

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.

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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"/> |
| 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:

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

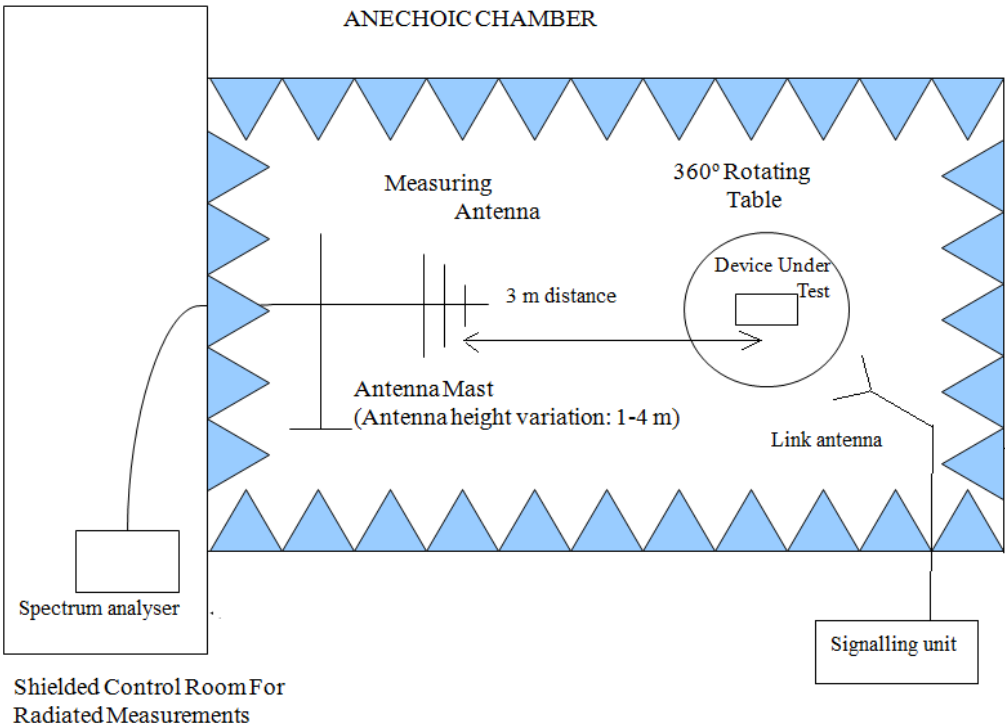
The maximum field strength (dBμV/m) of each detected emission at less than 20 dB respect to the limit is converted to an equivalent EIRP level (dBm) according to ANSI C63.26 with the formula:

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

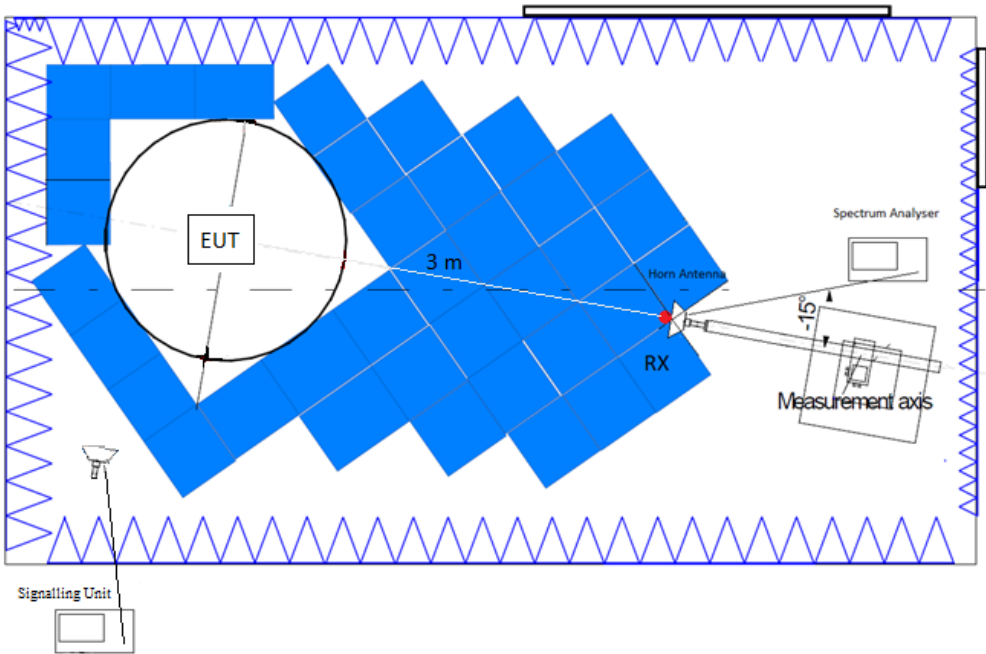
where D is the measurement distance (in the far field region) in m.

Test Setup

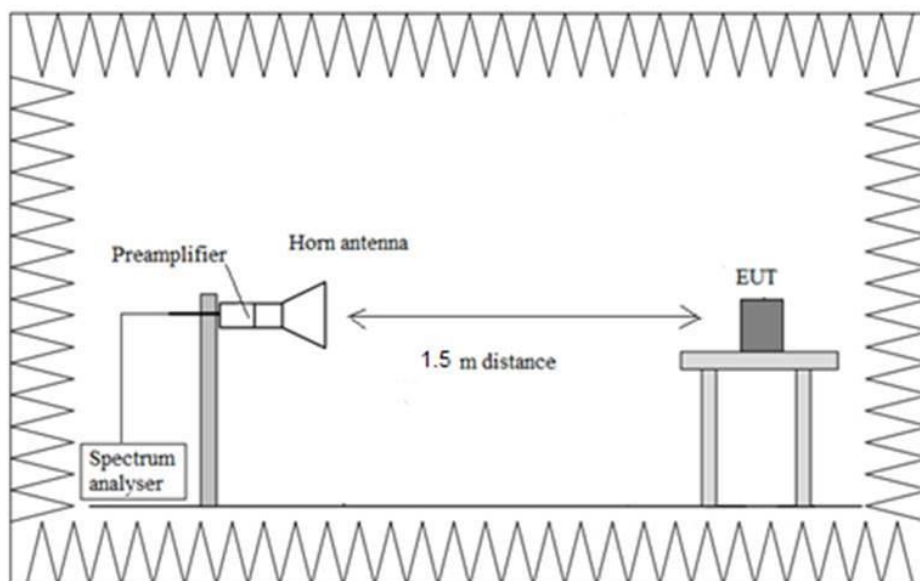
Radiated measurements below 1 GHz:



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.

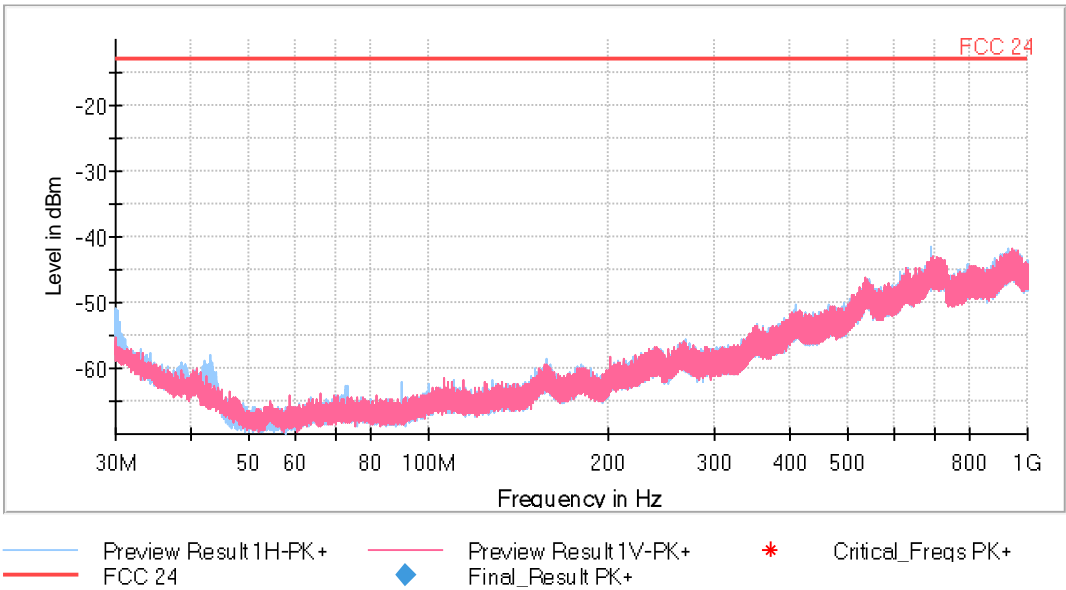
| | |
|------------------------------|--|
| | $<\pm 5.03$ for $f < 1$ GHz |
| Measurement uncertainty (dB) | $<\pm 4.32$ for $f \geq 1$ GHz up to 17 GHz |
| | $<\pm 4.58$ for $f \geq 17$ GHz up to 20 GHz |

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 |

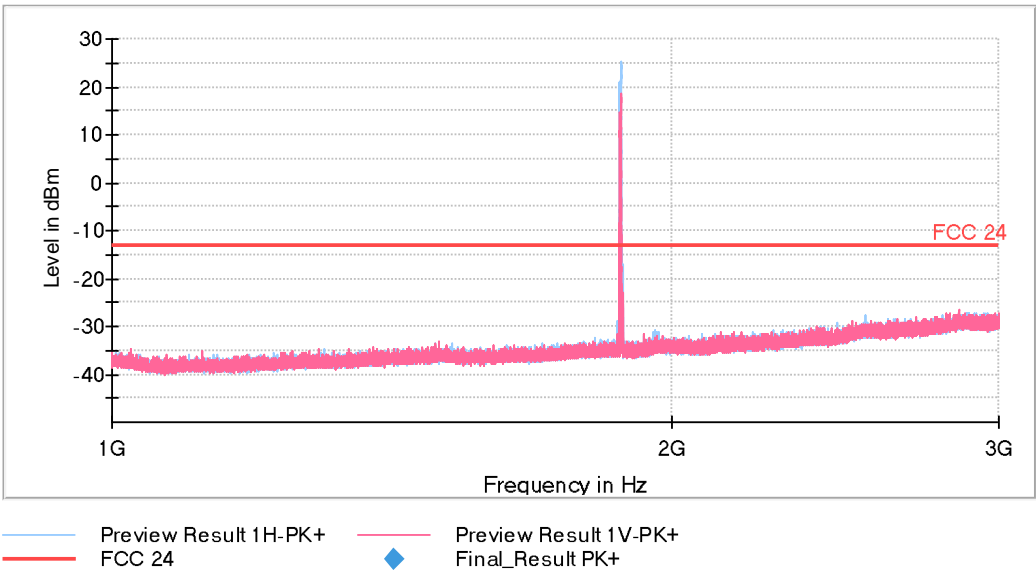
FREQUENCY RANGE 30 MHz - 1 GHz:

- Middle Channel:



FREQUENCY RANGE 1 - 3 GHz:

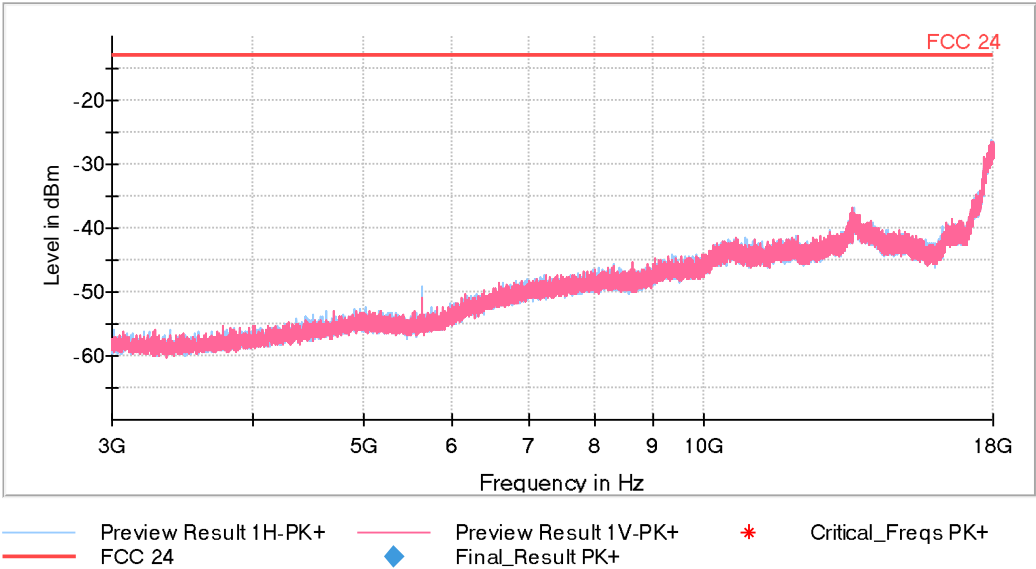
- Middle Channel:



The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 - 18 GHz:

- Middle Channel:



FREQUENCY RANGE 18 - 20 GHz:

- Middle Channel:

