

# RADIO TEST REPORT

**No. 2500906STO-101**

## RF Performance

### EQUIPMENT UNDER TEST

Equipment: Aperio HUB  
Type/Model: AH20, AH30, AH40  
Manufacturer: ASSA ABLOY AB  
Tested by request of: ASSA ABLOY AB

### SUMMARY

Referring to the emission limits, and the operating mode during the tests specified in this report, the equipment complies with the requirements according to the following standards:

47 CFR Part 15 (2023): Subpart C: Intentional radiators. Section 15.247

RSS-GEN Issue 5 (2018): General requirements of compliance of radio apparatus (2018) Amendment 1 (2019) & Amendment 2 (2021).

RSS-247 Issue 3 (2023): Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

For details, see clause 2 – 4.

Written by:

Approved by:

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## Revision History

| Test report number | Date              | Description    | Changes                                                                                                     |
|--------------------|-------------------|----------------|-------------------------------------------------------------------------------------------------------------|
| 2407959STO-102     | November 19, 2024 | First release  |                                                                                                             |
| 2500906STO-101     | See page 1        | Second release | Added HVIN number and corrected standard version for 47 CFR Part 15.<br>Moved pictures to separate document |

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## 1 CLIENT INFORMATION

The EUT has been tested by request of

|                 |                                                             |
|-----------------|-------------------------------------------------------------|
| Company         | ASSA ABLOY AB<br>Förmansvägen 11<br>117 43 Stockholm Sweden |
| Name of contact | Magnus Axelsson                                             |
| Client observer | Magnus Axelsson                                             |

## 2 EQUIPMENT UNDER TEST (EUT)

### 2.1 Identification of the EUT

|                                      |                                                                                                   |                                                          |
|--------------------------------------|---------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| Equipment:                           | Aperio HUB                                                                                        |                                                          |
| Type/Model:                          | AH20, AH30, AH40                                                                                  |                                                          |
| Brand name:                          | ASSA ABLOY                                                                                        |                                                          |
| Serial number:                       | 00.12.4B.00.2E.1A.11.29 (AH20)<br>00.12.4B.00.2E.1A.12.26 (AH30)<br>00.12.4B.00.2E.18.82.9C(AH40) |                                                          |
| HVIN number:                         | P001082870E (AH20 & AH30)<br>P001081348F (AH40)                                                   |                                                          |
| Manufacturer:                        | ASSA ABLOY AB                                                                                     |                                                          |
| Transmitter frequency range:         | 2402 - 2480MHz                                                                                    |                                                          |
| Receiver frequency range:            | 2402 - 2480MHz                                                                                    |                                                          |
| Number of channels:                  | 40                                                                                                |                                                          |
| Antenna:                             | <input checked="" type="checkbox"/> Internal antenna                                              | <input checked="" type="checkbox"/> External antenna     |
| Antenna connector:                   | <input checked="" type="checkbox"/> None, internal antenna                                        | <input checked="" type="checkbox"/> Yes, SMA male 3.5mm. |
| Antenna gain:                        | 3.6 dBi (internal)<br>2.3 dBi (external)                                                          |                                                          |
| Rating RF output power:              | 10 dBm                                                                                            |                                                          |
| Type of modulation:                  | GFSK                                                                                              |                                                          |
| Transmitter stand-by mode supported: | <input type="checkbox"/> Yes                                                                      | <input checked="" type="checkbox"/> No                   |

## 2.2 Additional information about the EUT

The EUT consists of the following units:

| Unit   | Type            | Serial number           | Comment                     |
|--------|-----------------|-------------------------|-----------------------------|
| Unit 1 | Aperio HUB AH20 | 00.12.4B.00.2E.1A.11.29 | Internal & external antenna |
| Unit 2 | Aperio HUB AH40 | 00.12.4B.00.2E.18.82.9C | Internal & external antenna |
| Unit 3 | Aperio HUB AH30 | 00.12.4B.00.2E.1A.12.26 | Internal & external antenna |

During the tests the EUT supported following software:

| Software | Version | Comment |
|----------|---------|---------|
| FW       | 3.21    | -       |

The EUT was tested with the following cables:

| Port:     | Type:    | Length:<br>[m] | Specifications: |
|-----------|----------|----------------|-----------------|
| DC supply | DC mains | 10.0           | -               |
| Ethernet  | PoE      | 3.0            | Shielded        |

## 2.3 Peripheral equipment

Peripheral equipment is equipment needed for correct operation of the EUT, but not included as part of the testing and evaluation of the EUT.

| Equipment       | Type / Model | Manufacturer | Serial no.         |
|-----------------|--------------|--------------|--------------------|
| Laptop          | P61G         | DELL         | DP5TXF2            |
| DC power supply | B605 D/S     | Oltronix     | S-605              |
| PoE adapter     | PD-3501G/AC  | Microsemi    | C22076555000001381 |

## 2.4 Test signals and operation modes

The EUT supports both Tx and Rx mode of operations. The Tx tests were made with the EUT in test mode continuously transmitting unmodulated and modulated signal carrier.

The unmodulated carrier was a CW signal. The modulated signal options were 1MHz and 2MHz bandwidth carrier signal.

The tests for both Tx and Rx were made on the following channels:

Channel 0 = 2402MHz

Channel 19 = 2440MHz

Channel 39 = 2480MHz

All tests on AH20 were supplied with 12VDC and for AH40 it was supplied with PoE adapter, unless otherwise stated in the report this is how the tests were performed.

## 2.5 Opinions and interpretations

The following type are also included as additional type in this test report:  
AH30

The difference as compared to the tested type is according to the manufacturer:

Both AH20 and AH30 can only be supplied with external power supply. AH40 is the only module supported with PoE but can also be supplied with external power supply.  
The models AH20, AH30, and AH40 have an identical radio design and schematic. The AH20 and AH30 are built on one PCB, while the AH40 uses a different PCB layout.  
The primary distinction between the AH20 and AH30 is that the AH20 features a Wiegand interface, while the AH30 has an RS485 interface.

All three models are compatible with both external and internal antennas. Additionally, they support multiple bandwidth modulation options, including 1 MHz and 2 MHz bandwidths.

### 3 TEST SPECIFICATIONS

#### 3.1 Standards

Requirements:

47 CFR Part 15 (2023): Subpart C: Intentional radiators. Section 15.247

RSS-GEN Issue 5 (2018): General requirements of compliance of radio apparatus (2018)  
Amendment 1 (2019) & Amendment 2 (2021).

RSS-247 Issue 3 (2023): Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices

Test methods:

ANSI C63.10-2020 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

KDB 558074 D01 v05r02.

#### 3.2 Additions, deviations and exclusions from standards and accreditation

No additions, deviations or exclusions have been made from standards and accreditation.

#### 3.3 Decision rule

The statements of conformity are reported as:

Passed – When the measured values are within the specified limits.

Failed – When one or more measures values are outside the specified limits

#### 3.4 Test site

Measurements were performed at:

Intertek Semko AB.  
Torshamnsgatan 43,  
P.O. Box 1103  
SE-164 22 Kista

Intertek Semko AB is a FCC listed test site with site registration number 90913

Intertek Semko AB is a FCC accredited conformity assessment body with designation number SE0002

Intertek Semko AB is an Industry Canada listed test facility with IC assigned code 2042G

Intertek Semko AB is an ISED recognized wireless testing laboratory with CAB identifier SE0003.

Measurement chambers / conducted system

| Measurement Chamber | Type of chamber    | IC Site filing # |
|---------------------|--------------------|------------------|
| 3 m SAC             | Semi-anechoic 3 m  | 2042G-1          |
| 3 m FAR             | Fully anechoic 3 m | 2042G-4          |

| Measurement System | Type of system      | IC Site filing # |
|--------------------|---------------------|------------------|
| TS8997             | TS8997 rack system. | -                |

#### 4 TEST SUMMARY

The results in this report apply only to sample tested:

| Requirement                                                 | Description                                                                                                                                                                                                                                                      | Result      |
|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| FCC §15.203<br>RSS-GEN 6.8                                  | <b>Antenna</b><br>The EUT has integrated non detachable antenna which can't be removed without breaking the EUT.                                                                                                                                                 | <b>PASS</b> |
| FCC §15.247(b)(4)<br>RSS-247 5.4(4),<br>5.4(5)              | The antenna gain is less than 6 dBi                                                                                                                                                                                                                              |             |
| FCC Part 15.205<br><br>RSS-GEN 8.10                         | <b>Restricted bands of operations</b><br><br>The transmit frequency, including fundamental components of modulation, of license-exempt radio apparatus shall not fall within the restricted frequency bands listed in CFR 47 §15.205 and in RSS-GEN section 8.10 | <b>PASS</b> |
| FCC §15.207,<br>15.107<br>RSS-GEN 8.8 table<br>3            | <b>Conducted continuous emission in the frequency range 150 kHz to 30 MHz, AC Power input port</b><br>See clause 5.3.                                                                                                                                            | <b>PASS</b> |
| FCC §15.247 (d),<br>15.209(a)<br>RSS-GEN 8.9<br>RSS-247 5.5 | <b>Radiated emission of electromagnetic fields in the frequency range 30 – 1000 MHz</b><br>The EUT complies with the limits.<br>See clause 6.4.                                                                                                                  | <b>PASS</b> |
| FCC §15.247(d),<br>15.209(a)<br>RSS-GEN 8.9<br>RSS-247 5.5  | <b>Radiated emission of electromagnetic fields in the frequency range above 1 GHz</b><br>The EUT complies with the limits.<br>See clause 6.5.                                                                                                                    | <b>PASS</b> |
| FCC §15.247(a)(2)<br>RSS-GEN 6.7<br>RSS-247 5.2(1)          | <b>Occupied bandwidth</b><br>The EUT complies with the limits.<br>See clause 10.4 & 11.3.                                                                                                                                                                        | <b>PASS</b> |
| FCC §15.247(b)<br>RSS-247 5.4(4)                            | <b>Conducted output power</b><br>The EUT complies with the limits.<br>See clause 9.4.                                                                                                                                                                            | <b>PASS</b> |
| FCC §15.247(e)<br>RSS-247 5.2(2)                            | <b>Peak power spectral density</b><br>The EUT complies with the limits.<br>See clause 12.4.                                                                                                                                                                      | <b>PASS</b> |
| FCC §15.247(e)<br>RSS-247 5.5                               | <b>Conducted Band edge</b><br>The EUT complies with the limits.<br>See clause 7.4.                                                                                                                                                                               | <b>PASS</b> |

## 5 CONDUCTED CONTINUOUS DISTURBANCES IN THE FREQUENCY-RANGE 0.15 TO 30 MHZ

|                      |                                                    |                           |                |
|----------------------|----------------------------------------------------|---------------------------|----------------|
| <b>Date of test:</b> | 28 October 2024                                    | <b>Test location:</b>     | Bur 4 (Cage 4) |
| <b>EUT Serial:</b>   | 00.12.4B.00.2E.1A.11.29<br>00.12.4B.00.2E.18.82.9C | <b>Ambient temp:</b>      | 22°C           |
| <b>Tested by:</b>    | Nahome Micheal<br>Björn Utermöhl                   | <b>Relative humidity:</b> | 36%            |
| <b>Test result:</b>  | Pass                                               | <b>Margin:</b>            | > 10.31dB      |

### 5.1 Test set-up and test procedure

The test method is in accordance with ANSI C63.10-2020 section 6.2.

The EUT was connected to the power via Artificial Mains Networks AMN.

The EUT was placed on an insulating support 0.8 m above the floor, 0.4 m from the vertical reference ground plane (RGP) and 0.8 m from the AMN/ISN.

Overview sweeps were performed for each lead.

During the tests the EUT was operated according to the mode of operation mentioned in clause 2.4.

### 5.2 Requirement

#### Limits for conducted emission from AC mains

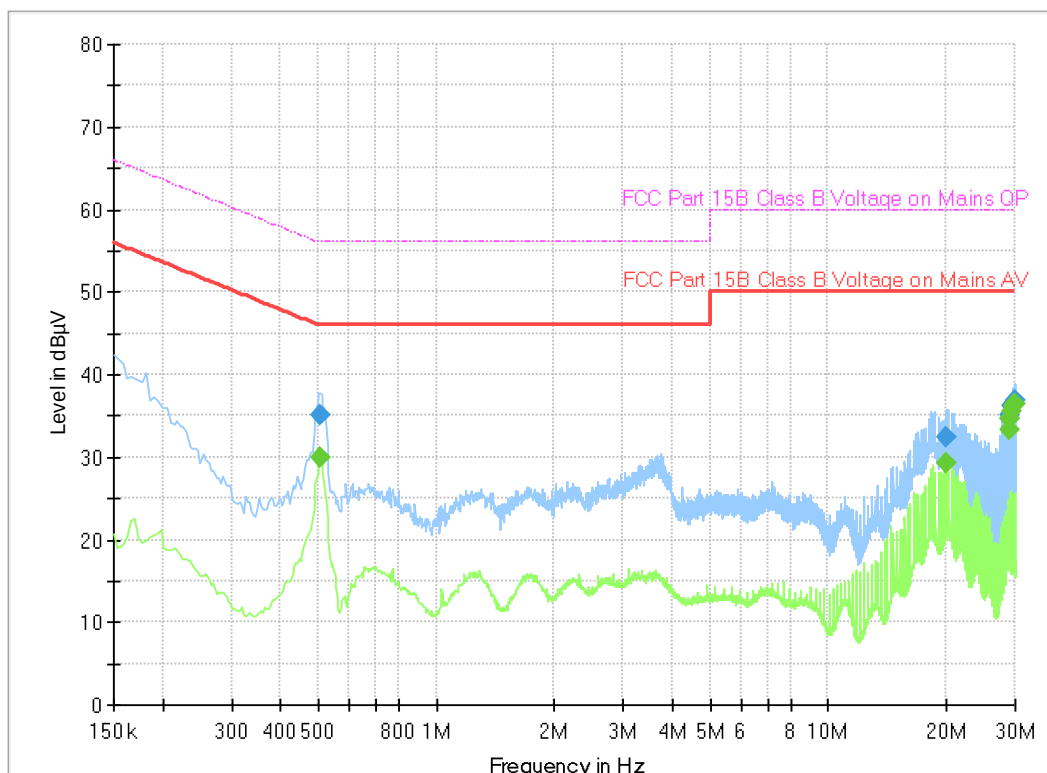
The EUT shall meet the limits for the standards.

Reference: 47 CFR §15.207

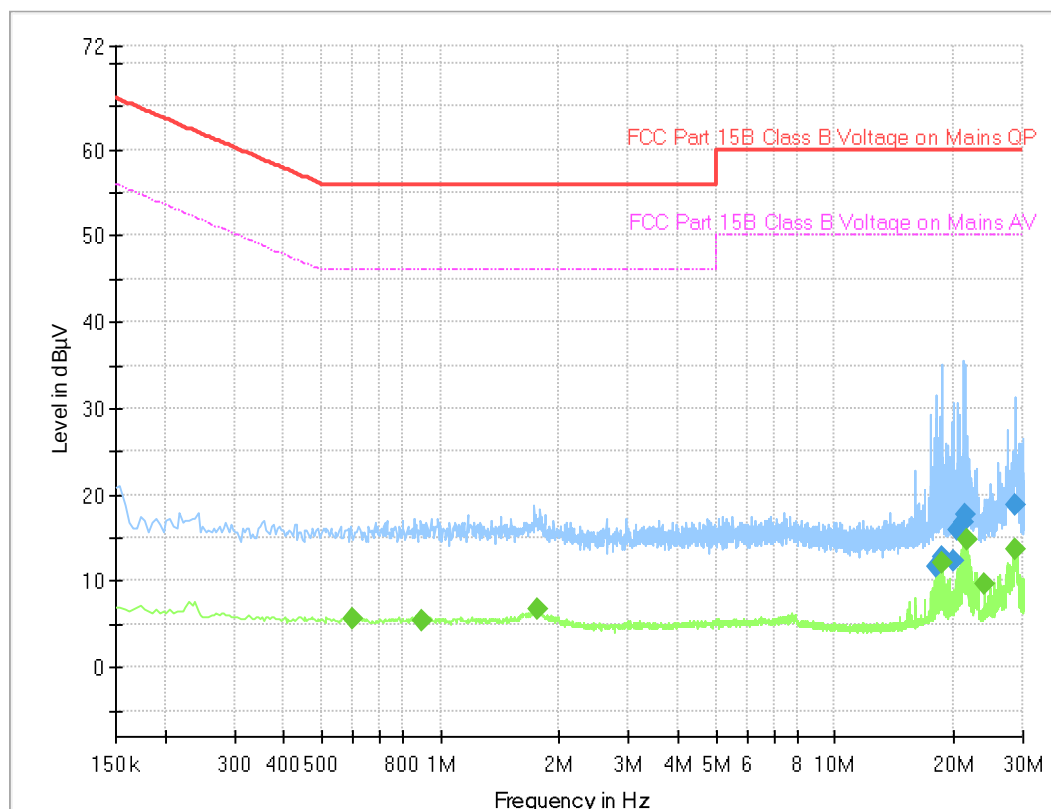
RSS-GEN, section 8.8 table 4

| Frequency range<br>[MHz] | Limits [dBµV] |         |
|--------------------------|---------------|---------|
|                          | Quasi-Peak    | Average |
| 0.15 – 0.50              | 66 – 56       | 56 – 46 |
| 0,50 – 5.00              | 56            | 46      |
| 5.00 – 30.0              | 60            | 50      |

### 5.3 Test results



Diagram, Peak and Average overview sweep (AH40)



Diagram, Peak and Average overview sweep (AH20)

**Measurement results, Average (AH40)**

| Frequency<br>[MHz] | Level<br>[dBμV] | Limit<br>[dBμV] | Line<br>L/N | Margin<br>[dB] |
|--------------------|-----------------|-----------------|-------------|----------------|
| 0.505000           | 29.92           | 46.00           | N           | 26.08          |
| 20.088000          | 29.29           | 50.00           | N           | 30.71          |
| 28.843000          | 33.28           | 50.00           | L1          | 26.72          |
| 29.099000          | 34.70           | 50.00           | L1          | 25.30          |
| 29.358000          | 35.43           | 50.00           | N           | 24.57          |
| 29.615000          | 36.10           | 50.00           | L1          | 23.90          |
| 29.873000          | 36.41           | 50.00           | N           | 23.59          |

**Measurement results, Quasi-peak (AH40)**

| Frequency<br>[MHz] | Level<br>[dBμV] | Limit<br>[dBμV] | Line<br>L/N | Margin<br>[dB] |
|--------------------|-----------------|-----------------|-------------|----------------|
| 0.508000           | 35.09           | 56.00           | N           | 10.91          |
| 20.086000          | 32.51           | 60.00           | N           | 17.49          |
| 28.843000          | 34.72           | 60.00           | L1          | 15.28          |
| 29.101000          | 35.14           | 60.00           | N           | 14.86          |
| 29.357000          | 36.22           | 60.00           | L1          | 13.78          |
| 29.615000          | 36.49           | 60.00           | N           | 13.51          |
| 29.873000          | 36.96           | 60.00           | L1          | 13.04          |

**Measurement results, Average (AH20)**

| Frequency<br>[MHz] | Level<br>[dBμV] | Limit<br>[dBμV] | Line<br>L/N | Margin<br>[dB] |
|--------------------|-----------------|-----------------|-------------|----------------|
| 0.600000           | 5.53            | 46.00           | N           | 40.47          |
| 0.897000           | 5.48            | 46.00           | N           | 40.52          |
| 1.757000           | 6.69            | 46.00           | N           | 39.31          |
| 18.696000          | 12.05           | 50.00           | N           | 37.95          |
| 21.600000          | 14.90           | 50.00           | L1          | 35.10          |
| 24.065000          | 9.63            | 50.00           | L1          | 40.37          |
| 28.755000          | 13.70           | 50.00           | N           | 36.30          |

**Measurement results, Quasi-peak (AH20)**

| Frequency<br>[MHz] | Level<br>[dBμV] | Limit<br>[dBμV] | Line<br>L/N | Margin<br>[dB] |
|--------------------|-----------------|-----------------|-------------|----------------|
| 18.055000          | 11.68           | 60.00           | N           | 48.32          |
| 18.747000          | 12.80           | 60.00           | N           | 47.20          |
| 20.003000          | 12.32           | 60.00           | N           | 47.68          |
| 20.509000          | 15.93           | 60.00           | N           | 44.07          |
| 21.066000          | 16.78           | 60.00           | L1          | 43.22          |
| 21.445000          | 17.69           | 60.00           | N           | 42.31          |
| 28.747000          | 18.85           | 60.00           | N           | 41.15          |

All other measured disturbances have a margin of more than 20 dB to the limits.

Result [dBμV] = Analyser reading [dBμV] + cable loss [dB] + LISN insertion loss [dB]

## 6 RADIATED RF EMISSION IN THE FREQUENCY-RANGE 30 MHZ TO 26.5 GHZ

|                      |                                                                               |                           |                               |
|----------------------|-------------------------------------------------------------------------------|---------------------------|-------------------------------|
| <b>Date of test:</b> | 4 – 8 November 2024                                                           | <b>Test location:</b>     | 3 m SAC, 3 m FAR,<br>10 m SAC |
| <b>EUT Serial:</b>   | 00.12.4B.00.2E.1A.11.29<br>00.12.4B.00.2E.18.82.9C<br>00.12.4B.00.2E.1A.12.26 | <b>Ambient temp:</b>      | 19 - 21°C                     |
| <b>Tested by:</b>    | Nahome Micheal<br>Sandipan Basu<br>Björn Utermöhl                             | <b>Relative humidity:</b> | 34 - 62%                      |
| <b>Test result:</b>  | Pass                                                                          | <b>Margin:</b>            | See tables below.             |

### 6.1 Test set-up and test procedure.

The test method is in accordance with ANSI C63.10-2020.

The EUT was set up in order to emit maximum disturbances.

The EUT was placed on an insulating support 0.8m above the turntable in the 3 m SAC, and 1.5 m above the turntable in the 3m FAR.

Overview sweeps were performed with the measurement receiver in max-hold mode and the peak detector activated in the frequency-range 30 – 1000 MHz. Above 1 GHz additionally the average detector was activated.

Portable device: Pre scan was made in three orthogonal EUT orientations.

All possible configurations have been tested such as different power source, orientations X/Y/Z and the antenna setups. The result presented in the report is the worst-case of all the configurations tested.

### 6.2 Test conditions

#### Test set-up:

Test receiver set-up:

Preview test:

Final test:

EUT height above ground plane:

Measuring distance:

Measuring angle:

Antenna

Height above ground plane:

Polarisation:

Type:

#### 30 MHz to 1000 MHz

Peak,

RBW 120 kHz

VBW 1 MHz

Quasi-Peak,

RBW 120 kHz

VBW 1 MHz

0.8 m

3 m

0 – 359°

1 – 4 m

Vertical and Horizontal

Bilog

#### Test set-up:

Test receiver set-up:

Preview test:

Final test:

#### 1 GHz – 26.5 GHz

Peak,

RBW 1 MHz

VBW 3 MHz

Average,

RBW 1 MHz

VBW 3 MHz

Peak,

RBW 1 MHz

VBW 3 MHz

Average

Peak value + 20 x LOG (Duty cycle) / RBW 1 MHz VBW 3 MHz

EUT height above ground plane:

1.5 m

Measuring distance:

3 m

Measuring angle:

0 – 359°

Antenna

Height above ground plane:

1 – 4 m

Polarisation:

Vertical and Horizontal

Type:

Horn

Antenna tilt:

Activated

### 6.3 Requirements

Within restricted bands and receive mode:

Reference: CFR 47 §15.209, RSS-Gen section 8.9

Field strength of emissions must comply with limits shown in table below

| Frequency range [MHz] | Field strength at 3 m (dBμV/m) | Field strength at 10 m (dBμV/m) | Detector (dBμV/m) |
|-----------------------|--------------------------------|---------------------------------|-------------------|
| 30 – 88               | 40.0                           | 29.5                            | Quasi Peak        |
| 88 – 216              | 43.5                           | 33.0                            | Quasi Peak        |
| 216 – 960             | 46.0                           | 35.5                            | Quasi Peak        |
| 960 – 1000            | 54.0                           | 43.5                            | Quasi Peak        |
| Above 1000            | 54.0 / 74.0                    | 43.5 / 63.5                     | Average / Peak    |

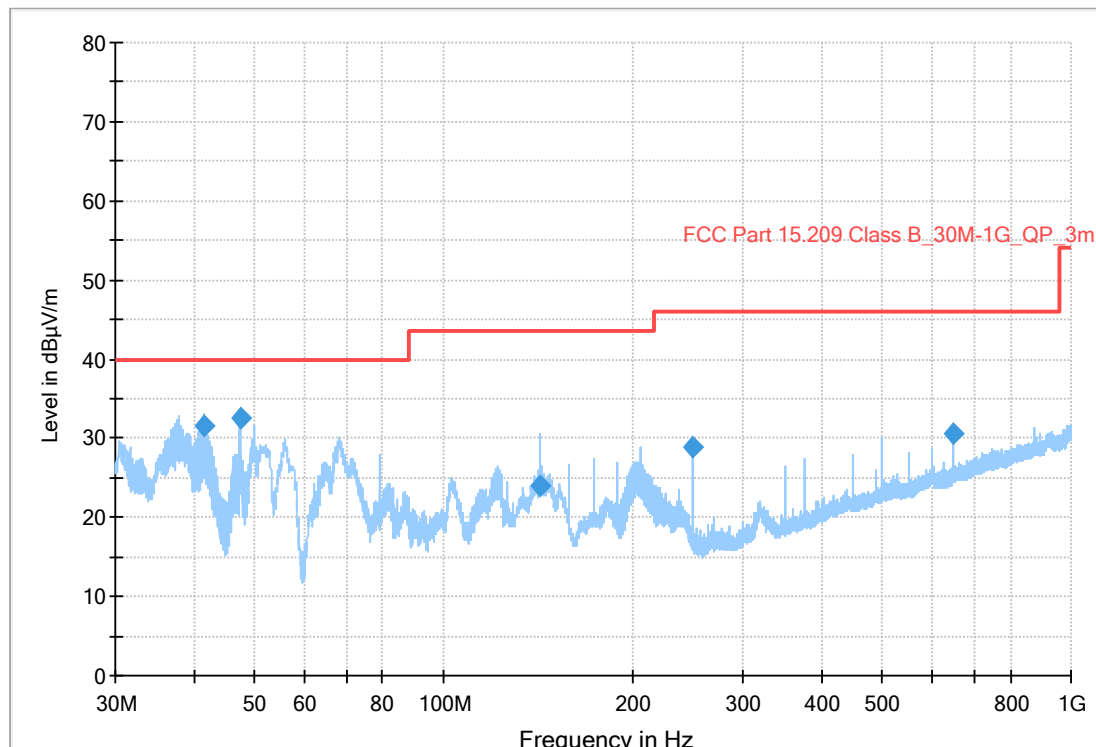
The values for 10 m measuring distance are calculated by subtracting 10.5 dB from the 3 m limit. (i.e. an extrapolation factor of 20 dB/decade according to CFR 47 §15.31(f)(1))

Outside the restricted bands:

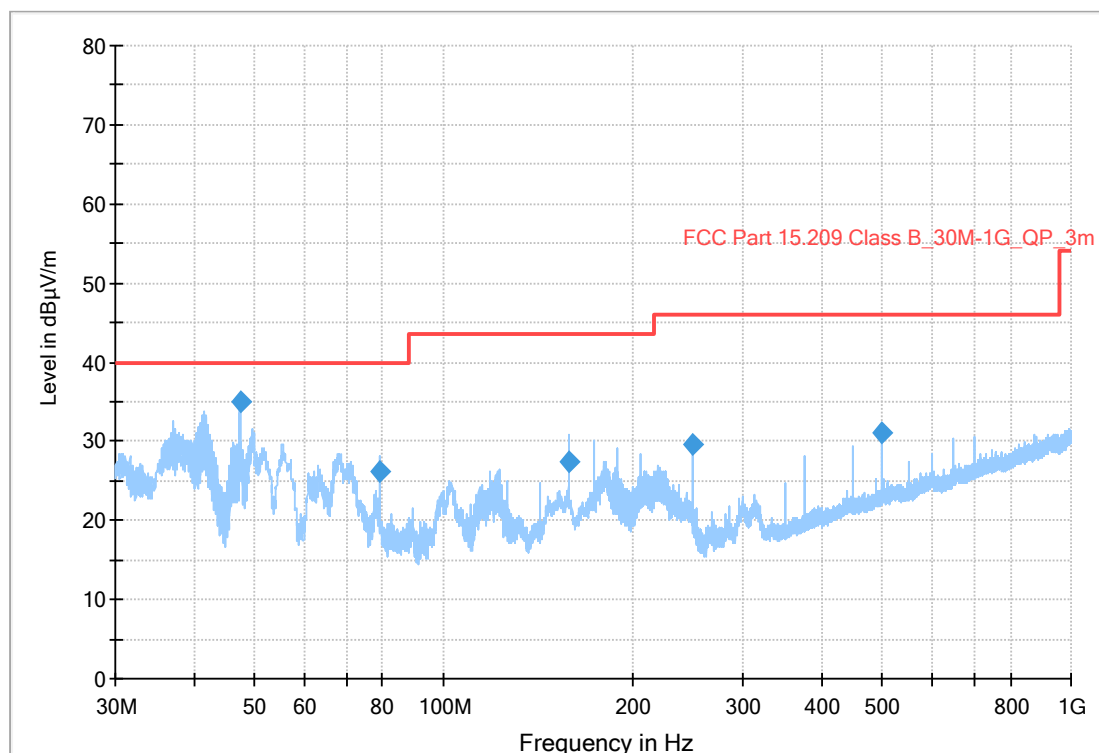
Reference: CFR 47 §15.247(d), RSS-247 5.5,

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits.

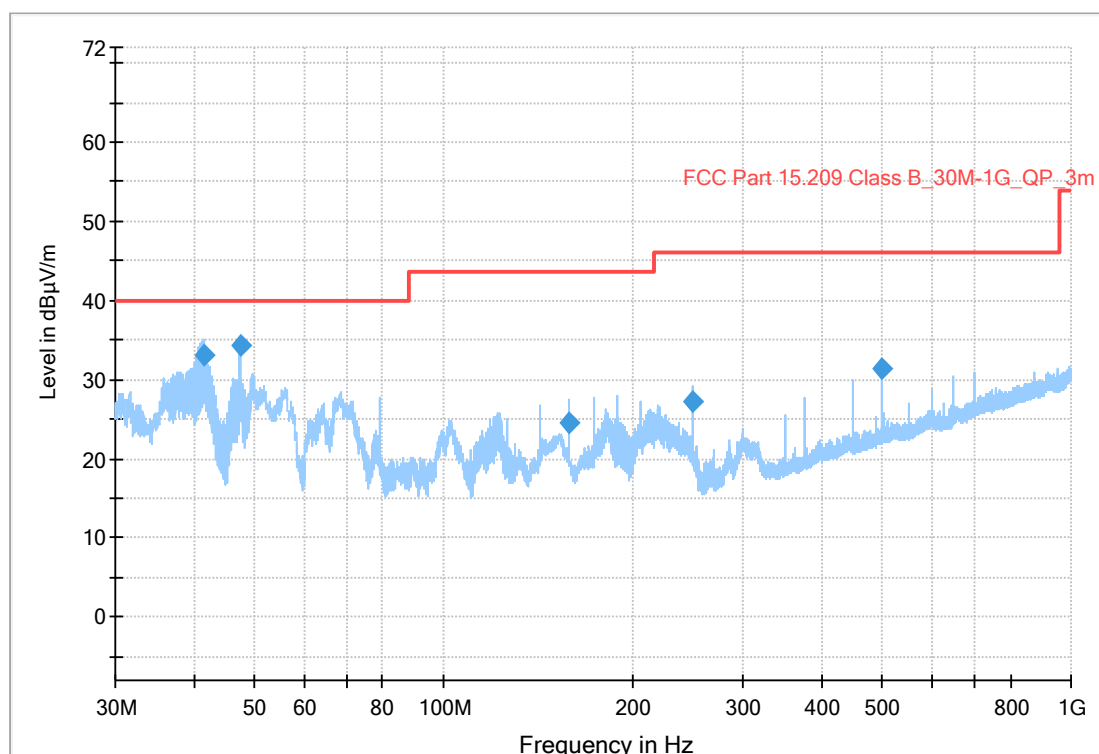
### 6.4 Test results 30 MHz – 1000 MHz, TX



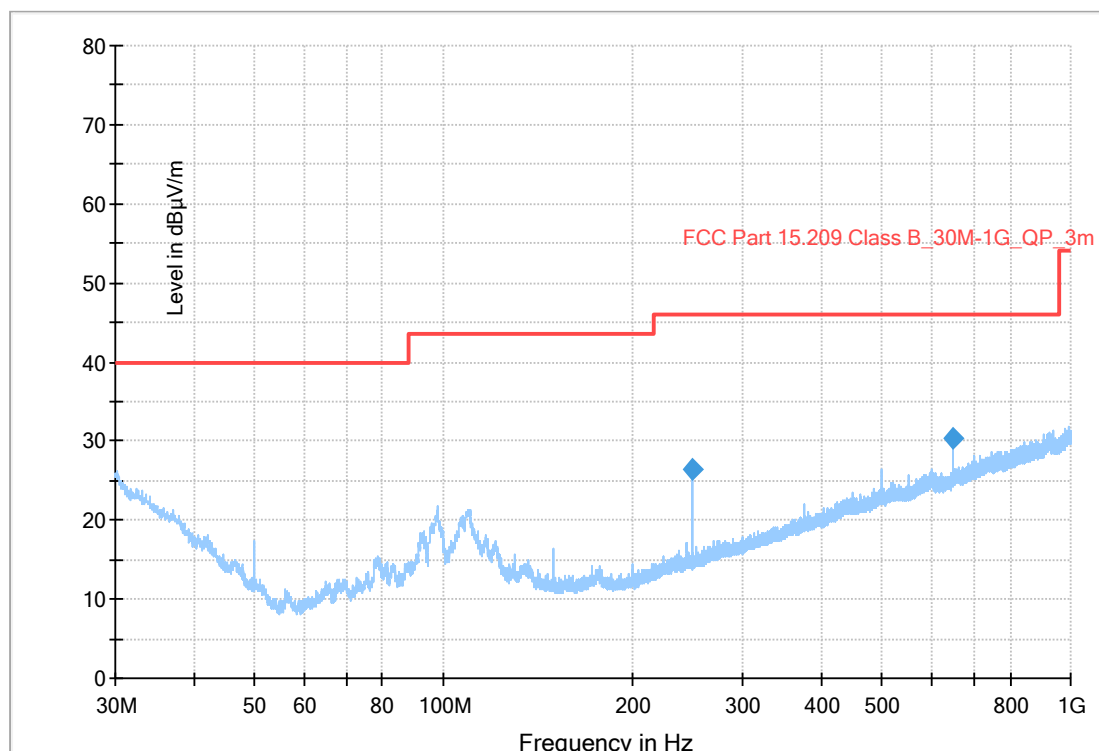
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX low channel, EUT orientation X. Powered via PoE, internal antenna. (AH40)



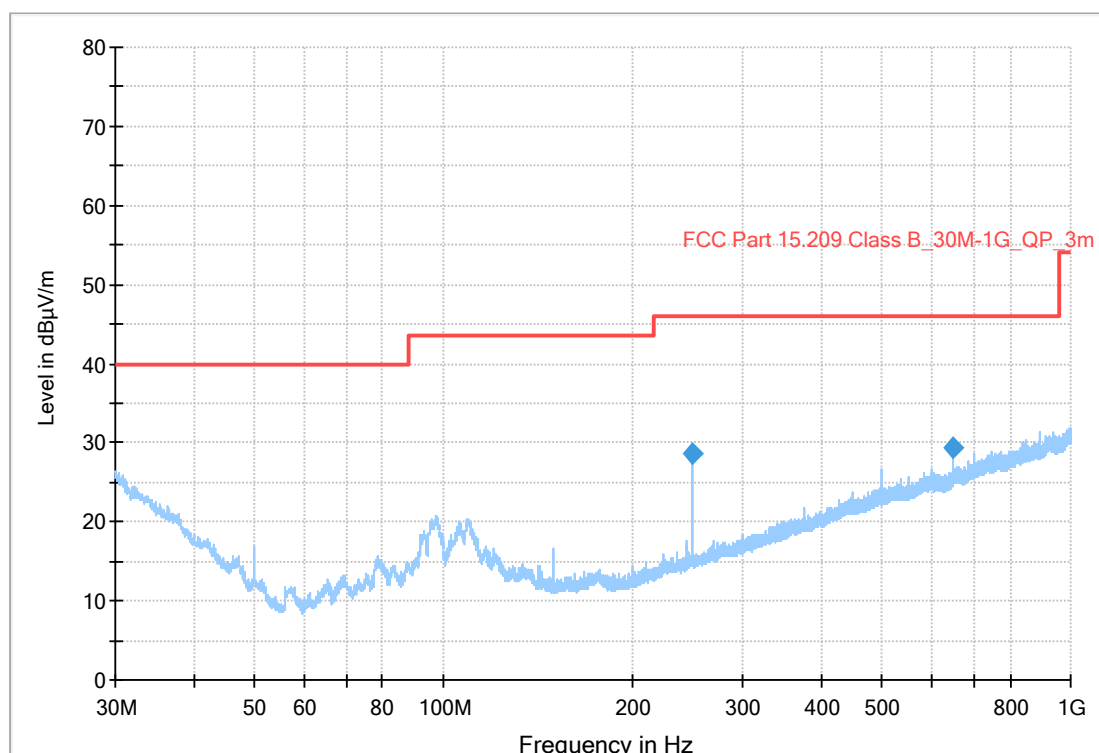
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX middle channel, EUT orientation X. Powered via PoE, internal antenna. (AH40)



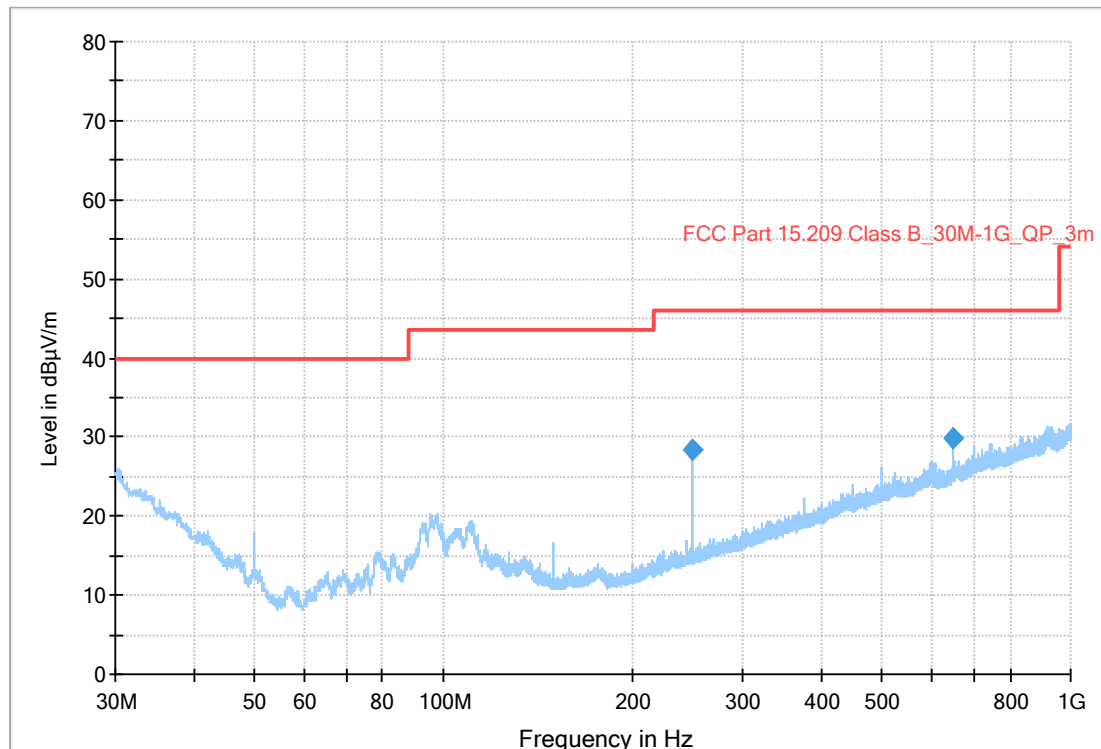
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX high channel, EUT orientation X. Powered via PoE, internal antenna. (AH40)



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX low channel, EUT orientation Y. Powered via AC/DC, External antenna. (AH40)



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX middle channel, EUT orientation Y, Powered via AC/DC, External antenna. (AH40)



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX high channel, EUT orientation X. Powered via AC/DC, External antenna. (AH40)

#### Measurement results, Quasi Peak, model AH40

##### Result for Internal Antenna

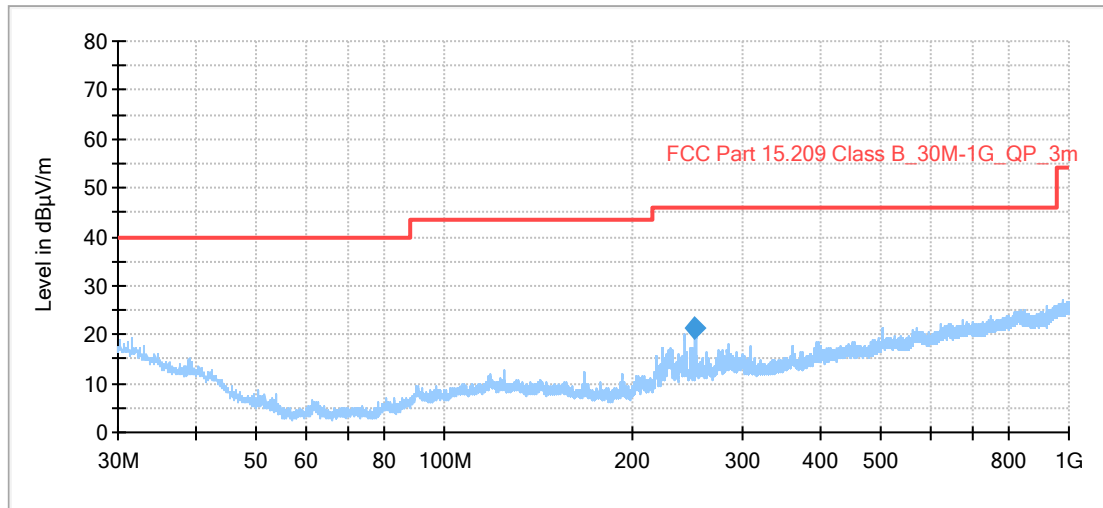
| Frequency<br>[MHz]                               | Level<br>[dBµV/m] | Limit<br>[dBµV/m] | Polarization<br>H/V | Margin<br>[dB] | Correction<br>factor<br>[dB] |
|--------------------------------------------------|-------------------|-------------------|---------------------|----------------|------------------------------|
| Y orientation, PoE feed, TX mode, Low channel    |                   |                   |                     |                |                              |
| 41.460                                           | 31.48             | 40.0              | V                   | 8.5            | 13.7                         |
| 47.400                                           | 32.46             | 40.0              | V                   | 7.5            | 10.2                         |
| 142.290                                          | 24.06             | 43.5              | H                   | 19.5           | 9.4                          |
| 250.020                                          | 28.96             | 46.0              | H                   | 17.1           | 12.0                         |
| 650.080                                          | 30.67             | 46.0              | V                   | 15.4           | 22.1                         |
| X orientation, PoE feed, TX mode, Middle channel |                   |                   |                     |                |                              |
| 47.400                                           | 34.95             | 40.0              | V                   | 5.1            | 10.2                         |
| 79.050                                           | 26.19             | 40.0              | V                   | 13.8           | 8.6                          |
| 158.100                                          | 27.40             | 43.5              | H                   | 16.1           | 9.1                          |
| 250.020                                          | 29.50             | 46.0              | V                   | 16.5           | 12.0                         |
| 500.050                                          | 31.15             | 46.0              | H                   | 14.9           | 19.5                         |
| X orientation, PoE feed, TX mode, High channel   |                   |                   |                     |                |                              |
| 41.460                                           | 33.14             | 40.0              | V                   | 6.9            | 13.7                         |
| 47.400                                           | 34.43             | 40.0              | V                   | 5.6            | 10.2                         |
| 158.100                                          | 24.48             | 43.5              | H                   | 19.0           | 9.1                          |
| 250.020                                          | 27.19             | 46.0              | H                   | 18.8           | 12.0                         |
| 500.050                                          | 31.30             | 46.0              | H                   | 14.7           | 19.5                         |

**Result for External Antenna, model AH40**

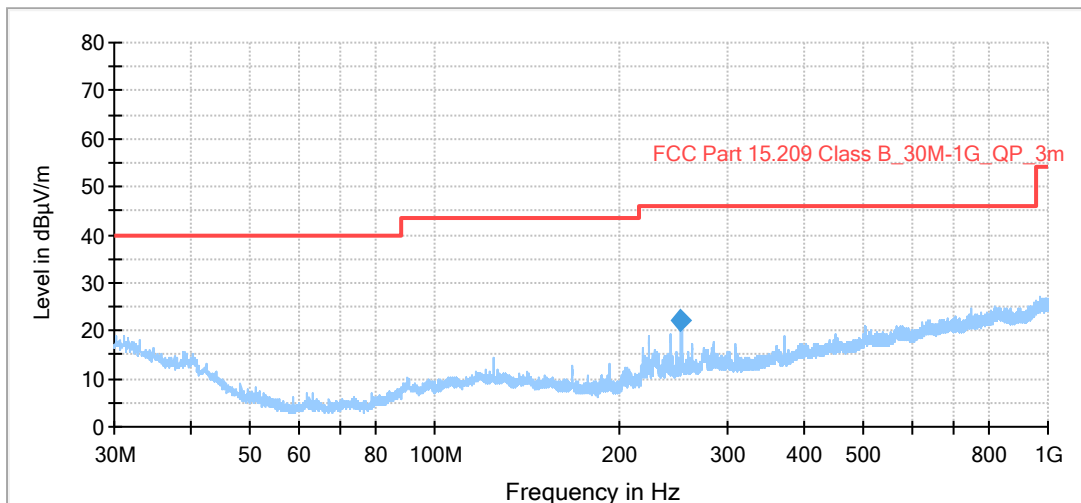
| Frequency<br>[MHz]                                               | Level<br>[dBμV/m] | Limit<br>[dBμV/m] | Polarization<br>H/V | Margin<br>[dB] | Correction<br>factor<br>[dB] |
|------------------------------------------------------------------|-------------------|-------------------|---------------------|----------------|------------------------------|
| <b>X orientation, Powered via AC/DC, TX mode, Low channel</b>    |                   |                   |                     |                |                              |
| 250.020                                                          | 26.32             | 46.0              | H                   | 19.7           | 12.0                         |
| 650.080                                                          | 30.43             | 46.0              | H                   | 15.6           | 22.1                         |
| <b>Y orientation, Powered via AC/DC, TX mode, Middle channel</b> |                   |                   |                     |                |                              |
| 250.020                                                          | 28.55             | 46.0              | H                   | 17.5           | 12.0                         |
| 650.080                                                          | 29.33             | 46.0              | V                   | 16.7           | 22.1                         |
| <b>X orientation, Powered via AC/DC, TX mode, High channel</b>   |                   |                   |                     |                |                              |
| 250.020                                                          | 28.36             | 46.0              | H                   | 17.7           | 12.0                         |
| 650.080                                                          | 29.74             | 46.0              | V                   | 16.3           | 22.1                         |

All other measured disturbances have a margin of more than 20 dB to the limits.

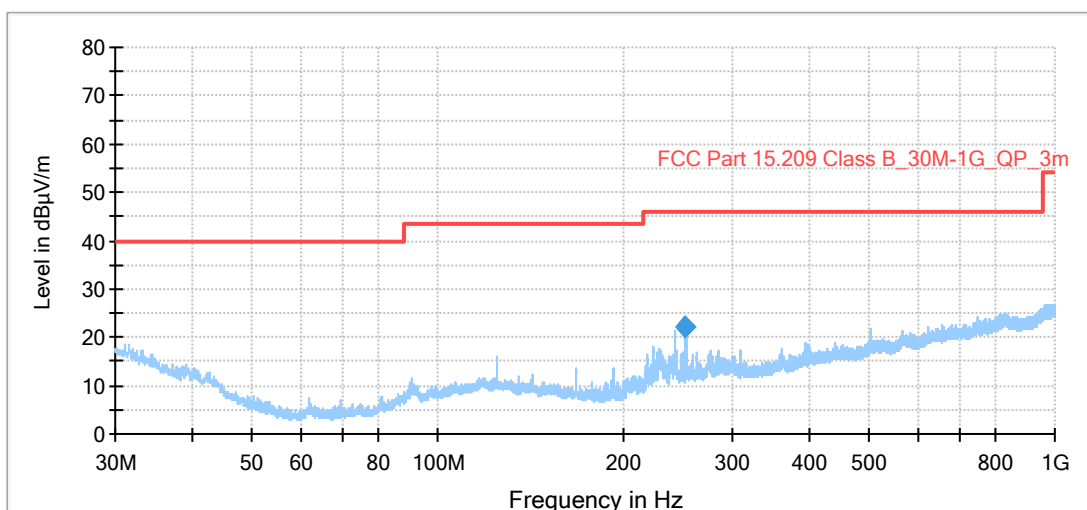
Result [dBμV/m] = Analyser reading [dBμV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]



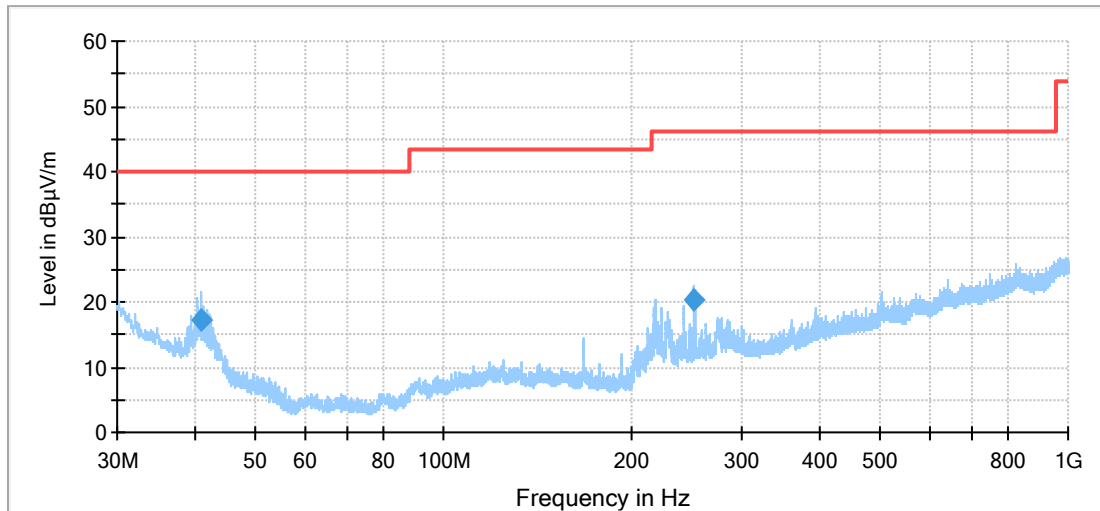
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX low channel, EUT orientation Z. Powered via AC/DC, internal antenna. (AH20)



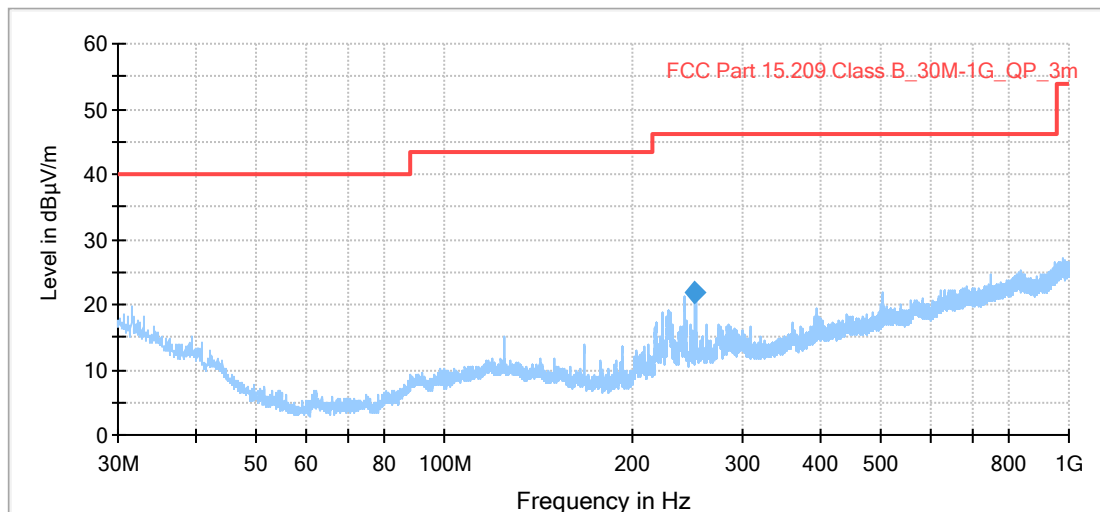
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX mid channel, EUT orientation X. Powered via AC/DC, internal antenna. (AH20)



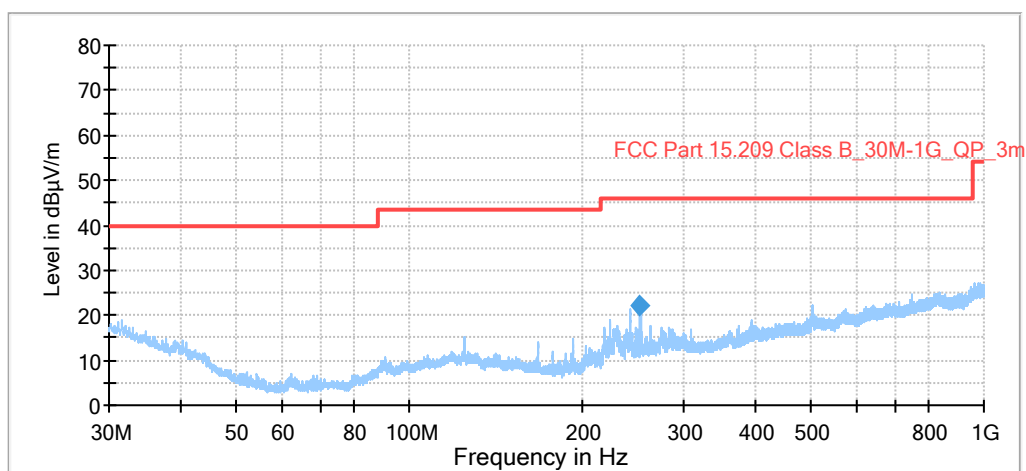
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX high channel, EUT orientation Z. Powered via AC/DC, internal antenna. (AH20)



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX low channel, EUT orientation X. Powered via AC/DC, External antenna. (AH20)



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX mid channel, EUT orientation X. Powered via AC/DC, External antenna. (AH20)



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX high channel, EUT orientation X. Powered via AC/DC, External antenna. (AH20)

**Measurement results, Quasi Peak, model AH20**
**Result for Internal Antenna**

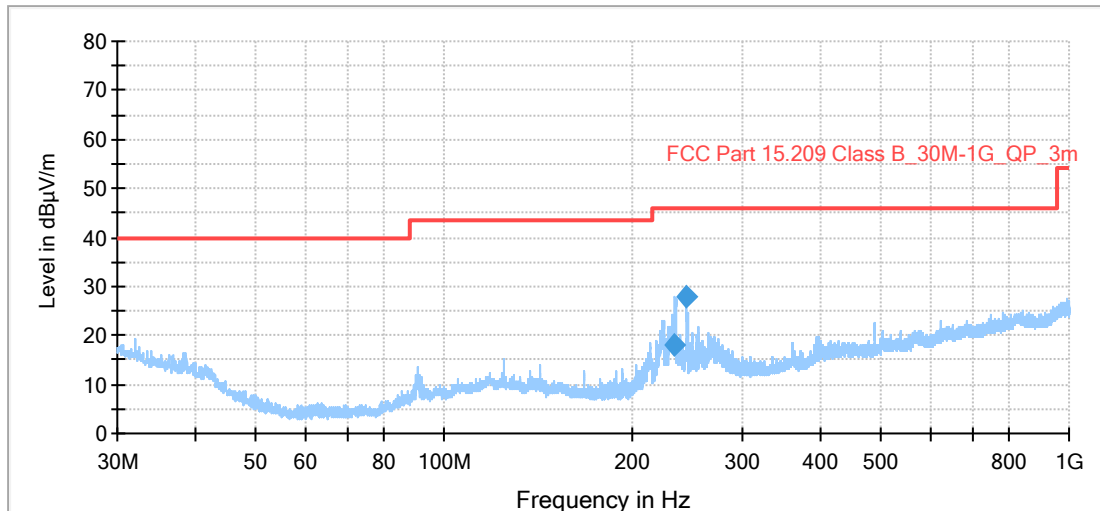
| Frequency<br>[MHz]                            | Level<br>[dBμV/m] | Limit<br>[dBμV/m] | Polarization<br>H/V | Margin<br>[dB] | Correction<br>factor<br>[dB] |
|-----------------------------------------------|-------------------|-------------------|---------------------|----------------|------------------------------|
| <b>Z orientation, TX mode, Low channel</b>    |                   |                   |                     |                |                              |
| 252.270                                       | 21.48             | 46.02             | H                   | 24.54          | -20                          |
| <b>X orientation, TX mode, Middle channel</b> |                   |                   |                     |                |                              |
| 252.330                                       | 22.01             | 46.02             | H                   | 24.01          | -20                          |
| <b>X orientation, TX mode, High channel</b>   |                   |                   |                     |                |                              |
| 252.150                                       | 22.15             | 46.02             | H                   | 23.87          | -20                          |

**Result for External Antenna, model AH20**

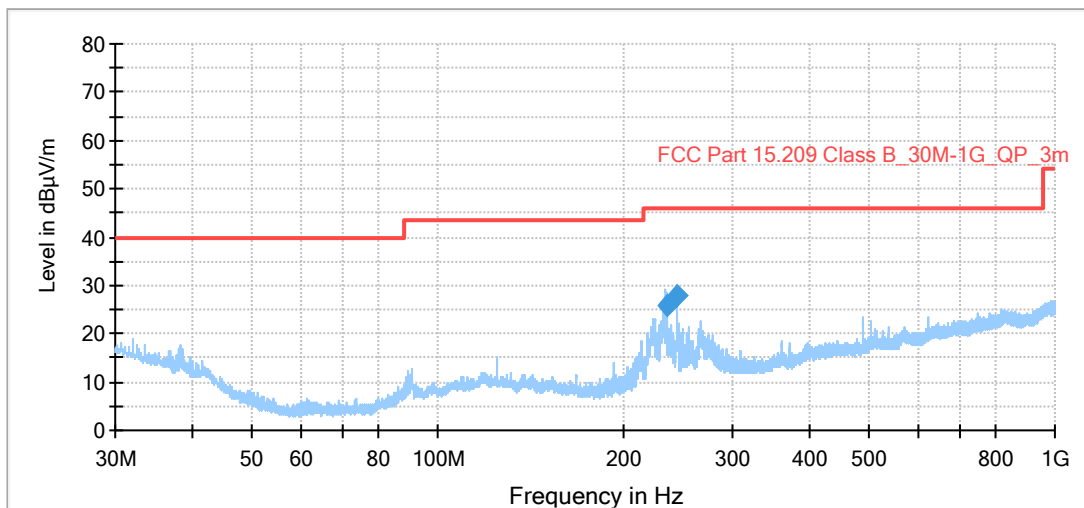
| Frequency<br>[MHz]                            | Level<br>[dBμV/m] | Limit<br>[dBμV/m] | Polarization<br>H/V | Margin<br>[dB] | Correction<br>factor<br>[dB] |
|-----------------------------------------------|-------------------|-------------------|---------------------|----------------|------------------------------|
| <b>X orientation, TX mode, Low channel</b>    |                   |                   |                     |                |                              |
| 40.860                                        | 17.08             | 40.00             | V                   | 22.92          | -21                          |
| 252.150                                       | 20.28             | 46.02             | H                   | 25.74          | -20                          |
| <b>X orientation, TX mode, Middle channel</b> |                   |                   |                     |                |                              |
| 252.300                                       | 21.81             | 46.02             | H                   | 24.21          | -20                          |
| <b>X orientation, TX mode, High channel</b>   |                   |                   |                     |                |                              |
| 252.270                                       | 22.22             | 46.02             | H                   | 23.80          | -20                          |

All other measured disturbances have a margin of more than 20 dB to the limits.

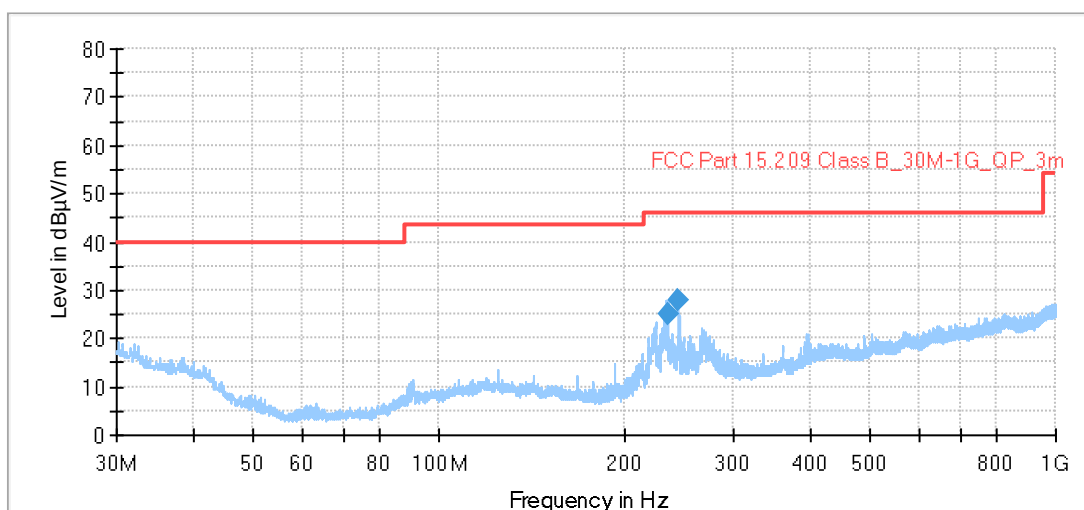
Result [dBμV/m] = Analyser reading [dBμV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]



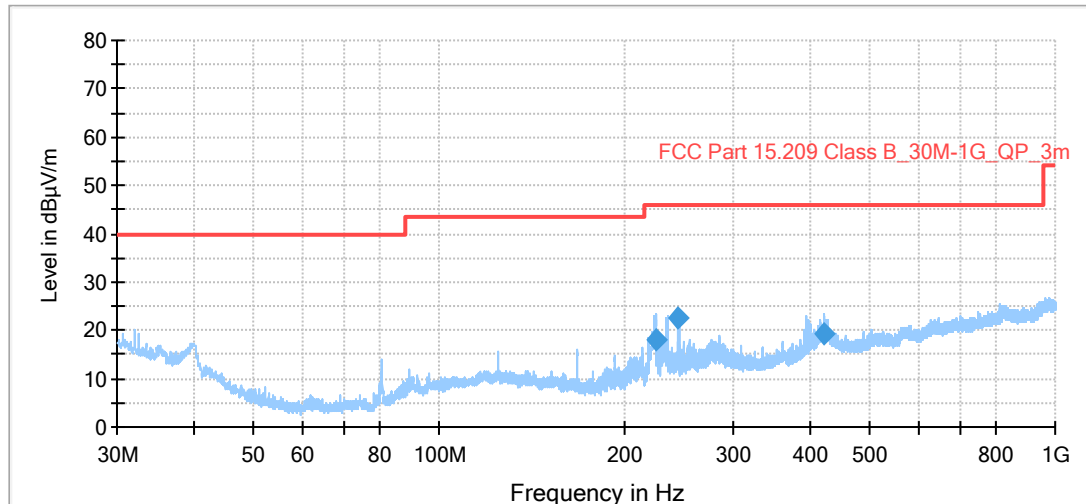
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX low channel, EUT orientation X. AC/DC powered, internal antenna. (AH30)



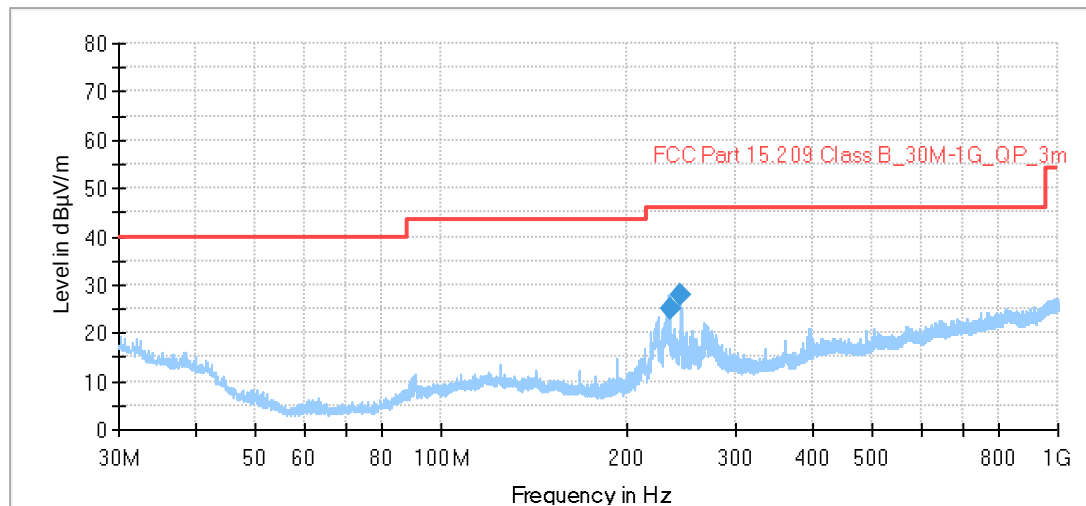
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX mid channel, EUT orientation X. AC/DC powered, internal antenna. (AH30)



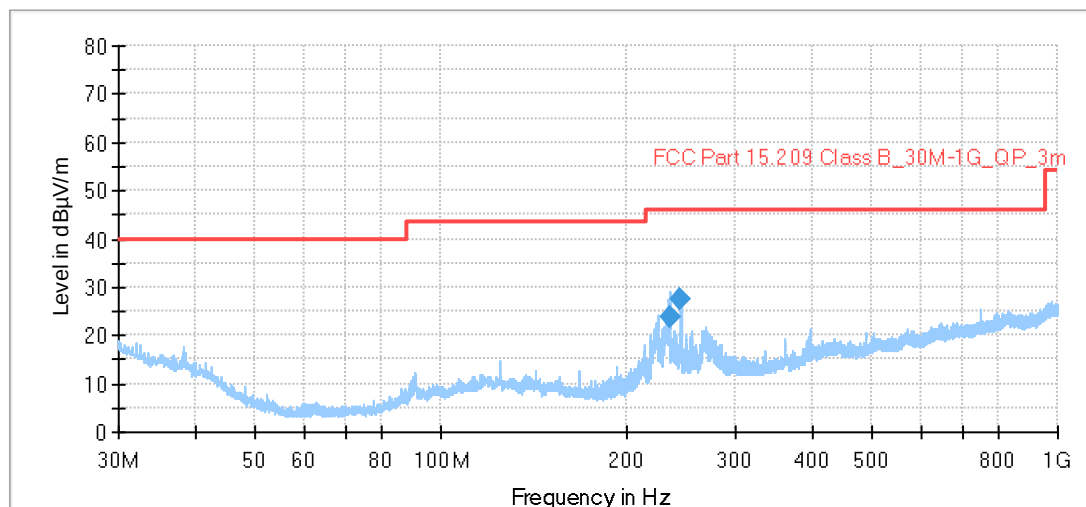
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX high channel, EUT orientation X. Powered via AC/DC, internal antenna. (AH30)



**Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX low channel, EUT orientation Y. Powered via AC/DC, External antenna. (AH30)**



**Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX mid channel, EUT orientation Y. Powered via AC/DC, External antenna. (AH30)**



**Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX high channel, EUT orientation Z. Powered via AC/DC, External antenna. (AH30)**

# Measurement results, Quasi Peak, model AH30

## Result for Internal Antenna

| Frequency<br>[MHz]                     | Level<br>[dBμV/m] | Limit<br>[dBμV/m] | Polarization<br>H/V | Margin<br>[dB] | Correction<br>factor<br>[dB] |
|----------------------------------------|-------------------|-------------------|---------------------|----------------|------------------------------|
| Z orientation, TX mode, Low channel    |                   |                   |                     |                |                              |
| 234.330                                | 18.10             | 46.02             | H                   | 27.92          | -22                          |
| 244.740                                | 27.82             | 46.02             | H                   | 18.20          | -21                          |
| X orientation, TX mode, Middle channel |                   |                   |                     |                |                              |
| 234.450                                | 25.94             | 46.02             | H                   | 20.08          | -22                          |
| 244.680                                | 27.91             | 46.02             | H                   | 18.11          | -21                          |
| X orientation, TX mode, High channel   |                   |                   |                     |                |                              |
| 234.690                                | 26.03             | 46.02             | H                   | 19.99          | -22                          |
| 244.650                                | 28.35             | 46.02             | H                   | 17.67          | -21                          |

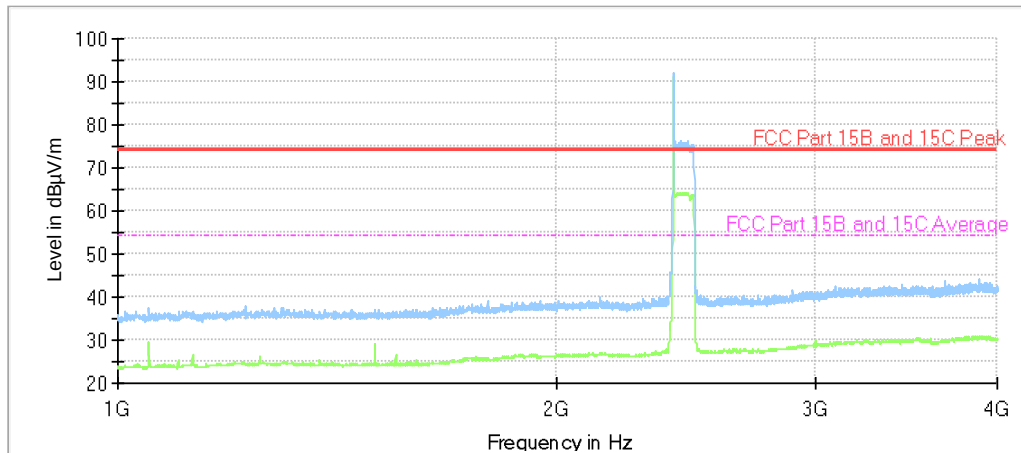
## Result for External Antenna, model AH30

| Frequency<br>[MHz]                     | Level<br>[dBμV/m] | Limit<br>[dBμV/m] | Polarization<br>H/V | Margin<br>[dB] | Correction<br>factor<br>[dB] |
|----------------------------------------|-------------------|-------------------|---------------------|----------------|------------------------------|
| Y orientation, TX mode, Low channel    |                   |                   |                     |                |                              |
| 224.340                                | 18.00             | 46.02             | H                   | 28.02          | -23                          |
| 244.650                                | 22.45             | 46.02             | H                   | 23.57          | -21                          |
| 421.920                                | 19.36             | 46.02             | V                   | 26.66          | -15                          |
| Y orientation, TX mode, Middle channel |                   |                   |                     |                |                              |
| 234.780                                | 25.10             | 46.02             | H                   | 20.92          | -22                          |
| 244.740                                | 27.79             | 46.02             | H                   | 18.23          | -21                          |
| Z orientation, TX mode, High channel   |                   |                   |                     |                |                              |
| 234.840                                | 23.82             | 46.02             | H                   | 22.20          | -22                          |
| 244.680                                | 27.50             | 46.02             | H                   | 18.52          | -21                          |

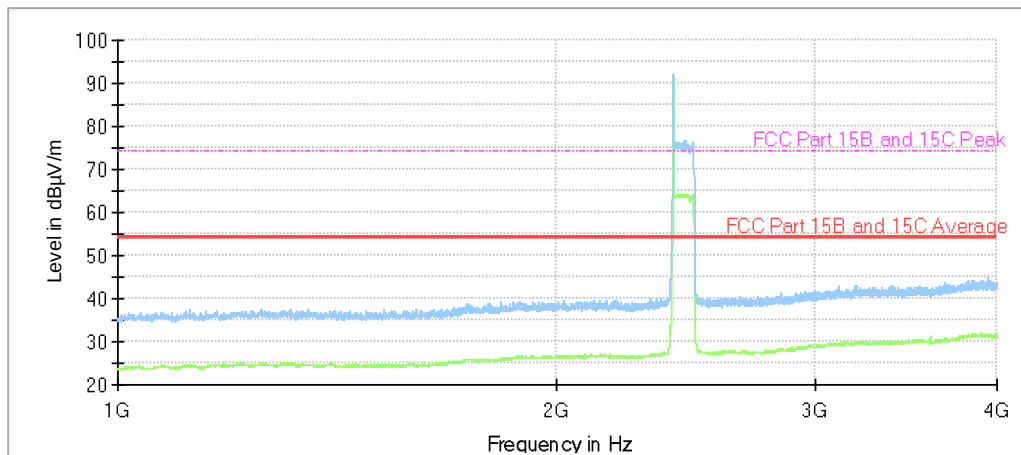
All other measured disturbances have a margin of more than 15 dB to the limits.

Result [dBμV/m] = Analyser reading [dBμV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

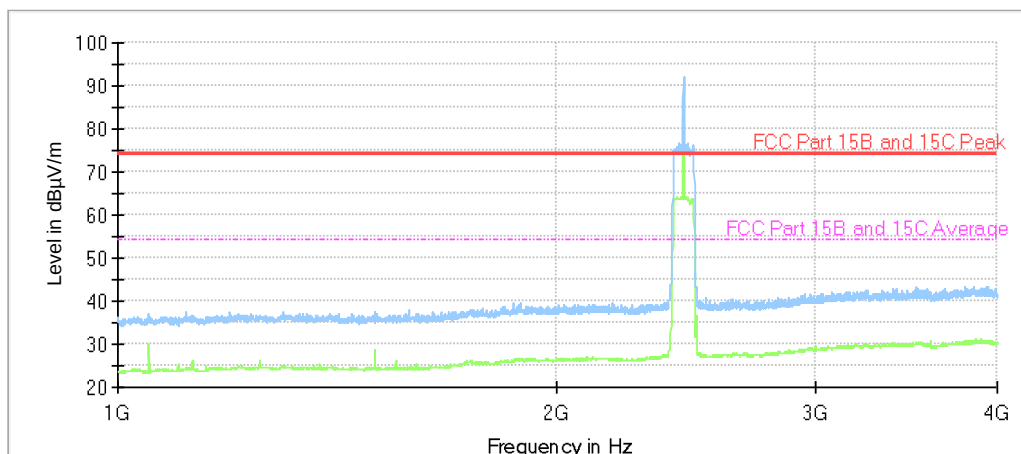
## 6.5 Test results 1 GHz – 26.5 GHz, TX



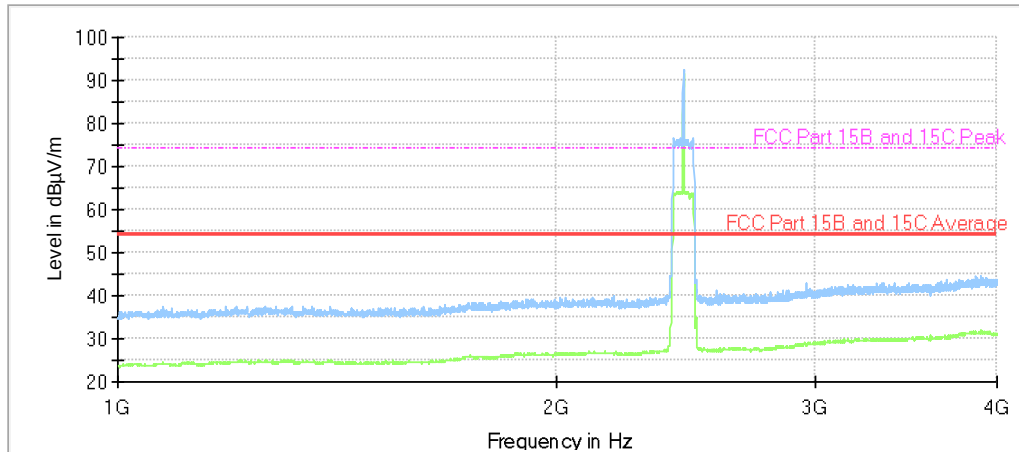
Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance. TX low channel, Internal antenna  
Carrier is attenuated by band rejection filter. Powered via PoE (AH40)



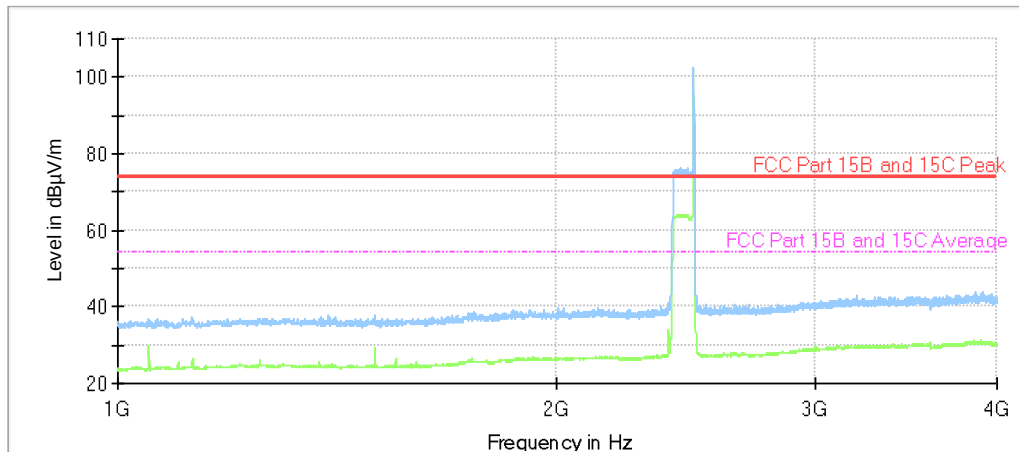
Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance. TX low channel, Internal antenna  
Carrier is attenuated by band rejection filter. Powered via AC/DC (AH20)



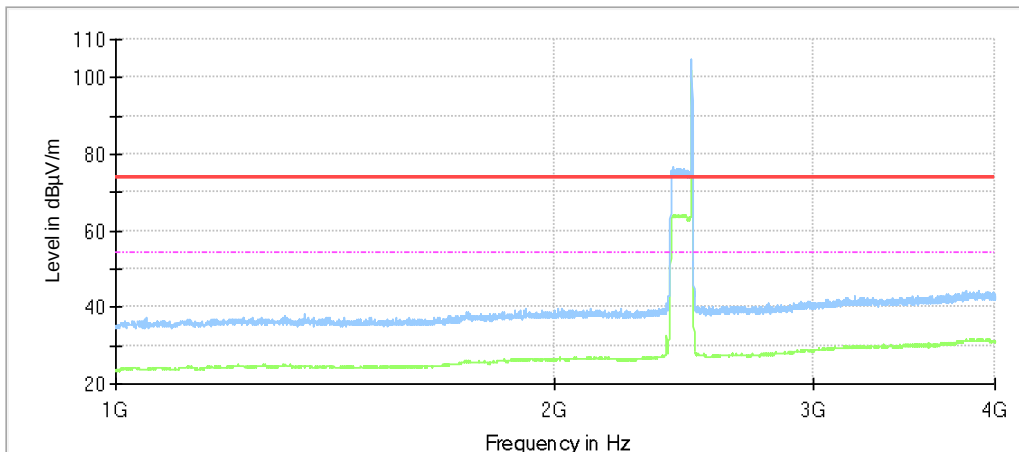
Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance. TX mid channel, Internal antenna  
Carrier is attenuated by band rejection filter. Powered via PoE (AH40)



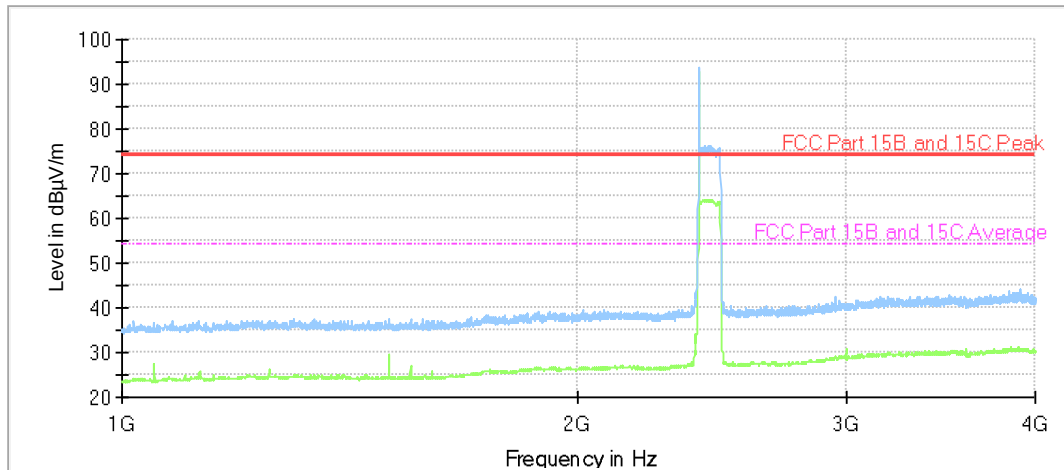
**Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance. TX mid channel, Internal antenna  
Carrier is attenuated by band rejection filter. Powered via AC/DC (AH20)**



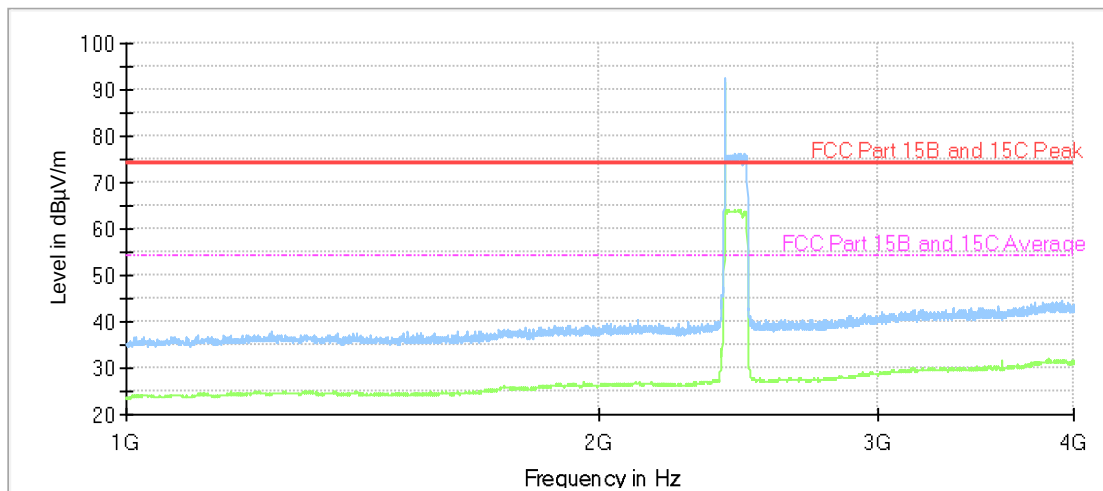
**Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance. TX high channel, Internal antenna  
Carrier is attenuated by band rejection filter. Powered via PoE (AH40)**



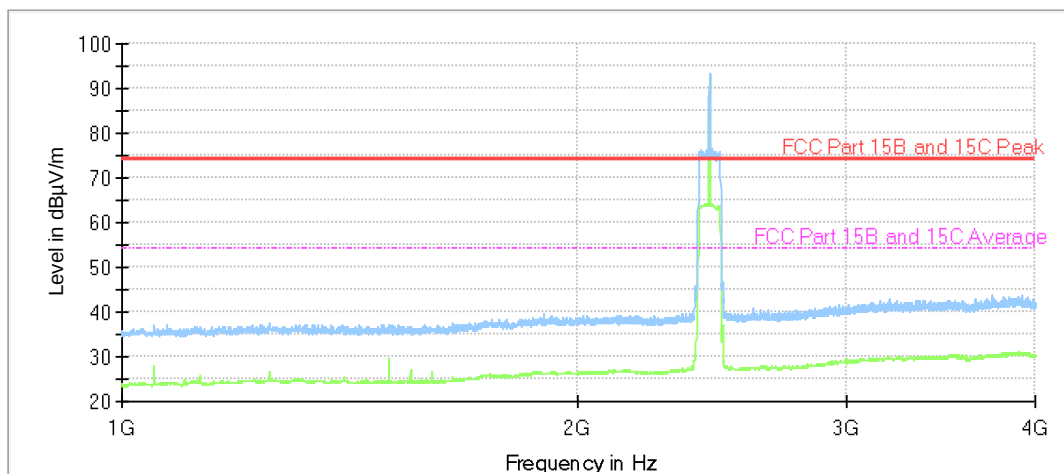
**Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance. TX high channel, Internal antenna  
Carrier is attenuated by band rejection filter. Powered via AC/DC (AH20)**



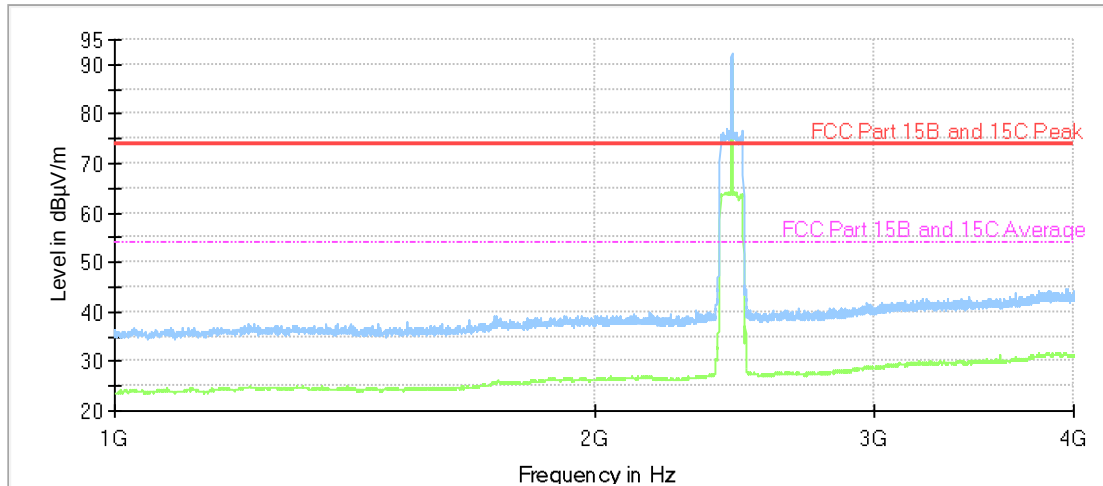
**Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance. TX low channel, External antenna  
Carrier is attenuated by band rejection filter. Powered via PoE (AH40)**



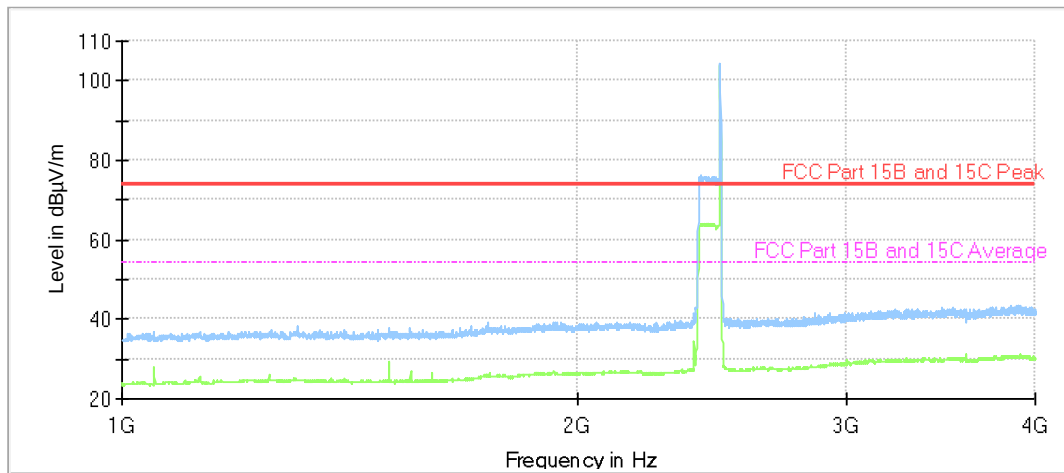
**Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance. TX low channel, External antenna  
Carrier is attenuated by band rejection filter. Powered via AC/DC (AH20)**



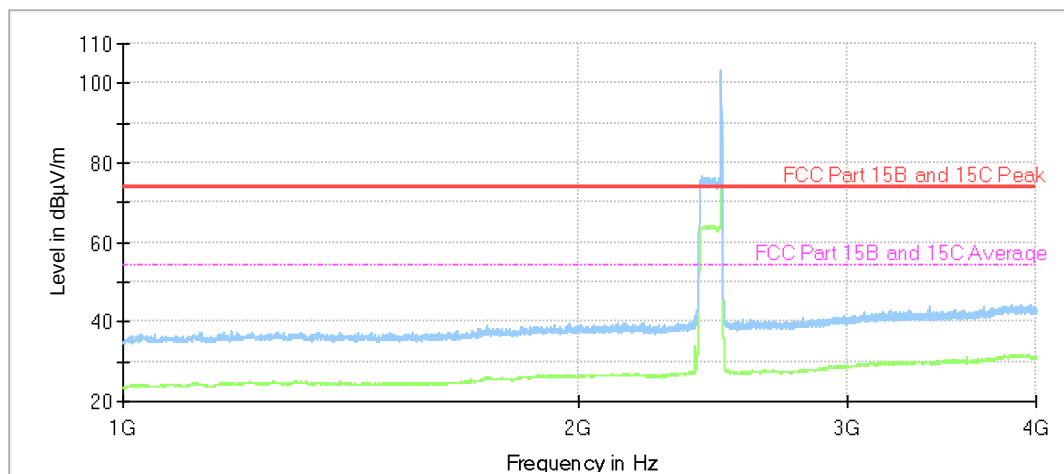
**Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance. TX mid channel, External antenna  
Carrier is attenuated by band rejection filter. Powered via PoE (AH40)**



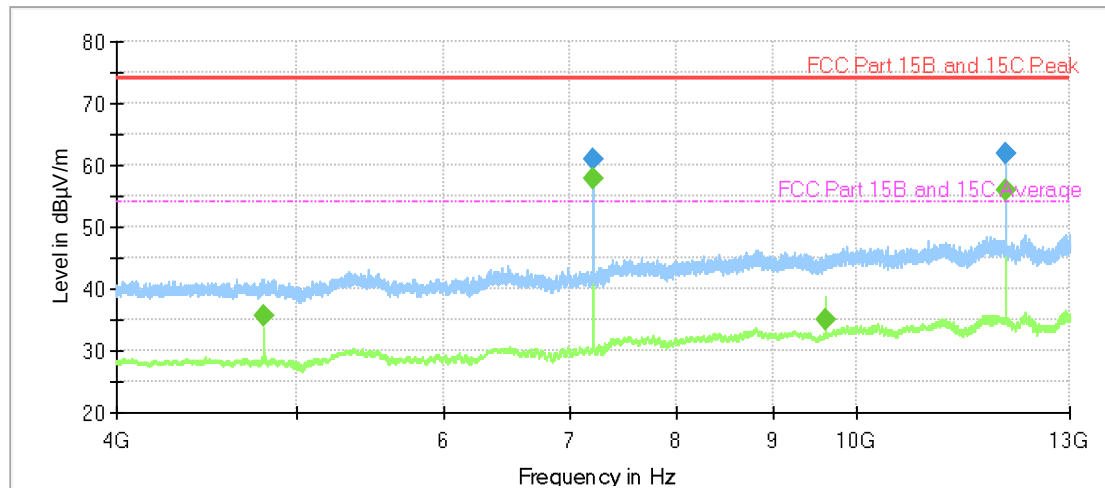
**Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance. TX mid channel, External antenna**  
**Carrier is attenuated by band rejection filter. Powered via AC/DC (AH20)**



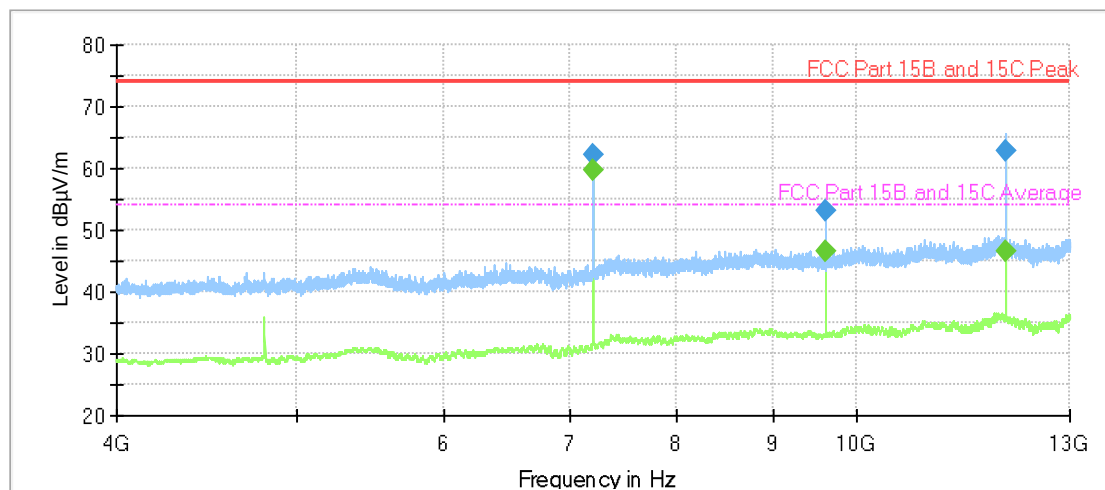
**Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance. TX high channel, External antenna**  
**Carrier is attenuated by band rejection filter. Powered via PoE (AH40)**



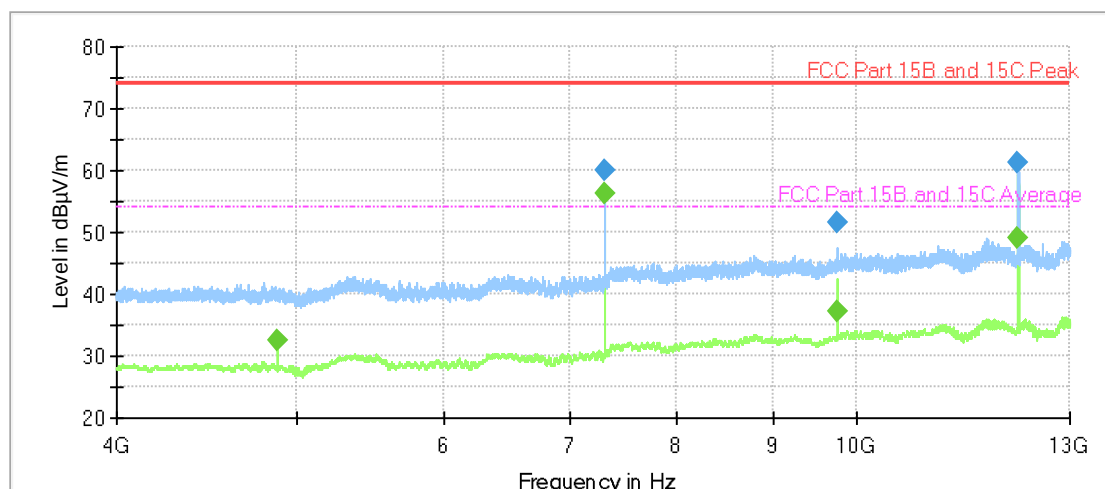
**Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance. TX high channel, External antenna**  
**Carrier is attenuated by band rejection filter. Powered via AC/DC (AH20)**



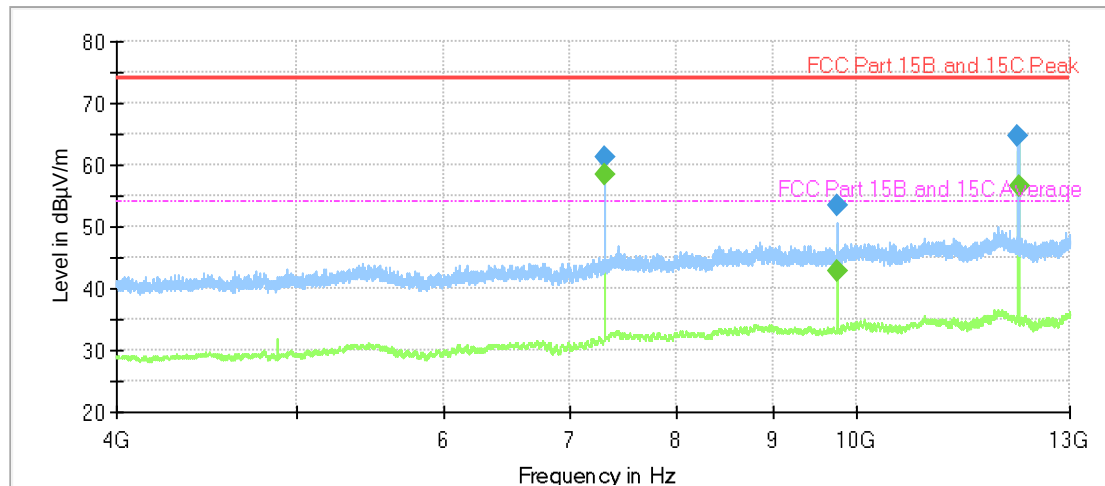
**Diagram, Peak overview sweep, 4– 13 GHz at 3 m distance. TX low channel, Internal antenna  
Emissions below 4000 MHz are attenuated by high-pass filter. Powered via PoE (AH40)**



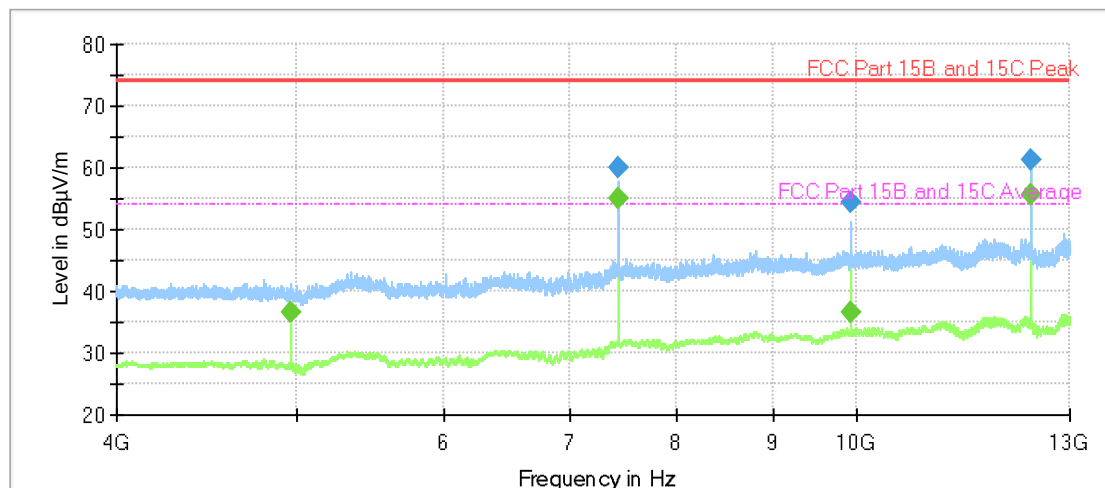
**Diagram, Peak overview sweep, 4– 13 GHz at 3 m distance. TX low channel, Internal antenna  
Emissions below 4000 MHz are attenuated by high-pass filter. Powered via AC/DC (AH20)**



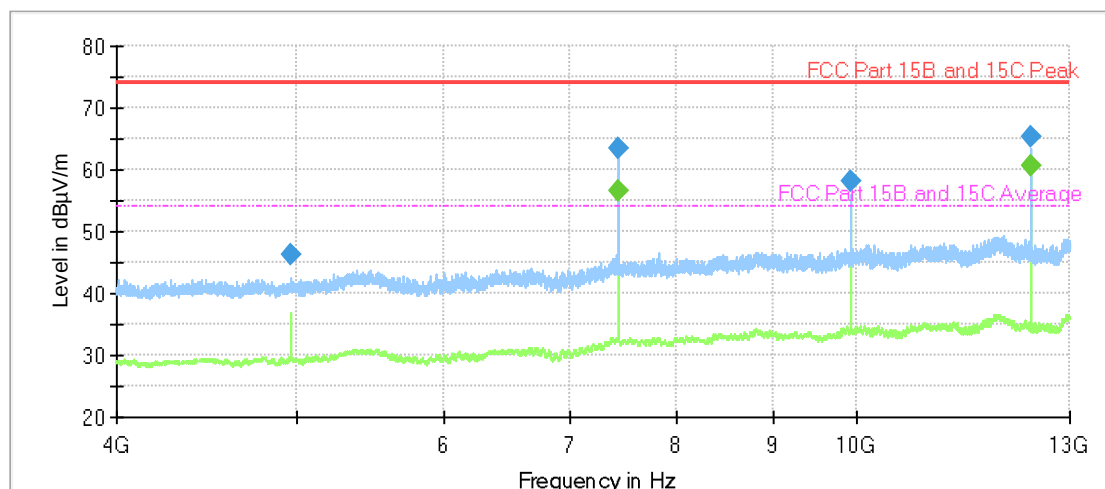
**Diagram, Peak overview sweep, 4– 13 GHz at 3 m distance. TX mid channel, Internal antenna  
Emissions below 4000 MHz are attenuated by high-pass filter. Powered via PoE (AH40)**



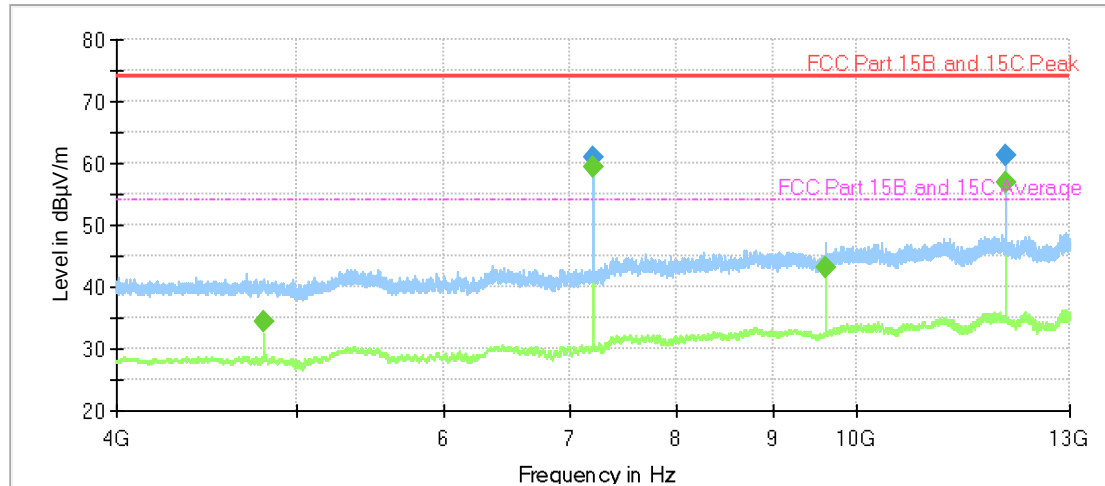
**Diagram, Peak overview sweep, 4– 13 GHz at 3 m distance. TX mid channel, Internal antenna**  
Emissions below 4000 MHz are attenuated by high-pass filter. Powered via AC/DC (AH20)



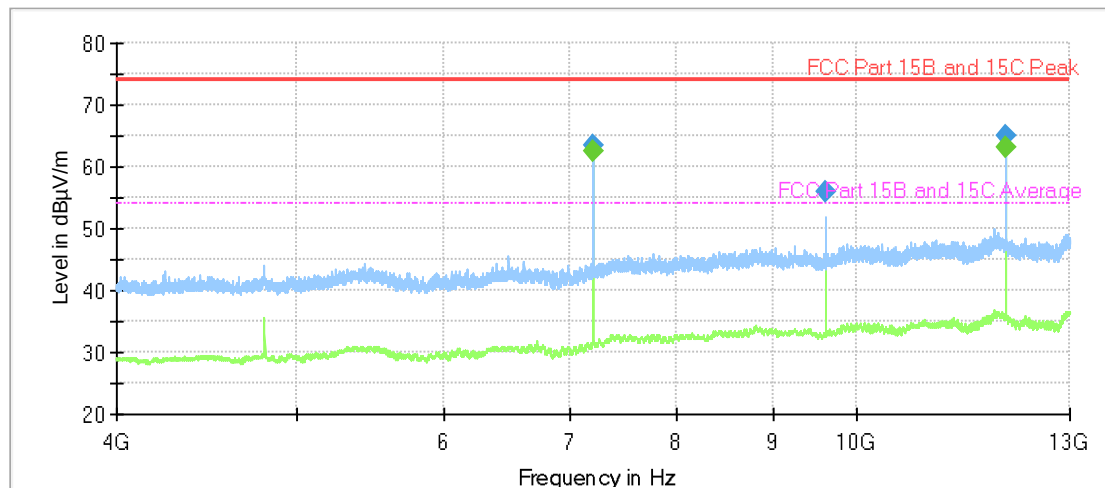
**Diagram, Peak overview sweep, 4– 13 GHz at 3 m distance. TX high channel, Internal antenna**  
Emissions below 4000 MHz are attenuated by high-pass filter. Powered via PoE (AH40)



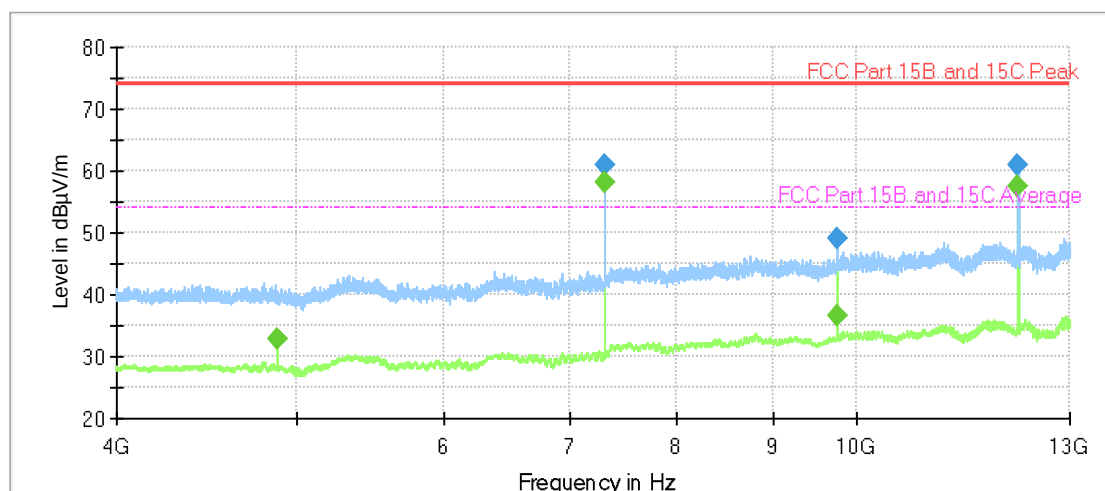
**Diagram, Peak overview sweep, 4– 13 GHz at 3 m distance. TX high channel, Internal antenna**  
Emissions below 4000 MHz are attenuated by high-pass filter. Powered via AC/DC (AH20)



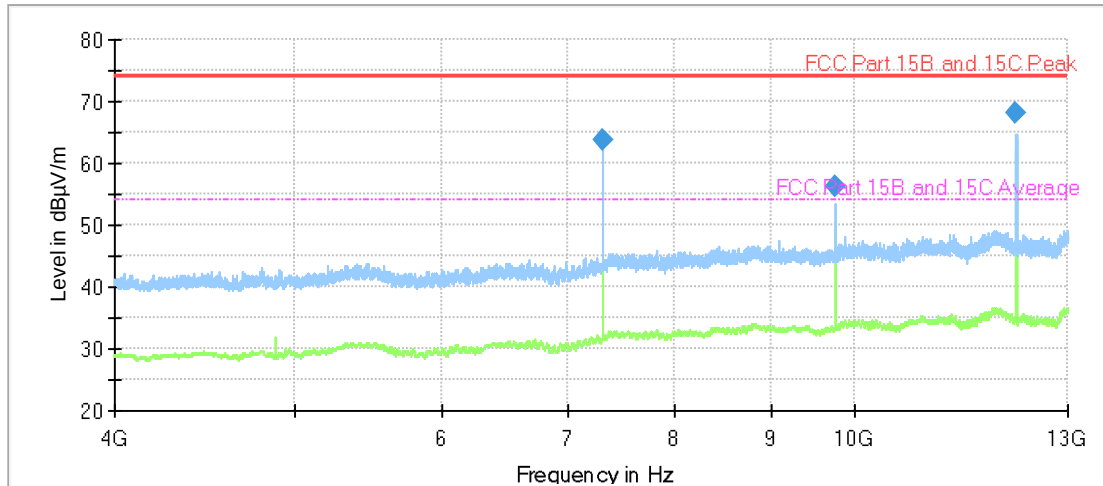
**Diagram, Peak overview sweep, 4– 13 GHz at 3 m distance. TX low channel, External antenna**  
**Emissions below 4000 MHz are attenuated by high-pass filter. Powered via PoE (AH40)**



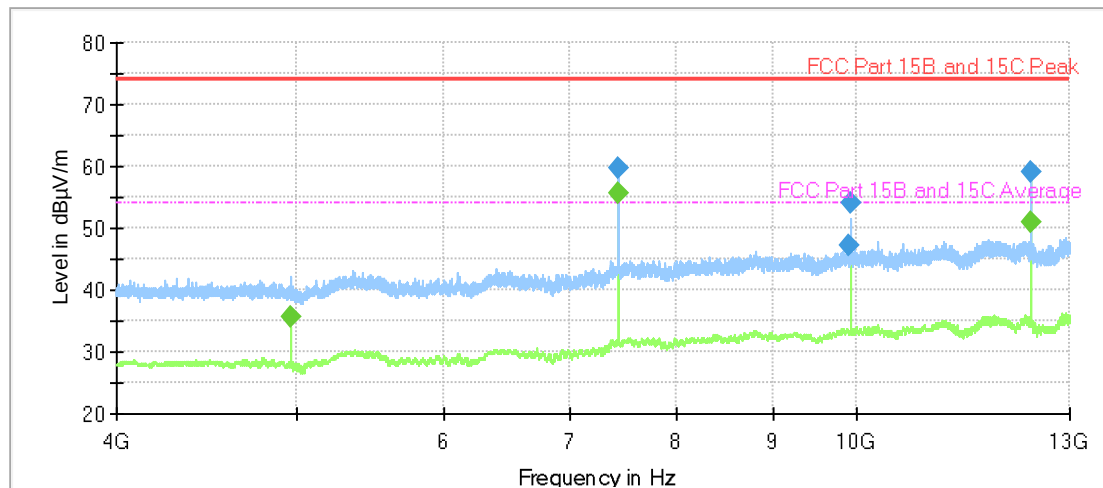
**Diagram, Peak overview sweep, 4– 13 GHz at 3 m distance. TX low channel, External antenna**  
**Emissions below 4000 MHz are attenuated by high-pass filter. Powered via AC/DC (AH20)**



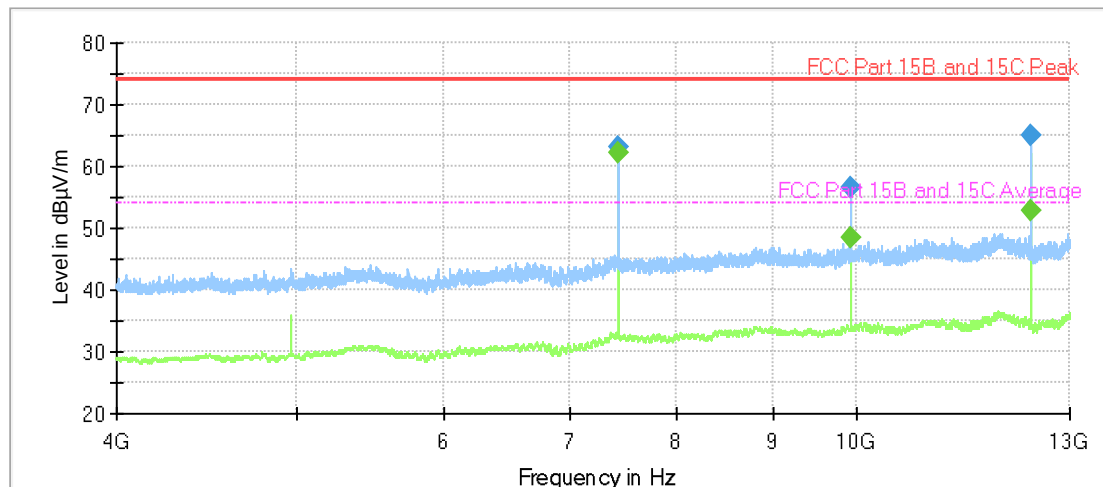
**Diagram, Peak overview sweep, 4– 13 GHz at 3 m distance. TX mid channel, External antenna**  
**Emissions below 4000 MHz are attenuated by high-pass filter. Powered via PoE (AH40)**



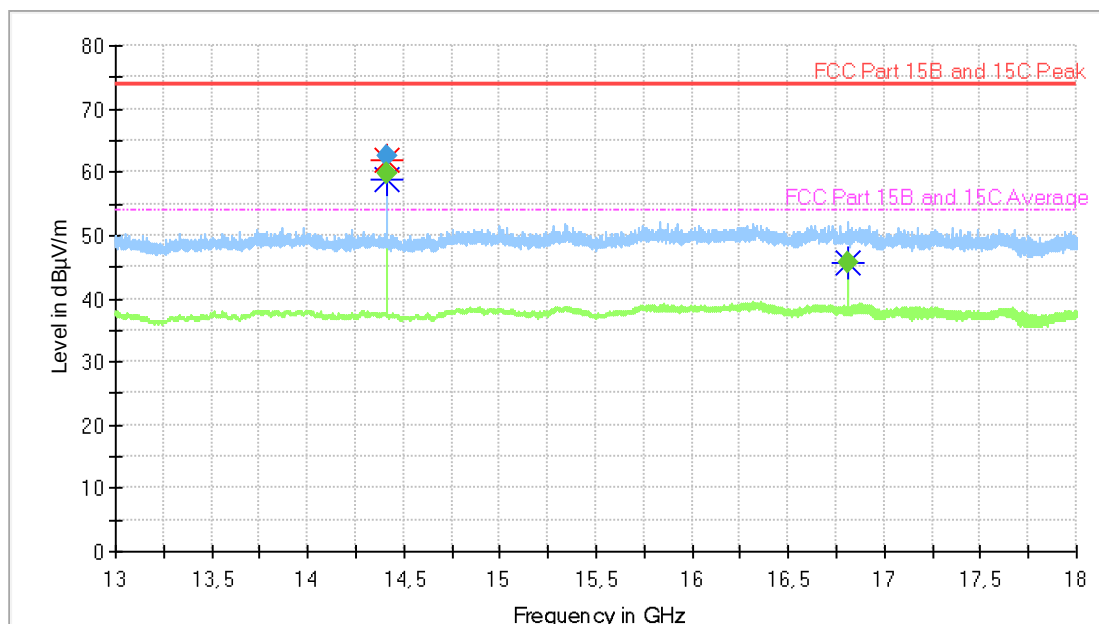
**Diagram, Peak overview sweep, 4– 13 GHz at 3 m distance. TX mid channel, External antenna**  
**Emissions below 4000 MHz are attenuated by high-pass filter. Powered via AC/DC (AH20)**



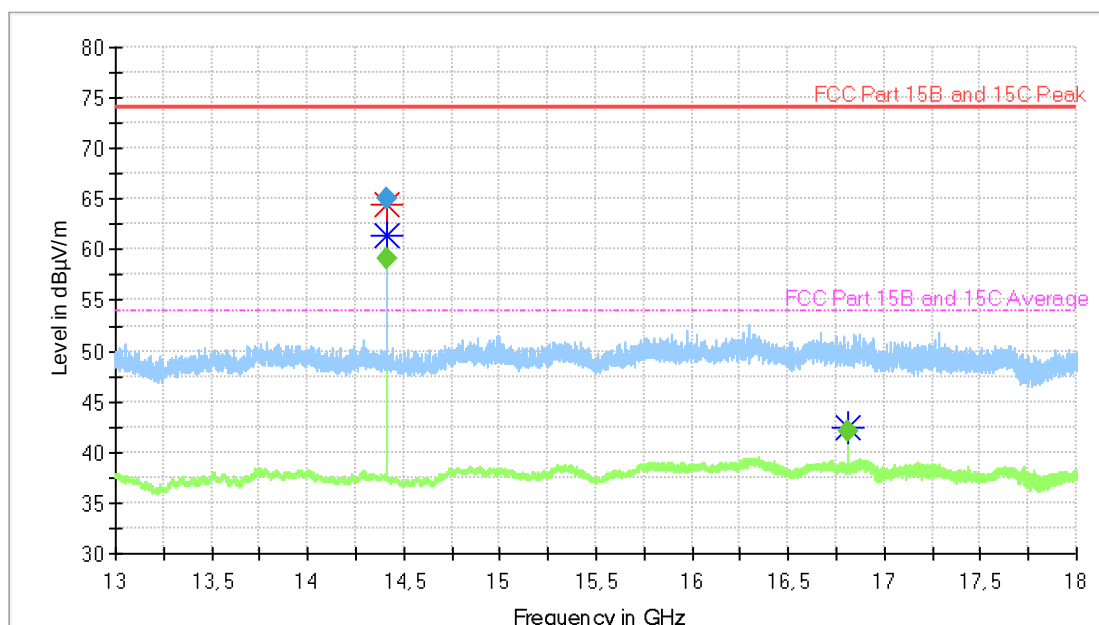
**Diagram, Peak overview sweep, 4– 13 GHz at 3 m distance. TX high channel, External antenna**  
**Emissions below 4000 MHz are attenuated by high-pass filter. Powered via PoE (AH40)**



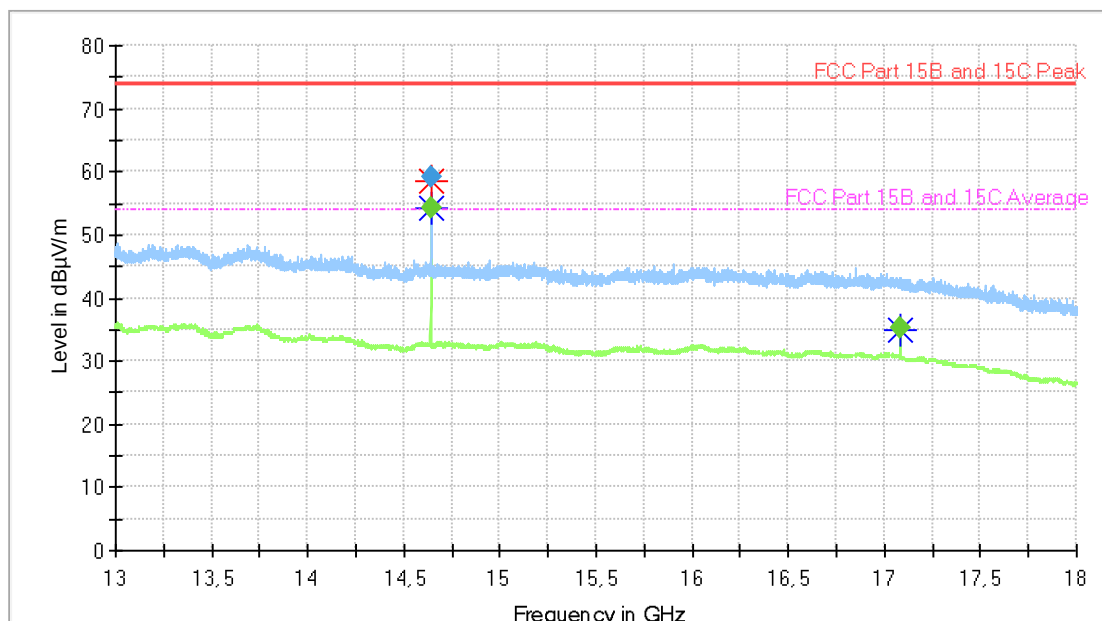
**Diagram, Peak overview sweep, 4– 13 GHz at 3 m distance. TX high channel, External antenna**  
**Emissions below 4000 MHz are attenuated by high-pass filter. Powered via AC/DC (AH20)**



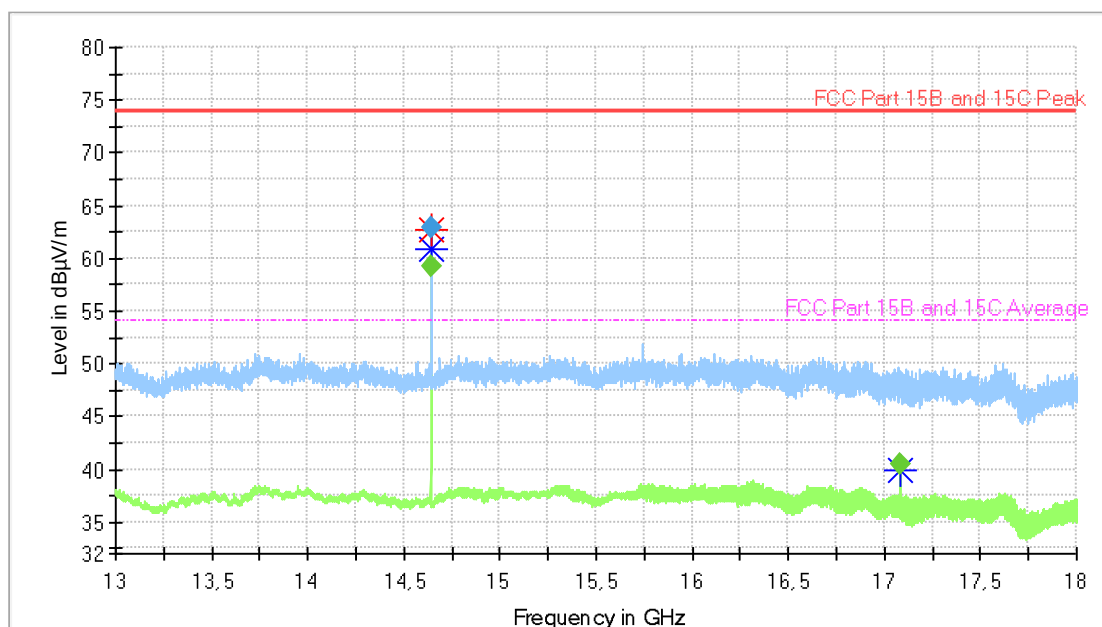
Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX low channel, Internal antenna. Powered via PoE (AH40)



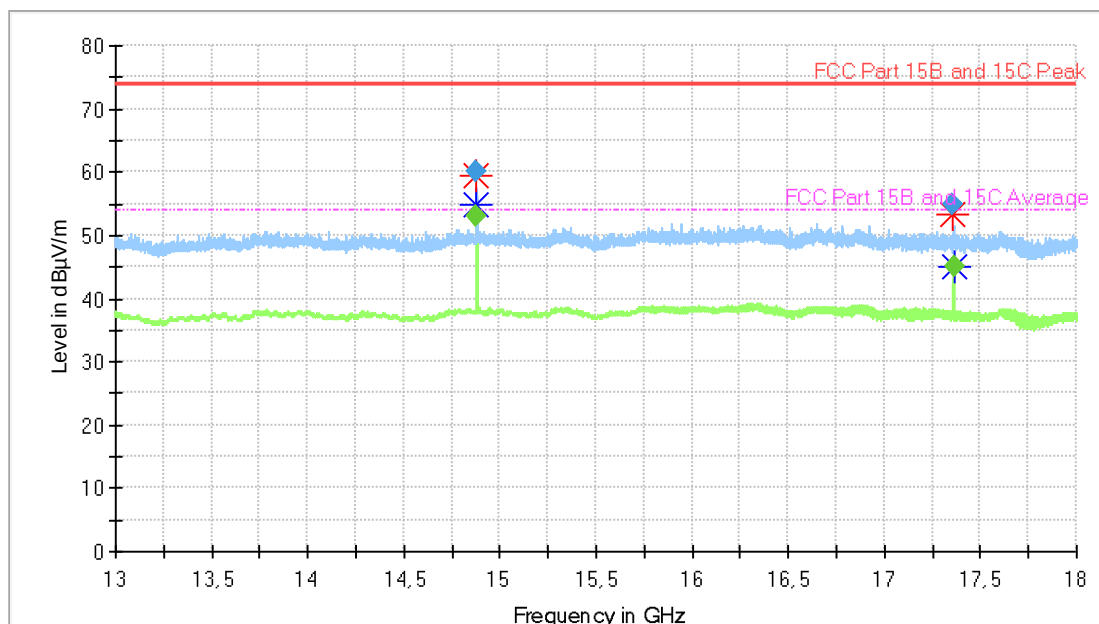
Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX low channel, Internal antenna. Powered via AC/DC (AH20)



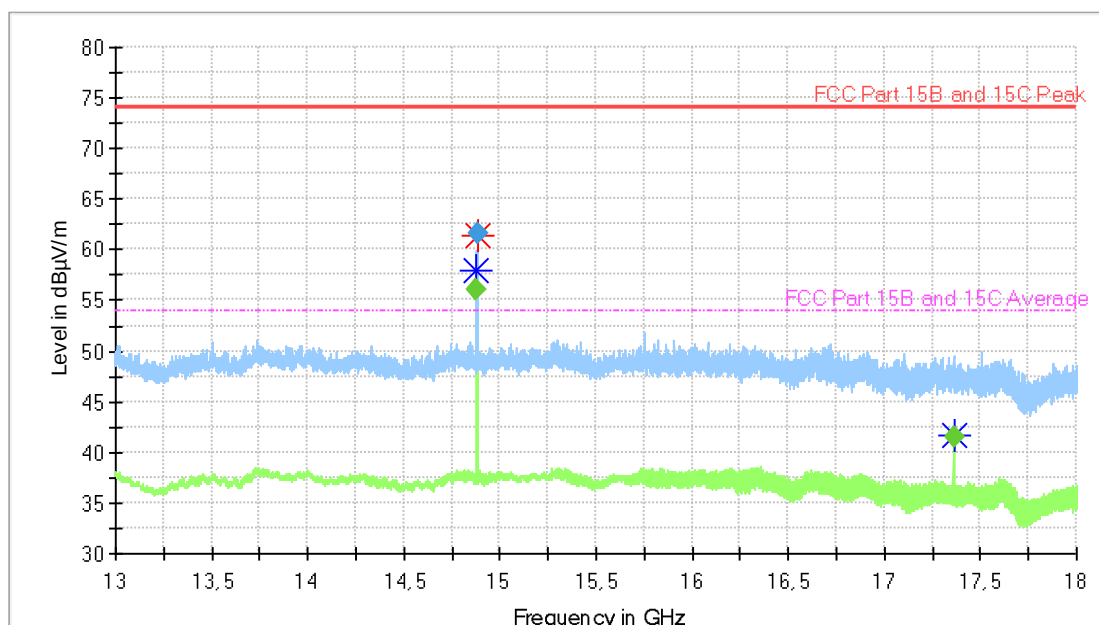
Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX mid channel, Internal antenna. Powered via PoE (AH40)



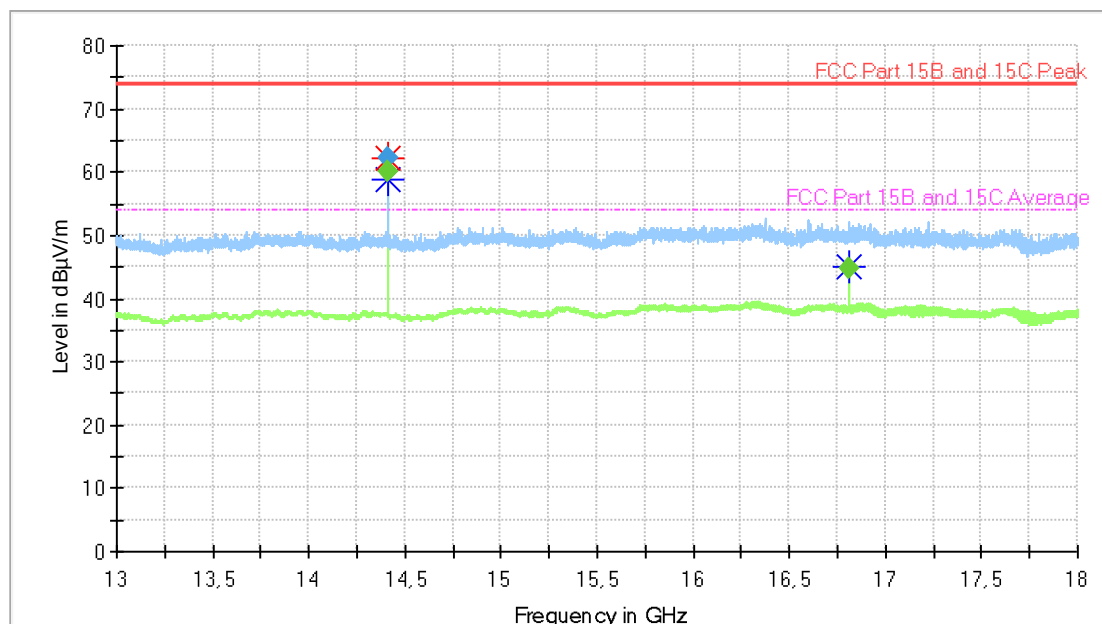
Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX mid channel, Internal antenna. Powered via AC/DC (AH20)



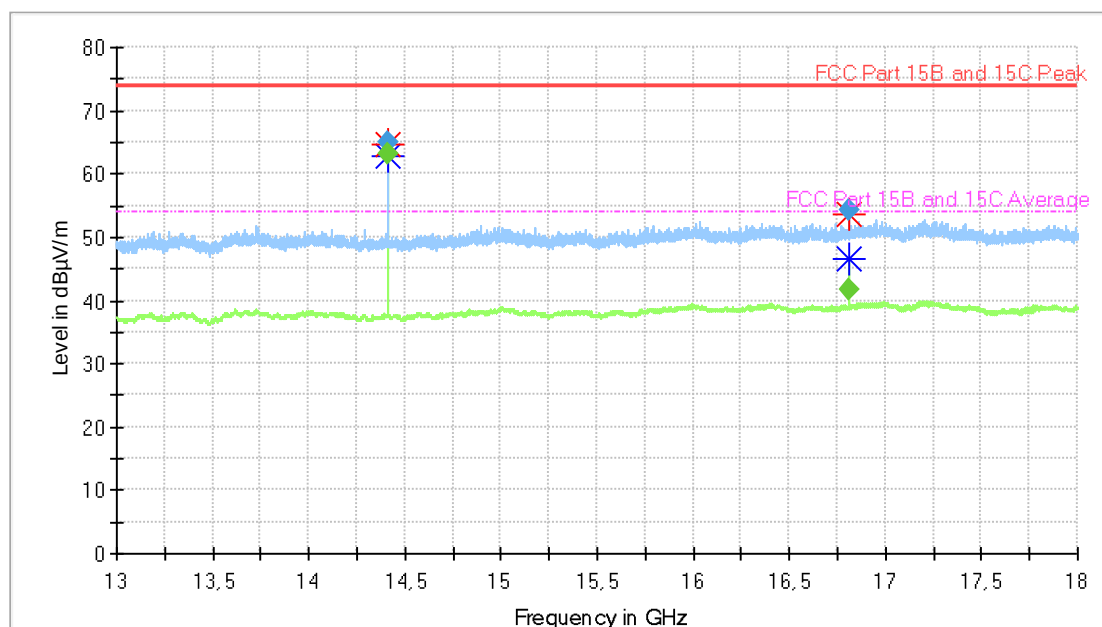
**Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX high channel, Internal antenna. Powered via PoE (AH40)**



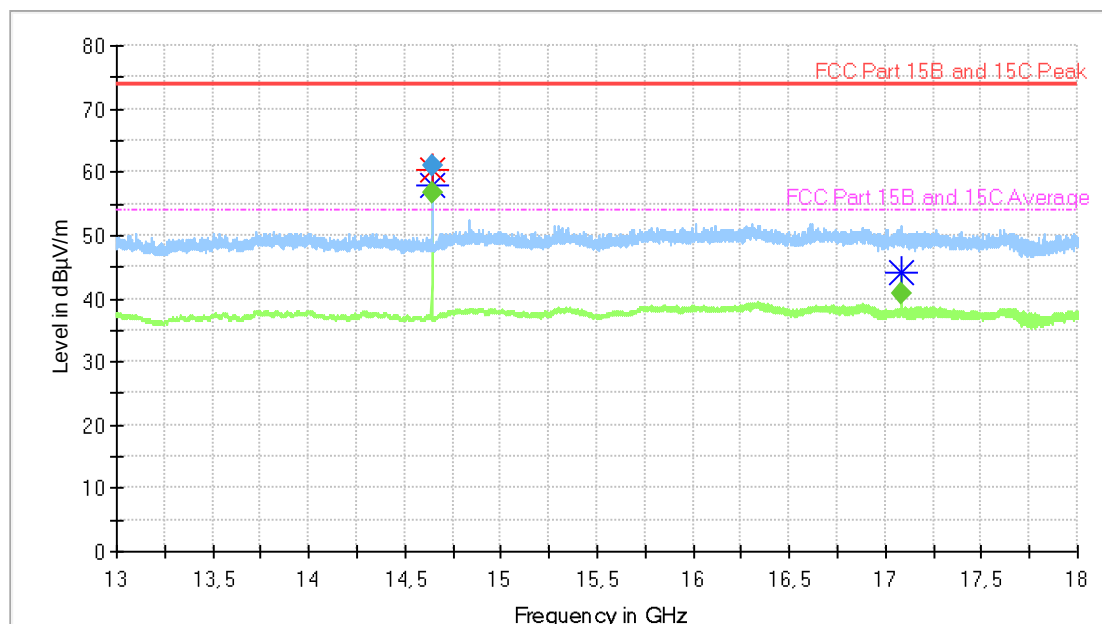
**Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX high channel, Internal antenna. Powered via AC/DC (AH20)**



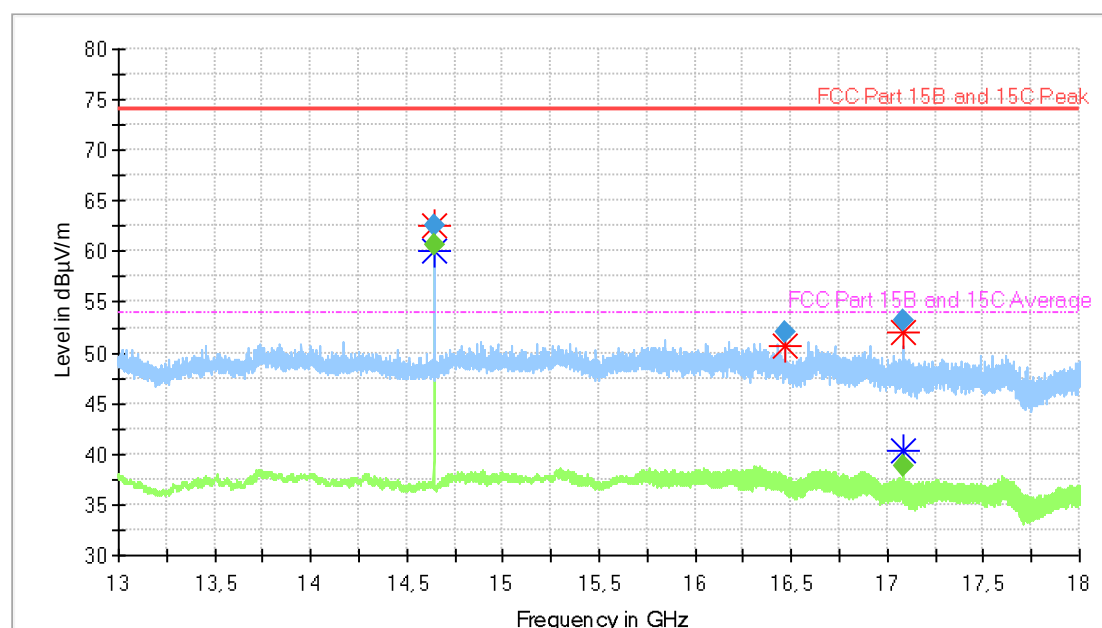
**Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX low channel, External antenna. Powered via PoE (AH40)**



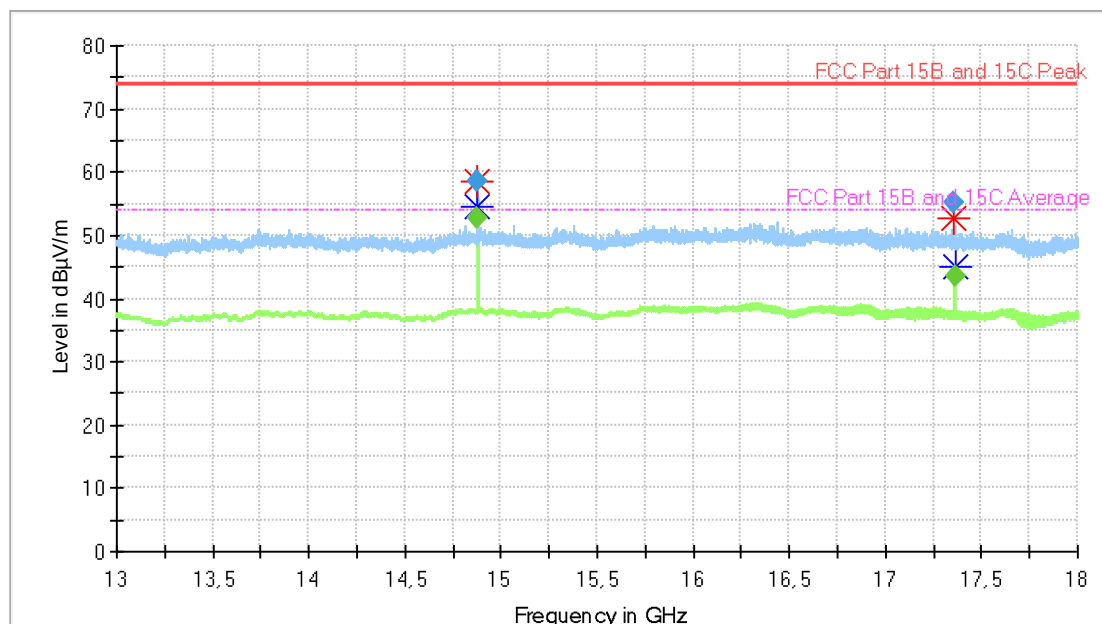
**Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX low channel, External antenna. Powered via AC/DC (AH20)**



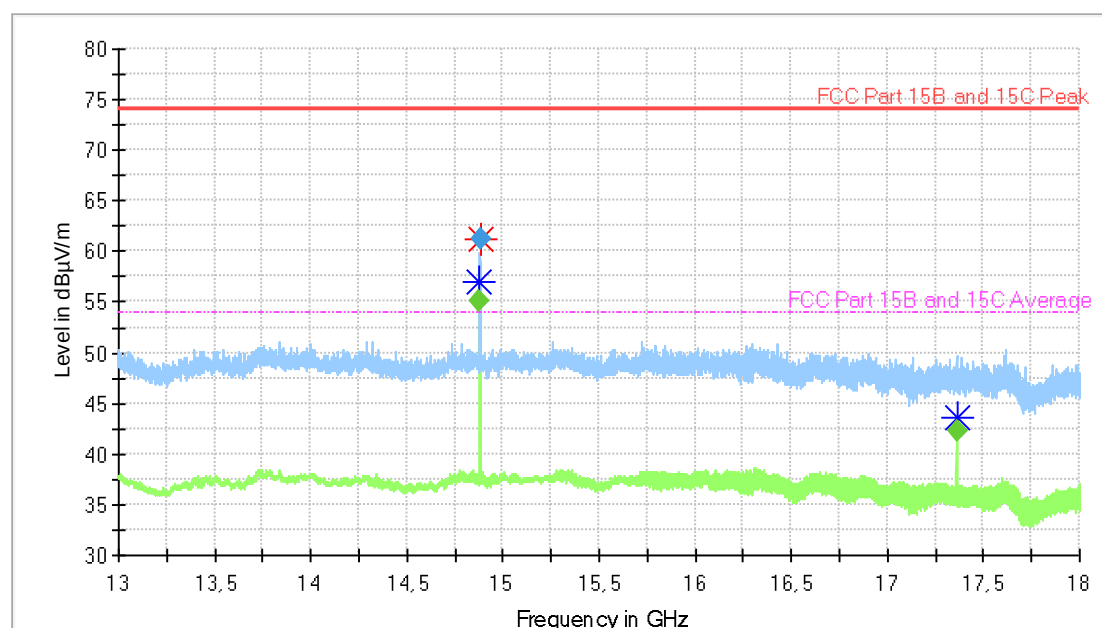
Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX mid channel,  
External antenna. Powered via PoE (AH40)



Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX mid channel,  
External antenna. Powered via AC/DC (AH20)



**Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX high channel, External antenna. Powered via PoE (AH40)**



**Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX high channel, External antenna. Powered via AC/DC (AH20)**