



Emissions Test Report

EUT Name: Freestyle Libre 2

Model No.: Freestyle Libre 2

CFR 47 Part 15.225: 2017, RSS 210 Issue 9

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

Report# 31863002.002

Revisions

Revision No.	Date MM/DD/YYYY	Reason for Change	Author
1	08/15/2018	Initial	D. Foster
2	2/26/21	Updated, Model No.: Freestyle Libre 2	RD

Note: Latest revision report will replace all previous reports.

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

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: Rules for digital transmission systems
Test Dates: 07/27/2018, 8/19/20

Guidance Documents:

Emissions: ANSI C63.10-2013 CFR47 part 15.225:2018 and RSS 210 Issue 9

Test Methods:

Emissions: ANSI C63.10-2013

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 sec. 1.4 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.

<u>Rachana Khanduri</u>	<u>September 18, 2018</u>	<u>Richard Decker</u>	<u>September 18, 2018</u>
Test Engineer	Date	Laboratory Signature	Date



**INDUSTRY
CANADA**

Testing Cert #3331.02 US1131

2932M-1

1	Executive Summary	5
1.1	Scope	5
1.2	Purpose	5
1.3	Summary of Test Results	5
1.4	Special Accessories	5
1.5	Equipment Modifications	5
2	Laboratory Information	6
2.1	Accreditations & Endorsements	6
2.1.1	US Federal Communications Commission	6
2.1.2	NIST / A2LA	6
2.1.3	Canada – Industry Canada	6
2.1.4	Japan – VCCI	6
2.1.5	Acceptance by Mutual Recognition Arrangement	6
2.2	Test Facilities	7
2.2.1	Emission Test Facility	7
2.3	Measurement Uncertainty	8
2.3.1	Sample Calculation – radiated & conducted emissions	8
2.3.2	Measurement Uncertainty Emissions	8
2.4	Calibration Traceability	9
3	Product Information	9
3.1	Product Description	9
3.2	Equipment Configuration	9
3.3	Operating Mode	9
3.4	Unique Antenna Connector	9
4	Operation within the band 13.110-14.010	10
4.1.1	Results	10
4.1.2	Restricted band Emissions	14
4.1.3	Frequency Stability	21
5	Test Equipment Used List	23
6	EMC Test Plan	24
6.1	Introduction	24
6.2	Customer	24
6.3	Test Configuration	24
6.4	Equipment Under Test (EUT)	25
6.5	Block Diagram	28
6.6	Test Specifications	29

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. Test data was verified before latest revision. This report is further intended to document changes and modifications to the EUT throughout its life cycle. 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 ANSI C63.10 2013	Test Parameters	Result
Tx mask	CFR47 part 15.225:2018, RSS 210 Issue 9	Limits	Pass
Frequency stability	CFR47 part 15.225:2018, RSS 210 Issue 9	Limits	Pass
Transmitter Spurious Emissions (30-1000MHz)	CFR47 part 15.209:2018, RSS 210 Issue 9	Limits	Pass
AC conducted Emissions	CFR47 part 15.207:2018, RSS 210 Issue 9	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.

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

Report# 31863004.002

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:

$$\text{Field Strength (dB}\mu\text{V/m)} = \text{RAW} - \text{AMP} + \text{CBL} + \text{ACF}$$

Where: RAW = Measured level before correction (dBμV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

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

Sample radiated emissions calculation @ 30 MHz

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

$$25 \text{ dBuV/m} + 17.5 \text{ dB} - 20 \text{ dB} + 1.0 \text{ dB} = 23.5 \text{ dBuV/m}$$

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.

2.4 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.

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 RFID frequency in a continuous transmit mode. The placement of the EUT system components was guided by the test standard and selected to represent typical operating 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

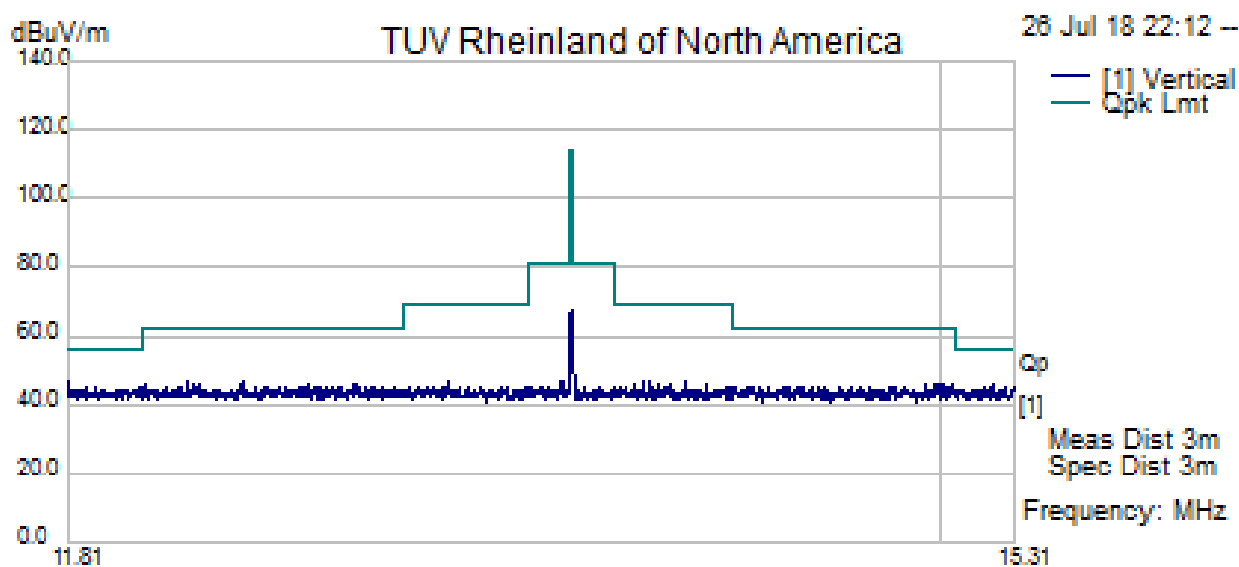
The Freestyle Libre 2 has an internal fixed antenna which is not removable.

4 Operation within the band 13.110-14.010

The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

4.1.1 Results

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
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
13.83	33.29	2.45	10.80	46.54	Peak [Scan]	V	125	206.00	69.00	-22.46	Pass
13.56	54.11	2.44	10.80	67.35	Peak [Scan]	V	125	23.00	114.50	-47.15	Pass



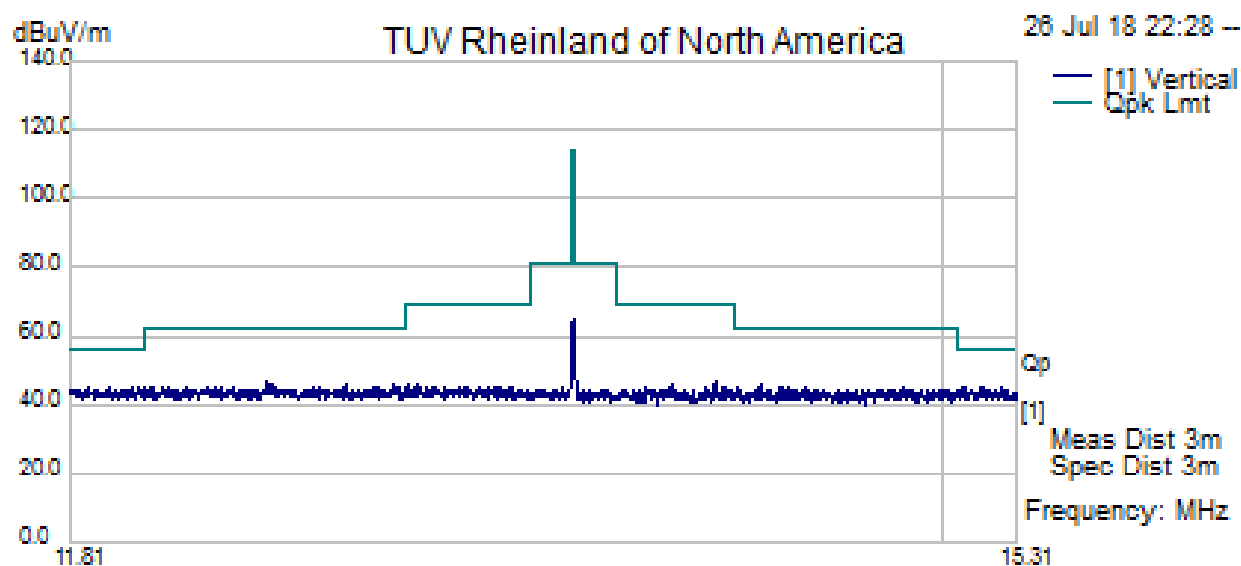
Filename: c:\program files (x86)\emisoft - vasona\results\donn\fhf.emi

NFC mask requirement Vertical unit in vertical orientation

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

Report# 31863004.002

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
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
15.18	31.79	2.45	10.78	45.02	Peak [Scan]	V	125	159.00	56.50	-11.48	Pass
14.10	33.42	2.45	10.80	46.67	Peak [Scan]	V	125	14.00	69.00	-22.33	Pass
13.56	51.39	2.44	10.80	64.63	Peak [Scan]	V	125	128.00	114.50	-49.87	Pass



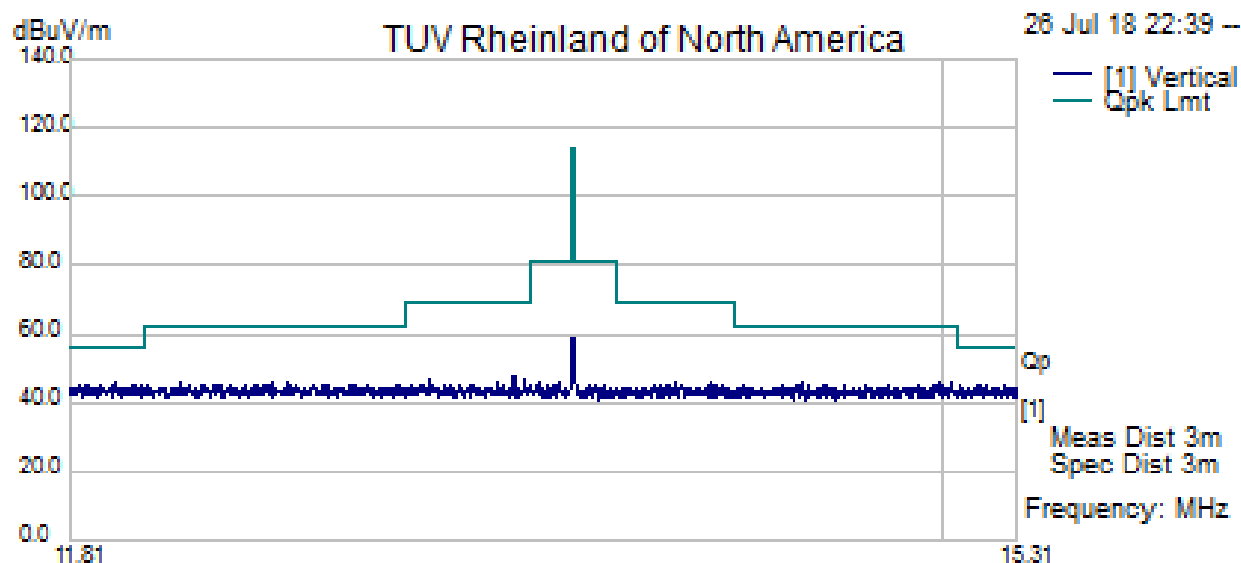
Filename: c:\program files (x86)\emisoft - vasona\results\donn\ochf.emi

NFC mask requirement Vertical unit in horizontal orientation

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

Report# 31863004.002

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
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
14.08	32.94	2.45	10.80	46.19	Peak [Scan]	V	125	103.00	69.00	-22.81	Pass



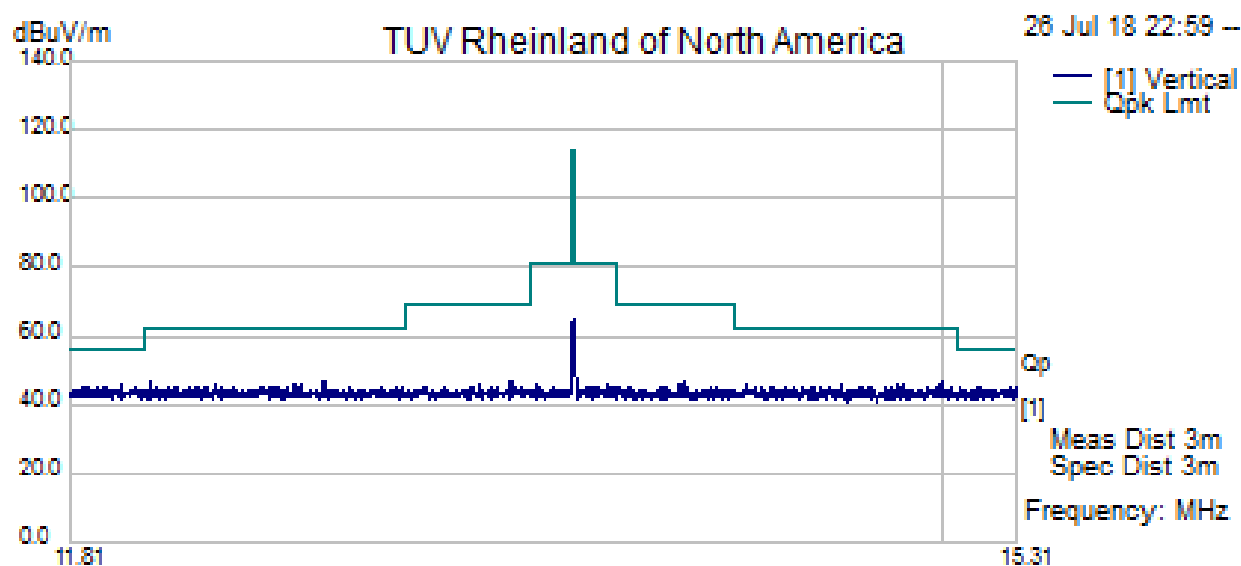
Filename: c:\program files (x86)\emisoft - vasona\results\donn\lgher.emi

NFC mask requirement Horizontal unit in horizontal orientation

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

Report# 31863004.002

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin	Result
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
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
15.00	33.23	2.45	10.80	46.49	Peak [Scan]	V	136	261.00	62.50	-16.02	Pass
13.97	33.70	2.45	10.80	46.94	Peak [Scan]	V	136	0.00	69.00	-22.06	Pass
13.56	51.53	2.44	10.80	64.77	Peak [Scan]	V	136	104.00	114.50	-49.73	Pass



Filename: c:\program files (x86)\emisoft - vasona\results\donn\trtrr.emi

NFC mask requirement Horizontal unit in vertical orientation

4.1.2 Restricted band Emissions

The system was tested in accordance CFR47 part 15.209 and RSS 210: Issue 9. 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 clauses 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.

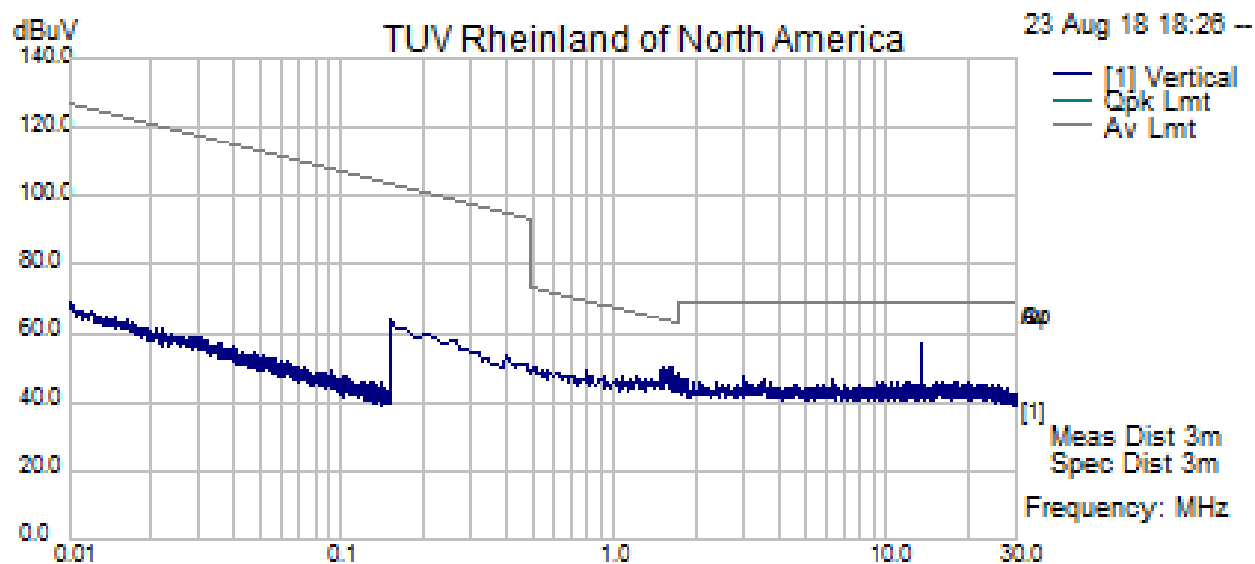
15.31f

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).

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

Report# 31863004.002

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)	13.56	43.56	2.44	10.80	56.8	Peak [Scan]	V	136	7.00	69.50	-12.7	Pass
2 (15)	1.64	37.29	2.33	10.60	50.21	Peak [Scan]	V	136	163.00	63.28	-13.07	Pass
3 (16)	1.60	36.82	2.32	10.60	49.75	Peak [Scan]	V	136	186.00	63.53	-13.79	Pass
4 (17)	1.51	37.30	2.32	10.60	50.22	Peak [Scan]	V	136	87.00	64.05	-13.83	Pass
5 (18)	1.70	35.22	2.33	10.60	48.15	Peak [Scan]	V	136	215.00	62.99	-14.84	Pass
6 (19)	2.96	34.31	2.36	10.60	47.27	Peak [Scan]	V	136	3.00	69.50	-22.23	Pass



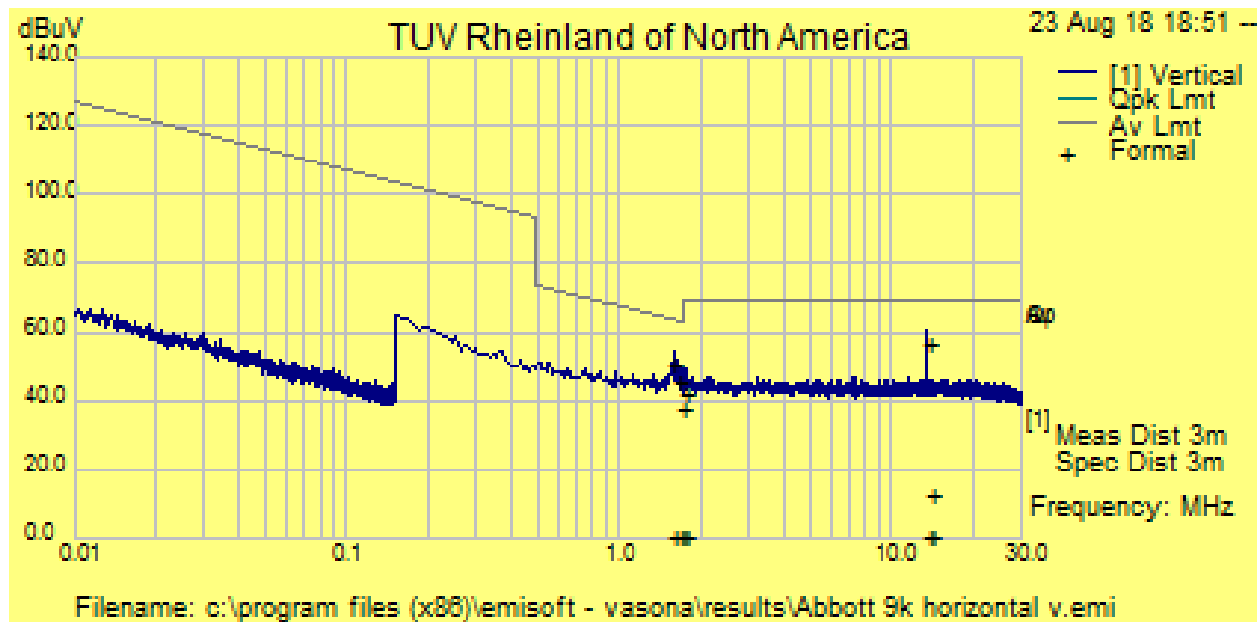
Filename: c:\program files (x86)\emisoft - vasona\results\Abbott 9k horizontal h.emi

9k to 30MHz Horizontal unit in horizontal orientation

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

Report# 31863004.002

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV	Margin dB	Pass /Fail
1.69	24.45	2.33	10.60	37.38	Quasi Max	V	134	48.00	63.04	-25.66	Pass
1.75	28.99	2.33	10.60	41.92	Quasi Max	V	134	266.00	69.50	-27.58	Pass
13.93	-0.75	2.45	10.80	12.5	Quasi Max	V	134	360.00	69.50	-57	Pass
13.56	43.39	2.44	10.80	56.63	Quasi Max	V	134	264.00	69.50	-12.87	Pass
1.60	37.81	2.32	10.60	50.73	Quasi Max	V	134	308.00	63.53	-12.8	Pass
1.64	32.37	2.33	10.60	45.3	Quasi Max	V	134	360.00	63.28	-17.98	Pass

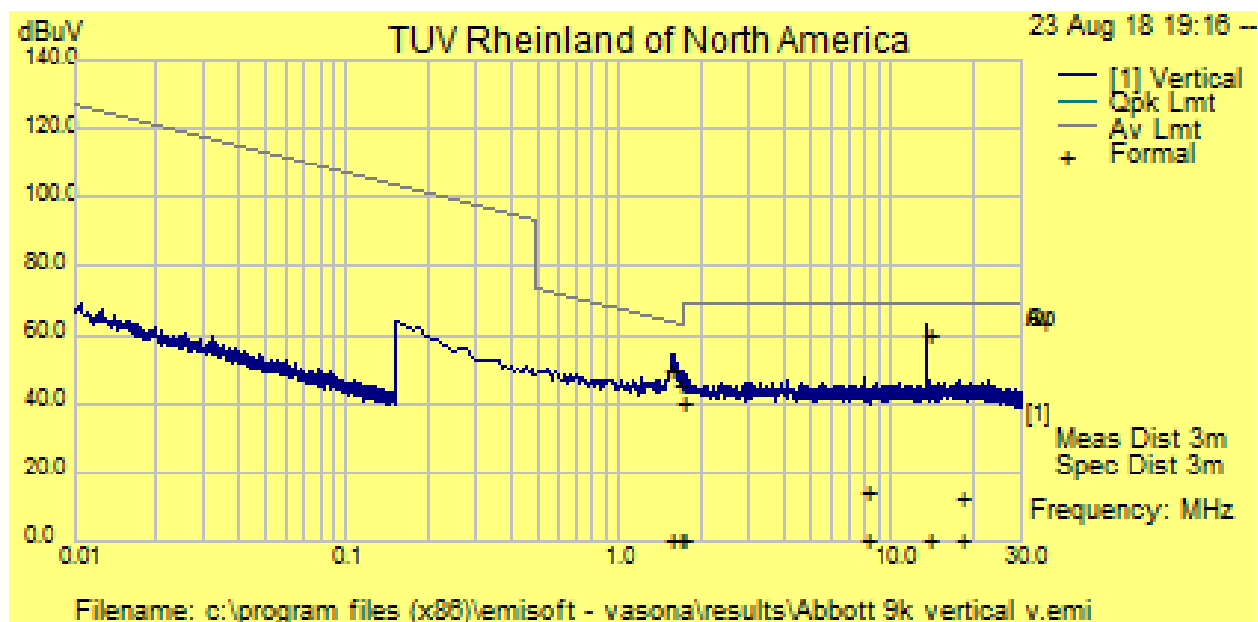


9k to 30MHz Horizontal unit in vertical orientation

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

Report# 31863004.002

Frequenc	Raw dBu	Cable Los	AF dB	Level dBu	Measuren	Pol	Hgt cm	Azt Deg	Limit dBu	Margin dB	Pass /Fail
0.762769	34.37	2.28	10.34	46.99	Peak [Scar V		136	147	69.96	-22.97	Pass
7.001869	33.41	2.41	10.7	46.51	Peak [Scar V		136	216	69.5	-22.99	Pass
0.15	51.91	2.19	10.38	64.48	Peak [Scar V		136	309	90	-25.52	Pass
25.32343	32.14	2.48	9.3	43.92	Peak [Scar V		136	350	69.5	-25.58	Pass
0.428531	37.08	2.25	10.26	49.59	Peak [Scar V		136	279	75.63	-26.04	Pass
0.242844	44.02	2.22	10.25	56.49	Peak [Scar V		136	194	83.41	-26.92	Pass

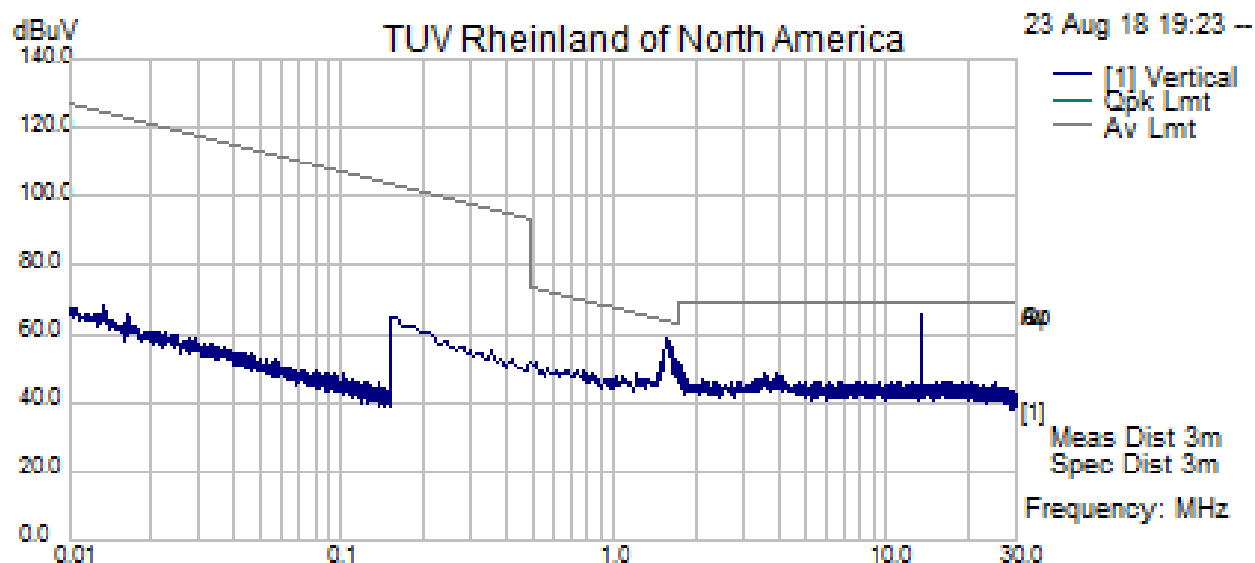


9k to 30MHz Vertical unit in vertical orientation

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

Report# 31863004.002

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 (92)	13.56	52.04	2.44	10.80	65.28	Peak [Scan]	V	136	295.00	69.50	-4.22	Pass
10 (101)	28.88	32.78	2.49	8.23	43.5	Peak [Scan]	V	136	200.00	69.50	-26	Pass
11 (102)	0.15	51.89	2.19	10.38	64.46	Peak [Scan]	V	136	91.00	104.08	-39.62	Pass
12 (103)	0.42	40.65	2.25	10.24	53.14	Peak [Scan]	V	136	190.00	95.15	-42.01	Pass
13 (104)	0.24	45.27	2.22	10.25	57.74	Peak [Scan]	V	136	346.00	99.89	-42.15	Pass
2 (93)	1.55	45.73	2.32	10.60	58.65	Peak [Scan]	V	136	185.00	63.79	-5.14	Pass
3 (94)	1.64	43.19	2.33	10.60	56.12	Peak [Scan]	V	136	196.00	63.28	-7.16	Pass
4 (95)	1.69	40.20	2.33	10.60	53.13	Peak [Scan]	V	136	202.00	63.04	-9.91	Pass
5 (96)	1.75	38.23	2.33	10.60	51.16	Peak [Scan]	V	136	359.00	69.50	-18.34	Pass
6 (97)	3.92	35.63	2.37	10.69	48.7	Peak [Scan]	V	136	2.00	69.50	-20.8	Pass
7 (98)	1.79	35.24	2.33	10.60	48.17	Peak [Scan]	V	136	359.00	69.50	-21.33	Pass
8 (99)	15.91	32.78	2.45	10.71	45.95	Peak [Scan]	V	136	206.00	69.50	-23.55	Pass
9 (100)	27.85	33.24	2.49	8.54	44.26	Peak [Scan]	V	136	301.00	69.50	-25.24	Pass



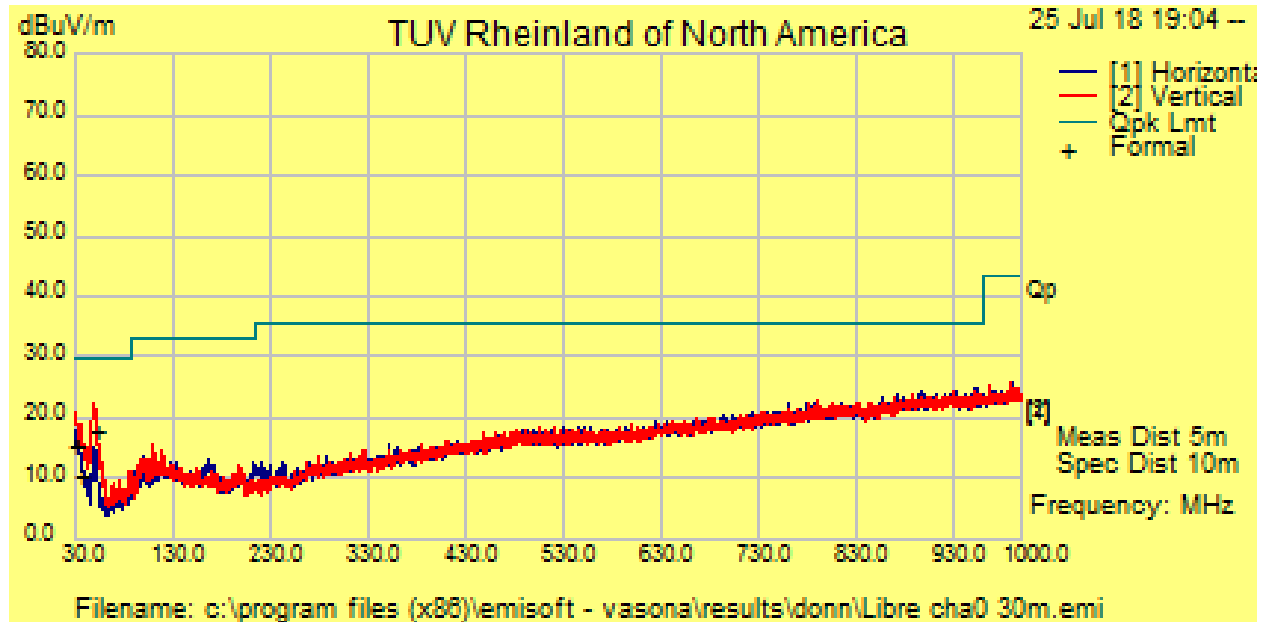
Filename: c:\program files (x86)\emisoft - vasona\results\Abbott 9k vertical h.emi

9k to 30MHz Vertical unit in horizontal orientation

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

Report# 31863004.002

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 (24)	705.65	22.48	4.58	-13.44	13.62	Quasi Max	V	117	118.00	35.50	-21.88	Pass
2 (25)	711.89	22.51	4.60	-13.22	13.88	Quasi Max	V	249	270.00	35.50	-21.62	Pass
3 (26)	709.90	22.55	4.59	-13.26	13.88	Quasi Max	V	176	265.00	35.50	-21.62	Pass
4 (27)	50.12	41.20	2.62	-26.03	17.8	Quasi Max	V	147	226.00	29.50	-11.7	Pass
5 (28)	31.02	24.36	2.49	-13.02	13.83	Quasi Max	V	223	360.00	29.50	-15.67	Pass
6 (29)	36.13	26.08	2.52	-16.90	11.7	Quasi Max	V	167	50.00	29.50	-17.8	Pass

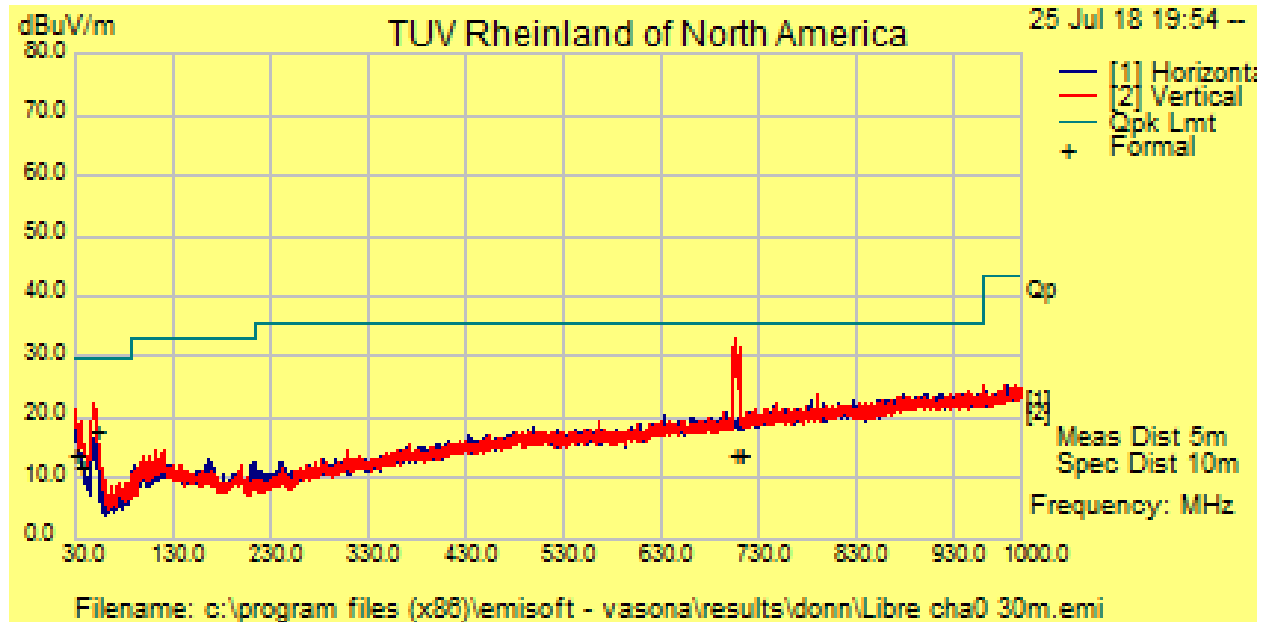


NFC reader in vertical orientation

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

Report# 31863004.002

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 (24)	705.65	22.48	4.58	-13.44	13.62	Quasi Max	V	117	118.00	35.50	-21.88	Pass
2 (25)	711.89	22.51	4.60	-13.22	13.88	Quasi Max	V	249	270.00	35.50	-21.62	Pass
3 (26)	709.90	22.55	4.59	-13.26	13.88	Quasi Max	V	176	265.00	35.50	-21.62	Pass
4 (27)	50.12	41.20	2.62	-26.03	17.8	Quasi Max	V	147	226.00	29.50	-11.7	Pass
5 (28)	31.02	24.36	2.49	-13.02	13.83	Quasi Max	V	223	360.00	29.50	-15.67	Pass
6 (29)	36.13	26.08	2.52	-16.90	11.7	Quasi Max	V	167	50.00	29.50	-17.8	Pass



NFC reader in horizontal orientation

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

Report# 31863004.002

4.1.3 Frequency Stability

Testing was performed in accordance ANSI C63.10: 2013 subsections 6.8.1 and 6.8.2. The requirements of ANSI section 5.6 could not be met since the NFC reader runs only at 13.56 MHz.

Measured frequency in Hz.

C°	0min	2min	5min	10min
50	13559960	13559960	13559960	13559960
40	13559980	13559960	13559960	13559960
30	13560020	13560000	13560000	13560000
20	13560040	13560020	13560020	13560020
10	13560080	13560060	13560060	13560040
0	13560080	13560080	13560060	13560060
-10	13560080	13560080	13560080	13560080
-20	13560040	13560060	13560060	13560060

Parts Per Million

C°	ppm			
	0min	2min	5min	10min
50	-2.9	-2.9	-2.9	-2.9
40	-1.5	-2.9	-2.9	-2.9
30	1.5	0.0	0.0	0.0
20	2.9	1.5	1.5	1.5
10	5.9	4.4	4.4	2.9
0	5.9	5.9	4.4	4.4
-10	5.9	5.9	5.9	5.9
-20	2.9	4.4	4.4	4.4

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

Report# 31863004.002

20 °C		
VDC Low	VDC Nominal	VDC High
3.145	3.7	4.255
Shuts down at 3.696	13560040000	13560040000
	2.9	2.9

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

Report# 31863004.002

5 Test Equipment Used List

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
DC programmable supply	Agilent	E3634A	MY40004331	01/25/2018	01/25/2019
Temp chamber	Evos	BTZ-133	n/a	n/a	n/a
Spectrum Analyzer	Rohde&Schwarz	FSL6	100169	01/13/2018	01/13/2019
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.

6 EMC Test Plan

6.1 Introduction

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

6.2 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	

6.3 Test Configuration

The reader will be set to continuously transmit at 13.56MHz.

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 per the manufacturers test documentation.
2. The unit will be placed in a temperature chamber and be tested for frequency stability over extreme temperature and voltage.

6.4 Equipment Under Test (EUT)

Table 2: 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:	<input type="checkbox"/> Yes and how many <input checked="" type="checkbox"/> No
Product Marketing Name (PMN)	Freestyle Libre 2
Hardware Version Identification Number (HVIN)	PRT28449-003 rev B
Firmware Version Identification Number (FVIN)	n/a
NFC Radio	
Operating Mode	RFID reader
Transmitter Frequency Band	13.56 MHz
Operating Bandwidth	Up to 1.8 MHz
Max. Radiated Voltage Output	124 dbuV/m
Power Setting @ Operating Channel	Max
Antenna Type	1 integrated Coil antenna
Modulation Type	ASK
Data Rate	106 to 424 kbps

Table 3: Antenna Information

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

Table 4: 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	<input type="checkbox"/> No	37"	<input checked="" type="checkbox"/> M

Table 5: 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 6: Description of Sample used for Testing

Device	Serial	RF Connection	CFR47 Part 15.225
Freestyle Libre 2	MAGY17 6-X0056	Integrated Antenna	TX Emissions, RSE, Frequency stability
	MAGY17 6-X0060	Integrated Antenna	TX Emissions, RSE, Frequency stability

Table 7: 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:					

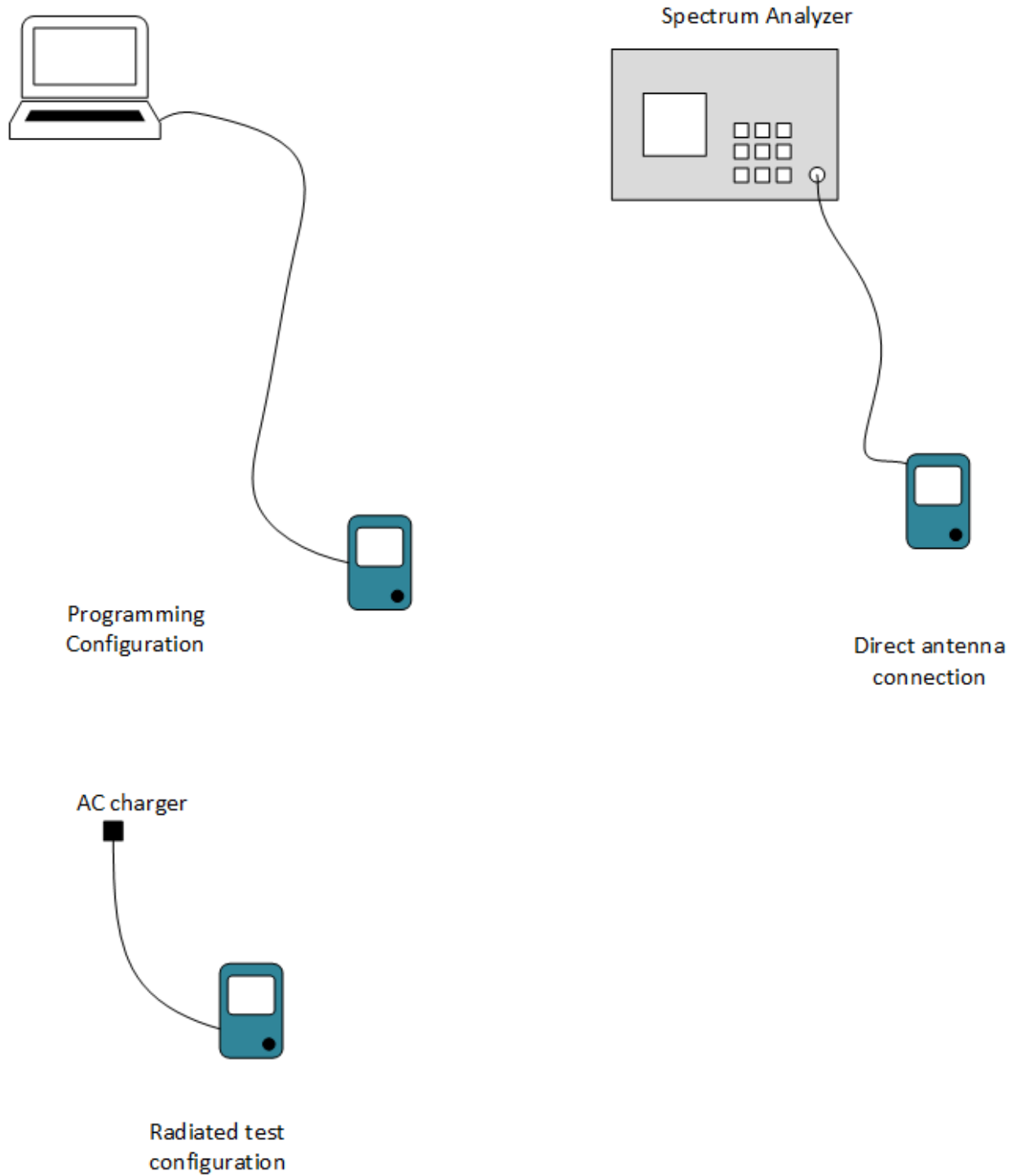
1279 Quarry Lane, Ste. A, Pleasanton, CA 95466
Tel: (925) 249-9123, Fax: (925) 249-9124

Report# 31863004.002

Table 8: NFC reader test summary

Test	802.15.4
Tx mask part 15.225 RSS 210 Issue 9	13.56 MHz NFC reader
Frequency stability part 15.225 RSS 210 Issue 9	13.56 MHz NFC reader
Transmitted Spurious Emission (30 MHz – 1GHz) FCC Part 15.205, 15.209 RSS 210 Issue 9	13.56 MHz NFC reader
AC Conducted Emission FCC Part 15.207 RSS-GEN	3.7 VDC out USB to 110VAC charger
Note:	

6.5 Block Diagram



6.6 Test Specifications

Testing requirements

Emissions	
Standard	Requirement
CFR 47 Part 15.225: 2018, RSS 210 Issue 9	Tx mask, Spurious emissions, Frequency Stability
CFR 47 Part 15.207: 2018, CFR 47 Part 15.205, RSS Gen	AC conducted emissions, Band edge