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Emissions
Test Report

EUT Name: Glucose Monitoring System

Model No.: Apollo

CFR 47 Part 15.225:2013 and RSS-210:2010

Prepared for:

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Revisions

Revision No.	Date MM/DD/YYYY	Reason for Change	Author
0	09/30/2013	Original Document	N/A
1	06/26/2014	Corrected Report Date in footer.	Jeremy Luong

Note: Latest revision report will replace all previous reports.

Statement of Compliance

Manufacturer:	Abbott Diabetes Care 1360 S. Loop Road Alameda CA, 94502 U.S.A. (510) 864-4405
Requester / Applicant:	William Matievich
Name of Equipment:	Glucose Monitoring System
Model No.	Apollo
Type of Equipment:	Industrial, Scientific, or Medical (ISM)
Application of Regulations:	CFR 47 Part 15.225:2013 and RSS-210:2010
Test Dates:	September 10, 2013 to September 13, 2013

Guidance Documents:

Emissions: ANSI C63.10: 2009

Test Methods:

Emissions: ANSI C63.10: 2009

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 Executive Summary 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 contains data that are not covered by A2LA accreditation. This report shall not be reproduced except in full, without the written authorization of TUV Rheinland of North America.

Jeremy Luong	September 27, 2013	Conan Boyle	June 26, 2014 (Reissue Date)
Test Engineer	Date	Laboratory Signature	Date

Industry Canada

Testing Cert #3331.02 **US5254** **2932M-1**

1 Executive Summary

1.1 Scope

This report is intended to document the status of conformance with the requirements of the CFR 47 Part 15.225:2013 and RSS-210:2010 based on the results of testing performed on September 10, 2013 through September 13, 2013 on the Glucose Monitoring System Model Apollo manufactured by Abbott Diabetes Care. This report only applies to the specific samples tested under the stated test conditions. 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. 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 C63.4	Test Parameters (from Standard)	Result
Transmitter Spurious Emissions	CFR47 15.209, RSS-GEN Sect.7.2.5	Class B	**Complied**
Restricted Bands of Operation	CFR47 15.205, RSS 210 Sect.2.6	Class B	**Complied**
AC Power Conducted Emissions	CFR47 15.207, RSS-GEN Sect.7.2.2	Class B	**Complied**
Occupied Bandwidth	CFR47 15.215 (c), RSS GEN Sect.4.4.1	N/A	**Complied**
Carrier Field Strength	CFR47 15.225 (a), RSS 210 Sect. A 2.6 (a)	124 dBuV/m at 3 meter	**Complied**
Out of Band Emissions	CFR47 15.225 (b), (c) RSS 210 Sect. A 2.6 (b) (c)	Per Standards.	**Complied**
Frequency Stability	CFR47 15.225 (e), RSS 210 Sect. A 2.6 (d)	100 ppm / +0.01%	**Complied**
Voltage Variation	CFR47 15.31 (e),	100 ppm / +0.01%	**Complied**

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 Lane, Ste. A., Pleasanton, CA 94566, is accredited 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 (FRN # US5254). 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 A2LA 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 (Testing Cert #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). This reference number is the indication to the Industry Canada Certification Officers that the site meets the requirements of RSS 212, Issue 1 (Provisional). 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 Lane, Pleasanton, CA 94566 has been assessed and approved in accordance with the Regulations for Voluntary Control Measures. (Registration Nos. A-0031).

2.2 Test Facilities

All of the test facilities are located at 1279 Quarry Lane, Ste. A, Pleasanton, California 94566, USA. The 2305 Mission College, Santa Clara, 95054, USA location is considered a Pleasanton annex.

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 C63.4:2009, at test distances of 3 and 5 meters. The site is listed with the FCC and accredited by A2LA (Testing Cert #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 C63.4:2009, at test distances of 3 meters and 5 meters. A report detailing this site can be obtained from TUV Rheinland of North America.

2.2.2 Immunity Test Facility

ESD, EFT, Surge, PQF: These tests are performed in an environmentally controlled room with a 3.7 m x 4.8 m x 3.175 mm thick aluminum floor connected to PE ground.

For ESD testing, tabletop equipment is placed on an insulated mat with a surface resistivity of 10^9 Ohms/square on a 1.6 m x 0.8 m x 0.8 m high non-conductive table with a 3.175 mm aluminum top (Horizontal Coupling Plane). The HCP is connected to the main ground plane via a low impedance ground strap through two 470-kΩ resistors. The Vertical Coupling Plane consists of an aluminum plate 50 cm x 50 cm x 3.175 mm thick. The VCP is connected to the main ground plane via a low impedance ground strap through two 470-kΩ resistors.

For EFT, Surge, PQF, the HCP and VCP are removed.

RF Field Immunity testing is performed in a 7.3m x 4.3m x 4.1m anechoic chamber.

RF Conducted and Magnetic Field Immunity testing is performed on a 4.8m x 3.7m x 3.175mm thick aluminum ground plane.

All test areas allow a minimum distance of 1 meter from the EUT to walls or conducting objects.

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.

The Expanded Uncertainty defines an interval about the result of a measurement that may be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measured. The fraction may be viewed as the coverage probability or level of confidence of the interval.

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 Uncertainties

Table 2: Summary of Uncertainties

	U_{lab}	U_{cispr}
Radiated Disturbance		
30 MHz – 25,000 MHz	3.2 dB	5.2 dB
Conducted Disturbance @ Mains Terminals		
150 kHz – 30 MHz	2.4 dB	3.6 dB
Disturbance Power		
30 MHz – 300 MHz	3.92 dB	4.5 dB

Note: U_{lab} is the calculated Combined Standard Uncertainty
U_{cispr} is the measurement uncertainty requirement per CISPR 16.

Measurement Uncertainty Immunity

The estimated combined standard uncertainty for ESD immunity measurements is ± 4.1%.
The estimated combined standard uncertainty for radiated immunity measurements is ± 2.7dB.
The estimated combined standard uncertainty for conducted immunity measurements is ± 1.4dB.
The estimated combined standard uncertainty for damped oscillatory wave immunity measurements is ± 8.8%.
The estimated combined standard uncertainty for harmonic current and flicker measurements is ± 0.45%.

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 ± 1.59 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 ± 4.01 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 Guide 17025:2005.

3 Product Information

3.1 Product Description

The Glucose Monitoring System is consisted of a handheld ID Reader and patient attached sensor
The handheld ID reader features color touch screen with integrated USB port for retrieving data to PC. It also has integrated strip port with internal rechargeable lithium ion battery for standalone application. The reader is an ACK RFID operating at 13.56MHz.
The patient sensor is a passive device, featuring small profile and footprint. It is a patient worn device with up to 14 days of glucose data. It is a waterproof device.

3.2 Equipment Configuration

A description of the equipment configuration is given in 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 connected to rated power and allowed to reach intended operating conditions. The placement of the EUT system components was guided by the test standard and selected to represent typical installation conditions.

In the case of an EUT that can operate in more than one configuration, preliminary testing was performed to determine the configuration that produced maximum radiation.

The final configuration was selected to produce the worst case radiation for emissions testing and to place the EUT in the most susceptible state for immunity testing.

3.3 Operating Mode

A description of the operation mode is given in Test Plan Section. In the case of an EUT that can operate in more than one state, preliminary testing was performed to determine the operating mode that produced maximum radiation.

The final operating mode was selected to produce the worst case radiation for emissions testing and to place the EUT in the most susceptible state for immunity testing.

3.4 Unique Antenna Connector

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of CFR47 Parts 15.211, 15.213, 15.217, 15.219, or 15.221.

3.4.1 Results

The Glucose Monitoring System uses the permanently attached antenna.

- PCB antenna integrated in RFID Reader PCB
- Antenna Type: Wire-wound bobbin antenna, 3-turn
- Antenna Size: 52 mm x 76 mm

4 Emissions

Testing was performed in accordance with CFR 47 Part 15.225:2013 and RSS 210 Annex 2:2010. These test methods are listed under the laboratory's A2LA Scope of Accreditation. This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Procedures described in ANSI C63.10: 2009 were used.

4.1 Carrier Field Strength Requirements

The RF fundamental field strength requirement is the power radiated in the direction of the maximum level under specified conditions of measurements in the presence of modulation.

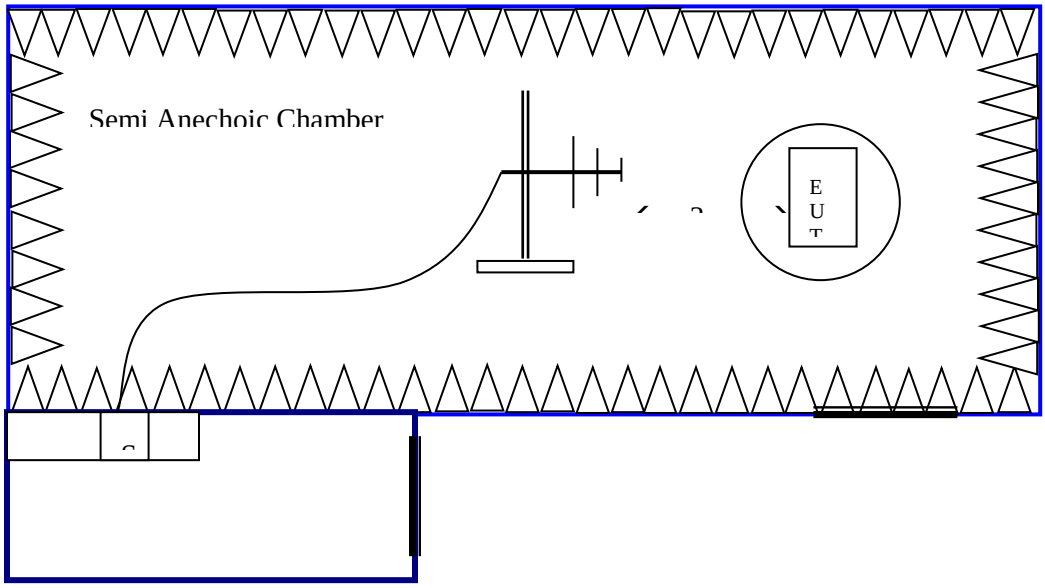
The RF fundamental field strengths shall not exceed CFR47 Part 15.225 (a):2013 and RSS 210 A2.6 (a):2010.

The field strength of any emission in the band of 13.553 and 13.567MHz shall be less than 84 dBuV/m at 30 meter distance; or 124 dBuV/m at 3 meter.

4.1.1 Test Method

The radiated method was used to measure the field strength of the fundamental signal according to ANSI C63.10:2009 Section 6.3. The measurement was performed with modulation on production sample S/N JCGT161-X0147. The worst result indicated below.

Test Setup:



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4.1.2 Results

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

Table 3: RF Fundamental Field Strength – Test Results

Test Conditions: Radiated Measurement, Normal Temperature and Voltage only						
Antenna Type: Integrated			**Power Setting:** 200 mW at Chipset			
Signal State: Modulated			**Duty Cycle:** 100 %			
Ambient Temp.: 21 °C			**Relative Humidity:**42 %			
Operating Frequency:	**Test Results**					
13.56 MHz	**Measured Level [dBuV/m]**	**Loop Position**	**Table [degree]**	**Antenna [cm]**	**Limit [dBuV/m]**	**Margin [dB]**
X-Axis	59.09	0	238	100	124.00	-64.91
	66.21	90	185	100	124.00	-57.79
Y-Axis	68.16	0	213	100	124.00	-55.84
	70.65	90	176	100	124.00	-53.35
Z-Axis	65.82	0	93	100	124.00	-58.18
	68.64	90	0	100	124.00	-55.36
Note: 1. Measurements were taken at 3 meter distance, and the limit was extrapolated accordingly.						

4.2 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.

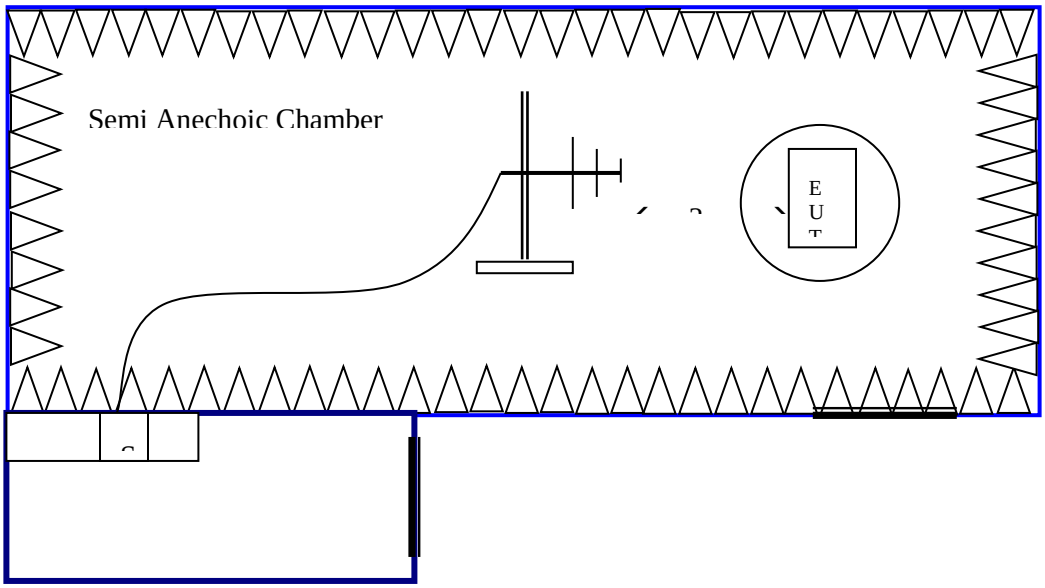
The 20dB bandwidth is defined the bandwidth of 20 dBr from highest transmitted level of the fundamental frequency.

The bandwidth shall be documented per Section CFR47 15.215(c) 2013 and RSS Gen Sect. 4.6: 2010. 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.

4.2.1 Test Method

The radiated method was used to measure the occupied bandwidth according to ANSI C63.10:2009. The measurement was performed with modulation. This test was performed on the production sample S/N JCGT161-X0147. The worst sample result indicated below.

Test Setup:



4.2.2 Results

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

Table 4: Occupied Bandwidth – Test Results

Test Conditions: Radiated Measurement, Normal Temperature and Voltage only				
Antenna Type: Integrated		**Power Setting:** 200 mW at Chipset		
Signal State: Modulated		**Duty Cycle:** 100 %		
Ambient Temp.: 21 °C		**Relative Humidity:**46%		
Occupied Bandwidth for 13.56 MHz RFID				
Oritentation	**Polarity**	**Limit (kHz)**	**99% BW (kHz)**	**20 dB BW (kHz)**
X	0	Na	5.4709	6.00
	90	Na	5.6713	6.00
Y	0	Na	5.8317	6.00
	90	Na	5.5912	6.00
Z	0	Na	6.2124	6.00
	90	Na	5.5511	6.00
Note: All lower and upper markers of 99% Bandwidth and 20 dB Bandwidth are within the allowable band; 13.553 MHz to 13.567MHz				

Table 5: 20 dB Bandwidth Frequency – Test Results

Test Conditions: Radiated Measurement, Normal Temperature and Voltage only					
Antenna Type: Integrated			**Power Setting:** 200 mW at Chipset		
Signal State: Modulated			**Duty Cycle:** 100 %		
Ambient Temp.: 21 °C			**Relative Humidity:**42%		
20 dB Bandwidth Frequencies for 13.56 MHz RFID					
Oritentation	**Polarity**	**Occupied Band Limit (MHz)**	**Lower Freq. (MHz)**	**Upper Freq. (MHz)**	**Results**
X	0	13.553 < X < 13.567	13.557	13.563	Pass
	90	13.553 < X < 13.567	13.557	13.563	Pass
Y	0	13.553 < X < 13.567	13.557	13.563	Pass
	90	13.553 < X < 13.567	13.557	13.563	Pass
Z	0	13.553 < X < 13.567	13.557	13.563	Pass
	90	13.553 < X < 13.567	13.557	13.563	Pass
Note: All lower and upper markers of 20 dB Bandwidth are within the allowable band; 13.553 MHz to 13.567MHz; where X is the lower frequency and upper frequency.					

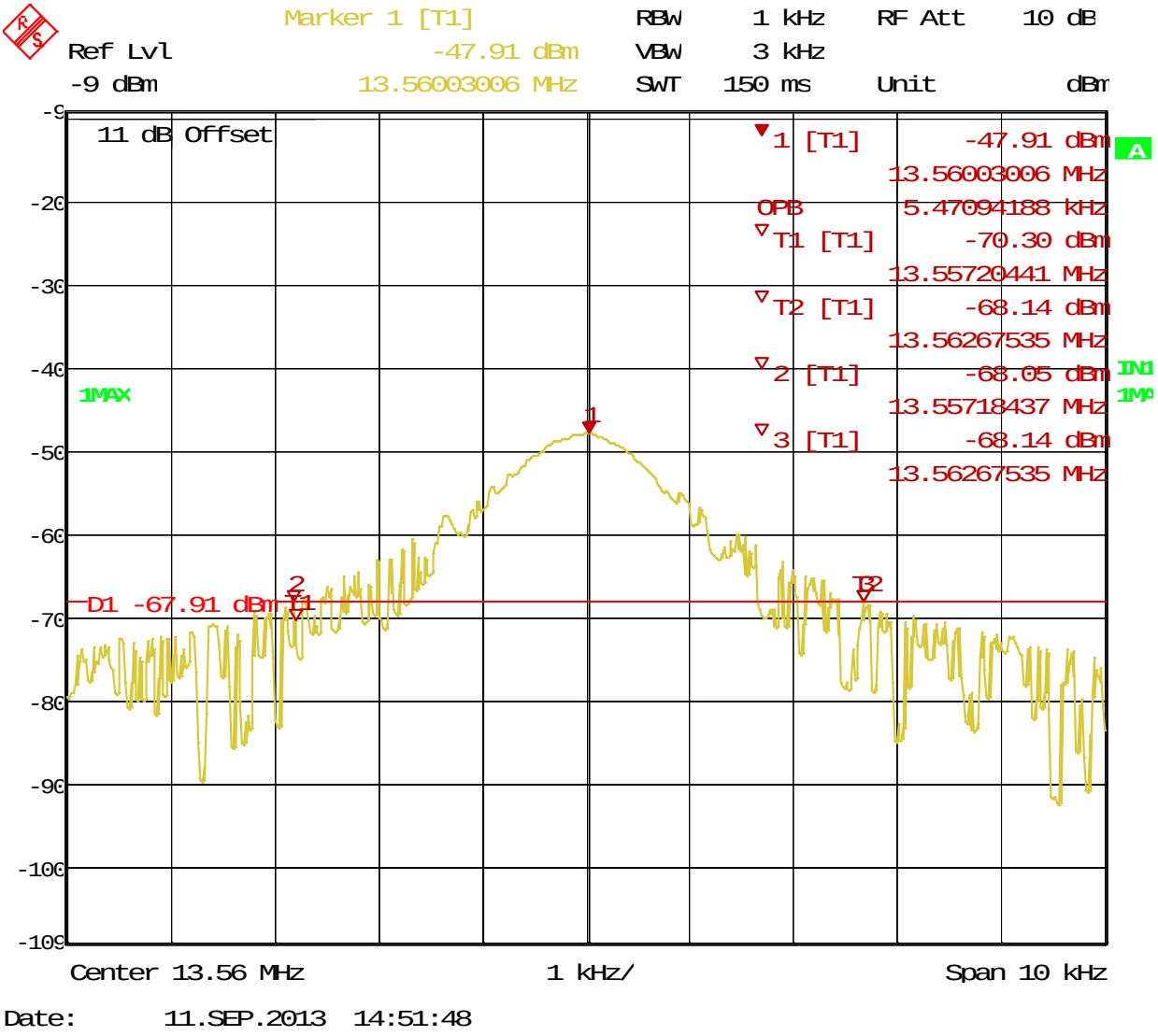


Figure 1: Occupied Bandwidth on X-Axis (Facing EUT)

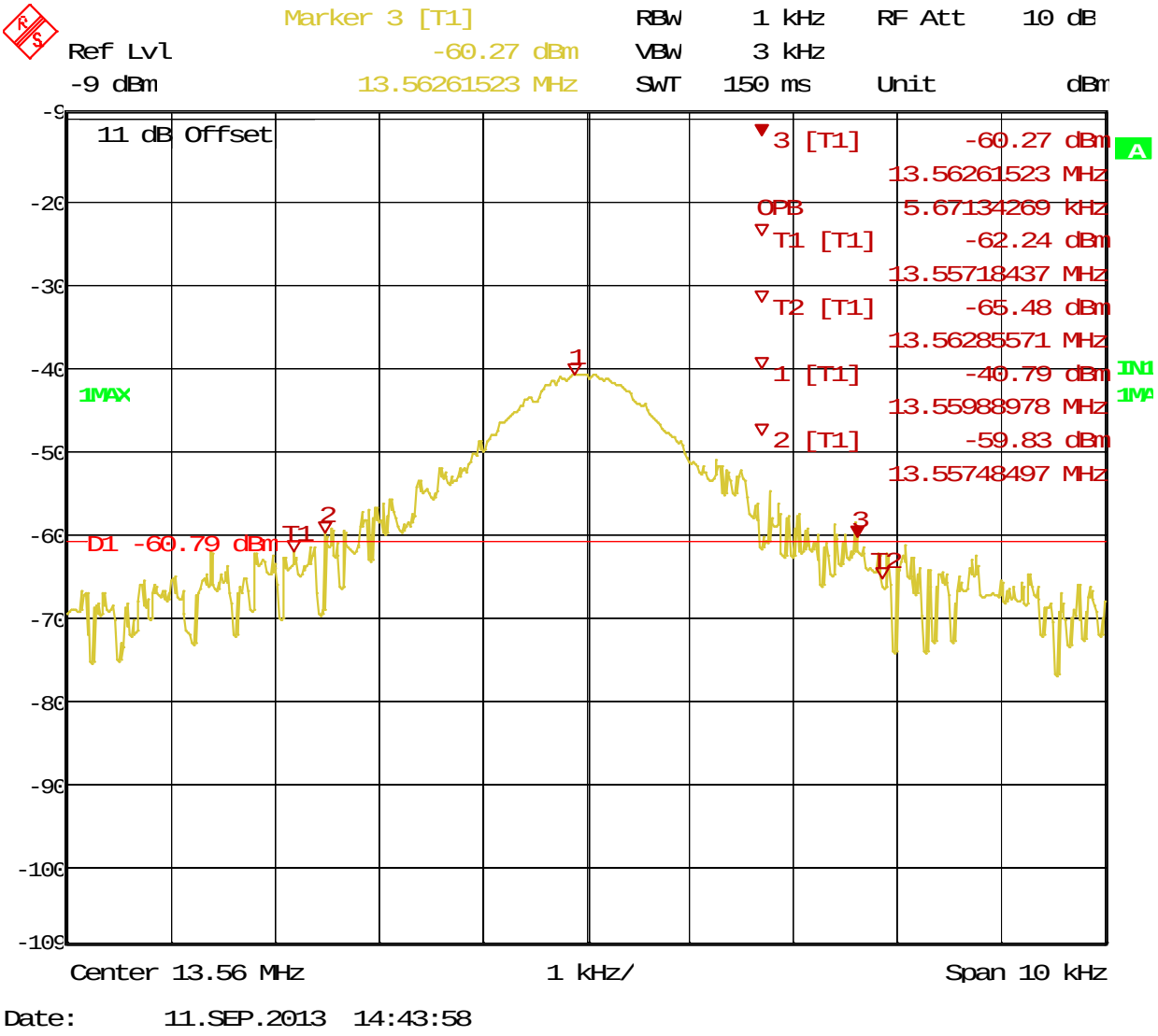


Figure 2: Occupied Bandwidth on X-Axis (Facing Away)

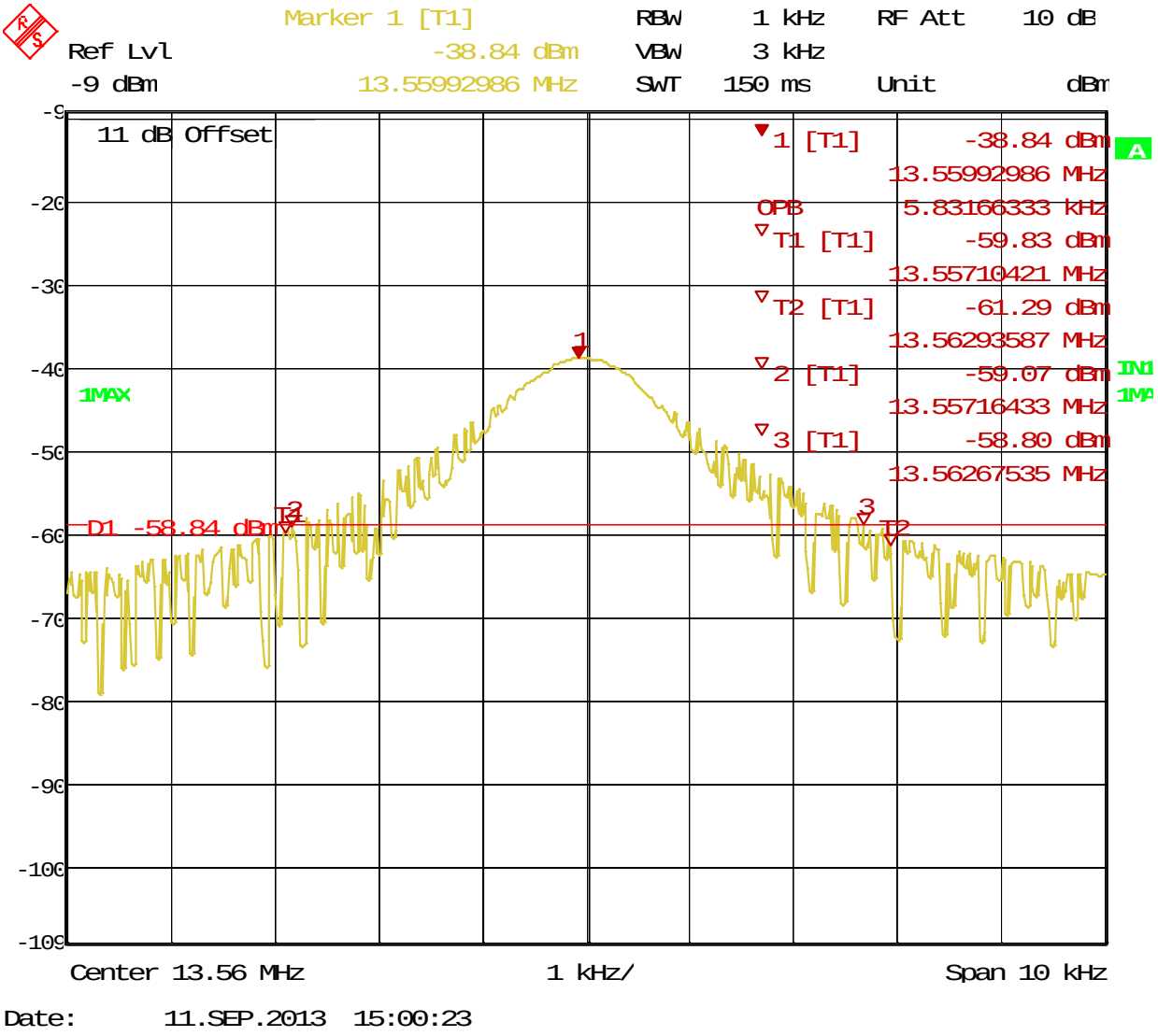


Figure 3: Occupied Bandwidth on Y-Axis (Facing EUT)

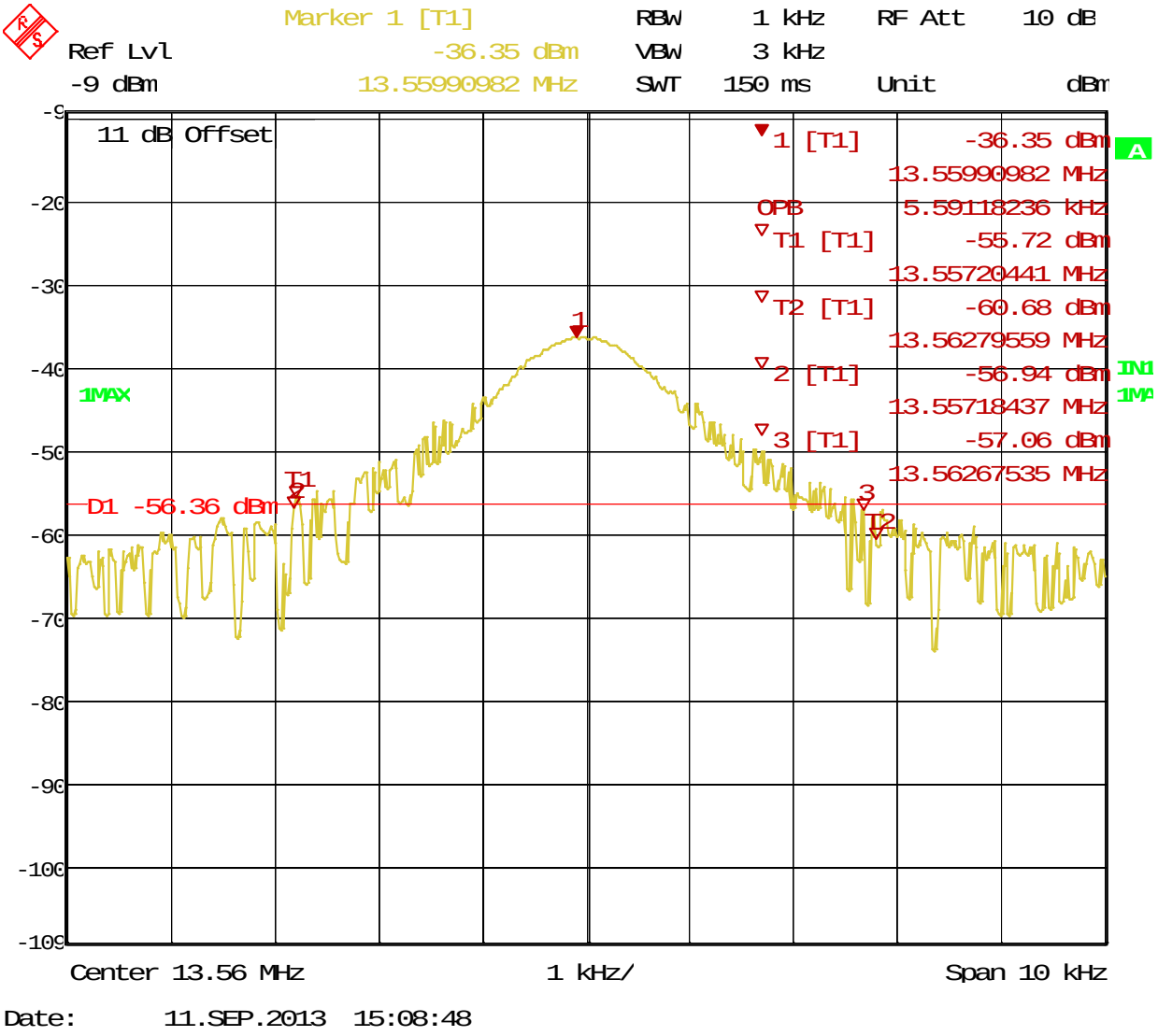


Figure 4: Occupied Bandwidth on Y-Axis (Facing Away)

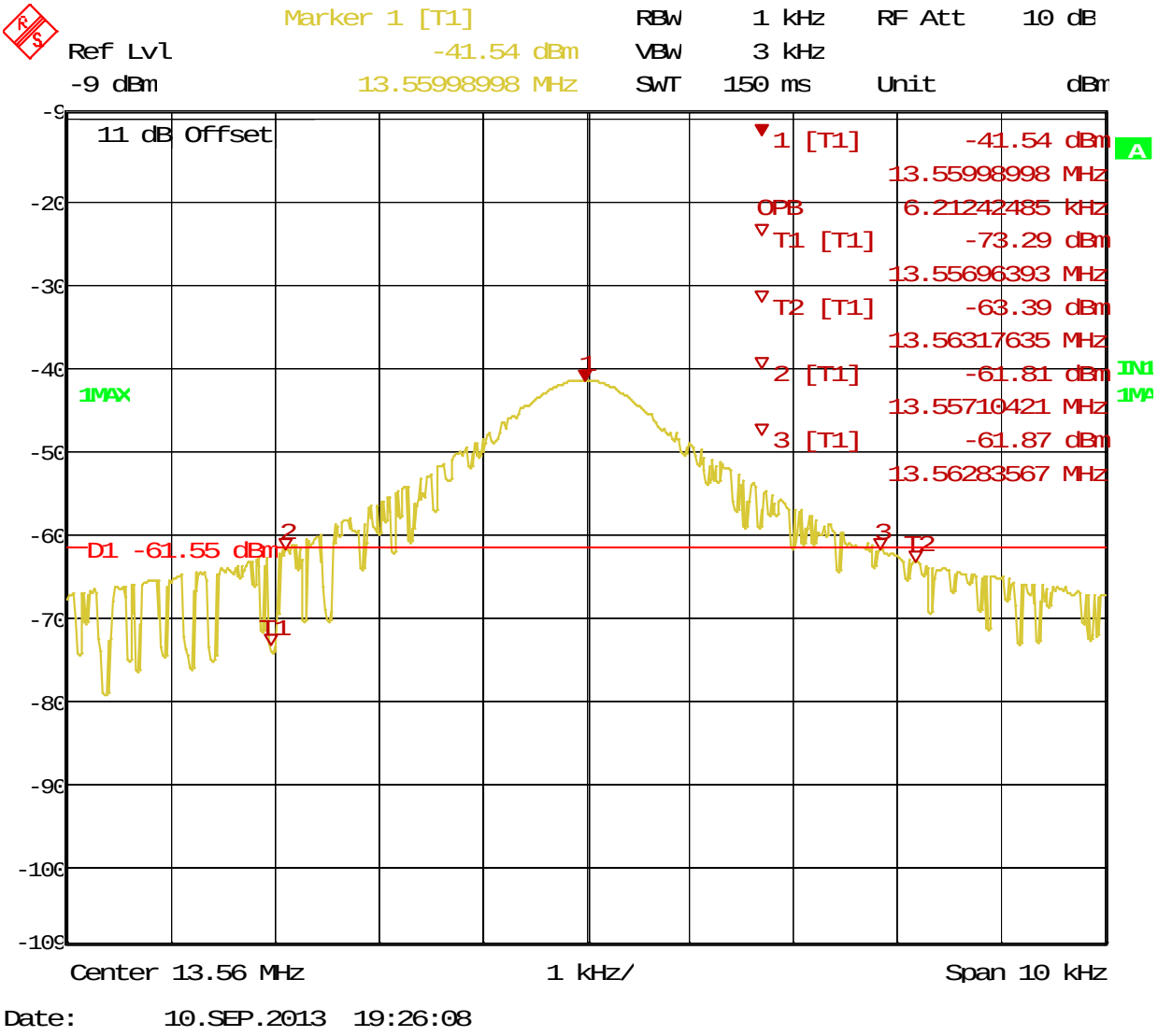


Figure 5: Occupied Bandwidth on Z-Axis (Facing EUT)

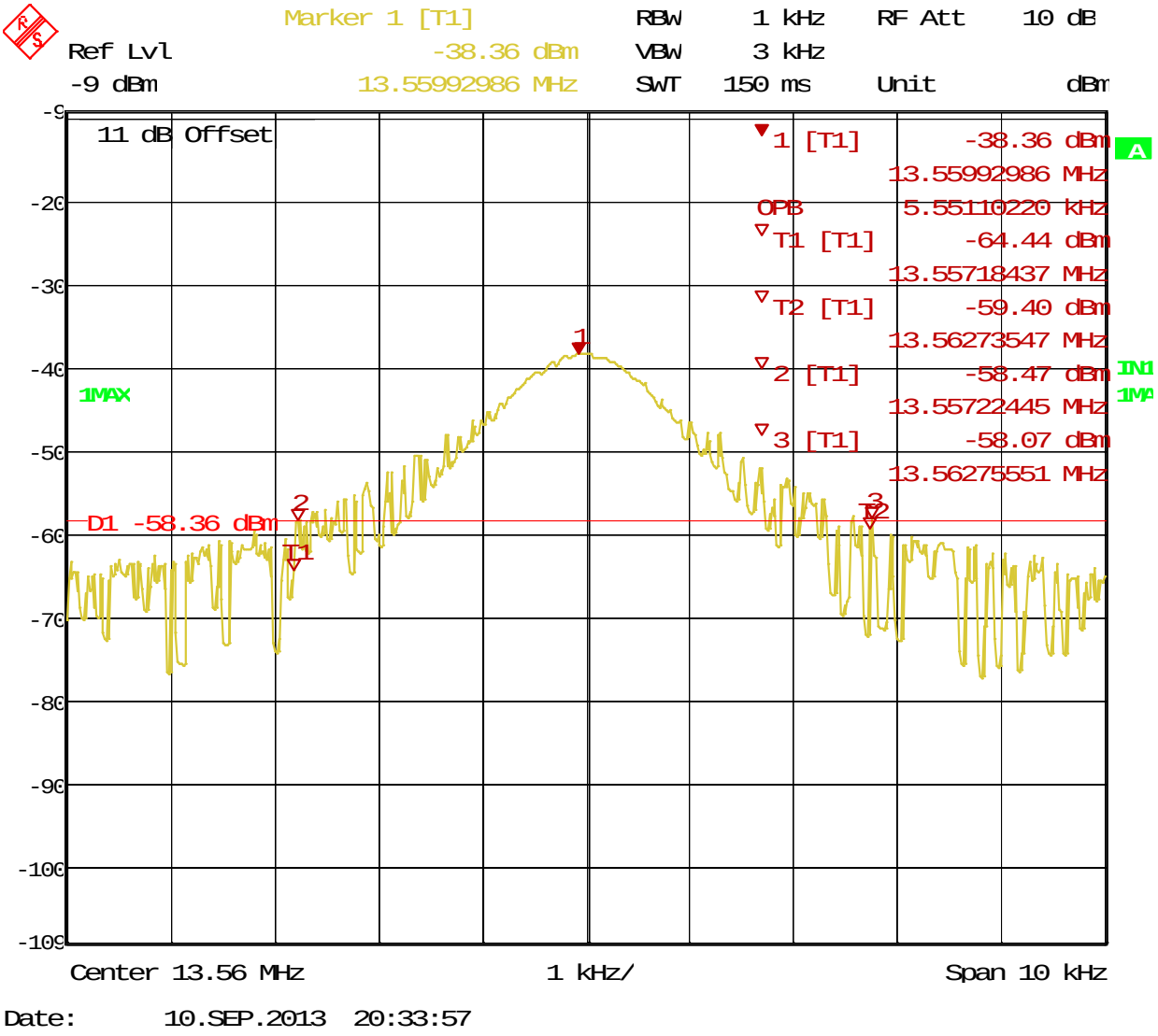


Figure 6: Occupied Bandwidth on Z-Axis (Facing Away)

4.3 Out-of-Band Emissions

The out of band emission is leakage measurement of the main carrier outside the allocated operating frequency band; 13.553 MHz to 13.567 MHz.
According to CFR47 Part 15.225: 2010 and RSS210 A2.6: 2010, the out of band emission shall;
-Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter (84 dBuV/m) at 30 meters,
-Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter (40.5 dBuV/m) at 30 meters.

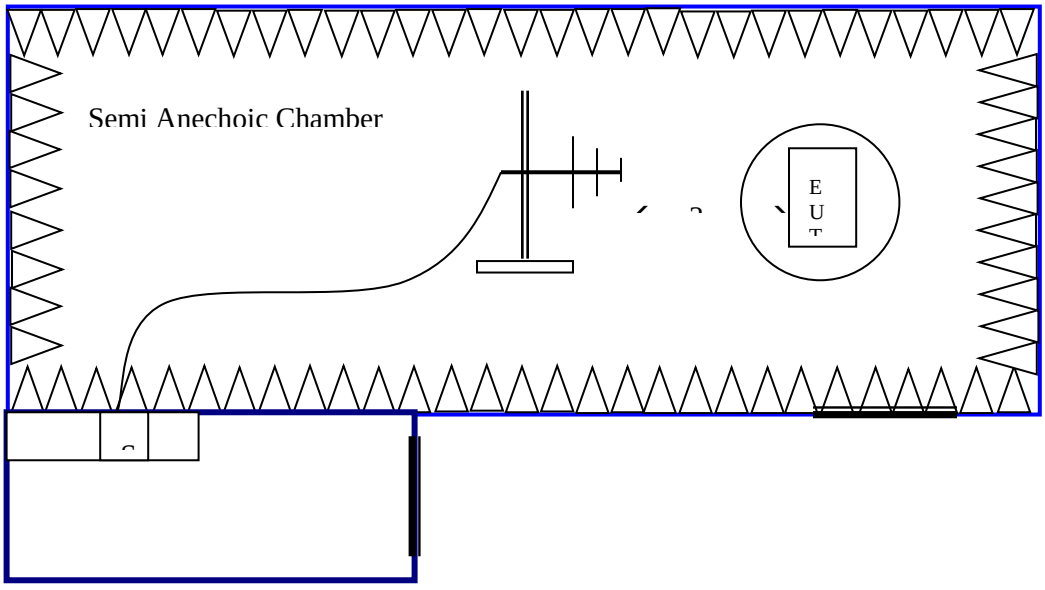
Table 6: Out of Band Emissions Limit

Frequency (MHz)	*Limit at 30m (dBuV/m)*	*Limit at 3m (dBuV/m)*	*Comment*
<13.110	*29.5*	*69.5*	*CFR47 15.225 (d), RSS210 A2.6 (d). Out of Band*
13.110-13.410	*40.5*	*80.5*	*CFR47 15.225 (c), RSS210 A2.6 (c). Out of Band*
13.410-13.533	*50.5*	*90.5*	*CFR47 15.225 (b), RSS210 A2.6 (b). Out of Band*
13.553-13.567	*84.0*	*124.0*	*CFR47 15.225 (a), RSS210 A2.6 (a), Inband (Carrier)*
13.567-13.710	*50.5*	*90.5*	*CFR47 15.225 (b), RSS210 A2.6 (b), Out of Band*
13.710-14.010	*40.5*	*80.5*	*CFR47 15.225 (c), RSS210 A2.6 (c), Out of Band*
>14.010	*29.5*	*69.5*	*CFR47 15.225 (d), RSS210 A2.6 (d), Out of Band*
Note: The limit was extrapolated 40dB/decade per CFR47 Part 15.31 (f)(3).			

4.3.1 Test Method

The radiated method was used to measure the out-of-band emission requirement. The measurement was performed with modulation per CFR47 15.225 (b) (c) 2010 and *RSS 210 A2.6.* (b) (c)*: 2010.* This test was performed on the production sample SN: JCGT161-X0147. The worst result indicated below.

Test Setup:



4.3.2 Test Result

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

Table 7: Out of Band Emissions – Test Results

Test Conditions: Conducted Measurement, Normal Temperature and Voltage only				
Antenna Type: Integrated		**Power Setting:** 200mW Chipset Output		
Signal State: Modulated		**Duty Cycle:** 100 %		
Ambient Temp.: 21 °C		**Relative Humidity:**42%		
Orientation	**Antenna Position**	**Spectrum Mask (12 to 15MHz)**	**Limit**	**Result**
X-Axis	0	Plot #7	See Table 6	Pass
	90	Plot #8		Pass
Y-Axis	0	Plot #9		Pass
	90	Plot #10		Pass
Z-Axis	0	Plot #11		Pass
	90	Plot #12		Pass
Note: All maximized emissions within 12 MHz to 15 MHz are below the spectrum mask limit per Table 6.				

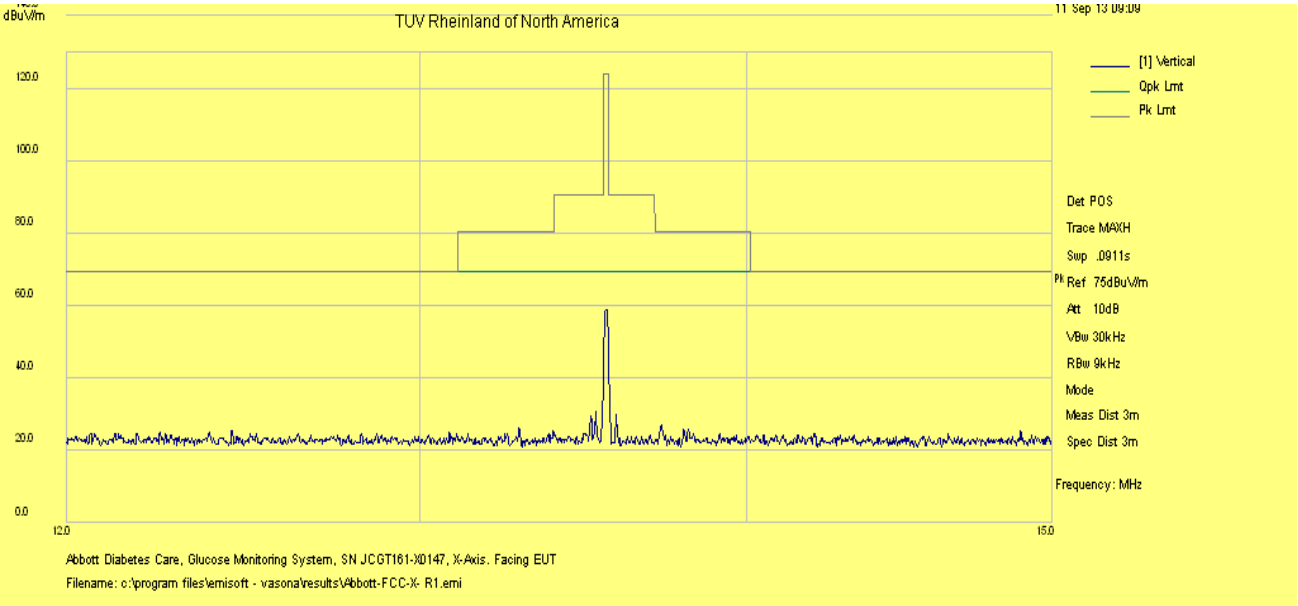


Figure 7: Out of Band Spectrum Mask for RFID Reader – 0 Degree Loop Antenna X axis

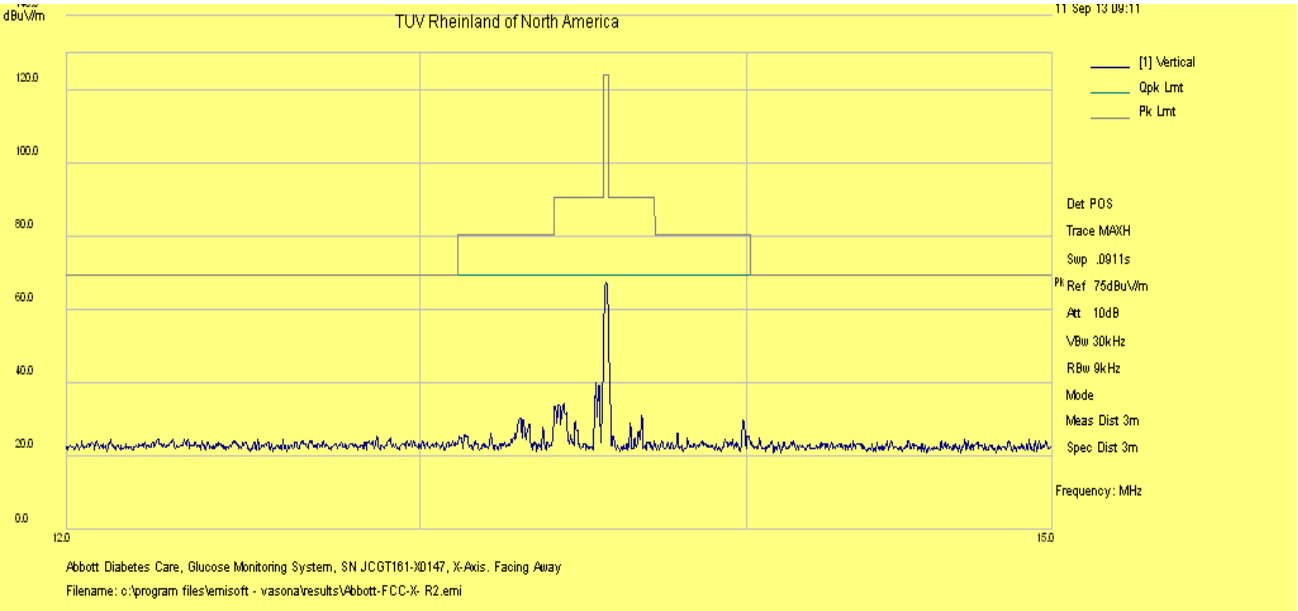


Figure 8: Out of Band Spectrum Mask for RFID Reader – 90 Degree Loop Antenna X axis

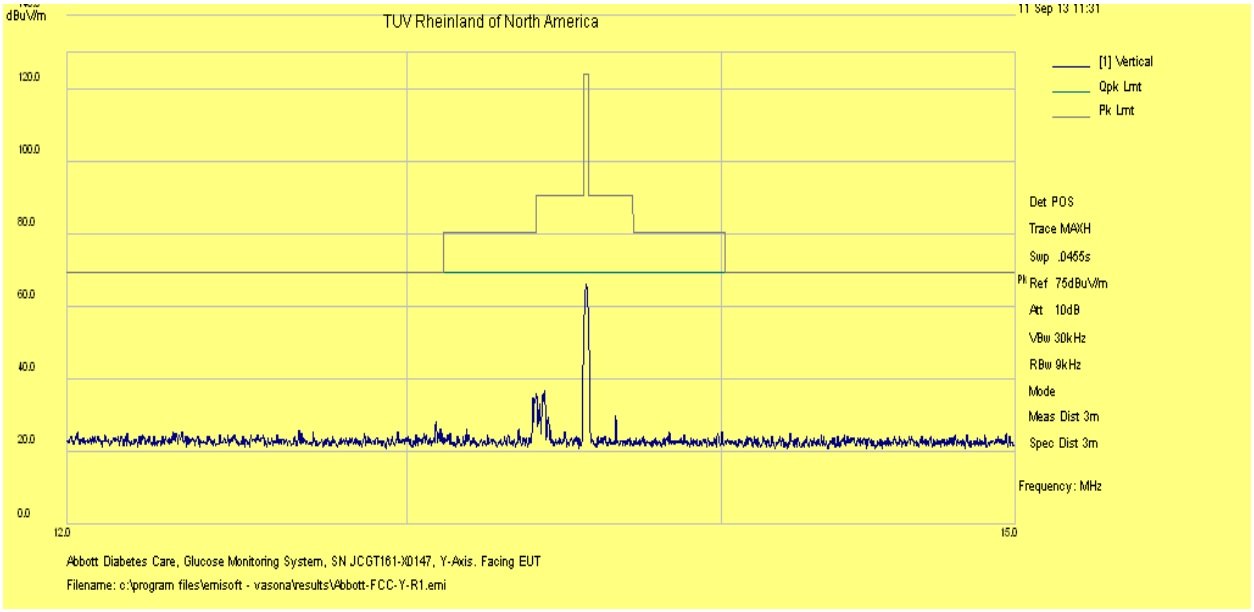


Figure 9: Out of Band Spectrum Mask for RFID Reader – 0 Degree Loop Antenna Y axis

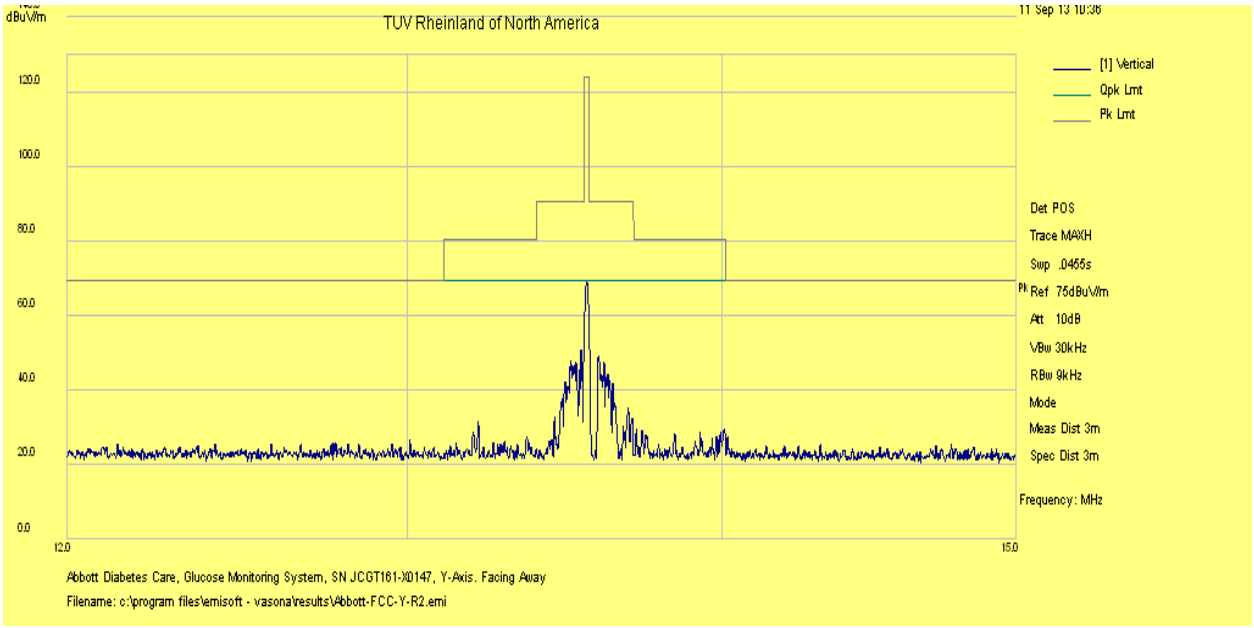


Figure 10: Out of Band Spectrum Mask for RFID Reader – 90 Degree Loop Antenna Y axis

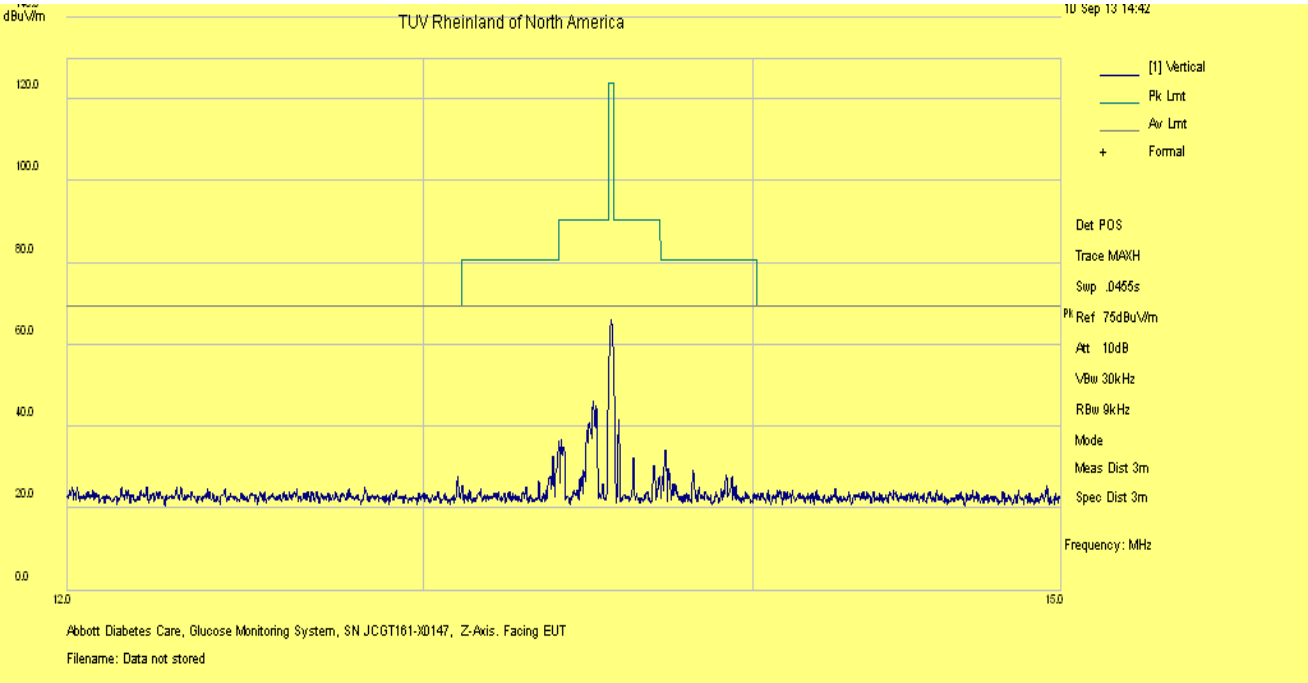


Figure 11: Out of Band Spectrum Mask for RFID Reader – 0 Degree Loop Antenna Z axis

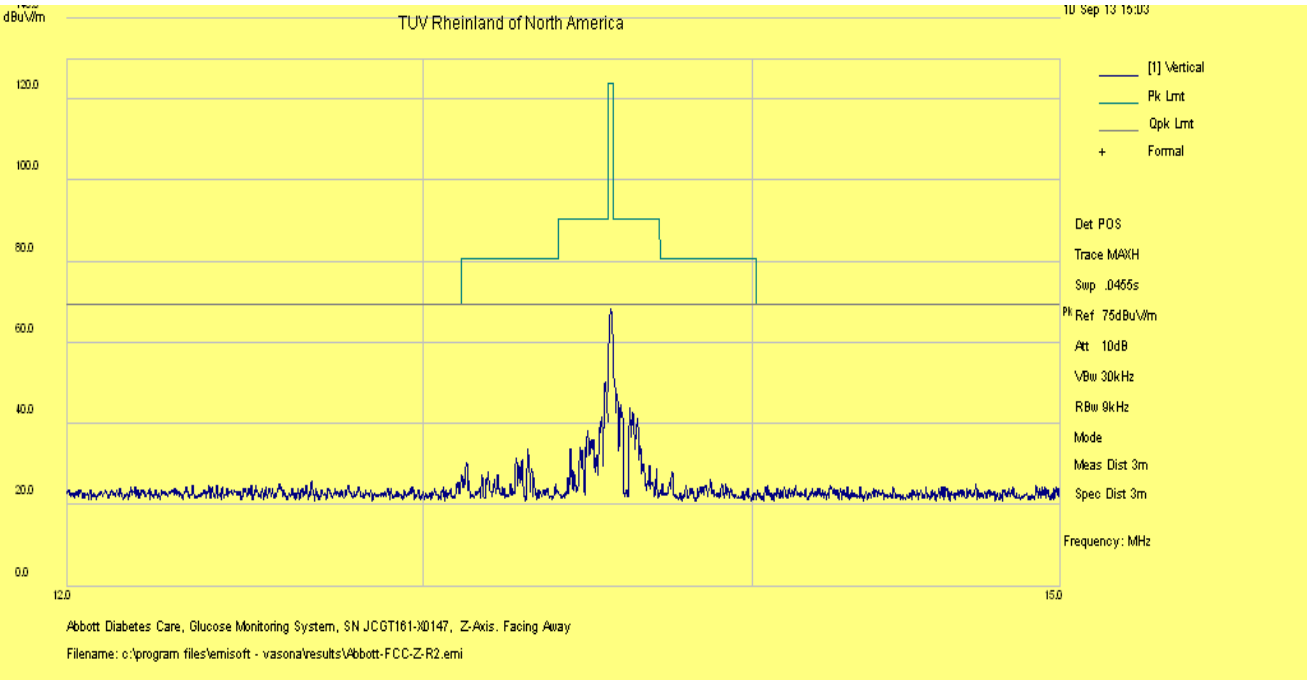


Figure 12: Out of Band Spectrum Mask for RFID Reader – 90 Degree Loop Antenna Z axis

4.4 Transmitter Spurious Emissions

Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmit mode; per requirement of CFR47 15.205, 15.209, 15.225(d), RSS GEN Sect. 6.

4.4.1 Test Methodology

4.4.1.1 Preliminary Test

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. The frequency range of interest was divided into sub-ranges to yield a frequency resolution of approximately 120 kHz and provide a reading at each frequency for no more than 12° of turntable rotation. For each frequency sub-range the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's.

Preliminary emission profile testing was performed inside the anechoic chamber. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm above the floor. The EUT was positioned as shown in the setup photographs. The receiving antenna was placed at a distance of 3m at a fixed height of 1m. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT.

4.4.1.2 Final Test

For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, than the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked.

Final testing was performed on an NSA compliant test site. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs.

The final spurious emission scans performed on the Z-Axis.

4.4.1.3 Deviations

None.

4.4.2 Transmitter Spurious Emission Limit

The spurious emissions of the transmitter shall not exceed the values in CFR47 Part 15.205, 15.209: 2013 and RSS GEN 6.1: 2010.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490.....	2400/F(kHz)	300
0.490-1.705.....	24000/F(kHz)	30
1.705-30.0.....	30	30
30-88.....	100 **	3
88-216.....	150 **	3
216-960.....	200 **	3
Above 960.....	500	3

4.4.3 Test Results

The final measurement data was taken under the worst case operating modes, configurations, and/or cable positions. It also reflects the results including any modifications and/or special accessories listed in Sections 1.4 and 1.5.

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

SOP 1 Radiated Emissions

Tracking # 31362360.001 Page 1 of 4

EUT Name	Glucose Monitoring System	**Date**	September 10, 2013
EUT Model	Apollo	**Temp / Hum in**	21°C / 42%rh
EUT Serial	JCGT161-X0147	**Temp / Hum out**	N/A
EUT Config.	Standalone Module Orientation Y axis	**Line AC / Freq**	120 Vac / 60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	See Below
Dist/Ant Used	3m / 6511 & JB3	**Performed by**	Jeremy Luong

Freq.	Raw	Cbl	AF	Level	Det.	Pol.	Height	Azimuth	Limit	Margin	Result
MHz	dBuV/m	dB	dB	dBuV/m		0/90	cm	deg	dBuV/m	dB	
1.35	21.24	0.12	11.60	32.96	QP	0	100	248	65.00	-32.04	Pass
3.79	13.49	0.20	11.30	24.99	QP	0	100	228	69.50	-44.51	Pass
4.14	12.08	0.21	11.27	23.56	QP	0	100	74	69.50	-45.94	Pass
13.10	7.82	0.38	10.67	18.87	QP	0	100	82	69.50	-50.63	Pass
13.42	10.93	0.39	10.65	21.97	QP	0	100	128	69.50	-47.53	Pass
13.43	13.60	0.39	10.65	24.65	QP	0	100	86	69.50	-44.85	Pass
13.65	6.17	0.39	10.65	17.21	QP	0	100	344	69.50	-52.29	Pass
3.47	25.10	0.20	11.30	36.60	QP	90	100	354	69.50	-32.90	Pass
3.50	23.60	0.20	11.30	35.10	QP	90	100	266	69.50	-34.40	Pass
3.89	22.90	0.20	11.30	34.40	QP	90	100	332	69.50	-35.10	Pass
13.51	16.88	0.39	10.65	27.92	QP	90	100	328	69.50	-41.58	Pass
13.54	16.46	0.39	10.65	27.50	QP	90	100	14	69.50	-42.00	Pass
13.54	19.30	0.39	10.65	30.34	QP	90	100	42	69.50	-39.16	Pass
13.60	18.58	0.39	10.65	29.62	QP	90	100	302	69.50	-39.88	Pass
13.62	24.34	0.39	10.65	35.39	QP	90	100	210	69.50	-34.12	Pass
27.12	13.57	0.56	8.90	23.03	QP	90	100	204	69.50	-46.47	Pass

Spec Margin = E-Field QP – Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty
Total CF= Amp Gain + Cable Loss + ANT Factor

Combined Standard Uncertainty $u_c(y)$ = ± 3.2 dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Note 1. RBW/VBW Setting:
9 kHz to 150 kHz; RBW = 200Hz, VBW = 1kHz
150 kHz to 30 MHz; RBW = 9kHz, VBW = 30kHz
2. Pre-scan performed on 3 orientations, and the worst case was observed on Y-Axis from 9kHz to 30MHz.

SOP 1 Radiated Emissions

Tracking # 31362360.001 Page 2 of 4

EUT Name	Glucose Monitoring System	**Date**	September 10, 2013
EUT Model	Apollo	**Temp / Hum in**	21°C / 44%rh
EUT Serial	JCGT161-X0147	**Temp / Hum out**	N/A
EUT Config.	Standalone Module Orientation X axis	**Line AC / Freq**	120 Vac / 60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	120 kHz/ 300 kHz
Dist/Ant Used	3m / 6511 & JB3	**Performed by**	Jeremy Luong

Freq.	Raw	Cable Loss	AF	Level	Det	Pol.	Hgt.	Azt	Limit	Margin	Result
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB	
48.01	41.42	0.75	-18.38	23.79	QP	V	98	62	40.00	-16.21	Pass
54.23	43.50	0.80	-19.90	24.40	QP	V	137	318	40.00	-15.60	Pass
81.36	44.50	1.00	-19.50	26.00	QP	V	151	120	40.00	-14.00	Pass
84.33	43.00	1.00	-19.70	24.30	QP	V	268	100	40.00	-15.70	Pass
457.35	40.76	2.53	-10.43	32.87	QP	V	171	167	46.00	-13.13	Pass
465.80	41.70	2.60	-10.20	34.10	QP	V	125	349	46.00	-11.90	Pass

Spec Margin = E-Field QP – Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty
Total CF= Amp Gain + Cable Loss + ANT Factor

Combined Standard Uncertainty $u_c(y)$ = ± 3.2 dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

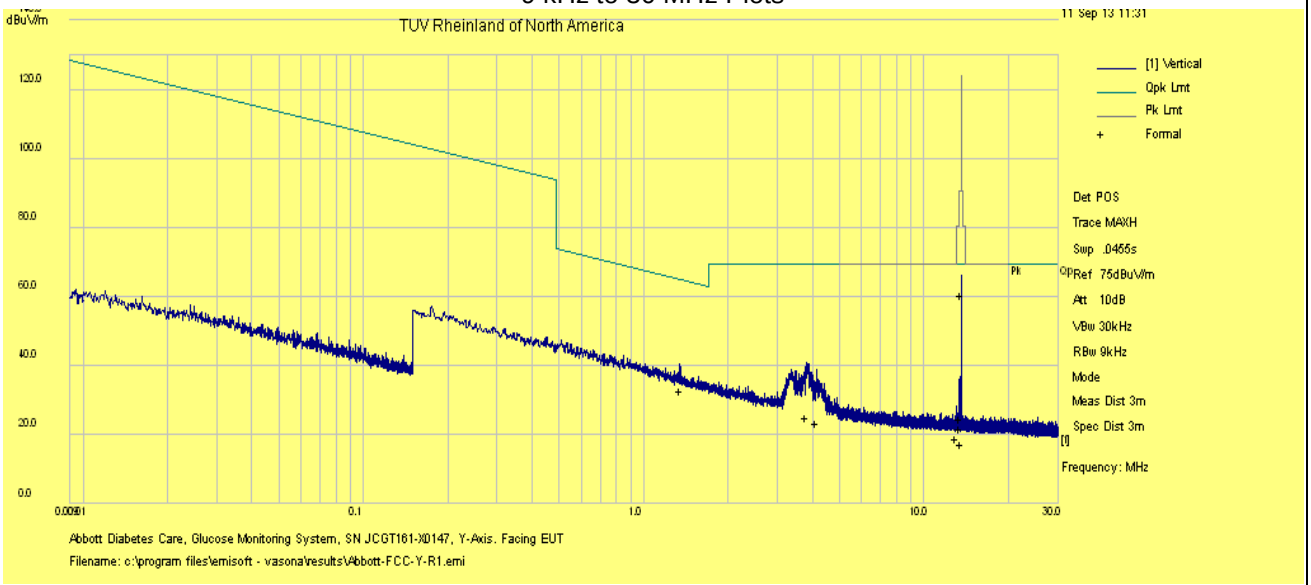
Note: Pre-scan performed on all 3 orientations, the worst case from 30MHz to 1GHz is observed on X-Axis

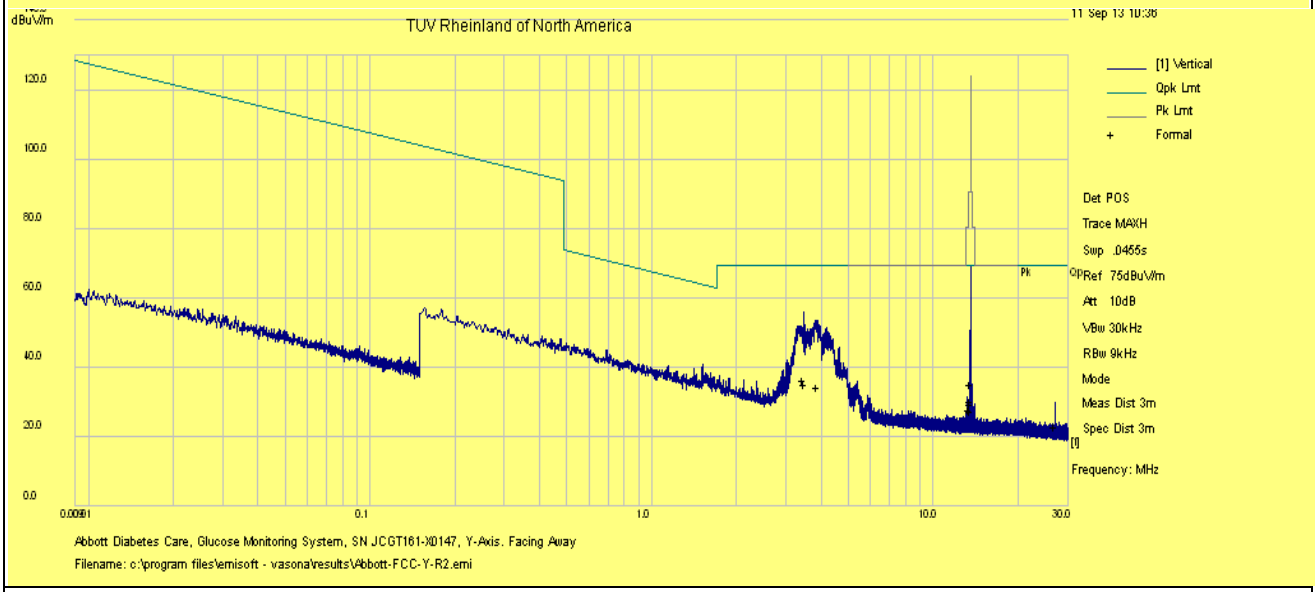
SOP 1 Radiated Emissions

Tracking # 31362360.001 Page 3 of 4

EUT Name	Glucose Monitoring System	**Date**	September 10, 2013
EUT Model	Apollo	**Temp / Hum in**	21°C / 42%rh
EUT Serial	JCGT161-X0147	**Temp / Hum out**	N/A
EUT Config.	Standalone Module Orientation Y axis	**Line AC**	120V/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	See below
Dist/Ant Used	3m / 6511	**Performed by**	Jeremy Luong

9 kHz to 30 MHz Plots

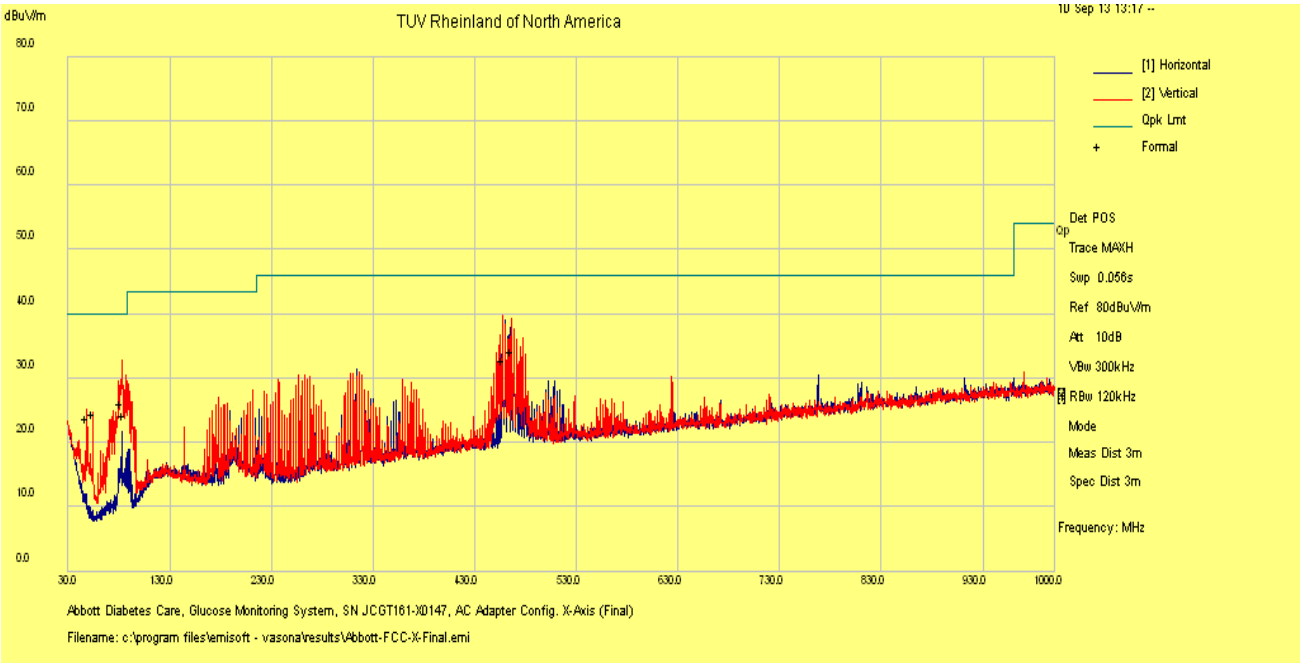




Notes: 9 kHz to 150 kHz; RBW = 200Hz, VBW = 1kHz
150 kHz to 30 MHz; RBW = 9kHz, VBW = 30kHz
The highest emission on the plots is the fundamental signal at 13.56MHz.

SOP 1 Radiated Emissions		Tracking # 31362360.001 Page 4 of 4	
EUT Name	Glucose Monitoring System	**Date**	September 10, 2013
EUT Model	Apollo	**Temp / Hum in**	21°C / 44%rh
EUT Serial	JCGT161-X0147	**Temp / Hum out**	N/A
EUT Config.	Standalone Module Orientation X axis	**Line AC**	120V/60Hz
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	120kHz / 300kHz
Dist/Ant Used	3m / JB3	**Performed by**	Jeremy Luong

30MHz to 1000MHz



Note: Pre-scan performed on all 3 orientations, the worst case from 30MHz to 1GHz is observed on X-Axis

4.4.4 Sample Calculation

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) = FIM - AMP + CBL + ACF

Where: FIM = Field Intensity Meter (dBμV)
AMP = Amplifier Gain (dB)
CBL = Cable Loss (dB)
ACF = Antenna Correction Factor (dB/m)

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

4.5 AC Conducted Emissions

Testing was performed in accordance with ANSI C63.4: 2003. 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: 2010 and RSS 210: 2010.

4.5.1 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 set of 50μH / 50Ω LISNs.

Testing is either performed in 5m Chamber. The setup photographs clearly identify which site was used. The vertical ground plane used in the semi-anechoic chamber is a 2m x 2m solid aluminum frame and panel, and it is bonded to the horizontal ground plane.

In the case of tabletop equipment, the EUT is placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane and 40cm from a vertical ground reference plane. The rear of the EUT was positioned flush with the backside of the table and directly over the LISNs. The power and I/O cables were routed over the edge of the table and bundled approximately 40cm from the ground plane. Support equipment was powered from a separate LISN.

4.5.1.1 Deviations

There were no deviations from this test methodology.

4.5.2 Test Results

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

Table 8: AC Conducted Emissions – Test Results

Test Conditions: Conducted Measurement at Normal Conditions only		
Antenna Type: Internal	**Power Level:** Fixed	
AC Power: 120 Vac/60 Hz	**Configuration:** AC-DC Adapter	
Ambient Temperature: 21° C	**Relative Humidity:** 42% RH	
Configuration	**Frequency Range**	**Test Result**
Line 1 (Hot)	0.15 to 30 MHz	Pass
Line 2 (Neutral)	0.15 to 30 MHz	Pass

SOP 2 Conducted Emissions

Tracking # 31362360.001 Page 1 of 4

EUT Name	Glucose Monitoring System	**Date**	September 11, 2013
EUT Model	Apollo	**Temp / Hum in**	21° C / 44% rh
EUT Serial	JCGT161-X0147	**Temp / Hum out**	N/A
EUT Config.	Standalone Module	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15.207	**RBW / VBW**	9kHz / 30 kHz
Lab/LISN	Lab 5 /ComPower, Line 1	**Performed by**	Jeremy Luong

Frequency	Raw	Cable Loss	Ins. Loss	Level	Detector	Line	Limit	Margin	Result
MHz	dBuV	dB	dB	dBuV		Line	dBuV	dB	
0.287	32.87	2.89	-0.06	35.70	QP	Live	60.62	-24.92	Pass
0.287	17.97	2.89	-0.06	20.80	Ave	Live	50.62	-29.82	Pass
0.419	32.02	2.89	-0.05	34.86	QP	Live	57.47	-22.61	Pass
0.419	21.63	2.89	-0.05	24.47	Ave	Live	47.47	-23.00	Pass
8.641	26.55	3.01	-0.01	29.55	QP	Live	60.00	-30.45	Pass
8.641	16.50	3.01	-0.01	19.50	Ave	Live	50.00	-30.50	Pass
13.559	23.97	3.04	0.05	27.05	QP	Live	60.00	-32.95	Pass
13.559	14.96	3.04	0.05	18.04	Ave	Live	50.00	-31.96	Pass
13.635	21.56	3.04	0.05	24.64	QP	Live	60.00	-35.36	Pass
13.635	9.27	3.04	0.05	12.35	Ave	Live	50.00	-37.65	Pass
13.737	21.64	3.04	0.05	24.72	QP	Live	60.00	-35.28	Pass
13.737	8.25	3.04	0.05	11.33	Ave	Live	50.00	-38.67	Pass
14.031	21.59	3.04	0.05	24.68	QP	Live	60.00	-35.32	Pass
14.031	8.45	3.04	0.05	11.54	Ave	Live	50.00	-38.46	Pass

Spec Margin = QP./Ave. - Limit, ± Uncertainty

Combined Standard Uncertainty $u_c(y)$ = ± 1.2 dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

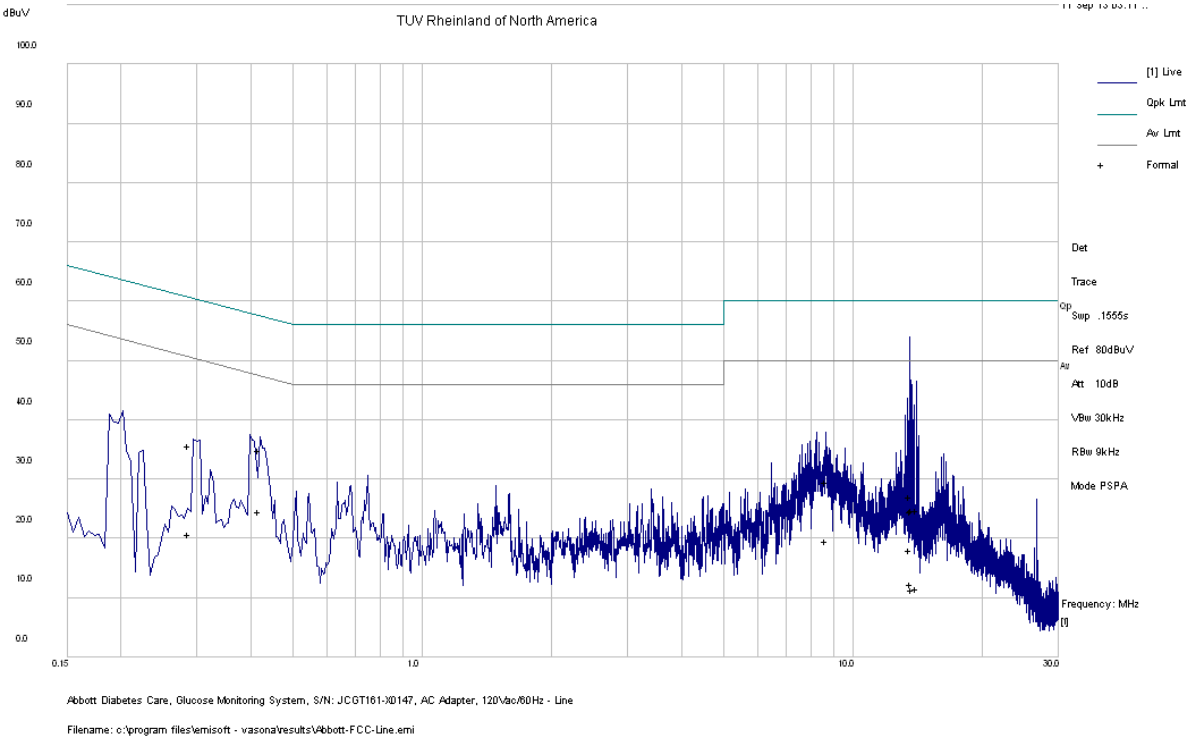
Notes: Tested with AC/DC adapter

SOP 2 Conducted Emissions

Tracking # 31362360.001 Page 2 of 4

EUT Name	Glucose Monitoring System	**Date**	September 11, 2013
EUT Model	Apollo	**Temp / Hum in**	21° C / 44% rh
EUT Serial	JCGT161-X0147	**Temp / Hum out**	N/A
EUT Config.	Standalone Module	**Line AC**	120Vac/60Hz
Standard	CFR47 Part 15.207	**RBW / VBW**	9kHz / 30 kHz
Lab/LISN	Lab 5 /ComPower, Line 1	**Performed by**	Jeremy Luong

150 kHz to 30 MHz Plot for Line 1 (Hot)



Notes: The emission over average limit is in-band emission at 13.56MHz.
Meet FCC Class B limit.

SOP 2 Conducted Emissions

Tracking # 31362360.001 Page 3 of 4

EUT Name	Glucose Monitoring System	**Date**	September 11, 2013
EUT Model	Apollo	**Temp / Hum in**	21° C / 44% rh
EUT Serial	JCGT161-X0147	**Temp / Hum out**	N/A
EUT Config.	Standalone Module	**Line AC / Freq**	120Vac/60Hz
Standard	CFR47 Part 15.207	**RBW / VBW**	9kHz / 30 kHz
Lab/LISN	Lab 5 /ComPower, Line 2	**Performed by**	Jeremy Luong

Frequency	Raw	Cable Loss	Ins. Loss	Level	Detector	Line	Limit	Margin	Result
MHz	dBuV	dB	dB	dBuV			dBuV	dB	
0.178	39.24	2.87	-0.09	42.02	QP	Neutral	64.56	-22.54	Pass
0.178	16.29	2.87	-0.09	19.07	Ave	Neutral	54.56	-35.49	Pass
0.276	32.72	2.89	-0.06	35.55	QP	Neutral	60.94	-25.39	Pass
0.276	11.18	2.89	-0.06	14.01	Ave	Neutral	50.94	-36.93	Pass
0.380	11.08	2.89	-0.05	13.92	Ave	Neutral	48.29	-34.37	Pass
0.380	33.29	2.89	-0.05	36.13	QP	Neutral	58.29	-22.16	Pass
0.565	7.73	2.90	-0.04	10.59	Ave	Neutral	46.00	-35.41	Pass
0.565	21.17	2.90	-0.04	24.03	QP	Neutral	56.00	-31.97	Pass
13.893	4.41	3.04	0.05	7.50	Ave	Neutral	50.00	-42.50	Pass
13.893	16.15	3.04	0.05	19.24	QP	Neutral	60.00	-40.76	Pass
13.991	17.78	3.04	0.05	20.87	QP	Neutral	60.00	-39.13	Pass
13.991	3.82	3.04	0.05	6.91	Ave	Neutral	50.00	-43.09	Pass
27.119	-1.94	3.11	0.31	1.48	Ave	Neutral	50.00	-48.52	Pass
27.119	8.00	3.11	0.31	11.42	QP	Neutral	60.00	-48.58	Pass
27.108	9.71	3.11	0.31	13.13	QP	Neutral	60.00	-46.87	Pass
27.107	-2.10	3.10	0.30	1.29	Ave.	Neutral	50.00	-48.70	Pass

Spec Margin = QP./Ave. - Limit, ± Uncertainty

Combined Standard Uncertainty $u_c(y)$ = ± 1.2 dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

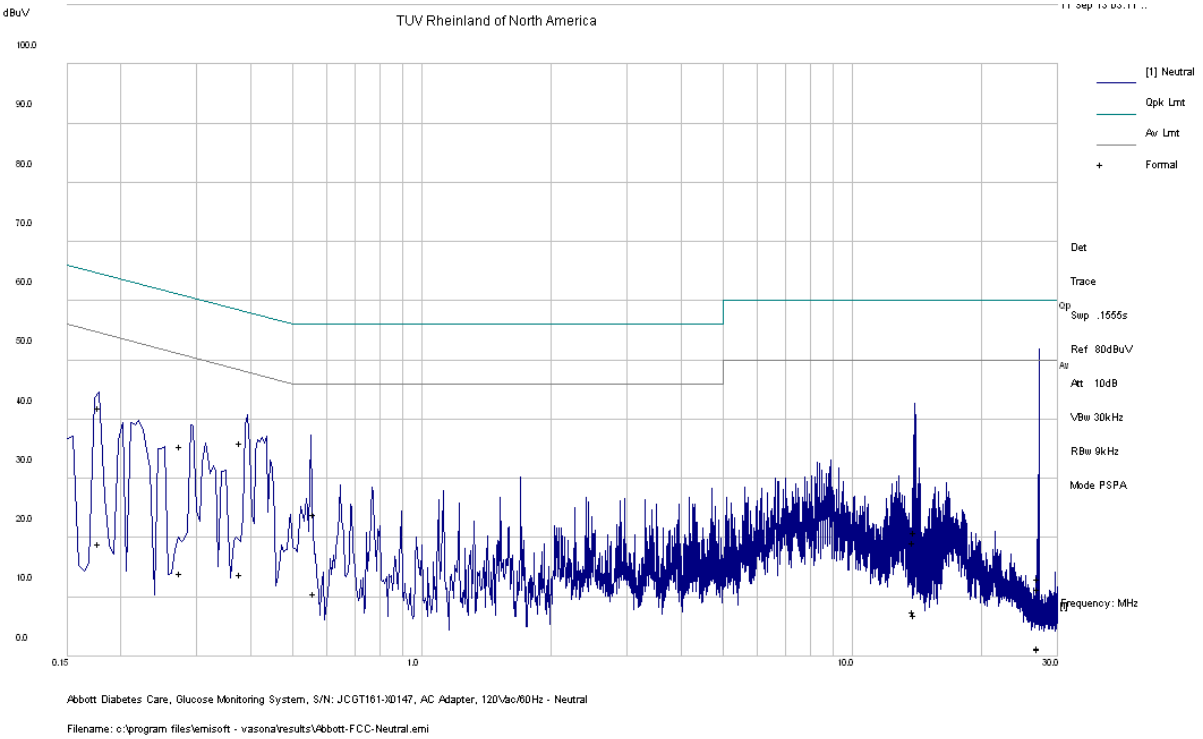
Note - Tested with AC/DC adapter

SOP 2 Conducted Emissions

Tracking # 31362360.001 Page 4 of 4

EUT Name	Glucose Monitoring System	**Date**	September 11, 2013
EUT Model	Apollo	**Temp / Hum in**	21° C / 44% rh
EUT Serial	JCGT161-X0147	**Temp / Hum out**	N/A
EUT Config.	Standalone Module	**Line AC**	120Vac/60Hz
Standard	CFR47 Part 15.207	**RBW / VBW**	9kHz / 30 kHz
Lab/LISN	Lab 5 /ComPower, Line 2	**Performed by**	Jeremy Luong

150 kHz to 30 MHz Plot for Line 2 (Neutral)



Notes: Meet FCC Class B limit.

4.6 Frequency Stability

In accordance with 47 CFR Part 15.225(e) the frequency stability of RFID devices must be such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual. The Manufacturer declares the operating temperature ranges of +20º to +45º C.

4.6.1 Test Methodology

The manufacturer of the equipment is responsible for ensuring that the frequency stability is such that emissions are always maintained within the band of operation under all conditions. This test performs according to ANSI C63.10-2009 Section 6.8

4.6.2 Manufacturer Declaration

The frequency stability of the reference oscillator sets the frequency stability of the RF transceiver signals. Per CFR47 Part 15.225 (e) and RSS 210 Sect. A2.6 (d), all of the RF signal should have ±0.01% or ±100 ppm stability.

This stability accounts for room temp tolerance of the crystal oscillator circuit, frequency variation across temperature, and crystal ageing.

Worst case:

±100 ppm at 13.56 MHz translates to a maximum frequency shift of ±1.356 kHz.

The frequency stability was conducted on the production sample, SN: JCGT161-X0257.

4.6.3 Test results

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

Table 9: Frequency Stability – Test Results

Temperature	Time	PPM
20°C	Start	24.34
	2 Min.	24.34
	5 Min	17.70
	10 min	24.34
22°C	-	
30°C	Start	19.91
	2 Min.	19.91
	5 Min	19.91
	10 min	19.9
40°C	Start	6.64
	2 Min.	28.76
	5 Min	30.97
	10 min	17.70
45°C	Start	15.49
	2 Min.	15.49
	5 Min	17.70
	10 min	15.49
Note: All frequency drifts from 13.56 MHz were less than ±100 ppm.		

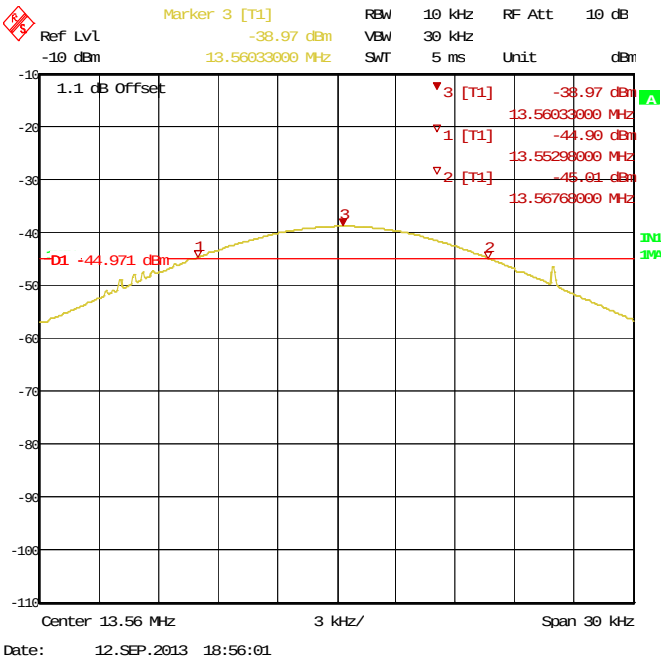


Figure 13: Frequency Stability at 20 °C - Start

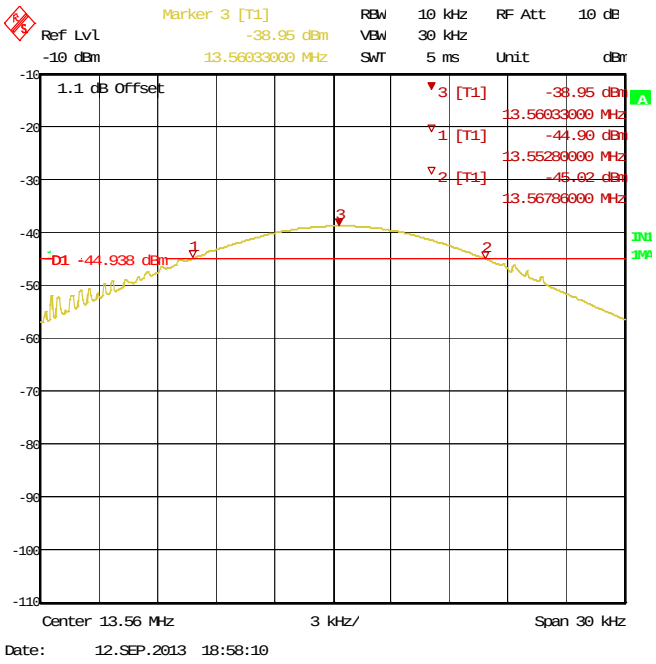


Figure 14: Frequency Stability at 20 °C – 2 min

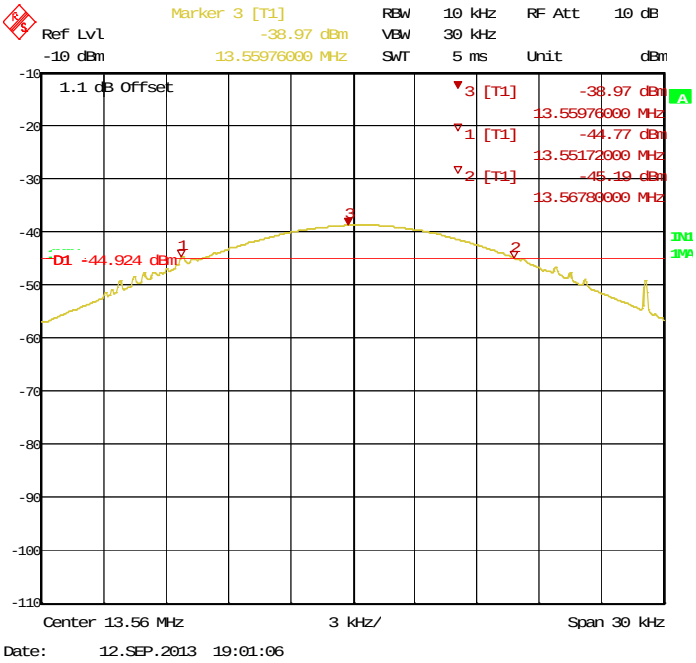


Figure 15: Frequency Stability at 20 °C – 5 min

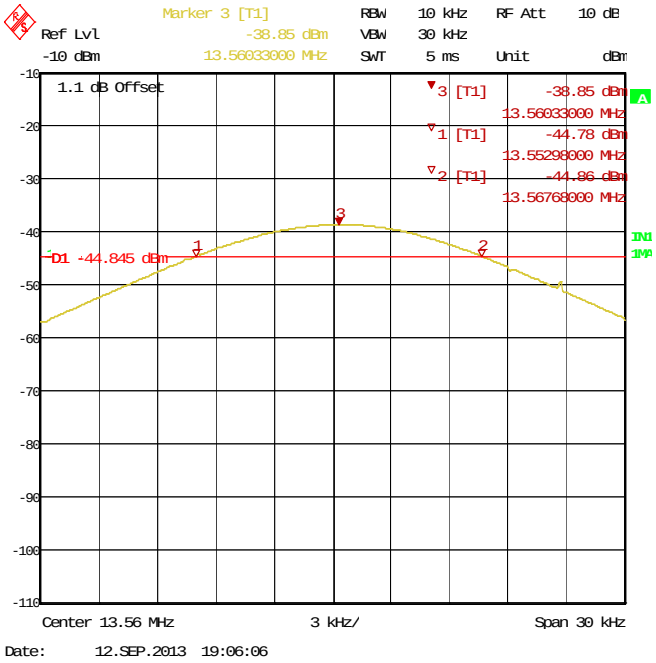


Figure 16: Frequency Stability at 20 °C – 10 min

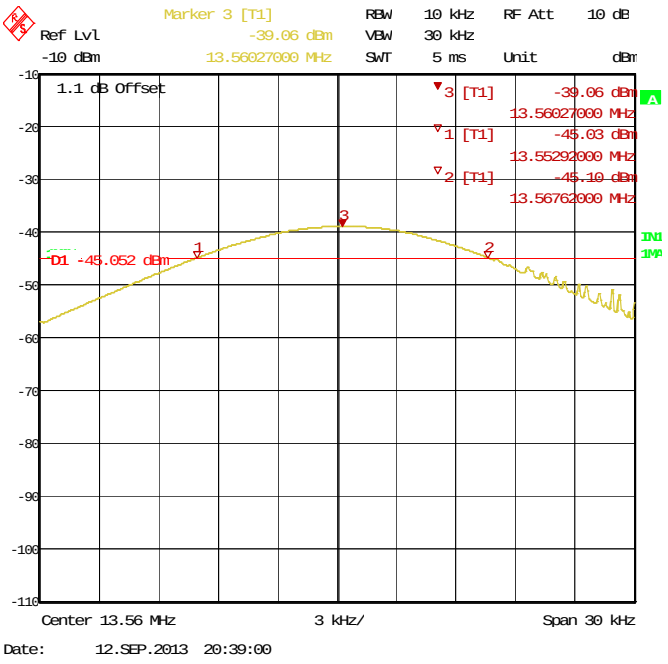


Figure 17: Frequency Stability at 30 °C - Start

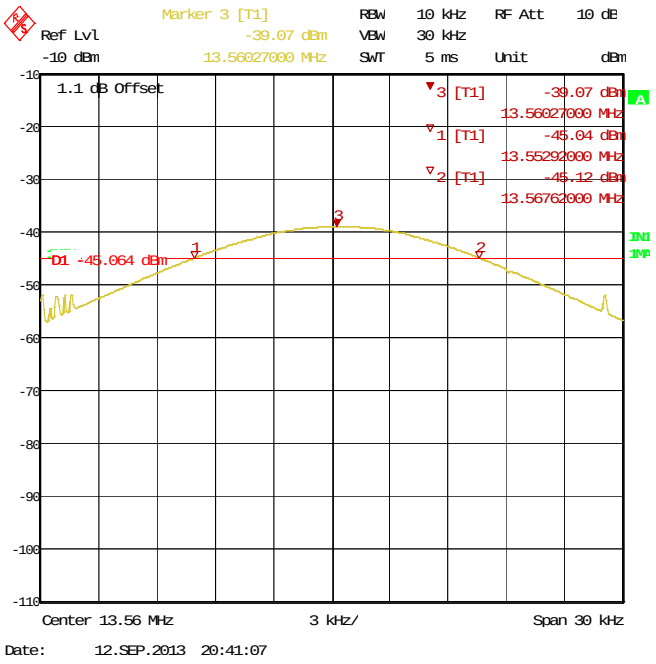


Figure 18: Frequency Stability at 30 °C – 2 min

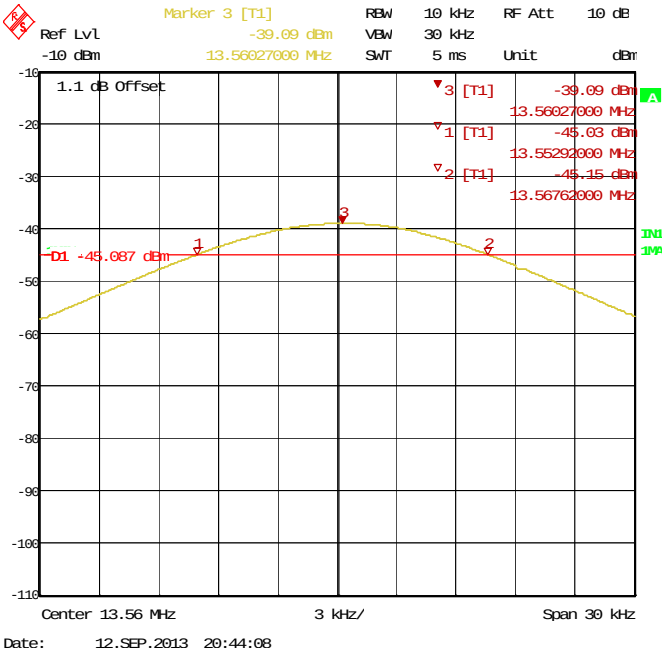


Figure 19: Frequency Stability at 30 °C – 5 min

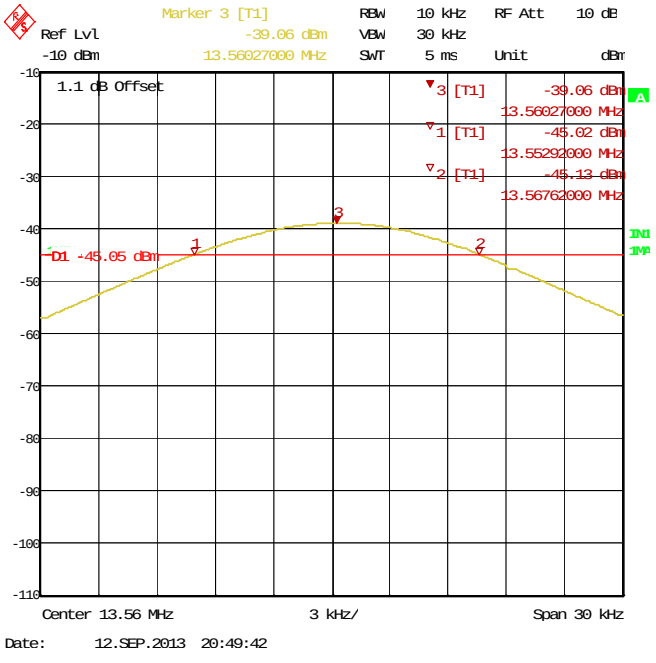


Figure 20: Frequency Stability at 30 °C – 10 min

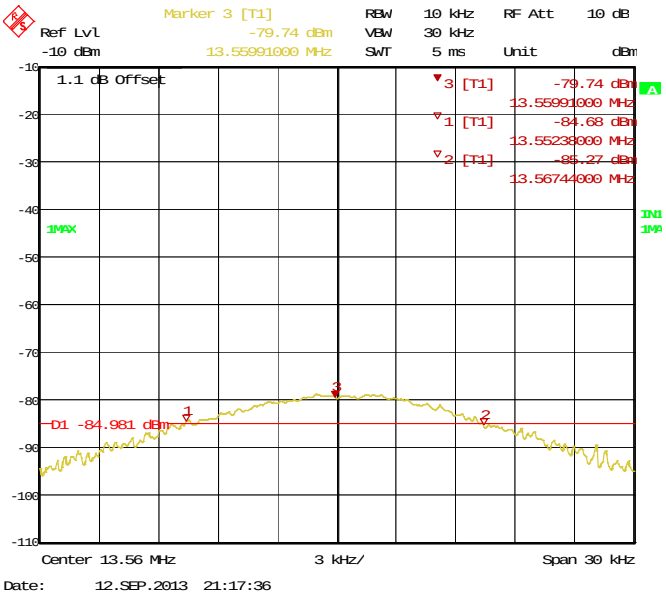


Figure 21: Frequency Stability at 40 °C - Start

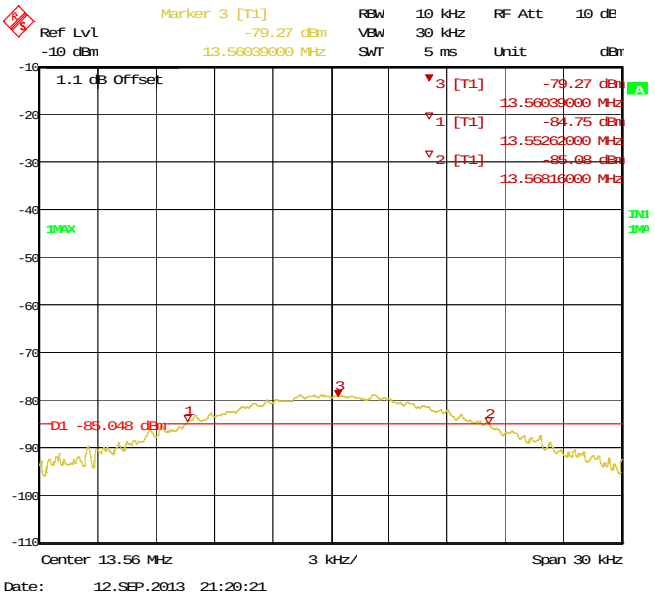


Figure 22: Frequency Stability at 40 °C – 2 min

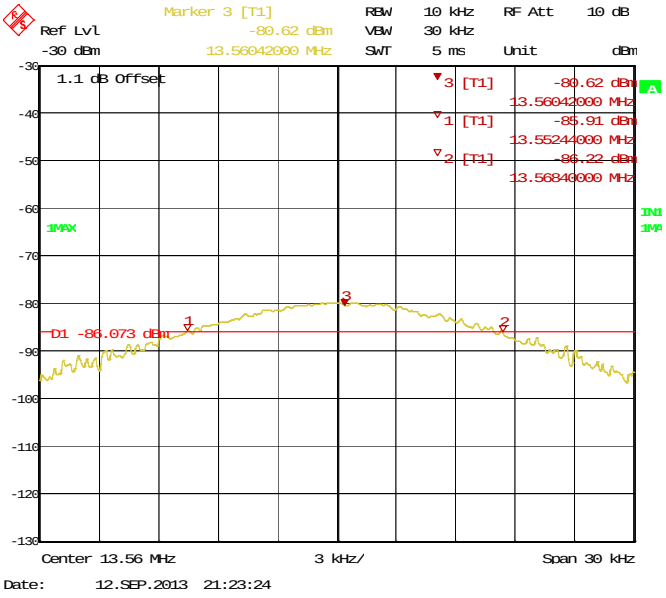


Figure 23: Frequency Stability at 40 °C – 5 min

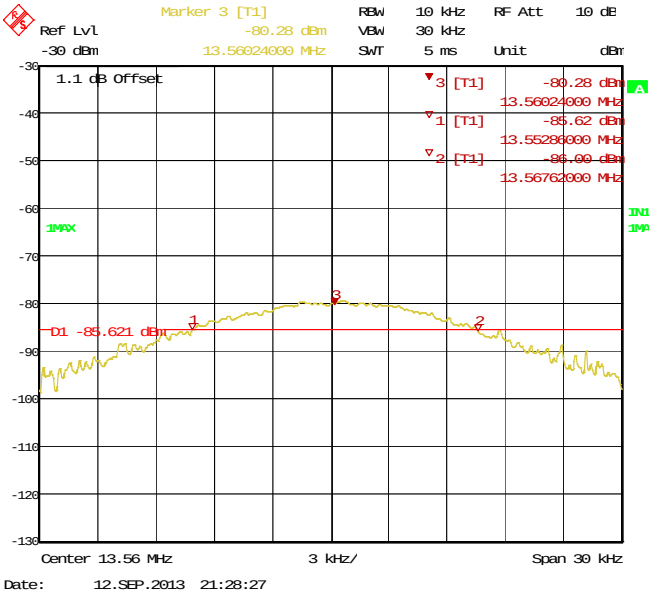


Figure 24: Frequency Stability at 40 °C – 10 min

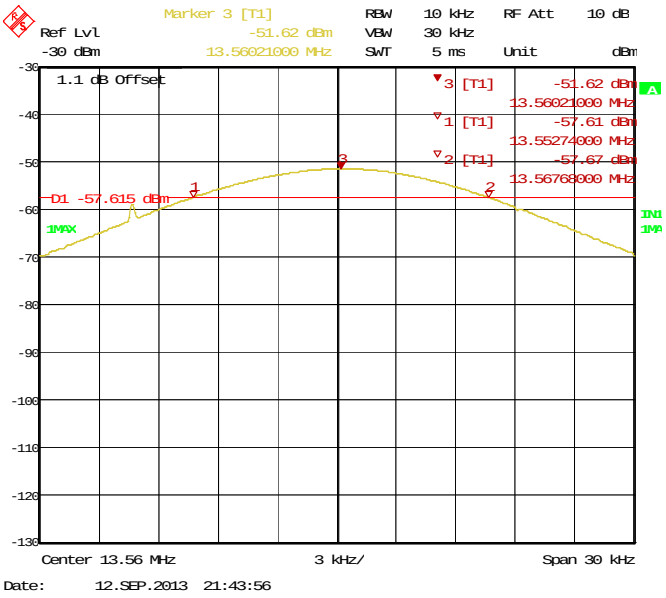


Figure 25: Frequency Stability at 45 °C - Start

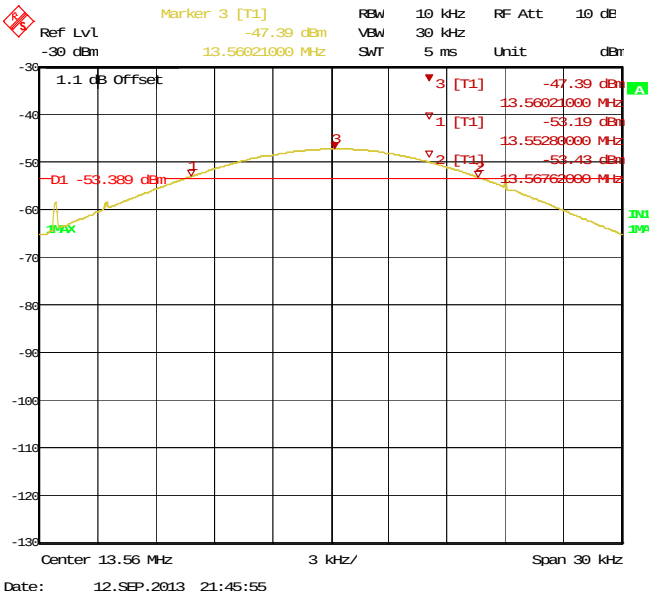


Figure 26: Frequency Stability at 45 °C – 2 min

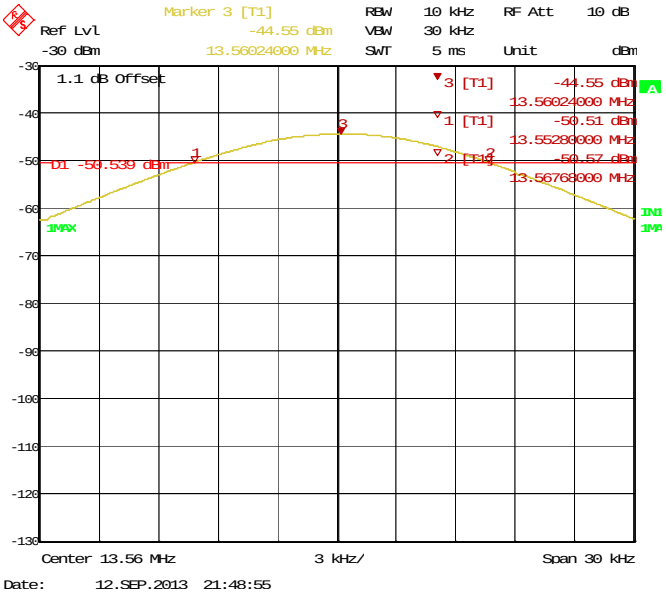


Figure 27: Frequency Stability at 45 °C – 5 min

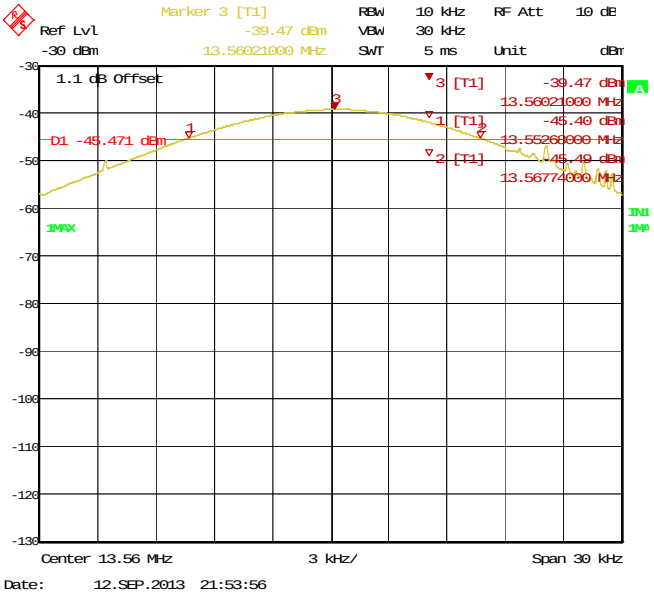


Figure 28: Frequency Stability at 45 °C – 10 min

4.7 Voltage Variation

In accordance with 47 CFR Part 15.31 (e) intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

4.7.1 Test Methodology

The RFID reader was designed to operating within 3.6 Vdc to 4.2 Vdc. If the battery voltage is outside the voltage range, the reader would shut down. The fundamental frequency was observed during the variation. The RF ID standalone module was powered by 4 Vdc by programmable power supply. The voltage was varied from 3.6 Vdc to 4.2 Vdc mean while the fundamental frequencies were observed and recorded for the maximum drift in ppm; part per millions.

The voltage variaion was conducted on the production sample, SN: JCGT161-X0257, modified with leads coming out of the battery terminals for worst case.

4.7.2 Test results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s). The fundamental frequencies drifted less than ±100 ppm.

Table 10: Voltage Variation – Test Results

Temperature	-6 dB Lower Edge (MHz)	+6 dB Upper Edge (MHz)	Center Frequency (MHz)	PPM
3.6V DC	13.55292	13.56768	13.56030	22.12
4.0V DC	13.55298	13.56768	13.56033	24.34
4.2V DC	13.55292	13.56768	13.66030	22.12
Note: All frequency drifts were less than ±100 ppm from 13.56 MHz No frequency change was observed with time.				

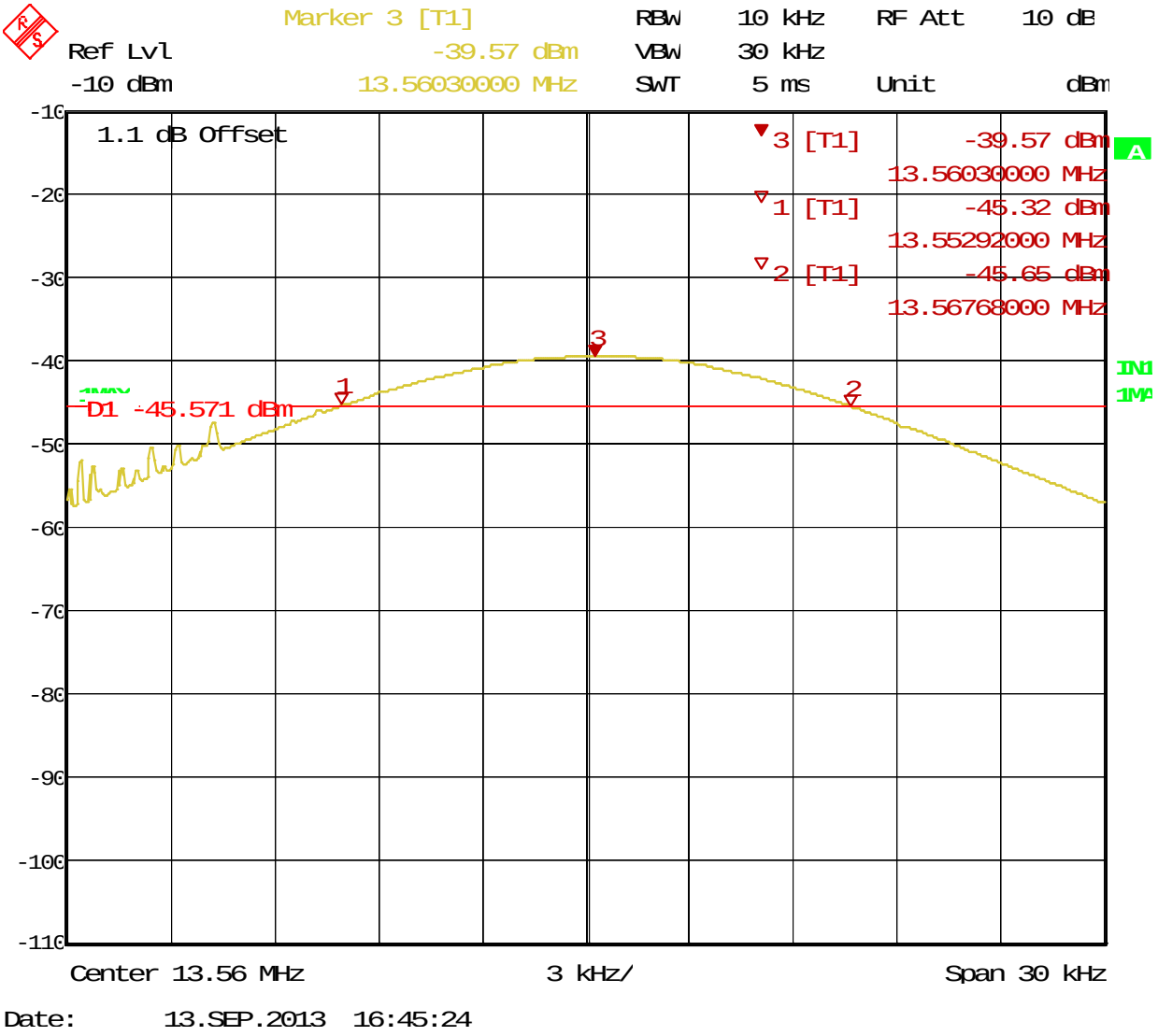


Figure 29: Voltage Variation at 3.6 Vdc

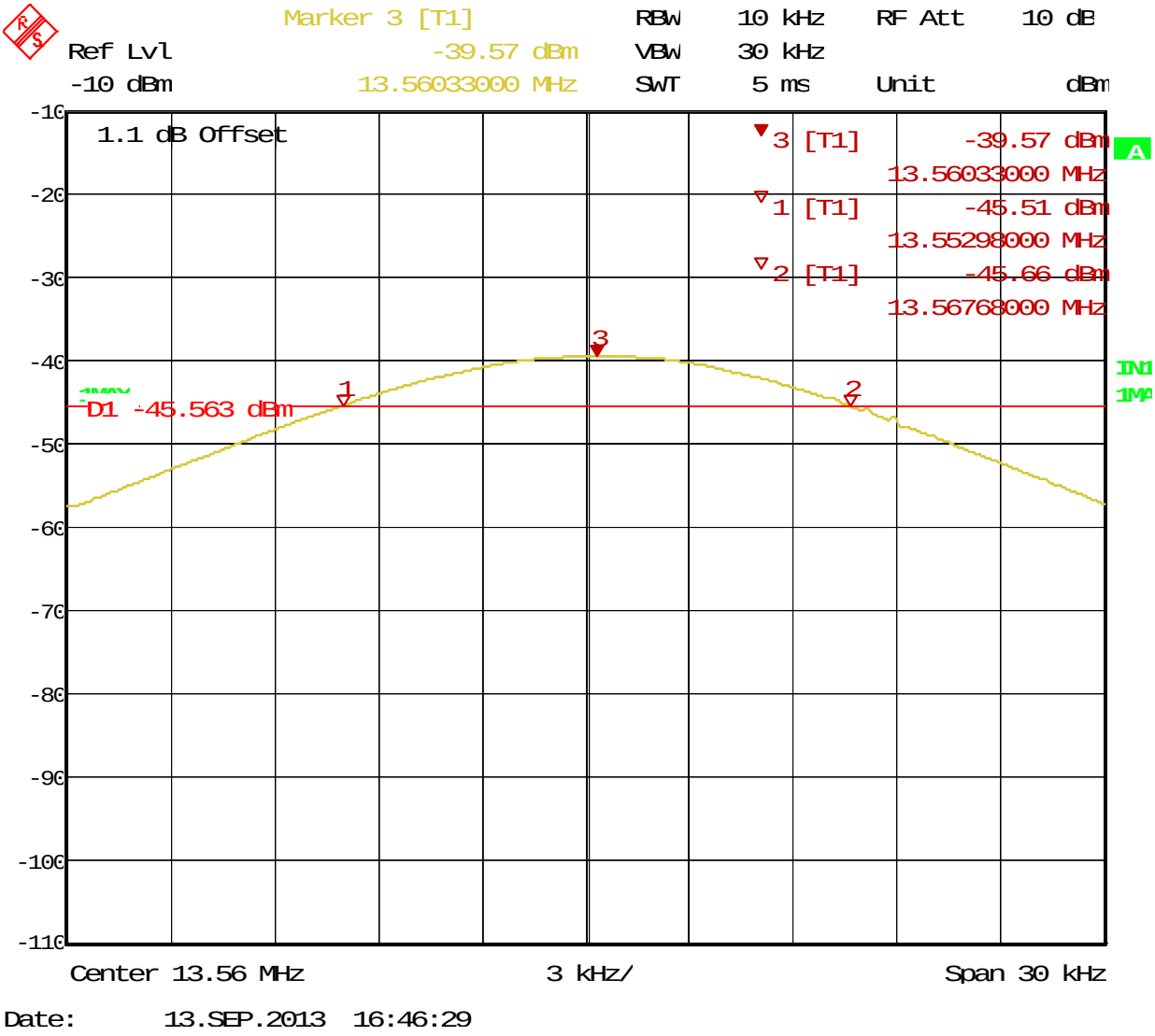


Figure 30: Voltage Variation at 4 Vdc

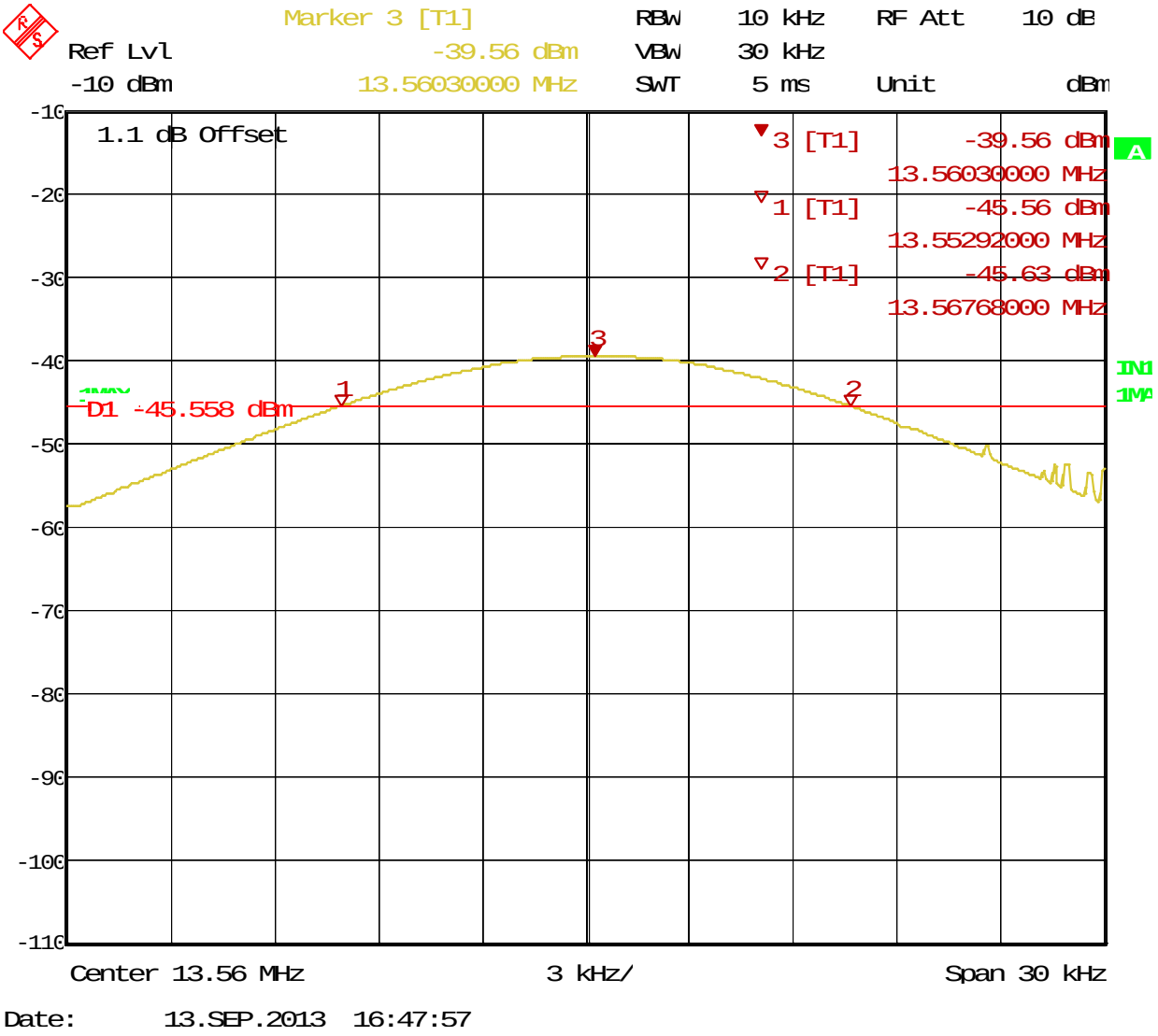


Figure 31: Voltage Variation at 4.2 Vdc

5 Test Equipment List

5.1 Equipment List

Equipment	Manufacturer	Model #	Serial/Inst #	Last Cal mm/dd/yy	Next Cal mm/dd/yy
EMI Receiver	Agilent	N9038A	MY52260210	07/18/2014	07/18/2014
Amplifier	Hewlett Packard	8447D	2944A07996	01/16/2013	01/16/2014
Bilog Antenna	Sunol Sciences	JB3	A102606	05/15/2012	05/15/2014
Loop Antenna	ETS-Lindgren	6502	62531	10/04/2012	10/04/2014
EMI Receiver	Hewlett Packard	8546A	3807A00445	01/18/2013	01/18/2014
Preselector	Hewlett Packard	85460A	3704A00407	01/18/2013	01/18/2014
Line Impedance Network Stabilization	Com-Power	L1-200	12111	01/16/2013	01/16/2014
Spectrum Analyzer	Rohde & Schwarz	ESIB40	100180	05/03/2013	05/03/2014
Thermo Chamber	ESPEC	BTZ-133	0613436	03/11/2013	03/11/2014
Thermometer	Fluke	52II	96480032	08/07/2013	08/07/2014
Digital Multimeter	Fluke	177	92780314	01/17/2013	01/17/2014

*** 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, and performance acceptance criteria. It is an overview of information provided by the manufacturer so that the test laboratory may perform the requested testing.

6.2 Customer

Table 11: Customer Information

Company Name	Abbott Diabetes Care
Address	1360 S. Loop Road
City, State, Zip	Alameda CA, 94502
Country	U.S.A.
Phone	(510) 864-4405
Fax	(510) 239-2683

Table 12: Technical Contact Information

Name	William Matievich
E-mail	william.matievich@abbott.com
Phone	(510) 864-4405
Fax	(510) 239-2683

6.3 Equipment Under Test (EUT)

Table 13: EUT Specifications

EUT Specification	
Dimensions:	Reader - 59mm X 94mm X 16mm Sensor – 29mm diameter
Power Supply:	Reader - 3.0 Vdc (Li Ion Battery), 270 mA, or 5 Vdc via USB Power. Sensor – 1.5 Vdc (Battery), 13.56 MHz H-Field Supply
Environment	Controlled Laboratory
Operating Temperature Range:	20 to 45 degrees C
Multiple Feeds:	☐ Yes and how many ☒ No. RFID Reader receives 5 Vdc via USB or internal battery.
Hardware Version	Reader - PRI 22175-003-Rev. 2 Sensor – PRT23207-102
RFID Software Version	Reader - V 1.34 Sensor – V 2.07
Operating Mode	RFID Reader
Transmitter Frequency Band	13.56 MHz
Chipset Rated Power Output	200 mW
Power Setting @ Operating Channel	Fixed. Power controls by FPGA firmware.
Antenna Type	Reader - Wire-wound Bobbin Antenna, 52 x 76 mm, 3turns. Sensor – integrated PCB antenna, 26mm diameter, 6 turns
Modulation Type	☐ AM ☐ FM ☐ Phase ☒ Other describe: OOK
Data Rate	26.4 kbit/s.
Max. Duty Cycle	100% for 15s interrogation
Type of Equipment	☐ Table Top ☐ Wall-mount ☐ Floor standing cabinet ☒ Other *describe: Portable, Handheld*

Table 14: 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	USB	Yes	3-ft	M
Note: USB cable was mainly used for providing DC power via AC/DC adapter during testing.				

Table 15: Supported Equipment

Equipment	Manufacturer	Model	Serial	Used for
Laptop	Dell Computers	D6410	Asset # D1148	Set RFID mode.
Note: None				

Table 16: Description of Sample used for Testing

Device	Serial Number	Configuration	Used For
RFID Reader	JCGT161-X0147	Radiated Sample	Max. Carrier Field Strength Occupied Bandwidth Out of Band Emission TX Spurious Radiated Emission RX Spurious Radiated Emission AC Conducted Emission
RFID Module	JCGT161-X0257	Radiated Sample	Frequency Stability Voltage Variation
Note: None			

Table 17: Description of Test Configuration used for Radiated Measurement.

Device	Antenna	Mode	Setup Description
RFID Reader	Internal	Transmit & Receive	EUT all 3 axes
Note: Testing was performed for all 3 orthogonal axes.			

6.4 Test Specifications

Testing requirements

Table 18: Test Specifications

Emissions and Immunity	
Standard	**Requirement**
CFR 47 Part 15.225:2013	All
RSS-210, Issue 8, December 2010	All

END OF REPORT