



Test report No:
NIE: 60909RRF.001

Test report

USA FCC Part 15.249, 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.

(*) Identification of item tested	Accessory to wireless hearing instrument
(*) Trademark	GN Hearing / ReSound / Beltone / Interton
(*) Model and /or type reference tested	RC-3
Other identification of the product	FCC ID: X26RC-3 IC: 6941C-RC3
(*) Features	Wireless 2.4 GHz proximity protocol
Applicant	GN HEARING A/S Lautrupbjerg 7, 2750 Ballerup, Denmark
Test method requested, standard	USA FCC Part 15.249 10-1-18 Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, 5725 - 5875 MHz, and 24.0 – 24.25 GHz. USA FCC Part 15.209 10-1-18 Edition: Radiated emission limits; general requirements. CANADA RSS-210 Issue 9 (August 2016). CANADA RSS-Gen Issue 5 (April 2018). ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	A. Llamas RF Lab. Manager  Firmado digitalmente por ALEJANDRO LLAMAS RODRIGUEZ Fecha: 2019.08.14 15:11:45 +02'00'
Date of issue	2019-08-14
Report template No	FDT08_22 (*) "Data provided by the client"

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Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification is a FCC-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report.

DEKRA Testing and Certification is an ISED-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. 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 DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. 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.

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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 DEKRA Testing and Certification S.A.U.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested")
2. The sample consists of a simple wireless remote control for a hearing instrument. Capable of connecting wirelessly with a GN hearing instrument. Once connected it can adjust the hearing instrument volume up and down. It can also switch the hearing instrument between preset programs.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

- Sample S/01 is composed of the following elements:

Control N°	Description	Model	Serial N°	Reception
60909B/10	Charger cable USB	---	---	2019/07/03
60909B/11	Accessory to wireless hearing instrument	RC-3	---	2019/07/03

Sample S/01 has undergone the following test(s): All CONDUCTED tests indicated in Appendix A.

- Sample S/02 is composed of the following elements:

Control N°	Description	Model	Serial N°	Reception
60909B/30	Accessory to wireless hearing instrument	RC-3	---	2019/07/03

Sample S/02 has undergone the following test(s): All RADIATED tests indicated in Appendix A.

Test sample description

Ports..... :	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾		
			☐	☐	☐		
Supplementary information to the ports..... :							
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☐	AC:	☐	☐	☐	☐	☐
☒	DC: 3.0 Vdc (battery)						

Rated Power			
Clock frequencies			
Other parameters.....			
Software version	V0.0.3.6		
Hardware version.....	Rev 01		
Dimensions in cm (W x H x D).....			
Mounting position.....	☐	Table top equipment	
	☐	Wall/Ceiling mounted equipment	
	☐	Floor standing equipment	
	☐	Hand-held equipment	
	☒	Other: Accessory for hearing aid	
Modules/parts	Module/parts of test item	Type	Manufacturer
Accessories (not part of the test item)	Description	Type	Manufacturer
Documents as provided by the applicant.....	Description	File name	Issue date

(3): Only for Medical Equipment.

Identification of the client

GN HEARING A/S
Lautrupbjerg 7, 2750 Ballerup, Denmark

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2019-07-16
Date (finish)	2019-07-26

Document history

Report number	Date	Description
60909RRF.001	2019-08-14	First release

Environmental conditions

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

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

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

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

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

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 35 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Remarks and comments

The tests have been performed by the technical personnel: Ignacio Cabra.

Used instrumentation:

Conducted Measurements:

	Last Calibration	Due Calibration
1. Signal and Spectrum Analyzer ROHDE AND SCHWARZ FSV40	2018/07	2020/02

Radiated Measurements:

	Last Calibration	Due Calibration
1. Semianechoic Absorber Lined Chamber ETS LINDGREN FACT3 200 STP	N.A.	N.A.
2. RF pre-amplifier 30 MHz-6 GHz Bonn Elektronik BLNA 0360-01N	2018/07	2019/07
3. RF Pre-amplifier, 48 dB, 18 GHz - 40 GHz NARDA JS44-18004000-33-8P	2019/02	2020/02
4. Biconical/Log Antenna ETS LINDGREN 3142E	2017/04	2020/04
5. Signal and Spectrum Analyzer ROHDE AND SCHWARZ FSV40	2018/02	2020/02
6. RF Pre-amplifier, 30 dB ,1-18 GHz BONN ELEKTRONIK BLMA 0118-1M	2019/04	2020/04
7. Broadband Horn antenna 1-18 GHz SCHWARZBECK BBHA 9120 D	2016/11	2019/11
8. Broadband Horn antenna 18-40 GHz SCHWARZBECK BBHA 9170	2018/07	2021/07
9. EMI Test Receiver 7 GHz ROHDE AND SCHWARZ ESR7	2017/08	2019/08

Testing verdicts

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

Summary

1. Proximity protocol 2.4 GHz.

FCC PART 15.249 PARAGRAPH / RSS-210			
Requirement – Test case		Verdict	Remark
Section 15.249 Subclause (a) / RSS-210 B.10. (a)	Field strength of fundamental and harmonics emissions	P	
Section 15.249 Subclause (d) / RSS-210 B.10. (b)	Emissions radiated outside of the specific frequency bands	P	
<u>Supplementary information and remarks:</u> None.			

Appendix A: Test results. Proximity protocol 2.4 GHz

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TEST CONDITIONS

POWER SUPPLY (V):

Vnominal: 3.0 Vdc
Type of power supply: Battery
Type of antenna: Integral antenna.
Declared antenna gain: 2.94 dBi

TEST FREQUENCIES:

Low Channel: 2410 MHz
Middle Channel: 2440 MHz
High Channel: 2464 MHz

CONDUCTED MEASUREMENTS

The equipment under test was set up in a shielded room and it is connected to the spectrum analyzer through a low loss RF cable. The reading of the spectrum analyzer is corrected with the cable loss.



RADIATED MEASUREMENTS

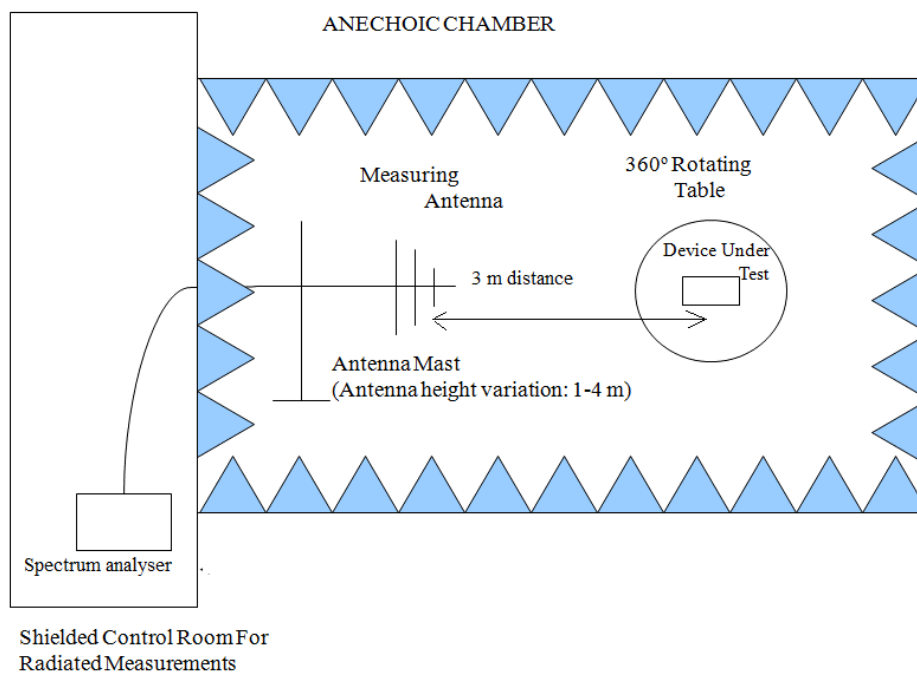
All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and at a distance of 1m for the frequency range 1 GHz-26 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-40 GHz horn antenna).

For radiated emissions in the range 1 GHz-26 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.

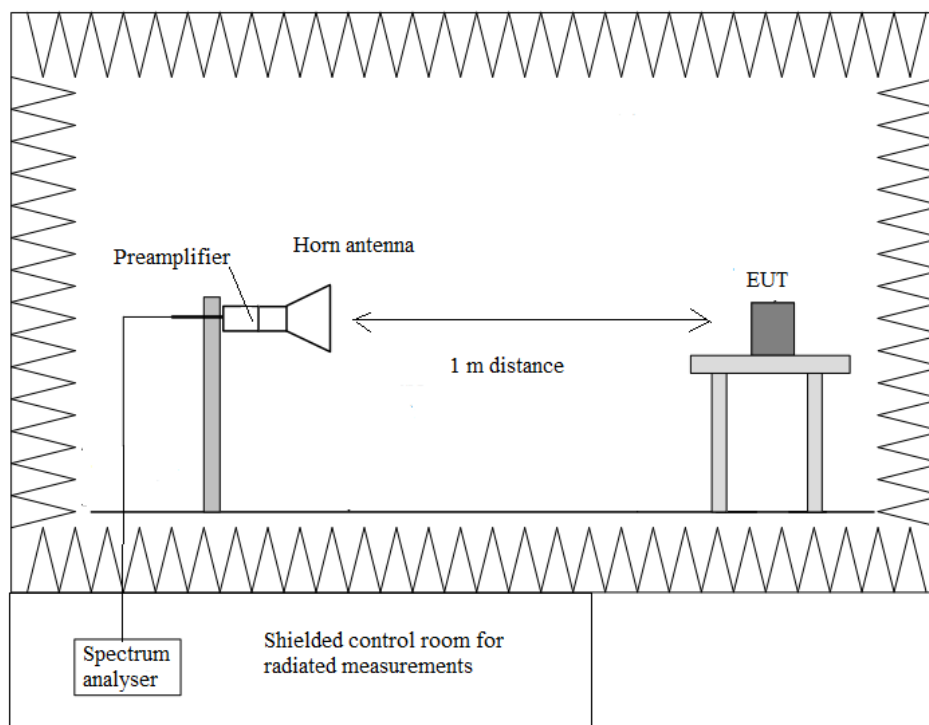
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

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

Radiated measurements setup $f < 1$ GHz:



Radiated measurements setup $f > 1$ GHz:

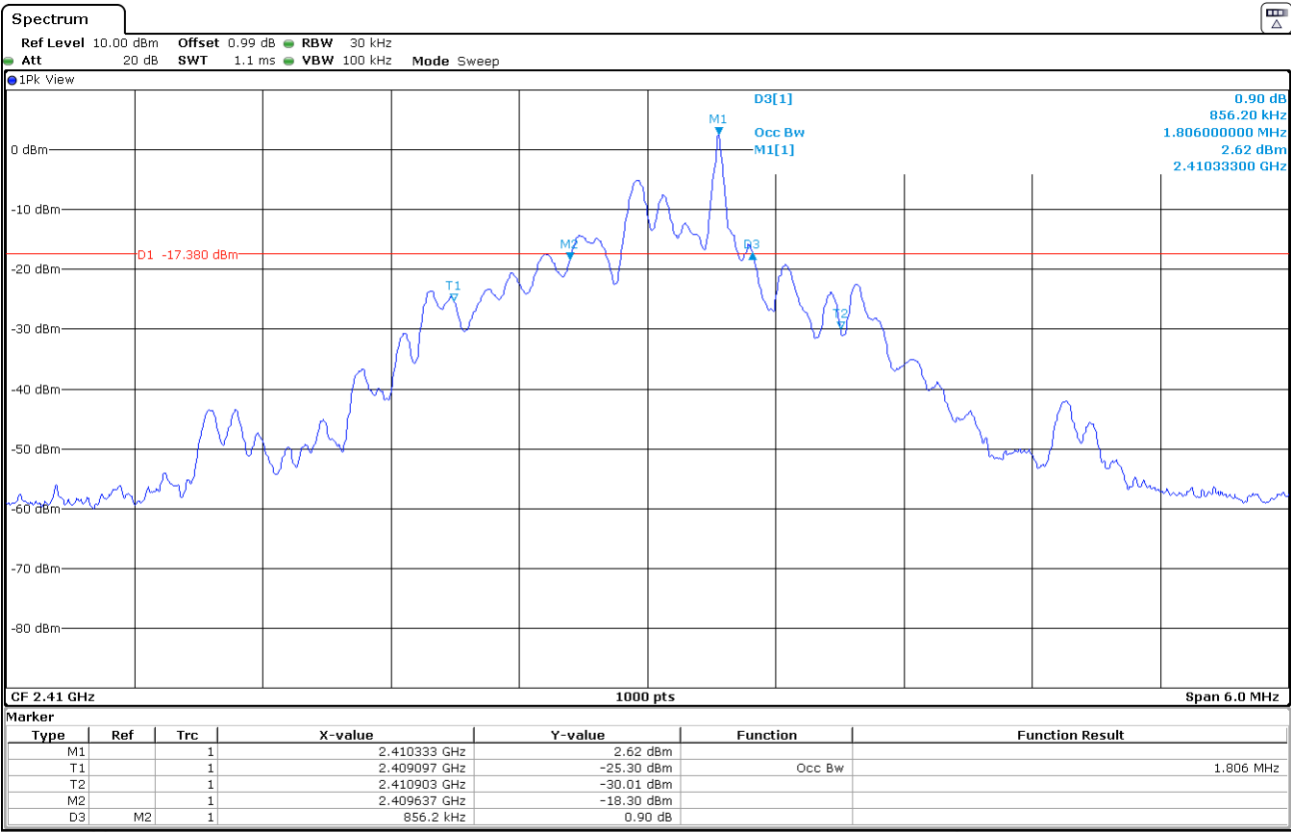


Occupied Bandwidth

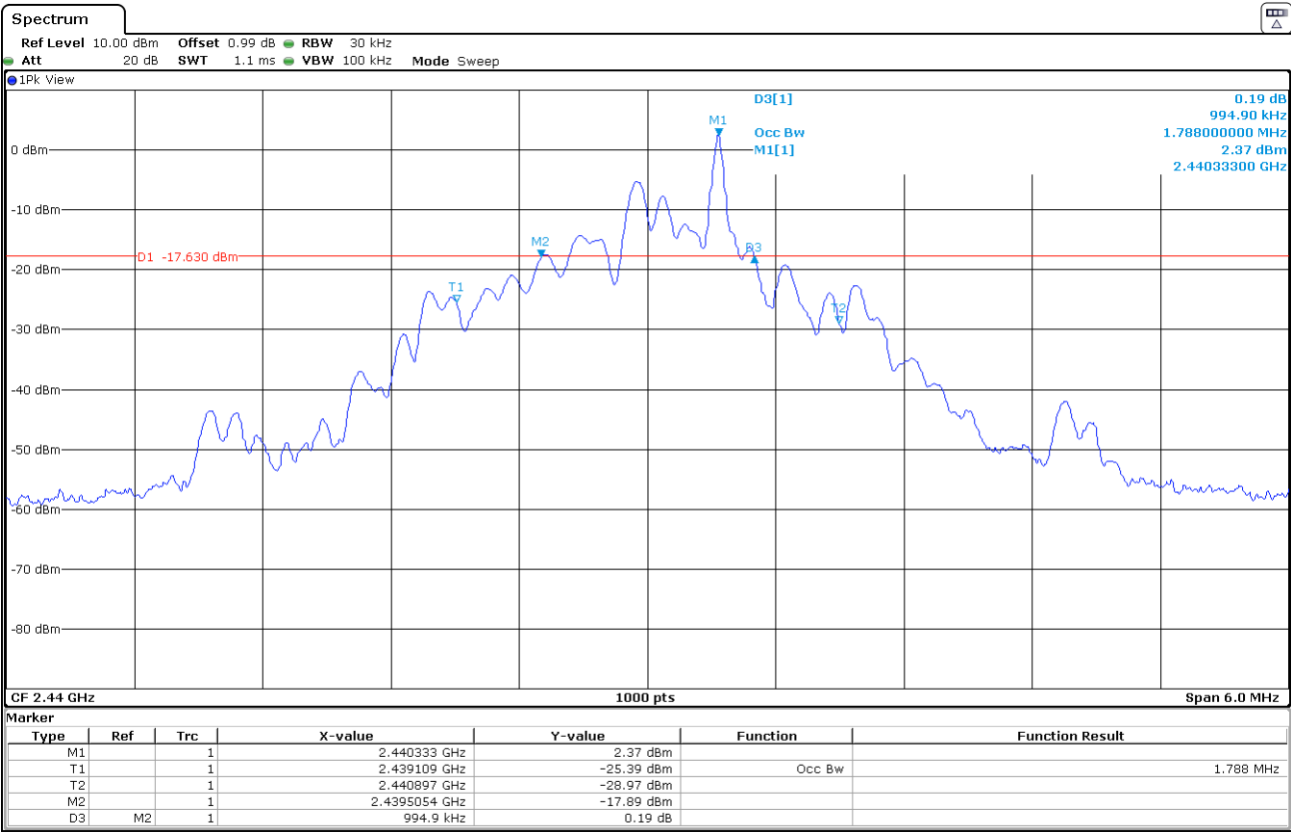
RESULTS:

	Low Channel 2410 MHz	Middle Channel 2440 MHz	High Channel 2464 MHz
99% Bandwidth (MHz)	1.806	1.788	1.788
-20 dBc Bandwidth (MHz)	856.2	994.9	993.3
Measurement Uncertainty (kHz)	<±0.55		

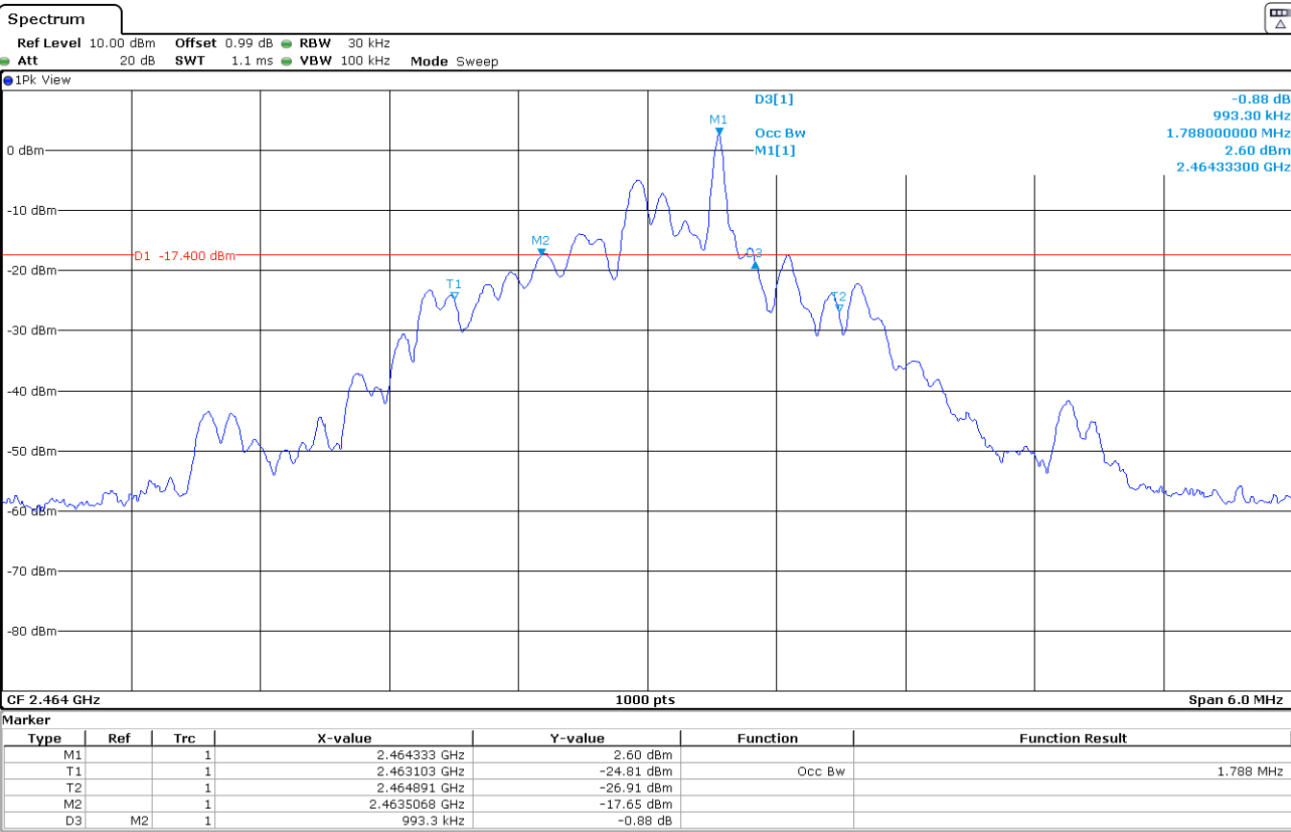
- Low Channel:



- Middle Channel:



- High Channel:



Section 15.249 Subclause (a) / RSS-210 B.10 (a). Field strength of Fundamental and harmonic emissions

SPECIFICATION:

The field strength of emissions from intentional radiators shall comply with the following

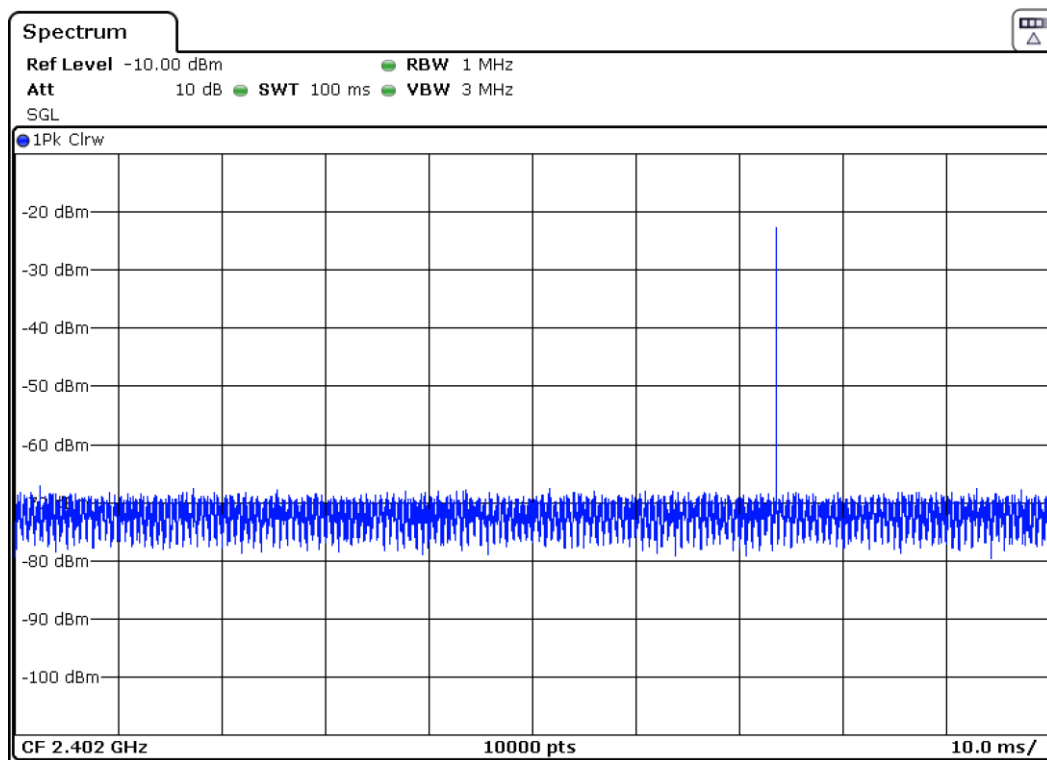
Fundamental frequency (MHz)	Field strength of fundamental (mV/m)	Field strength (dB μ V/m)	Measurement distance (m)
902 - 928	50	93.98	3
2400 – 2483.5	50	93.98	3
5725 - 5875	50	93.98	3
24000-24250	250	107.96	3

For frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

RESULTS:

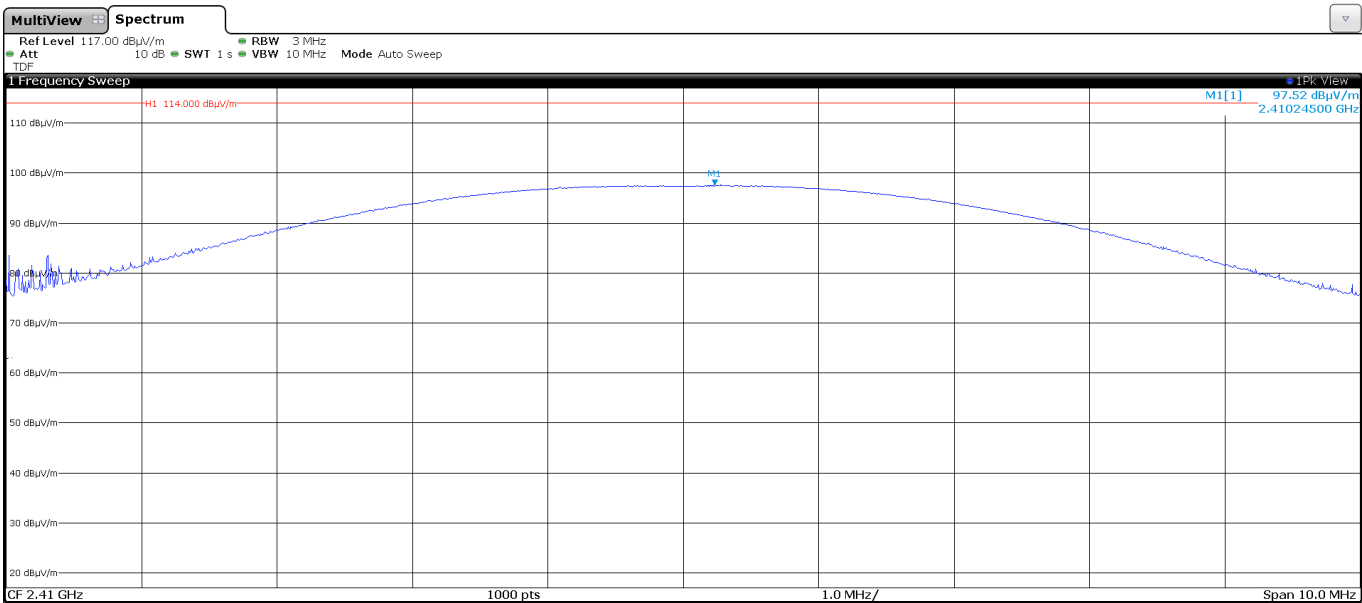
The transmission is pulsed so the average values of transmitter fundamental emission is calculated from the measured peak values using the duty cycle correction factor δ as indicated in standard ANSI C63.10-2013.

Computation of duty-cycle correction factor

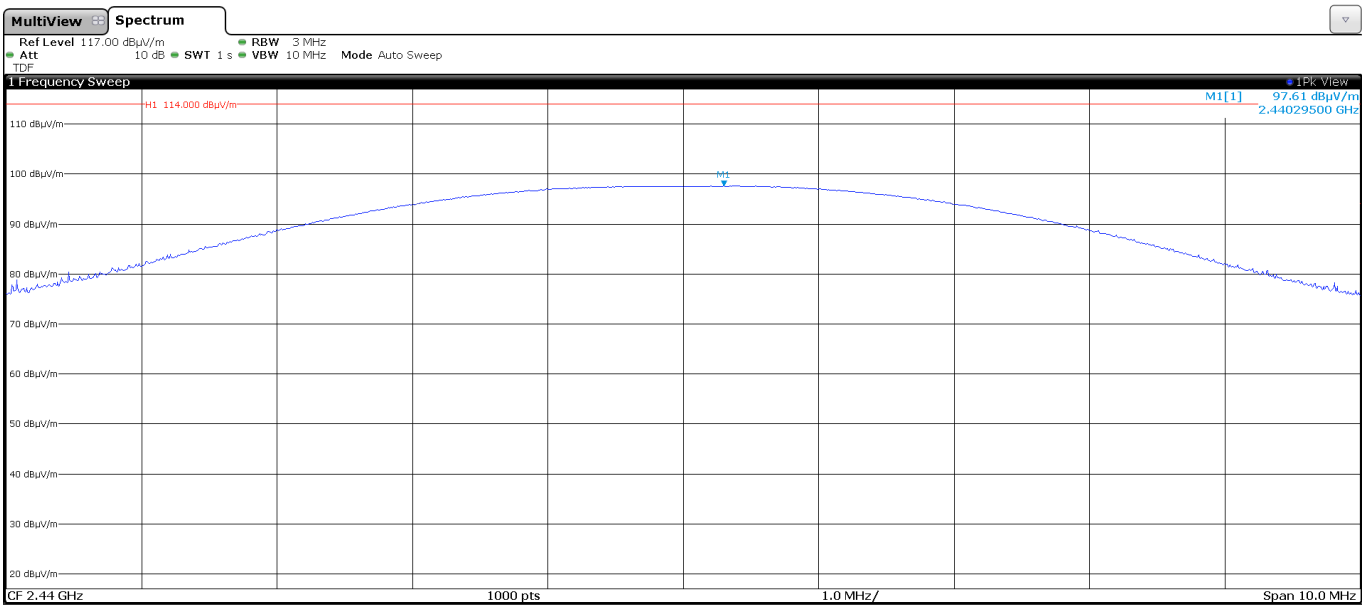


Number of pulses within 100 ms: 1

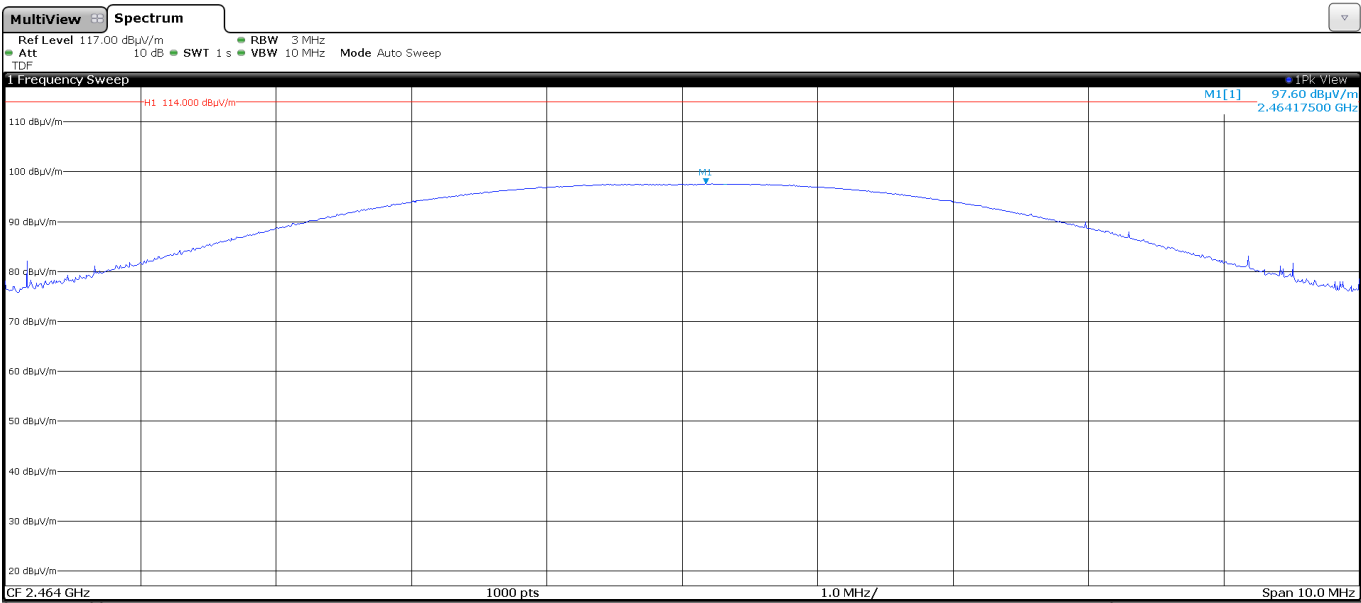
- Low Channel:



- Middle Channel:



- High Channel:



Section 15.249 Subclause (a) and (d) / RSS-210 B.10 (b). Emissions radiated outside of the specific frequency bands (Transmitter)

SPECIFICATION:

The field strength of harmonics from intentional radiators shall comply with the following

Fundamental frequency (MHz)	Field strength of harmonics ($\mu\text{V/m}$)	Field strength of harmonics ($\text{dB}\mu\text{V/m}$)	Measurement distance (m)
902 - 928	500	54	3
2400 – 2483.5	500	54	3
5725 - 5875	500	54	3
24000-24250	2500	67.96	3

Emissions radiated outside of the specific frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of fundamental or to the general radiated emission limits specified in section 15.209:

Frequency Range (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)	Measurement distance (m)
0.009-0.490	$2400/F(\text{kHz})$	-	300
0.490-1.705	$24000/F(\text{kHz})$	-	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

Whichever is the lesser attenuation.

RESULTS:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° 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-26 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 - 1 GHz.

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

No spurious frequencies detected at less than 20 dB below the limit.

Measurement uncertainty (dB)	<±3.81
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Frequency range 1 - 26 GHz.

The results in the next tables show the maximum measured levels in the 1-26 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 dB μ V/m at 3 m) are measured with average detector or derived from the Peak value, for checking compliance with the average limit.

- Low Channel (2410 MHz):

Spurious frequency (GHz)	Detector	Emission Level (dB μ V/m)	Polarization	Measurement Uncertainty (dB)
2.33088	Peak	54.33	V	<±4.72
	Average	52.22		
2.49175	Peak	55.30	V	<±4.72
	Average	49.80		
4.82070	Peak	39.98	V	<±4.72
7.23103	Peak	49.98	V	<±4.72
19.28255	Peak	38.98	H	<±4.72

- Middle Channel (2440 MHz):

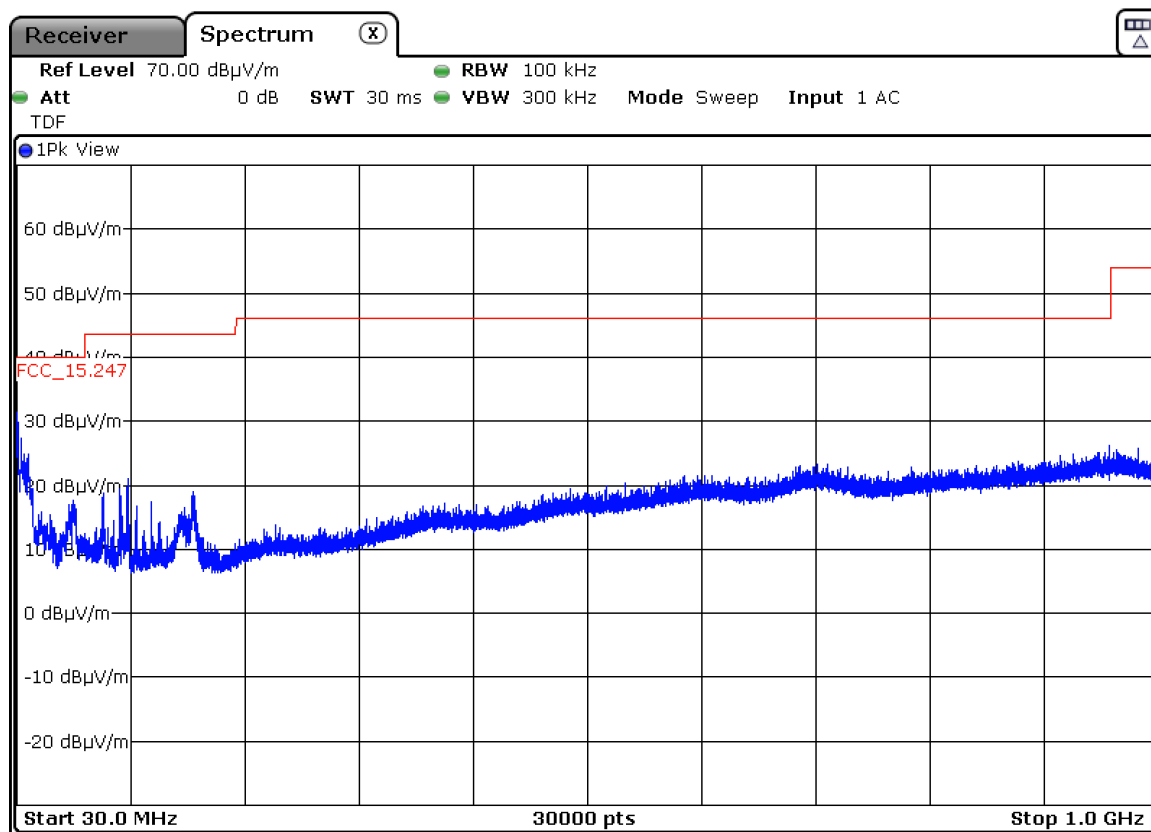
Spurious frequency (GHz)	Detector	Emission Level (dB μ V/m)	Polarization	Measurement Uncertainty (dB)
2.35747	Peak	54.97	V	<±4.72
	Average	46.48		
2.48785	Peak	52.08	V	<±4.72
4.88090	Peak	43.80	V	<±4.72
7.32063	Peak	47.72	V	<±4.72
19.52285	Peak	38.50	H	<±4.72

- High Channel (2464 MHz):

Spurious frequency (GHz)	Detector	Emission Level (dB μ V/m)	Polarization	Measurement Uncertainty (dB)
2.38454	Peak	55.78	V	< $\pm$ 4.72
	Average	47.62		
2.49584	Peak	50.52	V	< $\pm$ 4.72
4.92710	Peak	45.51	V	< $\pm$ 4.72
7.39297	Peak	46.01	V	< $\pm$ 4.72
19.71455	Peak	39.90	V	< $\pm$ 4.72

Verdict: PASS

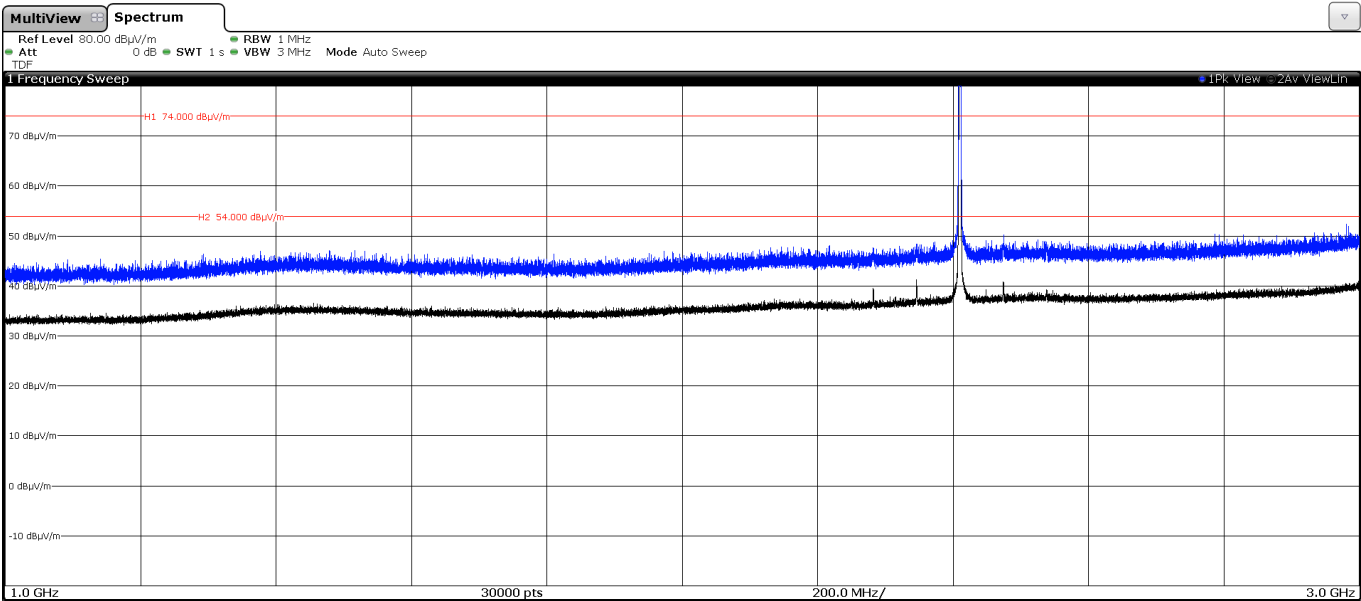
FREQUENCY RANGE 30 MHz - 1 GHz



Note: This plot is valid for all three channels

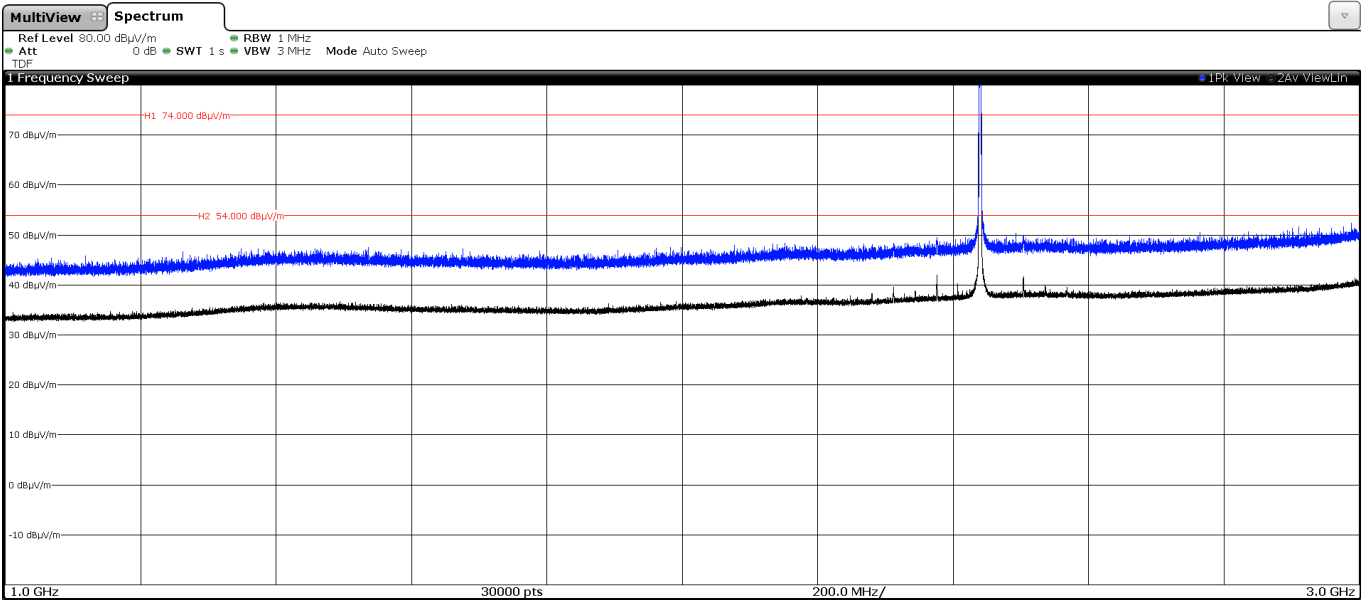
FREQUENCY RANGE 1 - 3 GHz

- Low Channel:



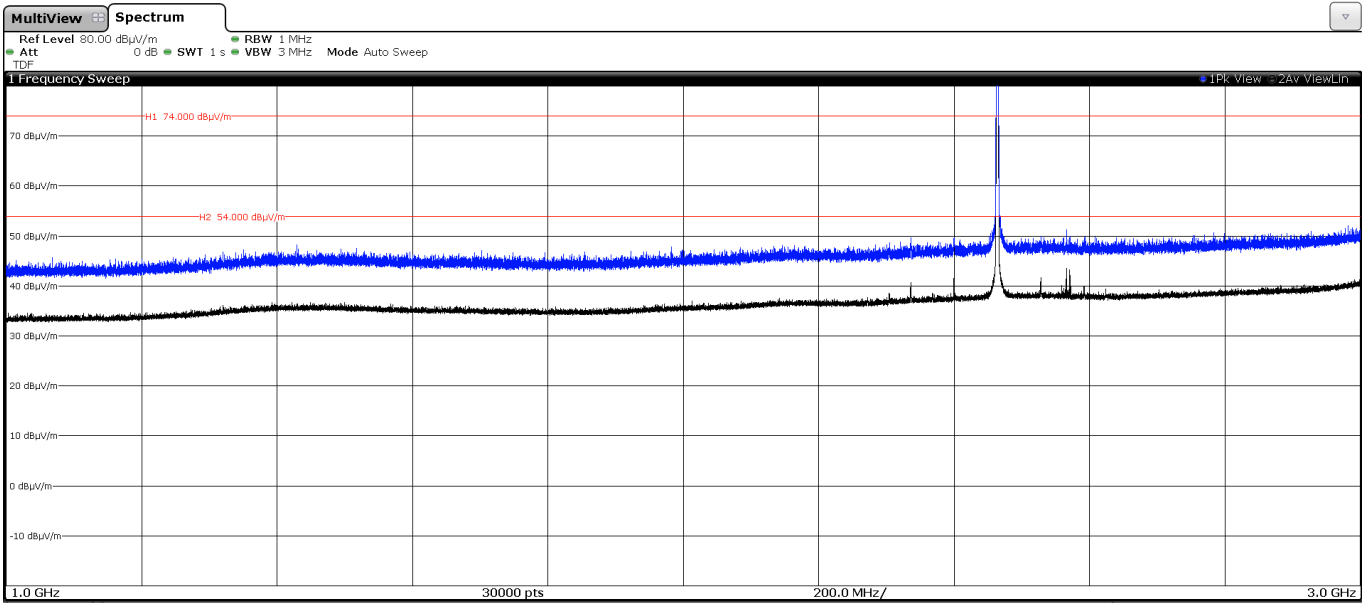
The peak shown in the plot above the limit is the carrier frequency.

- Middle Channel:



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

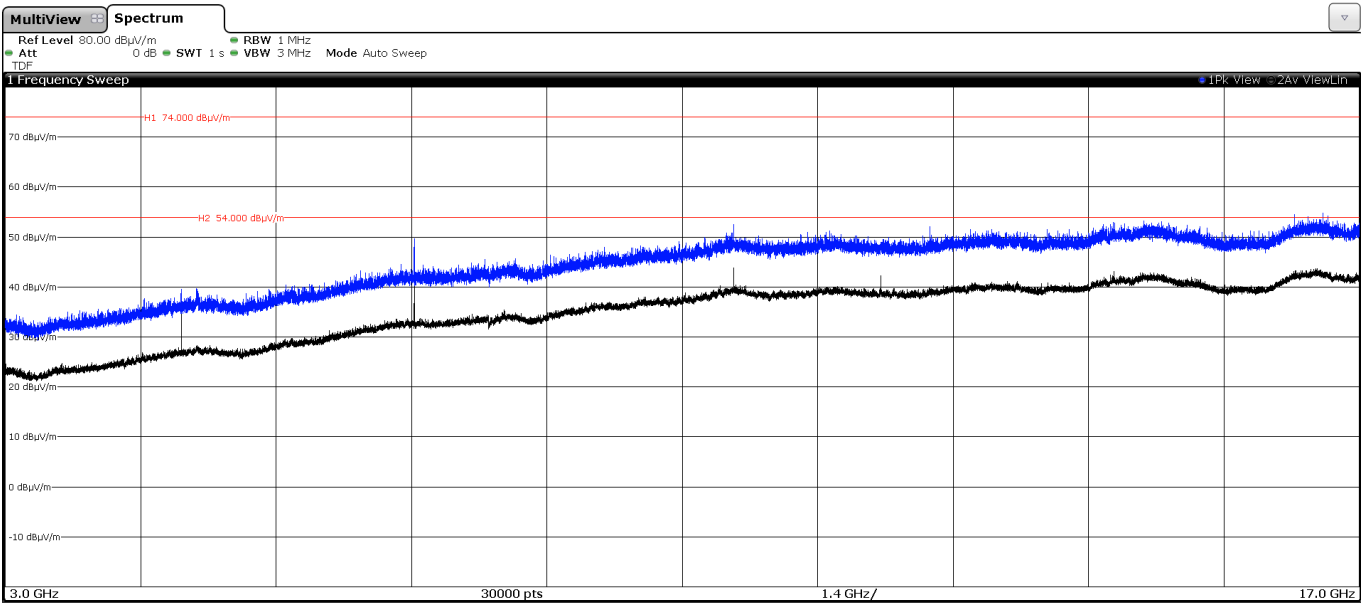
- High Channel:



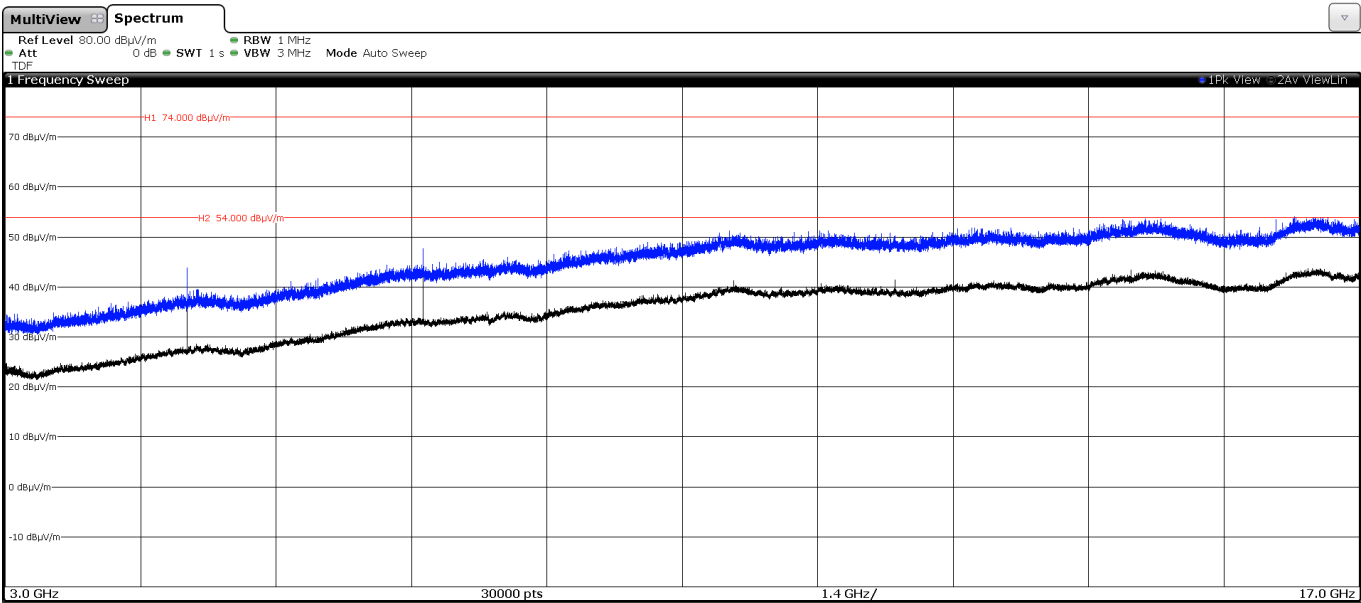
The peak shown in the plot above the limit is the carrier frequency.

FREQUENCY RANGE 3 - 17 GHz

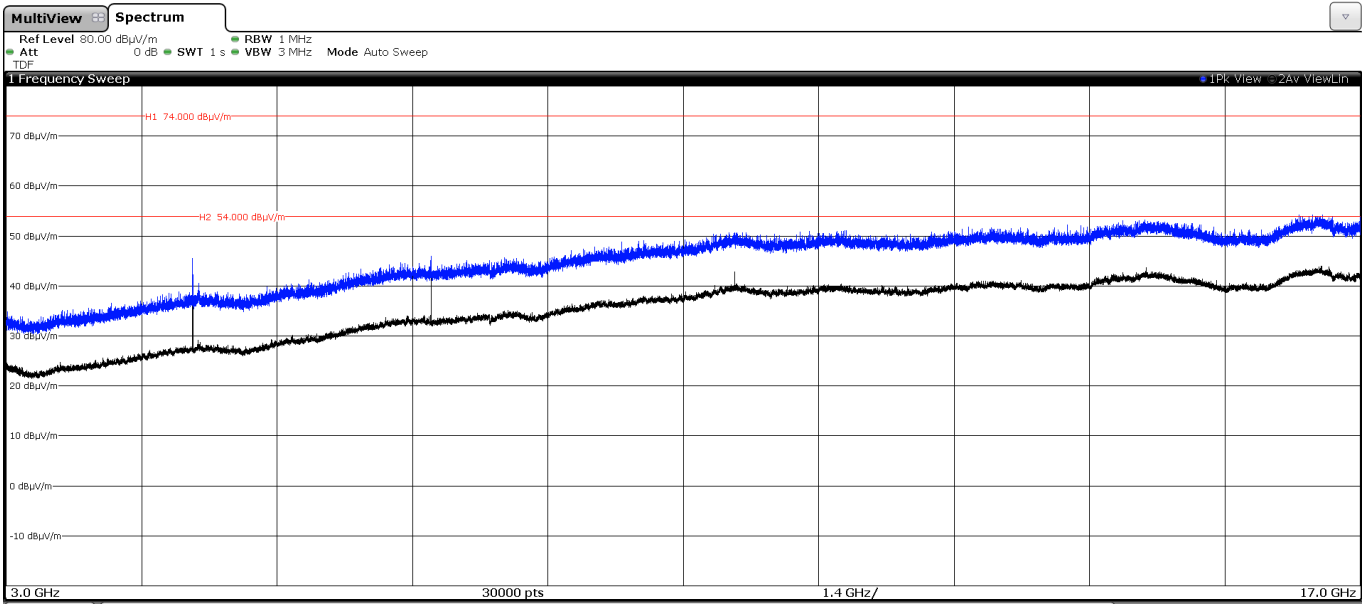
- Low Channel:



- Middle Channel:

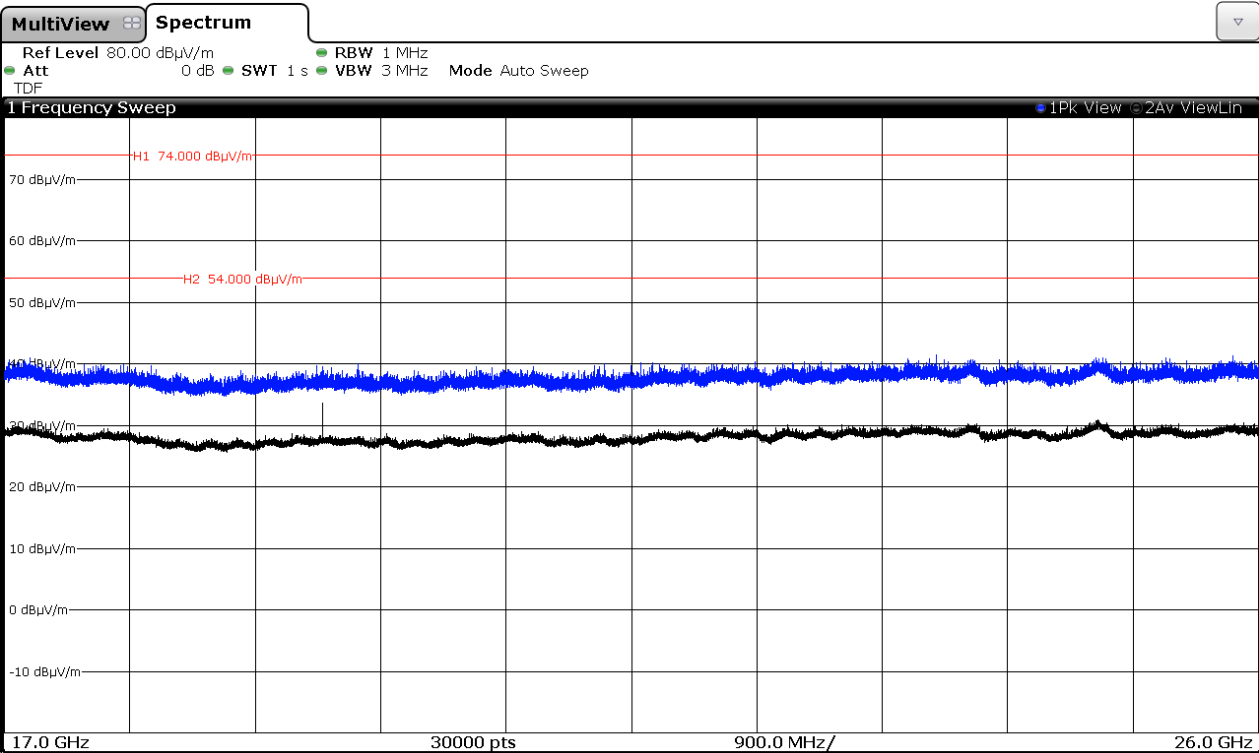


- High Channel:

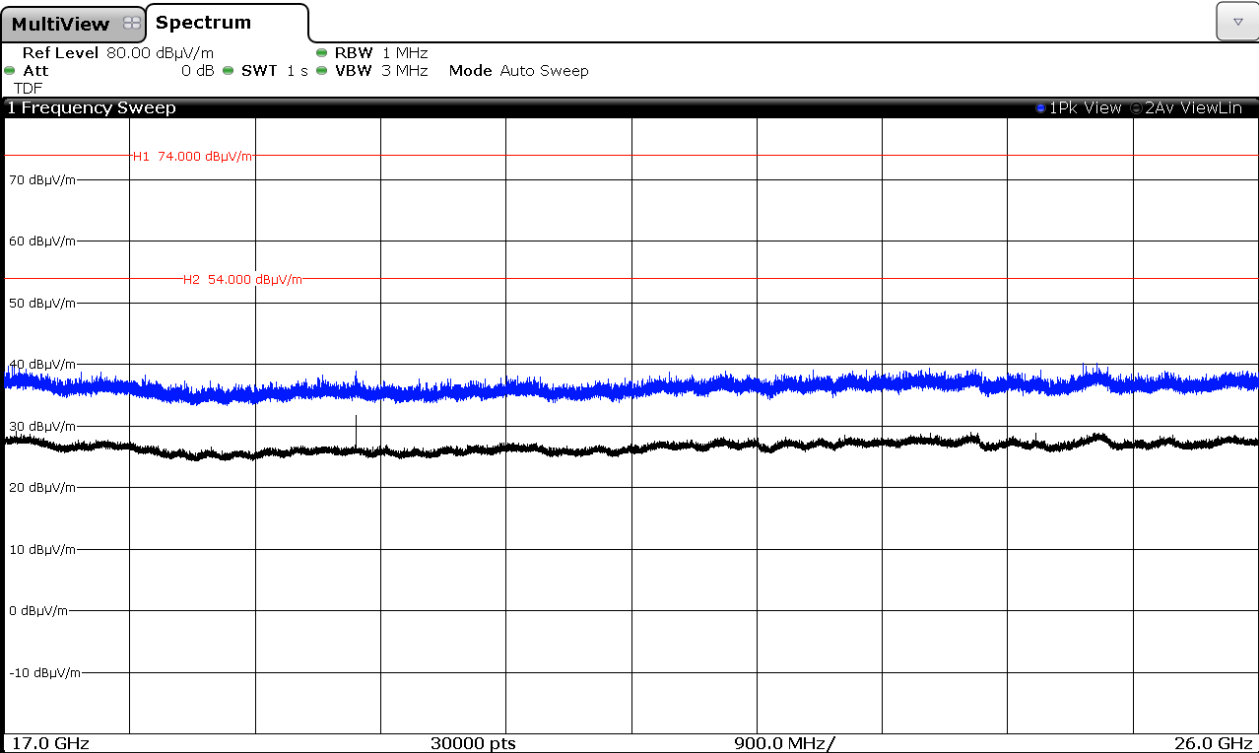


FREQUENCY RANGE 17 - 26 GHz

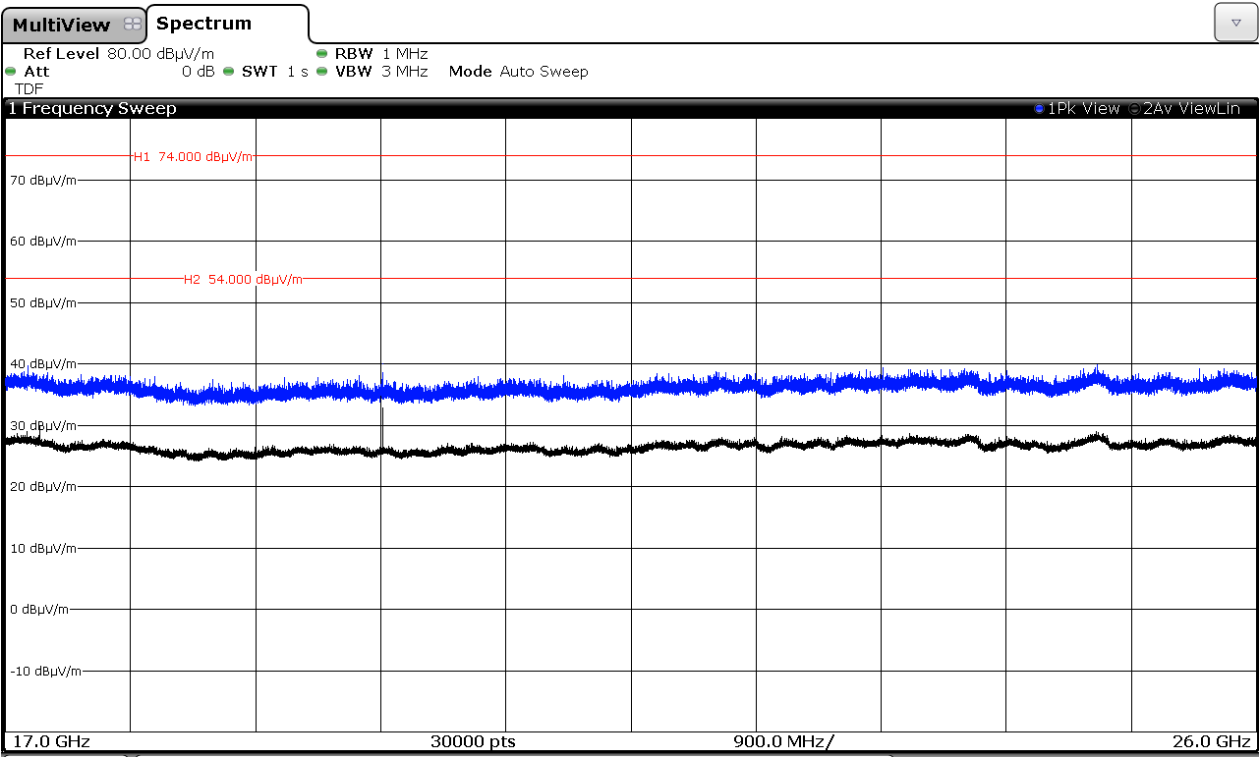
- Low Channel:



- Middle Channel:

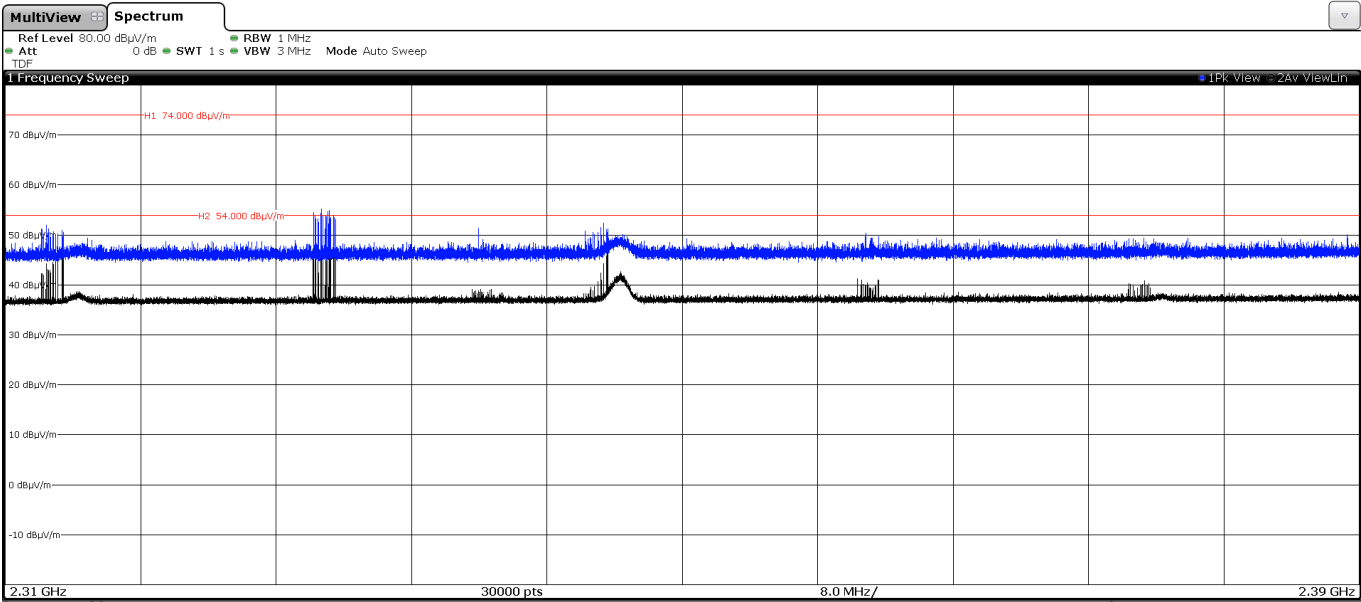


- High Channel:

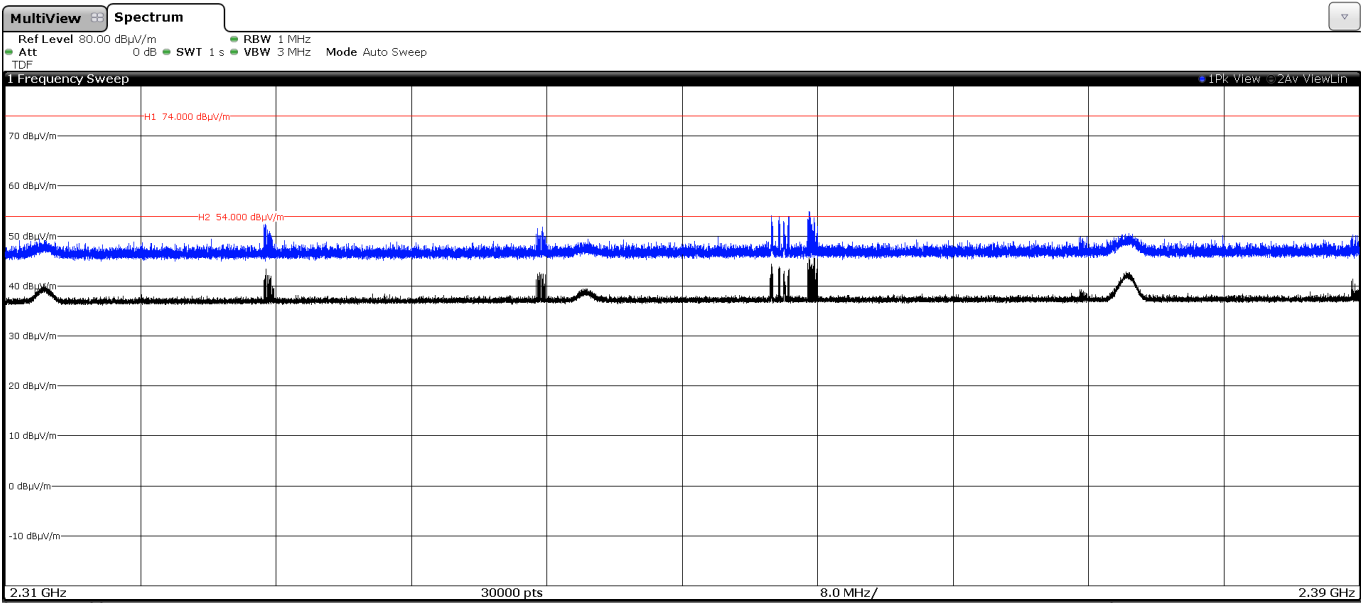


FREQUENCY RANGE 2.31 - 2.39 GHz. (RESTRICTED BAND 1)

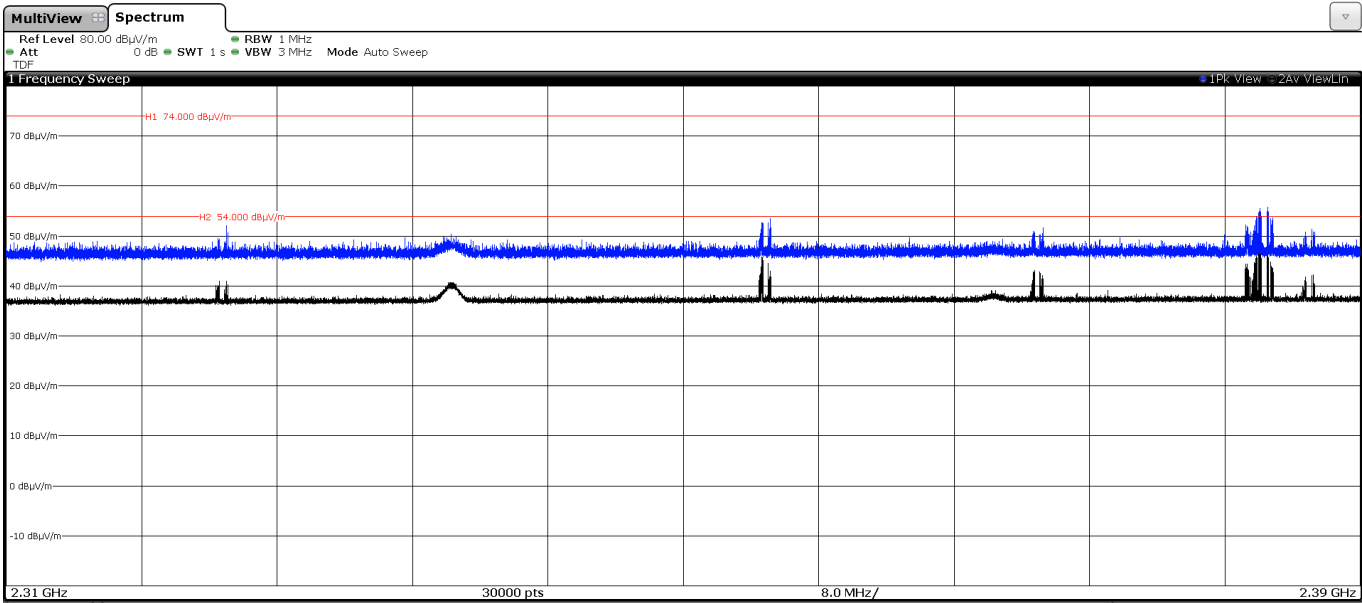
- Low Channel:



- Middle Channel:

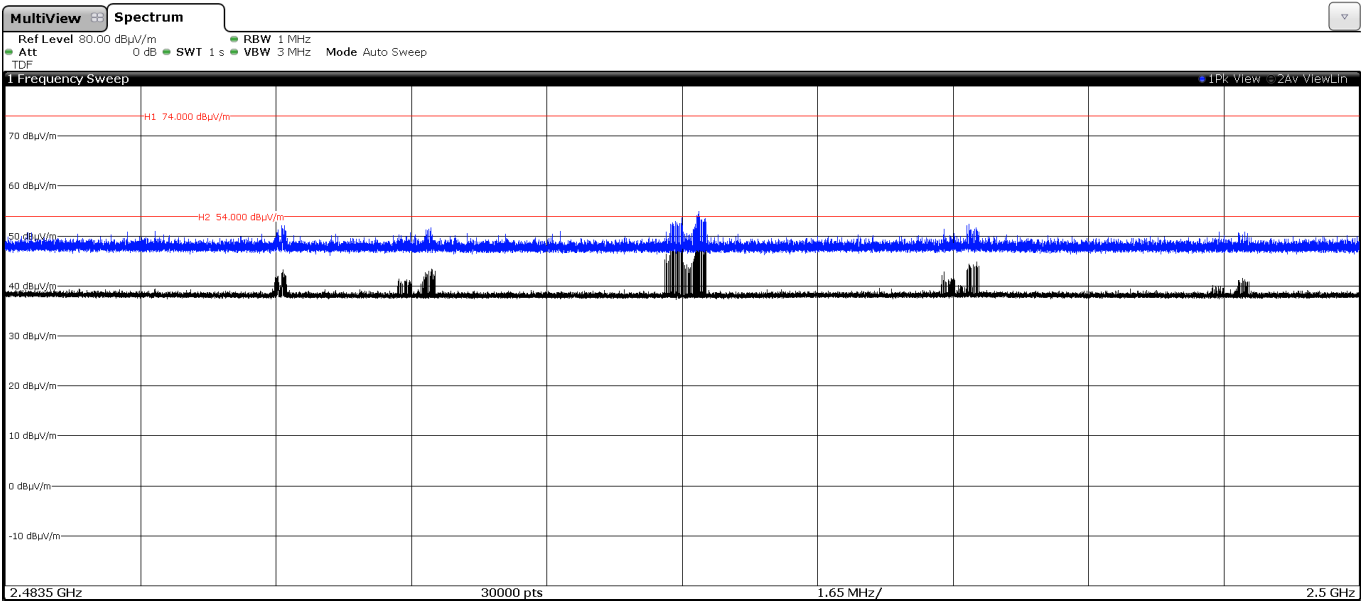


- High Channel:

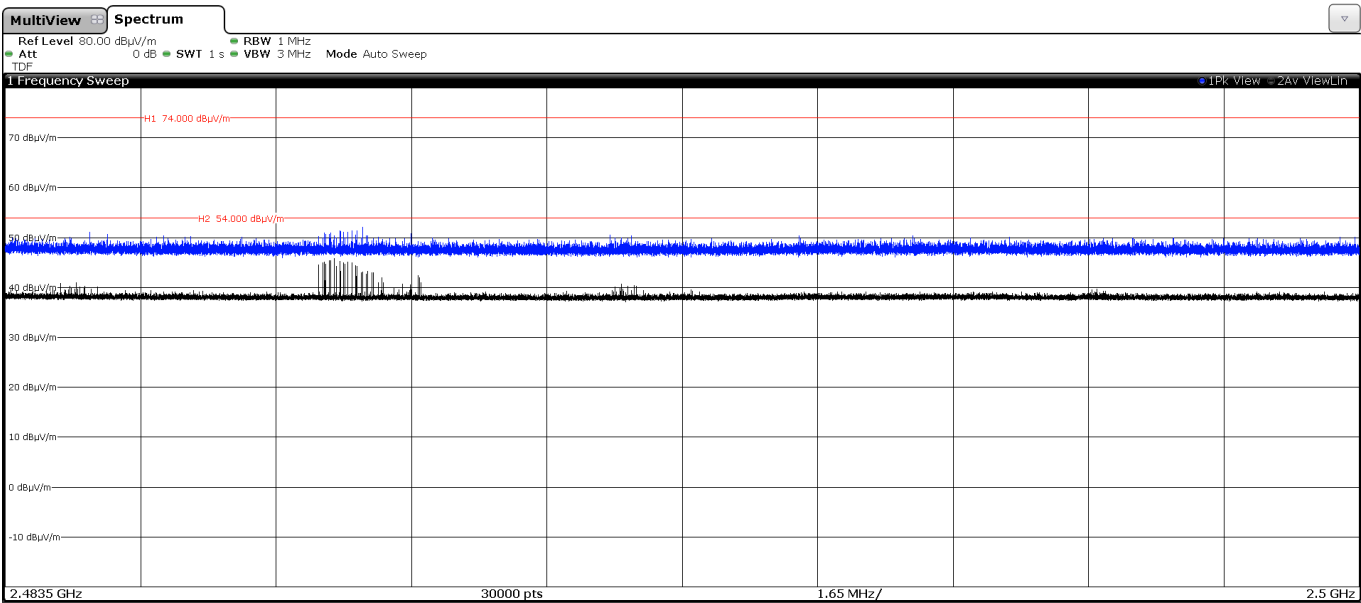


FREQUENCY RANGE 2.4835 - 2.5 GHz. (RESTRICTED BAND 2)

- Low Channel:



- Middle Channel:



- High Channel:

