AT4 wireless, S.A.U.
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FCC LISTED, REGISTRATION NUMBER: 720267

IC LISTED REGISTRATION NUMBER IC 4621A-1

Informe de ensayo nº:
Test report No:

NIE: 46495RRF.001A1

Test report (Modification 1)

USA FCC Part 15.247, 15.209
CANADA RSS-247, RSS-Gen

Radio Frequency Devices. Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz.
Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.
General Requirements and Information for the Certification of Radio Apparatus.

Identificación del objeto ensayado.....: Identification of item tested	MySignals (wireless device)
Marca .....: Trademark	Libelium
Modelo y/o referencia tipo .....: Model and /or type reference	MySignals
Other identification of the product .....:	FCC ID: XKM-MYSIGNAL-V1 IC: 8472A-MYSIGNALV1
Final HW version .....:	1.0
Final SW version .....:	1.0
Características .....: Features	This device sends data via WiFi and Bluetooth Low Energy.
Fabricante .....: Manufacturer	Libelium Comunicaciones Distribuidas S.L. C/ Escatrón 16 (Edificio Libelium), CP: 50014, Zaragoza (SPAIN)
Método de ensayo solicitado, norma.....: Test method requested, standard	USA FCC Part 15.247 10-1-15 Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209 10-1-15 Edition: Radiated emission limits; general requirements. CANADA RSS-247 Issue 1 (May 2015). CANADA RSS-Gen Issue 4 (November 2014). Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v03r03 dated 06/09/2015. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Resultado.....: Summary	IN COMPLIANCE

Aprobado por (nombre / cargo y firma) .....: Approved by (name / position & signature)	A. Llamas RF Lab. Manager  Firmado digitalmente por ALEJANDRO LLAMAS RODRIGUEZ Fecha: 2016.06.01 09:20:23 +02'00'
Fecha de realización .....: Date of issue	2016-05-24
Formato de informe No. .....: Report template No	FDT11_18

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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 program 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.

The results presented in this Test Report apply only to the particular item under test established in this document.

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of AT4 wireless.

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 document PODT000.

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
46495C/020	Wireless device	MySignals	---	2015-11-16
46495C/21	AC/DC power supply	3A-186DB07	PFM150809	2015-11-16
46495C/19	USB-micro USB cable	---	---	2015-11-16

1. Sample S/01 has undergone following test(s).

   All radiated tests indicated in appendix A and B.

Test sample description

The test sample consists of a device which receives data from sensors and sends information with its wireless radio. It is 7V DC powered using a 220/7 AC/DC converter and can be easily programmed.

Identification of the client

Libelium Comunicaciones Distribuidas S.L.

C/ Escatrón 16 (Edificio Libelium), CP: 50014, Zaragoza (SPAIN)

Testing period

The performed test started on 2015-11-18 and finished on the same day.

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. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 Ω

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 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).

Modifications to the reference test report

It was introduced the following modifications in respect to the test report number 46495RRF.001 related with the same samples, in the next clauses and sub-clauses:

Clauses / Sub-clauses	Modification	Justification
Cover sheet / Identification of item tested	Identification of item tested is changed to MySignals	Applicant's correction of provided data.
Cover sheet / Model	Model is changed to MySignals	Applicant's correction of provided data.
Cover sheet / FCC ID	FCC ID is changed to XKM-MYSIGNAL-V1	Applicant's correction of provided data.
Cover sheet / IC	IC is changed to 8472A-MYSIGNALV1	Applicant's correction of provided data.
Usage of samples / Model	Model is changed to MySignals	Applicant's correction of provided data.

This modification test report cancels and replaces the test report 46495RRF.001.

Remarks and comments

1: Used instrumentation:

Radiated Measurements

		Last Cal. date	Cal. due date
1.	Semianechoic Absorber Lined Chamber ETS FACT3 200STP	N.A.	N.A.
2.	BiconicalLog antenna ETS LINDGREN 3142E	2014/03	2017/03
3.	Multi Device Controller EMCO 2090	N.A.	N.A.
4.	Double-ridge Guide Horn antenna 1-18 GHz SCHWARZBECK BBHA 9120 D	2013/11	2016/11
5.	Broadband Horn antenna 18-40 GHz SCHWARZBECK BBHA 9170	2014/03	2017/03
6.	EMI Test Receiver R&S ESU 40	2014/02	2016/02
7.	RF pre-amplifier 10 MHz-6 GHz SCHWARZBECK BBV9743	2015/03	2016/03
8.	RF pre-amplifier 1-18 GHz Bonn Elektronik BLMA 0118-3A	2015/05	2016/05
9.	RF pre-amplifier 12-26 GHz Miteq JS4-12002600-30-5A	2015/10	2017/10

2: Test not requested. Only radiated spurious emission test was requested.

Testing verdicts

Not applicable ..... :	N/A
Pass ..... :	P
Fail ..... :	F
Not measured ..... :	N/M

1. Bluetooth Low Energy

FCC PART 15 PARAGRAPH / RSS-247		VERDICT			
		NA	P	F	NM
Section 15.247 Subclause (a) (2) / RSS-247 5.2. (1)	6 dB Bandwidth				NM[2]
Section 15.247 Subclause (b) / RSS-247 5.4. (4)	Maximum output power and antenna gain				NM[2]
Section 15.247 Subclause (d) / RSS-247 5.5	Emission limitations conducted (Transmitter)				NM[2]
Section 15.247 Subclause (d) / RSS-247 5.5. ..	Band-edge conducted emissions compliance (Transmitter)				NM[2]
Section 15.247 Subclause (e) / RSS-247 5.2. (2)	Power spectral density				NM[2]
Section 15.247 Subclause (d) / RSS-247 5.5. ...	Emission limitations radiated (Transmitter)		P		

2: See section “Remarks and comments”.

2. WiFi 2.4 GHz (802.11b/g/n20)

FCC PART 15 PARAGRAPH / RSS-247		VERDICT			
		NA	P	F	NM
Section 15.247 Subclause (a) (2) / RSS-247 5.2. (1)	6 dB Bandwidth				NM[2]
Section 15.247 Subclause (b) / RSS-247 5.4. (4)	Maximum output power and antenna gain				NM[2]
Section 15.247 Subclause (d) / RSS-247 5.5	Emission limitations conducted (Transmitter)				NM[2]
Section 15.247 Subclause (d) / RSS-247 5.5. ..	Band-edge conducted emissions compliance (Transmitter)				NM[2]
Section 15.247 Subclause (e) / RSS-247 5.2. (2)	Power spectral density				NM[2]
Section 15.247 Subclause (d) / RSS-247 5.5. ...	Emission limitations radiated (Transmitter)		P		

2: See section “Remarks and comments”.

Appendix A – Test result "Bluetooth Low Energy"

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TEST CONDITIONS

Power supply (V):

$V_{nominal}$ = 115Vac

Type of power supply = AC/DC adapter.

Type of antenna: Integral antenna

TEST FREQUENCIES:

Lowest channel: 2402 MHz

Middle channel: 2440 MHz

Highest channel: 2480 MHz

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).

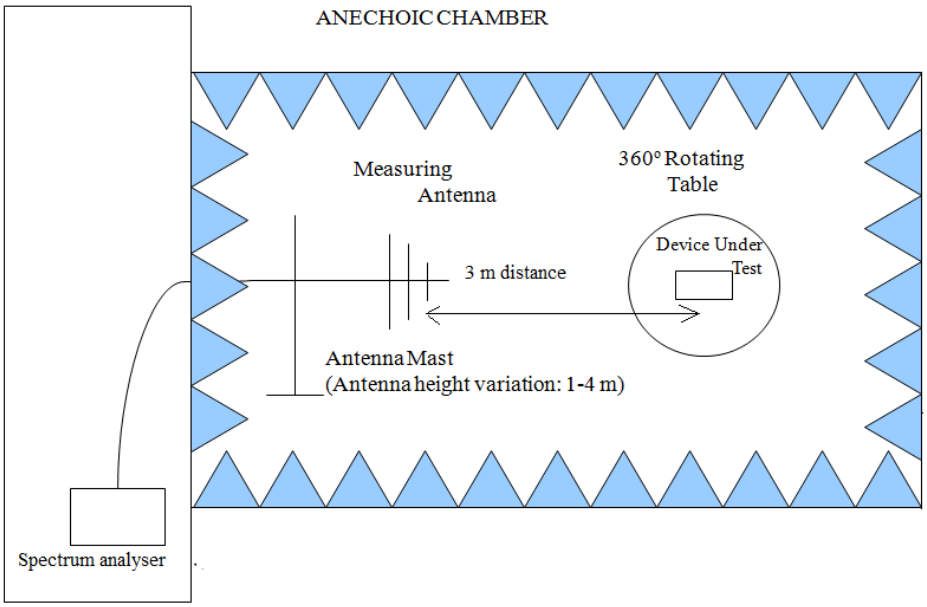
For radiated emissions in the range 1 GHz-25 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive (wooden) platform 1.5 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.

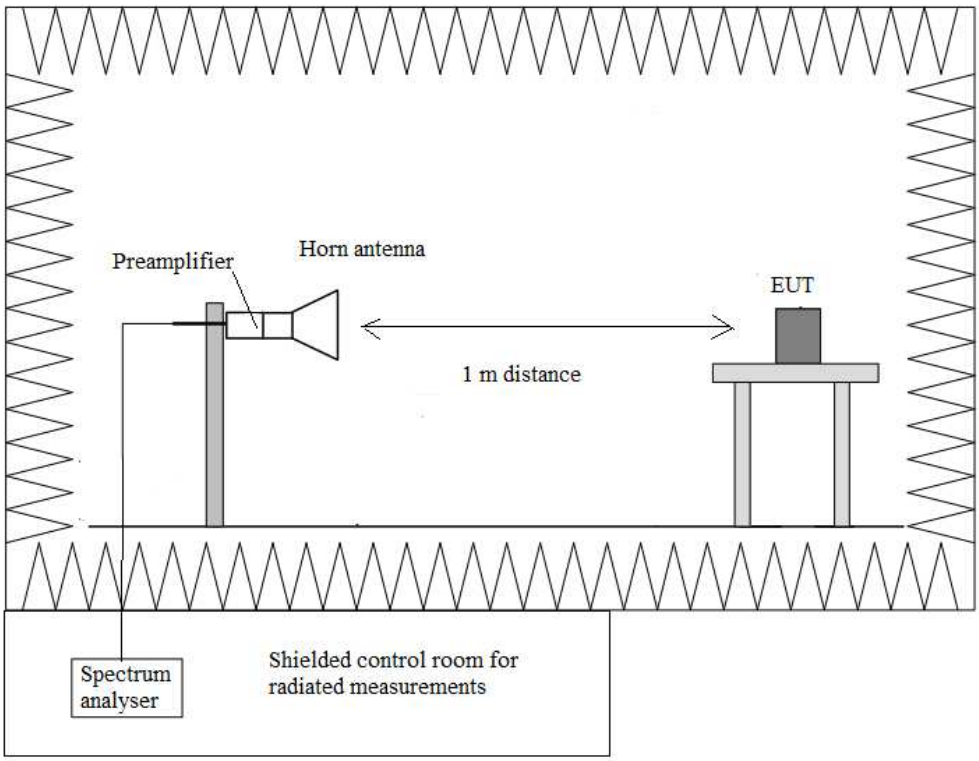
Measurements were made in both horizontal and vertical planes of polarization.

Radiated measurements setup f < 1 GHz



Shielded Control Room For Radiated Measurements

Radiated measurements setup f > 1 GHz



Section 15.247 Subclause (d) / RSS-247 5.5. 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)) / RSS-Gen 8.9.:

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)	-	30
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.

Frequency range 30 MHz-1000 MHz.

The spurious signals detected do not depend on the operating channel.

Highest spurious levels:

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
31.164	PV	Quasi-Peak	20.05	± 3.88
127.970	PH	Quasi-Peak	19.70	± 3.88
319.933	PH	Quasi-Peak	24.45	± 3.88
335.841	PH	Quasi-Peak	28.85	± 3.88
351.846	PH	Quasi-Peak	24.61	± 3.88
367.851	PH	Quasi-Peak	24.98	± 3.88
383.856	PH	Quasi-Peak	22.29	± 3.88
418.485	PV	Quasi-Peak	28.23	± 3.88
527.901	PV	Quasi-Peak	19.22	± 3.88
591.824	PV	Quasi-Peak	24.49	± 3.88

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).

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. CHANNEL: LOWEST (2402 MHz).

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38522	V	Peak	46.86	± 4.69
2.49465	V	Peak	47.96	± 4.69
4.80625	H	Peak	37.41	± 4.69
7.20575	H	Peak	42.43	± 4.69

2. CHANNEL: MIDDLE (2440 MHz).

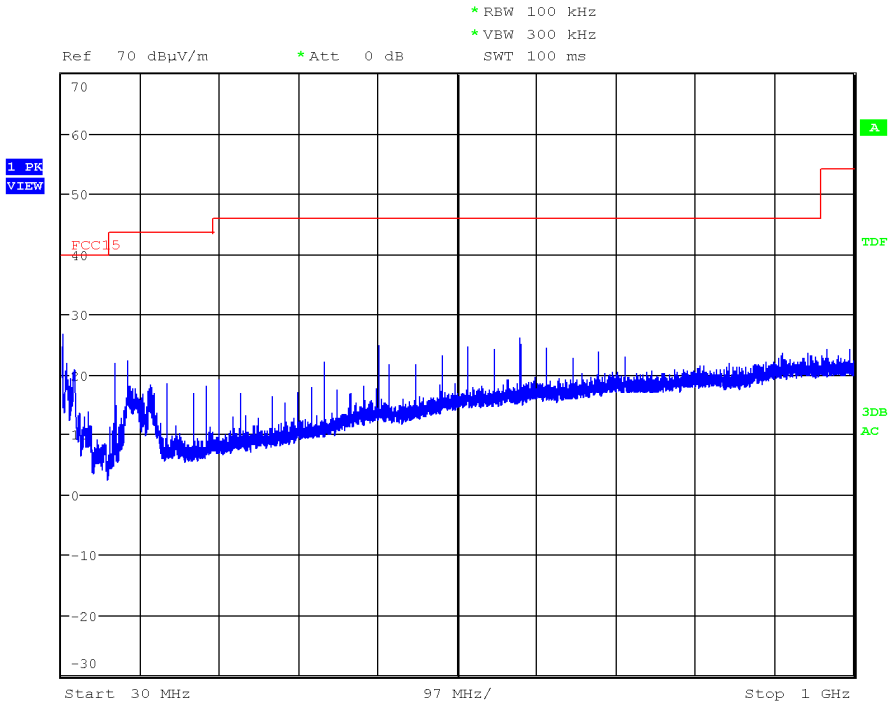
Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.34946	V	Peak	47.26	± 4.69
2.48669	V	Peak	47.76	± 4.69
4.88225	H	Peak	36.89	± 4.69

3. CHANNEL: HIGHEST (2480 MHz).

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.34017	V	Peak	47.10	± 4.69
2.48350	V	Peak	49.55	± 4.69
4.95825	H	Peak	38.37	± 4.69

Verdict: PASS

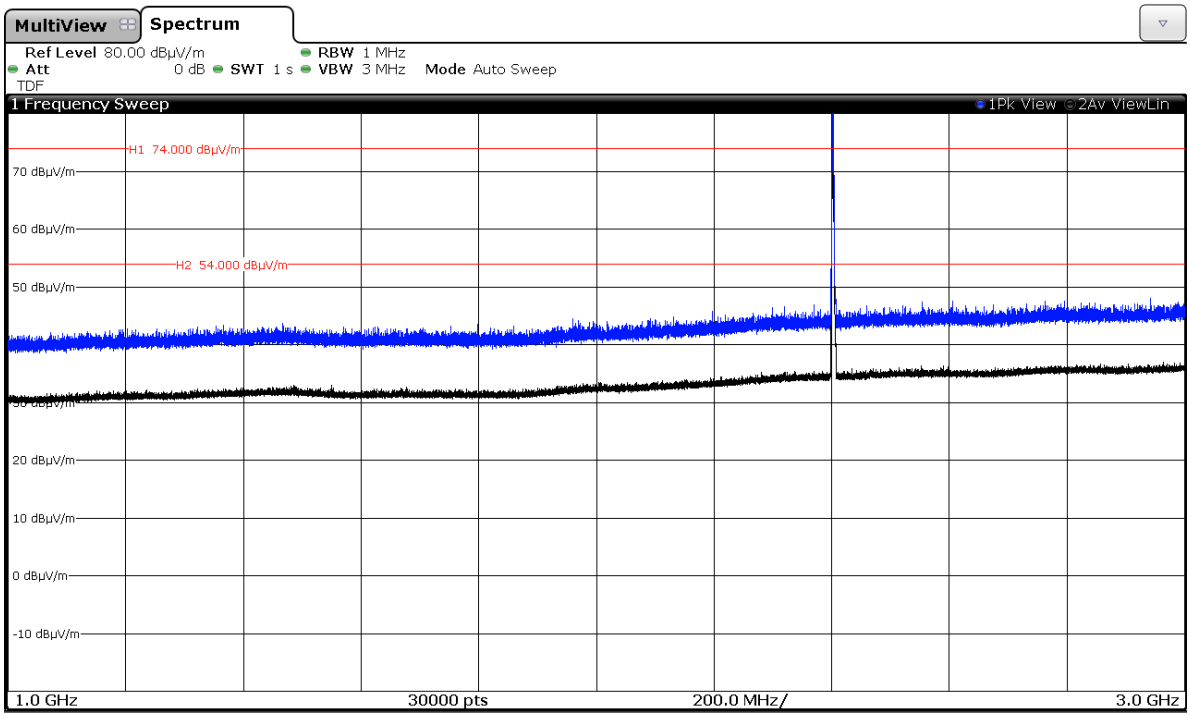
FREQUENCY RANGE 30 MHz-1000 MHz.



(This plot is valid for all three channels).

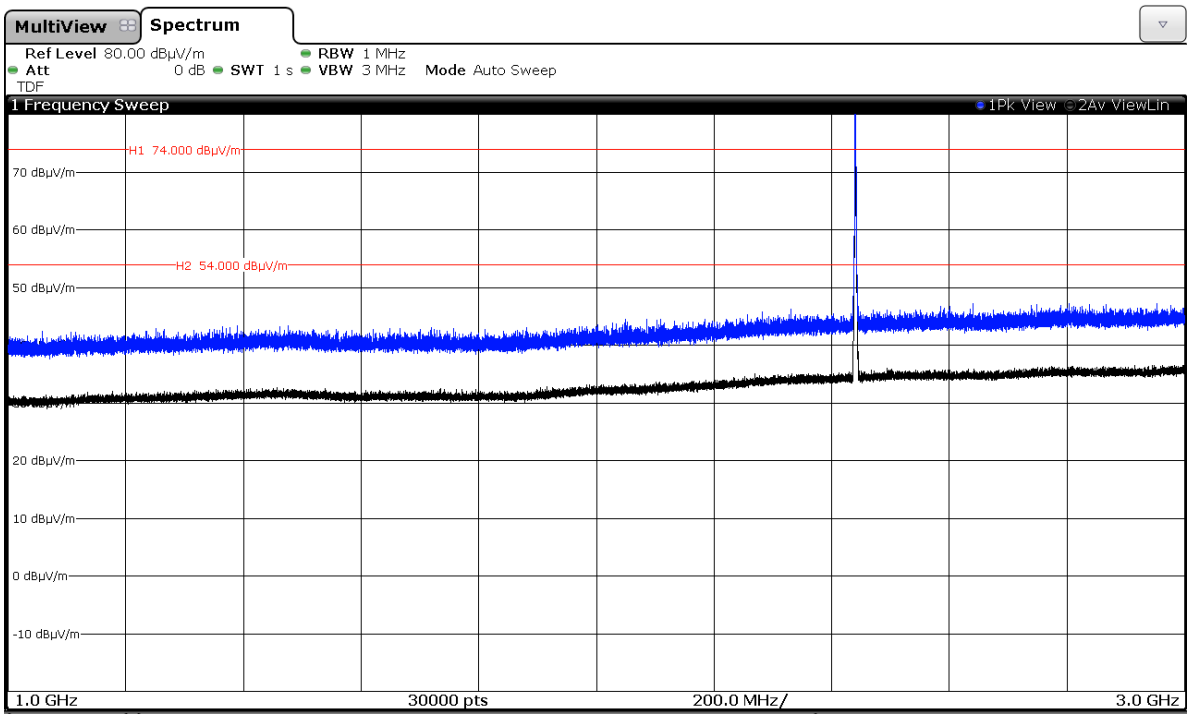
FREQUENCY RANGE 1 GHz to 3 GHz.

CHANNEL: Lowest (2402 MHz).



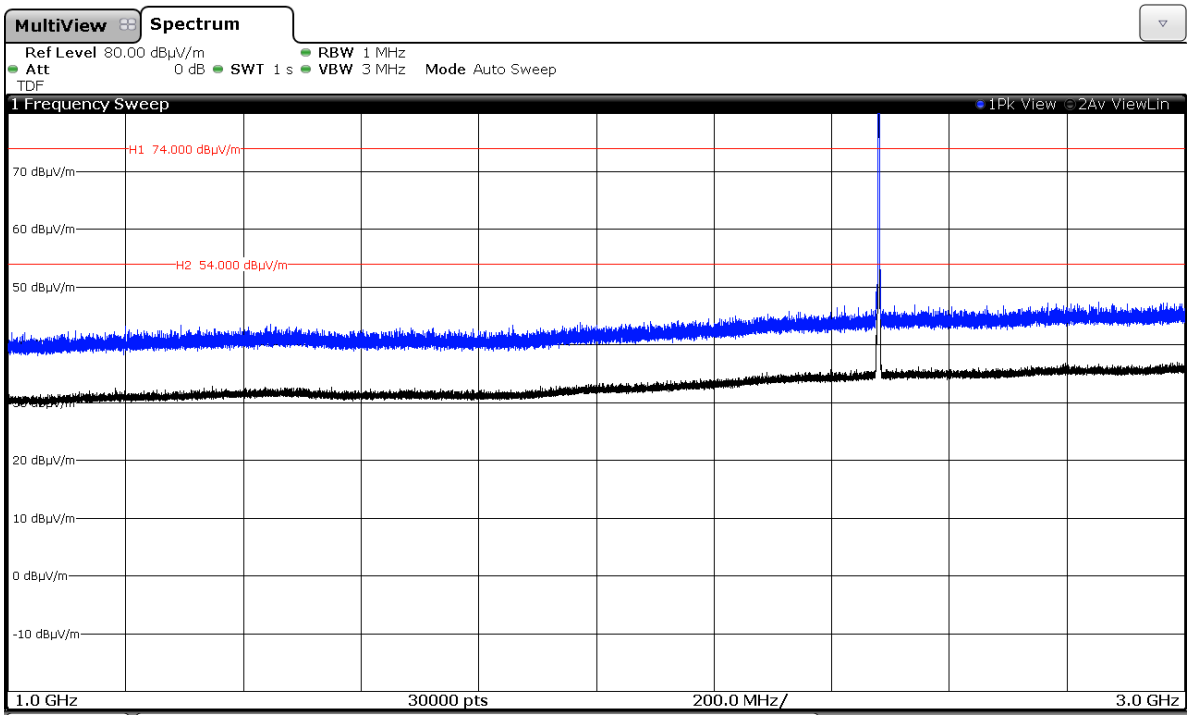
Note: The peak shown in the plot above the limit is the carrier frequency.

CHANNEL: Middle (2440 MHz).



Note: The peak shown in the plot above the limit is the carrier frequency.

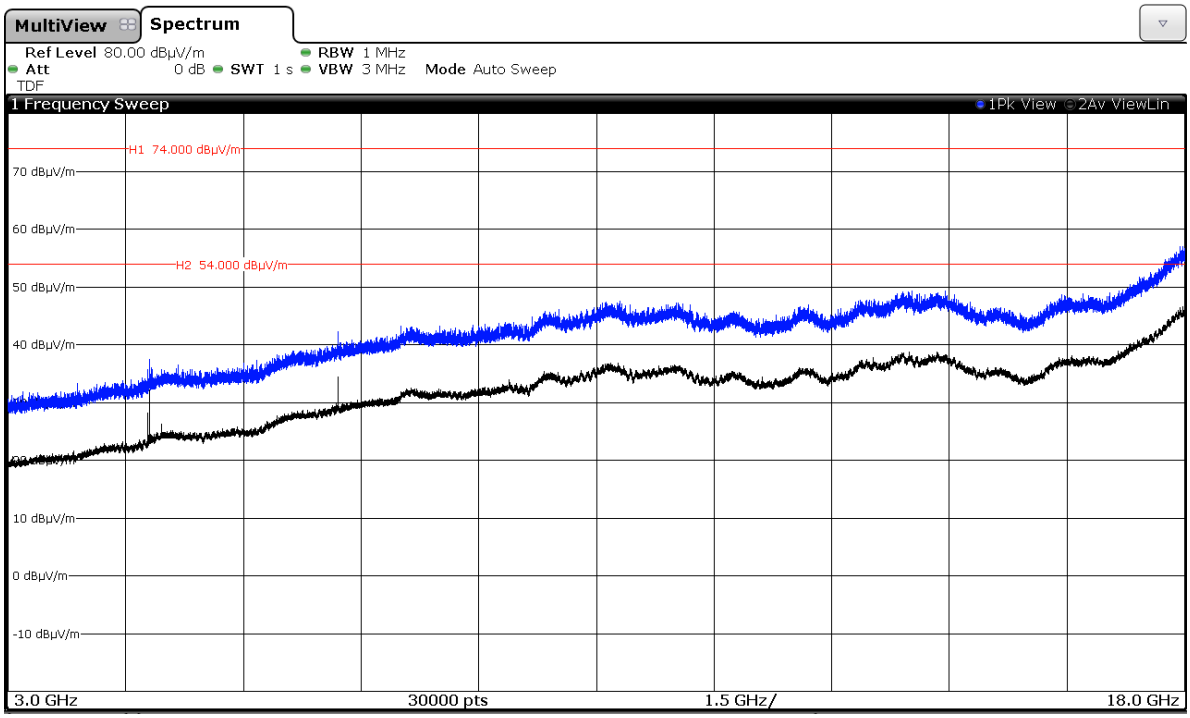
CHANNEL: Highest (2480 MHz).



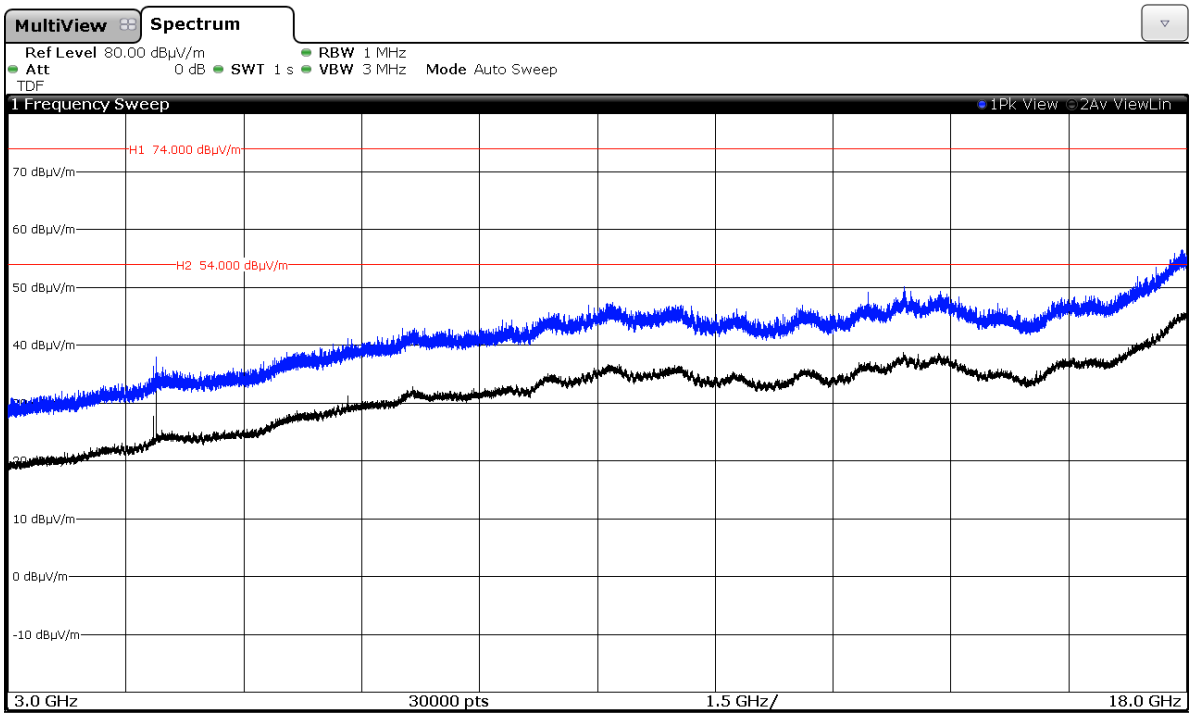
Note: The peak shown in the plot above the limit is the carrier frequency.

FREQUENCY RANGE 3 GHz to 18 GHz.

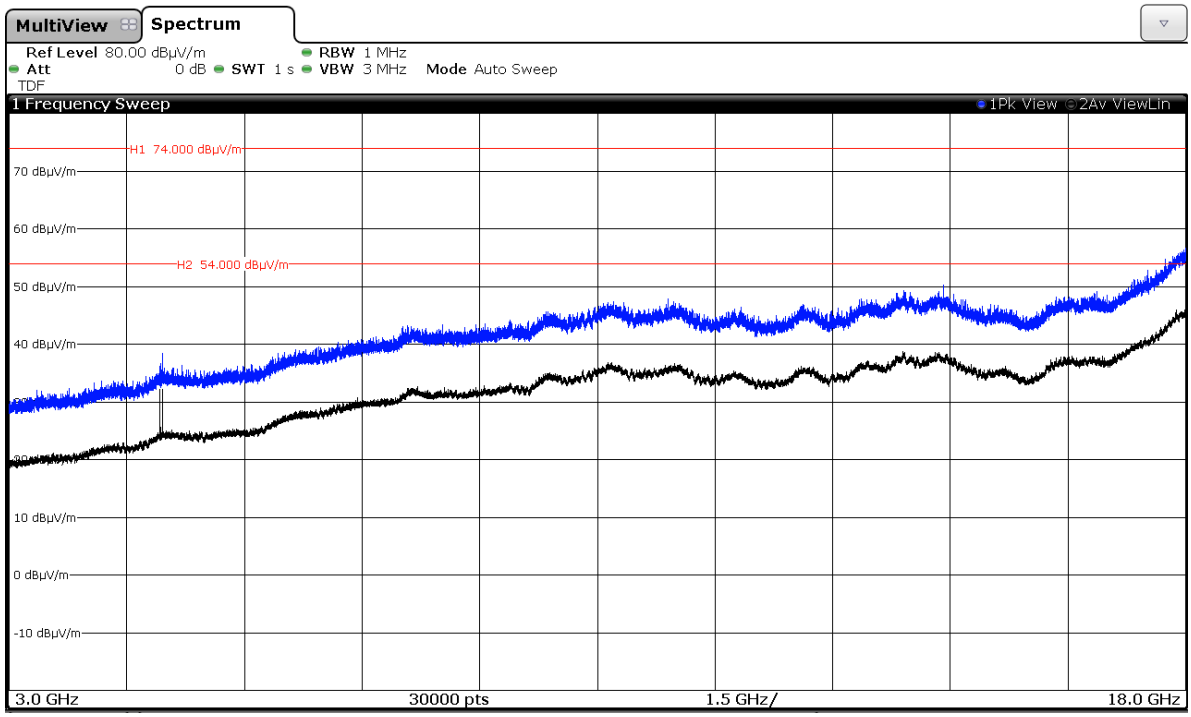
CHANNEL: Lowest (2402 MHz).



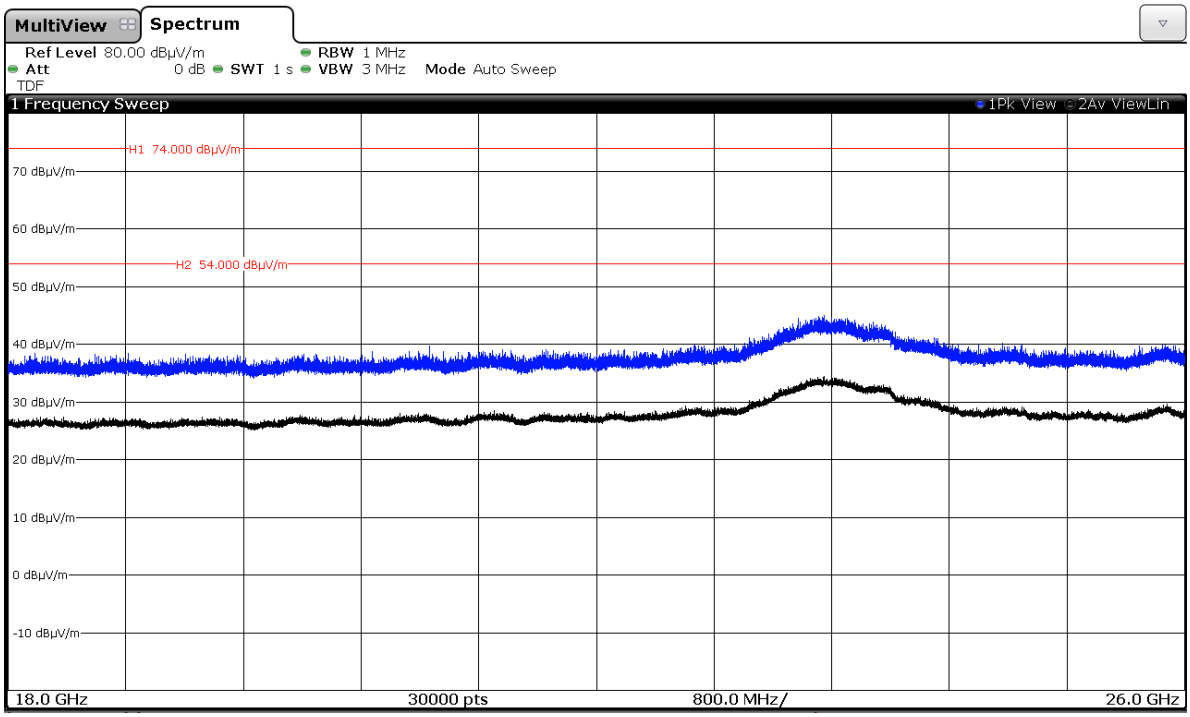
CHANNEL: Middle (2440 MHz).



CHANNEL: Highest (2480 MHz).



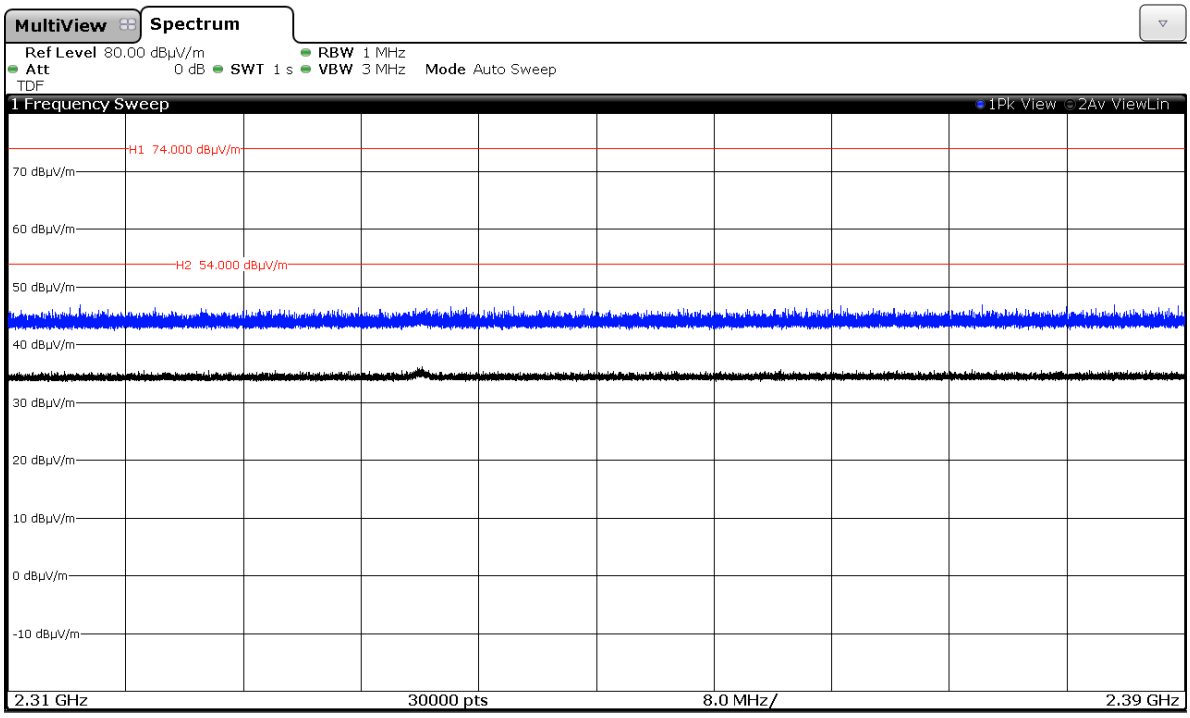
FREQUENCY RANGE 18 GHz to 26 GHz.



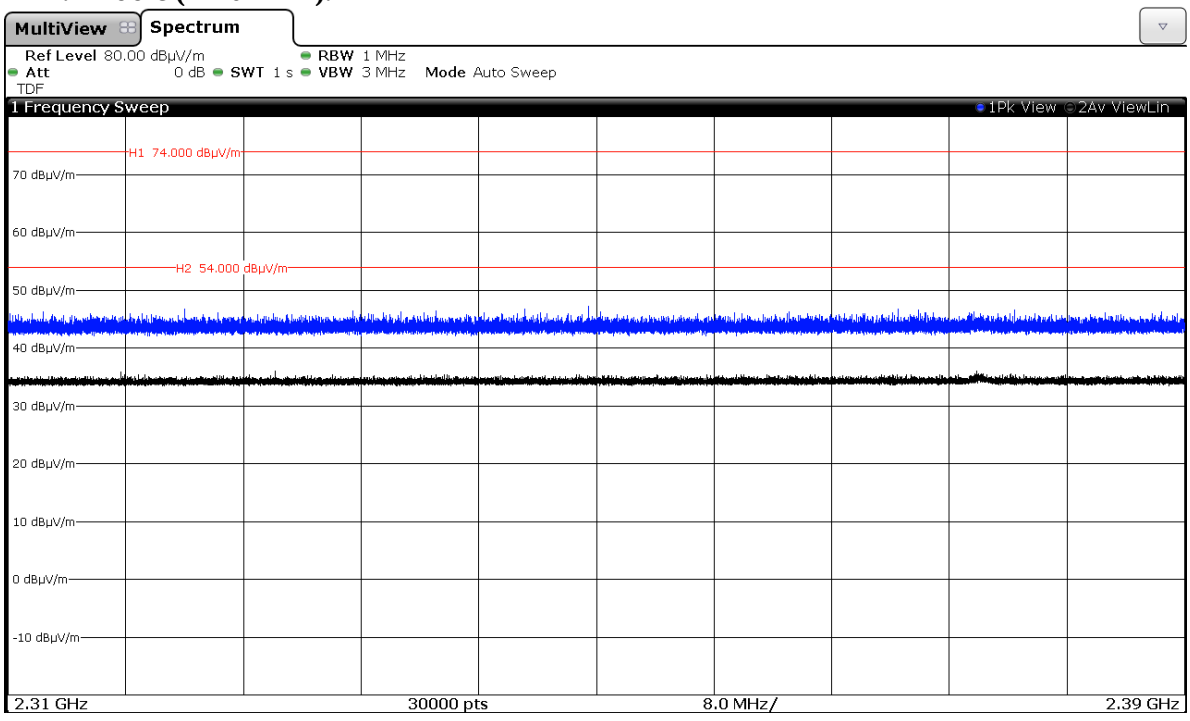
(This plot is valid for all three channels).

FREQUENCY RANGE 2.31 GHz to 2.39 GHz. (RESTRICTED BAND)

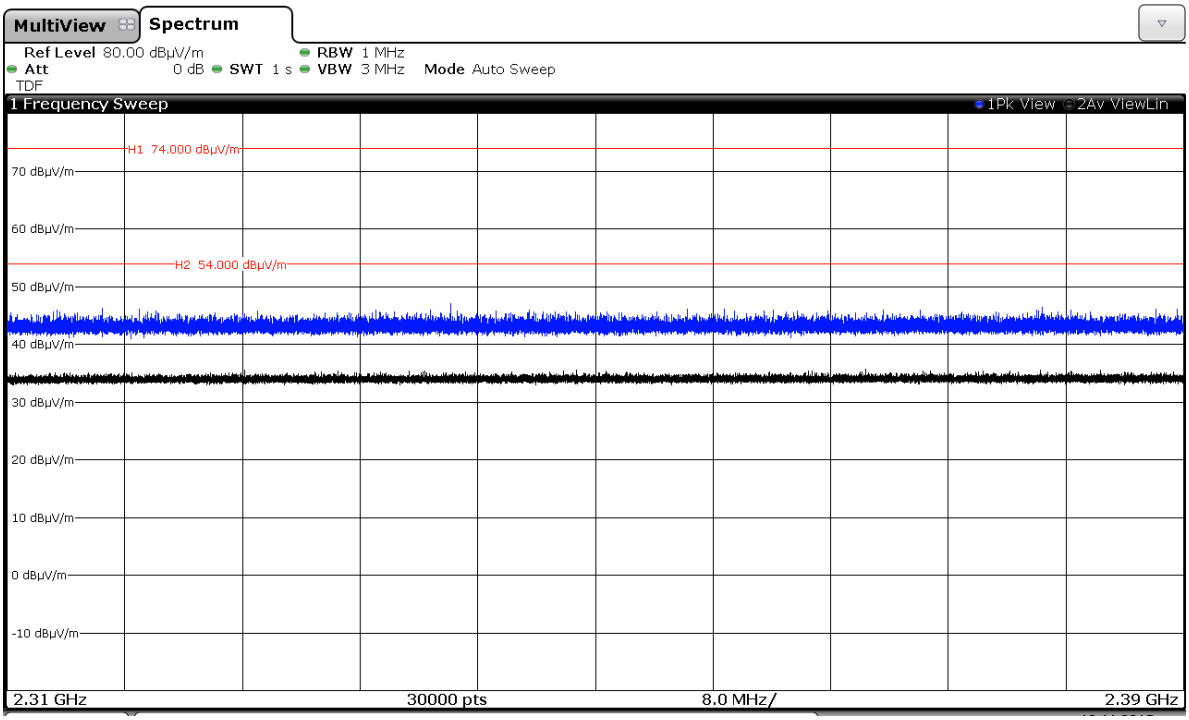
CHANNEL: Lowest (2402 MHz).



CHANNEL: Middle (2440 MHz).

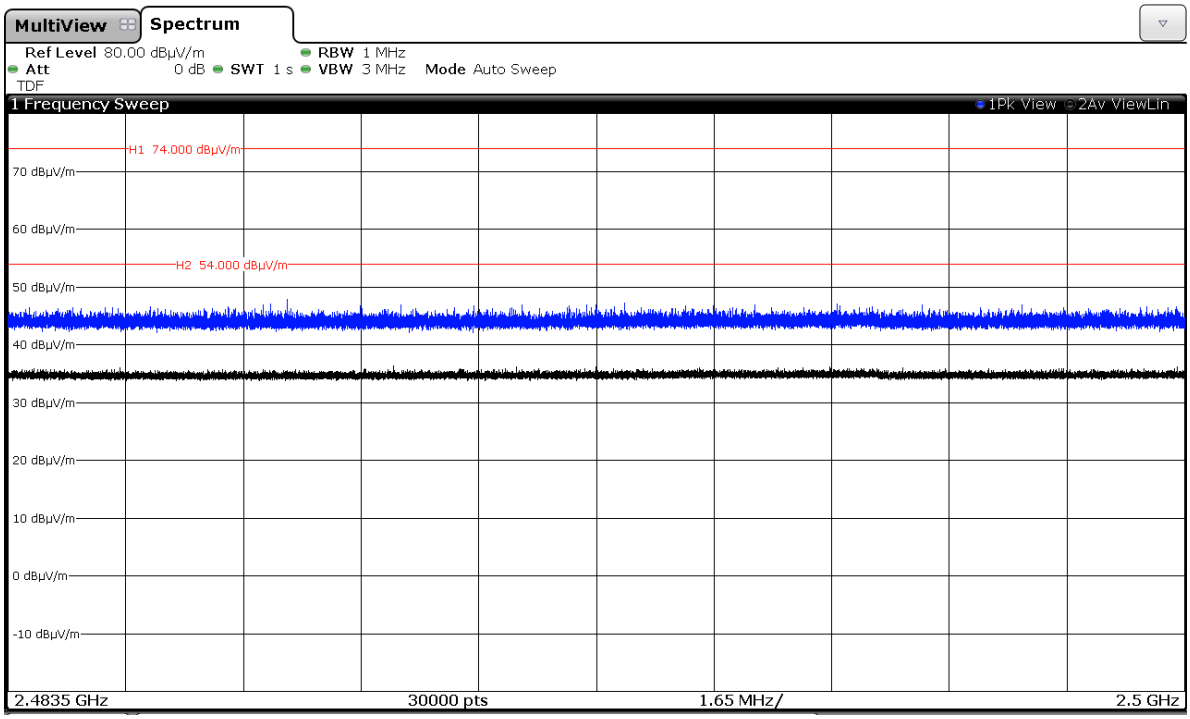


CHANNEL: Highest (2480 MHz).

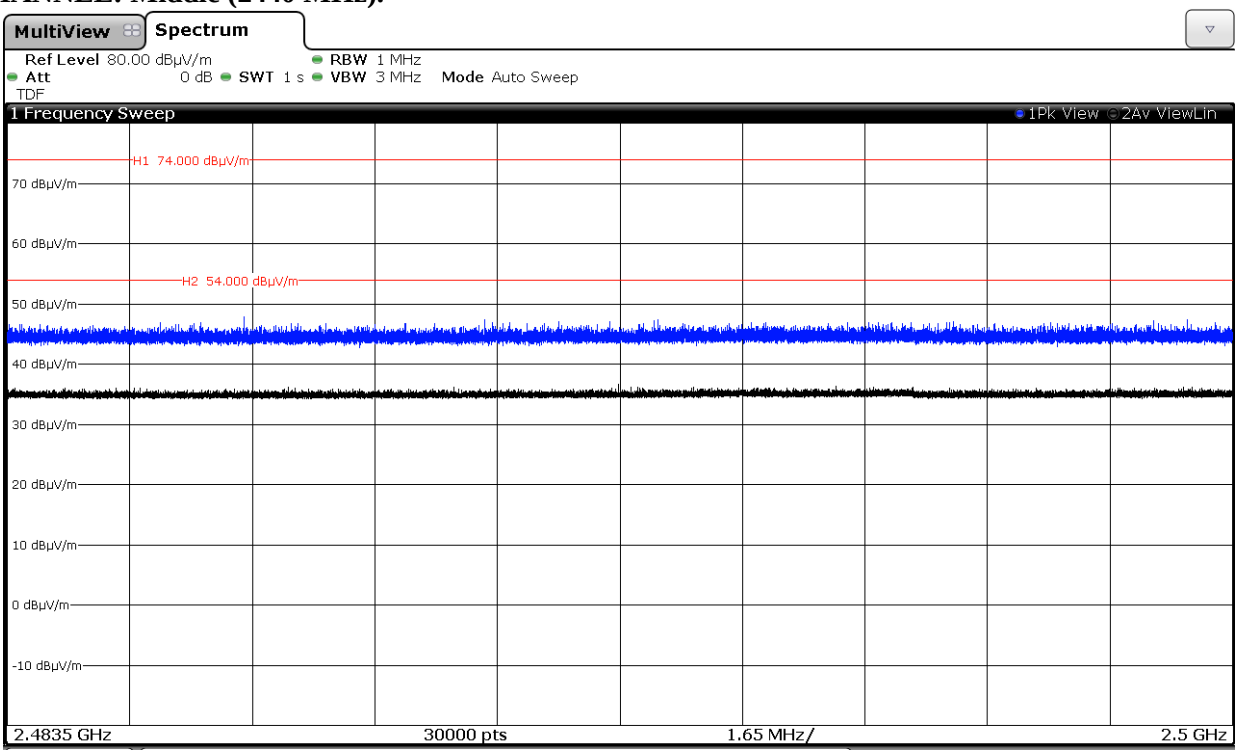


FREQUENCY RANGE 2.4835 GHz to 2.5 GHz. (RESTRICTED BAND)

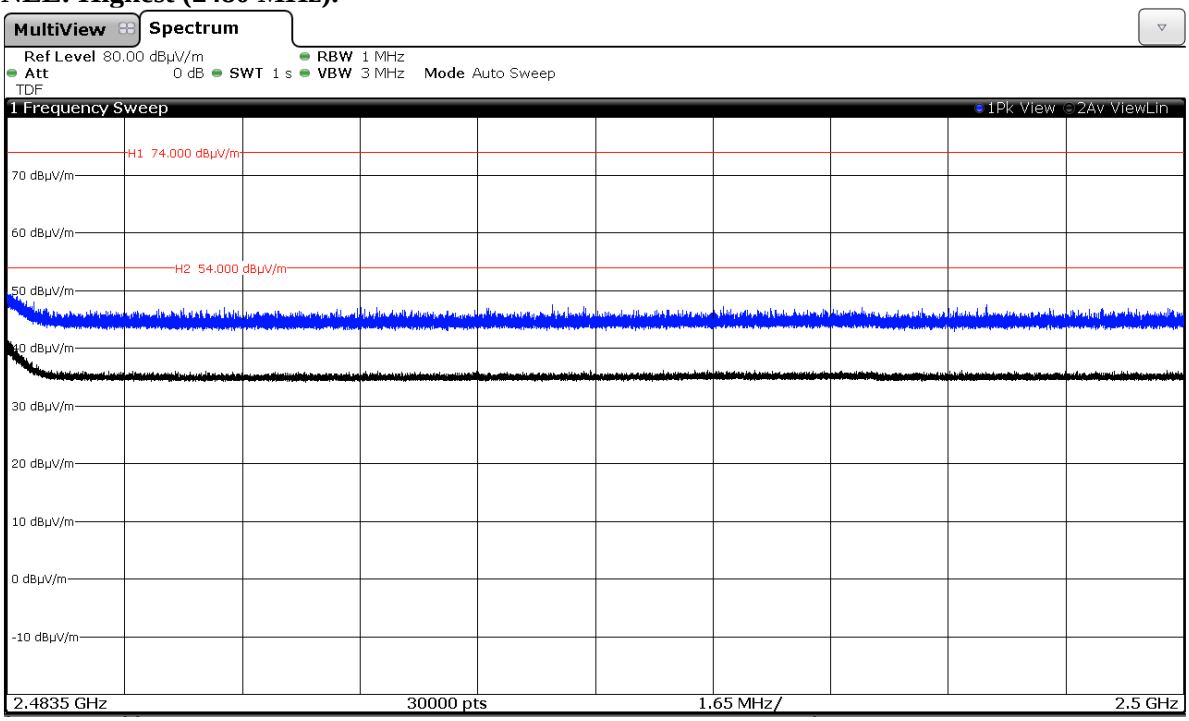
CHANNEL: Lowest (2402 MHz).



CHANNEL: Middle (2440 MHz).



CHANNEL: Highest (2480 MHz).



Appendix B – Test result "WiFi 2.4 GHz (802.11b/g/n20)"

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TEST CONDITIONS

Power supply (V):

$V_{nominal}$ = 115Vac

Type of power supply = AC/DC adapter.

Type of antenna: Integral antenna

TEST FREQUENCIES:

For WiFi 802.11b/g/n20:

Lowest channel (1): 2412 MHz

Middle channel (6): 2437 MHz

Highest channel (11): 2462 MHz

The test set-up was made in accordance to the general provisions of FCC DTS Measurement KDB 558074 D01 DTS Meas Guidance v03r03.

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).

The field strength at the band edges was evaluated for each mode and 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.

During transmitter test the EUT was being controlled by the SW 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) for 802.11n20 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.

RF conducted output power target values

Mode	BW (MHz)	Channel / Freq.	Data Rate	SISO A (dBm)
802.11b	20	1 / 2412	1 Mbps	2.0
		6 / 2437		1.0
		11 / 2462		0.0
802.11g	20	1 / 2412	6 Mbps	4.0
		6 / 2437		4.0
		11 / 2462		4.0
802.11n	20	1 / 2412	HT0	4.0
		6 / 2437		4.0
		11 / 2462		4.0

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).

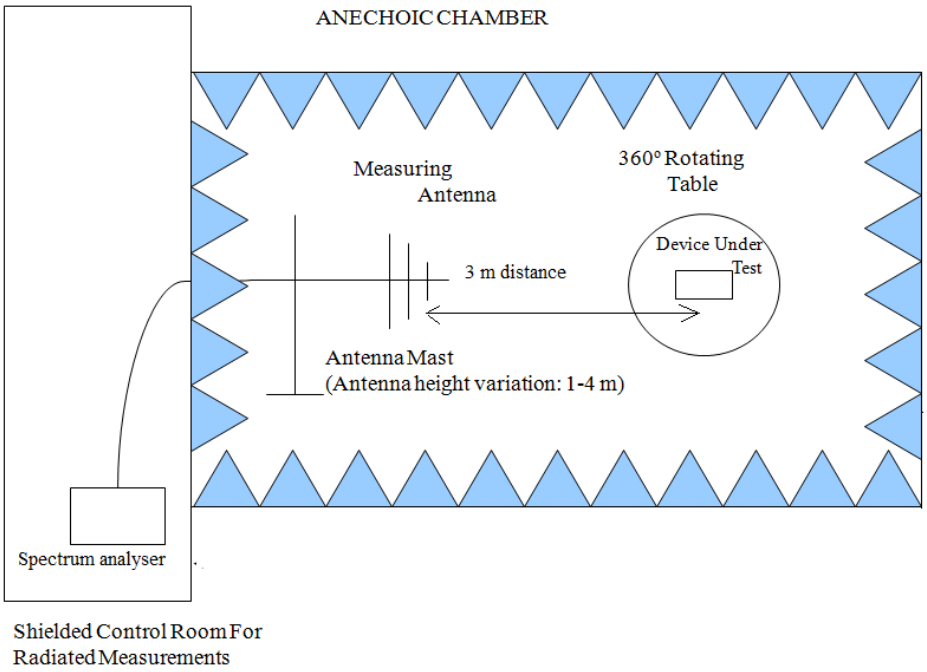
For radiated emissions in the range 1 GHz-25 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive (wooden) platform 1.5 meter above the ground plane and the situation and orientation was varied to find the maximum radiated emission.

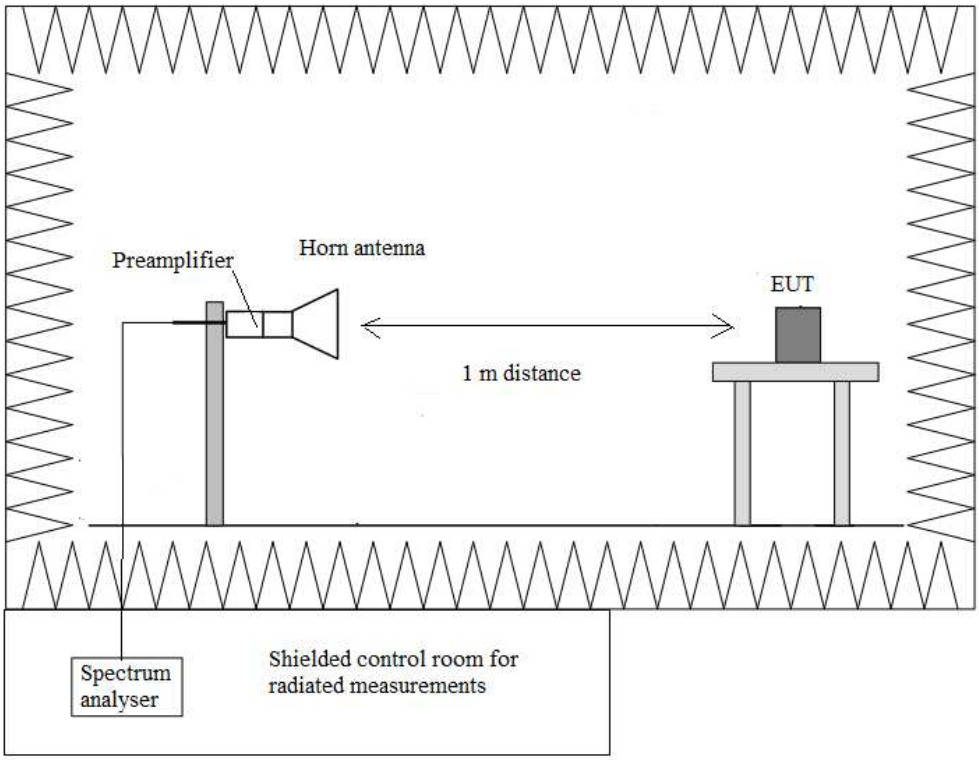
It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

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

Radiated measurements setup f < 1 GHz



Radiated measurements setup f > 1 GHz



Section 15.247 Subclause (d) / RSS-247 5.5. 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)) / RSS-Gen 8.9.:

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)	-	30
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.

Frequency range 30 MHz-1000 MHz.

Spurious levels closest to the limit:

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
30.873	PH	Quasi-Peak	19.16	± 3.88
96.057	PH	Quasi-Peak	22.09	± 3.88
128.164	PV	Quasi-Peak	22.49	± 3.88

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

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).

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.

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

1. WiFi 2.4GHz 802.11 b mode.

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

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38906	PH	Peak	54.17	± 4.69
		Average	38.54	± 4.69
3.21625	PV	Peak	42.27	± 4.69
4.82375	PH	Peak	55.03	± 4.69
		Average	53.55	± 4.69
7.23725	PH	Peak	41.68	± 4.69
9.64825	PH	Peak	43.43	± 4.69

1.2. CHANNEL 6: MIDDLE (2437 MHz). Out-of-band spurious emissions in the 1-25 GHz range.

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
3.24925	PV	Peak	42.09	± 4.69
4.87375	PH	Peak	55.44	± 4.69
		Average	53.87	± 4.69
7.31025	PH	Peak	42.44	± 4.69
9.74825	PH	Peak	44.58	± 4.69

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

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.48396	PV	Peak	51.43	± 4.69
3.28225	PV	Peak	41.69	± 4.69
4.92425	PH	Peak	54.63	± 4.69
		Average	53.38	± 4.69
7.38625	PH	Peak	43.01	± 4.69
9.84775	PH	Peak	46.78	± 4.69

Verdict: PASS

2. WiFi 2.4GHz 802.11 g mode

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

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.33623	PH	Peak	58.14	± 4.69
		Average	37.28	± 4.69
3.21575	PV	Peak	42.33	± 4.69
4.82975	PH	Peak	59.03	± 4.69
		Average	46.04	± 4.69
7.23125	PH	Peak	44.17	± 4.69
9.64525	PH	Peak	55.62	± 4.69
		Average	38.41	± 4.69
19.28600	PV	Peak	44.59	± 4.69
21.65827	PV	Peak	42.49	± 4.69
24.13053	PV	Peak	52.19	± 4.69

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

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.31370	PH	Peak	55.22	± 4.69
		Average	36.61	± 4.69
2.36736	PH	Peak	59.27	± 4.69
		Average	38.24	± 4.69
3.24925	PV	Peak	42.76	± 4.69
4.86975	PH	Peak	59.18	± 4.69
		Average	46.81	± 4.69
7.31075	PH	Peak	48.85	± 4.69
9.74725	PH	Peak	55.62	± 4.69
		Average	39.71	± 4.69
19.49960	PV	Peak	46.10	± 4.69
21.93880	PV	Peak	42.38	± 4.69
24.36307	PV	Peak	50.43	± 4.69

2.3. 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.

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.26316	PH	Peak	46.79	± 4.69
2.33243	PH	Peak	54.34	± 4.69
		Average	37.10	± 4.69
2.48364	PH	Peak	68.03	± 4.69
		Average	50.69	± 4.69
3.28275	PV	Peak	43.08	± 4.69
4.92275	PH	Peak	60.08	± 4.69
		Average	49.25	± 4.69
7.38625	PH	Peak	50.95	± 4.69
9.83775	PH	Peak	54.81	± 4.69
		Average	40.19	± 4.69
19.70813	PV	Peak	44.96	± 4.69
22.14867	PV	Peak	43.08	± 4.69
24.63960	PH	Peak	48.47	± 4.69

Verdict: PASS

3. WiFi 2.4GHz 802.11 n20 mode

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

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.38978	PH	Peak	64.94	± 4.69
		Average	51.12	± 4.69
3.21625	PH	Peak	42.20	± 4.69
4.82575	PH	Peak	56.72	± 4.69
		Average	47.14	± 4.69
7.24125	PH	Peak	43.84	± 4.69
9.66125	PH	Peak	57.25	± 4.69
		Average	39.66	± 4.69
19.30840	PH	Peak	45.19	± 4.69
21.68627	PV	Peak	42.95	± 4.69
24.09213	PV	Peak	51.17	± 4.69

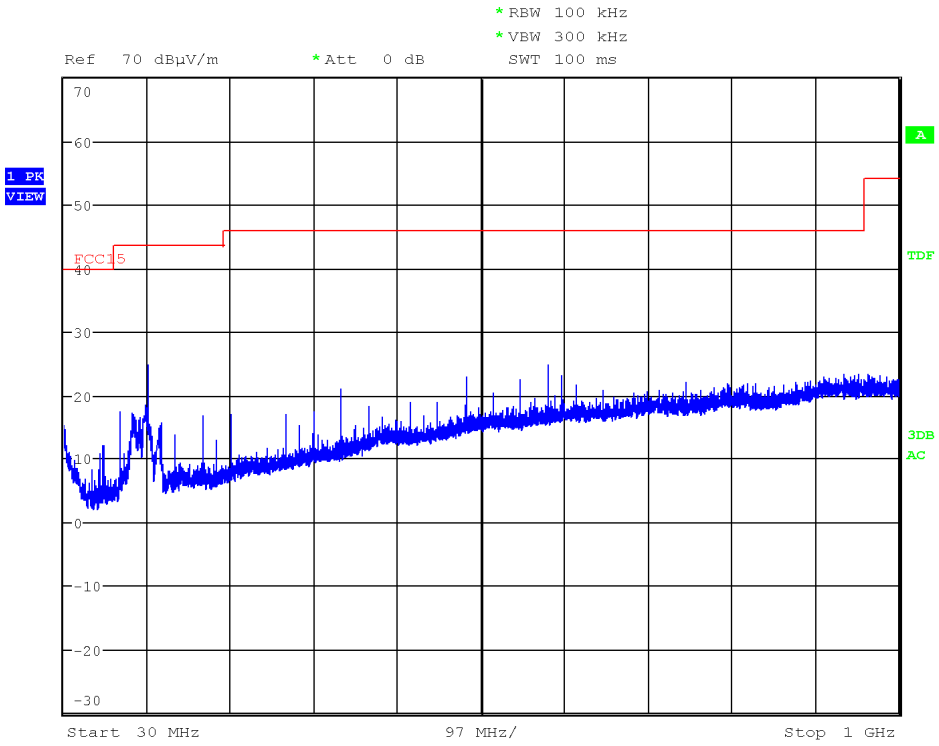
3.2. CHANNEL 6: MIDDLE (2437 MHz). Out-of-band spurious emissions in the 1-25 GHz range.

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
3.24925	PV	Peak	43.10	± 4.69
4.87875	PH	Peak	59.56	± 4.69
		Average	48.82	± 4.69
7.30925	PH	Peak	46.66	± 4.69
9.74826	PH	Peak	59.23	± 4.69
		Average	43.42	± 4.69
19.49640	PV	Peak	45.47	± 4.69
21.91507	PV	Peak	44.58	± 4.69
24.36387	PV	Peak	50.77	± 4.69

3.3. CHANNEL 11 (2462 MHz). Out-of-band spurious emissions in the 1-25 GHz range and in restricted band 2.4835-2.5 GHz.

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
2.48363	PH	Peak	71.76	± 4.69
		Average	53.89	± 4.69
3.28275	PV	Peak	42.83	± 4.69
4.91975	PH	Peak	60.17	± 4.69
		Average	49.71	± 4.69
7.38575	PH	Peak	51.18	± 4.69
9.84275	PH	Peak	56.39	± 4.69
		Average	43.08	± 4.69
19.69827	PV	Peak	45.38	± 4.69
22.11613	PV	Peak	44.00	± 4.69
24.59960	PV	Peak	46.04	± 4.69

FREQUENCY RANGE 30 MHz-1000 MHz.

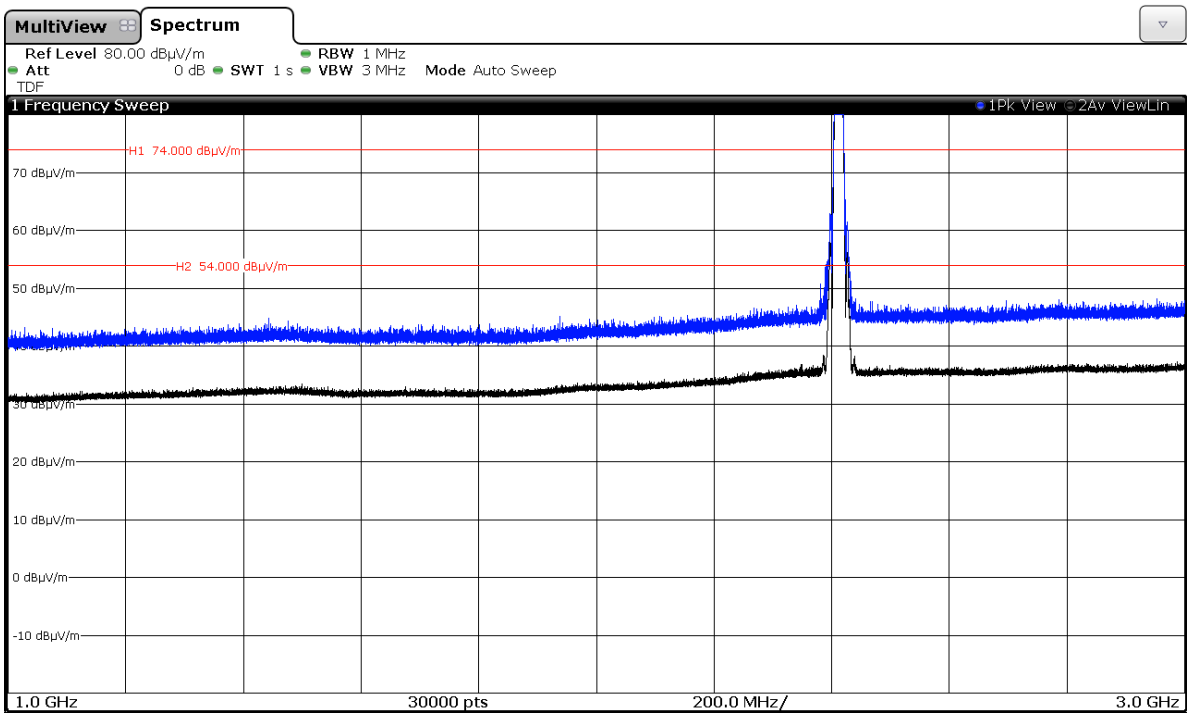


(This plot is valid for all three channels and all modulation modes).

FREQUENCY RANGE 1 GHz to 3 GHz.

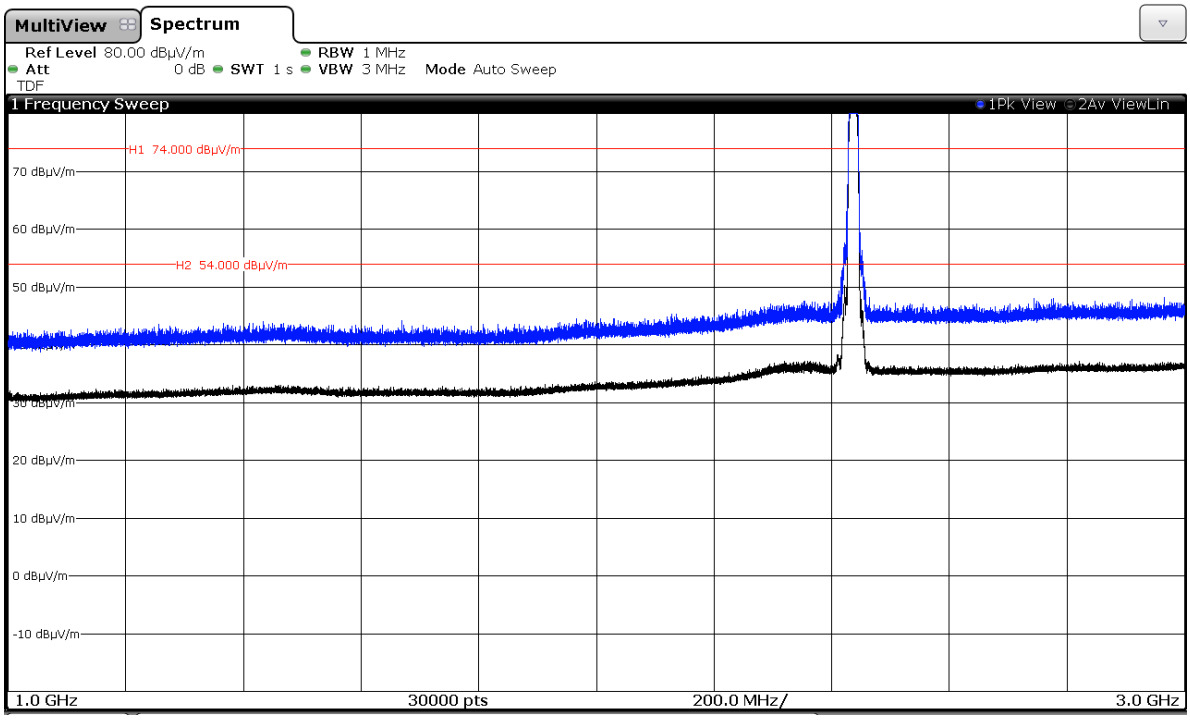
1. WiFi 2.4GHz 802.11 b mode

CHANNEL 1 (2412 MHz).



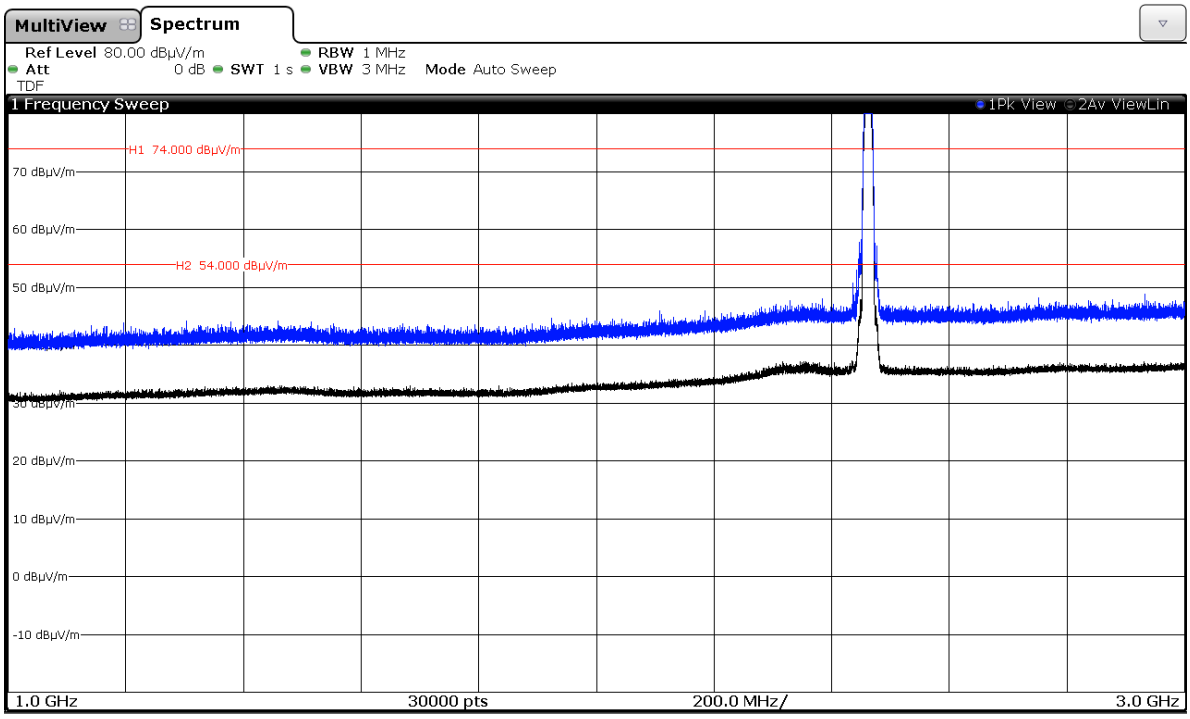
Note: The peak above the limit is the carrier frequency.

CHANNEL 6 (2437 MHz).



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

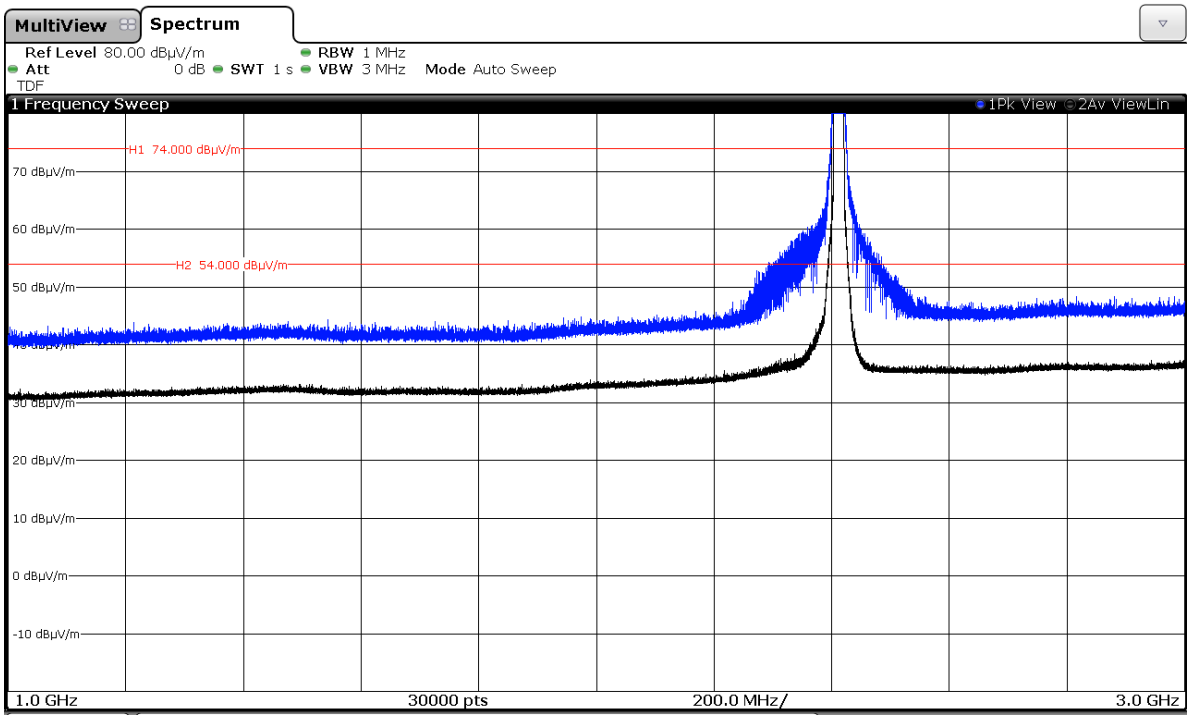
CHANNEL 11 (2462 MHz).



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

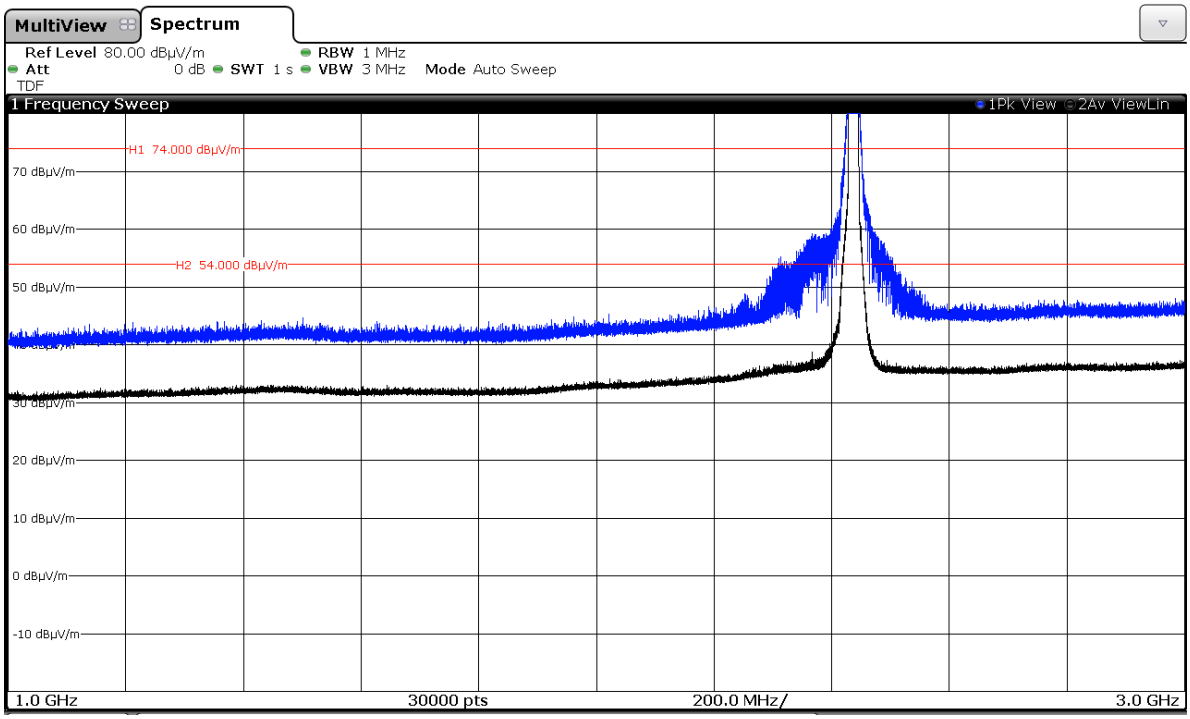
2. WiFi 2.4GHz 802.11 g mode

CHANNEL 1 (2412 MHz).



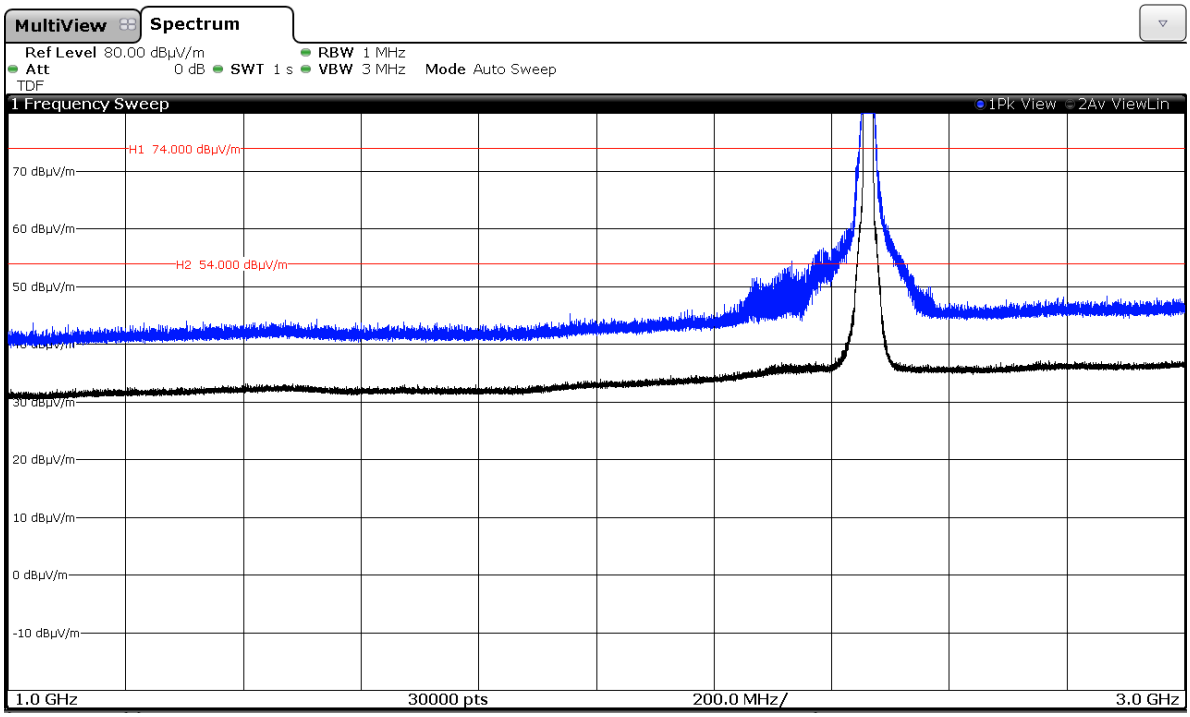
Note: The peak above the limit is the carrier frequency.

CHANNEL 6 (2437 MHz).



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

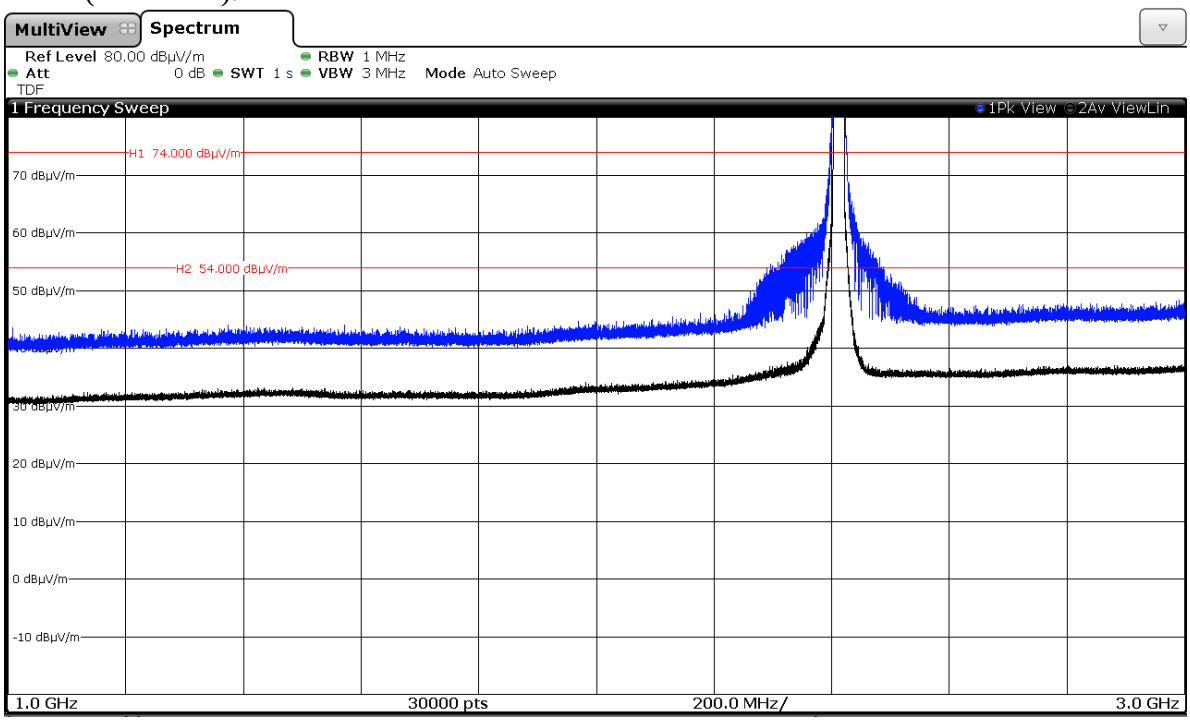
CHANNEL 11 (2462 MHz).



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

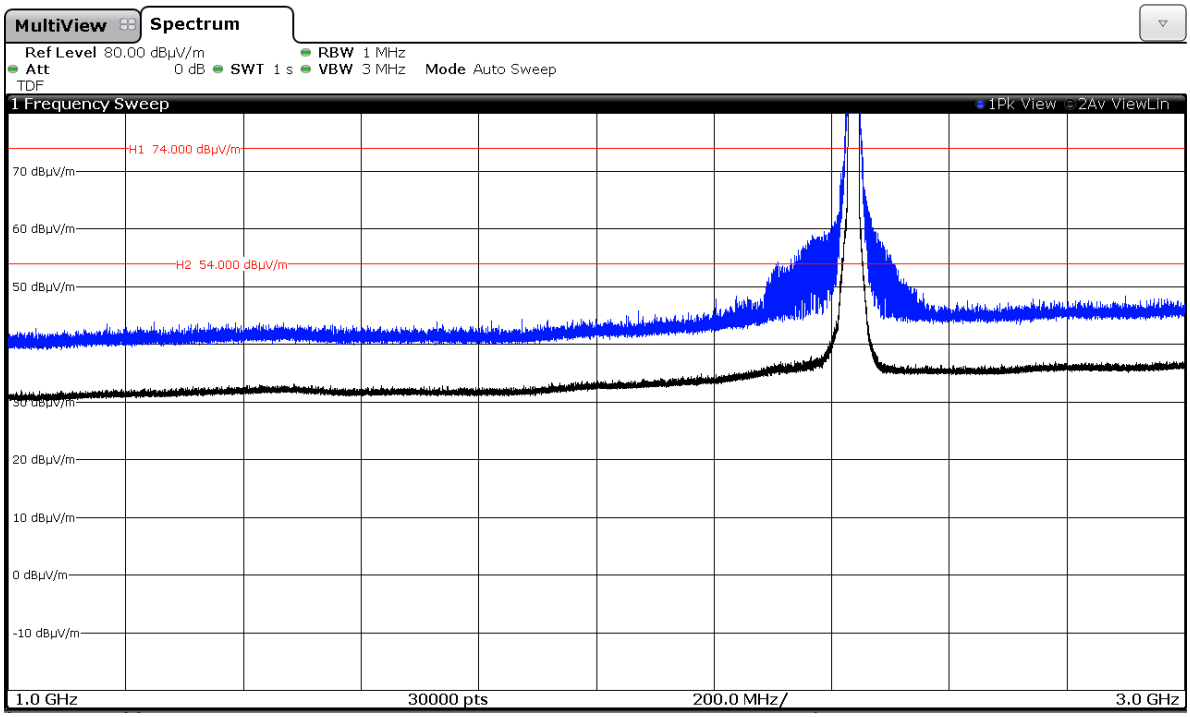
3.WiFi 2.4GHz 802.11 n20 mode

CHANNEL 1 (2412 MHz).



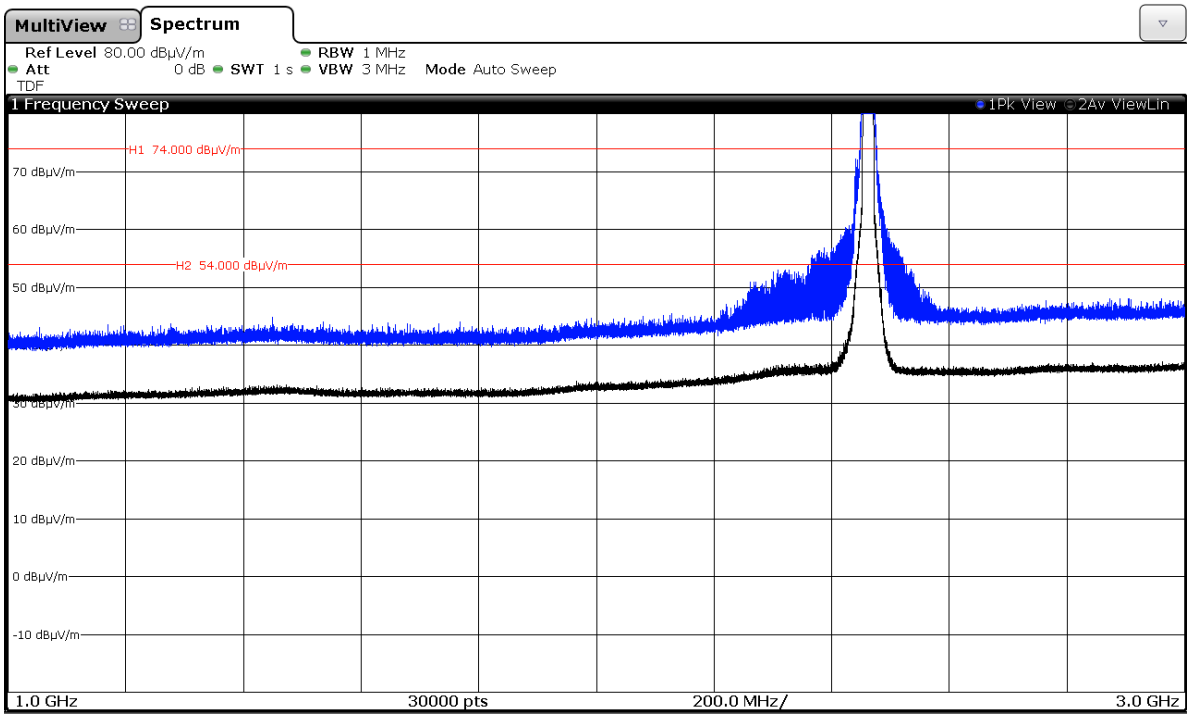
Note: The peak above the limit is the carrier frequency.

CHANNEL 6 (2437 MHz).



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

CHANNEL 11 (2462 MHz).

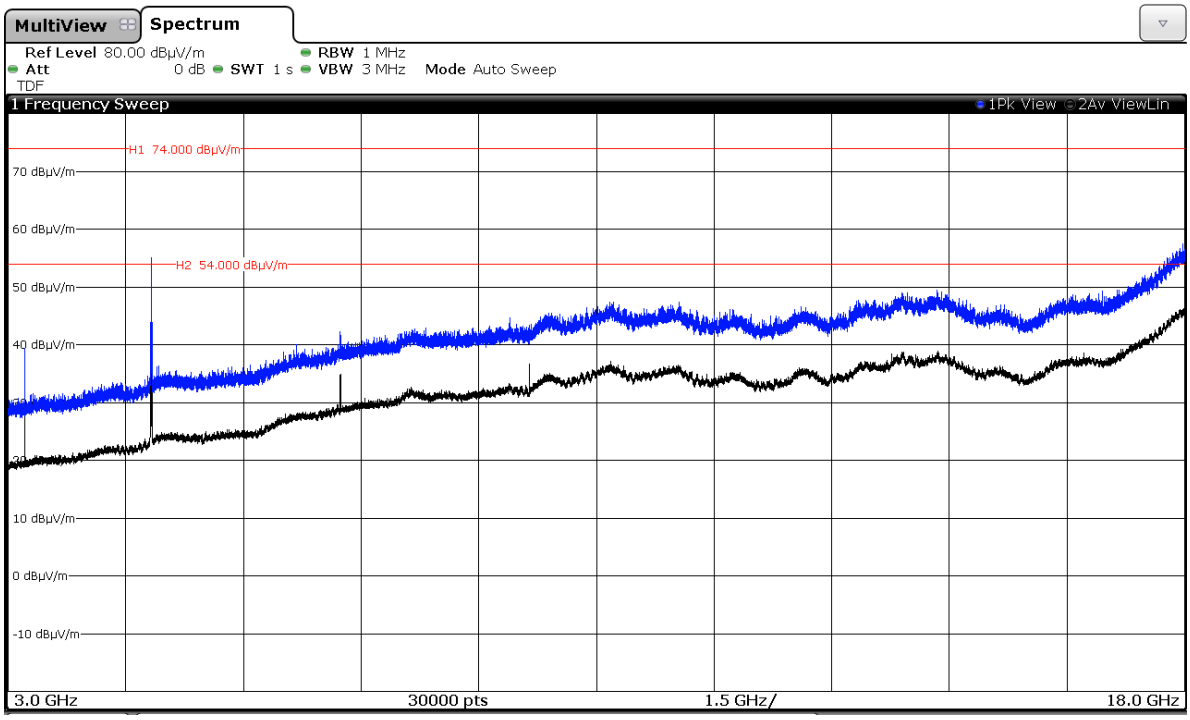


Note: The peak above the limit is the carrier frequency.

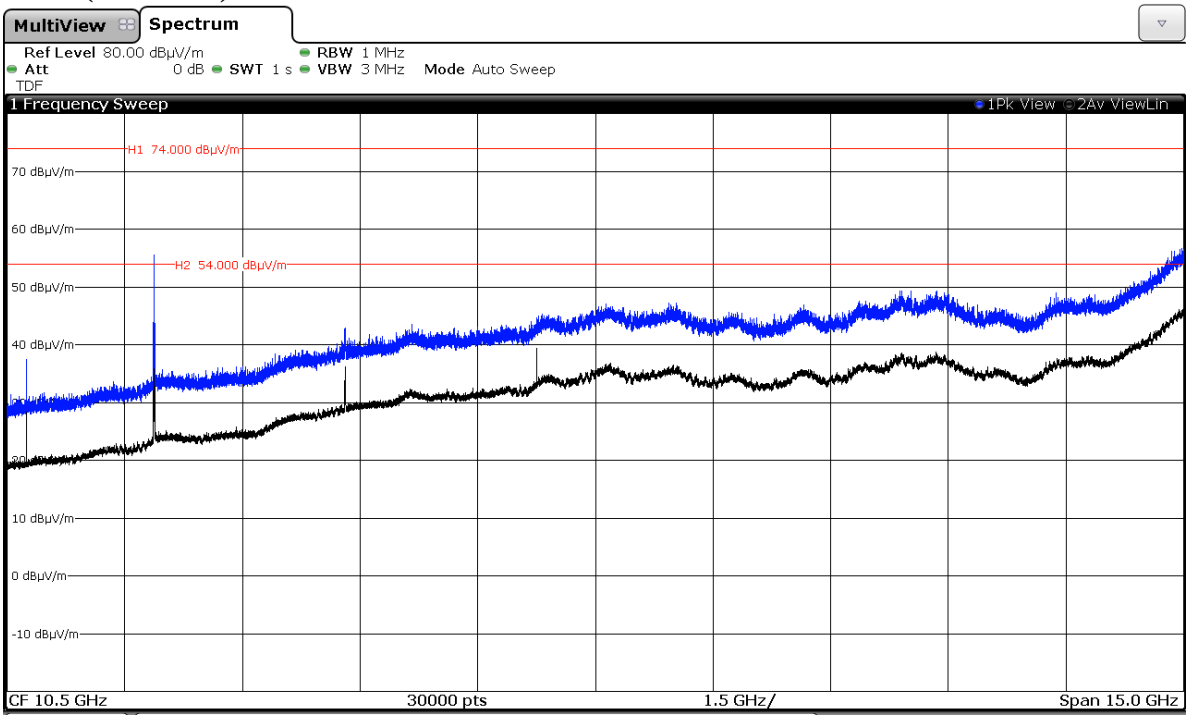
FREQUENCY RANGE 3 GHz to 18 GHz.

1. WiFi 2.4GHz 802.11 b mode

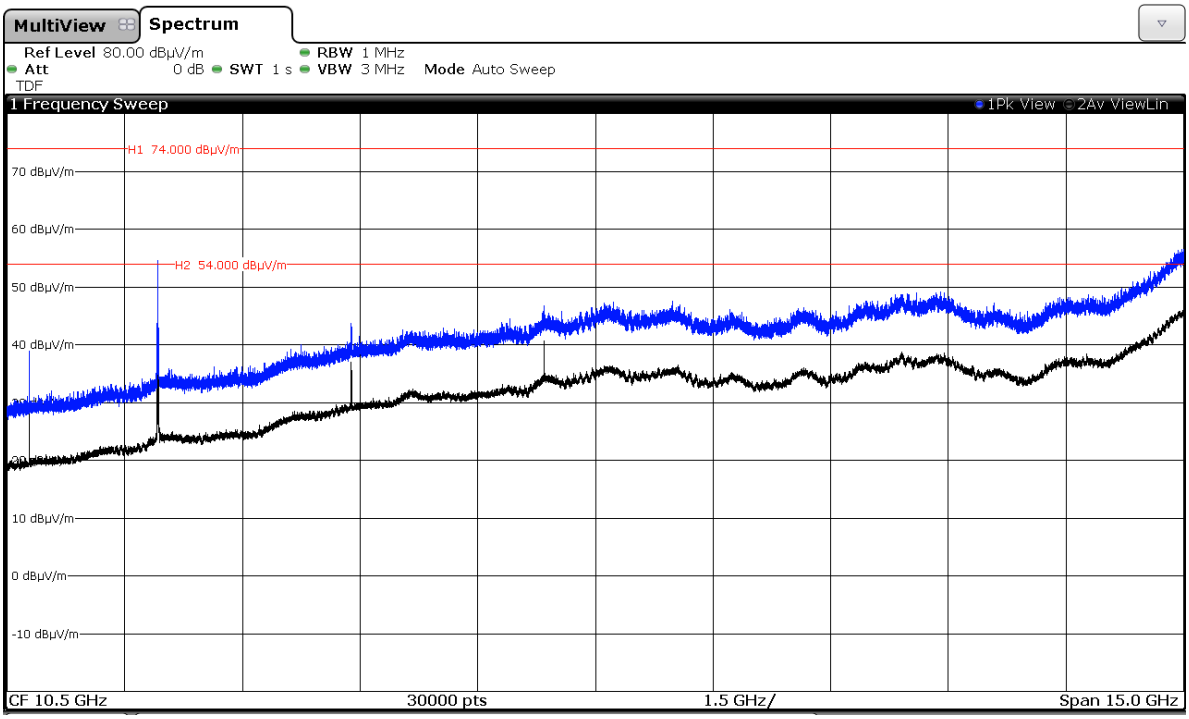
CHANNEL 1 (2412 MHz).



CHANNEL 6 (2437 MHz).

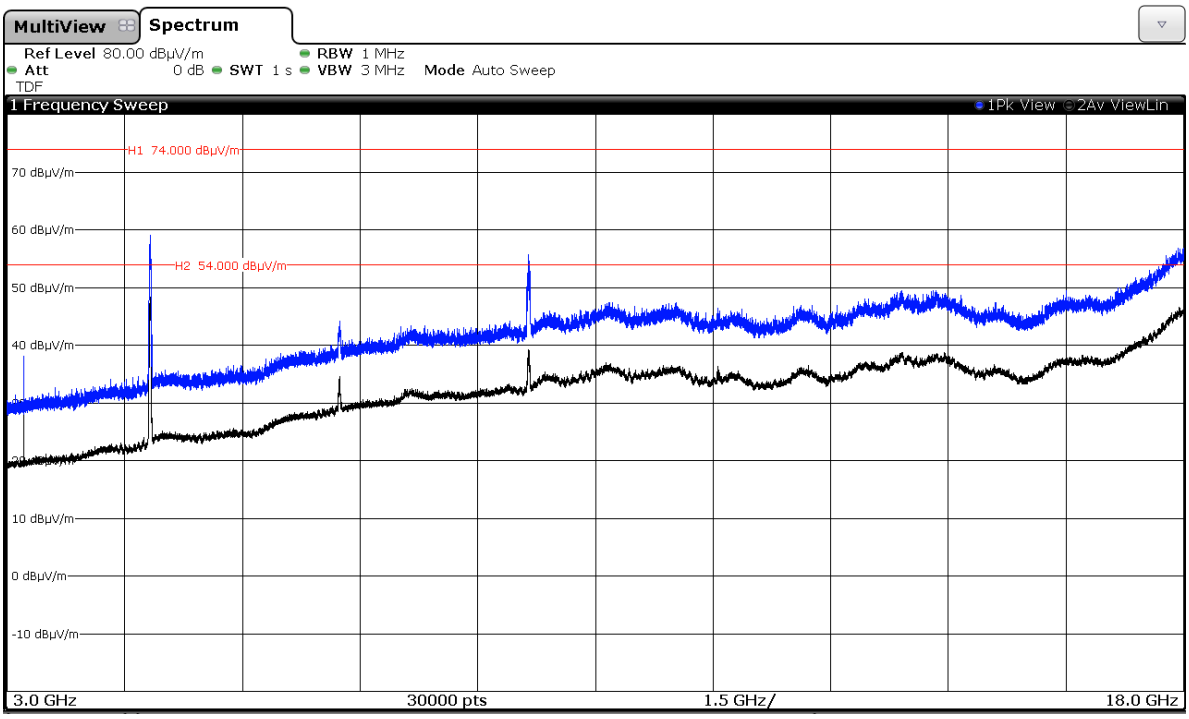


CHANNEL 11 (2462 MHz).

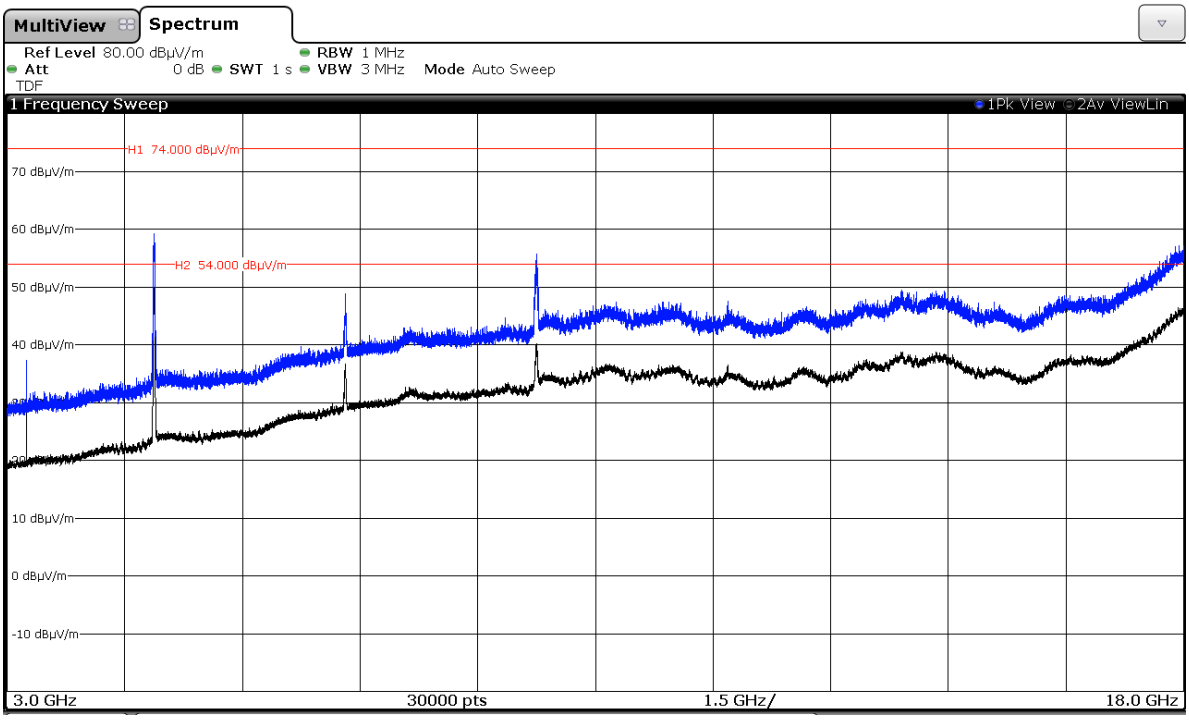


2. WiFi 2.4GHz 802.11 g mode

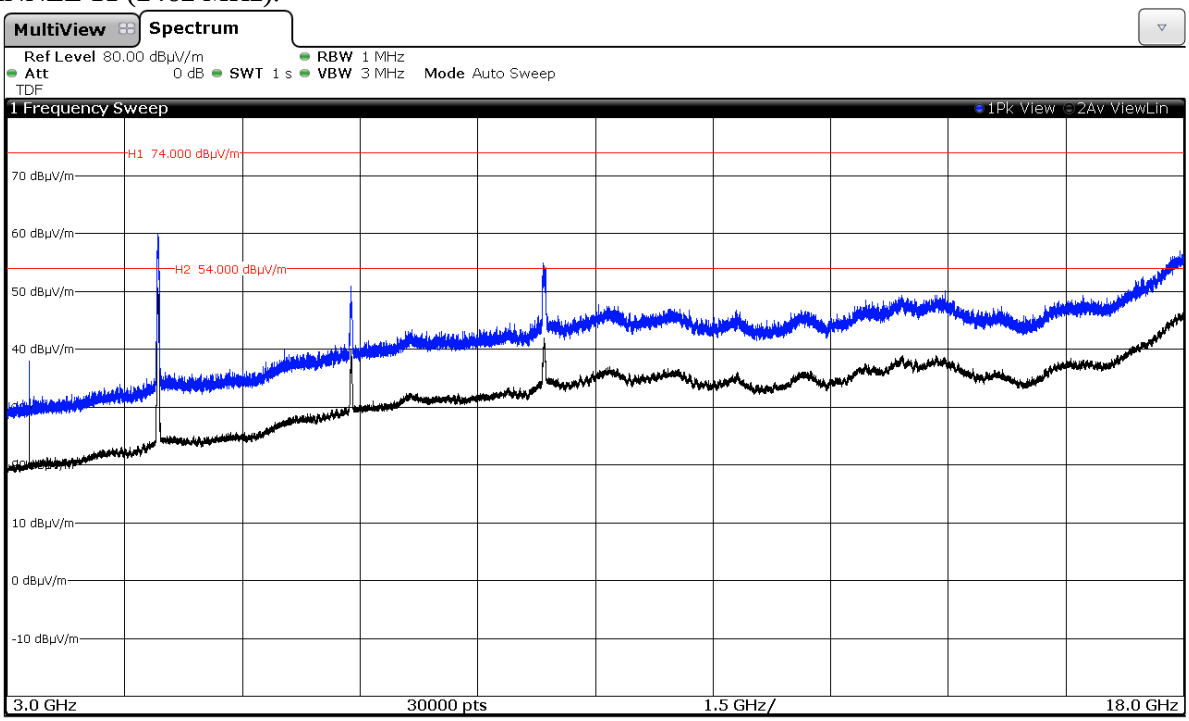
CHANNEL 1 (2412 MHz).



CHANNEL 6 (2437 MHz).

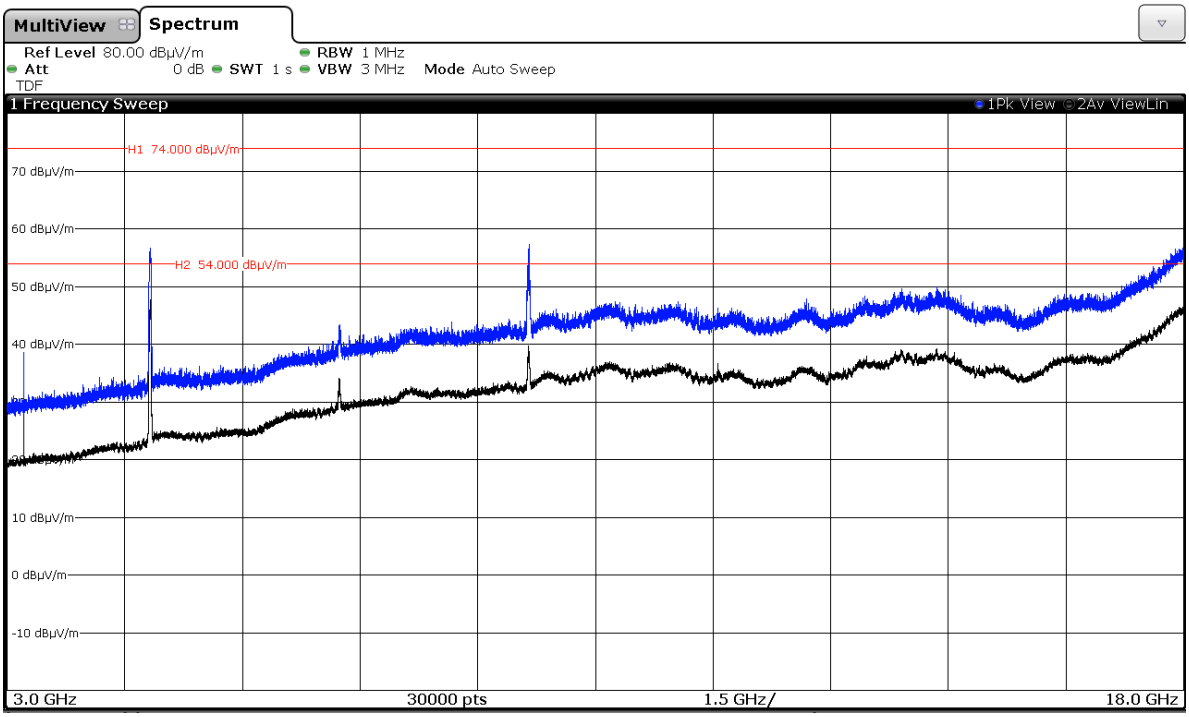


CHANNEL 11 (2462 MHz).

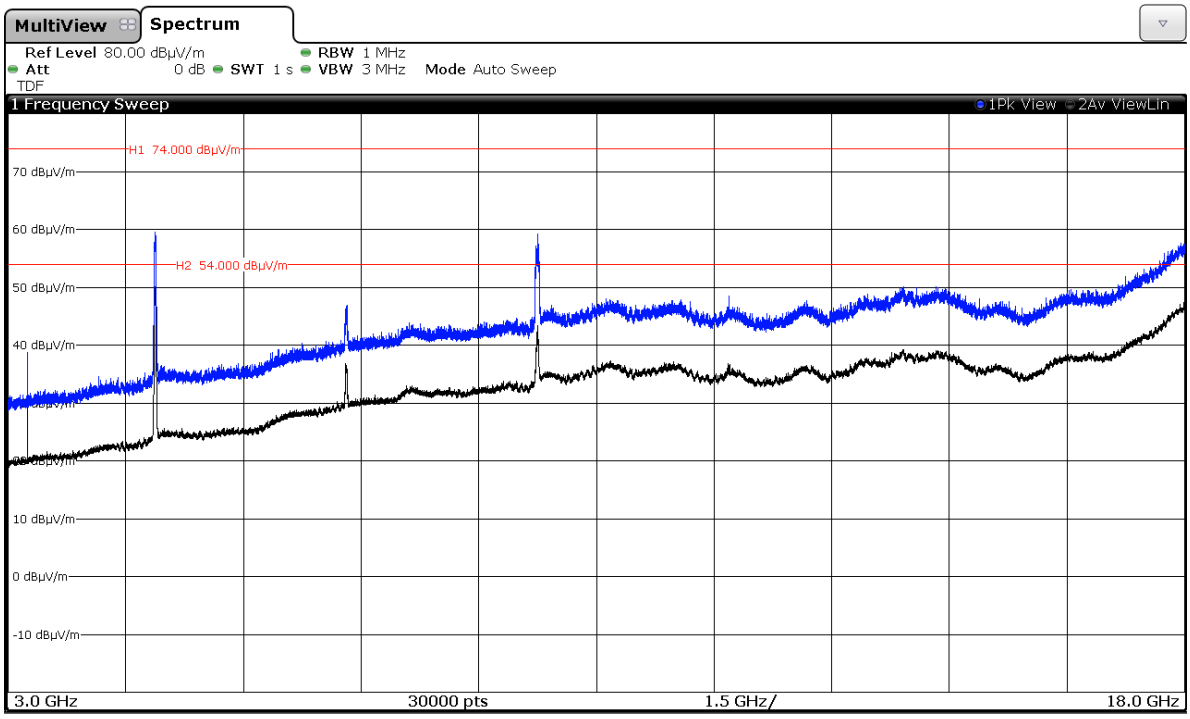


3.WiFi 2.4GHz 802.11 n20 mode (worst case)

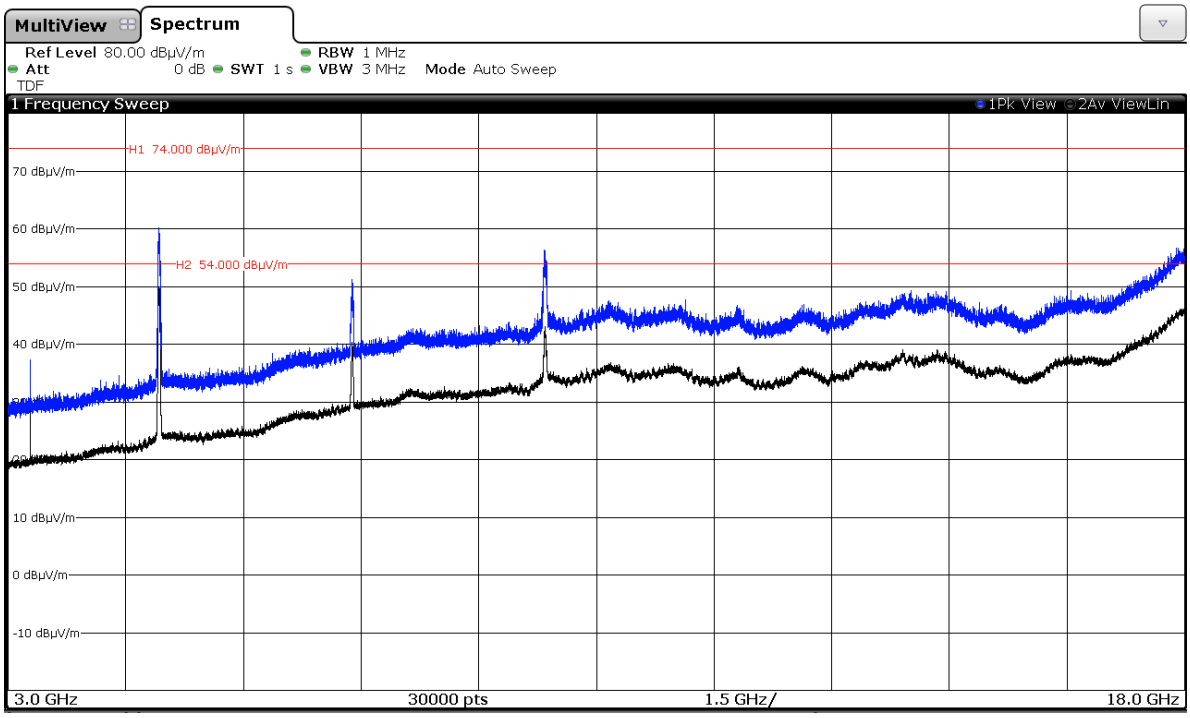
CHANNEL 1 (2412 MHz).



CHANNEL 6 (2437 MHz).



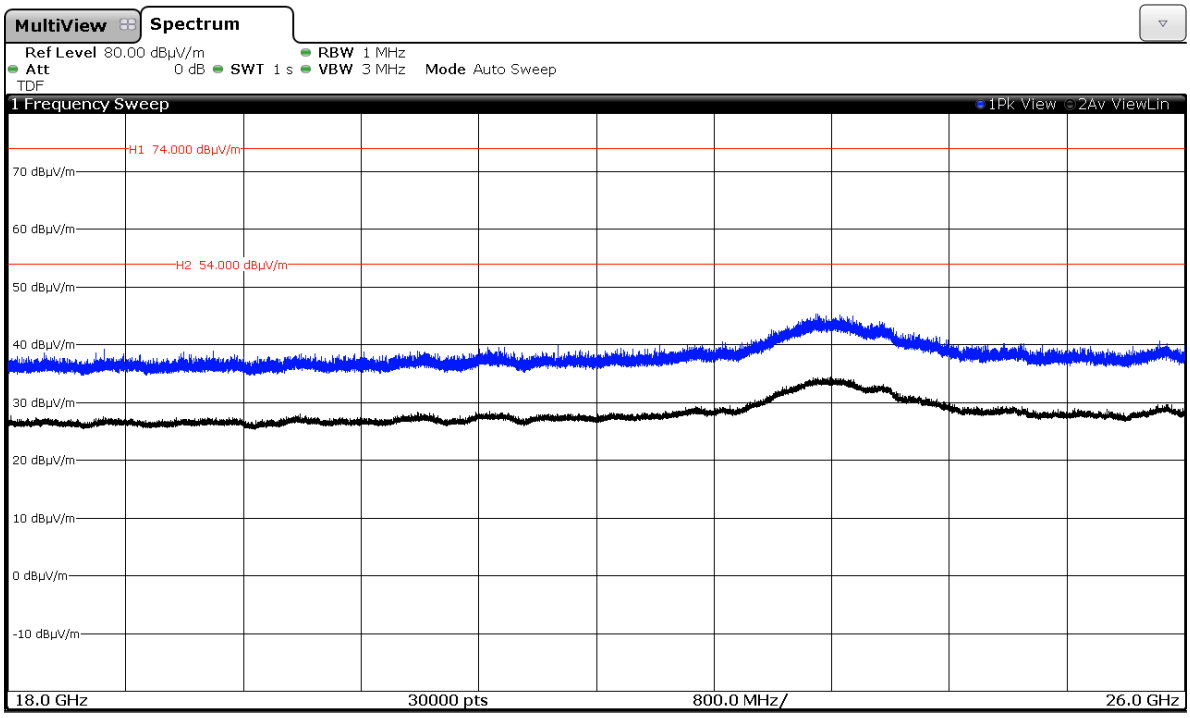
CHANNEL 11 (2462 MHz).



FREQUENCY RANGE 18 GHz to 26 GHz.

1. WiFi 2.4GHz 802.11 b mode

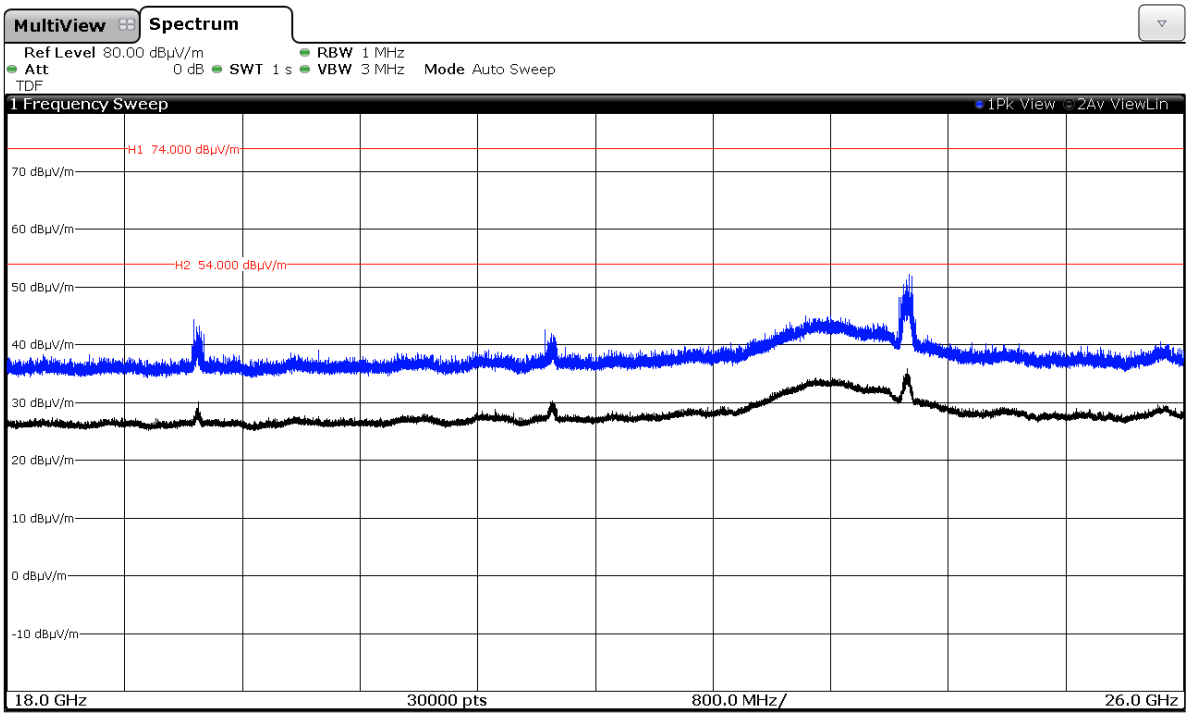
No spurious signals were detected.



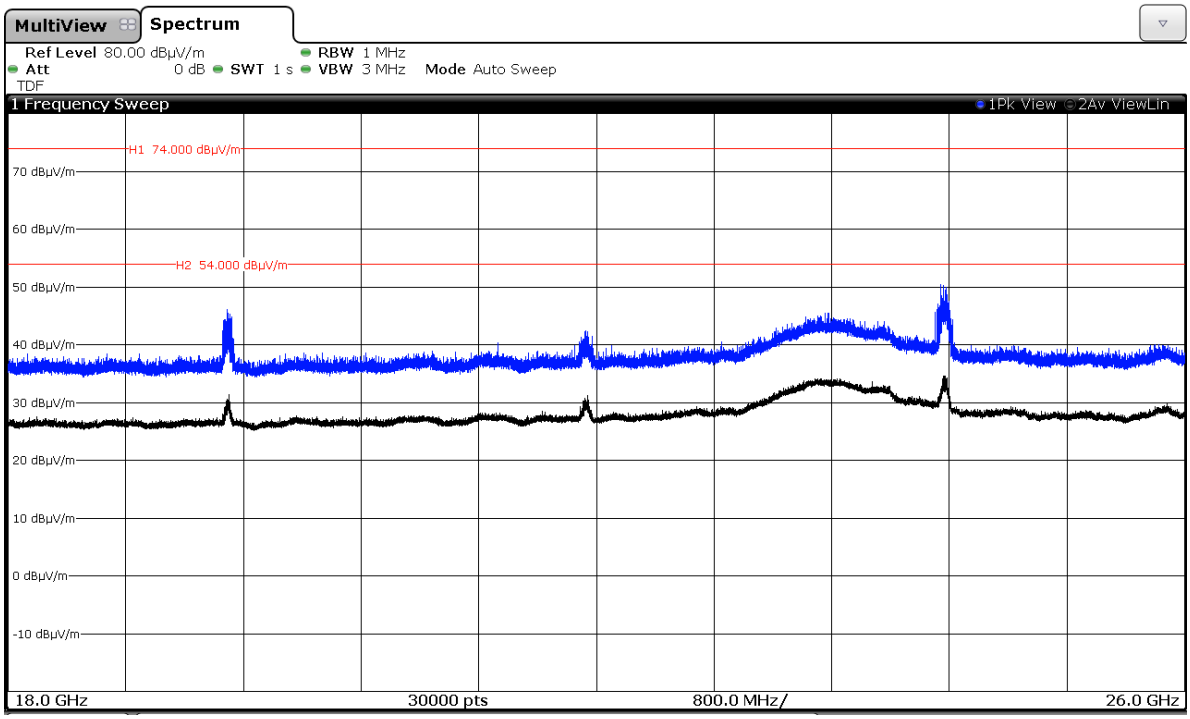
(This plot is valid for all channels).

2. WiFi 2.4GHz 802.11 g mode

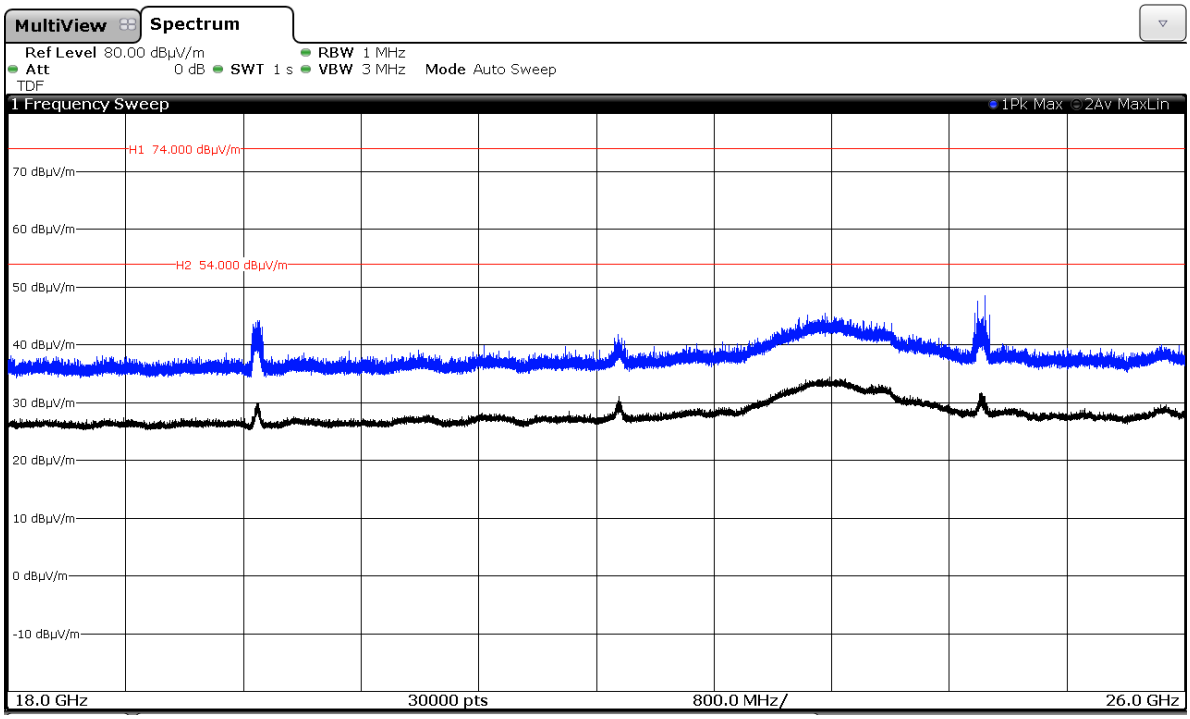
CHANNEL 1 (2412 MHz).



CHANNEL 6 (2437 MHz).

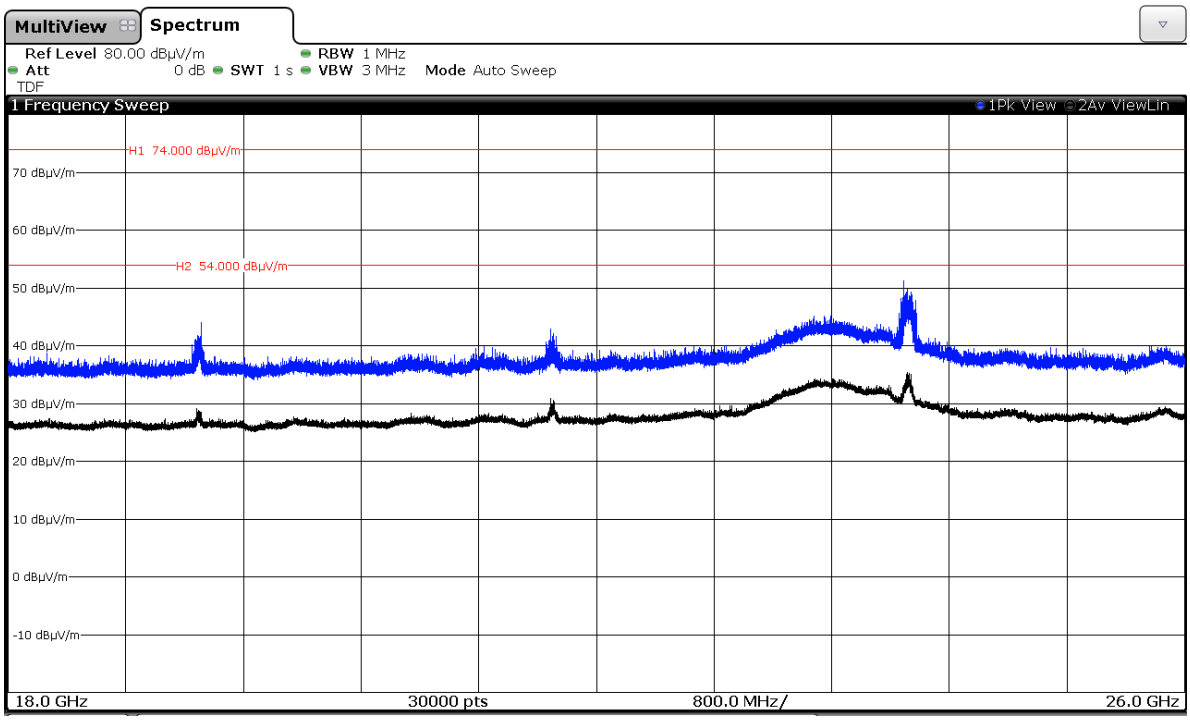


CHANNEL 11 (2462 MHz).

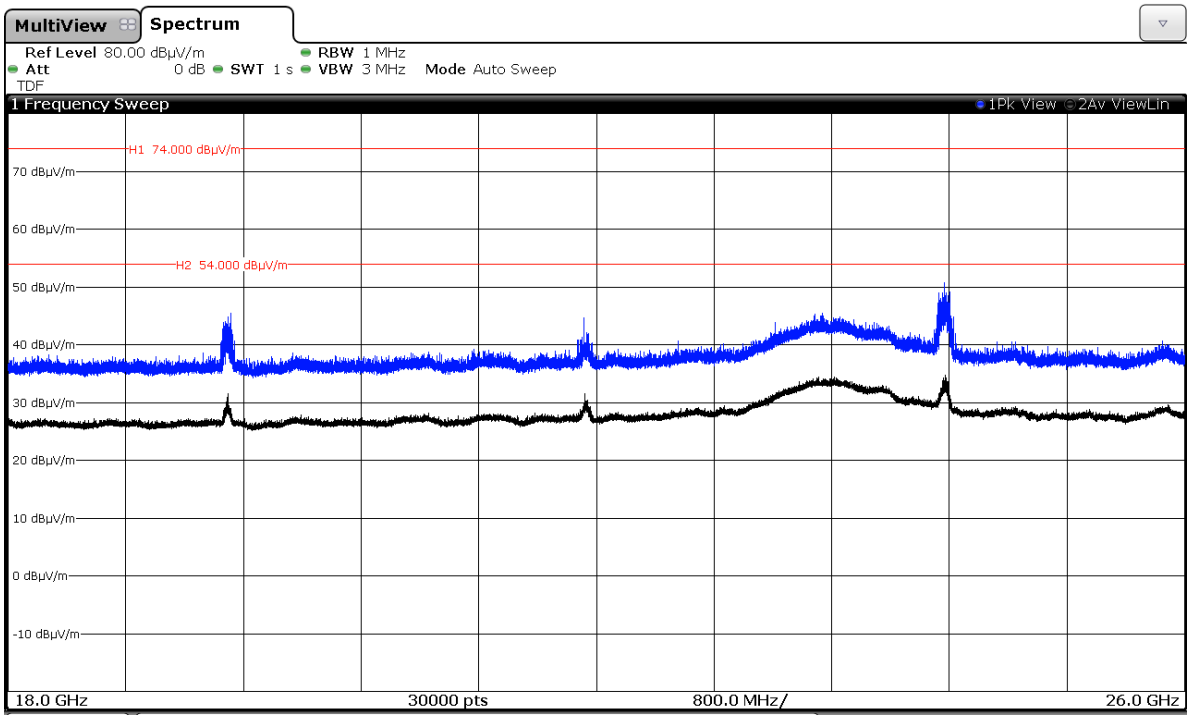


3.WiFi 2.4GHz 802.11 n20 mode

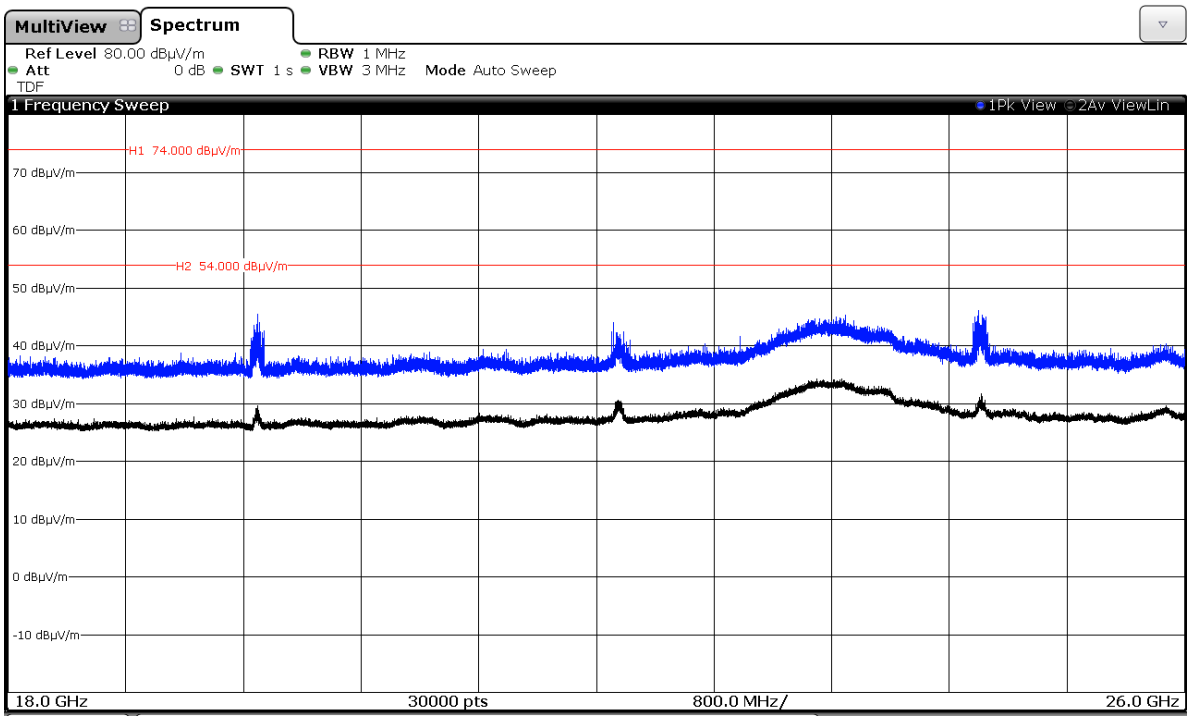
CHANNEL 1 (2412 MHz).



CHANNEL 6 (2437 MHz).



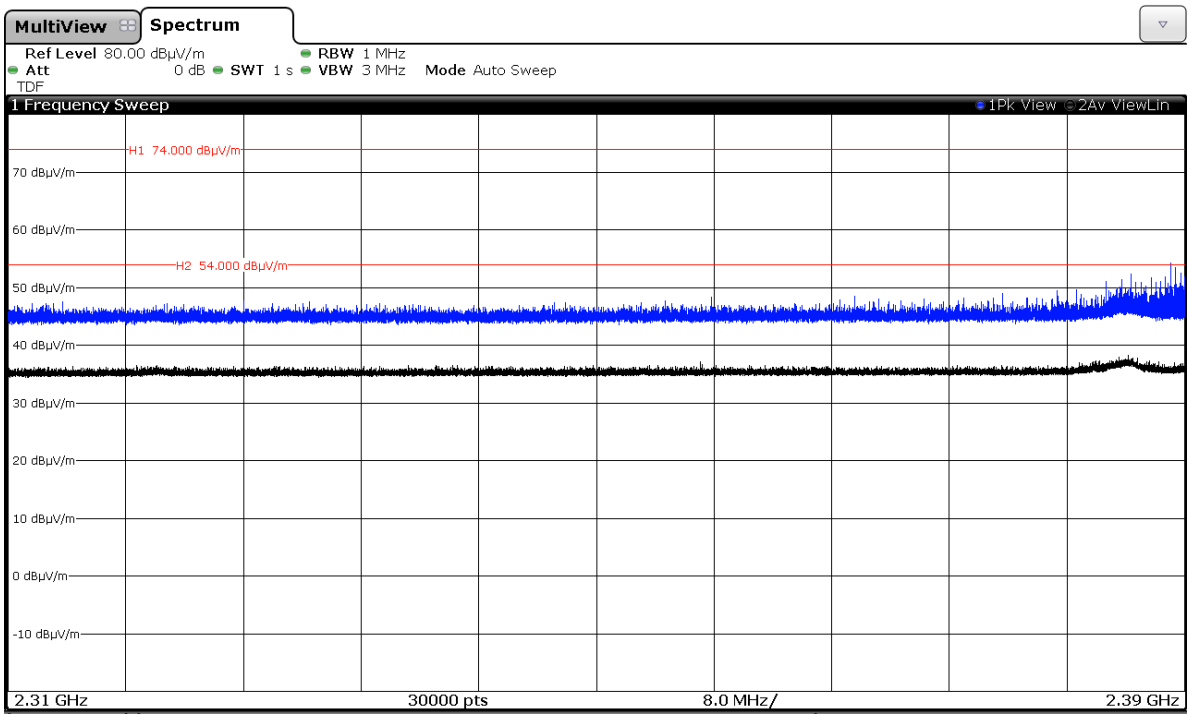
CHANNEL 11 (2462 MHz).



FREQUENCY RANGE 2.31 GHz to 2.39 GHz. (RESTRICTED BAND)

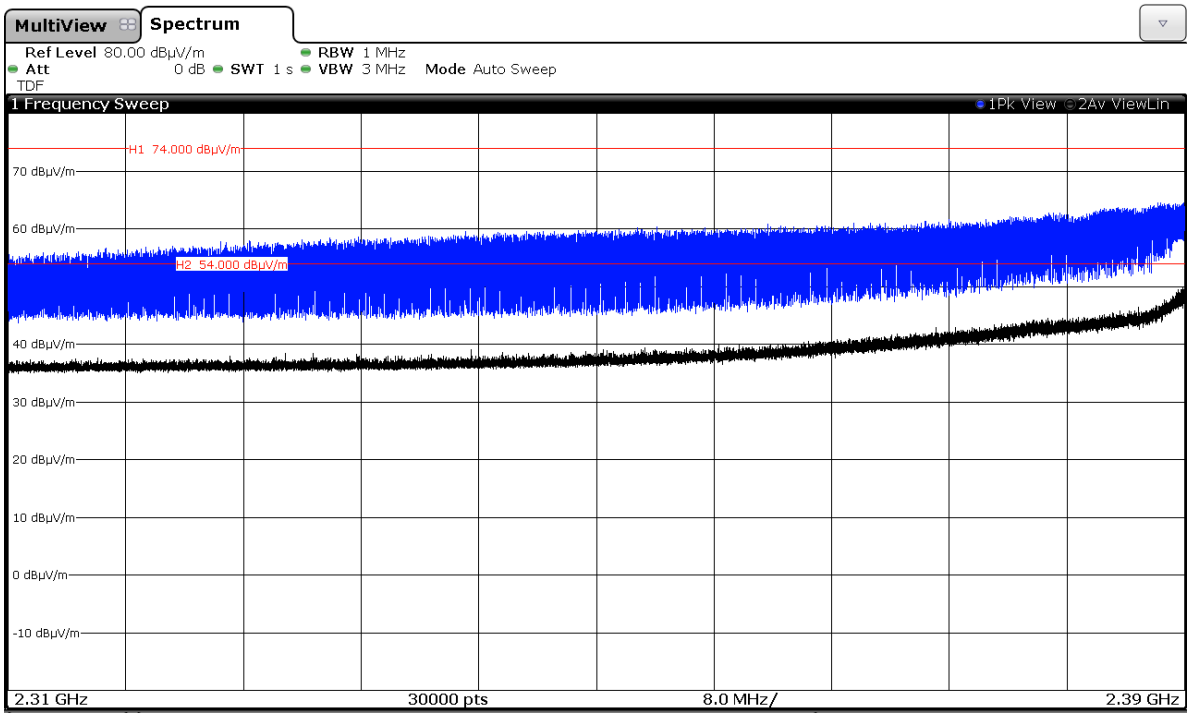
1. WiFi 2.4GHz 802.11 b mode

CHANNEL 1 (2412 MHz).



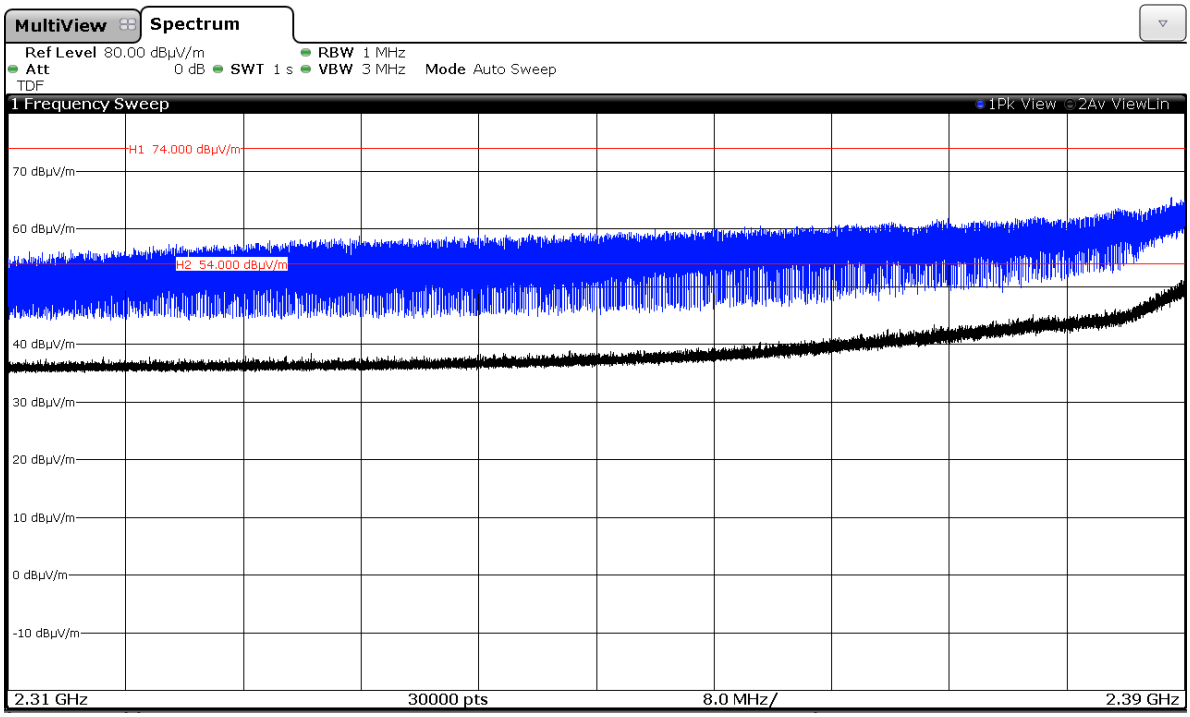
2. WiFi 2.4GHz 802.11 g mode

CHANNEL 1 (2412 MHz)



3. WiFi 2.4GHz 802.11 n20 mode

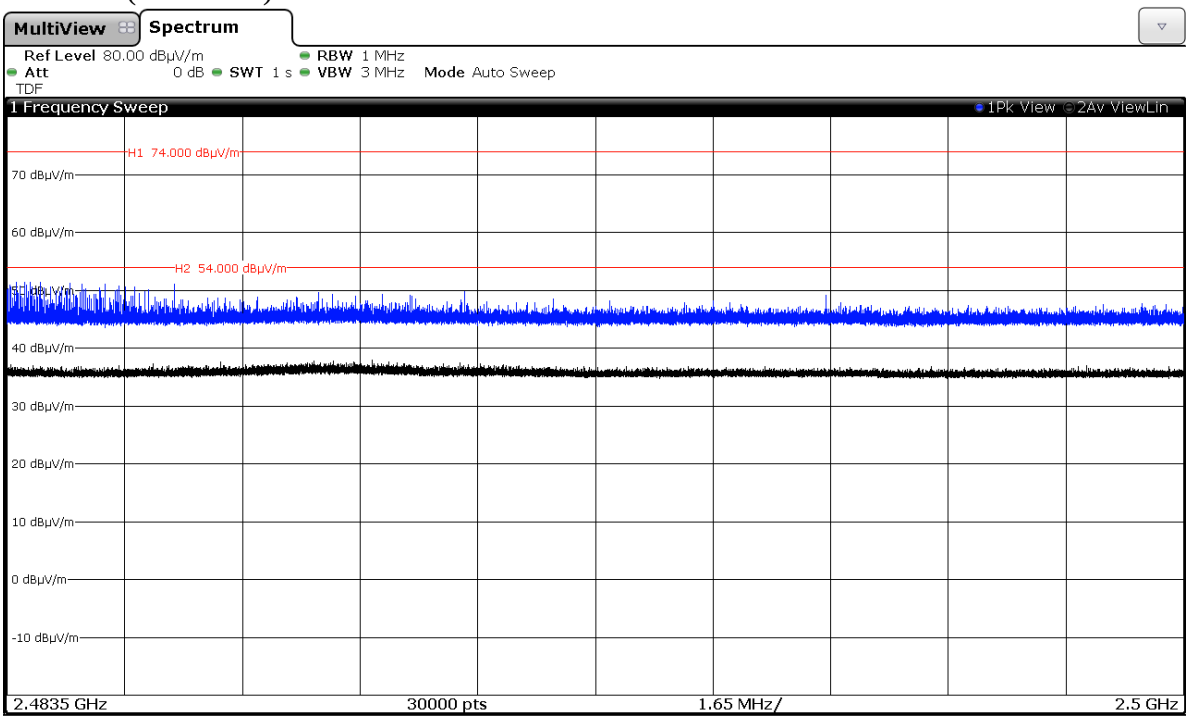
CHANNEL 1 (2412 MHz).



FREQUENCY RANGE 2.4835 GHz to 2.5 GHz. (RESTRICTED BAND)

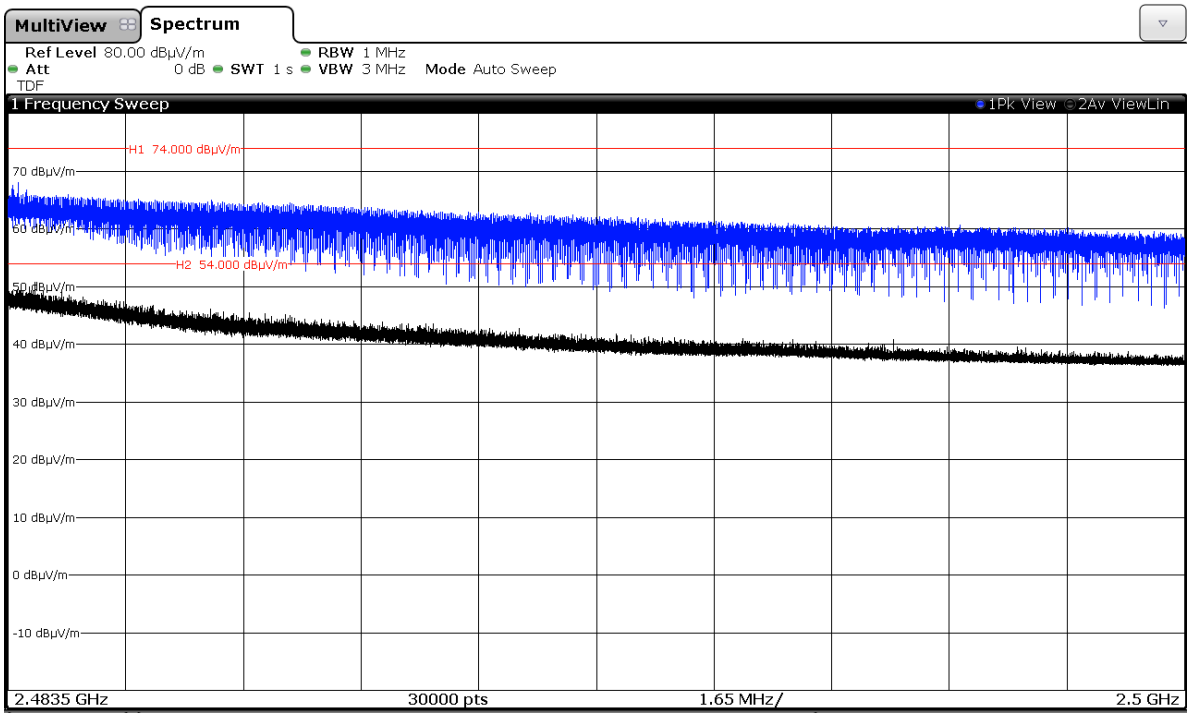
1. WiFi 2.4GHz 802.11 b mode

CHANNEL 11 (2462 MHz).



2. WiFi 2.4GHz 802.11 g mode

CHANNEL 11 (2462 MHz)



3. WiFi 2.4GHz 802.11 n20 mode

CHANNEL 11 (2462 MHz).