TEST REPORT

Reference No.	:	WTF25D02024506W002
FCC ID	:	2BNVO-XS1B
Applicant	:	iVolve Pty Ltd
Address	:	Level 6 52 Merivale Street South Brisbane QLD 4101 Australia
Manufacturer	:	iVolve Pty Ltd
Address	:	Level 6 52 Merivale Street South Brisbane QLD 4101 Australia
Product	:	Nexis XS1
Model(s)	:	Nexis XS1
Standards	:	FCC 47CFR Part 15.247
Date of Receipt sample	:	2025-02-12
Date of Test	:	2025-02-14 to 2025-03-06
Date of Issue	:	2025-03-06
Test Result	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

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3 Revision History

Test Report No.	Date of Receipt Sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTF25D02024506W002	2025-02-12	2025-02-14 to 2025-03-06	2025-03-06	Original	-	Valid

4 General Information

4.1 General Description of E.U.T.

Product:	Nexis XS1
Model(s):	Nexis XS1
Model Description:	N/A
Wi-Fi Specification:	2.4G-802.11b/g/n HT20
Hardware Version:	XS1B
Software Version:	NexisOS

4.2 Details of E.U.T.

Operation Frequency:	802.11b/g/n (HT20), 2412-2462MHz 11CH
Max. RF output power:	Ant.1: 14.54dBm Ant.2: 14.90dBm Ant.1+ Ant.2: 17.04dBm
Type of Modulation:	802.11b: DBPSK, DQPSK, CCK 802.11g: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna installation:	External antenna
Antenna Gain:	6.0dBi
Ratings:	DC 12V or 24V for·Battery

4.3 Channel List

Wi-Fi

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2412	2	2417	3	2422	4	2427
5	2432	6	2437	7	2442	8	2447
9	2452	10	2457	11	2462	-	-

4.4 Test Facility

The test facility has a test site registered with the following organizations:

ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.

Waltek Testing Group Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A, October 15, 2016.

FCC Designation No.: CN1201. Test Firm Registration No.: 523476.

Waltek Testing Group Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration number 523476, September 10, 2019.

4.5 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

☐ Yes ☒ No

If Yes, list the related test items and lab information:

Test Lab: N/A

Lab address: N/A

Test items: N/A

4.6 Abnormalities from Standard Conditions

None.

4.7 Test Mode

Tests Carried Out Under FCC part 15.247

Test Items	Mode	Data Rate	Channel	TX/RX
Maximum Conducted Output Power	802.11b	1 Mbps	1/6/11	TX
	802.11g	6 Mbps	1/6/11	TX
	802.11n HT20	MCS0	1/6/11	TX
Power Spectral Density	802.11b	1 Mbps	1/6/11	TX
	802.11g	6 Mbps	1/6/11	TX
	802.11n HT20	MCS0	1/6/11	TX
6dB Bandwidth and 99% Bandwidth	802.11b	1 Mbps	1/6/11	TX
	802.11g	6 Mbps	1/6/11	TX
	802.11n HT20	MCS0	1/6/11	TX
Band Edge	802.11b	1 Mbps	1/6/11	TX
	802.11g	6 Mbps	1/6/11	TX
	802.11n HT20	MCS0	1/6/11	TX
Transmitter Spurious Emissions	802.11b	1 Mbps	1/6/11	TX
	802.11g	6 Mbps	1/6/11	TX
	802.11n HT20	MCS0	1/6/11	TX

Note: Parameters set by test software during channel & power tests, the software provided by the applicant was used to set the operating channels as well as the maximum output power level. The RF output power set is the power expected by the manufacturer and is going to be fixed on the firmware of the final product.

5 Test Summary

Test Items	Test Requirement	Result
Radiated Emissions	15.247(d) 15.205(a) 15.209(a)	PASS
Conducted Spurious Emissions	15.247(d)	PASS
Conducted Emissions	15.207(a)	N/A
6dB Bandwidth and 99% Bandwidth	15.247(a)(2)	PASS
Maximum Conducted Output Power	15.247(b)(3), (4)	PASS
Power Spectral Density	15.247(e)	PASS
Band Edge	15.247(d)	PASS
Antenna Requirement	15.203	PASS
RF Exposure	1.1307(b)(1)	PASS
Note: Pass=Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable.		

6 Equipment Used during Test

6.1 Equipments List

3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	Spectrum Analyzer	R&S	FSP30	100091	2024-04-22	2025-04-21
2	Amplifier	Agilent	8447D	2944A10178	2024-07-18	2025-07-17
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2024-07-21	2025-07-20
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2024-04-22	2025-04-21
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2025-01-17	2026-01-16
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2024-07-18	2025-07-17
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2024-07-18	2025-07-17
8	Coaxial Cable (above 1GHz)	ZT26-NJ-NJ-8M/FA	1GHz-18GHz	NA	2024-04-22	2025-04-21
3m Semi-anechoic Chamber for Radiation Emissions Test site 2#						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No**	**Last Calibration Date**	**Calibration Due Date**
1	Test Receiver	R&S	ESCI	101296	2024-04-22	2025-04-21
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2024-11-04	2025-11-03
3	Active Loop Antenna	Com-Power Corp.	AL-130R	10160007	2024-04-27	2025-04-26
4	Amplifier	ANRITSU	MH648A	M43381	2024-04-22	2025-04-21
5	Cable	HUBER+SUHNER	CBL2	525178	2024-04-22	2025-04-21
RF Conducted Testing						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	Spectrum Analyzer	R&S	FSP40	100501	2024-07-18	2025-07-17
2.	EXA Signal Analyzer	Malaysia Keysight	N9010A	MY50520207	2024-04-22	2025-04-21

6.2 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
Adapter	/	SYS1649-6012-T3	/

6.3 Measurement Uncertainty

Parameter	Uncertainty
Conducted Emission	± 3.64dB (AC mains 150KHz~30MHz)
Radiated Spurious Emissions	± 5.08dB (Bilog antenna 30M~1000MHz)
	± 5.47 dB (Horn antenna 1000M~25000MHz)
Radio Frequency	± 1 x 10^{-7}Hz
RF Power	± 0.42 dB
RF Power Density	± 0.7dB
Conducted Spurious Emissions	± 2.76 dB (9kHz~26500MHz)
Confidence interval：95%. Confidence factor: k=2	

6.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R. China.

7 Duty Cycle

ANT 1:

Type of Modulation	On time ms	Period ms	Duty Cycle linear	Duty Cycle %	Duty Cycle Factor(dB)	Average Factor(dB)
802.11b	20.000	20.000	1.00	100.00	0.00	0.00
802.11g	20.000	20.000	1.00	100.00	0.00	0.00
802.11n-HT20	20.000	20.000	1.00	100.00	0.00	0.00

ANT 2:

Type of Modulation	On time ms	Period ms	Duty Cycle linear	Duty Cycle %	Duty Cycle Factor(dB)	Average Factor(dB)
802.11b	20.000	20.000	1.00	100.00	0.00	0.00
802.11g	20.000	20.000	1.00	100.00	0.00	0.00
802.11n-HT20	20.000	20.000	1.00	100.00	0.00	0.00

Remark:

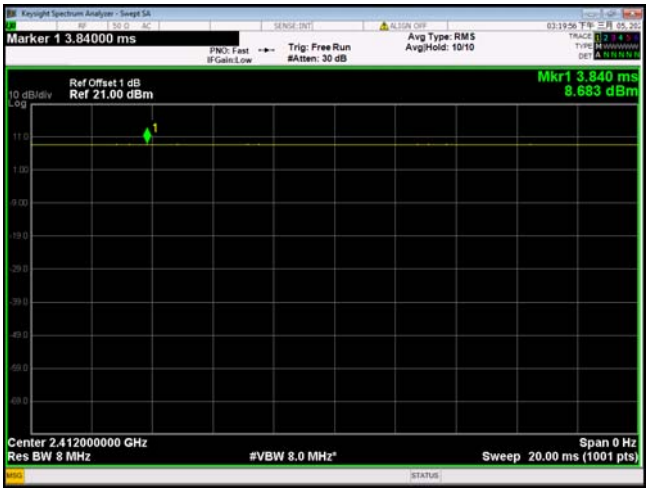
Duty cycle=On Time/period;

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

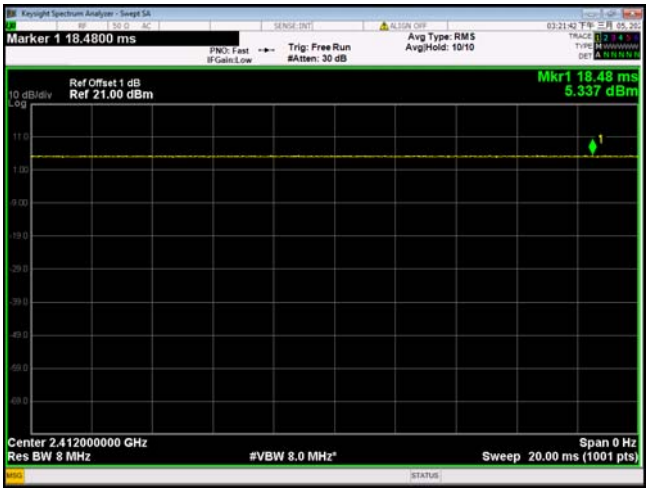
Average factor=$20\log_{10}$Duty cycle

ANT 1:

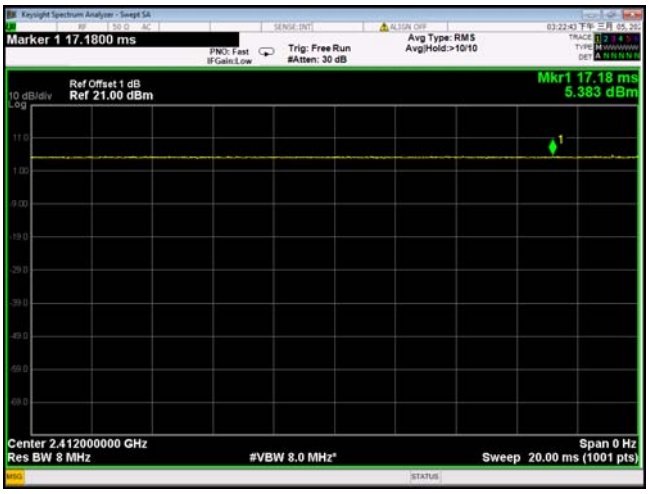
Wi-Fi 802.11b



Wi-Fi 802.11g

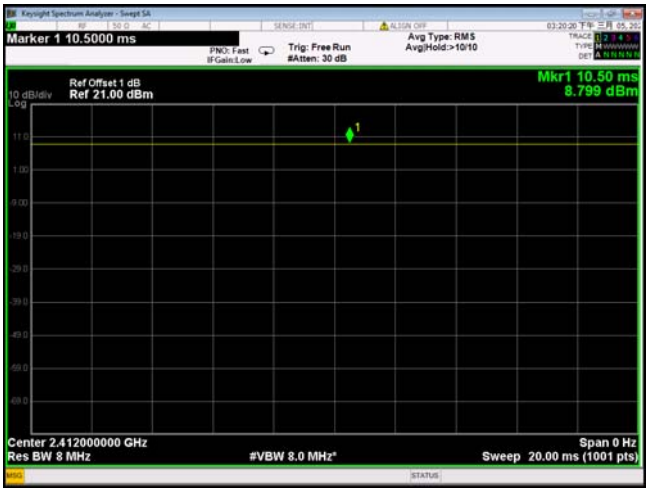


Wi-Fi 802.11n-HT20

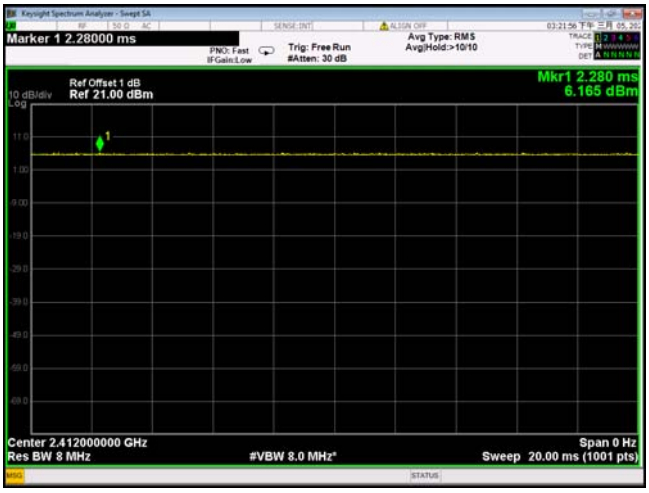


ANT 2:

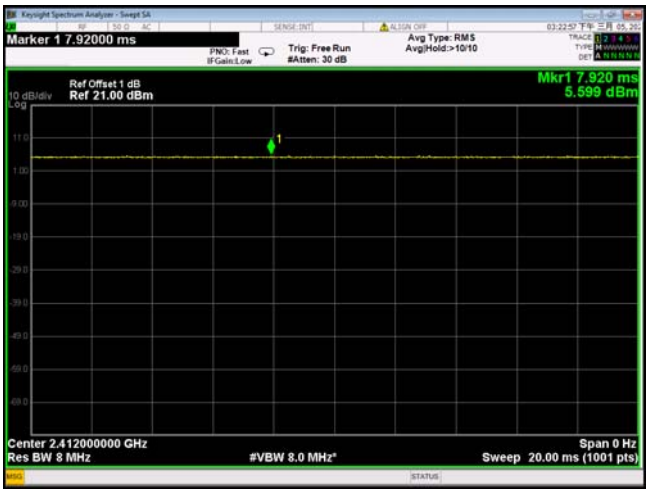
Wi-Fi 802.11b



Wi-Fi 802.11g



Wi-Fi 802.11n-HT20



8 Radiated Emissions

Test Requirement: 47CFR FCC Part15 Subpart C §15.209&15.247
KDB 662911 D01 Multiple Transmitter Output v02r01, October 31, 2013
Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019; ANSI C63.10-2020+A1-2024
Test Result: PASS
Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

8.1 EUT Operation

Operating Environment:

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

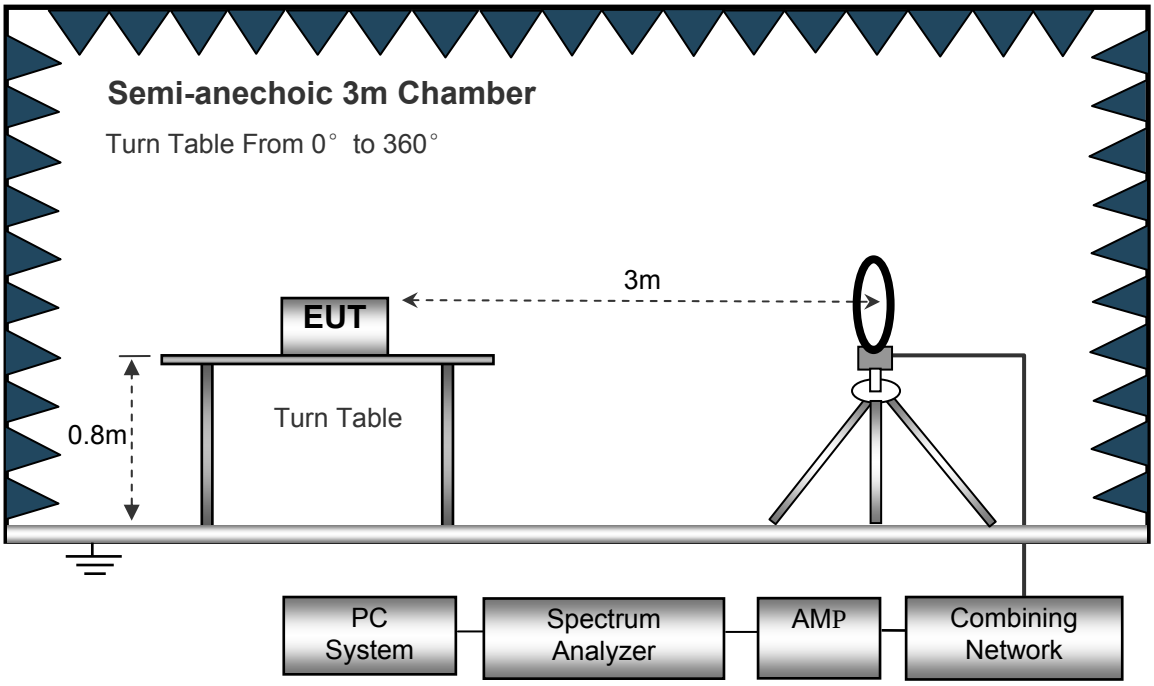
EUT Operation:

The test was performed in Transmitting mode, the worst test data were shown in the report.

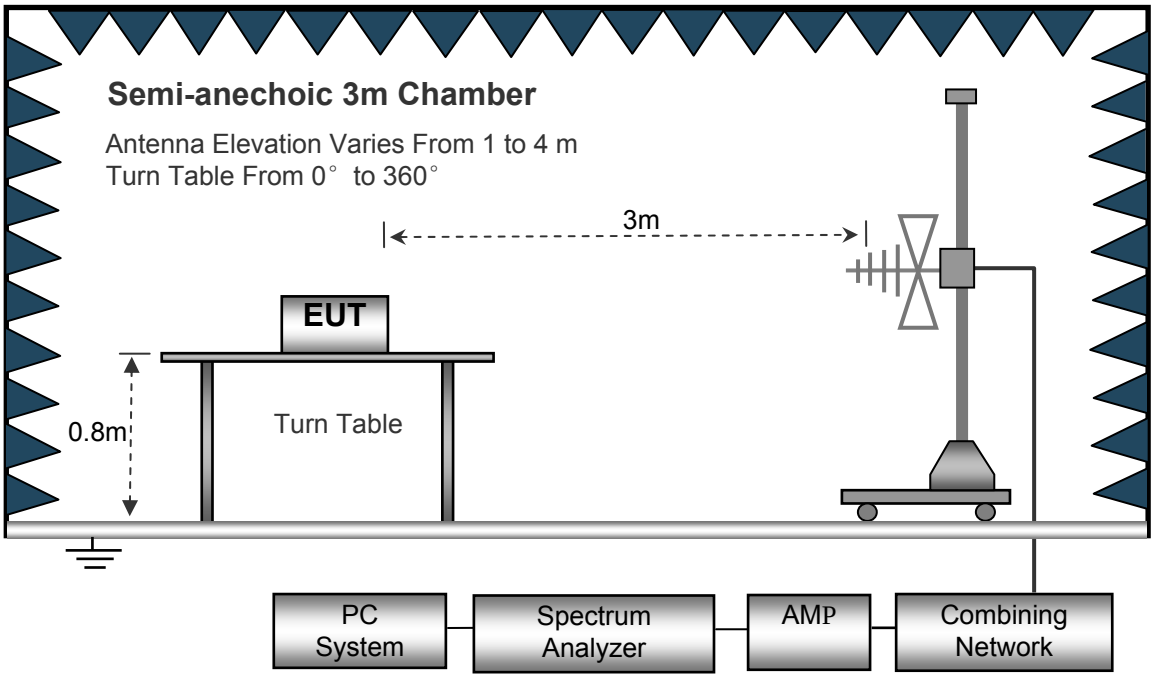
8.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

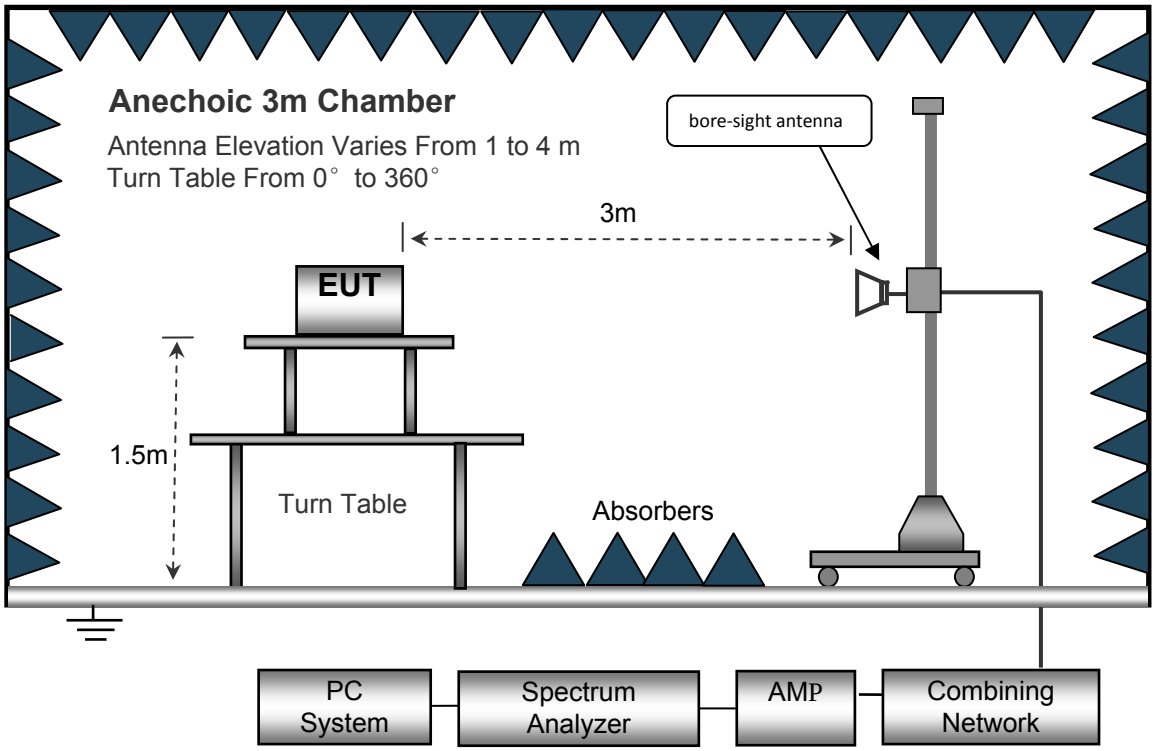
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



8.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed ..... Auto
IF Bandwidth..... 10kHz
Video Bandwidth..... 10kHz
Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 100kHz
Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 3MHz
Detector ..... Ave.
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 10Hz

8.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X, Y and Z axis positioning (X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), the worst condition was tested putting the EUT in Z axis, so the worst data were shown as follow.
8. A 2.4GHz high –pass filter is used during radiated emissions above 1GHz measurement.

8.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Limit

8.6 Summary of Test Results

Test Frequency: 9kHz ~ 30MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency: 30MHz ~ 8GHz

Note: Only the worst-case 802.11n HT20 mode were record in the report.

Test Mode: TX (Ant. 1+ Ant. 2)

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11n HT20: Low Channel 2412MHz									
325.18	41.35	QP	142	1.1	H	-12.36	28.99	46.00	-17.01
325.18	44.92	QP	104	1.9	V	-12.36	32.56	46.00	-13.44
4824.00	53.87	PK	2	1.0	V	-1.06	52.81	74.00	-21.19
4824.00	42.04	Ave	2	1.0	V	-1.06	40.98	54.00	-13.02
7236.00	48.12	PK	236	1.8	H	1.33	49.45	74.00	-24.55
7236.00	36.48	Ave	236	1.8	H	1.33	37.81	54.00	-16.19

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11n HT20: Middle Channel 2437MHz									
325.18	42.42	QP	335	1.5	H	-12.36	30.06	46.00	-15.94
325.18	45.92	QP	106	1.3	V	-12.36	33.56	46.00	-12.44
4874.00	53.77	PK	195	1.1	V	-0.62	53.15	74.00	-20.85
4874.00	42.91	Ave	195	1.1	V	-0.62	42.29	54.00	-11.71
7311.00	47.07	PK	284	1.3	H	2.21	49.28	74.00	-24.72
7311.00	36.55	Ave	284	1.3	H	2.21	38.76	54.00	-15.24

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11n HT20: High Channel 2462MHz									
325.18	43.42	QP	200	1.4	H	-12.36	31.06	46.00	-14.94
325.18	46.00	QP	272	1.1	V	-12.36	33.64	46.00	-12.36
4924.00	54.79	PK	63	1.7	V	-0.24	54.55	74.00	-19.45
4924.00	42.49	Ave	63	1.7	V	-0.24	42.25	54.00	-11.75
7386.00	45.74	PK	167	1.2	H	2.84	48.58	74.00	-25.42
7386.00	36.94	Ave	167	1.2	H	2.84	39.78	54.00	-14.22

Radiated Restricted Band Emission

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11n HT20: Low Channel 2412MHz									
2310.71	45.54	PK	155	1.3	V	-13.19	32.35	74.00	-41.65
2310.71	37.89	Ave	155	1.3	V	-13.19	24.70	54.00	-29.30
2370.51	43.03	PK	281	1.5	H	-13.14	29.89	74.00	-44.11
2370.51	36.91	Ave	281	1.5	H	-13.14	23.77	54.00	-30.23
2496.93	43.86	PK	123	1.6	V	-13.08	30.78	74.00	-43.22
2496.93	36.58	Ave	123	1.6	V	-13.08	23.50	54.00	-30.50

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11n HT20: High Channel 2462MHz									
2332.75	45.32	PK	189	1.6	V	-13.19	32.13	74.00	-41.87
2332.75	39.92	Ave	189	1.6	V	-13.19	26.73	54.00	-27.27
2373.63	44.33	PK	113	1.0	H	-13.14	31.19	74.00	-42.81
2373.63	36.58	Ave	113	1.0	H	-13.14	23.44	54.00	-30.56
2491.23	42.27	PK	225	1.4	V	-13.08	29.19	74.00	-44.81
2491.23	38.51	Ave	225	1.4	V	-13.08	25.43	54.00	-28.57

Test Frequency: 8GHz~25GHz

The measurements were more than 20 dB below the limit and not reported.

9 Conducted Spurious Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.247
KDB 662911 D01 Multiple Transmitter Output v02r01, October 31, 2013

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019; ANSI C63.10-2020+A1-2024

Test Result: PASS

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

9.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer:

Blow 30MHz:

RBW = 100kHz, VBW = 300kHz, Sweep = auto

Detector function = peak, Trace = max hold

Above 30MHz:

RBW = 100kHz, VBW = 300kHz, Sweep = auto

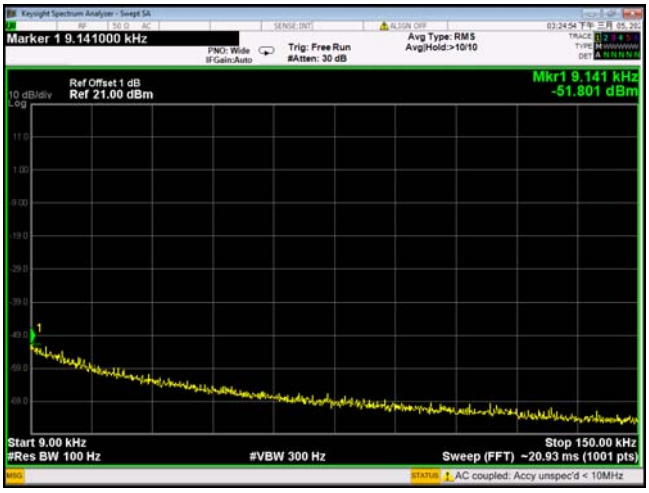
Detector function = peak, Trace = max hold

9.2 Test Result

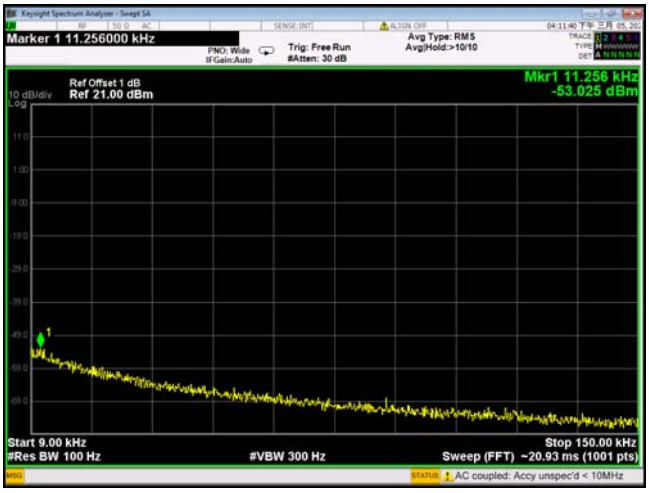
ANT 1

9KHz – 150KHz

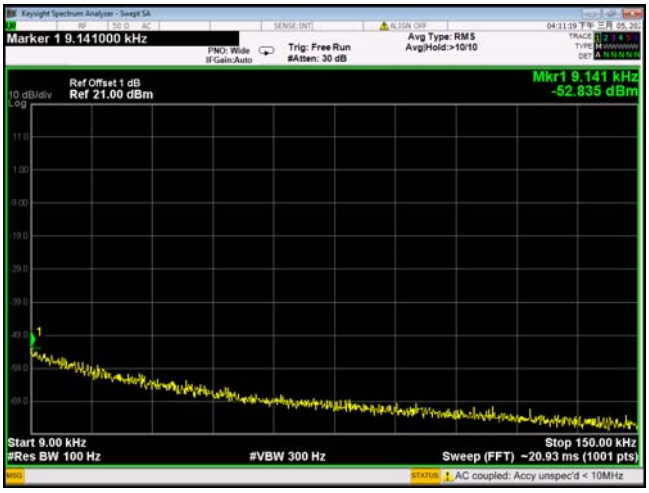
Mode: TX 11b channel 1



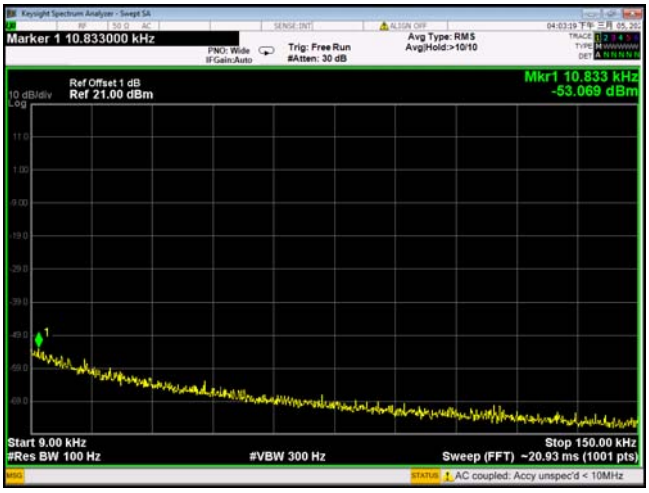
Mode: TX 11b channel 6



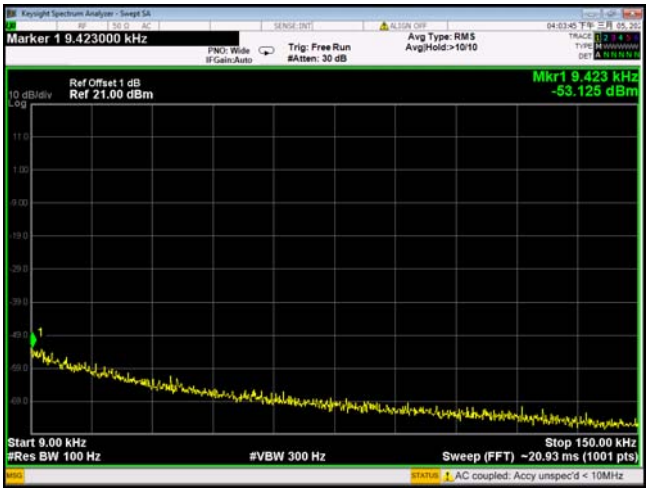
Mode: TX 11b channel 11



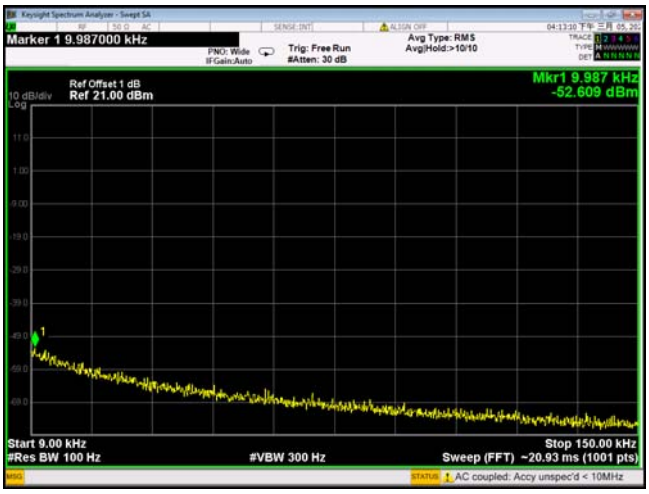
Mode: TX 11g channel 1



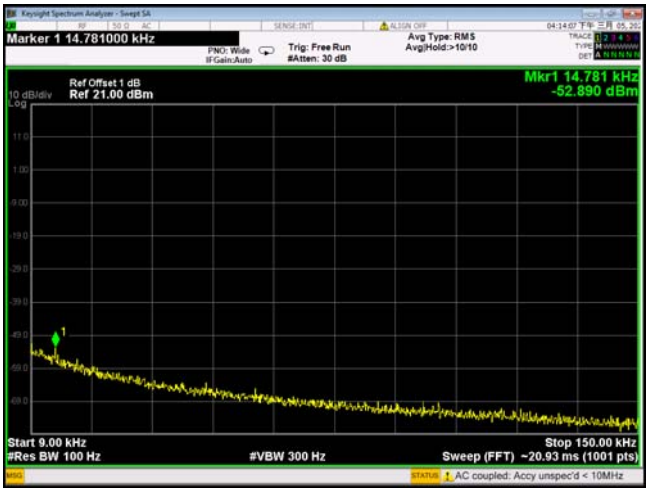
Mode: TX 11g channel 6



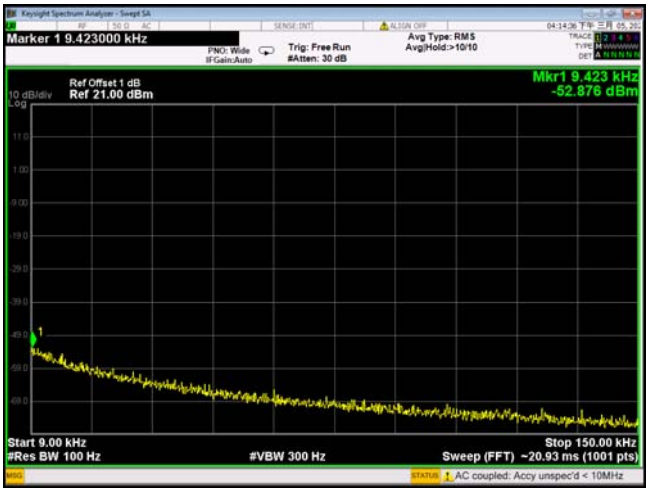
Mode: TX 11g channel 11



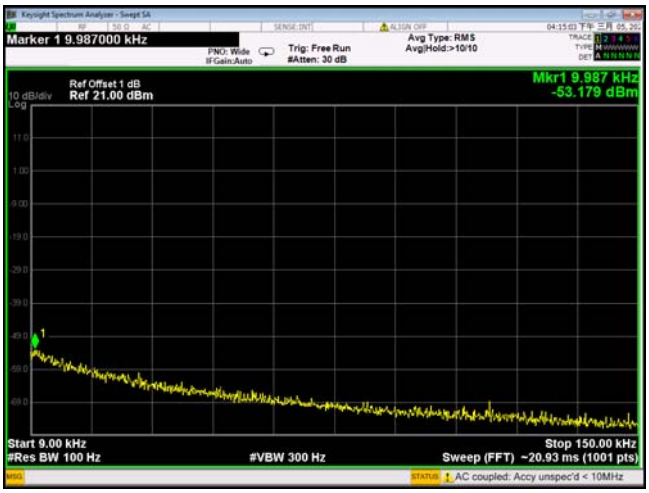
Mode: TX 11n HT20 channel 1



Mode: TX 11 n HT20 channel 6

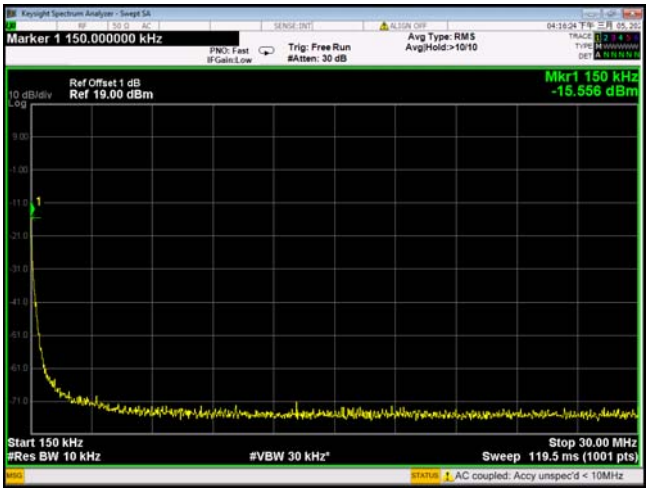


Mode: TX 11 n HT20 channel 11

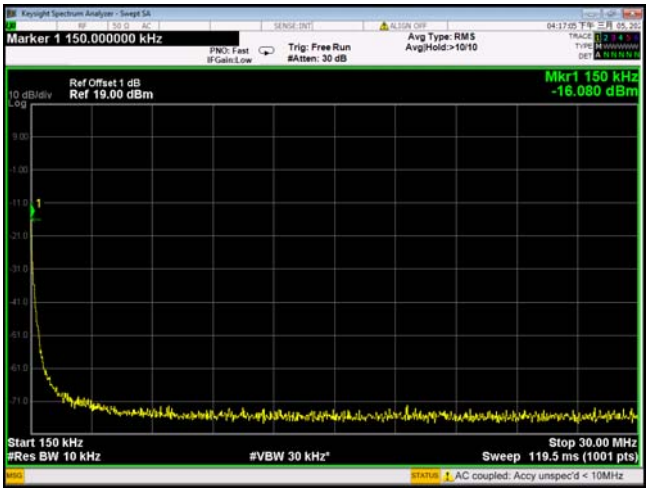


150KHz – 30MHz

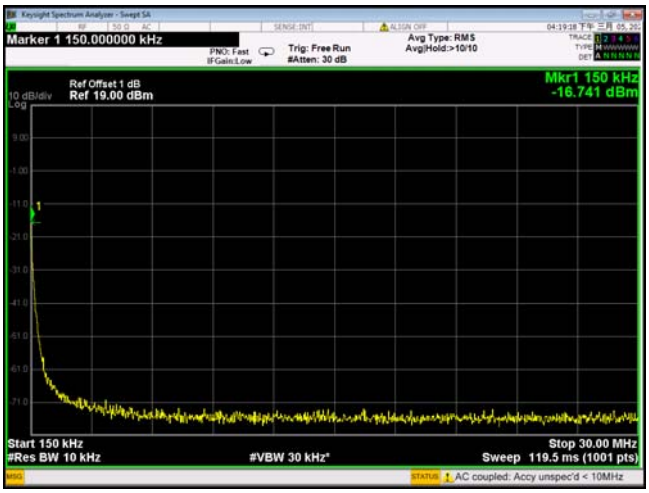
Mode: TX 11b channel 1



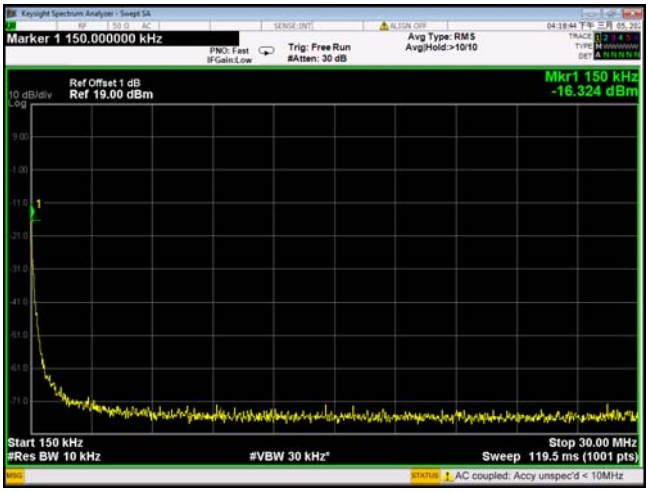
Mode: TX 11b channel 6



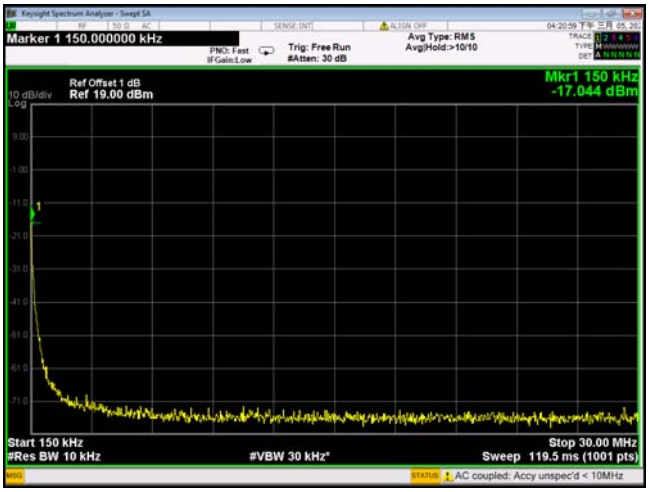
Mode: TX 11b channel 11



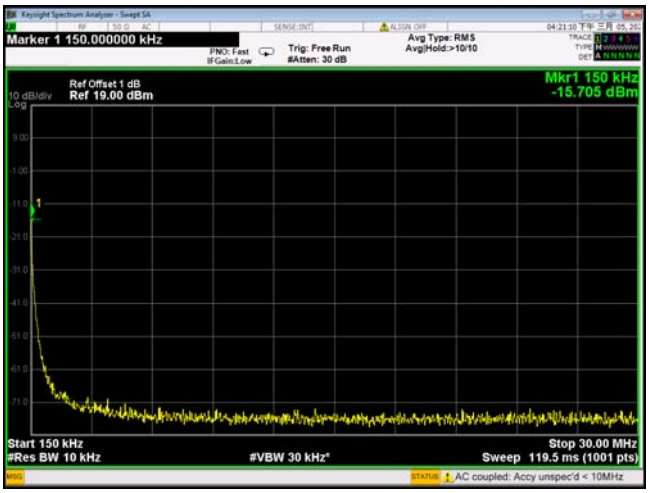
Mode: TX 11g channel 1



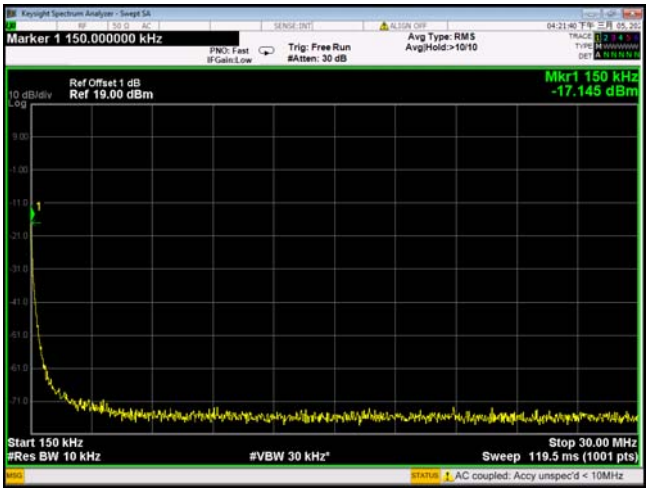
Mode: TX 11g channel 6



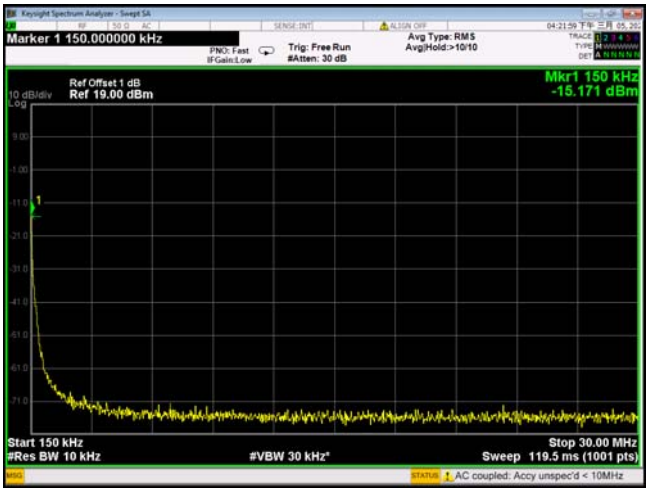
Mode: TX 11g channel 11



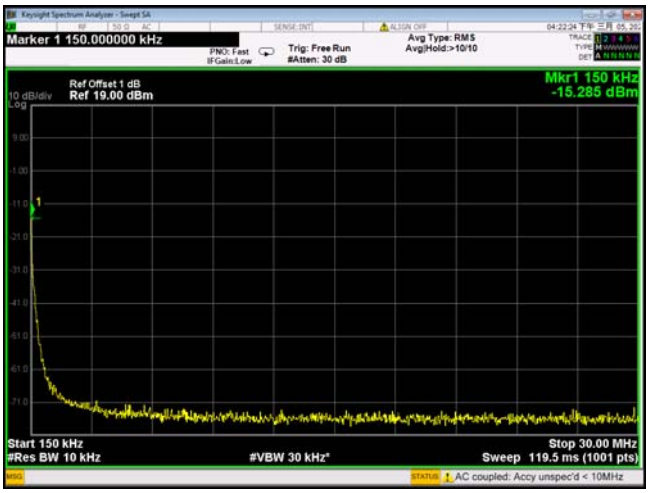
Mode: TX 11n HT20 channel 1



Mode: TX 11 n HT20 channel 6

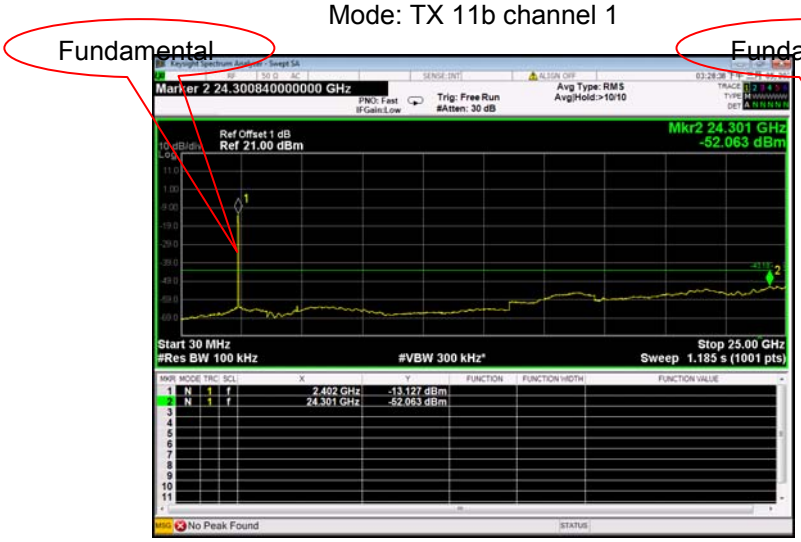


Mode: TX 11 n HT20 channel 11

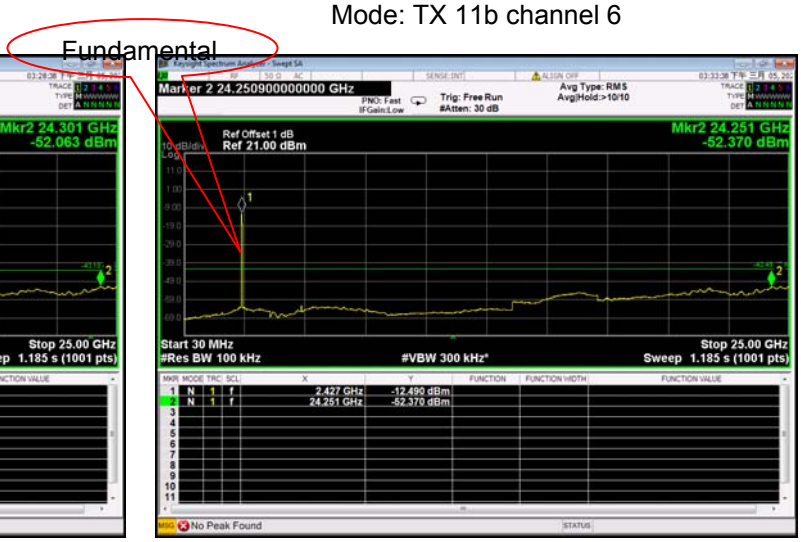


Above 30MHz

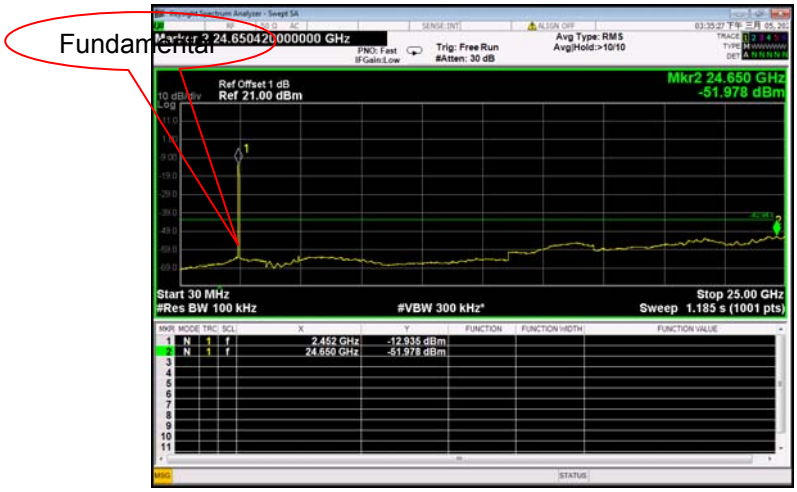
Mode: TX 11b channel 1



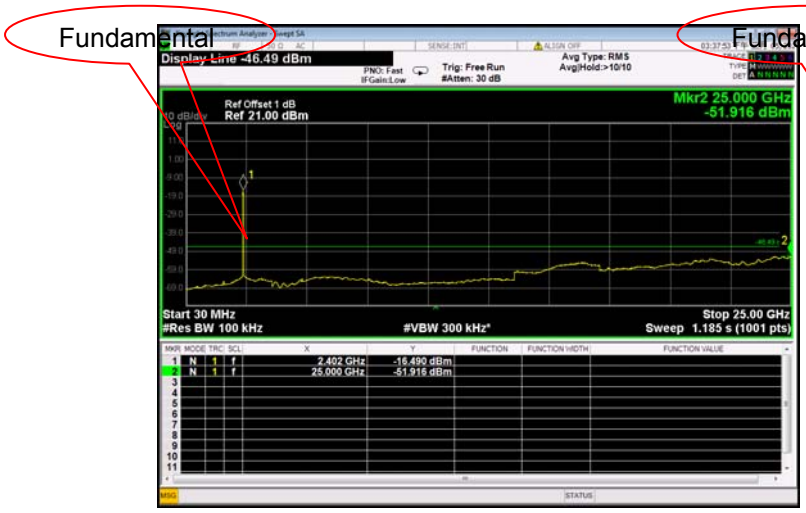
Mode: TX 11b channel 6



Mode: TX 11b channel 11

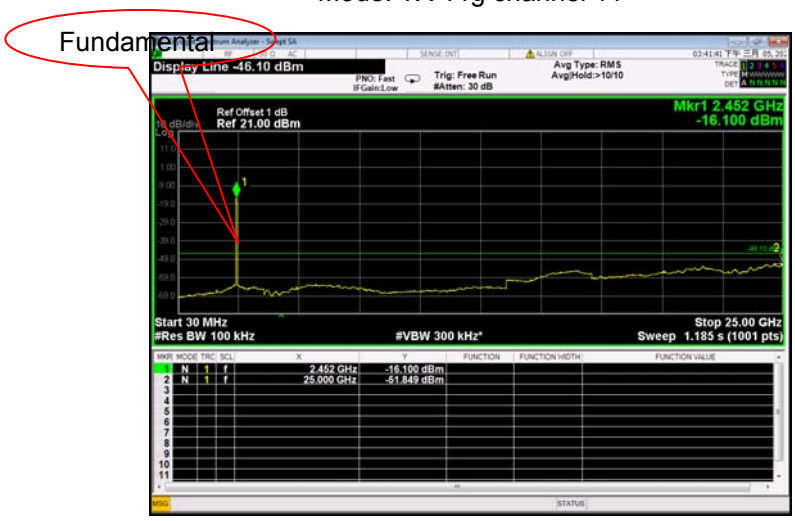


Mode: TX 11g channel 1

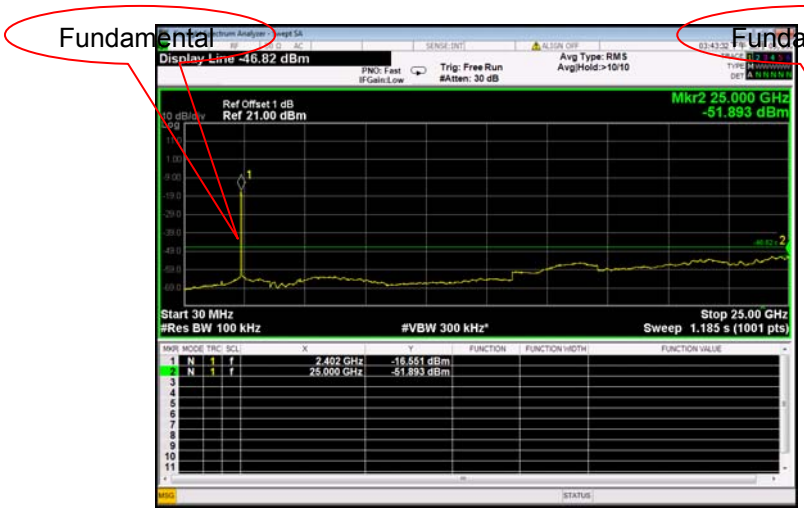


Mode: TX 11g channel 6

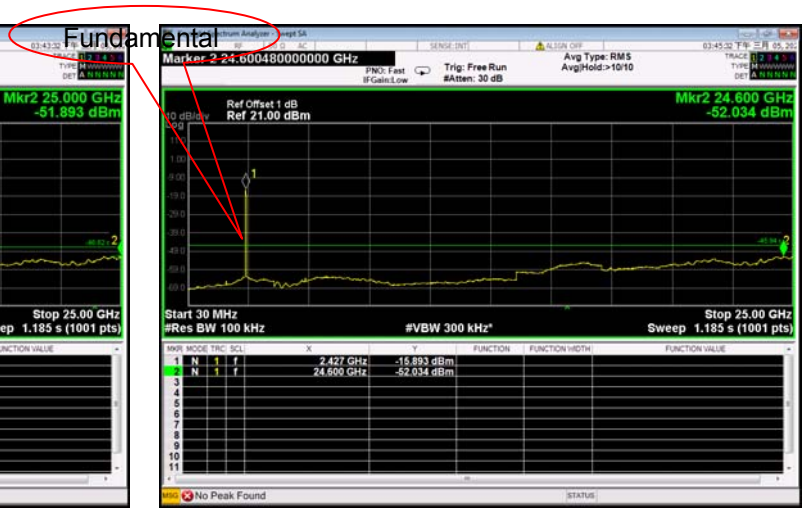
Mode: TX 11g channel 11



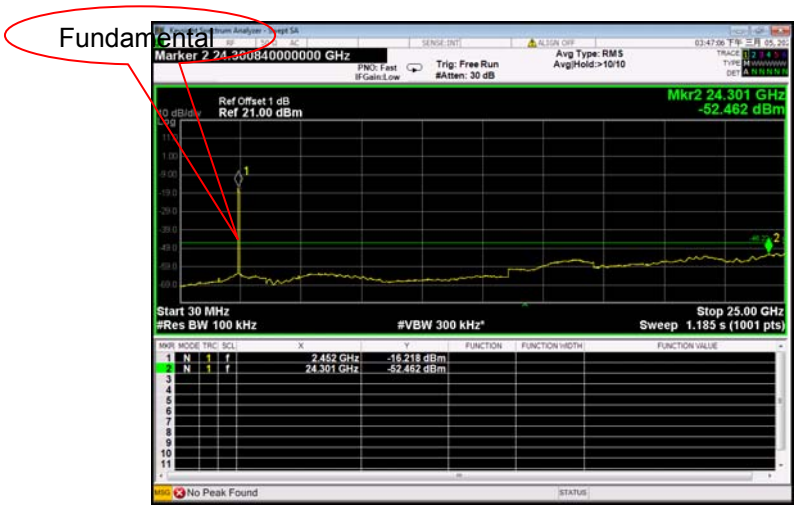
Mode: TX 11n HT20 channel 1



Mode: TX 11 n HT20 channel 6



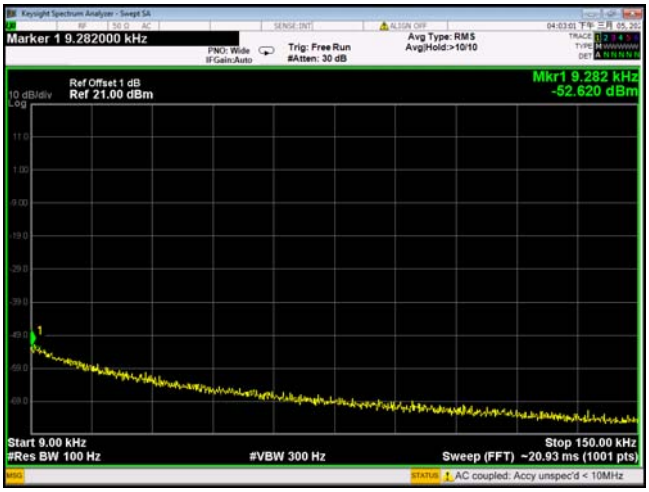
Mode: TX 11 n HT20 channel 11



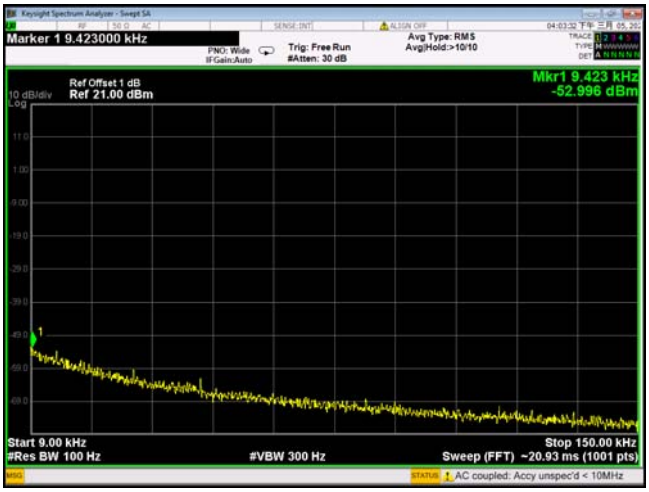
ANT 2

9KHz – 150KHz

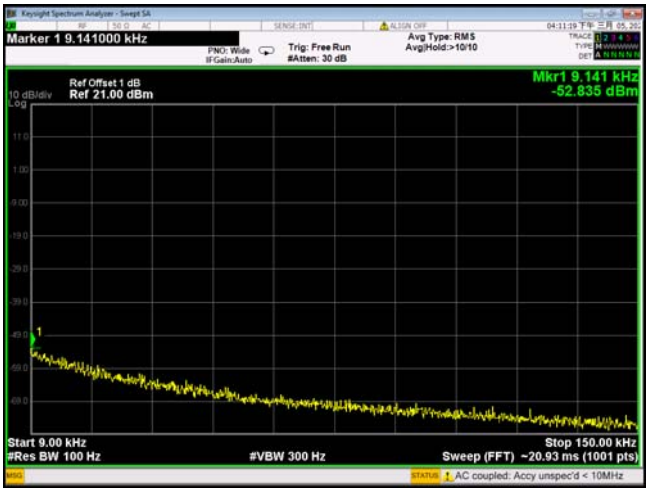
Mode: TX 11b channel 1



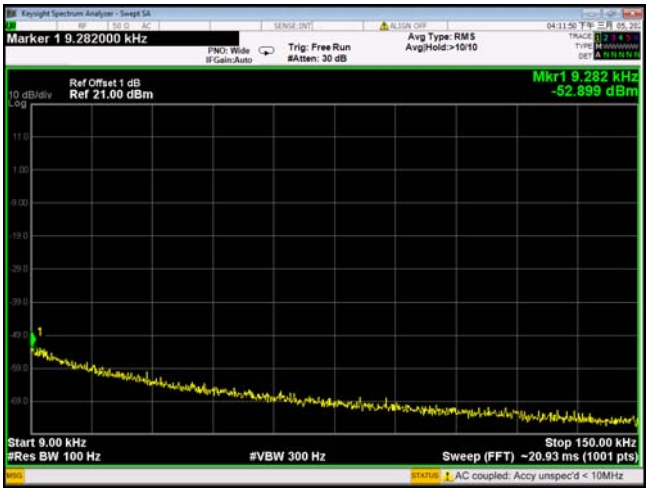
Mode: TX 11b channel 6



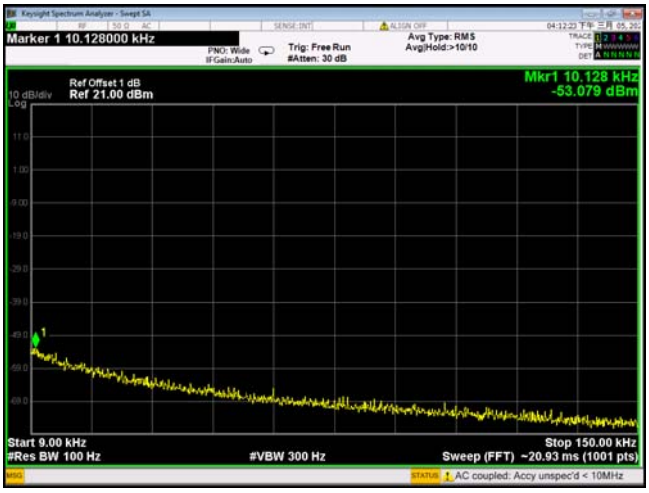
Mode: TX 11b channel 11



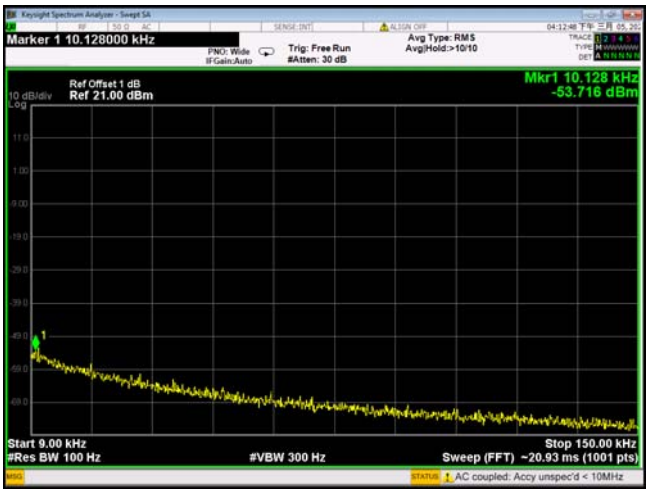
Mode: TX 11g channel 1



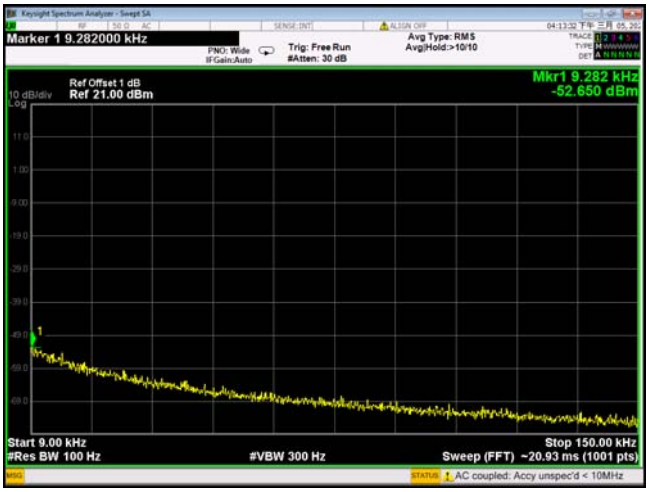
Mode: TX 11g channel 6



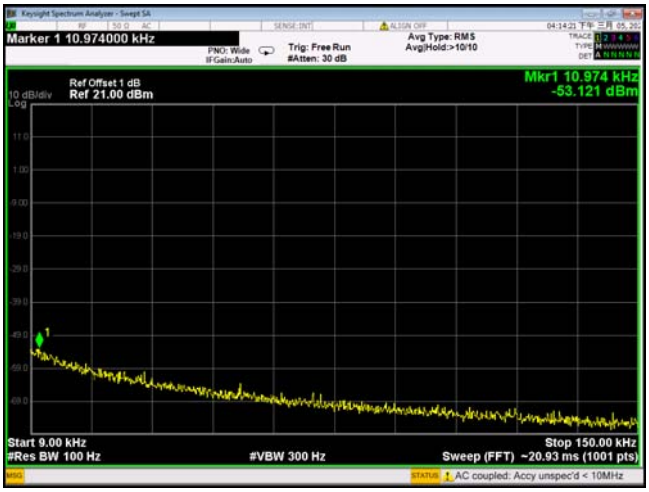
Mode: TX 11g channel 11



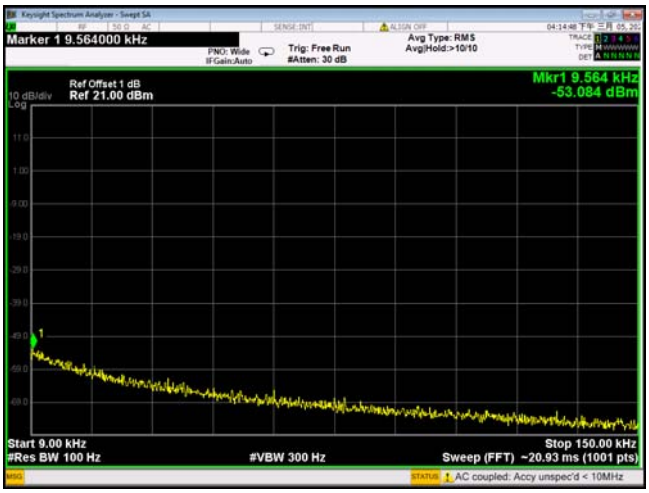
Mode: TX 11n HT20 channel 1



Mode: TX 11 n HT20 channel 6

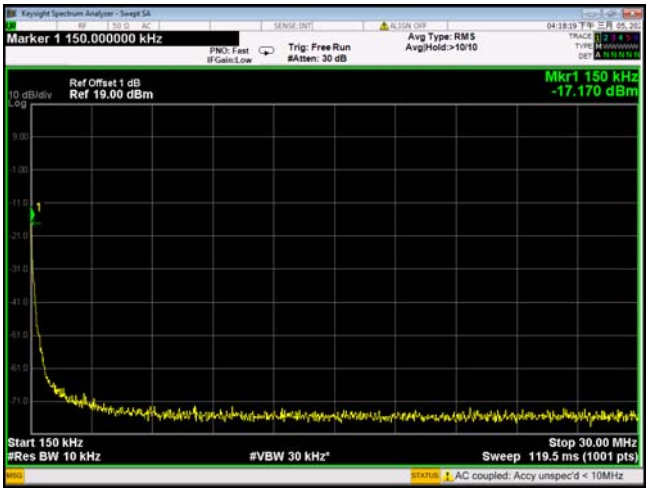


Mode: TX 11 n HT20 channel 11

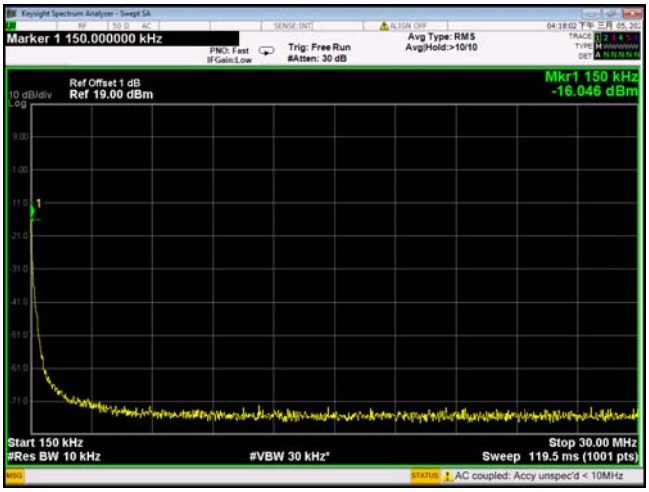


150KHz – 30MHz

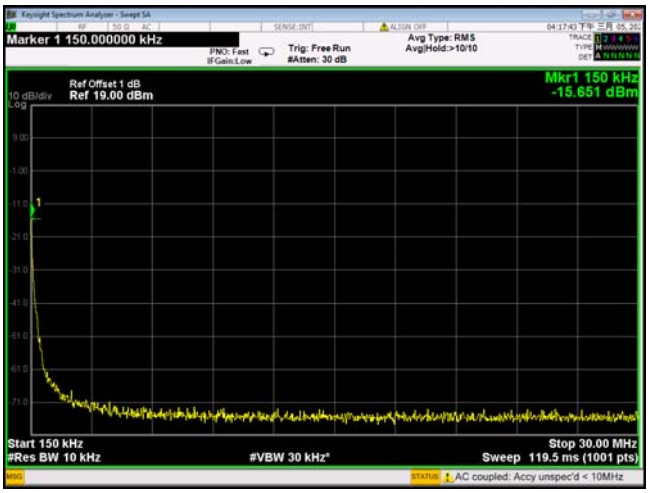
Mode: TX 11b channel 1



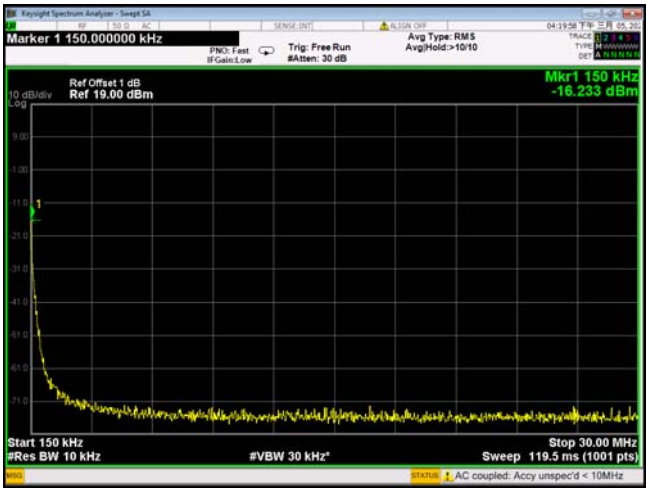
Mode: TX 11b channel 6



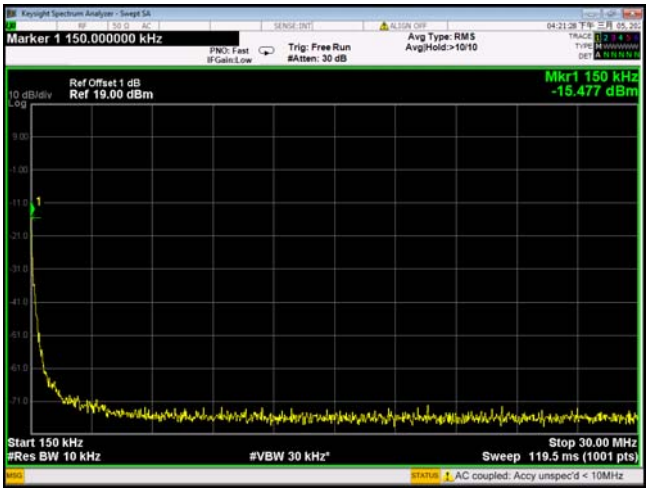
Mode: TX 11b channel 11



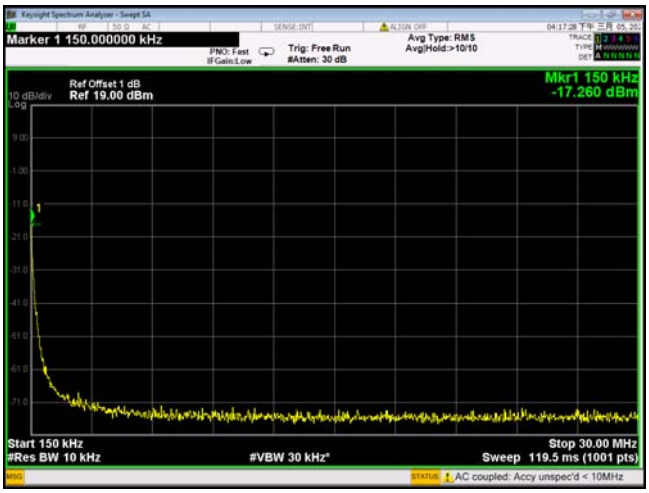
Mode: TX 11g channel 1



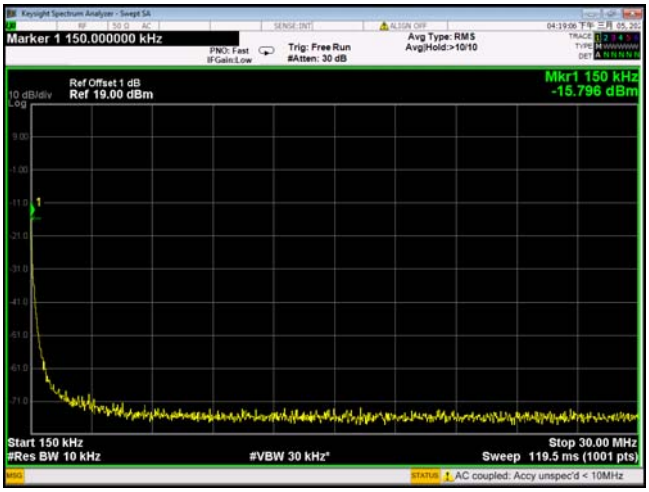
Mode: TX 11g channel 6



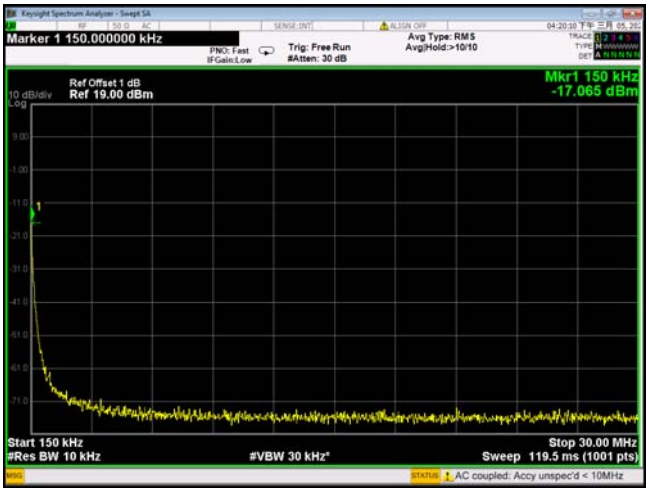
Mode: TX 11g channel 11



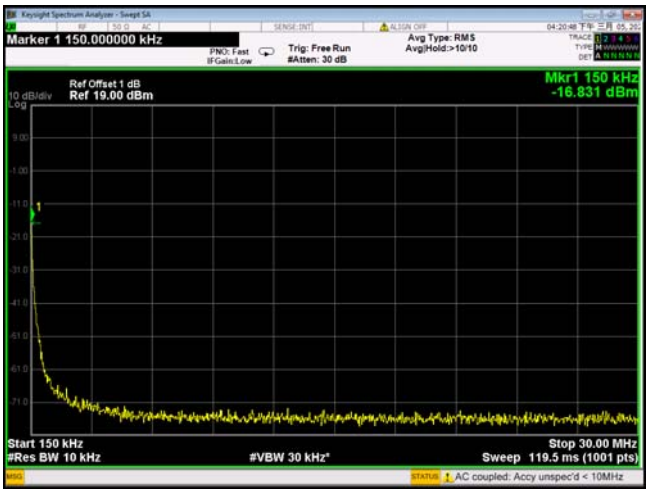
Mode: TX 11n HT20 channel 1



Mode: TX 11 n HT20 channel 6

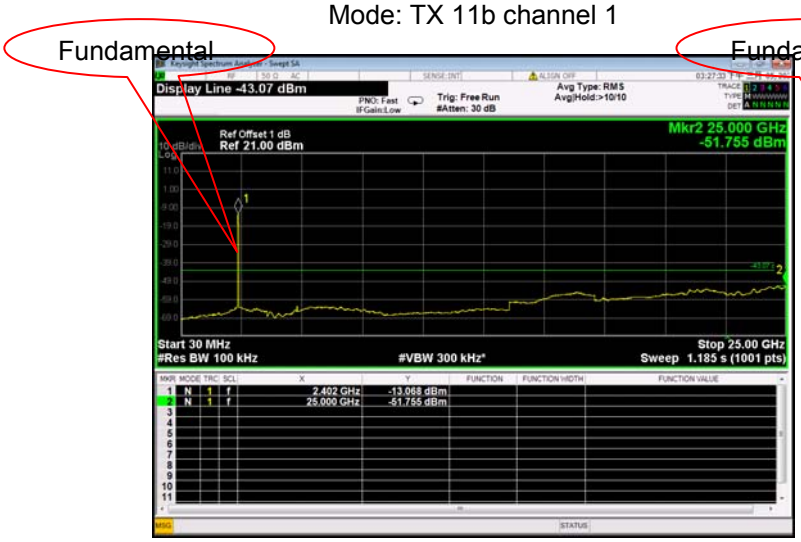


Mode: TX 11 n HT20 channel 11

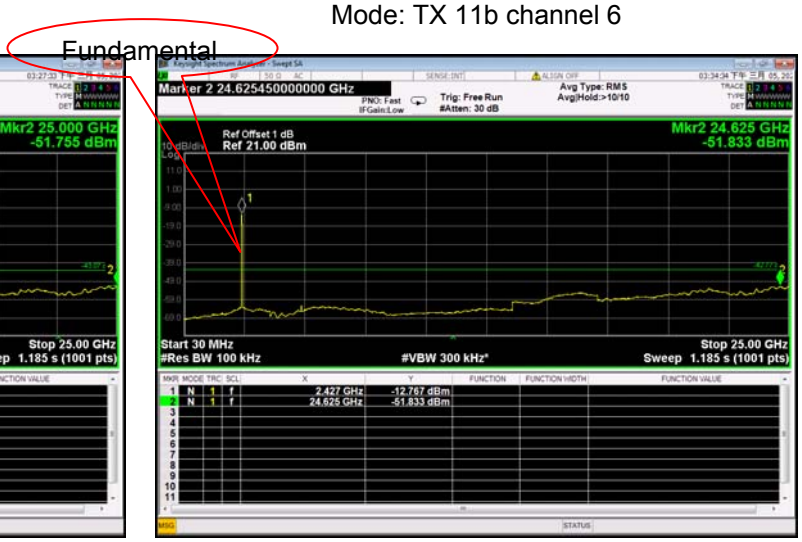


Above 30MHz

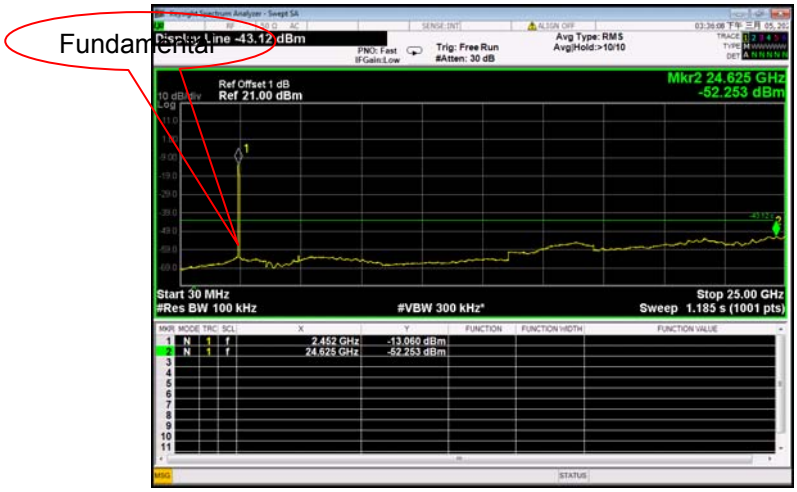
Mode: TX 11b channel 1



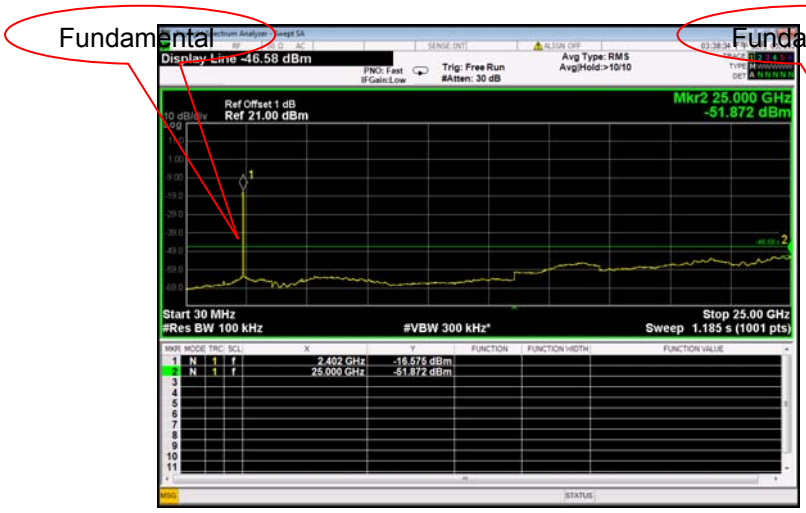
Mode: TX 11b channel 6



Mode: TX 11b channel 11

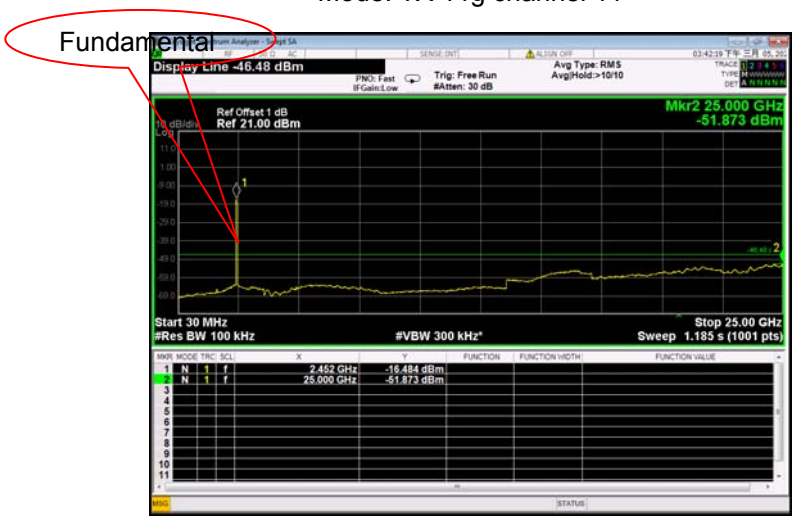


Mode: TX 11g channel 1



Mode: TX 11g channel 6

Mode: TX 11g channel 11



Mode: TX 11n HT20 channel 1

Mode: TX 11 n HT20 channel 6

Mode: TX 11 n HT20 channel 11

10 Band Edge Measurement

Test Requirement:	47CFR FCC Part15 Subpart C §15.247
Test Method:	KDB 662911 D01 Multiple Transmitter Output v02r01, October 31, 2013 KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019
Test Limit:	Regulation 15.247 (d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
Test Mode:	Transmitting

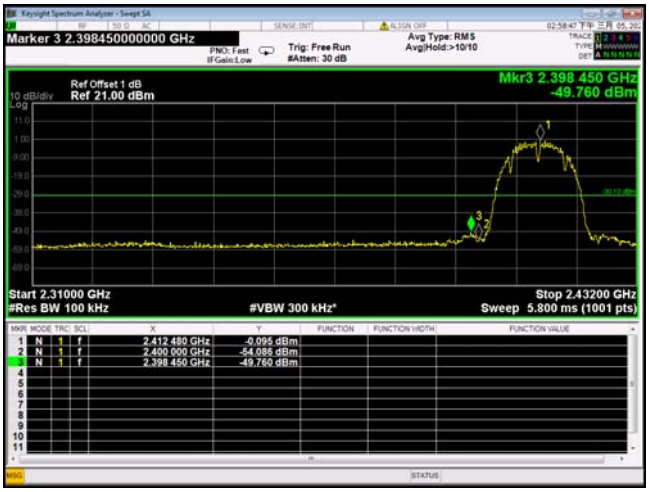
10.1 Test Produce

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

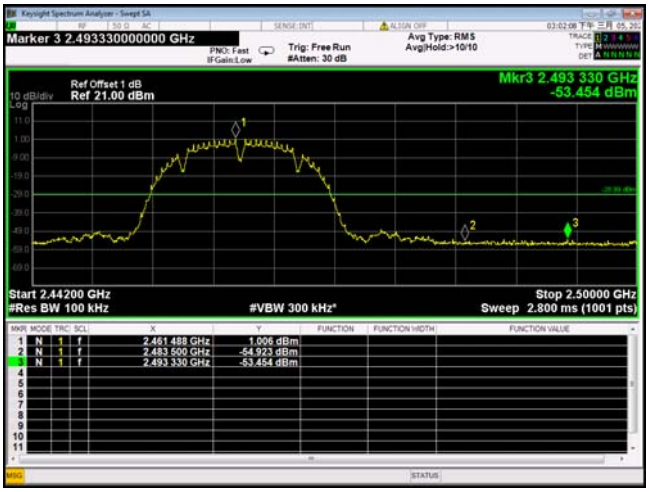
10.2 Test Result

Note: Both Ant. 1 and Ant. 2 have been tested separately, and the report only shows the worst case.
Test result plots shown as follows:
Ant. 1

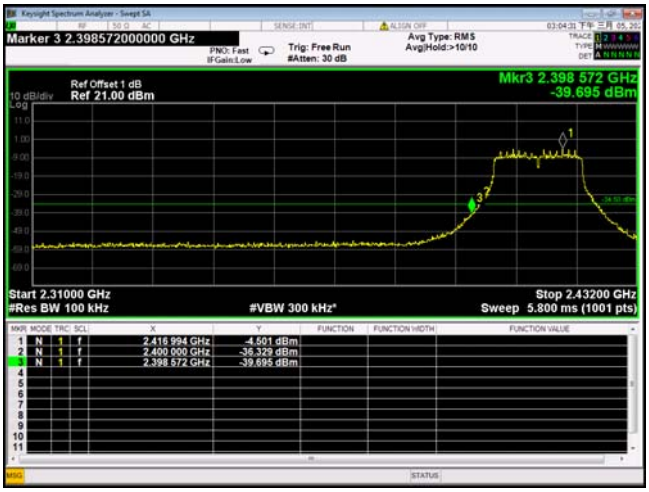
TX 11b: Band edge-left side



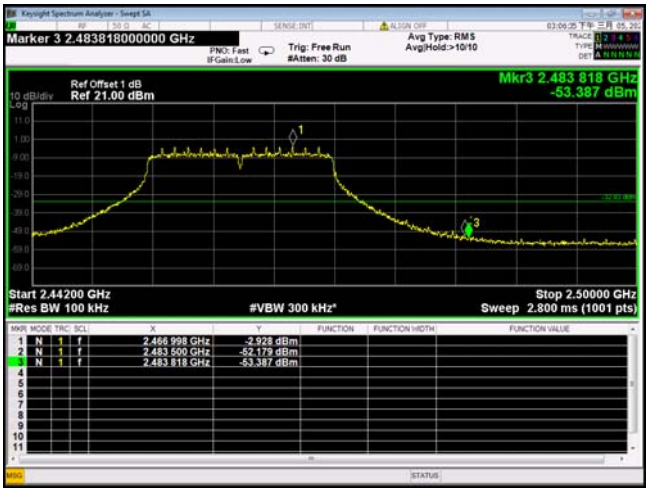
TX 11b: Band edge-right side



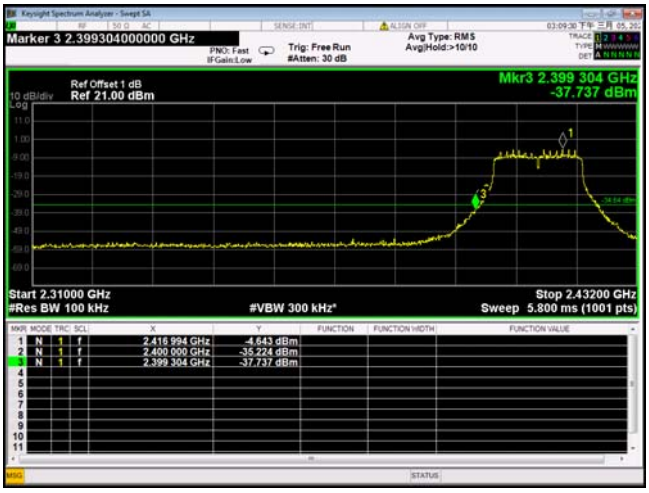
TX 11g: Band edge-left side



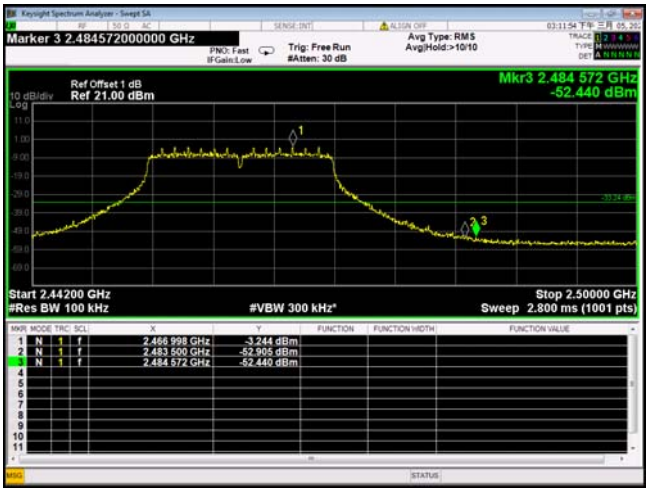
TX 11g: Band edge-right side



TX 11n HT20: Band edge-left side

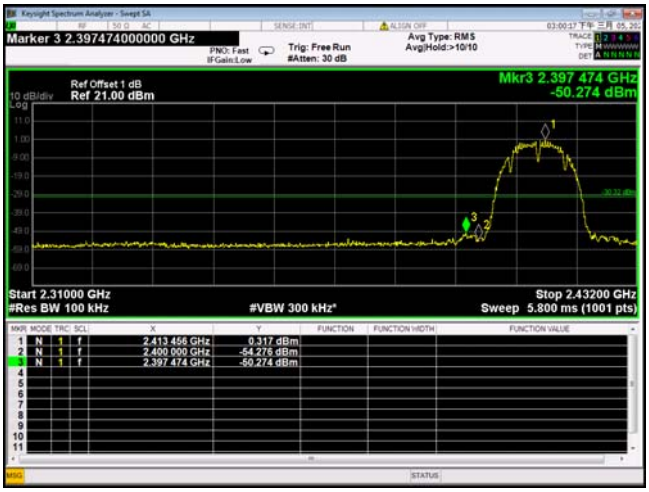


TX 11n HT20: Band edge-right side

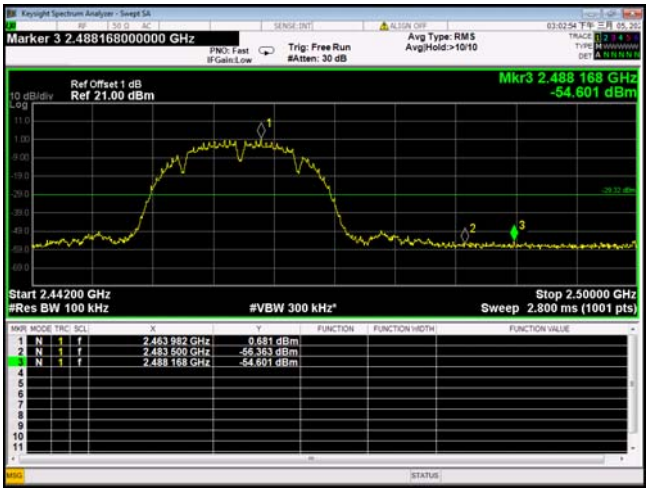


Ant. 2

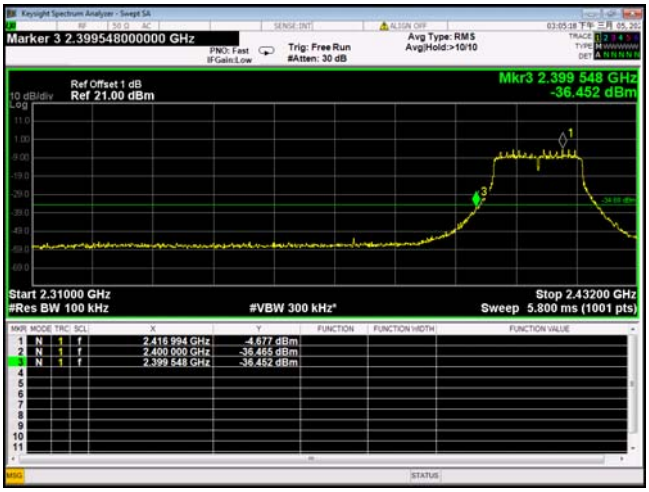
TX 11b: Band edge-left side



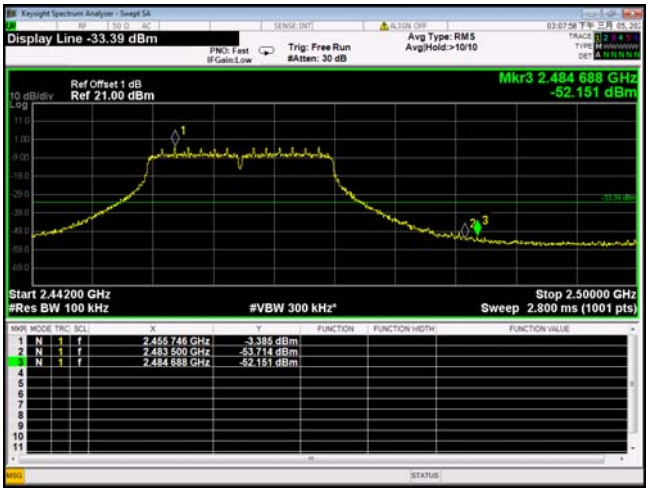
TX 11b: Band edge-right side



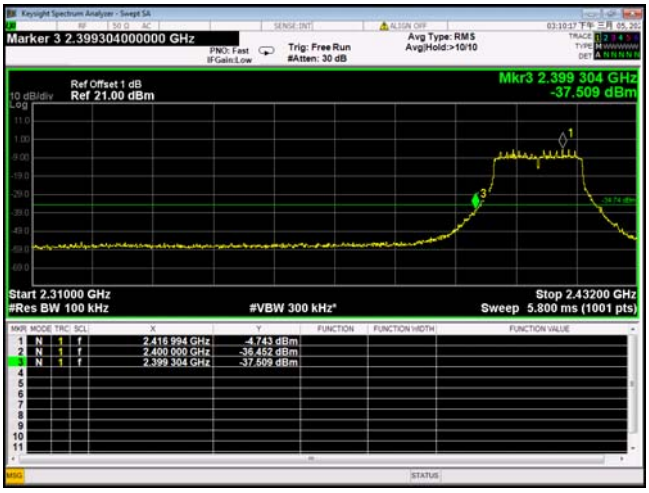
TX 11g: Band edge-left side



TX 11g: Band edge-right side



TX 11n HT20: Band edge-left side



TX 11n HT20: Band edge-right side

11 6 dB Bandwidth and 99% Bandwidth Measurement

Test Requirement: 47CFR FCC Part15 Subpart C §15.247
KDB 662911 D01 Multiple Transmitter Output v02r01, October 31, 2013

Test Method: ANSI C63.10-2020+A1-2024
KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019

Test Limit: §15.247(a)(2)
Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Mode: Transmitting

11.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. 6dB Bandwidth Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

99% Bandwidth Set the spectrum analyzer: 1~5% of the OBW, VBW = 3 times the RBW

11.2 Test Result

Ant. 1

Operation mode	Test Channel	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
TX 11b	Channel 1	10.020	13.873
	Channel 6	10.010	13.873
	Channel 11	10.010	13.844
TX 11g	Channel 1	17.650	17.784
	Channel 6	17.640	17.767
	Channel 11	17.650	17.769
TX 11n HT20	Channel 1	17.640	17.992
	Channel 6	17.650	17.034
	Channel 11	17.630	17.996

Ant. 2

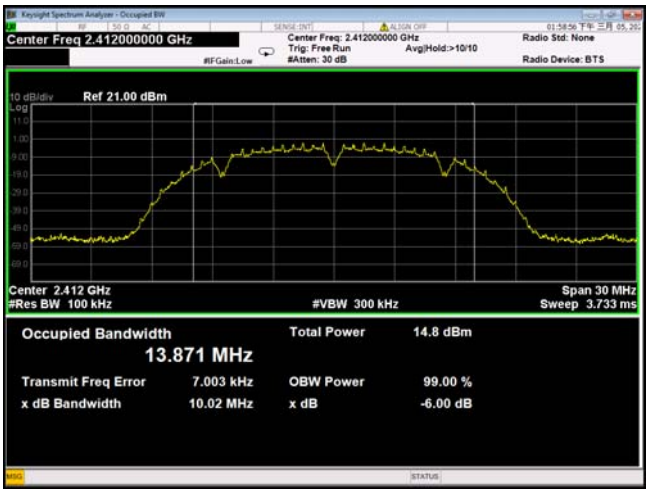
Operation mode	Test Channel	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
TX 11b	Channel 1	10.040	13.872
	Channel 6	9.262	13.877
	Channel 11	10.010	13.846
TX 11g	Channel 1	17.640	17.782
	Channel 6	17.650	17.773
	Channel 11	17.620	17.773
TX 11n HT20	Channel 1	17.660	18.012
	Channel 6	17.640	17.999
	Channel 11	17.630	18.002

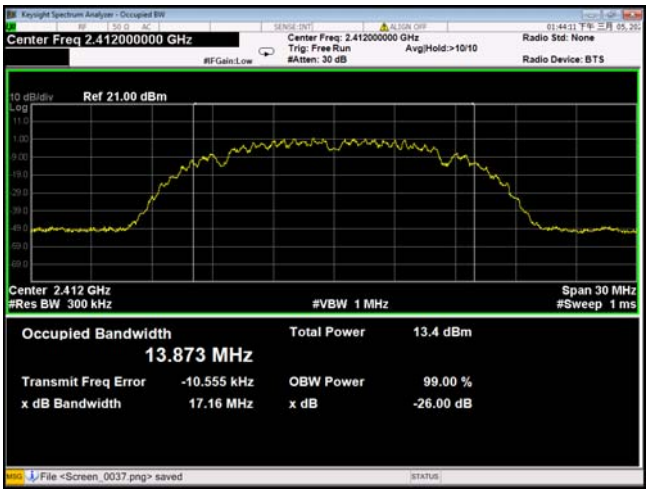
Test result plots shown as follows:

Test result plot:
Ant. 1

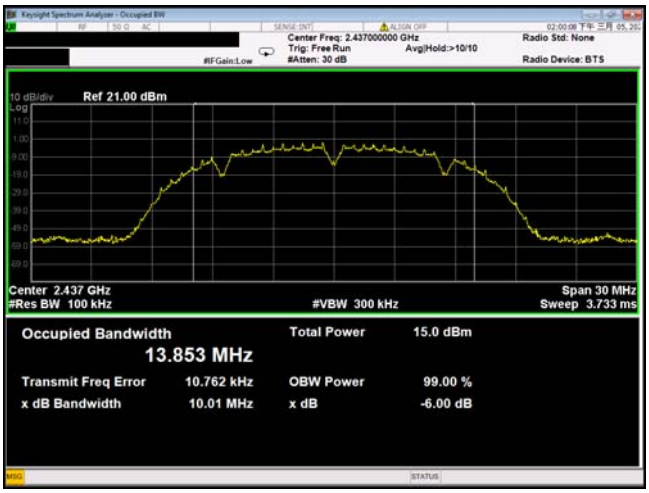
6 dB Bandwidth 99% Bandwidth

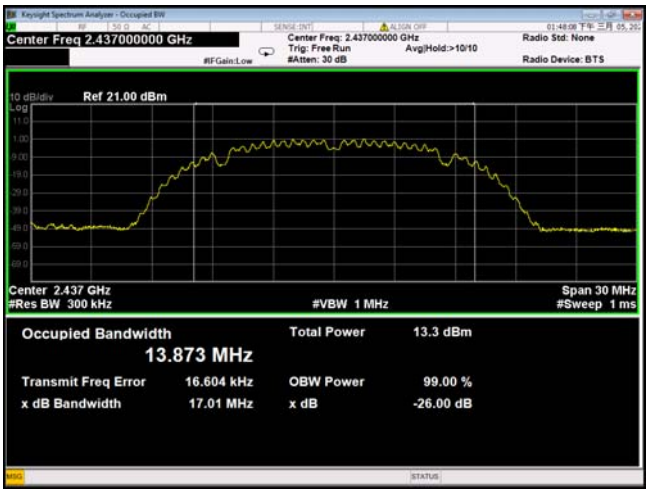
Mode: TX 11b channel 1





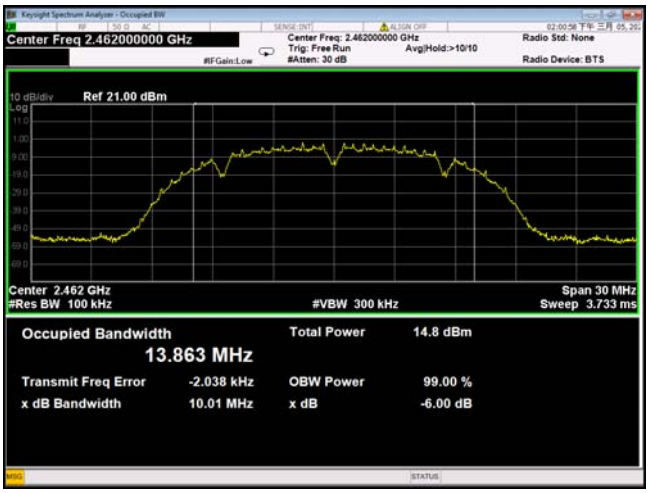
Mode: TX 11b channel 6

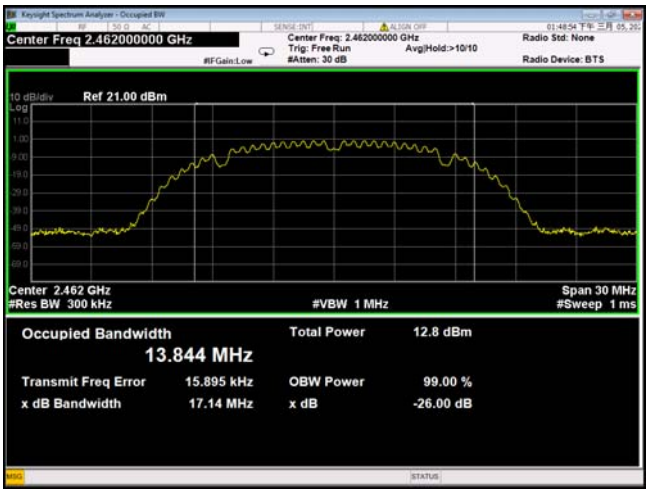




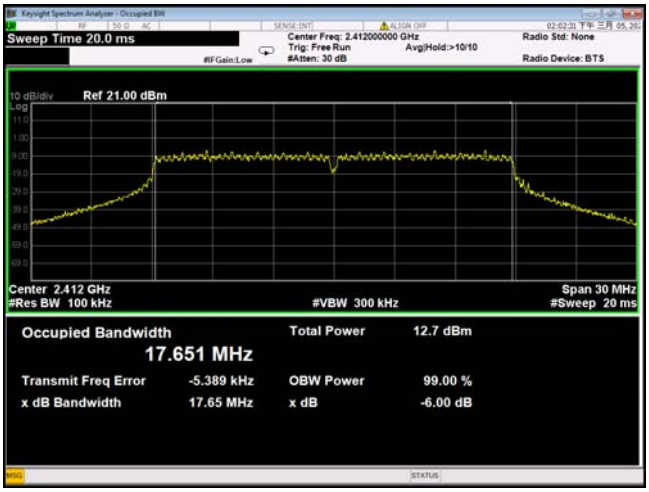
6 dB Bandwidth 99% Bandwidth

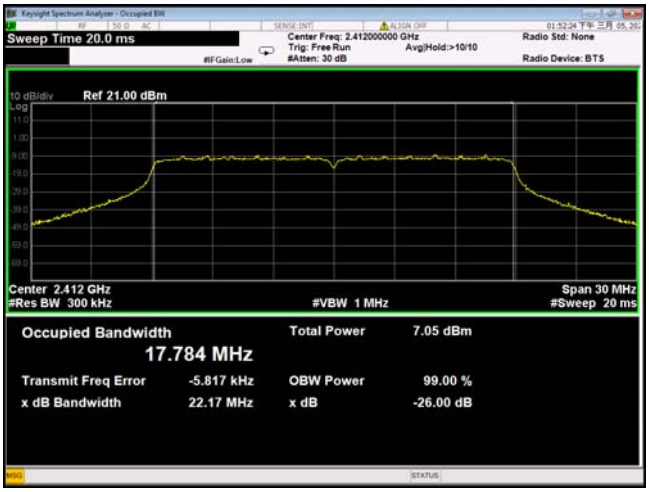
Mode: TX 11b channel 11





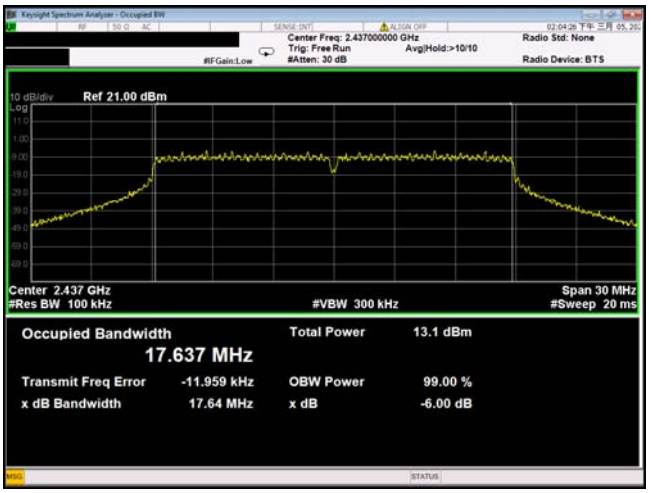
Mode: TX 11g channel 1

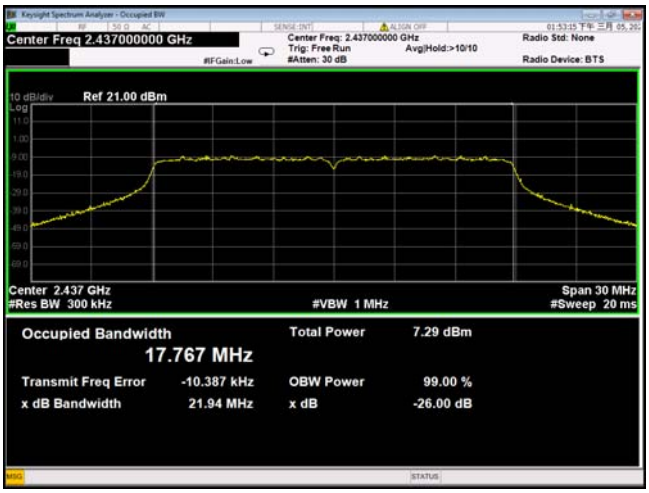




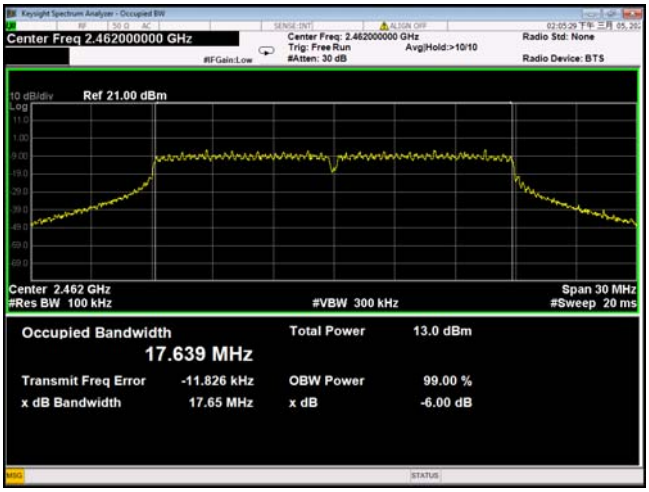
6 dB Bandwidth 99% Bandwidth

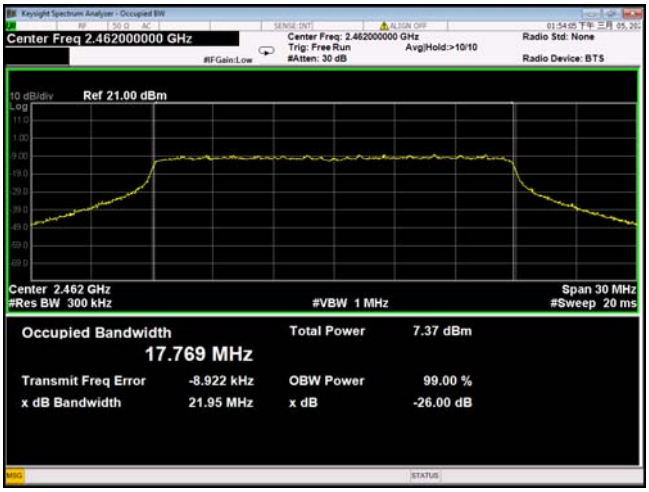
Mode: TX 11g channel 6





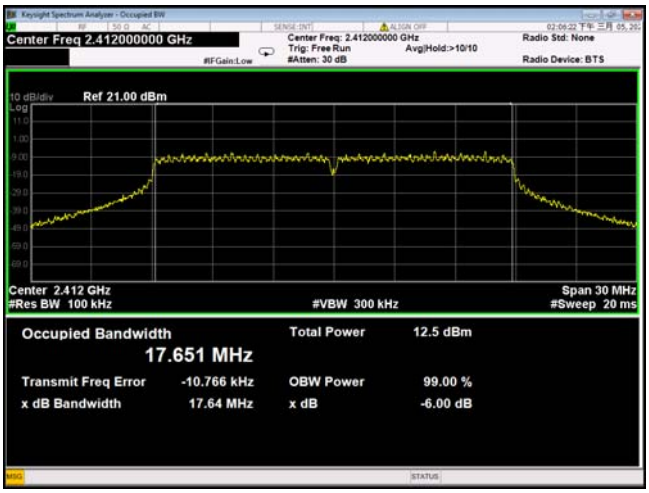
Mode: TX 11g channel 11

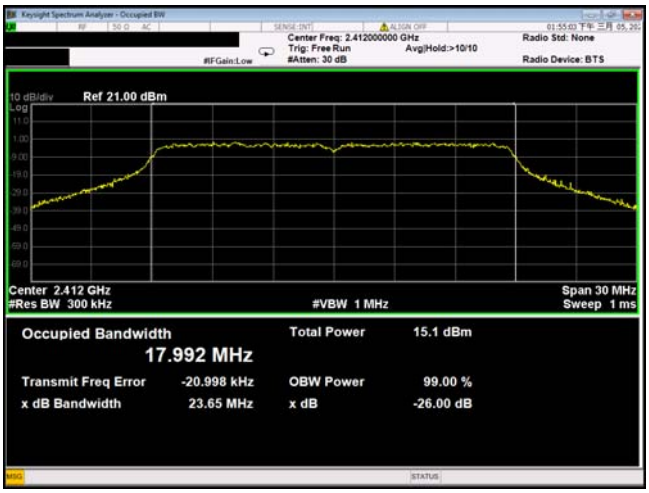




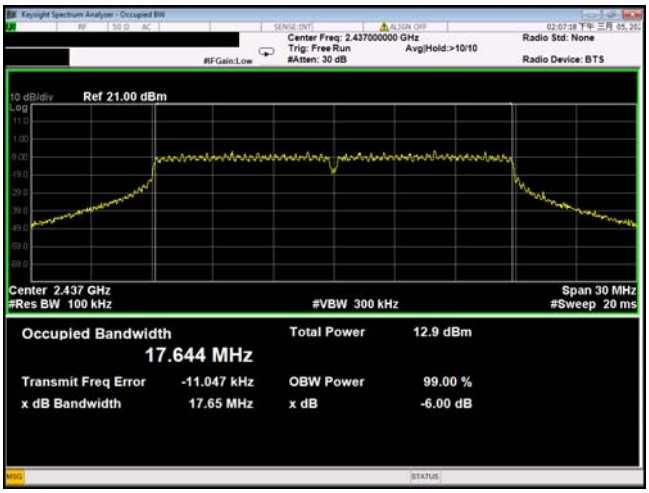
6 dB Bandwidth 99% Bandwidth

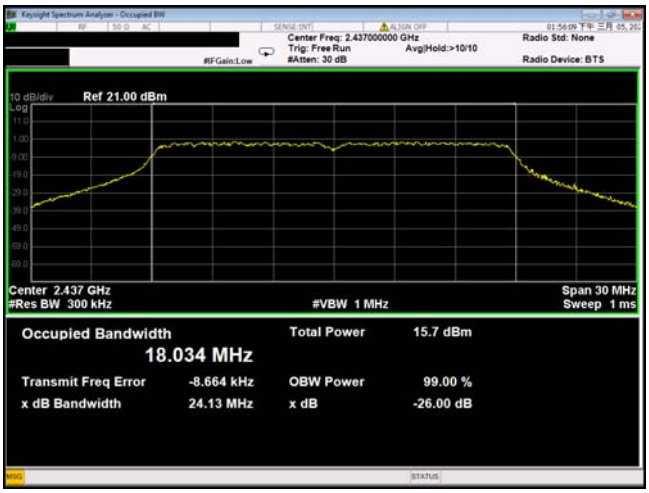
Mode: TX 11n HT20 channel 1



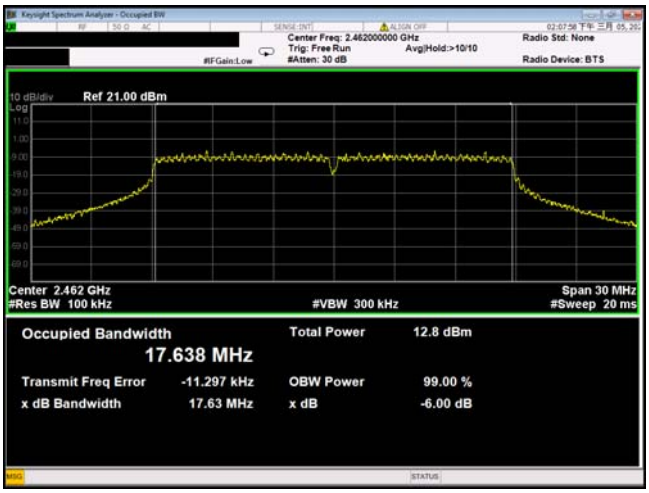


Mode: TX 11n HT20 channel 6



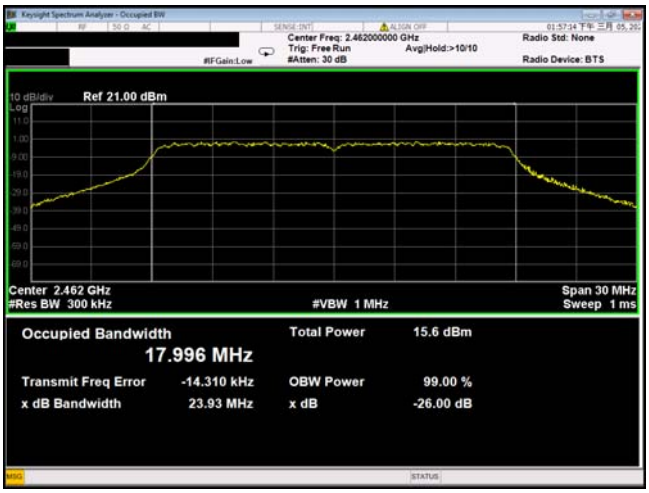


6 dB Bandwidth



99% Bandwidth

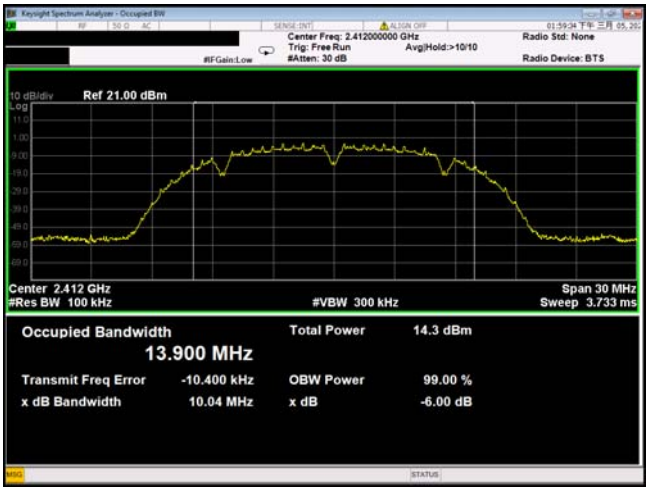
Mode: TX 11n HT20 channel 11

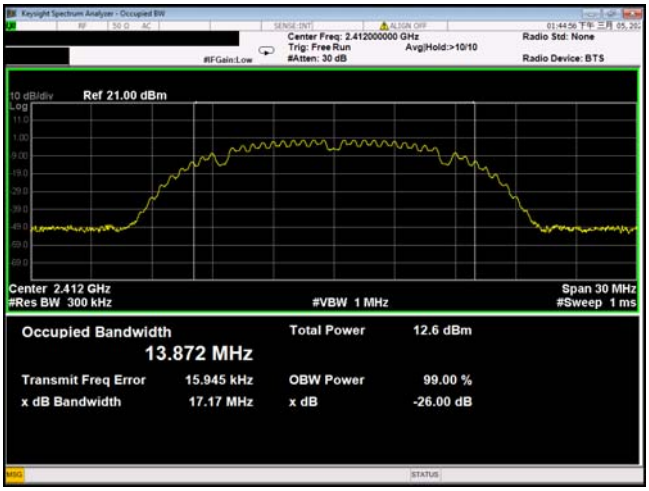


Ant. 2

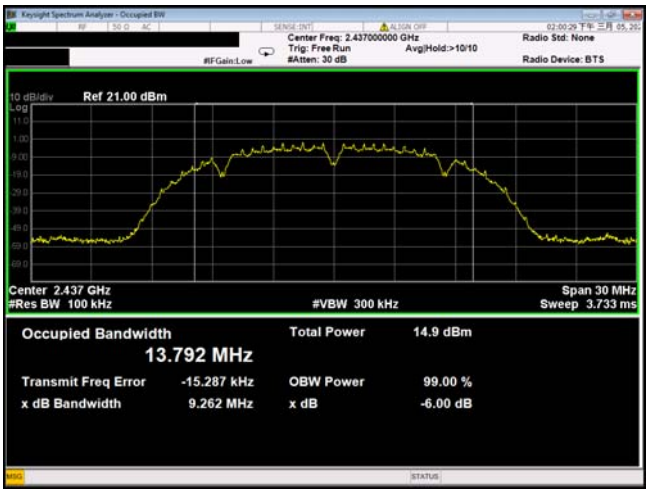
6 dB Bandwidth 99% Bandwidth

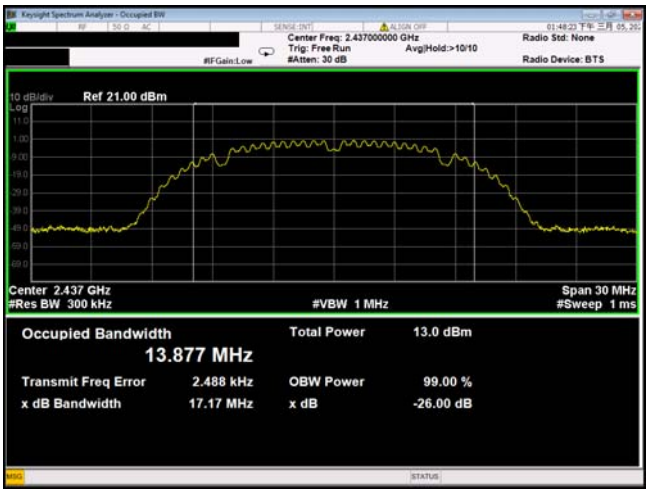
Mode: TX 11b channel 1





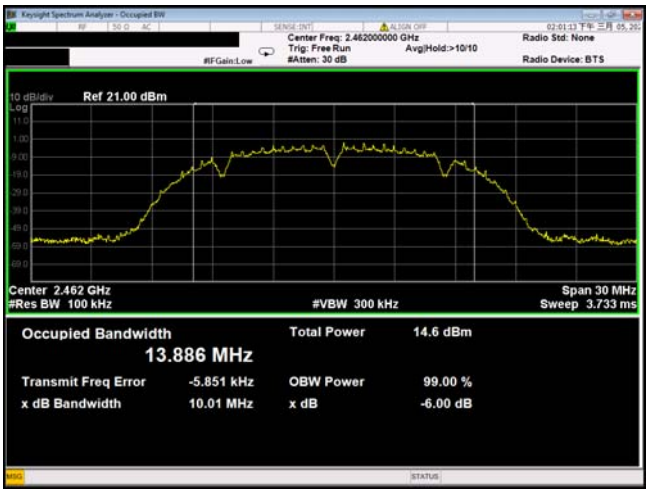
Mode: TX 11b channel 6

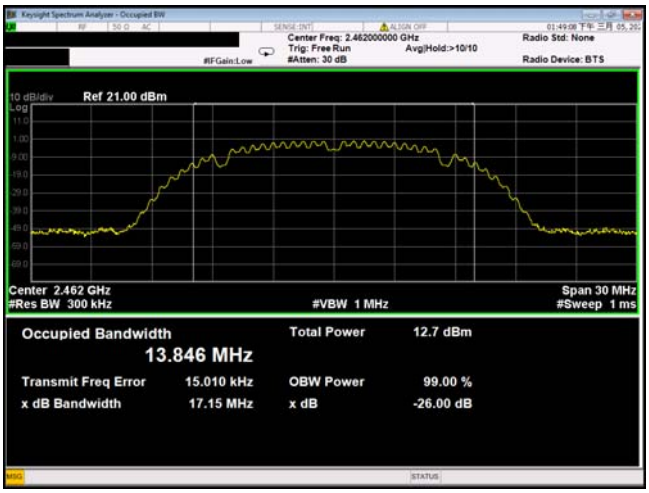




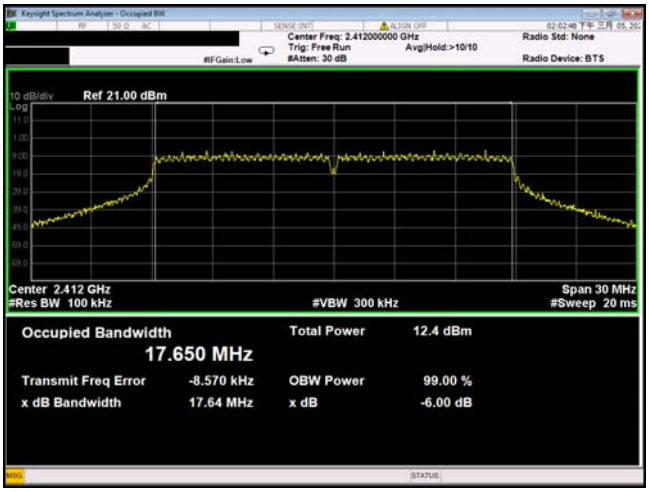
6 dB Bandwidth 99% Bandwidth

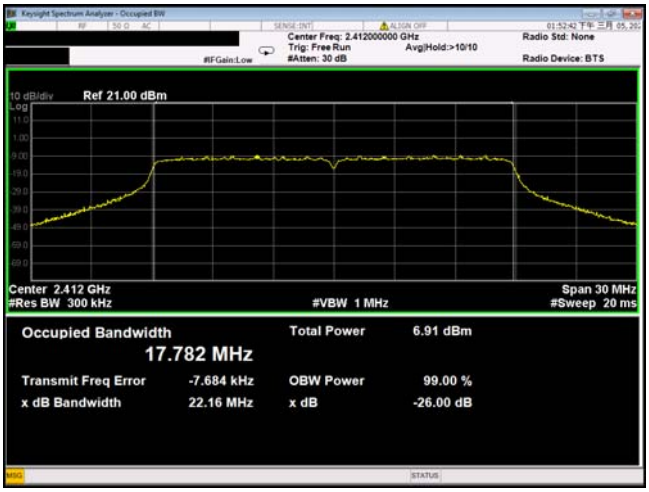
Mode: TX 11b channel 11





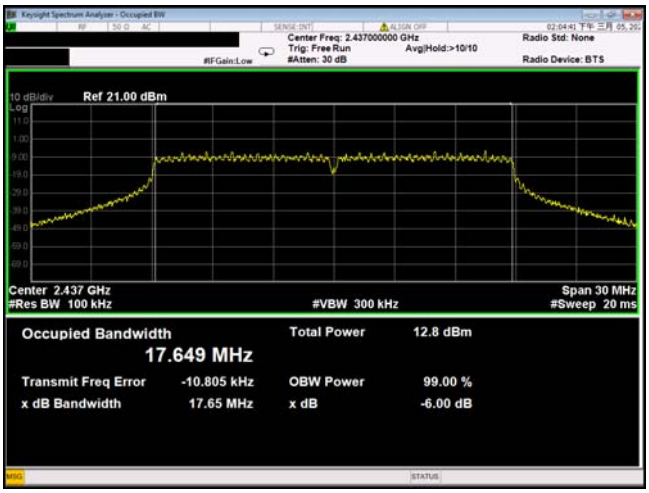
Mode: TX 11g channel 1

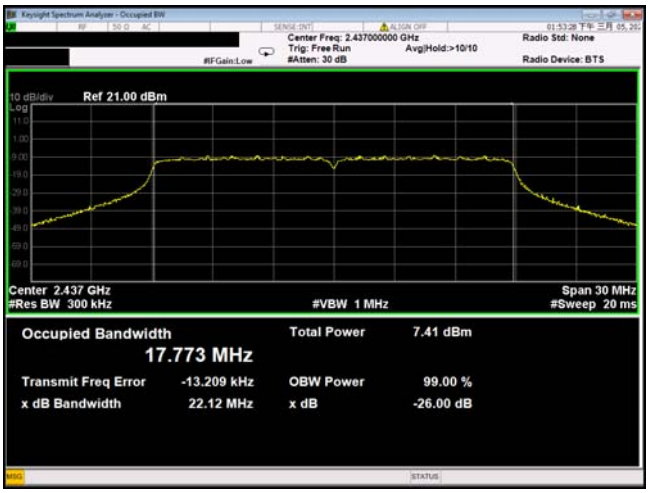




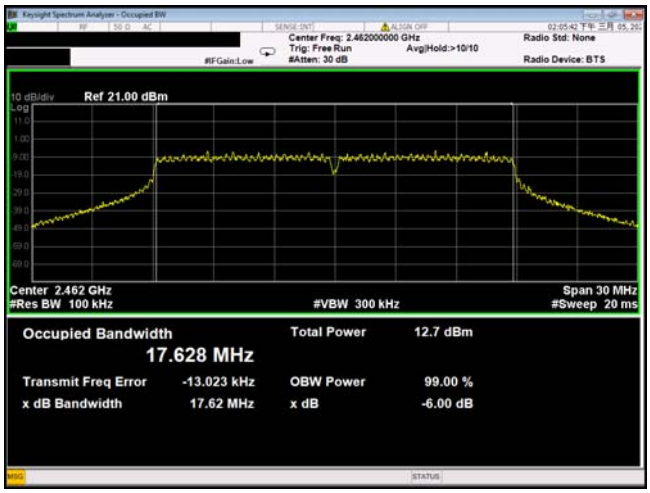
6 dB Bandwidth 99% Bandwidth

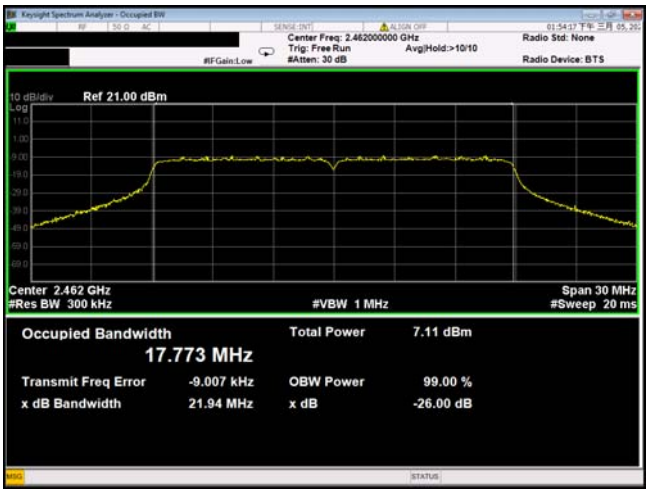
Mode: TX 11g channel 6





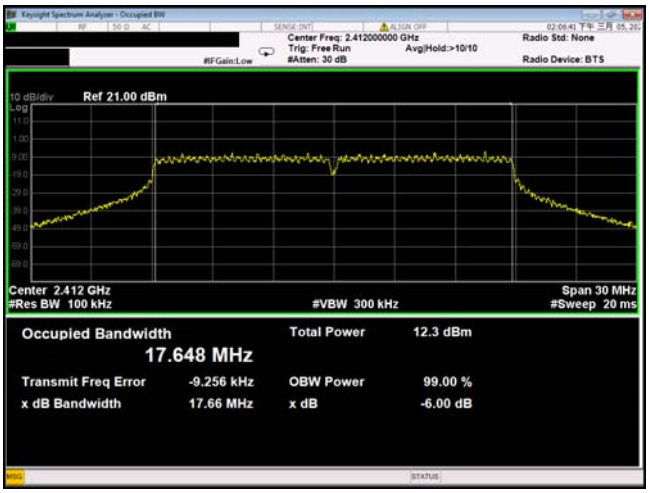
Mode: TX 11g channel 11

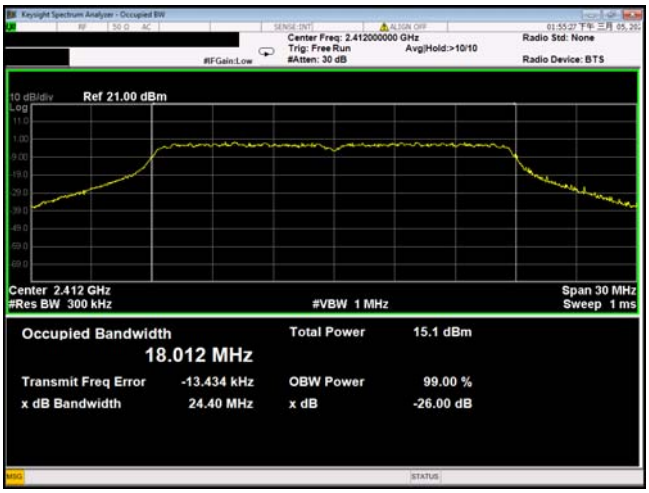




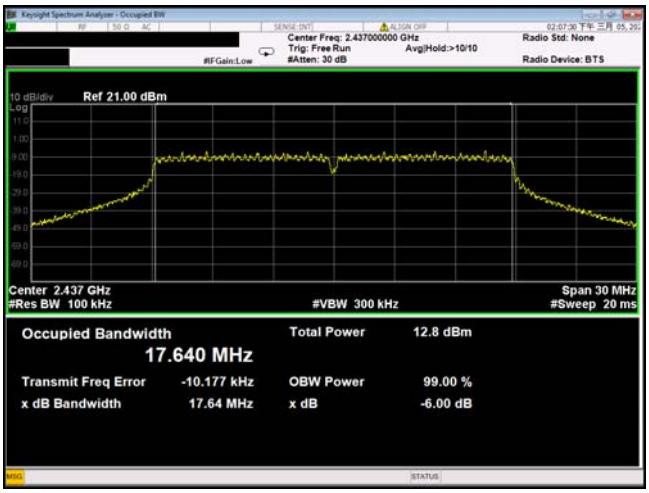
6 dB Bandwidth 99% Bandwidth

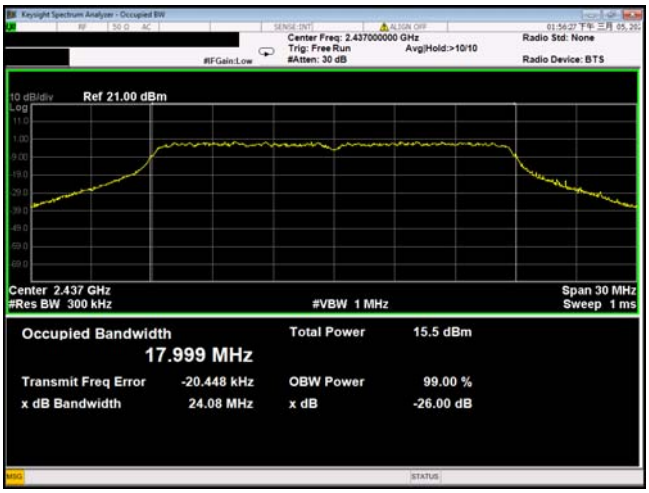
Mode: TX 11n HT20 channel 1



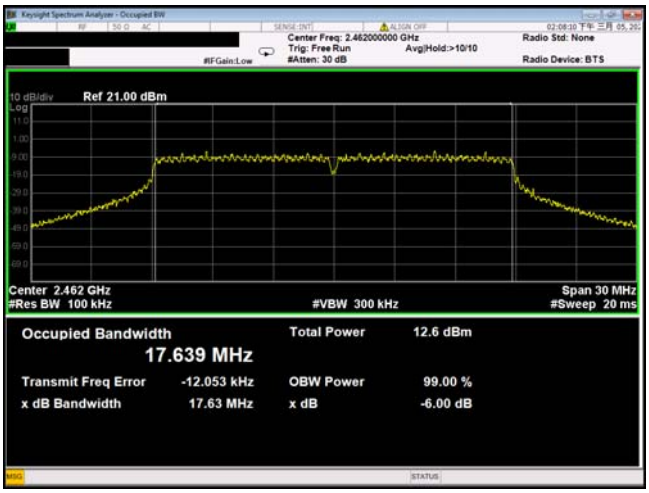


Mode: TX 11n HT20 channel 6



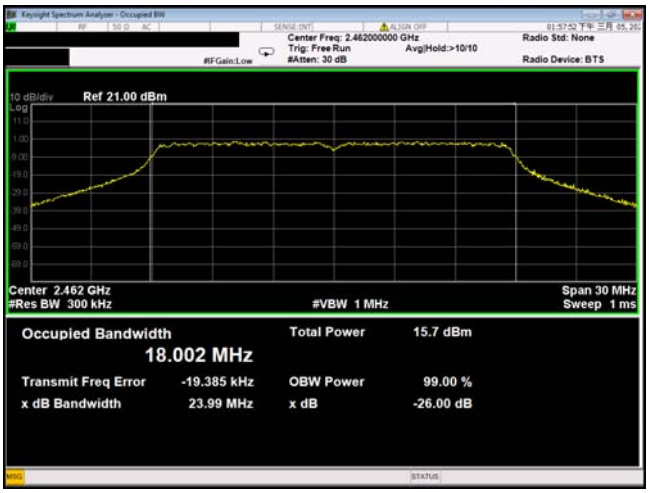


6 dB Bandwidth



99% Bandwidth

Mode: TX 11n HT20 channel 11



12 Maximum Conducted Output Power

Test Requirement:	47CFR FCC Part15 Subpart C §15.247
Test Method:	KDB 662911 D01 Multiple Transmitter Output v02r01, October 31, 2013 ANSI C63.10-2020+A1-2024 KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019
Test Limit:	§15.247(b) The maximum peak conducted output power of the intentional radiator shall not exceed 1W.
Test Mode:	Transmitting

12.1 Test Procedure

According to KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019

Section 8.3.1.1 RBW ≥ DTS bandwidth

Subclause 11.9.1.1 of ANSI C63.10 is applicable.

Section 8.3.1.2 Integrated band power method

For measuring the output power of a device transmitting a wide-band noise-like signal where the peak power amplitude is a statistical parameter, the preferred methodology is to use an integrated average power measurement, as described in 8.3.2. The peak integrated band power method of 11.9.1 in ANSI C63.10 is not applicable.

Subclause 11.9.2 of ANSI C63.10 is applicable.

12.2 Test Result

ANT 1:

Operation mode	Channel Frequency (MHz)	Measurements (dBm)	Duty Cycle Factor (dB)	Conducted Output Power (dBm)
TX 11b	Low-2412	12.69	0	12.69
	Middle-2437	13.10		13.10
	High-2462	12.84		12.84
TX 11g	Low-2412	14.22	0	14.22
	Middle-2437	14.54		**14.54**
	High-2462	14.37		14.37
TX 11n HT20	Low-2412	13.77	0	13.77
	Middle-2437	14.11		14.11
	High-2462	13.77		13.77

ANT 2:

Operation mode	Channel Frequency (MHz)	Measurements (dBm)	Duty Cycle Factor (dB)	Conducted Output Power (dBm)
TX 11b	Low-2412	12.55	0	12.55
	Middle-2437	13.01		13.01
	High-2462	12.72		12.72
TX 11g	Low-2412	14.68	0	14.68
	Middle-2437	14.90		**14.90**
	High-2462	14.59		14.59
TX 11n HT20	Low-2412	13.71	0	13.71
	Middle-2437	13.94		13.94
	High-2462	13.71		13.71

Operation mode	Channel Frequency (MHz)	Conducted Output Power (dBm)			Limit [1]
		ANT1	ANT2	SUM	
TX 11n HT20	Low-2412	13.77	13.71	16.75	26.99dBm
	Middle-2437	14.11	13.94	**17.04**	
	High-2462	13.77	13.71	16.75	

Note:
[1] According to ANSI C63.10 clause 14.4.3.1,
Directional gain=antenna gain + 10log(N)=6.0 + 10log2= 9.01dBi
N is number of array elements or staves

According to ANSI C63.10 clause 11.7,
For those cases where it is specified that the conducted output power be reduced by the amount in dB that the directional gain of the transmitting antenna exceeds 6dBi, the output power effective limit shall be calculated as follows in Equation:

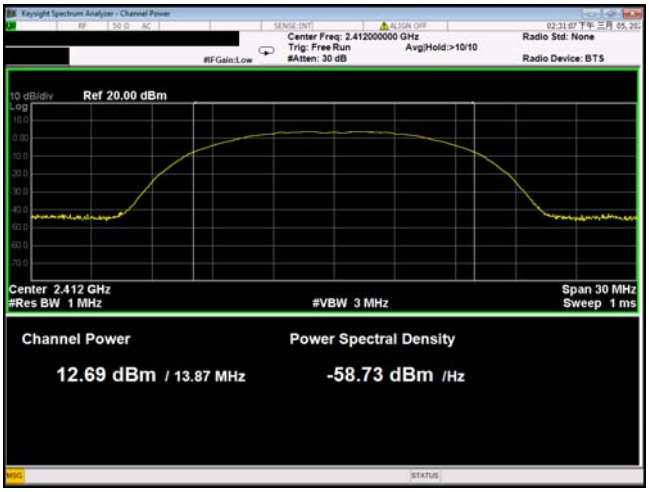
$$P_{out} = P_{Limit} - (G_{TX} - 6)$$

The Directional gain is 9.01dBi that greater than 6dBi, Limit of power (SUM) is **26.99dBm**.

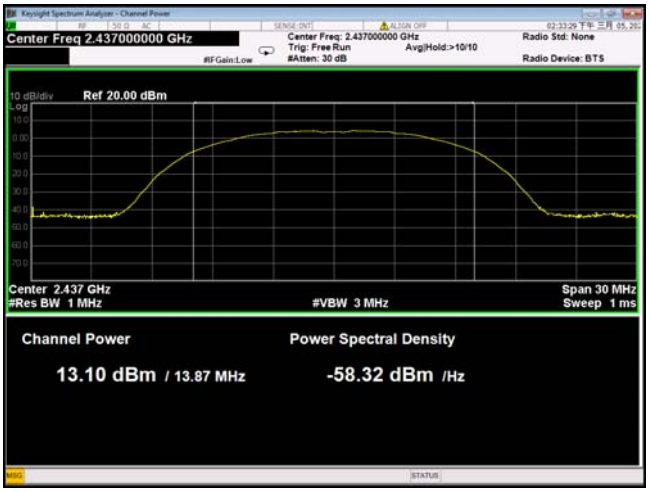
Test Plot:

ANT 1:

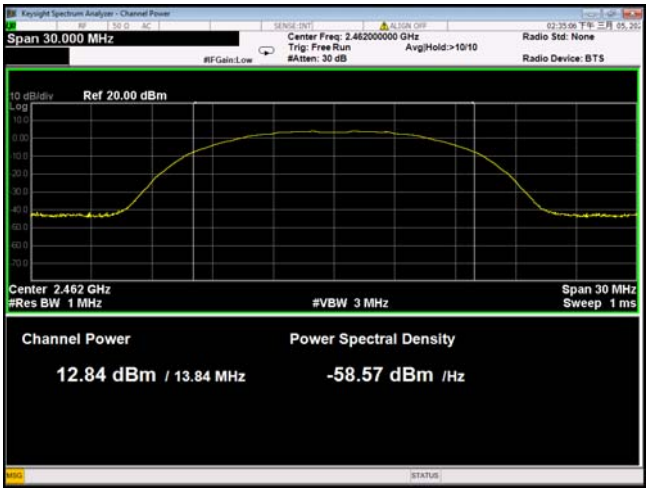
Mode: TX 11b channel 1



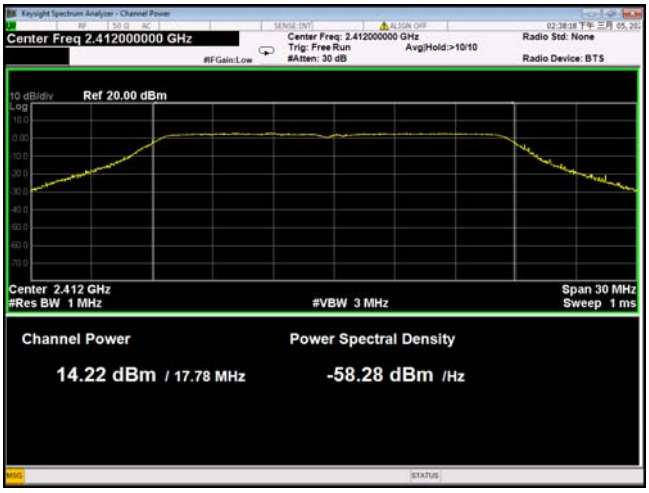
Mode: TX 11b channel 6



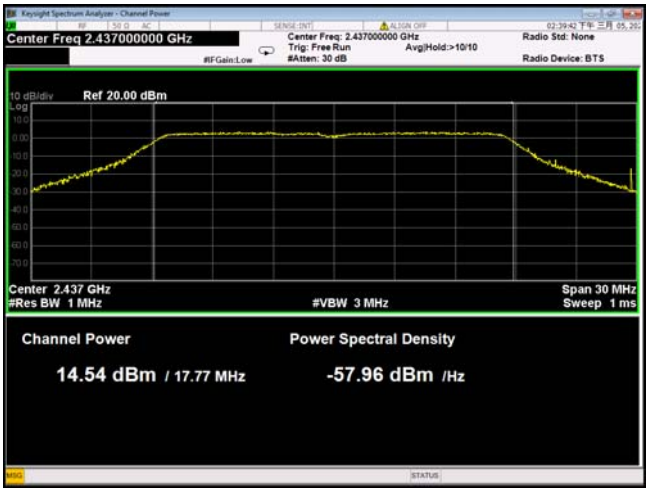
Mode: TX 11b channel 11



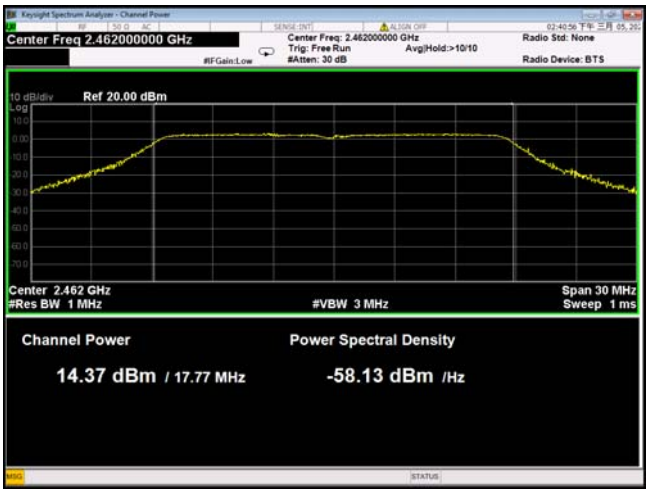
Mode: TX 11g channel 1



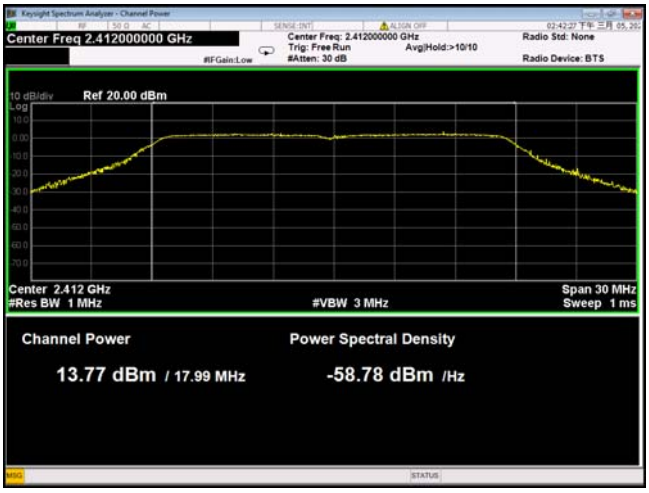
Mode: TX 11g channel 6



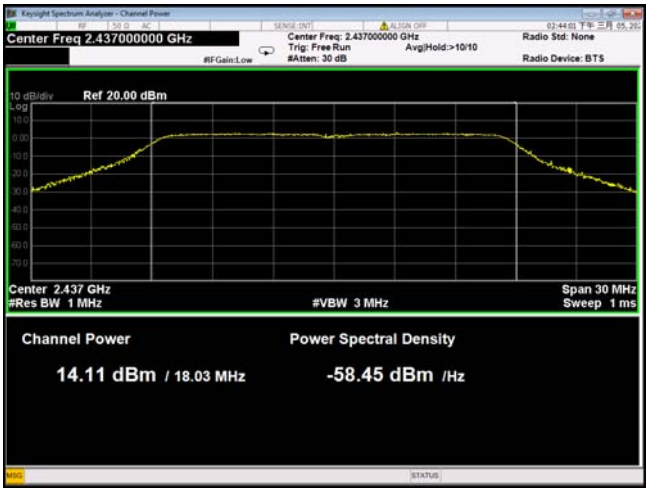
Mode: TX 11g channel 11



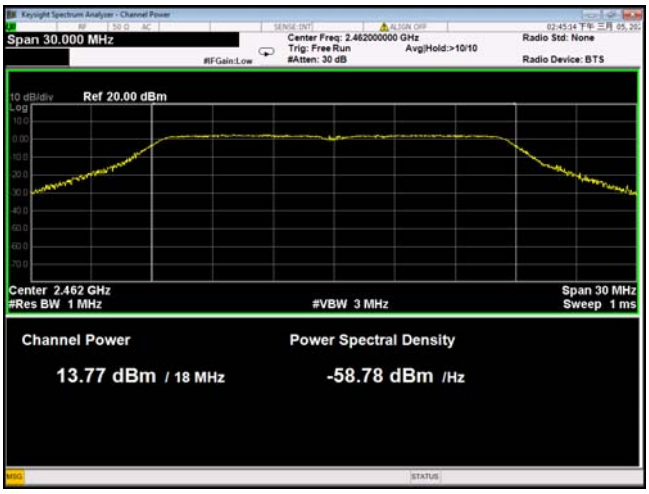
Mode: TX 11n HT20 channel 1



Mode: TX 11n HT20 channel 6

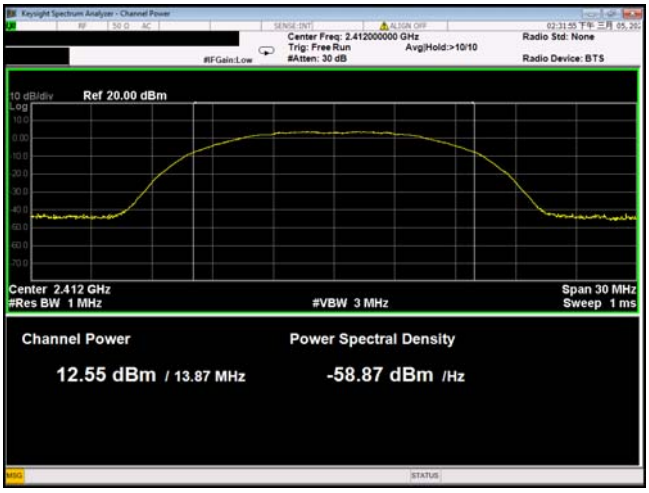


Mode: TX 11n HT20 channel 11

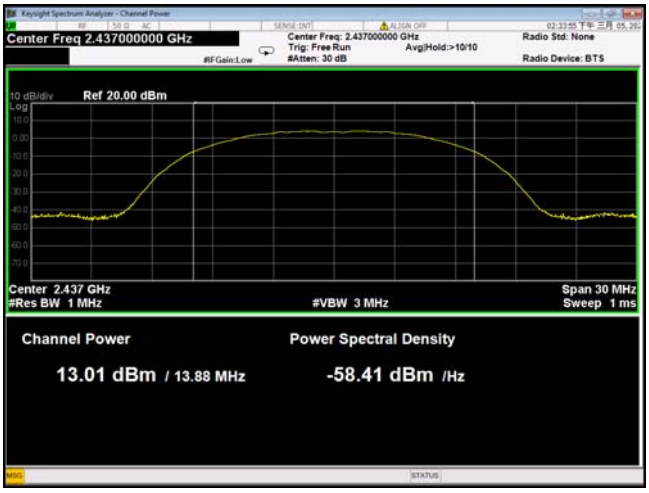


ANT 2:

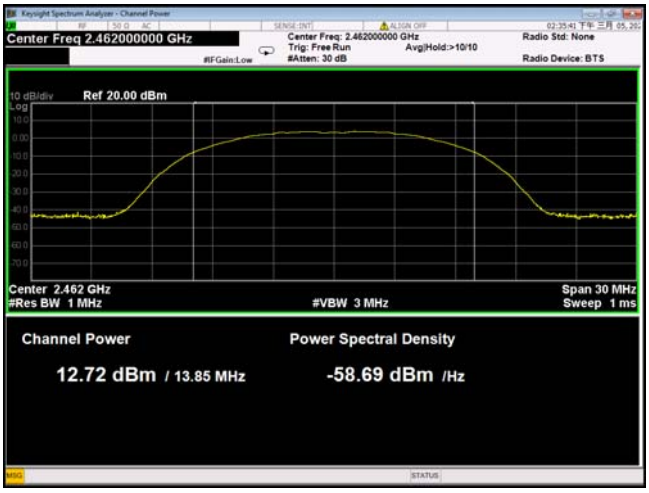
Mode: TX 11b channel 1



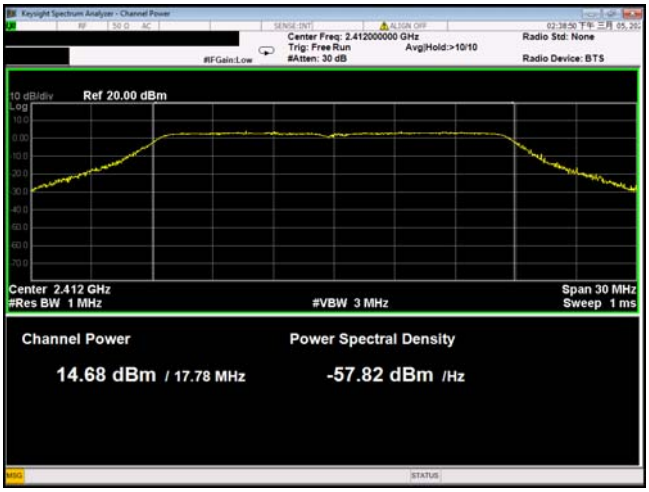
Mode: TX 11b channel 6



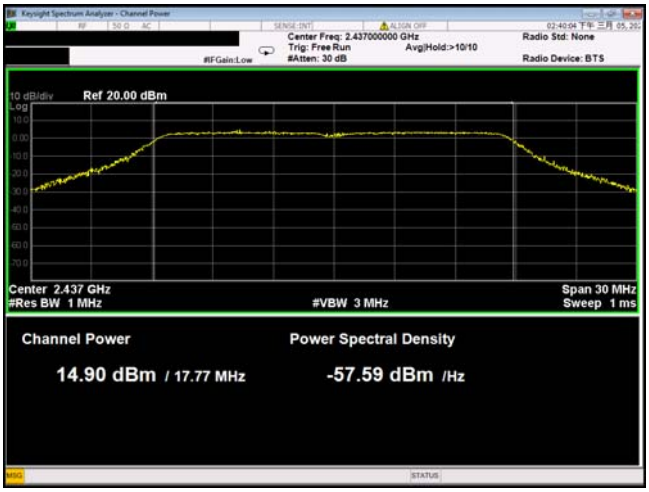
Mode: TX 11b channel 11



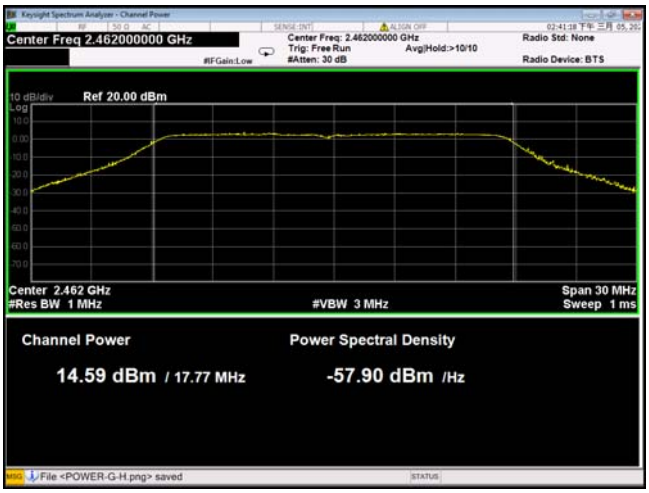
Mode: TX 11g channel 1



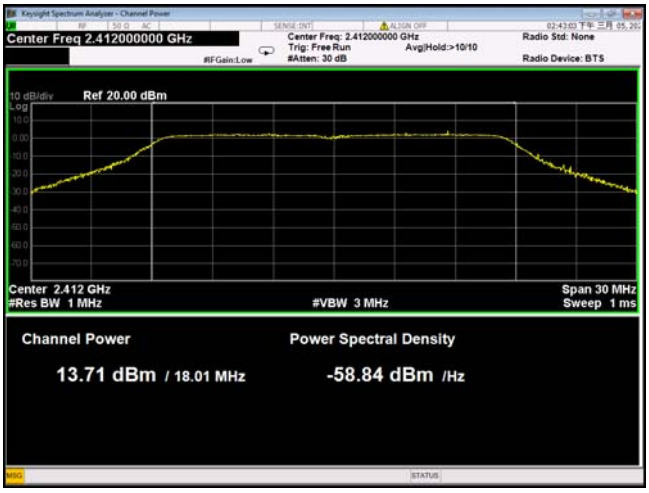
Mode: TX 11g channel 6



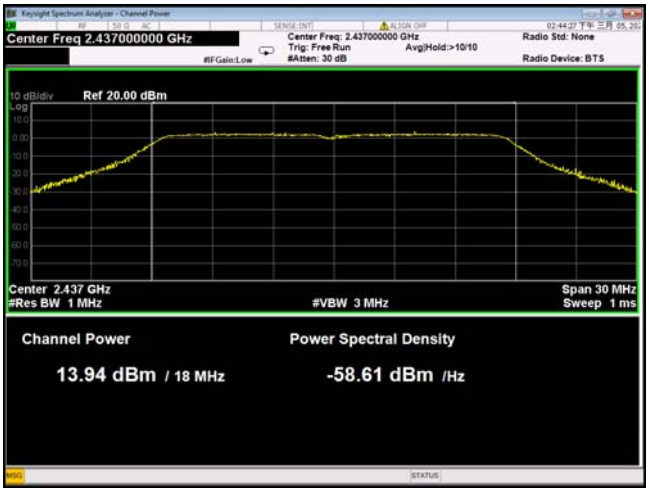
Mode: TX 11g channel 11



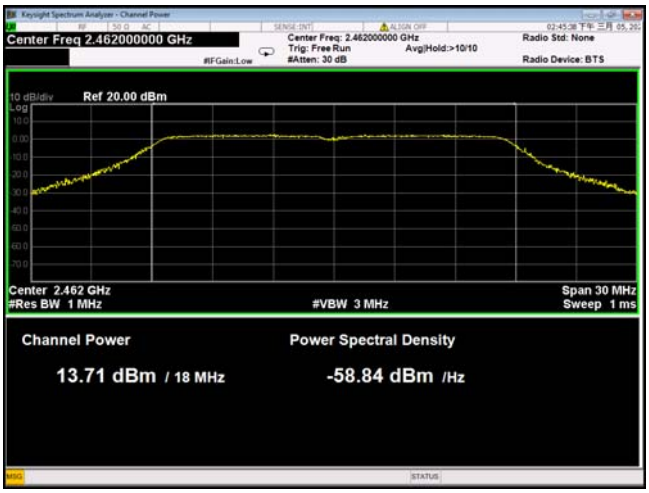
Mode: TX 11n HT20 channel 1



Mode: TX 11n HT20 channel 6



Mode: TX 11n HT20 channel 11



13 Power Spectral density

Test Requirement:	47CFR FCC Part15 Subpart C §15.247
Test Method:	ANSI C63.10-2020+A1-2024 KDB 558074 D01 15.247 Meas Guidance v05r02, April 2, 2019 KDB 662911 D01 Multiple Transmitter Output v02r01, October 31, 2013
Test Limit:	§15.247(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
Test Mode:	Transmitting

13.1 Test Procedure

According to KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019 section 8.4

Subclause 11.10 of ANSI C63.10 is applicable.

Choose the test procedure according to the product type

Peak PSD

Subclause 11.10.2 of ANSI C63.10 is applicable.

AVG PSD

Subclause 11.10.3/4/5/6/7/8 of ANSI C63.10 is applicable.

13.2 Test Result

ANT 1:

Operation mode	Channel Frequency (MHz)	Measurements (dBm per 3kHz)	Duty Cycle Factor (dB)	Power Spectral density (dBm per 3kHz)
TX 11b	Low-2412	-22.336	0	-22.336
	Middle-2437	-21.492		-21.492
	High-2462	-22.165		-22.165
TX 11g	Low-2412	-24.002	0	-24.002
	Middle-2437	-23.000		-23.000
	High-2462	-23.452		-23.452
TX 11n HT20	Low-2412	-24.340	0	-24.340
	Middle-2437	-24.526		-24.526
	High-2462	-24.495		-24.495

ANT 2:

Operation mode	Channel Frequency (MHz)	Measurements (dBm per 3kHz)	Duty Cycle Factor (dB)	Power Spectral density (dBm per 3kHz)
TX 11b	Low-2412	-22.193	0	-22.193
	Middle-2437	-22.566		-22.566
	High-2462	-22.008		-22.008
TX 11g	Low-2412	-23.830	0	-23.830
	Middle-2437	-22.433		-22.433
	High-2462	-22.998		-22.998
TX 11n HT20	Low-2412	-25.017	0	-25.017
	Middle-2437	-24.323		-24.323
	High-2462	-24.671		-24.671

Operation mode	Channel Frequency (MHz)	Power Spectral density (dBm)			Limit [1]
		ANT1	ANT2	SUM	
TX 11n HT20	Low-2412	-24.340	-25.017	-21.66	4.99dBm per 3kHz
	Middle-2437	-24.526	-24.323	-21.41	
	High-2462	-24.495	-24.671	-21.57	

Note:
[1] According to ANSI C63.10 clause 14.4.3.1,
Directional gain=antenna gain + 10log(N)=6 + 10log2= 9.01dBi
N is number of array elements or staves

According to ANSI C63.10 clause 11.7,
For those cases where it is specified that the conducted output power be reduced by the amount in dB that the directional gain of the transmitting antenna exceeds 6dBi, the output power effective limit shall be calculated as follows in Equation:

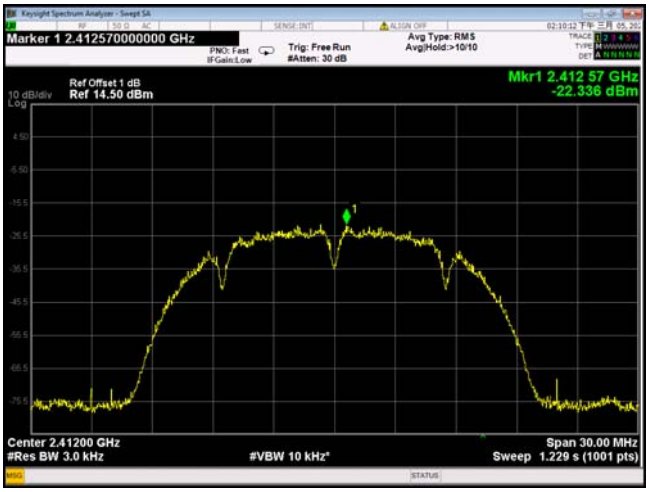
$$P_{out} = P_{Limit} - (G_{TX} - 6)$$

The Directional gain is 9.01dBi that greater than 6dBi, Limit of PSD (SUM) is **4.99dBm**.

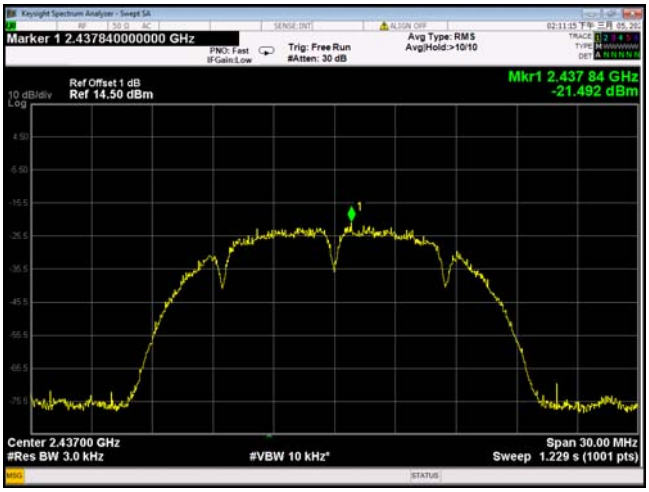
Test Plot:

ANT 1:

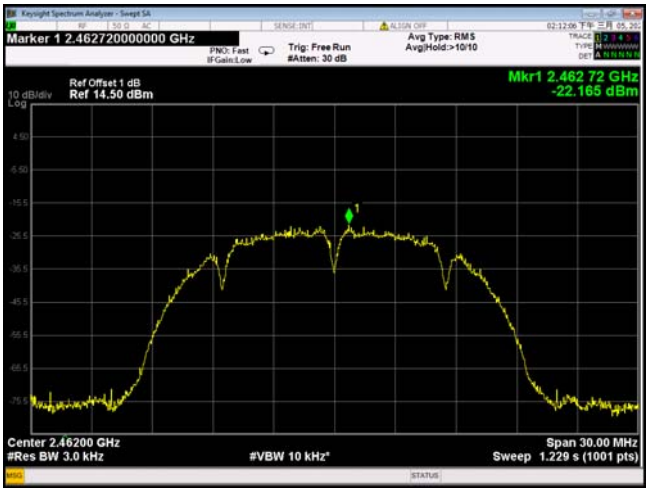
Mode: TX 11b channel 1



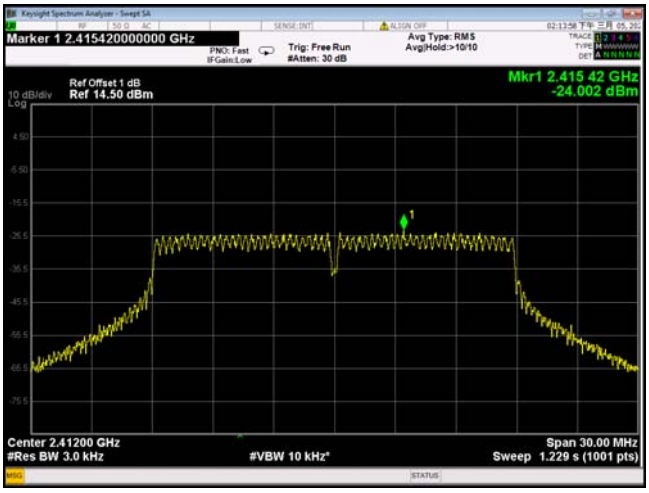
Mode: TX 11b channel 6



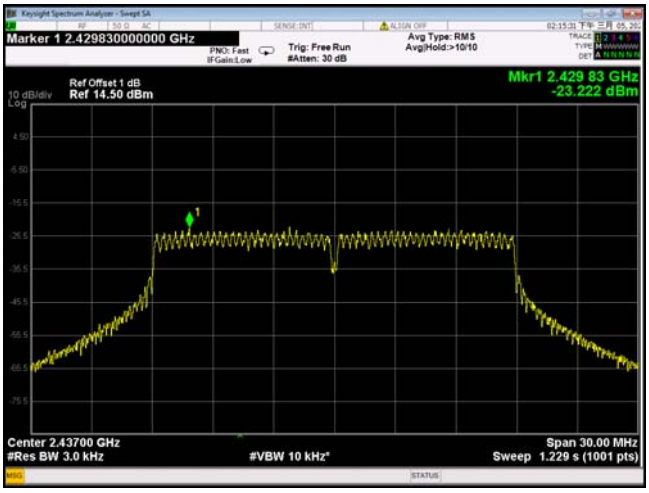
Mode: TX 11b channel 11



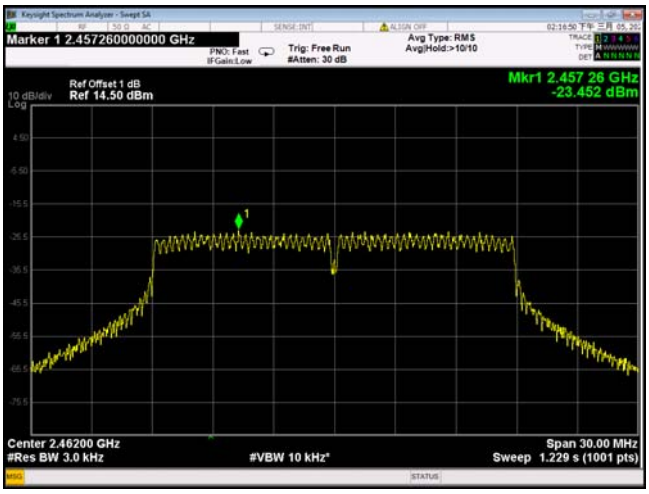
Mode: TX 11g channel 1



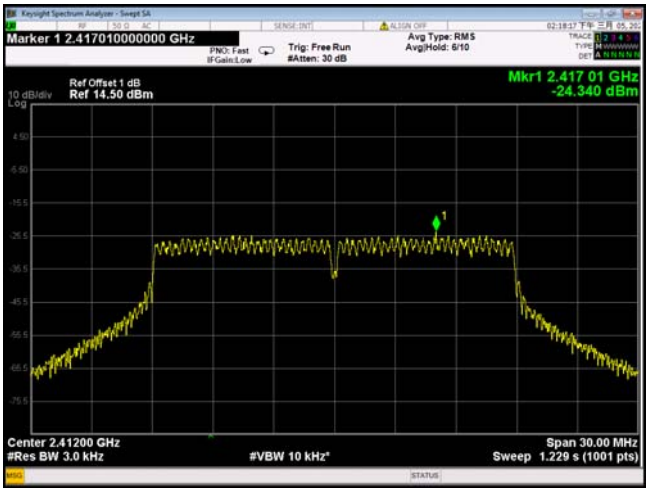
Mode: TX 11g channel 6



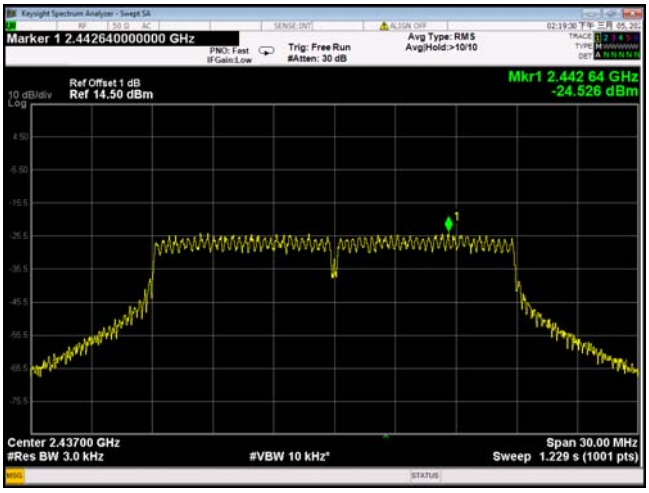
Mode: TX 11g channel 11



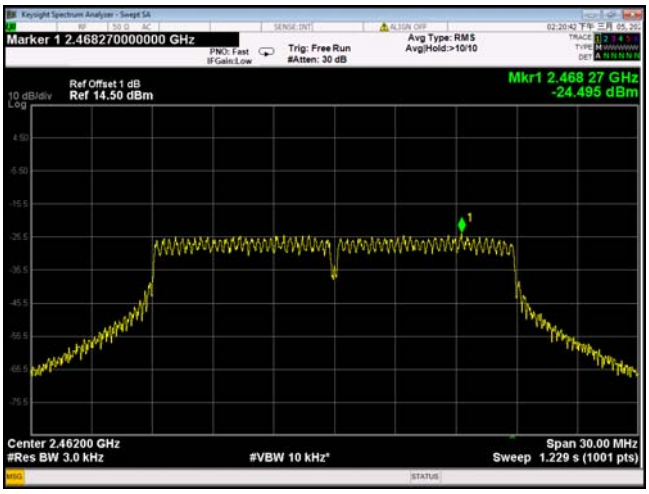
Mode: TX 11n HT20 channel 1



Mode: TX 11n HT20 channel 6

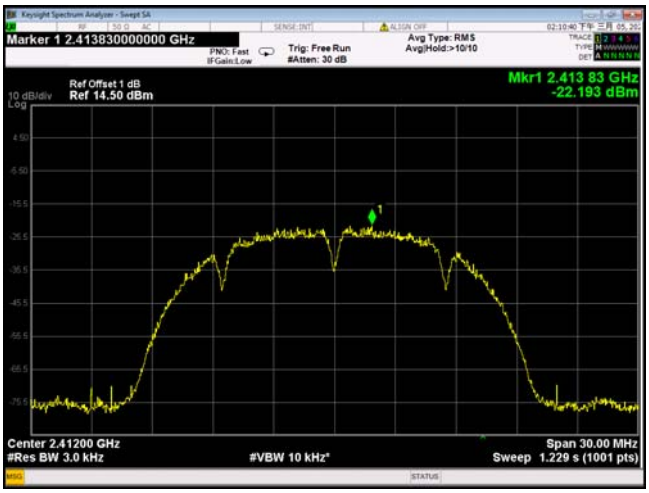


Mode: TX 11n HT20 channel 11

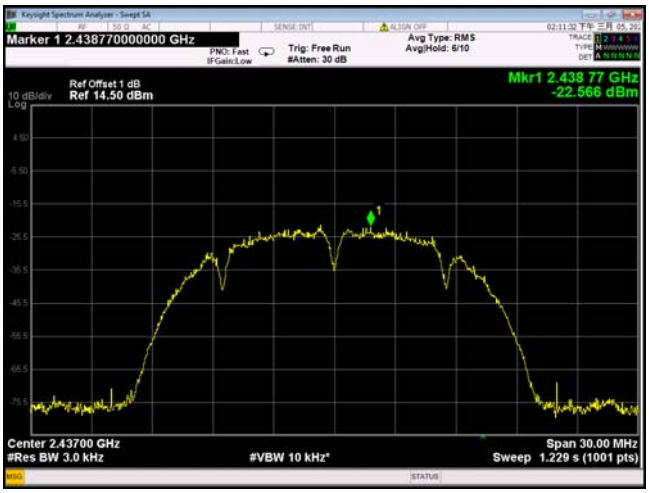


ANT 2:

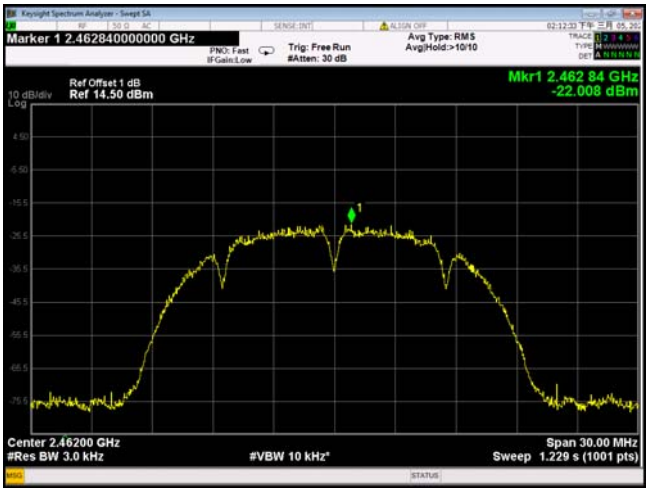
Mode: TX 11b channel 1



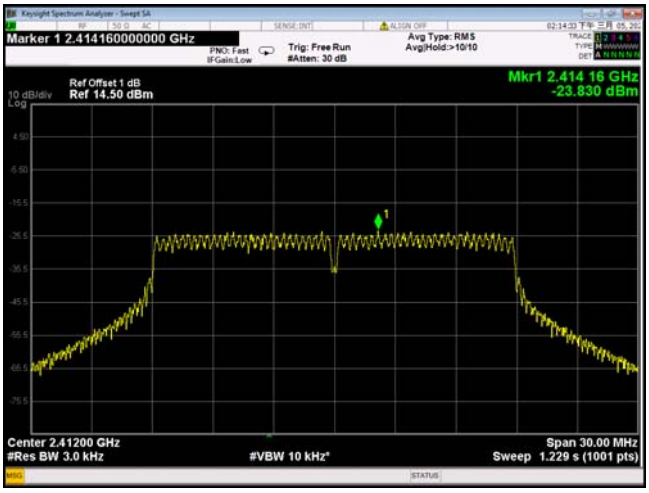
Mode: TX 11b channel 6



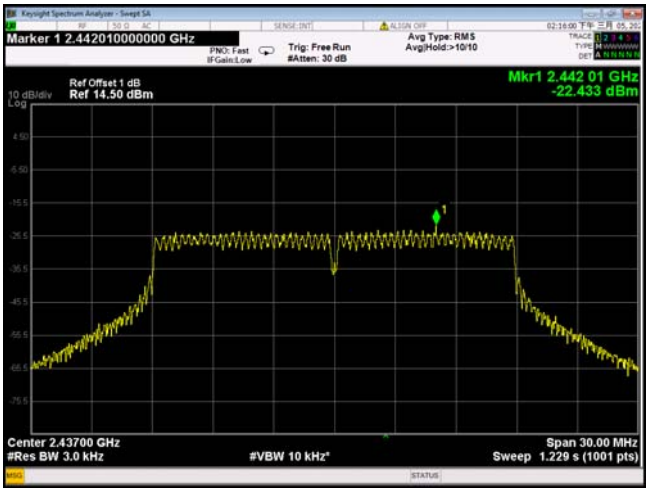
Mode: TX 11b channel 11



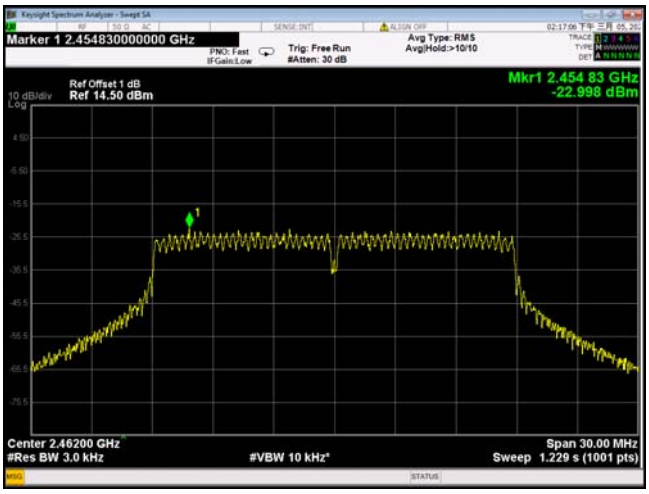
Mode: TX 11g channel 1



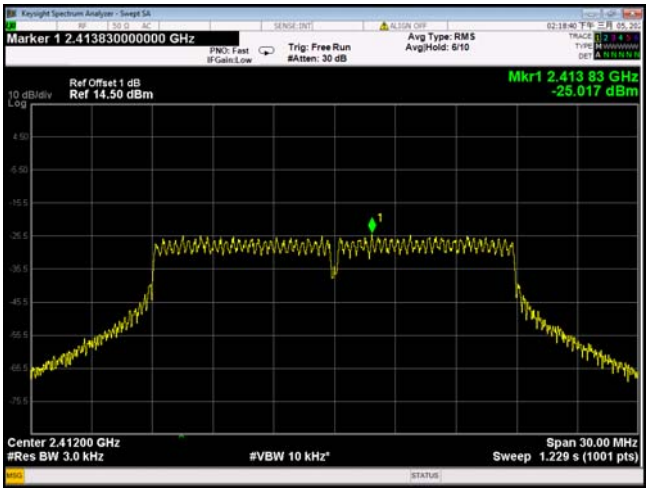
Mode: TX 11g channel 6



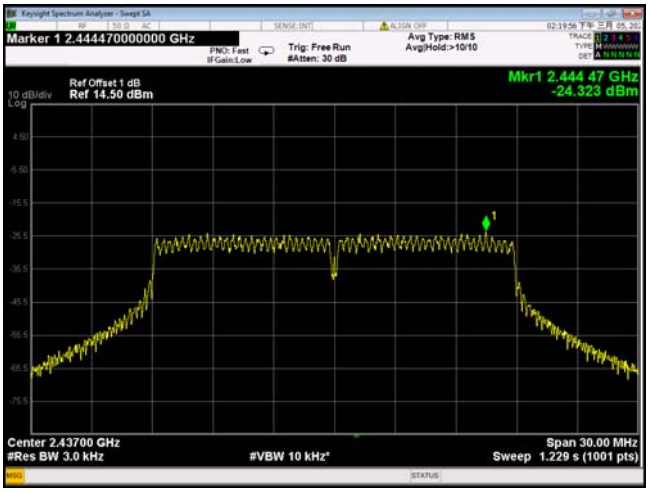
Mode: TX 11g channel 11



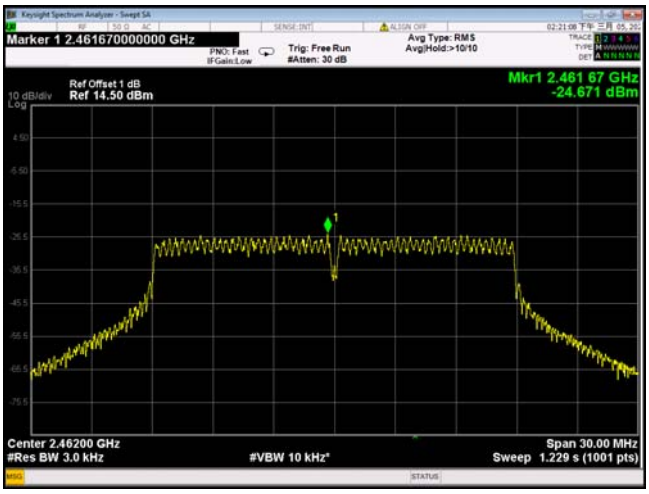
Mode: TX 11n HT20 channel 1



Mode: TX 11n HT20 channel 6



Mode: TX 11n HT20 channel 11



14 Antenna Requirement

According to the FCC Part 15 Paragraph 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. This product has two External antenna and It should be installed by professional people and used in special placesfulfil the requirement of this section.

Note: Please refer to EUT photos for more details.

15 RF Exposure

Note: Please refer to RF Exposure Report: WTF25D02024506W003.

16 Photographs of test setup and EUT.

Note: Please refer to appendix: Appendix-Nexis XS1-Photos.

======End of Report======