

TEST REPORT

Application No.: HKEM19100001028AT
Applicant: Vtech Telecommunications Ltd
Address of Applicant: 23/F, Tai Ping Industrial Centre, Block 1, 57 Ting Kok Road, Tai Po, Hong Kong
Equipment Under Test (EUT):
EUT Name: 2.4G WiFi Video Baby monitor
Model No.: RM7754HD PU; RM7754-2HD PU; RM7754-aHD PU; RM7854HD PU; RM7854-2HD PU; RM7854-aHD PU; VM816HD PU; VM816-1bHD PU; VM816-abHD PU; RM7764HD PU; RM7764-2HD PU; RM7764-aHD PU; RM7864HD PU; RM7864-2HD PU; RM7864-aHD PU; VM907HD PU; VM907-1bHD PU; VM907-abHD PU ♣



♣ Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.
Standard(s): CFR 47 FCC Part 15, Subpart C, 2019
RSS-247 Issue 2: May 2017
RSS-Gen: Issue 5 Amdt 2019
FCC ID: EW780-1924-01
IC: 1135B-80192401
HVIN: 35-201270PUB
Date of Receipt: 2019-10-25
Date of Test: 2019-10-25 to 2019-11-07
Date of Issue: 2019-11-13
Conclusion: **PASS***

Keny Xu
EMC Laboratory Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2019-11-13		Original

Authorized for issue by:			
Tested by:			
		Vincent Chen /Project Engineer	
Checked by:			
		Eric Fu /Reviewer	



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2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	CFR 47 FCC Part 15, Subpart C 15.247	N/A	CFR 47 FCCPart 15, Subpart C 15.203 & 15.247(c)	Pass
Antenna Requirement	RSS-Gen Issue 5: Amdt 2019	N/A	RSS-Gen Section 6.8	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Disturbance at AC Power Line(150kHz-30MHz)	CFR 47 FCCPart 15, Subpart C 15.207	ANSI C63.10: 2013 Section 6.2	CFR 47 FCCPart 15, Subpart C 15.207	Pass
Conducted Peak Output Power	CFR 47 FCCPart 15, Subpart C 15.247	ANSI C63.10: 2013 Section 11.9.1.2	CFR 47 FCCPart 15, Subpart C 15.247(b)(3)	Pass
Minimum 6dB Bandwidth	CFR 47 FCCPart 15, Subpart C 15.247	ANSI C63.10: 2013 Section 11.8.1	CFR 47 FCCPart 15, Subpart C 15.247a(2)	Pass
Power Spectrum Density	CFR 47 FCCPart 15, Subpart C 15.247	ANSI C63.10: 2013 Section 11.10.2	CFR 47 FCCPart 15, Subpart C 15.247(e)	Pass
Spurious Emissions	CFR 47 FCCPart 15, Subpart C 15.247	ANSI C63.10: 2013 Section 6.10.4, Section 11.11	CFR 47 FCCPart 15, Subpart C 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands	CFR 47 FCCPart 15, Subpart C 15.247 & 15.209	ANSI C63.10: 2013 Section 6.10.5	CFR 47 FCCPart 15, Subpart C 15.209 & 15.247(d)	Pass
Conducted Band Edges Measurement	CFR 47 FCCPart 15, Subpart C 15.247	ANSI C63.10: 2013 Section 11.13.3.2	CFR 47 FCCPart 15, Subpart C 15.247(d)	Pass



Conducted Emissions at AC Power Line (150kHz-30MHz)	RSS-Gen Issue 5: Amdt 2019	ANSI C63.10 (2013) Section 6.2	RSS-Gen Section 8.8	Pass
99% Bandwidth	RSS-Gen Issue 5: Amdt 2019	ANSI C63.10 Section 6.9.3	RSS-Gen Section 6.7	Pass
Minimum 6dB Bandwidth	RSS-247 Issue 2, February 2017	ANSI C63.10 (2013) Section 11.8.1	RSS-247 Section 5.2(a)	Pass
Conducted Peak Output Power	RSS-247 Issue 2, February 2017	ANSI C63.10 (2013) Section 11.9.1	RSS-247 Section 5.4(d)	Pass
Power Spectrum Density	RSS-247 Issue 2, February 2017	ANSI C63.10 (2013) Section 11.10.2	RSS-247 Clause 5.2(b)	Pass
Conducted Band Edges Measurement	RSS-247 Issue 2, February 2017	ANSI C63.10 (2013) Section 11.12	RSS-247 Section 5.5	Pass
Spurious Emissions	RSS-247 Issue 2, February 2017	ANSI C63.10 (2013) Section 11.11	RSS-247 Section 5.5	Pass
Radiated Emissions which fall in the restricted bands	RSS-Gen Issue 5: Amdt 2019	ANSI C63.10 (2013) Section 6.4&6.5&6.6	RSS-247 Section 3.3 & RSS-Gen Section 8.10	Pass

*Note: Frequency stability requested in RSS GEN Section 8.1.1 has been complied since the result of band edge can demonstrate.

Declaration of EUT Family Grouping:

Item no.:

RM7754HD PU; RM7754-2HD PU; RM7754-aHD PU; RM7854HD PU; RM7854-2HD PU; RM7854-aHD PU; VM816HD PU; VM816-1bHD PU; VM816-abHD PU; RM7764HD PU; RM7764-2HD PU; RM7764-aHD PU; RM7864HD PU; RM7864-2HD PU; RM7864-aHD PU; VM907HD PU; VM907-1bHD PU; VM907-abHD PU

a=any alphanumeric character or blank is presenting number of baby unit.

b= any alphanumeric character or blank is presenting color option

According to the confirmation from the applicant, the above models are identical in all electrical aspects in relating to the circuit design, PCB layout, electrical components used, internal wiring and functions. The differences are only the model/item No, color and decorations.

Therefore only the model RM7754HD PU was tested in this report.



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4 General Information

4.1 Details of E.U.T.

Power supply:	AC 120 V, 60 Hz DC 3.7V (“rechargeable” battery x 1)
Adapter	Adaptor 1 model: VT05EUS05100 Input: AC 100 V – 240 V, 50/60 Hz Output: DC 5 V, 1 A Adaptor 2 model: S005CAU0500100 Input: AC 100 V – 240 V, 50/60 Hz Output: DC 5 V, 1 A
Battery	Battery Model 1: Highpower, 605078(model), 3.7V / 2700mAh Battery Model 2: Springpower, 605078(model), 3.7V / 2700mAh
Cable	Adaptor 1 model: VT05EUS05100 Power Cable: 180 cm unshielded 2-wire AC cable Adaptor 2 model: S005CAU0500100 Power Cable: 180 cm unshielded 2-wire AC cable
Funtion	Monitoring
Test Voltage	AC120 V 60 Hz
Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS IEEE for 802.11g : OFDM IEEE for 802.11n(HT20)
Sample Type:	Indoor
Antenna Type:	Dipole
Antenna Gain:	1 dBi
Hardware Version:	V001
Software Version:	V0008
Frequency List	

Channel list for 802.11b/g/n(HT20)

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	5	2432	9	2452
2	2417	6	2437	10	2457
3	2422	7	2442	11	2462



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4	2427	8	2447		
Remark: Test frequencies for 20MHz bandwidth are the lowest channel: 1 channel(2412MHz), middle channel: 6 channel (2437 MHz) and highest channel: 11 channel (2462 MHz).					

4.2 Description of Support Units

The EUT has been tested with corresponding accessories as below:

Supplied by client

Description	Manufacturer	Model No.	SN/Certificate NO
UART Test board	N/A	MX3232	N/A
Test Software	MicroRidge System	Version 3.0.0.108	N/A

Supplied by SGS:

Description	Manufacturer	Model No.	SN/Certificate NO
NoteBook (EMC2)	Dell	P75F	N/A



4.3 Measurement Uncertainty (95% confidence level, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	Duty cycle	$\pm 0.37\%$
3	Occupied Bandwidth	$\pm 3\%$
4	Conduction emission	$\pm 3.0\text{dB}$ (150kHz to 30MHz)
5	RF conducted power	$\pm 0.75\text{dB}$
6	RF power density	$\pm 2.84\text{dB}$
7	Conducted Spurious emissions	$\pm 0.75\text{dB}$
8	RF Radiated power	$\pm 4.5\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (Above 1GHz)
9	Radiated Spurious emission test	$\pm 4.5\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (Above 1GHz)
10	Temperature test	$\pm 1^\circ\text{C}$
11	Humidity test	$\pm 3\%$
12	Supply voltages	$\pm 1.5\%$
13	Time	$\pm 3\%$

Remark:

The Ulab (lab Uncertainty) is less than Ucispr (CISPR Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.



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4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China.
518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

4.5 Test Facility

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

- **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.



4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



5 Equipment List

Conducted Emissions at AC Power Line (150kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2019-06-13	2024-06-12
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2019-07-11	2020-07-10
LISN	Rohde & Schwarz	ENV216	SEM007-01	2018-09-25	2020-09-23
LISN	ETS-LINDGREN	3816/2	SEM007-02	2019-04-01	2020-03-31
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2019-04-01	2020-03-31

RF Conducted Test					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2024-06-12
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2018-09-25	2020-09-23
Spectrum Analyzer	Rohde & Schwarz	FSU43	SEM004-08	2019-04-01	2020-03-31
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-01	2019-07-11	2020-07-10
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-28	2020-09-27
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-25	2020-09-24
Electric and Magnetic Field Analyzer	Narda	NBM-550/EHP-50F	EMC2143	2018-02-07	2020-02-06
Electric Field Probe (100KHz-3GHz)	WANDEL & GOLTERMANN	EMR-20	EMC0907	2019-05-21	2020-05-20
EMF Tester	Narda	ELT-400	SZE039-4	2019-07-08	2020-07-07

Radiated Emissions which fall in the restricted bands					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12



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Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2019-07-11	2020-07-10
EXA Spectrum Analyzer	AgilentTechnologies Inc	N9010A	SEM004-12	2019-04-12	2020-04-11
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Horn Antenna (15GHz-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16
Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23
Pre-amplifier (18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2019-04-01	2020-03-31
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2019-04-01	2020-03-31
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2019-09-24	2020-09-23
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

Radiated Spurious Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2019-07-11	2020-07-10
EXA Spectrum Analyzer	AgilentTechnologies Inc	N9010A	SEM004-12	2019-04-12	2020-04-11
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Horn Antenna (15GHz-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16



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Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23
Pre-amplifier (18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2019-04-01	2020-03-31
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2019-04-01	2020-03-31
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2019-09-24	2020-09-23
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

RE in Chamber					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date	Cal. Due date
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2017-08-05	2020-08-04
MXE EMI Receiver (20Hz-8.4GHz)	Agilent Technologies	N9038A	SEM004-05	2019-09-24	2020-09-23
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2017-06-27	2020-06-26
Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEM005-01	2019-04-01	2020-03-31
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2019-07-11	2020-07-10



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

FCC Part 15 Subpart C Section 15.247 & 15.203

RSS-Gen Section 8.3



6.1.2 Conclusion

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

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level. When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

15.203 requirement:

For intentional device. According to 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.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna uses a unique coupling to the intentional radiator and no consideration of replacement.

The best case gain of the antenna: 1 dBi.

Photo of antenna refer to Appendix – Internal photo.



7 Radio Spectrum Matter Test Results

7.1 Conducted Disturbance at AC Power Line(150kHz-30MHz)

Test Requirement FCC Part 15 Subpart C Section 15.207

RSS-Gen Section 8.8

Test Method: ANSI C63.10 Section 6.2

Limit:

Frequency of emission(MHz)	Conducted limit (dB μ V)	
	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.

7.1.1 E.U.T. Operation

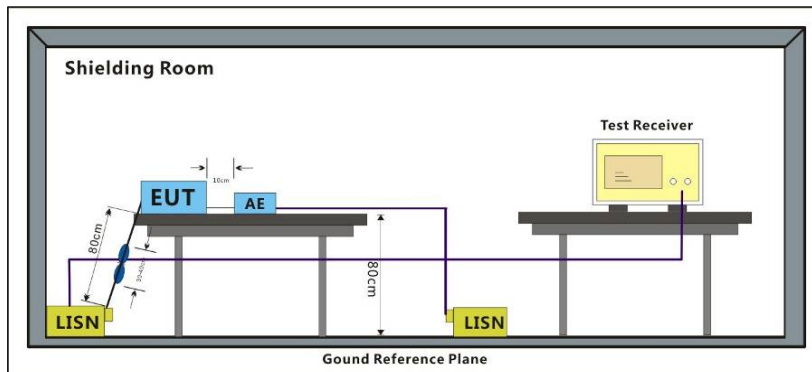
Operating Environment:

Temperature: 25.0 °C Humidity: 55 % RH

Test mode 1:(2.4g wifi)TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).

The worst case for final test: 1:(2.4g wifi)TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).

7.1.2 Test Setup Diagram



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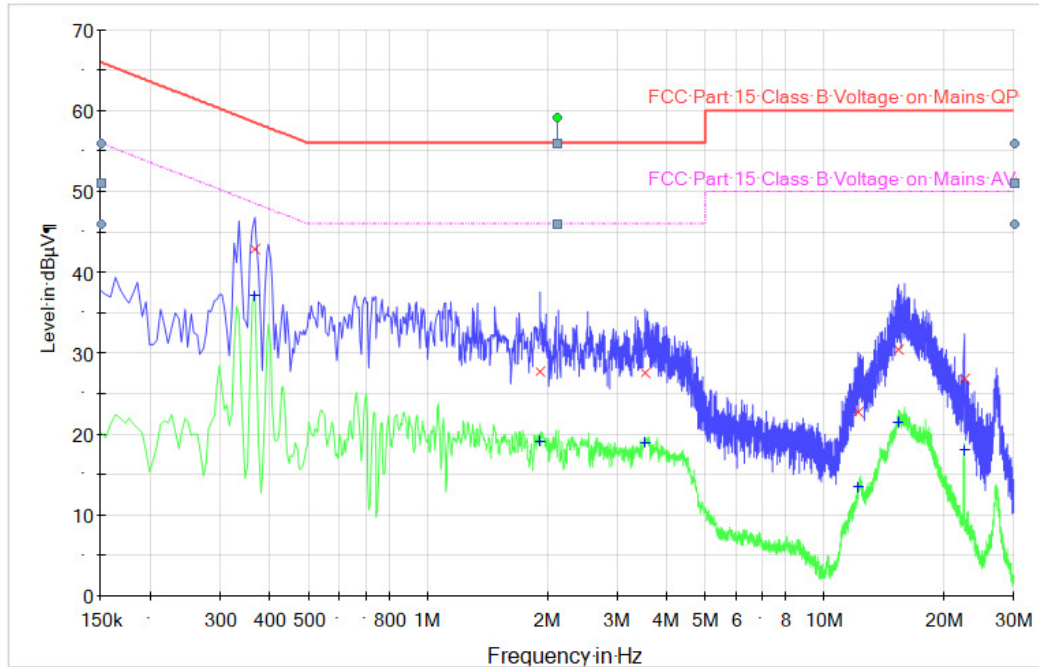
7.1.3 Measurement Data

- 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/50μH + 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.



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Neutral Line
Adaptor 1 VT05EUS05100



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Corr. (dB)	QuasiPeak Limit	QuasiPeak Over Limit	Average Limit	Average Over Limit
0.366000	42.9	37.1	10.2	58.6	-15.7	48.6	-11.5
1.918000	27.7	19.1	10.2	56.0	-28.3	46.0	-26.9
3.547500	27.6	19.0	10.3	56.0	-28.4	46.0	-27.0
12.214500	22.7	13.4	10.5	60.0	-37.3	50.0	-36.6
15.346500	30.4	21.5	10.6	60.0	-29.6	50.0	-28.5
22.501500	26.8	18.0	10.5	60.0	-33.2	50.0	-32.0

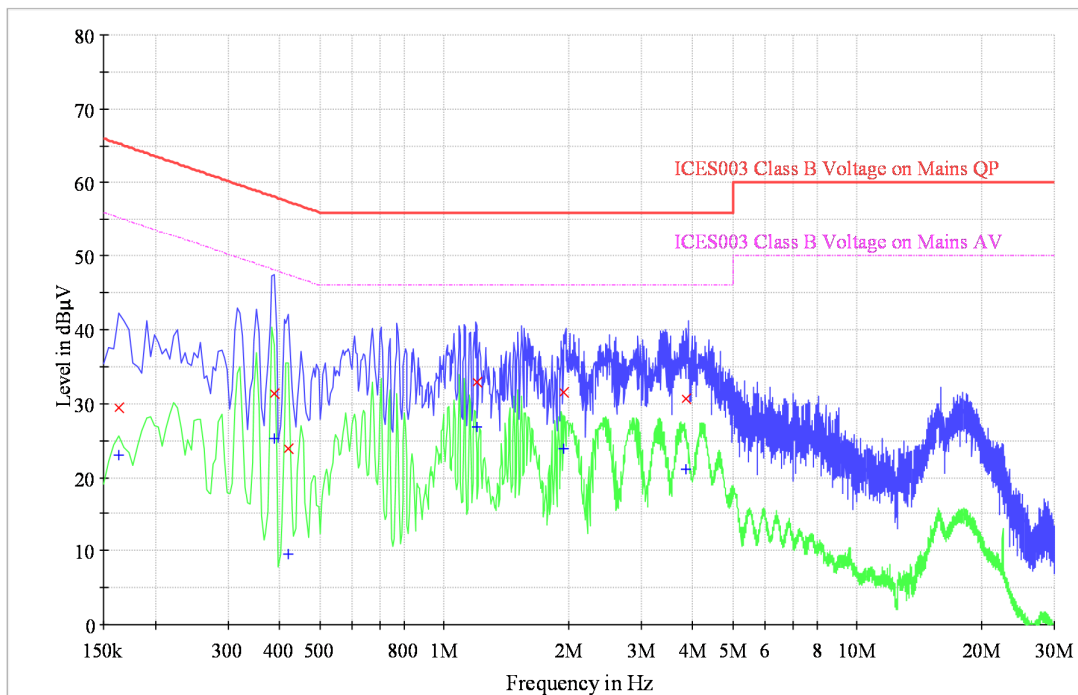
Remark:

1. Emission below limit 20dB is not shown on the graph.
2. Only worst case data is shown for each unit.



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Adaptor 2 S005CAU0500100



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Corr. (dB)	QuasiPeak Limit	QuasiPeak Over Limit	Average Limit	Average Over Limit
0.388500	31.3	25.2	9.9	58.1	-26.8	48.7	-23.5
0.420000	23.8	9.5	9.9	56.0	-32.2	46.0	-36.5
3.862000	30.7	21.2	10.0	56.0	-25.3	56.0	-34.8
1.198500	32.8	26.8	10.0	56.0	-23.2	56.0	-29.2
1.950000	31.5	24.0	10.0	56.0	-24.5	56.0	-32.0
0.163500	29.4	23.0	9.9	56.0	-26.6	46.0	-23.0

Remark:

1. Emission below limit 20dB is not shown on the graph.
2. Only worst case data is shown for each unit.



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7.2 Conducted RF Output Power

Test Requirement FCC Part 15 Subpart C Section 15.247(b)(3)
 RSS-247 Section 5.4(d)

Test Method: ANSI C63.10 Section 11.9.1

Limit:

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



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7.2.1 E.U.T. Operation

Operating Environment:

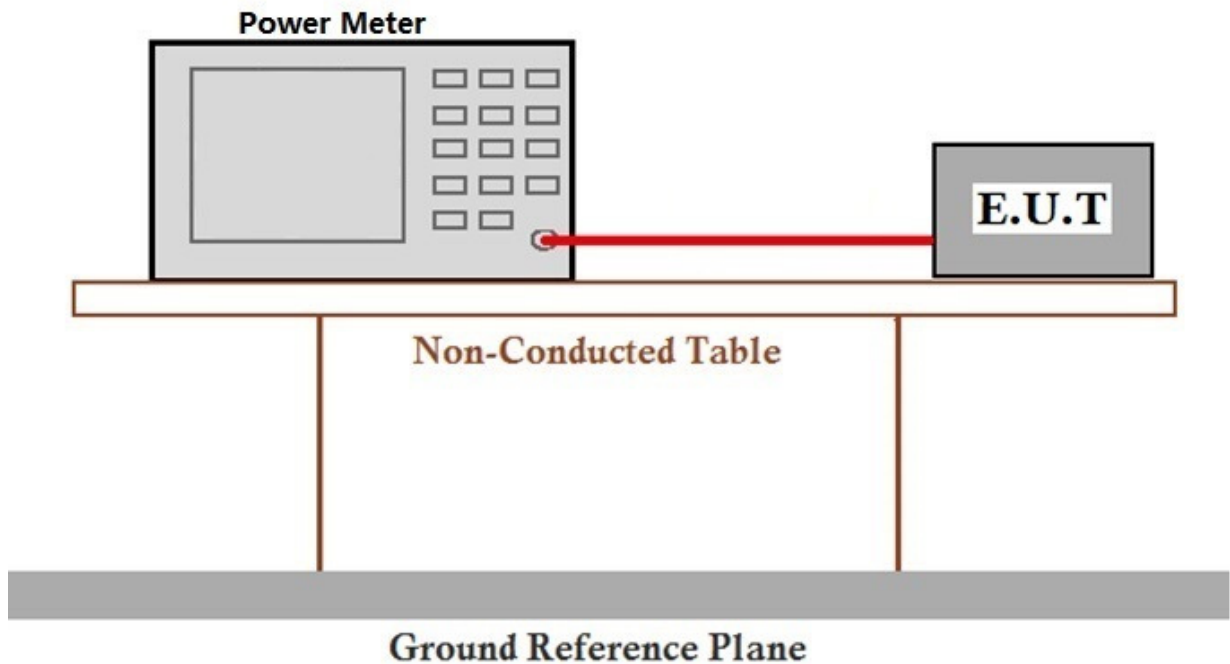
Temperature: 25.0 °C Humidity: 56 % RH

Test mode 1:(2.4g wifi)TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).

The worst case for final test: 1:(2.4g wifi)TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).

Through Pre-scan, find the worst case is 802.11b, 802.11g and 802.11n at MCS0, MCS0, MCS0 respectively.

7.2.2 Test Setup Diagram



7.2.3 Measurement Data

The detailed test data see: section 9 Appendix



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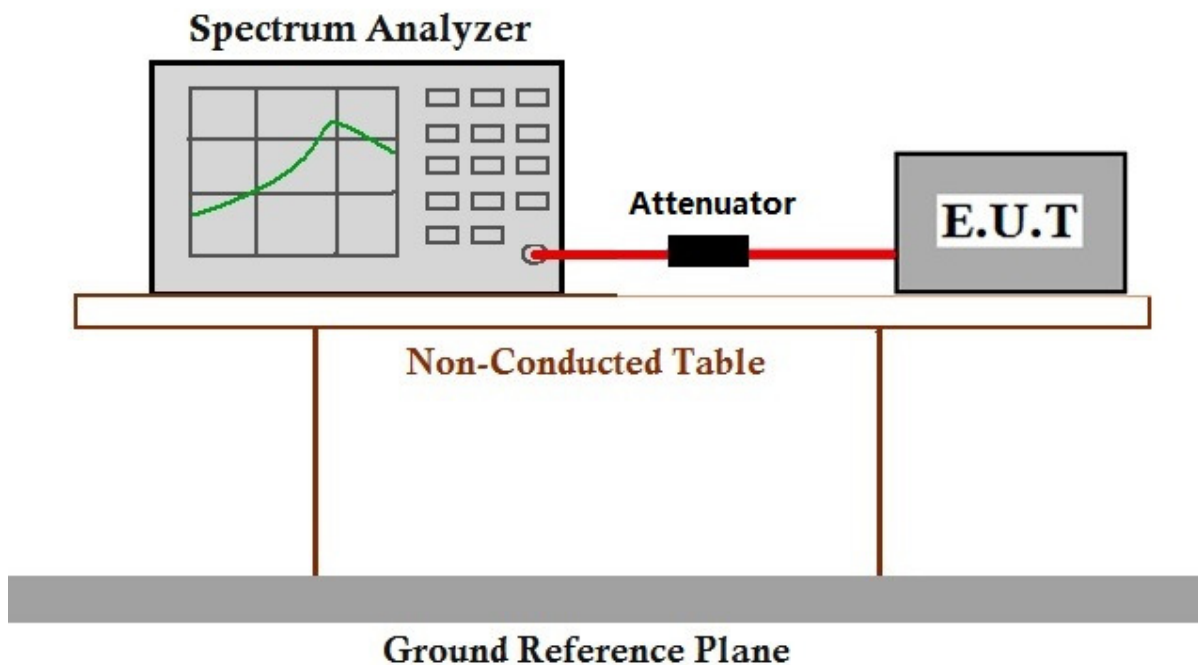
7.3 Minimum 6dB Bandwidth

Test Requirement FCC Part 15 Subpart C Section 15.247a(2)
 RSS-247 Section 5.2(a)
 Test Method: ANSI C63.10 Section 11.8.1
 Limit: ≥500 kHz

7.3.1 E.U.T. Operation

Operating Environment:
 Temperature: 25.0 °C Humidity: 56 % RH
 Test mode 1:(2.4g wifi)TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).
 The worst case for final test: 1:(2.4g wifi)TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).
 Through Pre-scan, find the worst case is 802.11b, 802.11g and 802.11n at MCS0, MCS0, MCS0 respectively.

7.3.2 Test Setup Diagram



7.3.3 Measurement Data

The detailed test data see: section 9 Appendix



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7.4 Power Spectrum Density

Test Requirement FCC Part 15, Subpart C Section 15.247(e)
 RSS-247 Clause 5.2(b)

Test Method: ANSI C63.10 Section 11.10.2

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

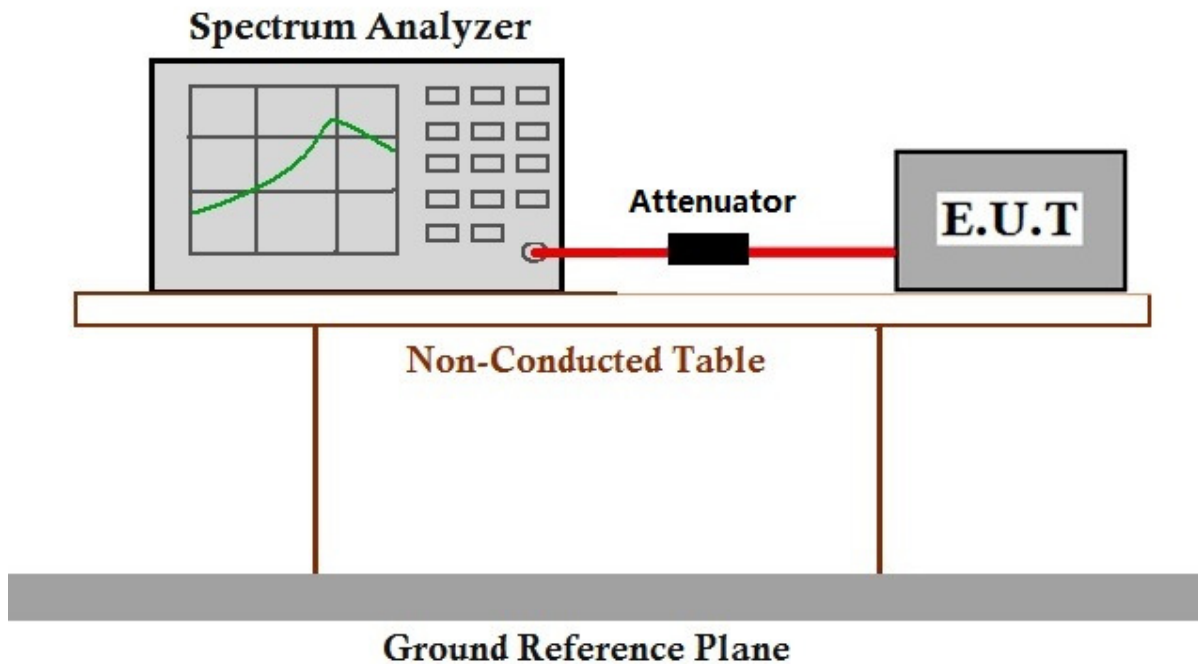
7.4.1 E.U.T. Operation

Operating Environment:
 Temperature: 25.0 °C Humidity: 56 % RH

Test mode 1:(2.4g wifi)TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).

The worst case for final test: 1:(2.4g wifi)TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).
 Through Pre-scan, find the worst case is 802.11b, 802.11g and 802.11n at MCS0, MCS0, MCS0 respectively.

7.4.2 Test Setup Diagram



7.4.3 Measurement Data

The detailed test data see: section 9 Appendix



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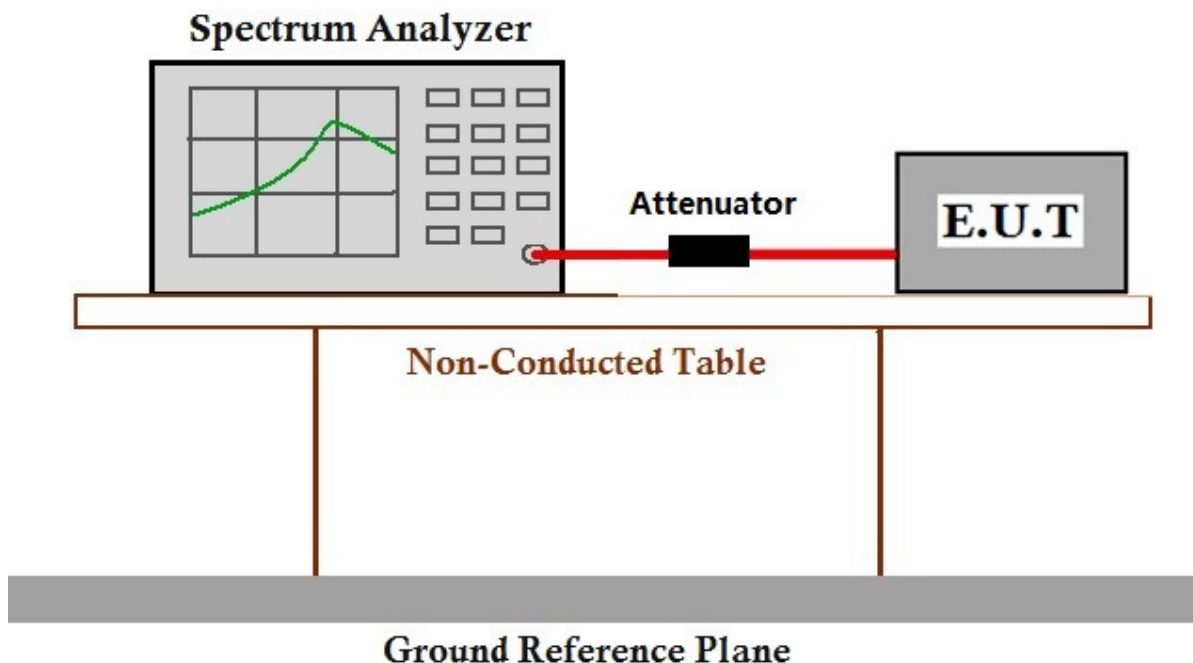
7.5 Spurious Emissions

Test Requirement	FCC Part 15, Subpart C Section 15.247(d) RSS-247 Section 5.5
Test Method:	ANSI C63.10 Section 11.11
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.

7.5.1 E.U.T. Operation

Operating Environment:	
Temperature:	25.0 °C Humidity: 56 % RH
Test mode	1:(2.4g wifi)TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).
The worst case for final test:	1:(2.4g wifi)TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).
Through Pre-scan, find the worst case is 802.11b, 802.11g and 802.11n at MCS0, MCS0, MCS0 respectively.	

7.5.2 Test Setup Diagram



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7.5.3 Measurement Data

The detailed test data see: section 9 Appendix



7.6 Conducted Band Edges Measurement

Test Requirement FCC Part 15, Subpart C Section 15.247(d)
RSS-247 Section 5.5

Test Method: ANSI C63.10 Section 11.13.3.2

7.6.1 E.U.T. Operation

Operating Environment:

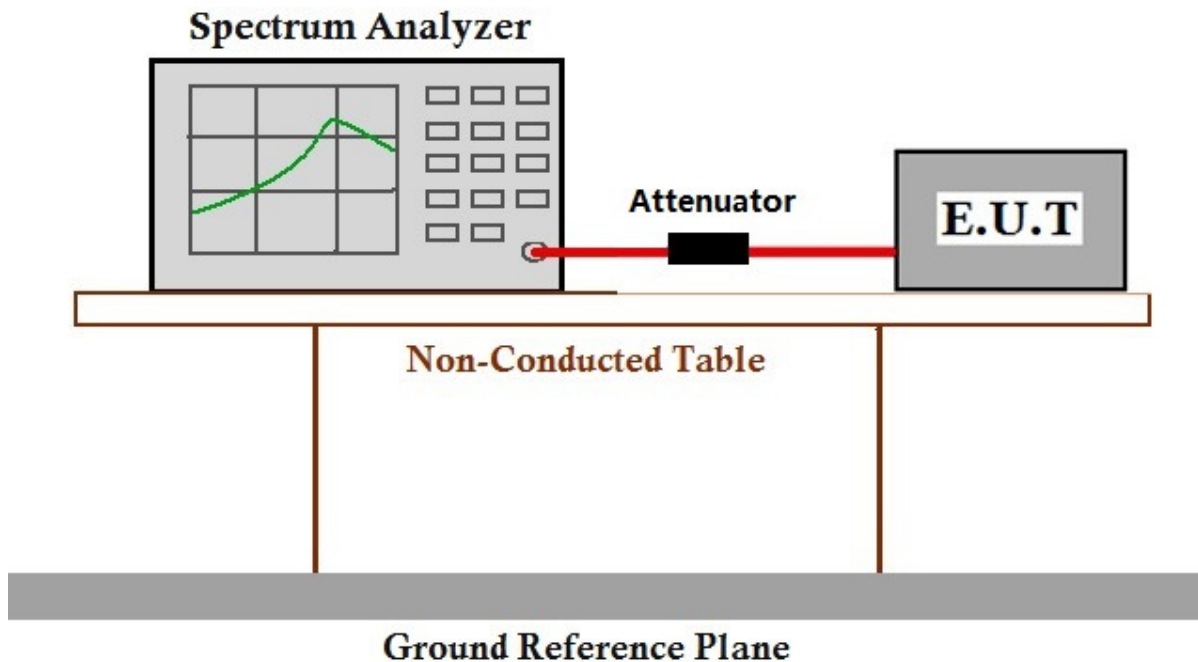
Temperature: 25.0 °C Humidity: 56 % RH

Test mode 1:(2.4g wifi)TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).

The worst case for final test: 1:(2.4g wifi)TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).

Through Pre-scan, find the worst case is 802.11b, 802.11g and 802.11n at MCS0, MCS0, MCS0 respectively.

7.6.2 Test Setup Diagram



7.6.3 Measurement Data

The detailed test data see: section 9 Appendix



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7.7 Radiated Emissions which fall in the restricted bands

Test Requirement FCC Part 15, Subpart C Section 15.209 & 15.247(d)
 Section 3.3 & RSS-Gen Section 8.9

Test Method: ANSI C63.10 Section 6.10.4
 ANSI C63.10 Section 6.4&6.5&6.6

Measurement Distance: 3m

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.



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7.7.1 E.U.T. Operation

Operating Environment:

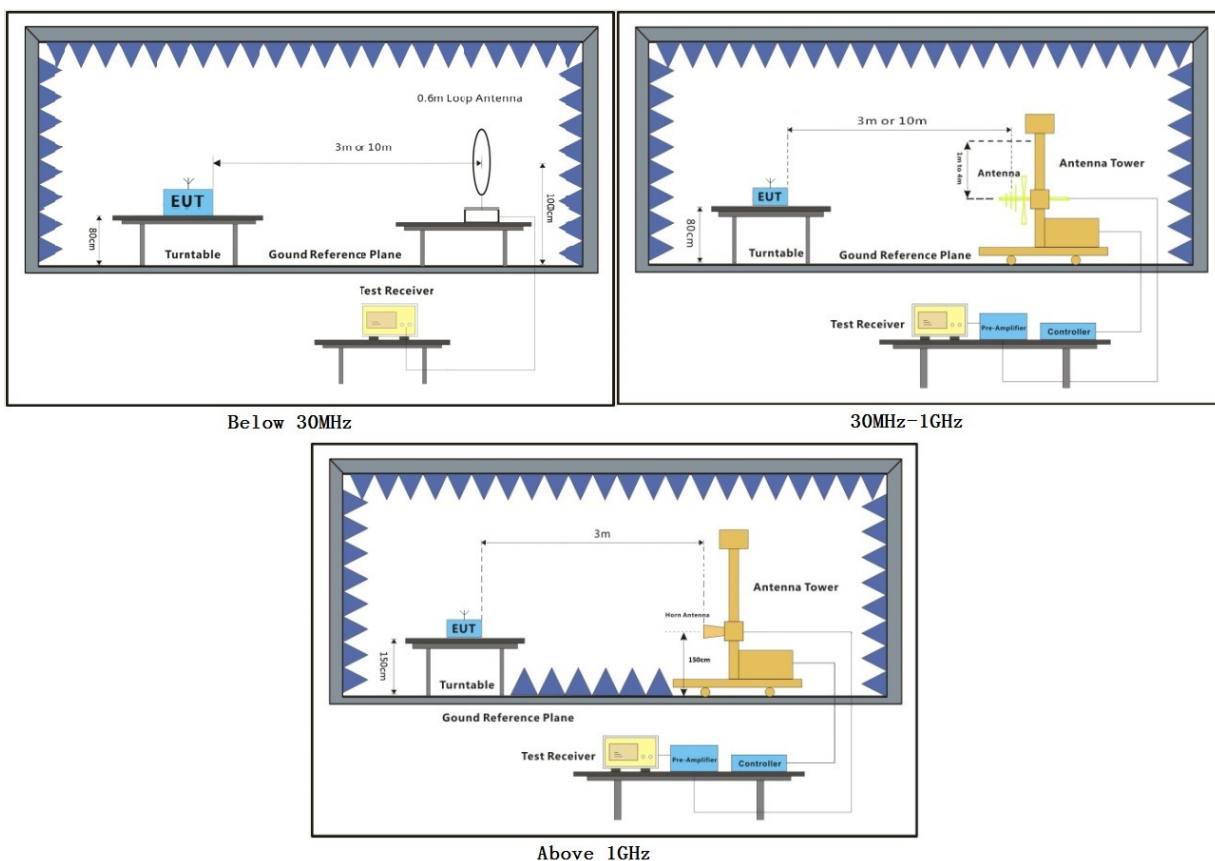
Temperature: 23.0 °C Humidity: 52 % RH Atmospheric Pressure: 1015 mbar

Test mode 1:(2.4g wifi)TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).

The worst case for final test: 1:(2.4g wifi)TX_Keep the EUT transmitted the continuous modulation test signal at the specific channel(s).

Through Pre-scan, find the worst case is 802.11b, 802.11g and 802.11n at MCS0, MCS0, MCS0 respectively.

7.7.2 Test Setup Diagram



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- 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 Y axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

7.7.3 Measurement Data

The detailed test data see: section 9 Appendix



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8 Photographs

8.1 EUT Constructional Details

Refer to appendix: Internal Photo and External Photo.

8.2 Test Setup Photos

Refer to appendix: Setup Photo.



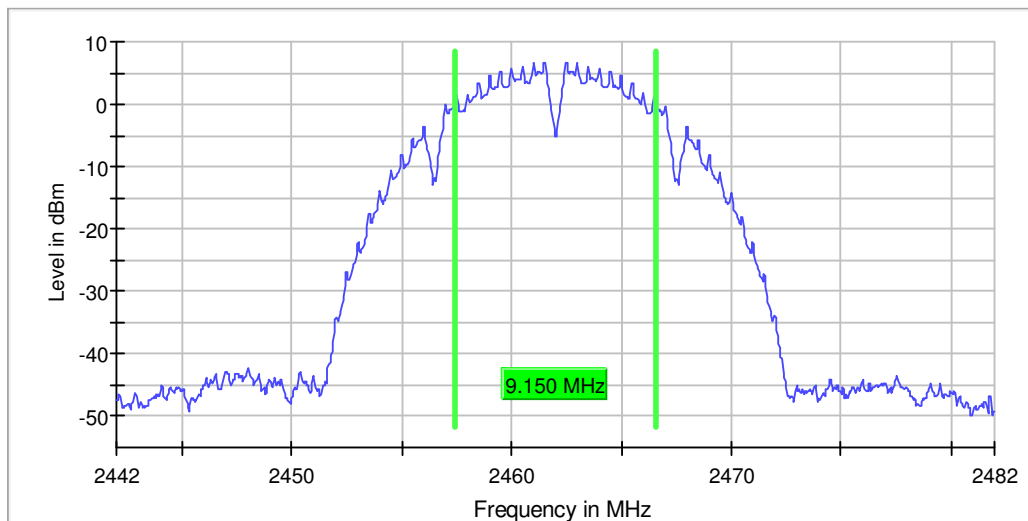
9 Appendix

9.1 Minimum Emission Bandwidth 6 dB

Operation Mode	DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Result
802.11b	2412.000000	9.150000	0.500000	PASS
802.11b	2437.000000	9.150000	0.500000	PASS
802.11b	2462.000000	9.150000	0.500000	PASS
802.11g	2412.000000	16.650000	0.500000	PASS
802.11g	2437.000000	16.650000	0.500000	PASS
802.11g	2462.000000	16.650000	0.500000	PASS
802.11n20	2412.000000	17.850000	0.500000	PASS
802.11n20	2437.000000	17.850000	0.500000	PASS
802.11n20	2462.000000	17.850000	0.500000	PASS

Test Plot: (only worse case plot was shown as below)

802.11b:

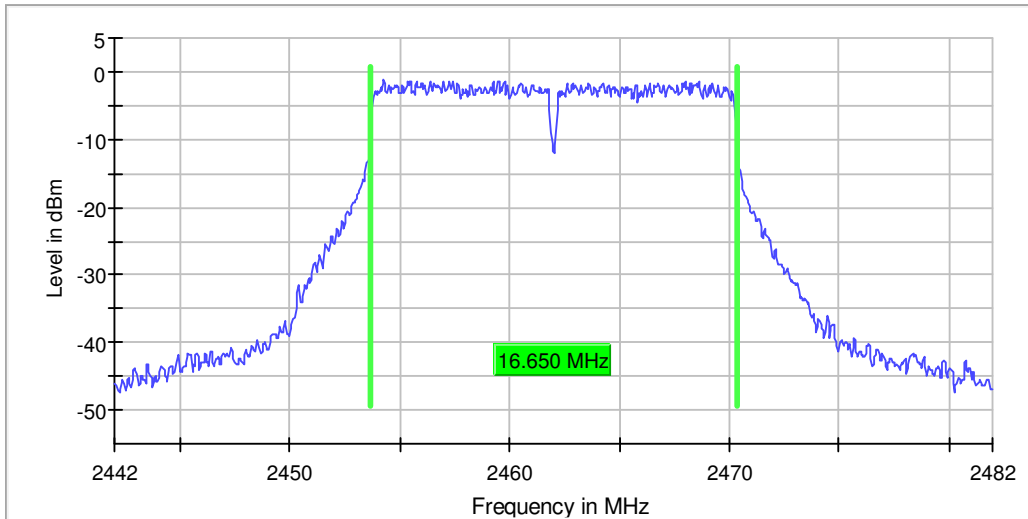


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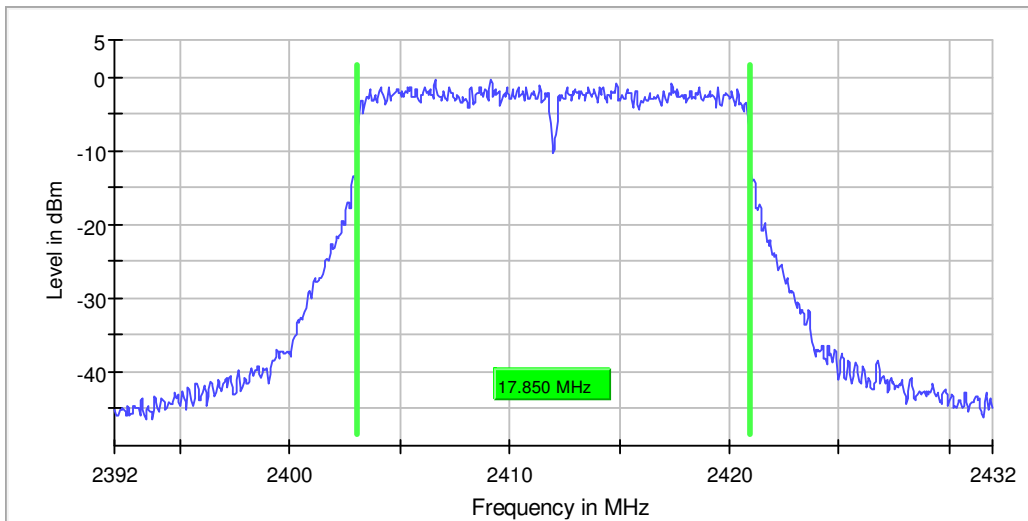
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802.11g:



802.11n20:



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Measurement Setting:

Setting	Instrument Value	Target Value
Span	40.000 MHz	40.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	800	~ 800
SweepTime	94.922 μ s	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	11 / max. 150	max. 150
Stable	5 / 5	5
Max Stable Difference	0.00 dB	0.50 dB



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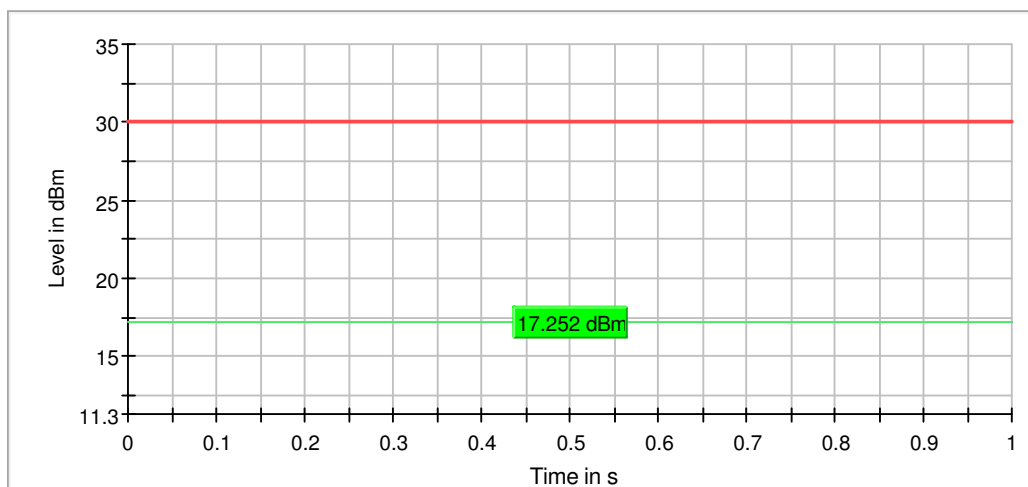
9.2 RF output power

Operation Mode	DUT Frequency (MHz)	Measured Conducted Power (dBm)	e.i.r.p (dBm)	Limit Conducted Power (dBm)	Limit Max e.i.r.p (dBm)	Result
802.11b	2412.000000	17.3	18.3	30.0	36.0	PASS
802.11b	2437.000000	16.6	17.6	30.0	36.0	PASS
802.11b	2462.000000	16.9	17.9	30.0	36.0	PASS
802.11g	2412.000000	15.9	16.9	30.0	36.0	PASS
802.11g	2437.000000	14.3	15.3	30.0	36.0	PASS
802.11g	2472.000000	14.7	15.7	30.0	36.0	PASS
802.11n20	2412.000000	15.2	16.2	30.0	36.0	PASS
802.11n20	2437.000000	14.2	15.2	30.0	36.0	PASS
802.11n20	2462.000000	14.6	15.6	30.0	36.0	PASS

Remark: Antenna gain: 1dB

Test Plot: (only worse case plot was shown as below)

802.11b:



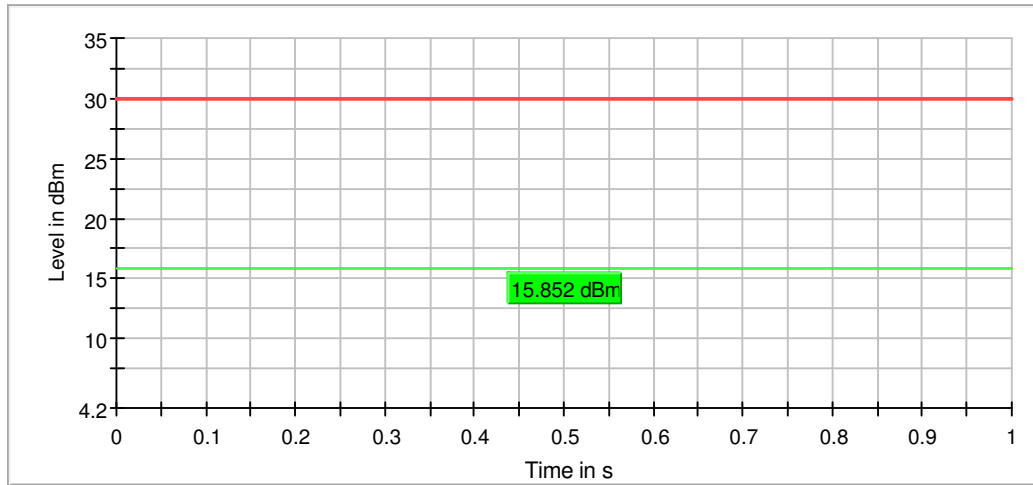
— Gated Trace — Overall — Limit



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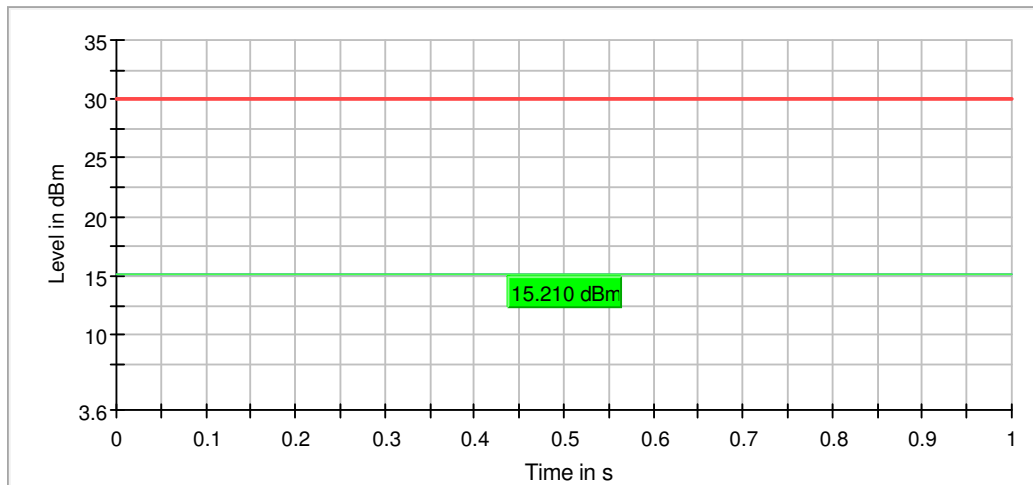
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802.11g:



— Gated Trace — Overall — Limit

802.11n20:



— Gated Trace — Overall — Limit



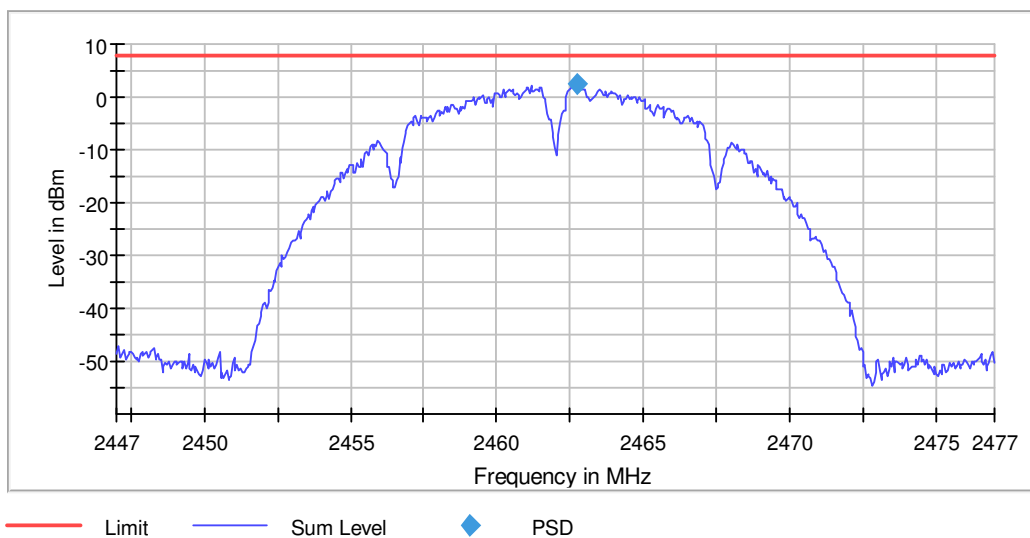
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9.3 Power Spectral Density

Operation Mode	DUT Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
802.11b	2412.000000	1.397	8.0	PASS
802.11b	2437.000000	1.371	8.0	PASS
802.11b	2462.000000	2.410	8.0	PASS
802.11g	2412.000000	-3.324	8.0	PASS
802.11g	2437.000000	-4.340	8.0	PASS
802.11g	2462.000000	-3.914	8.0	PASS
802.11n20	2412.000000	-2.738	8.0	PASS
802.11n20	2437.000000	-4.141	8.0	PASS
802.11n20	2462.000000	-3.610	8.0	PASS

Test Plot: (only worse case plot was shown as below)

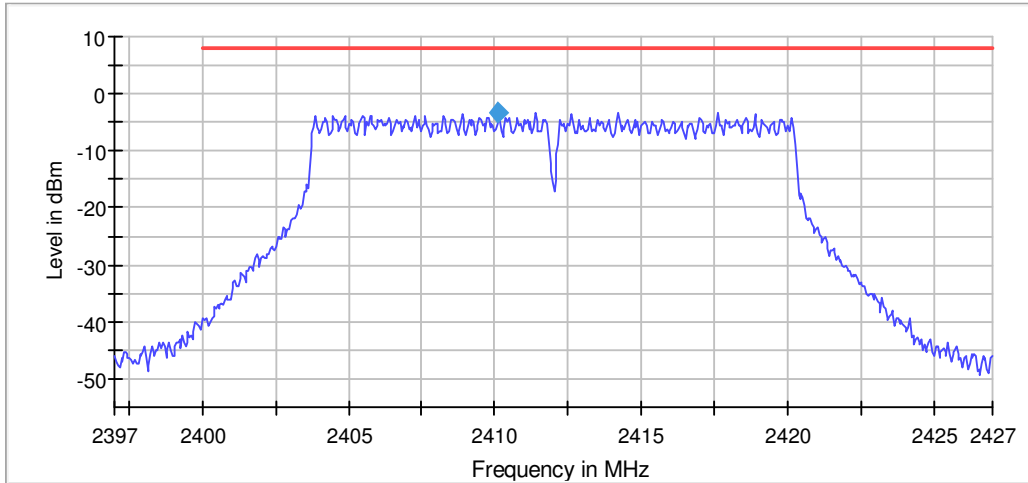
802.11b:



802.11g:

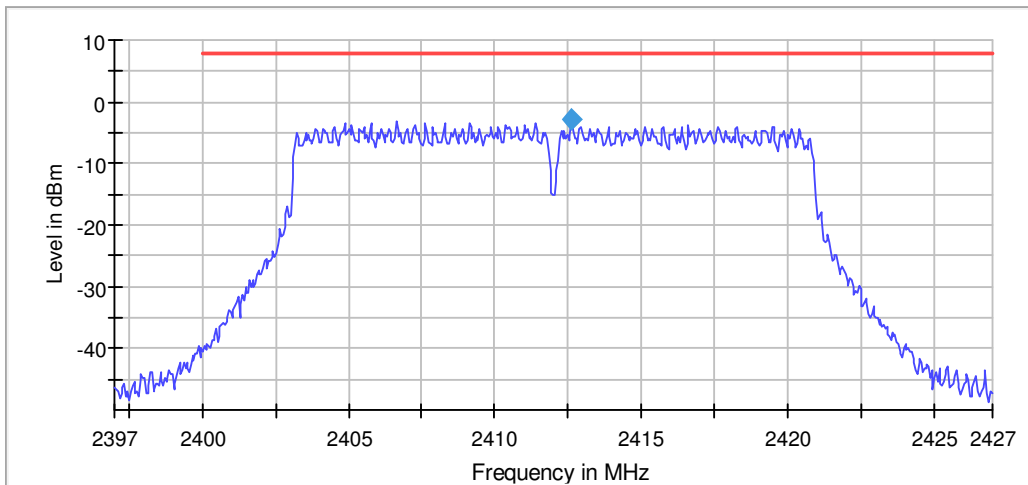


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— Limit — Sum Level ◆ PSD

802.11n20:



— Limit — Sum Level ◆ PSD



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Measurement Setting:

Setting	Instrument Value	Target Value
Span	30.000 MHz	30.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	600	~ 600
SweepTime	12.000 ms	12.000 ms
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	RMS	RMS
SweepCount	1	1
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	33 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.36 dB	0.50 dB

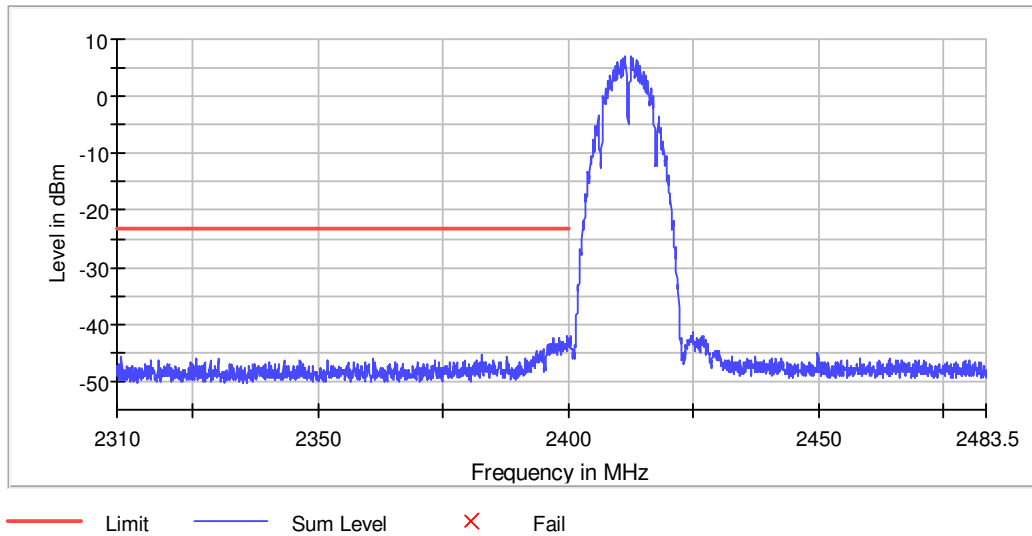


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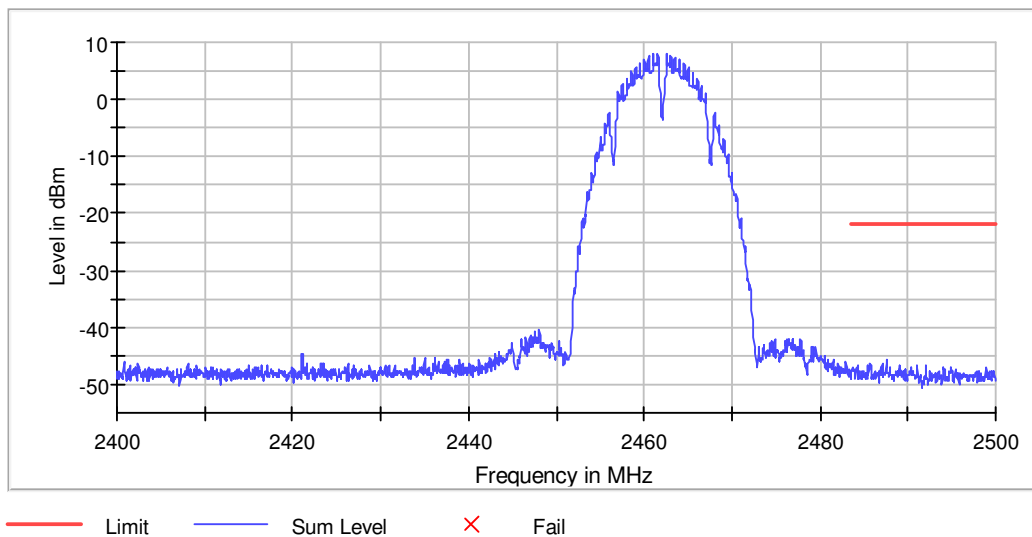
9.4 Band Edge

802.11b Band Edge Low



Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.725000	-42.2	19.1	-23.1	PASS

802.11b Band Edge High



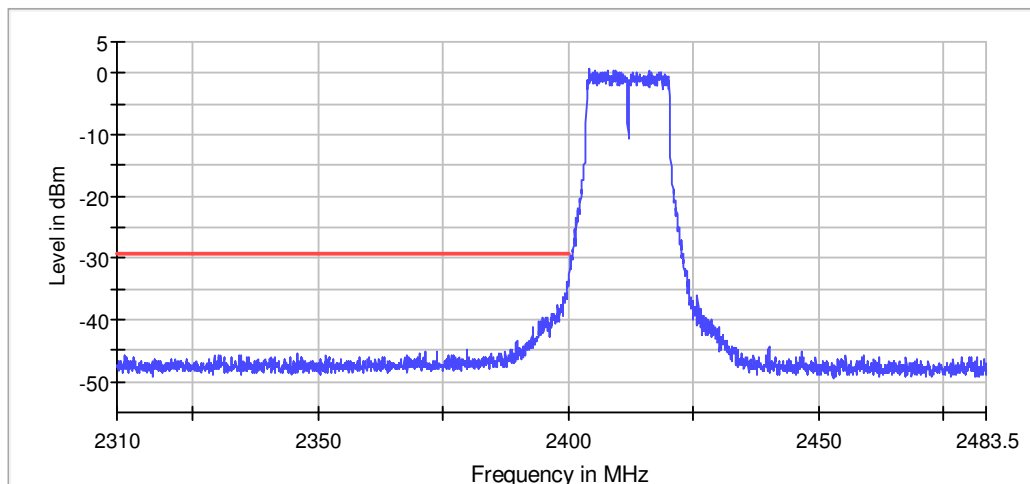
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2487.525000	-45.7	23.7	-21.9	PASS



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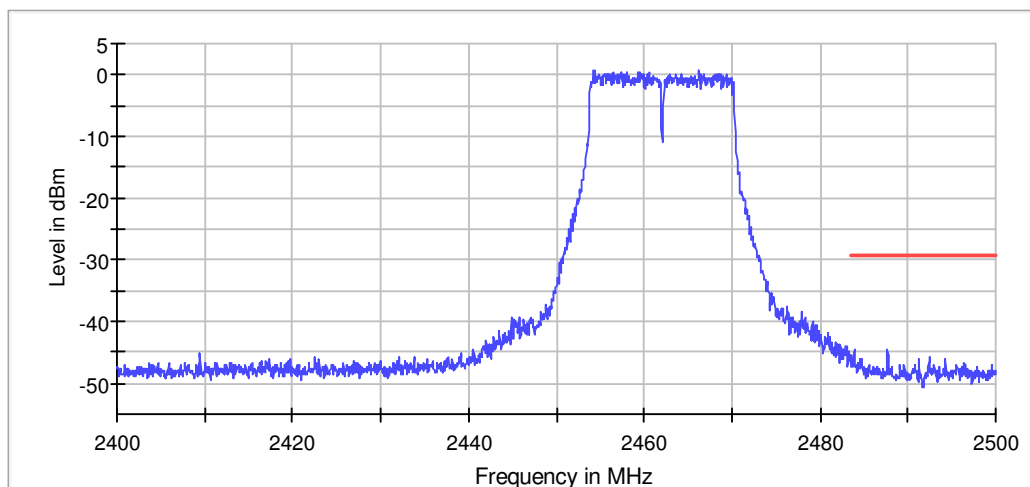
802.11g Band Edge Low



— Limit — Sum Level × Fail

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.825000	-33.9	4.7	-29.3	PASS

802.11g Band Edge High



— Limit — Sum Level × Fail

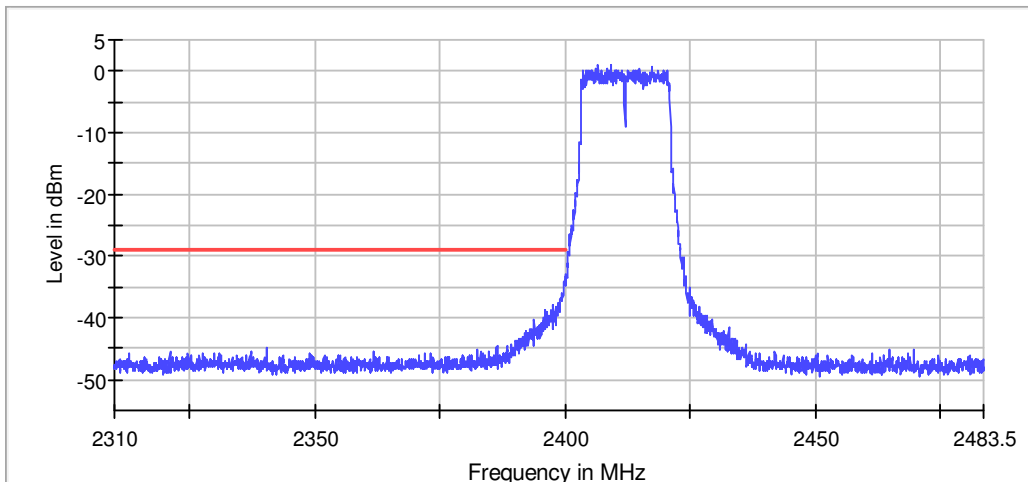
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.875000	-44.5	15.2	-29.3	PASS



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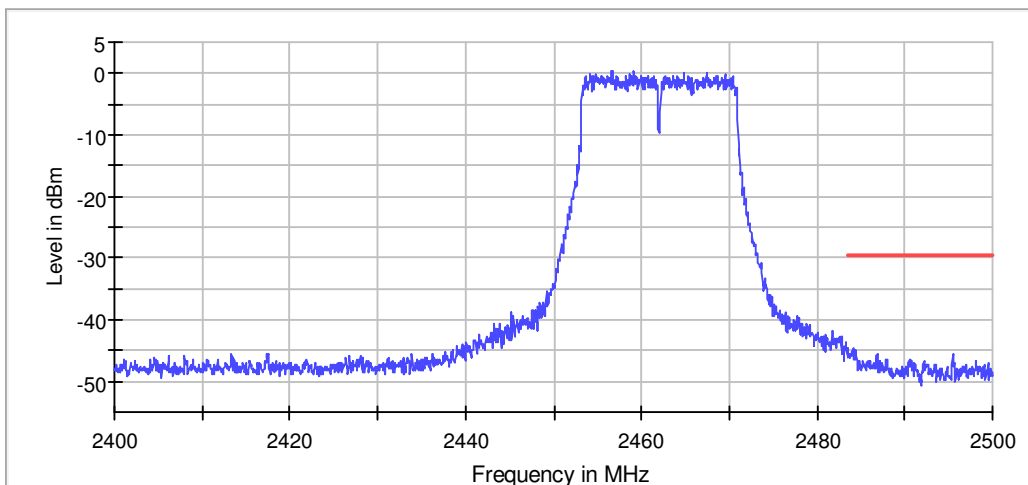
802.11n Band Edge Low



— Limit — Sum Level × Fail

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-33.9	4.9	-29.0	PASS

802.11n Band Edge High



— Limit — Sum Level × Fail

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2484.075000	-44.6	15.0	-29.6	PASS



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Measurement Setting:

Setting	Instrument Value	Target Value
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
SweepTime	1.800 ms	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

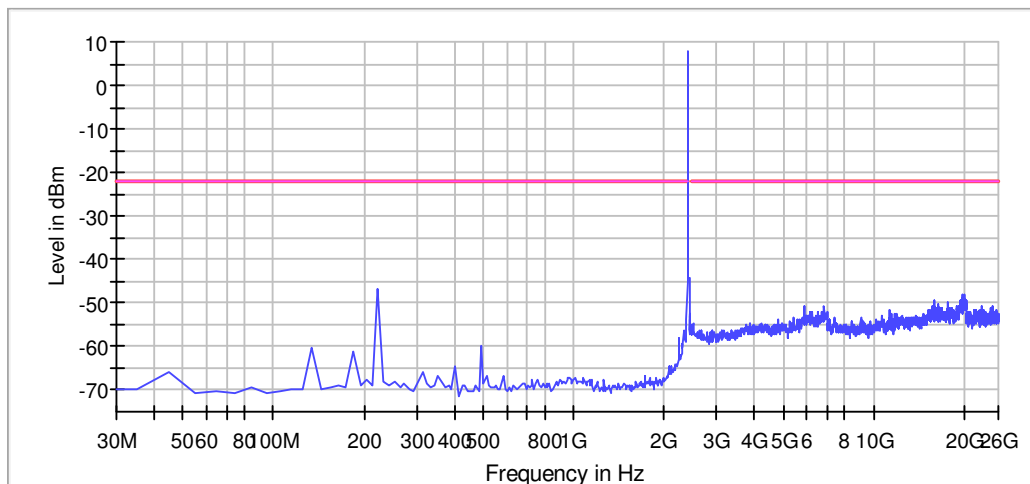


9.5 Spurious Emissions

802.11b

Lowest Channel

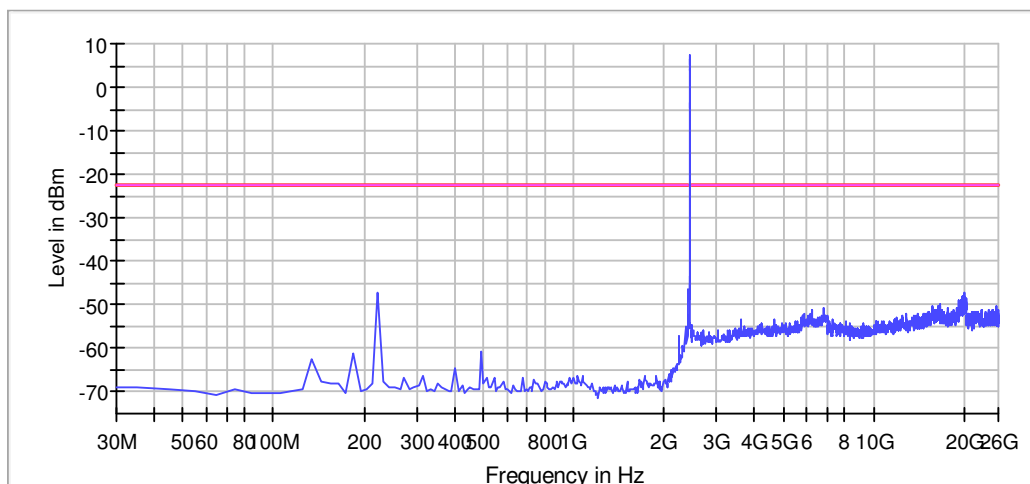
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2395.021008	-45.0	22.8	-22.3



— Limit — Sum Level — Threshold × Critical × Final Critical

Middle Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
224.180672	-47.2	24.5	-22.7



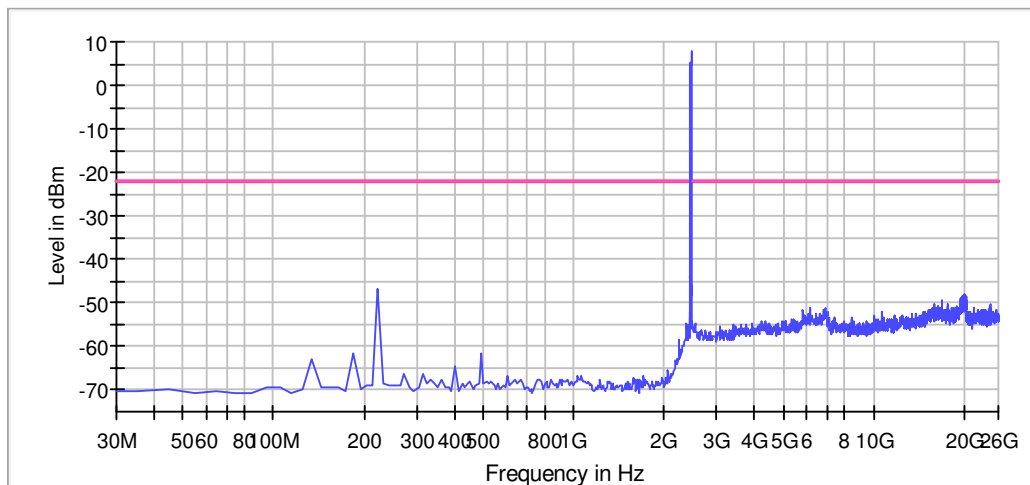
— Limit — Sum Level — Threshold × Critical × Final Critical



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Highest Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
224.180672	-46.9	24.6	-22.3

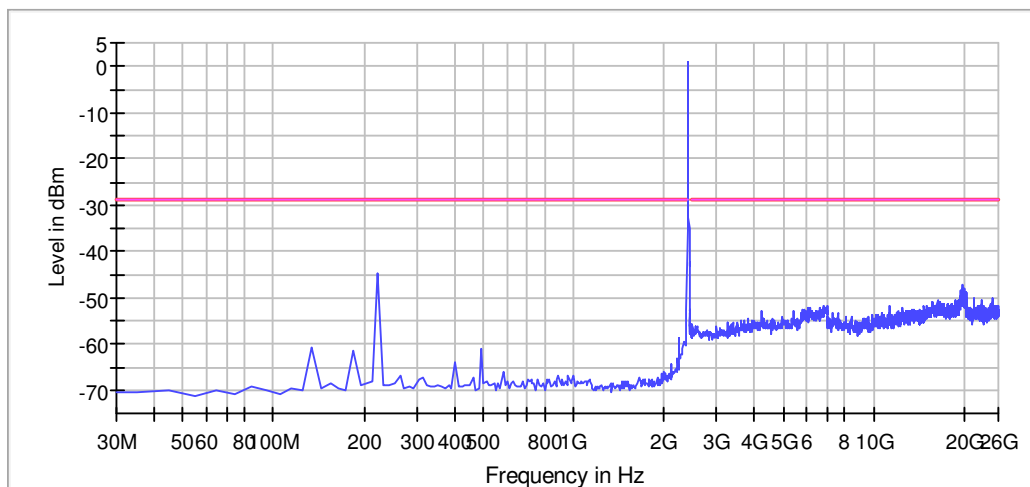


— Limit — Sum Level — Threshold × Critical × Final Critical

802.11g

Lowest Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2395.021008	-35.3	6.3	-29.1



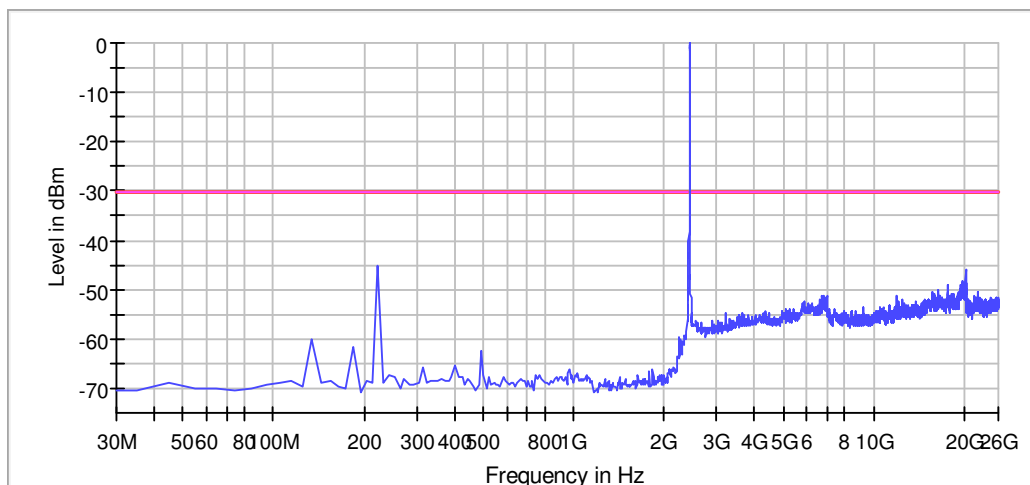
— Limit — Sum Level — Threshold × Critical × Final Critical



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Middle Channel

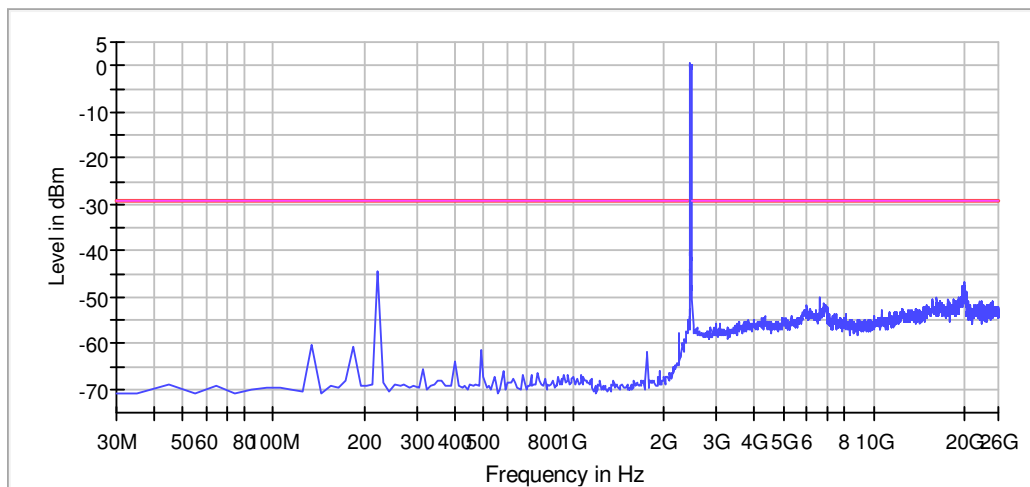
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
224.180672	-45.0	14.9	-30.2



— Limit — Sum Level — Threshold × Critical × Final Critical

Highest Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
135.025000	-59.9	3.5	-56.4



— Limit — Sum Level — Threshold × Critical × Final Critical

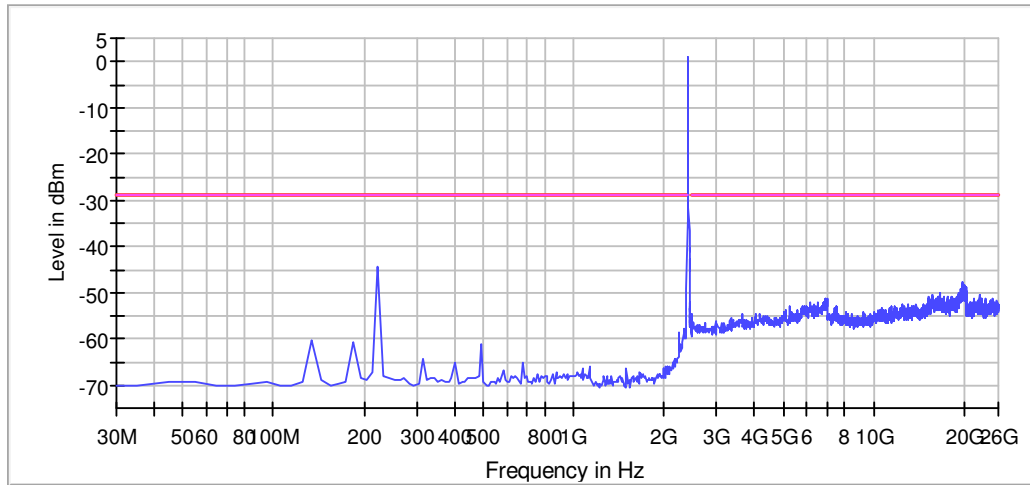


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802.11n20

Lowest Channel

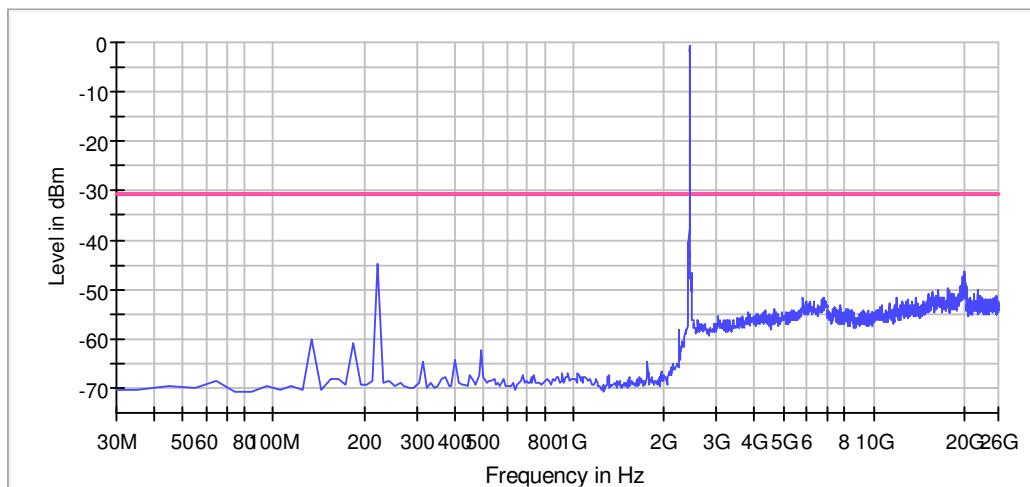
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2395.021008	-34.1	5.1	-29.0



— Limit — Sum Level — Threshold × Critical × Final Critical

Middle Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
224.180672	-44.8	14.0	-30.8



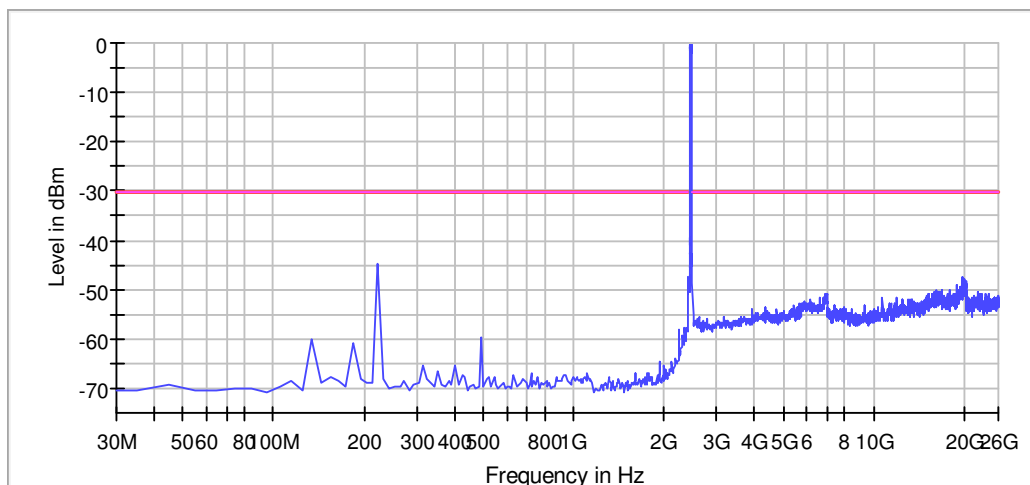
— Limit — Sum Level — Threshold × Critical × Final Critical



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Highest Channel

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
224.180672	-44.6	14.4	-30.3



— Limit — Sum Level — Threshold × Critical × Final Critical

Measurement Setting:

Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	238	~ 238
SweepTime	23.700 ms	AUTO
Reference Level	-10.000 dBm	-30.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	3	3
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	7 / max. 40	max. 40
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB



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9.6 Radiated Emissions which fall in the restricted bands

Mode: 802.11b

Frequency (MHz)	Antenna Polarization	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Remark
		Peak	Average	Peak	Average	
2486.250	V	49.2	/	74.0	54.0	Pass
2487.750	V	49.0	/	74.0	54.0	Pass

Mode: 802.11g

Frequency (MHz)	Antenna Polarization	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Remark
		Peak	Average	Peak	Average	
2390.000	V	52.1	/	74.0	54.0	Pass
2483.500	V	61.3	50.2	74.0	54.0	Pass

Mode: 802.11n20

Frequency (MHz)	Antenna Polarization	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Remark
		Peak	Average	Peak	Average	
2390.000	V	57.2	48.8	74.0	54.0	Pass
2483.500	V	62.8	52.6	74.0	54.0	Pass

No any other emissions level which are attenuated less than 20dB below the limit.

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part.

Hence there no other emissions have been reported.



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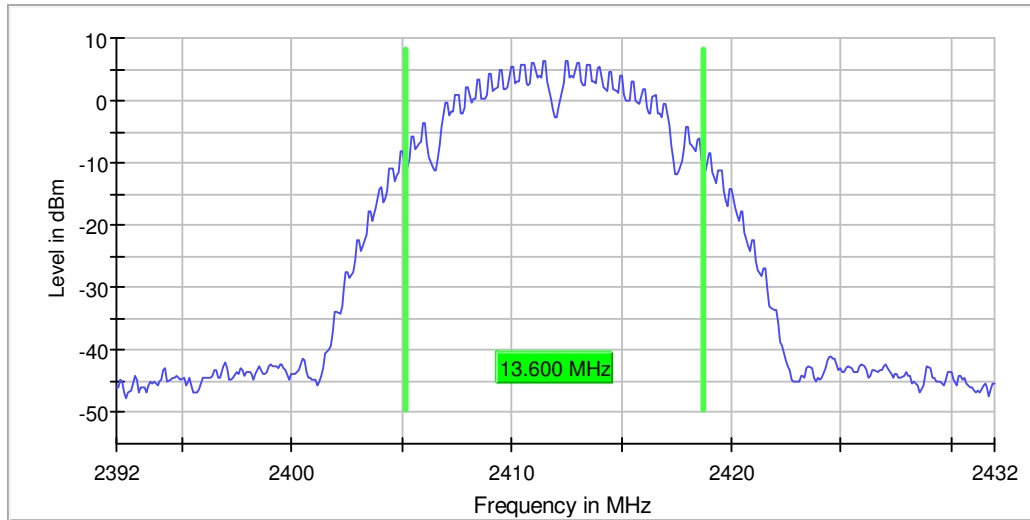
9.7 99% Occupied Bandwidth

Measurement

802.11b

Channel (MHz)	Bandwidth (MHz)
2412	13.600000
2437	13.600000
2462	13.500000

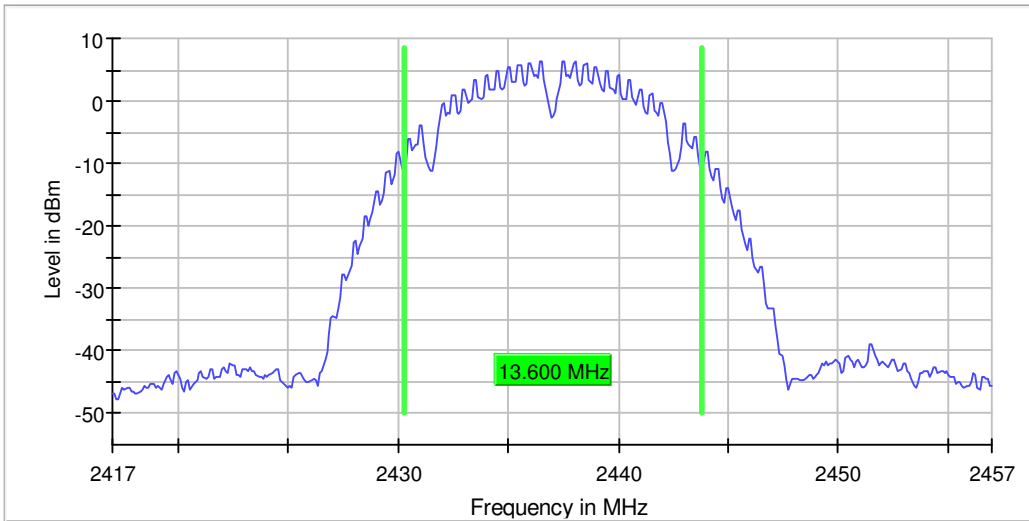
Lowest Channel



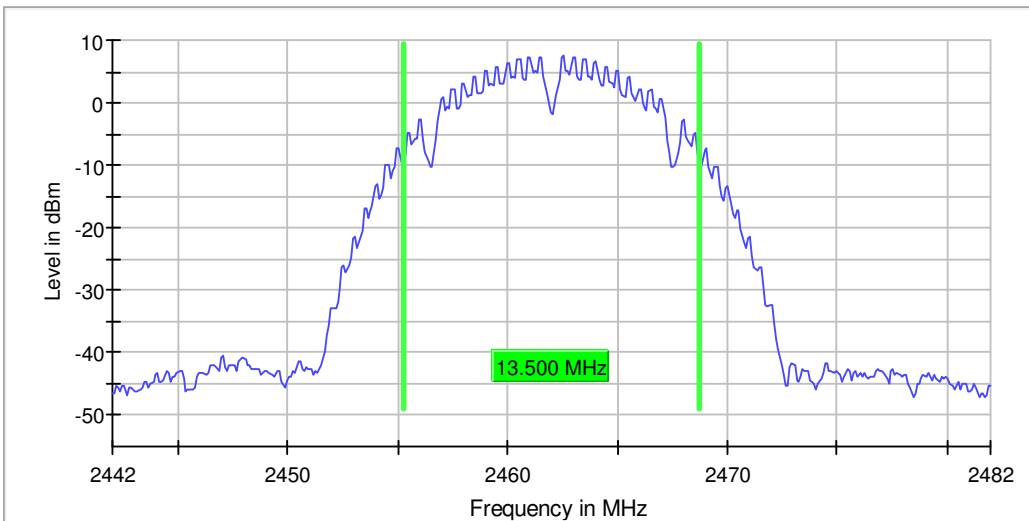
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Middle Channel



Highest Channel

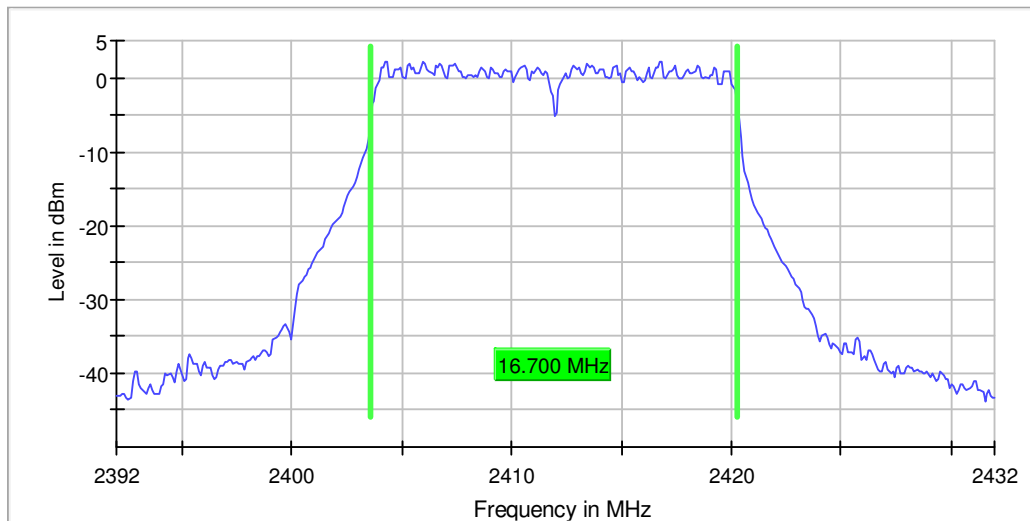


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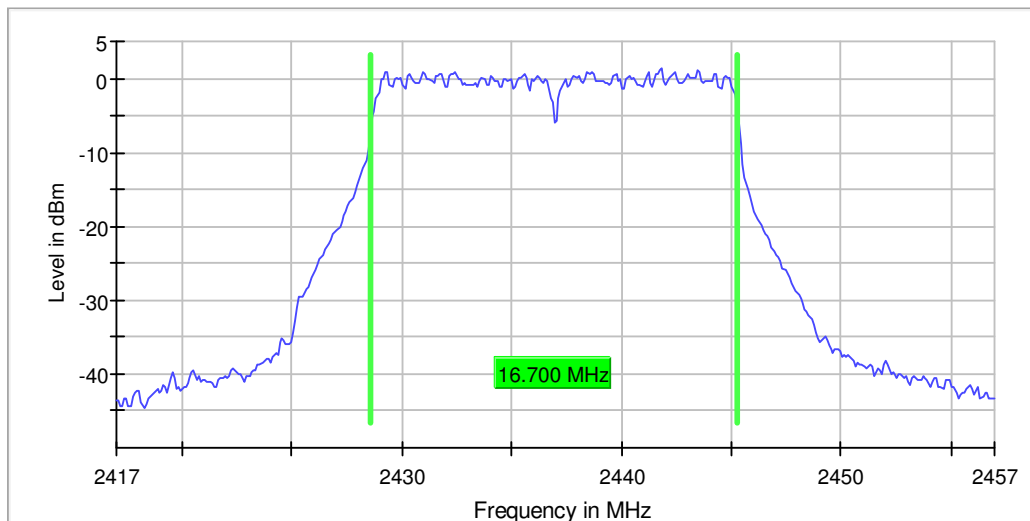
802.11g

Channel (MHz)	Bandwidth (MHz)
2412	16.700000
2437	16.700000
2462	16.700000

Lowest channel

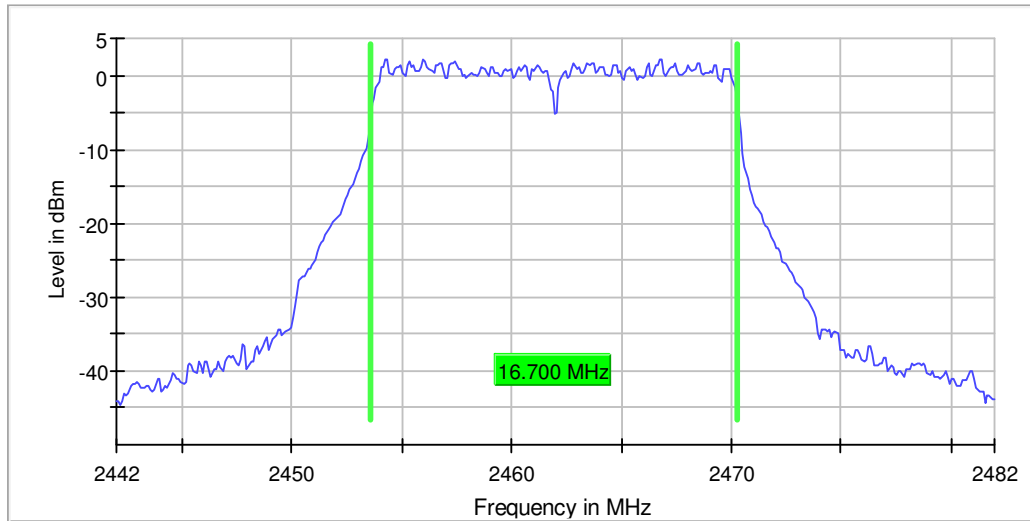


Middle Channel



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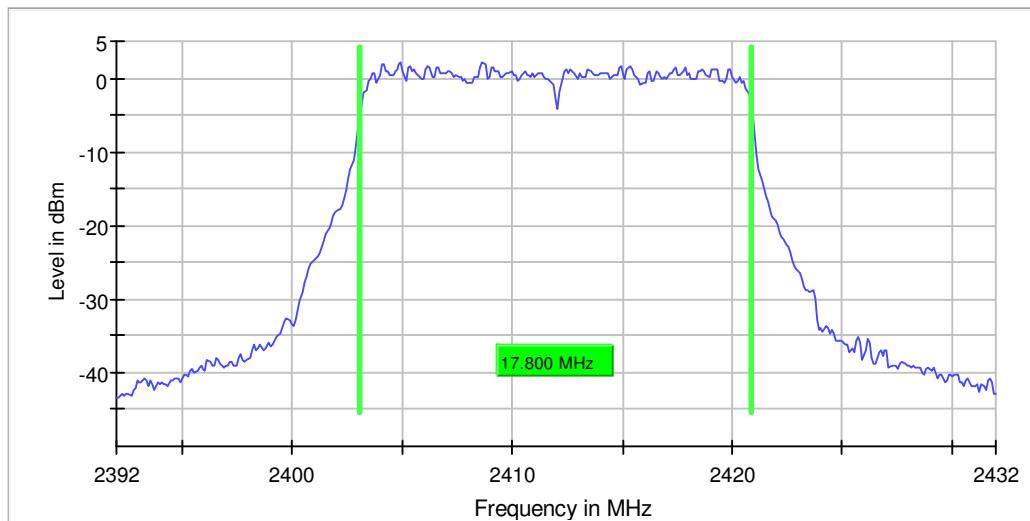
Highest Channel



802.11n20

Channel (MHz)	Bandwidth (MHz)
2412	17.800000
2437	17.800000
2462	17.800000

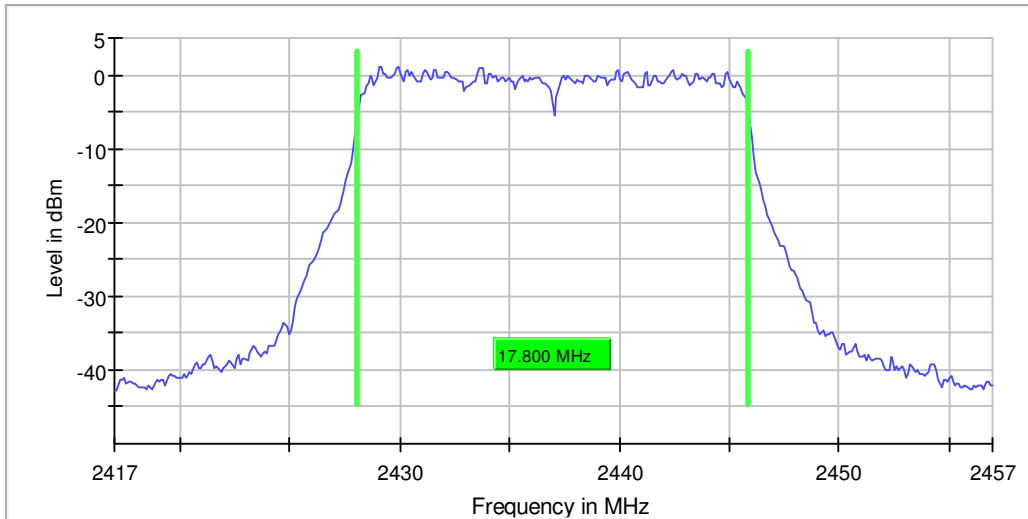
Lowest Channel



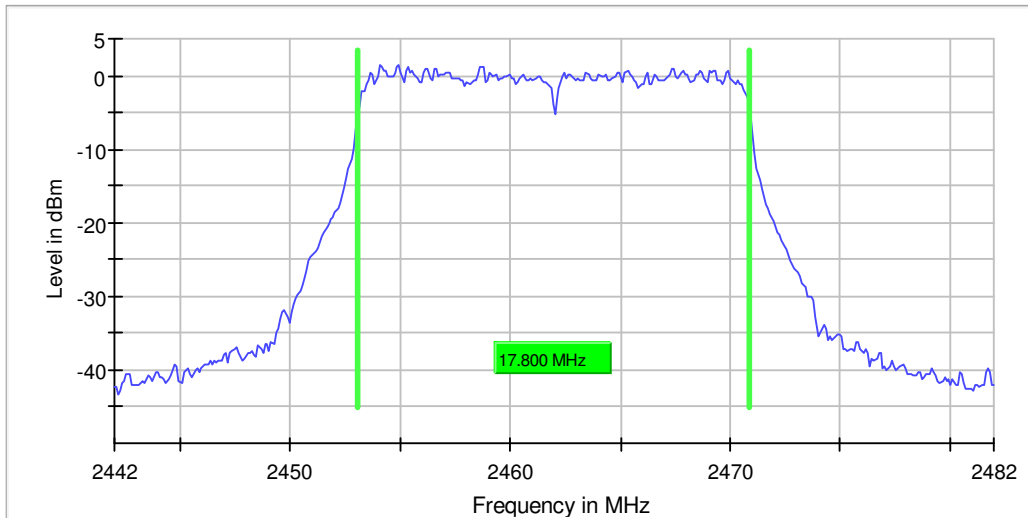
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Middle Channel



Highest Channel



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Measurement Setting:

Setting	Instrument Value	Target Value
Span	40.000 MHz	40.000 MHz
RBW	200.000 kHz	>= 200.000 kHz
VBW	1.000 MHz	>= 600.000 kHz
SweepPoints	400	~ 400
SweepTime	47.266 μ s	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	30.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.30 dB	0.30 dB
Run	7 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.01 dB	0.30 dB

- End of Report -

