FCC LISTED, REGISTRATION NUMBER: 720267

IC LISTED REGISTRATION NUMBER IC 4621A-1

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TEST REPORT

REFERENCE STANDARD:

USA FCC Part 15.247, 15.209

CANADA RSS-210, RSS-Gen

Radio Frequency Devices. Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz.

Licence-Exempt Radio Apparatus (All Frequency Bands): Category I Equipment.

General Requirements and Information for the Certification of Radio Apparatus.

NIE ..... :	41273RRF.002
Approved by (name / position & signature) ..... :	A. Llamas / RF Lab. Manager
Elaboration date ..... :	2014-03-12

Firmado digitalmente por Alejandro Llamas Rodríguez
Fecha: 2014.03.12 12:57:28 +01'00'

Identification of item tested ..... :	7265NGW
Trademark ..... :	INTEL
Model and/or type reference ..... :	7265NGW (includes family sub-models 7265NGW AN, 7265NGW NB and 7265NGW BN)
Serial number ..... :	TA#: G97996-007 WF MAC:001500E67260 BD MAC: 001500E67264
Other identification of the product ..... :	Commercial name: 7265NGW HW Version: QS SW Version: Test SW: DRTU_1_7_3_859 Op SW: V17.0.0 For OEM factory installation: FCC ID: PD97265NG IC: 1000M-7265NG For user installation: FCC ID: PD97265NGU IC: 1000M-7265NG
Features ..... :	802.11 a/b/g/n/ac Wireless LAN+ BT 4.0
Description ..... :	2x2 PCIe M.2 adapter card

Applicant ..... :	INTEL MOBILE COMMUNICATIONS
Address ..... :	100 Center Point Circle, Suite 200, Columbia, South Carolina 29210 USA
CIF/NIF/Passport ..... :	No provided data
Contact person:	Steven Hackett
Telephone / Fax ..... :	Tel: 803-216-2344/ FAX: 803-216-2176

e-mail: ..... :	steven.c.hackett@intel.com
Test samples supplier ..... :	Same as applicant
Manufacturer ..... :	Same as applicant

Test method requested .....: See Standard

Standard .....: USA FCC Part 15.247 10-1-12 Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz.

USA FCC Part 15.209 10-1-12 Edition: Radiated emission limits; general requirements.

Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v03r01 dated 09/04/2013.

Guidance for Emission Testing of Transmitters with Multiple Outputs in the Same Band 662911 D01 Multiple Transmitter Output v02r01 dated 10/31/2013.

ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices.

Test procedure .....: PERF034

Non-standardized test method .....: N/A

Used instrumentation .....:

Conducted Measurements

		Last Cal. date	Cal. due date
1.	Spectrum Analyzer Agilent E4440A	2012/04	2014/04
2.	Spectrum analyser Rohde & Schwarz FSW50	2013/10	2015/10
3.	Universal Power Meter R&S NRP-Z11	2012/12	2014/12
4.	Signal Analyzer R&S FSQ8	2012/04	2014/04

Radiated Measurements

		Last Cal. date	Cal. due date
1.	Semianechoic Absorber Lined Chamber IR 11. BS	N.A.	N.A.
2.	Control Chamber IR 12.BC	N.A.	N.A.
3.	Hybrid Bilog antenna Sunol Sciences Corporation JB6	2011/05	2014/05
4.	Antenna mast EM 1072 NMT	N.A.	N.A.
5.	Rotating table EM 1084-4. ON	N.A.	N.A.
6.	Double-ridge Guide Horn antenna 1-18 GHz HP 11966E	2011/05	2014/05
7.	Double-ridge Guide Horn antenna 18-40 GHz Agilent 119665J	2011/09	2014/09
8.	EMI Test Receiver R&S ESPI3	2013/12	2015/12
9.	RF pre-amplifier Miteq JS4-12002600-30-5A.	2012/07	2014/07
10.	Multi Device Controller EMCO 2090	N.A.	N.A.
11.	Spectrum analyser Rohde & Schwarz FSW50	2013/10	2015/10
12.	RF pre-amplifier Miteq AFS5-04001300-15-10P-6.	2012/07	2014/07
13.	RF pre-amplifier Schaffner CPA 9231.	2013/06	2015/06
14.	RF pre-amplifier Schwarzbeck BBV 9718	2014/02	2015/02

Report template No. .....: FDT08_14

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Competences and guarantees

AT4 wireless is a laboratory with a measurement facility in compliance with the requirements of Section 2.948 of the FCC rules and has been added to the list of facilities whose measurements data will be accepted in conjuction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Registration Number: 720267.

AT4 wireless is a laboratory with a measurement site in compliance with the requirements of RSS 212, Issue 1 (Provisional) and has been added to the list of filed sites of the Canadian Certification and Engineering Bureau. Reference File Number: IC 4621A-1.

In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance programme for its measurement equipment.

AT4 wireless guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at AT4 wireless at the time of performance of the test.

AT4 wireless is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of AT4 wireless.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of AT4 wireless and the Accreditation Bodies.

Uncertainty

Uncertainty (factor k=2) was calculated according to the AT4 wireless internal documents:

PODT000: : Procedimiento para el cálculo de incertidumbres de medida

Usage of samples

Samples undergoing test have been selected by: **the client**.

Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
41273/001	2x2 PCIe M.2 adapter card	7265NGW	TA#: G97996-007 WF MAC:001500E67260 BD MAC: 001500E67264	16/01/2014

Auxiliary elements used with the sample S/01:

Control Nº	Description	Manufacture	Model	Serial Nº	Date of reception
38067/28	Laptop PC	DELL	Latitude E5420	CTFQQL1	08/01/2013
38067/29	Cable of the AC/DC Adapter	DELL	---	---	08/01/2013
38067/30	AC/DC Adapter	DELL	LA90PM111	---	08/01/2013
40104B/16	Reference Antenna	SkyCross	WIMAX/WLAN	---	26/09/2013
40104B/17	Reference Antenna	SkyCross	WIMAX/WLAN	---	26/09/2013
38067/36	M2/NGFF extender cable	---	---	---	08/01/2013
38067/37	HMC/NGFF Testing board	INTEL	PCB00390	3902412-252	11/01/2013
38067/38	Adapter of the AC/DC Board Testing	SINPRO	SPU60-102	07990464 1249	11/01/2013
1302	Board 35mmx35mm	---	---	---	---

Usage of samples

Sample S/02 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
41273/001	2x2 PCIe M.2 adapter card	7265NGW	TA#: G97996-007 WF MAC:001500E67260 BD MAC: 001500E67264	16/01/2014

Auxiliary elements used with the sample S/01:

Control Nº	Description	Manufacture	Model	Serial Nº	Date of reception
38067/28	Laptop PC	DELL	Latitude E5420	CTFQQL1	08/01/2013
38067/29	Cable of the AC/DC Adapter	DELL	---	---	08/01/2013
38067/30	AC/DC Adapter	DELL	LA90PM111	---	08/01/2013
38067/36	M2/NGFF extender cable	---	---	---	08/01/2013
38067/37	HMC/NGFF Testing board	INTEL	PCB00390	3902412-252	11/01/2013
38067/38	Adapter of the AC/DC Board Testing	SINPRO	SPU60-102	07990464 1249	11/01/2013
1302	Board 35mmx35mm	---	---	---	---

1. Sample S/01 has undergone following test(s).
   All radiated tests indicated in appendix A, B and C.

2. Sample S/02 has undergone following test(s).
   All conducted tests indicated in appendix A, B and C.

Testing period

The performed test started on 2014-02-01 and finished on 2014-03-11.

The tests have been performed at AT4 wireless.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 19.2ºC Max. = 22.1ºC
Relative humidity	Min. = 41 % Max. = 53 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

In the semianechoic chamber (21 meters x 11 meters x 8 meters), the following limits were not exceeded during the test.

Temperature	Min. = 18.7ºC Max. = 21.9ºC
Relative humidity	Min. = 46% Max. = 51%
Air pressure	Min. = 1017mbar Max. = 1019mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω
Normal site attenuation (NSA)	< ±4 dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 1000 MHz).

In the chamber for conducted measurements the following limits were not exceeded during the test:

Temperature	Min. = 23.1 ºC Max. = 24.9ºC
Relative humidity	Min. = 39.4% Max. = 45.4%
Air pressure	Min. = 1016mbar Max. = 1020mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

Summary

Considering the results of the performed test according to standard USA FCC Parts 15.247 / RSS-210, the item under test is **IN COMPLIANCE** with the requested specifications specified in the standard.

NOTE: The results presented in this Test Report apply only to the particular item under test established in page 1 of this document, as presented for test on the date(s) shown in section, "USAGE OF SAMPLES, TESTING PERIOD AND ENVIRONMENTAL CONDITIONS".

Remarks and comments

1.- No comments.

Testing verdicts

Not applicable .....: NA

Pass.....: P

Fail .....: F

Not measured.....: NM

1. WiFi 2.4 GHz (802.11b/g/n20/n40)

FCC PART 15 PARAGRAPH / RSS-210		VERDICT			
		NA	P	F	NM
Section 15.247 Subclause (a) (2) / RSS-210 A8.2. (a)	6 dB Bandwidth		P		
Section 15.247 Subclause (b) / RSS-210 A8.4. (4)	Maximum output power and antenna gain		P		
Section 15.247 Subclause (d) / RSS-210 A8.5.	Emission limitations conducted (Transmitter)		P		
Section 15.247 Subclause (d) / RSS-210 A8.5.	Band-edge emissions compliance (Transmitter)		P		
Section 15.247 Subclause (e) / RSS-210 A8.2. (b)	Power spectral density		P		
Section 15.247 Subclause (d) / RSS-210 A8.5.	Emission limitations radiated (Transmitter)		P		

2. WiFi 5.725 – 5.825 GHz (802.11a/n20/n40/ac80)

FCC PART 15 PARAGRAPH / RSS-210		VERDICT			
		NA	P	F	NM
Section 15.247 Subclause (a) (2) / RSS-210 A8.2. (a)	6 dB Bandwidth		P		
Section 15.247 Subclause (b) / RSS-210 A8.4. (4)	Maximum output power and antenna gain		P		
Section 15.247 Subclause (d) / RSS-210 A8.5.	Emission limitations conducted (Transmitter)		P		
Section 15.247 Subclause (d) / RSS-210 A8.5.	Band-edge emissions compliance (Transmitter)		P		
Section 15.247 Subclause (e) / RSS-210 A8.2. (b)	Power spectral density		P		
Section 15.247 Subclause (d) / RSS-210 A8.5.	Emission limitations radiated (Transmitter)		P		

3. Bluetooth Low Energy

FCC PART 15 PARAGRAPH / RSS-210		VERDICT			
		NA	P	F	NM
Section 15.247 Subclause (a) (2) / RSS-210 A8.2. (a)	6 dB Bandwidth		P		
Section 15.247 Subclause (b) / RSS-210 A8.4. (4)	Maximum output power and antenna gain		P		
Section 15.247 Subclause (d) / RSS-210 A8.5.	Emission limitations conducted (Transmitter)		P		
Section 15.247 Subclause (d) / RSS-210 A8.5.	Band-edge emissions compliance (Transmitter)		P		
Section 15.247 Subclause (e) / RSS-210 A8.2. (b)	Power spectral density		P		
Section 15.247 Subclause (d) / RSS-210 A8.5.	Emission limitations radiated (Transmitter)		P		

APPENDIX A: Test results
“WiFi 2.4 GHz (802.11b/g/n20/n40)”

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TEST CONDITIONS

Power supply (V):

$V_{nominal}$ = 3.3 Vdc

Type of power supply = DC voltage from HMC/NGFC test board.

Type of antenna = External attachable PIFA antenna.

Declared Gain for antenna = 3.24 dBi

TEST FREQUENCIES:

For WiFi 802.11b/g/n20:

Lowest channel (1): 2412 MHz

Middle channel (6): 2437 MHz

Highest channel (11): 2462 MHz

Additional channels (12) and (13): 2467 MHz and 2472 MHz, respectively, for information purposes only.

For WiFi 802.11n40:

Lowest channel (3): 2422 MHz

Middle channel (6): 2437 MHz

Highest channel (9): 2452 MHz

Additional channels (10F) and (11F): 2457 MHz and 2462 MHz, respectively, for information purposes only.

The test set-up was made in accordance to the general provisions of FCC DTS Measurement KDB 558074 D01 DTS Meas Guidance v03r01.

For 802.11b/g modes the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually but not simultaneously.

For 802.11n modes 802.11n20 (20 MHz channel bandwidth) and 802.11n40 (40MHz channel bandwidth) the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually and simultaneously.

For radio testing purposes the card was installed in a test fixture. The test fixture is connected to a laptop computer and dc power supplied. The laptop computer was used to configure the EUT to continuously transmit at a specified output power with different modes and modulation schemes.

WiFi 2.4 GHz: 802.11b, 802.11g, 802.11n20 (20 MHz channel bandwidth) and 802.11n40 (40MHz channel bandwidth).

The field strength at the band edges was evaluated for each mode and on each chain individually on the lowest and highest channels at the rated power for the channel under test. Where the power at the edge channels was lower than the power at the center channels additional measurements were made at the adjacent channels. Single transmission at each chain and simultaneous transmission at both chains modes were fully evaluated.

The PC was using the Intel test utility DRTU Version 1.7.3-859.

During transmitter test the EUT was being controlled by the Intel DRTU tool to operate in a continuous transmit mode on the test channels as required and in each of the different modulation modes.

The data rates of 1Mb/s for 802.11b, 6Mb/s for 802.11g, HT0 (SISO)/HT8 (MIMO) for 802.11n20 and n40 were selected based on preliminary testing that identified those rates corresponding to the worst cases for output power and band edge levels at restricted bands.

The conducted RF output power at each chain was adjusted according to the client's supplied Target values (see following table) using the Intel DRTU tool and measuring the power by using a calibrated average power meter. Measured values for adjustment were within -0.2 dB/+0.3 dB respect to the Target values.

RF conducted output power target values

Mode	BW (MHz)	Channel / Freq.	SISO Chain A (dBm)	SISO Chain B (dBm)	MIMO at both ports A and B (dBm)
802.11b	20	1 / 2412	16,5	16,5	n/a
		6 / 2437	17,5	17,5	n/a
		11 / 2462	16,5	16,5	n/a
		12 / 2467	12	13.5	n/a
		13 / 2472	11	12.5	n/a
802.11g	20	1 / 2412	14	14,5	n/a
		2 / 2417	15,5	15,5	n/a
		6 / 2437	17,5	17,5	n/a
		10 / 2457	15,5	15,5	n/a
		11 / 2462	12,5	12,5	n/a
		12 / 2467	10	9	n/a
		13 / 2472	0	0	n/a
802.11n	20	1 / 2412	14	14,5	12,00
		2 / 2417	15,5	15,5	13,50
		6 / 2437	17,5	17,5	17,50
		10 / 2457	15,5	15,5	13,50
		11 / 2462	12,5	12,5	12,00
		12 / 2467	10	9	7,00
		13 / 2472	0	0	0,00
802.11n*	40	3 / 2422	13,5	13,5	9,50
		4 / 2427	14,5	14,5	11,50
		5 / 2432	15,5	15,5	12,00
		6 / 2437	17,5	17,5	13,50
		7 / 2442	14,5	13,5	11,50
		8 / 2447	13,5	12,5	10,50
		9 / 2452	12,5	11,5	9,50
		10F / 2457	10	9	7,00
		11F / 2462	0	0	0,00

CONDUCTED MEASUREMENTS

The equipment under test was set up in a shielded room and it is connected to the spectrum analyser using a calibrated low loss RF cable. The reading in the spectrum analyser is compensated with the cable loss at each measurement frequency.

RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and at a

distance of 1m for the frequency range 1 GHz-25 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-40 GHz horn antenna).

For radiated emissions in the range 1 GHz-25 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive (wooden) platform one meter above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

Occupied Bandwidth

RESULTS

1. WiFi 2.4GHz 802.11 b mode

Occupied Bandwidth (see next plots).

	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
99% bandwidth (MHz)	12.75	12.54	12.72	12.81	12.66	12.75
Measurement uncertainty (kHz)	±21.7					

2. WiFi 2.4GHz 802.11 g mode

Occupied Bandwidth (see next plots).

	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
99% bandwidth (MHz)	16.53	16.83	16.98	17.22	16.80	16.44
Measurement uncertainty (kHz)	±21.7					

3. WiFi 2.4GHz 802.11 n20 mode

Occupied Bandwidth (see next plots).

	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
99% bandwidth (MHz)	17.37	17.91	18.03	18.36	17.91	17.91
Measurement uncertainty (kHz)	±21.7					

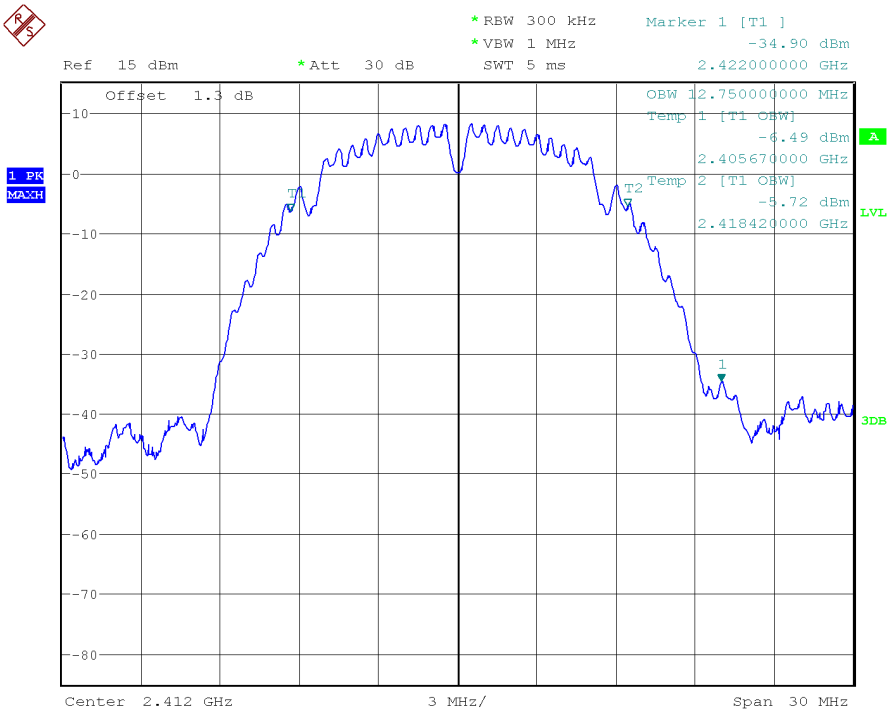
4. WiFi 2.4GHz 802.11 n40 mode

Occupied Bandwidth (see next plots).

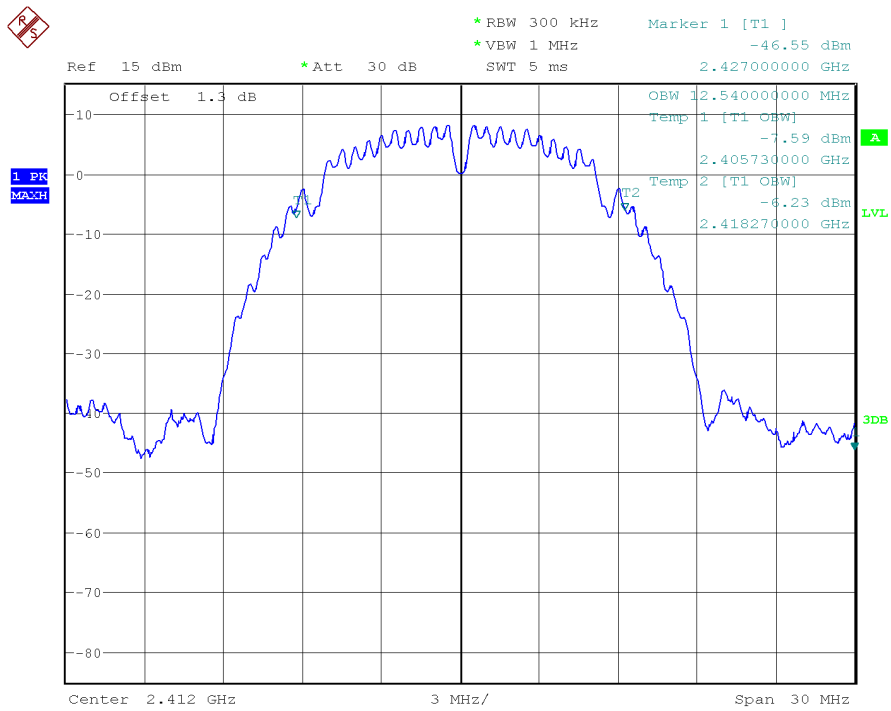
	Lowest frequency 2422 MHz		Middle frequency 2437 MHz		Highest frequency 2452 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
99% bandwidth (MHz)	36.20	36.22	36.35	36.35	36.20	36.15
Measurement uncertainty (kHz)	±21.7					

1. WiFi 2.4GHz 802.11 b mode

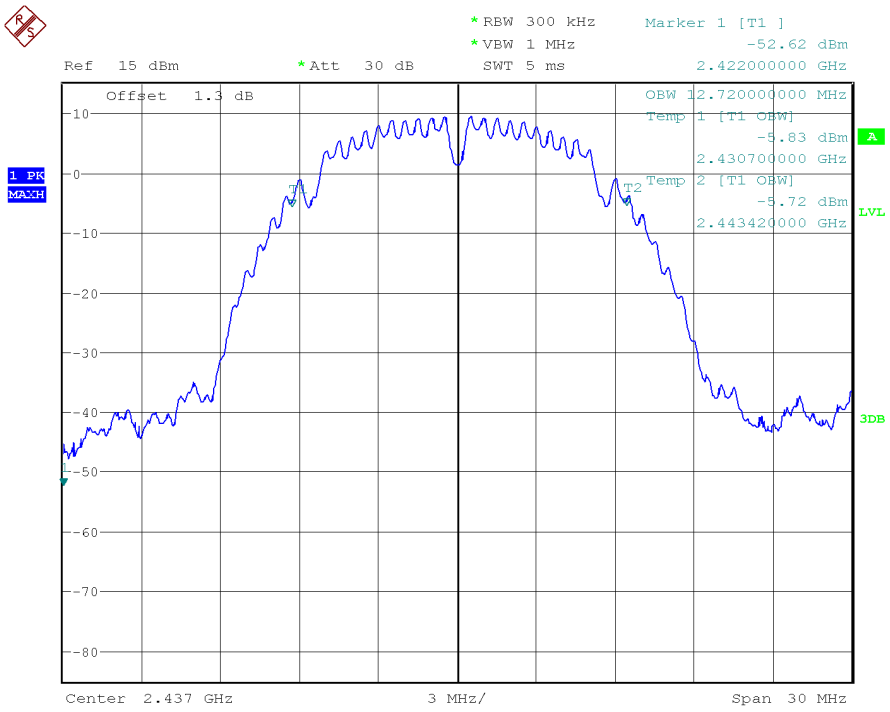
Lowest Channel: 2412 MHz. Chain A



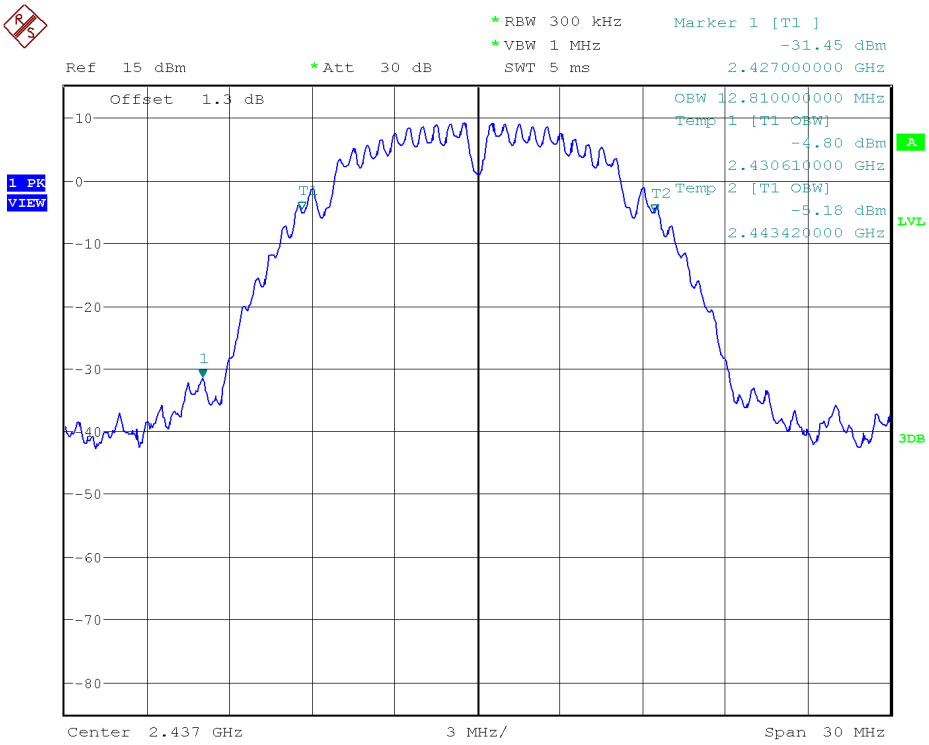
Lowest Channel: 2412 MHz. Chain B.



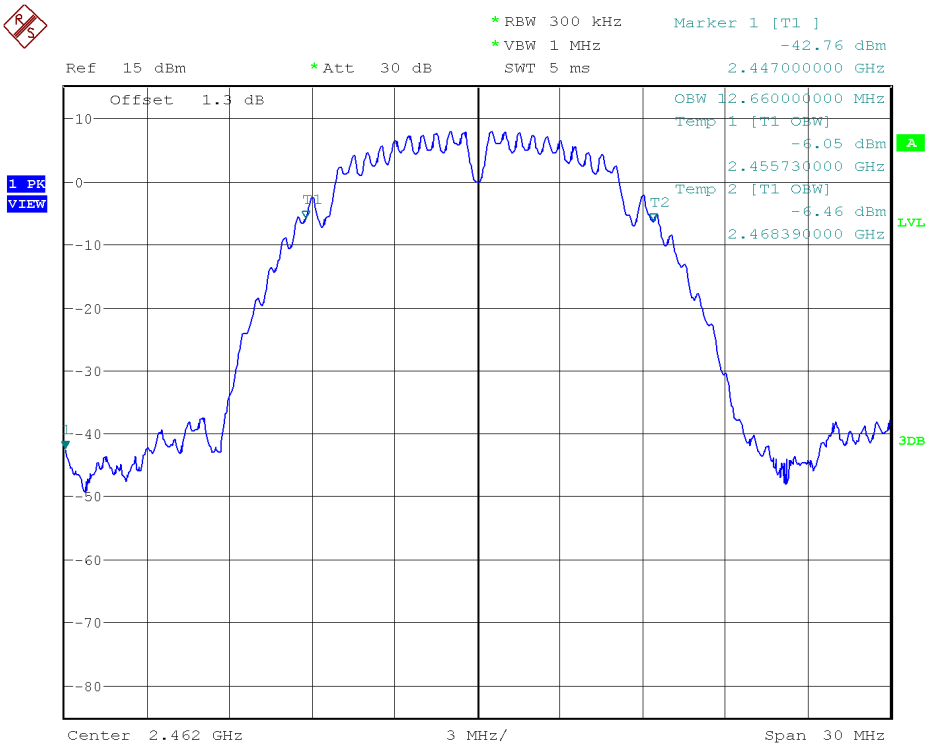
Middle Channel: 2437 MHz. Chain A



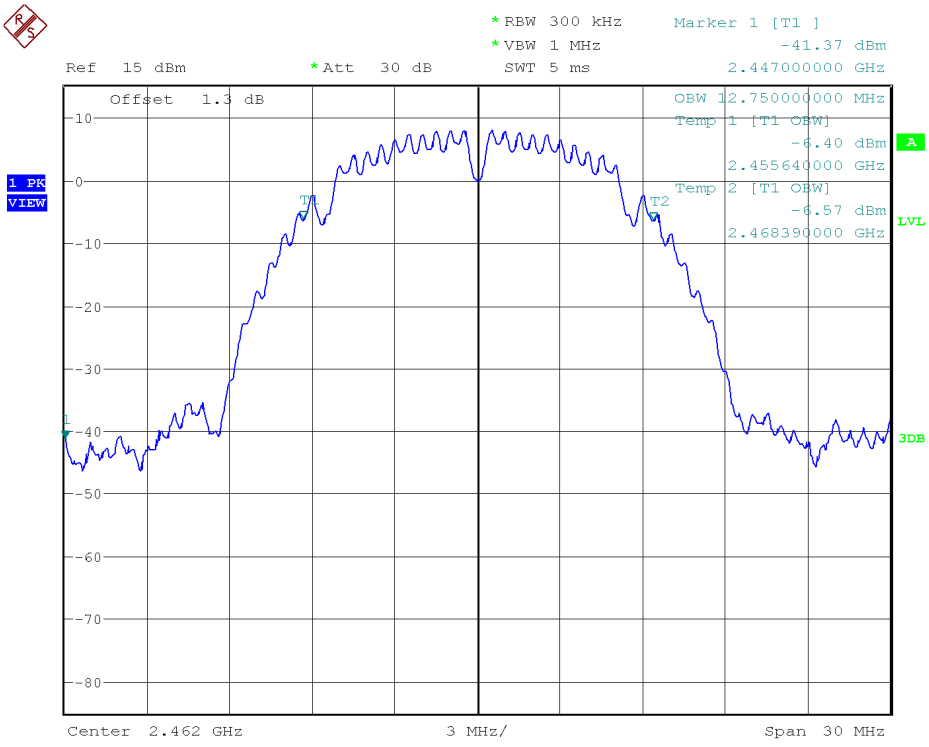
Middle Channel: 2437 MHz. Chain B



Highest Channel: 2462 MHz. Chain A.

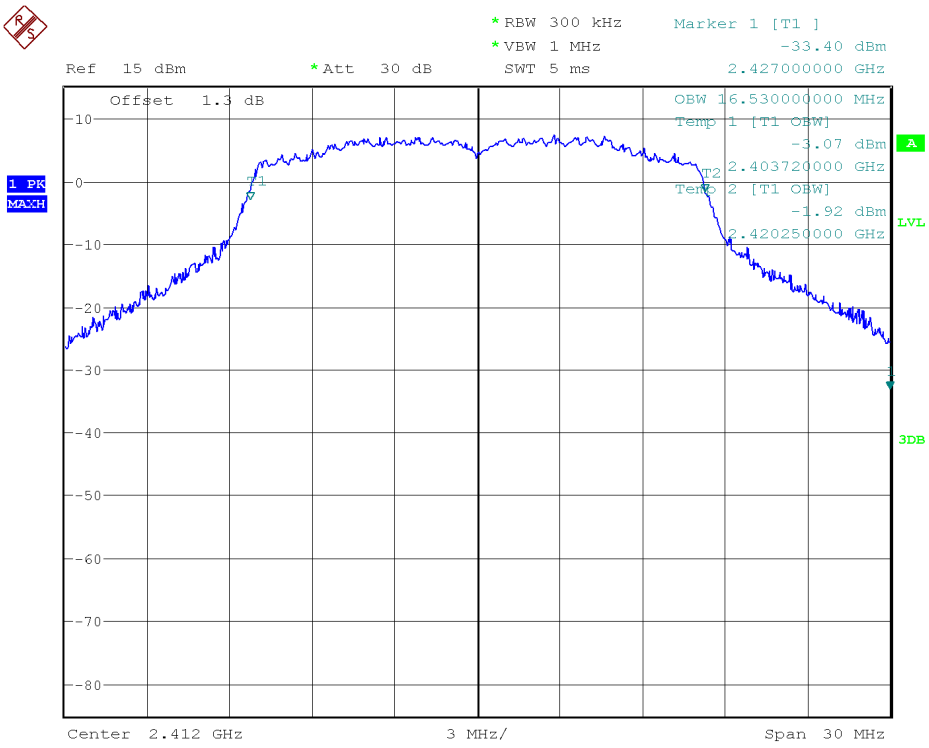


Highest Channel: 2462 MHz. Chain B.

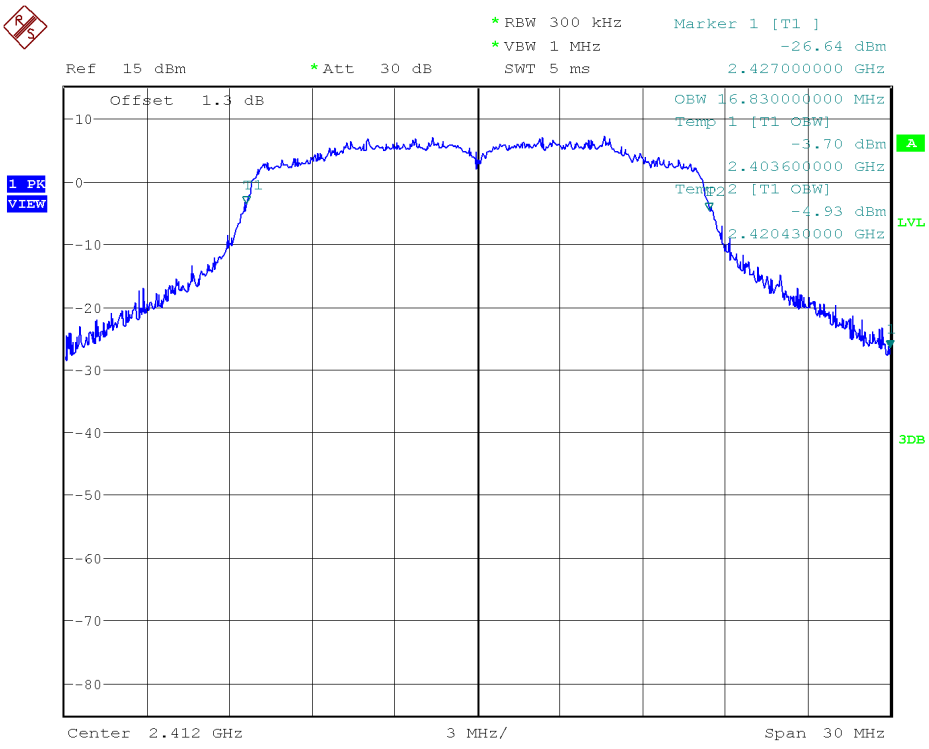


2. WiFi 2.4GHz 802.11 g mode

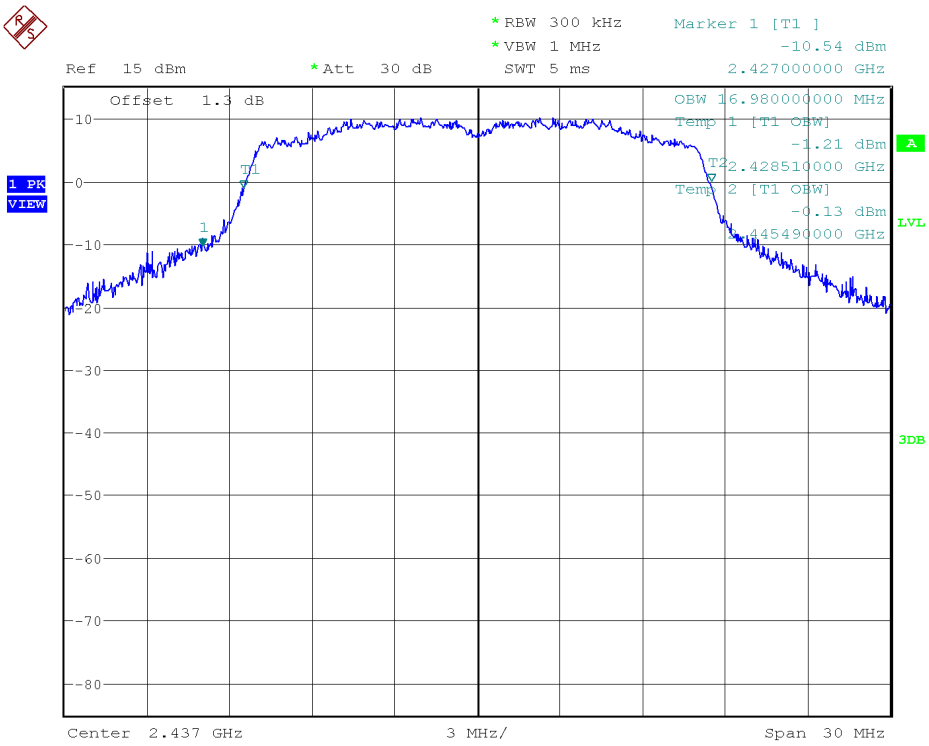
Lowest Channel: 2412 MHz. Chain A



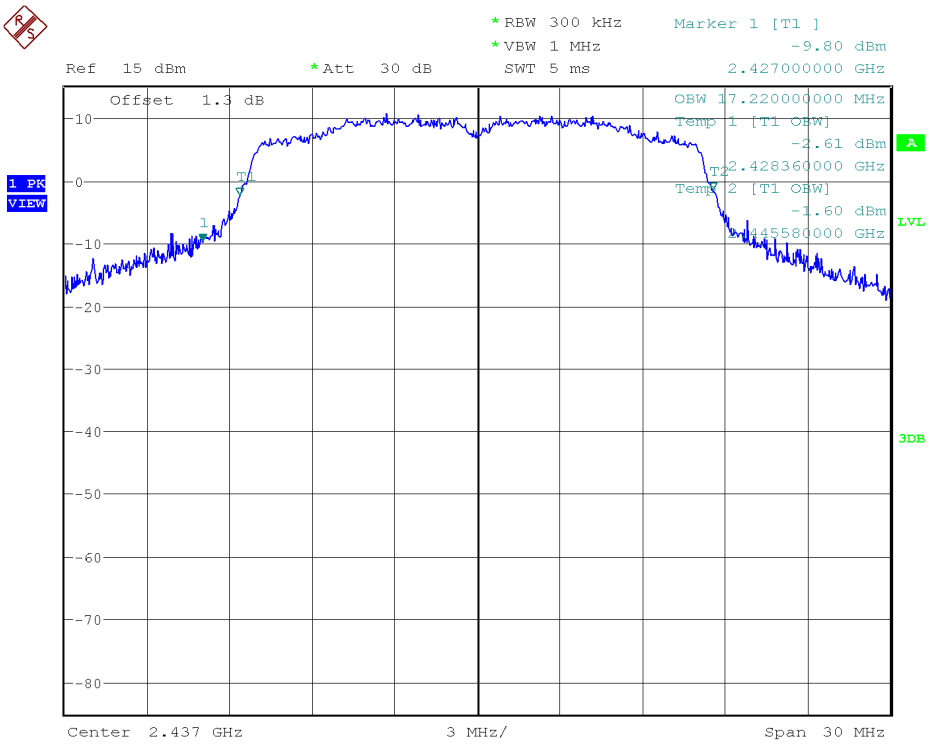
Lowest Channel: 2412 MHz. Chain B



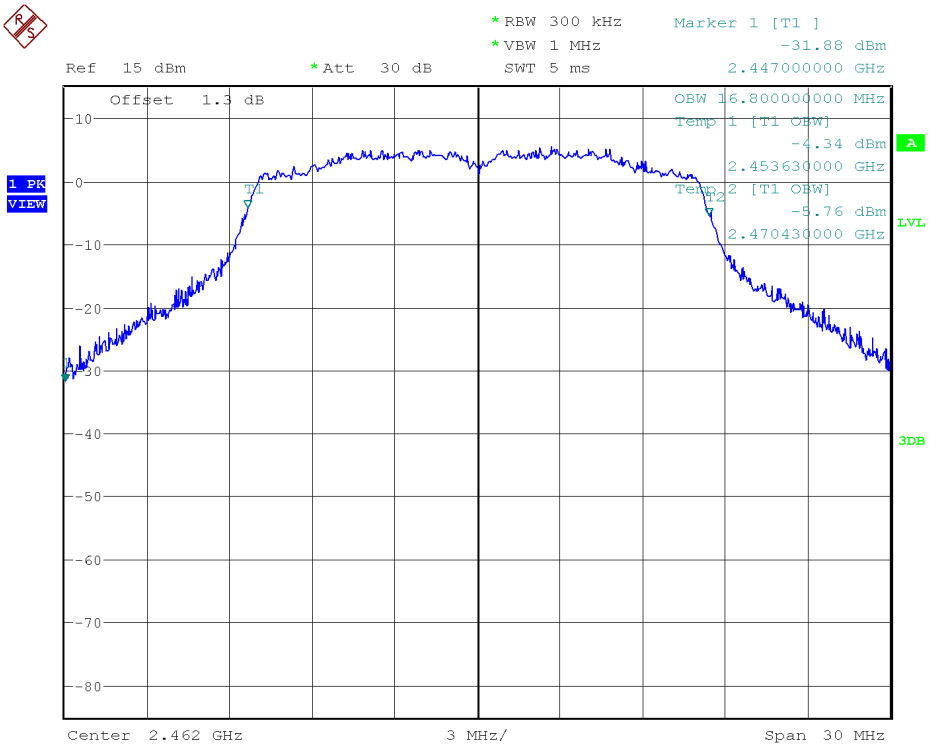
Middle Channel: 2437 MHz. Chain A



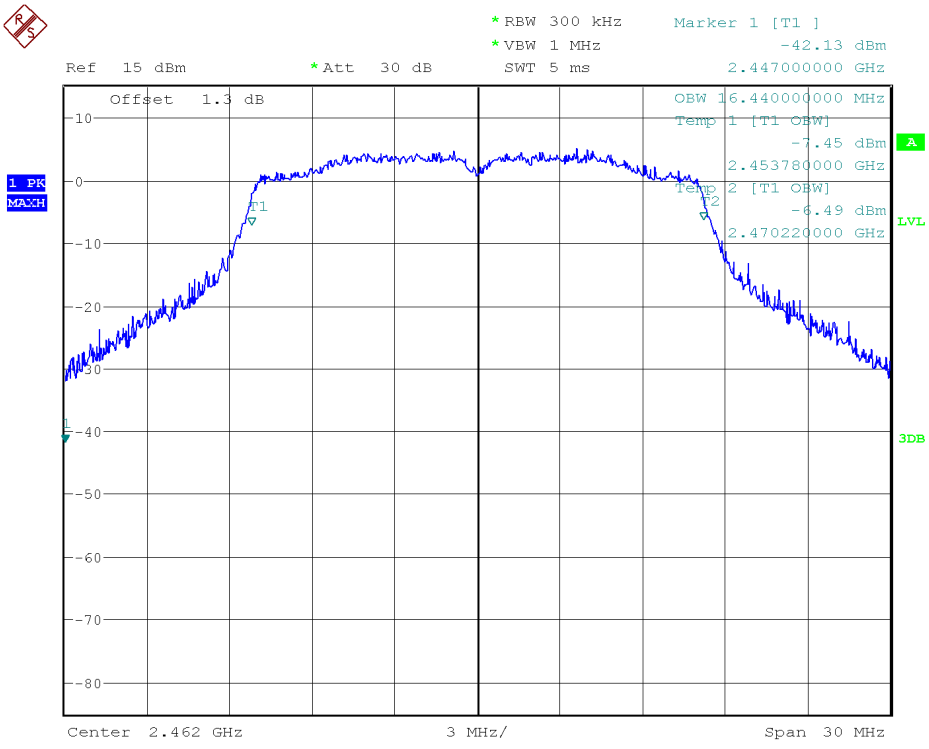
Middle Channel: 2437 MHz. Chain B



Highest Channel: 2462 MHz. Chain A.

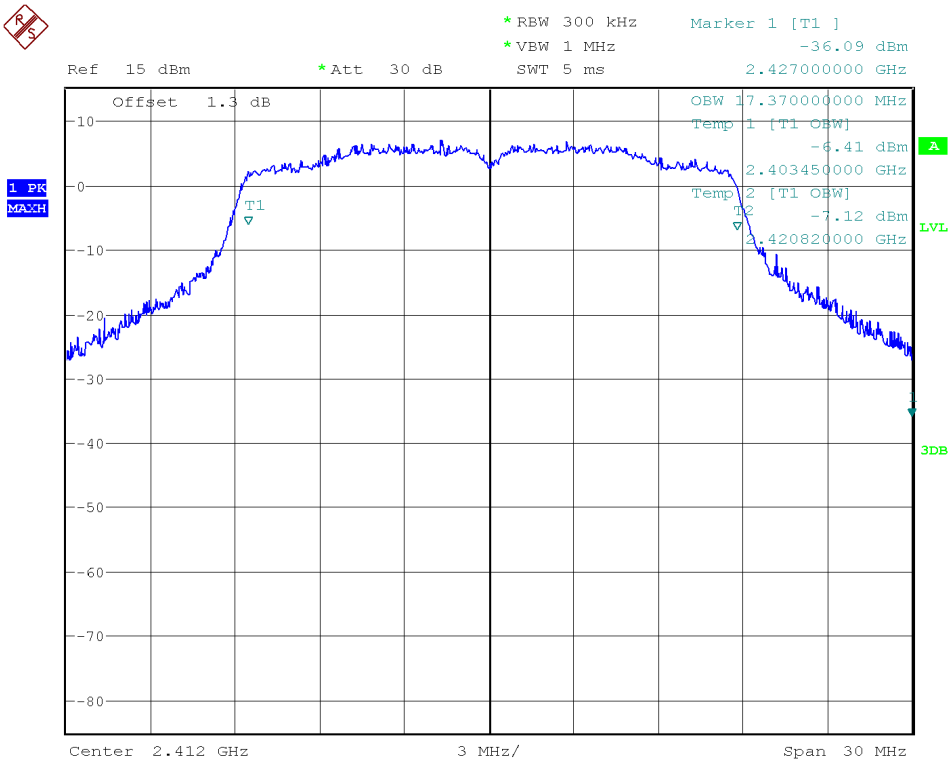


Highest Channel: 2462 MHz. Chain B.

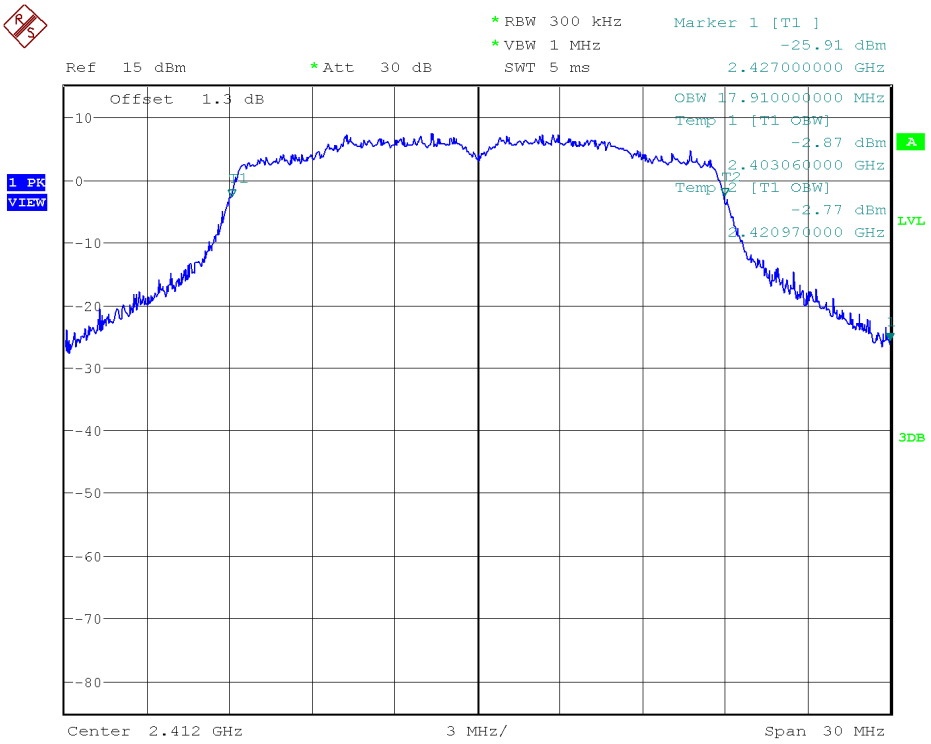


3. WiFi 2.4GHz 802.11 n20 mode

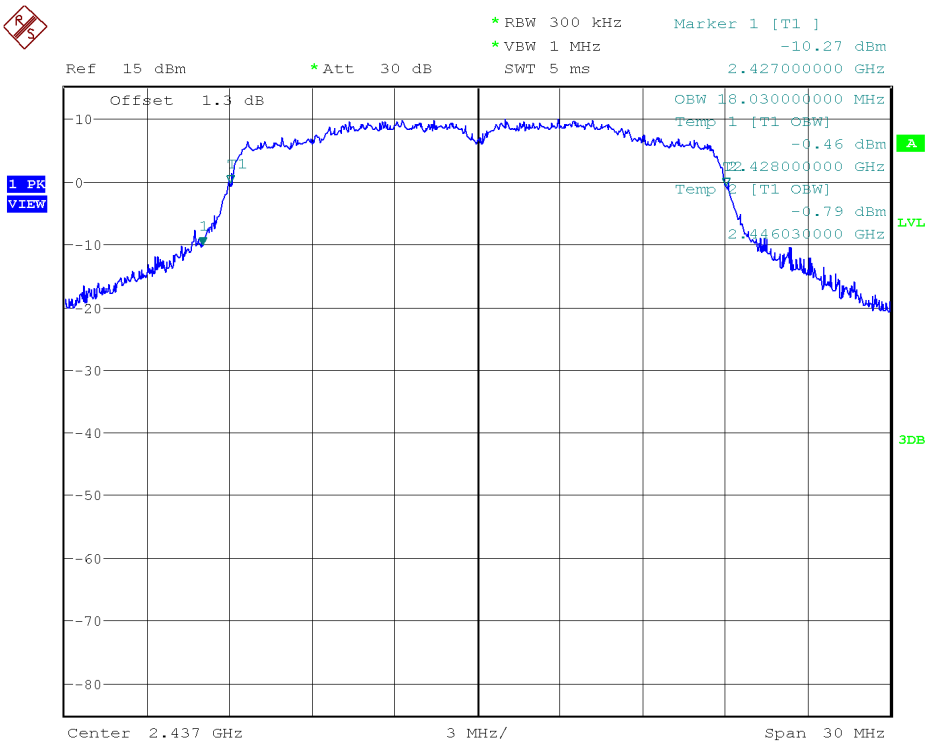
Lowest Channel: 2412 MHz. Chain A



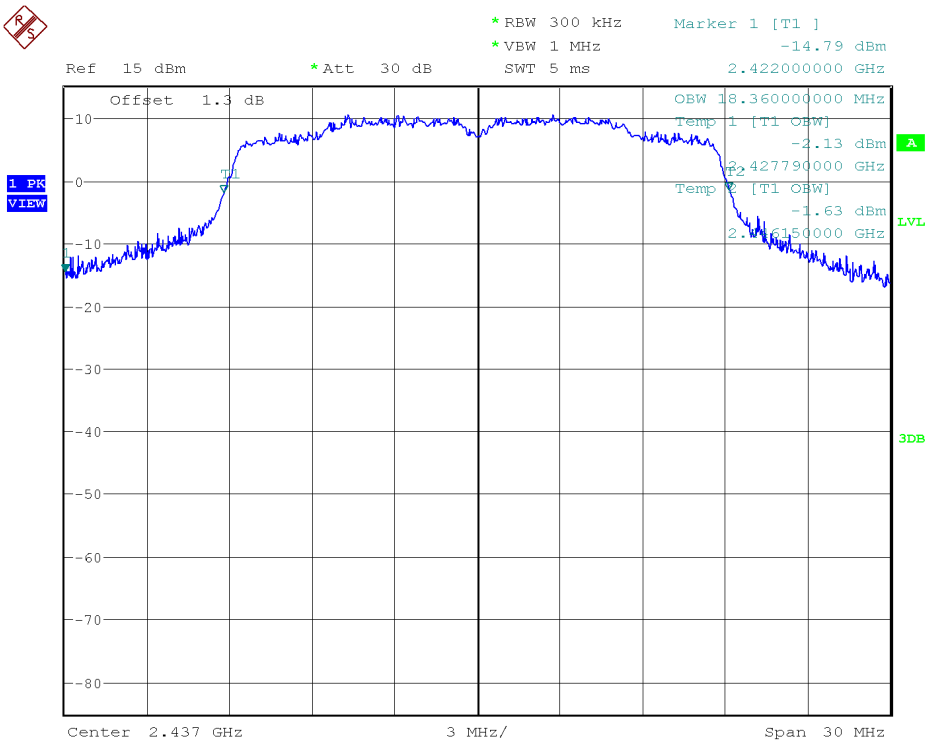
Lowest Channel: 2412 MHz. Chain B



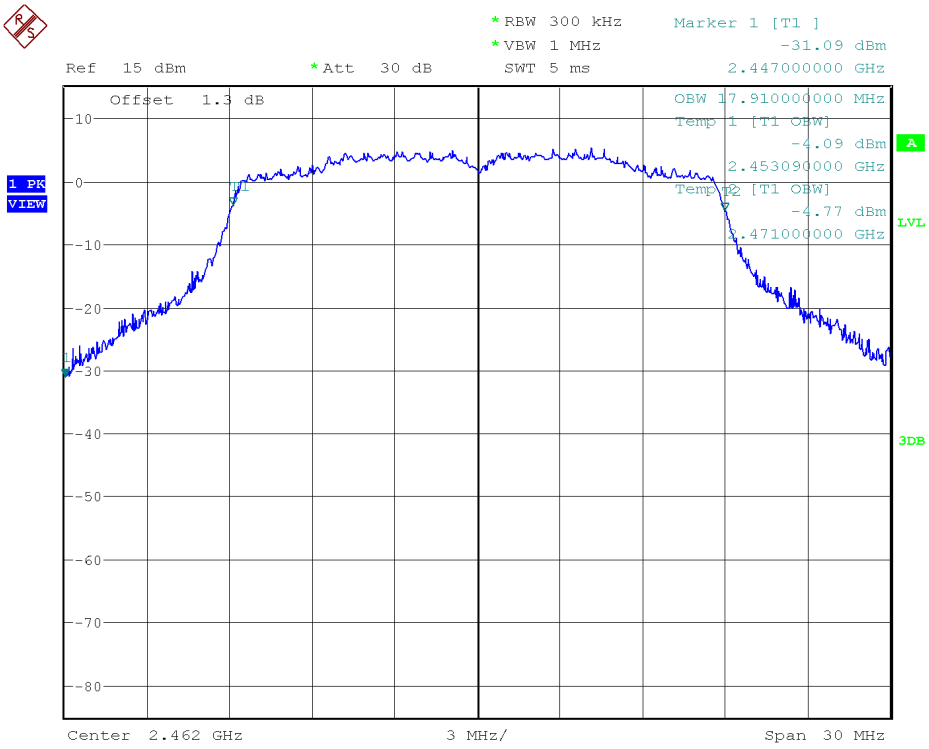
Middle Channel: 2437 MHz. Chain A



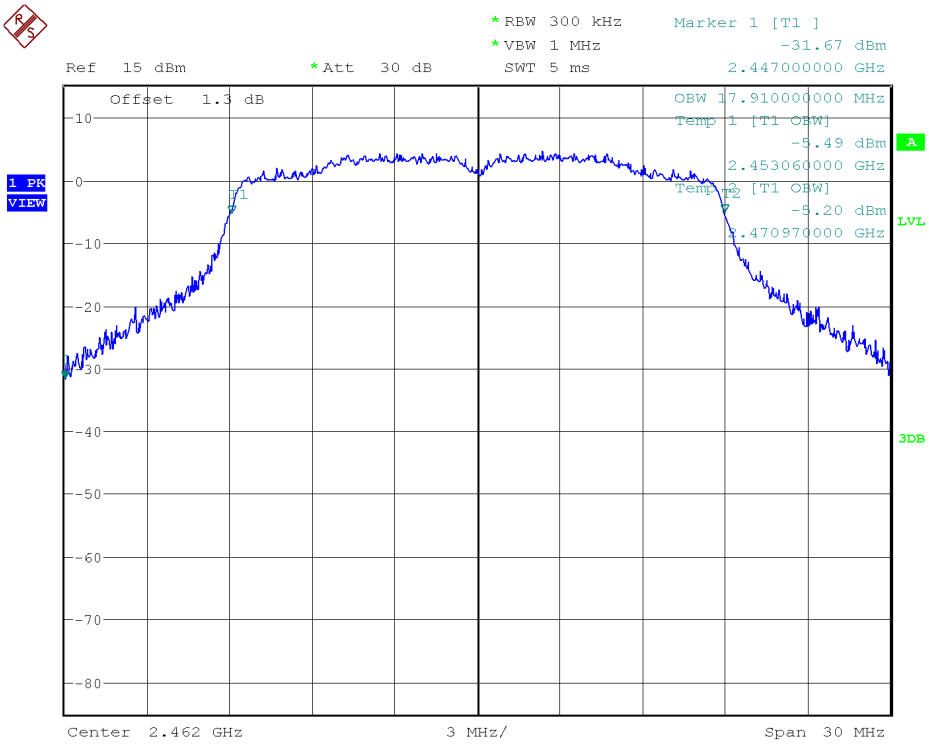
Middle Channel: 2437 MHz. Chain B



Highest Channel: 2462 MHz. Chain A.

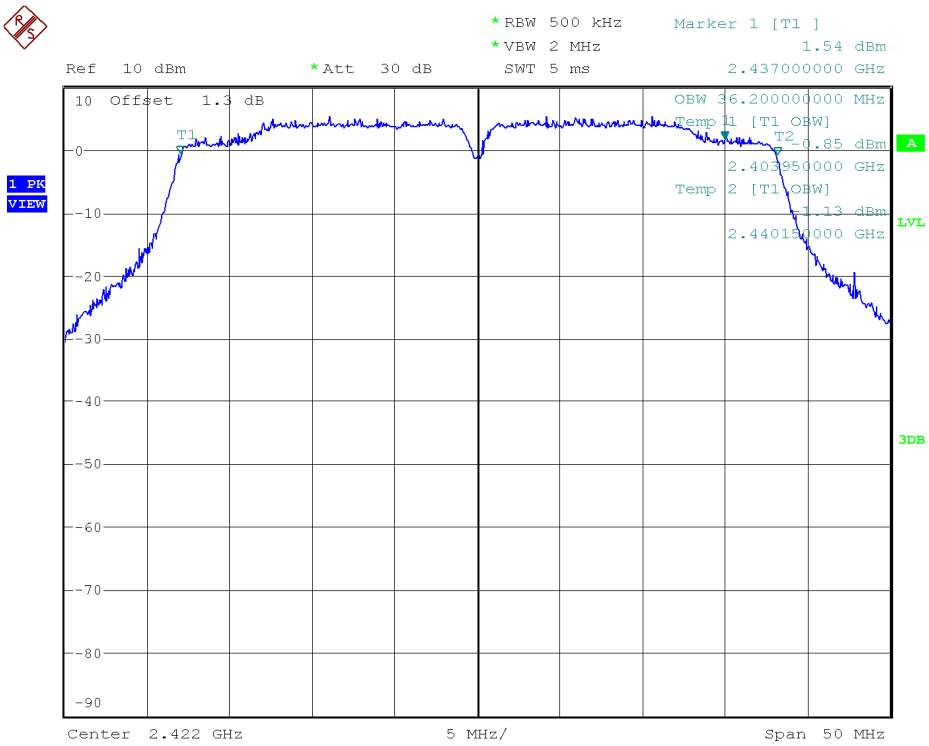


Highest Channel: 2462 MHz. Chain B.

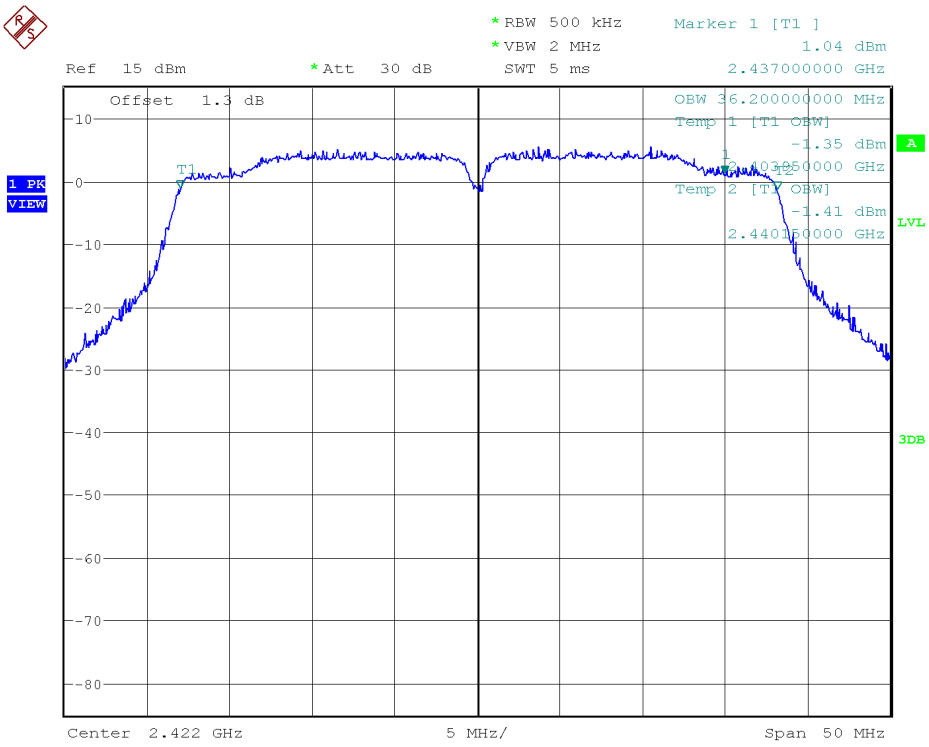


4. WiFi 2.4GHz 802.11 n40 mode

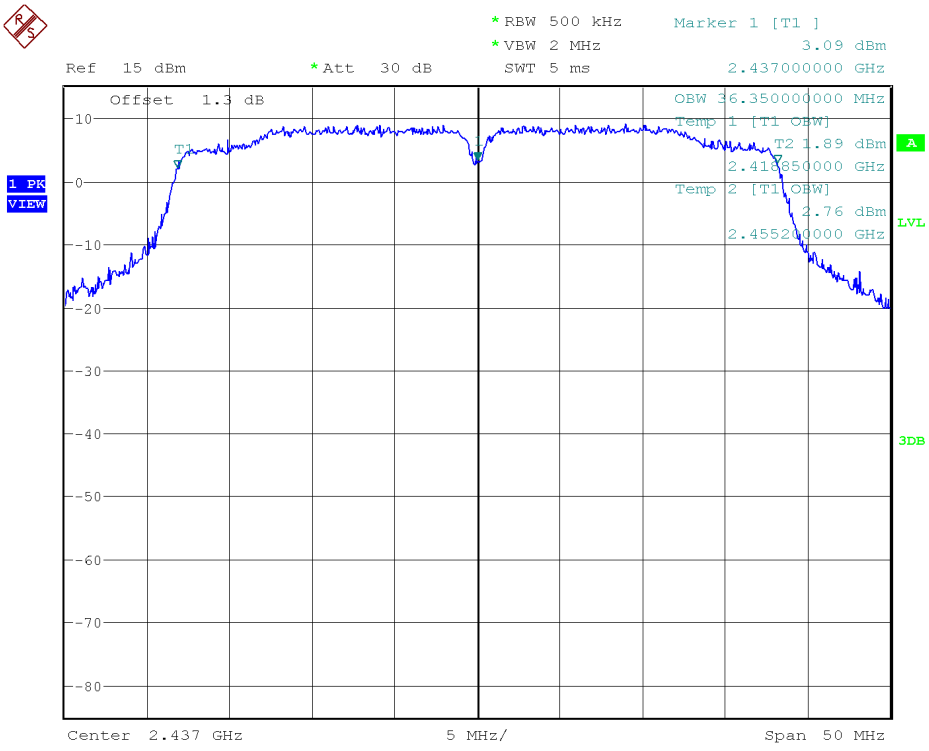
Lowest Channel: 2422 MHz. Chain A



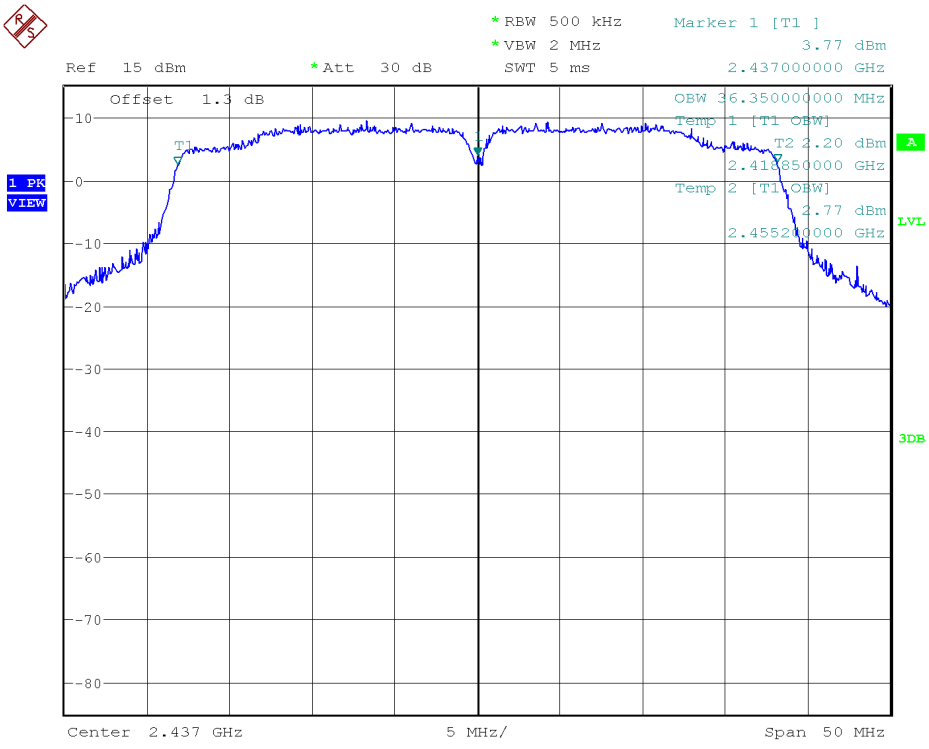
Lowest Channel: 2422 MHz. Chain B



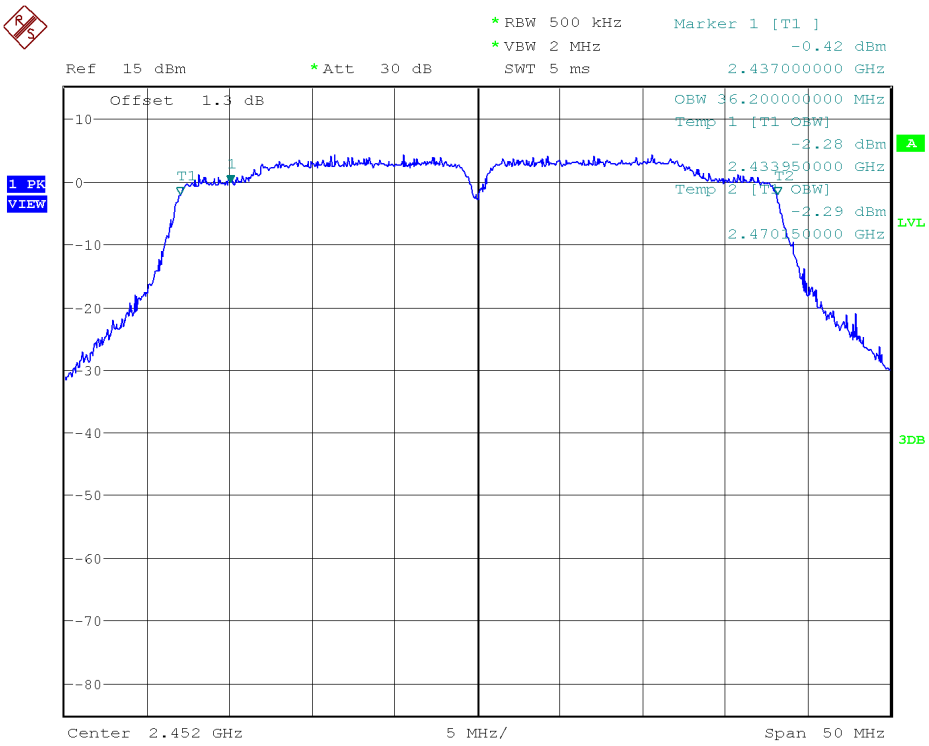
Middle Channel: 2437 MHz. Chain A



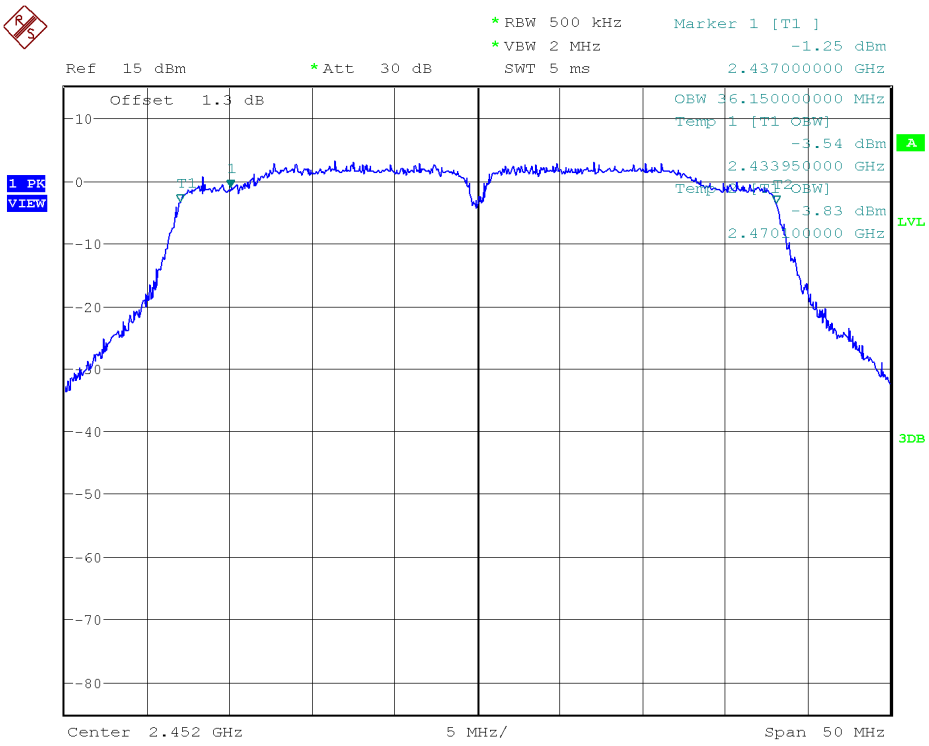
Middle Channel: 2437 MHz. Chain B



Highest Channel: 2452 MHz. Chain A.



Highest Channel: 2452 MHz. Chain B.



SPECIFICATION

The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

1. WiFi 2.4GHz 802.11 b mode

6 dB Bandwidth (see next plots).

	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
6 dB Spectrum bandwidth (MHz)	10.06	10.02	10.03	10.05	10.05	10.03
Measurement uncertainty (kHz)	±89					

Verdict: PASS

2. WiFi 2.4GHz 802.11 g mode

6 dB Bandwidth (see next plots).

	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
6 dB Spectrum bandwidth (MHz)	16.06	15.53	15.13	15.13	15.29	15.76
Measurement uncertainty (kHz)	±89					

Verdict: PASS

3. WiFi 2.4GHz 802.11 n20 mode

6 dB Bandwidth (see next plots).

	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
6 dB Spectrum bandwidth (MHz)	15.92	15.16	15.46	15.06	15.96	15.27
Measurement uncertainty (kHz)	±89					

Verdict: PASS

4. WiFi 2.4GHz 802.11 n40 mode

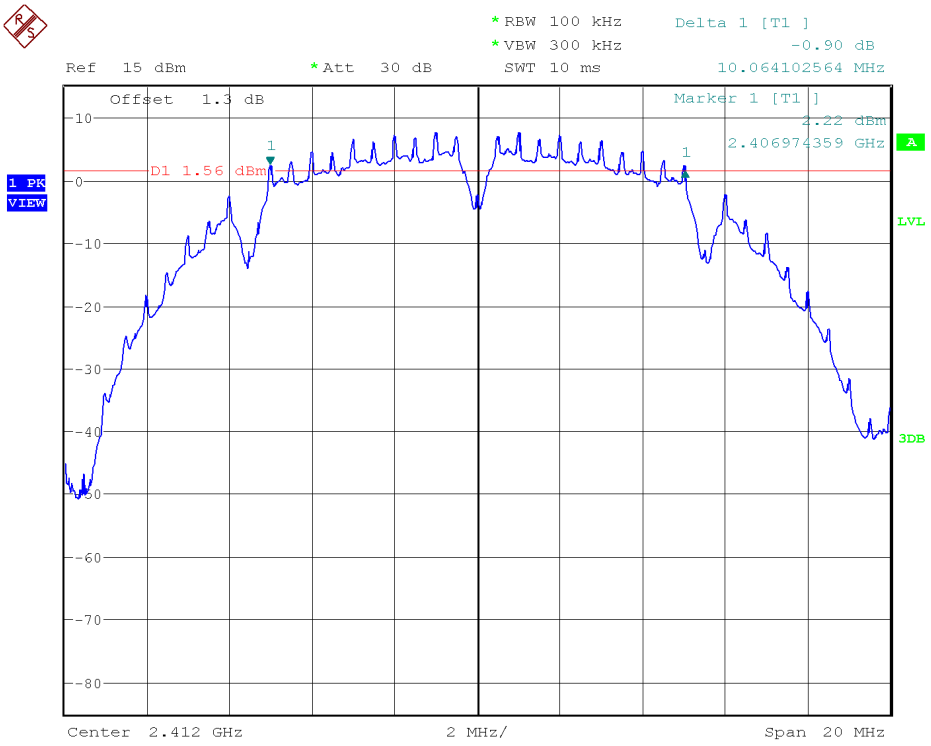
6 dB Bandwidth (see next plots).

	Lowest frequency 2422 MHz		Middle frequency 2437 MHz		Highest frequency 2452 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
6 dB Spectrum bandwidth (MHz)	35.13	35.13	35.13	35.13	35.13	35.13
Measurement uncertainty (kHz)	±89					

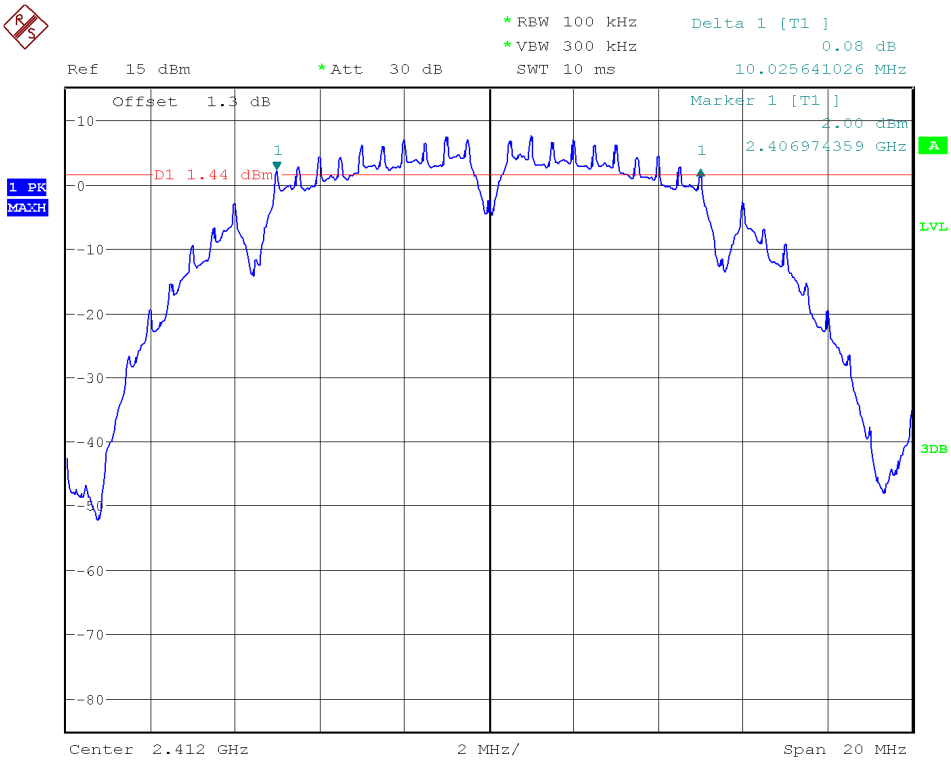
Verdict: PASS

1. WiFi 2.4GHz 802.11 b mode

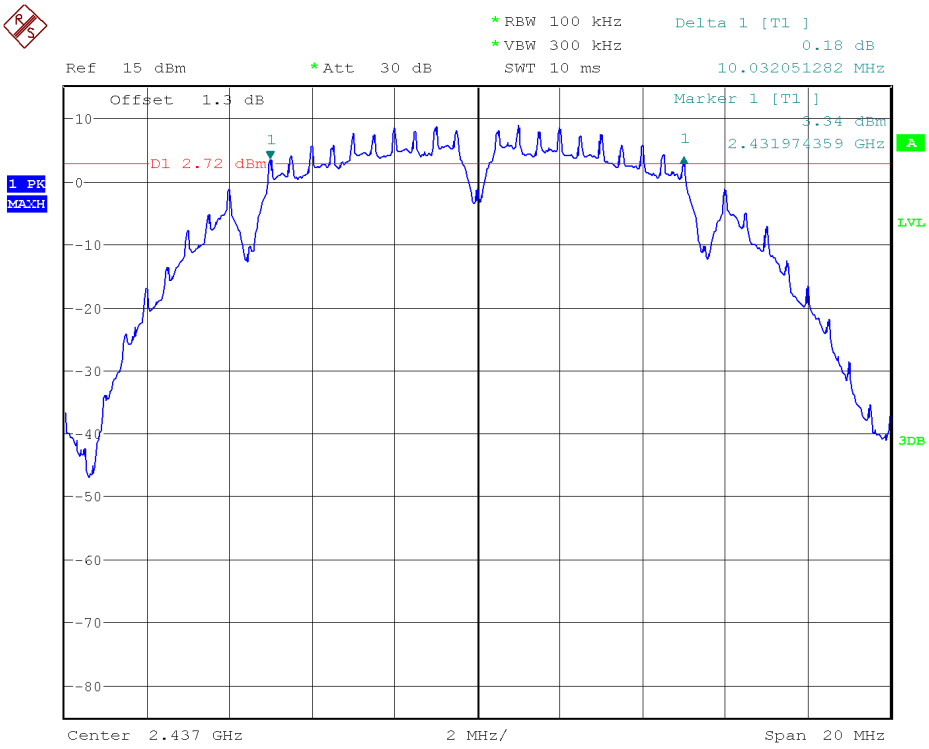
Lowest Channel: 2412 MHz. Chain A.



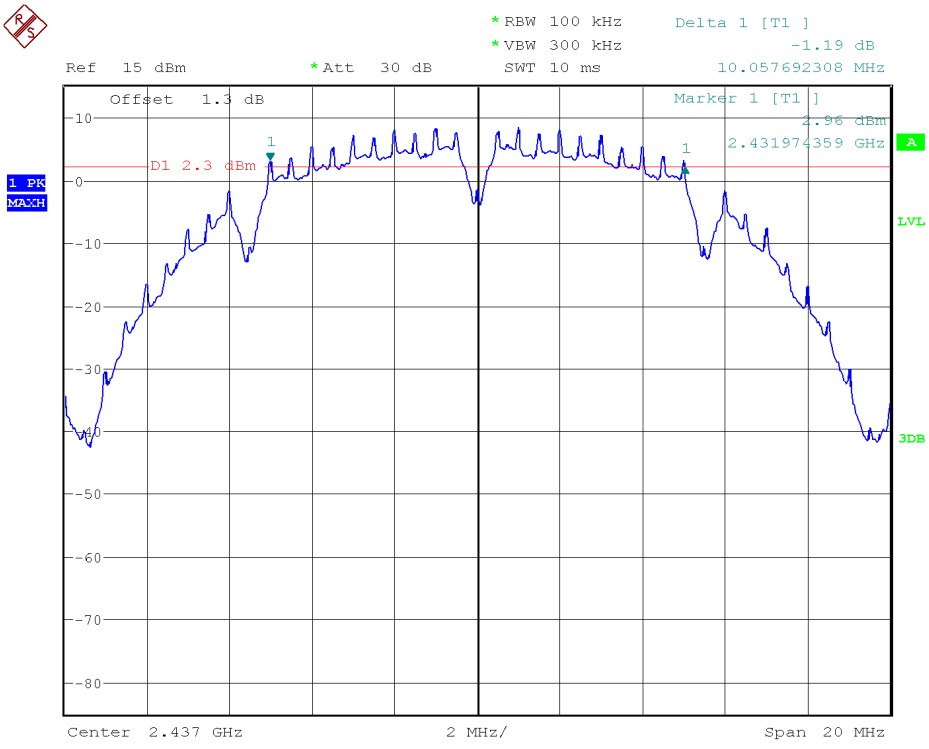
Lowest Channel: 2412 MHz. Chain B.



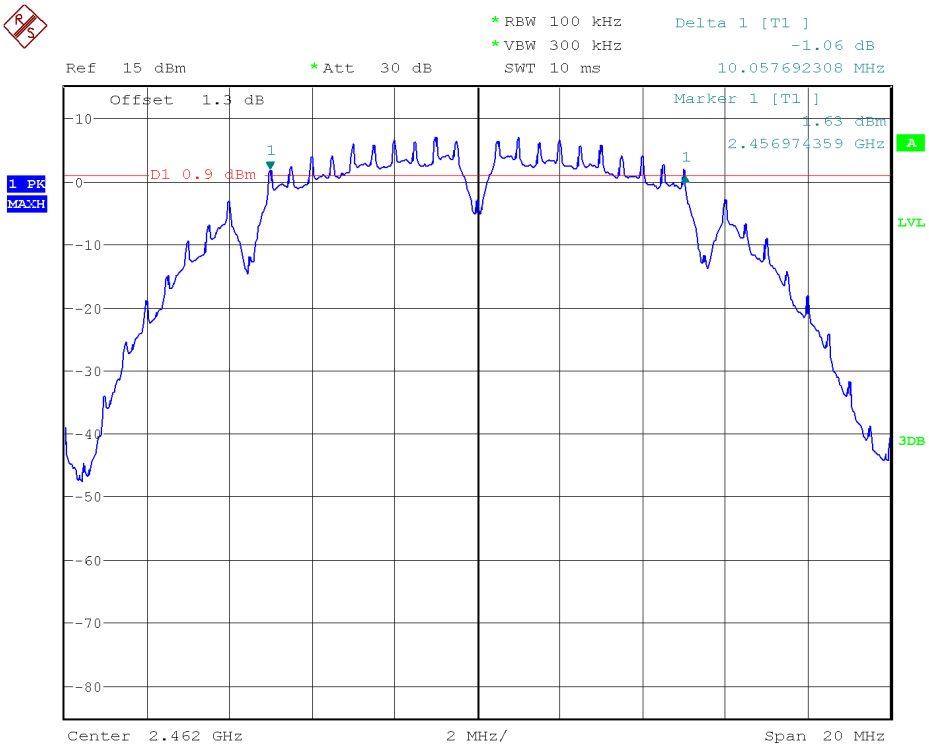
Middle Channel: 2437 MHz. Chain A



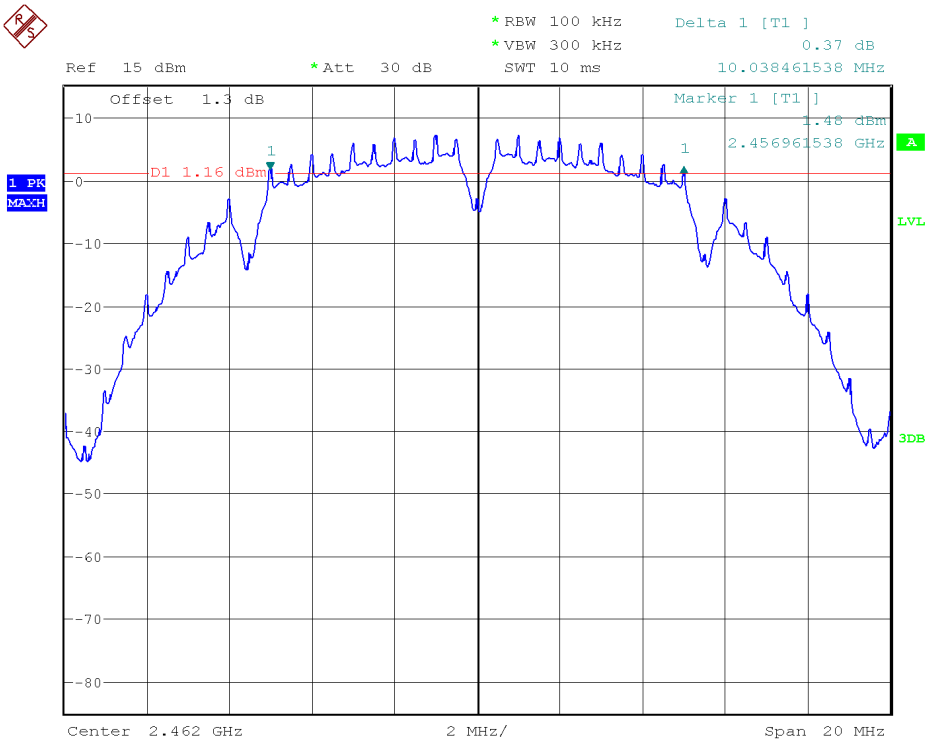
Middle Channel: 2437 MHz. Chain B.



Highest Channel: 2462 MHz. Chain A.

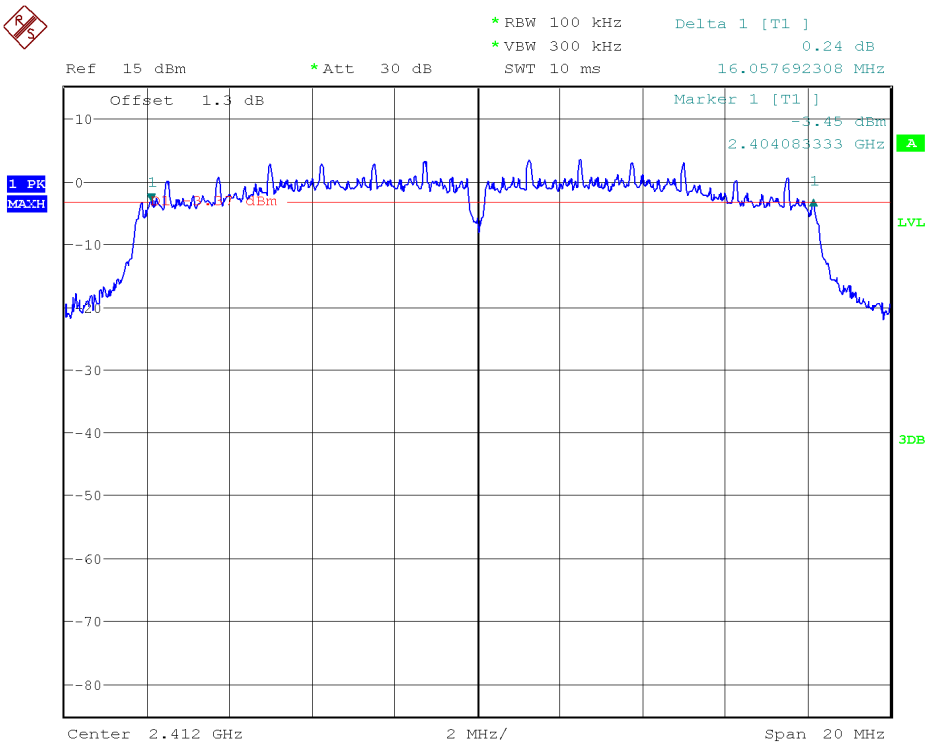


Highest Channel: 2462 MHz. Chain B.

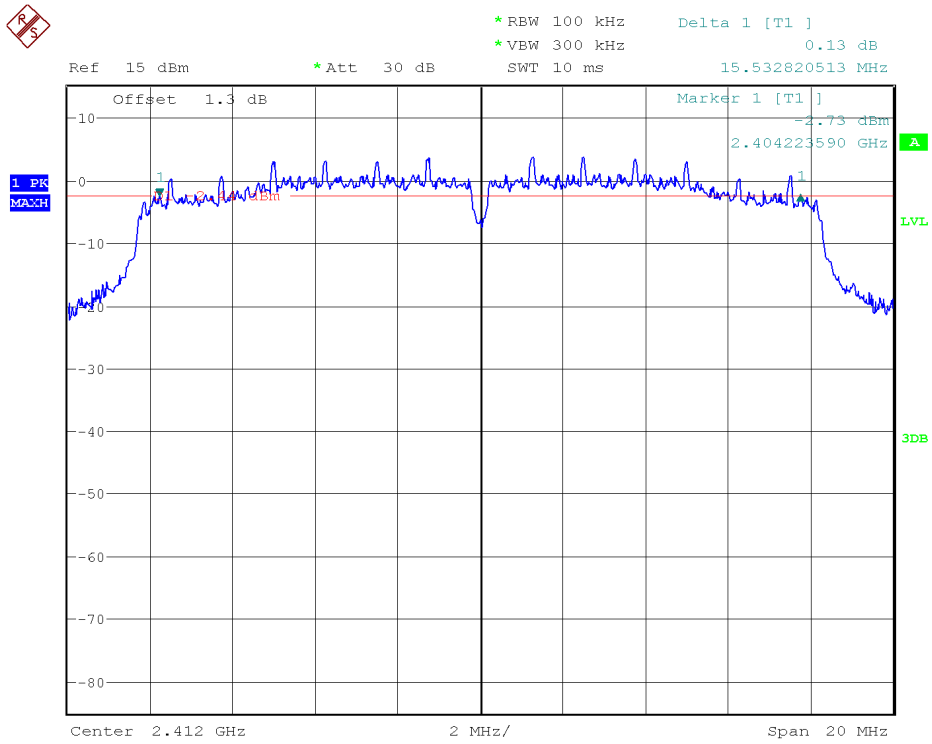


2. WiFi 2.4GHz 802.11 g mode

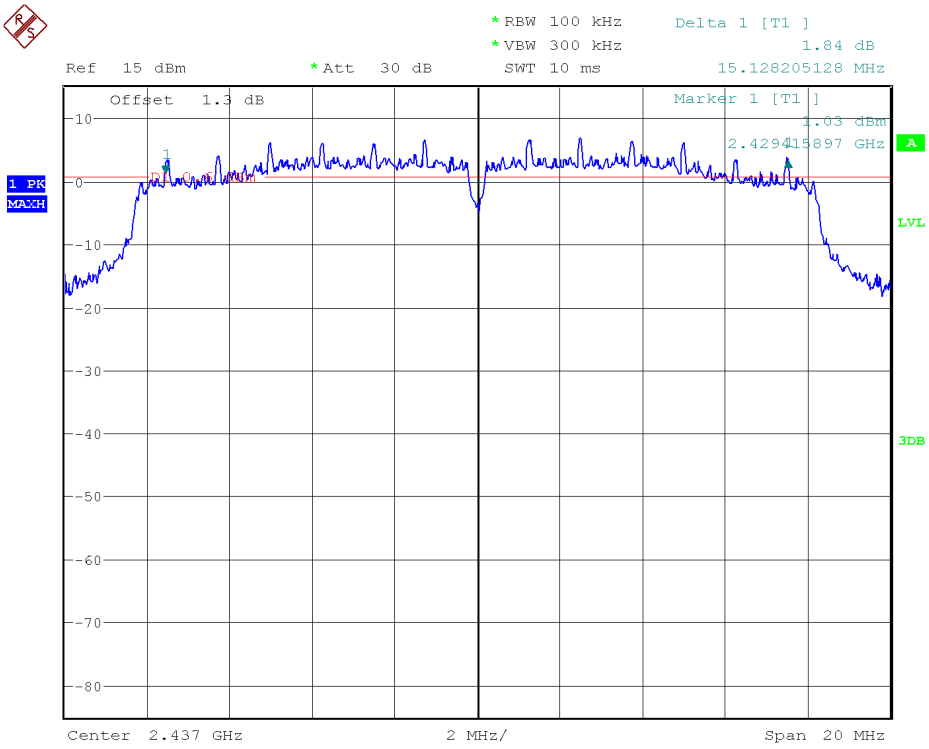
Lowest Channel: 2412 MHz. Chain A



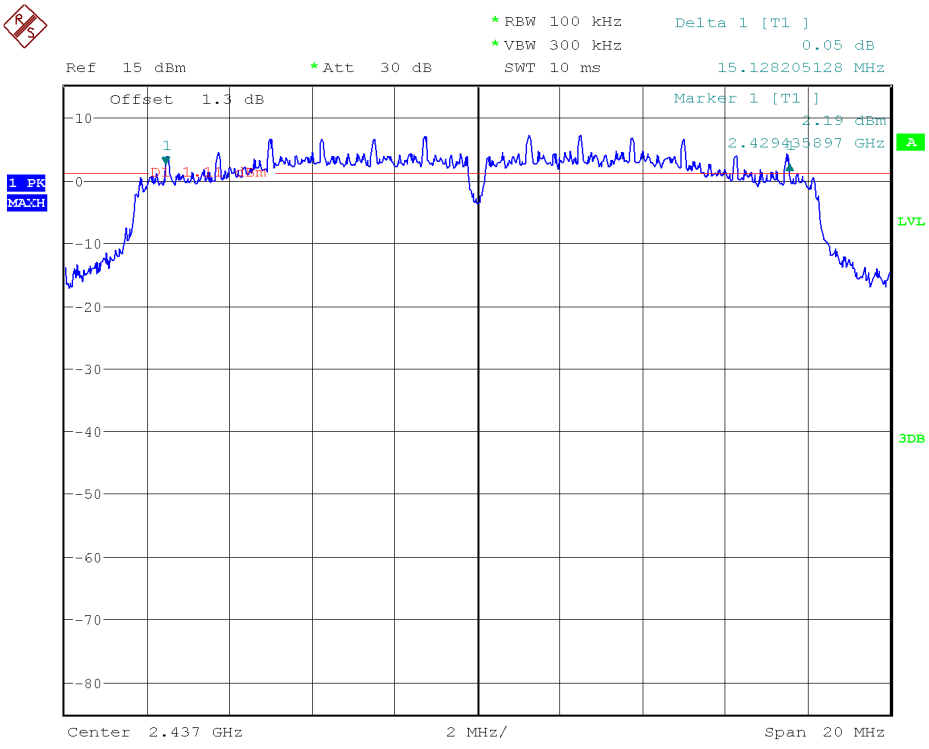
Lowest Channel: 2412 MHz. Chain B



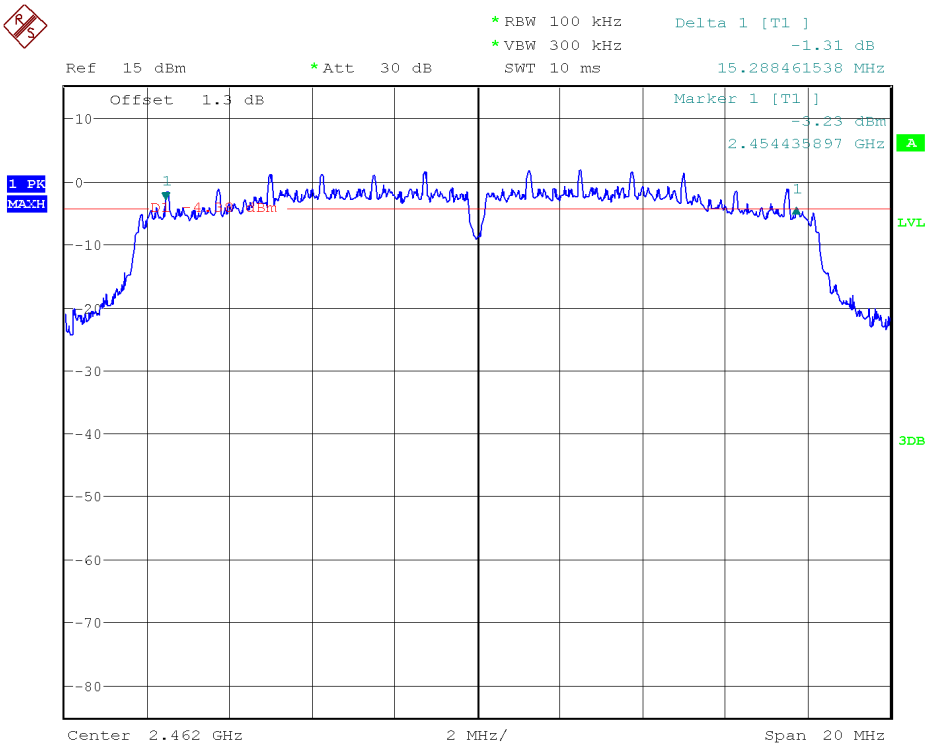
Middle Channel: 2437 MHz. Chain A



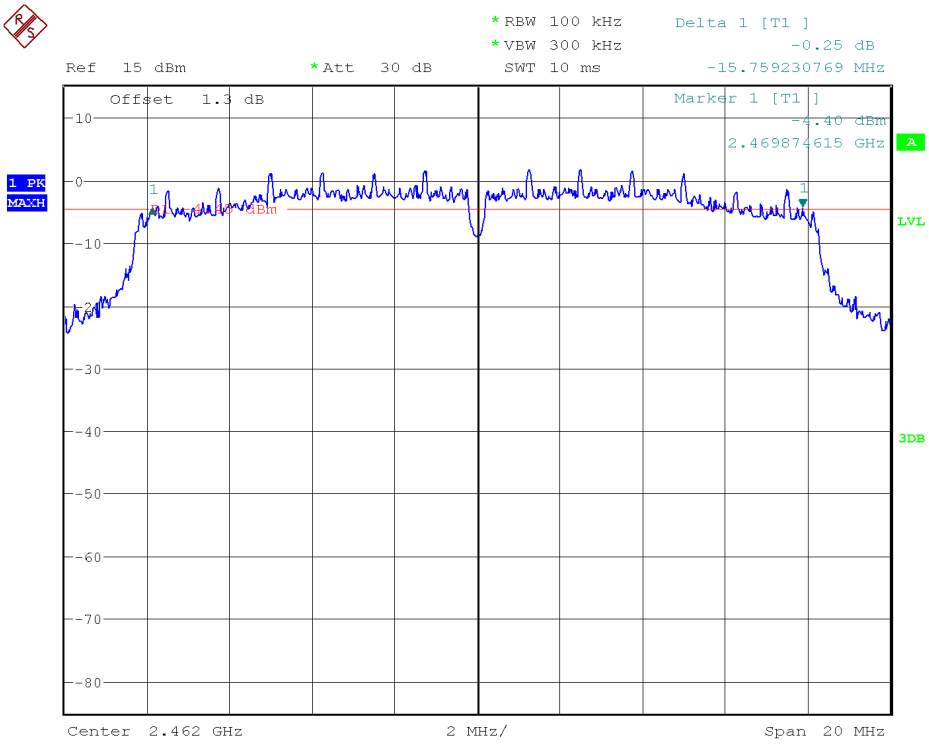
Middle Channel: 2437 MHz. Chain B



Highest Channel: 2462 MHz. Chain A

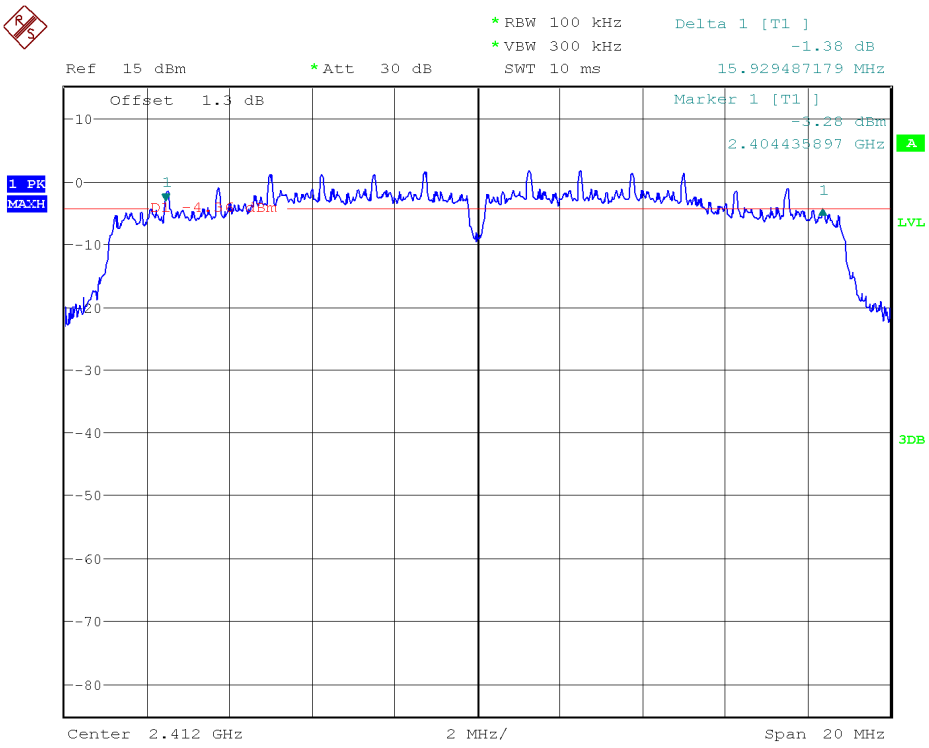


Highest Channel: 2462 MHz. Chain B

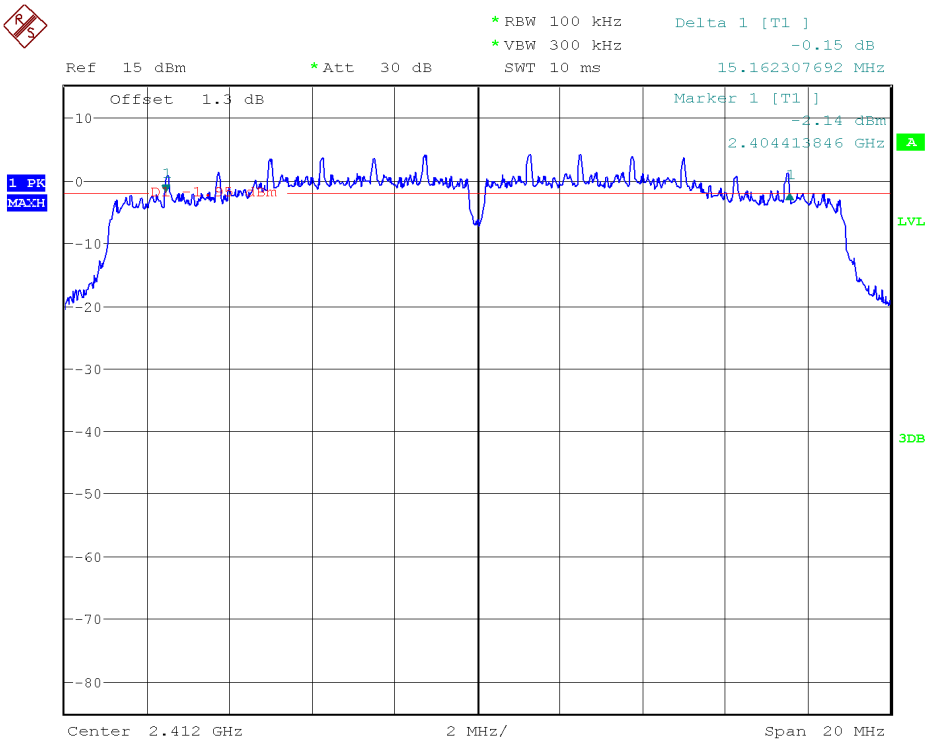


3. WiFi 2.4GHz 802.11 n20 mode

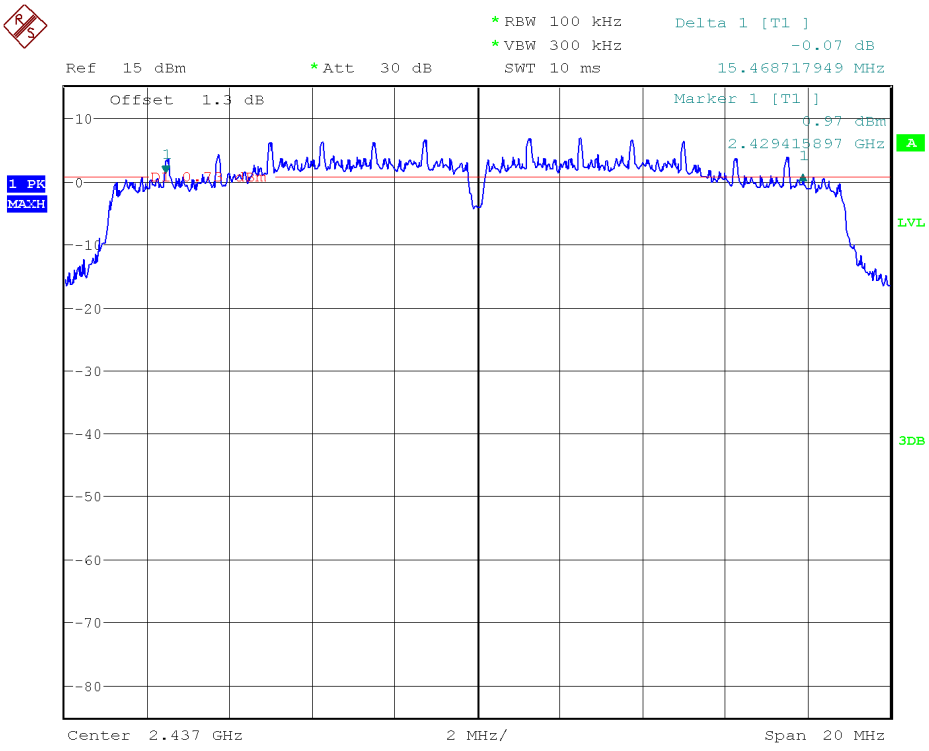
Lowest Channel: 2412 MHz. Chain A



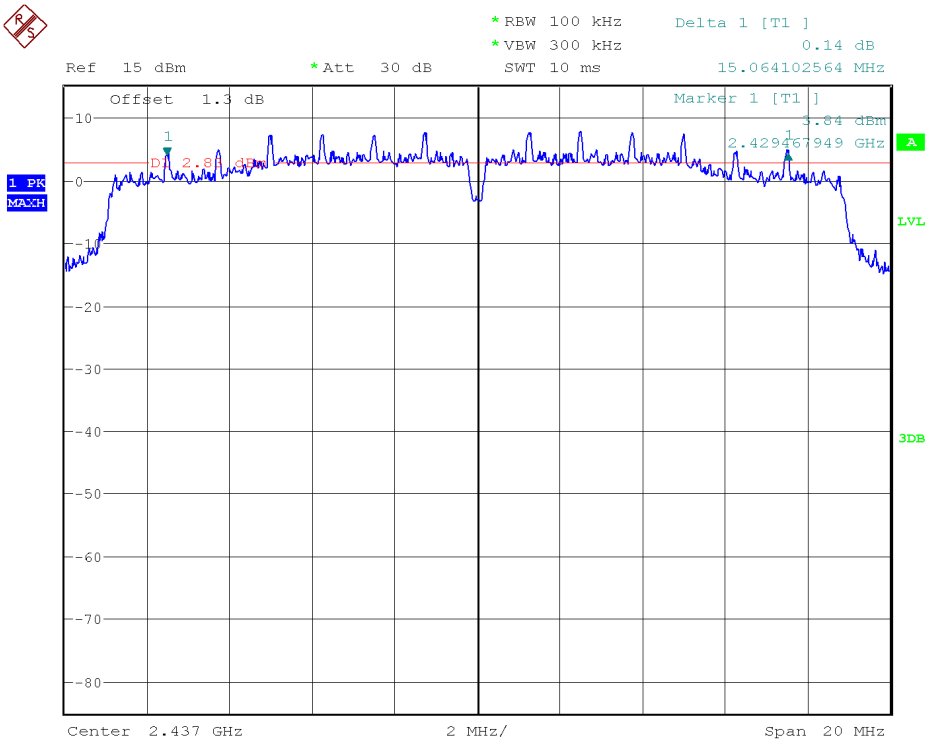
Lowest Channel: 2412 MHz. Chain B



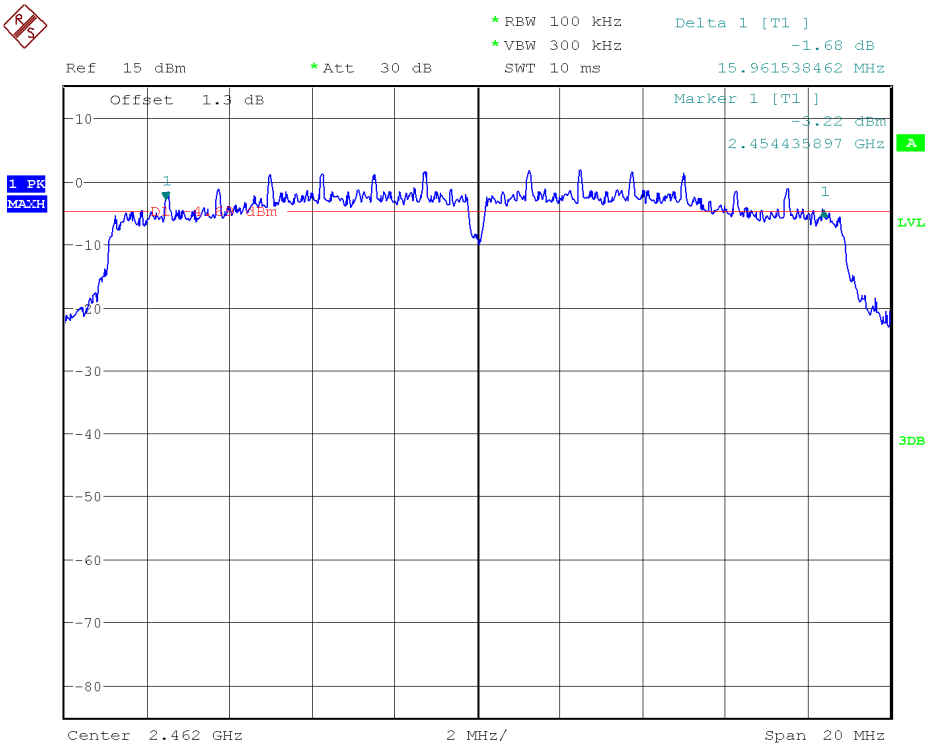
Middle Channel: 2437 MHz. Chain A



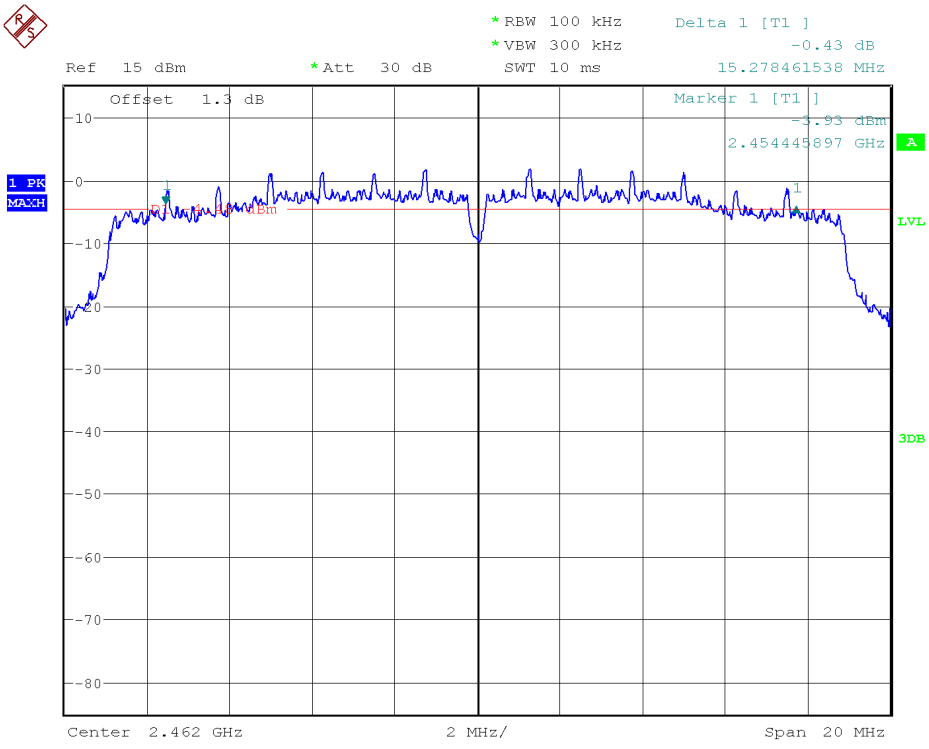
Middle Channel: 2437 MHz. Chain B



Highest Channel: 2462 MHz. Chain A

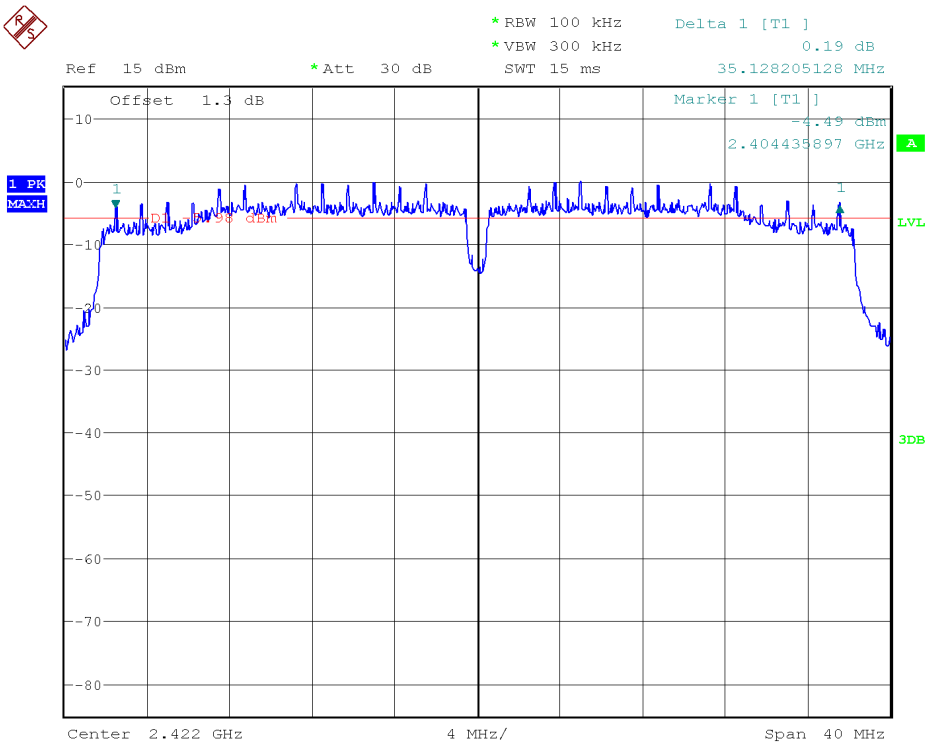


Highest Channel: 2462 MHz. Chain B

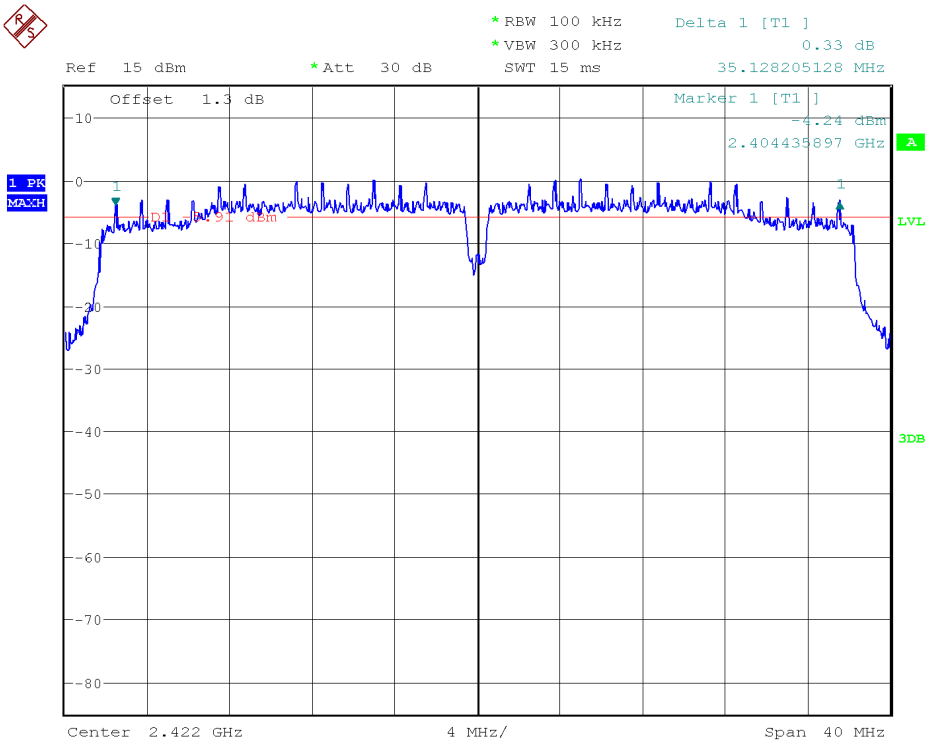


4. WiFi 2.4GHz 802.11 n40 mode

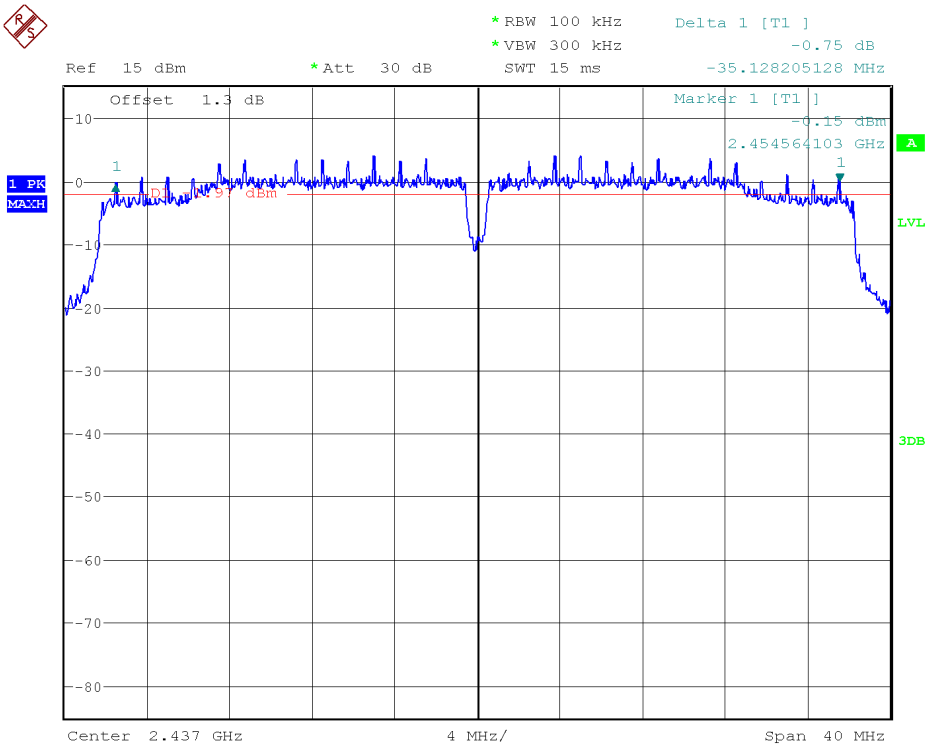
Lowest Channel: 2422 MHz. Chain A



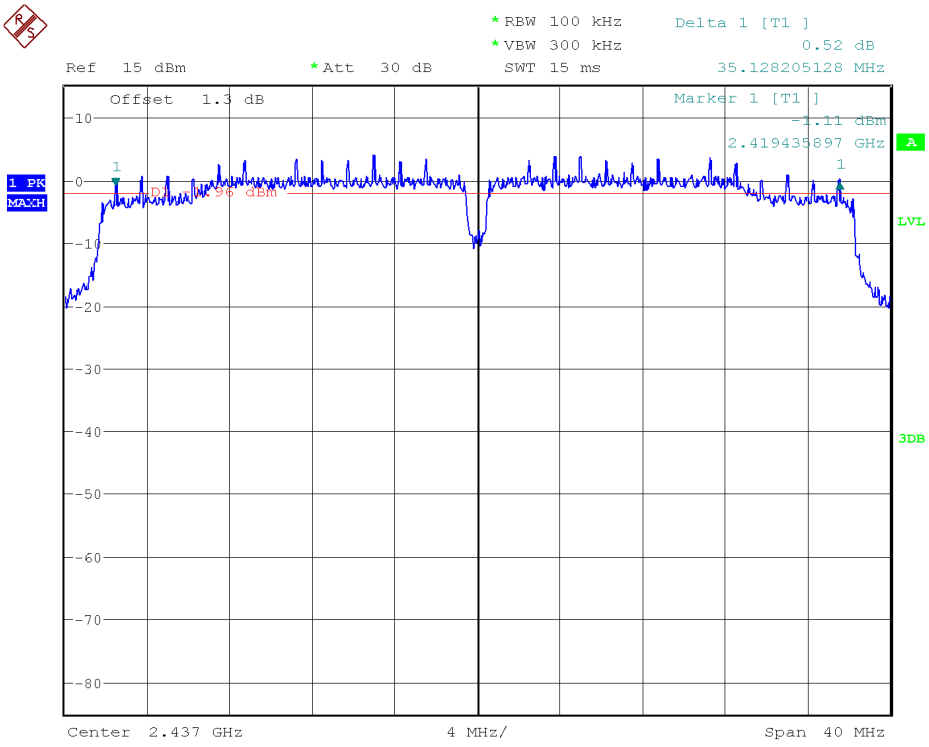
Lowest Channel: 2422 MHz. Chain B



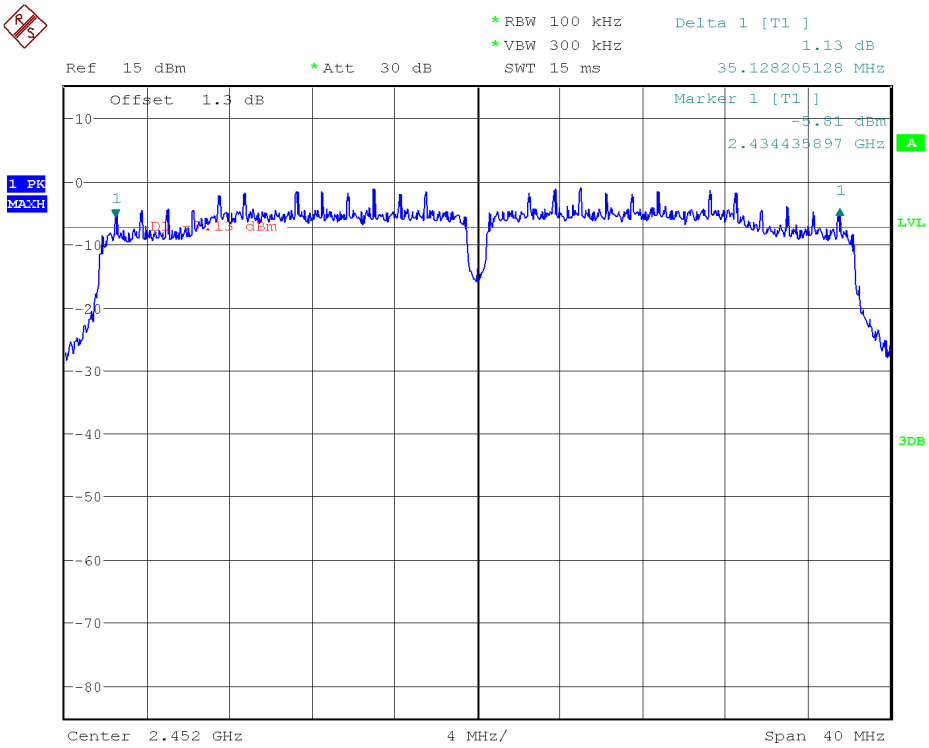
Middle Channel: 2437 MHz. Chain A



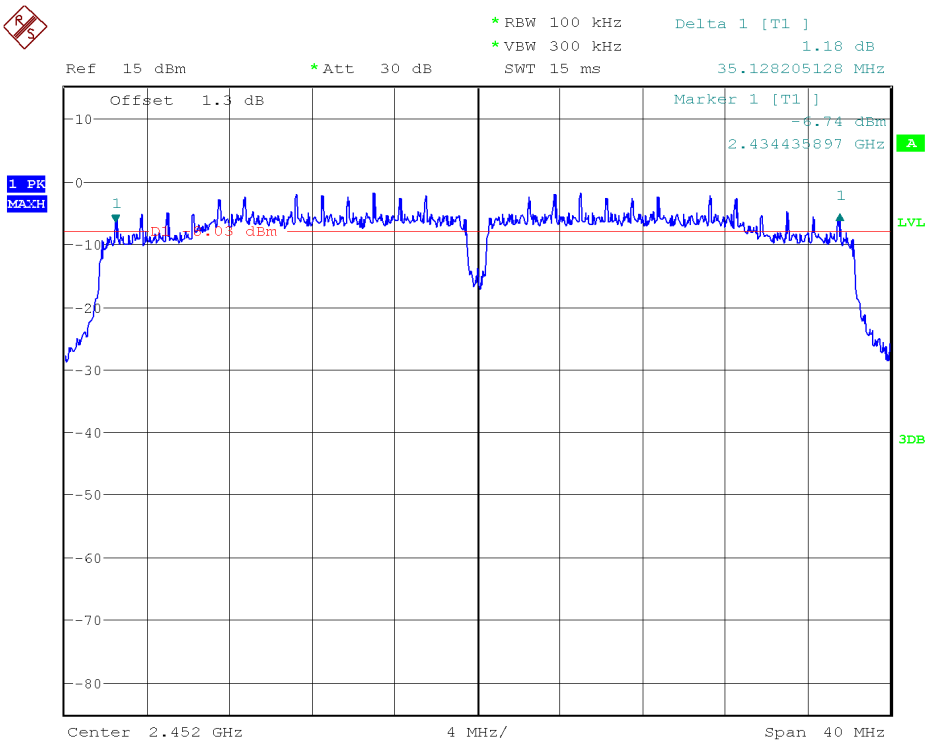
Middle Channel: 2437 MHz. Chain B



Highest Channel: 2452 MHz. Chain A



Highest Channel: 2452 MHz. Chain B



Section 15.247 Subclause (b) / RSS-210 A8.4. (4). Maximum output power and antenna gain

SPECIFICATION

The maximum peak conducted output power of the intentional radiator shall not exceed 1 watt (30 dBm). The e.i.r.p. shall not exceed 4 W (36 dBm) (Canada).

