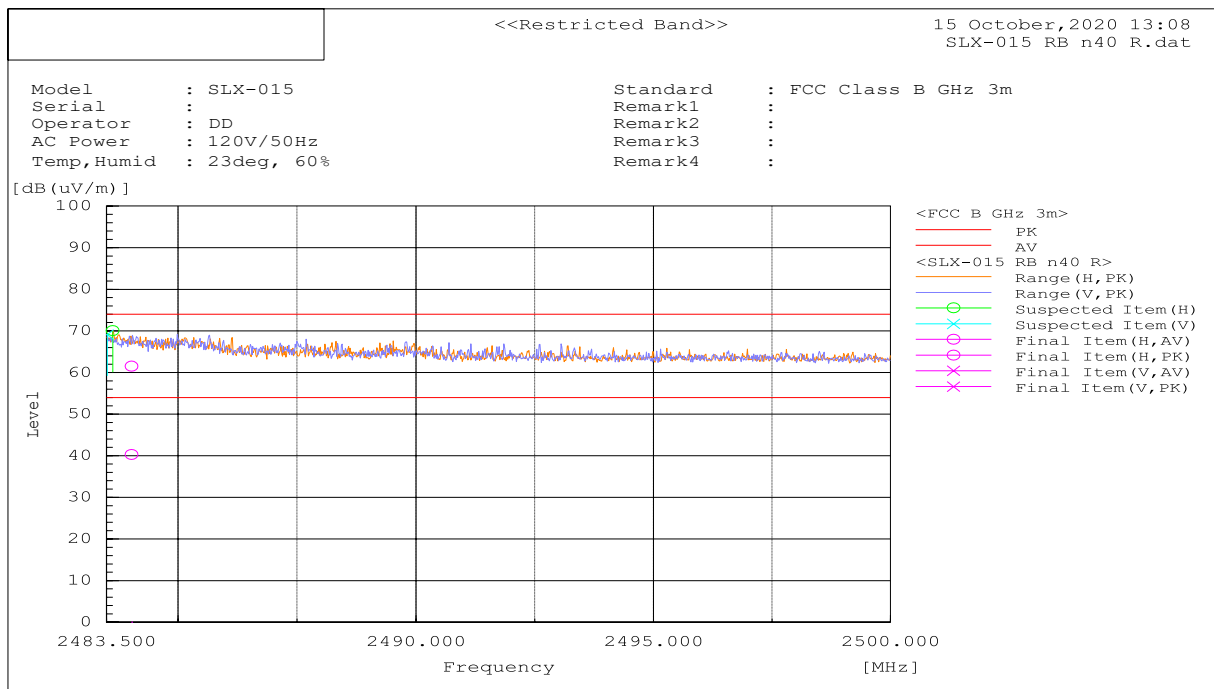
Antenna Polarity & Test Distance: Vertical and Horizontal at 3m

No.	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	2389.6	V	1.1	22.5	39.1	40.2	61.6	54	74	-13.8	-12.4	196	347.7	Pass
2	2389.84	H	1.3	21.3	39.1	40.4	60.4	54	74	-13.6	-13.6	104	62.3	Pass

REMARKS:

- Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
- Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) - Preamplifier Gain (dB)
- Margin = Level (dBuV/m) - Limit value (dBuV/m)

Restricted Band (802.11n40_High Channel)



Antenna Polarity & Test Distance: Vertical and Horizontal at 3m

No.	Frequency (MHz)	Polarization (H/V)	Reading AV [dB(uV)]	Reading PK [dB(uV)]	Factor [dB(1/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]	Height (cm)	Angle (Deg)	Pass/Fail
1	2483.23	V	0.7	23	39.6	40.3	62.6	54	74	-13.7	-11.4	298	351.8	Pass
2	2484.02	H	0.7	21.9	39.6	40.3	61.5	54	74	-13.7	-12.5	112	344.2	Pass

REMARKS:

- Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
- Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) –Preamplifier Gain (dB)
- Margin = Level (dBuV/m) - Limit value (dBuV/m)

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
EMI Test Receiver ROHDE & SCHWARZ	ESIB 40	100179	08/28/2020	08/28/2021
Transient Limiter ELECTRO-METRICS	EM-7600-5	106	12/31/2020	12/31/2021
LISN EMCO	3816/2NM	214372	01/10/2020	01/10/2021

4.2.3 Test Procedures

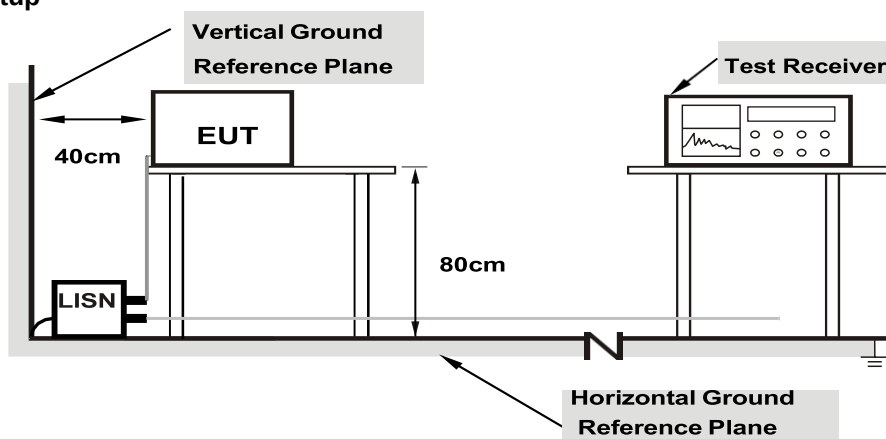
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Conditions

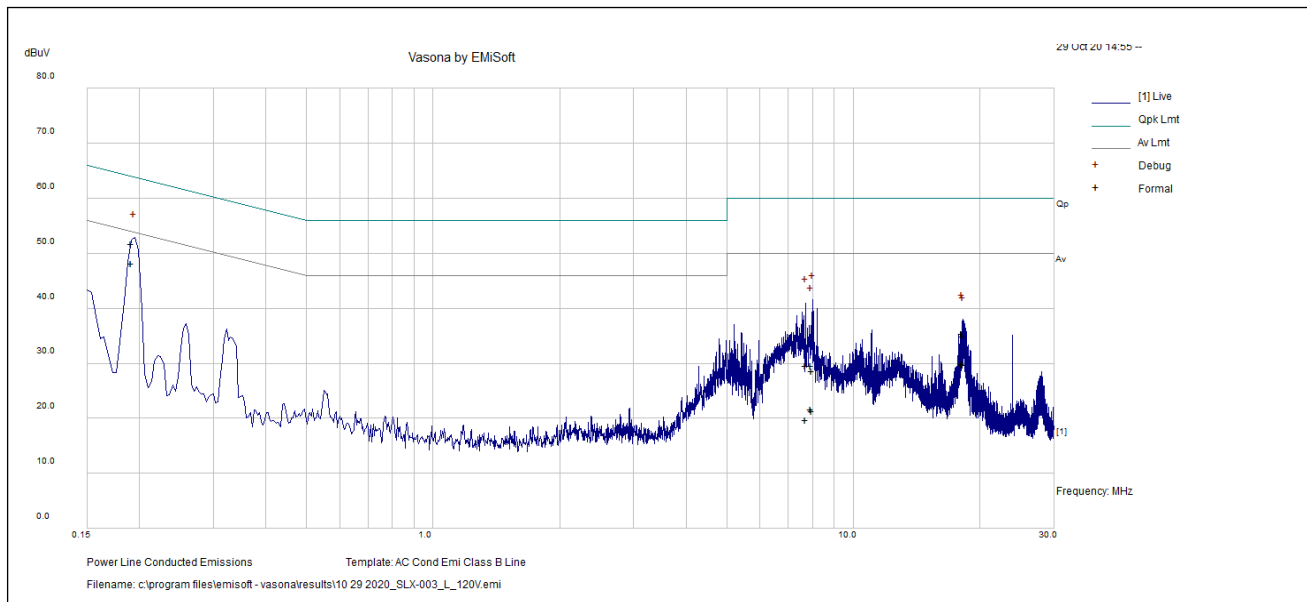
Same as 4.1.6.

4.2.7 Test Results

Phase			Line (L)			Detector Function		Quasi-Peak / Average		
No	Freq.	Raw	Cable Loss	Factors	Level	Measurement Type	Line	Limit	Margin	Pass /Fail
	[MHz]	(dBuV)	(dB)	(dB)	(dBuV)			(dBuV)	(dB)	
1	0.191591	42.42	9.36	0.04	51.82	Quasi Peak	Line	63.97	-12.15	Pass
2	18.28855	24.7	9.79	0.44	34.93	Quasi Peak	Line	60	-25.07	Pass
3	7.725693	19.9	9.58	0.16	29.64	Quasi Peak	Line	60	-30.36	Pass
4	18.21915	25.12	9.78	0.44	35.34	Quasi Peak	Line	60	-24.66	Pass
5	7.939136	19.77	9.58	0.17	29.52	Quasi Peak	Line	60	-30.48	Pass
6	7.994852	18.83	9.58	0.17	28.58	Quasi Peak	Line	60	-31.42	Pass
7	7.994852	11.5	9.58	0.17	21.26	Average	Line	50	-28.74	Pass
8	7.939136	11.98	9.58	0.17	21.73	Average	Line	50	-28.27	Pass
9	18.21915	19.64	9.78	0.44	29.86	Average	Line	50	-20.14	Pass
10	7.725693	10.03	9.58	0.16	19.77	Average	Line	50	-30.23	Pass
11	0.191591	38.8	9.36	0.04	48.2	Average	Line	53.97	-5.77	Pass
12	18.28855	19.45	9.79	0.44	29.67	Average	Line	50	-20.33	Pass

REMARKS:

1. The emission levels of other frequencies were very low against the limit.
2. Margin value = Emission level - Limit value
3. Emission Level = Correction Factor + Raw Value + Factors Value.

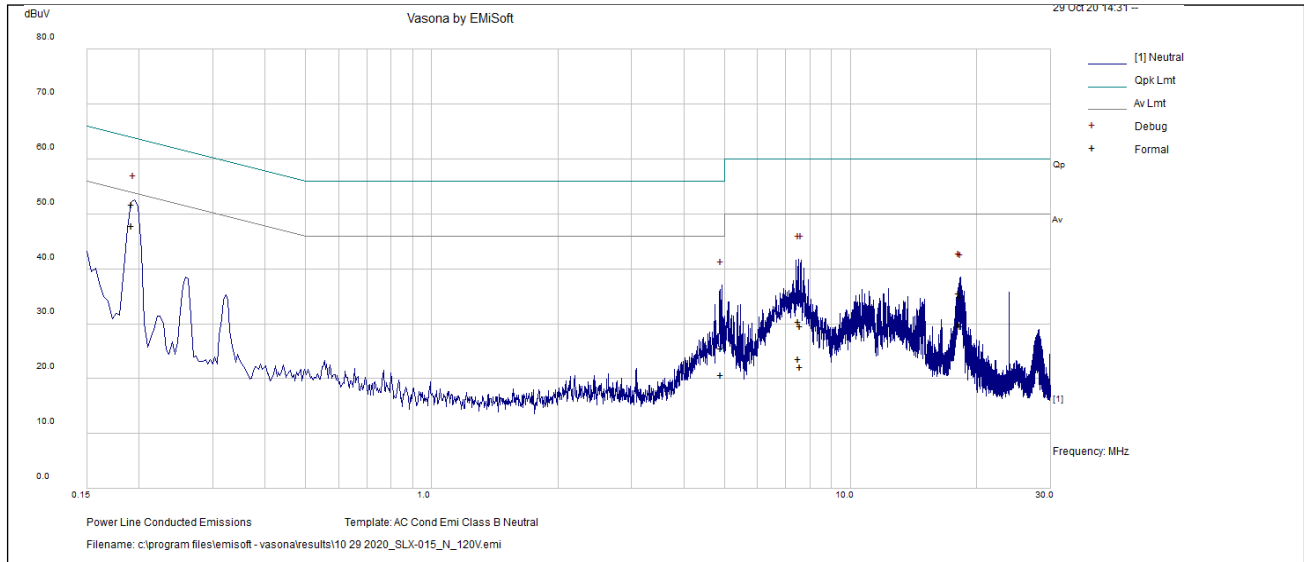


Phase	Neutral (N)	Detector Function	Quasi-Peak / Average
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No	Freq. [MHz]	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Measurement Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
1	0.192962	42.33	9.36	0.03	51.72	Quasi Peak	Neutral	63.91	-12.19	Pass
2	7.527401	20.6	9.58	0.15	30.33	Quasi Peak	Neutral	60	-29.67	Pass
3	7.626601	19.89	9.58	0.15	29.62	Quasi Peak	Neutral	60	-30.38	Pass
4	4.930615	15.91	9.56	0.08	25.55	Quasi Peak	Neutral	56	-30.45	Pass
5	18.21771	25.41	9.78	0.42	35.62	Quasi Peak	Neutral	60	-24.38	Pass
6	18.35783	24.74	9.79	0.43	34.96	Quasi Peak	Neutral	60	-25.04	Pass
7	0.192962	38.42	9.36	0.03	47.81	Average	Neutral	53.91	-6.1	Pass
8	7.527401	13.87	9.58	0.15	23.6	Average	Neutral	50	-26.4	Pass
9	7.626601	12.47	9.58	0.15	22.2	Average	Neutral	50	-27.8	Pass
10	4.930615	11.05	9.56	0.08	20.68	Average	Neutral	46	-25.32	Pass
11	18.21771	19.63	9.78	0.42	29.84	Average	Neutral	50	-20.16	Pass
12	18.35783	19.38	9.79	0.43	29.6	Average	Neutral	50	-20.4	Pass

REMARKS:

1. The emission levels of other frequencies were very low against the limit.
2. Margin value = Emission level - Limit value
3. Emission Level = Correction Factor + Raw Value + Factors Value.

