

Test Report No:
74509RRF.003A1

Partial Test Report

USA FCC Part 90

CANADA RSS-140

(*) Identification of item tested	Aveir device remote monitoring
(*) Trademark	AVEIR™ Patient Transmitter
(*) Model and /or type reference	LSRM01
Other identification of the product	FCC ID: 2A76T00NRF9160 IC: 7067A-00NRF9160
(*) Features	ECG monitoring, LTE Cat-M1 and NB-IoT HW version: DVT1.1 SW version: RSSI_V2.0.0_LTE
Applicant	Abbott Medical 15900 Valley View Court Sylmar, CA 91342, USA
Test method requested, standard	USA FCC Part 90 (10-1-21 Edition). CANADA RSS-140 Issue 1, April 2018 ANSI C63.26-2015. KDB 971168 D01 Power Meas License Digital Systems v03r01, April. 2018.
Approved by (name / position & signature)	José Manuel Gómez Galván EMC Consumer & RF Lab. Manager
Date of issue	2024-01-22
Report template No	FDT08_24 (*) "Data provided by the client"

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Competences and guarantees

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DEKRA Testing and Certification is an FCC-recognized accredited testing laboratory with appropriate scope of accreditation that covers the performed tests in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification has a calibration and maintenance program for its measurement equipment.

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The results presented in this Test Report apply only to the particular item under test established in this document.

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Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample consists of an Aveir device remote monitoring. ECG monitoring that communicates over LTE and NB-IoT.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

- Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
74509/001	Aveir device remote monitoring	LSRM01	772AT300013	20-09-2023

Sample S/01 has undergone the following test(s): The radiated tests indicated in Appendix A. Software version: RSSI_V2.0.0_LTE

Test sample description

Ports.....:	Port name and description	Cable				
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾	
		Jack 2.5	1.27	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		Jack 2.5	1.27	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Jack 3.5	1.27	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Supplementary information to the ports.....:	-					
Rated power supply	Voltage and Frequency					
	<input checked="" type="checkbox"/> DC: 9V					
Rated Power.....	1200mAh					
Clock frequencies.....	DSP 22.1184MHz. nRF5340 32.786kHz, RTC: nRF5340 32MHz. CPLD: 48MHz					
Other parameters	-					
Software version.....	RSSI_V2.0.0_LTE					
Hardware version	DVT1.1					
Dimensions in cm (W x H x D) ...	199mm x 187mm x 58mm					
Mounting position	<input type="checkbox"/> Table top equipment					
	<input type="checkbox"/> Wall/Ceiling mounted equipment					
	<input type="checkbox"/> Floor standing equipment					
	<input checked="" type="checkbox"/> Hand-held equipment					
	<input type="checkbox"/> Other:					
Modules/parts.....	Module/parts of test item		Type	Manufacturer		
	PLM EMC		DUT	Celestica		
	PLM Immunity		DUT	Celestica		
	PLM Safety (Mechanical and electronic)		DUT	Celestica		
	PLM RSSI LTE & NB-IoT		DUT	Celestica		
Accessories (not part of the test item)	Description		Type	Manufacturer		
	Patient Cables		Cables	Exceltek		
	Daughterboard		PCB	Abbott		
	Patientboard		PCB	Abbott		
	Pacemakers		LP	Abbott		
	Rottom Board		PCB	Celestica		
	FTDI, Tag Connect and Power Jack		Cables	N/A		
Documents as provided by the applicant	Description		File name	Issue date		
	Aveir PT Safety DVTP RevA		91014744_R ev	27/09/23		
	Aveir PT RF DVTP RevA		91016193_R ev	27/09/23		
	Aveir PT EMC/EMI DVTP RevA		91016747_A	27/09/23		

⁽³⁾ Only for Medical Equipment

Identification of the client

Abbott Medical
15900 Valley View Court
Sylmar, CA 91342, USA

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2023-10-12
Date (finish)	2023-10-12

Document history

Report number	Date	Description
74509RRF.003	2023-12-14	First release.
74509RRF.003A1	2024-01-22	First modification. The test report is modified to complete the information provided by the client. Software version declared is modified. This modification test report cancels and replaces the test report 74509RRF.003

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

In the semi-anechoic chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Sergio Carrasco.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
6791	SEMIANECHOIC ABSORBER LINED	FACT 3 200 STP	ETS LINDGREN	N/A
6792	SHIELDED ROOM	S101	ETS LINDGREN	N/A
6143	Biconical/Log Antenna 30 MHz - 6 GHz	3142E	ETS LINDGREN	2023-10
6496	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK	2023-08
7817	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE AND SCHWARZ	2023-12
3783	PRE-AMPLIFIER G>30dB 1GHz-18GHz	BLMA 0118-3A	BONN ELEKTRONIK	2023-12
8912	Wideband Radio Communication Tester	CMW500	ROHDE AND SCHWARZ	2025-10
4848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	N/A

Testing verdicts

Not applicable:	N/A
Pass:	P
Fail:	F
Not measured:	N/M

Summary

Appendix A: LTE Cat-M1 Band 26.

FCC PART 90 PARAGRAPH		
Requirement – Test case	Verdict	Remark
FCC 90.635 (b): Transmitter output power: RF output power	N/M	(1)
FCC 2.1047: Modulation characteristics	N/M	(1)
FCC 90.213: Frequency stability	N/M	(1)
FCC 2.1049: Occupied bandwidth (or 99% emission bandwidth)	N/M	(1)
FCC 90.691: Spurious emissions at antenna terminals	N/M	(1)
FCC 90.691: Spurious emissions at antenna terminals (Emission mask requirements for EA-based systems)	N/M	(1)
FCC 90.691: Radiated emissions	P	
<u>Supplementary information and remarks:</u> (1) Test not requested.		

Appendix A: Test results for FCC 90: LTE Cat-M1 Band 26

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TEST CONDITIONS

(*): Declared by the Applicant.

POWER SUPPLY (*):

Vnormal: 9 Vdc.
Type of Power Supply: External DC.

ANTENNA (*):

LOW Bands	GAIN	ANTENNA TYPE
LTE Cat-M1 Band 26	+1 dBi	Linear Polarization

TEST FREQUENCIES:

LTE Cat-M1 Band 26. Sub-band 814-824 MHz. QPSK and 16QAM:

	Channel (Frequency, MHz)				
	BW=1.4 MHz	BW=3 MHz	BW=5 MHz	BW=10 MHz	BW=15 MHz
Low	26697 (814.7)	26705 (815.5)	26715 (816.5)	N/A	N/A
Middle	26740 (819)	26740 (819)	26740 (819)	26740 (819)	N/A
High	26783 (823.3)	26775 (822.5)	26765 (821.5)	N/A	N/A

Radiated Emissions

Limits

1. LTE Cat-M1 Band 26:

* FCC § 90.691:

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

Method

The measurement was performed with the EUT inside an anechoic chamber. The spectrum was scanned from 30 MHz to at least the 10th harmonic of the High frequency generated within the equipment.

The EUT was placed on a 1 meter high non-conductive stand at a 3 meter distance from the measuring antenna. Detected emissions were maximized at each frequency by rotating the EUT and adjusting the height and polarization of the measuring antenna. The maximum meter reading was recorded.

MEASUREMENT LIMIT:

According to specification, the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log(P)$ dB, P in watts.

At P_o transmitting power, the specified minimum attenuation becomes $43 + 10 \log(P_o)$, and the level in dBm relative P_o becomes:

$$P_o \text{ (dBm)} - [43 + 10 \log(P_o \text{ in mwatts}) - 30] = -13 \text{ dBm}$$

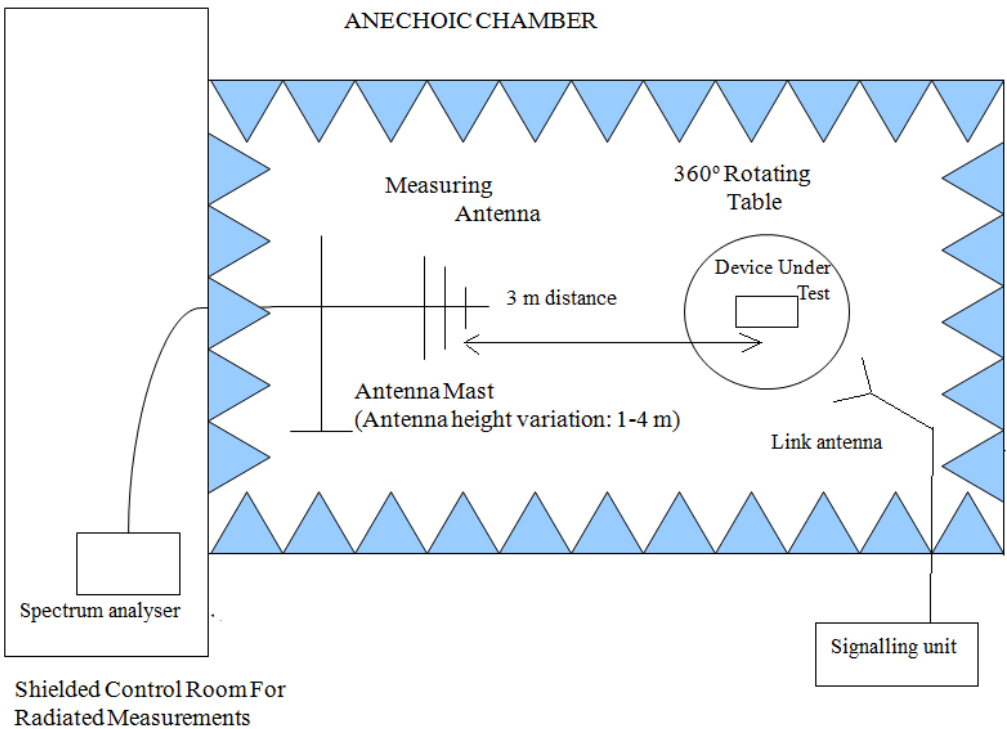
The maximum field strength (dBμV/m) of each detected emission at less than 20 dB respect to the limit is converted to an equivalent EIRP level (dBm) according to ANSI C63.26 with the formula:

$$\text{EIRP (dBm)} = E \text{ (dBμV/m)} + 20 \log(D) - 104.8; \text{ where } D \text{ is the measurement distance (in the far field region) in m. } D = 3 \text{ m}$$

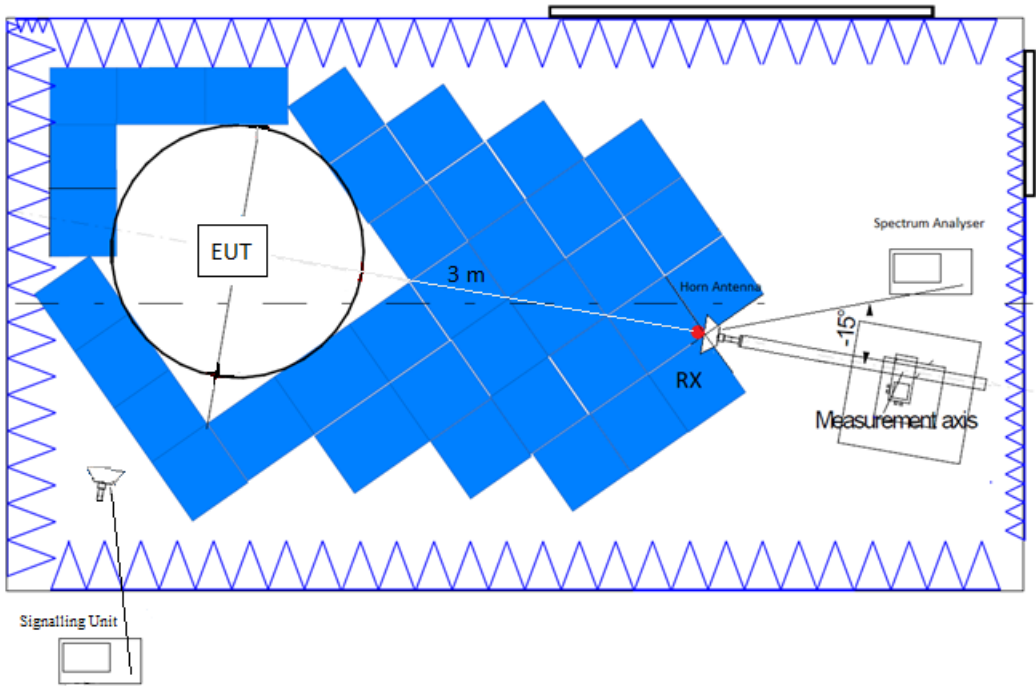
A resolution bandwidth / video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

Test Setup

Radiated measurements below 1 GHz:



Radiated measurements above 1 GHz:



Results

Measurements required on one frequency near top channel and one frequency near bottom channel, according to FCC § 15.31 (m).

LTE Cat-M1 Band 26. Sub-band 814-824 MHz:

A preliminary scan determined the BW=5 MHz, QPSK, RB Size=1, RB Offset=2, Narrowband=1 as the worst case. The next results are for this worst case configuration.

- MIDDLE CHANNEL:

Frequency range 30 MHz - 1 GHz

No spurious frequencies at less than 20 dB below the limit.

Frequency range 1 - 8.5 GHz

No spurious frequencies at less than 20 dB below the limit.

Measurement uncertainty (dB): $<\pm 5.35$ for $f \geq 30$ MHz up to 1 GHz
 $<\pm 4.32$ for $f \geq 1$ GHz up to 10 GHz

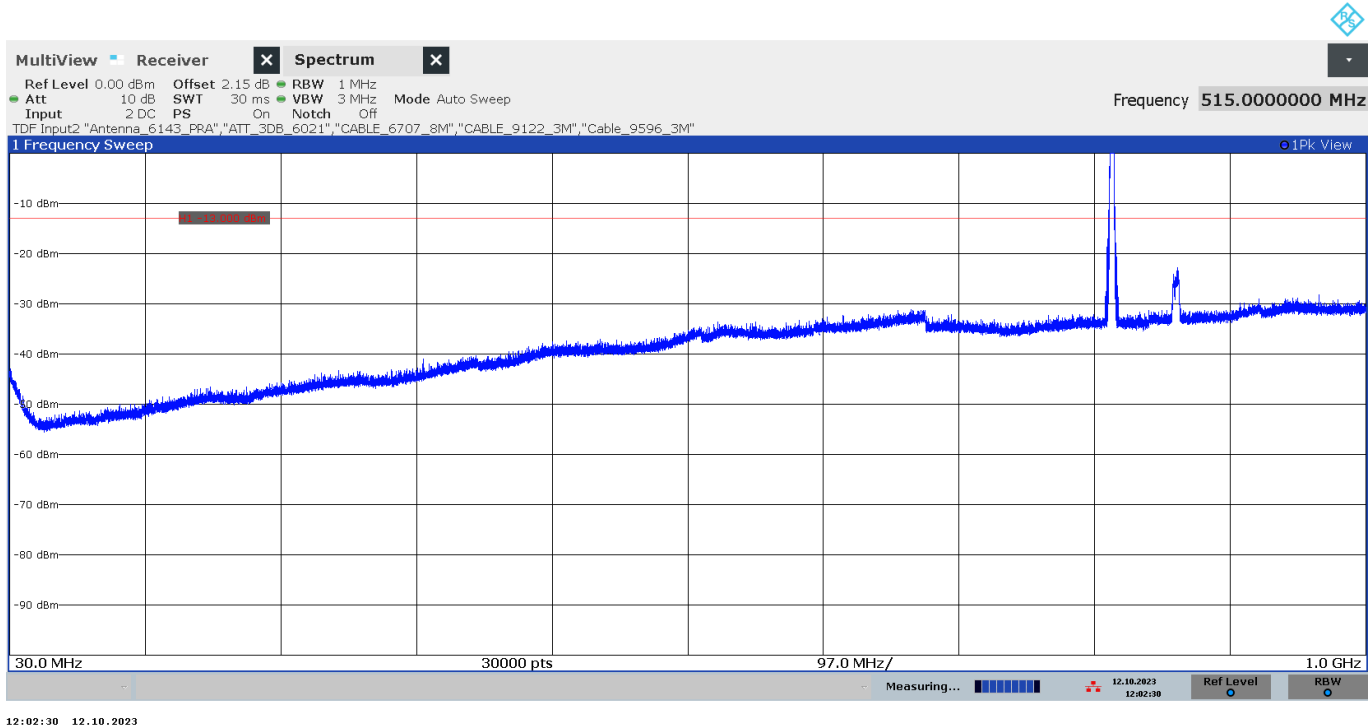
Verdict

Pass

LTE Cat-M1 Band 26. Sub-band 814-824 MHz:

FREQUENCY RANGE 30 MHz - 1 GHz:

- MIDDLE CHANNEL:



The peak above the limit is the carrier frequency:
LTE Cat-M1 Band 26, 819 MHz

FREQUENCY RANGE 1 - 8.5 GHz:

- MIDDLE CHANNEL:

