Medicalgorithmics
TEST REPORT

SCOPE OF WORK
EMC TESTING – POCKETECG IV

REPORT NUMBER
103762940LEX-001

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EMC TEST REPORT

(FULL COMPLIANCE)

Report Number:	103762940LEX-001
Project Number:	G103762940
Report Issue Date:	4/11/2019
Product Tested:	PocketECG IV
Standards:	FCC Part 15B
	FCC Part 27
	(Radiated Spurious Emissiosn)
	ICES-003 Issue 6

Tested by:	Client:
Intertek Testing Services NA, Inc.	Medicalgorithmics
731 Enterprise Dr.	Al. Jerozolimskie 81 Budynek ORCO Tower, 19
Lexington, KY 40510	Pietro
USA	02-001 Warszawa
	Poland

Report prepared by	Report reviewed by
Michael Carlson,	Bryan Taylor,
Test Engineer	Team Leader

Table of Contents

1   Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

2   Test Summary

Section	Test full name	Result
6	Radiated Emissions (ANSI C63.4:2014)	Pass
6	Radiated Spurious Emissions (From Transmitter) (ANSI C63.26:2015)	Pass
7	Conducted Emissions (ANSI C63.4:2014)	N/A

3   Client Information

This product was tested at the request of the following:

Client Information	
Client Name:	Medicalgorithmics
Address:	Al. Jerozolimskie 81 Budynek ORCO Tower, 19 Pietro 02-001 Warszawa Poland
Contact:	Marcin Gaska
Telephone:	48 22 825 12 49
Email:	m.gaska@medicalgorithmics
Manufacturer Information	
Manufacturer Name:	Medicalgorithmics
Manufacturer Address:	Al. Jerozolimskie 81 Budynek ORCO Tower, 19 Pietro 02-001 Warszawa Poland

4 Description of Equipment under Test and Variant Models

Equipment Under Test	
Product Name	PocketECG IV
Model Number	P4TR-AA-ADS
Serial Number	TR1218-00001A
Receive Date	1/4/2019
Test Start Date	1/7/2019
Test End Date	1/7/2019
Device Received Condition	Good
Test Sample Type	Production
Rated Voltage	3.7VDC (battery powered)
Rated Current	1700mAh
Description of Equipment Under Test (provided by client)	

PocketECG IV – Medicalgorithmics Unified Arrhythmia Diagnostic System is an ambulatory ECG device which analyzes electrographic signal in real time, classifies all detected heart beats and recognizes rhythm abnormalities. All detection results, including annotations for every detected heart beat and the ECG signal are transmitted via cellular telephony network to a remote server accessible by a Monitoring Center for reviewing by trained medical staff. The data transmission is automatically triggered when abnormalities are detected, when a symptomatic event is marked by the patient, or periodically in case of normal ECG. The PocketECG transmitter analyzes also the acceleration signals in order to estimate the physical activity of the patient, which allows for correlating the activity with potential arrhythmia occurrence. The accelerometer signal variations are quantified into 3 levels of activity: rest, walk, exercise. The PocketECG transmitter records the entire ECG and acceleration signals onto its storage card. All detection results along with the waveforms of the ECG and acceleration signals may be reviewed using PocketECG Client - PC based application.

4.1 Variant Models:
There were no variant models covered by this evaluation.

5   System Setup and Method

5.1   Method:

Configuration as required by ANSI C63.4:2014.

No.	Descriptions of EUT Exercising
1	For FCC part 15b measurements the device was powered on and the transmitters were in idle mode.
2	For spurious emissions related to the transmitter, the sample was connected via an over the air link to a base station simulator and set to transmit at maximum output power.

5.2   EUT Block Diagram:
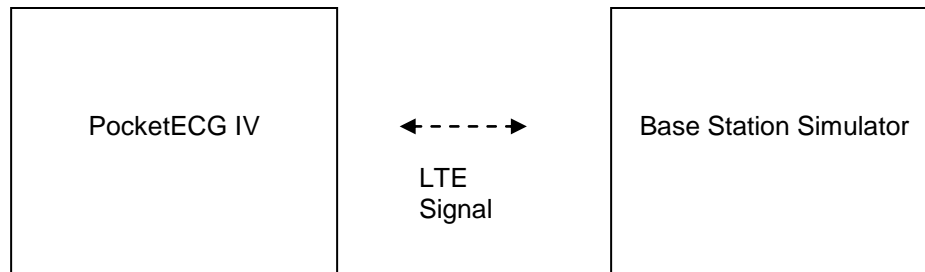
5.3   EUT Photo (Front):

5.4 EUT Photo (Back):

6   Radiated Emissions

6.1   Method

Tests are performed in accordance with ANSI C63.4:2014.
Radiated Spurious Emissions tests performed in accordance with ANSI C63.26:2015.

TEST SITE: 10m ALSE

Site Designation: 10m Chamber

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	3.9dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	4.0dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.7dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	4.7dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	4.7dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	4.7dB	5.5 dB

As shown in the table above our radiated emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required.

6.2 Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG
Where   FS = Field Strength in dBμV/m
                RA = Receiver Amplitude (including preamplifier) in dBμV
                CF = Cable Attenuation Factor in dB
                AF = Antenna Factor in dB
                AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = 32 dBμV/m

To convert from dBμV to μV or mV the following was used:

UF = $10^{(NF / 20)}$ where UF = Net Reading in μV
        NF = Net Reading in dBμV

To convert from dBm to dBμV/m (at 3m) the following was used:

dBμV/m = dBm + 97.38

This was used to create the limit line of -13dBm to dBμV/m

Example:

FS = RA + AF + CF − AG = 52.0 + 7.4 + 1.6 − 29.0 = 32.0
UF = $10^{(32\ dB\mu V / 20)}$ = 39.8 μV/m

6.3 Test Equipment Used:

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
EMI Test Receiver	3900	Rohde & Schwarz	ESU40	9/18/2018	9/18/2019
Bilog Antenna	7088	SunAR	JB6	7/24/2018	7/24/2019
Horn Antenna	3780	ETS Lindgren	3117	6/11/2018	6/11/2019
System Controller	4096	ETS Lindgren	2090	Verify at Time of Use	Verify at Time of Use
System Controller	3957	Sunol Sciences	SC99V	Verify at Time of Use	Verify at Time of Use
3m Cable Antenna→Preamp	3074			11/26/2018	11/26/2019
3m Cable Preamplifier	3918	Rohde & Schwarz	TS-PR18	11/26/2018	11/26/2019
3m Cable Preamp→Chamber	2588			11/26/2018	11/26/2019
3m Cable Chamber→Control Room	2593			11/26/2018	11/26/2019
3m Cable Control Room→Receiver	2592			11/26/2018	11/26/2019
10m Cable Antenna→Preamp	3339			11/26/2018	11/26/2019
10m Cable Preamplifier	7019	Rohde & Schwarz	TS-PR3	11/26/2018	11/26/2019
10m Cable Preamp→Chamber	3172			11/26/2018	11/26/2019
10m Cable Chamber→Control Room	2590			11/26/2018	11/26/2019
10m Cable Control Room→Receiver	2589			11/26/2018	11/26/2019

6.4 Software Utilized:

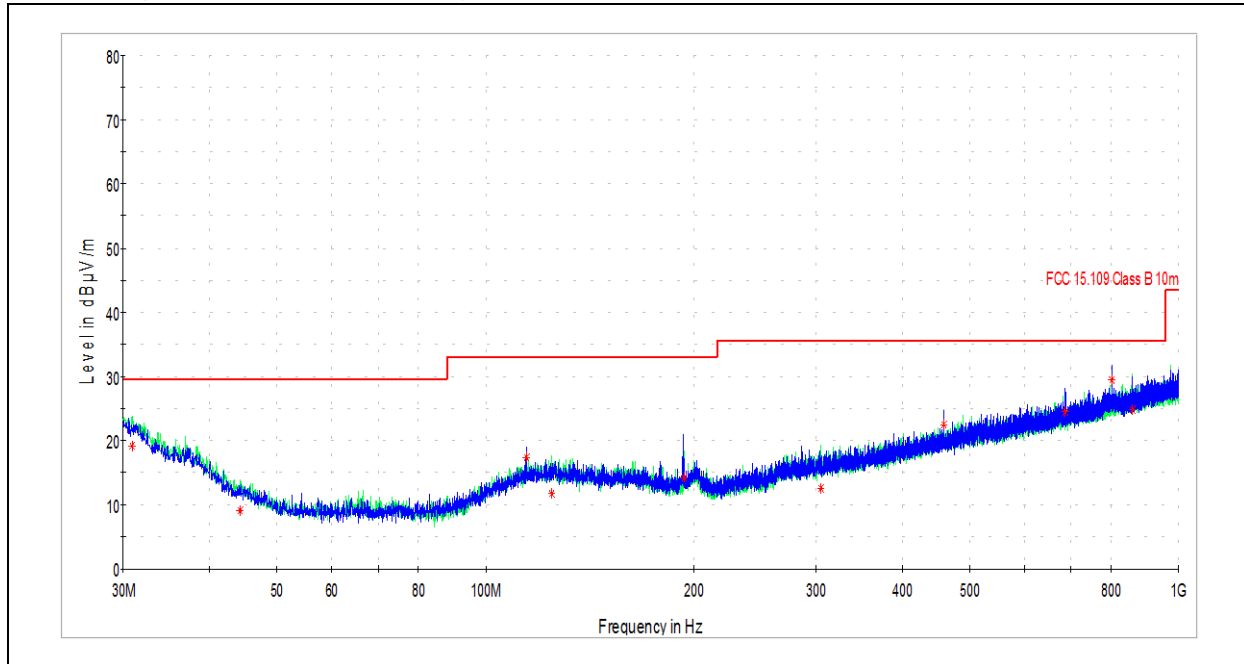| Name	Manufacturer	Version
EMC32	Rohde & Schwarz	Version 9.15.02

6.5 Results:

The sample tested was found to Comply.

6.6 Setup Photographs: Radiated Emissions, 30MHz – 1GHz

6.7   Plots/Data: Radiated Emissions, 30MHz – 1GHz

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.925222	19.25	29.55	10.30	120.000	400.3	H	73.0	-2.2
44.193556	9.15	29.55	20.40	120.000	370.1	H	164.0	-11.6
114.527778	17.39	33.10	15.71	120.000	391.4	V	340.0	-8.7
124.447889	11.69	33.10	21.41	120.000	105.1	H	258.0	-7.8
193.364667	14.15	33.10	18.95	120.000	100.2	V	329.0	-9.2
305.018444	12.52	35.55	23.03	120.000	296.1	H	138.0	-6.1
458.199111	22.45	35.55	13.10	120.000	117.8	H	82.0	-2.0
687.279778	24.50	35.55	11.05	120.000	284.3	V	92.0	2.2
801.823556	29.41	35.55	6.14	120.000	99.8	V	0.0	4.4
859.082444	24.80	35.55	10.75	120.000	144.4	H	303.0	4.8

Test Personnel:	Michael Carlson		Test Date:	1/7/2019
Supervising/Reviewing Engineer: (Where Applicable)	NA		Limit Applied:	Class B
Product Standard:	FCC Part 15B ICES-003 Issue 6		Ambient Temperature:	22.2 °C
Input Voltage:	Battery		Relative Humidity:	26.6 %
Pretest Verification w / Ambient Signals or BB Source:	Yes		Atmospheric Pressure:	982.0 mbar

Deviations, Additions, or Exclusions: None

6.8 Setup Photographs: Radiated Emissions, 1GHz – 18GHz
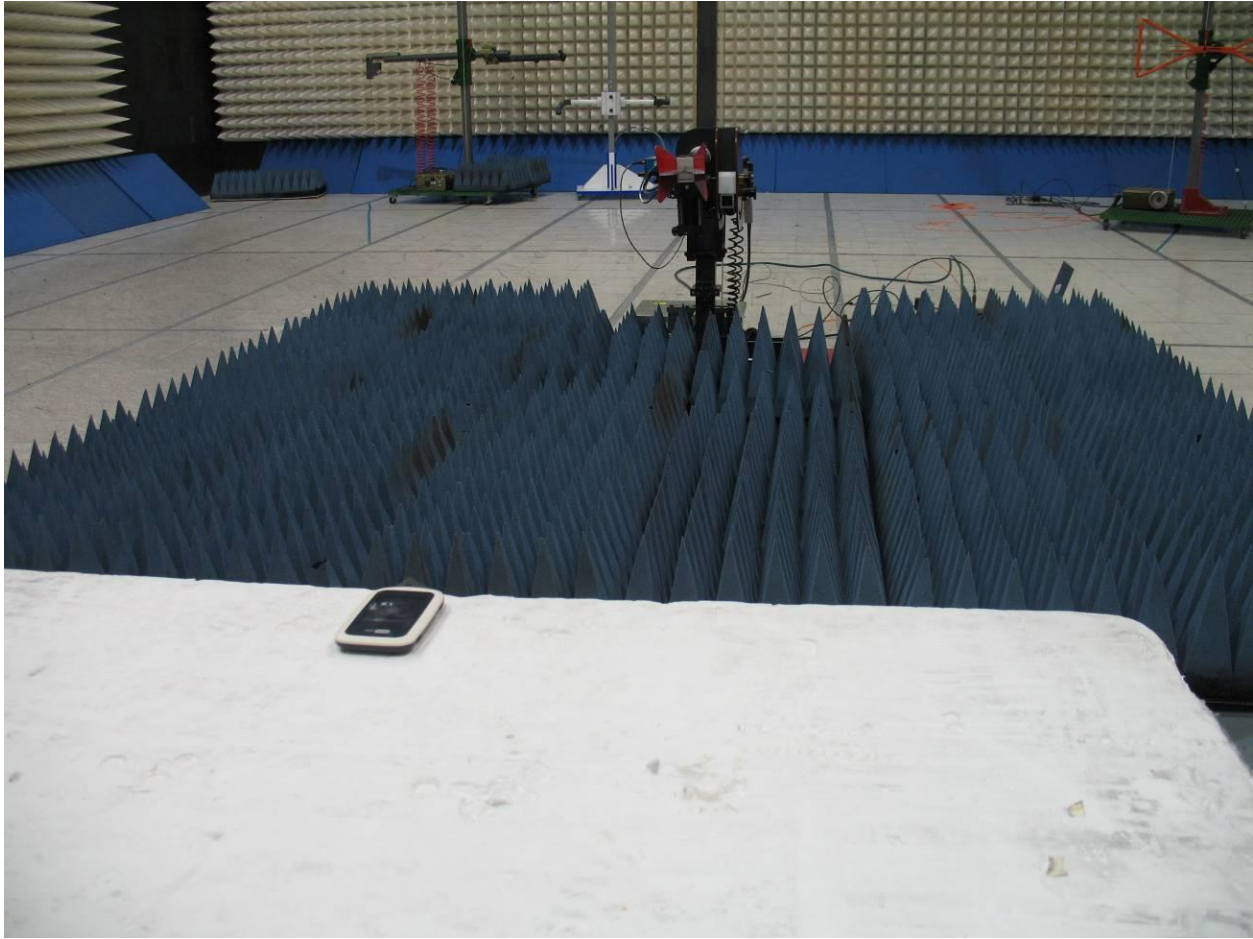
6.9   Plots/Data: Radiated Emissions, 1GHz – 18GHz
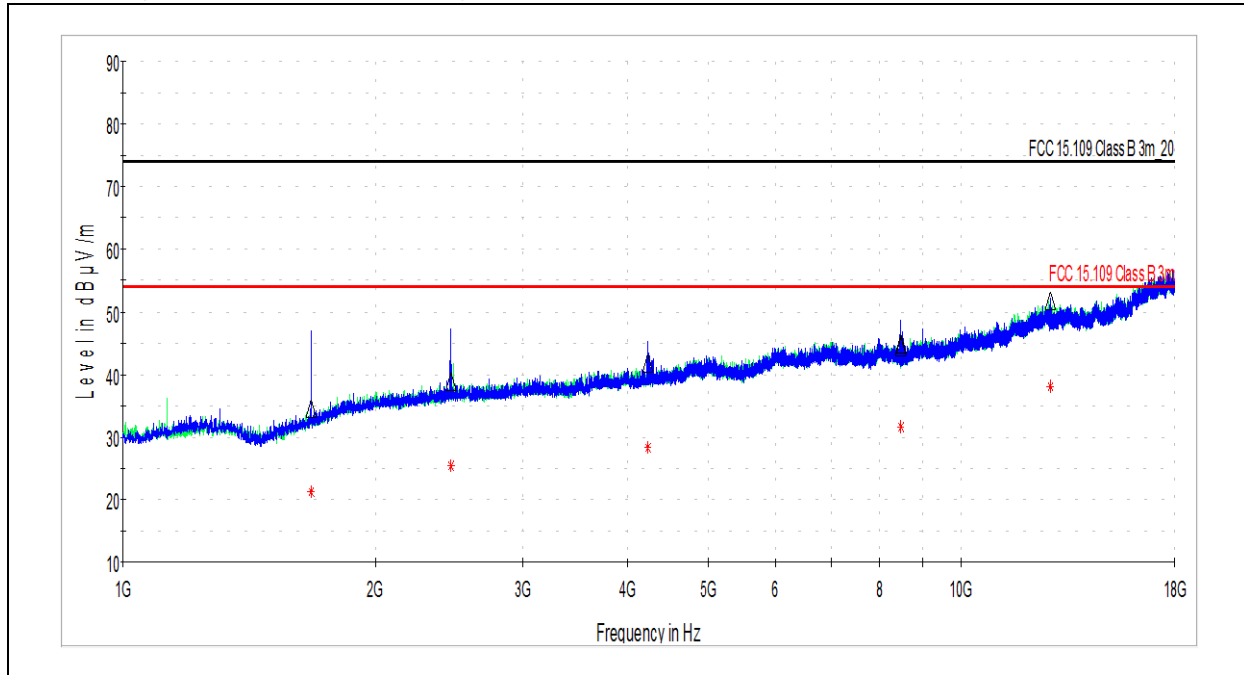

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1677.000000	34.55	74.00	39.45	1000.000	159.0	V	92.0	-1.3
2464.000000	38.83	74.00	35.17	1000.000	363.0	V	294.0	3.0
4225.500000	41.81	74.00	32.19	1000.000	100.0	V	0.0	6.1
8483.000000	44.48	74.00	29.52	1000.000	374.0	V	64.0	11.5
8488.500000	44.90	74.00	29.10	1000.000	100.0	V	222.0	11.5
12783.000000	51.82	74.00	22.18	1000.000	100.0	V	338.0	18.8

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1677.000000	21.25	54.00	32.75	1000.000	159.0	V	92.0	-1.3
2464.000000	25.48	54.00	28.52	1000.000	363.0	V	294.0	3.0
4225.500000	28.22	54.00	25.78	1000.000	100.0	V	0.0	6.1
8483.000000	31.62	54.00	22.38	1000.000	374.0	V	64.0	11.5
8488.500000	31.59	54.00	22.41	1000.000	100.0	V	222.0	11.5
12783.000000	38.11	54.00	15.89	1000.000	100.0	V	338.0	18.8

Test Personnel:	Michael Carlson	Test Date:	1/7/2019
Supervising/Reviewing Engineer: (Where Applicable)	NA	Limit Applied:	Class B
Product Standard:	FCC Part 15B ICES-003 Issue 6	Ambient Temperature:	22.2 °C
Input Voltage:	Battery	Relative Humidity:	26.6 %
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	982.0 mbar

Deviations, Additions, or Exclusions: None

6.10 Radiated Spurious Emissions Setup Photographs
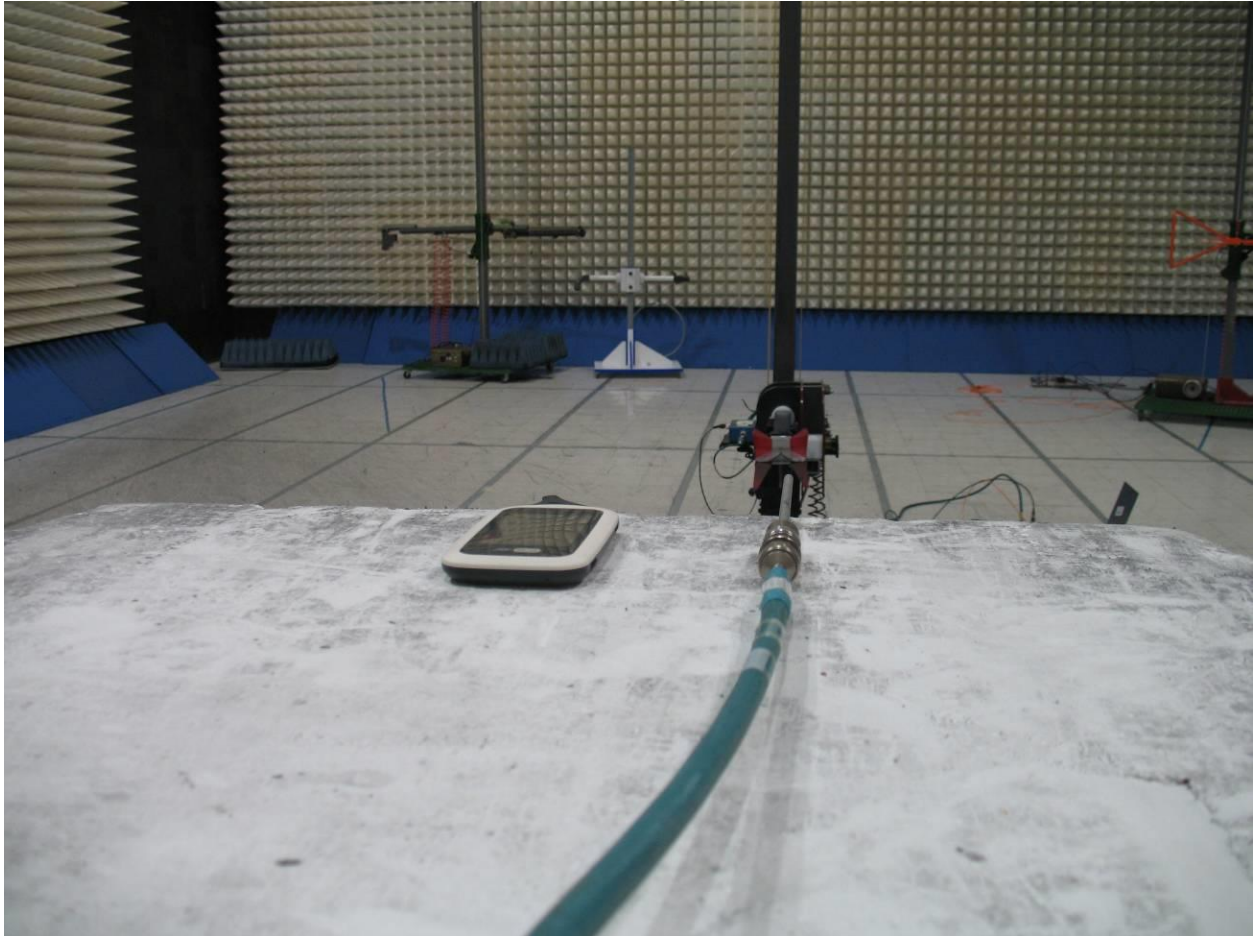
6.11 Data: Radiated Spurious Emissions

Band 4

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
3462.500000	30.41	82.25	51.84	1000.000	226.0	V	178.0	4.8
4265.000000	37.68	82.25	44.57	1000.000	410.0	V	107.0	6.0
5971.000000	31.45	82.25	50.80	1000.000	410.0	V	0.0	9.2
6930.000000	43.74	82.25	38.51	1000.000	100.0	V	25.0	10.7
8530.000000	43.88	82.25	38.37	1000.000	191.0	V	240.0	11.7
12795.000000	38.08	82.25	44.17	1000.000	268.0	V	226.0	18.9

Band 13

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1270.000000	20.33	82.25	61.92	1000.000	117.0	H	224.0	-1.8
1522.000000	18.97	82.25	63.28	1000.000	269.0	V	331.0	-2.4
1564.000000	19.89	82.25	62.36	1000.000	399.0	H	24.0	-2.5
1825.500000	22.97	82.25	59.28	1000.000	100.0	V	323.0	0.7
1942.500000	23.88	82.25	58.37	1000.000	100.0	H	236.0	1.6
2428.000000	25.39	82.25	56.86	1000.000	100.0	V	144.0	3.0
2482.000000	25.67	82.25	56.58	1000.000	100.0	H	253.0	3.4
3330.500000	26.12	82.25	56.13	1000.000	100.0	V	158.0	4.6

Test Personnel:	Michael Carlson		Test Date:	1/7/2019
Supervising/Reviewing Engineer: (Where Applicable)	NA		Limit Applied:	Class B
Product Standard:	FCC Part 27, RSS-139		Ambient Temperature:	22.2 °C
Input Voltage:	Battery		Relative Humidity:	26.6 %
Pretest Verification w / Ambient Signals or BB Source:	Yes		Atmospheric Pressure:	982.0 mbar

Deviations, Additions, or Exclusions: None

7   Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	4/11/2019	103762940LEX-001	MAC	BCT	Original Issue