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# TEST REPORT

**N°: 762868-A1-R1-E** **JDE : 129151**

**Subject** **Electromagnetic compatibility and Radio spectrum Matters (ERM) tests according to standards: FCC CFR 47 Part 15, Subpart B et C RSS-210 Issue 8**

| | |
|---|---|
| **Issued to** | **ISKN**<br>52, cours Jean Jaurès<br>38000 GRENOBLE |
| **Apparatus under test** | |
| Product name | **The Slate** |
| Trade mark | **ISKN** |
| Manufacturer | **ISKN** |
| Model under test | **TS1E1** |
| Serial number | **V0.3.5** |
| FCCID | **2ACQC-TS1E1** |
| ICID | **12188A-TS1E1** |
| **Test date** | From July 11th to 30th, 2014 |
| **Test location** | Moirans |
| **Test performed by** | A.Merlin, G.Deschamps and N.Billaud |
| **Composition of document** | 39 pages |
| **Modification of the last version** | None |
| **Document issued on** | August 27th, 2014 |

**Written by :**
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## SUMMARY

## 1. TEST PROGRAM

**Standard:**
- **FCC Part 15, Subpart C 15.247**
- **ANSI C63.4 (2003)**
- **RSS-210 Issue 8 – Dec 2010**
- **RSS-Gen Issue 3 – Dec 2010**

| EMISSION TEST | LIMITS | | | RESULTS |
|---|---|---|---|---|
| **Limits for conducted disturbance at mains ports**<br>150kHz-30MHz | **Frequency** | **Quasi-peak value (dBµV)** | **Average value (dBµV)** | ☑ **PASS**<br>☐ **FAIL**<br>☐ **NA**<br>☐ **NP** |
| | 150-500kHz | 66 to 56 | 56 to 46 | |
| | 0.5-5MHz | 56 | 46 | |
| | 5-30MHz | 60 | 50 | |
| **Radiated emissions**<br>9kHz-30MHz<br>*CFR 47 §15.209 (a)*<br>*CFR 47 §15.247 (d)*<br>*RSS-210 §A8.5* | **Measure at 300m**<br>9kHz-490kHz : 67.6dBµV/m /F(kHz)<br>**Measure at 30m**<br>490kHz-1.705MHz : 87.6dBµV/m /F(kHz)<br>1.705MHz-30MHz : 29.5 dBµV/m | | | ☑ **PASS**<br>☐ **FAIL**<br>☐ **NA**<br>☐ **NP** |
| **Radiated emissions**<br>30MHz-25GHz*<br>*CFR 47 §15.209 (a)*<br>*CFR 47 §15.247 (d)*<br>*RSS-210 §A8.5*<br>***Highest frequency :***<br>***(Declaration of provider)*** | **Measure at 3m**<br>30MHz-88MHz : 40 dBµV/m<br>88MHz-216MHz : 43.5 dBµV/m<br>216MHz-960MHz : 46.0 dBµV/m<br>Above 960MHz : 54.0 dBµV/m | | | ☑ **PASS**<br>☐ **FAIL**<br>☐ **NA**<br>☐ **NP** |
| **Bandwidth 6dB**<br>*CFR 47 §*15.247 (a) (2)<br>*RSS-210 §A8.2* | **At least 500kHz** | | | ☑ **PASS**<br>☐ **FAIL**<br>☐ **NA**<br>☐ **NP** |
| **Maximum Peak Output Power**<br>*CFR 47 §*15.247 (b)<br>*RSS-210 §A8.4 (4)* | **Limit: 30dBm**<br>Conducted or Radiated measurement | | | ☑ **PASS**<br>☐ **FAIL**<br>☐ **NA**<br>☐ **NP** |
| **Band Edge Measurement**<br>*CFR 47 §15.209 (a)*<br>*CFR 47 §15.247 (d)*<br>*RSS-210 §A8.5* | **Limit: -20dBc or**<br>**Radiated emissions limits in restricted bands** | | | ☑ **PASS**<br>☐ **FAIL**<br>☐ **NA**<br>☐ **NP** |
| **Power spectral Density**<br>*CFR 47 §15.247 (e)*<br>*RSS-210 §A8.2* | **Limit: 8dBm/3kHz** | | | ☑ **PASS**<br>☐ **FAIL**<br>☐ **NA**<br>☐ **NP** |
| **Occupied bandwidth**<br>*RSS-Gen §4.6.1* | **No limit** | | | ☑ **PASS**<br>☐ **FAIL**<br>☐ **NA**<br>☐ **NP** |
| **Receiver Spurious Emission****<br>*RSS-Gen §4.10* | **See RSS-Gen §4.10** | | | ☐ **PASS**<br>☐ **FAIL**<br>☑ **NA**<br>☐ **NP** |

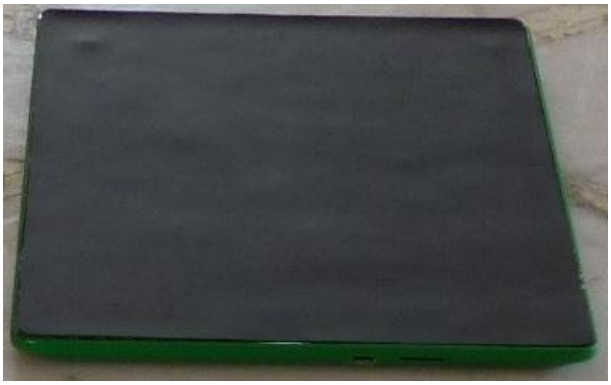
***§15.33:** The highest internal source of a testing device is defined like more the highest frequency generated or used in the testing device or on which the testing device works or agrees.
- If the highest frequency of the internal sources of the testing device is lower than 108 MHz, measurement must 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.

## 2. SYSTEM TEST CONFIGURATION

### *2.1. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):*

**Equipment under test (EUT):**
**TS1E1**
**Version: V0.3.5**



Photography of EUT

**Power supply:**
EUT is supplied by battery with or without load.
For measurement with different voltage, it will be presented in test method.

| Name | Type | Rating | Reference / Sn | Comments |
|---|---|---|---|---|
| Supply & Communication | ☐ AC ☑ DC ☐ Battery | 5VDC - USB | - | - |
| Supply2 | ☐ AC ☐ DC ☑ Battery | 3.7VDC | - | Lithium-ion |

**Inputs/outputs - Cable:**

| Access | Type | Length used (m) | Declared <3m | Shielded | Under test | Comments |
|---|---|---|---|---|---|---|
| Supply & Communication | USB cable | 1 | ☑ | ☑ | ☑ | - |

**Auxiliary equipment used during test:**

| Type | FCC Id | Reference | Sn | Comments |
|---|---|---|---|---|
| Laptop | Latitude E6420 | - | DELL | Laptop |
| Power supply for laptop | ADP-90LD B | DELL P/N: MK947 | DELL | Power supply for laptop |

**Equipment information:**

| | | | | |
|---|---|---|---|---|
| Type: | **Bluetooth Low Energy v4.0** | | | |
| Frequency band: | [2400 – 2483.5] MHz | | | |
| Sub-band REC7003: | Annex 3 (a) | | | |
| Spectrum Modulation: | ☑ DSSS (Tested like it) | | | |
| Number of Channel: | 40 | | | |
| Spacing channel: | 2MHz | | | |
| Channel bandwidth: | 1MHz | | | |
| Transmit chains: | ☑ 1 | ☐ 2 | ☐ 3 | ☐ 4 |
| | ☑ Single antenna | ☐ Symmetrical | ☐ Asymmetrical | |
| | Gain 1: 1.95dBi | Gain 2: dBi | Gain 3: dBi | Gain 4: dBi |
| Beam forming gain: | ☐ Yes: dB | | ☑ No | |
| Receiver chains | ☑ 1 | ☐ 2 | ☐ 3 | ☐ 4 |
| Type of equipment: | ☑ Stand-alone | ☐ Plug-in | ☐ Combined | |
| Ad-Hoc mode: | ☐ Yes | | ☑ No | |
| Adaptivity mode: | ☐ Yes (Load Based) | ☐ Off mode | ☑ No | |
| | Clear Channel Assessment Time: | | None | |
| | q value for Load Based Equipment: | | None | |
| Duty cycle: | ☑ Continuous duty | ☐ Intermittent duty | ☐ Continuous operation | |
| Equipment type: | ☐ Production model | | ☑ Prototype | |

| | | | | |
|---|---|---|---|---|
| Temperature range: | Tmin: | ☑ -20°C | ☐ 0°C | ☐ °C |
| | Tnom: | **20°C** | | |
| | Tmax: | ☑ 35°C | ☐ 55°C | ☐ °C |
| Test source voltage: | ☐ AC: | ☑ DC: 5VDC | ☐ Battery: VDC / Alkaline | |

| CHANNEL PLAN | | | |
|---|---|---|---|
| **Channel** | **Frequency (MHz)** | **Channel** | **Frequency (MHz)** |
| Cmin: 0 | 2402 | Cmid: 20 | 2442 |
| 1 | 2404 | 21 | 2444 |
| 2 | 2406 | 22 | 2446 |
| 3 | 2408 | 23 | 2448 |
| 4 | 2410 | 24 | 2450 |
| 5 | 2412 | 25 | 2452 |
| 6 | 2414 | 26 | 2454 |
| 7 | 2416 | 27 | 2456 |
| 8 | 2418 | 28 | 2458 |
| 9 | 2420 | 29 | 2460 |
| 10 | 2422 | 30 | 2462 |
| 11 | 2424 | 31 | 2464 |
| 12 | 2426 | 32 | 2466 |
| 13 | 2428 | 33 | 2468 |
| 14 | 2430 | 34 | 2470 |
| 15 | 2432 | 35 | 2472 |
| 16 | 2434 | 36 | 2474 |
| 17 | 2436 | 37 | 2476 |
| 18 | 2438 | 38 | 2478 |
| 19 | 2440 | Cmax: 39 | 2480 |

| DATA RATE | | |
|---|---|---|
| **Data Rate (Mbps)** | **Modulation Type** | **Worst Case Modulation** |
| 1 | GFSK | ☑ |

## *2.2. EUT CONFIGURATION*

The EUT is set in the following modes during tests with simulator / software: (Certif_USB_noPos/V0.3.5)
- Permanent emission with modulation on a fixed channel in the data rate that produced the highest power
- The power of Bluetooth chip is set at 1.7dBm.

They are 2 tests configurations tested in Radiated emission data:
- In USB mode, control by Laptop (by software: Certif_USB_noPos/V0.3.5) of Bluetooth emission (carrier, modulation and power).
- In Radio Frequency mode (communication by Bluetooth between laptop and EUT)

For these others tests, only the test in USB mode is performed.

## *2.3. EQUIPMENT MODIFICATIONS*

☑ None ☐ Modification:

## *2.4. 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

Assume a receiver reading of 52.5dBµV is obtained. The antenna factor of 7.4 and a cable factor of 1.1 are added. The amplifier gain of 29dB is subtracted, giving a field strength of 32 dBµV/m.
FS = 52.5 + 7.4 + 1.1 – 29 = 32 dBµV/m
The 32 dBµV/m value can be mathematically converted to its corresponding level in µV/m.
Level in µV/m = Common Antilogarithm [(32dBµV/m)/20] = 39.8 µV/m.

# 3. CONDUCTED EMISSION DATA

## *3.1. ENVIRONMENTAL CONDITIONS*

| | | |
|---|---|---|
| Date of test | : | July 07th, 2014 |
| Test performed by | : | Nicolas BILLAUD |
| Atmospheric pressure (hPa) | : | 994 |
| Relative humidity (%) | : | 57 |
| Ambient temperature (°C) | : | 25 |

## *3.2. TEST SETUP*

***Mains terminals***

The EUT and auxiliaries are set:

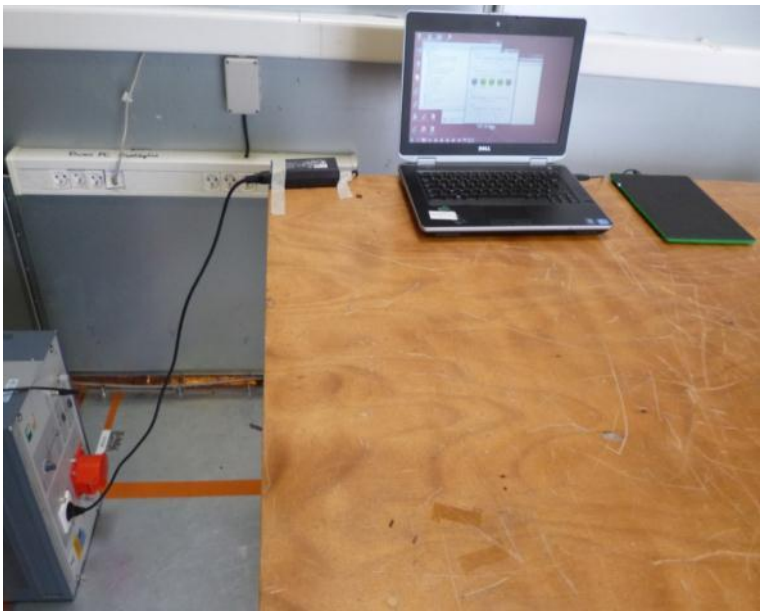
☑ 80cm above the ground on the non-conducting table (Table-top equipment)

☐ 10cm above the ground on isolating support (Floor standing equipment)

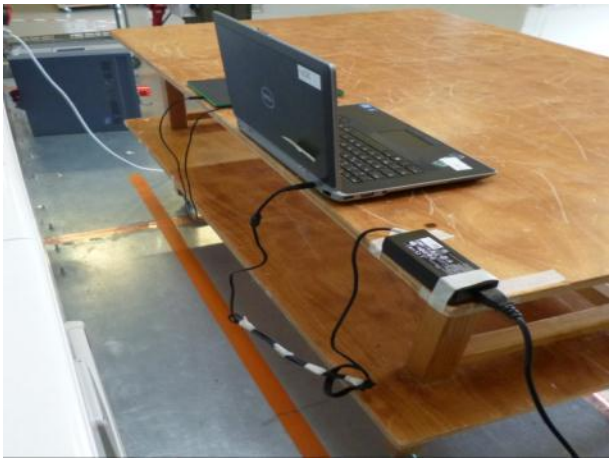
The distance between the EUT and the LISN is 80cm. The EUT is 40cm away for the vertical ground plane.

The EUT is powered by $V_{nom}$.

The EUT is powered through a LISN (measure). Auxiliaries are powered by another LISN.



*Test setup*



*Test setup*

### *3.3. TEST METHOD*

The product has been tested according to ANSI C63.4-(2003) and FCC Part 15 subpart B and C. The product has been tested with 120V/60Hz power line voltage and compared to the FCC Part 15 subpart B §15.107 and C §15.207 limits. Measurement bandwidth was 9kHz from 150kHz to 30MHz. This was followed by a Quasi-Peak, i.e. CISPR measurement for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary. The LISN (measure) is 50Ω / 50µH. The Peak data are shown on plots in annex 1. Quasi-Peak and Average measurements are detailed in a table with frequencies and levels measured. Interconnecting cables and equipment's were moved to position that maximized emission. A summary of the worst case emissions found in all test configurations and modes is shown on the following page.
Measurements are performed on the phase (L1) and neutral (N) of power line voltage. Graphs are obtained in PEAK detection. Measures are also performed in Quasi-Peak and Average for any strong signal.

### *3.4. TEST EQUIPMENT LIST*

| DESCRIPTION | MANUFACTURER | MODEL | N° LCIE | Cal_Date | Cal_Due |
|---|---|---|---|---|---|
| Cable | - | - | A5329585 | 07/13 | 07/14 |
| Conducted emission comb generator | BARDET | - | A3169049 | - | - |
| LISN tri-phase ESH2-Z5 | RHODE & SCHWARZ | 33852.19.53 | C2320063 | 10/13 | 10/14 |
| Receiver 20Hz-26.5GHz | ROHDE & SCHWARZ | ESMI | A2642009 | 06/13 | 06/14 |
| Receiver display | ROHDE & SCHWARZ | ESMI | A2642007 | 06/13 | 06/14 |
| Thermo-hygrometer (PM2) | OREGON | BAR916HG-G | B4206011 | 04/14 | 04/15 |
| Transient limiter | RHODE & SCHWARZ | ESH3-Z2 | A7122204 | 10/13 | 10/14 |

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

☑ None ☐ Divergence:

## *3.6. TEST RESULTS*

Measurements are performed on the phase (L1) and neutral (N) of the power line.
***Mains terminals:***

**Supply & Communication**
Measurements are performed on the phase (L1) and neutral (N) of the power line.
**Results: (PEAK detection)**

| | | |
|---|---|---|
| Measure on L1: | graph **Emc#1** | (see annex 1) |
| Measure on N: | graph **Emc#2** | (see annex 1) |

## *3.7. CONCLUSION*

Conducted emission data measurement performed on the sample of the product **TS1E1**, SN: **V0.3.5**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-210 Issue 8 limits.

# 4. RADIATED EMISSION DATA

## *4.1. ENVIRONMENTAL CONDITIONS*

| | | |
|---|---|---|
| Date of test | : | July 07th, 2014 |
| Test performed by | : | Nicolas BILLAUD |
| Atmospheric pressure (hPa) | : | 994 |
| Relative humidity (%) | : | 57 |
| Ambient temperature (°C) | : | 25 |

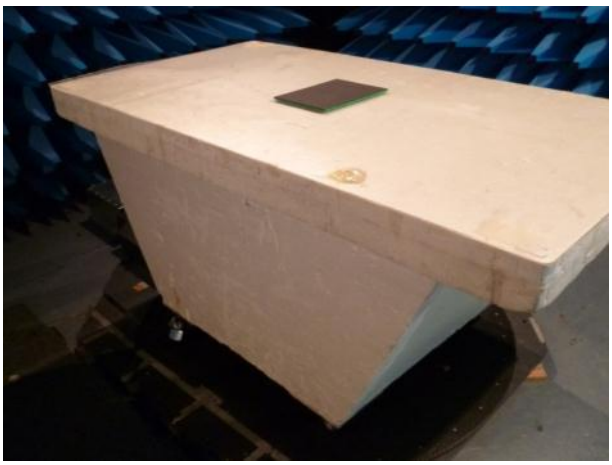
## *4.2. TEST SETUP*

The installation of EUT is identical for pre-characterization measures in a 3 meters semi - anechoic chamber and for measures on the 10 meters Open site.
The EUT and auxiliaries are set:
☑ 80cm above the ground on the non-conducting table (Table-top equipment)
☐ 10cm above the ground on isolating support (Floor standing equipment)
The EUT is powered by $V_{nom}$.

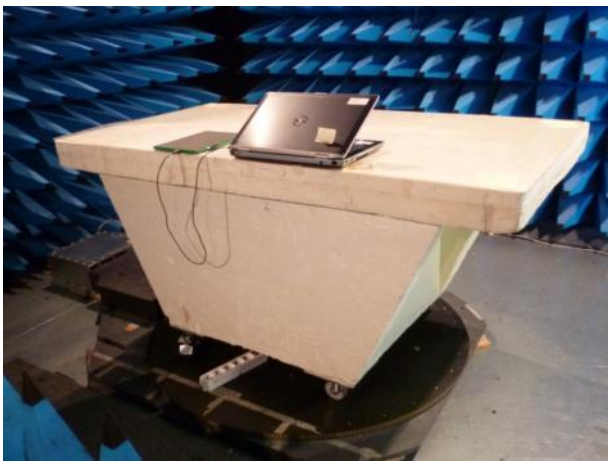
*Test setup on OATS (Bluetooth mode):*

*Test setup on OATS (USB mode):*

*Test setup on OATS*



*Test setup in anechoic chamber (Bluetooth mode):*



*Test setup in anechoic chamber (USB mode):*

### *4.3. TEST METHOD*

Pre-characterisation measurement: (30MHz – 2GHz)
A pre-scan of all the setup has been performed in a 3 meters semi-anechoic chamber for frequency from 30MHz to 2GHz. Test is performed in horizontal (H) and vertical (V) polarization, the loop antenna was rotated during the test to maximize the emission measurement. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on all axis of EUT used in normal configuration.
The pre-characterization graphs are obtained in PEAK detection and PEAK/AVERAGE from 1GHz to 2GHz.

Characterization on 10 meters open site from 30MHz to 1GHz:
The product has been tested according to ANSI C63.4 (2003), FCC part 15 subpart C. Radiated Emissions were measured on an open area test site. A description of the facility is on file with the FCC. The product has been tested at a distance of **10 meters** from the antenna and compared to the FCC part 15 subpart C §15.225 limits in the frequency range 13.553MHz 13.567MHz. Measurement bandwidth was 9kHz below 30MHz and 120kHz from 30 MHz to 1GHz. Test is performed in horizontal (H) and vertical (V) polarization, the loop antenna was rotated during the test to maximize the emission measurement. The height antenna is varied from 1m to 4m. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement 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.
Frequency list has been created with anechoic chamber pre-scan results.

Characterization on 3 meters full anechoic chamber from 1GHz to 2GHz:
The product has been tested at a distance of **3 meters** from the antenna and compared to the FCC part 15 subpart B §15.109 limits and C §15.209 limits. Measurement bandwidth was 1MHz from 1GHz to 2GHz.
Test is performed in horizontal (H) and vertical (V) polarization. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement 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.The height antenna is
☐ On mast, varied from 1m to 4m
☑ Fixed and centered on the EUT
Frequency list has been created with anechoic chamber pre-scan results.

## *4.4. TEST EQUIPMENT LIST*

| DESCRIPTION | MANUFACTURER | MODEL | N° LCIE | Cal_Date | Cal_Due |
|---|---|---|---|---|---|
| Amplifier 0.1MHz – 1300 MHz | HEWLETT PACKARD | 8447D | A7085009 | 08/13 | 08/14 |
| Antenna Bi-log | CHASE | CBL6111A | C2040051 | 04/14 | 04/16 |
| Antenna Bi-Log XWing | TESEQ | CBL6144 | C2040146 | 04/12 | 04/14 |
| Cable | SUCOFLEX | 106G | A5329061 | 02/14 | 02/15 |
| Cable (OATS) | - | - | A5329623 | 08/13 | 08/14 |
| Cable | MICRO-COAX | - | A5329654 | 04/14 | 04/15 |
| Cable | MICRO-COAX | - | A5329655 | 04/14 | 04/15 |
| Cable | MICRO-COAX | - | A5329656 | 04/14 | 04/15 |
| Semi-Anechoic chamber #2 | SIEPEL | - | D3044015 | 04/14 | 04/15 |
| Radiated emission comb generator | BARDET | - | A3169050 | - | - |
| Spectrum Analyzer 9kHz - 6GHz | ROHDE & SCHWARZ | FSL6 | A2642049 | 10/13 | 10/14 |
| Receiver 20-1000MHz | ROHDE & SCHWARZ | ESVS30 | A2642006 | 12/13 | 12/14 |
| Thermo-hygrometer (PM2) | OREGON | BAR916HG-G | B4206011 | 04/14 | 04/15 |
| Turntable / Mast controller (OATS) | ETS Lindgren | Model 2066 | F2000372 | - | - |
| Antenna mast (OATS) | ETS Lindgren | 2071-2 | F2000392 | - | - |
| Turntable controller (Cage#2) | ETS Lingren | Model 2066 | F2000393 | - | - |
| Turntable (OATS) | ETS Lindgren | Model 2187 | F2000403 | - | - |
| Turntable chamber (Cage#2) | ETS Lingren | Model 2165 | F2000404 | - | - |
| Table | MATURO Gmbh | - | F2000437 | - | - |

## *4.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION*

☑ None ☐ Divergence:

## *4.6. TEST RESULTS*

### 4.6.1. Pre-characterization at 3 meters [30MHz-1GHz]

**See graphs for 30MHz-1GHz:**

| | | | |
|---|---|---|---|
| Polarisation V: | bluetooth mode | graph **Emr#1** | (see annex 1) |
| Polarisation H: | bluetooth mode | graph **Emr#2** | (see annex 1) |
| Polarisation V: | USB mode | graph **Emr#3** | (see annex 1) |
| Polarisation H: | USB mode | graph **Emr#4** | (see annex 1) |

### 4.6.2. Pre-characterization at 3 meters [1GHz-2GHz]

**See graphs for 1GHz-2GHz:**

| | | | |
|---|---|---|---|
| Polarisation V: | bluetooth mode | graph **Emr#5** | (see annex 1) |
| Polarisation H: | bluetooth mode | graph **Emr#6** | (see annex 1) |
| Polarisation V: | USB mode | graph **Emr#7** | (see annex 1) |
| Polarisation H: | USB mode | graph **Emr#8** | (see annex 1) |

### 4.6.3. Characterization on 10 meters open site from 30MHz to 1GHz

**Worst case final data result:**

Frequency list has been created with semi-anechoic chamber pre-scan results.
Measurements are performed using a QUASI-PEAK detection.

| No | Frequency (MHz) | Limit Quasi-Peak (dBµV/m) | Measure Quasi-Peak (dBµV/m) | Margin (Mes-Lim) (dB) | Angle Table (deg) | Pol Ant. | Ht Ant. (cm) | Correc. Factor (dB) | Comments |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 53.460 | 40.0 | 34.4 | **-5.6** | 90 | PV | 100 | 8.8 | |
| 2 | 283.930 | 46.0 | 27.7 | **-18.3** | 0 | PV | 100 | 16.2 | |
| 3 | 285.520 | 46.0 | 28.2 | **-17.8** | 0 | PV | 100 | 16.2 | |
| 4 | 298.320 | 46.0 | 27.9 | **-18.1** | 0 | PV | 100 | 16.4 | |
| 5 | 308.400 | 46.0 | 29.2 | **-16.8** | 90 | PV | 100 | 16.7 | |
| 6 | 53.511 | 40.0 | 29.3 | **-10.7** | 0 | PH | 400 | 8.8 | |
| 7 | 158.809 | 43.5 | 23.1 | **-20.4** | 0 | PH | 400 | 12.6 | |
| 8 | 474.480 | 46.0 | 33.1 | **-12.9** | 0 | PH | 400 | 21.6 | |

*Note: Measure have been done at 10m distance and corrected according to requirements of 15.209.e) (M@3m = M@10m+10.5dB)*

### 4.6.4. Characterization on 3meters anechoic chamber from 1GHz to 2GHz

**Worst case final data result:**

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

| No | Frequency (MHz) | Limit Peak (dBµV/m) | Measure Peak (dBµV/m) | Margin (Mes-Lim) (dB) | Angle Table (deg) | Pol Ant. | Ht Ant. (cm) | Correc. Factor (dB) | Comments |
|---|---|---|---|---|---|---|---|---|---|
| No significant frequency detected | | | | | | | | | |

| No | Frequency (MHz) | Limit Average (dBµV/m) | Measure Average (dBµV/m) | Margin (Mes-Lim) (dB) | Angle Table (deg) | Pol Ant. | Ht Ant. (cm) | Correc. Factor (dB) | Comments |
|---|---|---|---|---|---|---|---|---|---|
| No significant frequency detected | | | | | | | | | |

*Note: Measures have been done at 3m distance.*

## *4.7. CONCLUSION*

Radiated emission data measurement performed on the sample of the product **TS1E1**, SN: **V0.3.5**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-210 Issue 8 limits.

