



Release July, 2017

# **TEST REPORT**

N°: 163209-741717-A (File#1028035) Version : 03

Subject Electromagnetic compatibility tests according to the standards:

FCC CFR 47 Part 15, Subpart C and Subpart B

RSS-210 Issue 9

Issued to INGENICO

9 Avenue de la gare

BP 25156

26958 - VALENCE

FRANCE

Apparatus under test

Product Payment terminal

♦ Trade mark
INGENICO
INGENICO

Model under test Lane/3000 N CL/ETH

♦ Serial number 191703413031159199991007

♥ FCCID XKB-L3000NCL
♥ IC 2586D-L3000NCL

**Conclusion** See Test Program chapter

Test date August 9, 2019 to August 14, 2019

Test location FONTENAY AUX ROSES

IC Test site 6230B-1 Composition of document 45 pages

**Document issued on** November 25, 2019

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I CIF

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## **PUBLICATION HISTORY**

| Version | Date                             | Author        | Modification  |
|---------|----------------------------------|---------------|---|
| 01      | November 25, 2019                | Jonathan PAUC | Creation of the document  |
| 02      | November 25, 2019                | Jonathan PAUC | Fixe issue on DUT reference<br>Add Family model information             |
| 03      | November 25 <sup>th</sup> , 2019 | Jonathan PAUC | OBW measurement carry on with correct settings TCB feedback / Subpart B |



## **SUMMARY**

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#### 1. **TEST PROGRAM**

Standard: - FCC Part 15, Subpart C and Subpart B

- ANSI C63.10 (2013) - RSS-210 Issue 9 - RSS-Gen Issue 5

| EMISSION TEST  | LIMITS   |   |                         | RESULTS (Comments)               |
|--|--|---|-------------------------|----------------------------------|
| Limits for conducted disturbance at mains ports  | Frequency  | Quasi-peak<br>value (dBµV)  | Average<br>value (dBµV) | ☑ PASS                           |
| 150kHz-30MHz   | 150-500kHz   | 66 to 56  | 56 to 46                | □ FAIL<br>□ NA                   |
| CFR 47 §15.207 / 15.107  | 0.5-5MHz   | 56  | 46                      | □NP                              |
| CIN 41 910.2017 10.101   | 5-30MHz  | 60  | 50                      |                                  |
| Radiated emissions 9kHz-30MHz CFR 47 §15.209 (a) / 15.109 CFR 47 §15.225 RSS-Gen §4.9  | Measure at 30m   | 9kHz-490kHz : 67.6dBµV/m /F(kHz) <b>Measure at 30m</b> 490kHz-1.705MHz : 87.6dBµV/m /F(kHz) |                         |                                  |
| Radiated emissions 30MHz-25GHz* CFR 47 §15.209 (a) CFR 47 §15.225 RSS-Gen §4.9 Highest frequency: 600MHz (Declaration of provider) | Measure at 3m<br>30MHz-88MHz : 40 dE<br>88MHz-216MHz : 43.5<br>216MHz-960MHz : 46<br>Above 960MHz : 54.0 | 5 dBμV/m<br>.0 dBμV/m   |                         | ☑ PASS<br>□ FAIL<br>□ NA<br>□ NP |
| Fundamental field strength limit<br>CFR 47 §15.225<br>RSS-210 §B.6   | Operation within the band<br>13.110-14.010 MHz   |   |                         | ☑ PASS □ FAIL □ NA □ NP          |
| Fundamental frequency tolerance<br>CFR 47 §15.225<br>RSS-210 §B.6  | Operation within the band<br>13.110-14.010 MHz   |   |                         | ☑ PASS □ FAIL □ NA □ NP          |
| Band edge compliance<br>CFR 47 §15.225<br>RSS-210 §B.6   | Operation within the band<br>13.110-14.010 MHz   |   |                         | ☑ PASS □ FAIL □ NA □ NP          |
| Occupied bandwidth<br>RSS-Gen Issue 5 §6.7   | No limit   |   |                         | ☑ PASS □ FAIL □ NA □ NP          |
| Receiver Spurious Emission** RSS-Gen Issue 5 §7.3  | See RSS-Gen §7.3   |   |                         | ☐ PASS ☐ FAIL ☑ NA ☐ NP          |

<sup>\*§15.33:</sup> 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.

<sup>-</sup> 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.

\*\*Testing covered the receive mode, and receiver spurious emissions are considered to be the same as transmitter.



#### 2. SYSTEM TEST CONFIGURATION

#### 2.1. INFORMATION

LANE/3000 N CL/ETH can be powered by two different sources: DESK/1500 N CL can be powered by

-USB input: 5 Vdc

-USB input: 5 Vdc

- DC input: 8-12Vdc, external Power supply

That's only one difference between both models; LANE/3000 N CL/ETH is worst configuration.

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

#### **Equipment under test (EUT):**

Lane/3000 N CL/ETH



#### Power supply:

During all the tests, EUT is supplied by  $V_{nom}$ : 240 VAC / 50Hz & 120VAC / 60Hz For measurement with different voltage, it will be presented in test method.

| Name    | Туре                | Rating  | Reference / Sn                    | Comments |
|---------|---------------------|---|-----------------------------------|----------|
| Supply1 | ☑ AC □ DC □ Battery | Input: 100-240V 50-60Hz 0.5A<br>Output: 8VDC 2A | INGENICO PSC16E-080L6 / 296199611 | 1        |

#### Voltage table used:

| Туре                     | Measurement performed:           |                                 |  |  |
|--------------------------|----------------------------------|---------------------------------|--|--|
| ☑ AC                     | ☑ 120VAC/60Hz                    | ☑ 240VAC/50Hz                   |  |  |
| □ DC                     | □ +VDC                           | □ <b>VDC</b>                    |  |  |
| ☐ USB (Laptop auxiliary) | ☐ 120VAC/60Hz (Laptop auxiliary) | ☐ 240VAC/50Hz(Laptop auxiliary) |  |  |



### Inputs/outputs - Cable:

| Access  | Туре | Length<br>used (m) | Declared <3m | Shielded | Under test | Comments |
|---------|------|--------------------|--------------|----------|------------|----------|
| Supply1 | PSU  | 2                  |              |          | ☒          | 1        |

#### **Auxiliary equipment used during test:**

| Type             | Reference       | Sn        | Comments |
|------------------|-----------------|-----------|----------|
| Contactless card | INGENICO Type B | 296116026 | -        |
| CAM0 card        | INGENICO        | -         | -        |
| USB cable        | INGENICO        | 296100039 | -        |

#### **Equipment information:**

|                                 | 1                    |          | T                  |                      | 1           |                              |  |
|---------------------------------|----------------------|----------|--------------------|----------------------|-------------|------------------------------|--|
| Frequency band:                 | ☑ [13.553–13.567]MHz |          | □ [12              | 5]kHz                |             | ] [ - ] MHz                  |  |
| RF mode:                        | □ Transmitter        | <b>V</b> | Transceiver        | ransceiver   Receive |             | ☐ Standby                    |  |
| Type:                           | ☑ RFID               |          | □ EAS              |                      | □0          | ther:                        |  |
| Bandwidth:                      | ☐ Narro              |          |                    | ☑ Wideband           |             |                              |  |
|                                 | (ISO15693, IS        | SO1800   | 00-3)              | (IS                  | <u> </u>    | 3, NFC)                      |  |
| Channelized system:             | ☑ No                 |          | ☐ Yes              | s, channel spa       | cing:       | kHz                          |  |
| Equipment intended for use as a |                      |          | □ M                | obile                |             | ☐ Portable                   |  |
| Type of equipment:              |                      | ;        | □ PI               | ug-in                |             | ☐ Combined                   |  |
| Antenna Type:                   | ☐ External           |          |                    |                      | ✓ Internal  |                              |  |
| Antenna connector:              |                      |          | Permanent internal | ☑ None               | )           | ☐ Temporary (only for tests) |  |
| Antenna Gain:                   |                      |          | NC                 |                      |             |                              |  |
| Duty cycle:                     | ☑ Continuous du      | ıty      | ☐ Intermi          | ttent duty           |             | ontinuous operation          |  |
| Equipment type:                 |                      | ion mo   | n model            |                      | □ Prototype |                              |  |
|                                 | Tmin:                |          | ☑ -30°C            | □ 0°C                |             | □ °C                         |  |
| Temperature range:              | Tnom:                |          |                    | 20°C                 |             |                              |  |
|                                 | Tmax:                |          | □ 35°C             | ☑ 55°C               | ;           | □ °C                         |  |
| Type of power source:           | ☑ AC power supp      | oly      | ☐ DC pow           | er supply            | □Ва         | attery ( Select type)        |  |
|                                 | Vmin:                |          | □ 207V             | /50Hz                |             | ☑ 102 VAC                    |  |
| Test source voltage:            | Vnom:                |          | □ 230V/50Hz        |                      | ☑ 120 VAC   |                              |  |
|                                 | Vmax                 |          | □ 253V/50Hz        |                      | ☑ 138 VAC   |                              |  |

NC: Not communicated by customer



#### 2.1. MARKING PLATE

i<del>ngen</del>ico

Made in: xxxxxxxxxxxx

Rev:xx

Product: Lane/3000 N CL /ETH

FCC ID : XKB-L3000NCL IC : 2586D-L3000NCL

Area for certification logo

8-12 V \_\_\_\_ 2A USB 5V 0.5A

Bar-Code 2D

PN: SN: HVN: MAC Adr:

HVN:LAN30AN

Mac Adr: XXXXXXXXXXXXX

Terminal Bar-Code (1D)

PN: XXXXXXXXXXXX

Terminal Bar-Code Serial N° (1D)

SN: YYDDDFFVPPPPPPPPXXXXXXXX

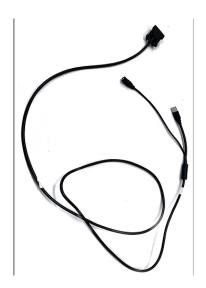


#### 2.2. EUT CONFIGURATION

#### Functions used:

| Configuration 1     |       |  |  |
|---------------------|-------|--|--|
| Auto EMC            | NO    |  |  |
| Block on fault      | NO    |  |  |
| Time between cycles | 400ms |  |  |
| Audio               | OFF   |  |  |
| Backlight           | ON    |  |  |
| Buzzer              | ON    |  |  |
| Cam0                | ON    |  |  |
| Cless               | ON    |  |  |
| Sam1                | ON    |  |  |
| Swipe               | OFF   |  |  |

## Configuration n°1:



Tested with direct cable



| 2  | 1. | EQUIPMENT MODIFICATIONS |
|----|----|-------------------------|
| J. | 1. |                         |

✓ None
✓ Modification:

#### 3.2. 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  $52.5dB\mu V$  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  $dB\mu V/m$ .

 $FS = 52.5 + 7.4 + 1.1 - 29 = 32 dB\mu V/m$ 

The 32 dBμV/m value can be mathematically converted to its corresponding level in μV/m.

Level in  $\mu$ V/m = Common Antilogarithm [(32dB $\mu$ V/m)/20] = 39.8  $\mu$ V/m.

#### 3.3. 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



#### 4. CONDUCTED EMISSION DATA

#### 4.1. ENVIRONMENTAL CONDITIONS

Date of test : August 14, 2019 Test performed by : Jonathan PAUC

Atmospheric pressure (hPa) : 994 Relative humidity (%) : 31 Ambient temperature (°C) : 21

#### 4.2. 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



#### 4.3. TEST METHOD

The product has been tested according to ANSI C63.10 and FCC Part 15 subpart B and C. The product has been tested with a voltage sets (see the table voltage in §2.2) and compared to the FCC Part 15 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  $50\Omega$  /  $50\mu$ H. 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 (for example). Graphs are obtained in PEAK detection. Measures are also performed in Quasi-Peak and Average for any strong signal.

#### 4.4. TEST EQUIPMENT LIST

| Test equipment used            |                 |         |            |                       |                      |
|--------------------------------|-----------------|---------|------------|-----------------------|----------------------|
| Description                    | Manufacturer    | Model   | Identifier | Last Calibration date | Calibration due date |
| Cable + self                   | _               | _       | A5329578   | 10/18                 | 10/19                |
| EMC comb generator             | LCIE SUD EST    | _       | A3169098   |                       |                      |
| LISN                           | ROHDE & SCHWARZ | ENV216  | C2320123   | 05/19                 | 05/20                |
| Spectrum Analyzer 9kHz - 30MHz | ROHDE & SCHWARZ | ESHS10  | A2642028   | 11/17                 | 11/19                |
| Transient limiter              | ROHDE & SCHWARZ | ESH3-Z2 | A7122204   | 02/19                 | 02/20                |
| EMC comb generator             | LCIE SUD EST    | _       | A3169098   |                       |                      |

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

| ✓ None | □ Divergence: |
|--------|---------------|
| M MOHE |               |

#### 4.6. TEST RESULTS

#### **AC tests Results:**

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

Results: (PEAK detection)

| Graph identifier | Line    | Comments                      |           |  |  |
|------------------|---------|-------------------------------|-----------|--|--|
| Emc# 1           | Phase   | 120VAC/60Hz                   | See Annex |  |  |
| Emc# 2           | Neutral | 120VAC/60Hz                   | See Annex |  |  |
| Emc# 3           | Phase   | 120VAC/60Hz (With Dummy Load) | See Annex |  |  |
| Emc# 4           | Neutral | 120VAC/60Hz (With Dummy Load) | See Annex |  |  |
| Emc# 5           | Phase   | 240VAC/50Hz                   | See Annex |  |  |
| Emc# 6           | Neutral | 240VAC/50Hz                   | See Annex |  |  |
| Emc# 7           | Phase   | 240VAC/50Hz (With Dummy Load) | See Annex |  |  |
| Emc# 8           | Neutral | 240VAC/50Hz (With Dummy Load) | See Annex |  |  |

#### 4.7. CONCLUSION

The sample of the equipment Lane/3000 N CL/ETH, Sn: 191703413031159199991007, tested in the configuration presented in this test report satisfies to requirements of class B limits of the standard FCC Part 15 Subpart B and C, for conducted emissions.



### 5. RADIATED EMISSION DATA (15.209)

#### 5.1. ENVIRONMENTAL CONDITIONS

Date of test : August 13, 2019 : August 14, 2019 Test performed by : Jonathan PAUC Jonathan PAUC

Atmospheric pressure (hPa) : 994 995 Relative humidity (%) : 34 34 Ambient temperature (°C) : 21 22

#### 5.2. 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:

 $\ensuremath{\,\boxtimes\,}$  80cm above the ground on the non-conducting table (Table-top equipment) - Below 1GHz

☐ 150cm above the ground on the non-conducting table (Table-top equipment) - Above 1GHz

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

The EUT is powered by V<sub>nom</sub>.



Test setup on anechoic chamber







Test setup on OATS



#### 5.3. TEST METHOD

The product has been tested according to ANSI C63.10, FCC Part 15 Subpart B and C. Pre-characterisation measurement: (9kHz – 6GHz)

A pre-scan of all the setup has been performed in a 3 meters semi-anechoic chamber for frequency from 30MHz to XGHz. Test is performed in horizontal (H) and vertical (V) polarization, the loop antenna was rotated during the test for maximized 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 6GHz.

#### Characterization on 10 meters open site from 9kHz to 1GHz:

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 B and C limits. 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 for maximized 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 6GHz:

The product has been tested at a distance of **3 meters** from the antenna and compared to the FCC Part 15 Subpart B and C limits. Measurement bandwidth was 1MHz from 1GHz to XGHz. 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 (EUT smaller than the beamwidth of the measurement antenna, ANSI C63.10 §6.6.5) Frequency list has been created with anechoic chamber pre-scan results.



#### 5.4. TEST EQUIPMENT LIST

|                               |                 | Test equipment us | sed        |                       |                      |
|-------------------------------|-----------------|-------------------|------------|-----------------------|----------------------|
| Description                   | Manufacturer    | Model             | Identifier | Last Calibration date | Calibration due date |
| Antenna Loop                  | ELECTRO-METRICS | EM-6879           | C2040052   | 11/17                 | 11/19                |
| Amplifier 9kHz - 40GHz        | LCIE SUD EST    | _                 | A7102082   | 10/18                 | 10/19                |
| Antenna Bi-Log                | CHASE           | UPA6192           | C2040221   | 01/18                 | 01/20                |
| Cable SMA                     | _               | 6GHz              | A5329637   | 02/19                 | 02/20                |
| Emission Cable                | _               | 6GHz              | A5329069   | 11/18                 | 11/19                |
| Emission Cable (SMA 1m)       | TELEDYNE        | 26GHz             | A5329874   | 01/19                 | 01/20                |
| Emission Cable (SMA 3.3m)     | TELEDYNE        | 26GHz             | A5329875   | 01/19                 | 01/20                |
| Emission Cable (SMA 30cm)     | TELEDYNE        | 26GHz             | A5329873   | 01/19                 | 01/20                |
| Spectrum analyzer             | ROHDE & SCHWARZ | FSV 30            | A4060050   | 12/17                 | 12/19                |
| Table C3                      | LCIE            | _                 | F2000461   |                       |                      |
| Thermo-hygrometer (C3)        | OREGON          | BAR206            | B4204078   | 10/18                 | 10/20                |
| Turntable chamber (Cage#3)    | ETS Lingren     | Model 2165        | F2000371   |                       |                      |
| Turntable controller (Cage#3) | ETS Lingren     | Model 2090        | F2000444   |                       |                      |

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

| ✓ None | □ Divergence: |
|--------|---------------|
|--------|---------------|

#### 5.6. TEST RESULTS

#### 5.6.1. Pre-characterization at 3 meters [9kHz-30MHz]

See graph for 9kHz-30MHz band:

| Graph identifier | Polarization | EUT position | Commen | ts          |
|------------------|--------------|--------------|--------|-------------|
| Emr# 1           | 0°           | Axis XY      | /      | See annex 1 |
| Emr# 2           | 90°          | Axis XY      | /      | See annex 1 |
| Emr# 3           | 270°         | Axis XY      | /      |             |

| Graph identifier | Polarization | EUT position | Commen | ts          |
|------------------|--------------|--------------|--------|-------------|
| Emr# 4           | 0°           | Axis XY      | /      | See annex 1 |
| Emr# 5           | 90°          | Axis XY      | /      | See annex 1 |
| Emr# 6           | 270°         | Axis XY      | /      |             |

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

See graphs for 30MHz-1GHz:

| Graph identifier | Polarization | EUT position | Commen | ts          |
|------------------|--------------|--------------|--------|-------------|
| Emr# 7           | H & V        | Axis XY      | /      | See annex 1 |
| Emr# 8           | H & V        | Axis XY      | /      | See annex 1 |



#### 5.6.3. Pre-characterization at 3 meters [1GHz-6GHz]

See graphs for 1GHz-6GHz:

| Graph identifier | Polarization | EUT position | Commen    | ts          |
|------------------|--------------|--------------|-----------|-------------|
| Emr# 9           | H & V        | Axis XY      | Axis XY / |             |
| Emr# 10          | H & V        | Axis XY      | /         | See annex 1 |

#### 5.6.4. Characterization on 10 meters open site below 30 MHz

#### 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<br>(MHz) | QPeak Limit<br>(dΒμV/m)<br>@ 30m | Qpeak<br>(dBµV/m)<br>@ 30m | Margin<br>(Mes-Lim)<br>(dB) | Angle<br>Table<br>(deg) | Pol<br>Ant. | Ht<br>Ant.<br>(cm) | Correc.<br>Factor<br>(dB) | Comments |
|----|--------------------|----------------------------------|----------------------------|-----------------------------|-------------------------|-------------|--------------------|---------------------------|----------|
| 1  | 13.56              | 84                               | 23                         | -61                         | 85                      | 270         | 210                | 35.4                      | /        |
| 2  | 27.12              | 29.5                             | 7                          | -22.5                       | 90                      | 270         | 200                | 42.3                      | 1        |

Note: Measure have been done at 10m distance and corrected according to requirements of 15.209.e) (M@30m = M@10m-19.1dB)

#### Limits Sub clause §15.225

| Frequency (MHz) | Field strength (µV/m) | Measurement distance (m) |
|-----------------|-----------------------|--------------------------|
| 13.553-13.567   | 15 848<br>84 dBμV/m   | 30                       |
| 13.410-13.553   | 334                   | 30                       |
| 13.567-13.710   | 50.5 dBµV/m           | 30                       |
| 13.110-13.410   | 106                   | 30                       |
| 13.710-14.010   | 40.5 dBµV/m           | 30                       |

See following chapter of this test report for band edge measurements.

#### 5.6.5. 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.

| Test<br>Freq<br>(MHz) | Meter<br>Reading<br>dB(μV) | Detector<br>(Pk/QP/Av) | Pol<br>(V/H) | Azimuth<br>(Degrees) | Antenna<br>Height<br>(cm) | Transducer<br>Factor<br>(dB) | Level<br>(dBµV/m) | Limit<br>(dBµV/m) | Margin<br>(dB) | Remark |
|-----------------------|----------------------------|------------------------|--------------|----------------------|---------------------------|------------------------------|-------------------|-------------------|----------------|--------|
| 40.676                | 25.1                       | QP                     | >            | 289                  | 100                       | 14.0                         | 39.1              | 40.0              | -0.9           | 1      |
| 67.791                | 28.1                       | QP                     | V            | 200                  | 400                       | 7.5                          | 35.6              | 40.0              | -4.4           | /      |
| 94.923                | 24.0                       | QP                     | >            | 154                  | 200                       | 10.9                         | 34.9              | 43.5              | -8.6           | //     |
| 122.038               | 26.0                       | QP                     | >            | 89                   | 95                        | 14.1                         | 40.1              | 43.5              | -3.4           | 1      |
| 149.161               | 27.8                       | QP                     | >            | 69                   | 167                       | 13.3                         | 41.1              | 43.5              | -2.4           | 1      |
| 230.520               | 17.8                       | QP                     | >            | 327                  | 290                       | 13.1                         | 30.9              | 46.0              | -15.1          | 1      |
| 250.000               | 16.4                       | QP                     | V            | 200                  | 100                       | 15.5                         | 31.9              | 46.0              | -14.1          | 1      |
| 284.760               | 21.1                       | QP                     | Τ            | 45                   | 235                       | 16.2                         | 37.3              | 46.0              | -8.7           | 1      |
| 600.000               | 18.4                       | QP                     | V            | 120                  | 243                       | 25.1                         | 43.5              | 46.0              | -2.5           | /      |

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



#### 5.6.6. Characterization on 3meters anechoic chamber from 1GHz to 6GHz

#### 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.

| Test<br>Freq<br>(MHz)             | Meter<br>Reading<br>dB(μV) | Detector<br>(Pk/QP/Av) | Pol<br>(V/H) | Azimutn | Ualaht | Transducer<br>Factor<br>(dB) | Level<br>(dBµV/m) | Limit<br>(dBµV/m) | Margin<br>(dB) | Remark |
|-----------------------------------|----------------------------|------------------------|--------------|---------|--------|------------------------------|-------------------|-------------------|----------------|--------|
| No significant frequency observed |                            |                        |              |         |        |                              |                   |                   |                |        |

Note: Measures have been done at 3m distance.

#### 5.7. CONCLUSION

The sample of the equipment Lane/3000 N CL/ETH, Sn: 191703413031159199991007, tested in the configuration presented in this test report satisfies to requirements of class B limits of the standard FCC Part 15 Subpart B and C, for radiated emissions.



### 6. Fundamental frequency tolerance (15.225e)

#### 6.1. ENVIRONMENTAL CONDITIONS

Date of test : August 13, 2019 Test performed by : Jonathan PAUC

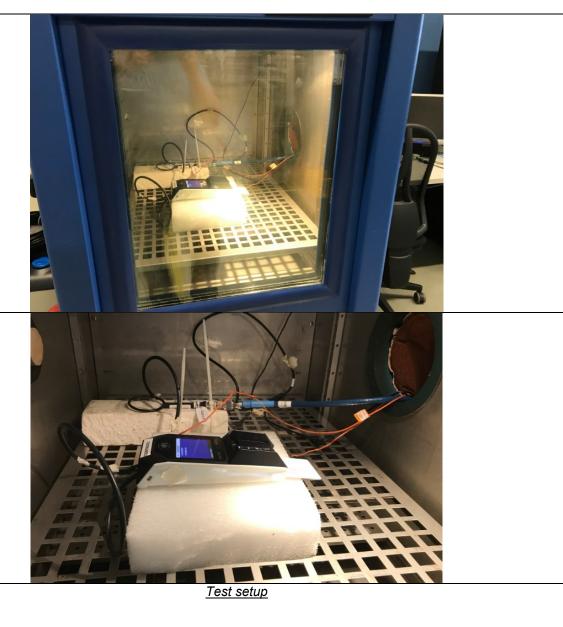
Atmospheric pressure (hPa) : 994 Relative humidity (%) : 34 Ambient temperature (°C) : 21

#### 6.2. TEST SETUP

Frequency of carrier: 13.56 MHz

Upper limit: 13.561356 MHz / Lower limit: 13.558644 MHz

The equipment (RF box) is set in a climatic chamber. Measure is performed on one channel of RF module.





#### 6.3. TEST METHOD

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency when the temperature is varied from  $-20^{\circ}$ C to  $+50^{\circ}$ C at the nominal power voltage and the primary power voltage is varied from 85% to 115% of the rated supply voltage at 20°C.

#### 6.4. TEST EQUIPMENT LIST

|                                  | Test equipment used |         |            |                       |                      |  |  |  |  |  |  |  |
|----------------------------------|---------------------|---------|------------|-----------------------|----------------------|--|--|--|--|--|--|--|
| Description                      | Manufacturer        | Model   | Identifier | Last Calibration date | Calibration due date |  |  |  |  |  |  |  |
| Spectrum Analyzer<br>9kHz - 6GHz | ROHDE & SCHWARZ     | FSL6    | A4060049   | 11/17                 | 11/19                |  |  |  |  |  |  |  |
| Climatic chamber                 | BIA CLIMATIC        | CL 6-25 | D1022117   | 02/19                 | 02/20                |  |  |  |  |  |  |  |
| SMA 1.5m                         | SUCOFLEX            | 18GHz   | A5329864   | 11/18                 | 11/19                |  |  |  |  |  |  |  |
| Antenna Loop (near field)        | ELECTRO-METRICS     | EM-6993 | C2040215   | 06/19                 | 06/21                |  |  |  |  |  |  |  |

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

| ✓ None | □ Divergence: |
|--------|---------------|
|        |               |



#### 6.6. TEST RESULTS

| Temperature              | -30°C      | -20°C      | 20°C       | +50°C      |
|--------------------------|------------|------------|------------|------------|
| Voltage                  | -50        | -20 C      | 20 C       | +50 C      |
| Mains voltage: 120V/60Hz |            |            |            |            |
| Frequency Drift (MHz)    | + 0.000081 | + 0.000088 | 13.560108  | - 0.000055 |
| Carrier level (dBc)      | + 1.02     | + 0.81     | 23.210945  | - 0.22     |
| Mains voltage: 102V/60Hz |            |            |            |            |
| Frequency Drift (MHz)    | + 0.000081 | + 0.000112 | - 0.000030 | - 0.000061 |
| Carrier level (dBc)      | + 1.04     | + 0.81     | - 0.04     | - 0.22     |
| Mains voltage: 138V/60Hz |            |            |            |            |
| Frequency Drift (MHz)    | + 0.000051 | + 0.000106 | - 0.000018 | - 0.000105 |
| Carrier level (dBc)      | + 1.05     | + 0.81     | - 0.04     | - 0.35     |

Frequency drift measured is -105Hz when the temperature is varied from -30°C to +50°C and voltage is varied.

#### 6.7. CONCLUSION

The sample of the equipment Lane/3000 N CL/ETH, Sn: 191703413031159199991007, tested in the configuration presented in this test report satisfies to requirements of the standard FCC Part 15 Subpart C, for fundamental frequency tolerance.



## 7. BAND-EDGE COMPLIANCE §15.209

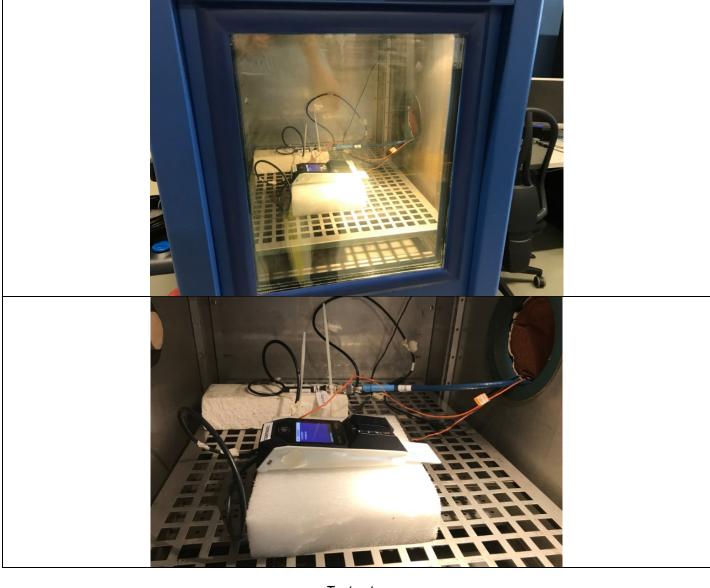
#### 7.1. ENVIRONMENTAL CONDITIONS

Date of test : August 13, 2019 August 14, 2019
Test performed by : Jonathan PAUC Jonathan PAUC

Atmospheric pressure (hPa) : 994 995 Relative humidity (%) : 34 34 Ambient temperature (°C) : 21 22

#### 7.2. TEST SETUP

For measurement, the power level calibration of the spectrum analyzer is related to the field strength measured in chapter radiated emission data.



Test setup



#### 7.3. TEST METHOD

#### Frequency band 13.110-14.010MHz

Following plots show radiated emission level in the frequency band 13.110-14.010MHz with a RBW of 9kHz and a quasi-peak detector. The graphs are obtained with a measuring receiver.

#### Frequency band 13.553-13.567MHz

Following plots show radiated emission level in the frequency band 13.55.-13.567MHz with a RBW of 1kHz. The graphs are obtained with a measuring receiver.

#### 7.4. TEST EQUIPMENT LIST

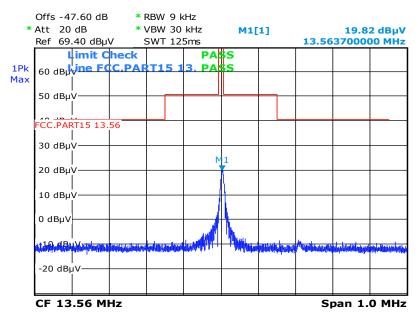
|                                  | Test equipment used |         |            |                       |                      |
|----------------------------------|---------------------|---------|------------|-----------------------|----------------------|
| Description                      | Manufacturer        | Model   | Identifier | Last Calibration date | Calibration due date |
| Spectrum Analyzer<br>9kHz - 6GHz | ROHDE & SCHWARZ     | FSL6    | A4060049   | 11/17                 | 11/19                |
| Climatic chamber                 | BIA CLIMATIC        | CL 6-25 | D1022117   | 02/19                 | 02/20                |
| SMA 1.5m                         | SUCOFLEX            | 18GHz   | A5329864   | 11/18                 | 11/19                |
| Antenna Loop (near field)        | ELECTRO-METRICS     | EM-6993 | C2040215   | 06/19                 | 06/21                |

# 7.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION ☑ None □ Divergence:

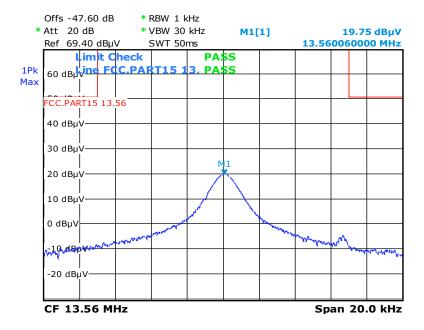


#### 7.6. TEST RESULTS

#### Frequency band 13.110-14.010MHz



#### Frequency band 13.553-13.567MHz



#### 7.7. CONCLUSION

The sample of the equipment Lane/3000 N CL/ETH, Sn: 191703413031159199991007, tested in the configuration presented in this test report satisfies to requirements of the standard FCC Part 15 Subpart C, for band-edge compliance.



#### 8. **OCCUPIED BANDWIDTH**

#### 8.1. **ENVIRONMENTAL CONDITIONS**

Date of test : August 13, 2019 Test performed by : Jonathan PAUC

Atmospheric pressure (hPa): 994 : 34 Relative humidity (%) : 21 Ambient temperature (°C)

#### 8.2. **TEST 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 10.3dB

#### ☑ 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 in the range of 1% to 5% of the anticipated emission bandwidth
- 2. Set the video bandwidth (VBW)  $\geq$  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

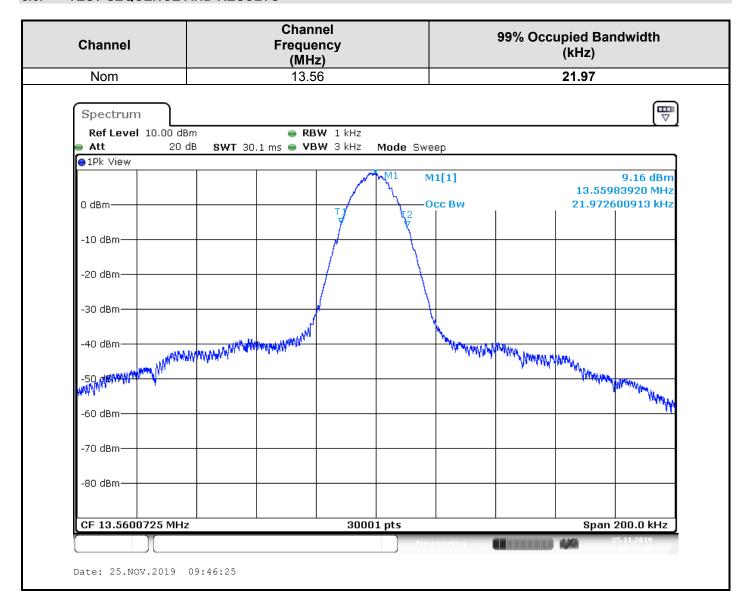
#### TEST EQUIPMENT LIST 8.3.

| Test equipment used            |                 |         |            |                       |                      |
|--------------------------------|-----------------|---------|------------|-----------------------|----------------------|
| Description Manufacturer Model |                 | Model   | Identifier | Last Calibration date | Calibration due date |
| Spectrum Analyzer 9kHz - 6GHz  | ROHDE & SCHWARZ | FSL6    | A4060049   | 11/17                 | 11/19                |
| Climatic chamber               | BIA CLIMATIC    | CL 6-25 | D1022117   | 02/19                 | 02/20                |
| SMA 1.5m                       | SUCOFLEX        | 18GHz   | A5329864   | 11/18                 | 11/19                |
| Antenna Loop (near field)      | ELECTRO-METRICS | EM-6993 | C2040215   | 06/19                 | 06/21                |

| 8.4.   | DIVERGENCE, | , ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION |
|--------|-------------|---|
|        |             |   |
| ✓ None | )           | □ Divergence:                                       |
|        |             |   |
|        |             |   |

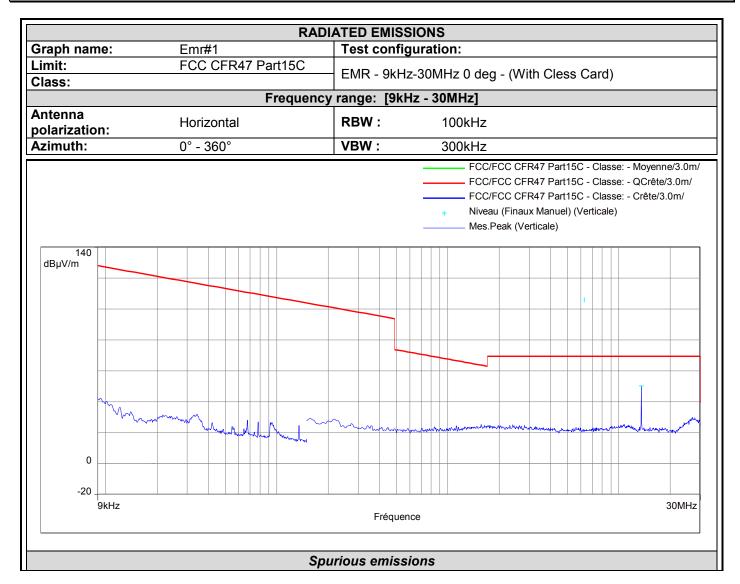


#### 8.5. TEST SEQUENCE AND RESULTS





## 9. ANNEX 1 (GRAPHS)



| Frequency (MHz) | Peak Level (dBµV/m) | Polarization |
|-----------------|---------------------|--------------|
| 13.559          | 50.3                | Vertical     |



|                       | RADIATED E                            | MISSIONS   |
|-----------------------|---------------------------------------|--|
| Graph name:           | Emr#2                                 | Test configuration:  |
| Limit:                | FCC CFR47 Part15C                     | EMR - 9kHz-30MHz 90 deg - (With Cless Card)  |
| Class:                |                                       |  |
|                       | Frequency range:                      |  |
| Antenna polarization: | Horizontal                            | RBW: 100kHz  |
| Azimuth:              | 0° - 360°                             | <b>VBW</b> : 300kHz  |
|                       |                                       | FCC/FCC CFR47 Part15C - Classe: - Moyenne/3.0m/  |
|                       |                                       | FCC/FCC CFR47 Part15C - Classe: - QCrête/3.0m/ FCC/FCC CFR47 Part15C - Classe: - Crête/3.0m/   |
|                       |                                       | + Niveau (Finaux Manuel) (Verticale)   |
|                       |                                       | Mes.Peak (Verticale)   |
|                       |                                       |  |
| 140<br>dBμV/m         |                                       |  |
|                       |                                       |  |
|                       |                                       |  |
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| M. Manha              |                                       |  |
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| 0                     |                                       |  |
|                       |                                       |  |
| -20                   |                                       |  |
| 9kHz                  |                                       | Fréquence 30MHz  |
|                       | Spurious e                            | missions   |

| Frequency (MHz) | Peak Level (dBµV/m) | Polarization |
|-----------------|---------------------|--------------|
| 13.559          | 45.9                | Vertical     |



|  | EMISSIONS  |
|--|--|
| raph name: Emr#3   | Test configuration:  |
| mit: FCC CFR47 Part15C   | EMR - 9kHz-30MHz 180 deg - (With Cless Card)                                     |
| lass:  |  |
| Frequency range  |  |
| ntenna polarization: Horizontal  | RBW: 100kHz  |
| zimuth: 0° - 360°  | VBW: 300kHz  |
|  | FCC/FCC CFR47 Part15C - Classe: - Moyenne/3.0m/                                  |
|  | FCC/FCC CFR47 Part15C - Classe: - QCrête/3.0m/                                   |
|  | FCC/FCC CFR47 Part15C - Classe: - Crête/3.0m/                                    |
|  | <ul><li>Mes.Peak (Verticale)</li><li>Peak (Peak/LimQ-Peak) (Verticale)</li></ul> |
|  | Fear (Fearling-Fear) (Venturale)   |
| 140<br>dΒμV/m  |  |
| ασμν/ΙΙΙ   |  |
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| 0  |  |
| -20  |  |
| 9kHz   | 30MHz  |
|  | Fréquence  |
|  |  |
| Spurious (   | omissions  |

| Frequency (MH | z) Peak (dBµV/m) | LimQP (dBµV/m) | Peak-LimQP<br>(dB) | Polarization | Correction (dB) |
|---------------|------------------|----------------|--------------------|--------------|-----------------|
| 13.559        | 68.7             | 69.5           | -0.8               | Vertical     | 0.0             |



|                  | RADIATED EMISSIONS   |  |  |  |
|------------------|--|--|--|--|
| Graph name       |  |  |  |  |
| Limit:<br>Class: | FCC CFR47 Part15C  EMR - 9kHz-30MHz 0 deg - (Without Cless Card)   |  |  |  |
|                  | Frequency range: [9kHz - 30MHz]  |  |  |  |
| Antenna pola     | arization: Horizontal RBW: 100kHz  |  |  |  |
| Azimuth:         | 0° - 360° <b>VBW</b> : 300kHz  |  |  |  |
|                  | FCC/FCC CFR47 Part15C - Classe: - Moyenne/3.0m/ FCC/FCC CFR47 Part15C - Classe: - QCrête/3.0m/ FCC/FCC CFR47 Part15C - Classe: - Crête/3.0m/ Niveau (Finaux Manuel) (Verticale) Mes.Peak (Verticale) |  |  |  |
| 140<br>dBμV/m    |  |  |  |  |
| 0                |  |  |  |  |
| -20              | 9kHz 30MHz Fréquence   |  |  |  |
|                  | Spurious emissions   |  |  |  |

| Frequency (MHz) | Peak Level (dBµV/m) | Polarization |
|-----------------|---------------------|--------------|
| 13.559          | 53.5                | Vertical     |



|                             |   | RADIA        | ATED EMIS           |  |  |  |                                   |       |  |  |  |
|-----------------------------|---|--------------|---------------------|--|--|--|-----------------------------------|-------|--|--|--|
| Graph name:                 | Emr#5                                   |              |                     | Test configuration:                            |  |  |                                   |       |  |  |  |
| Limit:                      | FCC C                                   | FR47 Part15C |                     | EMR - 9kHz-30MHz 90 deg - (Without Cless Card) |  |  |                                   |       |  |  |  |
| Class:                      |   |              |                     |  |  | • •  |                                   |       |  |  |  |
| A mtamma malawi-            | -tions Horizon                          | Frequency    | range: [9           |  |  |  |                                   |       |  |  |  |
| Antenna polariz<br>Azimuth: |   |              |                     | RBW:   | 100kHz   |  |                                   |       |  |  |  |
| Azimutn:                    | 0° - 36                                 | J ·          |                     | APAA:  | 300kHz   |  |                                   |       |  |  |  |
|                             |   |              |                     | +  | FCC/FCC CFR47 FCC/FCC CFR47 FCC/FCC CFR47 Niveau (Finaux M Mes.Peak (Vertica   | ' Part15C - Clas<br>' Part15C - Clas<br>anuel) (Vertical   | sse: - QCrête/<br>sse: - Crête/3. | 3.0m/ |  |  |  |
| 140<br>dBμV/m               | M. M. M.                                |              |                     |  |  | 1  |                                   |       |  |  |  |
| -20<br>9kHz                 | May | A way        |                     | man and an | Anger and Andrews and Anger and Ange | March of the state | wante may have maken              | 30MHz |  |  |  |
|                             |   | Spu          | Fréqu<br>rious emis |  |  |  |                                   |       |  |  |  |

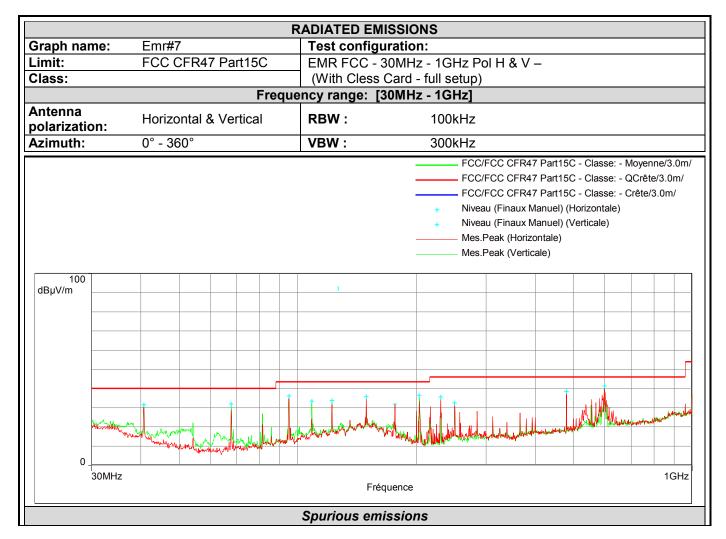
| Frequency (MHz) | Peak Level (dBµV/m) | Polarization |  |  |
|-----------------|---------------------|--------------|--|--|
| 13.559          | 48.9                | Vertical     |  |  |



|  | F              | RADIATED EM   | ISSIONS             |   |   |  |  |  |  |
|--|----------------|---------------|---------------------|---|---|--|--|--|--|
| Graph name:                                  | Emr#6          |               | Test configuration: |   |   |  |  |  |  |
| Limit:                                       | FCC CFR47 Part | t15C          | EMD OF              | √H= 20MH= 190 dog   | - (Without Cless Card                               |  |  |  |  |
| Class:                                       |                |               |                     |   | - (Williout Cless Card                              |  |  |  |  |
|  |                | ency range: [ |                     |   |   |  |  |  |  |
| Antenna polarization: Horizontal RBW: 100kHz |                |               |                     |   |   |  |  |  |  |
| Azimuth:                                     | 0° - 360°      |               | VBW:                | 300kHz  |   |  |  |  |  |
|  |                |               | •                   | <ul> <li>FCC/FCC CFR47 Part15C</li> <li>FCC/FCC CFR47 Part15C</li> <li>FCC/FCC CFR47 Part15C</li> <li>Mes.Peak (Verticale)</li> <li>Peak (Peak/LimQ-Peak) (V</li> </ul> | - Classe: - QCrête/3.0m/<br>- Classe: - Crête/3.0m/ |  |  |  |  |
| 140<br>dBμV/m                                |                |               |                     |   |   |  |  |  |  |
| -20   9kHz                                   |                | Fréc          | quence              |   | 30MHz   |  |  |  |  |
|  |                | Spurious emi  | issions             |   |   |  |  |  |  |

| Frequency (MHz) | Peak (dBµV/m) | LimQP (dBµV/m) | Peak-LimQP<br>(dB) | Polarization | Correction (dB) |  |
|-----------------|---------------|----------------|--------------------|--------------|-----------------|--|
| 13.559          | 71.8          | 69.5           | 2.3                | Vertical     | 0.0             |  |





| Frequency (MHz) | Peak Level (dBµV/m) | Polarization |  |  |
|-----------------|---------------------|--------------|--|--|
| 149.170         | 35.7                | Horizontal   |  |  |
| 176.285         | 31.9                | Horizontal   |  |  |
| 230.520         | 35.6                | Horizontal   |  |  |
| 250.000         | 32.6                | Horizontal   |  |  |
| 480.000         | 38.5                | Horizontal   |  |  |
| 600.000         | 41.4                | Horizontal   |  |  |
| 40.676          | 31.6                | Vertical     |  |  |
| 67.791          | 32.0                | Vertical     |  |  |
| 94.923          | 36.1                | Vertical     |  |  |
| 108.489         | 33.4                | Vertical     |  |  |
| 122.038         | 33.7                | Vertical     |  |  |
| 203.400         | 36.6                | Vertical     |  |  |



|                       | , i              | RADIATED EM   | ISSIONS                |  |   |  |  |  |
|-----------------------|------------------|---|------------------------|--|---|--|--|--|
| Graph name:           | Emr#8            |   | Test configuration:    |  |   |  |  |  |
| .imit:                | FCC CFR47 Par    | t15C  | EMR FCC -              | 30MHz - 1GHz I   | Pol H & V - (V  | Vithout  |  |  |
| Class:                |                  |   | Cless Card -           | · full setup)  |   |  |  |  |
|                       |                  | ency range: [3  |                        |  |   |  |  |  |
| Antenna polarization: | Horizontal & Ver | tical   | <b>RBW</b> : 1         | 00kHz  |   |  |  |  |
| \zimuth:              | 0° - 360°        |   | <b>VBW</b> : 3         | 00kHz  |   |  |  |  |
| 100<br>dBμV/m         |                  |   |                        | FCC/FCC CFR47 Part<br>FCC/FCC CFR47 Part<br>FCC/FCC CFR47 Part<br>Niveau (Finaux Manuel<br>Niveau (Finaux Manuel<br>Mes.Peak (Horizontale) | 15C - Classe: - QC<br>15C - Classe: - Cré<br>I) (Horizontale)<br>I) (Verticale) | Crête/3.0m/  |  |  |
| 0_                    |                  | y and the same of | restorm and the second | Mary and a superior and a superior   |   | harring the same of the same o |  |  |
| 30MHz                 |                  | Fréd  | quence                 |  |   | 1GHz   |  |  |
|                       |                  | Spurious em   | issions                |  |   |  |  |  |

| Frequency (MHz) | Peak Level (dBµV/m) | Polarization |
|-----------------|---------------------|--------------|
| 250.000         | 32.7                | Horizontal   |
| 480.000         | 38.5                | Horizontal   |
| 600.000         | 45.5                | Horizontal   |
| 40.676          | 29.9                | Vertical     |
| 81.357          | 31.5                | Vertical     |
| 108.472         | 34.4                | Vertical     |



|                          | RA                               | DIATED EMISS   | SIONS   |                         |  |
|--------------------------|----------------------------------|--|---|-------------------------|--|
| Graph name:              | Emr#9                            | Test config  | guration:   |                         |  |
| imit:<br>Class:          | FCC CFR47 Part15C                | C3 - FSV(I   |   | Axis XY – Cont          | act less card                                    |
|                          | Frequer                          | ncy range: [1G   | Hz - 6GHz]  |                         |  |
| Antenna<br>polarization: | Horizontal & Vertical            | RBW:   | 1MHz  |                         |  |
| Azimuth:                 | 0° - 360°                        | VBW:   | 3MHz  |                         |  |
|                          |                                  |  |   |                         | •  |
| 100<br>dBµV/m            |                                  |  |   |                         |  |
| аврулп                   |                                  |  |   |                         |  |
|                          |                                  |  |   |                         |  |
|                          |                                  |  |   |                         |  |
|                          |                                  |  |   |                         |  |
|                          |                                  |  |   |                         |  |
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|                          |                                  | Particular and the second  |   |                         |  |
|                          |                                  |  |   |                         |  |
|                          |                                  |  |   |                         |  |
| 0                        |                                  |  |   |                         |  |
| 1GHz                     |                                  | Fréquence  |   |                         | 6GHz   |
| 0                        |                                  | Eréquence.   |   |                         |  |



|                          | RAD                   | IATED EMISS                               | SIONS  |                              |                                 |  |  |  |  |  |  |
|--------------------------|-----------------------|---|--|------------------------------|---------------------------------|--|--|--|--|--|--|
| Graph name:              | Emr#10                | Test confi                                | Test configuration:  |                              |                                 |  |  |  |  |  |  |
| Limit:                   | FCC CFR47 Part15C     |   |  | Avia VV Witho                | ut Class Card                   |  |  |  |  |  |  |
| Class:                   |                       | C3-F3V(                                   | п+۷)[1-0]Сп2 -   | Axis XY - Witho              | ut Cless Card                   |  |  |  |  |  |  |
|                          | Frequenc              | y range: [1G                              | Hz - 6GHz]   |                              |                                 |  |  |  |  |  |  |
| Antenna<br>polarization: | Horizontal & Vertical | RBW:                                      | 1MHz   |                              |                                 |  |  |  |  |  |  |
| Azimuth:                 | 0° - 360°             | VBW:                                      | 3MHz   |                              |                                 |  |  |  |  |  |  |
|                          |                       |   |  |                              |                                 |  |  |  |  |  |  |
| 100<br>dBµV/m            |                       |   |  |                              |                                 |  |  |  |  |  |  |
|                          |                       |   |  |                              |                                 |  |  |  |  |  |  |
|                          |                       |   |  |                              |                                 |  |  |  |  |  |  |
|                          |                       |   |  |                              |                                 |  |  |  |  |  |  |
|                          |                       |   |  |                              |                                 |  |  |  |  |  |  |
|                          |                       |   |  |                              |                                 |  |  |  |  |  |  |
|                          |                       |   | January Market Bridge Control of the | had a substant of the second | the second second second second |  |  |  |  |  |  |
|                          |                       | Statistical and the state of the state of |  |                              |                                 |  |  |  |  |  |  |
|                          |                       |   |  |                              |                                 |  |  |  |  |  |  |
|                          |                       |   |  |                              |                                 |  |  |  |  |  |  |
|                          |                       |   |  |                              |                                 |  |  |  |  |  |  |
| 0  <br>1GHz              |                       | Fréquence                                 |  |                              | 6GH                             |  |  |  |  |  |  |
|                          | 0                     | urious emiss                              | ione   |                              |                                 |  |  |  |  |  |  |



|             |        |        |            |               |     |      |      | C  | 100       | NDU        | CTE         | ) E       | MISSI  | ONS                                   |  |      |    |          |                            |  |  |  |                 |
|-------------|--------|--------|------------|---------------|-----|------|------|----|-----------|------------|-------------|-----------|--|---------------------------------------|--|------|----|----------|----------------------------|--|--|--|-----------------|
| Graph r     | name:  |        |            | Eı            | mc# | :1   |      |    |           |            |             |           |  | con                                   | figura   | atio | n: |          |                            |  |  |  |                 |
| Limit:      |        |        |            | E             | N 5 | 5032 | 2    |    |           |            |             |           |  | / - Ph                                |  |      |    |          |                            |  |  |  |                 |
| Class:      | В      |        |            |               |     |      |      |    | 120       | / - Pi     | iase        |           |  |                                       |  |      |    |          |                            |  |  |  |                 |
|             |        |        |            |               |     |      |      |    |           | y ra       | nge:        | [1        | 50kHz  | - 301                                 | MHz]   |      |    |          |                            |  |  |  |                 |
| Voltage     | / Fred | quency | <b>'</b> : | 11            | 10V | AC / | 60 / | Hz |           |            |             |           | RBV  |                                       | 10kl   |      |    |          |                            |  |  |  |                 |
| Line:       |        | Phase  |            |               |     |      |      |    |           | VBV        | <b>V</b> :  | 30kl      | Hz   |                                       |  |      |    |          |                            |  |  |  |                 |
|             |        |        |            |               |     |      |      |    |           |            |             |           |  |                                       |  |      |    | •<br>•   | Mes<br>Mes<br>Mes<br>— Mes | .Peak (S<br>.QPeak   | SR 550xx<br>(SR 550x<br>R 550xx)<br>Phase 1) | sse:B - Q<br>) (Phase 1<br>xx) (Phase<br>(Phase 1) | )<br>: 1)       |
| 100<br>dBµV | ~~~    |        |            | ~~~~~<br>~~~~ |     | Mu   | nu ~ |    | ) January | myrodrodge | hermoniana. | May 2 (1) | and the state of t | A A A A A A A A A A A A A A A A A A A | of the second se |      | 1  | Markethe |                            | The same of the sa | Marsharelland                                | and take   | -publishingsive |
| 0           | 50kHz  |        |            |               |     |      |      |    |           |            | ı           | Fréqu     | ence   |                                       |  |      |    |          |                            |  |  |  | 30MHz           |
|             |        |        |            |               |     |      |      |    | S         | Spuri      | ious        | em        | ission   | s                                     |  |      |    |          |                            |  |  |  |                 |

| Frequenc<br>y (MHz) | Mes.Peak<br>(dΒμV) | Mes.QPe<br>ak<br>(dBµV) | LimQP<br>(dBµV) | Mes.QPe<br>ak-<br>LimQP<br>(dB) | Mes.Avg<br>(dΒμV) | LimAvg<br>(dBµV) | Mes.Avg-<br>LimAvg<br>(dB) | Line    | Correctio<br>n (dB) |
|---------------------|--------------------|-------------------------|-----------------|---------------------------------|-------------------|------------------|----------------------------|---------|---------------------|
| 0.318               | 48.2               | 46.4                    | 59.8            | -13.4                           | 43.9              | 49.8             | -5.9                       | Phase 1 | 19.5                |
| 13.556              | 57.0               | 49.2                    | 60.0            | -10.8                           | 37.8              | 50.0             | -12.2                      | Phase 1 | 20.5                |



|                          | CONDUCT                                | ED EMISSIONS   |
|--------------------------|--|--|
| Graph name:              | Emc#2                                  | Test configuration:  |
| Limit:                   | EN 55032                               | 100V Novirol   |
| Class:                   | В                                      | 120V - Neutral   |
|                          | Frequency range                        | e: [150kHz - 30MHz]  |
| Voltage / Frequency:     | 110VAC / 60Hz                          | RBW: 10kHz   |
| Line:                    | Phase                                  | VBW: 30kHz   |
| 100<br>dB <sub>U</sub> V |  | Mes.Peak (SR 550xx) (Neutre)     Mes.QPeak (SR 550xx) (Neutre)     Mes.Avg (SR 550xx) (Neutre)     Mes.Peak (Neutre)     Mes.Avg (Neutre)  |
|                          | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | Valleton of the form of the form of the form of the form of the collection of the collection of the collection of the form of the collection of the collecti |

| Frequenc<br>y (MHz) | Mes.Peak<br>(dΒμV) | Mes.QPe<br>ak<br>(dBµV) | LimQP<br>(dBµV) | Mes.QPe<br>ak-<br>LimQP<br>(dB) | Mes.Avg<br>(dΒμV) | LimAvg<br>(dBµV) | Mes.Avg-<br>LimAvg<br>(dB) | Line    | Correctio<br>n (dB) |
|---------------------|--------------------|-------------------------|-----------------|---------------------------------|-------------------|------------------|----------------------------|---------|---------------------|
| 0.326               | 46.0               | 42.8                    | 59.6            | -16.7                           | 34.9              | 49.6             | -14.6                      | Neutral | 19.5                |
| 13.560              | 58.0               | 50.3                    | 60.0            | -9.7                            | 35.4              | 50.0             | -14.6                      | Neutral | 20.5                |

Fréquence

30MHz



|                      | CONDUCT  | ED EMISSIONS  |
|----------------------|--|---|
| Graph name:          | Emc#3  | Test configuration:   |
| _imit:               | EN 55032   |   |
| Class:               | В  | 120V - Phase (dummy load)   |
|                      | Frequency rang   | e: [150kHz - 30MHz]   |
| /oltage / Frequency: | 110VAC / 60Hz  | RBW: 10kHz  |
| _ine:                | Phase  | VBW: 30kHz  |
|                      |  | Civile/EN 55032 - Classe:B - Moyenr Civile/EN 55032 - Classe:B - QCrête Mes.Peak (SR 550xx) (Phase 1) Mes.QPeak (SR 550xx) (Phase 1) Mes.Avg (SR 550xx) (Phase 1) Mes.Peak (Phase 1) Mes.Peak (Phase 1) |
| 100<br>dBµV          | Manufaction of the state of the |   |
|                      |  |   |

| Frequenc<br>y (MHz) | Mes.Peak<br>(dBμV) | Mes.QPe<br>ak<br>(dBµV) | LimQP<br>(dBµV) | Mes.QPe<br>ak-<br>LimQP<br>(dB) | Mes.Avg<br>(dΒμV) | LimAvg<br>(dBµV) | Mes.Avg-<br>LimAvg<br>(dB) | Line    | Correctio<br>n (dB) |
|---------------------|--------------------|-------------------------|-----------------|---------------------------------|-------------------|------------------|----------------------------|---------|---------------------|
| 0.322               | 47.4               | 45.2                    | 59.7            | -14.4                           | 41.4              | 49.7             | -8.2                       | Phase 1 | 19.5                |

Fréquence



|                      | CONDUCTE         | EMISSIONS  |  |
|----------------------|------------------|--|--|
| Graph name:          | Emc#4            | Test configuration:  |  |
| Limit:               | EN 55032         |  |  |
| Class:               | В                | 120V - Neutral (dummy  | load)  |
|                      | Frequency range: | [150kHz - 30MHz]   |  |
| Voltage / Frequency: | 110VAC / 60Hz    | <b>RBW</b> : 10kHz   |  |
| Line:                | Phase            | VBW: 30kHz   |  |
| 100                  |                  |  | Mes.Peak (SR 550xx) (Neutre) Mes.QPeak (SR 550xx) (Neutre) Mes.Avg (SR 550xx) (Neutre) Mes.Peak (Neutre) Mes.Avg (Neutre)  |
| dΒμV                 |                  | AN HATTER AND THE REAL PROPERTY OF THE PROPERT | May got of the state of the sta |
| 0150kHz              |                  | réquence   | 30МН   |

| Frequenc<br>y (MHz) | Mes.Peak<br>(dΒμV) | Mes.QPe<br>ak<br>(dBµV) | LimQP<br>(dBµV) | Mes.QPe<br>ak-<br>LimQP<br>(dB) | Mes.Avg<br>(dΒμV) | LimAvg<br>(dBµV) | Mes.Avg-<br>LimAvg<br>(dB) | Line    | Correctio<br>n (dB) |
|---------------------|--------------------|-------------------------|-----------------|---------------------------------|-------------------|------------------|----------------------------|---------|---------------------|
| 0.322               | 48.8               | 47.0                    | 59.7            | -12.7                           | 42.5              | 49.7             | -7.2                       | Neutral | 19.5                |



|                     |          | CONDUCTE  | <b>EMISSIONS</b>   |             |   |                 |
|---------------------|----------|---|--|-------------|---|-----------------|
| Graph name:         | Emc#1    |   | Test con   | figuration: |   |                 |
| Limit:              | EN 55032 |   |  |             |   |                 |
| Class:              | В        |   | 240V - P   | nase        |   |                 |
|                     | Fi       | requency range:   | [150kHz - 30   | MHz]        |   |                 |
| Voltage / Frequency |          |   | RBW:   | 10kHz       |   |                 |
| Line:               | Phase    |   | VBW:   | 30kHz       |   |                 |
|                     |          |   |  | =           | Civile/EN 55032 - Classe:B  Mes.Peak (SR 550xx) (Phase  Mes.QPeak (SR 550xx) (Phase  Mes.Avg (SR 550xx) (Phase  Mes.Peak (Phase 1)  Mes.Avg (Phase 1) | se 1)<br>ase 1) |
| 100<br>dBµV         |          | M/W///resource of the state of | Mangadori (Manada Manada Manad |             | The Charles   | Web on white    |
| 0150kHz             |          |   | Fréquence  |             |   | 30MH            |

| Frequenc<br>y (MHz) | Mes.Peak<br>(dBµV) | Mes.QPe<br>ak<br>(dBµV) | LimQP<br>(dBµV) | Mes.QPe<br>ak-<br>LimQP<br>(dB) | Mes.Avg<br>(dΒμV) | LimAvg<br>(dBµV) | Mes.Av<br>g-<br>LimAvg<br>(dB) | Line    | Correctio<br>n (dB) |
|---------------------|--------------------|-------------------------|-----------------|---------------------------------|-------------------|------------------|--------------------------------|---------|---------------------|
| 0.318               | 48.2               | 46                      | 59.8            | -13.8                           | 44.2              | 49.8             | -5.6                           | Phase 1 | 19.5                |
| 13.556              | 57.0               | 48.8                    | 60.0            | -11.2                           | 38.1              | 50.0             | -11.9                          | Phase 1 | 20.5                |



|                |        |      |      |                  |     | C  | 100 | NDU                    | CTEC                                   | EI                  | MISSI              | ONS         |  |      |                |             |                             |                            |  |  |         |
|----------------|--------|------|------|------------------|-----|----|-----|------------------------|--|---------------------|--------------------|-------------|--|------|----------------|-------------|-----------------------------|----------------------------|--|--|---------|
| Graph name:    |        | En   | nc#2 | 2                |     |    |     |                        |  |                     |                    | conf        | igura  | atio | n:             |             |                             |                            |  |  |         |
| Limit:         |        | ΕN   | V 55 | 032              | 2   |    |     |                        |  |                     |                    |             |  |      |                |             |                             |                            |  |  |         |
| Class:         |        | В    |      |                  |     |    |     |                        |  |                     | 240\               | / - Ne      | utrai  |      |                |             |                             |                            |  |  |         |
|                |        |      |      | F                | Fre | qu | end | cy ra                  | nge:                                   | [1:                 | 50kHz              | - 30N       | /Hz]   |      |                |             |                             |                            |  |  |         |
| Voltage / Freq | uency: | 24   | OVA  |                  |     |    |     |                        |  | _                   | RBV                |             | 10k  | Hz   |                |             |                             |                            |  |  |         |
| Line:          |        | Ph   | nase | !                |     |    |     |                        |  |                     | VBW                | <i>l</i> :  | 30k  | Hz   |                |             |                             |                            |  |  |         |
|                |        |      |      |                  |     |    |     |                        |  |                     |                    |             |  |      |                | _           | <ul><li></li><li></li></ul> | Mes.Pe<br>Mes.QF<br>Mes.Av | ak (SR 55<br>leak (SR 55<br>g (SR 550<br>ak (Neutre)   | 50xx) (N<br>550xx) (<br>0xx) (Ne<br>e) | Neutre) |
| dΒμV           |        | www. |      | W <sub>1</sub> , |     |    |     | V <sub>M-0</sub> /~~40 | \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\ | deprotein direction | rollaborar (tondo) | An November | Marina de la compansa |      | Nagara da maga | thready for | <b>"</b>                    | marable areas              | A managed and a second a second and a second |  |         |
| 0150kHz        |        |      |      |                  |     |    |     |                        | F                                      | réque               | ence               |             |  |      |                |             |                             |                            |  |  | 30MF    |

| Frequer |      | Mes.QPe<br>ak<br>(dBµV) | LimQP<br>(dBµV) | Mes.QPe<br>ak-<br>LimQP<br>(dB) | Mes.Avg<br>(dΒμV) | LimAvg<br>(dBµV) | Mes.Avg-<br>LimAvg<br>(dB) | Line    | Correctio<br>n (dB) |
|---------|------|-------------------------|-----------------|---------------------------------|-------------------|------------------|----------------------------|---------|---------------------|
| 0.326   | 46.0 | 43.4                    | 59.6            | -16.2                           | 35.3              | 49.6             | -14.3                      | Neutral | 19.5                |
| 13.560  | 58.0 | 50                      | 60.0            | -10                             | 35.1              | 50.0             | -14.9                      | Neutral | 20.5                |



|                    |          |    |  |                |      | (  | CON     | IDUC        | CTED                    | EMIS         | SSIC                 | NS               |             |             |     |       |  |   |   |  |
|--------------------|----------|----|--|----------------|------|----|---------|-------------|-------------------------|--------------|----------------------|------------------|-------------|-------------|-----|-------|--|---|---|--|
| Graph nan          | ie:      |    | Emc#                                   | <del>‡</del> 3 |      |    |         |             |                         |              |                      | conf             | igura       | tio         | n:  |       |  |   |   |  |
| <u>.</u><br>Limit: |          |    | EN 5                                   |                | 2    |    |         |             |                         |              |                      |                  |             |             |     |       |  |   |   |  |
| Class:             |          |    | В                                      |                |      |    |         |             |                         | - 2          | 40V                  | - Ph             | ase (       | dun         | nmy | / loa | ad)  |   |   |  |
|                    |          |    |  |                | Fre  | qu | enc     | y rai       | nge:                    | [150k        | ίΗz                  | - 30N            | 1Hz]        |             |     |       |  |   |   |  |
| Voltage / F        | requency | ': | 240V                                   |                |      |    |         | •           |                         |              | RBW                  |                  | 10kl        | Ηz          |     |       |  |   |   |  |
| Line:              |          |    | Phas                                   | е              |      |    |         |             |                         | V            | 'BW                  | :                | 30kł        | Ηz          |     |       |  |   |   |  |
|                    |          |    |  |                |      |    |         |             |                         |              |                      |                  |             |             |     | -     | <ul><li> </li><li> </li></ul>  | Civile/EN 550: Civile/EN 550: Mes.Peak (SF Mes.QPeak (S Mes.Avg (SR Mes.Peak (Ph Mes.Avg (Pha | 32 - Class<br>3550xx) (<br>3R 550xx)<br>550xx) (P<br>ase 1) | se:B - QCrête<br>Phase 1)<br>(Phase 1) |
| 100<br>dBµV        |          |    | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | Lun            | www. |    | ~,,~~~, | Marsaylille | Karthelena<br>Marahalla | merysolenter | tractorional popular | erresidas lastra | arenada, an | hade the co |     | V-140 | the state of the s | a Madragraman   | in the deficiency   |  |
| 0150kH.            |          |    |  |                |      |    |         |             | -                       | réquence     |                      |                  |             |             |     |       |  |   |   | 30MF                                   |

| Frequenc<br>y (MHz) | Mes.Peak<br>(dBµV) | Mes.QPe<br>ak<br>(dBµV) | LimQP<br>(dBµV) | Mes.QPe<br>ak-<br>LimQP<br>(dB) | Mes.Avg<br>(dΒμV) | LimAvg<br>(dBµV) | Mes.Avg-<br>LimAvg<br>(dB) | Line    | Correctio<br>n (dB) |
|---------------------|--------------------|-------------------------|-----------------|---------------------------------|-------------------|------------------|----------------------------|---------|---------------------|
| 0.322               | 47.4               | 45.0                    | 59.7            | -14.7                           | 41.2              | 49.7             | -8.5                       | Phase 1 | 19.5                |



|             |        |       |            |    |     |  |     |     | C   | ONDUC                                  | CTED              | <b>EMISSI</b>          | ONS          |                    |                       |      |        |   |   |  |                   |
|-------------|--------|-------|------------|----|-----|--|-----|-----|-----|--|-------------------|------------------------|--------------|--------------------|-----------------------|------|--------|---|---|--|-------------------|
| Graph n     | ame:   |       |            | Eı | mc# | <del>‡</del> 4                         |     |     |     |  |                   |                        | conf         | igura              | tio                   | n:   |        |   |   |  |                   |
| Limit:      |        |       |            | E  | N 5 | 503                                    | 2   |     |     |  |                   |                        |              |                    |                       |      |        | 1\  |   |  |                   |
| Class:      |        |       |            | В  |     |  |     |     |     |  |                   | 240\                   | / - Ne       | utral              | (dui                  | mm   | y Ic   | oad)  |   |  |                   |
|             |        |       |            |    |     |  | Fre | equ | ue  | ncy rai                                | nge:              | [150kHz                | - 30N        | /Hz]               |                       |      |        |   |   |  |                   |
| Voltage     | / Frec | uency | <b>'</b> : | 24 | 40V |  |     |     |     |  |                   | RBV                    |              | 10kl               | Ηz                    |      |        |   |   |  |                   |
| Line:       |        |       |            | Pl | has | e                                      |     |     |     |  |                   | VBV                    | <b>/</b> :   | 30kl               | Ηz                    |      |        |   |   |  |                   |
|             |        |       |            |    |     |  |     |     |     |  |                   |                        |              |                    |                       |      |        | <ul><li> </li><li> </li></ul>   | Mes.Pea<br>Mes.QP<br>Mes.Avg<br>— Mes.Pea | ak (SR 550x  | 0xx) (Neutre)     |
| 100<br>dBµV | ~~~    |       |            | M  |     | •••••••••••••••••••••••••••••••••••••• | Man |     | May | /************************************* | volvaja Propagaja | White and the first of | and plant of | de l'anna anno che | when we have a second | hony | hymlan | April 1 and | A Marille Carpe Angle Land                | and the state of t | Transaction Abril |
| 0 150       | OkHz   |       |            |    |     |  |     |     |     |  | Er/               | équence                |              |                    |                       |      |        |   |   |  | 30MHz             |

| Frequenc<br>y (MHz) | Mes.Peak<br>(dΒμV) | Mes.QPe<br>ak<br>(dBµV) | LimQP<br>(dBµV) | Mes.QPe<br>ak-<br>LimQP<br>(dB) | Mes.Avg<br>(dΒμV) | LimAvg<br>(dBµV) | Mes.Avg-<br>LimAvg<br>(dB) | Line    | Correctio<br>n (dB) |
|---------------------|--------------------|-------------------------|-----------------|---------------------------------|-------------------|------------------|----------------------------|---------|---------------------|
| 0.322               | 48.8               | 47.3                    | 59.7            | -12.4                           | 42.8              | 49.7             | -6.9                       | Neutral | 19.5                |



#### 10. UNCERTAINTIES CHART

| Type de mesure / Kind of measurement  | Incertitude élargie<br>laboratoire /<br>Wide uncertainty<br>laboratory<br>(k=2) ± x | Incertitude<br>limite du CISPR<br>/ CISPR<br>uncertainty limit<br>± y |
|---|---|---|
| Mesure des perturbations conduites en tension sur le réseau d'énergie<br>Measurement of conducted disturbances in voltage on the power port                         | 3.51 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. | 3.26 dB   | A l'étude /<br>Under consid.  |
| Mesure des perturbations discontinues conduites en tension Measurement of discontinuous conducted disturbances in voltage   | 3.45 dB   | 3.6 dB  |
| Mesure des perturbations conduites en courant Measurement of conducted disturbances in current  | 3.09 dB   | A l'étude /<br>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              | 5.20 dB   | 6.3 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.