



LCIE



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Template : November 10<sup>th</sup>, 2022

# TEST REPORT

N°: 14198293-776033-C (FILE#3899006)

VERSION: 02

**Subject** Electromagnetic compatibility tests according to the standards:  
FCC CFR 47 Part 15, Subpart B  
ANSI C63.4 / ANSI C63.4a  
ICES-003

**Issued to** SRETT  
121 rue d'aguesseau  
92100 - BOULOGNE BILLANCOURT

**Apparatus under test**

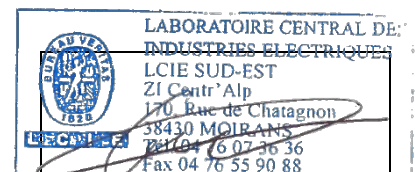
Product Wireless pressure and temperature sensors  
Trade mark BumbleBee  
Manufacturer SRETT  
Family range (see annex 1) P\*\*\*\*\*32\* / 1001910 / T\*\*\*32\*\*\*\* / 1001920  
Model under test 1001910  
Serial number 070049 and 070070  
FCCID RDT-1003135  
IC NC

**Conclusion** See Test Program chapter

Test date February 10, 2023  
Test location LCIE Grenoble  
FCC Test site FR0008 - 197516  
ISED Test site FR0008 - 6500A  
Sample receipt date November 28, 2022  
Composition of document 24 pages  
Document issued on February 14, 2023

**Written by :**  
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Tests operator

**Approved by :**  
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Technical manager



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## PUBLICATION HISTORY

| Version | Date              | Author         | Modification                                                               |
|---------|-------------------|----------------|----------------------------------------------------------------------------|
| 01      | February 06, 2023 | Majid MOURZAGH | Creation of the document                                                   |
| 02      | February 14, 2023 | Majid MOURZAGH | Measure comply with the requirements of C63.4 for measurements above 1 GHz |

*Each new edition of this test report replaces and cancels the previous edition. The control of the old editions of report is under responsibility of client.*



|                |
|----------------|
| <b>SUMMARY</b> |
|----------------|

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## 1. TEST PROGRAM

### Standard:

- ✓ FCC Part 15, Subpart B (Digital Devices)
- ✓ ANSI C63.4 (2014) / ANSI C63.4a (2017)
- ✓ ICES-003 (2020)

### 1.1.1. Requirements for disturbance emissions – Class A

| EMISSION TEST                                                              | LIMITS                                        |                |             | RESULTS<br>(Comments) |
|----------------------------------------------------------------------------|-----------------------------------------------|----------------|-------------|-----------------------|
| Limits for conducted disturbance<br>150kHz-30MHz<br>FCC §15.107 / ICES-003 | Access: AC power                              |                |             | NA                    |
|                                                                            | Frequency                                     | Quasi-peak     | Average     |                       |
|                                                                            | 150-500kHz                                    | 79 dBµV        | 66 dBµV     |                       |
|                                                                            | 0.5-30MHz                                     | 73 dBµV        | 60 dBµV     |                       |
| Radiated emissions<br>30MHz-1GHz<br>FCC §15.109                            | Access: Enclosure port of ancillary equipment |                |             | PASS                  |
|                                                                            | Frequency                                     | Quasi-peak @3m |             |                       |
|                                                                            | 30MHz-88MHz                                   | 49.5 dBµV/m    |             |                       |
|                                                                            | 88MHz-216MHz                                  | 53.9 dBµV/m    |             |                       |
|                                                                            | 216MHz-960MHz                                 | 56.9 dBµV/m    |             |                       |
|                                                                            | Above 960MHz                                  | 60.0 dBµV/m    |             |                       |
| Radiated emissions<br>30MHz-1GHz<br>ICES-003                               | Access: Enclosure port of ancillary equipment |                |             | PASS                  |
|                                                                            | Frequency                                     | Quasi-peak @3m |             |                       |
|                                                                            | 30MHz-88MHz                                   | 50.0 dBµV/m    |             |                       |
|                                                                            | 88MHz-216MHz                                  | 54.0 dBµV/m    |             |                       |
|                                                                            | 216MHz-230MHz                                 | 56.9 dBµV/m    |             |                       |
|                                                                            | 230MHz-960MHz                                 | 57.0 dBµV/m    |             |                       |
|                                                                            | Above 960MHz                                  | 60.0 dBµV/m    |             |                       |
| Radiated emissions<br>1GHz-25GHz*<br>FCC §15.109 / ICES-003                | Access: Enclosure port of ancillary equipment |                |             | PASS                  |
|                                                                            | Frequency                                     | Peak @3m       | Average @3m |                       |
|                                                                            | 1- 25GHz                                      | 80.0 dBµV/m    | 60.0 dBµV/m |                       |

NA: Not Applicable / NP: Not Performed, not requested by the customer (It cannot be taken into account for the declaration of conformity)

°: Divergence, the last version is used to make it possible to test the product with the standard which describes the current state of the art and thus to answer as well as possible his environment of final use.

\*§15.33: The highest internal source of a testing device is defined like more the highest frequency generated or used in the testing device or on which the testing device works or agrees.

- If the highest frequency of the internal sources of the testing device is lower than 108 MHz, measurement must be only performed until 1GHz.

- If the highest frequency of the internal sources of the testing device ranges between 108 MHz and 500 MHz, measurement must be only performed until 2GHz.

- If the highest frequency of the internal sources of the testing device ranges between 500 MHz and 1 GHz, measurement must be only performed until 5GHz.

If the highest frequency of the internal sources of the testing device is above 1 GHz, measurement must be only performed until 5 times the highest frequency or 40 GHz, while taking smallest of both.

Special condition for intentional radiator:

- For a composite system comprised of a digital device using a clock frequency of 1 GHz as the highest frequency for the digital logic and an intentional radiator operating at 2.4 GHz, the composite is required to be investigated to the upper frequency of 24 GHz (in this case, 10 times the intentional radiator frequency is the higher frequency).
- For a composite system comprised of a digital device using a clock frequency of 2 GHz as the highest frequency for the digital logic and an intentional radiator operating at 913 MHz, the composite is required to be investigated to the upper frequency of 10 GHz (in this case, 5 times the unintentional radiator clock frequency is the higher frequency).

## 2. EQUIPMENT UNDER TEST: CONFIGURATION (DECLARED BY PROVIDER)

### 2.1. INFORMATIONS

Tests are performed on the most complete product BumbleBee 1001910, SN: 070049 an 070070 .  
See Table on chapter annex 1 for difference between products.

### 2.2. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES)

#### Equipment under test (EUT):

|                                                                                     |                   |
|-------------------------------------------------------------------------------------|-------------------|
| Model under test :                                                                  | 1001910           |
| Serial Number:                                                                      | 070049 and 070070 |
|  |                   |
| Type :                                                                              | Table-Top         |

#### Power supply:

During all the tests, EUT is supplied by  $V_{nom}$ : **3.6Vdc**

For measurement with different voltage, it will be presented in test method.

| Name    | Type    | Rating | Reference / Sn | Comments |
|---------|---------|--------|----------------|----------|
| Supply1 | Battery | 3.6V   | /              | /        |

NC: Not communicated by provider



#### Inputs/outputs - Cable:

| Access  | Type   | Length used (m) | Declared <3m | Shielded | Under test | Comments       |
|---------|--------|-----------------|--------------|----------|------------|----------------|
| Antenna | Type N | /               | No           | No       | Yes        | SOLEXY : ANH52 |

NC: Not communicated by provider

#### Auxiliary equipment used during test:

| Type   | Reference   | Sn | Comments |
|--------|-------------|----|----------|
| Laptop | LENOVO L460 | /  | /        |

### 2.3. EUT CONFIGURATION

| Hardware information                                                |                        |                              |     |
|---------------------------------------------------------------------|------------------------|------------------------------|-----|
| Highest internal frequency (PLL, Quartz, Clock, Microprocessor...): | F <sub>Highest</sub> : | 2500                         | MHz |
| Software BLE                                                        | V. :                   | RealTerm V 2.0.0.70          |     |
| Software LoRa                                                       | V. :                   | BGTOOL SDK build: 2.4.2-2500 |     |

#### Running mode n°1:

Setup:

Equipment model **1001910** SN : 070070 is powered ON and send RF BLE in continuous on Cmin

#### Running mode n°2:

Setup:

Equipment model **1001910** SN: 0700049 is powered ON and send RF LoRa in continuous on Cmin

### 2.4. EQUIPMENT MODIFICATIONS DURING THE TESTS

None



## 2.5. FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follow:

$$FS = RA + AF + CF - AG$$

Where  
FS = Field Strength  
RA = Receiver Amplitude  
AF = Antenna Factor  
CF = Cable Factor  
AG = Amplifier Gain

## 2.6. TEST DISTANCE EXTRAPOLATION – FCC/ISED

The field strength is extrapolated to the new measurement distance using formula from FCC Part15.31 (f) and §6.5-6.6 RSS-GEN:

Below 30MHz,

$$FS_{\text{limit}} = FS_{\text{max}} - 40 \log \left( \frac{d_{\text{limit}}}{d_{\text{measure}}} \right)$$

Above 30MHz,

$$FS_{\text{limit}} = FS_{\text{max}} - 20 \log \left( \frac{d_{\text{limit}}}{d_{\text{measure}}} \right)$$

Where:

$FS_{\text{limit}}$  is the calculation of field strength at the limit distance, expressed in dBμV/m

$FS_{\text{max}}$  is the measured field strength, expressed in dBμV/m

$d_{\text{measure}}$  is the distance of the measurement point from the EUT

$d_{\text{limit}}$  is the reference limit distance

## 2.7. CALIBRATION DATE

The calibration intervals are extended at 12+2 months. This extended interval is based on the fact that there is sufficient calibration data to statistically establish a trend or based on experience of use of the test equipment to assure good measurement results for a longer period

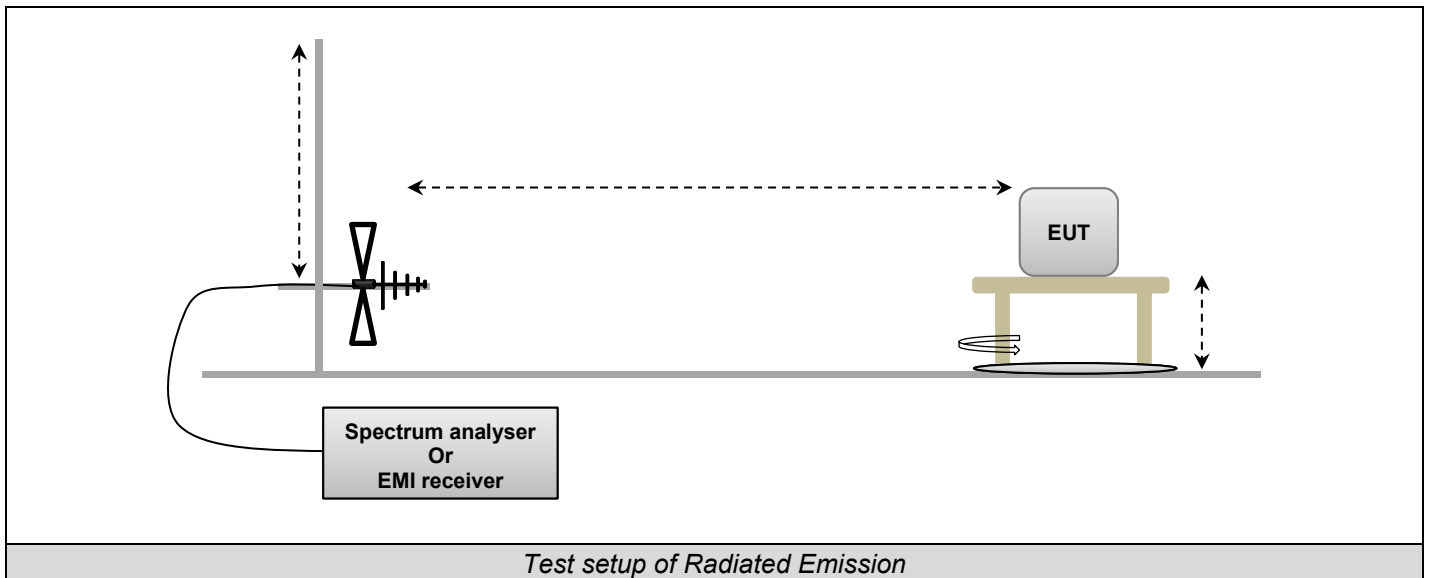
### 3. MEASUREMENT OF RADIATED EMISSION

#### 3.1. TEST CONDITIONS

Test performed by : Majid MOURZAGH  
Date of test : February 1, 2023  
Ambient temperature : 21 °C  
Relative humidity : 40 %

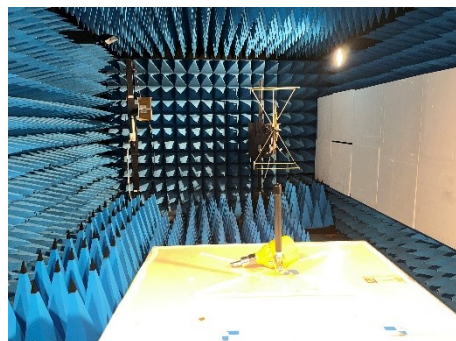
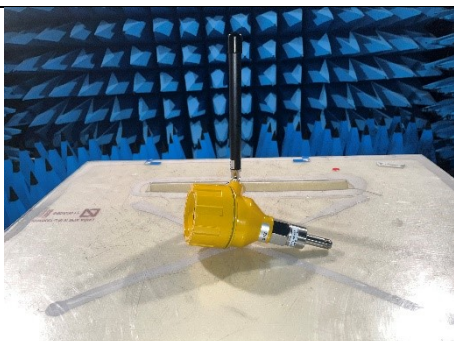
#### 3.2. TEST SETUP

The EUT and auxiliaries are set 80cm above the ground on the non-conducting table (Table-top equipment).  
The EUT is powered by  $V_{nom}$ .

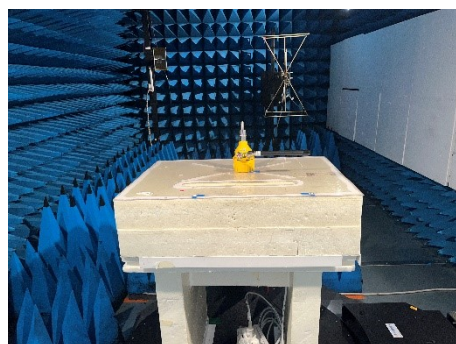
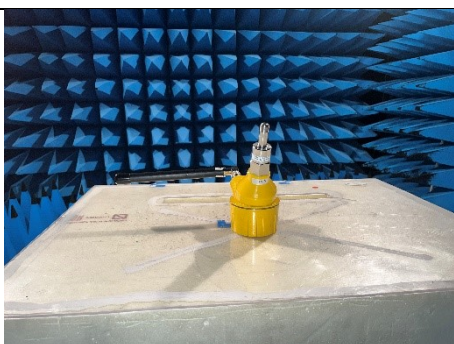


Same setup is used in semi anechoic chamber during pre-characterization, with a distance of 3m between EUT and antenna.





Axis XY on FAR test setup set at 80cm



Axis Z on FAR test setup set at 80cm

*Photo in anechoic chamber*





Axis XY on OATS



Axis Z on OATS

Photo on OATS



### 3.3. TEST METHOD

#### 3.3.1. 30MHz –1GHz

##### ***Pre-qualification measurement***

A pre-scan of all the setup has been performed in a 3 meters semi-anechoic chamber. Test is performed with antenna centered on EUT in horizontal (H) and vertical (V) polarization, continuous linear turntable azimuth search was performed with 360 degrees range. Measurements are performed on all axis of EUT used in normal configuration. The pre-characterization graphs are obtained in PEAK detection.

##### ***Qualification***

The installation of EUT is identical than for pre-qualification measurements on an Open Area Test Site with a 10 meters distance between EUT and antenna. In this case, it corrected according to requirements of 15.209.e),  $M@3m = M@10m + 10.5dB$ . Test is performed in horizontal (H) and vertical (V) polarization and the height antenna is varied from 1m to 4m. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurements are performed on all axis of EUT used in normal configuration. A summary of the worst case emissions found in all test configurations and modes is shown.

#### 3.3.2. 1GHz – 25GHz:

##### ***Pre-qualification measurement***

A pre-scan of all the setup has been performed in a 3 meters full anechoic chamber. Test is performed with antenna centered on EUT in horizontal (H) and vertical (V) polarization, continuous linear turntable azimuth search was performed with 360 degrees range. Measurements are performed on all axis of EUT used in normal configuration. The pre-characterization graphs are obtained in PEAK and AVERAGE detection.

##### ***Qualification***

The installation of EUT is identical for pre-characterization measurements. Test is performed in horizontal (H) and vertical (V) polarization and the height antenna is fixed and centered on the EUT, EUT smaller than the beamwidth of the measurement antenna.

Minimal beamwidth of the measurement antenna used: ETS3115 /  $w@3m=2.1m < 14GHz$  /  $w@3m=0.9m < 18GHz$

Continuous linear turntable azimuth search was performed with 360 degrees range. Measurements are performed on all axis of EUT used in normal configuration. A summary of the worst case emissions found in all test configurations and modes is shown.

