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Test Report

Applicant	:	Telink Semiconductor (Shanghai) Co., Ltd.
Address	:	11F, Building 1,61 shengxia Road, Pudong District, Shanghai 201203
Product Name	:	TLSR9118A Development Board
Brand Mark	:	Telink
Model	:	TL9118A-EVK40D
Series model	:	N/A
FCC ID	:	OEOTL9118A-EVK40D
Report Number	:	BLA-EMC-202501-A5302
Date of Receipt	:	Jan. 13, 2025
Date of Test	:	Jan. 13, 2025 to Feb. 05, 2025
Test Standard	:	47 CFR Part 15, Subpart C 15.247
Test Result	:	Pass

Compiled by: Mark Chen **Review by:** Sweeb **Approved by:** Blue Zheng

Issued Date: Feb. 11, 2025

BlueAsia of Technical Services(Shenzhen) Co.,Ltd.

Address: Building C, No. 107, Shihuan Road, Shiyan Sub-District, Baoan District, Shenzhen, Guangdong Province, China

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Revise Record

Version No.	Date	Description
01	Feb. 05, 2025	Original

1 General information

1.1 General information

Applicant	Telink Semiconductor (Shanghai) Co., Ltd.
Address	11F, Building 1,61 shengxia Road, Pudong District, Shanghai 201203
Manufacturer	Telink Semiconductor (Shanghai) Co., Ltd.
Address	11F, Building 1,61 shengxia Road, Pudong District, Shanghai 201203
Factory	N/A
Address	N/A

1.2 General description of EUT

Product Name	TLSR9118A Development Board
Model No.	TL9118A-EVK40D
Operation Frequency:	IEEE 802.11b/g/n(HT20)/ax(HE20): 2412MHz to 2472MHz IEEE 802.11n(HT40): 2422MHz to 2462MHz
Modulation Type:	802.11b: DSSS(CCK/QPSK/BPSK) 802.11g: OFDM(BPSK/QPSK/16QAM/64QAM) 802.11n (HT20 and HT40): OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11ax(HE20):OFDMA(1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK)
Channel Spacing:	5MHz
Number of Channels:	802.11b/g: 13 Channels 802.11n (HT20)/ax(HE20): 13 Channels 802.11n (HT40): 9 Channels
Antenna Type:	Dipole antenna
Antenna Gain:	1.40dBi (Provided by customer)
Power supply:	DC 5V from PC
Hardware Version	N/A
Software Version	N/A
Note: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.	

2 Test summary

No.	Test item	FCC standard	Test Method(Clause)	Result
1	Antenna Requirement	§15.203	N/A	Pass
2	Conducted Emissions at AC Power Line (150kHz-30MHz)	§15.207	ANSI C63.10-2013 Clause 6.2	Pass
3	Conducted Peak Output Power	§15.247 (b)(3)	ANSI C63.10-2013, Clause 11.9.1.3	Pass
4	Minimum 6dB Bandwidth	§15.247 (a)(2)	ANSI C63.10-2013, Clause 11.8.1	Pass
5	Power Spectrum Density	§15.247 (e)	ANSI C63.10-2013, Clause 11.10.2	Pass
6	Conducted Band Edges Measurement	§15.247(d)	ANSI C63.10-2013, Clause 11.13.3.2	Pass
7	Conducted Spurious Emissions	§15.247(d)	ANSI C63.10-2013, Clause 11.11	Pass
8	Radiated Spurious Emissions	§15.247 (d) §15.209	ANSI C63.10-2013 Clause 6.4&6.5&6.6	Pass
9	Radiated Emissions which fall in the restricted bands	§15.247 (d) §15.205	ANSI C63.10-2013 Clause 6.10.5	Pass

3 Test Configuration

3.1 Test mode

Test Mode Note 1	Description
TX	Keep the EUT in continuously transmitting mode with modulation.（Duty cycle>98%）
RX	Keep the EUT in receiving mode
TX Low channel	Keep the EUT in continuously transmitting mode in low channel
TX middle channel	Keep the EUT in continuously transmitting mode in middle channel
TX high channel	Keep the EUT in continuously transmitting mode in high channel

Note 1: The EUT was configured to measure its highest possible emission and/or immunity level. The test modes were adapted according to the operation manual for use; the EUT was operated in the engineering mode Note 2 to fix the TX or Rx frequency that was for the purpose of the measurements.

Note 2: Special software is used. The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

Power level setup in software			
Test Software Name	Tera Term VT		
Mode	Channel	Frequency (MHz)	Soft Set
802.11b/g/n(HT20)/ n(HT40)/ax(HE20)	1	2412	TX level : Default
	6	2437	
	11	2462	
	3	2422	
	9	2452	

3.2 Operation Frequency each of channel

Operation Frequency each of channel(802.11b/g/n HT20/ax(HE20)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	5	2432MHz	9	2452MHz	13	2472MHz
2	2417MHz	6	2437MHz	10	2457MHz	--	--
3	2422MHz	7	2442MHz	11	2462MHz	--	--
4	2427MHz	8	2447MHz	12	2467MHz	--	--

Operation Frequency each of channel(802.11n HT40)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
3	2422MHz	7	2442MHz	11	2462MHz	--	--
4	2427MHz	8	2447MHz	--	--	--	--
5	2432MHz	9	2452MHz	--	--	--	--
6	2437MHz	10	2457MHz	--	--	--	--

3.3 Test channel

For 802.11b/g/n(HT20)/ax(HE20), the lowest, middle, highest channel numbers of the EUT used and tested in this report are separately 1 (2412MHz), 6 (2437MHz) and 11 (2462MHz); 802.11n HT40, the lowest, middle, highest channel numbers of the EUT used and tested in this report are separately 3 (2422MHz), 6 (2437MHz) and 9 (2452MHz).

3.4 Auxiliary equipment

Device Type	Manufacturer	Model Name	Serial No.	Remark
PC	HP	14s-cr2010TX	/	/
AC adapter	PISEN	ZY2207-A521H	N/A	From lab
Note: "--" mean no any auxiliary device during testing.				

3.5 Test environment

Environment	Temperature	Voltage
Normal	25℃	DC 5V

4 Laboratory information

4.1 Laboratory and accreditations

The test facility is recognized, certified, or accredited by the following organizations:

Company name:	BlueAsia of Technical Services(Shenzhen) Co., Ltd.
Address:	Building C, No. 107, Shihuan Road, Shiyan Sub-District, Baoan District, Shenzhen, Guangdong Province, China
CNAS accredited No.:	L9788
A2LA Cert. No.:	5071.01
FCC Designation No.:	CN1252
ISED CAB identifier No.:	CN0028
Telephone:	+86-755-28682673
FAX:	+86-755-28682673

4.2 Measurement uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

Parameter	Expanded Uncertainty
Radiated Emission(9kHz-30MHz)	±4.34dB
Radiated Emission(30Mz-1000MHz)	±4.24dB
Radiated Emission(1GHz-18GHz)	±4.68dB
AC Power Line Conducted Emission(150kHz-30MHz)	±3.45dB
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1.5 dB
Power Spectral Density, conducted	±3.0 dB
Unwanted Emissions, conducted	±3.0 dB
Temperature	±3 °C
Supply voltages	±3 %
Time	±5 %

5 Test equipment

Radiated Spurious Emissions (Below 1GHz)

Equipment	Name	Model	Manufacture	S/N	Cal. Date	Due. Date
BLA-EMC-002-01	Anechoic chamber	9*6*6 chamber	SKET	N/A	2024/3/27	2027/3/26
BLA-EMC-002-02	Control room	966 control room	SKET	N/A	2024/3/27	2027/3/26
BLA-EMC-009	EMI receiver	ESR7	R&S	101199	2024/08/08	2025/08/07
BLA-EMC-043	Loop antenna	FMZB1519B	Schwarzbeck	00102	2024/06/29	2026/06/28
BLA-EMC-065	Broadband antenna	VULB9168	Schwarzbeck	01065P	2024/06/29	2026/06/27
BLA-XC-01	Coaxial Cable	N/A	BlueAsia	V01	N/A	N/A
BLA-XC-02	Coaxial Cable	N/A	BlueAsia	V02	N/A	N/A

Radiated Spurious Emissions (Above 1GHz)

Equipment	Name	Model	Manufacture	S/N	Cal. Date	Due. Date
BLA-EMC-001-01	Anechoic chamber	9*6*6 chamber	SKET	N/A	2023/11/16	2026/11/15
BLA-EMC-001-02	Control Room	966 control room	SKET	N/A	2023/11/16	2025/11/15
BLA-EMC-008	Spectrum	FSP40	R&S	100817	2024/08/08	2025/08/07
BLA-EMC-012	Broadband antenna	VULB9168	Schwarzbeck	00836 P:00227	2022/10/12	2025/10/11
BLA-EMC-013	Horn Antenna	BBHA9120D	Schwarzbeck	01892	2024/06/29	2026/06/28
BLA-EMC-014	Amplifier	PA_000318G-45	SKET	PA2018043003	2024/08/08	2025/08/07
BLA-EMC-046	Filter bank	2.4G/5G Filter bank	SKET	N/A	2024/06/28	2025/06/27
BLA-EMC-061	Receiver	ESPI7	R&S	101477	2024/06/28	2025/06/27
BLA-EMC-066	Amplifier	LNPA_30M01G-30	SKET	SK2021060801	2024/06/28	2025/06/27
BLA-EMC-086	Amplifier	LNPA_18G40G-50dB	SKET	SK2022071301	2024/06/28	2025/06/27
BLA-EMC-087	Horn Antenna	BBHA 9170	Schwarzbeck	1106	2024/06/29	2026/06/28

BLA-XC-03	Coaxial Cable	N/A	BlueAsia	V03	N/A	N/A
BLA-XC-04	Coaxial Cable	N/A	BlueAsia	V04	N/A	N/A

Conducted Emissions

Equipment	Name	Model	Manufacture	S/N	Cal. Date	Due. Date
BLA-EMC-003-001	Shield room	8*3*3	SKET	N/A	2023/11/16	2025/11/15
BLA-EMC-009	EMI receiver	ESR7	R&S	101199	2024/08/08	2025/08/07
BLA-EMC-011	LISN	ENV216	R&S	101372	2024/08/08	2025/08/07
BLA-EMC-033	Impedance transformer	DC-2GHz	DFXP	N/A	2024/06/28	2025/06/27
BLA-EMC-041	LISN	AT166-2	ATTEN	AKK1806000003	2024/08/08	2025/08/07
BLA-EMC-045	Impedance stable network	ISNT8-cat6	TESEQ	53580	2024/08/08	2025/08/07
BLA-EMC-095	Single-channel vehicle artificial power network	NNBM 8124	Schwarzbeck	01045	2024/06/28	2025/06/27
BLA-EMC-096	Single-channel vehicle artificial power network	NNBM 8124	Schwarzbeck	01075	2024/06/28	2025/06/27
BLA-XC-05	Coaxial Cable	N/A	BlueAsia	V05	N/A	N/A

RF conducted

Equipment	Name	Model	Manufacture	S/N	Cal. Date	Due. Date
BLA-EMC-003-003	Shield room	5*3*3	SKET	N/A	2023/11/16	2025/11/15
BLA-EMC-016	Signal Generator	N5182A	Agilent	MY52420567	2024/06/28	2025/06/27
BLA-EMC-038	Spectrum	N9020A	Agilent	MY49100060	2024/08/08	2025/08/07
BLA-EMC-042	Power sensor	RPR3006W	DARE	14I00889SN042	2024/08/08	2025/08/07
BLA-EMC-044	Radio communication tester	CMW500	R&S	132429	2024/08/08	2025/08/07
BLA-EMC-064	Signal Generator	N5182B	KEYSIGHT	MY58108892	2024/06/28	2025/06/27
BLA-EMC-079	Spectrum	N9020A	Agilent	MY54420161	2024/08/08	2025/08/07
BLA-EMC-088	Audio Analyzer	ATS-1	Audio Precision	ATS141094	2024/06/28	2025/06/27

Test software

Software No.	Software Name	Manufacture	Software version	Test site
BLA-EMC-S001	EZ-EMC	EZ	EEMC-3A1+	RE(Below 1GHz)
BLA-EMC-S002	EZ-EMC	EZ	EEMC-3A1+	RE(Above 1GHz)
BLA-EMC-S003	EZ-EMC	EZ	EEMC-3A1+	CE
BLA-EMC-S010	MTS 8310	MW	2.0.0.0	RF

6 Test result

6.1 Antenna requirement

Test Standard	47 CFR Part 15, Subpart C 15.203
Test Method	N/A

6.1.1 Requirement

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. The use of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of a so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT antenna:
The antenna is Dipole antenna. The best case gain of the antenna is 1.40dBi.

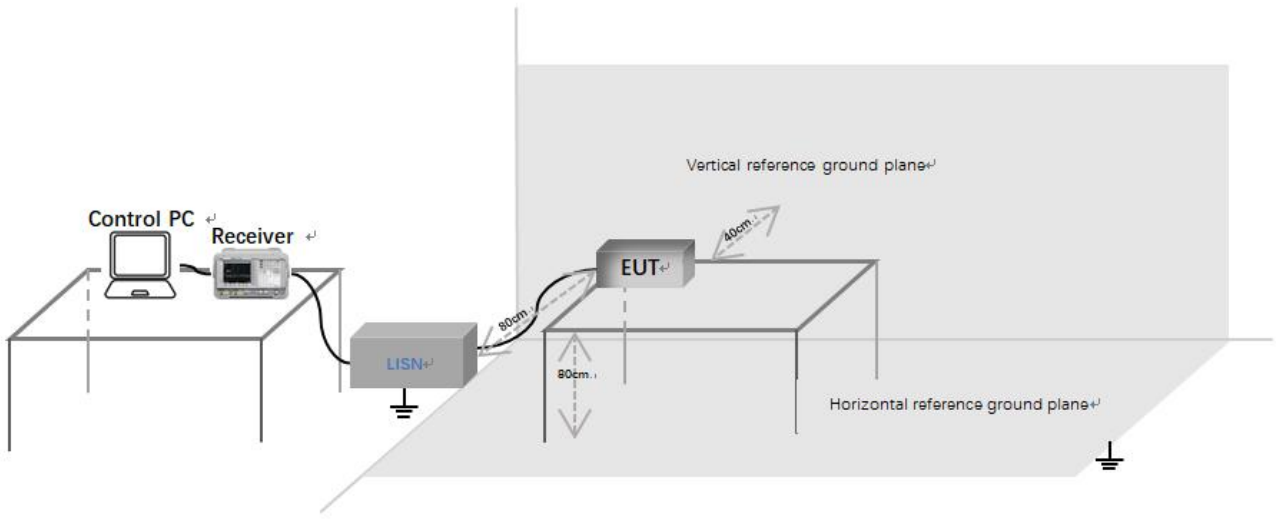
6.2 Conducted emissions at AC power line (150 kHz-30 MHz)

Test Standard	47 CFR Part 15, Subpart C 15.207
Test Method	ANSI C63.10 (2013) Section 6.2
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

6.2.1 Limit

Frequency of emission(MHz)	**Conducted limit(dBμV)**	
	Quasi-peak	**Average**
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency.		

6.2.2 Test setup



Description of test setup connection:

a) Connect the control PC to the receiver through a USB to GPIB cable;

b) The receiver is connected to the LISN through a coaxial line;

c) Connect the power port of LISN to the EUT.

6.2.3 Procedure

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50H + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

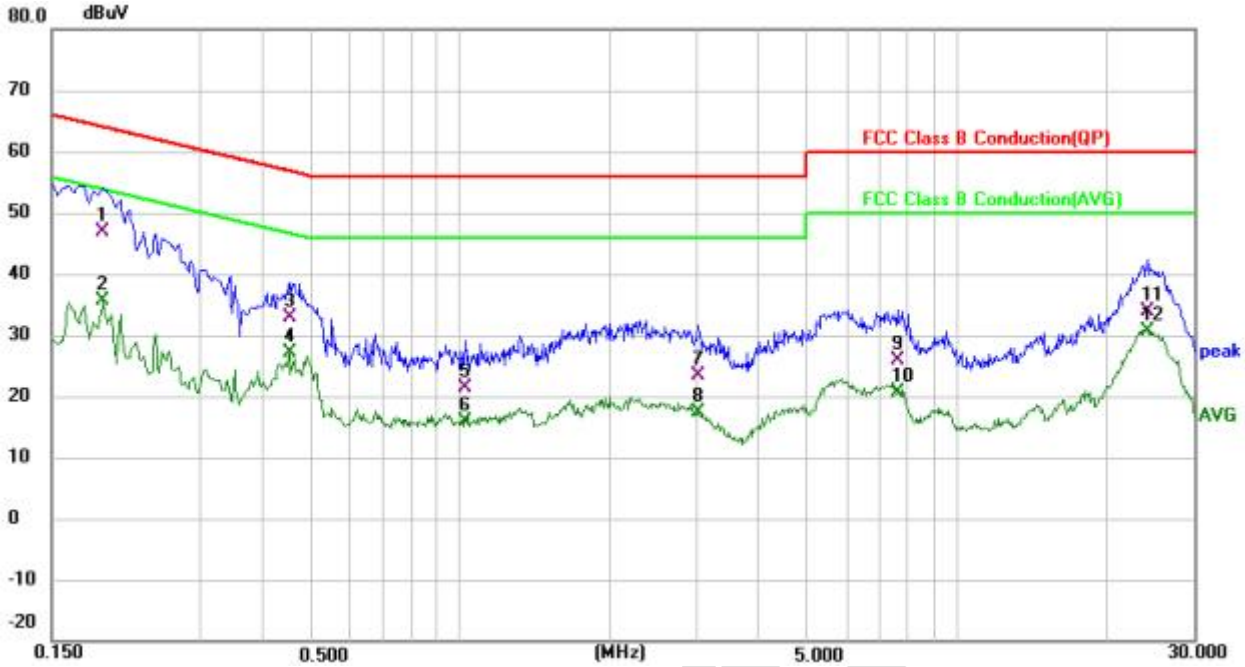
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

LISN=Read Level+ Cable Loss+ LISN Factor

6.2.4 Test data

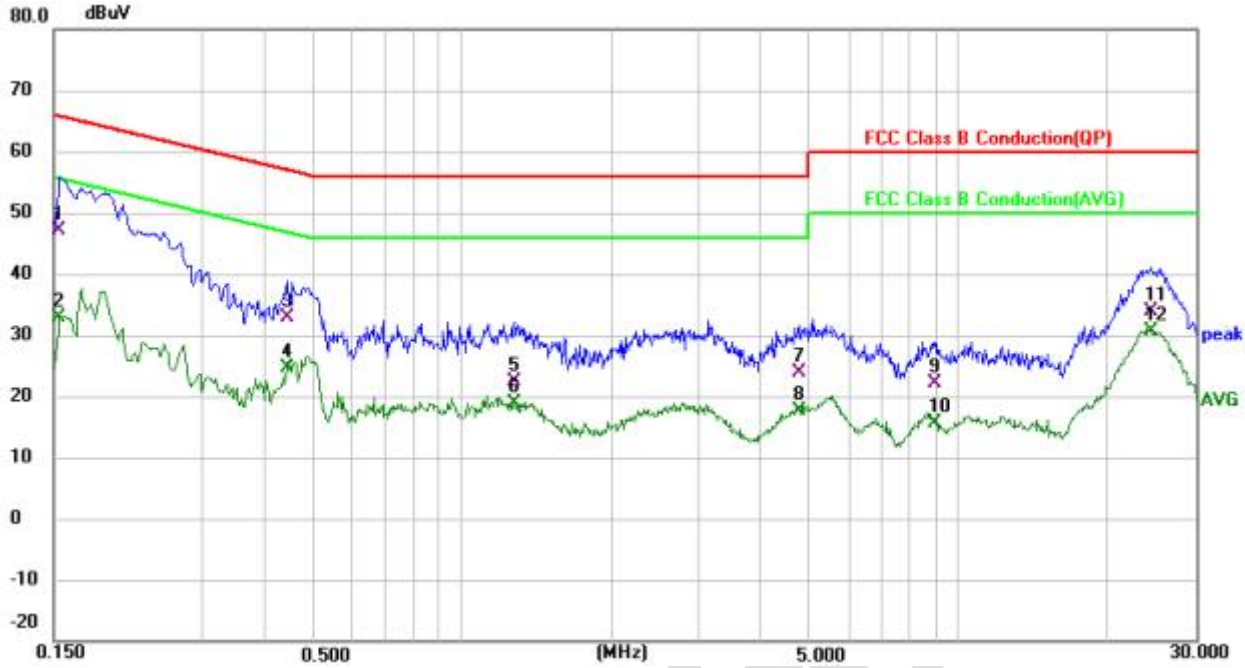
[Test mode: TX]; [Line: Line];[Power:AC120V/60Hz]



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	*	0.1900	36.53	10.24	46.77	64.04	-17.27	QP
2		0.1900	25.27	10.24	35.51	54.04	-18.53	AVG
3		0.4500	23.01	9.84	32.85	56.88	-24.03	QP
4		0.4500	17.23	9.84	27.07	46.88	-19.81	AVG
5		1.0260	11.59	9.78	21.37	56.00	-34.63	QP
6		1.0260	6.01	9.78	15.79	46.00	-30.21	AVG
7		3.0100	13.29	10.04	23.33	56.00	-32.67	QP
8		3.0100	7.32	10.04	17.36	46.00	-28.64	AVG
9		7.5780	15.46	10.32	25.78	60.00	-34.22	QP
10		7.5780	10.20	10.32	20.52	50.00	-29.48	AVG
11		24.2580	20.85	13.13	33.98	60.00	-26.02	QP
12		24.2580	17.54	13.13	30.67	50.00	-19.33	AVG

Test Result: Pass

[Test mode: TX]; [Line: Neutral];[Power:AC120V/60Hz]



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	*	0.1539	37.04	10.10	47.14	65.79	-18.65	QP
2		0.1539	22.67	10.10	32.77	55.79	-23.02	AVG
3		0.4420	22.99	9.78	32.77	57.02	-24.25	QP
4		0.4420	14.75	9.78	24.53	47.02	-22.49	AVG
5		1.2740	12.71	9.75	22.46	56.00	-33.54	QP
6		1.2740	9.17	9.75	18.92	46.00	-27.08	AVG
7		4.7500	13.87	10.10	23.97	56.00	-32.03	QP
8		4.7500	7.56	10.10	17.66	46.00	-28.34	AVG
9		8.9460	11.52	10.53	22.05	60.00	-37.95	QP
10		8.9460	5.16	10.53	15.69	50.00	-34.31	AVG
11		24.4100	20.91	13.05	33.96	60.00	-26.04	QP
12		24.4100	17.58	13.05	30.63	50.00	-19.37	AVG

Test Result: Pass

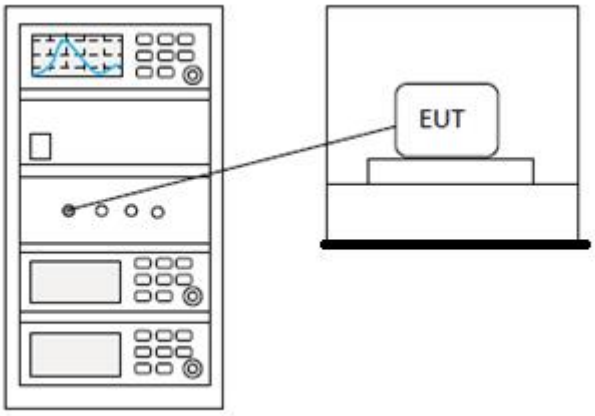
6.3 Conducted peak output Power

Test Standard	47 CFR Part 15, Subpart C 15.247(b)(3)
Test Method	ANSI C63.10 (2013) Section 11.9.1.3
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

6.3.1 Limit

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥50 hopping channels
	0.25 for 25≤ hopping channels <50
	1 for digital modulation
2400-2483.5	1 for ≥75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

6.3.2 Test setup



6.3.3 Test data

Pass: Please refer to appendix A for details

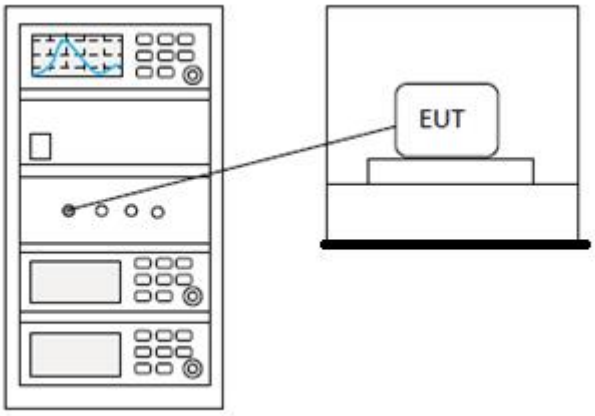
6.4 Minimum 6dB bandwidth

Test Standard	47 CFR Part 15, Subpart C 15.247(a)(2)
Test Method	ANSI C63.10 (2013) Section 11.8.1
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

6.4.1 Limit

≥500 kHz

6.4.2 Test setup



6.4.3 Test data

Pass: Please refer to appendix A for details

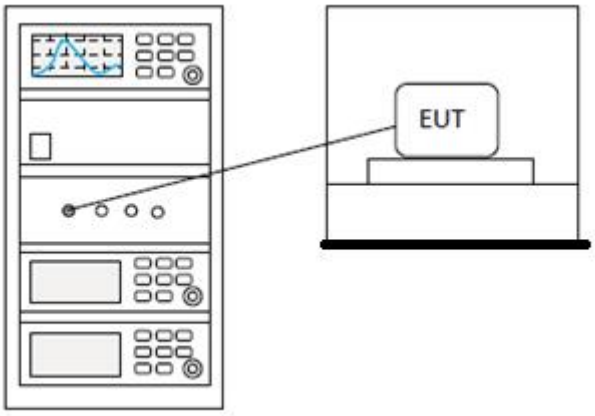
6.5 Power spectrum density

Test Standard	47 CFR Part 15, Subpart C 15.247(e)
Test Method	ANSI C63.10 (2013) Section 11.10.2
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

6.5.1 Limit

≤8dBm in any 3 kHz band during any time interval of continuous transmission

6.5.2 Test setup



6.5.3 Test data

Pass: Please refer to appendix A for details

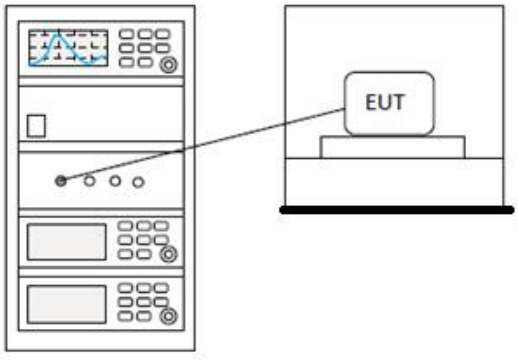
6.6 Conducted Band Edges Measurement

Test Standard	47 CFR Part 15, Subpart C 15.247(d)
Test Method	ANSI C63.10 (2013) Section 11.13
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

6.6.1 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 20dB.
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)).

6.6.2 Test setup



6.6.3 Test data

Pass: Please refer to appendix A for details

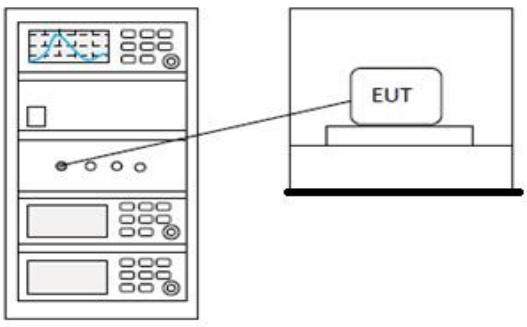
6.7 Conducted spurious emissions

Test Standard	47 CFR Part 15, Subpart C 15.247(d)
Test Method	ANSI C63.10 (2013) Section 11.11
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

6.7.1 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 20dB.
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)).

6.7.2 Test setup



6.7.3 Test data

Pass: Please refer to appendix A for details

6.8 Radiated spurious emissions

Test Standard	47 CFR Part 15, Subpart C 15.247(d)
Test Method	ANSI C63.10 (2013) Section11.11
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

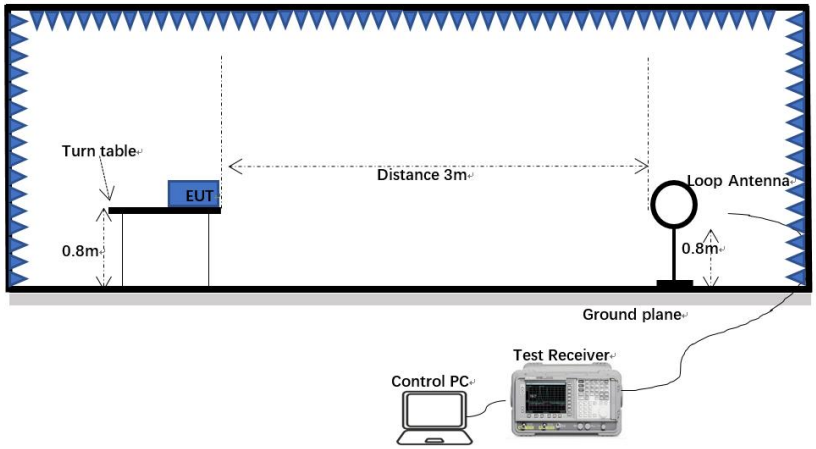
6.8.1 Limit

Frequency(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

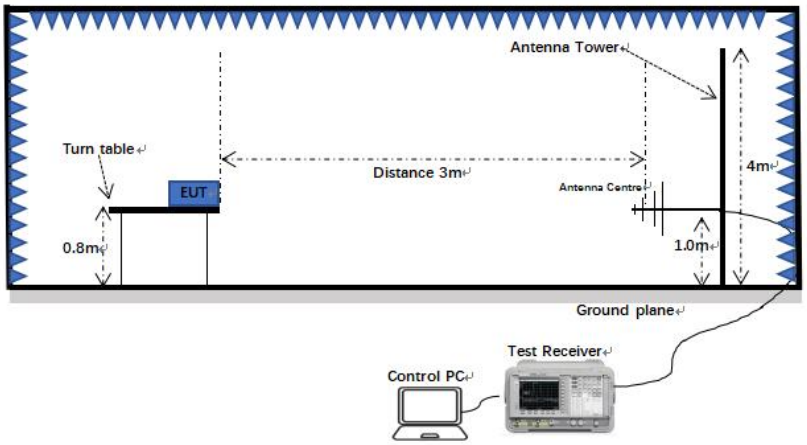
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

6.8.2 Test setup

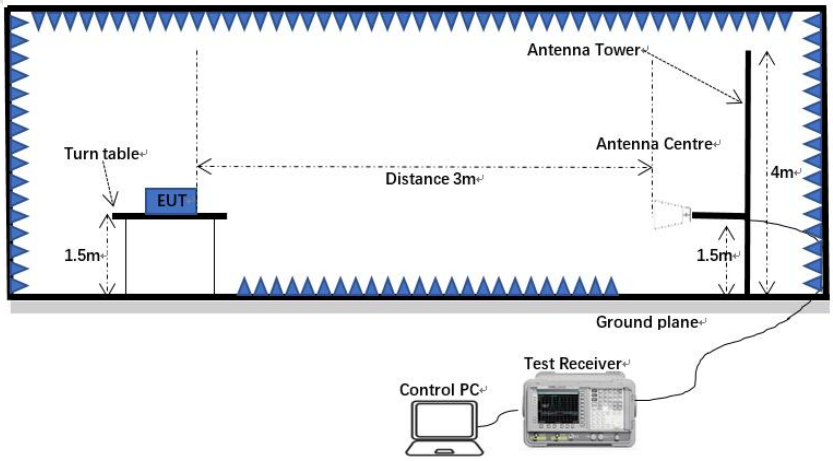
Below 1GHz：



30MHz-1GHz：



Above 1GHz：



6.8.3 Procedure

a) For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b) For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c) The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d) The antenna height 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.

e) 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g) If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h) Test the EUT in the lowest channel, the middle channel, the highest channel.

i) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j) Repeat above procedures until all frequencies measured was complete.

Note 1: Scan from 9 kHz to 25GHz, the disturbance above 12.75GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. Fundamental frequency is blocked by filter, and only spurious emission is shown.

Note 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Note 3: The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

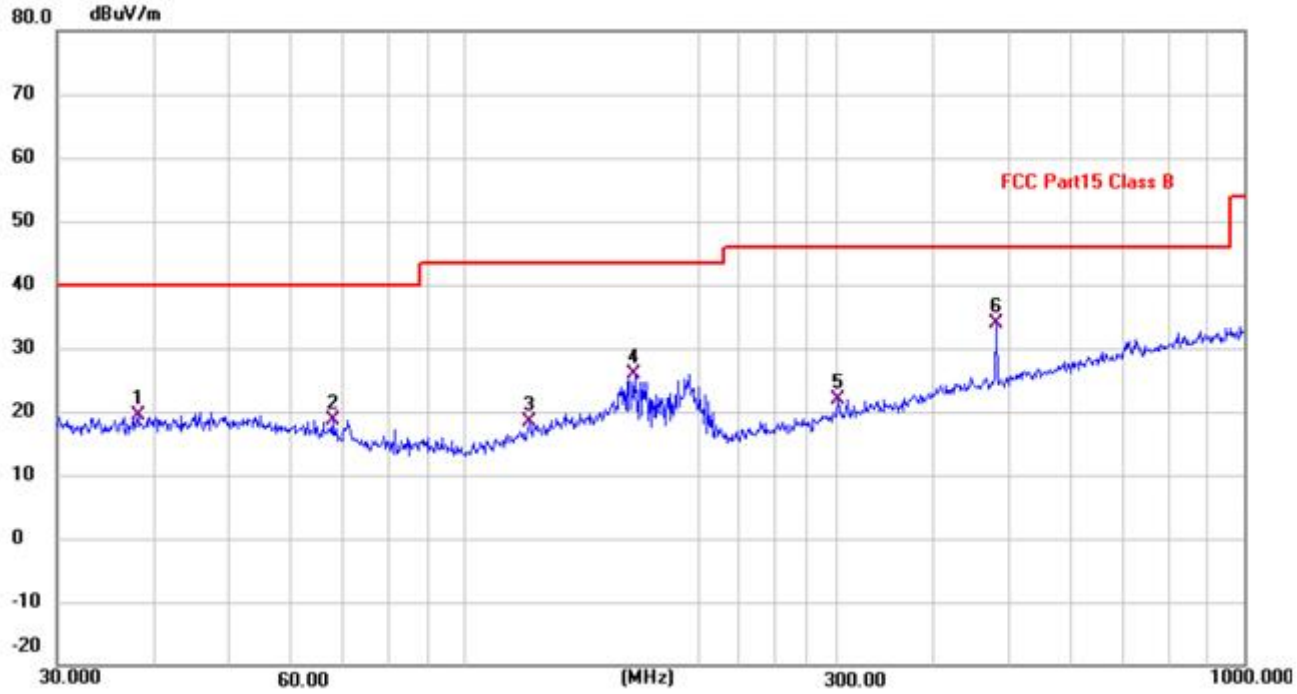
Level (dBuV) = Reading (dBuV) + Factor (dB/m)

6.8.4 Test data

Remark: During the test, pre-scan the 802.11b/g/n mode, and found the 802.11b mode which it is worse case, only the worse case lowest channel of 1Mbps for 802.11b was recorded in the report.

Below 1GHz

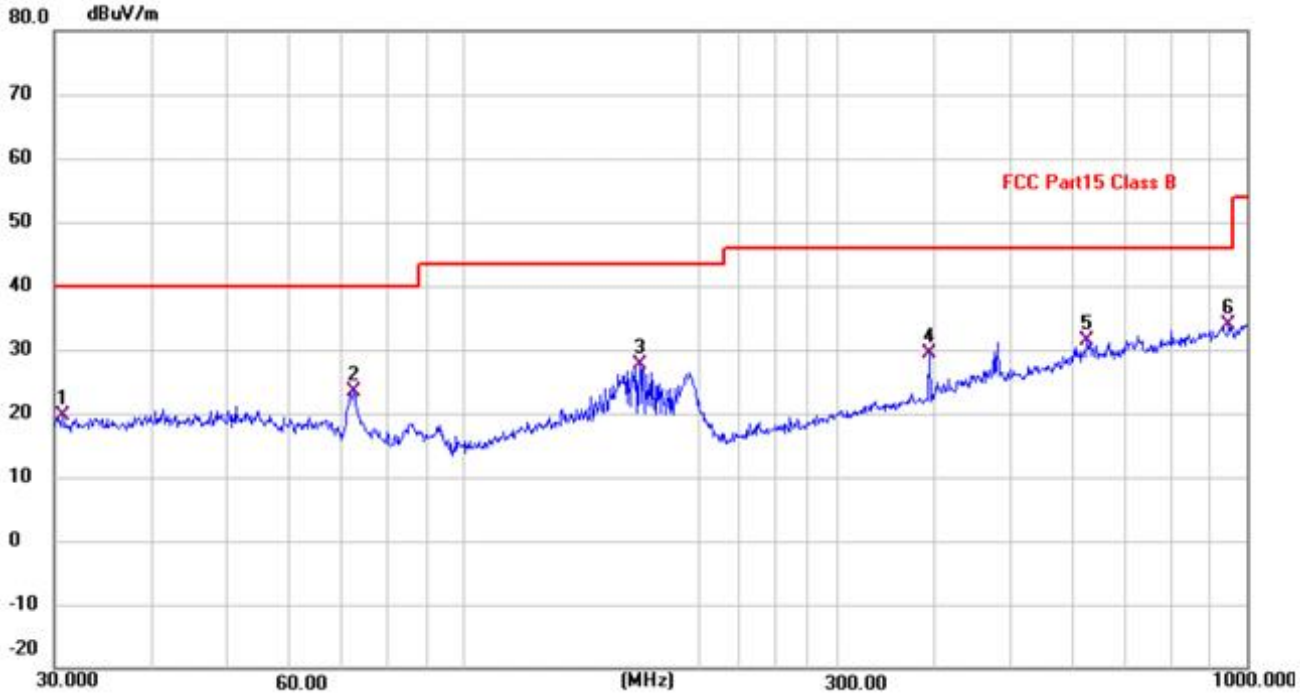
[Test mode: TX]; [Polarity: Horizontal]



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	38.0783	0.16	19.24	19.40	40.00	-20.60	QP
2	67.6751	1.26	17.39	18.65	40.00	-21.35	QP
3	121.1231	-0.15	18.65	18.50	43.50	-25.00	QP
4	165.4866	5.59	20.20	25.79	43.50	-17.71	QP
5	301.4224	1.83	20.11	21.94	46.00	-24.06	QP
6 *	480.5276	9.24	24.63	33.87	46.00	-12.13	QP

Test Result: Pass

[Test mode: TX]; [Polarity: Vertical]



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	30.7455	31.68	-12.03	19.65	40.00	-20.35	QP
2	72.3376	6.96	16.40	23.36	40.00	-16.64	QP
3	167.8243	7.70	19.84	27.54	43.50	-15.96	QP
4	393.4723	6.60	22.68	29.28	46.00	-16.72	QP
5	625.0780	3.56	27.72	31.28	46.00	-14.72	QP
6 *	948.7610	2.48	31.46	33.94	46.00	-12.06	QP

Test Result: Pass

Remark: During the test, pre-scan the 802.11b/g/n mode, and found the 802.11b mode which it is worse case, only the worse case for 802.11b was recorded in the report.

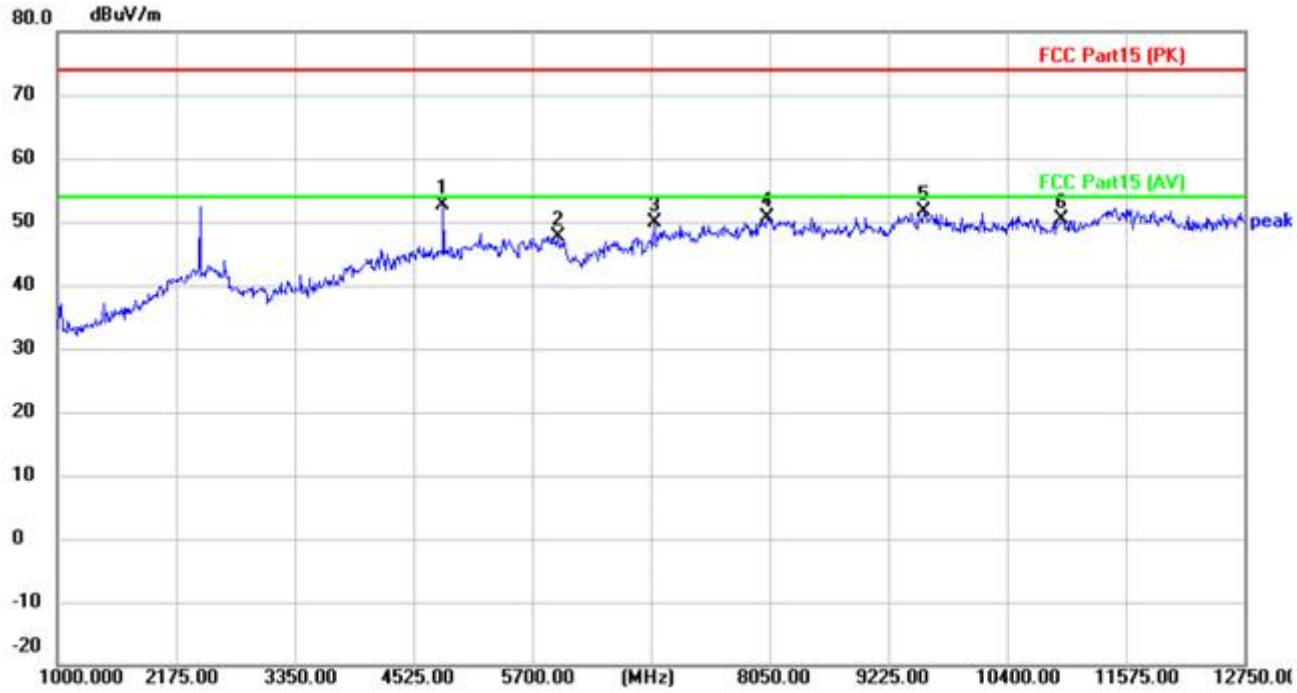
Above 1GHz:

[TestMode: TX 802.11b low channel]; [Polarity: Horizontal]

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	4818.750	46.34	6.30	52.64	74.00	-21.36	peak
2		5653.000	39.57	7.76	47.33	74.00	-26.67	peak
3		7603.500	38.64	10.63	49.27	74.00	-24.73	peak
4		9001.750	37.74	12.27	50.01	74.00	-23.99	peak
5		10282.50	36.44	13.50	49.94	74.00	-24.06	peak
6		11516.25	36.97	14.86	51.83	74.00	-22.17	peak

Test Result: Pass

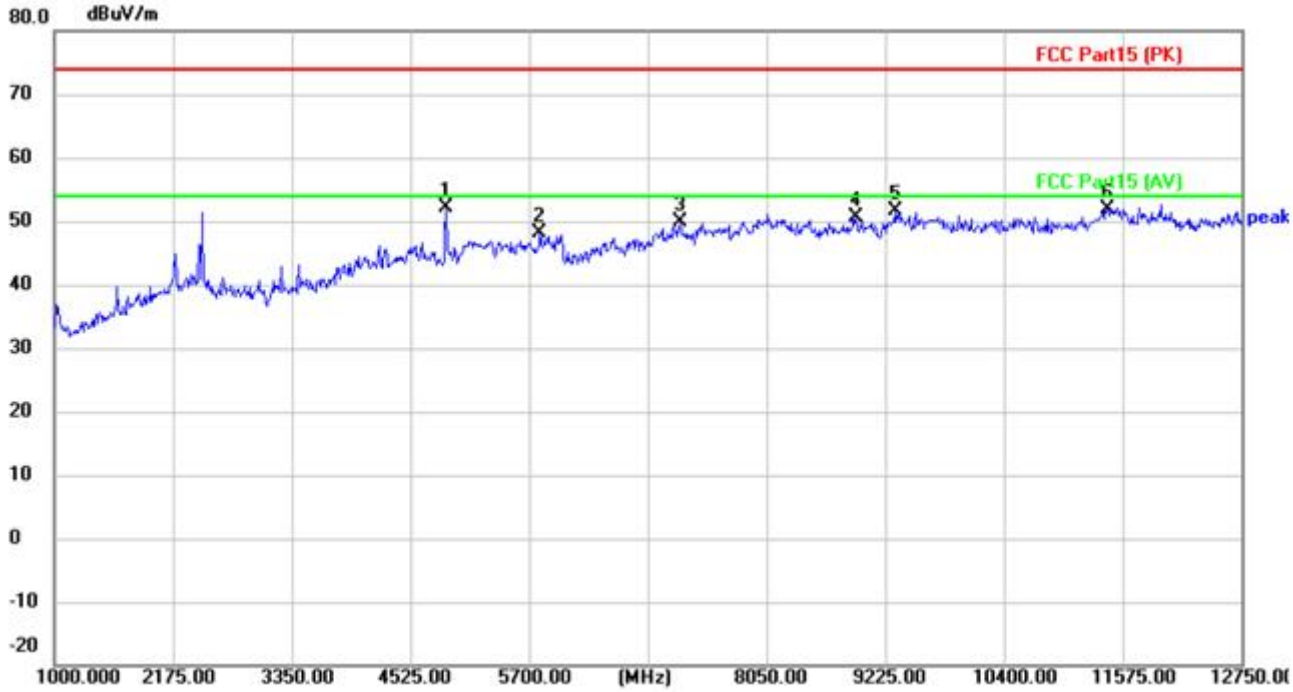
[Test mode: TX 802.11b low channel]; [Polarity: Vertical]



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	4818.750	46.21	6.30	52.51	74.00	-21.49	peak
2		5958.500	38.58	9.02	47.60	74.00	-26.40	peak
3		6910.250	40.58	9.21	49.79	74.00	-24.21	peak
4		8026.500	39.01	11.65	50.66	74.00	-23.34	peak
5		9577.500	38.49	13.04	51.53	74.00	-22.47	peak
6		10940.50	37.32	13.12	50.44	74.00	-23.56	peak

Test Result: Pass

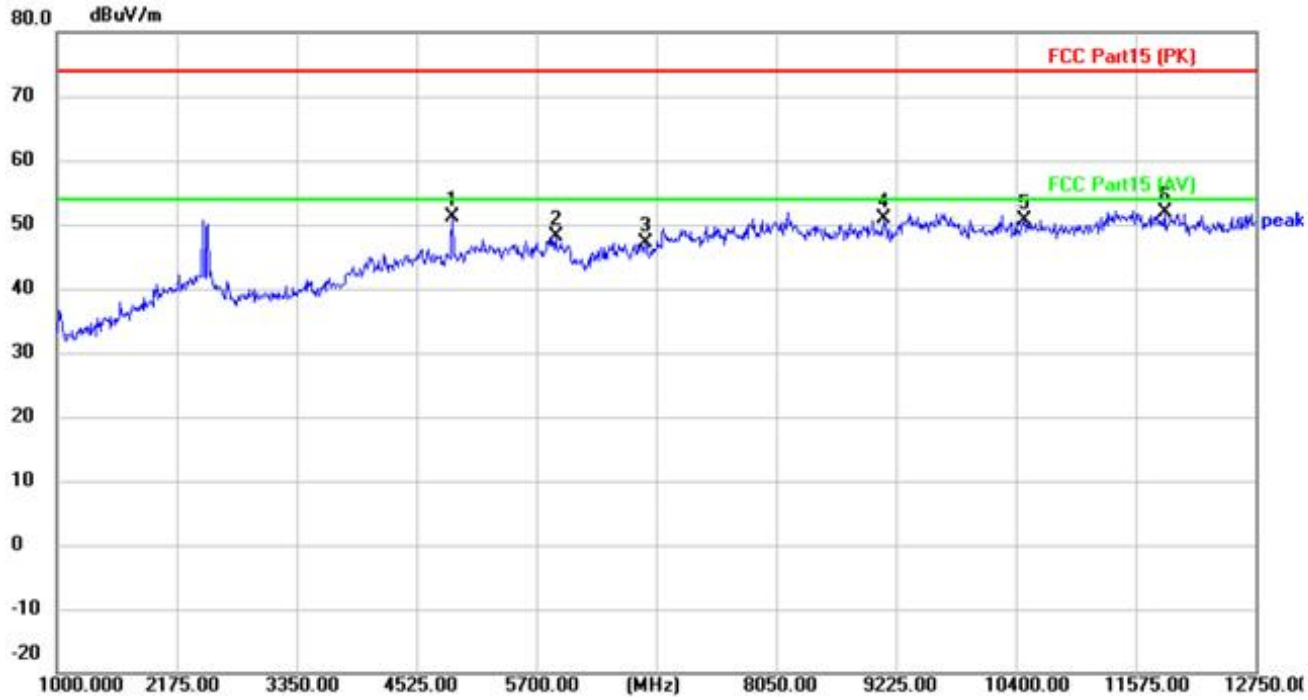
[TestMode: TX 802.11b mid channel]; [Polarity: Horizontal]



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	4877.500	45.80	6.41	52.21	74.00	-21.79	peak
2		5805.750	39.01	9.00	48.01	74.00	-25.99	peak
3		7192.250	39.45	10.43	49.88	74.00	-24.12	peak
4		8931.250	38.44	12.19	50.63	74.00	-23.37	peak
5		9319.000	38.38	13.21	51.59	74.00	-22.41	peak
6		11422.25	37.36	14.40	51.76	74.00	-22.24	peak

Test Result: Pass

[TestMode: TX 802.11b mid channel]; [Polarity: Vertical]



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4877.500	44.65	6.41	51.06	74.00	-22.94	peak
2		5888.000	38.98	9.05	48.03	74.00	-25.97	peak
3		6769.250	38.22	8.86	47.08	74.00	-26.92	peak
4		9107.500	38.52	12.26	50.78	74.00	-23.22	peak
5		10482.25	36.98	13.71	50.69	74.00	-23.31	peak
6	*	11857.00	38.24	13.53	51.77	74.00	-22.23	peak

Test Result: Pass

[Test mode: TX 802.11b High channel]; [Polarity: Horizontal]

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4924.500	45.39	6.90	52.29	74.00	-21.71	peak
2		5852.750	38.68	8.88	47.56	74.00	-26.44	peak
3		7615.250	39.22	10.59	49.81	74.00	-24.19	peak
4		8684.500	38.59	11.79	50.38	74.00	-23.62	peak
5		10517.50	36.92	13.72	50.64	74.00	-23.36	peak
6	*	11457.50	37.83	14.62	52.45	74.00	-21.55	peak

Test Result: Pass

[Test mode: TX 802.11b High channel]; [Polarity: Vertical]

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4924.500	43.94	6.90	50.84	74.00	-23.16	peak
2		6546.000	38.28	8.43	46.71	74.00	-27.29	peak
3		8026.500	38.67	11.65	50.32	74.00	-23.68	peak
4		9272.000	37.33	13.05	50.38	74.00	-23.62	peak
5		10541.00	37.40	13.69	51.09	74.00	-22.91	peak
6	*	11763.00	38.34	13.48	51.82	74.00	-22.18	peak

Test Result: Pass

6.9 Radiated emissions which fall in the restricted bands

Test Standard	47 CFR Part 15, Subpart C 15.247(d)
Test Method	ANSI C63.10 (2013) Section 6.12
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX

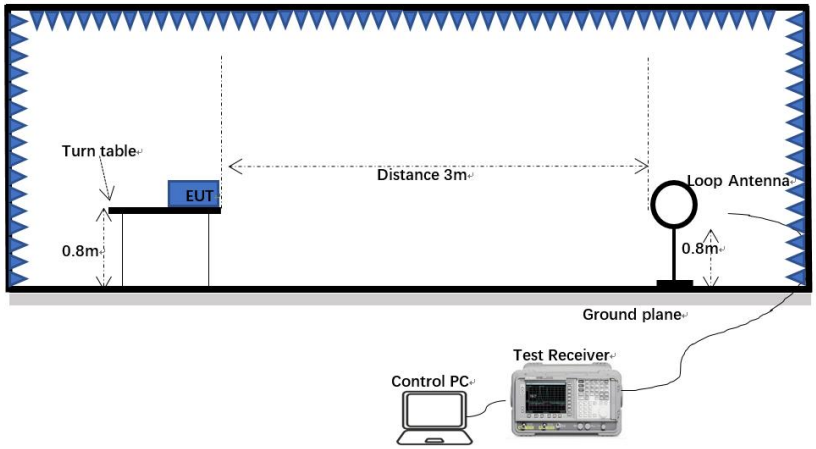
6.9.1 Limit

Frequency(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

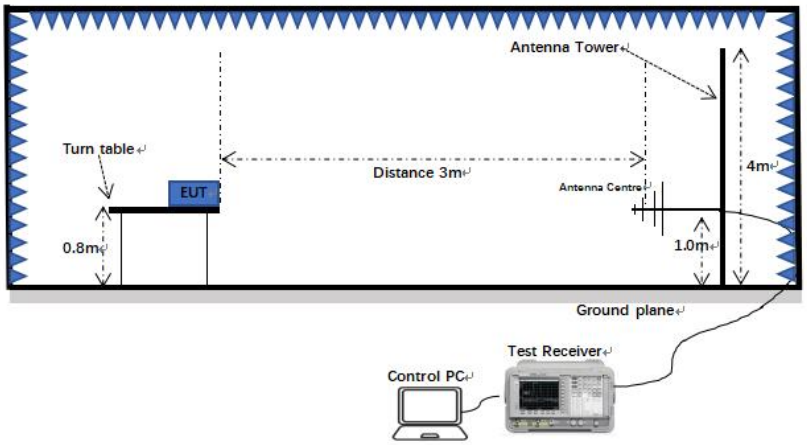
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

6.9.2 Test setup

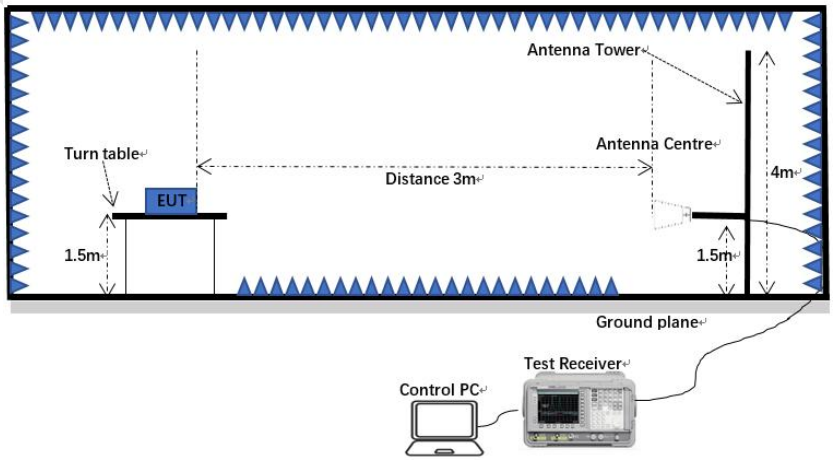
Below 1GHz：



30MHz-1GHz：



Above 1GHz：



6.9.3 Procedure

a) For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b) For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c) The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d) The antenna height 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.

e) 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g) If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h) Test the EUT in the lowest channel, the middle channel, the highest channel.

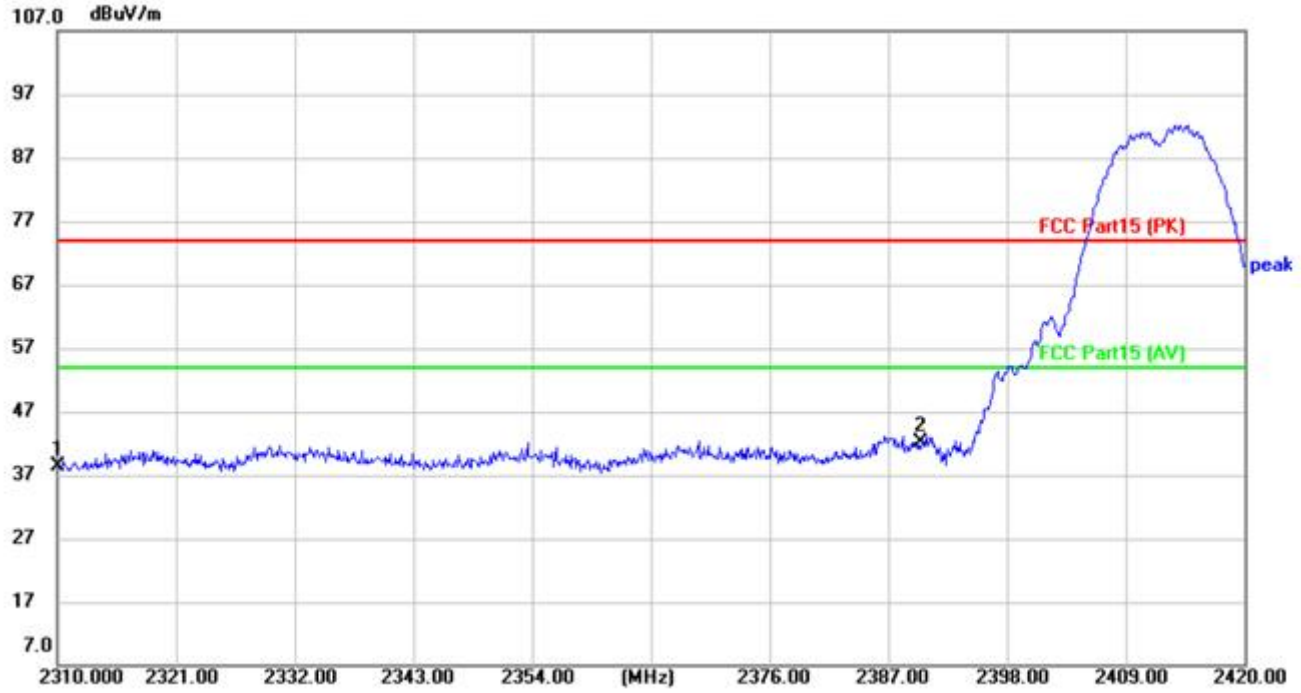
i) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j) Repeat above procedures until all frequencies measured was complete.

Note 1: Level (dBuV) = Reading (dBuV) + Factor (dB/m)
Note 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

6.9.4 Test data

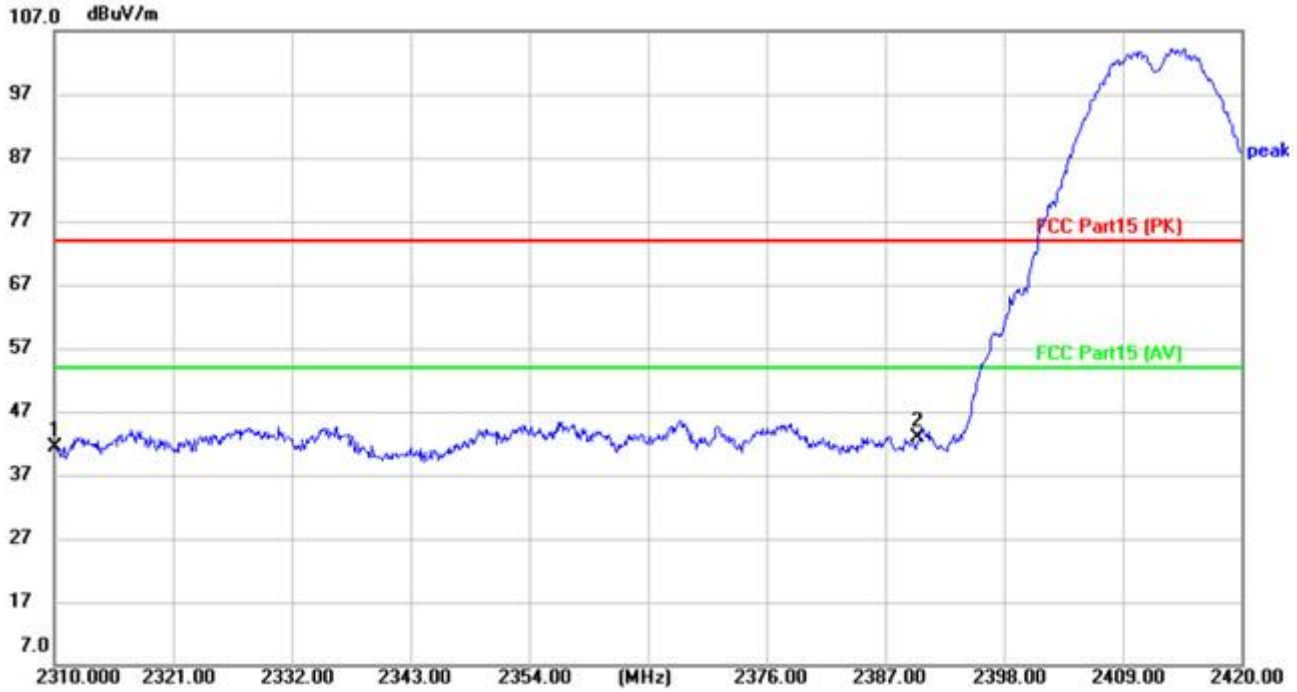
[Test mode: TX 802.11b low channel]; [Polarity: Horizontal]



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	41.21	-2.87	38.34	74.00	-35.66	peak
2	*	2390.000	44.69	-2.44	42.25	74.00	-31.75	peak

Test Result: Pass

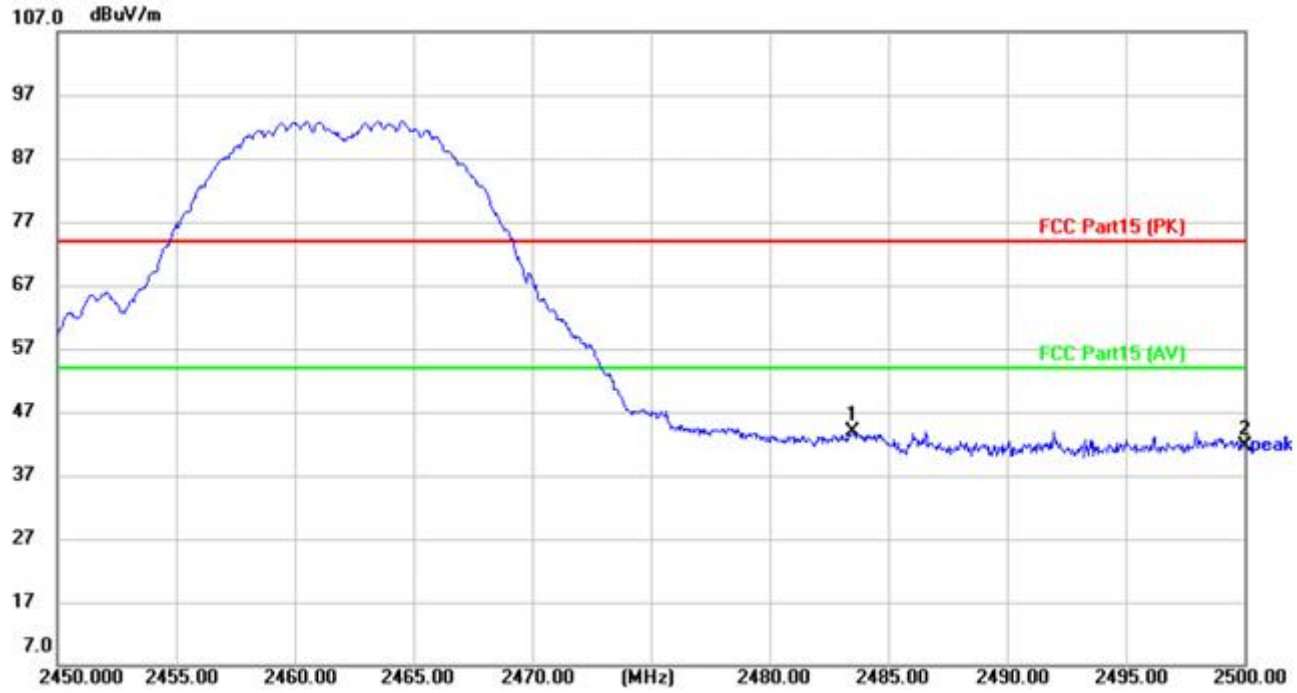
[Test mode:TX 802.11b low channel]; [Polarity: Vertical]



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	44.27	-2.87	41.40	74.00	-32.60	peak
2	*	2390.000	45.24	-2.44	42.80	74.00	-31.20	peak

Test Result: Pass

[Test mode: TX 802.11b High channel]; [Polarity: Horizontal]



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	2483.500	46.72	-2.91	43.81	74.00	-30.19	peak
2		2500.000	44.57	-3.00	41.57	74.00	-32.43	peak

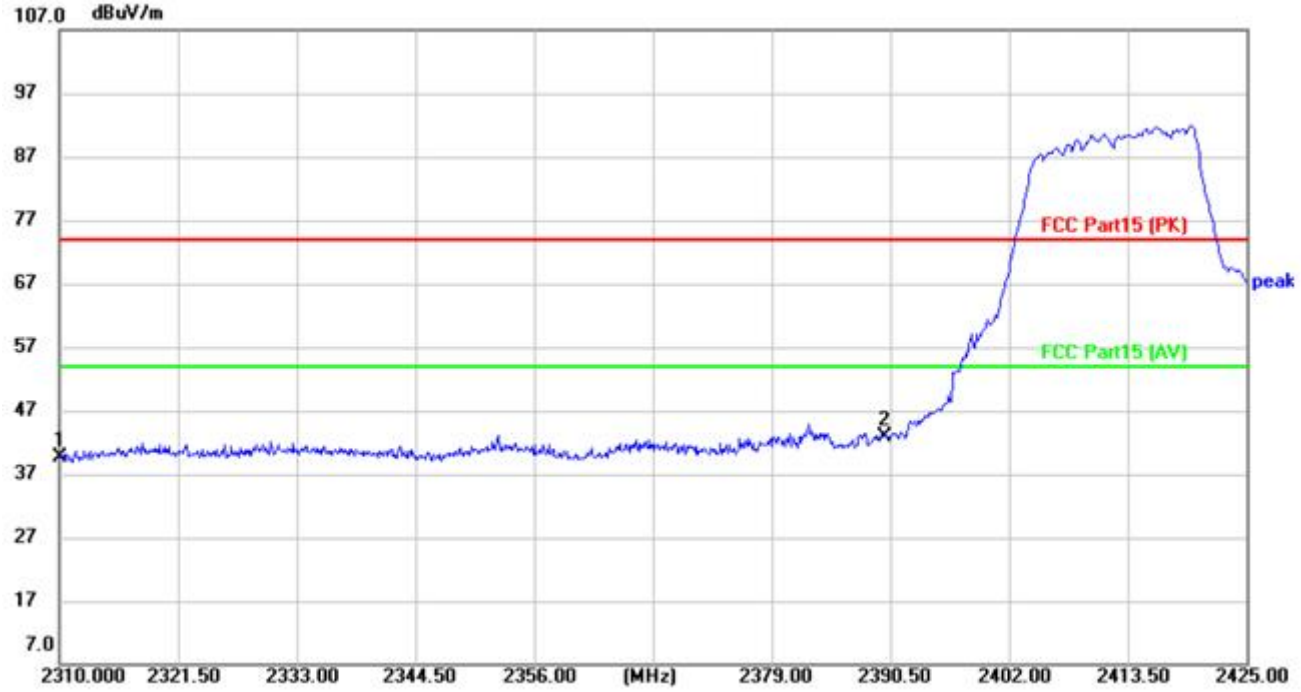
Test Result: Pass

[Test mode:TX 802.11b High channel]; [Polarity: Vertical]

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	2483.500	44.55	-2.91	41.64	74.00	-32.36	peak
2		2500.000	43.55	-3.00	40.55	74.00	-33.45	peak

Test Result: Pass

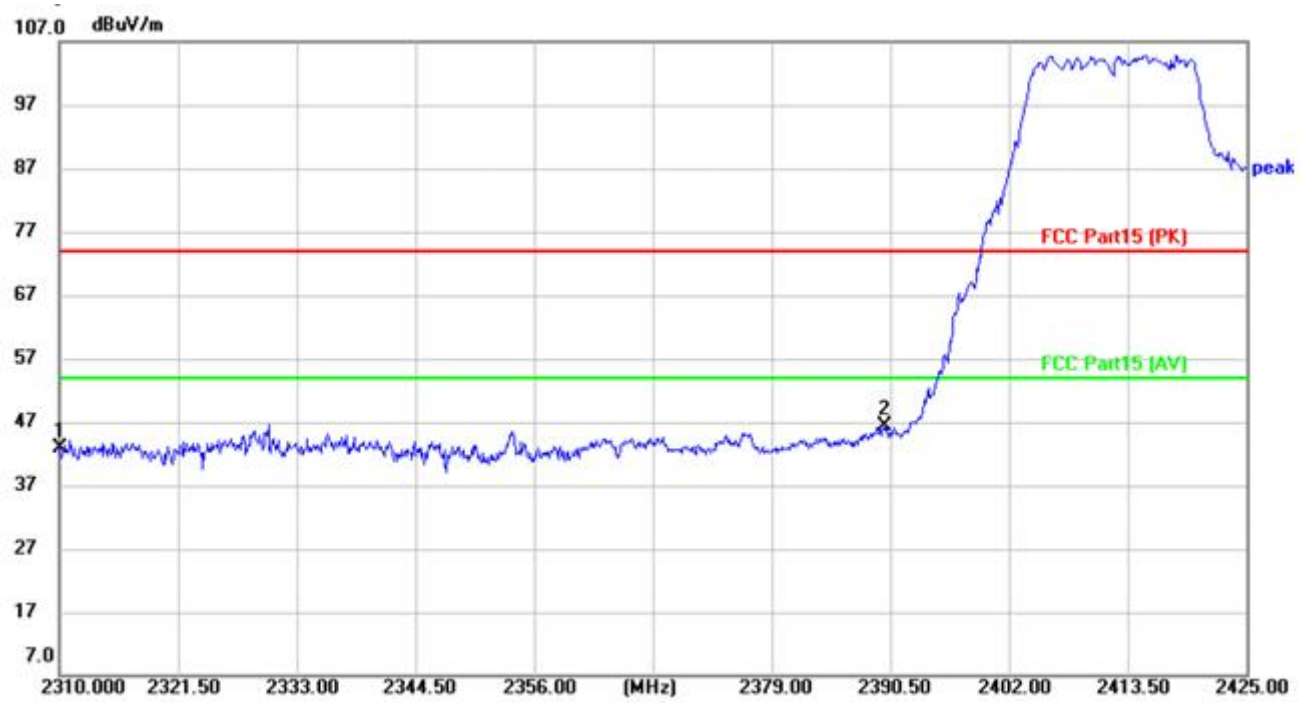
[Test mode: TX 802.11g low channel]; [Polarity: Horizontal]



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	42.56	-2.87	39.69	74.00	-34.31	peak
2	*	2390.000	45.28	-2.44	42.84	74.00	-31.16	peak

Test Result: Pass

[Test mode:TX 802.11g low channel]; [Polarity: Vertical]



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	45.65	-2.87	42.78	74.00	-31.22	peak
2	*	2390.000	48.88	-2.44	46.44	74.00	-27.56	peak

Test Result: Pass

[Test mode: TX 802.11g High channel]; [Polarity: Horizontal]

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	42.17	-2.91	39.26	74.00	-34.74	peak
2	*	2500.000	42.47	-3.00	39.47	74.00	-34.53	peak

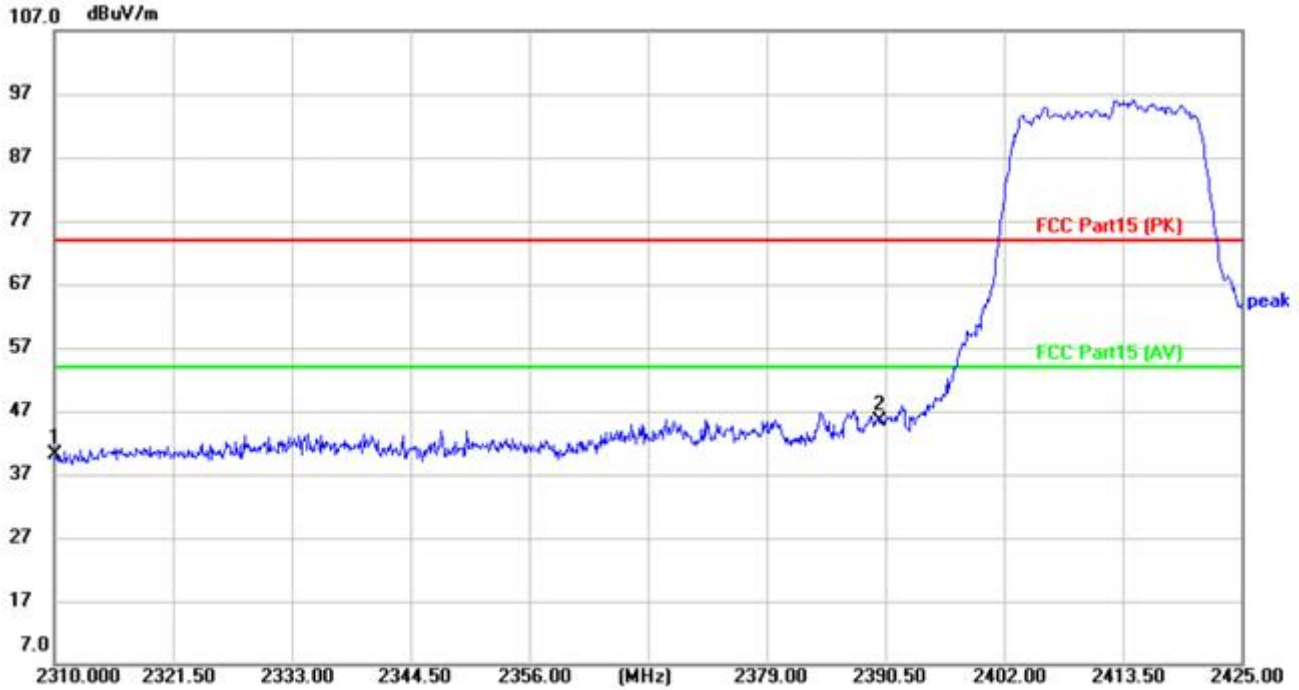
Test Result: Pass

[Test mode:TX 802.11g High channel]; [Polarity: Vertical]

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	44.19	-2.91	41.28	74.00	-32.72	peak
2	*	2500.000	44.35	-3.00	41.35	74.00	-32.65	peak

Test Result: Pass

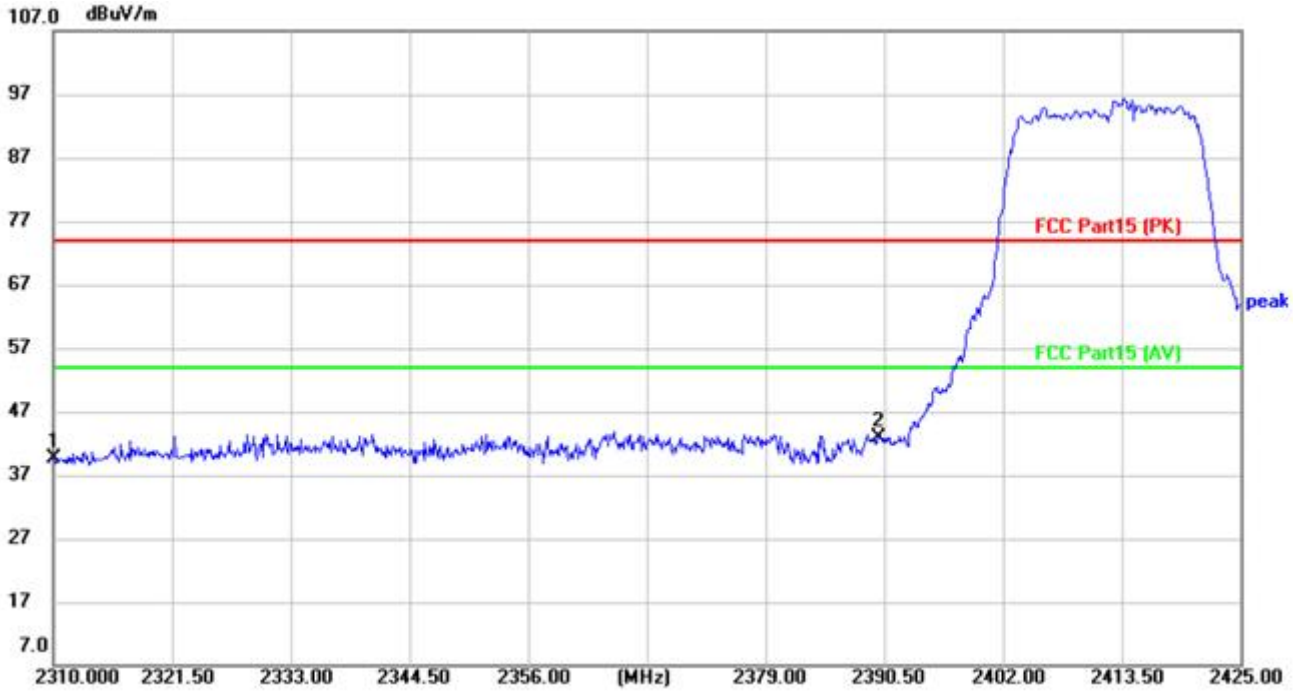
[Test mode: TX 802.11n20 low channel]; [Polarity: Horizontal]



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	42.94	-2.87	40.07	74.00	-33.93	peak
2	*	2390.000	47.83	-2.44	45.39	74.00	-28.61	peak

Test Result: Pass

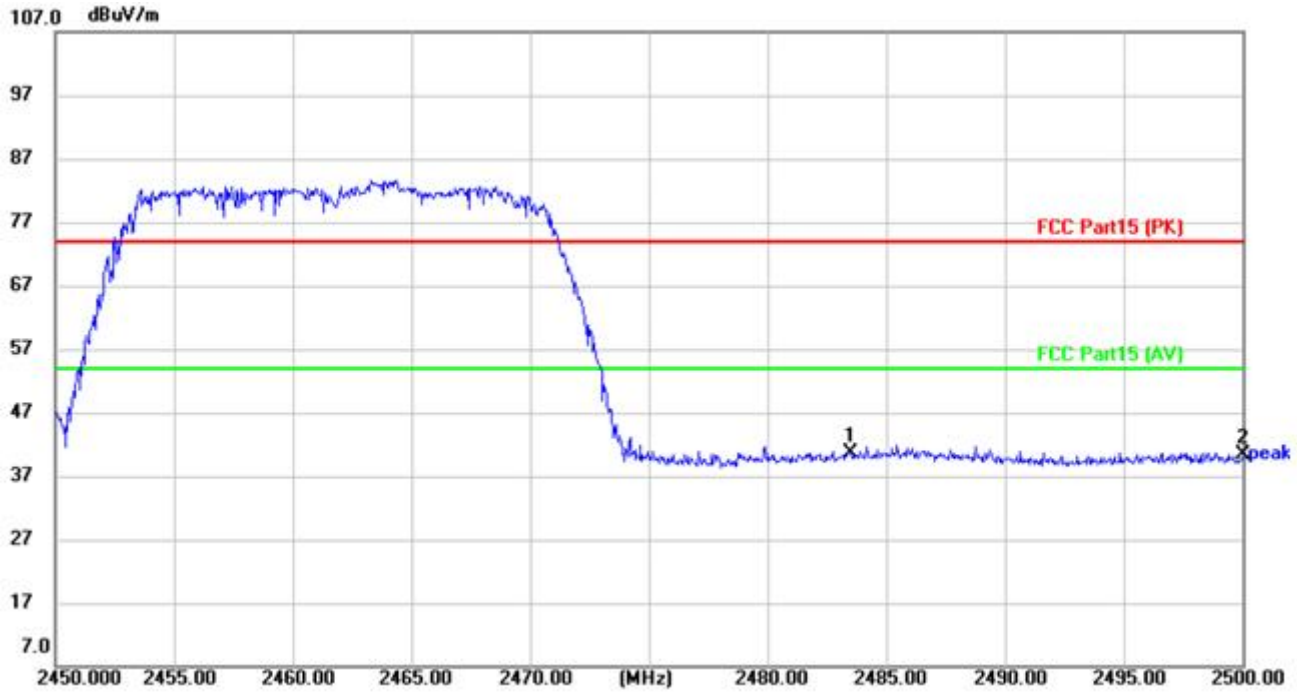
[Test mode:TX 802.11n20 low channel]; [Polarity: Vertical]



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	42.45	-2.87	39.58	74.00	-34.42	peak
2	*	2390.000	45.29	-2.44	42.85	74.00	-31.15	peak

Test Result: Pass

[Test mode: TX 802.11n20 High channel]; [Polarity: Horizontal]



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	2483.500	43.47	-2.91	40.56	74.00	-33.44	peak
2		2500.000	43.29	-3.00	40.29	74.00	-33.71	peak

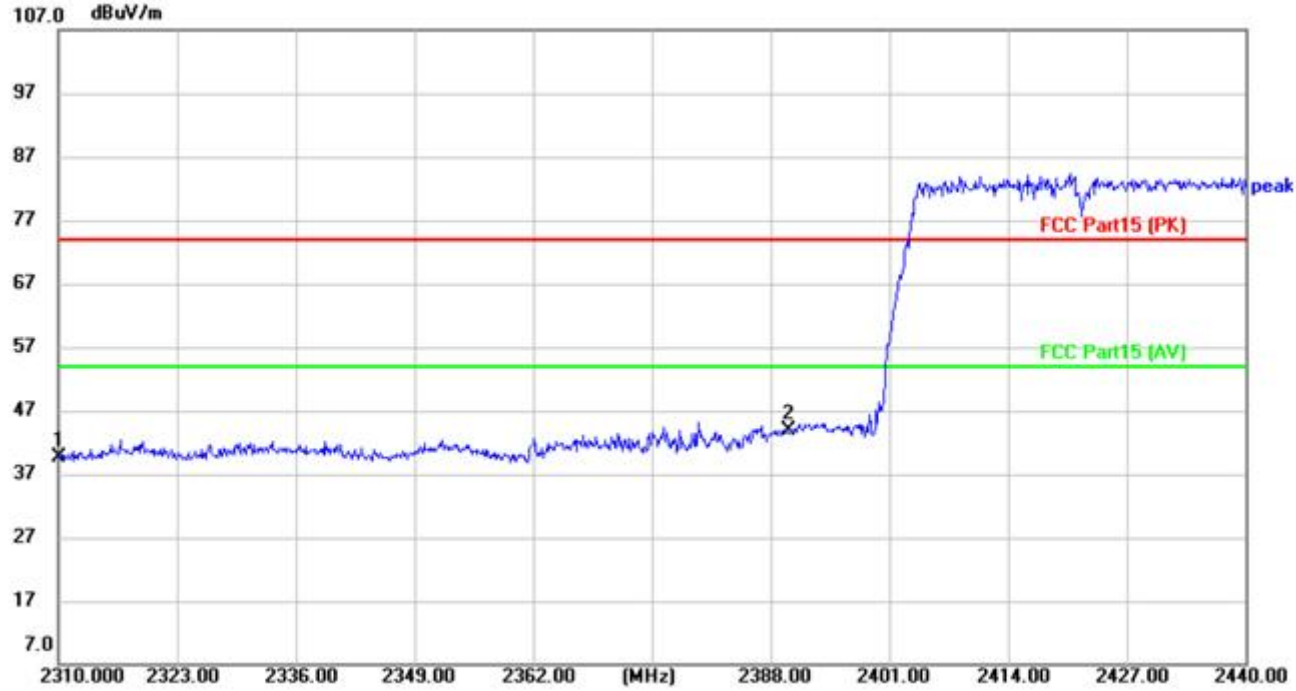
Test Result: Pass

[Test mode:TX 802.11n20 High channel]; [Polarity: Vertical]

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	44.89	-2.91	41.98	74.00	-32.02	peak
2	*	2500.000	46.52	-3.00	43.52	74.00	-30.48	peak

Test Result: Pass

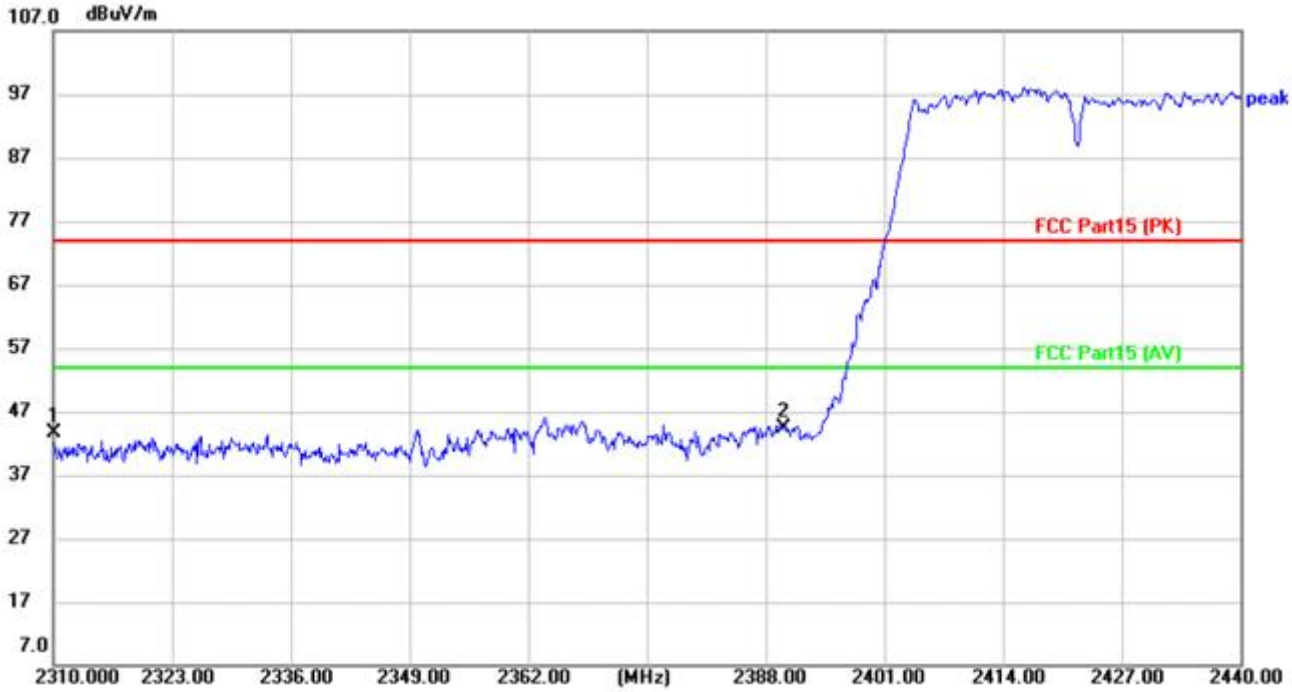
[Test mode: TX 802.11n40 low channel]; [Polarity: Horizontal]



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	42.39	-2.87	39.52	74.00	-34.48	peak
2	*	2390.000	46.34	-2.44	43.90	74.00	-30.10	peak

Test Result: Pass

[Test mode:TX 802.11n40 low channel]; [Polarity: Vertical]



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	46.50	-2.87	43.63	74.00	-30.37	peak
2	*	2390.000	46.85	-2.44	44.41	74.00	-29.59	peak

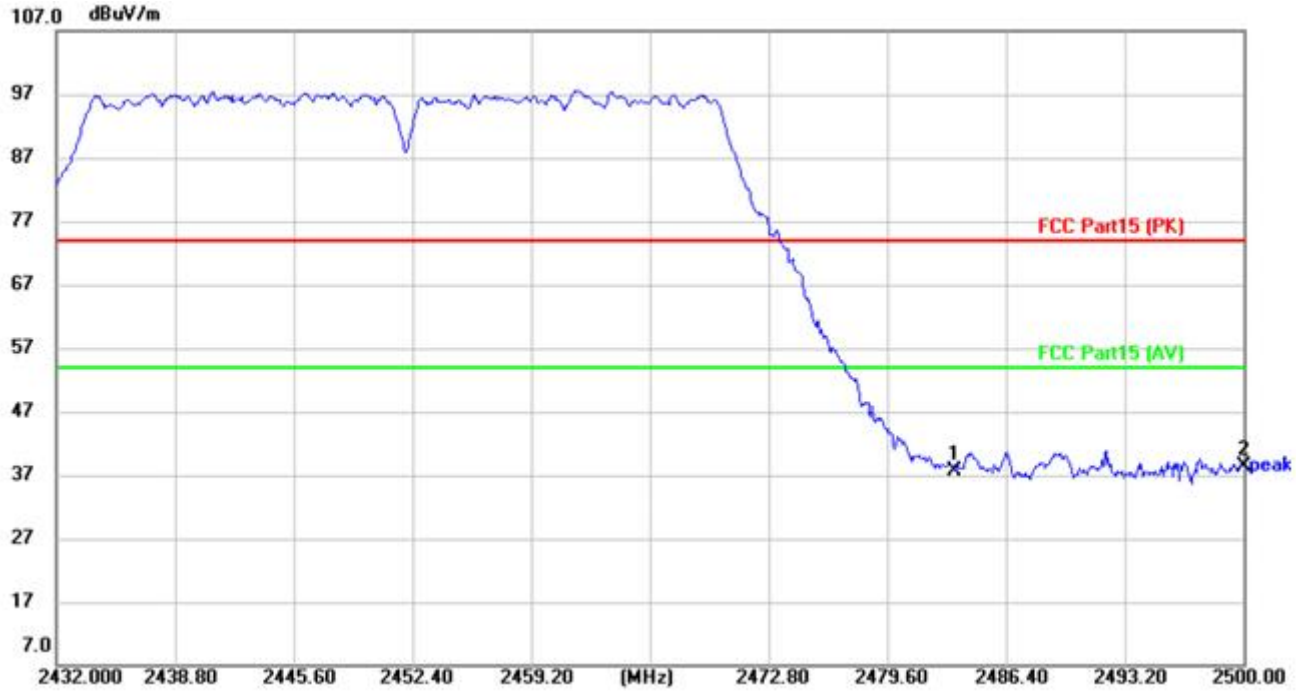
Test Result: Pass

[Test mode: TX 802.11n40 High channel]; [Polarity: Horizontal]

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	2483.500	43.35	-2.91	40.44	74.00	-33.56	peak
2		2500.000	43.35	-3.00	40.35	74.00	-33.65	peak

Test Result: Pass

[Test mode:TX 802.11n40 High channel]; [Polarity: Vertical]



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	40.65	-2.91	37.74	74.00	-36.26	peak
2	*	2500.000	41.49	-3.00	38.49	74.00	-35.51	peak

Test Result: Pass

7 Appendix A

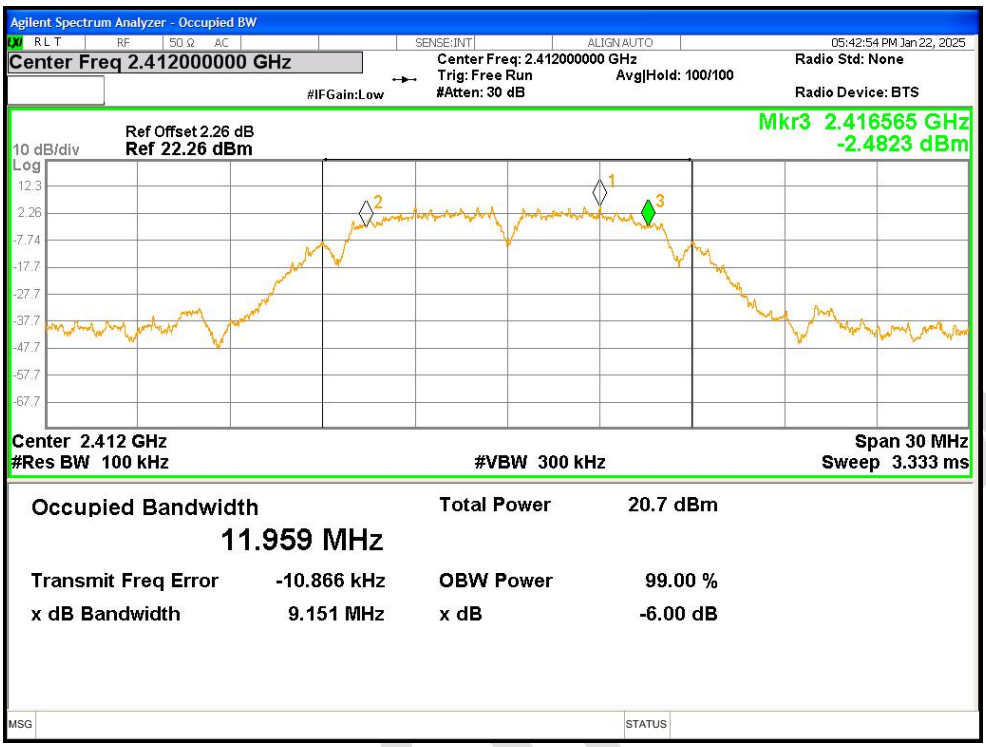
7.1 Maximum Conducted Output Power

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	b	2412	Ant1	**15.824**	30	Pass
NVNT	b	2437	Ant1	15.032	30	Pass
NVNT	b	2462	Ant1	15.167	30	Pass
NVNT	g	2412	Ant1	14.749	30	Pass
NVNT	g	2437	Ant1	14.341	30	Pass
NVNT	g	2462	Ant1	14.792	30	Pass
NVNT	n20	2412	Ant1	14.69	30	Pass
NVNT	n20	2437	Ant1	14.64	30	Pass
NVNT	n20	2462	Ant1	14.596	30	Pass
NVNT	n40	2422	Ant1	13.913	30	Pass
NVNT	n40	2437	Ant1	13.577	30	Pass
NVNT	n40	2452	Ant1	13.508	30	Pass
NVNT	ax20	2412	Ant1	14.271	30	Pass
NVNT	ax20	2437	Ant1	13.859	30	Pass
NVNT	ax20	2462	Ant1	13.805	30	Pass

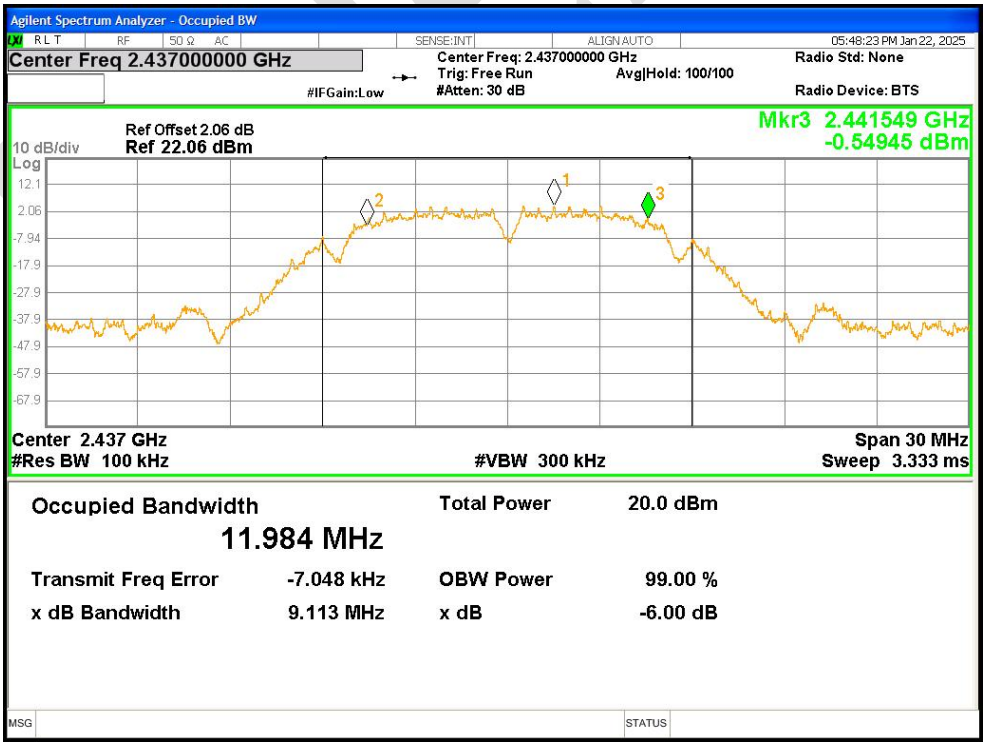
7.2 -6dB Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	b	2412	Ant1	9.151	0.5	Pass
NVNT	b	2437	Ant1	9.113	0.5	Pass
NVNT	b	2462	Ant1	10.026	0.5	Pass
NVNT	g	2412	Ant1	16.521	0.5	Pass
NVNT	g	2437	Ant1	16.36	0.5	Pass
NVNT	g	2462	Ant1	16.365	0.5	Pass
NVNT	n20	2412	Ant1	17.511	0.5	Pass
NVNT	n20	2437	Ant1	17.59	0.5	Pass
NVNT	n20	2462	Ant1	17.583	0.5	Pass
NVNT	n40	2422	Ant1	35.514	0.5	Pass
NVNT	n40	2437	Ant1	35.658	0.5	Pass
NVNT	n40	2452	Ant1	31.971	0.5	Pass
NVNT	ax20	2412	Ant1	18.658	0.5	Pass
NVNT	ax20	2437	Ant1	18.853	0.5	Pass
NVNT	ax20	2462	Ant1	18.933	0.5	Pass

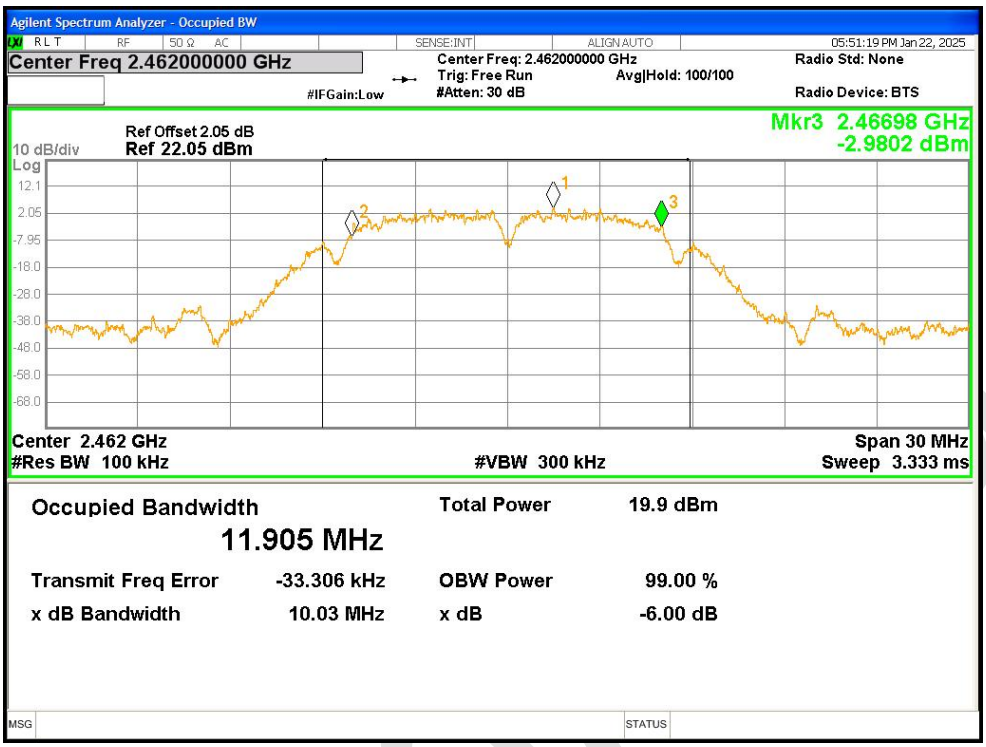
-6dB Bandwidth NVNT b 2412MHz Ant1



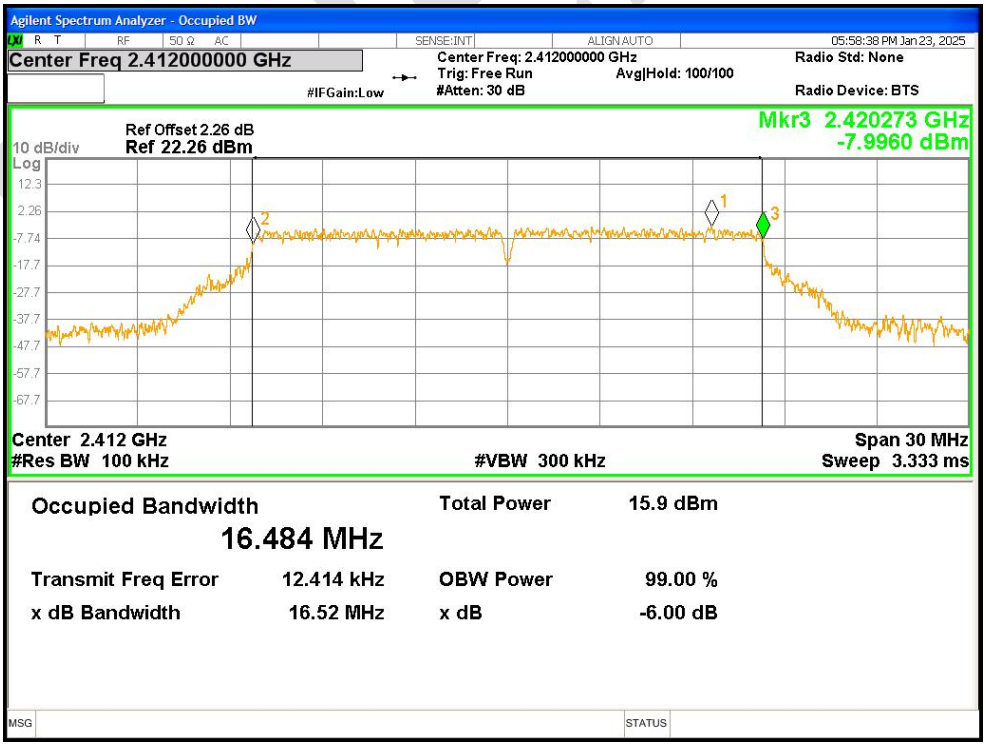
-6dB Bandwidth NVNT b 2437MHz Ant1



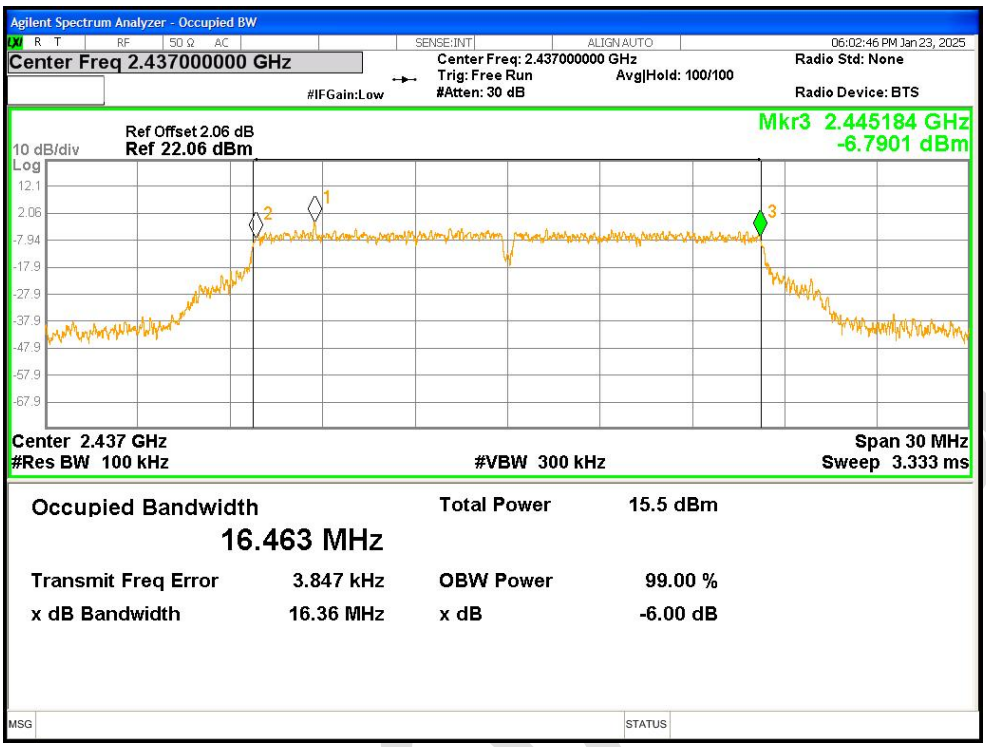
-6dB Bandwidth NVNT b 2462MHz Ant1



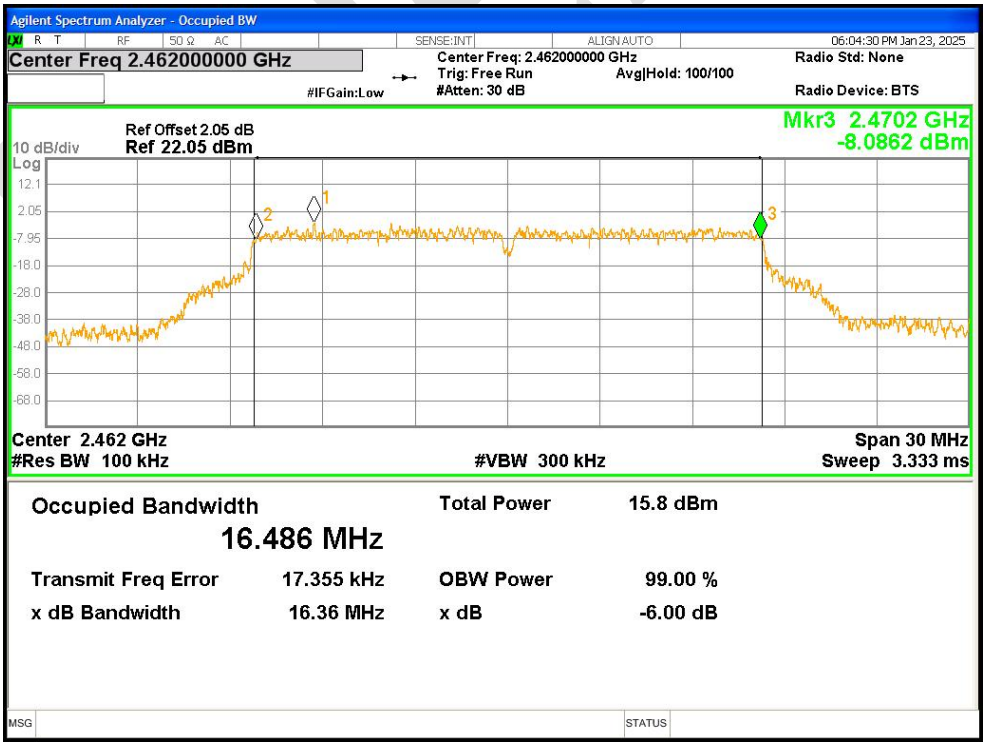
-6dB Bandwidth NVNT g 2412MHz Ant1



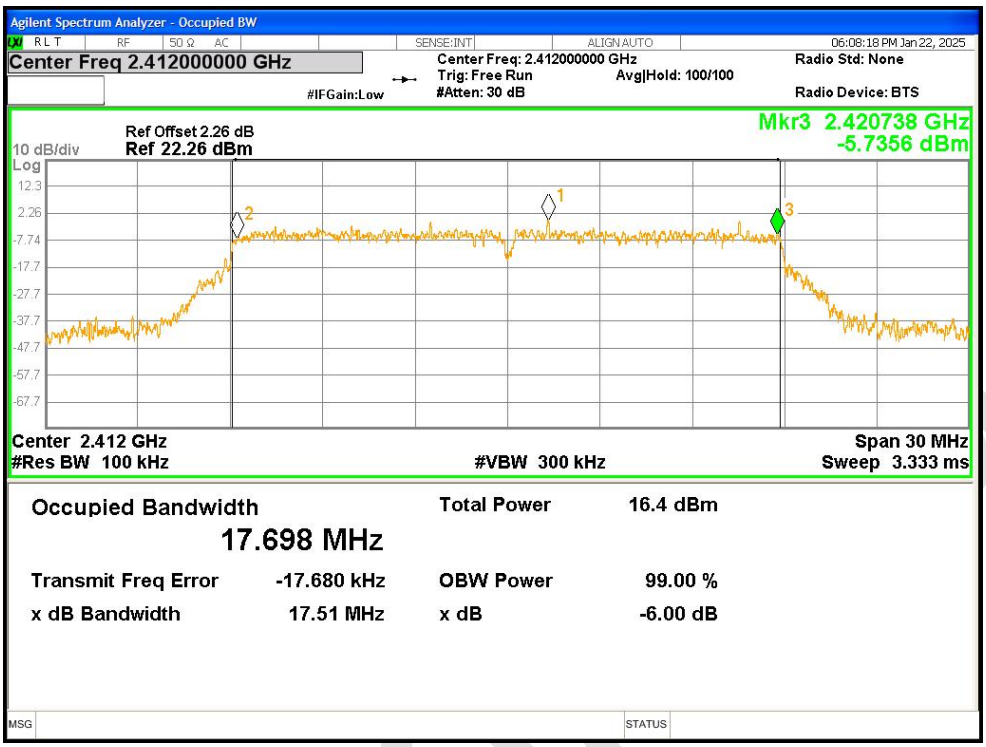
-6dB Bandwidth NVNT g 2437MHz Ant1



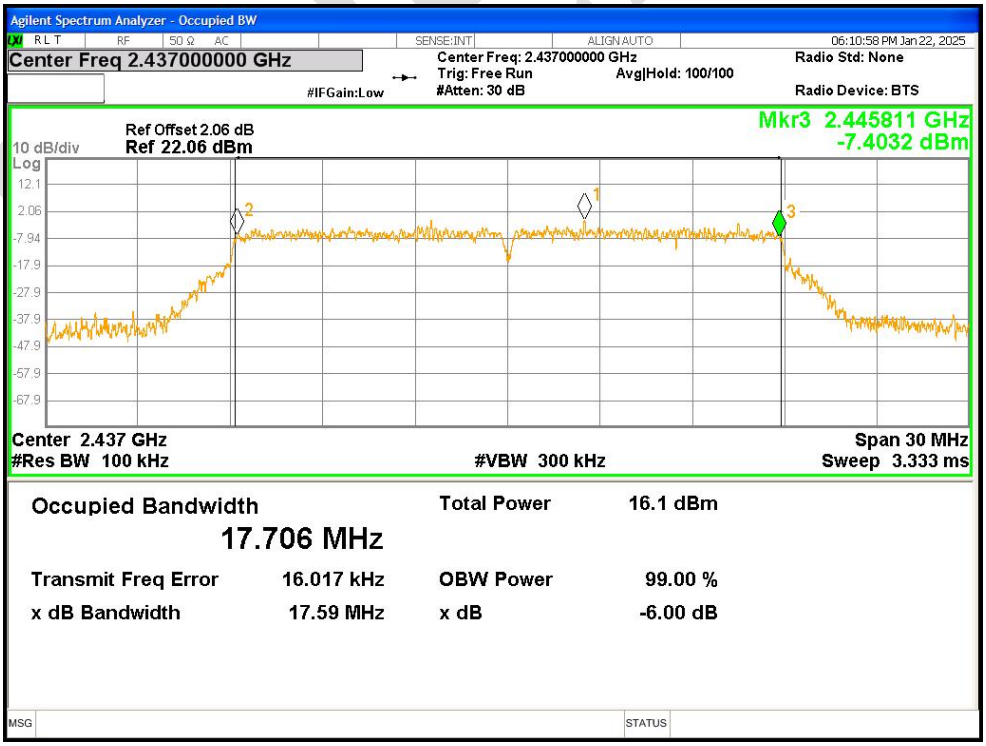
-6dB Bandwidth NVNT g 2462MHz Ant1



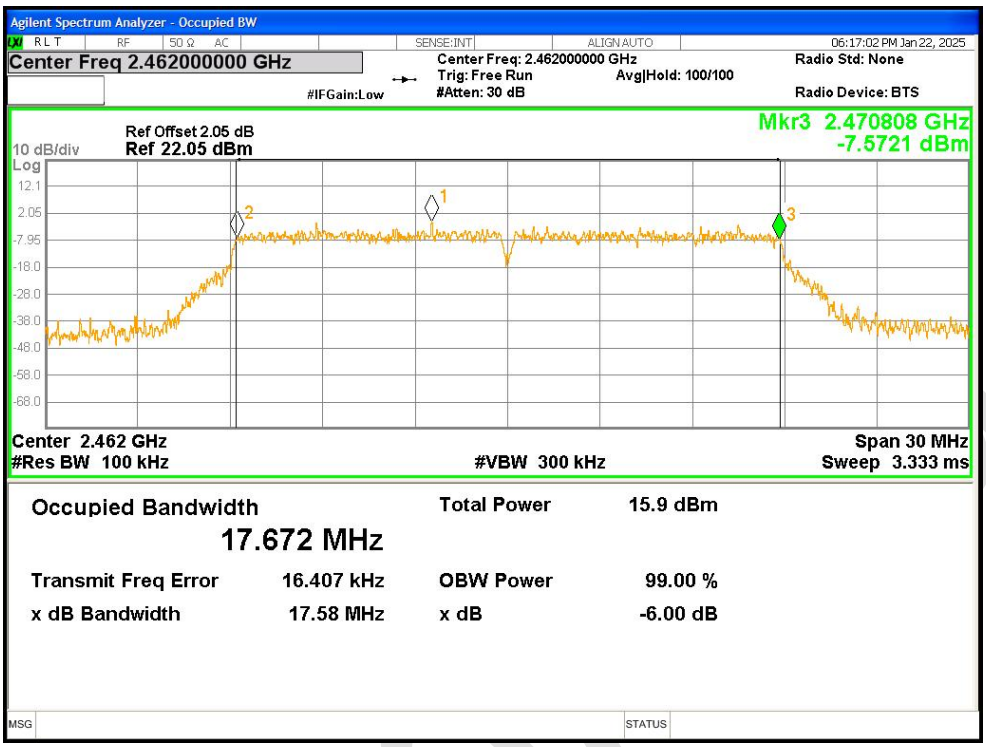
-6dB Bandwidth NVNT n20 2412MHz Ant1



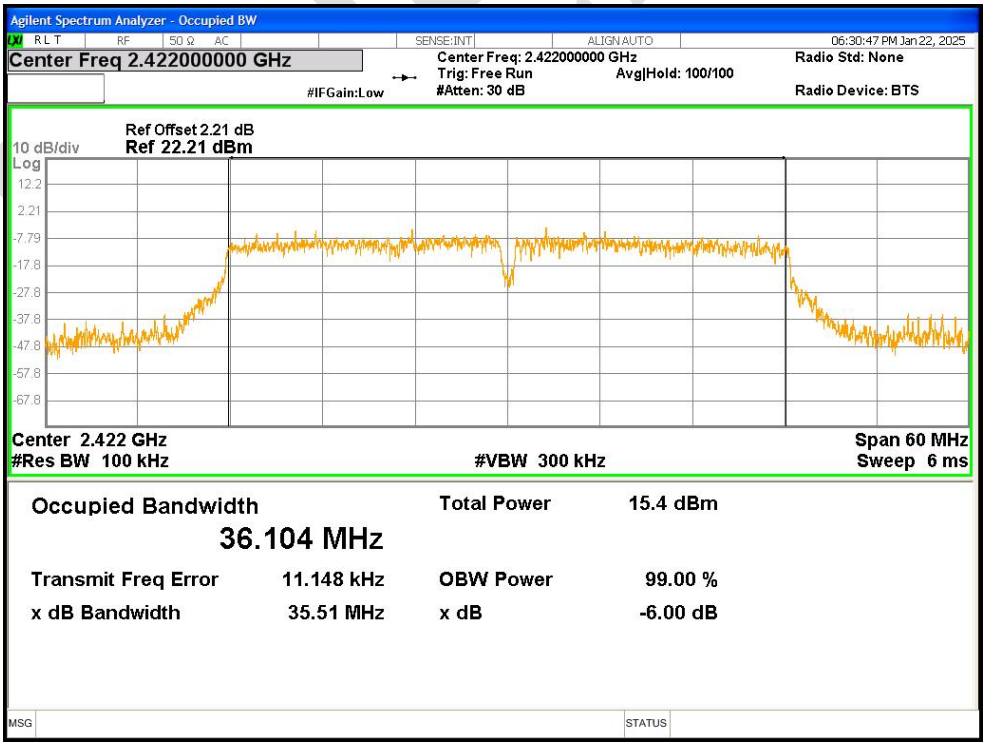
-6dB Bandwidth NVNT n20 2437MHz Ant1



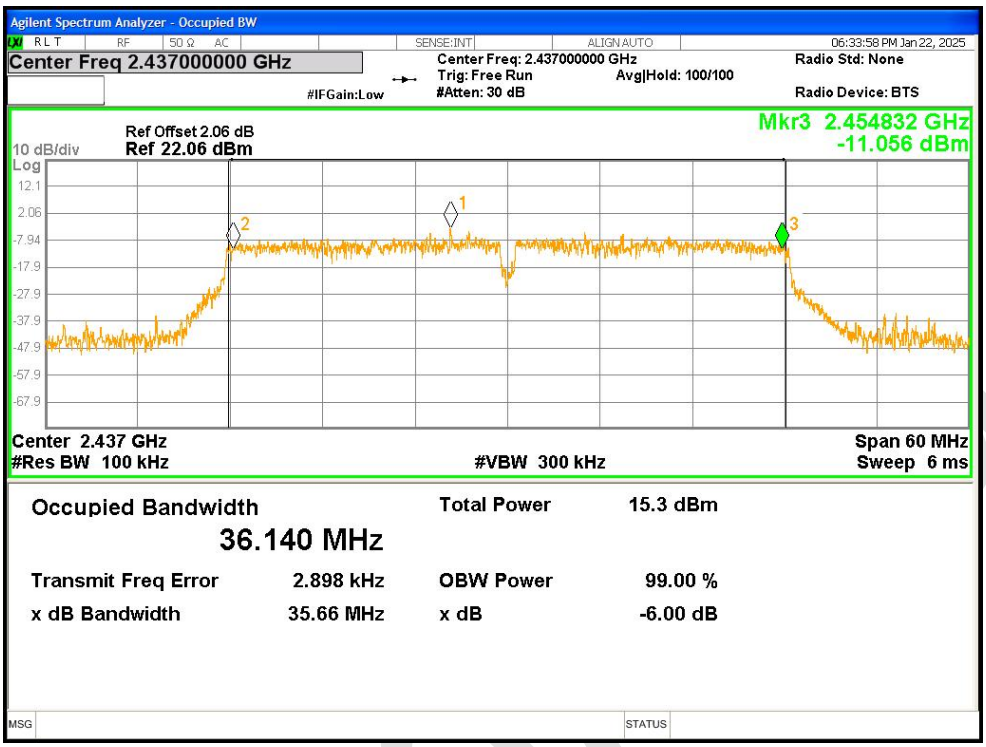
-6dB Bandwidth NVNT n20 2462MHz Ant1



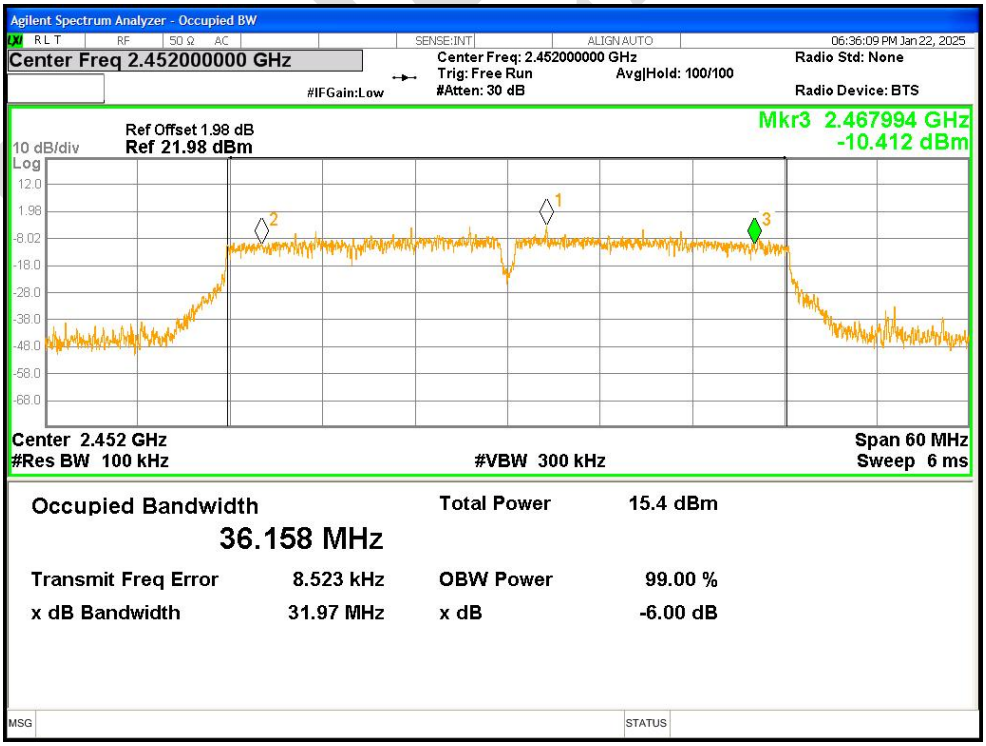
-6dB Bandwidth NVNT n40 2422MHz Ant1



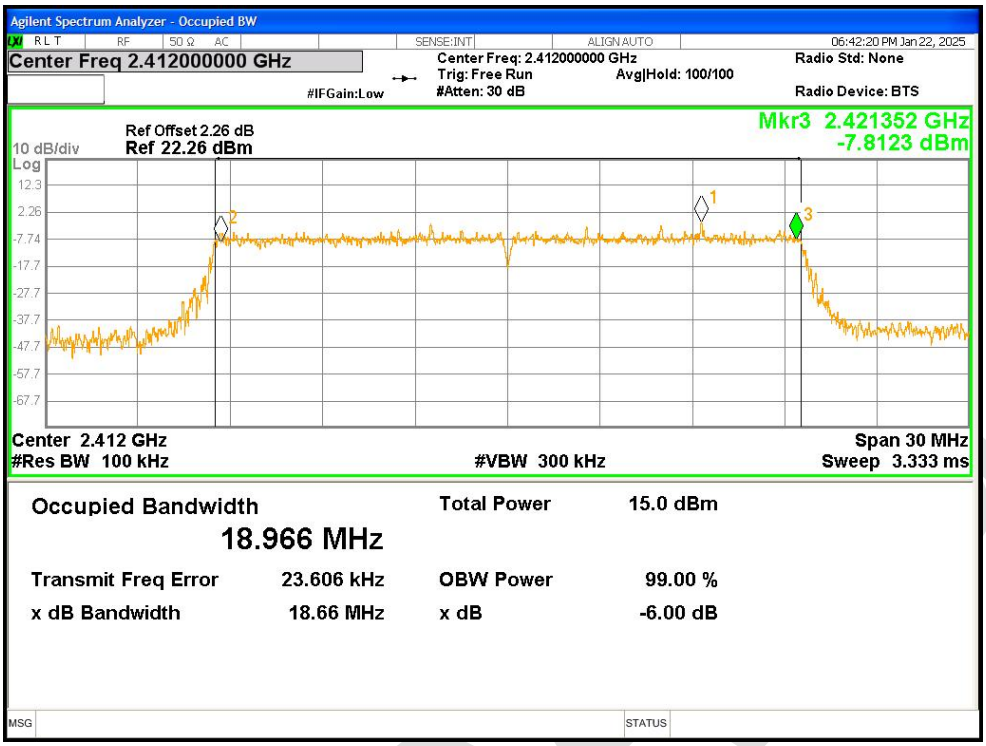
-6dB Bandwidth NVNT n40 2437MHz Ant1



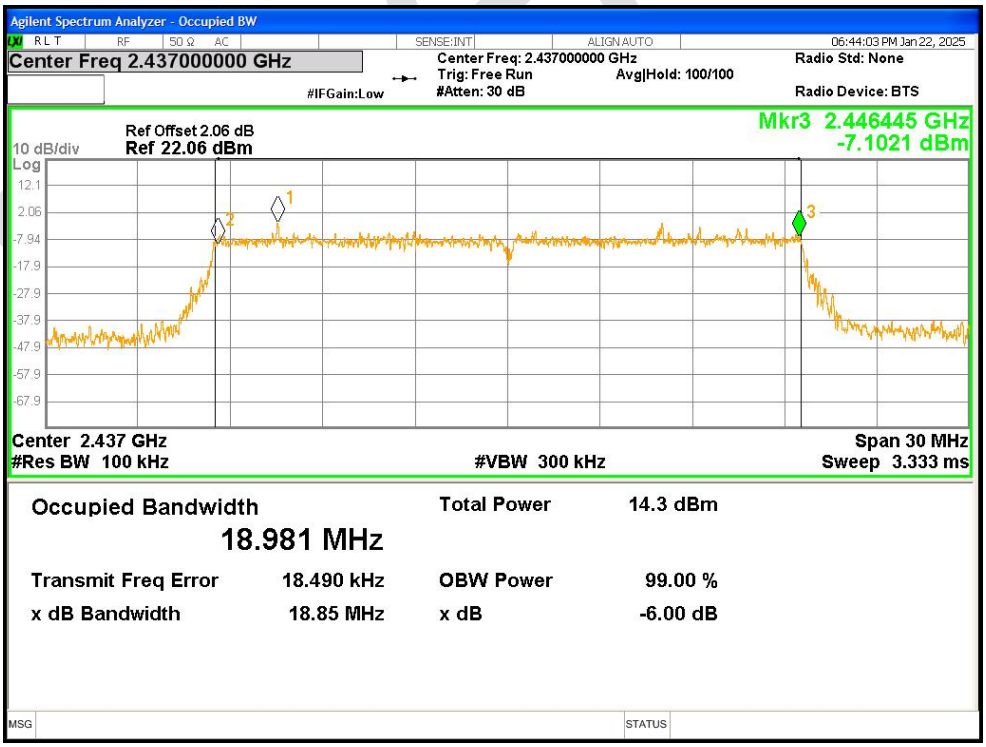
-6dB Bandwidth NVNT n40 2452MHz Ant1



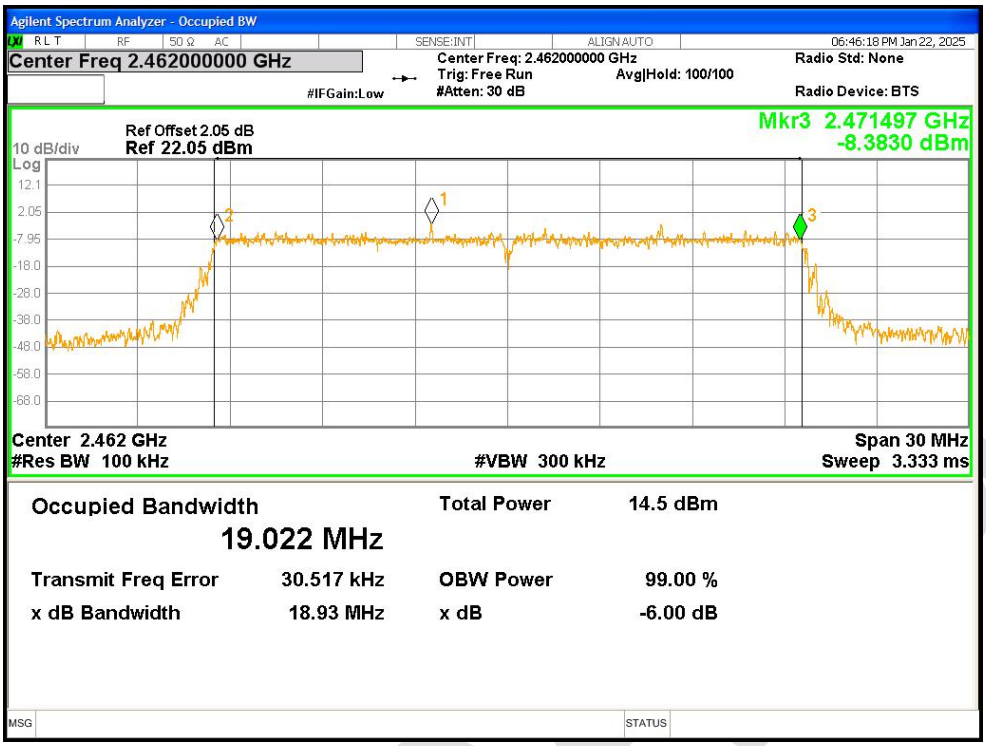
-6dB Bandwidth NVNT ax20 2412MHz Ant1



-6dB Bandwidth NVNT ax20 2437MHz Ant1



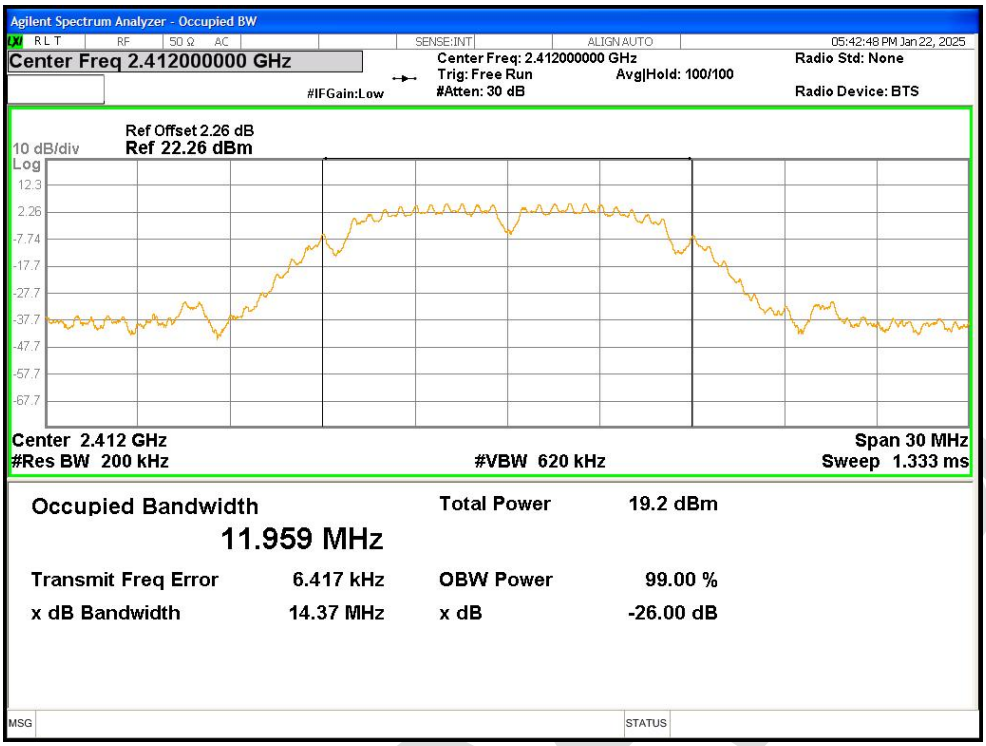
-6dB Bandwidth NVNT ax20 2462MHz Ant1



7.3 Occupied Channel Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	b	2412	Ant1	11.959
NVNT	b	2437	Ant1	11.975
NVNT	b	2462	Ant1	11.965
NVNT	g	2412	Ant1	16.553
NVNT	g	2437	Ant1	16.609
NVNT	g	2462	Ant1	16.564
NVNT	n20	2412	Ant1	17.756
NVNT	n20	2437	Ant1	17.739
NVNT	n20	2462	Ant1	17.793
NVNT	n40	2422	Ant1	36.253
NVNT	n40	2437	Ant1	36.177
NVNT	n40	2452	Ant1	36.166
NVNT	ax20	2412	Ant1	18.995
NVNT	ax20	2437	Ant1	18.966
NVNT	ax20	2462	Ant1	19.033

OBW NVNT b 2412MHz Ant1



OBW NVNT b 2437MHz Ant1