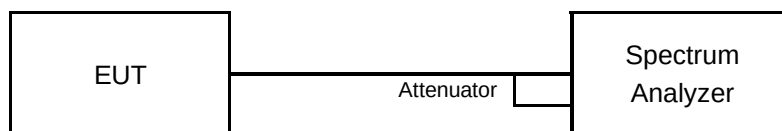


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.3.5 Deviation from Test Standard

No deviation.

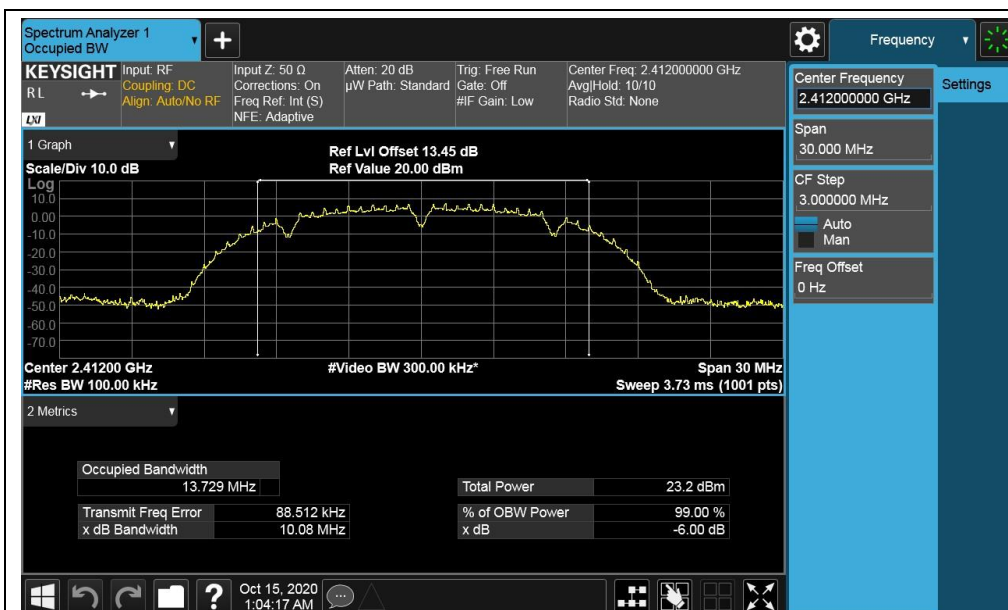
4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

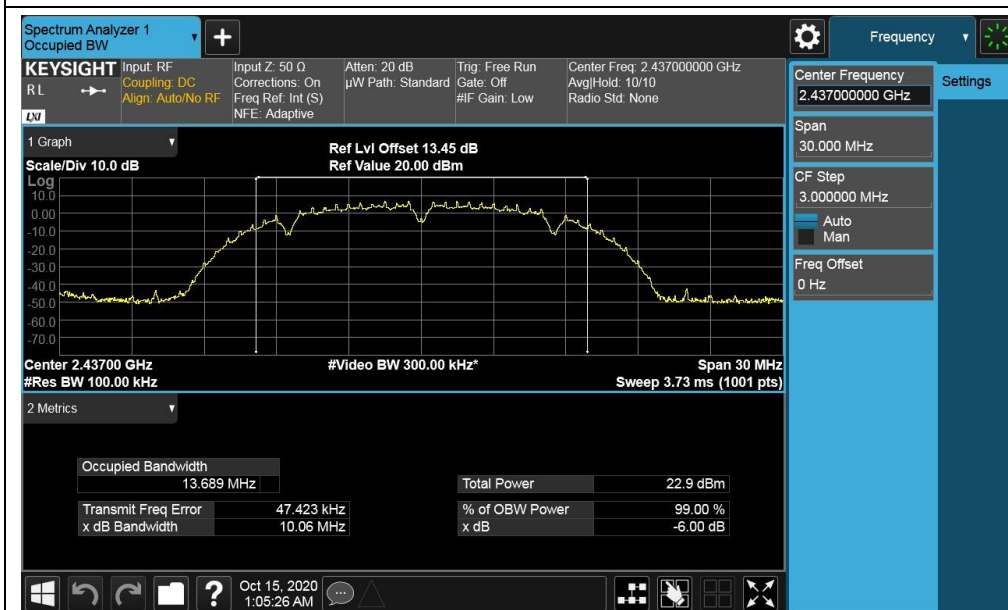
4.3.7 Test Result

Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
802.11b	1	2412	10.08	0.5	PASS
	6	2437	10.06	0.5	PASS
	11	2462	10.02	0.5	PASS
802.11g	1	2412	16.35	0.5	PASS
	6	2437	16.36	0.5	PASS
	11	2462	16.35	0.5	PASS
802.11n-HT20	1	2412	17.59	0.5	PASS
	6	2437	17.57	0.5	PASS
	11	2462	17.61	0.5	PASS
802.11n-HT40	3	2422	36.41	0.5	PASS
	6	2437	36.37	0.5	PASS
	9	2452	36.40	0.5	PASS

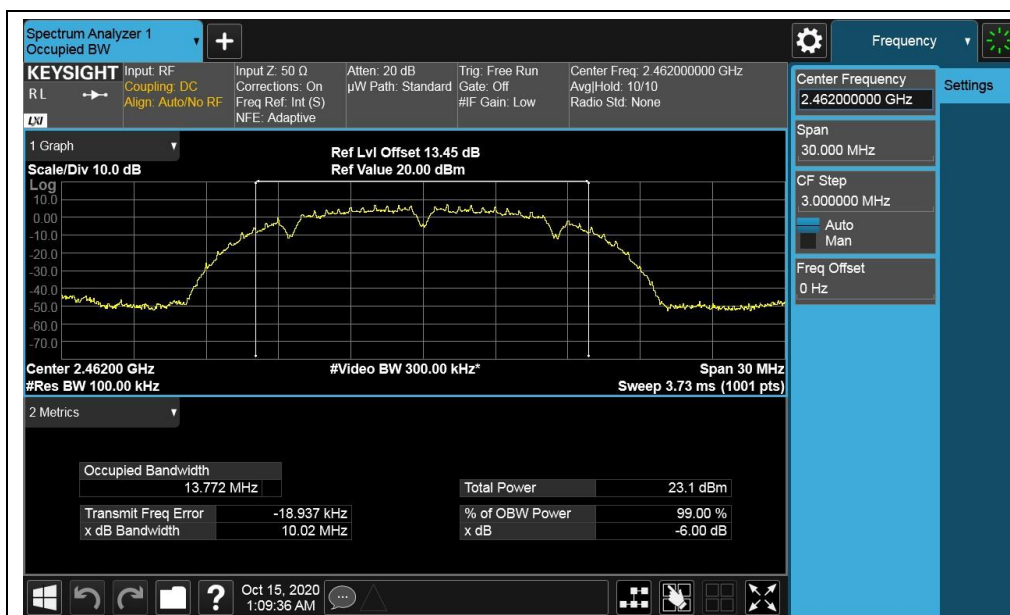
Test Plots:



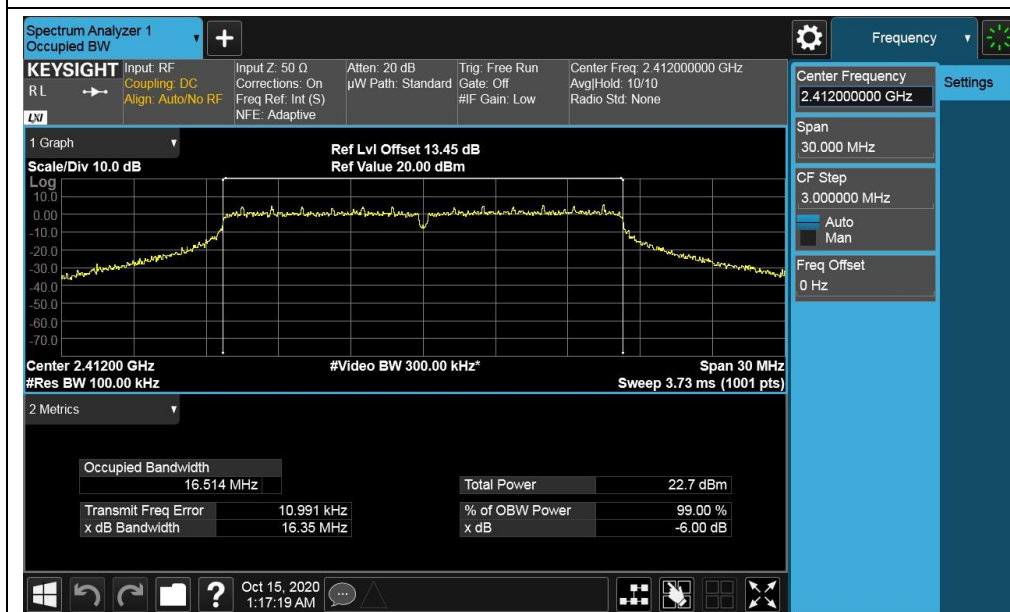
802.11b-2412MHz



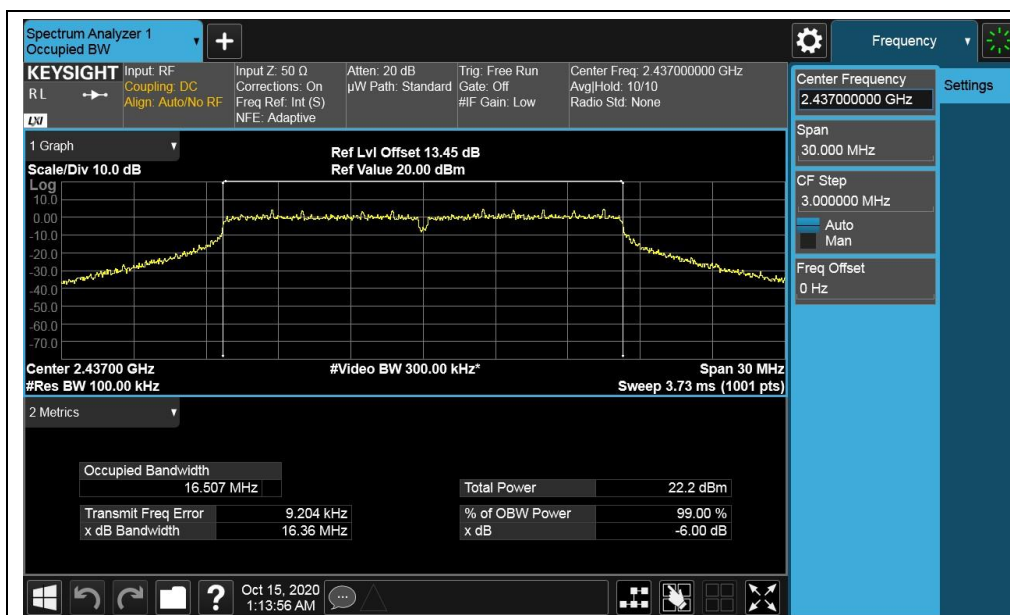
802.11b-2437MHz



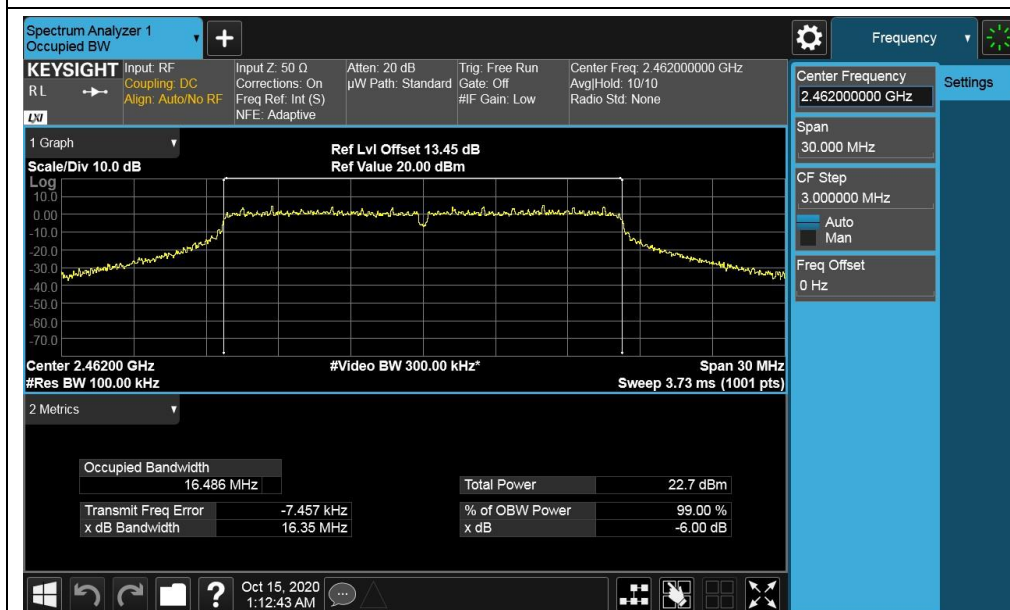
802.11b-2462MHz



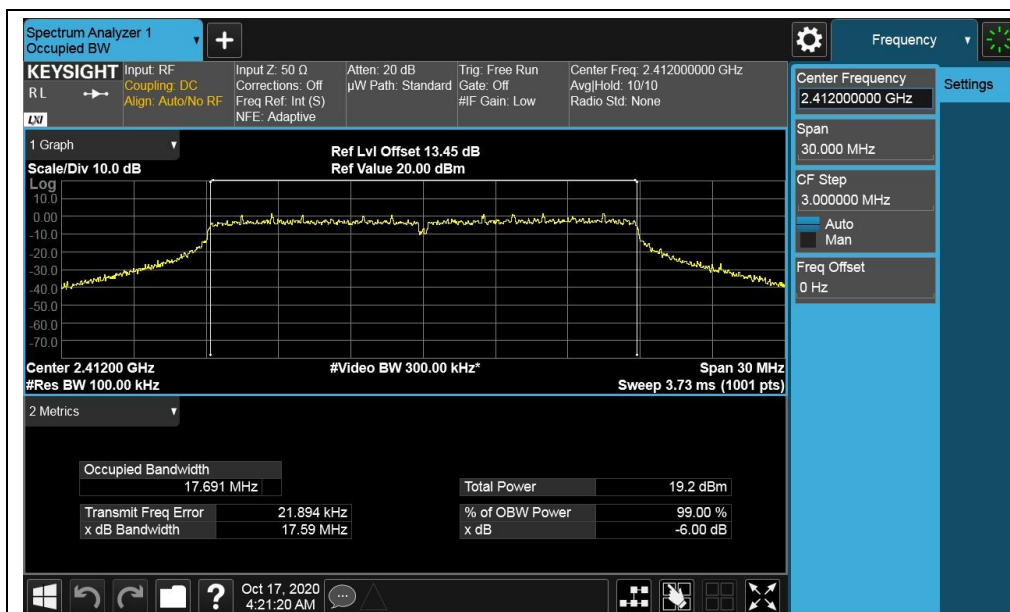
802.11g-2412MHz



802.11g-2437MHz



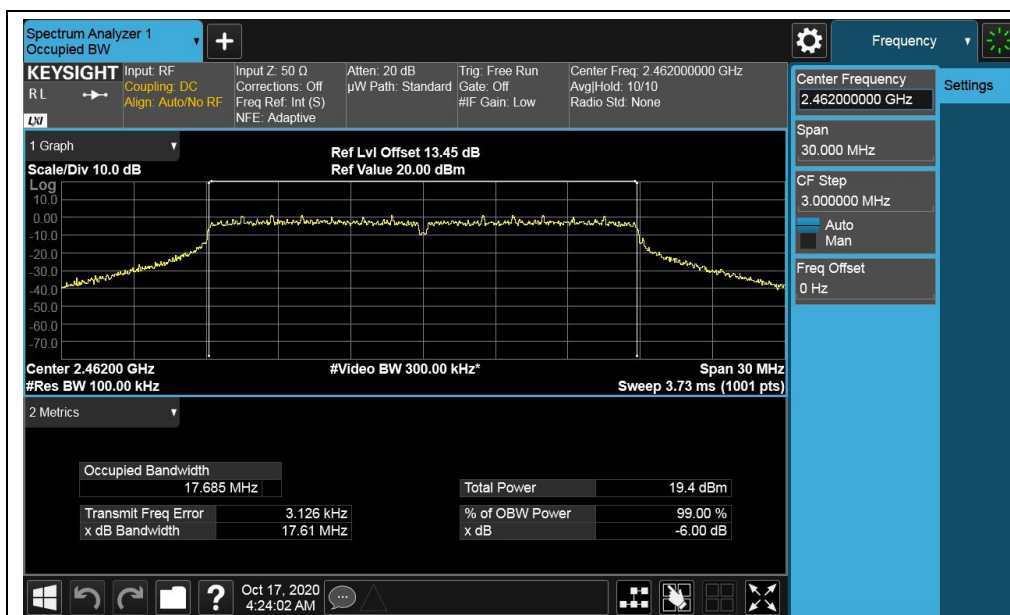
802.11g-2462MHz



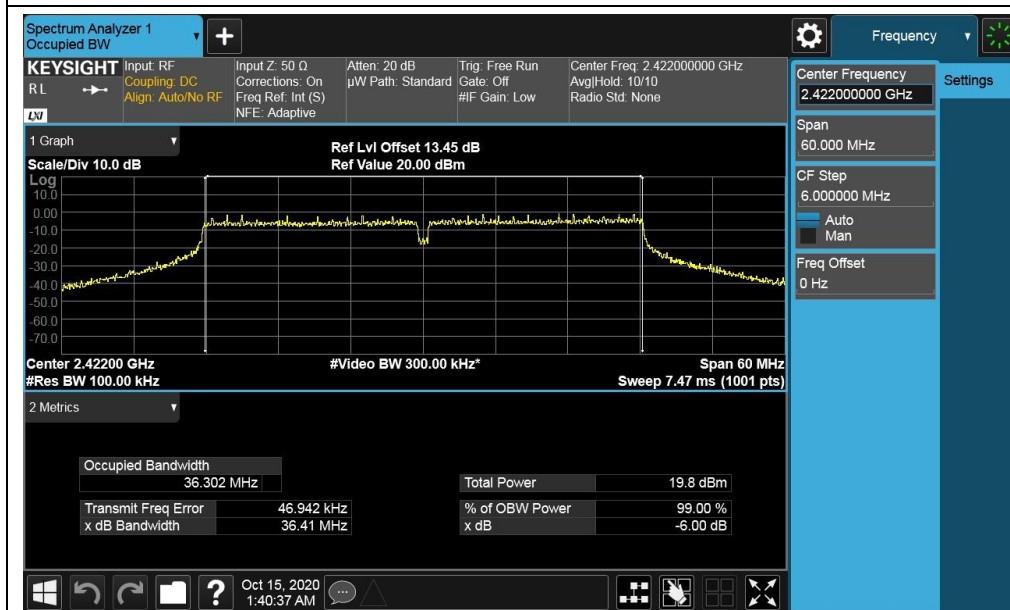
802.11n-HT20-2412MHz



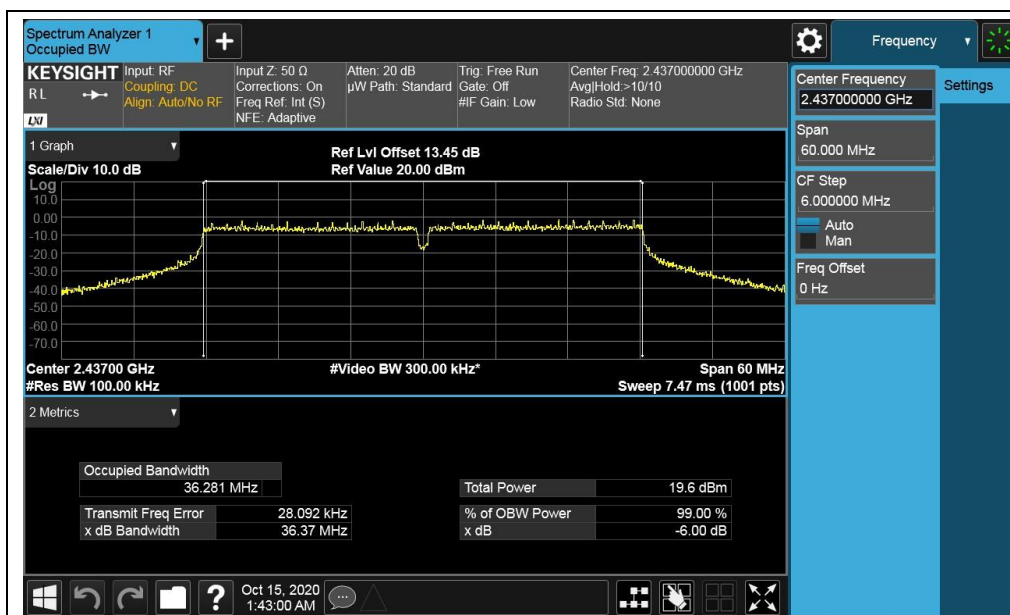
802.11n-HT20-2437MHz



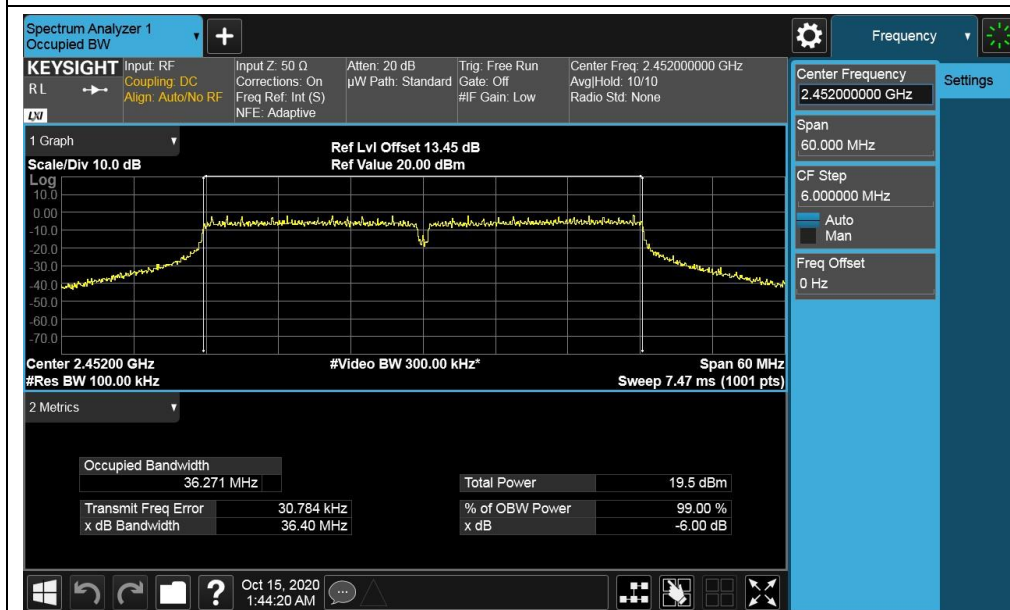
802.11n-HT20-2462MHz



802.11n-HT40-2422MHz



802.11n-HT40-2437MHz



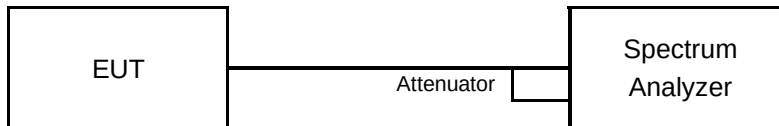
802.11n-HT40-2452MHz

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

- Set span to at least 1.5 times the OBW.
- Set RBW = 1-5% of the OBW, not to exceed 1 MHz.
- Set VBW $\geq 3 \times$ RBW.
- Number of points in sweep $\geq 2 \times$ span / RBW
- Sweep time = auto.
- Detector = RMS (i.e., power averaging), or sample detector mode.
- If transmit duty cycle $< 98\%$, use a sweep trigger with the level set to enable triggering only on full power pulses. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle $\geq 98\%$, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run”.
- Trace average at least 100 traces in power averaging (i.e., RMS) mode.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

802.11b

Chan.	Chan. Freq. (MHz)	Output Power (dBm)		Highest Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1			
1	2412	16.93	16.93	16.93	30	Pass
6	2437	16.73	17.06	17.06	30	Pass
11	2462	16.92	17.71	17.71	30	Pass

802.11g

Chan.	Chan. Freq. (MHz)	Output Power (dBm)		Highest Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1			
1	2412	16.88	16.84	16.88	30	Pass
6	2437	16.43	17.22	17.22	30	Pass
11	2462	16.84	17.49	17.49	30	Pass

802.11n-HT20

Chan.	Chan. Freq. (MHz)	Output Power (dBm)		Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1			
1	2412	13.56	13.80	16.69	30	Pass
6	2437	13.29	14.11	16.73	30	Pass
11	2462	13.58	14.41	17.02	30	Pass

802.11n-HT40

Chan.	Chan. Freq. (MHz)	Output Power (dBm)		Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1			
3	2422	14.60	14.45	17.54	30	Pass
6	2437	14.30	14.20	17.26	30	Pass
9	2452	14.24	14.11	17.19	30	Pass

Test Plots:
Chain 0:



802.11b-2412MHz



802.11b-2437MHz



802.11b-2462MHz



802.11g-2412MHz



802.11g-2437MHz



802.11g-2462MHz



802.11n-HT20-2412MHz



802.11n-HT20-2437MHz



802.11n-HT20-2462MHz



802.11n-HT40-2422MHz



802.11n-HT40-2437MHz



802.11n-HT40-2452MHz

Chain 1:



802.11b-2412MHz



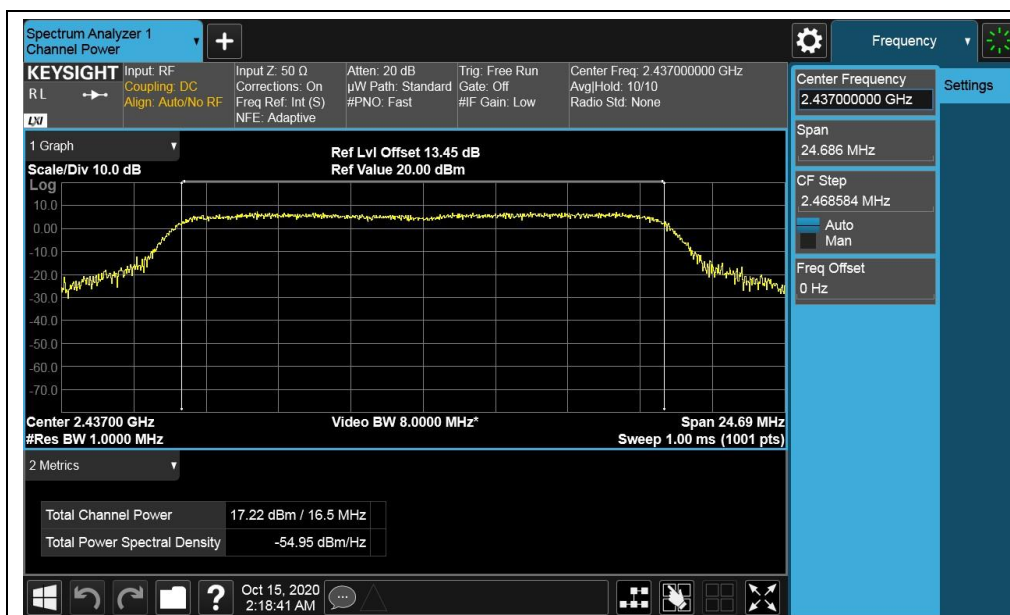
802.11b-2437MHz



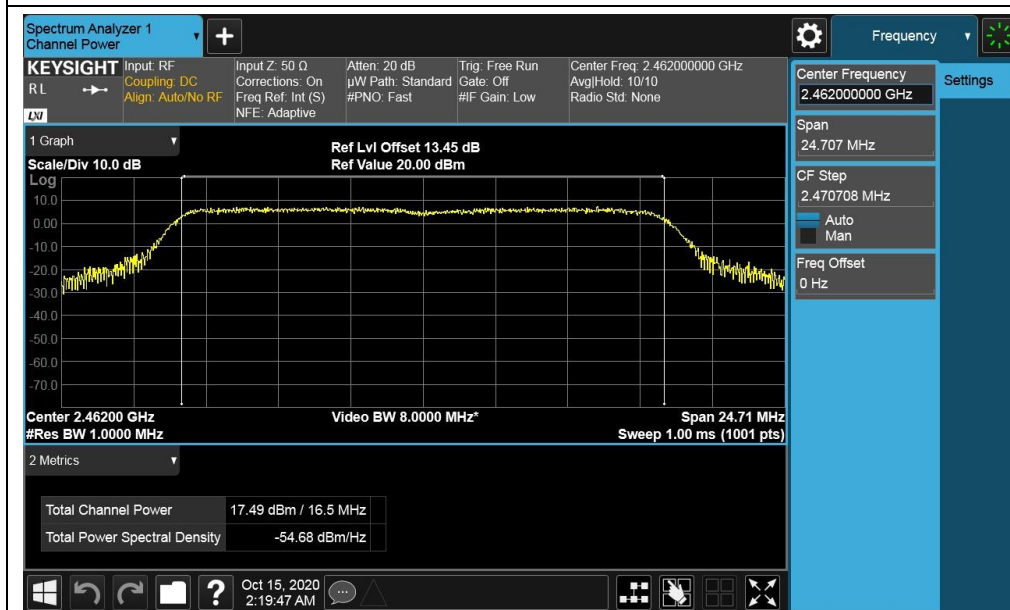
802.11b-2462MHz



802.11g-2412MHz



802.11g-2437MHz



802.11g-2462MHz



802.11n-HT20-2412MHz



802.11n-HT20-2437MHz



802.11n-HT20-2462MHz



802.11n-HT40-2422MHz



802.11n-HT40-2437MHz



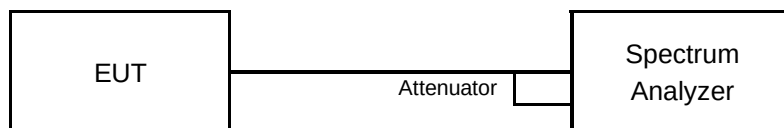
802.11n-HT40-2452MHz

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set the VBW $\geq 3 \times \text{RBW}$.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)		Highest PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1			
1	2412	-4.90	-4.92	-4.90	8	Pass
6	2437	-7.09	-6.88	-6.88	8	Pass
11	2462	-6.41	-5.54	-5.54	8	Pass

802.11g

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)		Highest PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1			
1	2412	-6.63	-6.46	-6.46	8	Pass
6	2437	-7.58	-7.09	-7.09	8	Pass
11	2462	-5.81	-6.21	-5.81	8	Pass

802.11n-HT20

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)		Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1			
1	2412	-10.26	-10.51	-7.37	8	Pass
6	2437	-10.74	-9.89	-7.28	8	Pass
11	2462	-10.04	-9.40	-6.70	8	Pass

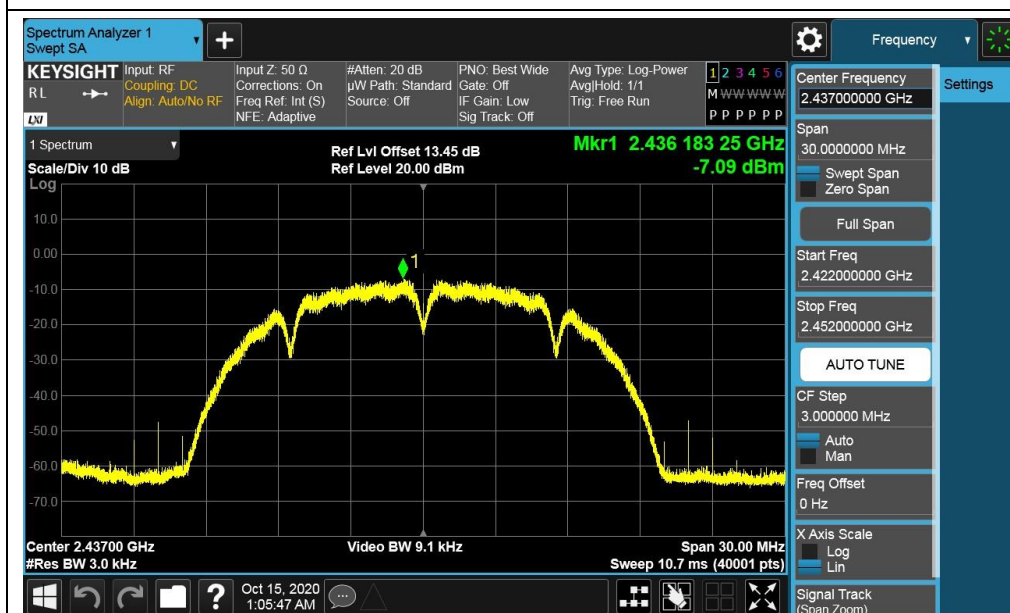
802.11n-HT40

Chan.	Chan. Freq. (MHz)	PSD (dBm/3kHz)		Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
		Chain 0	Chain 1			
3	2422	-11.40	-11.82	-8.59	8	Pass
6	2437	-12.00	-11.93	-8.95	8	Pass
9	2452	-11.77	-12.07	-8.91	8	Pass

Test Plots:
Chain 0:



802.11b-2412MHz



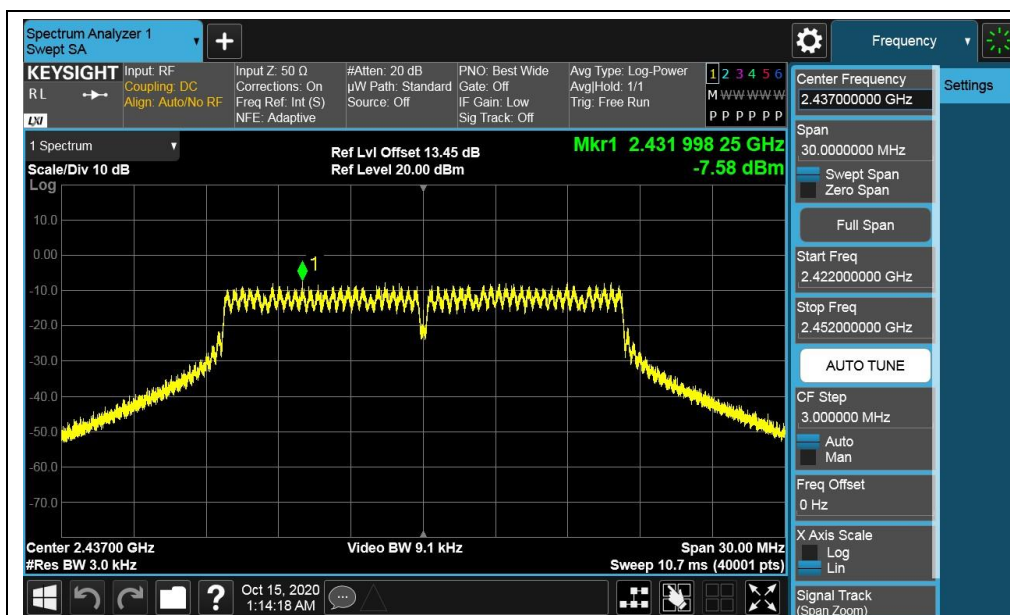
802.11b-2437MHz



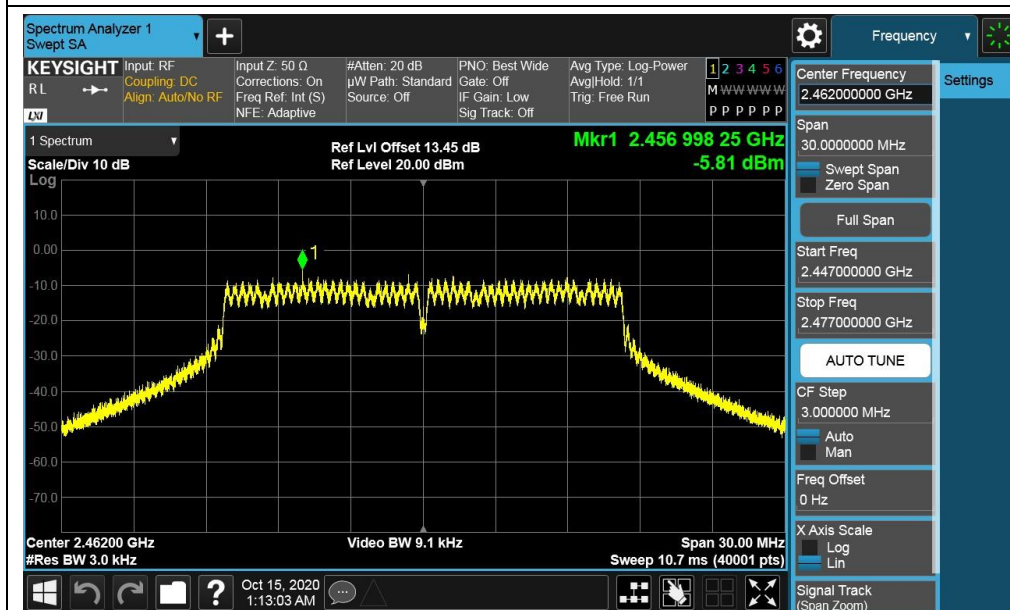
802.11b-2462MHz



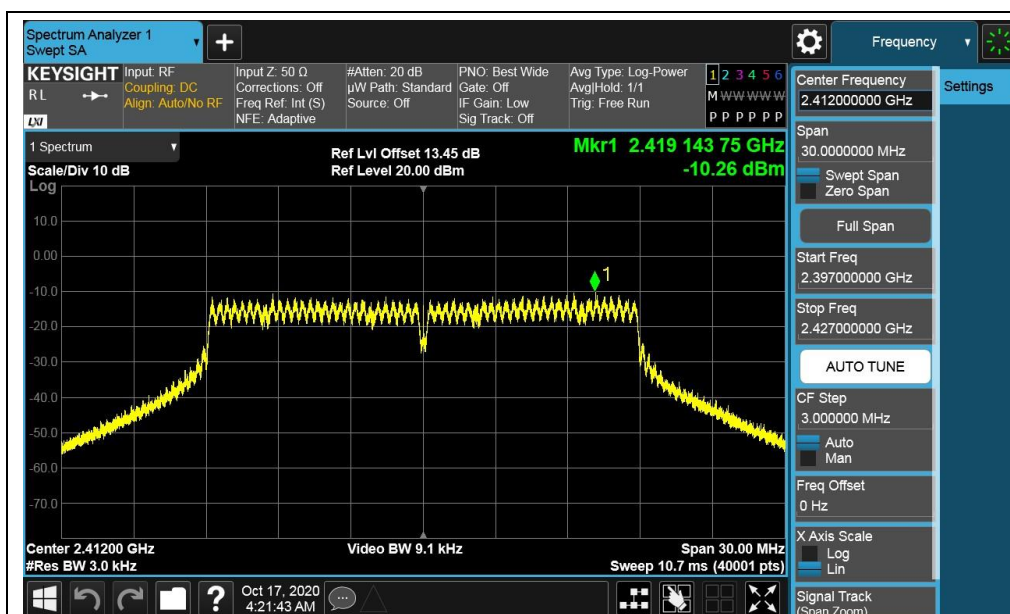
802.11g-2412MHz



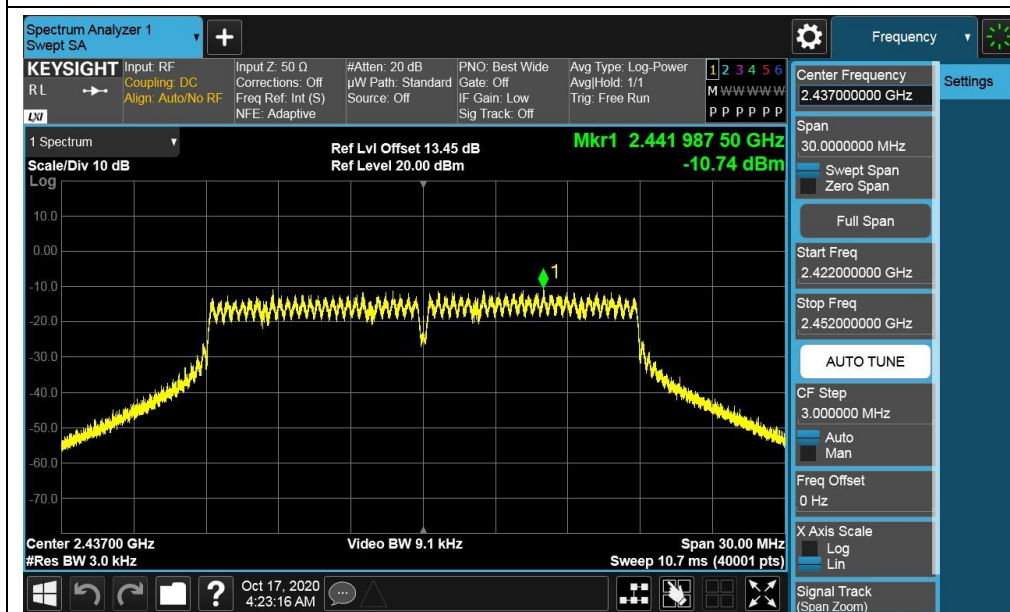
802.11g-2437MHz



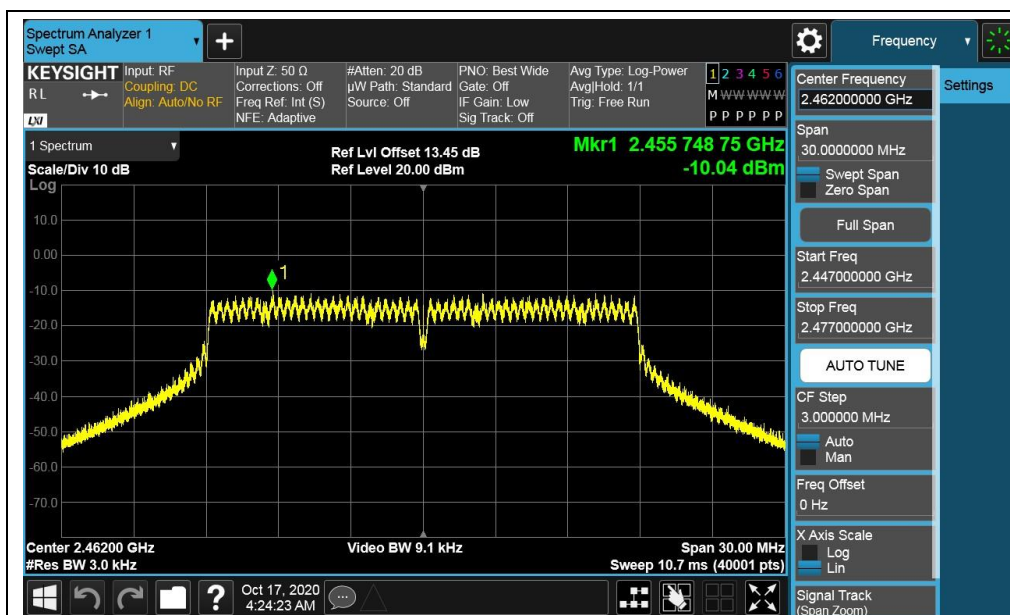
802.11g-2462MHz



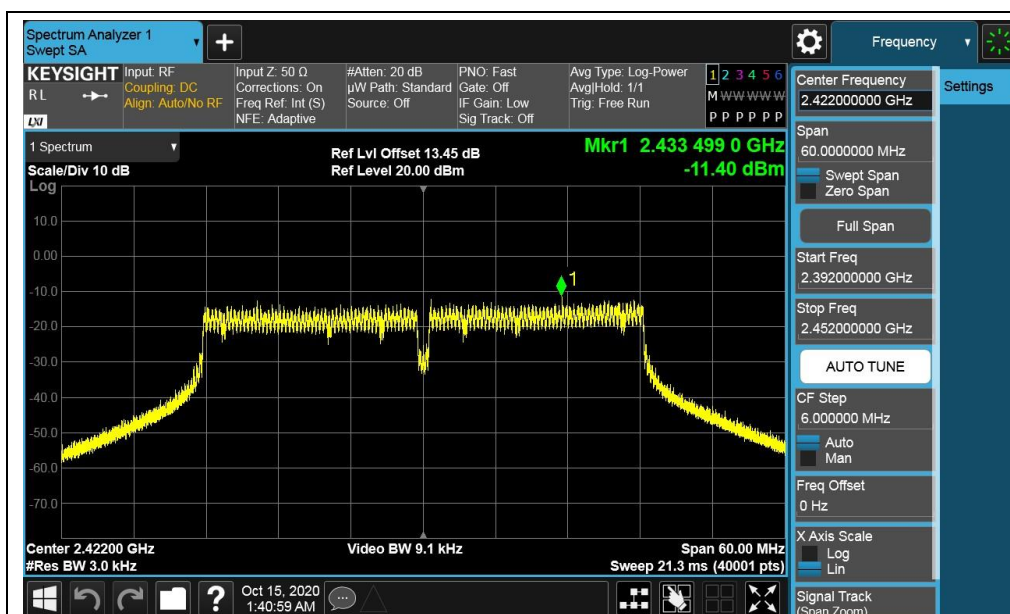
802.11n-HT20-2412MHz



802.11n-HT20-2437MHz



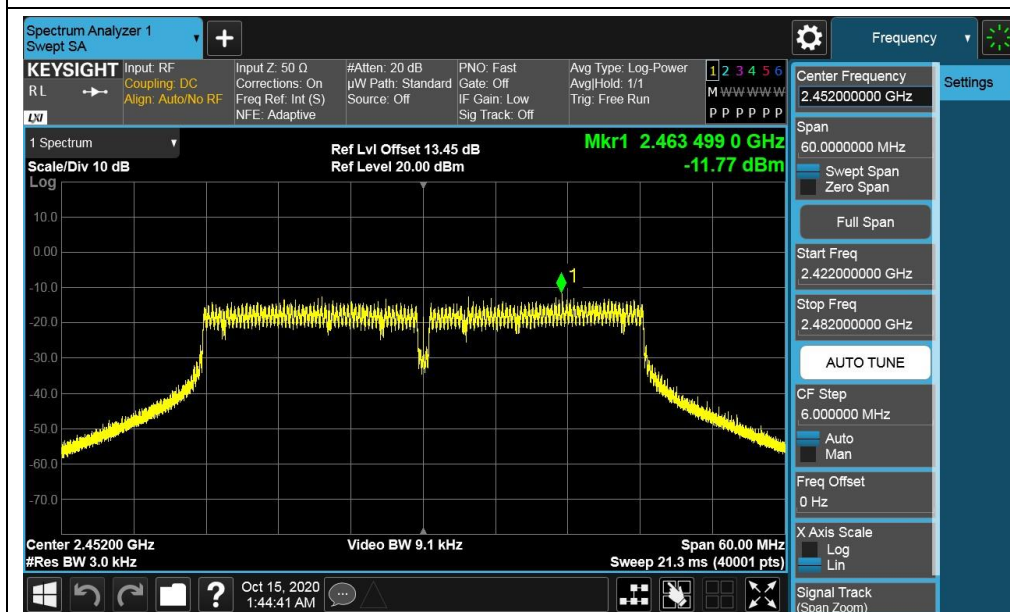
802.11n-HT20-2462MHz



802.11n-HT40-2422MHz



802.11n-HT40-2437MHz



802.11n-HT40-2452MHz

Chain 1:



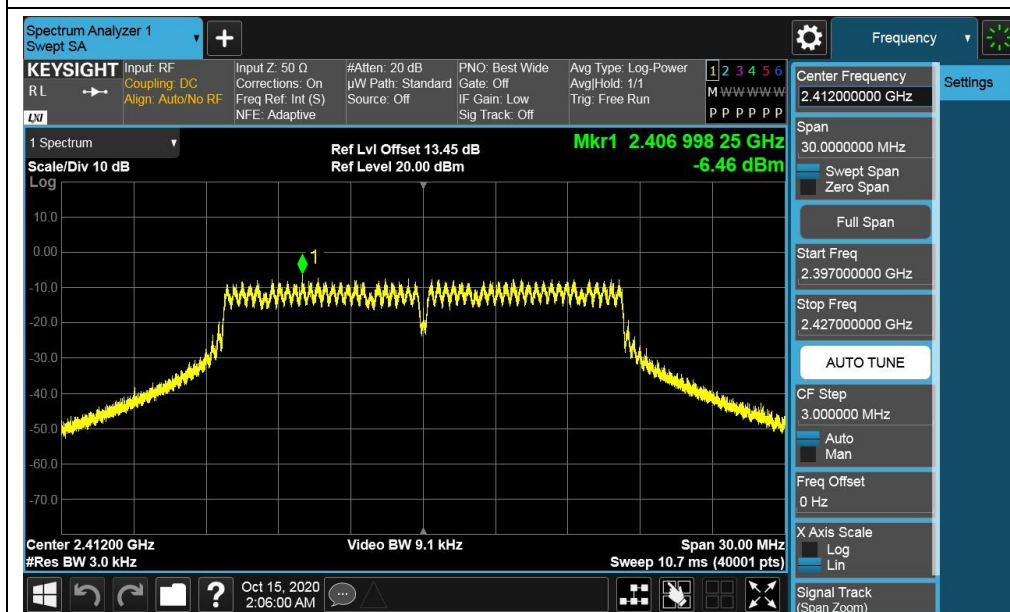
802.11b-2412MHz



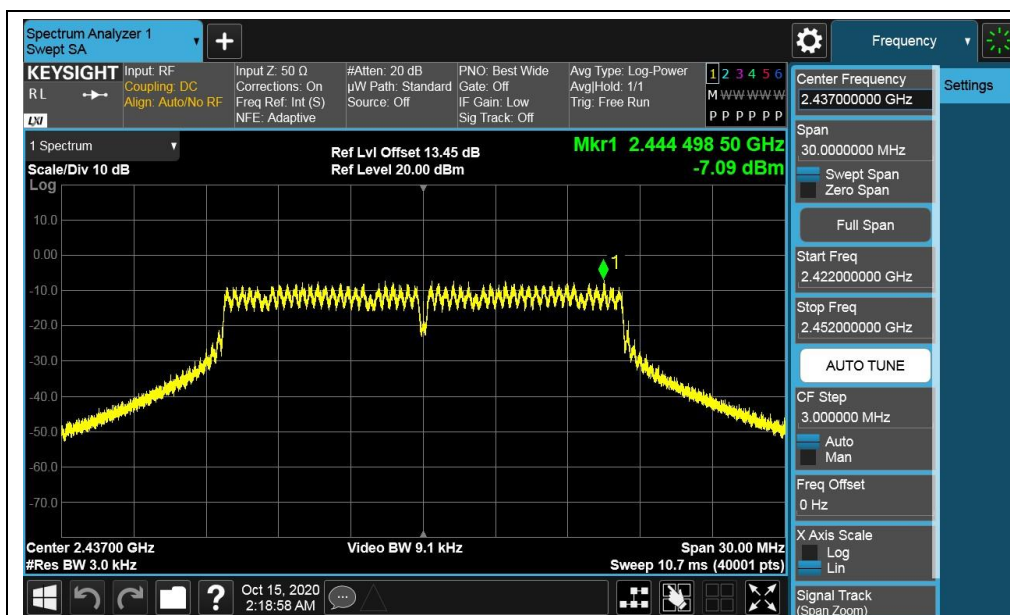
802.11b-2437MHz



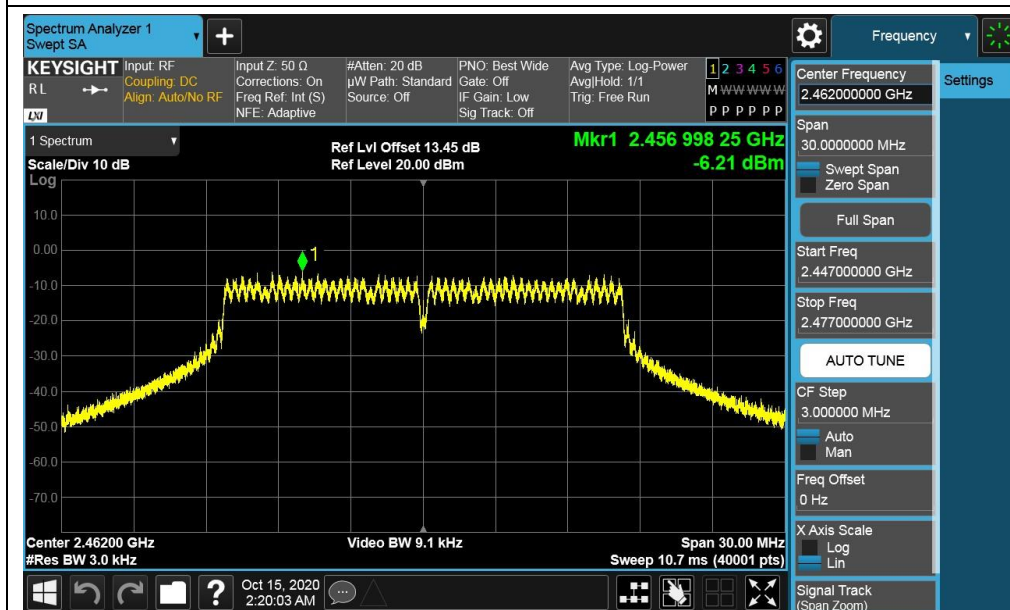
802.11b-2462MHz



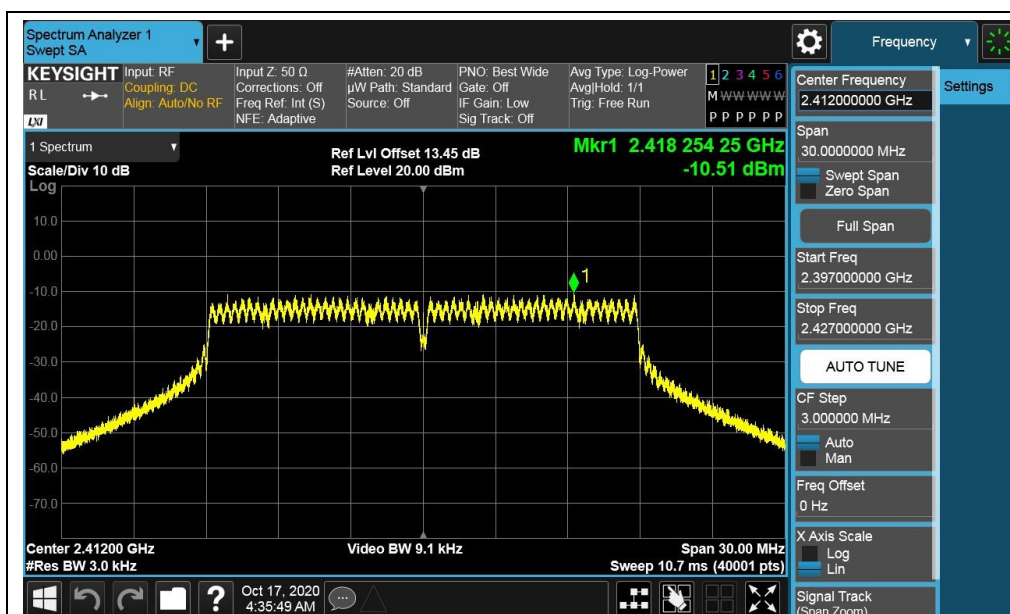
802.11g-2412MHz



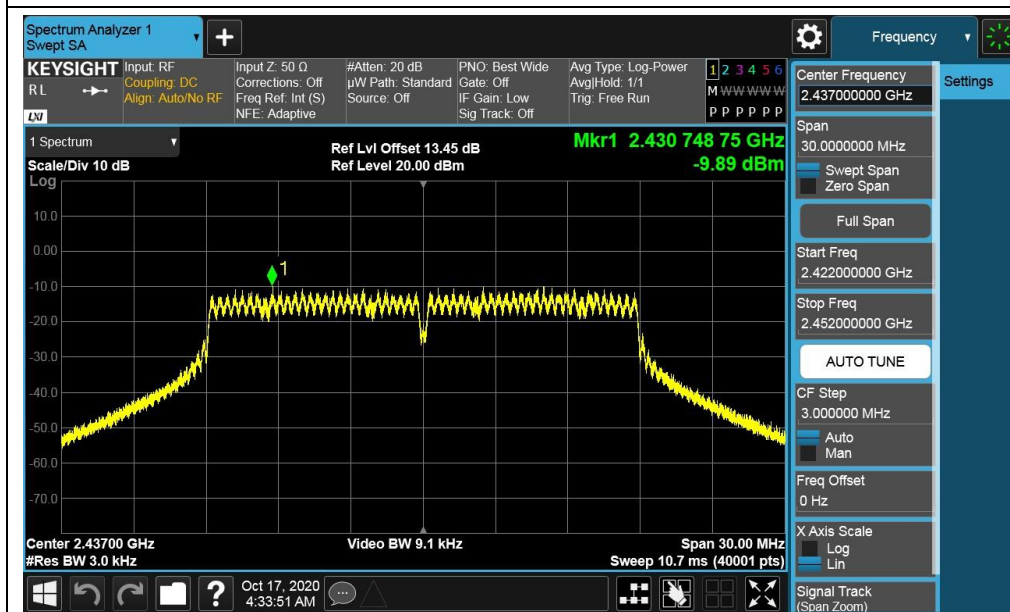
802.11g-2437MHz



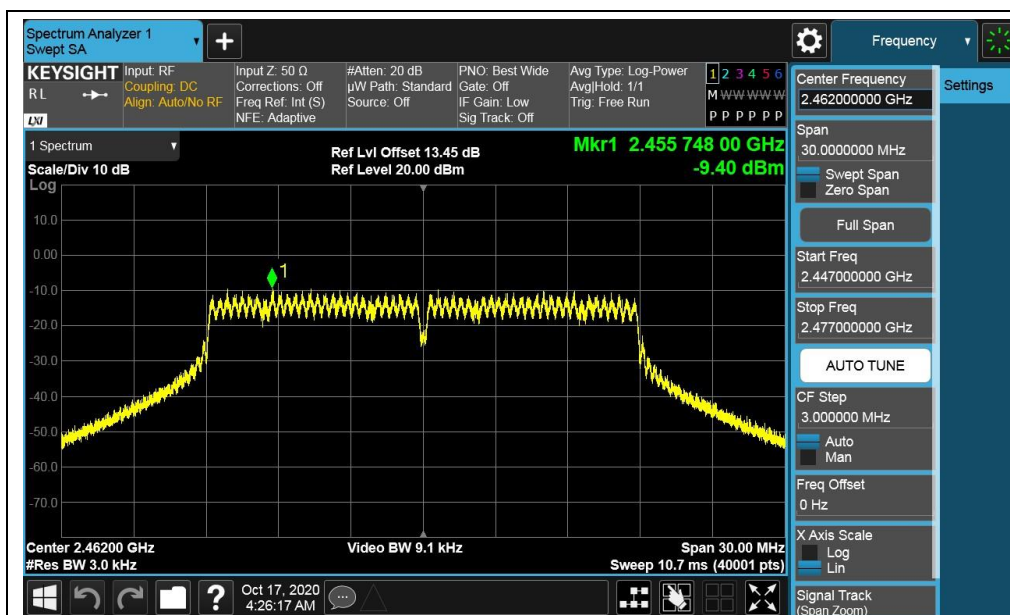
802.11g-2462MHz



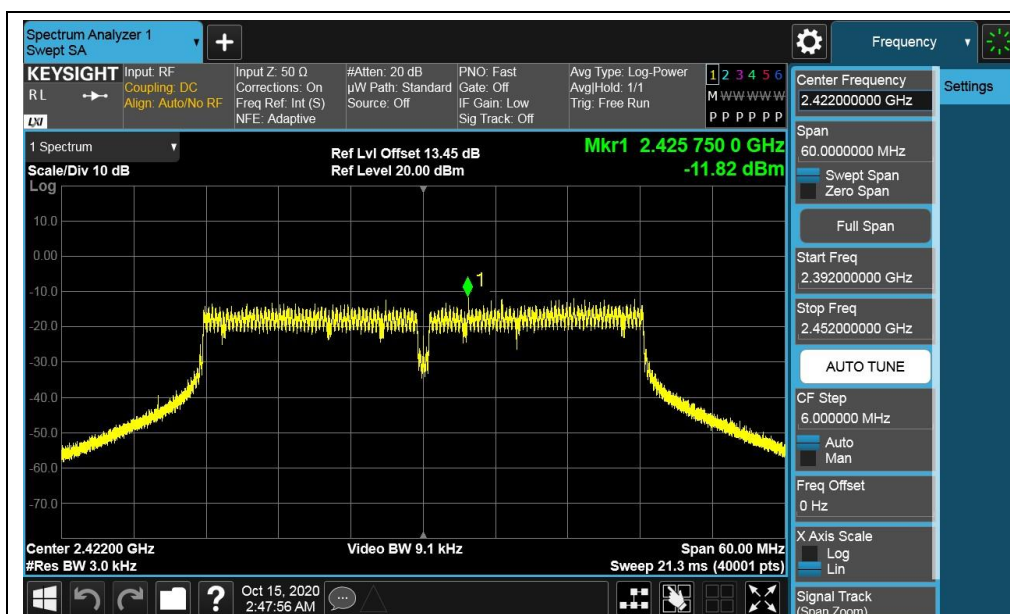
802.11n-HT20-2412MHz



802.11n-HT20-2437MHz



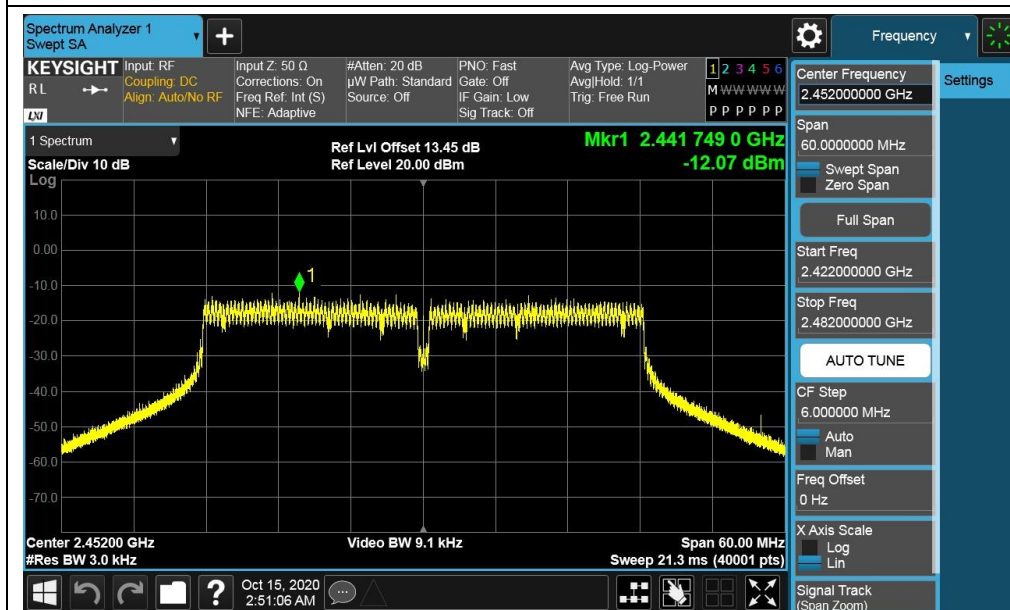
802.11n-HT20-2462MHz



802.11n-HT40-2422MHz



802.11n-HT40-2437MHz



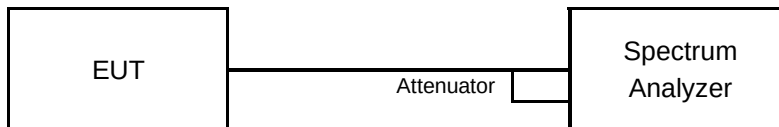
802.11n-HT40-2452MHz

4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

Below 30dB of the highest emission level of operating band (in 100 kHz Resolution Bandwidth).

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.6.5 Deviation from Test Standard

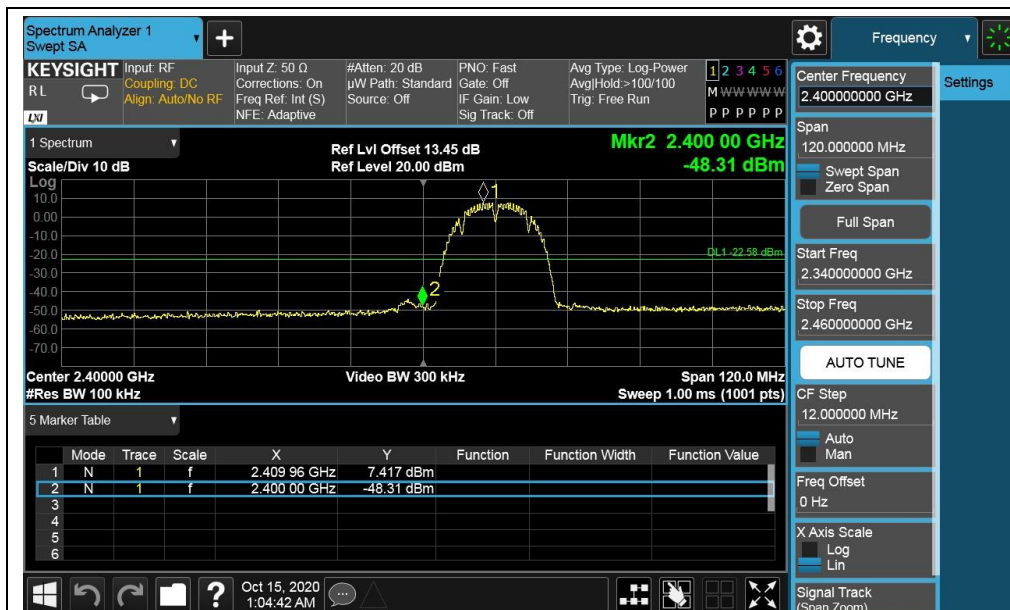
No deviation.

4.6.6 EUT Operating Condition

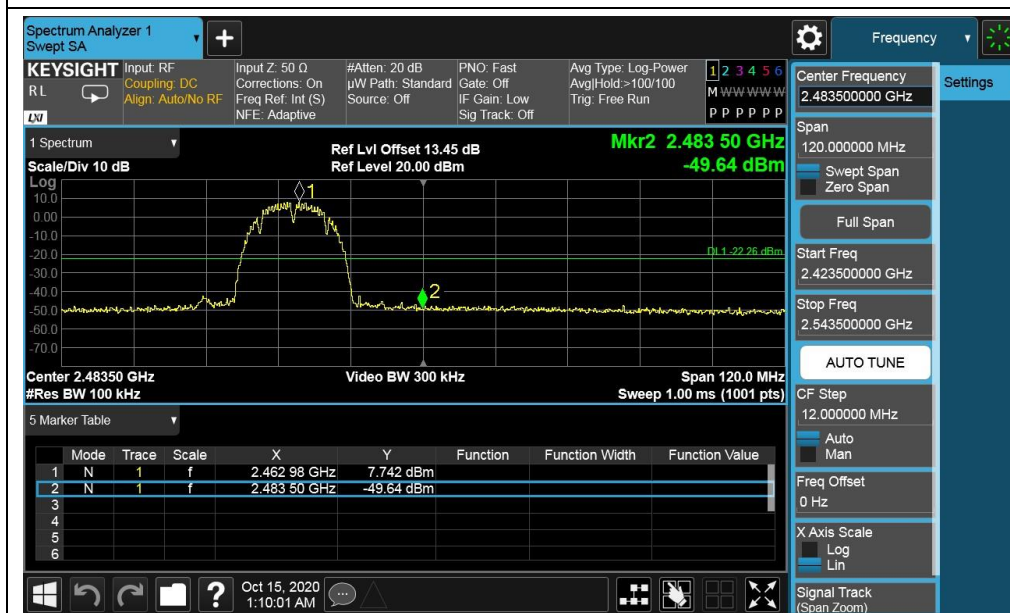
Same as Item 4.3.6

4.6.7 Test Results

Chain 0:



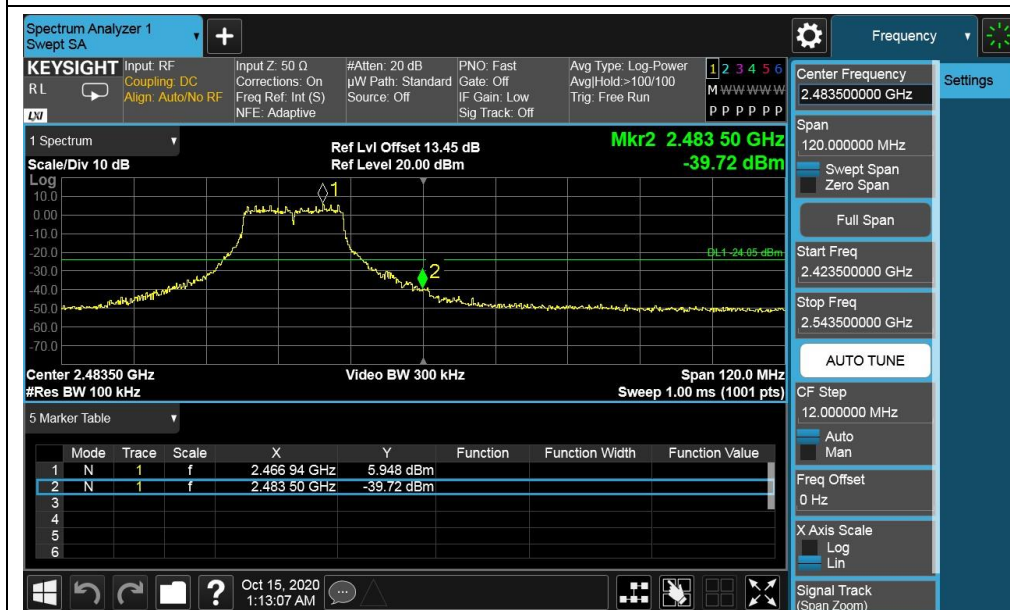
802.11b-2412MHz



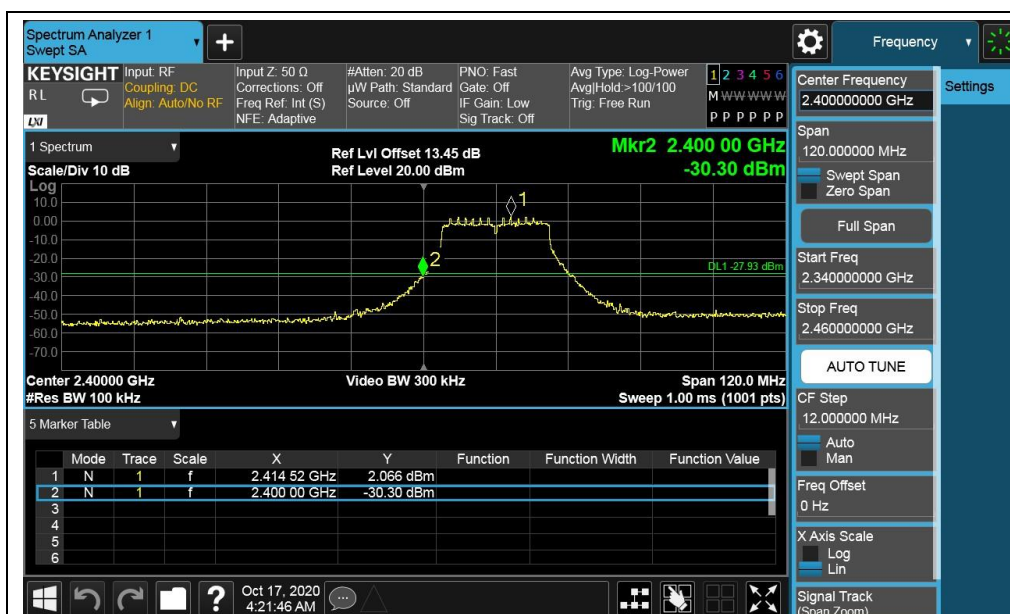
802.11b-2462MHz



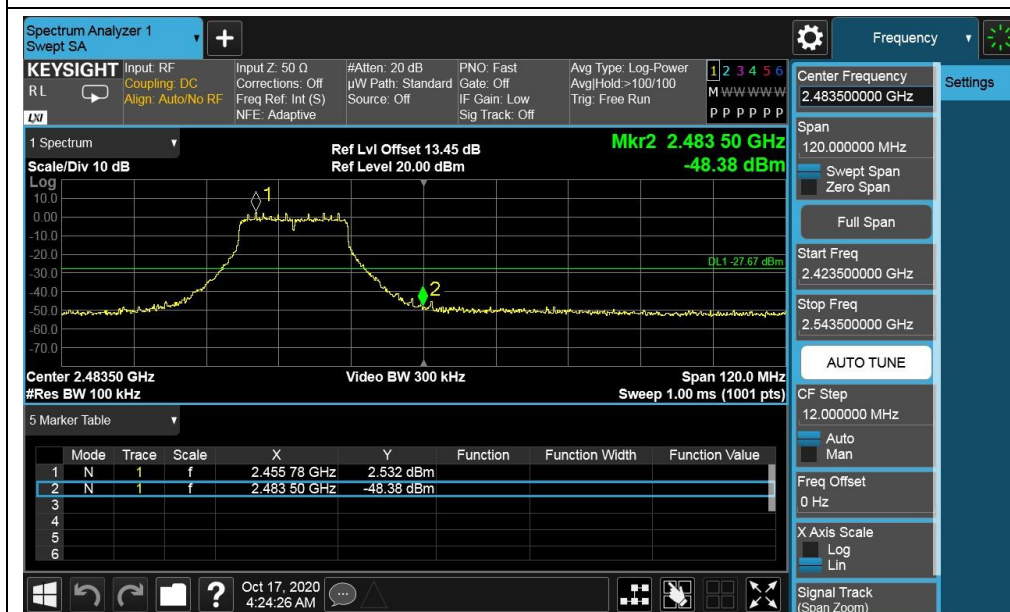
802.11g-2412MHz



802.11g-2462MHz



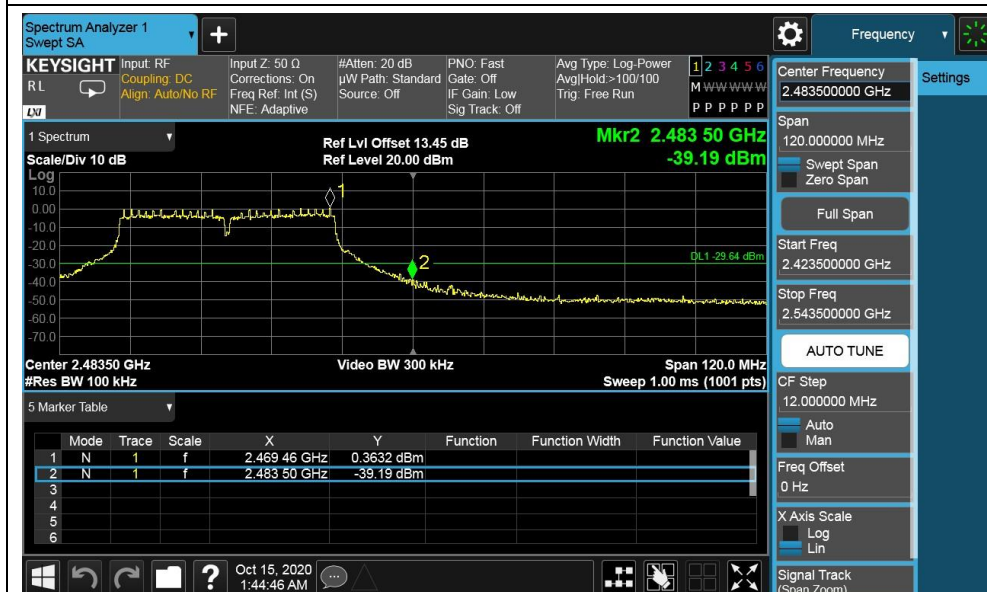
802.11n-HT20-2412MHz



802.11n-HT20-2462MHz

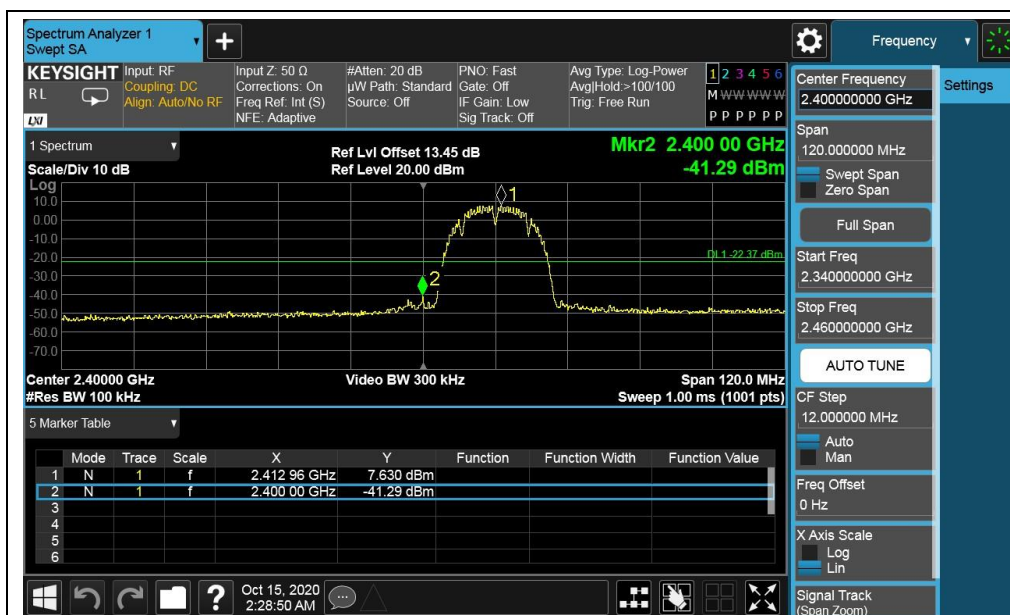


802.11n-HT40-2422MHz

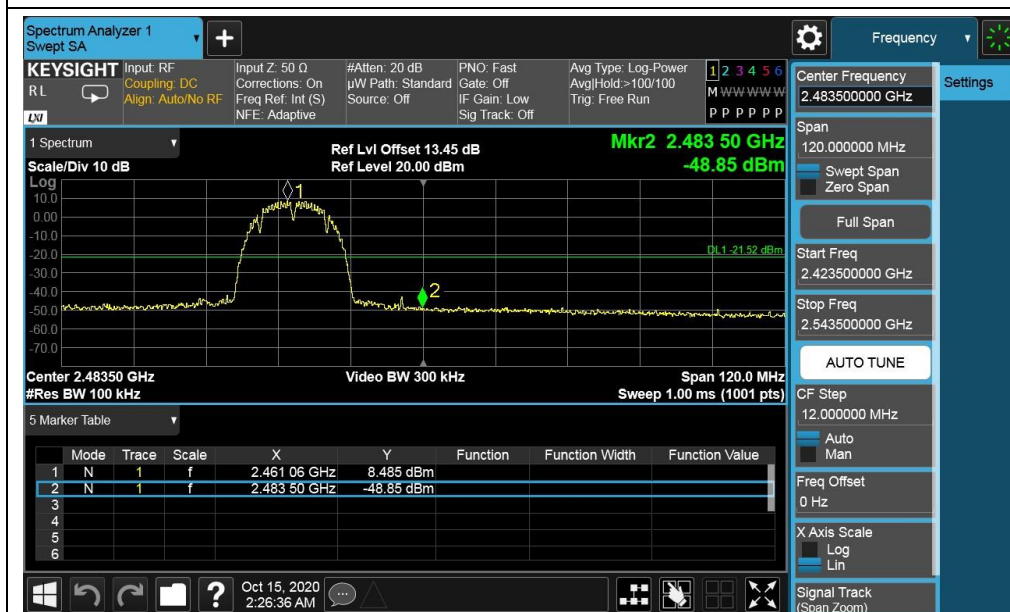


802.11n-HT40-2452MHz

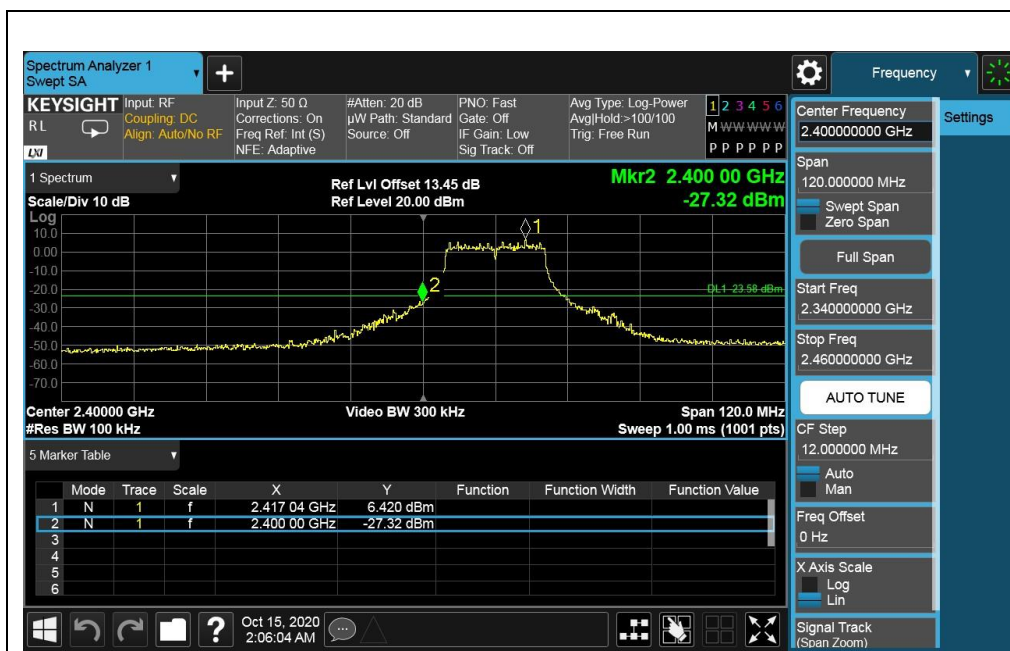
Chain 1:



802.11b-2412MHz



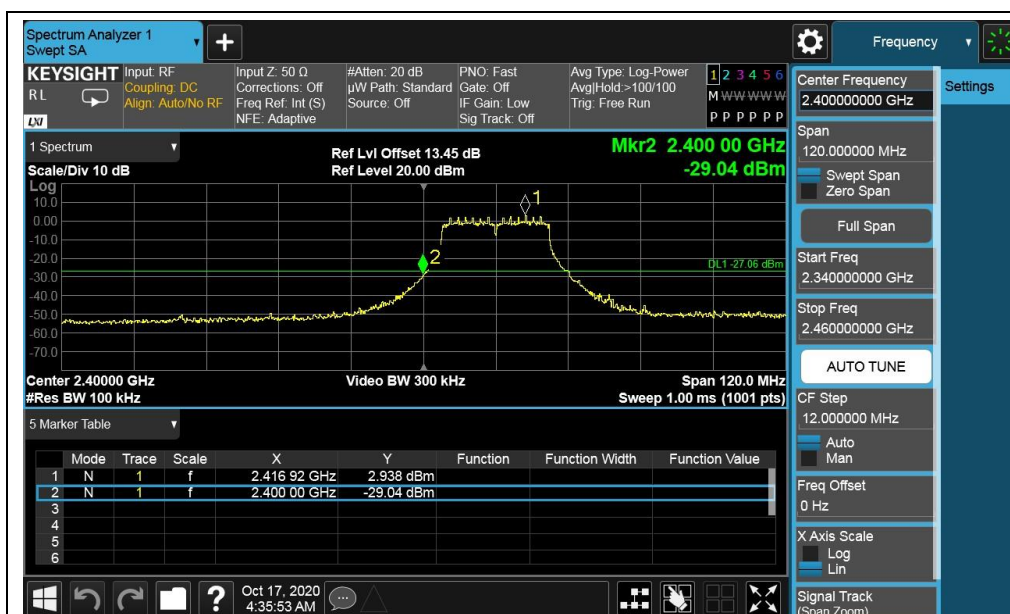
802.11b-2462MHz



802.11g-2412MHz



802.11g-2462MHz



802.11n-HT20-2412MHz



802.11n-HT20-2462MHz



802.11n-HT40-2422MHz



802.11n-HT40-2452MHz

5 Pictures of Test Arrangements

Please see setup photo file.

Appendix – Information on the Testing Laboratories

Bureau Veritas is a global leader in testing, inspection and certification (TIC) services. We help businesses improve safety, sustainability and productivity; and our clients include the majority of leading brands in retail, manufacturing and other industries. With a presence in every major country around the world, our quality assurance and compliance solutions are vital in helping our customers enhance product quality and concept-to-consumer journeys. We also assist with increasing speed to market, profitability and brand equity throughout the supply chain. Bureau Veritas is a leading wireless/IoT testing, inspection, audit and certification provider, with a global network of test laboratories to support the IoT industry in areas of connectivity, security, interoperability as well as quality, health & safety, and environmental/chemical requirements.

If you have any comments, please feel free to contact us at the following:

Milpitas EMC/RF/Safety/Telecom Lab

775 Montague Expressway, Milpitas, CA 95035
Tel: +1 408 526 1188

Sunnyvale OTA/Bluetooth Lab

1293 Anvilwood Avenue, Sunnyvale, CA
94089
Tel: +1 669 600 5293

Littleton EMC/RF/Safety/Environmental Lab

1 Distribution Center Cir #1, Littleton, MA 01460
Tel: +1 978 486 8880

Email: sales.eaw@us.bureauveritas.com

Web Site: www.cpsusa-bureauveritas.com

The address and road map of all our labs can be found in our web site also.

--- END ---