### 3.4. TEST EQUIPMENT LIST

| TEST EQUIPMENT USED             |                 |                  |               |          |         |
|---------------------------------|-----------------|------------------|---------------|----------|---------|
| Description                     | Manufacturer    | Model            | Identifier    | Cal_Date | Cal_Due |
| BAT EMC                         | NEXIO           | v3.21.0.32       | L1000115      |          |         |
| Amplifier 9kHz - 40GHz          | LCIE SUD EST    | —                | A7102082      | 05/22    | 05/24   |
| Antenna Bi-log                  | AH System       | SAS-521-7        | C2040180      | 02/21    | 02/23   |
| Antenna horn 18GHz              | EMCO            | 3115             | C2042029      | 03/22    | 03/25   |
| CABLE                           | TELEDYNE        | R82-0404-8M      | A5330008      | 02/22    | 02/24   |
| Cable 0.75m                     | -               | 18GHz            | A5329900      | 08/22    | 08/24   |
| Cable 1m                        | HUBER & SUHNER  | 18GHz            | A5329705      | 08/21    | 08/23   |
| Cable 1m                        | HUBER & SUHNER  | 18GHz            | A5329706      | 08/21    | 08/23   |
| Cable SMA 40GHz 40cm            | WITHWAVE        | W101-SM1-0.4M    | A5329979      | 04/21    | 04/23   |
| Comb EMR HF                     | YORK            | CGE01            | A3169114      |          |         |
| CONTROLLER                      | INNCO           | CO3000           | D3044034      |          |         |
| Emission Cable (SMA 1m)         | TELEDYNE        | 26GHz            | A5329874      | 08/22    | 08/23   |
| Emission Cable (SMA 3.3m)       | TELEDYNE        | 26GHz            | A5329875      | 08/22    | 08/23   |
| Filter Matrice                  | LCIE SUD EST    | Combined filters | A7484078      | 09/20    | 01/23   |
| Multimeter - CEM                | FLUKE           | 189              | A1240171      | 09/21    | 09/23   |
| Rehausse Table C3               | LCIE            | —                | F2000511      |          |         |
| Rehausse Table C3               | LCIE            | —                | F2000507      |          |         |
| Semi-Anechoic chamber #3 (BF)   | SIEPEL          | —                | D3044017_BF   | 04/22    | 04/25   |
| Semi-Anechoic chamber #3 (VSWR) | SIEPEL          | —                | D3044017_VSWR | 04/22    | 04/25   |
| Spectrum analyzer               | ROHDE & SCHWARZ | FSU 26           | A4060058      | 09/21    | 09/23   |
| Table C3                        | LCIE            | —                | F2000461      |          |         |
| Thermo-hygrometer (PM1/2/3)     | KIMO            | HQ 210           | B4206022      | 01/21    | 01/23   |
| TILT                            | INNCO           | TILT             | D3044033      |          |         |
| Turntable chamber (Cage#3)      | ETS Lingren     | Model 2165       | F2000371      |          |         |
| Turntable controller (Cage#3)   | ETS Lingren     | Model 2090       | F2000444      |          |         |
| Antenna horn 40GHz              | SCHWARZBECK     | BBHA 9170        | C2042028      | 06/22    | 06/25   |
| SMA 1.5m                        | SUCOFLEX        | 18GHz            | A5329864      | 09/22    | 09/23   |
| Spectrum analyzer               | ROHDE & SCHWARZ | FSV 40           | A4060059      | 11/21    | 11/23   |

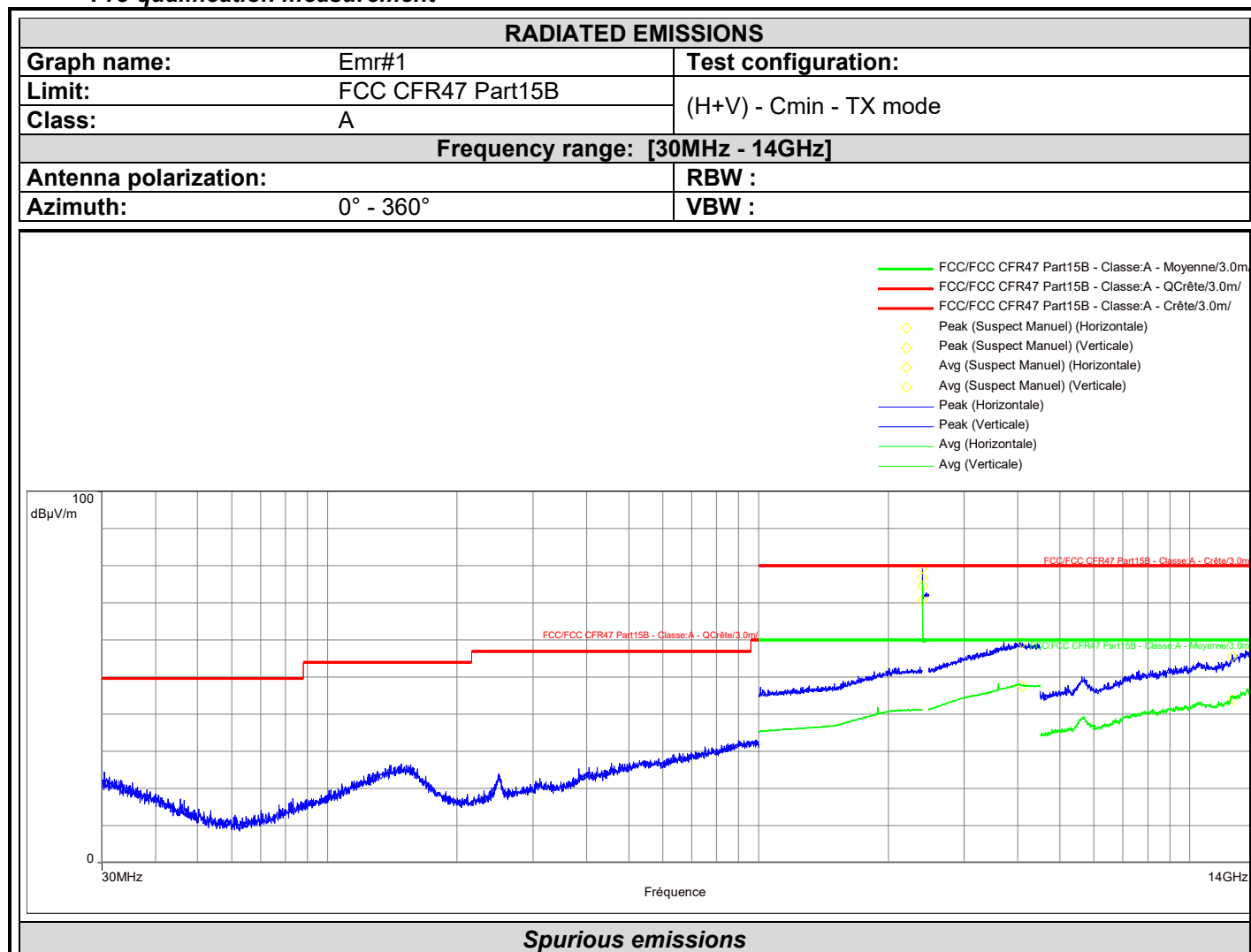
### 3.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

### 3.6. TEST RESULTS – RUNNING MODE N°1

#### 3.6.1. 30MHz –18GHz

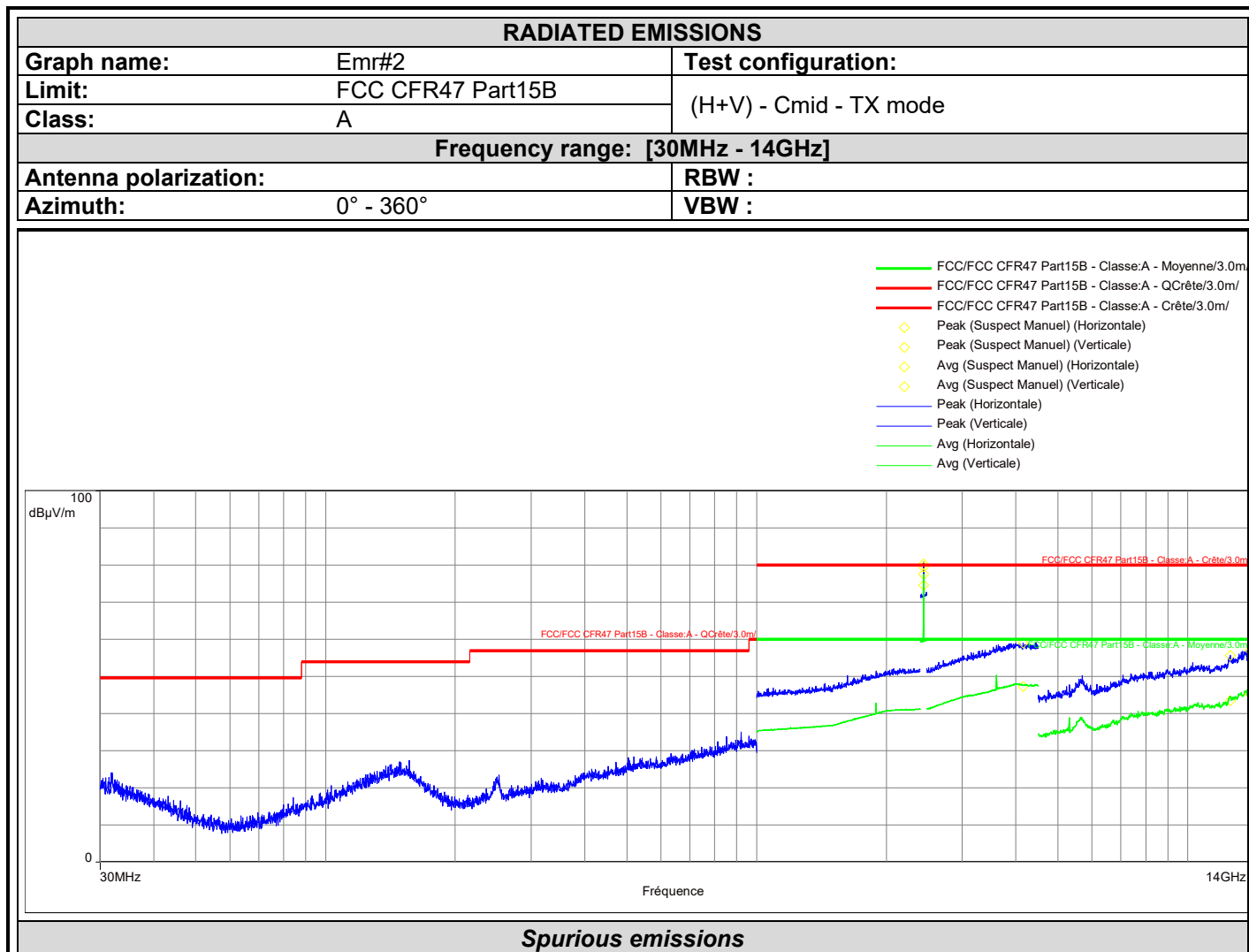
##### Pre-qualification measurement



| Frequency (MHz) | Peak (dBμV/m) | Lim.Peak (dBμV/m) | Avg (dBμV/m) | Lim.Avg (dBμV/m) | Lim.Q-Peak (dBμV/m) | Polarization | Correction (dB) |
|-----------------|---------------|-------------------|--------------|------------------|---------------------|--------------|-----------------|
| 2401.795        | 76.8          | 80.0              | 70.8         | 60.0             | /                   | Horizontal   | 35.4            |
| 4095.893        | 59.2          | 80.0              | 47.5         | 60.0             | /                   | Horizontal   | 41.0            |
| 12570.250       | 55.6          | 80.0              | 44.0         | 60.0             | /                   | Horizontal   | -9.5            |
| 13979.100       | 57.8          | 80.0              | 46.6         | 60.0             | /                   | Horizontal   | -4.9            |
| 2402.171        | 79.2          | 80.0              | 74.5         | 60.0             | /                   | Vertical     | 35.4            |



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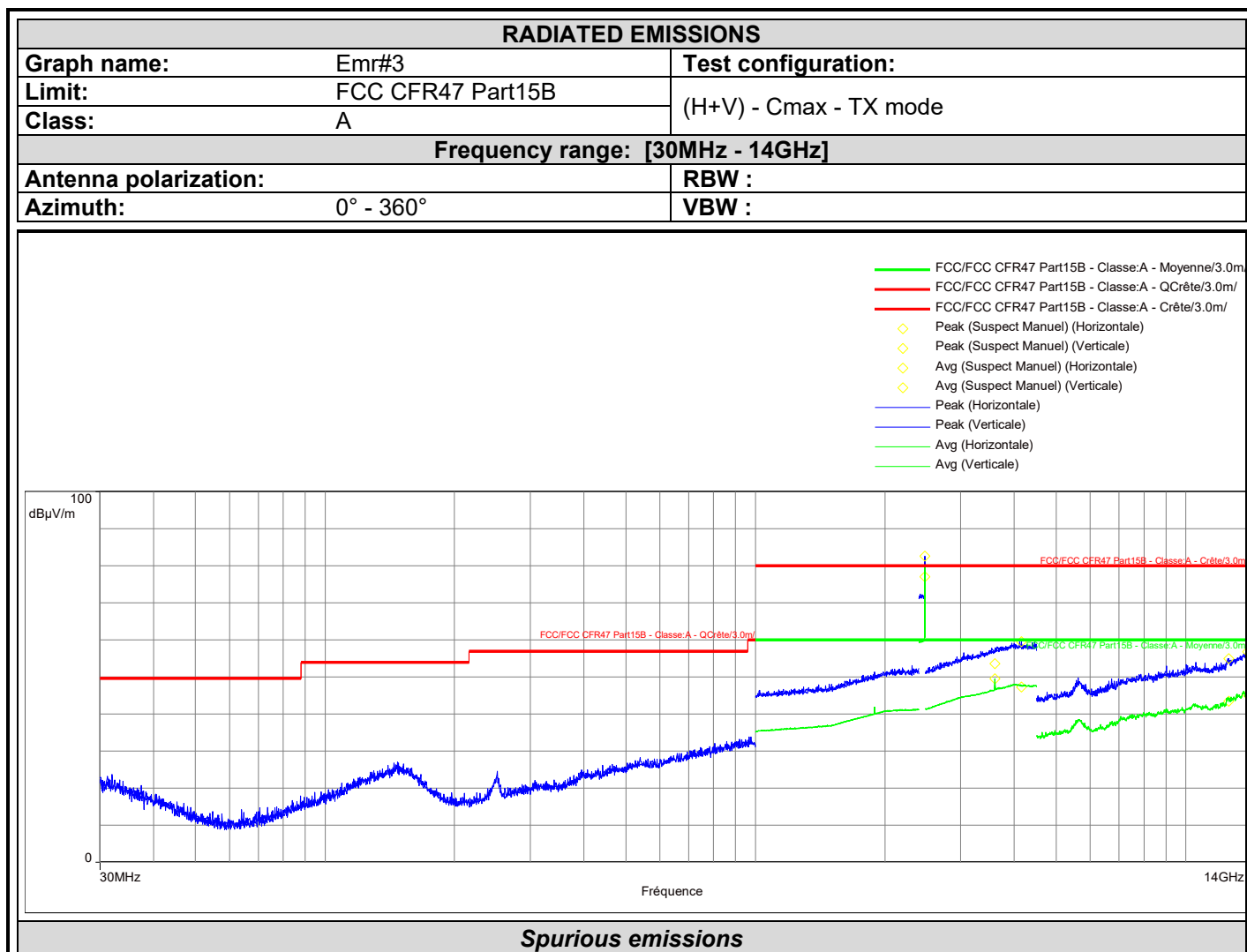


| Frequency (MHz) | Peak (dBμV/m) | Lim.Peak (dBμV/m) | Avg (dBμV/m) | Lim.Avg (dBμV/m) | Lim.Q-Peak (dBμV/m) | Polarization | Correction (dB) |
|-----------------|---------------|-------------------|--------------|------------------|---------------------|--------------|-----------------|
| 2439.871        | 79.6          | 80.0              | 74.6         | 60.0             | /                   | Horizontal   | 35.4            |
| 4155.178        | 59.0          | 80.0              | 47.3         | 60.0             | /                   | Horizontal   | 41.0            |
| 12584.500       | 55.7          | 80.0              | 43.5         | 60.0             | /                   | Horizontal   | -9.4            |
| 13971.500       | 57.1          | 80.0              | 45.2         | 60.0             | /                   | Horizontal   | -5.0            |
| 2439.955        | 80.3          | 80.0              | 77.6         | 60.0             | /                   | Vertical     | 35.4            |

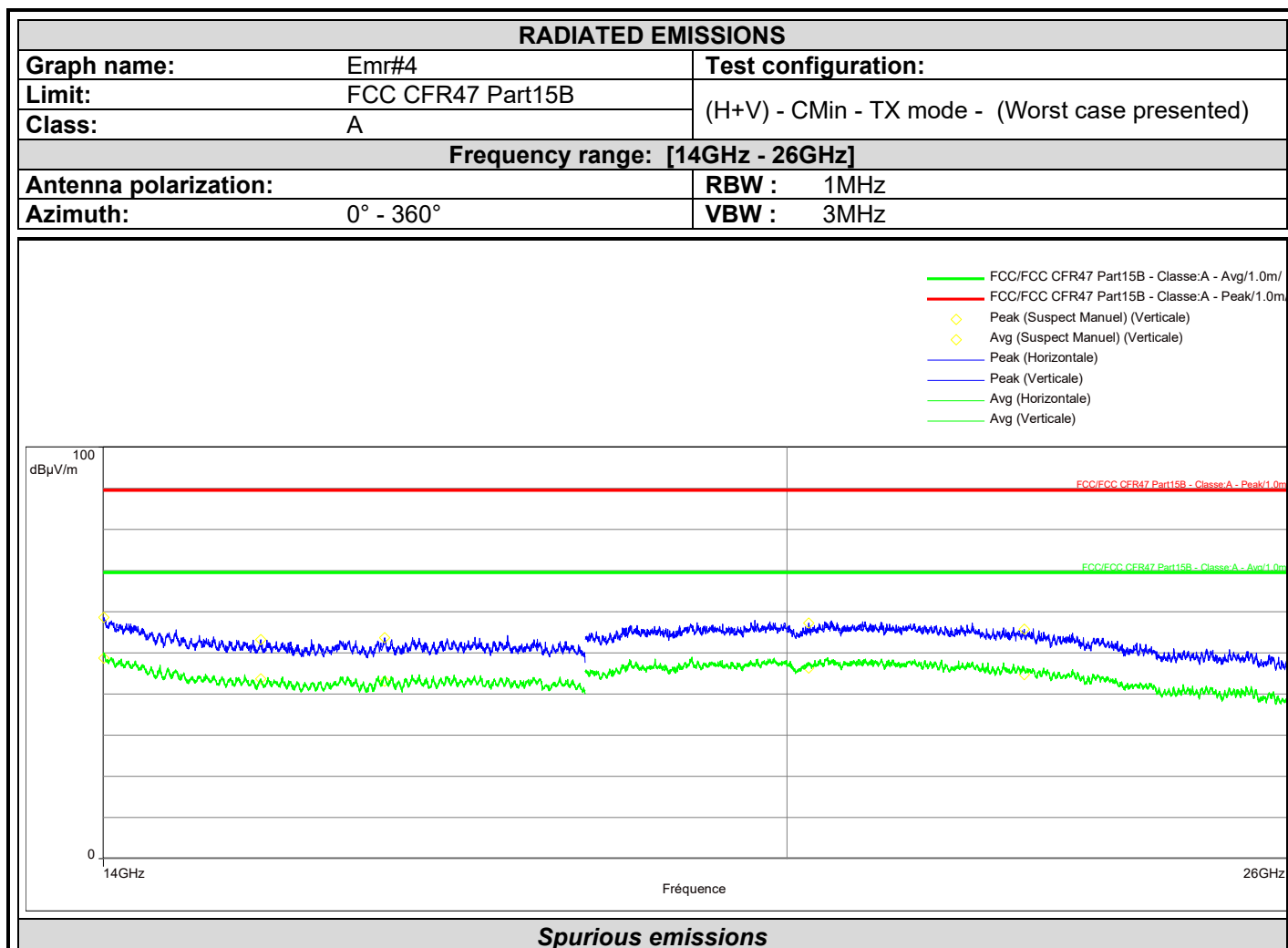




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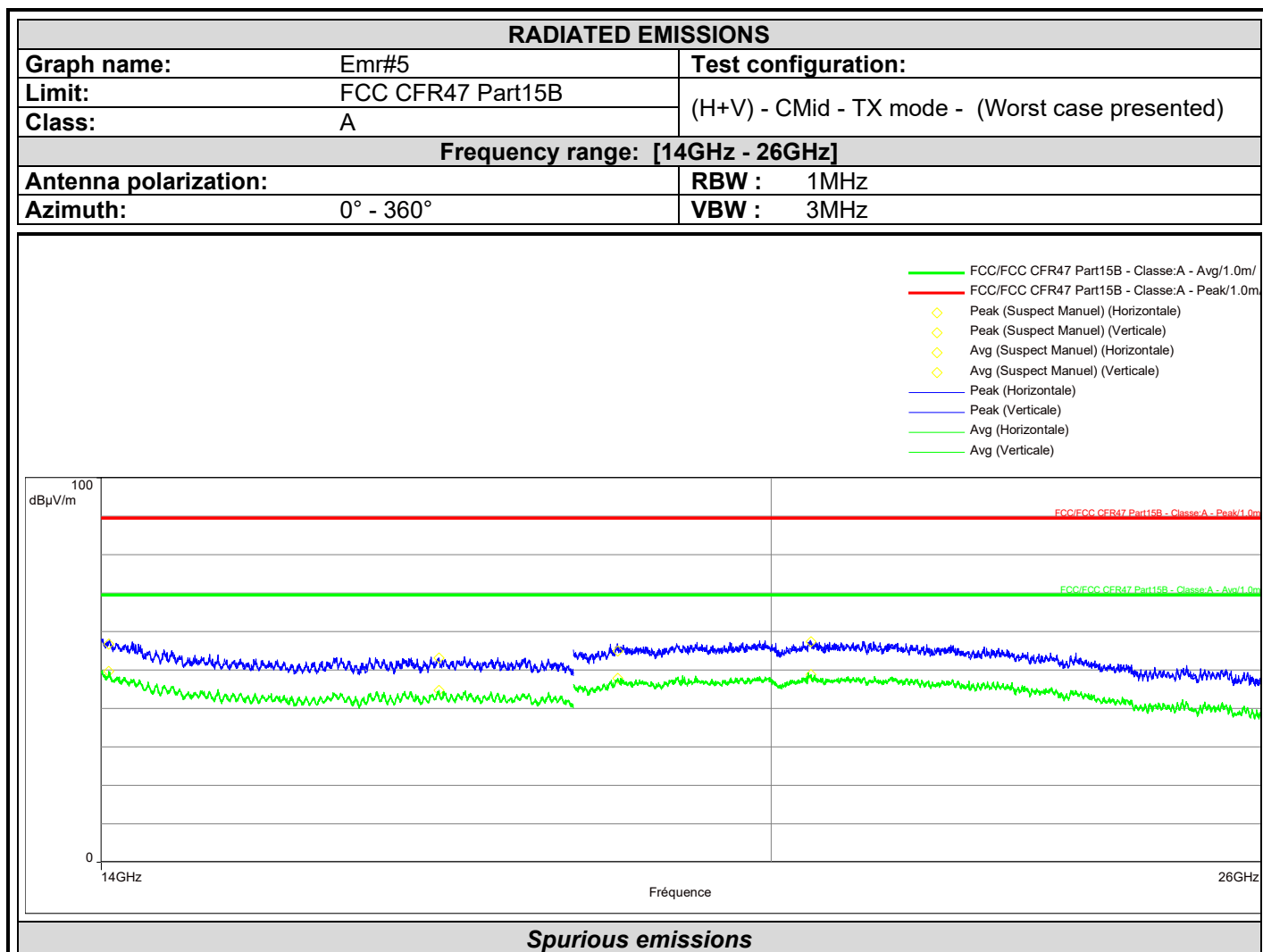


| Frequency (MHz) | Peak (dBμV/m) | Lim.Peak (dBμV/m) | Avg (dBμV/m) | Lim.Avg (dBμV/m) | Lim.Q-Peak (dBμV/m) | Polarization | Correction (dB) |
|-----------------|---------------|-------------------|--------------|------------------|---------------------|--------------|-----------------|
| 3599.834        | 53.6          | 80.0              | 49.5         | 60.0             | /                   | Horizontal   | 39.9            |
| 12591.150       | 54.9          | 80.0              | 43.4         | 60.0             | /                   | Horizontal   | -9.4            |
| 13936.350       | 56.8          | 80.0              | 45.2         | 60.0             | /                   | Horizontal   | -5.2            |
| 4149.936        | 59.5          | 80.0              | 47.4         | 60.0             | /                   | Vertical     | 41.0            |
| 2480.202        | 82.6          | 80.0              | 77.0         | 60.0             | /                   | Vertical     | 35.4            |



| Frequency (MHz) | Peak (dBµV/m) | Lim.Peak (dBµV/m) | Avg (dBµV/m) | Lim.Avg (dBµV/m) | Polarization | Correction (dB) |
|-----------------|---------------|-------------------|--------------|------------------|--------------|-----------------|
| 14002.000       | 58.6          | 83.5              | 48.8         | 63.5             | Vertical     | 5.1             |
| 15199.500       | 53.2          | 83.5              | 43.6         | 63.5             | Vertical     | -1.5            |
| 16213.000       | 53.7          | 83.5              | 43.1         | 63.5             | Vertical     | -1.4            |
| 20229.000       | 57.3          | 83.5              | 46.4         | 63.5             | Vertical     | 3.1             |
| 22642.000       | 55.8          | 83.5              | 44.8         | 63.5             | Vertical     | 2.7             |

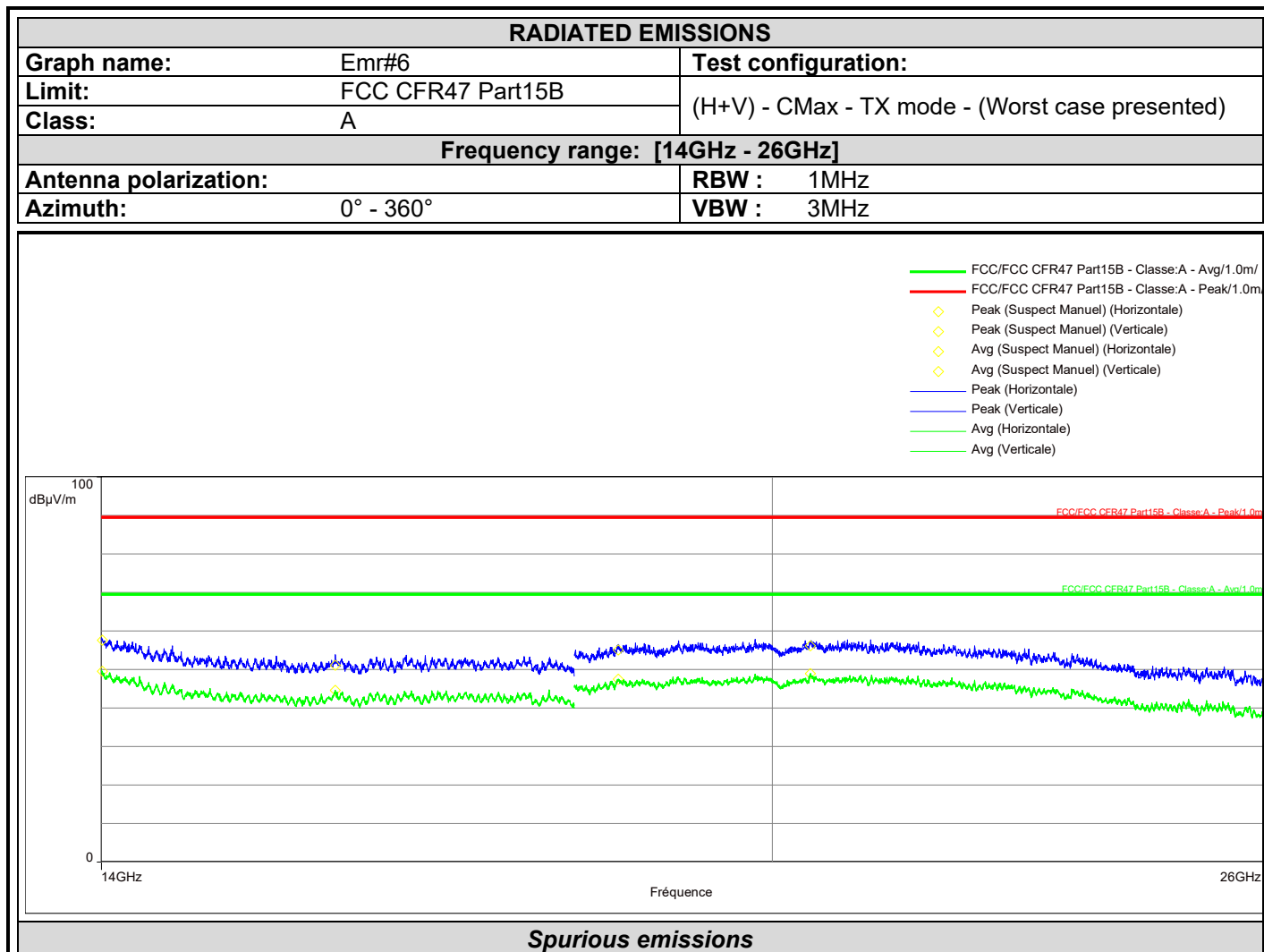




| Frequency (MHz) | Peak (dBμV/m) | Lim.Peak (dBμV/m) | Avg (dBμV/m) | Lim.Avg (dBμV/m) | Polarization | Correction (dB) |
|-----------------|---------------|-------------------|--------------|------------------|--------------|-----------------|
| 14055.500       | 56.7          | 89.5              | 49.6         | 69.5             | Horizontal   | 4.9             |
| 16759.500       | 53.1          | 89.5              | 44.7         | 69.5             | Horizontal   | -1.1            |
| 18433.000       | 55.0          | 89.5              | 47.9         | 69.5             | Vertical     | 3.1             |
| 20430.000       | 57.4          | 89.5              | 48.8         | 69.5             | Vertical     | 3.6             |



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| Frequency (MHz) | Peak (dBμV/m) | Lim.Peak (dBμV/m) | Avg (dBμV/m) | Lim.Avg (dBμV/m) | Polarization | Correction (dB) |
|-----------------|---------------|-------------------|--------------|------------------|--------------|-----------------|
| 18430.000       | 55.0          | 89.5              | 47.4         | 69.5             | Horizontal   | 3.1             |
| 20411.000       | 56.2          | 89.5              | 48.9         | 69.5             | Horizontal   | 3.6             |
| 14006.500       | 57.6          | 89.5              | 49.5         | 69.5             | Vertical     | 5.1             |
| 15854.500       | 51.1          | 89.5              | 44.6         | 69.5             | Vertical     | -1.8            |



### **Qualification**

The frequency list is created from the results obtained during the pre-qualification.  
Measurements are performed using a QUASI-PEAK detection.

| 30MHz to 18GHz                     |                 |                     |                      |                |                       |
|------------------------------------|-----------------|---------------------|----------------------|----------------|-----------------------|
| Polarization                       | Frequency (MHz) | Peak Level (dBμV/m) | QPeak Level (dBμV/m) | Limit (dBμV/m) | Margin QPeak (dBμV/m) |
| all emissions were below the limit |                 |                     |                      |                |                       |

### **3.6.2. 18GHz - 25GHz**

### **Qualification**

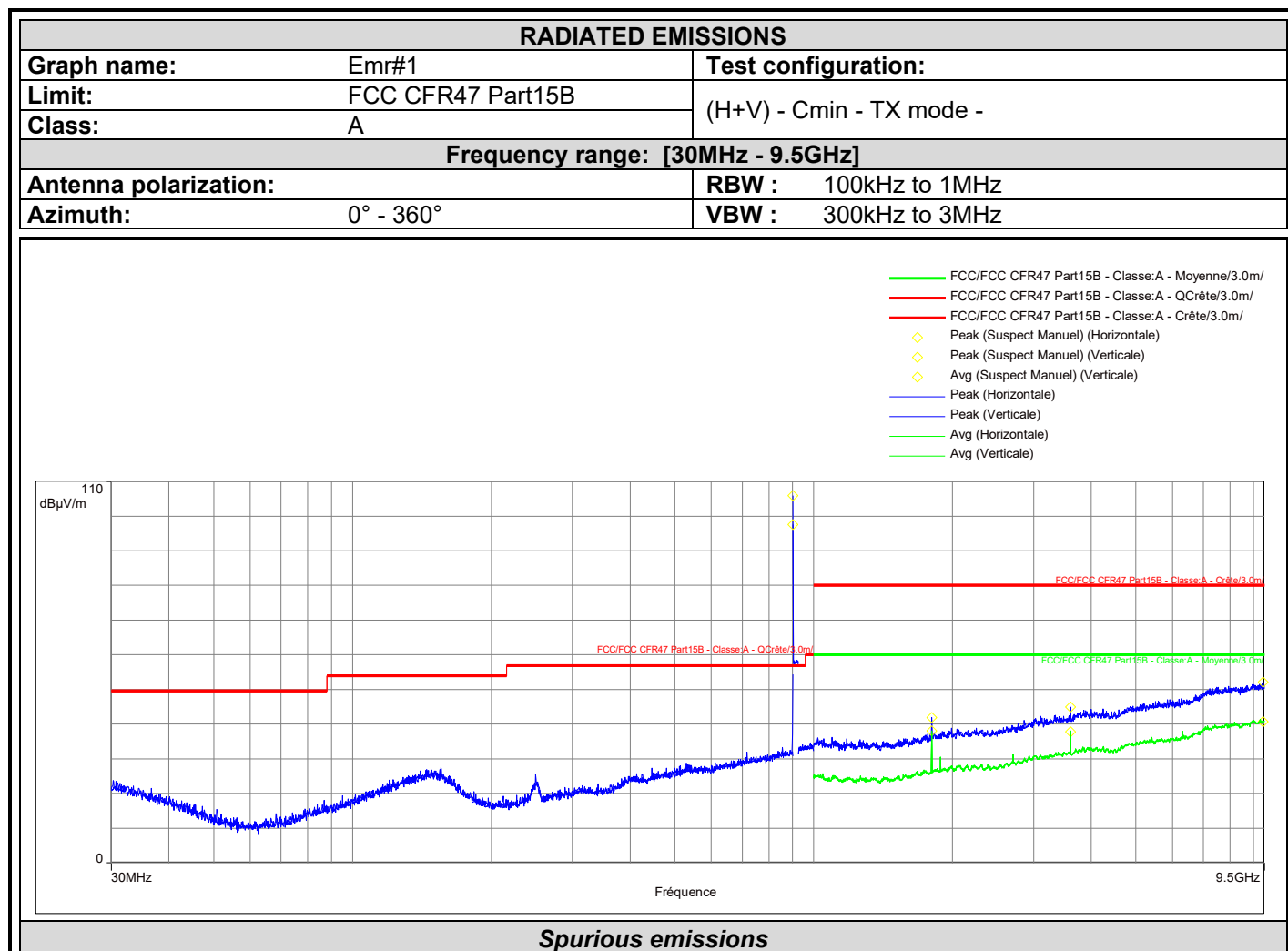
The frequency list is created from the results obtained during the pre-qualification.  
Measurements are performed using a PEAK and AVERAGE detection.

| 18GHz to 25GHz                     |                 |                     |                      |                |                       |
|------------------------------------|-----------------|---------------------|----------------------|----------------|-----------------------|
| Polarization                       | Frequency (MHz) | Peak Level (dBμV/m) | QPeak Level (dBμV/m) | Limit (dBμV/m) | Margin QPeak (dBμV/m) |
| all emissions were below the limit |                 |                     |                      |                |                       |

### 3.7. TEST RESULTS – RUNNING MODE N°1

#### 3.7.1. 30MHz –9.5GHz

##### Pre-qualification measurement



| Frequency (MHz) | Peak (dBµV/m) | Lim.Peak (dBµV/m) | Avg (dBµV/m) | Lim.Avg (dBµV/m) | Lim.Q-Peak (dBµV/m) | Polarization | Correction (dB) |
|-----------------|---------------|-------------------|--------------|------------------|---------------------|--------------|-----------------|
| 902.260         | 97.5          | /                 | /            | /                | 56.9                | Horizontal   | 28.8            |
| 1804.100        | 41.9          | 80.0              | 38.0         | 60.0             | /                   | Vertical     | -28.6           |
| 3608.650        | 44.9          | 80.0              | 37.8         | 60.0             | /                   | Vertical     | -22.6           |
| 9434.550        | 52.1          | 80.0              | 40.7         | 60.0             | /                   | Vertical     | -12.0           |
| 902.338         | 105.9         | /                 | /            | /                | 56.9                | Vertical     | 28.8            |

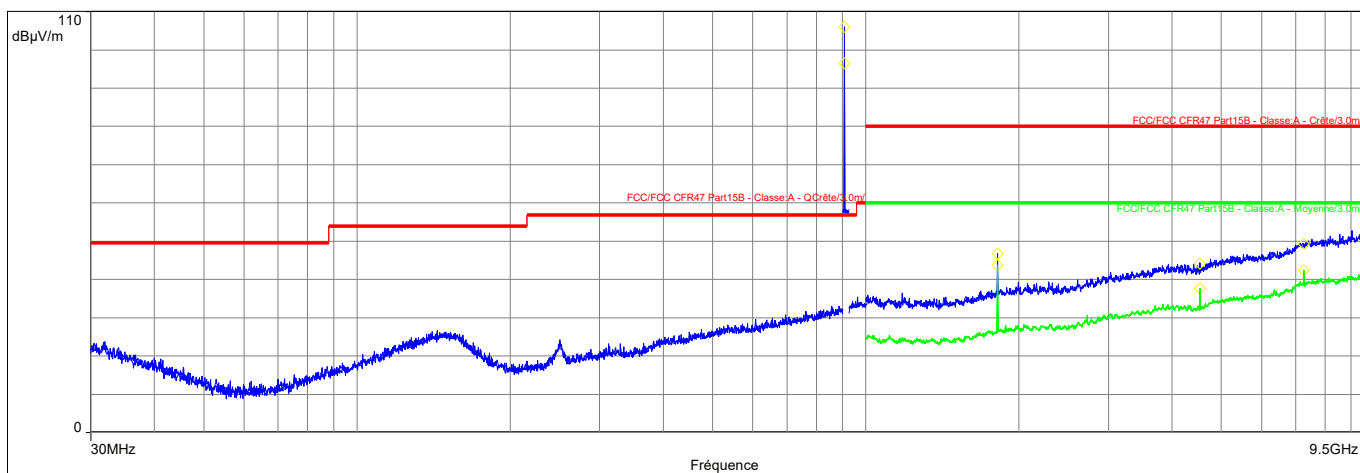


L C I E

## RADIATED EMISSIONS

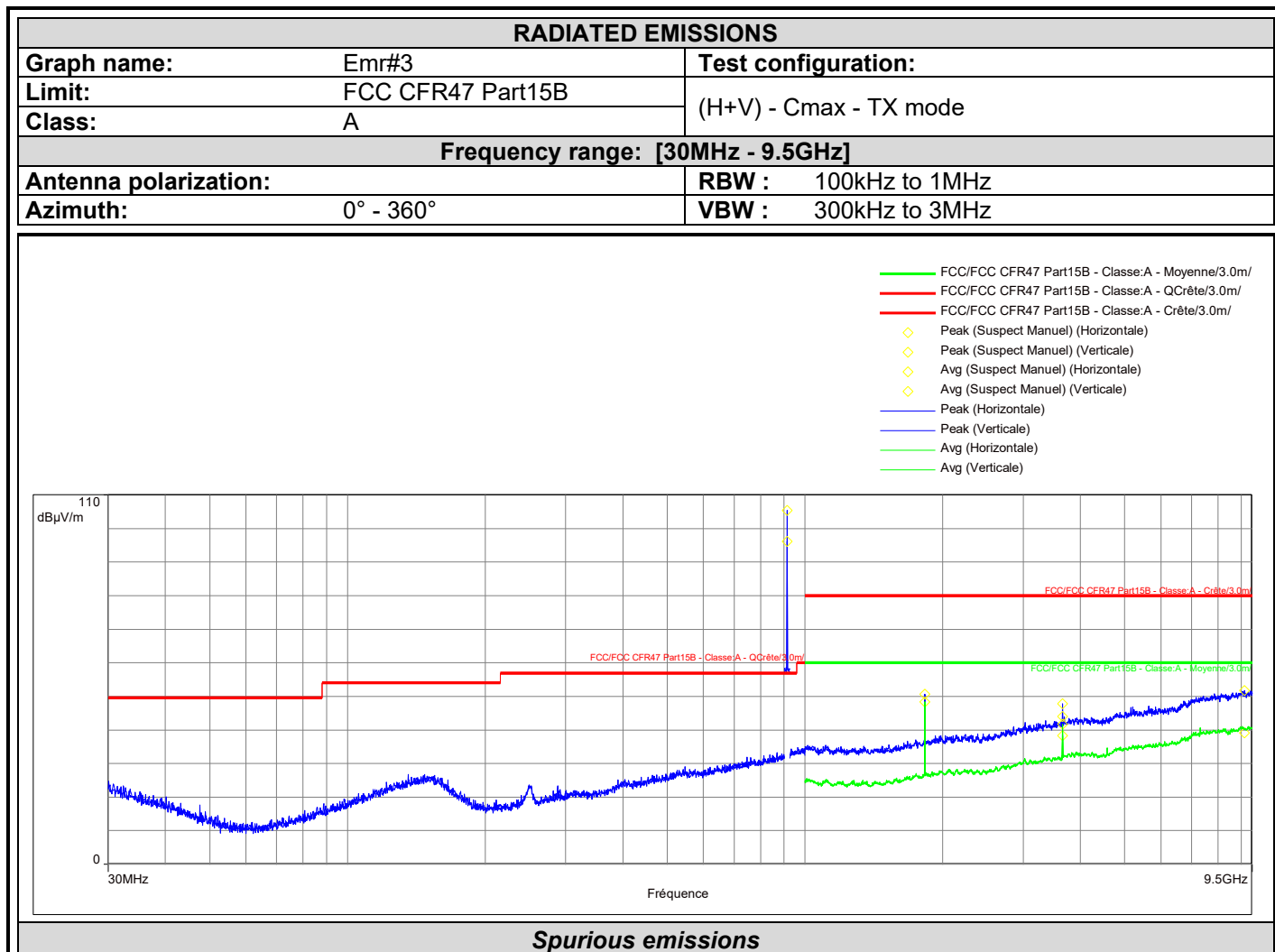
|                                   |                   |                                                   |
|-----------------------------------|-------------------|---------------------------------------------------|
| Graph name:                       | Emr#2             | Test configuration:<br><br>(H+V) - Cmid - TX mode |
| Limit:                            | FCC CFR47 Part15B |                                                   |
| Class:                            | A                 |                                                   |
| Frequency range: [30MHz - 9.5GHz] |                   |                                                   |
| Antenna polarization:             |                   | RBW : 100kHz to 1MHz                              |
| Azimuth:                          | 0° - 360°         | VBW : 300kHz to 3MHz                              |

- FCC/FCC CFR47 Part15B - Classe:A - Moyenne/3.0m/
- FCC/FCC CFR47 Part15B - Classe:A - QCrête/3.0m/
- FCC/FCC CFR47 Part15B - Classe:A - Crête/3.0m/
- Peak (Suspect Manuel) (Horizontale)
- Peak (Suspect Manuel) (Verticale)
- Avg (Suspect Manuel) (Verticale)
- Peak (Horizontale)
- Peak (Verticale)
- Avg (Horizontale)
- Avg (Verticale)



## Spurious emissions

| Frequency (MHz) | Peak (dBμV/m) | Lim.Peak (dBμV/m) | Avg (dBμV/m) | Lim.Avg (dBμV/m) | Lim.Q-Peak (dBμV/m) | Polarization | Correction (dB) |
|-----------------|---------------|-------------------|--------------|------------------|---------------------|--------------|-----------------|
| 908.552         | 96.5          | /                 | /            | /                | 56.9                | Horizontal   | 28.9            |
| 1816.850        | 46.7          | 80.0              | 43.8         | 60.0             | /                   | Vertical     | -28.6           |
| 4542.800        | 44.1          | 80.0              | 37.7         | 60.0             | /                   | Vertical     | -21.4           |
| 7267.900        | 49.3          | 80.0              | 42.4         | 60.0             | /                   | Vertical     | -13.5           |
| 908.526         | 106.0         | /                 | /            | /                | 56.9                | Vertical     | 28.9            |



| Frequency (MHz) | Peak (dBμV/m) | Lim.Peak (dBμV/m) | Avg (dBμV/m) | Lim.Avg (dBμV/m) | Lim.Q-Peak (dBμV/m) | Polarization | Correction (dB) |
|-----------------|---------------|-------------------|--------------|------------------|---------------------|--------------|-----------------|
| 914.896         | 96.2          | /                 | /            | /                | 56.9                | Horizontal   | 28.9            |
| 3659.650        | 47.8          | 80.0              | 41.7         | 60.0             | /                   | Horizontal   | -22.2           |
| 1829.600        | 50.6          | 80.0              | 48.3         | 60.0             | /                   | Vertical     | -28.6           |
| 3659.650        | 44.0          | 80.0              | 38.3         | 60.0             | /                   | Vertical     | -22.2           |
| 9135.350        | 51.8          | 80.0              | 39.1         | 60.0             | /                   | Vertical     | -12.0           |
| 914.974         | 105.4         | /                 | /            | /                | 56.9                | Vertical     | 28.9            |



#### **Qualification**

The frequency list is created from the results obtained during the pre-qualification.  
Measurements are performed using a QUASI-PEAK detection.

| 30MHz to 9.5GHz                    |                 |                     |                      |                |                       |
|------------------------------------|-----------------|---------------------|----------------------|----------------|-----------------------|
| Polarization                       | Frequency (MHz) | Peak Level (dBμV/m) | QPeak Level (dBμV/m) | Limit (dBμV/m) | Margin QPeak (dBμV/m) |
| all emissions were below the limit |                 |                     |                      |                |                       |

#### **3.7.2. 18GHz - 25GHz**

#### **Qualification**

The frequency list is created from the results obtained during the pre-qualification.  
Measurements are performed using a PEAK and AVERAGE detection.

| 9.5GHz to 25GHz                    |                 |                     |                      |                |                       |
|------------------------------------|-----------------|---------------------|----------------------|----------------|-----------------------|
| Polarization                       | Frequency (MHz) | Peak Level (dBμV/m) | QPeak Level (dBμV/m) | Limit (dBμV/m) | Margin QPeak (dBμV/m) |
| all emissions were below the limit |                 |                     |                      |                |                       |

#### **3.8. CONCLUSION**

The sample of the equipment **1001910**, Sn : **070049 and 070070** , tested in the configuration presented in this test report **satisfies** to requirements of the product family standard applied (See §Test Program) for radiated emissions.



#### 4. UNCERTAINTIES CHART

| Type de mesure / Kind of measurement                                                                                                                                                                                                                                          | Incertitude élargie<br>laboratoire /<br>Wide uncertainty<br>laboratory<br>(k=2) $\pm x$ | Incertitude limite<br>du CISPR /<br>CISPR uncertainty<br>limit $\pm y$ |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| Mesure des perturbations conduites en tension sur le réseau d'énergie (monophasé /triphase) 9kHz-150kHz<br><i>Measurement of conducted disturbances in voltage on the power port (single &amp; three phases)9kHz-150kHz</i>                                                   | 3.7dB                                                                                   | 3.8dB                                                                  |
| Mesure des perturbations conduites en tension sur le réseau d'énergie (monophasé /triphase) 150kHz-30MHz<br><i>Measurement of conducted disturbances in voltage on the power port (single &amp; three phases)150kHz-30MHz</i><br>LISN 50Ω/50μH<br>Capacitive Voltage Probe    | 3.3dB<br>3.7dB                                                                          | 3.4dB<br>3.9dB                                                         |
| Mesure des perturbations conduites en tension sur le réseau de télécommunication<br><i>Measurement of conducted disturbances in voltage on the telecommunication port.</i><br>AAN avec aLCL = 55 ... 40 dBc<br>AAN avec aLCL = 65 ... 50 dBc<br>AAN avec aLCL = 75 ... 60 dBc | 4.2dB<br>4.6dB<br>5.0dB                                                                 | 4.2dB<br>4.6dB<br>5.1dB                                                |
| Mesure des perturbations discontinues conduites en tension<br><i>Measurement of discontinuous conducted disturbances in voltage</i>                                                                                                                                           | 3.4dB                                                                                   | 3.4dB                                                                  |
| Mesure des perturbations conduites en courant<br><i>Measurement of conducted disturbances in current</i>                                                                                                                                                                      | 2.9dB                                                                                   | 2.9dB                                                                  |
| Mesure du champ électrique rayonné en cage de Faraday semi-anechoïque<br>de 30MHz à 1GHz<br><i>Measurement of radiated electric field in half-anechoic Faraday room</i><br><i>From 30MHz to 1GHz</i>                                                                          | 6.3dB                                                                                   | 6.3dB                                                                  |
| Mesure du champ électrique rayonné en cage de Faraday anechoïque<br>de 1GHz à 6GHz<br><i>Measurement of radiated electric field in full-anechoic Faraday room</i><br><i>From 1GHz to 6GHz</i>                                                                                 | 5.2dB                                                                                   | 5.2dB                                                                  |
| Mesure du champ électrique rayonné en cage de Faraday anechoïque<br>de 6GHz à 18GHz<br><i>Measurement of radiated electric field in full-anechoic Faraday room</i><br><i>From 6GHz to 18GHz</i>                                                                               | 5.5dB                                                                                   | 5.5dB                                                                  |
| Mesure du champ électrique rayonné sur le site en espace libre de Moirans<br>30MHz – 1GHz.<br><i>Measurement of radiated electric field on the Moirans open area test site</i><br><i>30MHz – 1GHz.</i>                                                                        | 6.3dB                                                                                   | 6.3dB                                                                  |
| Mesure du champ électrique rayonné IN SITU de 30 à 1000 MHz<br><i>IN SITU measurement of radiated electric field from 30 to 1000MHz</i>                                                                                                                                       | A l'étude /<br>Under<br>consideration                                                   | 5.2dB                                                                  |
| Mesure de la puissance perturbatrice<br><i>Measurement of disturbance power</i>                                                                                                                                                                                               | 3.32dB                                                                                  | 4.5dB                                                                  |
| Mesure des harmoniques de courant<br><i>Measurement of current harmonics</i>                                                                                                                                                                                                  | 11.11%                                                                                  | /                                                                      |
| Mesure du flicker<br><i>Flicker measurement</i>                                                                                                                                                                                                                               | 9.26%                                                                                   | /                                                                      |

Les valeurs d'incertitudes calculées du laboratoire étant inférieures aux valeurs d'incertitudes limites établies par le CISPR, la conformité de l'échantillon est établie directement par les niveaux limites applicables. Ce tableau regroupe l'ensemble des incertitudes maximales pour les essais réalisables dans le laboratoire, qu'ils aient été ou non réalisés dans le cadre du présent rapport / *The uncertainty values calculated by the laboratory are lower than limit uncertainty values defined by the CISPR. The conformity of the sample is directly established by the applicable limits values. This table includes all uncertainties maximum feasible for testing in the laboratory, whether or not made in this report*

Note - L'incertitude de mesure instrumentale est déterminée selon la CISPR 16-4-2. / *The instrumentation measurement uncertainty is determined according to CISPR16-4-2*