

Medicalgorithmics S.A. TEST REPORT

SCOPE OF WORK

EMC TESTING – POCKETECG III VLTE

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104137601LEX-001

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EMC TEST REPORT

(FULL COMPLIANCE)

Report Number: 104137601LEX-001

Project Number: G104137601

Report Issue Date: 3/2/2020

Model(s) Tested: PocketECG III VLTE

Standards: FCC Part 15B
ICES-003 Issue 6
FCC Part 27
(Radiated Spurious Emissions)

Tested by:
Intertek Testing Services NA, Inc.
731 Enterprise Dr.
Lexington, KY 40510
USA

Client:
Medicalgorithmics S.A.
Al. Jerozolimskie 81
02-001, Warsaw
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Report prepared by



Ben Coolbear, Engineer

Report reviewed by



Bryan Taylor, Team Leader

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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 (Transmitters Idle) (FCC Part 15B, ICES-003 Issue 6, ANSI C63.4:2014)	Compliant
6	Radiated Spurious Emissions (Transmitters Active) (FCC Par 27, ANSI C63.26:2015)	Compliant

Note: Since the PocketECG III VLTE is battery powered the conducted emissions tests from FCC Part 15B / ICES-003 did not apply.



3 Client Information

This product was tested at the request of the following:

Client Information	
Client Name:	Medicalgorithmics S.A.
Address:	Al. Jerozolimskie 81 02-001, Warsaw Poland
Contact:	Przemysław Tadla
Telephone:	+48 733 888 7788
Email:	p.tadla@medicalgorithmics.com
Manufacturer Information	
Manufacturer Name:	Medicalgorithmics S.A.
Manufacturer Address:	Al. Jerozolimskie 81 02-001, Warsaw Poland



4 Description of Equipment under Test and Variant Models

Equipment Under Test	
Product Name	PocketECG III VLTE
Model Number	P4TR-AA-ADS
Serial Number	TR0819-25620A
Receive Date	12/1/2019
Test Start Date	11/6/2019
Test End Date	11/9/2019
Device Received Condition	Good
Test Sample Type	Production
Rated Voltage	3.6VDC
Description of Equipment Under Test (provided by client)	
The PocketECG III VLTE 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.	

4.1 Variant Models:

There were no variant models covered by this evaluation.



5 System Setup and Method

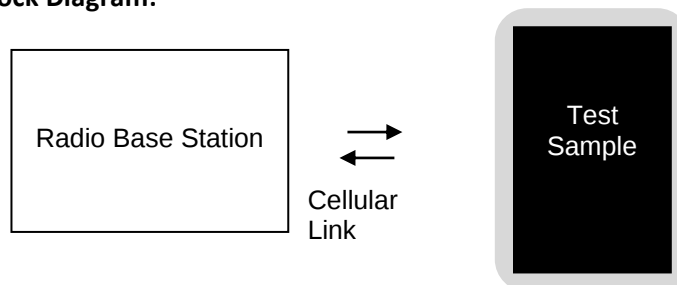
5.1 Method:

Configuration as required by ANSI C63.4:2014.

No.	Descriptions of EUT Exercising
1	During FCC Part 15B / ICES-003 measurements the PocketECG III VLTE was powered on and actively taking readings from the attached sensor electrodes.
2	During the FCC Part 27 measurements the device was in an active call with a base station simulator. The base station simulator was used to set the transmit band to either band 4 or 13 and to force the device to transmit at maximum output power.

Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
1	Electrode wiring harness	.75m	None	None	Electrode terminations

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. And ANSI C63.26

TEST SITE: 10m ALSE

Site Designation: 10m Chamber

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	U _{CISPR}
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 dB μ V/m

RA = Receiver Amplitude (including preamplifier) in dB μ V

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 dB μ V 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 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$RA = 52.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB/m}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$FS = 32 \text{ dB}\mu\text{V/m}$$

To convert from dB μ V to μ V or mV the following was used:

$$UF = 10^{(NF / 20)} \text{ where } UF = \text{Net Reading in } \mu\text{V}$$

$$NF = \text{Net Reading in dB}\mu\text{V}$$

Example:

$$FS = RA + AF + CF - AG = 52.0 + 7.4 + 1.6 - 29.0 = 32.0$$

$$UF = 10^{(32 \text{ dB}\mu\text{V} / 20)} = 39.8 \mu\text{V/m}$$

6.3 Field Strength to Power Calculation

As allowable by ANSI C63.26: 2015 section 5.2.7, the output power of unwanted emissions can be calculated from a field strength measurement. The transmitter measurements that follow in this report have applied the following calculation to the -13dBm limit to arrive an equivalent field strength limit at 3 meters as follows:

$$E \text{ (dB}\mu\text{V/m)} = \text{EIRP (dBm)} - 20\log(D) + 104.8; \text{ where } D \text{ is the measurement distance (in the far field region) in m.}$$

Example:

$$\text{Limit (dB}\mu\text{V/m)} = -13 - 20\log(3) + 104.8 = 82.25 \text{ dB}\mu\text{V/m}$$



6.4 Test Equipment Used:

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
EMI Test Receiver	3900	Rohde & Schwarz	ESU40	9/18/2019	9/18/2020
Bilog Antenna (30MHz-1GHz)	7085	SunAR	JB6	8/8/2019	8/8/2020
Bilog Antenna	7088	SunAR	JB6	8/8/2019	8/8/2020
Horn Antenna	3780	ETS Lindgren	3117	6/7/2019	6/7/2020
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

6.5 Software Utilized:

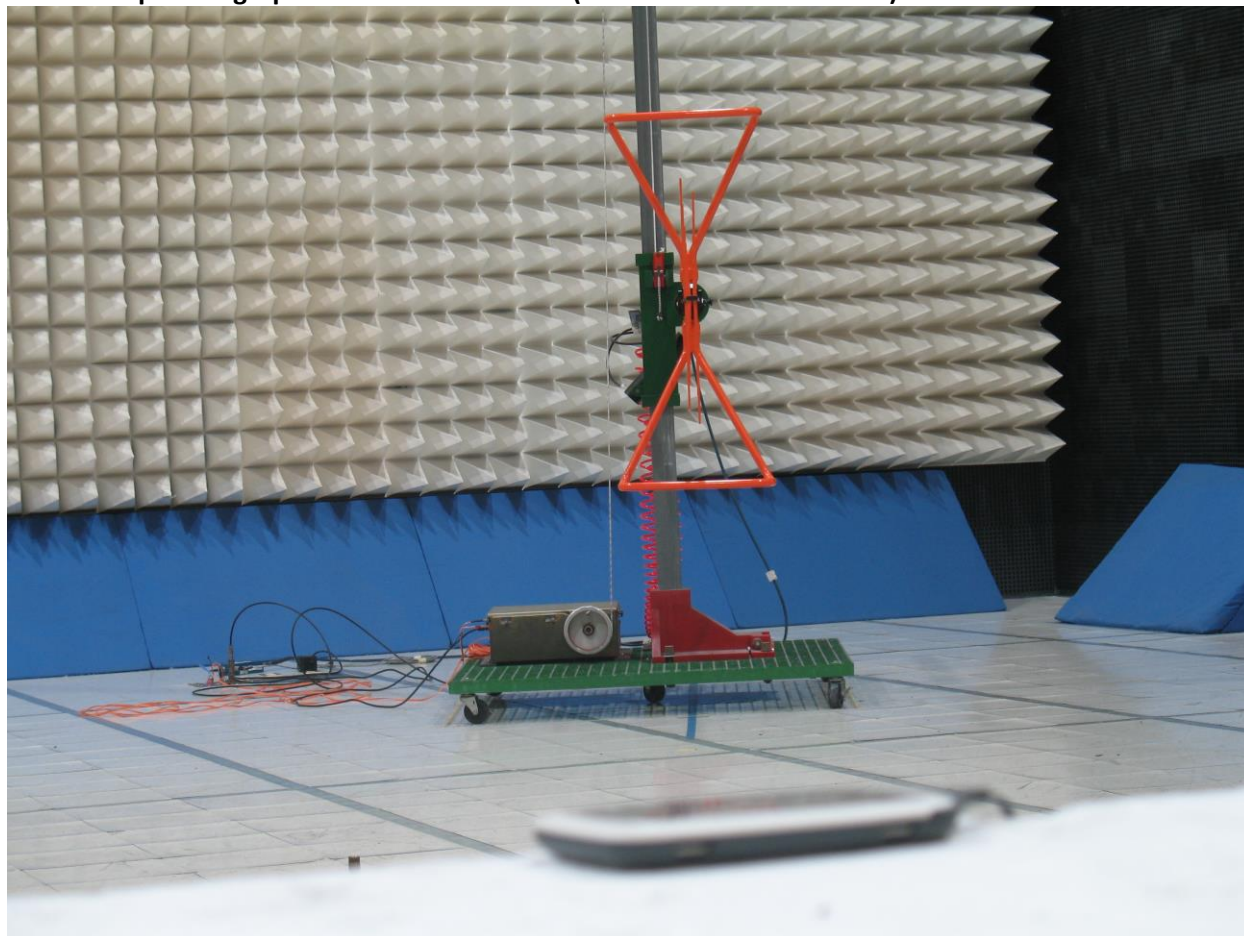
Name	Manufacturer	Version
EMC32	Rohde & Schwarz	Version 9.15.02

6.6 Results:

The sample tested was found to Comply.



