1279 Quarry Lane, Ste. A, Pleasanton, CA 95466
Tel: (925) 249-9123, Fax: (925) 249-9124

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Emissions Test Report

EUT Name: Freestyle Libre 2 Reader

Model No.: Freestyle Libre 2

CFR 47 Part 15.247: 2017, RSS 247 Issue 2, 2017

Prepared for:

Client	Abbott Diabetes Care
Address	1360 South Loop Road
Address	Alameda, CA 94502
Contact Person	Richard Ries
e-mail	Richard.ries@abbott.com

Prepared by:

TUV Rheinland of North America, Inc.
1279 Quarry Lane, Ste. A
Pleasanton, CA 94566 U.S.A.
Tel: (925) 249-9123
Fax: (925) 249-9124
http://www.tuv.com/

1279 Quarry Lane, Ste. A, Pleasanton, CA 95466
Tel: (925) 249-9123, Fax: (925) 249-9124

Revisions

Revision No.	Date MM/DD/YYYY	Reason for Change	Author
1	07/31/2018	Initial	D. Foster
2	08/14/2018	Add data and photos	D. Foster
3	08/29/2018	Make corrections per review	D. Foster
4	12/06/2018	Add reader to cover	D. Foster
5	12/11/2018	Add ID's FCC and IC	D. Foster
6	2/26/2021	Model name: Freestyle Libre 2	RD

Note: Latest revision report will replace all previous reports.

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Report# 31863002.001

Statement of compliance

Manufacturer: Abbott Diabetes Care
Requester / Applicant: Richard Ries
Name of Equipment: Freestyle Libre 2
Model No. 22175
Type of Equipment: Patch reader
Application of Regulations: CFR47 part 15.247:2018 and RSS247: 2017
Test Dates: 07/27/2018, 8/19/20

Guidance Documents:

Emissions: ANSI C63.10-2013 CFR47 part 15.247:2018 and RSS247: 2017

Test Methods:

Emissions:

The electromagnetic compatibility test and documented data described in this report has been performed and recorded by TUV Rheinland, in accordance with the standards and procedures listed herein. As the responsible authorized agent of the EMC laboratory, I hereby declare that the equipment described above has been shown to be compliant with the EMC requirements of the stated regulations and standards based on these results. If any special accessories and/or modifications were required for compliance, they are listed in the of this report.

This report must not be used to claim product endorsement by A2LA or any agency of the U.S. Government. This report shall not be reproduced except in full, without the written authorization of TUV Rheinland of North America.

Rachana Khanduri	February 26, 2021	Richard Decker	February 26, 2021
Test Engineer	Date	Laboratory Signature	Date

Testing Cert #3331.02 US1131 2932M-1

1 Executive Summary

1.1 Scope

The purpose of the following report is to demonstrate compliance of the Freestyle Libre 2 to the various regulatory requirements further listed in this Report.

It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. Test data was verified before latest revision. All documentation will be included as a supplement.

1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report.

1.3 Summary of Test Results

Table 1: Summary of Test Results

Test	Test Method	Test Parameters	Result
Duty Cycle	CFR 47 Part 15.247: 2018, RSS 247 Issue 2, 2017	Limits	**Pass**
Occupied Bandwidth	CFR 47 Part 15.247: 2018, RSS 247 Issue 2, 2017	Limits	**Pass**
Output power	CFR 47 Part 15.247: 2018, RSS 247 Issue 2, 2017	Limits	**Pass**
PSD	CFR 47 Part 15.247: 2018, RSS 247 Issue 2, 2017	Limits	**Pass**
Non-restricted band emissions	CFR 47 Part 15.247: 2018, RSS 247 Issue 2, 2017	Limits	**Pass**
Restricted band edge	CFR 47 Part 15.247: 2018, RSS 247 Issue 2, 2017	Limits	**Pass**
Restricted band emissions	CFR 47 Part 15.247: 2018, RSS 247 Issue 2, 2017	Limits	**Pass**
AC conducted emissions	CFR 47 Part 15.207: 2018, RSS Gen	Limits	**Pass**

Note:

1.4 Special Accessories

No special accessories were necessary in order to achieve compliance.

1.5 Equipment Modifications

None

2 Laboratory Information

2.1 Accreditations & Endorsements

2.1.1 US Federal Communications Commission

TUV Rheinland of North America at 1279 Quarry Ln, Pleasanton, CA 94566 is recognized by the commission for performing testing services for the general public on a fee basis. These laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (US1131). The laboratory scope of accreditation includes: Title 47 CFR Parts 15, 18, and 90. The accreditation is updated every 3 years.

2.1.2 NIST / A2LA

TUV Rheinland of North America is accredited by the National Voluntary Laboratory Accreditation Program, which is administered under the auspices of the National Institute of Standards and Technology. The laboratory has been assessed and accredited in accordance with ISO Guide 17025:2005 and ISO 9002 (Lab Code 3331.02). The scope of laboratory accreditation includes emission and immunity testing. The accreditation is updated annually.

2.1.3 Canada – Industry Canada

TUV Rheinland of North America at the 1279 Quarry Ln, Pleasanton, CA 94566 address is accredited by Industry Canada for performing testing services for the general public on a fee basis. This laboratory test facilities have been fully described in reports submitted to and accepted by Industry Canada (File Number 2932M). The accreditation is updated every 3 years.

2.1.4 Japan – VCCI

The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) is a group that consists of Information Technology Equipment (ITE) manufacturers and EMC test laboratories. The purpose of the Council is to take voluntary control measures against electromagnetic interference from Information Technology Equipment, and thereby contribute to the development of a socially beneficial and responsible state of affairs in the realm of Information Technology Equipment in Japan. TUV Rheinland of North America at 1279 Quarry Ln, Pleasanton, CA 94566 has been assessed and approved in accordance with the Regulations for Voluntary Control Measures.

VCCI Registration No. for Pleasanton: A-0268

2.1.5 Acceptance by Mutual Recognition Arrangement

The United States has an established agreement with specific countries under the Asia Pacific Laboratory Accreditation Corporation (APLAC) Mutual Recognition Arrangement. Under this agreement, all TUV Rheinland at 1279 Quarry Ln, Pleasanton, CA 94566 test results and test reports within the scope of the laboratory NIST / A2LA accreditation will be accepted by each member country.

2.2 Test Facilities

All of the test facilities are located at 1279 Quarry Lane, Pleasanton, California 94566, USA.

2.2.1 Emission Test Facility

The Semi-Anechoic chamber and AC Line Conducted measurement facility used to collect the radiated and conducted data has been constructed in accordance with ANSI C63.7:1992. The site has been measured in accordance with and verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2014, at a test distance of 3 and 5 meters. The site is listed with the FCC and accredited by A2LA (Lab Code 3331.02). The 3/5-meter semi-anechoic chamber used to collect the radiated data has been verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2014, at a test distance of 3 meter and 5 meters. A report detailing this site can be obtained from TUV Rheinland of North America.

2.3 Measurement Uncertainty

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1st Edition, 1995.

The Combined Standard Uncertainty is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities; it is equal to the positive square root of the sum of the variances or co-variances of these other quantities, weighted according to how the measurement result varies with changes in these quantities. The term *standard uncertainty* is the result of a measurement expressed as a standard deviation.

2.3.1 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

Field Strength (dBµV/m) = RAW - AMP + CBL + ACF

Where: RAW = Measured level before correction (dBµV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu V/m = 10^{\frac{dB\mu V/m}{20}}$$

Sample radiated emissions calculation @ 30 MHz

Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)

25 dBuV/m + 17.5 dB – 20 dB + 1.0 dB = 23.5 dBuV/m

2.3.2 Measurement Uncertainty Emissions

Per CISPR 16-4-2	**U_{lab}**	**U_{cispr}**
Radiated Disturbance @ 10 meters		
30 – 1,000 MHz	2.25 dB	4.51 dB
Radiated Disturbance @ 3 meters		
30 – 1,000 MHz	2.26 dB	4.52 dB
1 – 6 GHz	2.12 dB	4.25 dB
6 – 18 GHz	2.47 dB	4.93 dB
Conducted Disturbance @ Mains Terminals		
150 kHz – 30 MHz	1.09 dB	2.18 dB
Disturbance Power		
30 MHz– 300 MHz	3.92 dB	4.3 dB

Measurement Uncertainty – Radio Testing

The estimated combined standard uncertainty for frequency error measurements is ± 3.88 Hz
The estimated combined standard uncertainty for carrier power measurements is ± 0.7 dB.
The estimated combined standard uncertainty for adjacent channel power measurements is ± 1.47 dB.
The estimated combined standard uncertainty for modulation frequency response measurements is ± 0.46 dB.
The estimated combined standard uncertainty for transmitter conducted emission measurements is ± 2.06 dB

The expanded uncertainty at a level of 95% confidence is obtained by multiplying the combined standard uncertainty by a coverage factor of 2. Compliance criteria are not based on measurement uncertainty.

2.3.3 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2005.

3 Product Information

3.1 Product Description

The Glucose Monitoring System E is a unique sensor-based system that has two main parts: a disposable glucose Sensor, which is worn on your body, and the Reader, a handheld device that displays information from the Sensor. The Reader is used to wirelessly scan the Sensor to gather glucose readings. The Reader also receives glucose information for the Sensor via BLE.

3.2 Equipment Configuration

A description of the equipment configuration is given in the Test Plan Section. The EUT was tested as called for in the test standard and was configured and operated in a manner consistent with its intended use. The EUT was controlled from the support laptop used to configure the various modes of operation. The placement of the EUT system components was guided by the test standard and selected to represent typical installation conditions.

3.3 Operating Mode

A description of the operation mode is given in the Test Plan Section.

The final operating mode was selected to produce the worst case radiation for emissions testing.

3.4 Unique Antenna Connector

The Freestyle Libre 2 has an internal fixed antenna which is not removable.

4 Duty Cycle

Test Method

The ANSI C63.10-2013 Section 11.6 Conducted method was used to measure the duty cycle. The preliminary investigation was not necessary to determine the highest power output for each mode the unit has only one mode and one power level. The system was powered on and port 1 connected to the Spectrum analyzer. A diag program was used to set the AP in continuous Tx mode and also to set the channel, channel power and data rate. This test was conducted on 3 channels. The analyzer was configured as follows.

Cable loss was entered as an offset

RBW=8MHz

VBW= 50MHz

Span = 0Hz

Reference level= as needed to maintain headroom

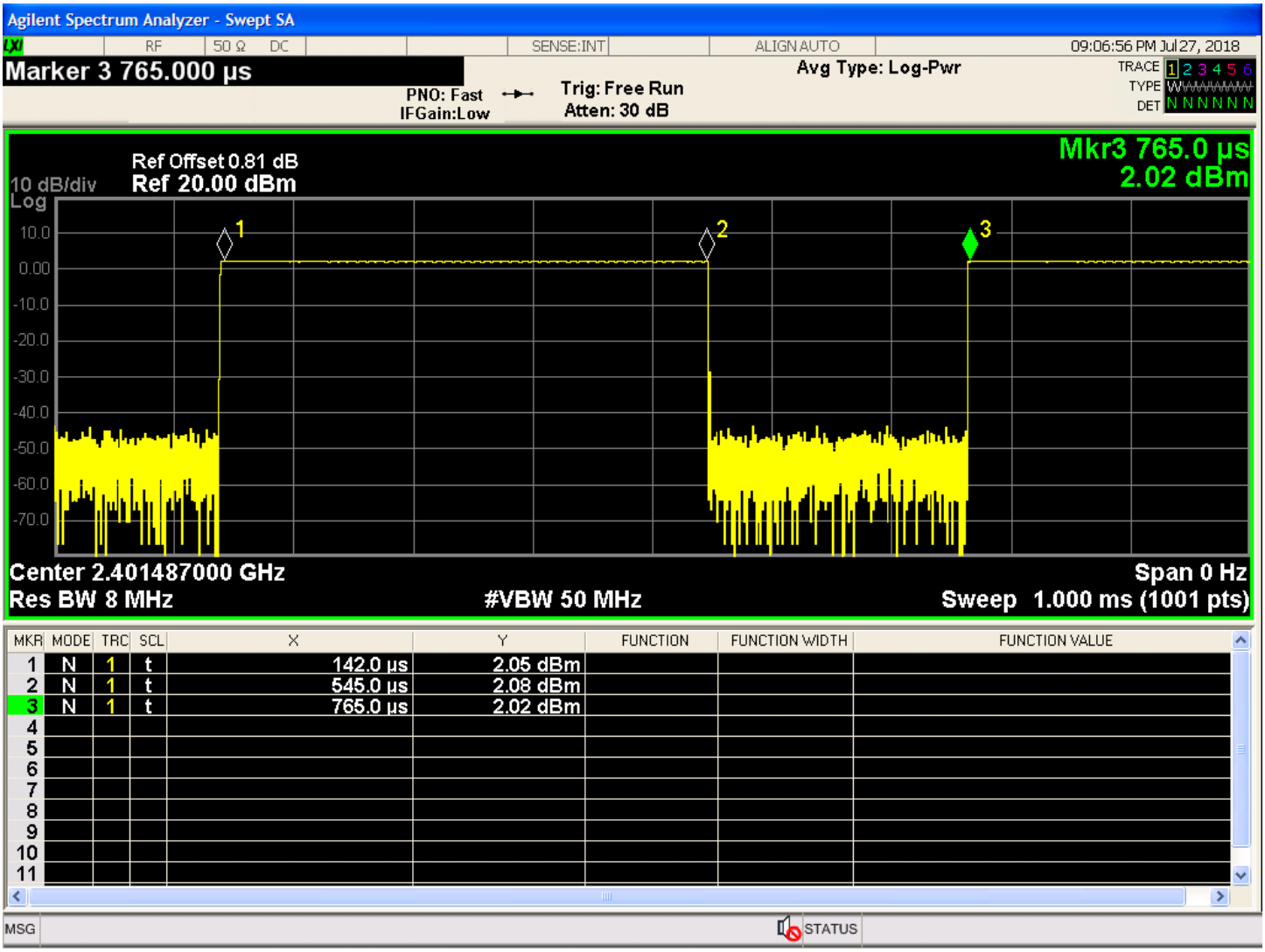
SWT= 5ms adjusted as needed to capture approx. 1.5 cycles

The off time and cycle time were captured using the marker functions and the duty cycle calculated.

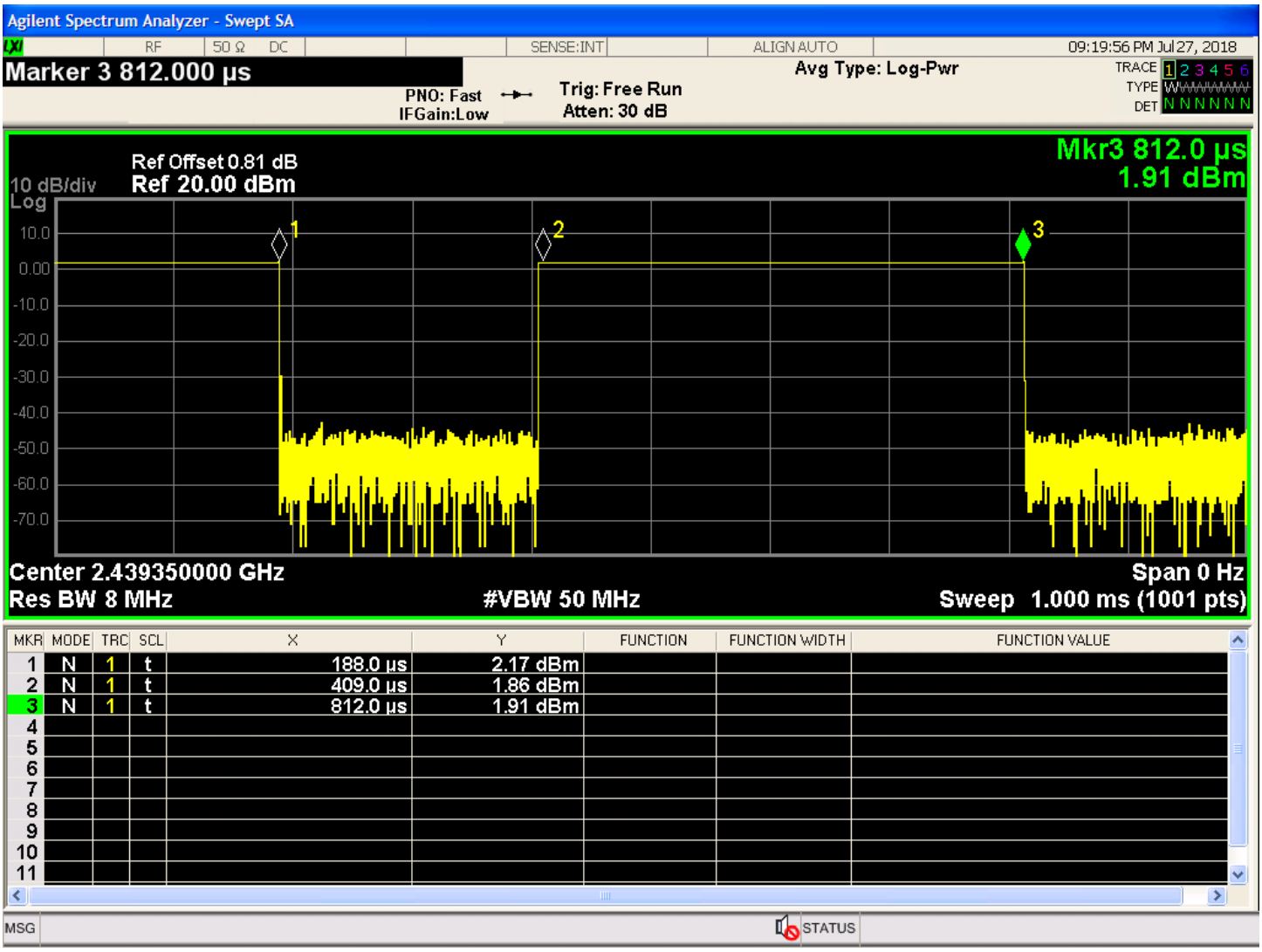
Test Conditions: Conducted Measurement (SA), Normal Temperature	**Date**: 07/27/2018
Antenna Type:	Integrated PIFA antenna
Duty cycle correction: table below	Data Rate: GFSK
Ambient Temp.: 24º C	Relative Humidity: 39 %RH

Duty cycle		
Mode	% of 100% cycle	DCCF dbm
GFSK channel 0	64	1.9
GFSK channel 39	65	1.9
GFSK channel 80	65	1.9

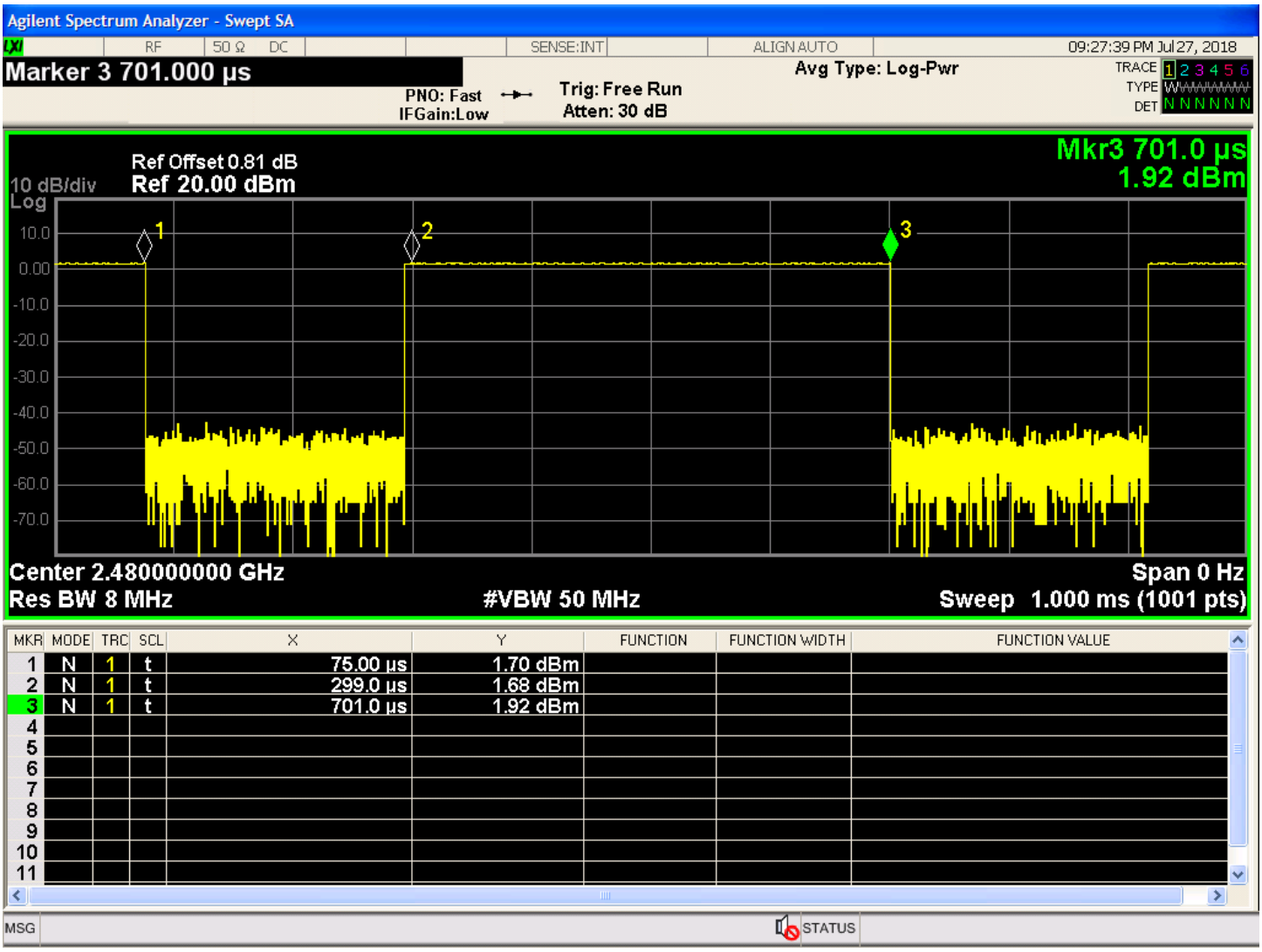
4.1 Results



Duty Cycle channel 0



Duty Cycle channel 19



Duty Cycle channel 39

6 Output Power Requirements

The maximum output power requirement is the maximum equivalent isotropic radiated power delivering at the transmitting antenna under specified conditions of measurements in the presence of modulation.

The maximum output power and harmonics shall not exceed CFR47 Part 15.247 (b):2018 and RSS 247: 2017 Sect. 5.4.4.

The maximum allowable transmitted power in the band 2400-2483.5 MHz: 1 W . The analyzer was configured as follows

6.1 Test Method

The ANSI C63.10-2013 Section 11.9.1.1. Conducted method was used to measure the channel power output. The preliminary investigation was not needed as the BT runs only one modulation and one power setting. This test was conducted on 3 channels. The result indicated in the tables below.

RBW= 1 MHz

VBW= 3 MHz

Span= 3 MHz

SWP= Auto

Trace= Max hold

\Detector= Peak

6.2 Test Setup

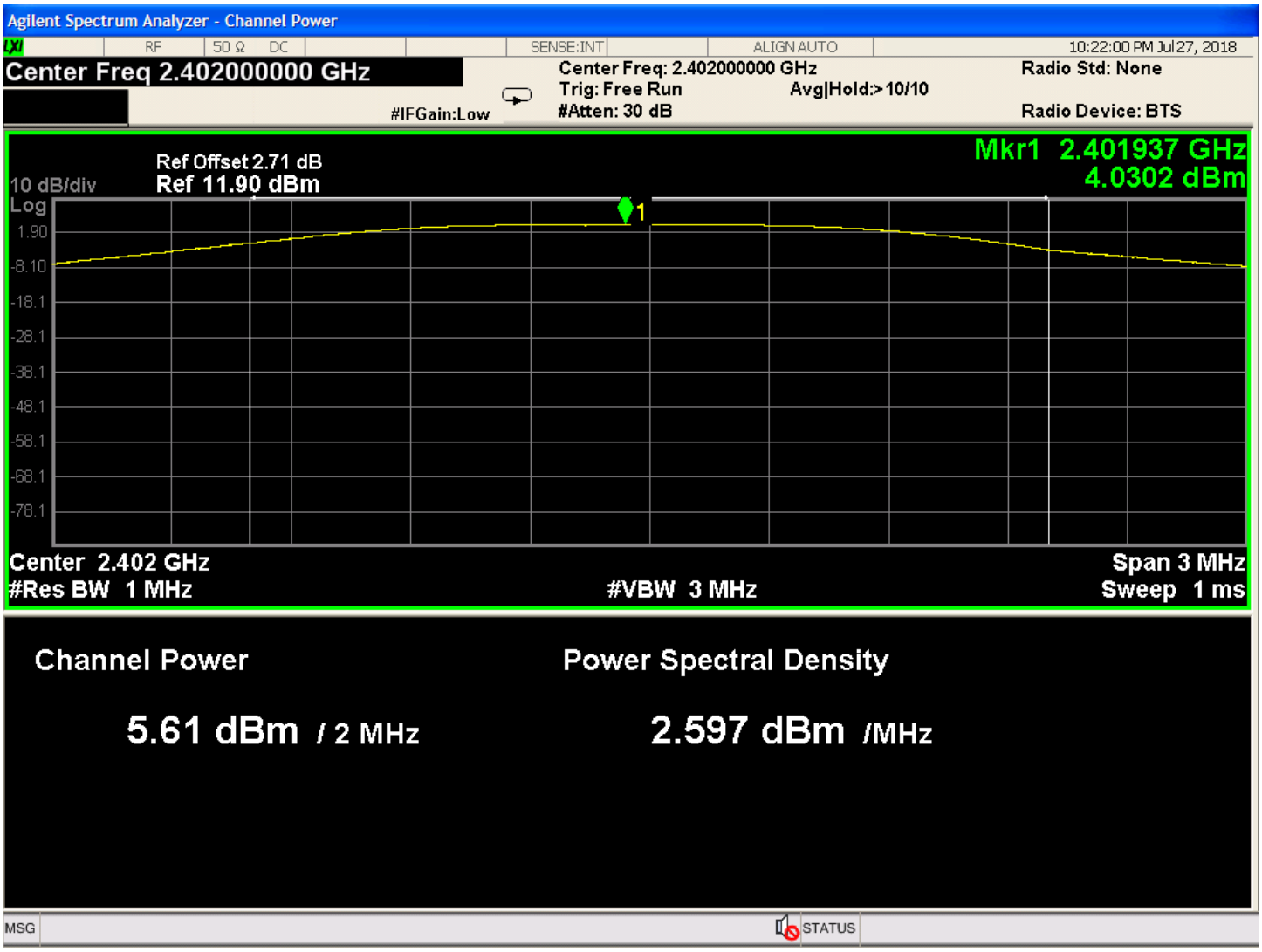
A diagram of the configuration of this test is found in the test plan.

6.2.1 Results

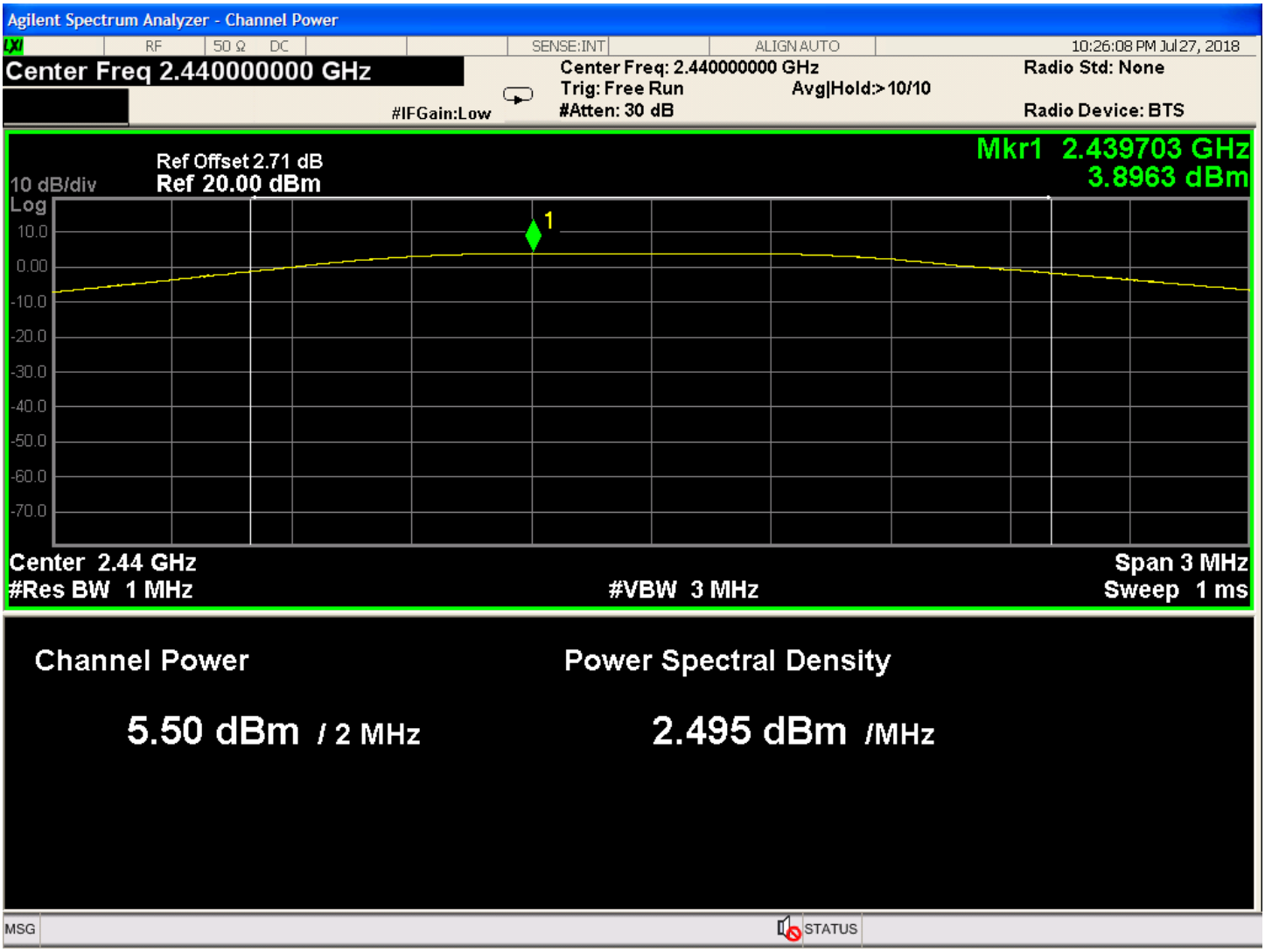
As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 2: RF Output Power at the Antenna Port – Test Results

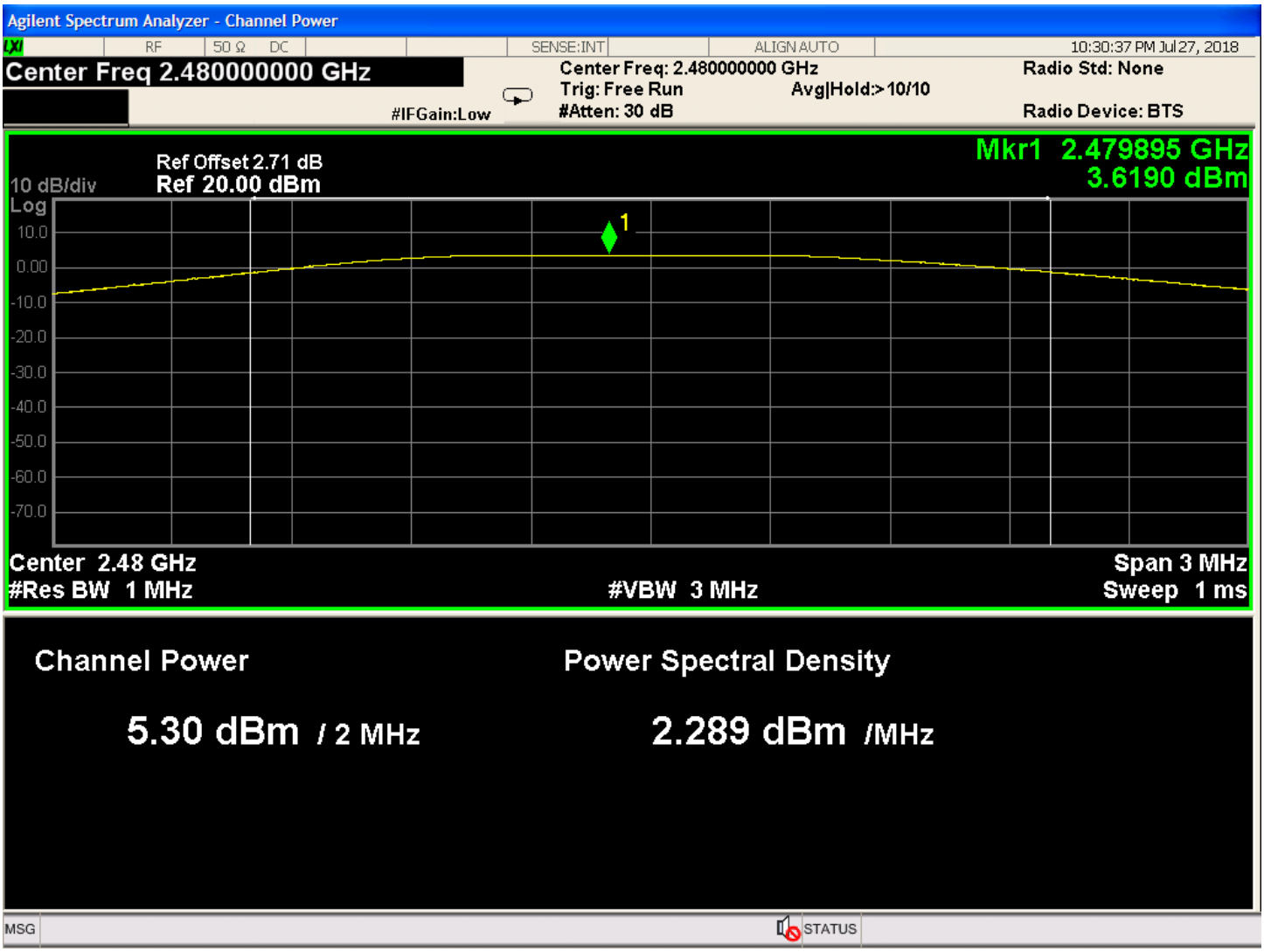
Test Conditions: Conducted Measurement, Normal Temperature			**Date**: 07/27/2018	
Antenna Type: Integrated Antenna			**Power Setting:** Fixed	
Max. Antenna Gain: 5.0 dbi			**Signal State:** Modulated	
Duty Cycle: see section 4			**Data Rate:** BLE	
Ambient Temp.: 24º C			**Relative Humidity:** 39 %RH	
Results				
Mode	**Operating Channel**	**Limit [dBm]**	**Power [dBm]**	**Comments**
BLE	2402 MHz	+30.00	5.61	
	2438 MHz	+30.00	5.50	
	2480 MHz	+30.00	5.30	



Channel power BLE mode 2402 MHz.



Channel power BLE mode 2440 MHz.



Channel power BLE mode 2480 MHz.

7 Occupied Bandwidth

The occupied bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency.

The 99% bandwidth is the bandwidth in which 99% of the transmitted power occupied.

20 dB bandwidth was performed by coupling the output of the EUT to the input of a spectrum analyzer.

The 6dB bandwidth is defined the bandwidth of 6dBr from highest transmitted level of the fundamental frequency.

The minimum 6 dB bandwidth shall be at least 500 kHz per Section CFR47 15.247(a2) 2017 and RSS-247 Sect. 5.3(a) Issue 2, 2017.

7.1.1 Test Method

The conducted method was used to measure the occupied bandwidth according to ANSI C63.10:2013 Section 11.8. The measurement was performed with modulation per CFR47 15.247 (a) (2) 2017 and RSS 247: 2017. This test was conducted on 3 channels. The result indicated below.

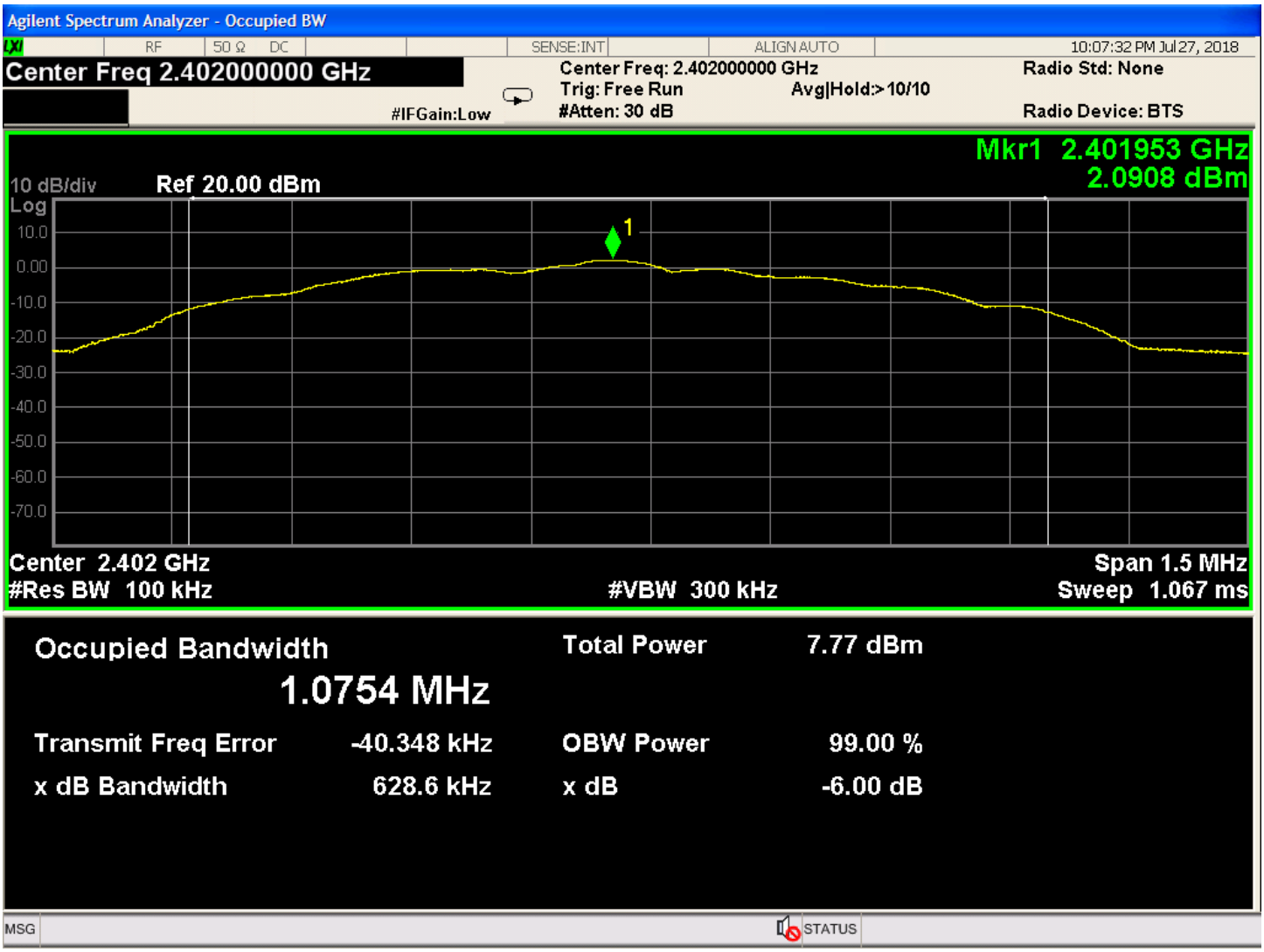
Test setup: A diagram of the test setup can be found in the test plan

Results

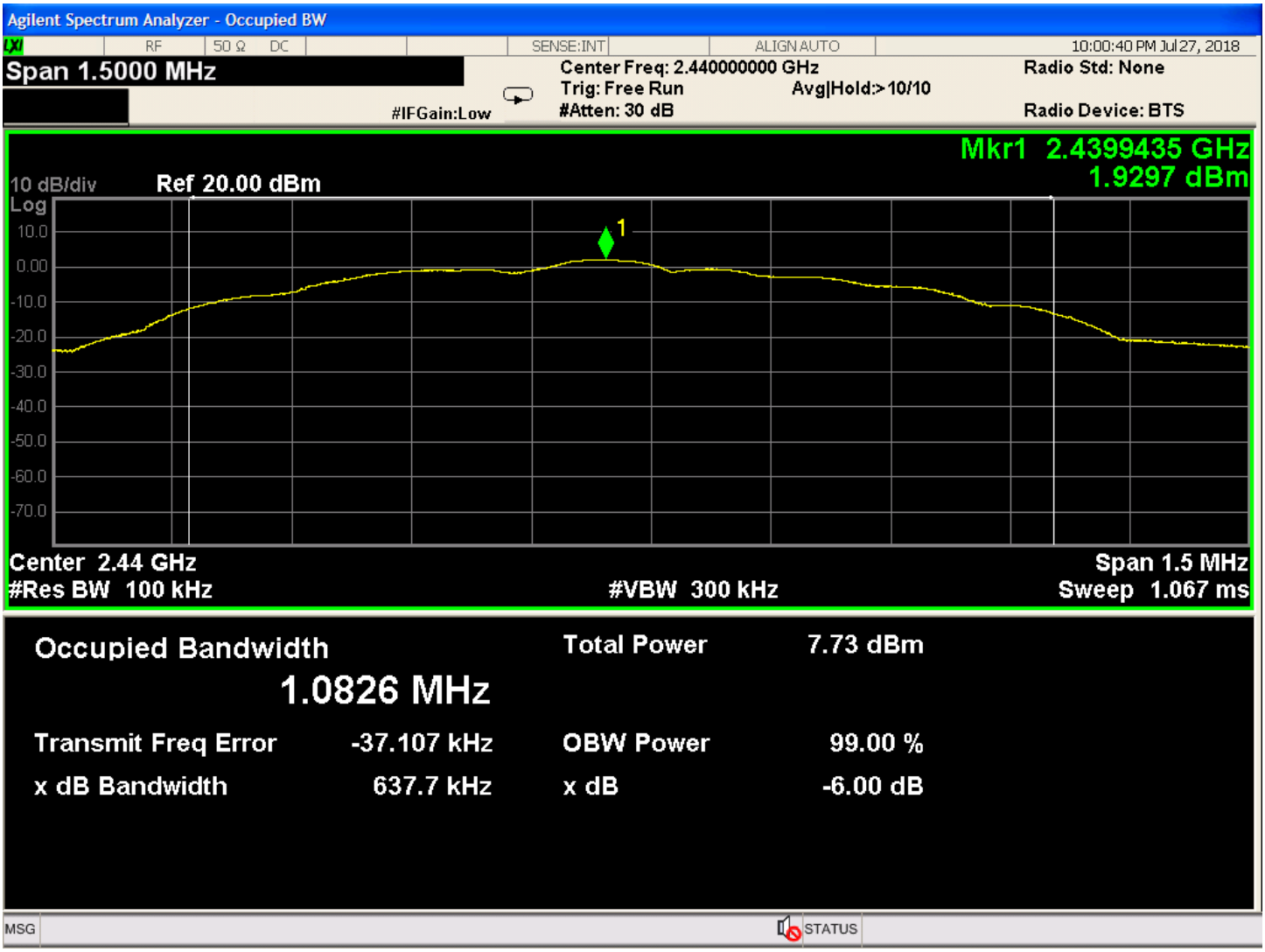
Test Conditions: Conducted Measurement, Normal Temperature	**Date**: 07/27/2018
Antenna Type: Integrated Antenna	**Power Setting:** Fixed
Max. Antenna Gain: 5.0 dbi	**Signal State:** Modulated
Duty Cycle: : see section 4	**Data Rate:** BLE
Ambient Temp.: 24º C	**Relative Humidity:** 39 %RH

Results

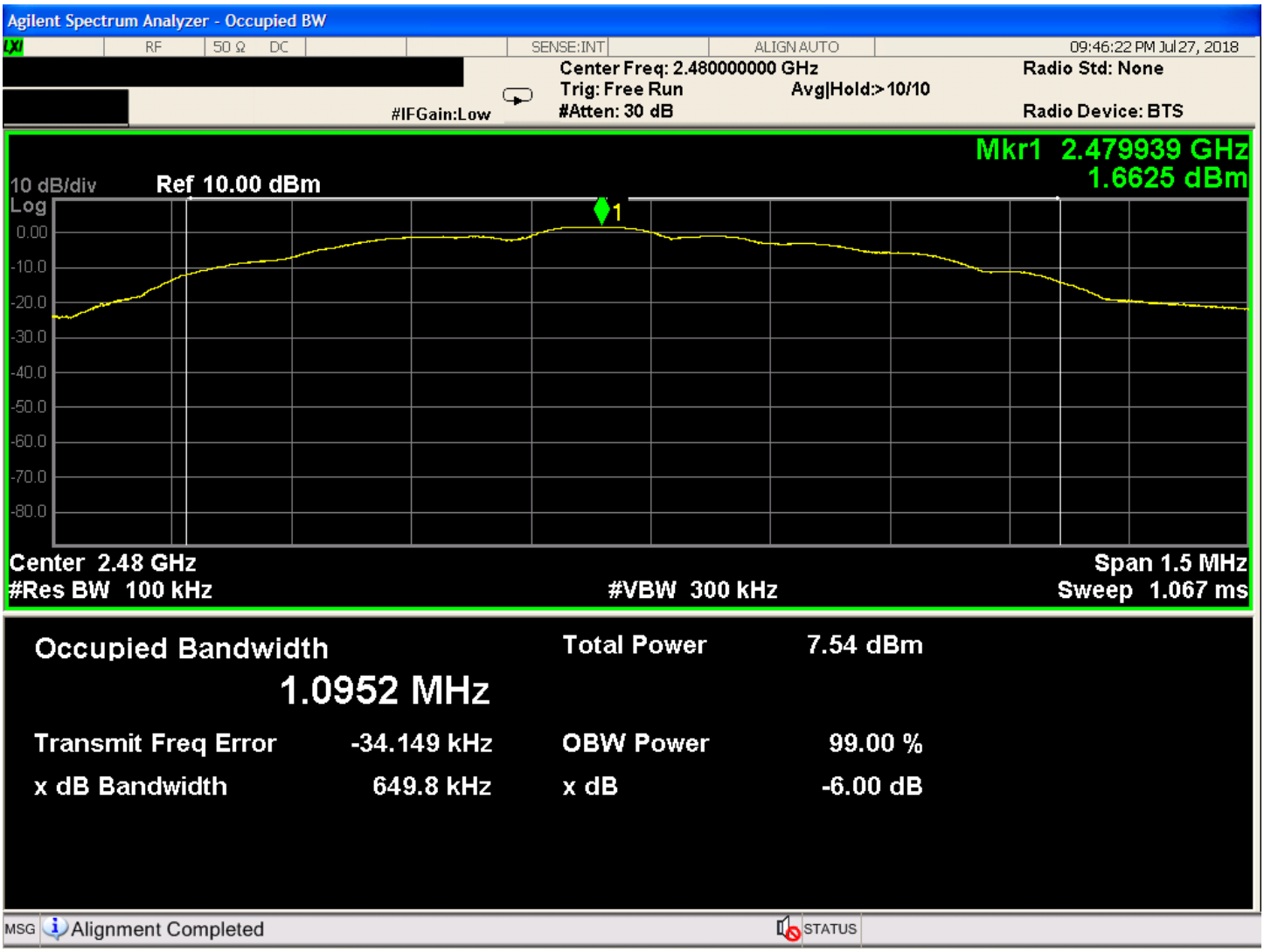
Mode	Operating Channel	Limit	99% OBW MHz	-6db BW MHz
BLE	2402 MHz	>500khz	1.07	0.628
	2440 MHz	>500khz	1.08	0.637
	2480 MHz	>500khz	1.09	0.649



OBW BLE mode 2402 MHz.



OBW BLE mode 2438



OBW BLE mode 2480 MHz.

8 Peak Power Spectral Density

According to the CFR47 Part 15.247 (e) and RSS 247 Sect.5.2 (b), 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.

8.1.1 Test Method

The conducted method was used to measure the channel power output per ANSI C63.10-2013 Section 11.10.2. The measurement was performed with modulation per CFR47 Part 15.247 (e) and RSS 247 Sect.5.2 (b).

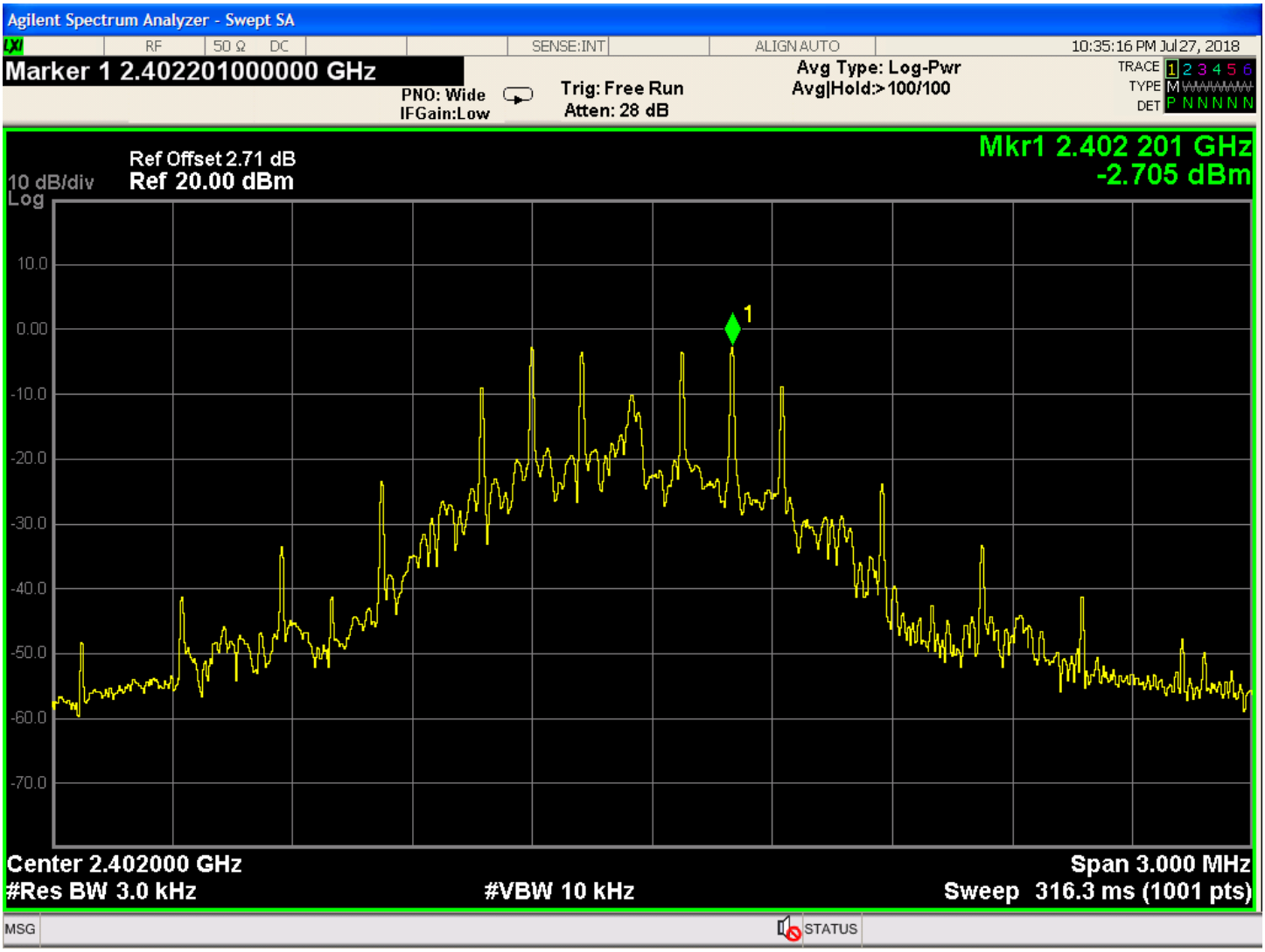
Will demonstrate compliance to the rules required for DTS per KDB 453039

Test setup: A diagram of the test setup can be found in the test plan

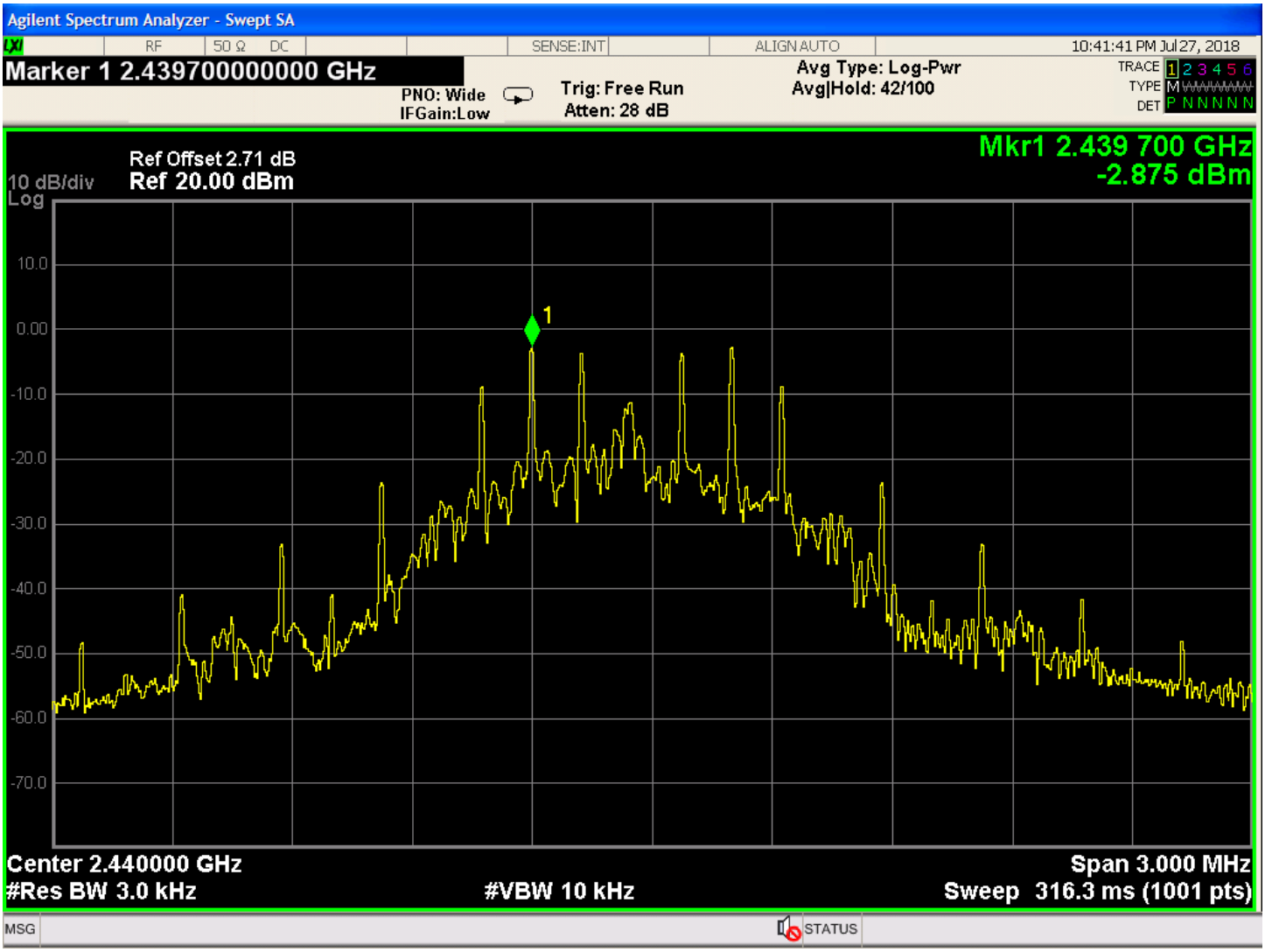
Test Conditions: Conducted Measurement, Normal Temperature	**Date**: 07/27/2018
Antenna Type: Integrated PIFA Antenna	**Power Setting:** Fixed
Max. Antenna Gain: 5.0 dbi	**Signal State:** Modulated
Duty Cycle: see section 4	**Data Rate:** BLE
Ambient Temp.: 24º C	**Relative Humidity:** 39 %RH

Results

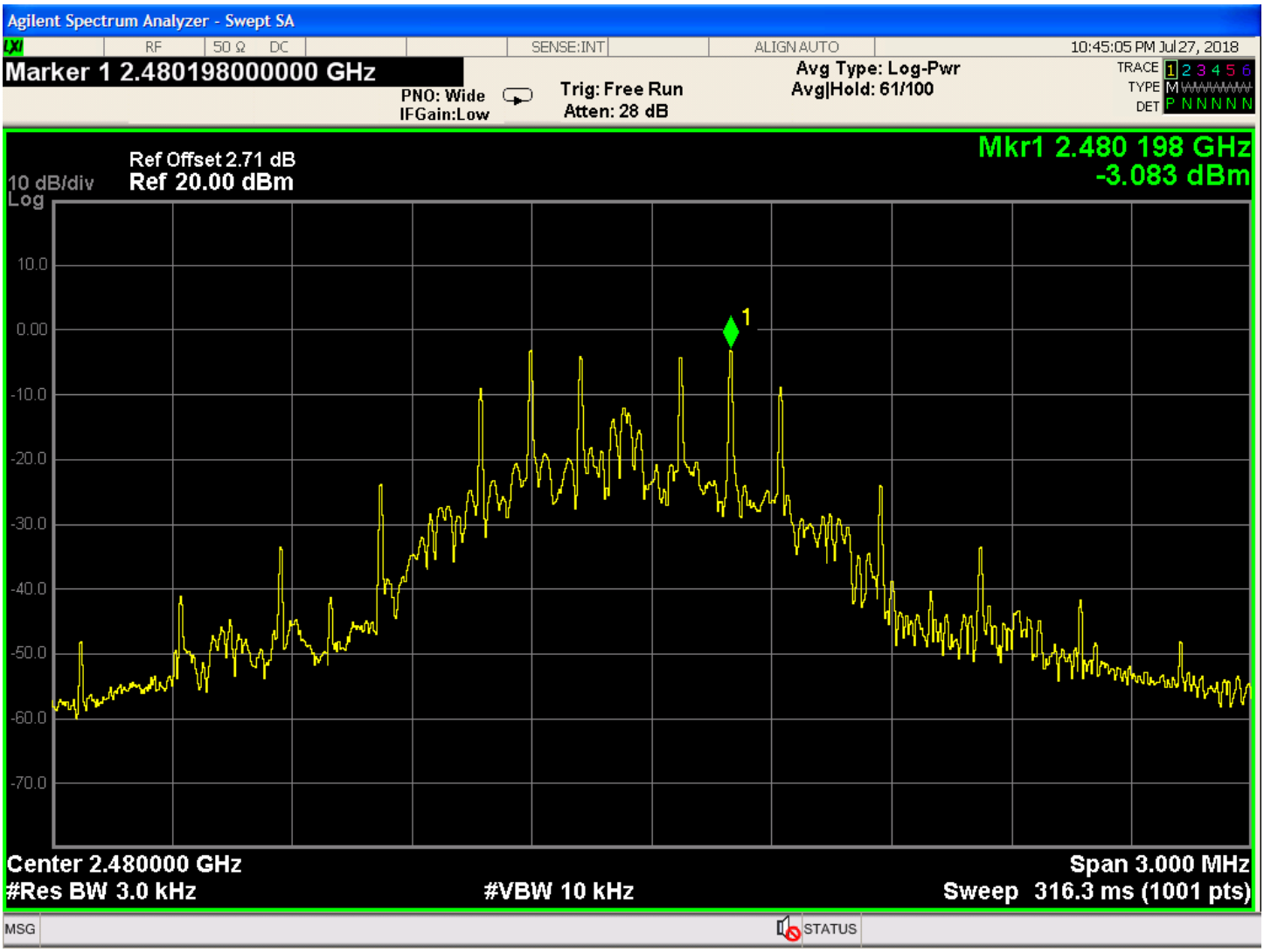
Mode	Operating Channel	Limit [dBm]	PPSD [dBm]	Comments
BLE	2402 MHz	8	-2.70	
	2440 MHz	8	-2.87	
	2480 MHz	8	-3.08	



Power Spectral Density BLE mode 2402 MHz.



Power Spectral Density BLE mode 2440 MHz.



Power Spectral Density BLE mode 2480 MHz.

9 Non-Restricted Band Emission requirements

The setup was identical to RF output power measurement. Intentional radiators operating under the alternative provisions to the general emission limits, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If the frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Any frequency outside the band of 2400 MHz to 2483.5 MHz, the power output level must be below 20 dB from the in-band transmitting signal; CFR 47 Part 15.215, 15.247(d) and RSS 247 Sect.5.5.

Note: Will demonstrate compliance to the rules required for DTS per KDB 453039

9.4.1 Results

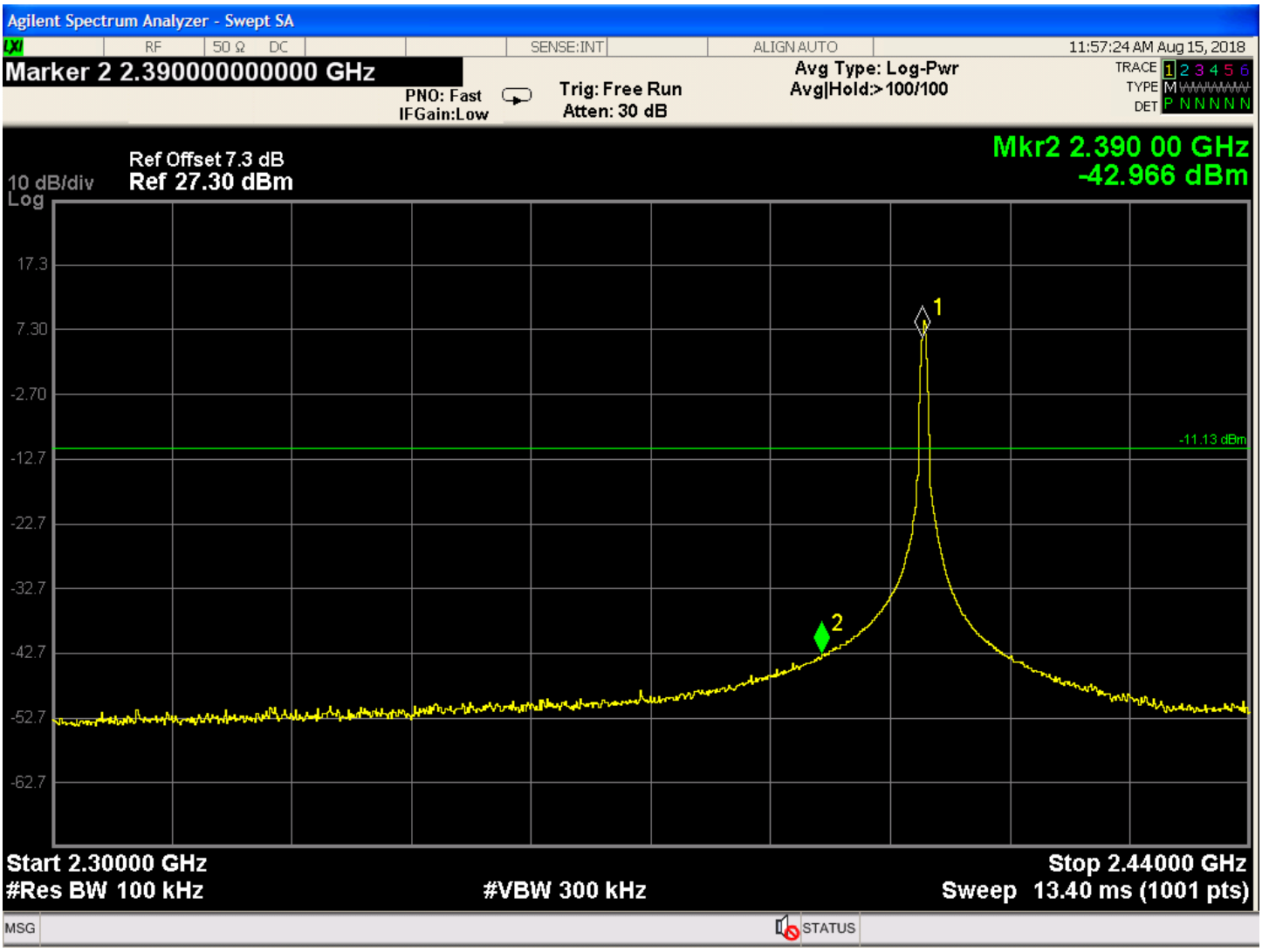
As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Non-Restricted band emissions

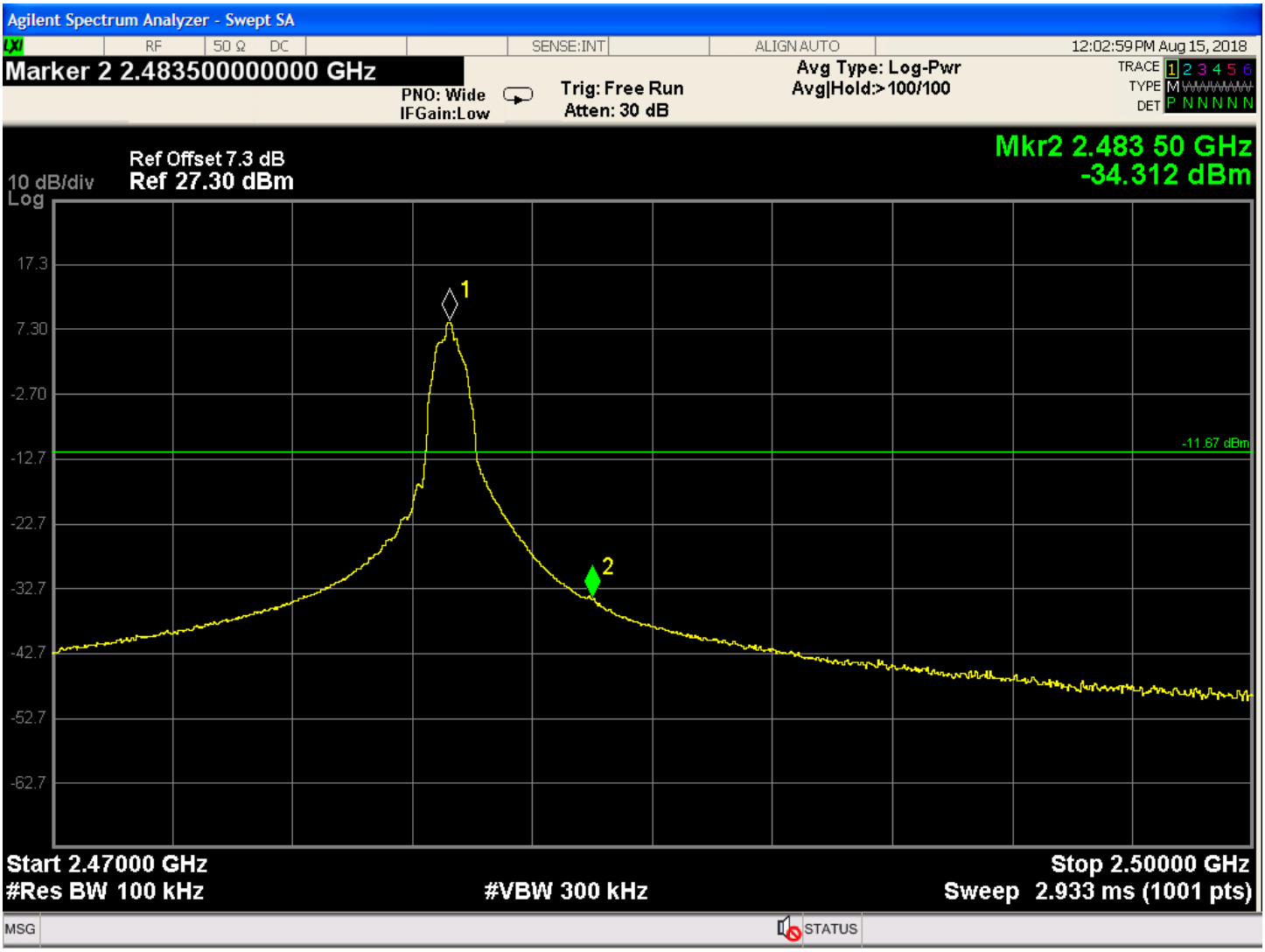
Test Conditions: Conducted Measurement, Normal Temperature	**Date**: 07/27/2018
Antenna Type: Integrated Antenna	**Power Setting:** Fixed
Max. Antenna Gain: 5.0 dbi	**Signal State:** Modulated
Duty Cycle: see section 4	**Data Rate:** BLE
Ambient Temp.: 234° C	**Relative Humidity:** 39 %RH

Results

Mode	Operating Channel	Limit [dBm]	Final Result	Comments
BLE	2402 MHz	-11.13	Pass	
	2480 MHz	-11.67	Pass	



Channel 2402 MHz.



Channel 2480 MHz.

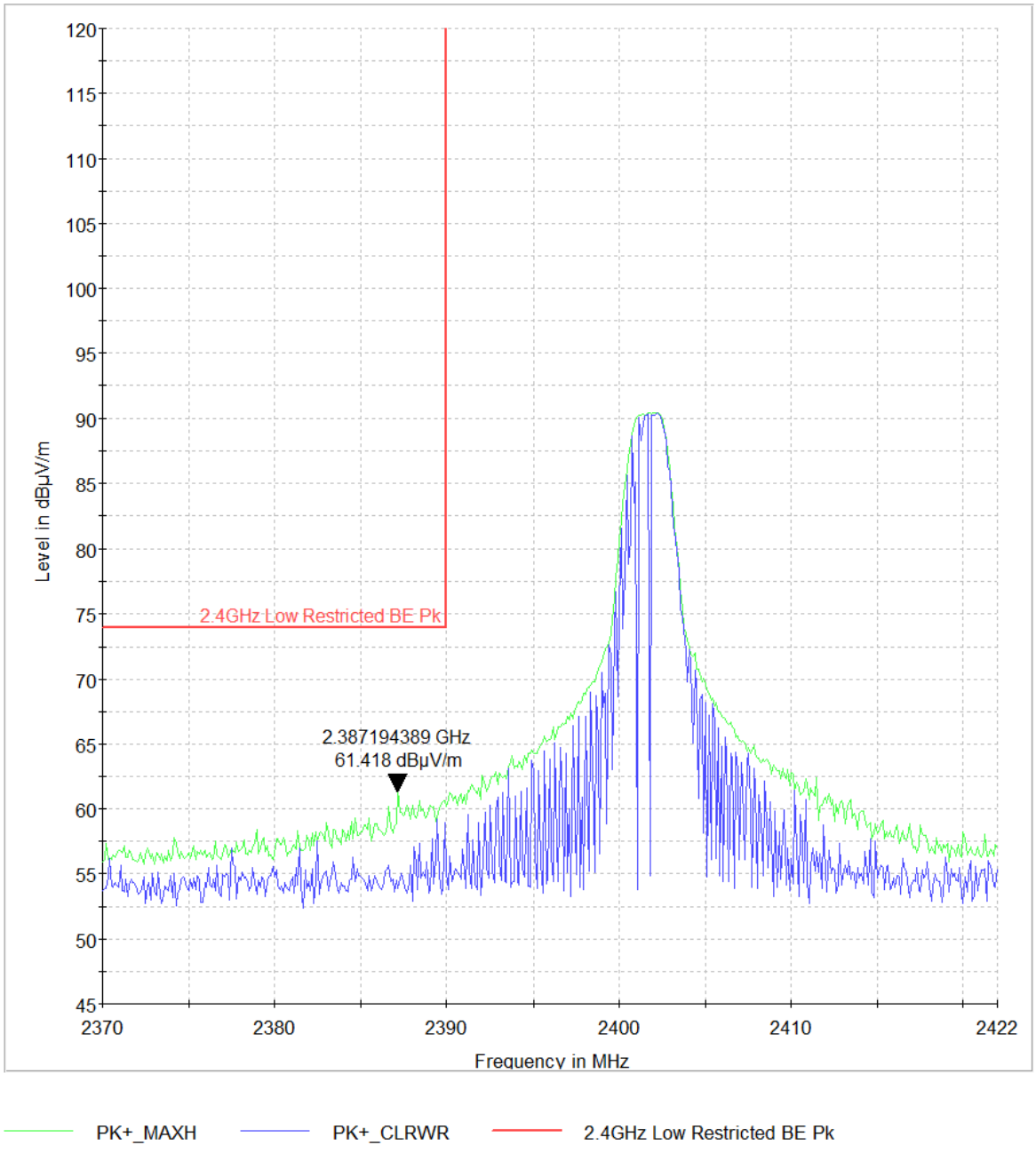
10 Restricted Band edges

10.1.1 Peak Band edge Emissions

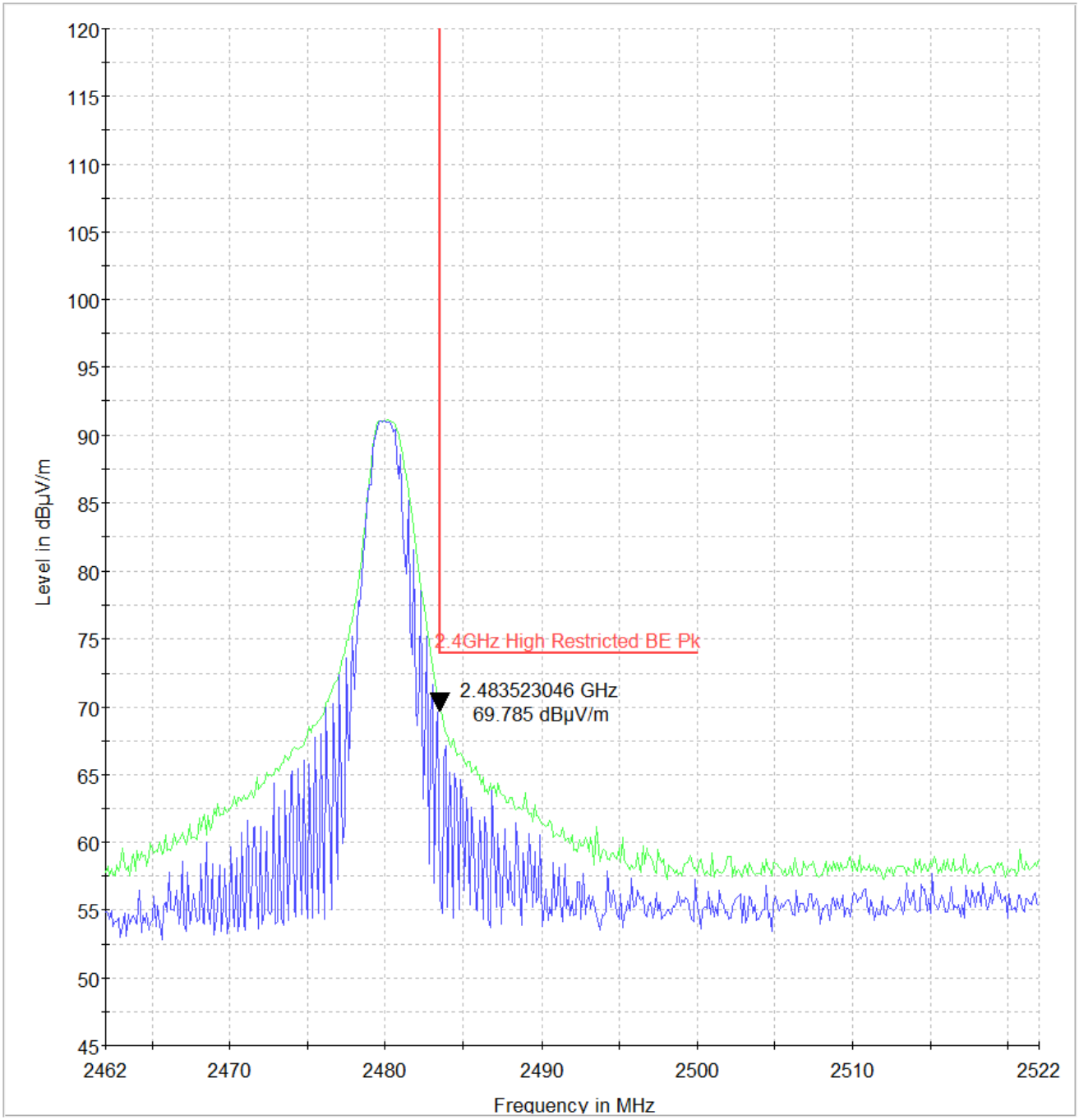
Test Method

The ANSI C63.10-2013 Section 11.13.3.5 and 6.10.5 the procedure described was followed testing in an anechoic chamber. The preliminary investigation was not needed as the interface supports only one modulation and one power setting. A diag program was used to set the BT in continuous Tx mode and also to set the channel, channel power and data rate. This test was conducted on the edge channels.

Mode	Operating Channel	Limit dbuV	Max Emission dbuV	Comments
BLE	2402 MHz.	74	61.4	
	2480 MHz.	74	69.7	



Peak BLE band edge 2402 MHz.



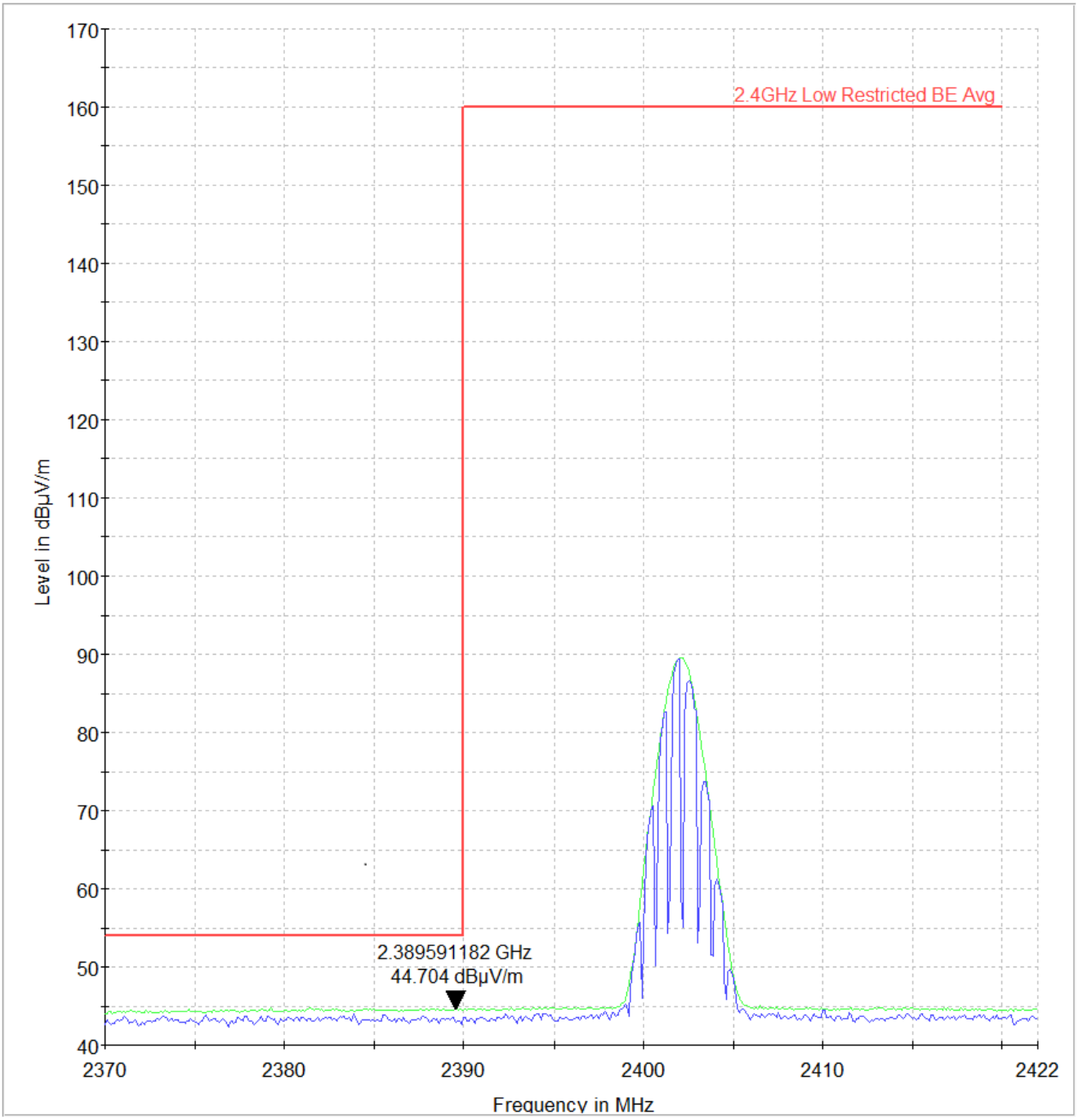
Peak BLE band edge 2480 MHz.

10.1.2 Average Band Edge Emissions

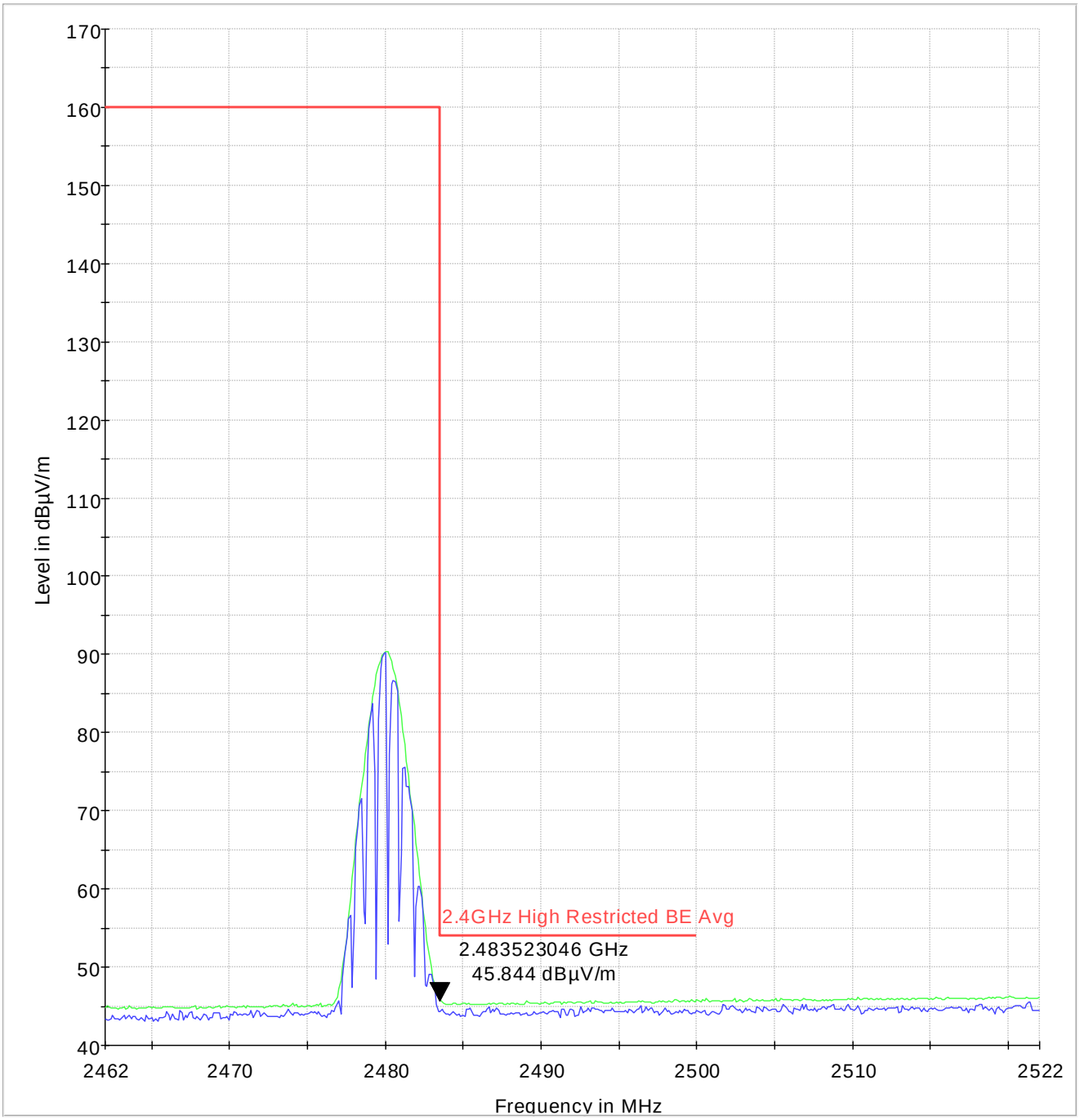
Test Method

The ANSI C63.10-2013 Section 11.13.3.5 and 6.10.5 the procedure described was followed testing in an anechoic chamber. The preliminary investigation was not needed as the interface supports only one modulation and one power setting. A diag program was used to set the BT in continuous Tx mode and also to set the channel, channel power and data rate. This test was conducted on the edge channels.

Mode	Operating Channel	Limit dbuV	Max Emission dbuV	Comments
BLE	2402	54	44.7	
	2480	54	45.8	



Average BLE band edge 2402 MHz



Average BLE band edge 2480 MHz.

11 Restricted Band Emissions

The system was tested in accordance CFR47 part 15.209 and RSS 247: sec 6.2. The emissions in the restricted band are required to meet the limits given for intentional radiators. For the frequency range 30-1000 MHz the test was run at a 5 meter distance. The conditions in the rule parts listed in 15.209(e) were met and the relevant text is listed below. For the purpose of accommodating the software with a negative correction factor the 3 meter spec limit was extrapolated out to 10 meters and this limit was used. A factor of -6db was added to all the result frequencies by the software. This factor corrects the 5 meter results when they are compared to the limit at 10 meters.

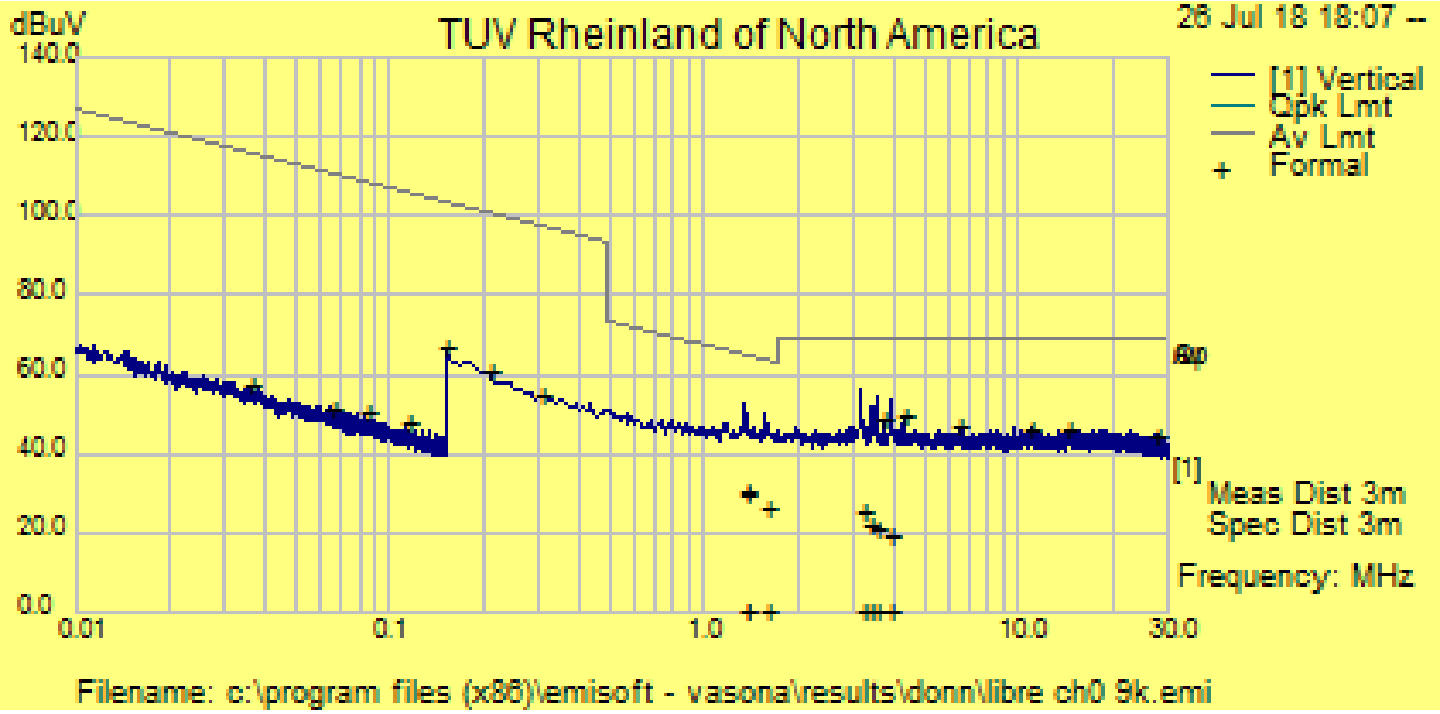
15.209

(e) The provisions in §§15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

15.31f

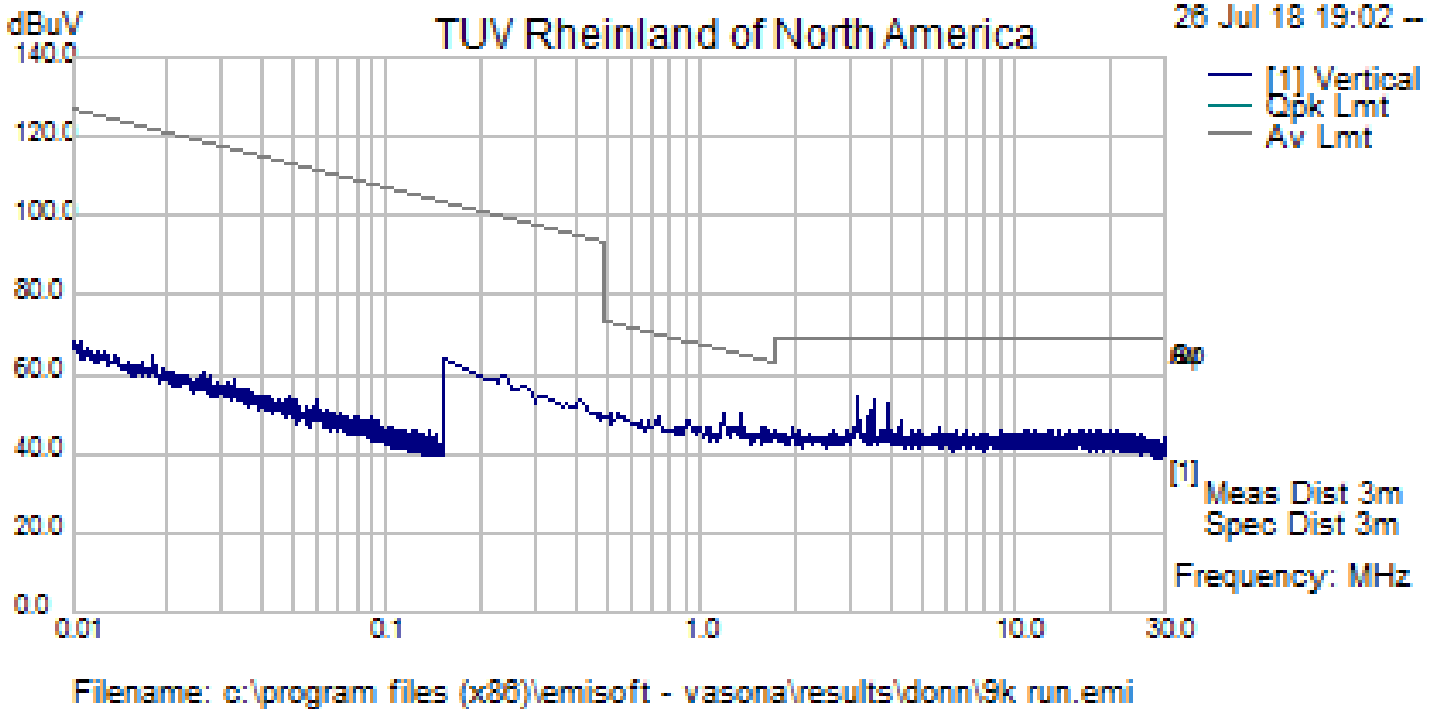
1) At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

9 kHz to 30 MHz



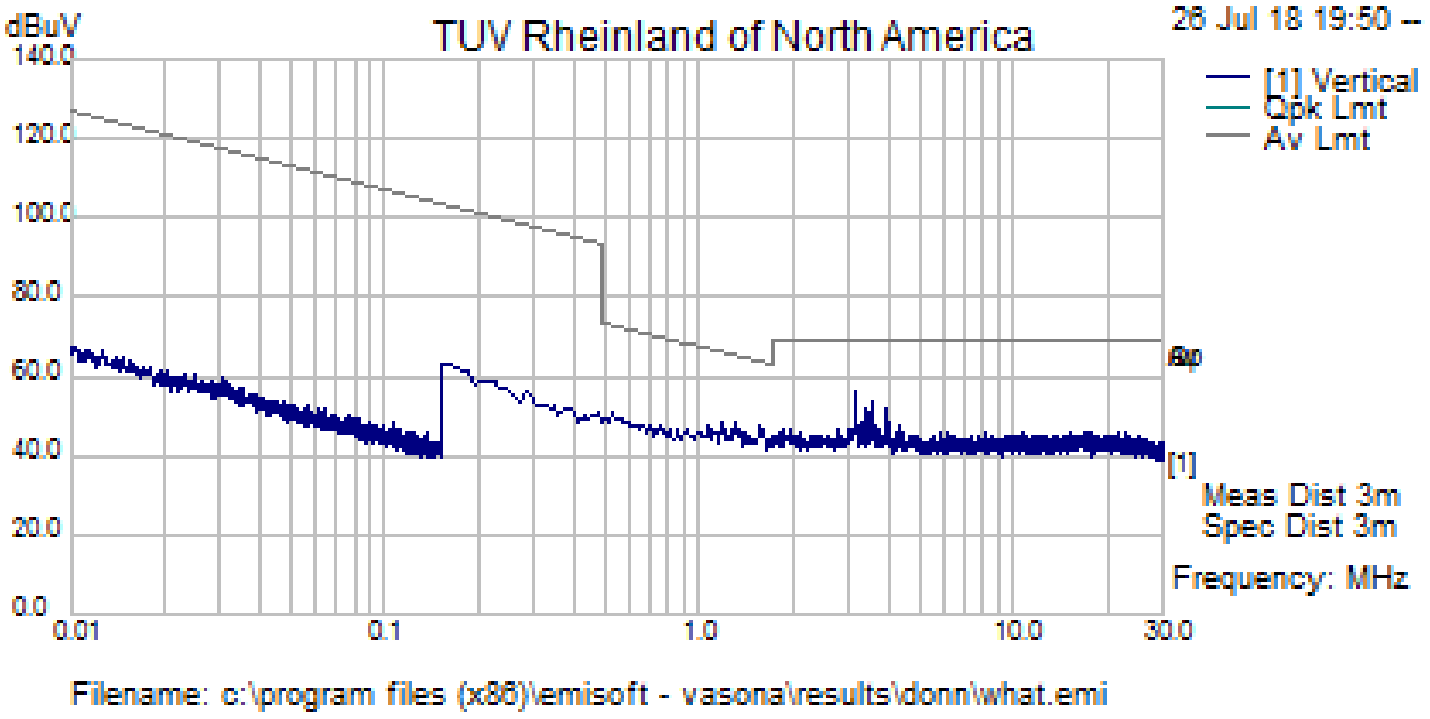
Channel 0 Horizontal unit in vertical orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail
1 (21)	1.35	40.11	2.31	10.60	53.03	Peak [Scan]	H	125	52.00	65.01	-11.99	Pass
2 (22)	3.15	43.50	2.36	10.53	56.4	Peak [Scan]	H	125	116.00	69.50	-13.1	Pass
3 (23)	1.57	37.00	2.32	10.60	49.92	Peak [Scan]	H	125	205.00	63.68	-13.76	Pass
4 (24)	1.37	37.30	2.31	10.60	50.22	Peak [Scan]	H	125	222.00	64.89	-14.68	Pass
5 (25)	3.52	41.63	2.37	10.61	54.61	Peak [Scan]	H	125	222.00	69.50	-14.89	Pass
6 (26)	3.92	40.48	2.37	10.69	53.54	Peak [Scan]	H	125	194.00	69.50	-15.96	Pass



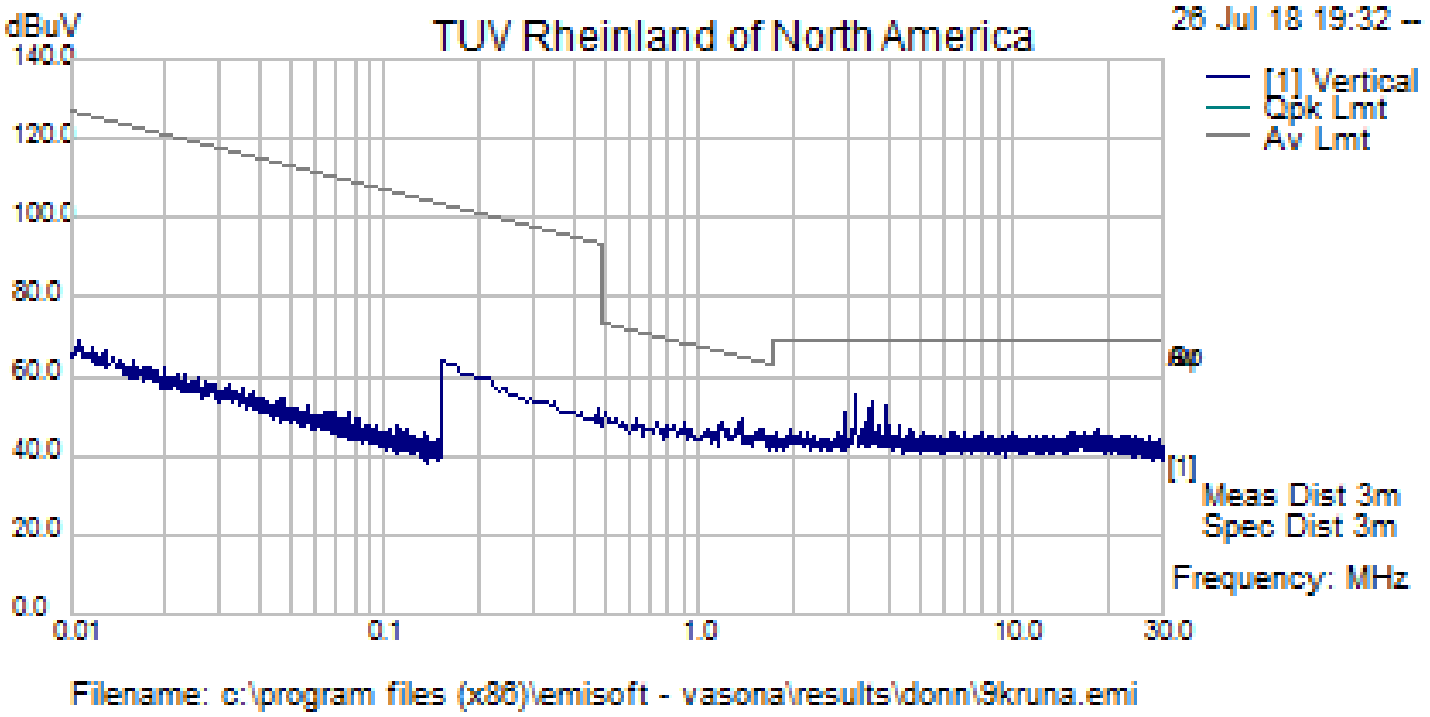
Channel 0 Horizontal unit in horizontal orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail
1 (13)	3.13	41.45	2.36	10.53	54.34	Peak [Scan]	H	125	274.00	69.50	-15.16	Pass
2 (14)	3.55	40.65	2.37	10.62	53.63	Peak [Scan]	H	125	18.00	69.50	-15.87	Pass
3 (15)	1.17	36.88	2.31	10.60	49.79	Peak [Scan]	H	125	221.00	66.23	-16.45	Pass
4 (16)	3.93	39.32	2.37	10.69	52.38	Peak [Scan]	H	125	302.00	69.50	-17.12	Pass
5 (17)	3.39	35.91	2.37	10.59	48.86	Peak [Scan]	H	125	12.00	69.50	-20.64	Pass
6 (18)	4.32	35.16	2.38	10.70	48.25	Peak [Scan]	H	125	116.00	69.50	-21.26	Pass



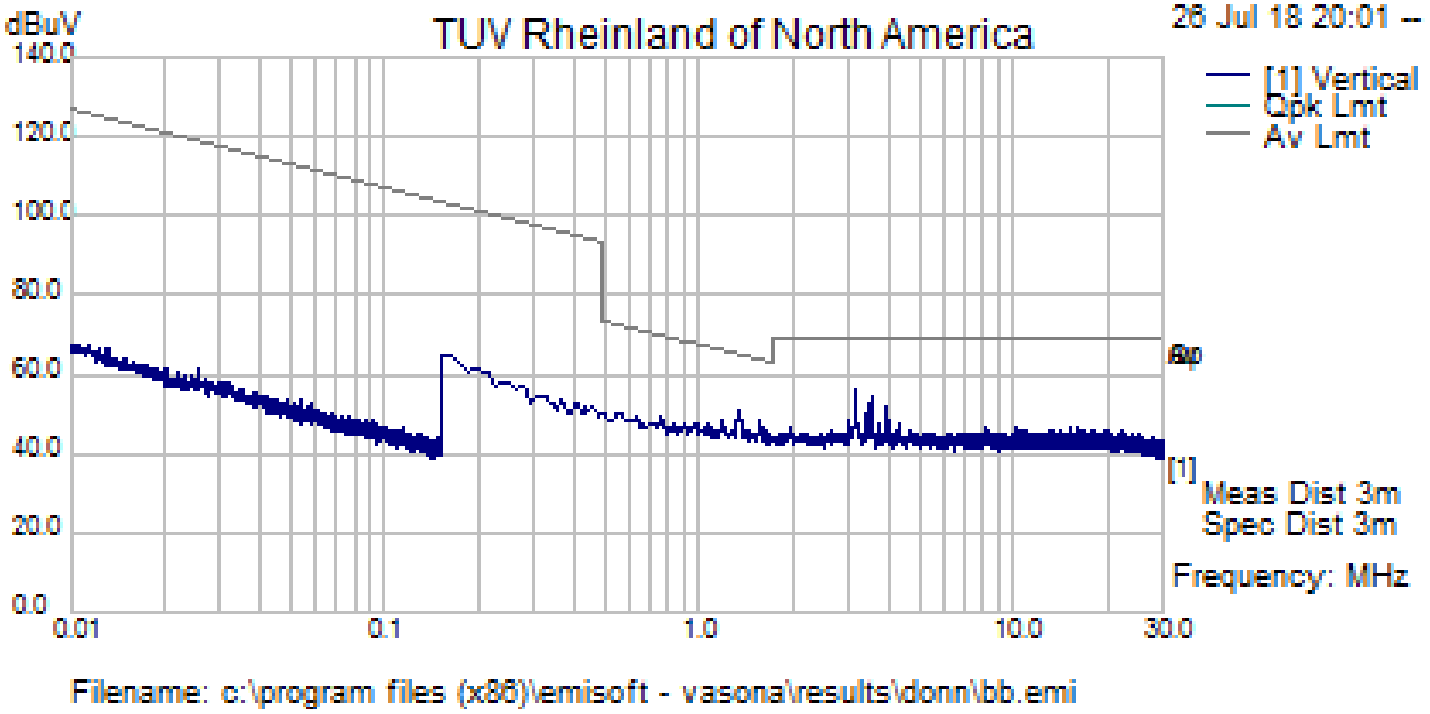
Channel 0 Vertical unit in vertical orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail
1 (16)	3.14	43.02	2.36	10.53	55.92	Peak [Scan]	V	125	34.00	69.50	-13.59	Pass
2 (17)	3.52	40.77	2.37	10.61	53.75	Peak [Scan]	V	125	257.00	69.50	-15.75	Pass
3 (18)	3.94	39.02	2.37	10.69	52.08	Peak [Scan]	V	125	69.00	69.50	-17.42	Pass
4 (19)	3.38	38.84	2.37	10.58	51.79	Peak [Scan]	V	125	314.00	69.50	-17.71	Pass
5 (20)	1.18	35.43	2.31	10.60	48.34	Peak [Scan]	V	125	11.00	66.16	-17.83	Pass
6 (21)	4.04	35.61	2.38	10.70	48.69	Peak [Scan]	V	125	344.00	69.50	-20.81	Pass



Channel 0 Vertical unit in horizontal orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail
1 (16)	3.15	42.07	2.36	10.53	54.97	Peak [Scan]	V	125	204.00	69.50	-14.53	Pass
2 (17)	1.36	36.63	2.31	10.60	49.55	Peak [Scan]	V	125	181.00	64.95	-15.41	Pass
3 (18)	3.53	40.74	2.37	10.61	53.72	Peak [Scan]	V	125	198.00	69.50	-15.78	Pass
4 (19)	3.92	39.40	2.37	10.69	52.46	Peak [Scan]	V	125	234.00	69.50	-17.04	Pass
5 (20)	2.89	37.92	2.36	10.51	50.79	Peak [Scan]	V	125	198.00	69.50	-18.71	Pass
6 (21)	3.35	35.10	2.37	10.58	48.04	Peak [Scan]	V	125	6.00	69.50	-21.46	Pass



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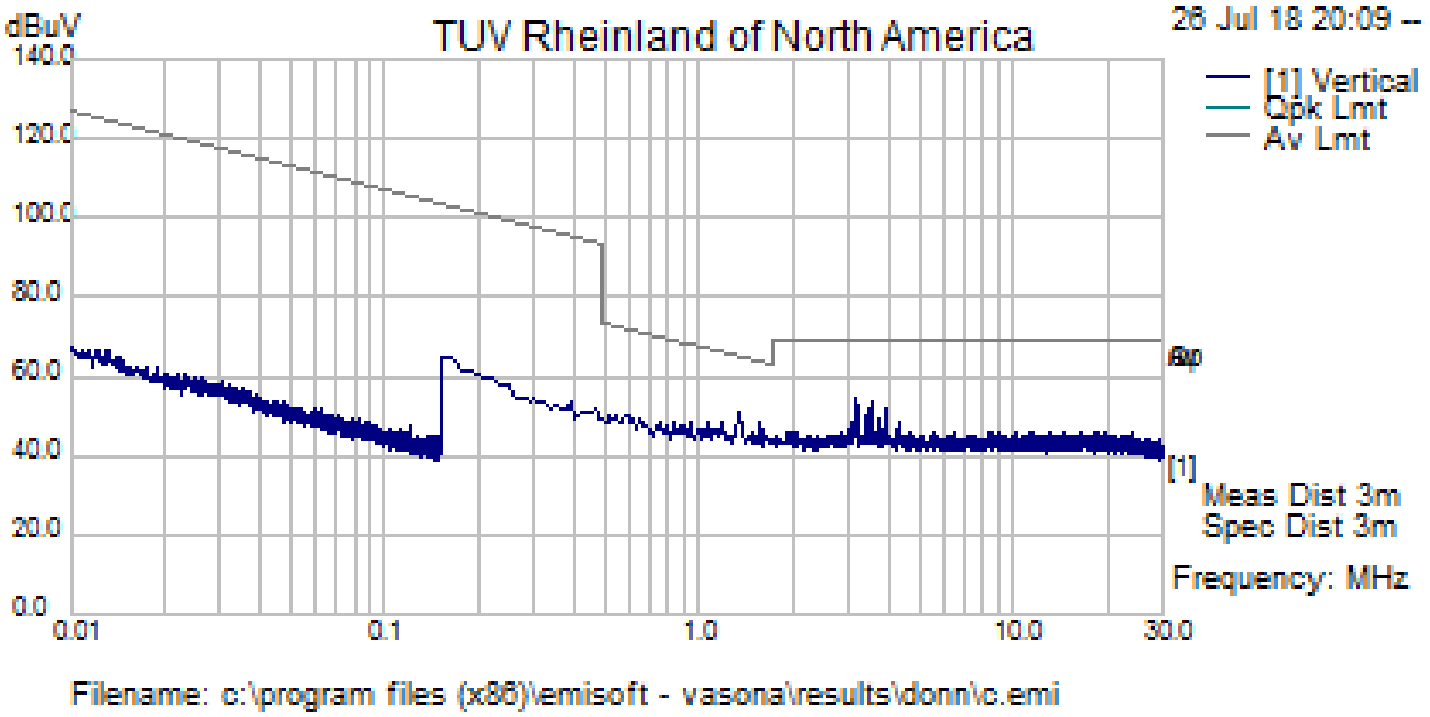
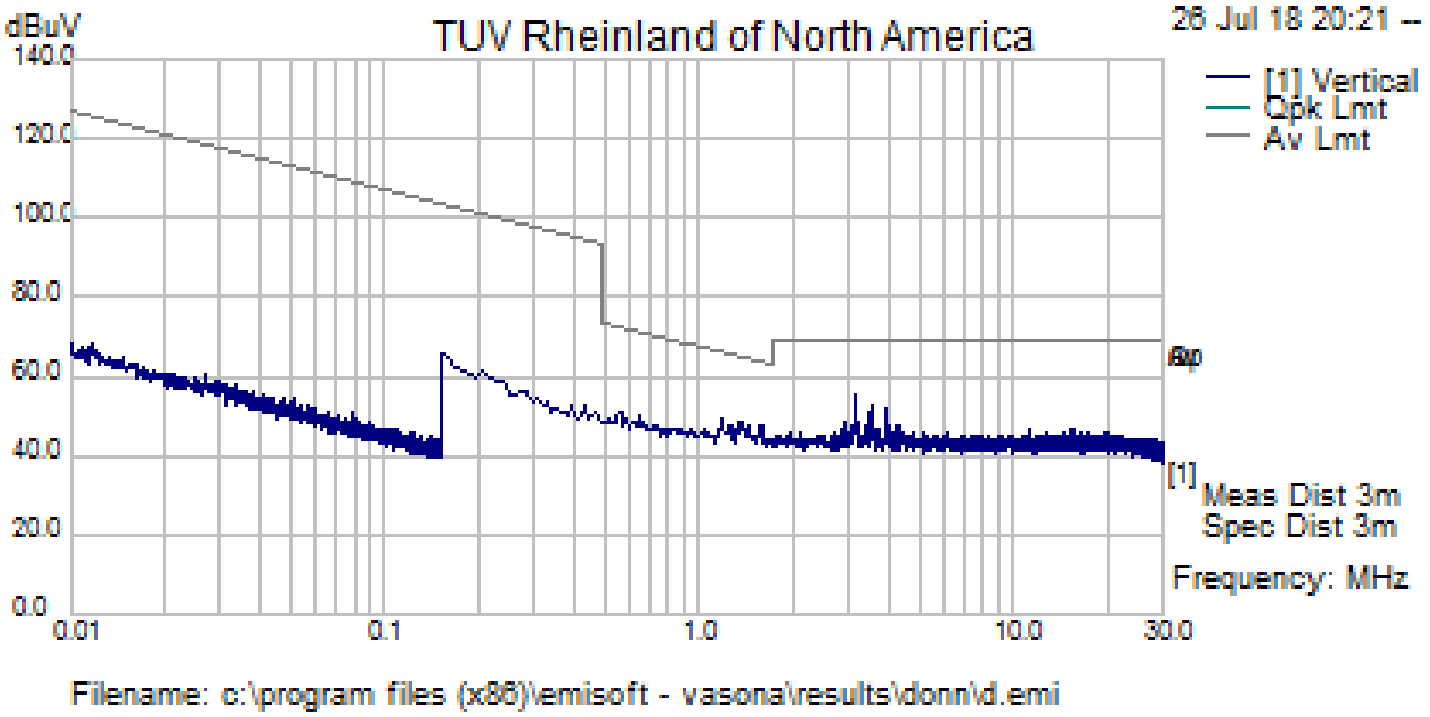
Channel 19 Vertical unit in vertical orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail
1 (15)	3.14	42.89	2.36	10.53	55.78	Peak [Scan]	V	125	104.00	69.50	-13.72	Pass
2 (16)	1.34	37.92	2.31	10.60	50.84	Peak [Scan]	V	125	232.00	65.07	-14.24	Pass
3 (17)	3.53	41.04	2.37	10.61	54.02	Peak [Scan]	V	125	314.00	69.50	-15.48	Pass
4 (18)	1.57	35.22	2.32	10.60	48.14	Peak [Scan]	V	125	127.00	63.68	-15.54	Pass
5 (19)	3.92	39.13	2.37	10.69	52.19	Peak [Scan]	V	125	243.00	69.50	-17.31	Pass
6 (20)	3.37	37.59	2.37	10.58	50.53	Peak [Scan]	V	125	122.00	69.50	-18.97	Pass



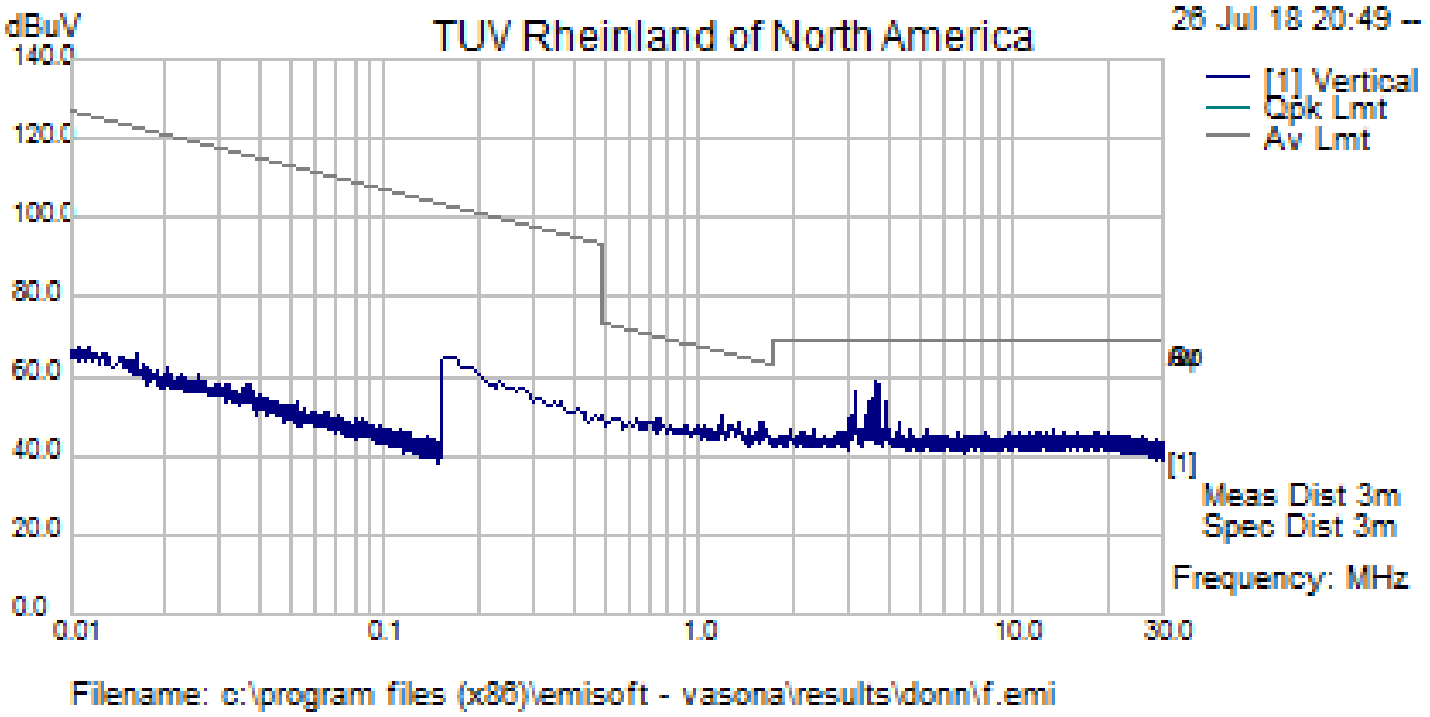
Channel 19 Vertical unit in horizontal orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail
1 (17)	1.33	38.12	2.31	10.60	51.03	Peak [Scan]	V	136	344.00	65.13	-14.1	Pass
2 (18)	3.13	41.91	2.36	10.53	54.8	Peak [Scan]	V	136	240.00	69.50	-14.7	Pass
3 (19)	1.57	35.27	2.32	10.60	48.19	Peak [Scan]	V	136	6.00	63.68	-15.49	Pass
4 (20)	3.53	40.69	2.37	10.61	53.67	Peak [Scan]	V	136	198.00	69.50	-15.83	Pass
5 (21)	3.20	39.46	2.36	10.54	52.37	Peak [Scan]	V	136	81.00	69.50	-17.13	Pass
6 (22)	3.92	39.12	2.37	10.69	52.18	Peak [Scan]	V	136	256.00	69.50	-17.32	Pass



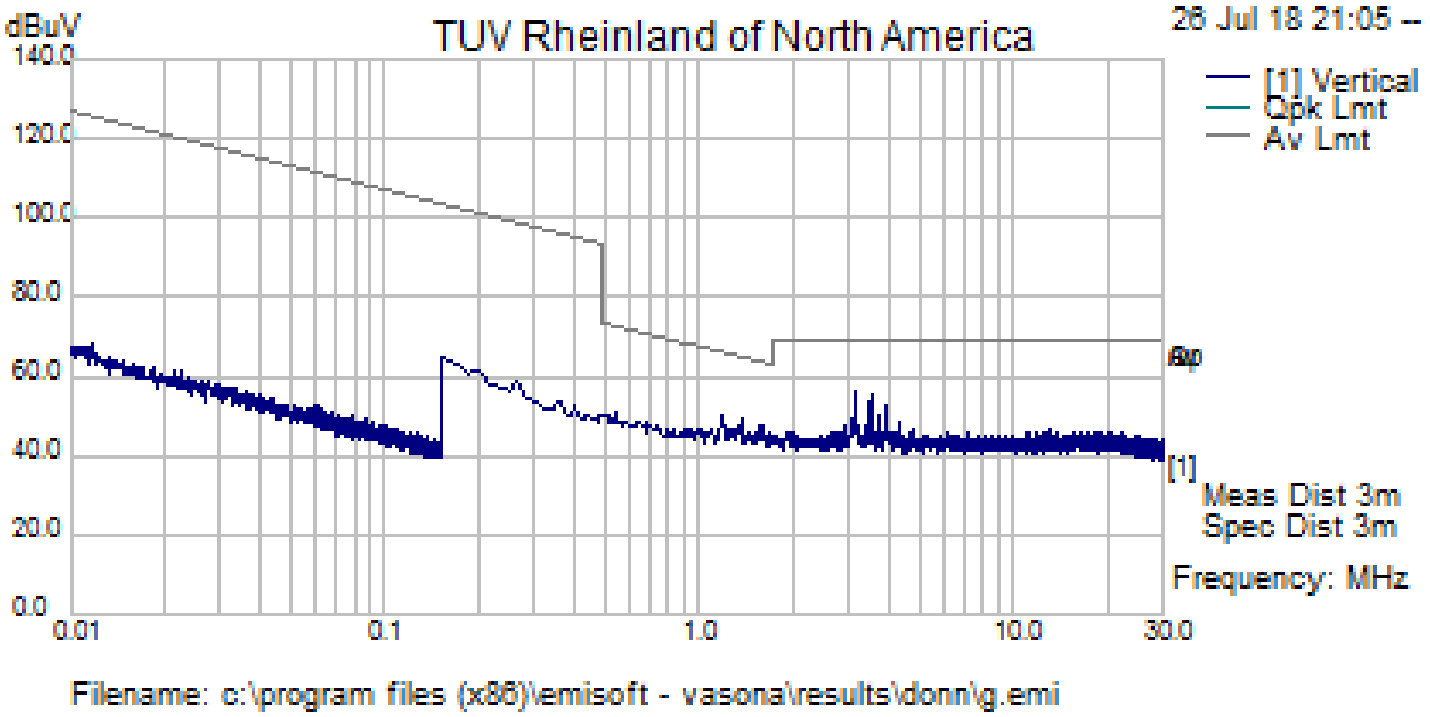
Channel 19 Horizontal unit in horizontal orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail
1 (15)	3.14	42.37	2.36	10.53	55.26	Peak [Scan]	V	136	0.00	69.50	-14.24	Pass
2 (16)	1.58	34.89	2.32	10.60	47.82	Peak [Scan]	V	136	52.00	63.63	-15.82	Pass
3 (17)	3.54	40.02	2.37	10.61	53.01	Peak [Scan]	V	136	94.00	69.50	-16.5	Pass
4 (18)	1.18	36.47	2.31	10.60	49.38	Peak [Scan]	V	136	0.00	66.16	-16.79	Pass
5 (19)	3.92	38.58	2.37	10.69	51.64	Peak [Scan]	V	136	279.00	69.50	-17.86	Pass
6 (20)	2.90	35.71	2.36	10.51	48.57	Peak [Scan]	V	136	233.00	69.50	-20.93	Pass



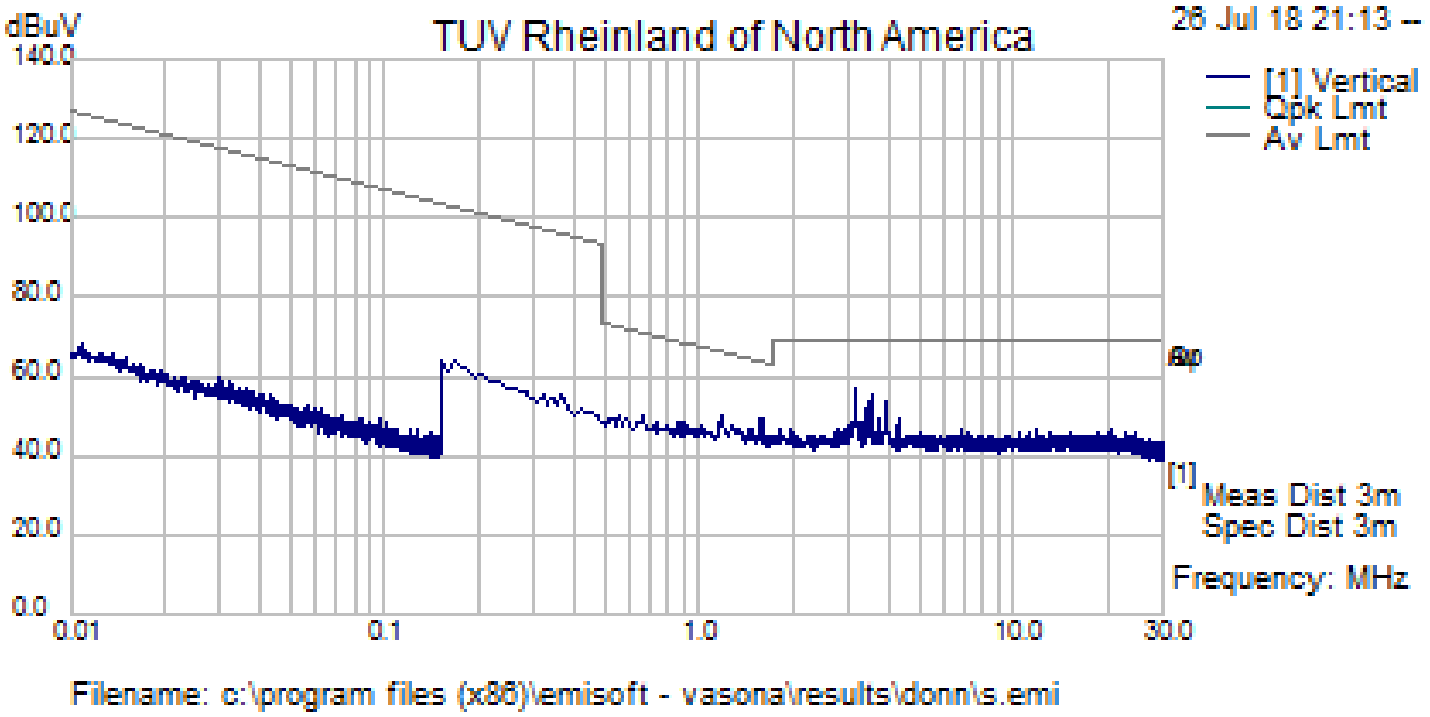
Channel 19 Horizontal unit in vertical orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail
1 (15)	3.69	45.73	2.37	10.64	58.75	Peak [Scan]	V	125	3.00	69.50	-10.75	Pass
2 (16)	3.15	42.94	2.36	10.53	55.83	Peak [Scan]	V	125	239.00	69.50	-13.67	Pass
3 (17)	3.52	41.14	2.37	10.61	54.12	Peak [Scan]	V	125	181.00	69.50	-15.38	Pass
4 (18)	1.58	35.19	2.32	10.60	48.12	Peak [Scan]	V	125	135.00	63.63	-15.51	Pass
5 (19)	1.17	37.51	2.31	10.60	50.41	Peak [Scan]	V	125	0.00	66.23	-15.82	Pass
6 (20)	3.92	40.39	2.37	10.69	53.45	Peak [Scan]	V	125	118.00	69.50	-16.05	Pass



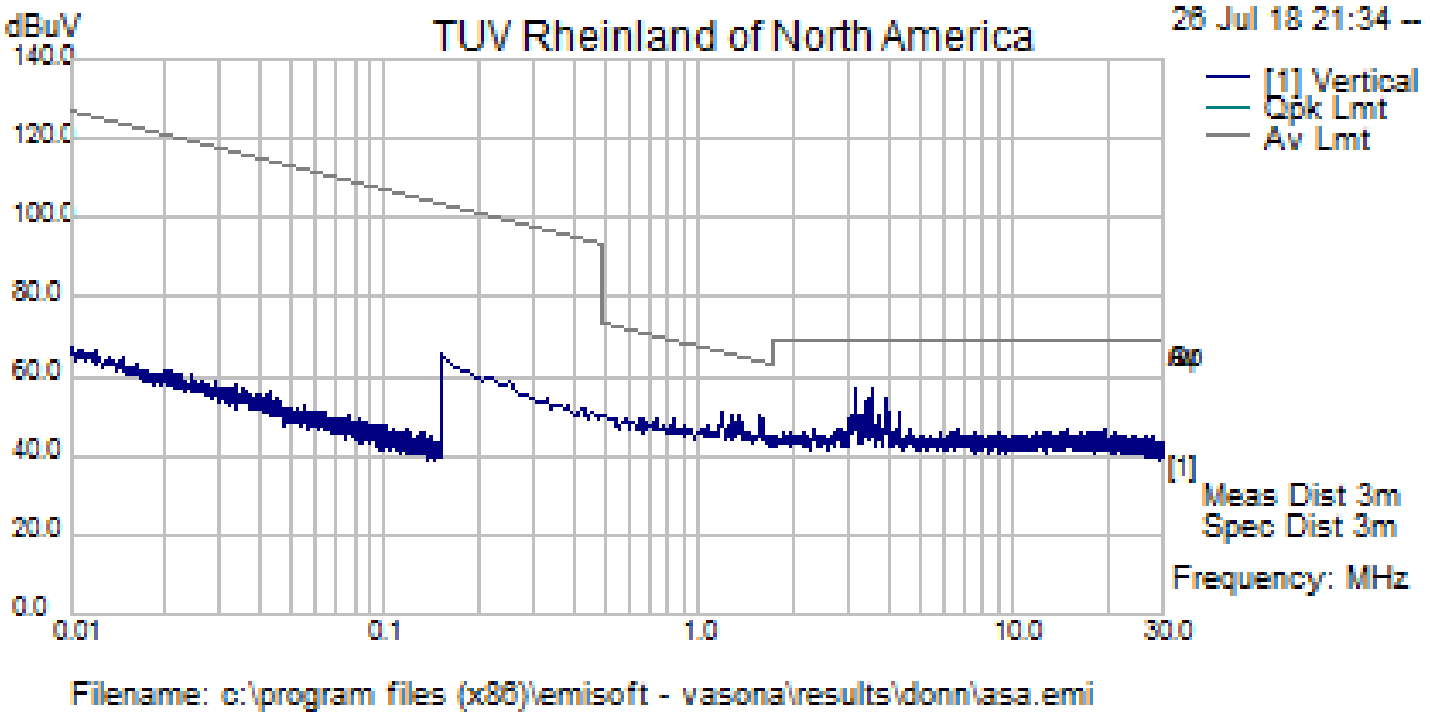
Channel 19 Horizontal unit in vertical orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail
1 (16)	3.14	43.28	2.36	10.53	56.17	Peak [Scan]	V	136	134.00	69.50	-13.33	Pass
2 (17)	3.53	42.34	2.37	10.61	55.32	Peak [Scan]	V	136	268.00	69.50	-14.18	Pass
3 (18)	1.36	36.29	2.31	10.60	49.21	Peak [Scan]	V	136	204.00	64.95	-15.74	Pass
4 (19)	1.57	34.70	2.32	10.60	47.62	Peak [Scan]	V	136	140.00	63.68	-16.07	Pass
5 (20)	1.18	37.09	2.31	10.60	50	Peak [Scan]	V	136	262.00	66.16	-16.17	Pass
6 (21)	3.92	39.69	2.37	10.69	52.76	Peak [Scan]	V	136	337.00	69.50	-16.75	Pass



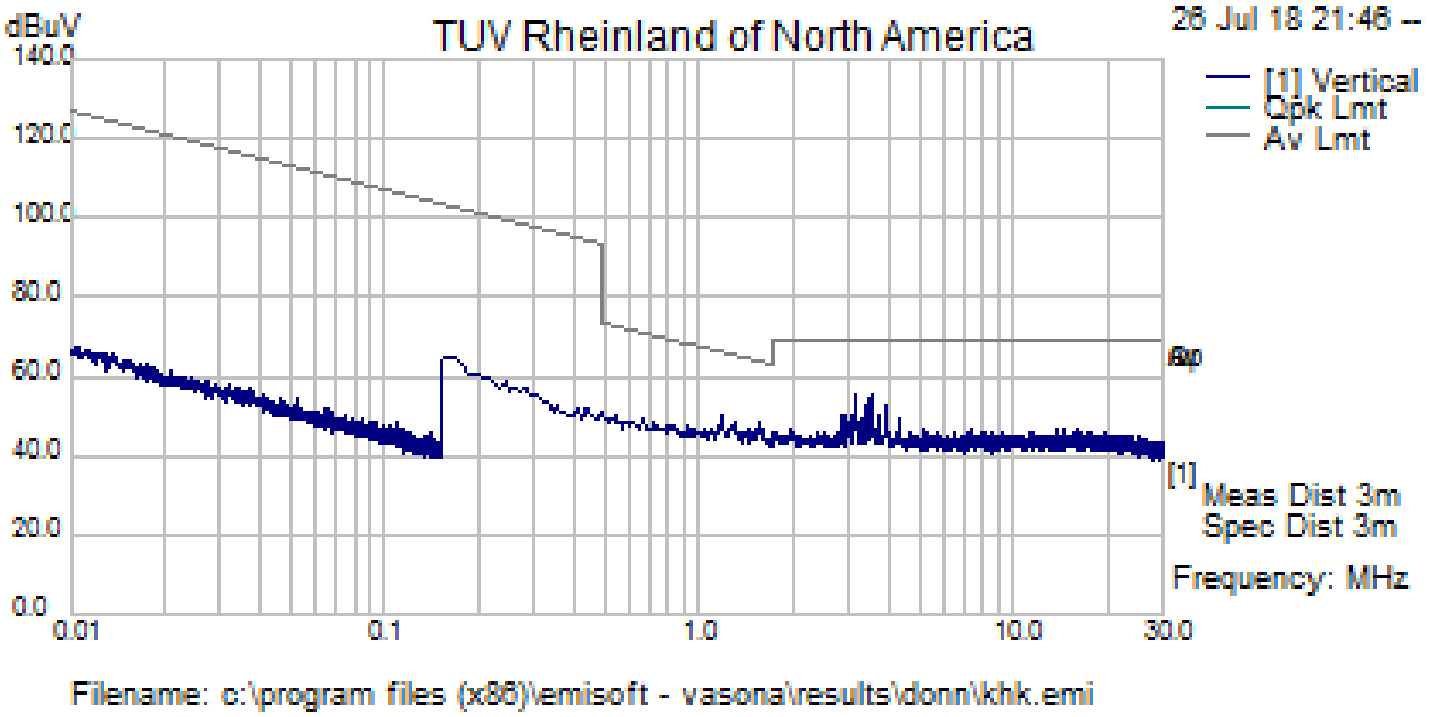
Channel 19 Horizontal unit in horizontal orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail
1 (14)	3.14	43.77	2.36	10.53	56.67	Peak [Scan]	V	125	128.00	69.50	-12.83	Pass
2 (15)	3.53	42.73	2.37	10.61	55.71	Peak [Scan]	V	125	256.00	69.50	-13.79	Pass
3 (16)	1.57	36.47	2.32	10.60	49.4	Peak [Scan]	V	125	40.00	63.68	-14.29	Pass
4 (17)	3.92	40.21	2.37	10.69	53.27	Peak [Scan]	V	125	337.00	69.50	-16.23	Pass
5 (18)	1.17	37.07	2.31	10.60	49.98	Peak [Scan]	V	125	128.00	66.23	-16.25	Pass
6 (19)	3.36	38.78	2.37	10.58	51.73	Peak [Scan]	V	125	238.00	69.50	-17.77	Pass



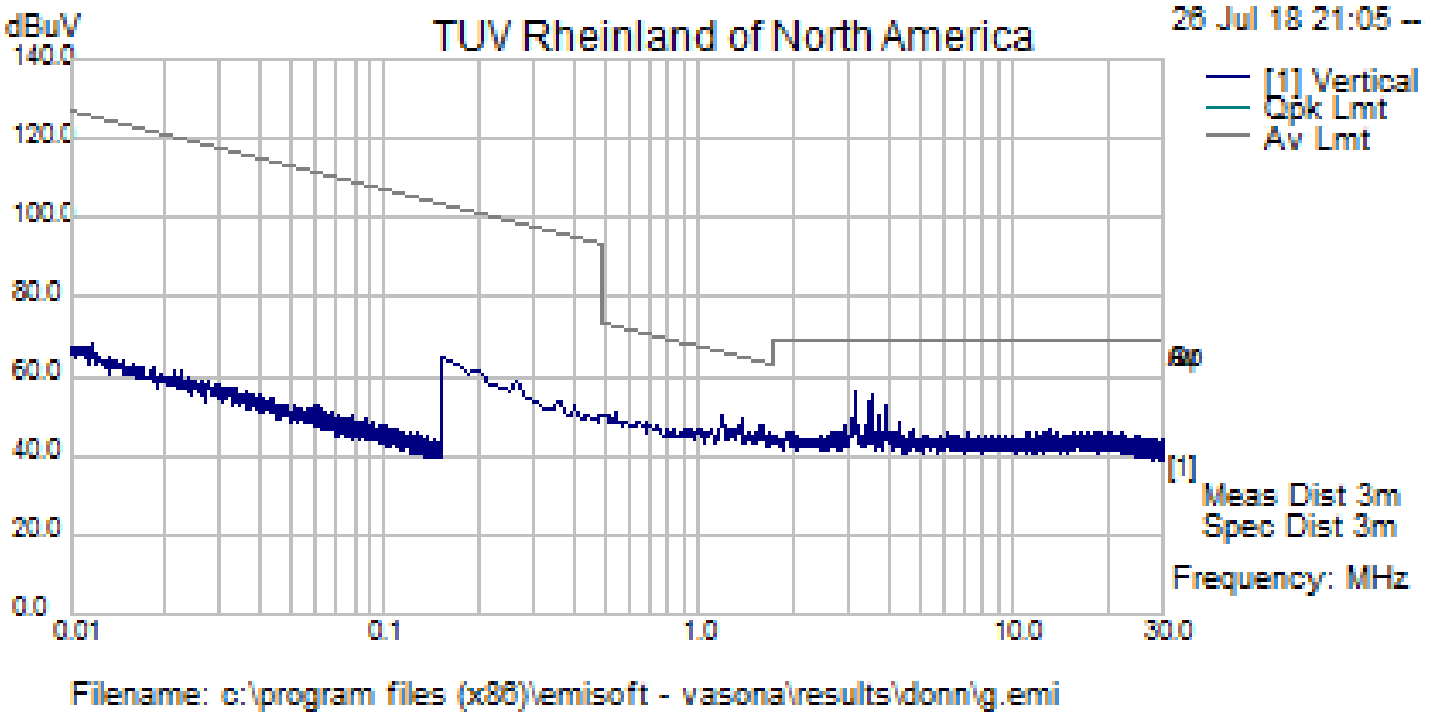
Channel 39 Vertical unit in horizontal orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail
1 (18)	3.13	44.17	2.36	10.53	57.06	Peak [Scan]	V	136	128.00	69.50	-12.44	Pass
2 (19)	3.55	44.05	2.37	10.62	57.03	Peak [Scan]	V	136	320.00	69.50	-12.47	Pass
3 (20)	1.57	36.93	2.32	10.60	49.85	Peak [Scan]	V	136	309.00	63.68	-13.84	Pass
4 (21)	3.91	41.54	2.37	10.68	54.6	Peak [Scan]	V	136	320.00	69.50	-14.91	Pass
5 (22)	1.28	37.33	2.31	10.60	50.24	Peak [Scan]	V	136	192.00	65.44	-15.21	Pass
6 (23)	1.18	38.05	2.31	10.60	50.96	Peak [Scan]	V	136	11.00	66.16	-15.21	Pass



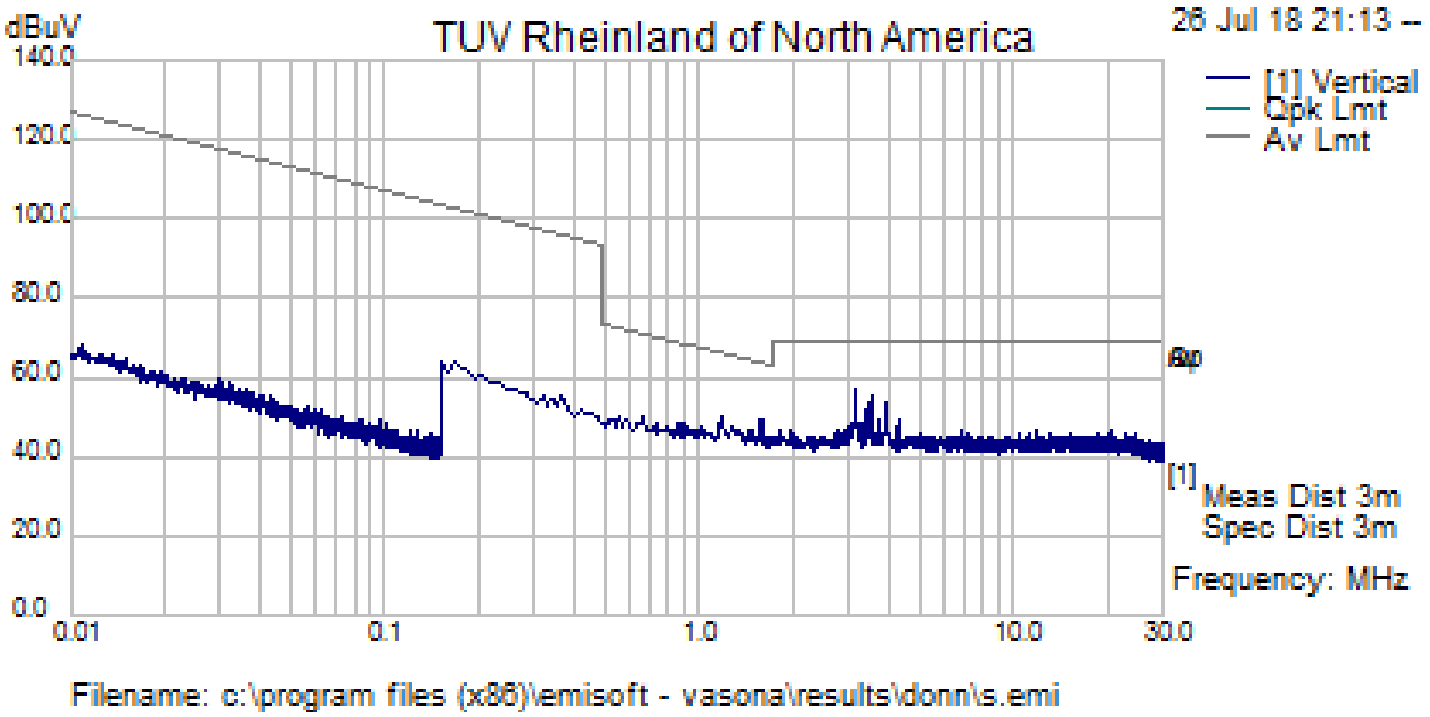
Channel 39 Vertical unit in vertical orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail
1 (19)	3.13	42.77	2.36	10.53	55.66	Peak [Scan]	V	125	349.00	69.50	-13.84	Pass
2 (20)	3.55	42.33	2.37	10.62	55.32	Peak [Scan]	V	125	192.00	69.50	-14.19	Pass
3 (21)	1.57	35.53	2.32	10.60	48.45	Peak [Scan]	V	125	262.00	63.68	-15.23	Pass
4 (22)	1.18	37.00	2.31	10.60	49.91	Peak [Scan]	V	125	256.00	66.16	-16.25	Pass
5 (23)	3.94	39.98	2.37	10.69	53.04	Peak [Scan]	V	125	46.00	69.50	-16.46	Pass
6 (24)	3.37	39.89	2.37	10.58	52.83	Peak [Scan]	V	125	214.00	69.50	-16.67	Pass



Channel 39 Horizontal unit in vertical orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail
1 (16)	3.14	43.28	2.36	10.53	56.17	Peak [Scan]	V	136	134.00	69.50	-13.33	Pass
2 (17)	3.53	42.34	2.37	10.61	55.32	Peak [Scan]	V	136	268.00	69.50	-14.18	Pass
3 (18)	1.36	36.29	2.31	10.60	49.21	Peak [Scan]	V	136	204.00	64.95	-15.74	Pass
4 (19)	1.57	34.70	2.32	10.60	47.62	Peak [Scan]	V	136	140.00	63.68	-16.07	Pass
5 (20)	1.18	37.09	2.31	10.60	50	Peak [Scan]	V	136	262.00	66.16	-16.17	Pass
6 (21)	3.92	39.69	2.37	10.69	52.76	Peak [Scan]	V	136	337.00	69.50	-16.75	Pass



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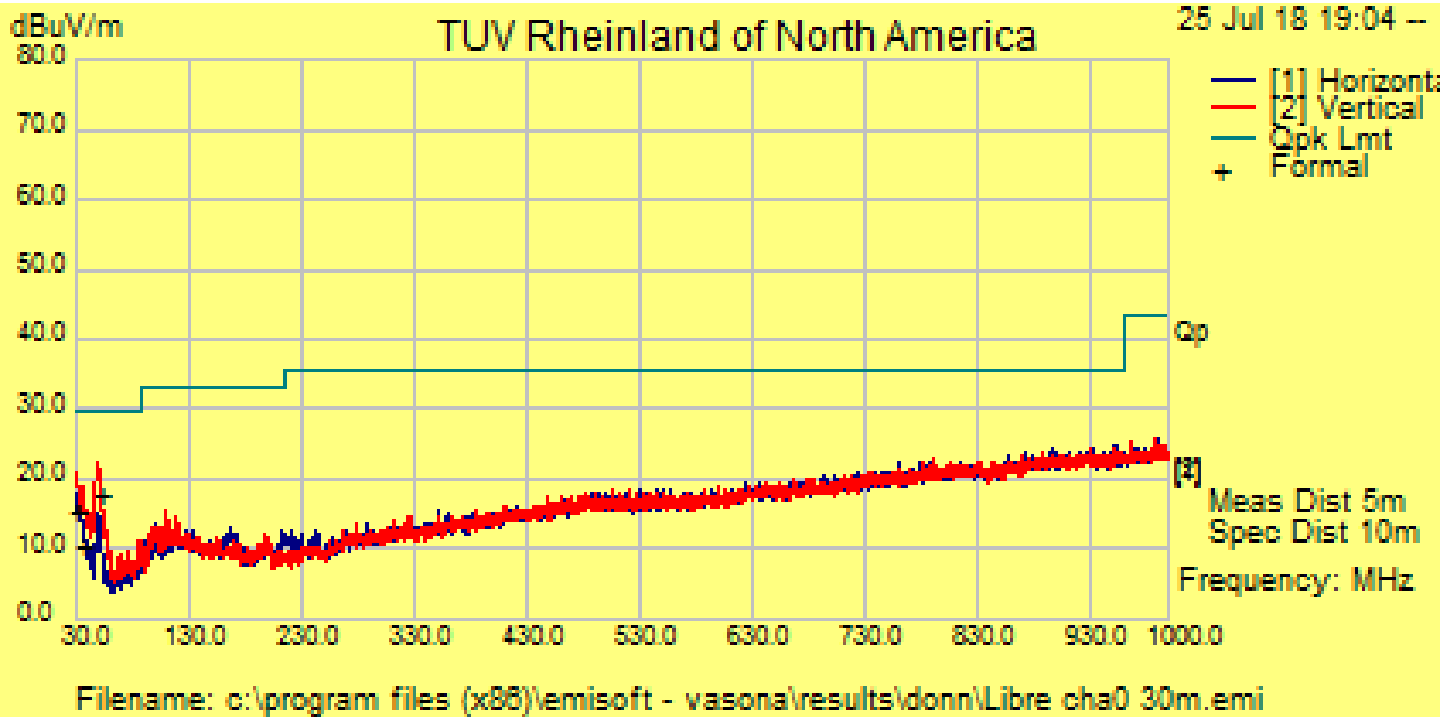
Channel 39 Horizontal unit in horizontal orientation

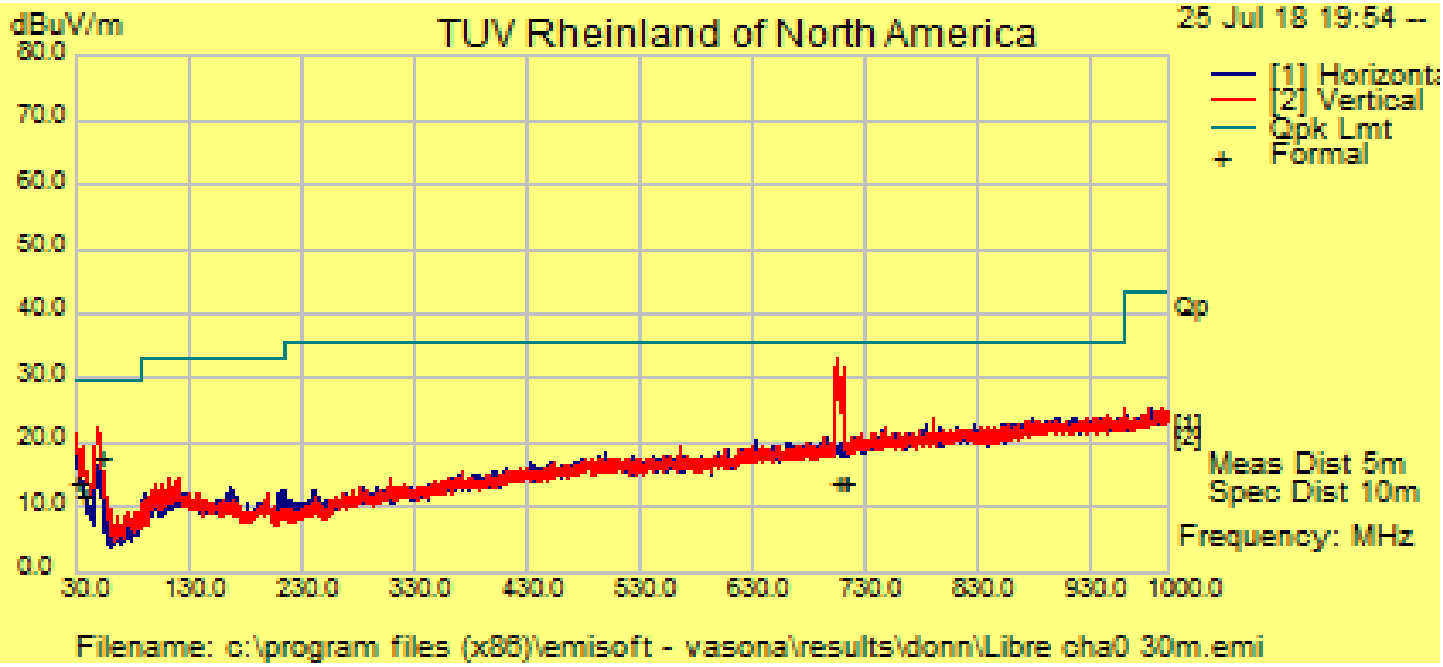
Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail
1 (14)	3.14	43.77	2.36	10.53	56.67	Peak [Scan]	V	125	128.00	69.50	-12.83	Pass
2 (15)	3.53	42.73	2.37	10.61	55.71	Peak [Scan]	V	125	256.00	69.50	-13.79	Pass
3 (16)	1.57	36.47	2.32	10.60	49.4	Peak [Scan]	V	125	40.00	63.68	-14.29	Pass
4 (17)	3.92	40.21	2.37	10.69	53.27	Peak [Scan]	V	125	337.00	69.50	-16.23	Pass
5 (18)	1.17	37.07	2.31	10.60	49.98	Peak [Scan]	V	125	128.00	66.23	-16.25	Pass
6 (19)	3.36	38.78	2.37	10.58	51.73	Peak [Scan]	V	125	238.00	69.50	-17.77	Pass

30 to 1000 MHz



Channel 0 unit Vertical orientation

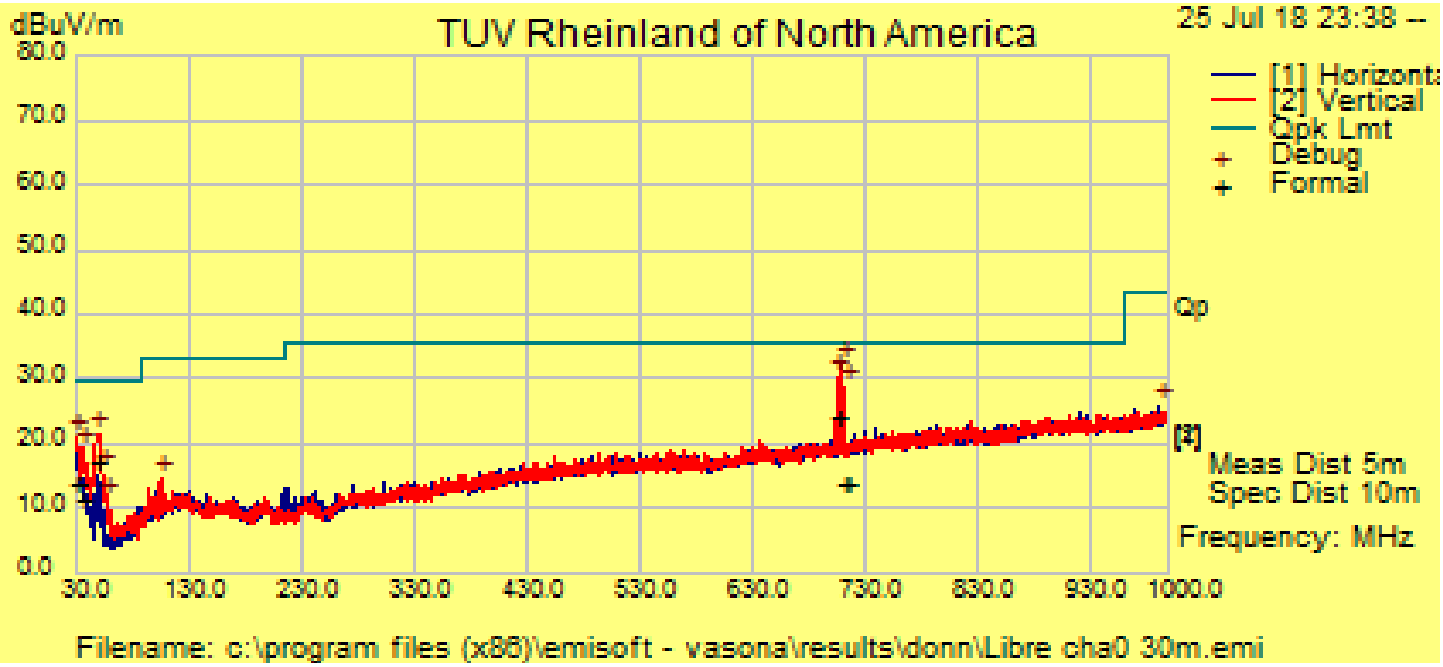
Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
1 (8)	50.07	41.15	2.62	-26.01	17.76	Quasi Max	V	140	0.00	29.50	-11.74	Pass
2 (9)	31.27	26.17	2.49	-13.22	15.44	Quasi Max	V	115	222.00	29.50	-14.06	Pass
3 (10)	36.49	25.15	2.53	-17.19	10.48	Quasi Max	V	258	302.00	29.50	-19.02	Pass



Channel 0 unit in Horizontal orientation

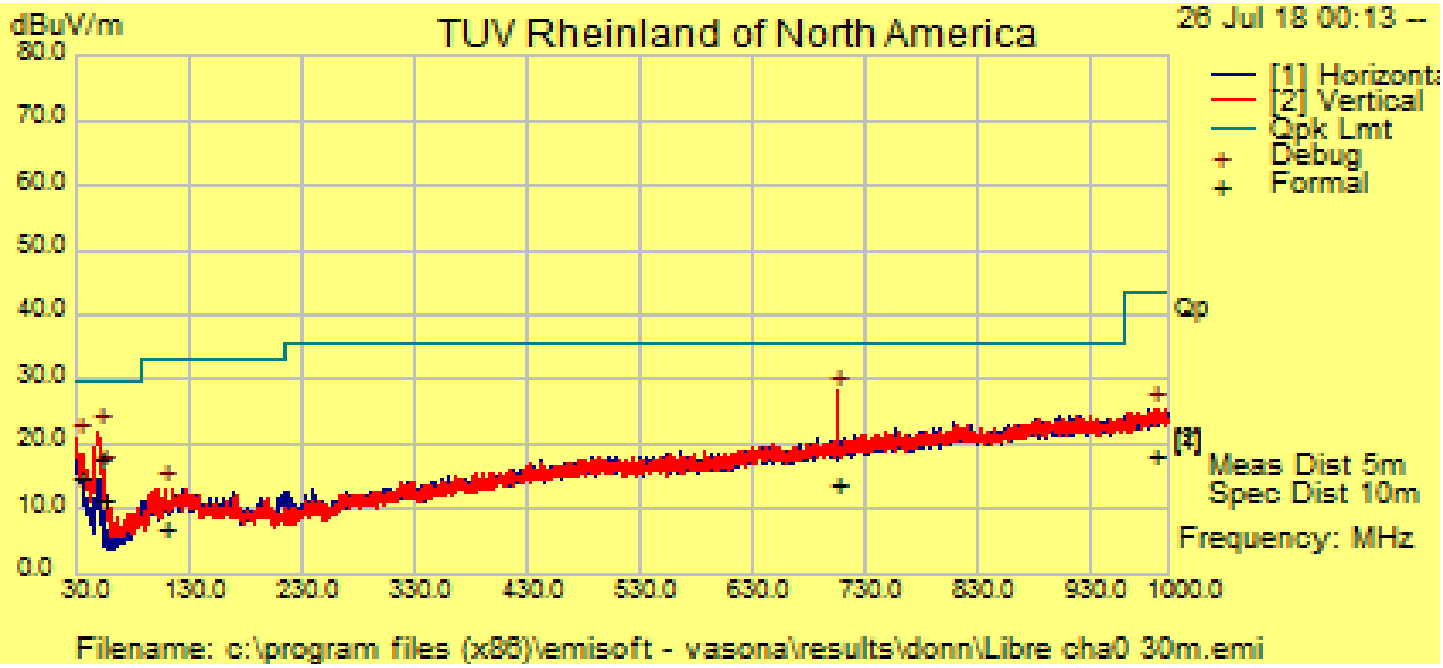
Vasona Data : List of Debug Frequencies

No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
1 (24)	705.665625	42.1	4.58	-13.44	33.23	Peak [Scan]	V	100	55	35.5	-2.27	Pass
2 (25)	711.728125	40.38	4.6	-13.23	31.75	Peak [Scan]	V	100	302	35.5	-3.75	Pass
3 (26)	709.909375	38.9	4.59	-13.26	30.23	Peak [Scan]	V	200	318	35.5	-5.27	Pass
4 (27)	50.309375	45.59	2.63	-26.08	22.13	Peak [Scan]	V	100	241	29.5	-7.37	Pass
5 (28)	30.909375	31.95	2.49	-12.93	21.51	Peak [Scan]	V	100	234	29.5	-7.99	Pass
6 (29)	36.365625	34.15	2.53	-17.1	19.59	Peak [Scan]	V	100	1	29.5	-9.91	Pass
7 (30)	54.85625	37.7	2.66	-26.69	13.67	Peak [Scan]	V	100	196	29.5	-15.83	Pass
8 (31)	111.540625	32.54	2.93	-20.73	14.73	Peak [Scan]	V	200	360	33	-18.27	Pass
9 (32)	984.84375	28.96	5.1	-8.84	25.22	Peak [Scan]	H	100	268	43.5	-18.28	Pass



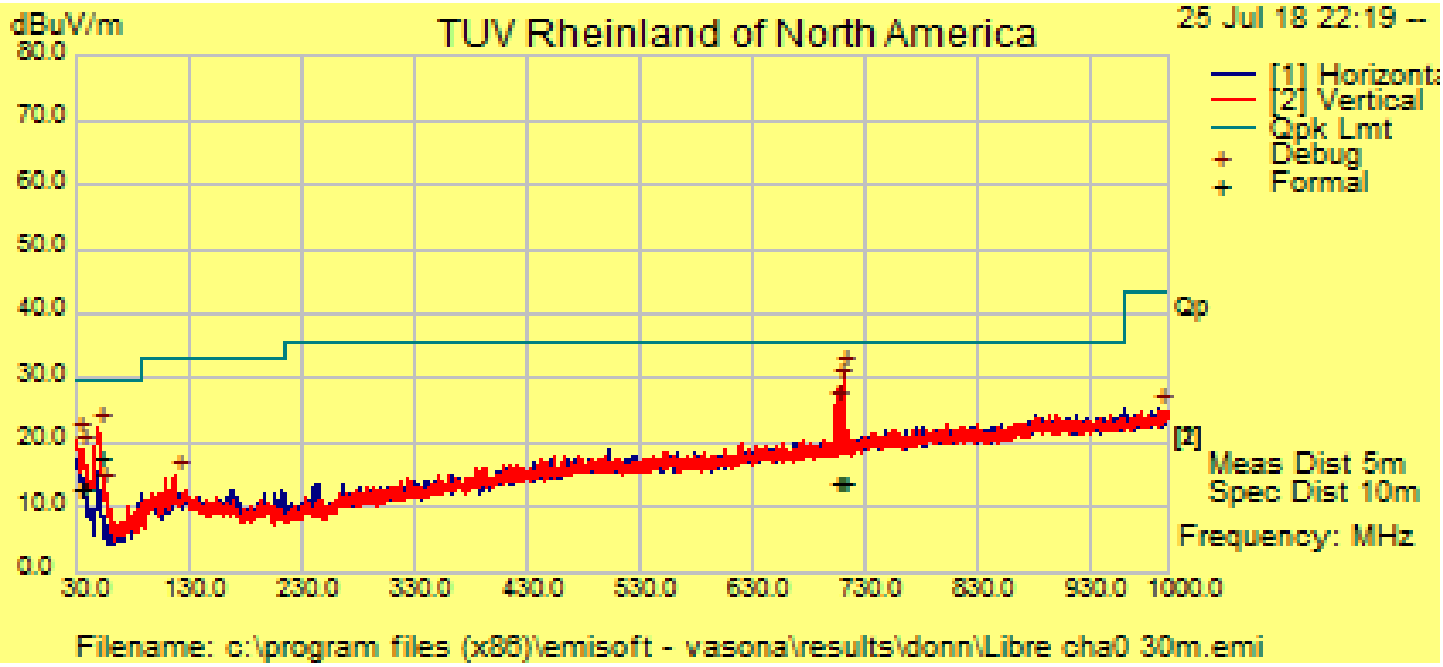
Channel 19 unit in Vertical orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
1 (115)	710.10	22.56	4.59	-13.26	13.89	Quasi Max	V	204	76.00	35.50	-21.61	Pass
2 (116)	705.75	33.09	4.58	-13.44	24.23	Quasi Max	V	224	78.00	35.50	-11.27	Pass
3 (117)	713.40	22.52	4.60	-13.19	13.93	Quasi Max	V	186	248.00	35.50	-21.57	Pass
4 (118)	48.97	40.16	2.61	-25.58	17.2	Quasi Max	V	125	30.00	29.50	-12.31	Pass
5 (119)	30.00	23.24	2.49	-12.20	13.53	Quasi Max	V	238	142.00	29.50	-15.98	Pass
6 (120)	36.14	25.47	2.52	-16.92	11.07	Quasi Max	V	224	84.00	29.50	-18.43	Pass



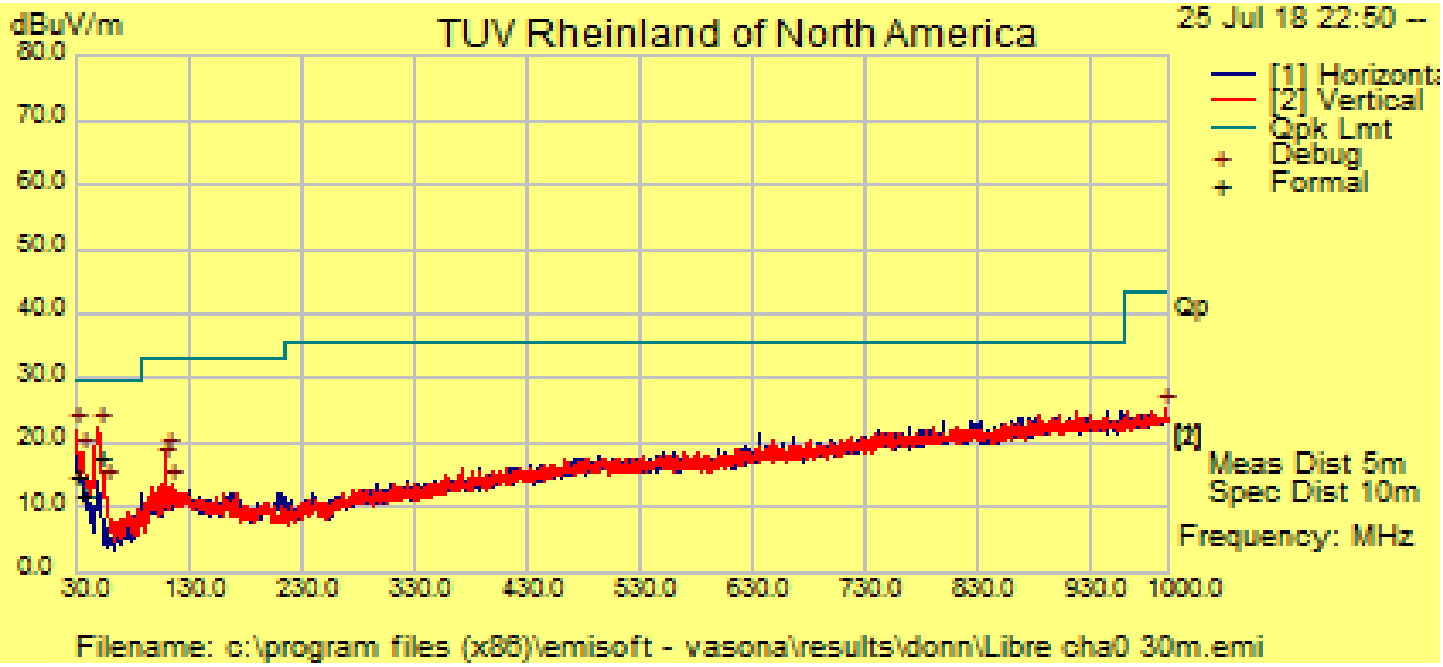
Channel 19 unit in Horizontal orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
1 (131)	706.70	22.55	4.58	-13.40	13.73	Quasi Max	V	237	226.00	35.50	-21.77	Pass
2 (132)	50.30	41.27	2.63	-26.08	17.81	Quasi Max	V	115	0.00	29.50	-11.69	Pass
3 (133)	31.57	25.91	2.49	-13.46	14.94	Quasi Max	V	144	236.00	29.50	-14.56	Pass
4 (134)	53.84	35.16	2.66	-26.67	11.14	Quasi Max	V	131	192.00	29.50	-18.36	Pass
5 (135)	988.39	21.54	5.13	-8.73	17.94	Quasi Max	V	292	284.00	43.50	-25.56	Pass
6 (136)	108.90	24.91	2.92	-21.17	6.66	Quasi Max	V	113	148.00	33.00	-26.34	Pass



Channel 39 unit in Vertical orientation

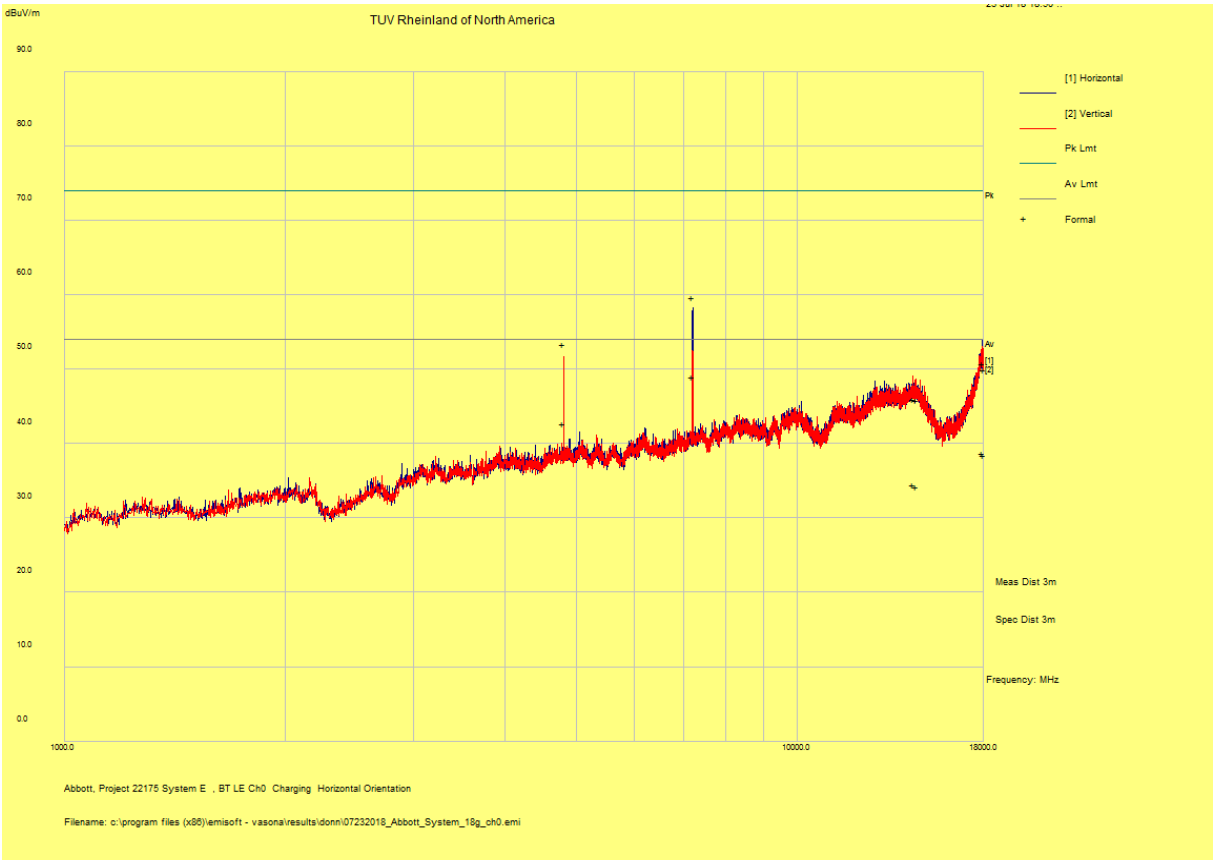
Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
1 (81)	49.90	40.79	2.62	-25.95	17.46	Quasi Max	V	175	306.00	29.50	-12.04	Pass
2 (83)	32.35	24.45	2.49	-14.05	12.89	Quasi Max	V	191	360.00	29.50	-16.61	Pass
3 (84)	36.75	27.41	2.54	-17.40	12.54	Quasi Max	V	112	360.00	29.50	-16.96	Pass
4 (80)	712.19	22.50	4.60	-13.22	13.89	Quasi Max	V	250	324.00	35.50	-21.62	Pass
5 (82)	708.67	22.57	4.59	-13.32	13.84	Quasi Max	V	363	360.00	35.50	-21.66	Pass
6 (85)	704.77	22.50	4.58	-13.47	13.61	Quasi Max	V	207	56.00	35.50	-21.89	Pass



Channel 39 unit in Horizontal orientation

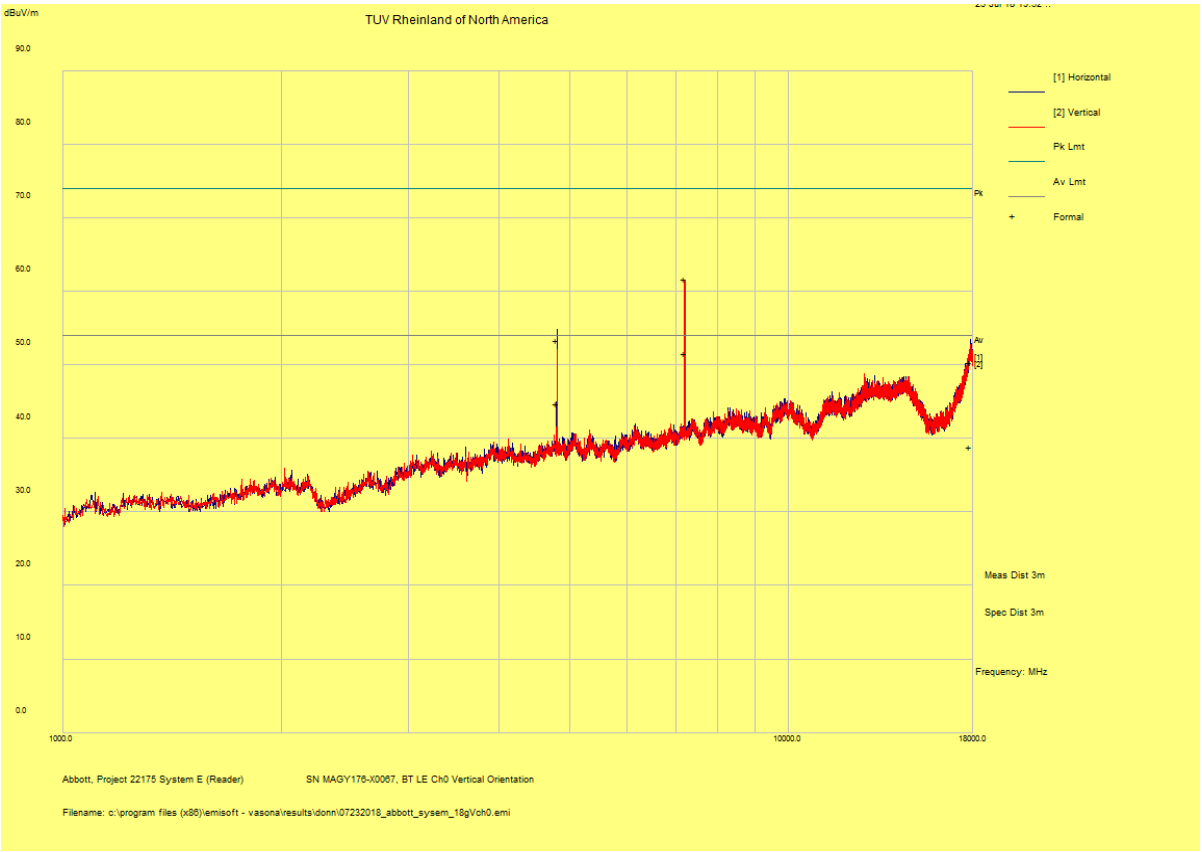
Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
No	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
1 (97)	50.21	41.03	2.62	-26.06	17.6	Quasi Max	V	160	292.00	29.50	-11.9	Pass
2 (98)	30.52	25.05	2.49	-12.62	14.93	Quasi Max	V	107	352.00	29.50	-14.58	Pass
3 (99)	36.07	25.96	2.52	-16.85	11.62	Quasi Max	V	155	146.00	29.50	-17.88	Pass

1 to 18 GHz.



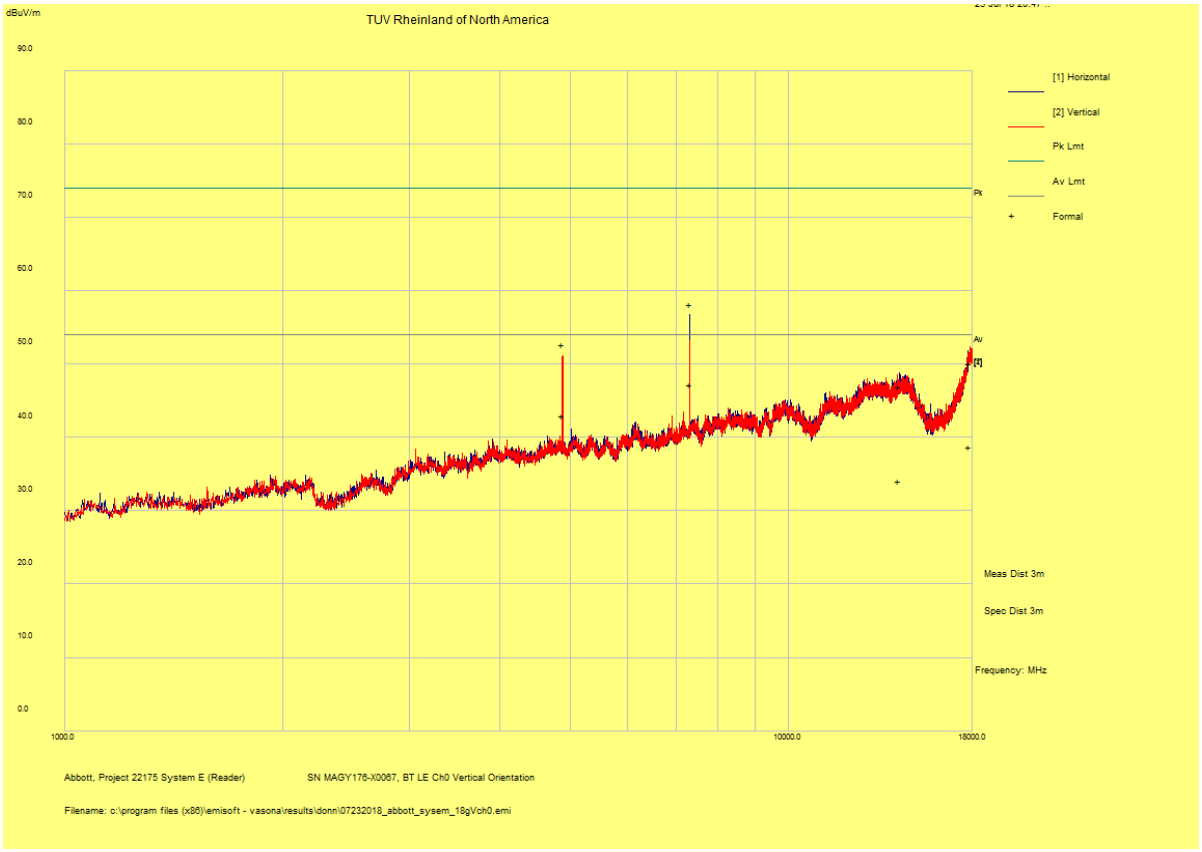
Channel 0 1 to 18GHz. Unit in Horizontal orientation

Vasona Data : Formally Assessed Peaks											
No	Frequency	Raw dBu\	Cable Los	AF dB	Level dBu	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBu	Margin dB	Pass /Fail
1 (36)	7206.659	71.08	2.64	-14.12	59.61	Peak Max	H	104	144	74	-14.39	Pass
2 (37)	17929.75	49.88	4.22	-3.33	50.76	Peak Max	H	206	124	74	-23.24	Pass
3 (38)	17996.25	48.97	4.2	-3.19	49.99	Peak Max	V	239	66	74	-24.01	Pass
4 (39)	4804.553	69.24	2.14	-17.97	53.41	Peak Max	V	116	76	74	-20.59	Pass
5 (40)	14410.64	51.87	3.67	-9.6	45.95	Peak Max	V	117	144	74	-28.05	Pass
6 (41)	14555.41	51.72	3.79	-9.64	45.87	Peak Max	V	161	228	74	-28.13	Pass
7 (36)	7206.659	60.49	2.64	-14.12	49.02	Average Max	H	104	144	54	-4.98	Pass
8 (37)	17929.75	37.82	4.22	-3.33	38.71	Average Max	H	206	124	54	-15.29	Pass
9 (38)	17996.25	37.46	4.2	-3.19	38.48	Average Max	V	239	66	54	-15.52	Pass
10 (39)	4804.553	58.55	2.14	-17.97	42.72	Average Max	V	116	76	54	-11.28	Pass
11 (40)	14410.64	40.36	3.67	-9.6	34.43	Average Max	V	117	144	54	-19.57	Pass
12 (41)	14555.41	40.03	3.79	-9.64	34.18	Average Max	V	161	228	54	-19.82	Pass



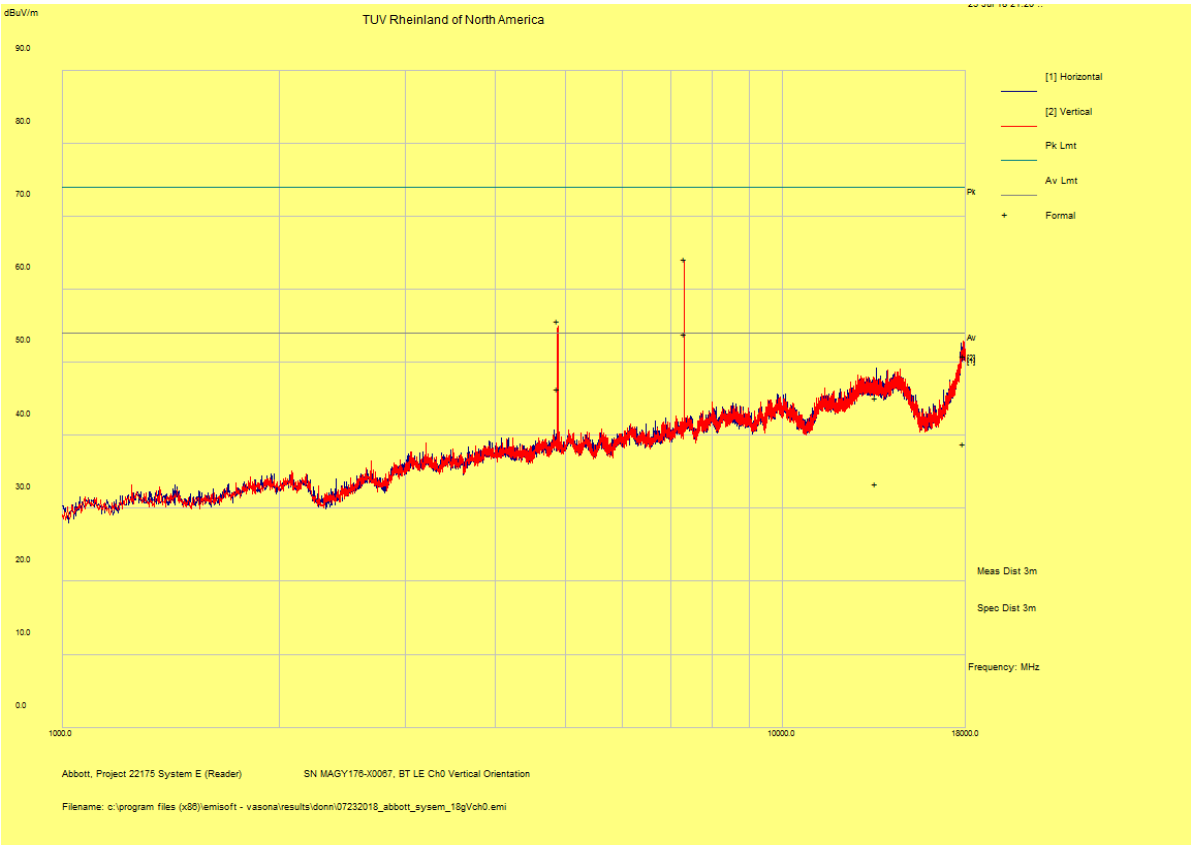
Channel 0 1 to 18GHz. Unit in Vertical orientation

Vasona Data : Formally Assessed Peaks											
No	Frequency	Raw dBuV	Cable Los	AF dB	Level dBu	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBu	Margin dB	Pass /Fail
1 (31)	4803.558	69.18	2.14	-17.97	53.35	Peak Max	H	311	54	74	-20.65	Pass
2 (31)	4803.558	60.54	2.14	-17.97	44.71	Average Max	H	311	54	54	-9.29	Pass
3 (30)	7205.16	63.13	2.65	-14.13	51.65	Average Max	V	255	18	54	-2.36	Pass
4 (30)	7205.16	73.26	2.65	-14.13	61.77	Peak Max	V	255	18	74	-12.23	Pass
5 (32)	17849.27	38.23	4.23	-3.65	38.82	Average Max	H	241	112	54	-15.18	Pass
6 (32)	17849.27	49.82	4.23	-3.65	50.41	Peak Max	H	241	112	74	-23.59	Pass



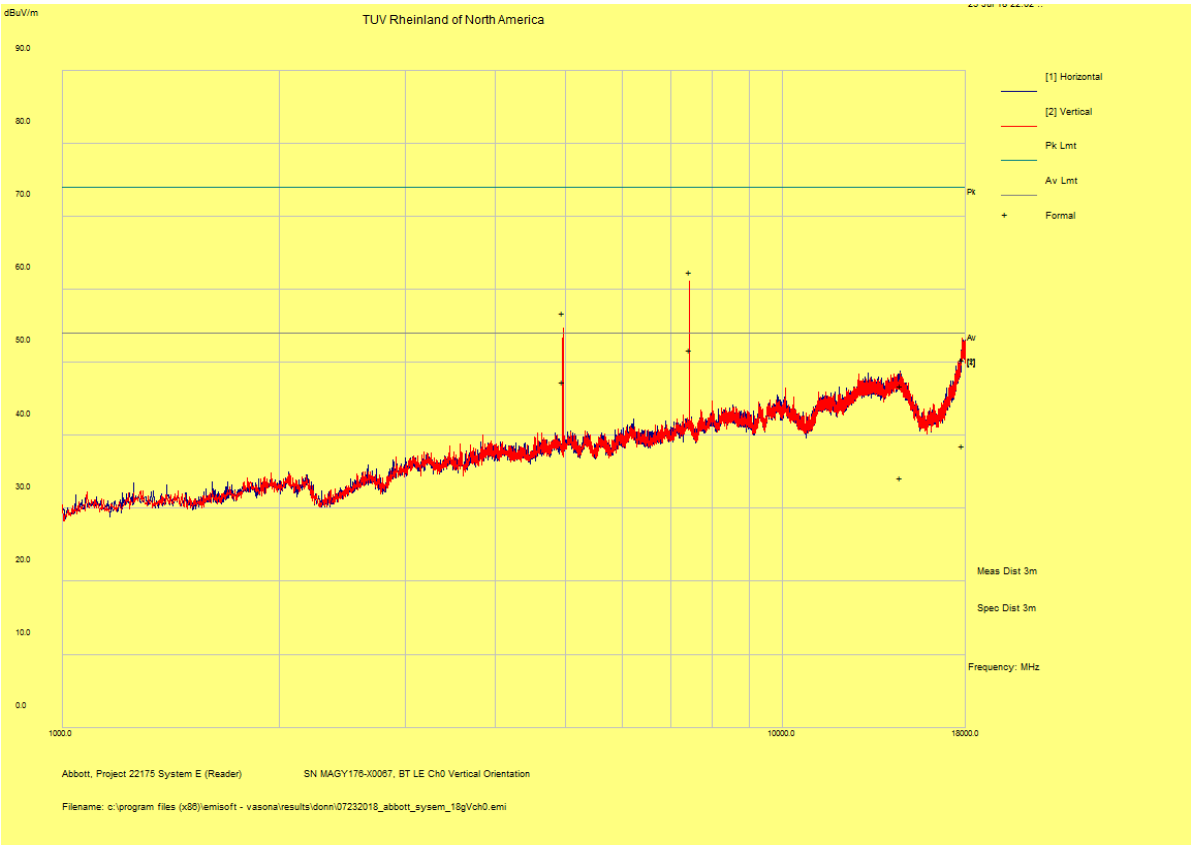
Channel 19 1 to 18GHz. Unit in Horizontal orientation

Vasona Data : Formally Assessed Peaks												
No	Frequency	Raw dBuV	Cable Los	AF dB	Level dBu	Measuren	Pol	Hgt cm	Azt Deg	Limit dBu	Margin dB	Pass /Fail
1 (60)	7320.693	68.9	2.63	-13.39	58.14	Peak Max	H	102	46	74	-15.86	Pass
2 (61)	17843.7	49.57	4.24	-3.68	50.13	Peak Max	V	263	22	74	-23.87	Pass
3 (62)	4880.374	68.32	2.24	-17.86	52.7	Peak Max	V	109	64	74	-21.3	Pass
4 (63)	14252.45	53.14	3.69	-9.87	46.96	Peak Max	H	332	268	74	-27.04	Pass
5 (60)	7320.693	57.93	2.63	-13.39	47.17	Average M	H	102	46	54	-6.83	Pass
6 (61)	17843.7	38.24	4.24	-3.68	38.8	Average M	V	263	22	54	-15.2	Pass
7 (62)	4880.374	58.54	2.24	-17.86	42.92	Average M	V	109	64	54	-11.08	Pass
8 (63)	14252.45	40.26	3.69	-9.87	34.08	Average M	H	332	268	54	-19.92	Pass



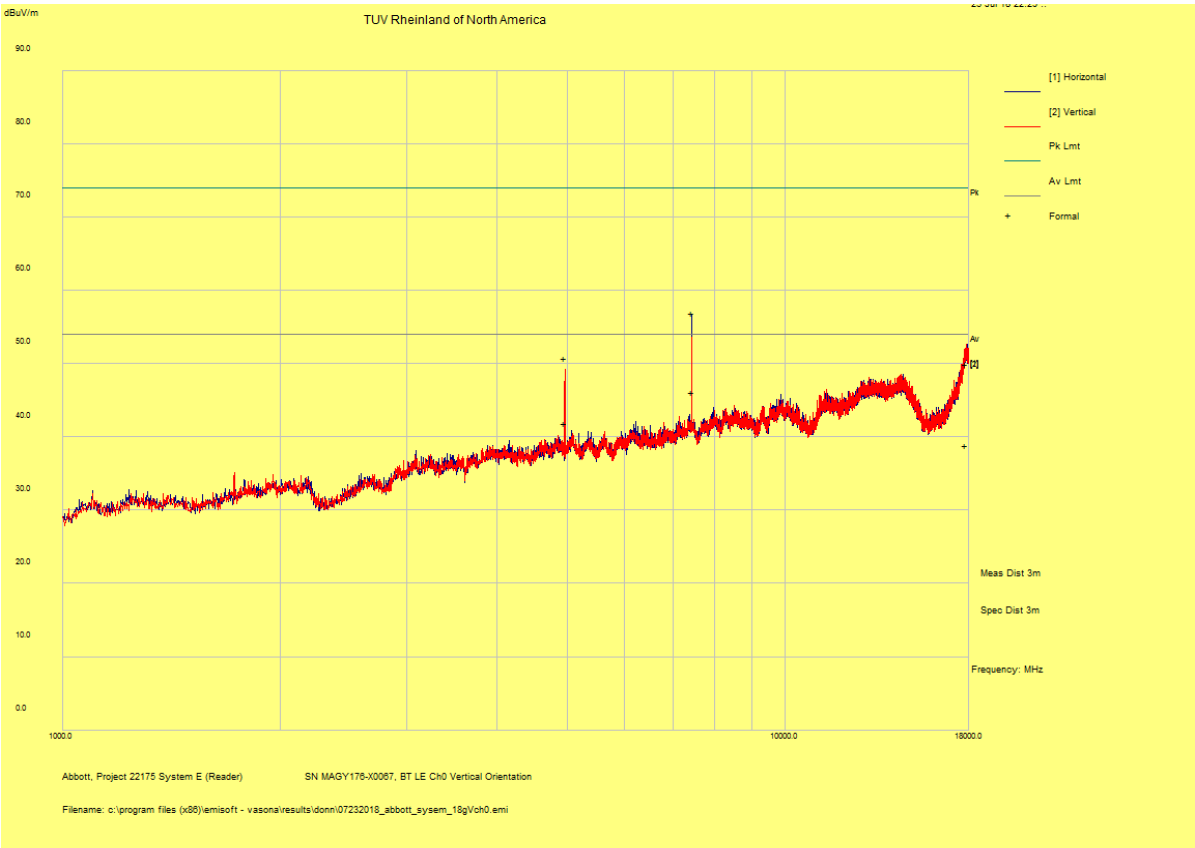
Channel 19 1 to 18GHz. unit in Vertical orientation

Vasona Data : Formally Assessed Peaks												
No	Frequency	Raw dBuV	Cable Los	AF dB	Level dBu	Measuren	Pol	Hgt cm	Azt Deg	Limit dBu	Margin dB	Pass /Fail
1 (90)	7319.086	74.88	2.64	-13.4	64.12	Peak Max	V	133	14	74	-9.89	Pass
2 (91)	4880.394	71.39	2.24	-17.86	55.77	Peak Max	V	313	360	74	-18.23	Pass
3 (92)	17866.13	50.29	4.22	-3.55	50.95	Peak Max	V	346	30	74	-23.05	Pass
4 (93)	13517.98	52.69	3.66	-11.22	45.14	Peak Max	H	247	264	74	-28.86	Pass
5 (90)	7319.086	64.66	2.64	-13.4	53.9	Average M	V	133	14	54	-0.1	Pass
6 (91)	4880.394	62.07	2.24	-17.86	46.45	Average M	V	313	360	54	-7.55	Pass
7 (92)	17866.13	38.16	4.22	-3.55	38.83	Average M	V	346	30	54	-15.17	Pass
8 (93)	13517.98	40.98	3.66	-11.22	33.43	Average M	H	247	264	54	-20.57	Pass



Channel 39 1 to 18GHz. unit in Vertical orientation

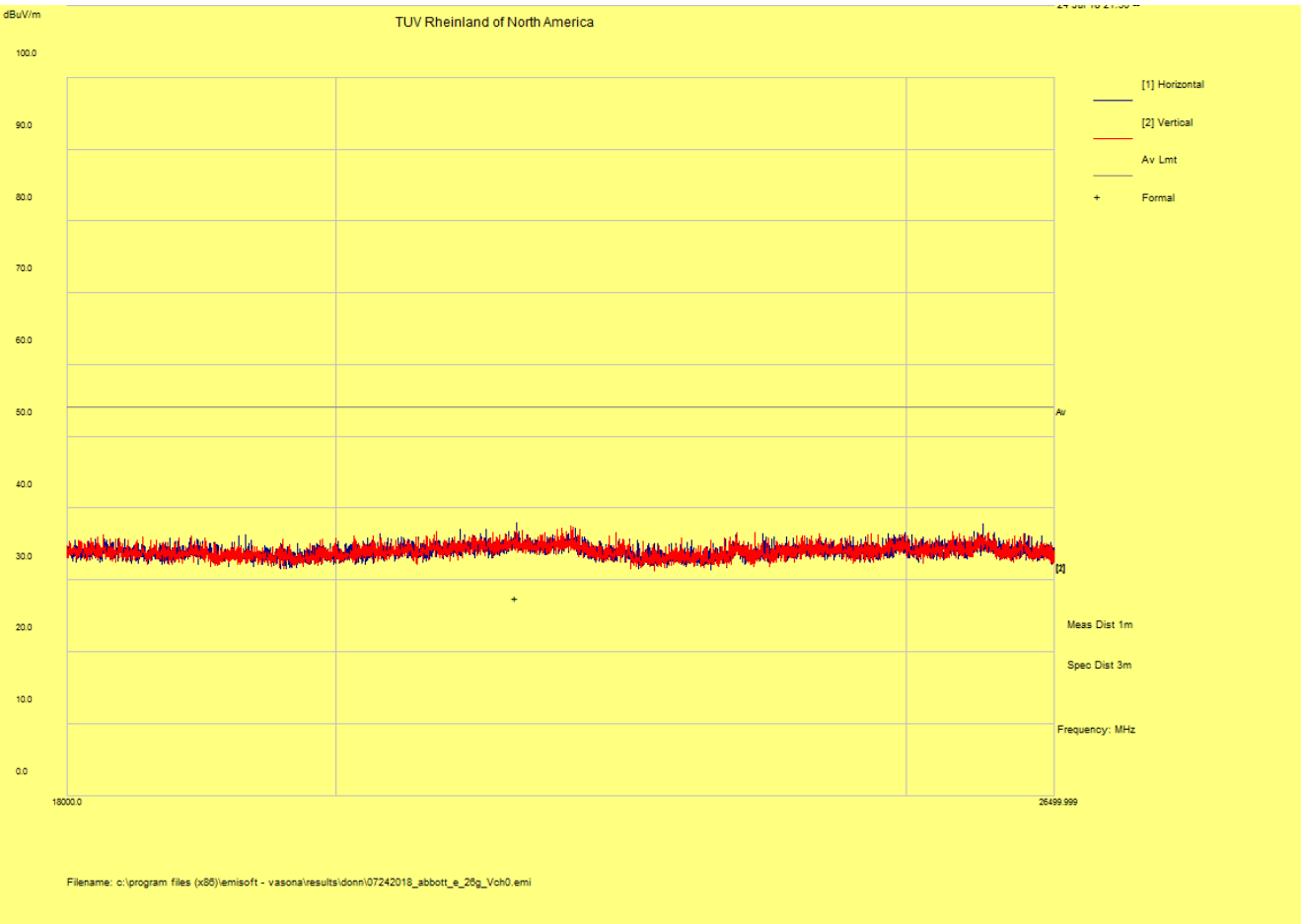
Vasona Data : Formally Assessed Peaks												
No	Frequency	Raw dBu\	Cable Los	AF dB	Level dBu	Measuren	Pol	Hgt cm	Azt Deg	Limit dBu'	Margin dI	Pass /Fail
1 (120)	7440.663	72.81	2.7	-13.1	62.41	Peak Max	V	108	14	74	-11.59	Pass
2 (121)	4960.404	72.72	2.16	-18.08	56.79	Peak Max	V	321	20	74	-17.21	Pass
3 (122)	17821.04	49.98	4.26	-3.81	50.42	Peak Max	V	146	360	74	-23.58	Pass
4 (123)	14604.01	52.44	3.87	-9.53	46.78	Peak Max	H	281	158	74	-27.22	Pass
5 (120)	7440.663	62.1	2.7	-13.1	51.7	Average M	V	108	14	54	-2.3	Pass
6 (121)	4960.404	63.28	2.16	-18.08	47.36	Average M	V	321	20	54	-6.64	Pass
7 (122)	17821.04	38.19	4.26	-3.81	38.63	Average M	V	146	360	54	-15.37	Pass
8 (123)	14604.01	39.82	3.87	-9.53	34.16	Average M	H	281	158	54	-19.84	Pass



Channel 39 1 to 18GHz. Horizontal orientation

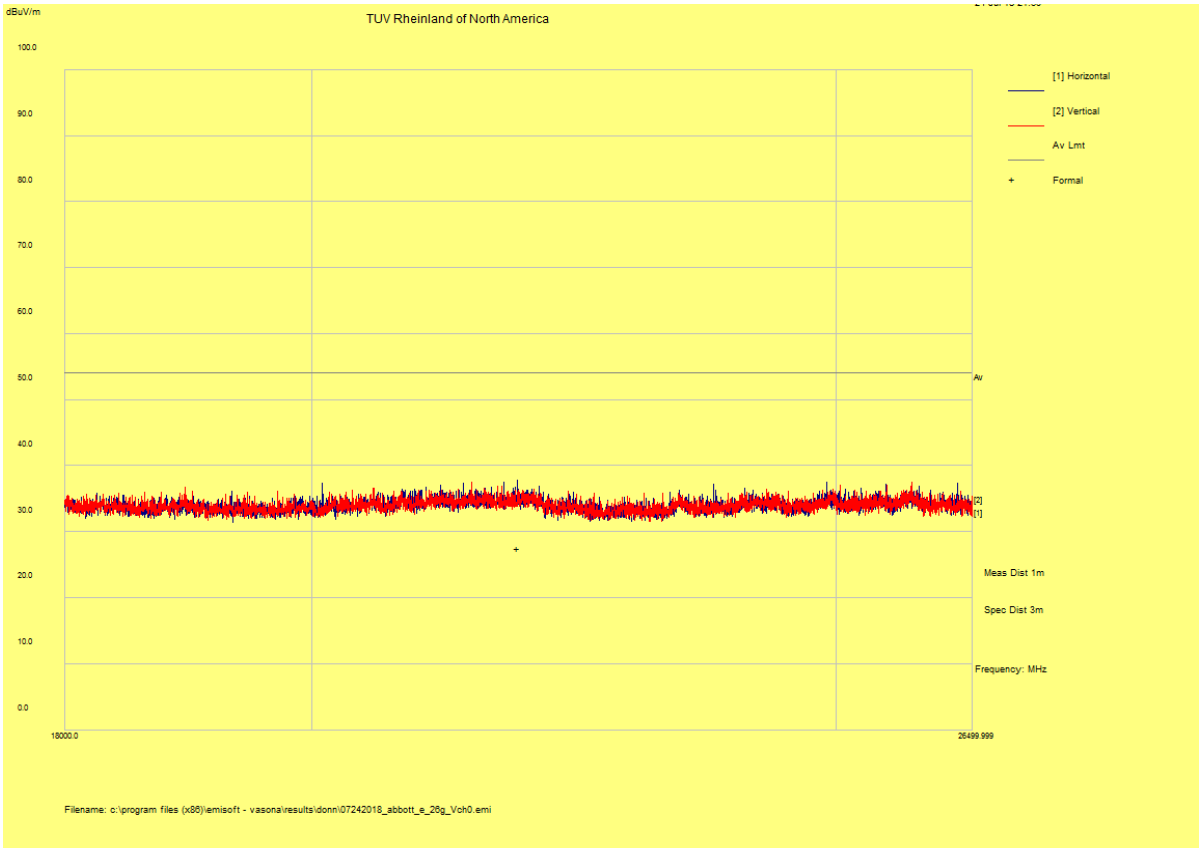
Vasona Data : Formally Assessed Peaks											
No	Frequency	Raw dBuV	Cable Los	AF dB	Level dBuV/m	Measuren	Pol	Hgt cm	Azt Deg	Limit dBu	Margin dB	Pass /Fail
1 (152)	7439.01	67.32	2.7	-13.11	56.91	Peak Max	H	111	144	74	-17.09	Pass
2 (153)	17834.35	49.39	4.25	-3.73	49.9	Peak Max	V	157	80	74	-24.1	Pass
3 (154)	4959.971	66.74	2.16	-18.08	50.81	Peak Max	V	337	54	74	-23.19	Pass
4 (152)	7439.01	56.52	2.7	-13.11	46.11	Average M	H	111	144	54	-7.89	Pass
5 (153)	17834.35	38.34	4.25	-3.73	38.85	Average M	V	157	80	54	-15.15	Pass
6 (154)	4959.971	57.87	2.16	-18.08	41.94	Average M	V	337	54	54	-12.06	Pass

18 to 26 GHz.



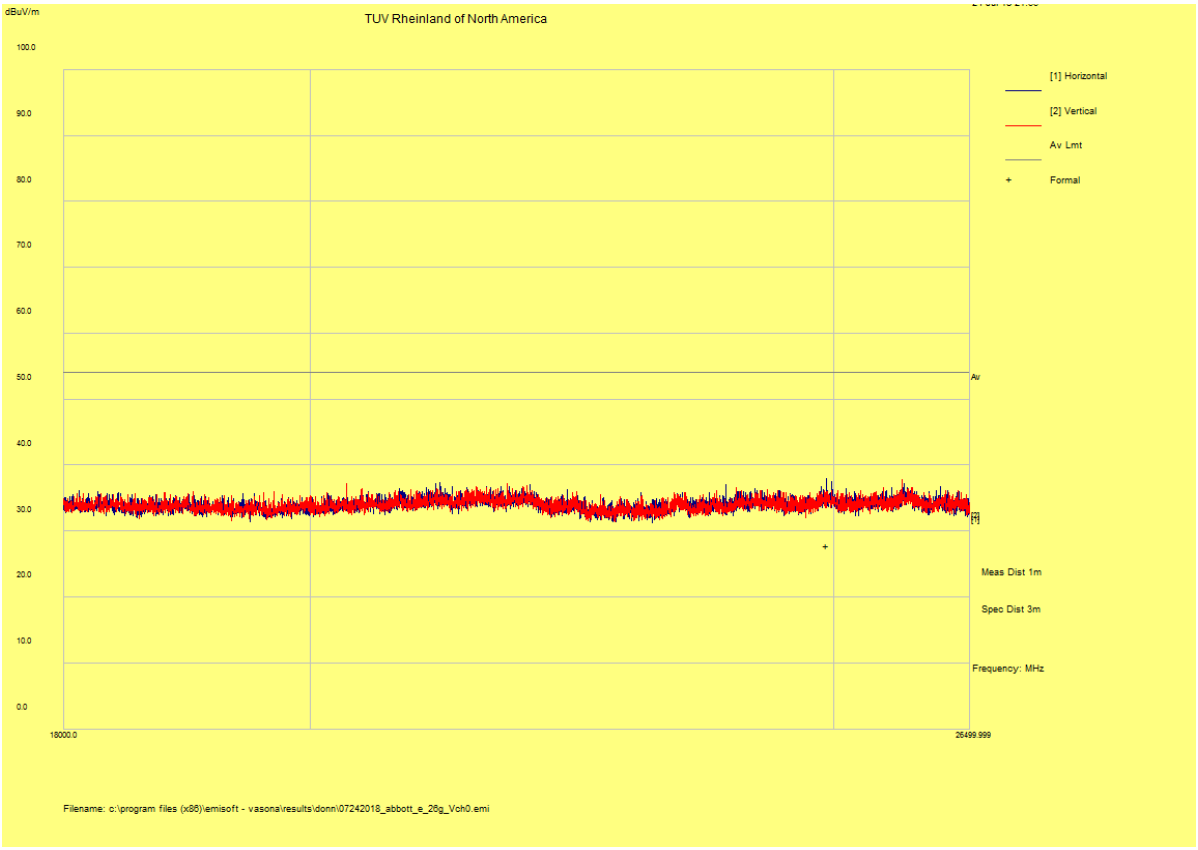
Channel 0 18 to 26GHz unit in Vertical orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
21459.40	29.29	7.70	-9.54	27.46	Average Max	H	150	158	54.00	-26.54	Pass	



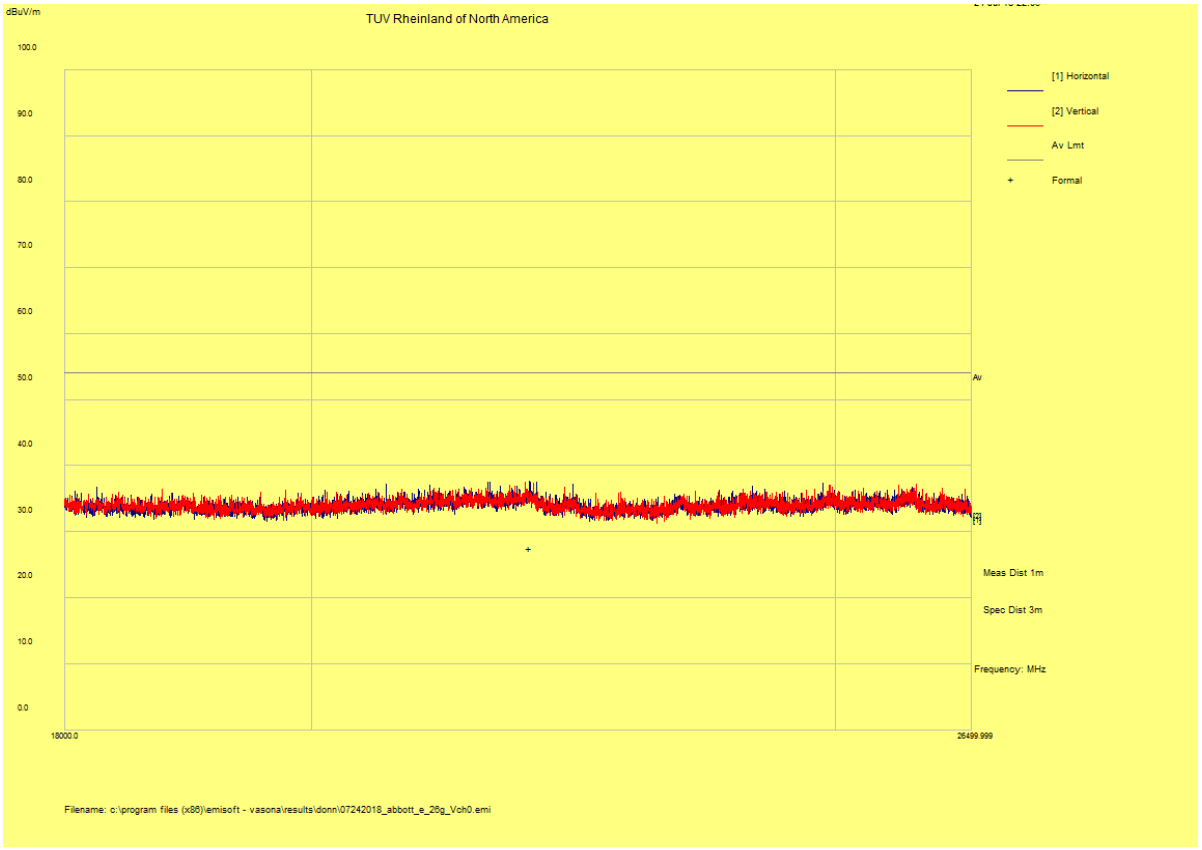
Channel 0 18 to 26GHz. unit in Horizontal orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
21828.45	29.82	7.64	-9.97	27.49	verage Ma	H	150	260	54.00	-26.51	Pass	



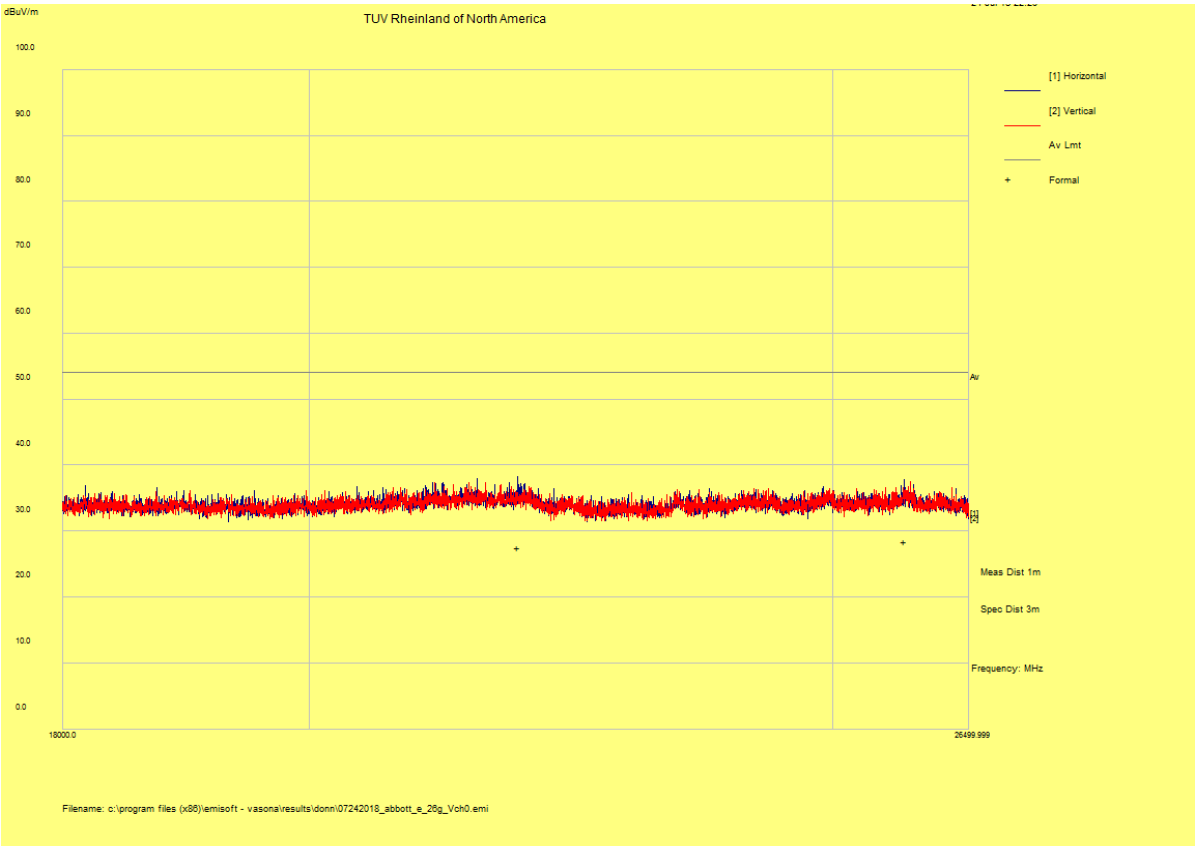
Channel 19 18 to 26GHz unit in Vertical orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
24928.29	32.70	8.17	-12.98	27.88	Average Max	H	150	192	54.00	-26.12	Pass	



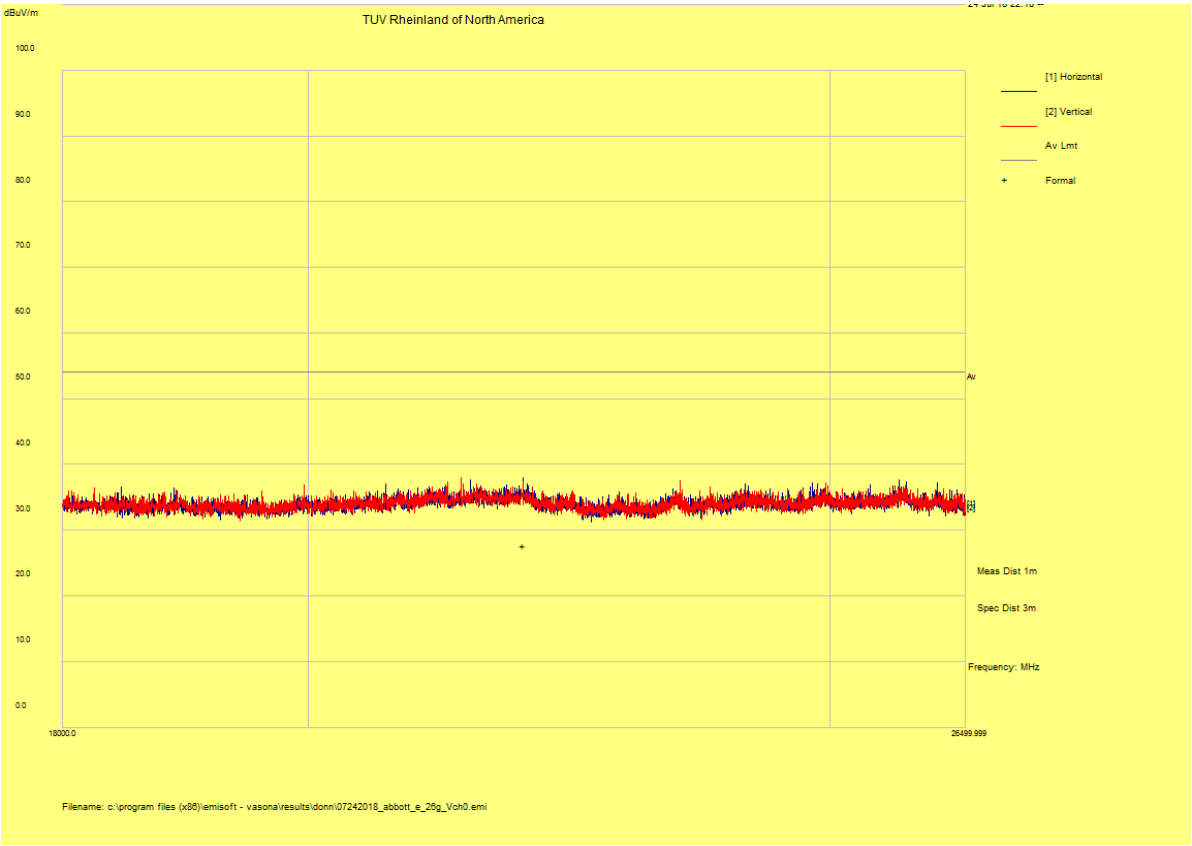
Channel 19 unit in Horizontal orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
21949.25	30.01	7.70	-10.11	27.60	Average Max	H	150	0	54.00	-26.40	Pass	



Channel 39 18 to 26GHz unit in Vertical orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
21863.64	29.99	7.63	-10.01	27.61	Average Max	H	150	220	54.00	-26.39	Pass	
25778.16	33.17	8.11	-12.87	28.41	Average Max	H	150	358	54.00	-25.59	Pass	



Channel 39 18 to 26GHz unit in Horizontal orientation

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result	Comments
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB		
21926.00	30.12	7.70	-10.08	27.74	Average Max	H	150	0	54.00	-26.26	Pass	

11.6 Conducted Emissions

Testing was performed in accordance with ANSI C63.10: 2013. These test methods are listed under the laboratory's A2LA Scope of Accreditation.

This test measures the levels emanating from the EUT's AC input port, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices.

The AC conducted emissions of equipment under test shall not exceed the values in CFR47 Part 15.207 and RSS247

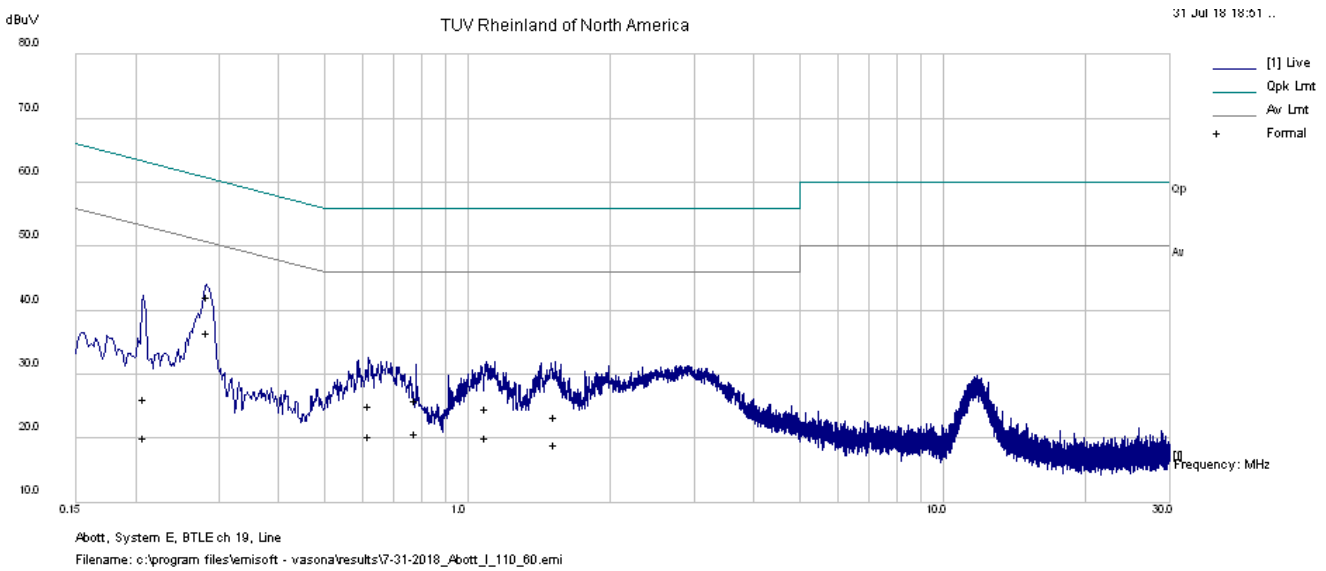
11.6.1 Test Methodology

A test program that controls instrumentation and data logging was used to automate the AC Power Line Conducted emission test procedure. The frequency range of interest was divided into sub-ranges such as to yield a frequency resolution of 9 kHz. Each phase and neutral of the AC power line were measured with respect to ground. Measurements were performed using a 50µH / 50Ω LISNs.

11.6.1.1 Deviations

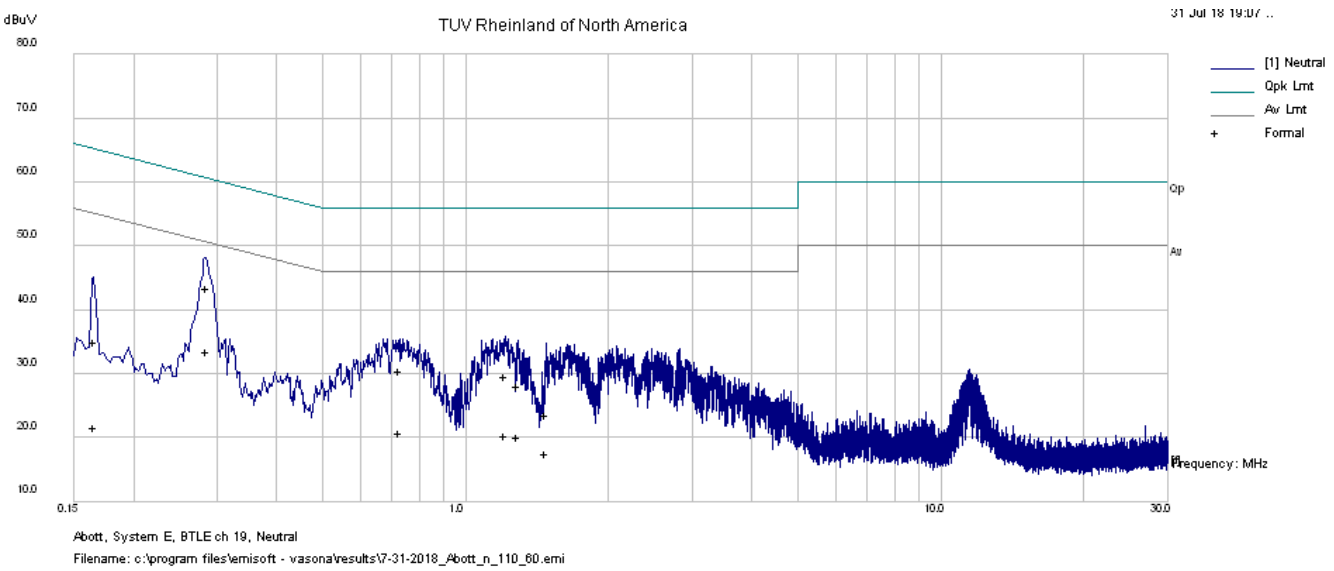
There were no deviations from this test methodology.

Test Results



Conducted emissions channel 19 line

Vasona Data : Formally Assessed Peaks										
No	Frequency	Raw dBu\	Cable Los	Factors d	Level dBu	Measurem	Line	Limit dBu\	Margin dE	Pass /Fail
1 (1)	0.282752	32.21	9.83	0.03	42.08	Quasi Pea	Live	60.73	-18.66	Pass
2 (2)	0.207962	16.33	9.83	0.04	26.2	Quasi Pea	Live	63.29	-37.08	Pass
3 (3)	0.619305	15.28	9.85	0.03	25.16	Quasi Pea	Live	56	-30.84	Pass
4 (4)	1.094218	14.77	9.87	0.03	24.68	Quasi Pea	Live	56	-31.32	Pass
5 (5)	1.526128	13.42	9.88	0.03	23.32	Quasi Pea	Live	56	-32.68	Pass
6 (6)	0.778232	16.02	9.87	0.03	25.92	Quasi Pea	Live	56	-30.08	Pass
7 (1)	0.282752	26.64	9.83	0.03	36.51	Average	Live	50.73	-14.23	Pass
8 (2)	0.207962	10.31	9.83	0.04	20.18	Average	Live	53.29	-33.1	Pass
9 (3)	0.619305	10.44	9.85	0.03	20.32	Average	Live	46	-25.68	Pass
10 (4)	1.094218	10.14	9.87	0.03	20.04	Average	Live	46	-25.96	Pass
11 (5)	1.526128	9.08	9.88	0.03	18.98	Average	Live	46	-27.02	Pass
12 (6)	0.778232	10.96	9.87	0.03	20.86	Average	Live	46	-25.14	Pass



Conducted Emissions channel 19 Neutral

Vasona Data : Formally Assessed Peaks										
No	Frequency	Raw dBu\	Cable Los	Factors d	Level dBu	Measurem	Line	Limit dBu\	Margin dE	Pass /Fail
1 (29)	0.284621	33.6	9.83	0.03	43.46	Quasi Pea	Neutral	60.68	-17.22	Pass
2 (30)	0.164958	25.09	9.82	0.05	34.96	Quasi Pea	Neutral	65.21	-30.25	Pass
3 (31)	1.212012	19.78	9.87	0.03	29.68	Quasi Pea	Neutral	56	-26.32	Pass
4 (32)	0.72588	20.59	9.86	0.03	30.48	Quasi Pea	Neutral	56	-25.52	Pass
5 (33)	1.284932	18.12	9.87	0.03	28.03	Quasi Pea	Neutral	56	-27.97	Pass
6 (34)	1.475645	13.61	9.88	0.03	23.52	Quasi Pea	Neutral	56	-32.48	Pass
7 (29)	0.284621	23.63	9.83	0.03	33.49	Average	Neutral	50.68	-17.19	Pass
8 (30)	0.164958	11.85	9.82	0.05	21.72	Average	Neutral	55.21	-33.49	Pass
9 (31)	1.212012	10.42	9.87	0.03	20.32	Average	Neutral	46	-25.68	Pass
10 (32)	0.72588	10.83	9.86	0.03	20.73	Average	Neutral	46	-25.27	Pass
11 (33)	1.284932	10.28	9.87	0.03	20.18	Average	Neutral	46	-25.82	Pass
12 (34)	1.475645	7.68	9.88	0.03	17.59	Average	Neutral	46	-28.41	Pass

12 Test Equipment Use List

12.1 Equipment List

Equipment	Manufacturer	Model #	Serial/Inst #	Last Cal mm/dd/yyyy	Next Cal mm/dd/yyyy
Bilog Antenna	Sunol Sciences	JB3	A102606	11/20/2017	11/20/2019
Horn Antenna	Sunol Science	DRH118	A040806	11/11/2016	11/11/2018
Horn Antenna	Com-Power	AHA-840	105005	05/26/2017	05/26/2019
Amplifier	Sonoma Instruments	310	165516	01/25/2018	01/25/2019
Spectrum Analyzer	Agilent	MXE	52260210	1/22/2018	1/22/2019
Spectrum Analyzer	Agilent	PXA	US513358291	01/22/2019	01/22/2019
LISN	Compower	n/a	12100	01/24/2018	01/24/2019
Spectrum Analyzer	Rohde & Schwarz	ESI	1088.7490	01/22/2018	01/22/2019
Active loop antenna	Emco	6502	00062531	06/08/2018	06/08/2019
Preamplifier	Miteq	TTA1800-30-HG	2020728	01/23/2018	01/23/2019

* Calibration of equipment past due for re-calibration will be performed expeditiously. If any equipment is found to be out of tolerance at that time, affected customers will be notified accordingly.

13 EMC Test Plan

13.1 Introduction

This section provides a description of the Equipment Under Test (EUT), configurations, operating conditions, and performance acceptance criteria. It is an overview of information provided by the manufacturer so that the test laboratory may perform the requested testing.

13.2 Customer

Customer Information

Company Name	Abbott Diabetes Care
Address	1360 South Loop Road
City, State, Zip	Alameda, CA 94502
Country	USA

Technical Contact Information

Contact	Richard Ries
E-mail	Richard.ries@abbott.com
Phone	

13.3 Test configurations

The reader will be set to continuously transmit at low, mid, and high channel of the BLE 2.4GHz. band

1 The meter will be placed in the chamber on the table and tested lying flat on the table which will be referred to as horizontal and scanned for emissions. The meter will then be placed on its long dimension edge which will be referred to as vertical and scanned for emissions per the manufacturers test documentation.
2 The reader will be connected to a spectrum analyzer directly from its antenna port.

13.4 Equipment Under Test (EUT)

Table 3: EUT Specifications

EUT Specifications	
Dimensions	95 mm x 60 mm x 16 mm
AC Input	3.7VDC or 110VAC- USB charger
Environment	Indoor/Outdoor
Operating Temperature Range:	10 / 45 C
Multiple Feeds:	☐ Yes and how many ☒ No
Product Marketing Name (PMN)	Freestyle Libre 2
Hardware Version Identification Number (HVIN)	22175
Firmware Version Identification Number (FVIN)	n/a
Bluetooth Radio	
Operating Mode	BLE
Transmitter Frequency Band	2402 MHz to 2480 MHz
Operating Bandwidth	1 MHz
Max. Power Output	5.6 dbm
Power Setting @ Operating Channel	Max
Antenna Type	1 integrated PIFA antenna
Antenna Gain	5.0dbi
Modulation Type	GFSK
Data Rate	1 Mbps

Table 4: Antenna Information

Number	Antenna Type	Description	Max Gain (dBi)
Antenna 1	Integrated PIFA	Max. peak gain at 2.4 GHz	5.0

Table 5: Interface Specifications

Interface Type	Cabled with what type of cable?	Is the cable shielded?	Maximum potential length of the cable?	Metallic (M), Coax (C), Fiber (F), or Not Applicable?
USB serial	USB to mini USB	☐ No	37”	☒ M

Table 6: Support Equipment

Equipment	Manufacturer	Model	Serial	Used for
Laptop	Lenovo	Thinkpad	None listed	Communication with meter
USB charging block	Phihong	PSMCA 050-Q	None listed	Charging the meter
Note: None.				

Table 7: Description of Sample used for Testing

Device	Serial	RF Connection	CFR47 Part 15.247
Freestyle Libre 2	MAGY176-X0056	Integrated Antenna	TX Emissions, RSE, band edge
	MAGY176-X0060	Direct connection	TX power,OBW, NR band emissions

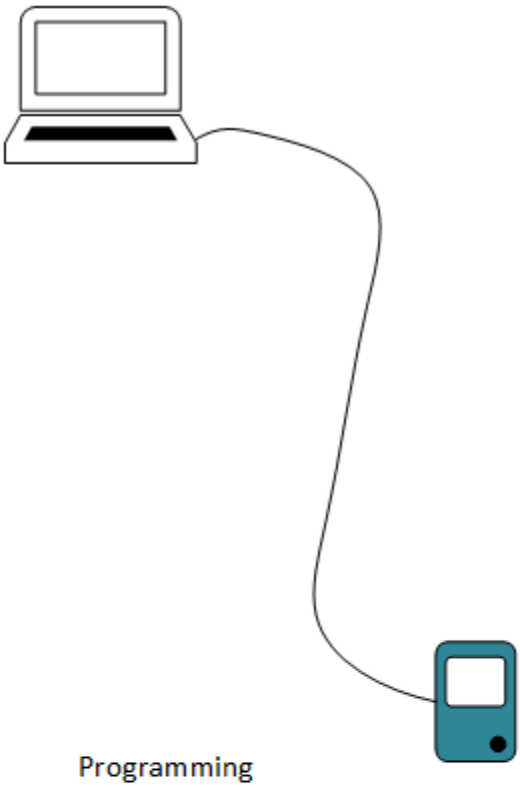
Table 8: Description of Test Configuration used for Radiated Measurement.

Device	Antenna	Mode	Setup Photo (X-Axis)	Setup Photo (Y-Axis)	Setup Photo (Z-Axis)
Freestyle Libre 2	Integrated	Transmit	N/A	See photos	N/A
Note:					

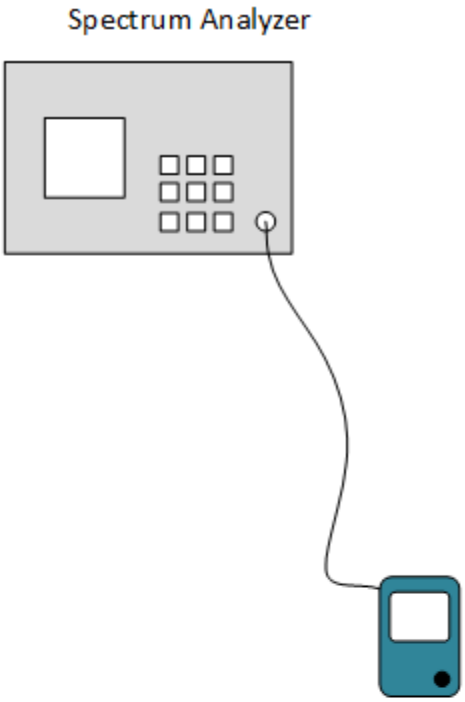
Table 9: Final Test Mode for 2402 MHz to 2480MHz Channels

Test	802.15.4
Occupied Bandwidth CFR 47 15.247(a1), RSS247:2017	2402, 2438, 2480 MHz BLE
Output Power CFR47 15.247 (b1), RSS247:2017	2402, 2438, 2480 MHz BLE
Out of Band Emission CFR47 15.247 (d), RSS247:2017	2402, 2438, 2480 MHz BLE
Band-Edge FCC Part 15.205, 15.209 RSS247:2017	2402, 2480 MHz BLE
Transmitted Spurious Emission (30 MHz – 1GHz) FCC Part 15.205, 15.209 RSS247:2017	2402, 2438, 2480 MHz BLE
Transmitted Spurious Emission (Above 1GHz) FCC Part 15.205, FCC Part 15.209, RSS247:2017	2402, 2438, 2480 MHz BLE
AC Conducted Emission FCC Part 15.207 RSS-GEN	3.7 VDC out USB to 110VAC charger
Note:	

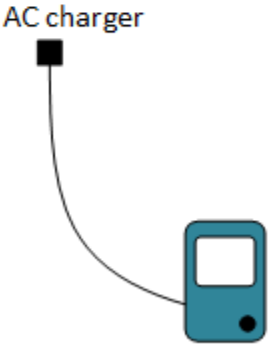
13.5 Block Diagram



Programming Configuration



Direct antenna connection



Radiated test configuration

13.6 Test Specifications

Testing requirements

Emissions	
Standard	Requirement
CFR 47 Part 15.247: 2018, RSS 247 Issue 2, 2017	OBW, PSD, Output power, Tx emissions,
CFR 47 Part 15.207: 2018, CFR 47 Part 15.205, RSS Gen	AC conducted emissions, Band edge