RESULTS

The maximum Peak Conducted Output Power was measured using the channel integration method according to point 9.1.2. of Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v03r01 dated 09/04/2013. This method was used for 802.11g and 802.11n20 modes.

The maximum conducted (average) output power was measured using the method according to point 9.2.1.2. of Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v03r01 dated 09/04/2013. This method was used for 802.11b and 802.11n40 modes.

In the measure-and-sum approach for MIMO mode, the conducted emission level (*e.g.*, transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in linear power units (mW—not dBm).

The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.

For MIMO mode, the Guidance on directional Gain calculations according to the Guidance for Emission Testing of Transmitters with Multiple Outputs in the Same Band 662911 D01 Multiple Transmitter Output v02r01 dated 10/31/2013 was used.
The number of transmit antennas (N_{ANT}) are 2 and the number of spatial streams (Nss) are 2 and therefore the Array Gain is 0 dB.

1. WiFi 2.4GHz 802.11 b mode

MAXIMUM OUTPUT POWER. Conducted (average) output power (See next plot of worst case: Highest power levels).

Maximum declared antenna gain: 3.24 dBi.

	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
Maximum conducted power (dBm)	16.12	16.33	17.21	17.31	16.55	16.20
Maximum EIRP power (dBm)	19.36	19.57	20.45	20.55	19.79	19.44
Measurement uncertainty (dB)	±1.5					

Verdict: PASS

2. WiFi 2.4GHz 802.11 g mode

MAXIMUM OUTPUT POWER. Peak Conducted Output Power (See next plot of worst case: Highest power level).

Maximum declared antenna gain: 3.24 dBi.

	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
Maximum conducted power (dBm)	16.86	17.04	20.18	20.49	15.29	14.89
Maximum EIRP power (dBm)	20.10	20.28	23.42	23.73	18.53	18.13
Measurement uncertainty (dB)	±1.5					

Verdict: PASS

Conducted (average) output power. These results are for information purposes only.

Maximum declared antenna gain: 3.24 dBi.

	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
Maximum conducted power (dBm)	13.91	14.37	17.19	17.60	12.13	12.64
Maximum EIRP power (dBm)	17.15	17.61	20.43	20.84	15.37	15.88
Measurement uncertainty (dB)	±1.5					

3. WiFi 2.4GHz 802.11 n20 mode

MAXIMUM OUTPUT POWER. Peak Conducted Output Power (See next plot of worst case: Highest power level).

Maximum declared antenna gain: 3.24 dBi.

	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
Maximum conducted power (dBm)	16.57	17.02	20.00	20.72	15.24	14.87
Maximum EIRP power (dBm)	19.81	20.26	23.24	23.96	18.48	18.11
Measurement uncertainty (dB)	±1.5					

MIMO	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A+B		Chain A+B		Chain A+B	
	Port A	Port B	Port A	Port B	Port A	Port B
Maximum conducted power (dBm)	14.85	14.26	25.57	26.54	14.16	14.57
	Port A+B		Port A+B		Port A+B	
Maximum conducted power (dBm)	17.57		29.09		17.38	
Maximum EIRP power (dBm)	20.81		32.33		20.62	
Measurement uncertainty (dB)	±1.5		±1.2		±1.5	

Verdict: PASS

Conducted (average) output power. These results are for information purposes only.

Maximum declared antenna gain: 3.24 dBi.

	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
Maximum conducted power (dBm)	13.76	14.65	17.18	17.84	12.15	12.18
Maximum EIRP power (dBm)	17.00	17.89	20.42	21.08	15.39	15.42
Measurement uncertainty (dB)	±1.5					

MIMO	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A+B		Chain A+B		Chain A+B	
	Port A	Port B	Port A	Port B	Port A	Port B
Maximum conducted power (dBm)	11.68	11.98	17.13	17.20	12.07	11.90
	Port A+B		Port A+B		Port A+B	
Maximum conducted power (dBm)	14.84		20.18		14.99	
Maximum EIRP power (dBm)	18.08		23.42		18.23	
Measurement uncertainty (dB)	±1.5		±1.2		±1.5	

4. WiFi 2.4GHz 802.11 n40 mode

MAXIMUM OUTPUT POWER. Conducted (average) output power (See next plot of worst case: Highest power level).
Maximum declared antenna gain: 3.24 dBi.

	Lowest frequency 2422 MHz		Middle frequency 2437 MHz		Highest frequency 2452 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
Maximum conducted power (dBm)	13.27	13.54	17.25	17.34	12.29	11.28
Maximum EIRP power (dBm)	16.51	16.78	20.49	20.58	15.53	14.52
Measurement uncertainty (dB)	±1.5					

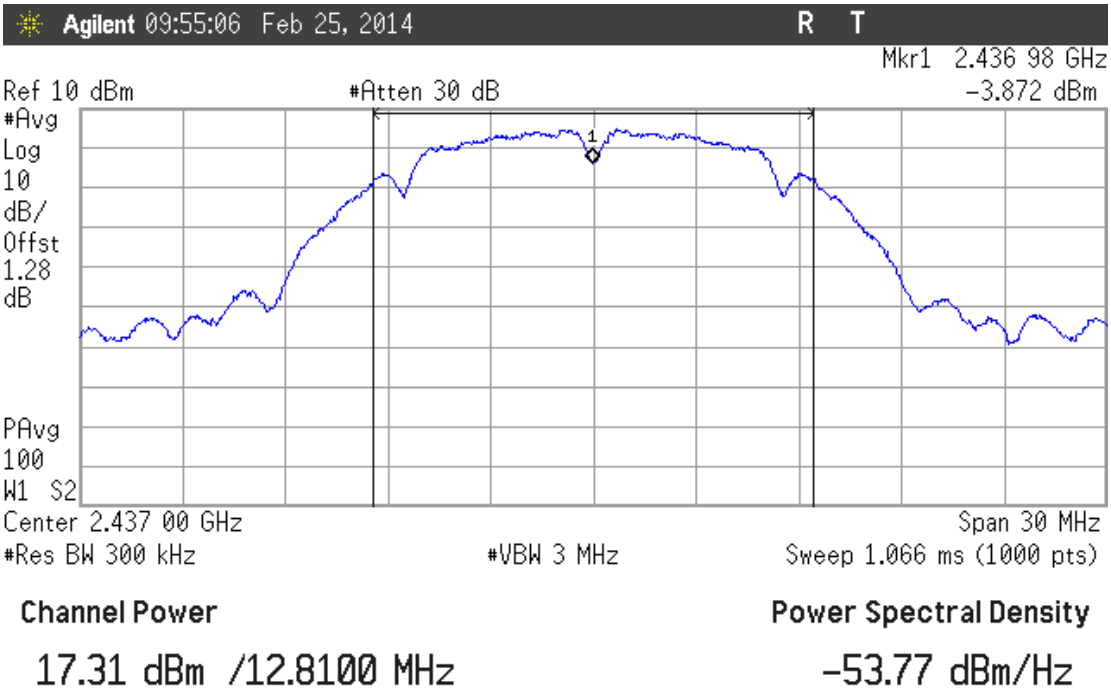
MIMO	Lowest frequency 2422 MHz		Middle frequency 2437 MHz		Highest frequency 2452 MHz	
	Chain A+B		Chain A+B		Chain A+B	
	Port A	Port B	Port A	Port B	Port A	Port B
Maximum conducted power (dBm)	9.54	9.53	13.54	13.45	9.37	9.37
	Port A+B		Port A+B		Port A+B	
Maximum conducted power (dBm)	12.54		16.50		12.38	
Maximum EIRP power (dBm)	15.78		19.74		15.62	
Measurement uncertainty (dB)	±1.5					

Verdict: PASS

The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

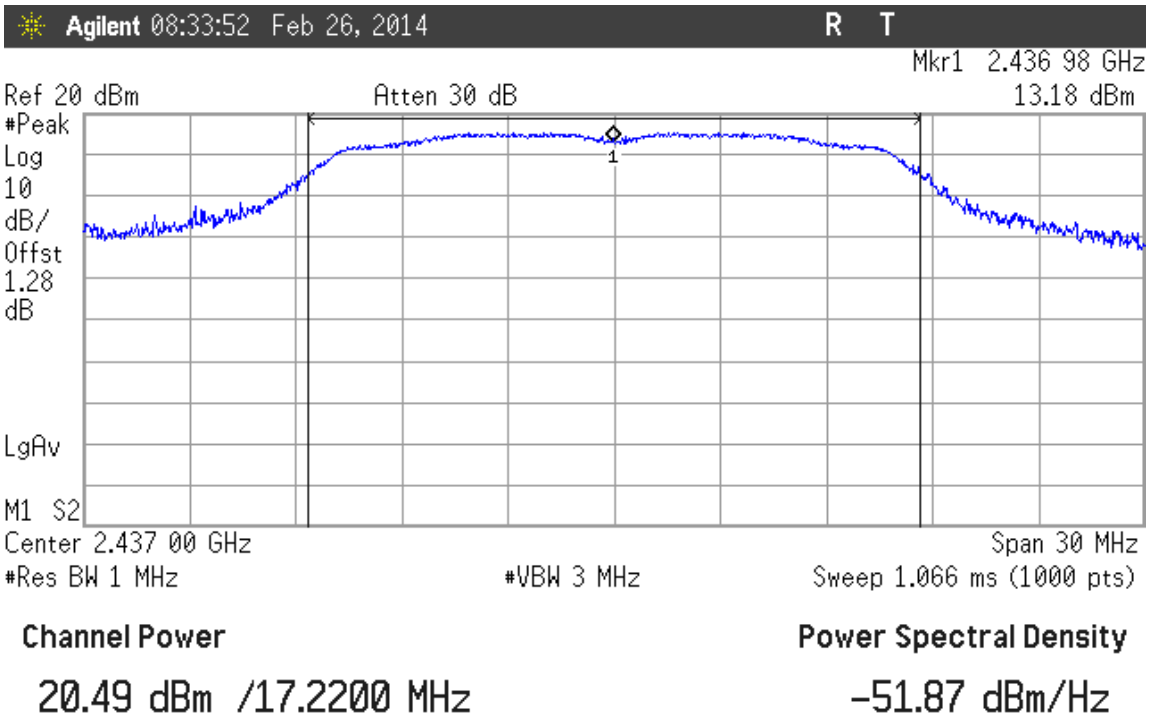
1. WiFi 2.4GHz 802.11 b mode

Middle frequency 2437 MHz. Chain B.



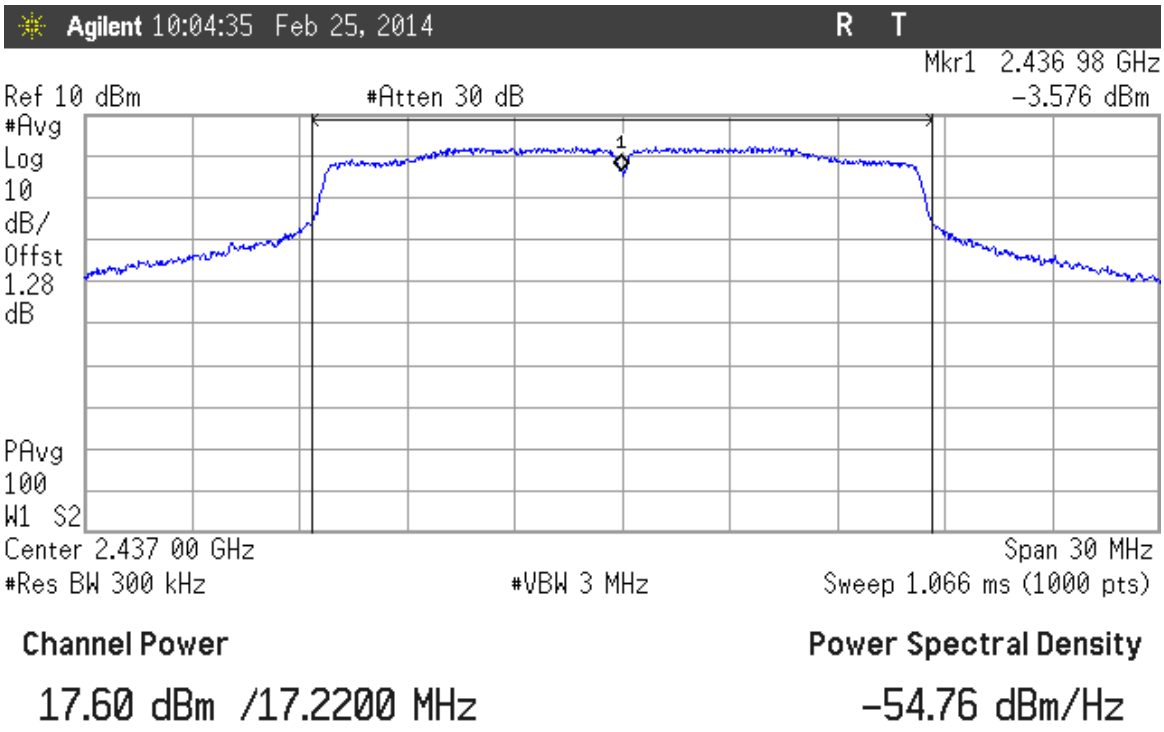
2. WiFi 2.4GHz 802.11 g mode

Peak conducted output power.
Middle frequency 2437 MHz. Chain B.



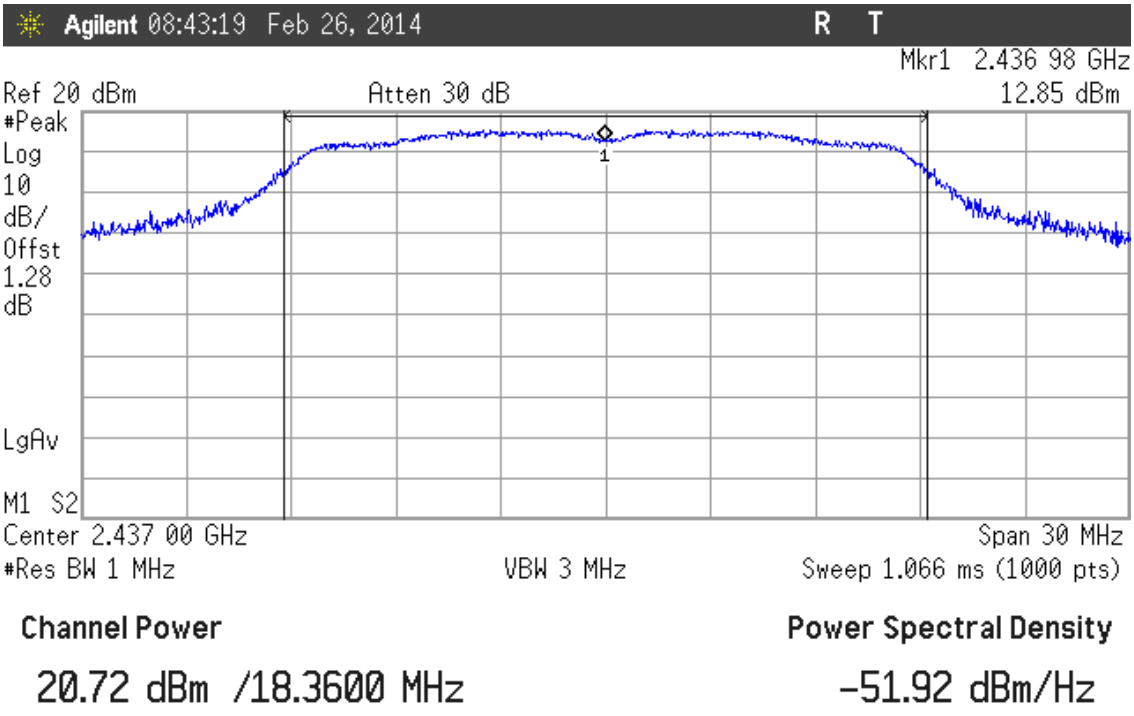
Conducted (average) output power (for information purposes only).

Middle frequency 2437 MHz. Chain B.

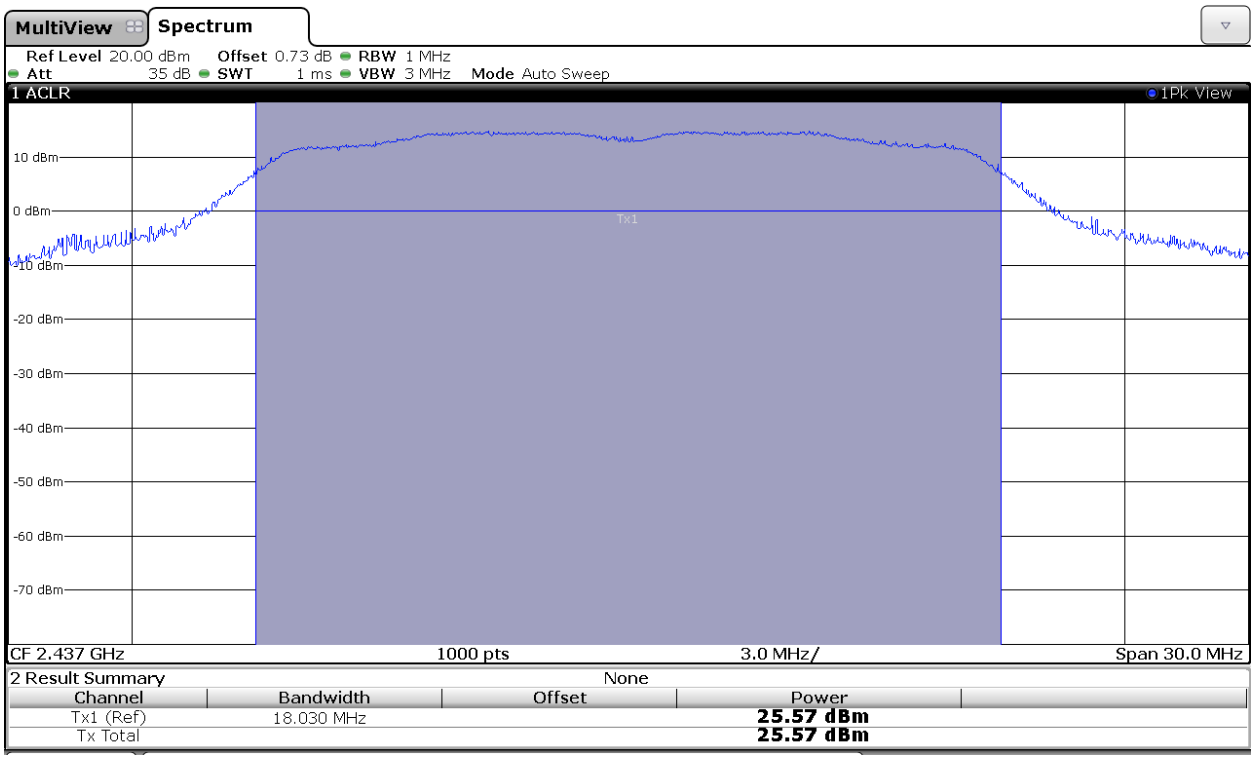


3. WiFi 2.4GHz 802.11 n20 mode

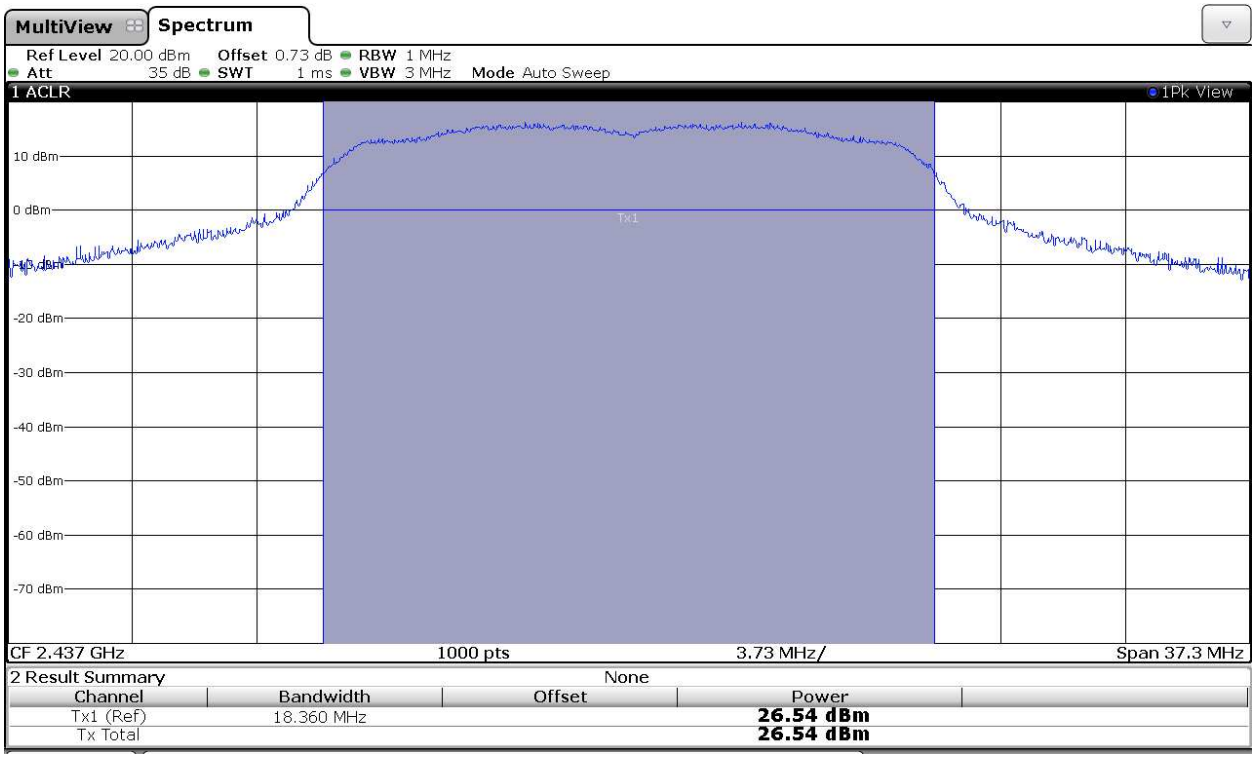
Peak conducted output power.
SISO mode. Middle frequency 2437 MHz. Chain B.



MIMO mode. Middle frequency 2437 MHz. Chain A.

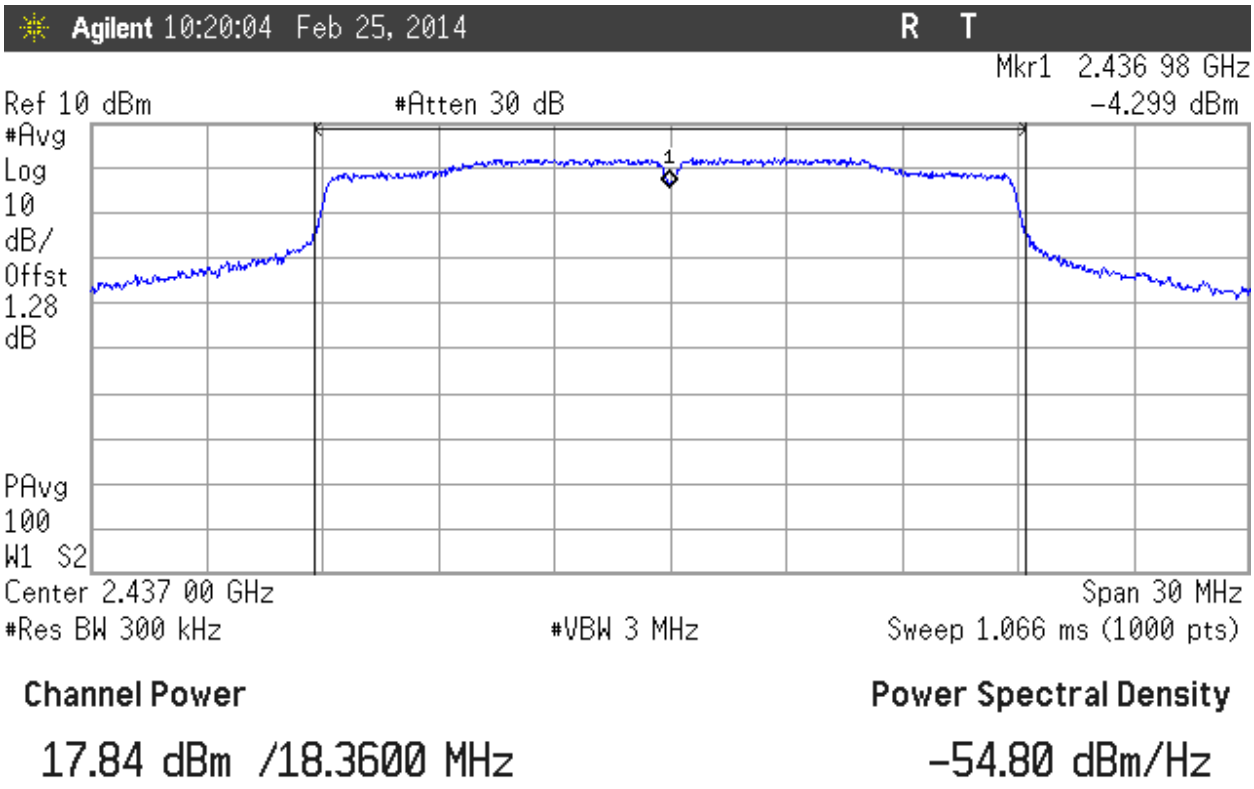


MIMO mode. Middle frequency 2437 MHz. Chain B.

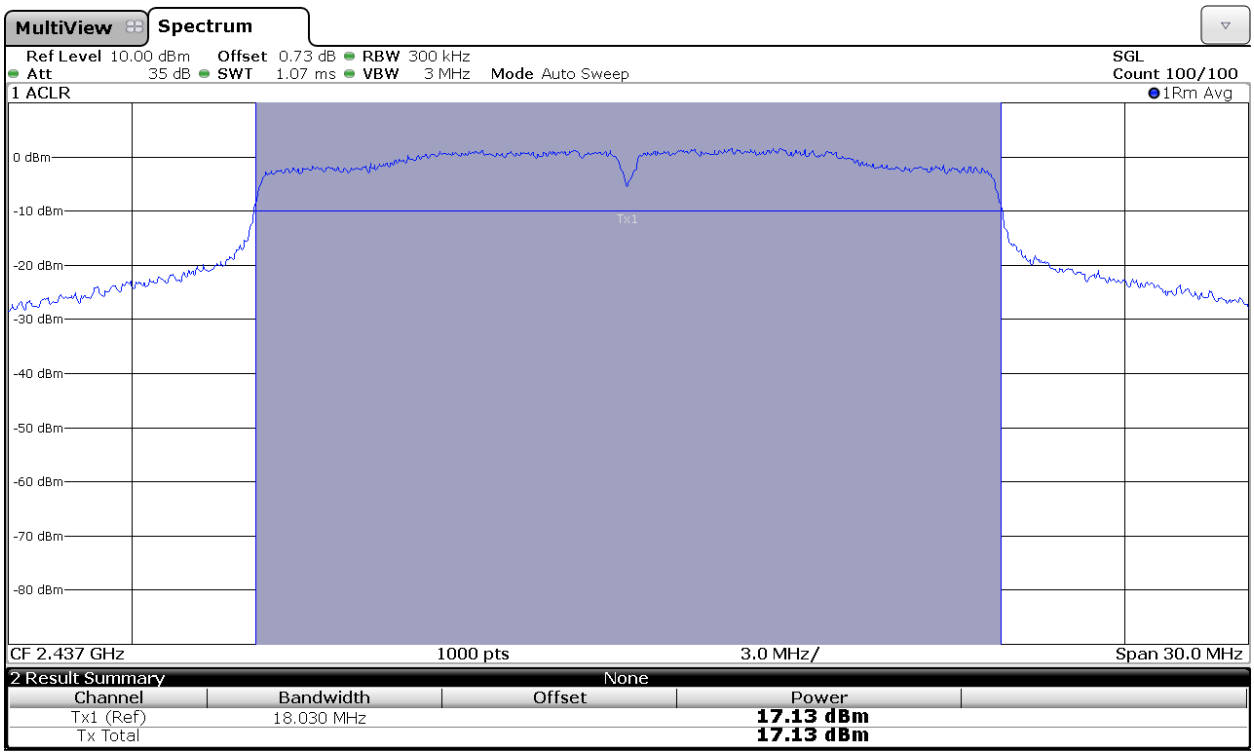


Conducted (average) output power (for information purposes only).

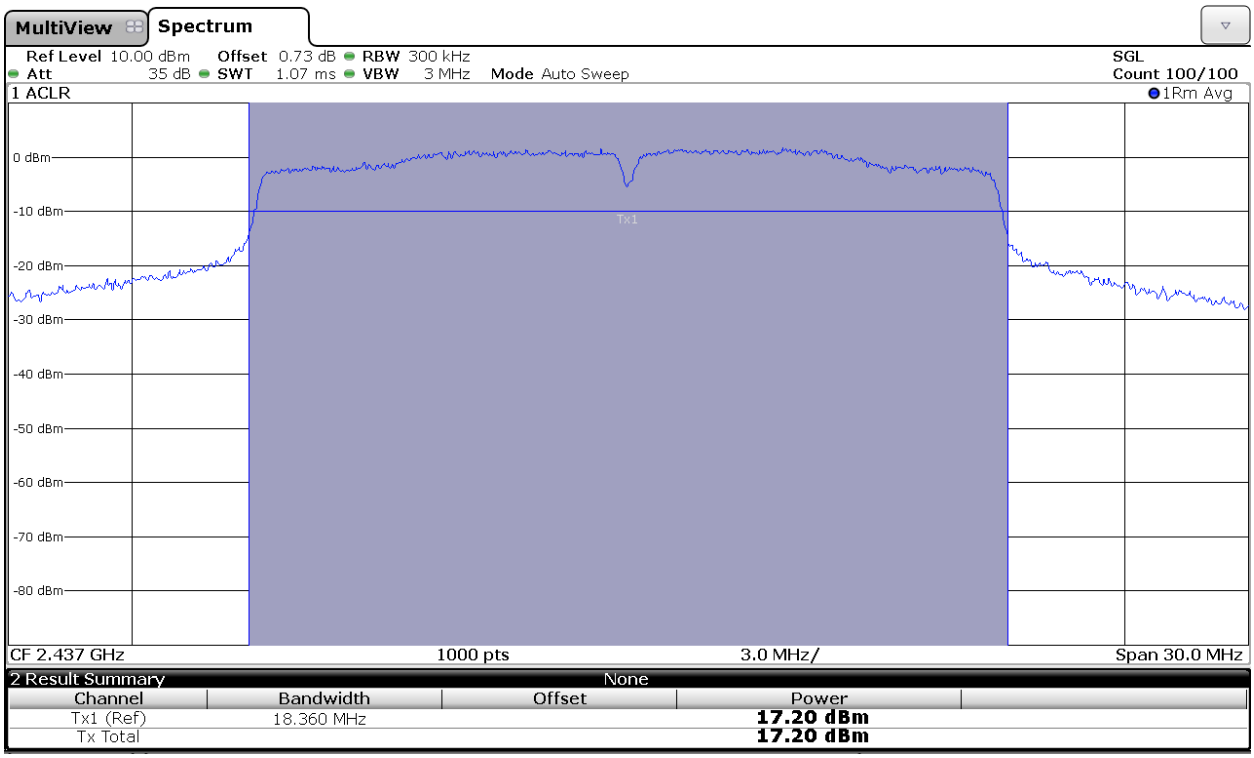
SISO mode. Middle frequency 2437 MHz. Chain B.



MIMO mode. Middle frequency 2437 MHz. Chain A.

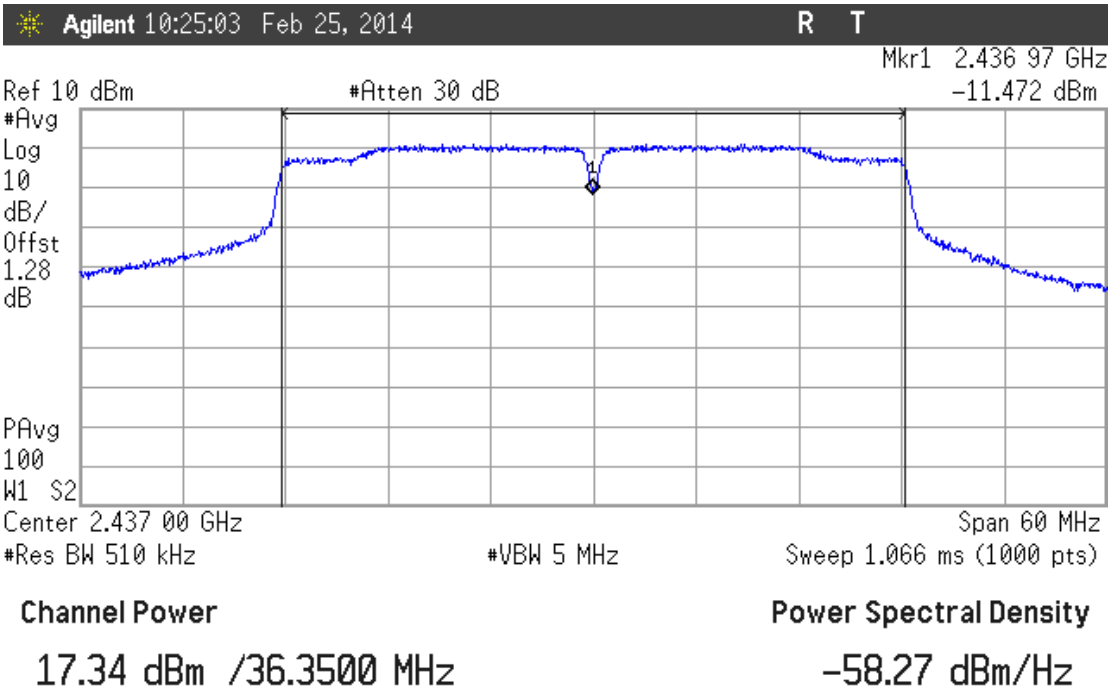


MIMO mode. Middle frequency 2437 MHz. Chain B.

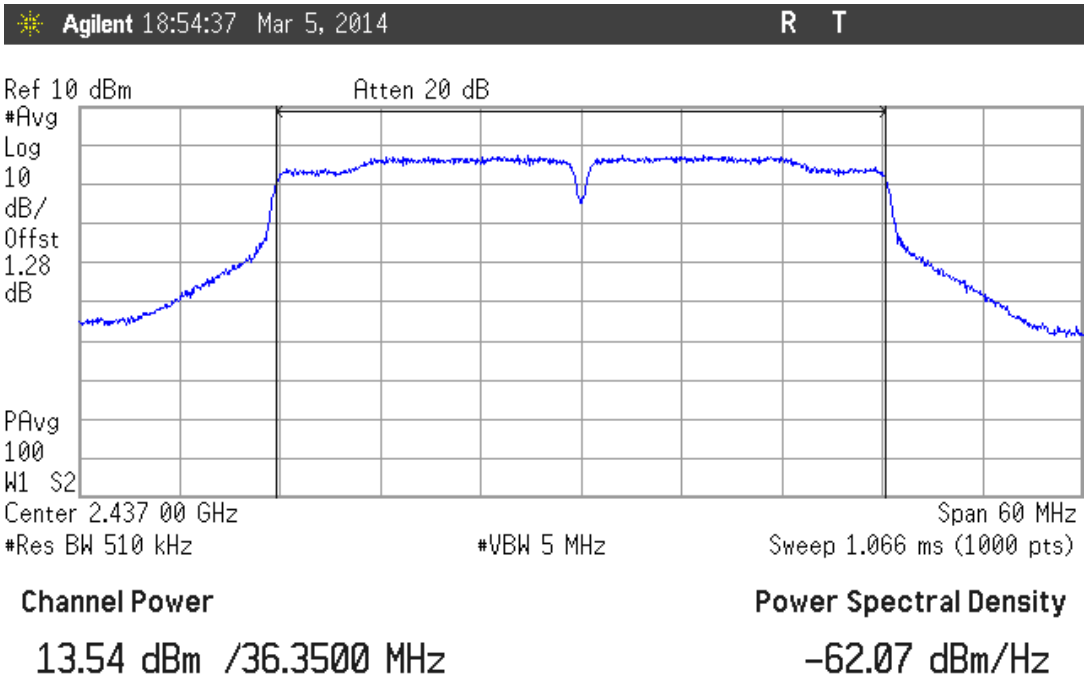


4. WiFi 2.4GHz 802.11 n40 mode

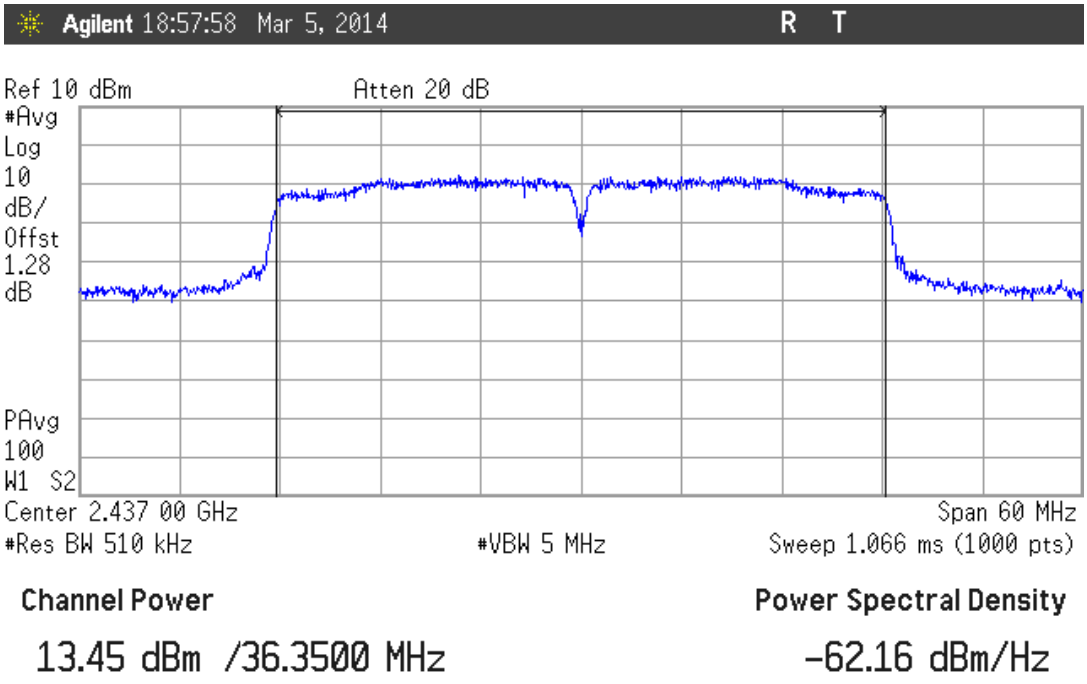
SISO mode. Middle frequency 2437 MHz. Chain B.



MIMO mode. Middle frequency 2437 MHz. Chain A.



MIMO mode. Middle frequency 2437 MHz. Chain B.



Section 15.247 Subclause (d) / RSS-210 A8.5. Emission limitations conducted (Transmitter)

SPECIFICATION

In any 100 kHz bandwidth outside the frequency band in which the 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB.