6.7 Setup Photographs: Radiated Emissions (FCC Part 15B Below 1GHz)



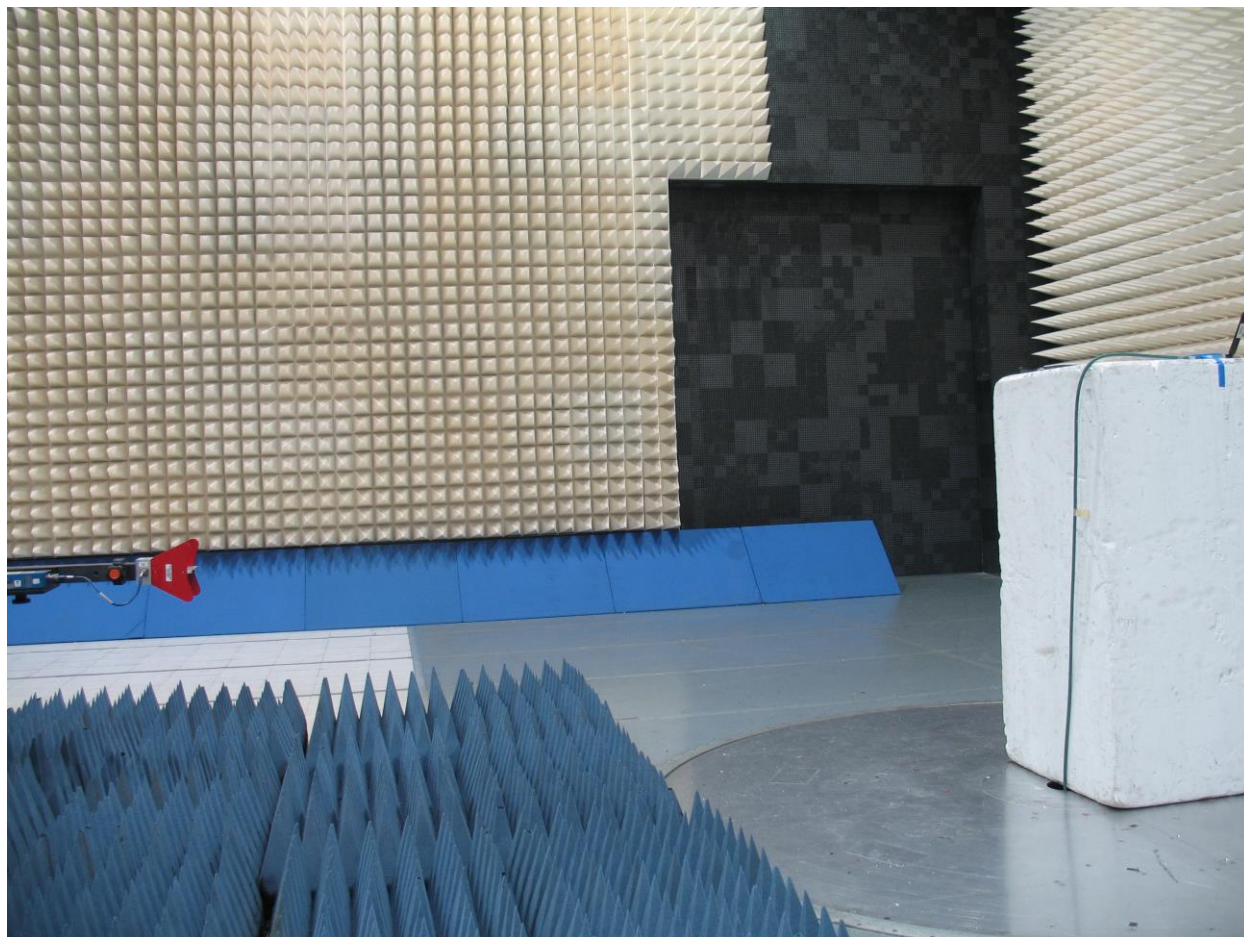


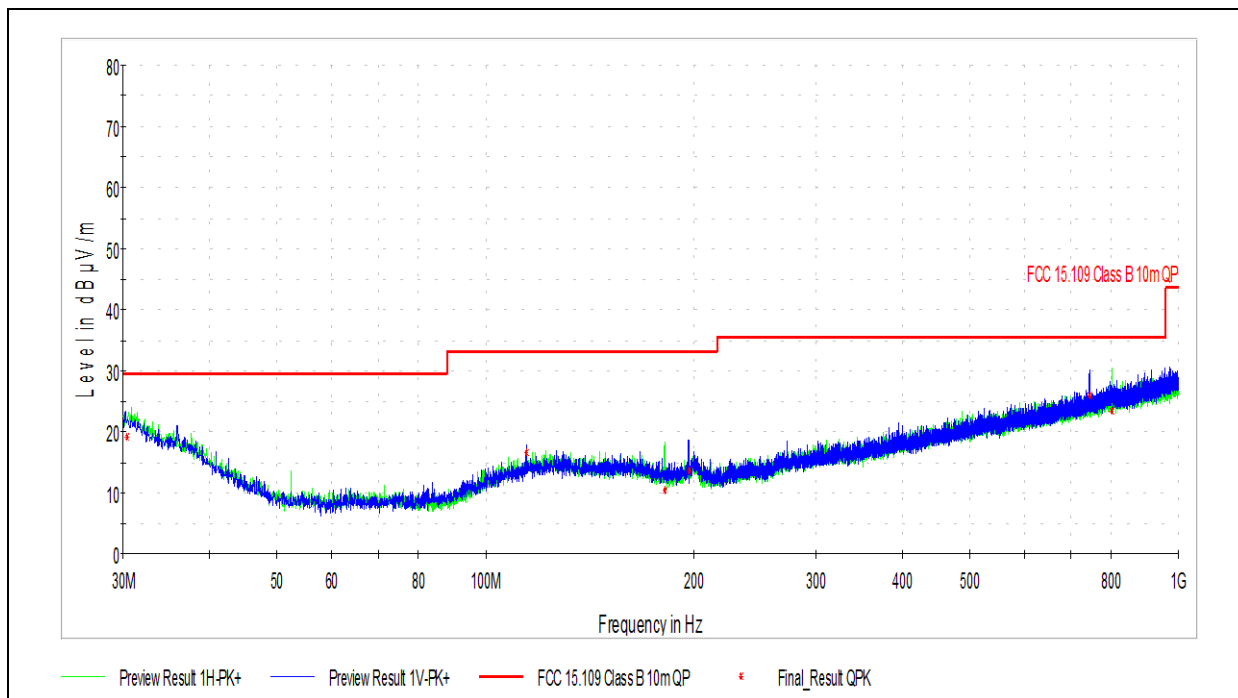
6.8 Setup Photographs: Radiated Emissions (FCC Part 15B Above 1GHz)





6.9 Setup Photographs: Radiated Emissions (Part 22, Part 24, and Part 27)



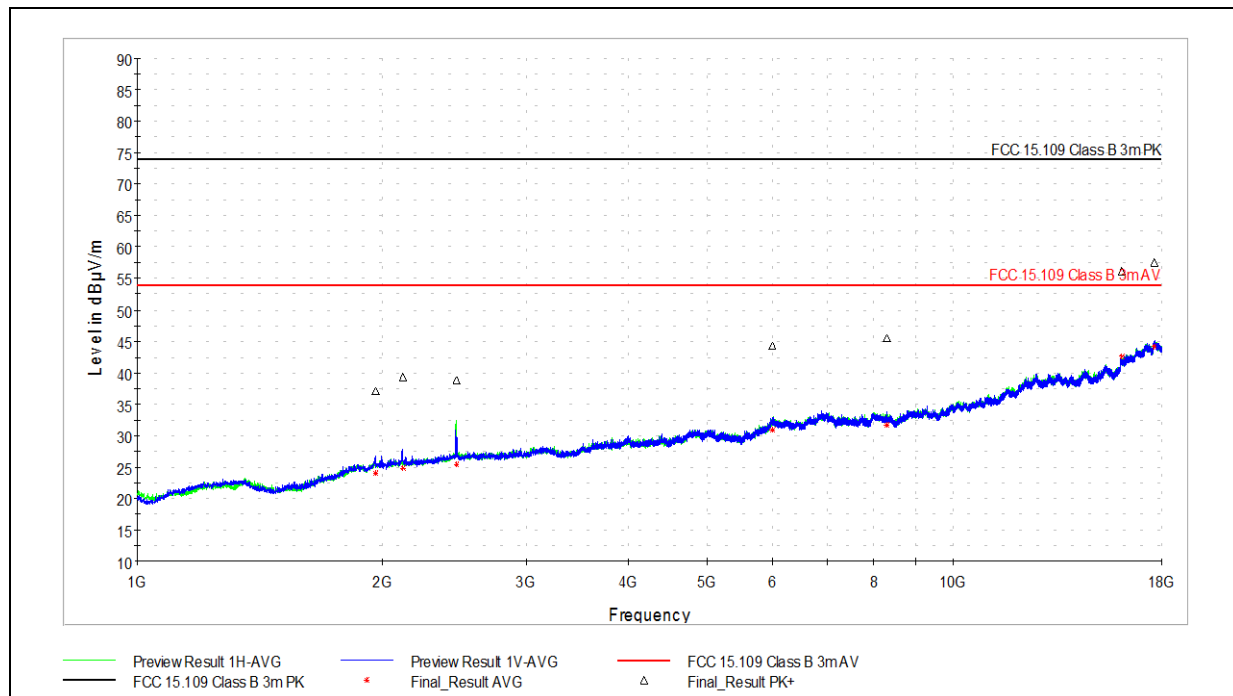
**6.10 Plots/Data: Radiated Emissions, 30MHz – 1GHz (Transmitters Idle)**

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.380000	19.25	29.55	10.30	120.000	383.5	H	16.0	-2.0
114.557778	16.65	33.10	16.45	120.000	400.0	V	295.0	-8.8
181.580000	10.45	33.10	22.65	120.000	105.0	H	0.0	-10.0
196.630556	13.58	33.10	19.52	120.000	105.0	V	0.0	-9.0
743.586667	26.00	35.55	9.55	120.000	142.1	V	246.0	3.1
801.816667	23.39	35.55	12.16	120.000	190.0	H	246.0	3.9

Test Personnel: Ben Coolbear
 Supervising/Reviewing Engineer: Bryan Taylor
 (Where Applicable)
 Product Standard: ICES-003 Issue 6
 Input Voltage: 3.6VDC
 Pretest Verification w / Ambient Signals or BB Source: Yes

Test Date: 11/7/2019
 Limit Applied: Class B
 Ambient Temperature: 22.3 °C
 Relative Humidity: 36.5 %
 Atmospheric Pressure: 993.8 mbar

Deviations, Additions, or Exclusions: None

**6.11 Plots/Data: Radiated Emissions, 1GHz – 18GHz (Transmitters Idle)**

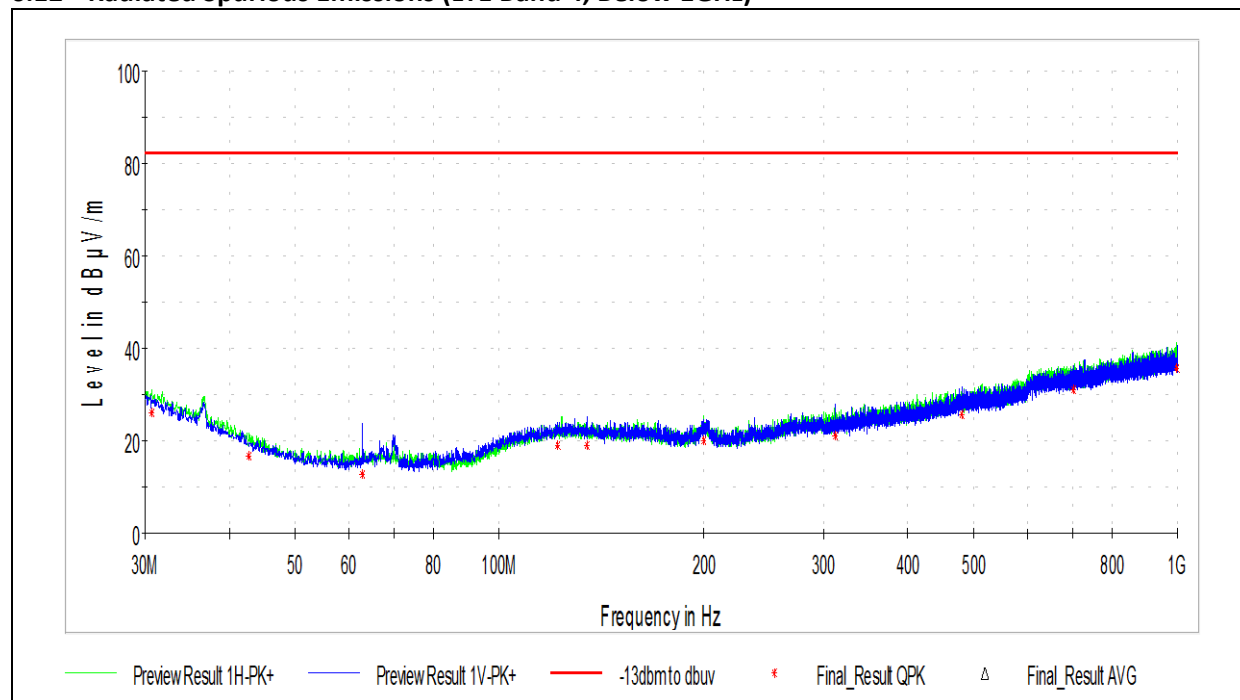
Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1958.500000	37.21	73.98	36.77	1000.000	238.0	V	262.0	1.8
2115.000000	39.27	73.98	34.71	1000.000	100.0	V	133.0	1.9
2461.000000	38.88	73.98	35.10	1000.000	373.0	H	88.0	3.3
6008.000000	44.33	73.98	29.65	1000.000	410.0	V	253.0	9.2
8286.500000	45.48	73.98	28.50	1000.000	358.0	H	60.0	11.6
16083.500000	56.13	73.98	17.85	1000.000	357.0	H	173.0	24.7
17653.500000	57.60	73.98	16.38	1000.000	100.0	H	226.0	25.1

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1958.500000	24.08	53.98	29.90	1000.000	238.0	V	262.0	1.8
2115.000000	24.80	53.98	29.18	1000.000	100.0	V	133.0	1.9
2461.000000	25.40	53.98	28.58	1000.000	373.0	H	88.0	3.3
6008.000000	30.85	53.98	23.13	1000.000	410.0	V	253.0	9.2
8286.500000	31.66	53.98	22.32	1000.000	358.0	H	60.0	11.6
16083.500000	42.62	53.98	11.36	1000.000	357.0	H	173.0	24.7
17653.500000	44.19	53.98	9.79	1000.000	100.0	H	226.0	25.1

Test Personnel: Ben Coolbear
Supervising/Reviewing Engineer: Bryan Taylor
(Where Applicable) FCC Part 15B
Product Standard: ICES-003 Issue 6
Input Voltage: 3.6VDC
Pretest Verification w / Ambient Signals or BB Source: Yes

Test Date: 11/7/2019
Limit Applied: Class B
Ambient Temperature: 22.3 °C
Relative Humidity: 36.5 %
Atmospheric Pressure: 993.8 mbar

Deviations, Additions, or Exclusions: None

**6.12 Radiated Spurious Emissions (LTE Band 4, Below 1GHz)**

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.700556	25.85	82.25	56.40	120.000	214.9	H	18.0	28.2
42.771667	16.59	82.25	65.66	120.000	228.8	H	202.0	19.4
62.764445	12.82	82.25	69.43	120.000	99.9	V	275.0	14.4
121.772778	19.04	82.25	63.21	120.000	350.3	V	116.0	21.9
134.436667	19.13	82.25	63.12	120.000	178.0	V	208.0	21.8
199.911667	20.00	82.25	62.25	120.000	133.0	H	258.0	21.7
312.485556	21.05	82.25	61.20	120.000	345.0	V	82.0	23.1
480.241667	25.70	82.25	56.55	120.000	105.5	V	310.0	27.4
702.533333	30.87	82.25	51.38	120.000	321.0	V	100.0	31.0
995.850556	35.53	82.25	46.72	120.000	400.1	H	75.0	35.4

Test Personnel: Ben Coolbear, Michael Carlson

Supervising/Reviewing Engineer: (Where Applicable) Bryan Taylor

Product Standard: FCC Part 27

Input Voltage: 3.6VDC

Pretest Verification w / Ambient Signals or BB Source: Yes

Test Date: 11/7/2019 – 11/8/2019

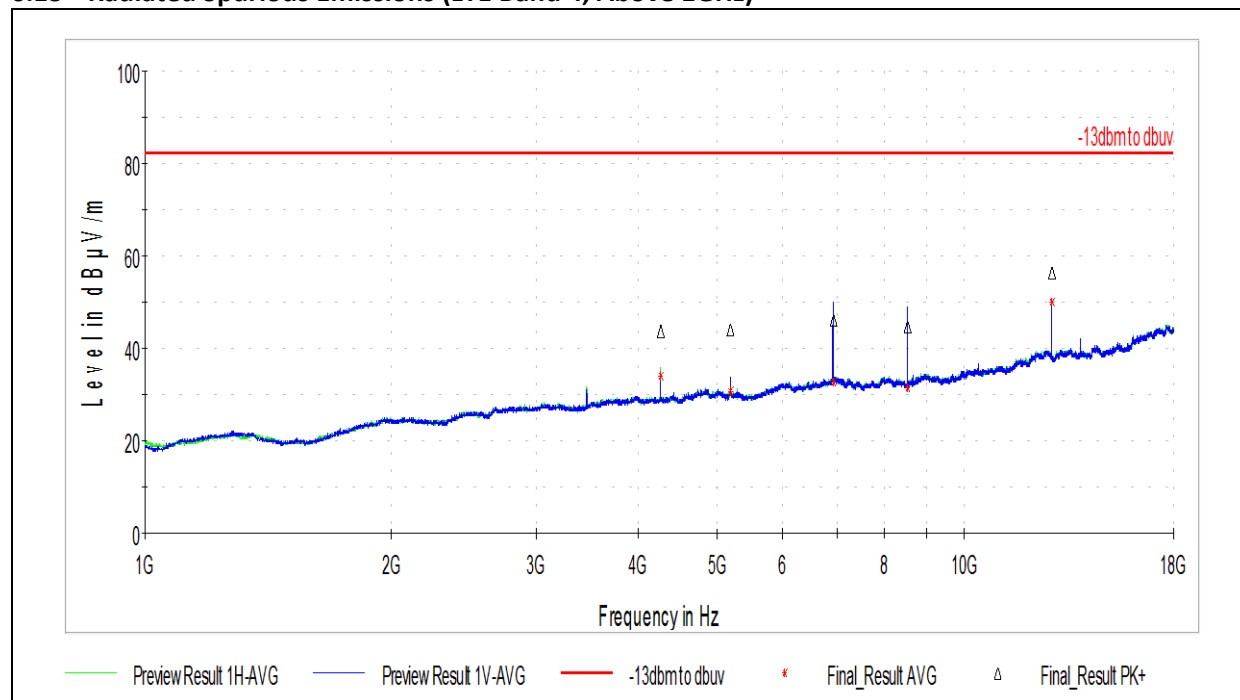
Limit Applied: -13dBm (converted to field strength)

Ambient Temperature: 22.3 °C

Relative Humidity: 36.5 %

Atmospheric Pressure: 993.8 mbar

Deviations, Additions, or Exclusions: None

**6.13 Radiated Spurious Emissions (LTE Band 4, Above 1GHz)**

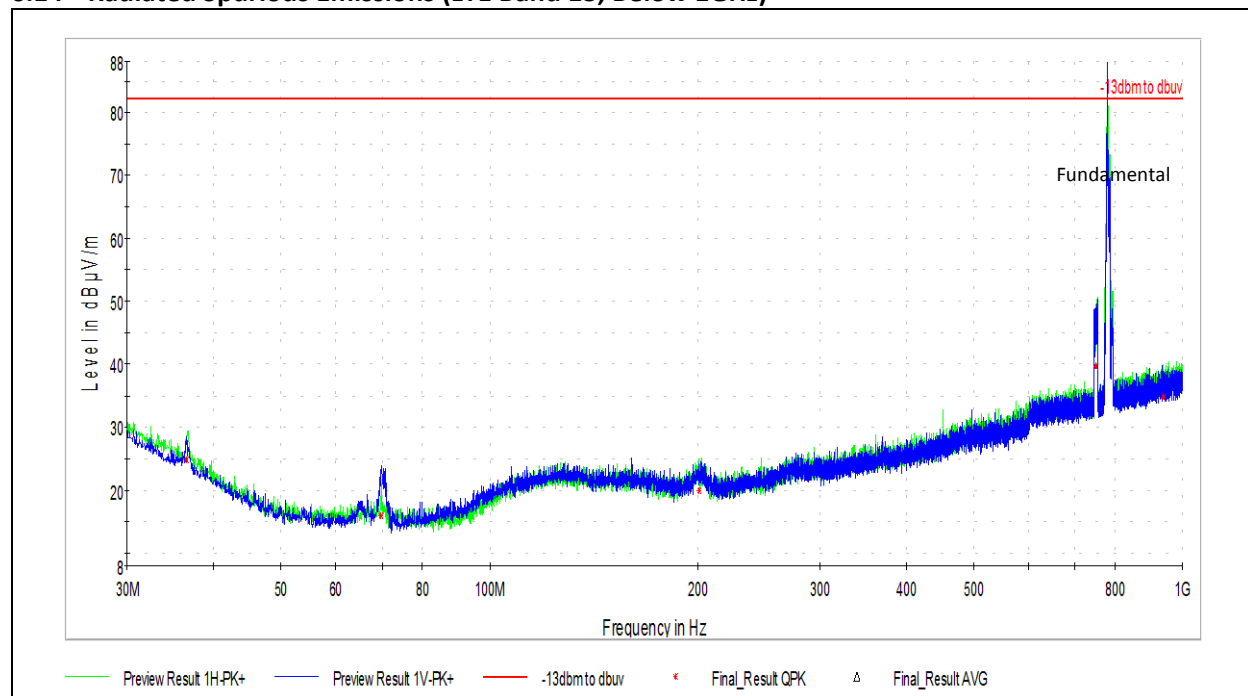
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4265.000000	43.70	82.25	38.55	1000.000	304.0	H	105.0	6.0
5187.500000	44.12	82.25	38.13	1000.000	100.0	H	53.0	7.7
6930.000000	46.03	82.25	36.22	1000.000	100.0	V	153.0	10.7
8530.000000	44.57	82.25	37.68	1000.000	100.0	V	192.0	11.6
12795.000000	56.29	82.25	25.96	1000.000	100.0	V	158.0	18.9

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4265.000000	34.07	82.25	48.18	1000.000	304.0	H	105.0	6.0
5187.500000	30.61	82.25	51.64	1000.000	100.0	H	53.0	7.7
6930.000000	32.59	82.25	49.66	1000.000	100.0	V	153.0	10.7
8530.000000	31.35	82.25	50.90	1000.000	100.0	V	192.0	11.6
12795.000000	50.07	82.25	32.18	1000.000	100.0	V	158.0	18.9

Test Personnel: Ben Coolbear, Michael Carlson
Supervising/Reviewing Engineer: (Where Applicable) Bryan Taylor
Product Standard: FCC Part 27
Input Voltage: 3.6VDC
Pretest Verification w / Ambient Signals or BB Source: Yes

Test Date: 11/7/2019 – 11/8/2019
Limit Applied: -13dBm (converted to field strength)
Ambient Temperature: 22.3 °C
Relative Humidity: 36.5 %
Atmospheric Pressure: 993.8 mbar

Deviations, Additions, or Exclusions: None

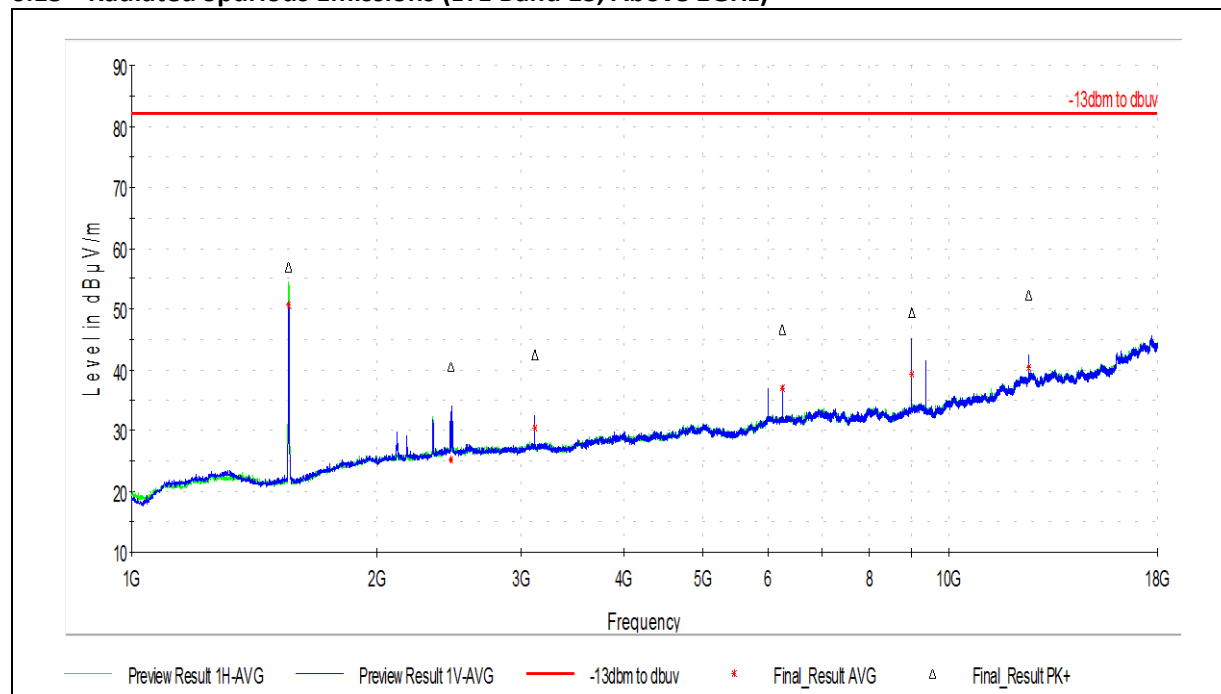
**6.14 Radiated Spurious Emissions (LTE Band 13, Below 1GHz)**

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
36.520556	24.92	82.25	57.33	120.000	284.4	H	264.0	24.0
69.770000	15.99	82.25	66.26	120.000	104.9	V	128.0	14.8
200.773889	19.86	82.25	62.39	120.000	106.5	V	285.0	21.5
750.386667	39.64	82.25	42.61	120.000	99.9	H	332.0	32.0
938.943889	34.70	82.25	47.55	120.000	312.1	H	183.0	34.7

Test Personnel: Ben Coolbear, Michael Carlson
Supervising/Reviewing Engineer: (Where Applicable) Bryan Taylor
Product Standard: FCC Part 27
Input Voltage: 3.6VDC
Pretest Verification w / Ambient Signals or BB Source: Yes

Test Date: 11/7/2019 – 11/8/2019
Limit Applied: -13dBm (converted to field strength)
Ambient Temperature: 22.3 °C
Relative Humidity: 36.5 %
Atmospheric Pressure: 993.8 mbar

Deviations, Additions, or Exclusions: None

**6.15 Radiated Spurious Emissions (LTE Band 13, Above 1GHz)**

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1556.500000	56.92	82.25	25.33	1000.000	410.0	H	334.0	-2.2
2459.000000	40.60	82.25	41.65	1000.000	242.0	V	0.0	3.1
3114.500000	42.48	82.25	39.77	1000.000	410.0	H	256.0	4.6
6256.000000	46.53	82.25	35.72	1000.000	169.0	V	22.0	9.7
9012.000000	49.30	82.25	32.95	1000.000	410.0	V	160.0	12.7
12512.000000	52.42	82.25	29.83	1000.000	100.0	V	168.0	18.7

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1556.500000	50.66	82.25	31.59	1000.000	410.0	H	334.0	-2.2
2459.000000	25.21	82.25	57.04	1000.000	242.0	V	0.0	3.1
3114.500000	30.52	82.25	51.73	1000.000	410.0	H	256.0	4.6
6256.000000	36.86	82.25	45.39	1000.000	169.0	V	22.0	9.7
9012.000000	39.36	82.25	42.89	1000.000	410.0	V	160.0	12.7
12512.000000	40.41	82.25	41.84	1000.000	100.0	V	168.0	18.7

Test Personnel: Ben Coolbear, Michael Carlson

Supervising/Reviewing Engineer: (Where Applicable) Bryan Taylor

Product Standard: FCC Part 27

Input Voltage: 3.6VDC

Pretest Verification w / Ambient Signals or BB Source: Yes

Test Date: 11/7/2019 – 11/8/2019

Limit Applied: -13dBm (converted to field strength)

Ambient Temperature: 22.3 °C

Relative Humidity: 36.5 %

Atmospheric Pressure: 993.8 mbar

Deviations, Additions, or Exclusions: None



7 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	3/2/2020	104137601LEX-001	BCT	BCT	Original Issue