

# 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 : Self-Monitoring Blood** 

**Glucose System** 

Model Name : EasyMax S1

FCC ID : 2AQBR-D064

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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# **TEST REPORT**

**Applicant** EPS Bio Technology Corp. Manufacturer EPS Bio Technology Corp.

**EUT Description** 

(1) Product Self-Monitoring Blood Glucose System

(2) Model EasyMax S1

(3) Power Supply: DC 6V

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: 2020.01.20

Reviewed by: (Tina Huang/Administrator)

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





# 1. REVISION RECORD OF TEST REPORT

Edition No	Issued Data	Revision Summary	Report Number
0	2020. 01. 20	Original Report	EM-F200036





# 2. SUMMARY OF TEST RESULTS

Rule Description		Results
15.207	Conducted Emission	N/A, Note
15.225(a)(b)(c)	225(a)(b)(c) Radiation Emission (In-Band)	
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	Self-Monitoring Blood Glucose System
Model	EasyMax S1



# 3.2. Description of EUT

Test Model	EasyMax S1
Serial Number	N/A
Power Rating	DC 6V
RF Features	NFC
Transmit Type	1T1R
Sample Status	Production
Date of Receipt	2019. 12. 20
Date of Test	2020. 01. 08 ~ 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	Mode Fundamental Range (MHz)		Modulation
NFC	13.56	1	ASK

# 3.5. Description of Key Components

None



# 3.6. Test Configuration

	Item	Mode	Test Channel
Radiated Test	Radiated Spurious Emission (In-Band)	NFC	1
Case	Radiated Spurious Emission (Out-Band) Note1	NFC	1
Conducted	20dB Bandwidth	NFC	1
Test Case	Frequency Stability	NFC	1

•		4	
N	ote	1	
IN	UIL.		

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	I NI/A	FCC ID: ZNFG710VM
2.	DC Power Supply	TOP WARD	3303A	N/A	N/A

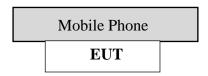
#### 3.7.2. Cable Lists

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

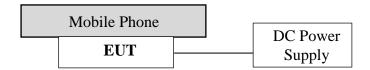


### 3.8. Setup Configuration

## 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 "ST25NFCTap" 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: attemc_report@audixtech.com
Accreditations	The laboratory is accredited by following organizations under ISO/IEC 17025:2017  (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 (2) RF Test Room





# 3.11.Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conducted Engineer	9kHz-150kHz	±3.7dB
Conducted Emission	150kHz-30MHz	±3.5dB
Radiated Emission (No.1 3m Semi Anechoic Chamber)	30MHz-200MHz, 3m, Horizontal	±4.1dB
	200MHz-1000MHz, 3m, Horizontal	±3.9dB
	30MHz-200MHz, 3m, Vertical	±4.2dB
	200MHz-1000MHz, 3m, Vertical	±4.1dB
	1GHz-6GHz, 3m	±4.2dB
	6GHz-18GHz, 3m	±4.6dB

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	Туре	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	2019. 12. 26	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	Туре	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Keysight	N9020B-544	MY57120357	2019. 01. 17	1 Year
	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

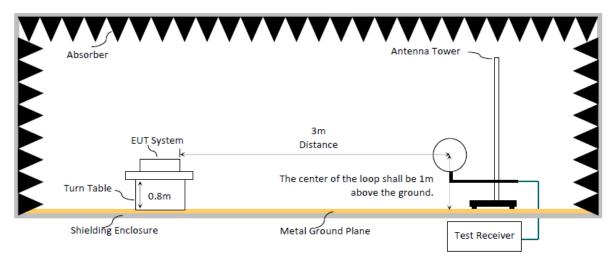
The conducted emission voltage limits are not required for EUT which only employ DC power for operation

# 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

Enggyonov (MHz)	Distance (m)	Limits		
Frequency (MHz)	Distance (m)	μV/m	dBμV/m	
13.553-13.567	30	15848	84	
13.333-13.307	3	1584893	124	
13.410 -13.553 and	30	334	50.50	
13.567-13.710	3	33381	90.50	
13.110 -13.410 and	30	106	40.5	
13.710-14.010	3	10592	80.50	

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

(2) 15848uV/m = 84dBuV/m = 84+40log(30m/3m) = 124dBuV/m 334uV/m = 50.5dBuV/m = 50.5+40log(30m/3m) = 90.5dBuV/m 106uV/m = 40.5dBuV/m = 40.5+40log(30m/3m) = 80.5dBuV/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

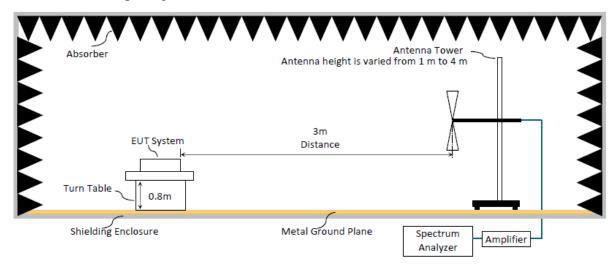
Please refer to Appendix A.

# 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		
riequency (Milz)	Distance (III)	dBμV/m	μV/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 dBμV/m (Peak) 54.0 dBμV/m (Average)		

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

- (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
- $(2)VBW \ge 3 \times RBW$ .
- (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

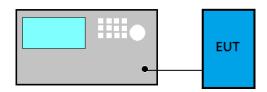
Peak Emission Level=Antenna Factor + Cable Loss + Meter Reading

#### 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:

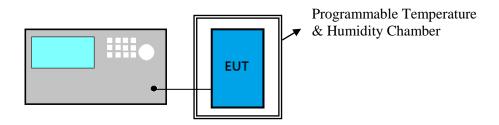
- (1) Set RBW to 1kHz.
- (2) Set the video bandwidth (VBW)  $\geq 3 \times RBW$ .
- (3) Detector = Peak.
- (4) Trace mode = max hold.
- (5) Sweep = auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x dB to -20 dB to record the final bandwidth.

#### 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 ±0.01% of the operating frequency over a temperature variation of -20degrees to 50 degrees 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 degree 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 degrees to +50 degree C at normal supply voltage.

#### 9.4. Test Results

Please refer to Appendix A





# 10.DEVIATION TO TEST SPECIFICATIONS

[NONE]



# APPDNDIX A

# TEST DATA AND PLOTS

(Model: EasyMax S1)



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	20dB BANDWIDTH	
	FREQUENCY STABILITY	



# A.1 RADIATED EMISSION (IN-BAND)

Test Date	2020/01/08	Temp./Hum.	22°C/57%
Test Voltage	DC 6V (via Batteries)	Tested by	Brian Hsieh

#### Antenna at 0 Degree

Test Frequency	Test Result	Limits	Margin	Detector
(MHz)	$(dB\mu V/m at 3m)$	$(dB\mu V/m at 3m)$	(dB)	Detector
13.560	51.80	124.00	72.20	QP

#### Antenna at 90 Degree

Test Frequency (MHz)	Test Result (dBµV/m at 3m)	Limits (dBµV/m at 3m)	Margin (dB)	Detector
13.560	47.30	124.00	76.70	QP

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



# A.2 RADIATED EMISSION (OUT-BAND)

Test Date	2020/01/08	Temp./Hum.	22°C/57%
Test Voltage	DC 6V (via Batteries)	Tested by	Brian Hsieh

#### A.2.1 Emissions within Restricted Frequency Bands

#### A.3.1.1 Frequency 9kHz~30MHz

#### Antenna at 0 Degree

Test Frequency (MHz)	Test Result (dBµV/m at 3m)	Limits (dBµV/m at 3m)	Margin (dB)	Detector
27.120	Note	69.54		QP

#### Antenna at 90 Degree

Te	est Frequency (MHz)	Test Result (dBµV/m at 3m)	Limits (dBµV/m at 3m)	Margin (dB)	Detector
	27.120	Note	69.54		QP

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



AUDIX Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City244, Taiwan

Tel: +886 2 26099301 Fax: +886 2 26099303

# A.3.1.2 Frequency 30MHz ~ 1000MHz

#### Antenna at Horizontal Polarization

Emission Frequency	Antenna Factor	Cable Loss	Meter Reading	Emission Level	Limits	Margin	Detector
(MHz)	(dB/m)	(dB)	(dBµV)	$(dB\mu V/m)$	$\left(dB\mu V/m\right)$	(dB)	
93.05	16.05	2.20	31.46	23.45	43.50	20.05	Peak
120.21	18.63	2.53	27.38	22.42	43.50	21.08	Peak
182.29	15.52	3.25	28.69	21.63	43.50	21.87	Peak
446.13	23.04	6.30	29.02	31.61	46.00	14.39	Peak
751.68	26.01	7.65	30.12	36.46	46.00	9.54	Peak
903.00	27.34	8.47	29.69	38.56	46.00	7.44	Peak

#### Antenna at Vertical Polarization

Emission Frequency	Antenna Factor	Cable Loss	Meter Reading	Emission Level	Limits	Margin	Detector
(MHz)	(dB/m)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	(dB)	Detector
52.31	14.20	1.60	33.71	23.10	40.00	16.90	Peak
101.78	17.50	2.31	30.36	23.94	43.50	19.56	Peak
212.36	16.95	3.56	29.78	24.55	43.50	18.95	Peak
350.10	21.15	5.20	28.15	28.45	46.00	17.55	Peak
494.63	23.64	6.71	29.69	32.98	46.00	13.02	Peak
903.00	27.34	8.47	28.78	37.65	46.00	8.35	Peak



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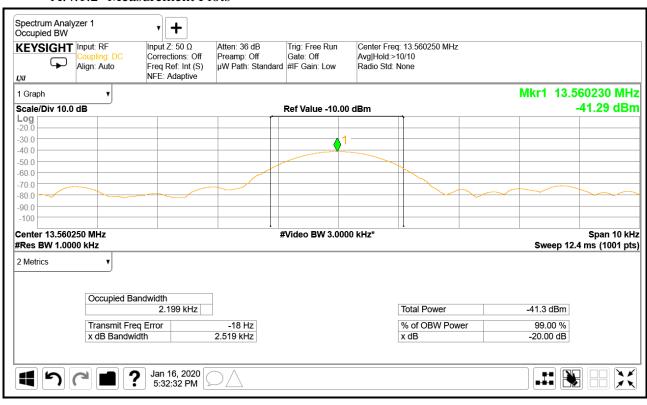
#### A.3 20dB BANDWIDTH

Test Date	2020/01/16	Temp./Hum.	22°C/64%
Cable Loss	N/A	Tostad by	Brian Hsieh
Test Voltage	DC 6V (via Batteries)	Tested by	Dilan fisicii

#### A.4.1.1 20dB Bandwidth Result

Centre Frequency (MHz)	20 dB Bandwidth	
13.56	2.199kHz	

#### A.4.1.2 Measurement Plots





# A.4 FREQUENCY STABILITY

Test Date	2020/01/09	Temp./Hum.	21°C/51%
Test Normal Voltage	DC 6V (DC Power Supply)	Tested by	Brian Hsieh

Mode: 0 Minute							
Temperature( $^{\circ}$ C)	-20	-10	0	10	20		
Voltage	DC 6V	DC 6V	DC 6V	DC 6V	DC 5.1V		
Frequency(MHz)	13.56095	13.56039	13.55987	13.56042	13.55901		
Error (%)	0.00701	0.00288	-0.00096	0.00310	-0.00730		
Temperature( $^{\circ}$ C)	20	30	40	50	20		
Voltage	DC 6.9V	DC 6V	DC 6V	DC 6V	DC 6V		
Frequency(MHz)	13.56094	13.560731	13.559524	13.559758	13.56124		
Error (%)	0.00693	0.00539	-0.00351	-0.00178	0.00914		

Mode: 2 Minute							
Temperature( $^{\circ}$ C)	-20	-10	0	10	20		
Voltage	DC 6V	DC 6V	DC 6V	DC 6V	DC 5.1V		
Frequency(MHz)	13.56005	13.55913	13.55878	13.56004	13.5594		
Error (%)	0.00037	0.00642	-0.00900	0.00029	-0.00442		
Temperature( $^{\circ}$ C)	20	30	40	50	20		
Voltage	DC 6.9V	DC 6V	DC 6V	DC 6V	DC 6V		
Frequency(MHz)	13.5608	13.56048	13.56031	13.559234	13.55867		
Error (%)	0.00590	0.00354	0.00229	-0.00565	-0.00981		



AUDIX Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City244, Taiwan

Tel: +886 2 26099301 Fax: +886 2 26099303

Mode: 5 Minute							
Temperature( $^{\circ}$ C)	-20	-10	0	10	20		
Voltage	DC 6V	DC 6V	DC 6V	DC 6V	DC 5.1V		
Frequency(MHz)	13.56046	13.55908	13.56088	13.55965	13.55977		
Error (%)	0.00339	-0.00678	0.00649	-0.00258	-0.00170		
Temperature( $^{\circ}$ C)	20	30	40	50	20		
Voltage	DC 6.9V	DC 6V	DC 6V	DC 6V	DC 6V		
Frequency(MHz)	13.55998	13.55951	13.560987	13.559457	13.55887		
Error (%)	-0.00015	-0.00361	0.00728	-0.00400	-0.00833		

Mode: 10 Minute							
Temperature( $^{\circ}$ C)	-20	-10	0	10	20		
Voltage	DC 6V	DC 6V	DC 6V	DC 6V	DC 5.1V		
Frequency(MHz)	13.55873	13.5602	13.55991	13.55932	13.55931		
Error (%)	-0.00937	0.00147	-0.00066	-0.00501	-0.00509		
Temperature( $^{\circ}$ C)	20	30	40	50	20		
Voltage	DC 6.9V	DC 6V	DC 6V	DC 6V	DC 6V		
Frequency(MHz)	13.56107	13.559943	13.560391	13.558868	13.56001		
Error (%)	0.00789	-0.00042	0.00288	-0.00835	0.00007		



# APPDNDIX B

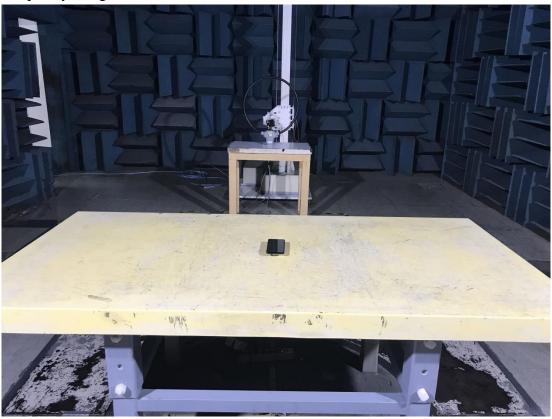
# **TEST PHOTOGRAPHS**

(Model: EasyMax S1)



## **B.1** Radiated Measurement at Chamber

Frequency Range 9kHz to 30MHz



Zoom in View



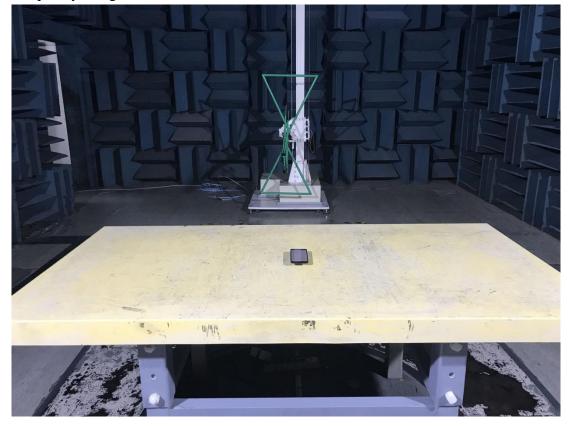


 AUDIX Technology Corp.
 Tel: +886 2 26099301

 No. 53-11, Dingfu, Linkou, Dist.,
 Fax: +886 2 26099303

 New Taipei City244, Taiwan
 Fax: +886 2 26099303

## Frequency Range 30MHz to 1GHz





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Tel: +886 2 26099301 Fax: +886 2 26099303

# **B.2** RF Measurement



Zoom View