# 5. BANDWIDTH (15.247)

## *5.1. TEST CONDITIONS*

| | |
|---|---|
| Date of test | :July 15th, 2014 |
| Test performed by | : A.Merlin / G.Deschamps |
| Atmospheric pressure (hPa) | :994 |
| Relative humidity (%) | :44 |
| Ambient temperature (°C) | :25 |

## *5.2. SETUP*

☑ ***Conducted measurement:***

The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

Offset: Attenuator+cable 11dB

☐ ***Radiated measurement:***

The EUT is placed in an anechoic chamber; the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete, a delta marker is used to measure the frequency difference as the emission bandwidth.

***Measurement Procedure:***

1. Set resolution bandwidth (RBW) = 100kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. Compare the resultant bandwidth with the RBW setting of the analyzer.

### *5.3. TEST EQUIPMENT LIST*

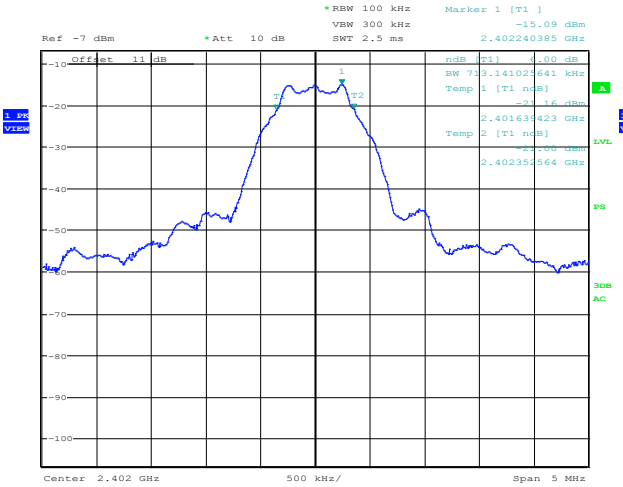
| DESCRIPTION | MANUFACTURER | MODEL | N° LCIE | Cal_Date | Cal_Due |
|---|---|---|---|---|---|
| Attenuator 10dB | JFW | - | A7122166 | 09/13 | 09/14 |
| Cable Measure | - | - | A5329604 | 04/13 | 04/14 |
| Receiver 20Hz – 8GHz | ROHDE & SCHWARZ | ESU8 | A2642019 | 10/13 | 10/14 |
| Thermo-hygrometer (C3) | OREGON | BAR206 | B4204078 | 01/14 | 01/15 |
| Thermo-hygrometer (PM2) | OREGON | BAR916HG-G | B4206011 | 04/14 | 04/15 |

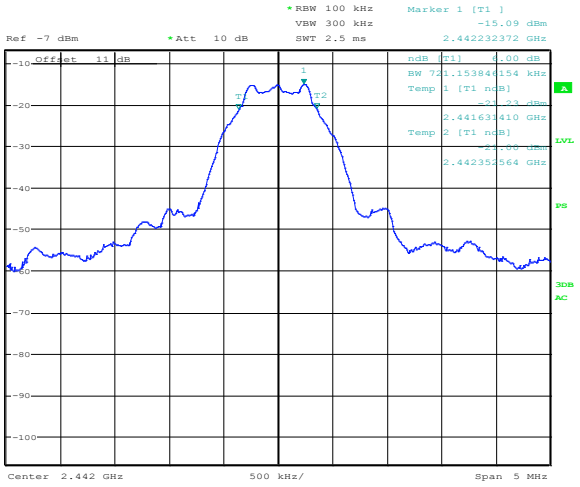
### *5.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION*

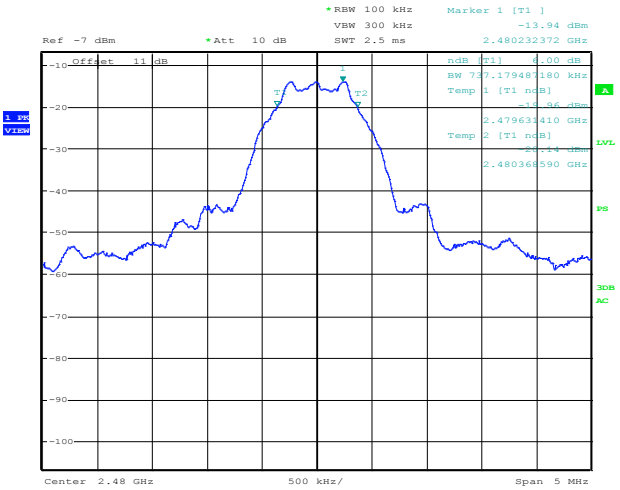
☑ None ☐ Divergence:

## *5.5. TEST SEQUENCE AND RESULTS*

| Channel | Channel Frequency (MHz) | 6dB Bandwidth (kHz) | Bandwidth Limit (kHz) |
|---|---|---|---|
| Min | 2402 | **713** | **>500** |
| Mid | 2442 | **721** | **>500** |
| Max | 2480 | **737** | **>500** |




## *5.6. CONCLUSION*

Bandwidth measurement performed on the sample of the product **TS1E1**, SN: **V0.3.5**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-210 Issue 8 limits.

# 6. MAXIMUM PEAK OUTPUT POWER (15.247)

## *6.1. TEST CONDITIONS*

| | |
|---|---|
| Date of test | :July 15th, 2014 |
| Test performed by | : A.Merlin / G.Deschamps |
| Atmospheric pressure (hPa) | :994 |
| Relative humidity (%) | :44 |
| Ambient temperature (°C) | :25 |

## *6.2. SETUP*

☑ ***Conducted measurement:***

The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency.

Offset: Attenuator+cable 11dB

☐ ***Radiated measurement:***

The EUT is placed in an anechoic chamber; the center frequency of the spectrum analyzer is set to the fundamental frequency.

The product has been tested at a distance of 3 meters from the antenna. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on 3 axis of EUT. A summary of the worst case emissions found in all test configurations and modes is shown on following table. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

To demonstrate compliance with peak output power requirement of section 15.247 (b), the transmitter's peak output power is calculated using the following equation:

$$E = \frac{\sqrt{30PG}}{d}$$

Where:

- E is the measured maximum fundamental field strength in V/m.
- G is the numeric gain of the transmitting antenna with reference to an isotropic radiator.
- d is the distance in meters from which the field strength was measured.
- P is the power in watts for which you are solving:

$$P = \frac{(E\,d)^2}{30G}$$

***Maximum peak conducted output power***

One of the following procedures may be used to determine the maximum peak conducted output power of a DTS EUT.

- ☑ ***RBW ≥ DTS bandwidth***

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ 3 x RBW.
c) Set span ≥ 3 x RBW
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

- ☐ ***Integrated band power method***

This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.

a) Set the RBW = 1 MHz.
b) Set the VBW ≥ 3 x RBW
c) Set the span ≥ 1.5 x DTS bandwidth.
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges

## *6.3. TEST EQUIPMENT LIST*

| DESCRIPTION | MANUFACTURER | MODEL | N° LCIE | Cal_Date | Cal_Due |
|---|---|---|---|---|---|
| Attenuator 10dB | JFW | - | A7122166 | 09/13 | 09/14 |
| Cable Measure | - | - | A5329604 | 04/13 | 04/14 |
| Receiver 20Hz – 8GHz | ROHDE & SCHWARZ | ESU8 | A2642019 | 10/13 | 10/14 |
| Thermo-hygrometer (C3) | OREGON | BAR206 | B4204078 | 01/14 | 01/15 |
| Thermo-hygrometer (PM2) | OREGON | BAR916HG-G | B4206011 | 04/14 | 04/15 |

## *6.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION*

☑ None ☐ Divergence:

## *6.5. TEST SEQUENCE AND RESULTS*

***Modulation:***

| Channel | Channel Frequency (MHz) | Peak Output Power (dBm) | Power Limit (dBm) |
|---|---|---|---|
| Min | 2402 | **-13.97** | 30.0 |
| Mid | 2442 | **-13.97** | 30.0 |
| Max | 2480 | **-12.72** | 30.0 |

## *6.6. CONCLUSION*

Maximum Peak Output Power measurement performed on the sample of the product **TS1E1**, SN: **V0.3.5**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-210 Issue 8 limits.

# 7. POWER SPECTRAL DENSITY (15.247)

## *7.1. TEST CONDITIONS*

| | |
|---|---|
| Date of test | :July 15th, 2014 |
| Test performed by | : A.Merlin / G.Deschamps |
| Atmospheric pressure (hPa) | :994 |
| Relative humidity (%) | :44 |
| Ambient temperature (°C) | :25 |

## *7.2. SETUP*

☑ ***Conducted measurement:***

The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency.

Offset: Attenuator+cable 11dB

☐ ***Radiated measurement:***

The EUT is placed in an anechoic chamber; the center frequency of the spectrum analyzer is set to the fundamental frequency.

The product has been tested at a distance of 3 meters from the antenna. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on 3 axis of EUT. A summary of the worst case emissions found in all test configurations and modes is shown on following table. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

To demonstrate compliance with peak output power requirement of section 15.247 (b), the transmitter's peak output power is calculated using the following equation:

$$E = \frac{\sqrt{30PG}}{d}$$

Where:

- E is the measured maximum fundamental field strength in V/m.
- G is the numeric gain of the transmitting antenna with reference to an isotropic radiator.
- d is the distance in meters from which the field strength was measured.
- P is the power in watts for which you are solving:

$$P = \frac{(Ed)^2}{30G}$$

***Measurement Procedure PKPSD:***
a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz.
d) Set the VBW ≥ 3 □ RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

## *7.3. TEST EQUIPMENT LIST*

| DESCRIPTION | MANUFACTURER | MODEL | N° LCIE | Cal_Date | Cal_Due |
|---|---|---|---|---|---|
| Attenuator 10dB | JFW | - | A7122166 | 09/13 | 09/14 |
| Cable Measure | - | - | A5329604 | 04/13 | 04/14 |
| Receiver 20Hz – 8GHz | ROHDE & SCHWARZ | ESU8 | A2642019 | 10/13 | 10/14 |
| Thermo-hygrometer (C3) | OREGON | BAR206 | B4204078 | 01/14 | 01/15 |
| Thermo-hygrometer (PM2) | OREGON | BAR916HG-G | B4206011 | 04/14 | 04/15 |

## *7.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION*

☑ None ☐ Divergence:

## *7.5. TEST SEQUENCE AND RESULTS*

***Modulation:***

| Channel | Channel Frequency (MHz) | Power Spectral Density (dBm) | PSD Limit (dBm) |
|---|---|---|---|
| Min | 2402 | **-32.21** | 8.0 |
| Mid | 2442 | **-31.99** | 8.0 |
| Max | 2480 | **-30.79** | 8.0 |

## *7.6. CONCLUSION*

Power Spectral Density measurement performed on the sample of the product **TS1E1**, SN: **V0.3.5**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-210 Issue 8 limits.

# 8. BAND EDGE MEASUREMENT (15.247)

## *8.1. TEST CONDITIONS*

Date of test :July 15th, 2014
Test performed by : A.Merlin / G.Deschamps
Atmospheric pressure (hPa) :994
Relative humidity (%) :44
Ambient temperature (°C) :25

## *8.2. LIMIT*

***RF antenna conducted test:***
Set RBW = 100 kHz, Video bandwidth (VBW) > RBW, scan up through 10th harmonic. All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. Note: If the device complies with the use of power option 2 the attenuation under this paragraph shall be 30 dB instead of 20 dB. *For -20dBc limit, lowest power output level is considered, worst case.*

***Radiated emission test:***
Applies to harmonics/spurs that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209. For measurements above 1 GHz, set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation. See results in Radiated emissions section before.

## *8.3. SETUP*

The EUT is placed in an anechoic chamber; levels have been corrected to be in compliant with Peak Output Power measurement. The EUT is turn ON; the graphs of the restrict frequency band are recorded with a display line indicating the highest level and other the 20dB offset below to show compliance with 15.247 (d) and 15.205. The emissions in restricted bands are compared to 15.209 limits.
RBW: 100kHz
VBW: 300kHz

## *8.4. TEST EQUIPMENT LIST*

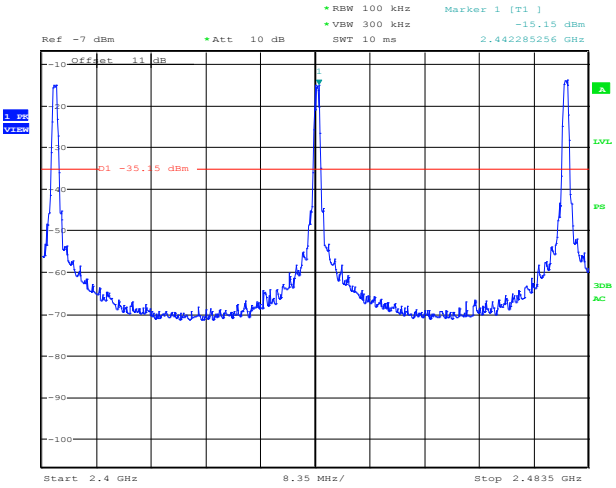
| DESCRIPTION | MANUFACTURER | MODEL | N° LCIE | Cal_Date | Cal_Due |
|---|---|---|---|---|---|
| Attenuator 10dB | JFW | - | A7122166 | 09/13 | 09/14 |
| Cable Measure | - | - | A5329604 | 04/13 | 04/14 |
| Receiver 20Hz – 8GHz | ROHDE & SCHWARZ | ESU8 | A2642019 | 10/13 | 10/14 |
| Spectrum Analyzer 9KHz – 26.5GHz | HEWLETT PACKARD | 8593E | A4060018 | 12/13 | 12/14 |
| Thermo-hygrometer (C3) | OREGON | BAR206 | B4204078 | 01/14 | 01/15 |
| Thermo-hygrometer (PM2) | OREGON | BAR916HG-G | B4206011 | 04/14 | 04/15 |

## *8.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION*

☑ None ☐ Divergence:

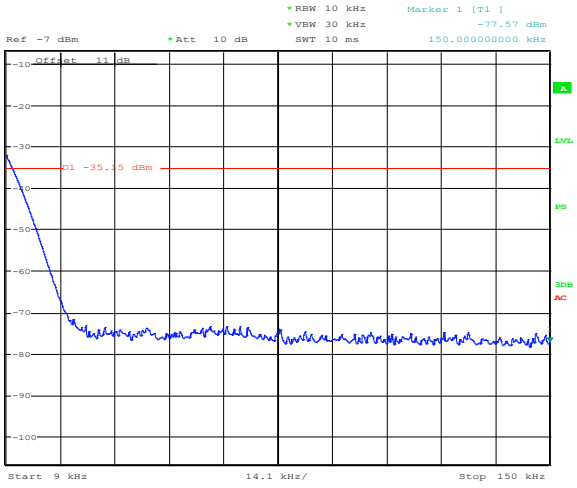
## *8.6. TEST SEQUENCE AND RESULTS*

Offset: Attenuator+cable 11dB

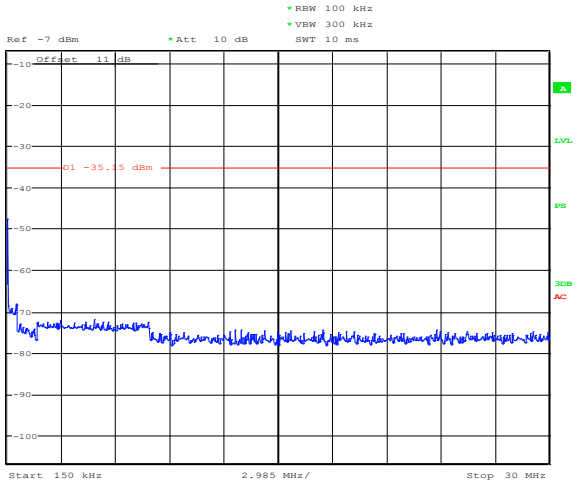



**-20dbc limit used: Channel mid, worst case, -35.15dBm**

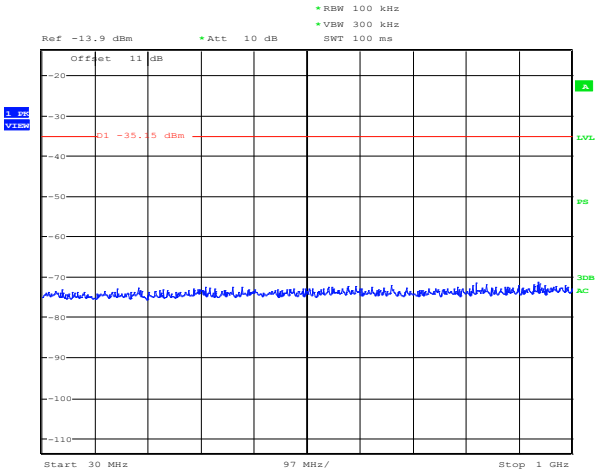
**From 9kHz to 150kHz, channel min/mid/max:**



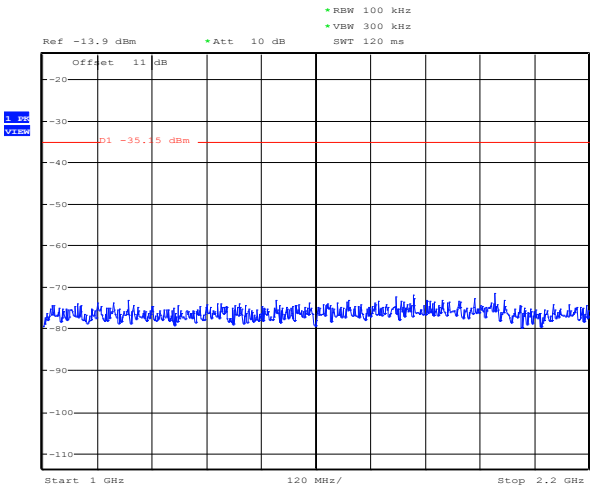

**From 150kHz to 30MHz, channel min/mid/max:**

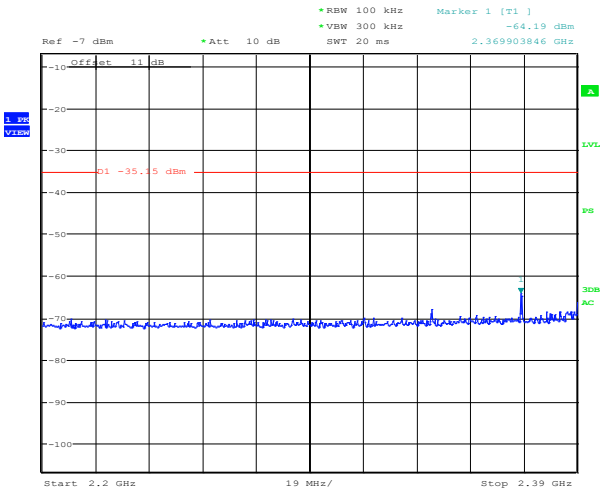


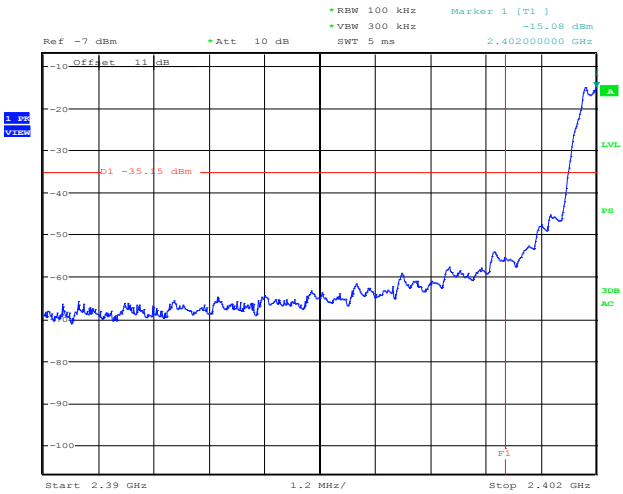

**From 30MHz to 1GHz, channel min/mid/max:**

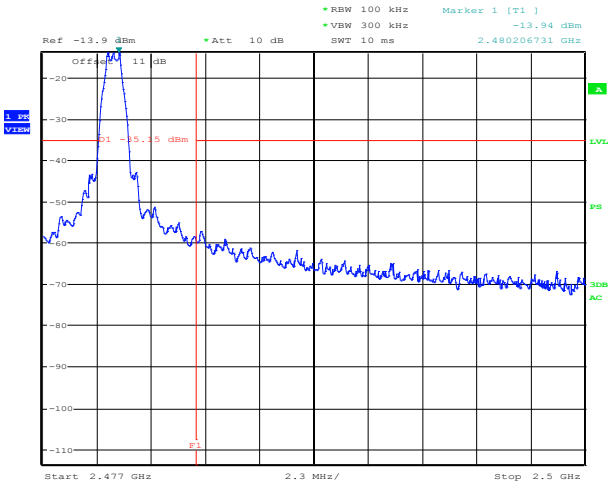


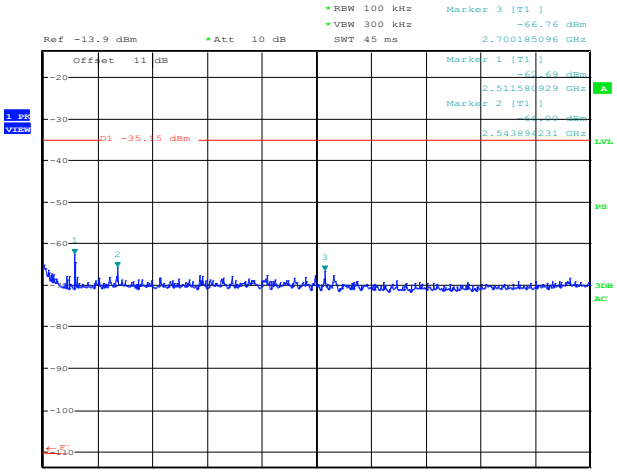

**From 1GHz to 25GHz, channel min/mid/max:**



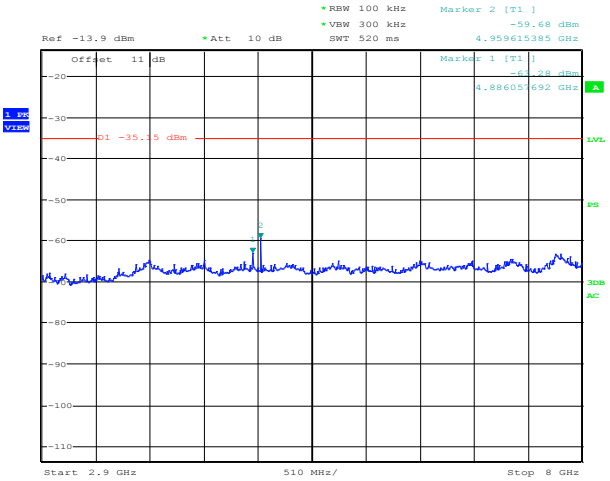



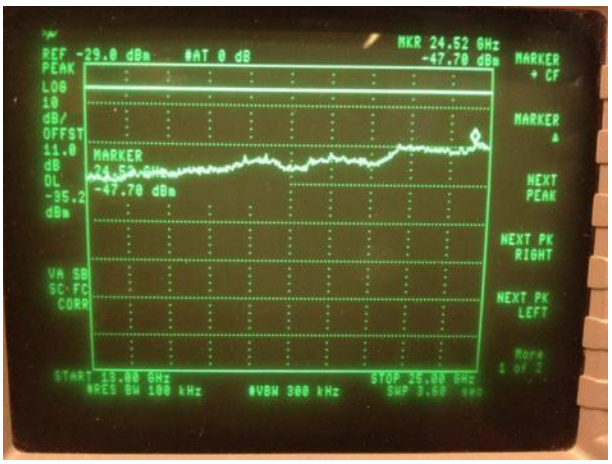










## *8.7. CONCLUSION*

Band Edge Measurement performed on the sample of the product **TS1E1**, SN: **V0.3.5**, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-210 Issue 8 limits.

# 9. OCCUPIED BANDWIDTH

## *9.1. TEST CONDITIONS*

Date of test :July 15th, 2014
Test performed by : A.Merlin / G.Deschamps
Atmospheric pressure (hPa) :994
Relative humidity (%) :44
Ambient temperature (°C) :25

## *9.2. SETUP*

☑ ***Conducted measurement:***
The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.
Offset: Attenuator+cable 11dB

☐ ***Radiated measurement:***
The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

***Measurement Procedure:***
1. RBW used should not be lower than 1% of the selected span
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. OBW 99% function of spectrum analyzer used

## *9.3. TEST EQUIPMENT LIST*

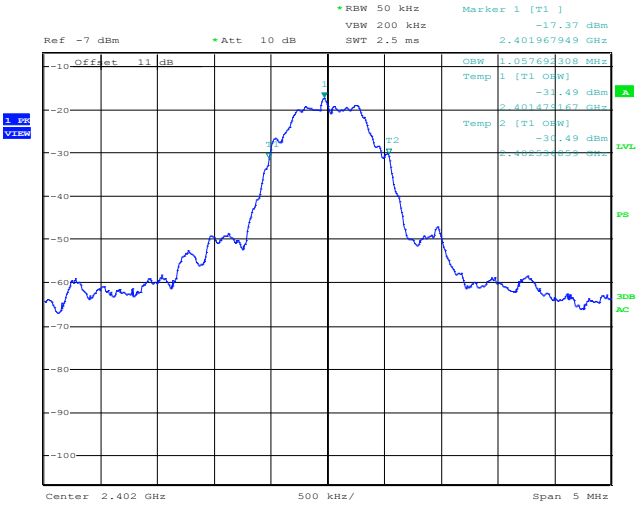
| DESCRIPTION | MANUFACTURER | MODEL | N° LCIE | Cal_Date | Cal_Due |
|---|---|---|---|---|---|
| Attenuator 10dB | JFW | - | A7122166 | 09/13 | 09/14 |
| Cable Measure | - | - | A5329604 | 04/13 | 04/14 |
| Receiver 20Hz – 8GHz | ROHDE & SCHWARZ | ESU8 | A2642019 | 10/13 | 10/14 |
| Thermo-hygrometer (C3) | OREGON | BAR206 | B4204078 | 01/14 | 01/15 |
| Thermo-hygrometer (PM2) | OREGON | BAR916HG-G | B4206011 | 04/14 | 04/15 |

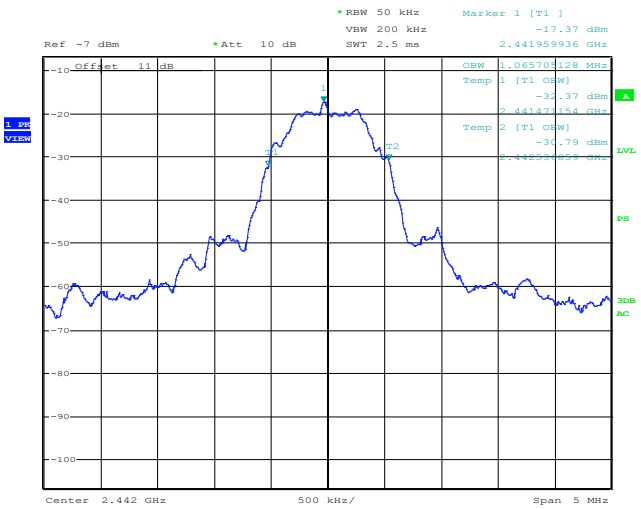
## *9.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION*

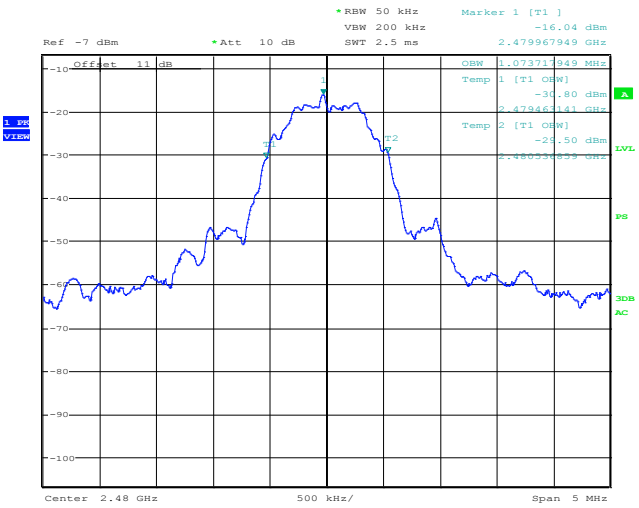
☑ None ☐ Divergence:

## *9.5. TEST SEQUENCE AND RESULTS*

| Channel | Channel Frequency (MHz) | 99% Occupied Bandwidth (MHz) |
|---|---|---|
| Min | 2402 | **1.057** |
| Mid | 2442 | **1.065** |
| Max | 2480 | **1.073** |

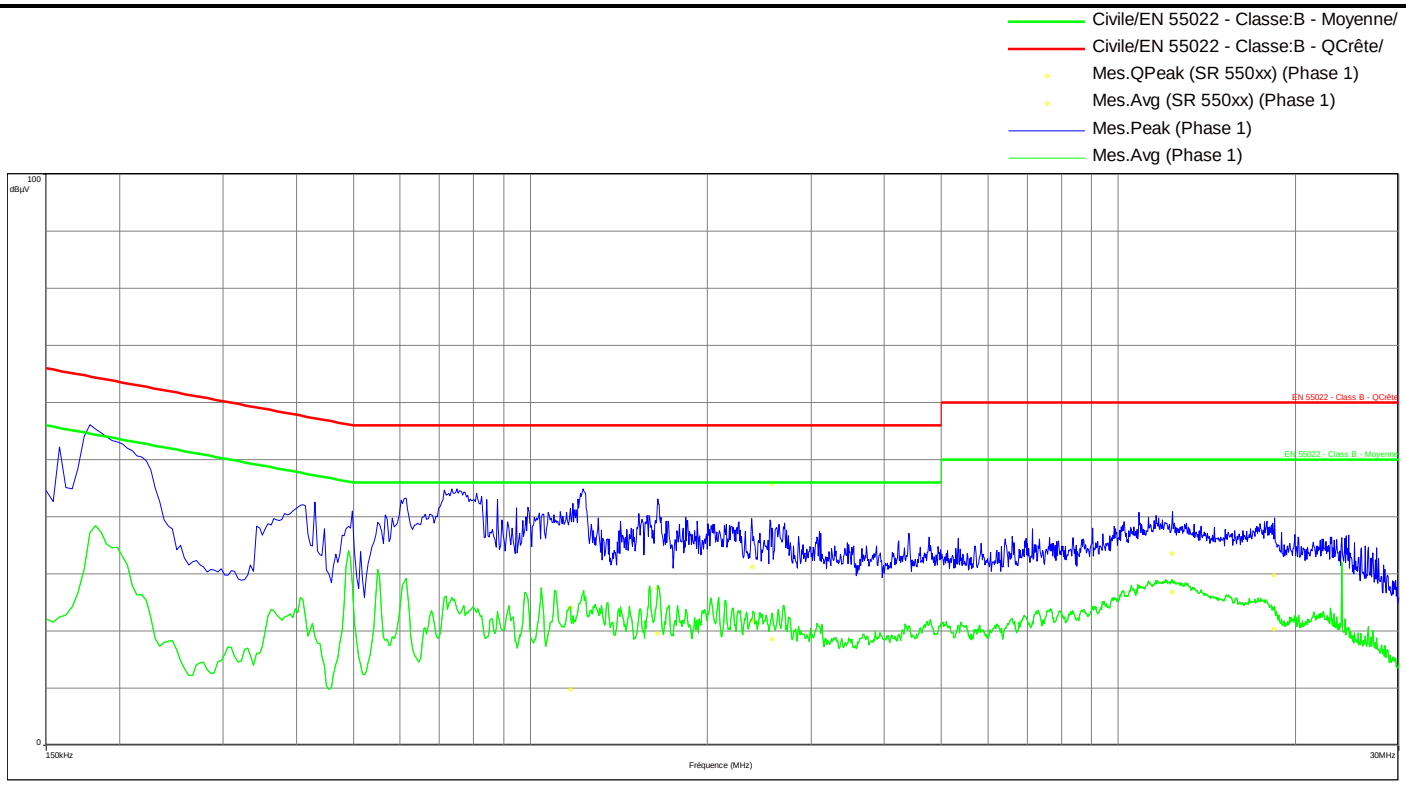


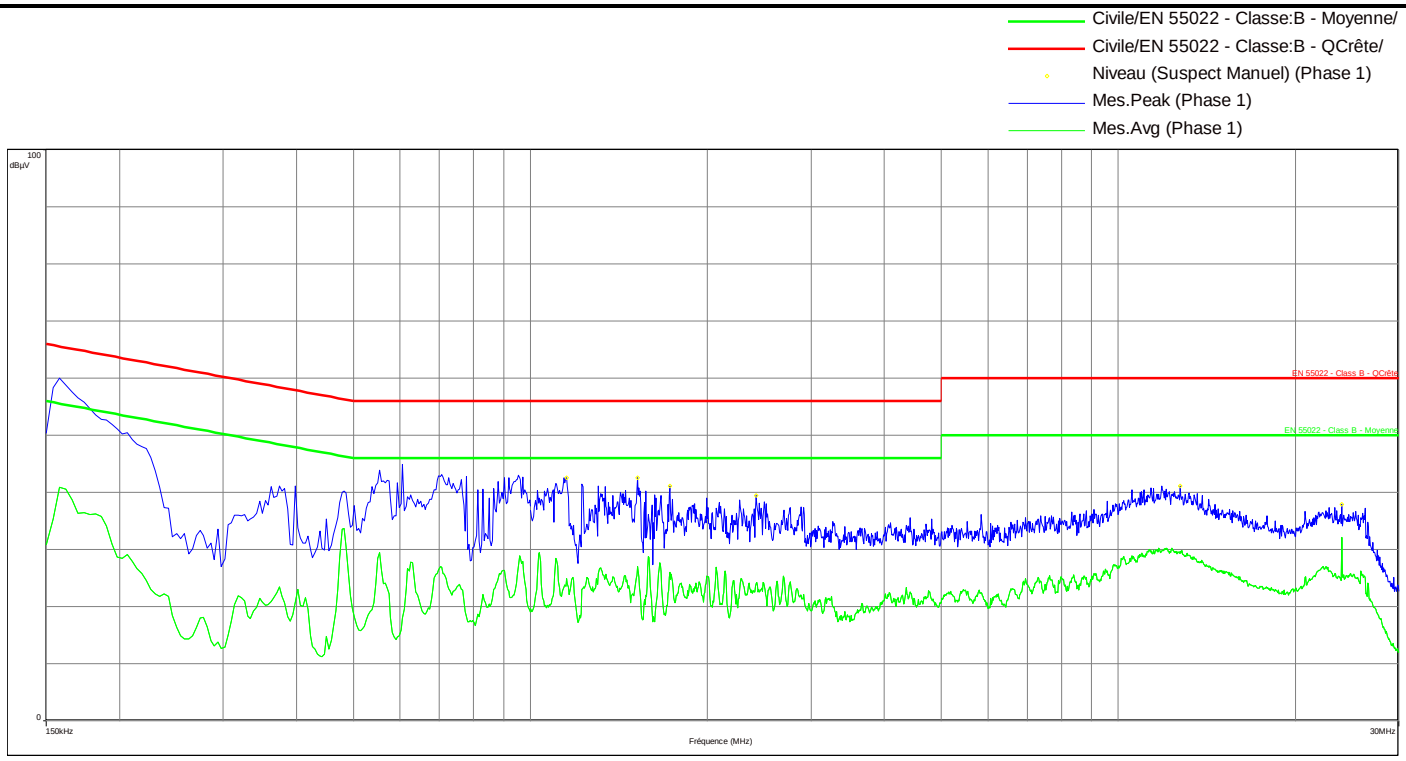
## 10. ANNEX 1 (GRAPHS)

| CONDUCTED EMISSIONS | | | |
|---|---|---|---|
| **Graph name:** | Emc#1 | **Test configuration:** | |
| **Limit:** | EN 55022 | L 110/60 | |
| **Class:** | B | | |
| **Frequency range: [150kHz - 30MHz]** | | | |
| **Voltage / Frequency:** | 110VAC / 60Hz | **RBW :** | 10kHz |
| **Line:** | Phase | **VBW :** | 30kHz |



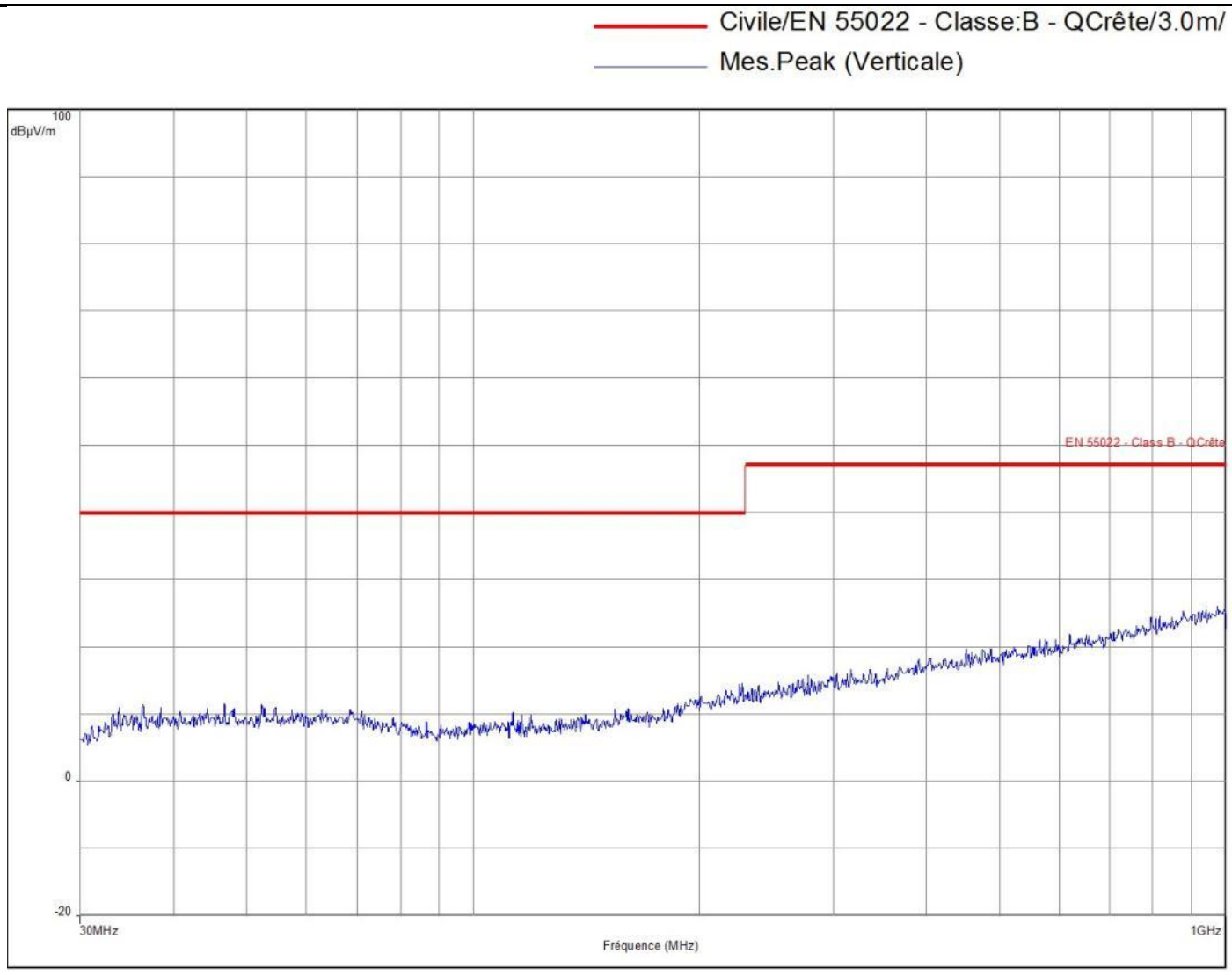

| Frequency (MHz) | Mes.QPeak (dBµV) | LimQP (dBµV) | Mes.QPeak-LimQP (dB) | Mes.Avg (dBµV) | LimAvg (dBµV) | Mes.Avg-LimAvg (dB) |
|---|---|---|---|---|---|---|
| 1.168 | 24.08 | 56 | -31.92 | 9.78 | 46 | -36.22 |
| 1.644 | 27.42 | 56 | -28.58 | 19.57 | 46 | -26.43 |
| 2.384 | 31.18 | 56 | -24.82 | 21.84 | 46 | -24.16 |
| 2.572 | 45.74 | 56 | -10.26 | 18.55 | 46 | -27.45 |
| 12.348 | 33.53 | 60 | -26.47 | 26.75 | 50 | -23.25 |
| 18.408 | 29.76 | 60 | -30.24 | 20.32 | 50 | -29.68 |

| CONDUCTED EMISSIONS | | | |
|---|---|---|---|
| **Graph name:** | Emc#2 | **Test configuration:** | |
| **Limit:** | EN 55022 | N 110/60 | |
| **Class:** | B | | |
| **Frequency range: [150kHz - 30MHz]** | | | |
| **Voltage / Frequency:** | 110VAC / 60Hz | **RBW :** | 10kHz |
| **Line:** | Neutre | **VBW :** | 30kHz |

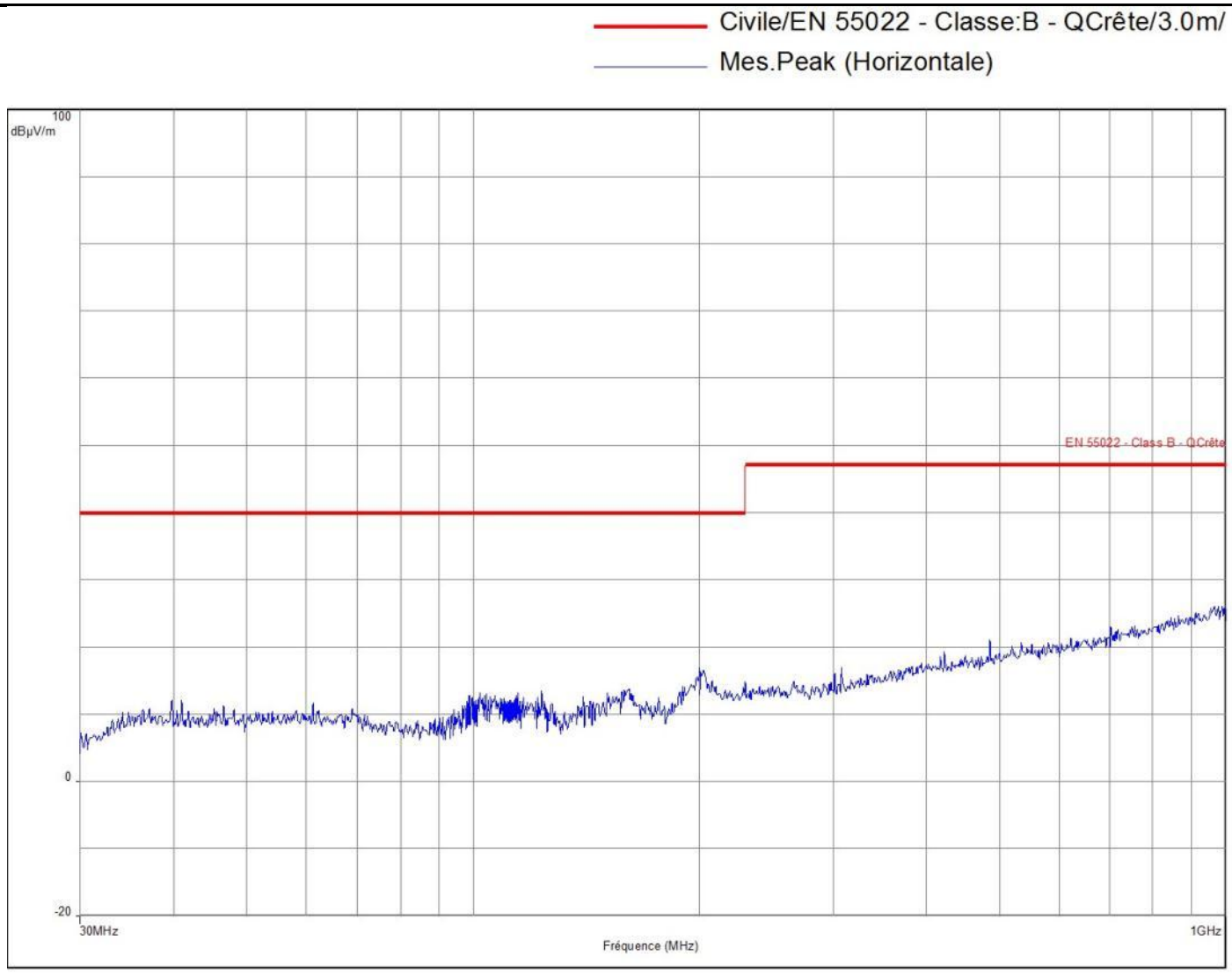



| Frequency (MHz) | Mes.QPeak (dBµV) | LimQP (dBµV) | Mes.QPeak-LimQP (dB) | Mes.Avg (dBµV) | LimAvg (dBµV) | Mes.Avg-LimAvg (dB) |
|---|---|---|---|---|---|---|
| 0.158 | 60.0 | 65.5 | -5.5 | 40.9 | 55.5 | -14.7 |
| 0.554 | 43.9 | 56 | -12.1 | 33.7 | 46.3 | -12.6 |
| 1.156 | 41.1 | 56 | -14.9 | 29.4 | 46 | -16.6 |
| 1.520 | 45.5 | 56 | -13.4 | 28.8 | 46 | -17.2 |
| 12.448 | 39.9 | 60 | -20.1 | 29.7 | 50 | -20.3 |
| 24.000 | 37.8 | 60 | -22.2 | 32.1 | 50 | -17.9 |

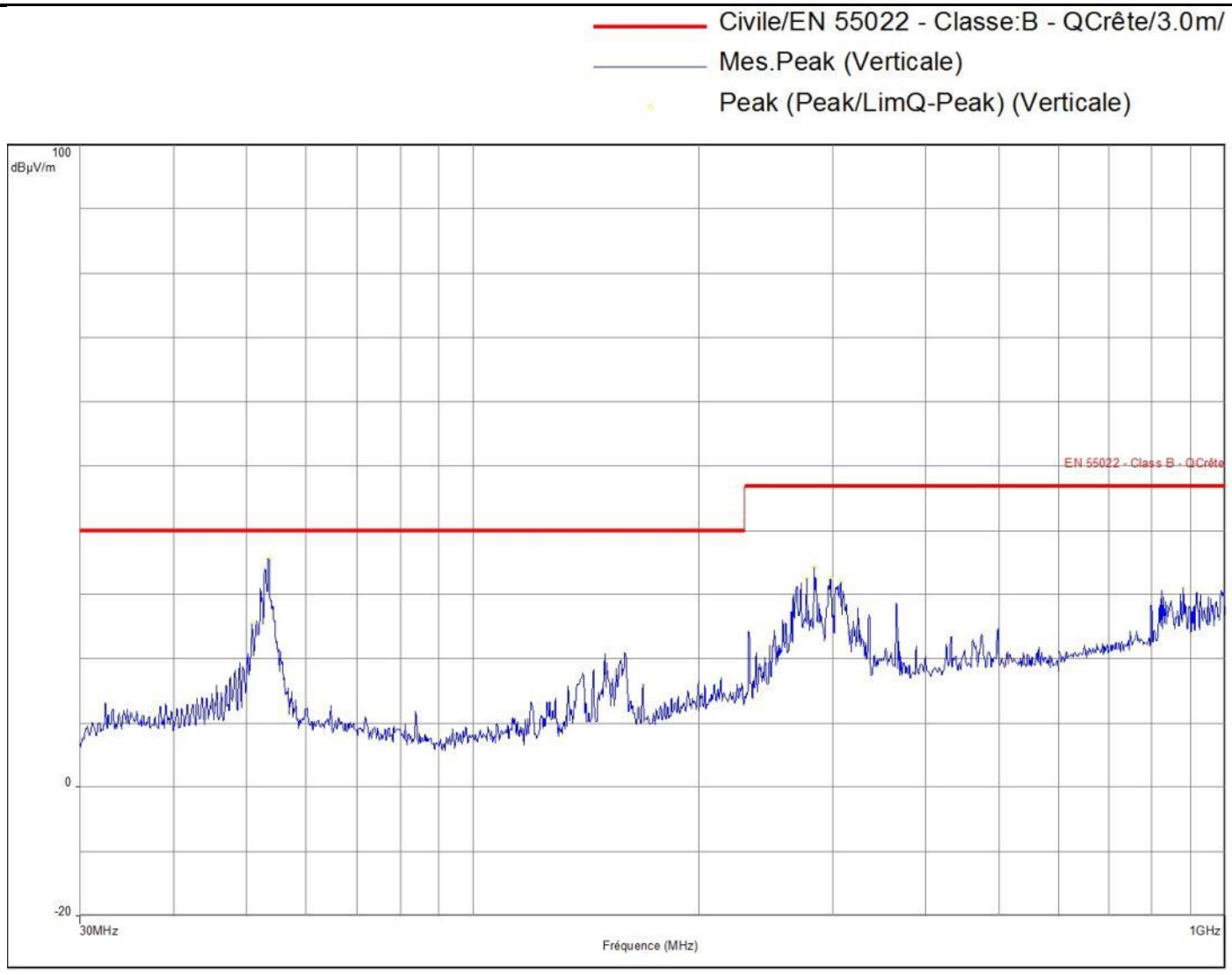
| RADIATED EMISSIONS | | | |
|---|---|---|---|
| **Graph name:** | Emr#1 | **Test configuration:** | |
| **Limit:** | EN 55022 | PV mode bluetooth | |
| **Class:** | B | | |
| **Frequency range: [30MHz - 1GHz]** | | | |
| **Antenna polarization:** | Vertical | **RBW :** | 100kHz |
| **Azimuth:** | 0° - 360° | **VBW :** | 300kHz |



| RADIATED EMISSIONS | | | |
|---|---|---|---|
| **Graph name:** | Emr#2 | **Test configuration:** | |
| **Limit:** | EN 55022 | PH mode bluetooth | |
| **Class:** | B | | |
| **Frequency range: [30MHz - 1GHz]** | | | |
| **Antenna polarization:** | Horizontal | **RBW :** | 100kHz |
| **Azimuth:** | 0° - 360° | **VBW :** | 300kHz |

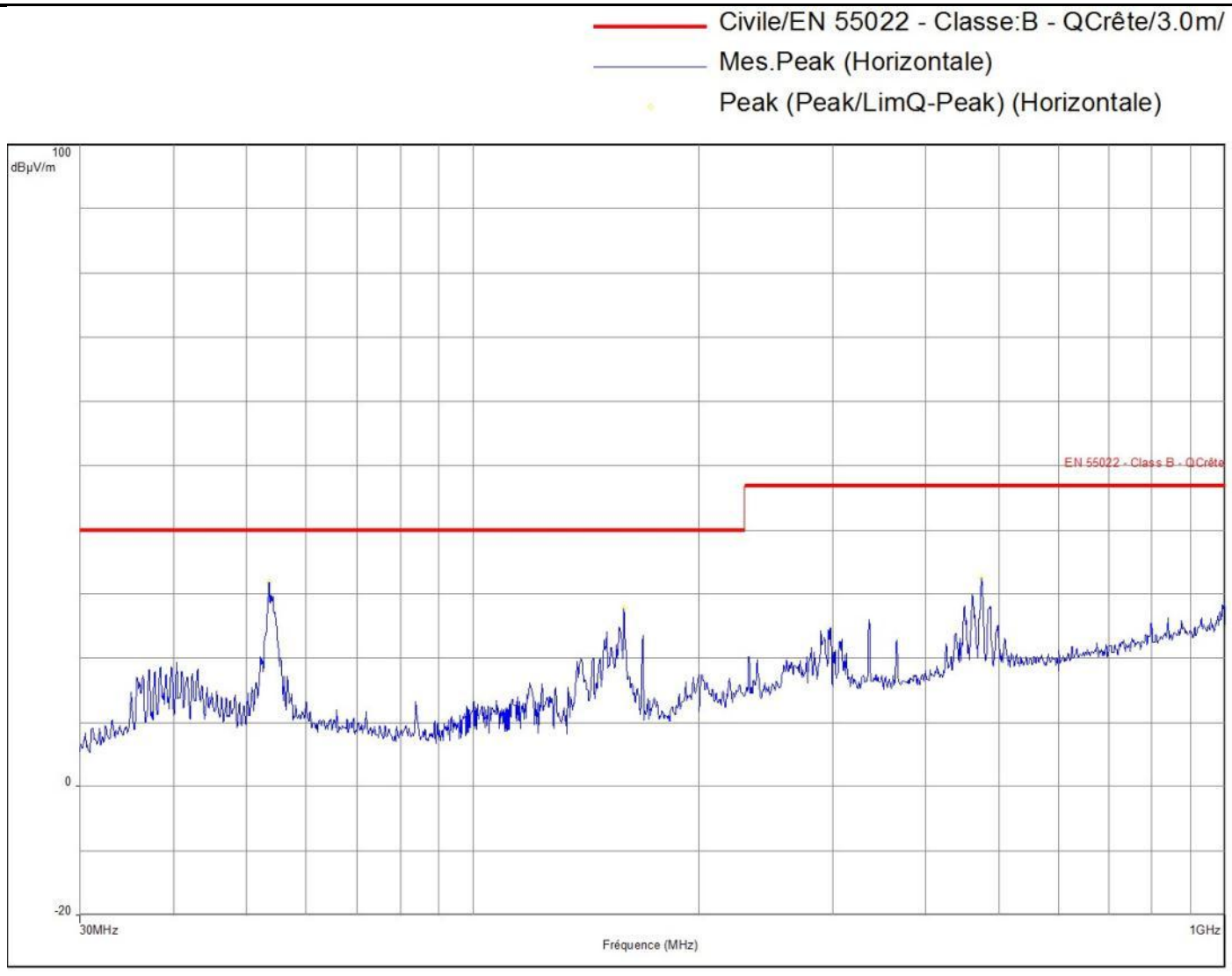


| RADIATED EMISSIONS | | | |
|---|---|---|---|
| **Graph name:** | Emr#3 | **Test configuration:** | |
| **Limit:** | EN 55022 | PV mode USB | |
| **Class:** | B | | |
| **Frequency range: [30MHz - 1GHz]** | | | |
| **Antenna polarization:** | Vertical | **RBW :** | 100kHz |
| **Azimuth:** | 0° - 360° | **VBW :** | 300kHz |



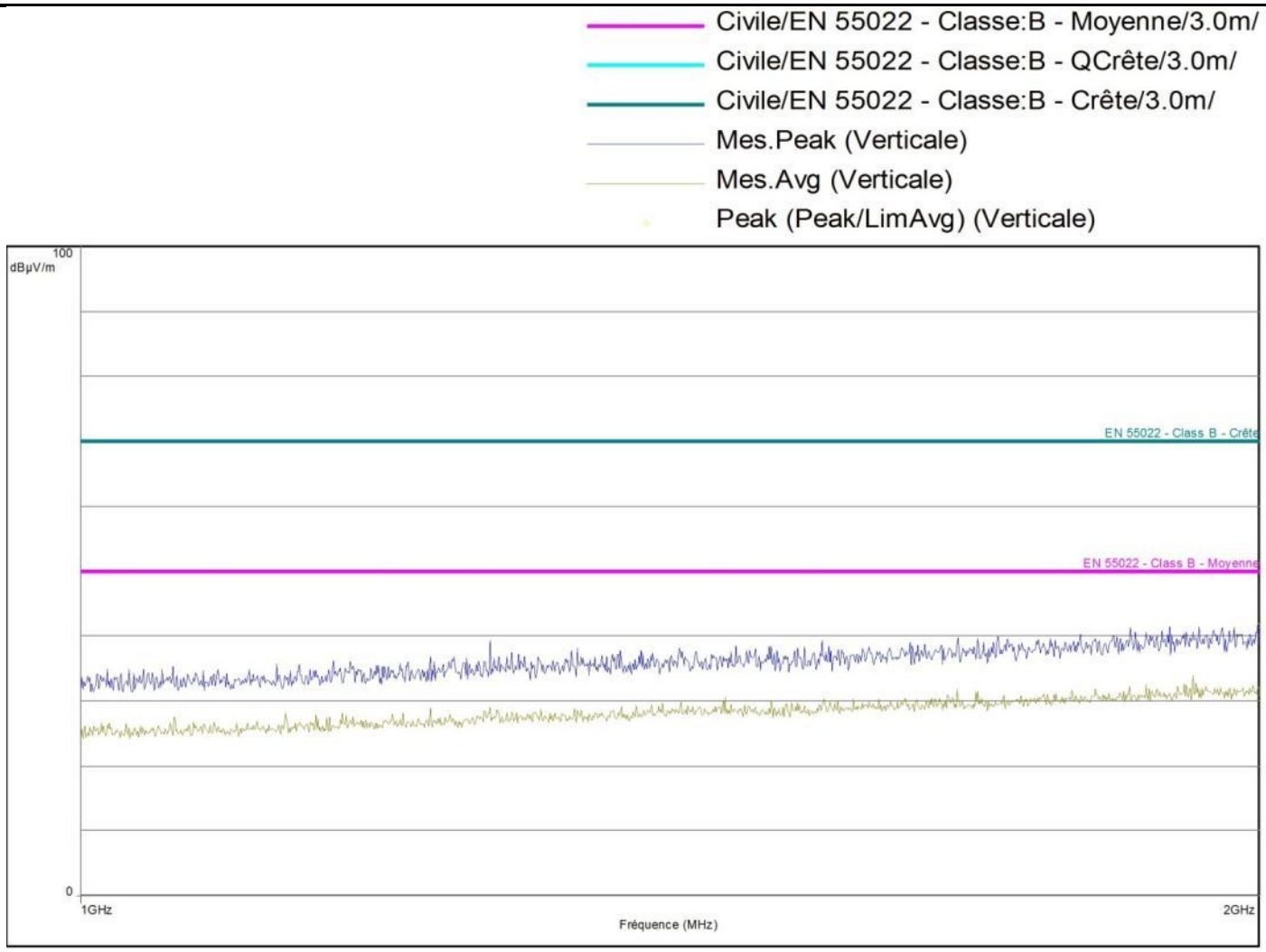

| Frequency (MHz) | Peak (dBµV/m) |
|---|---|
| 50.808 | 25.49 |
| 53.494 | 35.58 |
| 277.960 | 32.47 |
| 283.920 | 34.31 |
| 285.520 | 32.44 |
| 298.320 | 32.46 |
| 308.400 | 32.07 |

| RADIATED EMISSIONS | | | |
|---|---|---|---|
| **Graph name:** | Emr#4 | **Test configuration:** | |
| **Limit:** | EN 55022 | PH mode USB | |
| **Class:** | B | | |
| **Frequency range: [30MHz - 1GHz]** | | | |
| **Antenna polarization:** | Horizontal | **RBW :** | 100kHz |
| **Azimuth:** | 0° - 360° | **VBW :** | 300kHz |

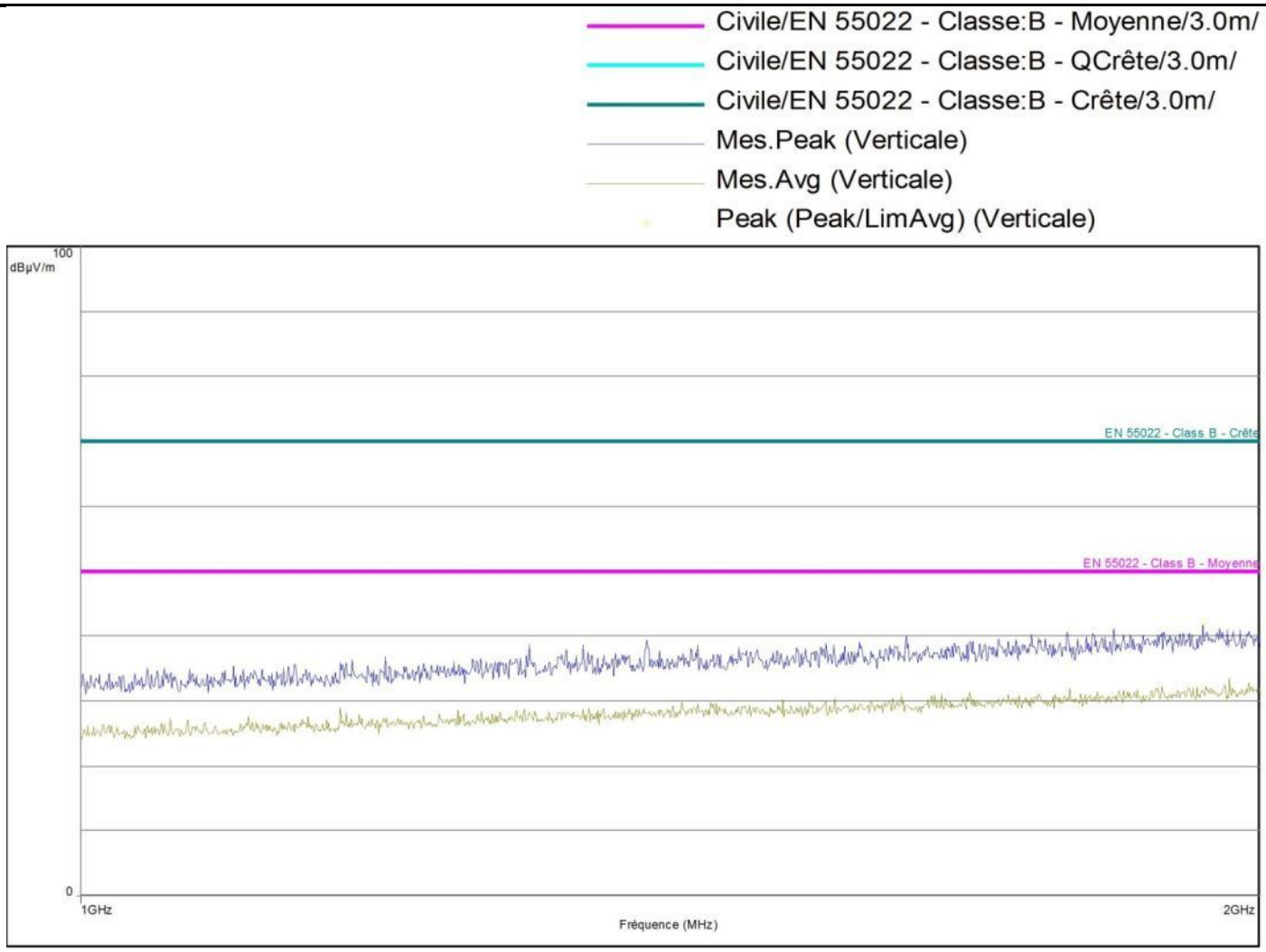



| Frequency (MHz) | Peak (dBµV/m) |
|---|---|
| 53.511 | 31.87 |
| 158.809 | 27.78 |
| 474.480 | 32.50 |

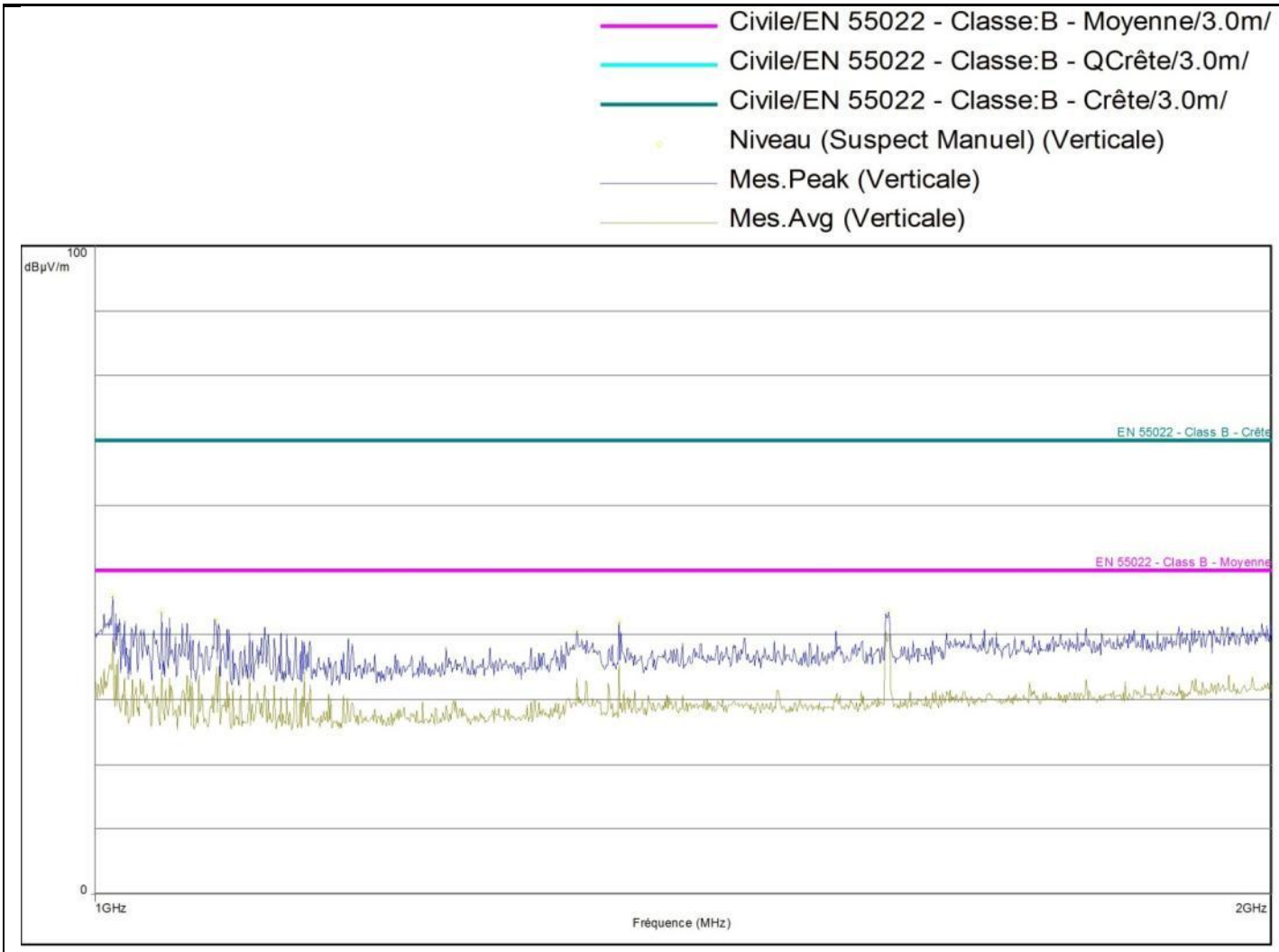
| RADIATED EMISSIONS | | | |
|---|---|---|---|
| **Graph name:** | Emr#5 | **Test configuration:** | |
| **Limit:** | EN 55022 | PV bluetooth | |
| **Class:** | B | | |
| **Frequency range: [1GHz - 2GHz]** | | | |
| **Antenna polarization:** | Vertical | **RBW :** | 1MHz |
| **Azimuth:** | 0° - 360° | **VBW :** | 3MHz |



| RADIATED EMISSIONS | | | |
|---|---|---|---|
| **Graph name:** | Emr#6 | **Test configuration:** | |
| **Limit:** | EN 55022 | PH bluetooth | |
| **Class:** | B | | |
| **Frequency range: [1GHz - 2GHz]** | | | |
| **Antenna polarization:** | Horizontal | **RBW :** | 1MHz |
| **Azimuth:** | 0° - 360° | **VBW :** | 3MHz |

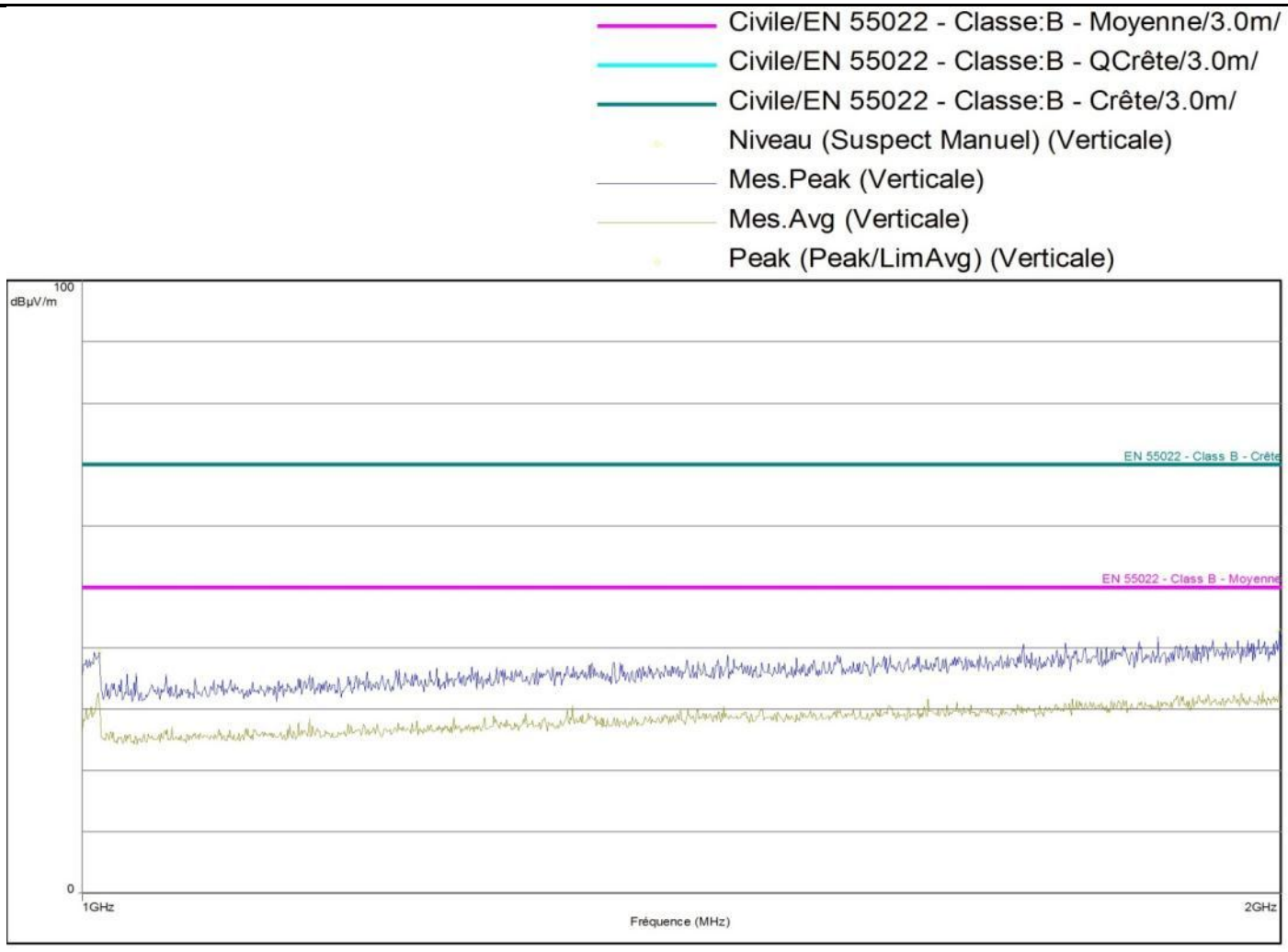


| RADIATED EMISSIONS | | | |
|---|---|---|---|
| **Graph name:** | Emr#7 | **Test configuration:** | |
| **Limit:** | EN 55022 | PV USB | |
| **Class:** | B | | |
| **Frequency range: [1GHz - 2GHz]** | | | |
| **Antenna polarization:** | Vertical | **RBW :** | 1MHz |
| **Azimuth:** | 0° - 360° | **VBW :** | 3MHz |




| Frequency (MHz) | Niveau (dBµV/m) |
|---|---|
| 1010.600 | 46.03 |
| 1039.900 | 43.64 |
| 1073.100 | 42.29 |
| 1328.300 | 40.65 |
| 1361.600 | 42.09 |
| 1595.900 | 43.52 |

| RADIATED EMISSIONS | | | |
|---|---|---|---|
| **Graph name:** | Emr#8 | **Test configuration:** | |
| **Limit:** | EN 55022 | PH USB | |
| **Class:** | B | | |
| **Frequency range: [1GHz - 2GHz]** | | | |
| **Antenna polarization:** | Horizontal | **RBW :** | 1MHz |
| **Azimuth:** | 0° - 360° | **VBW :** | 3MHz |



## 11. UNCERTAINTIES CHART

| **Type de mesure / *Kind of measurement*** | **Incertitude élargie laboratoire / *Wide uncertainty laboratory* (k=2) ± x** | **Incertitude limite du CISPR / *CISPR uncertainty limit* ± y** |
|---|---|---|
| Mesure des perturbations conduites en tension sur le réseau d'énergie<br>*Measurement of conducted disturbances in voltage on the power port* | 3.57 dB | 3.6 dB |
| Mesure des perturbations conduites en tension sur le réseau de télécommunication<br>*Measurement of conducted disturbances in voltage on the telecommunication port.* | 3.28 dB | A l'étude / Under consid. |
| Mesure des perturbations discontinues conduites en tension<br>*Measurement of discontinuous conducted disturbances in voltage* | 3.47 dB | 3.6 dB |
| Mesure des perturbations conduites en courant<br>*Measurement of conducted disturbances in current* | 2.90 dB | A l'étude / Under consid. |
| Mesure du champ électrique rayonné sur le site en espace libre de Moirans<br>*Measurement of radiated electric field on the Moirans open area test site* | 5.07 dB | 5.2 dB |

Les valeurs d'incertitudes calculées du laboratoire étant inférieures aux valeurs d'incertitudes limites établies par la norme, la conformité de l'échantillon est établie directement par les niveaux limites applicables. / *The uncertainty values calculated by the laboratory are lower than limit uncertainty values defined by the standard. The conformity of the sample is directly established by the applicable limits values.*