

Test report No:  
NIE: 67313RRF.001

## Partial Test report

### REFERENCE STANDARD: USA FCC Part 22 CANADA IC RSS-132

|                                           |                                                                                                                                                                                   |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (*) Identification of item tested         | Vaisala Beacon Station BWS500                                                                                                                                                     |
| (*) Trademark                             | BSW500                                                                                                                                                                            |
| (*) Model and /or type reference tested   | EGW501                                                                                                                                                                            |
| Other identification of the product       | SW version: V0708_01.002.01.002<br>HW version: D<br>FCC ID: 2AO39-EGW501<br>IC: 23830-EGW501                                                                                      |
| (*) Features                              | GSM, WCDMA, LTE                                                                                                                                                                   |
| Applicant                                 | Vaisala Oyj<br>Vanha Nurmijärventie 21, 01670 Vantaa FINLAND                                                                                                                      |
| Test method requested. standard           | USA FCC Part 22 10-1-19 Edition.<br>CANADA IC RSS-132 Issue 3, Jan. 2013.<br>ANSI C63.26 – 2015<br>KDB 971168 D01 Power Meas License Digital Systems<br>v03r01, April. 2018.      |
| Approved by (name / position & signature) | Rafael López Martín<br>EMC Consumer & RF Lab. Manager  2021.03.<br>22<br>09:58:25<br>+01'00' |
| Date of issue                             | 2021-03-22                                                                                                                                                                        |
| Report template No                        | FDT08_23<br>(*) "Data provided by the client"                                                                                                                                     |

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## Competences and guarantees

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DEKRA Testing and Certification is a FCC-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report.

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DEKRA Testing and Certification guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification at the time of performance of the test.

DEKRA Testing and Certification is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

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

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1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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## Uncertainty

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

## Data provided by the client

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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 of the model EGW501 is a compact weather station for environmental monitoring. The complete solution provides measurements, data collection, and data visualization in one package. Vaisala Beacon Station includes Vaisala Beacon Edge Gateway EGW50, a multi parameter Vaisala Weather Transmitter WXT536, powering equipment, and mounting accessories. To maximize ease-of-use, the station comes with a data plan and a variety of service packages to choose from.

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 N° | Description                      | Model  | Serial N° | Date of reception |
|------------|----------------------------------|--------|-----------|-------------------|
| 67313/002  | Vaisala Beacon Station<br>BWS500 | EGW501 | S5053426  | 2021/02/02        |
| 65531/006  | Weather Transmitter              | WXT536 | S3240235  | 2020/10/01        |
| 65531/038  | Power Supply Unit                | PSU501 | S3926080  | 2020/10/14        |

Auxiliary elements used with the Sample S/01:

| Control N° | Description  | Model | Serial N° | Date of reception |
|------------|--------------|-------|-----------|-------------------|
| 65531/013  | Load         | --    | --        | 2020/10/01        |
| 65531/015  | WXT cable    | --    | --        | 2020/10/01        |
| 65531/017  | DC out cable | --    | --        | 2020/10/01        |
| 65531/021  | DC in cable  | --    | --        | 2020/10/01        |
| 65531/039  | Power Cable  | --    | --        | 2020/10/14        |

Sample S/01 has undergone the following test(s): All radiated tests indicated in Appendix A.

## Test sample description

|                                               |                                                                                                                                                             |                                |                                     |                                     |                          |                          |                                     |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|-------------------------------------|
| Ports..... :                                  | Port name and description                                                                                                                                   |                                | Cable                               |                                     |                          |                          |                                     |
|                                               |                                                                                                                                                             |                                | Specified length [m]                | Attached during test                | Shielded                 |                          |                                     |
|                                               | PSU501                                                                                                                                                      |                                | 2                                   | <input checked="" type="checkbox"/> | <input type="checkbox"/> |                          |                                     |
|                                               | PSU502                                                                                                                                                      |                                | 2                                   | <input checked="" type="checkbox"/> | <input type="checkbox"/> |                          |                                     |
| WXT                                           |                                                                                                                                                             | 10                             | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |                          |                          |                                     |
| Supplementary information to the ports..... : | Connecting power cable to gateway turns station automatically on if power is available from battery or other power source. Other ports reserved future use. |                                |                                     |                                     |                          |                          |                                     |
| Rated power supply .....                      | Voltage and Frequency                                                                                                                                       |                                | Reference poles                     |                                     |                          |                          |                                     |
|                                               |                                                                                                                                                             |                                | L1                                  | L2                                  | L3                       | N                        | PE                                  |
|                                               | <input checked="" type="checkbox"/>                                                                                                                         | AC: 100 – 240 V                | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| <input checked="" type="checkbox"/>           | DC: 9 – 32 V                                                                                                                                                |                                |                                     |                                     |                          |                          |                                     |
| Rated Power .....                             | --                                                                                                                                                          |                                |                                     |                                     |                          |                          |                                     |
| Clock frequencies .....                       | max. 2GHz                                                                                                                                                   |                                |                                     |                                     |                          |                          |                                     |
| Other parameters.....                         | --                                                                                                                                                          |                                |                                     |                                     |                          |                          |                                     |
| Software version .....                        | V0708_01.002.01.002                                                                                                                                         |                                |                                     |                                     |                          |                          |                                     |
| Hardware version.....                         | D                                                                                                                                                           |                                |                                     |                                     |                          |                          |                                     |
| Dimensions in cm (L x W x D) .....            | 306 x 184 x 156                                                                                                                                             |                                |                                     |                                     |                          |                          |                                     |
| Mounting position..... :                      | <input type="checkbox"/>                                                                                                                                    | Table top equipment            |                                     |                                     |                          |                          |                                     |
|                                               | <input checked="" type="checkbox"/>                                                                                                                         | Wall/Ceiling mounted equipment |                                     |                                     |                          |                          |                                     |
|                                               | <input type="checkbox"/>                                                                                                                                    | Floor standing equipment       |                                     |                                     |                          |                          |                                     |
|                                               | <input type="checkbox"/>                                                                                                                                    | Hand-held equipment            |                                     |                                     |                          |                          |                                     |
|                                               | <input type="checkbox"/>                                                                                                                                    | Other:                         |                                     |                                     |                          |                          |                                     |
| Modules/parts .....                           | Module/parts of test item                                                                                                                                   |                                |                                     | Type                                |                          | Manufacturer             |                                     |
|                                               | --                                                                                                                                                          |                                |                                     |                                     |                          |                          |                                     |
| Accessories (not part of the test item) ..... | Description                                                                                                                                                 |                                | Type                                |                                     | Manufacturer             |                          |                                     |
|                                               | PSU501, AC power supply                                                                                                                                     |                                | PSU501                              |                                     | Vaisala Oyj              |                          |                                     |
|                                               | PSU502, DC solar power supply                                                                                                                               |                                | PSU502                              |                                     | Vaisala Oyj              |                          |                                     |
|                                               | WXT536, Weather transmitter                                                                                                                                 |                                | WXT536                              |                                     | Vaisala Oyj              |                          |                                     |
| Documents as provided by the applicant..... : | Description                                                                                                                                                 |                                | File name                           |                                     | Issue date               |                          |                                     |
|                                               | --                                                                                                                                                          |                                |                                     |                                     |                          |                          |                                     |

## Identification of the client

Vaisala Oyj  
Vanha Nurmijärventie 21, 01670 Vantaa FINLAND

## Testing period and place

|               |                                        |
|---------------|----------------------------------------|
| Test Location | DEKRA Testing and Certification S.A.U. |
| Date (start)  | 2021-02-03                             |
| Date (finish) | 2021-02-04                             |

## Document history

| Report number | Date       | Description   |
|---------------|------------|---------------|
| 67313RRF.001  | 2021-03-22 | First release |

## Environmental conditions

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

|                   |                              |
|-------------------|------------------------------|
| Temperature       | Min. = 15 °C<br>Max. = 35 °C |
| Relative humidity | Min. = 20 %<br>Max. = 75 %   |

In the semianechoic chamber, the following limits were not exceeded during the test.

|                   |                              |
|-------------------|------------------------------|
| Temperature       | Min. = 15 °C<br>Max. = 35 °C |
| Relative humidity | Min. = 20 %<br>Max. = 75 %   |

## Remarks and comments

The tests have been performed by the technical personnel: José Manuel Jimenez, Alfonso Gutiérrez and Pablo Redondo.

Used instrumentation:

### Radiated Measurements

|    |                                                                               | Last Cal. Date | Cal. Due date |
|----|-------------------------------------------------------------------------------|----------------|---------------|
| 1. | Semianechoic Absorber Lined Chamber<br>ETS LINDGREN FACT 3 200 STP            | N.A.           | N.A.          |
| 2. | Shielded Room ETS LINDGREN S101                                               | N.A.           | N.A.          |
| 3. | Biconical/Log Antenna ETS LINDGREN<br>3142E                                   | 2020/04        | 2023/04       |
| 4. | EMI Test Receiver 7 GHz ROHDE AND<br>SCHWARZ ESR7                             | 2019/10        | 2021/10       |
| 5. | Broadband Horn antenna 1-18 GHz<br>SCHWARZBECK MESS-ELEKTRONIK<br>BBHA 9120 D | 2019/11        | 2022/11       |
| 6. | RF Pre-amplifier 1-18 GHz BONN<br>ELEKTRONIK BLMA 0118-1M                     | 2020/05        | 2021/05       |
| 7. | Signal and Spectrum Analyzer ROHDE AND<br>SCHWARZ FSW 50                      | 2020/07        | 2022/07       |
| 8. | Digital Multimeter FLUKE 175                                                  | 2020/11        | 2021/11       |
| 9. | WIDEBAND RADIO COMMUNICATION<br>TESTER ROHDE AND SCHWARZ<br>CMW500            | 2021/02        | 2022/02       |

## Testing verdicts

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

## Summary

| FCC PART 22/IC RSS-132 PARAGRAPH                                                                                                                 |         |        |
|--------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------|
| Requirement – Test case                                                                                                                          | Verdict | Remark |
| Clause 22.913/RSS-132 Clause 5.4: RF output power                                                                                                | N/M     | (1)    |
| Clause 2.1047/RSS-132 Clause 5.2: Modulation characteristics                                                                                     | N/M     | (1)    |
| Clause 22.355/RSS-132 Clause 5.3: Frequency stability                                                                                            | N/M     | (1)    |
| Clause 2.1049: Occupied Bandwidth                                                                                                                | N/M     | (1)    |
| Clause 22.917/RSS-132 Clause 5.5: Spurious emissions at antenna terminals                                                                        | N/M     | (1)    |
| Clause 22.917/RSS-132 Clause 5.5: Radiated emissions                                                                                             | P       | (2)    |
| <u>Supplementary information and remarks:</u><br>(1) Test not requested.<br>(2) Radiated spurious emissions tests were tested in the worst case. |         |        |

## Appendix A: Test results for FCC Part 22 / RSS-132

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## TEST CONDITIONS

### POWER SUPPLY (V):

Vnominal = 110 Vac

Type of power supply = AC voltage

### ANTENNA:

Type of antenna = Integral antenna.

Declared Gain for antenna = +1.60 dBi.

### TEST FREQUENCIES:

2G Band 850 MHz:

#### GPRS and EDGE MODULATIONS:

Lowest Channel (128): 824.2 MHz

Middle Channel (190): 836.6 MHz

Highest Channel (251): 848.8 MHz

3G Band V:

#### WCDMA MODULATION:

Lowest Channel (4132): 826.4 MHz

Middle Channel (4182): 836.4 MHz

Highest Channel (4233): 846.6 MHz

### LTE. QPSK AND 16QAM MODULATION (BAND 5)

|         | Channel (Frequency, MHz) |                |                |                |
|---------|--------------------------|----------------|----------------|----------------|
|         | BW = 1.4 MHz             | BW = 3 MHz     | BW=5 MHz       | BW=10 MHz      |
| Lowest  | 20407 (824.70)           | 20415 (825.50) | 20425 (826.50) | 20450 (829.00) |
| Middle  | 20525 (836.50)           | 20525 (836.50) | 20525 (836.50) | 20525 (836.50) |
| Highest | 20643 (848.30)           | 20635 (847.50) | 20625 (846.50) | 20600 (844.00) |

Results show below were performed in the worst case of modulation, and combination between bandwidth and Resource Blocks through a preliminary scan.

## Radiated emissions

### SPECIFICATION

FCC § 22.917

RSS-132. Clause 5.5.

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.

### 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 highest 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 measuring antenna height and polarization. The maximum field strength (dBμV/m) is measured and recorded.

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:

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

Where D is the measurement distance (in the far field region) in m.  $D = 3 \text{ m}$

Measurement Limit:

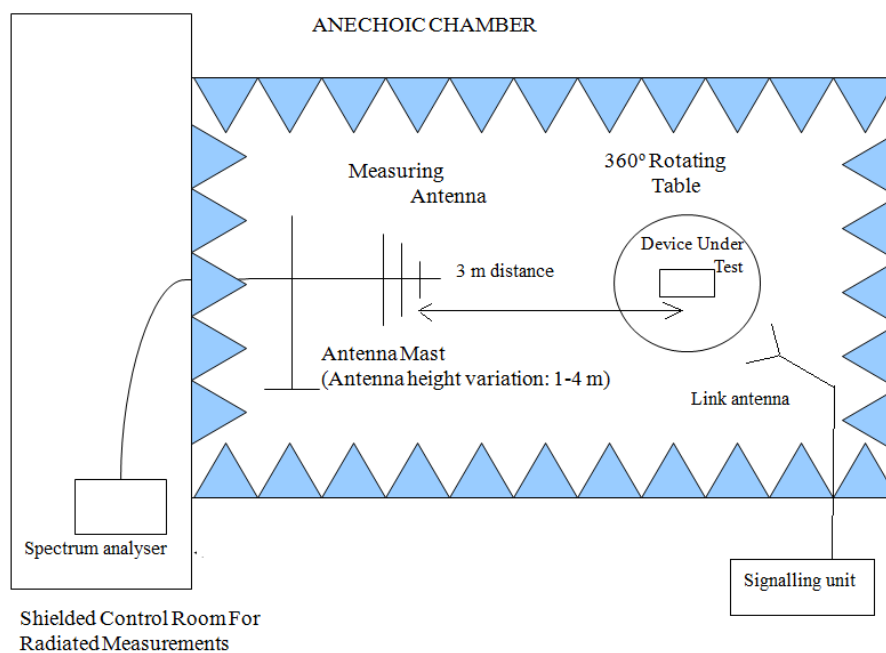
According to specification. the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB. P in watts.

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

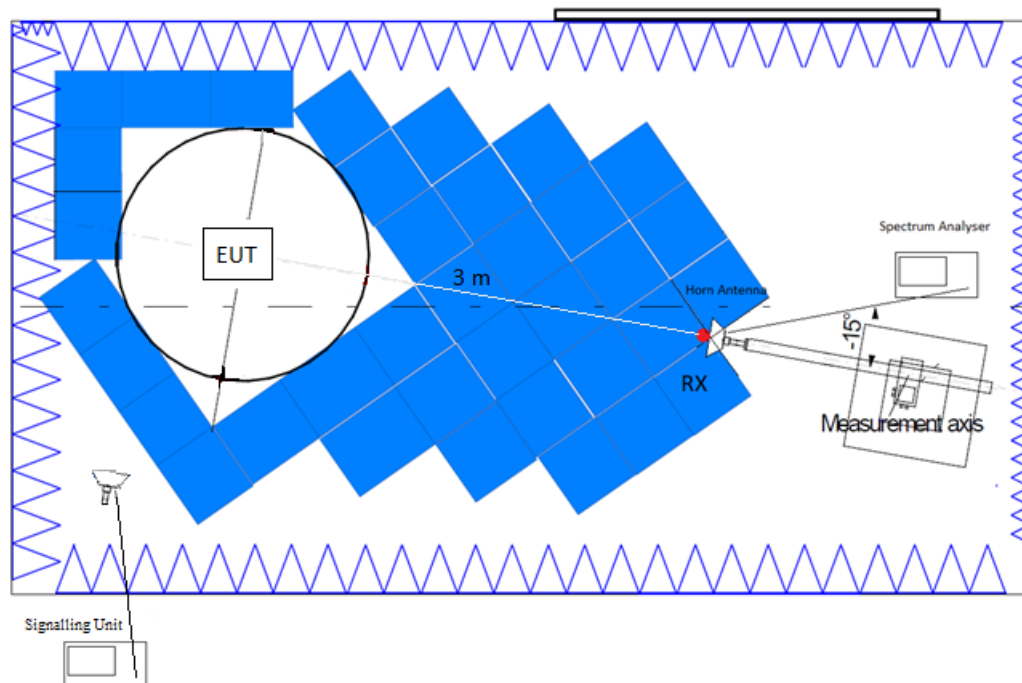
$$P_o \text{ (dBm)} - [43 + 10 \log (P_o \text{ in mwatts}) - 30] = - 13 \text{ dBm}$$

## TEST SETUP

Radiated measurements below 1 GHz:



Radiated measurements above 1 GHz:



### 2G Band 850 MHz:

A preliminary scan determined the GPRS modulation as the worst case. The following tables and plots show the results for the worst case modulation.

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

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

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

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

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

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

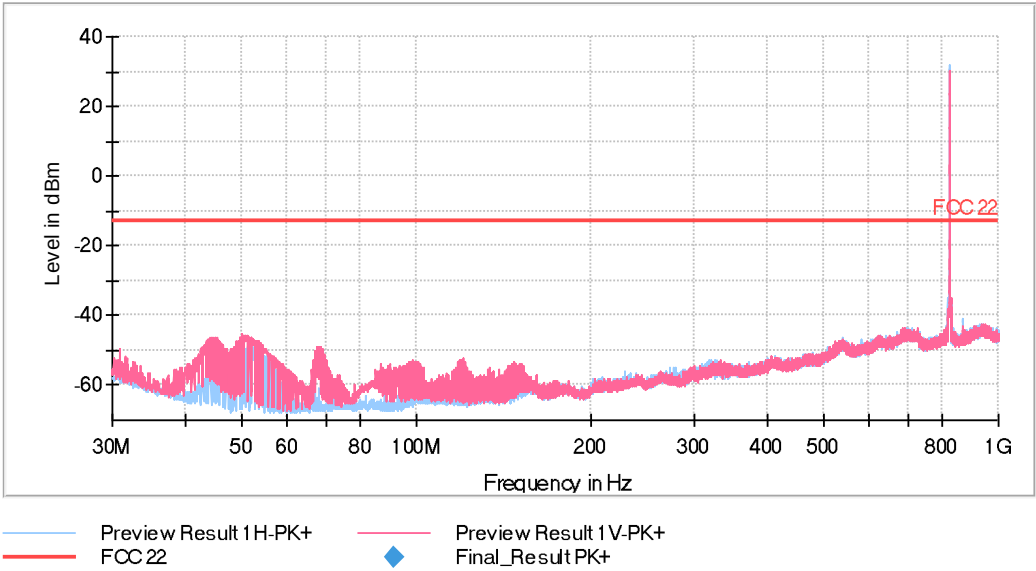
Measurement uncertainty (dB)  $< \pm 4.65$  for  $f < 1$  GHz  
 $< \pm 4.98$  for  $f \geq 1$  GHz

2021-03-22

FREQUENCY RANGE 30 MHz - 1 GHz

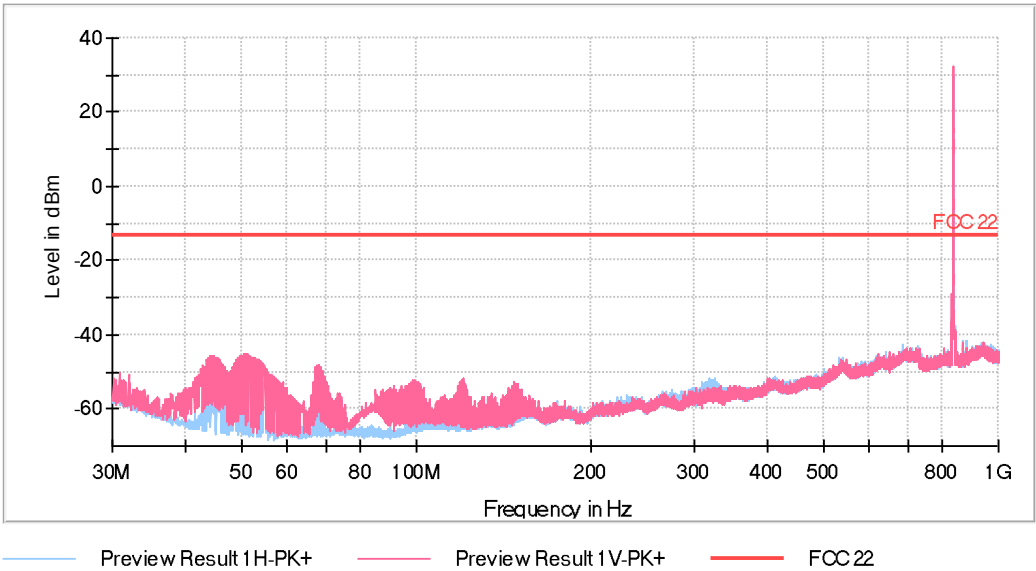
GPRS MODULATION.

- Lowest Channel:



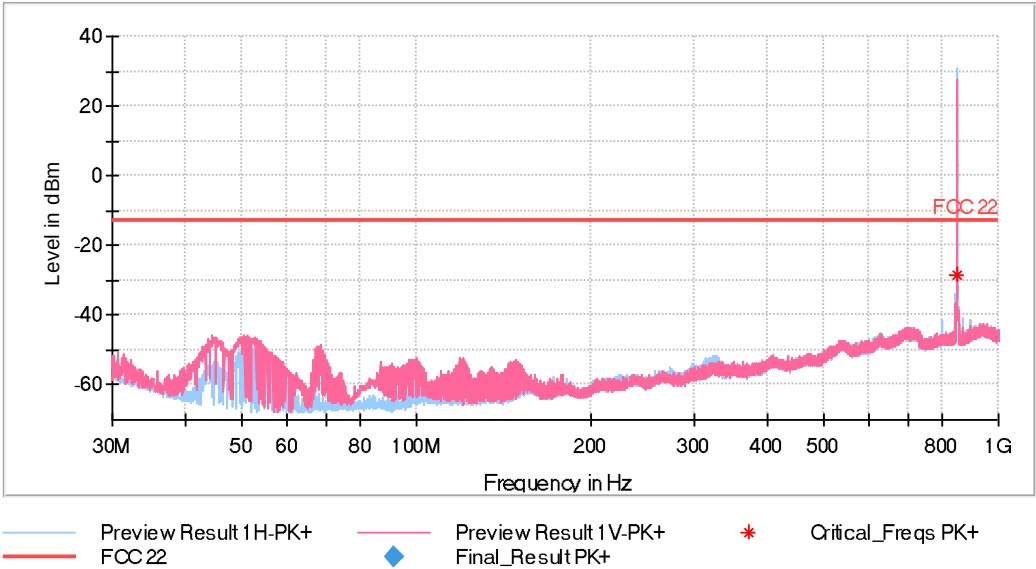
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

- Highest Channel:

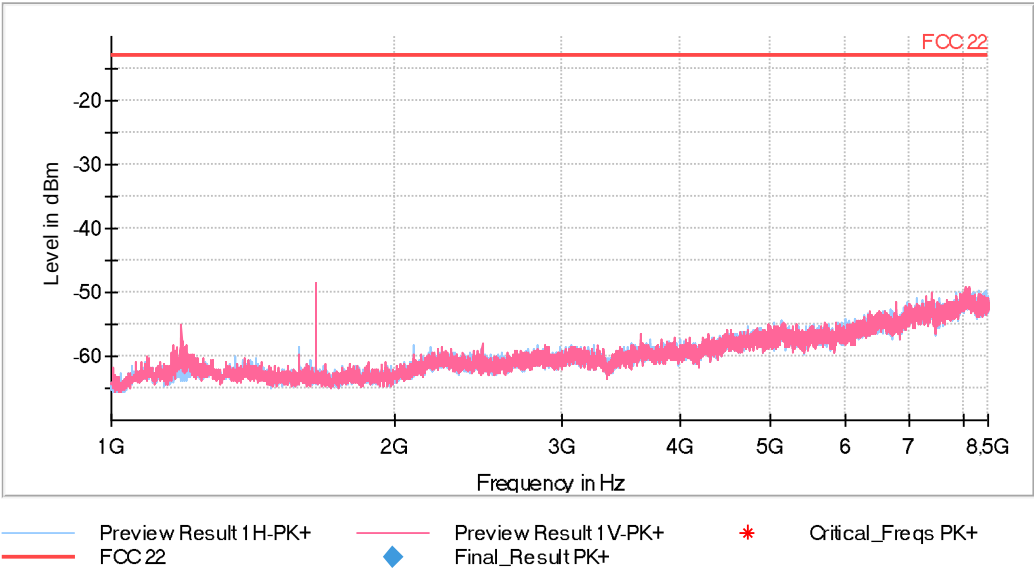


The peak above the limit is the carrier frequency.

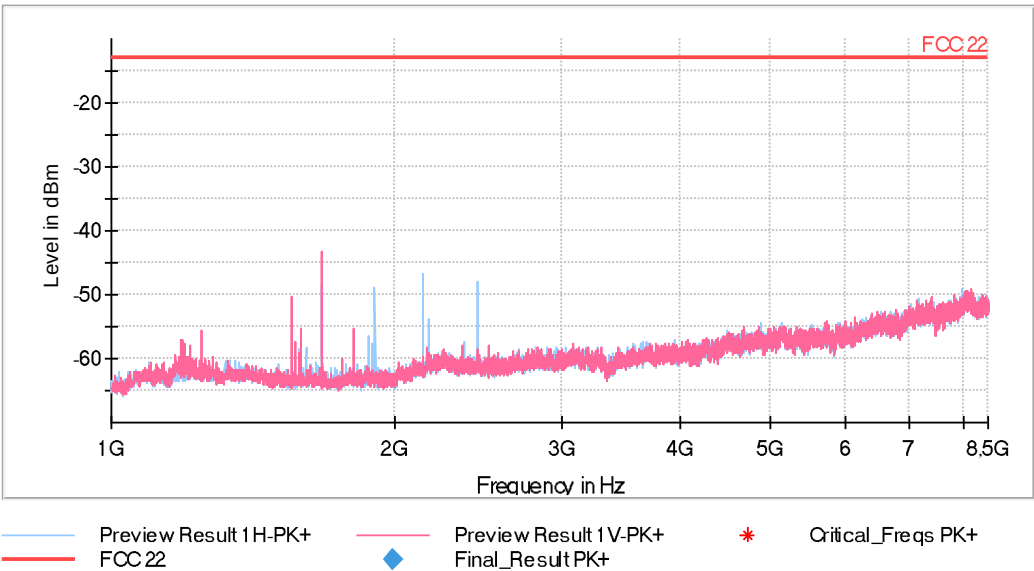
FREQUENCY RANGE 1 – 8.5 GHz

GPRS MODULATION.

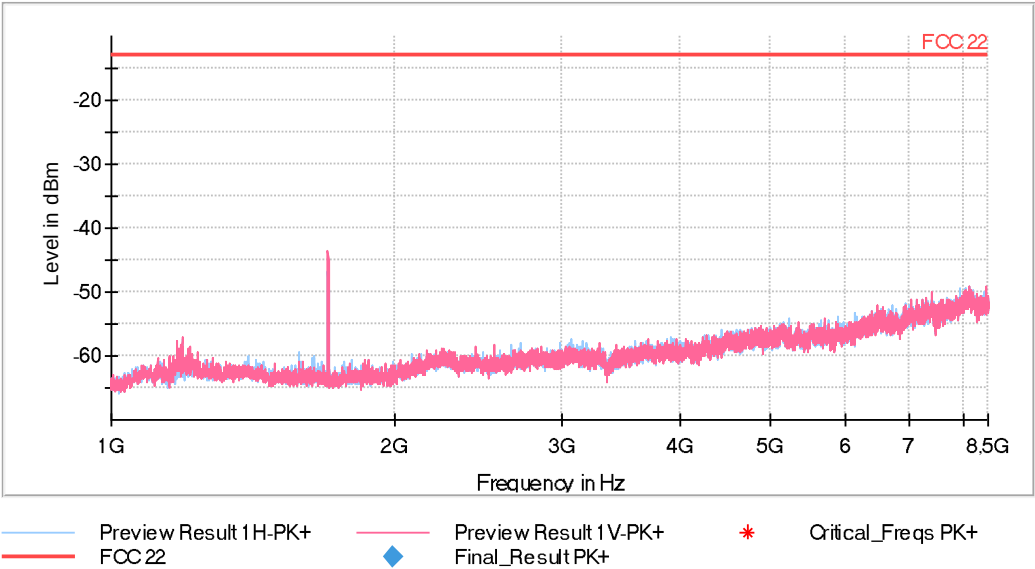
- Lowest Channel:



- Middle Channel:



- Highest Channel:



### **3G Band V:**

WCDMA and HSUPA Modulations:

A preliminary scan determined the WCDMA modulation as the worst case. The following tables and plots show the results for the worst case modulation.

#### **- LOW 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.

#### **- 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.

#### **- HIGH 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.

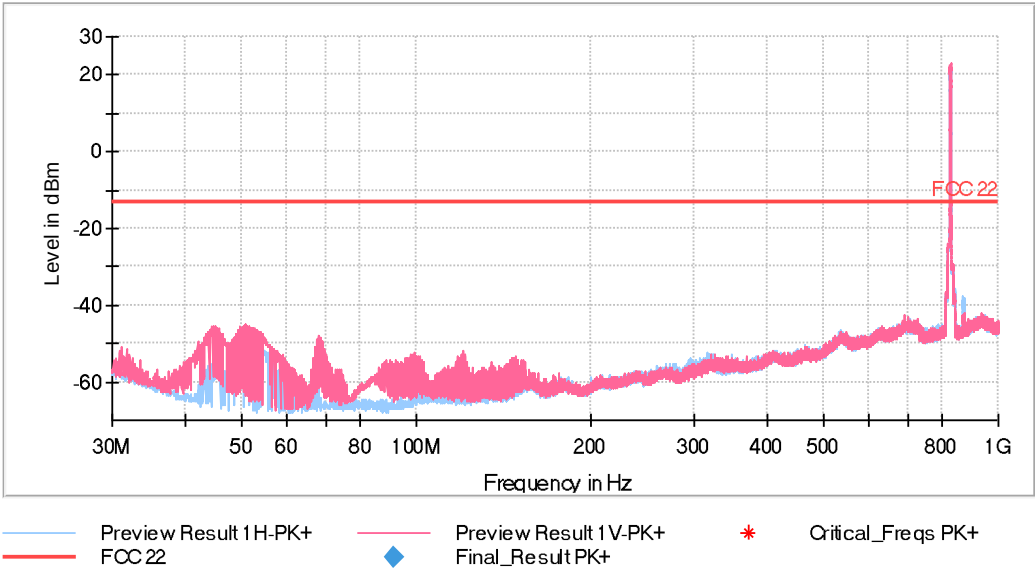
Measurement uncertainty (dB)    < ±4.65 for  $f < 1$  GHz  
                                                         < ±4.98 for  $f \geq 1$  GHz

Verdict: PASS

FREQUENCY RANGE 30 MHz - 1 GHz

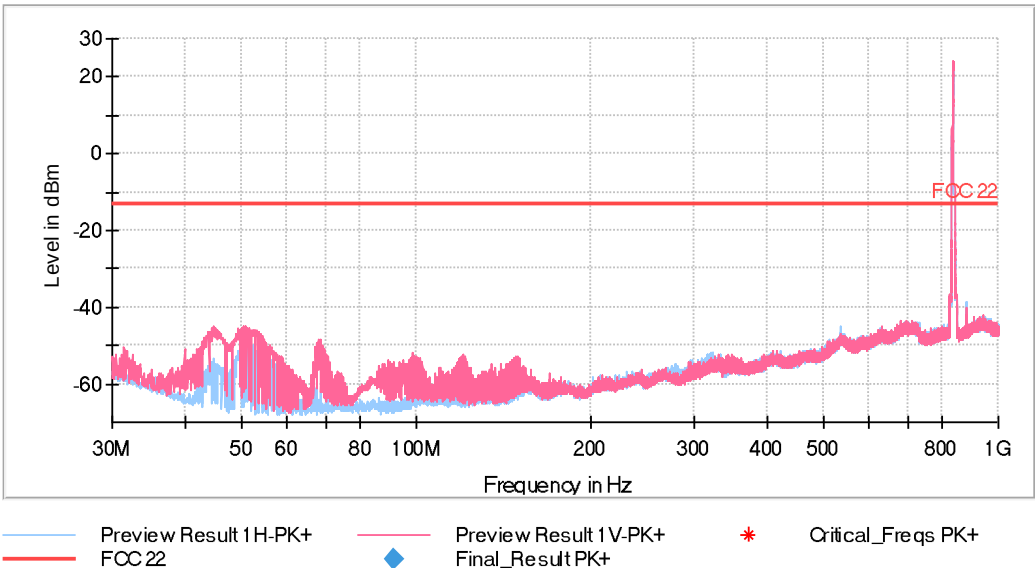
WCDMA

- Lowest Channel:



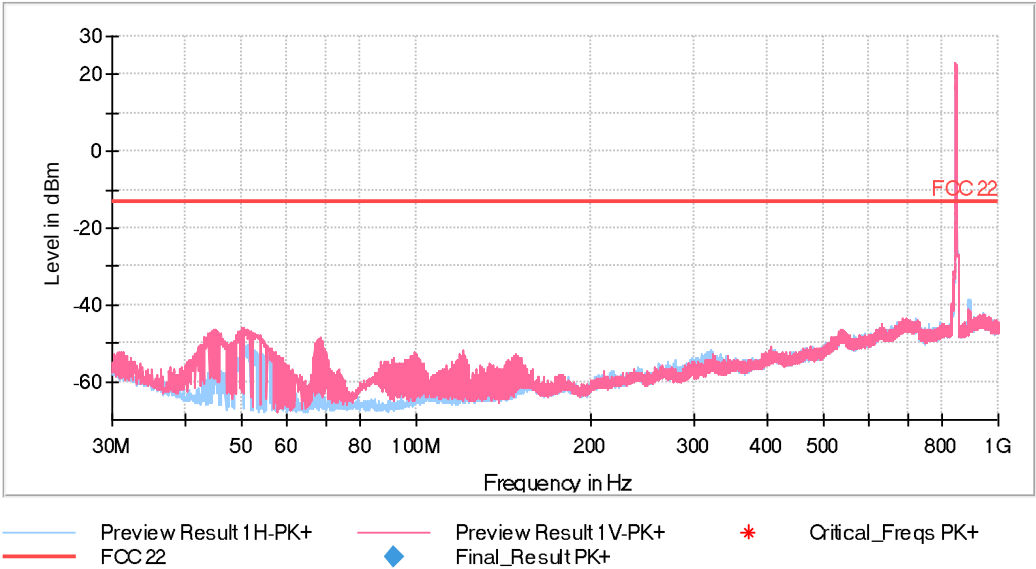
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

- Highest Channel:

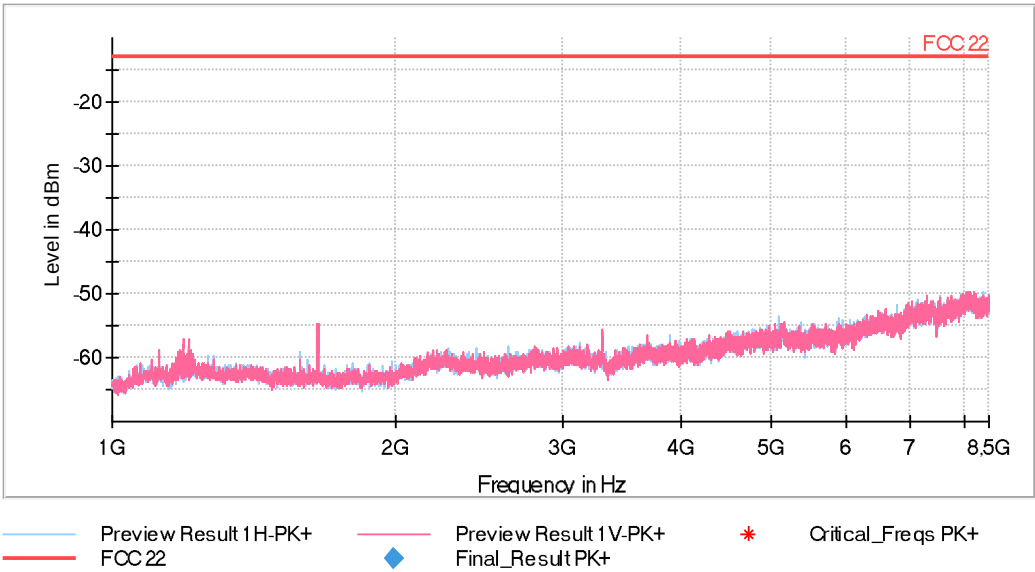


The peak above the limit is the carrier frequency.

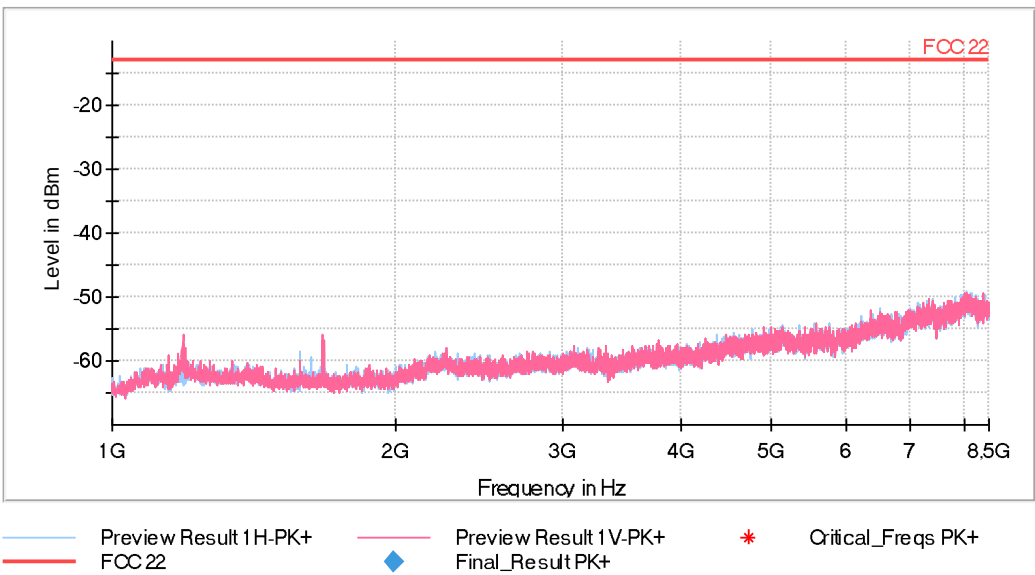
FREQUENCY RANGE 1 – 8.5 GHz

WCDMA

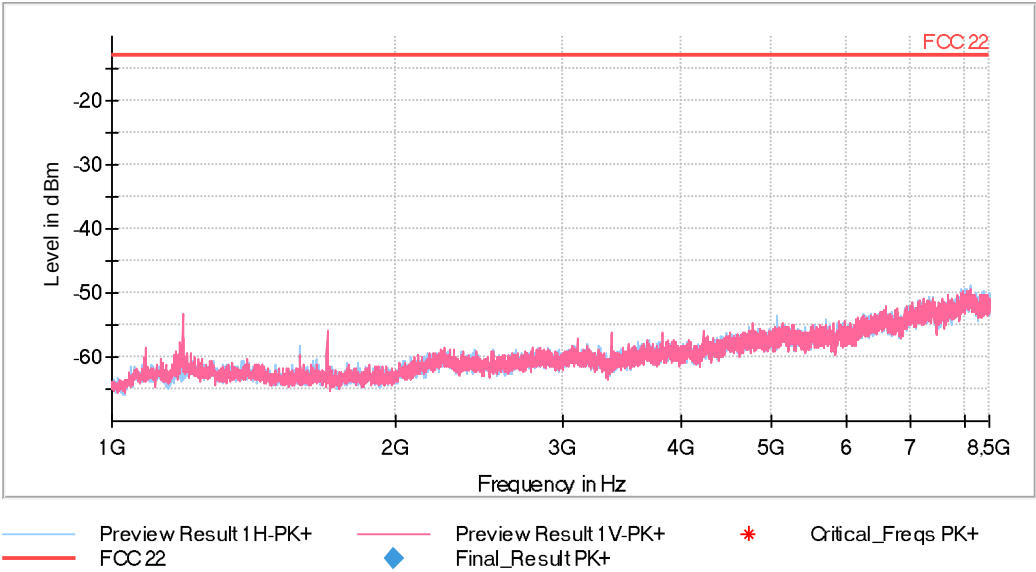
- Lowest Channel:



- Middle Channel:



- Highest Channel:



## **LTE Band 5:**

QPSK:

A preliminary scan determined BW=3 MHz, RB Size=1, RB Offset=8 as the worst case. The following tables and plots show the results for the worst case modulation.

### **- LOW 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.

### **- 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.

### **- HIGH CHANNEL:**

#### **Frequency range 30 MHz - 1 GHz**

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (MHz) | Detector | E.I.R.P (dBm) | Polarization |
|--------------------------|----------|---------------|--------------|
| 34.0255                  | Peak     | -21.08        | V            |
| 34.1710                  | Peak     | -14.63        | V            |
| 271.3360                 | Peak     | -22.97        | H            |
| 275.2160                 | Peak     | -26.23        | H            |
| 300.8725                 | Peak     | -23.64        | H            |
| 478.7705                 | Peak     | -24.81        | H            |

#### **Frequency range 1 – 8.5 GHz**

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

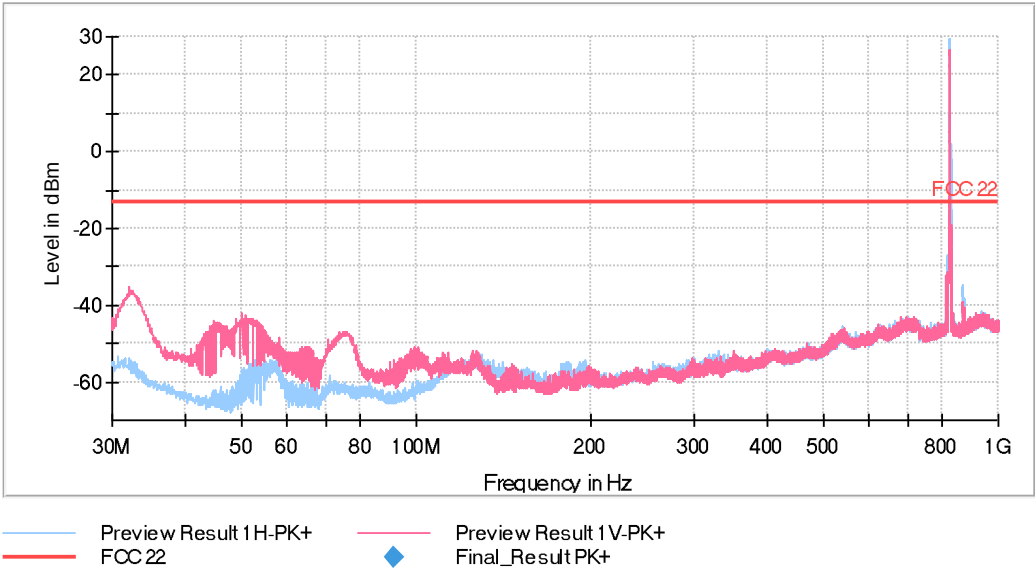
Measurement uncertainty (dB) < ±4.65 for f < 1 GHz  
< ±4.98 for f ≥ 1 GHz

Verdict: PASS

FREQUENCY RANGE 30 MHz - 1 GHz

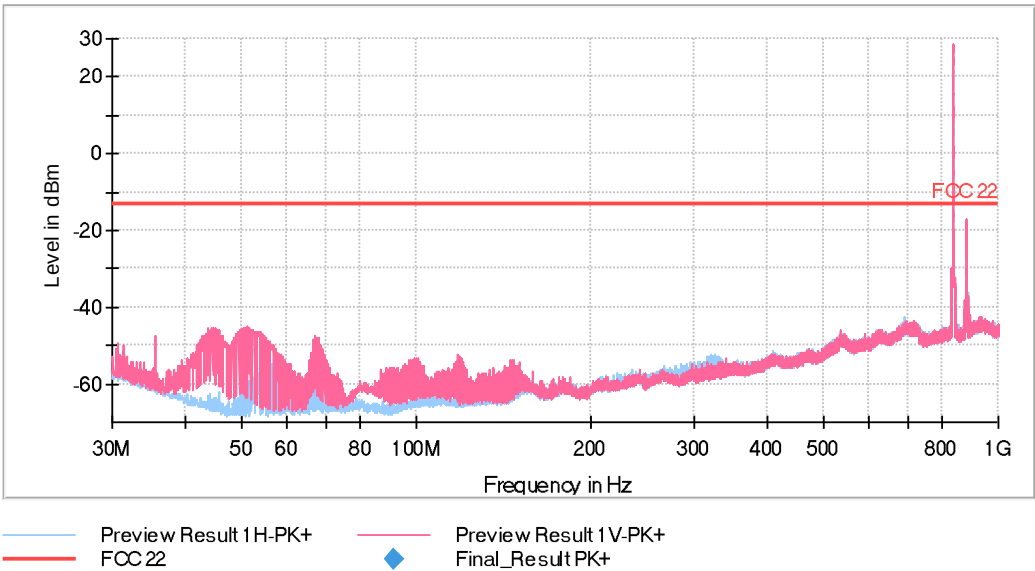
QPSK.

- Lowest Channel:



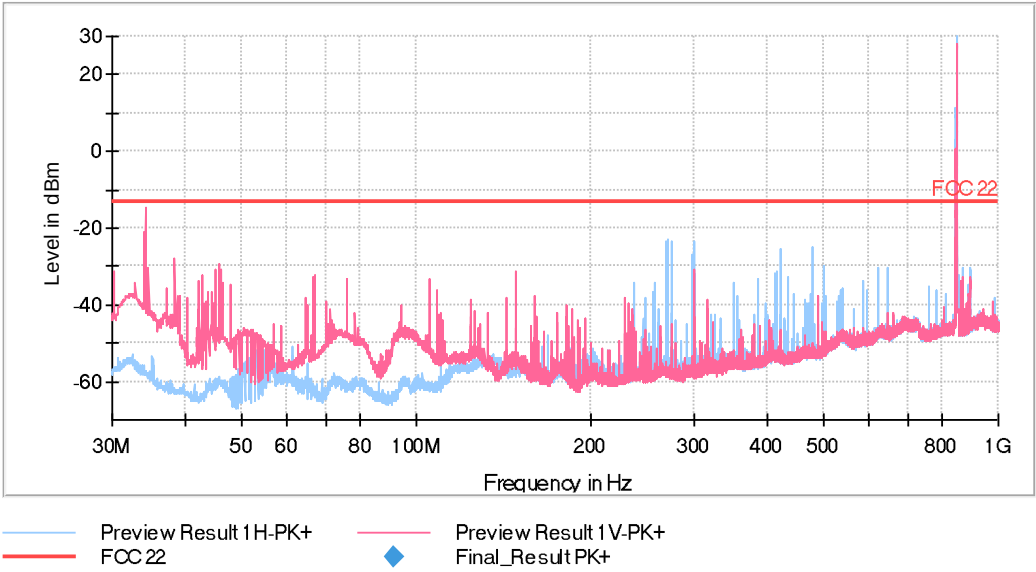
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency. Peak closed to the limit is the downlink from Communication Tester.

- Highest Channel:

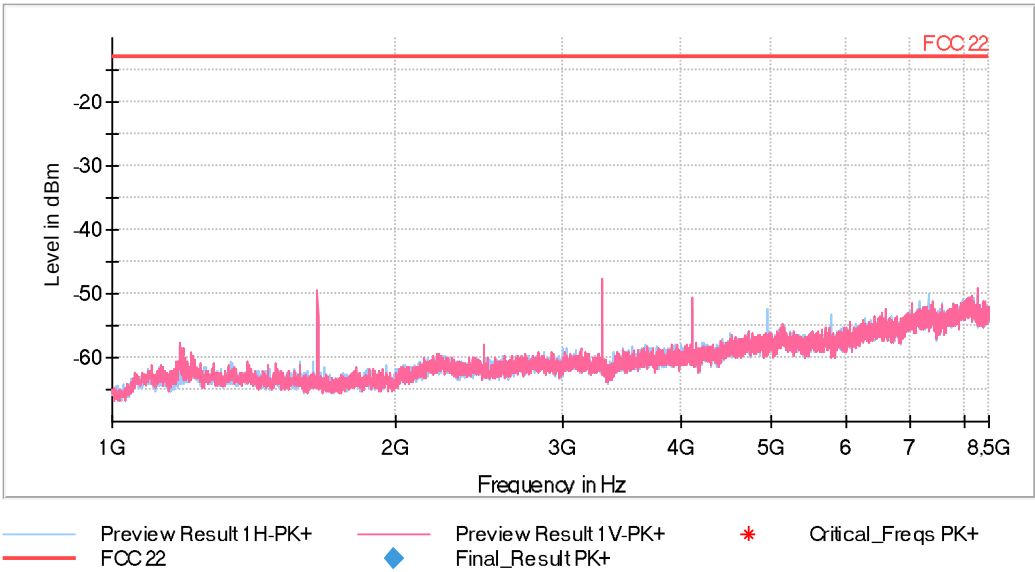


The peak above the limit is the carrier frequency.

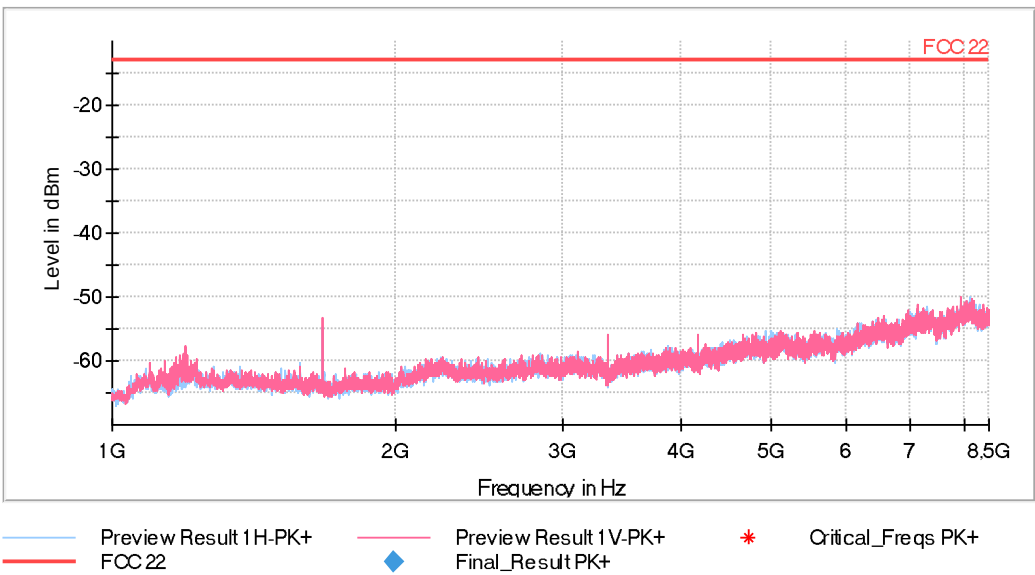
FREQUENCY RANGE 1 – 8.5 GHz

QPSK.

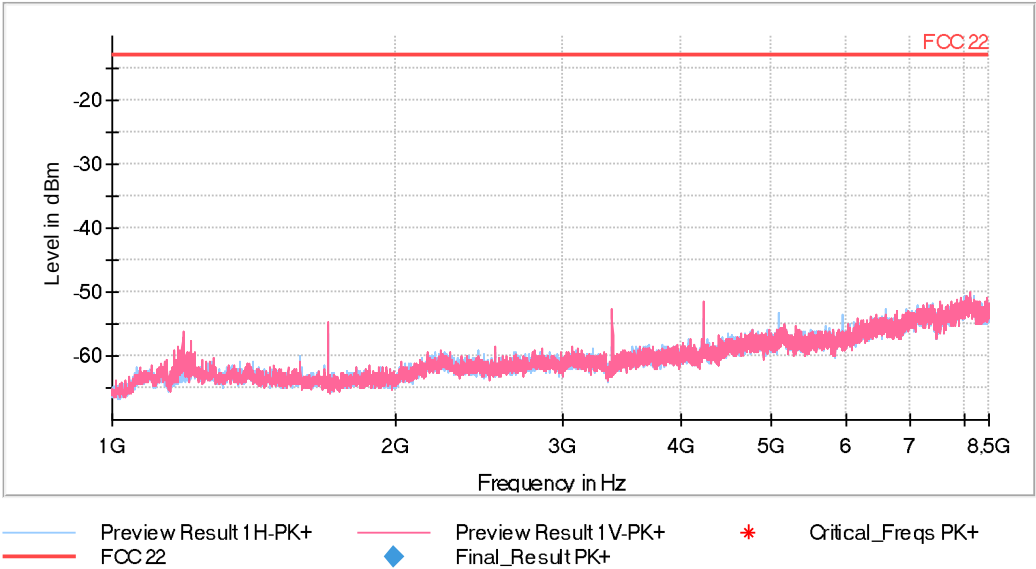
- Lowest Channel:



- Middle Channel:



- Highest Channel:



#### 16QAM:

A preliminary scan determined BW=1.4 MHz, RB Size=3, RB Offset=3 as the worst case. The following tables and plots show the results for the worst case modulation.

#### - LOW CHANNEL:

##### Frequency range 30 MHz - 1 GHz

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (MHz) | Detector | E.I.R.P (dBm) | Polarization |
|--------------------------|----------|---------------|--------------|
| 59.3910                  | Peak     | -29.50        | V            |
| 132.1895                 | Peak     | -26.92        | V            |
| 832.090                  | Peak     | -16.87        | H            |

##### Frequency range 1 – 8.5 GHz

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

#### - MIDDLE CHANNEL:

##### Frequency range 30 MHz - 1 GHz

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (MHz) | Detector | E.I.R.P (dBm) | Polarization |
|--------------------------|----------|---------------|--------------|
| 863.5620                 | Peak     | -24.61        | H            |

##### Frequency range 1 – 8.5 GHz

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

**- HIGH CHANNEL:**

**Frequency range 30 MHz - 1 GHz**

Spurious frequencies detected at less than 20 dB below the limit:

| Spurious frequency (MHz) | Detector | E.I.R.P (dBm) | Polarization |
|--------------------------|----------|---------------|--------------|
| 34.7530                  | Peak     | -26.87        | V            |

**Frequency range 1 – 8.5 GHz**

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

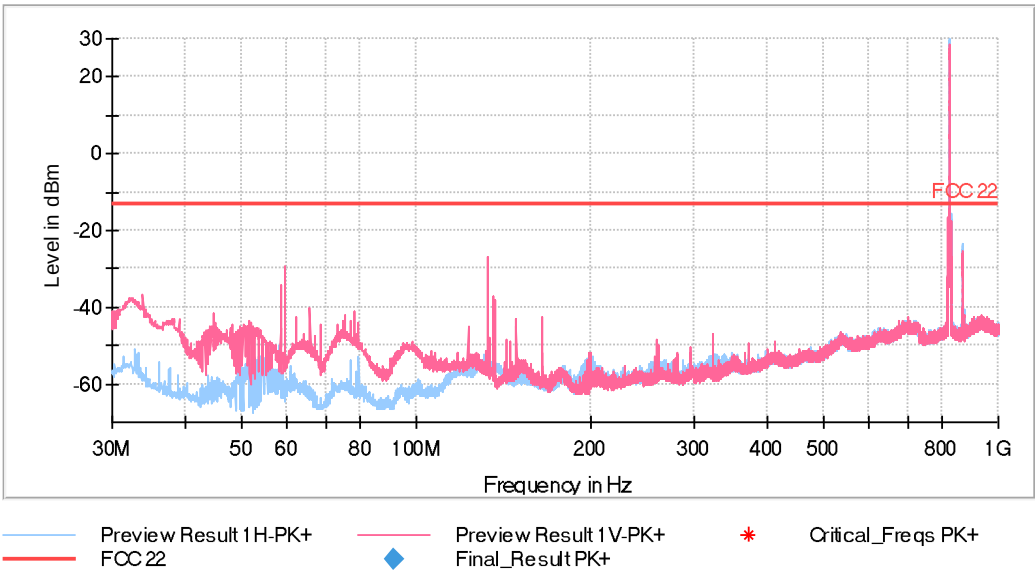
Measurement uncertainty (dB)    <  $\pm 4.65$  for  $f < 1$  GHz  
                                                         <  $\pm 4.98$  for  $f \geq 1$  GHz

Verdict: PASS

FREQUENCY RANGE 30 MHz - 1 GHz

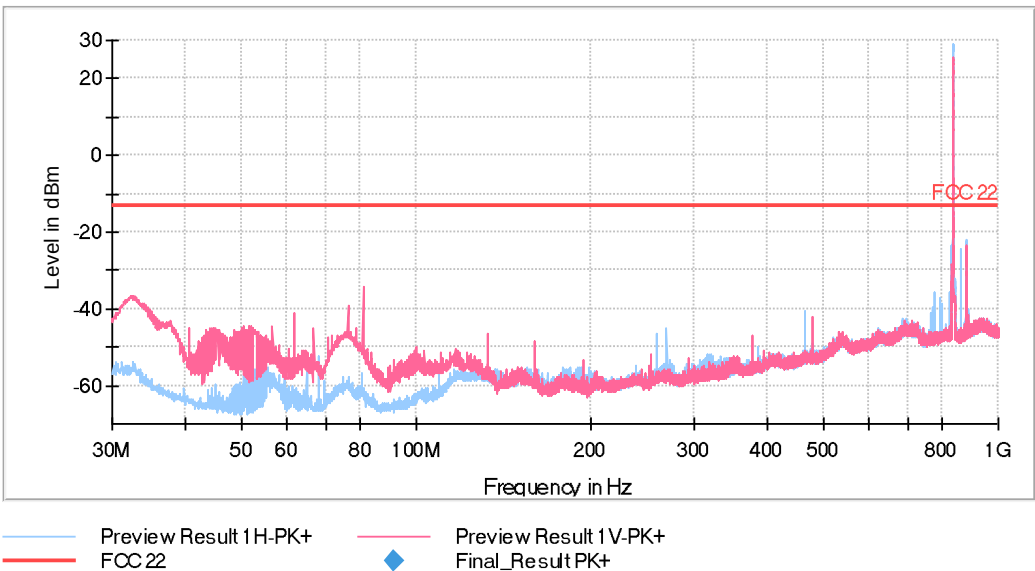
16QAM.

- Lowest Channel:



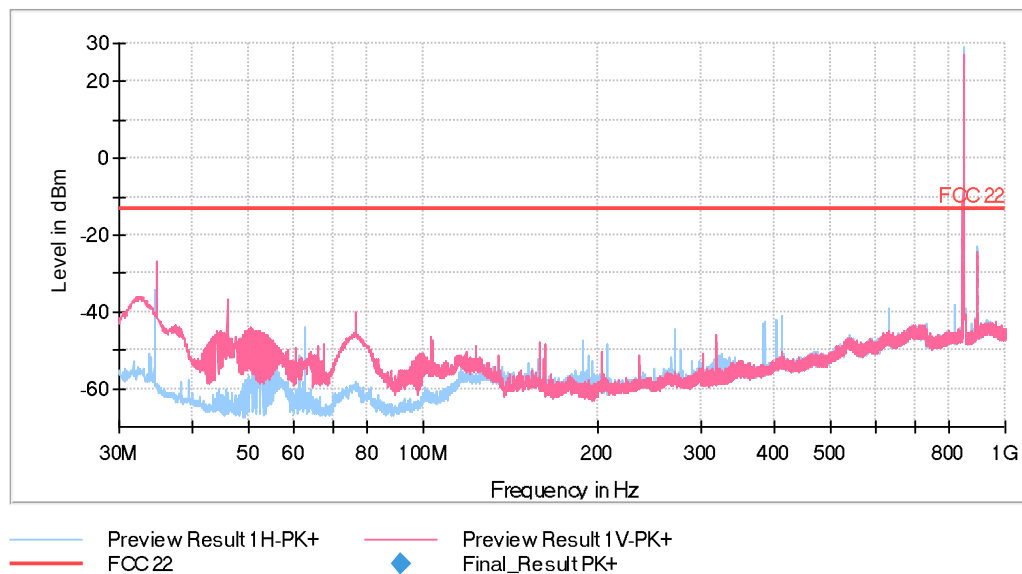
The peak above the limit is the carrier frequency. Peak closed to the limit is the downlink from Communication Tester.

- Middle Channel:



The peak above the limit is the carrier frequency. Peak closed to the limit is the downlink from Communication Tester.

- Highest Channel:

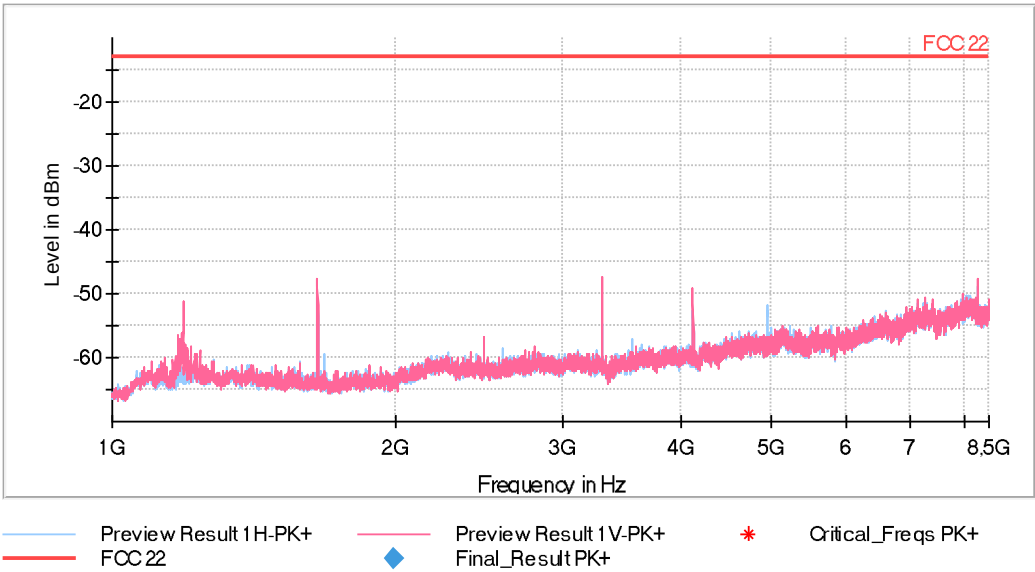


The peak above the limit is the carrier frequency. Peak closed to the limit is the downlink from Communication Tester.

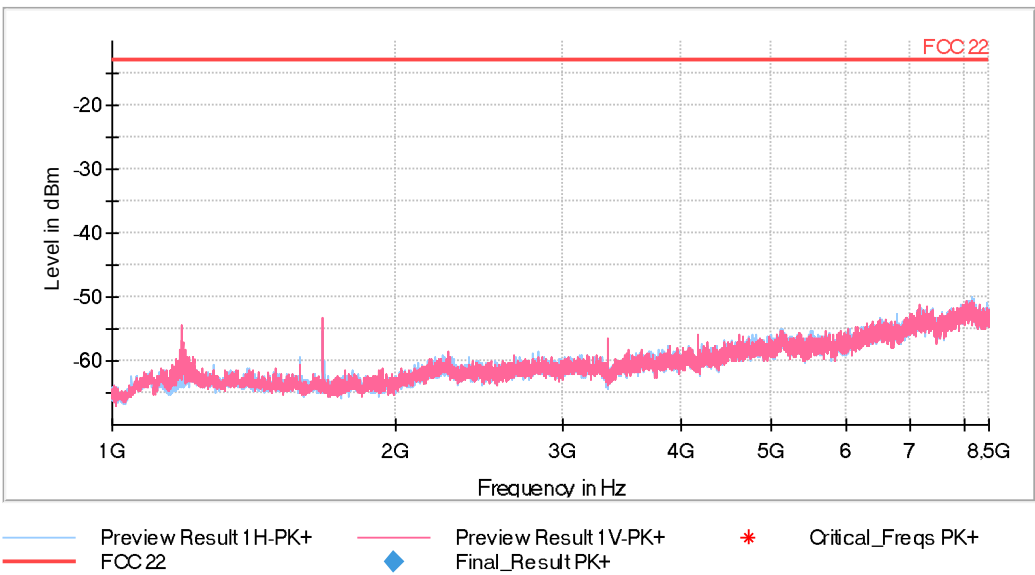
FREQUENCY RANGE 1 – 8.5 GHz

16QAM.

- Lowest Channel:



- Middle Channel:



- Highest Channel:

