



Test report No:
NIE: 65138RRF.001

Partial Test Report

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.

(*) Identification of item tested	Treon Gateway inside IP protected enclosure
(*) Trademark	TREON
(*) Model and /or type reference	Treon Gateway in protective enclosure, Model 1131
Other identification of the product	HW version: 0001 SW version: 5.8.0 FCC ID: 2AR86GW11 IC: 24716-GW11
(*) Features	GSM/NB-IOT/Cat M1, WLAN 2.4GHz b/g/n, Wirepas Mesh (BLE)
Applicant	TREON OY Visiokatu 3, 33720 Tampere, Finland
Test method requested, standard	USA FCC Part 15.247 (10-1-19) Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209 (10-1-19) Edition: Radiated emission limits; general requirements. CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 5 (March 2019). Guidance for Performing Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid Systems Devices Operating Under Section 15.247 of the FCC Rules. 558074 D01 Meas Guidance v05r02 dated April 2, 2019. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Approved by (name / position & signature)	José Carlos Luque RF Lab. Supervisor
Date of issue	2020-08-12
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.
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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 of the model Treon Gateway in protective enclosure, Model 1131 includes a Treon Gateway (Model 1111) which is placed inside a plastic IP67 enclosure to protect the gateway in challenging installation environments. Treon Gateway is a certified wireless gateway for Wirepas Mesh sensor networks. Through the Treon Gateway sensor data can be routed to backend systems via ethernet, WiFi or cellular data connection.

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 result.

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°	Date of reception
64587/001	Treon Gateway inside IP protected enclosure	Treon Gateway in protective enclosure, Model 1131	a87cc3ea	2020/05/19

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

Test sample description

Ports..... :	Port name and description	Cable				
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾	
	RJ45	<100	☐	☐	☐	
			☐	☐	☐	
Supplementary information to the	--					
Rated power supply	Voltage and Frequency		Reference poles			
			L1	L2	L3	N
	☒	AC: 100-240V 50/60Hz	☐	☐	☐	☐
☐	DC:					
Rated Power	--					
Clock frequencies..... :	1000MHz					
Other parameters	--					
Software version	5.8.0					
Hardware version	0001					
Dimensions in cm (W x H x D)	18 x 13 x 8,1					
Mounting position	☐	Table top equipment				
	☒	Wall/Ceiling mounted equipment				
	☐	Floor standing equipment				
	☐	Hand-held equipment				
	☐	Other:				

Modules/parts.....:	Module/parts of test item	Type	Manufacturer
	IRM-30-5ST	AC-DC Single output Encapsulated power supply	Mean Well
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

TREON OY

Visiokatu 3, 33720 Tampere, Finland

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2020-07-02
Date (finish)	2020-07-06

Document history

Report number	Date	Description
65138RRF.001	2020-08-12	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 %
Air pressure	Min. = 860 mbar
	Max. = 1060 mbar

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

Remarks and comments

The tests have been performed by the technical personnel: Cristina Calle, Pablo Redondo and José Gabriel Pendón.

Used instrumentation:

Radiated Measurements:

		Last Calibration	Due Calibration
1.	Semianechoic Absorber Lined Chamber ETS LINDGREN FACT 3 200 STP	N.A.	N.A.
2.	Shielded room ETS LINDGREN S101	N.A.	N.A.
3.	Biconical/Log Antenna ETS LINDGREN 3142E	2020/04	2023/04
4.	RF pre-amplifier 10 MHz-6 GHz Bonn Elektronik BLNA 0160-01N	2020/02	2021/02
5.	EMI Test Receiver ROHDE AND SCHWARZ ESR7	2019/10	2021/10
6.	Broadband Horn antenna 1-18 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9120 D	2019/11	2022/11
7.	RF pre-amplifier 1-18 GHz Bonn Elektronik BLMA 0118-1M	2020/05	2021/05
8.	Signal and Spectrum Analyzer ROHDE AND SCHWARZ FSV 40	2019/09	2021/09
9.	Broadband Horn antenna 18-40 GHz SCHWARZBECK BBHA 9170	2018/07	2021/07
10.	RF Pre-amplifier 30 dB, 18 GHz-40 GHz BONN ELEKTRONIK BLMA 1840-1M	2019/02	2021/02
11.	AC power supply ELGAR CS-AC35(351SL)	2019/09	2022/09
12.	Digital Multimeter FLUKE 175	2019/10	2020/10

Testing verdicts

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

Summary

1. WLAN 2.4 GHz (802.11 b/g/n20 1x1).

FCC PART 15 PARAGRAPH / RSS-247			
Requirement – Test case		Verdict	Remark
FCC 15.247 (a)(2) / RSS-247 5.2. (a)	6 dB Bandwidth	N/M	
FCC 15.247 (b) / RSS-247 5.4. (d)	Maximum output power and antenna gain	N/M	
FCC 15.247 (d) / RSS-247 5.5.	Band-edge emissions compliance (Transmitter)	N/M	
FCC 15.247 (e) / RSS-247 5.2. (b)	Power spectral density	N/M	
FCC 15.247 (d) / RSS-247 5.5.	Emission limitations radiated (Transmitter)	P	(1)
<u>Supplementary information and remarks:</u> (1) Only test requested.			

Appendix A: Test results. Wirepas Mesh (BLE)

TEST CONDITIONS.....	11
FCC 15.247 (d) / RSS-247 5.5. Emission limitations radiated (Transmitter).....	14

TEST CONDITIONS

POWER SUPPLY (V):

V nominal:	110 Vac.
Type of Power Supply:	AC voltage.

ANTENNA:

Type of Antenna:	Integral. pcb IFA
Maximum Declared Antenna Gain:	+1.59 dBi.

TEST FREQUENCIES:

Low Channel (1):	2402 MHz
Middle Channel (6):	2440 MHz
High Channel (11):	2480 MHz

RADIATED MEASUREMENTS:

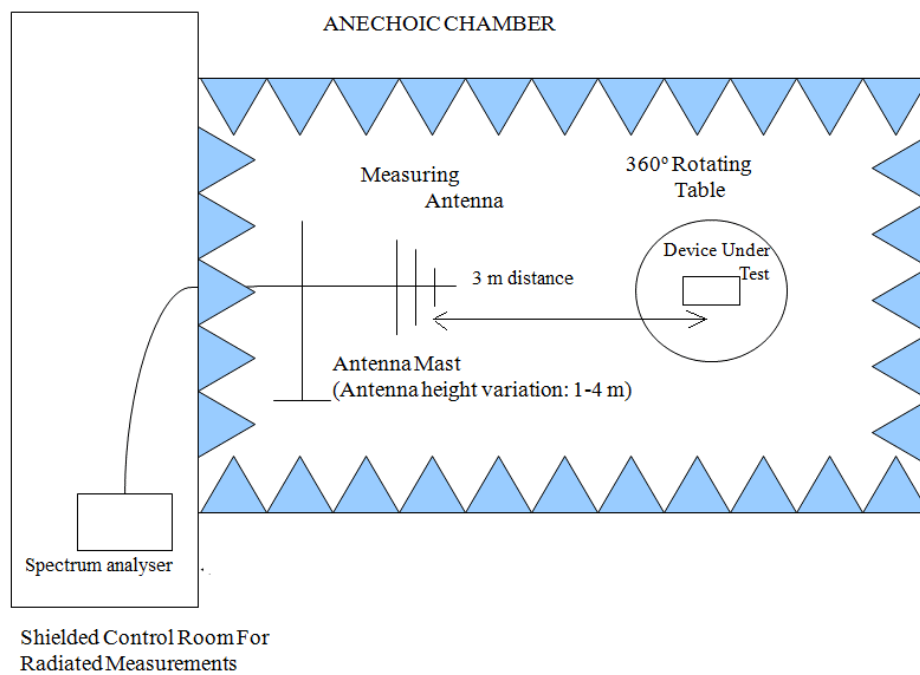
All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1000 MHz and Double ridge horn antenna for the range between 1 GHz-17 GHz) is situated at a distance of 3 m and at a distance of 1m for the frequency range 17 GHz-26 GHz (17 GHz-40 GHz horn antenna).

For radiated emissions in the range 17 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.

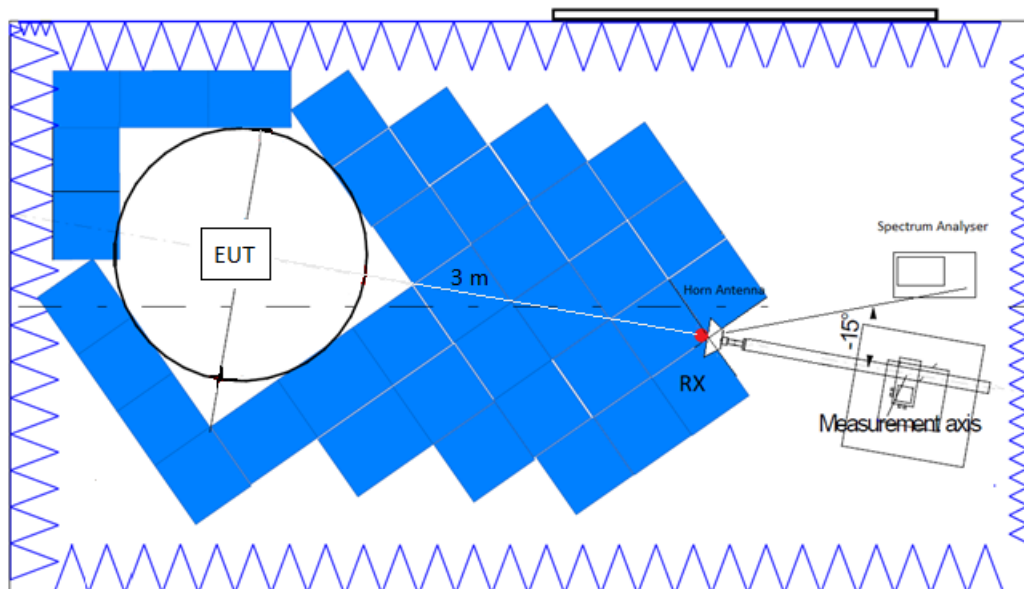
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find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

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

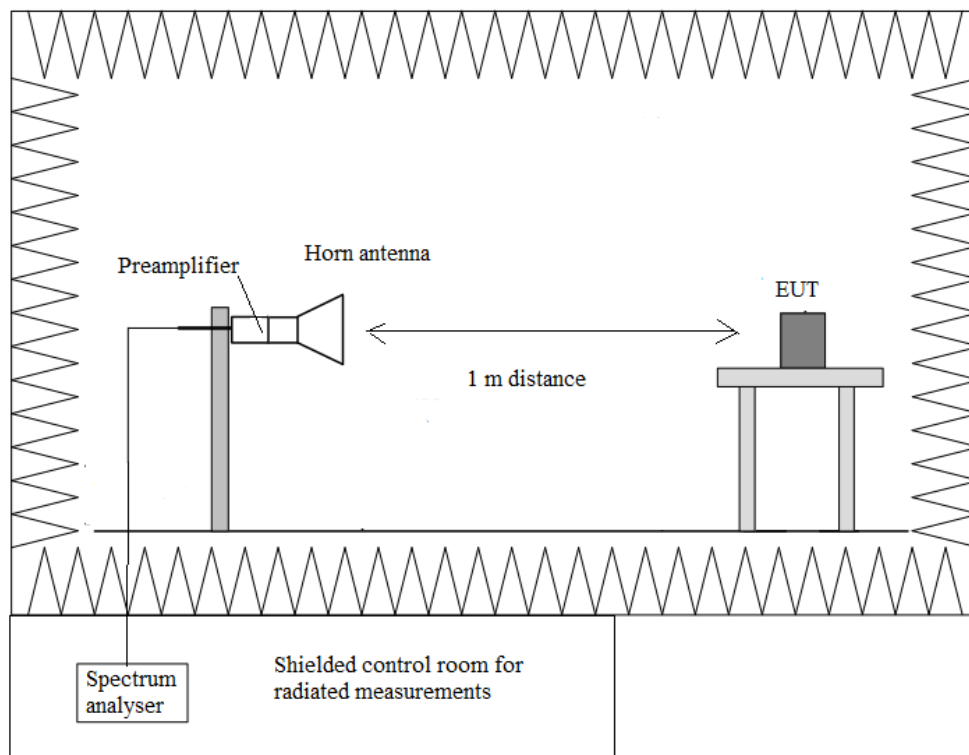
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup $f > 17$ GHz:



FCC 15.247 (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):

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(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 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-17 GHz and at distance of 1m for the frequency range 17 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:

- **LOW CHANNEL.** Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBμV/m)	Limit (dBμV/m)	Polarization	Detector	Measurement Uncertainty (dB)
37.259	21.6	40	V	Quasi peak	<± 4.99
171.184	34.7	43.5	V	Quasi peak	<± 4.99
177.101	29.4	43.5	H	Quasi peak	<± 4.99
240.474	27.7	46	V	Quasi peak	<± 4.99

- **MIDDLE CHANNEL.** Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBμV/m)	Limit (dBμV/m)	Polarization	Detector	Measurement Uncertainty (dB)
37.388	22.9	40	V	Quasi peak	<± 4.99
63.449	20.1	40	V	Quasi peak	<± 4.99
170.602	35.9	43.5	V	Quasi peak	<± 4.99
176.713	31	43.5	H	Quasi peak	<± 4.99
222.594	27.9	46	H	Quasi peak	<± 4.99

- **HIGH CHANNEL.** Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBμV/m)	Limit (dBμV/m)	Polarization	Detector	Measurement Uncertainty (dB)
37.356	23.1	40	V	Quasi peak	<± 4.99
63.708	22.2	40	V	Quasi peak	<± 4.99
116.411	20.3	43.5	H	Quasi peak	<± 4.99
138.689	20	43.5	H	Quasi peak	<± 4.99
170.602	39.9	43.5	V	Quasi peak	<± 4.99
177.456	34.4	43.5	H	Quasi peak	<± 4.99
239.763	25.2	46	V	Quasi peak	<± 4.99

Verdict: PASS

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.

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.

- LOW CHANNEL. Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (GHz)	Detector	Emission Level (dBμV/m)	Polarization	Measurement Uncertainty (dB)
2.337788	Peak	45.52	V	<± 4.98
2.795833	Peak	47.97	H	<± 4.98
3.5994	Peak	47.52	H	<± 4.98
10.79403	Peak	51.24	H	<± 4.98
11.2649	Peak	51.1	V	<± 4.98
14.80597	Peak	51.77	H	<± 4.98

- MIDDLE CHANNEL. Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (GHz)	Detector	Emission Level (dBμV/m)	Polarization	Measurement Uncertainty (dB)
2.3758787	Peak	46.3	V	<± 4.98
2.48754993	Peak	47.71	V	<± 4.98
2.584233	Peak	50.04	V	<± 4.98
2.798167	Peak	49.99	H	<± 4.98
3.6022	Peak	45.64	H	<± 4.98
10.71377	Peak	50.64	V	<± 4.98
11.2005	Peak	50.89	H	<± 4.98
14.65103	Peak	51.66	H	<± 4.98

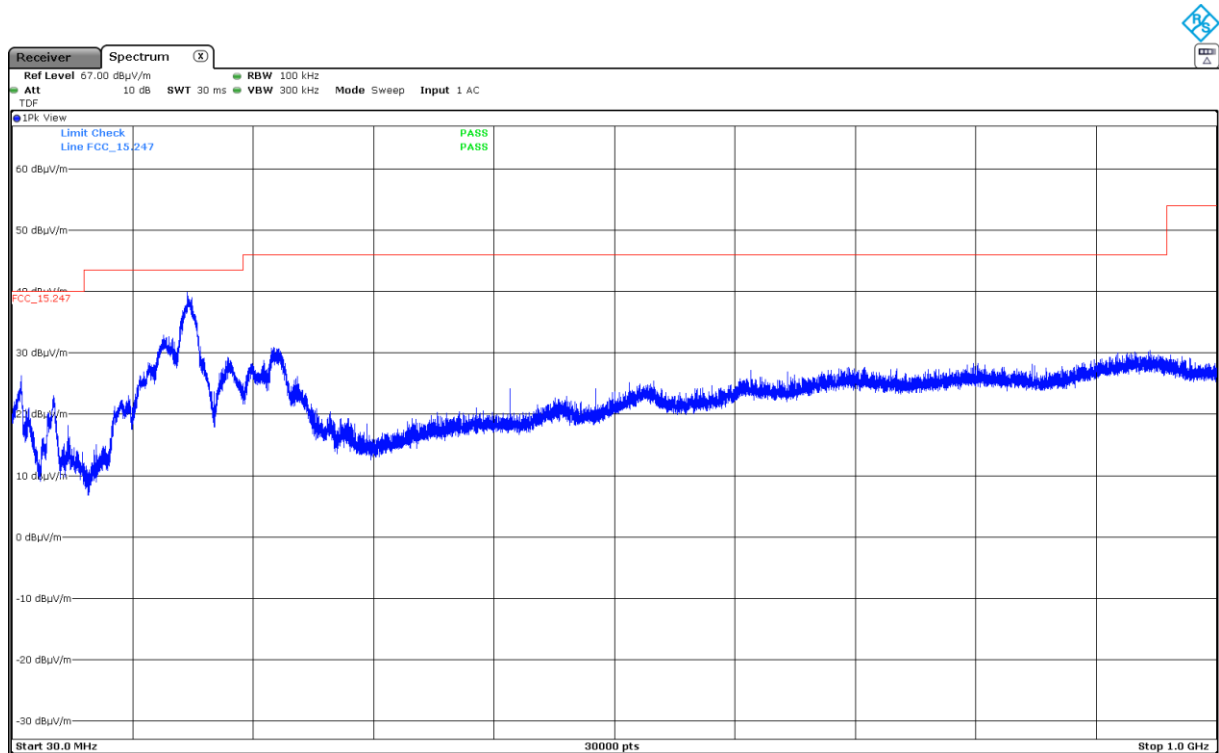
- HIGH CHANNEL. Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (GHz)	Detector	Emission Level (dBμV/m)	Polarization	Measurement Uncertainty (dB)
2.3357	Peak	49.05	V	<± 4.98
2.36967	Peak	49.88	H	<± 4.98
2.48351238	Peak	62.2	H	<± 4.98
	Average	39.15		<± 4.98
3.6055	Peak	47.8	V	<± 4.98
10.90463	Peak	51.38	V	<± 4.98
14.642	Peak	53.12	V	<± 4.98

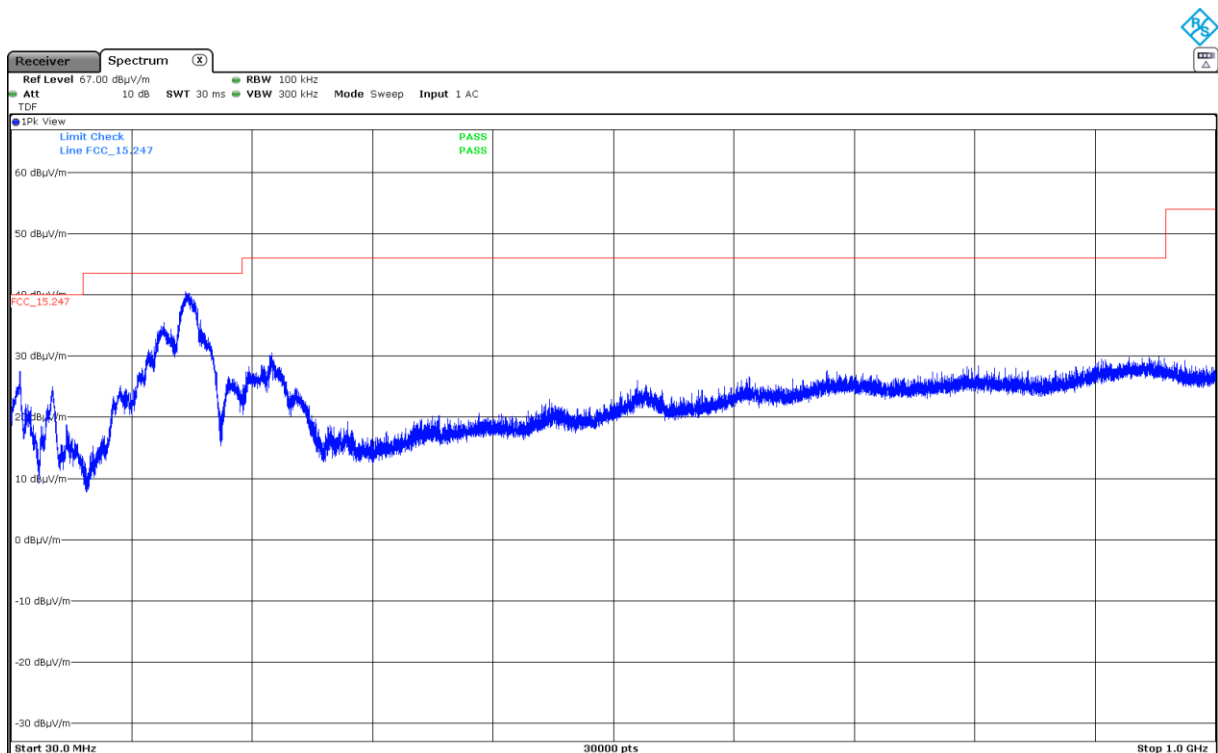
Verdict: PASS

FREQUENCY RANGE 30 MHz - 1 GHz:

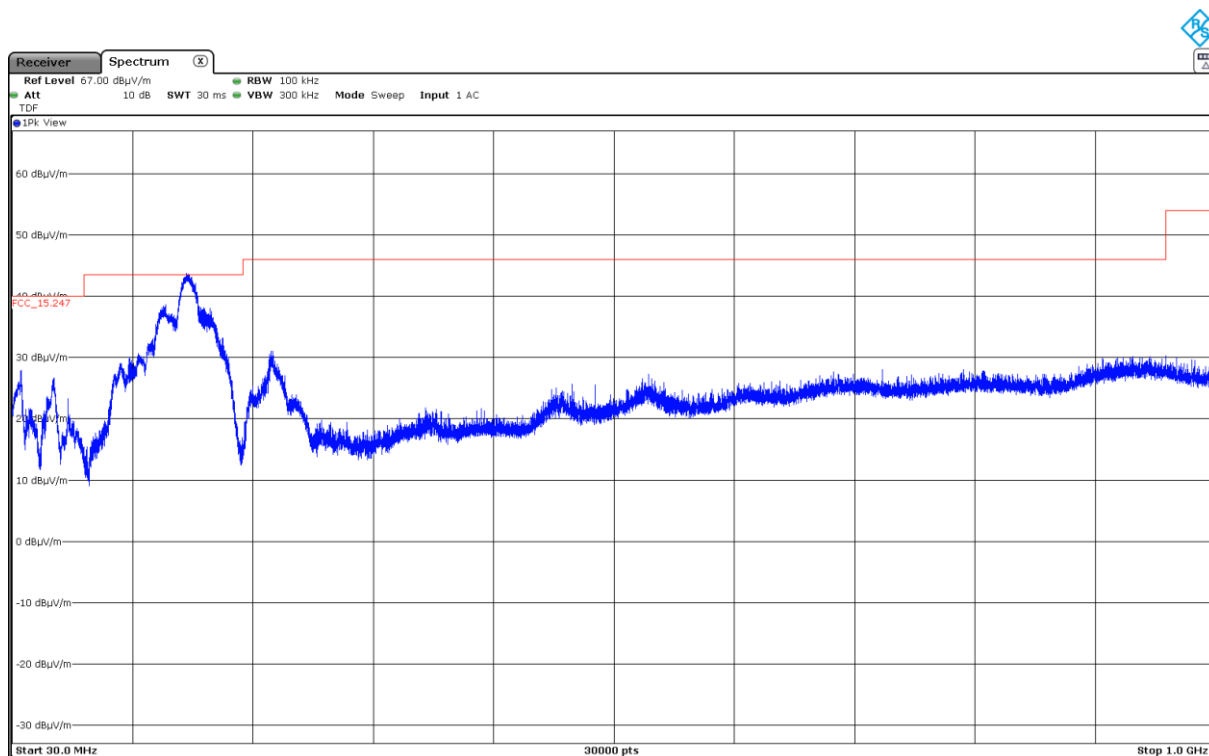
- Low Channel:



- Middle Channel:

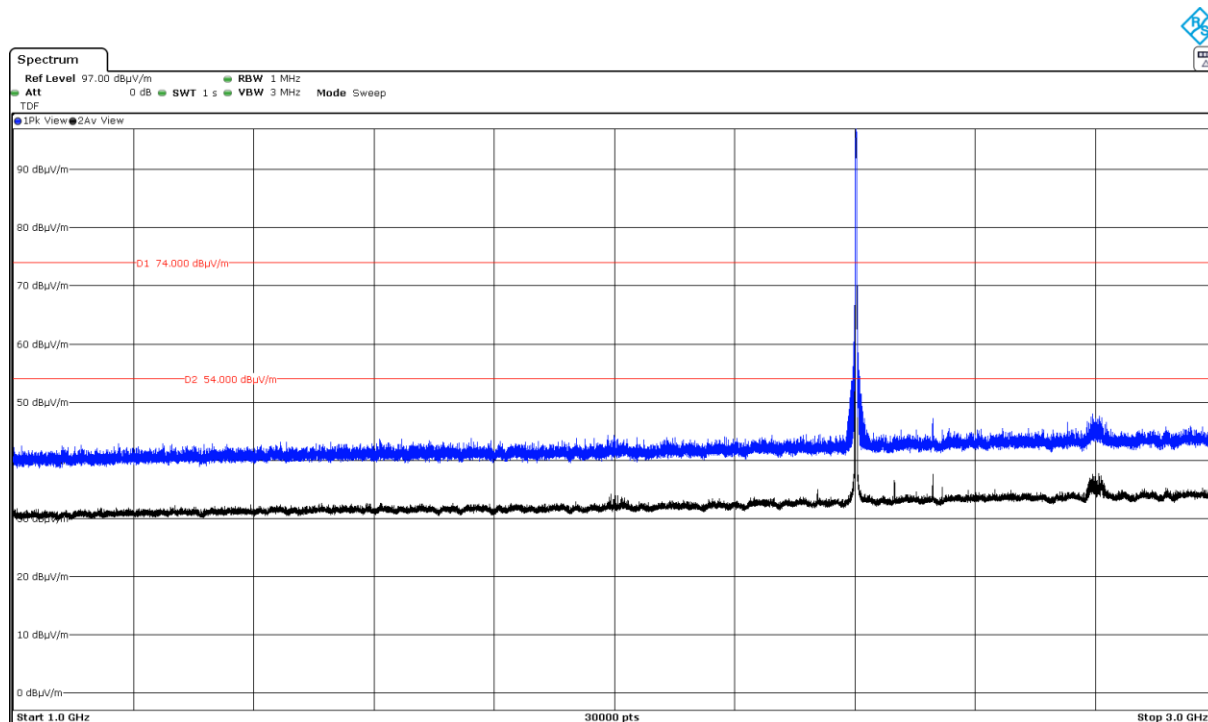


- High Channel:



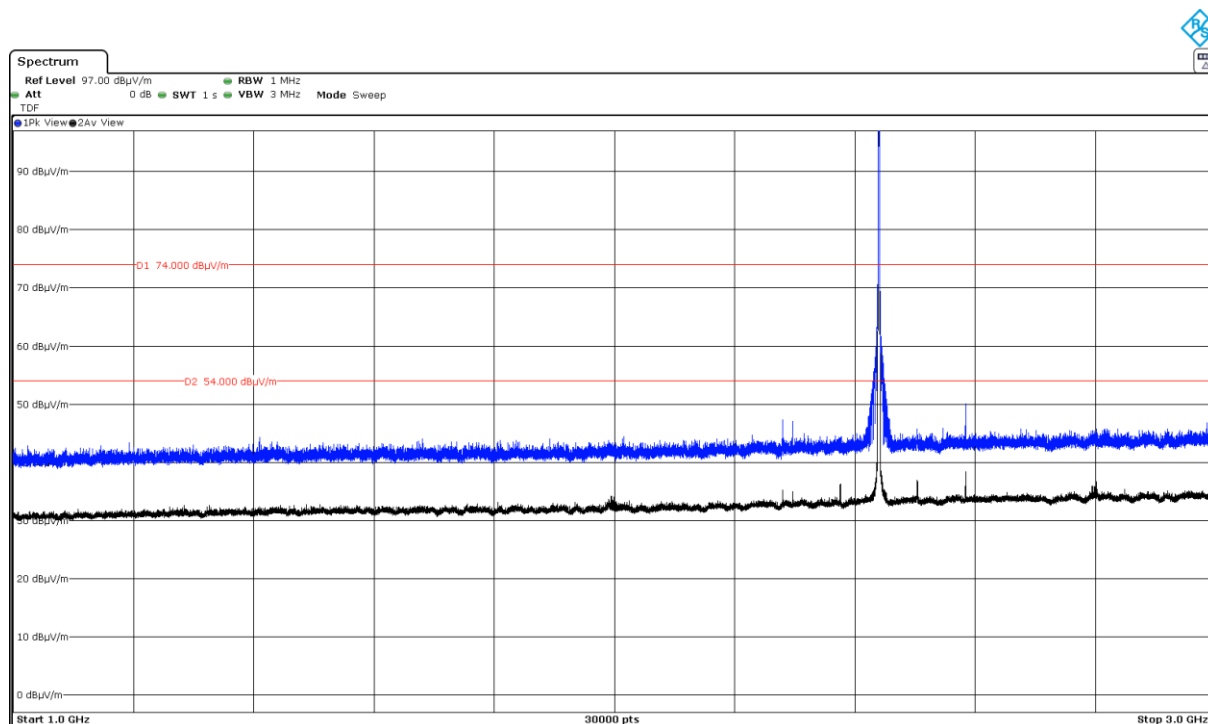
FREQUENCY RANGE 1 - 3 GHz:

- Low Channel:



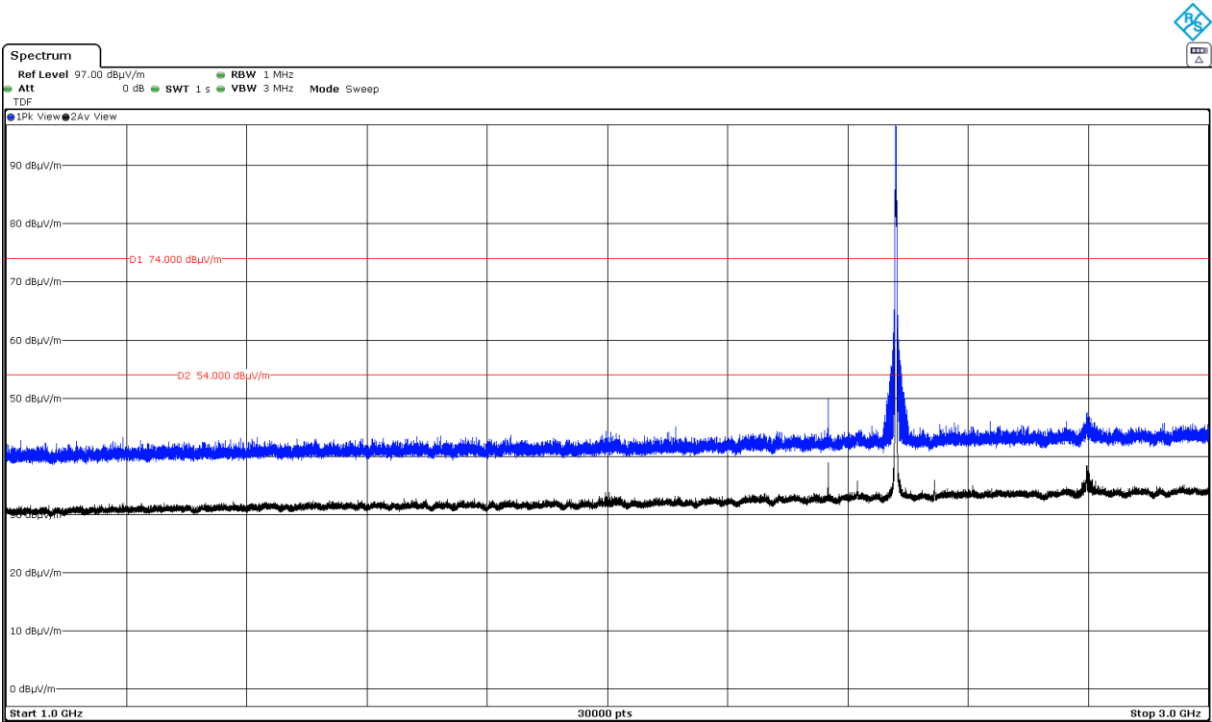
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

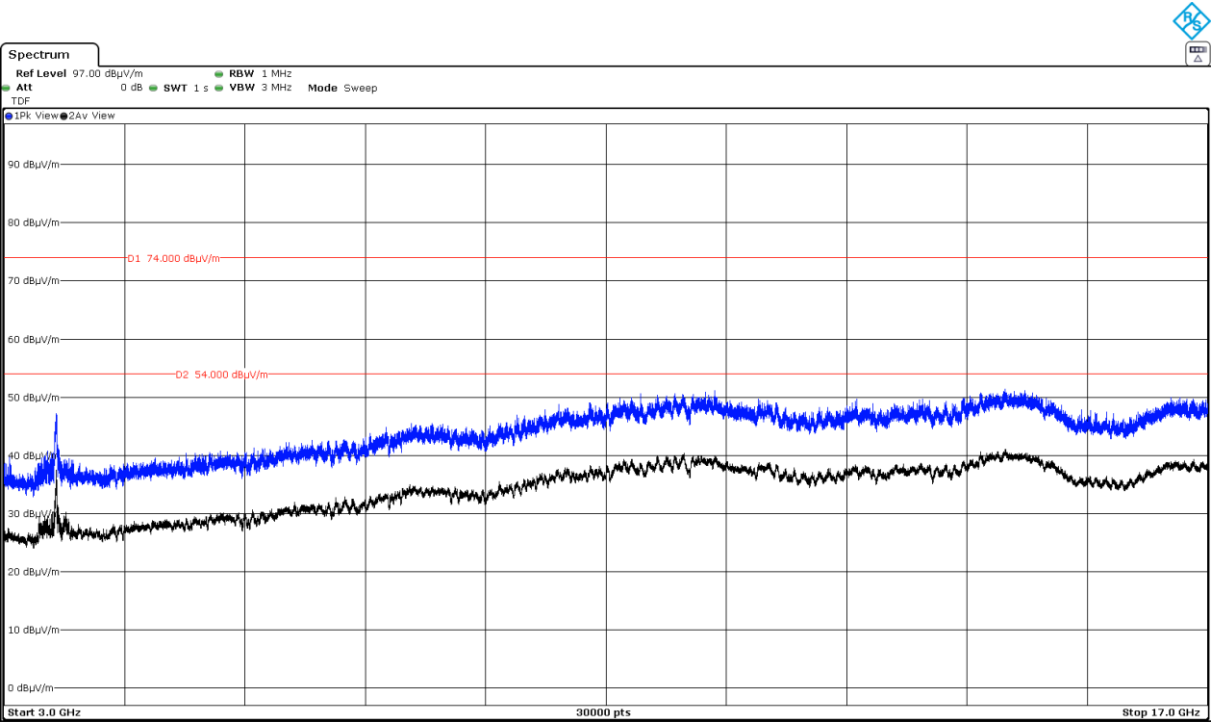
- High Channel:



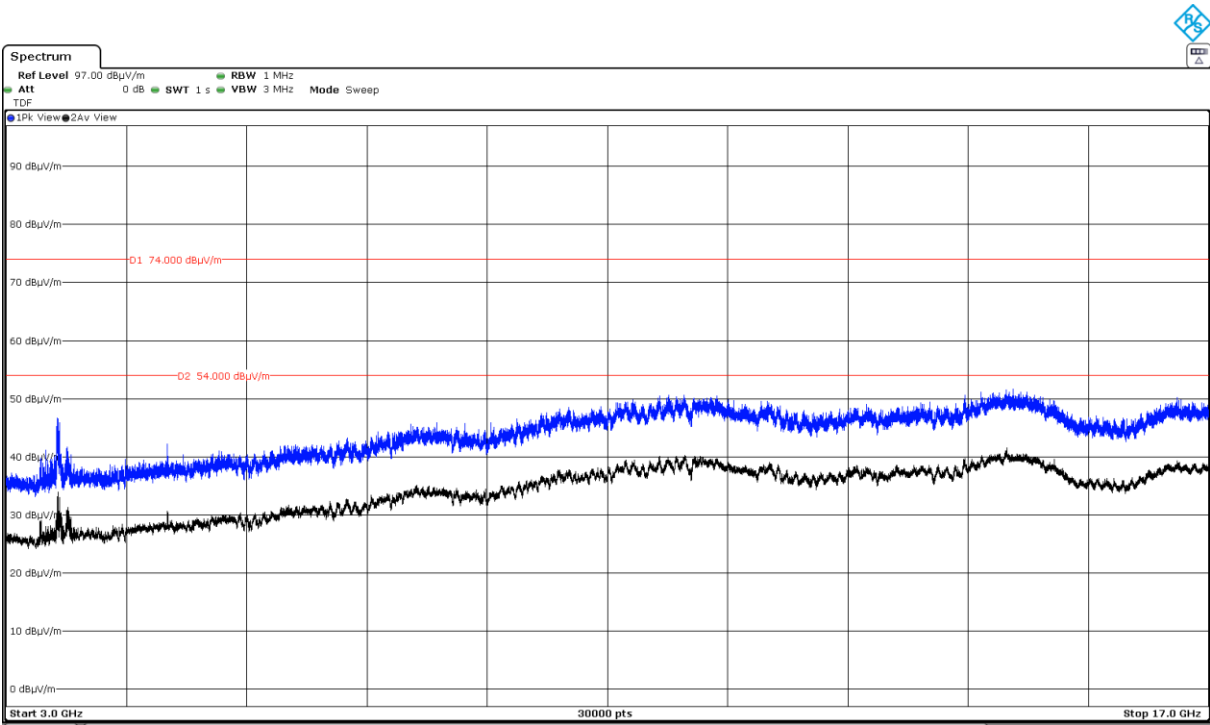
The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 - 17 GHz:

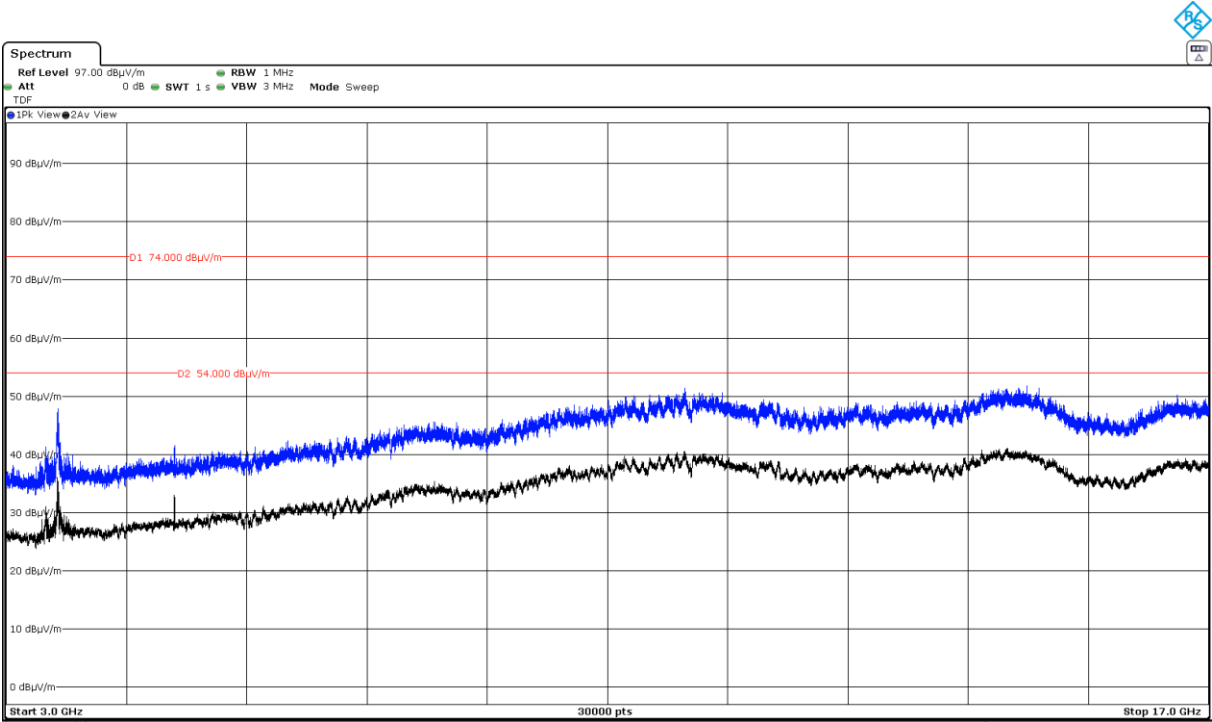
- Low Channel:



- Middle Channel:

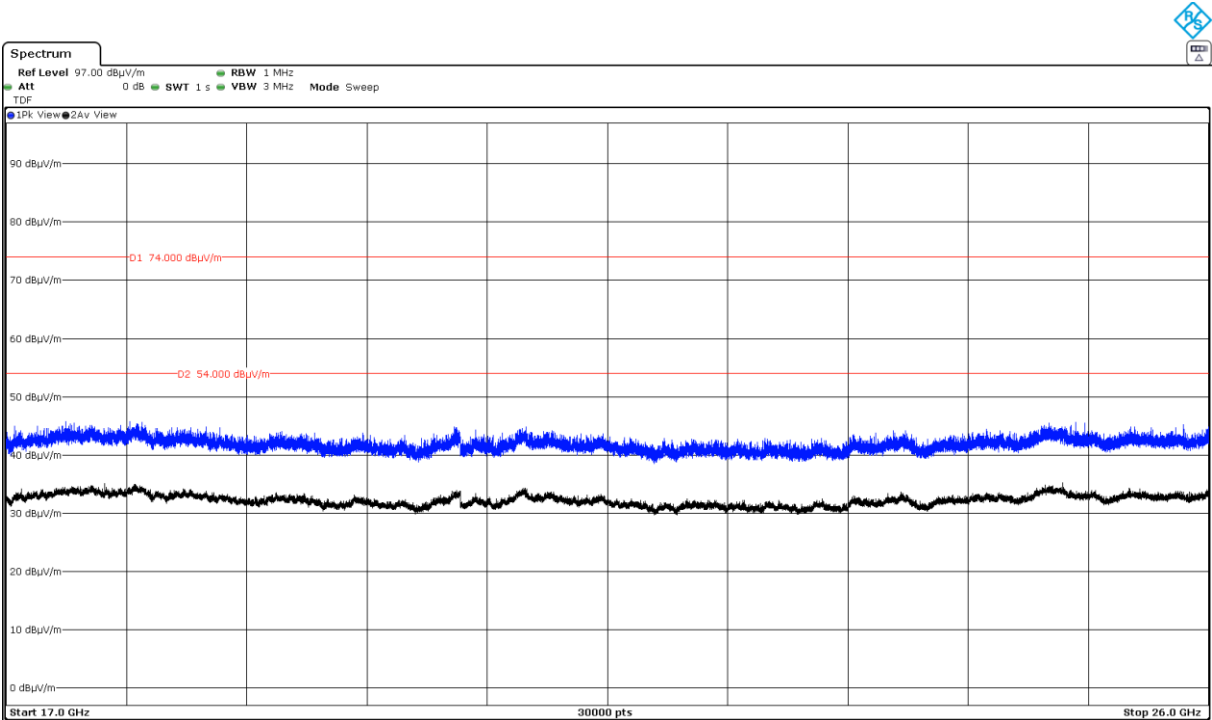


- High Channel:



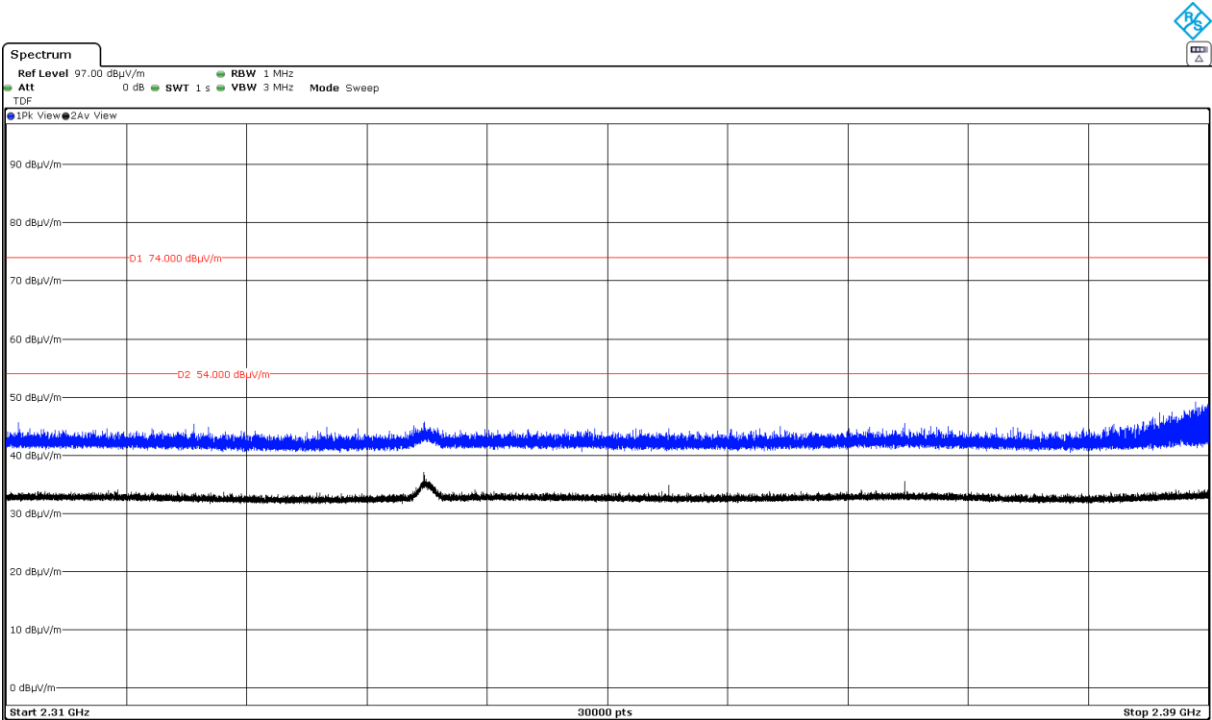
FREQUENCY RANGE 17 - 26 GHz:

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



RESTRICTED BAND 2.31-2.39 GHz:

- Low Channel:



RESTRICTED BAND 2.4835-2.5 GHz:

- High Channel:

