

FCC 15.225 13.56MHz Test Report

for

EPS Bio Technology Corp.

**NO. 8, R&D RD.III, HSINCHU SCIENCE PARK,
HSINCHU, TAIWAN, 30077, R.O.C.**

**Product Name : EasyMax Tag
Self-Monitoring Blood
Glucose System**

Model Name : EMTAG

FCC ID : 2AQBR-D062

**Prepared by: : AUDIX Technology Corporation,
EMC Department**



The test report is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the U.S. Government.

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APPENDIX A TEST DATA AND PLOTS

APPENDIX B TEST PHOTOGRAPHS



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TEST REPORT

Applicant : EPS Bio Technology Corp.
Manufacturer : EPS Bio Technology Corp.
EUT Description
(1) Product : EasyMax Tag Self-Monitoring Blood Glucose System
(2) Model : EMTAG
(3) Power Supply: DC 3V

Applicable Standards:

47 CFR FCC Part 15 Subpart C
ANSI C63.10:2013

Audix Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Audix Technology Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Report: 2020. 01. 16

Reviewed by: Tina Huang (Tina Huang/Administrator)

Approved by: Johnny Hsueh for (Ben Cheng/Manager)



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1. REVISION RECORD OF TEST REPORT

Edition No	Issued Data	Revision Summary	Report Number
0	2020. 01. 16	Original Report	EM-F190508

2. SUMMARY OF TEST RESULTS

Rule	Description	Results
15.207	Conducted Emission	N/A, Note
15.225(a)(b)(c)	Radiation Emission (In-Band)	PASS
15.225(d)/15.209	Radiation Emission (Out-Band)	PASS
15.215 (c)	20dB Bandwidth	PASS
15.225(e)	Frequency Stability Tolerance	PASS
Note: The conducted emission disturbance voltage limits are not required for EUT which only employ DC battery for operation.		

3. GENERAL INFORMATION

3.1. Description of Application

Applicant	EPS Bio Technology Corp. NO.8 R&D RD.III, HSINCHU SCIENCE PARK,HSINCHU, TAIWAN, 30077, R.O.C.
Manufacturer	EPS Bio Technology Corp. NO.8 R&D RD.III, HSINCHU SCIENCE PARK,HSINCHU, TAIWAN, 30077, R.O.C.
Product	EasyMax Tag Self-Monitoring Blood Glucose System
Model	EMTAG

3.2. Description of EUT

Test Model	EMTAG
Serial Number	N/A
Power Rating	DC 3V
RF Features	NFC
Transmit Type	1T1R
Sample Status	Production
Date of Receipt	2019. 11. 20
Date of Test	2019. 12. 06 ~ 2010. 01. 16
Interface Ports of EUT	None
Accessories Supplied	None

3.3. Antenna Information

No.	Antenna Part Number	Manufacture	Antenna Type	Frequency (MHz)	Max Gain (dBi)
1	N/A	N/A	Coil	N/A	N/A

3.4. EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number	Modulation
NFC	13.56	1	ASK

3.5. Description of Key Components

None

3.6. Test Configuration

Item		Mode	Test Channel
Radiated Test Case	Radiated Spurious Emission (In-Band)	NFC	1
	Radiated Spurious Emission (Out-Band) ^{Note 1}	NFC	1
Conducted Test Case	20dB Bandwidth	NFC	1
	Frequency Stability	NFC	1

Note 1:

Mobile Device

Portable Device, and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow: Lie Side Stand

3.7. Tested Supporting System List

3.7.1. Support Peripheral Unit

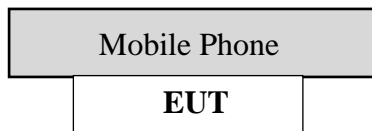
No.	Product	Brand	Model No.	Serial No.	Approval
1.	Mobile Phone	LG	G7+ThinQ	N/A	FCC ID: ZNFG710VM
2.	DC Power Supply	TOP WARD	6303A	N/A	N/A

3.7.2. Cable Lists

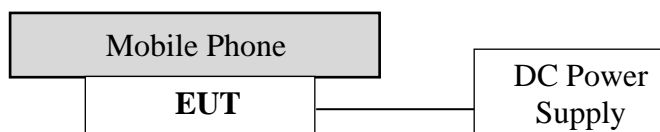
No.	Cable Description Of The Above Support Units
1.	---
2.	DC Power Cable: Unshielded, Detachable, 1.5 m AC Power Cord: Unshielded, Detachable, 1.8m

3.8. Setup Configuration

3.8.1. EUT Configuration for Radiated Emission



3.8.2. EUT Configuration for RF Conducted Test Items



3.9. Operating Condition of EUT

Test program “ST25” is used for enabling EUT NFC function under continues transmitting.

3.10. Description of Test Facility

Name of Test Firm	Audix Technology Corporation / EMC Department No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan Tel: +886-2-26092133 Fax: +886-2-26099303 Website : www.audixtech.com Contact e-mail: sales@audixtech.com
Accreditations	The laboratory is accredited by following organizations under ISO/IEC 17025:2005 (1) NVLAP(USA) NVLAP Lab Code 200077-0 (2) TAF(Taiwan) No. 1724
Test Facilities	FCC OET Designation Number under APEC MRA by NCC is : TW1724 ISED CAB Identifier Number under APEC TEL MRA by NCC is TW1724 (1) No.1 3m Semi Anechoic Chamber

3.11. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conduction Test	150kHz~30MHz	±3.50dB
Radiation Test (No.1 3m Semi Anechoic Chamber)	30MHz-200MHz, 3m, Horizontal	±3.9dB
	200MHz-1000MHz, 3m, Horizontal	±4.3dB
	30MHz-200MHz, 3m, Vertical	±4.5dB
	200MHz-1000MHz, 3m, Vertical	±4.1dB
	1GHz-6GHz, 3m	±5.1dB
	6GHz-18GHz, 3m	±5.5dB

Remark : Uncertainty = $ku_c(y)$

Test Item	Uncertainty
20dB Bandwidth	± 0.2kHz
Frequency Stability	±0.78ppm

4. MEASUREMENT EQUIPMENT LIST

4.1. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2019. 09. 11	1 Year
2.	Test Receiver	R & S	ESCS30	100338	2019. 06. 12	1 Year
3.	Amplifier	HP	8447D	2944A06305	2019. 01. 30	1 Year
4.	Bilog Antenna	TESEQ	CBL6112D	33821	2019. 01. 19	1 Year
5.	Loop Antenna	R&S	HFH2-Z2	891847/27	2017. 12. 18	2 Years
6.	Coaxial Cable	MIYAZAKI	5D2W	RE-11	2019. 02. 01	1 Year
7.	Coaxial Cable	MIYAZAKI	5D2W	CLAMP-01	2019. 09. 20	1 Year
8.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2019. 04. 20	1 Year
9.	Test Software	Audix	e3	V6.120619c	N.C.R.	N.C.R.

4.2. RF Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Keysight	N9010B-544	MY55460198	2019. 05. 06	1 Year
2.	Programmable Temperature & Humidity Chamber	GIANT	GTH-150-40-CP-AR	MAA1505-008	2019. 05. 31	1 Year
3.	Digital Thermo-Hygro Meter	Shenzhen Datronn Electronics	KT-905	RF	2019. 04. 20	1 Year



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5. CONDUCTED EMISSION

The conducted emission voltage limits are not required for EUT which only employ DC power for operation

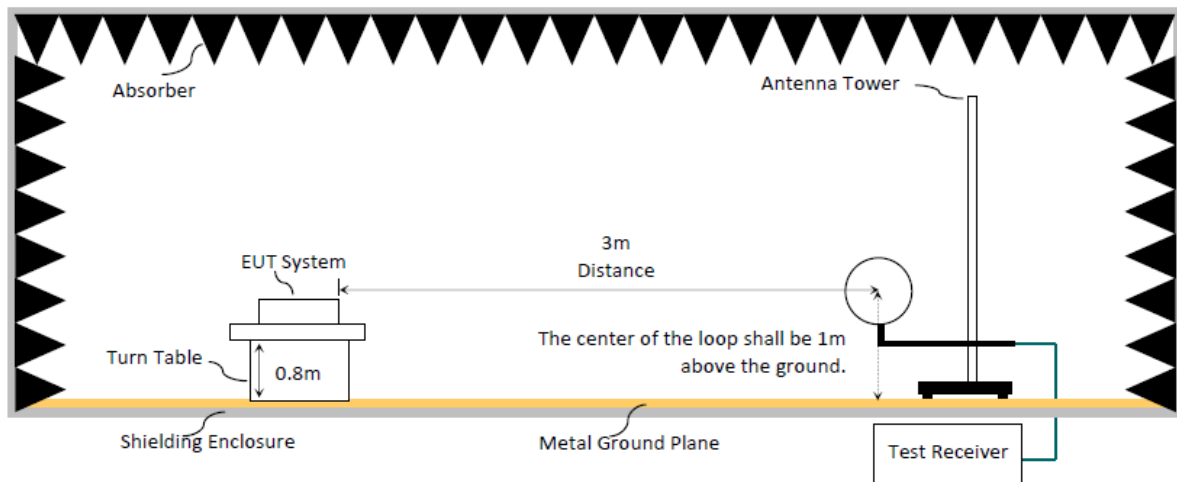
6. RADIATED EMISSION (IN-BAND)

6.1. Block Diagram of Test Setup

6.1.1. Block Diagram of EUT

Indicated as section 3.8

6.1.2. Setup Diagram for 9kHz-30MHz



6.2. Radiated Emission Limits

Frequency (MHz)	Distance (m)	Limits	
		$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
13.553-13.567	30	15848	84
	3	1584893	124
13.410 -13.553 and 13.567-13.710	30	334	50.50
	3	33381	90.50
13.110 -13.410 and 13.710-14.010	30	106	40.5
	3	10592	80.50

Remark : (1) $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$

(2) $15848\mu\text{V/m} = 84\text{dB}\mu\text{V/m} = 84 + 40\log(30\text{m}/3\text{m}) = 124\text{dB}\mu\text{V/m}$

$334\mu\text{V/m} = 50.5\text{dB}\mu\text{V/m} = 50.5 + 40\log(30\text{m}/3\text{m}) = 90.5\text{dB}\mu\text{V/m}$

$106\mu\text{V/m} = 40.5\text{dB}\mu\text{V/m} = 40.5 + 40\log(30\text{m}/3\text{m}) = 80.5\text{dB}\mu\text{V/m}$

6.3. Test Procedure

Frequency Range 9kHz~30MHz:

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level.

In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

(1) RBW = 9kHz with peak and average detector.

(2) Detector: average and peak (10kHz-490kHz)

Q.P. (490kHz-30MHz)

6.4. Test Results

Please refer to Appendix A.

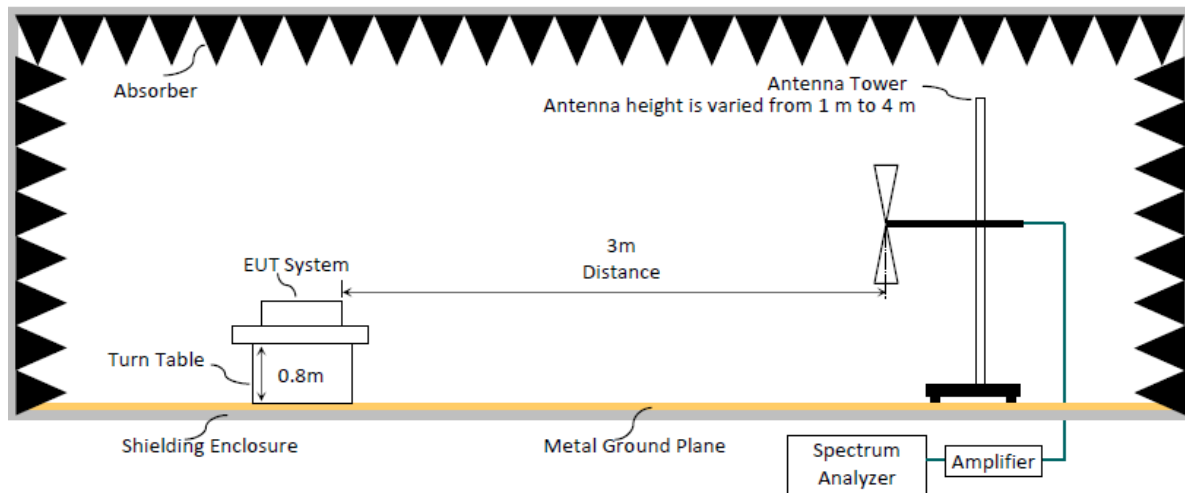
7. RADIATED EMISSION (OUT-BAND)

7.1. Block Diagram of Test Setup

7.1.1. Block Diagram of EUT

Indicated as section 3.8

7.1.2. Setup Diagram for 30-1000 MHz



7.2. Radiated Emission Limits

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205 must also comply with the radiated emission limits specified as below.

Frequency (MHz)	Distance (m)	Limits	
		dB μ V/m	μ V/m
0.009 - 0.490	300	67.6-20 log f(kHz)	2400/f kHz
0.490 - 1.705	30	87.6-20 log f(kHz)	24000/f kHz
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88- 216	3	43.5	150
216- 960	3	46.0	200
Above 960	3	54.0	500
Above 1000	3	74.0 dB μ V/m (Peak) 54.0 dB μ V/m (Average)	

Remark : (1) dB μ V/m = 20 log (μ V/m)

- (2) The tighter limit applies to the edge between two frequency bands.
- (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- (4) Fundamental and emission fall within operation band are exempted from this section.
- (5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

7.4. Test Procedure

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 regulation.

Frequency Range 30MHz~1GHz:

Spectrum Analyzer is used for pre-testing with following setting:

- (1)RBW = 120KHz
- (2)VBW $\geq 3 \times$ RBW.
- (3)Detector = Peak.
- (4)Sweep time = auto.
- (5)Trace mode = max hold.
- (6)Allow sweeps to continue until the trace stabilizes.

Note 1: When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required, otherwise using Q.P. for final measurement.

Note 2: When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

7.5. Measurement Result Explanation

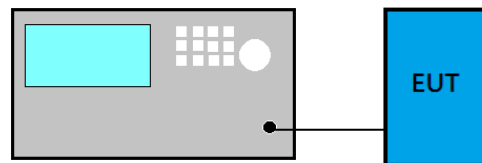
Peak Emission Level=Antenna Factor + Cable Loss + Meter Reading

7.6. Test Results

Please refer to Appendix A.

8. 20dB BANDWIDTH

8.1. Block Diagram of Test Setup



8.2. Specification Limits

The 20dB bandwidth shall be specified in operating frequency band.

8.3. Test Procedure

Following measurement procedure:

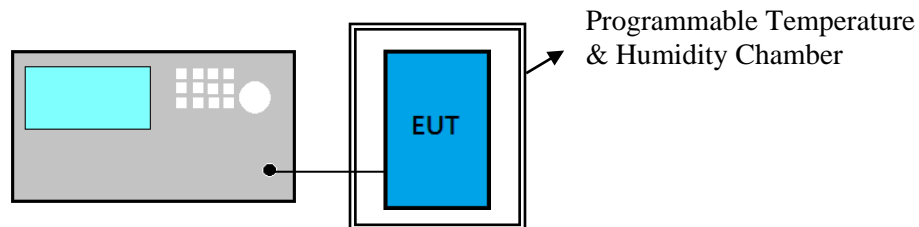
- (1) Set RBW = 1kHz
- (2) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Trace mode = max hold.
- (5) Sweep = auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x dB to -20 dB to record the final bandwidth.

8.4. Test Results

Please refer to Appendix A

9. FREQUENCY STABILITY

9.1. Block Diagram of Test Setup



9.2. Specification Limits

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20°C to 50°C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20°C .

9.3. Test Procedure

The device operating in the 13.553-13.567MHz shall maintain the carrier frequency within 0.01% of the operating frequency over the temperature variation of -20°C to $+50^{\circ}\text{C}$ at normal supply voltage.

9.4. Test Results

Please refer to Appendix A



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10.DEVIATION TO TEST SPECIFICATIONS

【NONE】



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APPDNDIX A

TEST DATA AND PLOTS

(Model: EMTAG)

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A.1 RADIATED EMISSION (IN-BAND)

Test Date	2019/12/06	Temp./Hum.	22°C/48%
Test Voltage	DC 3V (via Battery)	Tested by	Martin Chen

Antenna at 0 Degree

Test Frequency (MHz)	Test Result (dB μ V/m at 3m)	Limits (dB μ V/m at 3m)	Margin (dB)	Detector
13.560	47.00	124.00	77.00	QP

Antenna at 90 Degree

Test Frequency (MHz)	Test Result (dB μ V/m at 3m)	Limits (dB μ V/m at 3m)	Margin (dB)	Detector
13.560	41.90	124.00	82.10	QP

Note: All emissions are lower than the ambient level cannot be measured.

A.2 RADIATED EMISSION (OUT-BAND)

Test Date	2019/12/06	Temp./Hum.	22°C/48%
Test Voltage	DC 3V (via Battery)	Tested by	Martin Chen

A.2.1 Emissions within Restricted Frequency Bands

A.3.1.1 Frequency 9kHz~30MHz

Antenna at 0 Degree

Test Frequency (MHz)	Test Result (dB μ V/m at 3m)	Limits (dB μ V/m at 3m)	Margin (dB)	Detector
27.120	--- ^{Note}	69.54	---	QP

Antenna at 90 Degree

Test Frequency (MHz)	Test Result (dB μ V/m at 3m)	Limits (dB μ V/m at 3m)	Margin (dB)	Detector
27.120	--- ^{Note}	69.54	---	QP

Note: All emissions are lower than the ambient level cannot be measured.

A.3.1.2 Frequency 30MHz ~ 1000MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
30.97	25.03	1.21	1.67	27.91	40.00	12.09	Peak
101.78	17.50	2.31	3.28	23.09	43.50	20.41	Peak
480.08	23.47	6.59	0.37	30.43	46.00	15.57	Peak
782.72	26.32	7.81	2.31	36.44	46.00	9.56	Peak
911.73	27.41	8.52	1.04	36.97	46.00	9.03	Peak
970.90	27.87	8.87	1.18	37.92	54.00	16.08	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
30.97	25.03	1.21	0.06	26.30	40.00	13.70	Peak
161.92	16.37	3.03	1.77	21.17	43.50	22.33	Peak
476.20	23.41	6.56	1.24	31.21	46.00	14.79	Peak
547.01	24.23	6.81	2.08	33.12	46.00	12.88	Peak
826.37	26.72	8.05	0.95	35.72	46.00	10.28	Peak
984.48	27.97	8.95	0.69	37.61	54.00	16.39	Peak

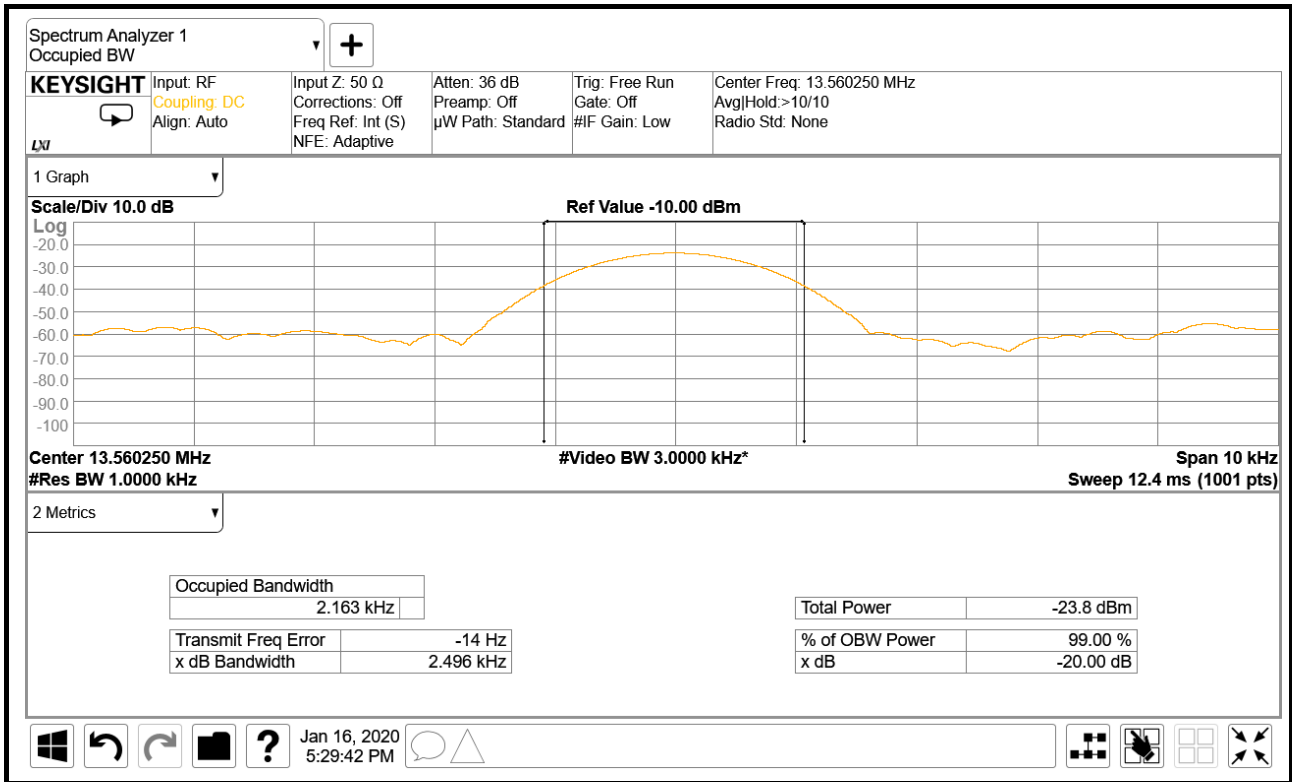
A.3 20dB BANDWIDTH

Test Date	2020/01/16	Temp./Hum.	22°C/64%
Cable Loss	N/A	Tested by	Martin Chen
Test Voltage	DC 3V (via Battery)		

A.4.1.1 20dB Bandwidth Result

Centre Frequency (MHz)	20 dB Bandwidth
13.56	2.496 kHz

A.4.1.2 Measurement Plots



A.4 FREQUENCY STABILITY

Test Date	2019/12/06	Temp./Hum.	22°C/48%
Test Normal Voltage	DC 3V (DC Power Supply)	Tested by	Martin Chen

Mode: 0 Minute					
Temperature(°C)	-20	-10	0	10	20
Voltage	DC 3V	DC 3V	DC 3V	DC 3V	DC 2.55V
Frequency(MHz)	13.56019	13.56013	13.56051	13.56054	13.55979
Error (%)	0.00140	0.00096	0.00376	0.00398	-0.00155
Temperature(°C)	20	30	40	50	20
Voltage	DC 3.45V	DC 3V	DC 3V	DC 3V	DC 3V
Frequency(MHz)	13.56014	13.560381	13.560374	13.560358	13.56066
Error (%)	0.00103	0.00281	0.00276	0.00264	0.00487

Mode: 2 Minute					
Temperature(°C)	-20	-10	0	10	20
Voltage	DC 3V	DC 3V	DC 3V	DC 3V	DC 2.55V
Frequency(MHz)	13.55921	13.55918	13.55941	13.55946	13.55956
Error (%)	-0.00583	0.00605	-0.00435	-0.00398	-0.00324
Temperature(°C)	20	30	40	50	20
Voltage	DC 3.45V	DC 3V	DC 3V	DC 3V	DC 3V
Frequency(MHz)	13.56028	13.5595	13.55952	13.559524	13.55934
Error (%)	0.00206	-0.00369	-0.00354	-0.00351	-0.00487

Mode: 5 Minute					
Temperature(°C)	-20	-10	0	10	20
Voltage	DC 3V	DC 3V	DC 3V	DC 3V	DC 2.55V
Frequency(MHz)	13.56009	13.55996	13.56009	13.56011	13.55987
Error (%)	0.00066	-0.00029	0.00066	0.00081	-0.00096
Temperature(°C)	20	30	40	50	20
Voltage	DC 3.45V	DC 3V	DC 3V	DC 3V	DC 3V
Frequency(MHz)	13.56018	13.56035	13.560337	13.560327	13.55952
Error (%)	0.00133	0.00258	0.00249	0.00241	-0.00354

Mode: 10 Minute					
Temperature(°C)	-20	-10	0	10	20
Voltage	DC 3V	DC 3V	DC 3V	DC 3V	DC 2.55V
Frequency(MHz)	13.55921	13.55934	13.55922	13.55921	13.55968
Error (%)	-0.00583	-0.00487	-0.00575	-0.00583	-0.00236
Temperature(°C)	20	30	40	50	20
Voltage	DC 3.45V	DC 3V	DC 3V	DC 3V	DC 3V
Frequency(MHz)	13.56036	13.559563	13.559541	13.559548	13.55934
Error (%)	0.00265	-0.00322	-0.00338	-0.00333	-0.00487



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