RESULTS: (See next plots)

1. WiFi 2.4GHz 802.11 b mode

Reference Level Measurement

	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
Reference Level Measurement (dBm)	7.22	6.78	8.18	8.53	6.75	6.78
Measurement uncertainty (dB)	±1.5					

Chain A / B:

Lowest frequency 2412 MHz	Limit (dBm)
All peaks are more than 20 dB below the limit.	-22.78 / -23.22

Middle frequency 2437 MHz	Limit (dBm)
All peaks are more than 20 dB below the limit.	-21.82 / -21.47

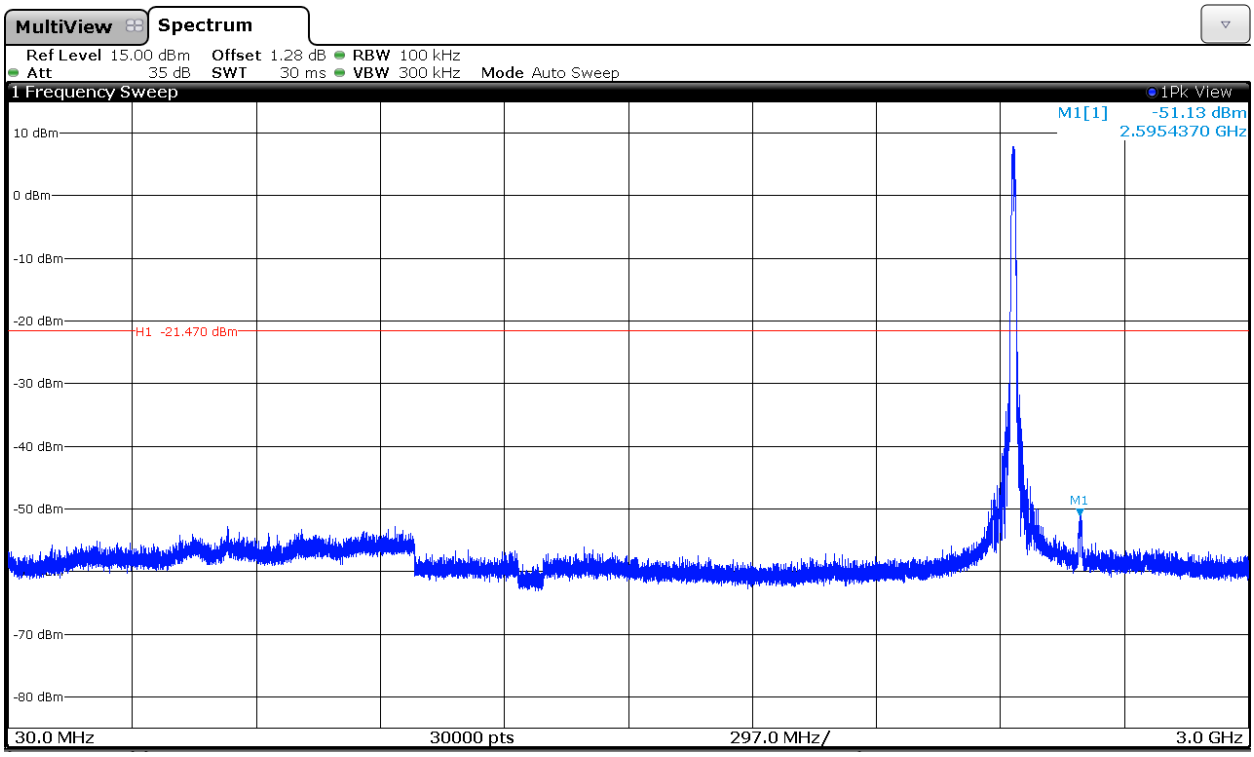
Highest frequency 2462 MHz	Limit (dBm)
All peaks are more than 20 dB below the limit.	-23.25 / -23.22

Verdict: PASS

See next plots of worst case: Mode b. Middle Channel: 2437 MHz. Chain B.

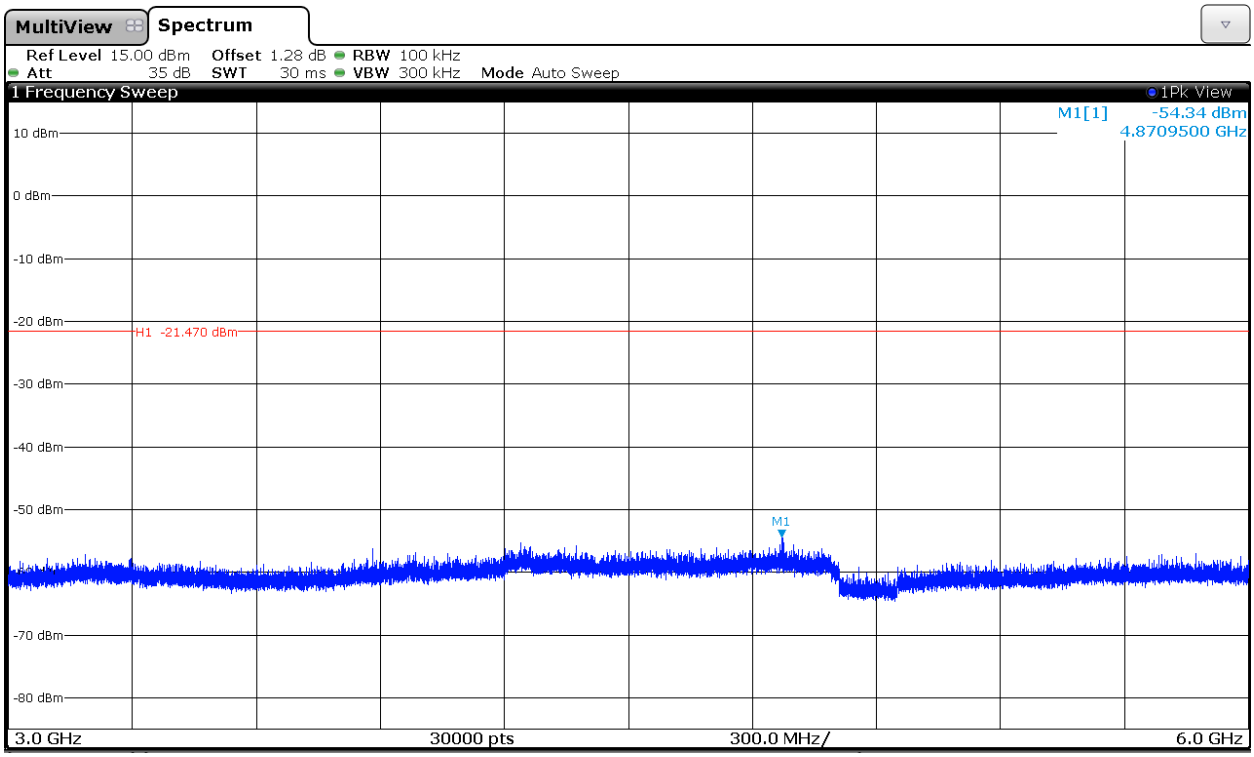
Number of sweep points: 30,000.

Plot 30 MHz to 3 GHz:

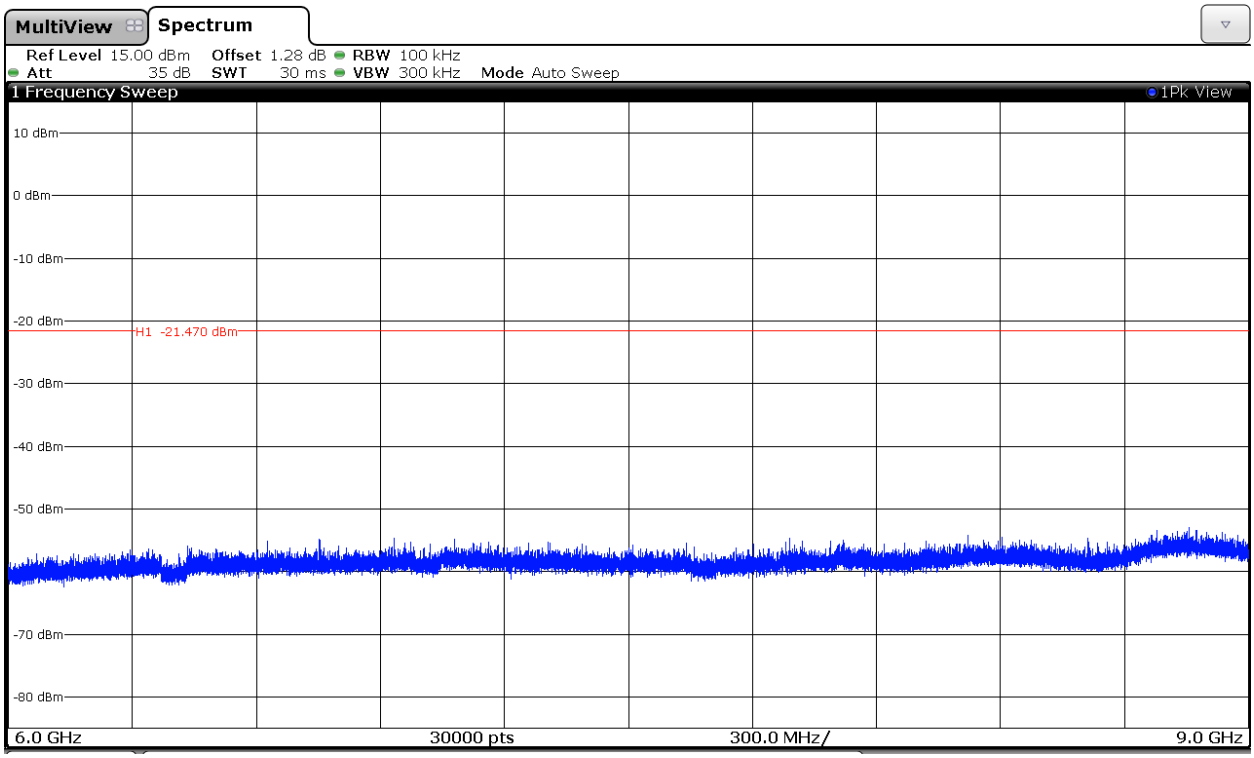


Note: The peak above the limit is the carrier frequency.

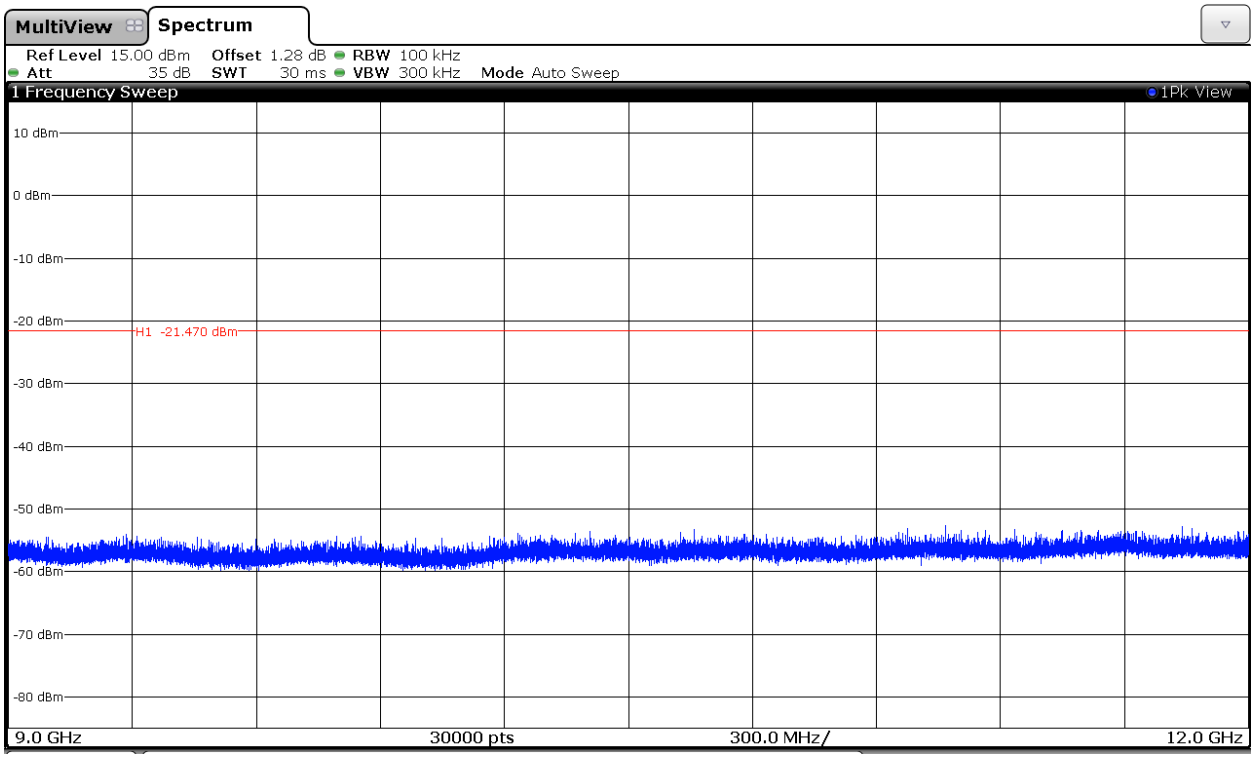
Plot 3 GHz to 6 GHz:



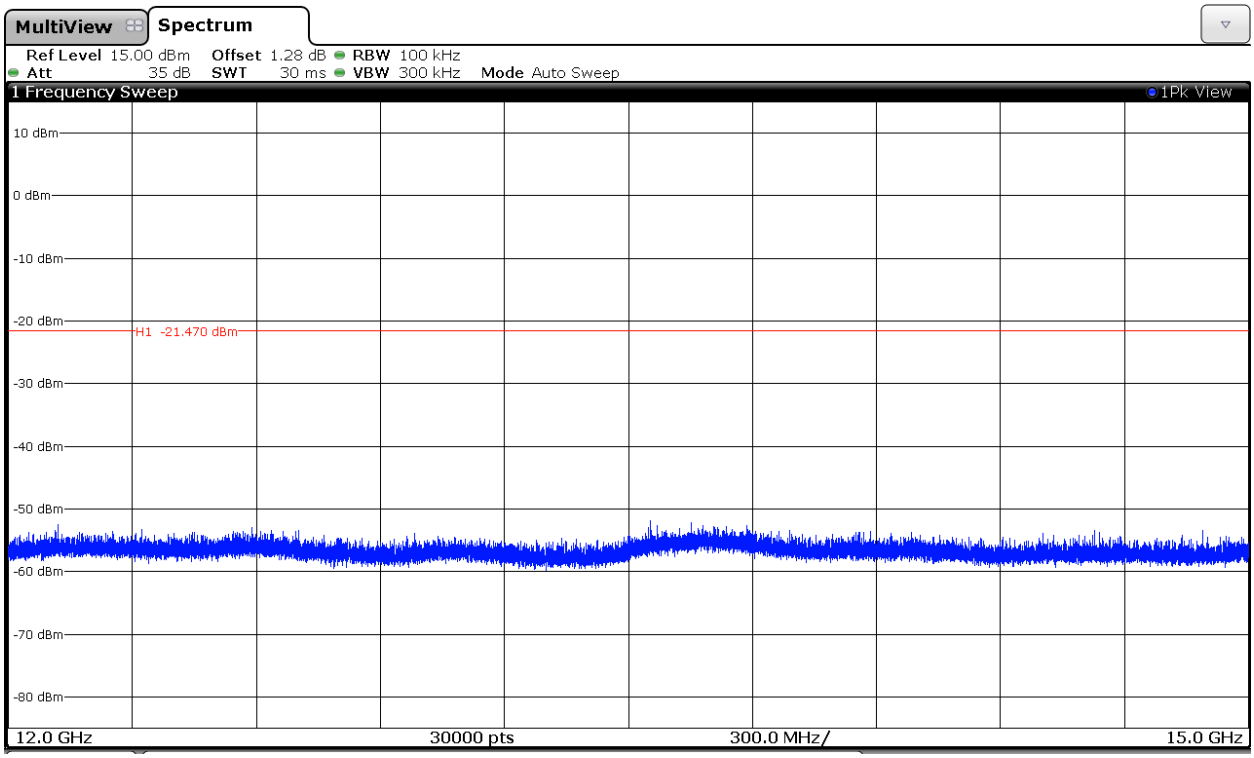
Plot 6 GHz to 9 GHz:



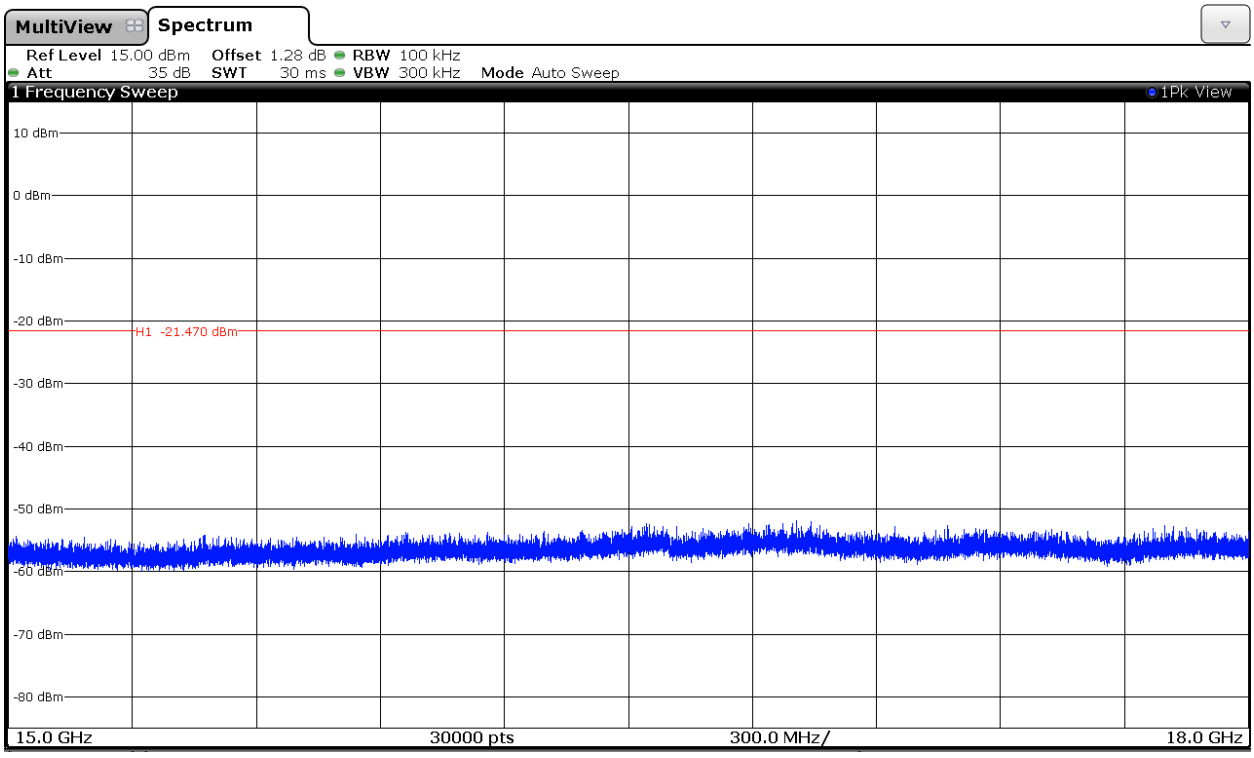
Plot 9 GHz to 12 GHz:



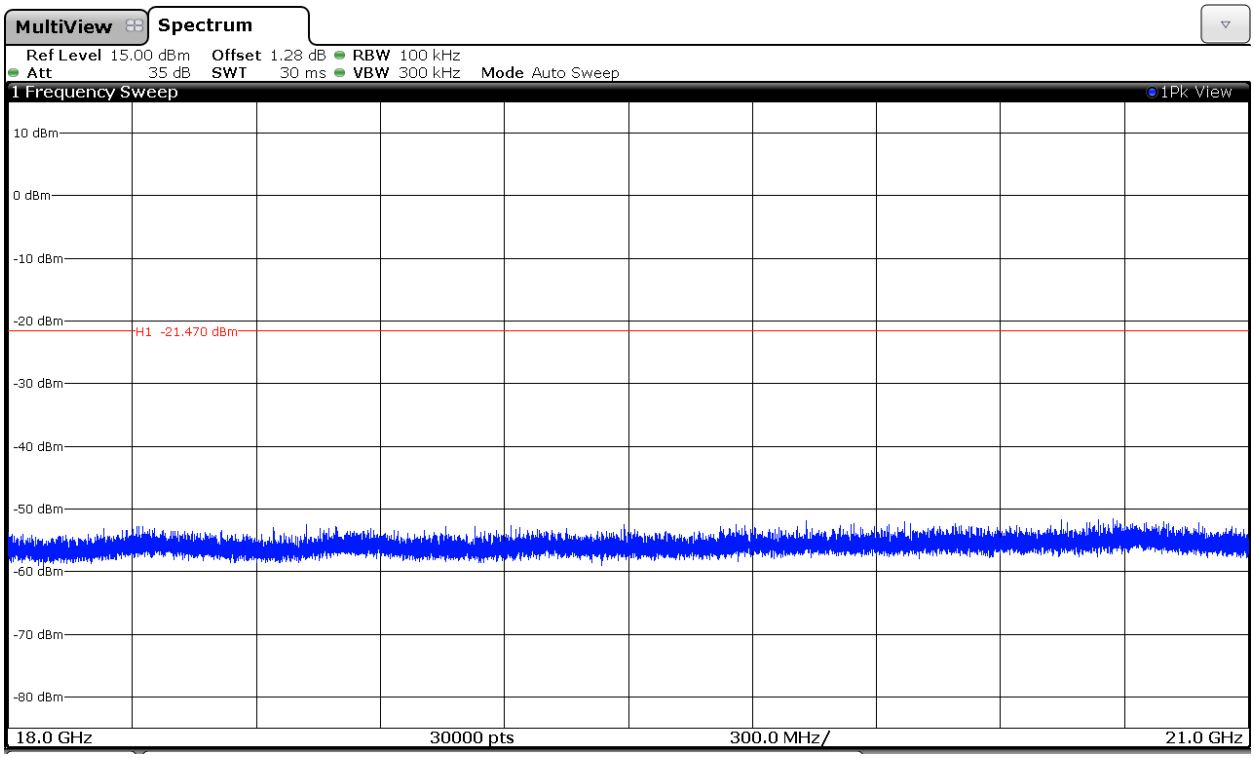
Plot 12 GHz to 15 GHz:



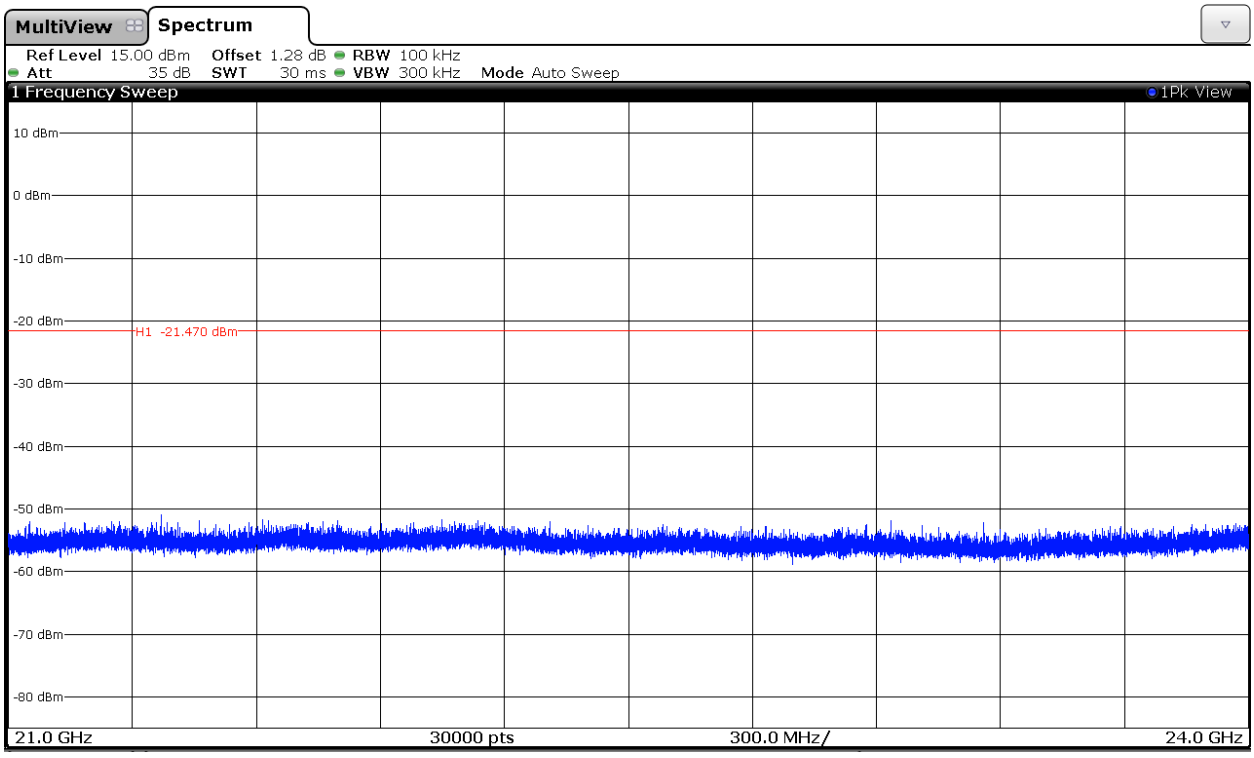
Plot 15 GHz to 18 GHz:



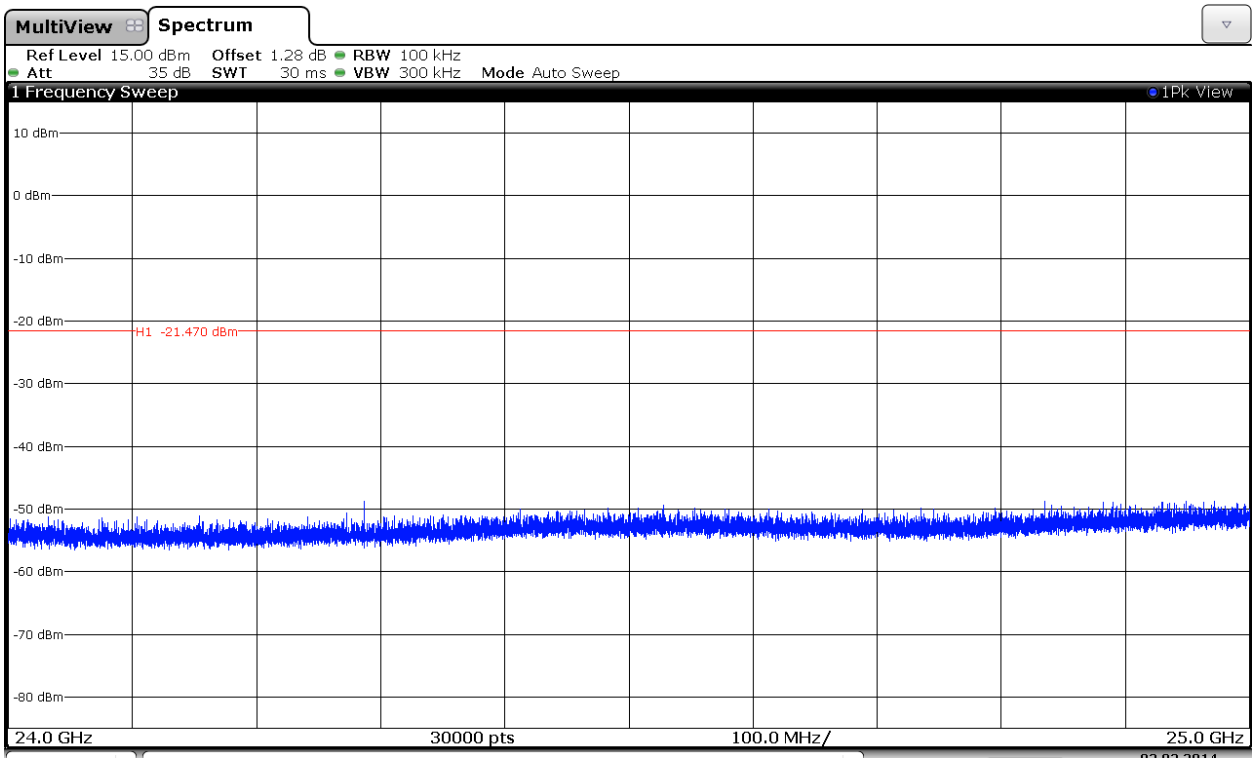
Plot 18 GHz to 21 GHz:



Plot 21 GHz to 24 GHz:



Plot 24GHz to 25 GHz:



2. WiFi 2.4GHz 802.11 g mode

Reference Level Measurement

	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
Reference Level Measurement (dBm)	3.40	3.09	6.47	6.72	1.43	1.32
Measurement uncertainty (dB)	±1.5					

Chain A / B:

Lowest frequency 2412 MHz	Limit (dBm)
All peaks are more than 20 dB below the limit.	-16.60 / -16.91

Middle frequency 2437 MHz	Limit (dBm)
All peaks are more than 20 dB below the limit.	-13.53 / -13.28

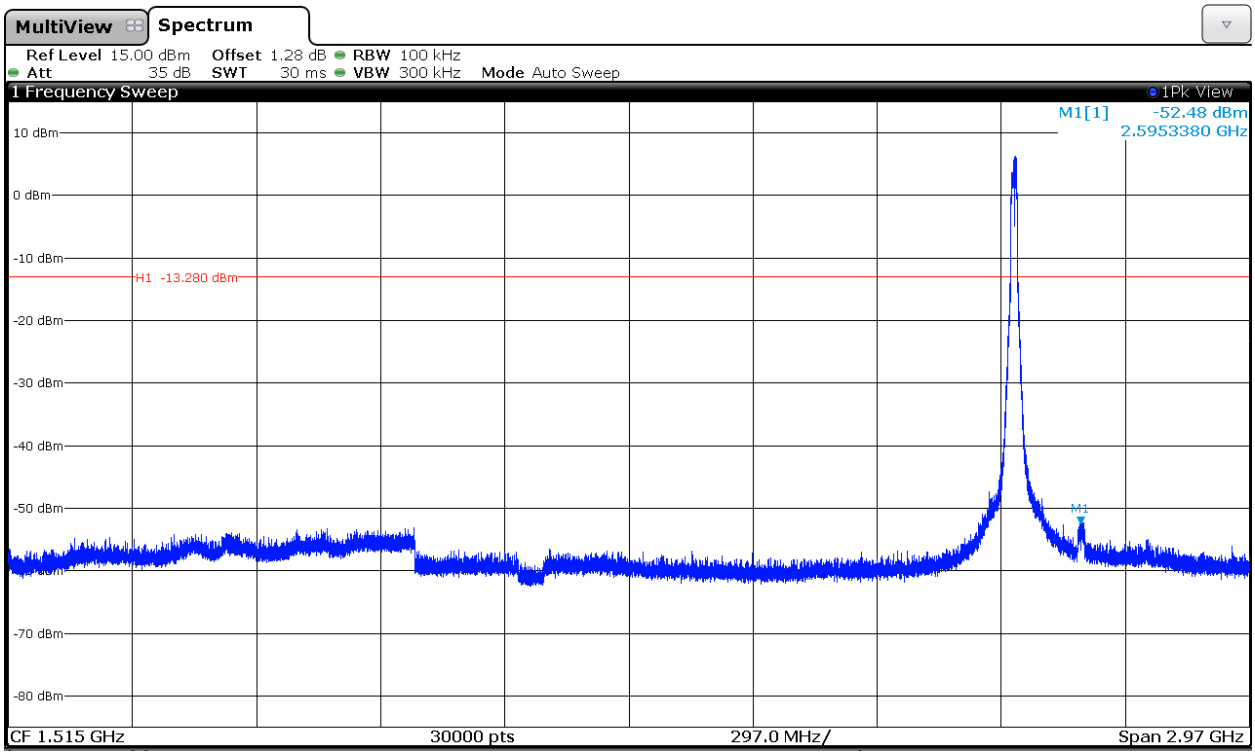
Highest frequency 2462 MHz	Limit (dBm)
All peaks are more than 20 dB below the limit.	-18.57 / -18.68

Verdict: PASS (NOTE: The limit is set to -20 dBc since the maximum peak conducted output power was measured for this mode.)

See next plots of worst case: Mode g. Middle Channel: 2437 MHz. Chain B.

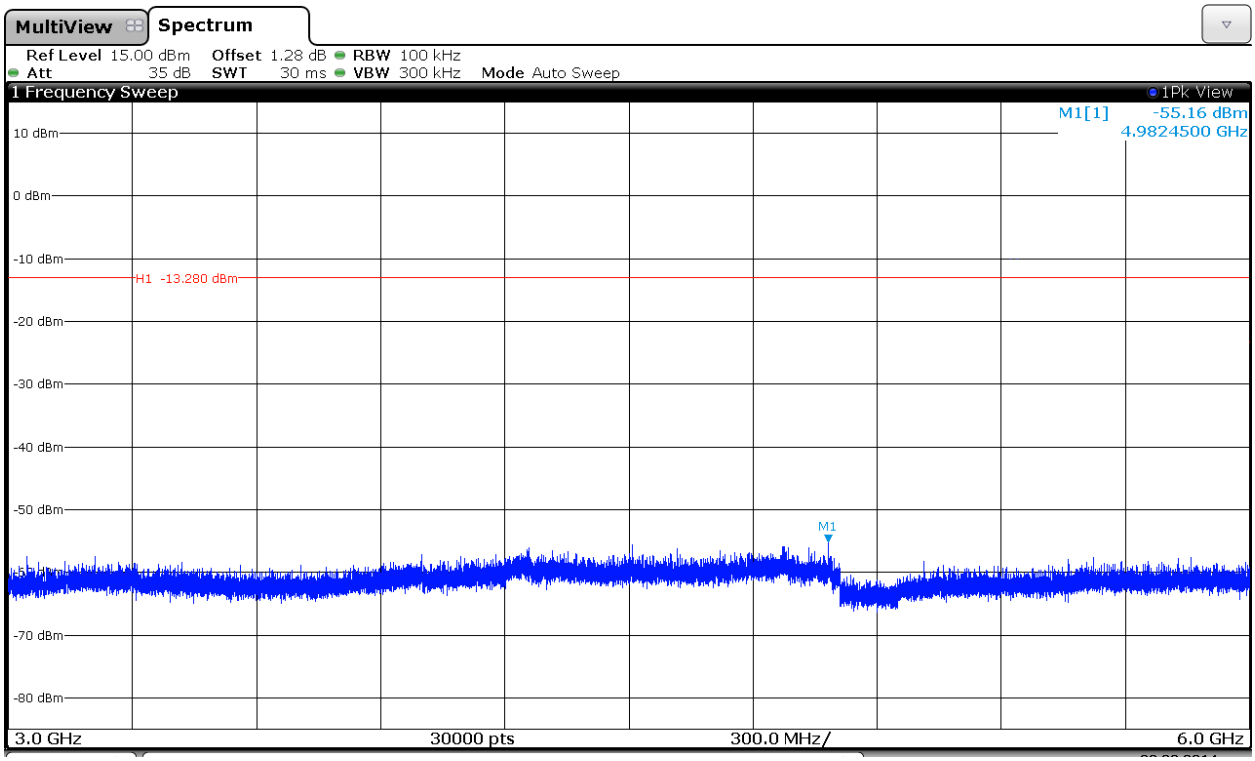
Number of sweep points: 30,000.

Plot 30 MHz to 3 GHz:

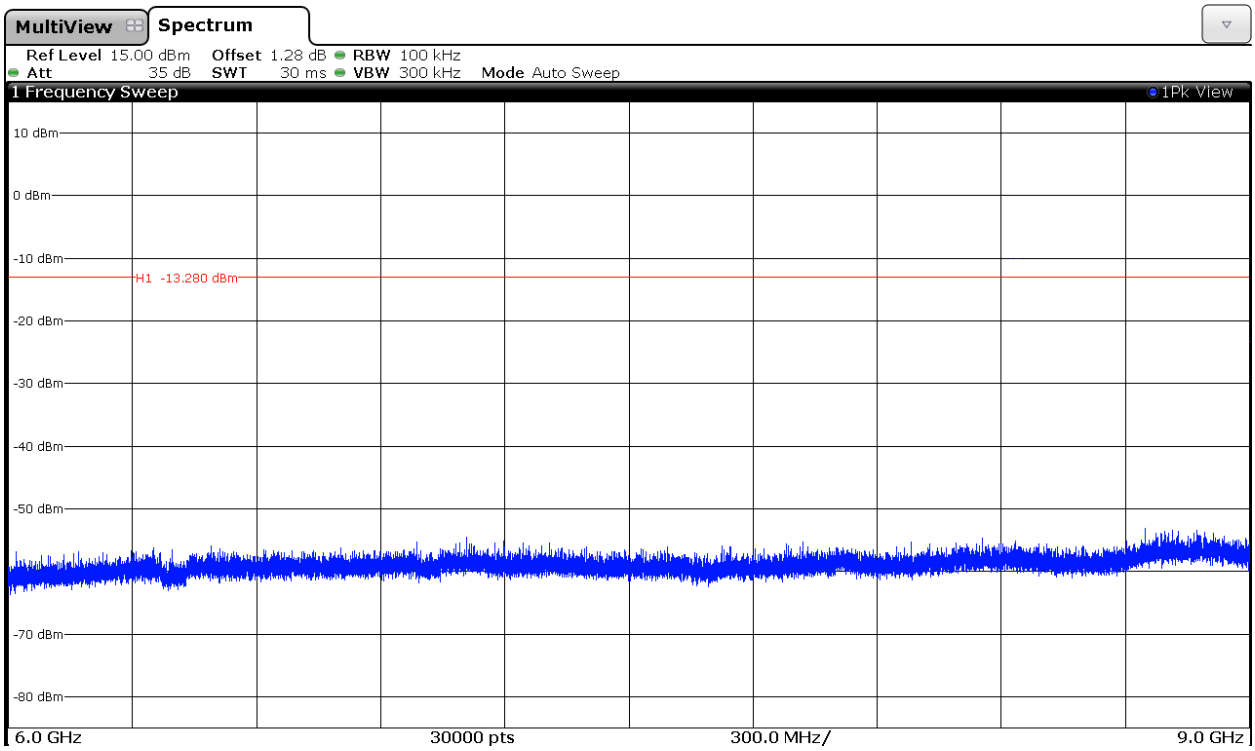


Note: The peak above the limit is the carrier frequency.

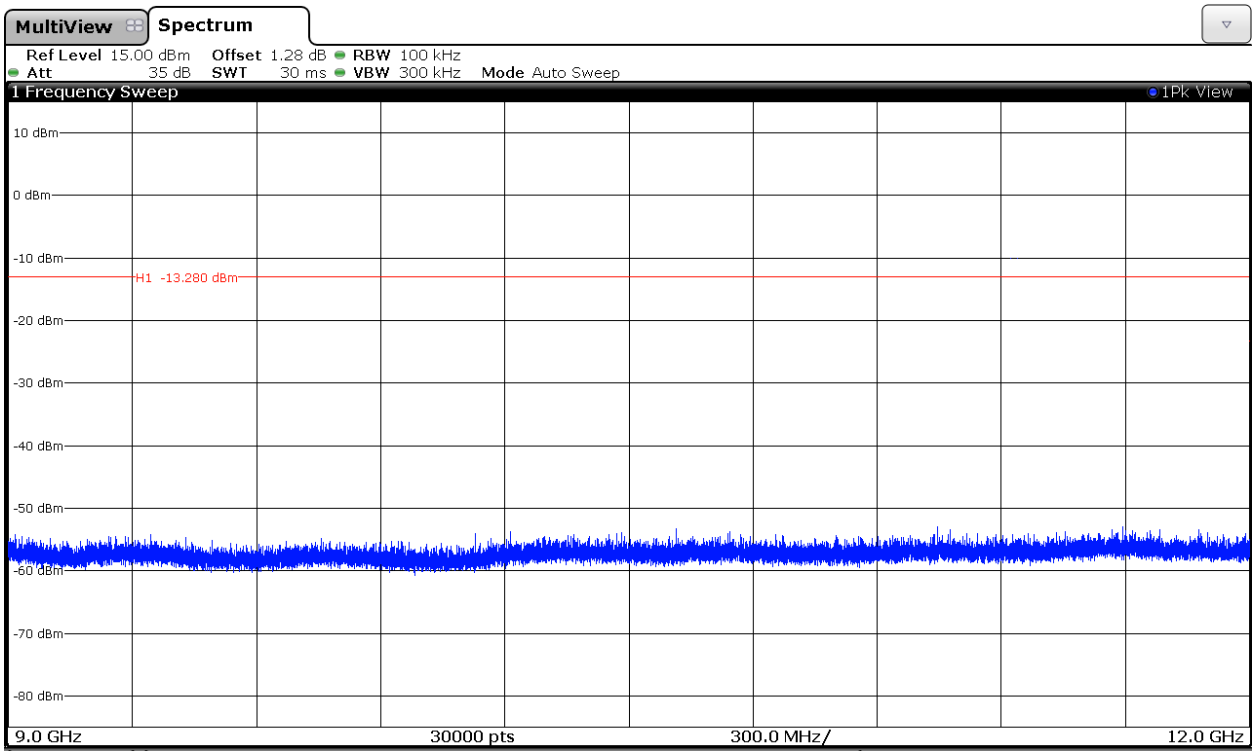
Plot 3 GHz to 6 GHz:



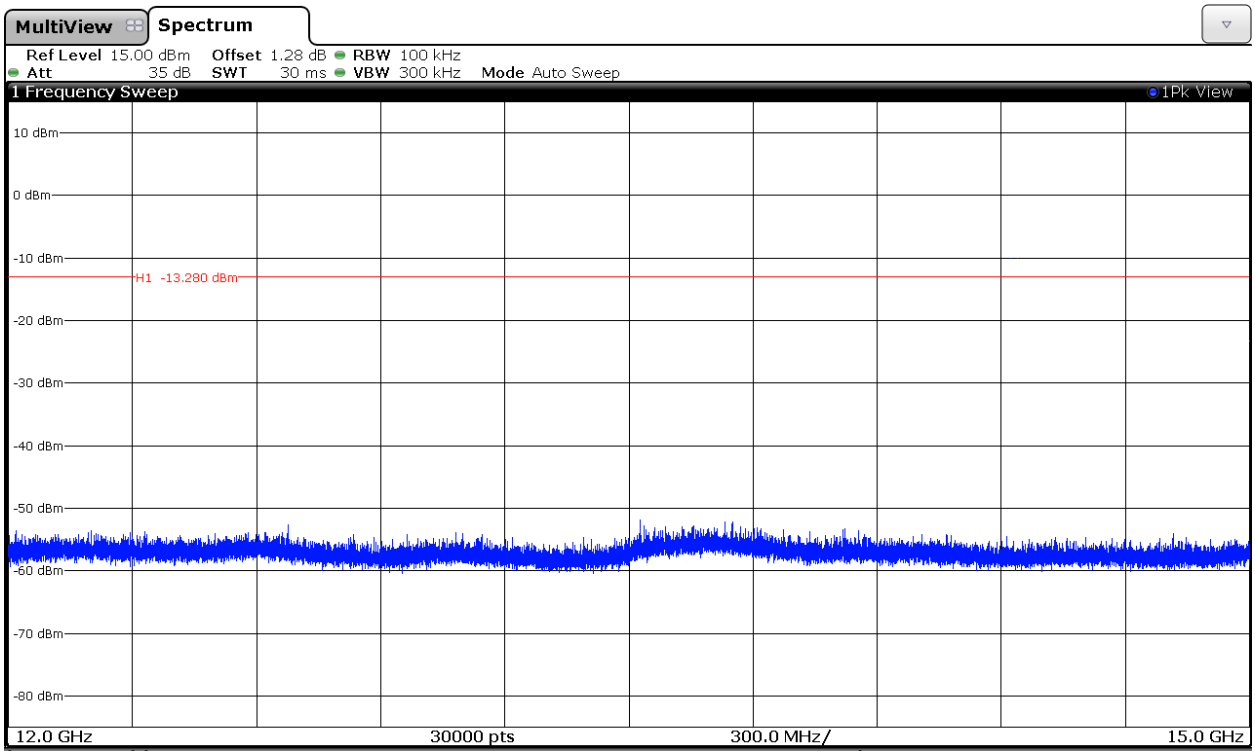
Plot 6 GHz to 9 GHz:



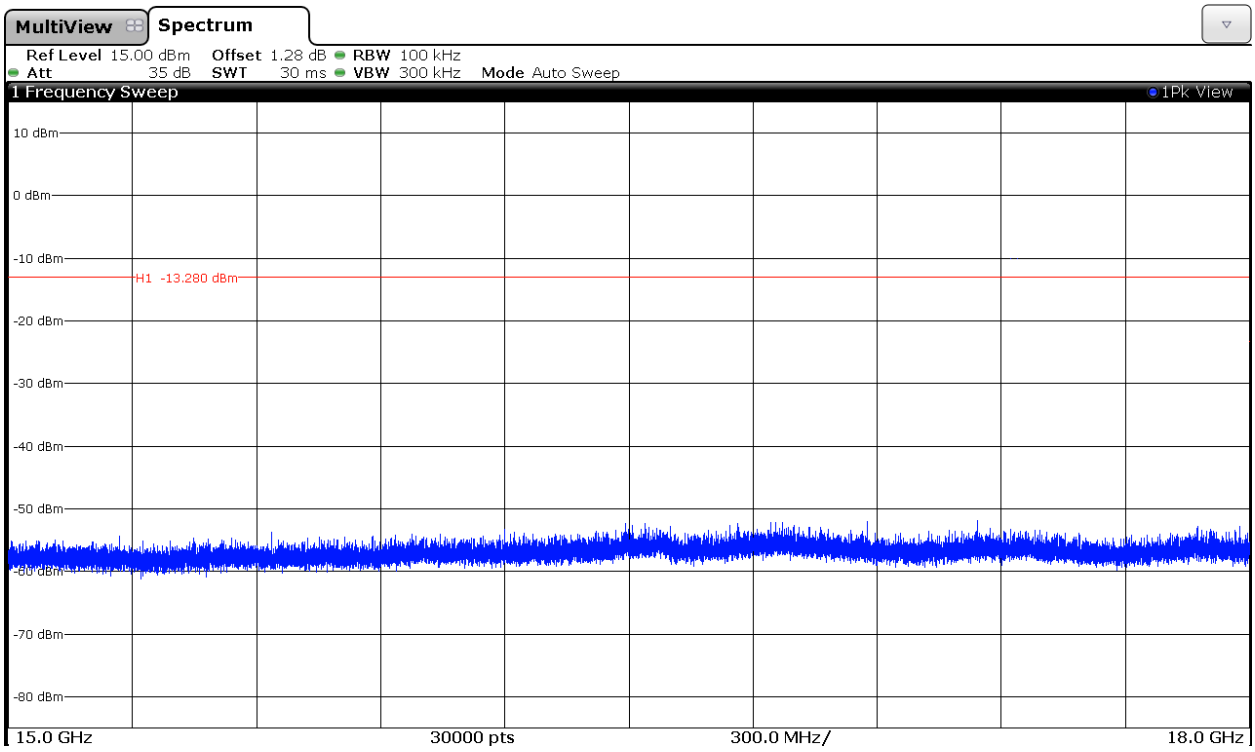
Plot 9 GHz to 12 GHz:



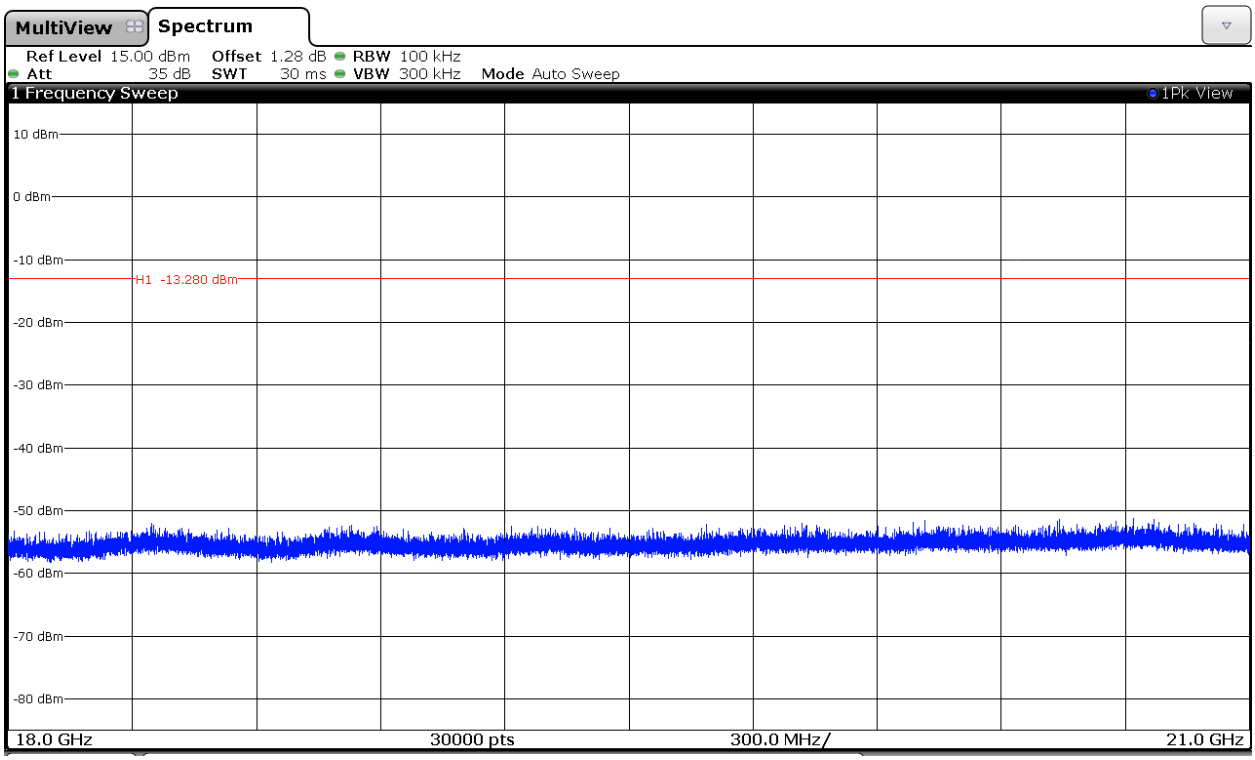
Plot 12 GHz to 15 GHz:



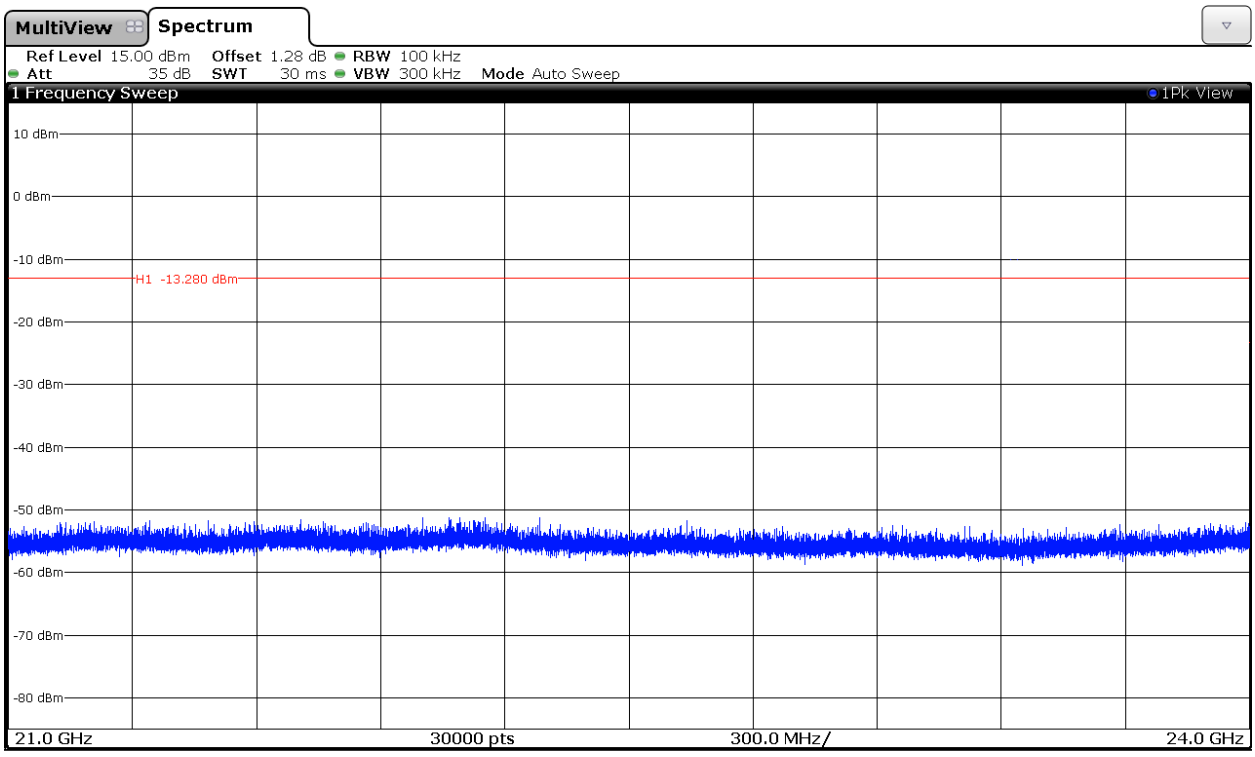
Plot 15 GHz to 18 GHz:



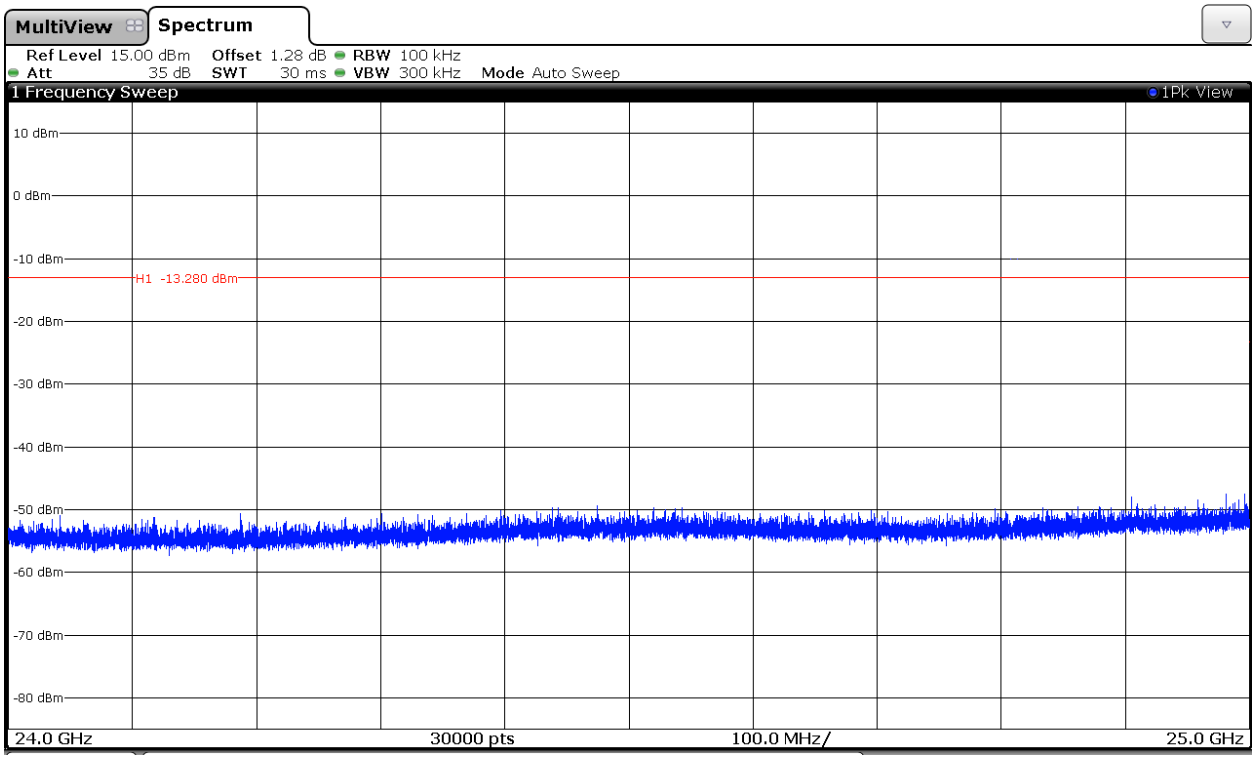
Plot 18 GHz to 21 GHz:



Plot 21 GHz to 24 GHz:



Plot 24GHz to 25 GHz:



3. WiFi 2.4GHz 802.11 n20 mode

Reference Level Measurement

	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
Reference Level Measurement (dBm)	3.27	3.59	6.40	7.14	1.40	1.08
Measurement uncertainty (dB)	±1.5					

Chain A / B:

Lowest frequency 2412 MHz	Limit (dBm)
All peaks are more than 20 dB below the limit.	-16.73 / -16.41

Middle frequency 2437 MHz	Limit (dBm)
All peaks are more than 20 dB below the limit.	-13.60 / -12.86

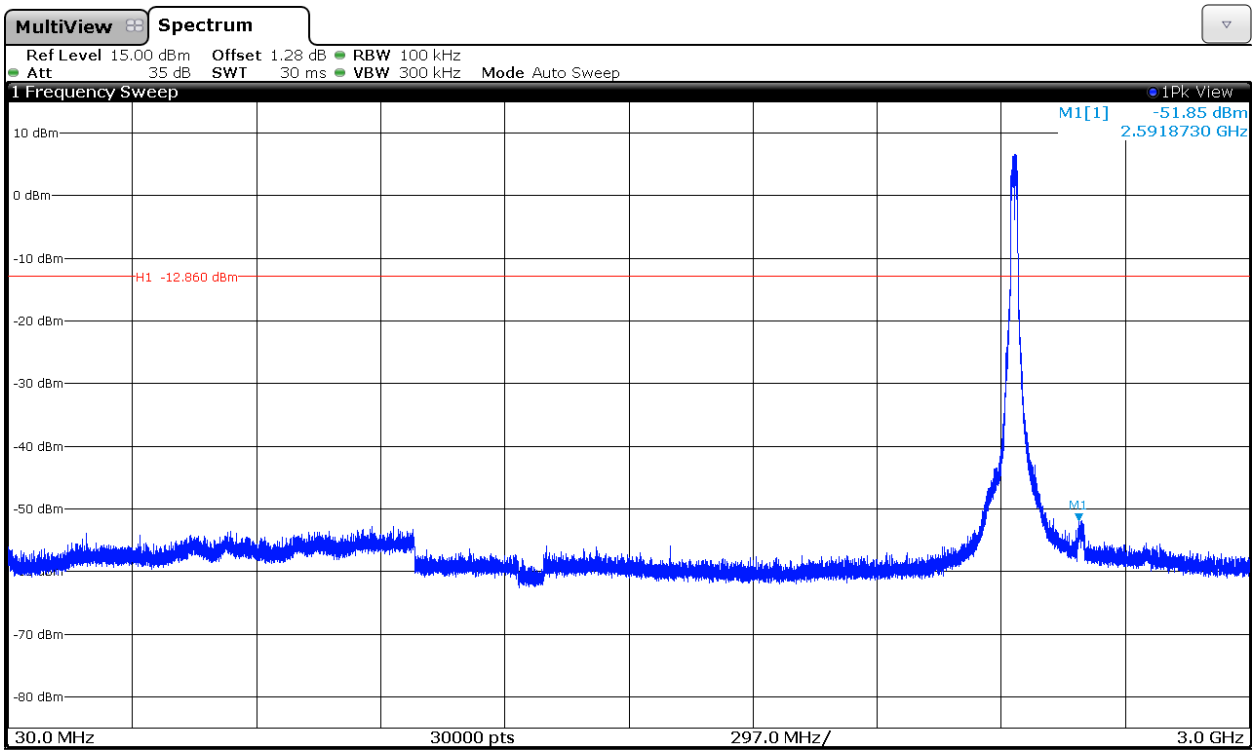
Highest frequency 2462 MHz	Limit (dBm)
All peaks are more than 20 dB below the limit.	-18.60 / -18.92

Verdict: PASS (NOTE: The limit is set to -20 dBc since the maximum peak conducted output power was measured for this mode.)

See next plots of worst case: Mode n20. Middle Channel: 2437 MHz. Chain B.

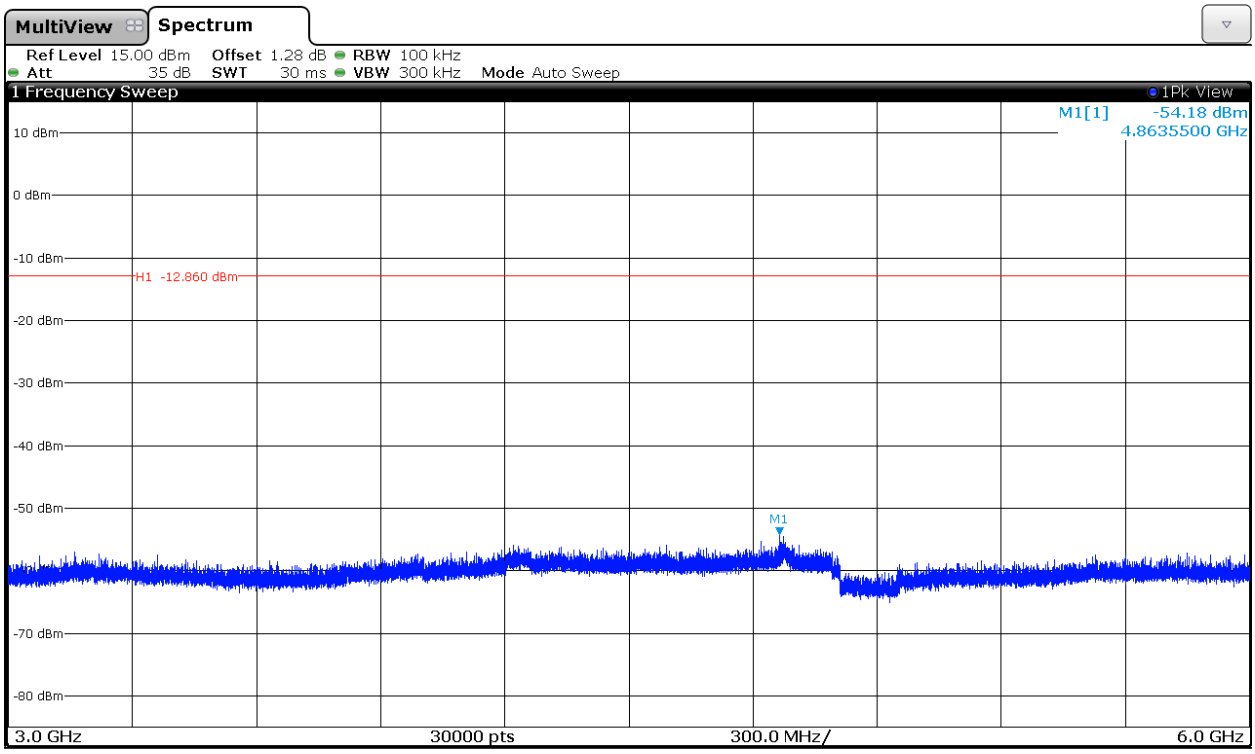
Number of sweep points: 30,000.

Plot 30 MHz to 3 GHz:

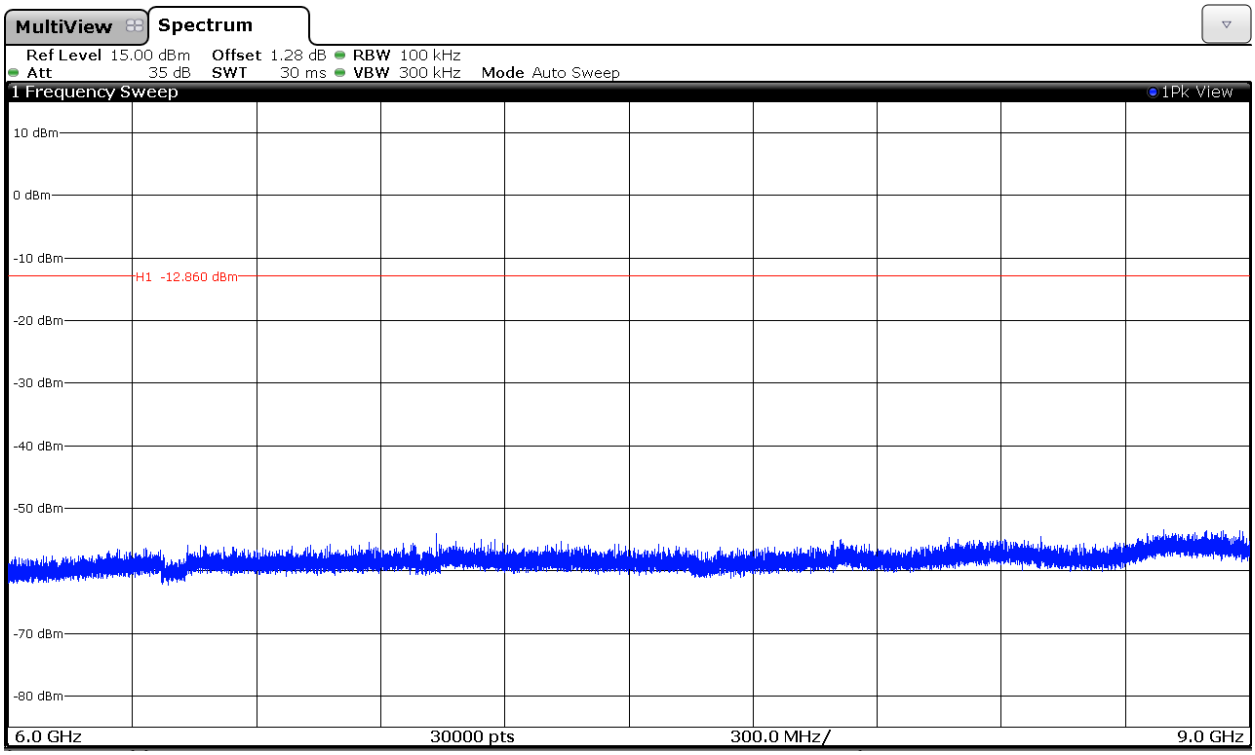


Note: The peak above the limit is the carrier frequency.

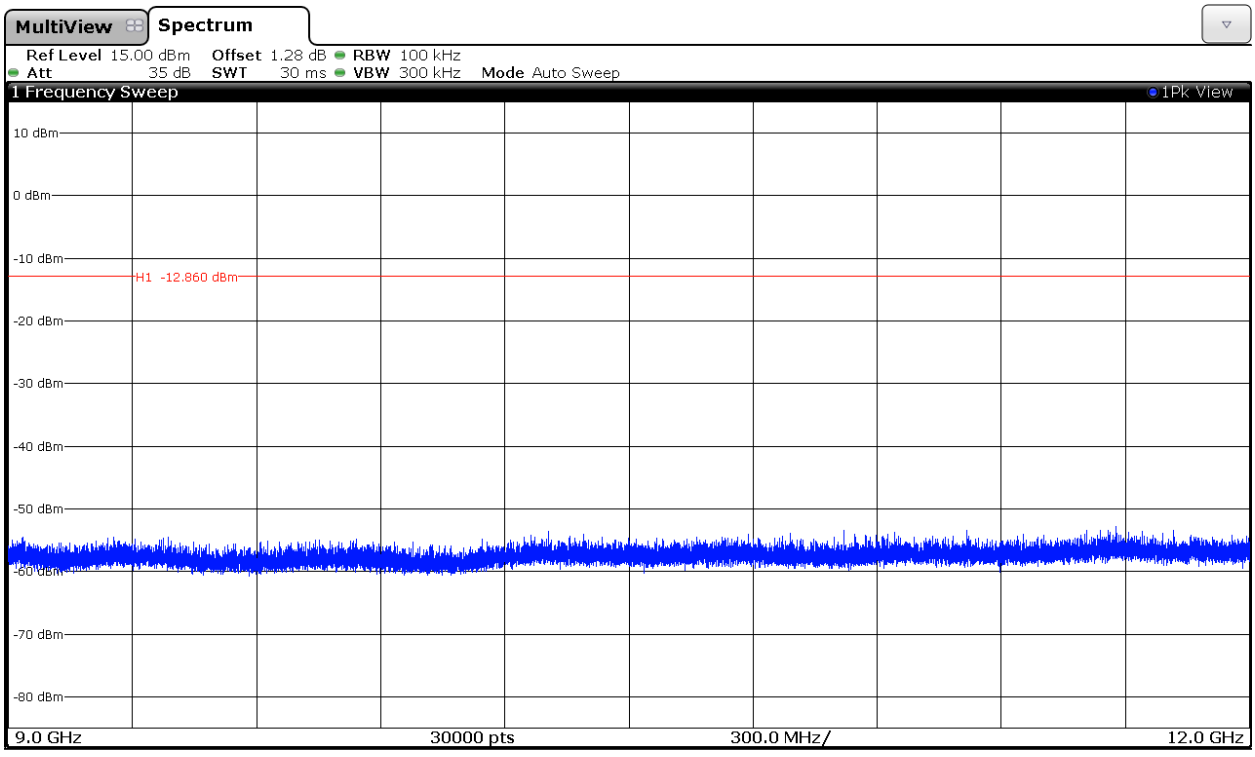
Plot 3 GHz to 6 GHz:



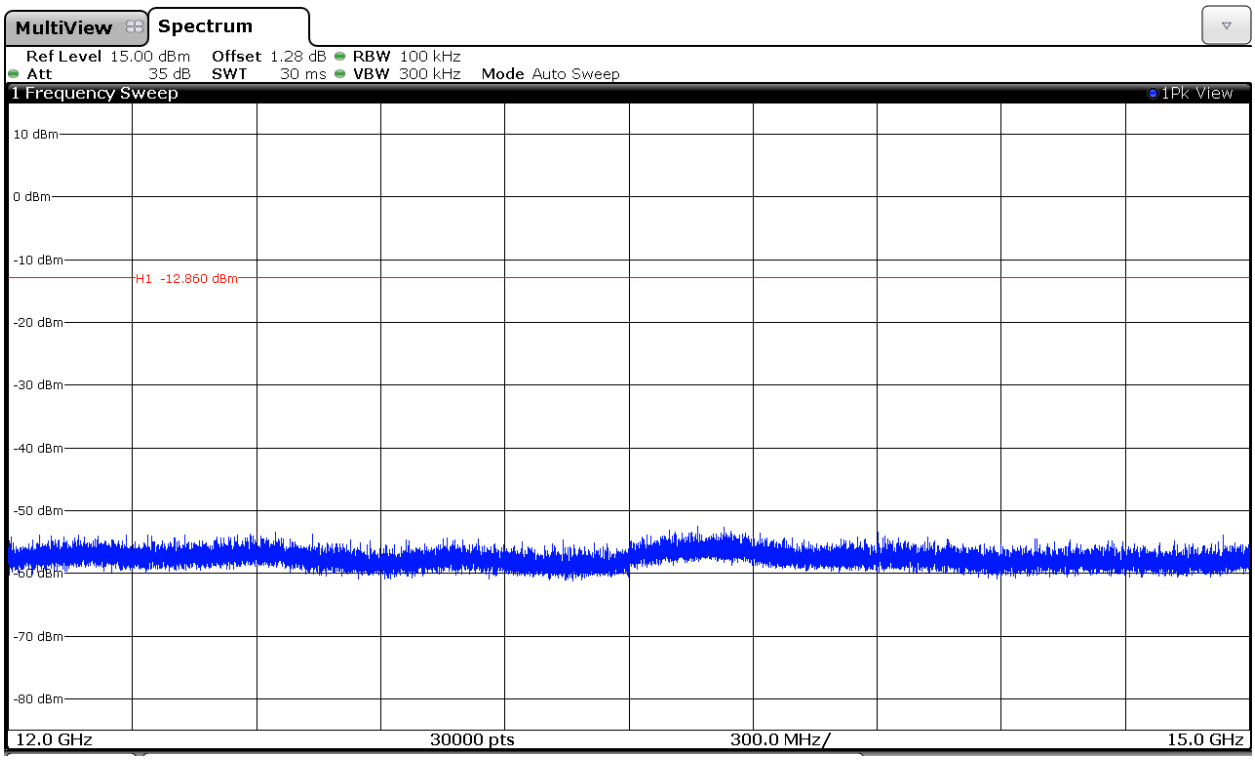
Plot 6 GHz to 9 GHz:



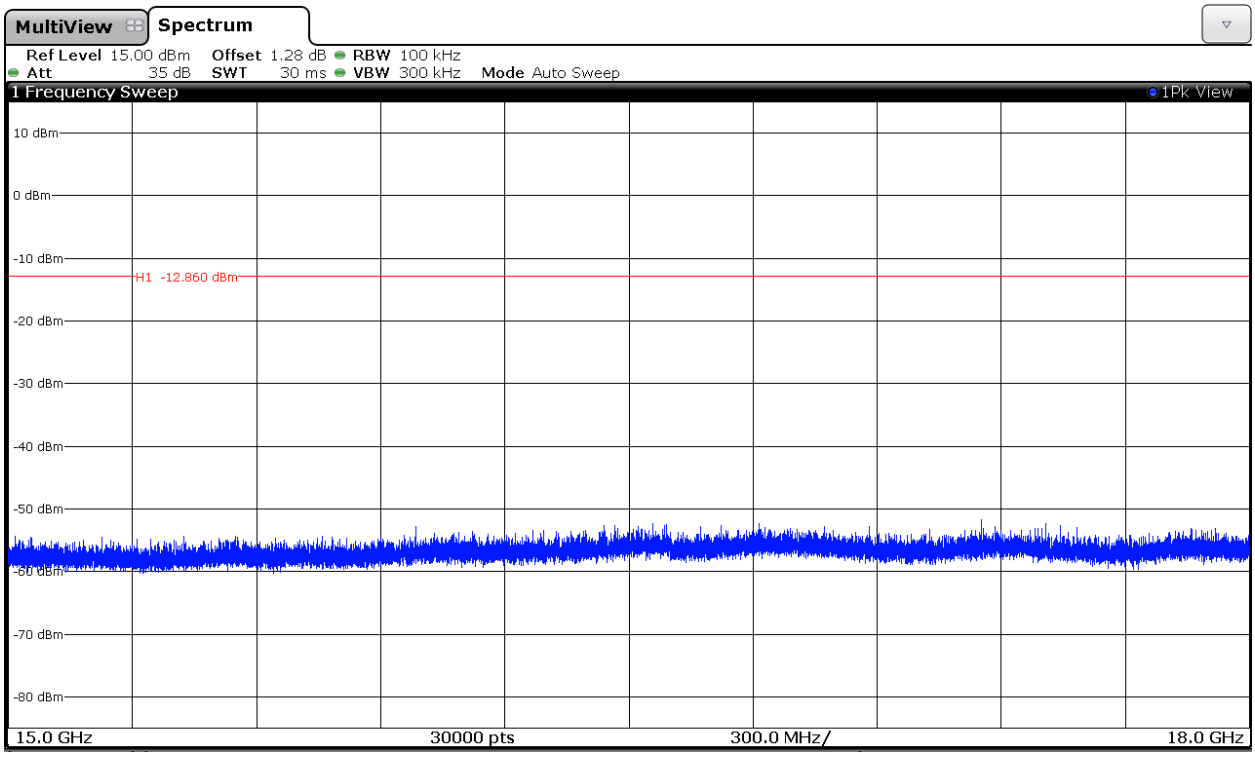
Plot 9 GHz to 12 GHz:



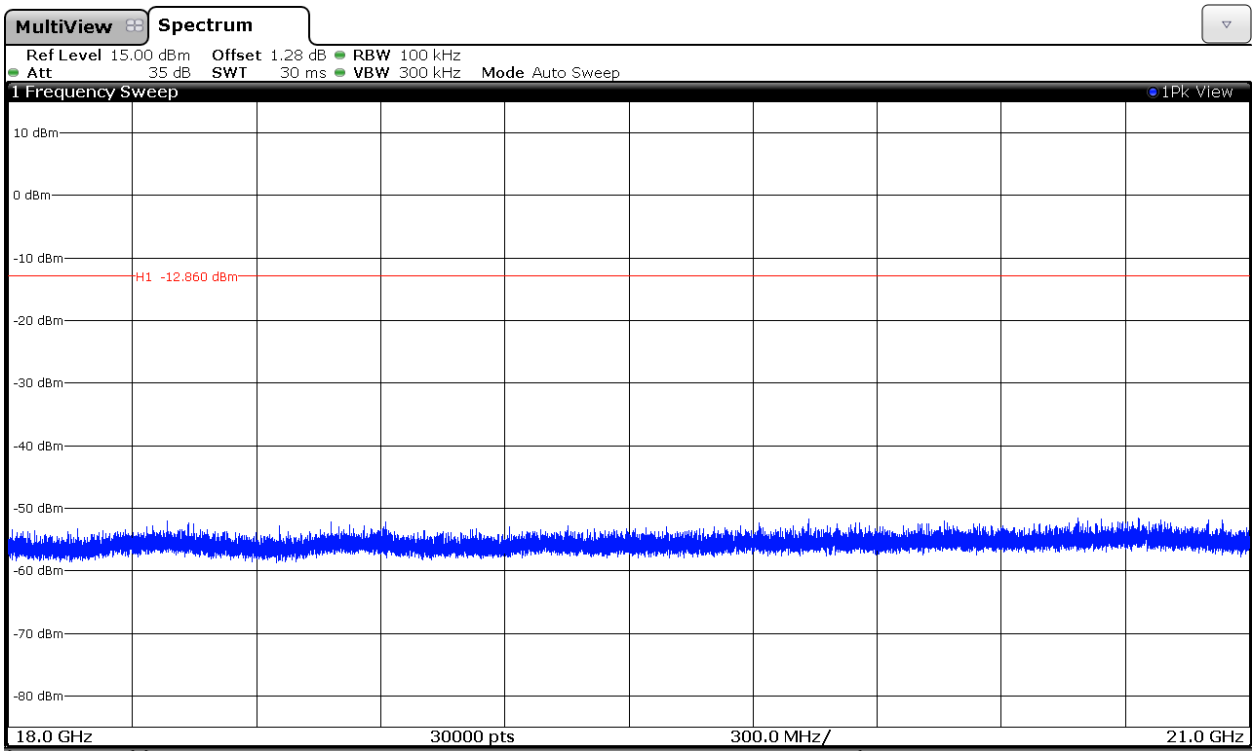
Plot 12 GHz to 15 GHz:



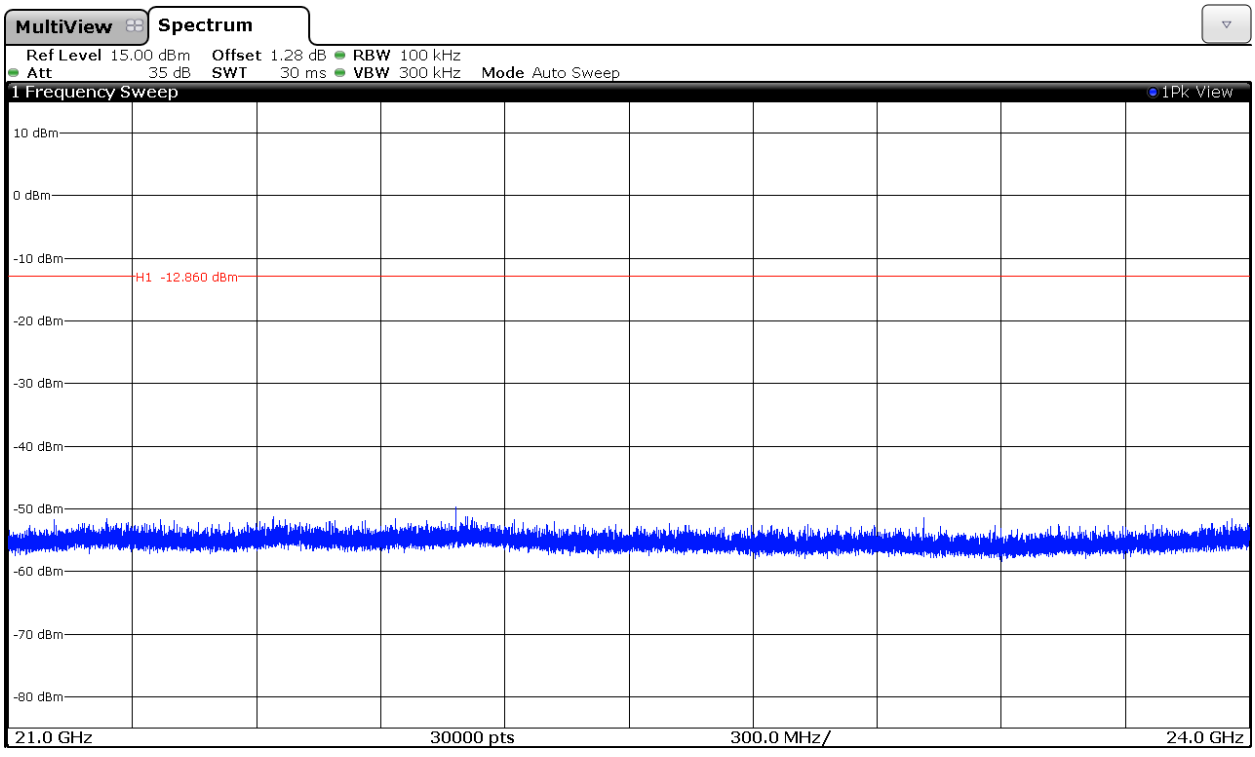
Plot 15 GHz to 18 GHz:



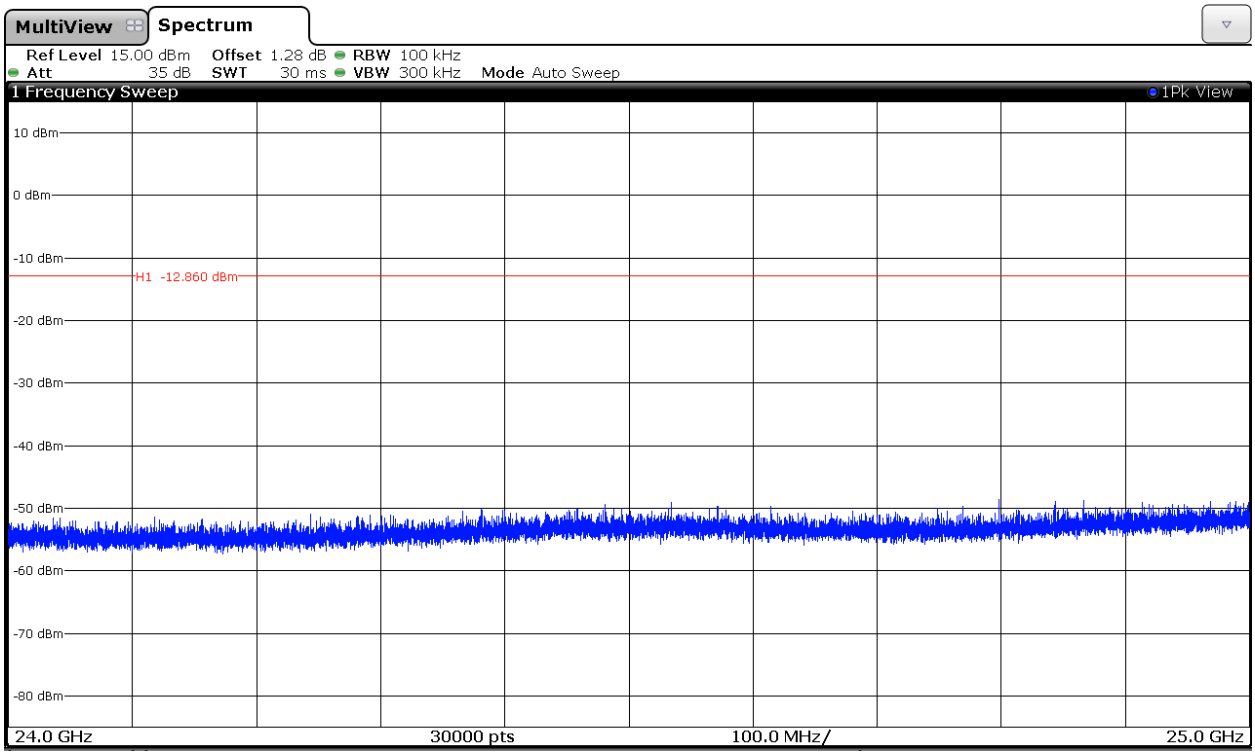
Plot 18 GHz to 21 GHz:



Plot 21 GHz to 24 GHz:



Plot 24GHz to 25 GHz:



4. WiFi 2.4GHz 802.11 n40 mode

Reference Level Measurement

	Lowest frequency 2422 MHz		Middle frequency 2437 MHz		Highest frequency 2452 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
Reference Level Measurement (dBm)	-0.34	-0.54	3.70	3.57	-1.41	-1.86
Measurement uncertainty (dB)	±1.5					

Chain A / B:

Lowest frequency 2422 MHz	Limit (dBm)
All peaks are more than 20 dB below the limit.	-30.34 / -30.54

Middle frequency 2437 MHz	Limit (dBm)
All peaks are more than 20 dB below the limit.	-26.30 / -26.43

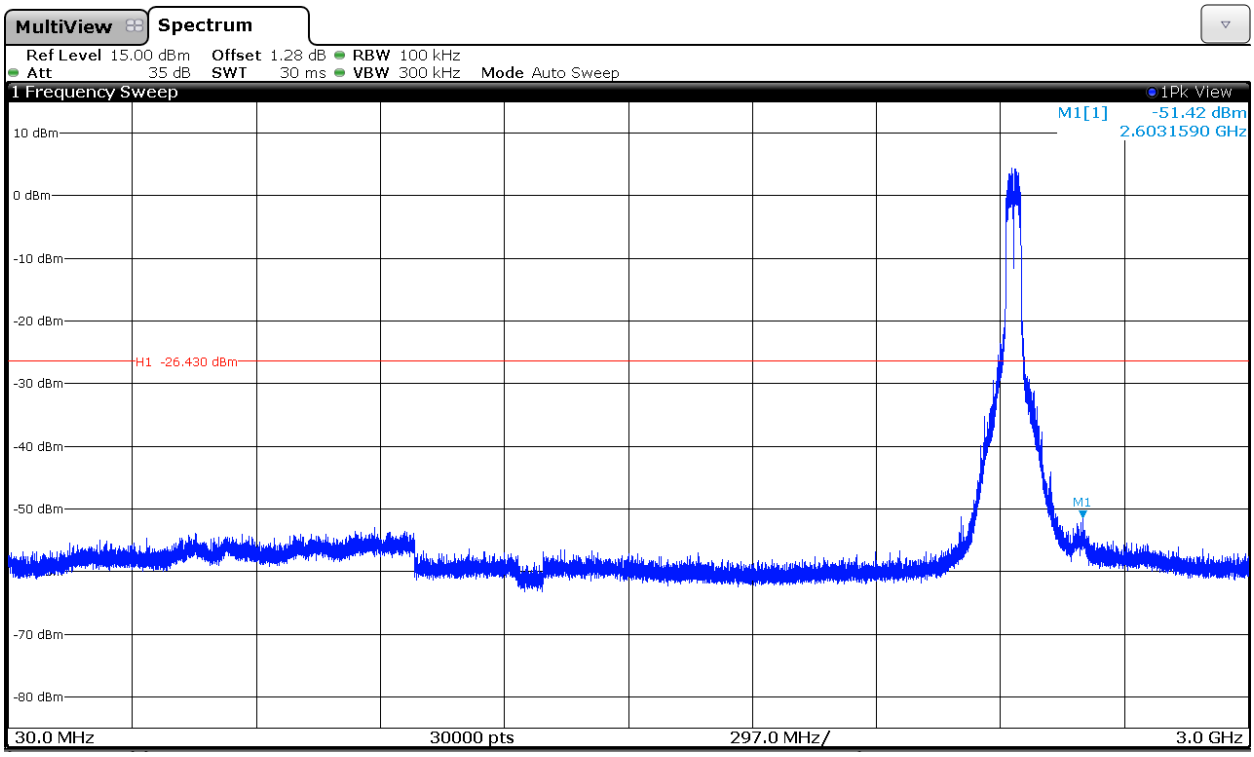
Highest frequency 2452 MHz	Limit (dBm)
All peaks are more than 20 dB below the limit.	-31.41 / -31.86

Verdict: PASS

See next plots of worst case: Mode n40. Middle Channel: 2437 MHz. Chain B.

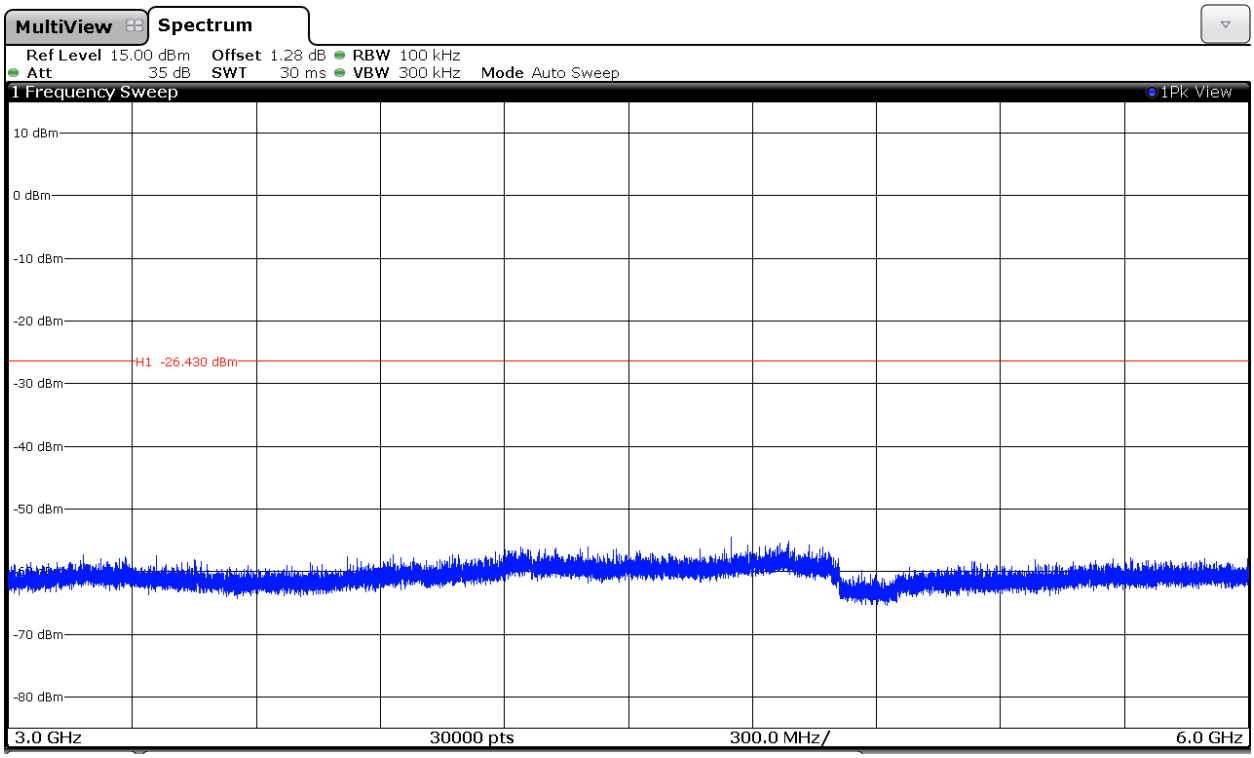
Number of sweep points: 30,000.

Plot 30 MHz to 3 GHz:

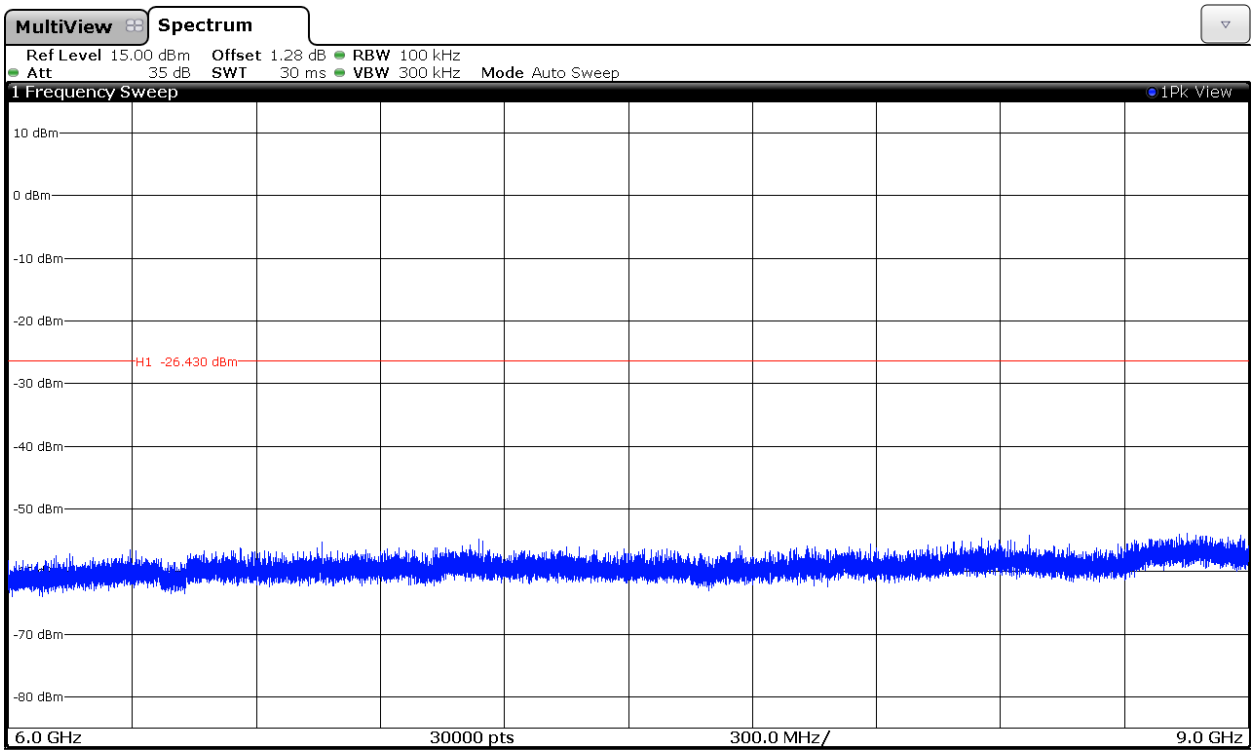


Note: The peak above the limit is the carrier frequency.

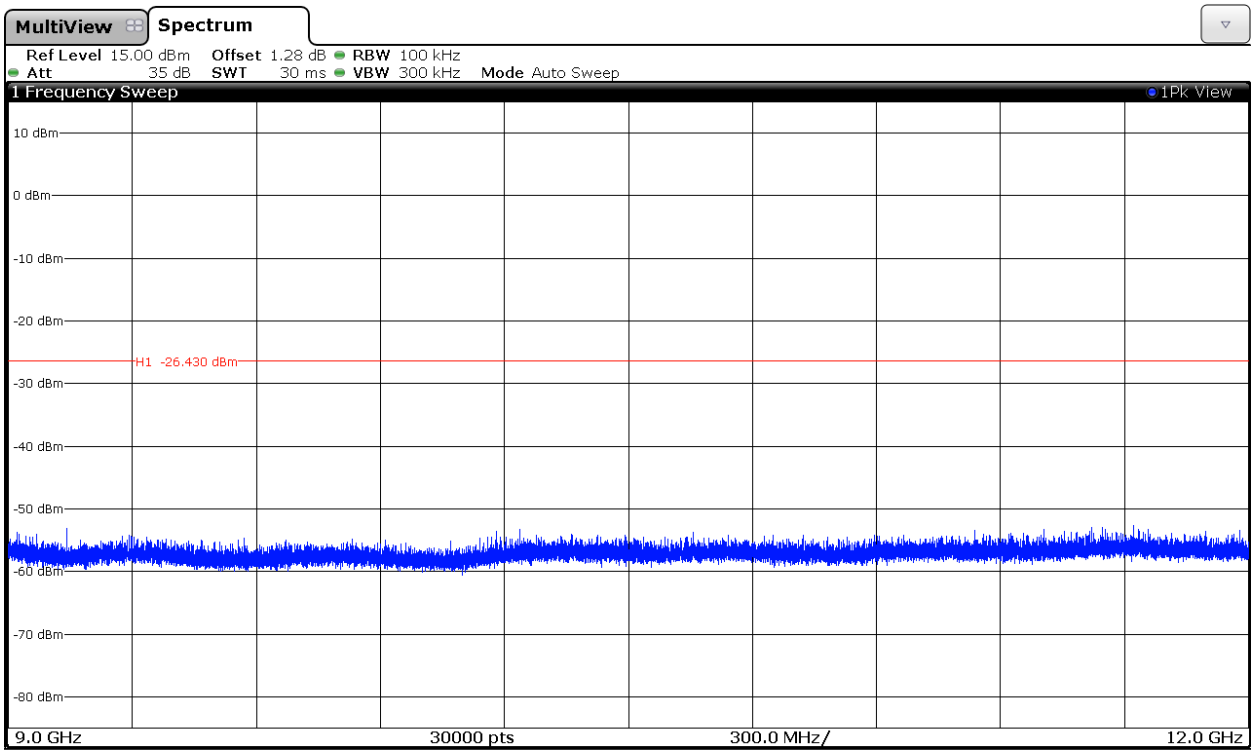
Plot 3 GHz to 6 GHz:



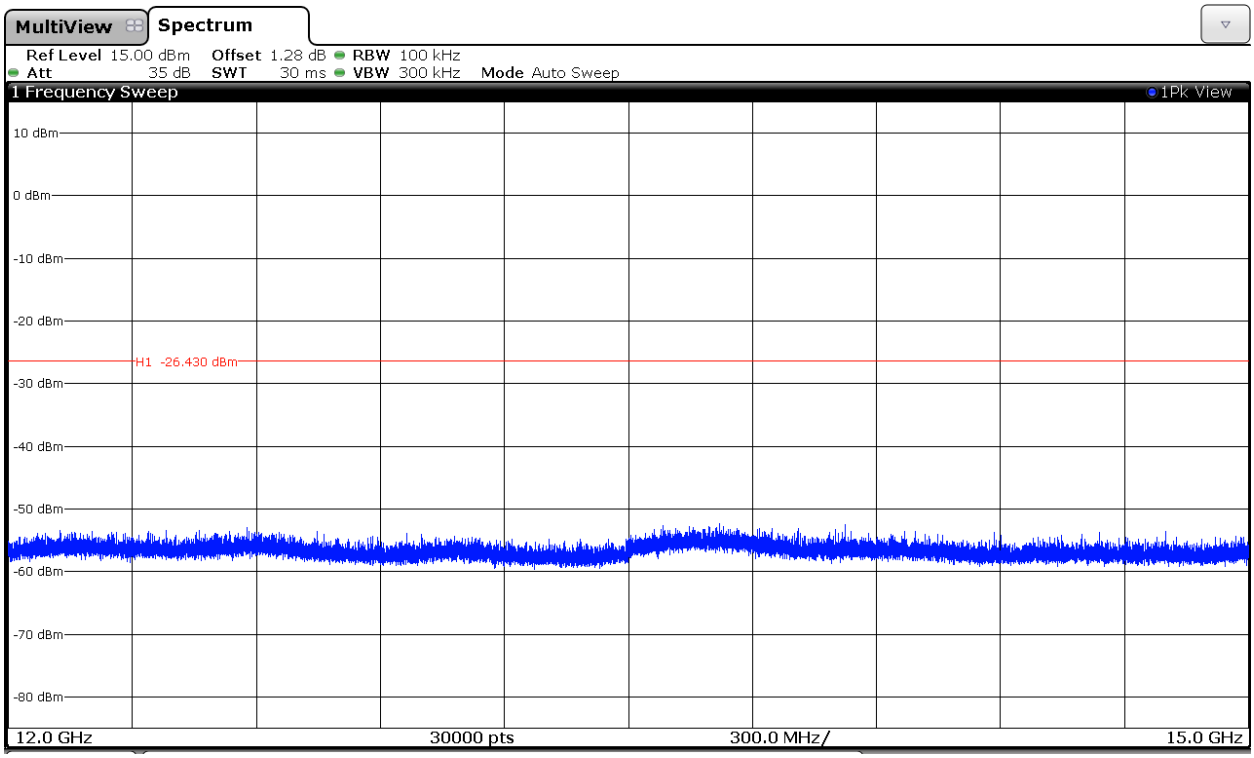
Plot 6 GHz to 9 GHz:



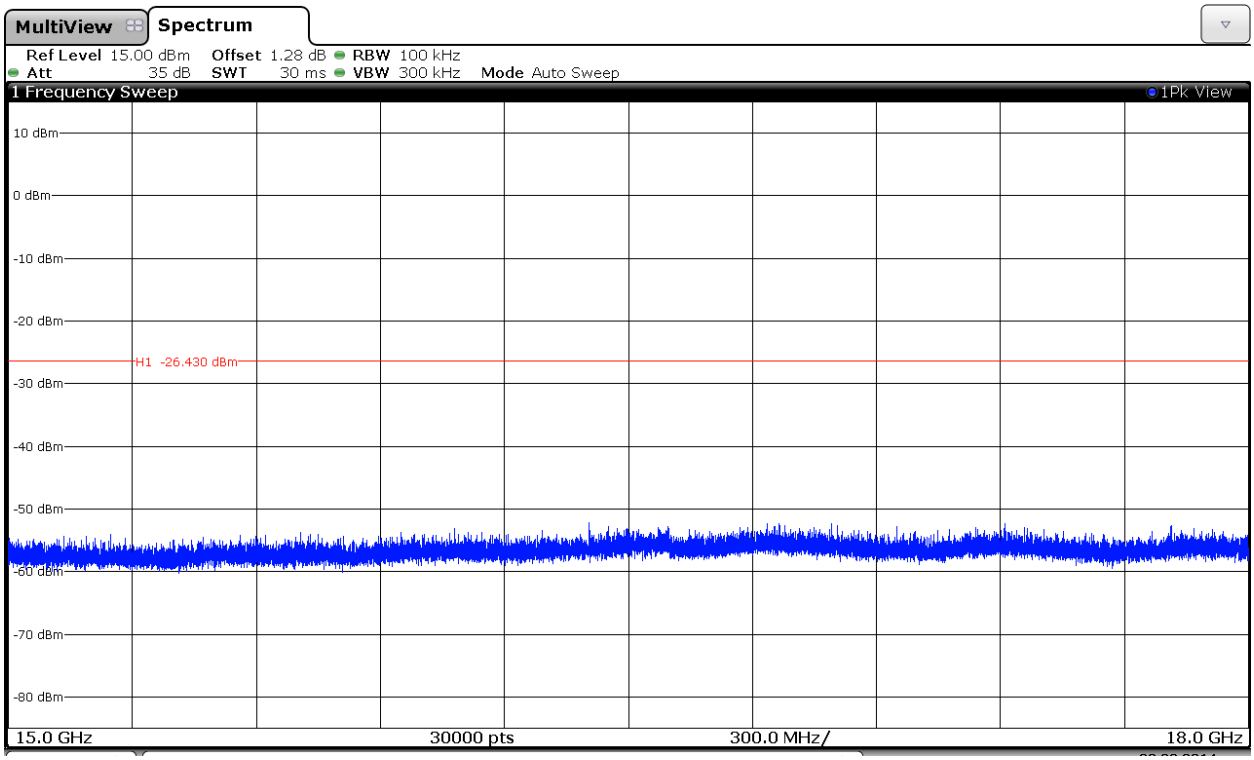
Plot 9 GHz to 12 GHz:



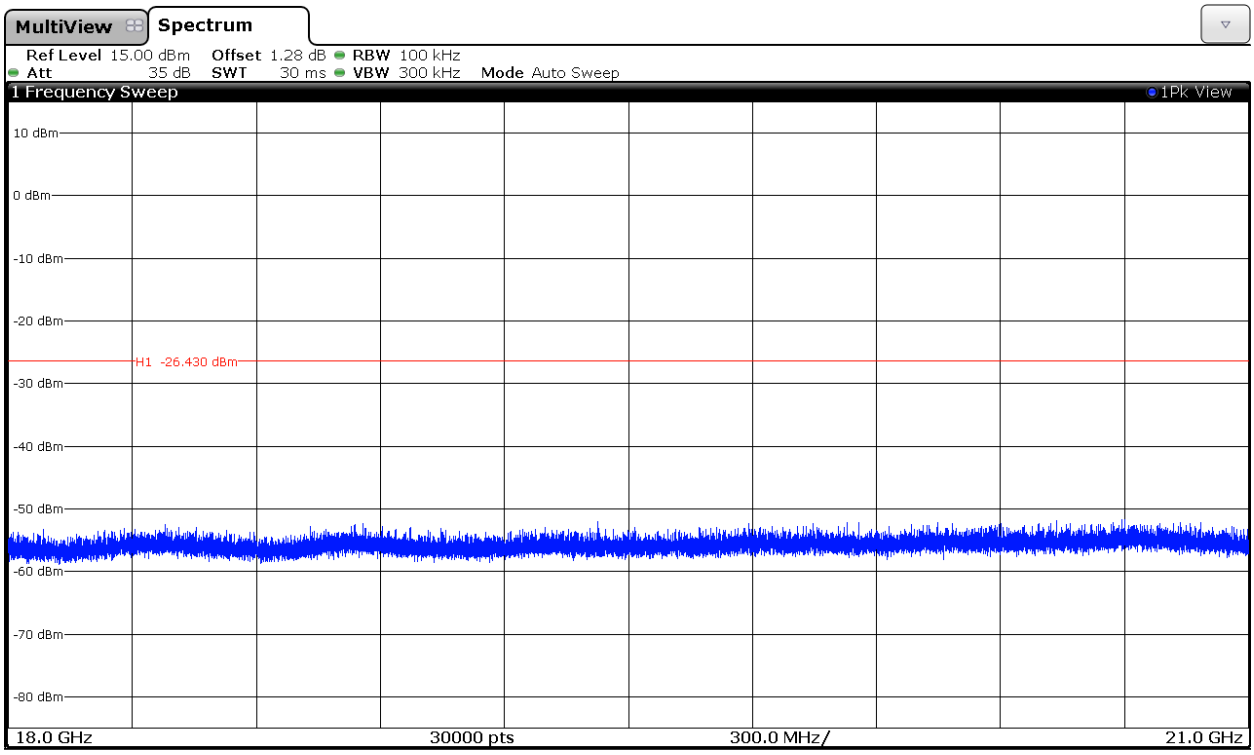
Plot 12 GHz to 15 GHz:



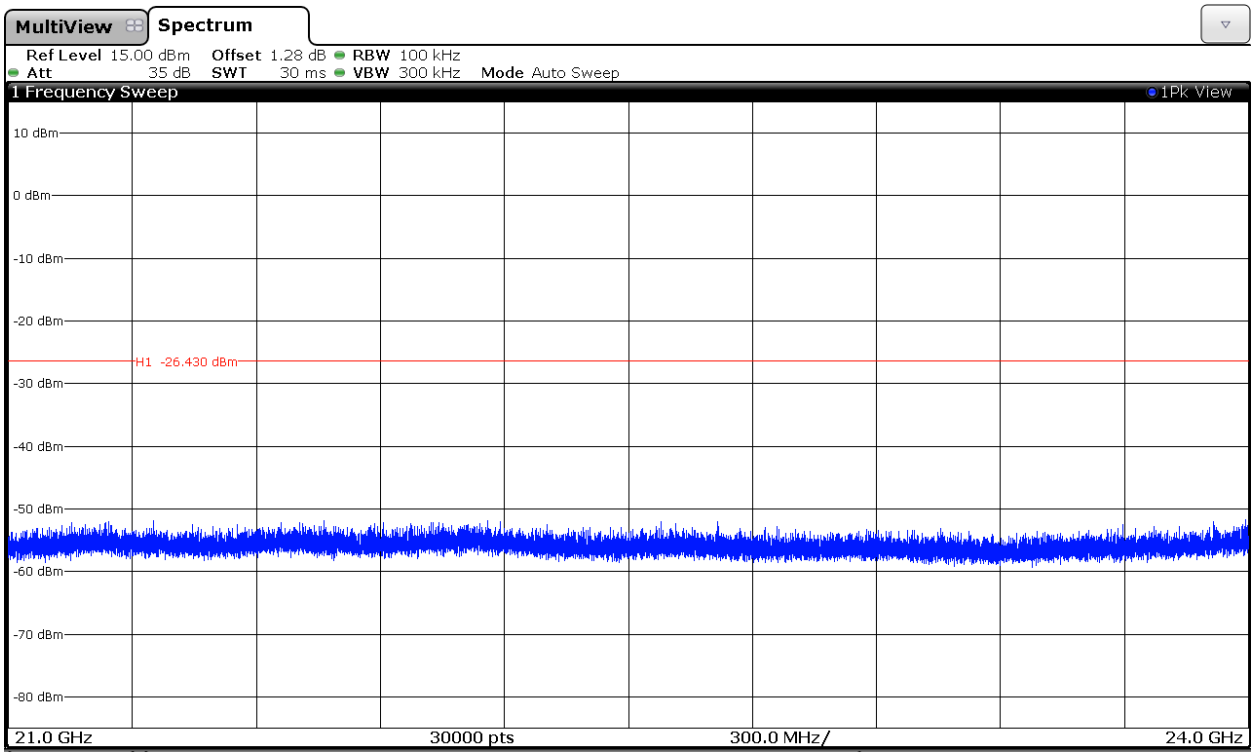
Plot 15 GHz to 18 GHz:



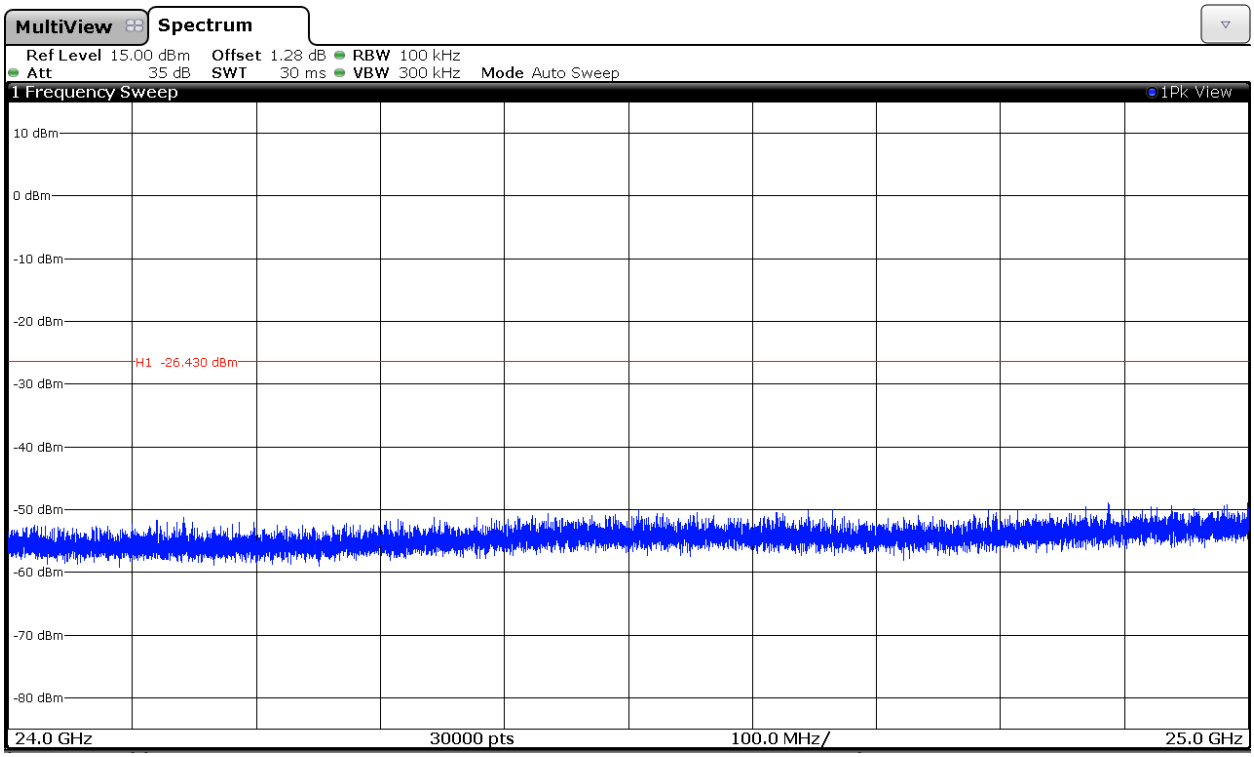
Plot 18 GHz to 21 GHz:



Plot 21 GHz to 24 GHz:



Plot 24GHz to 25 GHz:



Section 15.247 Subclause (d) / RSS-210 A8.5. Band-edge emissions compliance (Transmitter)

SPECIFICATION

Emissions outside the frequency band in which the intentional radiator is operating shall be at least 20dB below the highest level of the desired power. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB.

RESULTS:

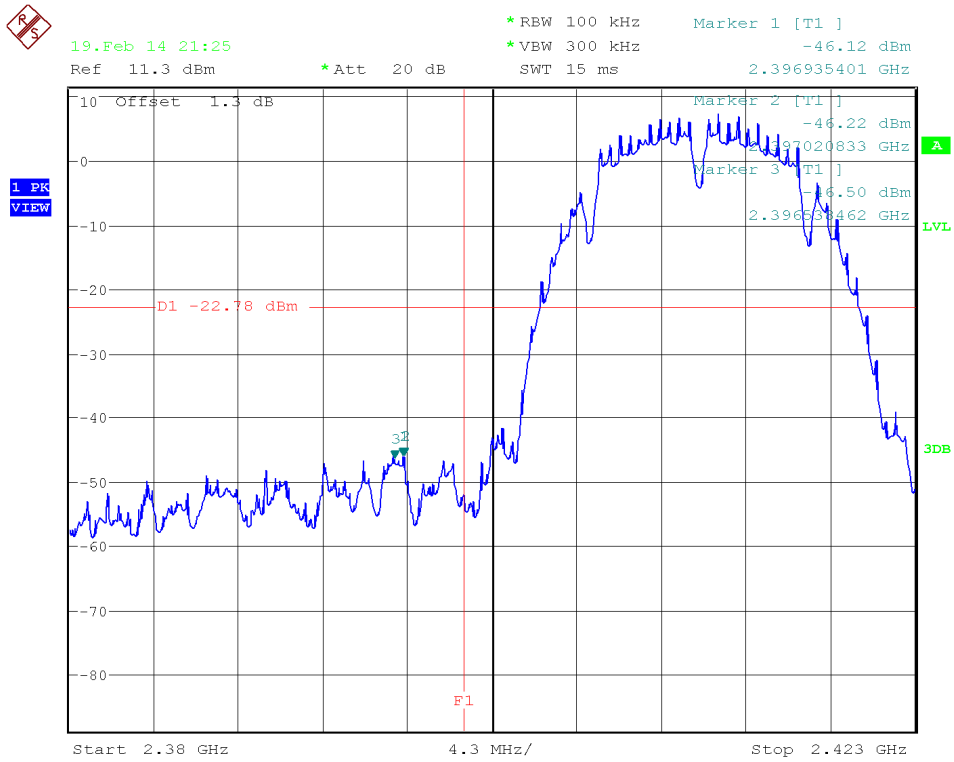
Note: Radiated measurements were used to show compliance with the limits in the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

LOW FREQUENCY SECTION 2412 MHz. CONDUCTED.

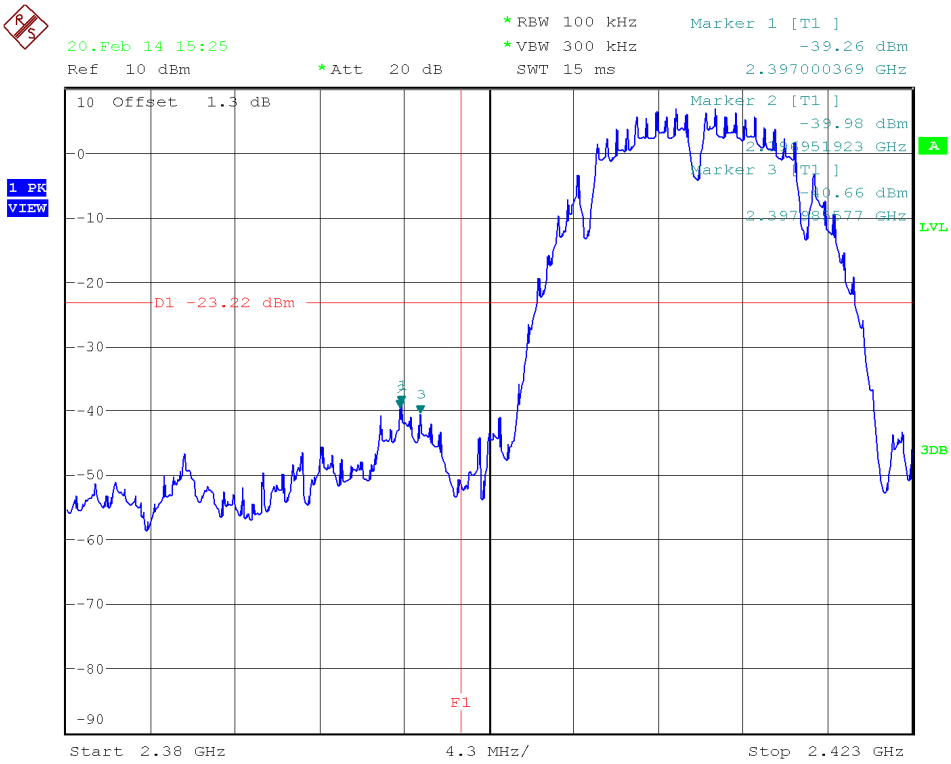
1. WiFi 2.4GHz 802.11 b mode

See next plots.

Chain A



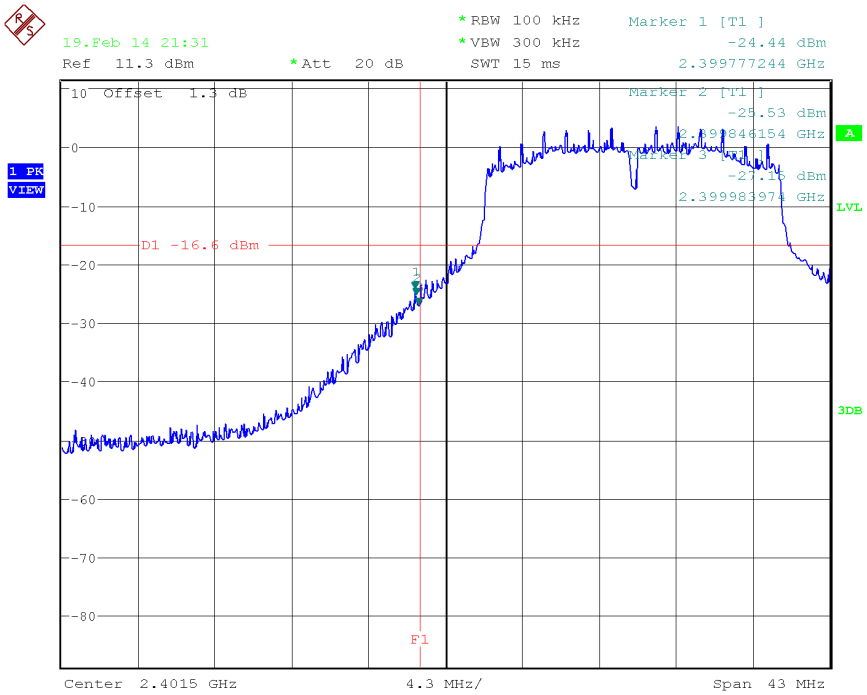
Chain B



Verdict: PASS

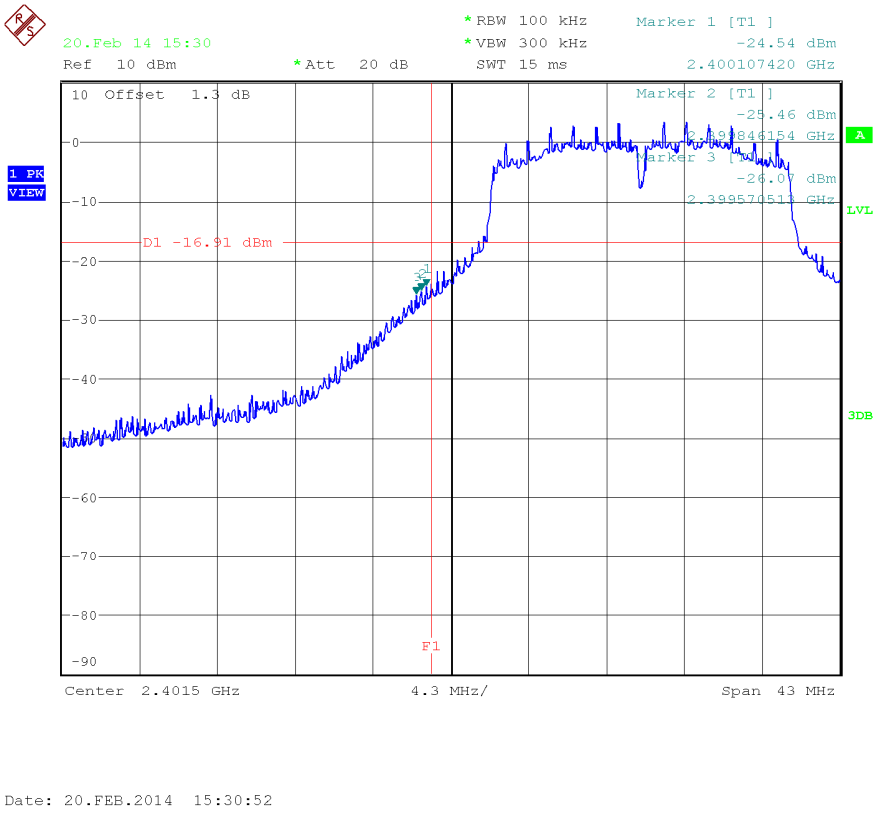
2. WiFi 2.4GHz 802.11 g mode

Chain A



Date: 19.FEB.2014 21:31:34

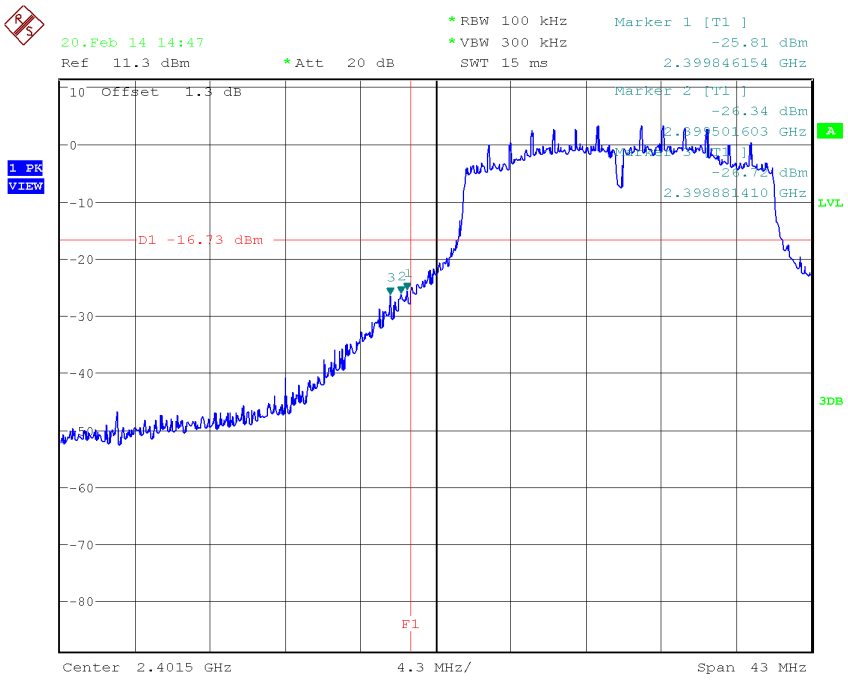
Chain B



Verdict: PASS (NOTE: The limit is set to -20 dBc since the maximum peak conducted output power was measured for this mode.)

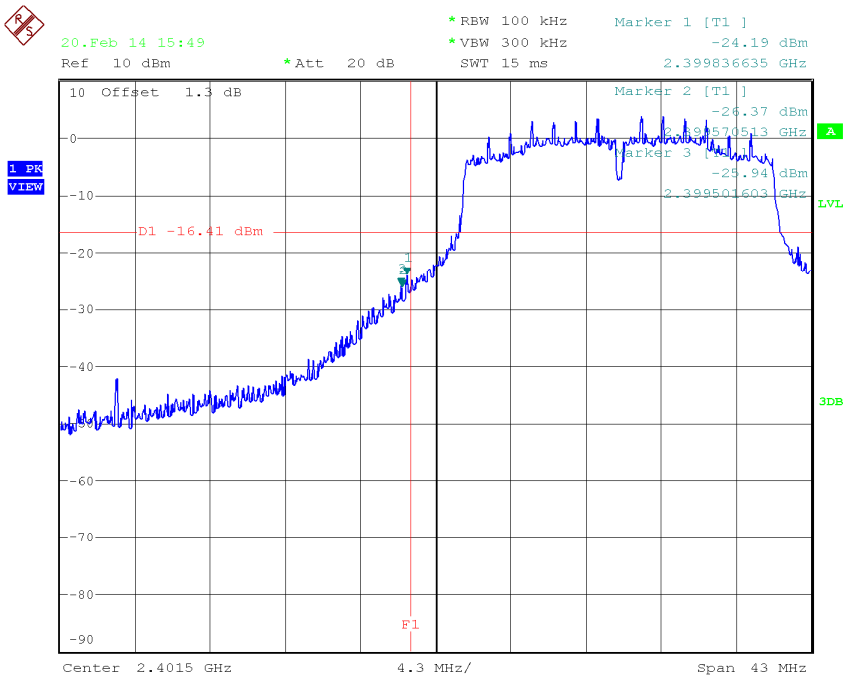
3. WiFi 2.4GHz 802.11 n20 mode

Chain A



Date: 20.FEB.2014 14:47:14

Chain B

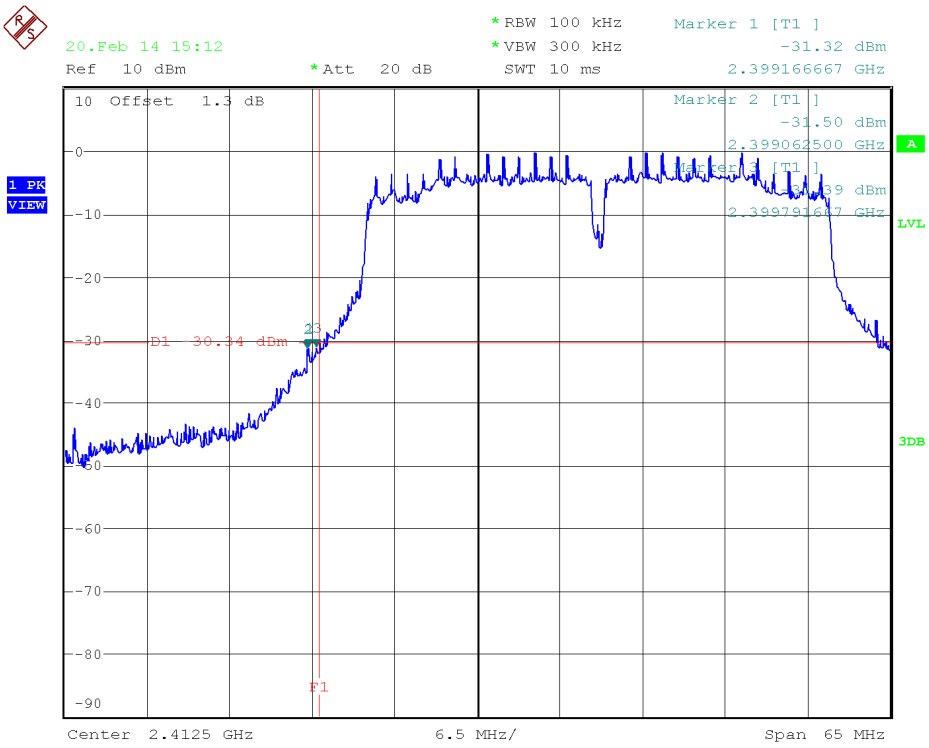


Date: 20.FEB.2014 15:49:54

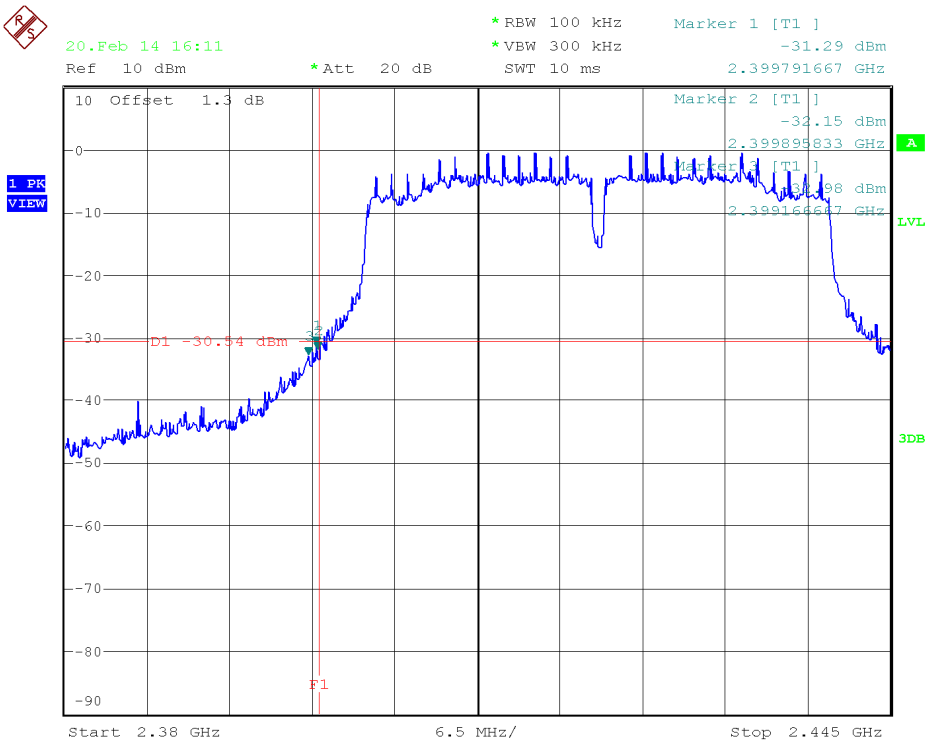
Verdict: PASS (NOTE: The limit is set to -20 dBc since the maximum peak conducted output power was measured for this mode.)

4. WiFi 2.4GHz 802.11 n40 mode

Chain A



Chain B



Verdict: PASS

Section 15.247 Subclause (e) / RSS-210 A8.5. Power spectral density

SPECIFICATION

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

The maximum power spectral density level in the fundamental emission was measured using the method of trace averaging with EUT transmitting at full power throughout each sweep according to point 10.3. of Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v03r01 dated 09/04/2013. This method was used for 802.11b and 802.11n40 modes.
For 802.11g and 802.11n20 modes the PKPSD (peak PSD) method was used since the maximum peak conducted output power was measured for this mode.

For MIMO mode, the *Measure and add 10 log(NANT) dB*, (where *NANT* is the number of outputs) technique was used according to the Guidance for Emission Testing of Transmitters with Multiple Outputs in the Same Band 662911 D01 Multiple Transmitter Output v02r01 dated 10/31/2013.
With this technique, spectrum measurements are performed at each output of the device, and the quantity *10 log(NANT)* dB is added to each spectrum value before comparing to the emission limit. Number of outputs = 2.

1. WiFi 2.4GHz 802.11 b mode

Power spectral density (See next plot of worst case = highest level).

	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
Power spectral density (dBm)	-0.869	-0.583	0.170	0.266	-0.802	-1.194
Measurement uncertainty (dB)	±1.5					

Verdict: PASS

2. WiFi 2.4GHz 802.11 g mode

Power spectral density (See next plot of worst case = highest level).

	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
Power spectral density (dBm)	3.73	4.33	6.99	7.76	1.99	2.20
Measurement uncertainty (dB)	±1.5					

Verdict: PASS (NOTE: the PKPSD (peak PSD) method was used since the maximum peak conducted output power was measured for this mode).

3. WiFi 2.4GHz 802.11 n20 mode

Power spectral density (See next plot of worst case = highest level).

	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
Power spectral density (dBm)	3.77	3.87	6.90	7.54	1.36	1.36
Measurement uncertainty (dB)	±1.5					

MIMO	Lowest frequency 2412 MHz		Middle frequency 2437 MHz		Highest frequency 2462 MHz	
	Chain A+B		Chain A+B		Chain A+B	
	Port A	Port B	Port A	Port B	Port A	Port B
Power spectral density (dBm)	2.62	1.70	-6.92	-6.59	2.25	1.65
Power spectral density (dBm) + 10*Log(2)	5.63	5.26	-3.91	-3.58	5.26	4.66
Measurement uncertainty (dB)	±1.5		±1.2		±1.5	

Verdict: PASS (NOTE: the PKPSD (peak PSD) method was used since the maximum peak conducted output power was measured for this mode. The Middle channel (MIMO A+B) was measured with RBW=3KHz and VBW=30KHz.)

4. WiFi 2.4GHz 802.11 n40 mode

Power spectral density (See next plot of worst case= highest level).

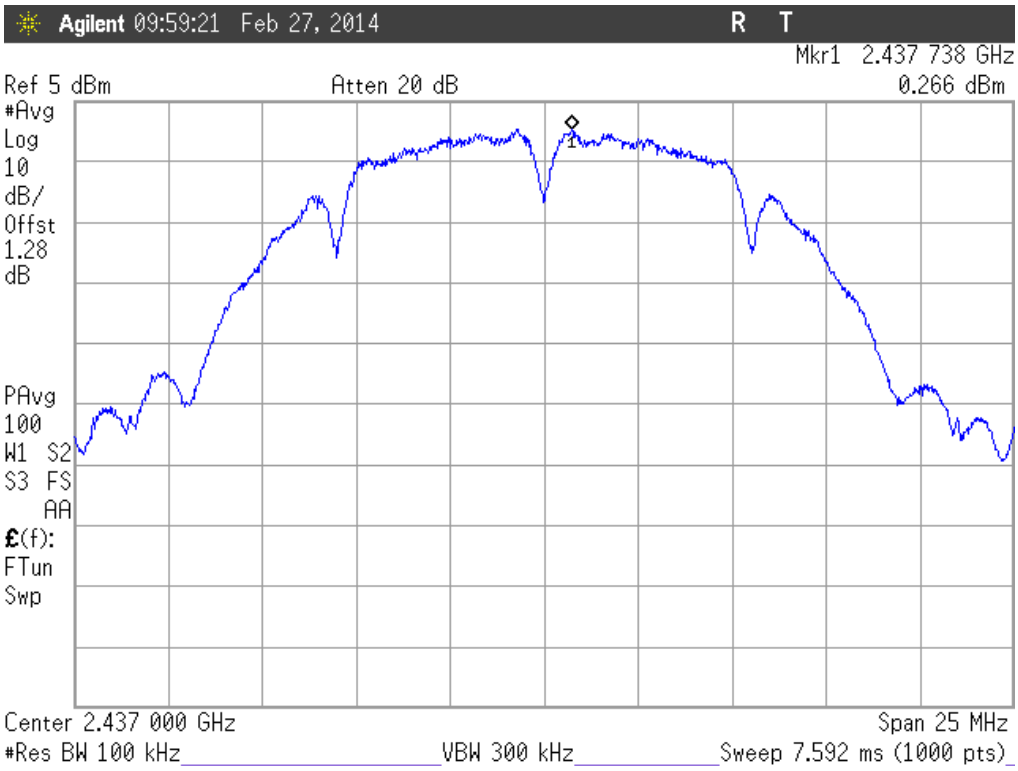
	Lowest frequency 2422 MHz		Middle frequency 2437 MHz		Highest frequency 2452 MHz	
	Chain A	Chain B	Chain A	Chain B	Chain A	Chain B
Power spectral density (dBm)	-9.504	-9.990	-5.311	-5.960	-10.121	-11.653
Measurement uncertainty (dB)	±1.5					

MIMO	Lowest frequency 2422 MHz		Middle frequency 2437 MHz		Highest frequency 2452 MHz	
	Chain A+B		Chain A+B		Chain A+B	
	Port A	Port B	Port A	Port B	Port A	Port B
Power spectral density (dBm)	-13.957	-13.139	-9.599	-9.440	-13.933	-13.726
Power spectral density (dBm) + 10*Log(2)	-10.95	-10.13	-6.59	-6.43	-10.92	-10.72
Measurement uncertainty (dB)	±1.5					

Verdict: PASS

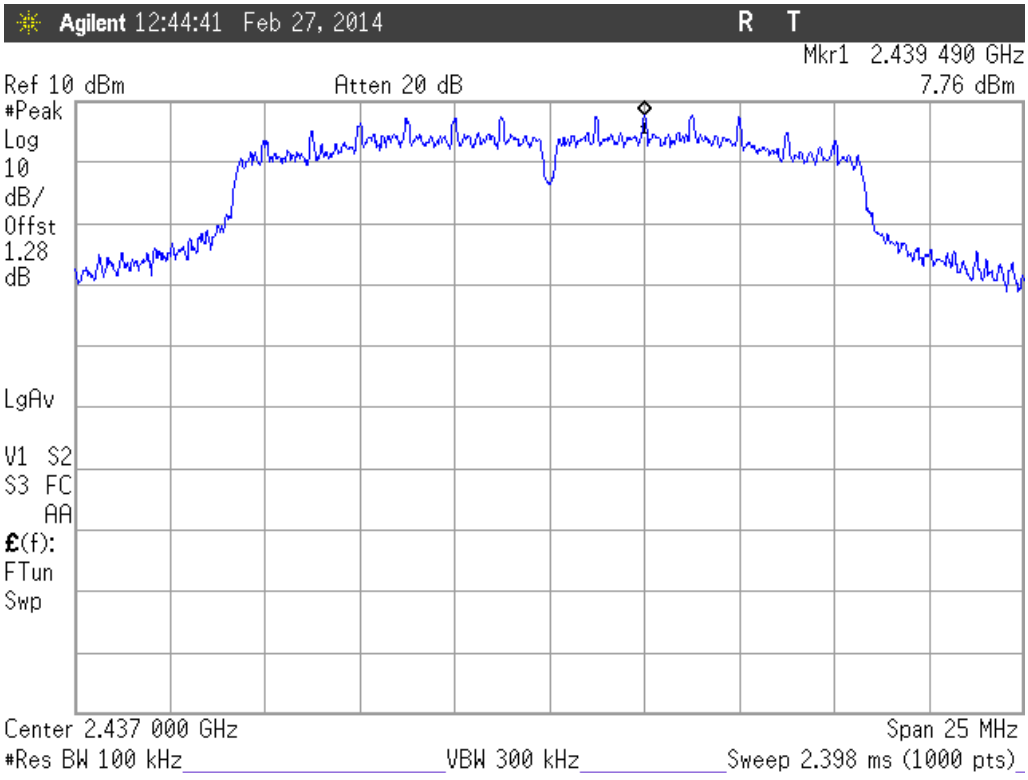
1. WiFi 2.4GHz 802.11 b mode

Middle Channel: 2437 MHz. Chain B.



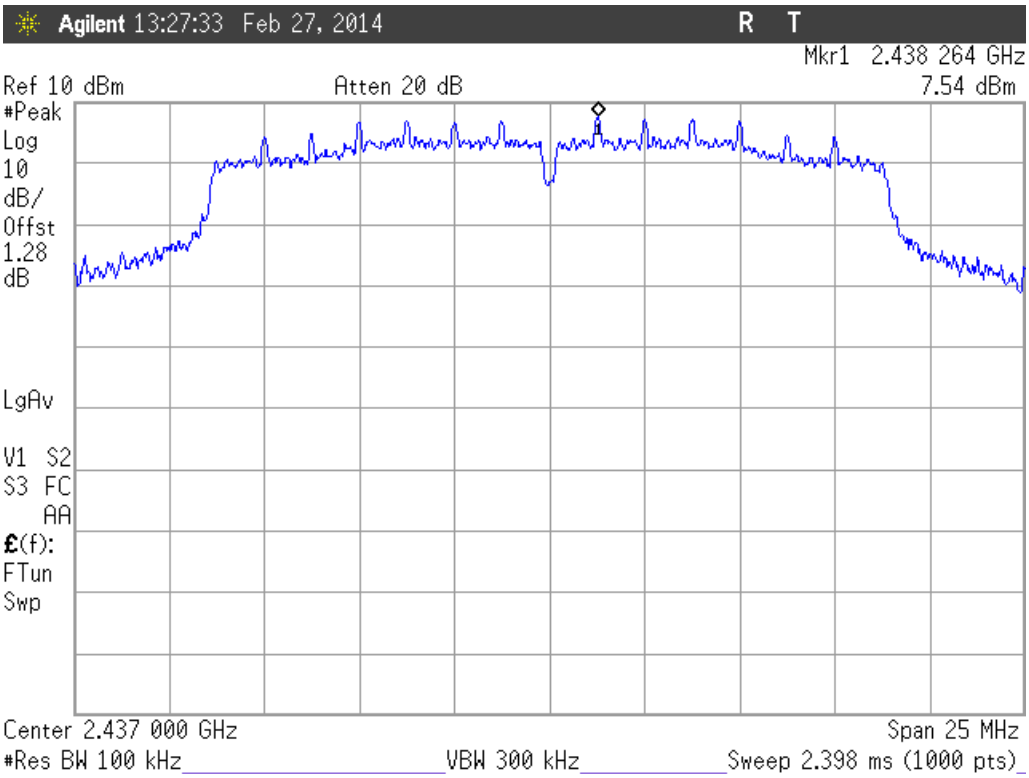
2. WiFi 2.4GHz 802.11 g mode

Middle Channel: 2437 MHz. Chain B.

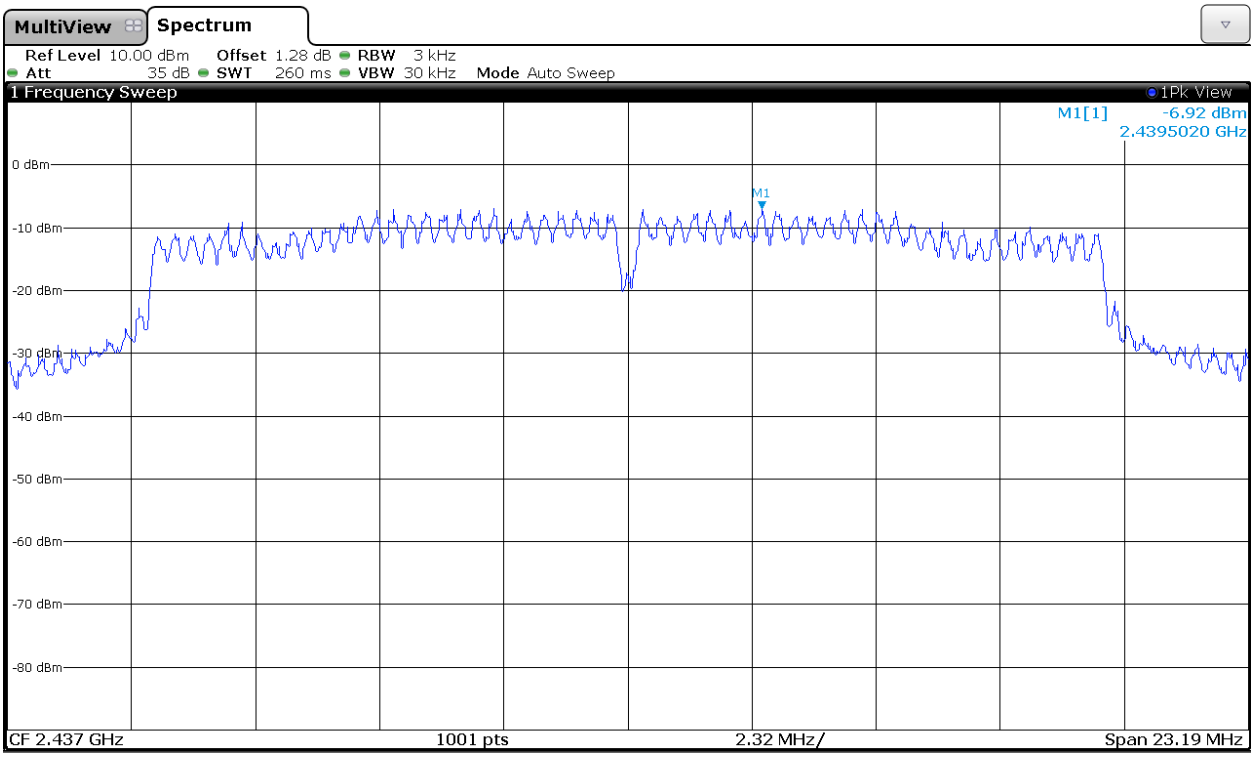


3. WiFi 2.4GHz 802.11 n20 mode

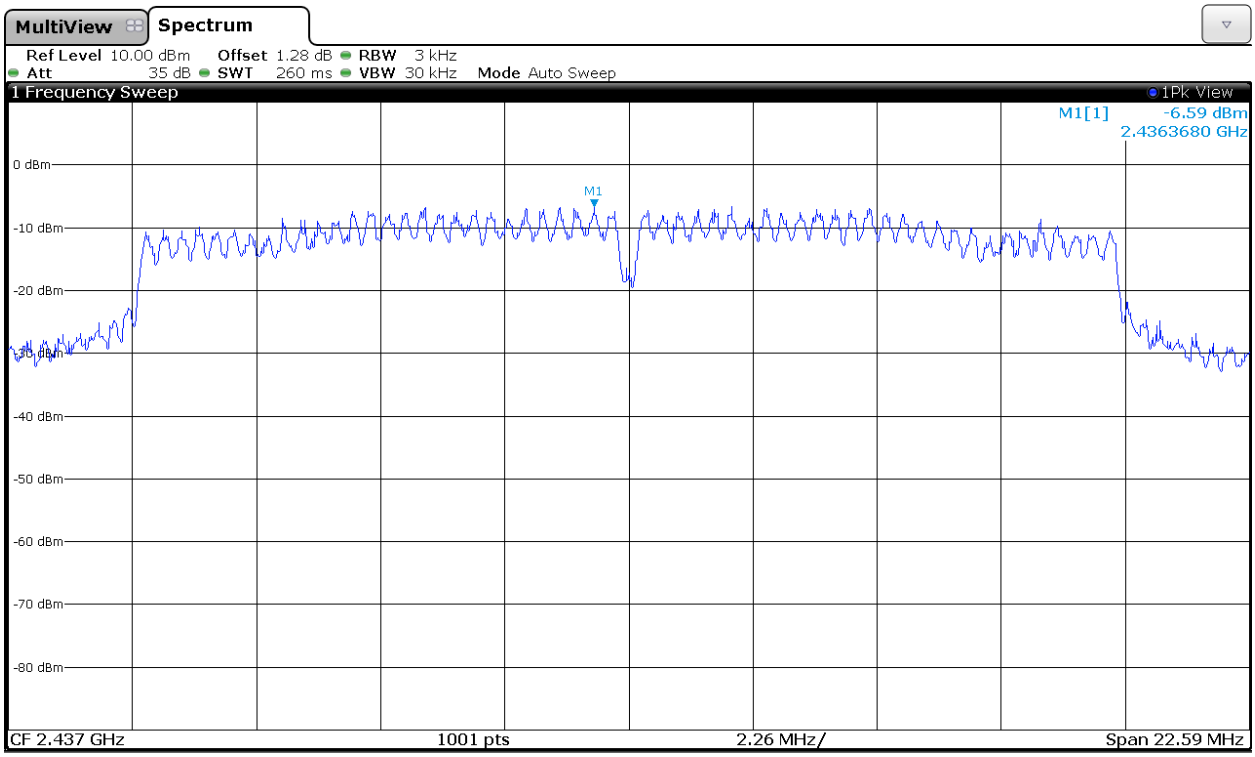
SISO. Middle Channel: 2437 MHz. Chain B.



MIMO. Middle Channel: 2437 MHz. Chain A+B. Port A.

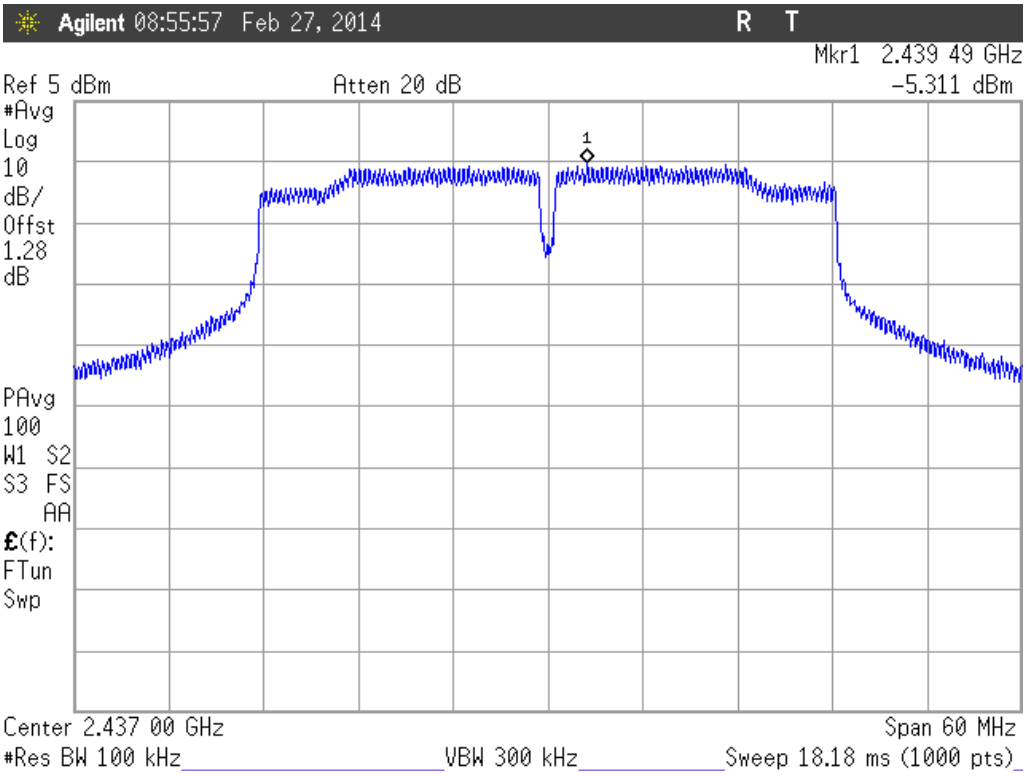


MIMO. Middle Channel: 2437 MHz. Chain A+B. Port B.

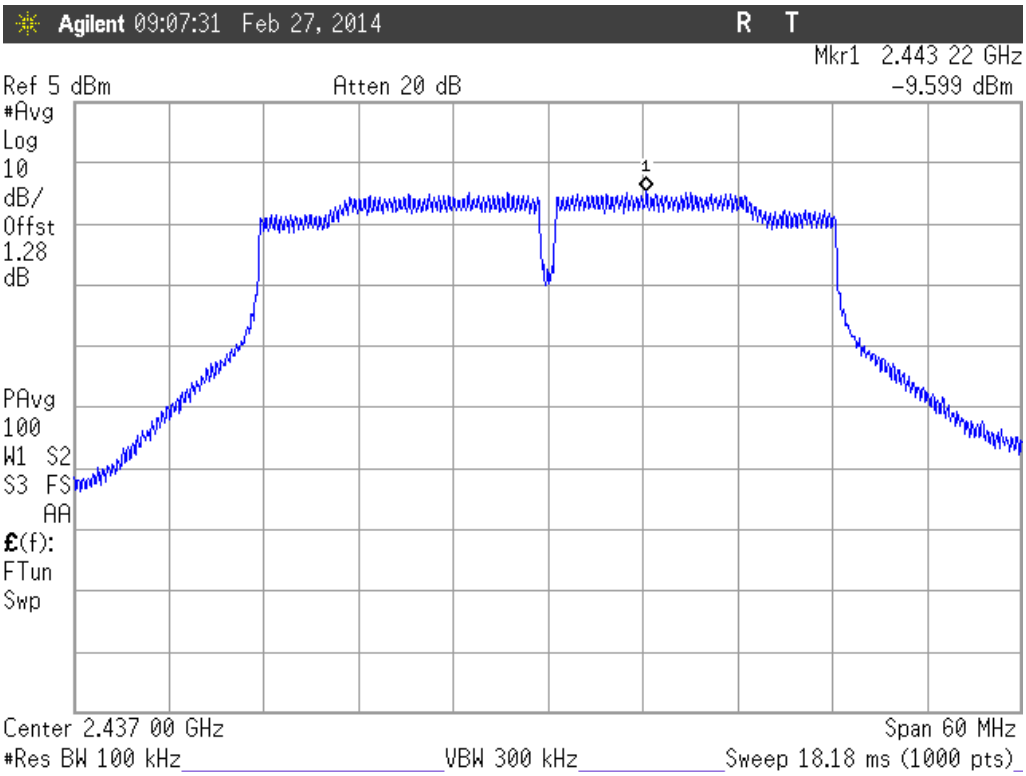


4. WiFi 2.4GHz 802.11 n40 mode

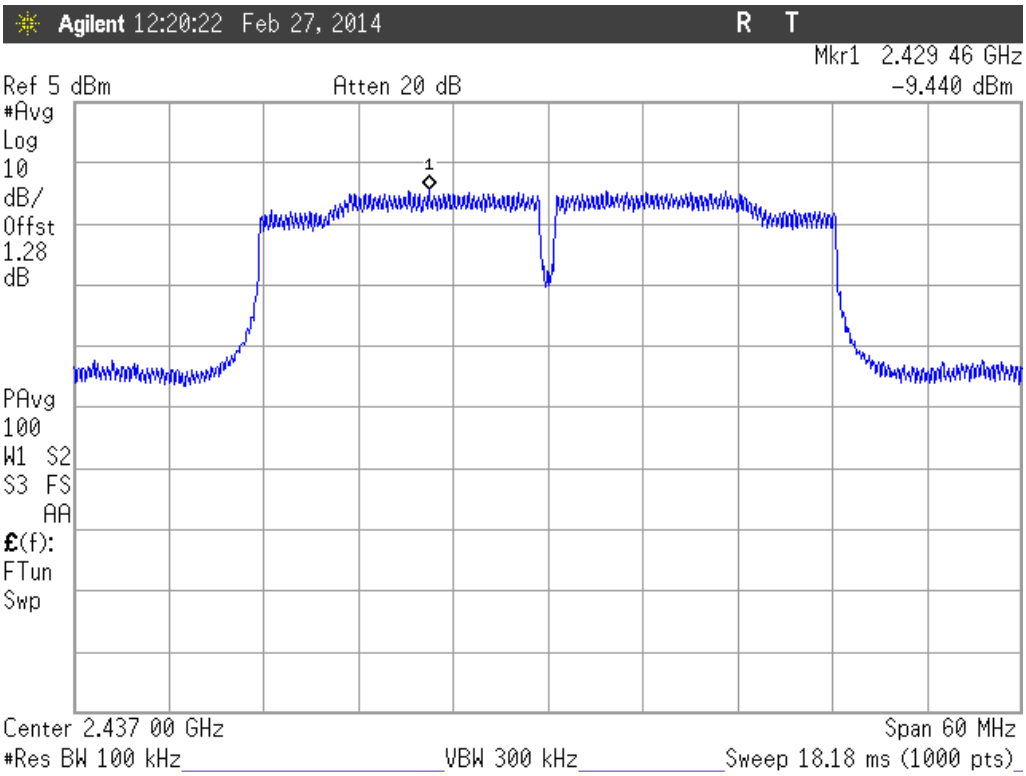
SISO. Middle Channel: 2437 MHz. Chain A.



MIMO. Middle Channel: 2437 MHz. Chain A+B. Port A.



MIMO. Middle Channel: 2437 MHz. Chain A+B. Port B.



Section 15.247 Subclause (d) / RSS-210 A8.5. Emission limitations radiated (Transmitter)

SPECIFICATION

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)):

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	300
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 25000	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RESULTS:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

All tests were performed in a semi-anechoic chamber at a distance of 3 m for the frequency range 30 MHz-1000 MHz and at distance of 1m for the frequency range 1 GHz-25 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

The equipment transmits continuously in the selected channel so it is not necessary a duty cycle correction factor.

Frequency range 30 MHz-1000 MHz.

The spurious signals detected do not depend on either the operating channel or the modulation mode.

Spurious levels closest to the limit:

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
158.04	PV	Quasi-Peak	28.16	± 4.12
257.95	PV	Quasi-Peak	25.83	± 4.12
340.40	PV	Quasi-Peak	32.06	± 4.12
484.93	PV	Quasi-Peak	30.53	± 4.12

Frequency range 1 GHz-25 GHz

The results in the next tables show the maximum measured levels in the 1-25 GHz range including the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz (see next plots).

For OFDM modulation modes (802.11g, 802.11n20 and 802.11n40), a preliminary measurement in the central channel in the range 1-18 GHz was performed to determine the worst case. The lowest and highest channels were measured for out-of-band emissions for the worst case (802.11g).

The field strength at the band edges was evaluated for each mode and on each chain individually on the lowest and highest channels at the rated power for the channel under test. Where the power at the edge channels was lower than the power at the center channels additional measurements were made at the adjacent channels. Single transmission at each chain and simultaneous transmission at both chains modes were fully evaluated.

Spurious signals with peak levels above the average limit (54 dBµV/m at 3 m) are measured with average detector for checking compliance with the average limit.

1. WiFi 2.4GHz 802.11 b mode

Note: For the lowest and highest channels the power was adjusted to the values of the adjacent respective channels, which are 1 dB higher, for checking compliance inside the restricted bands for lowest, highest and adjacent channels.

1.1. CHANNEL 1: LOWEST (2412 MHz). Out-of-band spurious emissions in the 1-25 GHz range and inside restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38772	PH	Peak	53.16	± 4.00
2.49295	PH	Peak	48.28	± 4.00
4.82396	PV	Peak	46.65	± 4.00
7.23674	PV	Peak	47.12	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38596	PH	Peak	52.62	± 4.00
2.483723	PH	Peak	50.00	± 4.00
2.570685	PH	Peak	50.94	± 4.00
4.824036	PV	Peak	48.39	± 4.00

1.2. CHANNEL 6: MIDDLE (2437 MHz). Out-of-band spurious emissions in the 1-25 GHz range and inside restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38868	PH	Peak	50.87	± 4.00
2.48569	PH	Peak	50.32	± 4.00
3.04106	PV	Peak	39.19	± 4.00
4.87395	PV	Peak	47.69	± 4.00
7.30879	PV	Peak	48.16	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38996	PH	Peak	50.85	± 4.00
2.48384	PH	Peak	52.18	± 4.00
4.87699	PV	Peak	45.07	± 4.00

1.3. CHANNEL 11: HIGHEST (2462 MHz). Out-of-band spurious emissions in the 1-25 GHz range and inside restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38996	PH	Peak	47.25	± 4.00
2.49971	PH	Peak	52.35	± 4.00
2.62383	PH	Peak	48.82	± 4.00
7.38694	PV	Peak	49.37	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38996	PH	Peak	48.14	± 4.00
2.48361	PH	Peak	51.99	± 4.00
2.62013	PH	Peak	49.17	± 4.00
4.92396	PV	Peak	54.26	± 4.00
		Average	53.30	± 4.00

Verdict: PASS

1.4. CHANNEL 12: (2467 MHz). Out-of-band spurious emissions in the 1-25 GHz range and inside restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz. For information purposes only.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38940	PH	Peak	46.25	± 4.00
2.48559	PH	Peak	49.36	± 4.00
4.93412	PV	Peak	38.92	± 4.00
7.40160	PV	Peak	44.89	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38780	PH	Peak	46.37	± 4.00
2.48354	PH	Peak	53.47	± 4.00
4.93410	PV	Peak	36.97	± 4.00

Verdict: PASS

1.5. CHANNEL 13: (2472 MHz). Out-of-band spurious emissions in the 1-25 GHz range and inside restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz. For information purposes only.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.37764	PH	Peak	44.86	± 4.00
2.48673	PH	Peak	50.06	± 4.00
4.94340	PV	Peak	39.28	± 4.00
7.41470	PV	Peak	43.02	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38732	PH	Peak	46.47	± 4.00
2.48476	PH	Peak	55.22	± 4.00
		Average	48.07	± 4.00
4.94340	PV	Peak	37.84	± 4.00

Verdict: PASS

2. WiFi 2.4GHz 802.11 g mode (worst case OFDM)

Note: For checking compliance of adjacent channels inside the restricted bands, mode n20 was tested, which has the same channel power adjustment, modulation scheme and a wider occupied bandwidth.

2.1. CHANNEL 1: LOWEST (2412 MHz). Out-of-band spurious emissions in the 1-25 GHz range and inside restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38996	PH	Peak	59.83	± 4.00
		Average	48.23	± 4.00
2.48437	PH	Peak	47.67	± 4.00
2.56797	PH	Peak	47.83	± 4.00
4.82380	PV	Peak	40.16	± 4.00
7.23366	PV	Peak	45.85	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38988	PH	Peak	60.76	± 4.00
		Average	46.21	± 4.00
2.48394	PH	Peak	48.65	± 4.00
4.82342	PV	Peak	58.19	± 4.00
		Average	46.12	± 4.00

2.2. CHANNEL 6: MIDDLE (2437 MHz). Out-of-band spurious emissions in the 1-25 GHz range and inside restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38996	PH	Peak	54.15	± 4.00
		Average	41.17	± 4.00
2.48402	PH	Peak	59.78	± 4.00
		Average	41.87	± 4.00
2.59369	PH	Peak	48.42	± 4.00
4.87373	PV	Peak	47.02	± 4.00
7.31195	PV	Peak	44.41	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38956	PH	Peak	60.20	± 4.00
		Average	47.15	± 4.00
2.48007	PH	Peak	59.95	± 4.00
		Average	46.37	± 4.00
4.87455	PV	Peak	60.62	± 4.00
		Average	50.79	± 4.00

2.5. CHANNEL 11: HIGHEST (2462 MHz). Out-of-band spurious emissions in the 1-25 GHz range and inside restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38892	PH	Peak	47.47	± 4.00
2.48357	PH	Peak	54.04	± 4.00
		Average	40.35	± 4.00
7.38516	PV	Peak	49.51	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38772	PH	Peak	47.08	± 4.00
2.48359	PH	Peak	53.27	± 4.00
4.92393	PV	Peak	49.40	± 4.00

Verdict: PASS

2.6. CHANNEL 12: (2467 MHz). Spurious emissions inside restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz. For information purposes only.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.39000	PH	Peak	44.44	± 4.00
2.48354	PH	Peak	61.70	± 4.00
		Average	43.43	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38980	PH	Peak	45.42	± 4.00
2.48351	PH	Peak	62.06	± 4.00
		Average	44.68	± 4.00

Verdict: PASS

2.7. CHANNEL 13: (2472 MHz). Spurious emissions inside restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz. For information purposes only.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38660	PH	Peak	46.59	± 4.00
2.48354	PH	Peak	65.54	± 4.00
		Average	47.38	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.36268	PH	Peak	45.42	± 4.00
2.48357	PH	Peak	65.71	± 4.00
		Average	49.07	± 4.00

Verdict: PASS

3. WiFi 2.4GHz 802.11 n20 mode

3.1. CHANNEL 1 (2412 MHz). Spurious emissions in restricted band 2.31-2.39 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38972	PH	Peak	62.98	± 4.00
		Average	49.91	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38996	PH	Peak	61.73	± 4.00
		Average	48.24	± 4.00

Chain A+B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38996	PH	Peak	66.25	± 4.00
		Average	51.83	± 4.00

3.2. CHANNEL 2 (2417 MHz). Spurious emissions in restricted band 2.31-2.39 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38980	PH	Peak	63.78	± 4.00
		Average	49.69	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38988	PH	Peak	63.20	± 4.00
		Average	45.50	± 4.00

Chain A+B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38996	PH	Peak	61.43	± 4.00
		Average	47.13	± 4.00

3.3. CHANNEL 6: MIDDLE (2437 MHz). Out-of-band spurious emissions in the 1-25 GHz range and inside restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38972	PH	Peak	52.26	± 4.00
2.48379	PH	Peak	55.75	± 4.00
		Average	41.86	± 4.00
2.59892	PH	Peak	48.21	± 4.00
4.87324	PV	Peak	47.17	± 4.00
7.31017	PV	Peak	43.93	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38980	PH	Peak	60.85	± 4.00
		Average	47.47	± 4.00
2.48369	PV	Peak	59.70	± 4.00
		Average	46.22	± 4.00
2.59300	PH	Peak	49.24	± 4.00
4.87498	PV	Peak	60.04	± 4.00
		Average	50.78	± 4.00

Chain A+B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38996	PH	Peak	64.09	± 4.00
		Average	51.72	± 4.00
2.48409	PH	Peak	66.52	± 4.00
		Average	52.20	± 4.00
4.87404	PV	Peak	56.70	± 4.00
		Average	45.28	± 4.00
7.31340	PV	Peak	45.95	± 4.00

3.4. CHANNEL 10 (2457 MHz). Spurious emissions in restricted band 2.4835-2.5 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.48369	PH	Peak	58.44	± 4.00
		Average	43.92	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.48369	PH	Peak	57.34	± 4.00
		Average	44.52	± 4.00

Chain A+B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.48395	PH	Peak	67.15	± 4.00
		Average	53.88	± 4.00

3.5. CHANNEL 11 (2462 MHz). Spurious emissions in restricted band 2.4835-2.5 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.48371	PH	Peak	57.77	± 4.00
		Average	42.49	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.48353	PH	Peak	57.43	± 4.00
		Average	43.76	± 4.00

Chain A+B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.48353	PH	Peak	65.00	± 4.00
		Average	50.42	± 4.00

3.6. CHANNEL 12: (2467 MHz). Out-of-band spurious emissions in the 1-25 GHz range and inside restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz. For information purposes only.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.37796	PH	Peak	45.69	± 4.00
2.48357	PH	Peak	59.82	± 4.00
		Average	43.53	± 4.00
7.3997	PV	Peak	43.42	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38900	PH	Peak	47.14	± 4.00
2.48359	PH	Peak	62.66	± 4.00
		Average	44.44	± 4.00
4.93410	PV	Peak	36.60	± 4.00

Chain A+B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38676	PH	Peak	45.97	± 4.00
2.48351	PH	Peak	63.70	± 4.00
		Average	47.40	± 4.00
4.93412	PV	Peak	39.36	± 4.00

3.7. CHANNEL 13: (2472 MHz). Spurious emissions inside restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz. For information purposes only.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.37860	PH	Peak	45.06	± 4.00
2.48351	PH	Peak	66.72	± 4.00
		Average	47.12	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38660	PH	Peak	45.11	± 4.00
2.48361	PH	Peak	67.14	± 4.00
		Average	48.32	± 4.00

Chain A+B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.37452	PH	Peak	45.69	± 4.00
2.48354	PH	Peak	68.03	± 4.00
		Average	49.41	± 4.00

4. WiFi 2.4GHz 802.11 n40 mode

4.1. CHANNEL 3 (2422 MHz). Spurious emissions in restricted band 2.31-2.39 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38996	PH	Peak	60.72	± 4.00
		Average	50.10	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38980	PH	Peak	64.73	± 4.00
		Average	53.57	± 4.00

Chain A+B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38956	PH	Peak	63.31	± 4.00
		Average	51.56	± 4.00

4.2. CHANNEL 4 (2427 MHz). Spurious emissions in restricted band 2.31-2.39 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38988	PH	Peak	60.71	± 4.00
		Average	49.73	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38924	PH	Peak	64.91	± 4.00
		Average	52.54	± 4.00

Chain A+B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38988	PH	Peak	64.83	± 4.00
		Average	52.16	± 4.00

4.3. CHANNEL 5 (2432 MHz). Spurious emissions in restricted band 2.31-2.39 GHz.

Chain A

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38972	PH	Peak	61.92	± 4.00
		Average	49.89	± 4.00

Chain B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38988	PH	Peak	65.46	± 4.00
		Average	50.86	± 4.00

Chain A+B

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38980	PH	Peak	62.35	± 4.00
		Average	49.33	± 4.00