

ISED CABid: ES1909
Lab. Company Number: 4621A

Test Report No:
74509RRF.002A1

Partial Test Report

USA FCC Part 24

CANADA RSS-133

(*) 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 24 (10-1-21 Edition). CANADA RSS-133 Issue 6, Jan. 2018 Amendment 1. 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.

DEKRA Testing and Certification is an ISED-recognized accredited testing laboratory, CABid: ES1909, Company Number: 4621A, with the 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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General conditions

1. This report is only referred to the item that has undergone the test.
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3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Testing and Certification S.A.U.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies.

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)	2023-10-02
Date (finish)	2023-10-02

Document history

Report number	Date	Description
74509RRF.002	2023-12-14	First release.
74509RRF.002A1	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.002

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: Álvaro Gutiérrez, Rafael Fernández and 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
4578	Biconical/Log Antenna 30MHz - 6GHz	3142E	ETS LINDGREN	2023-04
4611	Horn Antenna 1-18 GHz	BBHA 9120 D	SCHWARZBECK MESS-ELEKTRONIK	2026-01
4657	Horn Antenna 18-40 GHz	BBHA 9170	SCHWARZBECK MESS-ELEKTRONIK	2026-06
8856	Pre-Amplifier G>30dB 17-40GHz	BLMA 1840-4A	BONN ELEKTRONIK	2023-11
6165	EMI Test Receiver 9 kHz-7 GHz	ESR7	ROHDE AND SCHWARZ	2023-11
6667	Wideband Radio Communication Tester	CMW500	ROHDE AND SCHWARZ	2024-06
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 25.

FCC 24 / RSS-133		
Requirement – Test case	Verdict	Remark
FCC 24.232 / RSS-133 6.4: RF Output Power	N/M	(1)
FCC 2.1047 / RSS-133 6.2: Modulation characteristics	N/M	(1)
FCC 24.235 / RSS-133 6.3: Frequency stability	N/M	(1)
FCC 2.1049: Occupied Bandwidth	N/M	(1)
FCC 24.238 / RSS-133 6.5: Spurious emissions at antenna terminals	N/M	(1)
FCC 24.238 / RSS-133 6.5: Spurious emissions at antenna terminals at Block Edges	N/M	(1)
FCC 24.238 / RSS-133 6.5: Radiated Emissions	P	
<u>Supplementary information and remarks:</u>		
(1) Test not requested.		

Appendix A: Test results for FCC 24 / RSS-133: LTE Cat-M1 Band 25

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TEST CONDITIONS

(*): Declared by the Applicant.

POWER SUPPLY (*):

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

ANTENNA (*):

Band	Gain (dBi)	Type of Antenna
LTE Cat-M1 Band 25	+4.3	Linear Polarization

TEST FREQUENCIES:

LTE Cat-M1 Band 25. QPSK and 16QAM:

	Channel per BW=(Frequency, MHz)					
	BW = 1.4 MHz	BW = 3 MHz	BW = 5 MHz	BW = 10 MHz	BW = 15 MHz	BW = 20 MHz
Low	26047 (1850.7)	26055 (1851.5)	26065 (1852.5)	26090 (1855)	26115 (1857.5)	26140 (1860)
Middle	26365 (1882.5)	26365 (1882.5)	26365 (1882.5)	26365 (1882.5)	26365 (1882.5)	26365 (1882.5)
High	26683 (1914.3)	26675 (1913.5)	26665 (1912.5)	26640 (1910)	26615 (1907.5)	26590 (1905)

Radiated Emissions

Limits

1. LTE Cat-M1 Band 25:

* FCC §2.1051 and §24.238. RSS-133, Clause 6.5.

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.

Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater.

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

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

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 non-conductive stand at 3-meter distance from the measuring antenna for measurements up to 18 GHz. Measurements above 18 GHz require the distance to be reduced to 1.5 meters.

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:

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

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

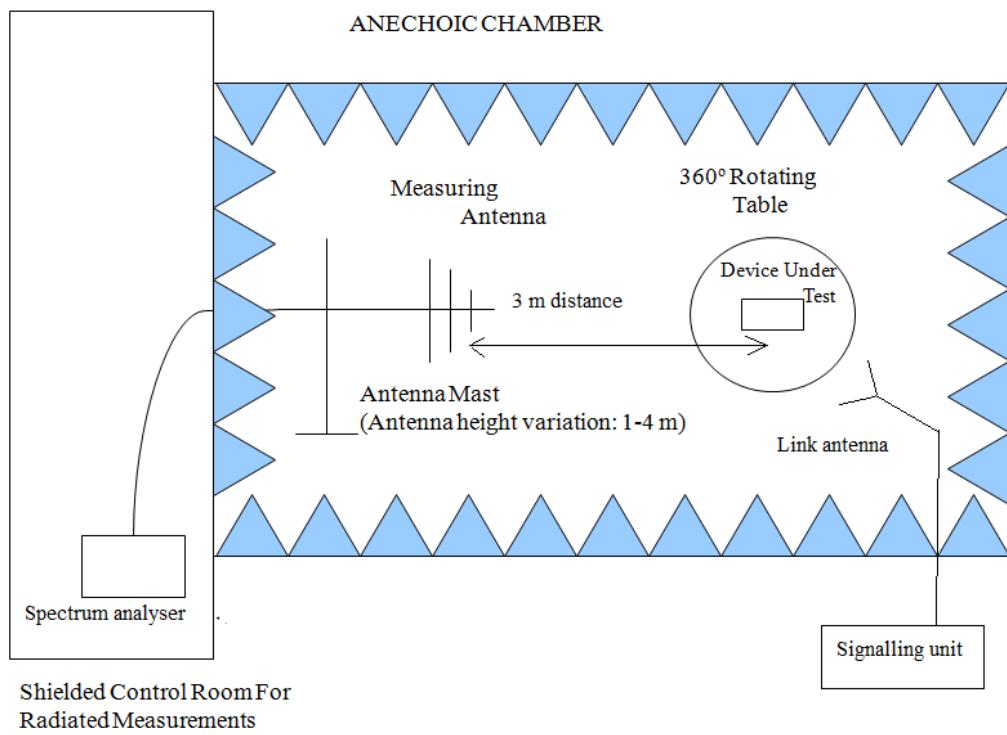
The maximum field strength ($\text{dB}\mu\text{V/m}$) of each detected emission at less than 20 dB respect to the limit is converted to an equivalent EIRP level (dBm) according to ANSI C63.26 with the formula:

$$\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20 \log(D) - 104.8;$$

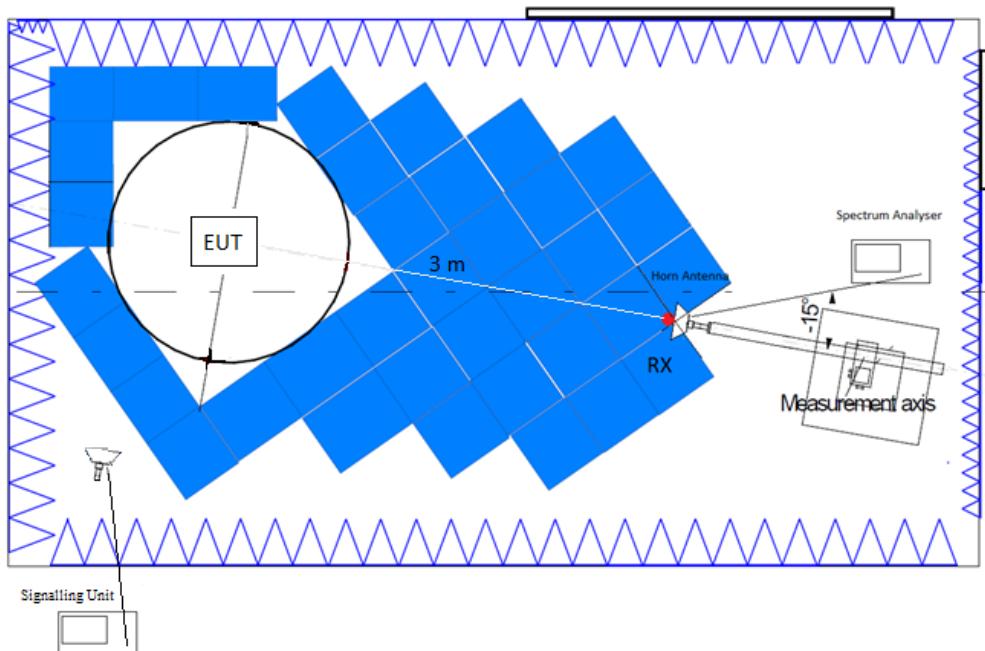
where D is the measurement distance (in the far field region) in m.

Test Setup

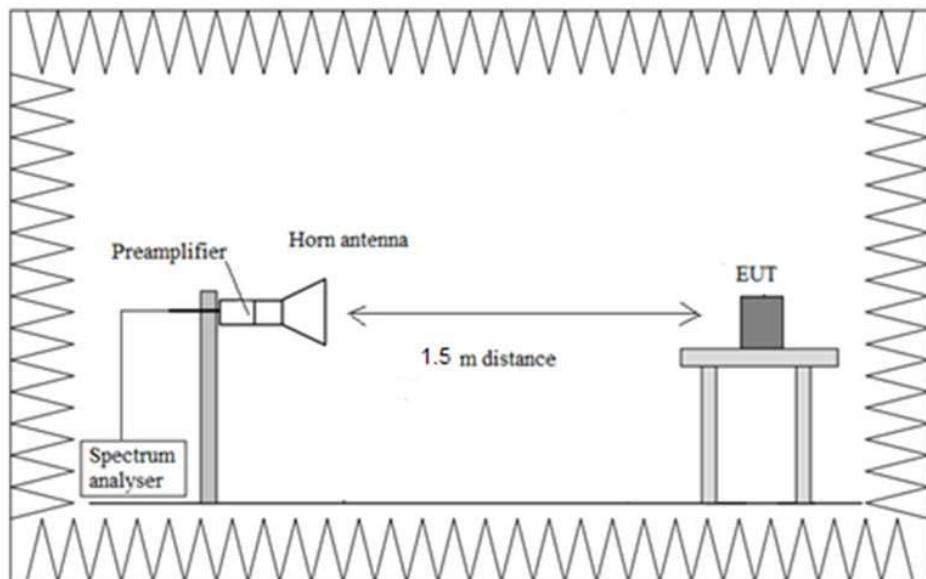
Radiated measurements below 1 GHz:



Radiated measurements above 1 GHz up to 18 GHz:



Radiated measurements above 18 GHz:



Results

LTE Cat-M1 Band 25:

A preliminary scan determined the BW=15 MHz, QPSK, RB Size=1, RB Offset=2, Narrow Band=1 as the worst case. The following results are for this worst-case configuration.

- MIDDLE CHANNEL:

Frequency range 30 MHz - 1 GHz:

No spurious signals were found at less than 20 dB below the limit.

Frequency range 1 - 18 GHz:

No spurious signals were found at less than 20 dB below the limit.

Frequency range 18 - 20 GHz:

No spurious signals were found at less than 20 dB below the limit.

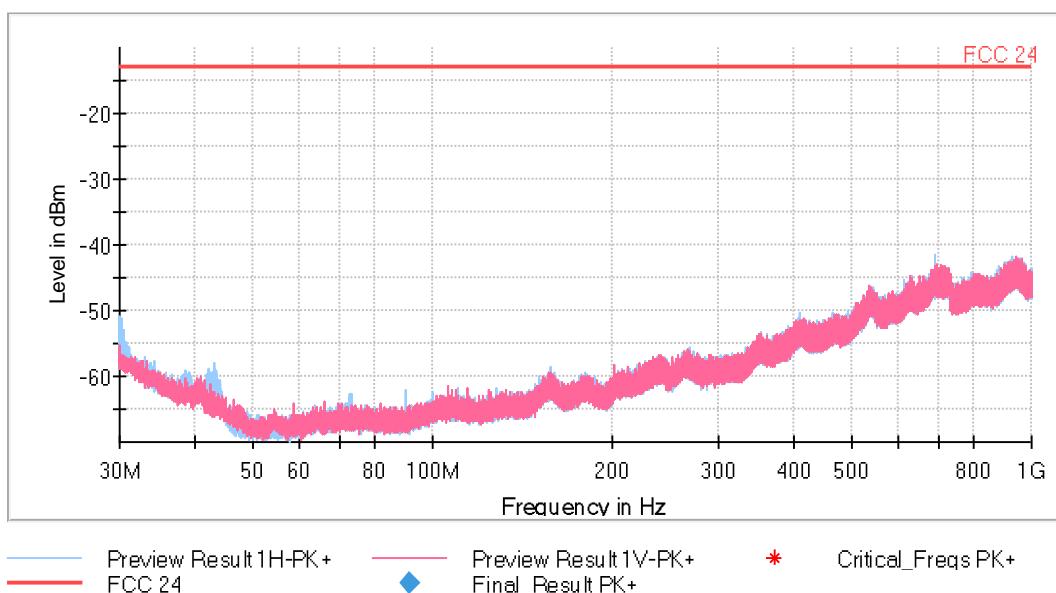
Measurement uncertainty (dB)	<math>\pm 5.03 \text{ for } f < 1 \text{ GHz}</math>
	$\pm 4.32 \text{ for } f \geq 1 \text{ GHz up to } 17 \text{ GHz}$
	$\pm 4.58 \text{ for } f \geq 17 \text{ GHz up to } 20 \text{ GHz}$

Verdict Pass

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	30.312 kHz	PK+	1 MHz	1 s	0 dB
1 GHz - 3 GHz	62.5 kHz	PK+	1 MHz	1 s	0 dB
3 GHz - 18 GHz	468.75 kHz	PK+	1 MHz	1 s	0 dB
18 GHz - 20 GHz	62.5 kHz	PK+	1 MHz	1 s	0 dB

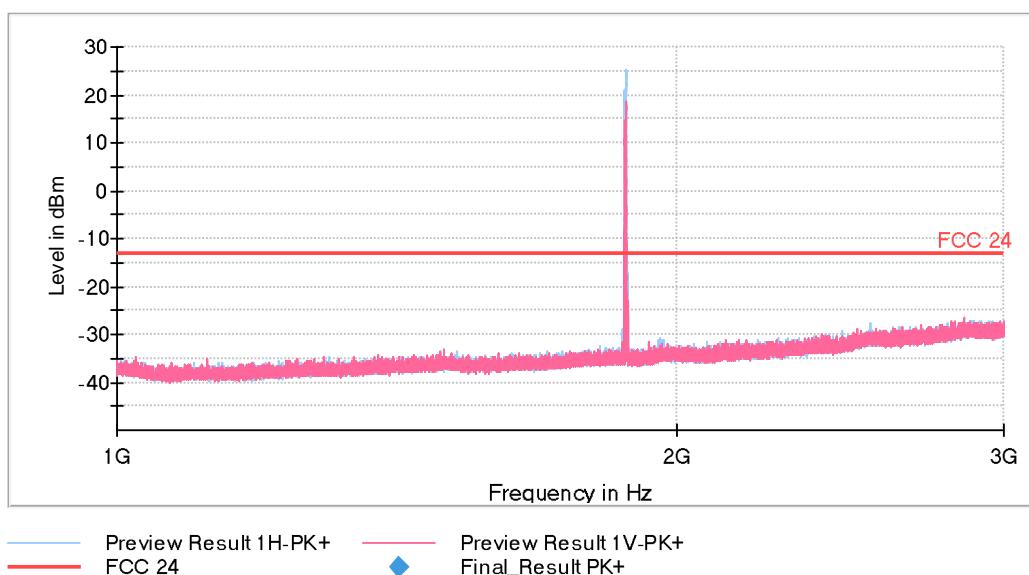
FREQUENCY RANGE 30 MHz - 1 GHz:

- Middle Channel:



FREQUENCY RANGE 1 - 3 GHz:

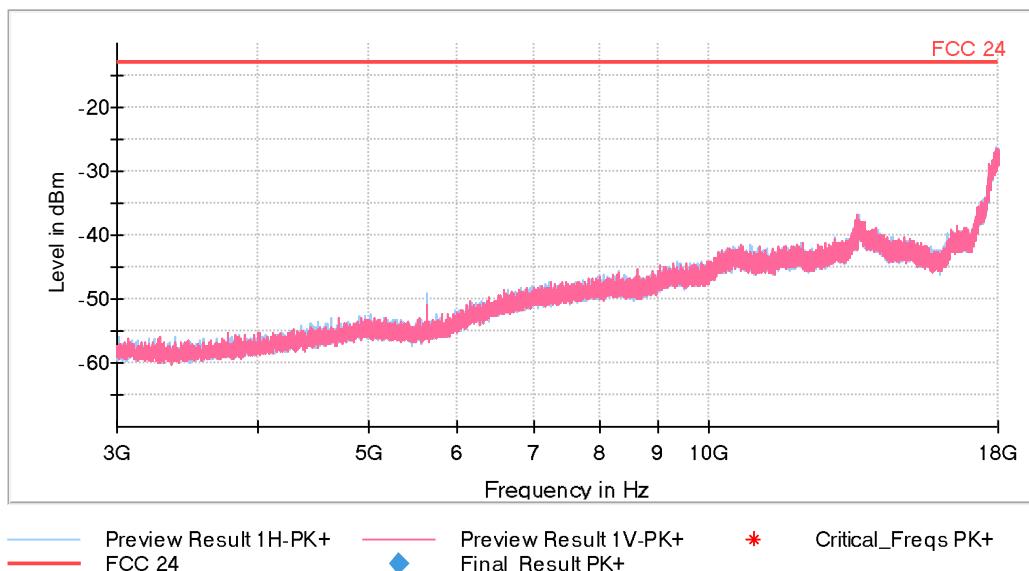
- Middle Channel:



The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 - 18 GHz:

- Middle Channel:



FREQUENCY RANGE 18 - 20 GHz:

- Middle Channel:

