TEST REPORT

Applicant	:	Shanghai XiaoYi Technology Co., Ltd
Address of Applicant	:	Building 18, Lane 55, Chuanhe Road, China(Shanghai) Pilot Free Trade Zone, Shanghai, China , 201203
Product Name	:	Kami Doorbell Camera
Model No.	:	YDS.20120
Sample No.	:	E21030014-01 #01 E21030014-01 #16
FCC ID	:	2AFIB-YDS20121
ISED Number	:	20436-YDS20121
Standards	:	FCC CFR47 Part 15, Subpart C RSS-Gen (Issue 5, March 2019) RSS-247 (Issue 2, February 2017)
Date of Receipt	:	2021-03-19
Date of Test	:	2021-03-19 ~ 2021-04-02
Date of Issue	:	2021-04-06

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

Contents

1 GENERAL INFORMATION 3

1.1 TESTING LABORATORY 3
1.2 DETAILS OF APPLICATION 3
1.3 DETAILS OF EUT 4
1.4 TEST METHODOLOGY 4

2 TEST CONDITION 5

2.1 TEST FACILITY 5
2.2 ENVIRONMENTAL CONDITIONS 5
2.3 EQUIPMENT LIST 5
2.4 MEASUREMENT UNCERTAINTY 5

3 TEST SET-UP AND OPERATION MODES 6

3.1 DETAILS OF TEST MODE 6
3.2 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT 7
3.3 SUPPORT SOFTWARE 7
3.4 TEST SETUP DIAGRAM 8

4 TEST RESULTS 10

4.1 TRANSMITTER REQUIREMENT & TEST SUITES 10
4.1.1 Antenna Requirement 10
4.1.2 Peak Output Power and E.I.R.P 11
4.1.3 6dB Bandwidth and 99% Bandwidth 14
4.1.4 Power Spectral Density 25
4.1.5 Conducted Spurious Emission & Authorized-band band-edge 33
4.1.6 Spurious Emission 51
4.1.7 Band Edge (Restricted-band band-edge) 53
4.2 MAINS EMISSIONS 54
4.2.1 Conducted Emission on AC Mains 54

5 APPENDIXES 55

5.1 PHOTOGRAPHS OF THE SAMPLE 55
5.2 SET-UP FOR CONDUCTED RF TEST AT ANTENNA PORT 56
5.3 SET-UP FOR SPURIOUS EMISSIONS BELOW 1GHZ 56
5.4 SET-UP FOR SPURIOUS EMISSIONS ABOVE 1GHZ 57

1 General Information

1.1 Testing Laboratory

Company Name	ICAS Testing Technology Service (Shanghai) Co., Ltd.
Address	No.1298 Pingan Rd, Minhang District, Shanghai, China
Telephone	0086 21-51682999
Fax	0086 21-54711112
Homepage	www.icasiso.com

1.2 Details of Application

Applicant Company Name	Shanghai XiaoYi Technology Co., Ltd
Address	Building 18, Lane 55, Chuanhe Road, China(Shanghai) Pilot Free Trade Zone, Shanghai, China , 201203
Contact Person	Jackie Han
Telephone	18017858789
Email	han.guangbao@xiaoyi.com
Manufacturer Company Name	Kami Vision Incorporated
Address	182 South Murphy Ave, Floor #2, Sunnyale CA 94086, United States

1.3 Details of EUT

Product Name	Kami Doorbell Camera
Brand Name	Kami
Test Model No.	YDS.20120
FCC ID	2AFIB-YDS20121
ISED Number	20436-YDS20121
Mode of Operation	WLAN 802.11b/g/n(HT20)
Frequency Range	2400MHz ~ 2483.5MHz
Channel Separation	5 MHz
Modulation Type	DSSS, OFDM
Antenna Type	FPC Antenna
Antenna Gain	1.88dBi
Extreme Temperature Range	-10℃~ +40℃
Test Voltage	DC 3.7V
Hardware version	D201 _MB_V2.2
Software version	9.2.00.32
Test SW Version	BL410_R;BL410_E
RF power setting in TEST SW	SecureCRT

1.4 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.

2 Test Condition

2.1 Test Facility

2.2 Environmental conditions

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

2.3 Equipment List

Name of Equipment	Manufacturer	Model	Serial No.	Cal. Due Date
Spectrum Analyzer	Keysight	N9020A	MY59260184	2021-08-23
Spectrum Analyzer	Keysight	N9020B	MY59260184	2021-08-18
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2021-06-08
EMI Test Receiver	Rohde & Schwarz	ESPI3	100173	2021-06-08
EMI Test Receiver	Rohde & Schwarz	ESR 7	101911	2021-06-08
V-network	SCHWARZBECK	NSLK 8127	8127-902	2021-07-28
Broadband Antenna	SCHWARZBECK	VULB9163	9163-1037	2021-06-08
Horn Antenna-18G	SCHWARZBECK	BBHA9120D	9120D-1775	2021-07-28
Loop Antenna	SCHWARZBECK	FMZB 1513	N/A	2021-11-22
Horn Antenna-40G	YINGLIAN	LB-180400-KF	N/A	2021-07-26
EMC chamber 9*6*6（L*W*H)	CHANGNING	966	N/A	2023-06-08
Shielded Enclosure 8*5*4（L*W*H)	CHANGNING	854	N/A	2021-06-08
Test Software	BL	BL410_E	N/A	N/A
Test Software	BL	BL410_R	N/A	N/A

2.4 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

3 Test Set-up and Operation Modes

3.1 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

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	11Mbps
802.11g	54Mbps
802.11n(20M)	MCS7

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

3.2 Special Accessories and Auxiliary Equipment

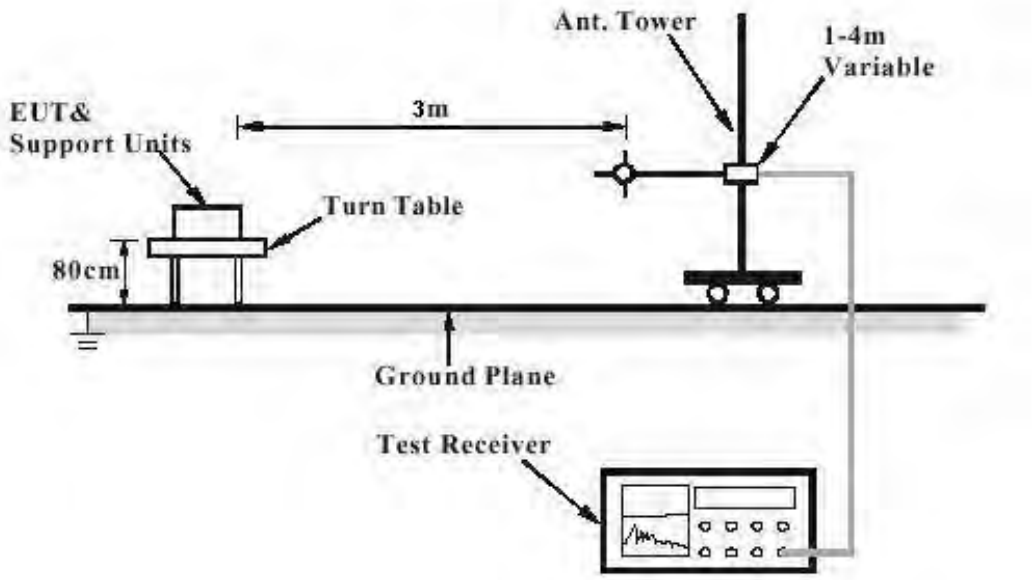
Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	E470C	N/A

3.3 Support Software

Description	Manufacturer	Software Name
Software	N/A	SecureCRT

3.4 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

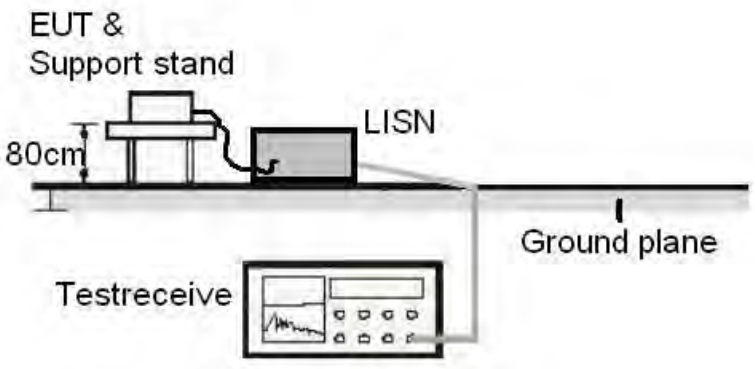
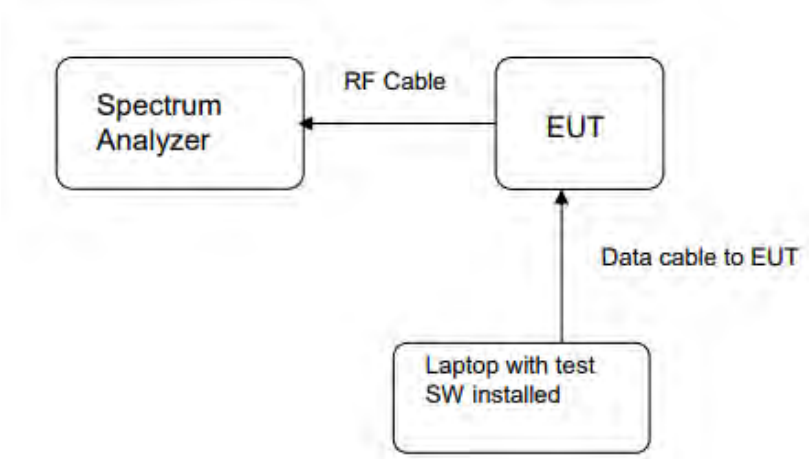


Diagram of Measurement Equipment Configuration for Transmitter Measurement



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 6dBi

According to the manufacturer declaration, the EUT has an antenna with a directional gain of 1.88dBi. The antenna is an FPC 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.

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	Peak Output Power		Limit (W)
		(dBm)	(dBm)	(mW)	
802.11b	2412	17.72	19.75	94.41	< 1
	2437	17.78	19.81	95.72	
	2462	17.85	19.88	97.27	
802.11g	2412	16.78	18.81	76.03	
	2437	16.80	18.83	76.38	
	2462	16.89	18.92	77.98	
802.11n(HT20)	2412	16.19	17.81	60.39	
	2437	15.65	17.27	53.33	
	2462	15.84	17.46	55.72	

Table 2: E.I.R.P

Test Mode	Test Channel (MHz)	E.I.R.P		Limit (W)
		(dBm)	(mW)	
802.11b	2412	21.63	145.55	< 4
	2437	21.69	147.57	
	2462	21.76	149.97	
802.11g	2412	20.69	117.22	
	2437	20.71	117.76	
	2462	20.80	120.23	
802.11n(HT20)	2412	19.69	93.11	
	2437	19.15	82.22	
	2462	19.34	85.90	

Notes：

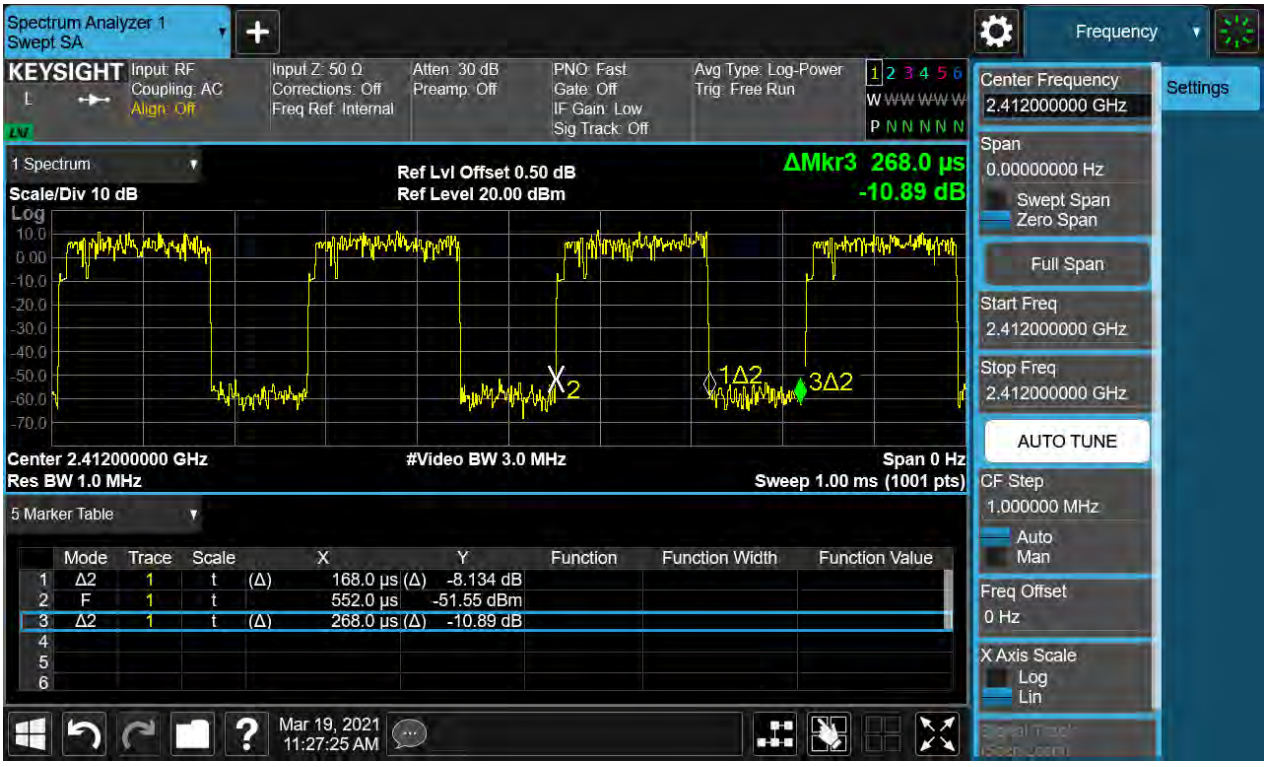
Peak Output Power = Measured Conducted peak power +duty cycle factor

EIRP = Peak Output Power + Antenna Gain(1.88dBi)

Duty cycle factor =10*log(1/duty cycle)

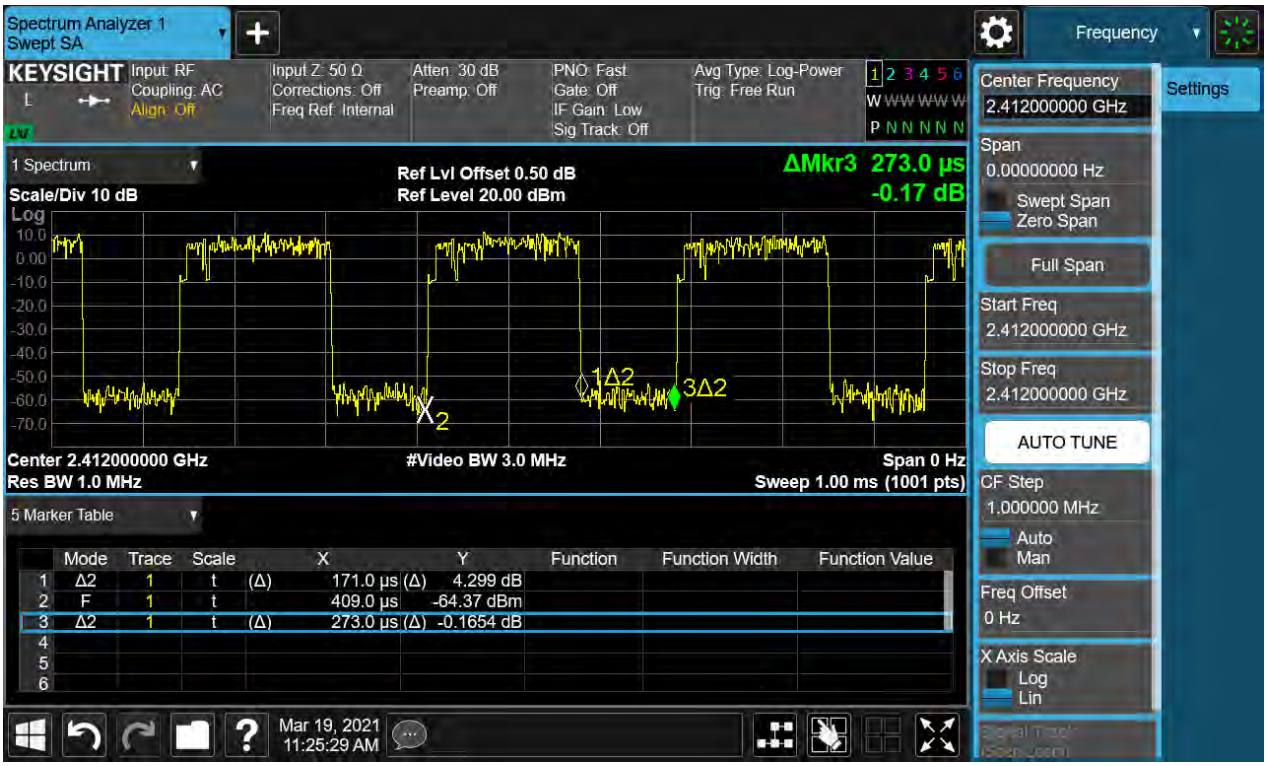
802.11b < 98%

Duty cycle factor =10*log(1/duty cycle)=2.03



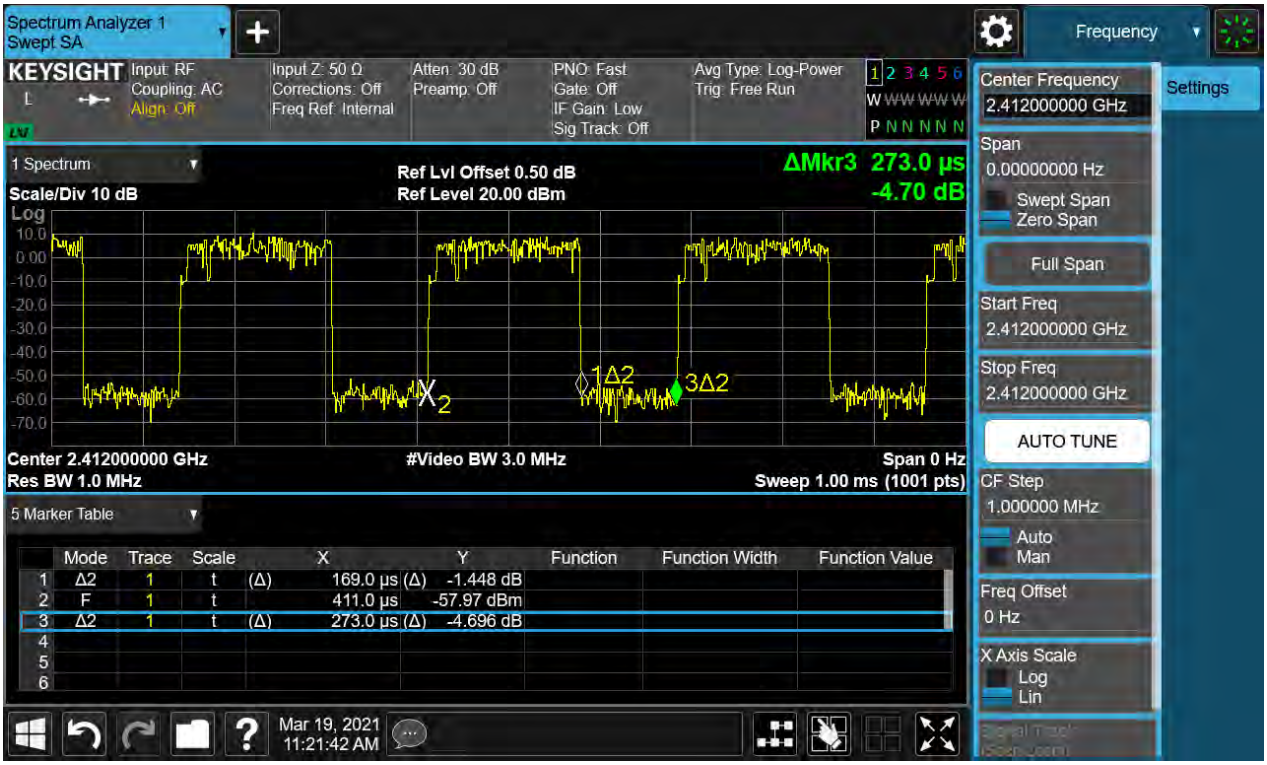
802.11g <98%

Duty cycle factor =10*log(1/duty cycle)=2.03



802.11n20<98%

Duty cycle factor =10*log(1/duty cycle)=1.62



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	9.561	12.423	⩾0.5
	2437	8.106	11.773	

	2462	8.481	11.752	
802.11g	2412	15.68	16.621	
	2437	15.41	16.859	
	2462	15.17	16.855	
802.11n(HT20)	2412	16.04	17.791	
	2437	15.20	17.705	
	2462	15.83	17.697	

Figure 1: 6dB Bandwidth and 99% Bandwidth, 802.11b, 2412MHz

Figure 2: 6dB Bandwidth and 99% Bandwidth, 802.11b, 2437MHz

Figure 3: 6dB Bandwidth and 99% Bandwidth, 802.11b, 2462MHz

Figure 4: 6dB Bandwidth and 99% Bandwidth, 802.11g, 2412MHz

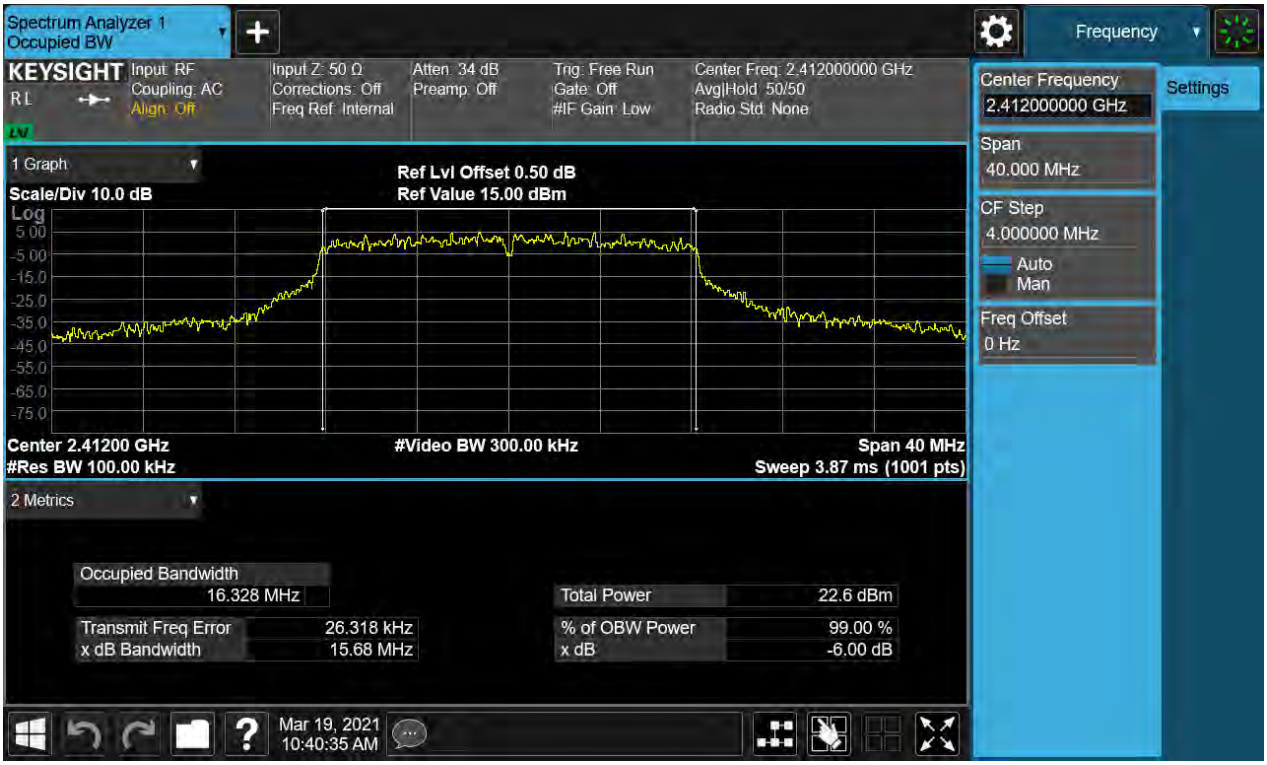


Figure 5: 6dB Bandwidth and 99% Bandwidth, 802.11g, 2437MHz

Figure 6: 6dB Bandwidth and 99% Bandwidth, 802.11g, 2462MHz

Figure 7: 6dB Bandwidth and 99% Bandwidth, 802.11n(HT20), 2412MHz

Figure 8: 6dB Bandwidth and 99% Bandwidth, 802.11n(HT20), 2437MHz

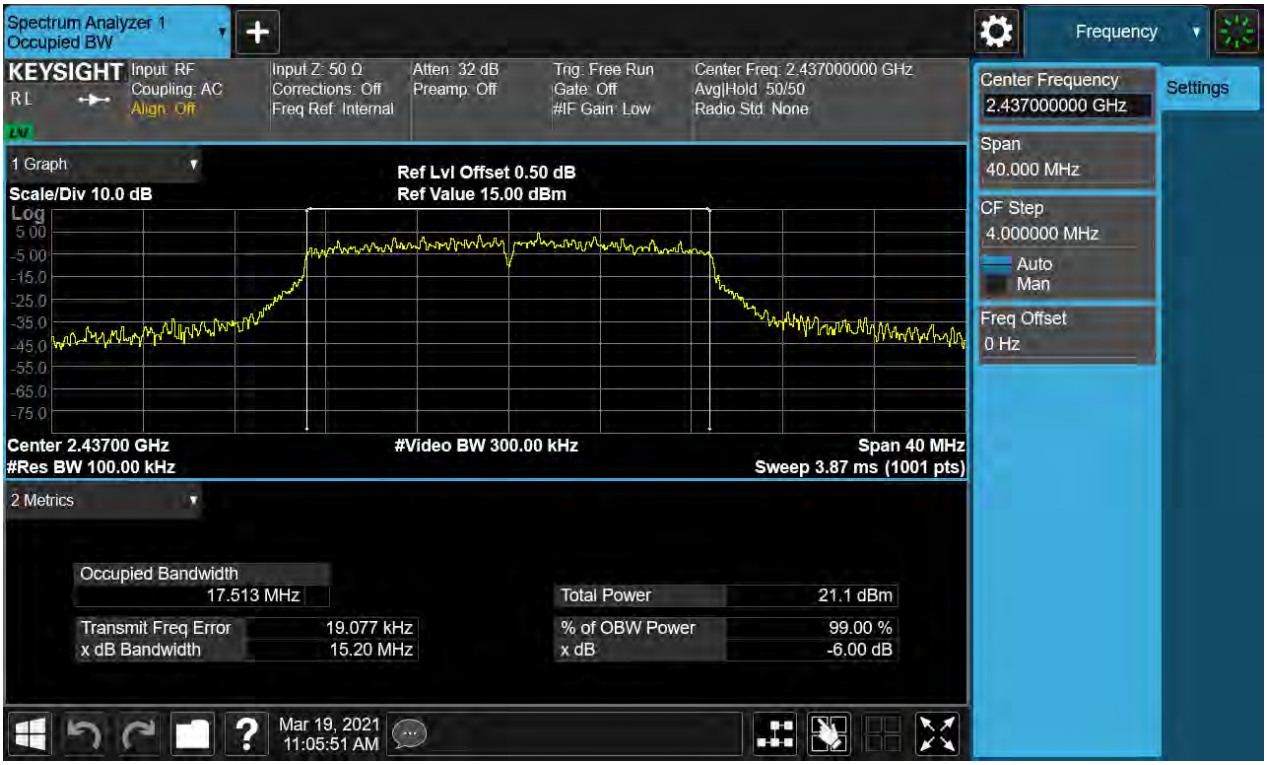
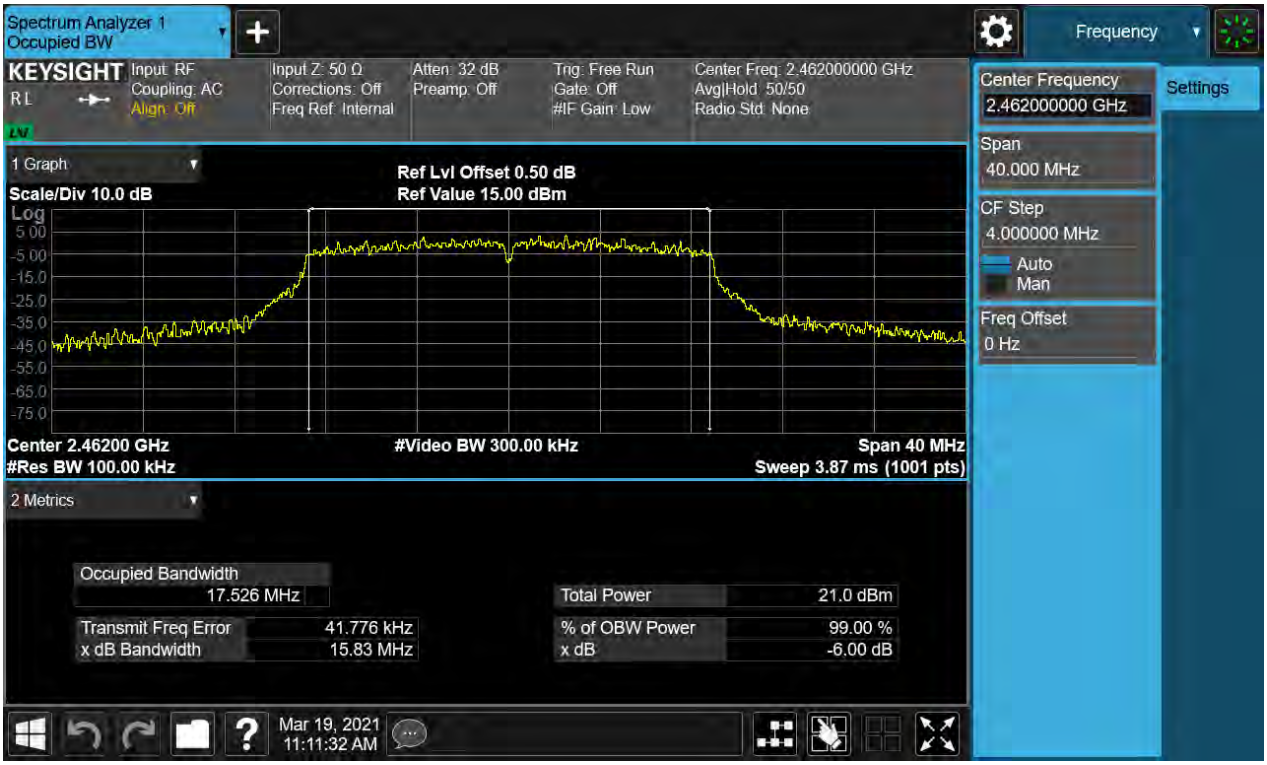


Figure 9: 6dB Bandwidth and 99% Bandwidth, 802.11n(HT20), 2462MHz



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	-7.10	8
	2437	-6.96	
	2462	-6.67	
802.11g	2412	-11.67	
	2437	-9.50	
	2462	-9.42	
802.11n(HT20)	2412	-10.95	
	2437	-11.70	
	2462	-11.58	

Figure 10: Power Spectral Density, 802.11b, 2412MHz

Figure 11: Power Spectral Density, 802.11b, 2437MHz

Spectrum Analyzer 1
Swept SA
Frequency
KEYSIGHT
Input: RF
Coupling: AC
Align: Off
Input Z: 50 Ω
Corrections: Off
Freq Ref: Internal
#Atten: 20 dB
Preamp: Off
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
Avg Type: Log-Power
Avg|Hold: 10/10
Trig: Free Run
1 Spectrum
Scale/Div 10 dB
Log
Ref Lvl Offset 0.50 dB
Ref Level 10.00 dBm
Mkr1 2.434 35 GHz
-6.96 dBm
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
Center 2.43700 GHz
#Res BW 3.0 kHz
#Video BW 10 kHz
Span 30.00 MHz
Sweep 3.16 s (601 pts)
Mar 19, 2021
10:19:19 AM
Center Frequency
2.437000000 GHz
Span
30.0000000 MHz
Swept Span
Zero Span
Full Span
Start Freq
2.422000000 GHz
Stop Freq
2.452000000 GHz
AUTO TUNE
CF Step
3.000000 MHz
Auto
Man
Freq Offset
0 Hz
X Axis Scale
Log
Lin
Signal Track
(Span Zoom)
Settings

Figure 12: Power Spectral Density, 802.11b, 2462MHz

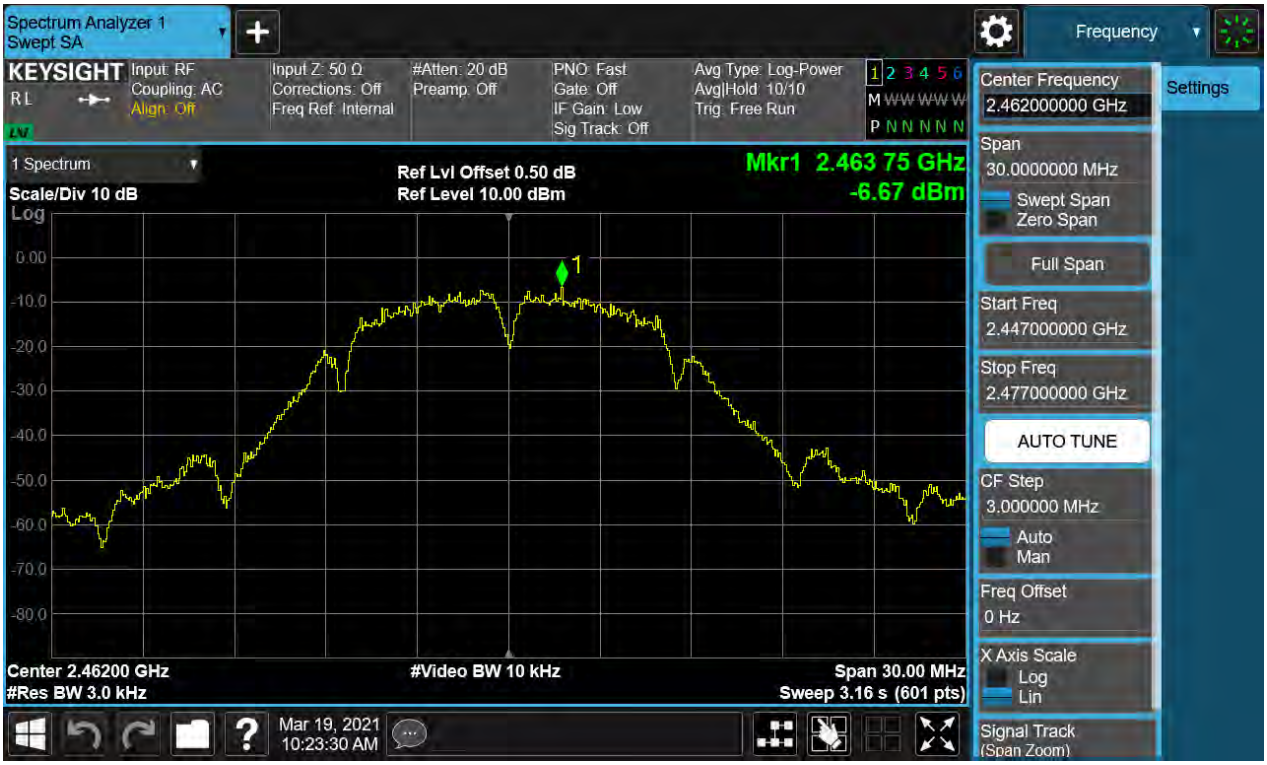


Figure 13: Power Spectral Density, 802.11g, 2412MHz

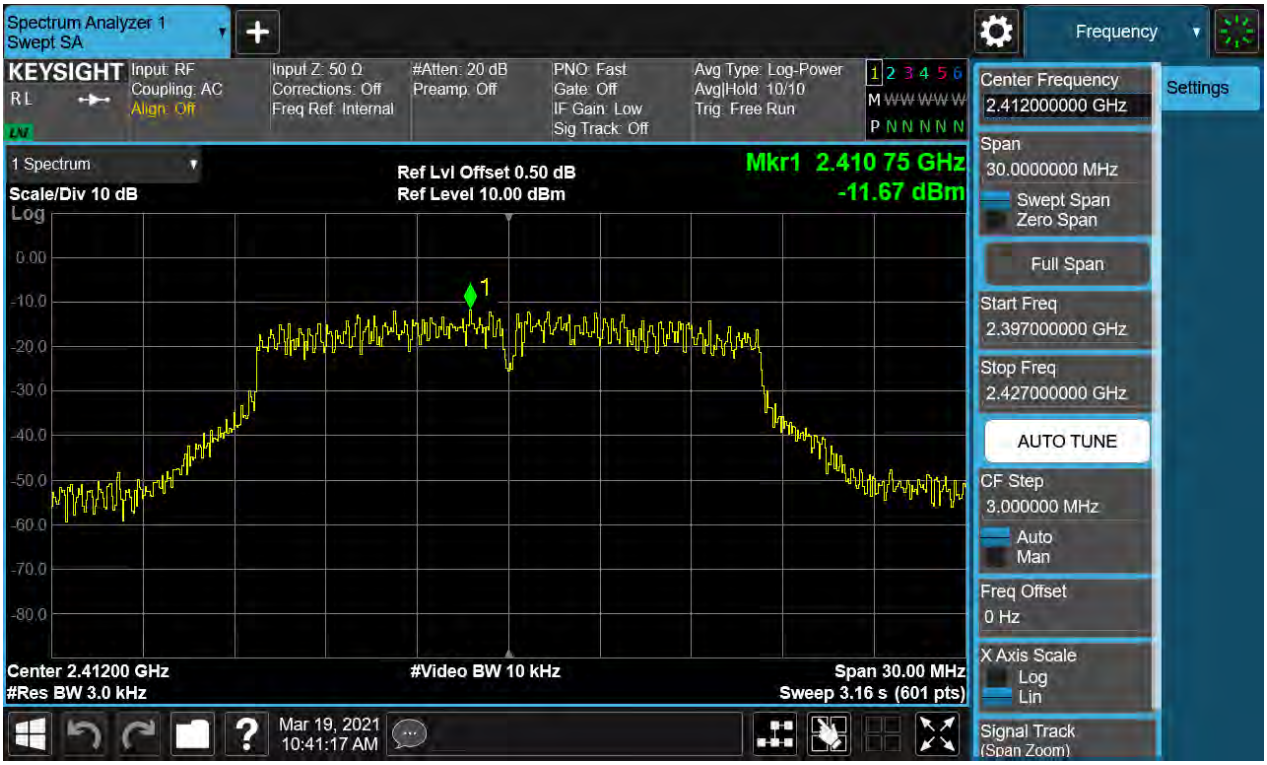


Figure 14: Power Spectral Density, 802.11g, 2437MHz

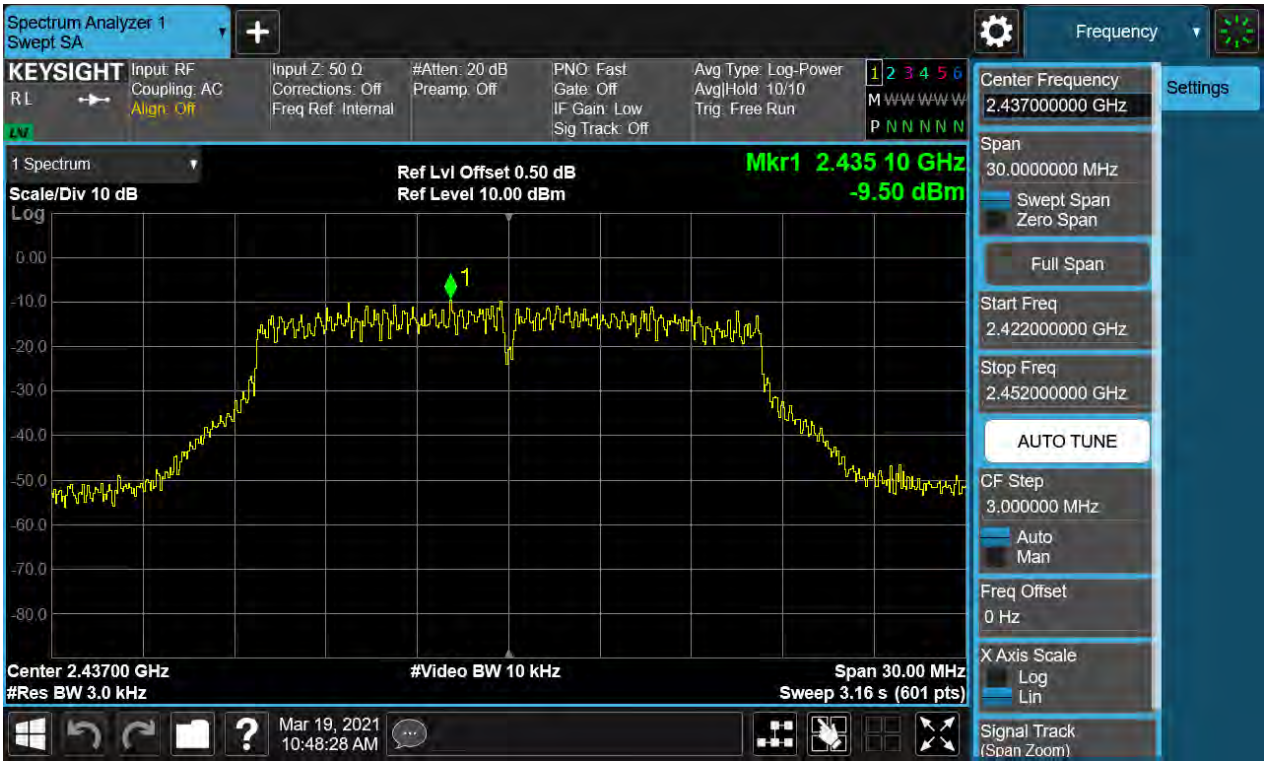


Figure 15: Power Spectral Density, 802.11g, 2462MHz

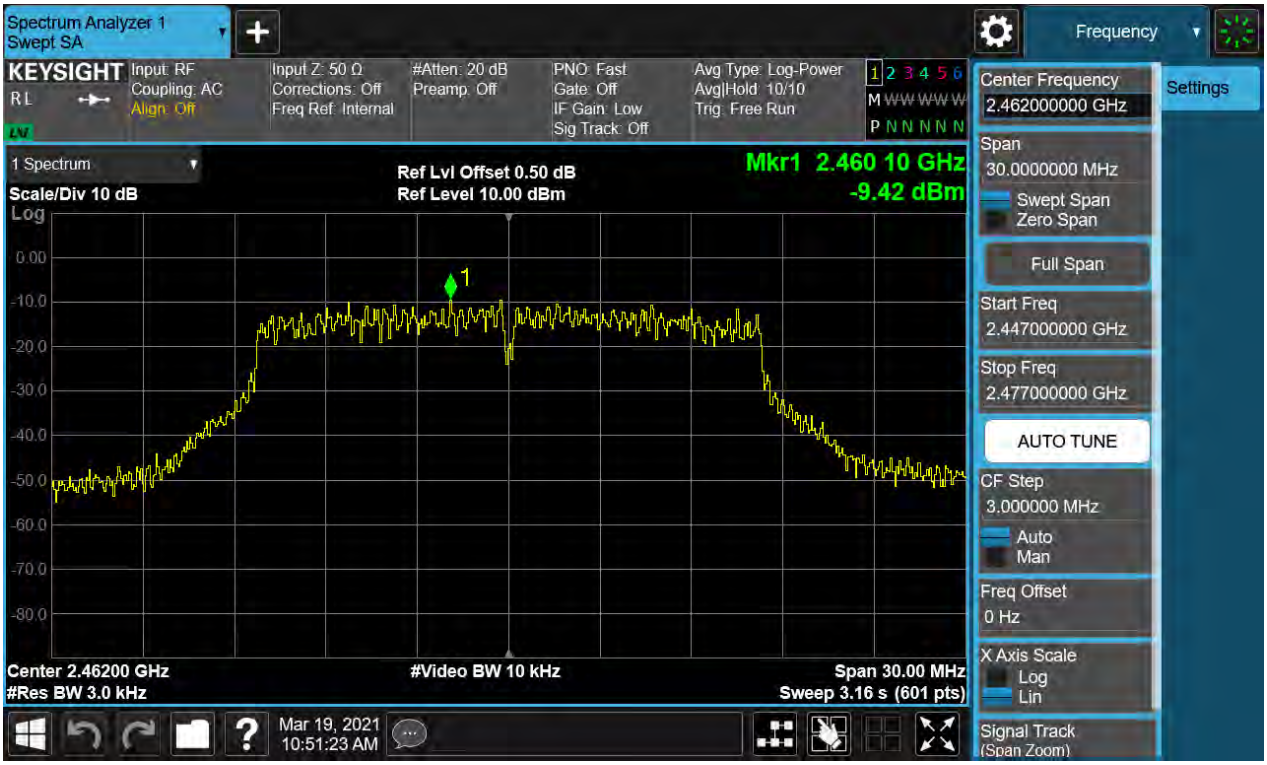


Figure 16: Power Spectral Density, 802.11n(HT20), 2412MHz

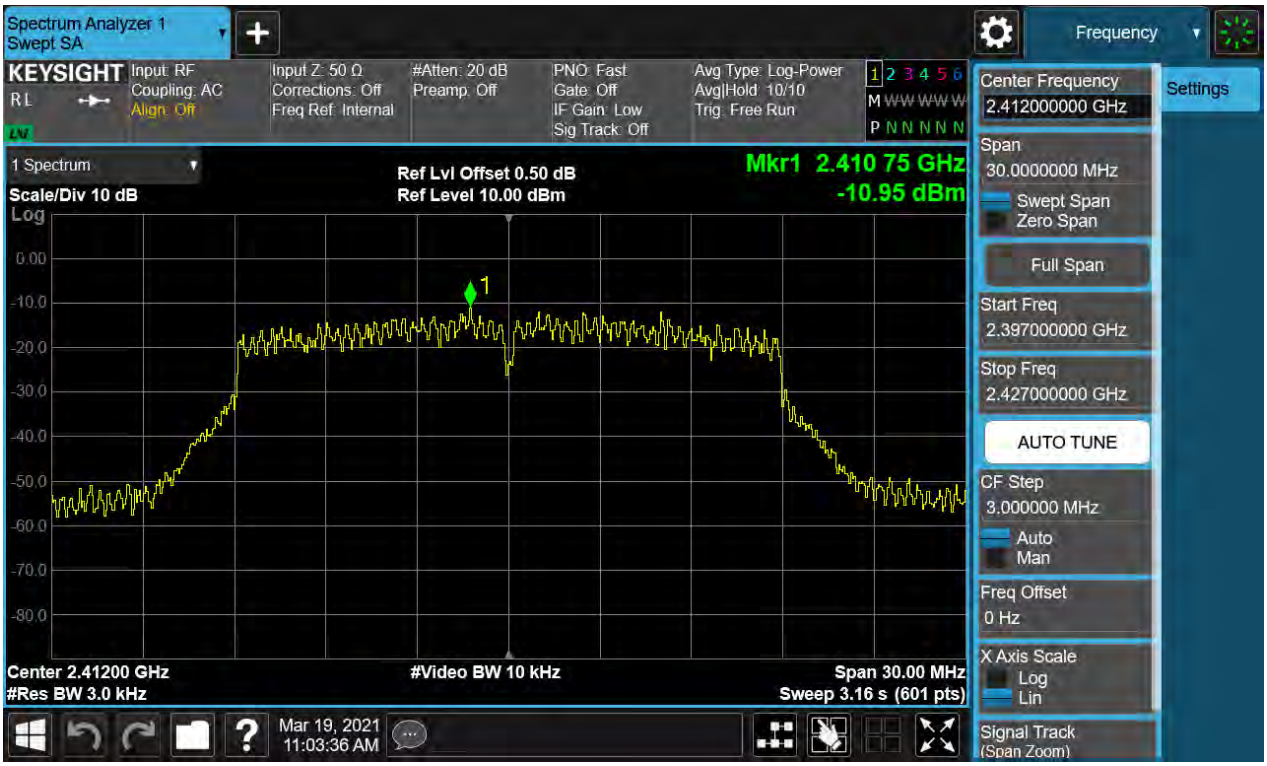


Figure 17: Power Spectral Density, 802.11n(HT20), 2437MHz

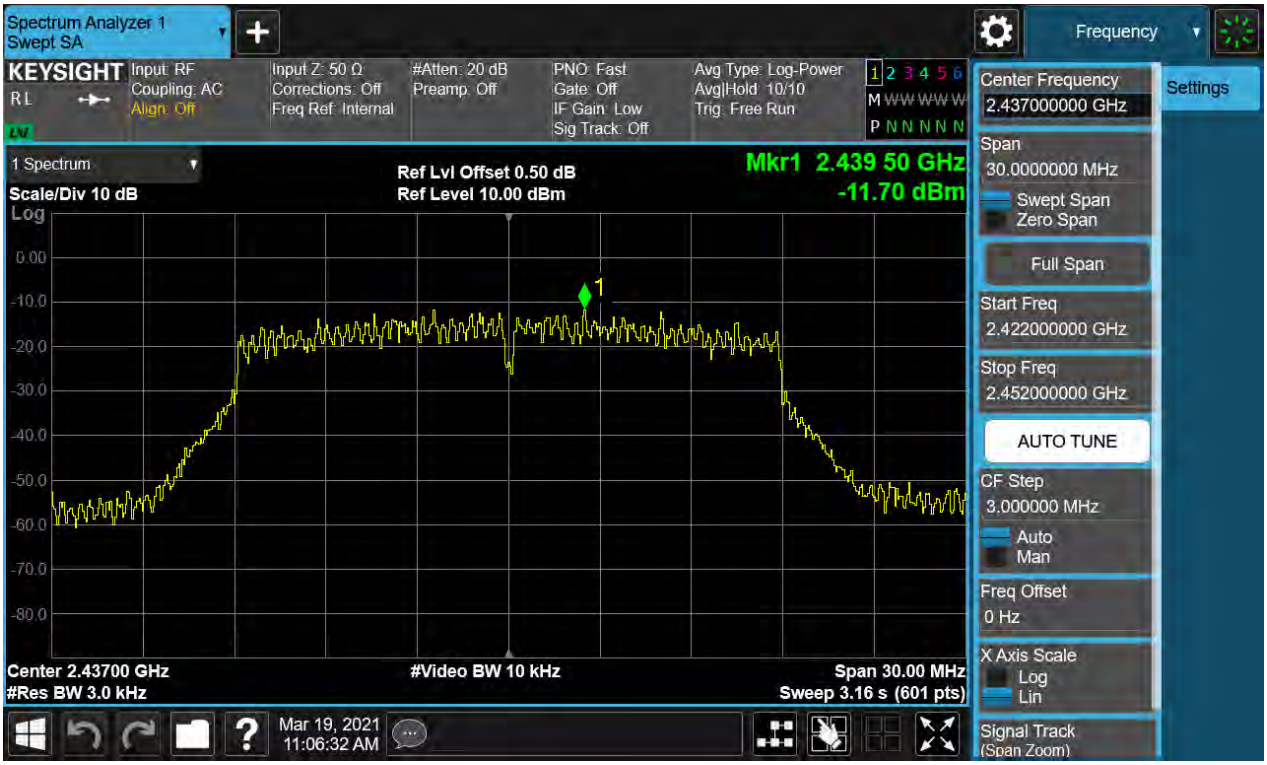
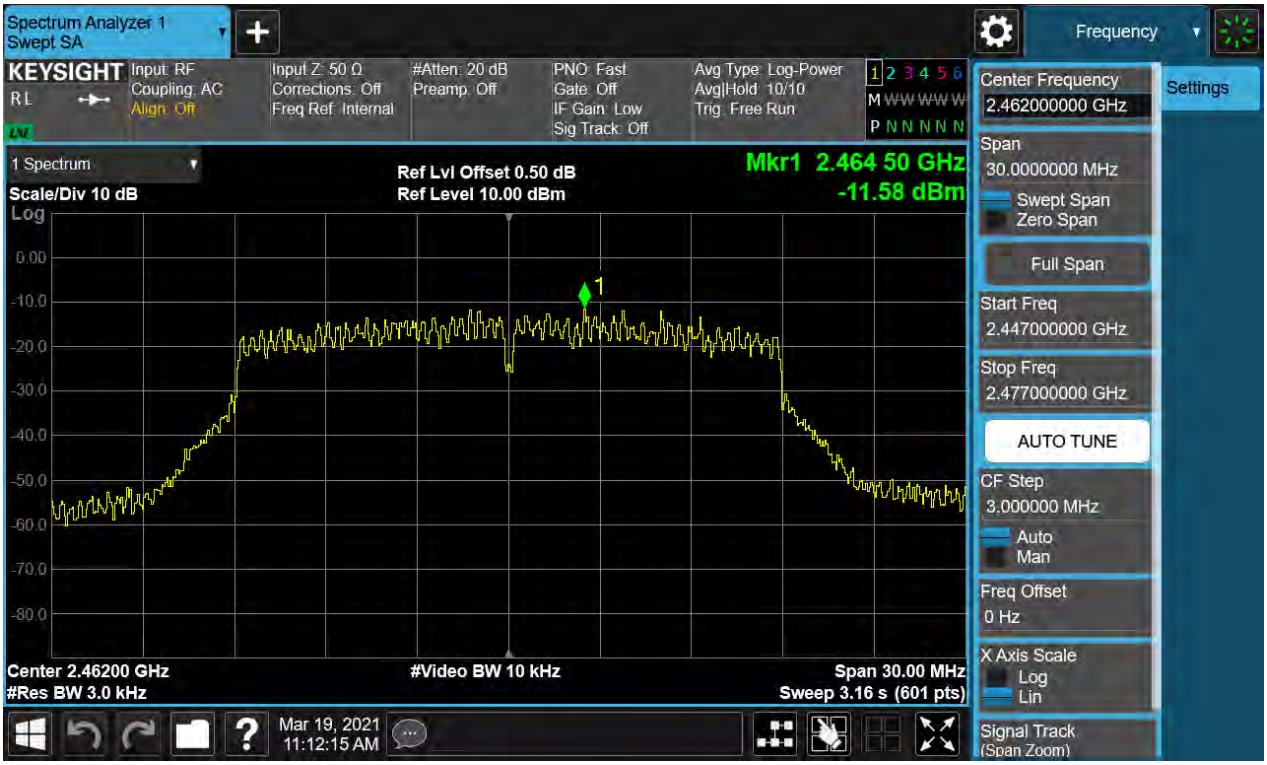


Figure 18: Power Spectral Density, 802.11n(HT20), 2462MHz



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

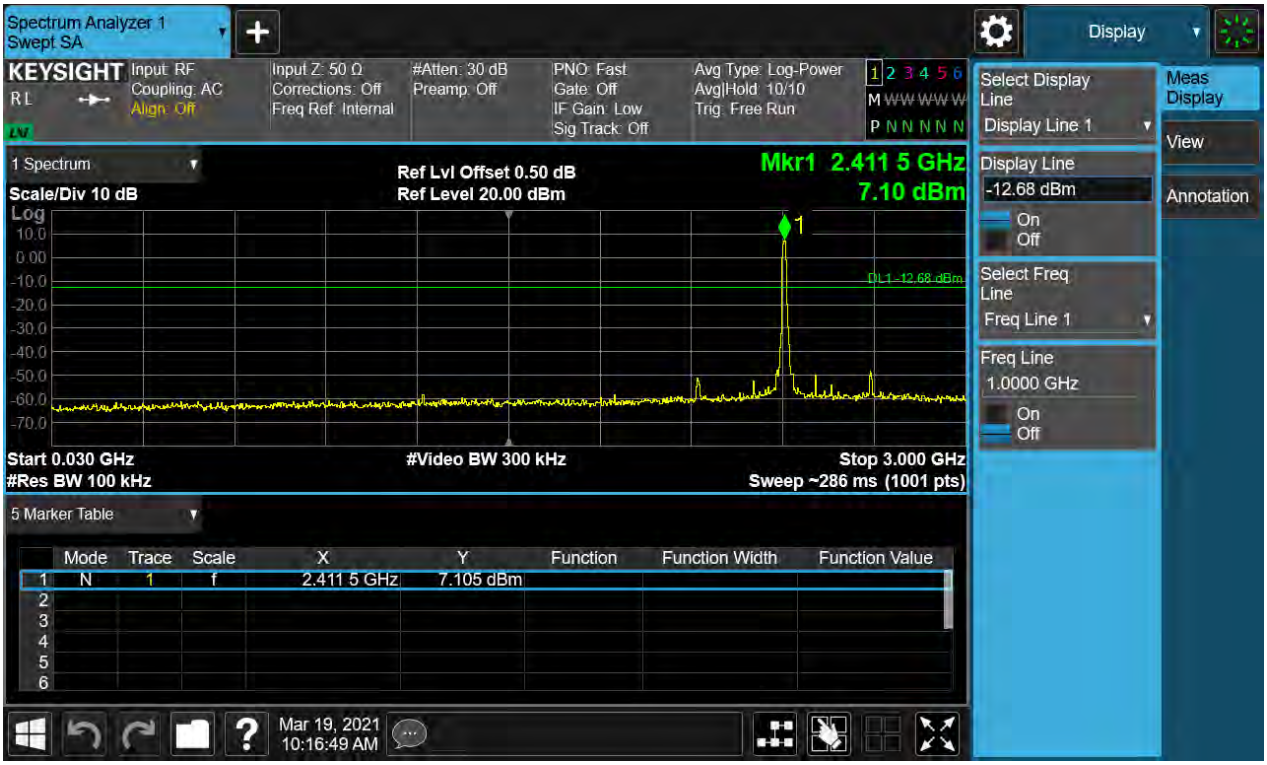
Test Channel	:	Low/Middle/High for spurious, Low/High for Band Edge
Operation Mode	:	A.1.a
Ambient temperature	:	25°C
Relative humidity	:	52%

For details refer to following test plot.

Figure 19: Conducted Spurious Emission & Authorized-band band-edge, 802.11b, 2412MHz Carrier Level

Band Edge

Conducted spurious emissions 30MHz-25GHz



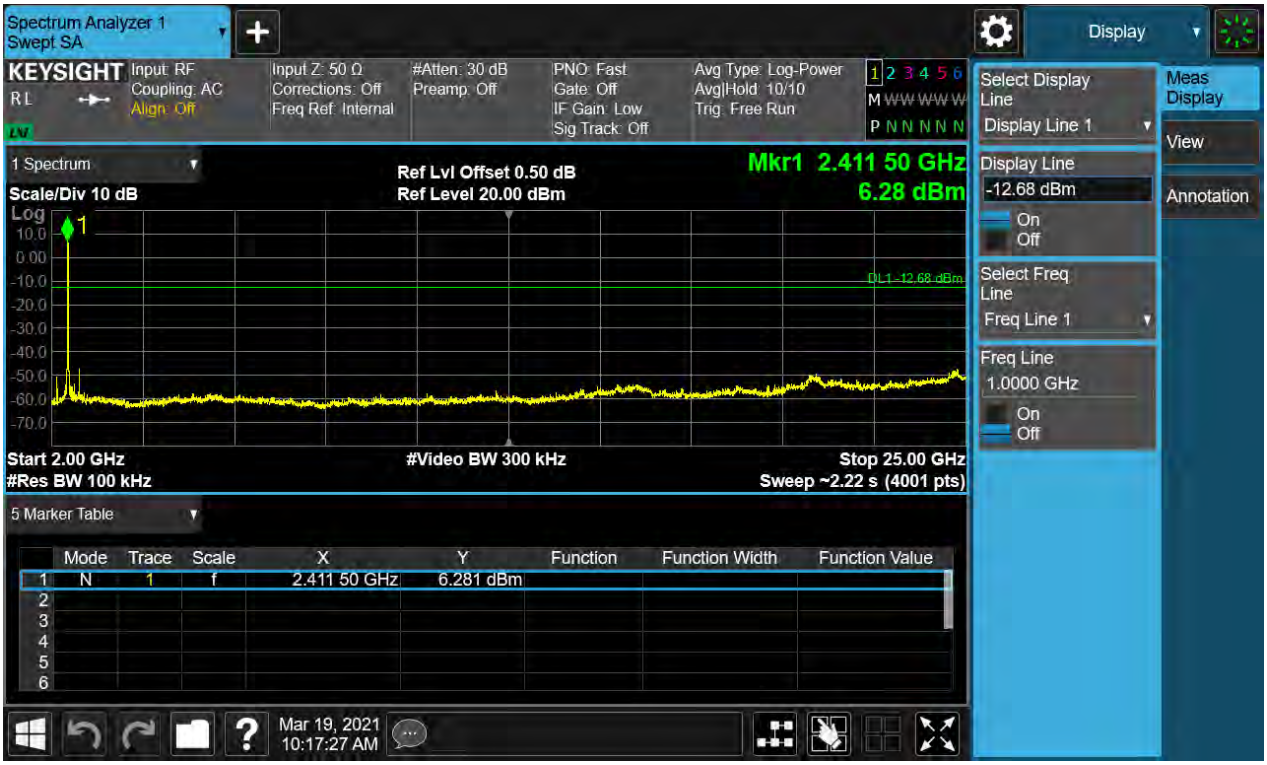


Figure 20: Conducted Spurious Emission & Authorized-band band-edge, 802.11b, 2437MHz Carrier Level

Conducted spurious emissions 30MHz-25GHz

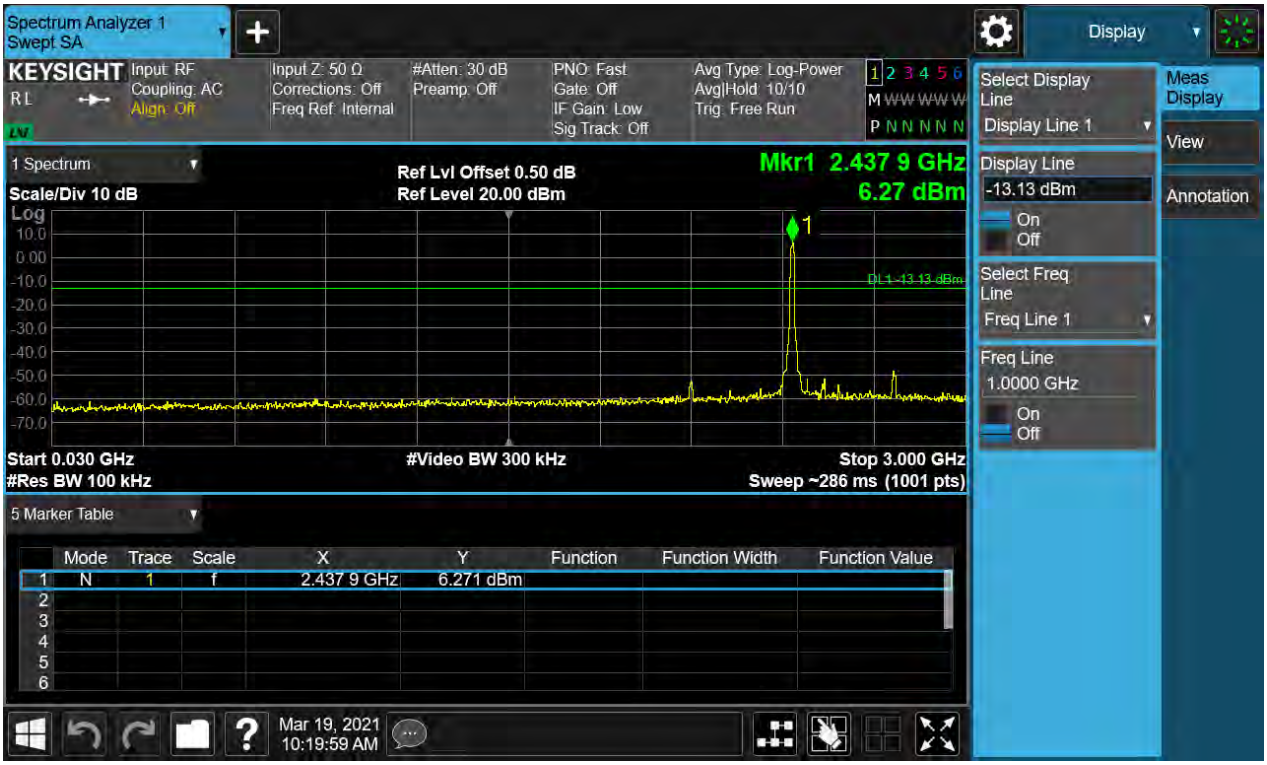
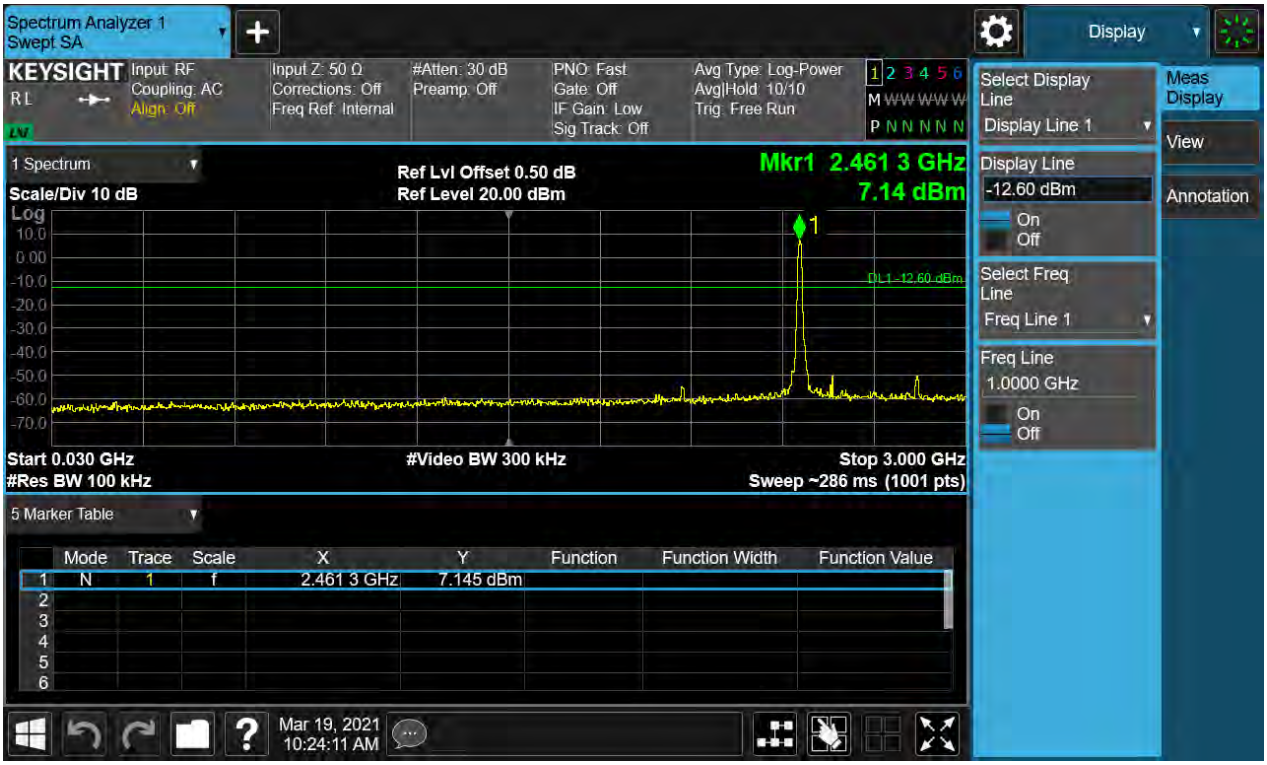


Figure 10: Conducted Spurious Emission & Authorized-band band-edge, 802.11b, 2462MHz Carrier Level

Band Edge

Conducted spurious emissions 30MHz-25GHz



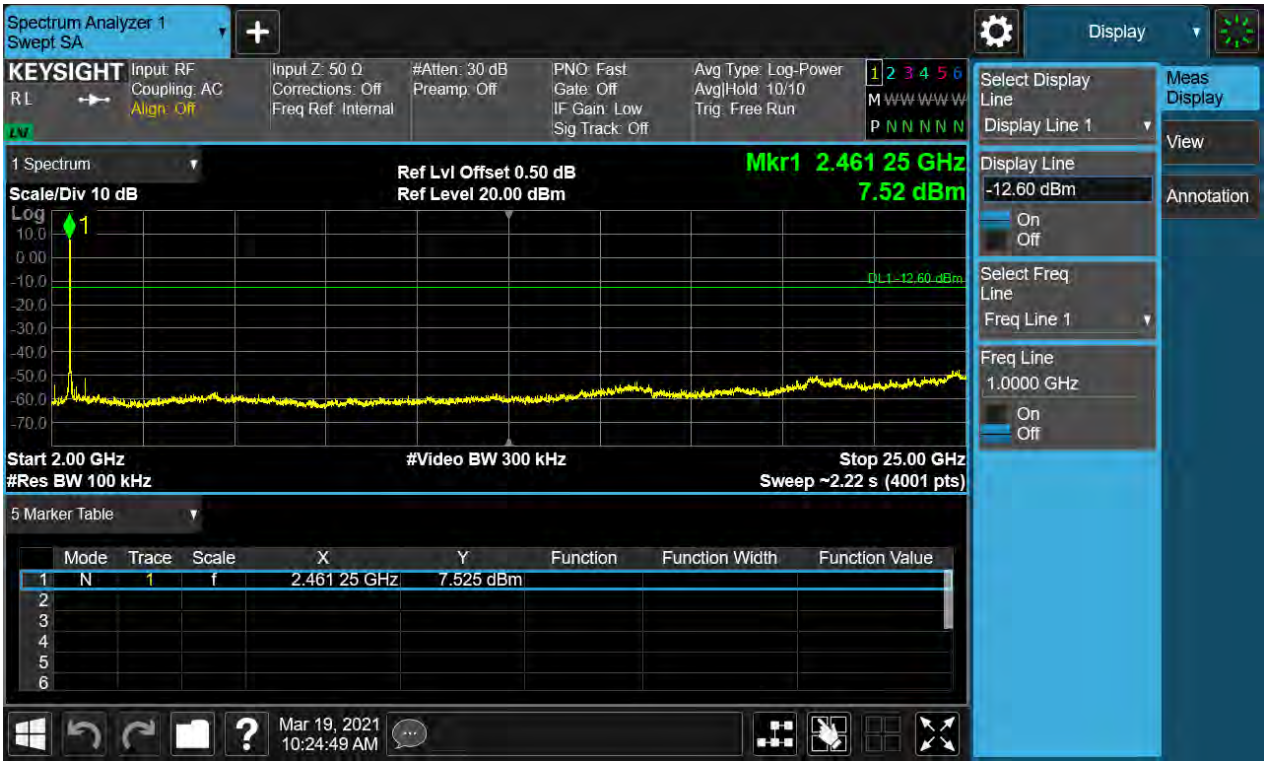


Figure 22: Conducted Spurious Emission & Authorized-band band-edge, 802.11g, 2412MHz Carrier Level

Band Edge

Conducted spurious emissions 30MHz-25GHz

Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Coupling: AC
Align: Off
Input Z: 50 Ω
Corrections: Off
Freq Ref: Internal
#Atten: 30 dB
Preamp: Off
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
Avg Type: Log-Power
Avg|Hold: 10/10
Trig: Free Run
Display
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 0.50 dB
Ref Level 20.00 dBm
Mkr1 2.413 3 GHz
2.65 dBm
Start 0.030 GHz
#Res BW 100 kHz
#Video BW 300 kHz
Stop 3.000 GHz
Sweep ~286 ms (1001 pts)
5 Marker Table
Mode Trace Scale X Y Function Function Width Function Value
1 N 1 f 2.413 3 GHz 2.645 dBm
Select Display Line
Display Line 1
Display Line
-14.01 dBm
Select Freq Line
Freq Line 1
Freq Line
1.0000 GHz
Meas Display
View
Annotation
Mar 19, 2021
10:42:02 AM

Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Coupling: AC
Align: Off
Input Z: 50 Ω
Corrections: Off
Freq Ref: Internal
#Atten: 30 dB
Preamp: Off
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
Avg Type: Log-Power
Avg|Hold: 10/10
Trig: Free Run
Display
1 Spectrum
Scale/Div 10 dB
Ref Lvl Offset 0.50 dB
Ref Level 20.00 dBm
Mkr1 2.413 30 GHz
4.42 dBm
Start 2.00 GHz
#Res BW 100 kHz
#Video BW 300 kHz
Stop 25.00 GHz
Sweep ~2.22 s (4001 pts)
5 Marker Table
Mode Trace Scale X Y Function Function Width Function Value
1 N 1 f 2.413 30 GHz 4.418 dBm
Select Display Line
Display Line 1
Display Line
-14.01 dBm
Select Freq Line
Freq Line 1
Freq Line
1.0000 GHz
Meas Display
View
Annotation
Mar 19, 2021
10:42:36 AM

Figure 23: Conducted Spurious Emission & Authorized-band band-edge, 802.11g, 2437MHz Carrier Level

Conducted spurious emissions 30MHz-25GHz

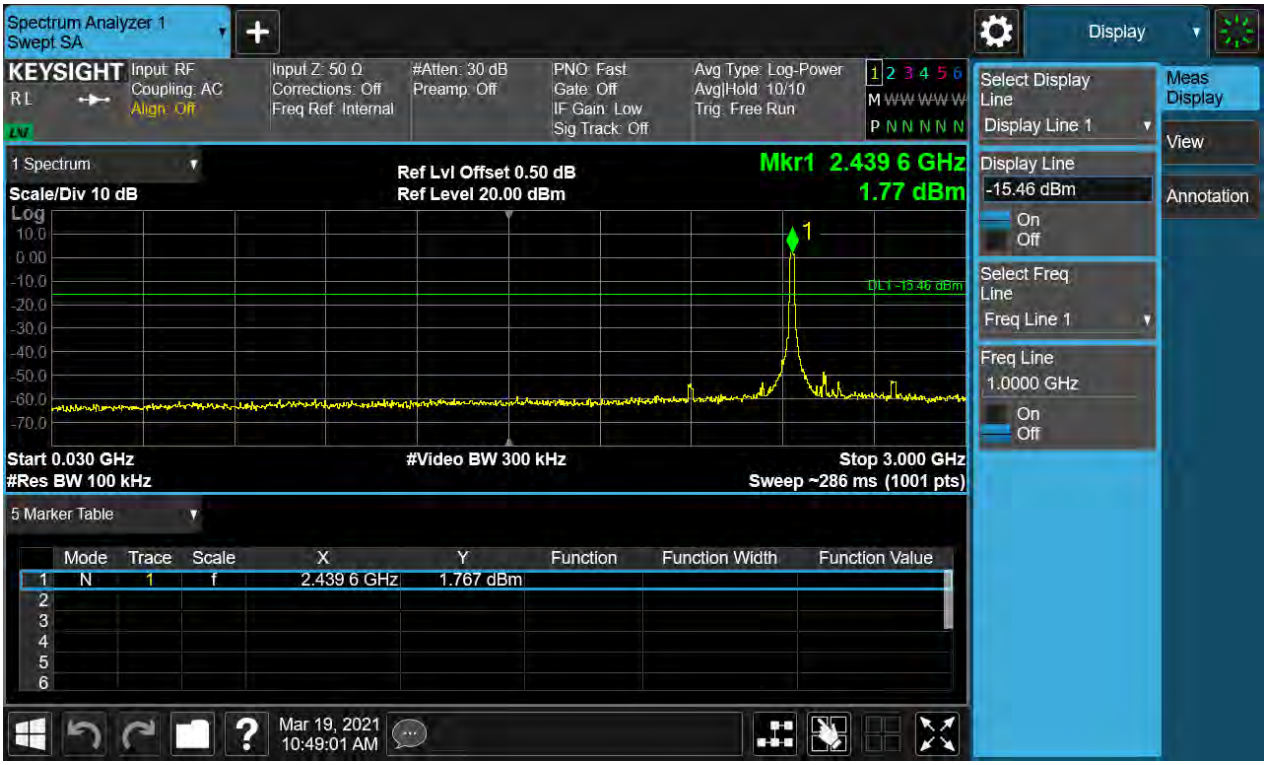
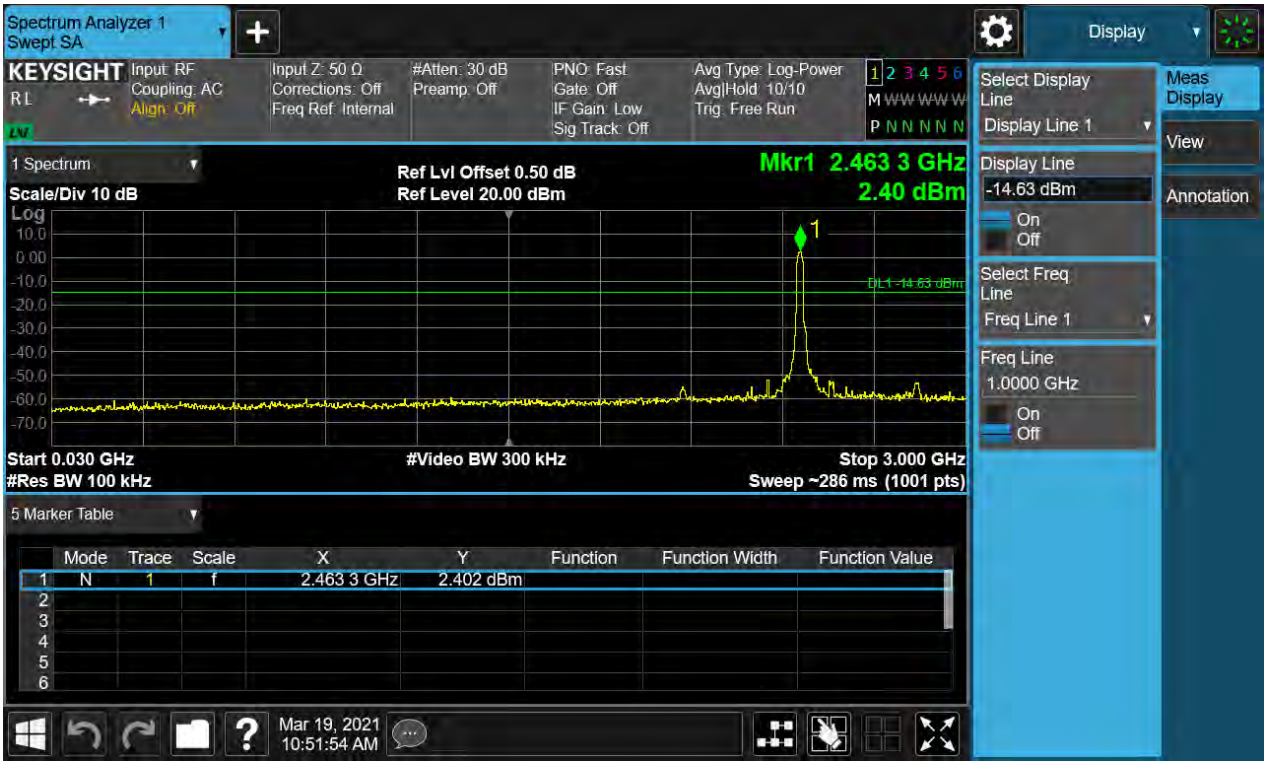


Figure 11: Conducted Spurious Emission & Authorized-band band-edge, 802.11g, 2462MHz Carrier Level

Band Edge

Conducted spurious emissions 30MHz-25GHz



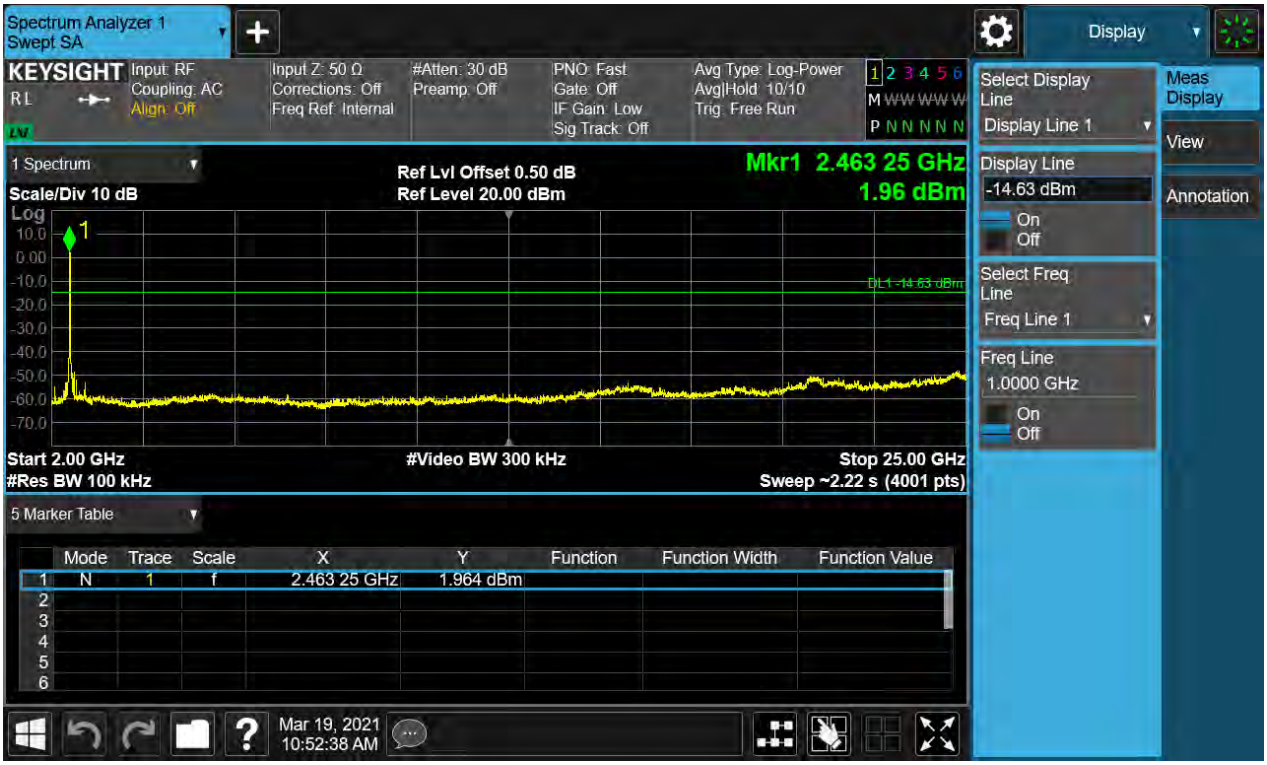


Figure 25: Conducted Spurious Emission & Authorized-band band-edge, 802.11n(HT20), 2412MHz Carrier Level

Band Edge

Conducted spurious emissions 30MHz-25GHz

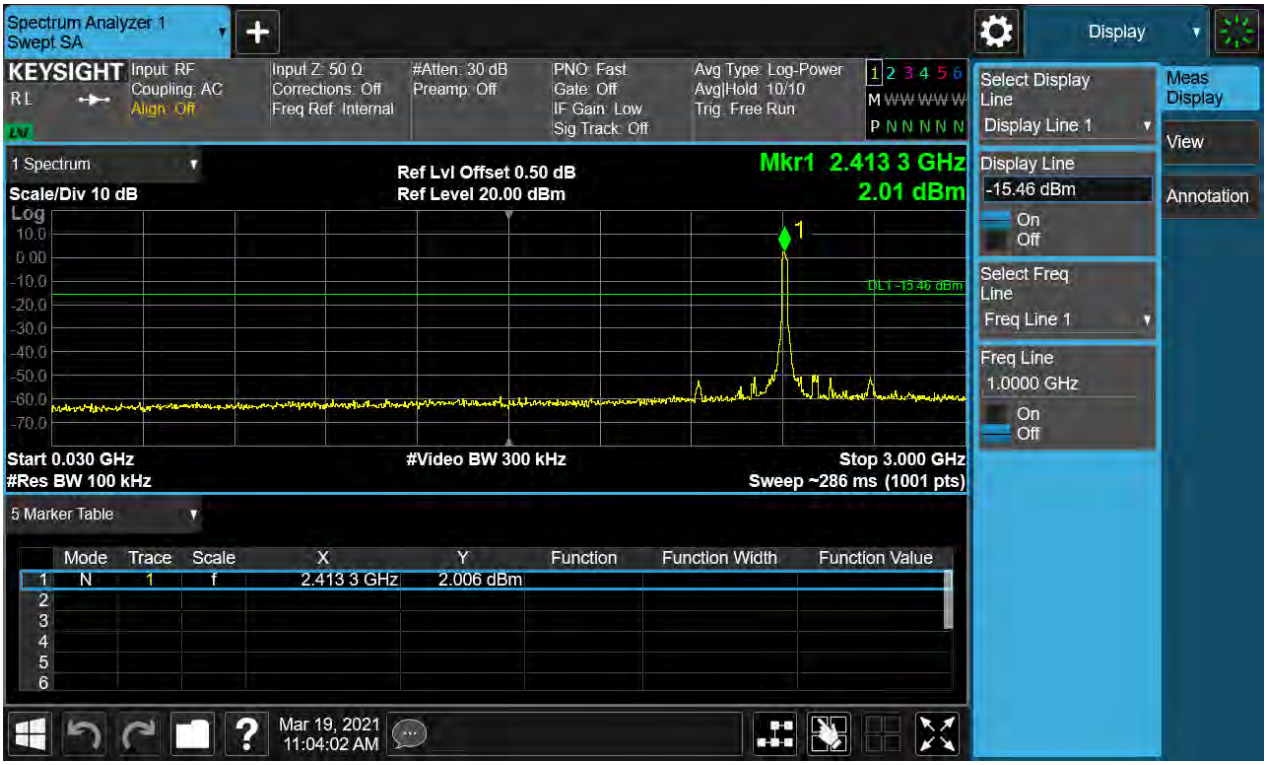
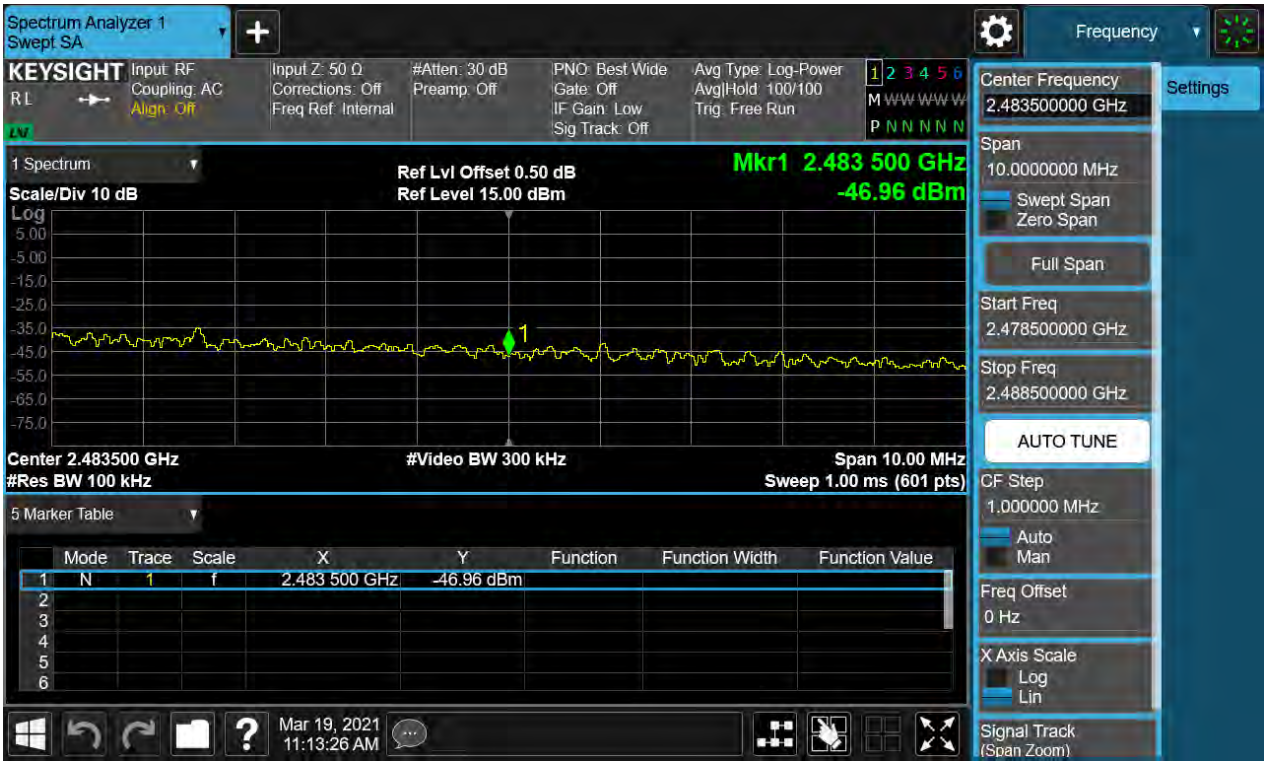


Figure 26 Conducted Spurious Emission & Authorized-band band-edge, 802.11n(HT20), 2437MHz Carrier Level

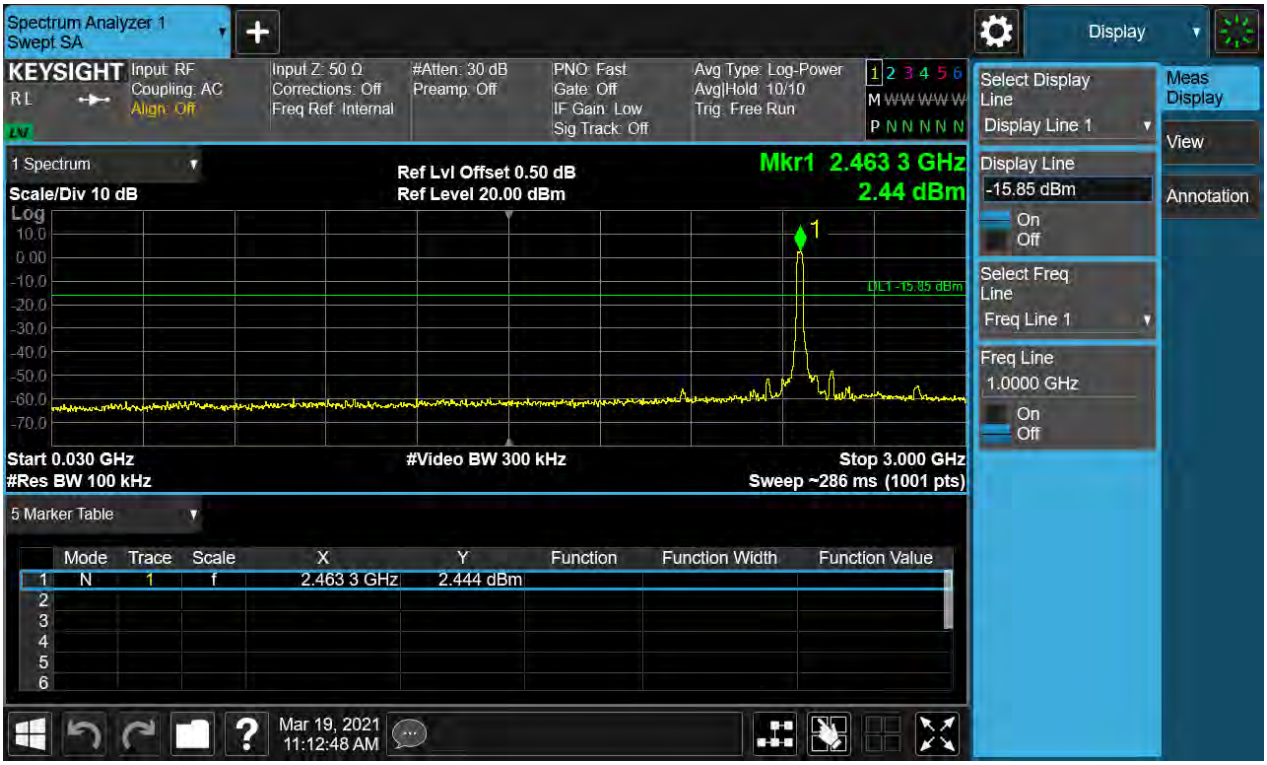
Conducted spurious emissions 30MHz-25GHz

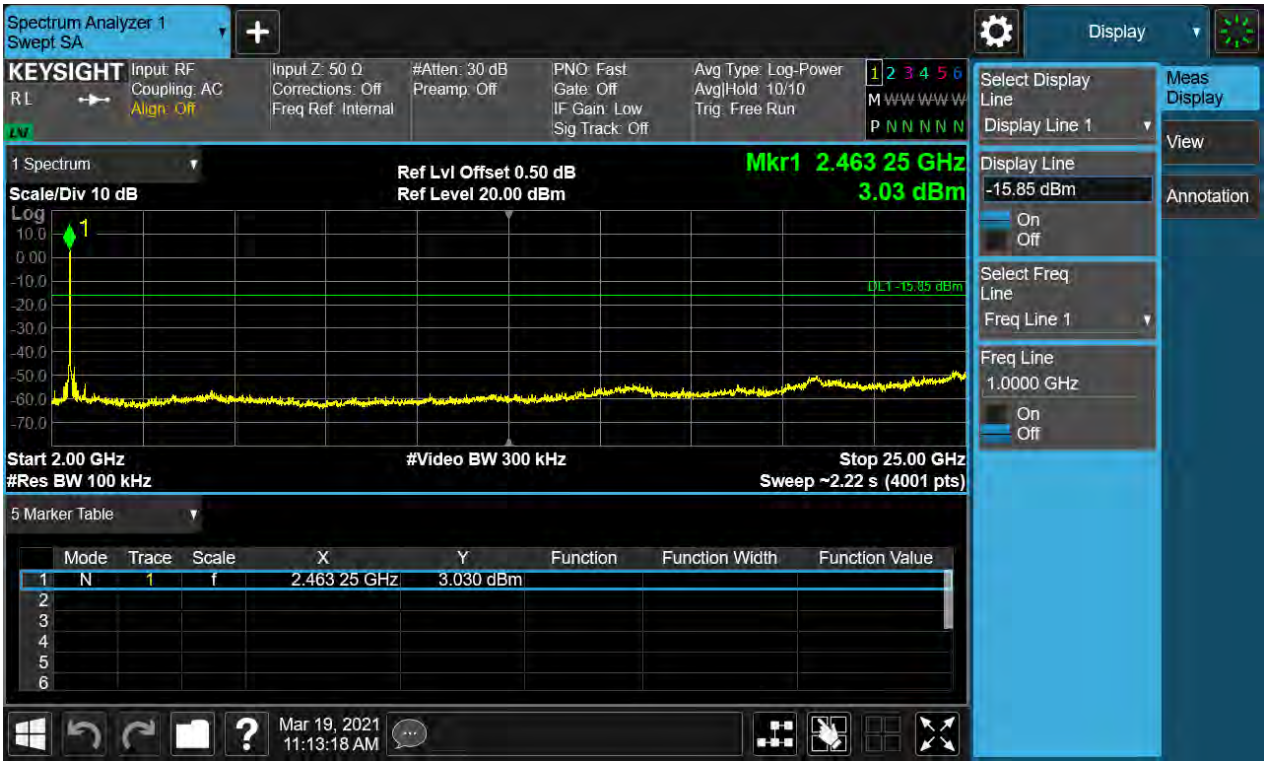
Figure 27: Conducted Spurious Emission & Authorized-band band-edge, 802.11n(HT20), 2462MHz Carrier Level

Band Edge



Conducted spurious emissions 30MHz-25GHz





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	:	25°C
Relative humidity	:	52%

Notes

Test plots please refer to the annex document "SHE21030014-02GE DATA WIFI 2.4GHz-TX EXHIBIT A".

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.

4.1.7 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	:	25°C
Relative humidity	:	52%

Notes:

Test plots please refer to the annex document "SHE21030014-02GE DATA WIFI 2.4GHz-TX EXHIBIT A".

4.2 Mains Emissions

4.2.1 Conducted Emission on AC Mains

RESULT: **N/A**

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：N/A meas not applicable. The EUT is powered by battery, There is no direct or indirect supply to mains.

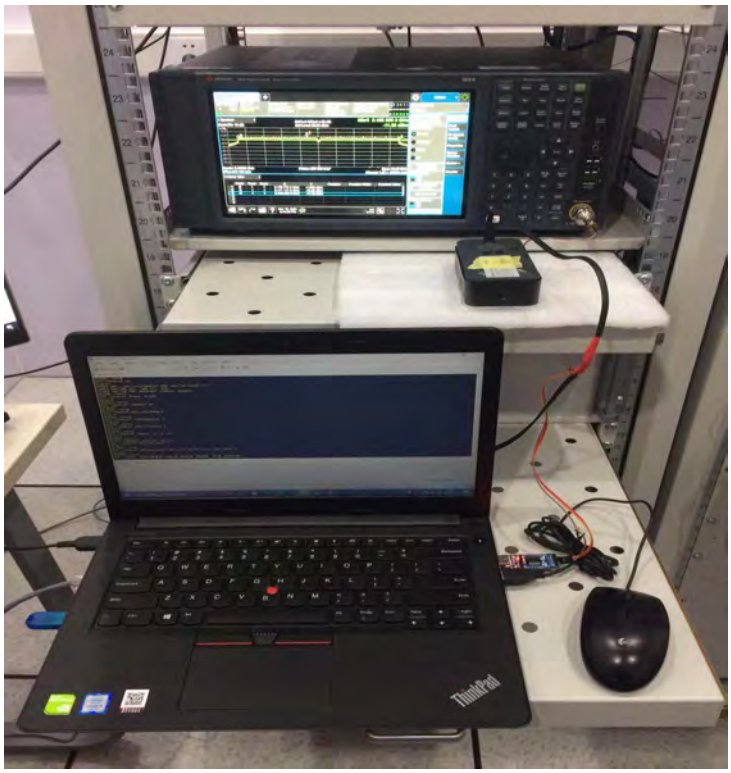
5 Appendixes

5.1 Photographs of the Sample

Front of the sample

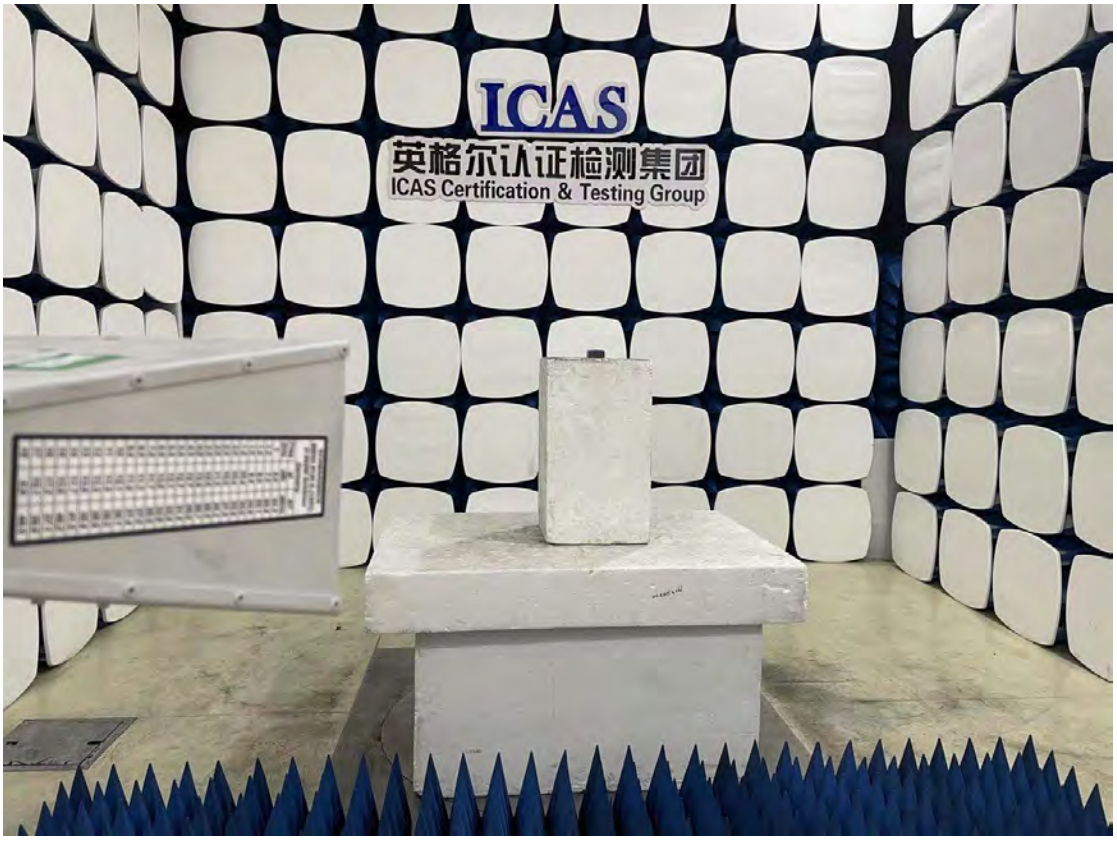
Rear of the sample

5.2 Set-up for Conducted RF test at Antenna Port



5.3 Set-up for Spurious Emissions below 1GHz

5.4 Set-up for Spurious Emissions above 1GHz



End of the report